Forward Pinellas

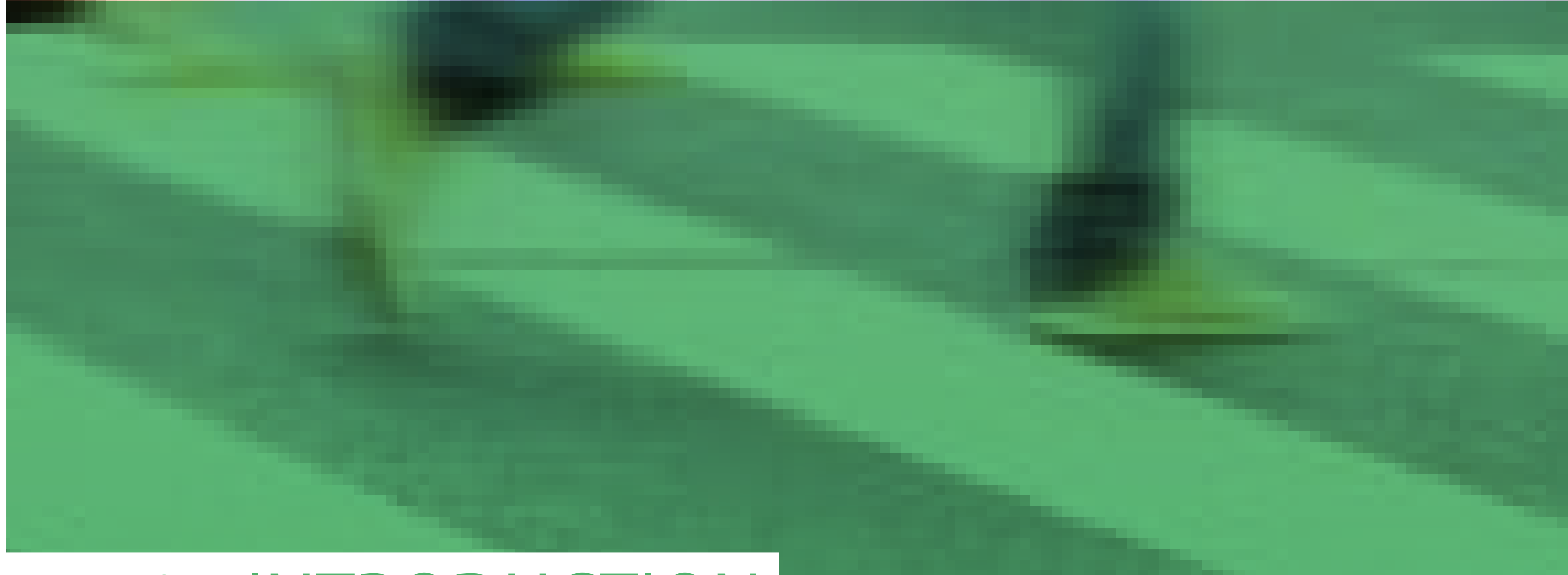
CONGESTION MANAGEMENT PROCESS

Putting Congestion in Context

NOVEMBER 2021

FORWARD PINELLAS

CONTENTS



01. INTRODUCTION

This document outlines Forward Pinellas' Congestion Management Process (CMP). The purpose of the CMP is to provide a performance-based planning process to make informed decisions regarding the expenditure of funding resources to manage traffic congestion in Pinellas County. It addresses recurring and nonrecurring congestion, motorized and non-motorized safety, tourism, and economic development. The CMP assesses the causes of congestion and the range of mitigation measures appropriate to address it, either directly or indirectly. The CMP establishes a comprehensive set of more than 40 performance measures used to evaluate the transportation network in Pinellas County and to assess the effectiveness of improvement strategies in relation to the 2045 Advantage Pinellas goals and objectives related to Mobility and Accessibility, Safety, Reliability, Tourism, and Modal Options.

Lastly, the CMP also includes a monitoring program that will periodically assess the effectiveness of congestion mitigation strategies over time.

Chapter 23 of the Code of Federal Regulations, Section 450.320 states,
"The transportation planning process in a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities through the use of travel demand reduction and operational management strategies. The development of a congestion management process should result in multimodal system performance measures and strategies that can be reflected in the metropolitan transportation plan (MTP) and TIP."

02. BACKGROUND

Metropolitan areas with populations exceeding 200,000, known as Transportation Management Areas (TMAs), are required by the Federal Highway Administration (FHWA) to develop a Congestion Management Process (CMP). The technical methodology and approach involved in the CMP is not prescribed by FHWA, allowing MPOs flexibility to design their own approaches to suit their respective needs. Forward Pinellas has elected to use a conventional performance-based planning process that focuses on safety, recurring and nonrecurring congestion, and a combination of transportation system management and operations (TSM&O) and multimodal strategies to mitigate congestion. However, the analysis methodology involves a non-traditional context-sensitive approach. This approach distinguishes traffic congestion that should be mitigated from traffic congestion that should be embraced for its beneficial effect on economic activity, multimodal safety, and livability.

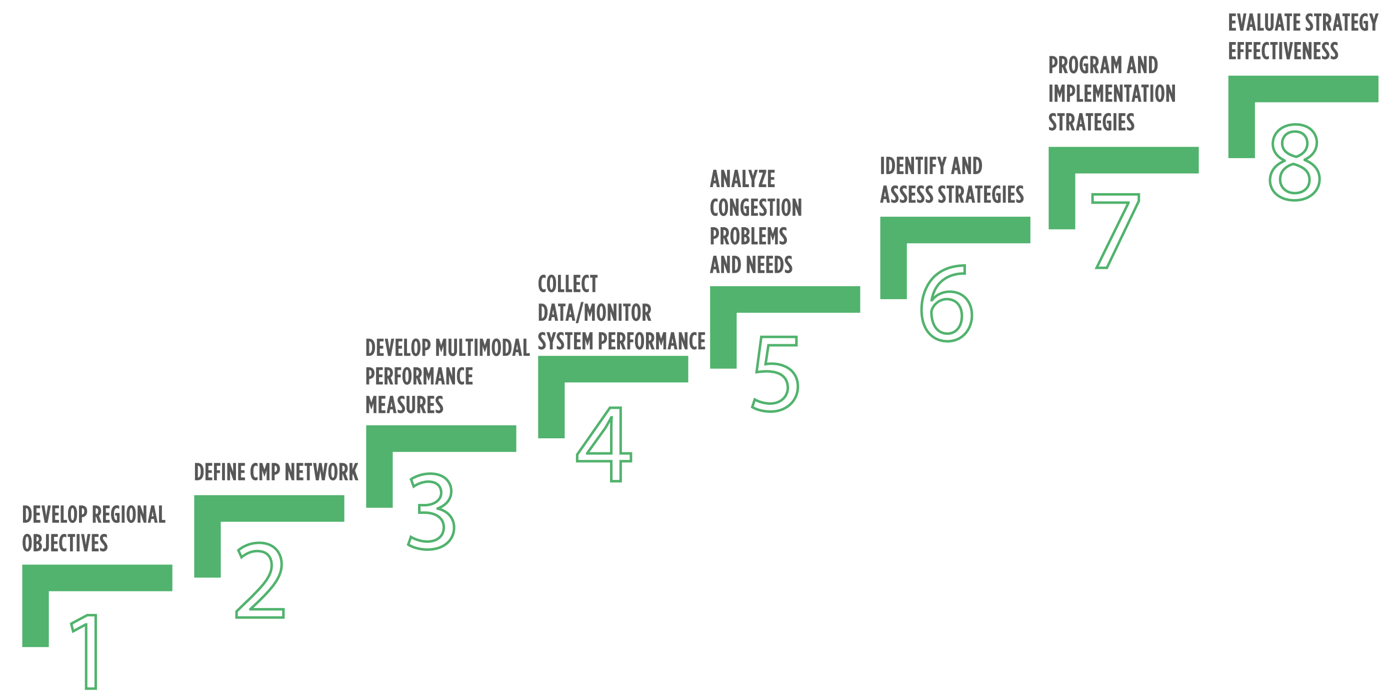
The CMP is intended to be a process rather than a plan. A living document that is continuously adjusted and improved over time as regional objectives change, new congestion hotspots are identified, new data sources become available, and new improvement strategies are identified and evaluated. Ultimately, the purpose of the CMP is not to program improvements. Instead, the CMP serves as a framework that can be used by Forward Pinellas and local planning partners to continuously monitor, assess, and evaluate system performance and to identify improvement strategies.

THE CMP SERVES AS A FRAMEWORK THAT CAN BE USED BY FORWARD PINELLAS AND LOCAL PLANNING PARTNERS TO CONTINUOUSLY MONITOR, ASSESS, AND EVALUATE SYSTEM PERFORMANCE AND TO IDENTIFY IMPROVEMENT STRATEGIES.

03. FHWA PROCESS MODEL

While the FHWA does not prescribe a congestion management process, it offers guidance as to an effective process model that adheres to best practices in performance-based planning. The FHWA guidance includes an eight-step process model that begins with identifying regional objectives and includes the necessary steps to evaluate network performance and identify and program improvements. Perhaps the most important step in the process, the final step, is assessing strategy effectiveness over time, stressing the notion of a living document with a continuous improvement feedback loop built into it.

FIGURE 1. FHWA CONGESTION MANAGEMENT PROCESS MODEL



1. Develop Regional Objectives for Congestion Management – The definition of objectives is the critical first step in any effective planning process, particularly one that relies on performance analysis to define success. Performance criteria must be based on desired outcomes derived from goals and objectives. "It may not be feasible or desirable to try to eliminate all congestion, and so it is important to define objectives for congestion management that achieve the desired outcome." -FHWA Congestion Management Process: A Guidebook

2. Define CMP Network – The second step is to define the geographic area and transportation network that will be analyzed and monitored. The objectives identified in the previous step should inform the CMP Network definition, ensuring that the relevant components of the transportation system are included.

3. Develop Multimodal Performance Measures – The CMP is a performance-based planning process dependent on specific performance metrics and criteria. This step involves the derivation of those metrics and criteria from the regional objectives.

4. Collect Data/Monitor System Performance – Data required to support the performance measures identified in the previous step must be collected and organized to evaluate the CMP network and its performance. It is critical to identify sustainable data sources, allowing continuous monitoring of system performance over time.

5. Analyze Congestion Problems and Needs – The data collected in the previous step is used to evaluate the CMP network and identify problematic segments or hotspots. Problematic segments are defined by congestion and other network or performance attributes that contextualize congestion. There are many instances of traffic congestion, for example, that may, in fact, be desirable.

6. Identify and Assess Strategies – This step involves developing a toolbox of solutions or strategies that can be implemented to mitigate the congestion problems identified in the previous step. The toolbox should include a wide range of multimodal strategies, both short- and long-term, as options to address the identified problems.

7. Program and Implement Strategies – Improvement strategies are included in the Long Range Transportation Plan (LRTP) and/or Transportation Improvement Program (TIP). Which involves identifying funding sources, prioritizing strategies, allocating funding in the TIP, and ultimately, implementing improvements.

8. Evaluate Strategy Effectiveness – The final, and ongoing step in the CMP process, is to monitor system performance continuously and make adjustments to measures and network improvements over time.

04. REGIONAL OBJECTIVES

The regional objectives selected from the Advantage Pinellas 2045 LRTP to guide the CMP are those that are either directly or indirectly related to congestion and the various causes of congestion. CMP Objectives are grouped into five broad categories: Mobility & Accessibility, Reliability, Safety, Tourism, and Modal Options. There are a total of 10 objectives across these five these categories.

MOBILITY & ACCESSIBILITY

Mobility and accessibility are two key performance areas that represent the ability of Pinellas County residents and visitors to access opportunities within a reasonable amount of travel time. Mobility is generally defined as the ability to travel without the hindrance of typically recurring congestion and is measured by network performance. Accessibility is a broader holistic measure that relates not only to motorized travel but to bicycle and pedestrian travel in addition to roadway congestion. In addition, while accessibility measures are sensitive to congestion, they are not limited to measuring roadway performance; rather, they also encompass network connectivity and the arrangement of land uses and are therefore much more comprehensive.

THE ADVANTAGE PINELLAS OBJECTIVES RELATED TO THIS PERFORMANCE CATEGORY INCLUDE:

Objective 1.1 - Create 20-minute neighborhoods that support walking and bicycling as a realistic travel choice for daily activities.

Objective 3.3 - Provide better transit access for those who are transit-dependent, including low-income, elderly, and/or disabled people who do not have access to a vehicle.

Objective 4.5 - Improve roadway and intermodal operations for the efficient movement of goods.

Objective 6.1 - Provide improved mobility and accessibility for everyone by better connecting people to places, eliminating transportation barriers to expanded economic opportunity, and enhancing community quality of life.

RELIABILITY

Travel time reliability is defined by FHWA as “a measure of the consistency or dependability in the travel time of a trip, or time to traverse a road segment, as experienced in different hours of the day and days of the week.” Reliability relates to non-recurring congestion caused by crashes, inclement weather, or other unpredictable events that result in a high level of travel time variability, as measured over time. For example, a roadway segment that is consistently congested is considered reliably slow. On the other hand, if traveling that route sometimes takes five minutes and other times thirty minutes, then that route may be considered unreliable, due to the high degree of variability in travel time.

THE ADVANTAGE PINELLAS OBJECTIVES RELATED TO THIS PERFORMANCE CATEGORY INCLUDE:

Objective 2.1 - Improve the performance of the transportation system through more efficient use of existing facilities and investments in technology.

Objective 4.5 - Improve roadway and intermodal operations for the efficient movement of goods.

SAFETY

Safety is of paramount importance to any transportation analysis or process. Crashes on the transportation system represent one of the significant contributors to nonrecurring congestion. There are two safety objectives from the Advantage Pinellas LRTP, one dealing with general safety for all users of the transportation system and the other addressing safety specifically for students traveling to and from school.

THE ADVANTAGE PINELLAS OBJECTIVES RELATED TO THIS PERFORMANCE CATEGORY INCLUDE:

Objective 3.4 - Make the transportation network safer for all users through community and engineering design, public policy, law enforcement, education, and funding.

Objective 3.6 - Facilitate safe travel to and from school. A Safer Transportation System for All Users.

TOURISM

The Pinellas County economy is heavily dependent on the tourism industry, generating more than $10 billion annually[1]. Therefore, managing traffic congestion related to tourist travel is critical to the county's economic prosperity. The CMP network experiences fluctuation in transportation performance based on peak season tourism, affecting reliability and congestion on heavily traveled tourist routes. This includes facilities providing both inter-regional and intra-regional connections to downtown areas, airports, and beaches.

THE ADVANTAGE PINELLAS OBJECTIVES RELATED TO THIS PERFORMANCE CATEGORY INCLUDE:

Objective 4.1 - Identify the impacts of tourism on Pinellas county's transportation needs and work with partners to develop and fund specific plans, programs and projects to address those need

1 VisitStPeteClearwater.com website

MODAL OPTIONS

Modal options such as public transit, bicycling, and walking provide an alternative to travel by personal automobile. While shifts to these modal options from personal automobiles may not resolve traffic congestion, they do provide alternatives to traveling in congested conditions and can alleviate congestion to some extent. Therefore, consideration of alternative modes of travel is important, particularly in areas oriented to those modes. There are two modal options objectives from the Advantage Pinellas LRTP. One deals with the promotion of general multimodal improvements to address travel needs. The other addresses transit mode share through transit level of service and reliability improvements.

THE ADVANTAGE PINELLAS OBJECTIVES RELATED TO THIS PERFORMANCE CATEGORY INCLUDE:

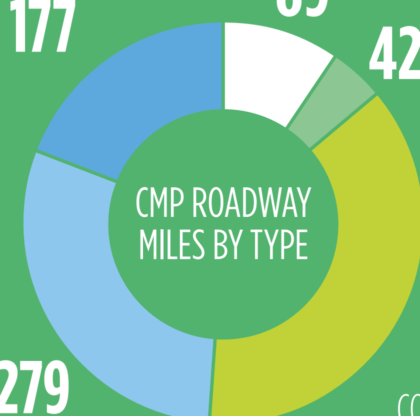
Objective 5.1 - Coordinate and collaborate with transportation partners to provide for multimodal options for local and regional travel.

Objective 6.2 - Increase transit mode share and overall ridership by providing frequent, fast and reliable service.

05. CMP NETWORK

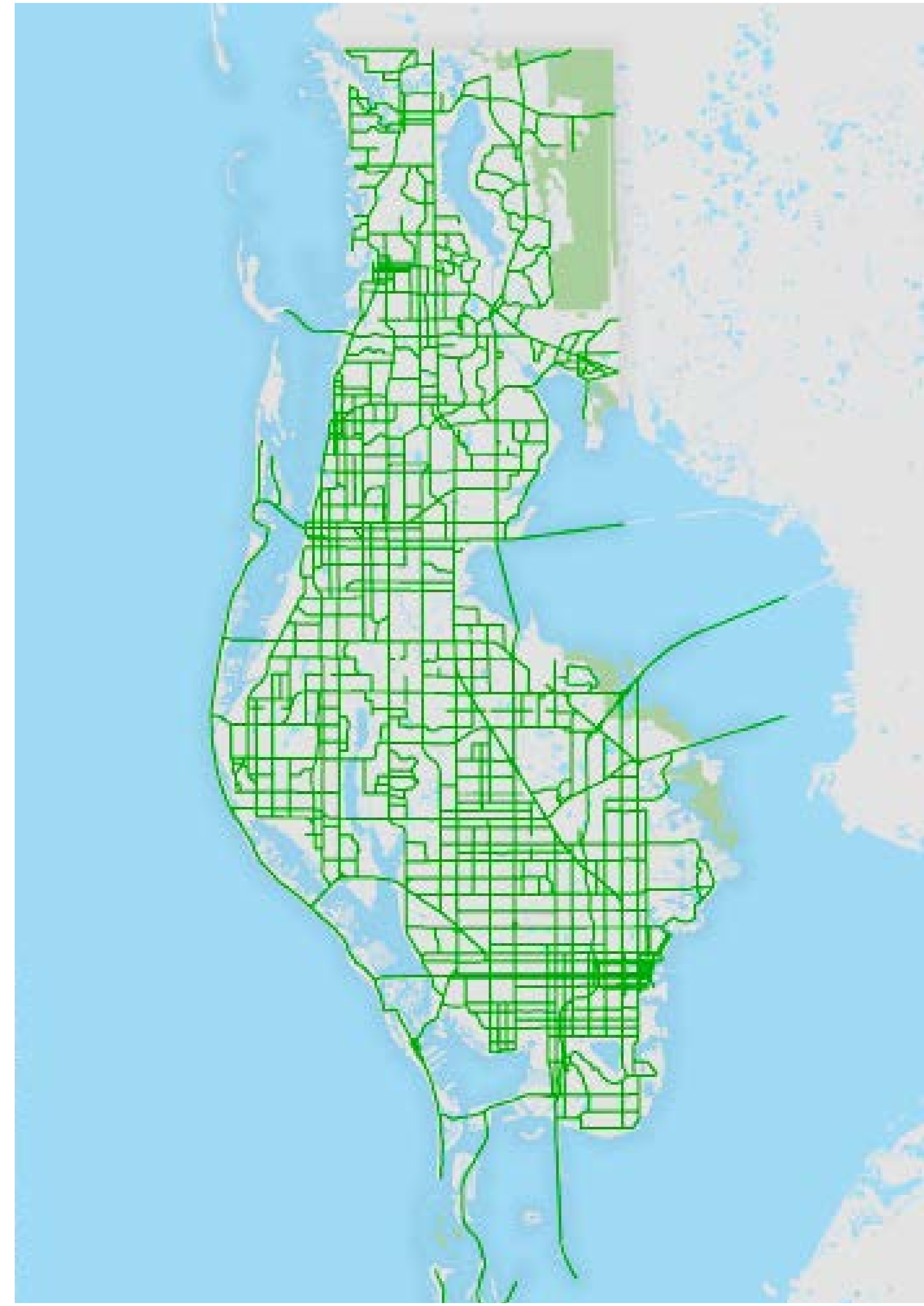
The roadway system that forms the basis for congestion evaluation and management considerations is a comprehensive network inclusive of local, regional, and inter-regional roadways in Pinellas County. A data-driven approach was used to evaluate the network's completeness. The first is federal aid eligibility. All federal aid eligible roadways are included to ensure that roadway segments with congestion mitigation needs eligible for federal funding are included in the analysis. A combination of data availability and network performance was used as the second criteria. Data includes congestion, crash, transit route performance, and multimodal activity data. The ultimate CMP network consists of more than 900 centerline miles of roadways. Figure 2 summarizes the network by functional classification, and Figure 3 includes a map of the CMP network. Appendix A includes a more detailed description of the network definition process.

FIGURE 2. CMP ROADWAY MILES BY TYPE



934.9 TOTAL CENTERLINE MILES

FIGURE 3. FORWARD PINELLAS NETWORK



A subset of the CMP Network was identified for a specific analysis of tourist travel impacts on the overall network. The resulting tourism network, depicted in Figure 4, includes inter-regional and intra-regional connections to downtown areas, airports, and beaches. Three performance measures, described in the following section, were applied to the tourism network, including measures of recurring and nonrecurring congestion and a measure of transit service on the tourism roadways.

FIGURE 4. TOURISM NETWORK

06. PERFORMANCE MEASURES

In the words of the late great Yogi Berra, If you don't know where you are going, you'll end up someplace else. While Berra's quips were intentionally tongue-in-cheek, this one encapsulates the importance of goal- and performance-based planning. The allocation of resources is best done through the identification of goals and a data-based assessment of performance relative to the goals. This helps to ensure the goals are not just a list of concepts in a document but a proactive step in a systematic approach to improving performance. The FHWA defines performance-based planning (PBP) and the MAP-21 PBP requirement as:

A system-level, data-driven process to identify strategies and investments. MAP-21 calls for statewide and metropolitan planning processes to incorporate a more comprehensive performance-based approach to decision making.

Identifying performance measures is a critical step in the CMP process because they represent the quantifiable assessment of the region's transportation deficiencies and progress toward regional goals. In addition, network performance evaluation provides the foundation for congestion management analysis and mitigation and ongoing monitoring to assess the effectiveness of implemented mitigation measures.

There are several important factors to consider in the development of a PBP process or framework. Perhaps the most important factor is the identification of performance measures that serve as a de facto authority of whether planning improvements are effective and to what degree. Ideally, identified measures can be used to monitor system performance and to assess individual segment performance. Both of these functions are equally important to PBP. The first provides an overall assessment of system performance and represents a specific direct federal requirement. The second is also important, as it bridges system monitoring and facility assessment, and project prioritization. In both cases, a range of criteria are key to the success of a sustained PBP framework. The most basic criteria include:

- Measures should have a direct relationship to respective goals.
- Data must be available to support baseline measurement against the selected measures.
- Data must have a sustainability source for ongoing measurement and application.
- Measures should be consistent with federal performance monitoring requirements

APPLICATIONS OF PERFORMANCE MEASURES

Both the system monitoring and roadway evaluation applications of performance measures are utilized in the CMP. The system monitoring application is intended to assess system performance over time, consistent with federal requirements pertaining to select measures. The segment-level performance measures are used for hotspot analysis to assess individual roadway performance related to a subset of performance measure categories. Overall, there are 50 performance measures, with a selected subset of nine measures used to support the hotspot analysis. Table 1 includes a summary of the system monitoring measures organized by goal category and regional objective.

TABLE 1. ADVANTAGE PINELLAS LRTP OBJECTIVES

OBJECTIVES	PERFORMANCE MEASURES
MOBILITY/ ACCESSIBILITY	
Objective 1.1 - Create 20-minute neighborhoods that support walking and bicycling as a realistic travel choice for daily activities.	▪ Percent centerline miles with bike lanes (Table 2) ▪ Percent centerline miles with sidewalks (Table 2) ▪ Percent population/employment within a half-mile of investment corridors (Table 3) ▪ Percent population/employment within a half-mile of existing trails (Table 3) ▪ Percent population/employmentt within a half-mile of transit stops (Table 3) ▪ Percent land area served by micro-mobility (Table 4).
Objective 3.3 - Provide better transit access for those who are transit-dependent, including low-income elderly and/or disabled people who do not have access to a vehicle.	▪ Percent of jobs accessible within 60 minutes by transit (countywide and in EJ areas) (Table 6) ▪ Percent of jobs accessible within 30 minutes by walking (countywide and in EJ areas) (Table 6) ▪ Percent of residents in EJ ar neas that can reach essential destinations by transit within 30 minutes (Table 7) ▪ Transit ridership in EJ areas (Table 8) ▪ Average fixed-route frequency for routes providing service in EJ areas (Table 8)
Objective 4.5 - Improve roadway and intermodal operations for the efficient movement of goods.	▪ Percent of truck route roadway miles congested in peak hour (Table 11)
Objective 6.1 - Provide improved mobility and accessibility for everyone by better connecting propel to places, eliminating transportation barriers to expanded economic opportunity and enhancing community quality of life.	▪ Percent of roadway miles congested in peak hour (Table 10) ▪ Number of jobs accessible within 30 minutes by walking (Figure 7) ▪ Number of jobs accessible within 60 minutes by transit (Figure 7)
RELIABILITY	
Objective 2.1 - Improve the performance of the transportation system through more efficient use of existing facilities and investments in technology.	▪ Percent of system miles actively monitored/managed (Table 12) ▪ Percent of Interstate roadway miles with reliable travel times (Table 13) ▪ Percent of non-Interstate roadway miles with reliable travel times (Table 13) ▪ Bus annual median on-time performance (Table 15) ▪ Bus worst month on-time performance (Table 15) ▪ Percent of transit route miles on roadways with reliable travel times (Table 17) ▪ Average roadway clearance time after incidents (Table 14)
Objective 4.5 - Improve roadway and intermodal operations for the efficient movement of goods.	▪ Truck Level of Traffic Time Reliability (Table 18)

OBJECTIVES	PERFORMANCE MEASURES
SAFETY	
Objective 3.4 - Make the transportation network safer for all users through community and engineering design, public policy, law enforcement, education, and funding.	▪ Total crashes (Table 20) ▪ Number of fatal crashes (Table 20) ▪ Number of incapacitating injury crashes (Table 20) ▪ Total multimodal crashes (Table 20) ▪ Number of fatal multimodal crashes (Table 20) ▪ Number of incapacitating injury multimodal crashes (Table 20) ▪ Average crash response times (Table 23) ▪ Rate of fatal and incapacitating injury crashes (per 100m VMT) (Figure 20) ▪ Rate of pedestrian/bicycle fatal and incapacitating injury crashes (per 100m VMT) (Figure 21)
Objective 3.6 - Facilitate safe travel to and from school. A Safer Transportation System for All Users.	▪ Total crashes within a half-mile of a school (Table 21) ▪ Number of fatal crashes within a half-mile of a school (Table 21) ▪ Number of incapacitating-injury crashes within a half-mile of a school (Table 21) ▪ Total multimodal crashes within a half-mile of a school (Table 21) ▪ Number of fatal multimodal crashes within a half-mile of a school (Table 21) ▪ Number of incapacitating-injury multimodal crashes within a half-mile of a school (Table 21)
TOURISM	
Objective 4.1 - Identify the impacts of tourism on Pinellas county's transportation needs and work with partners to develop and fund specific plans, programs, and projects to address those needs.	▪ Roadway miles on facilities providing access to tourist attractions with reliable travel times in peak season conditions (Table 24) ▪ Percent of roadway miles on facilities providing access to tourist attractions congested in peak hour in peak season conditions (Table 24) ▪ Percent of tourism network with transit routes (Table 27) ▪ Ratio of peak season travel time/off-peak season travel time reliability (Table 25)
MODAL OPTIONS	
Objective 5.1 - Coordinate and collaborate with transportation partners to provide multimodal options for local and regional travel.	▪ Land area served by shared micromobility services (Table 4) ▪ Trail usage (Table 31) ▪ Miles of multiuse trails (Table 5) ▪ Walk/Bike journey to work mode share (Table 33)
Objective 6.2 - Increase transit mode share and overall ridership by providing frequent, fast, and reliable service.	▪ Annual transit ridership (Table 29, 30) ▪ Annual transit ridership per capita (Table 29) ▪ Annual transit vehicle revenue miles (Table 29, 30) ▪ Transit mode share (Table 33)

The measures used to perform hotspot analysis focused on specific performance deficiencies associated with safety and both recurring and nonrecurring congestion are summarized in Table 2. A composite measure for each of the three categories was also developed and used to identify the most significant hotspots across the county. The hotspot analysis and results are fully described in Appendix B and summarized in the following section of this report.

TABLE 2. HOTSPOT ANALYSIS PERFORMANCE MEASURES

CATEGORY	MEASURE
SAFETY	Total Crashes
	Total Fatal and Incapacitating Injury Crashes
	Total Bicycle and Pedestrian Crashes
	Total Bicycle and Pedestrian Fatal and Incapacitating Injury Crashes
RELIABILITY	Level of Travel Time Reliability (LOTTR)
	Annual to Peak Season LOTTR Ratio
	Level of Truck Travel Time Reliability (TTTR)
MODAL OPTIONS	Peak AM Speeds and Speed Limit Difference
	Peak PM Speeds and Speed Limit Difference

07. SYSTEM PERFORMANCE RESULTS

The system performance monitoring measures address all eleven regional objectives identified to guide the CMP. The performance results presented in this section serve as a baseline analysis reflecting 2019 system performance. The isolated assessment of 2019 performance provides an important starting point. However, the purpose and value of these measures are realized over time, as they are tracked from year to year and related to implemented strategies. The subsequent identification and evaluation of strategies is illuminated by historical effectiveness, thus improving the planning process.

This section includes performance results for each of the individual measures. Appendix B provides a more detailed description and analysis of the performance measures.

MOBILITY/ACCESSIBILITY

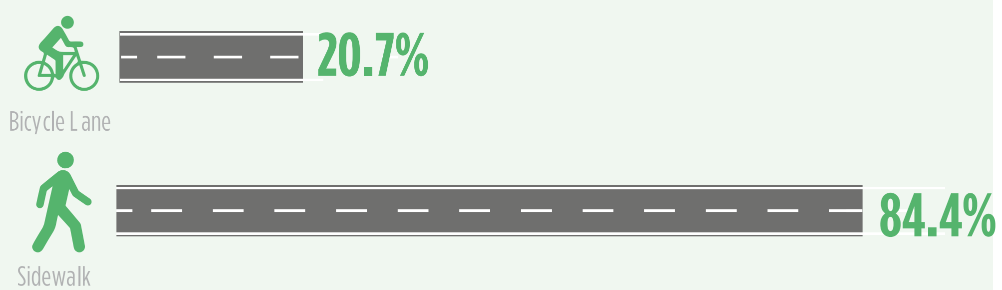
Mobility and accessibility are two key performance areas that represent the ability of Pinellas County residents and visitors to access opportunities within a reasonable amount of travel time. Mobility is generally defined as the ability to travel without the hindrance of typically recurring congestion and is measured by network performance. Accessibility is a broader holistic measure that relates not only to motorized travel but to bicycle and pedestrian travel in addition to roadway congestion.

Mobility in this context is defined as the ability to travel without the hindrance of generally recurring congestion. Accessibility, on the other hand, addresses the ability to access destinations within a reasonable amount of travel time as a function of network connectivity and land use. Accessibility can be measured for all modes of travel, but for the purpose of the CMP, is related specifically to the pedestrian and transit modes of travel. The range of Mobility and Accessibility metrics are reported for vehicles, transit, bicyclists, and pedestrians, as presented in Table 3.

In addition, while accessibility measures are sensitive to congestion, they are not limited to measuring roadway performance; rather, they also encompass network connectivity and the arrangement of land uses and are therefore much more comprehensive.

The Advantage Pinellas objectives associated with this performance category include:

TABLE 3. MULTIMODAL ACCESSIBILITY PERFORMANCE

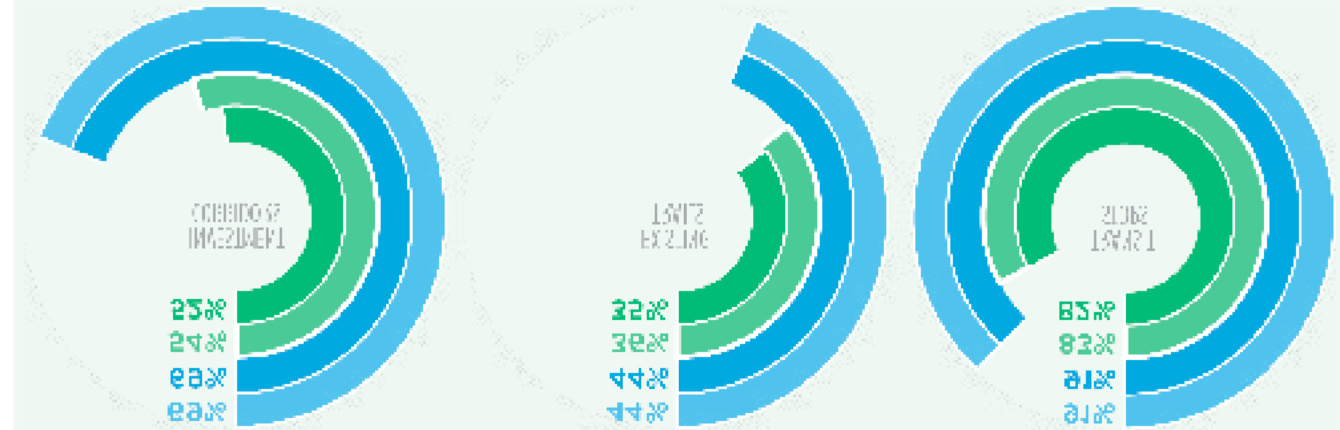
NON-MOTORIZED INFRASTRUCTURE COVERAGE	
DEFINITION	Percent of all centerline miles within the CMP network that has a bike lane or sidewalk
SOURCE	FP Monitored Network, Major Roads, Sidewalks
TIME PERIOD	2019
METHODOLOGY	Bicycle lanes and sidewalks were buffered by 100 feet and intersected with the CMP Network. A bicycle lane or sidewalk on only one side of the street was counted equally as a bicycle lane or sidewalk on both sides of the street.
2019 PERCENT CENTERLINE MILES WITH	

ACCESS TO MULTIMODAL INFRASTRUCTURE	
DEFINITION	Population and employment within a half-mile of key facilities, including Investment Corridors, trails, and public transit stops.
SOURCE	Pinellas Socioeconomic Data, Trail Facilities, Investment Corridors, Pinellas Suncoast Transit Authority (PSTA) Transit Stops.
TIME PERIOD	2015, 2045
METHODOLOGY	Each key facility was buffered by a half-mile and intersected with Pinellas population and employment data. Population and employment were then weighted by the area percentage of the intersect compared to the existing Pinellas census block area.

TOTAL POPULATION AND EMPLOYMENT

	Population	Employment
2015	922,200	534,900
2045	1,008,000	593,800

POPULATION AND EMPLOYMENT WITHIN A HALF MILE



AREA SERVED BY MICRO-MOBILITY SERVICES	
DEFINITION	Area served by micro-mobility services provided by Coast Bike Share, Veo, and Razor.
SOURCE	Coast Bike Share
TIME PERIOD	2021
METHODOLOGY	Micro-mobility area divided by the entire area of Pinellas County.

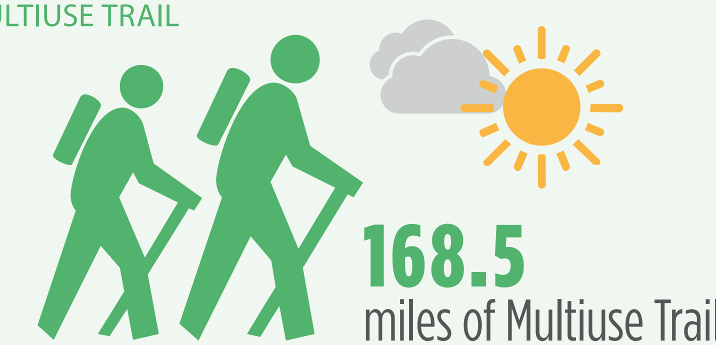
PERCENT AREA SERVED BY MICRO-MOBILITY SERVICES

14.1% of the area of Pinellas County is served by micro-mobility

MILES OF MULTIUSE TRAIL

DEFINITION	Miles of Multiuse Trail in Pinellas County.
SOURCE	Pinellas County Trails
TIME PERIOD	2019
METHODOLOGY	The total length of trails that are flagged as “Existing” and “Designated” by the Pinellas County Trails Database.

TOTAL MILES OF MULTIUSE TRAIL

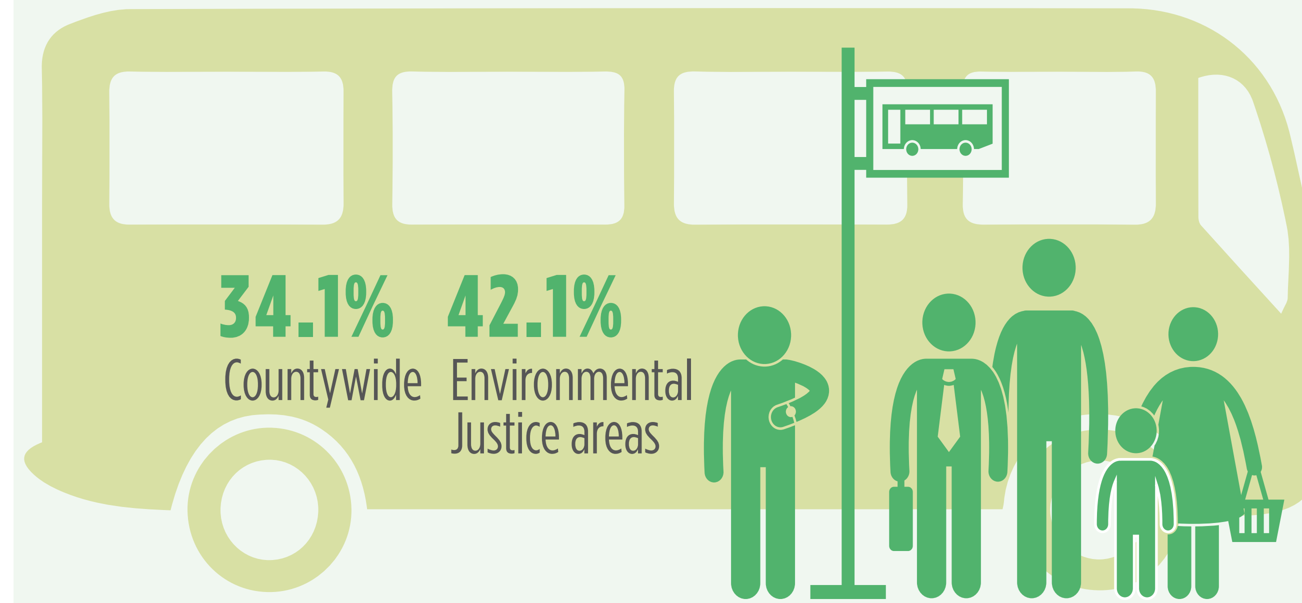


EMPLOYMENT ACCESSIBILITY

DEFINITION	Percent of jobs accessible within a certain travel time, by mode.
SOURCE	Environmental Justice Areas, Urban Footprint
TIME PERIOD	2019
METHODOLOGY	The relevant block area was uploaded to Urban Footprint, and analysis was performed for both walk and transit accessibility. The average percent of jobs available was calculated by averaging the percentile of each census block for the relevant geographic area.

AVERAGE PERCENT OF JOBS THAT CAN BE REACHED WITHIN A 30-MINUTE WALK

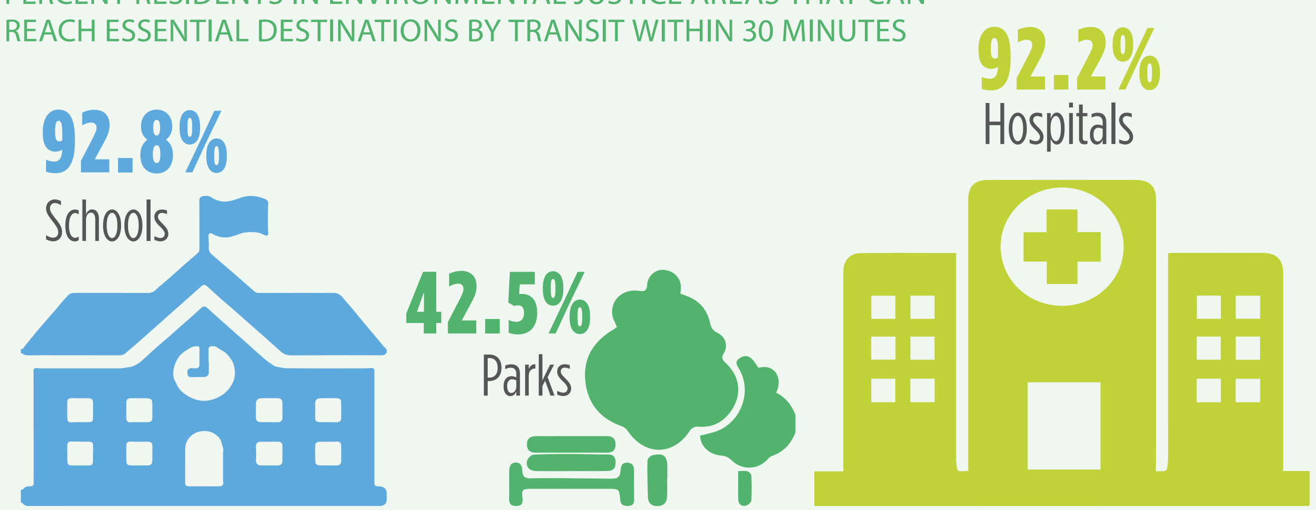
AVERAGE PERCENT OF JOBS THAT CAN BE REACHED WITHIN 60 MINUTES ON TRANSIT



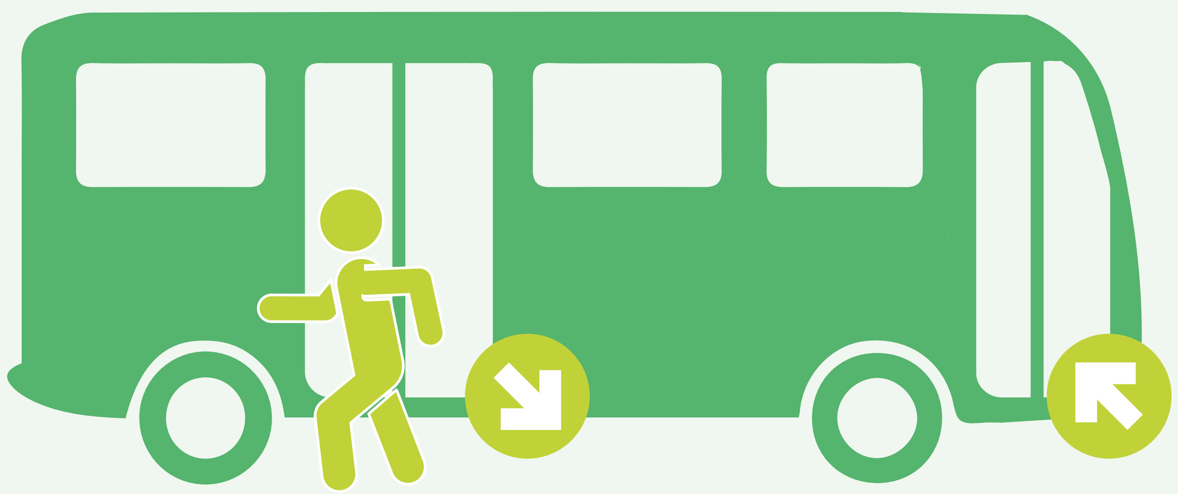
ACCESS TO ESSENTIAL DESTINATIONS IN ENVIRONMENTAL JUSTICE AREAS

DEFINITION	Access is defined as the number of people in environmental justice areas that can reach schools, hospitals, or parks within a 30-minute transit ride.
SOURCE	Environmental Justice Areas, Urban Footprint, PSTA Transit Ridership, PSTA Route Headways
TIME PERIOD	2019
METHODOLOGY	Percent of residents in environmental justice areas that can reach respective key destinations (schools, hospitals, parks) within a 30-minute transit ride.

PERCENT RESIDENTS IN ENVIRONMENTAL JUSTICE AREAS THAT CAN REACH ESSENTIAL DESTINATIONS BY TRANSIT WITHIN 30 MINUTES



TRANSIT RIDERSHIP IN ENVIRONMENTAL JUSTICE AREAS



46,334 Total **23,001** Off **23,333** On

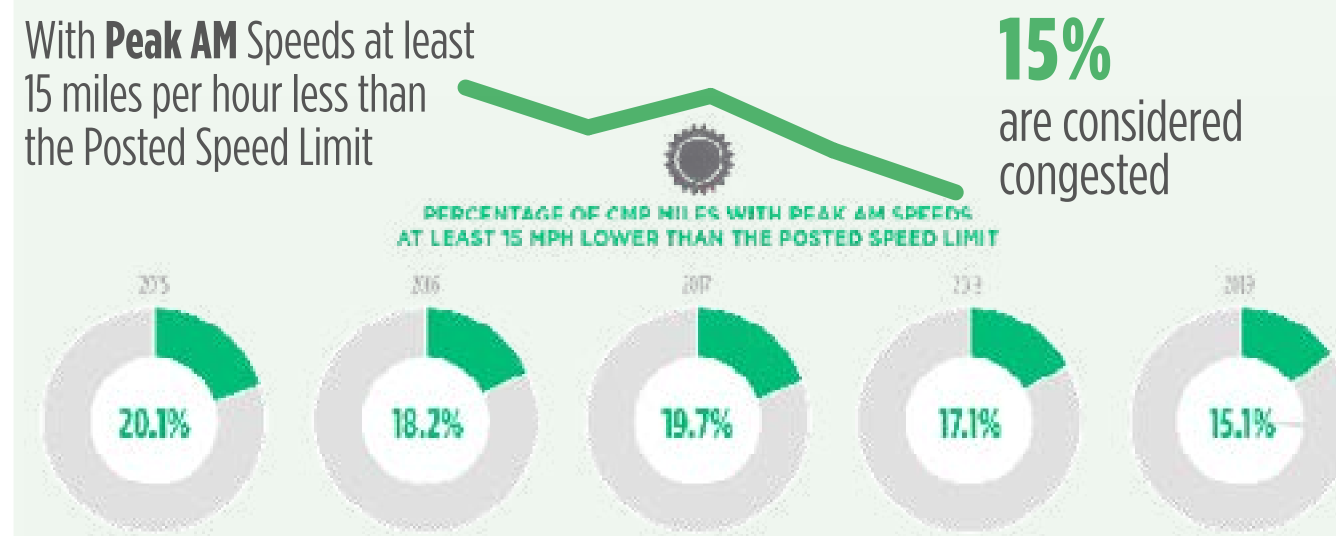
AVERAGE FIXED ROUTE FREQUENCIES IN ENVIRONMENTAL JUSTICE AREAS

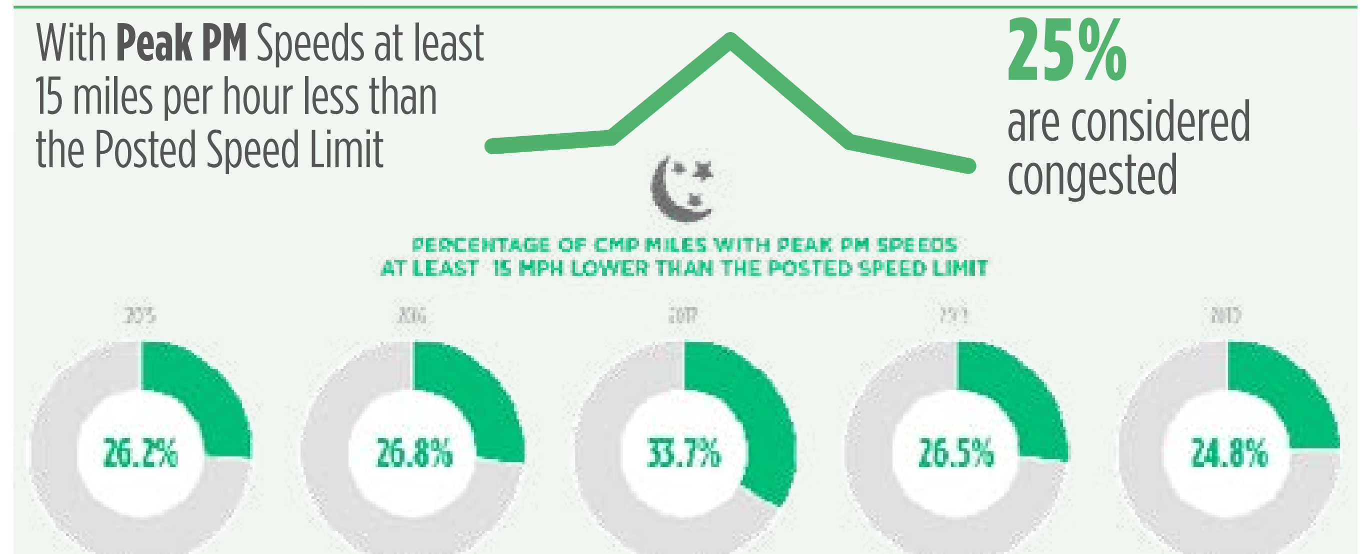
	MINIMUM HEADWAY		MAXIMUM HEADWAY	
	AVERAGE	MEDIAN	AVERAGE	MEDIAN
HEADWAYS IN ENVIRONMENTAL JUSTICE AREAS	27	15	73	60

ROADWAY MILES CONGESTED IN PEAK HOUR

DEFINITION	Percent of centerline roadway miles operating at least 15 miles per hour less than the posted speed limit in the AM or PM Peak
SOURCE	FP Monitored Network, HERE, CMP Network
TIME PERIOD	2015 – 2019 (average over 5 year period)
METHODOLOGY	HERE data was joined to the roadway network for each direction. For each segment of the CMP Network which had available HERE data, the direction with the lowest average peak hour speed was used. Segments were assumed to experience congestion in the peak hour when the peak hour speeds from HERE were 15 miles per hour less than the posted speed limit or less.

PERCENTAGE OF CMP MILES [CONGESTION TRENDLINE (2015-2019)]





FREIGHT NETWORK CONGESTED IN PEAK HOUR	
DEFINITION	Peak hour congestion defined as segments with a LOS E or F.
SOURCE	FDOT Freight Network, FP Monitored Network
TIME PERIOD	2019
METHODOLOGY	Miles of the FDOT Freight Network that have an LOS E or F compared to the entire FDOT Freight Network.

16.3%
of the freight network is congested in the peak hour

RELIABILITY

Similar to the mobility measures, travel time reliability deals with traffic congestion on roadways, but is associated with nonrecurring congestion. Nonrecurring congestion is commonly caused by traffic, weather, or other unpredictable incidents. This should not be confused with recurring congestion associated with predictable choke points in the network and facilities that are typically congested at certain times of the day. FHWA's technical definition of reliability, which is directly correlated to its measurement, is "a measure of the consistency or dependability in the travel time of a trip, or time to traverse a road segment, as experienced in different hours of the day and days of the week." For example, if the travel time on a particular roadway sometimes takes five minutes and other times thirty minutes, then that route may be considered unreliable due to the wide variability and therefore undependability of its performance.

Some of the reliability performance measures are direct representations of the variability of travel time on the network, like Level of Travel Time Reliability (LOTTR) and transit on-time performance, while others are indirectly related to travel time reliability, like incident clearance time and monitored network. The monitored network measure essentially represents reliability strategies rather than direct performance, as network monitoring is a key Transportation System Management and Operation (TSM&O) strategy type. Such strategies include dynamic messaging signs, closed-circuit television cameras, and other Intelligent Transportation System (ITS) technologies.

The Reliability metrics and performance data are presented in Table 4.

TABLE 4. RELIABILITY PERFORMANCE

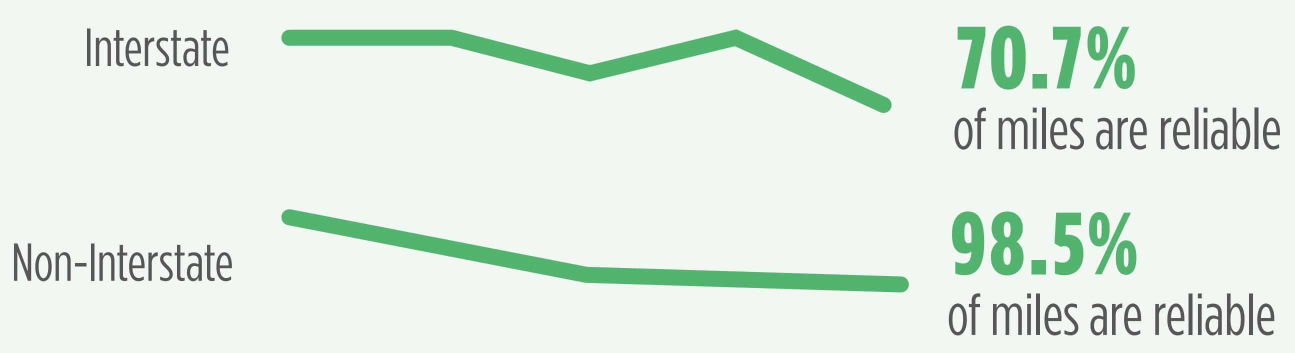
PERCENT OF CMP NETWORK THAT IS ACTIVELY MONITORED	
DEFINITION	Percent of system miles actively monitored/managed
SOURCE	Forward Pinellas ITS Corridors, CMP Network
TIME PERIOD	2019
METHODOLOGY	Centerline miles for the ITS Corridors on the CMP Network was compared to the total centerline miles for the entire CMP Network.

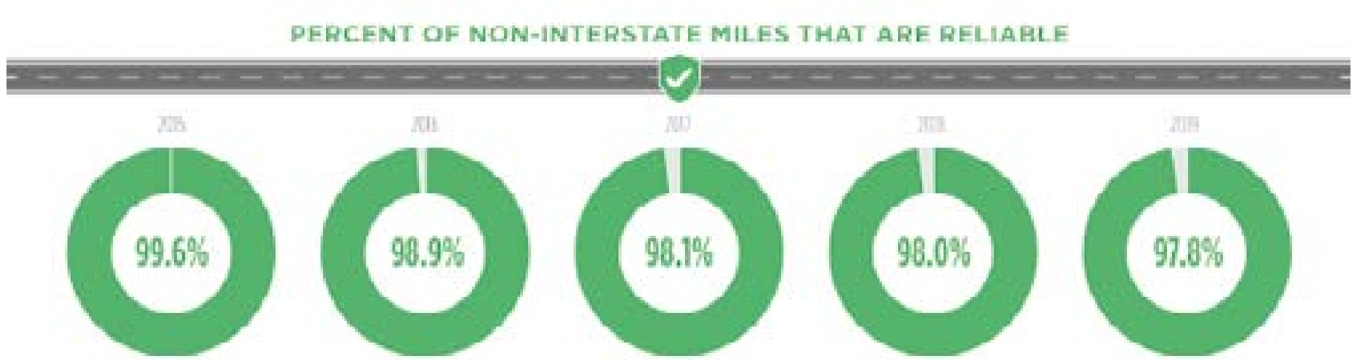
26.8%
of the CMP network is Actively Monitored

PERCENT OF CENTERLINE MILES THAT ARE RELIABLE (LOTTR)

DEFINITION	Reliable segments are defined with an LOTTR less than 1.50.
SOURCE	FP Monitored Network, CMP Network, HERE
TIME PERIOD	2015 - 2019
METHODOLOGY	LOTTR was determined by compared 80th percentile travel time over the 50th percentile travel time by joining HERE data to the CMP network. Data was aggregated over the 5-year time period and computed yearly.

PERCENT OF MILES THAT ARE RELIABLE TRENDLINE (2015-2019)

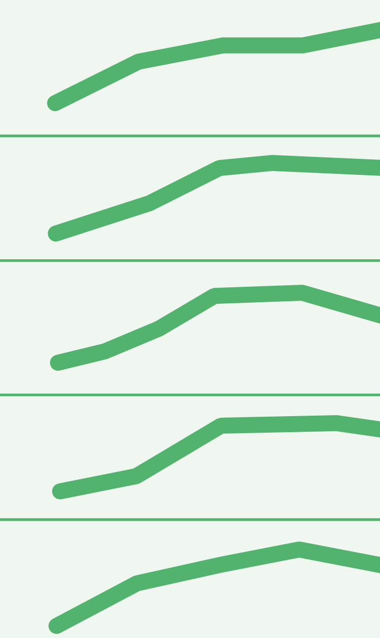




LOTTR BY ROADWAY TYPE

DEFINITION	The average LOTTR of the CMP Network by facility type is calculated yearly.
SOURCE	CMP Network, HERE
TIME PERIOD	2015 - 2019
METHODOLOGY	LOTTR was determined by compared 80th percentile travel time over the 50th percentile travel time by joining HERE data to the CMP network and averaging across roadway type.

	2015	2016	2017	2018	2019	TRENDLINE
Freeway	1.30	1.37	1.39	1.40	1.42	
Arterial	1.14	1.18	1.23	1.24	1.24	
Major Collector	1.12	1.16	1.22	1.23	1.19	
Minor Collector	1.14	1.16	1.21	1.21	1.21	
Local Roads	1.11	1.19	1.23	1.26	1.23	



TRANSIT RELIABILITY

DEFINITION	The percentage of transit routes by mileage on reliable roadway segments.
SOURCE	PSTA Transit Routes, HERE, CMP Network
TIME PERIOD	2015-2019, 2020
METHODOLOGY	The CMP Network Segments with a LOTTR less than 1.50 were buffered and intersected with PSTA Route Segments. The percentage of transit route miles that are reliable were compared to the entire PSTA Transit route miles on the CMP network that HERE data was available for. LOTTR was also averaged across roadway type.

RELIABILITY OF ROADWAYS WITH TRANSIT SERVICE

95.9% roadways with transit service that are reliable

Average reliability on roadways with transit service (by roadway type)

Freeway: **1.42**

Arterial: **1.22**

Major Collector: **1.21**

Minor Collector: **1.23**

Local Road: **N/A**

TRANSIT ON-TIME PERFORMANCE

DEFINITION	Median on-time performance across all routes and worst month on-time performance.
SOURCE	PSTA On-Time Performance Data
TIME PERIOD	FY-2020 (October 2019 – September 2020)
METHODOLOGY	Median on-time performance data was averaged over data provided for each route.

ON TIME PERFORMANCE

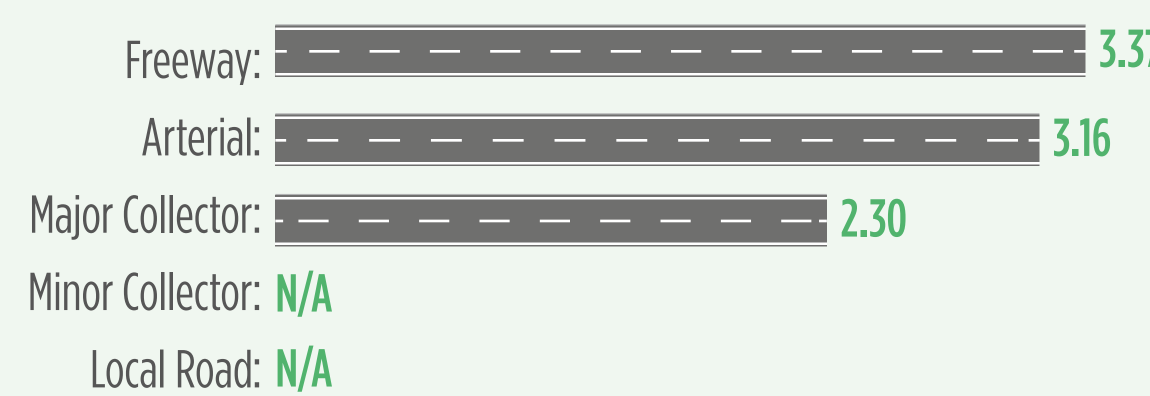
81% on time performance across all routes in 2020

75% on time performance in February 2020

TRUCK TRAVEL TIME RELIABILITY

DEFINITION	Unlike LOTTR, there is no clear cutoff point to define truck travel time as reliable. Rather the relationship for the network is depicted in a map.
SOURCE	CMP Network, NPMRDS
TIME PERIOD	2015 – 2019
METHODOLOGY	TTTR was determined using a ratio of the 95th percentile travel time to 50th percentile travel time, as measured in the NPMRDS network.

TRUCK TRAVEL TIME RELIABILITY BY ROADWAY TYPE



AVERAGE ROADWAY CLEARANCE TIME AFTER INCIDENTS						
DEFINITION	Average roadway clearance time on the interstate system in Pinellas County, defined as the average time between incidents and confirmation that all lanes are available for traffic flow.					
SOURCE	FDOT D7 Sunguide					
TIME PERIOD	2015 – 2019					
METHODOLOGY	Average yearly roadway clearance.					
	2015	2016	2017	2018	2019	TRENDLINE
Average Roadway Clearance Duration (in minutes)	37.2	40.8	36.8	38.6	31	

SAFETY

Safety is paramount to any transportation study, including congestion management. There are several ways in which safety is accounted for in the CMP, including system monitoring, hotspot analysis, and network screening for strategy identification. The various applications of safety data are intended to inform distinct, but related, analyses and purposes in the congestion management process. In addition to system performance monitoring and hotspot analysis, multimodal safety data are used at the facility level to inform the bicycle and pedestrian demand on those facilities and the most appropriate improvement strategies, as described in more detail in the Strategies section of this report.

Safety data was compiled and analyzed for all facilities on the CMP network for a period of five years from 2015 to 2019. The data was obtained from the Pinellas County Crash Management database. Crash metrics were calculated for both multimodal and all crash types in terms of total crashes, crashes involving fatalities and incapacitating injuries, and crash rates.

The Safety metrics and performance data are presented in Table 5.

TABLE 5. SAFETY PERFORMANCE

NON-MOTORIZED INFRASTRUCTURE COVERAGE	
DEFINITION	Crash data from 2015 – 2019 for each relevant crash category.
SOURCE	FP Monitored Network, Major Roads, Sidewalks
TIME PERIOD	2019
METHODOLOGY	Crash data on the number of crashes and each crash type was provided using the Crash Database maintained by Forward Pinellas. Crashes within a half-mile of schools were determined using a half-mile buffer. The average crash rate per 100M VMT was determined by combining AADT data, where available, and the length of the respective segment. Crashes on the CMP network were determined by buffering the CMP network and filtering to remove any duplicate crashes.

PINELLAS COUNTY ANNUAL CRASHES

PINELLAS COUNTY ANNUAL CRASHES BY TYPE AND SEVERITY

CRASHES ON CMP NETWORK	2015	2016	2017	2018	2019	TRENDLINE
Crashes	20,298	21,826	20,942	20,176	20,967	
Fatal Crashes (All)	91	97	95	101	92	
Incapacitating Injury Crashes (All)	831	857	634	570	577	
Fatal & Incapacitating Injury Crashes	922	954	729	671	669	
Multimodal Crashes	984	1,048	862	893	1,031	
Multimodal Fatal Injury Crashes	38	43	38	41	46	
Multimodal Incapacitating Injury Crashes	126	160	124	125	121	
Multimodal Fatal & Incapacitating Injury Crashes	164	203	162	166	167	

PINELLAS COUNTY ANNUAL CRASHES NEAR SCHOOLS BY TYPE AND SEVERITY

CRASHES WITHIN HALF A MILE OF A SCHOOL	2015	2016	2017	2018	2019	TRENDLINE
Crashes	20,375	21,194	21,727	20,693	19,681	
Fatal Crashes (All)	80	81	100	84	80	
Incapacitating Injury Crashes (All)	733	746	651	562	513	
Multimodal Crashes	928	968	911	914	975	
Multimodal Fatal Injury Crashes	31	38	43	33	36	
Multimodal Incapacitating Injury Crashes	124	138	127	131	115	

CRASHES PER 100M VMT

DEFINITION	The total number of crashes (bicycle and pedestrian fatal and incapacitating injury, fatal and incapacitating injury) on individual roadway segments per 100M VMT.
SOURCE	Forward Pinellas Crash Database, CMP Network
TIME PERIOD	2015-2019
METHODOLOGY	The AADT of each individual segment was converted to yearly VMT by multiplying the length of the segment and 365 days out of the year. The crashes were divided by the VMT and then normalized to 100M VMT.

AVERAGE CRASH RESPONSE TIMES

DEFINITION	Average crash response times on the interstate system in Pinellas County.
SOURCE	FDOT D7 Sunguide
TIME PERIOD	2015 – 2019
METHODOLOGY	The sum of the average verification time and average response time duration by year.

The average crash response time has decreased since 2015 from 8.2 minutes to 6.6 minutes in 2019.

	2015	2016	2017	2018	2019	TRENDLINE
Average Crash Response Times (in minutes)	8.2	9.9	8.8	6.9	6.6	

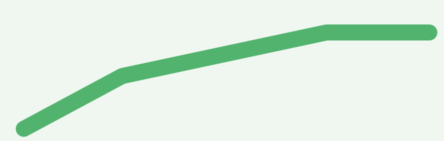
TOURISM

Pinellas County experiences fluctuation in transportation performance based on peak season tourism, affecting reliability and congestion on heavily traveled tourist routes. As one of the most important sectors of Pinellas County's economy, tourism plays a central role in transportation systems analysis. Evaluation of the reliability of the tourism network, in peak season conditions relative to average annual conditions, recurring congestion in peak season relative to annual, and the assessment of public transit service on the tourism network are measures that effectively assess system performance as it relates to tourism. The tourism network identified in consultation with Forward Pinellas staff includes those facilities providing both inter-regional and intra-regional connections to downtown areas, airports, and beaches, as described in the CMP Network section above.

The Tourism metrics and performance data are presented in Table 6. The LOTTR in peak season relative to annual LOTTTR results are also displayed in Figure 5.

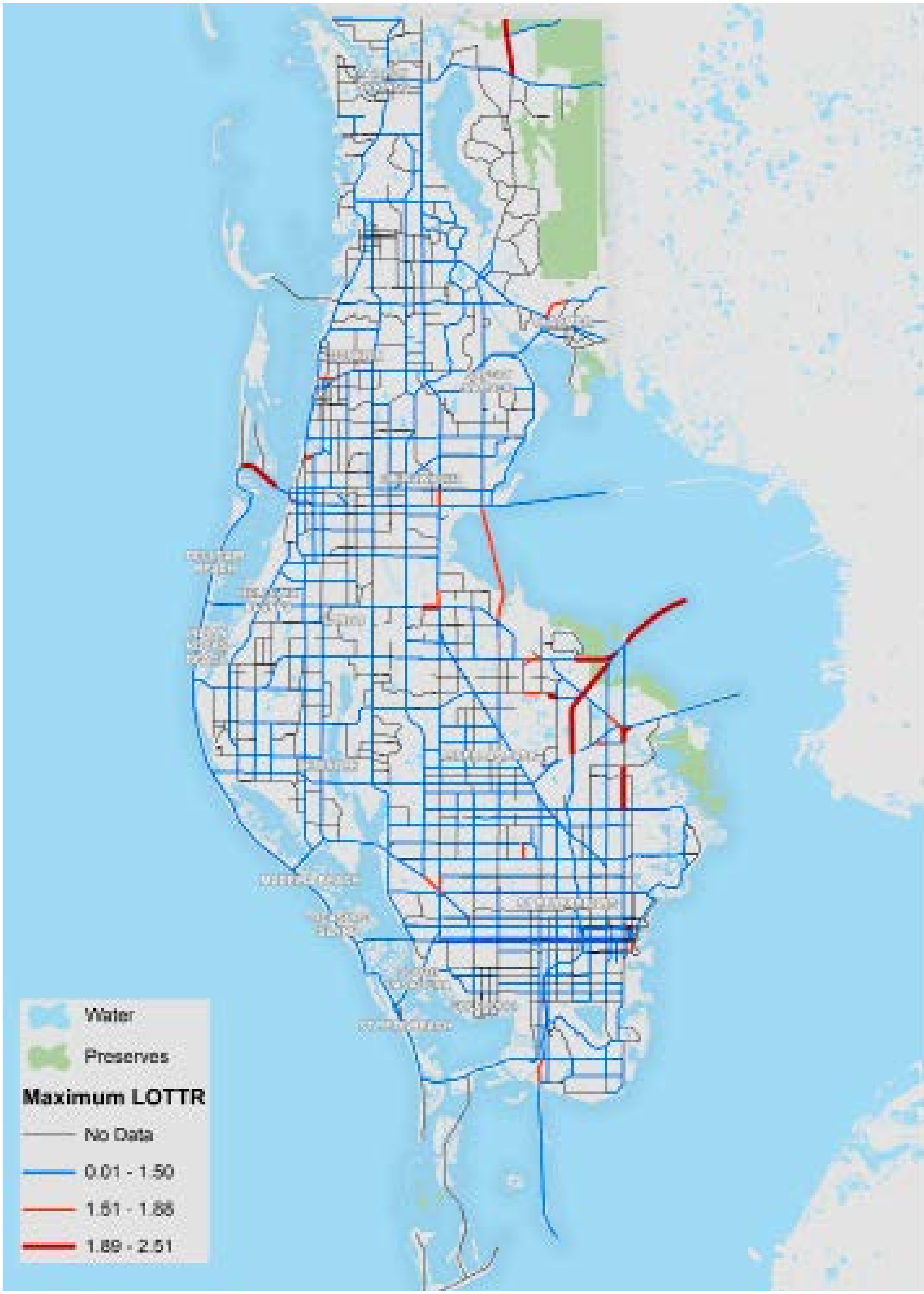
TABLE 6. TOURISM PERFORMANCE

LOTTR OF TOURISM NETWORK BY ROADWAY TYPE	
DEFINITION	The average LOTTR of the tourism network by facility type is calculated yearly.
SOURCE	Tourism Network, HERE
TIME PERIOD	2015 - 2019
METHODOLOGY	The HERE data was joined to the Tourism Network and averaged across roadway type. The peak tourism season is defined as November to March.

TOURISM NETWORK LOTTR BY FACILITY TYPE	2015	2016	2017	2018	2019	TRENDLINE
Freeway	1.12	1.35	1.40	1.44	1.55	
Arterial	1.16	1.24	1.26	1.28	1.29	

TOURISM RELIABILITY IN PEAK SEASON VS ANNUAL	
DEFINITION	The peak tourism season is defined as November to March. The LOTTR of the peak season for the CMP Network was compared to the overall LOTTR.
SOURCE	CMP Network, HERE
TIME PERIOD	2015-2019
METHODOLOGY	The LOTTR was calculated specifically for the peak season. The yearly LOTTR was divided by the peak season LOTTR and any value less than 100% means the segment was less reliable in the peak season compared to the entire year.

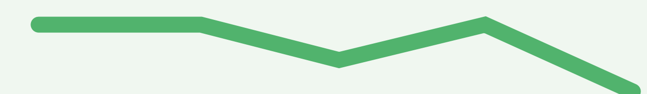
FIGURE 5. YEARLY TO PEAK SEASON LOTTR COMPARISON



TOURISM RELIABILITY	
DEFINITION	Roadways providing access to tourist destinations was defined in consultation with Forward Pinellas staff to ensure roadways serving tourism destinations were included. The peak tourism season is defined as November through March.
SOURCE	Tourism Network, HERE
TIME PERIOD	2015-2019
METHODOLOGY	The tourism network was joined with the HERE data to determine reliability. Congestion was determined using two measures. Segments with an LOS of E or F are assumed to be congested. Additionally, segments with speeds from HERE data 25% lower than the speed limit are assumed to be congested.

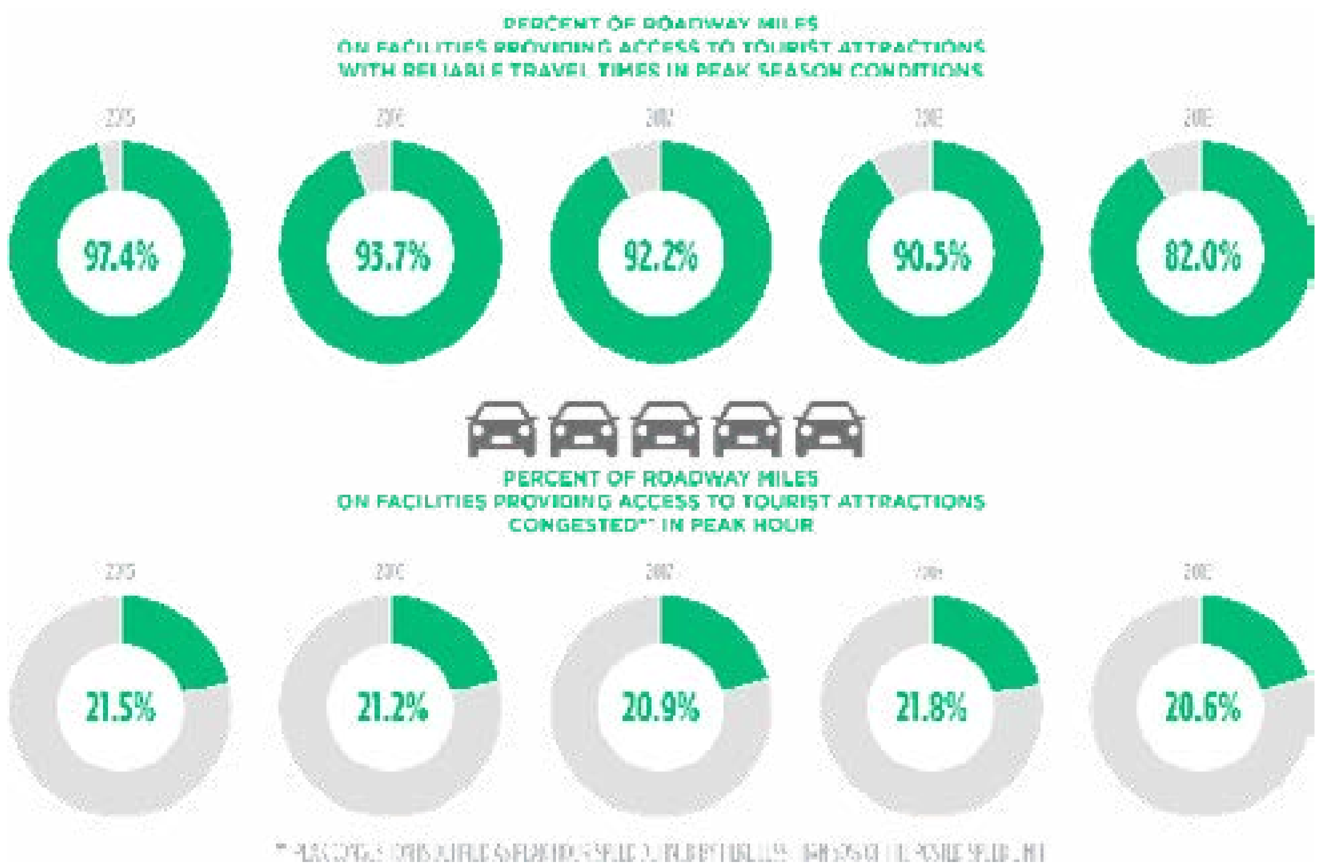
PERCENT ROADWAY MILES ON FACILITIES PROVIDING ACCESS TO TOURIST ATTRACTIONS BETWEEN 2015 AND 2019

88% reliable in peak season conditions



21% congested in peak hour*

**Using HERE data, speeds 50% lower than speed limit*



TOURISM NETWORK WITH TRANSIT	
DEFINITION	The percentage of roadway miles providing access to tourist destinations with fixed route transit service.
SOURCE	Tourism Network, PSTA Routes
TIME PERIOD	2019
METHODOLOGY	The PSTA Routes were buffered and intersected with roadways providing access to tourist destinations. The total length of the tourism network with transit was compared to the total length of the tourism network. The Tourism Network was buffered and intersected with PSTA Routes to see the percentage of total transit route miles that provide access to tourist attractions.

17.3%
of transit route miles provide access to tourist destinations

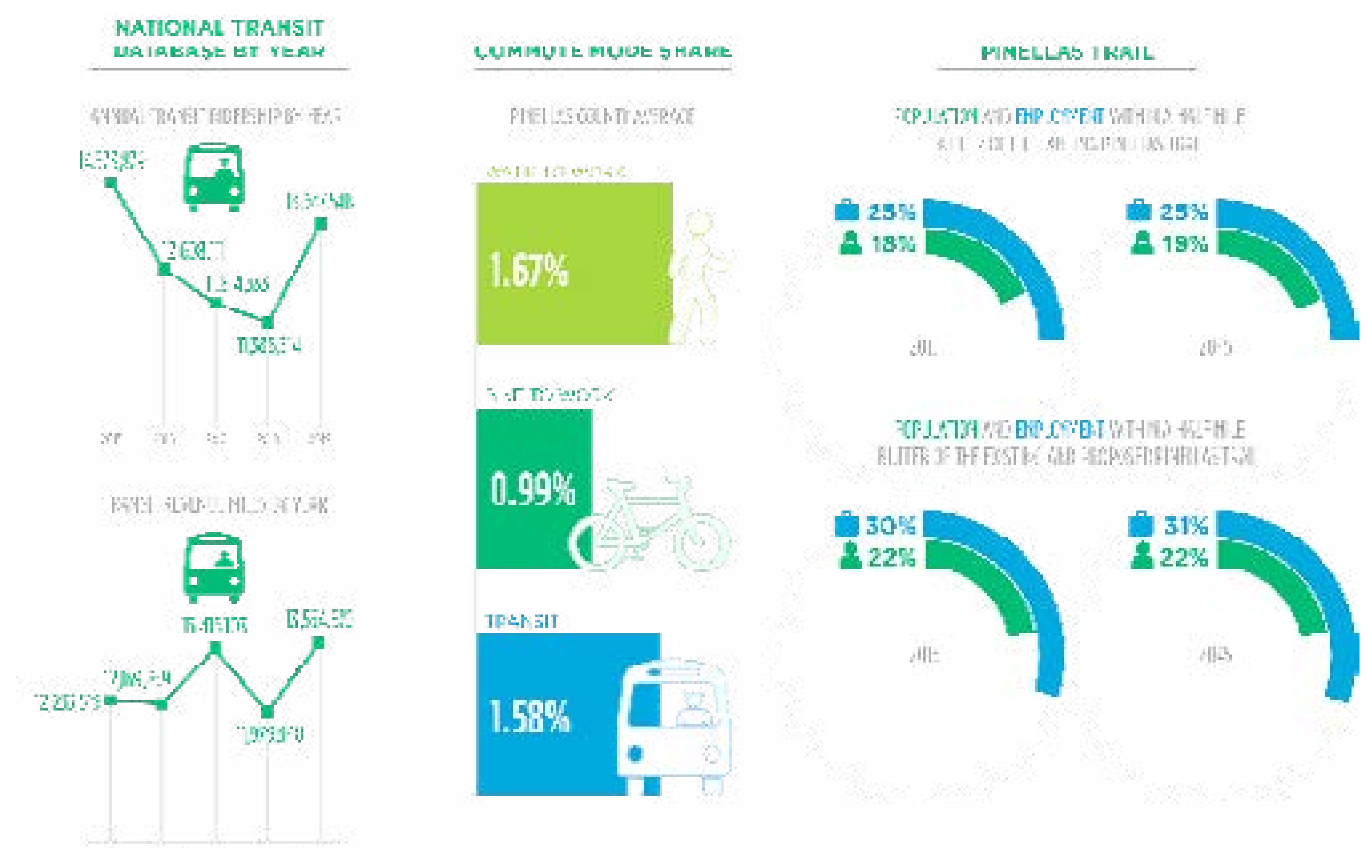
72.5%
of the tourism network has a transit route

MODAL OPTIONS

Modal options such as public transit, bicycling, and walking provide an alternative to travel by personal automobile. While shifts to these modal options from personal automobiles may not resolve traffic congestion, they do provide alternatives to traveling in congested conditions and can alleviate congestion to some extent. Consideration of alternative modes of travel is important, particularly in areas oriented to those modes. Performance measures and results accounting for modal options, including mode share, transit ridership, and other metrics, are presented in Table 7.

TABLE 7. MODAL OPTIONS PERFORMANCE

TRANSIT DATA	
DEFINITION	The National Transit Database provides annual ridership and vehicle revenue miles data for transit agencies.
SOURCE	National Transit Database
TIME PERIOD	2015-2020
METHODOLOGY	Yearly ridership and revenue miles were compared. Additionally, unlinked passenger trips per capita and per service area population were computed using National Transit Database population information.



TRANSIT METRICS VIA THE NATIONAL TRANSIT DATABASE	
ANNUAL TRANSIT RIDERSHIP (2019 UNLINKED PASSENGER TRIPS)	13,637,548
UNLINKED PASSENGER TRIPS PER CAPITA (2019)	5.58
UNLINKED PASSENGER TRIPS PER SERVICE AREA POPULATION (2019)	12.7
VEHICLE REVENUE MILES (2019)	13,554,570

TRANSIT METRICS VIA THE NATIONAL TRANSIT DATABASE

	2015	2016	2017	2018	2019	TRENDLINE
Annual Transit Ridership by Year	14,573,879	12,608,111	11,814,333	11,388,514	13,637,548	
Vehicle Revenue Miles by Year	12,233,519	12,169,859	13,416,103	11,979,948	13,554,570	

TRAIL USAGE	
DEFINITION	Yearly trail usage for Pinellas County.
SOURCE	Trail Usage
TIME PERIOD	2019 – 2020
METHODOLOGY	Yearly trail usage was compared for 2019 and 2020 across all trails with count data in the county.

YEARLY TRAIL USAGE

2019
1,303,788

2020
2,154,036

Trendline

MODE SHARE	
DEFINITION	PUMA stands for Public Use Microdata Area where each PUMA contains at least 100,000 people. PUMA provides more granular data than county-wide averages, such as mode share that is not available on a census block or tract level.
SOURCE	Census PUMA Areas
TIME PERIOD	2019
METHODOLOGY	PUMA area was pulled for Pinellas County, and the mode share was calculated for each multimodal mode by PUMA area and overall county average.

TABLE 8. MODE SHARE METRICS

	WALK TO WORK	BIKE TO WORK	TRANSIT
Pinellas County (North)	1.1%	0.6%	0.3%
Pinellas County (South Central) -- St. Petersburg City (West)	1.9%	1.2%	2.2%
Pinellas County (West Central) --Greater Seminole City	1.6%	0.6%	0.9%
Pinellas County (Central)--Clearwater City (South & Central)	2.9%	1.0%	2.8%
Pinellas County (North Central)	0.9%	1.1%	0.6%
Pinellas County (Central)--Greater Pinellas Park City	1.7%	0.8%	1.5%
Pinellas County (Southeast)--St. Petersburg City (East)	1.8%	1.3%	2.4%
Pinellas County (Central)--Greater Largo City	1.6%	1.1%	1.5%
Pinellas County Average	**1.7%**	**1.0%**	**1.6%**

08. HOTSPOT ANALYSIS

A subset of the performance measures used to assess segment level performance was selected to help identify problematic roadway segments, referred to as hotspots. The measures used to identify hotspots are associated with three of the goal categories, including safety, reliability, and mobility. As described in the Performance Measures section, mobility measures are designed to evaluate recurring congestion, reliability measures assess nonrecurring congestion, while the safety measures encompass a variety of crash types. These three performance categories represent the three most direct and impactful measures of congestion. There are nine distinct measures used in the hotspot analysis, aggregated to one composite measure for each category. This section includes a summary of the composite analysis for each of the performance categories. The HotSpots Technical Memorandum in Appendix C includes a detailed analysis of the individual measures used to develop the composite results.

SAFETY

The importance of safety considerations in any transportation analysis cannot be overstated. In addition to the inherent relevance of safety in its own right, it is specifically important to traffic congestion analysis, particularly nonrecurring congestion. Traffic crashes and other incidents tend to result in traffic bottlenecks, slowing traffic and creating congested conditions. Four of the safety performance measures were used to define the Top 20 safety hotspots on the CMP Network, including:

- Total Crashes
- Total Fatal and Incapacitating Injury Crashes
- Total Bicycle and Pedestrian Crashes
- Total Bicycle and Pedestrian Fatal and Incapacitating Injury Crashes

The four safety measures were assessed individually to identify safety hotspots, and a composite safety hotspot analysis was performed that encompasses all four of the metrics. The safety performance measures were calculated using crash data from 2015 – 2019 and spatially joined to each segment on the CMP Network. Further discussion on methodology is available in Appendix C: Performance Measures and Appendix D: Hotspots Technical Memorandum.

The composite safety analysis is designed to highlight the segments with the highest number of total crashes, multimodal crashes, and fatalities and serious injuries on a relative basis. For each of the individual variables, each segment in the CMP Network was given a score based on its performance score relative to the highest scoring segment in the network. So, for example, if the segment with the highest number of total crashes has 100 crashes, it receives a score of 1 and a segment with 90 crashes would receive a score of 0.9. This mathematical process enables the normalization of scores across the different variables, ensuring that they are all weighted equally in the compose score. Figure 6 includes the equation used to compute the composite safety score for all segments in the network.

FIGURE 6. SAFETY COMPOSITE SCORE EQUATION

$$\text{Composite Score} = \frac{\text{Total Crashes}}{\text{Max (Total Crashes)}} + \frac{\text{F\&I Crashes}}{\text{Max (F\&I Crashes)}} + \frac{\text{Multimodal Crashes}}{\text{Max (Multimodal Crashes)}} + \frac{\text{Multimodal F\&I Crashes}}{\text{Max (Multimodal F\&I Crashes)}}$$

There are three roadways with the majority of composite safety hotspots, comprising fourteen of the top 20 segments. The three roadways include Park Blvd (3 segments), US 19 (7 segments), and 4th Street (4 segments). The top twelve segments are composed of those three facilities. The balance of eight segments are composed primarily of segments in the top 20 for one or more of the individual metrics. There are three segments that score in the top 20 for all four of the safety metrics, including:

- Park Blvd from 66th St to 58th St N,
- 4th St N from 38th Ave to 58th Ave, and
- Park Blvd from 49th St to 43rd St.

Of the remainder of the safety hotspot segments, some are primarily bicycle/pedestrian crash hotspots and others primarily motorized crash hotspots.

The composite safety hotspots are listed in Table 9 and depicted in the map in Figure 7 . The safety hotspots table specifies which of the four metrics each segment scores highly, indicating the nature of the safety issues for the respective segments.

TABLE 9. COMPOSITE SAFETY HOTSPOTS

ID	ON STREET	FROM STREET	TO STREET	INDIVIDUAL SAFETY METRICS
1	PARK BLVD	66TH ST N	58TH ST N	Crashes involving fatalities/serious injuries; Total; Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
2	4TH ST N	38TH AVE N	54TH AVE N	Crashes involving fatalities/serious injuries; Total; Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
3	49TH ST N	54TH AVE N	62ND AVE N	Total; Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
4	US 19	KLOSTERMAN RD	MLK	Crashes involving fatalities/serious injuries; Total; Bike/ped crashes involving fatalities/serious injuries
5	US 19	38TH AVE N	54TH AVE N	Total; Bike/ped crashes involving fatalities/serious injuries
6	US 19	80TH AVE N	MAINLANDS BLVD	Crashes involving fatalities/serious injuries; Total; Bike/ped crashes involving fatalities/serious injuries
7	PARK BLVD	49TH ST N	43RD ST	Crashes involving fatalities/serious injuries; Total; Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
8	PARK BLVD	83RD ST N	71ST ST N | BELCHER RD	Crashes involving fatalities/serious injuries; Total; Total bicycle/pedestrian crashes
9	4TH ST N	9TH AVE N	22ND AVE N	Crashes involving fatalities/serious injuries; Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
10	4TH ST N	72ND AVE N	77TH AVE N	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
11	US 19 | 34TH ST N	30TH AVE N	38TH AVE N	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
12	US 19	ALDERMAN RD	INNISBROOK DR	Crashes involving fatalities/serious injuries; Total
13	ALT US 19 | SEMINOLE BLVD	WALSINGHAM RD	126TH AVE	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
14	4TH ST N	54TH AVE N	62ND AVE N	Total; Bike/ped crashes involving fatalities/serious injuries
15	66TH ST N	62ND AVE N	70TH AVE N	Total
16	GULF-TO-BAY BLVD	BELCHER RD	OLD COACHMAN RD	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
17	US 19	TAMPA RD	NEBRASKA AVE	Crashes involving fatalities/serious injuries; Total
18	18TH AVE S	22ND ST S	16TH ST S	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries
19	SR 686 | EAST BAY DR	FULTON ST	BELCHER RD	Total bicycle/pedestrian crashes
20	US 19 | 34TH ST N	1ST AVE N	5TH AVE N	Total bicycle/pedestrian crashes; Bike/ped crashes involving fatalities/serious injuries

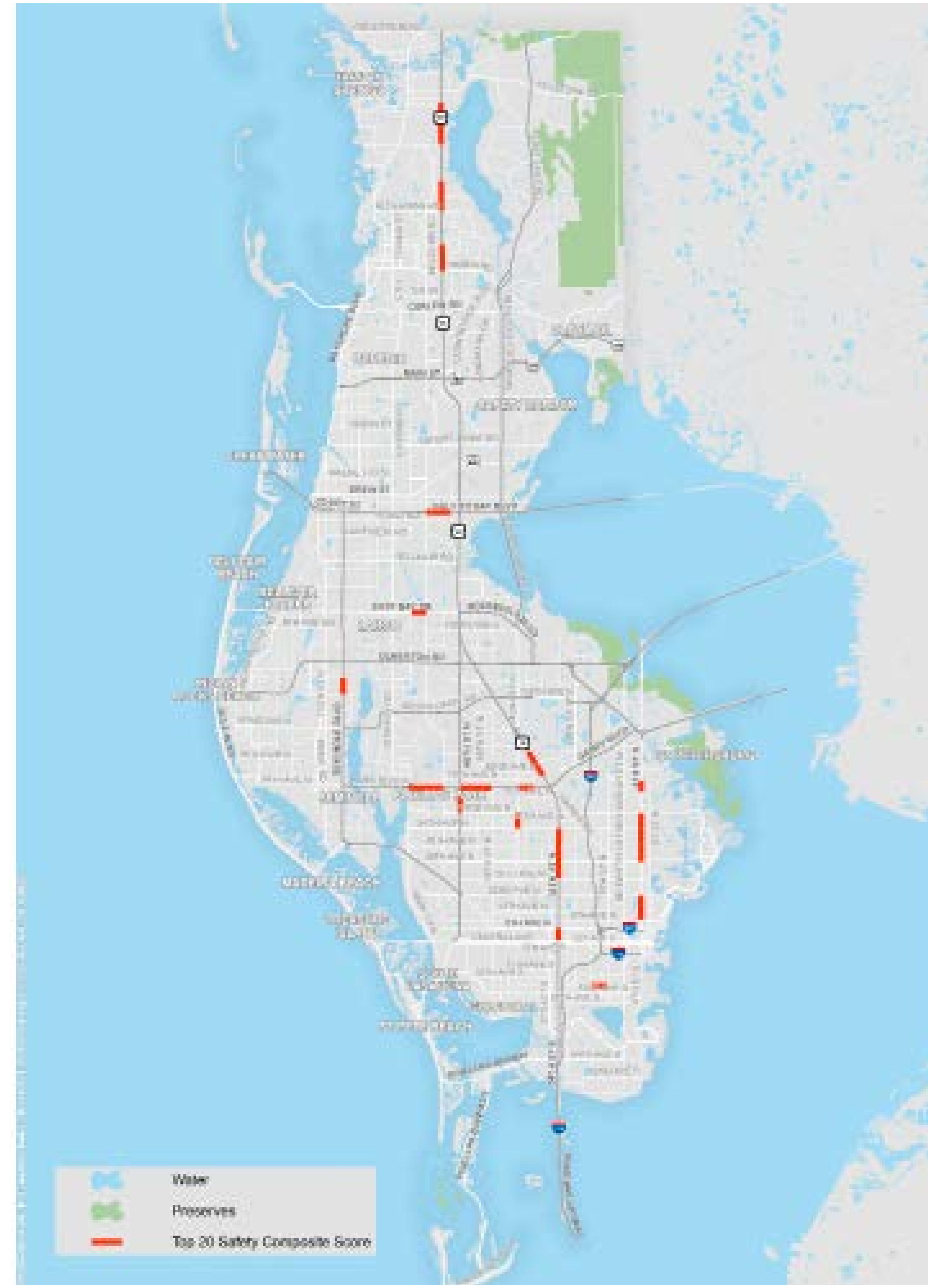
Total

Crashes involving fatalities/ serious injuries

Total bicycle/ pedestrian crashes

Bike/ped crashes involving fatalities/ serious injuries

FIGURE 7. SAFETY COMPOSITE HOTSPOTS



RELIABILITY

Reliability refers to the predictability of travel time on the roadway network. If users cannot rely on a more or less consistent travel time, the performance of the transportation system becomes disruptive and therefore unreliable. The performance metrics used to identify reliability hotspots include:

- FHWA endorsed Level of Travel Time Reliability (LOTTR) ratio, which relates the 80th percentile travel time to the median travel time during a given period for each roadway segment;
- Truck Travel Time Reliability (TTTR) ratio, which relates the 95th percentile travel time to the median travel time; and
- Ratio of peak season to average annual LOTTR, to isolate reliability issues related to peak season demand on the system.

The three reiliability measures were assessed individually to identify reliability hotspots, and a composite reliability hotspot analysis was performed that encompasses all three metrics. The reliability measures were calculated using HERE travel time data from 2015 – 2019 and spatially joined to each segment on the CMP Network. Further discussion on methodology is available in Appendix B: Performance Measures and Appendix C: Hotspots Technical Memorandum.

The composite reliability analysis is designed to highlight the segments with the highest variability in travel time using the LOTTR equation, the highest variability using the TTTR equation, and the variability in LOTTR during the peak tourism season relative to the average annual travel time. Similarly to the safety analysis, for each individual variable, each segment in the CMP Network was given a score based on its performance score relative to the highest scoring segment in the network. So, for example, if the segment with the highest variability in travel time is 2.0 (1.0 means no variability), it receives a score of 1 and a segment with LOTTR 1.5 would receive a score of 0.75. This mathematical process enables the normalization of scores across the different variables, ensuring that they are all weighted equally in the compose score. Figure 8 includes the equation used to compute the composite reliability score for all segments in the network.

FIGURE 8. SAFETY COMPOSITE SCORE

$$\text{Composite Score} = \frac{LOTTR}{Max(LOTTR)} + \frac{1}{(\text{Yearly to Peak Ratio}*1/Min(\text{Yearly to Peak Ratio}))} + \frac{TTTR}{Max(TTTR)}$$

There are four roadways with the majority of composite reliability hotspots, comprising fourteen of the top 20 segments. The four roadways include Memorial Causeway (4 segments), I-275 (5 segments), US 19 (3 segments), and East Lake Road (2 segments). There are two segments that do not score in the top 20 for any of the individual variables, but do score in the top 20 for the composite measure, including:

- Bayside Bridge from Roosevelt Blvd to Gulf to Bay Blvd
- US 19 from East Bay Dr to Whitney Rd

Of the remainder of the reliability hotspot segments, five score in the top 20 for Seasonal LOTTR, which is designed to identify those roadways most vulnerable to reliability issues in peak season conditions when school is in session and tourism is highest. Those roadway segments include:

- East Lake Rd from Trinity Blvd to Pasco County Line (2 segments)
- Memorial Causeway from Large Bridge to WB/EB split
- 66th St from Ulmerton Rd to US 19 (2 segments)

The composite reliability hotspots are listed in Table 10 and depicted in the map in Figure 9. The reliability hotspots table specifies which of the three metrics each segment scores highly, indicating the nature of the reliability issues for the respective segments.

TABLE 10. COMPOSITE RELIABILITY HOTSPOTS

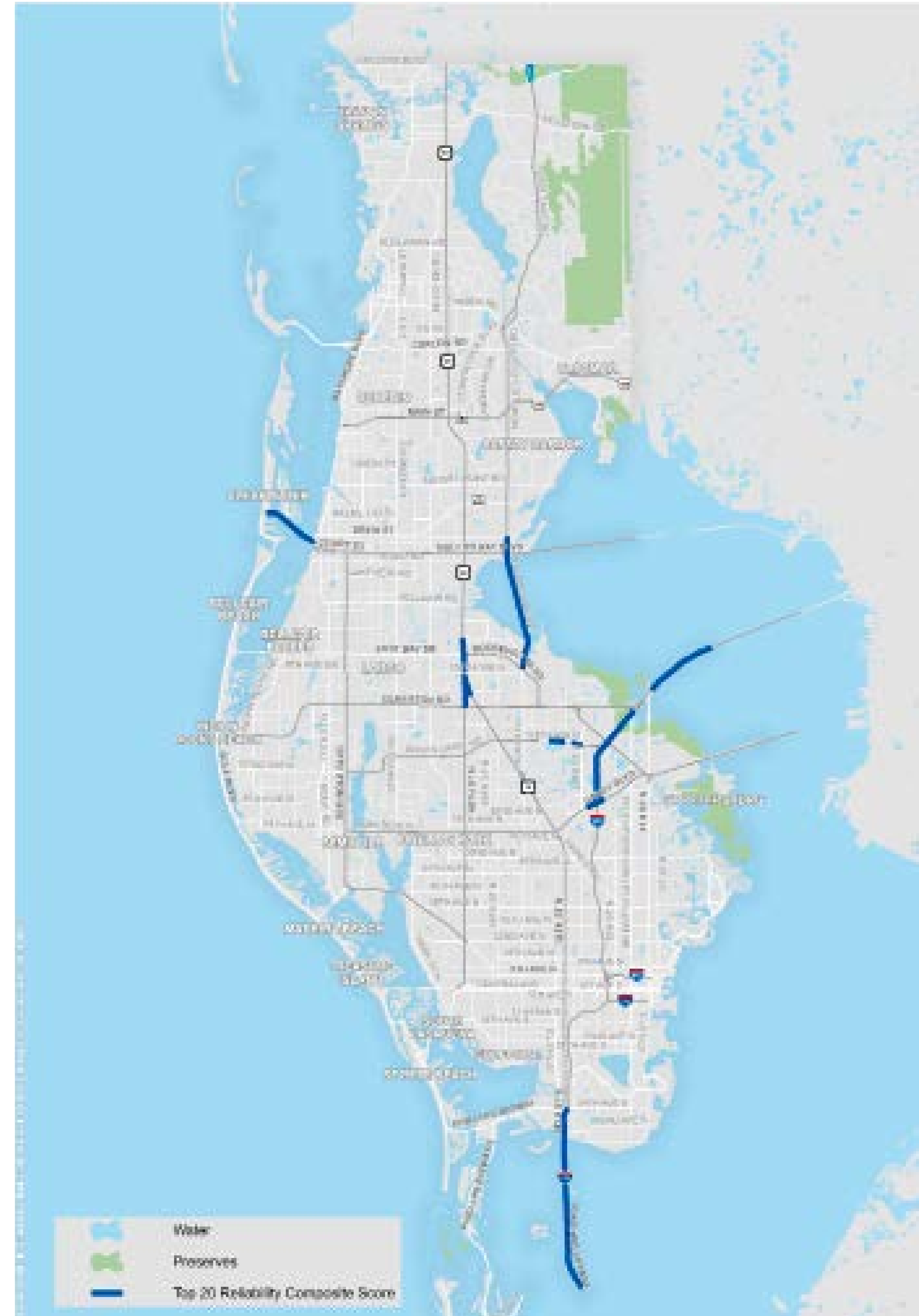
ID	ON STREET	FROM STREET	TO STREET	INDIVIDUAL RELIABILITY METRICS
1	MEMORIAL CSWY	ISLAND WAY	MEMORIAL CSWY LARGE BRIDGE W END	LOTTR, TTTR
2	MEMORIAL CSWY	CLEARWATER BEACH ROUNDABOUT	MEMORIAL CSWY SMALL BRIDGE W END	LOTTR, TTTR
3	MEMORIAL CSWY	MEMORIAL CSWY SMALL BRIDGE W END	ISLAND WAY	LOTTR, TTTR
4	I-275	GANDY BLVD	SR 686 | ROOSEVELT BLVD	LOTTR, TTTR
5	I-275	SR 686 | ROOSEVELT BLVD	DR ML KING JR ST N	LOTTR, TTTR
6	EAST LAKE RD	TRINITY BLVD	OLD E LAKE EXT	Seasonal LOTTR, TTTR
7	EAST LAKE RD	OLD E LAKE EXT	PASCO CO LINE	Seasonal LOTTR, TTTR
8	GANDY BLVD	I-275 WEST RAMPS	I-275 EAST RAMPS	LOTTR
9	MEMORIAL CSWY	MEMORIAL CSWY LARGE BRIDGE W END	MEMORIAL CSWY | WB/EB SPLIT	Seasonal LOTTR, TTTR

LOTTR TTTR Seasonal LOTTR

ID	ON STREET	FROM STREET	TO STREET	INDIVIDUAL RELIABILITY METRICS
10	CR 296 CONNECTOR	GATEWAY EXPRESS	BRYAN DAIRY RD | 118TH AVE N	TTTR
11	BRYAN DAIRY RD | 118TH AVE N	40TH ST N	34TH ST N	TTTR
12	BAYSIDE BRIDGE	SR 686 | ROOSEVELT BLVD	GULF-TO-BAY BLVD	COMPOSITE ONLY
13	I-275	4TH ST N	PINELLAS SHORELINE	LOTTR, TTTR
14	US 19	E BAY DR	WHITNEY RD	COMPOSITE ONLY
15	66TH ST N	142ND AVE N	US 19	Seasonal LOTTR
16	66TH ST N	ULMERTON RD	142ND AVE N	Seasonal LOTTR
17	I-275	PINELLAS SHORELINE	PINELLAS POINT DR	LOTTR, TTTR
18	I-275	PINELLAS POINT DR	54TH AVE S	LOTTR, TTTR
19	US 19	142ND AVE N SOUTH RAMPS	66TH ST N	TTTR
20	US 19	150TH AVE N	E BAY DR	TTTR

LOTTR TTTR Seasonal LOTTR

FIGURE 9. RELIABILITY COMPOSITE HOTSPOTS



MOBILITY

Mobility refers to the generalized travel time on the roadway network, highlighting segments with typically slow travel times due to recurring congestion. The roadway segments with mobility performance deficiencies include commonly experienced choke points in the network during the morning or afternoon peak, or rush hour conditions. The performance metrics used to identify mobility hotspots include:

- Average AM peak travel time relative to posted speed limit
- Average PM peak travel time relative to posted speed limit

The two mobility measures were assessed separately to identify mobility hotspots, and a composite mobility hotspot analysis was performed that encompasses both metrics. The mobility measures were calculated using HERE travel time data from 2015 – 2019 and spatially joined to each segment on the CMP Network. Further discussion on methodology is available in Appendix C: Performance Measures and Appendix D: Hotspots Technical Memorandum.

The composite mobility analysis is designed to highlight the segments with the highest levels of recurring congestion in the two peak periods during the day. Similarly to the safety and reliability analyses, for each individual variable, each segment in the CMP Network was given a score based on its performance score relative to the highest scoring segment in the network. This mathematical process enables the normalization of scores across the two variables, ensuring that they are weighted equally in the composte score. Figure 10 includes the equation used to compute the composite reliability score for all segments in the network.

FIGURE 10. MOBILITY COMPOSITE SCORE

$$\text{Composite Score} = \frac{\text{AM Peak Speed Difference}}{\min(\text{AM Peak Speed Difference})} + \frac{\text{PM Peak Speed Difference}}{\min(\text{PM Peak Speed Difference})}$$

where:

AM Peak Speed Difference is the AM Peak Speed minus the Posted Speed Limit

PM Peak Speed Difference is the PM Peak Speed minus the Posted Speed Limit

There are four roadways with the majority of composite mobility hotspots, comprising seventeen of the top 20 segments. The four roadways include US 19 (10 segments), Belcher Rd (3 segments), Dr Martin Luther King Jr St N (2 segments), and Tyrone Blvd (2 segments). All but two of the mobility hotspot segments score in the top 20 for both AM and PM peak travel times.

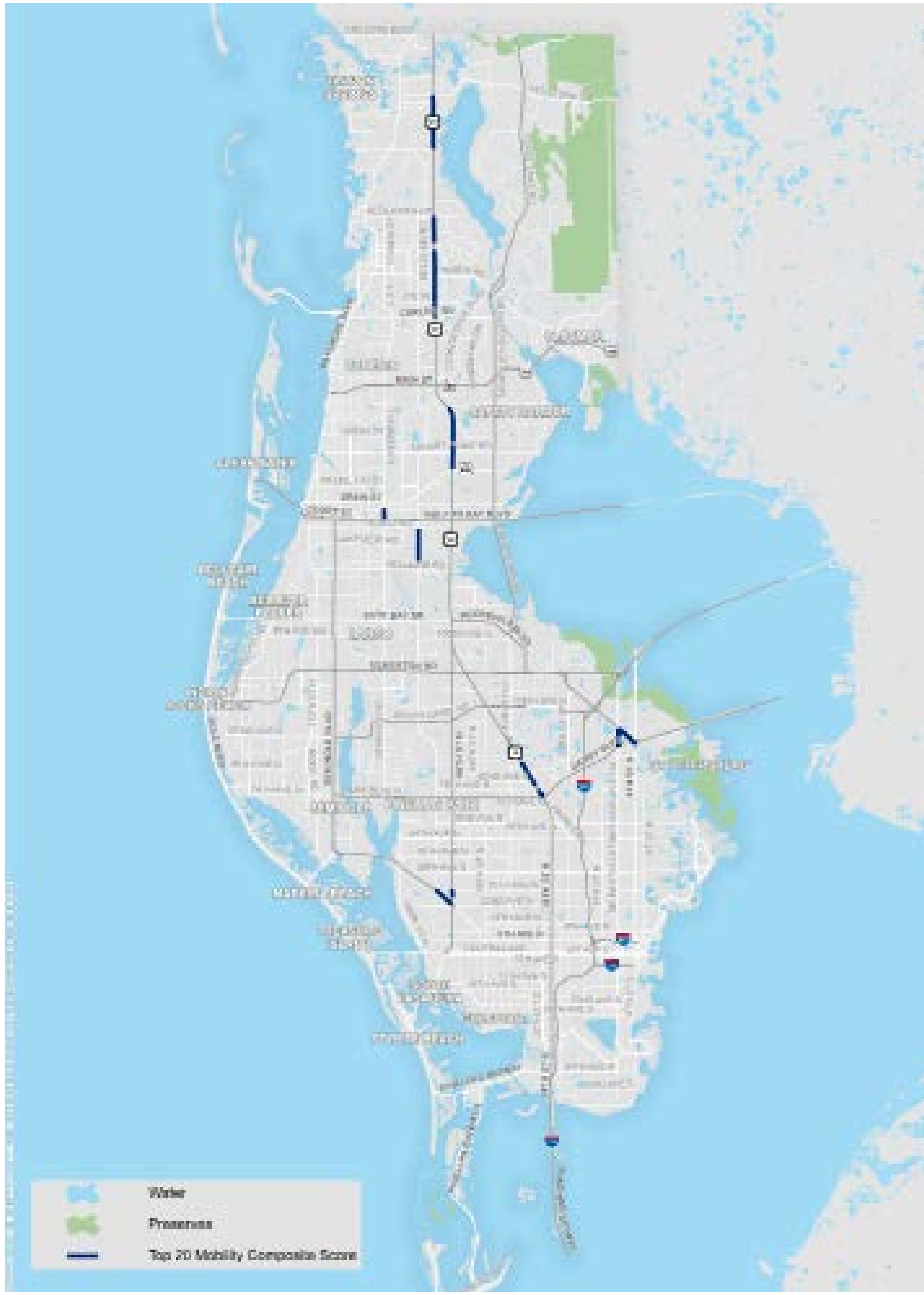
The composite mobility hotspots are listed in Table 11 and depicted in the map in Figure 11. The mobility hotspots table specifies which of the three metrics each segment scores highly, indicating the nature of the mobility issues for the respective segments.

TABLE 11. COMPOSITE SAFETY HOTSPOTS

ID	ON STREET	FROM STREET	TO STREET	INDIVIDUAL MOBILITY METRICS
1	US 19	MLK	TARPON AVE	AM Peak, PM Peak
2	US 19	KLOSTERMAN RD	MLK	AM Peak, PM Peak
3	US 19	HIGHLANDS BLVD	ALDERMAN RD	AM Peak, PM Peak
4	DR MARTIN LUTHER KING JR ST N	GANDY BLVD	102ND AVE N	AM Peak, PM Peak
5	US 19	SUNSET POINT RD	ENTERPRISE RD	AM Peak, PM Peak
6	US 19	NE COACHMAN RD	SUNSET POINT RD	AM Peak, PM Peak
7	DR MARTIN LUTHER KING JR ST N	102ND AVE N	ROOSEVELT BLVD	AM Peak, PM Peak
8	SR 686 | ROOSEVELT BLVD	4TH ST N	DR ML KING JR ST N	AM Peak, PM Peak
9	66TH ST N	26TH AVE N	30TH AVE N	AM Peak, PM Peak
10	ALT US 19 | TYRONE BLVD	66TH ST N	68TH ST N	AM Peak, PM Peak
11	ALT US 19 | TYRONE BLVD	68TH ST N	71ST ST N	AM Peak, PM Peak
12	US 19	80TH AVE N	MAINLANDS BLVD	AM Peak, PM Peak
13	US 19	GANDY BLVD	78TH AVE N	AM Peak, PM Peak
14	US 19	TAMPA RD	NEBRASKA AVE	AM Peak, PM Peak
15	BELCHER RD	NURSERY RD	OAK GROVE MIDDLE SCHOOL ENTRY	AM Peak, PM Peak
16	BELCHER RD	OAK GROVE MIDDLE SCHOOL ENTRY	HARN BLVD	AM Peak, PM Peak
17	BELCHER RD	HARN BLVD	DRUID RD	AM Peak, PM Peak
18	US 19	CURLEW RD	CR 39	AM Peak
19	US 19	CR 39	TAMPA RD	AM Peak
20	KEENE RD	GULF-TO-BAY BLVD	CLEVELAND ST	AM Peak

AM Peak PM Peak

FIGURE 11. MOBILITY COMPOSITE HOTSPOTS



09. MITIGATION STRATEGIES

There are many different types of strategies to mitigate for or resolve congestion and safety problems in the CMP Network, ranging from the addition of roadway capacity to the construction of pedestrian and bicycle facilities and many other capital and operational strategies. Two key factors in determining the appropriate strategy for any given roadway segment is the function and underlying context of the facility. For many roadway segments with traffic congestion, the function of the roadway is to provide access to local businesses and other destinations and the context is highly urban and multimodal oriented. For these roadways, it can be argued that traffic congestion is favorable, as it supports the local economy by providing a high degree of exposure for the businesses along them and it slows down traffic, making for a safer environment for pedestrians and bicyclists.

PUTTING CONGESTION IN CONTEXT

The CMP includes a two-step process designed to differentiate segments and respective improvement strategies. The first step is a network screening that scores each roadway segment on the network to determine whether a multimodal focus, roadway focus, or hybrid focus is most appropriate. The second step involves the use of a series of decision trees, one for each modal focus, to inform the recommendation of specific improvement types. This section of the CMP includes a high level description of those two steps and the application of the process to roadway segments identified as safety, reliability, and/or mobility hotspots. A more detailed report of the evaluation process including application of the screening and decision tree framework to nine roadway segments, is included in the Strategies Technical Memorandum in Appendix D.

MODAL NETWORK ASSESSMENT

The multimodal network assessment is based on four variables, including traffic, multimodal crash history, and both walk and transit accessibility. These four variables were selected to help define the context and function of any particular roadway in the CMP Network, leading to a composite score for each segment that correlates to a modal focus.

TRAFFIC

Purpose and Definition: The level of automobile traffic is an indicator of the modal orientation of the roadway and throughput and is central to traffic congestion and mitigation of the congestion. This variable is represented in the assessment as daily vehicle volume per travel lane, computed by dividing the 2019 Average Annual Daily Traffic (AADT) by the number of lanes on each respective segment. The traffic variable carries the heaviest weight in the aggregate score due to its direct relationship to congestion.

Data Source: 2019 Forward Pinellas traffic database

Weight in composite score: 39%

MULTIMODAL SAFETY

Purpose and Definition: The use of crash data, specifically crashes involving pedestrians and bicyclists, is intended to inform both modal emphasis and types of strategies most relevant to mitigate congestion on specific segments. In terms of modal emphasis, the reasoning is that if there are crashes involving pedesrians and bicyclists, the function and context of the roadway includes multimodal demand. This variable is represented in terms of total crashes by segment that involve bicyclists and/or pedestrians in the 5-year period between 2015 and 2019.

Data Source: 2019 Forward Pinellas traffic database

Weight in composite score: 28%

PEDESTRIAN ACCESSIBILITY

Purpose and Definition: The multimodal context and function of a roadway can be defined by both existing multimodal activity, which is captured indirectly by the multimodal crash variable, and propensity for multimodal activity. The latter is informed by pedestrian accessibility for the purpose of the CMP multimodal assessment. Accessibility measures the number of jobs that can be accessed by walking from any given area in the county. Accessibility scoring is assigned to land areas, or polygons and is assigned to network segments by proximity. Accessibility is based primarily on mix of land uses, network connectivity, and a reasonable amount of walk travel time.

Data Source: Urban Footprint

Weight in composite score: 17%

TRANSIT ACCESSIBILITY

Purpose: Similar to pedestrian accessibility, transit accessibility measures the number of jobs that can be accessed using public transit from any given area in the county. The purpose of also including transit accessibility is to represent the first and last mile multimodal access that is integral to effective public transit service.

Data Source: Urban Footprint

Weight in composite score: 17%

NETWORK ASSESSMENT RESULTS

The modal emphasis assessment results indicate 44 percent of the roadway miles in the CMP Network are multimodal focused, 15 percent are roadway focused, and the balance of 40 percent of roadway miles are of a hybrid orientation. The map in Figure 12 displays the assessment results, revealing that the roadway focused segments are limited primarily to major north/south thoroughfares like I-275, portions of US 19, Keene Rd, and McMullen Booth Rd and east/west facilities including portions of Bryan Dairy Rd, Park Blvd, Gulf to Bay, and Tampa Rd. The vast majority of the network, however, falls into the multimodal and hybrid focus scoring range. Individual scores by the four respective categories of variables are presented in Appendix D.

FIGURE 12. COMPOSITE ASSESSMENT SCORING

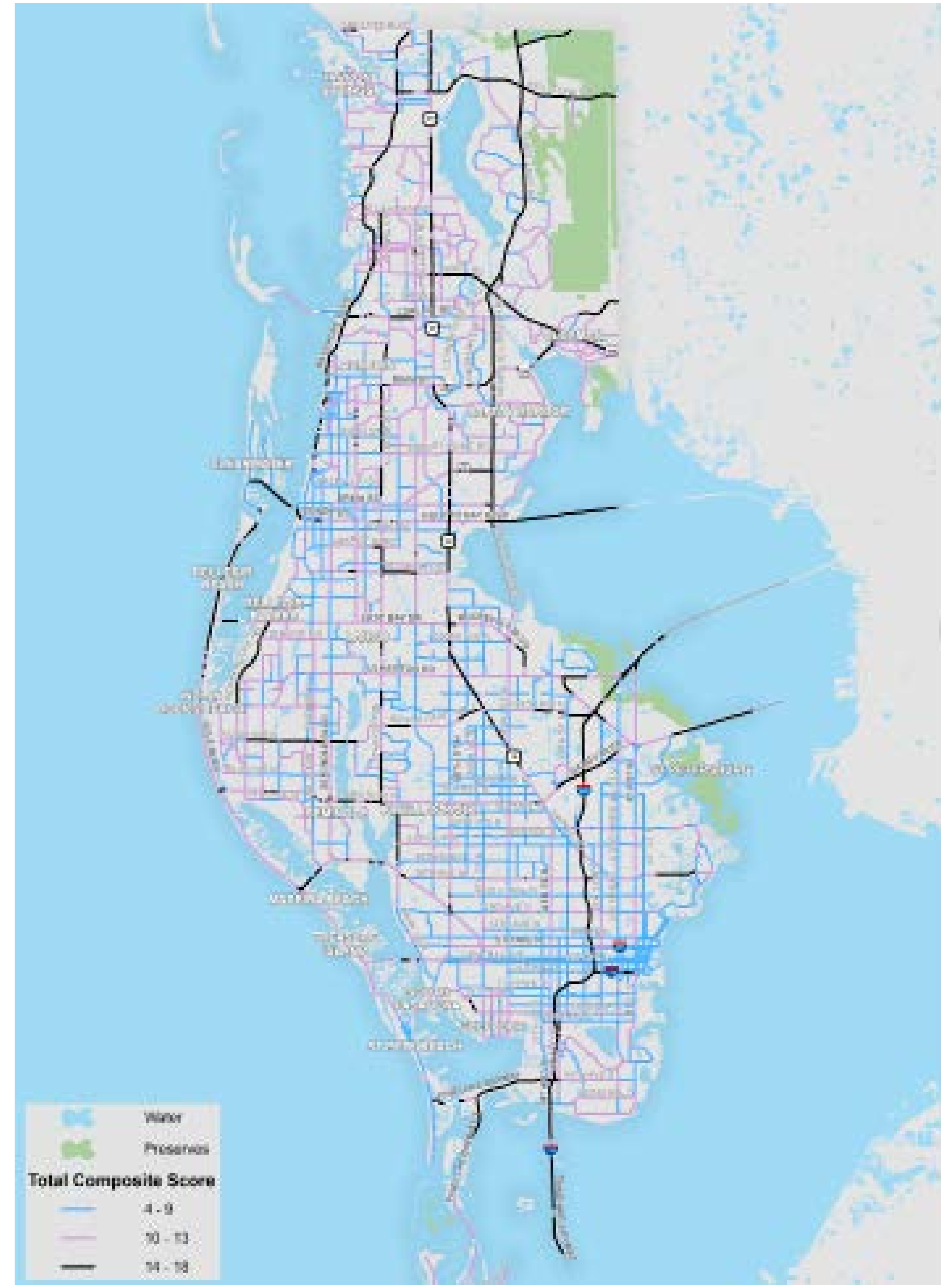


TABLE 12. NETWORK ASSESSMENT RESULTS

CLASS	CENTERLINE MILES	% OF NETWORK
MULTIMODAL EMPHASIS (4-9)	420	44%
HYBRID (10-13)	392	40%
ROADWAY EMPHASIS (14-18)	140	15%

STRATEGY DECISION TREES

The identification of specific improvement strategies for a roadway segment is based on a number of variables specific to the modal emphasis established for the segment. The roadway performance variables and corresponding decision trees below were established to provide a guide for the identification of strategies, but must also be weighed against other specific analyses and plans as well as local knowledge and judgement as to the most appropriate improvements. There are two important guiding principals embedded in the evaluation structure. The first is the assessment of context and function described in the preceding section and the second is a focus on implementable solutions that are operational in nature wherever possible, reserving more capital intensive solutions as a last resort. Each modal emphasis decision tree and corresponding lists of key variables is presented below. The application of the evaluation process for ten of the identified hotspots in the CMP network is included in Appendix D.

In addition to the evaluation methodology developed for the CMP strategy analysis, there are ancillary plans and analyses that should be considered as improvement strategies are included in long range plans or programmed in short range plans. Some of these ancillary plans include the Vision Zero plan, FDOT's context classification results and Design Manual, Level of Traffic Stress analysis, and other local plans and programs.

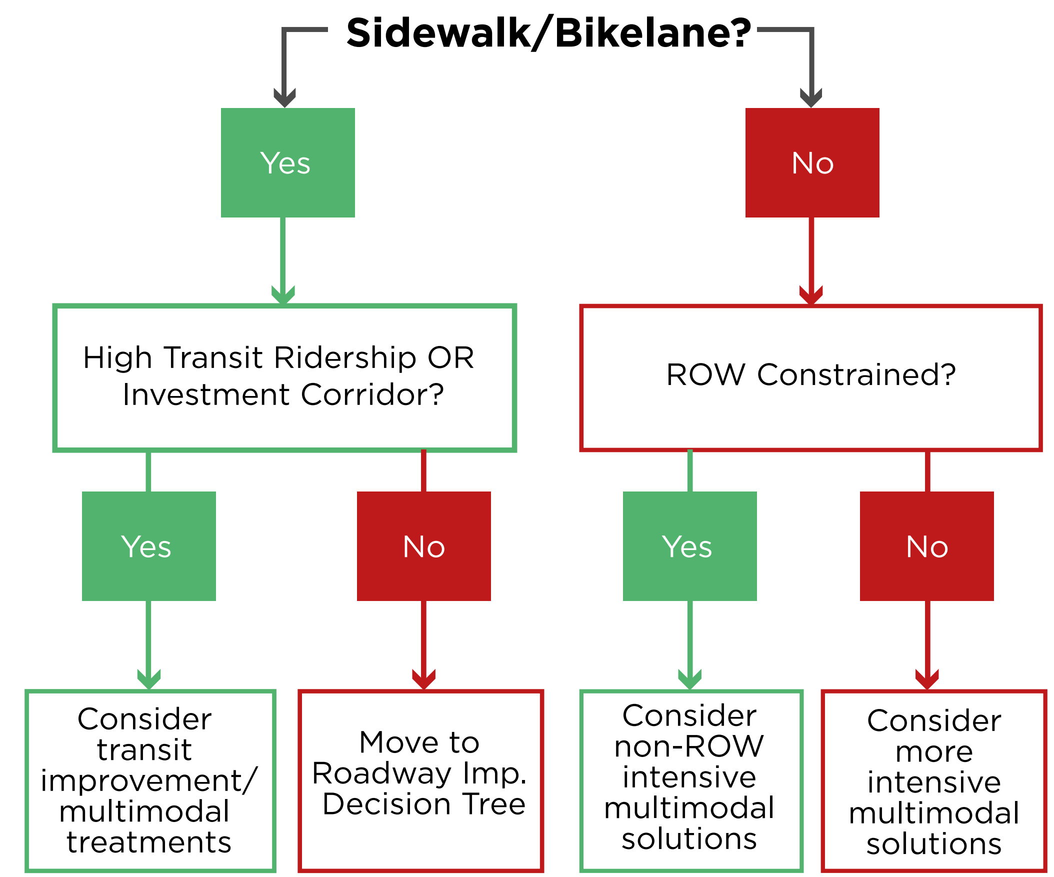
MULTIMODAL EMPHASIS

The key variables in the Multimodal Emphasis decision tree are primarily related to pedestrian and bicycle infrastructure and public transit service. If the segment currently has sidewalks and bicycle lanes and is a high transit ridership corridor, the decision tree leads to the identification of transit improvements, which can include augmentation of current transit service, operational improvements to current service, or the implementation of premium transit. If there are not sidewalks and bicycle lanes, the tree leads to pedestrian/bicycle improvements. If the segment has sidewalks and bicycle lanes and is not a high transit ridership corridor, the tree leads to roadway focused improvements. Figure 13 depicts a schematic of the multimodal decision tree and list of attributes. For variables categorized as "high", the corresponding ranking is based on a percentile analysis resulting in high/medium/low ratings.

Multimodal Decision Tree Variables

- Presence of sidewalk
- Presence of bicycle lane
- Level of transit ridership
- Is segment part of a Forward Pinellas designated Investment Corridor
- ROW constraint

FIGURE 13. MULTIMODAL DECISION TREE



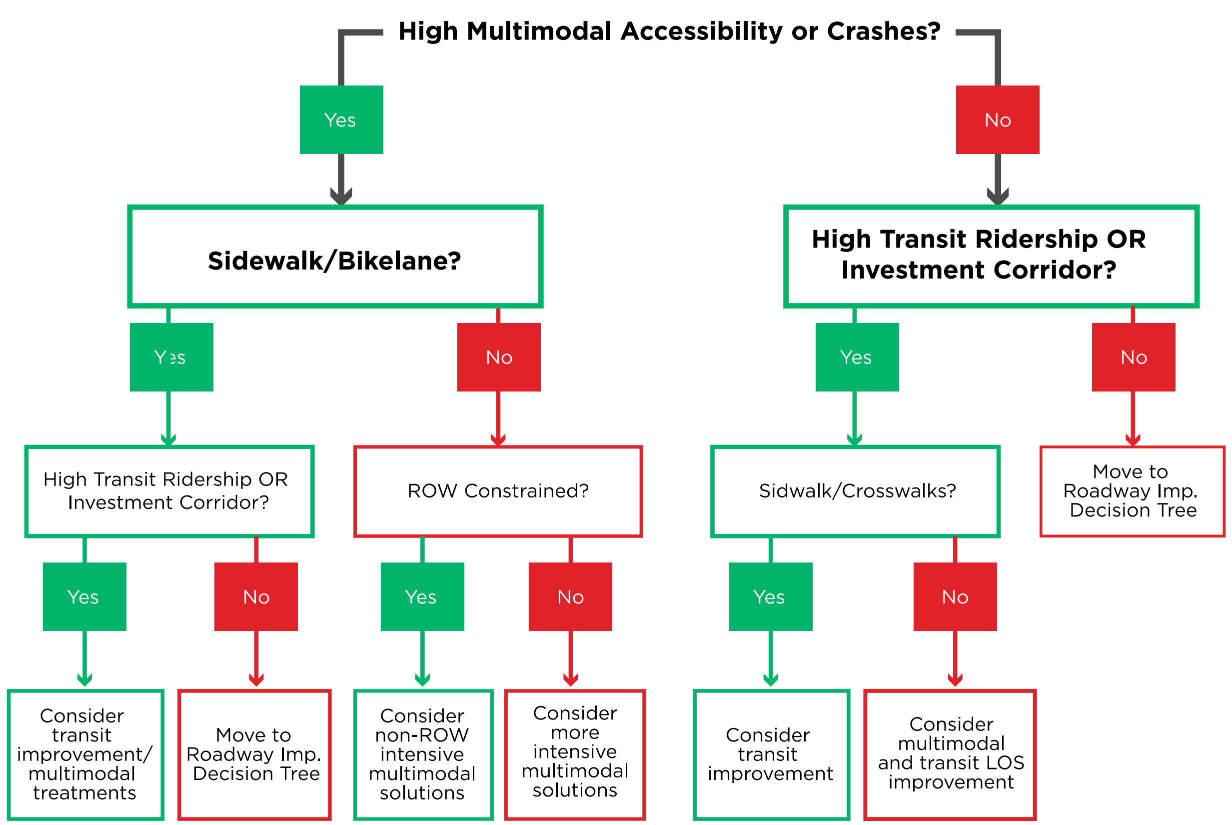
HYBRID EMPHASIS

The hybrid decision tree is the most complex of the three modal decision trees, due to the inherently uncertain nature of the most important mode and respective strategies for hybrid focus segments. This decision tree begins with assessment of the level of multimodal accessibility and crashes on the segment. If the segment scores high for either of those variables, the multimodal emphasis decision tree is applied. If the segment is not a high multimodal accessibility or crash segment, the tree assesses whether the segment is part of a high transit ridership corridor or investment corridor. If so, the tree leads to multimodal improvement types. If the segment is not part of a high transit ridership corridor, the roadway decision tree is used to identify roadway improvements. Figure 14 depicts a schematic of the hybrid decision tree and list of attributes. For variables categorized as "high", the corresponding ranking is based on a percentile analysis resulting in high/medium/low ratings.

Hybrid Decision Tree Variables

- Level of multimodal (walk) accessibility
- Level of crashes involving pedestrians or bicyclists
- Level of transit ridership
- Is segment part of a Forward Pinellas designated Investment Corridor
- Presence of sidewalk
- Presence of bicycle lane
- ROW constraint

FIGURE 14. HYBRID DECISION TREE



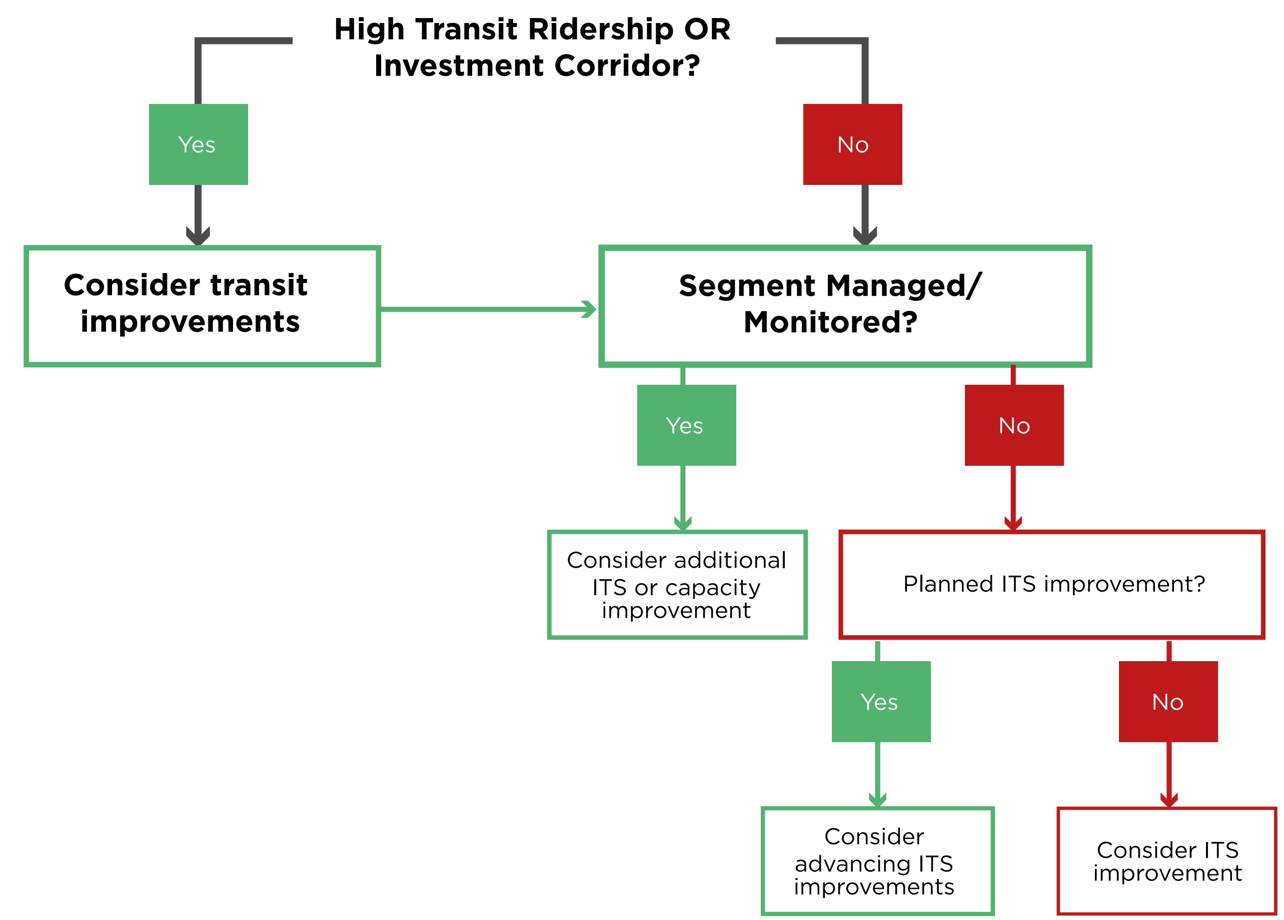
ROADWAY EMPHASIS

The roadway decision tree ultimately leads to transit and roadway improvement recommendations for segments with high transit ridership. For segments not on high transit ridership routes the tree recommends either TSM&O or traditional roadway capacity improvements. Figure 15 depicts a schematic of the hybrid decision tree and list of attributes. For variables categorized as "high", the corresponding ranking is based on a percentile analysis resulting in high/medium/low ratings.

Roadway Decision Tree Variables

- Level of transit ridership
- Is segment part of a Forward Pinellas designated Investment Corridor
- Does segment have current or planned ITS infrastructure

FIGURE 15. ROADWAY DECISION TREE



10. PROGRAMMING AND IMPLEMENTATION

The Congestion Management Process is implemented through the programming and implementation of infrastructure improvement projects. With the exception of long-range planned improvements, CMP projects are typically operational in nature, targeting non-capital strategies to alleviate congestion caused by recurring or non-recurring issues as analyzed in the CMP. While these improvements may also include projects in the Advantage Pinellas LRTP, they are focused on short-range implementation. There are many congestion mitigation projects that are currently programmed in FDOT's 5-year Work Program and in Pinellas County's Capital Improvement Program. The County's recently completed state-of-the-art Traffic Control Center is one example of the county's dedication to technology as a key improvement strategy to promote the efficient and safe movement of people throughout Pinellas County. Table 13 below outlines other projects in FDOT's current Work Program, including year of construction.

TABLE 13. FDOT PROGRAMMED CONGESTION MITIGATION PROJECTS

PROJECT ID	ROADWAY	FROM	TO	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	CONST. YEAR
448510-1	Alderman Rd	Palm Harbor Blvd	US 19	ATMS and ITS	Installation of fiber optic cable, CCTV cameras, dynamic message signs, and video detection at intersections along Alderman Rd	2025
448513-1	Causeway Blvd/ Curlew Rd	Honeymoon Park entrance	US 19	ATMS and ITS	ATMS/Arterial Traffic Management	2024
448512-1	Skinner/ Main St	Broadway	US 19	ATMS and ITS	ATMS/Arterial Traffic Management	2024
448851-1	Drew St	Ft Harrison Rd	US 19	ATMS and ITS	Installation of fiber optic cable, CCTV cameras, dynamic message signs, and video detection at intersections along Drew St	2025
443580-1	Tarpon Ave	S Huey Ave	US 19	Intersection Improvements		2022
437710-1	Alt US 19	S of Curlew Pl	N of Country Club Ct	Add left turn lanes		2024
437636-1	Palm Harbor Blvd	@ Florida Ave		Intersection Improvements	Roundabout to improve intersection safety	2022

PINELLAS COUNTY CONGESTION MANAGEMENT SET ASIDE

Forward Pinellas identified the need to set aside a pool of funding dedicated to non capital solutions to congestion management, as part of the Advantage Pinellas 2045 LRTP. An annual amount of $1 million in 9th cent fuel tax revenue was allocated through the cost feasible plan development process to Advanced Traffic Management System (ATMS), ITS and other technological improvements. Recognizing the need to be flexible as it relates to rapidly evolving technologies, Forward Pinellas has defined this program in very broad terms to allow for yet unknown technologies and improvement types to be funded through the set aside. At time of publication, the Pinellas County Capital Improvement Plan has $7.75 milion allocated to ATMS and ITS in fiscal years 2021 through 2024 to countywide improvements of this type. An additional $7 million is allocated to countywide intersection projects, including $1 million for intersection safety improvements.

TABLE 14. COUNTY PROGRAMMED CONGESTION MITIGATION PROJECTS

PROJECT ID	ROADWAY	FROM	TO	IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	CST DATE
002600A	49th St	SR 60	46th Ave N	ATMS	Install ATMS/ITS improvements on 49th St	2021
000106A	Countywide			ATMS/ITS Countywide System Program	Design and construct the countywide Advanced Traffic Management System (ATMS)/Intelligent Transportation System (ITS)	2019-2024
001032A	Countywide			ATMS/ITS Regional Improvements	Install ATMS/ITS improvements at various locations	2020-2024
000152A	Countywide			Intersection Improvements	Countywide intersection safety and capacity modifications and mast arm signalization projects	2019-2024
000195A	Countywide			Traffic Safety Improvements	Countywide transportation studies and construction for evaluation and implementation of traffic related safety improvements	2019-2024
002599A	St Pete Downtown			ATMS	Design and construct ITS improvements in downtown St Pete	2021

OTHER PLANNING EFFORTS

Forward Pinellas is focused on a variety of strategies to improve the mobility and overall quality of life of Pinellas County residents and visitors. Other ongoing planning efforts in addition to the CMP include the Safe Streets Pinellas Action Plan, the 15-minute neighborhood concept, and land use plans designed to either improve safety and/or mobility or to minimize the need for vehicular travel. In concert, this varied toolbox of strategies represents an effective way to achieve the Advantage Pinellas goals to reduce congestion, improve accessibility, improve safety, and promote the quality of life for all Pinellas County residents and visitors.

SAFE STREETS PINELLAS

In March 2021, the Forward Pinellas Governing Board adopted the Safe Streets Pinellas Action Plan, which is focused on achieving zero fatalities and serious injuries by 2045. The plan follows a similar process to the CMP, based on the vision zero goal and following a data based planning process. It also identifies roadway design elements key to improving safety and potential funding and policy strategies to implement the program. The Safe Streets Pinellas plan, similarly to the CMP, identified high injury roadway segments as a way to focus improvements and monitor progress. A unique feature of the plan is the implementation of demonstration projects that serve as tests of safety improvement strategies. The projects have included both technological solutions as well as educational outreach both of which are critical to achieving a safer network.

11. STRATEGY EFFECTIVENESS EVALUATION

The final step in FHWA's CMP guidance involves continuous monitoring to evaluate the effectiveness of implemented congestion management strategies. This is a crucial step in the process that enables adjustments in response to monitored effectiveness. The establishment of performance measures in earlier CMP steps is central to strategy effectiveness evaluation. FHWA guidance enables MPOs to establish effectiveness criteria based on regional goals and objectives, making the measurement of effectiveness a function of those goals and objectives. Also key to this process is the inclusion of multiple data points for the measures, whenever possible, that can be assessed over time and related to various implemented strategies. The goal is to establish a trend, associate it with strategy implementation, and other potential factors, and to adjust course on investment strategies based on performance. The effective before/after analysis forms the basis of performance based planning.

COUNTYWIDE TRENDS AND CONDITIONS REPORT

Forward Pinellas publishes a trends and conditions report annually that tracks land use trends and transportation performance in Pinellas County. The report tracks both land use and transportation out of recognition that the two fields are inextricably linked and neither can be assessed or planned properly in isolation. Forward Pinellas is an organization that was created by a Special Act unifying the Pinellas Planning Council (focused on land use planning) and the Pinellas County Metropolitan Planning Organization (focused on transportation planning) into one organization, which recognizes the importance of integrated land use and transportation planning. Land use and transportation both play a key role in the local and regional economy, quality of life, environment and community character.

The Countywide Trends and Conditions report includes a compilation of transportation and land use data collected from various sources, including Forward Pinellas and Federal, State and local agencies. The data summarized in the report also includes the CMP performance measures and serves as the annual report of progress toward Forward Pinellas' goals related to congestion management. Whenever possible, the measures in the report include multiple years, establishing a trend line and highlighting performance changes over time.

PROJECT RELATED PERFORMANCE RESULTS

While performance results are generally reported at the system level, as in the Trends and Conditions Report, performance based planning is scalable, iin terms of application at the segment level. Performance results related to specific project implementation, while not tracked and reported by Forward Pinellas, are available through agency coordination and database reporting. The implementing agencies, which include FDOT, Pinellas County Public Works Department, Pinellas Suncoast Transit Authority, and others, are responsible for before and after analysis to determine and track performance related to specific improvements. A generalization of the types of performance improvements expected from particular improvement strategies is represented in Table 15, which associates strategies and CMP objectives in matrix format.

WHILE THE TABLE DOES NOT GUARANTEE OBJECTIVE-SPECIFIC PERFORMANCE IMPROVEMENT RELATED TO STRATEGIES, IT DOES PROVIDE A RESOURCE TO ASSIST FORWARD PINELLAS AND ITS PLANNING PARTNERS IN THE IDENTIFICATION OF STRATEGIES TO ADDRESS SPECIFIC TYPES OF CHALLENGES.

TABLE 15. PERFORMANCE IMPROVEMENT STRATEGY MATRIX

PROJECT/ PROGRAM	IMPACTS	OBJ. 1.1. 20-MINUTE NEIGHBORHOODS	OBJ. 3.3 TRANSIT ACCESS	OBJ. 4.5 GOODS MOVEMENT		OBJ. 6.1 MOBILITY, ACCESSIBILITY	OBJ. 2.1. TECHNOLOGY	OBJ. 3.4. IMPROVE SAFETY	OBJ. 3.6. SCHOOL SAFETY	OBJ. 4.1. ADDRESS TOURISM	OBJ. 5.1. MULTIMODAL OPTIONS	OBJ. 2. TRANSIT MODE SHARE
Alternative Work Schedules	Reduced peak period traffic					X		X				
Teleworking	Reduced peak period traffic					X	X					
Ridesharing	Reduced peak period traffic					X				X		
Carsharing	Reduced parking demand, mode shift					X				X		
Employer Incentive Programs	Reduced VMT, enhanced travel time reliability					X						
Pricing Strategies	Reduced traffic, parking demand					X				X		
Transit-Oriented Development (TOD) Design Guidelines	Reduced traffic, increased transit and multimodal mode share	X	X			X				X	X	X
Urban Infill and Densification	Reduced traffic, increased transit and multimodal mode share	X	X			X				X	X	X
Mixed-use Development -	Reduced traffic, increased multimodal mode share	X	X			X				X	X	X
Local Complete Streets Policies	Reduced traffic, increased multimodal mode share and safety	X	X			X		X	X		X	X
Design Guidelines for Multimodal Friendly Development	Reduced traffic, increased multimodal mode share and safety	X	X			X		X	X		X	X

PROJECT/ PROGRAM	IMPACTS	OBJ. 1.1. 20-MINUTE NEIGHBORHOODS	OBJ. 3.3 TRANSIT ACCESS	OBJ. 4.5 GOODS MOVEMENT		OBJ. 6.1 MOBILITY, ACCESSIBILITY	OBJ. 2.1. TECHNOLOGY	OBJ. 3.4. IMPROVE SAFETY	OBJ. 3.6. SCHOOL SAFETY	OBJ. 4.1. ADDRESS TOURISM	OBJ. 5.1. MULTIMODAL OPTIONS	OBJ. 2. TRANSIT MODE SHARE
Partnership with Private Commercial Traffic/Routing Applications	Improved travel time reliability			X		X	X					
Enhanced Law Enforcement	Improved safety and travel time reliability							X	X			
Work Zone Management	Improved travel time reliability, reduced incidents					X		X				
Parking Management Program	Reduced traffic congestion and improved traffic flow in CBD areas					X						
Speed Harmonization	Reduced traffic congestion, improved travel time reliability			X		X	X					
Incident Patrols/ Response Units	Improved travel time reliability, incident response rates, safety							X	X			
Ramp Metering	Reduced traffic congestion, improved travel time reliability			X		X	X					
Managed Lanes	Reduced traffic congestion, improved travel time reliability					X	X					
Incident response and incident response vehicles	Reduced traffic congestion, improved travel time reliability, improved safety			X		X	X	X				
Rapid Incident Scene Clearance	Improved travel time reliability and incident response/clearance times, improved safety											
Advanced Traveler Information System	Improved travel time reliability and incident response/clearance times.			X		X	X	X				
Access Management	Reduced traffic congestion, improved safety					X		X				
Wayfinding Signage Improvements	Reduced traffic congestion					X				X		
ITS/Roadway Monitoring Infrastructure	Improved travel time reliability, reduced traffic congestion			X		X	X					

PROJECT/ PROGRAM	IMPACTS	OBJ. 1.1. 20-MINUTE NEIGHBORHOODS	OBJ. 3.3 TRANSIT ACCESS	OBJ. 4.5 GOODS MOVEMENT		OBJ. 6.1 MOBILITY, ACCESSIBILITY	OBJ. 2.1. TECHNOLOGY	OBJ. 3.4. IMPROVE SAFETY	OBJ. 3.6. SCHOOL SAFETY	OBJ. 4.1. ADDRESS TOURISM	OBJ. 5.1. MULTIMODAL OPTIONS	OBJ. 2. TRANSIT MODE SHARE
Pinellas County Traffic Management Center (TMC)	Improved travel time reliability and incident response/clearance times.			X		X	X	X	X			
Advanced Traffic Management System	Improved travel time reliability and incident response/clearance times.			X		X	X	X				
Acceleration/ Deceleration Lanes	Improved travel time reliability through incident/crash reduction, improved safety			X		X		X				
Intersection and Interchange Improvements	Reduced traffic congestion			X		X						
Improve Street Connectivity	Reduced travel time, improved multimodal accessibility and mode share	X	X			X					X	X
Add lanes through restriping (no new pavement)	Reduced congestion through added capacity			X		X				X		
Automated and Connected Vehicle Deployment	Improved travel time reliability, reduced traffic congestion			X		X	X					
Add lanes through roadway widening	Reduced congestion through added capacity			X		X						
New Roadways	Reduced congestion through added capacity			X		X						

APPENDIX A. CMP NETWORK DEFINITION

APPENDIX B. PERFORMANCE MEASURES

APPENDIX C. HOT SPOT ANALYSIS

APPENDIX D. STRATEGY IDENTIFICATION