Hazard and Security Activities of the Transportation Research Board

An All Hazards Context for Coordinated, All Modes, Security-Related Research

January 2008
"... the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art . . ."

The work of The National Academies is reported through an Annual Report to Congress
**Cycle of All Hazards Research — Transportation**

1. TRB Committee on Critical Transportation Infrastructure Protection shares **research results** from all sources & identifies **research needs**

2. AASHTO Special Cmte on Transportation Security identifies and refers research needs

3. NCHRP 20-59 panel funds applied research or refers prioritized requests

- 10,000 TRB Annual Meeting Participants
- 75 other technical meetings
- TRB Annual Field Visits to DOTs and University Research Centers
- State/Local Government
- Non-Government Organizations
- Federal Agencies
- Private Sector
The Hazards and Disaster Management System

**Pre-Impact Interventions**
- Mitigation Practices
- Emergency Preparedness Practices
- Recovery Preparedness Practices

**Post-Impact Responses**
- Emergency Activities (planned and improvised)
- Recovery Activities (planned and improvised)

**Hazard Vulnerability**
- Hazard Exposure
- Physical Vulnerability
- Social Vulnerability

**Disaster Impacts**
- Physical
- Social

**Disaster Event Characteristics**
- Frequency
- Predictability
- Controllability
- Magnitude of Impact
- Scope of Impact (spatial and social)
- Duration of Impact
- Length of Forewarning

**Chronological Time**
- Pre-Impact
- Trans-Impact
- Post-Impact

**Social Time**

Developing a Strategy to Counter Terrorism Requires a Roadmap; Each Component of the Roadmap Requires Research

- **Threat Analysis**
  - How can we best reduce the supply of terrorists?
  - Why do they hate us?
  - What makes them hate us more?

- **Offensive/Foreign**
  - Military Strategy and Programs
  - Intelligence Strategy and Programs
  - Police and Justice
  - International Development

- **Defensive/Domestic**
  - Preventive Measures
  - Response Measures
  - Threat and Risk Analysis

- **Support Denial**
  - Political Actions
  - Counter- and Non-Proliferation

- **Homeland Security**
  - How can we best allocate scarce HS dollars?
  - Does security deter?

Source: Riley, (2004), Reducing the Risks and Consequences of Terrorism, CREATE Conf.
Disasters Roundtables
January 2001 - present

1: Urban/Wildland Fire Interface (January 26, 2001)
2: Natural Disasters and Energy Policy
3: Sea Level Rise and Coastal Disasters
4: Countering Terrorism: Lessons Learned from Natural and Technological Disasters
5: From Climate to Weather: Impacts on Society and Economy
6: Alerting America: Effective Risk Communication
7: The National Earthquake Hazards Reduction Program at Twenty-Five Years: Accomplishments and Challenges
8: The Emergency Manager of the Future
9: Hazards Watch: Reducing Disaster Losses Through Improved Earth Observations
10: Reducing Future Flood Losses: The Role of Human Actions
11: Public Health Risks of Disasters: Building Capacity to Respond
12: Creating a Disaster Resilient America: Grand Challenges in Science and Technology
13: Lessons Learned Between Hurricanes: From Hugo to Charley, Frances, Ivan, and Jean
14: The Indian Ocean Tsunami Disaster: Implications for U.S. and Global Disaster Reduction and Preparedness
15: Law, Science, and Disaster
16: Community Disaster Resilience
17: Rebuilding for Health, Sustainability, and Disaster Preparedness in the Gulf Coast Region
18: Citizen Engagement in Emergency Planning for a Flu Pandemic
19: Protecting Lives and Property at our Coastlines
20: Creating and Using Multi-Hazards Knowledge and Strategies
21: Disaster Recovery (Wednesday, October 17, 2007)
Making the Nation Safer: The Role of Science and Technology in Countering Terrorism

NRC Policy Study released June 25, 2002

- **Predict**: Intelligence and surveillance of targets and means
- **Prevent**: Disrupt networks, contain threats
- **Protect**: Harden targets, immunize populations
- **Interdict**: Frustrate attacks, manage crisis
- **Response & Recovery**: Mitigate damage, expedite cleanup
- **Attribute**: Identify attacker to facilitate response

Source: Downey, TRB Annual Meeting 2003
Making the Nation Safer
General Strategies and Research Needs

- Biological  Research, prepare, distribute response to pathogens
- Chemical/Explosives  Sensors & filters
- Info Technology  Network security/ER communications
- Energy  SCADA controls/adaptive grid/vulnerabilities
- Cities/Infrastructure  Emergency responder support
- Transportation  Layered system security
- People  Trusted spokespersons
- Complex Systems  Data fusion/data mining/red-teaming
- Cross-Cutting Technology  Sensors/robots/SCADAs/systems analysis
- Deployment  Homeland Security Institute, Partnerships among feds/states/locals/universities
- Nuclear  Control weapons & materials at source

Source: Downey, TRB Annual Meeting 2003
Advisors to the Nation

The National Academies perform an unparalleled public service by bringing together committees of experts in all areas of scientific and technological endeavor. These experts serve *pro bono* to address critical national issues and give advice to the federal government and the public.
Mission of the National Research Council

The National Research Council serves as the “Operating Arm” of The National Academies to:

• Provide authoritative, unbiased advice on issues involving science, technology, and medicine based on scientific facts, not opinion
• Assess the state of current understanding that helps to illuminate public policy decision making
• Survey the broad possibilities of science, engineering, and medicine
• Direct the attention of scientific and technical communities to the value of their knowledge to the achievement of national goals
• Promote cooperation in research, at home and abroad
• Broadly disseminate its work
Ongoing Hazard and Security Activities at The National Academies

- Critical Infrastructure Roundtable
- Disasters Roundtable
- Government-University-Industry Research Roundtable
- Committee on Law and Justice
- Research Associateship Program
- TIGER Committee (Technology Insight – Gauge, Evaluate, and Review)
- Improving Cybersecurity Research in the United States
- The Forum on Microbial Threats
- Microbial Threats to Health--Emergence, Detection, and Response
- Biological Threats and Terrorism
- Pandemic Influenza Research Gaps
- Measures to Enhance the Effectiveness of CDC Quarantine Station Expansion Plans for US Ports of Entry
- Technologies for Transportation Security
- Committee on Critical Transportation Infrastructure Protection
- Radiation Source Use and Replacements
- Committee on Biodefense Analysis and Countermeasures
- The Role of Naval Forces in the Global War on Terror
- News & Terrorism: Communicating in a Crisis
- Committee on Operational Science and Technology Options for Defeating IEDs
Standing Boards and Committees: Division on Engineering and Physical Sciences (DEPS)

Government Missions
Space and Aerospace:
  - Aeronautics and Space Engineering Board (ASEB)
  - Space Studies Board (SSB)
Defense:
  - Air Force Science and Technology Board (AFSTB)
  - Board on Army Science and Technology (BAST)
  - Naval Studies Board (NSB)

National Infrastructure
  - Board on Energy and Environmental Systems (BEES)
  - Board on Infrastructure and the Constructed Environment (BICE)
  - Computer Science and Telecommunications Board (CSTB)
  - Board on Manufacturing and Engineering Design (BMED)

Disciplinary Programs
  - Board on Mathematical Sciences & Applications (BMSA)
  - Board on Physics and Astronomy (BPA)
  - National Materials Advisory Board (NMAB)

Continuing Program Assessment
  - Army Research Lab Technical Assessment Board (ARLTAB)
  - Board on Assessment of Nat’l Institute of Standards & Technology Prog. (NIST)
Key Hazard and Security Activities in Scoping or in Progress at The National Academies

– Assessing Fundamental Attitudes of Life Scientists as a Basis for Biosecurity Education
– Committee on Disaster Research in the Social Sciences
– Government-University-Industry Workshop on Sensitive but Unclassified Information
– Whither Biometrics?
– Improving Cybersecurity Research in the United States
– Technical and Privacy Dimensions of Information for Terrorism Prevention and Other National Goals
– Committee on Basic Research for Countering IEDs
– Assessment of Maintenance Costs for Explosive Detection Systems
– Assessment of Security Technologies for Transportation
– Systems Approach to Building Security Into the Transportation System
– Effective Screening Methods
– Dual Use Technologies & Processes
– Counter IED Experimentation, Testing and Evaluation: Responding to a Dynamic Operational Environment
– Forum on Medical and Public Health Preparedness
Key Hazard and Security Activities in Scoping or in Progress at The National Academies (cont.)

–Role of Public Transportation in Emergency Evacuation
–Private Sector Input into Design of DHS’s National Program of Exercises
–Enhancing the Robustness and Resilience of Future Electric Transmission and Distribution in the United States
–Testing and Evaluation of Biological Stand-off Detection Systems
–Protecting Occupants of DOD Buildings from Chemical or Biological Release
–Full System Testing and Evaluation of Personal Protective Equipment Ensembles in Simulated Chemical and Biological Warfare Environments
–Units of Measure for Biological Material in the Testing and Evaluation of Aerosol Detection Systems
–Committee on a New Government-University Partnership for Science and Security
–Medical Isotope Production Without Highly Enriched Uranium
–New Methods for Understanding Systemic Risk in the Financial Sector: Summary of a Workshop
–Interim Report on the Methodology for DHS Bioterrorism Risk Analysis
–Evaluation of the Methodology for DHS Bioterrorism Risk Analysis
–Statistics on Networks: Proceedings of a Workshop
–Strengthening Forensic Science in the United States
Programs of The National Academies Attract Broad Participation and Support

Revenue Applied to 2006: $228 million
An Infrastructure Owner’s View of a Layered, Integrated Security System

Source: Englot, PANY&NJ, 2004
Transportation Research Board Communications and Outreach

- TR News magazine
- Weekly newsletter
- Open calls for papers
- Open solicitations for
  - Research problems
  - Project proposals
  - IDEA proposals
  - Panel nominations
- Interactive Annual Meeting program

www.TRB.org
Transportation Sector Rationale for An All Hazards Approach to Natural Hazards and Security

1. **Safety first**: build on the successful experience of the systems approach, and extend the mission of existing safety personnel

2. **Build on DOT expertise in response**: urban areas work with law enforcement, fire, rescue, and towing and recovery on traffic incident management; statewide presence with emergency contracting, equipment (e.g., communications systems), personnel, and common response to weather emergencies; trained to observe and report

3. **Build on transit expertise in security**: in urban areas parallel size and location of high-value infrastructure; invested; bring expertise on policing and security; trained to observe and report

4. **Make interdependence an asset**: transportation depends on, and is depended on, by other critical infrastructures; roads and transit are publicly owned and managed, and house public involvement experts
Six Goals for Transportation Security

1. **Social**: Involve the public--make pre-operational surveillance riskier

2. **Budget & Policy**: Make risk-informed decisions the norm

3. **Technical**: focus on countermeasures & design (instead of vulnerabilities & threats) with dual benefits

4. **Operational**: quick, layered response with effective surge capability

5. **Psychological**:
   - for the public, peace of mind/acceptance of risk: security ≈ satisfaction
   - for the attack planner, transportation is a difficult target, prepare more or attack something easier

6. **Intelligence**: Support police/military/intelligence by having trained transportation employees report suspicious activities and by making the bad guys stretch out their planning time

**Desired Outcome**

*Mainstreaming* an integrated, high level, all-hazard, National Incident Management System (NIMS)-responsive, multimodal risk management process into major transportation agency programs and activities
Cooperative Research Programs
National Cooperative **Highway** Research Program
**Transit** Cooperative Research Program
**Airport** Cooperative Research Program
National Cooperative **Freight** Research Program
**Hazardous Materials** Cooperative Research Program
**Commercial Truck and Bus** Safety Synthesis Program
TRB 2006: 74 Sponsors and Sustaining Affiliates

- State Transportation Departments
- U.S. Department of Transportation
  - Federal Aviation Administration
  - Federal Highway Administration
  - Federal Motor Carrier Safety Administration
  - Federal Railroad Administration
  - Federal Transit Administration
  - National Highway Traffic Safety Administration
  - Research and Innovative Technology Administration
  - Maritime Administration
- National Aeronautics and Space Administration
- U.S. Army Corps of Engineers
- U.S. Coast Guard

- 109 Organizational Affiliates from 18 Nations
- More than 2,900 Individual Affiliates
Continuous Development of Risk Management and Emergency Response Planning Guidance

2002: Guides to Vulnerability Assessment & Emergency Response Planning
2002-2003: workshops
2004-2005: publications that anticipated NIMS, NRP, and NIPP.
2007-2008: publications for balloting by AASHTO

2007
A Guide to Risk Management of Multimodal Transportation Infrastructure
(NCHRP Project 20-59(17))

2008 (anticipated)
A Guide to Emergency Response Planning at State Transportation Agencies
(NCHRP Project 20-59(23))
Policy and Applied Research Audiences Differ

Applied research is developed through cooperative programs to provide tools, guides, and resources to owners and operators of transportation infrastructure.

Research program guidance and policy advice are provided to Legislative and Executive branches upon request.
Cooperative Research Programs at the Transportation Research Board

- National Cooperative Highway Research Program (NCHRP) – 1962
  American Association of State Highway and Transportation Officials (AASHTO)
- Transit Cooperative Research Program (TCRP) – 1992
  Federal Transit Administration
- Commercial Truck and Bus Safety Synthesis Program – 2001
  Federal Motor Carrier Safety Administration
- Airport Cooperative Research Program (ACRP) – 2005
  Federal Aviation Administration
- Strategic Highway Research Program II (SHRP II) – 2005
  Federal Highway Administration in association with AASHTO
- National Cooperative Freight Research Program (NCFRP) – 2006
  Research and Innovative Technology Administration
  Pipeline and Hazardous Materials Safety Administration
In Progress
–Assessment of Security Technologies for Transportation (National Materials Advisory Board, lead)
–Role of Public Transportation in Emergency Evacuation

Scoping Activities
–Systems Approach to Building Security Into the Transportation System
–Private Sector Input into Design of DHS National Program of Exercises
Committee on Critical Transportation Infrastructure Protection: One of 220 TRB Standing Committees

More than 10,000 attendees will see more than 3,000 presentations as they participate in 600 sessions of the Transportation Research Board Annual Meeting held every January in Washington, D.C. The 87th Annual Meeting: January 13-17, 2008.

Transportation Research Information Services (TRIS) Database—World’s Largest

http://ntl.bts.gov/tris

Research In Progress (RiP) Database

Research Needs Statements Database http://rns.trb.org/
Innovations Deserving Exploratory Analysis (IDEA)

Eight Transit IDEA projects address security; five have been completed.

January 6, 2006, presentation on Transit IDEA Project 45, Chemical and Biological Decontamination System for Rail Transit Facilities (completed January 2007).
Cooperative Research Security Projects Authorized: 90

—Projects in Development or Contracts Pending: 4
—Projects in Progress: 24 —Projects Completed: 62
Go to www.TRB.org/SecurityPubs for live links to Transportation Research Board documents

TRB E-Newsletter Search Results

Modify This Search

Subject Area(s): Security
Blur Type(s): Recently Released TRB Publications
Sort By: Date Posted | Title

Records found: 80

Transportation Security: A Summary of Transportation Research Board Activities
8/2/2007
A slideshow summary of the Transportation Research Board’s pre- and post-September 11, 2 security activities is updated monthly. [More]

Cooperative Research Programs Security Research Status Report
8/2/2007
TRB’s Cooperative Research Program produces a table summarizing more than 80 security and emergency preparedness projects representing over $11 million in the contract research programs for state departments of transportation and the public transportation industry. Updated monthly. [More]

Conceptualizing and Measuring Resilience: A Key to Disaster Loss Reduction
7/7/2007
A featured article in the May-June 2007 issue of TR News explores the components, dimensions, and implications of disaster response of resilience, which can be measured by the functionality of an infrastructure system after a disaster and also by the system’s failure to achieve certain minimum level of functionality. [More]

Bridge/Tunnel/Highway Infrastructure Vulnerability Workshops February-March 2003
1. Sacramento, California
2. Albany, New York
3. Austin, Texas

http://security.transportation.org/?siteid=65&pageid=1363
http://security.transportation.org/sites/security/docs/guide-VA_Appendices.pdf
A Guide to Updating Highway Emergency Response Plans for Terrorist Incidents available May 2002

CONTRACTOR’S FINAL REPORT

A Guide to Updating Highway Emergency Response Plans for Terrorist Incidents

Examples of Different Communications Systems to Achieve Redundancy

- Statewide land-mobile radio communication systems
- State microwave telephone systems
- Satellite information systems
- Public telephone systems and facsimile operations
- Cellular telephone systems
- Vehicle scanners
- Auxiliary radio system
- Emergency radio system
- Computer systems
- Two-way direct-connect communications, e.g., NEXTEL, and two-way pagers
- Internet communications
- High priority telephone service for government agencies. For example:

Prepared For
The American Association of State Highway and Transportation Officials’ Secretariat
As National Cooperative Highway Research Program Project 20-07/Task 15TA

Prepared By
Parsons Brinckerhoff – PB Farradyne
3200 Tower Oaks Boulevard
Rockville, MD 20852

May 2002

Table 1: Program of Commitments

**COMMIT** to a program that enables the public transportation system to:

- **PREVENT** incidents within its control and responsibility, effectively protect critical assets;
- **RESPOND** decisively to events that cannot be prevented, mitigate loss, and protect employees, passengers, and emergency responders;
- **SUPPORT** response to events that impact local communities, integrating equipment and capabilities seamlessly into the total effort; and
- **RECOVER** from major events, taking full advantage of available resources and programs.

“Blue Ribbon Panel on Bridge and Tunnel Security” report presented institutional, fiscal, and technical recommendations

Requested by: The American Association of State Highway and Transportation Officials (AASHTO) Transportation Security Task Force
Prepared by: The Blue Ribbon Panel on Bridge and Tunnel Security

SEPTEMBER 2003

http://www.fhwa.dot.gov/bridge/security/brpcover.htm
CRP Research Anticipated National Incident Management System Requirements (and National Infrastructure Protection Plan)

Four Overlapping Phases of NIMS Adoption

First Phase: Initial Staff Training: Complete EMI Course – NIMS, An Introduction

Available from Emergency Management Institute
training.fema.gov/EMIWeb/IS/is700.asp

Second Phase: Evaluation of Existing Plans, Policies, and Procedures

R86 vol. 7 Transit Emergency Mobilization and Emergency Operations Guide

R525 vol. 6 Guide to Emergency Transportation Operations (ETO)

Third Phase: Modification of Existing Plans, Procedures, and Policies

R86/R525 vol. 8 Continuity of Operations (COOP) Planning Guidelines

R86 vol. 10 Hazard and Security Plan Workshop: Instructor Guide

Fourth Phase: Verify Achievement of NIMS Integration Center Standards

- Certification and Credentialing
- Conducting Exercises

R86/R525 vol. 9 Guidelines for Transportation Emergency Training Exercises

Source: NIMS Implementation Plan Template, 30 December 2004
Cooperative Research to be Consolidated 2007-08
AASHTO Committees Expected to Adopt and Maintain Flagships

Operations

20-59(23) Guide to Emergency Management at State Transportation Agencies
NCHRP 525, Vol. 6: Guide for Emergency Transportation Operations (ETO)

NCHRP 525/TCRP 86, Vol. 12: Making Transportation Tunnels Safe and Secure

TCRP 86, Vol. 11: Security Measures for Ferry Systems


Infrastructure

20-59(17) Guide to Risk Management of Multimodal Transportation Infrastructure
NCHRP 525, Vol. 11: Disruption Impact Estimating Tool—Transportation (DIETT): A Tool for Prioritizing High-Value Transportation Choke Points

NCHRP 525/TCP 86, Vol. 9: Guidelines for Transportation Emergency Training Exercises
NCHRP 525/TCP 86, Vol. 8: Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies

NCHRP 525, Vol. 10: A Guide to Transportation’s Role in Public Health Disasters
<table>
<thead>
<tr>
<th>Report Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Making Transportation Tunnels Safe and Secure</td>
</tr>
<tr>
<td>11</td>
<td>Disruption Impact Estimating Tool--Transportation (DIETT): A Tool for Prioritizing High-Value Transportation Choke Points</td>
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<tr>
<td>10</td>
<td>A Guide to Transportation's Role in Public Health Disasters</td>
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<td>9</td>
<td>Guidelines for Transportation Emergency Training Exercises</td>
</tr>
<tr>
<td>8</td>
<td>Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies</td>
</tr>
<tr>
<td>7</td>
<td>System Security Awareness Training for Transportation Employees—CD</td>
</tr>
<tr>
<td>6</td>
<td>Guide for Emergency Transportation Operations</td>
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<tr>
<td>5</td>
<td>Guidance for Transportation Agencies on Managing Sensitive Information</td>
</tr>
<tr>
<td>4</td>
<td>A Self-Study Course on Terrorism-Related Risk Management of Highway Infrastructure</td>
</tr>
<tr>
<td>3</td>
<td>Incorporating Security into the Transportation Planning Process</td>
</tr>
<tr>
<td>2</td>
<td>Information Sharing and Analysis Centers: Overview and Supporting Software Features</td>
</tr>
<tr>
<td>1</td>
<td>Responding to Threats: A Field Personnel Manual</td>
</tr>
</tbody>
</table>
Transit Cooperative Research Program

Report 86, Volume

12 Making Transportation Tunnels Safe and Secure
11 Security Measures for Ferry Systems
10 Hazard and Security Plan Workshop: Instructor Guide
9 Guidelines for Transportation Emergency Training Exercises
8 Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies
7 Public Transportation Emergency Mobilization and Emergency Operations Guide
6 Applicability of Portable Explosive Detection Devices in Transit Environments
5 Security-Related Customer Communications and Training for Public Transportation Providers
4 Intrusion Detection for Public Transportation Facilities Handbook
3 Robotic Devices for the Transit Environment
2 K9 Units in Public Transportation: A Guide for Decision Makers
1 Communication of Threats: A Guide

Legal Research Digest 22: The Case for Searches on Public Transportation

New IDEAs for Transit: Annual Report of the Transit IDEA Program
Completed, Delivered to Others

– Scan: Tools for Prioritizing Anti-Terrorist Security Measures
– White Paper on Decontamination Procedures
– White Paper on Technology Clearinghouse
– Transit Security Roundtables and International Conference
– Blue Ribbon Panel on Bridge and Tunnel Security
– Emergency Response Workshops
– Vulnerability Assessment Workshops
– A Guide to Updating Highway Emergency Response Plans for Terrorist Incidents
– A Guide to Highway Vulnerability Assessment for Critical Asset Identification and Protection
– National Needs Assessment for Ensuring Transportation Infrastructure Security
– Peer Review of Disaster Response Issues in Transportation Planning
– Transportation Security Research Plan
– Strategic Assessment of Wireless Capabilities/Needs for Transit
– Fundamentals of All Hazards & Security Management for State DOTs

Completed, Publication Pending

– Quarantine Facilities for Arriving Air Travelers: Planning Needs, Costs
– Risk Management of Multi-modal Transportation Infrastructure
Current Cooperative Research Program Security Projects

- A Guide to Transportation and Hazards Resources Feb. 2008
- Emergency Quarantine and Isolation Controls of Rural Roads May 2008
- Regionally-Coordinated Airport Emergency Plans for CBRNE May 2008
- Blast-Resistant Highway Bridges: Design/Detailing Guidelines June 2008
- Emergency Evacuation & Repopulation June 2009
- Exercising Command-Level Decn Mkg for Critical Incidents at Airports Dec. 2009

- Identification/Delineation of Incident Mgt. & Multi-Agency Emergency Response
- Employee Coping w/ Traumatic Events
Table 72. How countermeasures deter, detect, and respond to hazards and threats.

<table>
<thead>
<tr>
<th>Deterrence</th>
<th>Detection</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operational Tactics</td>
<td>• Operational Tactics</td>
<td>• Operational Tactics</td>
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<tr>
<td>- Roving patrols</td>
<td>- Intelligence</td>
<td>- Command and control</td>
</tr>
<tr>
<td>- Bomb-sniffing dogs</td>
<td>- Security awareness</td>
<td>(multi-tenant)</td>
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<tr>
<td>- Background checks of employees and contractors</td>
<td>training of operating</td>
<td>- Evacuation protocol</td>
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<tr>
<td>- Background checks of facility vendors</td>
<td>and maintenance personnel</td>
<td>- Information sharing</td>
</tr>
<tr>
<td>- Access control</td>
<td>- Roving patrols</td>
<td>- Tunnel ventilation</td>
</tr>
<tr>
<td>- Credentialing and identification card system</td>
<td>- Guards at entry points</td>
<td>- Portable fire extinguishers</td>
</tr>
<tr>
<td>- Guards at entry points</td>
<td>- Bombing-sniffing dogs</td>
<td></td>
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<tr>
<td>- Intelligence</td>
<td>- Identification card system</td>
<td></td>
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<tr>
<td>- Hazardous material restriction</td>
<td>- Inspections</td>
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<td>- Inspections</td>
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<tr>
<td>• Technology</td>
<td>• Technology</td>
<td>• Technology</td>
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<tr>
<td>- CCTV</td>
<td>- Intrusion detectors</td>
<td>- CCTV system</td>
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<tr>
<td>- Intrusion detectors</td>
<td>- Identification card readers</td>
<td>- Communication</td>
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<tr>
<td>- System integration</td>
<td>- Chemical/biological/</td>
<td>- Explosive detectors</td>
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<tr>
<td></td>
<td>radiological detectors</td>
<td>- Interface with traffic</td>
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<td></td>
<td>- Seismic/stress detectors</td>
<td>monitoring</td>
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<td></td>
<td>- Mobile monitoring</td>
<td>- System integration</td>
</tr>
<tr>
<td></td>
<td>- Explosive detectors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- System integration</td>
<td></td>
</tr>
<tr>
<td>• Engineering</td>
<td>• Engineering</td>
<td>• Engineering</td>
</tr>
<tr>
<td>- Blast design</td>
<td>- Fire detection</td>
<td>- Fire protection</td>
</tr>
<tr>
<td>- Elimination of hidden corners, alcoves, and shelves</td>
<td>- Lighting</td>
<td>- Lighting</td>
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<tr>
<td>- Open, unimpeded lines of sight</td>
<td></td>
<td>- Ventilation</td>
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<tr>
<td>- Lighting</td>
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<tr>
<td>- Locked facility doors</td>
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</tbody>
</table>
### Table 1. Categorization of GSMs. (General Security Measures)

<table>
<thead>
<tr>
<th>GSM Categories and Sub-Categories</th>
<th># of GSMs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fencing/Barriers</strong></td>
<td></td>
</tr>
<tr>
<td>Retractable vehicle barriers/gates</td>
<td>5</td>
</tr>
<tr>
<td>Fixed vehicle deterrent with pedestrian access</td>
<td>4</td>
</tr>
<tr>
<td>Fixed, both vehicle and pedestrian deterrent</td>
<td>5</td>
</tr>
<tr>
<td><strong>Access Control</strong></td>
<td></td>
</tr>
<tr>
<td>Credentials</td>
<td>13</td>
</tr>
<tr>
<td>Locks</td>
<td>3</td>
</tr>
<tr>
<td>System Control</td>
<td>3</td>
</tr>
<tr>
<td><strong>Intruder Sensors</strong></td>
<td></td>
</tr>
<tr>
<td>Perimeter (doors &amp; windows, walls &amp; fences, and buried)</td>
<td>13</td>
</tr>
<tr>
<td>Volume sensors – motion detectors</td>
<td>9</td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>3</td>
</tr>
<tr>
<td>CCTV/video</td>
<td>7</td>
</tr>
<tr>
<td><strong>Procedural/Low Cost</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>Waterside Security</strong></td>
<td></td>
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<tr>
<td>Surface</td>
<td>4</td>
</tr>
<tr>
<td>Underwater</td>
<td></td>
</tr>
<tr>
<td><strong>Screening</strong></td>
<td></td>
</tr>
<tr>
<td>Passengers and Cargo</td>
<td>7</td>
</tr>
<tr>
<td>Trace Detection</td>
<td>14</td>
</tr>
<tr>
<td><strong>Human Observation</strong></td>
<td></td>
</tr>
<tr>
<td>All Areas</td>
<td>3</td>
</tr>
<tr>
<td>Waterside</td>
<td>2</td>
</tr>
</tbody>
</table>
Highways, rail, and waterway choke points
Key variable: Impact on commercial shipments
Prioritize on net national economic impacts
Excludes replacement costs & collateral damage

- Transportation response options to an extreme event with chemical, biological, or radiological agents
- Focuses on the effect and role of transportation
- Applicable to all civilian sites (not just transportation sites)

**TERET (Tracking Emergency Response Effects on Transportation) – Spreadsheet Layout**

**Sheet 1: Introduction**
Provides summary instructions

**Sheet 2: Basic Services**
Assess criticalities that may develop from ER changes in traffic patterns.

**Sheet 3: Mass Care**
Assess needs during shelter-in-place, temporary shelters, or quarantine shelter.

Hazard and Security Planning Tools for Rural, Small Urban, and Community-Based Public Transportation Operations
<table>
<thead>
<tr>
<th>Naturally Occurring</th>
<th>Human-Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intentional</td>
</tr>
<tr>
<td>Droughts</td>
<td>Bomb Threats and Other Threats of Violence</td>
</tr>
<tr>
<td>Dust/Wind Storms</td>
<td>Disruption of Supply Sources</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>Fire/Arson</td>
</tr>
<tr>
<td>Electrical Storms</td>
<td>Fraud/Embezzlement</td>
</tr>
<tr>
<td>Floods</td>
<td>Labor Disputes/Strikes</td>
</tr>
<tr>
<td>High Winds</td>
<td>Misuse of Resources</td>
</tr>
<tr>
<td>Hurricanes</td>
<td>Riot/Civil Disorder</td>
</tr>
<tr>
<td>Ice Storms</td>
<td>Sabotage: External and Internal Actors</td>
</tr>
<tr>
<td>Landslides</td>
<td>Security Breaches</td>
</tr>
<tr>
<td>Natively Occurring</td>
<td>Terrorist Assaults Using Chemical, Biological, Radiological, or Nuclear Agents</td>
</tr>
<tr>
<td>Epidemics</td>
<td>Terrorist Assaults Using Explosives, Firearms, or Conventional Weapons</td>
</tr>
<tr>
<td>Snowstorms and Blizzards</td>
<td>Theft</td>
</tr>
<tr>
<td>Tornadoes</td>
<td>Vandalism</td>
</tr>
<tr>
<td>Tropical Storms</td>
<td>War</td>
</tr>
<tr>
<td>Tsunamis</td>
<td>Workplace Violence</td>
</tr>
<tr>
<td>Typhoons</td>
<td>Accidental Contamination or Hazardous Materials Spills</td>
</tr>
<tr>
<td>Wildfires</td>
<td>Accidental Damage to or Destruction of Physical Plant and Assets</td>
</tr>
</tbody>
</table>

Accidents That Affect the Transportation System

Gas Outages

Human Errors

HVAC System Failures or Malfunctions

Inappropriate Training on Emergency Procedures

Power Outages

Software/Hardware Failures or Malfunctions

Unavailability of Key Personnel

Uninterruptible Power Supply (UPS) Failure or Malfunction

Voice and Data Telecommunications Failures or Malfunctions

Water Outages
Guidelines for Transportation Emergency Training Exercises

- Guidelines, resource CD-ROM and templates for developing a Progressive Exercise Program, compliant with DHS and ODP requirements.
- Exercise program must address NIMS requirements and Transit Emergency Response Plan and procedures.
- Moves users through the steps necessary to develop and implement a three-year program.
- Practical emphasis on affordable exercises, cost sharing, and grant opportunities.
Survey results: State DOT emergencies most likely to require COOP activation
– Overview of NIMS/NRP requirements.
– Updated discussion regarding new threats to transportation agencies:
  • Chronology of worldwide incidents.
  • Capabilities and intentions of specified terrorist groups.
– Recommendations for establishing a Transit Incident Management Organization.
– Specialized research and recommendations for mobilizing transit personnel resources to address a range of emergencies, including no-notice evacuations and terrorist events.
  • Over all incident management phases: awareness, prevention, preparedness, response and recovery.
  • Checklist for response to events indicating WMD agent release
An interactive CD-ROM training course; also available as train-the-trainer and for direct delivery through the National Transit Institute
Sensitivity of the tested device: 10 nanograms (not to scale)
1 Establishing a Sensitive Information Management Policy, 1
2 Identifying Sensitive Information, 3
3 Controlling Access to Sensitive Information, 5
4 Keys for Success, 10

Appendix A Florida DOT’s Exempt Documents and Security System Plan Request Form, A-1
Appendix B Texas DOT’s Confidential Safety Information Memorandum, B-1
Appendix C Examples of State Legislation to Exempt Selected Sensitive Transportation-Related Information from State “FOIA” Laws, C-1
TCRP Report 86, Vol. 5


2. Overview (PowerPoint presentation)


CD-ROM contains all 4 items

Response

All-hazards approach

- Natural disasters (e.g., hurricanes, tornadoes, floods, storms)
- Human accidents (e.g., hazardous materials spills, fires)
- Terrorism

Communication protocols must be applicable to all emergency events
### Vulnerability Issues

<table>
<thead>
<tr>
<th>Perception</th>
<th>Ease of Access</th>
<th>Clear zone</th>
<th>Exposure</th>
<th>Time on target</th>
<th>Structure</th>
</tr>
</thead>
</table>
| • Demonstrated defense | • Adjacent land-use  
  • Road approach  
  • Vessel approach | • Adjacent vegetation  
  • Adjacent buildings | • Lighting level  
  • Visibility | • Detection  
  • Response | • Scale  
  • Specific features |

### Countermeasures

- **Defend**: Harden key structural elements
- **Detect**: Monitor access to bridge substructure and tunnel portals to minimize time on targets
- **Deny**: Increase standoff distance from bridge substructure and tunnel entrances
- **Dynamic**: Threat-adjustable operational measures (inspections)
- **Deter**: Discourage attacks by visibility of countermeasures

### C/E

- Level of protection
- Level of cost
- Cost-effectiveness
Checklist:

☐ Does the lighting system meet the transit agency's established security requirement?
☐ Does the lighting system comply with the local building and safety codes?
☐ Have lighting effects on neighboring buildings or private homes been considered?
☐ Are sufficient portable lighting devices available?
☐ Is there a need for specialized spotlighting or infrared (IR) lighting?
☐ If required, is there adequate backup electrical power to support the lighting system?
☐ Is the lighting system clear of any obstructions within 6-feet (minimum) to 20-feet (ideal)?
☐ Is the lighting system properly secured to prevent removal, displacement, modification or theft?
☐ If required, are there adequate signs or language(s)?
☐ Are procedures in place for routine inspection and hardware?
☐ Have the system operators/maintainers input to the selection of this system?
☐ Are there adequate spare parts to support the system?
☐ Is Point-of-Contact information readily available for the system?
Figure 3. Overview of the transportation planning process in the context of safety (adapted from FHWA, Citizen’s Guide to Transportation Decisionmaking, FHWA EP-01-013, 2001).
TCRP Report 86, Vol. 3

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2 OVERVIEW
2 ENVIRONMENTS
   Structures, 2
   Vehicles, 4
   Vehicle Access/Egress, 4
   Vehicle Pathways, Overheads, and Transitions, 6
   Vehicle Special Obstacles, 7
   Roadways and Terrain, 9
   Weather Conditions, 10
   Optical Navigation Environments, 10
   Radio Environments, 10
   Hazardous Environments, 10
   Other Requirements, 11
   Requirements Specification, 12

13 AVAILABLE ROBOTIC SYSTEMS
   Introduction to Robotic Systems, 13
   Robot Vehicle
   Operator Control
   Available Systems, 14

20 SELECTION ANALYSIS
   Selection Rationale, 20
   Operator Demands, 21

22 GLOSSARY
23 BIBLIOGRAPHY
### TABLE 22: ACTIVITY OF DUAL PURPOSE K9 TEAM

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number per Year</th>
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</thead>
<tbody>
<tr>
<td>Public Relations and Other Demonstrations</td>
<td>10-20</td>
</tr>
<tr>
<td>Patrol Tours or Routes (two-hour shifts)</td>
<td>500-700</td>
</tr>
<tr>
<td>Narcotics Searches</td>
<td>25-50</td>
</tr>
<tr>
<td>Article Search</td>
<td>25</td>
</tr>
<tr>
<td>Building Search</td>
<td>100</td>
</tr>
<tr>
<td>Suspect Tracking</td>
<td>50</td>
</tr>
<tr>
<td>Victim or Lost Person Tracking</td>
<td>1</td>
</tr>
<tr>
<td>Police Officer Assist Calls</td>
<td>50</td>
</tr>
<tr>
<td>Local Agency Assist Calls</td>
<td>25</td>
</tr>
<tr>
<td>Arrests Made or Supported</td>
<td>12-50</td>
</tr>
<tr>
<td>Trials and Competitions</td>
<td>2</td>
</tr>
</tbody>
</table>
Provides a draft template that contains basic security awareness training in a workbook format that can be redesigned as a pamphlet, glove-box brochure, or other user-specific document.
Notional Surface Transportation Threat Information Forum

- **Open Sources**
- **Trans. Authorities**
- **Federal Authorities**
- **Authorized Analysts**

**EMAIL**

**ANALYSIS**
- Secure Web
- Database
- Correlation/trend analysis of all entries

**WEB** (pull)

**InfraGard** (push)

**National Portal**
Performs analysis and information sharing with other national entities (e.g., InfraGard)

**Regional Portal**
Local Public Transportation Authorities

**Regional Portal**
Local Public Transportation Authorities

**FIGURE 3: NOTIONAL SURFACE TRANSPORTATION THREAT INFORMATION FORUM**

Threat information is received via one of two mechanisms.

Content is analyzed, categorized and disseminated according to protocol and shared with relevant stakeholders.

**FIGURE 4: DISTRIBUTED IMPLEMENTATION MODEL**