US DoD Antiterrorism Design Standards in Europe

Task
For Information

Purpose
• Educate engineers and antiterrorism (AT) staff unfamiliar with AT design considerations on the DoD’s methodology
• Explain 2018 design criteria updates, and implementing guidance for Europe published in July 2019

End State
• Familiarity with applicable AT design criteria and methodologies in order to reference and apply to building design projects for US DoD in Europe
Agenda

• Reason for AT Design
• AT Requirement Sources
• Minimum AT Standards
• Additional Requirement Sources

• Facility Design Basis Threat
• Lessons Learned
• Engineer Resources
Reason for AT Design
Reason for AT Design, Recent Trends

ISIS’ TERROR CAMPAIGN IN EUROPE

Since 2013, there have been 251 ISIS-linked incidents in 18 countries

Most notably, there have been 63 in France, 42 in the U.K., and 42 in Germany

ISIS-LINKED PLOTS AGAINST THE WEST SINCE 2013

84 cases where ISIS used or attempted to build or use EXPLOSIVES

60 cases where ISIS used an EDGED WEAPON

23 cases where ISIS used a VEHICLE as a weapon

This document is produced by the Majority Staff of the House Homeland Security Committee. It is based on information culled from open source materials. Plots and attacks utilizing multiple weapons are included in the totals for each weapon.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Method</th>
<th>Killed</th>
<th>Injured</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>Beirut Barracks</td>
<td>VBEIDs 7k kg/15k lb</td>
<td>307</td>
<td>75</td>
<td>Standoff &amp; barriers</td>
</tr>
<tr>
<td>1993</td>
<td>WTC</td>
<td>VBIED 606 kg/1,336 lb</td>
<td>6</td>
<td>1042</td>
<td>Underground parking</td>
</tr>
<tr>
<td>1995</td>
<td>Murrah Federal Building, OKC</td>
<td>VBIED at 15 ft. 2,000 kg/4,800 lb</td>
<td>168</td>
<td>258</td>
<td>Progressive collapse</td>
</tr>
<tr>
<td>1996</td>
<td>Khobar Towers, Saudi Arabia</td>
<td>VBIED at 72 ft. 11,000 kg/25,000 lb</td>
<td>20</td>
<td>498</td>
<td>AT Design Codes and MWN</td>
</tr>
<tr>
<td>2001</td>
<td>WTC</td>
<td>Aircraft</td>
<td>2,996</td>
<td>6,000+</td>
<td>Emergency management</td>
</tr>
<tr>
<td>2008</td>
<td>Mumbai (12)</td>
<td>Firearms and IEDs</td>
<td>166</td>
<td>308</td>
<td>Coordinated attacks</td>
</tr>
<tr>
<td>2014</td>
<td>Peshawar Army Public School</td>
<td>Firearms</td>
<td>141</td>
<td>114</td>
<td>Children (132)</td>
</tr>
<tr>
<td>2017</td>
<td>OKC, BancFirst</td>
<td>VBIED 453 kg/1000 lb</td>
<td>0</td>
<td>0</td>
<td>Persistent tactics</td>
</tr>
</tbody>
</table>
Reason for AT Design, U.S. Army Europe

- 100,000 U.S. personnel
- $10.2 billion in assets
- $245 million construction / year
  - AT Design Considerations
- Building design lives 25-50+ years
Reason for AT Design, Private Sector

- Buildings serving governments and other high-profile institutions
e.g. banks, hotels
AT Requirement Sources
• Evolution of DoD AT Requirements
  - 1999: Interim after Khobar findings
  - 2002: First version of UFC 4-010-01
  - 2003: Standoff per 25 m & 45 m
  - 2007: Minor changes
  - 2012: Standoff per bldg. materials
  - 2013: Minor changes
  - 2018: VBIED threat tactic eliminated

*Green text in following slides denote changes from 2018 update*
AT Requirement Sources, Intent

• Intent
  - Minimize mass casualties
  - 2018: Reduce collateral damage

• Standardization
  - Reduce subjectivity for reasonable and justifiable levels of threat and protection

“While baseline threats are less than some of the terrorist attacks that have been directed against US personnel in the past, they represent more severe threats than a majority of historical attacks. It would be cost prohibitive to provide protection against the worst case scenario in every building” - DoDEA
AT Requirement Sources

• DoD Facilities
  - Unified Facilities Criteria (UFC)
    - UFC 4-010-01 & 02 DoD Minimum Antiterrorism Standards for Buildings
    - UFC 4-010-03 Security Measures for High-Risk Personnel
    - UFC 4-020-02 DoD Security Engineering Facilities Design Manual
    - UFC 4-021-01 Mass Notification Systems
    - UFC 4-022-01 Access Control Points
    - UFC 4-022-02 Selection of Vehicle Barriers
  - Theater and Agency Supplements
    - U.S. European Command AT Operation Order 18-11
    - FRAGORD 001 to USEUCOM AT OPORD 18-11
    - U.S. Central Command AT Operations Order 05-02
    - Army Europe Regulation 525-13 Antiterrorism
    - IMCOM-Europe Guidelines for Offices
    - DoDEA, Physical Security & Antiterrorism Guide
    - NATO ACO Directive 80-25 Force Protection
    - Army Standard for Access Control Points, April 2012
Minimum AT Standards for Buildings
UFC 4-010-01
12 DEC 2018
Minimum AT Standards, Introduction

• Applicability:
  - New Construction
  - Existing Buildings
    - Major Investments
    - Change of Occupancy
    - Window & HVAC Replacement Projects
    - New US DoD inhabitancy
  - Expeditionary Structures
  - Leased Buildings
  - Others...

• Exceptions:
  - “Low Occupancy” Buildings (<11 people)
  - Not Routinely Occupied
  - “Transitional” and “Temporary” Structures
  - Others...
Minimum AT Standards, Introduction

- **UFC 4-020-01** MUST be used to determine the Design Basis Threat (DBT) and Level Of Protection (LOP) for each project.

- Use **UFC 4-010-01 only when UFC 4-020-01 facility DBT process results in no identified threat or level of protection**

- **Assumptions:**
  - Only asset is people
  - U.S. threat environment
  - Facility will not be targeted by VBIED during its design life (25-50+ years)
Minimum AT Standards, 2018 Changes

• DoD intent of 2018 Changes:
  - Focus DoD resources on facilities with higher value and higher risks
  - **Reduce the cost** of construction
  - Promote land use efficiencies

• Philosophy shifts (assumed)
  - Economy of providing AT foundation
  - Dynamics of threat environment and building criticality
  - ACP capabilities
Minimum AT Standards, 2018 Changes

- **Summary of 2018 Changes**
  - Eliminated VBIED as minimum threat scenario
  - Only protects occupants from collateral damage of VBIEDs targeting other buildings
  - Progressive collapse considerations no longer required for existing buildings
  - Appendix B and C (extensive and includes windows)

*Not Applicable in USEUCOM AOR, see slides 29-31*
Minimum AT Standards, 2018 Changes

• Impact
  - Less forgiving for omissions and errors of AT topics in project development
  - Increased importance of AT stakeholder involvement
  - Increased importance of performance and accuracy of facility DBT
  - Increased importance of blast design
  - Less accommodating for future changes to threat environment and building criticality

*Not Applicable in USEUCOM AOR, see slides 29-31*
Minimum AT Standards, Overview

- UFC 4-010-01 Standards
  - Site Planning
    - 1: Standoff Distances
    - 2: Unobstructed Space
    - 3: Drive-Up/Drop-Off Areas
    - 4: Access Roads
    - 5: Parking Beneath Buildings or on Rooftops
  - Architectural Design
    - 10: Windows and Skylights
    - 11: Building Entrance Layout
    - 12: Exterior Doors
    - 13: Mail Rooms and Loading Docks
    - 14: Roof Access
    - 15: Overhead Mounted Architectural Features
  - Structural Design
    - 6: Progressive Collapse Resistance
    - 7: Structural Isolation
    - 8: Building Overhangs and Breezeways
    - 9: Exterior Masonry Walls
  - Electrical & Mechanical Design
    - 16: Air Intakes
    - 17: Mail Room and Loading Dock Ventilation
    - 18: Emergency Air Distribution Shutoff
    - 19: Equipment Bracing
    - 20: Under Building Access
    - 21: Mass Notification

*Not Applicable in USEUCOM AOR, see slides 29-31*
- **Std. 1: Standoff Distances**
  - No standoff requirements from roadways and parking within controlled perimeter
  - Required standoff to perimeter varies by situation from 6 to 15 m
  - Perimeter standoff not required for existing buildings

- **Std. 2: Unobstructed Space**
  - Unobstructed space set to 10 m, parking allowed

- **Std. 3: Drive-Up/Drop-Off Areas**
- **Std. 4: Access Roads**
  - Eliminated restrictions for access roads, etc.

*Not Applicable in USEUCOM AOR, see slides 29-31*
Minimum AT Standards, Std. 6 Prog. Collapse

- Std. 6: Progressive Collapse
  - Localized failure => overloading and failure of adjoining members
  - Disproportionate damage
  - Required for new buildings ≥ 3 stories
• **Progressive Collapse**
  - UFC 4-023-03, Design of Buildings to Resist Progressive Collapse
  - ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures
  - ACI 318-14, Building Code Requirements for Structural Concrete and Commentary
  - International Building Code 2015
Minimum AT Standards, Std. 10 Windows

Building Inspection Area

Legend

- A. P. Murrah Federal Building
- Collapsed Structure
- Structural Damage
- Broken Glass/Doors

Approximate Scale: 1" = 1,300'
Note: Undamaged structures are not shown on this map
Minimum AT Standards, Std. 10&12 Windows & Doors

- **Std. 10:** Windows no longer designed for blast; prescribed minimum of 6 mm laminated glass
- **Std. 12:** Doors no longer designed for blast; need only open outwards

*Not Applicable in USEUCOM AOR, see slides 29-31*
Minimum AT Standards, Std. 10 Windows

- Windows often govern required LOP standoff distance, not wall material type
- Also considering frame anchoring and wall strength adequacy

Windows often govern required LOP standoff distance, not wall material type. Also considering frame anchoring and wall strength adequacy.
Minimum AT Standards, Stds. 15 & 19

- Std. 15: Overhead Mounted Architectural Features

- Std. 19: Equipment Bracing (e.g. HVAC components)

- Lateral loading design requirements for features ≥ 14 kg
Minimum AT Standards, Std. 21

- **Std. 21: Mass Notification**
  - Notify building occupants of threats
  - Provide instructions for response
  - Both with microphone and pre-recorded messages
  - Minimum of two local operating consoles per building
  - Capability for remote location control
  - **UFC 4-021-01**
Minimum AT Standards, Overview

- **UFC 4-010-01 Standards**
  - Site Planning
    - 1: Standoff Distances
    - 2: Unobstructed Space
    - 3: Drive-Up/Drop-Off Areas
    - 4: Access Roads
    - 5: Parking Beneath Buildings or on Rooftops
  - Structural Design
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    - 19: Equipment Bracing
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    - 21: Mass Notification

*Not Applicable in USEUCOM AOR, see slides 29-31*
Additional Requirement Sources
Theater Specific Requirements

- U.S. European Command (EUCOM) AT Operations Order 18-11
- FRAGORD 001 published 14JUL2019 contains complete revision to Annex D, Antiterrorism Construction Standards
  - Reinforces requirement to perform facility DBT per UFC 4-020-01
  - Specifies threat and protection thresholds
  - Requires unique aggressors & additional tactics
  - Provides implementing guidance e.g. building additions
  - Requires document submissions throughout project lifecycle
  - Provides guidance on fragment retention film (FRF) retrofits
  - Establishes ballistic rating requirements

UNCLASSIFIED/FOUO
HEADQUARTERS
UNITED STATES
EUROPEAN COMMAND

ANTITERRORISM
OPERATIONS ORDER
18-11

Signed and Published: 1 November 2018

UNCLASSIFIED/FOUO

Scott Turygan, P.E. / USAREUR G34 AT
314-537-3131 / scott.d.turygan.civ@mail.mil

As of: 18 Sep 19
Theater Specific Requirements

- **EUCOM Specified Threat and Protection Thresholds**
  - EUCOM maintains vehicle borne improvised explosive device (VBIED) threats as a minimum AT design standard for inhabited buildings
  - Explosive weights (see FRAGORD 001 for U//FOUO weight values):
    - X kilograms (X pounds) within an access controlled installation
    - X kilograms (X pounds) outside an access controlled installation
  - **Stationary and Moving VBIEDs**
    - Facilities requiring a “very low” level of protection (LOP) (as determined by facility DBT) must mitigate against only stationary VBIED threats
    - Facilities requiring a “low” and higher LOP (as determined by facility DBT) must mitigate against stationary and moving VBIED threats
    - Inhabited buildings routinely occupied by 50 or more DoD personnel must mitigate against stationary and moving VBIED threats
    - Vehicle **barrier design guidance** provided e.g. minimum dimensions and embedment
Theater Specific Requirements

- EUCOM Specified Threat and Protection Thresholds, ctd.
  - Protection from VBIEDs
    - Inhabited buildings must provide occupants no less than a “very low” LOP
    - Inhabited buildings routinely occupied by 50 or more DoD personnel must provide occupants no less than a “low” LOP
    - Protective performance criteria for building damage and human injury are defined in Table B-1 (pg. 42) of UFC 4-010-01
  - Impact
    - Standoff distance is required from inhabited buildings to all roadways and parking spaces
    - Passive and active vehicle barriers at standoff threshold
    - Window and door properties must be uniquely designed for each building project i.e. there is no standard minimum window type
    - Reference Appendix B of current UFC 4-010-01, and Standards 1, 2, 3, 4, 10, and 12 of the previous UFC 4-010-01 (February 2012 with Change 1 October 2013) for design guidance to protect buildings from VBIEDs
Minimum AT Standards in EUCOM AOR

- **UFC 4-010-01, DEC 2018**
  - Site Planning
    - 1: Standoff Distances
    - 2: Unobstructed Space
    - 3: Drive-Up/Drop-Off Areas
    - 4: Access Roads
    - 5: Parking Beneath Buildings or on Rooftops
  - Structural Design
    - 6: Progressive Collapse Resistance
    - 7: Structural Isolation
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    - 20: Under Building Access
    - 21: Mass Notification

*FRAGORD 001 to USEUCOM AT OPORD 18-11 affects design criteria of standards in red*
Minimum AT Standards in EUCOM AOR

*FRAGORD 001 to USEUCOM AT OPORD 18-11 affects design criteria of below standards*

- Std. 1: Standoff Distances
- Std. 2: Unobstructed Space
- Std. 3: Drive-Up/Drop-Off Areas
- Std. 4: Access Roads
- Std. 10: Windows and Skylights
- Std. 12: Exterior Doors
### Example Standoff Table from Appendix C of UFC 4-010-01 DEC 2018

**Table C-2 Representative Standoff Distances for Low Level of Protection**

<table>
<thead>
<tr>
<th>Construction</th>
<th>Explosive Weight (TNT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55 lbs (25 kg)</td>
</tr>
<tr>
<td>Unreinforced European Clay Masonry</td>
<td>LB 2</td>
</tr>
<tr>
<td>Unreinforced European Clay Masonry</td>
<td>38 ft (11 m)</td>
</tr>
<tr>
<td>Reinforced Masonry</td>
<td>28 ft (9 m)</td>
</tr>
<tr>
<td>Reinforced Concrete</td>
<td>22 ft (7 m)</td>
</tr>
<tr>
<td>Concrete roofs and Metal Roofs w/ concrete topping</td>
<td>13 ft (4 m)</td>
</tr>
<tr>
<td>Windows</td>
<td>51 ft (15 m)</td>
</tr>
<tr>
<td>Minimum Standoff Distance</td>
<td>13 ft (4 m)</td>
</tr>
</tbody>
</table>

*Standoff distance for windows and doors must be individually analyzed, and typically control (typically no less than 15 m)*
Theater Specific Requirements

• Army Europe Regulation 525-13 Antiterrorism

• **Appendix E**, Antiterrorism Construction Standards
  - Perimeter countermobility
  - Centralized parking & cantonment areas
  - Active shooter (UFC 4-023-10 Safe Havens)
  - Windows
  - Access Control Point (ACP) search procedures
  - Facility operation and response plan

• **Others** e.g. IMCOM-E, DOD EA
Facility Design Basis Threat
UFC 4-020-01
• UFC 4-020-01 DoD Security Engineering Facilities Planning Manual
  - Chapter 3 describes steps to perform facility design basis threat (DBT)
  - Risk-asset management to establish protection thresholds
  - Chapter 4 describes design strategies
  - Appendixes list cost impacts
Facility DBT

- **UFC 4-020-01 Chapter 3, Design Criteria Development**
  - **Risk** is function of **criticality, threat, and vulnerability**
  - Step 1: Convene the planning team
  - Step 2: Identify assets
  - Step 3: Determine **asset value**
  - Step 4: Identify **aggressor likelihoods**
  - Step 5: Identify **tactics** and threat **severity** levels
  - Step 6: Consolidate into initial **design basis threat (DBT)**
  - Step 7: Determine initial **level of protection (LOP)**
  - Step 8: Determine planning risk levels
  - Step 9: Assess acceptability of risk levels
  - Step 10: Identify user constraints
Facility DBT

• **UFC 4-020-01 Chapter 3, Design Criteria Development**
  - Step 1: Convene the planning team
    - Engineer(s)
    - Facility User(s)
    - Antiterrorism Officer
    - Military Intelligence
    - Project Manager
    - Master Planner
    - Etc.
### Facility DBT

- **UFC 4-020-01 Chapter 3, Design Criteria Development**
  - Step 2: Identify assets

#### Design Criteria Summary Worksheet

<table>
<thead>
<tr>
<th>Building or Project</th>
<th>Analyst</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tactical</th>
<th>Explosive and Incendiary Devices</th>
<th>Standoff Weapons</th>
<th>Entry Tactics</th>
<th>Surveillance and Eavesdropping</th>
<th>Contamination</th>
<th>Water Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBT</td>
<td>Moving Vehicle Bomb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Stationary Vehicle Bomb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Hand Delivered Devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Indirect Fire Weapons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Direct Fire Weapons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Forced Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Covert Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Visual Surveillance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Acoustic Eavesdropping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Electronic Eavesdropping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Cyber Eavesdropping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Airborne Contamination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBT</td>
<td>Waterborne Contamination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>Waterfront Contamination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assets**

<table>
<thead>
<tr>
<th>Asset Number</th>
<th>Asset Category</th>
<th>Asset Value Rating</th>
<th>DBT</th>
<th>IOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Population</td>
<td>0.60</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>2</td>
<td>Mission Critical PAX</td>
<td>0.60</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td>L</td>
</tr>
</tbody>
</table>

[1] See BORE worksheet for this asset. Multiple areas exist for this tactic and have different DBT/LOPs.
Facility DBT, Asset Value

• UFC 4-020-01 Chapter 3, Design Criteria Development
  - Step 3: Determine asset value
  - Work through a series of tables to compute
    - Table 3-4. Criticality to User / Mission Impact / Population Type
    - Table 3-5. Impact on National Defense
    - Table 3-6. Asset Replacement
    - Table 3-7. Perceived Political Sensitivity
    - Table 3-8. Relative Value to User
## Facility DBT, Asset Value

### Table 3-8. Relative Value to User

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Measure of Relative Value</th>
<th>Relative Value</th>
<th>Value Rating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Population</td>
<td>Number of people present in facility</td>
<td>Number of people in the facility is less than 11</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 11 to 49</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 50 to 100</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 101 to 500</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is 501 to 1000</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of people in the facility is greater than 1000</td>
<td>5</td>
</tr>
</tbody>
</table>
Facility DBT, Example Worksheet

<table>
<thead>
<tr>
<th>Value Rating Factors</th>
<th>Aggressor</th>
<th>Likelihood Rating Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Infrastructure and Operations and Activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Elected Official</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Other Keynotes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Value Rating Factors

- Criticality to User
- Population Type
- Impact on National Defense
- Replaceability
- Political Sensitivity
- Relative Value to User
- Sum of Value Factors

Value Rating 1: 19
Value Rating 2: .76
### Facility DBT, Levels of Protection

#### Table 3-28. Applicable Levels of Protection

<table>
<thead>
<tr>
<th>Tactic</th>
<th>Threat Severity Level</th>
<th>Asset Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 0.5</td>
<td>0.51 – 0.74</td>
</tr>
<tr>
<td>Moving Vehicle Bomb</td>
<td>Very Low¹</td>
<td>Medium</td>
</tr>
<tr>
<td>Stationary Vehicle Bomb</td>
<td>Very Low¹</td>
<td>Low²</td>
</tr>
<tr>
<td>Hand Delivered Devices</td>
<td>Very Low¹</td>
<td>Medium</td>
</tr>
<tr>
<td>indirect Fire Weapons</td>
<td>Very Low¹</td>
<td>Low²</td>
</tr>
<tr>
<td>Direct Fire Weapons</td>
<td>Very Low¹</td>
<td>Low²</td>
</tr>
<tr>
<td>L, M, H</td>
<td>Very Low¹</td>
<td>Low²</td>
</tr>
<tr>
<td>Forced Entry</td>
<td>Very Low¹</td>
<td>Low</td>
</tr>
<tr>
<td>Covert Entry</td>
<td>Very Low¹</td>
<td>Low</td>
</tr>
<tr>
<td>Visual Surveillance</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Acoustic Eavesdropping</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Electronic Emanations Eavesdropping</td>
<td>Low ³</td>
<td>Medium</td>
</tr>
<tr>
<td>Airborne Contaminants</td>
<td>Very Low¹</td>
<td>Low</td>
</tr>
<tr>
<td>Waterborne Contaminants</td>
<td>Very Low¹</td>
<td>Low</td>
</tr>
<tr>
<td>Waterfront Attack</td>
<td>Very Low¹</td>
<td>Low</td>
</tr>
</tbody>
</table>
### Facility DBT, Protection Parameters

<table>
<thead>
<tr>
<th>Level of Protection</th>
<th>Potential Building Damage/Performance</th>
<th>Potential Door and Glazing Hazards</th>
<th>Potential Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Below AT standards</strong></td>
<td><em>Sever damage. Progressive collapse likely. Space in and around damaged area will be unusable.</em></td>
<td>*Windows will fail catastrophically and result in lethal hazards. <em>(High hazard rating)</em> *Doors will be thrown into rooms. <em>(Category V)</em></td>
<td><em>Majority of personnel in collapse region suffer fatalities. Potential fatalities in areas outside of collapsed area likely.</em></td>
</tr>
<tr>
<td><strong>Very Low</strong></td>
<td><em>Heavy damage - Onset of structural collapse, but progressive collapse is unlikely. Space in and around damaged area will be unusable.</em></td>
<td>*Glazing will fracture, come out of the frame, and is likely to be propelled into the building, with potential to cause serious injuries. <em>(Low hazard rating)</em> *Doors will become dislodged from the structure but will not create a flying debris hazard. <em>(Category IV)</em></td>
<td><em>Majority of personnel in damaged area suffer serious injuries with a potential for fatalities. Personnel in areas outside damaged area will experience minor to moderate injuries.</em></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><em>Moderate damage – Building damage will not be economically repairable. Progressive collapse will not occur. Space in and around damaged area will be unusable.</em></td>
<td>*Glazing will fracture, potentially come out of the frame, but at reduced velocity, does not present a significant injury hazard. <em>(Very low hazard rating)</em> *Doors will experience non-catastrophic failure, but will have permanent deformation and may be inoperable. <em>(Category III)</em></td>
<td><em>Majority of personnel in damaged area suffer minor to moderate injuries with the potential for a few serious injuries, but fatalities are unlikely. Personnel in areas outside damaged areas will potentially experience minor to moderate injuries.</em></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><em>Minor damage – Building damage will be economically repairable. Space in and around damaged area can be used and will be fully functional after cleanup and repairs.</em></td>
<td>*Glazing will fracture, remain in the frame and results in a minimal hazard consisting of glass dust and shivers. <em>(Minimal hazard and No Hazard ratings)</em> *Doors will be operable but will have permanent deformation. <em>(Category II)</em></td>
<td><em>Personnel in damaged area potentially suffer minor to moderate injuries, but fatalities are unlikely. Personnel in areas outside damaged areas will potentially experience superficial injuries.</em></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td><em>Minimal damage. No permanent detorations. The facility will be immediately operable.</em></td>
<td>*Innermost surface of glazing will not break <em>(No Break hazard rating)</em> *Doors will be substantially unchanged and fully operable. <em>(Category I)</em></td>
<td><em>Only superficial injuries are likely.</em></td>
</tr>
</tbody>
</table>

#### Medium LOP to blast event
- **Building:** minor damage, repairable
- **Glazing:** fracture, but remain in frame
- **Human:** injuries, but fatalities unlikely
Facility DBT, Aggressor Likelihood

- UFC 4-020-01 Chapter 3, Design Criteria Development
  - Step 4: Identify **aggressor likelihoods**
  - **Work through another series of tables to compute**
    - Table 3-10. Asset Location
    - Table 3-11. Installation or Facility Publicity Profile
    - Table 3.12 **Asset Accessibility**
    - Table 3-13. Asset Availability
    - Table 3-14. Asset Dynamics
    - Table 3-15. Recognizability
    - Table 3-16. Relative Value to Aggressors
    - Table 3-17. **Law Enforcement Personnel Visibility**
    - Table 3-18. Aggressors’ Perception of Success
    - Table 3-19. **Threat Level**
    - Table 3-20. History of Acts Against Like Assets / Terrorist Intention
    - Table 3-21. Terrorist **Operational Capability**
    - Table 3-22. Terrorist Operating Environment
    - Table 3-23. Terrorist Activity
### Facility DBT, Aggressor Likelihood

#### Table 3.12 Asset Accessibility

<table>
<thead>
<tr>
<th>Asset Location and Access Controls</th>
<th>Likelihood Rating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound to which access is controlled, the facility is in a separate access controlled compound interior of the installation, and there are no direct lines of sight to the facility from outside the installation</td>
<td>0</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound to which access is controlled and the facility is in the interior of the installation</td>
<td>2</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on a closed military installation or government compound to which access is controlled and the facility is within 100 meters of the installation perimeter</td>
<td>4</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on an open military installation or government compound to which access is not controlled and the facility is in the interior of the installation</td>
<td>6</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is on an open military installation or government compound to which access is not controlled and the facility is within 100 meters of the installation perimeter</td>
<td>8</td>
</tr>
<tr>
<td>The facility in which or at which the asset is located is not on a military installation or government compound</td>
<td>10</td>
</tr>
</tbody>
</table>
### Facility DBT, Example Worksheet

**ASSET VALUE/AGGRESSOR LIKELIHOOD WORKSHEET**

<table>
<thead>
<tr>
<th>Project or Building</th>
<th>Asset</th>
<th>Analyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Motor Pool</td>
<td>Tactical vehicles</td>
<td>Jane O. Planner</td>
</tr>
<tr>
<td></td>
<td>Asset Category D</td>
<td>Date 4 August 2008</td>
</tr>
</tbody>
</table>

#### General Population

- Unsophisticated Criminals: 94, 0.52
- Sophisticated Criminals: 91, 0.51
- Organized Criminal Groups: 97, 0.54

#### Critical Infrastructure and Operations and Activities

- Vandalism: 25, 0.47

#### Sensitive Information

- Extremist Protectors: 28, 0.49

#### All Other Assets

- International Terrorists: 116, 0.64
- Subversives: 91, 0.51
- Foreign Intelligence Services: 0.64

---

1. Population Type applies to General Population only.
2. Sum of Value Ratings = 10 for Sensitive Information; 15 for General Population; 20 for Critical Infrastructure and Operations and Activities; 25 for all other assets.
3. G for mission related goal, P for publicity related goal, M for monetary related goal.
4. Factors that should be same for all aggressors for given asset.
5. Applies to all aggressors other than terrorists.
6. Applies to Terrorists only.
7. Sum of Likelihood Ratings = 180.
## TACTIC, THREAT SEVERITY, AND LEVEL OF PROTECTION WORKSHEET

<table>
<thead>
<tr>
<th>Project or Building</th>
<th>Asset Tactical Vehicles</th>
<th>Analyst Jane Q. Planner</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Motor Pool</td>
<td></td>
<td></td>
<td>4 August 2008</td>
</tr>
</tbody>
</table>

### Aggressors

<table>
<thead>
<tr>
<th>Aggressor</th>
<th>Likelihood</th>
<th>Explosives and Incendiary Devices</th>
<th>Standoff Weapons</th>
<th>Entry</th>
<th>Surveillance and Eavesdropping</th>
<th>Contamination</th>
<th>Waterfall Attack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsophisticated Criminals</td>
<td>.52</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sophisticated Criminals</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organized Criminal Groups</td>
<td>.54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vandal</td>
<td>&lt; .5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extremist Protesters</td>
<td>&lt; .5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Terrorists</td>
<td>.57</td>
<td>L</td>
<td>m</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>International Terrorists</td>
<td>.64</td>
<td>L</td>
<td>m</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>State Sponsored Terrorists</td>
<td>.72</td>
<td>L</td>
<td>m</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Saboteur</td>
<td>.51</td>
<td>M</td>
<td>m</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Intelligence Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Design Basis Threat</td>
<td></td>
<td>L</td>
<td>m</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>Initial Level of Protection for Applicable Tactic (Table 3.28)</td>
<td></td>
<td>M</td>
<td>m</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>
## Facility DBT, Threat Parameters

Table 3-27  Threat Parameters

<table>
<thead>
<tr>
<th>Aggressor Tactic</th>
<th>Design Basis Threat</th>
<th>Weapons</th>
<th>Tools Or Delivery Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving and Stationary Vehicle Devices</td>
<td>Special Case ¹</td>
<td>9000 kg (19,800 lbs) TNT</td>
<td>18,000 kg / ~ 40,000 lbs truck</td>
</tr>
<tr>
<td></td>
<td>Very High</td>
<td>2000 kg (4400 lbs) TNT, Fuel</td>
<td>7000 kg / ~ 15,000 lbs truck</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>500 kg (100 lbs) TNT, Fuel</td>
<td>2500 kg / ~ 5500 lbs truck</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>250 kg (550 lbs) TNT, Fuel</td>
<td>1800 kg / ~ 4000 lbs car</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>100 kg (220 lbs) TNT</td>
<td>1800 kg / ~ 4000 lbs car</td>
</tr>
<tr>
<td></td>
<td>Very Low</td>
<td>25 kg (55 lbs) TNT</td>
<td>1800 kg / ~ 4000 lbs car</td>
</tr>
<tr>
<td>Hand Delivered Devices</td>
<td>High</td>
<td>IID, IED (up to 25 kg/55 lbs TNT) &amp; hand grenades (Mail bomb limited to 1 kg/2.2 lbs TNT)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>IID, IED (up to 1 kg/2.2 lbs TNT) &amp; hand grenades</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>IID</td>
<td>None</td>
</tr>
<tr>
<td>Indirect Fire Weapons Attack</td>
<td>Very High</td>
<td>Improvised mortar (up to 20 kg/44 lbs TNT)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>122 mm rocket</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>82 mm mortar</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Incendiary devices</td>
<td>None</td>
</tr>
<tr>
<td>Direct Fire Weapons Attack</td>
<td>Very High</td>
<td>Light antitank weapons, and UL 752 Level 10 (12.7 mm (0.50 caliber), 1 shot)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>UL 752 Level 19 (7.62mm NATO AP, 1 shot)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>UL 752 Level 5 (7.62mm NATO ball)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>UL 752 Level 13 (44 magnum)</td>
<td>None</td>
</tr>
</tbody>
</table>
Facility DBT, Protection Parameters

• UFC 4-020-01 Chapter 4, Design Strategies
  - Vehicle bomb tactics (stationary & moving)
  - Hand delivered devices
  - Indirect fire weapons
  - Direct fire weapons
    - Low LOP: block sightlines
    - High LOP: harden building elements (e.g. 4” RC for 7.62mm)
  - Airborne contamination tactic
  - Waterborne contamination tactic
  - Waterfront attack tactic
  - Forced entry tactic
    - Low LOP: 1 min. delay
    - High LOP: 15 min. delay
  - Covert entry tactic
  - Visual surveillance tactic
### Facility DBT, Example Worksheets

#### Asset Value Aggressor Likelihood Worksheet

<table>
<thead>
<tr>
<th>Building or Project</th>
<th>Asset</th>
<th>Analyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Critical PAX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Asset Category:** Mission critical personnel

<table>
<thead>
<tr>
<th>General Population</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Infrastructure and Operations and Activities</td>
<td>Unsophisticated Criminals</td>
<td>Sophisticated Criminals</td>
</tr>
<tr>
<td>Sensitive Information</td>
<td>Vandals</td>
<td>Extremist Protest Groups</td>
</tr>
<tr>
<td>All Other Assets</td>
<td>Domestic Terrorists</td>
<td>International Terrorists</td>
</tr>
</tbody>
</table>

| Value Rating Factors | | Value Rating Factor | | |
|----------------------|----------------------|----------------------|
| Criticality to User | Impact on National Defense | Repeatability | Relative Value to User |
| | | | |

#### Likelihood Rating Factors

- **Likelihood of Attack:** 0.46
- **Score:** 83
- **Score of Method Factors:** 0.46
Application and Lessons Learned
Application and Lessons Learned

- **AT engagement required throughout entire project lifecycle**

- **Planning**
  - Often inadequate AT planning documents e.g. DD1391 Tab G and facility DBT
  - Often improperly using minimum AT standards without facility DBT justification

- **Design**
  - 35/65/95% design reviews by security engineering trained staff

- **Construction**
  - Submittal reviews e.g. windows, barriers
  - Affect of modifications on AT features e.g. underground utilities and barrier spacing

- **Facility occupancy**
  - Operational plans, training, and exercises for AT features e.g. HVAC, MWNS, unobstructed space, barriers
Lessons Learned

- Installation DBT vs. Facility DBT
- DBT bomb size per installation search procedures
- Standoff, walls vs. windows
- Fragment retention film retrofits
  - Anchorage & rating, design life limitations
USAREUR AT Mitigation Efforts

- Across 51 countries
  - **Variation** of aggressor types and tactics
- Design facilities to deter, “Hard Targets”
  - Access controlled installations
  - Standoff and obstructed lines of sight
  - Deterring facility features
  - Random antiterrorism measures
- Design facilities to **protect**
  - **Threat severity** per aggressor likelihood
  - **Protective performance** per asset value
  - **Layers** of physical features and operational procedures
Holistic Approach

- Defense in depth
  - Deter
  - Detect
  - Deny
  - Delay
  - Defend
- Sitework, building, equipment, operations
- Multiple disciplines
- Regular assessments
References and AT Engineer Resources

• Engineering
  - Whole Building Design Guide, Unified Facilities Criteria Library
  - U.S. Army Corps of Engineers, Protective Design Center
    - Software (facility DBT, blast analysis, structural member and windows analysis), Engineering Technical Letters & Reports, UFCs, Std. Drawings, DoD Anti-Ram Vehicle Barrier List
  - FEMA 426, Ref. Manual to Mitigate Potential Terrorist Attacks Against Buildings
  - USEUCOM Antiterrorism Operations Order 18-11 and FRAGORD 001
  - US Army Europe Regulation 525-13 Antiterrorism
  - Joint Forward Operations Base, Protection Handbook (GTA 90-01-011)
  - Department of Homeland Security, Interagency Security Committee Standards
  - U.S. Department of State, Foreign Affairs Manuals and Handbooks

• Threat
  - West Point, Combatting Terrorism Center
  - University of Maryland, Global Terrorism Database
  - Terrorism Research Initiative, Perspectives on Terrorism
  - Department of Homeland Security, National Terrorism Advisory System
  - Homeland Security Committee and Terror Threat Map (interactive)
Agenda

- Reason for AT Design
- AT Requirement Sources
- Minimum AT Standards
- Additional Requirement Sources
- Facility Design Basis Threat
- Lessons Learned
- Engineer Resources
Questions & Discussion

"Without deep engagement in the world, America would face more conflict, not less - and on the terms of our adversaries, not on our own terms. That is why America's commitment to its allies - in Europe and around the world - is not a burden ... it's not a luxury, but it is a necessity. And it must be unwavering.”

- Secretary of Defense Chuck Hagel
May 2, 2014

45 Years of Terrorism
Terrorist Attacks, 1970-2015
Concentration and Intensity
High
Intensity value is a combination of incident fatalities and injuries
Low
Source: Global Terrorism Database
Contact

Scott Turygan, P.E.
Civil Engineer, Antiterrorism
USAREUR G34 Protect

Bldg 1000 (MCC), Room 3W01 B4

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