

Facilities Services Directorate
Washington Headquarters Services
Department of Defense



WASHINGTON HEADQUARTERS SERVICES BUILDING CODE

Prepared by:

Facility Services Directorate
Standards & Compliance Division

Revision 5.0 – January 1, 2017
Replaces Revision 4.0 – January 1, 2016

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WASHINGTON HEADQUARTERS SERVICES BUILDING CODE (WHSBC)

REVISION SUMMARY SHEET

Subject: WHSBC, Washington Headquarters Services Building Code, Revision 5.0, dated January 1, 2017.

Superseding: WHSBC, Revision 4.0, dated January 1, 2016.

Description of Change: Revision 5.0 incorporates proposed revisions to the WHSBC based on proposals and comments received during the January 2016-July 2016 code review cycle. This revision also incorporates revisions required by the release of UFC 3-600-01, dated 8 August 2016.

Reasons for Change: This change is in response to user input requesting clarification, tightening and further definition of code requirements.

Impact: Changes included herein include the following:

1. Editorial changes and corrections,
2. Content changes based on proposals received during 2016 code review cycle, which were documented in the Report on Proposals.
3. Editorial changes and corrections due to substantial revisions to UFC 3-600-01 (8 August 2016), which were documented in a Tentative Interim Amendment report.

History: The WHSBC supplements UFC 1-200-01, *General Building Requirements*, Dated 1 July 2013.

The WHSBC was developed to reflect the mission, infrastructure, and capabilities of WHS owned and operated properties in the National Capitol Region. As such, the WHSBC:

1. Incorporates all applicable sections of UFC 1-200-01, including references to other UFC codes, the International Codes, and National Fire Protection Association (NFPA) Codes,
2. Removes Military Department, Defense Agency, and DoD Field Activity specific requirements, incorporating singular WHS requirements,
3. Amends requirements to reflect WHS mission capabilities, and
4. Supplements UFC 1-200-01 with additional sections to provide further guidance regarding procedures and requirements within WHS.

The existing UFC guidance was inadequate for the following reasons:

- UFC 1-200-01, predecessor to this WHSBC, is intended to be applicable to the Military Departments, the Defense Agencies, and the DoD Field Activities for use in permanent, semi-permanent and temporary construction supporting their mission both nationally and abroad.
- Washington Headquarters Services (WHS) is a DoD Field Activity that serves multiple Military Departments, Defense Agencies, and DoD Field Activities within its facilities. WHS uniformly applies military criteria in the construction of its facilities.
- The WHSBC was developed to better reflect the mission, infrastructure and capabilities of WHS.

The following direct benefits will result from adoption of the WHSBC:

- Creation of a single source reference for modifications to a building code that provides guidance for the design and installation of WHS facilities.
 - Reduces interpretation and ambiguity that could lead to design and construction conflicts.
 - Continues DoD/WHS reliance upon NFPA Fire Code and Life Safety Code, and where they are to be specifically used and applied.
- WHS stakeholders will have a greater ability to modify requirements and administrative procedures associated with implementation of the building code.

Revision 1.5, dated June 1, 2013 incorporated proposed revisions to the WHSBC based on proposals and comments received during the July 2012 – December 2012 code review cycle.

Revision 1.6, dated June 20, 2013 updated the WHSBC to reflect modifications required by the release of UFC 3-600-01, 26 September 2006 edition Change 3 dated 1 March 2013. This revision clarified many of the requirements pertaining to previous UFC 3-600-01 editions. Revisions included sprinkler design criteria, SCIF criteria, and telecommunication facility criteria among others.

Revision 2.0, dated January 1, 2014 incorporated revisions to the WHSBC based on proposals and comments received during the January 2013- July 2013 code review cycle.

Revision 3.0, dated January 1, 2015, incorporated revisions to the WHSBC based on proposals and comments received during the January 2014-July 2014 code review cycle.

Revision 4.0, dated January 1, 2016, incorporated revisions to the WHSBC based on proposals and comments received during the January 2015-July 2015 code review cycle.

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Marginal Markings

Solid vertical lines in the margins within the body of the code indicate a technical change from the previous version of the code. Deletion indicators in the form of a bullet (●) are provided in the margins where an entire section, paragraph, exception or table has been deleted.

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100.0 ADMINISTRATION

101.0 GENERAL

101.1 Title.

These regulations shall be known as the Washington Headquarters Services Building Code (WHSBC), hereinafter referred to as "this code."

101.2 Scope.

The provisions of this code shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures on all Washington Headquarters Services (WHS) owned properties (excluding Site R) and the Fort Belvoir Mark Center Complex (FBMCC). This code is applicable to all methods of project delivery, including both design-bid-build and design-build.

Exception: Unless listed below, Sections 102.0 through 117.0 of this document do not apply to the FBMCC. In the code where Office of the Pentagon Fire Marshal (OPFM), Pentagon Building Management Office (PBMO) or Pentagon Force Protection Agency (PFPA) is called out as the Authority Having Jurisdiction (AHJ) for the specific regulation and said AHJ is not the active authority for such regulations at the site, then the equivalent AHJ for that site shall make the determination. The following code sections apply to the FBMCC: Sections 105.1 parts 1, 3, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15 and 16.

101.2.1 Appendices and Attachments.

101.2.1.1 Attachments - Attachments are considered part of the code and are fully enforceable as such.

101.2.1.2 Appendices - Provisions in the appendices shall not apply unless specifically adopted herein.

101.3 Intent.

The purpose of this code is to establish the minimum requirements to safeguard the public health, safety, physical security and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate lighting and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations. No construction, alteration, or repair shall reduce the level of fire protection or life safety provided by existing conditions unless approved by the AHJ.

101.4 Approach.

Department of Defense Directive 4270.5 prescribes that the Unified Facilities Criteria (UFC) and the Unified Facilities Guide Specifications (UFGS) (see Appendix D) be used to the greatest extent possible by all Department of Defense (DoD) Components for planning, design, and construction (i.e. restoration and modernization) of facilities, regardless of funding source. The WHSBC incorporates UFC 1-200-01 for all buildings/structures/appurtenances falling within the scope of this document. To remain in compliance with DODD 4270.5, the WHSBC:

1. Incorporates all applicable sections of UFC 1-200-01, including references to other UFC codes, the International Codes, and National Fire Protection Association (NFPA) Codes,
2. Removes Military Department, Defense Agency, and DoD Field Activity specific requirements, incorporating singular WHS requirements,
3. Amends requirements to reflect WHS mission capabilities, and
4. Supplements UFC 1-200-01 with additional sections to provide further guidance regarding procedures and requirements within WHS.

Washington Headquarters Services is a Department of Defense Field Activity, created on October 1, 1977 to supply services common to more than one DoD component or military department. WHS is an essential capabilities provider that enables the Secretary of Defense, Senior DoD Leadership, and their staffs to fulfill the mission of the Department. WHS provides consolidated administrative and operational support to several Defense Agencies, DoD Field Activities, the headquarters and various elements of the military departments, the President, and to some degree, Congress. As the Pentagon is the headquarters for the Department of Defense, additional clarification is provided for provisions in the UFC that are geared toward the individual armed services. “Code plus” enhancements are documented in each section of this code to identify areas where a greater degree of protection is warranted based on the mission and inherent risks present within WHS facilities. National Fire Protection Association codes and standards form the basis of all fire and life safety requirements.

101.5 Building Code.

Except as indicated below, use the 2012 International Building Code (IBC) as modified by Sections 200 and Sections 300 of this code, as the building code for WHS.

101.6 Substitutions.

101.6.1 All references in the International Building Code to the International Fire Code shall be considered to be references to NFPA 1.

101.6.2 All references in the International Building Code to the International Fuel Gas Code (IFGC) shall also be considered references to NFPA 54 and NFPA 58. Where International Fuel Gas Code requirements are more stringent than the NFPA 54 and NFPA 58, those IFGC requirements shall apply unless otherwise noted herein.

101.6.3 Unless specifically addressed within this code, where conflicts arise between codes referenced herein, the more stringent requirement applies. For conflicts where neither option is more stringent, consult the Building Code Official (BCO) for direction.

101.7 Acronyms and Definitions.

101.7.1 AHA – Activity Hazard Analysis

101.7.2 AHJ – Authority Having Jurisdiction (see definition below)

101.7.3 Alteration See definition for modification.

101.7.4 Approving Authority – The individual responsible for reviewing permit applications and issuing final authority to begin work under such permit.

101.7.5 Authority Having Jurisdiction (AHJ) – The individual responsible for approving equipment, materials, an installation, or a procedure. The WHS AHJ is the Director, Facilities Services Directorate.

101.7.6 BAS – Building Automation System

101.7.7 BCO – Building Code Official (see definition below)

101.7.8 *Building Code Official (BCO) – A division, office, or individual designated by the AHJ to serve as a representative for the AHJ. The BCO’s powers and responsibilities are defined and limited herein.

101.7.9 CFR – Code of Federal Registrar

Washington Headquarters Services Building Code

- 101.7.10 *Change of Use - A change in the purpose or level of activity within a structure or space that involves a change in application of the requirements of the WHSBC.
- 101.7.11 CM – Construction Manager (see definition below)
- 101.7.12 CMD – Construction Management Division, a division within FSD
- 101.7.13 Code Departure – A deviation from code granted for a “zero risk” condition.
- 101.7.14 Code Waiver – An exception to code granted for extenuating circumstances of impact to historic preservation, excessively high cost, and/or major constructability difficulties.
- 101.7.15 Construction Manager (CM) – An individual assigned, as required, to assist the Project Manager in managing the physical construction aspects of a project. The CM has authority as delegated by the PM.
- 101.7.16 Construction, Permanent – Buildings and facilities designed and constructed to serve a life expectancy of more than 25 years.
- 101.7.17 *Construction, New - The building of something, primarily a structure, but also the infrastructure built in support of that structure that was not previously in existence.
- 101.7.18 Construction, Semi-Permanent – Buildings and facilities designed and constructed to serve a life expectancy of more than five years but less than 25. This construction level is typically only used to support military operations. Expediency of construction and material availability may be a factor. Facility is intended for a more enduring presence with operational characteristics and functional performance similar to permanent construction. Maintainability of finishes and systems shall be commensurate with the facility life expectancy and available maintenance capabilities. A moderate level of energy and water efficiency shall be considered.
- 101.7.19 Construction, Temporary – Buildings and facilities designed and constructed to serve a life expectancy of five years or less using low-cost construction. Temporary construction typically cannot be economically converted to a higher construction level. Temporary facilities have limited flexibility for conversion and re-use.
- 101.7.20 COR – Contracting Officer’s Representative
- 101.7.21 DoD – Department of Defense
- 101.7.22 DTIC – Defense Technical Information Center
- 101.7.23 Electrical Rooms - Rooms that house dry type transformers, switchgear, lighting and power panels and other like electrical equipment.
- 101.7.24 ECM – Engineering and Construction Management, an office within FSD
- 101.7.25 EPA – Environmental Protection Agency
- 101.7.26 ESEB – Environmental Sustainability and Energy Branch, a branch within SCD
- 101.7.27 Facilities Configuration Management Branch – The organization responsible for receiving, tracking and archiving all drawings, submittals, specifications and other related design documents.
- 101.7.28 FBMCC – Fort Belvoir Mark Center Complex
- 101.7.29 FCMB – Facilities Configuration Management Branch, a branch within FFD

- 101.7.30 FFD – Federal Facilities Division, a division within FSD
- 101.7.31 FSD – Facilities Services Directorate, a directorate within WHS
- 101.7.32 GDA – Government Designated Authority
- 101.7.33 HRP – Heating and Refrigeration Plant
- 101.7.34 IBC – International Building Code
- 101.7.35 IFC – International Fire Code
- 101.7.36 IMC - International Mechanical Code
- 101.7.37 IPC - International Plumbing Code
- 101.7.38 IFGC – International Fuel Gas Code
- 101.7.39 Kitchen – A room with four walls that is equipped for preparing and cooking food according to health regulations.
- 101.7.40 Kitchenette – A space with walls constructed on three sides generally with cabinets fastened to the wall, all appliances fixed, may have a sink, but does not have a stove.
- 101.7.41 KO – Contracting Officer
- 101.7.42 LPG – Liquefied Petroleum Gas
- 101.7.43 Mechanical Room, Large – Mechanical rooms 2000 sq. ft. or larger in area.
- 101.7.44 MEF – Metro Entrance Facility
- 101.7.45 *Modification - The reconfiguration of any space; the addition, relocation, or elimination of load-bearing elements; the reconfiguration or extension of any system; or the installation of any additional equipment.
- 101.7.46 OPFM – Office of the Pentagon Fire Marshal
- 101.7.47 OSHB – Occupational Safety and Health Branch, a branch within SCD
- 101.7.48 Pantry – A dedicated cubicle that is used for food storage and coffee making and has no other office use (i.e. no computer/printer/paper or office supplies).
- 101.7.49 PBMO – Pentagon Building Management Office, a branch within FFD
- 101.7.50 PBMO O&M – Pentagon Building Management Office - Operations and Maintenance, a subset of PBMO
- 101.7.51 PCD – Project Controls Division, a division within FSD
- 101.7.52 Pentagon – Portions of the Pentagon Reservation contiguous to the original 1943, 5 sided structure. References to the Pentagon include floors above and below grade including the basement and mezzanine levels. References to Pentagon do not include the MEF, RDF or PLCC.
- 101.7.53 PERC – Pentagon Emergency Response Center
- 101.7.54 PFGS – Pentagon Facility Guide Specifications

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- 101.7.55 Permit Holder – Individual or entity holding an approved permit to conduct work on equipment, space or property under the jurisdiction of this code.
- 101.7.56 PFPA – Pentagon Force Protection Agency, a field agency of the Department of Defense
- 101.7.57 PLCC – Pentagon Library and Conference Center
- 101.7.58 PM – Project Manager (see definition below)
- 101.7.59 PM SOP – Project Manager Standard Operating Procedures – a document published by PCD
- 101.7.60 POC – Pentagon Operations Center
- 101.7.61 Project – One time efforts to design and construct real property improvements (new construction, renovations, modifications, or alterations to existing real property), systems of physical or virtual improvements, testing or validation of equipment, or any other program that will be coordinated with multiple stakeholders. This umbrella document is applicable to all efforts to improve the Pentagon Reservation, not solely for construction projects. See also Project, Small.
- 101.7.62 *Project Manager (PM) –The lead agent responsible for design and execution.
- 101.7.63 Project, Small – Any capital improvement cost estimate between \$20,000 and \$250,000 is considered a small project.
- 101.7.64 QRAS – Quick Response Automatic Sprinklers
- 101.7.65 RDF – Remote Delivery Facility
- 101.7.66 *Real Property – Land and improvements to land, buildings, structures, and linear structures (utilities/pavements), and includes equipment affixed and built into the facility as in integral part of the facility.
- 101.7.67 *Renovation - The replacement in kind, strengthening, or upgrading of building elements, materials, equipment, or fixtures, that does not result in a reconfiguration of the buildings spaces within.
- 101.7.68 *Repair - The patching, restoration, or painting of materials, elements, equipment, or fixtures for the purpose of maintaining such materials, elements, or fixtures in good or sound condition.
- 101.7.69 RPAM – Real Property Asset Management
- 101.7.70 SCD – Standards and Compliance Division, a division within FSD
- 101.7.71 SCIF – Sensitive Compartmented Information Facility
- 101.7.72 SBCO – Sub-Building Code Official (see definition below)
- 101.7.73 SSD – Security Services Directorate, a directorate within PFPA
- 101.7.74 Sub-Building Code Official (SBCO) – A designated subset of the Building Code Official in a designated area.
- 101.7.75 UFGS – Unified Facilities Guide Specifications
- 101.7.76 VADEQ – Virginia Department of Environmental Quality
- 101.7.77 WHS – Washington Headquarters Services, a field activity of the Department of Defense

- 101.7.78 WHSBC – Washington Headquarters Services Building Code
- 101.7.79 WHSFR – Washington Headquarters Services Fire Regulations
- 101.7.80 WHS OGC – DoD/WHS Office of the General Counsel

102.0 APPLICABILITY

102.1 General.

Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive provision shall govern.

102.2 Other Laws.

The provisions of this code shall not be deemed to nullify any provisions of federal, state, regional, or local laws; Executive Orders; or DoD Issuances.

102.3 Application of References.

References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapters, sections or provisions of this code.

102.4 Referenced Codes and Standards.

The codes and standards referenced in this WHSBC shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

102.5 Effective Date

The requirements of this code edition shall be effective 30 days after the adoption by the Director, Facilities Services Directorate, Washington Headquarters Services. This date shall be known as the 'Effective Date'. The applicable edition of the code for a project shall be based on the date of the request for proposal.

102.6 Partial Invalidity.

In the event that any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

102.7 Existing Structures.

The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as specifically covered in this code, the Washington Headquarters Services Fire Regulations (WHSFR), or as is deemed necessary by the Authority Having Jurisdiction (AHJ) for the general safety and welfare of the occupants and public as well as physical security.

102.8 Project Delays

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. The designer of record is responsible to determine if design revisions are required based on a code analysis performed by the government (Standards and Compliance Division). The evaluation must also include retroactive requirements that have been included in the new editions of the criteria.

103.0 STANDARDS AND COMPLIANCE DIVISION

103.1 Oversight and Enforcement

The responsibility for oversight and enforcement of the WHSBC shall reside in the Standards and Compliance Division (SCD) of the Facility Services Directorate (FSD). The official responsible for enforcement and implementation of the WHSBC shall be known as the Building Code Official (BCO).

103.2 *Appointment

The BCO shall be appointed by the AHJ.

103.3 Sub-Building Code Official.

In accordance with the prescribed procedures and with the concurrence of the AHJ, the BCO shall have the authority to appoint sub-building code officials (SBCOs), the related technical officers, inspectors, plan examiners, safety officers and other employees. Such employees shall have powers as delegated by the BCO.

104.0 DUTIES AND POWERS OF THE AUTHORITY HAVING JURISDICTION AND THE BCO

104.1 General.

The BCO is hereby authorized and directed to enforce the provisions of this code. The BCO shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies, and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

104.2 Applications and Permits.

The BCO shall receive applications from the appropriate Document Control organization; review construction documents and issue permits for the erection, alteration, demolition, and moving of buildings and structures; inspect the premises for which such permits have been issued; and enforce compliance with the provisions of this code.

104.3 Notices and Orders.

The BCO shall issue all necessary notices or orders to ensure compliance with this code through the COR/PM/KO to the contractor.

104.4 Inspections.

The BCO shall make all of the required code compliance inspections, or the BCO shall have the authority to accept reports of inspection by approved organizations or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such approved organization or by the responsible individual. The BCO is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the AHJ.

104.5 Identification.

The BCO and any designated representatives shall carry proper credentials when inspecting structures or premises in the performance of duties under this code.

104.5.1 The BCO shall be authorized to issue credentials for the designated representatives. The AHJ shall authorize the credentials for the BCO.

104.6 Right of Entry.

The AHJ, or their designated representative, has the power to enter and examine WHS facilities to conduct inspections. Before entering, the AHJ shall obtain the consent of the DoD Component controlling or occupying the space or obtain authorization from the Director, WHS, except in those instances where an imminent danger to life or property exists. If such structure or premises is occupied, credentials must be presented to the occupant and entry requested. If such structure or premises is unoccupied, the AHJ shall first make a reasonable effort to locate the project manager or other person having charge or control of the structure or premises and request entry. If entry is refused, the AHJ shall have recourse to the remedies provided to secure entry.

104.7 Department Records.

The BCO shall keep official records of applications received, permits and certificates issued, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for at a minimum the period required for retention of public records.

104.8 Reserved.

104.9 Approved Materials and Equipment.

104.9.1 Materials, equipment, and devices approved by the BCO shall be constructed and installed in accordance with such approval. Materials, equipment, and parts shall be of like quality, functionally compatible, and aesthetically equivalent to existing systems within the building.

104.9.2 Used Materials and Equipment.

The use of used materials which meet the requirements of this code for new materials is permitted. Used equipment and devices shall not be reused unless approved by the BCO.

104.10 Code Waivers and Departures.

Wherever there are practical difficulties involved in carrying out the provisions of this code, the AHJ and BCO shall have the authority to grant modifications for individual cases, upon application by the PM, provided the BCO shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of granting code waivers or departures shall be recorded and entered in the files of SCD.

104.10.1 Application Procedure.

104.10.1.1 Code Waivers.

104.10.1.1.1 A sample Waiver Request form is provided in Attachment 1 of this code. Completed form shall be submitted to SCD with all requisite attachments.

104.10.1.2 Code Departures.

104.10.1.2.1 A sample Departure Request form is provided in Attachment 2 of this code. Completed form shall be submitted to SCD with all requisite attachments.

104.10.2 Granting Authority.

104.10.2.1 Code Waivers.

Only the AHJ has authority to grant code waivers; the BCO does not have the authority.

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104.10.2.2 Code Departures.

Code departures may be granted by either the BCO or the AHJ.

104.11 Alternative Materials, Design, and Methods of Construction and Equipment.

The provisions of this code are not intended to prevent the installation of any material nor to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design, or method of construction shall be approved where the BCO finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety.

104.11.1 Research Reports.

Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

104.11.2 Tests.

Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the BCO shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the BCO shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the appropriate Document Control for the period required for retention of public records.

104.12 Revisions to the WHSBC.

Revisions to the WHSBC shall occur as described in Appendix C of this document.

105.0 PERMITS

105.1 Required.

Prior to execution, permits and licenses will be required to ensure the work effort meets building codes and regulations and complies with any Federal, State, and municipal laws, codes, and regulations. Permits will also be required to facilitate transportation, disposal, and handling of hazardous waste, asbestos removal/abatement, PCBs, refrigerants, lead based paint, etc. These items must be properly manifested and coordinated through FSD. Any organization that intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a WHS owned building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical, security, fire, life safety or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the BCO and obtain the required permit(s).

Required permits/approvals:

105.1.1 Air Quality Permit Review

105.1.1.1 Section 105.1.1 is included to assure that the requirements of the Clean Air Act are met.

- 105.1.1.2 When Required – Whenever the use of temporary generators and/or boilers for any activity, ceremony, special event or display are needed.
- Contact must be made with the Environmental Sustainability and Energy Branch (ESEB) at 703-693-3683 for a review and potential application.
- 105.1.1.3 Approving Authority – SCD/ESEB and Virginia Department of Environmental Quality (VADEQ)
- 105.1.1.4 Document Control – SCD/ESEB - If required, the Environmental Office will prepare and submit an application to the VADEQ on behalf of the submitter to obtain a temporary permit.
- 105.1.2 Antennas and Similar Devices Installation Application
- 105.1.2.1 Section 105.1.2 adopts by reference the latest edition of DD1494 – Application for Equipment Frequency Allocation as published by PBMO. Additional information is available upon request at whs.specialevents@mail.mil.
- 105.1.2.2 When Required – Installation of any temporary or permanent roof penetrating equipment or radio frequency generating device.
- 105.1.2.3 Approving Authority – PBMO
- 105.1.2.4 Document Control - PBMO
- 105.1.3 Asbestos Control Permit
- 105.1.3.1 Section 105.1.3 adopts by reference the latest edition of the Asbestos Control Permit, as published by SCD/Occupational Safety and Health Branch (OSHB), on its website at <https://safety.whs.mil/>, under “Forms” under the delegated authority of the Director, FSD.
- 105.1.3.2 When Required – Any construction, alteration, repair, or modification work requiring access to and/or disturbance of existing asbestos materials.
- 105.1.3.3 Approving Authority – SCD/OSHB
- 105.1.3.4 Document Control – SCD/OSHB
- 105.1.4 Building Pass Application
- 105.1.4.1 Section 105.1.4 adopts by reference the latest edition of the DoD Building Pass application (DD2249), as published by PFPA. Additional information is available on their website at <http://www.pfpa.mil/>.
- 105.1.4.2 When Required – All individuals required to access the property for inspection, survey, work or other purposes.
- 105.1.4.3 Approving Authority – PFPA
- 105.1.4.4 Document Control – PFPA
- 105.1.5 Building Code Permit
- 105.1.5.1 Section 105.1.5 adopts a building code permit. See Attachment 3 for an example of a WHS Building Code Permit. Copies of the permit are available from Standards and Compliance Division (SCD) at <https://fire.whs.mil> or 703-695-8004.

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- 105.1.5.2 When Required: Any construction, alteration, modification, or change in occupancy being completed on property under the jurisdiction of this code that is not listed in Section 105.2.
- 105.1.5.3 Approving Authority – SCD/BCO
- 105.1.5.4 Document Control – SCD/BCO
- 105.1.6 Cable Pulling Permit
- 105.1.6.1 Section 105.1.6 adopts by reference the latest edition of the Cable Pulling Permit, as published by PBMO. Additional information is available upon request by contacting whs.specialevents@mail.mil.
- 105.1.6.2 When Required – Cable pulling installations in above-ceiling, PBMO or publicly held spaces.
- 105.1.6.3 Approving Authority – PBMO
- 105.1.6.4 Document Control – PBMO
- 105.1.7 Confined Space Permit
- 105.1.7.1 Section 105.1.7 adopts by reference the latest edition of the Confined Space Entry Permit, as published by the SCD/OSHB, under “Confined Space” on its website at <https://safety.whs.mil/> under the delegated authority of the Director, FSD.
- 105.1.7.2 When Required – For any work that requires an individual to enter a confined space, supervise an entry, or approve an entry.
- 105.1.7.3 Approving Authority – SCD/OSHB
- 105.1.7.4 Document Control – SCD/OSHB
- 105.1.8 Excavation Permit
- 105.1.8.1 Section 105.1.8 adopts by reference the latest edition of the Excavation Permit, as published by PBMO. Additional information is available upon request by contacting whs.specialevents@mail.mil.
- 105.1.8.2 When Required – For any work on the Pentagon Reservation that may disrupt underground communication or utility lines, or above ground rights of ways.
- 105.1.8.3 Approving Authority – CMD
- 105.1.8.4 Document Control - CMD
- 105.1.9 Exhibits, Artwork, and Signs on the Pentagon Reservation
- 105.1.9.1 Section 105.1.9 adopts by reference Administrative Instruction No. 103: Exhibits, Artwork, and Signs on the Pentagon Reservation, as published by the DA&M, on its website at <http://www.dtic.mil/whs/directives/corres/pdf/a103p.pdf>. (See also Use of Space on Pentagon Reservation Permit)
- 105.1.9.2 When Required – Whenever exhibits, artwork, or signs are to be installed or modified.
- 105.1.9.3 Approving Authority – PBMO
- 105.1.9.4 Document Control - PBMO

- 105.1.10 Fire Prevention Permit
- 105.1.10.1 Section 105.1.10 adopts by reference the latest edition of the Fire Prevention Permit as published by OPFM under “Permits Section” on its website <https://fire.whs.mil>, under the delegated authority of the Director, FSD. This section also adopts by reference the latest edition of the WHS Fire Regulations, Chapter 5, as published by OPFM, under “Fire Regulations” on its website at <https://fire.whs.mil/> under the delegated authority of the Director, FSD and any permit required therein.
- 105.1.10.2 *When Required –Any work requiring the use, storage, or manipulation of flammable, combustible, or hazardous materials, storage and handling of liquefied petroleum gases (LPG) and whenever demolition of structures is required to complete project work.
- 105.1.10.3 Approving Authority – SCD/OPFM
- 105.1.10.4 Document Control – SCD/OPFM
- 105.1.11 Hazardous Material Management Form
- 105.1.11.1 Section 105.1.11 adopts by reference the latest edition of the Hazardous Materials Management Form, as published by the SCD/OSHB, under “Forms” on its website at <https://safety.whs.mil/> under the delegated authority of the Director, FSD.
- 105.1.11.2 When Required - When a WHS individual or group wants to test, try, use, or bring on property a product not currently on the WHS chemical inventory.
- 105.1.11.3 Approving Authority – SCD/OSHB and OPFM
- 105.1.11.4 Document Control – SCD/OSHB
- 105.1.12 Hot Work Permit (Welding, Cutting, or Brazing)
- 105.1.12.1 Section 105.1.12 adopts by reference the latest edition of the Hot Work Permits. Hot Work permits are published by OPFM under “Permits Section” on its website at <https://fire.whs.mil>, under the delegated authority of the Director, FSD.
- 105.1.12.2 When Required - Any operation involving open flames or producing heat and/or sparks, hot slag, or dross. Hot work includes, but is not limited to, brazing, cutting, grinding, soldering, arc welding, work on a pipe that would conduct heat through a wall or in contact with a wall, or torch-applied roofing.
- 105.1.12.3 Approving Authority: SCD/OPFM
- 105.1.12.4 Document Control: SCD/OPFM
- 105.1.13 Lead Work
- 105.1.13.1 Section 105.1.13 adopts by reference the latest edition of the Lead policy chapter, as discussed by the SCD/OSHB, under “Policy Chapters – Chapter 21 Lead” on its website at <https://safety.whs.mil/> under the delegated authority of the Director, FSD and any permit required therein.
- 105.1.13.2 When Required – During the use, handling, and removal of materials containing lead.
- 105.1.13.3 Approving Authority – SCD/OSHB
- 105.1.13.4 Document Control – SCD/OSHB

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- 105.1.14 Photo Permit
 - 105.1.14.1 Section 105.1.14 is included to provide guidance regarding obtaining a photo permit. Contact PFPA/SSD Access Control Staff at 703-614-1529 for further information.
 - 105.1.14.2 When Required – Whenever photography is required to complete a project/scope of work on WHS property.
 - 105.1.14.3 Approving Authority – PFPA/Director SSD
 - 105.1.14.4 Document Control - PFPA
- 105.1.15 Roof Access Permit
 - 105.1.15.1 Section 105.1.15 adopts by reference the latest edition of the Roof Access Permit, as published by PBMO. Additional information is available upon request by contacting whs.specialevents@mail.mil.
 - 105.1.15.2 When Required – All work requiring access to the roof.
 - 105.1.15.3 Approving Authority – PBMO
 - 105.1.15.4 Document Control – PBMO
- 105.1.16 Roof Hot Work Permit
 - 105.1.16.1 Section 105.1.16 adopts by reference the latest edition of the Roof Hot Work Permit, as published by PBMO. Additional information is available upon request by contacting whs.specialevents@mail.mil.
 - 105.1.16.2 When Required – Any roof operation involving open flames or producing heat and/or sparks, hot slag or dross. Hot Work includes, but is not limited to, brazing, cutting, grinding, soldering, arc welding, work on a pipe that would conduct heat through a wall or in contact with a wall, or torch-applied roofing.
 - 105.1.16.3 Approving Authority – PBMO
 - 105.1.16.4 Document Control - PBMO
- 105.1.17 *Space Access
 - 105.1.17.1 Section 105.1.17 adopts by reference the latest edition of DTM 09-012, “Interim Policy Guidance for DoD Physical Access Control”, as published by the Defense Technical Information Center (DTIC), on its website at <http://www.dtic.mil/whs/directives/corres/pdf/DTM-09-012.pdf>. Note: Additional access requirements may apply depending on work location.
 - 105.1.17.2 When Required – Whenever access to DoD installations or stand-alone facilities is required.
 - 105.1.17.3 Approving Authority – Component Security Officer/Manager
 - 105.1.17.4 Document Control – Component Security Officer/Manager
- 105.1.18 Stationary Lead-Acid Battery Systems Permit (Reserved)
- 105.1.19 Use of Explosives Permit
 - 105.1.19.1 Section 105.1.19 adopts by reference the latest edition of the Use of Explosives Permit, as published by PBMO. Additional information is available upon request by contacting whs.specialevents@mail.mil.

- 105.1.19.2 When Required – All work requiring use or storage of explosives.
- 105.1.19.3 Approving Authority – PBMO
- 105.1.19.4 Document Control – PBMO
- 105.1.20 Use of Space on the Pentagon Reservation Permit (to include land)
- 105.1.20.1 Section 105.1.20 adopts by reference the latest edition of DD2798, as published by the Defense Technical Information Center (DTIC), on its website at <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd2798.pdf>, authority for which is granted by Title 32 of the Code of Federal Registrar (CFR) Part 234.3D.
- 105.1.20.2 When Required – Whenever events, installations, projects, etc. require use of PBMO controlled or public spaces on WHS property. Use of equipment such as barbeque grills and open flames must be included in the Space Use Permit. Use of space permits are required for the following:
 - 105.1.20.2.1 Cable pulling (See also Cable Pulling Permit in Section 105.1.6, above)
 - 105.1.20.2.2 Construction
 - 105.1.20.2.3 Demolition of structures
 - 105.1.20.2.4 Excavation (See also Excavation Permit in Section 105.1.8, above)
 - 105.1.20.2.5 Flammable/combustible liquids storage (See also Fire Prevention Permit Requirements in Section 105.1.10, above)
 - 105.1.20.2.6 Gatherings such as meetings or parties in public areas
 - 105.1.20.2.7 Moved structures
 - 105.1.20.2.8 Open flames (See also Fire Prevention Permit in Section 105.1.10, above)
 - 105.1.20.2.9 Project laydown and storage areas (See also Public Space Policy in Section 105.1.20, above)
 - 105.1.20.2.10 Roof Work (See also Roof Access Permit in Section 105.1.15, above and Roof Hot Work Permit in Section 105.1.16, above)
 - 105.1.20.2.11 Temporary Structures
 - 105.1.20.2.12 Temporary Use of Equipment
 - 105.1.20.2.13 Use of Explosives (See also Use of Explosives Permit in Section 105.1.19, above)
- 105.1.20.3 Approving Authority – PBMO Special Events Office
- 105.1.20.4 Document Control – PBMO Special Events Office
- 105.1.21 Utility Outage Permit
- 105.1.21.1 Section 105.1.21 adopts by reference the latest edition of the Utility Outage Permit, as published by PBMO O&M, under the delegated authority of the Director, FSD. Forms can be obtained by contacting PBMO O&M at 703-693-8084.
- 105.1.21.2 When Required – Whenever a utility outage (electrical, mechanical, plumbing, telecommunication, fire protection, etc.) is required to complete work on WHS property.

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105.1.21.3 Approving Authority – PBMO O&M

105.1.21.4 Document Control – PBMO O&M

105.1.22 Utility Space Access Permit (Reserved)

105.1.22.1 Section 105.1.22 adopts by reference the latest edition of the Utility Space Access Permit, as published by PBMO O&M, under the delegated authority of the Director, FSD. Forms can be obtained by contacting PBMO O&M at 703-693-8084.

105.1.22.2 When Required – Reserved

105.1.22.3 Approving Authority – PBMO

105.1.22.4 Document Control - Reserved

105.2 Work exempt from permit.

Exemptions from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code.

105.2.1 Emergency repairs.

105.2.1.1 *Where equipment replacements and repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day to the BCO.

105.2.1.2 Emergency repairs must meet all applicable WHSBC requirements.

105.2.2 Repairs.

Application or notice to the BCO is not required for ordinary repairs to structures, replacement of lamps, or the connection of approved portable electrical equipment to approved permanently installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include addition to, alteration of, replacement or relocation of any standpipe, water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

105.2.3 Cosmetic. (Reserved)

105.2.4 Movable Furniture. (Reserved)

105.3 Application for Permits.

See each specific permit for application instructions.

105.4 Validity of Permits.

The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code. Permits presuming to give authority to violate or cancel the provisions of this code shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the Approving Authority from requiring the correction of errors in the construction documents and other data. The Approving Authority is also authorized to prevent occupancy or use of a structure where in violation of this code.

105.5 Expiration.

Every permit issued shall become invalid unless the work on the site authorized by such permit is commenced within 180 days after its issuance, or if the work authorized on the site by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. The Approving Authority is authorized to grant in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

105.6 Suspension or Revocation.

The Approving Authority is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any provisions of this code.

105.7 Placement of Permits.

The permit or copy shall be kept on the work site until the completion of the project.

106.0 FLOOR AND ROOF DESIGN LOADS

106.1 Live loads posted.

Where the live loads for which each floor or portion thereof of a commercial or industrial building are or have been designed to exceed 50 psf (2.40 kPa), such design live loads shall be conspicuously posted by the project manager in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

106.2 Issuance of certificate of occupancy.

A certificate of occupancy required by Section 111.0 shall not be issued until the floor load signs, required by Section 106.1, have been installed.

106.3 Restrictions on loading.

It shall be unlawful to place, or cause or permit to be placed, on any floor or roof of a building, structure or portion thereof, a load greater than is permitted by this code.

107.0 SUBMITTAL DOCUMENTS FOR BUILDING CODE PERMITS

107.1 General.

Submittal documents consisting of construction documents, statement of special inspections, geotechnical report, military real property forms, and other data shall be submitted as described herein. The construction documents shall be prepared by a registered design professional where required by this code and/or the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the BCO is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The BCO is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

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- 107.1.1 All project deliverables and data shall be submitted to the appropriate Document Control (as outlined in Section 105.1, above). The number of hard copy and electronic submittals of all design deliverables, coordination drawings, equipment submittals, Systems Operation Maintenance Manuals (SOMMs), O&M Manuals, and As-Built drawings as set by the individual Document Control group. Document Control will archive all applicable documents.
- 107.1.2 Basis of Design
- 107.1.2.1 Fire protection and life safety aspects of a Basis of Design document must follow the requirements for a Design Analysis as indicated in UFC 3-600-01.
- 107.1.2.2 Electronic Submission requirements:
- 107.1.2.2.1 All electronic data shall produce an exact reproduction of its respective hardcopy when printed.
- 107.1.2.2.2 Provide 2D and 3D wire-frame drawing source files in Bentley's Micro Station Design™ (DGN) format and include all drawing support. Provide dynamic links source files to database or other documents when beneficial.
- 107.1.2.2.3 All CAD drawings shall comply with the Pentagon Renovation & Construction Program Electronic Data Standards. To request a copy, please contact the enterprise Facilities Information center (eFIC) at 703-614-1200.
- 107.1.2.2.4 Provide document source files in Microsoft Office Professional formats. Provide each document in Portable Document Format (PDF) which is book-marked and fully text-retrievable. Provide a coversheet containing key cataloging information and a table of contents.
- 107.1.2.2.5 Provide database source files in Microsoft Access format. Provide complete database schema (plan) and user manual with database applications. Provide PDF version of reports generated from database applications.
- 107.1.2.2.6 Specification source files shall be in SpecsIntact (SEC) format and PDF version to include the associated Quality Assurance (QA) Reports generated by SpecsIntact Explorer.
- 107.2 Construction documents.
- Construction documents shall be in accordance with Sections 107.2.1 through 107.2.6. The BCO is authorized to waive or modify the requirement for a plan when the application for permit is for alteration or repair or when otherwise warranted.
- 107.2.1 Information on construction documents.
- Construction documents shall be dimensioned and drawn upon suitable material. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the BCO.
- 107.2.2 Fire protection system shop drawings.
- Shop drawings for the fire protection system(s) shall be submitted as required by Section 209.0 of this code. The construction documents and calculations shall be approved prior to the start of system installation or modifications. Shop drawings shall contain all information as required by Section 209.0 of this code.

107.2.3 Life safety plan.

The construction documents shall include a Life Safety Plan that shows in sufficient detail the location, construction, size, and character of all portions of the means of egress in compliance with the provisions of this code. This shall include but not be limited to the occupant load of all spaces by use, capacity of the corresponding egress components, number of exits and remoteness, and the arrangement of the means of egress as applicable (travel distances, common paths of travel, and dead-end conditions). Special locking features, if any, shall be clearly identified.

107.2.4 Exterior wall envelope.

Construction documents for all projects affecting or including exterior walls shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. The construction documents shall provide details of the exterior wall envelope as required, including security/blast protection, flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive membrane, and details around openings. The construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the security and weather resistance of the exterior wall envelope. The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used.

107.2.5 Site plan.

The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades and the proposed finished grades and, as applicable, flood hazard areas, floodways, and design flood elevations; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. For alteration and renovation work that occurs entirely within the interior of an existing building footprint, an exterior site plan is not required.

107.2.5.1 Design flood elevations.

Where design flood elevations are not specified, they shall be established in accordance with IBC Chapter 16.

107.2.6 Materials.

Sufficient technical data shall be submitted to substantiate the proposed use of any material, equipment, device, or assembly and proof of performance for the use intended. Determination of any material, equipment, device or assembly is based on (1) compliance with code, (2) items listed by nationally recognized independent testing laboratories, or (3) recommendations of architects and engineers.

107.3 Examination of documents.

The BCO shall examine or cause to be examined the accompanying submittal documents and shall ascertain by such examinations whether the construction indicated and described is in accordance with the requirements of this code.

107.3.1 Approval of construction documents.

When the BCO, designated representative or responsible party issues a permit, the construction documents shall be approved, in writing or by stamp, as "Reviewed for Code Compliance." One set of construction documents so reviewed shall be retained by Document Control. One set shall be returned to the applicant, be kept at the work site, and be open to inspection by the BCO, SBCO, or a duly authorized representative.

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107.3.2 Reserved.

107.3.3 Phased approval.

The BCO is authorized to issue a building code permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

107.3.4 Design professional in responsible charge.

107.3.4.1 General.

When it is required that documents be prepared by a registered design professional, the BCO shall be authorized to require the project manager to engage and designate on the building code permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the PM shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The BCO shall be notified in writing by the project manager if the registered design professional in responsible charge is changed or is unable to continue to perform the duties.

The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

107.3.4.2 Deferred submittals.

For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the BCO within a specified period. Deferral of any submittal items shall have the prior approval of the BCO. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the BCO. Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the BCO with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the BCO.

107.4 Amended construction documents.

Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

107.4.1 *For minor changes, red-line drawings are acceptable.

107.4.2 Red-line drawings shall be based off of the final approved design drawings and shall accurately illustrate any and all field made changes.

107.4.3 The red-line drawings shall be at all inspections and incorporate all changes made to that point.

107.5 Retention of construction documents.

One set of approved construction documents shall be retained by the Document Control for a period of not less than 180 days from date of completion of the permitted work, or as required by federal laws, whichever is greater.

107.6 Real Property Asset Management (RPAM).

107.6.1 Real Property Accountability.

RPAM is responsible for the proper custody, safekeeping, efficient and effective use of all buildings, structures, utilities, improvements, and lands under the control of the WHS. Maintains a formal set of property accounting records that show, on a continuing basis, the item identification, gain, and loss, on-hand balance, conditions, and location of all real property. Ensures real estate actions are legally bound and documented with real estate instruments. Promotes sound and efficient practices of real property management practices and procedures.

107.6.2 All capital improvement and new construction projects costing \$20,000 and greater require the submission of DD Form 1354, Transfer and Acceptance of Military Real Property (Available at <http://www.dtic.mil/whs/directives/forms/eforms/dd1354.pdf>), provided to the FSD Real Property Officer, in accordance with UFC 1-300-08, Criteria for Transfer and Acceptance of Military Real Property.

107.6.3 Three DD Form 1354s will be submitted; Draft, Interim and Final.

107.6.3.1 Draft.

107.6.3.1.1 The Draft DD Form 1354 shall be completed early on in the project, no later than the final design completion to ensure the level of detail and the different components of a project are explained.

107.6.3.1.2 The level of detail shall include the category code number for the project i.e. administrative space, dining facility, sidewalk, exterior lighting etc., with costs and units of measure broken out accordingly. WHS uses DA PAM 415-28 list of category codes and descriptions.

107.6.3.2 Interim.

107.6.3.2.1 *The Interim DD Form 1354 shall be submitted one month prior to the project being available for use.

107.6.3.2.2 The interim form submission shall include actual costs that have been expended to date as well as the following supporting documentation:

Work orders, DD Form 1391 (MILCON only)

Contract, modifications

Statement of work (dollar amounts, location, source of funds, parties to the contract and signature page required)

Approved invoices

Material inspection and receiving reports

Evidence of in-house labor

Drawings

Direct and indirect costs are to be included.

107.6.3.2.3 The interim form shall include any punch lists of items to be corrected prior to final acceptance.

107.6.3.2.4 The source of funds is also to be annotated, i.e., O&M, NAF, other agency/service, and private donation.

107.6.3.2.5 The interim DD Form 1354 must be signed by the transferring and accepting officials before the assets are placed in service.

107.6.3.3 Final.

107.6.3.3.1 The Final DD Form 1354 shall be completed once all costs have been expended and the project is ready for close out.

- 107.6.3.3.2 The final DD Form 1354 shall include the total final cost for each real property asset in a project and any corrections that need to be annotated. Additional supporting documentation that provides an audit trail of costs must be included.
- 107.6.3.3.3 The items listed in the punch lists at the interim must have been corrected or explanations of why they were not corrected shall be provided.
- 107.6.3.3.4 The source of funds is also to be annotated, i.e., O&M, NAF, other agency/service, and private donation.
- 107.6.3.3.5 The final DD Form 1354 must be signed by the transferring and accepting officials for a project to be completed.

108.0 TEMPORARY STRUCTURES AND USES

108.1 General.

The BCO is authorized to issue a building code permit for temporary structures and temporary uses (See Section 105.1.20). Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The BCO is authorized to grant extensions for demonstrated cause.

108.2 Conformance.

Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation, and sanitary requirements of this code as necessary to ensure public health, safety and general welfare.

108.3 Temporary power.

The BCO is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

108.4 Termination of approval.

The BCO is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.

109.0 RESERVED

110.0 INSPECTIONS

110.1 General.

Construction or work for which a building code permit is required shall be subject to inspection by the BCO and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code. Inspections presuming to give authority to violate or cancel the provisions of this code shall not be valid. It shall be the duty of the building code permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the BCO nor Standards and Compliance shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

110.2 Preliminary inspection.

Before issuing a building code permit, the BCO is authorized to examine or cause to be examined buildings, structures, and sites for which an application has been filed.

110.3 Required inspections.

Upon request from the building code permit holder, the BCO shall make the inspections set forth in Sections 110.3.1 through 110.3.22, as applicable. Contractor shall not schedule/request an inspection without a reasonable expectation that the work to be inspected will be completed at the time of the inspection. Penalties may be applied to the Contractor by the KO if less than 24 hours notice is given for cancellation of a scheduled/requested inspection.

110.3.1 Footing and foundation inspections.

Footing and foundation inspections shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.

110.3.2 Underground inspections.

Underground installations shall be inspected after all piping, utilities, footings, support systems, etc., have been installed, and prior to backfilling.

110.3.3 Concrete slab, foundation wall, and under-floor inspections.

Concrete slab and under-floor inspections shall be made after in-slab or under-floor reinforcing steel and building service equipment, conduit, piping accessories, and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the subfloor.

110.3.4 Lowest floor elevation inspections.

In flood hazard areas, upon placement of the lowest floor, including the basement, and prior to further vertical construction, the elevation certification required in Section 216.0 shall be submitted to the BCO.

110.3.5 Roof Framing inspections.

Roof framing inspections shall be made after the roof deck or sheathing, all framing, fireproofing, fire blocking, and bracing are in place and pipes, chimneys, and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes, and ducts are approved. Framing inspection shall be conducted prior to covering.

110.3.6 Wall Framing inspections.

Wall framing inspection shall be made after the wall framing, all fireblocking, fireproofing, and bracing are in place. Framing inspection shall be conducted prior to installation of utilities and wall coverings.

110.3.7 Wall Close-in inspections.

Wall close-in inspection shall be conducted after wall framing, bracing, and fireproofing is complete and after all utilities have been installed. Close-in inspections shall take place immediately prior to installation of insulation and wall covering material(s).

110.3.8 Ceiling Close-in inspections.

Ceiling close-in inspection shall be conducted after all framing, fireproofing, and firestopping are in place and installation of all above-ceiling utilities is finalized. Close-in inspections shall take place immediately prior to installation of the ceiling covering materials.

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110.3.9 Lath and gypsum board inspections.

Lath and gypsum board inspections shall be made after lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or gypsum board joints and fasteners are taped and finished.

Exception: Gypsum board that is not part of a fire-resistance-rated assembly or a shear assembly.

110.3.10 Fire and smoke-resistant penetration inspections.

Protection of joints and penetrations in fire-resistance-rated assemblies, smoke barriers, and smoke partitions shall not be concealed from view until inspected and approved.

110.3.11 Energy efficiency inspections.

Inspections shall be made to determine compliance with Section 213.0 of this code and shall include, but not be limited to, inspections for: envelope insulation R- and U-values, fenestration U-value, duct system R-value, and HVAC and water heating equipment efficiency.

110.3.12 Elevator inspections.

Elevators shall be tested and inspected as required in Section 230.0 of this code.

110.3.13 Fire protection and fire alarm inspections.

Fire protection/fire alarm inspections shall include verification of sprinkler and standpipe piping support, sprinkler location/placement, system components, conduit installation, detection/notification equipment placement, etc. Final fire protection and fire alarm inspections are required after completion of the work, prior to issuance of the Certificate of Occupancy. Fire protection and alarm systems shall be inspected prior to commencement of work in areas where existing systems are to remain in place and/or only minor modifications are to be made.

110.3.14 Life safety inspections.

Life safety inspections shall include verification of exit signs, handrails, available stair, door and corridor widths, travel distances, etc. Final life safety inspections are required after completion of the work, prior to issuance of the Certificate of Occupancy. Life safety components shall be inspected prior to commencement of work in areas where existing systems are to remain in place and/or only minor modifications are to be made.

110.3.15 Accessibility inspections (Reserved) See Section 211.0 of this code.

110.3.16 Mechanical inspections (Reserved) See Section 228.0 of this code.

110.3.17 Electrical inspections (Reserved) See Section 227.0 of this code.

110.3.18 Plumbing inspections (Reserved) See Section 229.0 of this code.

110.3.19 Other inspections.

In addition to the inspections specified above, the BCO is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code.

110.3.20 Special inspections.

For special inspections, see Section 231.0 of this code.

110.3.21 *Preparation for Final Code Compliance Inspection.

Before scheduling a Final Code Compliance Inspection, the contractor/builder shall verify to the satisfaction of the PM/COR that all work is complete and ready for occupancy.

110.3.22 Final Code Compliance Inspection.

The BCO shall perform a final code compliance inspection after all work and inspections required by the building code permit are completed and before issuance of the Certificate of Occupancy to ensure that any defective work or discrepancies have been corrected and all work conforms with this code. Penalties may be applied to the Contractor by the KO if an excessive number of inspection deficiencies are observed during the final inspection resulting in a new final inspection.

110.4 Inspection agencies.

The BCO is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

110.5 Inspection requests.

The building code permit holder shall assure that at least the minimum required inspections listed on the building code permit have been conducted and approved prior to requesting a certificate of occupancy. The building code permit holder or their designated representative shall request inspections from the BCO. The permit holder shall make access arrangements and provide a means for inspections of such work that is required by this code.

110.6 Approval required.

Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the BCO. The BCO, upon notification and within a reasonable timeframe, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the building code permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered, concealed, or otherwise deemed complete until authorized by the BCO.

110.7 Reports of inspections.

A record of all reports of inspections, tests, examinations, discrepancies and approvals shall be maintained by the BCO and shall be communicated promptly in writing to the permit holder.

111.0 CERTIFICATE OF OCCUPANCY

111.1 Use and occupancy.

No building, structure, or area shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made, until the BCO has issued a certificate of occupancy as provided herein. A certificate of occupancy indicating completion of the work for which a permit was issued shall be obtained prior to any occupancy of a structure. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code.

Exception: Certificates of occupancy are not required for work exempt from permits under Section 105.2.

111.2 Certificate issued.

111.2.1 Application for Certificate.

The building code permit holder shall file an application for a Certificate of Occupancy with the BCO (see Attachment 4 for an example Certificate of Occupancy). The application may be filed prior to a final inspection but will not be finalized and no certificate will be issued until completion of the final code compliance inspection discussed in Section 110.3.22 above.

111.2.2 Issuance of Certificate.

After the BCO inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by SCD, the BCO shall issue a certificate of occupancy that contains the following:

1. The permit type and number.
2. The address or location of the project or structure.
3. The name and contact information for the occupant.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code for the occupancy and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the BCO.
7. The edition of the code(s) under which the permit was issued.
8. The use and occupancy, in accordance with the provisions of Section 203.0.
9. The type of construction as defined in Section 206.0.
10. The design occupant load.
11. If an automatic sprinkler system is provided, whether the sprinkler system is required.
12. Any special stipulations and conditions of the building code permit.

111.3 Temporary occupancy.

The BCO is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that such portion or portions shall be occupied safely. The BCO shall set a time period during which the temporary certificate of occupancy is valid.

111.4 Revocation.

The BCO is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any of the provisions of this code.

112.0 SERVICE UTILITIES

112.1 Connection of service utilities.

No person shall make connections from a utility, source of energy, fuel, or power to any building or system that is regulated by this code for which a permit is required, until released by the BCO and the Building Manager.

112.2 Temporary connection.

The BCO, in conjunction with the Building Manager, shall have the authority to authorize the temporary connection of the building or system to the utility source of energy, fuel or power.

112.3 Authority to disconnect service utilities.

The BCO, in conjunction with the Building Manager, shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section 101.4 in case of emergency, where necessary to eliminate an immediate hazard to life or property, or when such utility connection has been made without the approval required by Section 112.1 or 112.2.

112.4 Exemptions.

Equipment and related wiring installed by a provider of publicly regulated utility service or a franchised cable television operator, and electrical equipment and related wiring used for radio, broadcast or cable television, telecommunications or information service transmission are exempt. Such exempt equipment and wiring shall be under the ownership and control of the service provider or its affiliates and shall be located on either public rights of way or buildings and structures for which the service provider has rights of occupancy and entry; however, the structures, including their service equipment, housing or supporting infrastructure of such exempt equipment and wiring shall be subject to this section. The installation of equipment and wiring exempted by this section shall not create an unsafe condition prohibited by code.

113.0 APPEALS

113.1 Consideration for appeals.

Any person shall be permitted to appeal a decision of the BCO to the AHJ when it is claimed that any one or more of the conditions listed below exist.

113.1.1 The true intent of this code has been incorrectly interpreted.

113.1.2 The provisions of the WHSBC or other codes do not fully apply.

113.1.3 A decision is unreasonable or arbitrary as it applies to alternatives or new materials.

114.0 VIOLATIONS

114.1 Non-Compliance.

No person, firm, or corporation may erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

114.2 Notice of violation.

The BCO is authorized to serve a notice of violation or order on the COR/PM/KO responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition, or occupancy of a building or structure in violation of the provisions of this code, or in violation of a permit or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation. Where violations pose a danger to life or property; a party is guilty of repeated failure to correct violations; the defective work or use has not been remedied within a reasonable time following an inspection report; or any other directive has not been complied with within a reasonable time, a notice of violation order may suspend or revoke a temporary or permanent Certificate of Occupancy. The notice of violation order shall indicate the right of appeal by referencing the appeals section. Appeals should be directed to the AHJ.

114.3 Prosecution of violation.

If the notice of violation is not complied with promptly, the BCO is authorized to request the COR/PM/KO, or if there is no KO, the Director, FSD, to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

114.4 Violation penalties.

At the discretion of the COR/PM/KO, any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the BCO, or of a permit or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by contract and/or regulation.

115.0 STOP WORK ORDER

115.1 Authority.

115.1.1 The BCO or a designated representative is authorized to issue a stop work order for any condition deemed an immediate danger to life or health.

115.1.2 The PM/COR, KO, or the Director, FSD, is authorized to issue a stop work order when the BCO determines that work regulated by this code is being performed in a manner contrary to the provisions of the code.

115.2 Issuance.

The stop work order shall be in writing and shall be given to the project manager involved or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

115.3 Unlawful continuance.

Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by contract or regulation.

116.0 UNSAFE STRUCTURES AND EQUIPMENT

116.1 Conditions.

Structures or equipment that are or hereafter become unsafe, unsanitary, or deficient because of inadequate means of egress facilities, inadequate light and ventilation, or which constitute a fire hazard, or are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance, shall be deemed an unsafe condition. Unsafe structures shall be taken down and removed or made safe as the BCO deems necessary and as provided for in this section. A vacant structure that is not secured against entry shall be deemed unsafe.

116.2 Record.

The BCO shall cause a report to be filed on an unsafe condition. The report shall state the occupancy of the structure and the nature of the unsafe condition.

116.3 Notice.

If an unsafe condition is found, the BCO shall serve on the person in control of the structure, a written notice that describes the condition deemed unsafe and specifies the required repairs or improvements to be made to abate the unsafe condition, or that requires the unsafe structure to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the BCO acceptance or rejection of the terms of the order.

116.4 Method of service.

Such notice shall be deemed properly served if delivered in a manner approved by WHS Office of the General Counsel (WHS OGC). Service of such notice upon the owner's agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

116.5 Restoration.

The structure or equipment determined to be unsafe by the BCO is permitted to be restored to a safe condition. To the extent that repairs, alterations or additions are made or a change of occupancy occurs during the restoration of the structure, such repairs, alterations, additions, or change of occupancy shall comply with the requirements of Sections 105.2.1 and 105.2.2.

117.0 COMMISSIONING

117.1 *Requirements.

The BCO/AHJ may require the implementation of a commissioning process depending upon the type of project, size and complexity, degree of interface with WHS utility infrastructure, and whether or not equipment will be turned over to WHS for Operations and Maintenance.

118.0 SITE LIMITATIONS

118.1 While installing building structures or during demolition, noise shall not exceed 85 dba to any tenant in their space at any one time during normal business hours of a normal 5 day work week.

200.0 WHSBC TECHNICAL AMENDMENTS

201.0 CHAPTER 1 – ADMINISTRATION

This code adopts the International Building Code (IBC) by reference, as the base building code for the Washington Headquarters Services except as modified herein, see Section 101.5.

- 201.1 Use Section 100.0 of this document in lieu of IBC Chapter 1.
- 201.2 Military Department, Defense Agency, and DoD Field Activity specific exceptions/requirements identified within referenced UFC documents or UFGSs do not apply unless specifically adopted by this document.
- 201.3 No construction, alteration, or repair shall reduce the level of fire protection or life safety provided by existing conditions.
- 201.4 Wherever the terms "Installation", "Base", "Basewide" are used in the UFCs, these terms shall also be meant to include the term "Facility".

202.0 CHAPTER 2 – DEFINITIONS

- 202.1 Use IBC Chapter 2 and definitions in Section 101.7.
- 202.2 Definitions apply to terms used in the model code, and are not intended to replace definitions and terms in military documents.

203.0 CHAPTER 3 – USE AND OCCUPANCY CLASSIFICATION

Use IBC Chapter 3 and UFC 3-600-01. If any conflict occurs between IBC Chapter 3 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

204.0 CHAPTER 4 – SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

Use UFC 3-600-01 and additional requirements below in lieu of IBC Chapter 4.

- 204.1 Reserved
- 204.2 Personnel Housing and Similar Lodging Facilities. (UFC 3-600-01, Section 4-32).
- 204.3 Family Housing (UFC 3-600-01, Section 4-14).
- 204.4 Food Preparation in Facilities (UFC 3-600-01, Section 4-15).
- 204.4.1 Revise Section 4-15.1.1 to read: Hood and duct systems for public and private commercial cooking equipment that produces smoke or grease-laden vapors must comply with NFPA 96, "*Ventilation Control and Fire Protection of Commercial Cooking Operations*" and NFPA 17A, "*Standard for Wet Chemical Extinguishing Systems*".
- 204.4.2 *Revise Section 4-15.1.2 to read: For new construction and new complete system installations, limit commercial kitchen extinguishing systems to water-assisted wet chemical installed in accordance with NFPA 96, NFPA 17A, and UL 300. Automatic sprinklers shall not be permitted for protection of kitchen hood and duct systems.
- 204.4.3 Add Section 4-15.1.3 - Install fire suppression systems that sound a general building fire alarm and transmit a signal to a constantly attended location.
- 204.4.4 Add Section 4-15.1.4 - Duct systems that convey grease-laden vapors must pass a water test that uses a pressure washer operating at a minimum of 1500 psi (10342.1 kPa) following the requirements of ASHRAE 154.

- 204.4.5 Revise Section 4-15.2.2.1 to read: All residential type range top cooking surfaces must be equipped with an approved residential range top extinguishing system in accordance with Section 204.4.8.
- 204.4.6 Add Section 4-15.2.4: Ventilation Equipment.
- 204.4.6.1 Add Section 4-15.2.4.1- Where commercial cooking appliances are vented by means of the Type I or II kitchen exhaust hood system that serves such appliances, the exhaust system shall be fan powered and the gas and electric appliances shall be interlocked with the exhaust hood system to prevent appliance operation when the exhaust hood system is not operating.
- 204.4.6.2 Add Section 4-15.2.4.2- Grease ducts shall require the installation of a continuous 2 hour fire barrier from the kitchen hood to the exhaust fan using a 2 hour fire barrier duct wrap, 2 hour fire resistant shaft type enclosure, or combination.
- 204.4.7 Add Section 4-15.2.5: Bypass. Where a solenoid valve is installed in the gas piping as part of an interlock system, a bypass line no larger than a 1/2 inch (12.7 mm) shall be installed to continuously supply the pilot(s) when the exhaust fan is not operating.
- 204.4.8 *Add Section 4-15.2.6 - Residential Cooking Equipment.
Use of residential style stoves/ranges must be approved by OPFM and the Building Manager.
- 204.4.8.1 Residential style stoves/ranges shall be located under a metal hood.
- 204.4.8.2 Residential style stoves/ranges shall be protected with a listed residential style fire suppression system acceptable to OPFM.
- 204.4.8.3 Residential style stoves/ranges shall be protected with a fire suppression system with an automatic fuel shut-off connected to all sources of fuel and electric that produce heat to the equipment being protected by that system.
- 204.4.8.4 Fire suppression systems protecting kitchen appliances shall be connected to the fire alarm system.
- 204.4.9 Dampers shall not be installed in the exhaust system.
- 204.4.10 Construction and renovation of food preparation, food service and food storage facilities shall comply with the requirements of the Tri Service Food Code.
- 204.5 Detention and Correctional Facilities (UFC 3-600-01, Section 4-10).
- 204.6 Historic Resource Libraries, Archives and Facilities (UFC 3-600-01, Section 4-23).
- 204.7 Child Development Programs (UFC 3-600-01, Section 4-5).
- 204.8 Electronic Equipment Areas (UFC 3-600-01, Section 4-11).
- 204.8.1 Change Section 4-11.3.2 to read:
Smoke detection shall provide not less than 3 distinct alarm conditions/levels indicating increasing smoke/combustion conditions. Add the following to Section 4-11.4.3:
- 204.8.2 Add the following to Section 4-11.4.3:
Exception: For spaces that are normally unoccupied and are 500 sq ft or less in area, delete NFPA 75 requirement for separately valved sprinkler systems.
- 204.8.3 Change Section 4-11.6.4 to read:
Electrical equipment shall be protected by disconnecting the power upon activation of heat detectors that are of lower temperature than the sprinkler protecting the space, unless power disconnect is permitted by manual means per UFC Section 4-11.6.2.
- 204.9 Ordnance (UFC 3-600-01, Section 4-30).

- 204.10 Warehouse and Storage Facilities (UFC 3-600-01, Section 4-42).
- 204.10.1 Section 4-42.2.1.1- Change 5000 sq ft (465 sq m) to 3000 sq ft (279 sq m).
- 204.11 Hazardous Materials and Hazardous Waste (UFC 3-600-01, Section 4-16).
- 204.12 Waterfront Facilities (UFC 3-600-01, Section 4-43)
- 204.13 Petroleum, Oils and Lubricants (POL) Facilities (UFC 3-600-01, Section 4-34).
- 204.14 Hydraulic Systems (UFC 3-600-01, Section 4-19).
- 204.15 Aircraft Facilities (UFC 3-600-01, Section 4-3).
- 204.16 Aircraft Acoustical Enclosures (UFC 3-600-01, Section 4-2).
- 204.17 Hyperbaric and Hypobaric Chambers (UFC 3-600-01, Section 4-21).
- 204.18 Anechoic Chambers (UFC 3-600-01, Section 4-4).
- 204.19 Oxygen (UFC 3-600-01, Section 4-31).
- 204.20 Department of Defense Education Activity (DODEA) (UFC 3-600-01, Section 4-9).
- 204.21 Vehicle Parking, Storage, Maintenance and Repair Facilities (UFC 3-600-01, Section 4-41).
- 204.22 Pesticide Storage and Handling Facilities (UFC 3-600-01, Section 4-33).
- 204.23 Limited Access and Underground Structures (UFC 3-600-01, Section 4-24).
- 204.24 Natural Gas Service (UFC 3-600-01, Section 4-29).
- 204.25 Coal (UFC 3-600-01, Section 4-6).
- 204.26 Power Generating and Utilization Equipment (UFC 3-600-01, Section 4-35).
- 204.27 Trash/Recycling Collection and Disposal Areas (UFC 3-600-01, Section 4-40).
- 204.28 Elevators (UFC 3-600-01, Section 4-12).
- 204.28.1 Change Section 4-12.3.1 to read: Provide smoke detectors at all elevator lobbies and all elevator machine rooms, including where machine room-less controllers are located. Where ambient conditions are beyond the listing parameters for the smoke detector, a heat detector shall be provided.
- 204.29 Tensioned Membrane Structures (UFC 3-600-01, Section 4-39).
- 204.30 Commissaries and Exchanges (UFC 3-600-01, Section 4-7).
- 204.31 Morale Welfare and Recreation Facilities (MWR) (UFC 3-600-01, Section 4-28).
- 204.32 Missile Alert Facilities (MAF) (UFC 3-600-01, Section 4-27).
- 204.33 Emergency Services Communication Centers (UFC 3-600-01, Section 4-13).
- 204.34 High-Rise Buildings (UFC 3-600-01, Section 4-17).
- 204.35 Hydrogen Facilities (UFC 3-600-01, Section 4-20)
- 204.36 Medical Facilities (UFC 3-600-01, Section 4-25).
- 204.37 Historical Listed Facilities (UFC 3-600-01, Section 4-18)

204.38 Secure Compartmented Information Facility (SCIF) (UFC 3-600-01, Section 4-38)

204.38.1 Modify Section 4-38 as follows:

204.38.1.1 Delete Section 4-38.2.1.2

204.38.1.2 Add Section 4-38.3.3– Audible alarm notification appliances shall be provided and shall produce a distinctive sound that is not to be used for any purpose other than that of a fire alarm. The audible alarm notification appliances shall provide a sound pressure level of 65 dBA; 15 dBA above the average ambient sound level; or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is higher.

204.38.1.3 Add Section 4-38.3.4 – Where audible circuits must pass a Sensitive Compartmented Information Facility (SCIF) boundary, a means must be provided to prevent listening across the SCIF boundary.

205.0 CHAPTER 5 – GENERAL BUILDING HEIGHTS AND AREAS

Use IBC Chapter 5, except as modified by UFC 3-600-01 for limitations on use of IBC Table 503. The building area for funding and planning purposes may be calculated differently than the method defined in IBC Chapter 5.

206.0 CHAPTER 6 - TYPES OF CONSTRUCTION

Use IBC Chapter 6 and UFC 3-600-01. If any conflict occurs between IBC Chapter 6 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

207.0 CHAPTER 7 – FIRE AND SMOKE PROTECTION FEATURES

Use IBC Chapter 7, UFC 3-600-01 and additional requirements below. If any conflict occurs between IBC Chapter 7 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

207.1 Replace Section 7-2 with the following:

- (1) In the Pentagon, the A Ring and E Ring walls shall be of one-hour fire resistance rated construction.
Exception: For alteration or renovation work beyond interior finish in the A Ring or E Ring corridors that are currently not rated, if the work involves 10 linear feet (3.05 m) or less, or involves only door replacement, then the wall does not need to be upgraded at time of renovation.
- (2) In the Pentagon, the radial corridor walls shall be of two-hour resistance rated construction.
Exception: For alteration or renovation work beyond interior finish in radial corridors that are currently not rated, if the work involves 10 linear feet (3.05 m) or less, or involves only door replacement and said wall or door is not immediately adjacent to a two-hour rated wall, then the wall does not need to be upgraded at time of alteration or renovation.
- (3) For nonsprinklered buildings, storage rooms between 100 sq ft (9.29 sq m) and 500 sq ft (46.45 sq m) shall be of one-hour fire resistance rated construction. For nonsprinklered buildings, storage rooms greater than 500 sq ft (46.45 sq m) shall be of two-hour fire resistance rated construction. For sprinklered buildings, storage rooms greater than 300 sq ft (27.87 sq m).
- (4) Electrical rooms shall be of one-hour fire resistance rated construction. Medium and high voltage electrical vaults and oil-insulated transformer vaults shall be of three-hour fire resistance rated construction.
- (5) Telecommunications rooms shall be a minimum of one-hour fire resistance rated construction.

- (6) Laboratory space shall be separated from all other spaces by two-hour fire resistance rated construction if flammable liquids of any quantity may be used.
- (7) Labeling - For all fire rated barriers and partitions, provide a stenciled label every 8 ft (2.4 m) to identify fire resistance rating and penetration requirements as shown below:

X HOUR FIRE RATED WALL
DO NOT PENETRATE WITHOUT
APPROVAL OF THE FIRE MARSHAL

The first line shall have stenciled letters no smaller than 1 inch (25.4 mm) in height. The second and third lines shall have stenciled letters no smaller than 5/8-inch (15.8 mm) in height. Striping may be interrupted at the point of stenciling if desired.

- (8) For all membrane penetrations of fire rated barriers and partitions, all steel electrical or junction boxes shall be firestopped by an approved method regardless of size or total aggregate area of the openings.

208.0 CHAPTER 8 – INTERIOR FINISHES

Use UFC 3-600-01 in lieu of IBC Chapter 8 in conjunction and coordination with UFC 3-120-10, *Interior Design*.

- 208.1 *Use UFC 1-200-02 for interior finish low volatile organic compounds (VOC) requirements.

209.0 CHAPTER 9 – FIRE PROTECTION SYSTEMS

Use UFC 3-600-01 in lieu of IBC Chapter 9 as modified below:

- 209.1 Add Section 9-3.1.6:

All water based fire suppression systems contiguous to the Pentagon must be supplied by the Center Courtyard Utility Tunnel (C-CUT) fire protection loop.

- 209.2 Change the wording of Section 9-5.5.1 to read:

Provide variable speed electric fire pump controllers with digital soft start bypass for electric-driven pumps.

- 209.3 Change Section 9-3.1.4 to read:

Provide corrosion protection utilizing polyethylene wraps, bituminous coatings, use of CPVC or cathodic protection.

- 209.4 Change Section 9-3.1.5 to read:

Where cathodic protection is used, comply with UFC 3-570-02A, *Cathodic Protection*.

- 209.5 Change Section 9-3.4.5 to read:

Provide supervision of all post indicator valves (PIVs). Supervision shall be accomplished using a lock or tamper seal as well as electronic supervision that reports to the building fire alarm system.

- 209.6 The following exceptions shall apply to Section 9-6.3.2

Exception: For new and modified pre-engineered fire suppression systems, designs by a factory certified system designer are acceptable.

- 209.7 Change Section 9-6.3.3 to read:
Where twenty or less sprinklers are modified or relocated, hydraulic calculations and material submittals are not required to be submitted. Construction shop drawings meeting NFPA 13 requirements for working plans are required for all sprinkler system modifications.
- 209.8 Section 9-6.4 shall not apply to renovations within the Pentagon Reservation where annual water flow test data is available. A water flow test conducted in accordance with NFPA 291 is required for all new free standing sprinklered structures. Water flow tests shall be witnessed by a representative of the OPFM.
- 209.9 Change Section 9-7.2.1.1 to read:
Single-story, Type I or II construction facilities greater than 5,000 sq ft (465 sq m).
- 209.10 Change Section 9-7.2.1.3 to read:
Single-story Type III, Type IV, and Type V construction greater than 3,500 sq ft (325 sq m).
- 209.11 Add Section 9-7.2.1.6
For Additions or Partial Renovations of Existing Buildings. Sprinkler protection must be provided if the entire gross floor area of the building (including any additions) exceeds 5,000 sq ft (465 sq m), or is an essential facility. The addition or portion of the building being renovated must include sprinkler protection and be designed to support sprinklers for the remainder of the building when it is renovated.
- 209.12 Add Section 9-7.3.1.3 – For any new construction within the Pentagon or existing Pentagon sprinkler system modifications the minimum design density and area shall not be less than 0.15 gpm/sqft over 3000 sqft.
- 209.13 *Add Section 9-7.3.1.4 - For all new building construction, the minimum design density and area shall follow the Ordinary Hazard requirements in UFC 3-600-01. All references to Light Hazard in other sections of the UFC 3-600-01 should not apply.
Exception: FBMCC.
- 209.14 Change Section 9-7.6.2 to read – Use Schedule 40 steel piping for all sprinkler systems.
- 209.15 Change Section 9-7.6.3 to read – CPVC pipe is not permitted.
- 209.16 Delete Section 9-7.6.5.
- 209.17 Add Section 9-7.6.11 – All piping in dry-pipe systems and piping exposed to humid or corrosive atmospheres (due to moisture or fumes from corrosive chemicals or both) shall be cleaned of oils and other contaminants, primed, and painted.
- 209.18 Add Section 9-7.6.12 - Unions and bushings shall not be used in sprinkler systems on the system side of the control valve.
- 209.19 Replace Section 9-7.6.8 as follows:
Installations utilizing flexible sprinkler connections must meet the following requirements:
- Connections shall be listed by UL and the equivalent lengths used in the hydraulic calculations shall originate from UL testing.
 - Connections utilizing O-ring style fittings will not be permitted.
 - Connection assemblies shall be listed for seismic installations per the UFC.
 - The use of a tool and/or special knowledge shall be required to detach mounting brackets from the ceiling construction.
 - All flexible connections on a project shall be of a uniform length. Note, the specific length used is permitted to vary between projects.

- 209.20 Add Section 9-6.3.9 Hydraulic calculations shall include a minimum 10 psi (68.95 kPa) safety factor.
- 209.21 Change 9-6.4 as follows:
Conduct waterflow tests, in accordance with the procedures contained in NFPA 291 to determine available water supply for the water-based fire extinguishing systems. The flow test must be performed under the direction of the *QFPE*. Calculations must be based on water flow test data fewer than 12 months old conducted in accordance with Section 209.6.
- 209.22 Delete Section 9-7.4.1.1 and 9-7.4.1.2.
- 209.23 Add the following exception to Section 9-7.4.3:
Exception: Electronic equipment and telecommunication spaces may utilize extended coverage sprinklers per NFPA 13.
- 209.24 Change Section 9-7.6.9 to read:
Along straight lengths of pipe, make changes in pipe sizes through tapered reducing pipe fittings.
- 209.25 Delete Section 9-7.10.2. Revert to NFPA 13 requirements.
- 209.26 *Re-number Section 9-7.10.6 to 9-7.10.6.1. Add Section 9-7.10.6.2 – Provide a dedicated control valve assembly for piping serving rooms designated for mercantile and food services. Locate the control valve assembly outside of the area it serves in an easily accessible identified location.
- 209.27 Change Section 9-10.1 to read “When required, standpipe systems must comply with NFPA 14 and the “Fire Suppression Systems” requirements of this UFC”.
- 209.28 Change Section 9-17.1 of the UFC 3-600-01 to read:
Portable extinguishers must be provided where required by NFPA 101, Life Safety Code. The following additional requirements shall also apply:
- (1) Fire extinguishers shall be provided in all electrical rooms, substations and mechanical rooms.
 - (2) Fire extinguishers shall be provided at the floor landing of each stairwell.
 - (3) The travel distance to a fire extinguisher shall not exceed 50 ft (15.24 m).
Exception: Parking garages – fire extinguishers are required at every level within each stairwell.
 - (4) ABC Dry Chemical extinguishers shall have minimum rating of 4A80BC and a minimum discharge time 20 seconds.
 - (5) ABC Clean Agent extinguishers shall minimum rating of 2A10BC and a minimum discharge time of 13 seconds.
 - (6) Fire extinguisher signage shall be provided at all fire extinguishers. Fire extinguisher signage shall be wall mounted, double sided and photoluminescent and shall project from the wall a minimum of 4 inches (101.6 mm).
Exception: Signage is not required in stairwells.
 - (7) Where provided, fire extinguisher monitoring systems shall be provided with a hard-wired means of power.
- 209.29 Change Section 9-17.2.2 to read “Clean agent fire extinguishers shall be provided in all telecommunications and computer rooms”.
- 209.30 Add Section 9-17.4:
Break-glass style fire extinguisher cabinets are not permitted.

- 209.31 Change Section 9-12.1 to read:
Wet chemical systems must conform to NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*, NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations* (for kitchen applications), the “Fire Suppression Systems” requirements of UFC 3-600-01, and the manufacturer’s listed installation manual.
- 209.32 Add Section 9-7.10.12 - Sprinkler piping shall not be installed in locations subject to significant and foreseeable mechanical or physical harm unless protected by approved barriers.
- 209.33 Add Section 9-7.10.13- The use of roll grooved pipe with grooved fittings is prohibited in dry and pre-action sprinkler systems.
- 209.34 Add Section 9-7.10.14- Valves controlling the water supply to automatic fire extinguishing systems protecting kitchen hoods shall be a listed, indicating type and shall be supervised open via the building fire alarm system.
- 209.35 Add Section 9-7.10.15 - Impairments to fire protection systems greater than 4 hours shall require a fire watch at no cost to the AHJ.
- 209.36 Change Section 9-18.9.1 to read:
Facility emergency notification systems including fire alarm (detection, notification, and signaling) and/or mass notification shall be addressable voice notification systems using a minimum of Class B pathways as defined by NFPA 72. Use of pathways with lesser performance capabilities shall require AHJ approval.
- 209.37 The following exception shall apply to Section 9-18.2:
Exception: For modifications to fire alarms systems affecting fewer than 5 audio/visual appliances, system working plans do not need to be reviewed or prepared by a NICET Level III/Fire Protection Engineer.
- 209.38 Amend Section 9-18.1.2.4 to include the following:
All DoD owned buildings within the Pentagon Reservation shall transmit point addressable alarm, supervisory, and trouble signals back to the Pentagon POC via the Class X fiber optic network.
- 209.39 Section -9-18.3.5 Add the following bullet items:
- Fire alarm systems and all detection, notification and monitoring components shall be controllable and resettable from the Pentagon POC or other respective proprietary supervising stations.
- 209.40 Section 9-18.6.3 - Add the following bullet items:
- Visual appliances shall be installed in offices with more than one work station or tables capable of accommodating four or more chairs.
 - Audible alarm notification appliances shall be provided and shall produce a distinctive sound that is not to be used for any purpose other than that of a fire alarm. The audible alarm notification appliances shall provide a sound pressure level of 65 dBA; 15 dBA above the average ambient sound level; or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is higher.
 - Where audible circuits must pass a Sensitive Compartmented Information Facility (SCIF) boundary, a means must be provided to prevent listening across the SCIF boundary.
 - Locally installed audio or visual systems that compete with or reduce the effectiveness of an emergency signal from the fire alarm or mass notification system shall be interlocked to shut down the local signal, prioritizing the emergency signal.
- 209.41 Change Section 9-18.11.3 to read:
Provide secondary power per NFPA 72. Where the fire alarm system also serves as a Mass Notification System refer to UFC 4-021-01, Design and O&M: Mass Notification Systems, for additional requirements.

209.42 Change Section 9-18.6.5 to read:

For systems using voice evacuation or combined with the Mass Notification System, the default fire alarm voice evacuation message must state the following:

“May I have your attention please. May I have your attention please. A fire emergency has been reported in the building. Please leave the building by the nearest exit or exit stairway. Do not use the elevators.”
<provide a 2 second pause> “May I have your attention please...” (repeat the message).

Note: For single story buildings, delete “or exit stairway. Do not use the elevators” in the voice message.

209.43 Delete Section 9-18.7.4.1

209.44 Change Section 9-18.7.6 to read:

When under-floor smoke detectors are provided, provide a framed CAD drawn floor plan showing the location of the devices in the room and their corresponding address. Locate a single framed drawing inside the space that contains smoke detectors adjacent to the main entrance to that space.

209.45 Change wording of Section 9-18.9.4.1 to read:

All new conductors must be solid copper. Modifications to existing systems must match the existing conductor types and protections at a minimum.

209.46 Change wording of Section 9-18.9.7.1 to read:

All fire alarm cable, conduit, junction boxes and covers in unfinished areas (above ceilings, mechanical rooms, etc.) must be red.

209.47 Change the wording of 9-18.9.7.2 to read:

In finished areas, conduit and junction boxes can be painted to match the room finish, the inside cover of the junction box must be identified as “Fire Alarm” and the conduit must have painted red bands ¾ -inch (20 mm) wide at 20 foot (6.0 m) intervals and on both sides of a floor, wall, or ceiling penetration.

209.48 Add Section 9-18.3 “Pathway Survivability”

Fire alarm pathways must be a minimum of Pathway Survivability Level 1 or Shared Pathway Level 3 as defined by NFPA 72.

209.49 Add Section 9-18.5.1.5 Gas Detection.

Each gas detection system control unit installed on the Pentagon Reservation shall be individually addressed and annunciate its associated gas alarm threshold on the fire alarm system as an alarm signal that does not automatically initiate occupant notification.

210.0 CHAPTER 10 – MEANS OF EGRESS

Use UFC 3-600-01 in lieu of IBC Chapter 10.

210.1 Add Section 10-1.3 - Door leaves shall unlock in the direction of egress upon activation of a manual pull station.

210.2 *Add Section 10-1.4 – Access panels shall not be installed in exit passageways.

210.3 Delete Section 10-2.1.2.

210.4 *Add the following to Section 10-2.3.2

210.4.1 Photoluminescent signage shall be provided in accordance with NFPA 101 Life Safety Code and the requirements set forth in Sections 210.4.2-210.4.7.16.2.

- 210.4.2 The luminance of photoluminescent signage and striping shall meet the performance criteria of ASTM E 2072-10.
- 210.4.3 Photoluminescent signage shall be continuously illuminated while the space is occupied.
- 210.4.4 Photoluminescent Exit Signage
- 210.4.4.1 All exit signage provided shall be listed for a viewing distance of not less than 50 feet (15.2 m) in accordance with UL 924.
- 210.4.4.2 UL 924 listed photoluminescent exit signs shall be installed at low level locations to supplement but not replace other code required exit signs.
- 210.4.5 As used herein, “striping” refers to 1-1/2 inch (38.1 mm) photoluminescent strips located directly above the baseboards unless otherwise indicated. The required width refers to the visible width of the photoluminescent strip after installation.
- 210.4.6 Striping shall be mounted within track frames unless otherwise indicated. The frame shall be of a color to match the wall/equipment/furniture upon which the track frame is installed.
- 210.4.6.1 The striping shall be mounted on permanent walls except where layout requires mounting on cubicle partition bases or furniture.
- 210.4.6.2 *When files or bookcases are located on these walls, the directional striping shall be mounted in a track frame applied to cabinet and cubicle partition bases.
- 210.4.7 *Photoluminescent lighting shall be installed in the following locations:
- 210.4.7.1 Corridors.
- 210.4.7.1.1 Directional/pathway striping shall be continuous from the most remote point to the nearest exit.
- 210.4.7.1.2 Striping shall be provided on both sides of the corridor when the width is 6-1/2 ft (2 m) or greater.
- 210.4.7.1.3 Exit doors from corridors to exits or stairs shall be provided with the following:
- 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
 - Exit sign located on latch side of door, above the baseboard. For double doors, exit signs shall be installed adjacent to each door leaf on the egress side of the door, above the baseboard. When there is not sufficient space on the wall, exit sign(s) can be installed on each door leaf, as long as that door is normally in the closed position (e.g. does not have a hold-open device).
 - Stairway identification sign.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.1.4 The following items located in corridors shall be provided with identification signs:
- Fire extinguisher cabinets (double sided, projecting at least 4 inches (101.6 mm))
 - Fire hose cabinets
 - Emergency telephones
 - Fire alarm pull stations
 - Automated external defibrillator cabinets
- 210.4.7.1.5 Any door, passage, or stairway that is neither an exit nor a way of exit access and that is located or arranged so that it is likely to be mistaken for an exit shall be identified by a sign that reads as follows: NO EXIT.
- 210.4.7.2 *Exit Stairs.
- 210.4.7.2.1 Directional/pathway striping continuous from all points within the stair to the stair discharge shall be provided.

210.4.7.2.2 Stairway Identification Signs.

A sign shall be provided at each floor landing in exit enclosures designating the floor level, the terminus of the top and bottom of the exit enclosure and the identification of the stair. The signage shall also state the story of, and the direction to, the exit discharge and the availability of roof access from the enclosure for the fire department. The sign shall be located 5 feet (1.52 m) above the floor landing in a position that is readily visible when the doors are in the open and closed positions. Floor level identification signs in tactile characters complying with ICC A117.1 shall be located at each floor level landing adjacent to the door leading from the enclosure into the corridor to identify the floor level.

210.4.7.2.2.1 Stairway identification signs shall comply with all of the following requirements:

- (1) The signs shall be a minimum size of 18 inches (457 mm) by 12 inches (305 mm).
- (2) The letters designating the identification of the stair enclosure shall be a minimum of 1-1/2 inch (38.1 mm) in height.
- (3) The number designating the floor level shall be a minimum of 5 inches (127 mm) in height and located in the center of the sign.
- (4) All other lettering and numbers shall be a minimum of 1 inch (25.4 mm) in height.
- (5) Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.

210.4.7.2.3 Handrails shall be identified by wall mounted striping installed above, and equal in length to, the railings.

210.4.7.2.4 *A solid and continuous stripe shall be applied to the horizontal leading edge of each step and shall extend for the full length of the step. Outlining stripes shall have a minimum horizontal width of 1 inch (25.4 mm) and a maximum width of 2 inches (50.8 mm). The leading edge of the stripe shall be placed at a maximum of 1/2 inches (12.5 mm) from the leading edge of the step. The stripe may overlap the leading edge of the step by not more than 1/2 inches (12.5 mm) down the vertical face of the step.

Exception: The minimum width of 1 inch (25.4 mm) shall not apply to outlining stripes listed in accordance with UL 1994.

210.4.7.2.5 Up or Down symbol markings shall be provided on all non-exit level landings to direct occupants to the exit/discharge level.

210.4.7.2.6 Markings shall be provided on all sprinkler control valves, fire hose standpipe valves, emergency telephones, fire extinguisher cabinets, etc.

210.4.7.2.7 Provide "Obstruction" markers on piping or other obstructions that project into landings.

210.4.7.2.8 Exit doors from stairs shall be provided with the following:

- 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
- Stairway identification sign.
- Exit sign located on latch side of door, above the baseboard.
- Door knob ring or PUSH BAR TO OPEN sign.

210.4.7.3 Elevator Banks and Escalators.

210.4.7.3.1 At elevator entrances, provide combination Elevator Identification and In Case of Fire Use Stairs sign.

210.4.7.3.2 At escalators, provide pathway directional striping, mounted above safety sweep strips.

210.4.7.4 *Individual Offices larger than 250 sq ft (23.2 sq m)

210.4.7.4.1 Pathway directional striping shall be provided for a minimum 6 ft from both sides of door.

210.4.7.4.2 On permanent walls, striping may be adhesively mounted (without track frames).

- 210.4.7.4.3 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.5 *Office Suites.
- 210.4.7.5.1 Pathway directional striping shall be provided from the most remote location to the exit door.
- 210.4.7.5.1.1 On permanent walls striping may be adhesively mounted (without track frames).
- 210.4.7.5.2 Doors from the space shall be provided with the following:
- 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.6 Conference Rooms.
- 210.4.7.6.1 Pathway directional striping is required for not less than half the length of the room for conference rooms from up to 300 sq ft (27.87 sq m).
- 210.4.7.6.2 Pathway directional striping shall extend the entire length of the room for conference rooms larger than 300 sq ft (27.87 sq m).
- 210.4.7.6.3 In amphitheater type conference rooms, edges of raised seating platforms shall be provided with luminous striping.
- 210.4.7.6.4 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door.
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.7 Exam/Treatment Rooms.
- Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.8 Library.
- 210.4.7.8.1 Provide pathway directional striping on aisle and corridor walls leading to egress doorways.
- 210.4.7.8.2 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door.
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.9 Restrooms.
- 210.4.7.9.1 Pathway directional striping shall be provided extending from the most remote point to the public corridor.
- 210.4.7.9.2 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door.
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.

- 210.4.7.9.3 Any restroom door or opening that is located or arranged so that it is likely to be mistaken for an exit shall be identified by a sign that reads as follows: NO EXIT.
- 210.4.7.10 Cafeteria/Lunch Rooms.
- 210.4.7.10.1 Pathway directional striping shall be provided on walls leading to egress doors.
- 210.4.7.10.2 Obstruction striping shall be provided on columns and fixed equipment obscuring path to exits.
- 210.4.7.10.3 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door.
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.11 Storage Areas.
- 210.4.7.11.1 Directional striping shall be provided from remote area to the room exit.
- 210.4.7.11.2 Pathway directional striping shall be installed within track on bases of fixed storage systems.
- 210.4.7.11.3 Pathway directional striping shall be installed within track on walls where mobile, flexible storage layouts exist.
- 210.4.7.11.4 Power sleeves over light bulbs shall be provided on nearest light fixture on emergency lighting circuit to door.
- 210.4.7.11.5 Doors from the space shall be provided with the following:
- 1 inch by 36 inch (25.4 mm by 914 mm) tape or equivalent mounted on or adjacent to door frame on latch side of door
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.12 Mechanical/Electrical Rooms.
- 210.4.7.12.1 Obstruction striping shall be provided on equipment bases and on columns as well as on low hanging obstructions and floor mounted piping.
- 210.4.7.12.2 Power sleeves over light bulbs shall be provided to nearest light fixture on emergency lighting circuit to door.
- 210.4.7.12.3 Doors from the space shall be provided with the following:
- 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.13 Workshops & Large Mechanical/Electrical Rooms.
- 210.4.7.13.1 Floor mounted directional arrow disks shall be provided every 24 inches (610 mm) along aisles and pathways from the most remote location to exit doorways.
- 210.4.7.13.2 Perimeter walls with no fixed equipment shall be provided with pathway directional striping.
- 210.4.7.13.3 Obstruction striping shall be provided on all fixed equipment bases, columns, etc.
- 210.4.7.13.4 Doors from the space shall be provided with the following:
- 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.13.5 Any door, passage, or stairway that is neither an exit nor a way of exit access and that is located or arranged so that it is likely to be mistaken for an exit shall be identified by a sign that reads as follows: NO EXIT.

- 210.4.7.14 Loading Docks / Shipping and Receiving Areas.
 - 210.4.7.14.1 Pathway directional striping shall be provided on walls.
 - 210.4.7.14.2 Pathway directional striping shall be provided on rolling door slat to provide continuous pathway marking.
 - 210.4.7.14.3 Floor mounted directional arrow disks shall be provided every 24 inches (610 mm) along aisles and pathways from the most remote location to exit doorways.
 - 210.4.7.14.4 On exterior exit stairs under loading docks:
 - 210.4.7.14.4.1 Stair tread marking shall be provided.
 - 210.4.7.14.4.2 Top stair handrail shall be painted with luminous paint or “rail safe” luminous wrapping shall be provided.
 - 210.4.7.14.5 Doors from the space shall be provided with the following:
 - 1 inch (25.4 mm) tape or equivalent mounted on or adjacent to door frame (both jambs and head).
 - Exit sign located on latch side of door, above the baseboard.
 - Door knob ring or PUSH BAR TO OPEN sign.
- 210.4.7.15 Central Courtyard Utility Tunnels.
 - 210.4.7.15.1 Continuous pathway directional striping shall be provided continuously leading to exit ways.
 - 210.4.7.15.2 Continuous obstruction striping adhered to floor mounted piping shall be provided.
- 210.4.7.16 Heating and Refrigeration Plant Utility Tunnels.
 - 210.4.7.16.1 Pathway directional striping shall be provided along walkways and leading continuously to exits.
 - 210.4.7.16.2 Obstruction striping shall be provided on vertical rack supports.
- 210.4.8 Change the following Occupant Load Factor in Table 10-1:

Table 10-1– Occupant Load Factors

Use	Sq ft (sq m) per person
Mechanical, electrical and other building equipment spaces	300 (27.9) gross

- 210.5 Add Section 10-1.3 - The common path of travel shall be measured starting at a point 12 inches (305 mm) from the most remote point in the room (exclusive of furniture) to 12 inches (305 mm) beyond the point where an occupant has the choice of two separate and distinct egress paths to two different exits.
- 210.6 Add Section 10-1.4 - Doors swinging into corridors shall be recessed such that they swing a maximum of 7 inches (178 mm) into the corridor.
- 210.7 *Add Section 10-1.5 - Security Locks. Where security locks are used to meet DoD security standards, the lock-sets shall be required to release the latch and to put the door leaf into motion with a single action. The lock-sets must not require special knowledge to operate. The lock-sets must not require tight hand/finger gripping to operate.

211.0 CHAPTER 11 – ACCESSIBILITY

Use the Architectural Barriers Act (ABA) *Accessibility Standard for Department of Defense Facilities* as adopted by the Deputy Secretary of Defense memorandum dated October 31, 2008, in lieu of IBC Chapter 11 (see Appendix D).

Where the ABA references the IBC 2000 or 2003 editions and supplements, the latest version of the IBC is acceptable when it meets or exceeds the ABA requirements.

212.0 CHAPTER 12 – INTERIOR ENVIRONMENT

Use IBC Chapter 12, except as modified below:

- 212.1 Delete Section 1204.1, including the exception, and replace with the following:
- 212.2 1204.1 *Equipment and Systems*. Use the applicable Unified Facilities Criteria for temperature control criteria.

213.0 CHAPTER 13 – SUSTAINABILITY AND ENERGY EFFICIENCY

*Use UFC 1-200-02 in lieu of IBC Chapter 13.

- 213.1 UFC 1-200-02, Chapter 1 - Introduction is supplemented by Section 100.0 of this code.
- 213.2 Integrated Design - See UFC 1-200-02 Chapter 2
- 213.3 Integrated Assessment - See UFC 1-200-02 Chapter 3
- 213.4 Existing Building Requirements - See UFC 1-200-02 Chapter 4
- 213.5 Federal Policies - See UFC 1-200-02 Chapter 5
- 213.6 Guiding Principles - See UFC 1-200-02 Chapter 6
- 213.7 WHS Code Plus Requirements of topics not discussed in UFC 1-200-02
- 213.7.1 The Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities shall be provided as part of the 100% design submission.
- 213.8 Higher Mandates
- 213.8.1 *Use UFC 3-210-10, *Low Impact Development* and UFC 2-100-01, *Installation Master Planning and Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds* to supplement these requirements.
- 213.8.2 Energy and water meters shall be installed in accordance with Energy Independence Security Act.

214.0 CHAPTER 14 – EXTERIOR WALLS

Use IBC Chapter 14.

215.0 CHAPTER 15 – ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

Use IBC Chapter 15 and UFC 3-101-01, *Architecture* and UFC 3-110-03, *Roofing*.

- 215.1 A life cycle cost analysis shall be conducted to determine the most cost effective, innovative strategies to minimize consumption of energy, water, and materials, as required by Executive Order (E.O.) 13514.
- 215.2 Use UFC 3-210-10, *Low Impact Development* to meet storm water management requirements.

216.0 CHAPTER 16 – STRUCTURAL DESIGN

Use IBC Chapter 16 as modified by UFC 3-301-01. Use IBC Chapter 16 and UFC 3-310-04 for seismic design.

217.0 CHAPTER 17 – SPECIAL INSPECTIONS AND TESTS

Use Chapter 17 as modified by UFC 3-301-01 and UFC 3-600-01. The Structural Tests and Special Instructions described in IBC Chapter 17 provide a variety of procedures and criteria for testing materials and assemblies. Some DoD requirements are more stringent and these take precedence as identified in these UFCs. Replace IBC Paragraph 1704.2 as follows:

217.1 The contractor must employ one or more *approved agencies* to perform inspections during construction on the types of work listed under IBC Section 1705 Required Verification and Inspection. These inspections are in addition to the inspections defined in Section 110. The inspecting agency must provide reports of the special instructions directly to the government.

218.0 CHAPTER 18 – SOILS AND FOUNDATIONS

Use IBC Chapter 18, as modified by UFC 3-301-01, and UFC 3-220-01.

218.1 Supplement to IBC 1804.3: Grading and associated storm water runoff shall be arranged so as to not adversely affect surrounding sites.

218.2 Supplement to UBC 1808.7.4: Finished floor elevations shall be a minimum of 8 inches (200 mm) above the finished grade at the perimeter of the building.

219.0 CHAPTER 19 – CONCRETE

Use IBC Chapter 19 as modified by UFC 3-301-01 and UFC 1-200-02.

220.0 CHAPTER 20 – ALUMINUM

Use IBC Chapter 20.

221.0 CHAPTER 21 – MASONRY

Use IBC Chapter 21 as modified by UFC 3-301-01.

222.0 CHAPTER 22 – STEEL

Use IBC Chapter 22 as modified by UFC 3-301-01.

223.0 CHAPTER 23 – WOOD

Use IBC Chapter 23.

224.0 CHAPTER 24 – GLASS AND GLAZING

Use IBC Chapter 24.

224.1 New windows shall be US EPA ENERGY STAR Most Efficient designated products.

225.0 CHAPTER 25 – GYPSUM BOARD AND PLASTER

Use IBC Chapter 25.

226.0 CHAPTER 26 – PLASTIC

Use IBC Chapter 26 and UFC 3-600-01

227.0 CHAPTER 27 – ELECTRICAL

*Use IBC Chapter 27, as modified by the following:

227.1 UFC 3-501-01 for general electrical requirement criteria.

227.1.1 Design Stationary Battery Areas in accordance with UFC 3-520-05.

- 227.1.1.1 Add a new Section 2-3.2.4 Hydrogen Detection to UFC 3-520-05 to read as follows:
Provide hydrogen gas detection systems for Stationary Battery Areas. Design hydrogen gas detection systems in accordance with the manufacturer's recommendations and listings. Alarm threshold shall be set at 1 percent concentration. Hydrogen gas detection systems shall be annunciated on the Pentagon Reservation's fire alarm and building automation systems as further described in Section 209.49 and 228.3.10.
- 227.2 UFC 3-520-01 for interior electrical systems criteria.
- 227.2.1 Revise Section 3-2 to include the following
 - 227.2.1.1 Enclosures for panelboards and switchboards shall not be used as junction boxes, auxiliary gutters or raceways for conductors feeding through or tapping.
 - 227.2.2 Revise Section 3-2.2 to include the following
 - 227.2.2.1 Panelboards are to be Main Circuit Breaker (MCB) type.
 - 227.2.2.1.1 *Exception: Unless otherwise restricted by code, Main Lug Only (MLO) type panelboards are acceptable when all of the conditions set forth in 227.2.2.1.1.1 - 227.2.2.1.1.4 are met.*
 - 227.2.2.1.1.1 Dedicated overcurrent protection device and disconnect device are provided for the panelboard.
 - 227.2.2.1.1.2 The disconnect device for the panelboard is within sight of the panelboard.
 - 227.2.2.1.1.3 The circuit distance between the panelboard and its means of disconnect is less than 25 ft (7620 mm).
 - 227.2.2.1.1.4 All neutral conductors shall be dedicated to one circuit.
 - 227.2.3 Revise Section 3-6.3 to include the following:
 - 227.2.3.1 Feeders. Feeder conductors shall be sized for a maximum voltage drop of 2% at design load.
 - 227.2.3.2 Branch Circuits. Branch circuit conductors shall be sized for a maximum voltage drop of 3% at design load. The design load shall be a minimum of 9 amperes.
 - 227.2.3.3 Feeders & Branch circuits: Feeder and Branch circuit conductors shall be sized for a maximum voltage drop of 5% at design load. The design load shall be a minimum of 16 amperes.
 - 227.2.4 Amend Section 3-11.2 to include the following
 - 227.2.4.1 *Rigid nonmetallic conduit (RNC) shall be prohibited from use above ground. Provide a transition from RNC to Rigid Metal Conduit before emerging from ground.
 - 227.2.5 Amend UFC 3-520-01 as follows:
 - 227.2.5.1 Polyvinyl Chloride (PVC) is not approved for electrical conduits for all interior electrical distribution on the Pentagon Reservation and FBMCC.
Exception: PVC conduit may be used in concrete slabs or duct banks.
 - 227.3 UFC 3-530-01 for interior and exterior lighting and controls criteria.
 - 227.3.1 Amend UFC 3-530-01 as follows:
 - 227.3.1.1 *For the Pentagon Reservation, footcandle levels shall be per Table 227.3.1.1.

Table 227.3.1.1 – Light Level Requirements

Space type	Target (FC)
Corridors	15
Private office	30 (ambient)
	50 (task)
Open office	30 (ambient)
	50 (task)
Waiting areas	10 (ambient)
	50 (task)
Conference rooms	30
Lounges	10
Office support	30 (ambient)
	50 (task)
Storage rooms	10
Mechanical/Electrical	30
Electrical closets	30
Restrooms	15
Kitchens	50
Cafeteria	15
	50
Enlisted dining rooms	15
	50
Officer dining rooms	15
	50
Indoor Pool	30
Indoor basketball	30
Locker Rooms	10
Retail	40
Command and Operation Center	46
TC Closets	50
Communications and Equipment Closets	50
TC – Wedge Rooms (Data Center)	50
Consolidated Radio Rooms (CRR)	50

- 227.3.1.1.1 All target footcandle levels stated herein are the Target Horizontal Illuminance average, unless stated otherwise, and shall be designed with a tolerance of +/- 10% footcandles in accordance with UFC.
- 227.3.1.1.2 When space types are not identified in Table 227.3.1.1 the Illuminating Engineering Society (IES) Standard shall determine the target footcandle levels.
- 227.3.1.2 For all other buildings, footcandle levels shall follow the UFC.
- 227.3.2 Revise Section 5-6.3 to include the following:
 - 227.3.2.1 Illumination for Electrical Rooms, Mechanical Rooms, Electrical Switchgear Rooms and Electrical Vaults shall be provided in accordance with the requirements set for forth for illumination of means of egress in NFPA 101, Sections 7.8 and 7.9.
- 227.3.3 Interior lighting shall be designed and installed to meet the requirements of UFC 3-530-01. The supplemental requirements below shall take priority over conflicting UFC requirements.
 - 227.3.3.1 Light emitting diode (LED) technology shall be used for new general overhead interior lighting or replacement of existing general overhead interior lighting systems. PBMO and SCD shall be consulted in consideration of LED lighting options.

- 227.3.3.2 Light sources shall have a correlated color temperature (CCT) of 3500K.
- 227.3.3.3 Lighting systems shall meet the lighting levels required in UFC 3-530-01, as amended by Table 227.3.1.1 of this code.
- 227.3.3.4 LED T8 lamp replacements shall comply with the following criteria:
 - 227.3.3.4.1 Shall be dimmable if installed with dimming ballast.
 - 227.3.3.4.2 A mixture of T-LEDs and fluorescent lamps is not permitted within local lighting systems.
- 227.4 UFC 3-550-01 for exterior power distribution systems criteria.
 - 227.4.1 Amend UFC 3-550-01, 3-11.8 "Medium Voltage Cable" as follows:
 - 227.4.1.1 No aluminum medium voltage cable shall be used.
 - 227.4.1.2 All 5 kV and 15 kV medium voltage cables shall be copper conductor, type MV (105 degree C). The insulation type shall be ethylene propylene rubber (EPR) and the insulation level for all classification of circuits shall be 133%.
- 227.5 UFC 3-560-01 for electrical safety and electrical O&M criteria.
 - 227.5.1 *Provide arc flash warning labels on electrical equipment likely to require examination, adjustment, servicing, or maintenance while energized. Some typical types of equipment include pad-mounted transformers, switchgear, switchboards, panelboards, disconnect switches, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling occupancies. Provide labels in accordance with the detailed arc flash warning labels specified by NFPA 70E-2015, Article 130.5(D) in lieu of general warning labels as provided by UFC 3-560-01, Section 1-10.
- 227.6 UFC 3-580-01 for interior telecommunications criteria.
- 227.7 UFC 4-021-01 for mass notification systems criteria.
- 227.8 Modifications to NFPA 70 – The National Electric Code (NEC):
 - 227.8.1 Amend Section 410.36 to include – Means of Support - Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
 - 227.8.1.1 Use steel support wire, supplied by the ceiling subcontractor, on at least all 4 corners to support the light fixtures from the building structure. Exceptions to this are on a case by case basis when there is a conflict with the other trades. In hard ceiling areas, the fixture is secured to the framing members with screws.
 - 227.8.1.2 Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4 inch (19.1 mm) metal channels spanning and secured to ceiling tees.
 - 227.8.2 Amend Section 760.30 to include – Junction box covers for fire alarm system conduit shall be colored red.
 - 227.8.3 Amend 2014 NEC Section 110.26(E)(1)(b) Foreign Systems in Dedicated Equipment Space as follows: The area above the dedicated space required by 110.26(E)(1)(a) shall NOT be permitted to contain foreign systems. Furthermore, any pipe or duct system foreign to the electrical installation shall not enter or pass through a designated electrical room. Piping or other facilities provided for fire protection or cooling, shall not be considered foreign to the electrical installation.
- 227.9 Building Automation System (BAS)
 - 227.9.1 All Building Automation System (BAS) work shall comply with UFC 3-470-01.
 - 227.9.2 Electrical and lighting control automation equipment with the capability of being remotely monitored or controlled shall be connected to the BAS
 - 227.9.3 Any new BAS connection or component to an existing system must be compatible with the system controller.

- 227.9.4 Device controllers through the field level controllers to the BAS supervisory user interface shall be functional at the time of commissioning of the controlled equipment.
- 227.9.5 New control systems shall communicate with the main BAS supervisory user interface in an open protocol that is native to both, supervisory and supervised systems.
- 227.9.6 New field controller devices utilized to control the equipment described in Sections 227.9.1-227.9.5 shall be required to have the native capability of communicating with their respective supervisory systems over BACNet/IP, Modbus/TCP/IP, OPC, RsLinx over the Facility Network or BACNet/MS-TP, N2, Modbus/RTU over the related serial communication bus available in the vicinity of the equipment.
- 227.9.6.1 The building management office responsible may approve the utilization of gateways as a means of protocol translation when the field equipment controller supplied as an integral part of the equipment is not equipped with the native capability of communicating on any of the above mentioned protocols.
- 227.9.7 For connection to existing systems, the building management office responsible will identify the building point of connection to the system through a request for information from the Contractor.
- 227.9.8 The BAS shall be analyzed for network connectivity and control capacity in order to provide all necessary infrastructure and programming to connect systems and equipment in a manner consistent with established standards.

228.0 CHAPTER 28 – MECHANICAL SYSTEMS

Use IBC Chapter 28 as modified by, UFC 3-401-01 and UFC 3-410-01.

- 228.1 Use UFC 3-410-01, Chapter 1
- 228.2 Use UFC 3-410-01, Chapter 2
- 228.3 Use UFC 3-410-01, Chapter 3 – General Design Requirements, as modified below:
- 228.3.1 Mechanical appliances and equipment shall be US EPA ENERGY STAR, US DOE FEMP-designated products or shall have an equal or greater efficiency based on life cycle cost.
- 228.3.2 Use UFC 3-400-02 to access climatological data for use in designing mechanical systems.
- 228.3.3 Terminal Units
- 228.3.3.1 Terminal units shall only be permitted to serve offices located within the suite the terminal unit is installed, unless otherwise permitted below:
- 228.3.3.1.1 Terminal Units located in public corridors may serve offices within the suite that the terminal unit's thermostat is located.
- 228.3.3.2 *Terminal units may serve more than one office within a suite as long as their thermal loads are similar.
- 228.3.3.3 Rooms that are programmed for a variable number of occupants shall have their own terminal unit. This unit shall be activated by an occupancy sensor and control its supply of vent air through the use of a CO2 sensor, but shall be set to the default minimum as required by this code.
- 228.3.3.4 *New thermal load calculations, re-balancing and sequence of operation modifications shall be performed in the event of space repurposing that entails significant heat load change.
- 228.3.4 Protection from damage
- 228.3.4.1 Equipment and appliances shall not be installed in a location where subject to mechanical damage unless protected by approved barriers.
- 228.3.4.2 Barriers shall not obstruct maintainable areas of equipment and appliances.
- 228.3.5 Valves shall be readily accessible or accessible by a means that first requires the removal or movement of a panel, door or similar obstruction and/or reached from the ground, a ladder, or approved platform.
- 228.3.6 Press fit type mechanical connections shall be permitted for use with copper pipe and tube of sizes 2 inches (50.8 mm) and smaller.

- 228.3.7 Joints on steel and stainless steel pipe greater than 2 inches (50.8 mm) shall be welded.
- 228.3.8 Fittings for steam condensate lines shall be of schedule 80 steel.
- 228.3.9 Elbows for steam condensate lines shall be of a long radius type.
- 228.3.10 Building Automation System (BAS)
- 228.3.10.1 All Building Automation System (BAS) work shall comply with UFC 3-470-01.
- 228.3.10.2 *Mechanical equipment with the capability of being remotely monitored or controlled shall be connected to the BAS
- 228.3.10.3 Any new BAS connection or component to an existing system must be compatible with the system controller.
- 228.3.10.4 Device controllers through the field level controllers to the BAS supervisory user interface shall be functional at the time of commissioning of the controlled equipment.
- 228.3.10.5 New control systems shall communicate with the main BAS supervisory user interface in an open protocol that is native to both, supervisory and supervised systems.
- 228.3.10.6 New field controller devices utilized to control the equipment described in Sections 228.3.10.1-228.3.10.5 shall be required to have the native capability of communicating with their respective supervisory systems over BACNet/IP, Modbus/TCP/IP, OPC, RsLinx over the Facility Network or BACNet/MS-TP, N2, Modbus/RTU over the related serial communication bus available in the vicinity of the equipment.
- 228.3.10.6.1 The building management office responsible may approve the utilization of gateways as a means of protocol translation when the field equipment controller supplied as an integral part of the equipment is not equipped with the native capability of communicating on any of the above mentioned protocols.
- 228.3.10.7 For connection to existing systems, the building management office responsible will identify the building point of connection to the system through a request for information from the Contractor.
- 228.3.10.8 The BAS shall be analyzed for network connectivity and control capacity in order to provide all necessary infrastructure and programming to connect systems and equipment in a manner consistent with established standards.
- 228.3.11 All equipment and appliances that need to reject heat (Ice Machine, Walk-in Cooler, etc.) shall reject that heat into the HVAC Chilled Water Loop.
- 228.3.12 Add the following text to UFC 3-410-01, Section 3-5.14.5 Variable Speed Drives:
“Measures shall be taken to protect pump motors from stray current migration through pump motor bearings on pumps equipped with VFDs.

New Variable Frequency Drive (VFD) assemblies shall have the following characteristics: The enclosures shall be NEMA 12 rated. The VFDs shall be equipped with a mechanical selector (HOA) providing the operator the ability to select between Drive, Bypass or Test mode. The bypass mode shall operate independently from the VFD. The assembly shall provide the operator the ability to remotely command the motor to start or stop in either mode, Drive or Bypass. The VFDs shall accept an analog signal of 0 to 10 VDC as external speed reference and an external binary signal as start/stop command. The VFDs shall be equipped with a serial communication board compatible with an existing facilities BAS and BACNet protocols. The VFDs and bypass circuit shall be independently fused. The bypass circuit shall be equipped with motor overload protection. Bypass for motors 25 HP and larger shall be equipped with a solid state soft starter. The VFD shall be able to provide its internal thermal status over the existing facilities BAS and BACNet.”
- 228.3.13 Replace Section 3-6.13 "HVAC System Testing and Balancing" - Reserved
- 228.3.14 Actuators
- 228.3.14.1 All electronic valve or damper actuators shall be equipped with position feedback terminals, analog feedback for proportional applications and binary feedback for two-position applications.

- 228.3.14.2 The position signals shall be wired back to the field controller controlling the actuator in question or its associated expansion modules.
- 228.3.14.3 The position signal feedback points shall be mapped to the BAS user interface and be compared to the respective command signal for the actuator.
- 228.3.14.4 An alarm shall be generated in the event the position signal does not match its respective command signal.
- 228.3.15 When making changes to a system or space that falls outside of the design constraints under which the system or space was constructed, a redesign shall take place.
- 228.4 Use UFC 3-410-01, Chapter 4, which references the International Mechanical Code, as modified below:
- 228.4.1 IMC, Chapter 1 – Scope and Administration is replaced by UFC 3-410-01 Chapter 1 and Section 100.0 of this code.
- 228.4.1.1 Revise UFC 3-410-01, Section 4-1 as follows:
 “Mechanical appliances, equipment, and systems shall be constructed and installed in accordance with the International Mechanical Code (IMC), the International Fuel Gas Code (IFGC), NFPA 54, and NFPA 58.”
- 228.4.1.2 Where IFGC requirements are more stringent than the NFPA 54 and NFPA 58, those IFGC requirements shall apply unless otherwise noted herein.
- 228.4.2 Use IMC, Chapter 2 – Definitions and Section 101.7 of this code. Delete definitions in UFC 3-410-01, Section 4-2.2.
- 228.4.3 Modifications to UFC 3-410-01 – IMC Chapter 3 – General Regulations are as follows:
- 228.4.3.1 Abandoned, unused or out of service mechanical systems, equipment, distribution material and supporting infrastructure shall be demolished to the nearest source and completely removed.
- 228.4.3.2 ABS, PVC, CPVC, PP, PE, PB, PEX-AL-PEX, PEX-AL-HDPE, PE-AL-PE, PE-RT, and PEX pipe, tube or hose is not permitted for use within a structure. Galvanized pipe is not permitted for use on WHS owned property.
- 228.4.3.2.1 PVC hoses such as "BEVLEX" may be used downstream of the backflow preventer in soda fountain applications. Developed lengths greater than 5.0 feet (1.5 m) shall be run end to end through EMT.
- 228.4.3.2.2 Pipe, tube, and hose consisting of the above materials shall be permitted when installed by a manufacturer as part of a listed and labeled assembly.
- 228.4.3.3 Labeling of distribution pipe
- 228.4.3.3.1 Labeling of distribution pipe shall follow ANSI A13.1.
- 228.4.3.3.2 Identification markings intervals on the pipe shall not exceed 25 feet (7620 mm).
- 228.4.3.3.3 Pipe labeling shall consist of one rectangular label noting pipe content, and a ring of flow arrows on each side of the description noting direction of flow, both conforming to ANSI A13.1.
- 228.4.3.3.4 Flow arrows shall wrap over the description label ends and also wrap around itself by at least 2 inches (50.8 mm) to ensure a good bond.
- 228.4.3.3.5 At least one identification label shall be provided on each pipe in each room, space or story.
- 228.4.3.3.6 Pentagon Reservation - The color coding of distribution systems shall follow Table 228.4.3.3.6. Labeling for distribution pipe not included in Table 228.4.3.3.6 shall be approved by the Building Code Official.

Table 228.4.3.3.6 - Color Coding of Distribution Piping

Wording	Label Color	Letter Color
CHILLED WATER SUPPLY	Green	White
CHILLED WATER RETURN	Green	White
BLENDED CHILLED WATER SUPPLY	Green	White
BLENDED CHILLED WATER RETURN	Green	White
MC CHILLED WATER SUPPLY	Green	Red
MC CHILLED WATER RETURN	Green	Red
CONDENSER WATER	Lt. Green	White
CONDENSATE	Gray	White
HEATING HOT WATER SUPPLY	Lt. Orange	Black
HEATING HOT WATER RETURN	Lt. Orange	Black
BLENDED HOT WATER SUPPLY	Lt. Orange	Black
BLENDED HOT WATER RETURN	Lt. Orange	Black
HIGH PRESSURE STEAM	Orange	Black
MEDIUM PRESSURE STEAM	Orange	Black
LOW PRESSURE STEAM	Orange	Black
STEAM CONDENSATE	Orange	Black
FUEL OIL	Brown	White

228.4.3.3.6.1 When pipe is installed in an existing space, the existing label color scheme shall be applied to the new work.

228.4.3.3.7 Mark Center - Reserved

228.4.3.4 Add after the last sentence of IMC, Section 303.1

“When locating mechanical appliances and equipment that require maintenance and repair, the manufacturers' recommended clearances shall be maintained, along with a 3 foot working clearance around the appliance and/or equipment.”

228.4.3.5 Add the following sections to IMC, Section 303:

“303.9 Confined Space. If equipment and appliances are to be located in a confined space then that equipment shall be provided with a means of removal so that a person is not required to maintain or repair said equipment and/or appliance within the confined space.

303.10 Secure Space. Equipment and appliances shall not be located in a manner that requires a person to pass through a secure space to gain access.

303.11 Designated Path. When locating equipment and appliances a designated path of travel is required. This designated path of travel shall be sized so that the equipment is able to be moved from its installed location to a location outside of the facility without the demolition of existing passageways.”

228.4.3.6 Addition - Section 307.2.5 “Condensate Drain Pans”

“307.2.5 All condensate drain pans installed on HVAC equipment and appliances shall be constructed of stainless steel.”

228.4.3.7 Delete last sentence of IMC, Section 307.2.1 and replace with the following: Condensate shall be plumbed with a trap and air gap to the storm system.

228.4.4 Modifications to UFC 3-410-01 – IMC Chapter 4 – Ventilation

- 228.4.5 Modifications to UFC 3-410-01 - IMC Chapter 5 – Exhaust Systems
- 228.4.6 Modifications to UFC 3-410-01 - IMC Chapter 6 – Duct Systems
- 228.4.6.1 *Delete IMC, Section 602.2.1.2.
- 228.4.6.2 *Add IMC Section 603.2.1
 “603.2 Transfer Duct. Transfer ducts shall be sized with maximum velocity of 500 FPM. Provide Z or U duct air transfers in noise sensitive areas.”
- 228.4.7 Modifications to UFC 3-410-01 - IMC Chapter 7 – Combustion Air
- 228.4.8 Modifications to UFC 3-410-01 - IMC Chapter 8 – Chimneys and Vents
- 228.4.9 Modifications to UFC 3-410-01 - IMC Chapter 9 – Specific Appliances, Fireplaces, and Solid Fuel-Burning Equipment
- 228.4.10 Modifications to UFC 3-410-01 - IMC Chapter 10 – Boilers, Water Heaters and Pressure Vessels
- 228.4.11 Modifications to UFC 3-410-01 - IMC Chapter 11 – Refrigeration
- 228.4.12 Modifications to UFC 3-410-01 - IMC Chapter 12 – Hydronic Piping
- 228.4.12.1 *Add the following section to IMC Section 1206.2:
 “1206.2.1 Riser drain down. Isolation valves and drain connections shall be installed at the low point of every water distribution riser. ”
- 228.4.12.2 *Replace IMC, Section 1208.1 with the following:
 “1208.1 General. Hydronic piping systems other than ground source heat pump loop systems shall be tested hydrostatically at one and one half times the maximum system design pressure. Hot and chilled water piping shall be tested at a minimum of 135 psi. High pressure steam and condensate piping shall be tested at 150 psi. Low pressure steam and condensate piping shall be tested at 45 psi. The duration of each test shall be not less than 1 hour. Ground-source heat pump loop systems shall be tested in accordance with Section 1208.1.1.
 1208.1.1 Ground source heat pump loop systems. Before connection (header) trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 30 minutes with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the problem shall be identified and corrected.
 1208.1.2 Stress due to pressure at bottom of vertical runs shall not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix `A' of ASME B31.9, "Building Services Piping."
 1208.1.4 Hydrostatic pressure tests are not required for HVAC condensate drain piping.”
- 228.4.13 Modifications to UFC 3-410-01 - IMC Chapter 13 – Fuel Oil Piping and Storage
- 228.4.14 Modifications to UFC 3-410-01 - IMC Chapter 14 – Solar Systems
- 228.5 Use UFC 3-410-01, Chapter 5 – Design Analysis and Drawing Requirements, as modified below:
- 228.5.1 Add UFC 3-410-01, Section 5-2.31 - Duct Shop Drawings
- 228.5.1.1 Duct shop drawings shall be approved by the designer of record and provided to the Government for review and acceptance.
- 228.6 Modifications to the IFGC are as follows:
- 228.6.1 Gas Leak Detection

- 228.6.1.1 A natural gas leak detection system shall be provided for the entire length of natural gas piping through a enclosed structure. This leak detection system shall be integrated with the Building Automation System (BAS) in accordance with Section 228.3.10 and the Fire Alarm System in accordance with Section 209.49.
- 228.6.1.2 *Carbon Monoxide (CO) detectors are required in any enclosed area that lacks ventilation and is subject to tasks involving the generation of CO. The CO detection shall be tied into the facilities BAS in accordance with Section 228.3.10 and the Fire Alarm System in accordance with Section 209.49. CO detectors shall meet the requirements of the NFPA 720.
- 228.6.1.3 Refrigerant detectors shall be installed in accordance with ASHRAE Standard 15. Refrigerant detectors shall be tied into the facilities BAS in accordance with Section 228.3.10.
- 228.6.1.4 Hydrogen detectors see Section 227.1.
- 228.6.2 Replace IFGC Section 401.5 as follows:
 - 228.6.2.1 Gas pipe shall be painted yellow along its entire run.
 - 228.6.2.2 Gas pipe shall be labeled in accordance with ANSI A13.1 at intervals not exceeding 5 feet (1524 mm).
 - 228.6.2.2.1 Pipe label shall consist of 1 rectangular label noting pipe content, and a ring of flow arrows on each side of the description noting direction of flow, both conforming to ANSI A13.1.
 - 228.6.2.2.2 Flow arrows shall wrap over the description label ends and also wrap around itself by at least 2 inches (50.8 mm) to ensure a good bond.
- 228.6.3 Natural Gas Testing Requirements
 - 228.6.3.1 *The test pressure to be used shall be no less than 1 and 1/2 times the proposed maximum working pressure, but not less than 50 psi (345 kPa), irrespective of design pressure. Where the test pressure exceeds 125 psi (862 kPa), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe.
 - 228.6.3.2 *Test duration shall be not less than 1/2 hour for each 500 ft³ (14 m³) of pipe volume or fraction thereof. Test duration shall be not less than 1 hour. The duration of the test shall not be required to exceed 24 hours.

229.0 CHAPTER 29 – PLUMBING SYSTEMS

- *Use IPC as modified by UFC 3-420-01. Toilet and bathing rooms shall be constructed in accordance with Section 1210 of the IBC, as modified by this code. UFC 3-420-01, Section 1-9 through 1-12 and Appendix A are replaced below:
 - 229.1 IPC, Chapter 1 – Scope and Administration is replaced by UFC 3-420-01, Chapter 1 and Section 100.0 of this code.
 - 229.1.1 *Use IPC, Chapter 2 – Definitions and Section 101.7 of this code. Delete definitions in UFC 3-420-01, Appendix A, “Definitions Supplements”.
 - 229.2 *Modify IPC, Chapter 3 – General Regulations as follows:
 - 229.2.1 Insert the following after the last sentence of Section 301.1 “Scope.”:
“Standpipes and hose systems for fire protection systems shall be designed in accordance WHSBC Section 209.”
 - 229.2.2 Insert the following before the first sentence of Section 301.6 “Prohibited locations.”:
“Plumbing system components shall not be installed within any Air Handling Unit (AHU), ductwork, or room used as a plenum conveying supply air, return air, outside air, or mixed air. Connections of AHU components, such as humidifiers, to the water supply system, and connection of trapped condensate pans and humidifier drains indirectly to the drainage system shall be permitted. Plumbing system components in ceiling spaces used as return air plenums, and drains in raised floor supply plenums shall be permitted.”
 - 229.2.3 Add Section 301.8 “Protection of building materials.” to IPC Chapter 3:

“301.8 Protection of building materials. Insulate plumbing piping with a vapor barrier type of insulation to prevent condensation when the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard. All chilled water piping from a central drinking water cooling system should be insulated with vapor barrier type insulation to prevent condensation. All above-ground receptor p-traps and drain piping branches that receive chilled waste water shall be insulated up to the first wye connection, to prevent condensation.”

229.2.4 *Add Section 301.9 “Protection of computers, telephone switches and terminal equipment, and other electronic equipment from water damage.” to IPC Chapter 3:

“301.9 Protection of computers, telephone switches and terminal equipment, and other electronic equipment from water damage. Neither water nor drainage piping shall be located over electrical wiring or equipment unless adequate protection against water (including condensation) damage has been provided.

301.9.1 Dedicated computer, telephone, and other electronic equipment.

301.9.2 Prohibited piping. Chilled water piping, domestic water piping, sanitary drains, roof drains, gas lines, fuel oil lines, steam lines, water mains, and other utility lines not serving the electronic equipment area are prohibited from the electronic equipment and record storage areas.

301.9.3 Restricted piping. Utilities containing water or other fluids, which serve the electronic equipment and record storage areas, shall not be routed to pass directly over electronic equipment or stored records, whether the utilities are installed over or below the finished ceiling.

301.9.4 Water damage protection. The floor above each of the electronic and records storage rooms shall be waterproofed or prohibit pipe in the rooms above the electronic equipment and record storage areas to prevent damage from accidental spillage.”

229.2.5 Add Section 301.10 “Identification on the Pentagon Reservation” to IPC Chapter 3:

“301.10 Identification on the Pentagon Reservation. Plumbing infrastructure on the Pentagon Reservation shall be identified in accordance with the following requirements.

301.10.1 Labeling of distribution pipe. Labeling of distribution pipe shall follow the recommendations of ANSI-A13.1 with the following modifications.

- (1) Identification markings intervals on the pipe shall not exceed 25 feet (7620 mm).
- (2) Pipe labeling shall consist of one rectangular label noting pipe content, and a ring of flow arrows on each side of the description noting direction of flow, both conforming to ANSI-A13.1.
- (3) Flow arrows shall wrap over the description label ends and also wrap around itself by at least 2 inches (50.8 mm) to ensure a good bond.
- (4) At least one identification label shall be provided on each pipe in each room, space or story.
- (5) The color coding of distribution systems on the Pentagon Reservation shall follow Table 301.10.1. Labeling for distribution pipe not included in Table 301.10.1 shall be approved by the Building Code Official.
- (6) When pipe is installed in an existing space, the existing label color scheme shall be applied to the new work.

Table 301.10.1 - Color Coding of Distribution Piping

Wording	Label Color	Letter Color
DOMESTIC COLD WATER	Blue	White
DOMESTIC HOT WATER	Blue	White
DOMESTIC HOT WATER RETURN	Blue	White
CHILLED DRINKING WATER	Lt. Blue	White
IRRIGATION WATER	White	Black
SANITARY SEWER	Black	White
GREASE WASTE	Black	White
STORM SEWER	Gray	White
NATURAL GAS	Yellow	Black

301.10.2 Asset Identification. Equipment and appliances on the Pentagon Reservation shall be identified in accordance with the Pentagon Equipment Labeling Standard.”

229.2.6 Add Section 301.11 “General Policy” to IPC Chapter 3:

229.2.6.1 *Design.

229.2.6.2 Energy efficiency and water conservation. Plumbing system energy usage and equipment efficiencies shall comply with UFC 1-200-02, *High Performance and Sustainable Building Requirements*. Per Executive Order 13693, employ strategies that in aggregate use a minimum of 20% less potable water than the indoor water use baseline calculated for the building after meeting the Energy Policy Act of 1992, and the International Plumbing Code 2006 fixture performance requirements.

229.2.6.3 Reliability. Where interruption of a service cannot be tolerated or where failure of a system would drastically reduce the efficiency of a facility, provide dual-fuel capability and/or redundant system components.

229.2.6.4 *Piping arrangement. Conceal piping in permanent-type structures. In limited life structures, piping may be installed exposed, except when specific project criteria justify concealment or where concealment does not increase the cost of the project. Exposed piping attached to or near fixtures or equipment, or subject to high heat or frequent washing, must be copper, brass, or chromium plate. Other exposed piping shall be primed with paint suitable for metal surfaces and finish-paint with color to match background. Arrange piping runs to minimize interference with personnel and equipment. Critical piping services shall meet the requirements of UFC 4-010-01 *DoD Minimum Antiterrorism Standards for Buildings*.

229.2.6.5 Siting. Site and design buildings so that sewers and water mains do not need sewage lift stations or water booster pumps. Where not possible approval of the AHJ is required to allow sewage lift stations or water booster pumps.

229.2.6.6 Existing conditions. All abandoned, unused or out of service plumbing systems, equipment, distribution material and supporting infrastructure shall be demolished to the nearest source and completely removed.

229.2.6.7 Metering. Per Executive Order 13693, water meters shall be installed in a manner that will provide complete facility water balance data. Meters shall be integrated into the facilities BAS in accordance with Section 229.3.3.1.8.

229.2.6.8 Building Automation System (BAS). All BAS work shall comply with UFC 3-470-01 and the following requirements.

- (1) Plumbing equipment with the capability of being remotely monitored or controlled shall be connected to the BAS
- (2) Any new BAS connection or component to an existing system must be compatible with the system controller.

- (3) Device controllers through the field level controllers to the BAS supervisory user interface shall be functional at the time of commissioning of the controlled equipment.
- (4) New control systems shall communicate with the main BAS supervisory user interface in an open protocol that is native to both, supervisory and supervised systems.
- (5) New field controller devices utilized to control the equipment described in Section 229.2.6.8 shall be required to have the native capability of communicating with their respective supervisory systems over BACNet/IP, Modbus/TCP/IP, OPC, RsLinx over the Facility Network or BACNet/MS-TP, N2, Modbus/RTU over the related serial communication bus available in the vicinity of the equipment. The facility management office responsible may approve the utilization of gateways as a means of protocol translation when the field equipment controller supplied as an integral part of the equipment is not equipped with the native capability of communicating on any of the above mentioned protocols.
- (6) For connection to existing systems, the building management office responsible will identify the building point of connection to the system through a request for information from the Contractor.
- (7) The BAS shall be analyzed for network connectivity and control capacity in order to provide all necessary infrastructure and programming to connect systems and equipment in a manner consistent with established standards.

- 229.2.6.9 Waste heat. All equipment and appliances that need to reject heat (Ice Machine etc.) shall reject that heat into the HVAC Chilled Water Loop.
- 229.2.7 Add Section 301.12 “Design Analysis” to IPC Chapter 3:
- 229.2.7.1 Design analysis. The Design Analysis shall consist of a Basis of Design Narrative and Calculations demonstrating compliance with all UFC requirements.
- 229.2.7.1.1 Basis of design narrative requirements. In addition to the Basis of Design Narrative requirements indicated in 3-401-01, provide the following:
- 229.2.7.1.1.1 Design criteria. Identify the governing codes and criteria, being used for the design. Include the titles and the date of the latest edition or publication. References to codes and criteria should be made in the narratives of the “Basis of Design”.
- 229.2.7.1.1.2 Design conditions. Provide the interior design conditions, to include the following:
- (1) Building population (number of males and number of females).
 - (2) Plumbing fixture determination, listing quantity and types of fixtures .
 - (3) Fixture units for drainage, venting, cold and hot water piping.
 - (4) Roof areas used in determining storm drainage pipe sizes.
 - (5) Capacities of all equipment and tanks.
- 229.2.7.1.1.3 Water quality. A water quality analysis will be performed and results included.
- 229.2.7.1.1.4 Legionnaire’s Disease. Include the rational analysis conducted by the Designer of Record documenting the consideration decision process on the incorporation of ASHRAE 12 recommendations.
- 229.2.7.1.1.5 Metering. Provide a description of the facility water metering and reporting strategy.
- 229.2.7.1.1.6 Sustainable design. Briefly describe all energy and water conservation features, systems, and components used in the project and the expected energy savings in accordance with UFC 1-200-02 calculation requirements, include the measures taken to reduce the indoor water use baseline by 20%. Describe all features being used for sustainability credits and include the applicable completed forms.
- 229.2.7.1.1.7 Service water heating system. Provide a description of the service water heating system proposed, including an explanation and cost analysis of why this system is preferred over other alternatives. Indicate locations of major components of the system.
- 229.2.7.1.1.8 Service water cooling system. Provide a description of the service water cooling system proposed, including an explanation and cost analysis of why this system is preferred over other alternatives. Indicate locations

of major components of the system.

- 229.2.7.1.1.9 Control system. Briefly describe the control system type and its functions.
- 229.2.7.1.1.10 Energy conservation. Provide completed compliance forms provided in ANSI/ASHRAE/IESNA Standard 90.1 User's Manual and any additional documentation to support compliance with this Standard and compliance with UFC 1-200-02 requirement to design buildings 30% below ASHRAE 90.1, including a narrative describing the method of compliance, descriptions of building systems and components to be incorporated, and computer analysis discussion, input and output. Provide a signed statement by a registered mechanical engineer indicating compliance with ANSI/ASHRAE/IESNA Standard 90.1.
- 229.2.7.1.2 *Calculations. In addition to the calculations and analysis requirements indicated in UFC 3-401-01, provide the following. Identify the source of each calculation including date of reference and chapter, paragraph or section. When tables used in the design are taken from publications, indicate the title, source, and date of the publication. Provide the model number and manufacturer of each major piece of equipment for which space was allocated.
- 229.2.7.1.2.1 Water conservation. Per Section 229.2.6.2, calculate the indoor water use baseline, measured in gallons per gross sq-ft., for the building after meeting the Energy Policy Act of 1992, and the International Plumbing Code 2006 fixture performance requirements.
- 229.2.7.1.2.2 Life cycle cost analysis (LCCA). Provide an analysis of all equipment either heating or cooling potable water. The analysis shall conform to the life cycle cost and energy criteria specified in UFC 1-200-02. This calculation shall also factor in projected maintenance costs.
- 229.2.7.1.2.2.1 Service water heating. Per Section 229.4.8 provide a LCCA evaluating alternative energy source options, such as electric, steam, oil-fired, and gas-fired service water heater.
- 229.2.7.1.2.2.2 Solar water heating. Per Section 229.4.3 include the life cycle cost analysis justifying the use or nonuse of solar hot water heaters on a project.
- 229.2.7.1.3 Equipment sizing calculations. Provide equipment sizing calculations and charts, if applicable, to justify the selection of equipment, including the following:
- (1) Pumps.
 - (2) Control valves and dampers.
 - (3) Meters and metering devices.
 - (4) Domestic Water Chillers.
 - (5) Domestic Water Heaters.
- 229.2.7.1.4 System sizing calculations. Provide system sizing calculations for all supply and return piping systems.
- 229.2.8 Add Section 301.13 "Drawing Requirements" to Chapter 3
- 229.2.8.1 Final drawing requirements. In addition to the final drawing requirements indicated in UFC 3-401-01, provide the following:
- 229.2.8.1.1 Drawings. The drawings will be accurate, to scale and show fixtures, equipment, and piping in their proper locations.
- 229.2.8.1.2 Riser diagrams. Show riser diagrams of soil, waste, drain, and vent stacks and water risers for all buildings in excess of one story. Calculate the grade of drain lines and establish invert elevations.
- 229.2.8.1.3 *Legend. Provide each set of drawings with a legend covering symbols and abbreviations as indicated in ASHRAE Handbook, *Fundamentals*. Unless directed otherwise, graphic symbols shall be in accordance with ASME Standard Y32.4, *Graphic Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction*.
- 229.2.8.1.4 *Water service. Unless directed otherwise, place the following note on the applicable drawing: "Water pipe sizes are based on a minimum working pressure of ____ [kPa (psig)] at a flow rate of ____ [L/s (gpm)] at the location where the main service enters the building."

- 229.2.8.1.5 Site work. Show the type and routing of the water source on the drawings. Exterior above and below grade water distribution plans shall be accompanied by profile drawings. Profile drawings must clearly depict all other utilities in the proximity of the new work.
- 229.2.8.1.6 Floor plans. Show control device locations on the plans.
- 229.2.8.1.7 Enlarged plans. Provide large-scale details of congested areas on the drawings, with dimensions locating all work relative to structural features of the building.
- 229.2.8.1.8 *Equipment room plans. Equipment rooms shall be drawn at no less than $\frac{1}{4}'' = 1'-0''$ (1:50). Congested mechanical rooms shall be drawn at no less than $\frac{1}{2}'' = 1'-0''$ (1:20).
- 229.2.8.1.9 Schematic diagrams. Provide a 3-dimensional isometric diagram representing the equipment room piping and a 2-dimensional diagram indicating the entire system. Indicate shutoff valve locations to allow replacement of control valves and system components.
- 229.2.8.1.10 Control valves schedule. Provide flow rates, minimum Cv or maximum pressure drop, nominal valve size, service (i.e. domestic chilled water, domestic hot water, etc.), configuration (i.e. 2-way or 3-way), and action (i.e. modulating or 2-position).
- 229.2.8.1.11 *Metric valve coefficient. The English version Cv shall not be used on a metric project.
- 229.2.8.1.12 Vibration isolator schedule. Where vibration and/or noise isolation is required, provide a vibration isolator schedule on the drawings indicating type of isolator, application, and deflection in inches (mm).
- 229.2.8.1.13 Fouling factors. Indicate fouling factors for all water-to-air and water-to-water heat exchangers (i.e. coils, converters, chillers, etc). Indicate in the appropriate equipment schedule. Fouling factors must be accompanied with their appropriate English or SI units.
- 229.2.8.1.14 Details. Details shall be edited to reflect the configurations and construction materials shown on the plans.
- 229.2.8.1.15 Access panels. Indicate location and size of access panels in floors, walls, and ceilings (except in lay-in tile applications) as required to access valves, balancing valves, drains, equipment, etc. on drawings.
- 229.2.8.1.16 Sequence of operations. The designer shall provide a sequence of operations that includes a step by step instruction for all anticipated modes of water heating and cooling system operations to include unoccupied periods.
- 229.2.8.1.17 Control diagrams. Provide for all Plumbing systems with a BAS integration requirement. Show system control schematics for the sequence of operation specified above on the drawings for each system. Show controller functions, such as normally open (NO), normally closed (NC), common (C), etc. Indicate all set points. Describe all controlled equipment operating modes, sequence of events, set points, and alarms. For Direct Digital Control (DDC) systems, include an input/output points list and a system architecture schematic.
- 229.2.8.1.18 Cold water make-up. Detail all accessories, to include pressure reducing valves (PRV), relief valves, and backflow preventers. Show pressure reducing and relief valve pressure settings.
- 229.2.8.1.19 Flow and slope arrows. Indicate the flow direction of pipe on the drawings. Show slope direction and rate of slope on all piping systems.
- 229.2.8.1.20 Guides for piping. Show pipe guide locations on all aboveground anchored piping.
- 229.2.8.1.21 Pipe anchors. Show anchor locations on plans. Provide anchor detail(s).
- 229.2.8.1.22 Pressure gauges. Indicate pressure gauge ranges; system operating pressures shall be midrange on the graduated scale.
- 229.2.8.1.23 Air vents. Show location of air vents required in piping systems.
- 229.2.8.1.24 Balance valves. Contract drawings shall specify the valve size and flow for each application. When an existing system is modified, provide all information required for re-balancing in the construction documents. Detail installation of all flow control balancing valves.
- 229.2.8.1.25 *Equipment schedules. Unless directed otherwise, include equipment schedules on the drawings.

- 229.2.9 *Insert the following after the last sentence of IPC Section 303.3 “Plastic pipe fittings and components.”:
- “Installation procedure for plastic piping materials shall be in accordance with the Plastic Pipe Institute (PPI) *Handbook of Polyethylene Pipe*. Design parameters such as thermal movement, chemical resistance, flow characteristics, and pressure ratings are covered in PPI publications. The designer should be aware that some schedule 40 plastic pipes do not have the strength of a schedule 40 steel pipe; therefore, the desired working temperature and pressure ratings for any plastic piping specified must be indicated either in the specifications or on the drawings.”
- 229.2.10 Add Section 303.3.1 “Prohibited Installation.” to IPC Chapter 3:
- “303.3.1 Prohibited Installation. ABS, PVC, CPVC, PP, PE, PB, PEX-AL-PEX, PEX-AL-HDPE, PE-AL-PE, PE-RT and PEX pipe, tube or hose is not permitted for use within a structure.
- Exception: Pipe, tube, and hose consisting of the above materials shall be permitted when installed by a manufacturer as part of a listed and labeled assembly. PVC hoses such as "BEVLEX" are permitted downstream of the backflow preventer in soda fountain applications. Developed lengths greater than 5.0 feet (1.5 m) shall be run end to end through EMT.”
- 303.3.2 Installation of unshielded rubber blind caps, couplings, and all other associated unshielded rubber fittings are prohibited.”
- 229.2.11 Add Section 303.5 “Galvanized pipe.” to IPC Chapter 3:
- “303.5 Galvanized pipe. Galvanized pipe is not permitted.
- 229.2.12 Replace all IPC Section 305.4 “Freezing.” content with the following:
- 305.4 Freezing. Water, soil and waste pipes shall not be installed outside of a building, in attics or crawl spaces, concealed in outside walls, or in any other place subjected to freezing temperatures. Exterior water supply system piping shall be installed not less than 6 inches (152 mm) below the frost line and not less than 12 inches (305 mm) below grade.
- Exception: Pipe runs to equipment required to be housed outdoors that in no way can be run indoors shall be insulated and heat traced for protection. Devices such as cooling towers, tanks etc. shall be insulated and heat traced for protection against damage. The proper thickness or conductivity factor for this insulation, and the watts/linear foot (watts/linear meter) for heat tracing are to be determined by the design engineer.
- 305.4.1 Building sewers that connect to private sewage disposal systems shall be a minimum of ___ inch (___ mm) below finished grade at the point of septic tank connection. Building sewers shall be a minimum of ___ inch (___ mm) below grade.”
- 229.2.13 Add Section 305.7.1 “Access.” to IPC Chapter 3:
- “305.7.1 Access. The means selected to protect the plumbing system components shall not obstruct maintainable areas of equipment and appliances.”
- 229.2.14 Replace IPC Section 312.2 "Drainage and vent water test." with the following:
- "312.2 Drainage and vent water test. A water test shall be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest openings of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 10-foot (3048 mm) head of water, or 5 psi. In testing successive sections, at least the upper 10 feet (3048 mm) of the next preceding section shall be tested so that no joint or pipe in the building, except the uppermost 10 feet (3048 mm) of the system, shall have been submitted to a test of less than a 10-foot (3048 mm) head of water, or 5 psi (34.5 kPa). This pressure (i.e. 10-foot (3048 mm) of hydrostatic pressure, or 4.3psi (29.6 kPa)) shall be held for not less than 15 minutes, with no visible drop in water level at the over-flowed test vent pipe, and no joint leaks detected. All entrapped air in the system shall be expelled prior to beginning the test. Once the stack is filled to ten feet, a visual inspection shall be made.”
- 229.2.15 *Replace IPC Section 312.3 "Drainage and vent air test." with the following:

“312.3 Drainage and vent air test. An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 psi (34.5 kPa) or sufficient to balance a 10-inch (254 mm) column of mercury. This pressure shall be held for a test period of not less than 1 hour. Any adjustments to the test pressure required because of changes in ambient temperatures or the seating of gaskets shall be made prior to the beginning of the test period.

312.3.1 Plastic piping shall not be tested using air.”

312.3.2 Cast iron piping shall not be tested using air.”

229.2.16 Replace all IPC Section 312.4 “Drainage and vent final test.” content with the following:

“312.4 Drainage and vent final test. The final test of the completed drainage and vent systems shall be visual and in sufficient detail to determine compliance with the provisions of this code. Where a smoke test is utilized, it shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, the stack openings shall be closed and a pressure equivalent to a 1-inch water column (248.8 Pa) shall be held for a test period of not less than 15 minutes. If a peppermint test is chosen the contractor shall be required to submit a testing procedure for approval.

229.2.17 Replace IPC Section 312.5 “Water supply system test.” with the following:

“312.5 Water supply system test. Upon completion of a section of or the entire water supply system, the system, or portion completed, shall be tested and proved tight under a pressure not less than 130 psi. This pressure shall be held for not less than 1 hour. The water utilized for tests shall be obtained from a potable source of supply. The required tests shall be performed in accordance with this section and IMC Section 107.”

229.2.18 Replace IPC Section 312.7 “Forced sewer test.” with the following:

“312.7 Forced sewer test. Forced sewer tests shall consist of plugging the end of the building sewer at the point of connection with the public sewer and applying a pressure of 50 psi greater than the operating pressure, and maintaining such pressure for 4 hours. Force main piping shall be uncovered and unconcealed for the duration of the test.”

229.2.19 *Replace IPC Section 312.8 “Storm drainage system test.” with the following:

“312.8 Storm drainage system test. An air test shall be made by forcing air into the system until there is a uniform gauge pressure of 5 psi (34.5 kPa) or sufficient to balance a 10-inch (254 mm) column of mercury. This pressure shall be held for a test period of not less than 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperatures or the seating of gaskets shall be made prior to the beginning of the test period.

312.8.1 Plastic piping shall not tested using air.”

312.8.2 Cast iron piping shall not be tested using air.”

229.2.20 Add Section 313.2 “Energy conservation.” to IPC Chapter 3:

“313.2 Energy conservation. Design systems containing electric water heaters, gas water heaters, solar water heaters, air-to-water heat pump water heaters, and water-to-water heat pump water heaters in accordance with the ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential* and DOE-FEMP (appropriate recommendations).”

229.2.21 Replace the last sentence of IPC Section 314.2.1 “Condensate disposal.” with the following:

“Condensate shall be plumbed with a trap and air gap to the storm system. All above-ground receptor p-traps and drain piping branches that receive chilled waste water shall be insulated up to the first wye connection, to prevent condensation.”

229.2.22 Add Section 317 “Installation and Location” to IPC Chapter 3:

“317.1 General. Equipment and appliances shall be installed as required by the terms of their approval, in accordance with the conditions of the listing, the manufacturer’s recommended installation instructions and

this code. Manufacturer's installation instructions shall be available on the job site at the time of inspection.

317.1.1 Clearance. When installing mechanical appliances and equipment that require maintenance and repair, the manufacturers' recommended clearances shall be maintained, along with a 3 foot working clearance around the appliance and/or equipment.

317.1.2 Confined space. If equipment and appliances are to be located in a confined space then that equipment shall be provided with a means of removal so that a person is not required to maintain or repair said equipment and/or appliance within the confined space.

317.1.3 Secure space. Equipment and appliances shall not be located in a manner that requires a person to pass through a secure space to gain access.

317.1.4 Path of Travel. When locating equipment and appliances a designated path of travel is required. This designated path of travel shall be sized so that the equipment is able to be moved from its installed location to a location outside of the facility without the demolition of existing passageways.

317.2 Conflicts. Where, in any specific case, different sections of any of the referenced standards specify different materials, methods of construction or other requirements, the most restrictive requirement will govern, unless otherwise approved by the BCO.”

229.3 Modify IPC, Chapter 4 - Fixtures, Faucets and Fixture Fittings as follows:

229.3.1 *Insert the following after the last sentence of IPC Section 401.2 “Prohibited fixtures and connections.”: “Fixtures employing continuous flow devices and fixtures that are subject to backflow are prohibited. ”

229.3.2 Replace all IPC Section 401.3 “Water conservation.” content with the following:

“401.3 Water conservation. Water conservation fixtures conforming to IPC Section 604.4 shall be used except where either:

- (1) DOE - FEMP water conservation requirements are more restrictive, or
- (2) The sewer system will not adequately dispose of the waste material on the reduced amount of water.”

229.3.3 Add Section 401.4 “Food Service.” to IPC Chapter 4:

“401.4 Food Service. Fixtures in toilet rooms designated for use by food service employees shall be provided with hands free operation.”

229.3.4 Insert the following after the last sentence of IPC Section 402.1 “Quality of Fixtures.”:

“Fixture materials shall be selected from those specified in UFGS 22 00 00, *Plumbing, General Purpose*. Porcelain-enameled cast-iron lavatories will be provided in gang toilet facilities.”

229.3.5 Replace all IPC Table 403.1 “MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES” content with the following:

Table 403.1 - Minimum Number of Required Plumbing Fixtures^a

No.	Classification	Occupancy	Description	Water Closes (Urinals See Section 419.2)		Lavatories		Bathtubs/ Showers	Drinking Fountain ^{e,f} (See Section 410.1)	Other
				Male	Female	Male	Female			
1	Assembly	A-1 ^d	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200	1 per 150	-	1 per 400	1 service sink
		A-2 ^d	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75		-	1 per 400	1 service sink

Table 403.1 - Minimum Number of Required Plumbing Fixtures^a

No.	Classification	Occupancy	Description	Water Closes (Urinals See Section 419.2)		Lavatories		Bathubs/ Showers	Drinking Fountain ^{e,f} (See Section 410.1)	Other
				Male	Female	Male	Female			
			Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200	1 per 150	-	1 per 400	1 service sink
		A-3 ^d	Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, arcades and gymnasiums	1 per 125	1 per 65	1 per 200		-	1 per 400	1 service sink
			Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750		-	1 per 400	1 service sink
			Places of worship and other religious services	1 per 150	1 per 75	1 per 150		-	1 per 400	1 service sink
		A-4	Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	-	1 per 400	1 service sink
			Locker rooms (for athletes) ^{h,j}	1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 40 persons		1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 45 persons)		1 per 15 persons when required, for population served	1 per 75; at least one per floor	1 service sink (1 per floor)
		A-5	Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	-	1 per 400	1 service sink
2	Business	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses, libraries, and	1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 40 persons		1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 45 persons)		1 per 15 persons when required, for population served	1 per 75; at least one per floor	1 service sink (1 per floor)

Table 403.1 - Minimum Number of Required Plumbing Fixtures^a

No.	Classification	Occupancy	Description	Water Closes (Urinals See Section 419.2)		Lavatories		Bathubs/ Showers	Drinking Fountain ^{e,f} (See Section 410.1)	Other
				Male	Female	Male	Female			
			bowling centers.							
3	Educational	E	Educational Facilities	1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 40 persons		1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 45 persons)		1 per 15 persons when required, for population served	1 per 75; at least one per floor	1 service sink (1 per floor)
4	Factory Industrial	F-1 and F-2	Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials	1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 40 persons		1 per 15 persons; then 1 per 20 persons, up to 95 persons; then 1 per 45 persons)		1 per 15 persons when required, for population served (See Section 411)	1 per 75; at least one per floor	1 service sink (1 per floor)
5	Institutional	I-1	Residential care	1 per 10		1 per 10		1 per 8	1 per 100	1 service sink
		I-2	Hospitals, ambulatory nursing home care recipient	1 per room ^c		1 per room ^c		1 per 15	1 per 100	1 service sink per floor
			Employees, other than residential care ^b	1 per 25		1 per 35		-	1 per 100	-
			Visitors, other than residential care	1 per 75		1 per 100		-	1 per 500	-
		I-3	Prisons ^b	1 per cell		1 per cell		1 per 15	1 per 100	1 service sink
			Reformatories, detention centers, and correctional centers ^b	1 per 15		1 per 15		1 per 15	1 per 100	1 service sink
			Employees ^b	1 per 25		1 per 35		-	1 per 100	-
I-4	Adult day care and child day care	1 per 15		1 per 15		1	1 per 100	1 service sink		
6	Mercantile	M	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500		1 per 750		-	1 per 1,000	1 service sink ^g
7	Residential	R-1	Hotels, motels, boarding houses (transient)	1 per sleeping unit		1 per sleeping unit		1 per sleeping unit	-	1 service sink
		R-2	Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 5		1 per 5		1 per 3	1 per 75 persons; then 1 per 30 persons; at least one per floor	1 service sink

Table 403.1 - Minimum Number of Required Plumbing Fixtures^a

No.	Classification	Occupancy	Description	Water Closets (Urinals See Section 419.2)		Lavatories		Bathtubs/ Showers	Drinking Fountain ^{e,f} (See Section 410.1)	Other	
				Male	Female	Male	Female				
			Apartment house	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit	-	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units	
			R-3	Congregate living facilities with 16 or fewer persons	1 per 5		1 per 5		1 per 3	1 per 75 persons; then 1 per 30 persons; at least one per floor	1 service sink
				One- and two-family dwellings	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit	-	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units
			R-4	Congregate living facilities with 16 or fewer persons	1 per 5		1 per 5		1 per 3	1 per 75 persons; then 1 per 30 persons; at least one per floor	1 service sink
8	Storage	S-1, S-2	Structures for the storage of goods, warehouses, storehouse and freight depots. Low and Moderate Hazard.	1 per 100		1 per 100		See Section 411	1 per 1,000	1 service sink	

- a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by the International Building Code.
- b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
- c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted where such room is provided with direct access from each patient sleeping unit and with provisions for privacy.
- d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
- e. The minimum number of required drinking fountains shall comply with Table 403.1 and Chapter 11 of the International Building Code.
- f. Drinking fountains are not required for an occupant load of 15 or fewer.
- g. For business and mercantile occupancies with an occupant load of 15 or fewer, service sinks shall not be required.
- h. For "High hazard" occupancies involving exposure to skin contamination with poisonous, infectious, or irritating materials, provide fixture quantities as listed in "Business" occupancy, except provide lavatories at 1 per 5 persons.
- i. Fixtures will be provided for swimmers only on this basis: The maximum capacity of the pool (swimmers) will equal the area of the pool in square feet divided by 27 (meters divided by 2-1/2). Where applicable, fixtures for waders will be computed on the basis of not less than 13-1/2 ft² (1-1/4 m²) per wader instead of 27 ft² (2-1/2 m²) in depth of less than 5 feet (1-1/2 m).
- j. In addition to the above fixtures, "wet toilets" required by wet swimmers and located adjacent to shower rooms will be provided as follows: One "wet toilet" for women, consisting of one water closet for 100 swimmers or less, and two water closets for over 100 swimmers. The "wet toilets" will be so placed that persons using them must pass through the shower before entering the pool.

- 229.3.6 Replace all Section 404.1 “Where required.” content with the following:
“404.1 Where required. Accessible plumbing facilities and fixtures shall be provided in accordance with the ABA.”
- 229.3.7 Add Section 410.5 “Central drinking water systems.” to IPC Chapter 4:
“410.5 Central drinking water systems. Central drinking water systems should be evaluated as an alternative to unitary water coolers in facilities where 15 or more drinking stations are required. Evaluation should include potential heat recovery from central condenser, addition of heat to building envelope by unitary condensers, differences in anticipated energy usage, and differences in first cost.”
- 229.3.8 Add Section 411.3 “Design requirements for emergency shower and eyewash stations.” to IPC Chapter 4:
“411.3 Design requirements for emergency shower and eyewash stations. The requirements of UFC 3-420-01, *Design: Plumbing Systems*, Appendix D shall be satisfied.
- 229.3.9 *Add Section 412.5 “Required locations and construction.” to IPC Chapter 4:
“412.5 Required locations and construction. Provide floor drains to serve, but not be limited to, the following areas and equipment:
- (1) Gang toilets, which are those having three or more water closets; and gang shower drying rooms, which are those serving two or more showers.
 - (2) Subsistence buildings, as follows:
 - a. Dishwashing, scullery or pot washing, and food-cart washing areas.
 - b. Vegetable peelers and vegetable preparation areas.
 - c. Steam table and coffee urn areas.
 - d. Soda fountain area.
 - e. Adjacent areas to ice chests, ice-making machines, and walk-in, reach-in, freezers and refrigerators.
 - f. Steam cookers and steam-jacketed kettles.
 - (3) Cold-storage buildings, as follows:
 - a. Fat-rendering, processing, salvage, and receiving rooms.
 - b. Receiving and issuing vestibules.
 - c. Adjacent areas to meat coolers and milk, butter, and egg rooms.
 - (4) Mechanical rooms with steam, condensate, chilled or hot water systems.
 - (5) Laundry rooms.
- When automatic priming is through a device connected to the water system, ensure that device is equipped with a vacuum breaker.”
- 229.3.10 Add Section 412.6 “Floor drains for emergency shower and eyewash stations.” to IPC Chapter 4:
“412.6 Floor drains for emergency shower and eyewash stations. The requirements of UFC 3-420-01, *Design: Plumbing Systems*, Appendix D shall be satisfied.
- 229.3.11 Add Section 412.7 “Indirect waste.” to IPC Chapter 4:
“412.7 Indirect waste. Floor drains that receive indirect waste shall be provided funnels to reduce splashing. If the floor drain is connected to the Sanitary System a hub adapter shall be installed to isolate it from potential grease waste on the floor. All above-ground receptor p-traps and drain piping branches that receive chilled waste water shall be insulated up to the first wye connection, to prevent condensation.”

229.3.12 Add Section 413.5 “Food waste grinders design.” to IPC Chapter 4:

“413.5 Food waste grinders design. Food waste grinders are authorized in Department of Defense permanent quarters, hospitals, and dining facilities when the sewage treatment plant can handle the additional load. Design of new sewage treatment plants and additions to existing plants will be based on the increase in load that will result from food waste grinders installed in hospital, dining facilities, and the ultimate projected number of family quarters to be constructed. Food waste grinders installed in hospital kitchens and dining facilities will be sized as shown in Table 413.5-1. Food waste grinders will not discharge into a grease interceptor.”

229.3.13 Add Table 413.5 “Sizing of Food Waster Grinders.” to IPC Chapter 4:

Table 413.5 - Sizing of Food Waster Grinders

Persons served	Pot washer horsepower	Dishwasher horsepower
Up to 200	2	3
200 to 500	3	5
501 to 1,000	5	7.5
Over 1,000	7.5	10

229.3.14 Insert the following after the last sentence of IPC Section 419.1 “Approval.”:

“Waterless/waterfree urinals shall conform to IAPMO Z124.9 *Plastic Urinal Fixtures* or ASME A112.19.2 *Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals*, but not conform to the hydraulic performance requirements. Approval for use of waterless/waterfree urinals shall come from the Building Manager.”

229.3.15 Replace all IPC Section 419.2 “Substitution for water closets.” content with the following:

“419.2 Substitution for water closets. For “male only” toilet facilities, urinals may be substituted for no more than one-third of the water closets required, one for one.”

229.3.16 Replacement all IPC Section 424.1.1 “Faucets and supply fittings.” content with the following:

“424.1.1 Faucets and supply fittings. Faucets and supply fittings shall conform to the water consumption requirements of IPC Section 401.3.”

229.3.17 Add Section 424.10 “Vendor Operated Spaces.” to IPC Chapter 4:

“424.10 Vendor Operated Spaces. A check valve shall be installed on each hot and cold water line supplying a sink in a vendor operated space. Check valves shall be installed on the supply line immediately before the fixture, or be integral to the fixture.”

229.3.18 Add Section 427.2 “Indirect waste.” to IPC Chapter 4:

“427.2 Indirect waste. Floor sinks receiving indirect waste shall be provided a grate with a manufacturer provided opening large enough to allow all waste run to the floor sink to pass through.”

229.4 Modify IPC, Chapter 5 – Water Heaters as follows:

229.4.1 Replace the first sentence of IPC Section 501.2 “Water heater as a space heater.” With the following:

“Where a combination potable water heating and space heating system requires water for space heating at temperatures of 140°F (60°C) and higher, a tempering valve shall be provided to limit the water to the potable hot water distribution system. The valve shall be set to deliver 110°F (43°C) water to the fixtures except where higher temperatures are required by specialized equipment as indicated in ASHRAE Handbook – *Applications*.”

- 229.4.2 Add Section 501.9 “Multiple water heaters.” to IPC Chapter 5:
“501.9 Multiple water heaters. Provide hospitals, laundry buildings, subsistence buildings, bachelor officers' quarters with mess and enlisted men's barracks with mess with multiple water heaters and storage tanks. Provide other facilities with a single water heater and storage tank. Multiple units, however, may be justified by circumstances such as
- (1) facility configuration
 - (2) space limitations
 - (3) limited access to tank room, and
 - (4) hot water requirements necessitating an unusually high capacity heating and storage unit.
- When two units are provided, each will have a capacity equal to two thirds of the calculated load. When more than two units are provided, their combined capacity will be equal to the calculated load.”
- 229.4.3 Add Section 501.10 “Solar water heating.” to IPC Chapter 5:
“501.10 Solar water heating. In accordance Public Law 110-140 and the Energy Independence and Security Act 2007, if proven lifecycle cost-effective as compared to other reasonably available technologies, not less than 30 percent of the hot water demand for each new building or major renovation shall be met through the installation and use of solar hot water heaters. Conventional back-up heating equipment shall be provided for periods when high demand or an extended period of cloudy days exceeds the capacity of the solar energy system.”
- 229.4.4 Insert the following after the last sentence of IPC Section 502.1 “General.”:
“Control of scale formation shall be provided with central water treatment on the hot-water system. This system will be in accordance with UFC 3-230-03 Water Treatment.”
- 229.4.5 Insert the following after the last sentence of IPC Section 504.2 “Vacuum relief valve.”:
“Provide a vacuum relief valve on each copper-lined storage tank to prevent the creation, within the tank, of a vacuum which could cause loosening of the lining.”
- 229.4.6 Add Section 505.2 “Insulation of hot water storage.” to IPC Chapter 5:
“505.2 Insulation of hot water storage. Insulate service hot water storage to meet the more restrictive minimum requirements of the following:
- (1) International Plumbing Code (IPC).
 - (2) ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.”
- 229.4.7 Add Section 505.3 “Upgrade insulation.” to IPC Chapter 5:
“505.3 Upgrade insulation. The insulation requirements and maximum heat loss rates stated in this section are minimum design requirements. The quality of insulation should be upgraded if the designer can show an improvement in the system performance or that insulation improvements are cost effective.”
- 229.4.8 *Add Section 506 “SIZING HOT WATER SYSTEMS.” to IPC Chapter 5:
“506.1 Sizing calculations. Design in accordance with the latest version of American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook “HVAC Applications”, Chapter 50 “Service Water Heating”; and in accordance with ASHRAE Standard 90.1, *Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings*.
- 506.1.1 Temperature. Size hot water system and set service water heater (SWH) storage temperature set point for not less than 140°F (60°C) to limit the potential for growth of *Legionella pneumophila*. Provide a hot water and cold water blending, tempering valve immediately downstream of the SWH storage tank to provide anti-scalding protection. Provide a balanced-pressure-type tempering valve. Set the blending valve to deliver 110°F (43°C) water to the fixtures except where higher temperatures are required by specialized equipment as indicated in ASHRAE Handbook – *Applications* and Table 506.

Table 506 – Water Service Temperatures

Service	Degrees F (Degrees C)
General use such as showers, sinks, family housing, administration facilities, etc.	120 (49)
Commercial type dishwashers with internal boosters	140 (60)
Commercial type dishwashers without internal boosters	180 (82)
Commercial type laundries	180 (82)

506.1.2 Sizing distributed or residential SWH systems. Use ASHRAE Handbook “HVAC Applications”, Chapter 50 “Service Water Heating”, Table 4 “HUD-FHA Minimum Water Heater Capacities for One- and Two-Family Living units” to size small SWH systems typical for family housing, lodges, and bachelor housing units provided with individual SWH’s. For family housing, select the SWH size from Table 4 based upon the number of bathrooms and bedrooms in the unit.

506.1.3 Sizing central SWH systems. Use ASHRAE Handbook “HVAC Applications”, Chapter 50 “Service Water Heating”, Table 10 “Hot-water Demand per Fixture for Various Types of Buildings” to size central SWH systems, except revise the numbers in row “9. Showers” by multiplying by the correction factor calculated in Section 506.1.7.”

506.1.4 Hot water mixing equation.
(Conversion Factors: 1 gpm = 3.8 L/s;
degree Fahrenheit = 9/5 degree Celsius + 32)

Let: Q_f = Fixture flow in gpm = 2.5 gpm per Public Law 102-486
 Q_s = Flow from SWH Storage Tank in gpm
 Q_c = Flow from Cold Water Supply in gpm
 T_f = Temperature at fixture in degrees F = 110 F for personnel safety
 T_s = Temperature at SWH Storage Tank in degrees F, 140 F minimum for Legionella
 T_c = Temperature at Cold Water Supply in degrees F, varies due to location and season

Mixing Equation: $(Q_f \times T_f) = (Q_s \times T_s) + (Q_c \times T_c)$

Substituting $Q_c = Q_f - Q_s$ gives the following:

$$\begin{aligned} (Q_f \times T_f) &= (Q_s \times T_s) + ((Q_f - Q_s) \times T_c) \\ (Q_f \times T_f) &= (Q_s \times T_s) + (Q_f \times T_c) - (Q_s \times T_c) \\ (Q_f \times T_f) - (Q_f \times T_c) &= (Q_s \times T_s) - (Q_s \times T_c) \\ Q_f \times (T_f - T_c) &= Q_s \times (T_s - T_c) \\ Q_s &= Q_f \times [(T_f - T_c) / (T_s - T_c)] \end{aligned}$$

Substituting $Q_f = 2.5$ gpm, $T_f = 110$ F, $T_s = 140$ F, and $T_c = 50$ F gives the following:

$$\begin{aligned} Q_s &= 2.5 \times [(110 - 50) / (140 - 50)] \\ Q_s &= 1.667 \text{ gpm of hot water from storage tank} \\ Q_c &= Q_f - Q_s = 2.5 \text{ gpm} - 1.667 \text{ gpm} = 0.833 \text{ gpm of cold water from supply} \end{aligned}$$

The mixing equation may be used to evaluate the effect of variation of T_c temperatures on Q_s . At $T_s = 140$ F, for $T_c = 40$ F, $Q_s = 1.75$ gpm; and for $T_c = 80$ F, $Q_s = 1.25$ gpm.

The mixing equation may also be used to evaluate the required size of SWH storage tanks as T_s varies. Higher storage temperatures allow smaller tank sizes to deliver equal water to fixtures.

506.1.5 Revisions to ASHRAE Handbook “HVAC Applications”, Chapter 50 “Service Water Heating”, Table 10 “Hot-water Demand per Fixture for Various Types of Buildings”. Row 9, Showers, indicates 225 gallons per hour (gph) per fixture for hot water flow in Gymnasiums, Industrial Plants, Schools, and YMCA’s. Assume this represents continuous flow of shower fixture, what is the design fixture flow rate? Since 225 gph/60 min. per hour = 3.75 gpm of hot water flow = Q_s , calculate the fixture flow Q_f from the mixing equation, using $T_f = 110$ degrees F, $T_s = 140$ degrees F, and $T_c = 50$ degrees F. Observe that $Q_f = Q_s + Q_c$, therefore $Q_c = Q_f - Q_s$. Substituting:

$$Q_f \times T_f = (Q_s \times T_s) + (Q_c \times T_c)$$

$$Q_f \times T_f = (Q_s \times T_s) + ((Q_f - Q_s) \times T_c)$$

$$Q_f \times T_f = (Q_s \times T_s) + (Q_f \times T_c) - (Q_s \times T_c)$$

$$(Q_f \times T_f) - (Q_f \times T_c) = (Q_s \times T_s) - (Q_s \times T_c)$$

$$Q_f \times (T_f - T_c) = Q_s \times (T_s - T_c)$$

$$Q_f = Q_s \times [(T_s - T_c) / (T_f - T_c)]$$

$$Q_f = 3.75 \times [(140 - 50) / (110 - 50)]$$

$$Q_f = 5.625 \text{ gpm}$$

Therefore, the proper correction factor (CF) for Chapter 50, Table 10, Row 9 is equal to 2.5 gpm per fixture (per PL 102-486) divided by 5.625 gpm (calculated above), which results in $CF = 0.444$ for T_c of 50 degrees F. This may also be calculated as $Q_s = 1.667$ divided by $Q_s = 3.75$ equals $CF = 0.444$. Thus, the gymnasium shower at 225 gph x CF corrects to 225 gph x 0.444 = 100 gph for T_c of 50 degrees F.

506.1.6 Domestic Hot Water Recirculation Pumps. Domestic hot water recirculation pumps shall meet the requirements of UFC 3-420-01, *Design: Plumbing Systems*, Appendix E.

506.2 Life cycle cost analysis. Executive Order 13423, “Strengthening Federal Environmental, Energy, and Transportation Management” requires life cycle cost analysis (LCCA) of alternatives and maximum utilization of energy conserving methods and equipment. Evaluate alternative energy source options, such as electric, steam, oil-fired, and gas-fired service water heater. Evaluate SWH storage tank capacity and electric heater element sizing to minimize electric demand charges to the government. Larger storage tanks with smaller heater elements may be cost effective due to reduced demand charges, although the longer storage recovery time and the additional costs for providing non-standard tank and element selections should also be considered. Do not exceed the ASHRAE recommended 8-hour maximum recovery time. Also consider the incremental cost of additional electric service capacity versus the incremental costs of providing steam or gas service or providing fuel oil storage and delivery. Include the costs of providing combustion air and flue gas exhaust for fuel-fired water heaters. Do not consider the cost of the tempering valve in the life cycle costs analysis, it is required by the 140°F (60°C) storage temperature to avoid legionella. However, since it is required, consider the life cycle cost advantages of storing hot water at higher temperatures, if the source is electric, steam, or natural gas, and the tank insulation is increased to maintain equal total heat loss. A smaller SWH storage tank may reduce the size of the mechanical room and the building, which will reduce the energy and capital costs of the facility. Consider a pre-heat tank upstream of the SHW storage tank for applications recovering heat from refrigerant hot gas, steam condensate, process waste cooling, solar collectors, and diesel engines. Provide a tempering valve for all heat recovery SWH systems to limit the supply temperature, because the recovered heat can heat the storage tank above the normal storage temperature. A pre-heat tank may increase the amount of heat useably recovered prior to allowing the water to be heated by prime energy. Consider sealed combustion chambers for natural gas-fired SWH’s, with combustion air ducted directly from and flue gases ducted directly to the outside air. This may reduce the possibility of carbon monoxide poisoning within the occupied spaces. Ensure adequate clearances of inlet and outlet during snow, icing, flood, and heavy wind-driven rain conditions.”

229.5 Modify IPC, Chapter 6 – Water Supply and Distribution as follows:

229.5.1 Add Section 601.5 “Storage tank materials.” to IPC Chapter 6:

“601.5 Storage tank materials. Storage tanks shall be constructed of one of the following combinations of materials and methods:

- (1) Ferrous metals lined with nonferrous metals and provided with cathodic protection.
- (2) Ferrous metals lined with glass and provided with cathodic protection.
- (3) Ferrous metals lined with cement and provided with cathodic protection.
- (4) Fiberglass reinforced plastic for atmospheric pressure applications.”

229.5.2 Insert the following after Section 602.2 “Potable water required”:

“Exception: A non-potable water supply, when used in an entirely separate system and when approved by the local health department, may be used for flushing water closets and urinals, and for other approved purposes where potable water is not required. Piping containing non-potable water, that is water not meeting accepted potable water standards, will be labeled "NONPOTABLE WATER, DO NOT DRINK." ”

229.5.3 Add Section 602.2.1 “Water for landscaping” to IPC Chapter 6:

“602.2.1 Water for landscaping. Wall faucets, wall hydrants, lawn faucets, and yard hydrants shall be located so that, with 100 feet (30 m) of garden hose, the area can be watered without crossing the main entrance of public buildings or barracks. The branch to the lawn faucets and yard hydrants shall be equipped with stop and waste valves. The means of watering lawn areas, flowerbeds, and gardens shall be provided as follows:

- (1) Wall faucets with vacuum breaker backflow preventer on outside walls in nonfreezing climates.
- (2) Non-freeze wall hydrants with vacuum breaker backflow preventer on outside walls in freezing climates.
- (3) Lawn faucets with vacuum breaker backflow preventer for garden and lawn areas in nonfreezing climates.
- (4) Yard non-freeze hydrants for garden and lawn areas in freezing climates. Yard non-freeze hydrants have an automatic drain feature that can allow ground water to enter the service line. To protect the water supply the designer can either isolate the supply to the yard non-freeze hydrants with a double check valve backflow preventer, or specify sanitary yard hydrants. Sanitary yard hydrants are self-contained and do not drain to the surrounding ground, eliminating the possibility of cross-contamination.

The designer shall select the most cost effective option; sanitary yard hydrants are about three times the cost of standard non-freeze yard hydrants.”

229.5.4 Insert the following after the last sentence of IPC Section 604.1 “General”:

“Service lines shall enter the building in an accessible location. Large buildings shall be provided with two or more water services to ensure constant delivery to all fixtures and equipment. Drain valves shall be installed on the fixture side of all service valves located inside a building and be placed in locations with access to waste drains.”

229.5.5 Insert the following after the last sentence of IPC Section 604.3 “Water distribution system design criteria.”:

“Provide piping water velocities not to exceed 10 feet per second (3.28 m/s). In hospitals and similar facilities, where a quiet system is desired, velocities are not to exceed 7 feet per second (2.13 m/s).”

229.5.6 *Replace Section 604.8 “Water-pressure reducing valve or regulator.” content with the following:

“604.8 Water pressure reducing valve or regulator. Where water pressure within a building exceeds the required water pressure of 70 psig (483 kPa) static by 10 psig (69 kPa), an approved water-pressure reducing valve conforming to ASSE 1003 or CSA B356 with strainer shall be installed to reduce the pressure in the building water distribution piping to not greater than 70 psi (552 kPa) static.

Exception: Service lines to sill cocks and outside hydrants, and main supply risers where pressure from the mains is reduced to 70 psi (552 kPa) or less at individual fixtures.”

229.5.7 Add the following after the last sentence of IPC Section 604.9 “Water hammer.”:

“Only specify commercial-type water hammer arresters, vertical capped pipe columns are not permitted. Size and locate commercial water hammer arresters in accordance with the latest version of PDI WH201,

Water Hammer Arresters and manufacturer’s recommendations. Provide access doors or removable panels when water hammer arresters are concealed.”

229.5.8 Replace IPC Section 605.2 “Lead content of water supply pipe and fittings.” content with the following:
 “605.2 Lead content of water supply pipe and fittings. Pipe and pipe fittings, including valves and faucets, utilized in the water supply system shall have a maximum of 0.25-percent lead content.

229.5.9 Replace all IPC Table 605.3 “Water service pipe.” content with the following:

Table 605.3 – Water Service Pipe

Material	Standard
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 1527; ASTM D 2282
Brass pipe	ASTM B 43
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D 2846; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Cross-linked polyethylene (PEX) plastic pipe and tubing	ASTM F 876; ASTM F 877; AWWA C904; CSA B137.5
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1281; ASTM F 2262; CSA B137.10M
Cross-linked polyethylene/aluminum/high-density polyethylene (PEX-AL-HDPE)	ASTM F 1986
Ductile iron water pipe	AWWA C151/A21.51; AWWA C115/A21.15
Polyethylene (PE) plastic pipe	ASTM D 2239; ASTM D 3035; AWWA C901; CSA B137.1
Polyethylene (PE) plastic tubing	ASTM D 2737; AWWA C901; CSA B137.1
Polyethylene/aluminum/polyethylene (PE-AL-PE) pipe	ASTM F 1282; CSA B137.9
Polyethylene of raised temperature (PE-RT) plastic tubing	ASTM F 2769
Polypropylene (PP) plastic pipe or tubing	ASTM F 2389; CSA B137.11
Polyvinyl chloride (PVC) plastic pipe	ASTM D 1785; ASTM D 2241; ASTM D 2672; CSA B137.3
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

229.5.10 Replace all IPC Section 605.4 “Water distribution pipe.” content with the following:
 “Water distribution pipe shall conform to NSF 61 and shall conform to one of the standards listed in IPC Table 605.4. Hot water distribution pipe and tubing shall have a pressure rating of not less than 100 psi (690 kPa) at 180°F (82°C). Pipe, valves, and fittings shall be nonferrous.

Exception: Ferrous pipe may be used for cold-water piping, provided:

- (1) Piping is not concealed in walls, partitions, or floors.
- (2) Replacement would be simple and inexpensive.
- (3) Piping diameter is greater than 3 inches (76 mm).
- (4) Selection of pipe, valves, and fittings is done in accordance with the quality of the water. Water quality is classified under the following categories:
 - a. *Category 1:* Calcium plus magnesium content 0 to 35 parts per million (ppm) expressed as calcium (Ca). For this type of water, pipe, valves, and fittings will be nonferrous for both hot- and cold-water services.
 - b. *Category 2:* Calcium plus magnesium content 35 to 75 ppm. For this type of water, pipe, valves, and fittings may be ferrous for cold –water service, when sulfates (SO4) are less than one and

one-half times the calcium content. If the sulfate content is more than one and one-half times the calcium content, pipe, valves, and fittings will be nonferrous for cold-water service. All pipe, valves, and fittings for hot-water service will be nonferrous.

- c. *Category 3:* Calcium plus magnesium content more than 75 ppm. For this type of water, pipe, valves, and fittings may be ferrous for cold-water service and nonferrous for hot-water service if the sulfates (SO₄) are less than twice the calcium content. If the sulfates are more than twice the calcium content, pipe, valves, and fittings will be nonferrous for hot and cold-water service.

High-chloride content, especially in category 2 and 3 waters, will have a corrosion-causing effect similar to high-sulfate content.

- (5) Local experience has shown that ferrous piping in category 2 and 3 waters has a satisfactory life of 20 to 25 years.

Where dissimilar metals are joined underground or at water heaters, insulated joints will be installed at those points to break the galvanic couple.”

- 229.5.11 Replace all IPC Table 605.4 “Water distribution pipe.” content with the following:

Table 605.4 – Water Distribution Pipe

Material	Standard
Brass pipe	ASTM B 43
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WK, L, WL, M or WM)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 447
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 876; ASTM F 877; CSA B 137.5
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX)_pipe	ASTM F 1281; ASTM F 2262; CSA B1 37.1 OM
Cross-linked polyethylene/aluminum/high-density polyethylene	ASTM F 1986 (PEX-AL-HDPE)
Ductile iron pipe	AWWA C151/A21.51; AWWA C115/A21.15
Polyethylene/aluminum/polyethylene (PE-AL-PE) composite pipe	ASTM F 1282
Polyethylene of raised temperature (PE-RT) plastic tubing	ASTM F 2769
Polypropylene (PP) plastic pipe or tubing	ASTM F 2389; CSA B137.11
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

- 229.5.12 Replace all of IPC Section 605.6 “Flexible water connectors.” with the following:

“605.6 Flexible water connectors. Flexible water connectors exposed to continuous pressure shall conform to A112.18.6/CSA B125.6 and shall be of the appropriate length as to make an uninterrupted connection between the water supply stub-out, and fixture of equipment. Access shall be provided to all flexible water connectors.”

- 229.5.13 Delete IPC Section 605.11 “Asbestos-cement” in its entirety.

- 229.5.14 Add Section 605.14.2.1 “Press fit type mechanical connections.” to IPC Chapter 6:

“605.14.2.1 Press fit type mechanical connections. Press fit type mechanical connections shall be permitted for use with copper pipe and tube of sizes 2 inches (50.8 mm) and smaller.”

605.14.2.2 “Pro-Press type fittings shall not be used for drain/waste applications, other than couplings installed for repair purposes only.”

- 229.5.15 Add Section 605.15.3.1 “Press fit type mechanical connections.” to IPC Chapter 6:
 “605.15.3.1 Press fit type mechanical connections. Press fit type mechanical connections shall be permitted for use with copper pipe and tube of sizes 2 inches (50.8 mm) and smaller.”
- 229.5.16 Delete IPC Section 605.18 “Steel” in its entirety.
- 229.5.17 Insert the following after the last sentence of Section 605.23 “Stainless steel.”:
 “Pipe of diameter greater than 2 inches (5.1 cm) shall be welded.”
- 229.5.18 Add Section 606.2.1 “Fixture Shutoff Valves.” to IPC Chapter 6:
 606.2.1 Fixture Shutoff Valves. Fixture shutoff valves in public areas and leased commercial spaces shall be of the keyed type.”
- 229.5.19 Replace all of Section 606.3 “Access to valves.” with the following:
 “606.3 Access to valves. Valves shall be readily accessible or accessible by a means that first requires the removal or movement of a panel, door or similar obstruction and/or reached from the ground, a ladder, or approved platform.”
- 229.5.20 Add Section 606.4.1 “Pentagon Reservation.” to IPC Chapter 6:
 “606.4.1 Pentagon Reservation. All valves on the Pentagon Reservation shall be labeled in accordance with the Pentagon Equipment Labeling Standard.
 606.4.2 Mark Center - Reserved”
- 229.5.21 *Add Section 606.5.11 “Sizing booster systems and pumps.” to IPC Chapter 6:
 “606.5.11 Sizing booster systems and pumps.
 606.5.11.1 Tank Pressure.
 606.5.11.2 Pumps. A minimum of three pumps shall be provided. The pumps shall be set up in lead, lag, and standby configuration. Each pump shall be sized to meet the requirements of the facility. Pump capacities in gallons per minute (L/s) shall be in accordance with IPC Table 606.5.11.2. Pump head shall be equal to the high pressure maintained within the hydro-pneumatic tank.”

Table 606.5.11.2. – Tank Fill Pumps

Location	Number of Fixtures	Gpm (L/s) per Fixture		Min. Pump Capacity GPM (L/s)	
Administration Building	1-25	1.23	(0.08)	25	(1.5)
	26-50	0.9	(0.06)	35	(2.2)
	51-100	0.7	(0.045)	50	(3.2)
	101-150	0.65	(0.04)	75	(4.7)
	151-250	0.55	(0.03)	100	(6.3)
	251-500	0.45	(0.03)	140	(7.8)
	501-750	0.35	(0.02)	230	(15)
	751-1000	0.3	(0.02)	270	(17)
	1000-up	0.275	(0.02)	310	(20)
Hospitals	1-50	1	(0.06)	25	(1.6)
	51-100	0.8	(0.05)	55	(3.5)
	101-200	0.6	(0.04)	85	(5.4)
	201-400	0.5	(0.03)	135	(7.9)
	401-up	0.4	(0.025)	210	(13)

Table 606.5.11.2. – Tank Fill Pumps

Location	Number of Fixtures	Gpm (L/s) per Fixture		Min. Pump Capacity GPM (L/s)	
		Gpm	(L/s)	GPM	(L/s)
Industrial Buildings	1-25	1.5	(0.1)	25	(1.6)
	26-50	1	(0.06)	40	(2.5)
	51-100	0.75	(0.05)	60	(3.8)
	101-150	0.7	(0.045)	80	(5)
	151-250	0.65	(0.04)	110	(7)
	251-up	0.6	(0.04)	165	(10.5)

606.5.11.3 Tank Capacity. Tank capacity shall be based upon a withdrawal, in gallons (liters), of 2-1/2 times the gallon per minute (L/s) capacity of the pump and a low water level of not less than 10 percent of total tank capacity or 3 inches (76 mm) above top of the tank outlet, whichever is greater. Table 606.5.11.3 indicates high water levels and withdrawals for efficient operation of tanks with bottom outlets and a 10-percent residual.

Table 606.5.11.3 - Hydro-Pneumatic Tank High Water Levels and Withdrawals

(Based on bottom outlet tanks and a 10 percent residual)

Pressure Range Psi (kPa)		High Water Level (% of total tank capacity)	Withdrawal (96% of total tank capacity)
20-40	(140-275)	43	33
30-50	(205-345)	38	28
40-60	(275-415)	34	24
50-70	(345-480)	32	22
60-80	(415-550)	28	18
20-45	(140-310)	48	38
30-55	(205-380)	42	32
40-65	(275-450)	37	27
50-75	(345-520)	35	25
60-85	(415-590)	32	22

606.5.11.4 Compressed Air. Provide 1.5 cubic feet per minute (cfm) for tank capacities up to 500 gallons (1893 L) and 2 cfm for capacities from 500 to 3,000 gallons (1893 to 11355 L). For each additional 3,000 gallons (11355 L) or fraction thereof, add 2 cfm (0.0566 cubic meters/min.). (Quantities are expressed in cubic feet (cubic meter) per minute free air at pressure equal to the high pressure maintained within the hydro-pneumatic tank.)

606.5.11.5 Controls. The controls of a hydro-pneumatic system are to maintain the predetermined pressures, water levels, and air-water ratio within the tank. Only one pump shall be started at a time. Pumps are to be operated alternately and run simultaneously only when a single pump cannot maintain the predetermined low pressure. The third pump shall be operator activated. Controls are to admit compressed air into the tank only when tank pressure at high water level is below normal.

606.5.11.6 Booster Pumps..

606.5.11.6.1 On-Off Type. The installation of an "on-off" type of pumping system shall be installed when relatively long periods of pump-on or pump-off are anticipated. Pumps are to be activated, only when pressure is inadequate, by a sensing device located in the pump suction line. Flow normally is through a single full-size pump bypass with check valve and two normally open (N.O.) isolating valves, whether the installation has one pump or multiple pumps. Provide each pump with a check valve on the discharge and two N.O. isolating valves.

606.5.11.6.2 Continuous Running. Variable speed, constant pressure, continuous running pumps shall be installed when anticipated pressure fluctuation would result in short-cycling of the "on-off" type of pumps. Whether the installation is a single pump or multiple pumps, provide one full-size pump bypass having a check valve and two N.O. gate valves. Provide each pump with a check valve on the discharge and two N.O. isolating valves."

229.5.22 Replace IPC Section 606.7 with the following:

"606.7 Labeling of water distribution pipes in bundles. Labeling of water distribution pipe shall meet the requirements of Section 301.10.

229.5.23 Add Section 606.8 "System drain down." to IPC Chapter 6:

606.8 System drain down. Piping systems shall be designed and installed to permit the system to be drained.

Exception: Section 606.8 shall not apply to buried portions systems embedded under floors or underground."

229.5.24 Add Section 607.1.3 "*Legionella Pneumophila* (Legionnaire's Disease)." to IPC Chapter 6:

607.1.3 *Legionella Pneumophila* (Legionnaire's Disease). The recommended practices described in ASHRAE 12 shall be considered and implemented wherever practical to minimize the risk of exposure to *Legionella Pneumophila*. The designer of record shall document the consideration decision process and submit their rational analysis as part of the Basis of Design."

229.5.25 Add Section 607.1.4 "System Selection." to IPC Chapter 6:

"607.1.4 "System Selection. ASHRAE Handbook "HVAC Applications", Chapter 50 "Service Water Heating" shall be used when selecting a source for service water heating. If a circulation system is applied it shall be sized to limit the water temperature drop to 20°F (11.1°C) (maximum temperature difference between supply and return). Valves for balancing the circulation shall be provided in each return branch."

229.5.26 Replace IPC Section 607.2 "Hot or tempered water supply to fixtures." with the following:

"607.2 Hot or tempered water supply to fixtures. Domestic hot water supply delivery time shall be no longer than 15 seconds."

229.5.27 Insert the following after the last sentence of IPC Section 607.2.1 "Hot water system controls.":

"In buildings operated on a nominal 40-hour week or on a nominal two-shift basis (either a 5- or a 7-day week), a clock or other automatic control shall be installed on domestic hot-water circulating pumps to permit operation only during periods of occupancy plus 30 minutes before and after."

229.5.28 Add Section 607.5.1 "Insulation of hot water piping." to IPC Chapter 6:

"607.5.1 Insulation of hot water piping. Insulate service hot water piping to meet the more restrictive minimum requirements of the following:

(1) *International Plumbing Code* (IPC).

(2) ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings.*"

229.5.29 *Add Section 607.5.2 "Upgrade insulation." to IPC Chapter 6:

"607.5.2 Upgrade insulation."

229.5.30 Add Section 607.6 "Mixing Devices." to IPC Chapter 6:

"607.6 Mixing Devices. Check valves shall be installed on the hot and cold water lines feeding mixing devices."

229.5.31 *Insert the following after the last sentence of Section 608.1 "General.":

"Backflow prevention devices shall be listed by the Foundation for Cross-Connection Control & Hydraulic Research, or any other approved testing laboratory having equivalent capabilities for both laboratory and field evaluation of backflow prevention devices and assemblies. Testing frequencies shall follow the

requirements set forth by the local regulatory agencies or DoD policy, whichever is more stringent.”

229.5.32 Replace Section 608.8 “Identification of nonpotable water.” with the following:

608.8 Identification of nonpotable water. Where nonpotable water systems are installed, the piping conveying the nonpotable water shall be identified by color marking in accordance with Sections 608.8.1 through 608.8.3. All nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified at the point of use for each outlet with the words, “Nonpotable --not safe for drinking.” The words shall be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches (12.7 mm) in height and in colors in contrast to the background on which they are applied.

608.8.1 Information. Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also contain information addressing the nature of the hazard. Pipe identification shall be repeated at intervals not exceeding 25 feet (7620 mm) and shall follow the recommendations of ANSI-A13.1. Lettering shall be readily observable within the room or space where the piping is located.

608.8.2 Color. The color of the pipe identification shall be discernable and consistent throughout the building. The color purple shall be used to identify reclaimed, rain and gray water distribution systems.

608.8.3 Size. The size of the background color field and lettering shall comply with the recommendations of ANSI-A13.1.

229.5.33 *Insert before the first sentence of Section 611.2 “Reverse osmosis systems.”:

“Reverse osmosis water treatment systems shall be installed when water of a higher purity than that produced by the domestic water is required. A water quality analysis shall be performed and water treatment design shall proceed based on that analysis.

229.5.34 *Add Section 614 “Ion exchange water softening treatment equipment.” to IPC Chapter 6:

“SECTION 614 ION EXCHANGE WATER SOFTENING TREATMENT

614.1 Ion exchange water softening treatment equipment.

229.6 Modify IPC Chapter 7 – Sanitary Drainage as follows:

229.6.1 Replace all IPC Table 702.2 “UNDERGROUND BUILDING DRAINAGE AND VENT PIPE.” content with the following:

Table 702.2 – Underground Building Drainage and Vent Pipe

Material	Standard
Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D 2661; ASTM F 628; ASTM F 1488; CSA B181.1
Cast-iron pipe	ASTM A 74; ASTM A 888; CISPI 301
Copper or copper-alloy tubing (Type K, L, M or DWV)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 306
Polyolefin pipe	ASTM F 1412; CSA B181.3
Polyvinyl chloride (PVC) plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D 2665; ASTM F 891; ASTM F 1488; CSA B181.2
Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D. and a solid, cellular core, or composite wall	ASTM D 2949, ASTM F 1488
Polyvinylidene fluoride (PVDF) plastic pipe	ASTM F 1673; CSA B 181.3
Stainless steel drainage systems, Type 316L	ASME A 112.3.1

229.6.2 Replace all Table 702.3 “BUILDING SEWER PIPE.” content with the following:

Table 702.3 – Building Sewer Pipe

Material	Standard
Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D 2661; ASTM F 628; ASTM F 1488; CSA B181.1
Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer (ABS) plastic pipe in sewer and drain diameters, including SDR 42 (PS 20), PS 35, SDR 35 (PS 45), PS 50, PS 100, PS 140, SDR 23.5 (PS 150) and PS 200; with a solid, cellular core or composite wall	ASTM F 1488; ASTM D 2751
Cast-iron pipe	ASTM A 74; ASTM A 888; CISPI 301
Concrete pipe	ASTM C14; ASTM C76; CSA A257. 1M; CSA A257.2M
Copper or copper-alloy tubing (Type K or L)	ASTM B 75; ASTM B 88; ASTM B 251
Polyethylene (PE) plastic pipe (SDR-PR)	ASTM F 714
Polyvinyl chloride (PVC) plastic pipe in IPS diameters, including schedule 40, DR 22 (PS 200) and DR 24 (PS 140); with a solid, cellular core, or composite wall	ASTM D 2665; ASTM F 891; ASTM F 1488
Polyvinyl chloride (PVC) plastic pipe in sewer and drain diameters, including PD 25, SDR 41 (PS 28), PS 35, SDR 35 (PS 46), PS 50, PS 100, SDR 26 (PS 115), PS 140, and PS 200; with a solid, cellular core or composite wall	ASTM F 891; ASTM F 1488; ASTM D 3034; CSA B182.2; CSA B182.4
Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D. and a solid, cellular core, or composite wall	ASTM D 2949, ASTM F 1488
Polyvinylidene fluoride (PVDF) plastic pipe	ASTM F 1673; CSA B181.3
Stainless steel drainage systems, Type 304 and 316L	ASME A 112.3.1
Vitrified clay pipe	ASTM C 4; ASTM C 700

229.6.3 Replace all Table 702.4 “PIPE FITTINGS.” content with the following:

Table 702.4 – Pipe Fittings

Material	Standard
Acrylonitrile butadiene styrene (ABS) plastic pipe in IPS diameters	ASTM D 2661; ASTM F 628; CSA B181.1
Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer and drain diameters	ASTM D 2751
Cast-iron pipe	ASME B 16.4; ASME B 16.12; ASTM A 74; ASTM A 888; CISPI 301
Copper or copper-alloy	ASME B 16.15; ASME B 16.18; ASME B 16.22; ASME B 16.23; ASME B 16.26; ASME B 16.29
Glass	ASTM C 1053
Gray iron and ductile iron	AWWA C 110/A2 1.10
Malleable iron	ASME B 16.3
Polyolefin	ASTM F 1412; CSA B181.3
Polyvinyl chloride (PVC) plastic pipe in IPS diameters	ASTM D 2665; ASTM F 1866
Polyvinyl chloride (PVC) plastic pipe in sewer and drain diameters	ASTM D 3034
Polyvinyl chloride (PVC) plastic pipe with a 3.25-inch O.D.	ASTM D 2949
Polyvinylidene fluoride (PVDF) plastic pipe	ASTM F 1673; CSA B181.3
Stainless steel drainage systems, Type 304 and 316L	ASME A 112.3.1

Table 702.4 – Pipe Fittings

Material	Standard
Steel	ASME B 16.9; ASME B 16.11; ASME B 16.28
Vitrified clay pipe	ASTM C 700

- 229.6.4 Delete Section 705.3 “Asbestos-cement” in its entirety.
- 229.6.5 Delete Section 705.12 “Steel” in its entirety.
- 229.6.6 Delete Section 705.13 “Lead” in its entirety.
- 229.6.7 Replace all Section 708.4 "Concealed piping.” content with the following:
 "708.4 Concealed piping. Cleanouts on concealed piping or piping under a floor slab or in a crawl space of less than 24 inches (610 mm) in height or a plenum shall be extended through and terminate flush with the finished wall, floor or ground surface or shall be extended to the outside of the building. Cleanout plugs shall not be covered with cement, plaster or any other permanent finish material. Where it is necessary to conceal a cleanout or to terminate a cleanout in an area subject to vehicular traffic, the covering plate, access door or cleanout shall be of an approved type designed and installed for this purpose. Clean outs shall be elevated above the flood level rim of the highest fixture connected to the pipe served by the cleanout."
- 229.6.8 *Insert the following after the last sentence of IPC Section 712.3.1 “Sump pump.”:
 “Sump pumps shall be installed in pits below the lowest floor. Sump pumps shall be duplex pump units. The capacity of each pump of the duplex pump unit shall be sufficient to meet the inflow requirements of the sump.
- 229.6.9 Insert the following after the last sentence of IPC Section 712.3.2 “Sump pit.”:
 “Sumps are to contain, in gallons, between the high level and low level operating switch settings approximately twice the capacity of the sump pump, in gallons per minute. The depth of the pit, below the finished floor, shall be in even feet to conform to standard lengths of submerged pump shafts.”
- 229.6.10 Insert the following after the last sentence of IPC Section 712.3.4 “Maximum effluent level.”:
 “A high water alarm actuator is to be installed within sump and operate an audible or visual alarm when the normal high-water level within sump has been exceeded. This alarm shall be sent to the facilities BAS.”
- 229.6.11 Add Section 712.3.6 “Controls.” to IPC Chapter 7:
 712.3.6 Controls. Duplex pump units shall be equipped with automatic controls to include, alternate the operation of the pumps under normal conditions and to operate pumps simultaneously when one pump cannot handle the flow. Each pump shall be fully controllable by the facilities BAS. The integration of the pumps with the facility BAS shall be done in accordance with Section 229.1.7”
- 229.6.12 Insert the following after the last sentence of IPC Section 712.4 “Sewage pumps and sewage ejectors.”:
 “Detailed requirements for pumps and ejectors shall be in accordance with the standards of the Hydraulic Institute. Where sewers are not of sufficient depth to drain the lower floor fixtures by gravity, the main toilet rooms shall be located on higher floors. Sewage ejectors shall be of the duplex pneumatic type and shall be located in a concrete pit below the lowest floor. Ejectors shall utilize a high-velocity steam, air, or water jet for ejecting the sewage. When the sewage must be pumped, duplex units shall be provided below the lowest floor in a concrete sump protected by a safety railing. Duplex sewage pumps shall be installed in a separate pump house when the sewage from a group of buildings must be pumped and where it is not possible to install sewage pumps in the buildings. Pump motors shall be located so as not to become submerged by an electrical service interruption. Packaged pumping systems installed in vertical dry or wet basins with non-clog centrifugal pumps are acceptable, if the influent line leads directly to the discharge line of both pumps and all incoming sewage passes through self-cleaning screens. Auxiliary screens shall be installed in influent lines within wet wells, since built-in, self-cleaning screens of the pump discharge lines may not be able to handle extreme peak flow conditions. Combination "T" and check valve arrangements

shall be provided in the influent line to each pump to prevent raw sewage from backing into incoming sewer lines, when pumps are operating.”

229.6.13 Insert the following after the last sentence of IPC Section 712.4.2 “Capacity.”:

“The capacity shall be determined by the fixture unit method described in IPC Section 710.”

229.6.14 Insert the following after the last sentence of IPC Section 715.5 “Location.”:

“A gate valve shall be installed on the sewer side of each backwater valve, and both shall be installed in a manhole.”

229.7 Modify IPC Chapter 8 – Indirect/Special Waste as follows:

229.7.1 Replace all of IPC Section 802.1.3 “Potable clear-water waste.” with the following:

“802.1.3 Potable clear-water waste. Devices and equipment, such as sterilizers and relief valves that discharge potable water shall dispose of the potable water through an indirect waste pipe by means of a trap and air gap into the Storm System.”

229.7.2 Replace all of IPC Section 802.1.5 “Nonpotable clear-water waste.” With the following:

“802.1.5 Nonpotable clear-water waste. Where devices and equipment such as process tanks, filters, drips and boilers discharge nonpotable water, the discharge shall be through an indirect waste pipe by means of an air break or an air gap into the Storm System. Clear water discharge from hydraulic elevator sump pumps shall be connected directly through an oil/water separator to storm sewer, in accordance with discharge permits, regulations, and statutes.”

229.7.3 Add IPC Section 802.1.9 “Arms vault and storage areas.” to IPC Chapter 8:

“802.1.9 Arms vault and storage areas. Through-the-wall drains with discharge to the storm system shall be provided in arms vaults and storage areas requiring dehumidification, to dispose of condensate water from dehumidifiers. When such drains are not practicable, floor drains discharging to the storm system shall be installed inside the vaults or storage areas to provide for water removal.

229.8 Modify IPC Chapter 9 – Vents as follows:

229.8.1 *Replace all of IPC Section 901.1 “Scope.” with the following:

“901.1 Scope. The provisions of this chapter shall govern the materials, design, construction and installation of vent systems. Single stack vent system (Philadelphia one pipe) system, air admittance valve system, engineered vent system, or a sovent (aerator) type system shall not be permitted.”

229.8.2 Replace all of IPC Section 901.3 “Chemical waste vent systems.” with the following:

“901.3 Chemical waste vent systems. Then vent system for a chemical waste shall be independent of the sanitary vent system and shall terminate separately through the roof to the outdoors.”

229.8.3 Replace all of IPC Section 901.6 “Engineering systems.” with the following:

“901.6 Engineering systems. Engineered venting systems are prohibited.”

229.8.4 Replace all of IPC Section 904.3 “Vent termination.” with the following:

“904.3 Vent termination. Vent stacks or stack vents shall terminate outdoors to the open air.”

229.8.5 Replace all of IPC Section 905.1 “Connection.” with the following:

“905.1 Connection. All individual branch and circuit vents shall connect to a vent stack, stack vent, or extend to the open air.”

229.8.6 Replace all of IPC Section 917 “SINGLE STACK VENT SYSTEM” with the following:

“SECTION 917 SINGLE STACK VENT SYSTEM

917.1 General. Single stack vent systems are prohibited.”

229.8.7 Replace all of IPC Section 918 “AIR ADMITTANCE VALVES” with the following:

“SECTION 918 AIR ADMITTANCE VALVES

918.1 General. Air admittance valves are prohibited.”

229.8.8 Replace all of IPC Section 919 “ENGINEERED VENT SYSTEMS” with the following:

“SECTION 919 ENGINEERED VENT SYSTEMS

919.1 General. Engineered vent systems are prohibited.”

229.9 Modify IPC Chapter 10 – Traps, Interceptors, and Separators as follows:

229.9.1 Replace all of IPC Section 1002.4 “Trap seals.” with the following:

“1002.4 Trap seals. Each fixture trap shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm), or deeper for special designs relating to accessible fixtures. Where a trap seal is subject to loss by evaporation, a deep-seal trap consisting of a 4-inch (102 mm) seal shall be installed.”

229.9.2 Insert the following after the last sentence of IPC Section 1003.1 “Where required.”:

“Interceptors shall be installed underground outside the building. The area surrounding interceptors shall be paved and provided with suitable drainage facilities. Where design temperatures are less than 0°F (–18°C), interceptors shall be located within the building, remote from the kitchen area.”

229.10 Modify IPC Chapter 11 – Storm Drainage as follows:

229.10.1 Replace all of IPC Table 1102.4 “PIPE FITTINGS.” with the following:

Table 1102.4 – Building Storm Sewer Pipe

Material	Standard
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 2661; ASTM D 2751; ASTM F 628; CSA B181.1; CSA B182.1
Acrylonitrile butadiene styrene (ABS) plastic pipe in sewer and drain diameters	ASTM D 2751
Cast-iron pipe	ASTM A 74; ASTM A 888; CISPI 301
Concrete pipe	ASTM C 14; ASTM C 76; CSA A257. 1M; CSA A257.2M
Copper or copper-alloy tubing (Type K, L, M or DWV)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 306
Polyethylene (PE) plastic pipe	ASTM F 2306/F 2306M
Polyvinyl chloride (PVC) plastic pipe (Type DWV, SDR 26, SDR 35, SDR 41, PS 50, or PS 100)	ASTM D 2665; ASTM D 3034; ASTM F 891; CSA B182.4; CSA B181.2; CSA B182.2
Vitrified clay pipe	ASTM C 4; ASTM C 700
Stainless steel drainage systems, Type 316L	ASME A 112.3.1

229.10.2 Replace all of IPC Table 1102.5 “SUBSOIL DRAIN PIPE.” with the following:

Table 1102.5 – Subsoil Drain Pipe

Material	Standard
Cast-iron pipe	ASTM A 74; ASTM A 888; CISPI 301
Polyethylene (PE) plastic pipe	ASTM F 405; CSA B182.1; CSA B182.6; CSA B182.8
Polyvinyl chloride (PVC) plastic pipe (Type sewer pipe, PS 25, PS 50, or PS 100)	ASTM D 2729; ASTM F 891; CSA B182.2; CSA B182.4
Stainless steel drainage systems, Type 316L	ASME A 112.3.1
Vitrified clay pipe	ASTM C 4; ASTM C 700

229.10.3 Replace the last sentence of IPC Section 1104.2 “Combining storm with sanitary drainage.” with the following:

“When a combined drainage system is to be provided, the systems shall be maintained as separate systems

within the building. Systems shall be combined outside of the building and preferably at a manhole.”

229.10.4 Insert the following after the last sentence of IPC Section 1104.4 “Insulation of rainwater conductors.”:
“Insulate horizontal piping runs and roof drains inside the building with a minimum of one-inch (25 mm) thick insulation to prevent condensation.”

229.11 Modify IPC Chapter 12 – Special Piping and Storage Systems as follows:

229.12 Modify IPC Chapter 13 – Gray Water Recycling Systems as follows:

229.13 Modify IPC Chapter 14 – Referenced Standards as follows:

229.14 Modify IPC Appendices as follows:

229.14.1 IPC APPENDIX B shall be applied as a requirement.

229.14.2 IPC APPENDIX D (weather data) shall be replaced with WHSBC Appendix E, Washington, DC Weather Data.

229.14.3 IPC APPENDIX E shall be applied as a requirement.

229.14.4 IPC APPENDIX F shall be applied as a requirement

230.0 CHAPTER 30 – ELEVATOR AND CONVEYING SYSTEMS

*Use IBC Chapter 30, UFC 3-600-01.

231.0 CHAPTER 31 – SPECIAL CONSTRUCTION

Use IBC Chapter 31.

232.0 CHAPTER 32 – ENCROACHMENT INTO THE PUBLIC RIGHT-OF-WAY

Use IBC Chapter 32.

233.0 CHAPTER 33 – SAFEGUARDS DURING CONSTRUCTION

233.1 Section 233.0 adopts by reference the latest edition of the SCD/OSHB Policy Chapters, as published on its website at <https://safety.whs.mil/>, under the delegated authority of the Director, FSD.

233.2 Where a topic is not addressed in the aforementioned Policy Chapters, use IBC Chapter 33 and UFC 3-600-01. If any conflict occurs between IBC Chapter 33 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

234.0 CHAPTER 34 – EXISTING STRUCTURES

Use IBC Chapter 34, except as modified below.

234.1 Use Section 3410 with UFC 3-600-01. If any conflict occurs between IBC Section 3410 and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

234.2 Existing buildings inside the United States, its territories and possessions must comply with ICSSC RP6/NISTIR 6762 in addition to IBC Chapter 34.

234.3 All references in ICSSC RP6/NISTIR 6762 to FEMA 310 and FEMA 356 shall be considered to be references to ASCE/SEI 31-03 and ASCE/SEI 41-06, respectively.

234.3.1 Seismic evaluation of existing buildings must be in accordance with ASCE/SEI 31-03.

234.3.2 Rehabilitation of existing buildings for seismic loads must be in accordance with ASCE/SEI 41-06.

234.4 Existing Structures shall be assessed and operated in accordance with UFC 1-200-02, Chapter 4: High Performance and Sustainable Building Assessment Requirements for Existing Buildings.

235.0 CHAPTER 35 – REFERENCED STANDARDS

235.1 Use IBC Chapter 35 and Appendix D of this document.

CANCELLED

300.0 OTHER CRITERIA

In addition to the International Building Code as modified in Chapter 2 of this WHSBC, comply with the following criteria:

301.0 HIGHER AUTHORITY MANDATES

All construction must be in accordance with all Public Laws (PS), Executive Orders (EO), Code of Federal Regulations (CFR), Department of Defense Instructions (DODI), and Department of Defense Directives (DODD) or other higher authority documents as applicable, as listed in MIL-STD-3007F, Appendix B.

302.0 UNIFIED FACILITIES CRITERIA (UFC)

Comply with latest version of UFCs.

303.0 CORE UNIFIED FACILITIES CRITERIA

See Appendix D for list of referenced Unified Facilities Criteria.

Go to <http://www.wbdg.org/ccb/> for a complete list of the Unified Facilities Criteria.

303.1 Antiterrorism.

303.1.1 Antiterrorism. For antiterrorism requirements, refer to UFC 4-010-01, UFC 4-010-02 and Combatant Commander Antiterrorism construction standards.

303.2 Sustainability.

All construction shall be in accordance with each section of UFC 1-200-02.

303.3 Architectural.

303.3.1 Use UFC 3-101-01 and Section 305.0 for architectural design criteria.

303.3.2 Use UFC 3-110-03 for roofing criteria.

303.3.3 Use UFC 3-120-10 and Section 305.0 for interior design criteria.

303.3.4 Additional Architectural Modifications.

303.3.4.1 Doors entering into stairs in public corridors must contain vision panels that comply with the size and location requirements for fire resistance rated doors as applicable.

303.3.4.2 Doors swinging outward into the A or E Rings in the Pentagon must be recessed such that at no point during the swing does the door impinge greater than 7 inches (178 mm) into the overall corridor width.

303.3.4.3 Doors swinging outward into the radial corridors from normally occupied spaces must be recessed such that at no point during the swing does the door impinge greater than 7 inches (178 mm) into the overall corridor width.

303.4 Civil Engineering.

303.4.1 Use UFC 3-210-10 for low-impact development criteria.

303.4.2 Use UFC 3-201-01 for general civil engineering, and site planning and design criteria.

303.4.3 Use UFC 3-230-01 for water supply.

303.4.4 Use UFC 3-240-01 for wastewater collection.

304.0 OTHER MILITARY CRITERIA

If directed by a DODI, military criteria other than those listed in this UFC may be applicable to specific types of structures, building systems, or building occupancies. Such structures, systems, or buildings must meet the additional requirements of the applicable military criteria.

304.1 Explosives Safety.

304.1.1 This document does not contain requirements for explosives safety. All facilities that involve DoD Ammunition and Explosives (AE) storage, handling, maintenance, manufacture or disposal, as well as any facilities within the explosives safety quantity distance (ESQD) arcs of AE facilities, must comply with the explosives safety requirements found in DoD Manual 6055.09-M.

304.1.2 It is essential that the planning and design of new facilities and occupation and renovation of existing AE-related facilities or any facilities within ESQD arcs be accomplished in close coordination with knowledgeable explosives safety professionals in theater or with the Services' explosives safety centers. This coordination should occur as early as possible in the planning/design process to avoid issues/problems and ensure compliance.

304.1.3 All facility construction or use within ESQD arcs requires review for compliance with explosives safety criteria and must have either an approved explosives safety site plan or an approved explosives safety deviation. Refer to the DoD documents mentioned above for further guidance in this area.

304.2 Physical Security.

304.2.1 Physical security is that part of security concerned with physical measures designed to safeguard personnel; to prevent unauthorized access to equipment, installations, material, and documents; and to safeguard them against espionage, sabotage, damage, and theft.

304.2.2 Many buildings require some level of physical security. When required, integrate physical measures into the site, building, room(s), or area(s) as applicable. The Intelligence Community (IC) and DoD document the requirements for physical security related to specific assets in IC and DoD publications, directives, and instructions. Services have related documents that implement the IC and DoD policy for the Services. Table 304.2.2, below, lists the main DoD and IC documents that contain the physical security requirements for the protection of specific DoD assets. This does not include the policy documents associated with the protection of nuclear and chemical assets.

Table 304.2.2: Policy Related to Physical Security

Asset	Policy
Classified Information	DoD 5200.01, <i>DoD Information Security Program</i> http://www.dtic.mil/whs/directives/corres/pub1.html
Sensitive Compartmented Information (SCI)	UFC 4-010-05, <i>Sensitive Compartmented Information Facilities Planning, Design, and Construction with Change 1</i> . Intelligence Community Directive (ICD) 705, <i>Sensitive Compartment Information Facilities</i> (Effective: 23 April 2012). http://www.wbdg.org/pdfs/dod_at/ic_techspec_705.pdf Intelligence Community Standard Number 705-1 (ICS 705-1), <i>Physical and Technical Security Standards for Sensitive Compartmented Information Facilities</i> (Effective: 17 September 2010) http://www.wbdg.org/pdfs/dod_at/ics_705_1.pdf Intelligence Community Standard Number 705-2 (ICS 705-2), <i>Standards for the Accreditation and Reciprocal Use of Sensitive Compartmented Information</i> (Effective: 17 September 2010) http://www.wbdg.org/pdfs/dod_at/ics_705_2.pdf IC Tech Spec-for ICD/ICS 705, <i>Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities</i> (Effective: 5 May 2011) http://www.wbdg.org/pdfs/dod_at/ic_techspec_705.pdf

Table 304.2.2: Policy Related to Physical Security

Asset	Policy
Special Access Program (SAP) Information	JAFAN 6/9 Manual, Physical Security Standards for Special Access Program Facilities http://www.ncms-isp.org/documents/JANAF_6-0.pdf
Arms, Ammunition and Explosives	DoD Manual 5100.76-M, <i>Physical Security of Sensitive Conventional Arms, Ammunition and Explosives</i> http://www.dtic.mil/whs/directives/corres/pub1.html
Weapon Systems and Platforms	DoD 5200.08-R, <i>Physical Security Program</i> http://www.dtic.mil/whs/directives/corres/pub1.html
Bulk Petroleum Products	
Communications Systems	
Controlled Inventory Items	

305.0 UNIVERSAL SPACE PLAN

The Universal Space Plan Technical Workbook shall be used for the layout and design of interior office space to the greatest extent possible. Copies of the workbook are available upon request from the Standards and Compliance Division at <https://fire.whs.mil> or at 703-695-8004.

306.0 INTEGRATED SUSTAINABLE REQUIREMENTS

306.1 *It is a FSD requirement to use material, equipment, and parts common to the building’s systems. Further information can be obtained from the building manager’s office.

306.1.1 The comprehensive guide for applying sustainable design is the Whole Building Design Guide (WBDG). The guide provides government and industry practitioners with one-stop access to up-to-date information on a wide range of building-related guidance, criteria and technology from a 'whole buildings' perspective. The WBDG is located at <http://www.wbdg.org>.

306.1.2 The Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities shall be used. The most recent version of the Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities, can be found on the Pentagon’s Environmental, Sustainability and Energy Branch (ESEB) website at <https://customerresources.whs.mil/FSD/scd/ESEB/> (CAC Required)

306.1.3 The principles and practices of low impact development (LID) shall be implemented into all project sites so that the project reduces stormwater runoff pollution to the maximum extent feasible and complies with EISA 438 and Arlington County Stormwater requirements. Documentation supporting compliance shall be submitted to ESEB in accordance with the permit-required Total Daily Maximum Load (TMDL) Action Plan.

307.0 EXTERIOR STANDARDS

307.1 *Comply with the Exterior Standards Manual for all work affecting exterior portions of the Pentagon Reservation.

307.2 Contact FSD office of Engineering and Construction Management (ECM) at 703-693-8293 for a copy of the Exterior Standards Manual.

308.0 HAZARDOUS MATERIALS USED IN CONSTRUCTION

- 308.1 Radioactive materials or instruments capable of producing ionizing/non-ionizing radiation as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates are prohibited.
- 308.1.1 Radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources are permitted.
- 308.2 Asbestos
- 308.2.1 *All items utilized, or work required, shall be free of asbestos in any form whatsoever.
- 308.2.2 The BCO shall be notified within five (5) business days of identifying that Section 104.10 must be applied to meet the requirement of Section 308.2.1, above.

309.0 LABELING STANDARDS

- 309.1 Pentagon Equipment Labeling Standard (PELS) shall be followed for all work that affects Federally controlled utility systems to include but not limited to Mechanical, Domestic Water, Sanitary Sewer, Storm Sewer, Fire Protection and Electrical systems on the Pentagon Reservation. Copies of the PELS are available upon request from the Standards and Compliance Division at 703-695-8004.
- 309.2 Fort Belvoir Mark Center Complex Equipment Labeling Standard - Reserved

310.0 PENTAGON FACILITY GUIDE SPECIFICATIONS

- 310.1 The Pentagon Facility Guide Specifications (PFGS) shall be applied to all planning, design, construction, sustainment, restoration, and modernization of the Pentagon, Metro Entrance Facility (MEF), and the Remote Delivery Facility (RDF), regardless of funding source. It is a requirement of FSD to use material, equipment, and parts common to the Pentagon building's systems. Copies of the specifications are available upon request from the Standards and Compliance Division at <https://fire.whs.mil> or 703-695-8004.
- 310.2 The application of the PFGS to projects affecting Pentagon facilities shall fulfill the requirement found within Department of Defense Directive 4270.5 to use the UFGS.
- 310.3 The guidance found within the PFGS shall take precedence over any guidance found within the UFGS.

ATTACHMENTS

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ATTACHMENT 1 Waiver Request Form

To Request A Waiver

1. Applicant transmits a preliminary waiver request form in electronic format to Document Control on the accepted waiver form with all requisite attachments with a meeting request date.
2. Document Control receives the preliminary waiver request, sends the request out electronically to reviewers (relevant contacts from FFD, SCD and FSD), and request that they attend the scheduled review meeting.
3. A preliminary review meeting is held on a date mutually agreed by the applicant and interested parties.
4. Applicant is responsible for documenting all comments and makes any necessary changes from the meeting.
5. Applicant, as necessary, arranges a follow up meeting with interested parties to review any changes. Reviewers indicate that they have attended and have reviewed the waiver.
6. Applicant sends the modified preliminary waiver request electronically to Document Control.
7. Document Control electronically sends the preliminary waiver request to reviewers.
8. Reviewers provide final comments to Document Control. Document Control compiles all comments and sends to the BCO. The BCO receives and reviews the comments, attaches the Waiver Request Worksheet indicating level of risk, and signs the request recommending approval or disapproval. The BCO sends request to the AHJ as well as Document Control.
9. Document Control will inform applicant of waiver request status.
10. Document Control receives the BCO signed waiver request and provides a recommendation review letter along with the entire signed package to the AHJ. The AHJ signs as accepted or rejected and returns all documentation to Document Control.
11. Document Control receives the signed or rejected waiver request from the AHJ.
12. If the waiver is approved, Document Control will file the original signed waiver, enter the accepted waiver in the Project Data Base, copying the BCO and applicant.
13. If the waiver is rejected, Document Control will file the rejected original waiver, enter the rejected waiver in the Project Data Base, copying the BCO and applicant.
14. If a waiver is rejected, once all documents have been filed, a meeting is scheduled with management leaders for further discussion.

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Waiver No.
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WAIVER REQUEST FORM
Department of Defense - Washington Headquarters Services
Facilities Services Directorate
Standards and Compliance Division, Construction Official
whs.planreview@mail.mil - Tel. (703) 695-8004



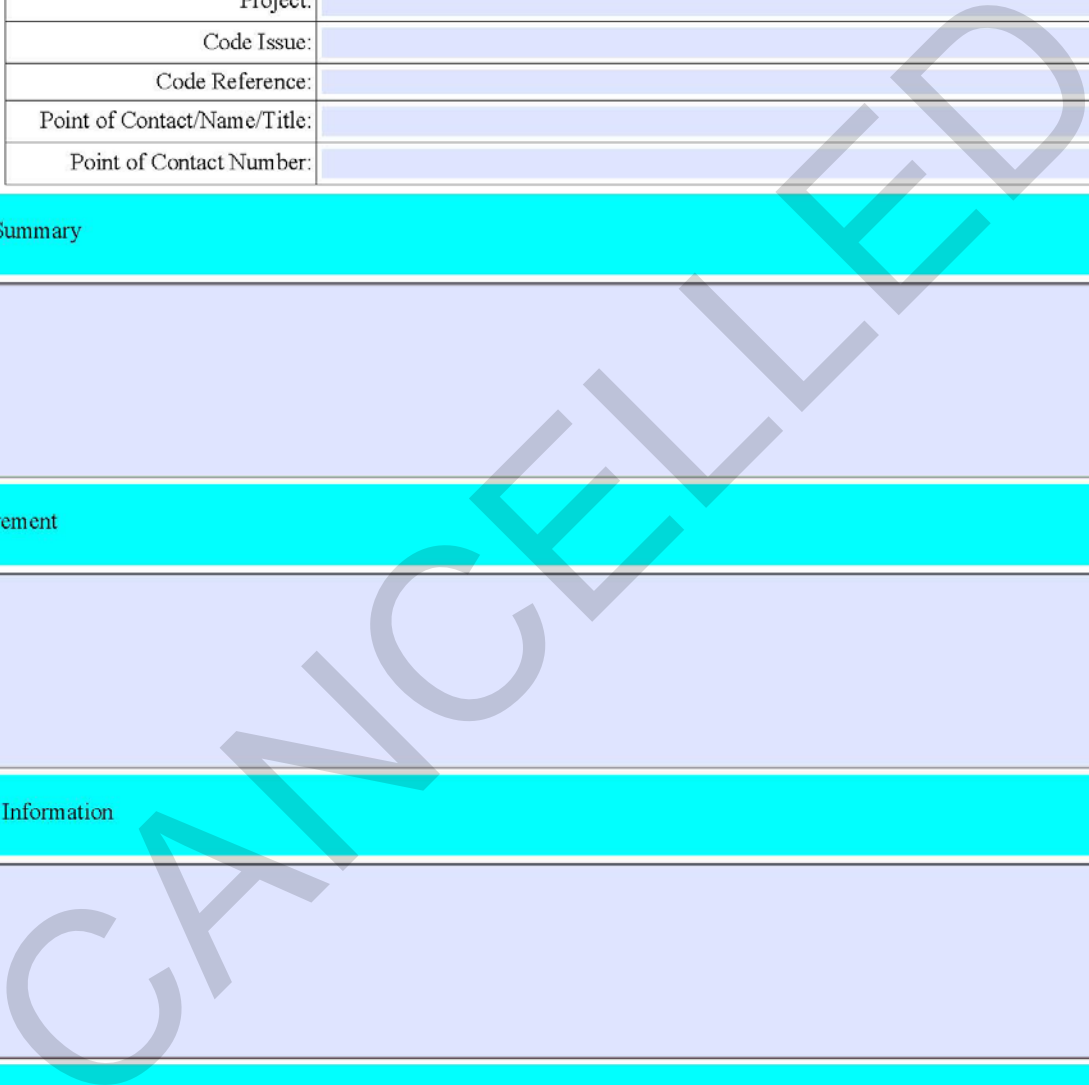
Date:	<input type="text"/>
Project:	<input type="text"/>
Code Issue:	<input type="text"/>
Code Reference:	<input type="text"/>
Point of Contact/Name/Title:	<input type="text"/>
Point of Contact Number:	<input type="text"/>

Code Issue Summary

Code Requirement

Background Information

Non-Code Compliance



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WAIVER REQUEST FORM
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 Facilities Services Directorate
 Standards and Compliance Division, Construction Official
 whs.planreview@mail.mil - Tel. (703) 695-8004



Risk

Compensatory Measures

Justification for Approval

Waiver Request Recommendation		AHJ Determination	
<input type="checkbox"/>	Recommend Approval of Code Waiver	<input type="checkbox"/>	Approve Code Waiver
<input type="checkbox"/>	Recommend Disapproval of Code Waiver	<input type="checkbox"/>	Disapprove Code Waiver
CONSTRUCTION OFFICIAL		AHJ	
Name:	<input type="text"/>	Name:	<input type="text"/>
Date:	<input type="text"/>	Date:	<input type="text"/>
Signature:	<input type="text"/>	Signature:	<input type="text"/>

ATTACHMENT 2 **Departure Request Form**

To Request A Departure

1. Applicant transmits a preliminary departure request in electronic format to Document Control on the accepted departure form (Attachment 2) with all requisite attachments with a meeting request date.
2. Document Control receives the preliminary departure request, sends the request out electronically to reviewers (involved contacts from FFD, SCD and FSD), and requests that they attend the scheduled review meeting.
3. A preliminary review meeting is held on a date mutually agreed by the applicant and interested parties.
4. Applicant is responsible for documenting all comments and makes any necessary changes from the meeting.
5. Applicant, as necessary, arranges a follow up meeting with interested parties to review any changes. Reviewers indicate that they have attended and have reviewed the departure.
6. Applicant sends the modified preliminary departure request electronically to Document Control.
7. Document Control electronically sends the preliminary departure request to reviewers.
8. Reviewers provide final comments to Document Control. Document Control compiles all comments and sends to the BCO or AHJ. The BCO/AHJ receives and reviews the comments, attaches the Departure Request Worksheet indicating level of risk, and signs the request indicating approval or disapproval. The BCO/AHJ then sends the request to Document Control.
9. Document Control will inform applicant of departure request status and return all applicable materials.
10. If the departure is approved, Document Control files the original signed departure, enters the accepted departure in the Project Data Base and copies BCO and applicant.
11. If the departure is rejected, Document Control files the rejected original departure, enters the rejected departure in the Project Data Base and copies the BCO and applicant.

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DEPARTURE REQUEST FORM
Department of Defense - Washington Headquarters Services
Facilities Services Directorate
Standards and Compliance Division, Construction Official
whs.planreview@mail.mil - Tel. (703) 695-8004



Date:	<input type="text"/>
Project:	<input type="text"/>
Code Issue:	<input type="text"/>
Code Reference:	<input type="text"/>
Point of Contact/Name/Title:	<input type="text"/>
Point of Contact Number:	<input type="text"/>

Code Issue Summary

Code Requirement

Background Information

Non-Code Compliance

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 Facilities Services Directorate
 Standards and Compliance Division, Construction Official
 whs.planreview@mail.mil - Tel. (703) 695-8004



Risk

Compensatory Measures

Justification for Approval

Construction Official/AHJ Determination	
<input type="checkbox"/>	Approve Code Departure
<input type="checkbox"/>	Disapprove Code Departure
Approving Authority (Circle One): CONSTRUCTION OFFICIAL AUTHORITY HAVING JURISDICTION	
Name:	<input type="text"/>
Date:	<input type="text"/>
Signature:	<input type="text"/>

ATTACHMENT 3 Building Code Permit

To obtain a permit:

The applicant shall first file an application on the form furnished herein for that purpose.

Such application shall:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the room, space, land, etc. on which the proposed work is to be done by room or corridor designation, legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by construction documents and other information as required in Section 107.0.
5. Include a list of other required permits and their effective dates/anticipated submittal dates that will be required to complete the scope of work (optional).
6. Be signed by the applicant, or the applicant's authorized agent.
7. Provide such other data and information as required by the BCO.

Action on application: The BCO shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not meet the requirements of this document, the BCO shall reject such application in writing, stating the reasons therefore. If the BCO is satisfied that the proposed work conforms to the requirements of this code, the BCO shall issue a permit therefore as soon as practicable.

Time limitation of application: Stated on permit application – the BCO is authorized to grant one or more extensions of time for additional periods. The extension shall be requested in writing and justifiable cause demonstrated.

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BUILDING CODE PERMIT APPLICATION

Department of Defense - Washington Headquarters Services
Facilities Services Directorate
Standards and Compliance Division, Building Code Official
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IMPORTANT - Complete ALL applicable items on Pages 1 and 2. Pages 3 and 4 are FOR OFFICE USE ONLY.

Project Name: []
Room No: [] Applicant Name: []
Site Address: [] Phone No.: []
Email Address: []

Tenant/Agency Name: [] Government PM: []
Contact Person: [] Title: []
Phone No.: [] Phone No.: []
Address: [] Address: []
Email Address: [] Email Address: []

Architect: [] Gen. Contractor: []
Contact Person: [] Contact Person: []
Phone No.: [] Phone No.: []
Address: [] Address: []
Email Address: [] Email Address: []

New Construction
 Renovation
 Alteration
 Change of Use
Project Description: []
Will the space be occupied during construction? No Yes
Contract No.: [] Project/Task No.: []
Estimated Start Date: [] Estimated Completion Date: []

Mixed Use: No Yes Primary Use Group: [] Total Area (sq ft): []
If yes, other use group(s): [] No. of Stories: []
Construction Type: IA IB IIA IIB IIIA IIIB IV VA VB
 Other, explain []
Fire Alarm System Provided: No Yes
Fire Sprinkler System Provided: No Yes - If partial, explain: []

AFFIDAVIT

I hereby certify that I have the authority to make the foregoing application and that the application, to the best of my knowledge, is complete and correct and that the plans submitted conform to the requirements of the WHS Building Code (Revision [], dated []) and all applicable ordinances.

[]
Printed Name of Applicant or Project Manager

[]
Signature of Applicant or Project Manager

Date: []

Permit No. _____

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Attachments to Building Code Permit Application

Providing the information requested herein is not required; however providing this information with your application may facilitate expedited processing of the application.



Plans Submitted

Check all plans that are provided in this project (via QuiCx or other method)

	Date Submitted		Date Submitted
<input type="checkbox"/> Civil		<input type="checkbox"/> Electrical Power	
<input type="checkbox"/> Underground Fire Protection		<input type="checkbox"/> Electrical Lighting	
<input type="checkbox"/> Structural		<input type="checkbox"/> Mechanical	
<input type="checkbox"/> Architectural		<input type="checkbox"/> Plumbing	
<input type="checkbox"/> Fire Protection		<input type="checkbox"/> Safety	
<input type="checkbox"/> Fire Alarm		<input type="checkbox"/> Environmental and Waste Management	
<input type="checkbox"/> Life Safety		<input type="checkbox"/> Sustainability and Energy	
<input type="checkbox"/> Accessibility		<input type="checkbox"/> Tenant Fit-Out	
<input type="checkbox"/> NCPC		<input type="checkbox"/> Security	
<input type="checkbox"/> Exterior Standards		<input type="checkbox"/> Other:	
<input type="checkbox"/> Other:		<input type="checkbox"/> Other:	

Permits

Check all permits that have been/will be obtained related to work described in this application. See WHSBC Section 105.1 for requirements and contact information for individual permits.

Permit	Permit No.	Effective Date
<input type="checkbox"/> Air Quality Permit Review		
<input type="checkbox"/> Antennas and Similar Devices Installation Application		
<input type="checkbox"/> Asbestos Control Permit		
<input type="checkbox"/> Building Permit		
<input type="checkbox"/> Building Pass Application		
<input type="checkbox"/> Confined Space Permit		
<input type="checkbox"/> Demolition Permit		
<input type="checkbox"/> Excavation Permit		
<input type="checkbox"/> Exhibits, Artwork and Signs on the Pentagon Reservation		
<input type="checkbox"/> Flammable, Combustible, and Hazardous Materials Permit		
<input type="checkbox"/> Hazardous Materials Management Form		
<input type="checkbox"/> Hot Work Permit		
<input type="checkbox"/> Lead Work		
<input type="checkbox"/> LPG Permit		
<input type="checkbox"/> Open Flame Permit		
<input type="checkbox"/> Photo Permit		
<input type="checkbox"/> Roof Access Permit		
<input type="checkbox"/> Roof Hot Work Permit		
<input type="checkbox"/> Space Access		
<input type="checkbox"/> Stationary Lead Acid Battery Systems Permit		
<input type="checkbox"/> Use of Explosives Permit		
<input type="checkbox"/> Use of Space on the Pentagon Reservation Permit		
<input type="checkbox"/> Utility Outage Permit		
<input type="checkbox"/> Utility Space Access Permit		

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BUILDING CODE PERMIT

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Project Name: _____

Project Description: _____

Will the space be occupied during construction? No Yes

Contract No.: _____ Project/Task No.: _____

Approved Disapproved - Reason: _____

Approving Official	
Printed Name:	_____
Title:	_____
Signature:	_____
Issue Date:	Expiration Date: _____

	Date Approved	By		Date Approved	By
Civil	<input type="checkbox"/>		Electrical - Power	<input type="checkbox"/>	
Underground Fire Protection	<input type="checkbox"/>		Electrical - Lighting	<input type="checkbox"/>	
Structural	<input type="checkbox"/>		Mechanical	<input type="checkbox"/>	
Architectural	<input type="checkbox"/>		Plumbing	<input type="checkbox"/>	
Fire Protection	<input type="checkbox"/>		Safety	<input type="checkbox"/>	
Fire Alarm	<input type="checkbox"/>		Environmental and Waste Mgmt.	<input type="checkbox"/>	
Life Safety	<input type="checkbox"/>		Sustainability and Energy	<input type="checkbox"/>	
Accessibility	<input type="checkbox"/>		Tenant Fit-Out	<input type="checkbox"/>	
NCPC	<input type="checkbox"/>		Security	<input type="checkbox"/>	
Exterior Standards	<input type="checkbox"/>		Other:	<input type="checkbox"/>	
Other:	<input type="checkbox"/>		Other:	<input type="checkbox"/>	

Inspections Required Before Issuance of Certificate of Occupancy (Check all that apply - see reverse for tracking form)					
<input type="checkbox"/> Footing and Foundation	<input type="checkbox"/> Concrete Slab, Foundation Wall and Under Floor	<input type="checkbox"/> Lowest Floor Elevation (in flood areas)			
<input type="checkbox"/> Underground	<input type="checkbox"/> Roof Framing	<input type="checkbox"/> Wall Framing			
<input type="checkbox"/> Wall Close-in	<input type="checkbox"/> Ceiling Close-in	<input type="checkbox"/> Life Safety			
<input type="checkbox"/> Fire and Smoke Resistant Penetration	<input type="checkbox"/> Fire Protection and Fire Alarm	<input type="checkbox"/> Lath and Gypsum Board			
<input type="checkbox"/> Accessibility	<input type="checkbox"/> Mechanical	<input type="checkbox"/> Electrical			
<input type="checkbox"/> Plumbing	<input type="checkbox"/> Energy Efficiency	<input type="checkbox"/> Elevator			
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____			
<input type="checkbox"/> Other: _____	<input type="checkbox"/> Other: _____	<input type="checkbox"/> Final Inspection:			

Permit No.

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INSPECTIONS TRACKING FORM

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 Standards and Compliance Division, Building Code Official
 whs.planreview@mail.mil - Tel. (703) 695-3300



This form is provided to assist with record-keeping for required inspections.

Please submit a copy of this form in conjunction with your request for Final Inspection.

For fastest execution, file the completed Certificate of Occupancy form concurrently when requesting the Final Inspection.

Review	Required	Signature of Inspector	Date Approved
Footing and Foundation	<input type="checkbox"/>		
Concrete Slab, Foundation Wall and Under Floor	<input type="checkbox"/>		
Lowest Floor Elevation (in flood areas)	<input type="checkbox"/>		
Underground	<input type="checkbox"/>		
Roof Framing	<input type="checkbox"/>		
Wall Framing	<input type="checkbox"/>		
Wall Close-in	<input type="checkbox"/>		
Ceiling Close-in	<input type="checkbox"/>		
Life Safety	<input type="checkbox"/>		
Fire and Smoke Resistant Penetration	<input type="checkbox"/>		
Fire Protection and Fire Alarm	<input type="checkbox"/>		
Lath and Gypsum Board	<input type="checkbox"/>		
Accessibility	<input type="checkbox"/>		
Mechanical	<input type="checkbox"/>		
Electrical	<input type="checkbox"/>		
Plumbing	<input type="checkbox"/>		
Energy Efficiency	<input type="checkbox"/>		
Elevator	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Other:	<input type="checkbox"/>		
Final Inspection:	<input type="checkbox"/>		
Fire/Life Safety**			
Electrical**			
Mechanical**			
Plumbing**			
Environmental			
Safety			

ATTACHMENT 4 Application for Certificate of Occupancy

To obtain a Certificate of Occupancy:

The applicant shall first file an application on the form furnished by the FSD Standards and Compliance Division (SCD) for that purpose.

Such application shall:

1. Verify and update/correct any information on the Certificate of Occupancy form.
2. Include copy of the building code permit and a completed inspection form indicating the inspector and date for each required inspection.
Note: Final inspection signatures and dates are not required when form is submitted. Final inspection by all trades must be completed prior to issuance of certificate.
3. Include a signature from the COR.
4. Provide such other data and information as required by the BCO.

Action on application: The BCO shall examine or cause to be examined applications for certificates and amendments thereto within a reasonable time after filing. If the application or the inspection information does not meet the requirements of this document, the BCO shall reject such application in writing, stating the reasons therefore. If the BCO is satisfied that the proposed work conforms to the requirements of this code, approved project documentation, and all applicable ordinances, the BCO shall issue a certificate therefore as soon as practicable.

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Submit By Email

Permit No.
 FOR OFFICE USE ONLY



CERTIFICATE OF OCUPANCY
 Department of Defense - Washington Headquarters Services
 Facilities Services Directorate
 Standards and Compliance Division, Construction Official
 whs.codes@mail.mil - Tel. (703) 695-8004



IMPORTANT - Applicant to complete ALL applicable items. Shaded boxes are FOR OFFICE USE ONLY.

Project Name:
 Room No: Tenant/Agency Name:
 Site Address: Phone No.:
 Email Address:

New Construction If existing: Most Recent Certificate of Occupancy Date:
 Renovation Use Group(s) Most Recently Approved:
 Alteration Code of Record (Revision/Issue Date): WHS Building Code:
 Change of Use Which adopts UFC 1-200-01: and IBC:
 Other:

Mixed Use: No Yes Primary Use Group: Total Area (sq ft):
 If yes, other use group(s): No. of Stories:
 Construction Type: IA IB IIA IIB IIIA IIIB IV VA VB
 Other, explain
 Fire Alarm System Provided: No Yes
 Fire Sprinkler System Provided: No Yes - If partial, explain:

AFFIDAVIT

I hereby certify that I have the authority to make the foregoing application and that the application, to the best of my knowledge, is complete and correct and that the permitted construction conforms to the requirements of the WHS Building Code (Revision , dated , approved project documentation and all applicable ordinances.

Printed Name of Applicant: Signature of Applicant:
 Email Address: Phone No.: Date:

APPROVALS

Certificate of Occupancy Temporary Certificate of Occupancy

Approving Official

Printed Name:
 Title:
 Signature: Date:

Max Occupant Load: Approved Use Group(s):
 Stipulations:

Certificate of Occupancy Revision History			
Date	Approving Official	Permit No.	Description

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APPENDICES

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APPENDIX A Explanatory Material

- A101.7.8 The executive official in charge of the building department is named the “building code official” by this section. In actuality, the person who is in charge of the department may hold a different title, such as building commissioner, building inspector or building official. For the purpose of the code, that person is referred to as the “building code official.”
- A101.7.10 An example of a Change of Use - The Child Development Center (CDC) is changed from a day-care occupancy to a business occupancy.
- A101.7.17 An example of New Construction - The new Pentagon Emergency Response Center (PERC), Pentagon Secure Access Lane (SAL), Fort Belvoir Mark Center Campus (FBMCC).
- A101.7.45 An example of a Modification - Adding a third fan to an Air Handler, adding a condensate drain to a Blended Chilled Water FPIU, adding a heating coil to a terminal unit without one.
- A101.7.62 The project manager (PM) is responsible for ensuring all activities related to projects are executed according to WHS, customer, DoD, and related outside agency requirements and regulations. The PM has the following additional responsibilities:
1. Establishes an Integrated Project Team (IPT) to plan and oversee project.
 2. Coordinates the development of the Project Management Plan (PMP).
 3. Follows procedures in the WHS Acquisitions Directorate (AD) Acquisition Handbook.
 4. Chairs Project IPT.
 5. Makes milestone presentations to the FSD Director, as requested.
 6. Provides status information in appropriate format to PMO.
 7. Ensures customers and stakeholders are informed of the status, budget and any issues or concerns, along with remedial or mitigating actions, relating to the project.
 8. Ensures project closeout and transition requirements are met.
- A101.7.66 DoD real property is accounted both physically and fiscally.
- A101.7.67 Rebuilding a pump with parts of the same part numbers that came out of the pump, fixing a hole in the wall with the exact same material that was originally installed.
- A101.7.68 Replacing one manufacturer’s air handler with another manufacturer’s air handler built with the same purpose; changing a Schedule 10 sprinkler pipe with Schedule 40.
- A103.2 This section establishes the Building Code Official as an appointed position by the Authority Having Jurisdiction.
- A105.1.10.2 See WHSFR for additional information.
- A105.1.17 Access to Controlled Areas: Controlling access to locations within the building and various surrounding related locations is a key component of maintaining our nation’s safety and security. In the event that a project team member or contractors needs access to a particular space or area that is not normally involved in the course of everyday duties, such as a secure location currently or soon to be under construction as part of an official project, or one that for some reason needs to be accessed after normal business hours, it is necessary to obtain the proper swipe access clearance via the appropriate security channels.
- To gain access to a space the following information is needed:
1. Full Name.
 2. Social Security Number.
 3. Office Telephone Number.
 4. Name and location of space to be accessed, and reason why.

This information should be given in person in order to protect against loss of personal information. If email must be used, the email containing this information must be encrypted. Any information attempted to be submitted via telephone or a third party will be rejected immediately.

Once submitted, the normal turnaround time is 72 hours. However, due to unforeseen occurrences including but not limited to personnel absences, computer outages, and office closures, this process can take longer. It is strongly recommended that requestors allow up to 120 hrs when submitting requests.

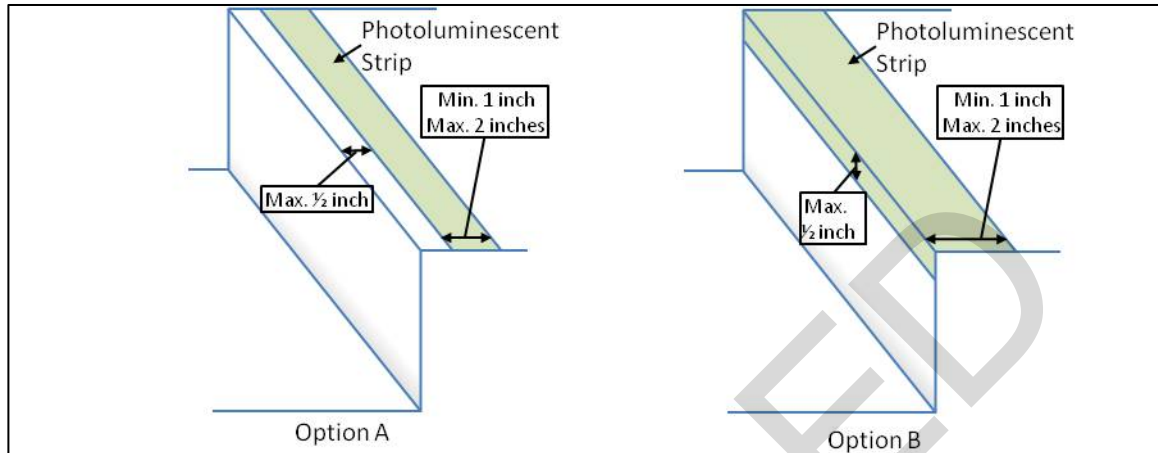
It is important to note that once a space changes ownership, requested access to that space will expire and continued access will require a resubmission of the appropriate information through the new owner.

- A105.2.1.1 Permit review and field inspection procedures are required for emergency repairs; however, due to the nature of an emergency repair, this section allows the permit process to begin the next business day after repairs are conducted.
- A107.4.1 A minor change is defined as a deficiency identified during a field walk that can be resolved with no additional design (for example a missing or blocked exit sign).
- A107.6.3.2.1 The DD Form 1354 is the official acceptance of real property for beneficial occupancy.
- A110.3.21 A Preparation Checklist for Final Code Compliance Inspection and Punch List should be developed by the contractor/builder as tools to complete this verification. All punch list items that are noted during the contractor/builder verification should be closed out before calling for the Final Code Compliance Inspection.
- A117.1 Commissioning is a proactive, systematic, and rigorous process of assuring by documentation, functional testing, and training, from the design phase to a minimum of one year after construction, that all building facility systems perform interactively in accordance with the design documentation and intent, and in accordance with the Government's operational needs. This process judges correct performance of both individual systems and systems operating interactively according to the project design intent. A guide for commissioning processes is available at <http://www.wbdg.org/project/buildingcomm.php>.
- A204.4.2 If an existing system can provide adequate listed coverage of additional equipment or changing of equipment, the requirement for water-assisted systems need not apply.
- A204.4.8 This judgment should take into account the type of cooking being performed, items being cooked, and the frequency of cooking operations. Examples of operations that might not require commercial cooking equipment and related levels of protection include the following: (1) Operations that are not cooking meals that produce grease-laden vapors, (2) Employee break rooms where food is warmed.
- A208.1 Section 2-6.4 of UFC 1-200-02, 1 March 2013 provides requirements that are applicable to interior finishes.
- A209.13 Revising existing Light Hazard sprinkler coverage to Ordinary Hazard Group 1 sprinkler coverage may require modifying existing sprinklers as well as branchline, cross main, and/or feed main piping over areas outside the scope of work of the renovation responsible for completing the revision.
- A209.26 Rooms designated for mercantile and food services undergo relatively frequent renovations as the tenants change. A separate sprinkler control valve is intended to help logistics during these renovations. In addition, it is consistent with design of mercantile and food service areas during the Pentagon Wedge 2-5 Renovation.
- A210.2 Access panels must be located on the non-exit passageway side. Mechanical, electrical, information technology and other utility design teams should coordinate location of their equipment and materials so that access to serviceable components can be reached by means other than through the exit passageway envelope.
- A210.4 Contact SCD at 703-695-8004 for additional descriptions and photographs of the signage discussed herein.
- A210.4.6.2 The mounting of directional striping in track frames on furniture and equipment will simplify directional rearrangement should the furniture be relocated.
- A210.4.7 Refer to the Photoluminescent Exit Signs and Marking informational packet available from the Office of the Pentagon Fire Marshal on its website at <https://fire.whs.mil>, or via email at whs.fireinfo@mail.mil.

A210.4.7.2 All stairway markings are designed to direct travel to the level of exit discharge.

A210.4.7.2.4 See below.

Figure 1: Graphical Representation of Stair Photoluminescent Striping Requirements



A210.4.7.4 Individual offices, by virtue of the type of occupancy, require a minimal amount of Low-Location Exit Path Marking to provide the occupant(s) with sufficient light source to exit the room.

A210.4.7.5 Most office suites are typically a combination of individual offices, small conference rooms and multiple work stations as well as equipment and furniture (copy machines, file cabinets, bookcases, etc.).

A210.7 Example of lock-sets meeting this requirement include the LKM7000 and the LKM10K series locks.

A213.0 Use DoDI 4170.11 to supplement UFC 1-200-02.

A213.8.1 DoD Instruction (DoDI) 4715.03, Natural Resources Conservation provides policy regarding Environmentally and Economically Beneficial Landscape Practices on Federal landscaped Grounds. The LID Manual can be accessed at:

<https://customerresources.whs.mil/FSD/SCD/ESEB/Natural%20Resources%20Management/LID.php> (CAC required)

A227.0 IBC, Chapter 27 adopts by reference the National Electrical Code, NFPA70.

A227.2.4.1 Rigid Metal Conduit located below ground should be protected from corrosion.

A227.3.1.1 After the Pentagon Renovation, a myriad of lighting standards existed for a variety of space types. In the development of the Pentagon Lighting Master Plan, government responses to contract deliverables have asked for compliance with certain codes and guidelines not mentioned explicitly in the Performance Work Statement (PWS). Among other design considerations, one component of the referenced codes and guidelines is target light level requirements. In some cases, the referenced code and guidelines have conflicting target light level requirements. The following codes and guidelines were considered:

- Unified Facilities Criteria (UFC) 3-530-01: Design: Interior, Exterior Lighting and Controls
- USP Utilities Design Criteria: Universal Space Plan (USP) Technical Workbook, Chapter 4
- Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities
- TIA
- IES

Table A227.3.1.1 – Abbreviated Comparison and Government Direction of Light Level Requirements

Space type	DESIGN REFERENCE				
	UFC 3-530-01	USP Utilities Design Criteria	Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities	TIA	IES
Space type	Target (fc)	Target (fc)	Target (fc)	Target (fc)	Target (fc)
Large lobby	10fc				10fc
Corridors	5fc	15fc	15fc		0.30 * average (fc) in adjoining space (in this case, office space) ~ 10fc
Private office	30fc ambient	14fc ambient	30fc ambient		30fc
	50fc task	42fc task	50fc task		30fc
Open office	30fc ambient	14fc ambient	30fc ambient		30fc
	50fc task	42fc task	50fc task		30fc
Waiting areas	10fc ambient				10fc
	50fc task				
Conference rooms	30-50fc	28fc			30fc
Lounges	10fc				10fc
Office support	30fc ambient				15fc
	50fc task				30fc
Storage rooms	10fc				10fc
Mechanical/Electrical	30fc	27fc			20fc
Electrical closets					10fc
Restrooms	5fc ambient	18fc			15fc
Kitchens	50fc	75fc			50fc
Cafeteria	10fc				15fc
	50fc				
Enlisted dining rooms	10fc	30fc			15fc
	50fc				
Officer dining rooms	10fc	30fc			15fc
	50fc				
Indoor pool					
	Per IES RP-6				10fc
Indoor basketball	30fc				30fc
	Per IES RP-6				
Locker Rooms	10fc				5fc
Retail		37fc			40fc

DESIGN REFERENCE					
	UFC 3-530-01	USP Utilities Design Criteria	Compliance Checklist for Implementing Sustainability Requirements at WHS Facilities	TIA	IES
Space type	Target (fc)	Target (fc)	Target (fc)	Target (fc)	Target (fc)
Command and Operation Center		46fc			
TC closets		46fc			15fc
Communications Equipment Closets		51fc		50fc horizontal 20fc vertical	50fc
TC - Wedge rooms (data center)		51fc		50fc horizontal 20fc vertical	10fc
Consolidated Radio Rooms (CRR)		50fc			

- A227.5.1 Typical types of equipment include pad-mounted transformers, switchgear, switchboards, panelboards, disconnect switches, industrial control panels, meter socket enclosures, and motor control centers that are in other than dwelling occupancies.
- A228.3.3.2 For example, envelope loads, equipment loads, occupant loads
- A228.3.3.4 For example, conference room to office space, storage close to copy machine room.
- A228.3.10.2 Examples of mechanical equipment that need to be remotely monitored include chiller, cooling tower, boiler, air handling unit, terminal unit, fan, pump, heat exchanger, kitchen hood, split system, fan coil unit, damper, and gas detector.
- A228.4.6.1 Plastic fire sprinkler piping is not permitted, only Schedule 40 steel pipe is allowed. See Section 209.14
- A228.4.6.2 Examples of noise sensitive areas are dining rooms next to kitchens, SCIFs, and conference rooms.
- A228.4.12.1 These systems include but are not limited to Heating Hot Water, and Chilled Water systems.
- A228.4.12.2 Air may be used as a testing medium.
- A228.6.1.2 These requirements are in addition to the requirements found within the IBC. An example of an area that would require CO detection is the CCUT as there is inadequate ventilation and welding is frequently conducted in this area.
- A228.6.3.1 This section modifies IFGC, Section 406.4.1 and NFPA 54, Section 8.1.4.2.
- A228.6.3.2 This section modifies IFGC, Section 406.4.2 and NFPA 54, Section 8.1.4.3.
- A229.0 Do not use IBC Chapter 29. The provisions of WHSBC Section 229.0 and the IPC govern the erection, installation, alteration, repairs, relocation, replacement, addition to, use or maintenance of plumbing equipment and systems.
- A229.1.1 Examples of plumbing equipment that need to be remotely monitored include pump, heat exchanger, water heater, and drain overflow switch.
- A229.2 The 2012 Edition of IPC Section 305.4 is 2006 IPC 305.6.
- A229.2.4 301.9 - Insulation alone is not adequate protection against condensation.

301.9.1 - These areas within buildings should be located to minimize exposure to water and other listed hazards from adjoining areas and activities; refer to NFPA-75, *Protection of Electronic Computer/Data Processing Equipment*.

301.9.3 Note that this does not apply to the cooling components of liquid cooled computers and servers which necessarily must be directly in contact with electronic equipment.

- A229.2.6.1 Design plumbing systems to provide economy and reliability. Provide simple, functional designs.
- A229.2.6.4 Critical piping services such as medical gas systems piping should be routed so that it is not on exterior walls or walls shared with mailrooms.
- A229.2.7.1.2 Show calculations clearly so that any changes that become necessary during construction or re-siting are made efficiently.
- A229.2.8.1.3 Where practical, group all notes, legends, and schedules at the right of the drawings above the title block.
- A229.2.8.1.4 When water pressure is not known, assume pressure to be the pressure that will not exceed the required minimum residual pressure, plus allowances for pressure due to friction and pressure required for elevation of the highest water outlet.
- A229.2.8.1.8 Equipment room plans should be supplemented by at least one section; at least two sections for more complex, congested applications.
- A229.2.8.1.11 The metric version of the valve coefficient, K_v , is calculated in cubic meters per second at 1 kPa pressure drop
- A229.2.8.1.25 The following are typical schedules and data provided on these schedules:

(1) Hot water circulating pumps:

- a. Capacity in L/s (gpm).
- b. Total head in meters (feet).
- c. Minimum horsepower.
- d. Volts, phase, hertz.
- e. RPM
- f. NEMA motor starter size.

(2) Ejector or sump pump:

- a. Capacity in L/s (gpm).
- b. Total dynamic head in meters (feet).
- c. Minimum horsepower.
- d. Volts, phase, hertz.
- e. RPM
- f. NEMA motor starter size.

(3) Water heater:

- a. Heating capacity in L/s (gph).
- b. Temperature rise in degrees Celsius (C) (Fahrenheit (F)).
- c. Storage capacity in liters (gallons).
- d. Energy Factor (defined by Gas Appliance Manufacturers Association (GAMA))

(4) Hot water storage tank:

- a. Dimensions.
- b. Capacity in liters (gallons).
- c. Minimum insulation.

(5) Hot water generator:

- a. Dimensions.
- b. Storage capacity in liters (gallons).
- c. Heating surface area.
- d. Design pressure.
- e. Heat source (i.e. steam, HTHW, natural gas, electric).
- f. GPH @ entering water temperature and leaving water temperature.

(6) Drinking water dispenser:

- a. Cafeteria: Type, size.
- b. Electric drinking water cooler: Type, size. (Note: Water coolers must use HFC refrigerants.)

(7) Grease interceptor:

- a. Fat capacity in kilograms (pounds).
- b. Flow rating in L/s (gpm).
- c. Maximum leaving water grains (ppm).

(8) Reverse osmosis water treatment equipment:

- a. Minimum flow rating in L/s (gpm).
- b. Design and operating temperature in ° C (° F).
- c. Maximum leaving water grains (ppm).
- (9) Water softening treatment equipment:
 - a. Minimum flow rating in L/s (gpm).
 - b. Grains (grams) hardness to which water is to be softened.
 - c. Amount of water metered in gallons (liters) to start automatic regeneration of a softener unit.
- (10) Booster pump
 - a. Capacity in L/s (gpm)
 - b. Total head in meters (feet)
 - c. Minimum horsepower
 - d. Volts, phase hertz
 - e. RPM
 - f. NEMA motor starter size.
- (11) Fixture
 - (a) Description (including relevant section of UFGS 22 00 00 from which the selected fixture material can be found)
 - (b) Manufacturer
 - (c) Model #
 - (d) Plumbing Connection Sizes (Trap, Vent, Drainage, Hot Water, Cold Water, Other)
 - (e) Remarks
 - (f) Code Compliant (List either DOE FEMP or IMC Section 604.4)
 - (g) Fixture Flow Rate

- A229.2.9 The designer should be aware that some schedule 40 plastic pipes do not have the strength of a schedule 40 pipe.
- A229.2.15 Water is the preferred test medium.
- A229.2.19 Water is the preferred test medium.
- A229.3.1 Continuous flow devices cannot be used for water conservation reasons.
- A229.3.9 Floor drains are not required in service sink rooms and transformer rooms.
- A229.4.8 506.1 - In addition to criteria provided in the ASHRAE Handbook, consideration shall be given to differences in costs of building area required to support systems when calculating life cycle costs.
- 506.1.3 - The revision reflects Public Law 102-486 maximum fixture flow of 2.5 gallons per minute (9.5 L/s), ASHRAE recommended service water storage temperature minimum of 140°F (60°C), personnel safety maximum fixture delivery temperature of 110°F (43°C), and the appropriate supply design cold water temperature, which varies according to location and season.
- A229.5.6 Consideration will be given to increasing pipe sizes based on the anticipated future installation of fixtures when performing design calculations.
- A229.5.21 606.5.11 - Water pressure may be increased by using a hydro-pneumatic system consisting of a tank, pumps, compressed air system, and associated control devices.
- 606.5.11.1 - The minimum pressure maintained within the tank is at low-water level and is equal to the pressure required to meet the fixture demands. The high pressure at high water level depends on the operating pressure differential selected for the system. A reasonable and most commonly selected pressure differential is 20 psi (138 kPa).
- 606.5.11.3 - Using this table, the tank capacity may be determined as per Example 1. Pressure ranges are given in pounds per square inch (psi) and kilopascals (kPa)
- Example 1. Determine the tank capacity when pump capacity is 150 gallons per minute and tank operating pressure range is 40 to 60 pounds per square inch. (Referring to Table 606.5.11-2, the withdrawal from the tank is 24 percent of the tank capacity.)
- Total tank capacity = 2.50 x 150 gpm / 0.24 percent = 1,563 gallons
- or

Total tank capacity = $2.50 \times 568 \text{ L/s} / 0.24 \text{ percent} = 5916 \text{ liters}$

606.5.11.4 - Compressed air is supplied for tank operation according to the tank capacities.

606.5.11.6 - Booster pumps may be the "on-off" type or continuous running type

- A229.5.29 The insulation requirements and maximum heat loss rates stated in this section are minimum design requirements. The quality of insulation should be upgraded if the designer can show an improvement in the system performance or that insulation improvements are cost effective.
- A229.5.31 Single check valves are not considered adequate protection against back flow.
- A229.5.33 De-ionized or distilled water systems used in hospitals are examples of when higher purity would be desired. Reverse osmosis is a general term covering equipment that can have various types of filter elements and membranes and polishing components. The reverse osmosis membrane selection is critical and the operating pressure depends upon the membrane selected. Pump pressures can range from 80 to 800 psi (552 to 5516 kPa). The reverse osmosis unit is only part of the required treatment systems, which may include pretreatment facilities and organic filters. In some cases, booster pumps may be required for final water distribution. Materials for piping, pumps, valves, and other components must be carefully selected due to the corrosive nature of the high-purity water produced.
- A229.5.34 Softening requirements are application-specific; it is typically required where precipitation of calcium carbonate can damage boiler/water heating equipment, block conduits or for aesthetic reasons. Ion exchange water softening is a suitable process for these purposes. However, each category has its own recommended limits for maximum hardness. Water hardness for laundries should not exceed 2.5 grains per gallon (43 ppm) and water hardness is usually reduced to zero. Large mess halls should have a water hardness not exceeding that provided for laundries; whereas, hospitals can utilize water of up to 3 grains per gallon (51 ppm) water hardness. Ion exchange water softening equipment consists of a softener unit and a regeneration brine tank utilizing common salt (NaCl) for regeneration of the softener exchange material. Softening units can be multiple units where two or more units utilize the same regenerating brine tank to provide for continuity of treatment during regeneration of a softening unit.
- A229.6.8 Subsoil drains may discharge into this pit.
- A229.8.1 A single stack vent system is also known as a Philadelphia (one pipe)
- A230.0 When UFC 3-490-06 is published, use IBC Chapter 30, UFC 3-600-01, and UFC 3-490-06.
- A306.1 The intent of this is to reduce repair parts inventories as well as to maintain standardization of systems.
- A307.1 The Pentagon Reservation Exterior Standards Manual has been developed for the Washington Headquarters Services (WHS) for the purpose of defining future standards for the design of exterior building and site elements on the Pentagon Reservation in Arlington, Virginia. The Pentagon is a designated National Historic Landmark originally constructed in 1943. A set of reference guidelines is required for future exterior repairs, design, and construction activities, to provide clarity as to how to preserve the historic elements protected by the National Historic Preservation Act and its implementing regulations.
- A308.2.1 A waiver to this prohibition may be requested per Section 104.10 when an asbestos-free product is not available. Such requests shall be fully documented and submitted as soon as possible after the contractor determines that an asbestos-free product is not available.

APPENDIX B Adopted Procedures

PROCEDURE	AUTHORITY	AVAILABLE THROUGH	APPLICABLE FOR
Air Quality Permit Review	SCD/ESEB	SCD/ESEB 703-693-3683	Use of temporary generators and/or boilers for any activity, ceremony, special event or display.
Antennas and Similar Devices Installation Application	PBMO	whs.permitreview@mail.mil DD1494 – Application for Equipment Frequency Allocation as published by PBMO.	Installation of temporary or permanent roof penetrating equipment or radio frequency generating device.
Asbestos Control Permit	SCD/OSHB	https://safety.whs.mil/ under “Forms”	Any work requiring access to and/or disturbance of existing asbestos materials.
Building Pass Application	PFPA	http://www.pfpa.mil/	All individuals required to access the property for inspection, survey, work or other purposes.
Building Code Permit	SCD/BCO	Attachment 3 of this code	Any construction, alteration, modification, or change in occupancy being completed.
Cable Pulling Permit	PBMO	whs.permitreview@mail.mil	Cable pulling installations in above-ceiling, PBMO or publicly held spaces.
Confined Space Permit	SCD/OSHB	https://safety.whs.mil/ under “Confined Space”	Any work that requires an individual to enter a confined space, supervise an entry, or approve an entry.
Demolition Permit	SCD/OPFM and PBMO	https://fire.whs.mil under “Permits Section”	Whenever demolition of structures is required to complete project work.
Excavation Permit	PBMO	whs.permitreview@mail.mil	For any work that may disrupt underground communication or utility lines, or above ground rights of ways.
Exhibits, Artwork, and Signs on the Pentagon Reservation	PBMO	http://www.dtic.mil/whs/directives/corres/pdf/a103p.pdf (See also Space Use Permit)	Whenever exhibits, artwork, or signs are to be installed or modified
Exterior Standards Manual	ECM	ECM at 703-693-8293	Any work affecting exterior portions of the Pentagon Reservation.
Flammable, Combustible, and Hazardous Materials Permit	SCD/OPFM	https://fire.whs.mil , under “Permits Section” see “Fire Prevention Permit”	Any work requiring the use, storage, or manipulation of flammable, combustible, or hazardous materials.
Hazardous Material Management Form	SCD/OSHB and OPFM	https://safety.whs.mil/ , under “Forms”	When a WHS individual or group wants to test, try, use, or bring on property a product not currently on the WHS chemical inventory.
Hot Work Permit (Welding, Cutting, or Brazing)	SCD/OPFM	https://fire.whs.mil under “Permits Section”,	Any operation involving open flames or producing heat and/or sparks, hot slag, or dross. Hot work includes, but is not limited to, brazing, cutting, grinding, soldering, arc welding, work on a pipe that would conduct heat through a wall or in contact with a wall, or torch-applied roofing.
Lead Work	SCD/OSHB	https://safety.whs.mil/ , under “Policy Chapters – Chapter 21 Lead”	During the use, handling, and removal of materials containing lead.
LPG Permit (See also Air Quality Permit)	SCD/OPFM	https://fire.whs.mil , under “Permits Section”, see “Fire Prevention Permit”	As required by NFPA 1, the Fire Prevention Code, and NFPA 58, and/or the Liquefied Petroleum Gas Code.

PROCEDURE	AUTHORITY	AVAILABLE THROUGH	APPLICABLE FOR
Open Flame Permit	SCD/OPFM	https://fire.whs.mil/ , under "Permits Section", see "Fire Prevention Permit"	Whenever an open flame will be used or displayed other than during hot work.
Photo Permit	PFPA/Director SSD	PFPA/SSD Access Control Staff at 703-614-1529	Whenever photography is required to complete a project/scope of work on WHS property.
Roof Access Permit	PBMO	whs.permitreview@mail.mil	All work requiring access to the roof.
Roof Hot Work Permit	PBMO	whs.permitreview@mail.mil	Any roof operation involving open flames or producing heat and/or sparks, hot slag or dross. Hot Work includes, but is not limited to, brazing, cutting, grinding, soldering, arc welding, work on a pipe that would conduct heat through a wall or in contact with a wall, or torch-applied roofing.
Space Access	Component Security Officer/Manager	DTM 09-012, "Interim Policy Guidance for DoD Physical Access Control", as published by the Defense Technical Information Center (DTIC), on its website at http://www.dtic.mil/whs/directives/corres/pdf/DTM-09-012.pdf	Whenever access to DoD installations or stand-alone facilities is required. Note: Additional access requirements may apply depending on work location.
Stationary Lead-Acid Battery Systems Permit	(Reserved)	(Reserved)	(Reserved)
Universal Space Plan	SCD	SCD at 703-695-8004	Whenever space modifications are planned for spaces within the Pentagon.
Use of Explosives Permit	PBMO	whs.permitreview@mail.mil	All work requiring use or storage of explosives.
Use of Space on the Pentagon Reservation Permit (to include land)	PBMO Special Events Office	DD2798, as published by the Defense Technical Information Center (DTIC), on its website at http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd2798.pdf authority for which is granted by Title 32 of the Code of Federal Registrar (CFR) Part 234.3D.	Whenever events, installations, projects, etc. require use of PBMO controlled or public spaces on WHS property. Use of equipment such as barbeque grills and open flames must be included in the Space Use Permit. Use of space permits are required for the following: Cable pulling (See also Cable Pulling Permit), Construction Demolition of structures Excavation (See also Excavation Permit), Flammable/combustible liquids storage (See Fire Prevention Permit), Gatherings such as meetings or parties in public areas Moved structures, Open flames (See also Fire Prevention Permit), Project laydown and storage areas (See also Public Space Policy), Roof Work (See also Roof Work Access Permit and Roof Hot Work Permit), Temporary Structures, Temporary Use of Equipment, Use of Explosives (See also Use of Explosives Permit)
Utility Outage Permit	PBMO O&M	PBMO O&M at 703-693-8084	Whenever a utility outage (electrical, mechanical, plumbing, telecommunication, fire protection, etc.) is required to complete work on WHS property.

PROCEDURE	AUTHORITY	AVAILABLE THROUGH	APPLICABLE FOR
Utility Space Access Permit	PBMO	PBMO O&M at 703-693-8084	Reserved

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APPENDIX C Procedure for Changing the WHSBC

The following outlines the procedures and key timelines for requesting changes to the WHSBC:

- A. Per Department of Defense Directive 4270.5, buildings, structures, etc. that fall under the jurisdiction of this Code are required to comply with the UFC to the greatest extent practicable. As such, this Code will be revised to reflect UFC revisions within 60 days of all UFC change releases directly affecting the WHSBC. Such interim revisions will include only those changes necessary to reflect new/modified UFC requirements. Until WHSBC revisions are completed, compliance with any new/modified requirements within the UFC is required in addition to compliance with the WHSBC.
- B. Any individual or DoD Component subject to the code wishing to propose a change to the WHSBC shall submit a WHSBC Proposal Form to the SCD. The form can be found on the OPFM Website at <https://fire.whs.mil>.
 1. After July 1 of each year, the code panel(s) will review all proposals submitted during the previous year and make recommendations to accept, accept in part, accept in principle, hold for additional information, or reject any proposal.
 2. Proposed changes to the WHSBC and code panel recommended actions (Report on Proposals) will be posted to the OPFM Website at <https://fire.whs.mil> for public comment by September 1 of each year for 30 days. Comments are to be made using the Public Comment Form located on the OPFM website.
 3. Public comments must be submitted by October 1.
 4. Upon review of comments, the code panel(s) will make final recommendations for proposed changes to the Director, FSD, by November 1 of each year.
 5. The Director, FSD, will approve any changes and updates to the WHSBC by December 1 of each year.
 6. Changes acted upon by Director, FSD, will be effective Jan 1 of each year.
 7. The Director, FSD, at his or her sole discretion, may institute a tentative interim amendment (TIA) to the WHSBC if an emergency nature requiring prompt action. Determination of an emergency nature to life or property shall include, but not be limited to, one or more of the following:
 - a. The WHSBC document contains an error or an omission.
 - b. The WHSBC document contains a conflict within the document.
 - c. The proposed TIA intends to correct a previously unknown existing hazard.
 - d. The proposed TIA intends to offer individuals or DoD Components subject to the code a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.
 - e. When a change in the UFC and/or ICC/NFPA standards creates a new conflict with the WHSBC.

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APPENDIX D References

GOVERNMENT PUBLICATIONS

ARCHITECTURAL BARRIERS ACT (ABA)

ABA Accessibility Standard for Department of Defense Facilities,

<http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/aba-standards>

"Access for People with Disabilities", Memorandum, October 31, 2008, Deputy Secretary of Defense, 1010 Defense Pentagon, Washington, DC 20301-1010.

<http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/ada-standards>

ADA and ABA Accessibility Guidelines for Buildings and Facilities, U.S. Access Board

<http://www.access-board.gov>

Architectural Barriers Act of 1968 (ABA), as amended, 42 U.S.C. § 4151, et seq., and Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794.

<http://www.gpo.gov/fdsys/pkg/FR-2007-06-20/pdf/07-2979.pdf>

AIR FORCE MANUAL (AFMAN)

AFMAN 91-201

Explosives Safety Manual

http://www.wbdg.org/ccb/AF/AFM/afman_91_201.pdf

DEPARTMENT OF THE ARMY PUBLICATIONS AND MANUALS (DA PAM)

DA PAM 385-64

Ammunition and Explosives Standards

http://www.apd.army.mil/pdf/files/p385_64.pdf

DOD ADMINISTRATIVE INSTRUCTION (AI)

AI-103

Exhibits, Artwork, and Signs on the Pentagon Reservation

<http://www.dtic.mil/whs/directives/corres/pdf/a103p.pdf>

DOD DIRECTIVE (DODD)

DoDD 4270.5

Military Construction

<http://www.dtic.mil/whs/directives/corres/pdf/427005p.pdf>

DOD INSTRUCTION (DODI)

DoDI 4170.11

Installation Energy Management

<http://www.dtic.mil/whs/directives/corres/pdf/417011p.pdf>

DoDI 4715.03

Natural Resources Conservation Program

<http://www.dtic.mil/whs/directives/corres/pdf/471503p.pdf>

DOD MANUAL

DOD MANUAL 5100.76-M *Physical Security of Sensitive Conventional Arms, Ammunition and Explosives*

<http://www.dtic.mil/whs/directives/corres/pub1.html>

DOD MANUAL 5200.1 *DoD Information Security Program*

<http://www.dtic.mil/whs/directives/corres/pub1.html>

DOD MANUAL 5200.08R *Physical Security Program*

<http://www.dtic.mil/whs/directives/corres/pub1.html>

DOD MANUAL 6055.09-M *DoD Ammunition and Explosives Safety Standards*

<http://www.dtic.mil/whs/directives/corres/html/605509m.html>

DOD SUPPLEMENTS

DOD Supplement to the National Manual on Uniform Traffic Control Devices (MUTCD)

http://www.sddc.army.mil/sites/TEA/Functions/SpecialAssistant/TrafficEngineeringBranch/Documents/MUTCD_DOD_Supplement_Revision_20150601.pdf

EXECUTIVE ORDERS

Executive Order 13514 – *Federal Leadership in Environmental, Energy, and Economic Performance*

Executive Order 13693 - *Planning for Federal Sustainability in the Next Decade*

Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds

Energy Independence Security Act of 2007

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)

FEMA-310 *Handbook for the Seismic Evaluation of Buildings,*
<http://www.wbdg.org/ccb/DHS/ARCHIVES/fema310.pdf>

INTELLIGENCE COMMUNITY

INTELLIGENCE COMMUNITY DIRECTIVE (ICD) 705,
Sensitive Compartment Information Facilities (Effective: 23 April 2012)
http://www.wbdg.org/pdfs/dod_at/ic_techspeg_705.pdf

INTELLIGENCE COMMUNITY STANDARD NUMBER 705-1 (ICS 705-1)
Physical and Technical Security Standards for Sensitive Compartmented Information Facilities (Effective: 17 September 2010)
http://www.wbdg.org/pdfs/dod_at/ics_705_1.pdf

INTERAGENCY COMMITTEE ON SEISMIC SAFETY IN CONSTRUCTION

ICSSC RP6/NISTIR 6762 *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings*, U.S. Department of Commerce, Technology Administration, Structures Division, Building & Fire Research Laboratory, National Institute of Standards and Technology, Gaithersburg, MD, <http://fire.nist.gov/bfrlpubs/build01/PDF/b01056.pdf>

MILITARY STANDARD (MIL-STD)

MIL-STD-3007F *Standard Practice for Unified Facilities Criteria and Unified Facilities Guide Specifications*, 13 December 2006,
<http://www.wbdg.org/ccb/FEDMIL/std3007f.pdf>

UNIFIED FACILITIES CRITERIA (UFC)

SERIES 1: **POLICY, PROCEDURES AND GUIDANCE**

SERIES 1-200: **POLICY**

UFC 1-200-01 *General Building Requirements*
https://wbdg.org/ccb/DOD/UFC/ufc_1_200_01.pdf

UFC 1-200-02 *High Performance and Sustainable Building Requirements*
https://www.wbdg.org/ccb/DOD/UFC/ufc_1_200_02.pdf

SERIES 1-300: **PROCEDURES AND GUIDANCE**

UFC 1-300-08 *Criteria for Transfer and Acceptance of DoD Real Property*
https://wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf

SERIES 1-900:	MISCELLANEOUS
UFC 1-900-01	<i>Selection of Methods for the Reduction, Reuse and Recycling of Demolition Waste</i> https://wbdg.org/ccb/DOD/UFC/ufc_1_900_01.pdf
SERIES 2	MASTER PLANNING
UFC 2-100-01	<i>Installation Master Planning</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_2_100_01.pdf
SERIES 3:	DISCIPLINE-SPECIFIC CRITERIA
SERIES 3-100:	ARCHITECTURE AND INTERIOR DESIGN
UFC 3-101-01	<i>Architecture,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_101_01.pdf
UFC 3-110-03	<i>Roofing,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_110_03.pdf
UFC 3-120-10	<i>Interior Design,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_120_10.pdf
SERIES 3-200:	CIVIL/GEOTECHNICAL/LANDSCAPE ARCHITECTURE
UFC 3-201-01	<i>Civil Engineering,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_201_01.pdf
UFC 3-210-10	<i>Low Impact Development,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_10.pdf
UFC 3-220-01	<i>Geotechnical Engineering</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_220_01.pdf
UFC 3-230-01	<i>Water Storage, Distribution, and Transmission</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_230_01.pdf
UFC 3-240-01	<i>Wastewater Collection,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_240_01.pdf
SERIES 3-300:	STRUCTURAL AND SEISMIC DESIGN
UFC 3-301-01	<i>Structural Engineering,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_301_01.pdf
UFC 3-310-04	<i>Seismic Design of Buildings</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_310_04.pdf
UFC 3-310-08	<i>Non-Expeditionary Bridge Inspection, Maintenance and Repair,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_310_08.pdf
UFC 3-320-03A	<i>Structural Considerations for Metal Roofing, with Change 2</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_320_03a.pdf
UFC 3-320-06A	<i>Concrete Floor Slabs on Grade Subjected to Heavy Loads</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_320_06a.pdf
UFC 3-340-01	<i>Design and Analysis of Hardened Structures to Conventional Weapons Effects (FOUO)</i>
UFC 3-340-02	<i>Structures to Resist the Effects of Accidental Explosions</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_340_02.pdf
SERIES 3-400:	MECHANICAL
UFC 3-400-02	<i>Design: Engineering Weather Data,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_400_02.pdf
UFC 3-401-01	<i>Mechanical Engineering</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_401_01.pdf
UFC 3-410-01	<i>Heating, Ventilating and Air Conditioning Systems</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_410_01.pdf
UFC 3-420-01	<i>Plumbing Systems,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_420_01.pdf
SERIES 3-500:	ELECTRICAL
UFC 3-501-01	<i>Electrical Engineering</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_501_01.pdf
UFC 3-520-01	<i>Interior Electrical Systems,</i> https://www.wbdg.org/ccb/DOD/UFC/ufc_3_520_01.pdf
UFC 3-520-05	<i>Stationary Battery Areas</i>

- https://www.wbdg.org/ccb/DOD/UFC/ufc_3_520_05.pdf
- UFC 3-530-01 *Interior and Exterior Lighting and Controls*
https://www.wbdg.org/ccb/DOD/UFC/ufc_3_530_01.pdf
- UFC 3-550-01 *Exterior Electrical Power Distribution,*
https://www.wbdg.org/ccb/DOD/UFC/ufc_3_550_01.pdf
- UFC 3-560-01 *Electrical Safety, O&M* https://www.wbdg.org/ccb/DOD/UFC/ufc_3_560_01.pdf
- UFC 3-570-02A *Cathodic Protection,*
https://www.wbdg.org/ccb/DOD/UFC/ufc_3_570_02a.pdf
- UFC 3-580-01 *Telecommunications Building Cabling Systems Planning and Design,*
https://www.wbdg.org/ccb/DOD/UFC/ufc_3_580_01.pdf
- SERIES 3-600: **FIRE PROTECTION**
- UFC 3-600-01 *Fire Protection Engineering for Facilities*
https://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf
- SERIES 4: **MULTI-DISCIPLINARY AND FACILITY-SPECIFIC DESIGN**
- UFC 4-010-01 *DoD Minimum Antiterrorism Standards for Buildings*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf
- UFC 4-010-02 *DoD Minimum Antiterrorism Standoff Distances for Buildings (FOUO)*
- UFC 4-010-05 *Sensitive Compartmented Information Facilities Planning, Design and Construction*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_05.pdf
- UFC 4-021-01 *Design and O&M: Mass Notification Systems*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_021_01.pdf
- SERIES 4-500: **HOSPITAL AND MEDICAL FACILITIES**
- UFC 4-510-01 *Design: Military Medical Facilities*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_510_01.pdf
- SERIES 4-700: **HOUSING AND COMMUNITY FACILITIES**
- UFC 4-740-06 *Youth Centers*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_740_06.pdf
- UFC 4-740-14 *Child Development Centers*
https://www.wbdg.org/ccb/DOD/UFC/ufc_4_740_14.pdf

UNIFIED FACILITIES GUIDE SPECIFICATIONS

Available at http://www.wbdg.org/ccb/browse_cat.php?c=3

UNITED STATES ARMY CORPS OF ENGINEERS Engineering Manuals

- USACE EM 385-1-1 *Safety – Safety and Health Requirements*
http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_385-1-1_2008Sep_Consolidated_2011Aug.pdf

NON-GOVERNMENT PUBLICATIONS

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) - 1801 Bell Drive, Reston, VA 20191-4400,
<http://www.asce.org>

- ASCE/SEI 31-03 *Seismic Evaluation of Existing Buildings*
ASCE/ SEI 41-06 *Seismic Rehabilitation of Existing Buildings*

AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR-CONDITIONING ENGINEERS (ASHRAE) - 1791 Tullie Circle, N.E. Atlanta, GA 30329
www.ashrae.org

Washington Headquarters Services Building Code

ASHRAE 55	<i>Thermal Environmental Conditions for Human Occupancy</i>
ASHRAE 62	<i>Ventilation for Acceptable Indoor Air Quality</i>
ASHRAE 90.1	<i>Energy Standard for Buildings Except Low-Rise Residential Buildings</i>
ASHRAE 154	<i>Ventilation for Commercial Cooking Operations</i>
ASHRAE 189.1	<i>Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings</i>

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) - 3 Park Avenue. New York, NY 10016-5990

ASME 17.1	<i>Safety Code for Elevators and Escalators</i> https://www.asme.org/products/codes-standards/a171csa-b44-2013-safety-code-elevators-escalators
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) - 100 Barr Harbor Drive. West Conshohocken, PA 19428-2959

ASTM E 2030-09-A	<i>Standard Guide for Recommended Uses of Photoluminescent (Phosphorescent) Safety Markings</i> http://www.astm.org/Standards/E2030.htm
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DEPARTMENT OF ENERGY - 1000 Independence Ave SW, Washington, DC 20585

www.energy.gov

Federal Energy Management Program	http://www1.eere.energy.gov/femp/
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ENVIRONMENTAL PROTECTION AGENCY – 1200 Pennsylvania Ave NW, Washington, DC 20460

www.epa.gov

EPA Comprehensive Procurement Guidelines	www.epa.gov/epawaste/consERVE/tools/cpg/index.htm
EPA Energy Star Program	www.energystar.gov
EPA Water Sense Program	www.epa.gov/watersense/

INTERNATIONAL CODE COUNCIL (ICC) – 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001.

<http://www.iccsafe.org/Store/>

<i>International Building Code (IBC)</i>
<i>International Energy Conservation Code (IECC)</i>
<i>International Existing Building Code (IEBC)</i>
<i>International Fire Code (IFC)</i>
<i>International Fuel Gas Code (IFGC)</i>
<i>International Green Construction Code</i>
<i>International Mechanical Code</i>
<i>International Plumbing Code</i>

NATIONAL FIRE PREVENTION ASSOCIATION (NFPA) – 1 Batterymarch Park Quincy, Massachusetts, 02169

NFPA 1	<i>Fire Code</i> www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=1
NFPA 10	<i>Standard for Portable Fire Extinguishers</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=10
NFPA 17A	<i>Standard for Wet Chemical Extinguishing Systems</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=17A
NFPA 54	<i>National Fuel Gas Code</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=54

NFPA 58	<i>Liquefied Petroleum Gas Code</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=58
NFPA 70	<i>National Electrical Code®</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=70
NFPA 72	<i>National Fire Alarm and Signaling Code</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=72
NFPA 75	<i>Standard for Protection of Information Technology Equipment</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=75
NFPA 96	<i>Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=96
NFPA 101	<i>Life Safety Code®</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=101
NFPA 170	<i>Standard for Fire Safety and Emergency Symbols</i> http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=170

UNDERWRITERS LABORATORIES (UL) – 333 Pfingsten Road Northbrook, IL 60062-2096

<http://www.ul.com/global/eng/pages/solutions/standards/>

UL 924	Emergency Lighting and Power Equipment
UL 300	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
UL 1994	Luminous Egress Path Marking Systems

APPENDIX E Washington DC Weather Data

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RONALD REAGAN WASHI	
Latitude = 38.85 N	Station ID = ICAO_KDCA
Longitude = 77.04 W	Elevation = 15 Feet
Period of Record = 1985 To 2014	Average Pressure = 29.98 inches Hg

Design Criteria Data

Dry Bulb Temperature (T)	Mean Coincident (Average) Values				
	Design Value (°F)	Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	98	76	101	10	W
0.4% Occurrence	95	76	105	10.5	S
1.0% Occurrence	92	75	102	10.1	S
2.0% Occurrence	90	74	100	9.9	S
Mean Daily Range	16	-	-	-	NW
97.5% Occurrence	26	22	11	10.3	NW
99.0% Occurrence	21	18	8	11.6	NW
99.6% Occurrence	18	15	7	11.3	NNW
Median of Extreme Lows	12	10	5	11.2	NNW

Wet Bulb Temperature (T _{wb})	Design Value (°F)	Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	81	91	139	10.5	S
0.4% Occurrence	79	89	129	9.9	S
1.0% Occurrence	77	86	122	9.3	S
2.0% Occurrence	76	85	119	9	S

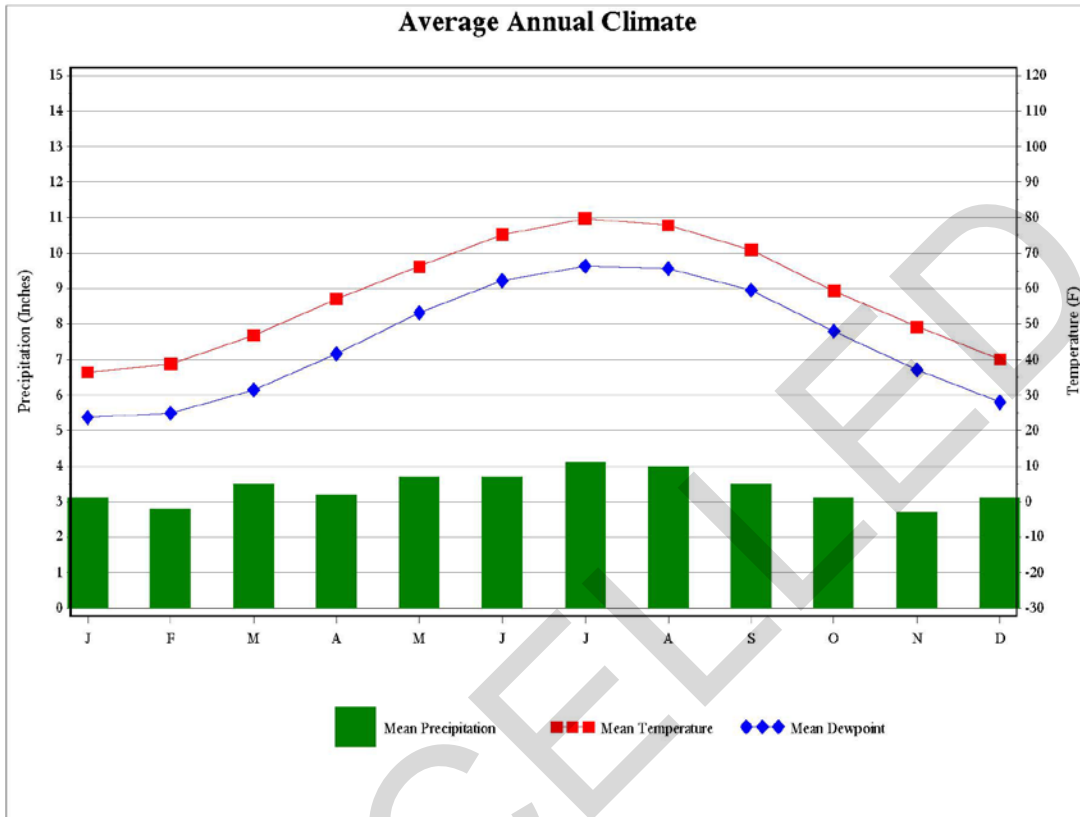
Humidity Ratio (HR)	Design Value (gr/lb)	Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	149	87	0.99	8.5	S
0.4% Occurrence	134	84	0.89	8.9	S
1.0% Occurrence	130	82	0.87	8.4	S
2.0% Occurrence	124	81	0.83	8.1	S

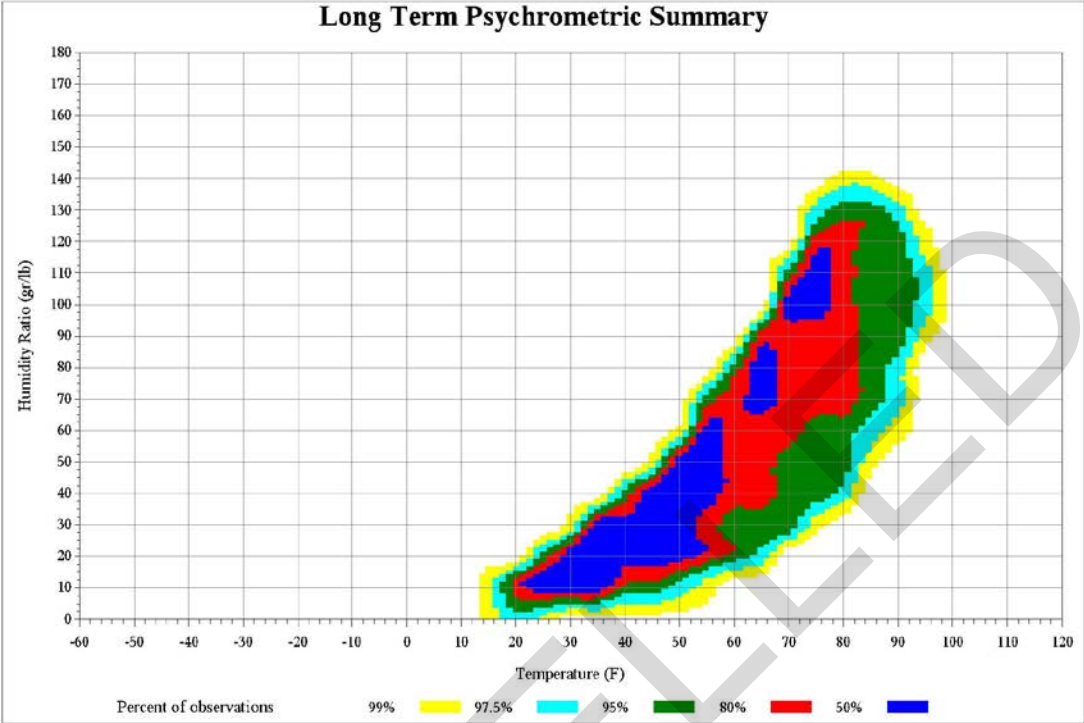
Air Conditioning/ Humid Area Criteria	Threshold	T ≥ 93°F	T ≥ 80°F	Twb ≥ 73°F	Twb ≥ 67°F
# of Hours		78	1062	794	2021

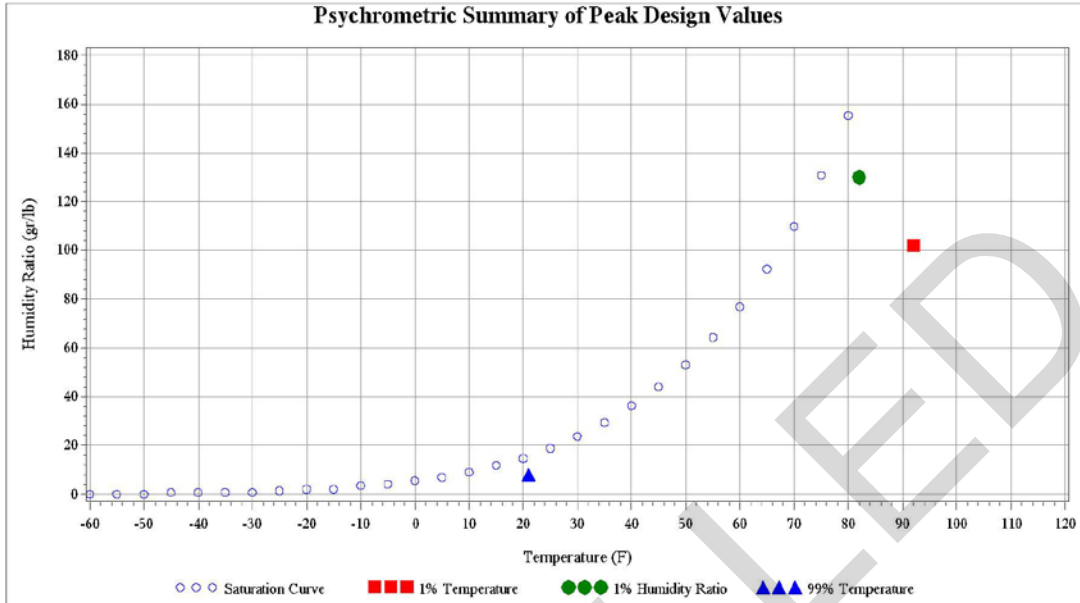
Other Site Data

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
7	3.3	90	3.1 + 1.1
Ground Water Temperature (°F) 50 Foot Depth*	Frost Depth 50 Year Recurrence (in)	Ground Snow Load 50 Year Recurrence (lb/ft²)	Average Annual Freeze-Thaw Cycles (#)
60.7	N/A	22	37

*Note: Temperatures at greater depths can be estimated by adding 1.5 °F per 100 feet additional depth.







	(°F) / (gr/lb)	MCDB (°F)	MCWB (°F)	MCDP (°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
1.0% Dry Bulb	92.0		75		102.0	38.8
99.0% Dry Bulb	21.0				8.0	6.3
1.0% Humidity Ratio	130.0	82.0	76.9	74.9		40.1

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	January					February					March				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
105/109															
100/104															
95/99															
90/94															
85/89												0	0	0	65.6
80/84											2	1	3	63.9	
75/79		0		0	64		0	0	0	62.3	3	2	5	60.7	
70/74		1	0	1	59.7		2	1	3	57.8	1	10	6	17	58.3
65/69	0	2	0	2	58.1	0	3	1	4	55.6	1	12	8	21	56
60/64	2	7	4	13	55.7	2	7	4	13	52.8	7	25	19	51	52.6
55/59	4	9	7	20	51.4	3	13	9	25	47.9	15	30	28	73	49
50/54	7	19	13	39	45.9	7	22	19	48	44.9	25	40	39	104	45.2
45/49	18	37	30	85	41.2	19	38	35	92	40.6	48	54	56	158	40.8
40/44	25	36	36	97	37.2	22	36	33	91	36.9	39	31	36	106	37
35/39	54	53	56	163	33.1	56	48	56	160	32.8	58	25	34	117	32.8
30/34	54	41	48	143	28.4	56	33	38	127	28.3	35	10	14	59	28.1
25/29	39	23	30	92	23.3	36	15	20	71	23.4	14	4	5	23	23
20/24	19	11	13	43	18.8	12	4	6	22	18.4	4	1	1	6	18.7
15/19	19	7	9	35	14.7	8	2	2	12	14.9	2	0	0	2	14.6
10/14	5	2	1	8	10	1	0	0	1	9.7	0			0	11
5/9	1	0	1	2	5.3	0			0	5					
0/4	0	0	0	0	-0.1										
-5/-1	0	0	0	0	-3.7										

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	April					May					June				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
105/109															
100/104												0	0	0	78
95/ 99							1	0	1	75.6		5	1	6	75.8
90/ 94		1	0	1	68.8		5	1	6	73.2		23	6	29	74
85/ 89		2	1	3	66.7	0	13	5	18	70.5	1	36	17	54	72.6
80/ 84		10	4	14	64.1	1	32	16	49	68.6	8	69	46	123	70.3
75/ 79	0	16	8	24	62.3	5	38	28	71	65.7	42	53	67	162	68.7
70/ 74	5	28	21	54	59.6	28	53	49	130	62.9	90	33	64	187	66.1
65/ 69	9	28	21	58	56.9	35	38	43	116	59.9	46	12	23	81	61.9
60/ 64	25	50	45	120	53.7	65	41	55	161	56.6	41	7	14	62	58.2
55/ 59	39	40	47	126	50.1	58	20	34	112	52.5	12	1	4	17	53.8
50/ 54	56	35	46	137	46.4	39	7	15	61	48.2	2	0	0	2	49.2
45/ 49	64	24	33	121	42	15	1	2	18	43.6					
40/ 44	24	5	9	38	37.3	1		0	1	38.6					
35/ 39	14	2	4	20	33.5	0			0	36.3					
30/ 34	3	0	0	3	27.7										
25/ 29	0			0	24.7										
20/ 24															
15/ 19															
10/ 14															
5/ 9															
0/ 4															
-5/ -1															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	July					August					September				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
105/109		0		0	73										
100/104		2	0	2	77		0		0	77.8					
95/99		15	4	19	76.1		7	1	8	76.1		1		1	73.5
90/94	1	46	20	67	75	0	33	10	43	74.7		9	2	11	73.2
85/89	4	53	30	87	73.7	1	47	22	70	73.1	0	16	5	21	72.5
80/84	30	77	70	177	71.8	16	83	66	165	71.6	2	48	22	72	70.1
75/79	90	38	78	206	70.6	72	50	80	202	70.3	20	61	48	129	68.3
70/74	91	14	40	145	67.4	106	22	54	182	67.3	63	58	75	196	65.5
65/69	26	2	6	34	63	38	5	11	54	63.3	52	27	41	120	61.7
60/64	6	0	1	7	58.7	13	1	3	17	59.1	61	17	33	111	57.9
55/59	0			0	51.1	1	0	0	1	53.7	28	3	11	42	53
50/54	0			0	47	0	0	0	0	48.4	12	1	3	16	49.1
45/49											2		0	2	45.3
40/44															
35/39															
30/34															
25/29															
20/24															
15/19															
10/14															
5/9															
0/4															
-5/-1															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

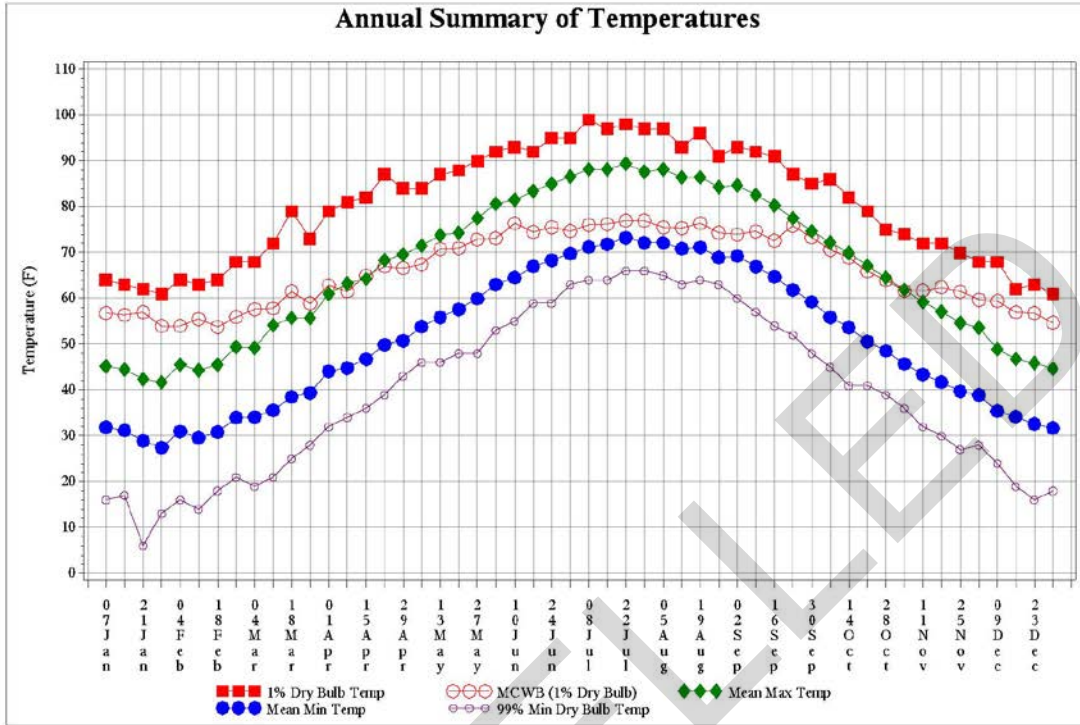
Temperature Range (°F)	October					November					December				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°F)
105/109															
100/104															
95/99															
90/94		1	0	1	70.9										
85/89		2	0	2	70.5										
80/84		9	2	11	69		0		0	67.6					
75/79	1	21	8	30	66.4		2	0	2	64.1		0		0	63
70/74	10	40	24	74	63.3	0	9	2	11	61.2	0	2	0	2	61.3
65/69	15	37	31	83	60.2	3	15	7	25	59.5	0	3	1	4	58.9
60/64	40	60	55	155	56.3	10	30	25	65	55.7	2	7	5	14	56.2
55/59	51	43	56	150	51.4	23	41	34	98	51.2	8	14	10	32	51.9
50/54	56	25	43	124	47.4	38	52	50	140	46.6	11	29	19	59	46.2
45/49	46	10	23	79	42.9	53	51	55	159	41.6	27	53	46	126	41.5
40/44	21	1	5	27	38.9	39	21	33	93	37.5	33	44	45	122	37.3
35/39	7	0	1	8	35.6	47	15	24	86	33.2	65	51	58	174	33
30/34	0	0		0	31.3	19	4	8	31	28.5	55	27	38	120	28.4
25/29						6	1	1	8	23.9	29	13	17	59	23.3
20/24						1			1	18.7	11	4	6	21	19.1
15/19											5	1	2	8	14.9
10/14											1	0	0	1	10.1
5/9											0	0		0	5.6
0/4															
-5/-1															

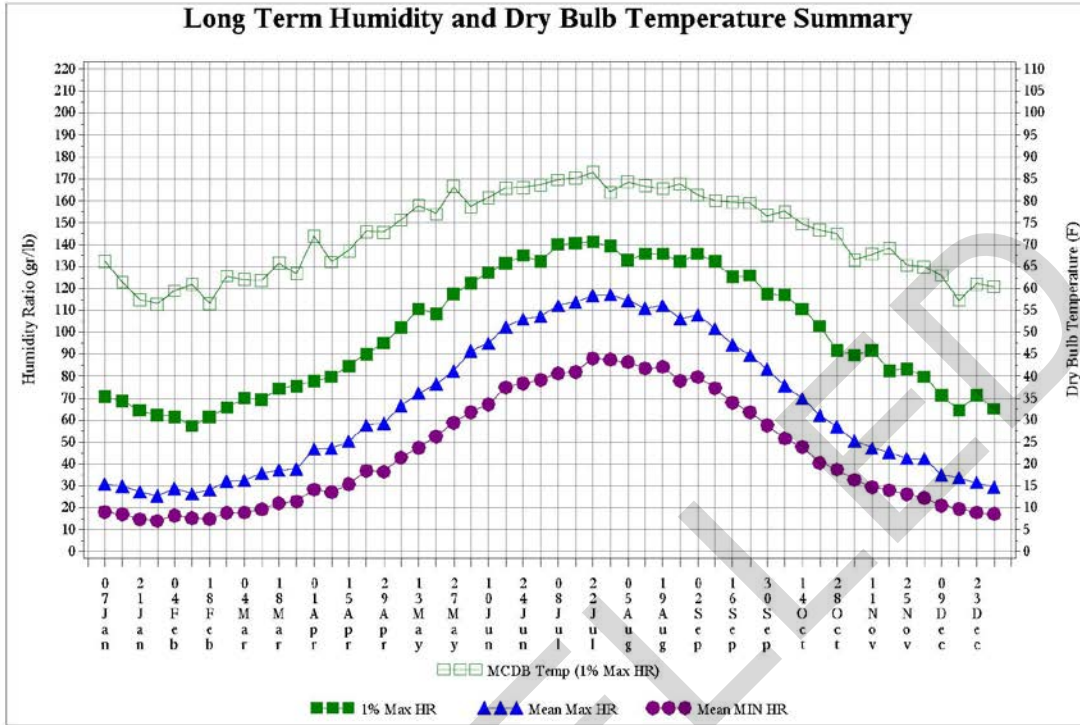
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°F)	Annual				M C W B (°F)
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	
105/109		0		0	73
100/104		3	0	3	77.3
95/ 99		28	6	34	76
90/ 94	1	118	39	158	74.5
85/ 89	5	170	80	255	72.9
80/ 84	56	329	226	611	70.7
75/ 79	232	282	319	833	68.9
70/ 74	393	272	335	1000	65.2
65/ 69	226	183	193	602	60.6
60/ 64	275	251	262	788	56
55/ 59	243	215	240	698	51.1
50/ 54	253	230	247	730	46.5
45/ 49	292	267	279	838	41.5
40/ 44	205	174	198	577	37.3
35/ 39	302	195	234	731	33
30/ 34	222	114	147	483	28.3
25/ 29	124	55	73	252	23.3
20/ 24	47	20	26	93	18.8
15/ 19	33	11	13	57	14.8
10/ 14	8	2	2	12	10
5/ 9	2	0	1	3	5.3
0/ 4	0	0	0	0	-0.1
-5/ -1	0	0	0	0	-3.7

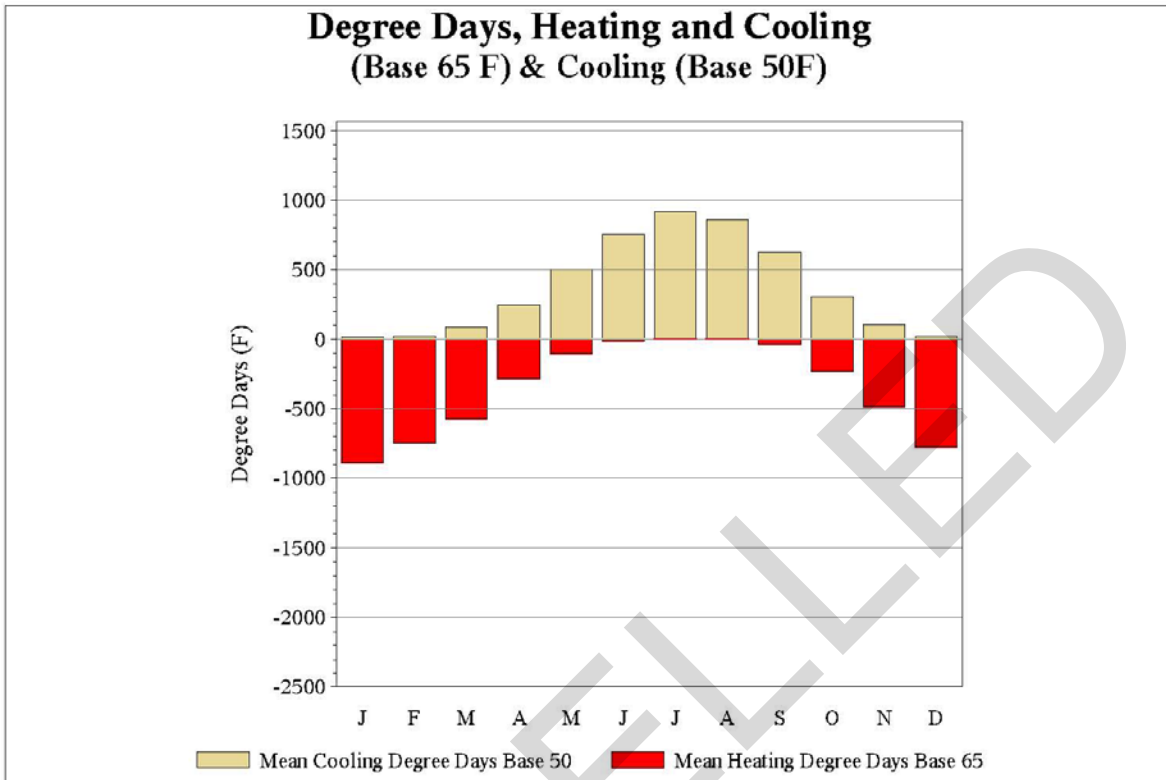
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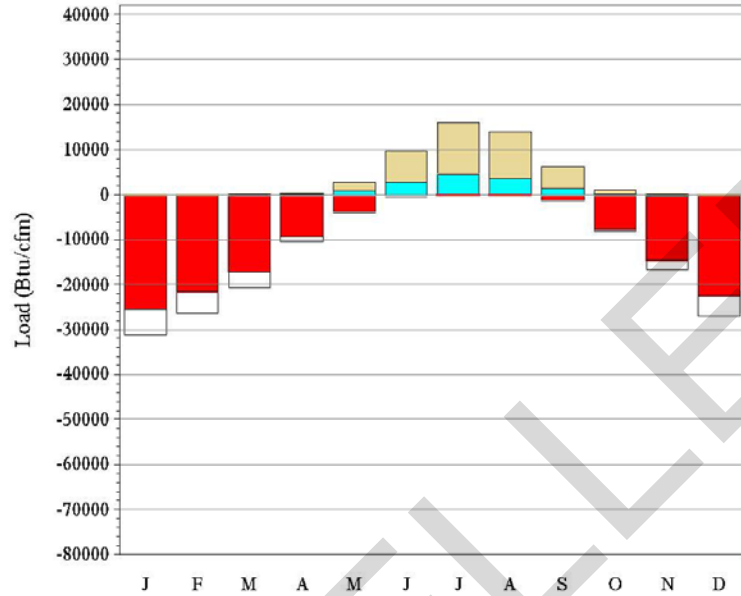
Long Term Humidity and Dry Bulb Temperature Summary

Week Ending	1.0% Temp (°F)	MCWB@ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB@ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	64	56.8	45.1	31.9	16	70.7	66.2	30.8	18.1
14-Jan	63	56.4	44.4	31.2	17	68.6	61.5	29.8	16.9
21-Jan	62	57	42.4	28.9	6	64.4	57.4	27.2	14.7
28-Jan	61	54	41.6	27.4	13	62.3	56.5	25.6	14
4-Feb	64	54	45.5	30.9	16	61.6	59.5	28.8	16.4
11-Feb	63	55.5	44.3	29.6	14	57.4	61	26.4	15.3
18-Feb	64	53.7	45.5	30.8	18	61.6	56.6	28.1	14.9
25-Feb	68	55.9	49.3	34	21	65.8	62.8	32.2	17.6
4-Mar	68	57.6	49.2	34.1	19	70	62.1	32.5	17.8
11-Mar	72	57.8	54.1	35.6	21	69.3	61.8	35.7	19.3
18-Mar	79	61.5	55.7	38.5	25	74.2	65.8	37.2	22
25-Mar	73	58.9	55.7	39.3	28	75.6	63.4	37.6	22.8
1-Apr	79	62.8	60.9	44.1	32	77.7	71.9	46.7	28.3
8-Apr	81	61.5	63.3	44.8	34	79.8	66.1	47.2	27
15-Apr	82	65	64.2	46.7	36	84.7	68.6	50.2	30.7
22-Apr	87	67	68.3	49.9	39	90.3	73	57.6	36.7
29-Apr	84	66.6	69.6	50.7	43	95.2	72.8	58.6	36.3
6-May	84	67.4	71.5	53.8	46	102.2	75.6	66.6	42.9
13-May	87	70.7	73.7	55.8	46	110.6	78.9	72.2	47.4
20-May	88	70.9	74.2	57.6	48	108.5	77	76.4	52.5
27-May	90	72.8	77.4	59.9	48	117.6	83.2	82.3	58.7
4-Jun	92	73.1	80.6	63	53	123.5	78.7	91.5	63.5
10-Jun	93	76.4	81.5	64.5	55	127.4	80.7	95	67.2
17-Jun	92	74.5	83.4	67	59	131.6	82.9	102.5	74.9
24-Jun	95	75.5	85	68.3	59	135.1	83.1	106	76.8
1-Jul	95	74.7	86.5	69.8	63	132.3	83.6	107.3	78.2
8-Jul	99	76	88.1	71.2	64	140	84.8	112.2	81.3
15-Jul	97	76.2	88.1	71.8	64	140.7	85.2	113.8	81.9
22-Jul	98	77	89.4	73.2	66	141.4	86.5	116.9	88
29-Jul	97	77	87.6	72.1	66	139.3	82	117.1	87.5
5-Aug	97	75.5	88.1	72.1	65	133	84.3	114.5	86.4
12-Aug	93	75.3	86.4	70.8	63	135.8	83.4	111	83.5
19-Aug	96	76.4	86.4	71.1	64	135.8	82.8	112.2	84.2
26-Aug	91	74.3	84.3	68.9	63	132.3	83.8	106.2	77.9
2-Sep	93	73.9	84.6	69.2	60	135.8	81.3	108.1	79.6
9-Sep	92	74.6	82.6	66.9	57	132.3	80	101.6	74.5
16-Sep	91	72.6	80.2	64.7	54	125.3	79.7	94.4	67.9
23-Sep	87	75.8	77.4	61.8	52	126	79.5	89.5	63.6
30-Sep	85	73.3	74.6	59.2	48	117.6	76.6	83	57.7
7-Oct	86	70.6	72.2	55.8	45	116.9	77.6	75.8	51.6
14-Oct	82	68.9	69.9	53.6	41	110.6	74.7	69.9	47.8
21-Oct	79	65.9	67.1	50.6	41	102.9	73.3	62.2	40.5
28-Oct	75	64	64.4	48.5	39	91.7	72.5	57.1	37.4
4-Nov	74	61.6	61.8	45.7	36	89.6	66.6	50.3	32.7
11-Nov	72	61.7	59.2	43.4	32	91.7	67.8	47.3	29.4
18-Nov	72	62.4	57.1	41.7	30	82.6	69.2	45.4	27.9
25-Nov	70	61.4	54.6	39.7	27	83.3	65.3	42.5	26.2
2-Dec	68	59.7	53.6	38.9	28	79.8	64.9	42.3	24.5
9-Dec	68	59.4	48.9	35.4	24	71.4	63	34.9	21
16-Dec	62	57	46.7	34.2	19	64.4	57.3	33.7	19.6
23-Dec	63	56.8	45.9	32.6	16	71.4	61.1	31.5	17.8
31-Dec	61	54.7	44.7	31.7	18	65.1	60.4	29.5	17.1



Month	Mean Cooling Degree Days (°F) Base 50	Mean Cooling Degree Days (°F) Base 65	Mean Heating Degree Days (°F) Base 65
JAN	18	0.4	888.4
FEB	22.6	1.1	743.3
MAR	94.2	10.7	575.4
APR	250.4	44.8	285.4
MAY	503.7	137.5	101
JUN	754.5	316.7	12.3
JUL	920.7	456.3	0.5
AUG	862.4	399.3	1.9
SEP	625.9	209.9	34.2
OCT	309.9	50.3	228.1
NOV	102.7	6	481.3
DEC	24.8	0.9	776.5
ANN	4489.8	1633.9	4128.3

Average Ventilation and Infiltration Loads (Outside Air vs 75F, 60% RH summer; 68F, 30% RH winter)



■ Average Sensible Cooling Load ■ Average Sensible Heating Load
■ Average Latent Cooling (Drying) Load ■ Average Latent Heating (Humidifying) Load

Month	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	0	-25432	3	-5731
FEB	0	-21445	1	-4879
MAR	34	-17206	11	-3536
APR	210	-9313	172	-1158
MAY	844	-3919	1917	-123
JUN	2598	-667	6956	-1
JUL	4593	-67	11557	0
AUG	3522	-157	10336	0
SEP	1247	-1592	4968	-6
OCT	168	-7794	982	-382
NOV	3	-14719	92	-2053
DEC	0	-22522	6	-4472
ANN	13219	-124833	37001	-22341

Washington Headquarters Services Building Code

Average Annual Solar Radiation - Nearest Available Site
 Source: National Renewable Energy Laboratory, Golden CO, 1995

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	STERLING, VA 93738	Window:	1.000
Lat, Lon, Elev	38.95N 77.45W 269ft	Overhang:	0.504
Press, Stn Type	14.6psia Primary	Vert Gap:	0.315

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day) Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ.	Global	670	930	1250	1590	1820	1990	1910	1710	1410	1070	720	580	1310
	Std.Dev.	65	86	99	158	117	120	134	95	103	94	68	43	50
	Minimum	530	730	1060	1330	1630	1740	1600	1550	1260	900	580	490	1180
	Maximum	780	1070	1420	1940	2040	2200	2130	1880	1610	1260	850	650	1400
Clear Day	Diffuse	330	430	570	720	860	950	940	850	660	460	340	290	620
	Global	950	1290	1760	2220	2510	2600	2520	2250	1840	1370	980	820	1760
NORTH	Global	200	270	350	450	550	630	590	500	390	300	220	180	390
	Diffuse	200	270	350	440	510	560	540	480	390	300	220	180	370
Clear Day	Global	190	250	330	430	580	680	620	480	370	280	200	170	380
	EAST	Global	440	590	760	930	1020	1080	960	830	670	480	390	760
Clear Day	Diffuse	250	330	430	530	610	670	650	600	490	370	270	220	450
	Global	710	910	1140	1330	1420	1430	1390	1300	1140	920	720	630	1090
SOUTH	Global	1040	1130	1100	970	830	790	810	930	1060	1170	1040	950	990
	Diffuse	360	430	500	550	580	610	610	600	540	460	370	320	490
Clear Day	Global	1940	1980	1780	1390	1050	910	960	1210	1560	1800	1850	1850	1520
	WEST	Global	450	590	770	910	990	1050	1010	940	820	670	470	390
Clear Day	Diffuse	250	330	430	540	620	670	660	600	490	370	270	220	460
	Global	710	910	1140	1330	1420	1430	1390	1300	1140	920	720	630	1090

Average Annual Solar Radiation - Nearest Available Site
 Source: National Renewable Energy Laboratory, Golden CO, 1995

AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Unshaded	440	630	850	1140	1330	1440	1390	1240	1010	740	480	370	933
NORTH	Unshaded	140	190	240	300	370	410	390	340	270	210	150	130	360
	Shaded	130	170	220	270	330	370	350	300	240	190	130	110	330
EAST	Unshaded	300	420	540	660	720	770	730	680	590	470	330	260	540
	Shaded	270	370	470	570	620	660	630	580	520	410	300	240	470
SOUTH	Unshaded	780	830	760	630	520	490	500	600	730	840	780	720	680
	Shaded	760	770	610	420	360	370	370	400	530	740	750	700	560
WEST	Unshaded	310	420	540	650	700	740	720	670	580	470	320	270	530
	Shaded	280	370	480	560	600	640	610	570	500	420	290	240	470

AVERAGE INCIDENT ILLUMINANCE (foot-candle-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS Percentage Uncertainty = 9											
		March					June				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ	M.Clear	37	72	83	67	29	44	81	101	95	69
	M.Cloudy	22	44	51	41	18	29	57	74	71	49
NORTH	M.Clear	10	14	15	13	8	19	17	18	18	16
	M.Cloudy	9	15	17	14	7	14	18	20	20	16
EAST	M.Clear	73	59	15	13	8	71	73	35	18	16
	M.Cloudy	26	32	17	14	7	33	46	30	20	16
SOUTH	M.Clear	37	71	83	67	29	12	30	46	42	22
	M.Cloudy	16	37	43	33	13	11	25	37	34	19
WEST	M.Clear	10	14	20	66	68	12	17	18	50	75
	M.Cloudy	9	15	19	33	24	11	18	20	39	45
M.Clear	(% hrs)	33	29	30	32	24	40	38	33	29	33

		Sept					Dec				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ	M.Clear	25	64	84	78	48	13	40	47	30	3
	M.Cloudy	15	40	57	53	31	8	24	28	18	2
NORTH	M.Clear	8	15	17	16	13	5	10	11	8	2
	M.Cloudy	7	15	18	17	12	4	10	11	8	1
EAST	M.Clear	57	69	32	16	13	38	40	11	8	2
	M.Cloudy	19	35	25	17	12	11	18	11	8	1
SOUTH	M.Clear	18	54	73	67	38	34	77	87	63	8
	M.Cloudy	9	29	44	41	21	10	29	34	23	3
WEST	M.Clear	8	15	17	50	70	5	10	19	47	11
	M.Cloudy	7	15	18	33	33	4	10	13	18	3
M.Clear	(% hrs)	42	43	38	35	38	29	31	30	32	35

