



**Homeland
Security**

S&T Stakeholders Conference

Transportation Challenges

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PARTNERING FOR A SAFER NATION

Transportation today

- ▶ Our nation has built a vast surface transportation system of roads, bridges, railways, waterways, and tunnels
 - Facilitates international and domestic commerce and access
 - Depend upon it to maintain our of life



Transportation today

- ▶ The flow of people and goods is enormous:

In 2004:

- the nation moved about 5 trillion ton miles of freight; and
- 5 trillion passenger miles of people

- ▶ Impacts of loss

- FHWA reported that a loss of a critical bridge or tunnel could exceed losses of \$10 billion



Infrastructure vulnerability

► Natural Hazards/Accidents

- 1971 San Fernando **Earthquake**, damaged 60 bridges in California
- 1997 Chicago **Flood**, the damaged wall of a utility tunnel beneath the Chicago River opened into a breach which flooded facilities throughout Chicago



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Infrastructure vulnerability

► Natural Hazards/Accidents

- 1987 Schoharie Creek **Bridge Collapse**, part of NY's busiest highway, due to aging, extreme winds, and flooding
- 2007 Elevated I-580 **overpass collapse** in Oakland, CA, due to an exploding gasoline tanker



Infrastructure vulnerability

► Terrorism

- ***Hammersmith Bridge Bomb*** - bridge was damaged by a IRA bomb
- ***Tigris River Bridge*** - an explosion from a suicide attack on a bridge in Baghdad



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IGD Approach

- ▶ Layered defense
- ▶ Maintain function for critical transportation components
- ▶ Avoid cascading effects
- ▶ Resilience

IGD Projects

▶ Advanced surveillance systems

Current

- Develops surveillance technologies to more effectively monitor critical infrastructure in urban areas (Innovation & Transition)

Future

- Enable detection of subtle changes against a **wide-area** background environment, and incorporating advanced sensors
- Affordable, automated monitoring and surveillance technologies to detect **underwater** threats in harsh environments



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IGD Projects

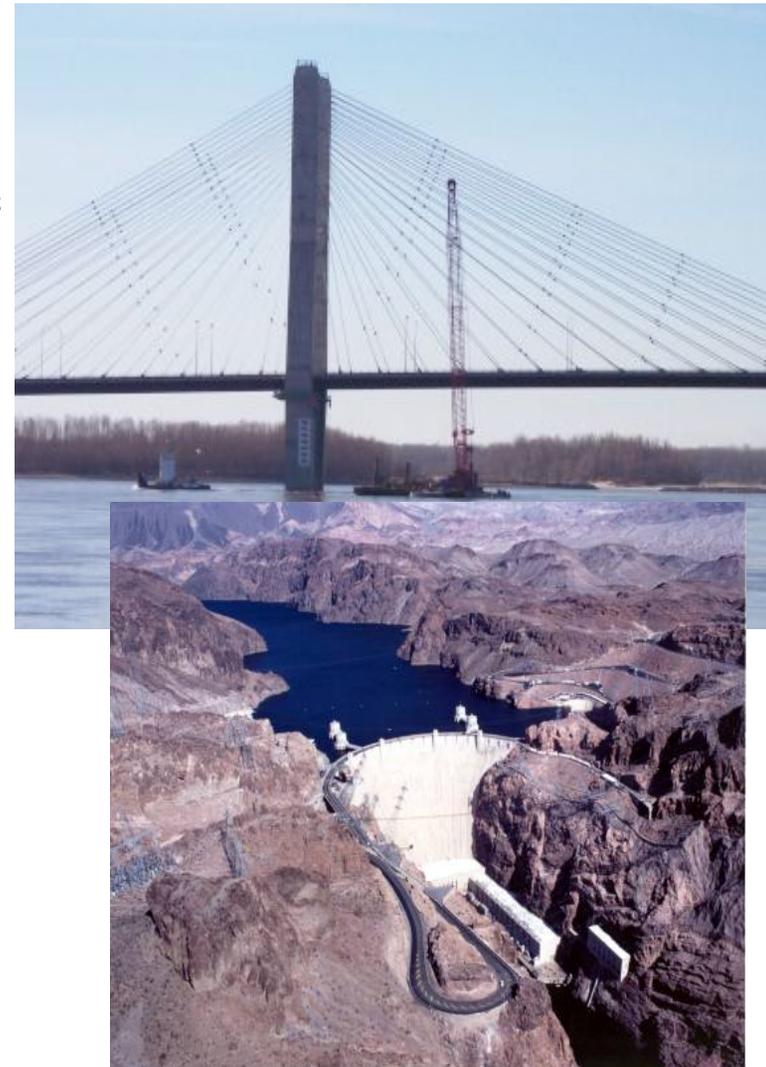
► Protective measures

Current

- Physical tests and numerical analysis of blast effects and vulnerabilities on tunnels, bridges, dams, and levees
- Hardening structures, potentially using composite techniques

Future

- Researching **advanced materials** for construction of transportation infrastructure
- Advanced materials that will enable infrastructure that can withstand all hazards



IGD Projects

► Rapid Response Technologies

Current

- Rapid repair of levees
- Tunnel plug for fire, HAZMAT, flooding

Future

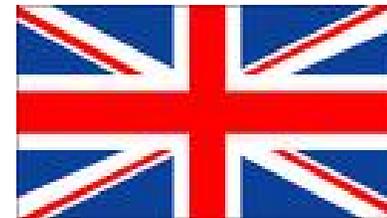
- Protective sealing materials to mitigate the damage to a storage tank or railcar from a puncture or small-caliber weapon impact



Other IGD efforts

- ▶ IGD plans to conduct various workshops in the near future
 - Aging Infrastructure
 - Infrastructure of the future

- ▶ International Collaboration
 - US/UK Collaborative workshop on tunnels, bridges, and stadia
 - US/Sweden workshop on tunnels and bridges





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