

Vulnerable and Loving It(?)

JIM LAFRENZ, P.E.

**AMERICAN CONCRETE PAVEMENT ASSOCIATION
5420 OLD ORCHARD ROAD
SKOKIE, IL 60077**

(847) 966-2272

AIRPORTS@PAVEMENT.COM



Which Target Would You Select?



You Cannot Afford Either Option

April 1983 – 63 Deaths

An aerial view of the American Embassy as heavy cranes continue to remove rubble from the upper floors on 21 April, 1983, following the terrorist bombing three days earlier.



*Photo courtesy of Claude Salthani / U.S. Marines in Lebanon 1982-1984
History and Museums Division, Headquarters, U.S.M.C., Washington, D.C.*

253 Marines – October 1983



1993 – 6 Deaths, 1042 Injuries



19 Deaths – Hundreds Injured



1996

212 Deaths – 4650 Injured



1998

USS Cole – 17 Dead



(UNITED STATES NAVY FILE)

3600(?) Deaths – Thousands Injured

September 11, 2001



Spencer Platt / Getty Images

The Response

**The Terrorists have won the toss and
have elected to recieve!**



Bob McCown

168 Deaths – 400 Injured



1995

The Terrorist Defined

■ Foreign

Theological

- Targets Large Populations
- Depends Upon Media Coverage

■ Domestic

- Targets a Specific

Time and Date of Strike

Basic Conclusions

- Active Defense Fails
 - Police
 - Military
 - Intelligence
- Passive Defense Not Implemented
 - Anti Collapse
 - Controlled Entry
- The Target Will Be Defeated
- Active Defense Will Continue to Fail
- Policy for Passive Defense Will Continue to Lag Events
- No Consideration for Minimizing Collateral Damage

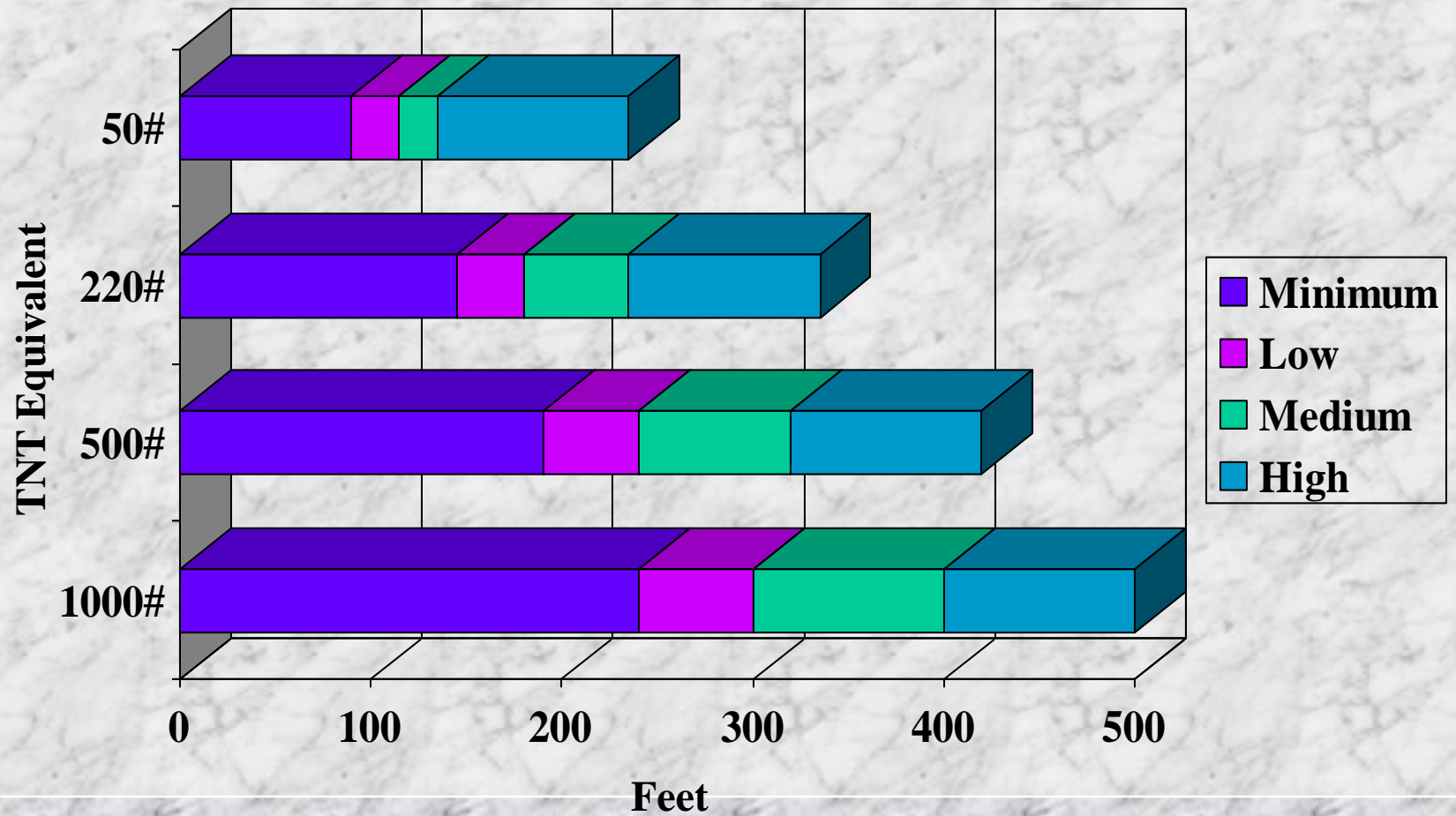
Tactics and Threats

- Vehicles
 - Attack
 - Stand-Off
 - Ballistics
 - Entry (Forced/Covert)
 - Airborne - Chem/Bio
 - Waterborne - Bio
- Threat
 - Minimum (**50 #**)
 - Low(**220#**)
 - Medium (**500#**)
 - High (**1000#**)
 - **Special Case**

Levels of Protection

Tactic	Level of Protection	Potential Structure Damage	Potential Injury
Bombing tactics	Minimum	Significant damage, but no progressive collapse	Majority of personnel suffer serious injuries. There are likely to be a limited number of fatalities
	Low	Damaged – unreparable No collapse, but structural members will require replacement	Majority of personnel suffer lacerations and blunt trauma injuries from window glazing and non-structural elements
	Medium	Damaged - repairable Damaged structural elements can be repaired	Mostly minor and some serious lacerations and blunt trauma from window glazing and non-structural elements
	High	Superficial damage	Only superficial lacerations and blunt trauma from non-structural elements
Ballistics tactic	Low	Limited - screening	Unlikely
	High	Superficial – hardened	None

Stand Off Distance



TNT EQUIVALENCY



73 lb.

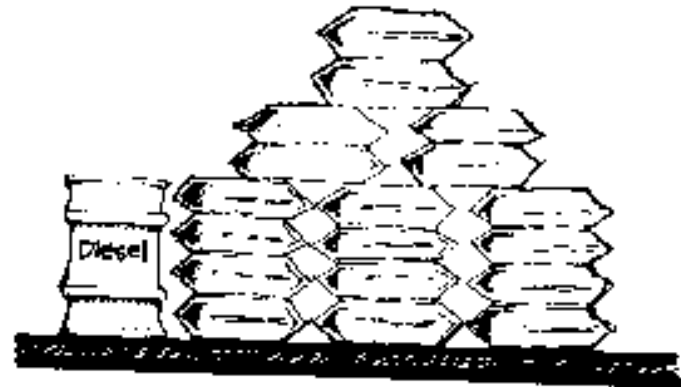
C-4

Plastic Explosive



100 lb.

TNT

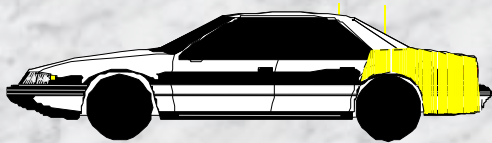


122 lb.

ANFO

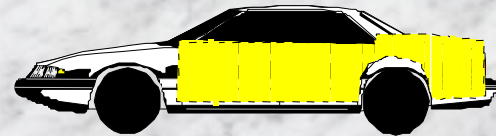
Diesel Fuel & Fertilizer

Relative Explosive Weights



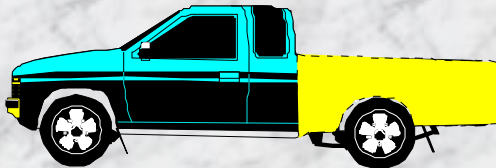
50 lb. charge

AUTOMOBILE: trunk or other location - easily hidden



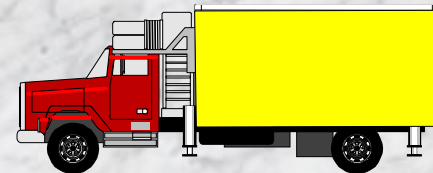
220 lb. charge

AUTOMOBILE: trunk/passenger compartment - not easily hidden



500 lb. charge

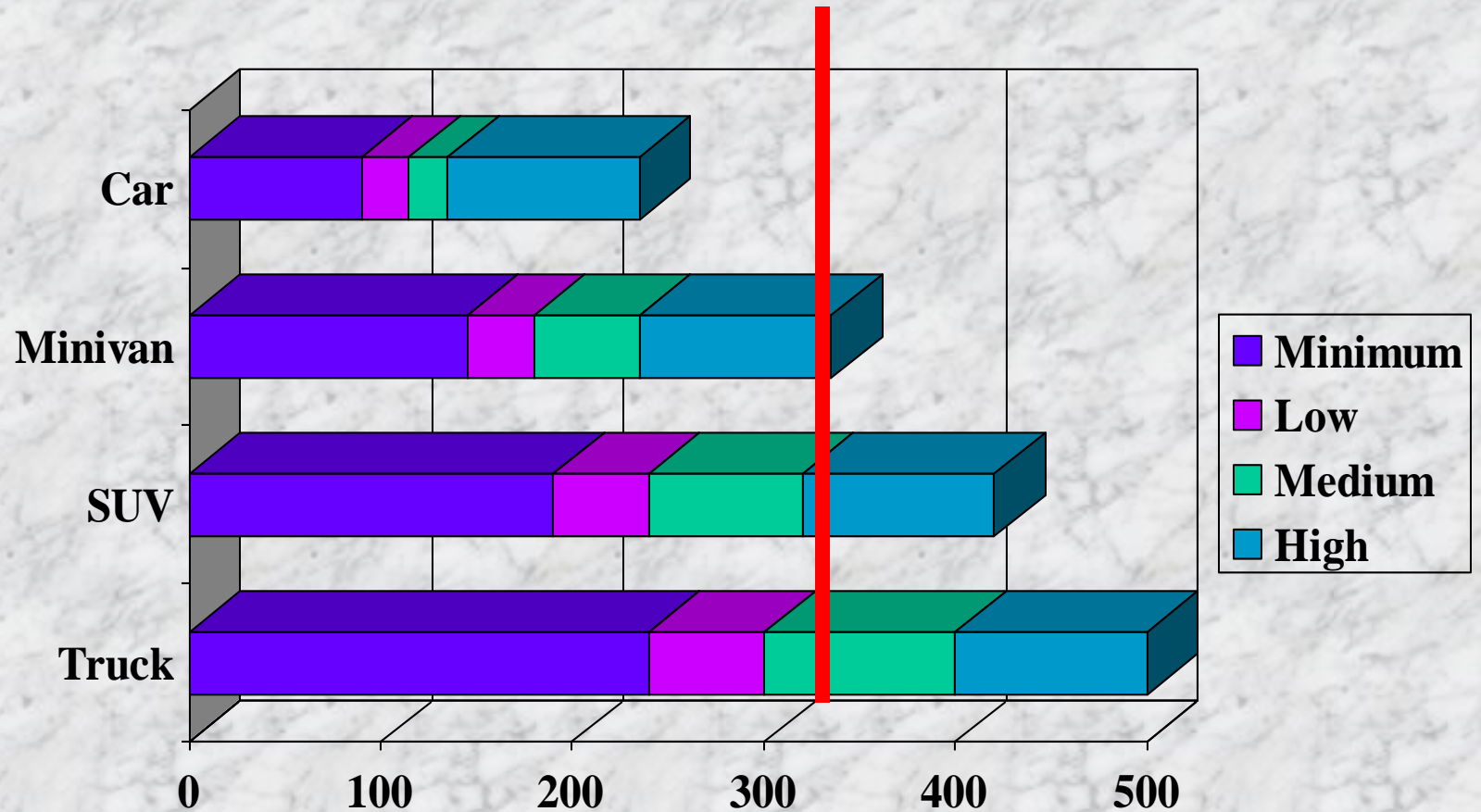
PICKUP: bed filled



1,000 lb. charge

TRUCK: 2-1/2 ton truck & larger back compartment filled

Stand Off Distance



Conventional Annealed Glass

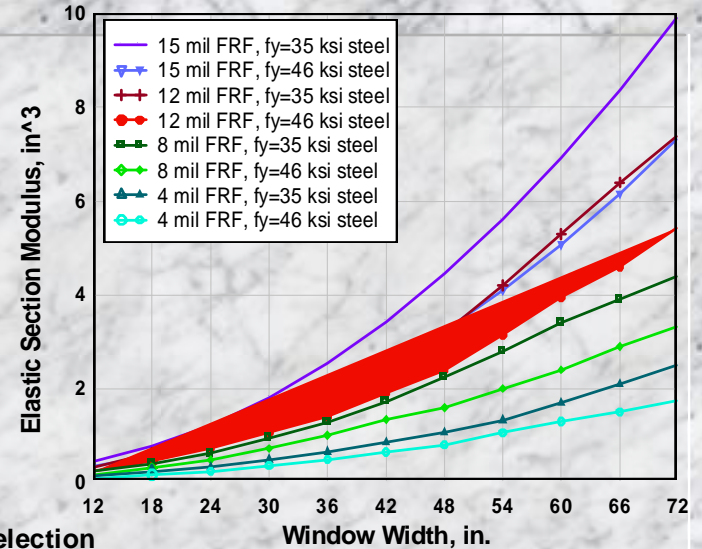
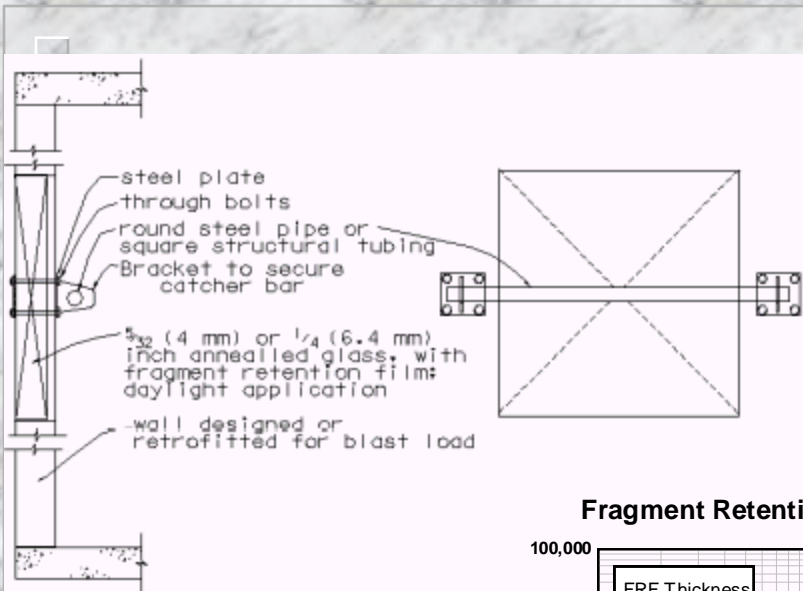


Glass With Micro Film

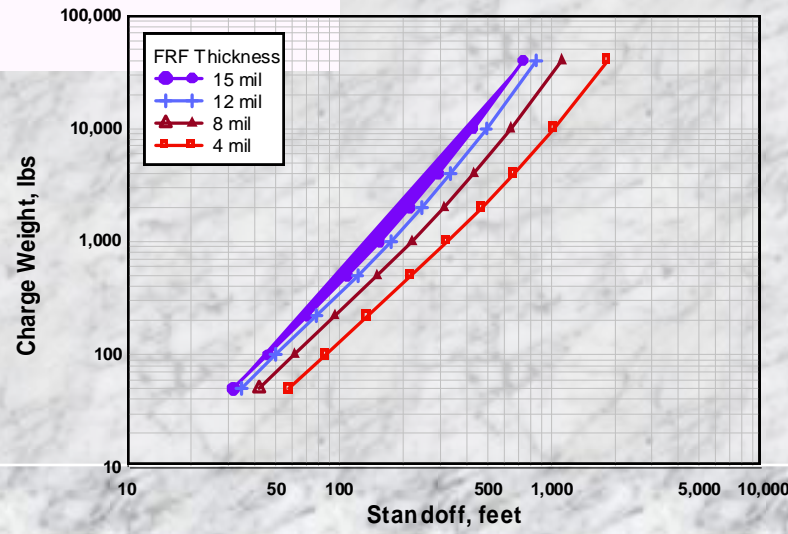


Window Retrofits

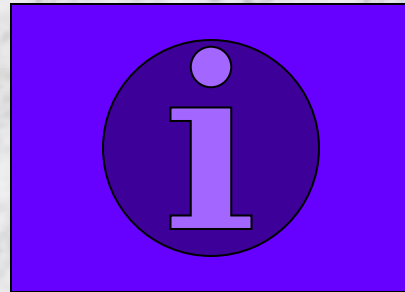
Catcher Bar Design Curves



Fragment Retention Film Thickness Selection



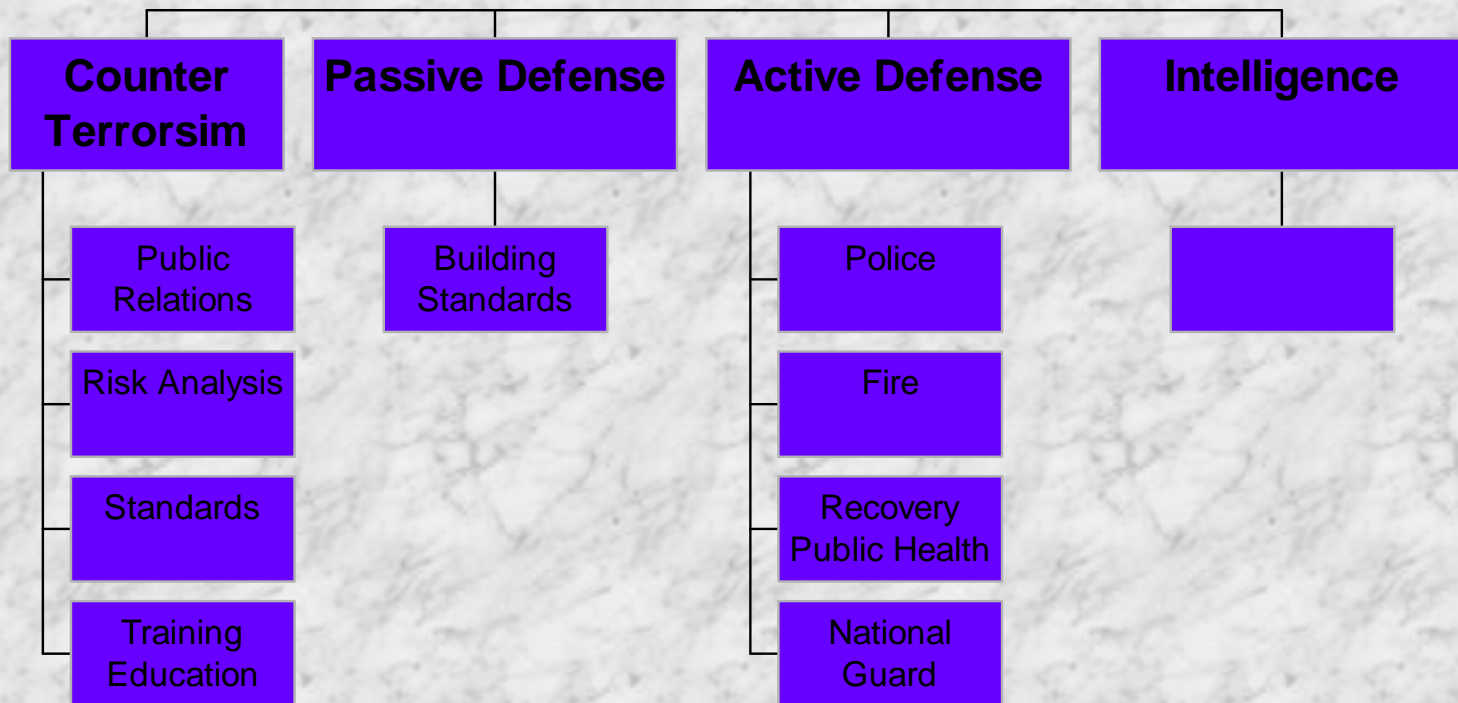
WINDAS



Organizing for Vulnerability



Organizing for Defense





Escaping Vulnerability

- Plan for Passive (Buildings Kill and Injure - Not Bombs)
- Use Active as the interim and not the rule
- Logical Analysis
 - Minimize Cost
 - Maximum Collateral Protection
- Standoff and Delay

Most effective
Targets Are Always Defeated

Vulnerability Assessment Tools

- Security Engineering Planning Assistant
- Mil HDBK 1013-10, 12, 14
- WINDAS

- DoD AT/FP Construction Standards
- Protective Structures Automated Design System

Questions



[Www.pavement.com](http://www.pavement.com)