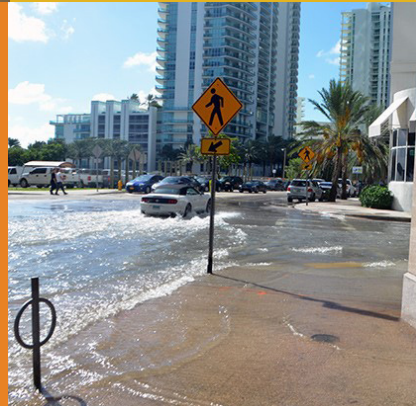




RESILIENCE QUICK GUIDE:

INCORPORATING RESILIENCE IN THE MPO LONG RANGE TRANSPORTATION PLAN



JANUARY 2020

RESILIENCE QUICK GUIDE INTRODUCTION

SYSTEM RESILIENCE

Federal Regulation 23 CFR 450.306(b)(9) requires Metropolitan Planning Organizations (MPOs), in cooperation with the State and public transportation operators to “improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation” in the long-range transportation planning process. As a result, Florida’s MPOs consider resilience as a planning factor when assessing projects, strategies, and services during the development of their Long Range Transportation Plans (LRTPs).

All of Florida’s MPO planning areas are affected by extreme events and changing conditions including weather, environmental changes, economic shifts, and operational disruptions. However, the specific ways in which each MPO is challenged are unique. These changing conditions can include increased inland flooding, sea level rise, increased frequency of severe storms with high winds and greater rainfall, increased duration of droughts and rapidly spreading fires, economic recessions, or even cyberattacks.

**RESILIENCE IS THE ABILITY TO
ANTICIPATE, PREPARE FOR, AND
ADAPT TO CHANGING CONDITIONS
AND WITHSTAND, RESPOND TO, AND
RECOVER RAPIDLY FROM DISRUPTIONS.**

FHWA Order 5220

Due to these changing conditions, transportation facilities may become damaged, eroded, flooded, weakened or otherwise impacted. These changes not only present risks to the immediate and long-term safety and mobility of Florida’s residents and visitors, but they also can result in costly repair efforts and deter business investment.

Since these events and conditions have intensified in duration, magnitude, and frequency, transportation agencies are identifying ways to protect, preserve, and improve their assets to combat extreme events and climate change in order to protect communities and local economies.



Image: Road blocked by trees downed in wind event near Tallahassee

RESILIENCE IN THE LRTP

One of the most important responsibilities of an MPO is to identify investment strategies that focus on developing projects and programs to best meet the transportation needs of the area’s residents, businesses, and visitors. The LRTP is a key tool the MPO uses to guide its planning process. To assist with incorporating resiliency into the LRTP, the FDOT Office of Policy Planning (OPP) developed the Resilience Quick Guide which outlines the steps for an MPO to consider throughout the development of the LRTP including:

- ▶ examining the plan goals and objectives to address resilience;
- ▶ developing performance measures to track progress on the objectives;
- ▶ ensuring that the Needs Plan assesses the impacts on assets and mobility;
- ▶ including projects and actions in the Cost Feasible Plan that will make the MPO region more resilient.

The Resilience Quick Guide identifies opportunities to incorporate resilience in each planning step of the LRTP Process:

Section 1: Goals and Objectives

Section 2: Performance Measures and Targets

Section 3: Risk and Vulnerabilities Assessment

Section 4: Needs Plan Development

Section 5: Cost Feasible Plan – Investments and Project Prioritization

In each section there are examples of noteworthy practices by MPOs in Florida and agencies around the country.

GOALS AND OBJECTIVES

THE FOUNDATION

Goals and objectives form the foundation of the LRTP, guiding the recommendations and strategies within the Needs Plan and the Cost Feasible Plan that sets the stage for project development. During the creation of goals and objectives, MPOs have the opportunity to integrate resiliency into the LRTP. As a planning document, the LRTP must address resiliency – whether as a standalone goal or intertwined with other goals and objectives. Integrating resiliency into goals allows MPOs to:

- ▶ Meet state and federal requirements.
- ▶ Prepare for current and future increases in extreme weather events.
- ▶ Prepare for current and future impacts of climate change.
- ▶ Prepare for shifting economic conditions and fluctuations.
- ▶ Anticipate operational challenges and impacts of new technologies.
- ▶ Manage life-cycle costs of the transportation system.

While a number of Florida's MPOs are already considering resiliency in their long-range planning process, continuing to refine goals and objectives will help shape recommendations, inform policy decisions, and facilitate coordination between MPOs and state and federal agencies.

Focus on Resilience

Since resilience is a multi-faceted and dynamic issue, each MPO may choose to incorporate resilience in a unique way that addresses the needs and assets of their planning area. In certain cases, a goal specific to resilience may be appropriate. For example, a standalone goal could be to create a resilient and reliable multimodal transportation system. This goal could include creating infrastructure that provides diverse transportation options that ensure accessibility, provide system redundancy, support evacuation needs, and address social equity.

In other cases, interweaving resiliency among objectives in a broader goal may be more effective. For instance the MPO's goal may be to improve and preserve the existing transportation system. In this example, the goal may be supplemented by more specific objectives related to resiliency, such as:

- ▶ Harden critical infrastructure to withstand the impacts of climate and extreme weather events.
- ▶ Provide a resilient transportation system to support economic competitiveness.
- ▶ Incorporate ITS measures to support efficient evacuation and alternate routes in the case of a storm event or disaster.

Identifying goals and objectives that directly address resiliency early in the plan development, will help MPOs build a framework to inform the rest of the planning process and support further analysis and decision-making.



Image: Sidewalk damage from Hurricane Wilma, Town of Miami Lakes



Image: Community members weighing in on the Tallahassee Community Resilience Plan which is being incorporated into CRTPA's 2045 Regional Mobility Plan.

In addition to the prior examples given, objectives or strategies related to resilience encompass many other planning areas including:

**ASSET MANAGEMENT**

- ▶ Evaluating assets for risks, gaps, or vulnerabilities.
- ▶ Creating mitigation actions to address risks, gaps, or vulnerabilities.

**ECONOMY**

- ▶ Ensuring that intermodal facilities important to regional economies are integrated into the transportation system.
- ▶ Supporting transportation projects that promote job creation and economic development.

**FREIGHT**

- ▶ Prioritizing fuel distribution or recovery plans.
- ▶ Improving freight connectivity and access to SIS and intermodal facilities.

**OPERATIONS**

- ▶ Supporting new ITS projects to improve operational management and information.
- ▶ Incorporating automated, connected, electric, or shared (ACES) vehicle technologies.

**SAFETY**

- ▶ Informing drivers of travel conditions, safety issues, or operational closures or routes.
- ▶ Developing evacuation plans.
- ▶ Enhancing equity in decision making and improving safety for elderly, disabled, minority, and other transportation disadvantaged groups.

NOTEWORTHY PRACTICES

FLORIDA



Miami-Dade TPO 2045 LRTP

The Miami-Dade TPO's recently adopted 2045 LRTP includes the goal to "Improve and Preserve the Existing Transportation System." This goal is supported by the following objectives:

- ▶ Improve the resilience/reliability of the transportation system.
- ▶ Reduce the vulnerability and increase the resilience of critical infrastructure to the impacts of climate and events. Preserve infrastructure.
- ▶ Site and design new transportation infrastructure to minimize exposure to sea level rise within the infrastructure life span, based on the Southeast Florida Regional Climate Change Compact's 2015 Unified Sea Level Rise Projection.

http://www.doverkohl.info/reports/Miami-Dade_2045_LRTP_Final.pdf

North Florida TPO 2045 PathForward

The North Florida TPO 2045 PathForward (LRTP) sets forth a resilience goal: "Create reliable and resilient multimodal infrastructure." This goal is supported by the following objectives:

- ▶ Incorporate climate risk in project planning, system preservation and maintenance and determine appropriate measures to mitigate risk or repurpose threatened facilities.
- ▶ Support regional evacuation needs as reflected in municipal Emergency Management Plans.
- ▶ Address social equity in adaption/resilience strategy implementation.

<http://pathforward2045.com/>

Hillsborough MPO 2040 LRTP

The Hillsborough MPO 2040 LRTP states an objective to "increase the security and resiliency to the multimodal transportation system." This objective is supported by several policies designed to improve evacuation planning such as "include emergency evacuation considerations in the MPO transportation planning process."

<http://www.planhillsborough.org/wp-content/uploads/2019/06/2040-LRTP-Final-Full-Report-Amended-6-11-19.pdf>

NATIONAL



New York Metropolitan Transportation Council 2045 LRTP

The New York Metropolitan Transportation Council's (NYMTC) 2045 LRTP sets forth the goal of "improving the resilience of the regional transportation system." The goal is further defined as a "system that can better resist disruptions to service and facilities and recover from them when they occur." NYMTC also identifies extreme weather events & resilience as a Driving Factor in its LRTP, pointing to the use of more sophisticated tools to identify vulnerabilities in the transportation system, ultimately identifying infrastructure for hardening as well as developing emergency response plans.

<https://www.nymtc.org/Required-Planning-Products/Regional-Transportation-Plan-RTP/Plan-2045-Maintaining-the-Vision-for-a-Sustainable-Region>

Roanoke Valley TPO 2040 LRTP

VTrans was developed by the Commonwealth Transportation Board (CTB) and acts as Virginia's long-range multimodal transportation plan. VTrans outlines the overarching vision and goals for regional transportation in the Commonwealth of Virginia, identifies investment priorities, and provides direction on implementation. One of the guiding principles of VTrans is to "[e]nsure safety, security, and resiliency," which is supplemented by a series of goals. In the Roanoke Valley's 2040 LRTP, the TPO assesses how its goals are related to VTrans' guiding principles and state-wide identified needs. One of the TPO's goals is to focus on "[m]aintaining transportation system resiliency and reliability" as it relates to the identified needs of corridor reliability, redundancy, mode choice, and congestion.

<http://www.vtrans.org/vision/our-vision>

<https://www.rvarc.org/wp-content/uploads/2019/08/Vision-2040-Plan-Final-A2-Approved-8-22-19.pdf>

PERFORMANCE MEASURES AND TARGETS

MEASURING PROGRESS

Enacted in 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) aimed to increase transparency and accountability to ensure that states were collectively making progress towards national transportation planning goals. The national performance areas identified to advance these goals were:

- ▶ Safety
- ▶ Infrastructure Condition
- ▶ System Reliability
- ▶ Freight Movement and Economic Vitality
- ▶ Economic Sustainability
- ▶ Reduce Project Delivery Delays

In 2015, the Fixing America's Surface Transportation (FAST) Act supported the approach of MAP-21 by requiring MPOs to conduct performance-based planning through the use of data-driven performance measures for each of the areas identified in MAP-21 that first establish an understanding of baseline conditions and then work towards a target for each.

Since Florida's transportation system needs exceed available funding, resources are invested in the most efficient and strategic ways possible to meet performance measure targets. MPOs use performance measures as an indicator of progress towards attaining national, state, and local goals and objectives. FDOT utilizes these performance measures in three major ways:

The Strategic Level. Performance measures help inform and establish the MPO's goals, objectives, and strategies as well as progress toward goals set forth in the Florida Transportation Plan, the Strategic Highway Safety Plan, and the Freight Mobility and Trade Plan.

The Decision-Making Level. Performance measures inform and address financial policies in the allocation of funds across the transportation system.

The Project Delivery Level. Performance measures help assess the efficiency and effectiveness of projects and inform the Five Year Work Program.

Focus on Resilience

While Federal performance measures and targets are guided by FAST Act legislation, MPOs do have the option of going

above and beyond the required measures. MPOs can elect to include additional measures that may address preparing for extreme weather events, anticipating abrupt or prolonged environmental changes, shifting economic patterns, or maintaining connectivity and mobility in order to incorporate resiliency. The MPO's performance measures may track the interstate system pavement condition after major flooding events, assess the number of highway lanes within the 100-year floodplain, quantify the number of bridges disrupted after storm surges, or calculate the percent of transit track segments with performance restrictions.



Image: Downed power lines after Hurricane Irma, Tallahassee

Ultimately, performance measures are used to track progress towards the achievement of the MPO's goals and objectives and are the drivers of investment and policy decision-making. Within their LRTP, MPOs have an opportunity to determine what successful resilience planning looks like and how to measure that success for their planning area.

In order to maximize the effectiveness of any new performance measure, it is helpful for the MPO to consider available data to assess progress across both near-term and long-term timeframes. Additionally, conversations with agency partners such as FDOT and FHWA will help align the measure with best practices from other areas. This approach leads to performance measures that can more easily translate between the LRTP and the Transportation Improvement Program (TIP).

NOTEWORTHY PRACTICES

FLORIDA



Martin MPO 2040 LRTP Moving Martin Forward

Across the four identified goals, the Martin MPO's 2040 LRTP—Moving Martin Forward—developed several resilience-related performance measures. As stated in the LRTP, Martin MPO sought to create goals that were focused on outcomes further supplemented by measurable performance measures. A few of these performance measures included:

- ▶ Centerline miles of roadway on evacuation routes operating at or better than the adopted level of service standard.
- ▶ Acres of impacted wetlands or significant wildlife habitat.
- ▶ Percent vehicle miles of travel operating at or better than the adopted level of service standard on freight corridors.

<https://martinmopo.com/wp-content/uploads/2019/04/2040-LRTP-Modification-12-11-17.pdf>

Palm Beach TPA 2045 LRTP

In Palm Beach TPA's 2045 LRTP adopted in December 2019, there are two resiliency-specific performance measures listed:

- ▶ To identify the “percentage of federal aid eligible mileage susceptible to inundation by 1.2-foot sea level rise and historic storm surge.”
- ▶ To record the “1% chance of annual flooding.”

Palm Beach TPA's LRTP shows the recorded percentages for both of these performance measures in 2018 as a baseline and the target goal percentages for 2030 and 2045 respectively. The use of performance measures provides data that is analyzed to determine areas of weaknesses, highlight future areas of focus and strengths, and identify where successful planning has proven to be valuable.

https://www.palmbeachtpa.org/static/sitefiles/LRTP/2045/LRTP_Full_Final.pdf

NATIONAL



North Central Pennsylvania RPO LRTP

The North Central Pennsylvania RPO conducted a risk analysis to develop a list of at-risk assets as a result of increases in risk to extreme weather. An Alternative Routes study was commissioned to ensure mobility in the event the at-risk facilities were disrupted due to flooding.

<https://rpo.ncentral.com/long-range-transportation-plan/>

National Associate of Development Organization (NADO)

Many of Florida's MPOs address economic resilience in their LRTP performance measures. By incorporating an economic development framework for wealth creation in transportation planning documents like the LRTP, MPOs can promote transportation projects that address environmental, economic, and operational resilience. The National Association of Development Organizations (NADO) provides information on incorporating economic resilience within the LRTP.

<https://www.nado.org/wp-content/uploads/2018/02/IntegratingEconRes.pdf>

Pudget Sound Regional Council (PSRC) RTP

The Puget Sound Regional Council (PSRC)'s Regional Transportation Plan (RTP) defines its performance-based evaluation in relation to 11 categories known as the Regional Outcomes Framework. The RTP outlines the seismic risks, tsunami impacts, and other climate impacts pertinent to the planning area. It describes how resilience was incorporated throughout the plan's development and how it was incorporated in the creation of the following performance measures:

- ▶ Air Quality and Climate Change Emissions – Determining the regional emissions levels compared to 2014 levels.
- ▶ Freight Mobility – Determining the delay and associated investment to mitigate delay times for medium and heavy trucks.
- ▶ Safe and Secure Transportation System – Hardening infrastructure to withstand frequent storm and flooding events, maintenance of lifeline routes, and intelligent transportation systems.

<https://www.psrc.org/sites/default/files/rtp-appendixk-systemperformancereport.pdf>

RISKS AND VULNERABILITIES ASSESSMENT

MITIGATING ADVERSE IMPACTS

A risk is a measure of the probability that an asset will experience a particular impact and the severity of that impact. While the probability of an occurrence may be low, the severity may be high or vice-versa. Building on the foundation set by the goals and the data obtained from setting performance measures, an MPO has the opportunity to identify vulnerabilities that may hinder their ability to achieve goals and performance measures. Cultivating an accurate inventory of assets and conditions helps identify susceptible infrastructure and plan for potential adverse environmental, weather, economic, or operational conditions.

Focus on Resilience

A risk assessment is a valuable method for establishing a network-wide perspective relative to resilience. The review of established baselines identified as part of the performance measurement process can help MPOs make informed decisions about the costs and benefits of mitigation options. When assessing vulnerabilities and risks, determining where certain weather and environmental conditions such as extreme heat, variations in rainfall, sea level rise, hurricanes, or greater periods of drought will strain the transportation network is vital. Additional vulnerabilities or risks could include recessions, gaps in network connectivity, or cyberattacks.

While environmental and weather vulnerabilities are most often associated with resilience, the operational and economic vulnerabilities are often interrelated. For example, after a major hurricane certain roadways and bridges may be disrupted or damaged. While the immediate impacts may be flooded or closed roadways, impacts on local or regional economies may include slower or less frequent product shipments that create sustained economic losses. Additionally, the condition of facilities can over time degrade due to extreme or frequent exposure. The interrelated nature of risk and vulnerabilities is the key reason why risk assessments and resiliency planning is so important.

Currently, many of Florida's MPOs are using mapping, GIS, and scenario planning capabilities to identify evacuation strategies, prioritize future investments, and integrate climate risk data into policy decision making. Determining the risks specific to the MPO may look different depending on the area. Coastal MPOs may identify the impacts of varying levels of storm surge on regional freight mobility

or evacuation routes, while inland MPOs may analyze the impacts of extreme rainfall on bridges and roads in low lying, flood prone areas. Scenario planning and risk assessments provide a holistic, regional approach to large scale threats that inform resiliency needs in the LRTP.

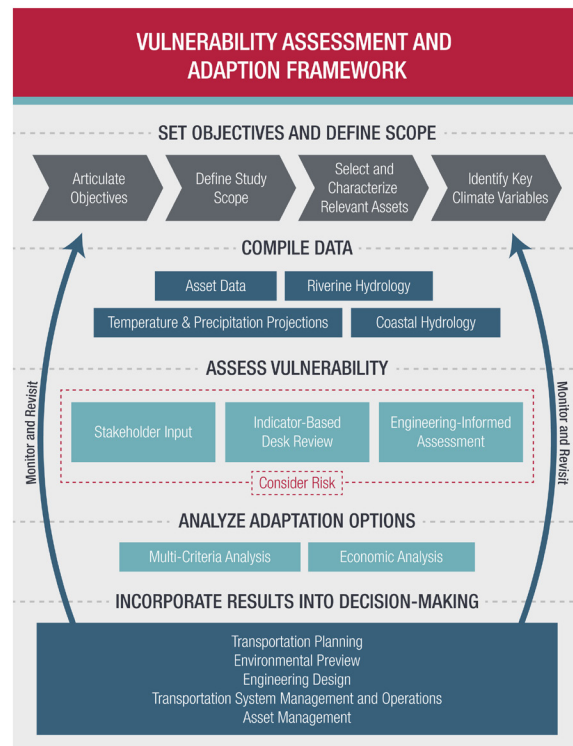


Image: FHWA Vulnerability Assessment and Adaptation Framework, Third Edition

https://www.fhwa.dot.gov/environment/sustainability/resilience/adaptation_framework/climate_adaptation.pdf



Image: Fire along I-75 in Marion County

NOTEWORTHY PRACTICES

FLORIDA



Hillsborough County MPO 2040 LRTP

The Hillsborough County MPO's 2040 LRTP takes an innovative approach by assessing security and vulnerability at various funding levels. The MPO recognizes that in the event of storm surge, certain roadways may be disrupted and damaged. To measure these impacts, the Hillsborough MPO evaluated three different investment scenarios over a period of 20 years to determine how funds would be allocated, the anticipated duration of disruption in weeks, and the impact on the economy. Each investment level approximated the impact on three performance measures: travel time delay, lost trips, and economic losses.

<http://www.planhillsborough.org/wp-content/uploads/2019/06/2040-LRTP-Final-Full-Report-Amended-6-11-19.pdf>

South Florida Climate Change Vulnerability Assessment and Adaptation Pilot Project

For the South Florida Climate Change Vulnerability Assessment and Adaptation Pilot Project, Broward, Miami-Dade, Palm Beach, and Monroe Counties developed a tool containing vulnerability scores for each network segment in the study area using three indicators—exposure, sensitivity, and adaptive capacity. The tool was used to determine the impacts of exposure to sea level rise and flooding for each highway segment.

<http://www.browardmpo.org/images/WhatWeDo/SouthFloridaClimatePilotFinalRpt.pdf>

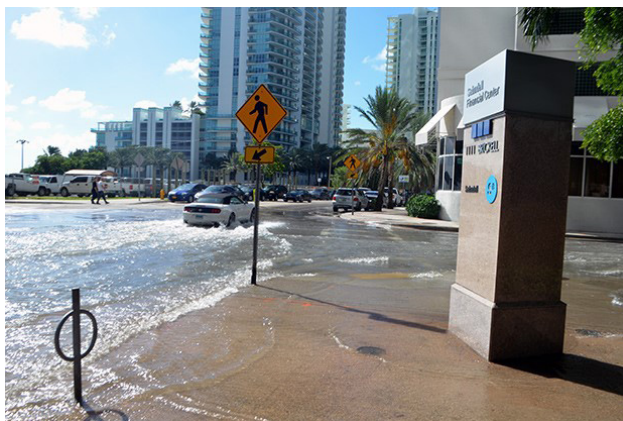


Image: King Tide in Miami

NATIONAL



Ohio DOT

Ohio DOT has employed FHWA's Vulnerability Assessment Scoring Tool (VAST) to evaluate the relative vulnerability of state-maintained bridges and highways. VAST has also been utilized by the Broward County and Miami-Dade MPOs for first phase vulnerability assessments.

https://www.fhwa.dot.gov/environment/sustainability/resilience/tools/scoring_tools_guide/vast_users_guide.pdf

Minnesota DOT

In 2014, FHWA created a pilot program that included nineteen states including Minnesota DOT (MnDOT). The project assessed vulnerability and risk of increased flooding of the highway system in MnDOT Districts 1 and 6. The vulnerabilities focused on the evaluation of at-risk facilities including bridges, culverts, pipes, and roads. Each asset had a unique set of metrics including:

- ▶ Stream velocity.
- ▶ Asset condition.
- ▶ Detour lengths.
- ▶ Heavy commercial average daily traffic (HCADT).
- ▶ Percentage of total roadway length parallel to the floodplain.
- ▶ Percentage of forest land cover in drainage area including bridges, culverts, and pipes.

The sensitivity variables were scored and then weighed to produce a final sensitivity score. The final score was then used to prioritize projects. The prioritization included five tiers ranging from the highest vulnerability – tier 1 – to the lowest vulnerability – tier 5.

http://www.dot.state.mn.us/sustainability/docs/D1VulnerabilityAssessment_Updated.pdf

NEEDS PLAN DEVELOPMENT

CONSIDERING THE OPTIONS

After identifying risks and vulnerabilities, the next step is creating a strategy to address the present and future needs. MPOs complete a Needs Plan to identify the transportation infrastructure essential to accommodate future travel demand. The Needs Plan is an opportunity to directly assess how projects—even those that are ultimately not funded within the Cost Feasible Plan—would strengthen the planning area against identified risks and vulnerabilities.

The Needs Plans is a tool to maximize synergistic opportunities for multimodal transportation networks. As such, some MPOs divide their Needs Plan and tables into categories like roadway, transit or public transportation, non-roadway, and mobility which may include ITS, bicycle and pedestrian, and TSMO programs. In these tables, MPOs may take additional steps to describe how each project is strengthening the ability of the MPO to address resiliency. For example, if certain roadways are plagued with inadequate stormwater management, the MPO may opt to note this as a concern and identify preliminary mitigation efforts to address resiliency.

MPOs can consider resilience factors in the prioritization of their Needs Plans to show how projects help fulfill planning goals. For example, an MPO may choose to consider whether a project is along an evacuation route, promotes continuity and connectivity, reduces congestion, is a freight route, or impacts wetlands. Projects may be evaluated based on anticipated impacts to these items and if the project is fulfilling the MPO's goals and supporting established performance measures. The Needs Plan serves as a key location for beginning to look at resilience strategies and how they translate into future infrastructure projects.

Focus on Resilience

The Needs Plan can identify resilience needs based on the MPO's goals, objectives, and risk and vulnerabilities assessment. Resiliency may be incorporated into the Needs Plan through projects, programs, policies, or other resilience planning efforts. How these elements are identified and evaluated may vary among MPOs. For example, a MPO could approve a specific planning criterion related to emergency response such as measuring impact of travel time along critical response

routes. This planning factor may be used when evaluating where corridors could be expanded or added to promote expedient emergency response or offer system redundancy in the event of an incident or congested conditions. The MPO could have an environmental specific criterion like identifying if the project is in a floodplain. This planning factor could be used to integrate mitigation strategies in project design to accommodate potential flooding.

Some MPOs are already considering multiple criteria to both demonstrate how they are working towards their goals and how projects enhance the statewide transportation network. The ability of the MPO to frame resiliency in a way that is not fiscally constrained, provides an opportunity to show how projects will strengthen and create a more adaptable transportation network and offer valuable comparisons to use when selecting the best projects, programs, policies, and planning efforts.

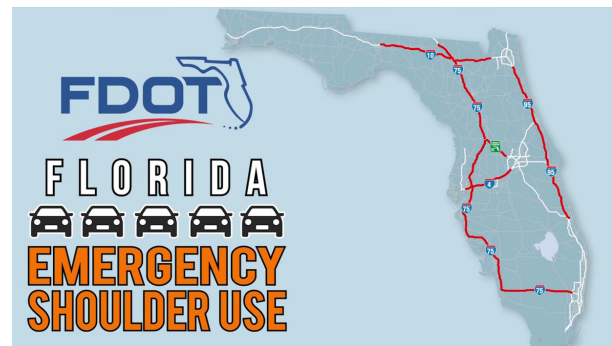


Image: FDOT's Emergency Shoulder Use is an innovative strategy to increase traffic capacity during major hurricane evacuations and contributes to the resilience of the system.



Image: Flooding on NW 93rd Street in 2019, Town of Medley

NOTEWORTHY PRACTICES

FLORIDA



River to Sea TPO Sea Level Rise Vulnerability Assessment

In 2016, the River to Sea TPO completed a Sea Level Rise Vulnerability Assessment of their critical facilities and transportation infrastructure. For development of Connect 2045, the TPO is using the data from this and other studies to evaluate a Resiliency Scenario.

<https://www.r2ctpo.org/wp-content/uploads/River-to-Sea-TPO-SLR-Analysis2-Reduced.pdf>

Broward County MPO 2045 MTP

The Broward County MPO's Commitment 2045 MTP developed five scenarios, including a "Resiliency Scenario" which responds to sea level rise projections and other climate stressors. In a previous study, the MPO evaluated the risk of the transportation system to extreme weather and climate change. The Resiliency Scenario sought to prohibit future investments to roadway identified in the "Extreme Weather and Climate Change Risk" study as vulnerable. The MPO's 2045 MTP identifies six planning factors. Each planning factor has specific criteria to help determine the magnitude of impact or needs a project will have. Here are just a few criteria that Broward MPO used to prioritize projects:

- Improvements related to sea-level rise mitigation/extreme weather resiliency.
- Economic development (measure by impact on access to key areas).
- Improvements to multimodal safety within equity areas.

http://browardmpo.org/images/WhatWeDo/2045_MTP/MTP_Final_Report_121219.pdf

Miami-Dade TPO 2045 LRTP

In the 2045 LRTP update, the Miami-Dade TPO explicitly incorporated the results of the South Florida Climate Change Vulnerability Assessment Pilot Project and cited coordination with the county's Local Mitigation Strategy and FEMA mapping for the region to consider flood zones when evaluating projects. Projects located in flood zones should "include adequate infrastructure hardening to prepare for potential impacts."

<https://miamidade2045lrtp.com/the-plan>

NATIONAL



Capital Area Metropolitan Planning Organization (CAMPO) Needs Plan

In their 2040 LRTP, the Capital Area Metropolitan Planning Organization (CAMPO, Austin, TX) developed the following measures to guide their Needs Plan:

- Evaluating evacuation routes as part of any identified project to increase system redundancy
- Advancing best design practices for addressing soil plasticity in road construction
- Evaluating localized flooding risks and developing appropriate mitigation approaches
- Facilitating additional research on resilience with local and regional partners

<https://www.campotexas.org/regional-transportation-plans/2040-plan/>

Boston Region MPO LRTP

The Boston Region MPO incorporates resilience in infrastructure that could be affected by climate change through its evaluation criteria. Projects are rated on how well their project's design improves the region's LRTP in areas that are flood-prone or at risk to storm surge and sea level rise.

<https://www.ctps.org/data/pdf/plans/LRTP/destination/Destination-2040-LRTP-20191030.pdf>

COST FEASIBLE PLAN – INVESTMENTS AND PROJECT PRIORITIZATION

THE FINAL STEP

The Cost Feasible Plan is a key element of the LRTP. While the Needs Plan can outline any and all projects desired, the Cost Feasible Plan lists the projects that are realistically achievable through the planning horizon due to anticipated funding availability at local, state, and federal levels. Based on revenue forecasts, the MPO will allocate funding according to eligible uses and policy direction. These financially constrained projects are prioritized based on the importance of the transportation facility's significance to the planning factors identified by the MPO, state, and federal government.

In the Cost Feasible Plan, the MPO creates a financial summary to show detailed cost over a twenty-five-year period. Additional information about a project's anticipated funding year is also shown. The Cost Feasible Plan is a section of the LRTP to show how the MPO attempts to leverage available funding to continue to create a resilient, multimodal transportation network. It is also an opportunity to partner with FDOT and local governments to consider on a macro- and micro-level the scale or impact projects have across MPO planning boundaries.

Focus on Resilience

Creating a resilient transportation system is a statewide priority. While MPOs have unique needs in addressing resilience, they are all directed by the same state and federal guidance. As such, the recommendations within the LRTP are tailored to ensure the region's transportation system (whether local, statewide, or other) is best equipped to handle anticipated risks and vulnerabilities.

The best way to incorporate resiliency into the Cost Feasible Plan is to show that MPOs are investing in and prioritizing projects that reflect resiliency goals and objectives. For example, by demonstrating that the current transportation network cannot adequately combat aspects of climate change, investments towards creating or upgrading infrastructure to fulfill these needs reflects the seriousness of resiliency as a priority for the MPO.



Image: Seawall at the Bristol in West Palm Beach, Florida

Many MPOs have been and continue to integrate resilience into their Cost Feasible Plan priorities. Some MPOs invest in conducting studies to identify resiliency improvements along certain corridors to compare the cost, feasibility, and impacts of various improvements. These studies are a preliminary step and can set up the MPO to more appropriately design and fund future projects along a corridor. Other MPOs focus investments on upgrading, expanding, or creating new facilities that promote freight movement, focused economic growth and development, or incorporating ITS improvements. Projects may target vulnerabilities to system resiliency by upgrading aging infrastructure or incorporating anticipated flood level increases into design standards. However, even if resiliency-related projects cannot be funded by the currently available funds, MPOs can still list them as unfunded. Including these unfunded projects is important because MPOs may revisit these projects in future LRTP updates or decide a project is no longer relevant or necessary.

Resiliency is a multi-faceted concept. With many ways to incorporate resilience into the LRTP, MPOs have the flexibility to define, prioritize, and invest in the types of resilience projects most critical to their respective planning areas. Successful resiliency planning outlines goals, defines performance measures, assesses risks and vulnerabilities, showcases needs, and ultimately demonstrates investments in projects that promote resilient communities and transportation networks.

NOTEWORTHY PRACTICES

FLORIDA

Space Coast MPO 2045 LRTP

In Space Coast MPO's 2045 LRTP, the Cost Feasible Plan includes more than 60 centerline miles of improvements on designated evacuation corridors, which is more than 50% of the total investment in the cost feasible plan. The MPO used the following three security strategies to ensure the capacity necessary for large scale evacuation was in place in the event of a disaster:

- ▶ Prevention and protection
- ▶ Redundancy
- ▶ Recovery

<https://spacecoasttpo.com/wp-content/uploads/2019/07/Amendment-2-Final-Corrected.pdf>

Broward County MPO Commitment 2045 MTP

The Broward County MPO's Commitment 2045 MTP (adopted December 2019) incorporated project prioritization criteria that considered whether an improvement would contribute to sea level rise mitigation and extreme weather resilience as well as how an improvement would impact greenhouse gas emissions. In the Cost Feasible Plan, Broward shows its commitment to resiliency by funding multiple studies to determine resiliency improvements.

http://www.browardmpo.org/images/WhatWeDo/2045_MTP/MTP_Final_Report_121219.pdf



Image: King Tide Event, Miami

NATIONAL

Southern California Council of Government (SCAG) Regional Transportation Plan

Connect SoCal, the Southern California Council of Government's (SCAG) Regional Transportation Plan, not only identifies \$68 billion to address preservation, operation, and resilience needs of the state highway system, but also embeds \$6 Billion to implement and accelerate strategies that will support transportation system resilience.

<https://www.connectsocal.org/Pages/Connect-SoCal-Draft-Plan.aspx>

Federal Highway Administration (FHWA)

In 2013, the Federal Highway Administration (FHWA) published the Assessment of the Body of Knowledge on Incorporating Climate Change Adaptation Measures into Transportation Projects. The report addressed the importance of capturing the cost of "no action" to help show when investment in adaptation measures can demonstrate financial feasibility and significance. While the cost of adaptation can vary project to project, the report identifies how to identify costs and benefits, provides methodologies for calculating costs, provides real world transportation sector examples, and identifies best practices. Some of the best practices included:

- ▶ Developing an information base. Combining the cultivation of performance measures with development of an information base.
- ▶ Improving access to existing data. Maryland DOT, Virginia DOT, and many other state DOTs provide estimation tools to help determine the cost of certain types of adaptation options.
- ▶ Monitoring the costs of extreme weather and documenting damages. Massachusetts DOT works with maintenance staff to document and record information into the asset management system during heavy rain and storm events that impact drainage. Iowa DOT developed a streamlined reimbursement process to quickly process funds requested during extreme weather events, which also tracks impacted areas geospatially.

https://www.fhwa.dot.gov/environment/sustainability/resilience/publications/transportation_projects/transportationprojects.pdf

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