



**Citizens Advisory Committee (CAC) Meeting**

Marion County Public Library- Meeting Room B

2720 E. Silver Springs Blvd. Ocala, FL 34470

1:00 PM

**MINUTES**

**Members Present:**

Davis Dinkins

Michelle Shearer

Richard Howard

Steve Rudnianyn

Travis Magamoll (*arrived at 1:11pm*)

**Members Not Present:**

Richard McGinley

Suzanne Mangram

**Others Present:**

Rob Balmes

Shakayla Irby

Sarah McNamara, FDOT

Tyler Burgett, FDOT

Franco Saraceno, Kittelson & Associates (*via WebEx*)

### **Item 1. Call to Order and Roll Call**

Vice-Chairwoman Michelle Shearer called the meeting to order at 1:03pm and Secretary Shakayla Irby called the roll, there was a quorum present.

### **Item 2. Proof of Publication**

Secretary Shakayla Irby stated the meeting had been published online to the TPO's website, as well as the City of Ocala, Belleview, Marion County, and Dunnellon's websites on February 1, 2022. The meeting had also been published to the TPOs Facebook and Twitter pages.

### **Item 4A. Performance Management Safety Targets**

Mr. Balmes presented on the Performance Management Safety Targets.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) required State DOTs and TPOs/MPOs to conduct performance-based planning by tracking performance measures and setting data-driven targets to improve those measures.

The first of the performance measures that became effective in 2016 was assessing the conditions of roadway safety – PM1. By May 2018, all TPO/MPO's were required to establish safety targets and approve or update on an annual basis.

Specifically, the Ocala Marion TPO was required to update and adopt **Targets** for **five** required **Safety Performance Measures** established under MAP-21. For the current year, the TPO had to submit Safety targets to the Florida Department of Transportation (FDOT) no later than February 25, 2022.

There were five required safety performance measures:

1. Fatalities- Total number of fatalities involving a motor vehicle crash
2. Fatalities (Rate) - Rate of fatalities per 100 Million Vehicle Miles Traveled (VMT)
3. Serious Injuries- Total number of serious injuries involving a motor vehicle crash
4. Serious Injuries (Rate) - Rate of serious injuries per 100 Million Vehicle Miles Traveled (VMT)
5. Non-Motorized Fatalities & Serious Injuries- Number of non-motorized fatalities and number non-motorized serious injuries involving a motor vehicle crash

On an annual basis, the TPO had the opportunity to select one of two options regarding updating and submission of safety targets.

1. Adopt the state targets established by FDOT.
2. Develop its own quantifiable safety performance targets.

If the TPO were to adopt state targets, it was required to annually adopt the same targets until changes were made by FDOT.

Presently, the FDOT had adopted 0 for each of the five safety targets.

In 2018, when the process became a federal requirement, the TPO Board adopted its own specific safety performance targets to better track progress and reflect more accountability to the public. The targets reflected specific crash data for Marion County. For the past four years, the TPO Board had opted to follow the same approach of reviewing prior year target results, and adopting revised targets tied to a specific methodology involving five-year rolling averages and projected vehicle miles traveled (VMT).

The TPO's Target Setting Methodology was as follows:

1. Calculate Average Percent Change of the three most recent five-year rolling averages
  - #1 Fatalities
  - #3 Serious Injuries
  - #4 Non-motorized Fatalities and Serious Injuries
2. Project the Vehicle Miles Traveled (VMT) in 2021 and 2022 to calculate:
  - #2 Fatality rate per 100 Million VMT
  - #4 Serious Injury rate per 100 Million VMT

Two options were provided to the committee:

#### Option A

- Adopt 2022 Targets based on current methodology.
- Staff explore crash reduction factors for 2023 targets as part of Commitment to Zero.

#### Option B

- Adopt 0 for all five targets to reflect State Targets and Commitment to Zero.
- Staff explore crash reduction factors for 2023 targets as part of Commitment to Zero.

With the understanding that when an MPO/TPO adopts State Targets, no changes can be made unless FDOT changes the State Targets.

*The presentation that was given is attached to pages 6-29 of this set of minutes for reference.*

The committee had discussion on the safety targets.

Mr. Magamoll asked if the Safety Targets and the Commitment to Zero were the same.

Mr. Balmes responded that the Safety Targets were an annual requirement to report on the five targets to FDOT to demonstrate how safety was applied to the plans and how safety was being monitored.

Mr. Dinkins said he would like to see how Marion County compared to other counties and statewide. He would also like to see the Census data to see how much Marion County had grown.

Ms. Shearer said she wondered if people that were on the roads were going faster and not paying attention contributing to the increase in accidents.

The committee had discussions on the safety targets and the best option for setting targets in Marion County.

Mr. Magamoll made a motion to accept Option A for the Performance Management Safety Targets. Mr. Howard seconded, and the motion passed unanimously.

### **3A. Transportation Resilience Guidance Paper**

The TPO had been supported by Kittelson and Associates to complete the guidance paper on transportation resilience. The main purpose of the paper was to help better educate and inform the TPO about transportation resilience. The paper also provided consideration for how to integrate resilience into future transportation planning, and opportunities at the state and federal levels of government for grants and funding.

Transportation Resiliency was the ability to adapt to changing conditions and recovery from disruptions, such as major weather events. The impacts from both natural and human-related events could have significant and unexpected impacts to the Ocala/Marion transportation system.

Franco Saraceno, Kittelson and Associates, provided a presentation at the meeting to share highlights from the guidance paper and considerations for next steps.

*The presentation that was given is attached to pages 30-49 of this set of minutes for reference.*

### **Item 5. Consent Agenda**

Mr. Howard made a motion to approve the Consent Agenda. Mr. Magamoll seconded, and the motion passed unanimously.

### **Item 6. Comments by FDOT**

Ms. McNamara provided an updated construction report and highlighted project 439238-1 US 441 from SR 35 to SR 200 and said that median work under the bridge would begin within the week with a new contractor, CW Roberts. The estimated completion date for the project was fall 2022.

### **Item 7. Comments by TPO Staff**

Mr. Balmes informed the committee that the 2021 TPO Annual Report was posted on the TPO's website to view <https://ocalamariontpo.org/about-us/annual-report/>. The Annual Report summarized the TPO program accomplishments in Ocala/Marion County in calendar year 2021. The report also included boards and committee leadership, along with major projects funded through the TPO process. To honor the TPO's 40th anniversary, a special timeline section was developed to highlight some of the major organizational milestones from 1981 to 2021.

Also on January 12, 2022, the TPO kicked-off Commitment to Zero: An Action Plan for Safer



Streets in Ocala Marion. Commissioner Stone led the meeting, which included participation by Mayor Guinn as a speaker. Several local safety leaders also participated as speakers at the meeting, including Lieutenant Eades and Sergeant McDonald of the Ocala Police Department, Battalion Chief Driggers of Marion County Fire Rescue and Ken Odom, Chair of the Community Traffic Safety Team. Loreen Bobo, Administrator of the FDOT Office of Safety also presented.

The TPO and consultant team (Benesch, Inc.) presented an overview of the Commitment to Zero project, including the schedule and how the public can get involved throughout the process. This included both an online public survey and comment map regarding safety concerns in Marion County. The meeting was video-recorded. The online public tools and link to the kick-off meeting recording are available at the Commitment to Zero project page: <https://ocalamariontpo.org/safety-plan>.

A full presentation on the Commitment to Zero could be expected in March or April.

Mr. Balmes asked the committee to share the project page for opportunities for public comment with constituents, diversity of feedback would be critical to the success of the project.

#### **Item 7. Comments by CAC Members**

*There were no comments by the CAC members.*

#### **Item 8. Public Comment**

*There was no public comment.*

#### **Item 9. Adjournment**

Vice-Chairwoman Shearer adjourned the meeting at 2:15pm.

Respectfully Submitted By:

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Shakayla Irby, TPO Administrative Assistant

# 2022 Safety Targets



- **Moving Ahead for Progress (MAP-21)  
Annual Federal Requirement**
- **Safety Performance Measures (PM-1)**
- **Integration into TPO's LRTP and TIP**

- **TAC and CAC review and action, February 8**
- **TPO Board review and action, February 22**
- **Submission of Safety Targets to FDOT by February 25, 2022**

# Targets for Five Performance Measures

<b>Safety Performance Measures</b>	<b>Description</b>
1. Fatalities	Total number of fatalities
2. Fatalities (Rate)	Rate of fatalities per 100 Million Vehicle Miles Traveled (VMT)
3. Serious Injuries	Total number of serious injuries
4. Serious Injuries (Rate)	Rate of serious injuries per 100 Million Vehicle Miles Traveled (VMT)
5. Non-Motorized Fatalities & Serious Injuries	Number of non-motorized fatalities and number non-motorized serious injuries

# 2021 Targets & Results

Safety Performance Measure	2020 Targets	2020 Results	Met Target?
#1 - Fatalities	88	105	No
#2 - Fatalities per 100 Million VMT	1.86	2.34	No
#3 - Serious Injuries	433	302	Yes
#4 - Serious Injuries per 100 Million VMT	9.19	6.72	Yes
#5 - Number of Non-Motorized (bicycle, pedestrian) Fatalities and Serious Injuries	55	54	Yes

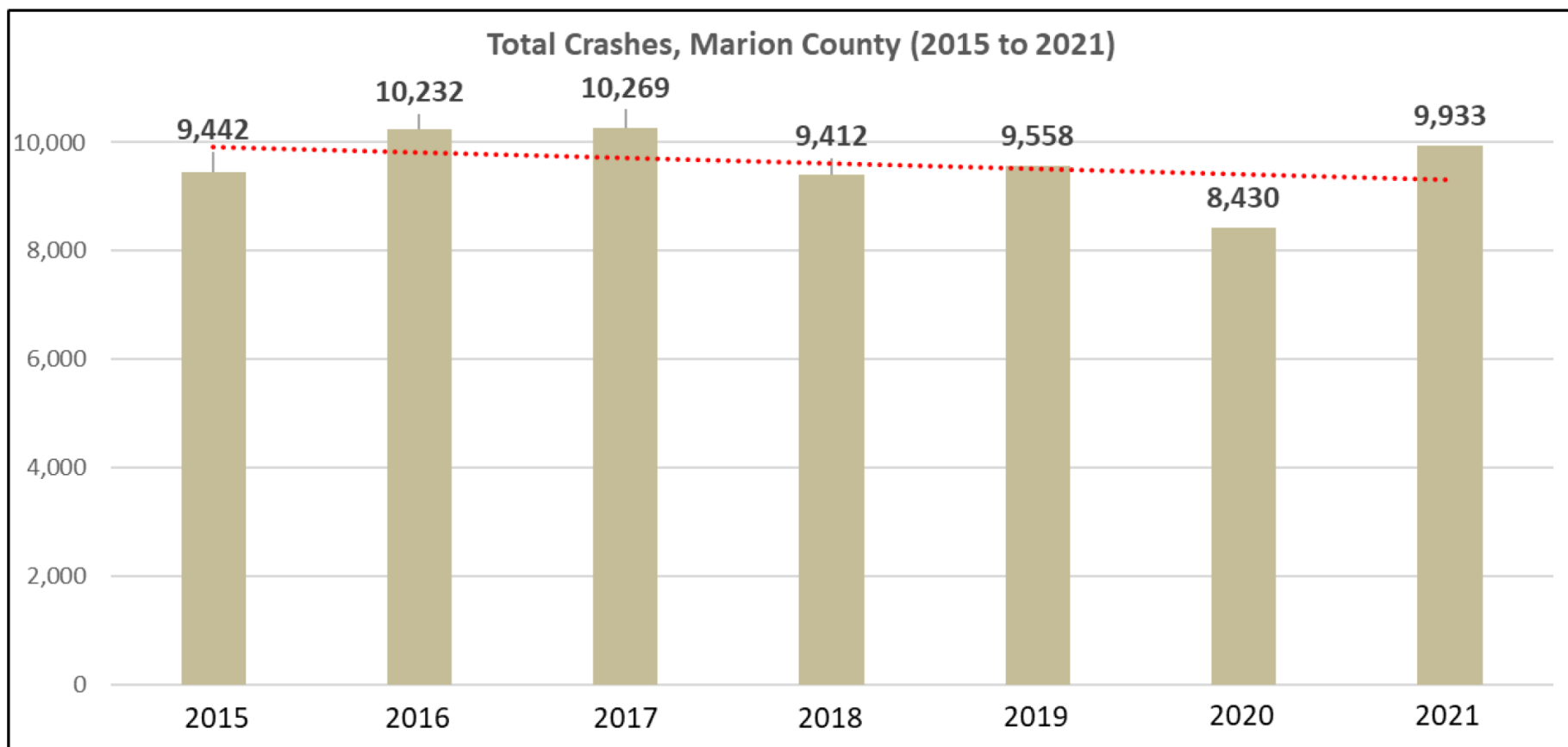
# Data and Information Sources

- **Florida Department of Transportation**  
Crashes (through 2020)  
Vehicle Miles Traveled (through 2020)
- **University of Florida (UF) Signal Four**  
Crashes (2021)

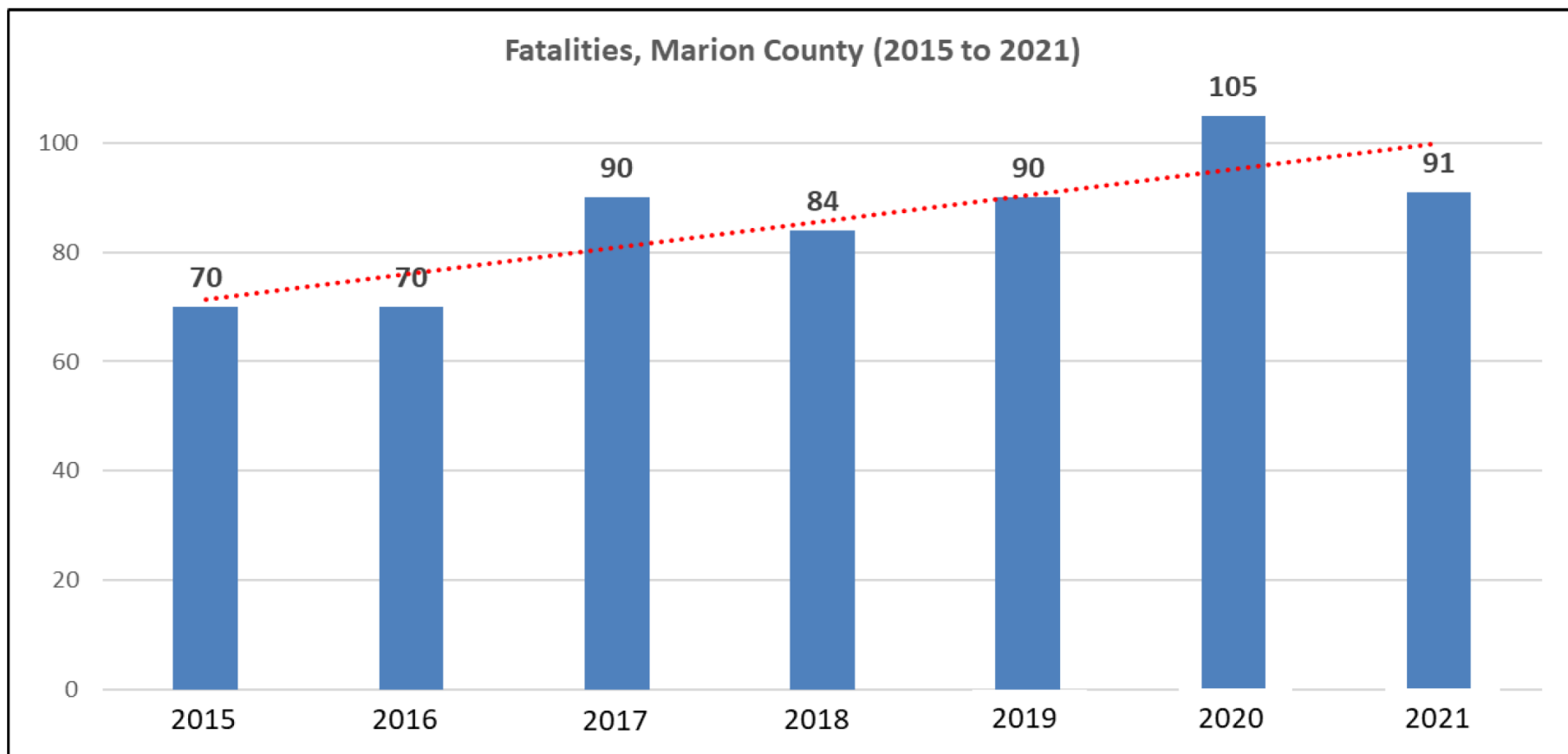
# **Review of Crashes in Ocala/Marion County**



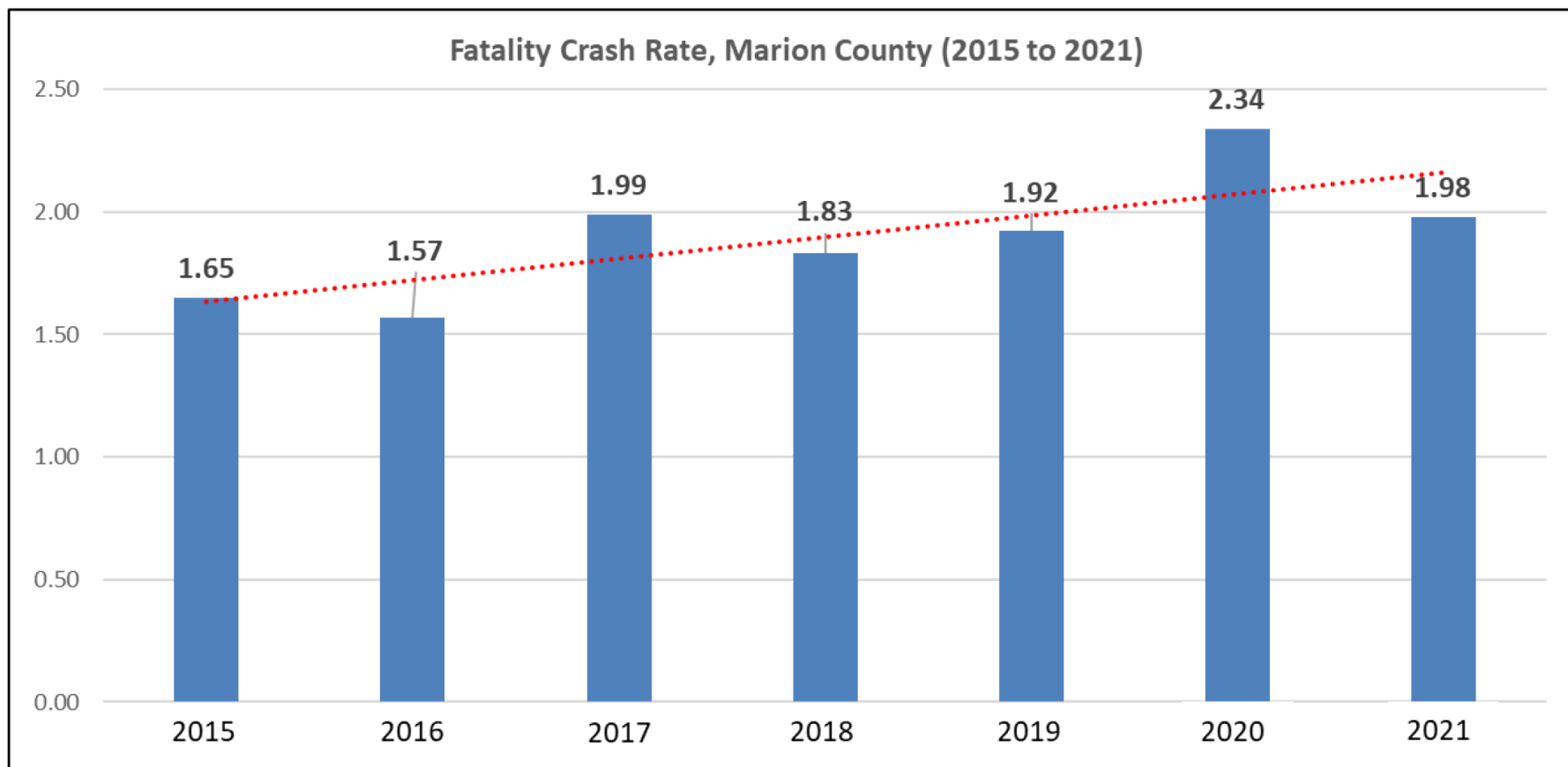
# 2015 to 2021 Total Crashes



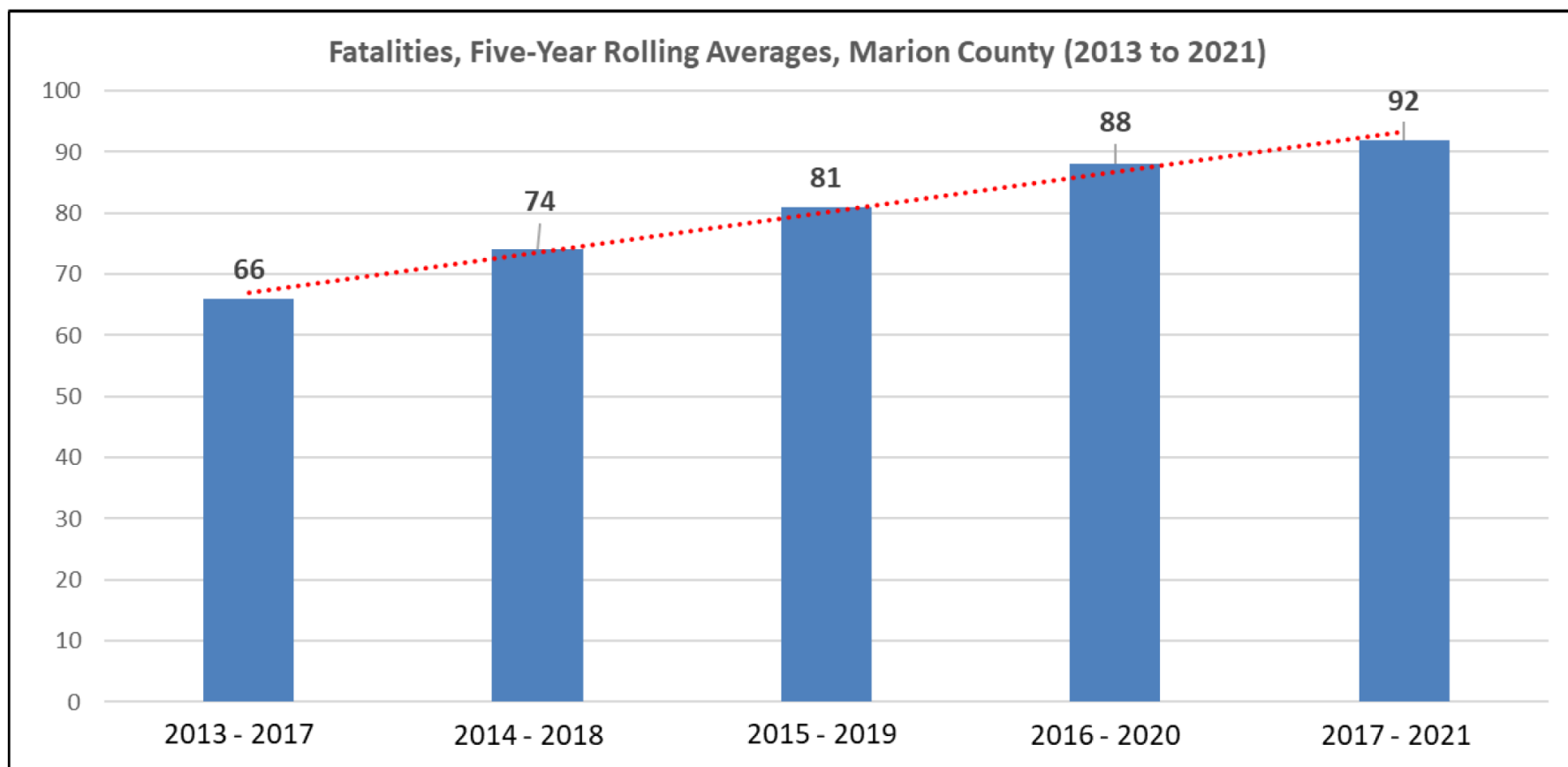
# 2015 to 2021 Fatalities



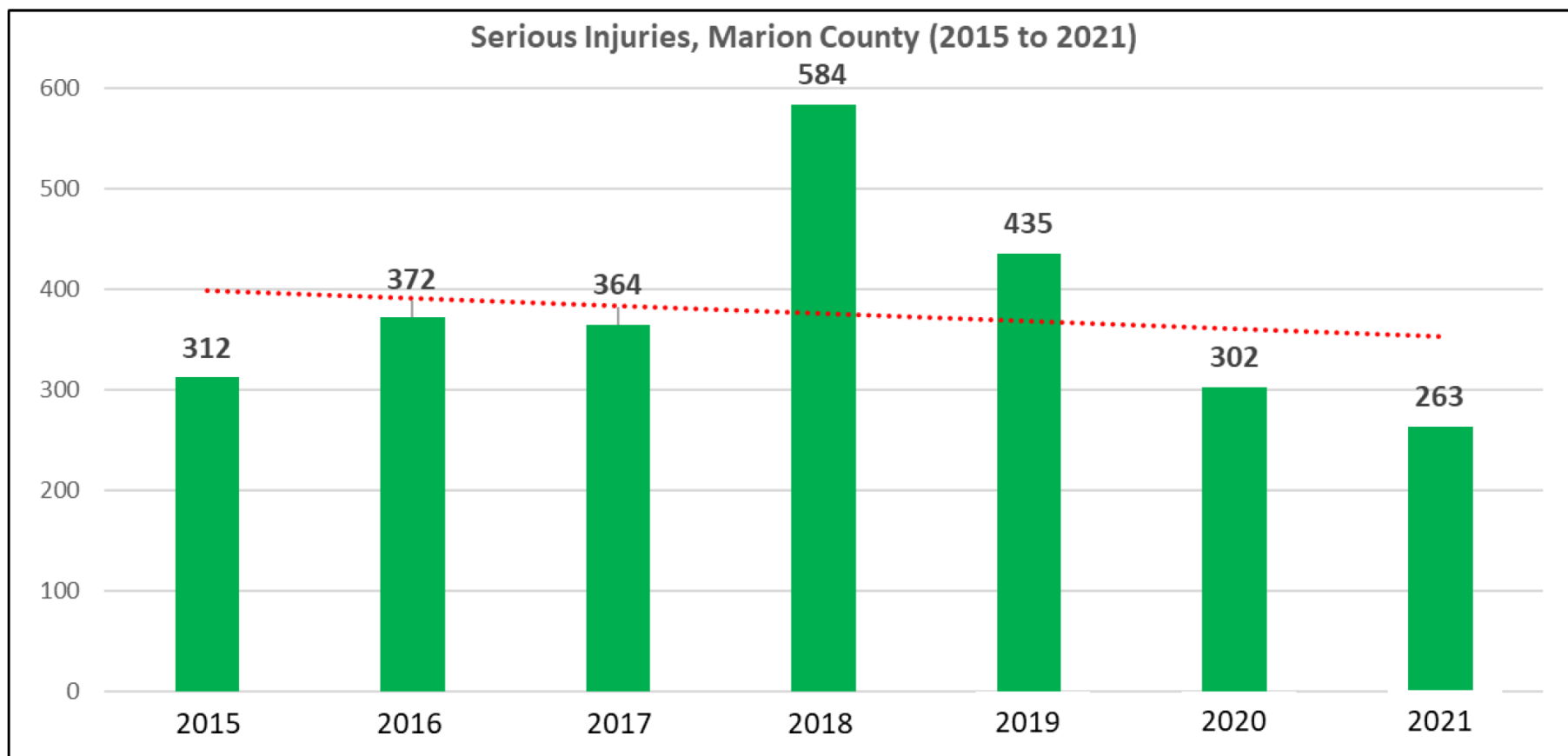
# 2015 to 2021 Fatality Rate



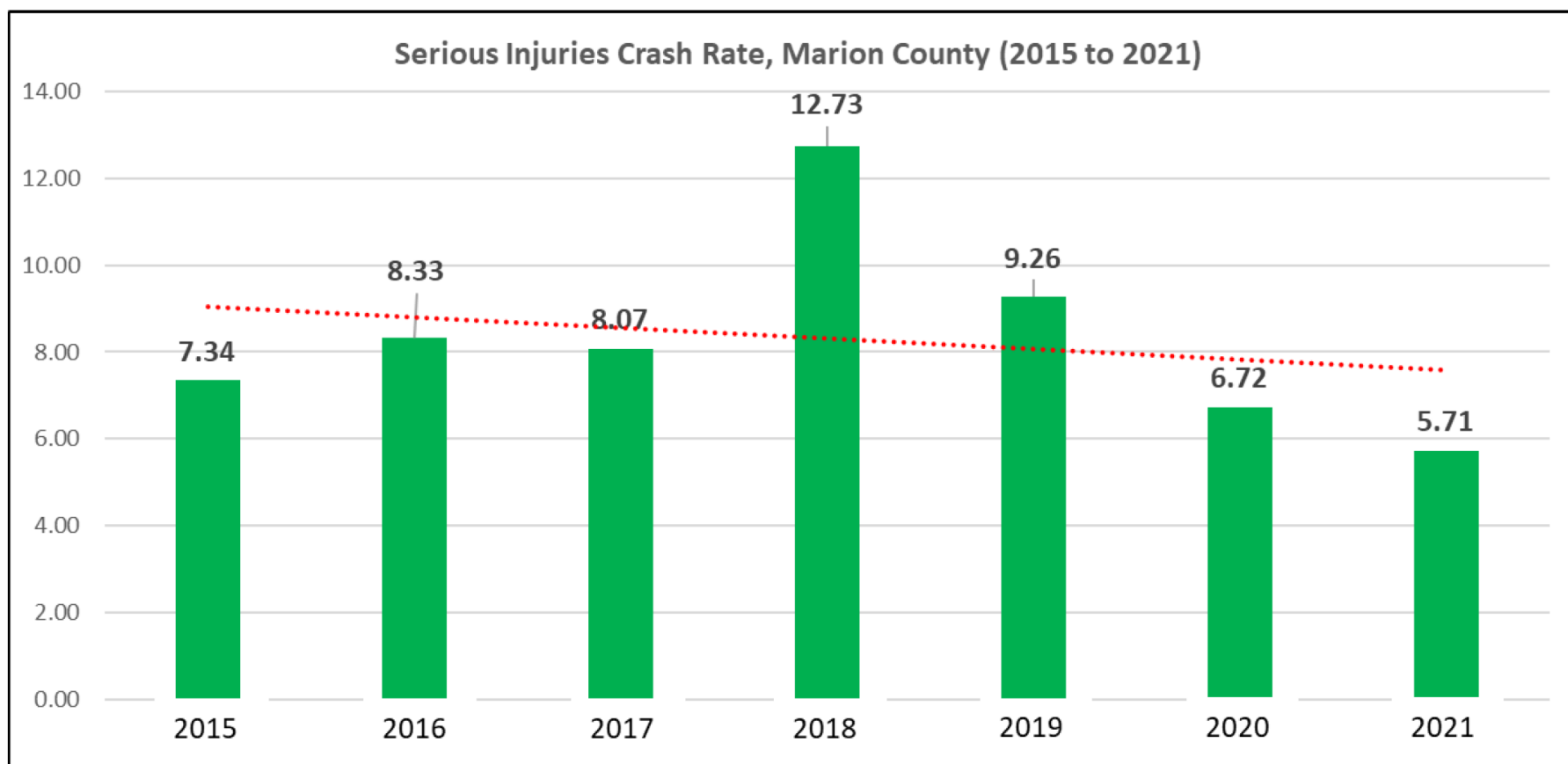
# Fatalities Five-Year Rolling Averages



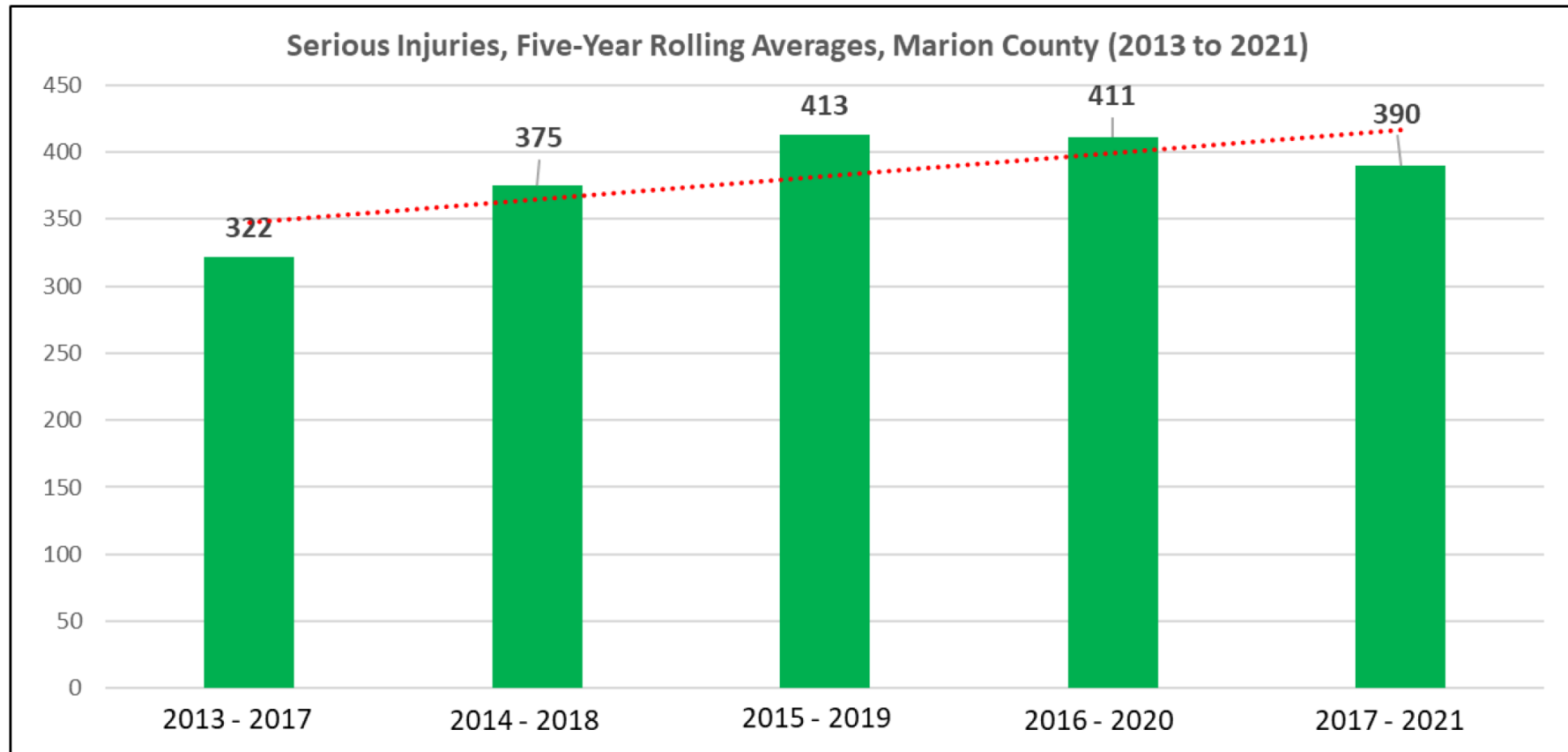
# 2015 to 2021 Serious Injuries



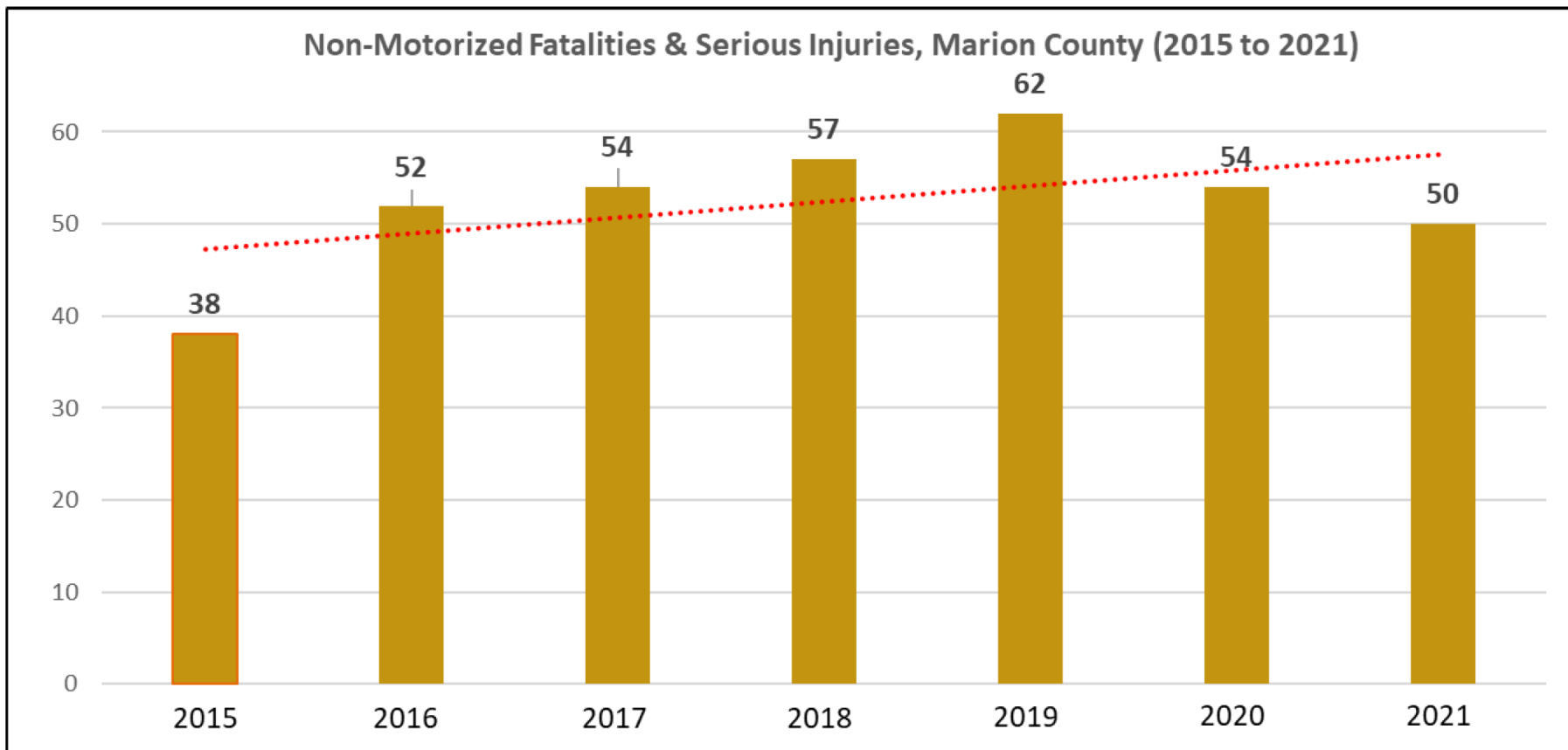
# 2015 to 2021 Serious Injury Rate



# Serious Injuries Five-Year Rolling Averages

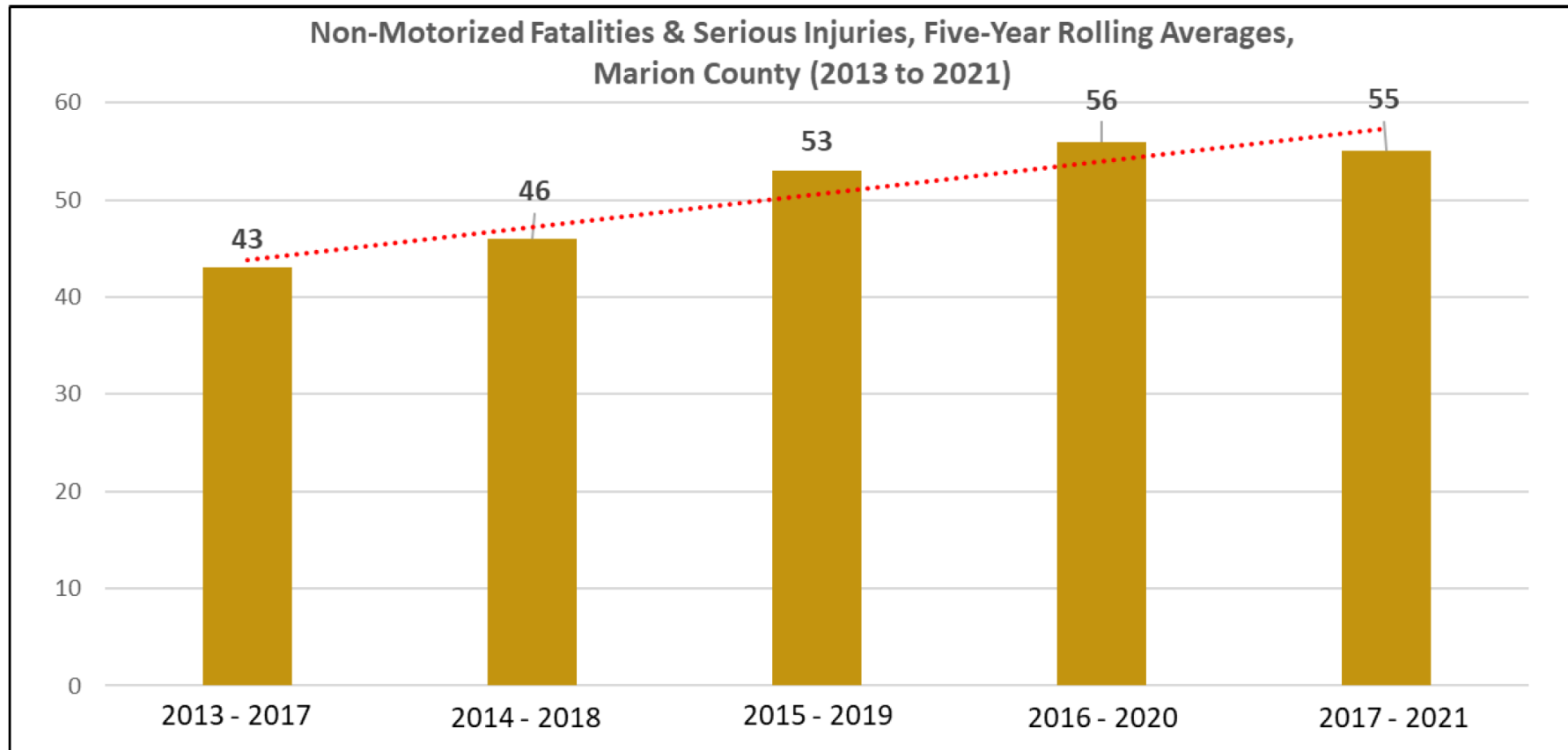


# 2015 to 2021 Non-Motorized Serious Injuries & Fatalities





# Non-Motorized Serious Injuries & Fatalities Five-Year Rolling Averages



# Targets for Five Performance Measures

<b>Safety Performance Measures</b>	<b>Description</b>
1. Fatalities	Total number of fatalities
2. Fatalities (Rate)	Rate of fatalities per 100 Million Vehicle Miles Traveled (VMT)
3. Serious Injuries	Total number of serious injuries
4. Serious Injuries (Rate)	Rate of serious injuries per 100 Million Vehicle Miles Traveled (VMT)
5. Non-Motorized Fatalities & Serious Injuries	Number of non-motorized fatalities and number non-motorized serious injuries

# TPO's Target Setting Methodology

1. Calculate **Average Percent Change** of the three most recent five-year rolling averages
  - #1. Fatalities
  - #3. Serious Injuries
  - #5. Non-Motorized Fatalities and Serious Injuries

# Target Setting Methodology

**2. Project the **Vehicle Miles Traveled (VMT)** in 2021 and 2022 to calculate:**

#2 Fatality rate per 100 Million VMT


#4 Serious Injury rate per 100 Million VMT

Performance Measure	2015	2016	2017	2018	2019	2020	2021		#1	#2	#2	2022 Method	2022
							*Total Results	Targets (Set Feb. 2021)	2015-2019 Rolling Average	2016-2020 Rolling Average	2017-2021 Rolling Average	Percent Change of Three Rolling Averages	Proposed 2022 Targets
#1 - Fatalities	70	70	90	84	90	105	91	97	81	88	92	6.7%	98
#2 - Fatalities per 100 Million VMT	1.65	1.57	1.99	1.83	1.92	2.34	1.98	1.96					2.08
#3 - Serious Injuries	312	372	364	584	435	302	263	432	413	411	390	-2.9%	378
#4 - Serious Injuries per 100 Million VMT	7.34	8.33	8.07	12.73	9.26	6.72	5.71	8.74					8.02
#5 - Number of non-motorized (bicycle & pedestrian) fatalities and serious injuries	38	52	54	57	62	54	50	61	53	56	55	2.7%	57

## 2022 Vehicle Miles Traveled (VMT) Chart

100 Million Vehicle Miles Traveled (MVMT) annually

2014	2015	2016	2017	2018	2019	*2020	2014 to 2019 Average Annual % Change
41.3	42.5	44.7	45.1	45.9	47.0	44.9	2.5%



PROJECTIONS YEARS	
2021	2022
46.0	47.2

\*Due to the 2020 anomaly year, TPO used projections from 2014 to 2019 to obtain historical VMT growth rate.  
VMT data for Marion County provided by Florida Department of Transportation

The MVMT equate to an overall Billion VMT  
i.e. 47.2 Million Vehicle Miles Traveled (MVMT) = 4.72 Billion VMT

# Proposed 2022 Targets

Safety Performance Measure	Proposed 2022 Targets (not to exceed)	2021 Targets
#1 - Fatalities	<b>98</b>	97
#2 - Fatalities per 100 Million VMT	<b>2.08</b>	1.96
#3 - Serious Injuries	<b>378</b>	432
#4 - Serious Injuries per 100 Million VMT	<b>8.02</b>	8.74
#5 - Number of Non-Motorized (bicycle, pedestrian) Fatalities and Serious Injuries	<b>57</b>	61

# 2022 Recommendations

## Option A

- Adopt 2022 Targets based on current methodology.
- Staff explore crash reduction factors for 2023 targets as part of Commitment to Zero.



# 2022 Recommendations

## Option B

- Adopt 0 for all five targets to reflect State Targets and Commitment to Zero.
- Staff explore crash reduction factors for 2023 targets as part of Commitment to Zero.

Note: When an MPO/TPO adopts State Targets, no changes can be made unless FDOT changes the State Targets.





# TRANSPORTATION RESILIENCY GUIDANCE

FEBRUARY 2022



An aerial photograph of a river meandering through a lush, dense green forest. The river is dark and calm, reflecting the surrounding foliage. The forest is composed of various shades of green, indicating a healthy, mature ecosystem. The word 'AGENDA' is overlaid in large, white, sans-serif capital letters on the upper left portion of the image.

# AGENDA

- What is Resiliency?
- National guidance
- Funding opportunities
- Vulnerability analysis
- Resiliency strategies
- Next steps



# Transportation Resiliency

Is it relevant to Marion County, FL?

The Federal Highway Administration defines resiliency as:

***the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions***





# DISRUPTIONS



Disruptions can include natural and man-made disasters

- Flooding
- Wildfires
- Tornadoes
- HazMat incidents
- Sinkholes
- Traffic crashes





# NATIONAL GUIDANCE



## Resiliency Requirements

Resilience planning was first introduced into federal transportation legislation 10 years ago.

2012

Moving Ahead for Progress in the 21<sup>st</sup> Century (MAP-21)

Added eligibility of “protection against extreme events” to funding programs

2015

Fixing America’s Surface Transportation Act (FAST Act)

Formalizes resilience consideration into transportation planning

2021

Infrastructure Investment & Jobs Act (II&J)

Allocates \$47 billion to infrastructure resilience

# FUNDING OPPORTUNITIES

In 2021, Governor DeSantis signed the first piece of legislation dedicated to resiliency planning in Florida.



**\$8.7 b**

Promoting Resilient Operations for Transformative, Efficient, & Cost-saving Transportation (PROTECT)



**\$1.0 b**

Building Resilient Infrastructure & Communities (BRIC)

**Federal Infrastructure Investment & Jobs Act**



**\$3.5 b**

Flood Mitigation Assistance (FMA)



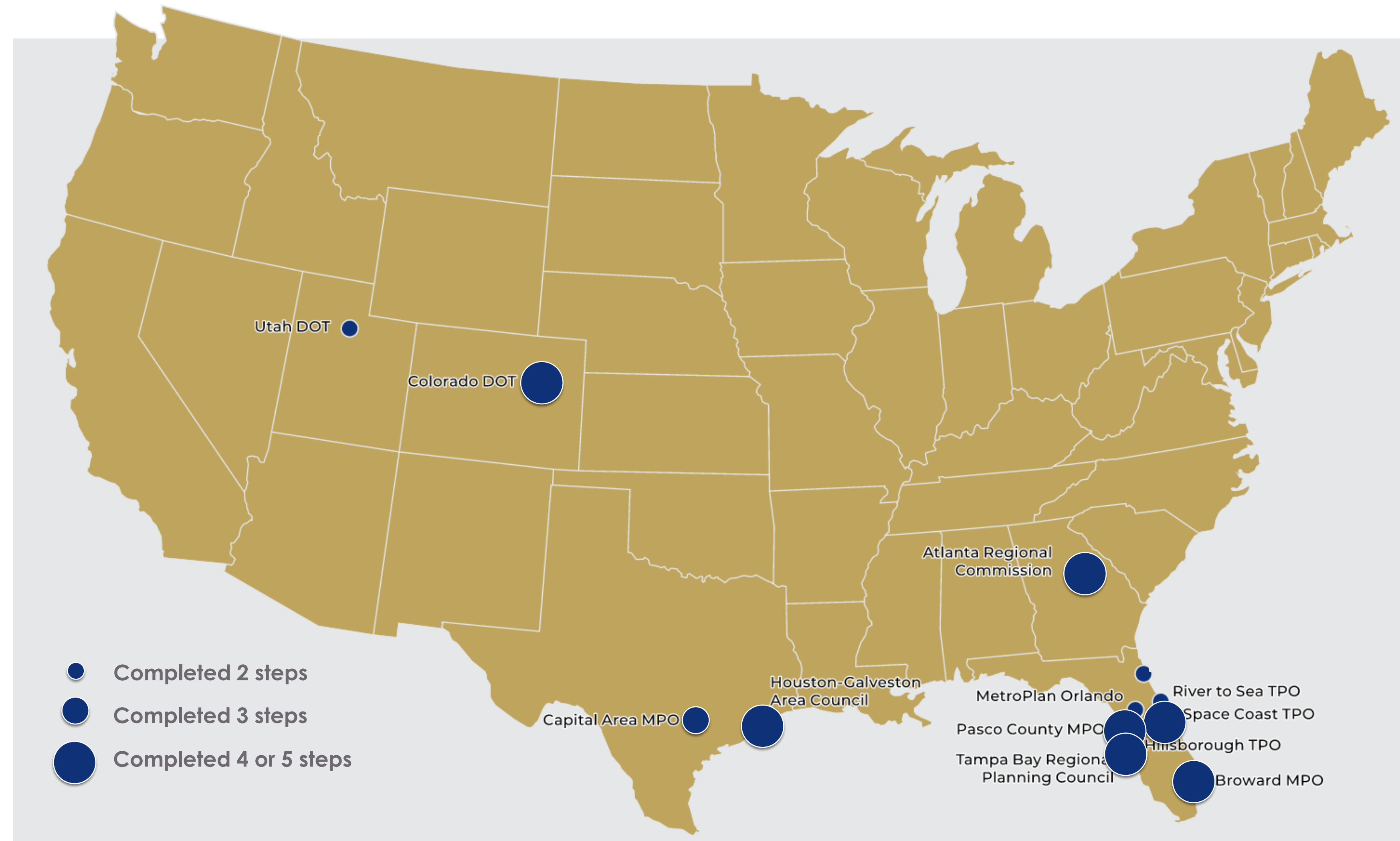
**\$20 m**

Resilient Florida Grant Program

**Statewide Flooding and Sea Level Rise Resilience**

# PEER AREA RESILIENCY EFFORTS

- 1 Define hazards
- 2 Identify critical roadways
- 3 Assess vulnerabilities
- 4 Develop mitigation strategies
- 5 Specify funding sources





# PEER AREA RESILIENCY EFFORTS

- 1 Define hazards
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- 3 Assess vulnerabilities
- 4 Develop mitigation strategies
- 5 Specify funding sources

Agency/ Location	Plan	Description	Resiliency Actions				
			Defines Hazards	Identifies Critical Roadways	Assesses Vulnerabilities/ Exposure	Develops Mitigation Strategies	Specifies Funding Sources
<b>Space Coast TPO Brevard County, FL</b>	Transportation Resiliency Master Plan	Defines six unique shocks/stressors and their impact on roadways critical to the communities in Brevard County; develops mitigation strategies.	●	●	●	●	●
<b>River to Sea TPO</b>	SLR Vulnerability Assessment	Identified exposure/vulnerability to evacuation routes, major roadways, trails, and stormwater storage assets.	●		●		
<b>MetroPlan Orlando</b>	2045 Long Range Transportation Plan	Used scenario planning to identify potential risks and how they can impact the region. MetroPlan Orlando chose six key drivers of change: Population, Economy, Visitation, Development & Land Use, Technology, and Climate. These drivers were used to form four scenarios, to help guide the planning and needs assessment.	●				





## Vulnerability analysis



**Wildfires** – **960** square miles in Marion County are prone to wildfires



**Flooding** – **315** square miles in Marion County are prone to flooding

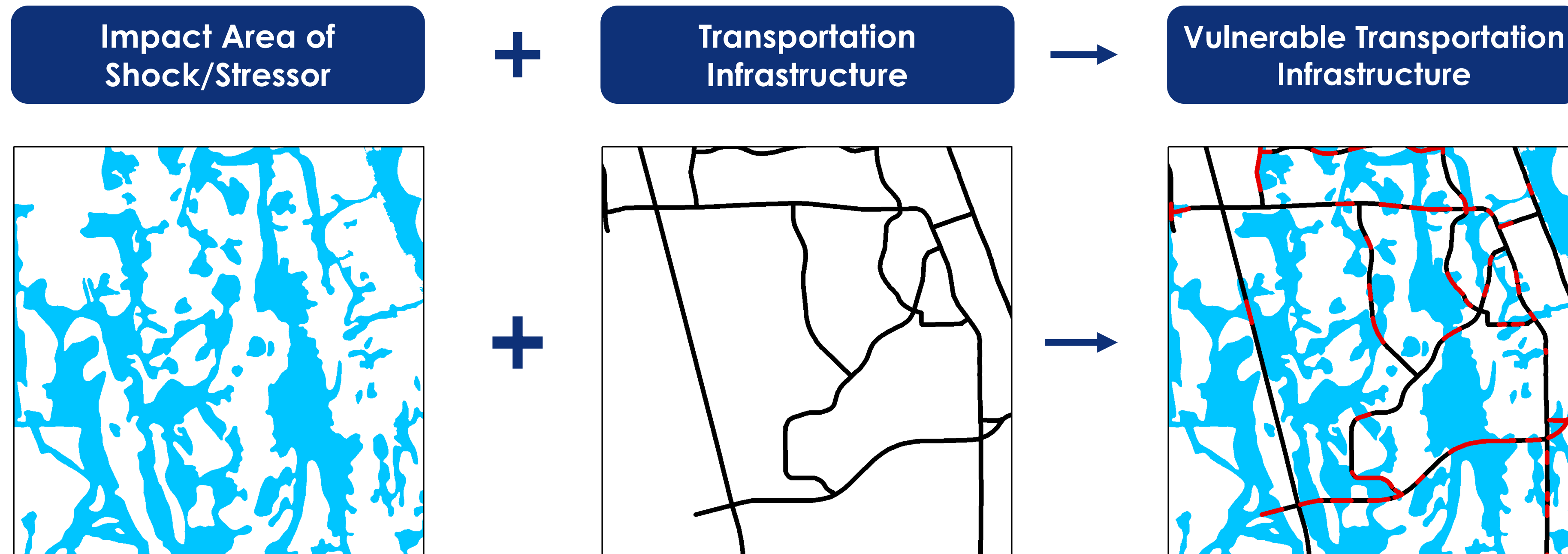


**Sinkholes** – **803** sinkholes in Marion County between 2015 and 2020



# Exposure analysis

Spatial analysis of the relationship between shock/stressors and federal aid eligible network. Analysis completed separately for evacuation network as well.

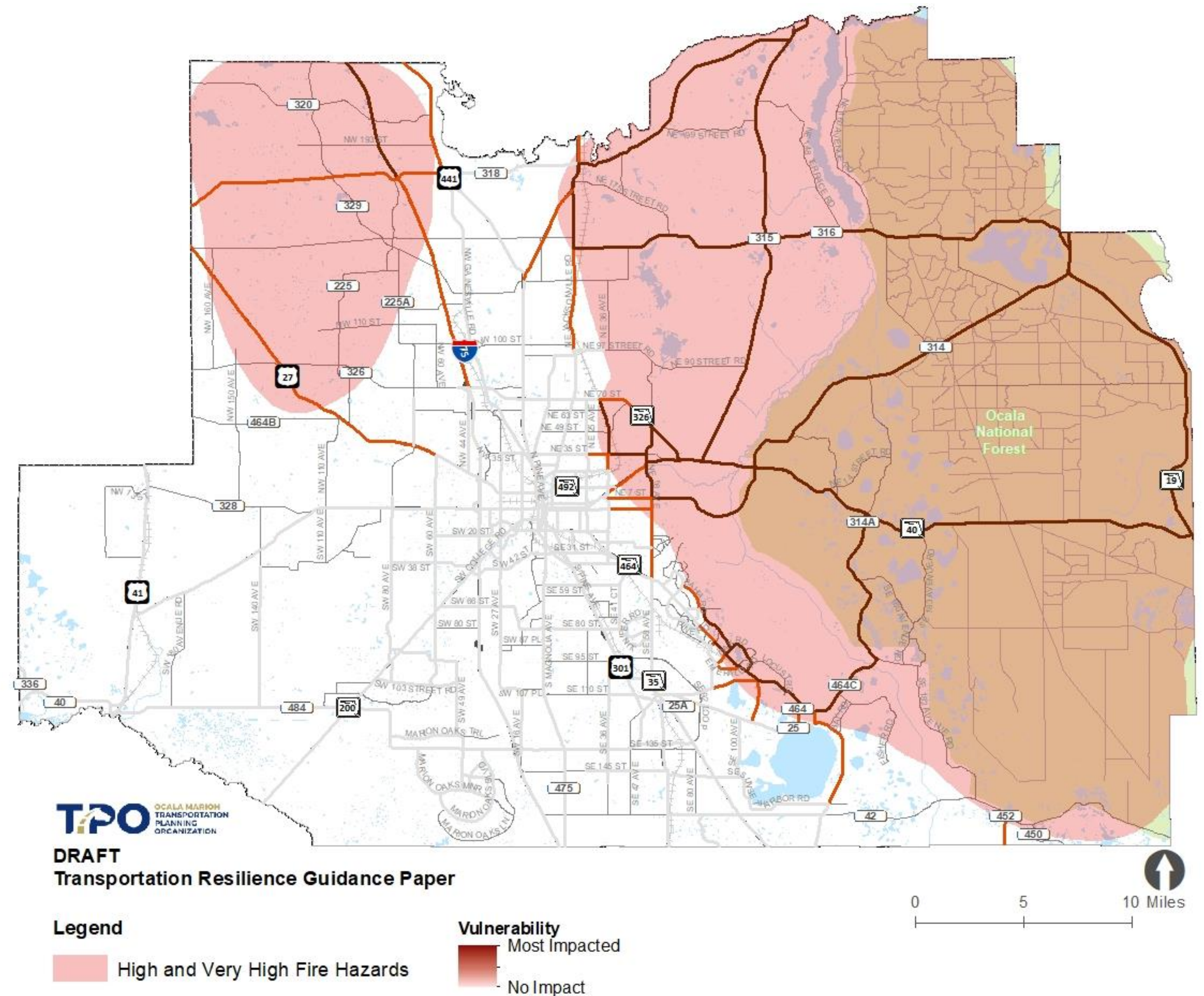




# WILDFIRE exposure

## Federal Aid Eligible Roadways exposure

- 78 miles of principal arterials
- 38 miles of minor arterials
- 116 miles of major collectors
- 23 miles of minor collectors
- 255 total miles of roadways  
35% of system

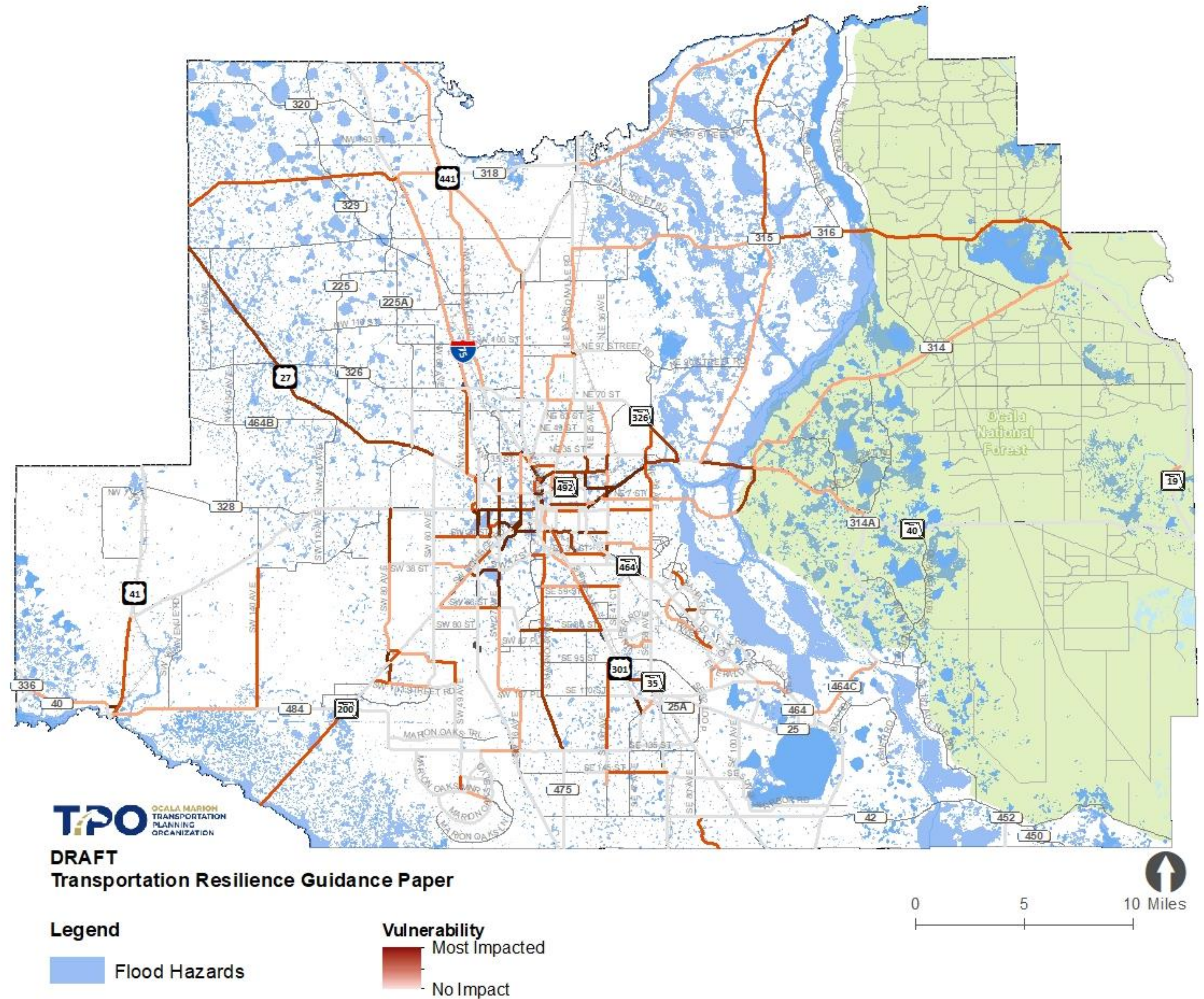




# FLOODING exposure

## Federal Aid Eligible Roadways exposure

- 125 miles of principal arterials
- 56 miles of minor arterials
- 151 miles of major collectors
- 100 miles of minor collectors
- 436 total miles of roadways  
60% of system

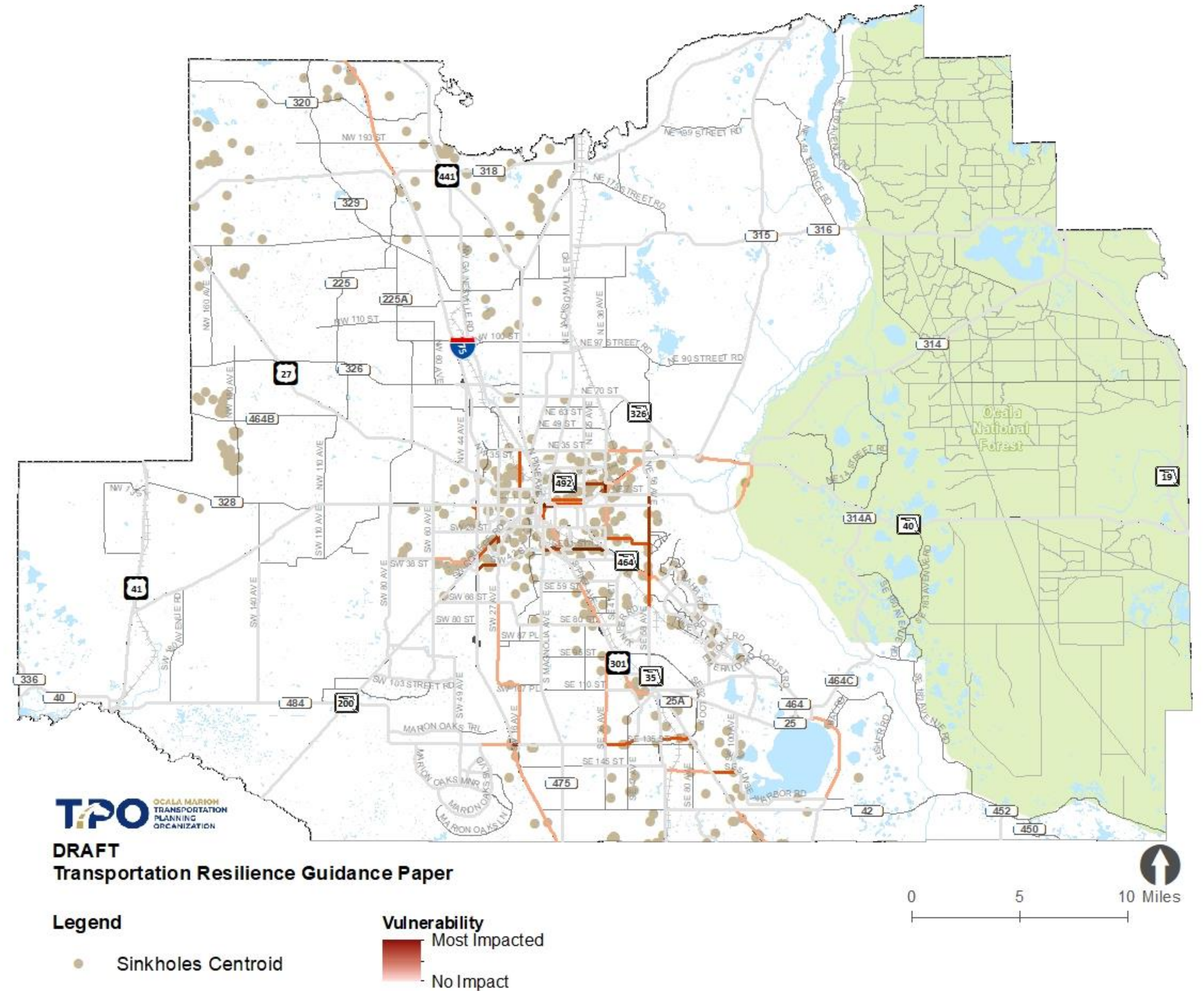




# SINKHOLE exposure

## Federal Aid Eligible Roadways exposure

- 37 miles of principal arterials
- 21 miles of minor arterials
- 6 miles of major collectors
- 21 miles of minor collectors
- 86 total miles of roadways  
12% of system





# MITIGATION STRATEGIES

## Types of Strategies



**Prevention** – Improvements that reduce likelihood of impact to the system



**Adaptation** – Improvements that adjust Minimize impacts























**Absorption** – Improvements that fortify the system against shocks and stressors



**Restoration** – Improvements that facilitate restoration of normal function after impacts.










# PREVENTION STRATEGIES

Strategy	Description	Hazards	Considerations	Benefits	Cost	Source
Prevention: Strategies that reduce the likelihood of a shock or stressor impacting the system.						
Reduce VMT	Reducing Vehicle Miles Travelled (VMT) reduces the strain on the network associated with rerouting trips or reducing the available route choices.			<ul style="list-style-type: none"><li>• Reduce community reliance on automobile trips</li><li>• Reduce the number of vehicles that must use detour routes</li></ul>		
Develop a Stormwater Management Plan	Develop a plan to address existing conditions and the required capacity for new facilities.			<ul style="list-style-type: none"><li>• Determine effectiveness of centralized facilities and other regional opportunities</li></ul>		<ul style="list-style-type: none"><li>• Houston Galveston Resilience Pilot Program</li></ul>
Construct green roofs	Utilize green roofs that provide shade, reduce surrounding air temperature, and reduce runoff.			<ul style="list-style-type: none"><li>• Reduce runoff</li><li>• Reduce urban heat island effect</li></ul>		<ul style="list-style-type: none"><li>• USFS Compendium of Adaptation Practices</li></ul>
Realign or reconnect water courses	Realign waterways away from critical infrastructure. Reconnect waterways to allow natural flood plains to absorb impact of storm events.			<ul style="list-style-type: none"><li>• Allow natural flooding to occur, rather than constraining waterways</li></ul>		<ul style="list-style-type: none"><li>• World Road Association International Climate Change Adaptation Framework for Road Infrastructure</li></ul>
Implement fire-use restrictions	Implement policies to reduce the likelihood of wildfire during conditions that are conducive to wildfire ignition.			<ul style="list-style-type: none"><li>• Reduce chances of wildfire</li></ul>		<ul style="list-style-type: none"><li>• USFS Compendium of Adaptation Practices</li></ul>
Use forest management techniques such as thinning, prescribed burn, and fuels removal	Reduce the likelihood for an extreme fire, with intermittent fire and other management practices.			<ul style="list-style-type: none"><li>• Maintain ecosystems that require fire</li></ul>		<ul style="list-style-type: none"><li>• USFS Compendium of Adaptation Practices</li></ul>
<div><div>Legend</div><div> General</div><div> Heat</div><div> Wildfire</div><div> Flood</div><div> Tornado</div><div> Low cost</div><div> Medium cost</div><div> High cost</div></div>						



# ADAPTATION STRATEGIES















## Adaptation: Strategies that change the system in anticipation of shocks and stressors to maintain normal functioning.

<b>Discourage development and growth in vulnerable areas</b>	Create zoning requirements that encourage dense development to occur outside of impact areas, for example the flood plain.		<ul style="list-style-type: none"> <li>• Consider impacts to communities living in less vulnerable areas</li> <li>• Consider conservation projects, especially in areas that coincide with environmentally vulnerable/valuable areas</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the amount of vulnerable infrastructure over time</li> </ul>		<ul style="list-style-type: none"> <li>• FEMA Nature-Based Solutions</li> <li>• Houston Galveston Resilience Pilot Program</li> </ul>
<b>Site new facilities outside of hazard area</b>	When developing new assets or infrastructure, consider locating outside of the hazard area.			<ul style="list-style-type: none"> <li>• Consider hazards during the planning phase to reduce the cost of relocation</li> </ul>		<ul style="list-style-type: none"> <li>• FHWA Adaptation Framework</li> </ul>
<b>Change the nature of access to critical facilities</b>	Provide access to critical facilities under hazards by considering alternative accesses. For example, access through the rear of the building, provide for walking or using a mode other than automobile for a portion of the access trip.			<ul style="list-style-type: none"> <li>• Provides redundant access during normal operations</li> </ul>		<ul style="list-style-type: none"> <li>• USFS Compendium of Adaptation Practices</li> </ul>
<b>Provide redundant routes</b>	Maintain redundant routes in the network that are functional for all modes.		<ul style="list-style-type: none"> <li>• Consider access to critical facilities and critical routes</li> </ul>	<ul style="list-style-type: none"> <li>• Reduces the consequence of segments being impacted by shocks or stressors</li> <li>• Offers traffic management in non-hazard times</li> </ul>		<ul style="list-style-type: none"> <li>• Resilient California</li> </ul>

**Legend**  General  Heat  Wildfire  Flood  Tornado  Low cost  Medium cost  High cost

# ABSORPTION STRATEGIES

**Absorption: Strategies that help the system function normally during events that cause shocks and stressors.**

<b>Conduct regular maintenance of infrastructure</b>	Maintain the working order of infrastructure, for example keeping culverts clear.			<ul style="list-style-type: none"><li>Proactive measure to maintain flow at critical points</li><li>Maintain clear of overgrown vegetation which may spread wildfire across the roadway</li></ul>		<ul style="list-style-type: none"><li>South Florida Climate Pilot</li><li>Houston Galveston Resilience Pilot Program</li></ul>
<b>Construct hardened shoulders</b>	Widen roadway structure to reduce impact to travel lanes.		<ul style="list-style-type: none"><li>Requires clearance around roadway</li><li>Along roadways experiencing strong flows</li></ul>	<ul style="list-style-type: none"><li>Limit inundation to one side of roadway</li><li>Reduce erosion from overtopping</li></ul>		<ul style="list-style-type: none"><li>Resilient Tampa Bay</li></ul>
<b>Use permeable pavements</b>	Slows, filters, and cleans stormwater runoff by installing porous surfaces.		<ul style="list-style-type: none"><li>Especially relevant in areas with large parking lots</li><li>Appropriate only for gentle slopes</li><li>Can become clogged.</li><li>Appropriate for low traffic volumes, loads, and speed</li></ul>	<ul style="list-style-type: none"><li>Reduce runoff</li><li>Allow water to infiltrate</li><li>Reduced particulates in water</li></ul>		<ul style="list-style-type: none"><li>Resilient Tampa Bay</li><li>Houston Galveston Resilience Pilot Program</li></ul>
<b>Construct enhanced road surface</b>	For flooding: Increase the thickness of hot mix asphalt (consider increasing 2”) and binder course using larger aggregate. For heat and wildfire: Design road with materials resistant to fire and heat.			<ul style="list-style-type: none"><li>Resist water movement and inundation</li><li>Withstand impacts of prolonged exposure to heat or submersion</li></ul>		<ul style="list-style-type: none"><li>Resilient Tampa Bay</li><li>Resilient California</li><li>Houston Galveston Resilience Pilot Program</li></ul>
<b>Construct enhanced sub-surface</b>	Increase the thickness of subbase layers to provide additional drainage, structural strength, and resistance to flow damages (consider increasing 4-6”).			<ul style="list-style-type: none"><li>Resist water movement and inundation</li></ul>		<ul style="list-style-type: none"><li>Resilient Tampa Bay</li><li>Houston Galveston Resilience Pilot Program</li></ul>
<b>Construct berms or barriers</b>	Construct a barrier to prevent water from flooding the roadway.		<ul style="list-style-type: none"><li>Consider available right-of-way to construct barrier</li></ul>	<ul style="list-style-type: none"><li>Prevent water from reaching roadway or flowing across roadway</li></ul>		<ul style="list-style-type: none"><li>FHWA Adaptation Framework</li></ul>
<b>Construct protected or depressed medians</b>	Separate the roadway and potential effect of inundation with a median between the travel lanes in each direction.		<ul style="list-style-type: none"><li>Especially effective along roadways in flat areas</li><li>Requires maintenance of vegetation and keeping drains clear</li></ul>	<ul style="list-style-type: none"><li>Reduce the occurrence of floods across the full roadway</li><li>If depressed, serve as a holding area for water</li></ul>		<ul style="list-style-type: none"><li>Resilient Tampa Bay</li><li>Houston Galveston Resilience Pilot Program</li></ul>

**Legend**



General



Heat



Wildfire



Flood



Tornado



Low cost



Medium cost

















High cost



# RESTORATION STRATEGIES

## Restoration: Strategies that help the system recover quickly and return to normal functioning.

<b>Install generator connections at traffic signals</b>	Provide built in connections on signal cabinets to connect a generator.		<ul style="list-style-type: none"> <li>• Battery capacity and need for replacement or installation of a generator</li> <li>• Prioritize signals with greatest impact</li> </ul>	<ul style="list-style-type: none"> <li>• Quickly resume operations after shock</li> </ul>		<ul style="list-style-type: none"> <li>• Space Coast TPO Resiliency Master Plan</li> </ul>
<b>Prioritize roadways</b>	Prioritize roadways based upon network effectiveness. In all response activities focus on roadways in priority order, for example send crews to clear debris from priority roadways before non-priority roadways.		<ul style="list-style-type: none"> <li>• Include community input regarding critical routes and facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Clear and defined plan that can be communicated to the community</li> </ul>		<ul style="list-style-type: none"> <li>• Resilient California</li> </ul>
<b>Develop warning systems with resilient communications</b>	Warning system may consist of sensors, cameras, citizen reporting tool, or other means.			<ul style="list-style-type: none"> <li>• Quickly alert of hazard to allow response to occur</li> </ul>		<ul style="list-style-type: none"> <li>• Houston Galveston Resilience Pilot Program</li> </ul>
<b>Develop a coordination plan with other agencies to respond to changes and hazards</b>						<ul style="list-style-type: none"> <li>• FHWA Adaptation Framework</li> </ul>
<b>Coordinate with transit providers to identify alternative routes and stops if normal infrastructure is impacted</b>				<ul style="list-style-type: none"> <li>• Continue to operate transit in a predetermined manner consistent with rider expectations.</li> </ul>		<ul style="list-style-type: none"> <li>• Resilient California</li> </ul>
<b>Establish stand-by contracts for damage response</b>	Establish mechanisms to pay for rapid response to hazards.			<ul style="list-style-type: none"> <li>• Proactive measure to reduce the length of impact.</li> </ul>		<ul style="list-style-type: none"> <li>• FHWA HOP-15-025</li> </ul>
<b>Stockpile materials (culvert pipe, fuel, components) and equipment (generators, traffic control devices) at appropriate locations</b>	Maintain an inventory of critical materials to quickly respond to needs during and after shocks.		<ul style="list-style-type: none"> <li>• Different materials will be needed at different locations to address each hazard</li> <li>• Consider in conjunction with prioritized roadways</li> <li>• Consider cost of storage and potential deterioration of materials over time</li> </ul>	<ul style="list-style-type: none"> <li>• Proactive measure to reduce the length of impact.</li> </ul>		<ul style="list-style-type: none"> <li>• FHWA HOP-15-025</li> </ul>





# NEXT STEPS

## Incorporating Resiliency into planning processes



Project level planning/development



Hazard data collection



Scenario planning analysis



Identification of critical facilities



Identification and prioritization of needed resiliency  
improvements





# Questions?

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