

# NATIONAL CAPITAL REGION TRANSPORTATION RESILIENCE IMPROVEMENT PLAN

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## Plan Overview

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CEEPC Meeting  
July 24, 2024



National Capital Region  
**Transportation Planning Board**

# What is Resilience?

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- FHWA definition of resilience as “the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recovery rapidly from disruptions.”



*Vehicle in Washington, DC, stuck in flash flood, 2019*



*Vehicles and drivers stranded in Arlington, VA, during a snowstorm in 2022*



# PROTECT PROGRAM

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The Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Grant Program

- Provides funding (**\$1.4 billion over 5 years**) to ensure **transportation resilience** to natural hazards including climate change and other natural disasters through four categories:

Planning  
activities

Resilience  
improvements

Community  
resilience and  
evacuation  
routes

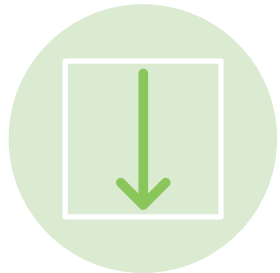
At-risk coastal  
infrastructure



# The Financial Benefits of PROTECT

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The PROTECT program provides a unique opportunity to access increased funding for transportation resilience



DOTs and MPOs that develop RIPs that meet program requirements reduce non-federal cost share by 7%



Additional 3% if the RIP is incorporated into state or regional long-range transportation plan (LRTP)



Projects included in a RIP do not require Benefit Cost Analysis (BCA)



# Awarded PROTECT Projects

- In April 2024, FHWA awarded \$830 million in funding under four grant types to 80 projects in 37 states, the District of Columbia, and the Virgin Islands



## Planning Grants

\$45 million for 26 projects for:

- Developing TRIPs
- Resilience planning
- Predesign and design activities
- Evacuation planning

## Resilience Improvement Grants



\$621 million for 36 projects to increase resilience by:

- Improving drainage
- Relocating roadways
- Elevating bridges



## Community Resilience & Evacuation Routes

\$45 million for 10 projects for improvements to enhance the resilience, capacity, or redundancy of evacuation routes

## At-risk Coastal Infrastructure



\$119 million for 8 projects to protect, strengthen, or relocate coastal highway and non-rail infrastructure



# TRIP Objectives



Build on the strong foundation of resilience work by TPB



Contribute to member organizations' understanding of and planning for climate change risk and resilience



Identify regional priorities for resilience investment



Better position member agencies and jurisdictions for federal funding and match reduction under the PROTECT program



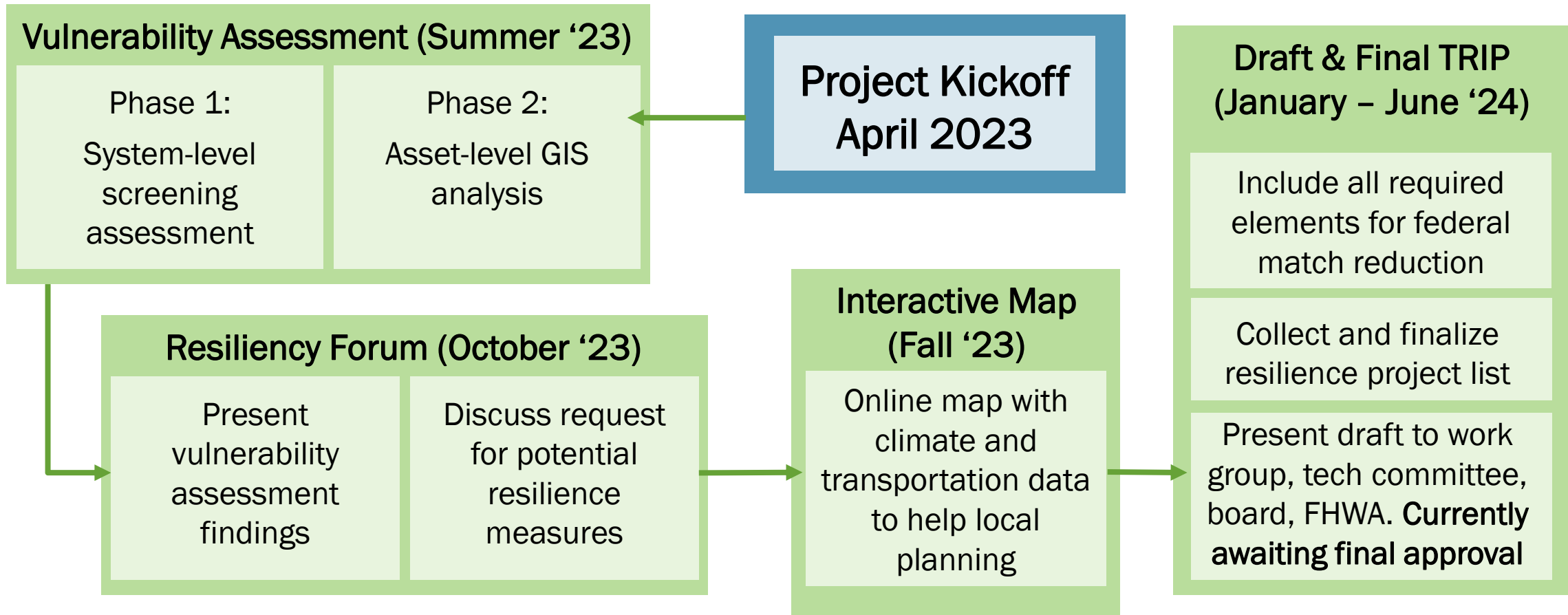
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## DRAFT Transportation Resilience Improvement Plan



# Process and Timeline

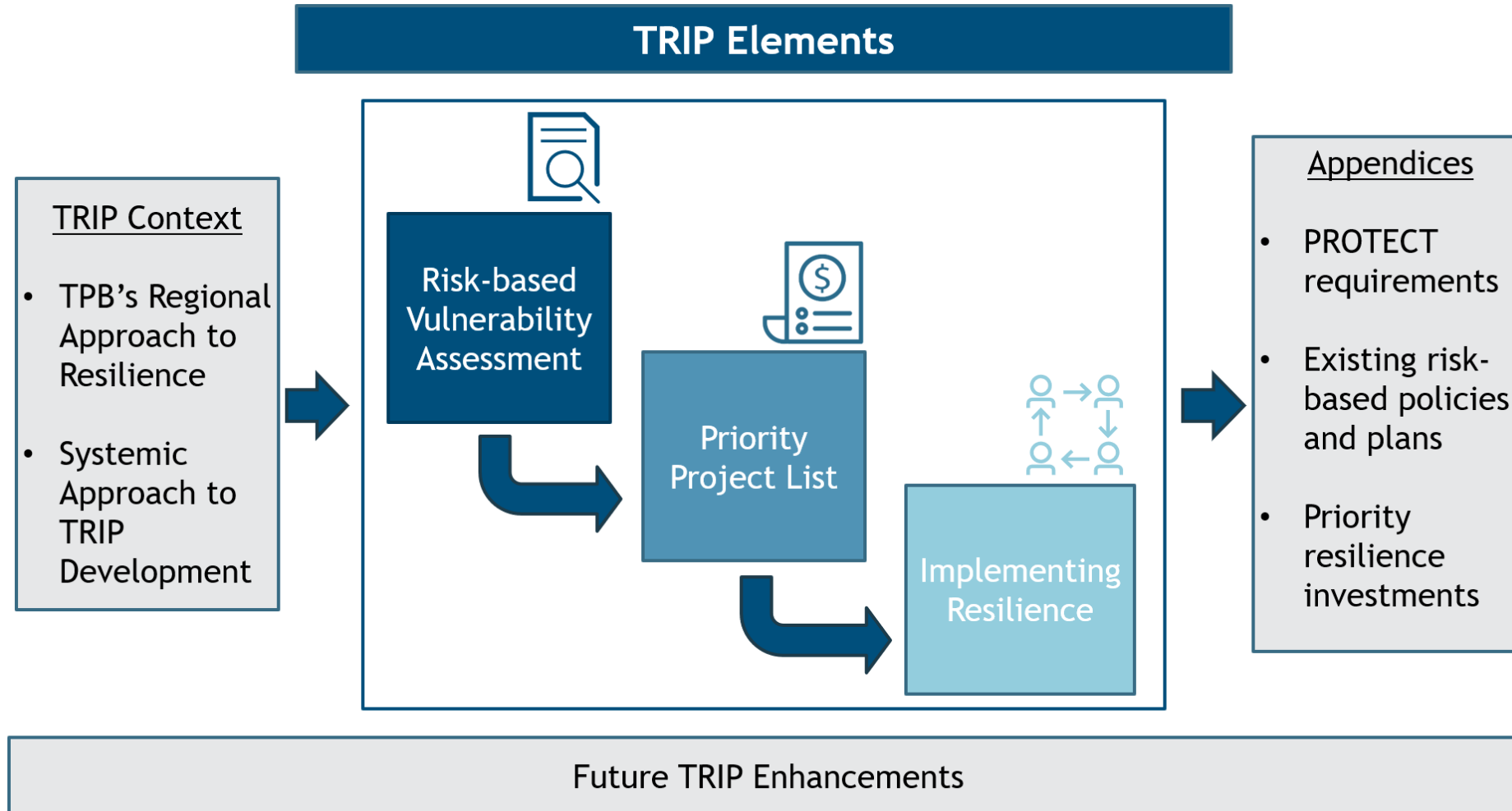


# Stakeholder Engagement and Collaboration





# TRIP Components



# Vulnerability Assessment Overview

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Identifies climate vulnerabilities of the region's transportation system



Identifies priority areas for resilience investments











Informs the resilience project list that facilitates the use of PROTECT funding



# Vulnerability Assessment Overview

Asset/Hazard Pairs Analyzed in the Vulnerability Assessment

Hazard	Asset Groups				
	Public transit	Roads and highways	Active transportation	Bridges	Stormwater
Extreme Heat 	Asset-level, indicator-based vulnerability assessment	Literature review	Map layer	Literature review	Literature review
Temporary Flooding (Coastal and Riverine) 	Asset-level, indicator-based vulnerability assessment	Asset-level, indicator-based vulnerability assessment	Literature review	Asset-level, indicator-based vulnerability assessment	Literature review
Permanent Flooding (Sea Level Rise) 	Asset-level, indicator-based vulnerability assessment	Asset-level, indicator-based vulnerability assessment	Literature review	Asset-level, indicator-based vulnerability assessment	Literature review
Extreme Winter 	Literature review	Literature review	Literature review	Literature review	Literature review
Extreme Wind 	Literature review	Literature review	Literature review	Literature review	Literature review

Analysis Method	
	Asset-level, indicator-based vulnerability assessment
	Literature review
	Map layer

# Asset-Level Assessment Methodology

Assets receive a score based on exposure to hazard and asset criticality

- **Exposure indicator:** Hazard Exposure (70% weighting)
- **Criticality indicator:** MWCOG Equity Emphasis Areas, Functional Classification, Detour Length (30% weighting)

**Example scoring system: Extreme Heat and Public Transit**

Scoring Scale for Exposure		Scoring Scale for Criticality	
Indicator Value	Score	Indicator Value	Score
Top 1/3 of surface temperatures	3	Located in Equity Emphasis Area	3
Middle tier of surface temperatures (1/3-2/3) experienced in the study area	2	Not located in Equity Emphasis Area	1
Bottom 1/3 of surface temperatures experienced in the study area	1		



# Asset-Level Assessment Results

The greatest number of assets are highly vulnerable to:



Temporary Flooding (coastal and riverine)



Extreme Heat



Permanent Flooding (sea level rise)



# Asset-Level Assessment Results

Equity emphasis areas (EEAs) contributed significantly to the overall vulnerability score

- For several asset categories, all highly vulnerable assets were located in an EEA

Several assets are highly vulnerable to multiple hazards:

- 50 miles of road
- 20 miles of rail line
- 6 bus stops




## NATIONAL CAPITAL REGION TRANSPORTATION SYSTEM CLIMATE VULNERABILITY ASSESSMENT

April 2024



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# Asset-Level Assessment Results

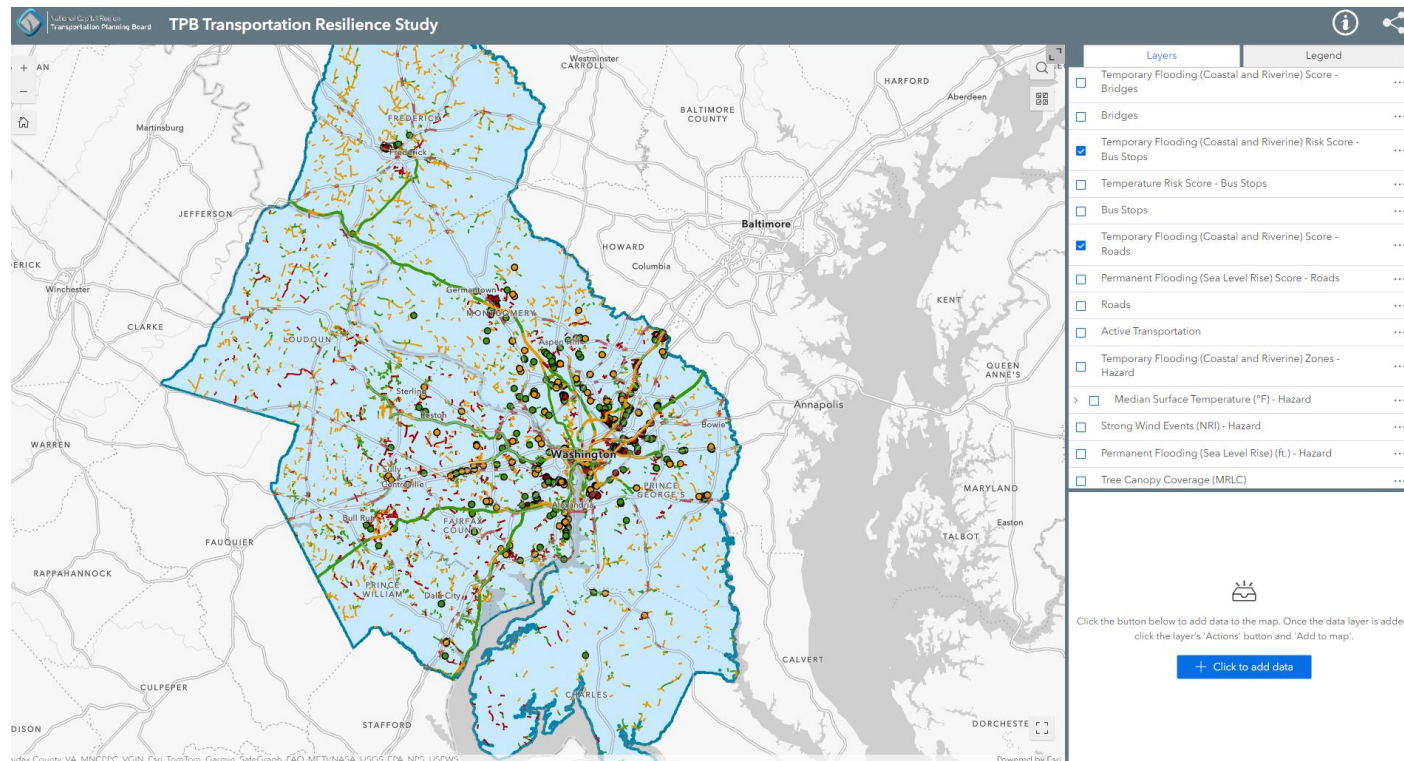
Asset Type	 Extreme Heat				 Temporary Flooding (Coastal and Riverine)				 Permanent Flooding (Sea Level Rise)			
	High	Medium	Low	Not Exposed	High	Medium	Low	Not Exposed	High	Medium	Low	Not Exposed
Roads/Highways (miles)	Not Assessed				1,097 (5%)	1318 (6%)	733 (3%)	19,754 (86%)	50 (0.2%)	17 (0.1%)	14 (0.1%)	22,820 (99.6%)
Bridge	Not Assessed				1 (0%)	39 (3%)	1,281 (97%)	0 (0%)	* Bridges were evaluated for flood vulnerability generally based on condition data rather than coastal and riverine vs. sea level rise			
Bus Stops	196 (3%)	6,467 (89%)	583 (8%)	0 (0%)	173 (2%)	336 (5%)	377 (5%)	6,360 (88%)	0 (0%)	0 (0%)	0 (0%)	7,246 (100%)
Rail Stops	0 (0%)	53 (33%)	107 (67%)	0 (0%)	1 (1%)	6 (4%)	4 (3%)	149 (93%)	0 (0%)	0 (0%)	0 (0%)	160 (100%)
Rail Line (miles)	18 (2%)	352 (35%)	646 (64%)	0 (0%)	115 (11%)	154 (15%)	128 (13%)	619 (61%)	19 (1.9%)	42 (4.1%)	2 (0.2%)	954 (93.8%)



# Online Mapping Tool

The rates of **vulnerability** to each climate hazard vary by **geography**

The [online mapping tool](#) helps determine vulnerabilities of specific areas





# TRIP Resources



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TPB Transportation Resilience Study

## I. Purpose

The National Capital Region Transportation Planning Board (TPB) includes in the TPB Transportation Resilience Study (TRS) projects that will enhance the region's federal and other resilience investments. The TRS will receive additional 3% reduction in project costs for PROTECT Discretionary Guidance from the Federal Highway Administration (FHWA).

- Resilience planning
- Resilience improvement
- Community resilience
- At-risk coastal infrastructure

This guidance document is for agencies that are already developing resilience projects for consideration.

For agencies that are already developing resilience projects for consideration, please contact the TPB for more information.

## II. What is a Resilient Region?

The COG 2030 Climate and Energy Resilience Plan defines a resilient region as one that has the "ability to absorb and chronic climate impacts a region can expect to experience under current and future, acute conditions or withstand, respond to, and recover from." FHWA defines a resilient region as one that can adapt to conditions or withstand, respond to, and recover from.

- Resist hazards or withstand
- Reduce the magnitude of
- Have absorptive capacity
- The consideration of incorporating natural infrastructure.

## Transp

The Transportation Resilience Plan (TRP) projects that will enhance the region's federal and other resilience investments.



Overviews the regional resilience National Capital Region



Helps to develop practitioners



Describes the Priority Projects



Provides guidance on funding program

For questions regarding this document, please contact the TPB.

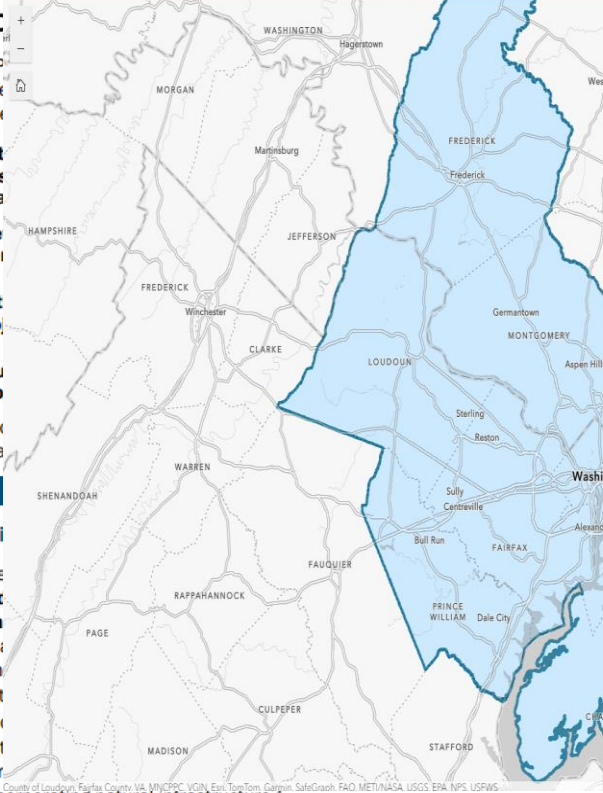
## What is transportation resilience?

The COG 2030 Climate and Energy Resilience Plan defines a resilient region as one that has the "ability to absorb and chronic climate impacts a region can expect to experience under current and future, acute conditions or withstand, respond to, and recover from." FHWA defines a resilient region as one that can adapt to conditions or withstand, respond to, and recover from.

- Resist hazards or withstand
- Reduce the magnitude of
- Have absorptive capacity
- The consideration of incorporating natural infrastructure.

## What are some examples of transportation resilience projects?

- The consideration of incorporating natural infrastructure.



# Building a Resilient Transportation System for the National Capital Region



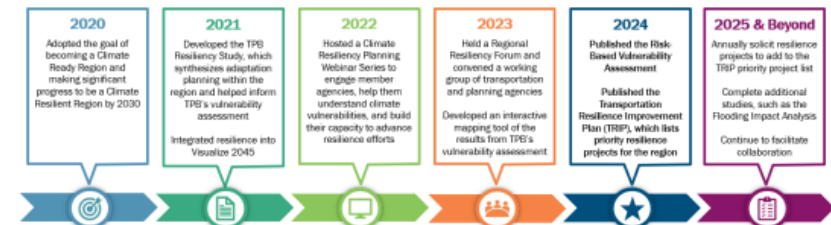
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## TPB's Regional Approach to Transportation Resilience

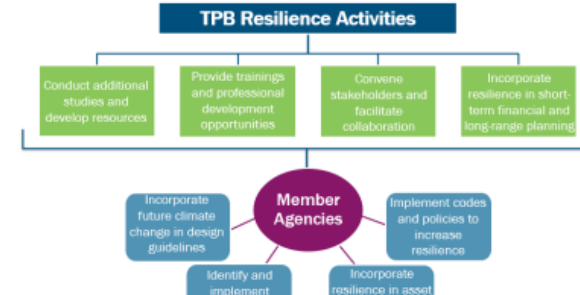
Metropolitan Washington is already adversely affected by extreme weather events, from heat waves to blizzards to severe coastal storms and flooding, and the frequency and severity of significant weather events will increase in the future due to climate change. The Transportation Planning Board (TPB) continued to address this reality by developing a 2024 Transportation Resilience Improvement Plan (TRIP) in coordination with member agencies to help **improve the preparedness and resilience of the region's transportation system to the impacts of climate change.**

TPB defines resilience as the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. The TRIP builds on the strong foundation of transportation resilience work in the region by further assessing transportation system vulnerabilities and identifying priority resilience investments.

### TPB's Road to Resilience



The TPB and its member agencies serve essential roles in advancing resilience across the National Capital Region. Continued collaboration and coordination between the TPB and its member agencies will be vital for achieving the goal of making significant progress to be a Climate Resilient Region by 2030.



# Future TRIP Enhancements

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Potential future improvements to the TRIP include:

- **Prioritized project list**  
Annual call for projects to update Resilience Investment Plan list
- **Additional flooding impact analysis**  
Consider urban flooding, pluvial flooding, floodplain change due to climate change, combined effects of sea level rise and coastal and riverine flooding; ground-truth flooding results.
- **Increased consideration of equity and potential impacts to critical services**  
Conduct user-based analysis, critical service access analysis.
- **Economic impacts and system-level analysis**  
Identify monetary risk associated with hazard; consider how alternative transportation options or a lack thereof impact vulnerability.
- **Mapping regional closures due to natural hazards**  
Analyze Regional Integrated Transportation Information System data alongside hazard data.

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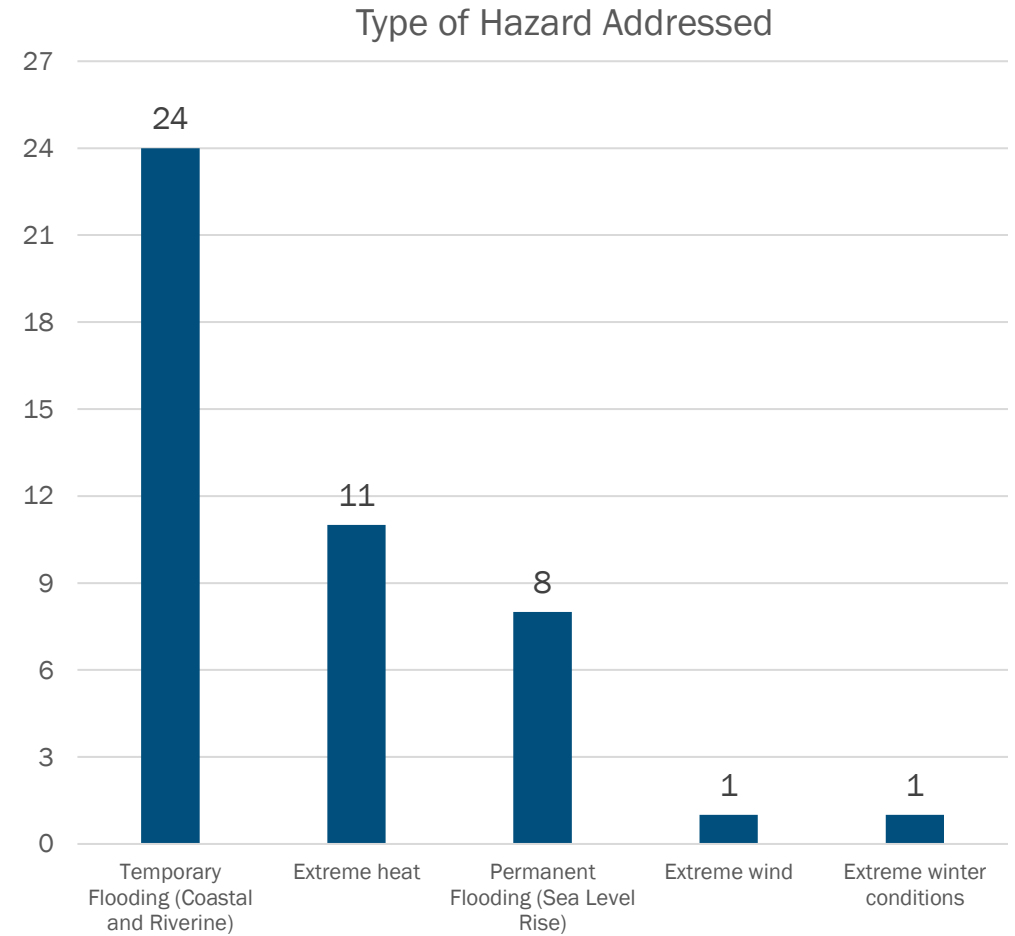
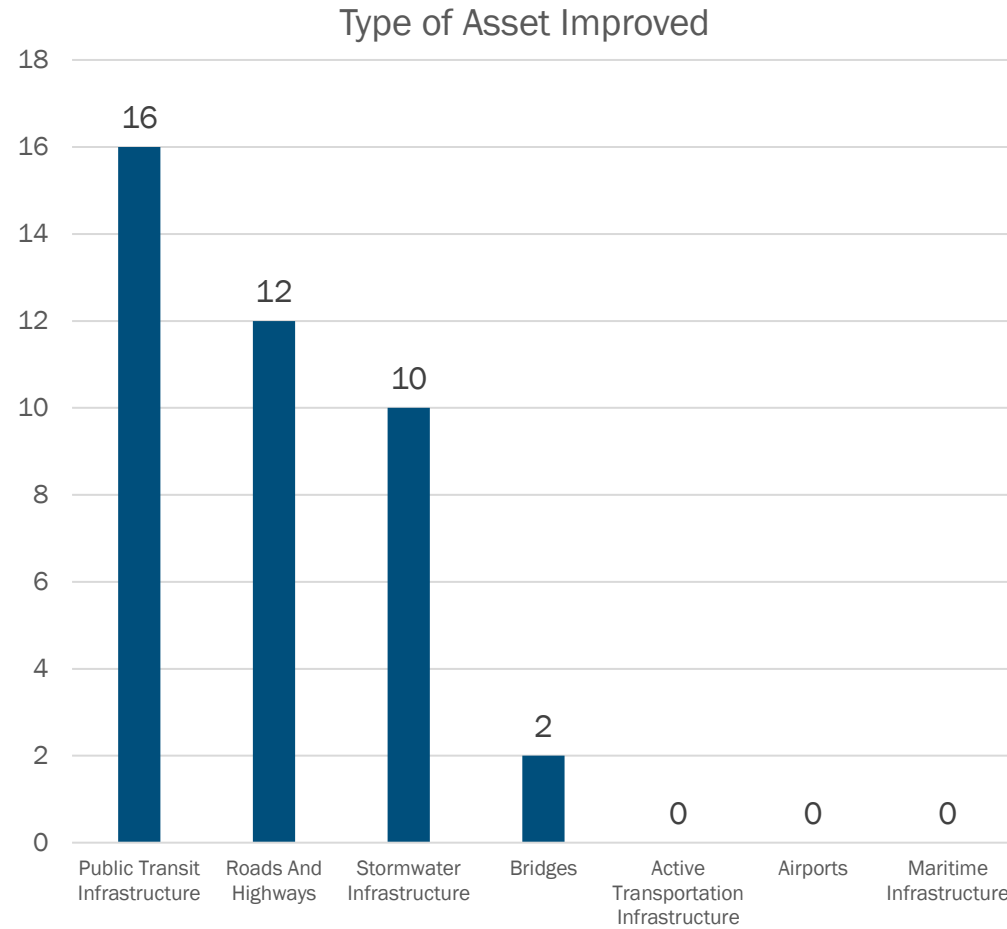
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# Priority Resilience Improvement Projects



- 34 projects from 8 jurisdictions submitted
  - 14 resilience plans
  - 20 resilience improvement projects
- Final project list included in the TRIP with submitting agencies providing information such as:
  - Project description and location
  - Climate hazards impacting the asset and resilience measures to be completed
  - Cost and timeline
  - Whether the project supports an EEA



# Priority Resilience Improvement Projects



# Resilience Improvement Projects - Examples

Lead Agency	Project Title	Location	Description	Hazards
DDOT (supported by the DOEE)	Nannie Helen Burroughs Avenue DC-295 Underpass	Nannie Helen Burroughs Avenue NE underpass beneath DC-295 in the District of Columbia.	The Nannie Helen Burroughs Avenue experiences frequent flash flooding due to the impermeable surfaces in the nearby Watts Branch watershed. Flooding happens quickly, leaving disadvantaged neighborhoods with vulnerable populations between DC-295 and the Anacostia River isolated with very little warning. The proposed Engineering Feasibility Study would identify methods to improve the flood resilience of transportation infrastructure while creating additional greenspaces between the Anacostia River and Kenilworth Park and the Nannie Helen Burroughs Avenue Commercial Corridor.	
Lead Agency	Project Title	Location	Description	Hazards
Virginia Railway Express	VRE Stations Heat Vulnerability and Mitigation Strategies Analysis	Station assets located on VRE's Manassas and Fredericksburg Lines, as well as on the joint line between Alexandria and Union Station.	Increasing temperatures have the potential to cause significant passenger discomfort to VRE riders. This project will identify the appropriate mitigation strategies to address the adverse effects of heat in five VRE station facilities. The project will detail potential effects on passengers and facilities, and will propose, at a planning level, conceptual projects that could mitigate or eliminate the adverse condition(s) through the horizon planning year.	
Lead Agency	Project Title	Location	Description	Hazards
Charles County Government (supported by the Resilience Authority of Charles County)	Cobb Island (MD-254) - Bridge Approach	MD-254 (Cobb Island Road) between MD-257 and the Cobb Island Bridge.	While the Cobb Island Bridge was recently replaced in 2020, the bridge approach and surrounding roadways still experience tidal flooding and inundation from sea level rise. There is ongoing planning for this project, and possible options include a range of possible nature-based and innovative interventions to address flood vulnerability from multiple hazards.	