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TRB Webinar: Transportation Resilience Addressing Climate Change Challenges

July 26, 2023 1:00 - 2:30 PM



PDH Certification Information

1.5 Professional Development Hours (PDH) – see follow-up email

You must attend the entire webinar.

Questions? Contact Andie Pitchford at TRBwebinar@nas.edu

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.



AICP Credit Information

1.5 American Institute of Certified Planners Certification Maintenance Credits

You must attend the entire webinar

Log into the American Planning Association website to claim your credits

Contact AICP, not TRB, with questions

Purpose Statement

This webinar will highlight emerging evidence-based best practices on resilience planning and projects, resilient recovery, and resilience processes and programs.

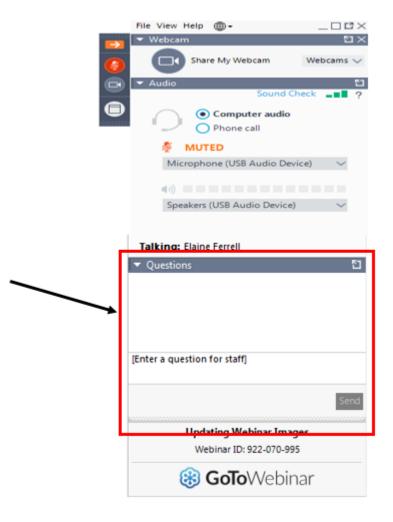
Learning Objectives

At the end of this webinar, you will be able to:

- (1) Prioritize and evaluate new methods and their performance on resilience investments
- (2) Share approaches for integrating climate resilience into agency processes, design standards, and standards of practice
- (3) Develop common understanding of transportation resilience concepts and state of practice

Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



Today's presenters



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Sciences Engineering

Port Authority of NY & NJ Climate Resilience Program

TRB Webinar: Transportation Resilience Addressing Climate Change Challenges

07.26.2023



PA Facilities

Aviation

- John F. Kennedy International Airport
- · LaGuardia Airport
- Newark Liberty International Airport
- Stewart International Airport

Tunnels, Bridges & Terminals

- Bayonne Bridge
- George Washington Bridge
- Goethals Bridge
- Outerbridge Crossing
- Holland Tunnel
- Lincoln Tunnel
- Port Authority Bus Terminal
- · George Washington Bridge Bus Terminal
- Journal Square Transportation Center

Port

- · Port Jersey-Port Authority Marine Terminal
- Brooklyn-Port Authority Marine Terminal
- · Elizabeth-Port Authority Marine Terminal
- · Howland Hook Marine Terminal
- Port Newark

Port Authority Trans-Hudson (PATH)

- PATH Rail Transit System
- · Journal Square Transportation Center

The World Trade Center

A Decade of Action

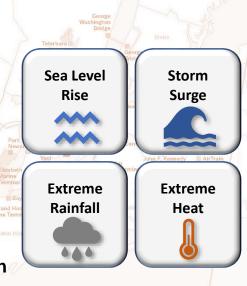
PA Progress since Sandy

- Since Hurricane Sandy, the Port Authority has embarked on an aggressive physical risk mitigation program, including:
 - 80 flood control measures implemented by the end of 2013
 - Over \$2.1 billion spent on Sandy recovery and storm hardening projects to date
 - Much stronger design standards for ALL projects in current or future flood zones (since 2015)
 - Major new focus on mitigating risks of intense precipitation (since 2021)
 - Launch of a proactive Climate Risk Assessment process focused on existing assets
 - Focus on implementation through a Resilience Action Plan

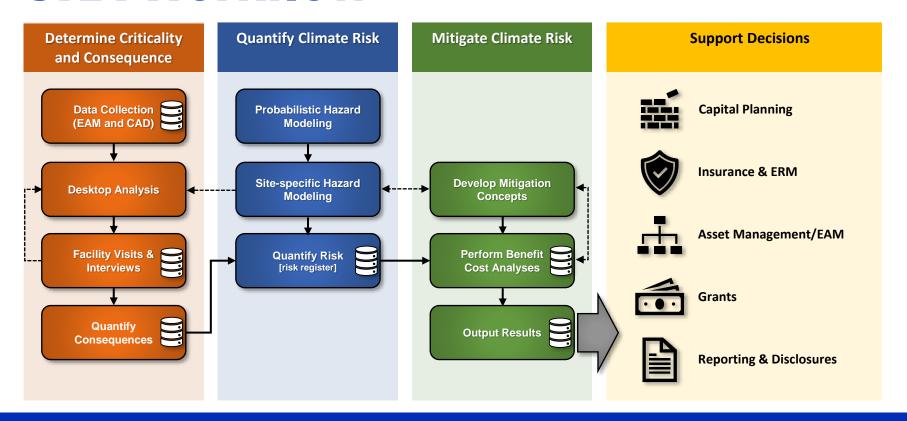
Looking Forward: Proactive Mitigation

PANYNJ Climate Risk Assessment (CRA) Initiative

- Launched in 2021, the CRA is a proactive, engineering-based analysis of climate-related risks across all Port Authority facilities to identify:
 - At-risk critical assets (Port Authority, tenant, and external connections)
 - Direct and indirect consequences of inaction (i.e., projected losses)
 - Measures to mitigate our highest priority risks
 - Strategic investment priorities for capital planning and grant pursuits
 - Substantial completion in 2024
- The CRA will serve as the basis for additional, aggressive resilience action



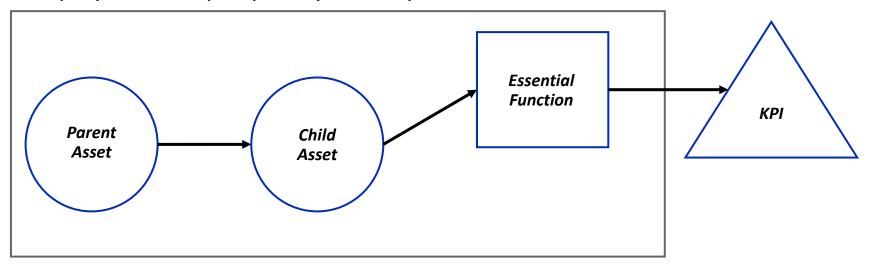
CRA Workflow



Representing Interdependency

Defining parent and child asset dependency relationships

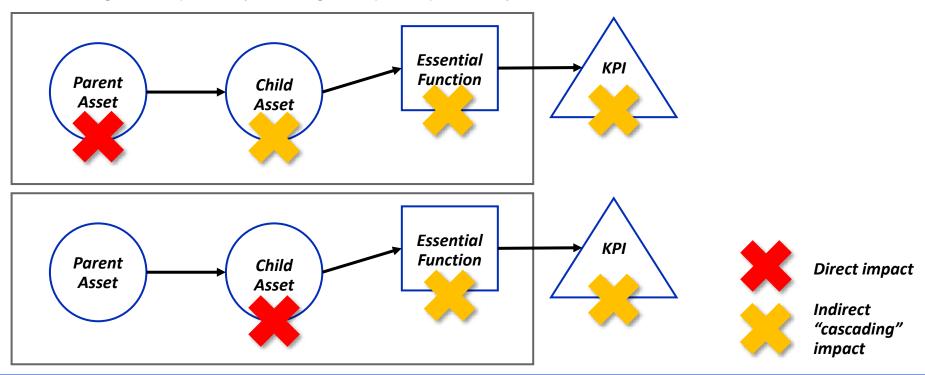
Example System with simple dependency relationship



A "child" asset is dependent on a "parent" asset to enable its function. Dependencies are grouped into system, power, and operational categories for the CRA.

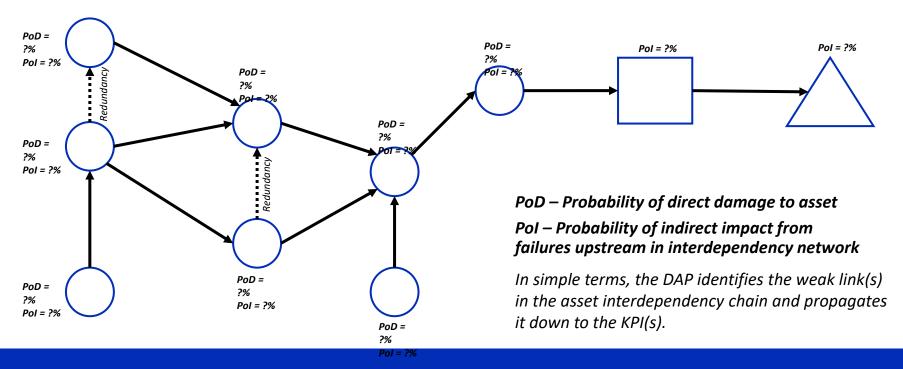
Representing Interdependency

Cascading failure pathways through simple dependency asset network



Assigning Consequences

The DAP propagates failure probabilities throughout the asset network and computes risk



CRA Key Takeaways (So Far ...)







Assessing Risk at Scale

 Understanding interdependencies is key to quantifying consequences (especially of critical parent assets that support key child assets and functions)

Managing Complexity

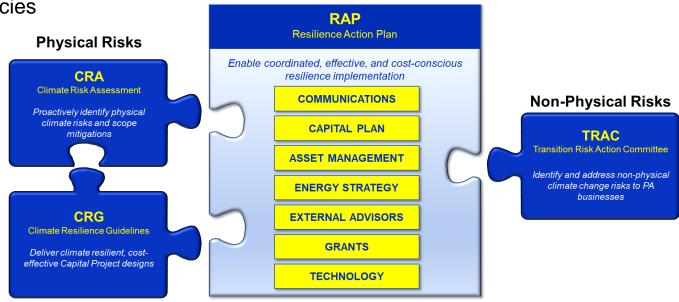
- Decision support software is necessary when dealing with complex interdependences at large scales
- DAP relies on good data inputs from EAM and field data collection

Implementing Priority Actions

- Optimize mitigation actions (quantitatively and qualitatively) to establish priority projects
- Incorporate outputs into core agency processes to ensure successful implementation

Putting it All Together: The RAP

 Resilience Action Plan (RAP) will enable aggressive but balanced integration of climate risks (physical and non-physical) into core agency programs, processes and policies



Thank You!

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TRB Webinar: Transportation Resilience Addressing Climate Change Challenges July 26, 2023

Heather Holsinger, Office of the Secretary, U.S. Department of Transportation

TRANSPORTATION VULNERABILITY

U.S. 2023 Billion-Dollar Weather and Climate Disasters Drought/Heat Wave Flooding Winter Storm/Cold Wave Central and Eastern Central Tornado Outbreak and Severe Weather Eastern Severe Weather April 4-6 March 31-April 1 Northeastern Winter Storm / Cold Wave February 2-5 Central Severe Weather California Flooding May 6-8 January-March Central and Eastern Tornadoes and Hail Storms Southern and Eastern May 10-12 Severe Weather March 2-3 Central Severe Weather Southern and Eastern April 19-20 Severe Weather Texas Hail Storms March 24-26 May 18-19 Southern Severe Weather Central and Southern June 11-14 Severe Weather April 15

This map denotes the approximate location for each of the 12 separate billion-dollar weather and climate disasters that impacted the United States through June 2023.

Climate Change and Notable Vulnerabilities of Transportation Assets

Roadways

Airports

Tunnels





National Performance Goals at Risk



Delivery Delays





Environmental

Sustainability



Freight

Movement &

Economic Vitality







Congestion Condition Reduction

System Reliability

USDOT STRATEGIC PLAN FOR FY 2022-2026





















Climate and Sustainability

- Path to Economy-wide Net-Zero Emissions by 2050
- Infrastructure Resilience
- Climate Justice and Environmental Justice

BIPARTISAN INFRASTRUCTURE LAW

- Once-in-a-generation investment in infrastructure
- Grows the economy, enhances U.S. competitiveness, creates good jobs, and makes the U.S. economy more sustainable, resilient, and equitable
- Around \$550 B in new Federal infrastructure investment, including—
 - Largest federal investment in public transit ever
 - Largest federal investment in passenger rail since the creation of Amtrak
 - Largest dedicated bridge investment since the construction of the Interstate System
 - Largest investment in clean energy transmission & electric vehicle infrastructure in history
- Transportation: First Climate Title and New Climate-Focused Transportation Programs
 - PROTECT Resilience Grants (formula and discretionary)
 - Carbon Reduction Program
 - Charging and Fueling Infrastructure
 - National Electric Vehicle Formula Program

Climate Action Plan - Adaptation & Resilience

US DOT Climate Action Plan, Revitalizing Efforts to Bolster Adaptation & Increase Resilience

Guiding principles from Policy Statement:

- Use Best-available Science
- Prioritize the Most Vulnerable
- Preserve Ecosystems
- Build Community Relationships
- Engage Globally

DOT Policy Statement

The world is facing an existential climate crisis. Climate change presents a significant and growing risk to the safety, effectiveness, equity and sustainability of our transportation infrastructure and the communities it serves. We have a 'once-in-a-generation' opportunity to address this risk. The United States Department of Transportation (DOT or Department) is going to lead the way.

Over the last decade, DOT has integrated climate change impacts, adaptation, and resilience into domestic and international planning, operations, policies, and programs. However, more must be done. The Department has the opportunity and obligation to accelerate reductions in greenhouse gas emissions from the transportation sector and make our transportation infrastructure more climate change resilient now and in the future. To do this, we will ensure that Federally supported transportation infrastructure, and DOT programs, policies, and operations, both consider climate change impacts and incorporate adaptation and resilience solutions whenever possible, by following these guiding principles:

- Use Best-available Science. Adaptation and resilience strategies will be grounded in the best-available scientific understanding of climate change risks, impacts, and vulnerabilities. Our adaptive actions will not be delayed—all plans and actions will be continuously reevaluated as our understanding of climate impacts evolves.
- Prioritize the Most Vulnerable. Adaptation and resilience plans will prioritize helping people, communities, and infrastructure that are most vulnerable to climate impacts—this includes proficient communities, and individuals with disabilities. These plans will be designed and implemented through a transparent process with meaningful involvement in decision making change impacts and adaptation will be addressed.
- Preserve Ecosystems. Protecting biodiversity and ecosystem services through adaptation strategies will increase resilience of human and natural systems to climate change and other risks, providing benefits to society and the environment (e.g. in a coastal setting, wetlands serve as buffers to transportation assets and can minimize the impacts of storm surge).
 Build Community Devices to the property of the property of
- Build Community Relationships. Adaptation and resilience require coordination across
 multiple sectors, geographical scales, and units of government. Our actions will build on
 existing efforts, knowledge, and meaningful engagement of communities that are impacted.
 Because impacts, vulnerabilities, priorities and needs vary by region and locale, adaptation will
 be most effective when driven by local and regional risks and needs.
- Engage Globally. The transformation of the global transport sector offers some of the most significant opportunities for deep greenhouse gas emissions cuts, healthier cities, and a 'oncein-a-generation' opportunity to build resilient infrastructure. DOT is committed to working with other nations, multilateral organizations, industry, and non-governmental organizations to lead a global transformation that addresses climate change mitigation, adaptation, and

We cannot do this alone. State, regional, local, territorial, and Tribal transportation agencies are encouraged to build resilience and adaptation into their planning and decision-making processes. Private sector innovation and investment in climate change realiency and adaptation is needed. By working together, we can ensure that our transportation systems can adapt to future changes, minimize negative impacts, take advantage of innovative opportunities, and better serve people and communities, especially those traditionally vulnerable and underserved.

Secretary Pete Buttigieg

Climate Action Plan - Adaptation & Resilience

Identifies Priority Strategies for DOT



Incorporate Resilience into DOT Grant and Loan Programs



Enhance Resilience Throughout the Project Planning and Development Process



Ensure Resiliency of DOT's Facilities and Operational Assets



Ensure Climate-ready Services and Supplies

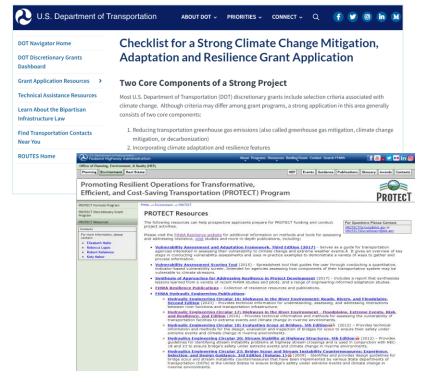


Improve Climate Education and Research on Resilience

DOT Discretionary Grants

Incorporating Climate Resilience Considerations in Funding Criteria

- Standard climate resilience language included in discretionary grant NOFOs, as appropriate
- Grant application checklist for climate change in DOT Navigator
- Working to simplify application process and develop additional technical assistance
- DOT Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) discretionary grant program
 - Funds projects that improve the resilience of the surface transportation system, including highways, public transportation, ports, and intercity passenger rail
 - Up to \$848 million in FY22 and FY23 funds being made available
 - Applications due August 18th



DOT Programs and Projects

Enhancing Resilience Throughout Project Planning and Development

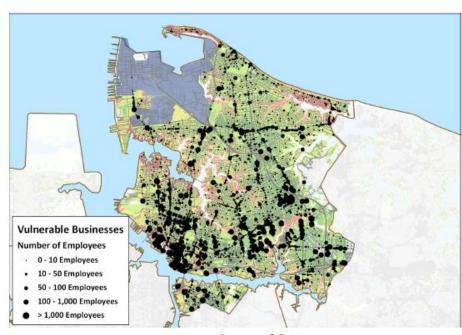
- DOT Operating Administrations continue to develop resources and provide technical assistance
- DOT Climate Resilience Review and Gap Assessment:
 - Policies and Guidance
 - Climate Informed Design
 - Climate Information
 - Education
 - DOT Operations and Workforce
 - International Initiatives



DOT Research

Technical Assistance and Decision-making Tools for Quantifying Resilience

- Industry framework for quantitative multi-modal resilience assessment with AASHTO and a 15-member industry coalition, responsive to <u>TRB Consensus</u> <u>Study</u>.
- Transportation Asset Risk and Resilience Manual for quantitative assessment of risk and resilience including benefit-cost analysis of resilience investments with NCHR
- Resilience and Disaster Recovery Tool analyzes resilience investments for Long-Range Transportation Planning. Now being implemented at state, local levels.



Storm Surge Analysis - Norfolk, Virginia

DOT Climate Education

Ensuring DOT staff have the knowledge to make climate informed decisions

- Climate 101 in partnership with NOAA
- **DOT Climate Change Center**



DOTnet News & Announcements - Technology - Work Tools - HQ Facilities - Careers & Training - Payroll & Benefits -Modal Intranets . Search Climate Change and Transportation 101 · Climate Change and Transportation Tackling the climate crisis is a key goal in our DOT Strategic Plan. And DOT staff have an important role to play. As such, all · Climate Change and Transportation staff are encouraged to take this important training, which explains both the science behind climate change and what USDOT is doing to tackle the climate crisis · Climate Change and Transportation The training kicks off with a three-minute video narrated by Under Secretary Carlos Monje and featuring several of your DOT colleagues. Next, NOAA scientists and communications specialists provide information on the causes and consequences of climate change. Then you will hear about strategies to reduce transportation greenhouse gas emissions and improve the resilience of transportation networks to climate change impacts. Finally, DOT colleagues will explain what the Department is doing to tackle the crisis, including through our funding programs, technical assistance, research, and policy leadership.

other job series employed by USDOT, this training will give you the basics of what you need to know to incorporate climate The training consists of a series of short videos with a total run time of one hour and three minutes. Videos are captioned and slides are 508 compliant. Please contact tina hodges@dot.gov ☑ with any questions.

Whether you are an engineer, planner, environmental protection specialist, grants manager, procurement specialist, or any

Module 1: Introduction and Why Climate Change Matters to Transportation

Introductory Video (3 minutes)

Why climate change matters to transportation

(4 minutes) (slides)

change considerations in your work and be part of the solution.

Module 2: The Science and its Implications

The Science and its Implications (29 minutes)

Module 3: Transportation Climate Solutions

Overview of US Climate Action in the Transportation Sector (3 minutes) USDOT Climate Action and What You Can Do to (24 minutes) (slides)



U.S. Department of Transportation



Questions?

Climate and Sustainability | US Department of Transportation

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Standing Committee on Climate Change and Extreme Weather Adaptation (AMR50)

Conference Objectives

- Develop common understanding of transportation resilience concepts and state of practice
- Share approaches for integrating climate resilience into agency programs and processes
- Learn new methods for evaluating and prioritizing resilience investments
- Discuss transportation resilience funding and financing challenges and opportunities
- Discover successful approaches for meaningful community engagement around transportation resilience
- Develop a peer learning network to exchange ideas

Target Audience

- Transportation practitioners
- Researchers
- Educators
- Consultants
- Government agencies
- Businesses
- Advocacy groups
- Local, tribal, state, national and international perspectives



Conference Themes

- Resilience Planning and Projects
- Resilient Recovery
- Resilience Processes and Programs



Includes various modes of transportation: pedestrian, bicycle/scooter, automobile, rail, transit, aviation and pipeline - facilities and critical infrastructure

Considers all aspects of the transportation sector - design, engineering, planning, asset management, operations, maintenance, emergency management and communications

Resilience Planning and Projects

- Identifying, screening and prioritizing transportation resilience projects during the planning to capital programming phase
- Approaches and frameworks being used to integrate resilience into the project development and design process
- Funding and financing strategies for adaptation planning and projects
- Showcasing completed projects that incorporate resilience
- Metrics and measures to track and monitor resilience activities





Resilient Recovery

- Methods and practices to expedite natural disaster recovery
- Economic, risk, and equity tradeoffs for building back more resiliently postdisaster
- Cascading impacts across critical infrastructure sectors
- Post-disaster data to enhance recovery planning and project development



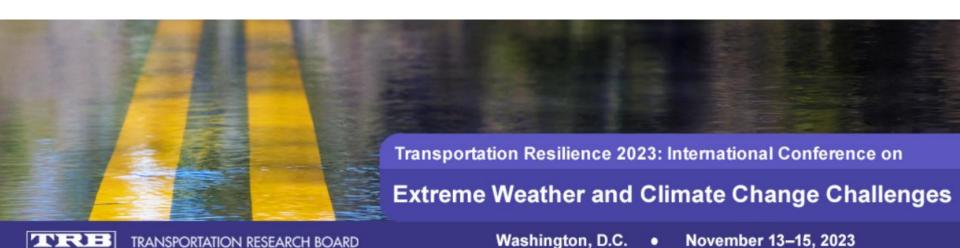


Resilience Processes and Programs

- Institutionalizing/mainstreaming resilience
- Utilizing climate projections for transportation planning, risk-based asset management, and surface transportation project development
- Incorporating resilience into agency workforce
- Stakeholder cooperation and collaboration
- Retreat or relocation as an acceptable option and how to make determination
- Communicating climate science/data to influence cultural and institutional changes
- Sector interdependencies and cross-sector collaboration

For more information:

https://trb.secure-platform.com/a/page/TransportationResilience



Today's presenters



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Sciences Engineering

Upcoming events for you

August 7, 2023

TRB Webinar: Climate-Resilient, Low-Volume Road Design and Management

November 13-15, 2023

TRB's Transportation Resilience 2023

https://www.nationalacademies.org/trb/events



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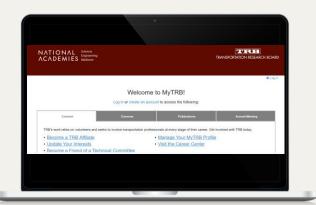
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Recycled Plastics in Infrastructure

Current Practices, Understanding, and Opportunities



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