AASHTO T-1
Technical Committee on Security
2005 SCOBS meeting update
FHWA Project Summary

- Surveillance and Security Technologies for Bridges & Tunnels
- Standardized Blast Response Curves for Bridges
- Development of Bridge Specific Blast Loading Program
- Validation of Numerical Modeling and Analysis of Steel Bridge Towers Subjected to Blast Loadings
- Blast Testing of Full-Scale, Precast, Prestressed Concrete Girder Bridges
- Blast Resistant Composite Barriers

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sheila.duwadi@fhwa.dot.gov
Surveillance and Security Technologies for Bridge & Tunnels

• Pooled Fund Study
  – KY, NH, NM, TX, MO, NJ, OH, CA, FHWA
• Objective – Synthesis of latest technologies and practices in surveillance and security
• Status – Complete.
• Product
  – Report
  – Sensor Database
  – Sensor Evaluation Checklist
Validation of Numerical Modeling & Analysis of Steel Bridge Towers Subjected to Blast Loadings (Tower Tests)

Pooled Fund Study  TPF-5(110)

CA, TX, WA, WI, NY, FHWA, NYSBA, GGBA

• Scope
  – Conduct analytical and controlled explosive tests on components and large-scale steel tower sections
  – as-built & retrofit schemes
    • verification of numerical analysis techniques
Tower Tests - Research Strategy

• Phase 1 – single plate and multi-plate tests – as built and with retrofits (8 months)
Tower Test

• Phase 2-- Scaled tower tests – as-built and with retrofits
  – Construct and test 3 tower models
  – Analytical modeling
TPF-5(110): Tower Tests

• Status:
  – Cleared by the FHWA
  – Estimated cost of project - $1.5M
  – Funds under commitment - $965K
  – Still soliciting funds

(www.pooledfund.org/)
Blast Testing of Full-Scale, Precast, Prestressed Concrete Girder Bridges

• Pooled fund study
  – led by Washington State DOT

• Objective
  – Assess damage to precast, prestressed girder bridges from blast generated below and on top of deck; develop mitigation measures

• Status
  – Cleared by FHWA
Blast Resistant Composite Barriers

• Objective
  – To characterize blast, fire, and mechanical cutting-resistant material properties for available FRP composite materials, and the feasibility of producing improved properties through material modifications

• Status
  – Will be initiated in FY05
Standardized Blast Response Curves for Bridges

James Ray – USACOE-ERDC, Vicksburg, MI

• Objective
  – To develop simple design aids for blast loadings

• Product
  – Standardized blast response curves for generic common bridge elements
    • R/C Piers
    • Box members @ deck Level (arches, towers)
    • P/C I-girders

• Status
  – Availability thru USACOE (SSI)
Development of Bridge Specific Blast Loading Program

James Ray – USACOE - ERDC, Vicksburg, MI

- **Objective**
  - Retool the ConWep, BlastX programs from building applications to bridges

- **Product**
  - Bridge Explosive Loading (BEL) Software

- **Status**
  - Version 1 Complete, Ver. 2 near complete
  - Available thru USACOE
Design of Bridges for Security
U. Texas at Austin
P.I.- Dr. Eric Williamson

- Pooled fund project--led by TXDot
- Focus on guidance for designers
  - Economical, unobtrusive strategies
- Status:
  - Final report being prepared
  - Will be available thru TXDoT
Design of Bridges for Security

• **Phase 1:** literature review of risk assessment, risk mgmt. procedures
  – Best practices
  – Cost vs. benefits
  – Performance categories

• **Phase 2:** General Design guidance
  – Substructures
  – Segmental box girders
  – Plate girders
  – Trusses
  – Cable stayed
NCHRP 12-72
Blast/Impact Resistant Hwy. Bridges, Effective Design and Detailing

• U. Texas Austin: Eric Williamson, P.I.
• To begin 2005
• Early Deliverables: (first 9 mos.)
  – Practices for Immediate Implementation (2 mos.)
  – Analysis / computer modeling guidelines
  – Design/detailing guides, AASHTO format
• Phase 2: work plan for expand guidelines/ spec
  – Analysis, Testing
TSA Self-Assessment Tool

James Orgill, TSA

james.orgill@dhs.gov

• On-line questionnaire to assess asset vulnerabilities to threat scenarios

• www.tsa.gov/risk
<table>
<thead>
<tr>
<th></th>
<th>BRIDGE SPECIFIC QUESTIONS</th>
<th>SUSPENSION CABLE STAY</th>
<th>OPEN GIRDER</th>
<th>BOX GIRDER</th>
<th>TRUSS</th>
<th>ARCH</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Can vehicular traffic get close to a main suspension cable? a. 0'-1', b. 1'-3', c. 3'-6', d. 6'-12' e. &gt;12'</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>Can vehicular traffic get close to a main support member? a. 0'-1', b. 1'-3', c. 3'-6', d. 6'-12' e. &gt;12'</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>Can vehicular traffic get close to your suspension or cable-stayed tower? a. 0'-1', b. 1'-3', c. 3'-6', d. 6'-12' e. &gt;12'</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Can vehicular traffic get close to your main arch rib or main truss members? a. 0'-1', b. 1'-3', c. 3'-6', d. 6'-12' e. &gt;12'</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Can vehicular traffic get close to your columns or piers? a. 0'-5, b. 5'-10', c. 10'-20', d.; &gt;20</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Do you have complete fendering systems around piers in water; i.e. not just individual dolphins?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Have cables been hardened at or below deck level?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Have suspenders or hangers been hardened at or below the deck level?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Does the structure utilize suspension cables; what is the smallest cable thickness? (in inches)</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>Have provisions been made to increase resistance to uplift forces from blasts that are in the opposite direction from those due to gravity loads?</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>Have you applied standoff enforcement (i.e. barriers, bollards) at critical superstructure components? a. 0'-1', b. 1'-3', c. 3'-6', d. 6'-12' e. &gt;12'</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Have you applied standoff enforcement i.e. barriers, bollards) at critical substructure components? a. 0'-5, b. 5'-10', c. 10'-20', d.; &gt;20</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>16</td>
<td>Was the bridge substructure designed or retrofitted for seismic loads?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>17</td>
<td>Have you restricted access or provided blast / impact / cutting protection for cable anchors and truss members at road level?</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
AASHTO Special Committee on Transportation Security (SCOTS)

- Newest AASHTO comm.
- Strategic Goals
  - Role of transportation in H.S.
    - White Paper: develop business case (by 1/06)
  - Research – *incorporate into AASHTO docs.*
  - Shape policy, legislation, regulation
  - Awareness, education assistance
- **Security.transportation.org**
T-1: Next Steps

• Focus areas
  – FHWA-(draft) Multi-Year Plan for Bridge/Tunnel Security Research
  – State DOT survey, feedback

• Research results for implementation
  – Commentary
  – Guidelines
  – Specifications?
Thank You

AASHTO T-1 Committee- 2005