



Guide to Expanding Mitigation

MAKING THE CONNECTION TO TRANSPORTATION



FEMA



Photo: Firefighter surveys damage, Butte County California
Cover Photo: Traffic in heavy rain on a freeway in Houston, TX




Photo: Sauk River, Darrington Wash.

Transportation connects us to one another and to the resources we need to thrive. It is made up of the vehicles we travel with, like buses, bikes, cars, and railways, and 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. They are at risk if they are not protected.

Major disasters and recovery efforts often elevate the connections between the people managing transportation and emergency management response. After Hurricane Sandy, state, local, and federal highway, transit and emergency management officials coordinated to distribute disaster relief funds and supplies. This type of collaboration can result in tangible mitigation projects for a more resilient transportation network. These 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 more flexible solutions like tunnel plugs which can be deployed during major storm events.

Transportation engineers, planners and construction workers share a common goal with emergency managers: keeping the public safe. Local emergency managers and transportation professionals can collaborate throughout the disaster lifecycle to save lives, protect community investments, and quickly restore critical transportation assets and services after a disaster. Pre disaster mitigation is essential for protecting transportation systems and the communities they serve 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 can help community officials initiate a conversation about mitigation investments to make transportation more resilient.



This *Guide to Expanding Mitigation* is part of a [series](#) highlighting innovative and emerging partnerships for mitigation.

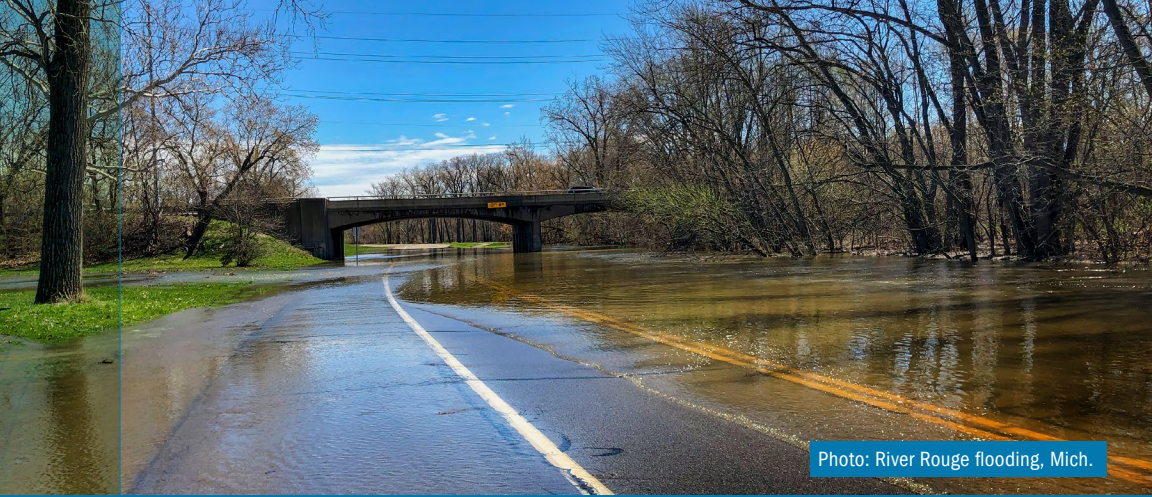


Photo: River Rouge flooding, Mich.

TRANSPORTATION RISK IN YOUR COMMUNITY

Every year, state, local, tribal and territorial governments and federal agencies invest \$290 billion in the transportation systems that are vital to our economy, our health and safety. Those investments fund everything from airports and pipelines to roads and railways. Transportation networks, including nearly 4.2 million miles of roadways 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. They should start 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 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 flooding after fires?
- How does our transit system reduce local emissions-related hazards?
- What populations are most vulnerable to evacuation challenges?

WHAT IS A “RIGHT-OF-WAY”?

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



Photo: Aerial view of the Los Angeles River

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 prepare for disasters internally and across agencies using scenario planning. Tabletop exercises and yearly drills that replicate a disaster response and hazard mitigation planning keep emergency and transportation professionals working together.

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

While the extra benefits of resilient parking may be invisible to users, infrastructure like parking lanes can both address risk and build awareness. For example, right-of-way lanes and parking lanes can become extended sidewalks, parklets (miniature parks), or outdoor dining space for restaurants. Indeed, eliminating parking minimums in urban areas reduces development costs. These funds can be repurposed to reduce community risk.

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

COORDINATION IN ACTION

The impacts of seasonal flooding and wildfires should be mitigated through ongoing efforts. For example, recurring washed-out roadways may be too expensive to replace using annual budgets. Mitigating the cause of the damage requires long-term planning. Close coordination by 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

Local emergency managers often keep the community's records of risk information and past events. While resilient transportation infrastructure relies on highly technical engineering analyses, a geotechnical analysis may not capture a scenario experienced by the community, like rights-of-way that experience repetitive flooding, frequent rockslides, or seasonal ice jams. Emergency managers can share this knowledge with transportation authorities to facilitate more sustainable investments. Holding the collective disaster and hazard "memory" for their communities, emergency managers are the often-untapped risk ambassadors to the transportation community.



Photo: Storm damage to highway, Outer Banks, N.C.



Photo: A fire truck and firefighters on a suburban street



Photo: Rural highway near bayou, La.



Photo: Drainage culvert with pipe under a path

CROSS-AGENCY COLLABORATION

Long-term partnerships can facilitate conversations across agencies, help overcome political challenges, and create a culture of safety through coordinating maintenance. 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 compound hazards, like flooding after wildfires?
- Does this roadway require no-wake zone considerations like signs?
- 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 washouts or flooding?
- What is the lifespan of the project, and what are its long-term maintenance requirements? Does future maintenance consider sea level rise projections?
- Will widening the roadway affect its capacity or the demand on evacuation routes?
- Will new developments with impervious surfaces create additional runoff?
- How will this project help the 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 public safety.

Mitigating risk is most successful when efforts go beyond maintenance, and when long-term investments are planned and coordinated across agencies and jurisdictions from the start. Local highway districts and emergency managers can share their hazard knowledge with rural regional transportation and metropolitan planning organizations to align transportation plans and future investments. Mitigating risk in advance of a disaster helps a community 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. Active ITS systems can alleviate traffic congestion and inform road users about the hazard mitigation lifecycle by increasing risk awareness and a speedier disaster response.

RESOURCES

Guides to Expanding Mitigation

<https://www.fema.gov/mitigation-risk-reduction>

Link to all available Guides to Expanding Mitigation.

FEMA Hazard Mitigation Planning

<https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning>

Review standards and guidance for the planning process.

The Transportation Research Board (TRB) and Resilience

<http://www.trb.org/Main/Blurbs/166648.aspx>

American Association of State Highway and Transportation Officials (AASHTO) Resilient and Sustainable Transportation Systems Technical Assistance Program

<https://rst.transportation.org/>

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

Federal Highway Administration 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, local, tribal or territorial 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-ExpandingMitigation@fema.dhs.gov.

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