SOUTHEAST FLORIDA REGIONAL TRANSPORTATION PLAN 2050

Miami-Dade • Broward • Palm Beach

Technical Memorandum

June 18, 2025

To: Regional Technical Advisory Committee (RTTAC)

From: Chris Sinclair, Renaissance Planning

CC: Franchesca Taylor, Miami-Dade TPO, and Jessica Josselyn, Kittelson & Associates, Inc.

RE: 2050 Scenario Story Development Summary

This technical memorandum aims to provide an overview of the 2050 Regional Transportation Plan (RTP) scenario planning process. It summarizes the framework and stories for each scenario and findings.

PURPOSE OF SCENARIOS

The American Planning Association (APA) provides a helpful and succinct explanation of the purpose of scenarios in planning processes:

"Scenario planning enables professionals, and the public, to respond dynamically to an unknown future. It assists them with thinking, in advance, about the many ways the future may unfold and how they can be responsive, resilient, and effective, as the future becomes reality."

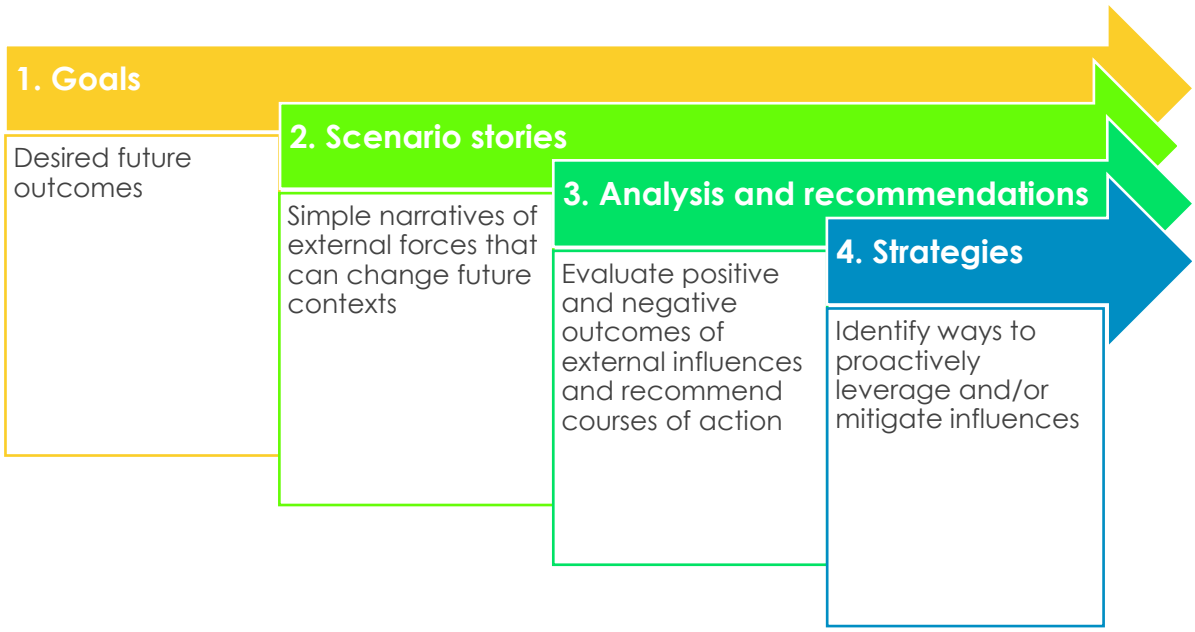
Scenarios explore possibilities. They do not take past trends as a given; rather, they provide insights into how external forces or fundamental changes in existing plans could impact an area. Data platforms such as geographical information systems (GIS) and models such as the Southeast Florida Regional Planning Model (SERPM) create and test scenarios effectively.

There is an important distinction between alternatives and scenarios. Alternatives explore options given a fixed context, for example, two differing transportation solutions for an adopted future land use plan. Scenarios explore differing contexts, for example, the need for transportation improvements, assuming a different future land use pattern. They purposely unwind and test many of the "givens" in traditional planning processes, for example, adopted land use plans or funding sources and levels.

Scenario Process

Figure 1 presents the scenario process steps. The 2050 RTP goals guide the development and evaluation of scenarios. Scenarios begin with stories of potential outcomes. Those stories are translated into computer-generated models that are then used to evaluate scenarios. The evaluations provide recommendations on how the region can plan for a preferred future while recognizing uncertainty. These recommendations lead to strategies. An example of a strategy is the use of a dynamic adaptive policy pathway approach, which supports decision-making over time and sequences of decisions or pathways under uncertainty. It supports planners in devising dynamic adaptive plans with short-term actions, long-term options, and adaptation signals.

Figure 1 - Scenario Planning Process



SCENARIO STORY THEMES

The scenario stories created for the previously adopted 2045 RTP focused on what would happen if the region fundamentally changed how it functions by investing in more transit, biking, and walking and changing land use patterns to support those improvements. The initial concepts for the 2050 scenarios build on the 2045 scenarios by incorporating how external forces, namely transportation technologies, climate, and policy changes, among other factors, influence future contexts.

Figure 2 illustrates the initial scenario framework for the RTP update. Scenario one combines transportation technologies with the 2045 transit scenario (transit and tech). Scenario two combines climate change (resilience) with the growth scenario from 2045. The framework includes two other concepts, finance and legislative, and disruptions and opportunities.

Figure 2 - 2050 RTP Scenario Framework

Regional Transportation Technical Advisory Committee (RTTAC) members participated in a scenario story development workshop on April 12, 2023. Using virtual sticky notes, participants provided their thoughts on the key considerations for each of the four concepts in the scenario framework. The members' input from this workshop provided insights and themes into each scenario story.

SCENARIO ANALYSIS

Table 1 lists the scenario stories developed. Two focused on the impact of technologies on travel demand, notably the impact on the transit and multimodal oriented direction of the RTP. Scenario 1A (Reactive Technology) assumed the region reacts to new technologies, while Scenario 1B (Proactive Technology) assumed the region proactively plans for and implements integrated, multimodal technologies. Two scenarios focused on resiliency, specifically the impact of sea level rise. Scenario 2A (Reactive Resiliency) assumed the region is reactive, Scenario 2B (Proactive Resiliency) assumed the region is proactive. A third set of scenarios were identified to test the compounding effects of technology and sea level rise. Modeling challenges precluded the ability to test those scenarios.

Table 1 - Proposed Scenario Framework

Perspectives	1. Tech and Transit	2. Resiliency and Growth	3. Cross-Cutting Effects (1+ 2)
A. Reactive / siloed	1A	2A	3A
B. Proactive/multidisciplinary	1B	2B	3B

The scenario analysis included the development of alternative land use forecasts. The RTP's 2050 adopted forecast was used for the baseline Scenario 0 (E+C) and Scenario 1A. An alternative forecast was developed for Scenario 1B that shifted a higher proportion of the region's population and employment growth increment into transit hubs. The second alternative, developed for Scenario 2A, assumed those living and working in flood prone areas would move out of the region. The third forecast, developed for Scenario 2B, assumed most of those living and working in flood prone areas would move to transit hubs.

The analysis also included differing network and travel demand assumptions. The reactive scenarios (1A and 2A) used the adopted E+C transit network. The proactive scenarios (1B and 2B) used the more robust RTP transit needs network. Both tech scenarios (1A and 1B) assumed increases in expressway and arterial capacities to reflect improved vehicle and roadway technologies. They also assumed increases in telecommuting, and fewer retail trips and more freight trips to reflect virtual shopping. Technical Memorandum 2 details the methods and assumptions used in the analysis. See **Appendix A** for the initial scenario methodology.

EVALUATION

SERPM is a powerful but complicated and time intensive platform, which made it difficult to properly iterate through the modeling process, especially given the different land use, network, and demand inputs. Because of those challenges, SERPM results are only available for Scenario 0 (E+C), Scenario 1A (Reactive Technology), Scenario 1B (Proactive Technology), and Scenario 2A (Reactive Resiliency). **Table 2** highlights the land use, network, and demand assumptions for those scenarios. Modeling results are shown in **Table 3**.

Table 2 - Summary of Scenario Inputs and Assumptions

Modeling Inputs	Scenario			
	E+C	1A Reactive Technology	1B Proactive Technology	2A Reactive Resiliency
Land Use	2050	2050	1B (Proactive Tech)	2A (Reactive Resiliency)
Roadway Network	2050 E+C	2045 Cost Feasible	2045 Cost Feasible	2045 Cost Feasible
Expressway Capacity	No change	Increase 100%	Increase 100%	No change
Arterial Capacity	No change	Increase 40%	Increase 40%	No change
Transit Network	2050 E+C	2050 E+C	Needs	2050 E+C
Telecommute Freq.	No change	Increase from 7% to 14%	Increase from 7% to 14%	Increase by 7%
Shopping Trip Freq.	No change	Decrease from 15% to 5%	Decrease from 15% to 5%	Decrease by 10%
Freight (4 tire truck) Trip Freq.	No change	Increase by 10%	Increase by 10%	Increase by 5%
Freight (larger truck) Trip Freq	No change	Increase by 5%	Increase by 5%	No increase

Table 3 - Scenario Results and Comparisons

Measures	E+C	1A Reactive Technology	Pct E+C Change	1B Proactive Technology	Pct E+C Change	2A Reactive Resiliency	Pct E+C Change
Households	2,951,505	2,951,505	0%	2,951,505	0%	2,616,481	-11%
Population	7,487,728	7,487,728	0%	7,487,728	0%	6,524,095	-13%
PPHH	2.54	2.54	0%	2.54	0%	2.49	-2%
Employment	4,134,157	4,134,157	0%	4,134,157	0%	3,588,148	-13%
Pct Employed	55%	55%	0%	55%	0%	55%	0%
Total trips	6,044,807	5,794,671	-4%	5,816,567	-4%	5,846,235	-3%
Vehicle miles traveled (000s)	157,228	146,112	-7%	145,112	-8%	133,006	-15%
VMT per capita	21.00	19.51	-7%	19.38	-8%	20.39	-3%
Average trip length	26.01	25.21	-3%	24.95	-4%	22.75	-13%
Drive	4,626,321	4,324,517	-7%	4,331,860	-6%	4,424,515	-4%
Alone	2,568,951	2,370,731	-8%	2,382,238	-7%	2,443,104	-5%
Shared	2,057,370	1,953,786	-5%	1,949,622	-5%	1,981,411	-4%
Transit	695,380	743,950	7%	754,450	8%	741,890	7%
Walk	219,321	292,014	33%	294,580	34%	260,138	19%
Bike	138,817	142,993	3%	143,934	4%	130,448	-6%
Other	364,968	291,197	-20%	291,743	-20%	289,244	-21%

FINDINGS AND RECOMMENDATIONS

Although the analysis was limited because of the complexity of the SERPM, the results from the two modeled scenarios provide helpful insights.

In comparison with the E+C Scenario, Scenarios 1A and 1B reduce both the total number of trips and the vehicle miles traveled (VMT). Increases in telecommuting and decreases in retail trips rates cause the total number of trips to drop by four percent in both scenarios. The drop in trips combined with land use changes contribute to the lower VMT (down by seven percent in Scenario 1A and eight percent in Scenario 1B). Driving trips (both drive alone and shared) decrease, while transit, walk, and bike trips increase. Those mode shifts are encouraging considering the Scenario's significant increase in expressway and arterial capacity (Table 3). Unfortunately, vehicle hours traveled and congested speed information from the model run were not available to allow a comparison of how increased capacities impact speed and delay. In sum, the results from Scenarios 1A and 1B suggest that while improved roadway capacity will reduce delays on major roads, they will not entice travelers to shift to driving from walking, biking, and transit as the region shifts its investments to multimodal improvements.

The population and employment in Scenario 2A (Reactive Resiliency) dropped by 13 percent from the E+C Scenario, yet the total number of trips made drops by only three percent. VMT drops by 15 percent, comparable with the population and employment decreases. The total number of driving trips decreases by four percent, and the number of transit and walk trips increases by seven and 19 percent respectively despite the population decrease. Without the modeling results for Scenario 2B (Proactive Resiliency) the extent to which proactive transportation and land use planning move the region towards its goals is unclear. In sum, sea level rise could reduce the population and employment growth in the region, but its impacts will not significantly alter travel demand.

The results of the scenario analysis indicate that the implementation of transportation technologies will benefit drivers but not at the expense of transit, walking, and biking if the region continues to invest in those modes. They also indicate that sea level rise will not significantly impact travel demand.

Tables 4 and 5 list recommendations on how the region should proactively plan for transportation technologies and resiliency.

Table 4 - Transit and Technology Scenario Stories

Transit + Technology		Recommendations
	System integration	Public agencies and private companies develop an integrated, multimodal approach to developing, deploying, and applying technologies to operate and manage the system. The integrated investment and deployment promote multimodal travel across the region.
	Virtual connectivity	Telecommuting and e-tailing ease congestion, yet rather than a shift to cars, transit and other travel technology investments increase multimodal travel demand. The availability of travel options improves commuting for lower-income workers.
	Land use	Mixed-use centers have become multimodal technology hubs where residents in surrounding neighborhoods can travel to shared office spaces and e-tail display centers.
	Equity	Mixed-use, multimodal technology hubs and investments in transit and other travel technologies improve access to low-income households.

	Finance	New funding sources are available, along with greater flexibility in how money can be spent.

Table 5 - Growth and Resiliency Scenario Stories

Growth + Resiliency		Proactive and multidisciplinary perspective
	Natural infrastructure	Low-lying and storm-prone areas are repurposed and protected to become interconnected natural habits, creating a natural framework for the region.
	Physical infrastructure	Networks in low-lying and storm-prone areas are repurposed and redesigned to optimize multimodal connectivity and minimize impacts on newly formed habits
	Socioeconomic	The region's proactive approach to climate change creates a more livable, environmentally sustainable region that continues to attract growth.
	Land use	The region plans for and invests in higher-intensity, multimodal centers located outside low-lying and storm-prone areas
	Finance	New funding sources are available, including a continuation of an increase in county sales taxes, new road user fees, and greater flexibility in how money can be spent.

Overall, the results of the scenario analysis indicate that the implementation of transportation technologies will benefit drivers but not at the expense of transit, walking, and biking if the region continues to invest in those modes. They also indicate that sea level rise will not significantly impact travel demand if the region is reactive to its impacts.

Appendix A – Initial Scenario Development Methodology

SOUTHEAST FLORIDA REGIONAL TRANSPORTATION PLAN 2050

Miami-Dade • Broward • Palm Beach

Memorandum

March 12, 2024 Project# 27613

To: Regional Technical Advisory Committee (RTTAC)

From: Chris Sinclair, Renaissance Planning

CC: Franchesca Taylor, Miami-Dade TPO and Jessica Josselyn, Kittelson & Associates, Inc.

RE: 2050 Scenario Story Development Methodology - Final

This technical memorandum documents the 2050 Regional Transportation Plan (RTP) scenario planning process and methodology along with the proposed framework and stories for each scenario.

PURPOSE OF SCENARIOS

The American Planning Association (APA) provides a helpful and succinct explanation of the purpose of scenarios in planning processes:

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Scenario Process

Figure 1 presents the scenario process steps. The 2050 RTP goals guide the development and evaluation of scenarios. Scenarios begin with stories of potential outcomes. Those stories are translated into computer generated models that are then used to evaluate scenarios. The evaluations provide recommendations into how the region can plan for a preferred future. This memorandum focuses on step two, creating scenario stories or simple narratives of unique future contexts.

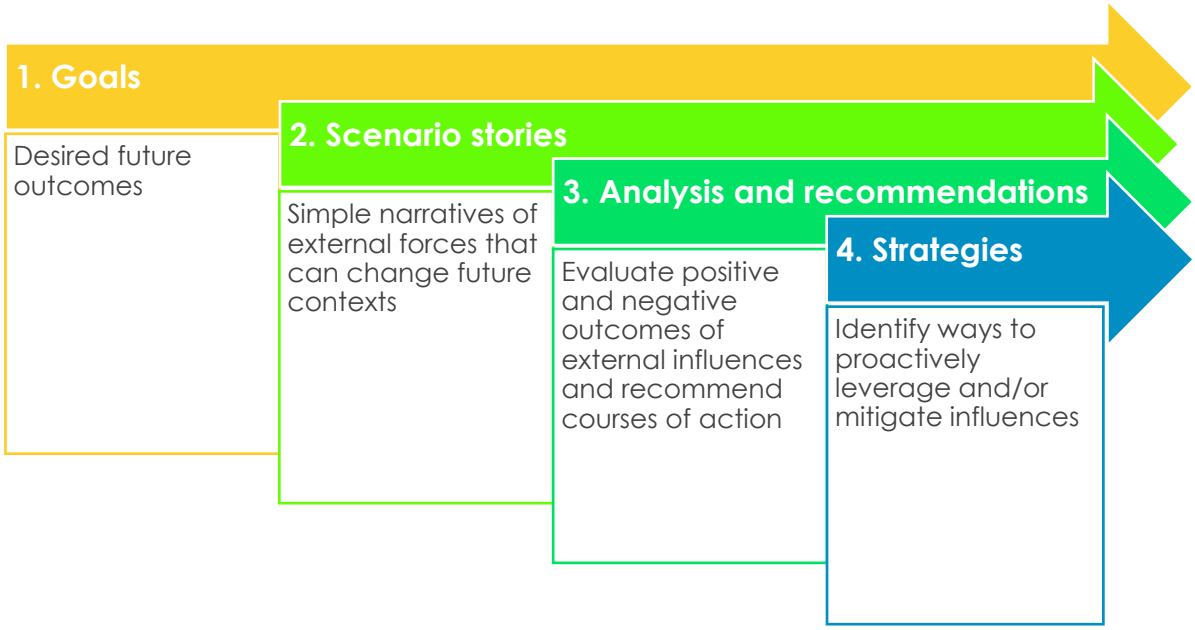

Figure 1 - Scenario Planning Process

SCENARIO STORY THEMES

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Figure 2 - 2050 RTP Scenario Framework

Regional Transportation Technical Advisory Committee (RTTAC) members participated in a scenario story development workshop on April 12, 2023. Using virtual sticky notes, participants provided their thoughts on the key considerations for each of the four concepts in the scenario framework. The members' input from this workshop provided insights and themes into each scenario story. Details on the inputs are available upon request.

SCENARIO FRAMEWORK AND STORIES

Table 1 presents the proposed scenario framework based on workshop feedback. Three scenario stories are recommended: one focusing on Tech + Transit, the second on Resilience + Growth, and the third combining the first two to reflect feedback on compounding effects. Each storyline is then played out in two ways, the first assuming a reactive and siloed approach to planning and the second assuming a proactive and multidisciplinary approach to planning (reflecting feedback on a multidisciplinary approach).

Table 1 - Proposed Scenario Framework

Perspectives	1. Tech and Transit	2. Resiliency and Growth	3. Compounding Effects (1+ 2)
A. Reactive / siloed	1A	2A	3A
B. Proactive / multidisciplinary	1B	2B	3B

As noted above, the framework reflects differing approaches to finance and legislation. Funding levels and legislation stay as they currently are under the reactive and siloed (A) versions of the scenario stories. For example, gas taxes are the primary funding mechanism for transportation and those rates do not change. Further, existing funding allocations continue (i.e., state and federal funding continues to be funneled into Strategic Intermodal System (SIS) roadway projects). The B version scenarios assume differing funding levels and flexibility. For example, the bulk of transportation revenues come from vehicle miles traveled taxes and there is greater flexibility in how state and federal revenues can be spent, particularly among modes.

Tables 2, 3, and 4 present the stories for each scenario. The overall storyline is presented at the top of each table. Themes summarized from workshop feedback are listed in rows and columns to reflect the reactive versus proactive responses to the storyline.

Story Feedback

The draft scenario stories were presented at the May RTTAC meeting, and follow-up meetings were held with the Miami Dade TPO and the Palm Beach TPA to better understand and coordinate with the scenarios those agencies were developing for their LRTP updates. The Miami Dade TPO is testing resource allocation among four focus areas: first / last mile improvements, extending the reach of the SMART Program, freight and highway safety improvements, and emerging technologies. The Palm Beach TPA is testing corridor

and transit hub-specific scenarios based on the corridors identified in their 561 Plan. The Broward MPO will rely on the regional scenarios to inform their plan.

The proposed RTP scenarios are designed to better understand how external forces, namely travel technologies and climate change, will impact the region and what steps SEFTC can take to take advantage of and/or mitigate those impacts. The RTP scenarios should provide additional insights into the scenarios the Miami Dade TPO and the Palm Beach TPA are developing.

SCENARIO ANALYSIS

The scenario stories will be developed and evaluated using GIS and other tools. The first step will create GIS-based scenario "wireframes". The second step will develop traffic analysis zone (TAZ) socioeconomic forecasts for each scenario using the scenario wireframes. The forecasts purposely modify the 2050 forecasts developed for the RTP to reflect the anticipated scenario changes. Step three will update future year networks and step four will estimate travel demand using the scenario TAZ forecasts and updated networks. Step five will evaluate and compare the scenarios.

GIS Wireframes

GIS wireframes, polygons created for GIS layers, will be used to construct the scenarios. The wireframes will reflect outcomes for each of the scenario stories. For example, the natural and protected land layer will be expanded to reflect anticipated sea level rise and storm inundation under the Growth and Resiliency scenarios (2A and 2B). An enhanced environmental framework that provides additional habitat and protection, and new corridors, centers, and wedge context zones located within the environmental framework will be created to reflect the region's proactive planning for sea level rise under scenario 2B. Growth zones will guide the allocation of jobs and homes to reflect the potential impacts of auto oriented, sprawl inducing market forces for the reactive High Tech and Transit scenario (1A). New high-tech hub centers and place types will be defined to reflect how planning could counterbalance those sprawling forces under the proactive High Tech and Transit scenario (1B).

The wireframes will include the following layers:

- natural and protected land (modified for resiliency scenarios to reflect the permanent impacts of inundation)
- existing land use (modified to reflect the impacts of inundation for the resiliency scenarios and residential and business location decisions for the technology scenarios)
- existing and future place types (i.e., urban center, urban mixed use, suburban center, suburban residential, rural residential) (modified as noted above)
- corridor, center, and wedge-based context zones (modified as noted above)

Socioeconomic Forecasts

The socio-economic forecasts will begin with extrapolating 2050 county population and job control totals developed for the SERPM9 forecasts to 2050. The 2050 forecast horizon is recommended to demonstrate the full impacts of scenarios (a twenty five year horizon may not fully capture the impacts of external forces). The regional totals will stay the same for all scenarios except for 2A, which assumes people in low-lying areas will either move to other parts or out of the region altogether.

The control totals will be allocated to differing context zones to reflect the scenario stories. For example, more people and jobs will move from corridors and centers into wedge areas under the reactive High Tech and Transit scenario (1A). Natural and protected lands, existing land uses, and place types will inform intra-context zone allocations. The resulting TAZ allocations will be fleshed out for all SERPM variables and ready for input to SERPM.

Network Updates and Travel Demand

Network modifications will be made to reflect scenario stories. For example, non-regional roads in low-lying areas will be dropped from the network under the reactive resilience scenario (2A). New premium transit lines will be defined and modeled for the proactive high-tech and resiliency scenarios (1B and 2B).

Model runs will be made in SERPM using the updated TAZ data and networks. Systemwide results (i.e., person miles traveled, person-hours of delay) and network results (link volumes and transit ridership) will be summarized.

Scenario Evaluation

The scenarios will be evaluated and compared using descriptive statistics and performance measures. The following reflects an initial set of statistics and measures (final measures will be developed once the RTP goals are finalized):

- Land use and place types
    - Percent of developed and protected land
    - Percent of population and jobs by context zones and place types
    - Percentage of population and jobs within walkable and bikeable contexts
    - Percentage of population and jobs within a half mile of a premium transit station
    - Percentage of population within three miles of a center
- Transportation
    - Person miles traveled overall and by mode (total and per capita)
    - Vehicle miles traveled (total and per capita)
    - Mode share
    - Average trip length by mode
    - Vehicle hours of delay (total and per capita)
    - Accessibility by mode and socioeconomic group
    - Accessibility based transportation / housing cost burden by socioeconomic group
    - Multimodal system productivity and efficiency (completed person trip per minute and per mile)

The consulting team will work with the RTTAC to develop additional statistics and measures.

Table 2 - Transit and Technology Scenario Stories

Transit + Technology		Reactive and siloed perspective	Proactive and multidisciplinary perspective
Scenario story: By 2050, travel technologies will be available across all modes.			
Themes	System integration	Technology and operations are not integrated. Private companies invest in smart car technologies and public agencies invest in smart roads. Limited investment in transit and other travel technologies, encouraging continued reliance on autos.	Public agencies and private companies develop an integrated, multimodal approach to developing, deploying, and applying technologies to operate and manage the system. The integrated investment and deployment promote multimodal travel across the region.
	Virtual connectivity	Telecommuting increases for professional workers. Lower-income workers continue commuting to jobs and continue to be challenged by auto-oriented land use patterns and transportation networks. E-tail reduces the number of retail jobs and trips and increases freight and delivery travel demand.	Telecommuting and virtual shopping (e-tailing) ease congestion, yet rather than a shift to cars, transit and other travel technology investments increase multimodal travel demand. Technology hubs in low-income areas and the availability of travel options improves the availability of jobs and commuting times for lower-income workers.
	Land use	Smart cars and roads encourage more to move to outlying suburbs. Transit ridership drops, forcing service reductions	Mixed-use centers become multimodal technology hubs where residents in surrounding neighborhoods can travel to shared office spaces and e-tail display centers.
	Equity	Auto-oriented development patterns and lower transit service makes access even more challenging for lower-income households.	Mixed-use, multimodal technology hubs and investments in transit and other travel technologies improve access to low-income households.
	Finance	Current funding levels and programs will remain as they are in 2023	New funding sources are available, including private sources, along with greater flexibility in how funds can be spent.

Table 3 - Growth and Resiliency Scenario Stories

Growth + Resiliency		Reactive and siloed perspective	Proactive and multidisciplinary perspective
Scenario story: By 2050, sea level rise and storm frequencies make rebuilding in low-lying and storm-prone areas cost-prohibitive.			
Themes	Natural infrastructure	Low-lying and storm-prone areas are vacated because the properties are not usable due to water inundation. A smattering of homes and businesses remain.	Low-lying and storm-prone areas are purchased by governments and repurposed and protected to become interconnected natural habits, creating a natural framework for the region.
	Physical infrastructure	Road networks crossing low-lying and storm-prone areas are either abandoned or major roads in storm-prone areas are continually raised.	Networks in low-lying and storm-prone areas are repurposed and redesigned to optimize multimodal connectivity and minimize impacts on newly formed habits
	Socioeconomic	Climate change impacts reduce the attractiveness of the region, slowing population growth. Low-income neighborhoods are subject to climate gentrification.	The region's proactive approach to climate change creates a more livable, environmentally sustainable region that continues to attract growth.
	Land use	Slow growth slows development demand. Those displaced from low-lying and storm-prone areas either move to higher land or out of the region.	The region plans for and invests in higher-intensity, multimodal centers located outside low-lying and storm-prone areas
	Finance	Current funding levels and programs will remain as they are in 2023	New funding sources are available, including a continuation or increase in county sales taxes, new road user fees, and private sources, and greater flexibility in how funds can be spent.

Table 4 - Combined Effects Scenario Stories

Compounding Effects		Reactive and siloed perspective	Proactive and multidisciplinary perspective
Scenario story: By 2050, travel technologies will be readily available, and sea level rise and storm frequencies make rebuilding in low-lying and storm-prone areas cost-prohibitive.			
Themes	Technology	New technologies are auto centric. The region spends little on transit technologies and integrating technologies across modes, resulting in fewer transit trips and increased reliance on autos. Telecommuting and e-tailing due to lack of internet access increase for all but lower-income households.	Travel technologies are integrated across modes and the region, increasing transit use. Telecommuting and e-tailing increase for all because internet connectivity and multimodal transit technologies improve connectivity for those households.
	Transit	The lack of ridership and new funding reduces transit service, increasing the challenge for lower-income households to access jobs and services.	Investments in and integration of multimodal travel technologies, and increases in transit funding, combined with transit-supportive development patterns, increase transit ridership in the region.
	Resilience	Low-lying and storm-prone areas are abandoned, creating large swaths of undeveloped and environmentally impactful land. The redistribution of development and lack of multimodal network improvements result in greater transportation and housing cost burdens on low-income households.	Low-lying and storm-prone areas are repurposed and protected to become interconnected natural habitats as a natural framework for the region. New funding sources are used to purchase and repurpose land. Affordable and workforce housing near premium transit improves access for lower income households.
	Land use	Regional growth slows. Large swaths of undeveloped land and disconnected networks isolate communities and increase trip lengths. Major roads are raised through those areas to maintain a semblance of connectivity but there is increased traffic congestion on the major road network. Auto-centric technologies help ease congestion.	The region plans for and invests in higher intensity, multimodal centers located outside low-lying and storm-prone areas. The centers are located along major transit lines to increase ridership. The centers become high-tech hubs that provide shared office space and e-tail display centers.