

# **Standing Committee on Critical Transportation Infrastructure Protection (ABR10) 2018-2021 TRIENNIAL STRATEGIC PLAN (TSP)**

Approved by Section: March 2018

## **PART 1: Committee Name and Scope**

The Standing Committee on Critical Transportation Infrastructure Protection (ABR10) is a committee of TRB's Section on Transportation System Resilience (ABR00). Its scope is:

To consider issues relating to threats posed by potential physical, chemical, biological, and cyberattacks on critical transportation infrastructure in the United States. It will develop activities and provide a forum for discussion among the academic community, the private sector, and appropriate government agencies regarding transportation infrastructure assurance. The Committee will also be in a position to support outreach efforts of the USDOT and other federal agencies to the owners and operators of the nation's transportation system from states and municipalities to trucking companies, airlines, barge operators, ocean shipping companies, railroads, mass transit, port and airport authorities, pipelines, and shippers. Attention will be given to a full range of security issues including risk assessment, prevention, technology, procedures and applications, emergency preparedness and response, as well as the integration of security considerations in the planning and operation of the nation's transportation systems.

As the scope of the committee remain relevant, no changes are proposed at this time.

## **PART 2: Committee Future Outlook Statement and Committee Three-Year Plan**

### **Committee Future Outlook Statement**

The threats facing transportation infrastructure and systems range from terrorism and cyber-attacks to catastrophic natural hazards. In the years after Sept. 11, 2001, the terrorist threat has become more volatile and varied. All too often, in the intervening years, terrorists launched simultaneous attacks against mass transit and commuter rail systems in major international cities. In response, some cities deployed significant security measures, many of which included permanent changes to critical infrastructure and the overall built environment. However, the threat remains and the attack methods have shifted. New tactics targeting crowded urban places, such as the vehicle attacks in Paris, London, Stockholm, Berlin, Nice and New York in 2016 and 2017 raise new questions about how to respond to demands for increased security in urban centers.

The cyber threat has been increasing; we have witnessed information security being compromised a countless number of times in recent years. Cyber-attacks can cause catastrophic incidents and facilitate cascading hazards and consequences. Transportation and transit/rail systems, signal networks, and private autos and transit vehicles are becoming increasingly more connected and reliant on SCADA industrial control systems, electronic systems, and GPS

location technology. They are therefore more vulnerable to physical damage caused by cyber-attack and concomitant hazards.

Extreme weather conditions appear to be increasing in frequency. As a result, a single natural hazard (such as a hurricane, flood, or draught) affects housing, safety, employment of millions of people and can have long-term economic losses for community and state agencies. Often times, communities that are not prepared to mitigate or adsorb the impacts of a national hazardous event are then affected by consequences of additional disruptions and disasters. This is common in hurricanes and large forest fires. Hurricane Harvey in Houston, devastating as it was, resulted in more damage because of chemical plants sited in locations that were in the path of the hurricane's path and subsequent water rise. The aftermath of Hurricane Maria in Puerto Rico was exacerbated by the island's poor economic foundation that existed prior to the hurricane. Without the financial resources available to restore electrical power and other critical infrastructure, its recovery is expected to far longer. One result of the anticipated long recovery is the loss of population to the U.S. mainland, in particular Florida.

A health crisis such as pandemic influenza or a similar infectious disease has the potential to kill or disable hundreds of thousands, according to the Strategic National Risk Assessment. (Among others, one connection to transportation being that people with the disease can transmit these diseases far more easily through our mobile society.)

As interdependence among various sectors increases and our infrastructure ages, the likelihood of technological and accidental hazards increase as well.

All of these can threaten our critical transportation infrastructure.

**Transportation Infrastructure:** We define transportation infrastructure broadly - in addition to physical structures and facilities (roads, bridges, tunnels, transit/railroads, airports, pipelines), we include key transportation systems (vehicles, passengers, drivers, cargo) which use the physical infrastructure and cyber and technological infrastructure (communications, ITS, system control and signal, safety and vehicle tracking systems) which support and are integral elements of the transportation infrastructure. In addition, an important aspect of the transportation infrastructure is the supply chain network that is comprised of multiple modes of transportation and typically spans multiple political and geographic boundaries.

Therefore:

- **Our Vision** is secure and resilient transportation infrastructure.
- **Our Mission** is to advance research, knowledge, and collaboration in transportation infrastructure protection from an all-hazards, all-modes, and whole community perspective.

To move towards this vision and mission, the Committee will address relevant Core and Cross-Cutting areas in congruence with national goals and Presidential Policy Directives and in cooperation with federal agencies including DHS, TSA, USCG, DOT, FHWA, FTA, FRA, MARAD, state DOTs and key professional organizations including AASHTO and APTA. In

partnership with the organizations, the Committee will also continue to organize and sponsor activities and events. For example, with AASHTO and FHWA, it is planning the first Transportation Resilience Innovations Summit and Exchange (RISE) in October 2018. The Committee has a active 15 year relationship with AASHTO, until August 2017, the Special Committee on Transportation Security and Emergency Management that has been recently restructure and renamed the Committee on Transportation Systems Security and Resilience.

The interdependencies between and among transportation and these other sectors will be considered as well to address overall preparedness as well as economic health and efficiency by identifying and harvesting synergies among the various sectors.

Finally, we recognize the importance of diverse stakeholders including private and nonprofit sectors, NGOs, faith-based organizations, research centers and universities, as well as the federal, state, and local government agencies and the international community.

The Committee identifies and addressing the following Critical Issues:

- Homeland Security: Physical Security, Cyber Security, Border Security, and Supply Chain Security.
- Risk Assessment and Planning: Risk assessment (including Threat Assessment, Vulnerability Assessment, and Consequence Assessment)
- Workforce Preparedness: Training and Education, Workforce Planning

The Committee identifies and addressing the following Cross-Cutting Issues:

- Risk and Resilience Assessment and Management:
  - Protection, Prevention, & Preparedness
  - Mitigation
  - Adaptation
  - Response
  - Recovery
- External and Internal Dependencies
- Technology Development, Application, and Evaluation
- Finance, Funding, and Infrastructure
- Congestion Issues

#### Committee Scope:

The Committee will consider issues relating to threats posed by potential physical, chemical, biological, and cyber-attacks on critical transportation infrastructure in the United States. It will develop activities and provide a forum for discussion among the academic community, the private sector, and appropriate government agencies regarding transportation infrastructure assurance. The Committee will also be in a position to support outreach efforts of the USDOT and other federal agencies to the owners and operators of the nation's transportation system from states and municipalities to trucking companies, airlines, barge operators, ocean shipping companies, railroads, mass transit, port and airport authorities, pipelines, and shippers. Attention will be given to a full range of security issues including risk assessment, prevention, technology,

procedures and applications, emergency preparedness and response, as well as the integration of security considerations in the planning and operation of the nation's transportation systems.

Therefore, our focus areas may overlap with those of other TRB committees, and coordination and collaboration with these committees are essential to our success and effectiveness in carrying out our mission.

With the establishment of the TRB Transportation Systems Resilience Section in 2014, the issues and concerns that ABR10 identifies above have been elevated to a higher level for the purposes of both research and discussion.

Keeping this in mind, the TRB Critical Infrastructure Protection Committee's principal goals are:

- To foster and contribute to the research, development, and implementation of best practices in both critical infrastructure protection and resilience;
- To contribute significantly to improved communications and dissemination of research findings and best practices in resilience including international developments that are applicable to the range of all hazards events as well as the day-to-day operations of public agencies;
- To enhance the understanding, skills and workforce capabilities of transportation leaders and professionals in the art and science of resilience; and
- To show how resiliency is an integral component of a public agency's effective operational strategy, contribute to our national economic vitality, and help address critical transportation issues.

To achieve these goals, the committee will focus on the key concerns and emerging issues that will be discussed during the Transportation RISE 2018, to include discussions of the 2020-2025 Resilience Research Roadmap that was first discussed at the 2018 TRB Annual Meeting. Since the Committee on Critical Transportation Infrastructure Protection has been an integral part of collaborative efforts among many TRB committees for "Resilience" (as evident by 18 activities in which the committee was a participant during the 2018 annual meeting), it is anticipated that these emerging issues will provide continued opportunities for liaison and collaborative efforts.

1. Strategic asset management and its connection to resilience;
2. Institutional arrangements, governance mechanisms, and policies to address emerging financing challenges in establishing resiliency at the agency level;
3. Financial and business case strategies to incentivize the incorporation of resilience into agency-wide programs (Making the Case is one of the three components of the Transportation RISE 2018.);
4. The benefits and challenges of public-private partnerships, public-public partnerships, private investment and/or operations in resilience;
5. Implications of trends and policy changes in international trade and economic activity on supply chain security;
6. Workforce needs to ensure a more agile workforce that is adaptive to resilience;
7. The resilience of the nation's transportation network to ensure that the transportation network of 2040 can move the increased level of goods at a level that will meet the needs of the consumer. Multi-modal and logistics coordination between the

commercial and the public sectors;

8. Continued attention to considerations and cost-effective approaches to emergency preparation, response and recovery efforts; and

9. Find ways to incorporate the results of recent human trafficking research into material for public agencies.

### **Committee 2018-2021 Yearly Plan**

#### **CY 2018:**

##### **Convening Activities:**

- Transportation RISE 2018 October 2018 - The chair of ABR10 serves as chair of the Resiliency Summit Planning Committee which allows for the concerns of the committee to be represented.
- Promote continued discussion of cross-cutting topics through workshops, sessions, webinars

##### **Succession Building:**

- Continue to name (through volunteers or chair selection) committee members as co-coordinators to broaden committee members' understanding of TRB's processes as a way to build a stronger, more active committee.
- Maintain the 2017 action to select subcommittee co-chairs from the Friends of the Committee list as a way to broaden the committee's reach into the broader resiliency community.
- Implement the appropriate software platform that allows the committee to communicate unfettered with its 250+ friends (as listed in the committee list found in MyTRB).
- When appropriate, establish focused task forces to address specific issues; these task forces will dissolve upon resolution of issue(s).

#### **CY 2019:**

##### **Convening Activities:**

- Proposed: 2019 Midyear Meeting held in conjunction with the other committees of the TRB Transportation System Resilience Section and the AASHTO Transportation Systems Security and Resilience committee. Purpose of the midyear meeting:
  - Based on what was learned at Transportation RISE 2018, the June 2018 report from the TRB Sustainability and Resiliency Executive Task Force, the 2020-2025 Resilience Research Roadmap, the Resilience Primer for State DOTs, and the triennial reports of the three committees, discuss and develop a three to five year section roadmap.
  - Possible agenda items to include:
    - Should additional resiliency summits be held; if so, when.
    - The section's (thanks to the Logistics Committee) Sunday interactive workshops - based on the summit and other work, future topics for the workshops
  - Continued development and use of outreach material to ensure that resilience is incorporated into the programmatic efforts of the TRB Standing Committees. (A two-page fact sheet describing the section and the committees has been prepared for the 2015, 2016 and 2017 TRB annual meeting; A four-page fact sheet was prepared for the 2018 annual meeting.)
- Promote continued discussion of cross-cutting topics through workshops, sessions, webinars

##### **Committee Activities:**

- Begin to develop list for 2020 committee rotation to ensure that the current or proposed changed membership composition will respond to issues identified:

- strategies to encourage significant involvement by the committee’s Young Members, state DOT members, and other key constituents, both during committee meetings and at other times;
- committee’s communication activities, and efforts to provide assistance and technology transfer to the transportation community;
- research – for the TRB committees, “research” is a very broad concept that can begin with providing the user perspective on research needs, writing research needs statements, tracking research, understanding the funding available for research in their topic area, developing case studies, lessons learned, disseminating research, technology transfer, and other activities that will advance the state of the practice. Potential research activities are:
  - research directions, results, and needs or gaps;
  - plan for maintaining and augmenting the Research Need Statements (RNS) database;
  - efforts to address research implementation and user needs, and ways to identify research use and implementation.

#### CY 2020:

##### Convening Activities:

- Implement activities based on 2019 mid-year meeting discussions
- Organize the 2<sup>nd</sup> Transportation Sustainability and Climate Resilience Conference

##### Committee Activities:

- Rotation of committee members
- Begin evaluating activities for preparation of the 2022-2025 TSP.

The committee will undertake the following strategies and actions to address the emerging, critical, and cross-cutting issues identified above:

#### Strategy 1 - Promote rigorous basic and applied research

- 1.1 Develop and submit research problem statements for consideration under the various TRB cooperative research programs
- 1.2 Issue a "Call for Papers" highlighting research interest areas
- 1.3 Co-sponsor paper and poster sessions at TRB Annual Meeting
- 1.4 Solicit and review research papers in conjunction with the Annual Meeting
- 1.5 Provide opportunity for selected papers to be presented at joint Committee meetings
- 1.6 Post papers on committee website for member review and reference
- 1.7 Support establishment of subcommittees/task forces as appropriate to focus on areas of critical interest/concern to the marine transportation community
- 1.8 Coordinate research activities with associations and other affiliations including the AASHTO’s resilience section, DHS, TSA, FEMA and other industry groups including the All Hazards Consortium.

#### Strategy 2 – Encourage engagement and attract new Friends:

- 2.1 Organize sessions at the TRB Annual Meeting;
- 2.2 Sponsor summer sessions and workshops with other TRB committees;
- 2.3 Bring resilience (cyber, physical and supply chain) and critical infrastructure speakers and experts to TRB meetings. Put a “practitioners’ face” on resilience;
- 2.4 Broaden membership and friends of the committee and encourage their active participation in committee activities to recruit young members and achieve a diverse representation from all regions of the United States and abroad; and
- 2.5 Encourage research, panel sessions and papers on collaborative processes involving the public and private sectors.

Strategy 3 - Provide a forum for state-of-the-art initiatives, “best practices” and research results for areas addressed under Strategy 1.

- 3.1 Solicit papers for publication;
- 3.2 Hold special conferences and workshops every two to three years;
- 3.3 Sponsor at least one session in the annual TRB winter meeting and in relevant summer meetings;
- 3.4 Create and publicize a committee website to showcase our activities; and
- 3.5 Highlight annual awards of excellence.

### **PART 3: Committee History**

#### Number of Papers Reviewed for Annual Meeting

**2016 Annual Meeting: 18**

**2017 Annual Meeting: 46**

**2018 Annual Meeting: 45**

#### Annual Meeting Activities

**2018:**

#### **Number of Podium Sessions: 3**

Session 592 (Lectern) - Cybersecurity Challenges for Connected and Autonomous Vehicles: Fact Versus Myth

Session 801 (Lectern) - What Did the 2017 Solar Eclipse Teach Us About Resilience?

Session 191 (Lectern) - After the Hurricanes

#### **Number of Poster Sessions: 1**

Session 860 (Poster) - Transportation Infrastructure Security and Resilience

#### **Number of Workshops: 1**

Session 156 (Workshop) - 2020–2025 Resilience Research Road Map

#### **2018 Annual Meeting Presenters:**

- **Karl Kim**, *Learning to Build Resilience into Transportation Systems*
- **Yun Tang**, *Seismic Vulnerability Analysis for the Urban Road Network by a Bayesian Network Approach*
- **Giancarlo Troncoso Parady**, *The Effect of Seawalls on Tsunami Evacuations Department Time: A Case Study of the 2011 Great East Japan Earthquake*
- **Andy Chow**, *Agent-Based Analysis of Operation Stack Practice on M20/M2 Motorway in Southeast England*

- **Evangelos Kaisar**, *Data Envelopmant Analysis Model for Assessment of Safety and Security of Intermodel Transportation Facilities*
- **Wisinee Wisetjindawat**, *Modeling the Effectiveness of Infrastructure and Travel Demand Management Measures to Improve Traffic Congestion During Typhoons*

#### 2017:

##### Number of Podium Sessions: 3

Session 866 (Lectern) - Building the Resilience of U.S. Ports and Supply Chains Through Impact Assessment and Mitigation Strategies

Session 619 (Lectern) - Transportation Workforce Needs for Critical Infrastructure Resilience for Physical Security and Related Cyber-Security Challenges

Session 557 (Lectern) - Cyber Security and Resilience for the Internet of Moving Things

##### Number of Poster Sessions: 1

Session 499 (Poster) - Infrastructure Security and Resilience

##### Workshops: 2

Session 111 (Workshop) - Resilience Tabletop Simulation: What You Need to Know Before and After Disaster Strikes

Session 160 (Workshop) - Understanding Transportation Resilience Intersection with Cybersecurity

#### 2016:

##### Number of Podium Sessions: 2

Session 836 (Lectern) - Expanding the Scope of Resilience: Concerns About Human Trafficking and Hazardous Materials

Session 261 (Lectern) - Cyber Security: We've Been Framed!

##### Number of Poster Sessions: 1

Session 710 (Poster) - Critical Transportation Infrastructure Protection and Resilience

##### Workshops: 2

Session 111 (Workshop) - Resilience: Now That TRB Has a New Section, What's the New Direction?

Session 870 (Workshop) - Cyber Security and Resilience in a Connected and Automated World

#### 2016 Annual Meeting – Presenters:

- **Bryan Higgs**, University of the District of Columbia, **Mihalis Gkolias**, University of Memphis: *Network Vulnerability Measures: A Collection of State-of-the Art*
- **Amirreza Mamdoohi**, Tarbiat Modares University, **Mohamadhosseini Noruzoliaee**, University of Illinois, Chicago, **Fatemeh Nazari**, University of Illinois, Chicago: *Evaluation of Network Robustness and Link Susceptibility in Case of Supply Deflation.*
- **Hang Li**, Beijing Normal University, **Hu Xiaobing**, Beijing Normal University, **Guo Xiaomei**, Beijing Normal University, **Liu Hao**, Beijing Metropolitan Traffic Information Center: *Relationship between Traditional Network Properties and Spatial Vulnerability.*
- **Veeresh Varad Basavaraj**, University of Massachusetts, Dartmouth, **Venkateswaran Shekar**, University of Massachusetts, Dartmouth, **Lance Fiordella**, University of Massachusetts, Dartmouth, **Ashrafur Rahman**, Merrimack College, **Nicholas Lownes**, University of Connecticut: *Multiple Facility, Multiple Hazard Road Restoration Prioritization*



- **Zhao Lin**, Harbin Institute of Technology, **Leng Jun-qiang**, Harbin Institute of Technology  
*Measuring Road Network Vulnerability with Sensitivity Analysis.*
- **Mohammad Dehghani**, The World Bank, **Gerardo Flintsch**, Virginia Polytechnic Institute and State University, **Sue McNeil**, University of Delaware: *Roadway Degradation and the Impact on Vulnerability to Disruptions.*
- **Karl Kim**, University of Hawaii, Pradip Pant, University of Hawaii, **Eric Yukio Yamashita**, University of Hawaii: *A Framework for Roadway Flood Risk Management.*
- **Dominic Nessi**, Burns Engineering, Inc.: *Reducing Cyber Security Risks in the Airport Environment.*
- **Avigail Gutman**, Cisco Systems, Inc.: Panel 1: *Cyber Threats and Risks: Hacker Motivations*
- **Phil Bertolini**, Oakland County: Panel 2: *Cyber Security and Resilience Strategies: Working with Management to Make Smart Investments*
- **Rae Zimmerman**, New York University Panel 3: *Future Research and Program Needs Related to Cyber Security: Physical Security*

#### Committee Membership Make-up

]As of November 2017, ABR10 consisted of 28 members.

#### MEMBERSHIP TYPES

<b>Regular Member</b>	19
<b>State Department of Transportation Member</b>	2
<b>International Member</b>	4
<b>Young Member</b>	3
<b>Male</b>	17
<b>Female</b>	9
<b>Unknown</b>	2
<b>White</b>	14
<b>Black</b>	2
<b>Hispanic</b>	0
<b>Asian or Pacific Islander</b>	2
<b>American Indian</b>	0
<b>Two or More Races</b>	0
<b>Unknown</b>	10
<b>Public-Sector</b>	8
<b>Private-Sector</b>	6
<b>Academia</b>	10
<b>Nonprofit/Other</b>	4

#### TRB Publications by Committee

- TR News September-October 2017: **Transportation Systems Resilience**  
Transportation systems' resilience is the theme of feature articles in this issue. Authors describe lessons learned in planning, engineering, and operations management with regards to resilience; discuss supply chain business continuity; identify techniques for evacuation and emergency transportation; examine the role of social capital in transportation; and examine how to think about resiliency in future research endeavors. ABR10 played the key role in writing the outline used to organize the issue and articles. Several articles were authored or co-authored by committee members and appear in both

publications.

- **Transportation System Resilience: Preparation, Recovery, and Adaptation** *November 20, 2017*: TRB's E-Circular 226: Transportation System Resilience: Preparation, Recovery, and Adaptation explores research issues related to implementing transportation systems resilience, and explores themes of a whole system approach to resilience, weather and advances in forecasting, an integrated approach to cyber-physical security for transportation, a European perspective on research for resilient road infrastructure, training and recruiting qualified employees who can assist during adverse events, and improving the resilience of transit systems threatened by natural disasters. This report accompanies the [September/October 2017 print edition](#) of the TR News.

When the Transportation System Resilience Section was first established, the committees received the additional charge to encourage the incorporation of resilience into the mission of all those TRB committees not part of the TRB Section. The Standing Committee on Critical Transportation Infrastructure Protection has taken that charge seriously and to that end,

- Developed and distributed at the 2015, 2016 and 2017 annual meetings, a two-page fact sheet that explains the section and three committees' mission and goals.
- In preparation for the 2018 Resiliency Summit, the committee played a key role in the development of the four-page fact sheet that was distributed at the 2018 annual meeting.
- Sponsored or co-sponsored specialty conferences, symposia, workshops, webinars or other joint efforts with other TRB committees, other TRB entities, or other organizations (i.e. AASHTO, FHWA, State DOTs, ASTM, ASCE, and/or other modes of transportation).

Beginning in the spring of 2017, the current ABR10 chair has served as the co-chair of the Planning Committee for the Transportation RISE 2018 meeting in October to be held in Denver, Colorado.

For mid-year meetings in the recent past, including the August 2017 and usually every other previous year, ABR10 met with AASHTO's SCOTSEM (Special Committee on Transportation Security and Emergency Management) Committee to ensure that research and practitioners' needs align. Recent previous joint mid-year meetings include the August 2016 meeting in Tucson, Arizona.

ABR10 as co-sponsor of the 2nd International Symposium on Disaster Prevention and Mitigation of Highway Infrastructure organized by the China Highway and Transportation Society (CHTS) held in Xian, China in June 2016, was represented by the committee vice chair who in addition to a presentation on current TRB resiliency activities, also gave the opening remarks on behalf of TRB. Jürgen Krieger, a member of ABR10 also spoke at the summit.

The Committee co-sponsored the TRB First International Conference on Surface Transportation System Resilience to Climate Change and Extreme Weather Events held in Washington, D.C. from September 16-18, 2015.