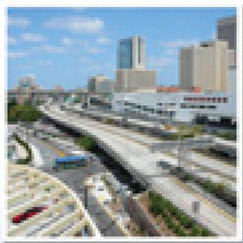
MIAMI-DADE **2040**

Long Range Transportation Plan

Congestion Management Process Report

October 23, 2014

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

This page intentionally left blank

MIAMI-DADE
2040 LONG RANGE TRANSPORTATION PLAN
Metropolitan Planning Organization for the Miami Urbanized Area

This document was prepared by the Metropolitan Planning Organization (MPO) for the Miami Urbanized Area in collaboration with Florida Department of Transportation, Miami-Dade Expressway Authority, Florida's Turnpike Enterprise, South Florida Regional Transportation Authority, Miami-Dade League of Cities, Miami-Dade County Regulatory and Economic Resources Department, Miami-Dade County Public Works and Waste Management Department, Miami-Dade Transit Agency, Miami-Dade Aviation Department, Miami-Dade Seaport Department, Miami-Dade County Office of Strategic Business Management, City of North Miami, City of Hialeah, City of Miami, City of Miami Beach, City of Miami Gardens, City of Homestead, Miami-Dade County Public Schools, Miami-Dade MPO Citizens Transportation Advisory Committee, Bicycle/Pedestrian Advisory Council, Freight Transportation Advisory Committee, Transportation Aesthetics Review Committee, Broward MPO, Palm Beach MPO, and South Florida Regional Planning Council.

The Miami-Dade MPO complies with the provisions of Title VI of the Civil Rights Act of 1964, which states: No person in the United States shall, on grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. It is also the policy of the Miami-Dade MPO to comply with all of the requirements of the Americans with Disabilities Act. For materials in accessible format please call (305) 375-4507.

The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

MOBILITY OPTIONS
2040 Miami-Dade Transportation Plan
EYES ON THE FUTURE

CONGESTION MANAGEMENT PROCESS REPORT

Prepared for:
Metropolitan Planning Organization for the Miami Urbanized Area
111 NW 1st Street
Suite 920
(p) 305.375.4507 – (f) 305.375.4950

Prepared by:
Gannett Fleming, Inc.

In Association with:
AECOM Technical Services, Inc.
Cambridge Systematics, Inc.
Charesse Chester & Associates, Inc.
Decisions Lens, Inc.
Kittelson & Associates, Inc.
Parsons Brickerhoff
The Corradino Group

OCTOBER 2014

Table of Contents

List of Tables

List of Figures

Introduction of Congestion Management Process

Background

Pursuant to Title 23 U.S. Code § 134 – Metropolitan Transportation Planning, a congestion management process (CMP) is required in Transportation Management Areas (TMA), which are metropolitan areas with population greater than 200,000. Congestion management is the application of strategies to improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods. A congestion management process (CMP) is a systematic and regionally accepted approach for managing congestion that provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs. The CMP is intended to move these congestion management strategies into the funding and implementation stages.[1]

The concept of CMP evolved from Congestion Management System, which was first introduced by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 and continued under the Transportation Equity Act for the 21st Century (TEA-21). Starting from the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), it has been referred to a congestion management process, reflecting that the goal of the law is to utilize a process that is an integral component of metropolitan transportation planning.

The CMP is intended to be an on-going process, fully integrated into the metropolitan transportation planning process; the CMP is also a living document, continually evolving to address the results of performance measures, concerns of the community, new objectives and goals of the MPO, and up-to-date information on congestion issues. CMP shall be developed and implemented as an integrated element of the metropolitan planning process.

Federal and State Requirements on CMP

Title 23 CFR Section 450.320 documents Federal Requirements on CMP in TMAs. These requirements are summarized below[2]:

- 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 eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53 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 and the TIP.

- The congestion management process shall be developed, established, and implemented as part of the metropolitan transportation planning process that includes coordination with transportation

[1] Congestion Management Process: A Guidebook, Federal Highway Administration, U.S. DOT, April 2011.

[2] http://www.ecfr.gov/cgi-bin/text-idx?SID=b0632257c9446466293356edff3c53bb&node=23:1.0.1.5.11.3.1.11&rgn=div8, accessed on June 20, 2014

system management and operations activities. The congestion management process shall include: (1) Methods to monitor and evaluate the performance of the multimodal transportation system and its congestion; (2) Definition of congestion management objectives and appropriate performance measures that are tailored to the specific needs of the area with other stakeholders in the covered area; (3) Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions; (4) Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies, such as demand management measures, traffic operational improvements, public transportation improvements, ITS technologies, and where necessary, additional system capacity; (5) Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy proposed for implementation; and (6) Implementation of a process for periodic assessment of the effectiveness of implemented strategies.

- In TMAs designated as nonattainment for ozone or carbon monoxide pursuant to the Clean Air Act, the congestion management process shall provide an appropriate analysis of reasonable travel demand reduction and operational management strategies for the corridor in which a project that will result in a significant increase in capacity for SOVs is proposed to be advanced with Federal funds.

Miami-Dade MPO CMP

The Miami-Dade Metropolitan Planning Organization (MPO) has an established congestion management process. This report documents the update to the 2009 Miami-Dade Congestion Management Process, which described in detail Miami-Dade MPO's CMP and executive mechanism, identified congested spots and corridors, and identified strategies for these hotspots and corridors. In this 2014 CMP update, all the 2009 CMP components were re-evaluated and updated. Congestion management strategies were developed for the identified hotspots and congested corridors and funding sources were identified for implementing these strategies.

Components of the 2014 CMP Update

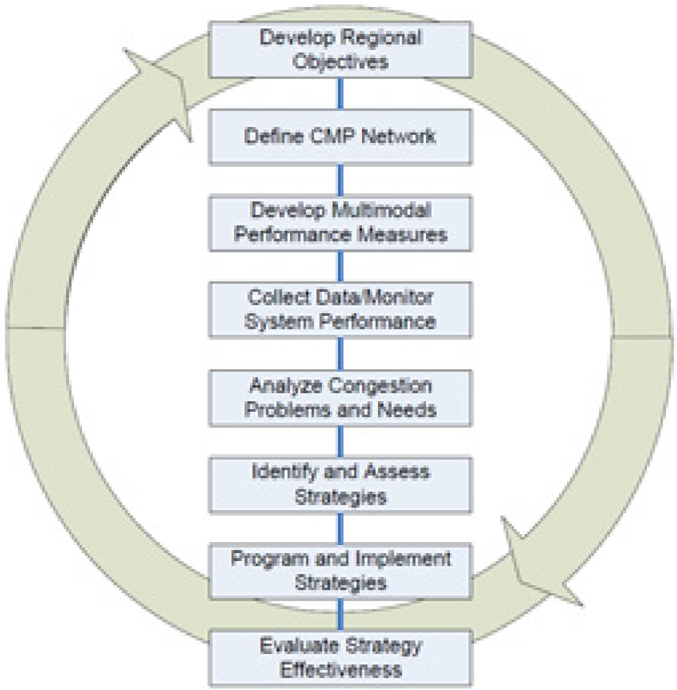
According to the FHWA *Congestion Management Process: A Guidebook*, a successful CMP model is built upon eight actions including:

1. Develop regional objectives for congestion management: it may not be feasible or desirable to try to eliminate all congestion; therefore it is important to define objectives for congestion management that achieve the desired outcome.

2. Define CMP network: this action defines both the geographic scope and system elements that will be analyzed in the CMP.

3. Develop multimodal performance measures (PMs): this action involves developing PMs that will be used to measure congestion on both a regional and local scale.

4. Collect data/monitor system performance: after PMs are defined, data should be collected and analyzed to determine system performance.



Source: Congestion Management Process: A Guidebook, FHWA

Figure 1: Elements of the CMP

5. Analyze congestion problems and needs: this action involves identification of existing and future congestions, and causes of unacceptable congestion.

6. Identify and assess strategies: this action involves both identifying and assessing potential strategies to mitigate congestion.

7. Program and implement strategies: this action involves including strategies in the LRTP, determining funding sources, prioritizing strategies, allocating funding in the TIP, and ultimately, implementing these strategies.

8. Evaluate strategy effectiveness: this action involves assessment of implemented CMP strategies and is designed to inform future decision making about effectiveness of transportation strategies in the region.

This eight-step CMP model was followed by the study team in the 2014 Miami-Dade CMP update process. With the understanding that CMP is an on-going process which requires continuous data collection, performance monitoring and strategies assessment, CMP PMs and data required (actions 3 and 4 above) are divided into two sets that serve two purposes in this update:

- For the purpose of on-going monitoring and evaluation:
    - PMs developed to be used on continuously monitoring the performance of congested corridors and hotspots identified in Miami-Dade County
    - Data required to determine PMs for continuous monitoring and evaluation
- For the purpose of identifying future congestion:
    - PMs developed to identify future congestion
    - Data required to determine PMs for identification of future congestion

Different from the 2009 CMP documentation, the 2014 CMP is documented as a chapter of the 2040 LRTP with the intention of integrating the CMP fully into the LRTP update process. The content of the chapter is organized around the eight actions in the order presented above.

CMP Objectives

The starting point of CMP update is the update of objectives for congestion management. Defining congestion management objectives are also required as part of the CMP per Federal regulation 23 CFR 450.320 (c) 2. In the 2014 CMP update, CMP objectives were drawn from Miami-Dade County's 2040 LRTP goals and objectives. **Table 1** documents the 2040 LRTP goals and corresponding objectives addressing congestion management:

Table 1: CMP Objectives Adopted from the 2040 LRTP

2040 LRTP Goals	2040 LRTP Objectives
• Improve transportation system and travel – LRTP Goal1	• Enhance mobility for freight and people - LRTP Objective 1.2 • Reduce congestion - LRTP Objective 1.3 • Promote system reliability - LRTP Objective 1.6 • Promote non-motorized projects through new projects or reconstruction - LRTP Objective 1.9
Support economic vitality – LRTP Goal 4	• Increase access to employment sites - LRTP Objective 4.1 • Increase and improve passenger and good access to airports and seaports - LRTP Objective 4.3 • Enhance the efficient movement of freight goods - LRTP Objective 4.5
Protect and preserve the environment, quality of life and promote energy consumption – LRTP Goal 5	• Coordinate transportation investments with other public and private decisions to foster livable communities - LRTP Objective 5.10
Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight – LRTP Goal 6	• Improve connectivity to Strategic Intermodal System (SIS) and intermodal facilities - LRTP Objective 6.1 • Improve goods movement by enhanced intermodal access and other infrastructure that serve major freight origins and destinations in Miami-Dade County (And Regional) - LRTP Objective 6.4

Source: Gannet Fleming, Inc. and Cambridge Systematics, Inc

These objectives serve as one of the primary points of connection between the CMP and LRTP, and define the direction for development of CMP PMs.

CMP Network

Before conducting any CMP analysis, a specific geographic area and network of surface transportation facilities should be defined. In the previous 2009 CMP update, the CMP area of application consisted of the urbanized Miami area; the CMP network was defined based on the MPO's designated Major Road Network. In the 2014 CMP update, the CMP area is defined as the Miami-Dade County portion of the regional travel demand model (SERPM 7.0) area, and the CMP roadway network is defined as the Miami-Dade County portion of the SERPM 7.0 network. **Table 2** presents the approximate centerline miles and lane miles of the CMP roadway network. **Figure 2** shows the map of the CMP roadway network.

Table 2: CMP Roadway Network Centerline Miles and Lane Miles

Facility Type	Centerline Miles*	Lane Miles
Freeways	69	276
Uninterrupted Roadways	38	151
Higher Speed Interrupted Facility	560	2,241
Lower Speed Facility and Collector	812	3,250
Ramps	52	209
HOV	4	14
Toll	90	359
Total	1,625	6,500

* Centerline Miles shown in this table is a rough estimate using SERPM model.

Source: SERPM E+C Model as of March 21st, 2014, and Cambridge Systematics, Inc analysis.

Different from the 2009 update, in the 2014 CMP update process, transit, freight, and non-motorized modes are evaluated through the 2040 LRTP update process as a separate effort, thus are not included in the CMP update process.

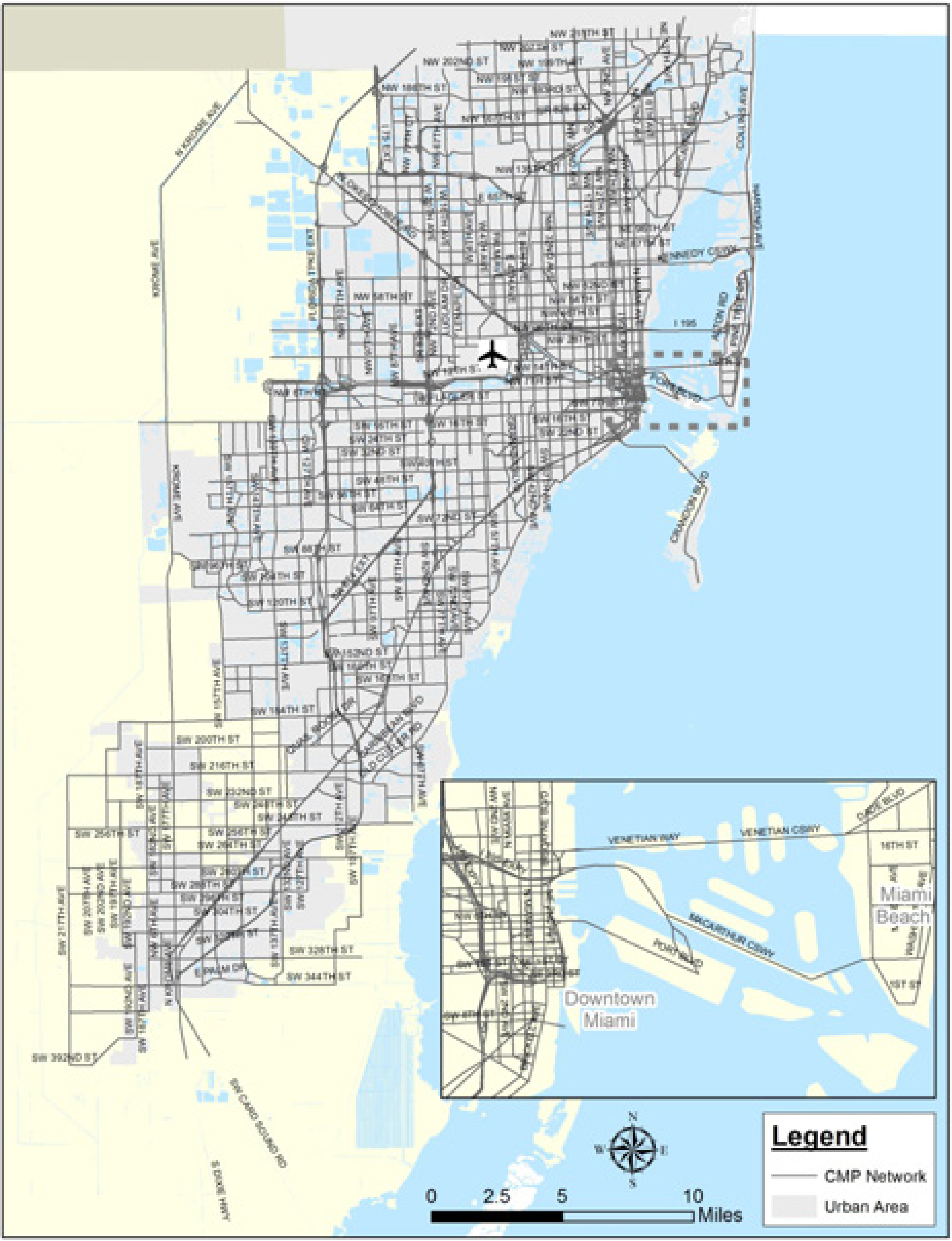


Figure 2: Miami-Dade County CMP Roadway Network

CMP Performance Measures

CMP is a performance-based process. The Federal Highway Administration (FHWA) supports performance-based programs like the CMP. Mobility performance measures, along with other measures, are emphasized in the federal transportation legislation MAP-21. CMP PMs are used to characterize current and future conditions on the transportation system in the region. They provide an indicator of Miami-Dade MPO's progress in meeting their goals. As mentioned previously, with the understanding that CMP is an on-going process which requires continuous data collection, performance monitoring and strategies assessment, CMP PMs and data required are divided into two sets that serve two purposes in this update: 1) on-going monitoring and evaluation; and 2) identifying future congestion. There are a large range of measures that can be considered for use in the CMP. They generally represent four dimensions of congestion recommended by the FHWA CMP Guidebook:

- intensity
- duration
- extent, and
- variability

The PMs recommended here are most appropriate for use in Miami-Dade MPO's CMP, and are most consistent with Miami-Dade's 2040 LRTP PMs and FHWA recommendations. Some of these PMs are not supported by data currently available or affordable in Miami-Dade, however, they provide guidance to future data collection efforts when resources become available or affordable.

Performance Measures for On-Going Monitoring and Evaluation

A number of PMs are recommended to serve the CMP goals and objectives identified previously, they are described below:

- Average travel time: This measure assesses the quality of travel and could be applied at the level of facility, corridor, and systemwide.
- Hours of delay: This measure assesses the quality of travel and could be applied at the point, segment, facility, corridor, and systemwide level.
- Planning time index: This measure assesses the quality of travel and could be applied at the facility, corridor, and systemwide level.
- Percent sidewalk and bike lane coverage: These measures evaluate the accessibility of nonmotorized transportation options and could be applied at the facility, corridor, and systemwide level.
- Percent of population within 20 minutes of employment center: This measure evaluates accessibility to jobs and could be assessed at a system level.
- Connector level of service: This measure evaluates the accessibility to hubs and could be applied at the facility and system level.
- Truck hours of delay: This measure assesses the quality of truck travel and could be applied at the point, segment, facility, corridor, and systemwide level.

- Transit, sidewalk, and trail miles per highway centerline miles: These measures evaluate the accessibility of nonmotorized transportation options and could be applied at the facility, corridor, and systemwide level.

- Truck travel time: This measure assesses the quality of truck travel and could be applied at the facility, corridor, and systemwide level.

Table 3 links the LRTP goals and objectives served by the above described CMP PMs.

Table 3: CMP On-Going Monitoring and Evaluation PMs

2040 LRTP Goals	2040 LRTP Objectives	CMP Performance Measures
Improve transportation system/travel	• Enhance mobility for freight and people • Reduce congestion • Promote system reliability • Promote nonmotorized projects through new projects or reconstruction	• Average travel time • Hours of delay • Planning time index* • Percent sidewalk and bike lane coverage*
Support economic vitality	• Increase access to employment sites • Increase and improve passenger and good access to airports and seaports • Enhance the efficient movement of freight goods	• Percent of population within 20 minutes of employment center* • Connector level of service* • Truck hours of delay*
Protect and preserve the environment	• Coordinate transportation investments with other public and private decisions to foster livable communities	• Transit, sidewalk, and trail miles per highway centerline miles
Enhance integration and connectivity of the transportation system	• Improve connectivity to Strategic Intermodal System (SIS) and intermodal facilities • Improve goods movement by enhanced intermodal access and other infrastructure that serve major freight origins and destinations in Miami-Dade County (And Regional)	• Connector level of service* • Truck travel time*

* PMs denoted with "*" are PMs not included in the LRTP PMs.

Currently FHWA is working on development of PMs at the national level. The Miami-Dade CMP PMs will be updated to be consistent with the FHWA PMs when they are finalized.

Performance Measures for Identifying Future Congestion

The SERPM 7.0 E+C model, dated March 21, 2014, was used to evaluate future congestion. The SERPM model provides future network data, estimated future traffic, and volume assignment. Miami-Dade's 2040 LRTP also used the SERPM model to conduct various analyses. A number of measures provided by the model were chosen as the PMs for identifying future congestion, including:

- AM-peak, PM-peak, and off-peak volumes;
- Level of service E capacity;
- AM-peak, PM-peak, and off-peak congested travel time;
- Free flow travel time;
- Link daily volume

Performance Measures used to identify future congested corridors:
Three measures were used to identify future congested corridors, they are:

- Service volume ratio (SVR): AM-peak, PM-peak, and Off-Peak Volumes/LOS E capacity
- Travel time ratio (TTR): Congested travel time/free flow travel time (AM/Off-/PM peak periods)
- Segment Daily throughput

Performance Measures used to identify future congested hotspots – intersections, interchanges, and short link:

- Total Vehicle Delay: Link Daily Volume * [(AM Peak Congested Travel Time – Free Flow Travel Time)+ (PM Peak Congested Travel Time – Free Flow Travel Time)+ (Off Peak Congested Travel Time – Free Flow Travel Time)]

An important aspect of PMs development is to update the PMs when new objectives are identified for the region, or additional data source become available to the region. Miami-Dade MPO should update the PMs accordingly to serve a region's objectives and to reflect the best utilization of easily accessible data.

CMP Data Collection Plan

An integral part of developing PMs is to support the process with a realistic data collection plan. The Miami-Dade MPO has been collecting and using performance measures data to support long range planning and congestion management processes for nearly a decade. Like many transportation agencies, the Miami-Dade MPO collects, maintains, and reports on a wide variety of internal and external performance measures. Many of these measures are used in the congestion management process. The methodologies for calculating CMP performance measures call for multiple inputs; data used for the inputs can come from a number of sources. This section identifies data critical to calculating CMP measures.

A challenge of performance measurement is making sure critical processes and responsibilities for data processing, analysis, and distribution work as effectively as possible. A data inventory assessment will identify all priority data sets to support key MPO business needs including performance reporting and congestion management. During the inventory process, a verification of data availability and quality will occur through communication with data owners. Along with traditional methods, Miami-Dade MPO should take advantage of current technologies and tools for data collection, processing, and analysis.

Changes occurring at the federal level will affect performance reporting at the state and MPO levels. As the national performance measurement program evolves, the CMP's performance measures will similarly evolve. Future performance reporting will focus on travel time reliability and the Miami-Dade MPO should change its data collection accordingly. The Miami-Dade MPO should access the National Performance Measurement Research Data Set (NPMRDS) provided free of charge to all MPOs by FHWA. Acquiring data into the future may require utilizing ITS data for speeds and volumes or obtaining speed and volume data from the Regional Integrated Transportation Information System (RITIS).

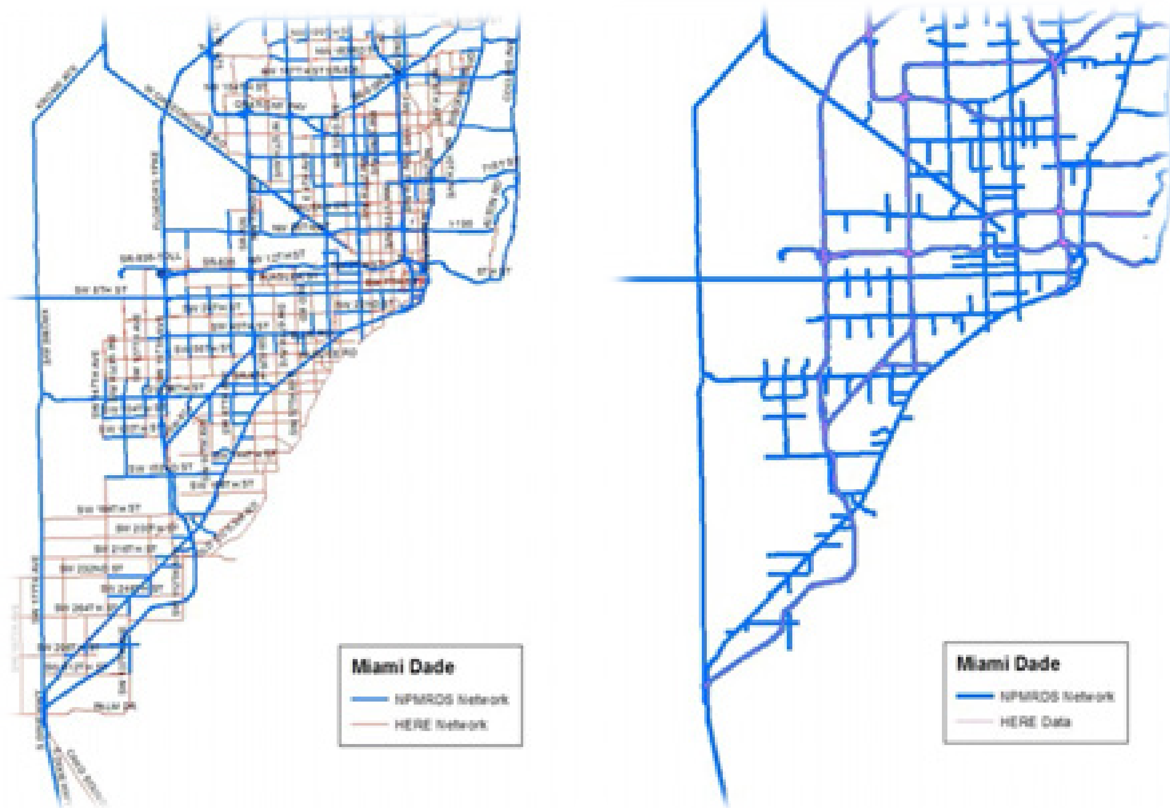
Table 4 provides the major sources for travel time and speed data in Miami-Dade County. **Figure 3** compares the network coverages of the two low cost sources, NPMRDS and HERE[3] data, and their current data availability.

[3] HERE is a Nokia company, formerly known as NAVTEQ.

Table 4: Potential Sources for Travel Time and Speed Data

	Cost	Granularity	Data Availability	Volume	Coverage
NPMRDS	Provided free of charge to MPOs by FHWA	5 minute speed data for both automobiles and trucks separately	New data is reported monthly - Historical data is made available	Does not include vehicle volumes	Covers the entire National Highway System (NHS)
HERE	Purchased by FDOT for internal use	5 minute speed data – granularity is fine as 20 second data	Real time data can be accessed any time – Historical data requires an archiving system e.g. RITIS	Does not include vehicle volumes	Larger network than the NPMRDS but has less data coverage
INRIX	Must be purchased form INRIX	5 minute speed data – granularity is as fine as 2 minute data	One time purchase affords unlimited access to data for the covered period	Does not include vehicle volumes	Covers more roads than the HERE data

Source: Cambridge Systematics, Inc.



(a) Network (b) Currently Available Data

Figure 3: NPMRDS and HERE Data Coverage Comparison

Data available to the Miami-Dade MPO originates from multiple sources. Count station data is a reliable source for automobile and truck volumes at 15-minute, hourly and daily increments. Miami-Dade and FDOT have located hundreds of permanent and temporary count stations throughout the county. The data produced by the count stations is updated annually. FDOT District 6 Traffic Management Center (TMC) also installed ITS devices, e.g. CCTVs and detectors, along major highways districtwide, which are used to monitor real time traffic conditions and collecting traffic volume and speed data. **Figure 4** maps out the locations of these ITS devices. Intersection specific data is required for arterial performance measurement. This data is obtained from the local municipalities through the collection of signal timing plans. To analyze highway adequacy an agency must have robust geometric data. The geometric data set accounts for area type, facility type, segment distance, number of thru and turning lanes, posted speed limit, median type, and the presence of bike lanes and sidewalks. The volume, signal timing, and geometric data obtained through aerial imagery are used to report on Miami-Dade's highway adequacy.

Common CMP data that should be collected annually to report on Miami-Dade's highway adequacy include:

- Traffic volume counts
- Speed and travel time data
- Aerial photography-based congestion data
- Crash data
- Data for transit and non-motorized mode
- Travel survey data

Common date sources for the above mentions data are:

- Count station data
- Archived ITS and operations data
- Other electronic traffic datasets: cellphone data, etc.
- Aerial photography

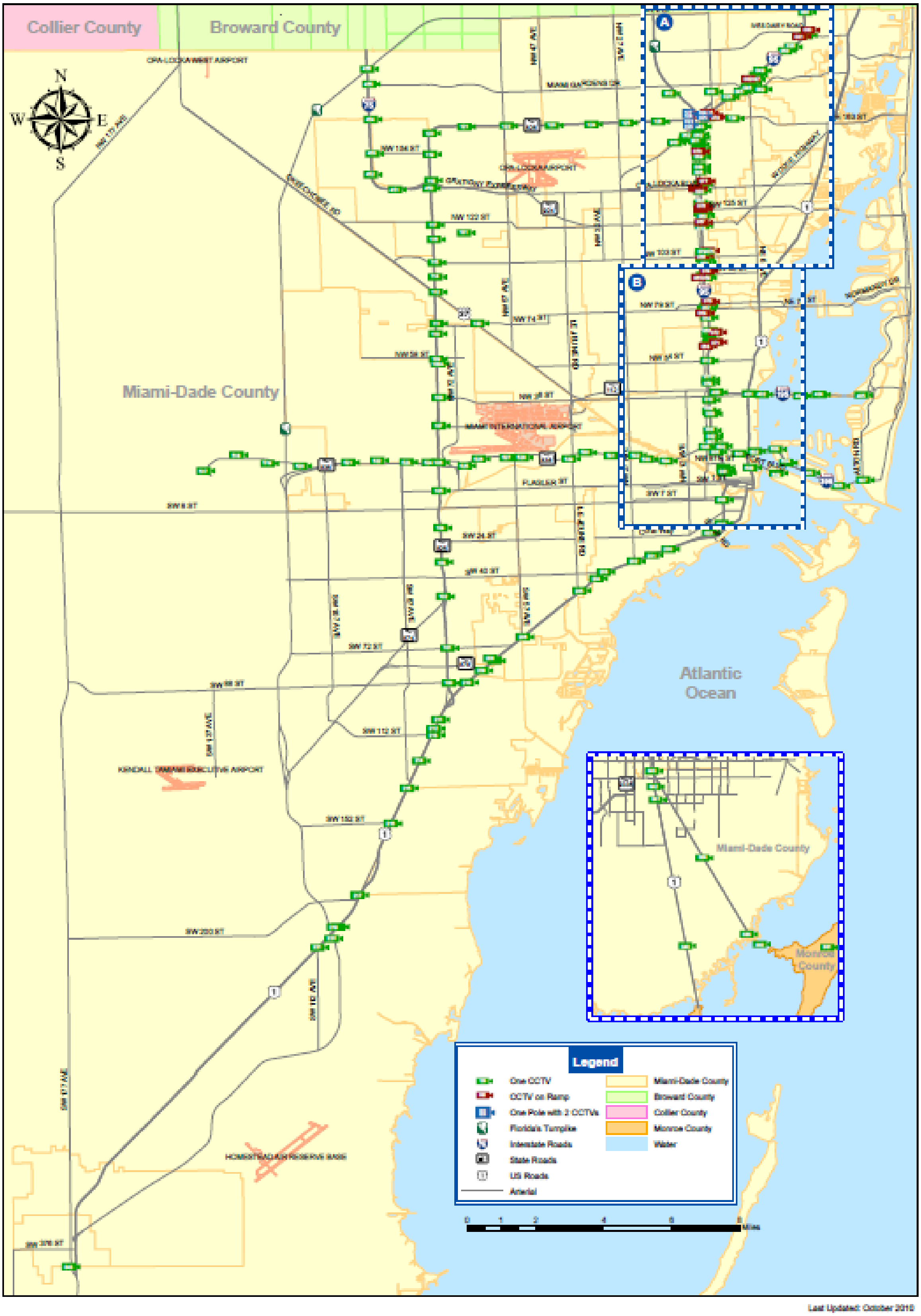


Figure 4: Locations of FDOT D6 TMC ITS Devices

Analysis of Congestion Problems and Needs

After PMs are established, they should be used to identify congestion problems and needs of the region. For the 2014 CMP update multiple PMs were selected to identify congested corridors. To prioritize congested corridors based on these PMs, an evaluation methodology was developed to integrate these PMs in to a single measure, which was then used to rank congested corridors. Identification of hotspots, comparing with congested corridors, is a much simpler process. Only one PM was used to rank hotspots.

Methodology for Identifying Congested Corridors

Step 1. Calculate link performance measures

The smallest unit in SERPM 7.0 E+C network is link. For each link, a set of measures is reported in the loaded network output file. Some of these measures like peak period volumes, LOS E capacity, etc. are selected to calculate CMP PMs. The first step of the evaluation is to calculate these PMs for each link in the model network using the following measures:

- AM-peak volume
- PM-peak volume
- Off-peak volume
- LOS E Capacity Volume
- AM-peak travel time
- PM-peak travel time
- Off-peak travel time
- Free flow travel time
- Daily volume

Step 2. Rank link performance measures

- After link PMs are calculated, these link measures were ranked individually in a descending order, with the largest number ranked as "1". Through this approach, all the link PMs are normalized and can be compared or summed up.

Step 3. Sum up ranks of link performance measures for three time period: AM-peak, PM-peak, and Off-peak

- After step 2, relevant ranked PMs are then summed up to achieve one overall rank following the formula presented below:
- Link SVR Rank = Rank (AM-peak SVR)+Rank (Off-peak SVR)+Rank (PM-peak SVR)
- Link TTR Rank = Rank (AM-peak TTR)+Rank (Off-peak TTR)+Rank (PM-peak TTR)

Step 4. Aggregate link SVR rank, TTR rank, and daily volume into Segment ranks

SERPM model uses Segment ID to connect links into corridors. In order to measure congestion at the corridor level, the link SVR rank, link TTR rank, and link daily volume are aggregated into segment SVR rank

(Rank A), segment TTR rank (Rank B), and segment daily volume rank (Rank C) using segment ID. The segments shorter than 2 miles were not considered corridors and eliminated from the list. **Table 5** summarizes step 1 through 4 into a tabulated format.

Table 5: Evaluation Matrix for Congested Corridors

Link Measures	PMs	Integrated Link PMs	Segment Measures
• AM-peak volume • PM-peak volume • Off-peak volume • LOS E Capacity Volume	Service volume ratio (SVR): • AM-peak SVR = AM-peak volume/LOS E capacity; • Off-peak SVR = Off-peak volume/LOS E capacity • Pm-peak SVR = PM-peak volume/LOS E capacity	Link SVR Rank = Rank (AM-peak SVR)+Rank (Off-peak SVR)+Rank (PM-peak SVR)	Rank segments using average aggregated segment SVR (**Rank A**)
• AM-peak travel time • PM-peak travel time • Off-peak travel time • Free flow travel time	Travel time ratio (TTR): • AM-peak TTR = AM-peak travel time/free flow travel time; • Off-peak TTR = Off-peak travel time/free flow travel time; • PM-peak TTR = PM-peak travel time/free flow travel time;	Link TTR Rank = Rank (AM-peak TTR)+Rank (Off-peak TTR)+Rank (PM-peak TTR)	Rank segments using average aggregated segment TTR (**Rank B**)
• Daily volume	Daily volume	Daily volume	Rank segments using average aggregated segment volume (**Rank C**)

Source: Cambridge Systematics, Inc.

Step 5. Combine three segment measures into a single measure

In order to show different results when emphasizing different congestion aspects (intensity, duration, extent, and variability), two different weighting schemes were used to combine the three segment measures achieved in step 4.

To emphasize more on congestion intensity and variability, the weighting scheme used is:

Weighted Rank = 0.4 x Rank A + 0.4 x Rank B + 0.2 x Rank C (Weighted rank (1))

To emphasize more on congestion extent and duration, the weighting scheme used is:

Weighted Rank = 0.3 x Rank A + 0.3 x Rank B + 0.4 x Rank C (Weighted Rank (2))

Using these two weighting schemes, all segments were assigned with two different rank scores. Two lists of top 30 ranked corridors then were achieved by sorting these two sets of rank scores, as shown in **Table 6**. List (1) was identified using weighted rank (1), and list (2) used weighted rank (2).

Table 6: Two Lists of Top 30 Congested Corridors

Congested Corridors (1)	Rank (1)	Congested Corridors (2)	Rank (2)
MacArthur Causeway between Watson Island and Alton Rd	1	MacArthur Causeway between Watson Island and Alton Rd	1
NW 21st St between MIA and NW 37th Ave	2	NW 21st St between MIA and NW 37th Ave	2
NW 7th St between NW 72nd Ave and NW 5th St	3	NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line	3
Ponce De Leon Blvd between SW 57th Ave and Le Jeune Rd	4	NW 7th St between NW 72nd Ave and NW 5th St	4
NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line	5	NW 12th St between NW 107th Ave and MIA	5
NW 12th St between NW 107th Ave and MIA	6	SR 934 between NW 84th Ave and W 5th Ave	6
NW 167th St between NW 2nd Ave and NE 15th Ave	7	Ponce De Leon Blvd between SW 57th Ave and Le Jeune Rd	7
SR 934 between NW 84th Ave and W 5th Ave	8	NW 167th St between NW 2nd Ave and NE 15th Ave	8
NW/E 36 St between S River Dr and Biscayne Blvd	9	US 1 between SW 344 St and SW 22nd St	9
US 1 between SW 344 St and SW 22nd St	10	NW 82nd St between NW 14th Ave and Kennedy Causeway	10
SW 16th St between SW 37th Ave and SW 17th Ave	11	Collins Ave between 96th St/Broad Causeway and 63rd St	11
NW 82nd St between NW 14th Ave and Kennedy Causeway	12	Ocean Blvd/Collins Ave between 96th St/Broad Causeway and Miami-Dade/Broward County line; Harding Ave between 71st St/Normandy Dr and 96th St/Broad Causeway	12
Ocean Blvd/Collins Ave between 96th St/Broad Causeway and Miami-Dade/Broward County line; Harding Ave between 71st St/Normandy Dr and 96th St/Broad Causeway	13	NW 27th Ave between S. Bayshore Dr/Miami Ave and NW 215th St	13
Collins Ave between 96th St/Broad Causeway and 63rd St	14	W Okeechobee Rd between just before and after Turnpike Ext., and between W. 28th Ave and NW 27th Ave	14
NW 12th St between NW 107th Ave and NW 132nd Ave	15	NW/E 36 St between S River Dr and Biscayne Blvd	15
Coral Way/Miracle Mile between SW 57th Ave and SW 37th Ave	16	NW 12th St between NW 107th Ave and NW 132nd Ave	16
NW 27th Ave between S. Bayshore Dr/Miami Ave and NW 215th St	17	SW 7th St between SW 27th Ave and SE 2nd Ave	17
NW 28th St between N River Dr and NW 14th Ave	18	Opa Locka Blvd/NW 135 St between NW 37th Ave and NW 2nd Ave	18
SW 288th St between SW 182nd Ave and E. of SW 137th Ave	19	SW 8th St between SW 139th Ave and Brickell Ave	19
Main Hwy between SW 72nd St and Grand Ave	20	NW 103rd St/49th St between W. Okeechobee Rd and NE 6th Ave	20
NW 39th St between NW 27th Ave and I-95	21	Biscayne Blvd between NE 6th Ave (N. of NW 82nd St) and NE 215th St	21
Old Cutler Rd between SW 120th St and SW 72nd St	22	NE 203rd St between NW 6th Ave and Biscayne Blvd	22
W Okeechobee Rd between just before and after Turnpike Ext., and between W. 28th Ave and NW 27th Ave	23	W. Dixie Hwy between NW 119th St and NE 203rd St	23
Opa Locka Blvd/NW 135 St between NW 37th Ave and NW 2nd Ave	24	NW 79th St between E 4th Ave/East Dr and NE 10th Ave (before Kennedy Causeway)	24
W. Dixie Hwy between NW 119th St and NE 203rd St	25	Hialeah Dr/NW 54th St between W Okeechobee Rd and Biscayne Blvd	25
NW 47th Ave between SR 826 and NW 215th St	26	NW 47th Ave between SR 826 and NW 215th St	26
NW 95th St between NW 36th Ave and NE 10th Ave	27	Coral Way/Miracle Mile between SW 57th Ave and SW 37th Ave	27
SW 7th St between SW 27th Ave and SE 2nd Ave	28	SW 42nd Ave between SW 72nd St and 135th St/Opa Locka Blvd	28
SW 8th St between SW 139th Ave and Brickell Ave	29	NW 95th St between NW 36th Ave and NE 10th Ave	29
NW 103rd St/49th St between W. Okeechobee Rd and NE 6th Ave	30	NW 62nd St between Okeechobee Rd and Biscayne Blvd	30

Source: Cambridge Systematics, Inc.

Step 6. Combine two lists of congested corridors

Among the two lists of top 30 congested corridors identified through step 6, 24 corridors are in both lists; within which nine corridors are identified in both lists as top 10 corridors. The study team decided to group these corridors into three tiers, with Tier 1 being the nine corridors identified in both lists as top 10 corridors, the rest of the 24 corridors that show up in both lists as Tier 2, and the remaining 12 corridors that only show up in one of the lists as Tier 3. Tier 1 corridors are considered the most congested corridors with the greatest confidence. The results are documented in **Table 7**.

Table 7: Final List of Congested Corridors in Three Tiers

No.	Congested Corridors	Tier
1	MacArthur Causeway eastern terminus (Watson Island to Alton Rd)	Tier 1
2	W 21st St/MIA access/circulation road	Tier 1
3	NW 7th St between NW 72nd Ave and NW 5th St	Tier 1
4	Ponce De Leon Blvd between SW 57th Ave and Le Jeune Rd	Tier 1
5	NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line	Tier 1
6	NW 12th St (MIA Perimeter Rd)/MIA access/circulation road	Tier 1
7	NW 167th St between NW 2nd Ave and NE 15th Ave	Tier 1
8	SR 934 between NW 84th Ave and W 4th Ave (Red Road)	Tier 1
9	US 1 between SW 344 St and I-95	Tier 1
10	NW/E 36 St between S River Dr and Biscayne Blvd	Tier 2
11	NW 82nd St between NW 14th Ave and Kennedy Causeway	Tier 2
12	Ocean Blvd/Collins Ave between 96th St/Broad Causeway and Miami-Dade/Broward County line; Harding Ave between 71st St/Normandy Dr and 96th St/Broad Causeway	Tier 2
13	Collins Ave between 96th St/Broad Causeway and 63rd St	Tier 2
14	NW 12th St between NW 107th Ave and NW 132nd Ave	Tier 2
15	Coral Way/Miracle Mile between SW 57th Ave and SW 37th Ave	Tier 2
16	NW 27th Ave between S. Bayshore Dr/Miami Ave and NW 215th St	Tier 2
17	W Okeechobee Rd between just before and after Turnpike Ext., and between W. 28th Ave and NW 27th Ave	Tier 2
18	Opa Locka Blvd/NW 135 St between NW 37th Ave and NW 2nd Ave	Tier 2
19	W. Dixie Hwy between NW 119th St and NE 203rd St	Tier 2
20	NW 47th Ave between SR 826 and NW 215th St	Tier 2
21	NW 95th St between NW 36th Ave and NE 10th Ave	Tier 2
22	SW 7th St between SW 27th Ave and SE 2nd Ave	Tier 2
23	SW 8th St between SW 139th Ave and Brickell Ave	Tier 2
24	NW 103rd St/49th St between W. Okeechobee Rd and NE 6th Ave	Tier 2
25	SW 16th St between SW 37th Ave and SW 17th Ave	Tier 3
26	NW 28th St between N River Dr and NW 14th Ave	Tier 3
27	SW 288th St between SW 182nd Ave and E. of SW 137th Ave	Tier 3
28	Main Hwy between SW 72nd St and Grand Ave	Tier 3
29	NW 39th St between NW 27th Ave and I-95	Tier 3
30	Old Cutler Rd between SW 120th St and SW 72nd St	Tier 3
31	Biscayne Blvd between NE 6th Ave (N. of NW 82nd St) and NE 215th St	Tier 3
32	NE 203rd St between NW 6th Ave and Biscayne Blvd	Tier 3
33	NW 79th St between E 4th Ave/East Dr and NE 10th Ave (before Kennedy Causeway)	Tier 3
34	Hialeah Dr/NW 54th St between W Okeechobee Rd and Biscayne Blvd	Tier 3
35	SW 42nd Ave between SW 72nd St and 135th St/Opa Locka Blvd	Tier 3
36	NW 62nd St between Okeechobee Rd and Biscayne Blvd	Tier 3

Source: Cambridge Systematics, Inc.

Methodology for Identifying Hotspots

Hotspots are roadway infrastructures that are shorter than two miles. Given the links in SERPM 7.0 E+C model network are mostly shorter than two miles, they were used directly to identify hotspots, with the links longer than two miles eliminated. The methodology for identifying hotspots is simple. Only one PM was used in the process – total vehicle delay, which is calculated using the following measures from the loaded model network output file:

- Daily volume
- AM-peak travel time (AM TT)
- Off-peak travel time (Off Peak TT)
- PM-peak travel time (PM TT)
- Free flow travel time (Free Flow TT)

Following the equation below, the total vehicle delay is calculated for each link within the model network:

$$Total\ Vehicle\ Delay = Link\ Daily\ Volume \times [(AM\ TT - Free\ Flow\ TT) + (PM\ TT - Free\ Flow\ TT) + (Off\ Peak\ TT - Free\ Flow\ TT)]$$

After total vehicle delay was calculated for each link, the top 30 links with the highest total vehicle delay were then selected as the top hotspots. These top 30 locations (links) were than grouped into three tiers, with the top 10 being the most congested locations. **Table 8** presents the final list of hotspots in Miami-Dade County.

Table 8: Final List of Hotspots in Three Tiers

No.	Hotspots	Tier	On a Congested Corridor?
1	East leg of the intersection at NW S River Dr and NW 33rd Ave - EB	Tier 1	
2	East leg of the intersection at NW S River Dr and NW 33rd Ave - WB	Tier 1	
3	South leg of the intersection at NE 203rd St and Highland Lakes Blvd	Tier 1	
4	South of the south leg of the intersection at NW 21st St and Perimeter Rd at MIA - SB	Tier 1	Yes, NW 12th St between NW 107th Ave and MIA
5	South leg of the intersection at NW 21st St and Perimeter Rd at MIA - NB	Tier 1	Yes, NW 12th St between NW 107th Ave and MIA
6	South of the south leg of the intersection at NW 21st St and Perimeter Rd at MIA - NB	Tier 1	Yes, NW 12th St between NW 107th Ave and MIA
7	South leg of the intersection at NW 29th St and NW 42nd Ave (Le Jeune Rd) - SB	Tier 1	Yes, SW 42nd Ave between SW 72nd St and 135th St/Opa Locka Blvd
8	I-95 NB/SB on-ramp to I-195 EB (after two ramps merging into one, before merging into I-195)	Tier 1	
9	I-195 WB on-ramp to I-95 NB/SB (before diverging point)	Tier 1	
10	NW 27th Ave between NW 17th St and NW 20th St	Tier 1	Yes, NW 27th Ave between S. Bayshore Dr/Miami Ave and NW 215th St
11	East leg of the intersection at NW 21st St and Perimeter Rd at MIA - WB	Tier 2	Yes, NW 21st St between MIA and NW 37th Ave
12	South leg of the intersection at NW 20th St and NW 27th Ave	Tier 2	Yes, NW 27th Ave between S. Bayshore Dr/Miami Ave and NW 215th St
13	East of east leg of the intersection at NW 21st St and Perimeter Rd at MIA, before where the southbound off-ramp from SR 112 merges in - WB	Tier 2	Yes, NW 21st St between MIA and NW 37th Ave
14	West leg of the intersection at S Dixie Hwy and SW 27th Ave	Tier 2	Yes, US 1 between SW 248 Ave and SW 22nd St
15	West leg of the intersection at S Dixie Hwy and SW 22nd Ave	Tier 2	Yes, US 1 between SW 248 Ave and SW 22nd St
16	West leg of the Intersection at NW 21st St and SR 112 SB off-ramp - WB	Tier 2	Yes, NW 21st St between MIA and NW 37th Ave
17	West leg of the intersection between S Dixie Hwy and SW 32nd Ave	Tier 2	Yes, US 1 between SW 248 Ave and SW 22nd St
18	MacArthur Cswy between Watson Island Fountain St (Palm Island) - WB	Tier 2	Yes, MacArthur Causeway between Watson Island and Alton Rd
19	East leg of the intersection at NW 21st St and Perimeter Rd at MIA - EB	Tier 2	Yes, NW 21st St between MIA and NW 37th Ave
20	MacArthur Cswy between Fountain St (entrance to Palm Island) and Bridge Rd (entrance to Star Island) - WB	Tier 2	Yes, MacArthur Causeway between Watson Island and Alton Rd
21	MacArthur Cswy between Fountain St (entrance to Palm Island) and Bridge Rd (entrance to Star Island) - EB	Tier 3	Yes, MacArthur Causeway between Watson Island and Alton Rd
22	I-95 SB before I-195 on-ramp merging point	Tier 3	
23	I-95 NB before I-195 on-ramp merging point	Tier 3	
24	SR 826 NB between SW 40th St and SW 24th St	Tier 3	
25	SR 826 NB between SW 24th St and SW 8th St (just north of the on-ramp from SW 24th St EB	Tier 3	
26	I-95 NB between NE Miami Gardens Dr and NE 203rd St	Tier 3	
27	I-95 SB between NE Miami Gardens Dr and NE 203rd St	Tier 3	
28	SR 826 SB between the on- and off- ramps from/to W 68th St	Tier 3	
29	I-95 NB between NW 69th St and NW 79th St	Tier 3	
30	I-95 SB between NW 82nd St and NW 95th St	Tier 3	

Source: Cambridge Systematics, Inc.

CMP Corridors and Hotspots Recommended for CMP Funding

One important task of the 2014 CMP update is to identify funding sources for CMP projects recommended through the CMP. CMP projects were identified using the final list of congested corridors and hotspots presented previously, and supplemented with high-priority 2035 LRTP congestion management projects carried forward as unfunded needs. The methodology used to identify CMP projects for the 2040 plan is described below:

1. All Tier 1 congested corridors are proposed for CMP improvements
2. 2035 LRTP CMP projects that had aggregate score of over 35 are proposed for CMP improvements
3. Tier 1 hotspots were checked against the corridors proposed for CMP improvements. Only hotspots outside of those corridors are proposed for CMP improvements.

After the process described above, a total of 20 CMP corridors and hotspots were identified as candidates for CMP funding. These 20 CMP corridors and hotspots were then prioritized using “average vehicle delay”. The formula applied to calculate average vehicle delay using model data is presented below:

$$Average\ Vehicle\ Delay = \frac{\sum_{i=1}^{n}(Link\ Volume_{i}) \times [(AM\ TT_i - Free\ Flow\ TT_i) + (PM\ TT_i - Free\ Flow\ TT_i) + (Off\ Peak\ TT_i - Free\ Flow\ TT_i)]}{\sum_{i=1}^{n} Link\ Distance_i}$$

The corridor or hotspot with the highest average vehicle delay was ranked as the most congested. The prioritized congested corridors and hot spots are presented in **Table 9**. Projects IDs starting with “2014 CMP-“ denote corridors identified using tier 1 congested corridors; Projects IDs starting with “LRTP-“ denote the corridors carried over from the 2035 LRTP; and Projects IDs starting with “2014 CMP HS-“ denote hotspots identified using tier 1 hotspots. **Table 9** lists the locations of these corridors and hotspots. **Figure 5** visually presents the locations and limits of these facilities.

Table 9: CMP Corridors/Hotspots Recommended for CMP Funding

Rank.	Projects ID	CMP Corridors/Hotspots
1	2014 CMP HS-4	Interchange at I-95 and I-195
2	2014 CMP HS-1	Intersection at NW S River Dr and NW 33rd Ave
3	2014 CMP-1	MacArthur Causeway eastern terminus (Watson Island to Alton Rd)
4	2014 CMP HS-3	Intersection at NW 29th St and NW 42nd Ave (Le Jeune Rd) - north leg
5	2014 CMP HS-2	Intersection at Ives Dairy Rd (NE 203rd St) and Highland Lakes Blvd - south leg
6	LRTP-FDOT132	Coral Way from SW 37th Ave to US-1
7	2014 CMP-9	US 1 between SW 344 St and I-95
8	LRTP-CoM106	NW 27th Ave/SW 27th Ave from SW 8th St (Tamiami Trail) to NW 36th St
9	2014 CMP-4	Ponce De Leon Blvd between SW 57th Ave (Red Road) and NW 42nd Ave (Le Jeune Rd)
10	2014 CMP-3	NW 7th St between NW 72nd Ave and NW 7th Ave
11	2014 CMP-5	NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line
12	LRTP-FDOT137	SW 8^{th} St (Tamiami Trail) from SR-826 (Palmetto Expressway) to I-95
13	LRTP-FDOT112	NW 57th Ave (Red Rd) from NW 135th St to SR 826 (Palmetto Expressway)
14	2014 CMP-7	NW 167th St between NW 2nd Ave and NE 15th Ave
15	2014 CMP-8	SR 934 (Hialeah Expressway) between NW 84th Ave and W 4th Ave (Red Road)
16	LRTP-CoM100	Miami Ave; SW 2nd Ave; SW 1st St; Flagler St; NW 7th Ave bridges over Miami River
17	LRTP-PW101	SW 22nd St (Coral Way) from SR-826 (Palmetto Expressway) to SW 37th Ave
18	LRTP-HS104	SR 997 (Krome Ave) at SW 312th St (Campbell Dr)
19	2014 CMP-2	NW 21st St/MIA access/circulation road
20	2014 CMP-6	NW 12th St (MIA Perimeter Rd)/MIA access/circulation road

Source: Cambridge Systematics, Inc. and Gannett Fleming, Inc

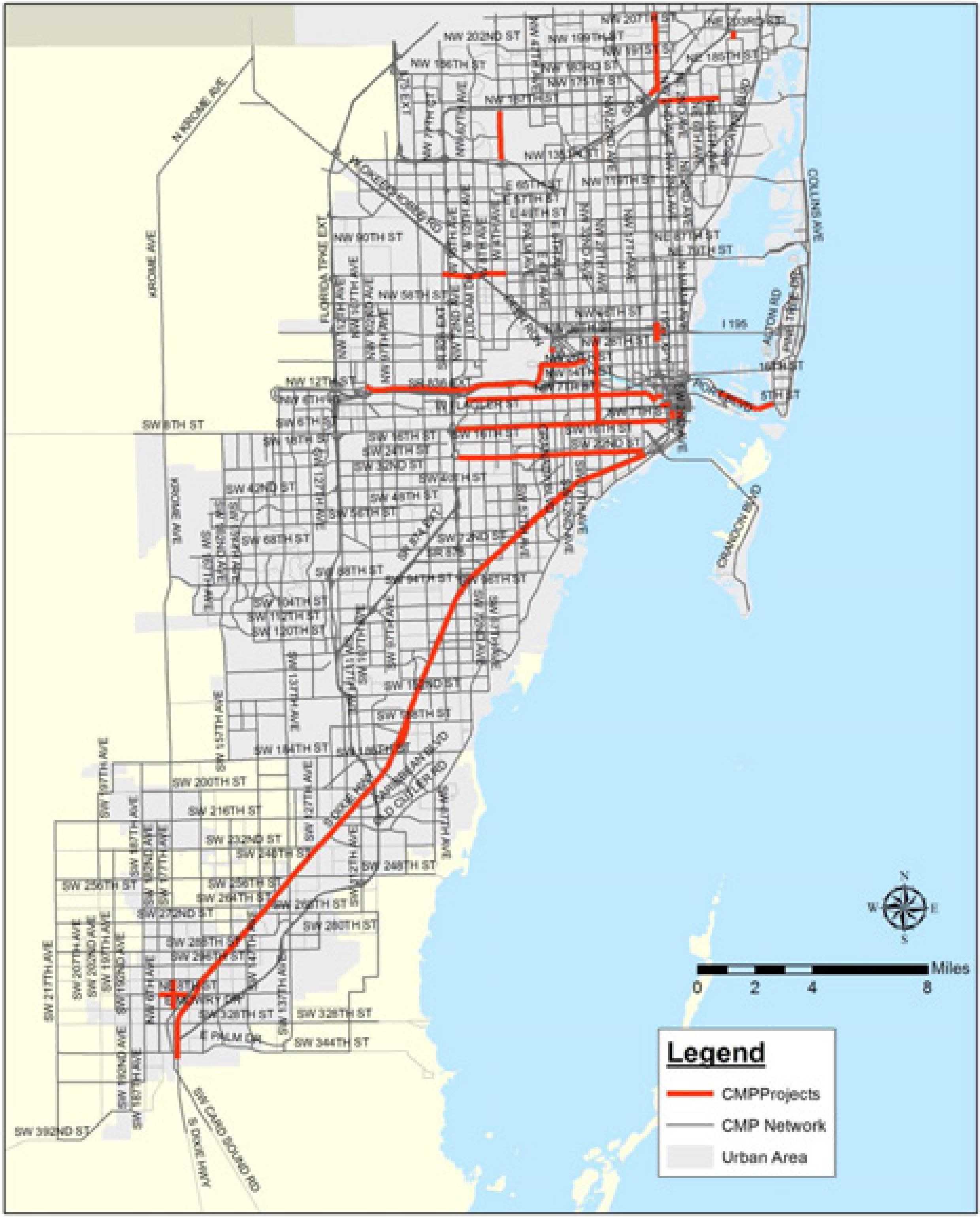


Figure 5: Locations of Corridors and Hotspots Recommended for CMP Improvements

Source: Cambridge Systematics, Inc

CMP Strategies and CMP Projects

This section documents identification and implementation of CMP strategies. A literature review was done to identify CMP strategies commonly applied in different metropolitan areas. A CMP strategy toolbox was developed to help identify the most effective CMP strategies efficiently. This toolbox was then utilized to identify strategies for the CMP corridors and hotspots recommended for CMP funding.

Development of CMP Strategy Toolbox

A wide range of congestion management strategies have been implemented in different areas across the nation. As part of the CMP update, the study team reviewed CMP strategy toolboxes developed by various metropolitan areas including NYMTC, MARC, DRCOG, MAG, and SLC WFRC. Based on the literature review, a CMP toolbox was developed for Miami-Dade MPO, considering the region's demographics and congestion pattern. The toolbox is organized into nice CMP strategy categories: ITS and TSM, TDM, Land Use, Parking, Regulatory, Transit, Highway, Bicycle and Pedestrian, and Access Management. Within each category, there are a number of strategies. **Table 10** lists the nine categories, number of CMP strategies included in each category, general benefits and costs pertinent to each category, and most representative strategies. The strategies under each category, their definition, benefits, general costs, and implementation timeframe are documented in Appendix A.

Table 10: CMP Corridors / Hotspots Recommended for CMP Funding

Major Categories	Intensity /Number of Strategies	Benefits	Costs	Examples
Intelligent Transportation Systems (ITS) and Transportation System Management (TSM) Strategies	19 strategies	Reduce travel time, reduce stops, reduce delays, increase safety	Mostly low to moderate	Signal coordination, ramp metering, highway information systems, service patrols
TDM	9 strategies	Reduce peak period travel, reduce SOV VMT	Mostly low to moderate	Alternative work hours, telecommuting, road pricing, toll roads
Land Use	5 strategies	Decrease SOV trips, increase walk trips, increase transit modeshare, air quality benefits	Low to moderate	Infill, TOD development, densification
Parking	7 strategies	Increase transit use, reduce VMT, generate revenue	Low to moderate	Preferential parking for HOVS, park and ride lots, advanced parking systems
Regulatory	5 strategies	Decrease VMT, air quality benefits, increase safety, generate revenue	Low to moderate	Carbon pricing, VMT fee, pay as you drive insurance, auto restriction zones, truck restrictions
Transit	15 strategies	Shifting modeshare, increasing transit ridership, reduce VMT, provide air quality benefits	Low to high	Increasing coverages and frequencies, new fixed guideways, travelways, signal priority, intelligent transit stops (tech improvements)

Major Categories	Intensity /Number of Strategies	Benefits	Costs	Examples
Highway	9 strategies	Increase capacity, mobility, and traffic flow	Moderate to high	HOV lanes, super street arterials, highway widening, acceleration and deceleration lanes, design improvements
Bicycle and Pedestrian	8 strategies	Decrease auto modeshare, reduce VMT, provide air quality benefits	Mostly low	New sidewalks and bike lanes, improved facilities near transit stations, bike sharing, and exclusive rights of way
Access Management	9 strategies	Increase capacity, efficiency, and mobility, reduce travel time	Mostly moderate to high	Turn restrictions, turn lanes, frontage roads, roundabout intersections

Identification of CMP Strategies

Based on a review of roadway conditions and the congestion pattern, a number of congestion mitigation strategies were identified for each congested facility. These congestion strategies and their estimated costs are documented in this section. Please note that only roadway and transit capital costs are included, assuming all highway O&M costs will be covered by FDOT Operations & Maintenance funding.

1. Interchange at I-95 and I-195

A review of the geometric condition of this congested interchange suggests that the large amount of merging and diverging vehicles, and the speed differential on I-95 in between the on-/off-ramps to I-195/SR 112 contribute to congestion on I-95, while the large amount of traffic going from I-95 to I-195 and from I-195 to I-95 combining with short merging and diverging distance of the interchange ramps contribute to the congestion on the I-195 ramps. The recommended congestion strategies and their costs for this facility are:

Table 11: CMP Strategies - Interchange at I-95 and I-195

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Speed harmonization/queue warning on I-95 and I-195	$12,000,000	Active Traffic Management Concept of Operations, Washington State DOT, Dec 2008	2008	1.082	$12,984,000
Roadway signage improvements on ramps from I-195 to I-95	insignificant				

Source: Cambridge Systematics, Inc

2. Intersection at NW S River Dr and NW 33rd Ave

A review of the geometric condition of this location suggests that two-lane access road and bridge to the area and the large amount of turning vehicles make it hard for other vehicles to pass. The recommended congestion strategies and their costs for this facility are:

Table 12:CMP Strategies - Intersection at NW S River Dr and NW 33rd Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Access management	$1,000,000	estimate	2013	1	$1,000,000
Widen the road and bridge to at least three lanes to provide at a minimum, a turn lane for the turning vehicles	$2,303,273	estimate	2013	1	$2,303,273

Source: Cambridge Systematics, Inc

3. MacArthur Causeway Eastern Terminus (Watson Island to Alton Rd)

A review of the geometric conditions and traffic patterns suggest that the large amount of traffic and the signals on the east side of the corridor contribute to the congestion on this corridor. The recommended congestion strategies and their costs for this facility are:

Table 13: CMP Strategies - MacArthur Causeway Eastern Terminus (Watson Island to Alton Rd)

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$12,000	http://www.itscosts.its.dot.gov/	2009	1.086	$13,032
Access management and intersection improvement at Watson Island	$30,000,000	estimate	2013	1	$30,000,000

Source: Cambridge Systematics, Inc

4. Intersection at NW 29th St and NW 42nd Ave (Le Jeune Rd) - north leg

A review of the geometric condition and traffic pattern of this segment suggests that the density of signals and large amount of turning vehicles contribute to the congestion on this corridor. The recommended congestion strategies and their costs for this facility are:

Table 14: CMP Strategies - Intersection at NW 29th St and NW 42nd Ave - north leg

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$45,000	http://www.itscosts.its.dot.gov/	2009	1.086	$48,870
Intersection improvements at NW 29th St and NW 42nd Ave	$1,000,000	estimate	2013	1	$1,000,000
Access improvements	$1,000,000	estimate	2013	1	$1,000,000

Source: Cambridge Systematics, Inc

5. Intersection at Ives Dairy Rd (NE 203rd St) and Highland Lakes Blvd - south leg

A review of the geometric condition and traffic pattern of this segment suggests that the large amount of turning vehicles turning west contributes to the congestion on this segment. The recommended congestion strategy and its costs for this facility are:

Table 15: CMP Strategies - Intersection at Ives Dairy Rd and Highland Lakes Blvd - south leg

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal detector improvement - pilot	$50,000	estimate	2013	1	$50,000

Source: Cambridge Systematics, Inc

6. Coral Way from SW 37th Ave to US-1

A review of the geometric condition and traffic pattern of this segment suggests that the large amount of vehicles, on-street parking activities, and turning activities contribute to the congestion on this segment. The recommended congestion strategies and their costs for this facility are:

Table 16: CMP Strategies - Coral Way from SW 37th Ave to US-1

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Communication network and roadway surveillance coverage*	$32,831,400**	FDOT D4 ATMS	2011	1.036	$34,013,330
Signal timing optimization	$54,000	http://www.itscosts.its.dot.gov/	2009	1.086	$58,644
Real Time Parking Availability Information	$1,000,000	estimate	2013	1	$1,000,000

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);
- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

** Assumes that the 40% of the system devices will be replaced between FY 2030 and FY 2040.

7. US 1 between SW 344 St and I-95

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput on US 1, densely located signals, and large activity centers and residential areas along the corridor all contribute to the congestion. The recommended congestion strategies for this facility are:

Table 17: CMP Strategies - US-1 between SW 344 St and I-95

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Enforce "don't block box' initiatives	Insignificant				
Signal timing optimization	$210,000	http://www.itscosts.its.dot.gov/	2009	1.086	$228,060
Communication network and roadway surveillance coverage*	insignificant; connect US 1 to the network				

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);

- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

8. NW 27th Ave/SW 27th Ave from SW 8th St (Tamiami Trail) to NW 36th St

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located signals and access points along the corridor all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 18: CMP Strategies - NW 27th Ave / SW 27th Ave from SW 8th St to NW 36th St

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Communication network and roadway surveillance coverage*	$32,831,400	FDOT D4 ATMS	2011	1.036	$34,013,330
Signal timing optimization	$30,000	http://www.itscosts.its.dot.gov/	2009	1.086	$32,580
Median/access improvements	$3,025,000	estimate	2013	1	$3,025,000

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage:

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);

- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

9. Ponce De Leon Blvd between SW 57th Ave (Red Road) and NW 42nd Ave (Le Jeune Rd)

A review of the geometric condition and traffic pattern of this segment suggests that congestion along this segment is caused by traffic generated by University of Miami and diverted from US 1. The recommended congestion strategies and their costs for this facility are:

Table 19: CMP Strategies - Ponce De Leon Blvd between SW 57th Ave and NW 42nd Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$18,000	http://www.itscosts.its.dot.gov/	2009	1.086	$19,548

Source: Cambridge Systematics, Inc

10. NW 7th St between NW 72nd Ave and NW 7th Ave

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located signals and access points along the corridor all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 20: CMP Strategies - NW 7th St between NW 72nd Ave and NW 7th Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Communication network and roadway surveillance coverage*	$32,831,400	FDOT D4 ATMS	2011	1.036	$34,013,330
Signal timing optimization	$63,000	http://www.itscosts.its.dot.gov/	2009	1.086	$68,418

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- o Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);
- o Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

11. NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located access points along the corridor all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 21: CMP Strategies - NW 2nd Ave between Golden Glades Interchange and Miami-Dade / Broward County Line

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$24,000	http://www.itscosts.its.dot.gov/	2009	1.086	$26,064

Source: Cambridge Systematics, Inc

12. SW 8th St (Tamiami Trail) from SR-826 (Palmetto Expressway) to I-95

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located signals and access points along the corridor, connection to downtown Miami all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 22: CMP Strategies - SW 8th St from SR-826 to I-95

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Communication network and roadway surveillance coverage*	$32,831,400	FDOT D4 ATMS	2011	1.036	$34,013,330
Signal timing optimization	$105,000	http://www.itscosts.its.dot.gov/	2009	1.086	$114,030

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- o Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);
- o Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

13. NW 57th Ave (Red Rd) from NW 135th St to SR 826 (Palmetto Expressway)

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located signals and access points along the corridor all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 23: CMP Strategies - NW 57th Ave from NW 135th St to SR-826

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$24,000	http://www.itscosts.its.dot.gov/	2009	1.086	$26,064
Access improvements	$2,000,000	estimate	2013	1	$2,000,000

Source: Cambridge Systematics, Inc

14. NW 167th St between NW 2nd Ave and NE 15th Ave

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput, densely located signals and access points along the corridor all contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 24: CMP Strategies - NW 167th St between NW 2nd Ave and NE 15th Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$30,000	http://www.itscosts.its.dot.gov/	2009	1.086	$32,580
Access improvements	$1,000,000	estimate	2013	1	$1,000,000

Source: Cambridge Systematics, Inc

15. SR 934 (Hialeah Expressway) between NW 84th Ave and W 4th Ave (Red Road)

A review of the geometric condition and traffic pattern of this segment suggests that the high truck volume and speed differential both contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 25: CMP Strategies - SR-934 between NW 84th Ave and W 4th Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Signal timing optimization	$18,000	http://www.itscosts.its.dot.gov/	2009	1.086	$19,548
Intersection improvements for trucks	$3,000,000	estimate	2013	1	$3,000,000
TDM Strategies	insignificant				

Source: Cambridge Systematics, Inc

16. Miami Ave; SW 2nd Ave; SW 1st St; Flagler St; NW 7th Ave bridges over Miami River

A review of the geometric condition and traffic pattern of this segment suggests that the draw bridges are the bottlenecks of the roadways. The recommended congestion strategy and its cost for this facility are:

Table 26: CMP Strategies - Miami Ave; SW 2nd Ave; SW 1st St; Flagler St; NW 7th Ave bridges over Miami River

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Advanced bridge closing signs/rerouting information signs	$1,200,000	FDOT Pay Item Cost History	2012	1.015	$1,218,000

Source: Cambridge Systematics, Inc

17. SW 22nd St (Coral Way) from SR-826 (Palmetto Expressway) to SW 37th Ave

A review of the geometric condition and traffic pattern of this segment suggests that the high throughput and densely located traffic signals both contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 27: SW 22nd St from SR-826 to SW 37th Ave

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Communication network and roadway surveillance coverage*	$32,831,400	FDOT D4 ATMS	2011	1.036	$34,013,330
Signal timing optimization	$42,000	http://www.itscosts.its.dot.gov/	2009	1.086	$45,612

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);
- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

18. SR 997 (Krome Ave) at SW 312th St (Campbell Dr)

A review of the geometric condition and traffic pattern of intersection suggests that the intersection experience high turning volumes. The recommended congestion strategy and its cost for this facility are:

Table 28: CMP Strategies - SR-997 at SW 312th St

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Intersection Improvements - redesign to meet minimum turn radius requirements	$500,000	estimate	2013	1	$500,000

Source: Cambridge Systematics, Inc

19. NW 12th St (MIA Perimeter Rd)/MIA access/circulation road

A review of the geometric condition and traffic pattern of intersection suggests that the high throughput and limited capacity with the circulation road at MIA contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 29: CMP Strategies - NW 12th St (MIA Perimeter Rd)/MIA access/circulation road

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
Active traffic management strategies on MIA circulator road and between MIA and NW 37th Ave*	$8,000,000	estimate	2013	1	$8,000,000
Real Time Parking Availability Information	$1,000,000	estimate	2013	1	$1,000,000

Source: Cambridge Systematics, Inc

* Active traffic management strategies include dynamic lane control, dynamic speed control, real-time information, etc. It requires installation of speed/volume detectors, travel time collection devices, traffic monitoring cameras, dynamic message signs, lane markings, etc.

20. NW 12th St (MIA Perimeter Rd)/MIA access/circulation road

A review of the geometric condition and traffic pattern of intersection suggests that the high throughput and limited capacity with the circulation road at MIA contribute to the congestion. The recommended congestion strategies and their costs for this facility are:

Table 30: CMP Strategies - NW 12th St (MIA Perimeter Rd)/MIA access/circulation road

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2014$
Communication network and roadway surveillance coverage*	$32,831,400	FDOT D4 ATMS	2011	1.036	$34,013,330

Source: Cambridge Systematics, Inc

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);

- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

21. City of Miami Beach ITS and Parking Management System (PMS)

The City of Miami Beach is an important economic generator for Miami-Dade County. Collins Ave in Miami Beach is ranked 12 among the congested corridors and is included in the tier 2 corridors. The City of Miami Beach Commission recently approved moving forward with an Intelligent Transportation Systems (ITS) and Parking Management Systems (PMS) project that received City Commission approval on July 23, 2014. The costs of both projects are estimated to be $14.5 million (2013$). The City has applied for $14.5 M TIGER funding for this project, with the City contributing $4.5 M local match. In the event the project does not get TIGER funding, the City will use the $4.5 M local funding to fund a reduced scope. Given the importance of the City in promoting economic activity, the arterial ITS and PMS projects approved by City of Miami Beach are also included in the list of CMP projects.

Table 31: CMP Strategies - City of Miami Beach ITS and Parking Management System

CMP Strategies	Estimated Costs	Reference	Year of Estimates	Inflation (CPI)	2013$
ITS and PMS	$14,500,000	City of Miami Beach	2013	1	$14,500,000

Source: City of Miami Beach

Implementation of CMP Strategies

Implementation of congestion mitigation strategies are constrained by available funds for congestion management in the region. Miami-Dade MPO established a set aside to fund CMP projects. Five percent of Other Arterials funds and Local Gas Tax were set aside as funding for CMP improvements, as presented in Error! Reference source not found..

Table 32: CMP Funding in $YOE (FY 2020 – FY 2040)

2040 LRTP Congestion Management Set Aside	2020	2021-2025	2026- 2030	2031- 2040	Total
Other Arterials (5%)	$4,8 M	$21.5 M	$20.3 M	$44.4 M	$91 M
Local Gas Tax (5%)	$4.1 M	$24.6 M	$25.2 M	$25.9 M	$80 M
TOTAL	$9 M	$46 M	$45 M	$70 M	$171 M

Source: Gannett Fleming, Inc.

Based on funding availability in different time periods from 2020 to 2040, CMP projects were assigned to different timeframe. Using *Table D-1 Inflation Factors to Convert Project Cost Estimates to Year of Expenditure Dollars* from FDOT 2040 Revenue Forecast Handbook, inflation factors were applied to project costs to reflect future value. **Table 32** documents the total CMP project needs and the cost feasible projects.

Evaluation of CMP Strategies

Evaluation of CMP strategy effectiveness is an essential element of the CMP. The primary goal of the evaluation is to understand the effectiveness of implemented strategies at addressing congestion as intended, and to make changes based on the findings as necessary. Findings that show improvement in congested conditions due to specific implemented strategies can be used to encourage further implementation of these strategies, while negative findings may be useful for discouraging or downplaying the effectiveness of similar strategies in similar situations. CMP strategy evaluation can be either at the system level or at the project level. Traffic data before and after implementation of a strategy, should be collected in order to understand the real impact of a strategy. Therefore, strategy evaluation methodology should be determined before a strategy is implemented, and data collection should be conducted before implementation of a project.

Table 33: Cost Feasible CMP Projects

CMP Corridors/Hotspots	CMP Strategies	2013$	2020 (Capital)	2021-2025 (Capital)	2026-2030 (Capital)	2031-2040 (Capital)	Total
Network*	Communication network and roadway surveillance coverage	$34,013,330	$4,763,730	$27,483,664		$19,727,732	**$51,975,125**
Interchange at I-95 and I-195	Speed harmonization/queue warning on I-95 and I-195	$12,984,000		$17,528,400			**$17,528,400**
	Roadway signage improvements on ramps from I-195 to I-95	insignificant					**$0**
Intersection at NW S River Dr and NW 33rd Ave	Access management	$1,000,000	$1,210,000				**$1,210,000**
	Widen the road and bridge to at least three lanes to provide at a minimum, a turn lane for the turning vehicles	$2,303,273		$987,936	$2,498,634		**$3,486,571**
MacArthur Causeway eastern terminus (Watson Island to Alton Rd)	Signal timing optimization	$13,032	$15,769				**$15,769**
	Access management and intersection improvement at Watson Island	$30,000,000			$7,481,616	$51,374,455	**$58,856,071**
Intersection at NW 29th St and NW 42nd Ave (Le Jeune Rd) - north leg	Signal timing optimization	$48,870	$59,133				**$59,133**
	Intersection improvements at NW 29th St and NW 42nd Ave	$1,000,000			$1,590,000		**$1,590,000**
	Access improvements	$1,000,000			$1,590,000		**$1,590,000**
Intersection at Ives Dairy Rd (NE 203rd St) and Highland Lakes Blvd - south leg	Signal detector improvement - pilot	$50,000	$60,500				**$60,500**
Coral Way from SW 37th Ave to US-1	Signal timing optimization	$58,644	$70,959				**$70,959**
	Real Time Parking Availability Information	$1,000,000			$1,590,000		**$1,590,000**
US 1 between SW 344 St and I-95	Enforce "don't block box' initiatives	insignificant					**$0**
	Signal timing optimization	$228,060	$275,953				**$275,953**
NW 27th Ave/SW 27th Ave from SW 8th St (Tamiami Trail) to NW 36th St	Signal timing optimization	$32,580	$39,422				**$39,422**
	Median/access improvements	$3,025,000			$4,809,750		**$4,809,750**
Ponce De Leon Blvd between SW 57th Ave (Red Road) and NW 42nd Ave (Le Jeune Rd)	Signal timing optimization	$19,548	$23,653				**$23,653**
NW 7th St between NW 72nd Ave and NW 7th Ave	Signal timing optimization	$68,418	$82,786				**$82,786**
NW 2nd Ave between Golden Glades Interchange and Miami-Dade/Broward County line	Signal timing optimization	$26,064	$31,537				**$31,537**
SW 8th St (Tamiami Trail) from SR-826 (Palmetto Expressway) to I-95	Signal timing optimization	$114,030	$137,976				**$137,976**
NW 57th Ave (Red Rd) from NW 135th St to SR 826 (Palmetto Expressway)	Signal timing optimization	$26,064	$31,537				**$31,537**
	Access improvements	$2,000,000			$3,180,000		**$3,180,000**
NW 167th St between NW 2nd Ave and NE 15th Ave	Signal timing optimization	$32,580	$39,422				**$39,422**
	Access improvements	$1,000,000			$1,590,000		**$1,590,000**
SR 934 (Hialeah Expressway) between NW 84th Ave and W 4th Ave (Red Road)	Signal timing optimization	$19,548	$23,653				**$23,653**
	Intersection improvements for trucks	$3,000,000			$4,770,000		**$4,770,000**
	TDM Strategies	insignificant					**$0**
Miami Ave; SW 2nd Ave; SW 1st St; Flagler St; NW 7th Ave bridges over Miami River	Advanced bridge closing signs/rerouting information signs	$1,218,000	$1,473,780				**$1,473,780**

CMP Corridors/Hotspots	CMP Strategies	2013$	2020 (Capital)	2021-2025 (Capital)	2026-2030 (Capital)	2031-2040 (Capital)	Total
SW 22nd St (Coral Way) from SR-826 (Palmetto Expressway) to SW 37th Ave	Signal timing optimization	$45,612	$55,191				**$55,191**
SR 997 (Krome Ave) at SW 312th St (Campbell Dr)	Intersection Improvements - redesign to meet minimum turn radius requirements	$500,000	$605,000				**$605,000**
NW 21st St/MIA access/circulation road	Active traffic management on MIA circulator road and between MIA and NW 37th Ave**	$8,000,000			$12,720,000		**$12,720,000**
	Advanced Parking System	$2,000,000			$3,180,000		**$3,180,000**
NW 12th St (MIA Perimeter Rd)/MIA access/circulation road	Communications networks and roadway surveillance coverage – please refer to the strategy for "Network"						**$0**
City of Miami Beach	ITS and Parking Management System (PMS)***	$14,500,000					**$0**
Cost Feasible Projects Total			**$9,000,000**	**$46,000,000**	**$45,000,000**	**$71,102,187**	**$171,102,187**

Source: Cambridge Systematics.

* Communications networks and roadway surveillance coverage (US 1 already has communications network):

- Between SR 821/Florida Turnpike Homestead Extension and I-95/US 1(about 51 miles): SW 88th St (Kendall Dr.); SW 40th St; SW 24th St (Coral Way); SW 8th St, NW 7th St, NW 12th St (between SR 821 and NW 42nd Ave);
- Between SR 112/SR 835 and US 1/SW 88th St (about 27 miles): SW 107th Ave, SW 87th Ave, SW 57th Ave, SW 42th Ave (Le Jeune Rd), SW 27th Ave, US 1

** Active traffic management strategies include dynamic lane control, dynamic speed control, real-time information, etc. It requires installation of speed/volume detectors, travel time collection devices, traffic monitoring cameras, dynamic message signs, lane markings, etc.

*** The City of Miami Beach has applied for $14.5 M TIGER funding for this project, with the City contributing $4.5 M local match. In the event the project does not get TIGER funding, the City will use the $4.5 M local funding to fund a reduced scope.

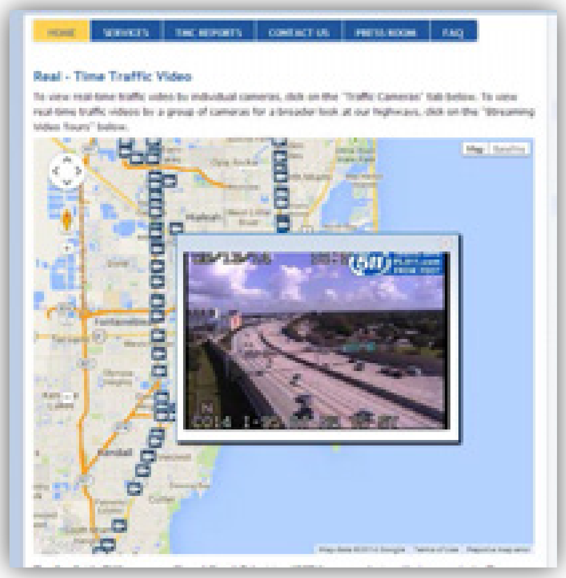
CMP Visualization

To help general public, stakeholders, and transportation professionals to understand the congestion conditions in the region and the impact of proposed CMP projects, a couple of visualization tools were utilized in this CMP update:

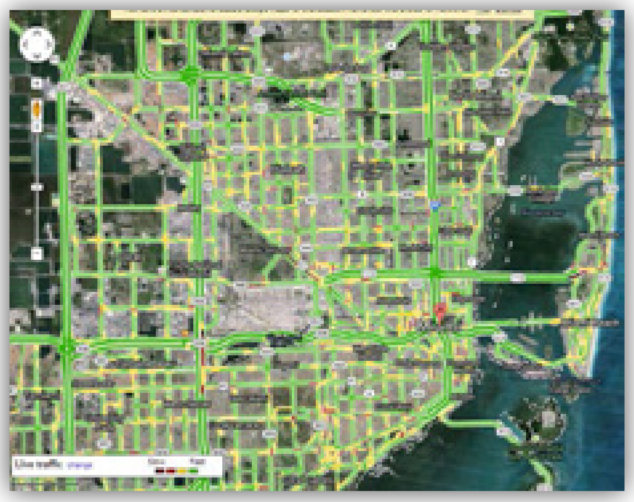
1. Internet and mobile application resources are gathered to visually present real-time congestion conditions of the region;

   a. Website:

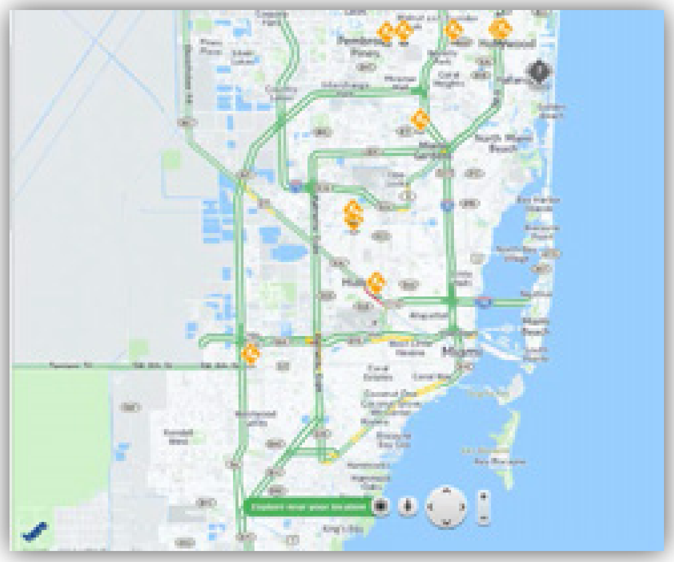
      i. FDOT District 6 TMC Real-Time Traffic Video: http://sunguide.info/sunguide/index.php/travel_info



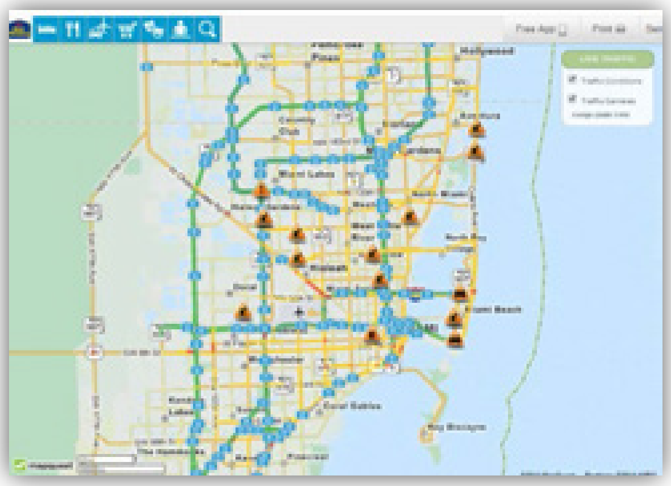
      ii. Google Maps: https://www.google.com/maps



iii. HERE- City and County Maps: http://here.com/



iv. MapQuest: http://www.mapquest.com/traffic/



b. Mobile Applications

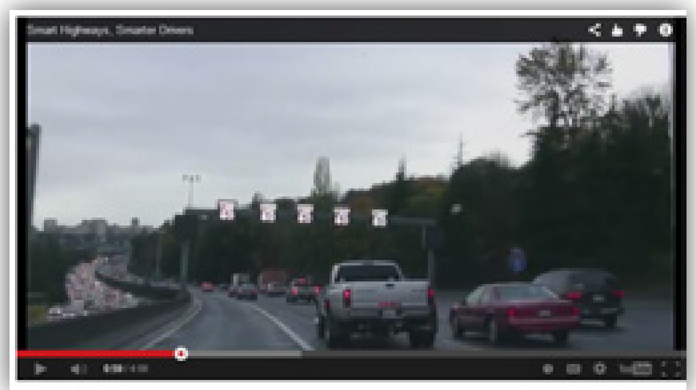
i. Florida 511 Traveler Information System: IOS, Android

ii. Google Maps: IOS, Android, Blackberry ($1.99)

iii. Beat the Traffic: IOS, Blackberry, Android

iv. INRIX Traffic: IOS, Blackberry, Android

2. Visual demonstrations of CMP strategies were introduced to help public understand these strategies and how they can help mitigate congestion.



(a) Speed Harmonization

(b) Real Time Parking Availability Information

These tools are accessible through the 2040 LRTP website.

Appendix A: CMP Strategy Toolbox

Table 34: Intelligent Transportation Systems (ITS) and Transportation System Management (TSM) Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Traffic Signal Coordination and Modernization This strategy improves traffic flow and reduces emissions by minimizing stops on arterial streets. Enhancements to timing/coordination plans and equipment to improve traffic flow and decrease the number of vehicle stops. May include: • Modern technology that provides for real-time traffic and transit management • Equipment that may permit immediate knowledge of malfunctions • Responsive control that allows traffic signals to alter timing in response to immediate traffic flow conditions, rather than at predetermined times • Transit signal priority system that can extend "green-time" a few seconds to allow buses to progress through an intersection	• Improve travel time • Reduce the number of stops • Reduce VMT by vehicle miles per day, depending on program • Reduce VHD and PHT • Reduced air pollution, fuel consumption and travel time • Increase "capacity" of an intersection to handle vehicles, reduced number of vehicle strategies	L	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Ramp Metering This allows freeways to operate at their optimal flow rates, thereby speeding travel and reducing collisions. May include bus or high-occupancy vehicle bypass lanes. May require ramp widening to avoid extensive vehicle queuing.	• Decrease travel time • Decrease accidents • Improve traffic flow on major facilities • Improved speed on freeway • Decreased crash rate on freeway	L	• Medium-term: 5 to 10 years
Highway Information Systems These systems provide travelers with real-time information that can be used to make trip and route choice decisions.	• Reduce travel times and delay • Some peak-period travel shift	L	• Medium-term: 5 to 10 years
Advanced Traveler Information Systems This provides an extensive amount of data to travelers, such as real time speed estimates on the web or over wireless devices, and transit vehicle schedule progress. Provides travelers with real-time information that can be used to make trip and route choice decisions. Information accessible on the web, dynamic message signs, 511 systems, Highway Advisory Radio (HAR), or handheld wireless devices.	• Reduce travel times and delay • Some peak-period travel and mode shift	L	• Medium-term: 5 to 10 years
Targeted and Sustained Enforcement of Traffic Regulations Improves traffic flow by reducing violations that cause delays; Includes automated enforcement (e.g., red light cameras)	• Improve travel time • Decrease the number of stops	L	• Short-term: 1 to 5 years
Special Events and Work Zone Management Includes a suite of strategies including temporary traffic control, public awareness and motorist information, and traffic operations	• Minimize traffic delays • Improve mobility • Maintain access for businesses and residents	L	• Short-term: 1 to 5 years
Road Weather Management Identifying weather and road surface problems and rapidly targeting responses including advisory information, control measures, and treatment strategies	• Improve safety due to reduced crash risk • Increased mobility due to restored capacity, delay reductions, and more uniform traffic flow	L	• Short-term: 1 to 5 years
Roadway Signage Improvements Adequate or additional signage that facilitates route-finding and the decision-making ability of roadway users. Signs with clearer/larger lettering that can be read from a greater distance	• Reduced level of driver uncertainty and fewer erratic driving maneuvers • Reduced delay for upstream approaching vehicles • Psychological encouragement to unsure motorists • Less chance of crashes caused by sudden lane changes, extremely slow-moving vehicles or sudden stops	L	Short-term • Production of signs and installation can occur shortly after site visits and design of new signing plans. Design should follow the guidance of the Manual on Uniform Traffic Control Devices (MUTCD).
Dynamic Speed Control "Go Slow, Go Fast"	• Air Quality Benefit Medium • Positive user impacts	L	• 1-2 years
Freeway Incident Detection and Management Systems This is an effective way to alleviate non-recurring congestion. Systems typically include video monitoring, dispatch systems, and sometimes roving service patrol vehicles.	• Reduce accident delay • Reduce travel time • Decrease VHT and PHT	M	• Medium- to Long-term: likely 10 years or more
Service Patrols Service vehicles patrol heavily traveled segments and congested sections of the freeways that are prone to incidents to provide faster and anticipatory responses to traffic incidents and disabled vehicles	• Reduce incident duration time • Restore full freeway capacity • Reduce the risks of secondary accidents to motorists	M	• Short-term: 1 to 5 years
Converting Streets to One-Way Operations Establishes pairs of one-way streets in place of two-way operations. Most effective in downtown or very heavily congested areas	• Increase traffic flow	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Traffic Surveillance and Control Systems Often housed within a Traffic Management Center (TMC), monitors volume and flow of traffic by a system of sensors, and further analyzes traffic conditions to flag developing problems, and implement adjustments to traffic signal timing sequences, in order to optimize traffic flow estimating traffic parameters in real-time.	• Decrease travel times and delay • Some peak-period travel and mode shift	M	• Medium-term: 5 to 10 years
Electronic toll collection (ETC) Equipment that electronically collects tolls from users without requiring vehicles to stop at a toll booth	• Fewer vehicle stops and less traveler delay at toll stations • Cost savings due to no (or fewer) toll booth facilities or lanes • Significant decrease in pollutant emissions from stop-and-go traffic at toll booths/plazas	M	Short- to medium-term: • Physical implementation of electronic toll collection equipment can be completed in a short time period for a roadway, unless additional right-of-way is needed.
Communications networks and roadway surveillance coverage • Base infrastructure (fiber, cameras, etc.) required to support all operational activities. • Communications networks that allow remote roadway surveillance and system control from a TMC and provision of data for immediate management of transportation operations and distribution of information	• Increased capability for regional-level coordination of operations and traveler information.	M	Medium- to long-term • Small-scale items and opportunistic expansion can be done quickly. Larger-scale regional network components require more time for planning and funding.

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Transit vehicle travel information Communications infrastructure, GPS technology, vehicle detection/monitoring devices and signs/media/Internet sites for providing information to the public such as the arrival times of the next vehicles	• More satisfied customers and increased ridership due to enhanced and reliable information sources • Improved operations and management of transit service	M	Medium • Time is required for detailed planning, design and funding procurement
Transit intersection queue jump lanes and signal priority • Additional travel lane at a signalized intersection that allows buses to proceed via their own "green-time" before other vehicles • Done by restriping within existing road footprint or this may require construction	• Reduced bus travel delays due to traffic signals and traffic congestion • Reduced bus travel delays due to traffic signals and traffic congestion • Improved operational efficiency of transit service within a corridor • Increased ridership and reduced congestion due to time savings • Safer driving conditions for all vehicles due to fewer severe and sudden lane changes by buses • Increased ridership and reduced congestion due to time savings • Safer driving conditions for all vehicles due to fewer severe and sudden lane changes by buses	M	Short-term: 1 to 5 years • All phases–planning, engineering and implementing–a queue-jump lane can be reasonably completed in less than one year. • Longer time is needed if new lane must be constructed
Reversible Traffic Lanes These are appropriate where traffic flow is highly directional.	• Increase peak direction capacity • Reduce peak travel times • Improve mobility	H	• Short-term: 1 to 5 years
Cordon area congestion fees An established cordon area or zone in which vehicles are charged a fee to enter. Such a fee can be variable (by time of day) or dynamic (based on real-time congestion conditions). Should include electronic payment/collection methods using cameras or transponders	• Reduced pollution and congestion within the cordon area • Revenues for roadway maintenance and new transit, bicycle and pedestrian facilities • Overall reduced congestion due to less VMT • Provide incentive to use transit, bike, or walk	H	Medium- to long-term • Extensive time is required for the entire process including political and public discussions, possible ballot measures, construction and implementation

Table 35: Travel Demand Management (TDM) Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Alternative Work Hours This allows workers to arrive and leave work outside of the traditional commute period. It can be on a scheduled basis or a true flex-time arrangement. Can also include a compressed work week.	• Reduce peak-period VMT • Improve travel time among participants • Reduction in SOV trips (maybe modify with "during peak")	L	• Employer-based • Short-term: 1 to 5 years
Telecommuting This involves employees to work at home or regional telecommute center instead of going into the office. They might do this all the time, or only one or more days per week. Also include teleconferencing and videoconferencing.	• Reduce VMT • Reduce SOV trips • Fewer drivers during morning and afternoon rush hours. • Increased employee productivity, improved employee retention and recruitment, reduced overhead costs and lower demand for physical office and parking space • Decreased commuting time and expenses for employees	L	• Employer-based • Short-term: 1 to 5 years
Alternative travel mode events and assistance • Variety of events that promote, encourage and educate people about alternative travel modes (e.g. Bike to Work Day, RideSmart Thursdays and employer transportation fairs) • Programs that provide free or low-cost transit services (e.g. EcoPass) or other incentives	• Fewer single-occupant vehicles on the road and less overall traffic congestion • Lower commuting costs	L	• Short-term
Public Education Campaigns E.g. driving habits, trip chaining, idle reduction, jackrabbit starts, Clean the Air Challenge	• Air Quality Benefit Medium • Positive user impacts	L	• Immediate
Commuter Services Please note that the costs and impacts are statistics between Oct. 1st 2007 and Sept. 30th 2008 - in December 2008, the 95 Express Lanes opened, so the statistics are likely over-estimates of the benefits of commuter services	• Reduce VMT • Reduce SOV trips • Lower commuting cost	L	• Immediate
Ridesharing This is typically arranged/encouraged through employers or transportation management agencies, which provides ride-matching services. Programs to promote carpooling and vanpooling, including ridematching services and policies that give ridesharing vehicles priority in traffic and parking.	• Reduce work VMT • Reduce SOV trips • Lower commuting costs • Reduce parking congestion • Promote transit, biking and walking	M	• Employer-based • Short-term: 1 to 5 years
Road Pricing Involves pricing facilities to encourage off-peak or HOV travel, and includes time-variable congestions pricing and cordon (area) tolls, high occupancy/ toll (HOT) lanes, and vehicle-use fees	• Decrease peak period VMT • Decrease SOV trips	M	• Short-term: 1 to 5 years
Guaranteed Ride Home Policies Provides a guaranteed ride home at no cost to the employee in the event an employee or a member of their immediate family becomes ill or injured, requiring the employee to leave work	• Decrease work VMT • Decrease SOV trips	H	• Employer-based • Short-term: 1 to 5 years
Non-traditional toll roads For non-traditional toll roads, travelers choose to pay for passage on roads. They are implemented similarly to traditional toll roads, but with non-traditional implementation: • Managed Lanes – A toll lane or lanes designed to increase freeway efficiency through a combination of operational and design actions; and • HOT Lanes – High Occupancy Vehicle (HOV) toll lanes that allow a limited number of low-occupancy vehicles to use the lane if a fee is paid. Typically free for HOVs	• Generate revenue to maintain its system and to address transportation improvements regionwide • Reduce congestion in corridors and systems • Provide travel time savings to users of the system	H	• Mid term (3 to 10 years) for implementation • Long term (11+ years) before strategy becomes effective

Table 36: Land Use Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Mixed-Use Development This allows many trips to be made without automobiles. People can walk to restaurants and services rather than use their vehicles	• Increase walk trips • Decrease SOV trips • Decrease in VMT • Decrease vehicle hours of travel	L	• Long-term: 10 or more years
Infill and Densification This takes advantage of infrastructure that already exists, rather than building new infrastructure on the fringes of the urban area.	• Decrease SOV • Increase transit, walk, and bicycle • Doubling density decreases VMT per household • Medium/high vehicle trip reductions • Air quality benefit to densification	L	• Long-term: 10 or more years
Efficient land use and development practices • Areawide policies and strategies that result in a more transportation-efficient regional development pattern (e.g. urban growth boundary) • Localized planning, zoning, ordinances and site approval strategies that result in more transportation-efficient developments (e.g. mixed-land-uses, higher density, urban centers, well connected transit, pedestrian and bicycling facilities)	• Less motor vehicle use through greater bicycling, walking and transit use • Related health benefits and economic savings via less infrastructure needs • Reduce VMT • Reduce SOV trips • Increase alternative modes share	M	Short- to long-term • Small-scale retrofit practices, re-zonings or comprehensive plan amendments can be done in a short to moderate timeframe. Regional-scale policy changes may take a long time to adopt and result in development changes on the ground and integration with transportation systems.
Transit-Oriented Development This clusters housing units and/or businesses near transit stations in walkable communities.	• Decrease SOV share • Shift carpool to transit • Increase transit trips • Decrease VMT • Decrease in vehicle trips • Increase transit mode share	NA	• Long-term: 10 or more years
Transportation Management Associations Nonprofit, member-controlled organizations that provide transportation services in a particular area, such as a commercial district, mall, medical center, or industrial park. They are generally public-private partnerships consisting primarily of area businesses with local government support.	• Reduce VMT • Reduce SOV trips • Increase alternative modes share • Increase transit mode share	NA	• Employer-based • Short-term: 1 to 5 years

Table 37: Parking Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Employer/Landlord Parking Agreements Employers can negotiate leases so that they pay only for the number of spaces used by employees. In turn, employers can pass along parking savings by purchasing transit passes or reimbursing non-driving employees with the cash equivalent of a parking space	• Reduce work VMT • Increase non-auto mode shares	L	• Short-term: 1 to 5 years
Preferential or Free Parking for HOVs and Parking Management Strategies include reducing the availability of free parking spaces, particularly in congested areas, or providing preferential or free parking for HOVs. This provides an incentive for workers to carpool.	• Reduce work VMT • Increase vehicle occupancy	L	• Short-term: 1 to 5 years
On-Street Parking and Standing Restrictions Enforcement of existing regulations can substantially improve traffic flow in urban areas. Peak-period parking prohibitions can free up extra general purpose travel lanes or special us or HOV “diamond” lanes.	• Increase peak period capacity • Reduce travel time and congestion on arterials • Increase HOV and bus mode shares	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Park and Ride Lots Park-and-Ride lots provide parking in areas that are convenient to other modes of transportation, and are commonly located adjacent to train stations, bus lines, or HOV lane facilities	• Increase transit use and ridesharing • Decrease VMT	M	• Medium-term: 5 to 10 years
Real Time Parking Availability Information Helps drivers find or reserve parking using real-time information about the status of parking availability	• Decrease congestion on local streets • Some peak-period travel and mode shift	M	• Short-term: 1 to 5 years
Location-Specific Parking Ordinances Parking requirements can be adjusted for factors such as availability of transit, a mix of land uses, or pedestrian-oriented development that may reduce the need for on-site parking. This encourages transit-oriented and mixed-use development.	• Reduce VMT • Increase transit and non-motorized mode shares	NA	• Long-term: 10 or more years
Local and Regional Excise Taxes A flat fee-per-space on parking spaces provided by businesses designed to discourage automobile-dependent development, encourage more efficient land use, and - to the extent the fees are passed on to parkers - encourage non-motorized and transit choices. The revenue generated by such a tax (on parking spaces, not their use) could be used for transit and other transportation investments not eligible for highway dollars.	• Generate revenue to maintain its system and to address transportation improvements regionwide • Reduce congestion in corridors and systems • Promote transit, biking, and walking • Increase access to and increase use of alternative modes	NA	• Medium-term Implementation should take between 3 to 10 years.

Table 38: Regulatory Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Trip Reduction Ordinance Draws commuters to use other ways to travel to work besides driving alone. Requires employers to promote commute alternatives.	• Improve air quality • Decrease traffic congestion • Minimize energy consumption	L	• Medium-term: 5 to 10 years
Congestion Pricing Controls peak-period use of transportation facilities by charging more for peak-period use than for off-peak. Congestion pricing fees are charged to drivers using congested roadways during specific times of the day. This strategy is evaluated in order to maintain a specific level of service on a given road or all roads (areawide systems) in a region. For example, an average fee of $0.65 cents/mile could be applied to 29 percent of urban and 71 percent of rural vehicle miles traveled (VMT) to better manage travel demand and the resulting congestion for a roadway	• Decrease VMT • Increase transit and nonmotorized mode shares	M	• Medium-term: 5 to 10 years
Auto Restriction Zones (Pedestrian Malls) Allows for a more equitable community, where all residents have an equal access to services within the area. Provides commercial access for pedestrians and non-car users. The most common form of an auto-restriction zone (pedestrian zones) in large cities is the pedestrian mall. Pedestrian malls generally consist of a storefront-lined street that is closed off to most automobile traffic.	• Increase capacity • Decrease travel times • Increase safety • Improve bicycle and pedestrian-friendly roadways	M	• Medium-term: 5 to 10 years
Truck Restrictions Aims to separate trucks from passenger vehicles and pedestrians. Prohibits trucks from traveling on certain roadways, and may call for weight restrictions on certain bridges.	• Increase capacity • Decrease travel times • Increase safety • Improve bicycle and pedestrian-friendly roadways	M	• Medium-term: 5 to 10 years
Arterial Access Management Involves the application of local and state planning, and regulatory tools in efforts to preserve and/or enhance the transportation functions of roadways. Includes land use ordinances and techniques, corridor preservation, transportation improvements, and techniques in finance.	• Increase capacity • Decrease travel times • Increase safety • Improve bicycle and pedestrian-friendly roadways	M	• Medium-term: 5 to 10 years

Table 39: Transit Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Enhanced Transit Amenities Includes vehicle replacement/upgrade, which furthers the benefits of increased transit use	• Decrease daily VMT • Decrease congestion • Increase ridership	L	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Realigned Transit Service Schedules and Stop Locations Service adjustments to better align transit service with ridership markets	• Increase transit ridership • Decrease daily VMT	L	• Short-term: 1 to 5 years
Improved Bicycle and Pedestrian Facilities at Transit Stations Includes improvements to facilities that provide access to transit stops as well as provisions for bicycles on transit vehicles and at transit stops (bicycle racks and lockers)	• Increase bicycle mode share • Decrease motorized vehicle congestion on access routes	L	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Reducing Transit Fares This encourages additional transit use, to the extent that high fares are a real barrier to transit.	• Reduce daily VMT • Reduce congestion • Increase ridership	M	• Short-term: Less than one year
Employer Incentive Programs Encourages additional transit use through transit subsidies of mass transit fares provided by employers	• Increase transit ridership • Decrease travel time • Decrease daily VMT	M	• Short-term: 1 to 5 years
Electronic Payment Systems and Universal Farecards Interchangeable smartcard payment system (including RFID) that can be used as a fare payment method for multiple transit agencies throughout the region	• Increase transit ridership • Decrease travel time	M	• Short-term: 1 to 5 years
Intelligent Transit Stops Ranges from kiosks, which show static transit schedules, to real-time information on schedules, locations of transit vehicles, arrival time of the vehicle, and alternative routes and modes	• Decrease daily VMT • Decrease congestion • Increase ridership	M	• Medium-term: 5 to 10 years (includes planning, engineering, and construction
Electronic fare collection Equipment that allows riders to electronically pay a transit fare by using credit, debit and magnetic fare cards	• Improved service efficiency, passenger convenience and passenger loading time • Increased ridership • Acquisition of more accurate and comprehensive ridership and trip data • Improved analysis and forecasting of trip ridership patterns and fare structure impacts • Reduced overall operating cost of fare collection and processing • Increased revenue through less fare evasion and greater accountability	M	• Medium-term It is estimated that a full deployment of an electronic fare payment system could take from three to five years
Express Bus Service Expansion Bus service with high-speed operations, usually between two commuter points.	• Reduce VMT • Reduce SOV trips • Increase transit ridership & mode share	M	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Local circulator expansion Fixed-route service within an activity area, such as a CBD or campus, designed to reduce short trips by car.	• Reduce VMT • Reduce SOV trips • Increase transit ridership & boardings	M	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Implementing Rail Transit This best serves dense urban centers where travelers can walk to their destinations. Rail transit from suburban areas can sometimes be enhanced by providing park- and- ride lots.	• Reduce daily VMT • More consistent and sometimes faster travel times versus driving • Reduce SOV trips	H	• Long-term: 10 or more years (includes planning, engineering, and construction)
New Fixed Guideway Transit Travelways • Exclusive guideways (e.g. light rail, heavy/commuter rail) and street travelways (e.g. 16th Street Mall, bus rapid transit (BRT)) devoted to increasing the person-carrying capacity within a travel corridor (see section 3.F. for information on HOV lanes)	• More consistent and sometimes faster travel times for transit passengers versus driving • Increased person throughput capacity within a corridor due to people switching from single occupant motor vehicles to transit • Stimulation of efficient mixed-use or higher-density development	H	• Medium- to long-term Development and implementation of a rail project is a major undertaking that can take 10 or more years from initial planning phases through NEPA studies to an opening day. • On-street conversion of travel lanes to BRT may not take quite as long.
Increasing Bus Route Coverage or Frequencies This provides better accessibility to transit to a greater share of the population. Increasing frequency makes transit more attractive to use. May require investment in new buses which would create a capital cost per passenger trip. May also include new routes or extensions to existing routes.	• Increase transit ridership • Decrease travel time • Reduce daily VMT • Improved convenience and travel reliability • Reduced traffic congestion due to trips switched from driving alone to transit	H	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Dedicated Rights-of-Way for Transit Reserved travel lanes or rights-of-way for transit operations, including use of shoulders during peak periods	• Increase transit ridership • Decrease travel time	H	• Medium-term: 5 to 10 years (includes planning, engineering, and construction)
BRT High-capacity, highly efficient bus service designed to compete with rail in terms of quality of service.	• Reduce VMT • Reduce SOV trips • Increase transit ridership & mode share	H	• Long-term: 10 or more years (includes planning, engineering, and construction)

Table 40: Highway Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Increasing Number of lanes without Highway widening This takes advantage of "excess" width in the highway cross section used for breakdown lanes or median.	• Increase capacity	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Geometric Design Improvements This includes widening to provide shoulders, additional turn lanes at intersections, improved sight lines, auxiliary lanes to improve merging and diverging. Interchange modifications to decrease weaving sections on a freeway, paved shoulders and realignment of intersecting streets. Consider revising to discuss added segment capacity and added intersection capacity	• Increase mobility • Reduce congestion by improving bottlenecks • Increase traffic flow and improve safety • Decrease incidents due to fewer conflict points	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Super Street Arterials This involves converting existing major arterials with signalized intersections into "super streets" that feature grade-separated intersections.	• Increase capacity • Improve mobility	M	• Medium-term: 5 to 10 years (includes planning, engineering, and implementation)
Acceleration/Deceleration lanes • Deceleration lane provided on a freeway just before an exit off-ramp allowing vehicles to reduce speed outside the through-lanes • Acceleration lane provided as an extension of a freeway on-ramp or an arterial street turn-lane for vehicles to increase speed and merge more smoothly into the through-lane	• Slower-moving turning or exiting vehicles are removed from through lanes resulting in fewer delays for upstream traffic • Accelerating vehicles are provided more distance to reach the speed of through traffic, resulting in fewer delays caused by merging and weaving vehicles • In certain situations, can greatly reduce delays (caused by braking) for upstream vehicles during peak traffic flow periods	M	• Medium-term Right-of-way is an important factor in the time required for implementation and construction.
Highway Widening by Adding Lanes This is the traditional way to deal with congestion.	• Increase capacity, reducing congestion in the short term • Long-term effects on congestion depend on local conditions • Reduced traffic and congestion on parallel streets	H	• Long-term: 10 or more years (includes planning, engineering, and construction)
HOV Lanes This increases corridor capacity while at the same time provides an incentive for single-occupant drivers to shift to ridesharing. These lanes are most effective as part of a comprehensive effort to encourage HOVs, including publicity, outreach, park-and-ride lots, and rideshare matching services.	• Reduce Regional VMT • Reduce regional trips • Increase vehicle occupancy • Improve travel times • Increase transit use and improve bus travel times	H	• Medium-term: 5 to 10 years (includes planning, engineering, and construction)
Grade separated railroad crossings Roadway underpass or overpass of a railroad line	• Significant reduction in travel delays at high volume locations • Likely elimination of car-train crashes • Decreased noise from train horns/whistles	H	• Medium- to long-term Implementation requires significant negotiation with railroads and local communities
New Freeways Construction of new, access-controlled, high-capacity roadways in areas previously not served by freeways.	• Reduce arterial street network congestion • Reduce travel times & delay	H	• Long-term: 10 or more years (includes planning, engineering, and construction)
New Arterial Streets Construction of new, higher-capacity roads designed to carry large volumes of traffic between areas in urban settings.	• Provide connectivity • Carry traffic from local & collector streets to other areas	H	• Medium-term: 5 to 10 years (includes planning, engineering, and construction

Table 41: Bicycle and Pedestrian Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
New Sidewalks and Designated Bicycle Lanes on Local Streets. Enhancing the visibility of bicycle and pedestrian facilities increases the perception of safety. In many cases, bike lanes can be added to existing roadways through restriping. Use of bicycling and walking is often discouraged by a fragmentary, incomplete network of sidewalks and shared use facilities.	• Increase mobility and access • Increase nonmotorized mode shares • Separate slow moving bicycles from motorized vehicles • Reduce incidents	L	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Improved Bicycle Facilities at Transit Stations and Other Trip Destinations. Bicycle racks and bike lockers at transit stations and other trip destinations increase security. Additional amenities such as locker rooms with showers at workplaces provide further incentives for using bicycles.	• Increase bicycle mode share • Reduce motorized vehicle congestion on access routes	L	• Short-term: 1 to 5 years (includes planning, engineering, and construction)
Design Guidelines for Pedestrian-Oriented Development Maximum block lengths, building setback restrictions, and streetscape enhancements are examples of design guidelines that can be codified in zoning ordinances to encourage pedestrian activity.	• Increase pedestrian mode share • Discourage motor vehicle use for short trips • Reduce VMT, emissions	L	• Short-term: 1 to 5 years
Improved Safety of Existing Bicycle and Pedestrian Facilities. Maintaining lighting, signage, striping, traffic control devices, and pavement quality, and installing curb cuts, curb extensions, median refuges, and raised crosswalks can increase bicycle and pedestrian safety.	• Increase nonmotorized mode share • Reduce incidents • Increase monitoring and maintenance costs	L	• Short-term: 1 to 5 years
Bike Sharing Programs Short-term bicycle rental program supported by a network of automated rental stations	· Increase non-motorized mode share · Discourage motor vehicle use for short trips · Decrease VMT	L	• Short-term: 1 to 5 years
Promote Bicycle and Pedestrian Use Through Education and Information Dissemination Bicycle and pedestrian use can be promoted through educational programs and through distribution of maps of bicycle facility/multi-use path maps.	• Shift trips into non-SOV modes such as walking, bicycling, transit • Increase bicycle/pedestrian mode share	L	• Short-term: 1 to 5 years
Exclusive Non-Motorized Rights-of-Way. Abandoned rail rights-of-way and existing parkland can be used for medium- to long distance bike trails, improving safety and reducing travel times.	• Increase mobility • Increase nonmotorized mode shares • Reduce congestion on nearby roads • Separate slow-moving bicycles from motorized vehicles • Reduce incidents	M	• Medium-term: 5 to 10 years (includes planning, engineering, and construction)
Adopt and implement a Complete Streets policy Policy that takes into account all users of streets rather than just autos, with a goal of completing the streets with adequate facilities for all users. A "Complete Street" is one designed and operated to enable safe access for all users including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.	• Increase safety by improving the overall (pedestrian and bicycle) transportation system environment • Reduce congestion in corridors and systems • Provide cost savings by reducing longer distance travel, increasing shorter distance travel, and use by non-motorized modes • Provide travel time savings to users of the system • Increase access to and use of alternative modes • Protect natural environment through sound land use and transportation sustainability policies • Increase community involvement and activity in developing policy and promoting projects • Promote incentive to use transit, bike, or walk	NA	• Near term (1-2 years)

Table 42: Access Management Strategies

Strategies/Projects	Congestion and Mobility Benefits	Costs	Implementation Timeframe
Left Turn Restrictions; Curb Cut and Driveway Restrictions Turning vehicles can impede traffic flow and are more likely to be involved in crashes.	• Increased capacity, efficiency on arterials • Improved mobility on facility • Improved travel times and reduced delay for through traffic • Fewer incidents	L	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Turn lanes and New or Relocated Driveways and Exit Ramps In some situations, increasing or modifying access to a property can be more beneficial than reducing access.	• Increased capacity, efficiency • Improved mobility and safety on facility • Improved travel times and reduced delay for all traffic	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Interchange Modifications Conversion of a full cloverleaf interchange to a partial cloverleaf, for example, reduces weaving sections on a freeway.	• Increased capacity, efficiency • Improved mobility on facility • Improved travel times and reduced delay for through traffic • Fewer incidents due to fewer conflict points	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Roadway Restrictions Closes access during rush hours (AM and PM peak hours) and aids in the increase of safety levels through the prevention of accidents at problem intersections. This measure may be effective along mainline segments of a highway, which operate at poor service levels.	• Increase capacity, efficiency on arterials • Improve mobility on facility • Improve travel times and decrease delay for through traffic • Decrease incidents	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Access Control to Available Development Sites Coordination of access points to available development sites allows for less interference in traffic flow during construction and/or operation of new developments	• Increase capacity, efficiency on arterials • Improve mobility on facility • Improve travel times and decrease delay for through traffic • Decrease incidents	M	• Short-term: 1 to 5 years (includes planning, engineering, and implementation)
Intersection turn lanes Additional left-turn or right-turn lanes that separate turning vehicles from through-traffic	• Greater number of vehicles can pass through the intersection in given amount of time, resulting in a lower level of travel delays and stopped time • Can reduce the likelihood of rear-end crashes	M	• Medium-term Agencies must be sure to plan for possible time needed to obtain right-of-way.
Roundabout intersections An intersection modification that does not use traffic signal or stop sign controls. Provides continuous movement via entrance and exit lanes to/from a typically circular distribution roadway	• Greater capacity than traditional 3- or 4-way intersections in many situations • Fewer crashes over time • Lower air pollutant emissions due to fewer stopped vehicles	M	• Medium-term Completion time for a replacement roundabout is related to the amount of planning and public outreach time needed and the right-of-way acquisition process
Frontage Roads and Collector-Distributor Roads Frontage roads can be used to direct local traffic to major intersections on both super arterials and freeways. Collector-distributor roads are used to separate exiting, merging, and weaving traffic from through traffic at closely spaced interchanges.	• Increased capacity, efficiency • Improved mobility on facility • Improved travel times and reduced delay for through traffic • Fewer incidents due to fewer conflict points	H	• Medium-term: 5 to 10 years (includes planning, engineering, and implementation)
New grade separated intersections An overpass or underpass for one roadway to avoid intersecting with a cross street	• Increased capacity and fewer stops • No stops for through traffic • Fewer turning movement conflicts	H	• Medium- to long-term Completion of a grade-separated intersection can take from five to 15 years, including planning, engineering, environmental analysis and construction phases.

This page intentionally left blank

MIAMI-DADE METROPOLITAN
PLANNING ORGANIZATION

111 NW 1st Street
Suite 920
Miami, FL33128
305-375-4507
www.miamidade.gov/MPO

Learn more by visiting: **www.MiamiDade2040LRTP.com**

Photo by Asad Gilani