

ENHANCING U.S. HIGHWAY BRIDGE SECURITY: *Motivation and Challenges*

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DEFINITION:

Iconic Bridge: a unique and outstanding bridge composed of non-typical structural components or configurations (e.g., cable-stayed, suspension, arches)



FACT:

Approximately half of the global bridge-related terrorist attacks reported by MTI involved non-iconic bridges.

highway infrastructure

2004...reason for concern?

MOTIVATION: The September 11, 2001 Terrorist Attacks Against the United States

- Demonstrates the ability and willingness of major terrorist organizations to:
 - a) successfully plan and execute large-scale attacks
 - b) identify targets of major importance
 - c) circumvent and/or manipulate public safety and security personnel
 - d) cause mass destruction
 - e) take the lives of the innocent

- Reveals the economic, socioeconomic, and emotional distress associated with a large-scale terrorist attack



MOTIVATION: Recent Threats to Major U.S. Highway Bridges

- In 2000, a captured Al Qaeda training manual revealed plans to blast and destroy bridges leading into and out of major

FACT:

Most reported terrorist threats against U.S. highway bridges have involved iconic bridges, though non-iconic bridges around the world have also been targeted.

flashlight connected with copper wiring along with two suspicious packages lying on each side of the bridge deck were discovered.

CHALLENGE: Prioritizing the Security Enhancement Process

➤ **How do we identify “key” bridges in need of immediate fortification?**

- historical data suggests that both iconic and non-iconic bridges are targeted by terrorists
- the importance of a bridge could change with time
- the importance of a bridge could be a function of the terrorists’ motive to attack (e.g., mass casualties, mass damage, disrupt critical transportation route, etc.)
- the importance of a bridge could be a function of accessibility (e.g., major transportation corridors)

CHALLENGE: Identifying and Rectifying Design Deficiencies in the Current State-of-the-Practice

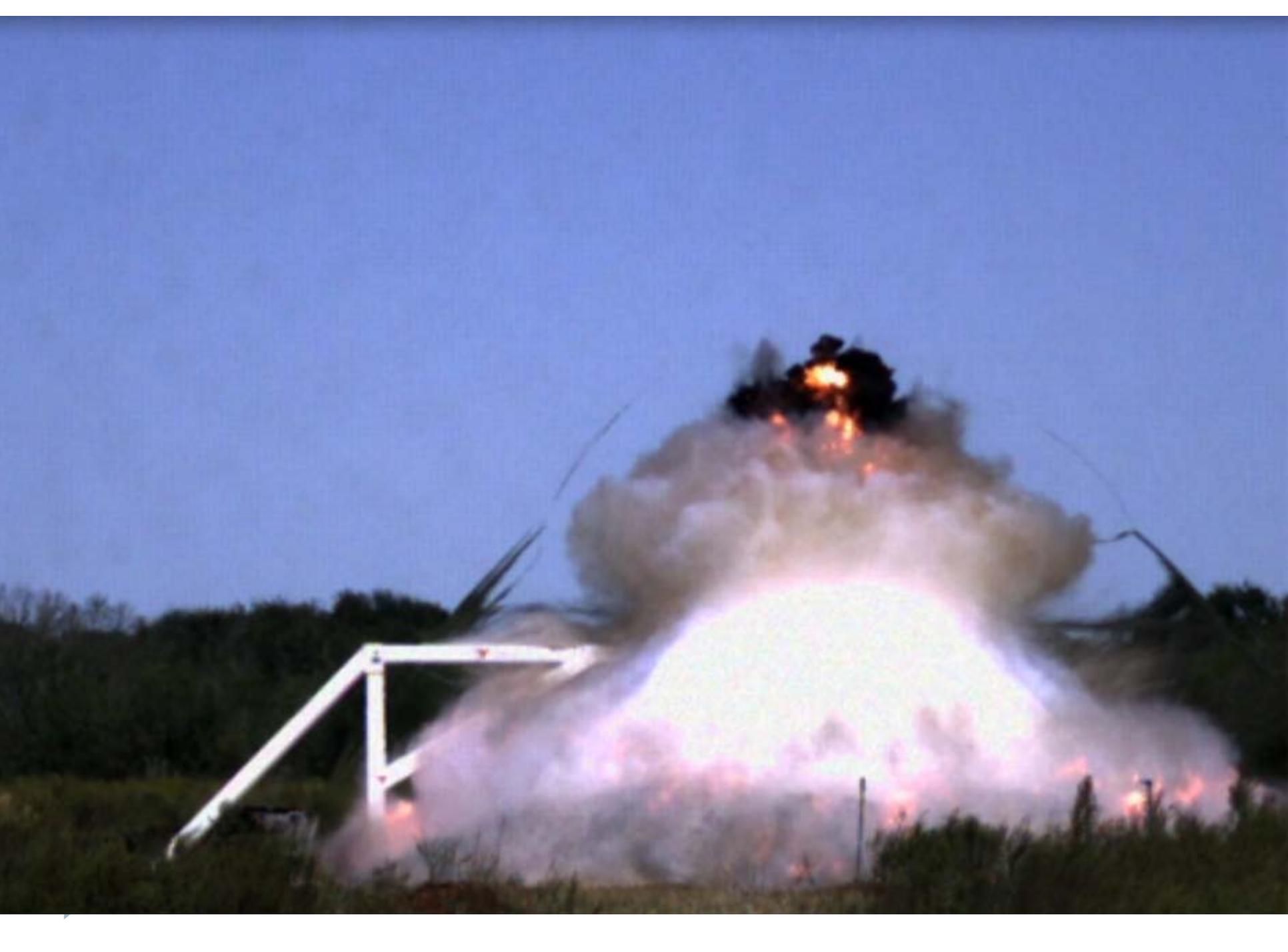
- Observations from past attacks have revealed deficiencies in the current state-of-the-practice as it relates to protective design of bridges
- Research is needed to:
 - gain a better understanding of bridge component behavior when subjected to extreme loading
 - develop improved design guidance
 - develop retrofit techniques for purposes of hardening existing bridges

Who will fund the research?

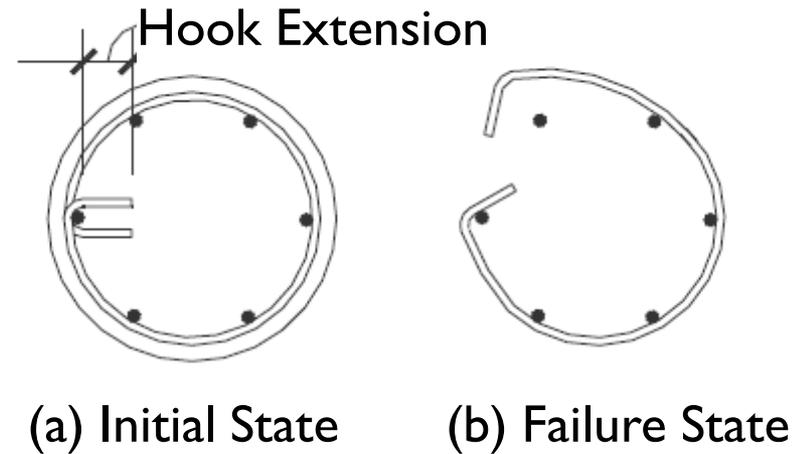
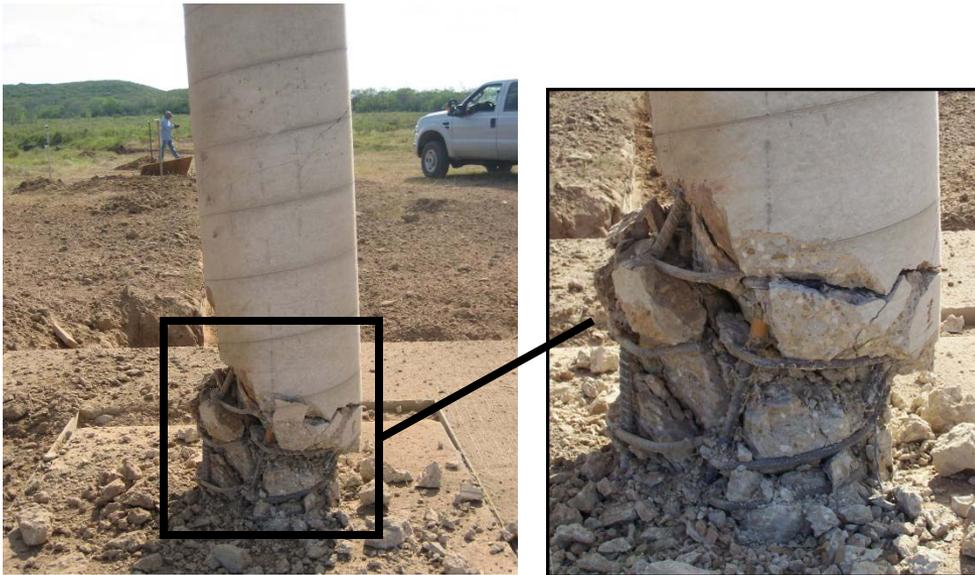
Who will conduct the research?







CASE STUDY: Experimental Investigation of Structural Detailing in Blast Scenario

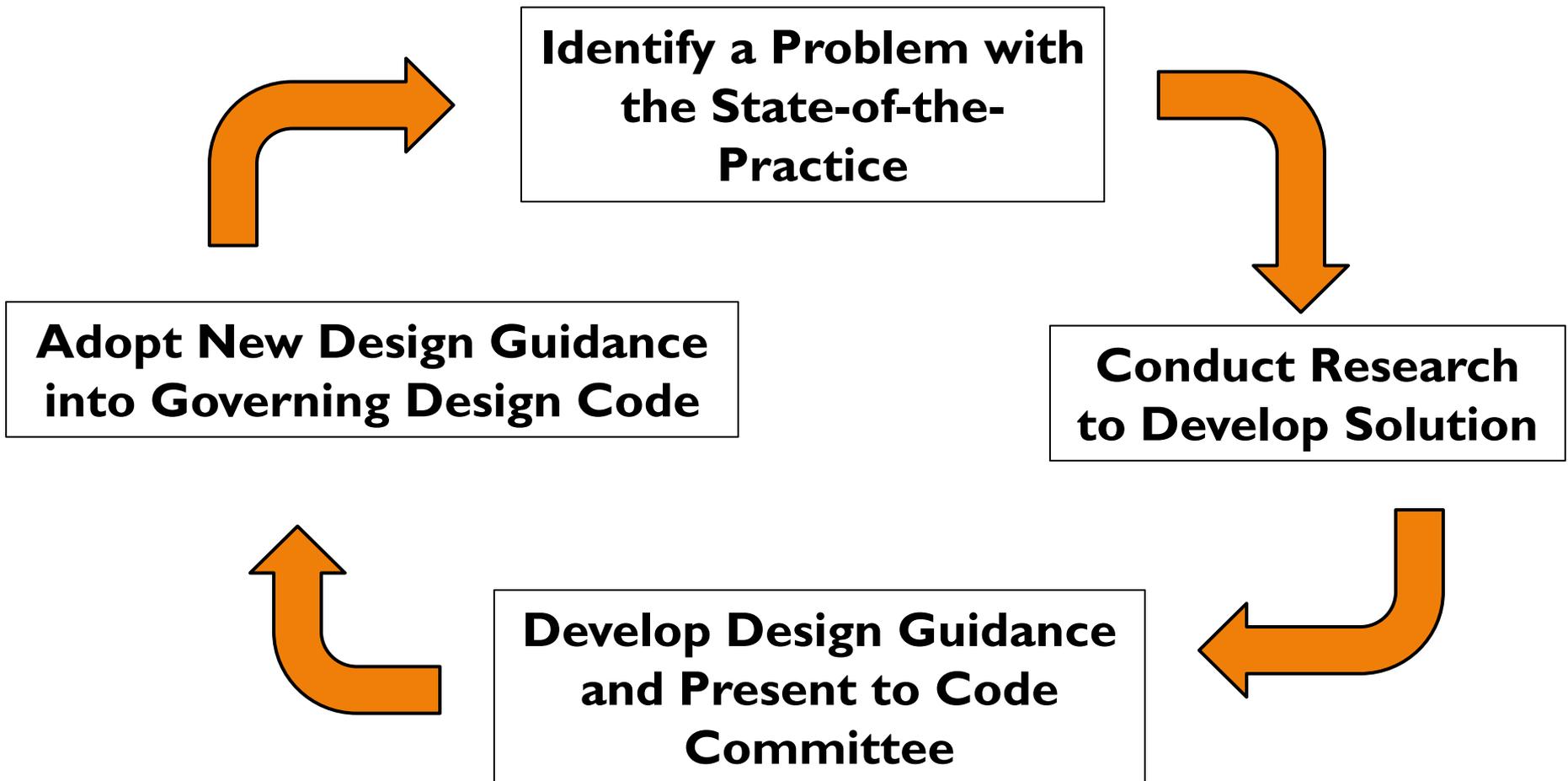


Inadequate Performance of a Blast-Loaded Bridge Column

Design Provisions Derived from Seismic Research and Other Extreme Loads Are Not Guaranteed to be Sufficient for a Blast Event

CHALLENGE: Dealing with Resistance to Adopt New Technology into Practice

The vicious cycle...



ADDITIONAL DISCUSSION:

- What can be done to make the research-to-practice process more efficient?
- What criteria should be used to establish research priorities?
- In general, is the accessibility of the nation's major highway bridges too unrestrictive?
- How can stakeholders be convinced that bridge security is important (proactive versus reactive)?

QUESTIONS ??

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