



Resilience Subcommittee Meeting

October 29-30, 2019

Broward Metropolitan Planning Organization
Trade Center South
100 West Cypress Creek Road, 6th Floor, Suite 650
Fort Lauderdale FL, 33309

MEETING OBJECTIVES

The Florida Transportation Plan (FTP)-Strategic Intermodal System (SIS) Resilience Subcommittee is supporting the FTP update by focusing on transportation system resilience to environmental, community, and economic disruptors. The objectives of this meeting include:

- Partner presentations
- Review additional background information
- Discuss potential strategies to incorporate resilience into the FTP

For meeting information, please contact Jennifer Carver at (850) 414-4820, Jennifer.Carver@dot.state.fl.us.

MEETING ATTENDEES (* = attended only Oct 29, ** = attended only Oct 30)

Subcommittee Members	
James Stansbury, <i>Florida Department of Economic Opportunity</i>	Sean Sullivan, <i>Florida Regional Councils Association</i>
Janet Bowman, <i>The Nature Conservancy</i>	Michael Stewart, <i>Florida Airports Council</i>
Karen Deigl, <i>Florida Public Transit Association*</i>	Paul Owens, <i>1000 Friends of Florida **</i>
Casey Grigsby, <i>Florida Ports Council</i>	
Alternates	
Chris Stahl, <i>Florida Department of Environmental Protection</i>	
Friends	
Anna Quiñones, <i>Tampa Hillsborough Expressway Authority **</i>	Jayantha Obeysekera, <i>Florida International University **</i>
Andrew Uhler, <i>Palm Beach Transportation Planning Agency</i>	Jennifer Jurado, <i>Broward County **</i>
Ben Moore, <i>RS&H, Inc.</i>	Jim Murley, <i>Miami-Dade County **</i>
Nancy Gassman, <i>City of Fort Lauderdale*</i>	John Linden, <i>Town of Lake Park</i>
Christina Miskis, <i>South Florida Regional Planning Council</i>	Lauren Swan, <i>AECOM</i>

Crystal Goodison, <i>University of Florida GeoPlan Center</i>	Mayor Michael O'Rourke, <i>Town of Lake Park</i>
Eric Hanegraaf, <i>AECOM **</i>	Hank Hodde, <i>Pinellas County</i>
Ingrid Birenbaum, <i>Moffatt and Nichol*</i>	Raymond Sciortino, <i>Jacobs Engineering</i>
Jason Liechty, <i>Broward County Environmental Planning and Community Resilience Division*</i>	Steven Gayle, <i>RSG</i>
FDOT Staff	
Lois Bush, <i>FDOT District 4</i>	Andrew Jungman, <i>FDOT District 6</i>
Larry Hymowitz, <i>FDOT District 4</i>	Shereen Yee Fong, <i>FDOT District 6</i>
John Podczerwinsky, <i>FDOT District 4</i>	Siaosi Fine, <i>FDOT Turnpike</i>
James Poole, <i>FDOT District 4</i>	Irene Cabral, <i>FDOT Emergency Management</i>
Gregor Senger, <i>FDOT District 4*</i>	Holly Cohen, <i>FDOT Freight & Multimodal Ops</i>
Jeremy Upchurch, <i>FDOT District 5</i>	Will Watts, <i>FDOT Chief Engineer *</i>
Steven Craig James, <i>FDOT District 6*</i>	
FTP Staff and Consultant Support	
Jennifer Carver, <i>FDOT Office of Policy Planning</i>	Jim Wood, <i>Kimley-Horn</i>
Jim Halley, <i>FDOT Office of Policy Planning</i>	Macy Fricke, <i>Kimley-Horn</i>
	Danny Shopf, <i>Cambridge Systematics</i>

MEETING SUMMARY – October 29, 2019

Welcome, Introductions, and Subcommittee Charge

Jennifer Carver, FDOT, welcomed the participants and asked everyone to introduce themselves. She then introduced James Cromar, Broward MPO, and he welcomed the group to Fort Lauderdale. He gave an update on projects in the region related to resilience, highlighting improvements to A1A.

Florida Transportation Plan and Activities Overview

Jennifer provided background information on the Florida Transportation Plan (FTP). She described how the FTP is Florida's long range transportation plan, as required by federal and state statutes and is meant to be a plan for all of Florida, not just for FDOT. She said the FTP has a Vision, Policy, and Implementation Element. In May 2019, a long range visioning session kicked off the update of the FTP. Since then, the FTP Steering Committee has met multiple times to guide the update process. Three subcommittees are supporting the FTP Steering Committee – the Automated, Connected, Electric, and Shared (ACES) Subcommittee, the Resilience Subcommittee, and the Safety Subcommittee. The Vision Element is expected to be completed by December 2019 and the Policy Element will be developed throughout 2020. She noted that through extensive outreach, coordination with partners, and input from the FTP Steering Committee, the FTP goals have been updated:

- Safety and Security for Residents, Visitors, and Businesses

- Agile, Resilient, and Quality Transportation Infrastructure
- Connected, Efficient, and Reliable Mobility for People and Freight
- Transportation Choices that Improve Accessibility and Equity
- Transportation Solutions that Strengthen Florida's Economy
- Transportation Systems that Enhance Florida's Communities
- Transportation Solutions that Enhance Florida's Environment

Jennifer reviewed the charge of the Resilience Subcommittee, emphasizing that the group will discuss themes, trends, and planning implications of transportation system resilience in Florida with an ultimate goal of identifying strategies and policies that support a resilient transportation system in Florida. The FTP Steering Committee will receive information provided by the Resilience Subcommittee and will determine which strategies should be included in the FTP.

Jim Wood, Kimley Horn, reviewed the agenda for the Resilience Subcommittee meeting and provided an overview of the three activities the group would participate in during the meeting.

Resilience in Transportation

Lois Bush, FDOT District 4, gave a presentation on the efforts FDOT District 4 and 6 have taken to create a more resilient transportation system to support the region. She identified common risks and stressors on the transportation system in the Southeast Florida region. Lois reviewed the typical project development process and emphasized that resilience must be considered throughout the project development process, as resilience can impact multiple phases of the planning process. She identified a variety of transportation facilities at risk to rising sea levels and storm surge and provided an overview of solutions implemented to improve the resilience of these facilities. Lois said the FDOT Drainage Manual was updated in 2016 to include guidance on how to better manage stormwater and storm surge. Attendees had the following questions and comments:

- How can other regions of Florida benefit from the work that has been done in Southeast Florida? Can other regions of the state use some of this information to inform their long range transportation plans, for example? How can the data we collect through these processes help inform budgeting and capital improvements in the future?
 - Hillsborough MPO has also done a climate adaptation pilot project and can be another resource for lessons learned. Finding programs like this can help other regions identify common strategies and themes that will support resilience in their own region.
 - The University of Florida GeoPlan Center/FDOT Sea Level Scenario Sketch Planning Tool is something that can be applied at the statewide level and could support decision making in any region in Florida.

- FDOT Central Office is developing guidance for MPOs on incorporating resilience into long range transportation plans.
- How were the local governments engaged in resilience discussions with FDOT? Did they come to FDOT or the MPO or did these agencies reach out to them?
 - It varies based on the region but a Climate Compact, like the one established in Southeast Florida, has been very effective at engaging partners at all levels of government.
- What resources, tools, or policies would help to achieve the resilience objectives in this region?
 - One of the biggest challenges in these efforts is getting consensus on what projections should be considered. When there is agreement on the sea level rise projection to be used for planning, agencies can more easily work together with consistent solutions.
 - Coordination with adjacent private property owners has been challenging, so any resource or tools that helps to engage these owners would be greatly beneficial.

Activity 1 – Priority Pyramid

Jennifer provided an overview of the activity, encouraging attendees to prioritize resilience themes identified at prior Resilience Subcommittee meetings and discuss their priorities with the group. Table 1 summarizes the results of Activity 1, showing the themes that the Resilience Subcommittee is most interested in implementing through the FTP. The count column represents the total number of people that ranked the priority. Participants were asked to rank their top six priorities of 12 options.

Table 1. Top Priorities of the Resilience Subcommittee

Resilience Priority	Count
Develop and implement policies, tools, guidance, and design standards that reduce risk	26
Develop consistent statewide transportation planning practices that incorporate resilience	24
Ensure that vulnerable populations are considered fully in transportation resilience planning	20
Integrate resilience data into transportation planning and design	20
Consider both coastal and inland resilience in transportation planning	19
Establish a statewide framework for collaboration to achieve transportation resilience	19
Consider regional differences and needs	14
Identify ways to make the transportation system more adaptive	13

Resilience Priority	Count
Minimize the impact to mobility before, during, and after a disaster	11
Identify and implement cost effective solutions	9
Prepare for uncertainty through nimble transportation planning and programming processes	9
Incorporate the role of other emerging transportation issues such as ACES technology	3

Priorities not listed on the activity sheet but mentioned in the meeting include:

- Identify and target resilience spending to retrofit the most vulnerable links in the transportation system.
- Highlight that we aren't just protecting the infrastructure for the sake of our investment but ensuring that we are protecting the people that the infrastructure serves.
- Ensure all transportation system stressors have been identified, including those beyond environmental stressors.
- Consider land development regulations, tools, and incentives
- Focus on freight network to ensure goods can be delivered and minimize impact to the freight network
- Develop and implement policies and strategies that generate revenues as technology changes and revenue sources decline
- Important to consider nature based resilience management systems, including living shorelines and natural buffers.

Freight Movement and Resilience Panel

Jennifer introduced a panel to discuss freight movement and resilience. The panel included:

- Holly Cohen, FDOT Freight and Multimodal Operations
- Casey Grigsby, Florida Ports Council
- Michael Stewart, Florida Airports Council

Holly provided an overview of the Freight Mobility and Trade Plan (FMTP), highlighting the freight scenario planning effort that informed the update of the FMTP. She said the FMTP is aligned with the update of the FTP. Holly noted that the Resilience Scenario identified during the FMTP update included

increasing temperatures, rising sea levels, increased frequency and strength of hurricanes, and a higher rate of extreme weather events. Staff worked collaboratively to identify potential impacts to freight movement in Florida based on the assumption of the Resilience Scenario. These potential impacts were used to help inform potential strategies to create more resilient freight infrastructure and a more resilient freight network.

Casey gave an update on the resilience efforts of Florida's ports. She said each of Florida's ports conducts a resilience study and publishes a resilience plan. She said the Florida Ports Council has just published a Seaports Resiliency Report, that identifies best practices and serves as a resource for ports. Casey noted that the Coast Guard is responsible for surveying a port after it has been closed down due to an emergency situation, such as a hurricane. She said the short- and long-term plans account for the resilience of the facilities and equipment for Florida's ports, considering factors such as rising sea levels, to ensure equipment and facilities do not need to be replaced due to rising sea levels and extreme weather events.

Michael gave an update on resilience efforts at Florida's airports. He noted that each of Florida's airports is very unique, but they consistently share information to ensure each airport has potential resilience solutions to apply at their own facilities. He emphasized that preparing employees for disruptions and natural disasters is key to the resilience of businesses in Florida.

Attendees had the following questions and comments:

- In the ports' resilience plans, are there considerations for access incorporated to ensure there aren't challenges for gaining access to ports like there were during Hurricane Irma?
 - In the case of Hurricane Irma, all 14 ports were shut down. During this event, all of the roads were closed, and port staff was not available to open the ports. Following this event, and all major events that cause ports to shut down, there is a debrief where lessons learned are discussed and protocol is revised to improve operations and access.
- Fuel access is a major vulnerability for the state. Has there been discussion on alternative fuels and different points of access for those fuels to increase fuel resiliency?
 - Yes, the alternative fuels discussion has been present during the update of the FMTP. Staff is exploring ways to incentivize alternative fuels while ensuring the system is well equipped to support vehicles using these alternative fuels.
- How is air cargo considered in terms of resilience?
 - Much of the freight handling is coordinated through freight providers, such as FedEx and UPS, and each airport handles the resilience of the air cargo processes differently.
- Is it possible to store fuel off port property so that it can be accessed even if the port is closed?
 - This has been considered but it would create a port security issue, so it has not been implemented.

- In Arizona, some airports have been shut down due to excessive heat. Is that a challenge in Florida and have we considered alternative materials for Florida's runways to ensure this doesn't become a recurring issue?
 - The thinness of the air during extreme heat is also a challenge for planes taking flight. The issue of materials on runways is not common in Florida.
- Is there a need to have more hardened facilities with backup power to house staff during emergency evacuation scenarios to ensure staff is available to open and operate major port facilities?
 - Improvements have been made to many of Florida's ports so that some critical operations can be operated remotely. Essential personnel commonly stay with the facility during emergency situations to ensure they can be quickly reopened.

Data to Support Decision Making

Crystal Goodison, University of Florida GeoPlan Center, provided an overview of the data and tools available for resilience planning and analysis. She reviewed the vulnerability assessment process and emphasized that it is an iterative process that must happen continually to ensure resilience is included. Data play a critical role in an effective vulnerability assessment process and helps to inform resilience decision making. She noted that critical data informing the Sea Level Scenario Sketch Planning Tool include elevation data, climate stressors, and detailed data on assets and resources. She said that while good data are important, equally important is relying on good methods and guides on how to process, analyze, and use data. She mentioned that the Tampa Bay Regional Planning Council created a tool modeling sea level rise, storm surge, and precipitation events, allowing local governments to make their own projections to inform their resilience decisions. She noted that standardized frameworks, methods, and tools are critical to allow for consistent vulnerability assessments to be replicated over time and geographic areas. Attendees had the following questions and comments:

- Have any smaller local governments been able to rely on the Sea Level Scenario Sketch Planning Tool?
 - Satellite Beach used the tool and needed to have custom data incorporated into the tool because of the unique nature of barrier islands.
 - Other smaller local governments have used the tool but they often don't report back to the GeoPlan Center, so staff is often unaware of it.
- Has the tool been recalibrated related to impacts to the state or other parts of the nation?
 - The tool is focused on long-term impacts, so it is not often recalibrated, especially based on individual events. The Army Corps of Engineers publishes sea level tracking regularly so that provides a way to see how sea levels are changing. The tool is currently being updated to include newer sea level rise projections.

Facilitated Discussion and Transition to Activity

Jim Wood updated the group on the most common themes identified in Activity 1:

- Develop and implement policies, tools, guidance, and design standards that reduce risk
- Develop consistent statewide transportation planning practices that incorporate resilience
- Ensure that vulnerable populations are considered fully in transportation resilience planning
- Integrate resilience data into transportation planning and design
- Consider both coastal and inland resilience in transportation planning

He then asked attendees to consider the following questions as they completed Activity 2:

- What do you see as the biggest vulnerabilities in Florida transportation?
- What resources do we need to improve the resilience of our local, regional, and state transportation systems?
- In what ways do you think technology will improve the resilience of our transportation network?

Activity 2 – Identify Resilience Strategies

Jim provided instructions on how to complete Activity 2 and asked groups to work collaboratively to identify potential strategies related to resilience. As part of the activity, groups identified their top five potential strategies, which are summarized in Table 2. The rank column represents the ranking the table gave the strategy and the table column identifies the table that developed the strategy. Note that there may be some duplication between the top five strategies from each table. See the attachments for a full list of potential resilience strategies.

Table 2. Top Potential Resilience Strategies

Rank	Table	Strategy
1	1	Integrate land use in transportation planning for stronger growth management
1	2	Sustainable funding to support resilience responses (dedicated)
1	3	Improve collaboration and coordination across entities including regional, statewide, county, and community organizations
1	4	Modify transportation facility design to improve infrastructure resiliency
2	1	FDOT assume leadership role
2	2	Incorporate resilience into FDOT design standards (for new construction and rehabilitation)

Rank	Table	Strategy
2	3	Define resiliency and develop standards across goals and objectives
2	4	Better coordination in operating and maintaining facilities (eliminate jurisdictional facilities)
3	1	Reduce dependence on one overwhelmingly dominant mode (cars/road)
3	2	An accepted process and content to conduct vulnerability analysis studies
3	3	Develop standards for statewide stormwater management for public and private, including natural infrastructure
3	4	Improve coordination across jurisdictions and plans to more fully establish resilience efforts and achieve co-benefits
4	1	Stable funding source (reduce dependence on gas tax/find an alternative)
4	2	Better coordination of local land use plans and transportation
4	3	Use natural infrastructure
4	4	Study infrastructure concerns / failures that were identified elsewhere. Consider adapting strategies to Florida. (LA, USACE, Netherlands)
5	1	Use transportation projects to leverage replacement of vulnerable/aging utility infrastructure
5	2	Monitor and incorporate impacts of emerging technology in resilience plans
5	3	Require resilience in infrastructure planning and design
5	4	Identify incentives to relocate land uses dependent on vulnerable infrastructure
6	4	Development of more inland ports to less vulnerable areas and design coastal ports to transfer more needed and vulnerable products to these areas when threatened

Wrap Up and Next Steps - Day 1

Jim said staff will summarize the results of Activity 2 to support the activities on Wednesday. Jennifer asked attendees if they had final comments or questions before concluding for the day:

- There were no questions or comments.

MEETING SUMMARY – October 30, 2019

Welcome and Introductions

Jennifer welcomed everyone back for Day 2 of the Resilience Subcommittee Meeting. She asked attendees to introduce themselves, since there were some additional attendees who had not been present for Day 1.

Local and Regional Resilience Initiatives in Southeast Florida

Jennifer Jurado, Broward County, provided an overview of the Southeast Florida Regional Climate Change Compact, highlighting the methodology the Compact selected to evaluate sea level rise in the Southeast Florida region. The Regional Climate Action Plan was developed by the Compact, including strategies and actions related to mitigating the impacts of flooding and sea level rise. She also discussed resilience efforts within Broward County, identifying a variety of storm surge, flooding, and sea level rise solutions that have been implemented by the County. The 2045 Long Range Transportation Plan includes a Resiliency Scenario intended to prohibit future investment in vulnerable roads and prioritize projects that improve resilience regardless of vulnerability. Jennifer said the Broward County Comprehensive Plan includes a Climate Change Element that provides a countywide strategy, based on local vulnerability to mitigate the causes and address the local implications of changing climate.

Jim Murley, Miami-Dade County, provided an update on Miami-Dade County's resilience efforts. He highlighted the Strategic Miami Area Rapid Transit (SMART) Plan, to provide premium transit service to Miami-Dade County. He noted that in the context of climate, economic, and social resilience, the SMART Plan is a key to improving resilience in the county. Jim provided an overview of the land use and scenario planning efforts that informed the development of the SMART Plan. He also provided an update on the Resilient 305 Plan, highlighting strategies including redesigning the bus system to increase ridership, electrification of the vehicle fleet, and creating transportation mobility hubs. Jim reviewed the South Florida Climate Change Vulnerability Assessment which calculates the vulnerability score for the county's regional road network and Tri-Rail network based on sensitivity to risk, exposure to risk, and adaptive capacity. He said Miami-Dade County is prioritizing the development of electric vehicle infrastructure and transit oriented development to reduce greenhouse gas emissions.

Attendees had the following questions and comments:

- Has there been training for local first responders to manage fires to electric vehicles and electric vehicle charging stations (specifically the batteries)?
 - No, there hasn't been any training yet, but it is an issue of which the county is aware.
- Has the county considered what kind of improvements need to be made to the county's charging infrastructure?
 - The county has prioritized six locations to prepare electrical infrastructure to support hundreds of electric vehicle charging stations.
 - The transit system is working on converting the fleet to electric vehicles and requires substantial improvements to the electric grid.
- Has there been a cost analysis performed for how much savings are gained by the electrification of the transit system?

- It costs about 60% as much to run an electric vehicle fleet vs a gasoline vehicle fleet. However, significant improvements to the existing electric grid are required and there will need to be an expansion of electric vehicle charging infrastructure.
- How do we evaluate existing and future infrastructure investments for resilience?
 - There is enough information available, although it is continually changing based on new information, to create a uniform projection for sea level rise and other risks. This information should be used as consistently as possible to prioritize investments and adjust plans as projections are refined.
 - There should be an explicit focus and coordination on drainage. There needs to be a way to get the water off the infrastructure quickly and effectively.
 - Florida's ports and airports are critical to the function of Florida's economy. Resilience needs to be incorporated into Florida's ports and airports to ensure the state's economy remains resilient.
 - There is not sufficient funding to implement all of these resilience solutions, so it is critical to explore new funding opportunities specific for resilience investment.
- How do we create partnerships with the private sector to collaboratively support/implement drainage solutions?
 - In Broward County, property owners are required to retain their drainage onsite instead of allowing runoff onto roadways and waterways. Private property owners are engaged in all drainage improvement projects.

Activity 3 – Prioritize Resilience Strategies

Jim provided instructions on how to complete Activity 3 and asked groups to work collaboratively to continue to refine potential strategies related to resilience. Following the activity, groups highlighted the following potential strategies as their top priorities:

- **Incorporate resilience into design standards** – require resilience in infrastructure planning and design
- **Strengthen integration of land use in transportation planning** for stronger growth management
- **Improve collaboration and coordination** across jurisdictions and levels (local, regional, state, federal)
- **Sustainable and stable funding** to support resilience

See the attachments for Activity 3 results.

Decision Making Under Deep Uncertainty

Jayantha Obeysekera, Florida International University, gave a presentation on decision making under deep uncertainty. He defined deep uncertainty as a situation in which analysts do not know or can't agree on (1) models that relate to key forces that shape the future, (2) probability distributions of key variables and parameters in these models, and/or (3) the value of alternative outcomes. He outlined the concept of dynamic adaptive policy pathways as an approach that includes decision making over time with a variety of potential pathways and adaptive design to get to a common solution. Attendees had the following questions and comments:

- How do you encourage people and agencies to embrace uncertainty instead of avoiding it?
 - Demonstrate that there is a way to deal with the uncertain future. By identifying a long-term plan that offers flexibility to account for a variety of potential futures, investment can be more palatable over time, rather than up front.
 - It would be effective to demonstrate the potential impacts to infrastructure if no action is taken. It will create a better understanding that something needs to be done and provides an opportunity to identify a variety of potential solutions based on a variety of projections and potential futures.
- Is there an iterative component to the adaptive planning model? Is there an established best practice on how often to reevaluate the model?
 - Five-year increments seem to be an appropriate amount of time to update the model to identify if sea level rise has exceeded or lagged behind projections.
- How long did the pilot project take and what is the best way to help understand the dynamic adaptive policy?
 - The pilot project took about a year and a half. It takes some time and effort to help not only staff, but partners and the public understand the dynamic adaptive policy model.
 - There will be a webinar on this model on November 19, 2019. Jennifer will provide the information to subcommittee members and friends.
- Is the tool developed by the Netherlands available?
 - The tool is publicly available and is a good way to perform economic analysis and return on investment information.

Wrap Up and Next Steps

Jennifer asked attendees if they had any final comments. Attendees had the following questions and comments:

- Many of these solutions need support from both the public and private sector to be accomplished. Consider options for public-private partnerships for major resilience projects going forward.

Jennifer thanked attendees for participating and adjourned the meeting.

ATTACHMENTS

Table 3. Activity 2 Results

Table 4. Activity 3 Results

Table 3. Activity 2 Results

Table	Strategy	Notes	Priority
1	Integrate land use in transportation planning for stronger growth management		1
2	Sustainable funding to support resilience responses	Never enough or dedicated	1
3	Improve collaboration and coordination across entities including regional, statewide, county, and community organizations		1
4	Modify transportation facility design to improve infrastructure resiliency		1
1	FDOT assume leadership role		2
2	Incorporate resilience into FDOT design standards	For new construction and rehabilitation	2
3	Define resiliency and develop standards across goals and objectives		2
4	Better coordination in operating and maintaining facilities (eliminating jurisdictional boundaries)		2
1	Reduce dependence on one overwhelmingly dominant mode (cars/road)		3
2	An accepted process and content to conduct vulnerability analysis studies		3
3	Require resilience in infrastructure planning and design		3
4	Improve coordination across jurisdictions and plans to more fully establish resilience efforts and achieve co-benefits		3
1	Stable funding source (reduce dependence on gas tax/find an alternative)		4
2	Better coordination of local land use plans and transportation		4
3	Integrate transportation, land use, and stormwater plans and projects		4
4	Study infrastructure concerns and failures that were identified elsewhere, consider adapting strategies to Florida	Louisiana, Netherlands, USACE	4
1	Use transportation projects to leverage replacement of vulnerable/aging utility infrastructure		5
2	Monitor and incorporate impacts of emerging technology in resilience plans		5
3	Co-locate multimodal and transportation infrastructure (cultural shift)		5
4	Identify incentives to relocate land uses dependent on vulnerable infrastructure		5
2	Create partnerships to address needs including a resilient communication system and power grid	New partners	6
3	Develop an education strategy		6
4	Development of more inland ports to less vulnerable areas and design coastal ports to transfer more needed and vulnerable products to these areas when threatened		6
2	Project prioritization for cost feasible that recognizes resilience elements	Related to uniform because	7
2	Address uniformity of benefit cost analysis, particularly benefits		7
3	Innovative technologies and materials to withstand environmental conditions (salt)		7
4	Consider insurability of properties, equitability. Concerns to ensure fair investment in infrastructure		7
2	Maintain first and last mile connections between SIS and critical facilities (multimodal)	Work with communities to define critical facilities and infrastructure	8
2	Ensure multimodal responses		8
3	Develop standards for statewide stormwater management for public and private, including natural infrastructure		2A

Table	Strategy	Notes	Priority
3	Use natural infrastructure		2B
1	Reduce greenhouse gas emissions		
1	Adopt emerging technology strategically - don't be trendy, be smart		
1	Minimize impacts to environmental resources (and look for opportunities to restore and improve)		
1	Limit transportation infrastructure investment in vulnerable greenfield areas		
1	Measure and consider outcomes rather than outputs	Moving people rather than vehicles, etc.	
1	Consider redundancy		
1	Interoperability of transportation data and services		
1	"Botanize" streets, roads, and transportation corridors		

Table 4. Activity 3 Results

Table	Strategy	FTP Goals								Geography			Timeframe			Organizations and Partners	
		Safety and Security for Residents, Visitors, and Businesses	Agile, Resilient, and Quality Transportation Infrastructure	Connected, Efficient, and Reliable Mobility for People and Freight	Transportation Choices that Improve Accessibility and Equity	Transportation Solutions that Strengthen Florida's Economy	Transportation Systems that Enhance Florida's Communities	Transportation Solutions that Enhance Florida's Environment	FTP Goal Ranking	State wide	Regional	Local	Near (0-5 years)	Medium (6-10 years)	Long (11+ years)	Lead Organization and Partners (Example: Federal, State, MPO, or local government)	Role
1	Incorporate resilience into FDOT design standards	3	3	3	3	3	3	3	21	X			X			FDOT and FDEP	
1	Improve coordination across jurisdictions and plans to more fully establish resilience efforts and achieve co-benefits / Improve collaboration and coordination across entities including regional, statewide, county, and community organizations	3	3	3	3	3	3	3	21	X	X	X	X	X		FDOT, DEO, regional planning councils, state government, and local government	
3	Integrate land use in transportation planning for stronger growth management	3	3	3	3	3	3	3	21	X	X	X	X	X	X	Local, state, and regional organizations	Local = land use policy. Regional = glue. State = state comp. plan

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		Safety and Security for Residents, Visitors, and Businesses	Agile, Resilient, and Quality Transportation Infrastructure	Connected, Efficient, and Reliable Mobility for People and Freight	Transportation Choices that Improve Accessibility and Equity	Transportation Solutions that Strengthen Florida's Economy	Transportation Systems that Enhance Florida's Communities	Transportation Solutions that Enhance Florida's Environment	FTP Goal Ranking	State wide	Regional	Local	Near (0-5 years)	Medium (6-10 years)	Long (11+ years)	Lead Organization and Partners (Example: Federal, State, MPO, or local government)	Role
1	Integrate land use in transportation planning for stronger growth management	2	3	3	3	3	3	3	20	X	X	X		X		FDOT, local government, DEO, and regional planning council	
1	Stable funding source (reduce dependence on gas tax / find an alternative)	2	3	3	3	2	3	3	19	X				X		FDOT, state government, and local government	
3	Improve coordination and collaboration across jurisdictions	2	2	3	3	3	3	3	19	X	X	X	X	X	X	Everyone	
1	Identify incentives to relocate land uses dependent on vulnerable infrastructure	3	3	3	2	2	2	3	18		X	X	X			Federal, FEMA, local government, and DEO	
2	Require resilience in infrastructure planning and design	2	3	3	3	2	2	3	18	X		X		X	X	State, APA, MPO, local, and DEO	State = new institutions / missions enabled by legislation
3	Require resilience in infrastructure planning and design (define resilience)	3	3	2	3	2	3	2	18	X	X	X	X	X	X	State, regional, and local	State = green book and FL Design Manual. Regional = stormwater permitting and SLR projections. Local = code.
2	Integrate land use in transportation planning	2	2	3	2	3	3	2	17	X	X	X		X	X	State, local government, FDOT, and other state and Federal agencies	State = new institutions / missions enabled by legislation

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		Safety and Security for Residents, Visitors, and Businesses	Agile, Resilient, and Quality Transportation Infrastructure	Connected, Efficient, and Reliable Mobility for People and Freight	Transportation Choices that Improve Accessibility and Equity	Transportation Solutions that Strengthen Florida's Economy	Transportation Systems that Enhance Florida's Communities	Transportation Solutions that Enhance Florida's Environment	FTP Goal Ranking	State wide	Regional	Local	Near (0-5 years)	Medium (6-10 years)	Long (11+ years)	Lead Organization and Partners (Example: Federal, State, MPO, or local government)	Role
3	Use natural infrastructure	2	3	1	2	3	3	3	17	X	X	X	X	X	X	USACE, state, and local	USACE = Permitting and construction. State = water management. Local = permitting and design.
4	Stable funding source (and reduce dependence on gas tax / find an alternative)	3	3	2	3	3	2	1	17								
2	Improve coordination and collaboration and coordination across entities	1	3	3	2	1	3	2	15	X	X	X	X	X	X	MPO / TPO, state agencies, and Federal	State = new institutions / missions enabled by legislation
3	Sustainable funding support for resilience responses	1	2	2	2	3	2	3	15	X	X	X	X	X	X	Federal and state	Federal = update federal funding bill. State = designate funding.
2	Sustainable funding to support resilience work	1	3	1	1	3	3	2	14	X		X		X	X	State, FHWA, and USDOT	State = new institutions / missions enabled by legislation
2	Incorporate resilience into FDOT design standards	3	3	2	1	1	1	3	14	X				X	X	FDOT, MPO, local government, DEP, USACE, professional associations, and FHWA	State = new institutions / missions enabled by legislation
4	Modify transportation facility design to improve infrastructure resilience	3	3	2	1	2	2	1	14								
4	Require resilience in infrastructure planning and design	3	3	2	1	2	2	1	14								
4	Use natural infrastructure	2	3	1	1	0	2	3	12								

Table	Strategy	FTP Goals							Geography			Timeframe			Organizations and Partners		
		Safety and Security for Residents, Visitors, and Businesses	Agile, Resilient, and Quality Transportation Infrastructure	Connected, Efficient, and Reliable Mobility for People and Freight	Transportation Choices that Improve Accessibility and Equity	Transportation Solutions that Strengthen Florida's Economy	Transportation Systems that Enhance Florida's Communities	Transportation Solutions that Enhance Florida's Environment	FTP Goal Ranking	State wide	Regional	Local	Near (0-5 years)	Medium (6-10 years)	Long (11+ years)	Lead Organization and Partners (Example: Federal, State, MPO, or local government)	Role
4	Identify incentives to relocate land uses dependent on vulnerable infrastructure	3	2	0	0	1	0	2	8								