

# REGIONAL TRANSPORTATION RESILIENCE

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## Update on regional work and implications for freight planning

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TPB Transportation Planner

TPB Freight Subcommittee Meeting  
July 6, 2023



National Capital Region  
**Transportation Planning Board**

# Agenda

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- Resilience – overview
- Resilience at TPB/MWCOG
- Freight implications/examples
- Discussion – I want to hear from you

# Poll

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Please follow the link in the chat  
<https://www.menti.com/alv4adszf4at>

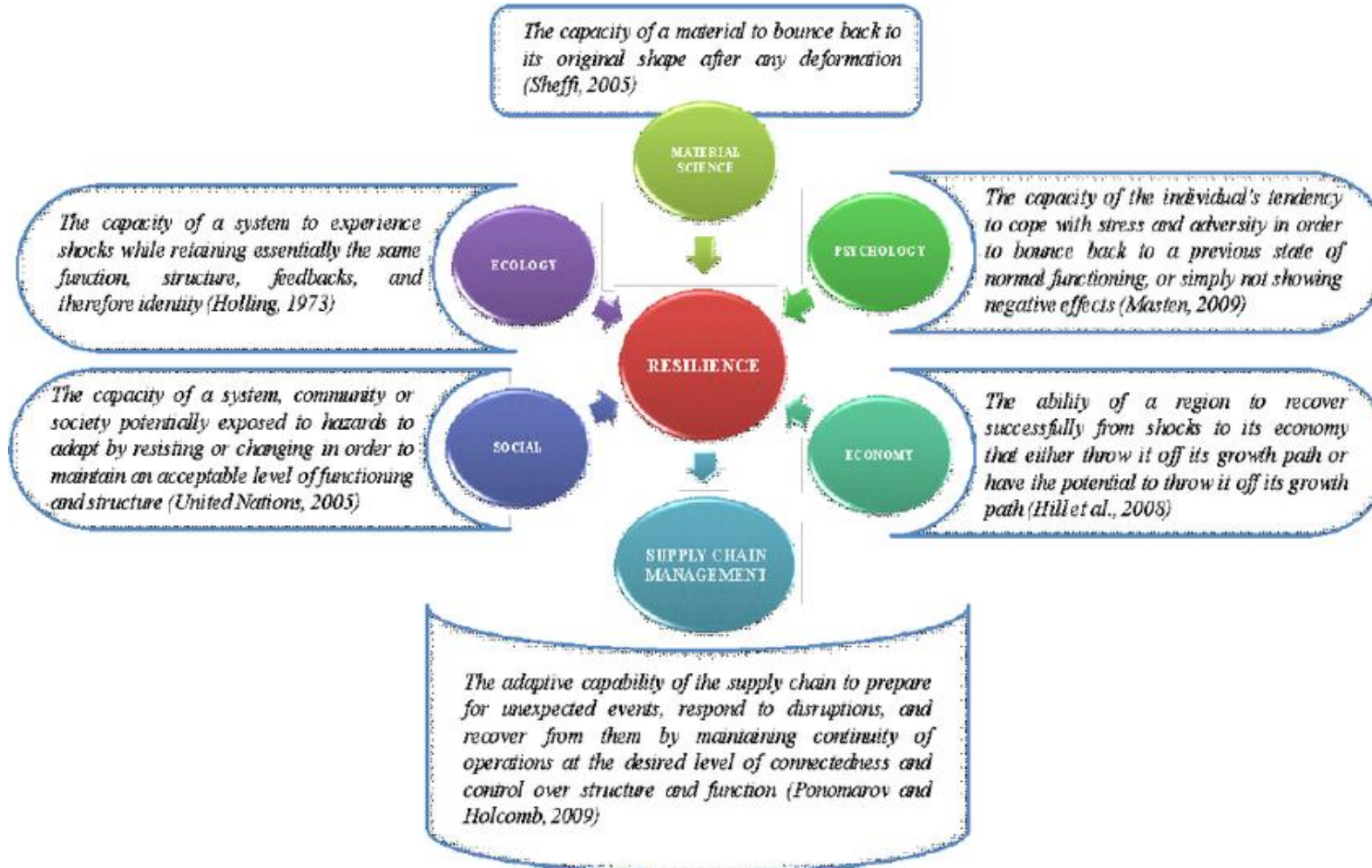
What do you think of  
when you hear the  
term RESILIENCE in  
transportation  
planning context?



# Natural Hazard and Climate Resilience: Background



# Resilience – a term with many meanings



# Resilience & Vulnerability Defined (FHWA)

- **Resilience** is the ability to **anticipate, prepare for, and adapt** to changing conditions and **withstand, respond to, and recover** rapidly from disruptions from natural hazards
- **Vulnerability** is the degree to which a system **is susceptible to, or unable to cope with adverse effects** of natural hazards



Damage to Hunter Mill Road in Fairfax County from Tropical Storm Lee (2011). Source: [Flicker/VDOT](#)

# Natural Hazards to Transportation

- **Extreme heat:**
  - Train rails expand, risking derailments
  - Concrete roads crack and asphalt buckles
  - Bridge joints expand
- **Extreme winter conditions:**
  - Road surfaces crack and potholes form
  - Systems operations power loss
  - Roads close due to obstructions
- **Extreme precipitation and flooding:**
  - Erosion can cause catastrophic collapse of any transportation infrastructure
  - Roads close due to flood or obstructions

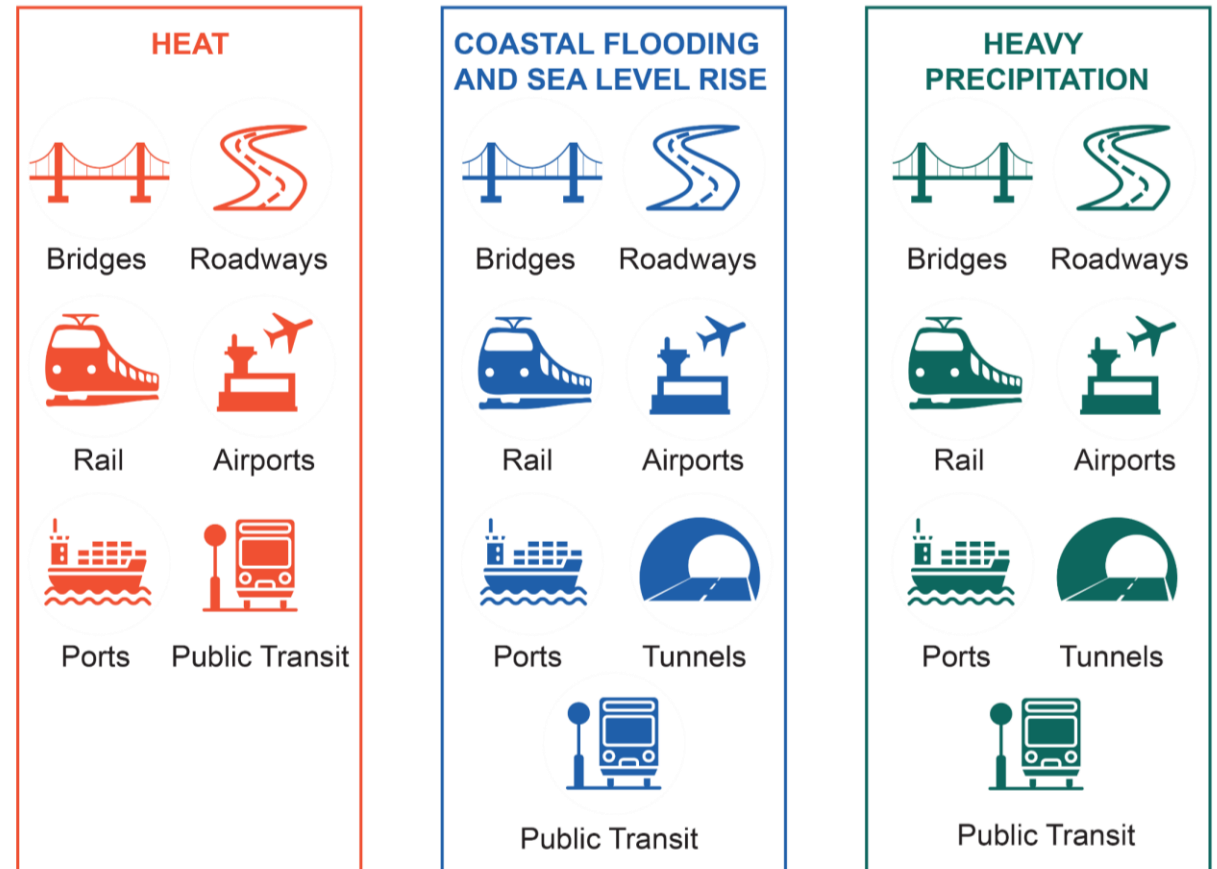
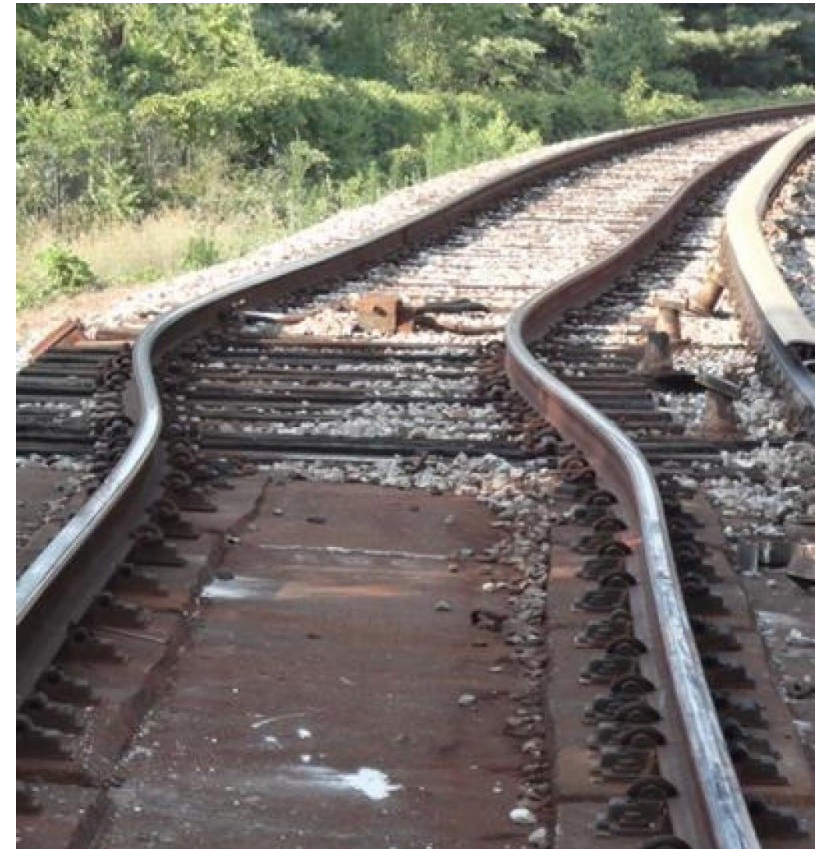


Figure: Fourth National Climate Assessment, Transportation Chapter



# Natural Hazards and Climate Change

- Climate change is accelerating over time and will continue over the design life of infrastructure
- Impacts to the transportation system have ripple effects on communities and the economy
- Some of these impacts disproportionately affect vulnerable populations

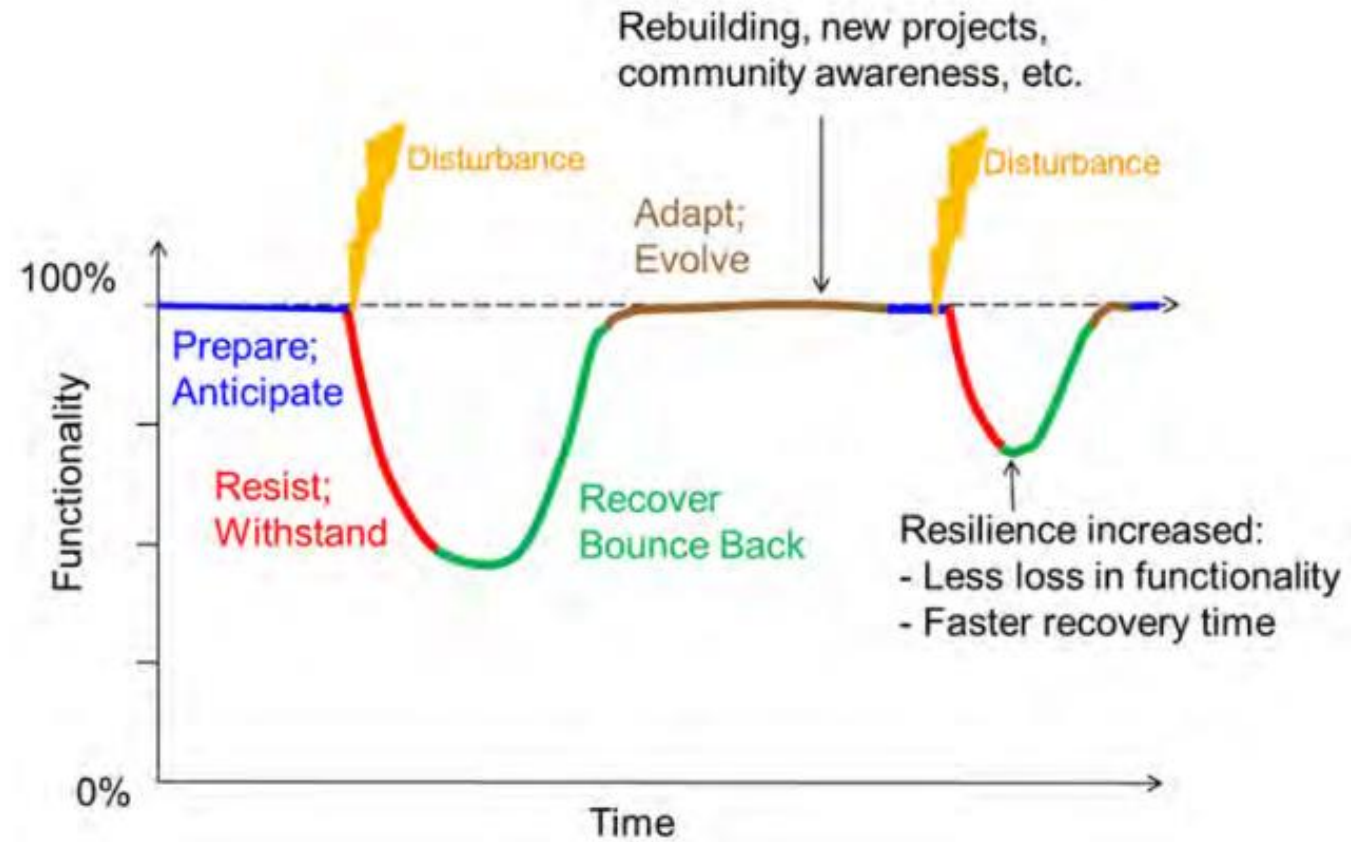


Source: [Washington Post](#), WMATA





# Resilience in practice



**FIGURE 1 Components of resilience (3).**

Figure Source: Transportation Research Board, 2021

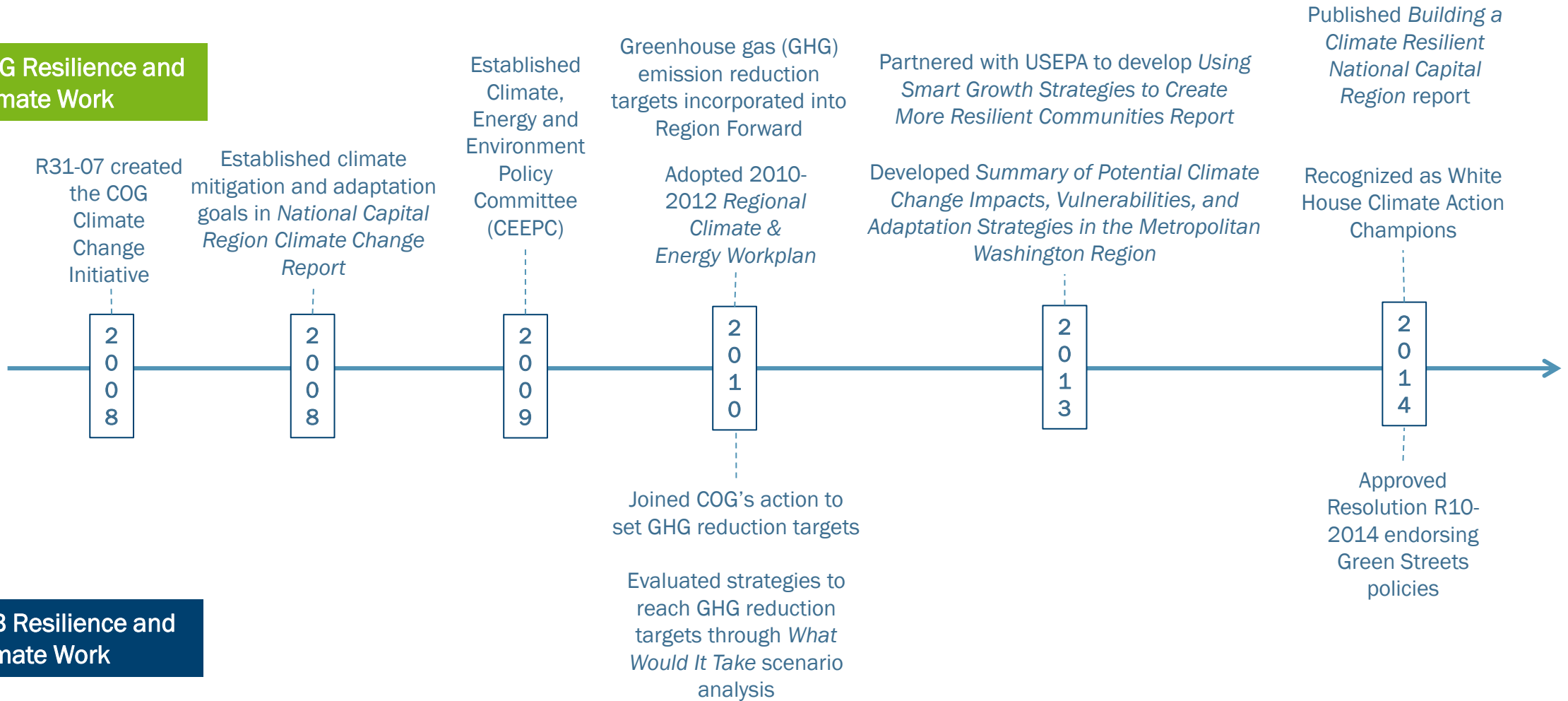


# Resilience in MWCOG/TPB Region



# Resilience work in TPB region

## COG Resilience and Climate Work



## TPB Resilience and Climate Work



National Capital Region  
**Transportation Planning Board**



Metropolitan Washington  
**Council of Governments**

# Resilience work in TPB region (continued)

## COG Resilience and Climate Work

Updated Climate Energy and Environment Policy Committee Final 2013-2016 Action Plan Resource Guide

2015

Support local resilience planning, such as DC's [Climate Ready](#) and [100 Resilient Cities](#) initiatives (ongoing)

Developed *Metropolitan Washington 2030 Climate and Energy Action Plan*

2016

Published Environmental Justice Toolkit

2017

Named a Regional and Metro Scale Climate Leader by the Global Covenant of Mayors for Climate and Energy

2019

Developed and a *Metropolitan Washington 2030 Climate and Energy Action Plan*

2020

Met global standards for climate planning

2021

## TPB Resilience and Climate Work

Identified types of projects, programs, and policies with the greatest potential to reduce GHGs of the transportation sector (TPB Multisector Working Group)

Published TPB Climate Change Mitigation Study of 2021

Developed TPB Resiliency Study



# Climate Resilience Goals

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In October 2020, per CEEPC's recommendation, the COG Board adopted (and TPB affirmed) the climate resilience goal of becoming a Climate Ready Region and making significant progress towards becoming a Climate Resilient Region by 2030.

## *Climate Ready Region:*

To be Climate Ready by 2030, all local governments must assess current and future climate risks, and be actively integrating climate planning across government plans, operations, and communications.

## *Climate Resilient Region:*

To fully be a Climate Resilient Region, the region must have the ability to adapt and absorb against disturbances caused by current and future, acute and chronic climate impacts and successfully maintain essential functions.

# Bipartisan Infrastructure Law (BIL/IIJA) – PROTECT Program

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- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)
  - \$8.7 billion over five years
    - \$7.3 billion for State DOTs
    - \$1.4 billion across four competitive grant programs:

Planning grants

Resilience improvements

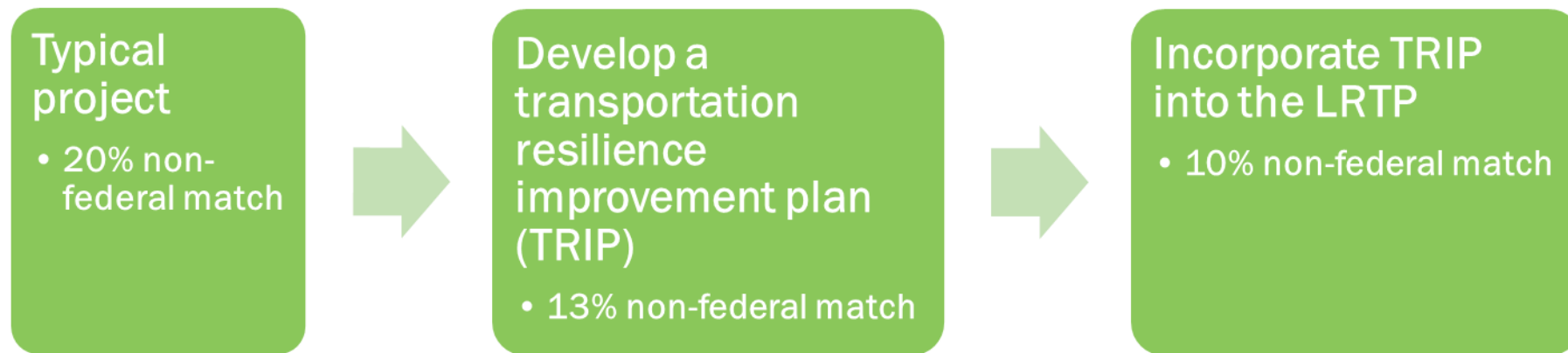
Community resilience and evacuation routes

At-risk coastal infrastructure



# Bipartisan Infrastructure Law (BIL/IIJA) – PROTECT Program

- Some (Transportation Resilience Improvement Plan) TRIP requirements include:
  - Demonstrate a **systematic approach** to system resilience
  - Include a **risk-based vulnerability assessment**
  - Include an **investment plan** and list of **priority projects**
- Opportunities to lower local match requirements



# Phase II Resiliency Study

- Transportation Resilience Improvement Plan (TRIP)
- Regional Working Group, eventual subcommittee
- Resilience Forum
- Project list
- Interactive map of major regional resilience hazards





# Resilience Study Schedule

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May 2023: Finalize Working Group members and schedule meetings

July 2023: Conduct Vulnerability Assessment (system and asset level analyses)

August 2023: Identify criteria to define resilience projects

September 2023: Host resiliency forum






November 2023: Request proposed projects and use criteria to establish Resilience Project List

March 2024: Draft the Transportation Resilience Improvement Plan (TRIP)

June 2024: Finalize TRIP and develop Transportation Resiliency Planning Interactive Map



TABLE 1. SUMMARY SYSTEM-LEVEL ANALYSIS RESULTS FOR MWCOG REGION (INFRASTRUCTURE IMPACTS ON LEFT; SERVICE AND CUSTOMER IMPACTS ON RIGHT)

					
	Extreme Heat	Inland Flooding	Coastal Flooding	Extreme Winter	Extreme Wind
Roads and highways					
Bridges					
Public transit					
Active transport					
Airport					
Maritime					
Stormwater					

Legend:

				(no pattern)
<i>High sensitivity</i>	<i>Medium sensitivity</i>	<i>Low sensitivity</i>	<i>Impacts to infrastructure</i>	<i>Impacts to customers and service</i>



# Freight Resilience Planning



Figure: Multiple vehicles stuck on flooded roads in Detroit. Source: ClickOnDetroit



# Freight Resilience - definition

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- **USDOT National Freight Strategic Plan (2020)**

“The ability of a system to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. A resilient freight transportation system is responsive, able to provide reliable services when it encounters small disruptions and return to service quickly after large disruptions. Disruptions to the transportation system often require the coordinated activities of the public and private sectors to ensure freight transportation flows, both for emergency response and economic recovery. The availability of alternative routes and modes allows shippers to develop contingency plans enhancing their flexibility.”



# Impact of Natural Hazards on Freight Networks - Examples

Table Source: USDOT/FHWA State of the Practice Report, June 2022

**Table 1: Recent examples of extreme weather disruptions to the U.S. freight transportation network.**

<i>Hurricane Maria</i>	In September 2017, a Category 5 hurricane in Puerto Rico caused major damage across the island, damaging all major infrastructure. In the wake of the storm, food and critical supplies were rationed across the island as emergency relief supplies were stuck in containers at the Port of San Juan for several weeks, due in part to infrastructure damage caused by the storm. <sup>3</sup>
<i>Texas Deep Freeze</i>	In February 2021, Texas experienced historically low temperatures, causing the electrical grid to fail for several days across the State. Grocery stores across Texas experienced extreme food supply shortages, exacerbating already low supplies caused by the Covid-19 pandemic, and international freight crossing the U.S.-Mexico border saw delays of up to three days. <sup>4</sup>
<i>Glenwood Canyon Wildfire and Subsequent Mudslides</i>	In July 2021, heavy rains caused a mudslide wiping out a section of Interstate-70 in the Colorado mountains, blocking a 46-mile stretch of the highway for several weeks. A wildfire preceding the rains created a “wildfire burn scar” through the surrounding forest, enabling mudslide conditions. Commercial vehicles were required to take a 250-mile detour through a different mountain pass, delaying the delivery of fuel, food, and supplies to the Western Slope communities of Colorado affected by ongoing wildfires in the area. <sup>5</sup>
<i>Delta Wildfires</i>	In September 2018, a massive wildfire rapidly overtook a section of Interstate 5 in Northern California. Seventeen commercial vehicle drivers were forced to abandon their tractor-trailers to flee from the blaze and several of the rigs melted to the roadway surface. The Interstate was closed for several days after the fires were extinguished, further disrupting freight movement. <sup>6</sup>
<i>2011 and 2019 Missouri River Flooding</i>	In 2011 and 2019 Missouri River flooding was triggered by heavy snowfall in the Rocky Mountains followed by heavy spring rainfall. Flooding was caused by a combination of record snowfall followed by quick temperature rise and heavy late winter rainfall on frozen ground. In Nebraska, 3,000 miles of state highways were washed away or closed, cutting off access to communities. In Iowa, a section of I-29 was closed for a total of 100 days. Several bridges over the Missouri River were closed, disrupting movement of freight and people.



# Freight Resilience Planning – Findings

- Some state DOTs are working to develop collaborative data analysis, planning, and policy approaches to freight resiliency
- State DOTs often think about resiliency primarily in the context of highway operations, multimodal freight network sometimes missing
- Long-range transportation planning efforts often focus on climate change mitigation instead of adaptation
- No single approach or office within state DOTs responsible for freight resiliency
- Transportation agencies are in the early stages of considering resiliency performance measures

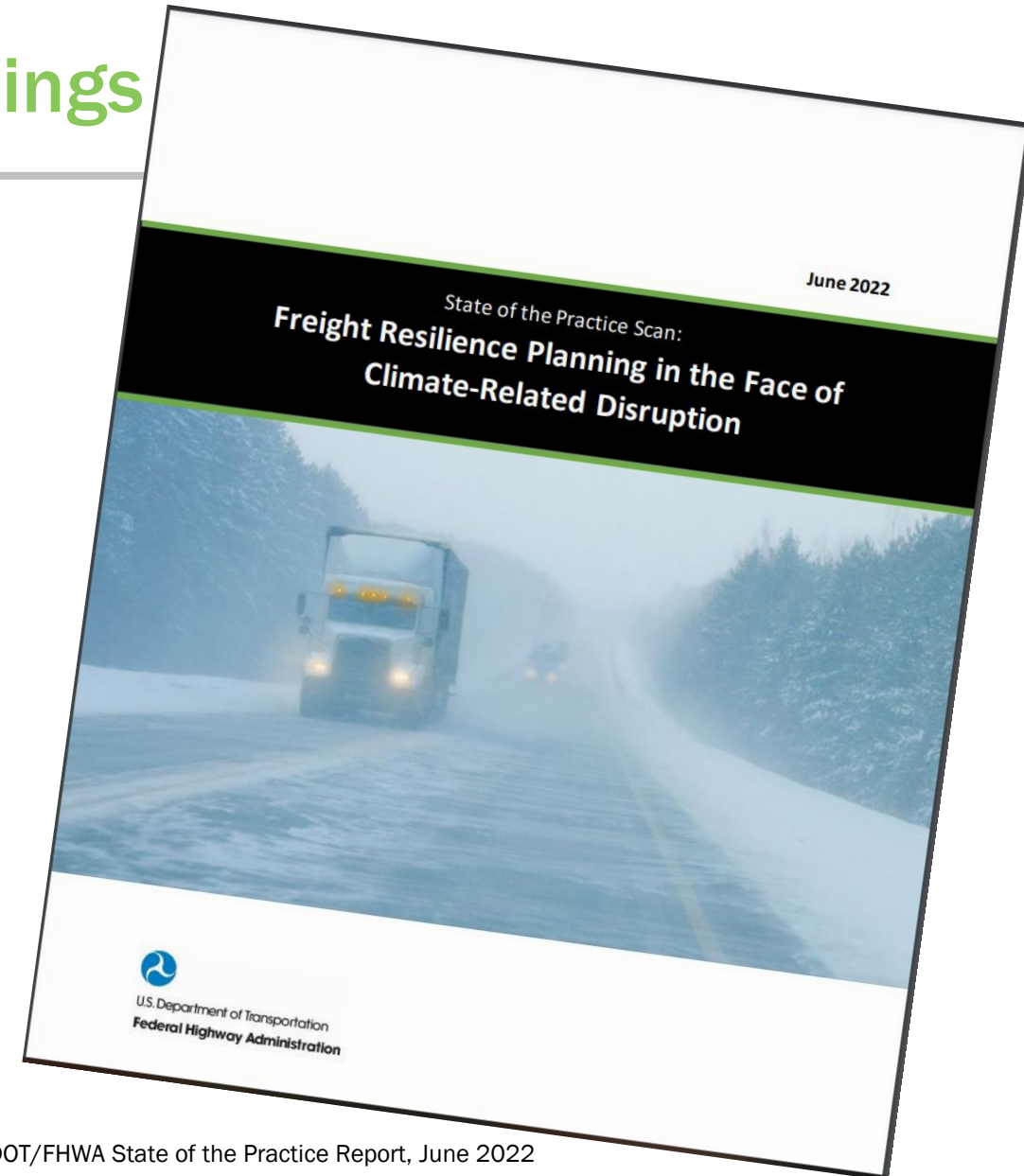


Figure: USDOT/FHWA State of the Practice Report, June 2022



# Freight Resiliency Planning - Approaches

- Standalone freight resiliency studies
- Infrastructure vulnerability and risk assessments
- Statewide coordination approaches
- Engineering and infrastructure responses
- Operations approaches

Figure 2: Caltrans Risk Assessment Example - Changing Levels of Wildfire Concern. Source: Caltrans.

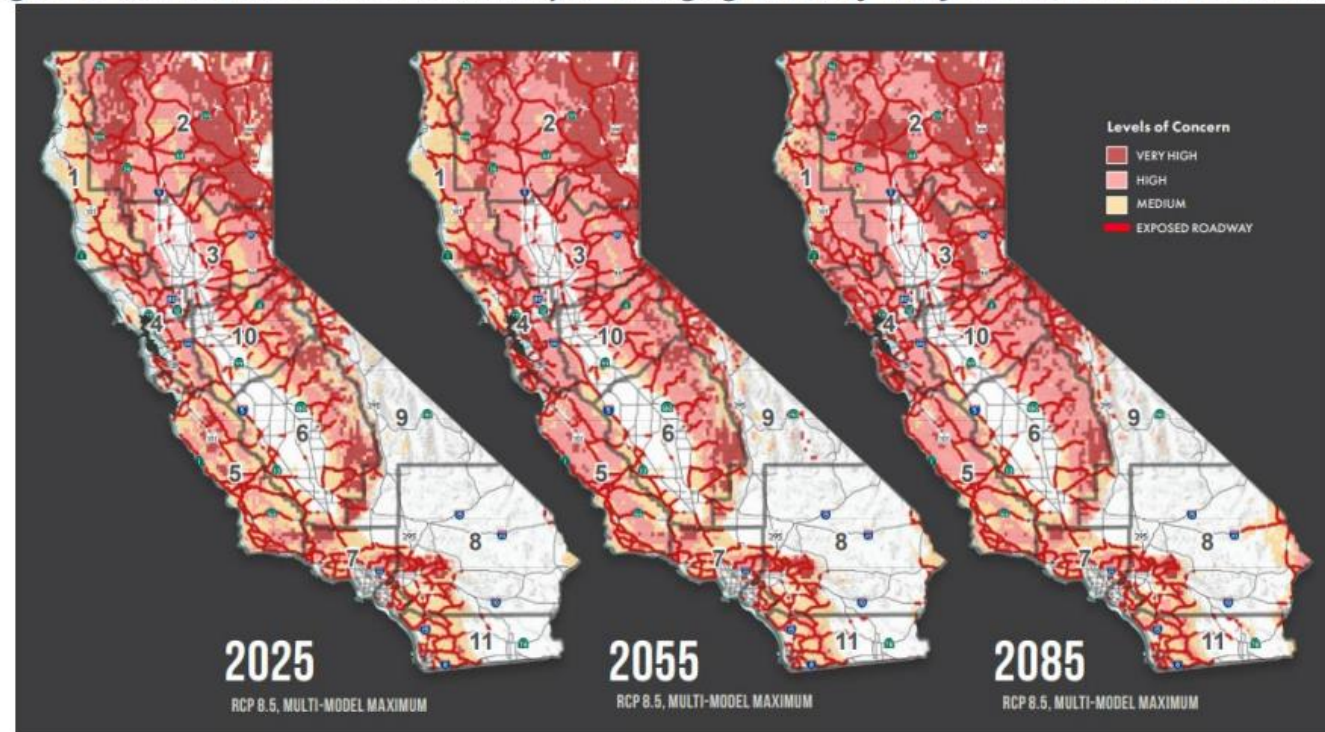


Figure Source: USDOT/FHWA

# Freight Resiliency Planning - Approaches

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*Figure 3 Example of tied concrete block mats in use in western Iowa to protect roadway shoulders from erosion caused by flooding. Source: Iowa Department of Transportation.*



Figure Source: USDOT/FHWA



# Freight Resiliency Planning - Approaches

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Figure 4: Screenshot of COtrip's Trucker Mode, which helps plan freight trips and communicates real-time weather conditions and routing restrictions to truckers. Source: COtrip.org

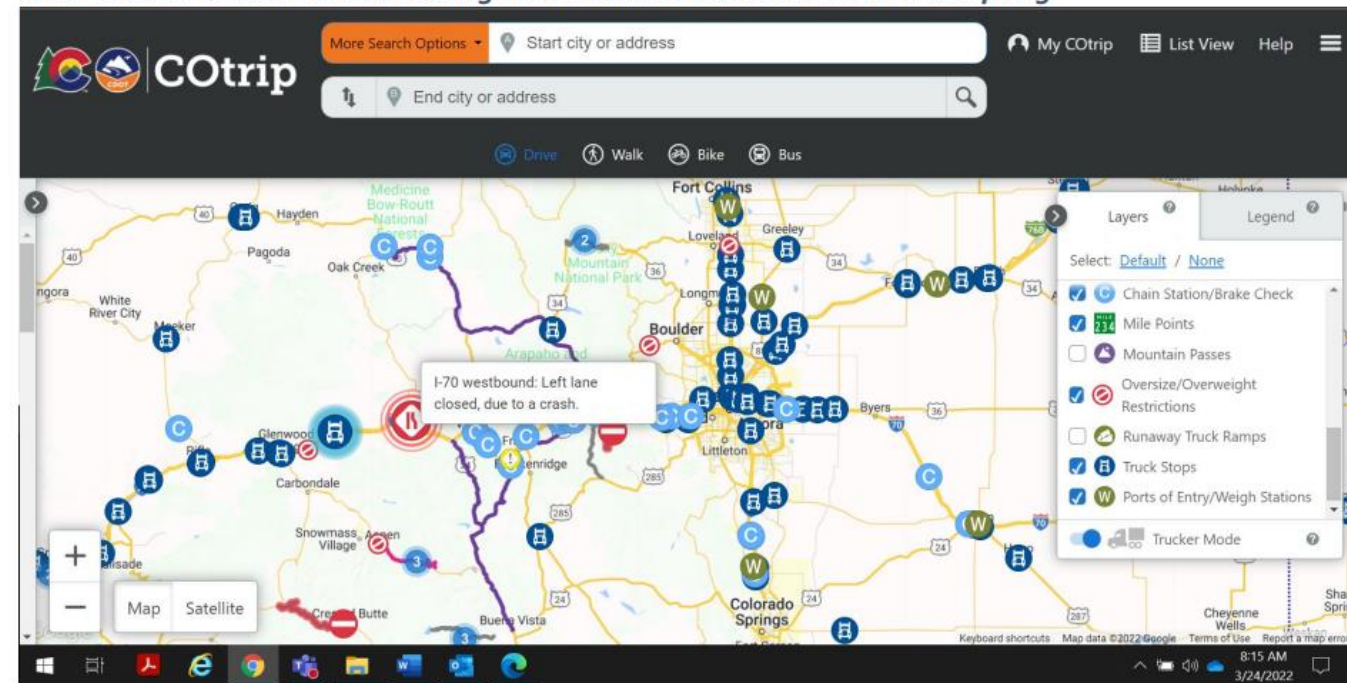


Figure Source: USDOT/FHWA

# Discussion

- Have you come across any disruption issues that made you think about resilience, or where resilience planning would have helped?
- Have any of you begun to incorporate resiliency into your state freight plans, or plan to?
- Is there anything we at the MPO can assist you with regarding resilience planning?

Image source: DDOT Freight Plan Update 2023



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