



Guide to Expanding Mitigation

MAKING THE CONNECTION TO TRANSPORTATION



FEMA

RiskMAP
Increasing Resilience Together



Transportation connects us to one another and to the resources we need to thrive. It is made up of the vehicles that you travel with, like buses, bikes, cars, and metros and of the networks of trucks, trains, and planes that move goods across the country. The movement and storage of these vehicles is made possible by near and long-term infrastructure investments. These connectors are critical, and many are exposed to hazards and are at risk unless protected.

Major disasters often connect and elevate transportation and emergency management response officials and recovery efforts. After Hurricane Sandy, disaster relief funds were distributed through coordination between state, local, and federal highway, transit, and emergency management officials. This type of collaboration can result in tangible mitigation projects for a more resilient transportation network. These strategies can take the form of service-proven hardening solutions like elevating a bus storage yard to mitigate interior flood damage or installing targeted stretches of seawalls and floodgates to manage floodwater during major storm events. Disasters can also spur the deployment of solutions like tunnel plugs which can be more flexibly deployed during major storm events.

Transportation engineers, planners, and construction workers share a common goal with emergency managers: keeping the public safe. Community emergency managers and transportation professionals can collaborate throughout the disaster lifecycle to save lives, protect community investments, and restore critical transportation assets and services quickly after a disaster. In advance of a disaster, however, mitigation is essential to ensuring transportation systems and the communities they serve are protected well into the future.

This *Guide to Expanding Mitigation* explores how community officials can work with the transportation sector to support hazard mitigation, including the planning process. This guide is a starting place for community officials to initiate a conversation about mitigation investments that can make transportation more resilient.



This *Guide to Expanding Mitigation* is part of a series highlighting innovative and emerging partnerships for mitigation.



TRANSPORTATION RISK IN YOUR COMMUNITY

Every year, state governments and federal agencies invest \$290 billion in transportation systems that are vital to our economy, our health, and our safety. Those investments fund everything from airports and pipelines to roads and railways. Transportation networks, including nearly 4.2 million miles of roadway across the country, face risks that vary by community. Emergency managers can work with transportation professionals to understand how different transportation elements are related and exposed to risk by asking questions such as:

- Does the right of way expose drivers or riders to hazards?
- Do our transit stops expose riders to high temperatures?
- How do our local streets and parking lots drain after a heavy rain?
- Are all of our bridges earthquake resistant?
- How do local roads feed into evacuation routes?
- Are the roads adjacent to critical facilities well-maintained?
- Can emergency vehicles access neighborhoods during regular tidal flood events?
- Are we prepared for an all-hazards approach to reducing risk, including flood after fire?
- How does our transit system reduce local emissions-related hazards?
- What populations are most susceptible to evacuation stress?

WHAT IS A “RIGHT OF WAY”?

Transportation infrastructure occupies space. The right of way is the land and immediately surrounding area of the rail and road network. Right of way owners and managers can include all levels of government as well as private entities and citizens.

PLANNING FOR RISK WITH THE TRANSPORTATION SECTOR

All capital investments in transportation resilience require funding. This funding is typically made available after disasters. Emergency managers can also prepare for disasters internally and across agencies using scenario planning. Tabletop exercises and yearly drills that replicate disaster response and hazard mitigation planning keep emergency professionals and transportation authorities continually engaged.

When it comes to mitigation, transportation projects can leverage funding creatively and meet multiple community needs. For example, communities constructing more parking in flood prone areas can design the new parking lot or structure to absorb or store flood water. Off-street parking is a significant investment on its own, but with additional funding can also be designed to reduce risk.

While resilient parking may be invisible to its users, other infrastructure like parking lanes can be used to address risk and build awareness. A right of way can be repurposed to provide more space between pedestrians during a pandemic. Parking lanes can become extended sidewalks, parklets (miniature parks), or additional outdoor dining space for restaurants. Indeed, less parking in urban areas through the elimination of parking minimums reduces development costs which can be repurposed to reduce community risk.

Elevating roads and railways in flood prone areas is a common, but expensive, way to increase community safety. However, designs that also preserve wetlands or green space adjacent to the right of way can prevent washouts and reduce maintenance needs.

COORDINATION IN ACTION

Seasonal flooding and wildfires should be mitigated through ongoing efforts. Recurring washed out roadways may be too expensive to replace using annual budgets and mitigating them requires long-term planning. Close coordination among local emergency managers, rural planning organizations (RPOs), regional transportation planning organizations (RTPOs), and metropolitan planning organizations (MPOs) and state highway authorities can identify problem spots and identify creative funding solutions.

EMERGENCY MANAGERS AS TRANSPORTATION PLANNING CHAMPIONS

While resilient transportation infrastructure relies on highly technical engineering analysis, local emergency managers are often the community keepers of risk information and past events. A geotechnical analysis may not capture a scenario experienced by the community, like right of ways that experience repetitive flooding, frequent rockslides, or seasonal ice jams. Emergency managers can share this knowledge with transportation authorities to facilitate more sustainable investments. Emergency managers serve as the collective disaster and hazard memory for their communities and are the untapped risk ambassadors to the transportation community.





CROSS-AGENCY COLLABORATION

Long term partnerships can facilitate conversations across agencies, help overcome political challenges, and create a culture of safety through maintenance coordination. Collaboration between transportation, planning, and emergency officials can result in creative mitigation solutions that yield multiple community benefits. When officials work together, they can answer questions like:

- How will this regional transportation project affect local evacuation routes and planning?
- Has this project been designed to withstand current and future hazards?
- What about compounding hazards, like flood after fire?
- Does this roadway require no-wake zone considerations like signage?
- Does this project align with long term community priorities outlined in the comprehensive plan?
- Can a new transportation corridor guide development to safer, more sustainable areas?
- Has water runoff or fire mitigation been considered for this project? Can the project be designed to serve as a fire break or storm surge protection?
- Does this project account for underlying risks, like repetitive wash outs or flooding?
- What is the lifespan of the project and its long-term maintenance requirements? Does future maintenance consider sea level rise projections?
- Will widening the roadway affect traffic capacity and demand on evacuation routes?
- Will new developments with impervious surfaces create additional runoff?
- How will this project help people who are most at-risk in our community?

If you are engaging transportation officials in hazard mitigation planning for the first time, you could start by looking at infrastructure maintenance needs. For example, maintaining evacuation routes, especially those exposed to hazards, can reduce risk and keep routes operable. Clearing debris from culverts, removing brush from fire evacuation routes, and removing blockages from catch basins are all important efforts for both transportation maintenance and improving public safety.

Mitigating risk is most successful when efforts go beyond maintenance, when long-term investments are planned and coordinated across agencies and jurisdictions from the start. Local highway districts and emergency managers can connect their hazard knowledge with RPOs, RTPOs and MPOs to align transportation plans and future investments. Mitigation in advance of a disaster helps anticipate needs for evacuation routes, ways to reduce response times for emergency vehicles in high risk areas, and assets that will benefit from increased resilience.



DID YOU KNOW?

Transportation planners use intelligent transportation systems (ITS) to identify redundant evacuation routes based on local hazard knowledge and real time traffic demand. ITS systems already in place can alleviate traffic congestion and inform road users about the hazard mitigation lifecycle by increasing risk awareness and speed disaster response.

RESOURCES

FEMA Hazard Mitigation Planning
fema.gov/hazard-mitigation-planning

Review standards and guidance for the planning process

What is Mitigation?
fema.gov/what-mitigation

Learn more about how FEMA defines mitigation

The Transportation Research Board (TRB) and Resilience
trb.org/Main/Blurbs/166648.aspx

Connection to a broad swath of tools and concepts in transportation and hazard resilience

American Association of State Highway and Transportation Officials (AASHTO) Resilience and Sustainable Transportation Systems Program
environment.transportation.org/center/rsts/

Access to technical assistance for state departments of transportation addressing resiliency goals

FHWA Eco-Logical Program and Applications to Resilience:
https://www.environment.fhwa.dot.gov/env_initiatives/eco-logical.aspx

Program resources for creating more resilient transportation infrastructure



ENGAGE WITH US

Are you a state, territorial, tribal, or local official interested in making the connection with transportation? Are you a transportation engineer or planner interested in connecting with emergency managers to reduce risk from hazards? Please contact us at FEMA-R2-MT-Planning@fema.dhs.gov.

REFERENCES CONSULTED

Congressional Budget Office (CBO). 2018. “Public Spending on Transportation and Water Infrastructure, 1956 to 2017.”
cbo.gov/publication/54539

FEMA. 2004. “At Home in the Woods.”
fema.gov/pdf/library/woods/athome_woods.pdf

FEMA. 2010. “Hazard Mitigation Field Book - Roadways.”
fema.gov/media-library/assets/documents/19299

Texas Department of Transportation. 2019. “Asset Management, Extreme Weather, and Proxy Indicators Pilot Report.”
www.fhwa.dot.gov/asset/pilot/tx.pdf

Transportation Research Board National Cooperative Highway Research Program. 2014. “A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events.”
nap.edu/catalog/22338/a-guide-to-regional-transportation-planning-for-disasters-emergencies-and-significant-events

United States Department of Transportation, Federal Highway Administration (FHWA). 2019. “Highway Statistics 2018.”
<http://www.fhwa.dot.gov/policyinformation/statistics/2018/hm16.cfm>

National Association of City Transportation Officials (NACTO). 2020. “Streets for Pandemic Response & Recovery.”
<https://nacto.org/streets-for-pandemic-response-recovery/>

ACKNOWLEDGEMENTS

Project Team: Jack Heide, FEMA Region II; Matt Kroneberger, *Resilience Action Partners*; Melissa Herlitz, *Resilience Action Partners*

We thank the following individuals who contributed their time toward advancing our understanding of mitigation and transportation: Nan Johnson, FEMA Region I; Andrew McMahan, Metropolitan Transportation Authority; Aydde Martinez, Kurt Raschke, Steven Loehr, New York City Transit; EJ Simie, Natalie Jones-Best, and Thomas Neider, District of Columbia Department of Transportation; Jacqueline Koons-Felion, Jonathan Fleming, and Kenneth Bair, Pennsylvania Department of Transportation; Michael Duncan, Oregon Department of Transportation; Michael Martello, Massachusetts Institute of Technology; Madeline Brozen, University of California, Los Angeles Lewis Center for Regional Policy Studies; Shalini Vajjhala, re:focus partners.

