



The 2009 Congestion Management Process Update



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Prepared by:



October 2009



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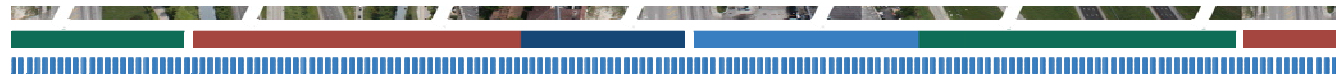
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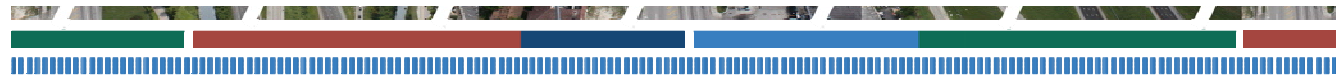


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1. INTRODUCTION

The Miami-Dade County Urbanized Area Metropolitan Planning Organization (MPO) has an established congestion management process to monitor the state of transportation network in Miami-Dade County (County). This process is known as Congestion Management System (CMS) which was last updated in 2004. The CMS, as a continually developing process, has expanded in scope and content over the last few years and is now known as Congestion Management Process (CMP). This document serves as an update to the 2004 CMS and reflects recent changes to the scope and regulatory requirements. The larger goal of this process is to identify whether the County's transportation system meets established mobility standards and develop strategies to address deficiencies. This document includes the following four major elements:

1. Section 2: A review of the CMPs and practices employed by other MPOs;
2. Sections 3-9: A description of the MPO's CMP and execution mechanism;
3. Section 10: Identification of congested spots and corridors; and,
4. Section 11: Recommendations to further improve the MPO's CMP.

1.1. What is a Congestion Management Process?

The CMP is "a systematic process for defining what levels of congestion are acceptable to communities; developing performance measures to monitor congestion levels; identifying alternative solutions to manage congestion; prioritizing funding for those strategies and assessing the effectiveness of those actions".¹

The CMP is part of a comprehensive systematic approach to transportation improvements that is expected to support the MPO's transportation vision and goals. Historically the MPO's Long Range Transportation Plan (LRTP) has focused on the capital investments needed to address the continuous increase in travel demand. However, funding constraints, concerns related to quality of life, regional and global environment, and land use have necessitated a close examination of alternative approaches such as effective management and operations of existing transportation facilities. As the County continues to grow, the CMP can be a valuable tool in identifying congestion and implementing strategies that are less capital-intensive compared to capacity expansion projects.

¹ U.S. Department of Transportation. An Interim Guidebook on the Congestion Management Process in Metropolitan Transportation Planning. February, 2008.



1.2. Purpose of the 2009 CMP Update

1.2.1. Meet State and Federal Requirements

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act – A Legacy for Users (SAFETEA-LU) requires CMP as an integral part of the metropolitan planning process in Transportation Management Areas (TMA) – urbanized areas with a population over 200,000, or any area where designation as a TMA has been requested. The CMP expands on requirements dating from the early 1990's for MPOs to address and manage congestion. With a population that exceeds the minimum threshold of 200,000 specified in federal planning regulations, the MPO is required to have a CMP.

Federal regulation, 23 CFR Part 450.320, identifies the required components for a CMP. These regulations were updated in the Final Rule published in February 2007. The requirements for a CMP are summarized as follows (also refer to Appendix A):

1. Methods to monitor and evaluate the performance of the multimodal transportation systems, identify the causes of recurring and non-recurring congestion, identify and evaluate alternative strategies, provide information supporting the implementation of actions, and evaluate the effectiveness of implemented actions;
2. Definition of congestion management objectives and appropriate performance measures to assess the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods;
3. Establishment of a coordinated program for data collection and system performance monitoring to define the extent and duration of congestion, to determine 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 that will contribute to more effective use and improved safety of existing and future transportation systems based on established performance measures;
5. Identification of a schedule, implementation responsibilities, and possible funding sources for each strategy (or combination of strategies) proposed for implementation; and,
6. Process for periodically assessing the effectiveness of implemented strategies, in terms of the area's established performance measures.

As a supplement to SAFETEA-LU requirements, a detailed checklist was developed by the FHWA Florida Division office in 2007 (Figure 1). This checklist is meant to ensure that all MPO CMP's become fully integrated into the metropolitan planning process. This report follows components of this checklist (also refer to Appendix B).

Figure 1: Congestion Management Process Checklist

1. **CMP Area of Application**
2. **System Definitions (modes and network)**
3. **Performance Measures**
4. **Performance Monitoring Plan**
5. **Identification and Evaluation of Strategies**
6. **Monitoring Strategy Effectiveness**
7. **Implementation and Management**

1.2.2. Update of the 2004 Congestion Management System

The 2004 CMS Update (Figure 2) accomplished the following:

- Defines established and systematic methods to monitor and evaluate system performance;
- Uses established performance measures to identify, and evaluate congestion and congestion management strategies;
- Defines a program for data collection and management incorporating existing data sources and methods; and,
- Defines procedures for periodic review of the effectiveness of strategies selected for implementation, as well as assessments of the usefulness of performance measures and supporting data.

This document serves as an update to the 2004 CMS.

Figure 2: The 2004 CMS Update



2. LITERATURE REVIEW

A literature review was conducted to identify different approaches to congestion management. The CMPs/CMSs of the following six agencies were reviewed:

- Broward Metropolitan Planning Organization (BMPO), Florida
- Palm Beach Metropolitan Planning Organization (PBMPO), Florida
- Atlanta Regional Commission (ARC), Georgia (Figure 3)
- Hillsborough Metropolitan Planning Organization (HMPO), Florida (Figure 4)
- Delaware Valley Regional Planning Council (DVRPC), Pennsylvania
- Hampton Roads Metropolitan Planning Organization (HRMPO), Virginia

Figure 3: Atlanta Regional Commission CMP

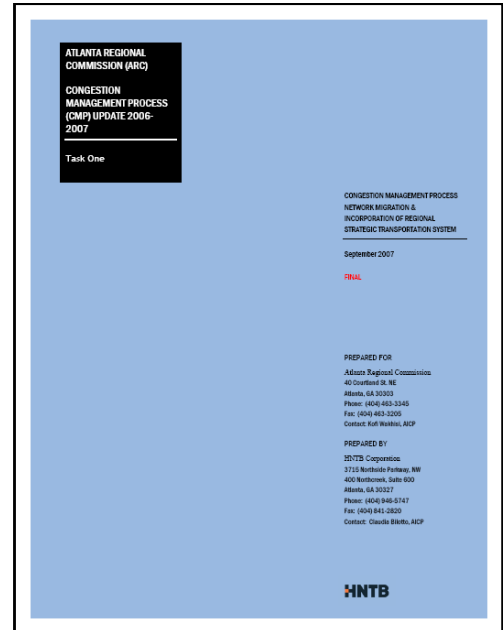
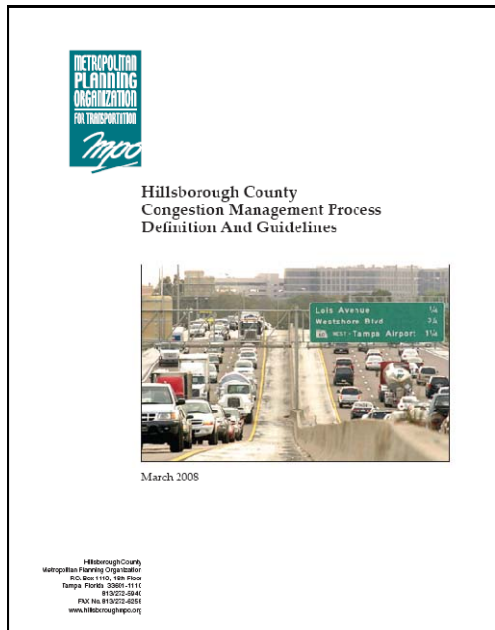


Figure 4: Hillsborough County CMP



Performance measures and congestion management strategies used by the above agencies are summarized in two matrices included as Tables 1 and 2, respectively. In addition to the information provided in the matrices, brief descriptions of each CMP's approach and procedures are provided in the Appendix C. The recommendations based on the literature review are included in Section 2.1.

Table 1: Performance Measures

Performance Measure	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
Highway						
▪ Volume to Capacity (V/C)/Volume to Max. Service Volume (V/MSV)	•	•	•		•	•
▪ Travel Time Index (TTI)				•		
▪ Existing and/or Future Peak-hour Congestion		•			•	
▪ Capacity	•	•				
▪ Level of Service (LOS)	•	•	•			•
▪ Total vehicle delay percentage				•		
▪ Intersection Level of Service	•					
▪ Travel speed	•					
▪ Travel time	•	•				
▪ Total daily congested hours		•		•		
▪ Person throughput capacity	•					
▪ Average daily traffic (ADT)	•		•		•	
▪ ADT growth rate		•				
▪ Vehicle density	•					
▪ Auto occupancy	•		•			
▪ Intermodal connectivity		•				
▪ Intersection critical sum		•				
▪ Roadway user survey		•				
▪ Relief to constrained roadways		•				
▪ Percent of congested miles by facility type		•				
▪ Frequent Crash-related Congestion					•	
Non-motorized						
▪ miles of bicycle facilities		•	•			
▪ miles of sidewalks/pedestrian facilities			•			
▪ Presence of sidewalks		•	•			
▪ Presence of bicycle lanes		•				
▪ Transit						
▪ Passengers per mile	•					
▪ Passengers per hour	•					
▪ Service headway			•			
▪ Passengers per revenue mile			•			
▪ Travel times	•					
▪ On-time performance	•	•				
▪ Peak load factor	•					
▪ Pedestrian access	•					
▪ Load factor	•	•				



Performance Measure	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
▪ On-time performance	•					
▪ Travel rates	•					
▪ Congested links	•	•				
▪ Service areas	•	•				
▪ Transit route miles	•	•				
▪ Reserved ROW for future mass transit	•	•				
▪ Monitor P&R lots	•					
▪ Intermodal connectivity	•					
▪ Parking at Intermodal Centers					•	
▪ Intermodal passenger sites					•	
Other						
▪ Serve activity centers		•				
▪ Roadway classification		•				
▪ Potential extraordinary costs		•				
Growth relations						
▪ Residential growth rate		•				
▪ Future residential growth rate		•				
▪ Supports urban infill		•				
▪ Location (urban core or suburb)					•	
Environmental						
▪ Benefits to underserved populations		•				
▪ Reduction in air pollution		•				
▪ Land use 'fit'		•				
▪ Corridor master plan		•				
Safety & security						
▪ Evacuation route		•				
▪ High hazard locations		•				
Regional planning						
▪ An identified regional corridor		•				
▪ Continuous typical section		•				
Freight						
▪ Capacity constraints	NA				•	

Table 2: Congestion Management Strategies

Strategy	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
Roadway Facilities						
▪ Limited-access highways				NA	•	
▪ General purpose lanes	•	•			•	•
▪ Alternate facilities	•					
▪ Geometrics	•	•				
▪ Signs and markings			•		•	
▪ Improve shoulders			•			
▪ Center turn lane					•	
▪ Jug handles					•	
▪ Short connection roads					•	
▪ Reversible lanes						•
▪ Roundabouts					•	
▪ Weaving sections			•			
Roadway Operations						
▪ HOV lane priority	•	•			•	•
▪ HOV signal priority		•			•	
▪ HOV access priority		•				
▪ Acceleration/deceleration lane			•			
▪ Ramp metering		•	•		•	•
▪ Parking management	•				•	
▪ Bottleneck removal					•	•
▪ Travel time			•			
▪ Vehicle use limitations					•	
Intersections						
▪ Signal improvements	•	•	•		•	•
▪ Geometric improvements	•	•	•			•
▪ Use of Intelligent Transportation Systems (ITS)			•		•	•
▪ Increase queue lengths			•			
▪ Traffic control	•				•	
▪ Time-of-Day restrictions		•				
▪ Signal prioritization for safety vehicles					•	
▪ Turn restrictions						•
Interchange						
▪ New interchanges					•	•
▪ Interchange improvements					•	
▪ Road user fees	•	•	•		•	•

Strategy	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
▪ HOV toll savings						•
▪ Parking fees		•			•	•
Access Management	•					
▪ Driveway control		•			•	•
▪ Access management						
▪ Median control		•			•	•
▪ Frontage Roads		•			•	•
▪ Accessibility					•	
▪ Effectiveness						
Bicycle						
▪ On-road bicycle lanes		•	•			•
▪ Off-road bicycle lanes			•			•
▪ Facility improvements	•				•	
▪ Signage and pavement markings			•			
▪ Awareness programs			•			
▪ Infrastructure/amenities (bike racks, lockers, maps)		•				•
Pedestrian						
▪ Pedestrian/countdown signals			•			•
▪ Reduce crossing distance			•			
▪ Facility maintenance/improvements	•		•		•	
▪ Missing sidewalk connections	•					
▪ Safety education and enforcement					•	
▪ Crosswalks						•
▪ Overpass/tunnels						•
Transit Capital						
▪ New vehicles		•	•			•
▪ New routes					•	
▪ Dedicated bus lanes/Bus Rapid Transit			•		•	•
▪ Local and regional rail service	•				•	•
▪ Reserved ROW for future mass transit	•	•			•	
▪ Support facilities		•				
▪ Bus By-pass Ramps		•				
▪ Park & Ride facilities / intermodal connections		•			•	•
▪ Bottleneck removal					•	
▪ Ferry service					•	
▪ Intelligent transit stops					•	
▪ Shuttle service to stations					•	
▪ Amenities			•		•	

Strategy	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
▪ Paratransit/Demand-responsive transit	•				•	
▪ Accessibility improvements			•			
Transit Operations						
▪ Headway improvement	•	•	•		•	•
▪ Extended service hours	•	•	•		•	
▪ Routing changes		•	•			
▪ Express/limited-stop Service		•			•	
▪ Consolidating stops		•	•			
▪ Improved transfers	•		•			
▪ Traffic operations	•	•				
▪ ITS	•				•	•
▪ Safety	•				•	
▪ Connections	•				•	
▪ Marketing	•	•			•	
▪ Transit Information Systems	•	•				•
▪ Flexible Route/Route Deviation Service					•	
▪ Queue jumper			•		•	
▪ Signal prioritization			•		•	
▪ Transit fare reduction						•
Transportation Demand Management (TDM)						
▪ Carpool		•	•		•	
▪ Vanpool	•	•	•		•	•
▪ Ride-matching service			•		•	•
▪ Guaranteed ride home		•	•		•	
▪ Flexible work hours/compressed work week	•		•		•	•
▪ Telecommuting	•		•			•
▪ Parking cash outs			•			
▪ Ride share	•				•	
▪ Trip reduction program	•					•
▪ Financial incentives	•	•				
▪ Parking management	•	•				•
▪ Park and Ride Lots	•					
▪ Traffic calming					•	•
▪ Marketing					•	
▪ One-car Less Program					•	
Growth Management						
▪ ROW dedication for roads			•			
▪ Exaction for improvements			•			
▪ Impact fees			•			
▪ Concurrency			•			

Strategy	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
▪ Site and urban design		•	•		•	•
▪ Growth Management/Land Use/Zoning/Transit-Oriented Design	•	•			•	•
▪ Forming TMAs	•					
▪ Trip reduction ordinances					•	•
▪ Infill Development						•
Incident Management	•		•		•	
▪ Detection		•				•
▪ Response		•				•
▪ Clearance		•				•
▪ Information/routing		•				•
▪ At-grade Railroad crossing improvements					•	
▪ Advanced Traffic Management Systems (ATMS)		•				•
▪ Advanced Traveler Information Systems (ATIS)		•				
▪ Advanced Public Transportation Systems (APTS)		•				
▪ Commercial Vehicle Operations (CVO)		•				
▪ Safety improvements and programs					•	
Event management			•			
▪ Transportation services for special events					•	
▪ Construction management		•			•	
ITS	•	•				
▪ Traveler information system	•				•	
▪ Electronic toll collection			•			
▪ White enforcement lights			•			
▪ Traffic management centers			•			
▪ Dynamic management signage			•			
▪ CCTV monitoring			•			
▪ Traffic detection stations			•			
▪ Archived data			•			
▪ Video Camera			•			
▪ Incident detection			•			
Freight	•					
▪ Geometric improvements			•			
▪ Incident management			•			
▪ Diversion to designated routes			•			
▪ Truck route signage			•			
▪ Change freight delivery times			•			

Strategy	Broward MPO	Palm Beach MPO	Hillsborough MPO	Atlanta Regional Commission	Delaware Valley RPC	Hampton Roads MPO
▪ Truck lane restrictions			•			
▪ Highway/Railway crossing improvements			•			
▪ Adding capacity			•			
▪ Goods movement management	•					
▪ Commercial vehicle improvements		•			•	
▪ Bottleneck removal					•	
▪ Freight intermodal center/yard					•	
▪ Freight rail					•	
Other						
▪ Auto restricted zones	•					
▪ Intermodal facilities	•	•			•	
▪ Information systems	•					
▪ Alternative fuel type	•					
▪ Economic Empowerment Zones/Economic development oriented policies	•				•	
▪ Environment-friendly transportation services and environmental justice					•	
▪ Interregional coordination					•	
▪ Local delivery service					•	
▪ Multi-lingual / Non-traditional communication					•	
▪ Transportation security / terrorism prevention					•	
▪ Transportation services for special populations					•	
▪ Vehicle use limitations and restrictions					•	

2.1. Recommendations Based on Literature Review

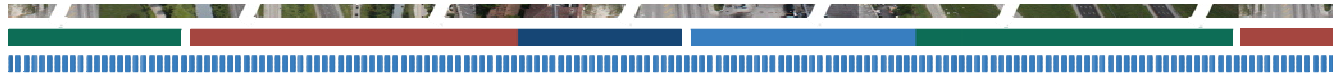
The MPO's existing congestion management process has established a solid foundation for identifying and quantifying congestion in the County. However, some of the practices used by other agencies can be used to further improve the MPO's CMP. Based on the literature review, the following enhancements are recommended for this and subsequent updates of the MPO's CMP.

📌 Performance Measures

- Adopt system-wide multimodal performance measures to evaluate changes on an aggregate basis for the entire transportation system over time.
- Identify congestion using three critical criteria: intensity, duration, and extent.
- Migrate from existing Relative Congestion Ratio (RCR), defined as the existing V/C ratio divided by the maximum allowed V/C ratio, to travel time based performance measures.
- Identify congestion by facility types: The following facility types are currently used in the MPO's approved travel demand model and therefore, could potentially be used for the CMP analysis:
 - Freeways and uninterrupted roadways
 - Tolled facilities
 - HOV facilities
 - Arterials
 - Collectors
 - Ramps
- Identify congestion based on area types: The following area types are currently used in the MPO's approved travel demand model and could potentially be used for the CMP analysis:
 - Central Business District (CBD) and Fringe CBD (Figure 5)
 - Other Business Districts
 - Residential
 - Rural

Figure 5: Central Business District





➤ Strategies

- Prioritize strategies in the following descending order:
 - Eliminate person trips or reduce Vehicle Miles Traveled (VMT)
 - Shift trips from auto to other modes
 - Shift trips from Single-Occupancy Vehicles (SOV) to other modes
 - Maximize effectiveness and efficiency of existing system
 - Add capacity
- Identify strategies by facility type and area type.



3. DEVELOPMENT OF CMP OBJECTIVES

The CMS has been described as a “7-Step” process. A major difference between the CMS and CMP is the addition of a new step, “Development of Congestion Management Objectives” which makes the CMP an “8-Step” process. The change reflects a new way of thinking and addressing congestion related issues. The approach embraces objectives-driven planning and emphasizes management and operations as a new focus for metropolitan transportation planning.

The MPO’s 2035 LRTP vision and goals provide the context for the CMP objectives and policy actions. The established LRTP vision and goals are based on extensive agency and public coordination efforts. Therefore, the vision and goals reflect a shared view of how the region’s highways, transit systems, and other facilities contribute to achieving generally agreed-upon goals for mobility, access to jobs and other opportunities, economic development, and others.

The LRTP goals (Figure 6) are broad statements of purpose. The CMP objectives, on the other hand, are specific statements of purpose, and CMP policy actions provide a bridge between general policies and actual implementation guidelines (Figure 7). The CMP objectives focus on managing congestion in the short-term with lower cost. However, the CMP objectives recognize that transportation system maintenance and operations improvements occur in a larger context of development and land use policies and, therefore should reflect the region’s planning priorities. Therefore, CMP Objectives 1 and 2 ensure that the maintenance and operations improvements, in addition to providing short-term congestion mitigation, are also incremental steps towards the County’s planning priorities. Objective 3 primarily focuses on efficiency and effectiveness that can be achieved with transportation maintenance and operations.

Figure 6: 2035 LRTP Goals

- Improve Transportation System and Travel
- Increase the Safety of the Transportation System for Motorized and Non-motorized Users
- Increase the Security of the Transportation System for Motorized and Non-motorized Users
- Support Economic Vitality
- Protect and Preserve the Environment and Quality of Life and Promote Energy Conservation
- Enhance the Integration and Connectivity of the Transportation System, Across and Between Modes, for People and Freight
- Optimize Sound Investment Strategies for System Improvement and Management/Operation
- Maximize and Preserve the Existing Transportation System



Figure 7: CMP Objectives and Policy Actions

Objective 1: Reduce vehicle trips and trip lengths

Policy Action 1.1 Encourage projects that support urban infill and densification

Policy Action 1.2 Encourage mixed-use development in adopted Urban Centers

Policy Action 1.3 Expand the use of Transportation Demand Management (TDM) strategies

Objective 2: Shift Trips from Single-occupancy Vehicles to High-occupancy Vehicles and Other Modes

Policy Action 2.1 Encourage transit-oriented development in existing and future Rapid Transit Urban Centers

Policy Action 2.2 Improve access to transit, bicycle and pedestrian modes

Policy Action 2.3 Make transit, bicycle, and pedestrian modes more attractive

Policy Action 2.4 Encourage use and implementation of special-use lanes

Objective 3: Maximize Effectiveness and Efficiency of Existing System

Policy Action 3.1 Identify and reduce severe congestion

Policy Action 3.2 Reduce number of vehicles hours affected by congestion

Policy Action 3.3 Reduce number of person trips affected by variation in travel time

Policy Action 3.4 Identify and remove transportation “bottlenecks”

4. AREA OF APPLICATION

The area of application covers the geographic area to which the CMP functions and analysis are applied. It is an area where congestion levels are monitored and congestion management strategies evaluated and implemented. The CMP area of application consists of the urbanized Miami area. The Miami-Dade MPO is the federally designated planning agency serving the urbanized Miami area.

4.1. CMP Roadway Network

The CMP roadway network is based on the MPO's designated Major Road Network. All corridors that are part of the Major Road Network are eligible for federal transportation funding through the MPO process. The classification of roadways is based upon FHWA's defined functional classification system. The CMP major road network includes three major categories of roads or facility types: (1) freeways, HOV and tolls roads (Figure 8); (2) arterials; and, (3) collectors. Functionally classified local roads and residential streets are not included in the designated Major Road Network. Tables 3 and 4 categorize existing (2005) roadways by facility and area types. Figure 9 shows the CMP roadway network.

Figure 8: Region's Highway



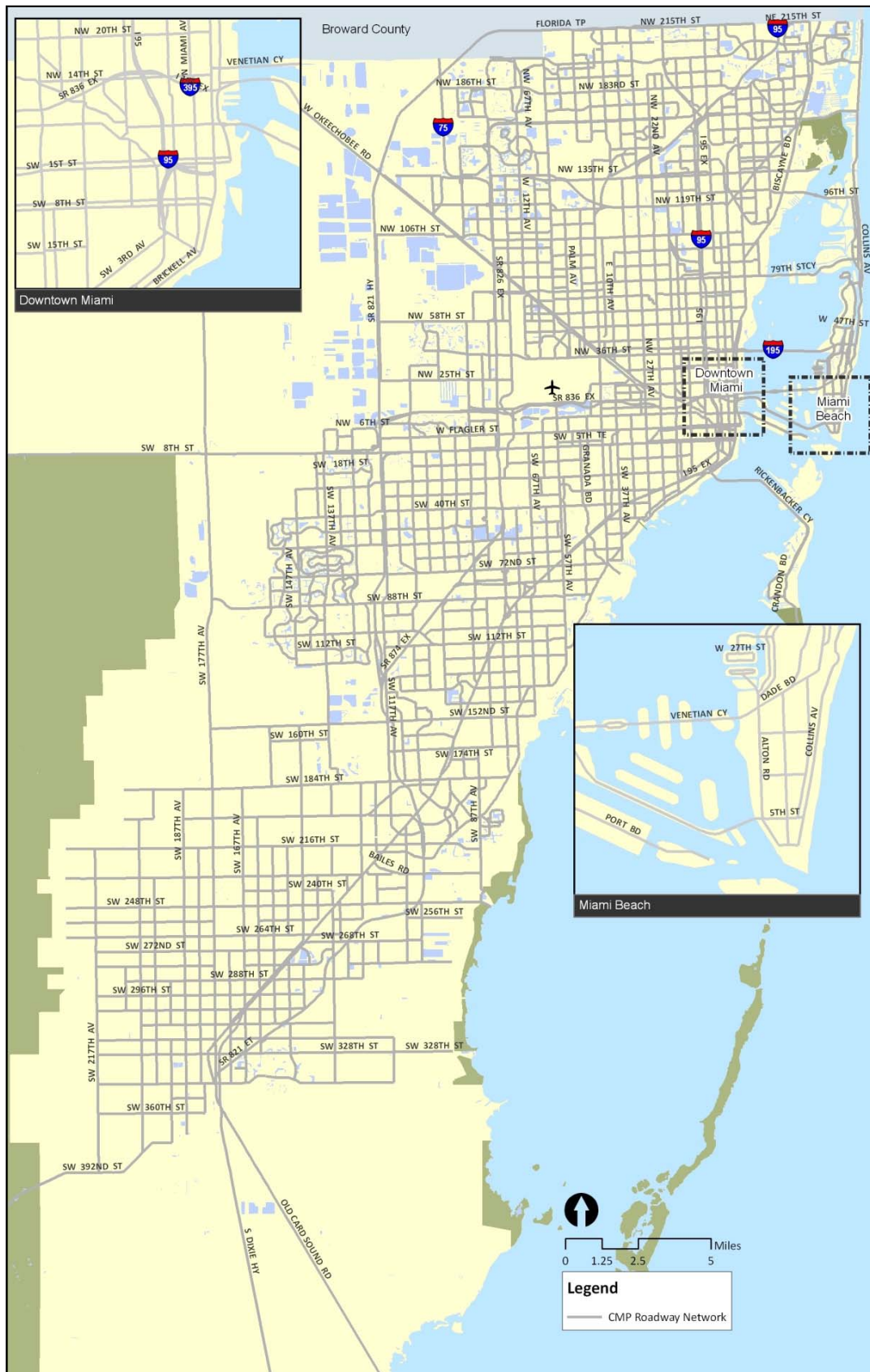
Table 3: Roadway Lane Miles by Facility and Area Type (2005)

Facility Type/Area Type	Central Business District	Fringe CBD	Other Business District	Residential	Rural	Total
▪ Freeways	11	147	271	91	0	520
▪ Uninterrupted Roadways	2	26	10	13	63	115
▪ Divided Arterials	7	249	1,103	777	142	2,279
▪ Collectors	86	338	820	705	191	2,140
▪ Ramps	8	32	86	42	6	174
▪ HOV	0	0	20	6	0	26
▪ Toll Facilities	0	1	58	168	53	280
Total	115	794	2,367	1,802	455	5,534

Table 4: Roadway Centerline Miles by Facility and Area Type (2005)

Facility Type / Area Type	Central Business District	Fringe CBD	Other Business District	Residential	Rural	Total
▪ Freeways	3	40	81	26	0	150
▪ Uninterrupted Roadways	0	5	2	7	26	40
▪ Divided Arterials	2	57	255	228	63	605
▪ Collectors	30	108	278	262	87	765
▪ Ramps	6	25	62	27	5	125
▪ HOV	0	0	20	6	0	26
▪ Toll Facilities	0	0	19	59	19	97
Total	41	235	717	616	200	1,809

Figure 9: CMP Roadway Network



4.2. CMP Transit Network

The CMP transit network consists of the existing Metrobus fixed-route network, Metrorail (Figure 10), Metromover, and Tri-Rail (Figure 11). The CMP transit network does not include local shuttle services by operated cities and other agencies. The existing (2005) transportation modes and route/track miles are included in Table 5. These transit systems are eligible for federal funding.

Figure 10: Transit in Miami-Dade County



Table 5: CMP Transit Network (2005)

Transit Mode	Lane Miles
▪ Directional Metrobus Route Miles	1,930
▪ Directional MetroRail Track Miles	45
▪ Directional MetroMover Track Miles	8.5
▪ Directional Tri-Rail Track Miles	142.2
Total Directional Transit Route/Track Miles	2125.7

4.3. CMP Bicycle Facility Network

The CMP Bicycle Network (Figure 12) consists of the following facility types:

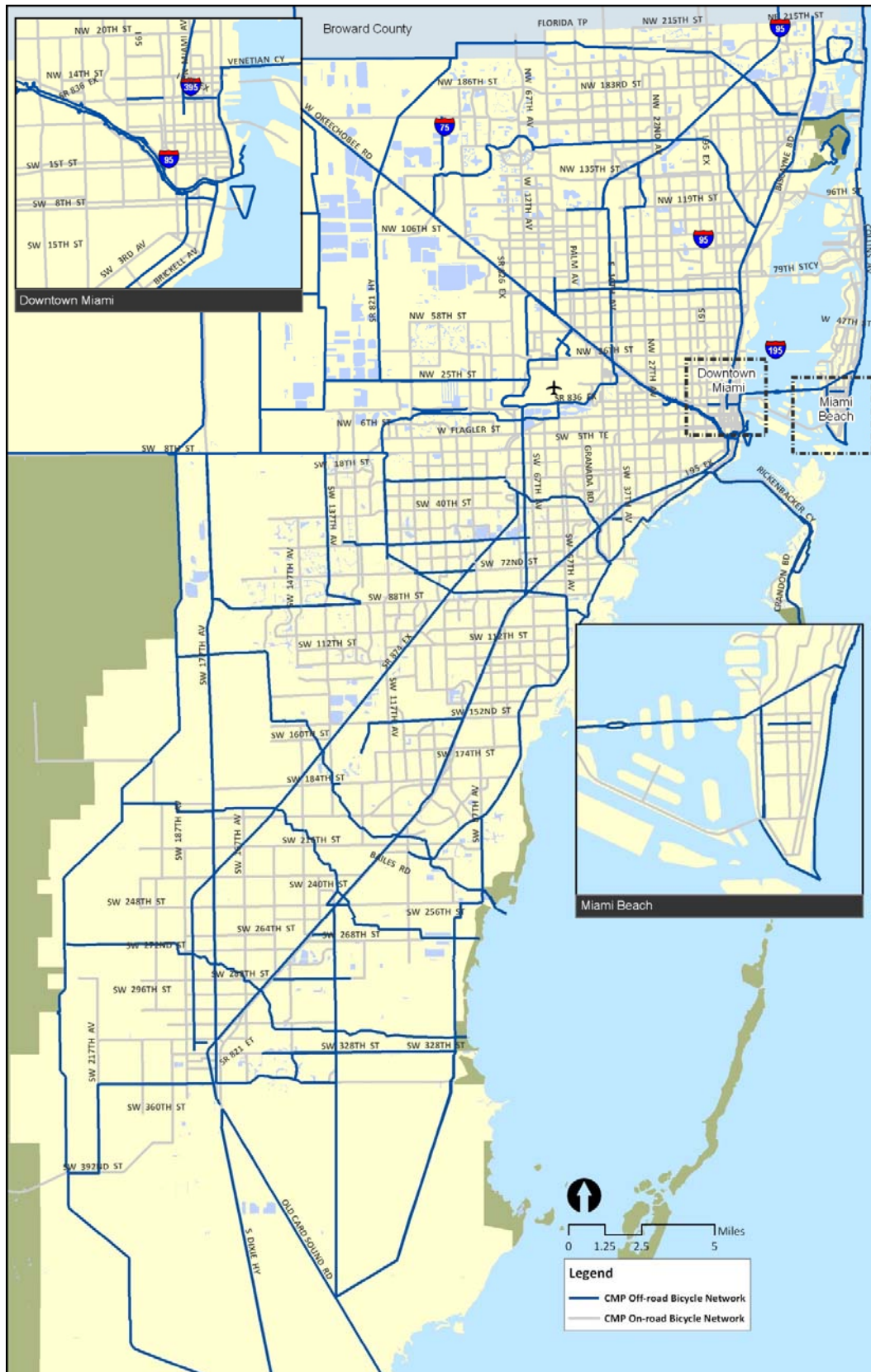
➤ **On-road Bicycle Facilities:** On-road bicycle facilities are comprised of the entire roadway network except highways, HOV and toll facilities, and ramps where bicycling is prohibited. On-road bicycle facilities include bicycle lanes, paved shoulders, and wide curb lanes.

- **Bicycle Lanes:** A typical designated bicycle lane is at least 4 feet wide and has signage and pavement markings. State, county, and local agencies typically have different requirements for unique conditions.
- **Paved Shoulders:** Paved shoulders have varying widths and are designed to serve vehicles with mechanical trouble, roadway service vehicles, as well as bicycles. Paved shoulders are generally used as undesignated bicycle facilities along sub-urban and rural roadways.
- **Wide Curb Lanes:** Wide curb lanes are generally more than 13 feet wide and are considered wide enough to provide a safe operational environment for both motorists and cyclists.

Figure 11: CMP Transit Network



Figure 12: CMP Bicycle Network



➤ **Off-road Bicycle Facilities:** Off-road bicycle facilities are separated from the roadway surface by a curb or some other type of border. Some off-road bicycle facilities shown on Figure 12 share some roadway segments with motor vehicles. They may also include greenways, trails, and shared-use paths.

- **Unpaved Trails:** The unpaved trail network is used for activities such as mountain biking.
- **Shared-use Trails:** Shared-use trails can be found along thoroughfares such as US-1 in the region (Figure 13). Bicyclists share these facilities with pedestrians.

Figure 13: Off-Road Bicycle Facility



Both on-road and off-road bicycle facilities are eligible for federal funding.

4.4. CMP Pedestrian Facility Network

The pedestrian facility network is comprised of areas along the roadway network except along facilities such as highways, limited access facilities, HOV and toll facilities, and ramps where typically pedestrian activity is prohibited (Figure 14). The County has a large network of pedestrian facilities that can be divided into the following two categories (Figure 16):

Figure 14: Pedestrian Facility



➤ **Sidewalk / Separated Path:** Pedestrian facilities in the County include sidewalks along a significant part of the arterial and collector roadway network (Figure 14).

➤ **Shared-use Path:** Shared use paths are exclusive rights-of-way and have minimal cross flow by motor vehicles. Pedestrians and cyclists typically share these facilities.

Both types of pedestrian facilities are eligible for federal funding.

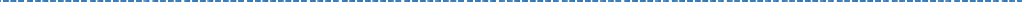
4.5. CMP Freight Network

The freight network consists of the MPO's designated Major Road Network and railroad lines in the County (Figure 15). Freight movement, depending on vehicle type, is restricted on some roadways. The freight rail network mainly consists of rail lines operated by CSX Transportation (CSXT) and Florida East Coast Railway (FEC) (Figure 17).

Figure 15: Freight Movement Along Major Road Network









5. PERFORMANCE MEASURES

Performance measures quantitatively indicate performance of transportation system and effectiveness of congestion management strategies. The CMP performance measures help determine the degree of success of a strategy, project, program or initiative has had in achieving the CMP objectives. Performance measures can help achieve the CMP objectives in the following ways:

- **Identify:** Identify congested spots and corridors;
- **Evaluate:** Evaluate the effectiveness of implemented congestion management strategies;
- **Track:** Track changes in effectiveness and efficiency of transportation system and services; and,
- **Communicate:** Communicate changes in performance of transportation systems to the public as well as to appointed and elected officials.

Performance measures typically have established thresholds or goals to provide the basis for evaluating a transportation system's operating conditions and identifying location and severity of congestion. For example, a typical user expects to experience peak-hour congestion along her normal routes but finds congestion as "unacceptable" when it surpasses a threshold. Each transportation user may have a different threshold that conveys that congestion is a relative term. Therefore, performance thresholds are accepted quantitative goals generally established by rigorous analysis and discussions among stakeholders. In the absence of established performance thresholds and goals, usefulness of performance measures is reduced.

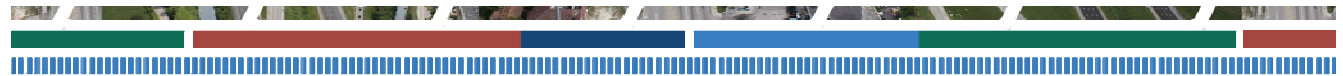
The discussion the subsequent sub-sections lists the MPO's adopted performance measure and established thresholds.

5.1. Adopted Performance Measure

The MPO's 2004 CMS update identified congestion based on RCR. The RCR is defined as the existing Volume to Capacity (VC) Ratio divided by the adopted VC ratio for the count location. The adopted VC ratio refers to acceptable roadway level of service threshold established in the County's Comprehensive Development Master Plan (CDMP). The County has adopted congestion thresholds based on several factors such as availability of mass or bus transit and geographic location.

5.1.1. Methodology

The RCR used to identify congested spots and corridors, takes into account current and future conditions and is referred to as a weighted RCR. The weighted RCR is calculated by multiplying the existing RCR by 60 percent



and future RCR by 40 percent and summing the results. Identifying the currently congested corridors is important, but it is also necessary to look at the future conditions of the corridors as well. Adequate consideration can be given to both the existing and future conditions by using this method. Due to increased development in the western portion of the County, this methodology provides insight into future congestion.

The existing RCR is based on count locations for a given year. The future RCR is determined for each count location by adding the vested trips to the existing traffic count and dividing by the maximum capacity allowed. The vested trips are calculated based on approved developments that are expected to be constructed within approximately 5 years.

Roadway segments with weighted RCR values of 0.9 or greater are considered congested or nearly congested roadway segments according to the following categories:

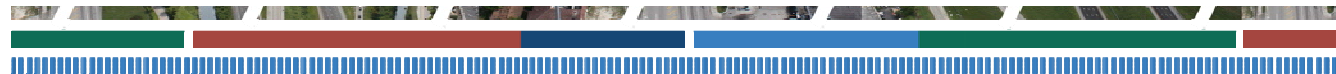
- Nearly Congested – $0.9 < \text{weighted RCR} \leq 1.00$
- Moderately Congested – $1.00 < \text{weighted RCR} \leq 1.20$
- Highly Congested - $\text{weighted RCR} \geq 1.20$

The Steering Committee of the Miami-Dade County MPO approved the criteria that a corridor should be at least 2 miles in length to be considered a CMP corridor. Roadway segments less than two miles in length are considered congested spots.

5.2. Potential Performance Measures

As the name suggests, the CMP is a dynamic effort designed to continually improve transportation systems and services. As a part of the 2009 CMP update, various methods and techniques were discussed and evaluated. The focus of this evaluation was to identify a set of performance measures that comprehensively conveys the state of the County's transportation system to both technical and non-technical audience. User-oriented performance measures such as travel time and travel delay were tested but are not included in this CMP update primarily due to the following reasons:

1. Lack of readily available reliable data and need to establish data collection methods;
2. Additional time needed for agency coordination;
3. Additional time and effort needed to adopt performance thresholds; and,
4. Additional time need to establish a performance-monitoring plan.



5.2.1. Potential System-level Aggregate Performance Measures

In 2008, the MPO conducted a “Transportation System Performance Monitoring Study” which identified system-level multimodal performance measures (Table 6) that can track state of the entire transportation system on an aggregate basis. These measures can convey cumulative impact of transportation improvements. The study also included a data collection plan. It is recommended that various transportation and land uses agencies in the county consider the identified system-level performance measures and establish performance thresholds.

Table 6: System-level Aggregate Performance Measures

- Trip Length (minutes)
- HBW Trip Length (minutes)
- Trips by Auto (Daily)
- HBW Trips by Auto
- Auto Occupancy
- HBW Auto Occupancy
- Trips by Metrobus (Annual Unlinked Trips)
- Trips by Metrorail (Annual Unlinked Trips)
- Trips by Metromover (Annual Unlinked Trips)
- Trips by Tri-rail (Annual Unlinked Trips)
- HBW Trips by Transit
- Transit Mode Split
- HBW Transit Mode Split
- Metrobus Percent of Transfers
- Metrorail Percent of Transfers
- Tri-rail Percent of Transfers
- Vehicle Miles Traveled (VMT)
- Vehicle Hours Traveled (VHT)
- Volume-to-Capacity (V/C) ratio
- Highway LOS
- Transit Revenue Vehicle Miles Per Acre
- Peak-Period Speed
- Delay Time Due to Congestion



5.2.2. Potential Corridor-level Performance Measures

Corridor-level performance measures help identify congested facilities using different dimensions of recurring and non-recurring congestion. The recommended actions are listed below:

- Different agencies in the region have established performance-monitoring programs which include performance measures and data collection methods to monitor their respective systems (See Table 7). These established performance monitoring programs can potentially be integrated into the County's CMP. This may require the following steps.
 - Adoption of a common set of performance measures across agencies to enable system-wide tracking.
 - Adoption of a consistent data collection methodology.
 - Establishment of performance thresholds for different facility- and area-types. The established thresholds will work as performance goals.
 - Establishment of a performance monitoring and reporting system. Currently each agency has an established reporting mechanism. As an example, FDOT's ITS performance measures are reported on an annual basis in the form of "ITS Performance Measures Review Report". Similarly, a few other performance measures are reported annually in the form of the "Performance and Production Review Report".
 - Establishment of a purpose for each performance measure. A performance measure can be used for two purposes: (1) to identify congestion; and, (2) to evaluate effectiveness of congestion management strategies.
 - Associate every performance measure with CMP objectives and policy actions to track progress.
- Performance measures that identify three critical dimensions of congestion: intensity, duration, and extent should be used. These and other potential performance measures are included in Table 8 and are defined in Table 9. As shown in Table 8, each performance measure is tied with a CMP objective and policy action(s) to track progress towards the CMP objectives.



Table 7: Performance Measures Currently Used by Agencies in the Region

Measure	Definition	Formula	Analysis Unit	Frequency	Agency	Notes
Travel Time Reliability - Travel Time Index	A measure of traffic congestion.	Average Peak Travel Time / Free-flow Travel Time	Number	Yearly	FDOT	2008 ITS Performance Measures Review Report (Data is not available for District 1, 3, 4, 6, and Turnpike Enterprise)
Customer Satisfaction	A qualitative measure of public satisfaction with services provided by the FDOT ITS Program	-	-	Yearly	FDOT	2008 Performance and Production Review Report
Density	The number of vehicles per lane mile	-	Vehicle/Lane Mile	Yearly	FDOT	2008 Performance and Production Review Report
Peak Hour Travel Congestion	The number of Travel Congested	-	Number	Yearly	FDOT	2008 Performance and Production Review Report
Public Transit Ridership Growth Rate	Public transit ridership growth rate compared to the state population growth rate	-	Number	Yearly	FDOT	2008 Performance and Production Review Report
Annual Growth in Transit Revenue Miles	Annual growth in the number of miles transit vehicles in service	-	Number	Yearly	FDOT	2008 Performance and Production Review Report
Unlinked Passenger Trips	The total number of single passenger boarding of Tri-Rail	-	Number	Yearly	Tri-Rail	2007 Performance Evaluation Report
Total Operating Cost	The total costs to operate and maintain the Tri-Rail system	-	US Dollar	Yearly	Tri-Rail	2007 Performance Evaluation Report
Operating Cost per Passenger Trip	The average costs to operate and maintain the Tri-Rail system per passenger trip	Total Operating Cost / Total Passenger Trips	US Dollar / Trip	Yearly	Tri-Rail	2007 Performance Evaluation Report
Number of Commuters Switched from SOV	The number of commuters switched from Single Occupancy Vehicles	-	Number	Yearly	South Florida Commuter Services	2008 Performance Report for Miami-Dade County
Number of Vehicle Trips Eliminated	The number of vehicle trips eliminated from roads	Number of Commuters Switched x Specified Period x 2	Number	Yearly	South Florida Commuter Services	2008 Performance Report for Miami-Dade County
Number of Vehicle Miles Eliminated	The number of vehicle miles traveled eliminated from roads	Number of SOV Commuters Switched X Actual Commute Distance during Specified Period	Mile	Yearly	South Florida Commuter Services	2008 Performance Report for Miami-Dade County
Commuter Costs Saved	The commuter costs saved from carpooling or vanpooling	Miles Eliminated x 0.29	US Dollar	Yearly	South Florida Commuter Services	2008 Performance Report for Miami-Dade County
On-time Performance	Schedule Adherence for bus, rail, and mover	-	Number	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Development Activity in the Adopted CUC for Residential and Retail/Office	Development activity in the adopted Community Urban Centers (CUC) for residential and retail/office	-	Number	Quarterly	Miami-Dade Planning and Zoning	2008-2009 Quarter 1 Performance Report
SHS Roadway Maintenance Condition Rating	Maintenance rating of at least 90	-	Number	Yearly	Miami-Dade Expressway Authority	2007 Transportation Authority Monitoring and Oversight Report
Maintenance Condition Rating	Maintenance condition rating of at least 80 achieved on the Florida Turnpike	-	Number	Yearly	Florida Turnpike	2004 Performance Report
Average Trip Length	The average distance ridden for an unlinked passenger trip by time period	Total Passenger Miles / Total Passenger Trips	Mile / Trip	Yearly	Tri-Rail	2007 Performance Evaluation Report
Level of Service	A qualitative measure that characterizes operational conditions within the Tri-Rail system and their perception by motorists and passengers. It includes Service Span, Service Frequency, Service Coverage, and On-time Performance.	-	-	Yearly	Tri-Rail	2007 Performance Evaluation Report
Traffic Improvements Forwarded to Construction	The number of traffic improvements forwarded to construction	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Satisfaction with Traffic Signal Coordination during Peak Congestion Times	The percentage of customers satisfied with traffic signal coordination during peak congestion times	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Pavement Condition Rating	The percentage of SHS lane miles rated "excellent or good"	-	Number	Yearly	Miami-Dade Expressway Authority	2007 Transportation Authority Monitoring and Oversight Report
Total Annual Road Ranger Stops	The total number of annual road ranger stops	-	Number	Yearly	FDOT	2008 ITS Performance Measures Review Report
Miles Managed by ITS	The centerline mileage of the limited-access Florida State Highway Managed by ITS	-	Mile	Yearly	FDOT	2008 ITS Performance Measures Review Report

Measure	Definition	Formula	Analysis Unit	Frequency	Agency	Notes
Incident Duration	The total time of impact on traffic for an incident	-	Minute	Yearly	FDOT	2008 ITS Performance Measures Review Report (Data is not available for District 1 and 3)
Travel Time Reliability - Buffer Index	A measure of the reliability of travel service.	(95th Travel Time - Average Travel Time) / Average Travel Time	Number	Yearly	FDOT	2008 ITS Performance Measures Review Report(Data is not available for District 1, 3, 4, 6, and Turnpike Enterprise)
Fatalities per 100 Million VMT	The number of fatalities per 100 million Vehicle Miles Traveled (VMT)	Number of Fatalities Per Year / 100 Vehicle Miles Traveled	Crash Per 100 Million VMT	Yearly	FDOT	2008 Performance and Production Review Report
Vehicle Miles Traveled	The cumulative sum of miles each vehicle traveled	-	Vehicle Mile	Yearly	FDOT	2008 Performance and Production Review Report
Percentage of Lane Miles by PCR	The percentage of lane miles on the SHS having a Pavement Condition Rating (PCR) of "excellent or good"	-	Number	Yearly	FDOT	2008 Performance and Production Review Report
Lane Miles Resurfaced	The number of lane miles on the State Highway System (SHS) let for resurfacing	-	Lane Mile	Yearly	FDOT	2008 Performance and Production Review Report
Maintenance Rating	Maintenance rating of at least 80 achieved on the State Highway System (SHS)	-	Number	Yearly	FDOT	2008 Performance and Production Review Report
Number of Lane Miles Added	Number of lane miles of capacity projects on the State Highway System (SHS) let	-	Lane Mile	Yearly	FDOT	2008 Performance and Production Review Report
SunPass Participation	The number of SunPass transactions as a percentage of total transactions	Number of SunPass Transactions / Number of Total Transactions	Number	Yearly	FDOT	2008 Performance and Production Review Report
Fatalities per 100 Million VMT	The number of fatalities per 100 million Vehicle Miles Traveled (VMT)	Number of Fatalities Per Year / 100 Vehicle Miles Traveled	Crash Per 100 Million VMT	Yearly	Florida Turnpike	2005 Performance Report
Average Time to Clear Accidents and Incidents	The average length of time required to clear accidents and incidents on the Turnpike	-	Minute	Yearly	Florida Turnpike	2005 Performance Report
Average Peak-Hour Travel Speed Between Toll Plazas	The average travel speed between toll plazas during peak hour	-	Mile/Hour	Yearly	Florida Turnpike	2004 Performance Report
Average Peak-Hour Delay at Main Toll Plazas	The average waiting time to pay tolls at main toll plazas during peak hour	-	Second	Yearly	Florida Turnpike	2004 Performance Report
Percent of Transactions through ETC	The ratio of Electronic Toll Collection (ETC) transactions to total transactions	-	Number	Yearly	Florida Turnpike	2005 Performance Report
Route Miles	The total number of miles of Tri-Rail route	-	Mile	Yearly	Tri-Rail	2007 Performance Evaluation Report
Passenger Miles Traveled	The cumulative sum of the distances ridden by each passenger	Sum (Passenger Load X Distance)	Passenger Mile	Yearly	Tri-Rail	2007 Performance Evaluation Report
Train Revenue Miles	The miles that trains actually travel while in revenue service		Mile	Yearly	Tri-Rail	2007 Performance Evaluation Report
Train Revenue Hours	The hours that trains actually travel while in revenue service		Hour	Yearly	Tri-Rail	2007 Performance Evaluation Report
Operating Cost per Revenue Hour	The average costs to operate and maintain the Tri-Rail system per revenue hour	Total Operating Cost / Total Revenue Hour	US Dollar / Hour	Yearly	Tri-Rail	2007 Performance Evaluation Report
Passenger Trips per Revenue Hour	The average number of passenger trips per revenue hour	Total Passenger Trips / Total Revenue Hours	Trip / Hour	Yearly	Tri-Rail	2007 Performance Evaluation Report
Weekend Service	The availability of Tri-Rail service on weekend	-	-	Yearly	Tri-Rail	2007 Performance Evaluation Report
Number of New SOV Commuter Sign-ups	Single Occupancy Vehicle (SOV) sign-ups during specified period	-	Number	Yearly	South Florida Commuter Services	2008 Performance Report for Miami-Dade County
Total Weekday Ridership	The number of rides taken by people using a public transportation system on weekday	-	Number	Monthly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Total Saturday Ridership	The number of rides taken by people using a public transportation system on Saturday	-	Number	Monthly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Total Sunday Ridership	The number of rides taken by people using a public transportation system on Sunday	-	Number	Monthly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report

Measure	Definition	Formula	Analysis Unit	Frequency	Agency	Notes
Total Number of Complaints	The total number of complaints for bus, rail, and mover	-	Number	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
All Complaints per 100K Boardings	All Complaints per 100K boardings for bus, rail, mover, and STS	-	Number	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Traffic Control and Street Name Signs Repairs / Replacement	The number of traffic control and street name signs repaired or replaced	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Illuminated Street Name Signs Installed	The number of intersections with illuminated street name signs installed	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Satisfaction with Quality of Road Signs	The percentage of customers satisfied with quality of road signs	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Satisfaction with Management of Traffic Flow on County Streets	The percentage of customers satisfied with management of traffic flow on County streets	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Number of Traffic Studies Received	The number of traffic studies received	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Traffic Improvement Design Requests Received	The number of traffic improvement design requests received	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Safety Tree Trimming to Remove Visual Obstruction	The percentage of trees trimmed to remove visual obstruction	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Integrate Traffic Signalized Intersections with ATMS	The number of signalized intersections integrated with Advanced Traffic Management System (ATMS)	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Percentage of System Traffic Signals Maintaining Communication with Control Center	The percentage of system traffic signals maintaining communication with control center	-	Number	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Roadways Rehabilitation	The length of roadways rehabilitation	-	Lane Mile	Quarterly	Miami-Dade Public Works	2008-2009 Quarter 1 Performance Report
Employment Growth Rate in CUC	Employment growth rate in Community Urban Centers (CUC)	-	Number	Quarterly	Miami-Dade Planning and Zoning	2008-2009 Quarter 1 Performance Report
Electronic Toll Collection (ETC) Transactions	The number of ETC transactions as a percentage of total transactions	-	Number	Yearly	Miami-Dade Expressway Authority	2007 Transportation Authority Monitoring and Oversight Report
Safety	Safety fatalities per 100 million vehicle miles traveled	-	Number	Yearly	Miami-Dade Expressway Authority	2007 Transportation Authority Monitoring and Oversight Report
Composite Average for Safety	The percentage of customers satisfied with the composite average rating for safety	-	Number	Yearly	Florida Turnpike	2005 Performance Report
Mean Distance Between Failures	Mean Distance Between Failures for bus, rail, and mover	-	Mile	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Total Annual 511 Calls	The total number of annual 511 calls	-	Number	Yearly	FDOT	2008 ITS Performance Measures Review Report
Fare Policy	The policy that determines how much is to be paid by various passengers using the Tri-Rail system at any given time	-	-	Yearly	Tri-Rail	2007 Performance Evaluation Report
Elevator Availability	Elevator availability for Metrorail and Metromover	-	Number	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Escalator Availability	Escalator availability for Metrorail and Metromover	-	Number	Quarterly	Miami-Dade Transit	2008-2009 Quarter 1 Performance Report
Seaport Cargo Tonnage	The number of monthly cargo tonnage	-	Ton	Quarterly	Miami-Dade Sea Port	2008-2009 Quarter 1 Performance Report
Number of Cruise Passengers	The number of monthly cruise passengers	-	Number	Quarterly	Miami-Dade Sea Port	2008-2009 Quarter 1 performance report
Number of Passengers	The total number of domestic and international passengers	-	Number	Quarterly	Miami-Dade Aviation	2008-2009 Quarter 1 Performance Report
Customer Service	The percentage of customers satisfied with level of service	-	Number	Yearly	Miami-Dade Expressway Authority	2007 Transportation Authority Monitoring and Oversight Report



Table 8: Potential Corridor-level Performance Measures

CMP Objective/Policy Action		Performance Measure By Mode			
		Auto ¹	Transit ²	Bike-ped	TDM / Land Use / Other
Objective 1: Reduce vehicle trips and trip lengths					
Policy Action 1.1	Encourage projects that support urban infill and densification				▪New development in high-density areas ▪Population in high-density areas ▪Population concentration
Policy Action 1.2	Encourage mixed-use development in Adopted Urban Centers				▪Availability of mixed-use development ▪Ratio of LU within mixed-use development
Policy Action 1.3	Expand the use of Transportation Demand Management (TDM) strategies				▪Usage of carpool/vanpool service
Objective 2: Shift Trips from Single-occupancy Vehicles to High-occupancy Vehicles and Other Modes					
Policy Action 2.1	Encourage transit-oriented development in existing and future Rapid Transit Urban Centers		▪TOD development		
Policy Action 2.2	Improve access to transit, bicycle and pedestrian modes		▪Access to Metrobus ▪Access to premium transit ▪Access to P&R Lots ▪Service per Capita	▪Availability of bicycle facilities ▪Availability to pedestrian facilities	
Policy Action 2.3	Make transit, bicycle, and pedestrian modes more attractive	▪Auto travel time	▪Transit travel time ▪On-time Performance ▪Peak-hour Service Frequency ▪Average age of fleet ▪Number of stops / stations ▪Number of ADA-compliant Stops		
Policy Action 2.4	Encourage use and implementation of special-use lanes		▪Number of HOV Lane Miles ▪Number of HOT Lane Miles		
Objective 3: Maximize Effectiveness and Efficiency of Existing System					
Policy Action 3.1	Identify and reduce severe congestion	▪Travel Time Index (TTI)			
Policy Action 3.2	Reduce number of vehicles hours affected by congestion	▪Total hours of congestion			
Policy Action 3.3	Improve reliability of transportation systems OR Reduce number of person trips affected by variation in travel time	▪Number of incidents ▪Total delay caused by incidents	▪Number of incidents		
Policy Action 3.4	Identify and remove transportation “bottlenecks”	▪Intersection capacity ▪Signal density ▪Miles of narrow sections	▪Transit capacity ▪Number of P&R Lots ▪Capacity of P&R Lots	▪Number of P&R Lots ▪Capacity of P&R Lots	
	1: Auto mode categories: a. Freeways / Uninterrupted Roadways / Ramps / HOV / Toll b. Divided arterials / collectors	2: Transit categories: a. Metrobus b. Premium transit	3: Area-types a. CBD, HD nonCBD, MD nonCBD b. Low- or very-low density nonCBD		

Table 9: Definition and Data Collection Plan for Potential Corridor-level Performance Measures

Purpose		Measure	Definition	Formula	Units	Updates	Source
Objective 1: Reduce vehicle trips and trip lengths							
Policy Action 1.1	EV	▪New development in high-density areas	▪New units available in CBD or High-density non CBD	-	Number of units	Yearly	Planning and Zoning Research Section
	EV	▪Population in high-density areas	▪Population in CBD or high-density non CBD	-	Number	Yearly	SERPM / Planning and Zoning Research Section
	EV	▪Population concentration	▪Ratio of Population in CBD and High-density non CBD to Population in Low-or Very-low Density non CBD	Sum of Population in CBD and High-density non CBD / Sum of Population in Low-or Very-low Density non CBD	-	Yearly	SERPM / Planning and Zoning Research Section
Policy Action 1.2	EV	▪Availability of mixed-use development	▪Area of mixed-use developments	-	Sq. Ft.	Yearly	Planning and Zoning Dept.
	EV	▪Ratio of LU within mixed-use development	▪Ratio of land uses within completed Mixed-use Development	Residential / Commercial; Residential / Office; Office / Commercial	-	Yearly	Planning and Zoning Dept.
Policy Action 1.3	EV	▪Usage of carpool/vanpool service	▪Number of commuters using carpool or vanpool service	-	Number	Monthly / Quarterly	South Florida Commuter Services
Objective 2: Shift Trips from Single-occupancy Vehicles to High-occupancy Vehicles and Other Modes							
Policy Action 2.1	EV	▪TOD development	▪Number of residential units, office and commercial area in transit-oriented developments near fixed-guideway stations	-	Number of units; Sq. Ft. of Commercial Space; Sq. Ft. of Office Space	Yearly	Planning and Zoning Dept.
Policy Action 2.2	EV	▪Access to Metrobus	▪Service Area Population		Number	Yearly / Quarterly	Miami-Dade Transit
	EV	▪Access to premium transit	▪Service Area Population		Number	Yearly / Quarterly	Miami-Dade Transit, Tri-Rail
	EV	▪Access to P&R lots	▪Population within two-miles of a Park and Ride Lot	-	Number	Yearly	SERPM / Planning and Zoning Research Section
	EV	▪Service per capita	▪Vehicles Miles per Capita	Total Number of Miles / Service Area Population	Miles / Thousand Person	Yearly	Miami-Dade Transit
	EV	▪Availability of bicycle facilities	▪Miles of Designated Bicycle Lanes	-	Number (miles)	Yearly	Miami-Dade MPO
	EV	▪Availability of pedestrian facilities	▪Miles of ADA-compliant Sidewalks/Shared Paths	-	Number (miles)	Yearly	FDOT; Miami-Dade Public Works Dept.
Policy Action 2.3	EV	▪Auto travel time	▪Congested or Peak-hour Travel Time	-		Yearly	SERPM
	EV	▪Transit travel time	▪Scheduled Travel Time	Number of Route Miles / Travel Time	Miles / Hour	Yearly	Miami-Dade Transit; Tri-Rail
	EV	▪On-time performance	▪Percent of on-time trips	-	Percent	Monthly / Quarterly	Miami-Dade Transit; Tri-Rail
	EV	▪Peak-hour service frequency	▪Service Headway during AM and PM Peaks	-	Minutes	Yearly	Miami-Dade Transit; Tri-Rail
	EV	▪Average age of fleet	▪Years of Service	-	Years	Yearly	Miami-Dade Transit; Tri-Rail
	EV	▪Number of stops / stations	▪Total Number of Stops / Stations	-	Number	Quarterly	Miami-Dade Transit; Tri-Rail
	EV	▪Number of ADA-compliant stops	▪Total Number of ADA-compliant Stops / Stations		Number	Yearly	Miami-Dade Transit; Tri-Rail
Policy Action 2.4	EV	▪Number of HOV lane miles	▪Number of Lanes Miles	-	Number (miles)	Yearly	FDOT; MDX
	EV	▪Number of HOT lane miles	▪Number of Lanes Miles	-	Number (miles)	Yearly	FDOT; MDX
Objective 3: Maximize Effectiveness and Efficiency of Existing System							
Policy Action 3.1	ID, EV	▪Travel Time Index (TTI)	▪Ratio of Congested Travel Time to Free-flow Travel Time	Congested Travel Time / Free-flow Travel Time	-	Yearly	SERPM
Policy Action 3.2	ID, EV	▪Total hours of congestion	▪Total Number of Vehicle Hours Lost Due to Congestion	(Congested Travel Time - Free-flow Travel Time) X Total Volume	Hours	Yearly	SERPM
Policy Action 3.3	ID, EV	▪Number of incidents	▪Total Number of Incidents along Roadways	-	Number	Yearly	Police Dept., FDOT, Miami-Dade Public Works Dept., MDX, Turnpike
	EV	▪Number of incidents (transit)	▪Total Number of Transit Incidents	Total number of incidents resulting in injury/fatality, collision, or property damage in excess of \$1000	Number	Yearly	Miami-Dade Transit, Tri-Rail
	ID, EV	▪Total delay caused by incidents	▪Minutes to clear a reported incident location	Minutes	Minutes	Yearly	Police Dept.



	Purpose	Measure	Definition	Formula	Units	Updates	Source
Policy Action 3.4	ID	▪Intersection capacity	▪Top 25 Intersections with highest through traffic volume				TBD
	ID	▪Signal density	▪Number of Signals with Spacing Less than XX Feet	Number	Number	Yearly	TBD
	ID, EV	▪Transit capacity	▪Number of Trains/Buses Operating at 90-100% Capacity	-	Number	Quarterly	Miami-Dade Transit; Tri-Rail
	ID	▪Miles of narrow sections	▪Drop in Total Number of Lanes for Segments Less than a Mile		Number	Yearly	FDOT, Miami-Dade Public Works Dept.
	EV	▪Number of P&R locations	▪Number of park & ride locations	-	Number	Yearly	
	EV	▪Capacity at P&R locations	▪Number of parking spaces available at park & ride locations	-	Number	Yearly	

ID: Performance measure to be used for identification of congestion; EV: Performance measure to be used for evaluation of congestion management strategies

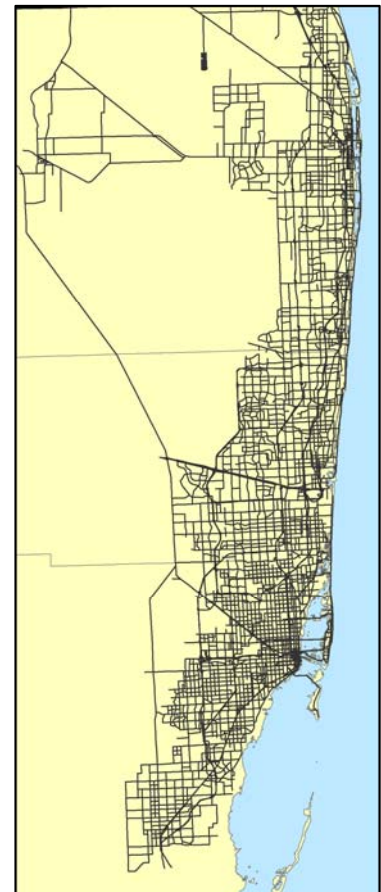
5.3. Linkage between Intelligent Transportation System Management and the CMP

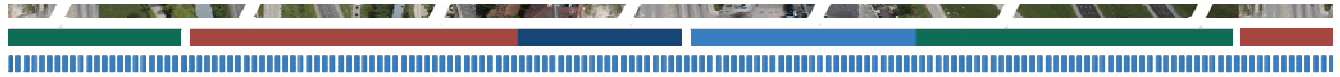
Intelligent Transportation Systems (ITS) is an important component of the CMP due to its focus on transportation maintenance and operations. The County adopted an ITS Plan in February 1997. The plan was updated in 1999 and since then, reports have been produced periodically to track the integration of ITS architecture in the transportation system. The County's ITS architecture is an integral part of Florida's Statewide ITS Architecture (SITSA) which charts the current and future course of ITS deployment. The SITSA was last updated in 2005 to conform to the current national ITS architecture. SITSA provides an integrated framework to ensure that various transportation technologies can work together smoothly and effectively on Florida's highways. The updated SITSA also integrates ITS planning and deployment with operations, maintenance and security subsystems. SITSA harmonizes the various existing regional ITS architectures in the state.

The County's ITS architecture is managed by South Florida Regional ITS Coalition (Figure 18) under the SunGuide program. FDOT has taken a lead in guiding development and deployment of ITS infrastructure in the County. The South Florida Regional ITS Coalition includes the following agencies:

- City of Boca Raton
- Broward County Metropolitan Planning Organization
- Broward County Traffic Engineering Division
- Broward County Transit (BCT)
- Florida Department of Transportation (Districts 4 and 6; Florida Turnpike Enterprise)
- Fort Lauderdale - Hollywood International Airport
- Miami-Dade Expressway Authority (MDX)
- Miami-Dade County Information Technology Division
- Miami-Dade County Metropolitan Planning Organization
- Miami-Dade County Public Works Department
- Miami-Dade Transit
- Miami International Airport (MIA)
- Palm Beach County ITMS/ I-95 Corridor(sponsored by FDOT District 4)
- Palm Beach County Metropolitan Planning Organization

Figure 18: Southeast Florida / Tri-County Region

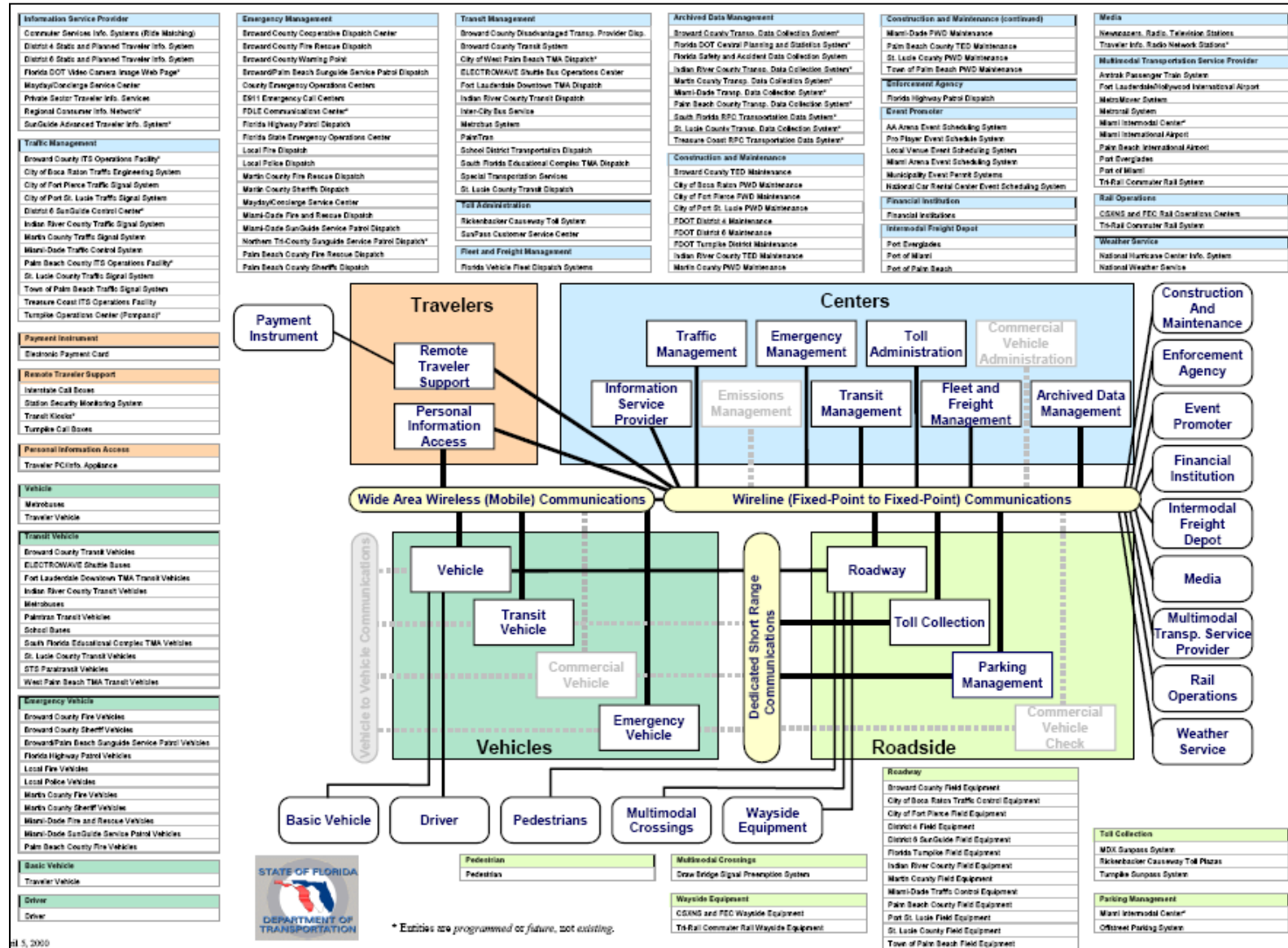




- Palm Beach County Traffic Division
- Palm Beach International Airport (PBIA)
- Palm Tran
- Port Everglades
- Port of Miami
- Port of Palm Beach
- SmarTraveler (sponsored by FDOT)
- Smart SunGuide TMC FDOT D4
- Regional Transportation Authority (RTA/Tri-Rail)

Like all project included in the MPO's LRTP, congested corridors and spots identified through the CMP program will be considered for potential applicability of ITS deployments (Figure 19).

Figure 19: Southeast Florida ITS Architecture





5.4. Documentation of the CMP Process

The CMP is documented in the form of updates that are completed along with the MPO's LRTP updates every five years. This and subsequent CMPs will be included in the MPO's LRTP. The identified congested spots and corridors, except minor spot operations improvements, will be included in the MPO's 2035 LRTP as candidate projects. Projects for congested spots that are likely to require minor operations improvements only will be defined at a later date. A discussion related to identification of congested spots and corridors is included in Section 10.

5.5. Involvement and Role of Decision Makers

5.5.1. Agency Involvement

The key decisions-makers in the planning process include various transportation, land use, and commuter services agencies in the County. Agency involvement is in two forms: (1) collaboration; and, (2) decision-making in the form of reviews and formal endorsements. As shown in Table 7, several agencies were contacted during data collection efforts for the CMP. Most of these agencies are represented on the MPO's Transportation Planning Technical Advisory Committee (TPTAC), which also acts as the CMP Steering Committee, and Transportation Planning Council (TPC). The TPTAC members will review the CMP and provide input on the process. The Transportation Planning Council (TPC), upon its approval, will formally endorse the CMP results.

5.5.2. Elected Official Involvement

Congested spots and corridor identified through the CMP process will be included in the MPO's LRTP that will be presented to elected officials. The following members presently serve on the MPO Board

- The 13 County Commissioners;
- MDX representative;
- Miami-Dade County School Board representative;
- A representative from a municipality appointed by the Governor of Florida, and,
- One non-elected public official appointed by the Governor of Florida.



6. PERFORMANCE MONITORING PLAN

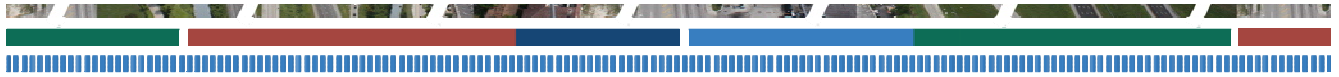
This section describes the mechanism for collecting data needed to quantify the adopted CMP performance measure and track congestion over time. The monitoring plan specifies elements such as type, frequency of data collection, data collection sites, responsibilities, analysis techniques, and performance reporting. Data collection needs are specific to the adopted performance measure, the RCR. Data collection needs and mechanisms for the potential performance measures identified in Section 5 are also included.

6.1. Data Acquisition Plan

The key to effective transportation decisions is accurate and reliable transportation data. This need permeates all levels of the project planning and programming process, including needs identification, project development, comparison of user benefits to needs, prioritization of funding, and measurement of results.

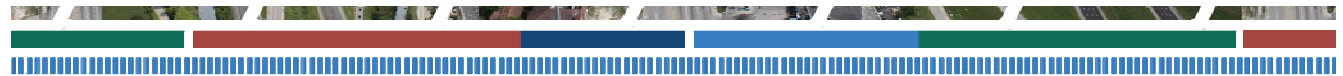
Data collection for the adopted performance measure, the RCR, is conducted by FDOT and the Engineering Division of Miami-Dade Public Works Department (MDPWD). Both agencies conduct yearly traffic count surveys to determine the volumes and types of vehicles. Traffic volume count surveys provide information essential to the general administration of roadway programs. There are a total of 621 Telemetered Traffic Monitoring Site (TTMS) and Portable Traffic Monitoring Sites (PTMS) located throughout the county (Figure 20). A volume counter collects the number of vehicles in intervals of 15 minutes and/or one hour per 24-hour periods. The data are compiled and processed annually. The most recent processed data for the year 2007 includes:

- Station number;
- Roadway name;
- Location;
- Functional classification;
- Maximum capacity;
- Current traffic count;
- Vested trips;
- Available trips;
- Maximum allowed level of service; and,
- Date of last update.



This established data collection mechanism ensures that data necessary for the CMP Performance Monitoring is available. Analysis of the collected data will be conducted to coincide with the LRTP updates. The current analysis technique utilizes Geographic Information System (GIS). The database is managed by FDOT and MDPWD. The performance reports will be presented to the CMP Steering Committee.





6.2. Agencies Involved in the CMP

Members of the following agencies are represented on the MPO's TPTAC, which acts as the CMP Steering Committee:

- Florida Department of Transportation
- Miami-Dade Aviation Department
- Miami-Dade Department of Environmental Resources Management
- Miami-Dade Expressway Authority
- Miami-Dade Department of Planning & Zoning
- Miami-Dade Public Works Department
- Miami-Dade Seaport Department
- Miami-Dade Transit
- South Florida Regional Transportation Authority (Tri-Rail)
- Miami-Dade Metropolitan Planning Organization

The TPTAC meets once a month and the meetings are open to the public. The results of the CMP will be evaluated by the TPTAC on an annual basis.

6.2.1. Integration with the LRTP

The CMP will be an integral part of the MPO's planning process, including the LRTP, Transportation Improvement Program (TIP), Public Involvement Plan (PIP), and the Unified Work Program (UPWP). The CMP, in accordance with Federal guidance, guides the planning process in the following ways:

- Identifies operations and management improvement projects that can be included in the County's TIP and LRTP; and,
- Identifies a set of congestion mitigation/alleviation strategies that can be applied to congested and/or strategically important (e.g. county's evacuation routes) corridors.

The 2035 LRTP identifies \$120.9 million (in 2008 dollars) for CMP projects over a 20-year period (Table 12).

The MPO's LRTP Steering Committee comprised of state, county, and local agencies provides input to the CMP process. The LRTP Steering Committee identifies projects for potential maintenance and operations related improvements that can be included in the CMP.

Moreover, CMP will be included in the InteracLRTP, an application designed to facilitate stakeholder participation and information dissemination (see Appendix D).

6.2.2. Integration with the TIP

The identified congested corridors and spots will be considered for the TIP (Figure 21). All capital improvement projects, including roadway capacity enhancement projects, will also be considered candidates for congestion management.

The TIP Development Committee includes a subcommittee to organize the project selection criteria into a more structured and understandable format. There are three generalized steps to follow, Project Selection, Project Prioritization and Project Ranking.

Figure 21: Transportation Improvement Program



1. Project Selection: This stage, which serves as a prescreening step, asks three basic criteria. The first criteria is related to project eligibility, the second is related to that of consistency with the most recently adopted LRTP, and the third criteria is related to project category.

2. Project Prioritization: A combination of quantitative and qualitative criteria is used to select and prioritize projects. The results are envisioned to be a matrix or spreadsheet listing project proposals with numerical rankings and qualitative "scores" for other supporting features they may possess. The project prioritization for the CMP projects will be based on the RCR, agency evaluation score, and other factors such as public involvement, and safety.

3. Project Ranking: This step is nearly identical to the LRTP prioritization process. The project proposals listed in the matrix or spreadsheet are considered in order of the most favorable project rankings.

Congested spots and corridors identified through the CMP will go through the above-mentioned screening process.

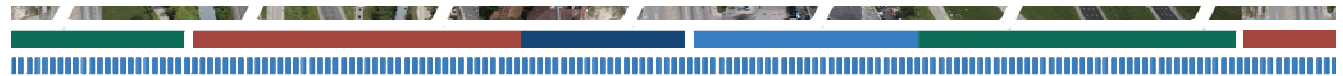
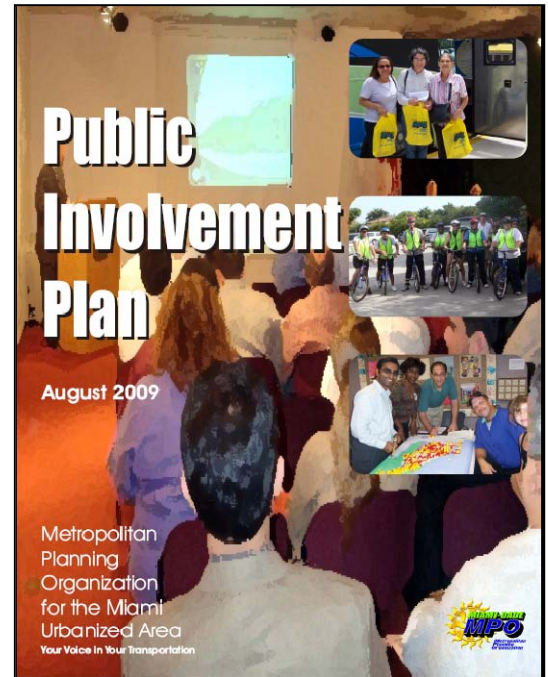


Figure 22: Public Involvement Plan

6.2.3. Integration with the Public Involvement Plan (PIP)

The MPO has adopted a PIP to ensure that residents receive appropriate information regarding transportation issues in their community (Figure 22). The PIP also provides the MPO with the tools, procedures, and structure needed to create, implement, and evaluate public involvement programs and projects. This process allows the MPO to better assess the effectiveness of its outreach efforts, which will lead to the most appropriate application of public involvement strategies. In order to meet the needs of the dynamic metropolitan area it represents, the PIP requires periodic updates. The next update to the PIP will specifically reference the public's role in the CMP and a process to provide timely input.



6.3. Linkage between the CMP and the NEPA

All highway, transit, and non-motorized projects that utilize federal funds are required to undergo applicable National Environmental Policy Act (NEPA) process. Transportation agencies in the county have established mechanism to address NEPA related issues. For example, FDOT's Project Development and Environment (PD&E) study process reflects NEPA requirements. A typical PD&E study for roadway improvements considers several congestion management strategies as part of no-build alternative which is evaluated against one or more build alternatives. Strategies included in a typical no-build alternative are evaluated for their effectiveness in addressing the purpose and need of the given project.

7. IDENTIFICATION AND EVALUATION OF STRATEGIES

This section outlines the process within the CMP for identifying, screening and evaluating congestion management strategies for addressing the identified congestion problems. This component can function at both system-level and corridor-level of analysis and provide guidance in selecting strategies, actions and policies required to manage congestion.

7.1. Approach to Congestion Mitigation Strategies

A strategy “toolbox” was assembled that includes a variety of congestion management strategies (Table 10). The “toolbox” can be utilized to identify the most effective strategies for the congested spots and corridors. The identified corridors need to be examined to determine which congestion management strategies would be beneficial in each situation. Consistent with the CMP Objectives and Policy Actions, the strategy “toolbox” is arranged so that the measures on top take precedence over those on the bottom. The general categories for the “toolbox” are included in Figure 23.

Figure 23: Prioritization of Strategies

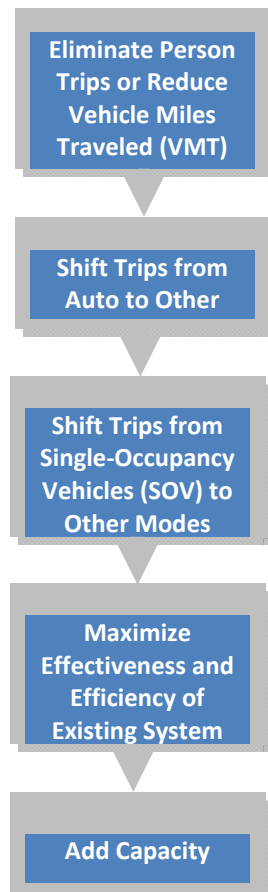




Table 10: CMP Strategy Toolbox

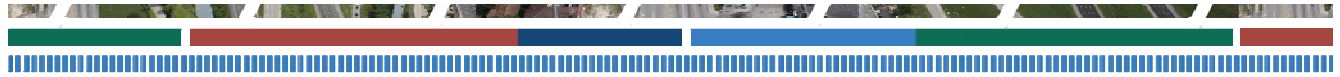
Related Policy Action	Mode	Strategy / Description	Congestion Impacts / Expected Benefits	Implementation Costs	Participating/Involved Agencies	Implementation Timeframe	Potential Strategy Effectiveness Analysis Method
Policy Action 1.1	TDM	Infill Development and Densification: This maximizes benefits of existing infrastructure and reduces need to build or enhance infrastructure in suburban areas. 	Decreased Single-Occupancy Vehicle Trips	Public costs to enact ordinances	Miami-Dade County Planning Department, South Florida Regional Planning Council	Long-term: 10 or more years	SERPM
			Decreased Vehicle Miles of Travel	Public costs to enforce new and existing ordinances			Journey to Work / Travel Surveys
			Decreased Vehicle Hours of Travel	Economic or financial incentives to encourage high-density development			
			Increased Walk, Bicycle, and Transit Trips				
Policy Action 1.2	TDM	Mixed-use Development: This improves accessibility to destinations such as employment areas.	Decreased Single-Occupancy Vehicle Trips	Public costs to enforce new and existing ordinances	Miami-Dade County Planning Department, South Florida Regional Planning Council	Long-term: 10 or more years	SERPM
			Decreased Vehicle Miles of Travel	Economic or financial incentives used to encourage mixed-use development			Journey to Work / Travel Surveys
			Decreased Vehicle Hours of Travel				
			Increased walk and bicycle trips				
Policy Action 1.3	TDM	Flexible/Compressed Work Schedules: This allows workers to work outside of traditional work hours.	Reduced peak-period VMT	Public cost for outreach, awareness, and publicity	South Florida Commuter Services, public and private employers	Short-term: One to Five Years	Journey to Work / Travel Surveys
			Reduced VMT	Employer cost for accommodating flexible or compressed work schedules			
			Travel Time Saving for Participants				
		Telecommuting: This involves workers to work at home instead of going to office.	Reduced VMT	Public cost for outreach, awareness, and publicity	South Florida Commuter Services	Short-term: One to Five Years	Journey to Work / Travel Surveys
			Reduced SOV Trips	Employer or employee cost for accommodating telecommuting			
		Carpool/Vanpool: This involves workers sharing a ride to go to a destination. 	Reduced VMT	Public cost for outreach, awareness, and publicity	South Florida Commuter Services	Short-term: One to Five Years	Journey to Work / Travel Surveys
				Employer cost for providing or contributing towards vanpool service			
	Auto	Provision of a Ride-sharing matching service: This can make it easier for commuters to find others who have similar commutes so that they can form a carpool.	Increased use of carpools	Public cost for service management and publicity	South Florida Commuter Services	Short-term: One to Five Years	
			Reduced SOV Trips				
			Reduced VMT				
		Provision of Park-n-Ride lots for carpoolers: Drivers are more likely to enter into a carpool program if a safe central meeting point is available.	Increased use of carpools and non-motorized modes	Public costs for constructing these facilities and for providing security. Public cost for outreach, awareness, and publicity.	Miami-Dade Transit, South Florida Regional Transportation Authority, South Florida Commuter Services	Medium-term: One to Five Years	
Policy Action 2.1	TDM	TOD Development: This increases density around transit stations and	Increased transit trips	Public costs to enact ordinances	Miami-Dade Transit, South Florida Regional Transportation Authority, Miami-Dade County Planning and Zoning Department	Long-term: 10 or more years	SERPM



Related Policy Action	Mode	Strategy / Description	Congestion Impacts / Expected Benefits	Implementation Costs	Participating/Involved Agencies	Implementation Timeframe	Potential Strategy Effectiveness Analysis Method
Policy Action 2.2	Transit	stops and, makes more accessible.	Decreased vehicle trips	Economic or financial incentives used to encourage transit-oriented development			Journey to Work / Travel Surveys
			Decreased single-occupancy Vehicle Trips				
			Shifts Carpool to Transit				
		Increase Route Coverage and/or Frequency: This improves accessibility to transit to a greater share of the population.	Increase Transit Trips	Possible capital cost to procure new vehicles	Miami-Dade Transit, South Florida Regional Transportation Authority	Medium-term: One to Five Years	SERPM
			Reduced VMT	Higher O&M Cost			MDT and SFRTA Monthly Ridership Reports
			Decreased Trip Travel Time				
Policy Action 2.3	BP	Improve Safety of Existing Bicycle and Pedestrian Facilities: Regular maintenance of existing facilities can encourage more pedestrian and bicycle activity. 	Increase the use of non-motorized modes	Capital costs of sidewalk and bicycle facility improvements		Short-term: One to Five Years	Journey to Work / Travel Surveys
			Reduced VMT				
	Transit	Increase Bus Route Coverage and Transit Service Frequencies: This increases access and attractiveness of transit mode. 	Increases transit ridership	Capital and operating costs per passenger trip	Miami-Dade Transit, South Florida Regional Transportation Authority	Short-term: One to Five Years	MDT and SFRTA Monthly Ridership Reports
			Reduced VMT				
	Auto, Transit	Implement Parking Management: the management of parking operations throughout a city can help to reduce costs, encourage use of alternative modes, and it can support smart growth objectives.	Increased use of carpools and non-motorized modes	Public cost for the management of parking facilities	Miami-Dade Parking Authority	Medium-term: One to Five Years	MDT and SFRTA Monthly Ridership Reports
Policy Actions 3.1, 3.2, 3.3	Transit	Transit on SUL: SUL lanes can be used for transit buses, vanpools, and carpools and help to reduce overall congestion.	Reduce congestion, improve traffic flow, increased use of carpools and non-motorized modes	Public cost for lane restriping, outreach, and marketing	Miami-Dade Transit, Florida Department of Transportation, Miami-Dade Expressway Authority	Medium-term: One to Five Years	MDT and SFRTA Monthly Ridership Reports
Policy Actions 3.1, 3.2, 3.3	Auto	Optimize Weaving Sections: This can help optimize vehicular traffic flow and capacity for highway weaving sections.	Reduced vehicle congestion on highway on and off ramps	Public cost for redesigning weaving sections		Medium-term: One to Five Years	"Before-and-After" Surveys, Micro-simulation Models
		Improve Roadway Geometrics: minor improvements of this type remove bottlenecks.	Reduce vehicle congestion on highway on and off ramps	Public cost for redesigning weaving sections	Florida Department of Transportation, Miami-Dade Expressway Authority, Miami-Dade Public Works Department	Medium-term: One to Five Years	



Related Policy Action	Mode	Strategy / Description	Congestion Impacts / Expected Benefits	Implementation Costs	Participating/Involved Agencies	Implementation Timeframe	Potential Strategy Effectiveness Analysis Method
		Improve Traffic Signals: Signal phases can be optimized by re-timing or actuating to respond to changes in traffic flow.	· Improved traffic flow	· Public cost for signal calibration	· Florida Department of Transportation, Miami-Dade Public Works Department	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys
		Provision of Auxiliary Lanes at Intersections: This	· Benefit both, through and turn movements	· Public cost for planning and construction	· Florida Department of Transportation, Miami-Dade Public Works Department	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys
			· Maximizes vehicle throughput at intersections	· Public cost for right-of-way acquisition			
		Optimize Acceleration / Deceleration Lanes: this can help to optimize vehicular capacity and reduce congestion on roadway.	· Reduce congestion, improve traffic flow, increased use of carpools and non-motorized modes	· Public cost for lane reconfiguration	· Florida Department of Transportation, Miami-Dade Expressway Authority	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys, Micro-simulation Models
		Implement Ramp Metering: traffic signals can control the flow of vehicles onto a highway which helps to alleviate congestion on it.	· Reduce congestion, improve flow of traffic on highway	· Public cost for the placement of traffic signals	· Florida Department of Transportation, Miami-Dade Expressway Authority, Miami-Dade Public Works Department	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys, Micro-simulation Models
		Implement or Improve Access Management: by improving the design and placement of driveways and medians, many traffic conflicts can be reduced or avoided.	· Reduce traffic conflicts	· Public cost for outreach, awareness, and publicity	· Florida Department of Transportation, Miami-Dade Public Works Department	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys, Micro-simulation Models
Policy Action 3.4	Auto	Implement Congestion Pricing on managed lanes: congestion pricing increases the reliability of the expected travel time.	· Increased use of carpools and non-motorized modes	· Public cost for signal calibration	· Florida Department of Transportation, Miami-Dade Expressway Authority	Medium-term: One to Five Years	RCR, "Before-and-After" Surveys, SERPM
		Provide Highway Information Systems: These systems can provide travelers with real-time information about existing highway traffic conditions.	· Reduced travel time and improved traffic flow	· Public costs related to design, implementation, and management.	· Florida Department of Transportation, Miami-Dade Expressway Authority	Medium-term: One to Five Years	Travel Surveys



A “top-down” approach ensures that solutions that reduce auto trips or improve existing roadway operations are evaluated before adding roadway capacity. This toolbox of solutions includes measures involving all modes of transportation as well as encouraging more efficient land use and development practices.

7.2. Selecting Appropriate Analytical Tools

The adopted performance measure RCR will also be used for evaluating the effectiveness of strategies. Additionally, as part of the long-range planning process, the MPO uses the following tools in the planning process to predict appropriateness and effectiveness of a strategy. As listed in Table 10, these tools can potentially be utilized for identifying and evaluating strategies during corridor-level analysis.

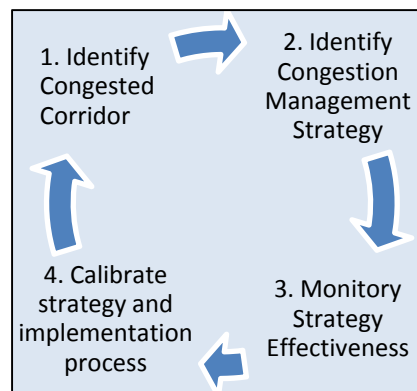
- Sketch-planning Tools
- Travel Demand Models
- Micro-simulation Models

Illustrations showing potential application of the strategy “tool-box” are included in Chapter 11.

8. MONITORING STRATEGY EFFECTIVENESS

Monitoring strategy effectiveness is the final component of the CMP cycle (Figure 24) which feeds the iterative strategy evaluation process. This component is to complete a “feedback loop” for the planning process so that the CMP Steering Committee can evaluate whether the CMP objectives are being met. Anticipated performance and expected benefits or impacts of congestion management strategies are included in Table 10.

Figure 24: CMP Cycle



8.1. Documentation of Effectiveness

After appropriate strategies have been applied to a congested corridor, the RCR will be used to identify the effectiveness of implemented strategies. A more detailed evaluation of individual strategies is expected to occur during corridor studies.

Analytical tools identified in Section 7.2 will be used to evaluate the effectiveness of CMP strategies. Note that certain techniques may have benefits beyond reducing congestion however; the CMP strategies are rated strictly on their potential benefit for congestion relief.

8.1.1. Monitoring and Tracking

The effectiveness of the congestion management strategies will be monitored and tracked along with the updates to the CMP every five years. As more and more data is collected over time, it will become easier to identify trends, and compare data across projects and geographic regions.

The usage of RCR will also permit a “before-and-after” type of analysis to determine the effectiveness of adopted strategies. The time frame for “before-and-after” analysis will vary based on several factors. For example, impacts of some strategies such as transportation demand management TDM measures will be



visible only over a long period of time. On the other hand, strategies such as addition of an auxiliary right-turn lane are likely to show immediate results.

9. IMPLEMENTATION AND MANAGEMENT

The entire CMP process requires an implementation plan to coordinate various activities, ensure timely development and delivery of CMP products and maintain a high level of quality control. Coordination and cooperation among multiple agencies is required to ensure that the CMP functions properly and provides the desired information. This component also functions to periodically review CMP activities, procedures, and techniques and update the CMP process as new technologies become available.

9.1. Implementation Schedule

As mentioned previously, the CMP is expected to be an integral part of the MPO's LRTP process and therefore, will be updated on a five-year cycle to coincide with the development of the LRTP. It is recommended that congested spots and corridors be further studied in between LRTP cycle. The CMP update will focus on results of the CMP implementation and will calibrate responses necessary to address new arising congestion related issues.

Coordination with operating agencies such as FDOT, MDPWD, and MDX is expected to be an on-going process through established communication channels such as the CMP Steering Committee. The coordination process will focus on identifying needs and appropriateness of implementing CMP strategies along identified corridors.

9.2. Implementation Responsibilities

9.2.1. Transportation Plan Technical Advisory Committee (TPTAC)

The TPTAC provides technical support via a review process to the TPC. The MPO's established TPTAC will act as the CMP Steering Committee. This committee is composed of representatives from entities with TPC voting members that are appointed by the director of each entity. This mechanism ensures a linkage between the CMP and funding decisions. Agencies represented on the TPTAC are listed in Section 6.2. The TPTAC meets once a month and is open to the public. The committee will annually evaluate:

- State of congestion along the CMP network;
- Recommend strategies for implementation;



- Evaluate and monitor results of implemented strategies; and,
- Recommend changes to the CMP.

9.2.2. Other MPO Committees

The following three established MPO committees also guide transportation development and improvement in the County. These committees will review the CMP improvements on as-needed basis:

- Bicycle and Pedestrian Advisory Committee (BPAC)
- Citizens Advisory Committee
- Freight Transportation Advisory Committee

9.2.3. Transportation Planning Council (TPC)

The TPC has ultimate responsibility for the technical adequacy of the MPO programs that are presented to the MPO Governing Board for approval and adoption. CMP funding and projects will be subjected to approval of TPC. The committee is chaired by the MPO Director and members are directors of county, and various municipal, departments involved in the transportation planning process. At the time of preparation of this document, agencies represented on the TPC include:

- Cities of Hialeah, Homestead, Miami, Miami Beach, Miami Gardens and North Miami
- Florida Dept. of Environmental Protection
- Florida Department of Transportation
- Miami-Dade Aviation Department
- Miami-Dade County Public Schools
- Miami-Dade Department of Environmental Resources Management
- Miami-Dade Expressway Authority
- Miami-Dade League of Cities
- Miami-Dade Planning & Zoning
- Miami-Dade Public Works
- Miami-Dade Seaport Department
- Miami-Dade Transit



10. IDENTIFICATION OF CONGESTED SPOTS AND CORRIDORS

The weighted RCR was used to identify congested corridors in the County. The 2007 traffic count station and concurrency data were obtained from the Miami-Dade Planning and Zoning Department. The most pertinent data needed to determine the congested corridors in Miami-Dade County includes roadway names, locations, maximum capacities, traffic counts, and vested trips.

The next step analyzed the existing RCR and future RCR, and developed a weighted RCR to take into account the existing and future conditions at each count station. The weighted RCR was calculated by multiplying the existing RCR by 60 percent and future RCR by 40 percent and summing the results. By using 60 percent on the existing conditions and 40 percent on the future, adequate consideration could be given to both the existing and future conditions of the roadways in Miami-Dade County.

Roadway segments with RCR values of 0.9 or greater are considered congested or nearly congested roadway segments according to the following categories:

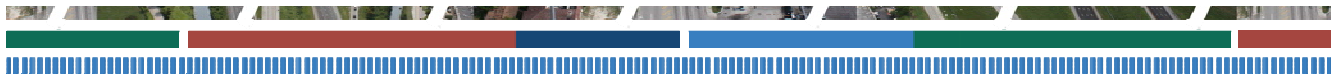
- Nearly Congested – $0.9 < \text{weighted RCR} \leq 1.00$
- Moderately Congested – $1.00 < \text{weighted RCR} \leq 1.20$
- Highly Congested - $\text{weighted RCR} \geq 1.20$

The CMP Steering Committee approved the criteria that a corridor should be at least 2 miles in length to be considered a CMP corridor. Roadway segments less than two miles in length are considered congested spots.

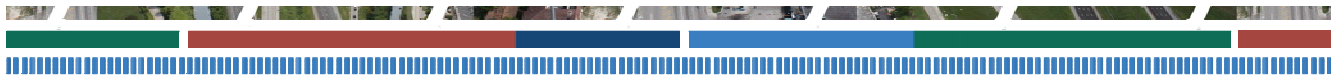
The list of corridors was further refined by filtering out corridors that have capacity enhancing projects planned or underway. Similarly, FDOT manages freeway facilities and related improvement projects in the County, therefore freeway segments are excluded from the analysis. The results are shown on Figure 25. The MPO's LRTP Steering Committee comprised of state, county, and local agencies provide input to the CMP process. The LRTP Steering Committee identified spots and corridors for potential maintenance and operations related improvements. All, including those identified by the LRTP Steering Committee, congested spots and corridors are listed in Table 11 and depicted on Figure 26. The identified congested spots and corridors, except minor spot operations improvements, will be included in the MPO's 2035 LRTP as candidate projects. Projects for congested spots that are likely to require minor operations improvements only will be defined at a later date.

Table 11: Congested Spots and Corridors

Facility or Spots	From	To	Description
Congested Corridors and Spots Identified based on RCR Methodology			
SW 136 St	US 1	SW 67 Ave	Congestion Management
SW 152 Ave	US 1	Old Cutler Rd	Congestion Management
SW 67 Ave/Ludlam Rd	SR 992/SW 152 St	SR 968/Flagler St	Congestion Management
SR 959/SW 57 Ave/Red Rd	Old Cutler Rd	SW 56 St	Congestion Management
SW 200 St/Caribbean Blvd	SW 127 Ave	Coral Sea Rd	Congestion Management
Old Cutler Rd	SW 216 Street	SW 37 Ave	Congestion Management
NW 58 St	SR 985/NW 107 Ave	SR 826/ Palmetto Expwy	Congestion Management
NW 154 St/Miami Lakes Blvd	SR 973/NW 87 Ave	NW 67 Ave	Congestion Management
SR 847/NW 47 Ave	SR 826/Palmetto Expwy	SR 852/NW 215 St	Congestion Management
SW 56 St\Miller Dr	SW 127 Ave	SR 959/SW 57 Ave	Congestion Management
SR 973/SW 87 AV & SR 94/Kendall Dr			Congestion Management
Highland Lakes Blvd & SR854/NE 203 St/Ives Dairy Rd			Congestion Management
NE 2 AV & NE 215 St			Congestion Management
SR 973/NW 87 AV & SR 948/NW 36 St			Congestion Management
S Bayshore Dr & SW 17 AV			Congestion Management
SR 9/SW 27 AV & US 1			Congestion Management
SW 97 AV & SW 184 St			Congestion Management
SR 990/SW 104 St & US 1			Congestion Management
SW 112 St & SW 112 AV			Congestion Management
SW 117 AV & US 1			Congestion Management
SW 122 AV & Tamiami Trail			Congestion Management
SW 127 AV & Coral Way			Congestion Management
SW 127 AV & SR 94/Kendall Dr			Congestion Management
SR 992/SW 152 St & SW 137 AV			Congestion Management
SW 184 St & US 1			Congestion Management
SW 296 St & US 1			Congestion Management
W 29 St & SR 959/SW 57 Ave/Red Rd			Congestion Management
SW 127 AV & SW 26 St			Congestion Management
NW 41 St & NW 97 AV			Congestion Management
SW 168 St & SR 973/SW 87 AV			Congestion Management
SR 976/SW 40 St & SR 821/Florida's Tpke			Congestion Management
E/O SW 187 Ave	SW 192 Ave	US 1	Congestion Management
S/O SR 826/Palmetto Expwy	SW 98 St	SR 990/SW 112 St	Congestion Management
Congested Corridors and Spots and Associated Projects Identified by the LRTP Steering Committee			
Miami Ave/2 Ave/NW 5 St/Flagler (1 St)	Bridge over Miami River		ITS/Advance Warning Signals
SR 9/SW/NW 27 Ave	SR 90/SW 8 St	SR 25/NW 36 St	Median / access improvements



Facility or Spots	From	To	Description
NW 20 St	SR 9/NW 27 Ave	I 95	Roadway Infrastructure Improvements
SR 112/Airport Expwy (WB)		SR 25/NW 36 St /Okeechobee Rd	Reconstruct Intersection
Golden Glades Interchange			Ramp and /or operational improvements. Series of low cost operational improvements within the Golden Glades
NE 125 St/NE 6 Ave/W Dixie Hwy			Intersection Improvements
SR 823/Red Road/NW 57 Ave	SR 826/Palmetto Expwy	SR 916/NW 135 St	Congestion management
SR 990/SW 104 St/SW 112th St	SR 821/Florida's Tpke	US1	Congestion management
SR 973/NW 87 Ave	SR 836/Dolphin Expwy	NW 58 St	Improve SR 836/NW 12 St/NW 87 Ave Interconnections; improve intersections to accommodate truck movements
SR 997/Krome Ave	SR 90/SW 8 St/Tamiami Trail	US 1	Improve intersections to accommodate truck movements
SR 826/SR 9/I-95 Interchange			Congestion Improvements; improve turning radius/speeds on ramp from Turnpike to WB SR 826
NW 12 St		SR 973/NW 87 Ave	Signal Improvements
North River Dr	SR 985/NW 107 Ave	NW 74 Ave	Widen North River Dr to include shoulders and improved access management
Integration of Truck Route System and Regional ITS Network			Implementation of ITS improvements specifically geared toward trucks
Medley Freight Hub Streetlight and local roadway Improvements			Improve the local infrastructure to and from businesses in the Medley area-Pavement, turning radii. 15 miles of roadway
Way-Finding Sign Improvement Program			Improve county-wide for movements to/from regional freight hub
Port of Miami Operations			PierPass Feasibility Study to examine the impact of implementing congestion mitigation incentives for off-peak operations
Freight Rail Landside Access			Projects that enhance landside access, including intermodal ramps and truck access to railroad terminals
SR 25/Okeechobee Rd Operations/Access Improvements	NW 138 Ave	NW 79 Ave	Signal timing improvements, improve access and improve signing to provide better flow along Okeechobee and access from side roads and access by trucks to and from Medley
Medley Gateway Establishment			Provide business and wayfinding signing, including a Medley area business inventory
SR 997/Krome Ave		SW 312 St	Intersection Improvements



Facility or Spots	From	To	Description
41 St	Alton Rd	Collins Ave	Corridor Improvements
One-waying of South Beach Local Streets			Capacity improvements
Park and Ride Lot Program			MDT program to identify potential sites and construct park & ride lots
SR 90/SW 8 St/Tamiami Trail	SR 826/Palmetto Expwy	I 95	Congestion management
SR 872/SW 22 St/Coral Way	SR 826/Palmetto Expwy	US 1	Congestion management
US 1	SW 88 St. (Kendall Dr)	I 95	Congestion management
SR 916/NW 135 St	SR 959/NW 57 Ave/Red Rd	SW 37 Ave/Douglas Rd	Congestion management
SW 200 Street / US 1 (South Dixie Highway)			Multimodal Terminal
SR 94/SW 88 St / HEFT			Multimodal Terminal
SR 860/Miami Gardens Drive	SR 821/Florida's Tpke	Biscayne Blvd.	Congestion Management
SR 854/Ives Dairy Rd	SR 821/Florida's Tpke	Biscayne Blvd.	Congestion Management
Expand Shipping/Freight Industry hours of operation			
SR 25/NW 36 St/41 St	SR 953/NW 42 Ave/Le Jeune Rd	HEFT	Express Street (ITS, Grade Separations, Etc.)
Granada Blvd and SR 976/SW 40 St/Bird Rd			Intersection improvement

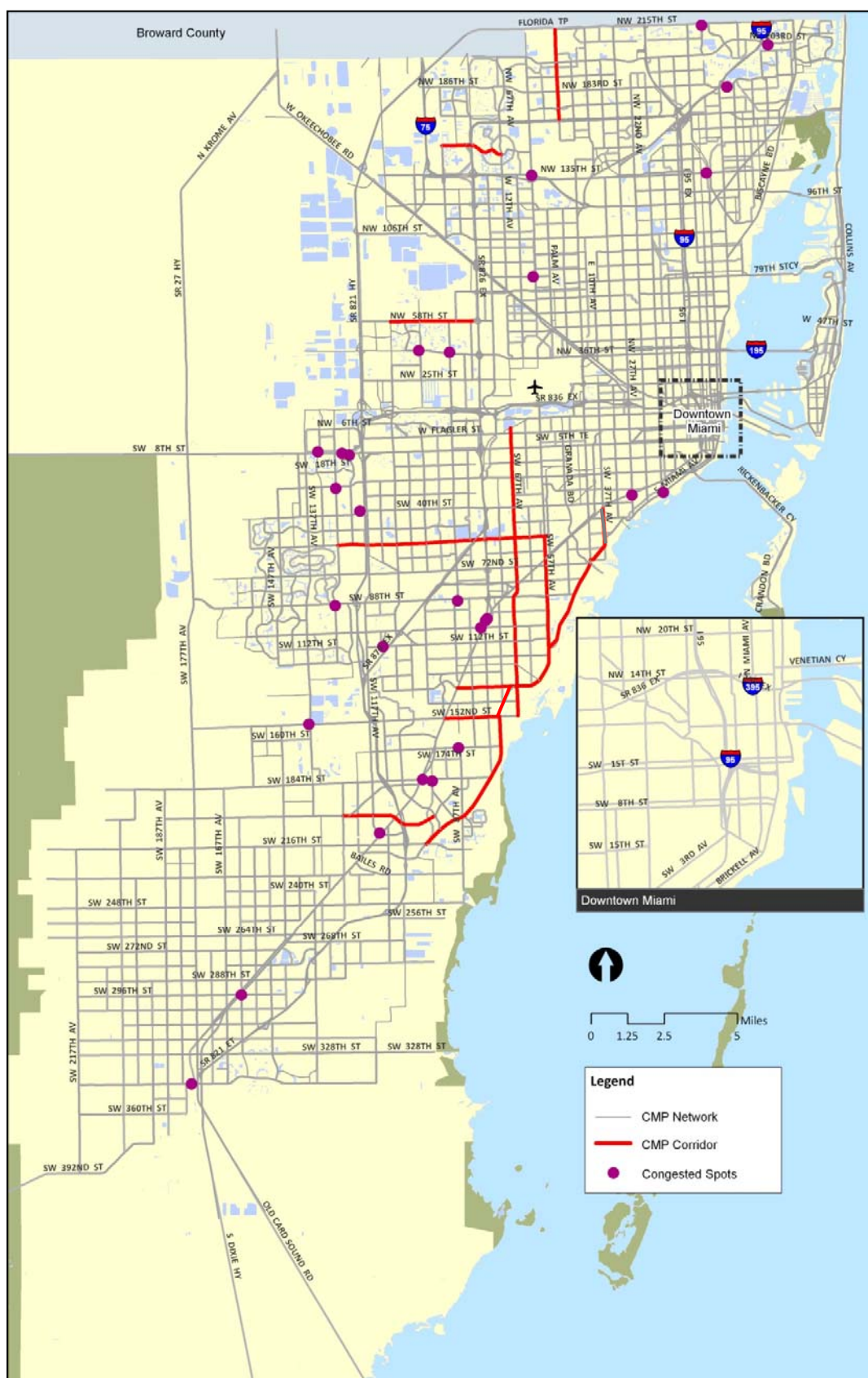
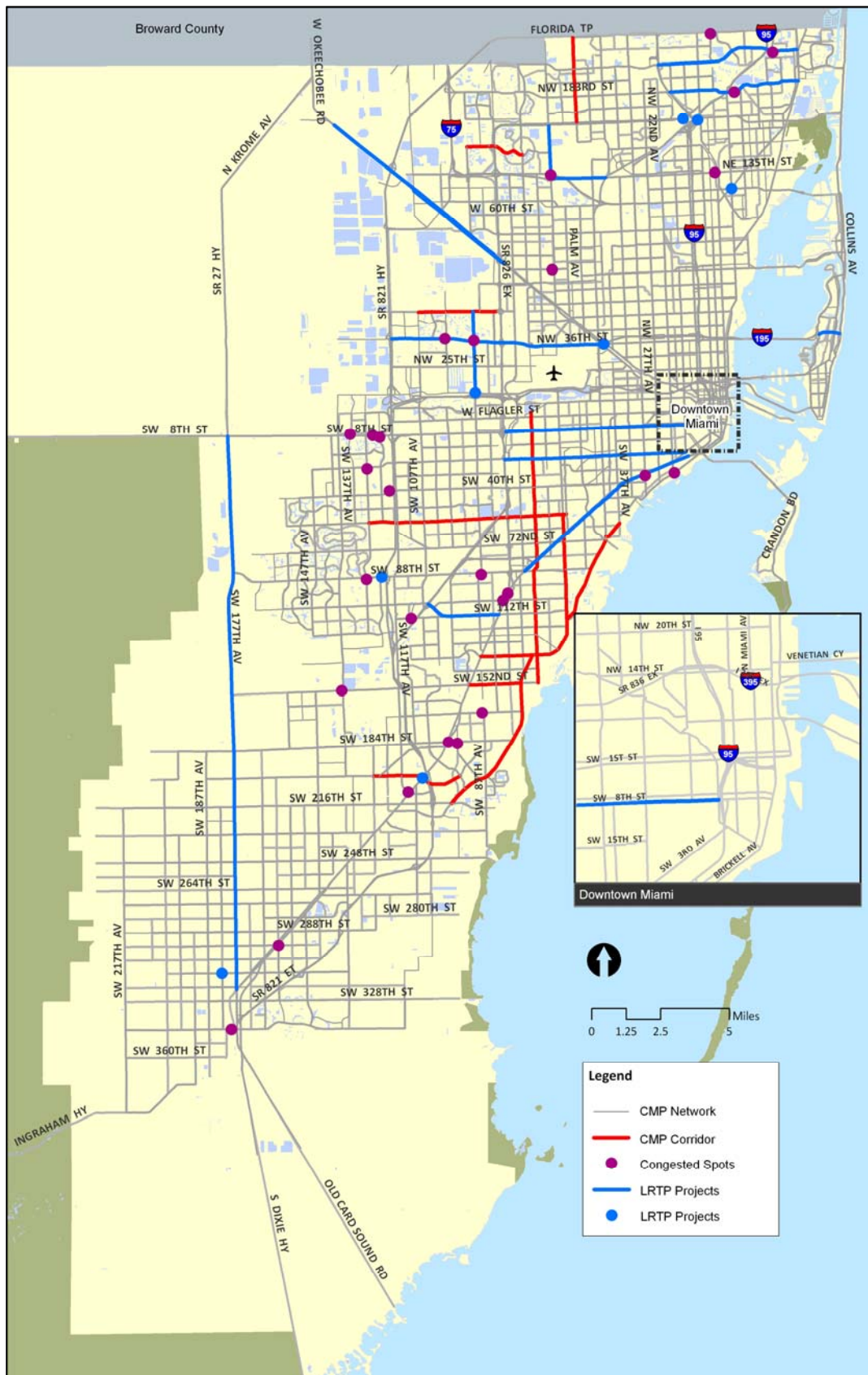


Figure 26: CMP Corridors and spots (based on RCR and LRTP Steering Committee Input)



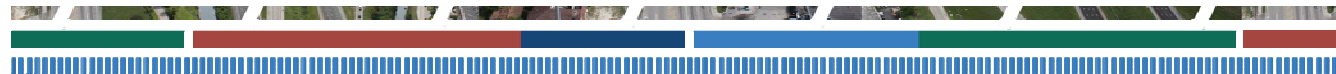


11. RECOMMENDATIONS

A summary of methods and procedures recommended for future CMP updates is provided below. These recommendations are categorized by CMP steps and are included in relevant sections throughout this document.

Performance Measures

- Consider adopting same or similar performance measures for both LRTP and CMP.
- Adopt system-level multimodal performance measures to evaluate changes on an aggregate basis for the entire transportation system over time. In 2008, the MPO conducted a “Transportation System Performance Monitoring Study” which identified system-level multimodal performance measures (Table 6) that can track state of the transportation system on an aggregate basis. The performance measures identified in the study should be considered for adoption as part of the CMP. It is recommended that various transportation and land uses agencies in the county consider the identified system-level performance measures and establish performance thresholds.
- Establish purpose for each performance measure. A performance measure can be used for two purposes: (1) to identify congestion; and, (2) to evaluate effectiveness of congestion management strategies.
- Migrate from existing RCR, defined as the existing V/C ratio divided by the maximum allowed V/C ratio, to travel time based performance measures.
- Identify congestion by facility types: The following facility types are currently used in the MPO’s approved travel demand model and therefore, could potentially be used for the CMP analysis:
 - Freeways and uninterrupted roadways
 - Tolloed facilities
 - HOV facilities
 - Arterials
 - Collectors
 - Ramps
- Identify congestion based on area types: The following area types are currently used in the MPO’s approved travel demand model and could potentially be used for the CMP analysis:
 - Central Business District (CBD) and Fringe CBD
 - Other Business Districts
 - Residential
 - Rural



Performance Monitoring Plan

➤ Different agencies in the region have established performance-monitoring programs that include performance measures and data collection methods to monitor their respective systems (See Table 7). These established performance monitoring programs can potentially be integrated into the MPO's CMP. This may require the following steps.

- Categorization based on three-critical congestion criteria: intensity, duration, and extent.
- Adoption of a common set of performance measures across agencies to enable system-wide tracking.
- Adoption of a consistent data collection methodology.
- Establishment of performance thresholds which could consist of facility- and area-types. The established thresholds will work as performance goals.

➤ Develop a data collection program that focuses on data compatibility, maintenance, and continuous on-going coordination.

- Identify data 'gaps' that facilitate implementation of potential performance measures.
- Integrate data collection efforts with the MPO's LRTP and other planning efforts.

Implementation and Management

➤ The CMP will be updated on a five-year cycle to coincide with the development of the LRTP. Congested spots and corridors identified through the CMP process are recommended to be evaluated in between LRTP cycle. Figures 27-32 illustrate potential implementation of CMP strategies. The MPO's 2035 LRTP identifies 120.9 million dollars for CMP related improvements.

Table 12: Funding for CMP Improvements

	2015	2016-2020	2021-2025	2026-2030	2031-2035	TOTAL
Other Arterials & ROW	2.1	11.5	11.0	10.1	9.4	43.9
Transit	0.4	2.0	1.7	1.4	1.0	6.6
Gas Taxes	4.0	18.8	17.3	15.8	14.5	70.4
Total	6.6	32.3	30.0	27.3	24.9	120.9

Note: Amounts in 2008 dollars

Figure 27: Example 1: Potential Application of the CMP Strategies



Figure 28: Example 2: Potential Application of the CMP Strategies

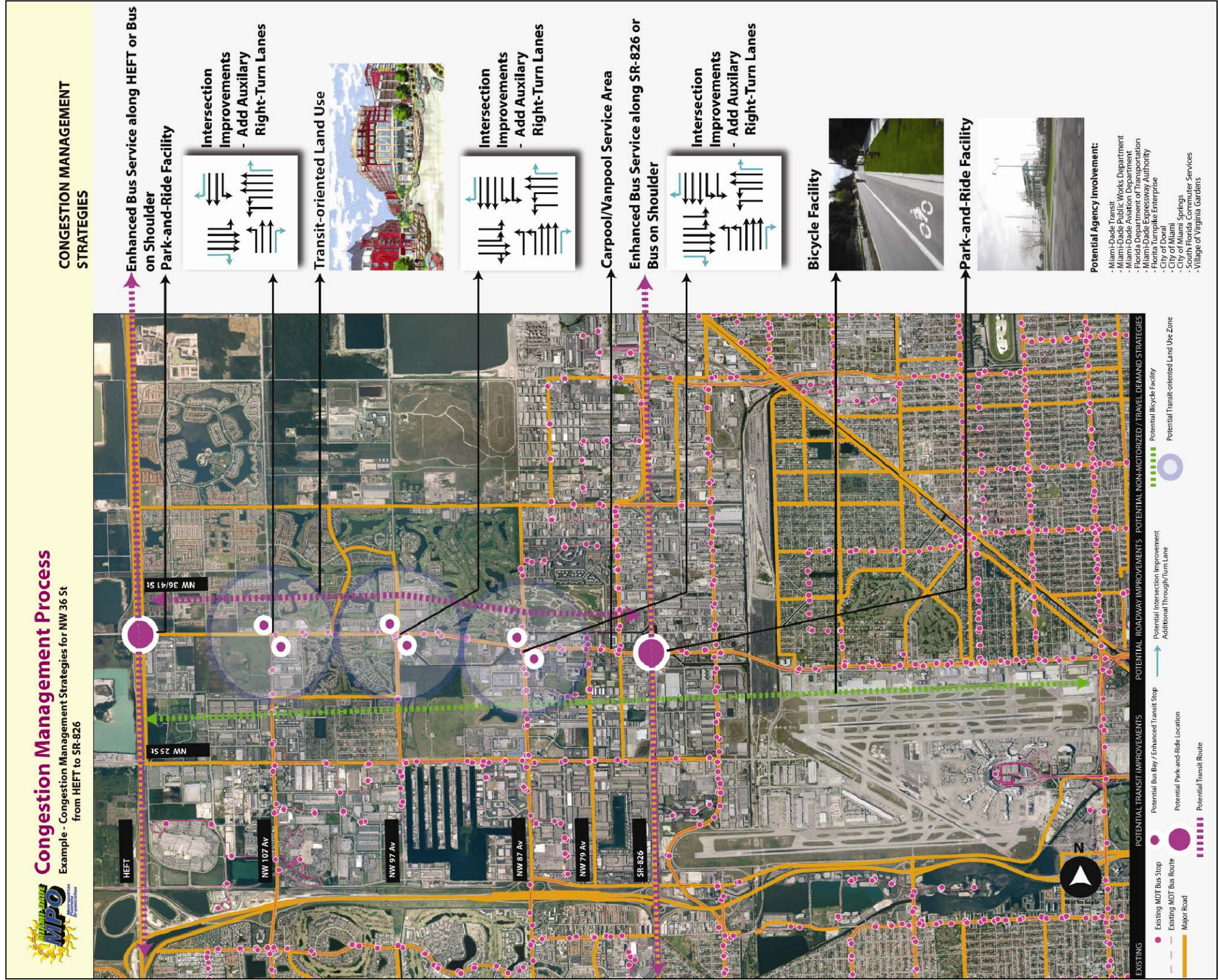


Figure 29: Example 3: Potential Application of the CMP Strategies

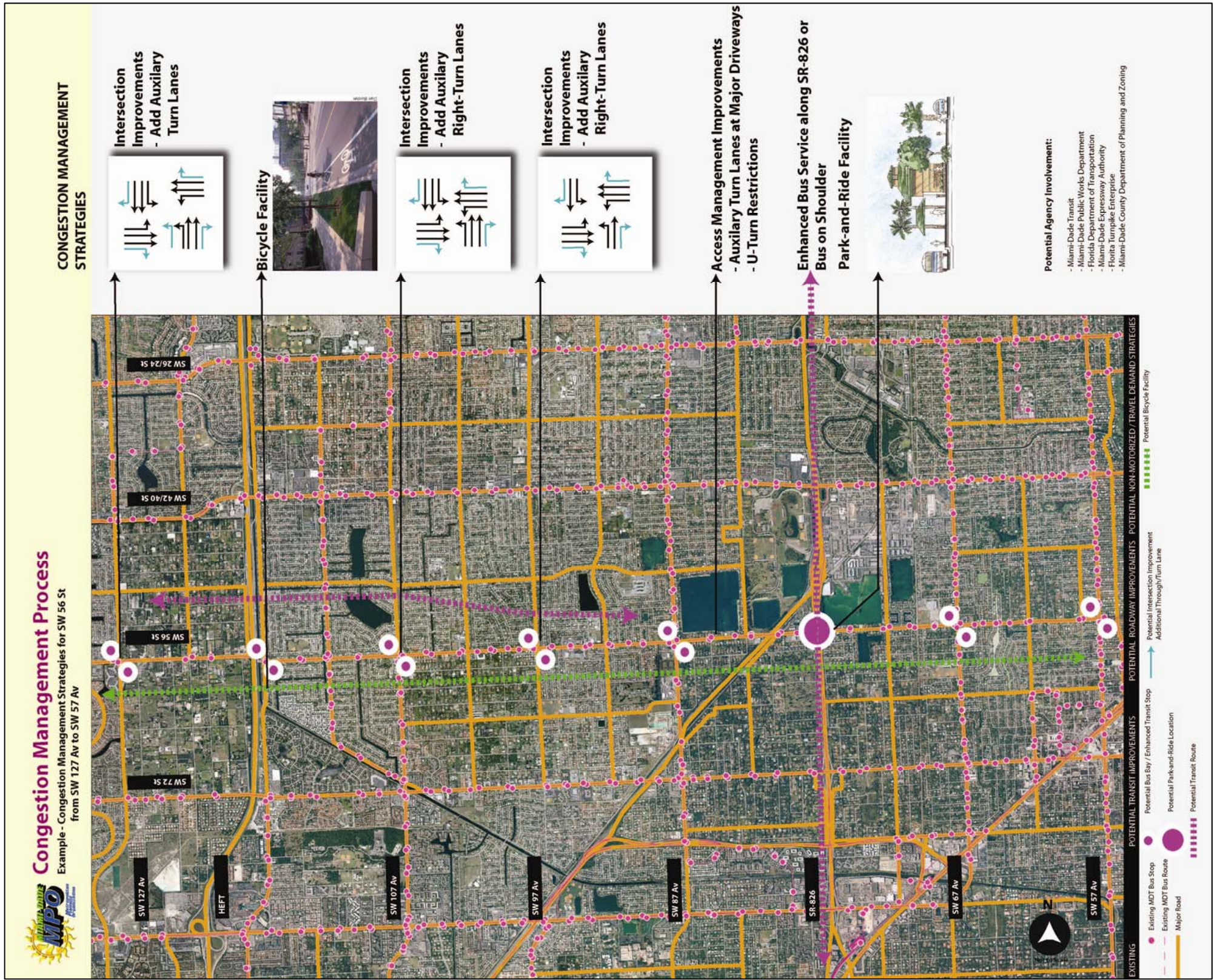


Figure 30: Example 4: Potential Application of the CMP Strategies

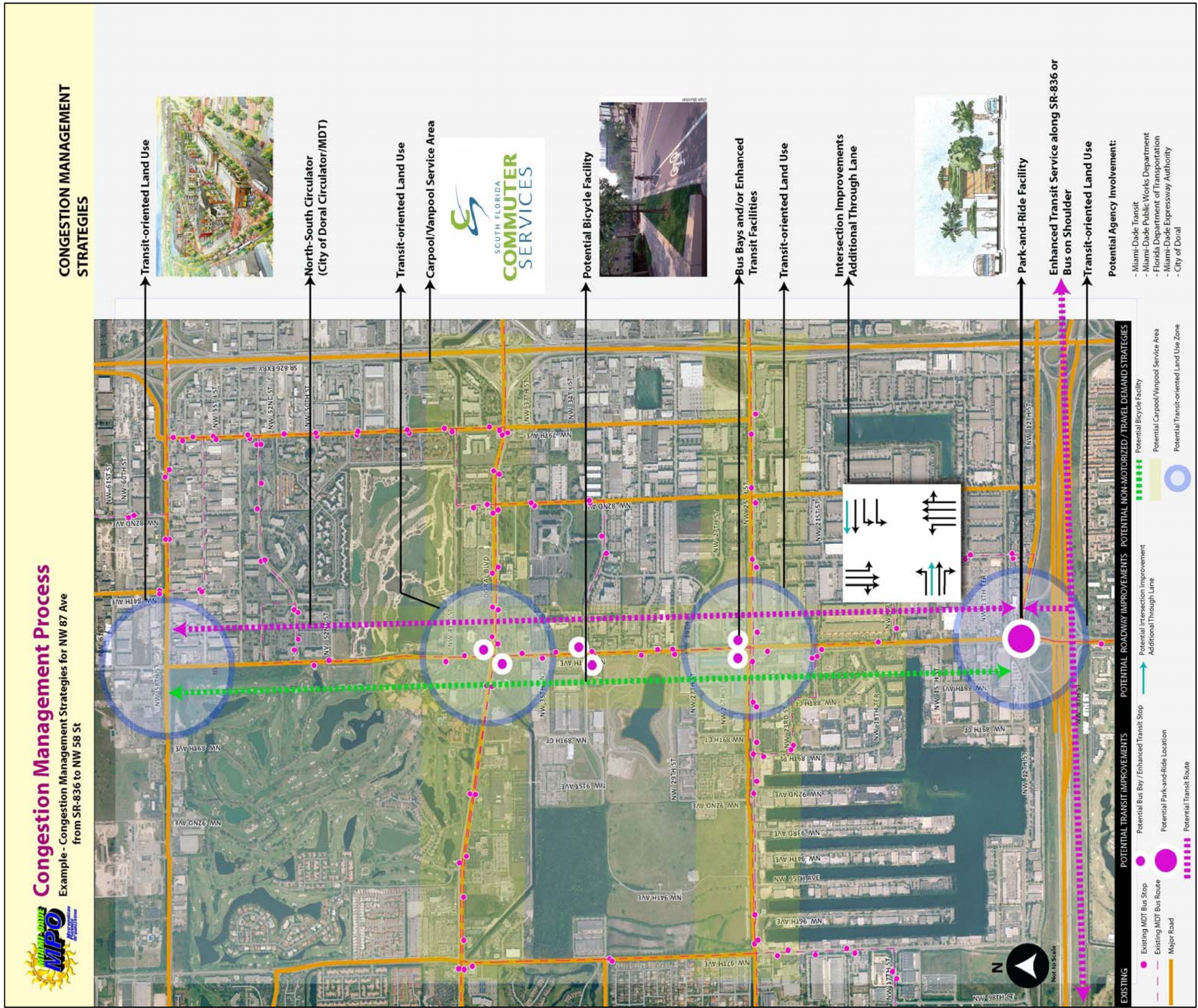


Figure 31: Example 5: Potential Application of the CMP Strategies

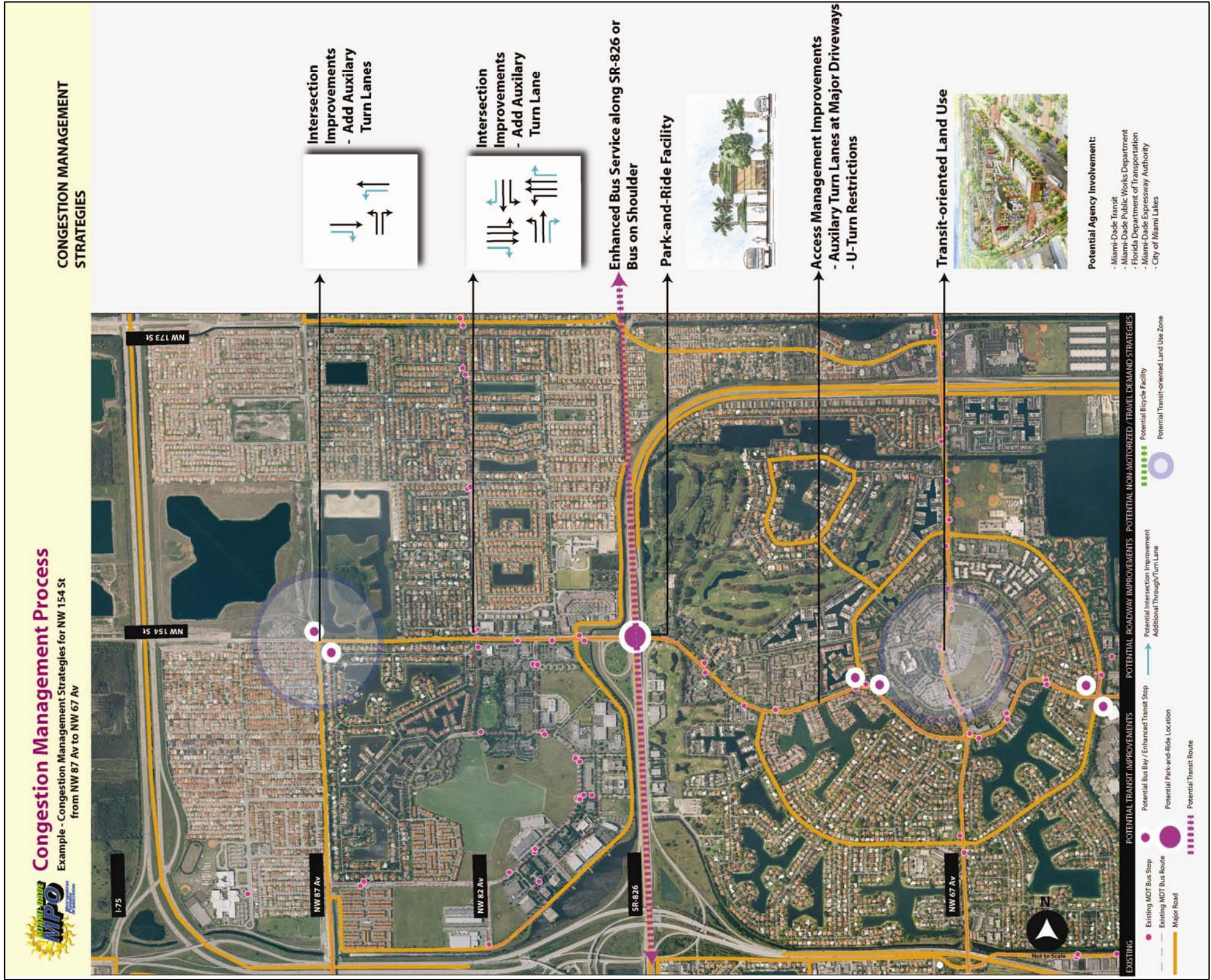
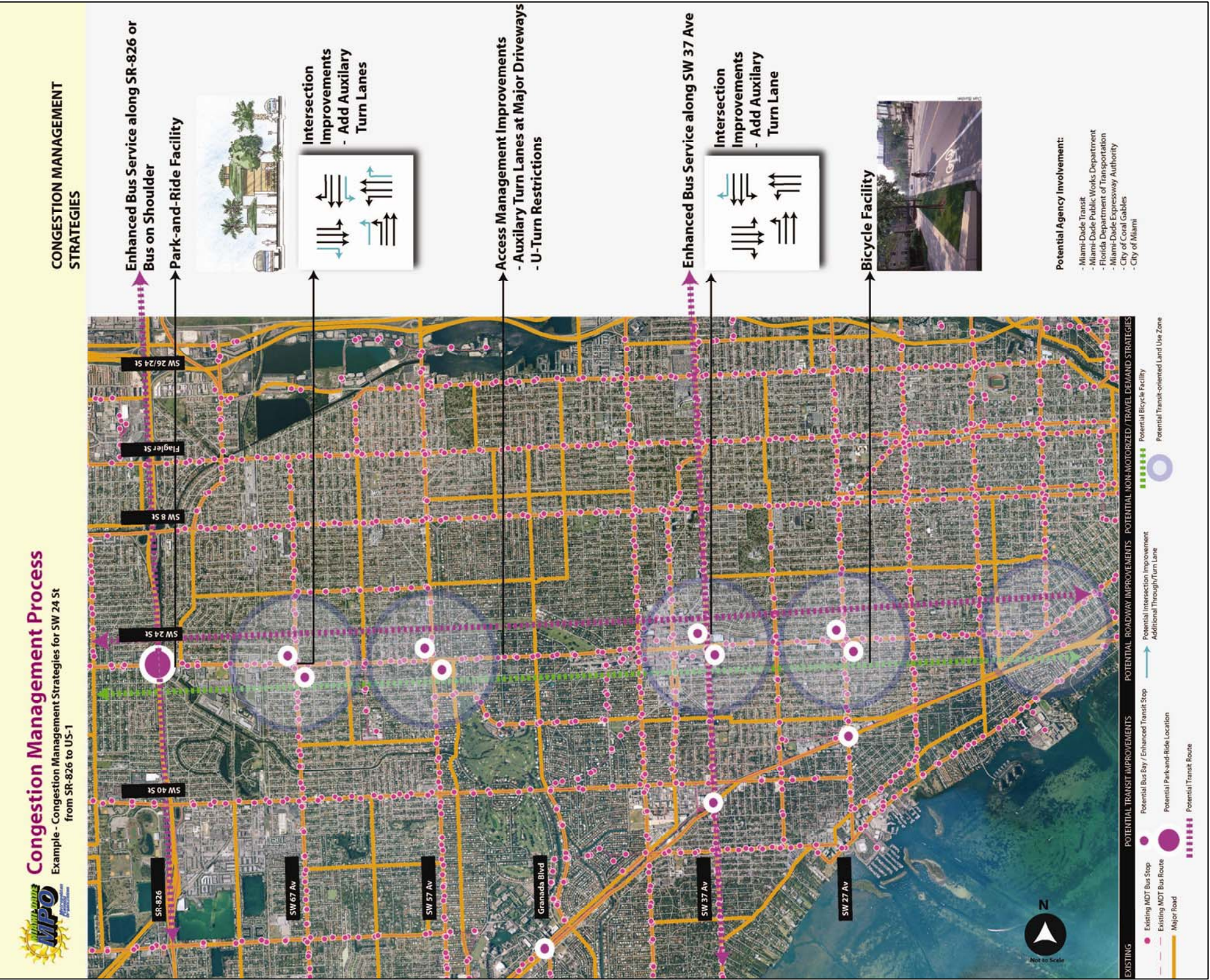


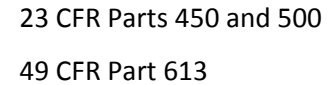
Figure 32: Example 6: Potential Application of the CMP Strategies

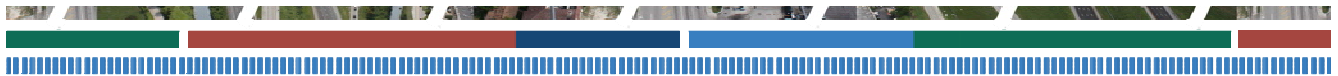




The 2009 Congestion Management Process Update

Appendix –A: Legislative Language





(2) **Definition of congestion management Policy Actions and appropriate performance measures to assess** the extent of congestion and support the evaluation of the effectiveness of congestion reduction and mobility enhancement strategies for the movement of people and goods. Since levels of acceptable system performance may vary among local communities, performance measures should be tailored to the specific needs of the area and established cooperatively by the State(s), affected MPO(s), and local officials in consultation with the operators of major modes of transportation in the coverage area;

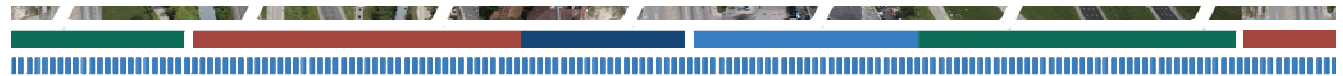
(3) Establishment of a coordinated program for **data collection and system performance monitoring** to define the extent and duration of congestion, to contribute in determining the causes of congestion, and evaluate the efficiency and effectiveness of implemented actions. To the extent possible, this data collection program should be coordinated with existing data sources (including archived operational/ITS data) and coordinated with operations managers in the metropolitan area;

(4) **Identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies** that will contribute to the more effective use and improved safety of existing and future transportation systems based on the established performance measures. The following categories of strategies, or combinations of strategies, are some examples of what should be appropriately considered for each area: 1. Demand management measures, including growth management and congestion pricing; 2. Traffic operational improvements; 3. Public transportation improvements; 4. ITS technologies as related to the regional ITS architecture; and 5. Where necessary, additional system capacity;

(5) **Identification of an implementation schedule, implementation responsibilities, and possible funding sources for each strategy** (or combination of strategies) proposed for implementation; and

(6) Implementation of a process for periodic **assessment of the effectiveness of implemented strategies**, in terms of the area's established performance measures. The results of this evaluation shall be provided to decision makers and the public to provide guidance on selection of effective strategies for future implementation.

(d) In a TMA designated as nonattainment area for ozone or carbon monoxide pursuant to the Clean Air Act, **Federal funds may not be programmed for any project that will result in a significant increase in the carrying capacity for SOVs** (i.e., a new general purpose highway on a new location or adding general purpose lanes, with the exception of safety improvements or the elimination of bottlenecks), **unless the project is addressed through a congestion management process** meeting the requirements of this section.



(e) In TMAs designated as nonattainment for ozone or carbon monoxide, the congestion management process shall provide **an appropriate analysis** of reasonable (including multimodal) 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 (as described in paragraph (d) of this section) is proposed to be advanced with Federal funds. If the analysis demonstrates that travel demand reduction and operational management strategies cannot fully satisfy the need for additional capacity in the corridor and additional SOV capacity is warranted, **then the congestion management process shall identify all reasonable strategies to manage the SOV facility safely and effectively (or to facilitate its management in the future).** Other travel demand reduction and operational management strategies appropriate for the corridor, but not appropriate for incorporation into the SOV facility itself, shall also be identified through the congestion management process. **All identified reasonable travel demand reduction and operational management strategies shall be incorporated into the SOV project or committed to by the State and MPO for implementation.**

(f) State laws, rules, or regulations pertaining to congestion management systems or programs may constitute the congestion management process, if the FHWA and the FTA find that the State laws, rules, or regulations are consistent with, and fulfill the intent of, the purposes of 23 U.S.C. 134 and 49 U.S.C. 5303.

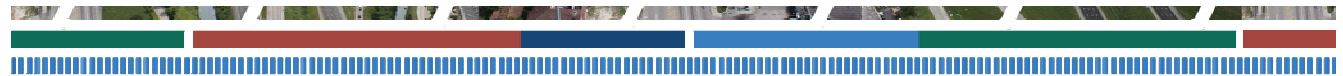
PART 500 - MANAGEMENT AND MONITORING SYSTEMS

Subpart A - Management Systems

Sec. 500.109 CMS (p. 7274)

(a) For purposes of this part, congestion means the level at which transportation system performance is unacceptable due to excessive travel times and delays. Congestion management means the application of strategies to improve system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods in a region. A congestion management system or process is a systematic and regionally accepted approach for managing congestion that provides accurate, up-to-date information on transportation system operations and performance and assesses alternative strategies for congestion management that meet State and local needs.

(b) The development of a congestion management system or process should result in performance measures and strategies that can be integrated into transportation plans and programs. The level of system performance deemed acceptable by State and local officials may vary by type of transportation facility, geographic location (metropolitan area or subarea and/or non-metropolitan area), and/or time of day. In both metropolitan and nonmetropolitan areas, consideration needs to be given to strategies that manage demand, reduce single occupant vehicle (SOV) travel, and improve transportation system management and operations. Where the



addition of general purpose lanes is determined to be an appropriate congestion management strategy, explicit consideration is to be given to the incorporation of appropriate features into the SOV project to facilitate future demand management strategies and operational improvements that will maintain the functional integrity of those lanes.

Source:

Federal Register / Vol. 72, No. 30 / Wednesday, February 14, 2007 / Rules and Regulations

<http://edocket.access.gpo.gov/2007/pdf/07-493.pdf>, as of 5/31/07

Recent Changes (also included above)

SAFETEA-LU modified Title 23, Section 134 of the U.S. Code to include the following (corresponding changes were made to Title 49, the Public Transportation portion of the Code, under Section 5303):

“(k) TRANSPORTATION MANAGEMENT AREAS (TMA).

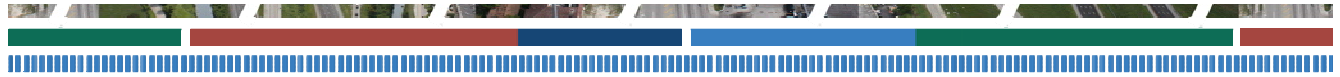
“(1) IDENTIFICATION AND DESIGNATION.

“(A) REQUIRED IDENTIFICATION. – The Secretary shall identify as a transportation management area each urbanized area (as defined by the Bureau of the Census) with a population of over 200,000 individuals.

“(B) DESIGNATIONS ON REQUEST. – The Secretary shall designate any additional area as a transportation management area on the request of the Governor and the metropolitan planning organization designated for the area.

“(2) TRANSPORTATION PLANS. – In a metropolitan planning area serving a transportation management area, transportation plans shall be based on a continuing and comprehensive transportation planning process carried out by the metropolitan planning organization in cooperation with the State and public transportation operators.

“(3) CONGESTION MANAGEMENT PROCESS. –Within a metropolitan planning area serving a transportation management area, the transportation planning process under this section shall address congestion management through a process that provides for effective management and operation, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under this chapter and chapter 53 of title 49 through the use of travel demand reduction and operational management strategies. The Secretary shall establish an appropriate phase-in schedule for compliance with the requirements of this section but no sooner than one year after the identification of a transportation management area....



“(m) ADDITIONAL REQUIREMENTS FOR CERTAIN NONATTAINMENT AREAS.

“(1) IN GENERAL. – Notwithstanding any other provisions of this chapter or Chapter 53 of Title 49, for transportation management areas classified as nonattainment for ozone or carbon monoxide pursuant to the Clean Air Act, Federal funds may not be advanced in such area for any highway project that will result in a significant increase in the carrying capacity for single-occupant vehicles unless the project is addressed through a congestion management process.

“(2) APPLICABILITY. – This subsection applies to a nonattainment area within the metropolitan planning area boundaries determined under subsection (e). In addition, under the Statewide Planning Requirements, SAFETEA-LU added the following language to Title 23, Section 135 (and Title 49, Section 5304):

“(i) TREATMENT OF CERTAIN STATE LAWS AS CONGESTION MANAGEMENT PROCESSES. – For purposes of this section and Section 134, and Sections 5303 and 5304 of Title 49, State laws, rules, or regulations pertaining to congestion management systems or programs may constitute the congestion management process under this section and Section 134, and Sections 5303 and 5304 of Title 49, if the Secretary finds that the state laws, rules, or regulations are consistent with, and fulfill the intent of, the purposes of this section, Section 134, and Sections 5303 and 5304 of Title 49, as appropriate.”



The 2009 Congestion Management Process Update

Appendix –B: CMP Checklist



Checklist Question	Refer to:
1. Area of Application	
• How is the CMP a systematic process for managing congestion?	Section 1
- Does the MPO have a CMP in place?	Section 1
- A description of the area, network, and modes covered by the CMP?	Section 4
- Include highways, transit, and the movement of people and the goods?	Sections 4.1, 4.2, 4.3, 4.4, 4.5
- New and existing facilities eligible for federal funding?	Sections 4.1, 4.2, 4.3, 4.4, 4.5
- Travel demand reduction strategies (reduce SOV travel)?	Section 7, Figure 23, Table 10
- Operational and management strategies?	Section 7, Figure 23, Table 10
2. System Definition (modes and network)	
• Does the CMP provide the following types of information?	
- Methods to monitor and evaluate the transportation and multimodal system performance based on defined parameters. This monitoring and evaluation includes program for data collection and system performance monitoring to define the extent and duration of congestion, to help determine the causes of congestion, and to evaluate the efficiency and effectiveness of implemented actions;	Section 5 (performance measures), Section 6 (data acquisition plan)
- Alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet State and local needs, including the following:	Section 7
- Transportation demand management measures	
- Growth management	
- Congestion pricing	
- Traffic operational strategies	
- ITS technologies	
- Additional system capacity (where necessary)	
3. Performance Measures	
- Has the region established performance measures for measuring and monitoring congestion as part of the CMP? What are they and how are they used?	Section 5.1, Section 5.2
- How does Transportation System Management and Operations and the ITS architecture link to the CMP?	Section 5.3
- How is the CMP process documented? How are the results of the CMP documented?	Section 5.4 (documentation), Section 10 (results of the CMP)
- What is the role of decision makers and elected officials in the CMP process? How are they kept informed and what is their involvement?	Section 5.5, Section 9.2
4. Performance Monitoring Plan	
- How is the CMP process carried out? Is there a CMP committee or other coordinating group? Who is involved in the CMP process?	Section 6.2
- To what extent has the CMP been integrated into the metropolitan transportation planning process, including the Metropolitan Transportation Plan and the Transportation Improvement Program?	Section 6.2.1, Section 6.2.2, Section 6.2.3, Section 9.1
- How are agencies/persons responsible for transportation operations and public transit involved in the CMP? What is the role of the public transit agency and persons/agencies responsible for operations in the CMP?	Section 5.5, Section 6.2.1, Section 6.2.2, Section 6.2.3
- How does the CMP link to the NEPA process?	Section 6.3
5. Identification and Evaluation of Strategies	
- Where the addition of general purpose lanes is determined to be an appropriate strategy, how is explicit consideration given to incorporating appropriate features to facilitate future demand management and operational improvement	Section 7, Figure 23



Checklist Question	Refer to:
strategies that will maintain the functional integration of those lanes?	
- In TMAs designated as nonattainment for ozone or carbon monoxide, does the CMP provide an appropriate analysis of reasonable travel demand reduction and operational management strategies for the corridors in which a project that will result in a significant increase in capacity for SOV's is proposed to be implemented with Federal funds? How is this analysis documented?	N.A.
- Does the CMP include the following evaluation mechanisms of the efficiency and effectiveness of implemented strategies based on the established performance measures?	Table 10, Section 8
- Document process for periodic assessment	Section 8
- Results provided to decision makers to provide guidance on selection of effective strategies for future improvement.	Section 8
6. Monitoring Strategy Effectiveness	
- Does the CMP include the identification and evaluation of the anticipated performance and expected benefits of appropriate congestion management strategies?	Table 10
- How is the CMP effectiveness in enhancing transportation investment decisions and improving the overall efficiency of the metropolitan area's transportation systems and facilities?	Section 8
- Is this CMP's effectiveness evaluated periodically as part of the metropolitan planning process?	Section 8, Section 9.1
7. Implementation and Management	
- To implement the CMP, are the following things identified:	Section 9, Table 12
- Implementation schedule	
- Implementation responsibilities	
- Possible funding sources for each strategy or combination of strategies.	



The 2009 Congestion Management Process Update

Appendix –C: Key Literature Review Findings



Broward MPO's CMS

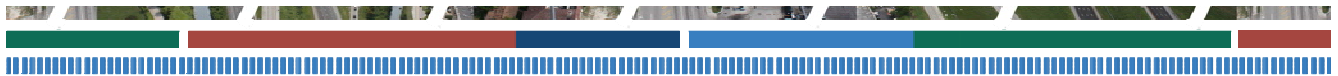
The most recent Broward County MPO's CMS update was performed in 2004. This update included measurements and strategies for roadways, transit, bicycle, and pedestrian modes. Recently, the Broward MPO included freight related measures in their CMS.

- **Methodology** – The Broward County CMS applies a two-tiered analysis process to identify the most congested facilities and intersections. The first tier includes system-wide performance measures that identify congested corridors. Tier 2, identified congested corridors studied by a Technical Advisory Committee (TAC). The tier 2 analysis includes all modes and identifies deficiencies and bottlenecks.
- **Performance Measures** – The system-wide tier 1 analysis includes determination of level of service (LOS) for corridors by using V/C during daily peaks based on generalized LOS tables developed by Florida Department of Transportation (FDOT). The tier 1 analysis also includes defining the transit load factor, which is the total number of passengers using transit divided by the number of available seats during daily peak periods. At the end of tier 1 analysis, congested corridors are identified. For corridor-level analysis other measures such as auto travel time and travel speeds are analyzed. The performance measures vary based on characteristics of congest corridor and the analysis is performed at the segment level.
- **Data** – Traffic count data is used for system-level analysis. Detailed studies and data collection efforts are conducted for corridor-level analysis.
- **Strategies** – The CMP includes a 'tool box' that identifies six broad categories – transportation systems management, transportation demand management, transit, bicycle, pedestrian, and other. Within each category, there are specific strategies. The Hollywood/Pines Boulevard study indicates that other strategies are included based on identified corridor-specific needs.
- **Merits of Broward County MPO's CMS** – The 'enhanced corridor analysis' approach is useful in setting a direction for the County's transportation planning process and should be considered for the Miami-Dade CMP.

Palm Beach MPO's CMS

The Palm Beach County MPO's CMS/Mobility Management Process (MMS) includes measurements and strategies for roadways, transit, bicycle, and pedestrian modes.

- **Methodology** – Palm Beach County MPO's CMS has a three-tiered, also known as 'enhanced analysis corridor, analysis process to identify the most congested facilities and intersections. The first tier includes system-wide performance measures that identify congested corridors. The tier 2 analysis identifies the



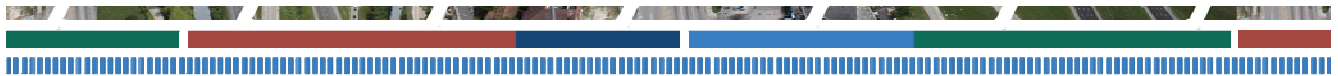
most congested corridors within the system. The identified congested corridors are analyzed in detail under tier 2C.

- **Performance Measures** – The system-wide tier 1 analysis includes determination of V/C ratios for all network segments and segments with average daily V/C > 1 are included in a tier 2 analysis. Tier 2 examines V/C analysis for peak season, peak hour, and peak direction and corridors with V/C > 1 and intersection critical sum > 1400 vehicles per hour are categorized as CMS corridors. If there are no improvements planned along a CMS corridor, the corridor is studied in greater detail.
- **Data** – Traffic and highway data collected by state, county, and local authorities is used for tier 1 and tier 2 analyses. Identified CMS corridors are analyzed beyond what available data shows.
- **Strategies** – Once a corridor is identified as a CMS analysis corridor, a peer review is conducted to identify programs and strategies to reduce congestion.
- **Merits of Palm Beach County MPO's CMS** – Similar to Broward MPO's CMS, the 'enhanced corridor analysis' approach is useful in setting a direction for the Broward County's transportation planning process and should be considered for Miami-Dade CMP. Similarly, peak hour, peak season, peak direction V/C ratio, instead of daily V/C used for tier 2 analysis helps identify the most congested corridors. These performance measures should be considered for Miami-Dade CMP.

Hillsborough County MPO's CMP

The Hillsborough County MPO's CMP was last updated in March 2008 and includes measurements and strategies for roadways, transit, bicycle, and pedestrian modes.

- **Methodology** – The Hillsborough County MPO utilizes a tiered approach incorporating two levels of performance measures: system-wide and corridor-specific. The system-wide analysis determines congested corridors across the major road network. The CMP identifies an integration process with programs for FDOT, transit, County, and other agencies.
- **Performance Measures** – A corridor is considered congested when its volume to Maximum Service Volume (V/MSV) ratio is greater than 1.00. The identified congested corridors are analyzed based on corridor-specific performance measures and are summarized in System Performance Reports. The CMS Steering Committee approves performance measures that include roadway, transit, bicycle and pedestrian modes. The latest CMP identifies potential performance measures that will be considered based on available data, technology and experience of current practice. Identified potential performance measures include freight related measures.
- **Data** – The Hillsborough MPO identifies traffic and highway data collected by state, county, regional, and local authorities categorized by – geographical coverage, source, frequency of updates, and agency.



- **Strategies** –A range of strategies have been identified and evaluated by the HMPO as a means to manage congestion. In-depth screening and evaluation occurs in the course of corridor studies.
- **Merits of Hillsborough MPO’s CMP** – Data acquisition plan included in this CMP, utilized and compiled data from various sources and should be considered for the Miami-Dade CMP. Similarly, this CMP identifies the role of various agencies and methods to integrate CMP recommendations into their work programs. A similar approach should be considered for the Miami-Dade CMP. Growth management related strategies such as, dedication of Right-of-Way (ROW) for future roadways and exactions for improvements should be considered for the Miami-Dade CMP.

Atlanta Regional Commission (ARC) CMP

The ARC's CMP was last updated in September 2007 and includes congestion measurement criteria.

- **Methodology** – The ARC’s CMP includes a facility-based congestion analysis instead of a link-based model analysis so that the regional model can provide a logical, consistent, and sustainable framework for evaluating both current as well as future congested conditions. The analysis is conducted by facility type: Interstate/Freeways, High-Occupancy Vehicles (HOVs), State Routes and Principal Arterials, and other roads. Transportation facilities are further categorized by area type: Mega Corridors, City Center, Urban Neighborhood, Suburban Neighborhood, and Rural Areas. This CMP also includes a methodology to identify point-source bottlenecks that may not be identifiable by a regional travel demand model. For bottle-neck identification, it utilizes the following criteria: 1. lane drops/sudden change in physical capacity; 2. roadway alignment (grades and curves); 3. traffic control devices (signal timing or spacing, railroad crossings); 4. insufficient turn lanes (causing traffic disruption in through lanes); 5. weaving movements due to driveway spacing.
- **Performance Measures** – The performance measures identified in ACR’s latest CMP define congestion by: intensity, extent and duration. Intensity is measured by Travel Time Index, duration is measured by daily congested hours, and extent is defined by total vehicle delay percentage.
- **Data** – This CMP defines a Congestion Monitoring Network which is a subset of the CMP network to prioritize data collection tasks. Furthermore, it identifies criteria to prioritize data collection efforts. Applications that may benefit from certain data collection tasks are identified.
- **Strategies** – NA
- **Merits of ARC’s CMP** – The facility-based congestion analysis is a reliable method to identify congested corridors. The 2004 Miami-Dade CMS adopts a similar approach under which links with only certain length are considered for further analysis. The facility-based congestion analysis could prove to be a further

➤ **Merits of HRMPO’s CMP** – A detailed analysis of traffic along bridges and tunnels is a useful approach and should be considered for the Miami-Dade MPO’s CMP. Similarly, the categorization of identified strategies provides a well-defined and prioritized ‘tool box’ for all types of facilities in a given system and therefore should be considered for the Miami-Dade MPO’s CMP.

Other Documents

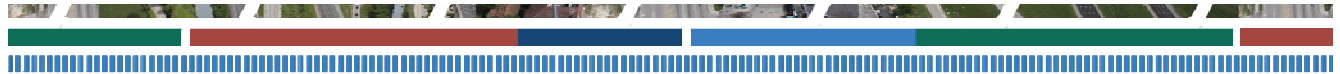
The DOT’s publication “Congestion Management Process: A Menu of Options” was reviewed and the following practices were considered suitable for the Miami-Dade MPO’s CMP.

- **Methodology** – Use different definition of congestion for different locations
- **Performance Measure** – Adopt travel time based performance measures
- **Strategies** – Characterize strategies based on practicality, strategy type, or other factors
- **Implementation** – Further strengthen linkages between CMP and LRTP, TIP, and other processes

The Texas Transportation Institute’s (TTI) “The Keys to Estimating Mobility in Urban Area, applying Definitions and Measures That Everyone Understands” was also reviewed. A summary of performance measures related finding is included in Table 3. Related recommendations are included in the subsequent section.

Measuring Highway Congestion

Performance Measure	Definition	Formula
Network Capacity Based Measures		
▪ Volume to Capacity (V/C) Ratio	Network based measure that is a ratio of present and forecast volume to corresponding roadway capacity	Volume/Capacity
Travel Time Based Measures		
▪ Travel Rate	Rate at which a segment of roadway is traversed or a trip is undertaken	Travel Time/Segment Length or 60/Average Speed
▪ Delay Rate	Rate of time loss for vehicles in congested corridors	Actual Travel Rate-Acceptable Travel Rate
▪ Total Delay	Sum of time lost due to congestion	(Actual Travel Time-Acceptable Travel Time)*Vehicle Volume OR Delay Rate*Person Volume*Segment Length
▪ Relative Delay Rate	Dimensions measure that can be used to compare among facilities, modes or systems	Delay Rate/Acceptable Travel Time
▪ Delay Ratio	Dimensionless measure used to compare congestion among facilities	Delay Rate/Actual Travel Time
▪ Travel Time Index	Compares Peak Period and Free flow travel conditions	Travel Rate/Free Flow Rate
Person Based Measures		
▪ Person-miles of Travel	Magnitude of travel on a given segment or corridor	Person Volume*Distance
▪ Corridor Mobility Index	Describes magnitude and relativity of congestion based on person movement	(Passenger Volume* Average Travel Speed)/Normalizing Value
Other Indices		
▪ Roadway Congestion Index	System-wide mobility measure	Weighted Daily VMT by Functional Class/Daily VMT per Lane by Function Class



Performance Measure	Definition	Formula
▪ Lane-mile Duration Index	Measure of extent and duration of congestion	(Congested Lane Miles* Congestion Duration) summed for Individual Roadway Segments
▪ Congestion Severity Index	Measure freeway delay per million vehicle-miles of travel (VMT)	Total Freeway Delay/Freeway VMT

Sources: Texas Transportation Institute, The Keys to Estimating Mobility in Urban Area, applying Definitions and Measures That Everyone Understands, A White Paper Prepared for Urban Transportation Performance Measure Study, Chapter 5 Recommended Mobility Measures and Data Elements, Second Edition-May 2005, Available at http://mobility.tamu.edu/ums/estimating_mobility/chapter5.pdf

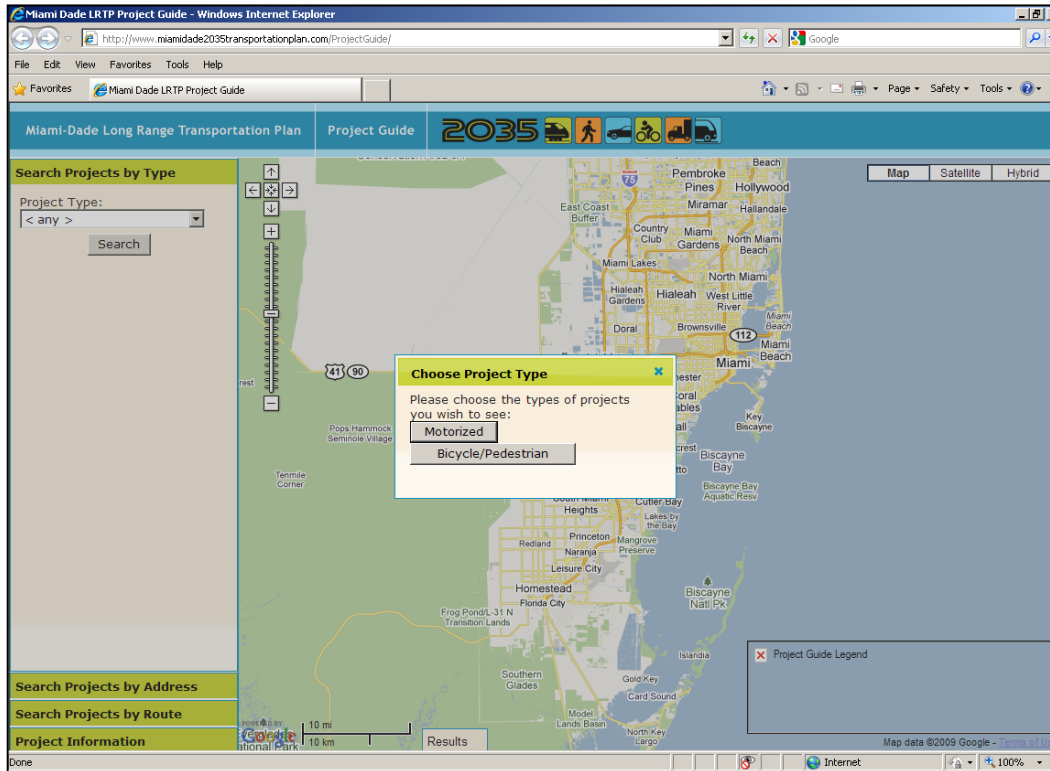
Quantifying Congestion, Volume 1, Final Report, National Cooperative Highway Research Program (NCHRP) Report 398, National Academy Press, Washington D.C. 1997



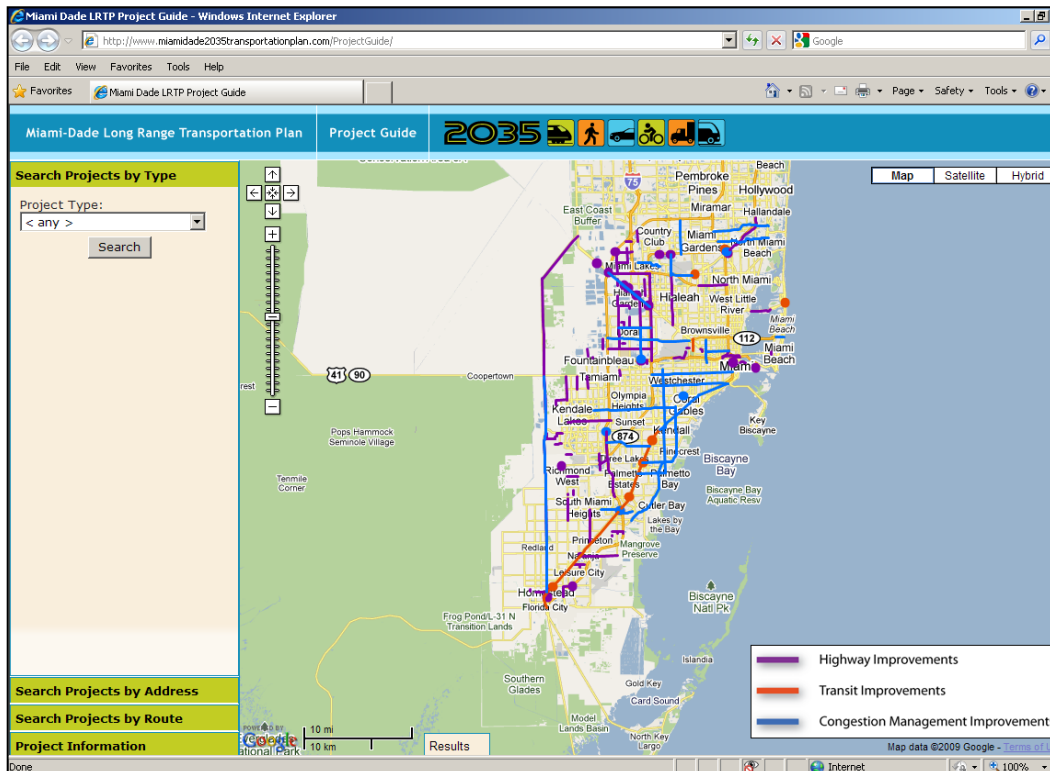
The 2009 Congestion Management Process Update

Appendix –D: CMP Integration with InteracLRTP

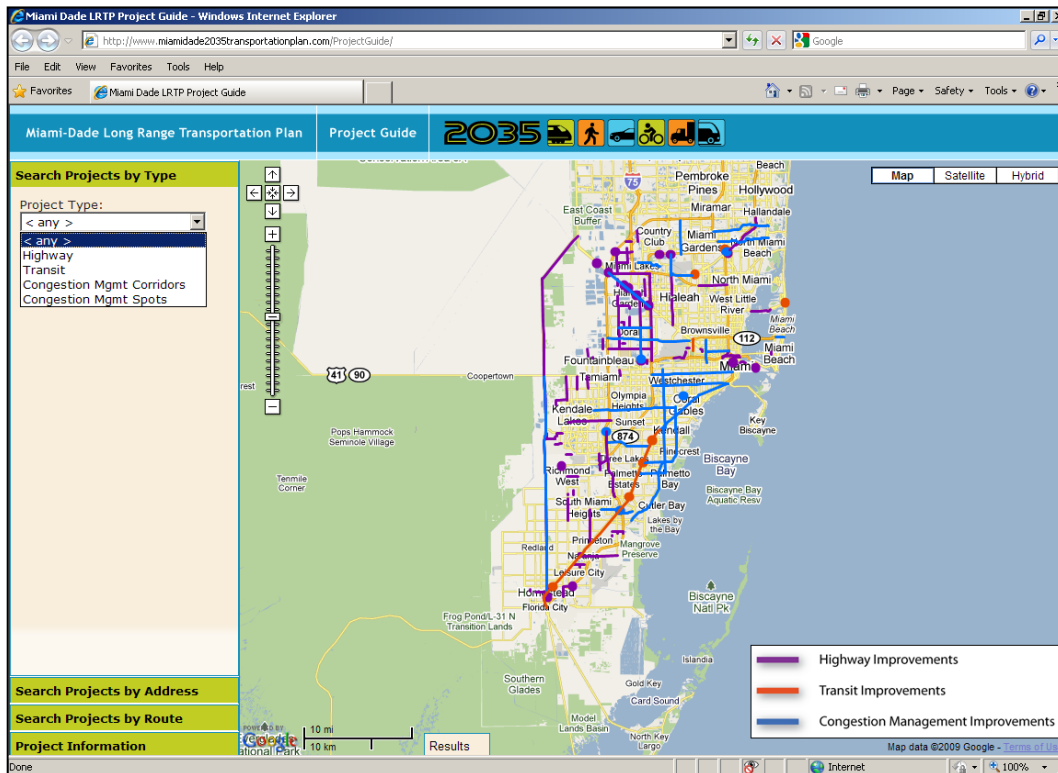
InteractLRTP Interface



Choose Project Type > Motorized



Search Projects by Type > Congestion Management Corridors OR Congestion Management Sports



Congestion Management Corridors

