

# **Security Activities at the Texas DOT Related to Bridges**

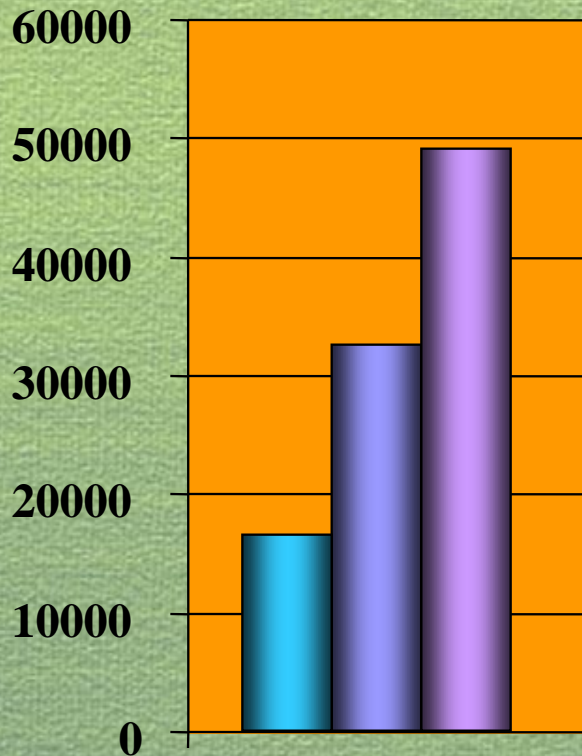
**by**

**Tom Rummel, P.E.  
Texas Department of Transportation**

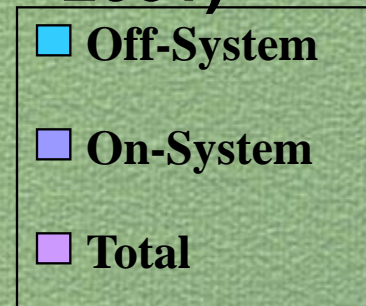
**Iowa State University  
Center for Transportation Research and Education  
and the Midwest Transportation Consortium**



# Texas Bridges



16,498 Off-System  
32,526 On-System  
49,024 Total Bridges in  
Texas  
(September 17,  
2001)



# Bridge Security Approach

- **Identify the most critical bridges**
- **Consider options for deterrence / surveillance and protection**
- **Conduct research, as needed**
- **Ensure military needs are properly addressed**
- **Ensure preparedness**



# **Identify Critical Bridges by Assessing Vulnerability**



# Methodology

- ➔ **Automate to the extent possible**
- ➔ **Use Bridge Inspection Database for bridge data**
- ➔ **Develop formula that takes Texas priorities into account**



## Methodology, cont'd.

### ☞ Develop Weighted Selection Criteria

☞ Consider terrorist objectives: disruption, demoralization, and killing

☞ Make consistent with survey responses

☞ Do not consider “Under Records” (Underpasses)



# Texas Responses to Factors for Identifying Critical Transportation Infrastructure Assets

Rated from Extremely Important (5) to Less Important (1)

- ➡ **5 - Impact on Local, State, and National Economy**
- ➡ **5 - Major Commercial Route**
- ➡ **4 - Major Passenger Route**
- ➡ **3 - Cost to Repair or Replace**
- ➡ **3 - Time to Repair or Replace**



## Texas Responses to Factors for Identifying Critical Transportation Infrastructure Assets, cont'd.

Rated from Extremely Important (5) to Less Important (1)

- **2 - Relative Vulnerability to Attack**
- **1 - Ability to Provide Adequate Protection**
- **1 - Symbolic Nature of the Target**
- **1 - Environmental Consequences**





# Texas Bridge Vulnerability Assessment

## Vulnerability Criteria

- ➔ **Commerce - Truck ADT**
- ➔ **Transportation Needs - Total ADT, Detour length**
- ➔ **Navigational Access - Coast Guard permits**
- ➔ **International Access - Border with Mexico**
- ➔ **Military Movement - STRAHNET (Strategic Highway Network)**
- ➔ **Repair/Replacement Index - Type, Span (cost + ease of repair)**



# TxDOT's Bridge Vulnerability Formula

$$\left[ \begin{array}{l} \frac{(\text{Truck ADT} \times \text{Truck ADT Factor})}{\text{Max Truck ADT}} \\ + \\ \frac{(\text{ADT} \times \text{ADT Factor})}{\text{Max ADT}} \\ + \\ \frac{(\text{Detour} \times \text{ADT} \times \text{Detour Factor})}{\text{Max Detour} \times \text{Max ADT}} \\ + \\ \text{Navigation Factor} \\ + \\ \text{International Factor} \\ + \\ \text{Military Factor} \end{array} \right] \times \text{Replacement Factor}$$



Queries   Forms   Reports   Macros   Modules

alcVuln   Open

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### Calculate for Vulnerability

<b>ADT Factor</b> [ ]	<b>Military Factor</b> [ ]	<b>Priority Rating for Structure Type</b>	<b>Select System</b>	<b>Top Values</b> [ ]
<b>Truck ADT Factor</b> [ ]	<b>International Factor</b> [ ]	<b>High</b> [ ]	OnSystem [ ]	<b>Span Length Factor</b>
<b>Navigation Factor</b> [ ]	<b>Detour Factor</b> [ ]	<b>Medium</b> [ ]	OffSystem [ ]	<b>150 - 300</b> [ ]
		<b>Low</b> [ ]	Both [ ]	<b>301 +</b> [ ]

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# Criteria Not in Bridge Inspection Database

- **Capacity of detour**
- **Alternate detour(s)**
- **Utilities carried across bridge**



## Methodology, cont'd.

- ➔ **Verify data for top 50 critical bridge candidates**
- ➔ **Get district input on ranking**
- ➔ **Look at changes in ranking needed to take into account criteria not in database, and make manual adjustments accordingly**
- ➔ **Evaluate need for deterrence / surveillance / protection options on case-by-case basis**



# Potential Deterrence / Surveillance Options

- ➡ **Eliminate parking areas beneath bridge**
- ➡ **Restrict ingress and egress routes from adjacent areas**
- ➡ **Provide additional lighting**
- ➡ **Limit / monitor access to plans of existing bridges**



# Potential Deterrence / Surveillance Options, cont'd.

- ➡ **Install motion sensors or other active sensors**
- ➡ **Install surveillance cameras**
- ➡ **Apprise local law enforcement officials of critical bridges**



# Potential Protection Options

- ➡ Provide column protection
- ➡ Provide pass-through in concrete median barriers
- ➡ Install advance warning systems





# Transportation Security Research

- ➡ **Looked for topics that would add value**
- ➡ **Topics are non-traditional; academia will likely need to pull in outside resources**



# Research - Rapid Bridge Replacement

- ➡ Important to restore use of bridge quickly
- ➡ May be some simple things that can be done
- ➡ Also applicable to loss of bridge from other events - e.g., flood, earthquake

*Note: Funding approved by  
TxDOT, RFP out December 2001*



# Research - Design for Security

- **Fundamental difference between threat & consequence of natural disaster vs. terrorist attack**
- **Bridges hardened for natural disasters are not necessarily hardened for terrorist attack**
- **Security design solutions**
  - ❖ **Reduce the threat**
  - ❖ **Mitigate the consequences**



# Research - Design for Security, cont'd.

- ➔ Innovation based on assessment of consequences of terrorist threat is needed, rather than replication of designs responsive to consequences of natural disasters

*Note: Funding approved by TxDOT, RFP out December 2001*



# Research - Surveillance

- ➡ **Surveillance may provide low-cost, easy to implement protection**
- ➡ **Need to determine optimal surveillance for bridges**
- ➡ **Explore latest technology**



# Military Mobility Needs

- ☞ **Texas National Guard coordinates all military movement in Texas**
- ☞ **TxDOT assists Texas National Guard**
  - ❖ **Provides routes**
  - ❖ **Checks bridge capacities**
- ☞ **Most large military convoys use the Strategic Highway Network (STRAHNET)**



# **Military Mobility Needs, cont'd.**

- ➡ Numerous pre-approved non-STRAHNET routes for single vehicle moves**
- ➡ Pre-approved routes are re-evaluated every two years**
- ➡ For a new route, maximum review time for bridge capacity is 10 working days**
- ➡ If requested, same day review**



# TxDOT Preparedness

- **Established points of contact**
- **Consider current TxDOT emergency preparedness activities / needs**
- **Identify training needs**





# Points of Contact

- ☞ **24-hour contacts  
(names / numbers)**
  - ❖ **TxDOT Divisions**
  - ❖ **TxDOT Districts**
  - ❖ **TxDOT Administration**
  - ❖ **Division of Emergency Management**
  - ❖ **AGC / Contractors**
  - ❖ **Equipment and material suppliers**



# **TxDOT Preparedness, cont'd.**

- ☞ **Texas Division of Emergency Management (DEM)**
  - ❖ **Established by Governor's Office**
  - ❖ **Under control and direction of Texas Department of Public Safety (DPS)**
  - ❖ **Administers the State's Emergency Management Plan**



# TxDOT Preparedness, cont'd.

## State Emergency Management Plan

- ❖ Provides system for the mitigation of, preparedness for, response to, and recovery from natural or man-made disasters

- Reduces vulnerability of citizens and communities to

- Damage
- Injury
- Loss of life and property



# **TxDOT Preparedness, cont'd.**

- ☞ Standard Emergency Process**
  - ❖ TxDOT maintenance personnel work with local first responders (DPS, local law enforcement, fire dept., etc.)**
  - ❖ Events off DOT ROW typically responded to after approval by DPS District Commander or DEM Director**



# **TxDOT Preparedness, cont'd.**

## **☞ Standard Emergency Process, cont'd.**

- ❖ TxDOT assists as needed with traffic control, debris clearance and disposal, and making fire breaks**
- ❖ Sometimes TxDOT is tasked with repair of local county or city roads when local capability is exceeded**



# **TxDOT Preparedness, cont'd.**

- ☞ **State-level Terrorism Working Group**
  - ❖ **Functions under DEM**
  - ❖ **Purpose - to determine needs for response to acts of domestic terrorism**
    - training
    - equipment
    - organization
  - ❖ **TxDOT participates**



# **TxDOT Preparedness, cont'd.**

## **☞ Terrorist Incident Response Annex to State Emergency Management Plan**

- ❖ Developed in 1998 by DEM  
Terrorism Working Group**
- ❖ Clarifies roles and  
responsibilities of state &  
federal agencies, including  
TxDOT**



# **TxDOT Preparedness, cont'd.**

- ☞ Incident Command System (ICS)**
  - ❖ Part of State Emergency Management Plan**
  - ❖ System used to manage disasters or other emergencies**
  - ❖ Most TxDOT districts have trained personnel**





# **TxDOT Preparedness, cont'd.**

- ☞ Terrorism Awareness  
Conferences / Seminars**
  - ❖ Sponsored by DEM**
  - ❖ Several TxDOT districts have  
participated**



# TxDOT Preparedness, cont'd.

## ☞ Weapons of Mass Destruction (WMD) / Terrorism Incident Exercise Program

- ❖ Sponsored by DEM
- ❖ Assesses existing state and local plans and procedures for consequence management of terrorist act or incident
- ❖ Provides opportunity to enhance those plans and procedures
- ❖ TxDOT participates



# **TxDOT Preparedness, cont'd.**

- ☞ Foreign Animal Disease Exercise**
  - ❖ Sponsored by DEM**
  - ❖ Same methods used during this exercise could be applied in cases of bio-terrorism attack**
  - ❖ TxDOT participated with 24 other agencies in 2001 exercise**



# **TxDOT Preparedness, cont'd.**

## **☞ Texas Emergency Highway Traffic Regulation Plan**

- ❖ Directed by DPS**

- ❖ Traffic management and control  
system**

- Regulates use of highways**
- Expedites and facilitates priority  
vehicle movement before, during, and  
after a national security emergency**

- ❖ Revised with focus on WMD**



# TxDOT Preparedness, cont'd.

## Military Mobility Exercise

- ❖ Sponsored by Federal Highway Administration
- ❖ Scheduled for March 2002
- ❖ Simulates large-scale movement of military equipment
- ❖ Purpose - to improve coordination between military and civilians using public roads
- ❖ TxDOT participation



# **TxDOT Preparedness, cont'd.**

## **☞ Hazardous Materials (HAZMAT) Recognition and Awareness Training**

- ❖ Sponsored by TxDOT**
- ❖ Provides ability to adequately respond to HAZMAT incidents while protecting self**
- ❖ All TxDOT maintenance personnel are trained**



# **TxDOT Preparedness, cont'd.**

## **☞ Governor's Task Force on Homeland Security**

- ❖ Coordinates efforts to detect and deter threats**
- ❖ Assures Texans of state and local preparedness to respond to threats**
- ❖ Assesses ability of state and local governmental agencies to respond to threats and to effectively provide victim assistance**



# **TxDOT Preparedness, cont'd.**

- ☞ Governor's Task Force on Homeland Security - cont'd.**
  - ❖ Aids coordination among federal, state, and local efforts**
  - ❖ Develops recommendations on how to improve Texas' ability to detect, develop and coordinate response to any terrorist events**





# **TxDOT Preparedness, cont'd.**

## **☞ Governor's Task Force on Homeland Security - cont'd.**

- ❖ Helps Texas coordinate with  
federal Office of Homeland  
Security**
- ❖ TxDOT, as a member of the DEM  
Terrorism Working Group, is a  
resource agency**



# Future Preparedness

- ➡ **TxDOT training for terrorism recognition and awareness**
- ➡ **TxDOT to serve on State Preparedness Council for Bio-terrorism, sponsored by Texas Department of Health**



**Questions?**



**Thank You**

