UFC 4-010-01, DoD Minimum Standards for Buildings

NAVFAC Far East
Presented by: Richard Cofer, P.E.
John Lynch, P.E.
Naval Facilities Engineering Command Atlantic
Capital Improvements Business Line
Engineering Criteria and Programs

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Background – Terrorist Attacks

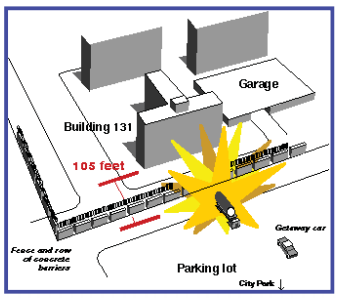
- 1983 –USMC BARRACKS IN BERUIT, LEBANON
- 1993 – WORLD TRADE CENTER GARAGE, NEW YORK
- 1995 –ALFRED P. MURRAH BLDG, OKLAHOMA CITY
- 1996 –KOHBAR TOWERS, SAUDI ARABIA
- 1998 –US EMBASSIES DAR ES SALAAM, TANZANIA AND NAIROBI, KENYA
- 2001 -WORLD TRADE CENTER ATTACKS, NEW YORK
- 2001 – PENTAGON ATTACK, ARLINGTON, VA

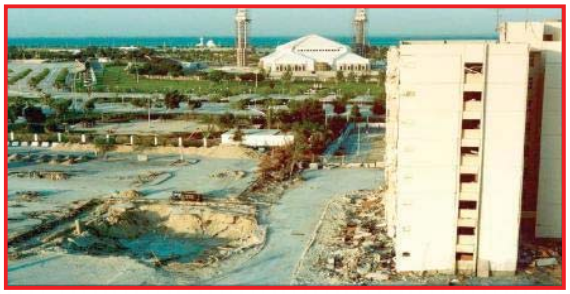
The Khobar Towers, and the Embassy bombings in Africa were the impetus behind the development of the DoD Minimum AT Standards.

Background - KHOBAR TOWERS

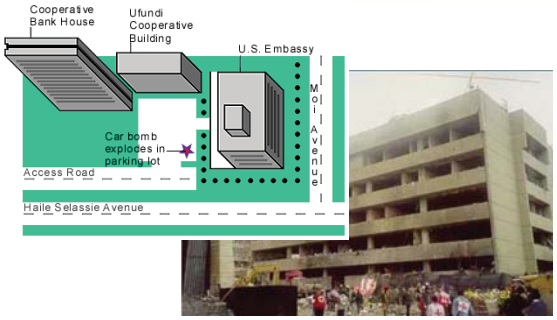
- Khobar Towers housed approximately 3,000 Air Force and Army personnel.
  - Built to the construction standards that including progressive collapse prevention.
  - Did not include laminated glass
- Explosive weight of 20,000 lbs
- Detonated 105 feet from the face of the building
- 19 casualties

While the Khobar Towers were not designed to withstand the blast effects of a bomb of this magnitude, the building did not collapse; and therefore, the design and construction of the building minimized mass casualties.





US EMBASSIES DAR ES SALAAM, TANZANIA AND NAIROBI, KENYA



Nairobi, Kenya

- **224 killed (12 Americans)**
- **4000 injured**
- **Adjacent building collapsed**
- **Built to DOS Foreign Building Operations Criteria**

Dar es Salaam, Tanzania

- **10 killed (No Americans)**
- **74 injured**
- **Built to Israeli Construction Criteria – Former Israeli Embassy**

12 Americans, 40 Kenyan and Tanzanian US Embassy employees were killed.

Background of DoD AT Standards What Drives the Requirements?

Title 10 U.S. Code, Sections 2859. Construction requirements related to ATFP

- **Antiterrorism and Force Protection Guidance and Criteria - The Secretary of Defense shall develop common guidance and criteria to be used by each Secretary concerned.**

Joint Publication 3-07.2 (CJCS), ANTITERRORISM (FOUO)

- **Directors of other DOD agencies and field activities, OSD, principal staff assistants, and those that report directly to the Secretary or Deputy Secretary of Defense, shall Ensure AT protective features for facilities and installations include in project planning, design, and construction.**

DoDI 2000.12 DoD ANTITERRORISM (AT) PROGRAM

- **Include AT protective features for facilities and installations in the planning, design, and execution of minor and military construction projects and leases to mitigate AT vulnerabilities and terrorist threats.**

DoDI O-2000.16 DoD ANTITERRORISM (AT) PROGRAM IMPLEMENTATION:

- **Pursuant to DoDD 5134.01 and in coordination with the USD(P), USD(I), and the Secretaries of the Military Departments, the Under Secretary of Defense for Acquisition, Technology, and Logistics develops antiterrorism protection standards in DoD Unified Facilities Criteria (UFC) for buildings on defense installations.**

Background of DoD AT Standards
What Drives the Requirements?

Title 10 U.S. Code, Sections 2859. Construction requirements related to antiterrorism and force protection:

- **Antiterrorism and Force Protection Guidance and Criteria.— The Secretary of Defense shall develop common guidance and criteria to be used by each Secretary concerned:**
  - **to assess the vulnerability of military installations located inside and outside of the United States to terrorist attack;**
  - **to develop construction standards that, taking into consideration other security or force-protection measures available for the facility or military installation concerned, are designed to reduce the vulnerability of structures to terrorist attack and improve the security of the occupants of such structures;**
  - **to prepare and carry out military construction projects, such as gate and fence line construction, to improve the physical security of military installations; and**
  - **to assist in prioritizing such projects within the military construction budget of each of the armed forces.**

Background of DoD AT Standards
What Drives the Requirements?

Joint Publication 3-07.2, *Antiterrorism (FOUO)*

- **Directors of other DOD agencies and field activities, OSD, principal staff assistants, and those that report directly to the Secretary or Deputy Secretary of Defense, shall ensure AT protective features for facilities and installations are included in the planning, design, and execution of military and minor construction projects to mitigate vulnerabilities and terrorist threats (Unified Facilities Criteria [UFC] 4-010-01, DOD Minimum Antiterrorism Standards for Buildings)**

- **Functional combatant commanders shall establish AT policies and programs for assigned DoD elements**

Background of DoD AT Standards
What Drives the Requirements?

DoDI 2000.12 *DoD Antiterrorism (AT) Program*

17. HEADS OF THE DoD COMPONENTS. The Heads of the DoD Components shall:

i. Include AT protective features for facilities and installations in the planning, design, and execution of minor and military construction projects and leases to mitigate AT vulnerabilities and terrorist threats (as described in Reference (ax) and DoDD 5100.01 (Reference (ay))).

REFERENCES:

- **(ax) Unified Facilities Criteria 4-020-01, DoD Security Engineering Facilities Planning Manual**
- **(ay) DoDD 5100.01, Functions of the DoD and its Major Components**

Background of DoD AT Standards
What Drives the Requirements?

DoDI 2000.16, *Volume 1 DoD AT Program Implementation: DoD AT Standards*

AT Standard 17: AT Construction and Building Considerations.

The USD(AT&L), in coordination with the USD(P), USD(I) and Secretaries of the Military Departments will establish AT protection standards in UFC 4-020-01, and other UFC documents as necessary, for buildings on defense installations.

DoD Component heads will

- **Establish DBT Standards – baseline protective measures**
- **Ensure appropriate installation personnel participate**

Background of DoD AT Standards
What Drives the Requirements?

SECNAVINST 3300.2C: Department Of The Navy (DoN) Antiterrorism (AT) Program

- **Implements DoDI 2000.12/2000.16 by providing guidance and information to reduce the vulnerability of DON military and civilian! personnel, family members, select contractors, resources, facilities, and ships to terrorist acts.**

OPNAVINST 3300.53C: Navy Antiterrorism Program

- **CNO N4 shall Ensure that all new construction projects meet or exceed minimum construction standards in UFC to mitigate possibility of a terrorist attack, and to lessen the effects of a terrorist attack should one occur.**

OPNAVINST 5530.14E: Navy Physical Security and Law Enforcement

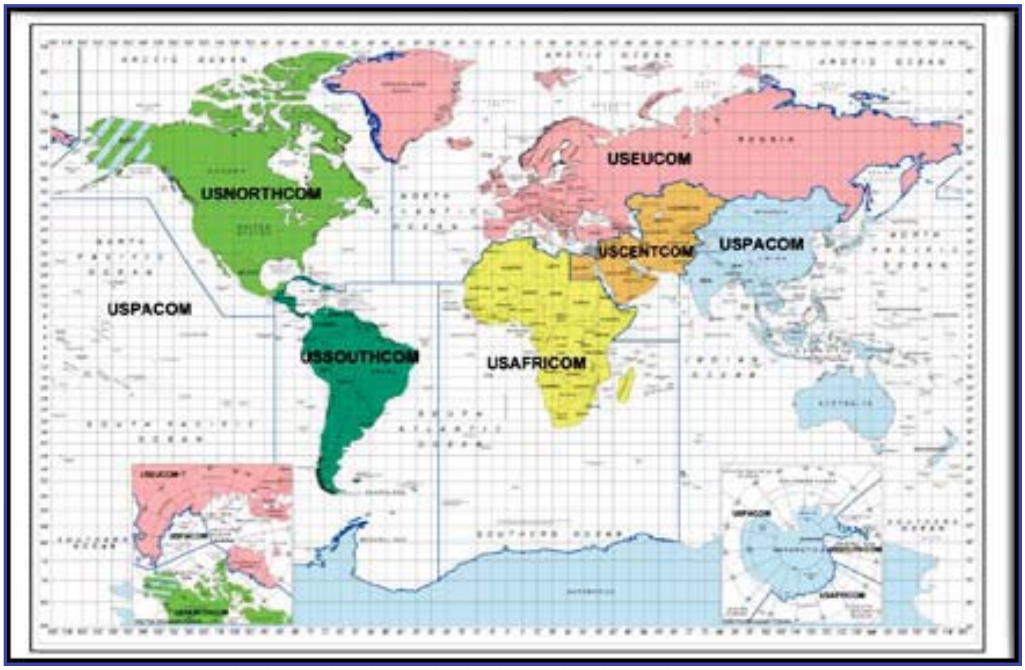
- **New Construction and Facility Modifications. All new construction' shall comply with the requirements of this manual and approved Unified Facilities Criteria (UFC).**

Background of DoD AT Standards
What Drives the Requirements?

Paragraph 1-8 Regulatory Authorities

- **DoD and Heads of DoD Components:**
  - **May establish additional guidance or standards**
  - **Special Circumstances**
- **Geographic Combatant Commanders:**
  - **May establish additional guidance or standards**
  - **Antiterrorism OPORDs**
- **Installation Specific Requirements:**
  - **Installation Antiterrorism Plan**
  - **Installation Design Basis Threat (UFC 4-020-01)**

Geographic Combatant Commands



Geographic Combatant Commands

More Stringent

- Central Command (USCENTCOM)
- European Command (USEUCOM)
- Africa Command (USAFRICOM)

Not More Stringent

- Northern Command (USNORTHCOM)
- Pacific Command (USPACOM)
- Southern Command (USSOUTHCOM)

ANTICIPATE CHANGES BASED ON THE REVISED UFC 4-010-01

Ownership
DoD Security Engineering Working Group - SEWG

UFC 4-010-01 falls under the SEWG. The SEWG is Chaired by the NAVFAC ATLANTIC - Engineering and Criteria Programs. Members:

- **U.S. Army**
  - USACE Protective Design Center
  - Headquarters, Corps of Engineers (USACE)
- **U.S. Navy**
  - NAVFAC ATLANTIC - Engineering and Criteria Programs - ATFP
- **Headquarters U.S. Marine Corps**
- **U.S. Air Force**
  - Civil Engineer Center (AFCEC)
- **Other Defense Agencies (NEXCOM, NPC, DECA, DTRA, DDESB, TRICARE Health DoD….)**

UFC 4-010-01, DoD Minimum AT Standards for Buildings - Timeline

1999) Interim Department of Defense Antiterrorism/Force Protection Construction Standards issued 16 December 1999 by Under Secretary of Defense A&T Memorandum (FOUO).

2002) Standards updated and converted to UFC 4-010-01 and issued by Under Secretary of Defense AT&L Memorandum on 20 September 2002.

2003) Standards updated 8 October 2003.

2007) Standards updated with change 1 dated 22 January 2007.

2008) UFC 4-020-01, DoD Security Engineering Facilities Planning Manual Published.

2012) Standards Revised 9 February 2012. Major changes include:
- Change in approach to conventional construction standoff distance
- Reduce minimum standoff distance
- Major changes to window design
- Eliminated minimum window construction requirements

2013) Standards updated with change 1 dated 1 October 2013.
- Removed all requirements for leased buildings and required all DoD leased buildings off DoD installations to comply with standards established by the Department of Homeland Security's Interagency Security Committee in The Risk Management Process for Federal Facilities.

2013) SEWG proposed drastic changes to the Standards-eliminating standoff distances.

2015) SEWG met with OSD and others to discuss direction of Security Engineering Planning Manual and Standards.

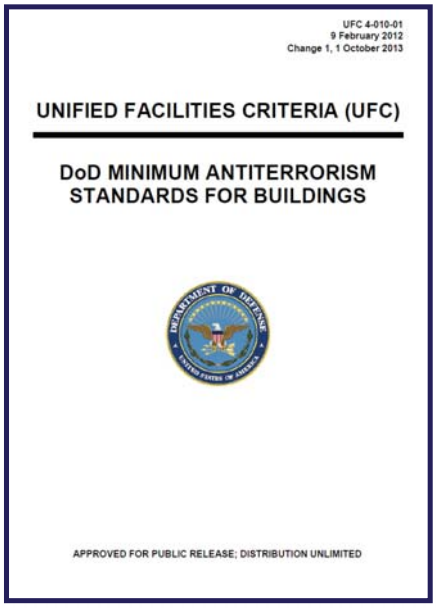
2017) SEWG given direction from CP and ESEP in developing major changes to the Standards.

2018) CNO releases NAVADMIN 026/18 (NAVFAC ITG 2018-02) relaxing some of the major Standards.

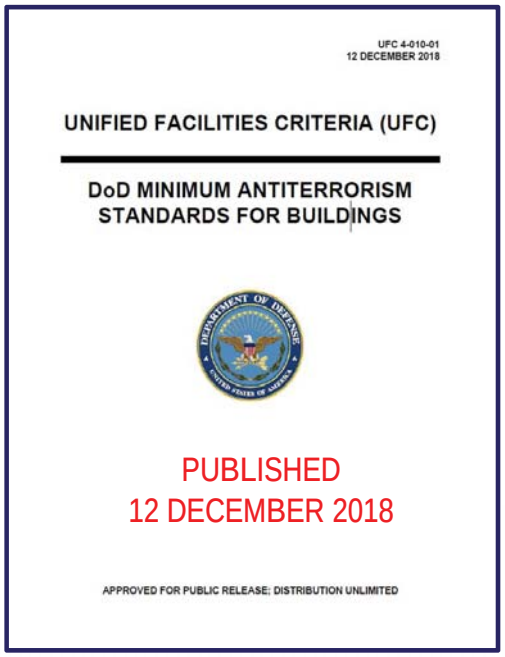
2018) SEWG published UFC 4-010-01 on 12 December, implementing the OSD, CP, and ESEP direction in eliminating threat which modified standoff distances, minimum requirements for windows and doors and effected or eliminated the other remaining standards.

UFC 4-010-01, DoD Minimum AT Standards for Buildings – Previous Version 2012/2013

- Sets minimum Design Basis Threat for DoD buildings
- Sets minimum Level of Protection to protect personnel
- Sets minimum protective measures to be incorporated into DoD buildings to protect DoD personnel
- UFC 4-020-01 (DoD Security Engineering Facilities Planning Manual) used to justify protective measures above minimum standards



UFC 4-010-01, DoD Minimum AT Standards for Buildings – Current Version of 12 December 2018



- **Establishes the minimum engineering standards that incorporate antiterrorism (AT) based mitigating measures to be incorporated into inhabited DoD buildings**
- **UFC 4-020-01 (DoD Security Engineering Facilities Planning Manual) used to justify protective measures above minimum standards**
- ***UFC 4-010-02, DoD Minimum Antiterrorism Standoff Distances for Buildings* is cancelled.**

UFC 4-010-01, DoD Minimum AT Standards for Buildings – 2018 Revision

REASON FOR CHANGES

- Remove the Design Basis Threat
- Remove the minimum Level of Protection

RATIONAL:

- The DoD could no longer afford to provide the level of protection as defined by previous DoD Minimum Antiterrorism Standards
- The DoD does not provide hardened construction and Electronic Security Systems to mitigate the forced entry threat for all buildings.
  - Engineering Community: Baseline mitigation for all facilities:
    - Locks on doors and latches on windows.
- Security Community: Enhanced mitigation for specific assets (ex: SCI, SAP, Classified Information, and AA&E):
  - Hardened doors, windows and man passible openings.
  - Standard, enhanced and vault construction.
  - Electronic Security Systems.

IMPACT

- Reduce costs
- Reduce in setback/standoff requirements reducing DoD land use

Content of Current Standard

Chapter 1: Introduction

- ❑ Background
- ❑ Intent/Implementation
- ❑ Applicability
- ❑ Exemptions
- ❑ Occupancy Calculation
- ❑ Regulatory Authorities
- ❑ Historic Preservation

Chapter 2: Philosophy, Design Strategies, and Assumptions

Chapter 3: Standards

Chapter 4: Standards for Expeditionary Structures

Appendix A: Recommended Antiterrorism Measures for New and Existing Buildings

Appendix B: Best Practices

Appendix C: Representative Standoff Distances for Conventional Construction and Expeditionary Structures

Appendix D: Glossary

Appendix E: References

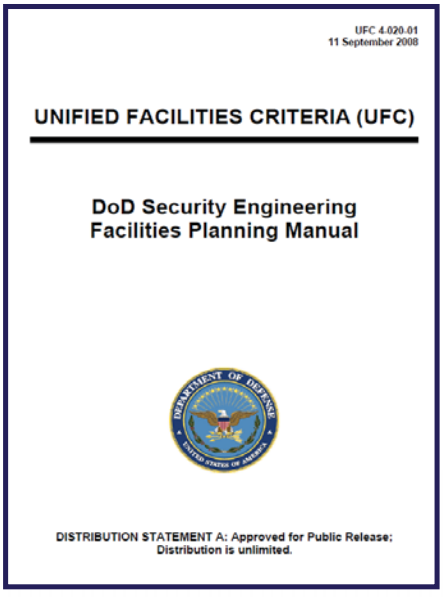
Implementation (1-4)

Implement in accordance with the Implementation, Administration, and Enforcement paragraph in **UFC 1-200-01, *DoD Building Code (General Building Requirements)***.

- Apply to projects funded under host-nation agreements after the implementation date of these standards or as soon as negotiations with the foreign governments can be completed.
- Due to major changes between these standards and previous editions, projects currently under design and beyond 35% completion may consider complying with these standards where possible.

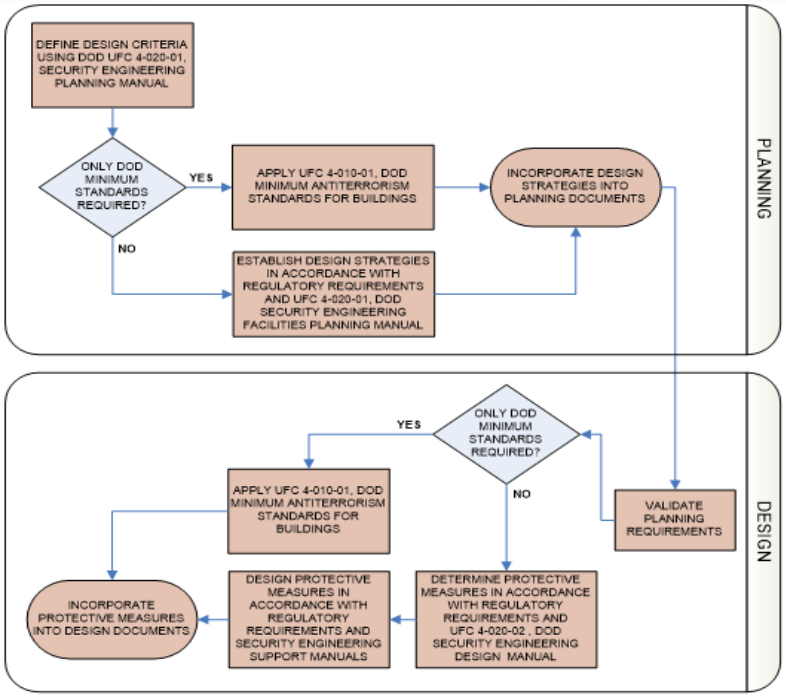
UFC 4-020-01, DoD Security Engineering Facilities Planning Manual

- **Provides a unified planning approach for security and antiterrorism protective measures.**
- **Does not include the protection measures for assets covered by regulatory or policy documents.**
  - **Arms, Ammunition & Explosives (AA&E)**
  - **Classified Information**
  - **Nuclear**
  - **Chemical**



Security Engineering UFC Application

Figure 1-1 in UFC 4-010-01

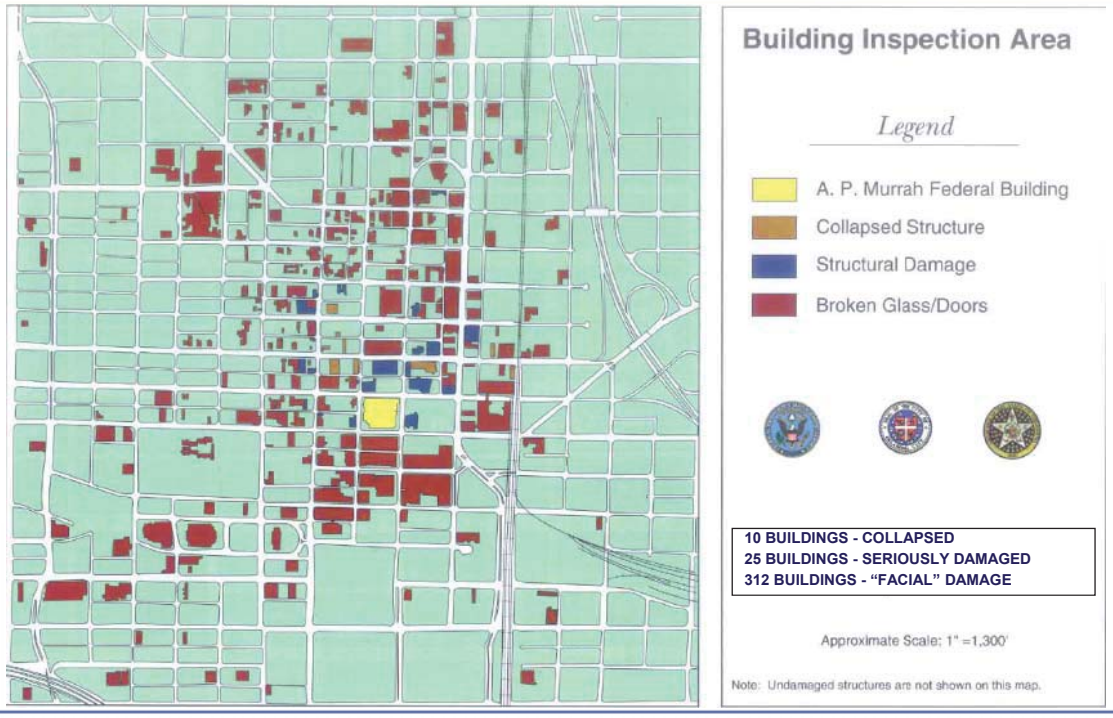


Intent of Standards (1-3)

- **Protect DoD Personnel, not mission:**
  - **Provides minimum engineering standards to mitigate terrorist threats.**
  - **Minimize collateral damage and the severity of mass casualties in the event of a terrorist attack.**
  - **Provide cost effective, implementable, and enforceable construction standards to protect personnel against terrorist attacks.**
- **Complete protection against all potential threats for every inhabited building is cost prohibitive, the intent can be achieved:**
  - **Prudent Master Planning**
  - **Real Estate Acquisition**
  - **Design and Construction Practices**

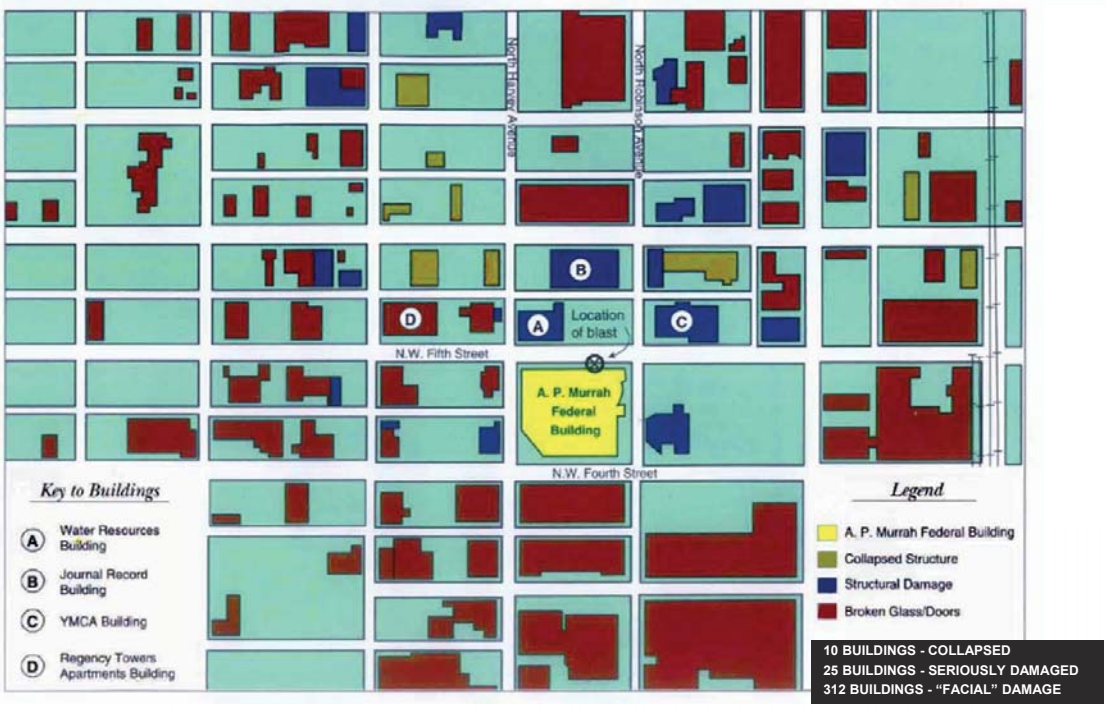
Collateral Damage – Oklahoma City Bombing

Location of Murrah Building and Other Damaged Structures



Collateral Damage – Oklahoma City Bombing

Immediate Vicinity of Murrah Building



DoD Philosophy

- **DoD decision makers must commit to making smarter investments with the scarce resources available.**
  - **The majority of facilities will be designed and constructed to include only the minimum engineering standards.**
  - **Stakeholders must determine on a project by project basis what facilities may require more protection.**
    - Buildings that must remain mission operational during periods of national crisis and may be subjected to terrorist attack may warrant design to higher levels of protection than those provided by these standards. Ensure detailed risk and threat assessments are executed using UFC 4-020-01 for buildings containing critical assets to:
      - Establish Design Basis Threat
      - Establish Level of Protection
      - Establish Associated Protection Measures
  - **These facilities may be:**
    - Command Headquarters
    - Communication Centers

UFC 4-010-01, DoD Minimum AT Standards for Buildings – Building Occupancy

- **Two Basic Occupancy Categories of Facilities:**
  - **Low Occupancy**
  - **Inhabited Structures**

Categories of Facilities

Low Occupancy Building:

- **Any building or portion of a building routinely occupied by fewer than 11 DoD personnel or with a population density of less than one person per 430 gross square feet (40 gross square meters) are exempt from all provisions of these standards.**

Categories of Facilities

Inhabited Structures:

- **Buildings or portions of buildings routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 40 gross square meters (430 square feet.)**
  - **Generally excludes industrial, maintenance and storage facilities, except more densely populated portions such as administrative areas.**
  - **Does not typically include guard type facilities.**
  - **Does not currently include Family Housing Facilities with less than 13 units.**
  - **In a building that meets the criterion of having 11 or more personnel with low occupancy portions that do not have sufficient population densities to qualify as inhabited buildings, those portions that have sufficient population densities will be considered inhabited buildings while the remainder of the building may be considered low occupancy (Aircraft Hangar).**

ROUTINELY OCCUPIED:

For the purposes of these standards, an established or predictable pattern of activity within a building that terrorists could recognize and exploit.

DoD Personnel

- Any U.S. military
- DoD civilian
- Family member of military or DoD civilian
- Host-nation employees working for DoD
- Contractors occupying DoD buildings
- *Non-DoD visitors to DoD owned or controlled visitor centers, visitor control centers, museums, etc.*

Categories of Facilities

Paragraph 1-7 Occupancy Calculation

The starting point for applying the Standards is based on buildings or portions of buildings being routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 430 gross square feet (40 gross square meters). UFC provides examples for:

- Gas stations and Car care centers
  - Employees
  - DoD and non DoD Visitors
- Visitor Centers and Museums
  - Employees
  - DoD and non DoD Visitors
- Visitor Control Center at ECP/ACP
  - DoD Personnel
  - Daily Peak Occupancy Non DoD Visitors

Applicability (1-5)

- **New construction –** Mandatory for all inhabited buildings regardless of funding sources.
- **Existing Buildings** – Four triggers: Major Investment, Conversion of Use, Glazing Replacement, and Building Additions. ***No trigger = no requirement***.
- **Building Additions -** Inhabited additions to existing buildings must comply with the minimum standards for new buildings. If the addition is 50% or more of the gross area of the existing building, the existing building will comply with the minimum standards for existing buildings.
- **Leased Buildings –** In accordance with Deputy Secretary of Defense Memorandum dated 7 December 2012, the security standards established by the Department of Homeland Security's Interagency Security Committee (ISC) in *The Risk Management Process for Federal Facilities* must apply to all off-installation leased space managed by DoD and all DoD occupied spaced in buildings owned or operated by the U.S. General Services Administration (GSA). US and Foreign Countries.
- **Privatized Buildings –** Privatized (PPV) inhabited buildings and high occupancy family housing.
- **DoD Purchases of Existing Buildings -** occupancy by DoD personnel.
- **Non-DoD Tenant Buildings on DoD Installations -** occupancies for non-DoD tenant-built building will be calculated assuming that building occupants are DoD personnel.
- **National Guard –** using Federal funding for new construction, renovations, repairs, mods, or leasing meeting applicability requirements.
- **Expeditionary Structures –** See Chapter 4 of UFC 4-010-01.

"Triggers" for Existing Structures (1-5.2)

- **Major investments:** Costs for renovation, modification, repair, or restoration exceed 50% of replacement value IAW UFC 3-701-01 (Chapter 3).
  - Cost is exclusive of costs identified to meet the standards
  - Where 50% threshold is not met, compliance is recommended
- **Change of Occupancy Level:** When any portion of a building is modified from low occupancy to inhabited occupancy.
  - Example: Warehouse (low occupancy) converted to administrative building (inhabited) use
- **Glazing and Door replacement:** Glazing and Door provisions are mandatory for existing inhabited buildings with any planned window, skylight glazing, glazing or door replacement project – including supplemental windows behind (inside face) existing windows and windows in new openings. **(Standard 10 and 12 only)**
- **Heating, Ventilating, and Air Conditioning (HVAC) Systems and Associated Controls:** Whenever HVAC systems featuring outside air intakes or control systems associated with HVAC systems including outside air intakes are being replaced or modified to include but not limited to AHU replacement/damper replacement/ductwork reconfig/control system replacement and/or reprogramming. **(Standards 16 and 18 only)**
- **Building additions:** If addition is 50% or more of the gross area of the existing building the existing building must meet all Standards and be considered as new construction.

Exemptions – Full and Partial (1-6)

Exempt From ALL Provisions	Exempt From Unobstructed Space
• Low Occupancy Buildings	Stand-alone franchised food operations
• Low Occupancy Family housing with 12 units or fewer per building • Parking Structures	Small stand-alone commercial facilities – including bank and pharmacy facilities
• Fisher Houses with 24 units or fewer	Stand-alone Shoppettes, Mini Marts and similarly sized commissaries – those with area of less than 15000 SF
• Town Centers – mixed use w/retail, health, community services	
• Enhanced Use Leases – does not apply to Bldgs. owned or leased by DoD in those areas • Transitional Structures	ALL OTHER STANDARDS APPLY
• Temporary and Relocatable Bldgs. • Construction Administration Structures • Parking Structures • Military Protective Construction	

DoD Philosophy (2-2)

- **DoD committed to making smarter investments in buildings that DoD personnel will occupy for decades.**
- **Two key elements that influence implementation**
  - **Time:**
    - ✓ Must be in place at time of attack.
    - ✓ Least expensive time for application is in construction / major renovation.
  - **Design Practice:** Concepts to be incorporated into standard design practice to build a baseline level of resistance to terrorist attack into all DoD inhabited buildings.
    - ✓ These standards are NOT based on an identified threat or level of protection, they are engineering solutions intended to provide the easiest and most economical methods to minimize injuries and fatalities in the event of a terrorist attack.

Design Strategies (2-3)

- **Prevent Building Collapse**
  - Progressive collapse prevention to minimize mass casualties in buildings three stories or more in height.
- **Minimize Hazardous Flying Debris**
  - Use of laminated glazing systems that eliminates glass shards – dagger like fragments.
  - Special detailing for walls and 'hanging' architectural, mechanical and electrical equipment (non-structural features).
- **Provide Effective Building Layout**
  - Reduce targeting through building entrance layout
  - Provide unobstructed space around facility
  - Control access to roof and under building
  - Locate mailrooms on perimeter of building
- **Limit Airborne Contamination**
  - Provide emergency HVAC shutoff capability
  - Elevate air intakes
  - Provide separate ventilation for mailrooms
- **Provide Mass Notification Capability**
  - Require inhabited buildings to have capability to provide real-time information to building occupants in the immediate vicinity of the building during emergency situations.

Assumptions (2-4)

- **Baseline Antiterrorism Protective Measures**
  - These standards provide a reasonable baseline of antiterrorism protective measures for inhabited DoD buildings and inhabited tenant buildings on DoD installations.
  - Designing to these standards will provide general collateral protection and will establish a foundation upon which to build additional measures where justified by higher threats or when the threat environment increases in the future.
- **External Explosive Threats**
  - These minimum standards are not based on a specific Design Basis Threat.
  - These minimum standards provide collateral damage protection for threats directed against other nearby facilities.
- **Policies and Procedures – are in place to support these standards**
- **Training – Assumption that all DoD personnel are trained in basic antiterrorism awareness IAW DoD I O-2000.16**

Historic Preservation (1-12)

- Historic properties on military land are protected with other facilities from terrorism where there is a perceived threat to people and critical resources
- Implementing AT policy does not supersede DoD's obligation to comply with National Historic Preservation Act regarding cultural resources
- Conversely, historic preservation compliance does not negate the requirement to implement DoD AT policy
- Preservation issues should be solved quickly. Consult with SHPO wrt processes established by Section 106 process of the National Historic Preservation Act
- CONUS - Determine possible adverse effects and how they can be avoided, minimized and/or mitigated
- OCONUS - Coordinate with legal counselors and host nation counterparts to determine appropriate measures

Civil Engineering Magazine: October 2012

BLAST PROTECTION AND HISTORIC PRESERVATION

Efforts to protect structures of historical importance from the effects of blasts often result in the loss of some portion of what makes the structures significant. But blast mitigation does not have to be at odds with historic preservation, particularly if designers thoroughly understand the structural conditions of facades, account for their inherent abilities to resist blasts, and use appropriate methodologies for analyzing structures in response to blasts.

By Timothy Beach, P.E., M.ASCE, and Peggy Van Eepoel, P.E., M.ASCE

CHAPTER 3

"THE STANDARDS"

- **Site Planning**
  - 1: Standoff Distances (N)
  - 2: Unobstructed Space (B)
  - *3: Drive-up/Drop-off Areas*
  - *4: Access Roads*
  - 5: Parking Under Or On (B)
- **Structural Design**
  - 6: Progressive Collapse (N)
  - 7: Structural Isolation (B)
  - 8: Building Overhangs (N)
  - 9: Exterior Masonry Walls (B)
- **Architectural Design**
  - 10: Glazing (B)
  - 11: Building Entrance Layout (B)
  - 12: Exterior Doors (B)
  - 13: Mail Rooms (N)
  - 14: Roof Access (B)
  - 15: Overhead Mounted Architectural Features (B)
- **Electrical & Mechanical Design**
  - 16: Air Intakes (B)
  - 17: Mail Room Ventilation (N)
  - 18: Emergency Air Distribution Shutoff (B)
  - 19: Equipment Bracing (B)
  - 20: Under Building Access (B)
  - 21: Mass Notification (B)

(N) New Construction Only (B) Both New and Existing Construction

Key Standoff Definitions

- **Installation Perimeter: For the purposes of these standards any demarcation identifying limit of DoD property and directly or indirectly indicating that unauthorized access is prohibited.**
- **Clear Zone: Areas commonly associated with perimeters that are free of all obstacles, topographical features, and vegetation exceeding 8 in. (152 mm) in height that could impede observation or provide cover and concealment of an aggressor.**
- **Unobstructed Space: Space around inhabited buildings in which there are no opportunities for concealment from observation of explosive devices of no less than a 6 in. (150 mm) cube.**

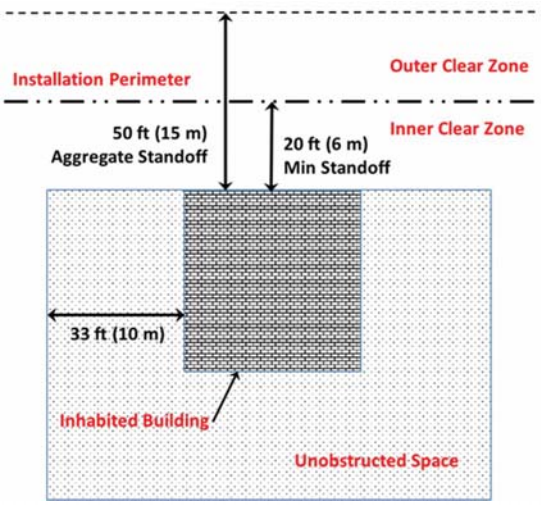
DoD Minimum AT Standards for Buildings

Standard 1. Standoff Distances

- The previous version of Standard 1 established standoff distances to parking, roadways, and controlled perimeters that were based on building construction and occupancy.
- In this revision of Standard 1, standoff distances only apply to distances to installation perimeters for new construction and additions to existing buildings that are required to comply with these standards.
- **NO required standoff for buildings except for defined clear zone from installation perimeter**
- **Exception: Existing buildings within an installation perimeter are exempt from this standard.**

Standard 1. Standoff Distances – Clear Zone

- The minimum standoff distance for new construction and additions to existing buildings to the installation perimeter is 20 ft. (6 m).
- Where there is no clear zone outside the perimeter, the minimum standoff distance is 50 ft. (15 m).
- Standoff distances to installation perimeters are based on clear zone requirements.
- Clear zones are areas established around the perimeters to provide unobstructed views to enhance detection and assessment.
- Provide a minimum aggregate standoff of 50 feet (15 m) inclusive of the clear zones outside and inside the installation perimeter.
- For example, if an outer clear zone is 20 ft. (6 m) wide, the standoff distance to the installation perimeter must be 30 ft. (10 m) wide.
- Clear zones only provide unobstructed views and do not require access control.
- Some installations and high security areas may have higher clear zone requirements.
- **For buildings that are outside an installation perimeter, use UFC 4-020-01 to establish the Design Basis Threat, Level Of Protection and resulting standoff – if applicable.**



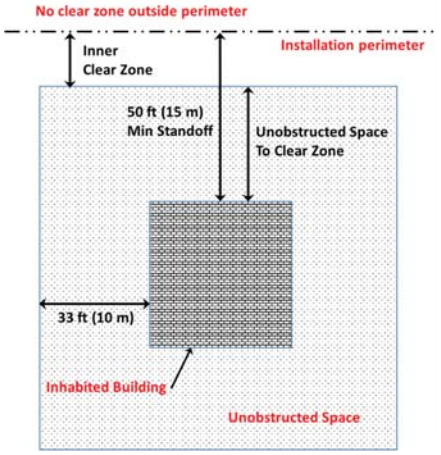
DoD Minimum AT Standards for Buildings

Standard 2. Unobstructed Space

- **It is assumed that aggressors will not attempt to place explosive devices in areas near buildings where those explosive devices could be visually detected by building occupants observing the area around the building.**
- **Ensure there are unobstructed spaces in which there are no obstructions or building features that might allow for concealment from observation of explosive devices with dimensions of no less than 6 in. (150 mm) cube around buildings and underneath building overhangs or breezeways.**
- **This does not preclude the placement of site furnishings or plantings around buildings. It only requires conditions such that any explosive devices placed in the unobstructed spaces would be observable by building occupants either from within the buildings or as they walk into or around it. For trees or shrubs ensure that no foliage extends lower than 3 ft. (1 m) above the grounds to improve observation of objects underneath them.**

Standard 2. Unobstructed Space

- Where buildings are required to meet these standards, the unobstructed space must extend out from the building to the edge of the inner clear zone, or 33 ft. (10 m).
- When the unobstructed space overlaps an established clear zone, the more stringent clear zone requirement will govern.
- **Exception:**
  - Stand-alone franchised fast food operations, commercial, bank, and pharmacy facilities.
  - Stand Alone Shoppettes, Mini Marts, and Commissaries with areas of less than 15,000 square feet (1394 square meters).

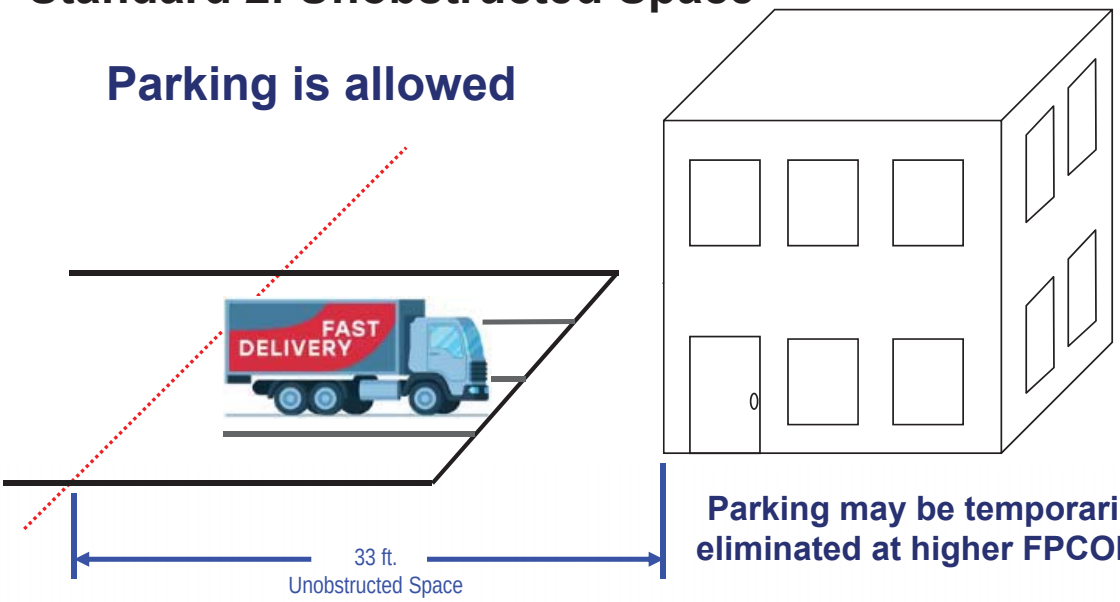


Parking Within Unobstructed Spaces.
- Parking is allowed within the unobstructed space.
- Parking may be temporarily eliminated within the unobstructed space at a higher Force Protection Condition (FPCON).

DoD Minimum AT Standards for Buildings

Standard 2. Unobstructed Space

Parking is allowed



Parking may be temporarily eliminated at higher FPCONs

Standard 2. Unobstructed Space

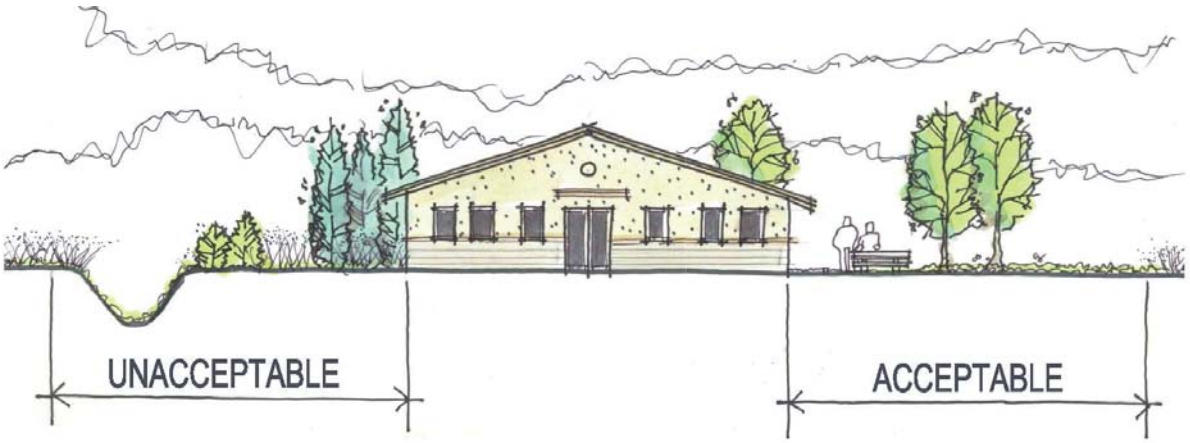
- **Trash Containers.**
  - Trash containers are not allowed within the unobstructed space unless the containers are secured or enclosed to preclude concealment of explosives.
- **Electrical and Mechanical Equipment.**
  - Electrical and mechanical equipment may be located within unobstructed spaces if they do not provide opportunities for concealment of explosives or are within an enclosure.
- **Fuel Tanks.**
  - Fuel tanks may be located within unobstructed spaces if they do not provide opportunities for concealment of explosives or are within an enclosure.

DoD Minimum AT Standards for Buildings

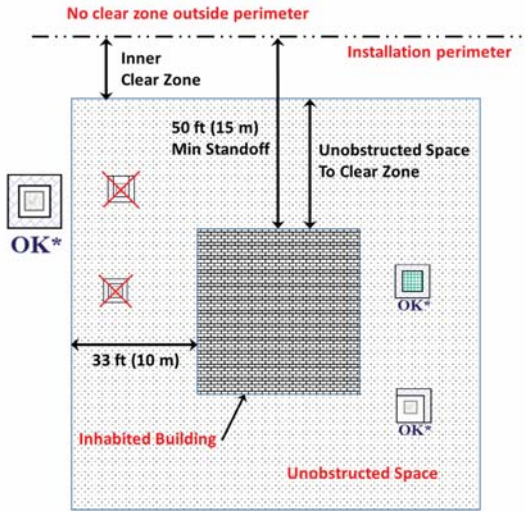
Standard 2. Unobstructed Space

- **Enclosures -** When trash containers, fuel tanks or electrical or mechanical equipment provide the opportunity for concealment, they must be outside the unobstructed space or enclosed.
  - Enclosures must have four sides and a top.
  - Openings in screening materials and gaps between the ground and screens or walls making up an enclosure will not be 6 in. (150 mm) or greater.
  - Secure any surfaces of the enclosures that can be opened so that unauthorized personnel cannot gain access.
  - Where opaque top enclosures are provided, they will have a pitch of at least 1 vertical to 2 horizontal to increase visibility of objects thrown onto them and to increase the likelihood that the objects will slide off.
  - Alternatively, if the vertical surfaces of the enclosures are transparent and at least 7 ft. (2.1 m) high, a top enclosure is not required.
- **Walls and Screens.**
  - If walls or other screening devices with more than two sides are placed around trash containers, fuel tanks or electrical or mechanical equipment within the unobstructed space, provide enclosure as required above.

Landscaping within Unobstructed Space

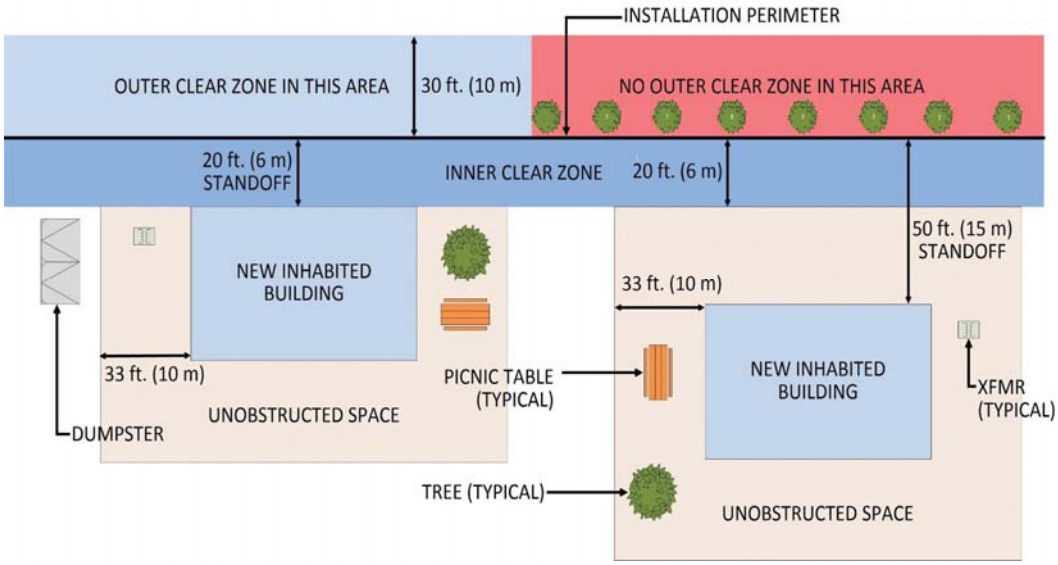


Enclosures/Walls and Screens



- Avoid opportunities for concealment
- Screening material ≤ 6 inches (150 mm)
- Secure enclosures that can be opened

UFC 4-010-01,
Standard 2 – Unobstructed Space



UFC 4-010-01,
Standard 2 – Unobstructed Space

UFC 4-010-01,
Standard 2 – Unobstructed Space




UFC 4-010-01,
Standard 2 – Unobstructed Space



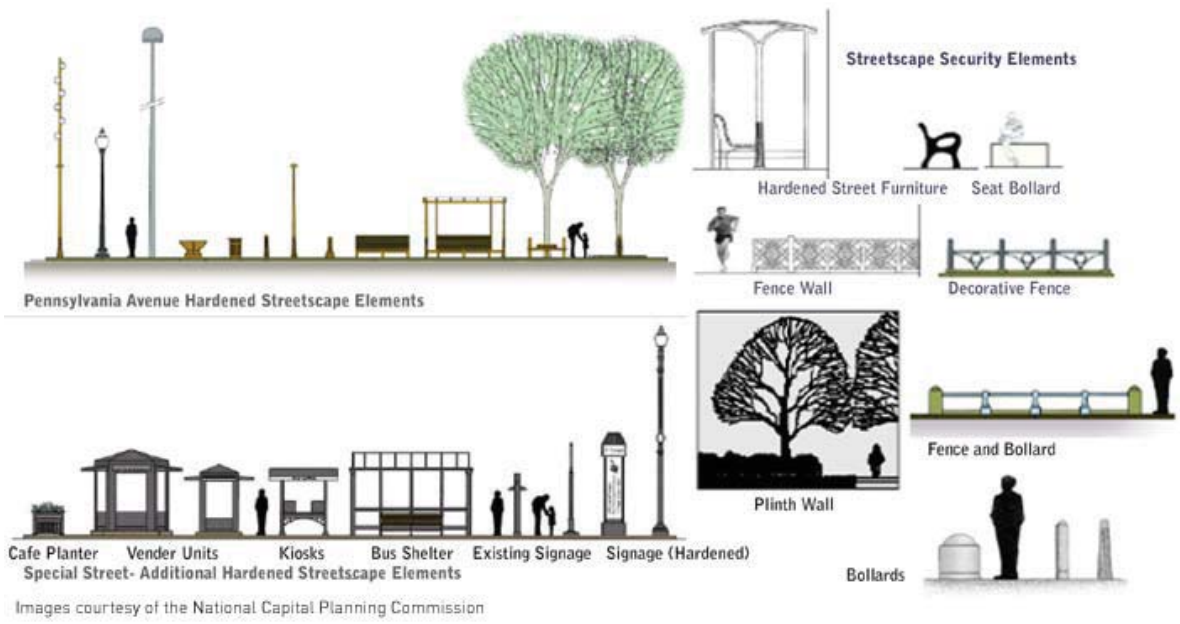


UFC 4-010-01,
Standard 2 – Unobstructed Space




NOT REQUIRED BY STANDARD 2

Site Concepts
(Not Required by DoD Minimum Standards)



Site Concepts
(Not Required by DoD Minimum Standards)
What We Don't Want!

Site Concepts
(Not Required by DoD Minimum Standards)
What We Do Want!

Standard 2. Unobstructed Space

- **Adjacent Existing Buildings**
  - **Maintain unobstructed space between new projects and existing buildings located nearby.**
  - **Modify any features that provide opportunity to conceal explosive devices.**

DoD Minimum AT Standards for Buildings

- **Standard 3: Drive-Up/Drop-Off Areas**
  - **Removed and No Longer Applies**
- **Standard 4: Access Roads**
  - **Removed and No Longer Applies**
- **Standard 5: Parking Beneath Buildings or on Rooftops**
  - **Avoid parking beneath or on rooftops**
  - **When required, provide access measures to prohibit unauthorized vehicles from entering**
    - ✓ Very Limited Real Estate
    - ✓ Existing buildings when triggered/if applicable

DoD Minimum AT Standards for Buildings

DoD Minimum AT Standards for Buildings

Standard 6. Progressive Collapse Avoidance

ASCE 7-16, C1.4

- General Structural Integrity
  - Progressive collapse defined as the spread of an initial local failure from element to element, resulting eventually in the collapse of an entire structure or a disproportionately large part of it.

Murrah Federal Building Oklahoma City

THIS IS PROGRESSIVE COLLAPSE!!

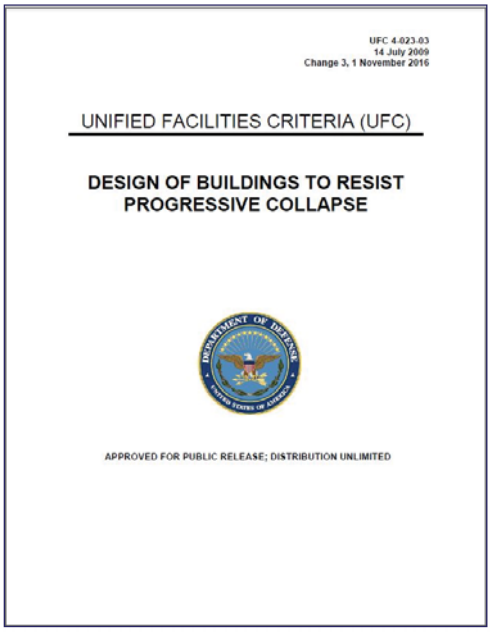
Standard 6. Progressive Collapse Avoidance

- Required for New Inhabited Building with 3 or more stories.
- Required to follow design guidance in UFC 4-023-03, *Design of Buildings to Resist Progressive Collapse.*
- Applies to new construction with parking beneath or multi-level parking above inhabited space.
- The design guidance provided in UFC 4-023-03 for new construction lessens the potential for progressive collapse due to localized structural damage. No blast requirements.
- Apply the requirements for Risk Category II or higher per UFC 3-301-01 (Structural Engineering).
- Evaluate interior columns and/or walls in parking areas beneath or above inhabited areas for progressive collapse in accordance with UFC 4-023-03.

UFC 4-023-03 Design of Buildings to Resist Progressive Collapse

- 1st Edition - 25 January 2005
- 2nd Edition - 14 July 2009
- Change 1 – 27 January 2010
- Change 2 – 1 June 2013
- Change 3 – 1 November 2016
- 3rd Edition – Sometime in 2020

- ❑ ASCE is preparing a standard for Disproportionate Collapse
- ❑ PEC/USACE-PDC preparing a 'bridge' document
- ❑ DoD to rely on ASCE standard as much as possible
- ❑ Tie Force and Enhanced Local Resistance methods not approved by ASCE – may be kept in DoD 'bridge' document



UFC 4-023-03
14 July 2009
Change 3, 1 November 2016

UNIFIED FACILITIES CRITERIA (UFC)

DESIGN OF BUILDINGS TO RESIST PROGRESSIVE COLLAPSE

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

UFC 4-023-03 Design of Buildings to Resist Progressive Collapse

Determination of Design Requirements

Table 2-1. Risk Categories

Nature of Occupancy	\3\Risk Category/3/ [C]
• Buildings in Risk Category I in \1\ Table 2-2 of UFC 3-301-01. /1/ • Low Occupancy Buildings[A]	I
• Buildings in Risk Category II in \1\ Table 2-2 of UFC 3-301-01. /1/ • Inhabited buildings with less than 50 personnel, primary gathering buildings, billeting, and high occupancy family housing[A,B]	II
• Buildings in Risk Category III in \1\ Table 2-2 of UFC 3-301-01. /1/	III
• Buildings in Risk Category IV in \1\ Table 2-2 of UFC 3-301-01. /1/ • Buildings in Risk Category V in \1\ Table 2-2 of UFC 3-301-01. /1/	IV

[A] As defined by UFC 4-010-01 *DoD Minimum Antiterrorism Standards for Buildings*
[B] Risk Category II is the minimum occupancy category for these buildings, as their population or function may require designation as Risk Category III, IV, or V.
\2\ [C] Section 1604.5.1 Multiple occupancies of the International Building Code (IBC) is applicable for determination of the Risk Category including the provisions for structurally separated structures. /2/

Table 2-2. Risk Categories and Design Requirements

\3\ Risk Category /3/	Design Requirement
I	No specific requirements
II	Option 1: Tie Forces (TF) for the entire structure and Enhanced Local Resistance (ELR) for the corner and penultimate columns or walls at the first story. OR Option 2: Alternate Path (AP) for specified column and wall removal locations.
III	Alternate Path for specified column and wall removal locations and Enhanced Local Resistance (ELR) for all perimeter first story columns or walls.
IV[A]	Tie Forces and Alternate Path for specified column and wall removal locations and Enhanced Local Resistance for all perimeter first story columns or walls.

\3\ [A] For buildings in Risk Category IV in Table 2-2 of UFC 3-301-01, the minimum structural requirements for Tie Force application in Section 3-1.1 can be exempted. The minimum structural requirements shall remain for buildings in Risk Category V. /3/

UFC 4-023-03 Design of Buildings to Resist Progressive Collapse

- **Tie Force Method**
  - **Building mechanically tied together, enhancing continuity, and aiding development of alternate load paths**
- **Alternate Path Method**
  - **Requires structure to be capable of spanning over a missing structural element (column or load-bearing wall)**
- **Enhanced Local Resistance**
  - **Requires that the shear capacity of a column or wall exceed the flexural capacity**
  - **This will provide a more ductile and controlled response than the sudden failure associated with shear**

DoD Minimum AT Standards for Buildings

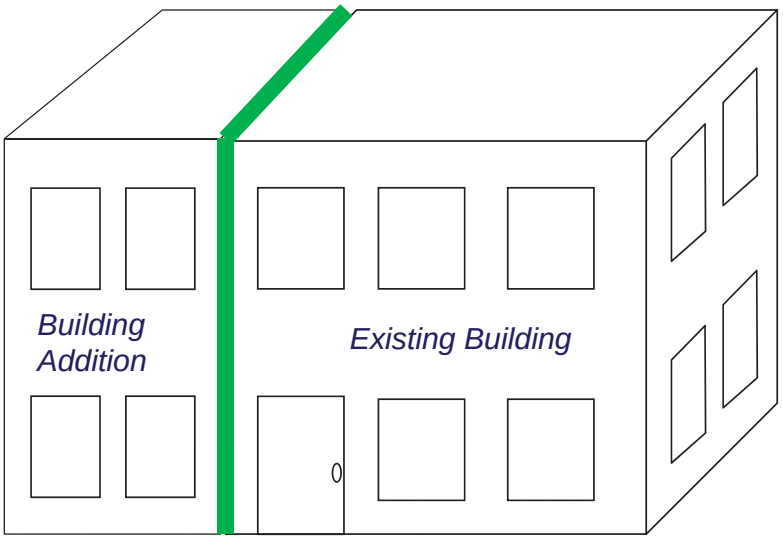
Standard 7: Structural Isolation

- Structural isolation minimizes the possibility that collapse of one part of a building will affect the stability of the remainder of the building.
- Building Addition – Structurally independent or verify through analysis that collapse will not result for addition or existing building.
- Low occupancy portions – ensure superstructure structurally independent from inhabited portions or verify through analysis that collapse will not result for any portion covered by these standards.
- Not required for existing buildings when designed IAW the standards (including previous versions).

DoD Minimum AT Standards for Buildings

DoD Standard 7: Structural Isolation

- Building additions to be structurally isolated from the existing building
- Low Occupancy portions to be isolated from inhabited portions
- Alternatively may prove non-collapse with calculations



Additions considered new construction

DoD Minimum AT Standards for Buildings

Standard 8: Building Overhangs and Breezeways

- Avoid building overhangs and breezeways with inhabited spaces above them where people could gain access to the areas underneath the overhangs.
- Where such overhangs or breezeways must be used, ensure the areas underneath overhangs/breezeways comply with the provisions of Standard 2 – Unobstructed Space.

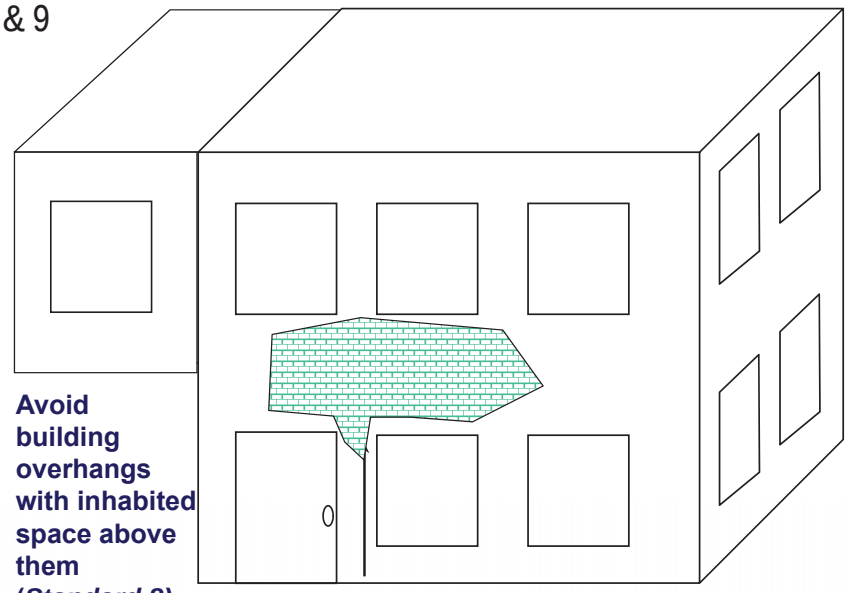
Standard 9: Exterior Masonry Walls

- Unreinforced masonry walls are prohibited for the exterior walls of new construction required to comply with these standards.
- Exterior masonry walls must have vertical and horizontal reinforcement distributed throughout the wall section as required by this standard.
- For conventional cavity wall construction reinforcement only needs to be in the inner wall unless other reinforcement is required by other criteria.

DoD Minimum AT Standards for Buildings

DoD Standards 8 & 9

The areas underneath the overhangs or breezeways can be considered to be extensions of the surrounding unobstructed spaces.



Avoid building overhangs with inhabited space above them (*Standard 8)*

Unreinforced exterior masonry walls prohibited (*Standard 9)*

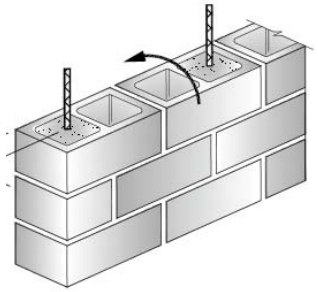
DoD Minimum AT Standards for Buildings

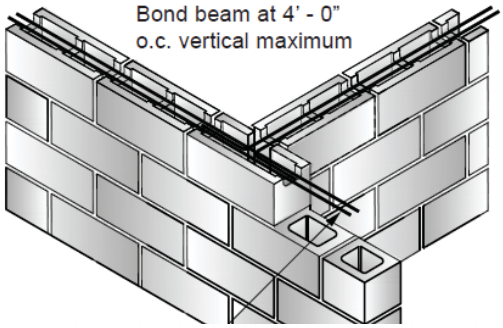
Standard 9: Exterior Masonry Walls

Why we avoid unreinforced masonry walls

Standard 9: Exterior Masonry Walls

- **New Buildings**
  - **A minimum of 0.05% vertical steel reinforcement spaced no more than 48 inches**
  - **0.025% horizontal steel**
    - Either joint reinforcing at 16 inches
    - Or bond beam no more than 48 inches

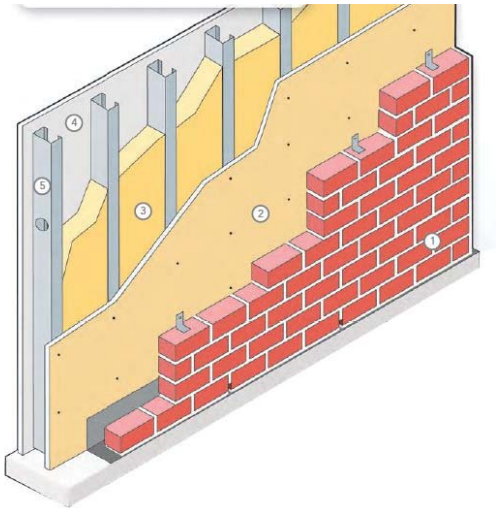


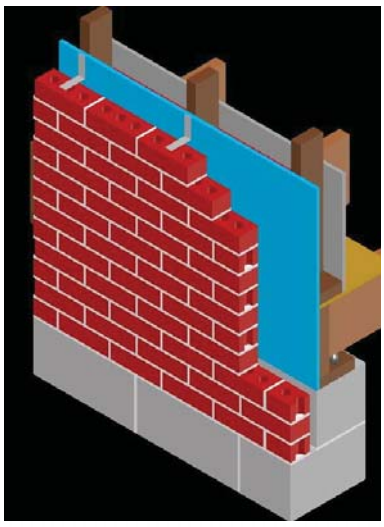


DoD Minimum AT Standards for Buildings

Standard 9: Exterior Masonry Walls

- **Wood or metal studs used with unreinforced masonry *veneers* are allowed**

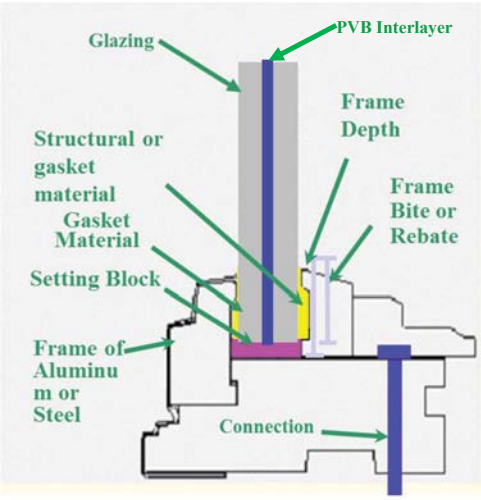




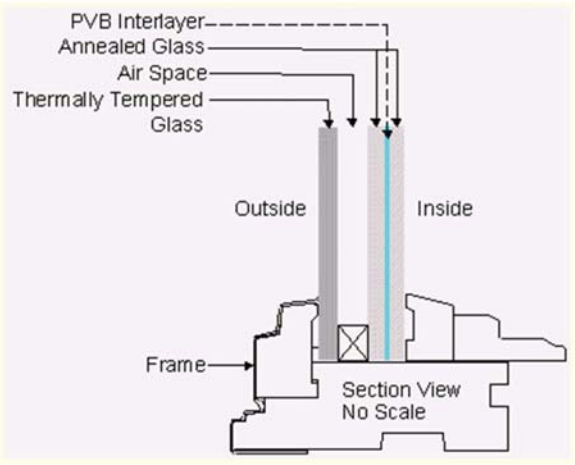
Standard 10. Glazing

- Glazing that is in compliance with this standard **is not required to be designed or constructed for blast resistance.**
- It is intended to minimize hazardous glazing fragments.
- For glazing in exterior building elements such as storefronts, doors, windows, curtain walls, clerestories, and skylights provide no less than 1/4 in. (6 mm) nominal polycarbonate or laminated glass.
- The 1/4 in. (6 mm) laminated glass consists of two nominal 1/8 in. (3 mm) glass panes bonded together with a minimum of a 0.030 in. (0.75 mm) interlayer of a material designed for blast resistance.
- For insulated glass units (IGU), use the polycarbonate or laminated glass for the innermost pane as a minimum.
- Frames may be constructed of any material – Wood, Steel, Aluminum, Plastic (PVC, PET/HDPE/LDPE/PP/PS) or any combination thereof.

TYPICAL WINDOW MAKE-UPS

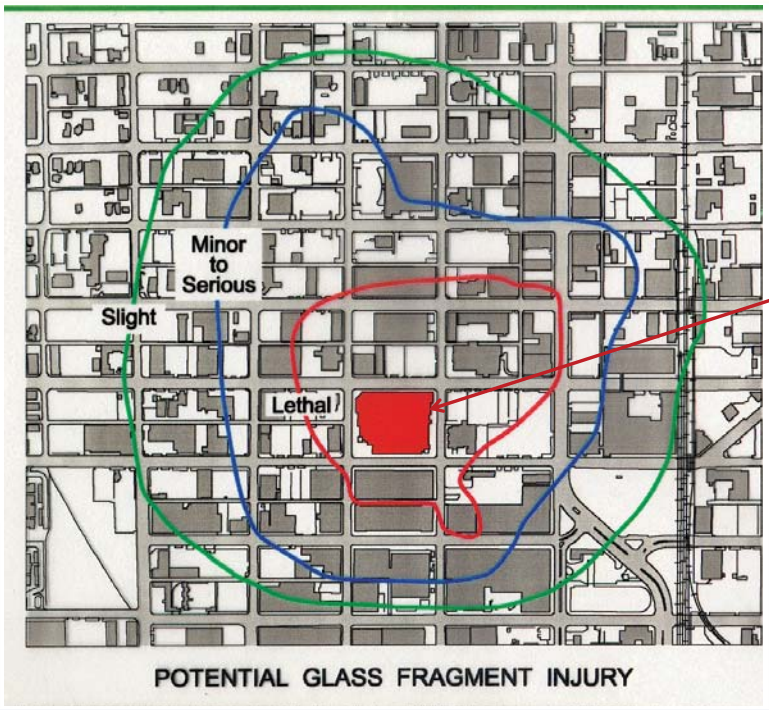


SINGLE PANE



DOUBLE PANE INSULATED GLASS UNIT (IGU)

DoD Minimum AT Standards for Buildings



Extent of Glass Hazard
Case Study
Oklahoma City
Murrah Federal Building

DoD Minimum AT Standards for Buildings

Glass Fragments

Annealed Glass

DoD Minimum AT Standards for Buildings

Historically the glazing hazard causes up to 85% of the Injuries in blast events

DoD Minimum AT Standards for Buildings

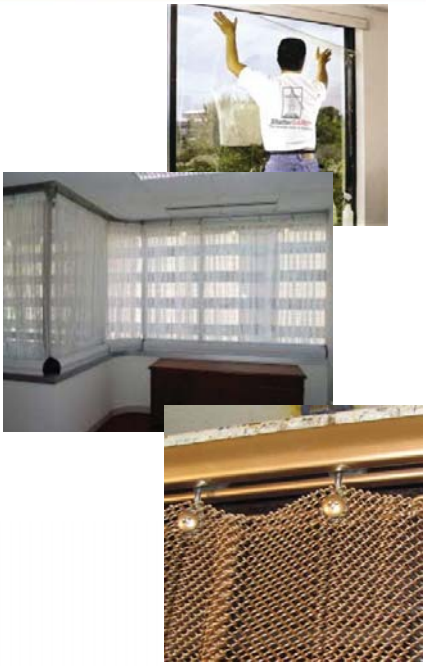
Desired Glazing Performance

- **Note Glazing Performs Acceptably, Glazing Remains In Frame**
- **Limited Glass Fragments into Interior**

DoD Minimum AT Standards for Buildings

Alternate Window Treatments

- **Retrofits incorporating fragment retention film or blast curtains are not allowed for new and existing buildings needing to comply with standards**
- **Such retrofits allowed for leased buildings if lease agreement stipulates maintenance**
- **Such retrofits are encouraged for existing buildings not required to comply with standards**



Structural Design Requirements for Buildings

Do Not Forget Windborne Debris

WINDBORNE DEBRIS REGION. Areas within hurricane-prone regions located:

- Within 1 mile (1.61 km) of the coastal mean high-water line where the basic design wind speed, *V*, is 130 mph (58 m/s) or greater; or
- In areas where the basic design wind speed is 140 mph (63.6 m/s) or greater.
- For *Risk Category* II buildings and structures and *Risk Category* III buildings and structures, except health care facilities, the windborne debris region shall be based on Figure 1609.3.(1). For *Risk Category* IV buildings and structures and *Risk Category* III health care facilities, the windborne debris region shall be based on Figure 1609.3(2).
- **1609.2 Protection of openings.** In *windborne debris regions*, glazing in buildings shall be impact resistant or protected with an impact-resistant covering meeting the requirements of an *approved* impact-resistant standard or ASTM E1996 and ASTM E1886.

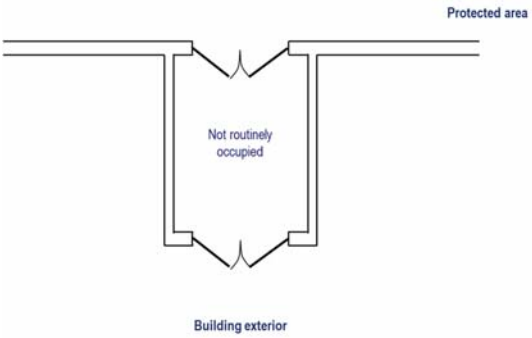
Standard 11: Building Entrance Layout

- For new construction, ensure that the main entrance to the building does not face uncontrolled vantage points with direct lines of sight or provide means to block the lines of sight using mitigation such as walls, privacy fencing, or vegetation.
- For existing building use a different entrance or screen that entrance.

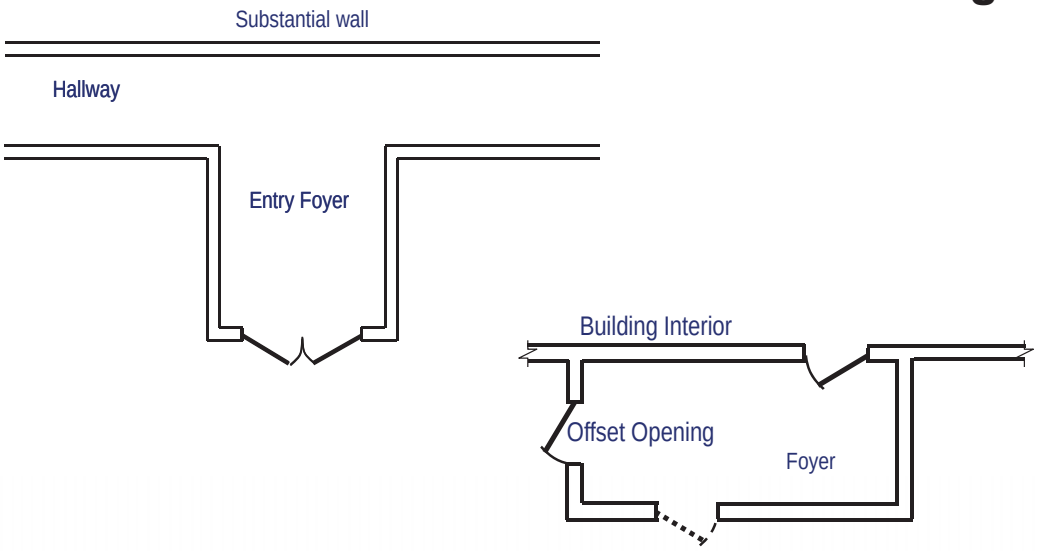
DoD Minimum AT Standards for Buildings

Standard 12: Exterior Doors

- For all new and existing buildings covered by these standards, ensure that all exterior doors into inhabited areas open outwards.
- Alternatively, position doors such that they will not be propelled into inhabited spaces or provide other means to ensure they do not become hazards to building occupants.
- Glazed Doors – comply with Standard 10 - Glazing

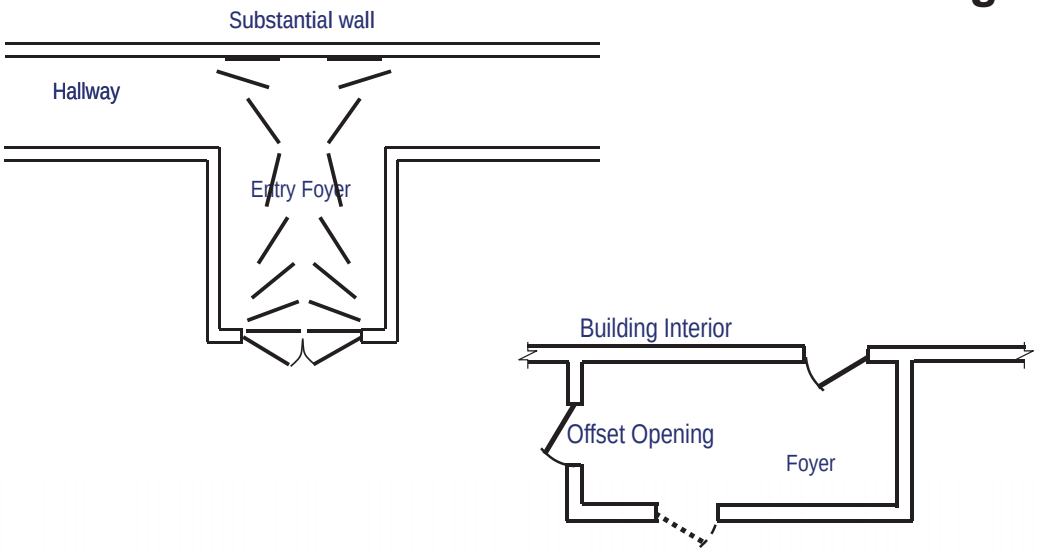


Standard 12. Exterior Doors – Alternate Design

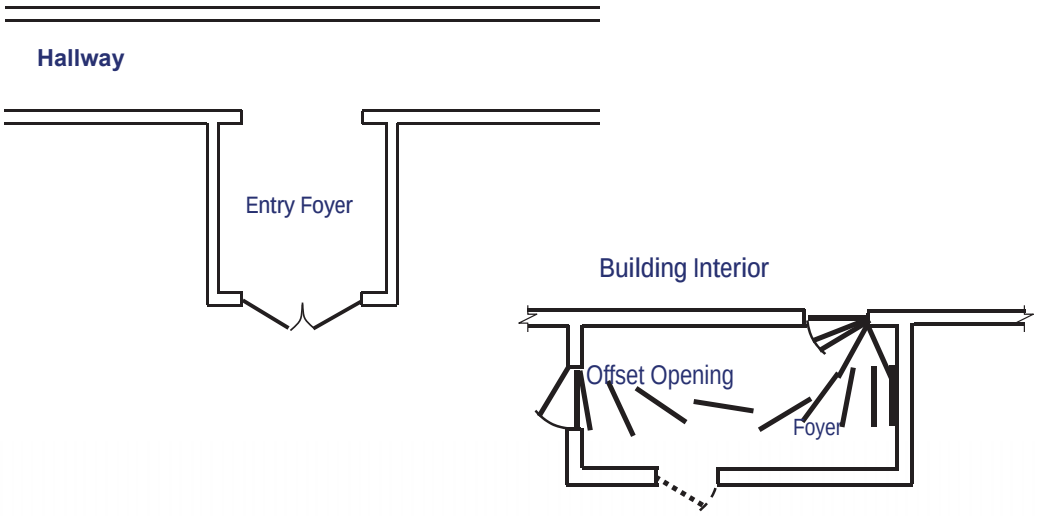


DoD Minimum AT Standards for Buildings

Standard 12. Exterior Doors – Alternate Design



Standard 12. Exterior Doors – Alternate Design



Standard 13: Mail Rooms and Loading Docks

- Addresses location of rooms to which mail or supplies are delivered/handled.
- Not applied to mail rooms/loading docks to which mail/supplies were initially delivered to a central mail/supplies handling facility.
- Locate on the perimeter of building away from heavily populated areas of building.
- Not required for existing building – recommended where possible.

Standard 14: Roof Access

- For buildings required to comply with these standards, control access to roofs.
- For new construction eliminate all external roof access by providing access from internal stairways or ladders, such as in mechanical rooms.
- For existing buildings, eliminate external access where possible or secure external ladders or stairways with locked cages or similar mechanisms.

Standard 15: Overhead Mounted Architectural Features

- New and Existing Buildings
- Overhead mounted features weighing 31 pounds or more
- Secure (rigid/flexible) to resist forces horizontally at 0.5 X weight and vertically/downward at 1.5 X weight
- Need to consider other loading conditions – i.e. Seismic

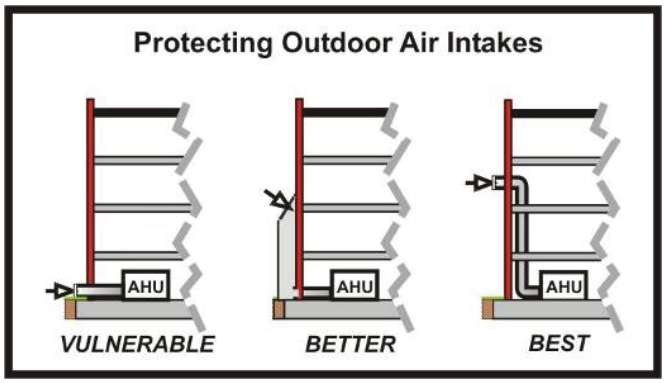


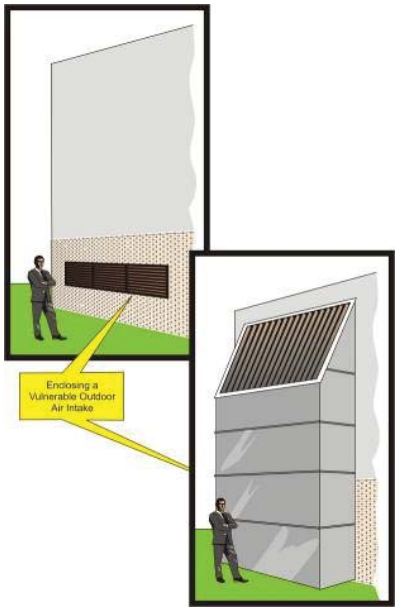
Standard 16: Air Intakes

- HVAC systems at ground level that move air throughout the building
- New – locate all air intakes at least 10 ft/3 m above ground
- Existing – locate all air intakes at least 10 ft/3 m above ground OR provide exterior chimneys to extend elevation of intake to at least 10 ft/3 m
- Exception – Air intakes within an enclosure that meets the requirements set forth in Standard 2 Unobstructed Space and at a minimum of 10 ft/ 3 m from enclosure perimeter

LOCATE ALL AIR INTAKES AT LEAST 3 METERS (10 FEET) ABOVE THE GROUND

Mandatory for
Both New and Existing Buildings





DoD Minimum AT Standards for Buildings

Standard 17: Mail Room and Loading Dock Ventilation

- New Construction – provide separate/dedicated HVAC for mail rooms/loading docks receiving initial delivery of mail/supplies.
- Dedicated exhaust that maintains slight negative air pressure so flow of air is into and contained in mail rooms/loading docks.
- Provide ventilation system with low leakage isolation dampers that close automatically to isolate mail rooms/loading docks.
- Provide separate control switches or methods to isolate mail rooms.
- Walls must extend from true floor to true ceiling – joints sealed.
- Doors must have gaskets or weather stripping to minimize leakage.

DoD Minimum AT Standards for Buildings

Standard 18: Emergency Air Distribution Shutoff

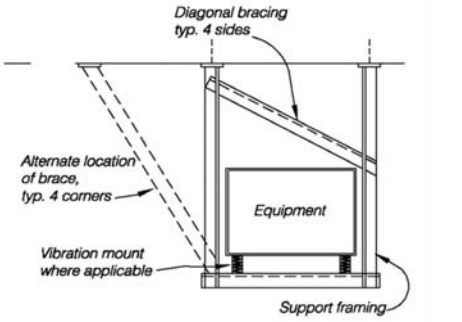
- For new and existing buildings provide emergency shutoff in the HVAC control system.
- Switch initiates a response in HVAC systems and dampers leading to outside regardless of hand/off/auto (HOA) position within 30 seconds of activation.
- Locate switch for easy access – located similarly to MNS so that travel distance is not in excess of 200 feet.
- Ensure switches are well labeled and different color than fire alarm.
- Additional Guidance is provided for:
  - Outside Air Intakes, Relief Air and Exhausts
  - Critical Areas
  - Unoccupied Areas
  - Fan Coil Units

- **Don't shut off exhaust fans if violates life safety codes or creates unsafe conditions.**

DoD Minimum AT Standards for Buildings

Standard 19: Equipment Bracing

- New and Existing Building
- Overhead utilities and other fixtures weighing 31 pounds or more.
- Secure (rigid/flexible) to resist forces horizontally at 0.5 X weight and vertically/downward at 1.5 X weight.
- Need to consider other loading conditions – i.e. Seismic.



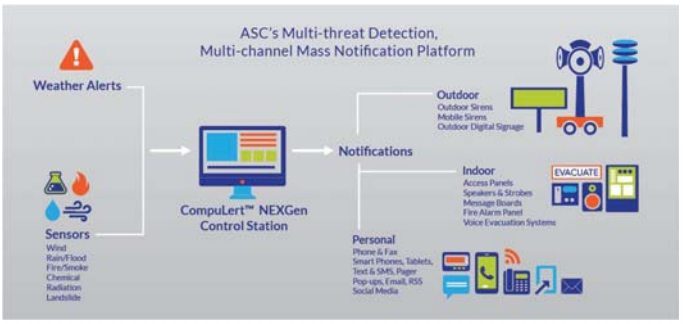
DoD Minimum AT Standards for Buildings

Standard 20: Under Building Access

- For all buildings required to comply w/standards, ensure access to crawl spaces, utility tunnels, and other means of under building access is controlled.

Standard 21: Mass Notification

- All buildings required to comply w/standards must have a timely means to notify occupants of threats and provide instructions on how to respond.
- UFC 4-021-01, Design and O&M: Mass Notification Systems provides additional guidance.



Appendix A - Recommendations

1: Vehicle access points
2: High speed vehicle approaches
3: Drive-Up/Drop-Off
4: Building Location
5: Railroad Location
6: Access Control for Family Housing
7: Standoff for Family Housing
8: Building Separation
9: Visitor Control
10: Asset Location
11: Room Layout
12: External Hallways

Appendix B – Best Practices

Use in conjunction with Appendix C when given a DBT and LOP

- Introduction
- Site Planning for Stationary and Hand Delivered Devices
  - Standoff Distances
  - Drive-Up/Drop-Off Areas
  - Access Roads
  - Parking Beneath Building or on Rooftops
- Architectural and Structural Design
  - Windows and Skylights
  - Exterior Doors

Appendix C – Representative Standoff Distances for Conventional Construction and Expeditionary Structures

- Introduction
- How to Use this Appendix
- Walls
- Roofs
- Windows
- Expeditionary Structures
- Tables: C-1 through C-6
  - C-1: Representative Standoff Distances for Very Low Level of Protection
  - C-2: Representative Standoff Distances for Low Level of Protection
  - C-3: Representative Standoff Distances for Medium Level of Protection
  - C-4: Representative Standoff Distances for High Level of Protection
  - C-5: Conventional Construction Parameters
  - C-6: Standoff Distances for Expeditionary Structures

Table C-2 Representative Standoff Distances for Low Level of Protection [7]

Construction [1]	Explosive Weight (TNT)											
	55 lbs (25 kg)		220 lbs (100 kg)		550 lbs (250 kg)		1,100 lbs (500 kg)		4,400 lbs (2,000 kg)		19,800 lbs (9,000 kg)	
	LB [2]	NLB [3]	LB [2]	NLB [3]	LB [2]	NLB [3]	LB [2]	NLB [3]	LB [2]	NLB [3]	LB [2]	NLB [3]
Metal Stud with Lightweight Sheathing [4]	150 ft (46 m)	84 ft (26 m)	376 ft (115 m)	206 ft (63 m)	661 ft (201 m)	372 ft (113 m)	971 ft (296 m)	566 ft (173 m)	1642 ft (500 m)	1279 ft (390 m)	2656 ft (809 m)	2910 ft (887 m)
Metal Stud with Brick Veneer [4]	74 ft (22 m)	42 ft (13 m)	186 ft (57 m)	107 ft (33 m)	341 ft (104 m)	191 ft (58 m)	538 ft (164 m)	300 ft (91 m)	1303 ft (397 m)	730 ft (223 m)	2545 ft (776 m)	1779 ft (542 m)
Wood Stud with Lightweight Sheathing [4]	85 ft (26 m)	65 ft (20 m)	211 ft (64 m)	163 ft (50 m)	386 ft (118 m)	299 ft (91 m)	601 ft (183 m)	465 ft (142 m)	1441 ft (439 m)	1134 ft (346 m)	2645 ft (806 m)	2625 ft (800 m)
Wood Stud with Brick Veneer [4]	36 ft (11 m)	22 ft (7 m)	103 ft (31 m)	78 ft (24 m)	193 ft (59 m)	150 ft (46 m)	303 ft (92 m)	238 ft (73 m)	761 ft (232 m)	589 ft (179 m)	2010 ft (613 m)	1546 ft (471 m)
Pre-engineered Building (Girt and Metal Panel [4])	104 ft (32 m)	54 ft (17 m)	336 ft (102 m)	151 ft (46 m)	684 ft (209 m)	287 ft (88 m)	1132 ft (345 m)	458 ft (140 m)	1668 ft (508 m)	1294 ft (394 m)	2780 ft (847 m)	2985 ft (910 m)
Unreinforced Concrete Masonry [4]	80 ft (24 m)	26 ft (8 m)	262 ft (80 m)	124 ft (38 m)	535 ft (163 m)	276 ft (84 m)	906 ft (276 m)	484 ft (148 m)	1893 ft (577 m)	1393 ft (425 m)	2780 ft (847 m)	2940 ft (896 m)
Unreinforced European Clay Masonry [4]	38 ft (11 m)	22 ft (7 m)	163 ft (50 m)	59 ft (18 m)	398 ft (121 m)	148 ft (45 m)	748 ft (228 m)	314 ft (96 m)	1614 ft (492 m)	1146 ft (349 m)	N/A	2688 ft (819 m)
Reinforced Masonry [4]	28 ft (9 m)	13 ft (4 m)	85 ft (26 m)	30 ft (9 m)	166 ft (51 m)	72 ft (22 m)	273 ft (83 m)	120 ft (37 m)	736 ft (224 m)	326 ft (99 m)	2212 ft (674 m)	945 ft (288 m)
Reinforced Concrete [4]	22 ft (7 m)	14 ft (4 m)	104 ft (32 m)	35 ft (11 m)	234 ft (71 m)	105 ft (32 m)	424 ft (129 m)	200 ft (61 m)	1255 ft (383 m)	663 ft (202 m)	2504 ft (763 m)	2122 ft (647 m)
Concrete roofs and Metal Roofs w/ concrete topping [5]	13 ft (4 m)		23 ft (7 m)		50 ft (15 m)		92 ft (28 m)		270 ft (82 m)		737 ft (225 m)	
Windows [6]	51 ft (15 m)		123 ft (37 m)		197 ft (60 m)		269 ft (82 m)		545 ft (166 m)		1092 ft (333 m)	
Minimum Standoff Distance [8]	13 ft (4 m)		20 ft (6 m)		26 ft (8 m)		33 ft (10 m)		50 ft (15 m)		82 ft (25 m)	

1. Refer to Table C-5 for details on the analysis assumptions and material properties for these wall and roof types.
2. Load bearing construction.
3. Non-load bearing construction.
4. Where wall types include multiple cladding systems such as brick half way up the wall and EIFS above that, use the greater of the two applicable standoff distances. For additional information on Steel Studs see PDC TR 15-01, Minimum Standoff Distances for Non-Load Bearing Steel Stud In-Fill Walls.
5. Roof construction seldom controls standoff distances. Standoffs of at least those in this row will commonly be adequate for those roof types. Other roof types will have to be analyzed separately
6. At distances closer than these standoff distances windows will commonly be much heavier and more expensive than conventional windows.
7. Note that these standoff distances are for planning purposes only. All building components should be designed for blast loading and conventional loading.
8. See Paragraph B-2.1.3.

Appendix C – Representative Standoff Distances for Conventional Construction and Expeditionary Structures

Table C-5 Conventional Construction Parameters

Wall or Roof Type [1]	Analysis Assumptions [2, 10]						
	Sections	Span	Spacing	Support Condition	Supported Weight [9]	Reinforcement Ratio	Min. Static Material Strength
Wood Studs – Brick Veneer	2x4 & 2x6 in (50x100 & 50x150 mm)	8 – 10 ft (2.4 - 3 m)	16 - 24 in (400 – 600 mm)	S-S	44 psf (215 kg/m²)	N/A	875 psi (6 MPa)
Wood Studs – EIFS	2x4 & 2x6 in (50x100 & 50x150 mm)	8 – 10 ft (2.4 – 3 m)	16 -24 in (400 -600 mm)	S-S	10 psf (49 kg/m²)	N/A	875 psi (6 MPa)
Steel Studs – Brick Veneer [3]	600S162-43 600S162-54 600S162-68	8 – 12 ft (2.4 – 3.7 m)	16 - 24 in (400 – 600 mm)	S-S	44 psf (215 kg/m²)	N/A	50,000 psi (345 MPa)
Steel Studs – EIFS [3]	600S162-43 600S162-54 600S162-68	8 – 12 ft (2.4 – 3.7 m)	16 - 24 in (400 – 600 mm)	S-S	10 psf (49 kg/m²)	N/A	50,000 psi (345 MPa)
Metal Panels [8] (in wall or roof construction)	1.5 – 3 in (38 - 76 mm) 22, 20, & 18 ga	4 – 8 ft (1.2 - 2.4 m)	N/A	S-S	10 psf (49 kg/m²)	N/A	33,000 psi (228 MPa)
Girts [8] (in wall or roof construction)	8Z3 & 10Z3 16, 14, & 12 ga	20 – 25 ft (6 – 7.6 m)	6 – 8 ft (1.8 – 2.4 m)	S-S	5 psf (24 kg/m²)	N/A	50,000 psi (345 MPa)
Reinforced Concrete [7]	≥ 6 in (≥ 150 mm)	12 – 20 ft (3.7- 6 m)	N/A	S-S, One way flexure	10 psf (49 kg/m²)	≥ 0.0015	3,000 psi (21 MPa)
Unreinforced Concrete Masonry [4, 6]	6 – 12 in (150 – 300 mm)	8 – 12 ft (2.4 – 3.7 m)	N/A	S-S, One way flexure	10 psf (49 kg/m²)	0	1,500 psi (10 MPa)
Reinforced Concrete Masonry [7, 6]	8 – 12 in (200 - 300 mm)	10 – 14 ft (3 – 4.3 m)	N/A	S-S, One way flexure	10 psf (49 kg/m²)	0.0005 - 0.0030	1,500 psi (10 MPa)
European Clay Block Masonry [4, 6]	6 – 8 in (150 – 200 mm)	10 – 12 ft (3 – 3.7 m)	N/A	S-S, Brittle Flexure	10 psf (49 kg/m²)	0	1,800 psi (12 MPa)
Concrete Roofs [7]	4 – 12 in (100 - 300 mm)	6 ft (1.8 m)	N/A	F-S	15 psf (73 kg/m²)	0.0015 - 0.005	3,000 psi (21 Mpa)
Metal Roofs	K and LH joists with Metal Deck and/or 3.5 - 5.5 in (90 - 140 mm) Concrete Topping	30 ft (9.1m)	4 – 8 ft (1.2 – 2.4 m)	S-S	15 – 90 psf (73 – 439 kg/m²)	N/A	50,000 psi (345 MPa)

1. Other types of construction other than that shown in this table may be permissible subject to validation by the designer of record.
2. See PDC Technical Report 10-01 for details on the analysis assumptions and material properties.
3. Steel studs are assumed to be connected top and bottom for load bearing walls. For non-load bearing walls steel studs are assumed to have a slip-track connection at the top. For additional information on Steel Studs see PDC TR 15-01, Minimum Standoff Distances for Non-Load Bearing Steel Stud In-Fill Walls.
4. Unreinforced masonry must have adequate lateral support at the top and bottom.
5. Weight supported by the wall that moves through the same deflection as the wall, not including self-weight of the component.
6. For walls or roofs built using metal panels and girts; use the greater of the standoffs for the metal panel and the girt.
7. Reinforcing steel is 60,000 psi (414 MPa) tensile strength.
8. Concrete Masonry Units (excluding European block) are medium weight (120 pcf / 1922 kg/m³)
9. European clay block masonry complies with DIN: 105 Teil 1 + 2/HLz B
10. Shear will need to be checked when using higher than minimum material strengths.

S-S = Simple - Simple Supports F-S = Fixed - Simple Supports

Project Development

Project Development

The planning team must:

- **Understand related DoD/Service Policy/Regulations**
- **Understand related GCC OPORD AT requirements**
- **Determine if more than the minimum standards are required**
- **Incorporate protective measures and related costs in project scope and budget as required**
  - **See paragraphs in UFC 4-010-01 Titled 'Installation Specific Requirements'; 'Threat-Specific Requirements' for guidance in determining/validating threat and level of protection requirements.**

Project Development

- **Incorporate AT requirements and the associated costs into the DD 1391. Work with our supported Commanders to determine:**
  - **Requirement for AT.**
    - **Is the Facility an Inhabited facility?**
    - **Is the Facility 3 stories or more?**
    - **Is the Facility located within a Installation perimeter?**
    - **Are there any identified threats (GCC OPORD)?**
    - **Is the Facility a Critical Asset?**
    - **Is there a required/desired level of protection?**

MUST BE DONE DURING PROJECT PLANNING

Use UFC 4-020-01 (Planning Manual) to establish/validate the Design Basis Threat and Level of Protection for individual projects.

Project Development

INTEGRATE OTHER REQUIREMENTS:

- **Security Regulations: DoD and Service policy and regulations establish baseline requirements for protective measures.**
- **Explosive Safety: Explosive safety regulations may require high level of protection than required by the antiterrorism standards**
- **GCC AT Construction Standards (OPORD)**
- **Historic Preservation: Implementation of security and antiterrorism protective measures cannot supersede the obligation to protect cultural resources.**
  - **Installation personnel need to determine possible adverse effects upon an historic structure and/or archaeological resource during project development.**
- **Sustainable Design: Security and antiterrorism protective measures may pose challenges for sustainable design, but the two are not mutually exclusive.**

Document the AT requirements

- **Block 10 (scope) of DD 1391 and backup documentation should be utilized to describe AT requirements.**
  - This facility is considered low occupancy per UFC 4-010-01.
  - This facility is considered Inhabited per UFC 4-010-01.
  - Progressive Collapse Avoidance must be included in the Structural design of this facility per UFC 4-010-01.
- **Utilize 1391 Team Checklist to document requirements**

ID#	Keyword	Item
1.25	Resources	Confirm environmental, historical and cultural resources impact issues are addressed. If there are any potential "showstoppers" (such as wetlands mitigation, State Historic Preservation Officer (SHPO) consultation, cultural resources issues, installation restoration clean-up, and Anti-Terrorist / Force Protection) (AT/FP)
5.08	AT/FP	Identify the AT/FP elements that could impact scope and cost, including:
		a) Expected occupancy of the facility (i.e., low occupancy, inhabited, ~~primary gathering, billeting~~)
		b~~) Level of protection needed based on facility type, location, and other factors.~~
		c) Level of protection above minimum DoD standards for COCOMs and others. Use UFC 4-020-01 (Planning Manual) to establish/validate the Design Basis Threat and Level of Protection for individual projects.
5.19	Existing Buildings	For renovation projects, perform engineering studies of, although not limited to, the structural, electrical, mechanical, fire protection, AT/FP, building envelop, accessibility, seismic, and roof components and systems to assess the extent of work needed for the renovation.
7.47	PRV	Determine ~~Plant~~ Replacement Value of building if this is a renovation project. Exceeding certain percentages may trigger the need for additional seismic and AT/FP features.
7.51	Progressive Collapse	Determine the number of stories of each facility provided by this project. Progressive collapse features are required for new building that will be three stories or higher.

Project Development

Document the Cost Associated with AT Standards

- **Block 9 (Project Cost) of DD 1391 and backup documentation should be utilized to document costs of the AT and PSE requirements.**
  - Cost for AT Minimum Standards must be included in Block 9 of the DD 1391 under primary facilities (Anti-Terrorism/Force Protection).

- **Renovation jobs:**
  - Requirements need to be considered early in project development to ensure the mitigation measures are considered in the project scope/budget and included in the economical analysis.

Project Development

- **Cost Associated with DoD Minimum AT Standards:**
  - **New construction: Consult with Cost Engineering**
  - **Major renovation work (50% Replacement Cost)**
    - ✓ The 50% cost is exclusive of the costs identified to meet the standards
  - **Note that a Seismic Risk Evaluation must be performed at 30% replacement value.**
- **Refer to MCON/MCNR Consistency Review Board (CRB) Guidelines & DD 1391 Development**
  - **Available on the portal: CI Programs > MILCON Program Office > Program Guidance**

RFP/Design Development

Validate and finalize the AT scope during preliminary design.

- Has the occupancy changed?
- Is there a desired Level of Protection requirement?
- Is there validated design basis threat?
- Include AT Minimum Standards, GCC AT Standards (where allowed per information security/sensitivity requirements) in RFPs/construction contracts.

Construction

Build Facility in accordance with the contract documents!

- Consider AT and GCC OPORD when evaluating any contract modifications
- Do not delete any AT Standard

Compliance

As the Design & Construction Agent for the Navy, NAVFAC ensures projects incorporate applicable DoD/Navy policies, building codes, and best practices. This includes the DoD Minimum Antiterrorism Standards for buildings and applicable GCC OPORD.

- **Project Development:**
  - Document and budget Antiterrorism and Security Requirements into DD 1391
- **RFP and Design Development:**
  - Validate planning requirements
  - Incorporate protective measures into contract documents
- **Construction:**
  - Ensure protective measures are provided in accordance with the contract documents (Plans and Specifications)

Enforcement

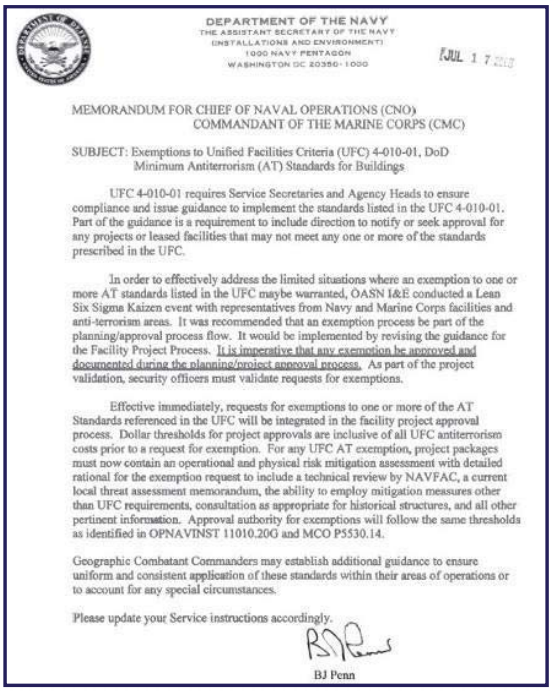
- **Joint Mission Assurance Assessment (MAA) teams conduct Joint Staff assessments to assist in identifying vulnerabilities and recommending options to reduce risk and improve mission assurance**
  - **Per DoD policy, DoD installations must have an assessment conducted approximately every three years per DoD D 3020.40 *Mission Assurance* DoD I 3020.45 *Mission Assurance Construct***
- **Higher Headquarters Assessments to include:**
  - **Geographic Combatant Commander (GCC) Assessment**
  - **Chief Naval Operations Mission Assurance Assessment (CNO-MAA)**
  - **Fleet**
  - **Navy Regional Assessments**

  All teams utilize the DoD and GCC construction Standards
- **Installation and associated tenant commands are to coordinate on the completion of the Corrective Action Plan, on identified vulnerabilities within 90 days of receipt of the final report.**

Exceptions, Exemptions, Variance, or Deviations

Penn Memo

- **Released 17 July 2008**
- **Directing CNO and CMC to implement process for obtaining exemptions**
- **Imperative that any exemption be approved during the planning process.**
- **Security officers must validate requests**
- **Operational and physical risk mitigation assessment must be included**
- **Approval authority for exemptions will follow thresholds identified in OPNAVINST 11010.20G/H and MCO P5530.14**
- **GCC may establish additional guidance to ensure unified and consistent application within their area of operation**



DEPARTMENT OF THE NAVY
THE ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

JUL 17

MEMORANDUM FOR CHIEF OF NAVAL OPERATIONS (CNO)
COMMANDANT OF THE MARINE CORPS (CMC)

SUBJECT: Exemptions to Unified Facilities Criteria (UFC) 4-010-01, DoD Minimum Antiterrorism (AT) Standards for Buildings

UFC 4-010-01 requires Service Secretaries and Agency Heads to ensure compliance and issue guidance to implement the standards listed in the UFC 4-010-01. Part of the guidance is a requirement to include direction to notify or seek approval for any projects or leased facilities that may not meet any one or more of the standards prescribed in the UFC.

In order to effectively address the limited situations where an exemption to one or more AT standards listed in the UFC maybe warranted, OASN I&E conducted a Lean Six Sigma Kaizen event with representatives from Navy and Marine Corps facilities and anti-terrorism areas. It was recommended that an exemption process be part of the planning/approval process flow. It would be implemented by revising the guidance for the Facility Project Process. It is imperative that any exemption be approved and documented during the planning/project approval process. As part of the project validation, security officers must validate requests for exemptions.

Effective immediately, requests for exemptions to one or more of the AT Standards referenced in the UFC will be integrated in the facility project approval process. Dollar thresholds for project approvals are inclusive of all UFC antiterrorism costs prior to a request for exemption. For any UFC AT exemption, project packages must now contain an operational and physical risk mitigation assessment with detailed rational for the exemption request to include a technical review by NAVFAC, a current local threat assessment memorandum, the ability to employ mitigation measures other than UFC requirements, consultation as appropriate for historical structures, and all other pertinent information. Approval authority for exemptions will follow the same thresholds as identified in OPNAVINST 11010.20G and MCO P5530.14.

Geographic Combatant Commanders may establish additional guidance to ensure uniform and consistent application of these standards within their areas of operations or to account for any special circumstances.

Please update your Service instructions accordingly.

BJ Penn

OPNAVINST 11010.20H Facilities Project Manual 16 May 2014 (Change 1, 24 June 2015)

ASN(EI&E) has authorized an exemption process per ASN(EI&E) memorandum to CNO and the Commandant of the Marine Corps of 17 July 2008, Exemptions to UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings.

1) **Requests for exemptions shall be integrated in the project approval process.**
2) **Project packages must contain an operational and physical risk mitigation assessment with detailed rationale for the exemption request to include:**
   - **Technical review by NAVFACENGCOM,**
   - **Current local threat assessment memorandum,**
   - **Ability to employ mitigation measures other than UFC requirements,**
   - **Consultation as appropriate for historical structures, and all other pertinent information.**
3) **GCCs may establish additional guidance to ensure uniform and consistent application of these standards within their areas of operations.**

- **Ensure that all new construction projects meet or exceed minimum construction standards in UFC 4-010-01 to mitigate possibility of a terrorist attack, and to lessen the effects of a terrorist attack should one occur.**
- **Exceptions, waivers, variances, or deviations will be submitted, reviewed, and endorsed, by NAVFACENGCOM prior to submission to DCNO (N3/N5) (afloat) and Director, Shore Readiness (OPNAV (N46)) (ashore). Prior to forwarding, NAVFACENGCOM will coordinate with the respective NCC/echelon 2 commander to ensure GCC AT/CIP requirements are addressed.**

TAKE AWAYS

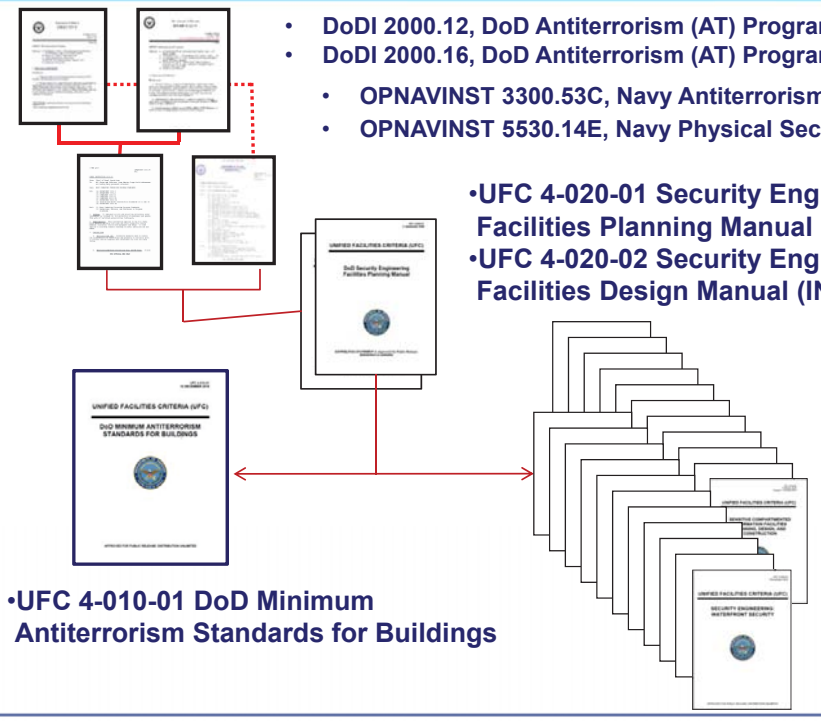
1. **We have Unified Criteria for Antiterrorism and Physical Security**
2. **The Criteria is risk based**
3. **The Criteria is reasonable and implemental**
4. **<u>The Criteria requires input during project development.</u>**
5. **Work with your Regional/Installation Security and Antiterrorism Personnel to ensure project meets the AT and Physical Security requirements.**

Security Engineering Courses

U.S Army Corps of Engineers
Security Engineering Course (Five days training)
https://www.nwo.usace.army.mil/About/Centers-of-Expertise/Protective-Design-Center/PDC-Training/

NAVFAC
Security Engineering Planning Assistance Training (SEPAT) (Five days training)
https://www.navfac.navy.mil/navfac_worldwide/specialty_centers/exwc/products_and_services/capital_improvements/dod_lock/SEP.html

DoD Policy and Security Engineering Criteria



- DoDI 2000.12, DoD Antiterrorism (AT) Program
- DoDI 2000.16, DoD Antiterrorism (AT) Program Implementation (2 Vols)
  - OPNAVINST 3300.53C, Navy Antiterrorism Program
  - OPNAVINST 5530.14E, Navy Physical Security and Law Enforcement

•UFC 4-020-01 Security Engineering Facilities Planning Manual
•UFC 4-020-02 Security Engineering Facilities Design Manual (IN DRAFT)

•UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

Antiterrorism & Security Engineering Unified Facilities Criteria

Security Engineering Unified Facility Criteria

MULTIDISCIPLINE	
4-020-01	Security Engineering Facilities Planning Manual
4-020-02	Security Engineering Facilities Design Manual
4-010-01	DoD Minimum Antiterrorism Standards for Buildings
4-010-02	ARCHIEVED
4-010-03	Security Engineering: Physical Security Measures for High Risk Personnel
4-010-05	Sensitive Compartmented Information Facilities

SITE DEVELOPMENT/BUILDING LAYOUT	
4-022-01	Entry Control Facilities/Access Control Points
4-022-02	Selection and Application of Vehicle Barriers
4-022-03	Security Engineering: Fences and Gates
4-025-01	Security Engineering: Waterfront Security
4-026-01	Security Engineering Design to Resist Forced Entry
4-026-02	Design for Mitigating Acoustic Emanations
4-027-01	Design of Deployed Operational Bases to Mitigate Terrorist Attacks
4-028-01	Critical Infrastructure Planning Manual

Published Documents Available On the Whole Building Design Guide Website at:

http://WWW.WBDG.ORG

Security Engineering Unified Facility Criteria

STRUCTURAL/WEAPONS EFFECTS	
4-023-01	Structural Design to Resist Explosives Effects for New Buildings
4-023-02	Retrofit of Existing Buildings to Resist Explosive Effects
4-023-03	Design of Buildings to Resist Progressive Collapse
4-023-04	Design of Windows to Resist Blast, Ballistic, and Forced Entry
4-023-06	Design of Mail Rooms, Delivery Points, and Building Entrances to Resist Explosive Effects
4-023-07	Design to Resist Direct Fire Weapons Effects
4-023-08	Design to Resist Indirect Fire Weapons Effects
4-023-10	Design for Safe Havens

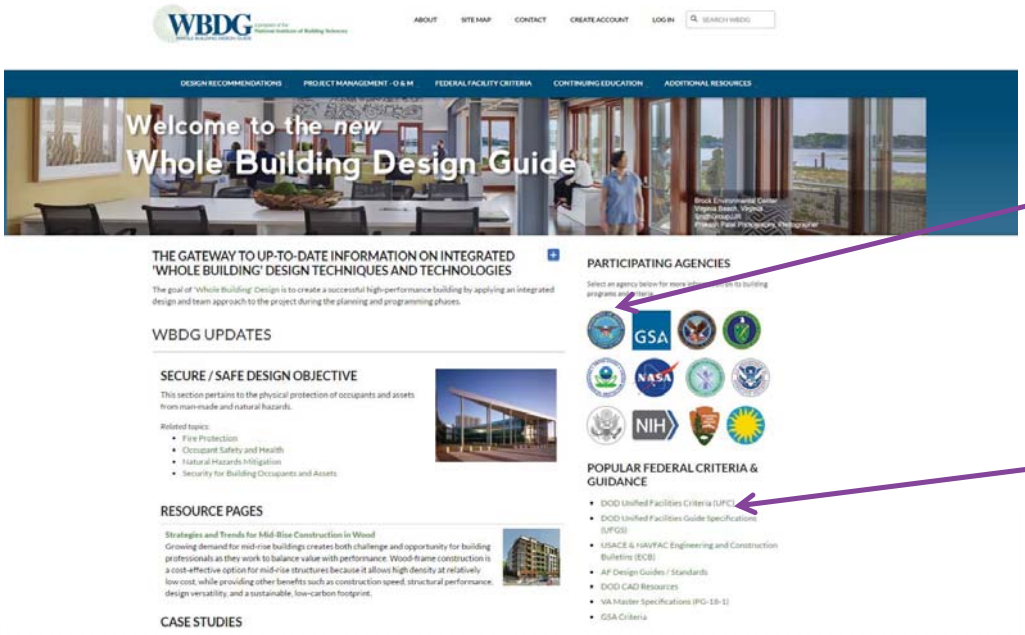
ELECTRICAL	
4-021-01	Mass Notification Systems, Design and O&M
4-021-02NF	Security Engineering: Design of Electronic Security Systems
4-026-03	Design of Shielding for Reducing Electronic Emanations

CHEMICAL/BIOLOGICAL	
4-024-01	Procedures for Designing Airborne Chemical, Biological, and Radiological Collective Protection for Buildings
4-024-05	Design to Protect Against Waterborne Chemical, Biological, and Radiological Contaminants

Published Documents Available On the Whole Building Design Guide Website at:

http://WWW.WBDG.ORG

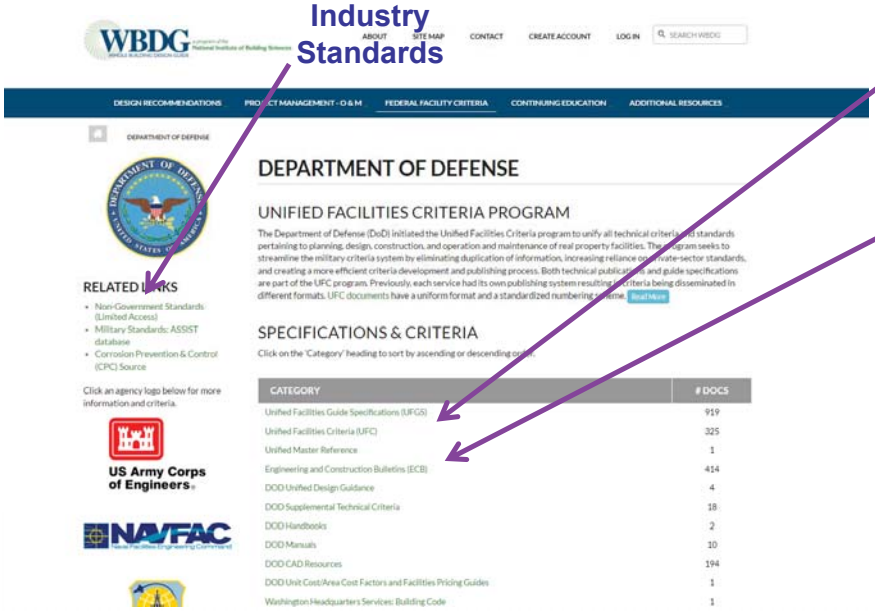
WBDG – DoD Criteria



DoD Page Link

UFC UFGS

WBDG – DoD Criteria



Industry Standards

UFC/UFGS

ECBs

WBDG – Training & Seminars

- From the previous slide
- Click on DOD
- Click on NAVFAC
- Click on Training & Seminars
- Click on "Antiterrorism and Security Engineering Unified Facilities Criteria Seminars

- Physical Security and Protective Measures
- AT Standards
- Secure Facilities
- SCIF
- Security Planning
- Electronic Security Systems
- Waterfront Security
- Budget and Cost Tools for ESS and Gate Automation (ECF/ACP)

NAVFAC AT POC

NAVFAC Marianas AT and SE Criteria questions:

Noel Ocampo
noel.ocampo@fe.navy.mil
(671) 333-3164

Thanks!

NAVFAC Atlantic:

John Lynch, PE
john.j.lynch@navy.mil
(757) 322-4207

Richard Cofer, PE
richard.cofer@navy.mil
(757) 322-4447

NAVFAC Naval Facilities Engineering Command