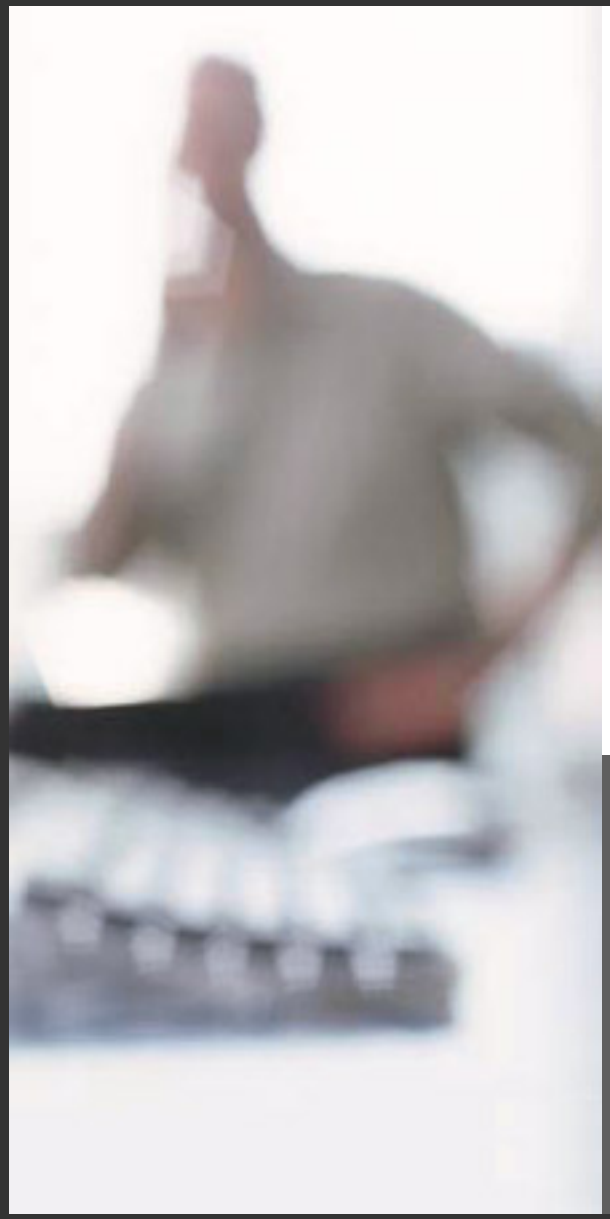
HINMAN



FEMA 455
Handbook for Rapid Visual Screening of Buildings to Evaluate Terrorist Risks

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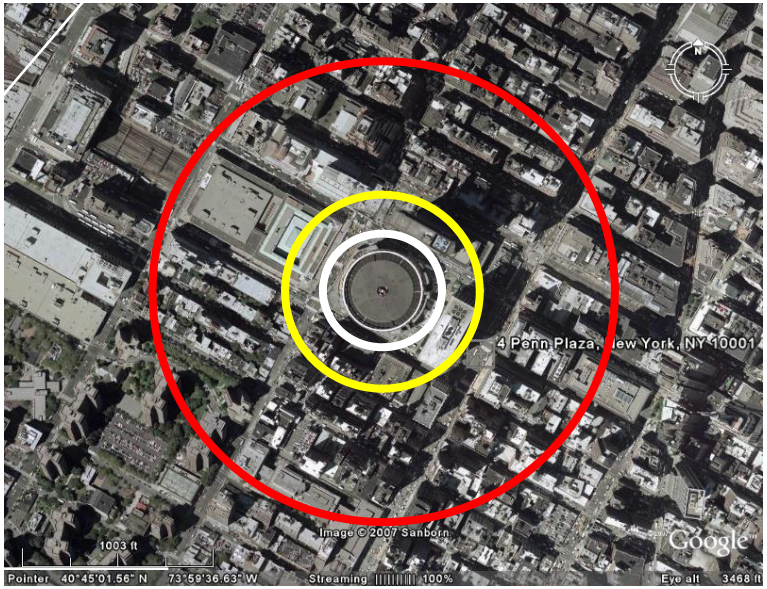
Risk Methodology Overview

- Any building in the U.S.
- Building is not necessarily target
- Major terrorist attack
- Casualties, damages and business interruption
- Complete form in 1-4 hours
- No special training
- Used MIPT database
- Consistent with DHS definitions

Pilot Study Validation



1. Information Technology
2. Telecommunications
3. Banking and Finance
4. Government
5. Defense Industrial Base
6. Commercial
7. Transportation
8. National Monuments
9. Dams
10. Chemical Processing
11. Food Processing
12. Water Supply
13. Energy
14. Public Health
15. Postal/Shipping
16. Emergency Services
17. Agriculture
18. Critical Manufacturing

DHS Critical Infrastructure/ Key Resources

Risk Methodology Process

Pre-field Activities	Select inventory of buildings to be included in study Identify key objectives of the screening from building stakeholders Identify screeners and train if needed Gather publicly available information on buildings Obtain and review available materials obtained from the building owner including operations and security procedures, policies, and construction drawings (*) Make arrangements for access to the building
Field Visit	Verify information already obtained Tour exterior and publicly accessible areas of the building filling in data form and photographing building characteristics. Interview stakeholders (*) Tour critical internal areas (*)
Post-field Activities	Calculate the risk scoring for the buildings Review ratings and make appropriate adjustments based on additional materials reviewed and interviews performed (*) Interpret scoring Identify buildings requiring further analysis Prepare a written report summarizing findings

Risk Model

Risk = C x T x V

C = Consequences

(criticality; importance to owner and region)

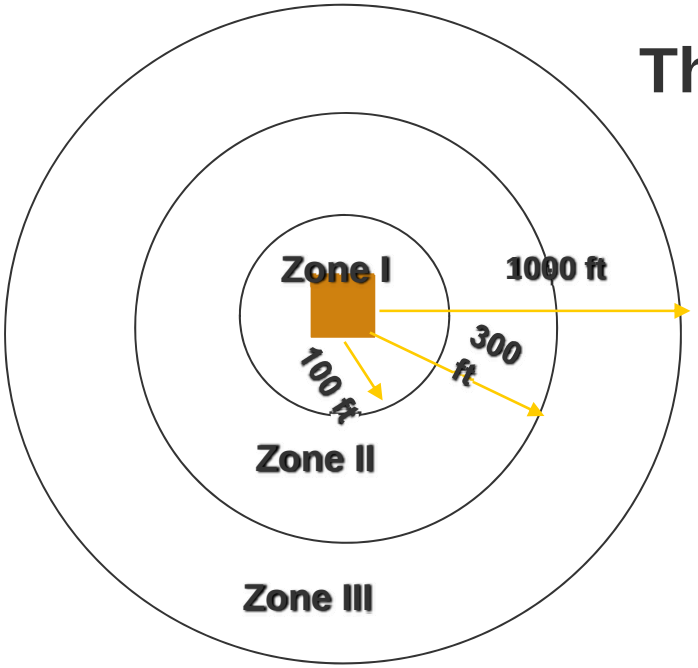
***T* = Threat Rating**

(attractiveness; likelihood of attack)

***V* = Vulnerability Rating:**

(features that add or detract to impact of attacks on facility and its occupants)

Threat Definition



- Zone I – Major
- Zone II – Moderate
- Zone III – Minor

- Explosive
- Chemical/Biological/ Radiological
- Internal/External

Threat Scenarios

Threat Type	Threat Scenario
Internal Attack	Internal Explosive Attack Internal CBR Release Other Internal Attack (Intrusion)
External Explosive Attack	External Zone I Explosive Attack External Zone II Explosive Attack External Zone III Explosive Attack
External Chemical, Biological, Radiological (CBR) Release	External Zone I CBR Release External Zone II CBR Release External Zone III CBR Release

Form Organization

- Consequences Rating
- Threat Rating
- Vulnerability Rating
  - Site
  - Architecture
  - Building Envelope
  - Structural Components and Systems
  - Mechanical / Electrical / Plumbing Systems
  - Security

FEMA Rapid Visual Screening

CONSEQUENCES

- Locality Type
- Number of Occupants
- Replacement Value
- On Historic Registry
- Business Continuity
- Impact of Physical Loss

THREAT

- # Occupants
- Occupancy Use
- Site Population Density
- Visibility/Symbolic
- Target Density

VULNERABILITY

- Site
- Architecture
- Building Envelope
- Structural Components and Systems
- Mechanical/Electrical /Plumbing (MEP)
- Security

5 Building Envelope

Total % Window Area

The exposure of building occupants to failed window glass provides a serious hazard in explosive events.

The % window area is defined as ratio of the window area to the total wall area, where walls are assumed to provide greater protection than windows to occupants. Estimates can be based a typical area of the building between two column lines (i.e., one bay width).

Options:

a less than 20%
b More than or equal to 20%, less than 40%
c More than or equal to 40%, less than 60%
d More than or equal to 60%, less than 80%
e More than or equal to 80%

Option b

Option c

Option e

BUILDING CHARACTERISTICS		a.	b.	c.	d.	e.	VULNERABILITY RATING FOR GIVEN THREAT SCENARIO								
							Internal			Explosive			CBR		
							Intrusion	Explosive	CBR	Zone I	Zone II	Zone III	Zone I	Zone II	Zone III
5. ENVELOPE	5.1. Glazing System Type	Punched & Ribbon Type 1	Punched Type 2	Ribbon Type 2	Curtain Wall/ Store Front	Structurally Glazed									
		0.1	0.2	0.3	0.4	0.6									
		0.1	0.3	0.5	0.6	0.9									
		0.1	0.3	0.5	0.7	1.0									
	5.2. Bite Depth	≥ 0.5 in.	< 0.5 in.												
		0.1	0.5												
		0.1	0.9												
		0.1	1.0												
	5.3. Percent Fenestration Area in Typical Bay.	20%	40%	60%	80%	100%									
		0.1	0.2	0.3	0.4	0.5									
		0.1	0.3	0.5	0.7	0.9									
		0.2	0.5	0.9	1.2	1.5									
		0.2	0.5	1.0	1.3	1.7									
		0.1	0.4	0.8	1.0	1.2									
	5.4. Façade Wall Type	Reinf. C-I-P	Reinf. Masonry	Precast Panel	URM w/ H/T ≥ 10	Lt. Frame or URM w/ H/T <10									
		0.1	0.3	0.4	0.5	0.6									
		0.1	0.4	0.5	0.6	0.9									
		0.1	0.5	0.6	0.8	1.0									
		0.2	0.8	1.0	1.3	1.6									
		0.1	0.6	0.8	1.0	1.2									
	5.5. Glass Type	Laminated IGU	Laminated Single Pane	Monolithic TTG/HS IGU	Monolithic AG IGU & Single Pane TTG/HS	Single Pane Monolithic AG									
		0.1	0.2	0.4	0.5	0.6									
		0.1	0.2	0.6	0.8	1.0									
		0.2	0.3	1.1	1.4	1.5									
	5.6. Wind Region	High Post Benchmark	All Other												
		0.1	0.5												
		0.1	0.9												
		0.2	1.5												
V.2 SUB-TOTAL FOR VULNERABILITY RATING (V): Sum values in each column and enter on line V.2 on Vulnerability Rating Checklist (Part IV)															

Risk Scores

	Building 1	Building 2	Building 3	Building 4	Building 6	Buidling 7
Internal Intrusion	133.1	197.6	37	206.9	249	74
Internal Explosives	129.9	192.8	42.4	211.2	235.8	115
Internal CBR	132.4	181.6	41	193.7	234.9	108
Explosive Zone I	153.3	205.4	54.8	270.8	304.1	141.2
Explosive Zone II	195.5	208.2	53.2	191.5	145.2	104.7
Explosive Zone III	195.5	208.2	53.2	191.5	145.2	104.7
CBR Zone I	116.6	155.4	39	226	257.1	162.9
CBR Zone II	79.1	86.1	19.7	80.8	63.1	53.1
CBR Zone III	42.8	50.7	5.9	57.4	66.6	35.7
Total Risk	1178	1486	346	1630	1701	899

Low Risk	1 - 60
Medium Risk	61-175
High Risk	> 175

Uses of Tool

- Can be used for DHS Grant Applications
- Can use for prioritizing mitigation measures
- Easy to reevaluate threat changes
- Easy to add emerging threats
- Can tailor for other countries or specific inventories
- Currently adding companion documents for bridges and tunnels