

UNIFIED FACILITIES CRITERIA (UFC)

HOST NATION FACILITIES IN SUPPORT OF MILITARY OPERATIONS



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U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEER CENTER

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

Change No.	Date	Location



FOREWORD

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

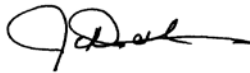
UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and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

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

- Whole Building Design Guide web site <http://dod.wbdg.org/>.

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

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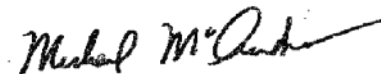
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**UNIFIED FACILITIES CRITERIA (UFC)
NEW DOCUMENT SUMMARY SHEET**

Document: UFC 1-202-01, **Host Nation Facilities in Support of Military Operations**
Superseding: None.

Description: This UFC provides life safety and habitability-related design requirements for facilities designed and constructed during military operations for Host Nation occupancy.

Reasons for Document: This UFC was developed to provide design requirements to accomplish the following:

- Provide architects, engineers, planners and construction surveillance personnel with the minimum requirements for the Life Safety and Habitability aspects of facilities constructed for Host Nation use associated with military operations.

Impact: The following will result from the publication of this UFC:

- There is currently no UFC for Host Nation facilities constructed as part of military operations.

Non-Unification Issues: None.

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CHAPTER 1 INTRODUCTION

1-1 PURPOSE.

This UFC provides life safety and habitability-related design requirements for all facilities designed and constructed for Host Nation personnel associated with military operations.

1-2 APPLICABILITY.

This UFC applies to all DoD components involved with planning, design and construction of all facilities built for Host Nation personnel use outside of the United States and its territories and possessions. Joint Publication JP 3-0, Joint Operations, provides typical examples of military operations where use of this UFC is appropriate. This UFC does not apply to temporary facilities or relief camps constructed in disaster relief efforts. This document must be used in conjunction with Status of Forces agreements (SOFA), bilateral agreements or other Host Nation (HN) agreements.

This criteria applies to the following:

- Buildings
- Utility distribution systems and infrastructure

1-3 AUTHORITY HAVING JURISDICTION.

The terms "Building Official" and "Authority Having Jurisdiction" (AHJ) as used in the codes and standards referenced in this UFC mean the Service office of responsibility, i.e., U.S. Army, HQ USACE/CECW-CE; U.S. Navy, NAVFACENGCOCOM HQ Code CHE; U.S. Marine Corps, HQMC Code LFF-1; and U.S. Air Force, HQ AFCEC/CL. The Service's Chief Engineer can delegate to their Technical Representative the enforcement of the codes and standards.

1-4 FACILITY DESIGN.

Designs must consider cultural and architectural norms for local facilities. Features should not be incorporated which cannot be supported by local infrastructure (power or water supplies). Also, components should not be utilized which cannot be maintained by local labor or supplies. The Designer of Record (DOR) should consider potential constraints in local trades and in testing and inspections capability, when selecting building systems and materials.

Facility designs must be performed by qualified personnel. Professional engineering resources are available through reachback capabilities within each branch of Service. See Appendix B for reachback Contacts for each branch of Service.

1-4.1 UFC Criteria.

UFC 1-200-01, General Building Requirements, does not apply. Only the referenced UFC requirements defined in this document for safety and habitability are mandatory. All other UFC requirements are considered guidance and best practices and can assist designers in identifying functional requirements of building systems and spaces.

1-4.2 International Building Codes.

Only the referenced International Building Code (IBC, IMC and IPC) requirements defined in this document are mandatory. The 2009 Editions of the International Building Codes (IBC, IMC and IPC) are the basis of the requirements in this UFC.

1-4.3 Alternative Materials.

Locally available materials may be utilized when deemed acceptable by the AHJ for the intent of protecting life safety and health of personnel.

1-4.4 Local and Regional Codes.

Established local or regional codes may be utilized when deemed acceptable by the AHJ for the intent of protecting life safety and health of personnel.

1-5 ACCESSIBILITY.

Use existing Host Nation standards for accessibility. If no Host Nation standards exist, integrate accessibility concepts into design based on occupancy and use of facility.

1-6 SPECIAL REQUIREMENTS.

For facilities that include children as occupants, such as child development centers and educational facilities, incorporate design features to insure child safety including access control, visual inspection, and separation of pedestrian and vehicular traffic. Refer to applicable facility type UFCs for requirements.

1-7 TESTS AND INSPECTIONS.

Establish and maintain an effective Construction Quality Management (CQM) system through the duration of construction to ensure that facilities constructed are safe and habitable. The CQM system must consist of two components: Quality Control (QC) and Quality Assurance (QA). QC personnel are responsible for work and safety planning, establishing and monitoring work quality and executing all specified inspections and testing. QA personnel are responsible for reviewing QC, inspection and testing reports, and workmanship for conformance with the specified requirements. QC and QA actions must be performed by separate individuals.

Quality Control and Quality Assurance personnel must be subject matter experts in one of the construction trades and have met Service or contract requirements. The

Designer of Record (DOR) should consider potential constraints in typical CQM Systems used in the contingency environment, when developing the design solution.

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CHAPTER 2 CRITERIA

This chapter presents requirements to ensure life safety and health protection for building occupants.

2-1 CIVIL/SITE.

Systems must comply with local regulations and, as a minimum, the World Health Organization (WHO) guidelines. The designer must understand local capabilities to support water and wastewater infrastructure, and must work with the local team to only include appropriate building features and support infrastructure. Systems may include wells, sanitary sewer systems, sewage holding tanks, septic systems, etc. The sub-sections below include some, but not all, resources for design of these systems.

2-1.1 Potable Water Supply and Treatment.

All drinking water facilities and systems must be designed and operated to ensure protection of human health and safety. Design resources for these systems include the following:

- World Health Organization (WHO) Guidelines for Drinking-water Quality
- ANSI/AWWA A100-06, Water Wells, for water well construction.
- TB MED 577/NAVMED P-5010-10/AFMAN 48-138_IP, Sanitary Control and Surveillance of Field Water Supplies, for water supply source selection and testing, and potable water treatment and disinfection.
- UFC 3-230-01, Water Storage, Distribution, and Transmission,
- NTRP 4-04.2.13/FM 3-34.469/AFMAN 32-1072, Water-Well Drilling Operations, for construction of wells for groundwater supplies.

2-1.2 Wastewater Systems.

All wastewater facilities and systems must be designed and operated to ensure protection of human health and safety. Design resources for these systems include the following:

- Afghanistan Engineer District (AED) Design Requirements: Sanitary Sewer & Septic Systems for design and construction requirements of sanitary sewer and septic systems.
- WHO Technical Notes on Drinking-Water, Sanitation and Hygiene in Emergencies

2-1.3 Stormwater.

Locate facilities and equipment away from areas subject to stormwater runoff and flooding

2-2 STRUCTURAL SYSTEMS.

Structural design must be in accordance with the International Building Code, Chapter 16, "Structural Design", Chapter 17, "Structural Tests and Special Inspections", Chapter 18, "Soils and Foundations", Chapter 19, "Concrete", Chapter 20, "Aluminum", Chapter 21, "Masonry", Chapter 22, "Steel", and Chapter 23, "Wood".

The use of ballasted systems for securing rooftop photovoltaic panels or other solar panels is prohibited. Panels must be connected directly to the building structure.

2-3 FIRE PROTECTION.

The intent of this document is to provide buildings constructed in accordance with the International Building Code (IBC) that are limited in size (height and floor area) to avoid the need to install active fire protection systems. Based on this design, these buildings will not require installed active fire protection or fire alarm systems, except where explicitly required by the IBC for a given occupancy regardless of the building size (i.e. Residential, Institutional, Hazardous occupancies).

2-3.1 Large Buildings.

If a need exists for a building that is larger or taller than the limits from Chapter 5, "General Building Heights and Areas", and Chapter 9, "Fire Protection Systems", of the 2009 IBC (as current IBC when this document was developed) on building size, then the following options are to be pursued in order of preference:

1. Small buildings constructed as modular buildings. Buildings must be connected in accordance with IBC requirements for pedestrian walkways to maintain each as separate buildings, so that active fire protection systems are not required.
2. Buildings subdivided by fire walls or exterior walls such that neither height nor floor areas of each independent building exceed the IBC size limitations, so that active fire protection systems are not required.
3. Provide large buildings with active fire protection and fire alarm systems as required by the IBC.

2-3.2 Fire Protection and Fire Alarm Systems.

For occupancies that require installed fire protection and/or fire alarm systems regardless of size (such as Residential or Institutional), provide installed fire protection as required by the IBC, or, subject to the approval of local building code authorities, must meet all of the following requirements:

1. Each living unit in a residential building must have a direct exit to the exterior of the building.

2. Fire rated walls (1 hour) must separate all living units of residential occupancies from one another.
3. Install multiple station smoke alarms in each room of each residential living unit.

If it is planned to provide sprinkler protection and infrastructure such as a water system does not exist, provide an on-site water supply. This should be practical by providing a pressure tank or storage tank and small pump to supply a sprinkler system designed in accordance with NFPA 13R requirements, for example.

2-3.3 Hazardous Material Storage Areas.

Spill containment and ventilation must be provided for any hazardous material storage areas in accordance with NFPA 30 and ACGIH Industrial Ventilation requirements and any local regulations.

2-4 PLUMBING AND MECHANICAL SYSTEMS.

2-4.1 Requirements for All Facilities.

Provide interior spaces intended for occupancy with ventilation by natural or mechanical means in accordance with the International Mechanical Code (IMC), Chapter 4, "Ventilation".

Recommend interior spaces intended for occupancy be provided with active or passive air-conditioning systems capable of maintaining the spaces between an ASHRAE effective maximum temperature of 93 degrees Fahrenheit (33.9 degrees Celsius), and effective minimum temperature of 60 degrees Fahrenheit (15.5 degrees Celsius) in order not to jeopardize the life safety and health of the occupants.

For engineering weather data, follow UFC 3-400-02, Design: Engineering Weather Data.

2-4.2 Requirements for Specific Systems.

The requirements listed below in the remainder of this section are additional life safety and habitability requirements that must be incorporated if these features are included in order to meet the functional requirements as requested by the local team.

2-4.2.1 HVAC Systems and Controls.

Follow IMC Chapter 3, "General Regulations".

2-4.2.2 Duct Systems.

Follow IMC Chapter 6, "Duct Systems".

2-4.2.3 Hydronic Systems.

Follow IMC Chapter 12, "Hydronic Piping".

2-4.2.4 Exhaust Systems.

Follow IMC Chapter 5, "Exhaust Systems".

2-4.2.5 Noise.

Noise levels must not exceed the permissible exposures of 29 CFR 1910.95, Table G-16.

2-4.2.6 Plumbing Systems - General Regulations.

Follow the International Plumbing Code (IPC), Chapter 3, General Regulations, with the following exceptions:

- Section 310.5, "Urinal Partitions": does not apply
- Section 313, "Equipment Efficiencies": does not apply
- Section 314.2.1, "Condensate Disposal": does not apply with the exception of the last sentence that does apply (i.e., "Condensate must not discharge into a street, alley, or other areas so as to cause a nuisance").
- Section 314.2.2, "Drain Pipe Materials and Sizes": does not apply; instead refer to IPC Table titled "Condensate Drain Sizing", for condensate drain sizing.
- Section 314.2.3, "Auxiliary and Secondary Drain Systems": does not apply

2-4.2.7 Plumbing Fixtures.

Follow the IPC, Chapter 4, Fixtures, Faucets, and Fixture Fittings, with the following exceptions:

- Section 405.3, "Setting": does not apply
- Section 405.4.1, "Floor Flanges": does not apply
- Section 405.4.3, "Securing Wall-hung Water Closet Bowls": does not apply
- Section 405.5, "Water-tight Joints": does not apply
- Section 405.6, "Plumbing in Mental Health Centers": does not apply
- Section 405.7.1, "Connection of Overflows": does not apply
- Section 405.8, "Slip Joint Connections": does not apply
- Section 405.9, "Design and Installation of Plumbing Fixtures": does not apply

2-4.2.8 Water Heaters.

Follow the IPC, Chapter 5, Water Heaters, with the following exceptions:

- Section 501.2, "Water Heater as a Space Heater": does not apply
- Section 502.3, "Water Heaters Installed in Attics": does not apply
- Section 503, "Connections": does not apply
- Section 505, "Insulation": does not apply

2-4.2.9 Water Supply and Distribution.

Follow the IPC Chapter 6, Water Supply and Distribution, with the following exceptions:

- Section 604.10, "Gridded and Parallel Water Distribution Systems": does not apply
- Section 604.11, "Individual Pressure Balancing In-line Valves for Individual Fixture Fittings": does not apply
- Section 608.8.3, "Size": does not apply

2-4.2.10 Sanitary Drainage.

Follow IPC, Chapter 7, "Sanitary Drainage".

2-4.2.11 Indirect/ Special Waste.

Follow IPC, Chapter 8, "Indirect/Special Waste".

2-4.2.12 Vents.

Follow IPC, Chapter 9, "Vents".

2-4.2.13 Traps, Interceptors, and Separators.

Follow IPC, Chapter 10, "Traps, Interceptors, and Separators", with the following exception:

- Trap seal primer valves not required.

2-4.2.14 Storm Drainage.

Follow IPC, Chapter 11, "Storm Drainage".

2-4.2.15 Special Piping and Storage Systems.

Follow IPC Section 1202, "Medical Gases".

2-4.2.16 Gray Water Recycling Systems.

Follow IPC, Appendix C, “Gray Water Recycling Systems”, Sections C101, “General” and C102, “Systems for Flushing Water Closets and Urinals”.

2-4.2.17 Emergency Shower and Eyewash Stations.

Follow IPC Section 411, “Emergency Showers and Eyewash Stations”.

2-4.2.18 Structural Safety.

Follow IPC, Appendix F, “Structural Safety”.

2-4.2.19 Compressed Air Systems.

Follow Compressed Air and Gas Institute’s Compressed Air and Gas Handbook and the ASME Boiler and Pressure Vessel Codes.

2-4.2.20 Boilers, Water Heaters and Pressure Vessels.

Follow IMC Chapter 10, titled “Boilers, Water Heaters, and Pressure Vessels”.

2-4.2.21 Solar Preheat Systems.

Follow IPC Section 612, “Solar Systems”.

2-4.2.22 Solar Heating.

Follow IPC Section 612, “Solar Systems”.

2-4.2.23 Fuel Oil Piping and Storage.

Follow requirements in IMC Chapter 13, “Fuel Oil Piping and Storage”, for fuel storage and piping supporting building systems.

2-4.2.24 Refrigeration.

Follow requirements in IMC Chapter 11, “Refrigeration” for facilities that are provided with refrigerant systems.

2-5 ELECTRICAL SYSTEMS.

Comply with NFPA 70 and NFPA 780 for 60 Hz systems. Comply with BS 7671 for 50 Hz systems.

2-5.1 Short Circuit Analysis.

Calculations are required for short circuit analysis.

2-5.2 Lightning Protection.

Comply with NFPA 780, Standard for the Installation of Lightning Protection Systems, for lightning protection risk assessment. Calculations are required for lightning protection analysis.

2-5.3 Configuration for Pad-mounted Distribution Transformers, Switchgears, and Sectionalizing Termination Cabinets.

Use dead-front construction for pad-mounted distribution transformers, switchgears, and sectionalizing termination cabinets unless not available within system parameters.

In rare cases when “live-front construction” is required due to equipment ratings (available system fault current values), obtain approval from the authority having jurisdiction.

2-5.4 Emergency and Standby Power Systems.

Comply with IBC, Chapter 27, “Electrical”, Section 2702. Compliance with the following subsections is not required:

- Subsection 2702.2.8, “Semiconductor Fabrication Facilities”
- Subsection 2702.2.9, “Membrane Structures”
- Subsection 2702.2.14, “Covered Mall Buildings”
- Subsection 2402.2.18, “Airport Traffic Control Towers”

2-5.5 Underground Distribution General Criteria – Cable Identification in Manholes.

Tag all underground cables in all accessible locations such as in manholes, transformers, switches and switchgear. Install a detectable locator tape above all buried underground circuits. Marking must meet the local utility standards.

2-6 TELECOMMUNICATIONS SYSTEMS.

2-6.1 Distribution System Grounding.

Refer to the section entitled, “Electrical Systems” in Chapter 2.

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APPENDIX A REFERENCES

American Conference of Governmental Industrial Hygienists, Inc.
<http://www.acgih.org>

ACGIH Industrial Ventilation: A Manual of Recommended Practice

AMERICAN SOCIETY OF MECHANICAL ENGINEERS
<http://www.asme.org>

ASME Boiler and Pressure Vessel Codes

AMERICAN WATER WORKS ASSOCIATION
<http://www.awwa.org>

ANSI/AWWA A100-06, Water Wells

BRITISH STANDARDS INSTITUTION
<http://shop.bsigroup.com/>

BS 7671, Requirements for Electrical Installations

COMPRESSED AIR & GAS INSTITUTE
<http://www.cagi.org>

CAGI Compressed Air and Gas Handbook

DEPARTMENT OF THE ARMY

AED Design Requirements: Sanitary Sewer & Septic Systems,
<http://www.aed.usace.army.mil/contracting/AED-Design.pdf>

DEPARTMENT OF DEFENSE
<http://dod.wbdg.org/>

Joint Publication 3-0, *Joint Operations*, http://www.fas.org/irp/doddir/dod/jp3_0.pdf

NTRP 4-04.2.13/FM 3-34.469/AFMAN 32-1072, *Water-Well Drilling Operations*

TB MED 577/NAVMED P-5010-10/AFMAN 48-138_IP, *Sanitary Control and Surveillance of Field Water Supplies*,
http://armypubs.army.mil/med/DR_pubs/dr_a/pdf/tbmed577.pdf

UFC 3-230-01, *Water Storage, Distribution, and Transmission*

UFC 3-400-02, *Design: Engineering Weather Data*

INTERNATIONAL CODE COUNCIL

<http://www.iccsafe.org/Pages/default.aspx>

International Building Code (IBC), 2009 Edition

International Mechanical Code (IMC), 2009 Edition

International Plumbing Code (IPC), 2009 Edition

NATIONAL FIRE PROTECTION ASSOCIATION

<http://www.nfpa.org>

NFPA13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*

NFPA 30, *Flammable and Combustible Liquids Code*

NFPA 70, *National Electrical Code*

NFPA 780, *Standard for the Installation of Lightning Protection Systems*

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

29 CFR 1910.95, Occupational Noise Exposure,

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9735

WORLD HEALTH ORGANIZATION

Guidelines for Drinking- Water Quality, Fourth Edition,

http://whqlibdoc.who.int/publications/2011/9789241548151_eng.pdf

Technical Notes on Drinking-Water, Sanitation and Hygiene in Emergencies,

http://www.who.int/water_sanitation_health/hygiene/envsan/technotes/en/

APPENDIX B OTHER RESOURCES

SERVICE REACHBACK CONTACTS:

Army:

USACE Reachback Operations Center (UROC);
Email: UROC@usace.army.mil or UROC@usace.army.smil.mil
NIPR website: <https://uroc.usace.army.mil>;
SIPR website: <http://uroc.usace.army.smil.mil>

Navy/Marine Corps:

NAVFAC Pacific (PACOM AOR)
<https://portal.navfac.navy.mil/portal/page/portal/navfacpac/ce>

NAVFAC Atlantic (All other AORs)
NFCEL_CE_Reachback@navy.mil
757-322-8302

Air Force:

AFCEC Reachback Center
Email: AFCEC.RBC@tyndall.af.mil
Phone: DSN 312.523.6995, Comm 850.283.6995

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APPENDIX C ABBREVIATIONS AND ACRONYMS

A

ACGIH	American Conference of Governmental Industrial Hygienists
AED	Afghanistan Engineer District
AFCEC	Air Force Civil Engineer Center
AHJ	Authority Having Jurisdiction
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association

B

BIA	Bilateral Infrastructure Agreements
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C

C	Degrees Celsius
CCR	Criteria Change Request
CFR	Code of Federal Regulations
CQM	Construction Quality Management

D

deg	Degrees
DoD	Department of Defense
DOR	Designer of Record

F

F	Degrees Fahrenheit
FM	Field Manual

H

HN	Host Nation
HNFA	Host Nation Funded Construction Agreements
UQSACE	Headquarters, United States Army Corps of Engineers
HVAC	Heating, ventilation, and air conditioning

I

IBC	International Building Code
IMC	International Mechanical Code
IPC	International Plumbing Code

J

JP Joint Publication

N

NAVFAC Naval Facilities Engineering Command
NFPA National Fire Protection Association

Q

QA Quality Assurance
QC Quality Control

S

SOFA Status of Forces Agreement

U

UFC Unified Facilities Criteria
USACE United States Army Corps of Engineers

W

WHO World Health Organization