

Highway Bridge and Tunnel Resilience

Standards for Disaster Resilience for
Buildings and Physical Infrastructure
Systems

Arlington, Virginia



U.S. Department of Transportation
Federal Highway Administration

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Bridge Design Standards

- Like some other infrastructure systems, bridge standards do not address all hazards – such as security
- Katrina spotlighted need to look at wave-forces
- Security is another non-traditional hazard under consideration

What We're Trying to Prevent



Bridge Design Standards

- Security is added to the AASHTO Load and Resistant Factor Design Code as **Guidance**
- Comprehensive Guidance is under development
- This guidance is in “code form” and mimics seismic standard language

Design Guideline Format

- Competing needs for owners and operators means that bridges and tunnels must undergo a formal risk assessment before applying design guidance
- Assessment will help determine the level of protection required (analogous to seismic design)

System Risk and Component Risk

- What is important?
 - Vital to the economy
 - Safe enough to prevent deaths or casualties
 - National icons
- Component risk for bridges
 - Apply to a structure that has been determined to be important

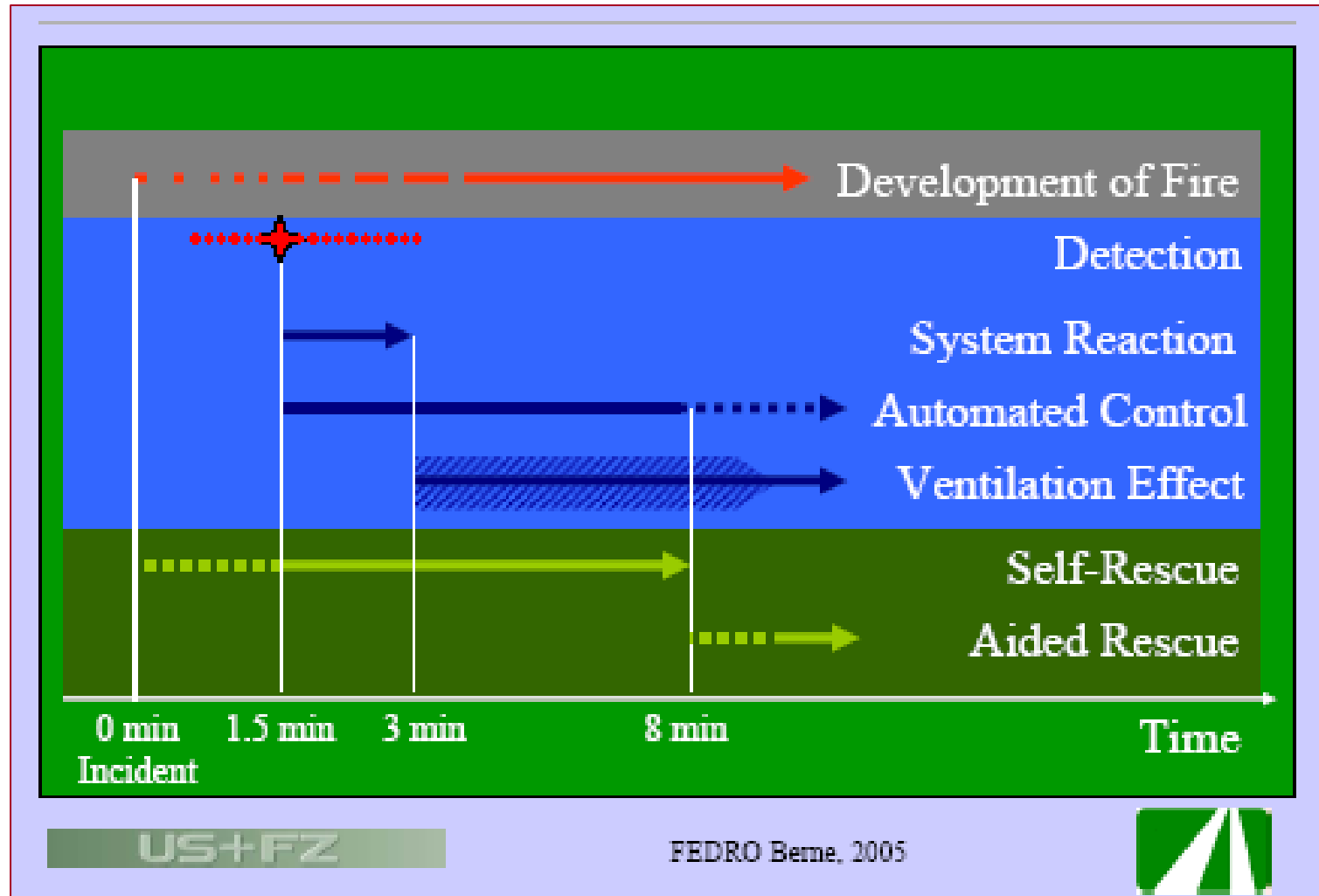
Design Guideline Format for Blast Loading

- Assessment results help determine the level of protection needed (threat level)
- Threat level and scaled standoff (Z) can place a component into a Blast Design Category
- Blast Category (A, B, or C) determines the method of detailing or other design actions that must be taken

Design Guidelines for Tunnels

- Highway Tunnels do not have security standards
- NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways is used for fire design
- NFPA 502 also has a section for bridges
- This standard and the guidance have some security application

Fire Mitigation Strategies



LED Lighting for Safety (Human Factor Engineering)



Assessment Goal

- Develop a cost-effective risk management plan for a critical bridge, using a component level analysis to present to management

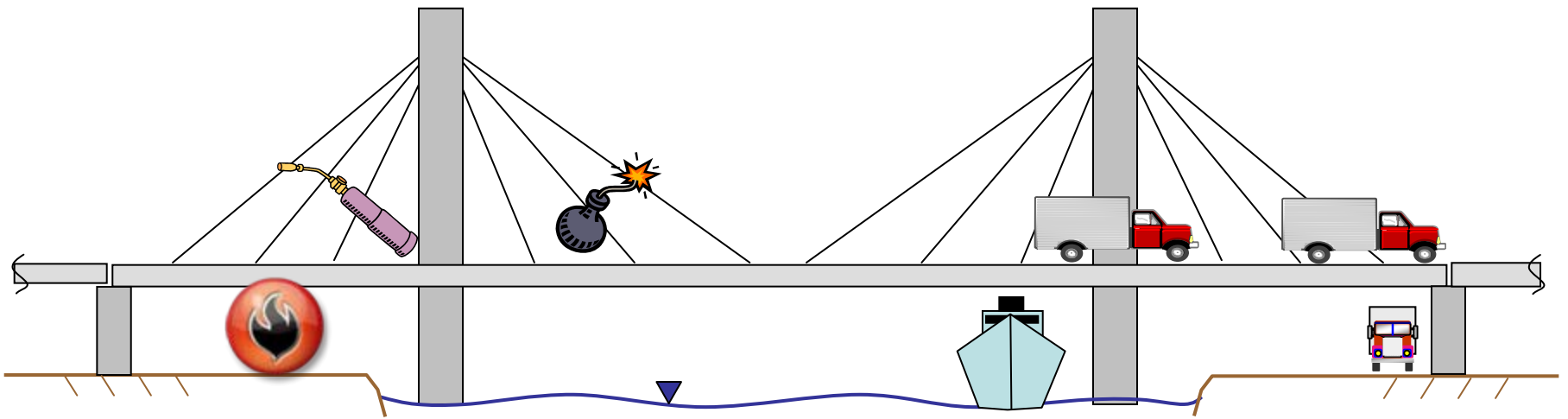


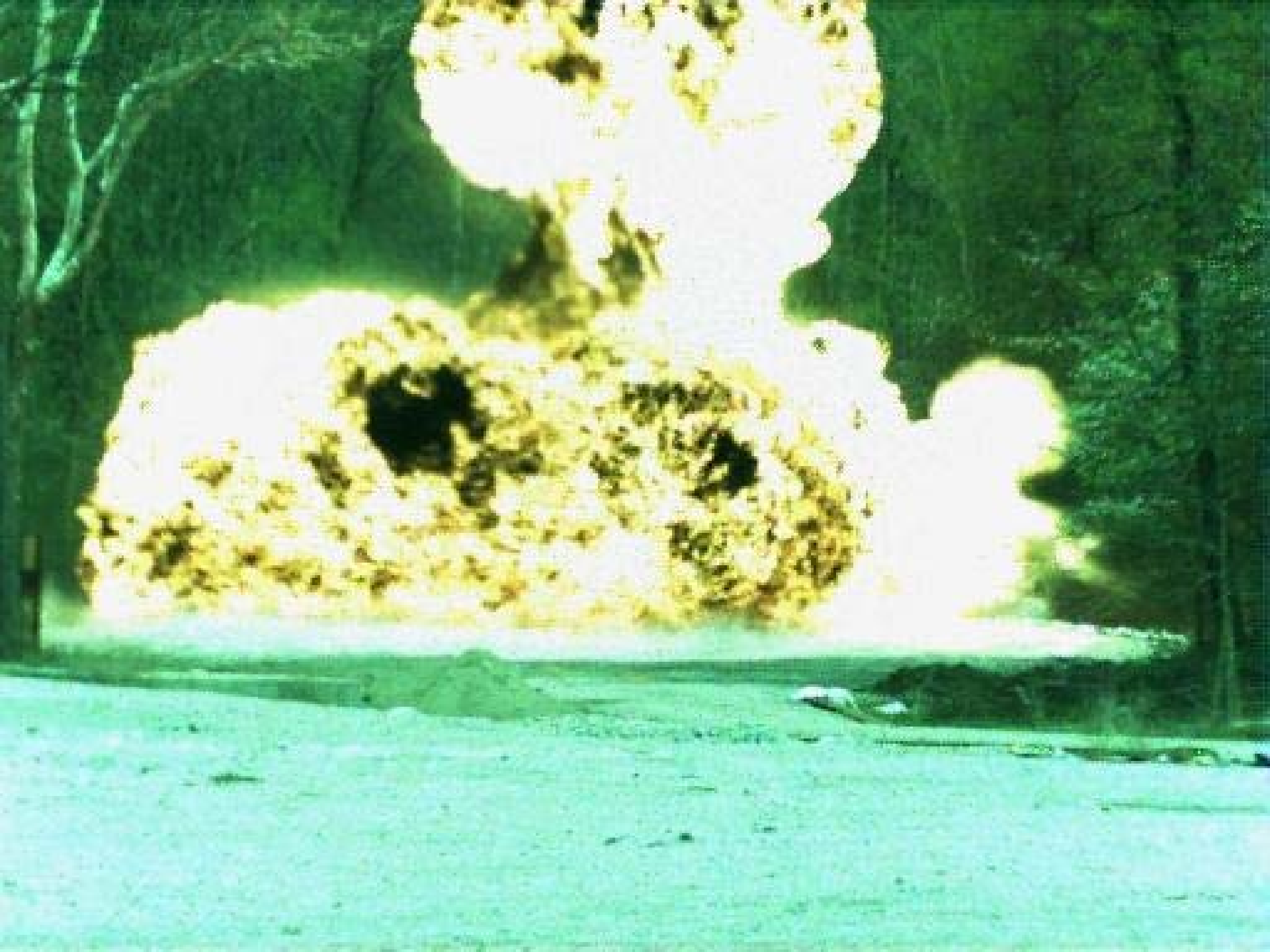
Assessment Products

- Describe:
 - What we know
 - What is not known
 - The unknowable
- We are not optimizing solutions, rather, we are informing decisions



Identify Components





Steel Tower Retrofit Design Category Requirement

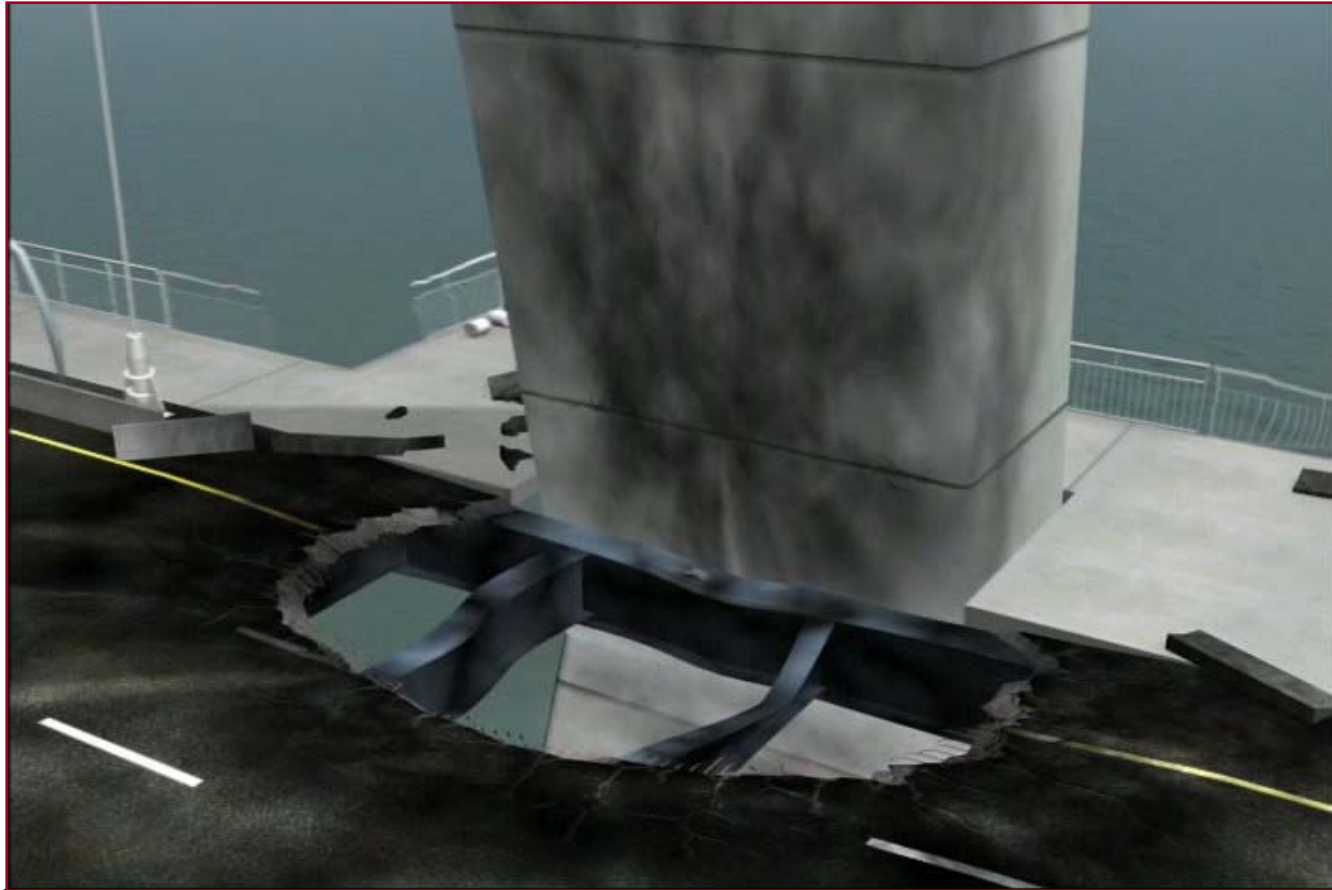


Un-retrofitted



Retrofitted

Successful Retrofit



Questions?

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