CHAPTER 8

Congestion Management

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The CMP is a management system and process conducted to improve traffic operations and safety through operational improvements and strategies that reduce travel demand. Federal regulations require that metropolitan areas use a CMP while planning transportation investments.

The CMP uses a number of analytic tools to define and identify congestion within a region, corridor, and activity center, or project area. The CMP is also used to develop and select appropriate strategies to reduce congestion or mitigate the impacts of congestion.

Greater availability of data, enhanced tools for data management and modeling, expanded use of intelligent transportation systems, and opportunities for regional cooperation and collaboration can improve the active management of the regional transportation system. The CMP addresses congestion through effective management and operations and enhanced connection to the planning and environmental review process.

Public Involvement

CMP strategies were presented during public involvement activities to provide citizen groups information on congestion monitoring activities currently in place in Charlotte County and planned improvements to mitigate congestion. The public involvement process included various activities to inform the public and gather input and is integrated with the 2040 LRTP public involvement activities conducted throughout the LRTP process. Public involvement is discussed in **Chapter 4**.

Causes of Congestion

Congestion management begins by understanding the problem. There are six major causes of congestion:

Bottlenecks are points where the roadway narrows or regular traffic demands (typically at traffic signals) cause traffic to back up. This is the largest source of congestion and typically causes a road to carry more vehicles than it was designed for.

Traffic incidents can include crashes, stalled vehicles, or debris on the road. Incidents cause about one quarter of congestion problems. A focus of the CC-PG MPO CMP is reducing crashes that cause congestion and expediting incident response to clear incidents where ITS surveillance is in place.

Work zones occur when new roads are built and where maintenance activities, such as filling potholes and repaving, are underway. The amount of congestion from these actions can be reduced by various strategies.

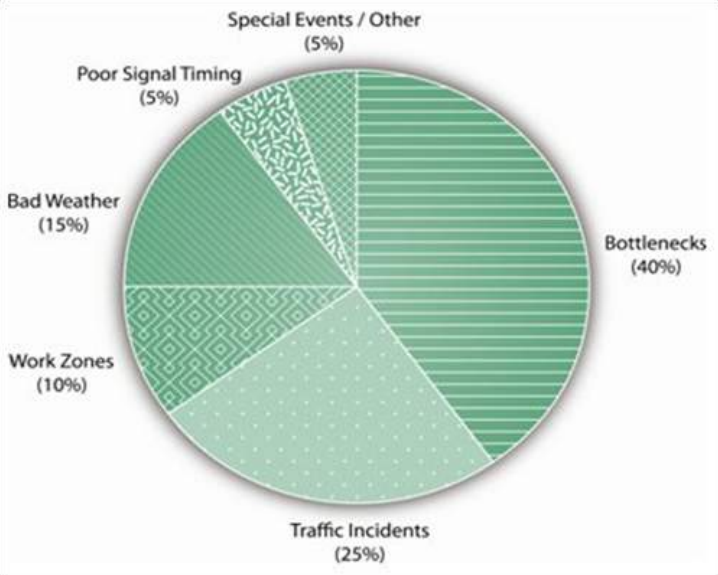
Bad weather cannot be controlled. Travelers can be notified of the potential for increased congestion, and signal systems can adapt to improve safety.

Poor traffic signal timing is the faulty operation of traffic signals or green/red lights where the time allocation for a road does not match the volume on that road. Poor signal timing is a source of congestion on major and minor streets.

Special events cause “spikes” in traffic volumes and changes in traffic patterns. These irregularities either cause or increase delay on days, times, or locations where there usually is none.

Figure 8-1 shows the results of a national study presented by FHWA on the sources of congestion. Bottlenecks are the largest cause of congestion nationally, followed by traffic incidents and bad weather. These national data are widely used in CMP updates because there are few comprehensive local studies on the causes of congestion.

Figure 8-1: Causes of Road Congestion Nationally



Source: USDOT, Advancing Metropolitan Planning for Operations: An Objectives-Driven, Performance-Based Approach – A Guidebook; February, 2010

The data suggest that local causes are likely to be similar, with bottlenecks and traffic incidents typically being the top two causes of congestion.

Federal Requirements

The CMP as required by MAP-21 builds upon the Congestion Management Systems first introduced in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Fundamental aspects of MAP-21 were extended through the new transportation bill (FAST) effective October 1, 2015. However, due to the timing of the FAST Act, MAP-21 requirements were used during analysis of the CMP.

MAP-21 provides updated policy and programmatic framework for investments to guide the growth and development of the country's transportation infrastructure. MAP-21 creates a streamlined, performance-based, multimodal program to address the needs of the national transportation system as outlined in national goals.

National Goals

A key feature of MAP-21 is the establishment of a performance- and outcome-based program. The objective is for states to invest resources in projects that collectively will make progress toward the achievement of the following national goals:

- **Safety** to achieve a significant reduction in traffic fatalities and serious injuries
- **Infrastructure condition** to keep the highway infrastructure in good repair
- **Congestion reduction** to achieve a significant reduction in congestion on the National Highway System (NHS)
- **System reliability** to improve the efficiency of the surface transportation system
- **Freight movement and economic vitality** to improve the national freight network, strengthen the ability of rural communities to access trade markets, and support regional economic development
- **Environmental sustainability** to enhance the performance of the transportation system while protecting the natural environment
- **Reduced project delivery delays** to reduce project costs, promote the economy, and expedite the movement of people and goods by eliminating delays in project development and delivery, including reducing regulatory burdens and improving agencies' work practices.

Eight Step Process

Developing a CMP typically follows an eight-step objectives-driven, performance-based approach to focus on managing congestion. The CMP looks at management and operations as well as other strategies, focusing on developing objectives that drive performance-based planning for responding to congestion.

The CMP is based upon objectives articulated in the LRTP. The CMP incorporates specific, measurable, agreed-upon, realistic, and time-bound objectives that reflect regional goals. And, as an integral part of the planning process, the CMP feeds projects and strategies directly into the LRTP and TIP. **Figure 8-2** summarizes framework for the CMP process as described in the FHWA's Congestion Management Process: A Guidebook.

Figure 8-2: Federal Eight-Step Congestion Management Process

Step 1 – Develop Congestion Management Objectives

The first step in developing a CMP is to identify objectives that focus on congestion management, typically derived from the vision and goals of the LRTP. These objectives include performance criteria and are defined in terms that enable stakeholders to focus on specific aspects of congestion. For example, objectives for commute trips may be different from objectives for other travel purposes. Alternatively, objectives may be established only for peak period travel as opposed to off-peak. Objectives may also be developed for freight movement and may be focused on activity areas or corridors where the movement of goods is particularly important, such as a port, terminal, or freight corridor.

The following objectives for the CMP were developed from the adopted LRTP goals and objectives to maintain consistency with regional goals and plans:

1. Reduce vehicle miles of travel per capita
2. Increase the viability and usage of non-automobile modes of travel
3. Improve and increase transit as a viable transportation alternative
4. Improve roadway operations to reduce congestion

It is recommended that these objectives be re-evaluated every three to five years.

Step 2 – Identify the Area of Application

The CMP is applied to a specific geographic area and network of surface transportation facilities. Often an area of application may align with the same geographic area as the regional ITS architecture. This alignment would allow system inventories and network descriptions to link together. The geographic area of application for this CMP update is the MPO planning area boundary, as shown in **Figure 8-3**.

Step 3 – Define the System/Network of Interest

Whatever the area of application used, the CMP defines the system characteristics and transportation network under consideration. The CMP should be multimodal, and freight and/or rail transportation assets are also included as conditions warrant. The CMP considers particular corridors or activity centers, based on safety needs, as discussed below.

The CC-PG MPO CMP is applied to the roadway network, with some consideration given to freight, bicycling, and pedestrian facilities, as well as travel patterns. A CMP would typically also include the transit network, but there is no Fixed Route transit in Charlotte County.

Step 4 – Develop Performance Measures

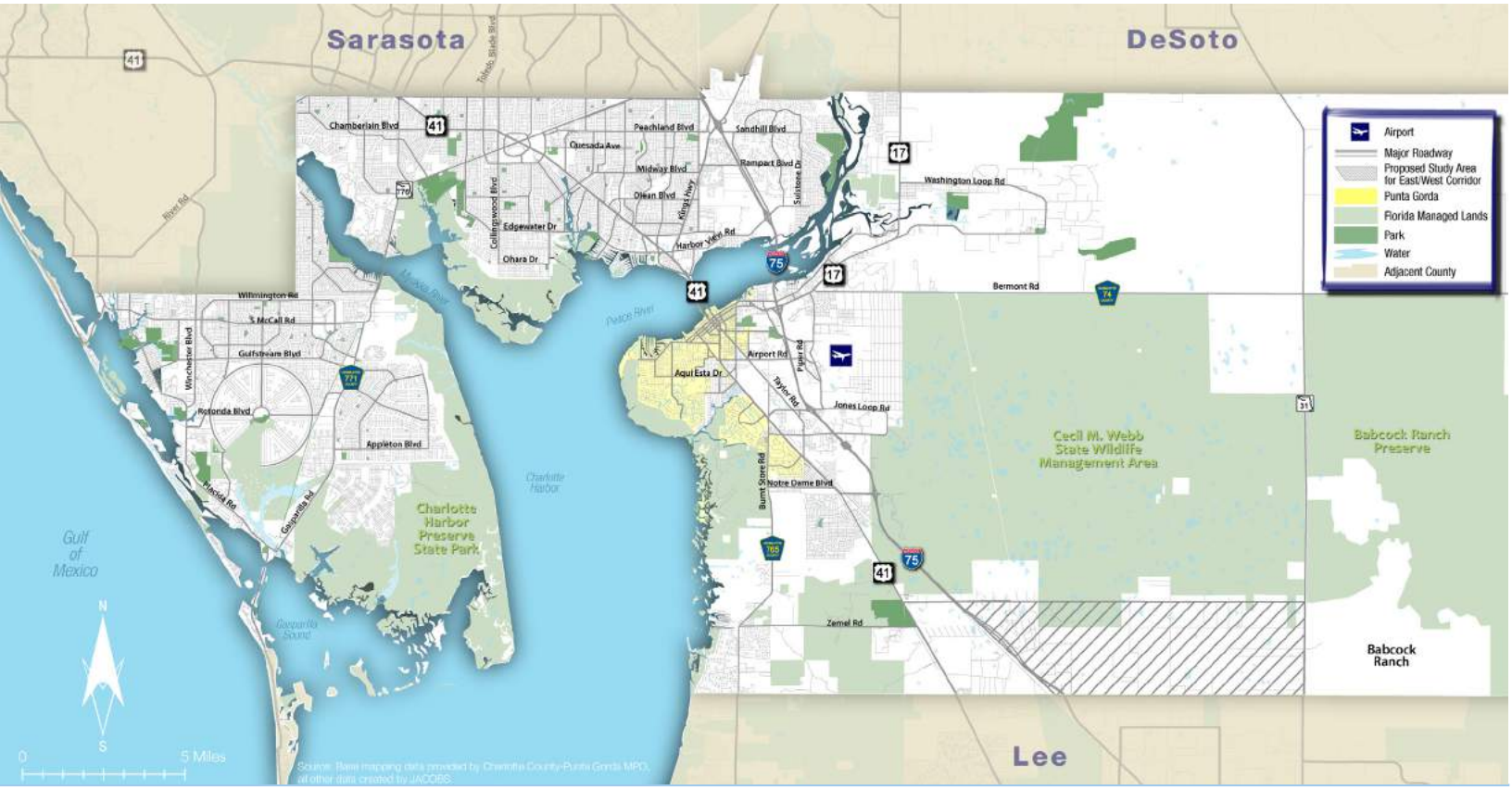
As with the objectives-driven, performance-based approach, performance measures created for the CMP should be derived from goals (Step 1) and reflect the impact of congestion on travelers and on economic activity, such as the number of accidents or lost time due to congestion. Measures should be flexible in their application and may change over time. Measures were developed to include multimodal consideration. For example, measures related to highway congestion should be accompanied by those for goods movement and non-motorized modes. Finally, ideal performance measures allow system performance to be tracked over time.

Performance measures and, where applicable and available, the associated data are presented below by category: roadways, goods movement, bike/pedestrian facilities, transportation demand management, and safety.

Roadways

Charlotte County roadway performance was analyzed. As a result, it is estimated that in 2018, 7,021,490 total Vehicle Miles will be traveled in Charlotte County. Of those, 723,462, or about 10 percent, are below the adopted Level of Service (LOS). **Figure 8-4** shows the percent of miles of roadways in the county by the typical LOS. LOS is a way to measure the actual vehicles attempting to use the road compared to the capacity for which the road was designed. A road that is operating at capacity are designated LOS E, and those that are operating over capacity and with significant delays are designated LOS F.

Figure 8-3: Charlotte County-Punta Gorda MPO Planning Area and Roadway Network



The percentages were determined by modeling the E+C Roadway Network, which includes the existing network with the projects committed to be funded by 2019. All of Charlotte County roads are operating at capacity, although nearly one quarter of the roadways are considered congested (LOS D and E).

Another roadway measurement analyzes how many miles people are driving on roadways by LOS type. As **Figure 8-5** shows, more than half of countywide vehicle miles traveled (VMT) are on congested roadways (LOS D and E). Nearly half (46 percent) are on completely stable roadways with unimpeded travel speeds (LOS C).

Goods Movement

The percent of truck travel on congested roadways is monitored to determine the roadway performance for goods movement. More specifically, the total travel or VMT on truck routes is reported, which is calculated by multiplying the Average Annual Daily Traffic (AADT) by the segment length or miles for segments that are truck routes. In 2040, if no improvements are made, more than 500,000 miles each day are traveled by trucks on congested truck routes, as shown in **Figure 8-6**.

Monitoring the number of crashes involving heavy vehicles is recommended, as these crashes can often create the most disruption to the transportation network, especially on the interstate, and result in more injuries and fatalities.

Bicycle/Pedestrian Facilities

The performance measures monitored for bicycling and pedestrian travel include existing pedestrian and bicycling facilities as well as existing, planned, and conceptual multi-use trails, of which there are 387 miles. **Table 8-1** shows the performance of the bicycle and pedestrian network for Charlotte County.

Table 8-1: Bicycle and Pedestrian Performance Measures

Performance Measure	Bicycle Facilities	Pedestrian Facilities
Total Miles of Facilities	100	82
Miles of Facilities on Congested Roadways	37	6
Percent of Congested Roadway Centerline Miles with Facilities	156	25

Transportation Demand Management

TDM is a menu of strategies to help spread out the typically heavy morning and late afternoon demand on transportation facilities. These strategies can include carpooling, vanpooling, telework, and parking management and pricing. Locally, the best performance measure is to follow the number of registered carpools or vanpools.

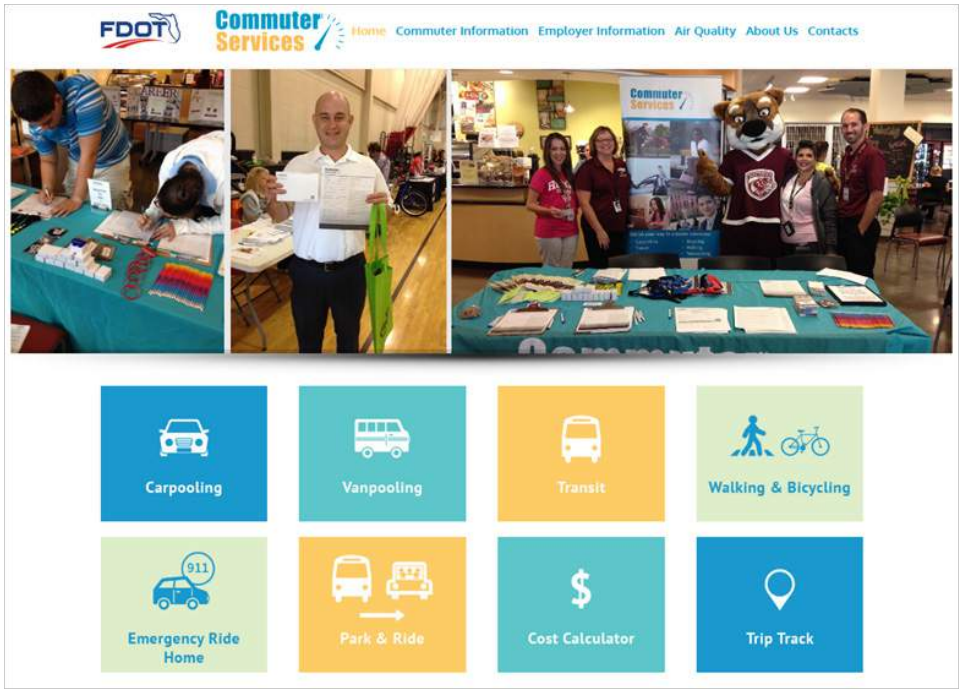


Figure 8-4: Percent of Roadway Miles by Level of Service

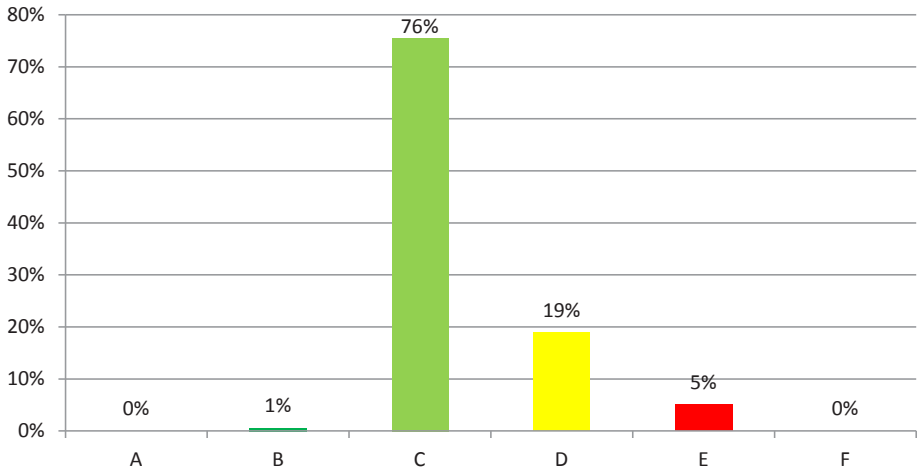


Figure 8-5: Percent of Vehicle Miles Traveled by Level of Service

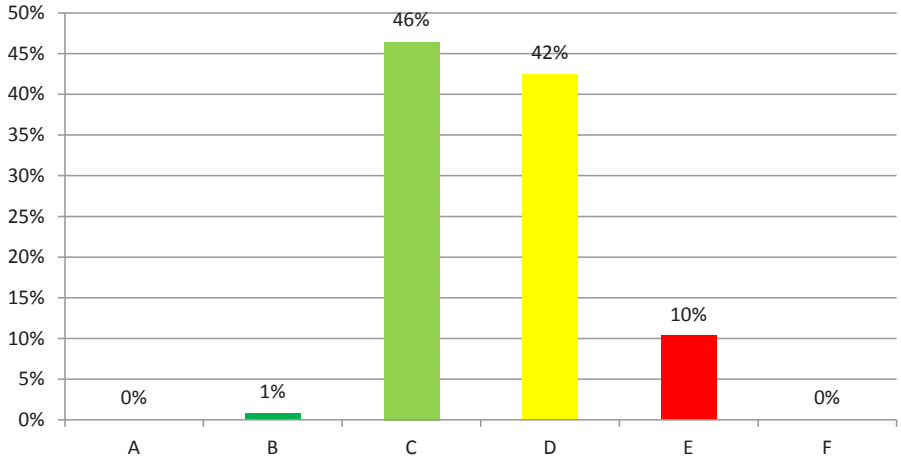
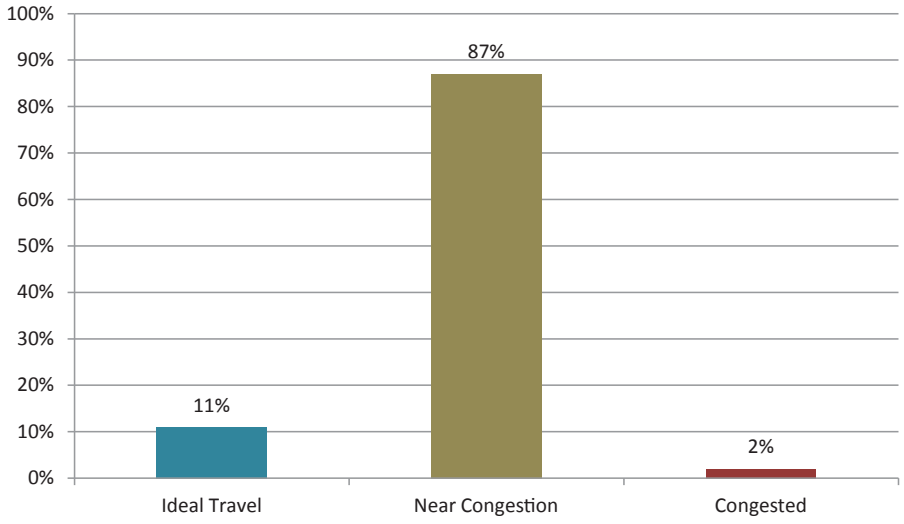


Figure 8-6: Percent of Truck Vehicle Miles Traveled on Congested Roads



While there are not localized TDM services, FDOT District One runs Commuter Services of Southwest Florida for the 12 counties in southwest Florida, including Charlotte County. It is a formalized TDM program that helps match commuters with similar home and work destinations, as well as manages a vanpooling service, and offering resources for reducing trips and costs for all commuters.

For all 12 counties served during 2013, Commuter Services of Southwest Florida tracked 83 carpools and vanpools and managed nine vans. **Table 8-2** includes other metrics as measured in 2012.

Table 8-2: Commuter Services of Southwest Florida District-Wide Statistics (2012)

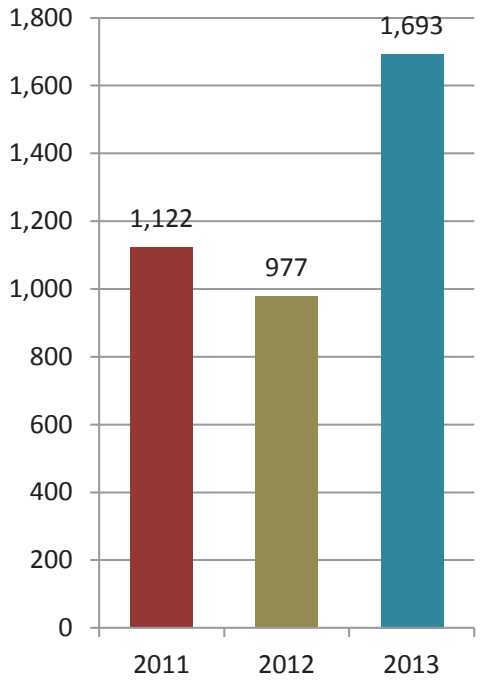
Performance Measure	Result
Vehicle miles of travel reduced (annually)	620,700
Vehicle trips reduced (annually)	23,800
Percent of drive-alone customers switching to an alternative	16.90%
Daily current carpool and vanpool person trips	83
Round-trip commutes avoided by use of telework	30,757 trips
Customer round-trip commutes avoided by use of alternative work schedules	119,611 trips
Gasoline consumption reduced (gallons annually)	28,800
Carbon Dioxide avoided (annually)	260 metric tons
Carbon footprint	260 metric tons

The Charlotte County TDP suggests using park-and-ride lots to encourage shifts from single-occupant vehicles to transit or other alternative modes. Six locations are proposed for establishing shared-use park-and-ride facilities, including Murdock, Parkside, I-75 and Kings Highway interchange, Englewood Library/Tringali Park, West Englewood, and the medical area in Punta Gorda.

Safety

Addressing safety issues tackles the second most common cause of congestion as well as saves lives, prevents property damage, and reduces private and public expenses. There was a sizable increase in crashes in 2013 (**Figure 8-7**).

Figure 8-7: Total Crashes in Charlotte County (2011-2013)



Source: FDOT Safety Office, 2015

FDOT's Safety Office prepares the Strategic Highway Safety Plan (SHSP) to highlight key traffic safety areas and is used to focus data collection, analysis, and actions where they are needed most. Emphasis is placed on certain types of crashes:

- **Aggressive Driving**: speeding, improper lane change, following too closely, failure to yield right-of-way, improper passing, failure to obey traffic control devices
- **Intersections:** occur at or within 250 feet of a signalized or unsignalized intersection
- **Vulnerable Road Users:** pedestrians, bicyclists, motorcyclists

- **Lane Departures:** head-on collisions, running off the road, crossing the center median
- **Impaired Driving**: resulting from alcohol and/or drug-impairment
- **At-Risk Drivers:** aging road users (ages 65 or older) and teens (ages 15 to 19)
- **Distracted Driving:** resulting from taking eyes and/or mind off the road, and/or taking hands off the wheel

Figure 8-8 shows the trends of all crashes within these safety emphasis areas over three years. **Figures 8-9** and **8-10** show the trend of injury crashes and fatal crashes, respectively. **Table 8-3** lists the total crashes, injuries, and fatalities by emphasis area.

Crash data plays an important role in the CMP and is further analyzed with GIS in Step 7 below.

Step 5 – Institute System Performance Monitoring Plan

For a CMP to be truly effective, it requires a coordinated program of data collection and system performance monitoring to assess the extent of congestion and to see whether remedial steps are working. Data collection needs are based on the performance measures selected. The data should be relevant to the area, readily available, timely, reliable, consistent, and receptive to forecasting.

The goal of the CC-PG MPO CMP system monitoring plan is to develop an ongoing system that relies primarily on data already collected or planned to be collected in the county. The components of the plan include roadways, bicycle/pedestrian/trail, TDM, and goods movement where:

- Roadways are monitored through annual LOS analysis using traffic counts and other data constantly collected throughout the region.
- Crashes are monitored to measure non-recurring congestion.
- Bicycle/pedestrian/trail data are monitored and updated in various city and county databases.
- Significant goods movement corridors are evaluated to address mobility needs of goods movement providers.

It is recommended that the CC-PG MPO use an Annual Congestion Management System Report to document performance.

Table 8-3: Total Crashes, Injury Crashes/Injuries, and Fatal Crashes/Fatalities

Emphasis Area	2011			2012			2013		
	Crash Total	Injury Total (Injuries)	Fatality Total (Fatalities)	Crash Total	Injury Total (Injuries)	Fatality Total	Crash Total	Total Injury Crashes (Injuries)	Total Fatal Crashes (Fatalities)
Aggressive Driver	17	12 (18)	1 (1)	23	15 (22)	0	48	28 (35)	1 (2)
At Risk Drivers	395	293 (493)	12 (14)	335	326 (441)	10 (11)	723	400 (662)	6 (7)
Distracted Driver	0	0	0	0	0	0	0	0	0
Impaired Driving	91	48 (63)	5 (5)	88	47 (73)	6 (6)	99	55 (72)	12 (13)
Intersections	578	408 (658)	10 (12)	448	307 (527)	4 (5)	826	452 (716)	12 (13)
Lane Departure	310	185 (262)	8 (8)	297	172 (255)	6 (6)	502	221 (305)	7 (8)
Vulnerable Road User	161	148 (157)	13 (15)	139	123 (140)	5 (5)	147	123 (133)	12 (12)

Figure 8-8: Total Crashes by State Safety Emphasis Area (2011-2013)

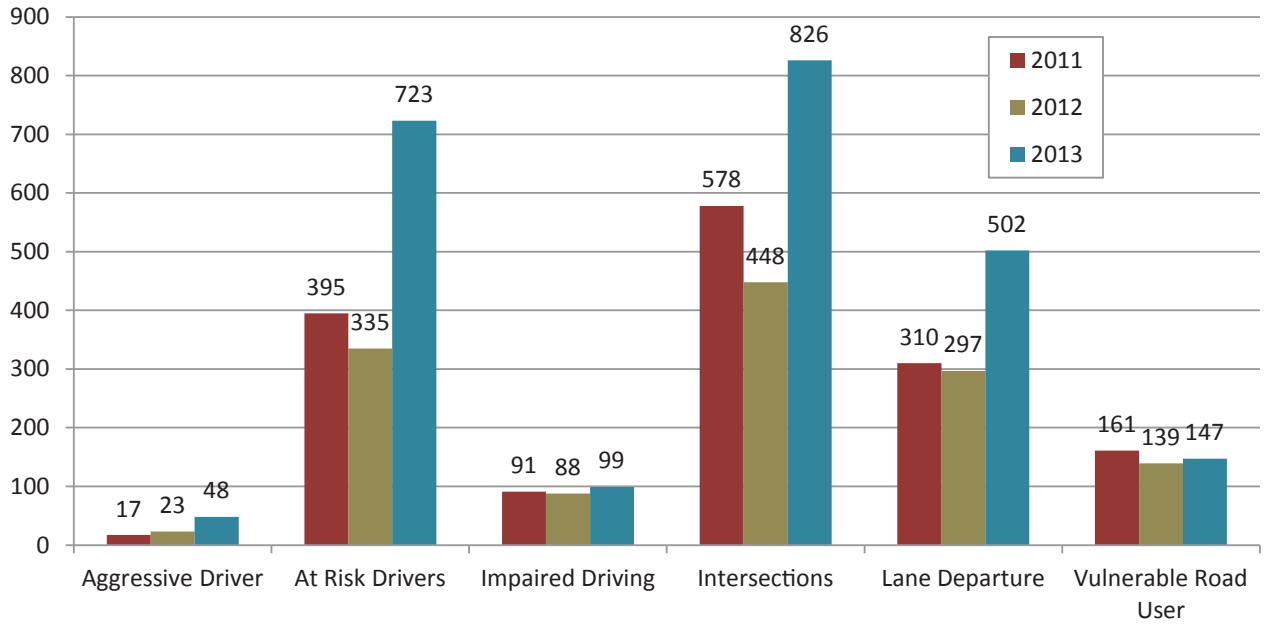


Figure 8-9: Total Injury Crashes by State Safety Emphasis Area (2011-2013)

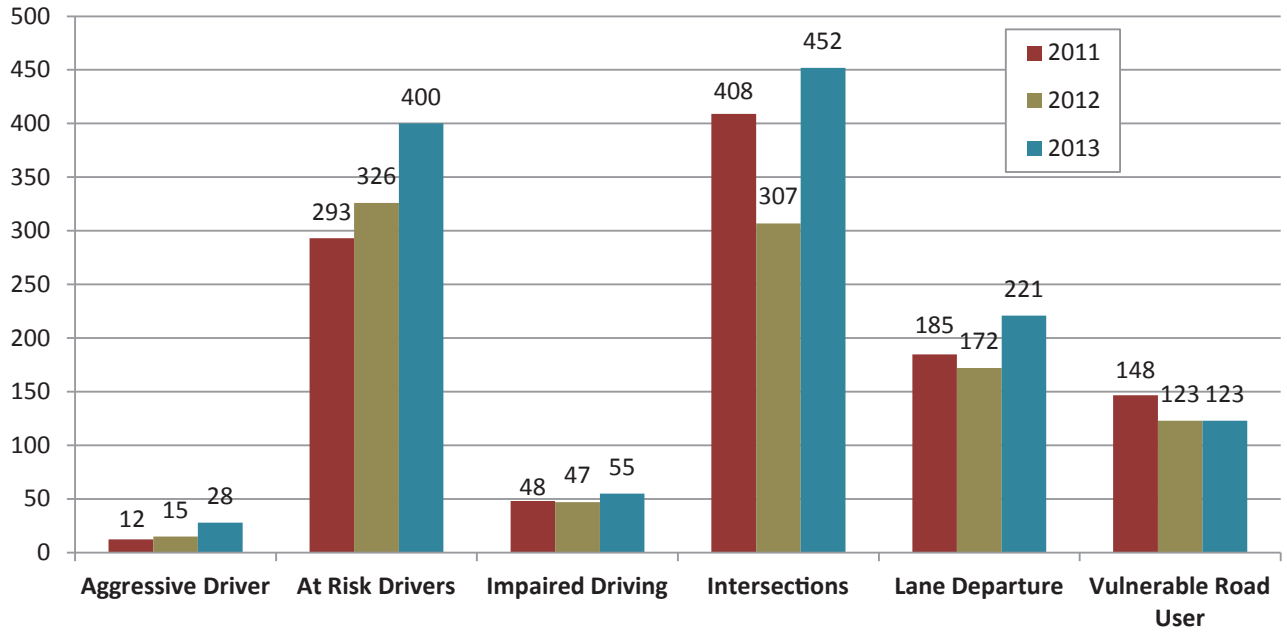
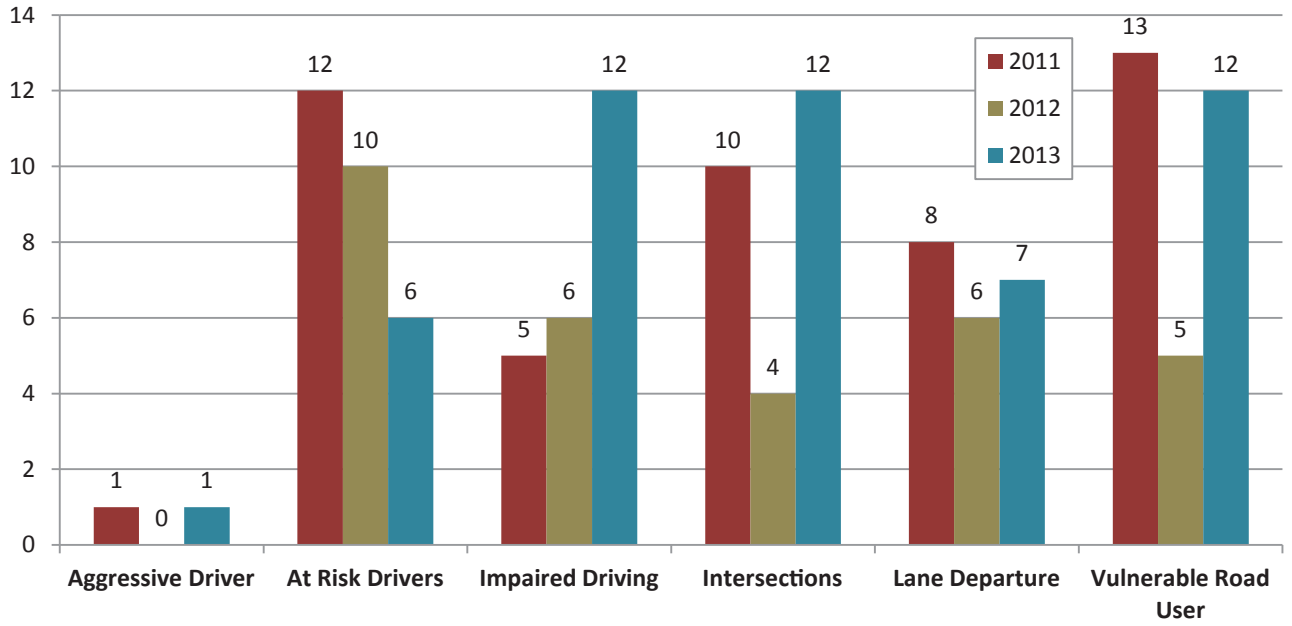


Figure 8-10: Total Fatal Crashes by State Safety Emphasis Area (2011-2013)



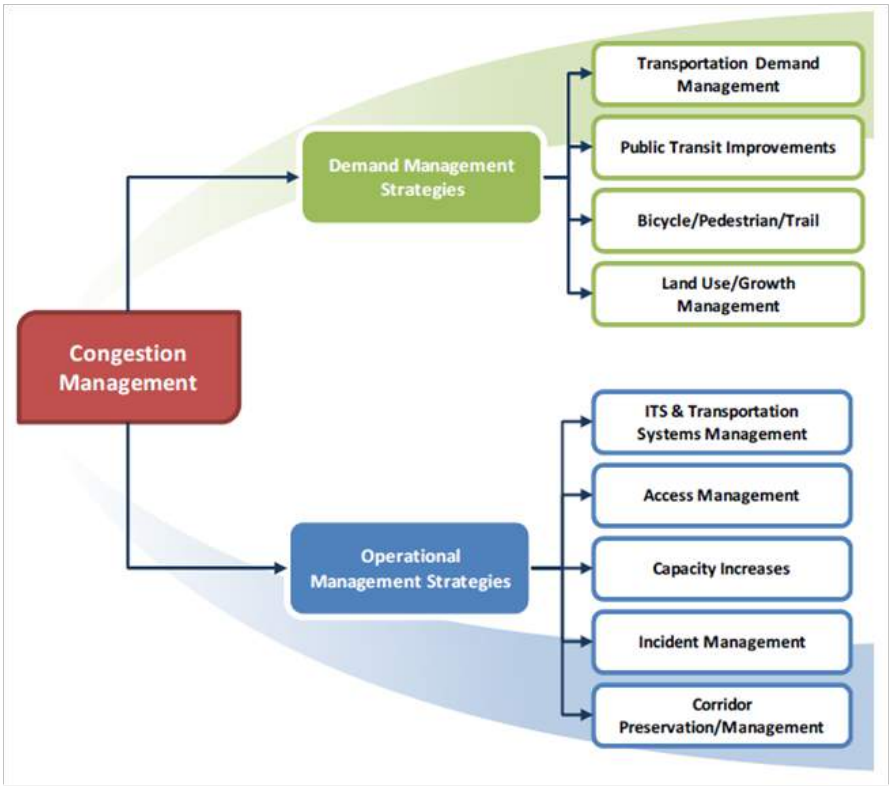
Step 6 – Identify and Evaluate Strategies

As the CMP is performance-based, strategies that manage congestion should be identified and evaluated for their performance. A full range of potential strategies should be considered, including management and operational strategies (including travel demand management), land use strategies, and infrastructure improvements.

An evaluation would rely upon the performance measures selected and assess whether associated objectives were realized. This step of the CMP identifies and evaluates the strategies intended for mitigating existing and future congestion in the Charlotte County roadway network.

A full range of potential strategies has been identified for the MPO's multimodal CMP network. These strategies can be grouped into two broad categories highlighted in **Figure 8-11**: demand management and operational management. These strategies are presented to help policy makers and planners select and use congestion reduction and/or mitigation strategies.

Figure 8-11: Congestion Management Strategies



Congestion Management Strategies

Transportation Demand Management

These strategies are used to reduce the use of single occupant motor vehicles, as the overall objective of TDM is to reduce the miles traveled by automobile. The following TDM strategies, not in any particular order, are available for consideration in the toolbox to potentially reduce travel in the peak hours. Strategies include:

- Congestion Pricing
- Alternative Work Hours
- Telecommuting
- Guaranteed Ride Home Programs
- Alternative Mode Marketing and Education
- Safe Routes to Schools Program
- Preferential or Free Parking for HOVs

The following TDM strategies shift trips from Single Occupant Vehicle trips to High Occupancy Vehicle use:

- Ridesharing (Carpools and Vanpools)
- High Occupancy Vehicle Lanes
- Park-and-Ride Lots
- Employer/Landlord Parking Agreements
- Parking Management
- Managed Lanes

Public Transit Strategies

Two types of strategies, capital and operating, are used to enhance the attractiveness of public transit services to shift auto trips to transit. Transit capital improvements generally modernize the transit systems and improve their efficiency; operating improvements make transit more accessible and attractive. The following strategies are included in the toolbox for consideration:

- Transit Capacity Expansion
- Increasing Bus Route Coverage or Frequencies
- Implementing Premium Transit
- Providing Real-Time Information on Transit Routes
- Reducing Transit Fares
- Provide Exclusive Bus Right-of-Way

Non-Motorized Transportation Strategies

Non-motorized strategies include bicycle, pedestrian, and trail facility improvements that encourage non-motorized modes of transportation instead of single occupant vehicle trips. The following strategies are included:

- New Sidewalk Connections
- Designated Bicycle Lanes on Local Streets
- Improved Bicycle Facilities at Transit Stations and Trip Destinations
- Improved Safety of Existing Bicycle and Pedestrian Facilities
- Exclusive Non-Motorized Right of Way

Premium Transit in Managed Lanes


Transit Use

Land Use/Growth Management Strategies

The strategies in this category include policies and regulations that would decrease the total number of auto trips and trip lengths while promoting future transit and non-motorized transportation options. These strategies include the following:

- Negotiated Demand Management Agreements
- Trip Reduction Ordinance
- Infill Developments
- Transit Oriented Development
- Design Guidelines for Pedestrian Oriented Development
- Mixed-Use Development

Operational Management Strategies

Intelligent transportation Systems Strategies

The strategies in ITS use new and emerging technologies to mitigate congestion while improving safety and environmental impacts. Typically, these systems are made up of many components, including sensors, electronic signs, cameras, controls, and communication technologies. ITS strategies are sets of components working together to provide information and allow greater control of the operation of the transportation system. The following strategies are included in the toolbox:

- Dynamic Messaging
- Advanced Traveler Information Systems
- Integrated Corridor Management
- Transit Signal Priority

Transportation Systems Management Strategies

Transportation Systems Management (TSM) strategies identify operational improvements to enhance the capacity of the existing system. These strategies typically are used together with ITS technologies to better manage and operate existing transportation facilities. The following strategies are included in the toolbox:

- Traffic Signal Coordination
- Channelization
- Intersection Improvements:
- Bottleneck Removal
- Vehicle Use Limitations and Restrictions
- Improved Signage
- Geometric Improvements for Transit
- Intermodal Enhancements
- Goods Movement Management

Access Management

- Access Management Policies

Incident Management

- Freeway incident detection and management systems

Corridor Preservation/Management

- Corridor Preservation
- Corridor Management

Dynamic Digital Message Sign


Traffic Signal Coordination

Increase Capacity

Strategies to add capacity are the most costly and least desirable strategies and should be considered as last resort methods for reducing congestion. As the strategy of cities trying to "build" themselves out of congestion has not provided the intended results, capacity-adding strategies should be applied after determining the demand and operational management strategies identified earlier are not feasible solutions. The key strategy is to increase the capacity of congested roadways through additional general purpose travel lanes.

Step 7 – Implement Selected Strategies/Manage the System

This step involves implementing and managing the defined strategies. The congested corridors can be screened for application of the strategies above. However, new strategies may be added and/or removed based on the prevailing conditions and local decisions.

This process recommends that capacity improvement projects for the CMP roadway network provide documentation that the applicability of strategies have been evaluated and used as feasible. Once all the appropriated strategies have been evaluated/considered on the corridor, adding capacity may be considered an applicable congestion management strategy.

Managers of the CMP should work closely with the operating agencies that have participated in the CMP. Information developed throughout the process should be applied to establish priorities in the TIP, thereby facilitating the implementation of the CMP. This ensures a linkage between the CMP and funding decisions either through a formal ranking and weighting of strategies and projects, or through other formal or informal approaches.

Highest consideration is given to congested corridors with high crash rates. As crashes are the second most common cause of congestion and typically cause congestion at unpredictable times, addressing crashes through the CMP addresses a number of high-cost issues.

All of the reported crashes in Charlotte County from 2011 through 2013 were analyzed to determine the highest crash corridors and intersections. As **Figure 8-12** shows, the crashes are concentrated on US 41 between SR 776 and US 17 as well as two hot spots at the interchanges with Interstate 75 and Kings Highway and Duncan Road (US 17). Similarly, crashes involving bicycles and/or pedestrians were analyzed to identify hot spots, and are shown in **Figure 8-13**.

Advanced Traveler Management

Access Management through Driveways and Channelization

Table 8-4 lists the top 20 crash intersections from 2011 to 2013. Determining the safety hot spot locations allows local transportation and public safety officials to select and tailor the strategies from the menu above.

Step 8 – Monitor Strategy Effectiveness

Finally, as with the objectives-driven, performance-based approach, the CMP is an iterative process. Each step is evaluated and opportunities for improvement are noted. Based on the feedback received, an MPO should revise its CMP and restart the process anew.

Table 8-4: Top 20 Crash Intersections (2011-2013)

Rank	Rank by Crash Total				
	On	Intersecting	Total	Main RD AADT	by Volume
1	US 41	Cochran Blvd	36	53,500	0.07
2	US 41	Midway Blvd	32	53,500	0.06
3	US 41	Olean Blvd	29	46,000	0.06
4	US 41	Conway Blvd	27	41,500	0.07
5	US 41	Olympia Ave	26	16,000	0.16
6	US 41	Toledo Blade Blvd	24	32,000	0.08
7	US 41	Harbor Blvd	22	41,500	0.05
8	US 41	Easy St	21	41,500	0.05
9	US 41	Port Charlotte Blvd	20	46,000	0.04
10	US 41	Murdock Cir	20	50,000	0.04
11	US 41	El JoBean Rd	19	37,000	0.05
12	El JoBean Rd	Toledo Blade Blvd	17	20,500	0.08
13	S McCall Rd	Oceanspray Blvd	15	16,500	0.09
14	S McCall Rd	Sunnybrook Blvd	15	23,000	0.07
15	Duncan Rd/US 17	I-75	15	17,400	0.09
16	Kings Hwy	Veterans Blvd	15	19,800	0.08
17	US 41	Marion Ave	14	16,000	0.09
18	S McCall Rd	Gulfstream Blvd	14	24,500	0.06
19	El JoBean Rd	Veterans Blvd	13	18,900	0.07
20	US 41	Gardner Dr	12	41,500	0.03

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Figure 8-12: Top Crash Locations - All Crashes (2011-2013)

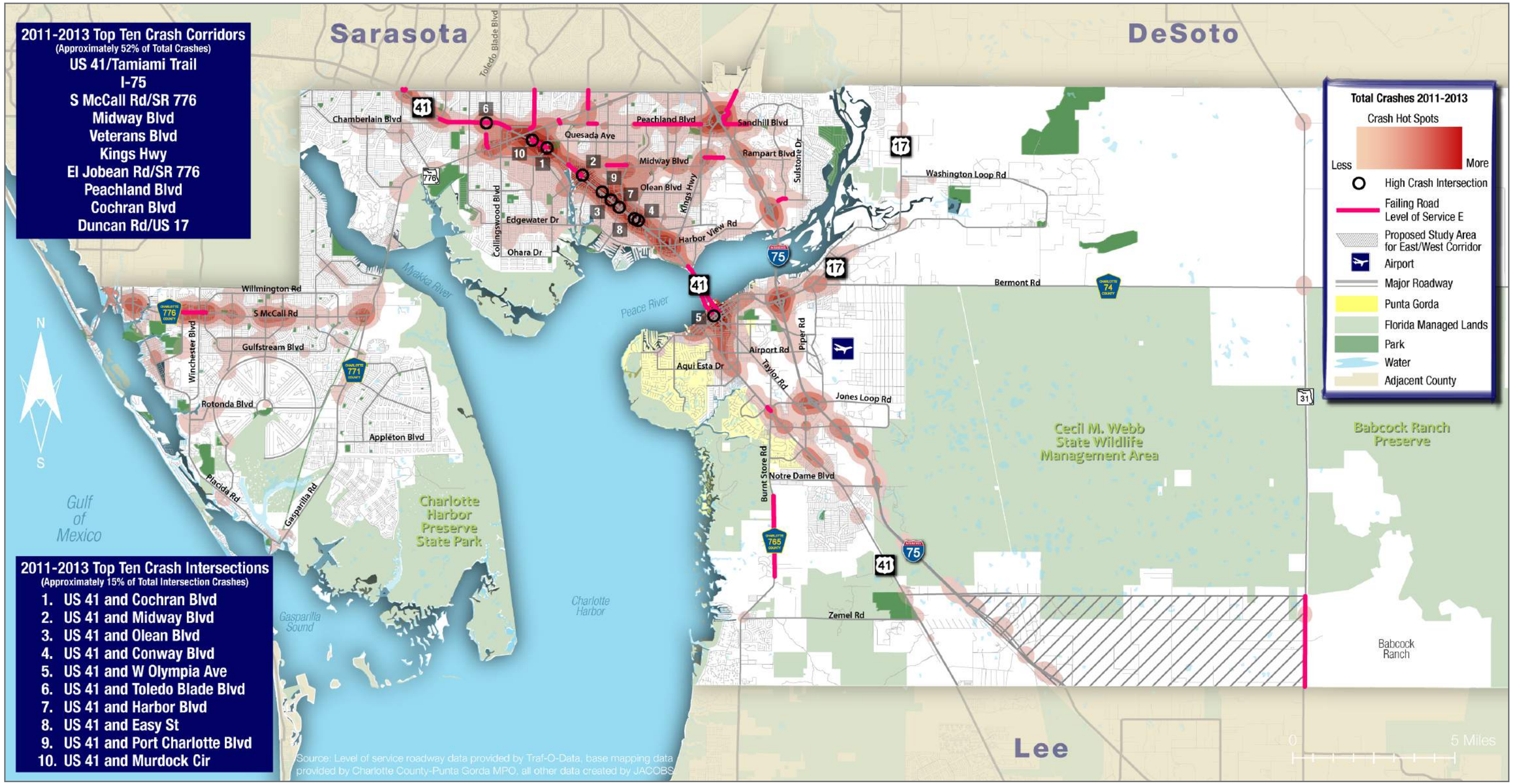

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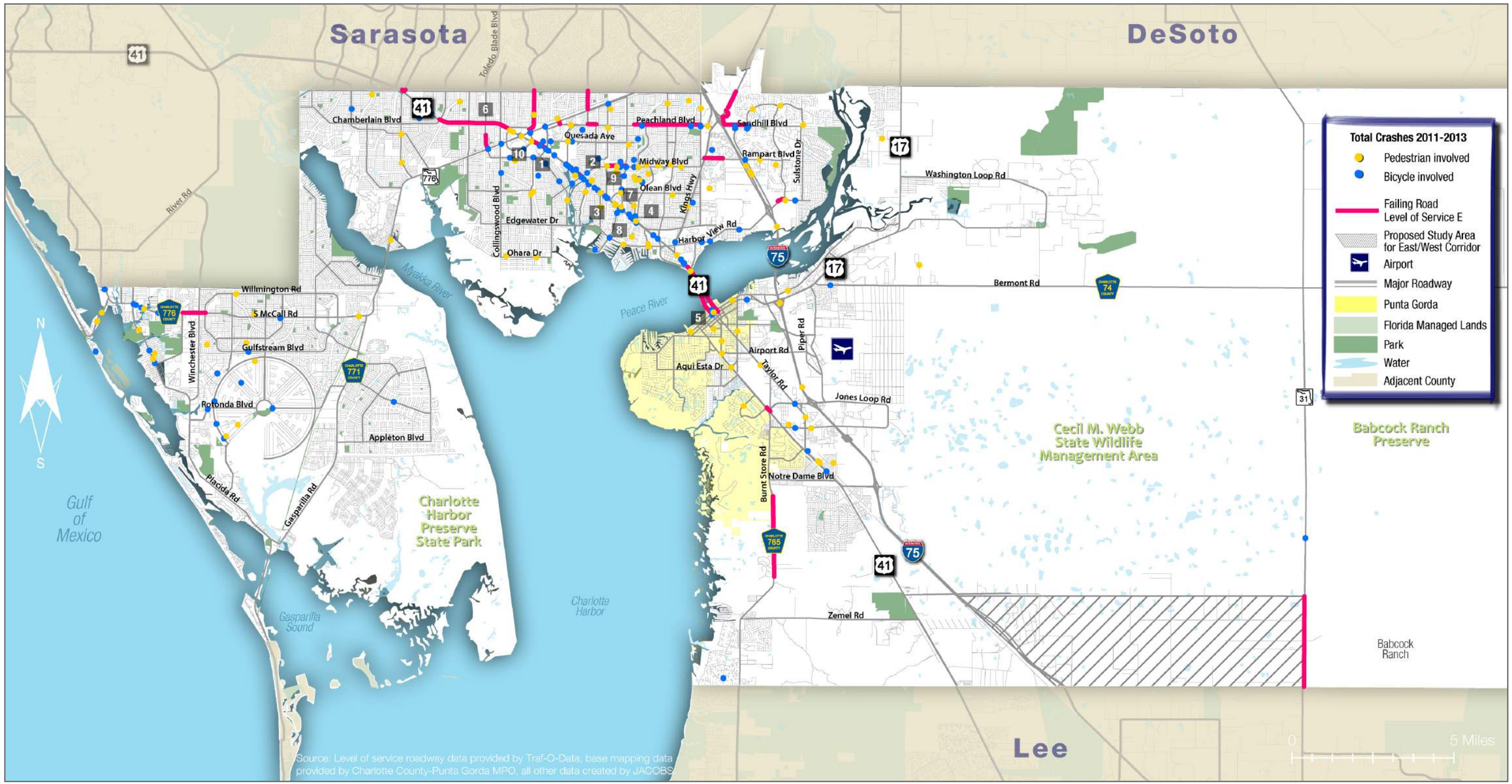
Figure 8-13: Top Crash Locations - Bicycle and Pedestrian Crashes (2011-2013)



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