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Congestion Management Process & Crash Mitigation Performance

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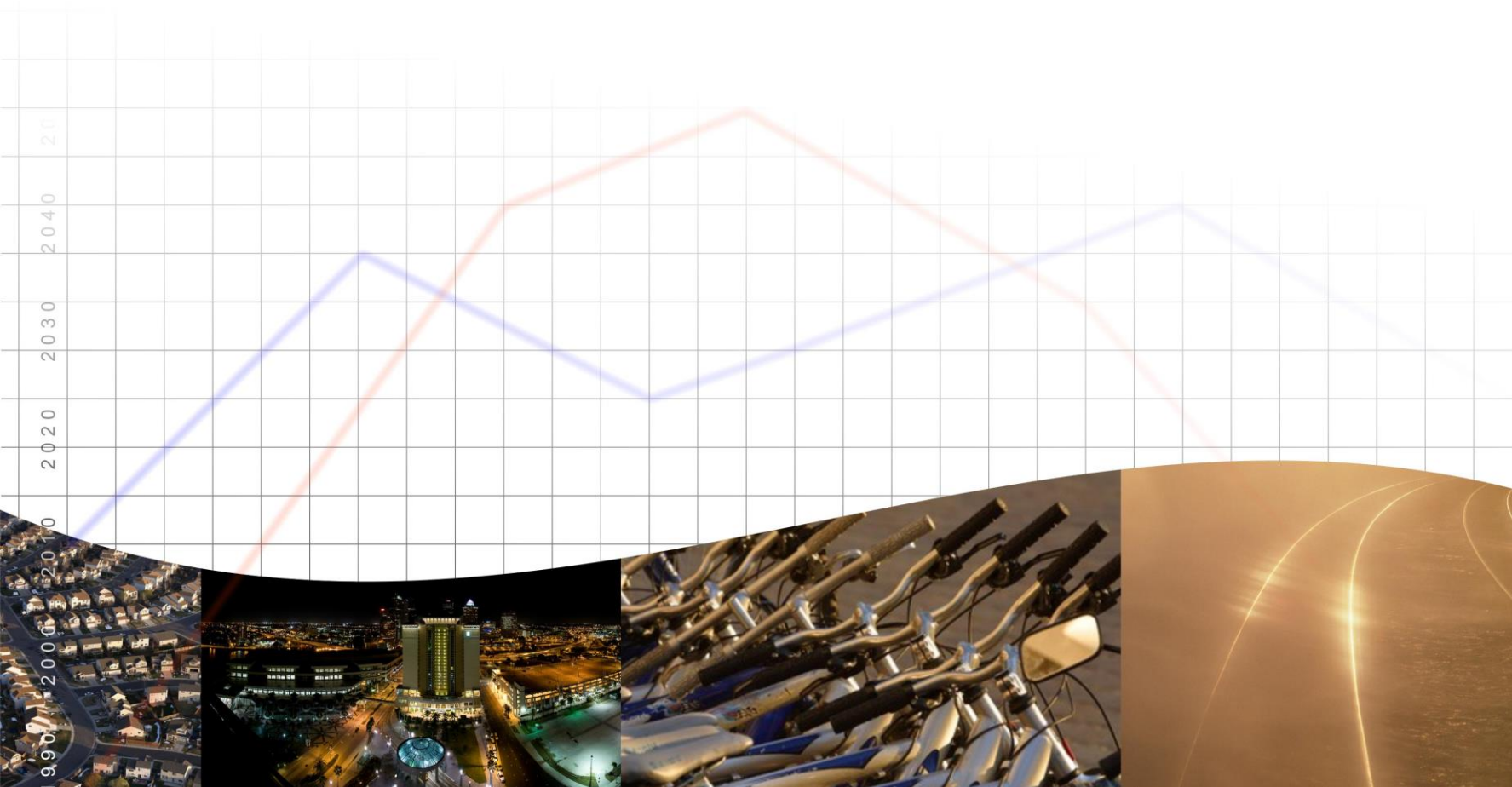




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The first section of the CMP Report discusses how past actions influence our definition of congestion across multiple modes of travel, and how other places are undertaking congestion management processes. This information is then distilled to provide inputs into defining, identifying, analyzing, and mitigating congestion in order to provide a framework for the analysis and mitigation phases discussed in subsequent sections of the Report.

Section 1.0 | Congestion Practice and Planning

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) was a landmark piece of transportation legislation that signaled a major departure from past federal “highway bills” in a number of respects, including the way in which stakeholders were included in the planning process, the degree to which technical analyses should be applied to outcomes, and how funding is apportioned to **metropolitan planning organizations (MPOs)**. One of the major initiatives that has stayed in place is the concept of measuring and mitigating congestion through the development of a Congestion Management Process (CMP).

The CMP has been defined by the Federal Highway Administration of the US Department of Transportation as a systematic and regionally-accepted approach for managing congestion that provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs, and is intended to advance the strategies towards implementation. Unlike other MPO-regulated tasks, the CMP is therefore focused on short- and mid-term strategies, and emphasizes the consideration of non-capacity increasing measures before adding major new capacity.

The FHWA has updated its Congestion Management Guidebook earlier this year (2011). The guidance recommends that a number of actions must occur to have a valid and useful congestion management process, shown in [Figure 1](#) in sequential order from left to right, with the evaluation stage (Step 8) feeding back into the assessment of performance in subsequent updates.

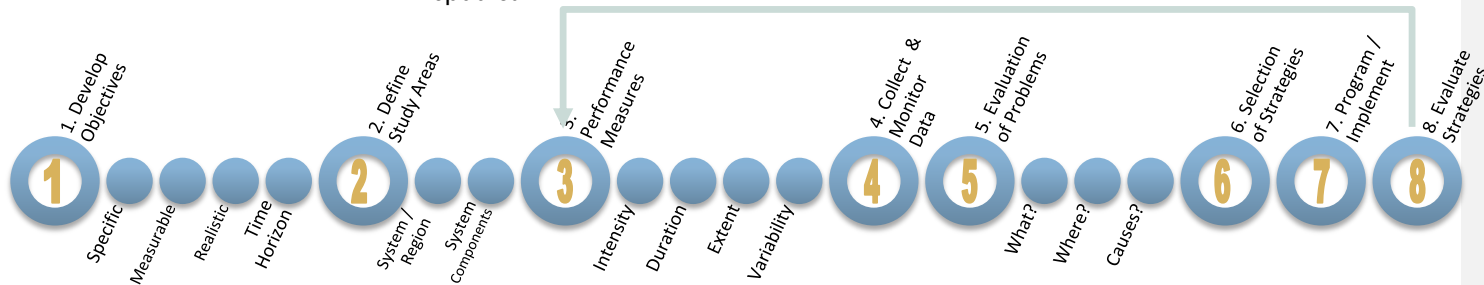


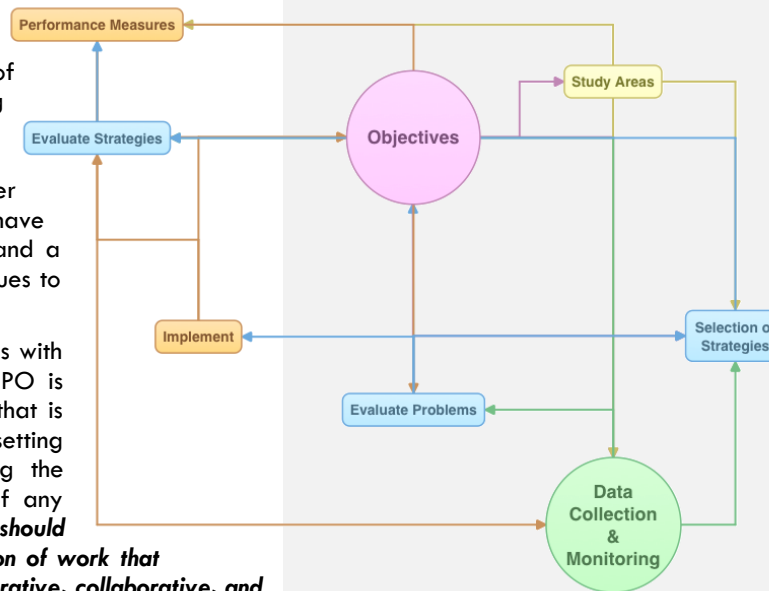
Figure 1. Key Requirements of CMP

(source: adapted from FHWA Congestion Management Process: A Guidebook (2011))



It is also important to note that FHWA recognizes other important aspects of the planning process that are required to actuate these eight steps (*these steps also describe the Federal Register language contained in Appendix A.1*). Partnerships, community livability, respecting the context of individual corridor conditions, and working multimodal measures into the CMP are all emphasized in the current generation of best practice congestion management processes. The CMP is required to consider “reasonable” demand management and operations strategies for a corridor in which a single-occupant vehicle (SOV) capacity increases are proposed. This objective can be difficult to achieve when staff, funding mechanisms, and institutional policies are set up to create capital solutions, usually roadway construction. When all of these factors are considered together, the CMP becomes at once potentially very complex and a prime mover of MPO activities since the recommendations contained in the CMP must be respected in project priority and long-range transportation plan actions, and the data collection and evaluation represent significant expenditures of MPO resources that must be accounted for in the unified planning work program (UPWP) each year. Furthermore, since the community and physical context components of identifying and evaluating strategies for congestion relief require an examination at a closer level that a system-wide CMP typically allows, many communities have chosen to undertake corridor studies to provide more information and a deeper level of analysis; the choice of the corridor and types of issues to be examined are still the purview of the CMP.

However, an effective CMP is in practice *not* a strictly linear process with feedback loops; the CMP only formalizes a workflow that the MPO is already conducting, and each “step” is really one aspect of work that is massively interconnected (see *figure at right*). Collecting data, setting objectives, programming / implementing projects, and evaluating the results of past efforts in light of new data are core principles of any planning process that seeks to effect change. ***In this sense, the CMP should not be thought of as an auxiliary process, but instead is a formalization of work that resides at the core of the traditional MPO function of creating a cooperative, collaborative, and continuing transportation planning process.***



The Local Practice of Congestion Management

While defining congestion may seem like a straightforward proposition, there are actually a number of variables that will greatly influence how congestion is measured, evaluated and perceived. An obvious example is one in which a business choosing to relocate from Los Angeles, California may be enticed by the almost non-existent traffic congestion in Hillsborough County and Tampa. A similar firm considering relocation options that is currently headquartered in Farmville, Iowa may have a very different perception of the traffic conditions in the Tampa area. Traffic engineers and transportation planners, as well as elected officials that are familiar with hearing traffic impact study reports generated by private consultants or their own staff, rely heavily on the level of service (LOS) metric, expressed in the familiar (but somewhat misleading when equated to a student’s school performance) A-through-F scale (Figure 2). In some situations that require analysis of larger transportation networks or where the data is less detailed, transportation professionals will express congestion in terms of vehicular delay or comparisons between the capacity of a roadway and its current or forecasted traffic volumes during some period of time.

However, these standard measures, while very useful, do not convey the complexity of transportation congestion. A number of relevant questions would quickly reveal that any single measure would be inadequate to describe congested conditions in many situations:

- Is the congestion being measured recurring every (work) day, or is the congestion non-recurring and due to an accident or temporary construction?
- What is the time period being measured, and is there “seasonality” to congestion related to factors such as major federal holidays or school calendars?
- What mode of travel is being assessed for congestion – besides roadways, congestion can and does occur on buses, light rail lines, and even pedestrian facilities.
- A standard metric will also not convey the real impact to residents and businesses of congestion depending on the location and type of facility. A roadway that is designed to carry 40,000 vehicles per day (vpd) that is carrying 60,000vpd will impact many more people than a road carrying 14,000vpd that was designed to handle 10,000vpd (although the residents on the minor street in the second example may voice their discontent much more loudly than the commuters in the first situation). Businesses may be much more concerned about reliability than congestion; in other words, a level of congestion may be acceptable to a business that relies on just-in-

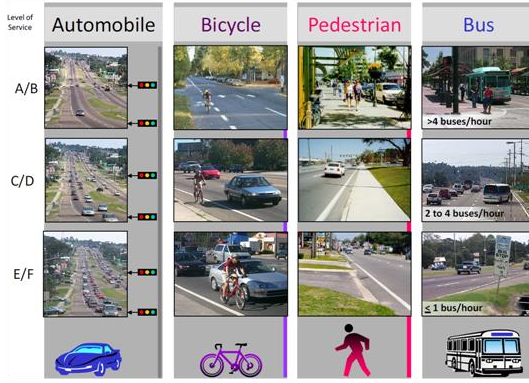


Figure 2. Letter Grades for Levels of Congestion, by Mode



time goods delivery IF the level of delay between the distribution center and the store is approximately the same every day or is known in advance.

- Finally, a standard measure of congestion – level of service, volume-to-capacity ratio, and vehicle hours of delay – are silent with respect to what is actually causing the congestion to occur in the first place. Is it because there are too many left-turning vehicles, the intersections are spaced too closely together, there are too many driveways, many heavy trucks, too many accidents, poor roadway design, absent signal coordination, land uses that put too much pressure on the roadway at peak periods of travel, a lack of travel options, or some combination of factors?

The following paragraphs represent a brief sampling of adopted policies that influence how the HCMPO thinks about congestion. Each policy is briefly summarized, and an assessment of its relevance to the Congestion Management Process for Hillsborough County is provided.

Florida Department of Transportation Quality / Level of Service Handbook (2009). This guide to the Q/LOS software bases definitions of congestion on other analysis methods: the Highway Capacity Manual (roads), Transit Capacity and Quality of Service Manual (buses and passenger rail), Bicycle Level of Service Model (cycling), and Pedestrian Level of Service Model (walking). The real utility of this model is that it conveniently places all four analysis methods within the figurative reach of typical data environments and the skill sets of non-traffic engineers. It has therefore realized widespread use not only in Florida but elsewhere. To use the software, the user describes sections of a transportation corridor, including amount of traffic, sidewalk facilities, bicycle facilities, and public transportation frequency of service. The authors are quick to discern the difference between *level* of service and *quality* of service (e.g., how satisfactory the trip experience is for the traveler), as well as carefully segmenting service standards by type of area. Rural, urbanizing, and transitioning areas have different service standard thresholds. Notably, the model may not be sensitive to certain improvements that can facilitate travel and alleviate congestion, such as providing improved pedestrian crossing treatments. These types of measures may require additional, more detailed assessments to accurately evaluate their effectiveness.

Relevancy to Hillsborough CMP: This report pertains directly to the CMP process in terms of identifying performance metrics and thresholds for levels of service. The alternative (non-auto) modes of travel emphasize quality / quantity of the supply of facilities, not the level of

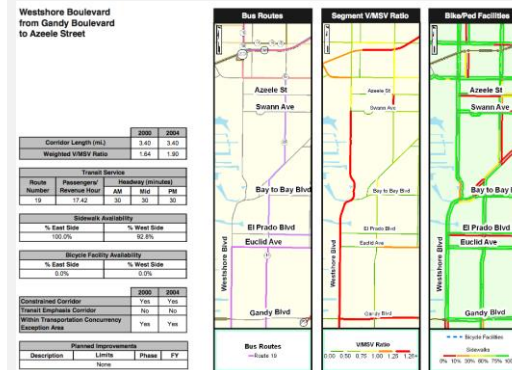


Figure 3. Congestion Report Card
(Source: Hillsborough County MPO CMP Report, 2005)

congestion on those facilities because these modes' effectiveness in providing alternative travel on congested roads is related to these modes' availability to serve populations and destinations.

Hillsborough County Congestion Management System Performance Report (2005). This report goes into detail about past efforts to report and monitor congestion, including the following historical documents:

- CMS Goals, Performance Measures, and Work Plan (1995)
- Congestion Management System Performance Report (1995)
- CMS Database Development (1997)
- Congestion Management System Development and Implementation, Relationship of CMS to MPO Planning Activities (1997)
- Fully-Operational Congestion Management System Report (1997)
- Mobility Management Plan Process Review (2000)
- Congestion Management System Performance Report (2001)
- CMS Corridor Studies (1998 – 2004) – includes seven corridor studies

From these past efforts, it can be seen that the Hillsborough County MPO obviously has a long history with addressing the Congestion Management System/Process requirements and attempting to integrate those requirements into its typical workflow.

The report identifies the performance measures that were used to test for performance for the entire metropolitan system as well as for individual corridors ([Table 1](#)). Note that several of the measures aren't actually measuring congestion (e.g., percentage of roadway corridor miles with sidewalks or percentage of people within one-quarter mile of transit service) but are rather measuring service quality. Other measures may be measuring congestion, or at least usage, indirectly. Measures such as bicycle or pedestrian crashes have value in determining concentrations of cyclists and pedestrians as well as identifying locations where safety improvements could further improve the accessibility of these areas by bicycling or walking.



Table 1. Performance Measures, Hillsborough County MPO

(Source: Hillsborough County MPO CMP Report, 2005)

System Performance Measures	Corridor Performance Measures
Vehicle Miles Traveled by Roadway Level of Service	Corridor Weighted Volume to Maximum Service Volume Ratio (V/MSV)
Number of Carpoolers/Vanpools	Percentage of Roadway Corridor Miles with On-Road Bicycle Facilities
Bicycle Facility Miles per Roadway	Percentage of Roadway Corridor Miles with Sidewalks
Centerline Miles	Transit Passengers per Revenue Hour
Bicycle Crashes	Transit Service Headway (Peak and Off-Peak Periods)
Sidewalk Miles Per Roadway Centerline Miles	
Pedestrian Crashes	
Percent of Total Population Within One-Quarter Mile of Transit Service	
Percent of Transit Service by Headway (Peak and Off-Peak Periods)	
Transit Passengers per Revenue Hour	
Transit Cost per Passenger Trip	
Transit Farebox Recovery	

The report emphasizes both system and corridor performance, and contains a number of report card-style pages for corridors as shown in the image on this page.

Relevancy to Hillsborough CMP: (1) The 2005 version of the congestion management report clearly demonstrates the long interest that Hillsborough County MPO has maintained in the objectives of identifying, analyzing and proposing strategies for congestion relief. The quality of the material (the Congestion Report Card shown in Figure 3 was highlighted in the recent update to the FHWA Congestion Management Process Guidebook) and the level of detail go well beyond the minimum requirements to meet Federal code language. (2) A number of performance metrics are identified, although several of these metrics measure the quality of the trip-making experience to provide a broader understanding of aspects of congestion or congestion mitigation strategies.

Northeast and West Corridor Alternatives Analysis Study (2010). This study considered an analysis of bus rapid transit (BRT) and light rail options for two congested corridors. A number of evaluation factors are described in the report, some of which are measures of congestion although many are qualitative measures of other characteristics of the two services.

- Improve Mobility
- Travel Time
- Ridership
- Population & Employment Served
- Transit Dependent Population
- Provides Opportunities for Transit Supportive Development
- Find Cost Effective Solutions
- Capital Cost
- Operating and Maintenance Costs
- Minimize Impacts
- “Implementability”
- Community Support

Additionally, air quality criteria pollutants (NO_x, CO₂ and VOC emissions) per passenger mile for full and average occupancies were compared between the two alternatives (BRT and light rail). The concept of person miles of travel as the denominator for congestion measures is introduced as well.

The [alternatives analysis](#) (August, 2010) makes extensive use of person trips (per day) in the analysis to describe both internal and external trip volumes between major origins and destinations. Other metrics include person seconds of delay, percentage of trips “not late,” and average bus travel speeds in a corridor. Additionally, the alternatives analysis technical memorandum identifies a number of districts used to describe trip-making, such as USF, University of Tampa, Airport, Busch Boulevard Area, and Westshore.

Relevancy to Hillsborough CMP: This report pertains directly to the CMP process in terms of identifying specific performance measures for transit modes of travel. In order to maintain continuity between the CMP and these analyses and documents, using the same performance metrics for congestion in this analysis (e.g., travel time, ridership) and the CMP is important.

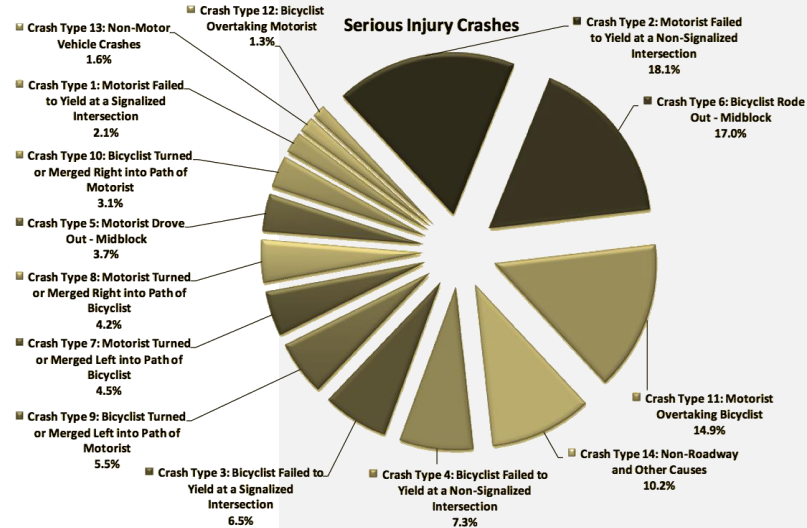


Hillsborough Countywide Bicycle Safety Action Plan (2011). The Bicycle Safety Action Plan, as the name implies, is focused on reducing crashes, injuries, and fatalities involving cyclists. Bicyclist-related crash statistics are used extensively throughout the report, and are broken out by type/cause (see graphic on this page) as well as age, race and ethnicity of the cyclist. Bicyclist deaths were posted at nearly twice that of the statewide average, or 6.19 per million population. The goal of the Plan is to reduce the average rate of bicyclist fatalities to 1.04 per million population by the year 2035. Four objectives are clearly stated to support that goal and the overarching vision of a zero-fatality transportation system:

- OBJECTIVE 1: Reduce bicycle crashes and encourage bicycle usage by improving transportation system infrastructure through the implementation of strategic countermeasures and construction of new bicycle facilities.
- OBJECTIVE 2: Reduce bicycle crashes and the severity of crashes by changing the behavior of drivers and bicycles to increase compliance with existing laws through coordinated education and law enforcement efforts.
- OBJECTIVE 3: Support long-term bicycle safety improvements and bicycle usage through land use strategies.
- OBJECTIVE 4: Monitor the progress of bicycle safety improvements.

A number of strategies are presented to achieve these objectives, including applying for funding assistance; wrong-way and bicycle lighting campaigns; and lighting improvement on certain high-crash corridors. The Plan was undertaken with public outreach to both the general public and key stakeholder or partnering agencies.

Several of the strategies identified have the potential to influence the strategy identification stage of the Congestion Management Process, some of which place greater emphasis on rural or urban corridors.



- Lighting in nighttime high-crash corridors
- Use of shared lane markings (sharrows)
- Reducing lanes (road diet)
- Bicycle detection symbols at signalized intersections (particularly rural areas)
- Implementation of review procedures (“checklists”) for new, retrofitted, and reconstructed roadways, particularly in urban areas

Relevancy to Hillsborough CMP: While the objectives are generally directed at safety concerns (which may still tangentially influence non-recurring congestion), the strategies listed above have implications for (1) the strategy toolbox developed in the CMS; and (2) the stratification of the study area into urban and rural components. Additionally, the safety of bicycle and pedestrian facilities also affects people’s willingness to use those modes as an alternative to travelling congested roads. The availability of the data in this report should be helpful in addressing the mode shift goal in the CMP.

Hillsborough Countywide Pedestrian Safety Action Plan (2010). As with the Bicycle Safety Action Plan, this Plan goes into substantial detail on crash rates and causes. Based on this information, the Pedestrian Safety Action Plan identifies four principal goals:

1. Improve transportation system infrastructure through the implementation of strategic countermeasures and construction of new transportation facilities to increase pedestrian safety.
2. Change the behavior of drivers and pedestrians to increase compliance with existing laws and encourage mutual respect and courtesy.
3. Foster long-term pedestrian safety improvements through land use strategies.
4. Coordinate and fund 4E activities with the full support of elected and appointed leaders.

The Plan recognizes a number of infrastructure improvements as strategies for achieving these goals, including the installation of crosswalks, island channelization at cross streets, raised medians, signing/signal improvements, improved street lighting, and ensuring that bus access is provided that considers the pedestrian in terms of clearance values at transit stops. Reducing designated crossing distances along major roadways, as well as coordinating



transit locations with crossing points, is crucial. To identify priority locations for potential retrofits, pedestrian crash rates, AADT counts (under 24,000) and narrow travel lanes less than 11 feet wide are used as threshold conditions or values.

Accidents (pedestrian crashes) are a major performance metric used in the Plan to identify areas of concern. In fact, the Plan notes that pedestrian safety benefits should be incorporated into all project selection criteria and processes (page 33). Appendix A is devoted to pedestrian crash statistics and mapping.

Relevancy to Hillsborough CMP: (1) Pedestrian crash rates are an important metric in this Plan, and (2) roadway design features that accommodate pedestrians (and pedestrians at transit stops) are also highlighted as strategies.

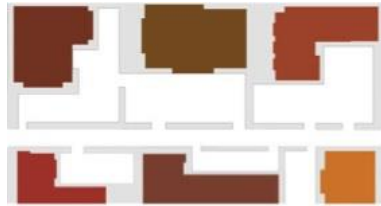
Hillsborough County Metropolitan Planning Organization 2025 Comprehensive Pedestrian Plan (2004). The Plan initially notes that Tampa has the nation's third-worst record for pedestrian fatalities pedestrian fatality rate). This rate has actually worsened recently to second (behind Orlando-Kissimmee, Florida), according to a report released recently by Transportation for America.¹ Table 2 shows the worst ten rankings.

Focus on Pedestrians

"In lieu of making road capacity modifications to achieve acceptable level of service, the multi-modal transportation district gives primary emphasis to making multi-modal system enhancements, improving pedestrian-supportive design and enhancing street connectivity (versus merely widening to achieve a roadway service volume target)."

- Source: MPO
Comprehensive
Pedestrian Plan, Page
25.

¹ Transportation for America, "Dangerous by Design 2011." 36 pages. (website accessed July 19, 2011: <http://t4america.org/docs/dbd2011/Dangerous-by-Design-2011.pdf>).



Discouraged
 Typical suburban development patterns may have density and diversity, but with few direct connections, pedestrian mobility is difficult.



Encouraged
 Small block sizes create a fine-grained network of streets and buildings. Building scale and proximity allow for a mixture of uses within each block.

Rank	Metro area	Total pedestrian deaths (2000-2009)	Avg. annual pedestrian deaths per 100,000 (2000-2009)	Percent of workers walking to work (2005-2009)	Pedestrian Danger Index
1	Orlando-Kissimmee, FL	557	3.0	1.2%	255.4
2	Tampa-St. Petersburg-Clearwater, FL	905	3.5	1.6%	212.7
3	Jacksonville, FL	342	2.8	1.6%*	177.8
4	Miami-Fort Lauderdale-Pompano Beach, FL	1,555	2.9	1.7%	167.9
5	Riverside-San Bernardino-Ontario, CA	938	2.5	1.8%	139.2
6	Las Vegas-Paradise, NV	421	2.5	1.9%	135.2
7	Memphis, TN-MS-AR	266	2.1	1.6%*	132.6
8	Phoenix-Mesa-Scottsdale, AZ	867	2.3	1.7%	132.4
9	Houston-Sugar Land-Baytown, TX	1,024	2.0	1.5%	128.2
10	Dallas-Fort Worth-Arlington, TX	942	1.6	1.4%	119.4

Table 2. Top Ten Worst Cities in the U.S. for Pedestrian Fatalities
 (source: *Dangerous by Design 2011*, page 6)

The Plan also notes that the pedestrian mode is the focus of a new paradigm of transportation planning, and that the focus is on corridors where pedestrian attractors are concentrated. Ybor City; Florida Avenue; Wellswood near Al Lopez Park; the vicinity of the intersection of Gandy Boulevard at Dale Mabry Highway; and the Hyde Park area are specified as examples where concentrations of pedestrian demand exist currently. The Plan also designates priority, cost affordable, and unfunded priority corridors in the Region. Goals for pedestrian planning are organized around several concepts: facilities, destinations, transit, crossings, safety/education, special needs, and engagement/enforcement. Each of the subsequent objectives has at least one measure of performance, as shown in [Table 3](#).



Table 3. Pedestrian Plan Concepts, Objectives, and Performance Measures

Pedestrian Concepts and Objectives	Performance Measure(s)
<p>Facilities</p> <ol style="list-style-type: none"> 1. Provide More Sidewalk 2. Provide/Maintain More Off-Road Trails 3. Maintain and Enhance Existing Pedestrian Facilities 4. Integrate Consideration of Pedestrian Facilities into other Aspects of Transportation 5. Adopt Pedestrian Facility-Supportive Policies 	<ul style="list-style-type: none"> ● Miles of Sidewalks Added ● Number of Sidewalk-to-Trail Connections Added ● Miles of Off-Road Trails Added ● Miles of Off-Road Trails Receiving Regular Maintenance ● Percentage of Maintenance Calls Resulting in Facility Improvements ● Number of New Pedestrian Shelters, Benches, and Trees Installed ● Number of Identified Gaps/Barriers Remedied ● Miles of Sidewalk Added as a Result of Maintenance or Construction ● Miles of Sidewalk Added by Private Development ● Adoption of Pedestrian Plan in LRTP ● Revising Standards and Development Codes ● Number of Intersection Treatments Completed ● Number of Pedestrian-Oriented Centers Created ● Adoption of Livable Roadways Design Guide
<p>Destinations</p> <ol style="list-style-type: none"> 1. Improve Connectivity 2. Improve Pedestrian Access to Common Destinations 	<ul style="list-style-type: none"> ● Safe Routes to School Adoption at One and Six Years ● Number of Connections Created to Neighborhoods and Trails within a ½-mile Radius of Activity Centers
<p>Transit</p> <ol style="list-style-type: none"> 1. Ensure Stops are Served by Sidewalk Network 2. Incorporate Transit Service into Office Parks, Employment Centers, and Activity Centers 	<ul style="list-style-type: none"> ● Number of Connections Created between Transit Access and the Neighborhoods or Activity Centers They Serve ● Number of Transit Stops Created by New Development
<p>Crossings</p> <ol style="list-style-type: none"> 1. Assess Locations where Safe and Convenient Crossings are Most Needed 2. Link Intersection Improvements with Roadway Projects 	<ul style="list-style-type: none"> ● Number of Intersections Improved per Year ● Completion of Inventory and Prioritization of Needed Intersections and Mid-Block Crossings ● Adoption of Intersection Standards to Be Incorporated Into Intersection Design

(Table 3, Continued)

Pedestrian Concepts and Objectives	Performance Measure(s)
Safety and Education 1. Implement Pedestrian Safety Programs 2. Improve Motorists' Understanding of Need to Share the Road 3. Improve Safety and Security of Pedestrians through Partnerships with Law Enforcement Agencies, Citizen Groups and Environmental Design	<ul style="list-style-type: none"> ● Safe Routes to School Adoption at One and Six Years ● Reduction in Reported Crashes Involving Pedestrians ● Reduction in Number of Pedestrian and Motorist Violations ● Number of Intersection Treatments Completed ● Incorporation of Pedestrian Safety Information into Drivers' Education Courses and Testing Materials ● Reduction in Reported Pedestrian Crashes ● Reduction in Reported Pedestrian and Motorist Violations ● Reduction in Criminal Activity Involving Pedestrians ● Increase in Pedestrian Activity in Targeted Areas
Special Needs 1. Design Facilities to Accommodate all Ages and Abilities 2. Target Special Needs Populations for Safety Training and Awareness	<ul style="list-style-type: none"> ● Number of Improvements Completed for Special Needs Population[s] ● Development of a Special Needs Education and Workshop Program within One Year of [Plan] Adoption
Encouragement and Enforcement 1. Reduce Motorists' Violations, Esp. Pedestrian-Related 2. Reduce Pedestrians' Violations of Traffic Safety Laws 3. Provide Incentives for Walking 4. Increase Effectiveness and Extent of Pedestrian Programs	<ul style="list-style-type: none"> ● Reduction in Reported Pedestrian Crashes ● Reduction in Reported Pedestrian and Motorist Violations ● Reduction in Number of Violations by Pedestrians ● Number of Businesses Enrolled in Green Commuter Program ● Number of Pedestrian Support Facilities Added at Key Destinations ● Production of Pedestrian Map and Information on Travel Choices ● Number of Pedestrian Programs and Publications ● One Public Event Held Bi-Monthly or Quarterly ● Attendance at BPAC Meetings ● Annual Funding Committed to Pedestrian Programs

The Plan also establishes benchmarks for performance, stating when some of the performance measures will be achieved and at what level (page 29).



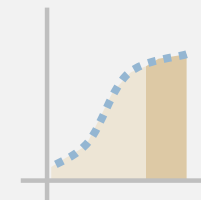
The variety of performance measures, as well as their number, stand out in this Plan. Strategies notably include policy changes, creating Multi-modal Transportation Districts, requirements for private developers to eliminate barriers or support destinations within 1/4-mile of their developments, “livable” lane widths (i.e., accommodating bicycle facilities through narrowing automobile travelways), promoting transit use, and safety/education campaigns. Finally, the Plan identifies a number of facility and building design principles, such as shown in the graphic on this page, which if implemented would encourage and better accommodate pedestrian travel.

Relevancy to Hillsborough CMP: (1) The quantity of pedestrian performance measures is highly useful to the CMP; and (2) the designation of high-priority corridors and subareas should be considered in the development of the CMP as well.

Hillsborough County Comprehensive Bicycle Plan Update (2008). The 2008 update of the countywide bicycle plan notes six goals (and a number of additional objectives and policies for each goal):

1. Implement an interconnected on-road bicycle system;
2. Create an off-road bicycle system, interconnected with the on-road network;
3. Increase the awareness of safety issues on the part of cyclists, motorists, and pedestrians;
4. Increase the use of bicycles for transportation purposes;
5. Maintain the bicycle plan through data collection, analysis and review; and
6. Pursue funding and resources necessary to carry out the recommendations in the Plan.

Goal Number Five notes that bicycle counts should be conducted at 20 locations in the MPO every three years, update crash data every three years, update the bikes-on-bus user data every three years, and update a system-wide bicycle level-of-service (BLOS) measure for every jurisdiction in the MPO. The Plan further states that FDOT believes that the BLOS tool (incorporated into the Q/LOS tool) is the best analytical tool for measuring on-road bicycle conditions, and that some of the variables in the BLOS methodology are logarithmic progressions (see example of such a deteriorating function in the graphic on this page). Cited



Example of a Deteriorating Function

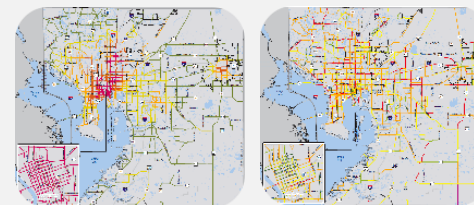


Figure 4. Latent Demand (left) and BLOS for Hillsborough MPO

is the case of (auto) vehicular volumes: the Bicycle LOS drops faster as the motorized volumes increase initially; but the BLOS declines more slowly at higher motorized volumes.

The other performance measure emphasized in the Plan is latent demand for bicycle use. Latent demand is favored because, like BLOS, it is an index that incorporates several variables to produce a robust measure that can be “forecasted.” The latent demand score is an indicator of where people would want to ride a bicycle if there were facilities there to accommodate their trip. The proximity of generators of bicycle travel have a positive influence on the latent demand score, while increasing distance between origins and destinations has a negative influence on the score.

Both BLOS and latent demand are readily mapped and convey information well visually (see [Figure 4](#)).

Table 6-1 in the Plan notes bicycle crashes, connectivity (to existing facilities and destinations), community and agency support, and highway congestion reduction as priority criteria. This last is assessed by comparing the proposed facility location to the adjacent highway level-of-service: the worse (higher) the LOS, the more points the proposed bicycle facility receives.

Relevancy to Hillsborough CMP: (1) The Plan establishes connectivity and other goals, implying the need for a connectivity measure as well as total length of bike facilities and a ridership number; and (2) identifies the Q/LOS bicycle performance outputs (Bicycle LOS) and latent demand as key performance metrics. Bicycle crashes, community support, and roadway LOS are also noted as performance metrics.

Multi-Modal Transportation Needs Plans (various years of completion). Studies for Plant City, Downtown Tampa, Temple Terrace, Tampa (citywide), Westshore District, USF and other areas in the County were developed considering land uses and transportation facilities. Connectivity in the transportation networks was a key factor, although congestion was not explicitly measured in the studies reviewed (Temple Terrace and Plant City) except through a modal level-of-service analysis. However, the organization of land uses and their “complementarity” needed to support bicycle, pedestrian and transit users is useful as a way of monitoring land use-driven relief strategies. For the LOS measure, bicycle, pedestrian, and



transit modes were given an A through F service rating by corridor as well as area-wide. The Q/LOS model was used as the generator of these statistics to produce a multimodal level-of-service (MMLOS). Five peer agency evaluations were performed to determine best (in-state) practices for mitigating congestion (Temple Terrace report).

Relevancy to Hillsborough CMP: (1) The use of the Q/LOS model and thresholds is reinforced in these plans for alternative and active modes; and (2) information from the peer studies and the recommendations contained in these area studies should be reviewed carefully to build a list of potential mitigation strategies for the CMP.

Florida Concurrency Requirements and Hillsborough County Comprehensive Plan. The Local Government Comprehensive Planning and Land Development Regulation Act (Chapter 163, Part II of the Florida Statutes) became known as Florida's Growth Management Act and required all counties and municipalities to adopt Local Government Comprehensive Plans. These comprehensive plans must address traffic circulation (among other elements, including public transit), but may also address parking and public transportation. A key component of the Act is its "concurrency" provision that requires facilities and services to be available concurrent with the impacts of development. Prior to recent revisions, local governments had to define an adequate level of service, indicate if that if facility level-of-service is being maintained in the future through public capital investment, and may require private development actions to make up the difference. Although no longer a legislative requirement, local governments are still frequently engaged in this practice of aligning services to demands. The majority of communities in Florida have used a level-of-service standard of "D" for their concurrency target.² The complexity of this system for determining transportation conformity is exemplified by [Figure 5](#), but the actual practice in a rapidly growing city is demanding of staff time and resources. The private sector has also complained about the fairness of the Act, leading to substantial revisions in 2005 and 2011 to allow developers the option to pay a portion or "proportionate fair share" of the cost of

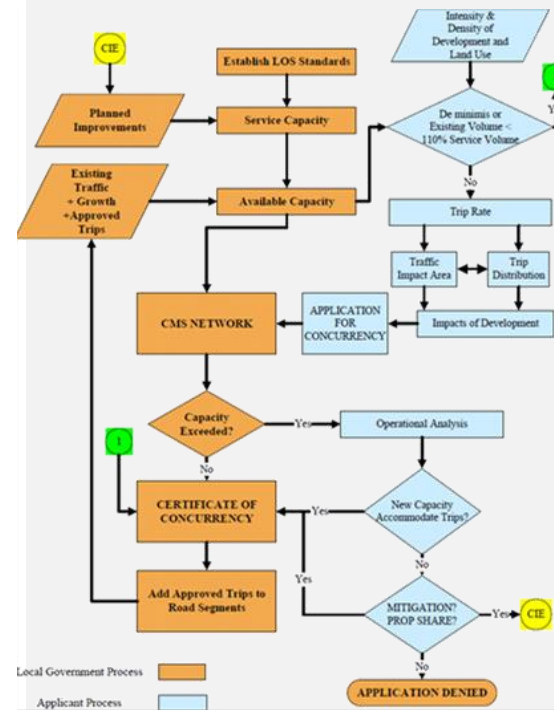


Figure 5. Concurrency Flowchart
 (source: *Transportation Concurrency Requirements and Best Practices: Guidelines for Developing and Maintaining An Effective Transportation Concurrency Management System*, Figure 1)

² State of Florida Department of Community Affairs, "Transportation Concurrency Requirements and Best Practices: Guidelines for Developing and Maintaining An Effective Transportation Concurrency Management System," September, 2006, page 2.

making some transportation improvements. The 2011 legislative changes stated that public facilities should be implemented to meet the LOS standard adopted by the local government, and further encouraged local governments to adopt measures that would encourage infill development, redevelopment, and promoting pedestrian and transit modes (even to the point where private auto mobility assumes a second-tier priority). The existing legislation emphasizes multimodal systems, although airport facilities are an optional element in the required comprehensive planning document.

The *Future of Hillsborough: Comprehensive Plan for Unincorporated Hillsborough County Florida* document specifies the following LOS standards for concurrency for peak hours as shown in [Table 4](#).

Table 4. Hillsborough County LOS Standards for Concurrency

(source: *Future of Hillsborough: Comprehensive Plan for Unincorporated Hillsborough County Florida*, June 5, 2008, Table 1)

	Urban Service Area	Outside of Urban Service Area	Constrained and Deficient Roads	High Transit LOS Corridor	High Transit LOS Corridor on Constrained Roads
Arterials	D	D	E	E	120% of LOS "E"
Collectors	D	C		E	120% of LOS "E"

A **Constrained Roadway** in this context means roads that cannot be widened further due to unacceptable levels of impacts to adjacent properties or other reasons.

Transit LOS was set at "D" as well for at least 25% of the Urban Service Area. Public transportation congestion relief strategies include queue jump lanes, signal preemption, bus bay turnouts, use of shoulders for bus travel in rural areas, and use of metered highway ramps and "slip" lanes to allow buses to bypass private auto traffic.

Relevancy to Hillsborough CMP: (1) Concurrency sets both a standard (LOS) and a threshold (LOS "D") for the acceptable congestion levels for roadway and mass transit facilities; (2) a list



of roadways “constrained” for future widening are listed, which potentially limits the expansion-related mitigation options and encourages non-construction options; and (3) a number of strategies are identified in the concurrency planning documents.

Long-Range Transportation Plan (2009). The LRTP addresses the needs of the multi-modal transportation system covering Hillsborough County, and is required by federal mandate to be updated at least every five years. Chapter 1 reviews the goals of the LRTP, which includes economic vitality, transportation connectivity, increasing transportation options for more people, protecting the natural environment, improving quality of life, and promoting efficiency in the transportation system(s). Each of these goals is married to a number of objectives, nearly all of which are meaningful in terms of considering mitigation strategies for congestion relief. Chapter 3 discusses regional growth centers and anticipated population and employment growth.

Chapter 8 of the LRTP identifies major recommendations for improvements in a number of corridors. These improvements typically include roadway expansion, but also discuss **intelligent transportation system (ITS)** options; mass transit options; and bicycle/pedestrian improvements. Chapter 8 also includes a number of performance measures, listed below.

System-Wide Measures

- Vehicle Miles Traveled (VMT) by Roadway Level of Service (LOS)
- Average Commute Distances and Travel Times
- Number of Carpools/Vanpools
- Bicycle Facility Miles per Roadway (Centerline) Mile
- Bicycle Crashes
- Sidewalk Miles per Roadway (Centerline) Mile
- Pedestrian Crashes
- Percent of Population and Jobs near Transit
- Percent of Transit Service by Headway
- Transit Passengers per Revenue Hour
- Transit Cost per Passenger Trip
- Transit Farebox Recovery
- Transit LOS, Existing and Cost-Affordable in 2035

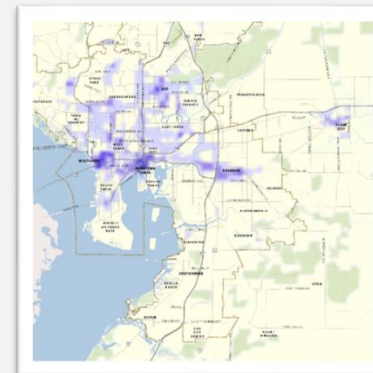
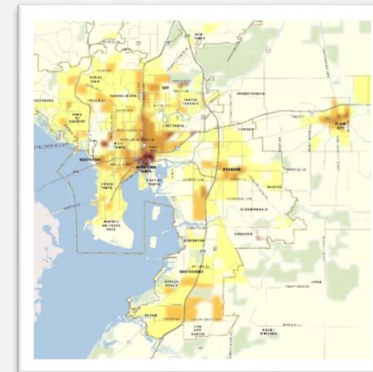


Figure 6. Population (top) and Employment Growth to 2025
(source: HCMPO LRTP, Chapter 3)

- Greenhouse Gas Emissions

Corridor-Specific Measures

- Vehicle Hours of Delay per Mile (VHD/Mile)
- Corridor Weighted Volume to Maximum Service Volume Ratio (V/MSV)
- Percentage of Roadway Corridor Miles with On-Road Bicycle Facilities
- Percentage of Roadway Corridor Miles with Sidewalks
- Transit Passengers per Revenue Mile and Ridership per Mile (Rail Corridors)
- Capital Cost per Mile (Rail Corridors)
- Transit Service Headway

Corridor management, travel demand management, multimodal planning, roadway capacity increases, and intelligent transportation systems techniques are all discussed (briefly) as strategies for improving performance. The Plan draws on modal analyses, available as separate reports, to identify its high priority strategies for consideration for future funding.

Relevancy to Hillsborough CMP: The LRTP is the most influential and crosscutting document adopted by the MPO, with relevancy spread across a number of categories. (1) The goals and objectives have to be evaluated against congestion relieve strategies and the goals/objectives of the CMP itself; (2) the ways in which the LRTP identifies deficiencies predisposes the CMP towards using a LOS measure, although other metrics are also used in the LRTP; and (3) the specific strategies in the LRTP, while weighted towards roadway expansion, do include transportation system management, bicycle/pedestrian, and mass transit projects. Specific project recommendations in the LRTP are required to be documented, prioritized, and identified as either fiscally constrained or illustrative (outside of the cost affordable plan element).

TBARTA Regional Transportation Master Plan (2009). A multi-county, regional planning document, the TBARTA Regional Transportation Master Plan principally relied on ridership forecasts and local growth and development potential to arrive at a recommended future mass transit system. The Plan notes that regionalism, planning, funding, and communication are guiding principles. Objectives were developed as well, and are fairly general in nature (e.g., building partnerships, providing project costs).



The recommendations focus on a network of bus and rail services linking the region that will, by the year 2050, contain the following elements:

- 135 miles of Short-Distance Rail;
- 115 miles of Long-Distance Rail;
- 42 miles of Bus Rapid Transit (BRT) in Mixed Traffic;
- 220 miles of Managed Lanes with Express Bus; and
- 217 miles of other Express Bus.

Additional performance measures mentioned later in the report include reduction in vehicle miles of travel, daily passenger miles, and daily passenger boardings.

Relevancy to Hillsborough CMP: Although covering more territory than just the Hillsborough County MPO, the TBARTA Regional Transportation Master Plan is relevant principally by identifying mass transit recommendations in major corridors. These transit recommendations will need to be taken into account at a corridor level in the CMP.

Hillsborough Area Regional Transit Authority (HART) Transit Development Plan 2011 – 2020 (ongoing). The utility of the HART Transit Development Plan (the new update is underway as of this writing) is principally to showcase the efforts of the agency to provide transit services in Tampa. Ridership increased by 16% between fiscal year 2005 to fiscal year 2009. In addition to rolling stock, service changes, and route planning, the agency notably gets involved fairly heavily in the review of development applications (125 in the year preceding the Plan) as well as long-range and comprehensive plans, focusing on inserting language pertaining to livable and transit-supportive community design. HART gets involved in committees that advise bicycle, pedestrian, and corridor recommendations.

The Plan singles out three major activity centers: University of South Florida, Downtown Tampa and Westshore Business District. HART lists several performance measures in an appendix to the main body of the Plan:

- Bus passengers per revenue hour;
- Collisions per 100,000 revenue miles;
- Gross cost per revenue mile;
- Complaints per 100,000 passengers;

Market	Trip Purpose	From	To	Market Size (Person-Trips/Day)		
				2006	2035	Change
Commute to Work	Home-Based Work	Study Area	Core	19,527	45,889	134%
		Study Area	Westshore	14,805	23,138	56%
		Study Area	Airport	5,489	9,218	50%
Student Travel	School	Study Area excl. New Tampa	USF	28,482	40,217	41%
		Study Area	USF	20,721	34,120	65%
Airport	Air Travel	Study Area	Univ. of Tampa	1,705	2,754	62%
		Study Area	Airport	4,503	11,817	162%
Shopping	Home-Based Shopping	Study Area	USF	28,748	38,535	34%
		Study Area	Busch Blvd. area	21,041	27,194	29%
		Study Area	MLK Jr. Blvd. area	9,274	21,222	129%
		Study Area	Westshore	20,713	27,980	35%
Park-and-Ride to Work	Home-Based Work	East Pasco	Northeast Corridor	12,414	57,713	365%
		East Pasco	West Corridor+Core	13,446	17,170	28%
		West Hillsborough	Core	3,832	7,580	99%
		Central Hillsborough	West Corridor	3,832	7,580	99%
		New Tampa	Study Area			

- Mean distance between vehicle failures; and
- On-time performance (one minute early to five minutes late at some timepoints).

The introduction of a new bus rapid transit (BRT) service on Fletcher Avenue from Interstate 75 to downtown Tampa is significant, as the MetroRapid service offers a new, high-capacity strategy for certain corridors covered in the CMP. Flexible (door-to-door) and express route services are also identified as current and future action items on specific routes.

Relevancy to Hillsborough CMP: The HART TDP (and the supporting alternatives analysis technical memorandum dated August, 2010) contains some important information relative to the CMP in several areas: (1) the alternatives analysis uses person seconds of travel time and delay; bus on-time percentages; and average bus travel speeds as measures of delay; (2) the report denotes three major transit activity centers that should be evaluated as stratifications of the study area, and several corridors and other subareas are identified in the alternatives analysis; and (3) the array of services and aggressive stance that HART has taken on providing new services such as MetroRapid are directly relevant to the CMP toolbox.

Hillsborough Area Intelligent Transportation System Master Plan: Technical Memorandum One (2004). This Plan features a review of the municipal and organizational stakeholders relevant to ITS, and notes from these interviews point to the locations (intersections and corridors) that are perceived as experiencing traffic congestion. Some of the agencies interviewed were also specific as to the types of strategies that they have or will employ to reduce congestion. For example, Hillsborough County noted that several ITS-related strategies would be implemented, including “Ethernet/Collapsed Ring fiber system, video detection, variable message signage for select arterial roadways, and upgrades to the traffic signal system, including re-timing.” A number of additional strategies were recognized by Hillsborough County as future needs, including better coordination between TMCs and agencies, interoperability of equipment, greater coordination of arterial roadway signals interfacing with freeway ramps, identification of additional express bus routes on priority corridors, traffic signal fire [vehicle] pre-emption (which was also noted as a priority need by the City of Tampa fire department), and a better system for automated data gathering at signalized intersections. [Table 5](#) provides a listing of the criteria and strategies (“functions”) from the Plan.

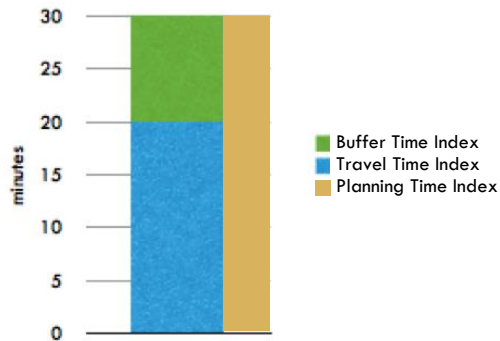


Table 5. ITS General Evaluation Criteria (source: Hillsborough Area Intelligent Transportation System Master Plan: Technical Memorandum One, 2009. Table II)

Evaluation Criteria	Function (Strategies)
Increase in freeway and arterial throughput and effective capacity	DMS, Signal Timing Plans, Adaptive Control traffic signals, Electronic Toll Payment, enhanced transit network, HOV lanes, Freeway Management System
Reduction in travel delays and travel time variability	DMS, Adaptive Control traffic signals, enhanced transit network, ATIS, CCTV,HOV lanes
Reduction in overall rate of crashes	White Enforcement Lights, Variable Speed Limit, enhanced pavement marking, exclusive truck lanes, DMS, CCTV
Reduction in the rate of crashes resulting in injuries and fatalities	White Enforcement Lights, Variable Speed Limit, enhanced pavement marking, exclusive truck lanes, DMS, CCTV
Reduction in the rate of pedestrian and bicycle related crashes	White Enforcement Lights, Variable Speed Limit, enhanced pavement marking, Increase in ridership ATIS, enhanced transit network coordination, bus queue lanes, bus bypass lanes, Universal Smart Card Pass, DMS
Reduction in travel time for mass transit users	ATIS, DMS, bus queue lanes, bus bypass lanes, enhanced transit network Enhanced route connectivity of mass transit and rail systems ATIS, DMS, Universal Smart Card Pass
Increase in profit for transit systems	Electronic Toll Payment, Universal Smart Card Pass, enhanced connectivity, DMS,ATIS
Cost savings for road users and operating agencies	Electronic Toll Payment, Universal SmartCard Pass, enhanced connectivity, DMS,ATIS
Reduction in fuel consumption	DMS, ATIS, Adaptive Control traffic signals, signal timing, coordinated signal systems enhanced transit network, Freeway Management System, Ridesharing, Vanpooling, Clean Air Partnership (CAP),
Increase in positive feedback from motorists and pedestrians	ATIS, enhanced pavement markings, signal timing, Universal Smart Card Pass, coordinated transit schedules, DMS, Exclusive Truck Lanes Greater accuracy in data Cameras, fiber connections, co-location of personnel at TMCs, Adaptive Control traffic signals
Reduction of error/problems in the field after installation	Cameras, fiber connections, co-location of personnel at TMCs, Adaptive Control traffic signals
Increase in response time to incident	CCTV, Cameras, AVL for all agencies, Traffic Control Training, enhanced radio communications, TMCs, Traffic Signal Preemption
Reduction in delay to traveler due to incident	DMS, ATIS, Adaptive Control traffic signals, enhanced radio station information, parallel relief corridors
Increase in alternate routes available	DMS, enhanced multi-modal transit network, Smart Card Payment Pass, ATIS, enhanced radio station information Ability to communicate with other agencies directly via radio Co-location of personnel at TMCs, upgrade to Countywide radio system
Reduction of time necessary to implement evacuation process	CCTV, Cameras, fiber connections, enhanced radio communications, Adaptive Control traffic signals, Electronic Toll Payment, DMS, ATIS, Traffic Signal Preemption
Reduction of average emergency response time for agencies	DMS, CCTV, Traffic Signal Pre-emption, Adaptive Control traffic signals
Improve Air Quality	Adaptive Control traffic signals, signal timing optimization, Electronic Toll Payment, enhanced transit network. Ridesharina. Vanpoolina. Clean Air Partnership

Each of the “functions” is provided with a succinct description that could also be migrated to the CMP to ensure a robust and consistent set of definitions.

Relevancy to Hillsborough CMP: This initial technical memorandum for the ITS Master Plan provides (1) a wealth of information on potential strategies for reducing congestion. The strategies listed are particularly focused on non-capacity increases, which is also a paramount focal point of the CMP. (2) Some of the performance metrics, such as response time to incidents and reduction in travel time variability, are also relevant to the CMP.



Congestion Management Process Steering Committee (ongoing). To update the CMP, the staff and several technical committee members of the Hillsborough County MPO conducted a series of meetings to discuss, define, and implement the congestion management process. This committee and the MPO staff produced a set of preliminary recommendations to define goals related to congestion, brainstorm strategies, and performance metrics. Additionally, a study area or areas were identified as well as an analysis method for each issue and strategy. These strategies are summarized in the table on the next page ([Table 6](#)).

The strategies thus far developed address three goals: improving reliability of travel times; shifting peak hour (PH in the table) trips to non-single occupant vehicle trips; and reducing the peak hour impacts of traffic congestion. All of these strategies focus primarily on corridors (or signalized intersections along congested corridors) and do not speak to MPO-wide or subareas of study.

The performance metrics are commonly understood reductions in accidents or delays, with the exception of the Buffer Time index. Simply stated, the Buffer Time Index (BTI) is the additional travel time beyond the normal trip time that a traveler would need to ensure reaching a destination at a specific time. This measure is easiest to understand when it is compared to two other performance measures, the Travel Time Index and the Planning Time Index. The travel time index is the average amount of time, usually expressed in minutes, a trip typically takes under a standard set of conditions (e.g., peak hour, weekday, etc.). The Planning Time Index is the sum of the Travel Time Index and the Buffer Time Index, as represented by the three columns shown in the graphic on this page. The relationship between



Table 6. Performance Measures Identified by HCMPO

Goal	Mitigation Strategy	Recurring	Non-Recurring	Mode Benefits	MPO-Wide	Corridor	Subarea	Performance Measure(s)	Implementation
Reliability	1-A. Crash Reduction	●		A/T		●	●	(1) Reduce total crashes; (2) Reduce severe crashes)	Identification of locations for traffic operation measures
	1-B. Incident Clearance		●	A/T		●	●	(1) Reduce minutes of clearance time; (2) Reduce Buffer Time Index	Identify truck routes and track incidents by location
Shift SOV Trips	2-A. Improve Transit Modes	●		T				(1) Transit runs delayed by congestion; (2) Percent on-time arrivals	Queue jump lanes and signal prioritization
	2-B. Improve Non-Motorized Modes	●		B/P		●	●	(1) Increase bike and walk counts; (2) Reduce frequency & severity of crashes	Bike/Ped treatments, action plans, and safety audits; better land use planning
Reduce PH Delay	3-A. Improve Intersection Operations	●		A/T		●		Decreased delay at top 50 intersections	Update ITS Plan and study reversible lanes and parking or turn restrictions
	3-B. Reduce Peak-Hour Demand	●		A/T		●		Decreased delay along top 50 segments	Review HOV market study; conduct variable pricing study

the Planning Time Index to the Travel Time Index is somewhat easier to grasp (e.g., “the total travel time necessary to ensure reaching my destination is 30 minutes, or 50% greater than the average travel time”)³. Both the Planning Time and Buffer Time indices require a

³ FHWA, “Travel Time Reliability: Making It There On Time, All The Time,” US Department of Transportation, website accessed 6.2011 (http://ops.fhwa.dot.gov/publications/tt_reliability/brochure/).

considerable amount of data about trip origins, destinations, and the travel times required to get between the two. However, data that produces both statistically reliable averages and variances can be used to quantify either measure – and in either case, the average travel time value must be known to make the metric useful.

As with some of the adopted plans, accidents or crash rates are used as a surrogate for reductions in non-recurring congestion (that is, congestion produced by construction, special events, or incidents). Non-recurring congestion has become an increasing focus in thriving urban areas as recurring congestion (congestion caused by having too many cars in a given amount of space and time on a typical weekday) has proved difficult to dispel. Non-recurring congestion has impacts on manufacturing and service operations that have come to rely on just-in-time deliveries to reduce the costs of distribution and storage. A bakery that cannot get flour, yeast, nuts, and fruit when it needs them in the evening cannot open on time in the morning.

The implementation measures noted are sometimes more in the vein of identification strategies, such as monitoring truck and other types of accidents, or conducting pedestrian/bicycle safety audits.

The linkages between the initial CMP strategy guidance and other plans are fairly strong. For example, route delay is noted in the HART plan, and accident or crash rate statistics are identified in several plans, such as the bicycle and pedestrian safety action plans. There is some discrepancy in how these metrics are formulated. For example, the HART plan update notes that it will measure delay in route service as the number of destinations where the bus is one or five minutes late; the CMP strategy document lists daily runs delayed by congestion and percent of on-time arrivals as key performance metrics. Using both the HART plan and the strategy guidance may identify similar congestion issues, but the reporting, monitoring, and perhaps even the selection of the improvement strategies could be different. It is also noteworthy that the 2005 CMP update document contained a number of additional performance measures, and made a distinction between corridor and system levels of measurement.



The National Practice of Congestion Management

In order to identify best practices for MPO congestion management processes, a number of candidate MPOs / CMPs were identified through communication with the Association of Metropolitan Planning Organizations (AMPO) staff and technical committee, as well as a review of the Congestion Management Process: A Guidebook (FHWA, 2011) document published by the Federal Highway Administration. The following represent those MPOs that have noteworthy practice in one or more areas of interest to the Hillsborough County MPO.

[North Central Texas Council of Governments](#) (Dallas/Fort Worth; Natalie Bettger). Large MPO, traditionally cited in many best practice reports. The NCTCOG Congestion Management Process report is both informative and detailed, and features a brochure version of the main report.

[Capital District Transportation Committee](#) (Albany; Chris O'Neill). Although a smaller MPO, CDTC has developed a software program internally that forecasts condition level of corridors based on levels of funding for maintenance activities.

[Houston-Galveston Area Council](#) (Jeff Kaufman/Gabriella Villegas). A call has been placed to locate a more up-to-date version of the CMP documentation than that shown on the website. H-GAC will have strong technical work and linkages to air quality issues.

[Tri-County Regional Planning Commission](#) (Lansing; Paul Hamilton). Although a smaller MPO, Paul Hamilton and Tri-County have a premier traffic count database system that allows users to explore the region's traffic flows by highlighting areas on a map or SQL-type search engine.

[Hampton Roads Transportation Planning Organization](#) (Camelia Ravanbakht/Robert B. Case). This is the only MPO that recommended themselves based on the query put out by AMPO for best practice CMPs. HRTPO has a well-deserved reputation as an extremely strong technical MPO, but they also publish a *State of Transportation in Hampton Roads* report that addresses multi-modal transportation congestion, including freight, marine, and air travel. The MPO is very active in updating the CMP and making the work a linchpin element of their overall planning program.

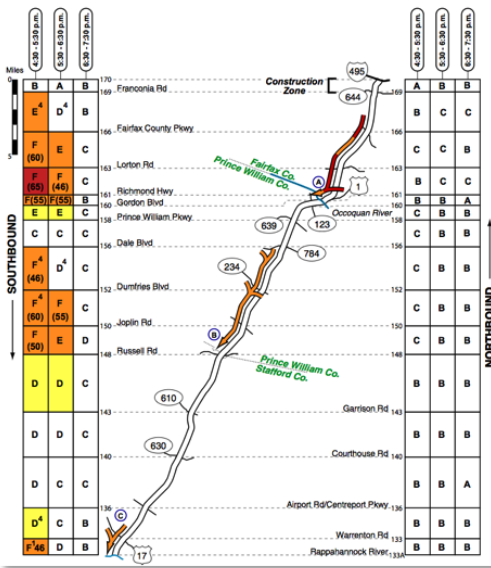


Figure 7. Sample Strip Map
 Source: NCRTPB, *Traffic Quality on the Metropolitan Washington Area Freeway System*

MetroPlan (Orlando; Eric Hill). The MetroPlan MPO has a CMP that is fairly traditional, but does include both recurring and nonrecurring congestion measures. How the CMP cross-links to MetroPlan’s other activities like [project prioritization strategies](#) isn’t immediately obvious, but could be clarified with a teleconference.

Baltimore Metropolitan Council (Eileen Singleton/Bala Akundi). A very large MPO with a strong regional orientation, the BMC, like other multifunctional MPOs tied to regional planning agencies, is more likely to have stronger ties back to land use issues as a source of creating or strategy for alleviating congestion. However, they have been using GPS to collect travel time on 30 corridors in the region since 1998, and are using aerial photography updated every three years to survey congestion. A major effort in the CMP is focused on the northeast corridor, which could serve as an example of how a detailed corridor is monitored and strategies identified and implemented.

Atlanta Regional Commission (David D’Onofrio). The ARC, like H-GAC, is a large MPO that has to deal with many air quality conformity issues. The CMP here does have a direct tie back to the project priority process. The ARC has had to explore non-capacity increasing strategies as much or more than any MPO, and they have also published (prepared by Jacobs) a report detailing a data collection and standards framework.

National Capital Region Transportation Planning Board (Washington, D.C.; Andrew Meese). Although the D.C. region is iconoclastic in terms of its commuting patterns and land use configurations, the CMP nevertheless has a long history at NCRTPB, with six reports dating back 1993 ([most recent: 2008](#)) that utilize identical evaluation methodologies. This MPO therefore presents one of the better opportunities to see how change is monitored through the CMP. The graphics in the most recent report make use of strip mapping (refer to [Figure Z](#)), an approach that allows rapid exploration of data in a small space for a long and complex corridor note especially the rather dramatic application of this display beginning on page 60 for the Capital Beltway). However, this CMP is not particularly multi-modal in nature.

Mid-America Regional Council (Kansas City, MO; Mell Henderson). A perennial best practice MPO on a number of fronts, the MARC [CMP page](#) contains a number of technical resources, including a report on best practices review of other MPOs (Cambridge Systematics).



Atypically, MARC includes a congestion management process policy document outlining how it will approach the CMP.

[Puget Sound Regional Council](#) (Seattle, WA; Robin Mayhew). Like the NCRTPB, Puget Sound has a unique organization structure and very comprehensive mission that may not translate well at a policy level to other MPOs. The key feature of the PSRC process is the “SMART corridor” concept, which identifies 12 subareas (that collectively comprise the region) and reports on congestion within these subareas. The [reporting effort](#) is multimodal and has a freight component.

[Delaware Valley Regional Planning Commission](#) (Philadelphia, PA). Reviewed in the most recent CMP Process Update guidebook, the DVRPC is notable for its work on the CMP in at least two areas, “supplemental” strategies to alleviate congestion and the application of criteria to define major CMP sub-corridors.

[Lafayette Metropolitan Planning Organization](#) (Lafayette, LA). The Lafayette MPO has adopted an aggressive stance and policies that favor [roundabouts](#) inside their planning jurisdiction. Additionally, the LMPO has an adopted [Bikeway Master Plan](#) that contains a number of relevant objectives to that component of the CMP for Hillsborough County MPO.

The graphic on the following page ([Table Z](#)) illustrates the key features of several MPOs with regards to their CMPs; note that the dots represent particularly strong emphasis areas based on a cursory review, not that the category is totally absent.

<p><i>Is the problem in a congested subcorridor? Is the problem in an emerging / regional corridor?</i></p>	<p><input type="checkbox"/> if YES... Document.</p>	<p><input type="checkbox"/> if NO... It may not matter, depending on the project. *</p>
<p><i>Can the problem be addressed without building more road capacity?</i></p>	<p><input type="checkbox"/> if YES... DVRPC is available to help evaluate strategies.</p>	<p><input type="checkbox"/> if NO... Document this initial research.</p>
<p><i>If new road capacity is an alternative, is it likely to be Major SOV Capacity?</i></p>	<p><input type="checkbox"/> if YES... Go to next question.</p>	<p><input type="checkbox"/> if NO... Keep the project description current in TIP listings; DVRPC is available to help.</p>
<p><i>Is the new Major SOV Capacity consistent with the CMP?</i></p>	<p><input type="checkbox"/> if YES... Start considering supplemental strategies.</p>	<p><input type="checkbox"/> if NO... A different SOV Capacity - adding strategy was listed - Include that strategy in an alternative, include other CMP strategies as alternatives. Adding Major SOV Capacity was not listed - Use the CMP Very Appropriate, Secondary, and Strategies Appropriate Everywhere to develop alternatives. The project is not in a congested subcorridor - See "Evaluating Projects Outside of Congested Corridor" and checklist. *</p>
<p><i>Are the supplemental strategies set?</i></p>	<p><input type="checkbox"/> if YES... Stakeholders agree on strategies, implementation, and timeline.</p>	<p><input type="checkbox"/> if NO... DVRPC remains available to help.</p>

Figure 8. Project Evaluation in CMP (DVRPC)

Table 7. Key Emphasis Areas for Selected CMPs

MPO Name	Data Management	Crash Mitigation Strategies	Technical Analyses	Multimodal Strategies	Work Program Integration	Regional Focus	Corridor Focus	Unique Display	NOTES
Atlanta Regional Commission		•	•	•	•				Excellent review of data sources
Baltimore Metropolitan Council	•		•				•		Complex region
Capital District Transportation Committee	•	•	•				•	•	May not be portable from a policy perspective; CMP part of LRTP
Delaware Valley Regional Planning Commission		•	•		•		•	•	Development of criteria to determine CMP corridors; good overview/summary
Hampton Roads Transportation Planning Organization		•	•		•		•		Very specific recommendations on corridors; strong analysis capability
Houston-Galveston Area Council			•						Call in to H-GAC to determine most recent CMP effort; many corridor studies
Lexington Area MPO (KY)		•	•				•		Smaller MPO; Straightforward report that's easy to understand
MetroPlan			•	•					Similar MPO structure and achievable results
Mid-America Regional Council		•				•			CMP policy document; review of other best practices; no one CMP report
National Capital Region Transportation Planning Board		•	•	•			•	•	Long-standing program has produced an emphasis on change over time
North Central Texas Council of Governments			•	•				•	Uses embedded loop data to measure non-recurring congestion
Puget Sound Regional Council		•				•	•		May not be portable from a policy perspective
Tri-County Regional Planning Commission	•	•			•				The 2004 report emphasized land use strategies



Based on this cursory review, five CMPs were initially chosen for evaluation:

- MetroPlan (Orlando, Florida)
- Baltimore Metropolitan Council (Baltimore, Maryland)
- Metropolitan Washington Council of Governments (Washington, DC)
- Hampton Roads Transportation Planning Organization (Chesapeake, Virginia)
- Mid-America Regional Council (Kansas City, Missouri)

Three additional MPOs had information available for them and were included, bringing the total to eight peer studies. The following are summaries of the content of each CMP, as well as candidate recommendations on best practices applicable to the Hillsborough County MPO. The ultimate selection of which practices to include in the Hillsborough County CMP is to be made by the staff and officials of the Hillsborough County MPO.

MetroPlan (Orlando, FL)

The CMP for MetroPlan is contained as a stand-alone chapter in the overall long-range transportation plan (technical report number five), and was prepared by a private consultant guided by a steering committee. The planning process for the CMP was simplified to five steps: selection of performance measures, data collection, alternatives evaluation, project selection, and monitoring.

A number of objectives were borrowed from the long-range transportation plan, although not all of the objectives were equally appropriate for a CMP (e.g., financing as compared to safety, mobility, or achieving a “balanced” transportation system). A fairly extensive list of performance measures were identified (Table 2 in the CMP) and evaluated in terms of constraints (Table 3 in the CMP), although not all of the evaluation conclusions provided sources (e.g., air quality had the stated constraints of “Secondary indicator; low travel speeds and excessive delay will result in poor air quality,” statements that are at best debatable under many circumstances⁴).

⁴ See, for example, van Bee, Wim, “The Effects of Speed Measures on Air Pollution and Traffic Safety,” or Wang, Zhong and Walton, C. Michael, “An Investigation on the Environmental Benefits of a Variable Speed Control Strategy.”

MetroPlan at a Glance

	MP	HC
Population (millions)	1.8	1.1
Members (number)	25	8
2030 Growth (percent)	74	49
Organization Structure*	C	C

MetroPlan Orlando shares a similar policy context to the Hillsborough County MPO due to its Florida location.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

The following recurring congestion performance measures were selected, divided into recurring and non-recurring performance measures ([Table 8](#)).

Table 8. Performance Measures (MetroPlan Orlando)

Recurring Congestion Measures	Non-Recurring Congestion Measures
Daily segment volume-to-capacity ratio	High crash intersections measured by crash rate (crashes per million vehicles entering) and by the number of crashes
Peak-hour travel speed indicated as a percent of the posted speed limit	High crash corridors measured by crash rate (crashes per million vehicles miles)
Bicycle/pedestrian customer satisfaction	Incident severity measured as a percentage of fatalities vs. injuries vs. property damage only
Transit ridership	Incident duration
Signal retiming cost/benefit	Customer survey
Intersection volume-to-capacity ratio	
Air quality	

In order to initially identify corridors and intersections that are in need of further study without incurring a large cost or staff time resource expenditure, a tiered analysis approach was adopted. Tier One analyses looked simply at high crash locations and high volume-to-capacity ratios to identify intersections and roadway segments for further analysis; however, “key truck corridors” and evacuation routes were also chosen for detailed evaluation. The Tier Two level of analysis considered peak-hour percentage of the speed limit, crashes per million vehicles, and incident severity. Tier Three analyses would require more detailed study, potentially separate from the CMP.

As regards potential congestion mitigation strategies, these are broken into several categories as follows:

Demand management measures:

- Transportation Demand Management – car and vanpooling, flexible work hours, compressed work weeks, telecommuting, etc.



- Parking management.
- Land use policies and regulations that encourage more efficient patterns of commercial or residential development in defined growth areas.
- Value pricing.

Traffic operational improvements:

- Improved traffic signal coordination. In some areas, this may require physical improvements or upgrades that allow the traffic signal controllers to communicate.
- Pavement markings and intersection improvements.
- Incident management programs.
- Various intersection safety countermeasures.
- Access management changes.
- New or improved sidewalks and designated bicycle lanes.
- Bus pullout bays.
- Coordination of maintenance responsibilities between jurisdictions.

Public transportation improvements:

- System capital and operational improvements.
- Traffic signal priority.
- New or more frequent routes.
- New services.

ITS technologies as related to the regional ITS architecture:

- Traffic Management Center improvements.
- Expansion of fiber-optic networks or other means of communication.
- Expansion / improvements to archives of ITS data.

System Capacity:

- Road widening.
- Addition of turn lanes at intersections.

Appendices to the plan identify funding strategies and project priority factors; however, there is almost no content on bicycle and pedestrian modes of travel, and very little on public transportation, although coordination with the LYNX service is discussed.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

- The use of a tiered analysis method would save considerable effort and increase the objectivity of the overall CMP by delineating the top intersections and congested segments for a more detailed analysis.
- The performance measures and strategies should both be weighed as the Hillsborough County MPO moves forward into finalizing these elements of its CMP.

BRTB at a Glance

	BR	HC
Population (millions)	2.9	1.1
Members (number)	8	8
2030 Growth (percent)	7	49
Organization Structure*	C	C

BRTB has a slower growth rate of growth than HCMPO, but similar board sizes and organization.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

Baltimore Metropolitan Council (Baltimore, Maryland)

The format of the Baltimore Regional Transportation Board (BRTB) Congestion Management Process documentation is designed for access through the agency’s website, with various components of the CMP described and linked through a dedicated CMP “home” page on the website. Data collection, comparing existing and future congestion levels (a linkage to the LRTP), treatment of the high-priority Northeast Corridor, and integration with state-level planning processes like purpose and need statements, alternatives development, and alternative selection/mitigation strategies are given separate sub-areas of the CMP portion of the MPO website. Of these four areas, the most well-developed and relevant to Hillsborough County are data collection/monitoring and treatment of the high-priority corridor.

The MPO collects the following data for monitoring congestion in the planning region:

Roadway

- Vehicle volumes (direction, time of day, peak hour, average daily traffic)
- Volume-to-Capacity ratios by direction and time of day
- Intersection Level of Service – average queue length, delay
- Miles operating at LOS E or F in peak period
- Duration of congestion

Transit

- Average speeds or travel time
- Ratio of bus to auto speed
- Average peak period vehicle load factors (passenger miles per seat miles; passengers per vehicle)

The CMP does not mention any additional measures collected for bicycle and pedestrian modes of travel, or for safety-related (e.g., accidents) statistics.

The MPO has used GPS (Global Positioning System) units in cars since 1998 to do travel-time studies for four days per week during the fall of the year for morning rush hours and in the spring for evening rush hour data collection. Seven travel time “runs” are collected in each direction on each of 14 corridors selected from the staff’s insight into the region. In June of 2010, the MPO released a trends report that noted that travel speeds had decreased from 59.5mph to 53mph on freeways between 2002 and 2008, and from 44.5mph to 38mph on arterials during the same time period. [Figure 9](#) shows how the travel speeds have changed between 1998 and 2008.

The following figure ([Figures 10](#)) illustrates how the agency displays information about travel speeds, with color coding, directional arrows, and actual change measured in miles per hour and speed by corridor. [Figure 11](#) describes the corridor and sources of congestion.

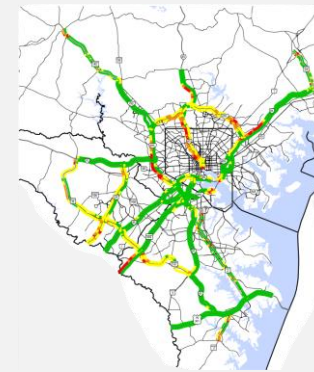


Figure 9. Travel Speed Map, 1998 (top) and 2008

ROUTE	DIRECTION	LIMITS	DISTANCE (miles)	AVERAGE TRAVEL SPEED (MPH) 1998	AVERAGE TRAVEL SPEED (MPH) 2002	AVERAGE TRAVEL SPEED (MPH) 2008	CHANGE IN AVERAGE TRAVEL SPEED (MPH) 1998-2002		CHANGE IN AVERAGE TRAVEL SPEED (MPH) 2002-2008		CHANGE IN AVERAGE TRAVEL SPEED (MPH) 1998-2008	
I-95 JFK Hwy.	Southbound	MD 24 to I-695 NE (White Marsh)	12.78	65	66	48	↑	+1	↓	-18	↓	-17
I-795	Southbound	MD 140 to I-695	8.82	64	62	51	↓	-2	↓	-11	↓	-13
I-895	Southbound	I-95 NE (East Baltimore) to Harbor Tunnel	4.86	62	59	52	↓	-3	↓	-7	↓	-10
I-695 Beltway	Outerloop	I-95 NE (White Marsh) to I-795	16.71	51	50	42	↓	-1	↓	-8	↓	-9
MD 295 B/W Pkwy.	Southbound	I-95 to Prince George's-Howard County Line	18.13	57	50	48	↓	-7	↓	-2	↓	-9

Figure 10. Sample Travel Speed and Time Chart

In addition this table, a brief paragraph like the one in [Figure 11](#) accompanies each corridor to describe the potential causes of congestion.

Sample Corridor Description

MD 2 Northbound from MD-214 to College Parkway

Average Travel Speed, 1998: 51 MPH Average Travel Speed, 2008: 38 MPH Change: - 13 MPH

Possible Cause: Annual average daily traffic on the northern section of this corridor actually decreased from 48,246 vehicles in 1998 to 46,540 in 2008 due to more traffic choosing the alternate I-97 route. However, the central portion of this segment runs directly through the city of Annapolis and shares a portion of its path with US-50. In 1998 the annual average daily traffic was 42,225 vehicles at its intersection with Aris T. Allen Blvd in Annapolis. That area has seen increases in retail and residential development with the construction of the mixed use Annapolis Town Centre on the former site of the Parole Plaza Shopping Centre. By 2008, AADT had significantly increased to 53,220 vehicles.

Figure 11. CMP Project Description from Transportation Outlook 2035



Some corridors receive additional attention depending on their importance and level of congestion. The Northeast Corridor contains six major arterials; bus and rail transit services; and is an important truck and air freight route. In addition to the performance measures listed above, the Northeast Corridor is also monitored using the following statistics:

Efficiency

- Average auto occupancy
- Modal split (especially percent transit to auto driver)
- Multi-modal person throughput (person trips or person miles per hour across all modes)

Policy

- Average trip length of corridor users (overall & by mode)
- Percent of corridor users who have an alternative (proportion who have a realistic transit alternative; availability of high occupancy vehicle lane or managed lane)
- Distribution of congestion burden across population groups
- Average travel time for index of origins/destinations
- Crash/injury or fatality rates
- Average delay per traveler
- Reliability: Variation in daily travel time
- Number & duration of breakdowns/incidents

The corridor has been modeled using a microsimulation program (SynchroProfessional, or just Synchro) so that levels of service can be determined.

One note is that the current project priority method and factors described in the adopted long-range transportation plan do not align with any of the performance measures. Some of the trends descriptions in the LRTP (Chapter 4) do have some similarities with the CMP performance measures (e.g., mode split), but the output of the CMP does not appear to be a part of the LRTP document or process except for a description of the CMP process and requirements and a map outlining some of the CMP projects.

Use of Microsimulation Tools in HCMPO: Bloomingdale Corridor

Microsimulation software takes data about turning movements, average speeds, roadway capacity, and signal timing to produce performance measures and visual depictions of traffic levels of service.

The Bloomingdale Corridor Signal Retiming Study (Albeck Gerkin, Inc, 2010) used Synchro to estimate fuel consumption, traveler delay, total stops at intersections, and travel time to measures the benefits of retiming signals for a segment of roadway that included 14 intersections. The results indicated that traveler delay could be reduced substantially with better signal coordination, from 24% to 87% depending on the direction of travel, peak/off-peak period, and other factors. Building and calibrating the model required input data like turning movement counts, travel time runs, and field / aerial photograph studies.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

- The use of graphics that are fairly consistent across years, as well as clever use of color to indicate change in tabular formats, present a lot of data quickly.
- The corridor-level measures and text descriptions of issues and causes of congestion provide a good balance of technical detail and brevity commensurate with the typical objectives of a CMP.
- The additional performance measures for the high-priority Northeast Corridor are good examples of where the CMP increases in intensity for selected areas.

NCTPB at a Glance

	NC	HC
Population (millions)	6.3	1.1
Members (number)	21	8
2030 Growth (percent)	22	49
Organization Structure*	C	C

NCTPB has multiple seats for some members; House and Senate members from Maryland, Virginia and DC also have a voting membership.

**S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council*

National Capital Region (Metropolitan Washington COG, Washington, DC)

The National Capital Transportation Planning Board (NCTPB) has an extremely comprehensive CMP for automobile-related congestion, and extensive information pertaining to public transit (including park-and-ride facilities) and freight. The roadway congestion sections of the (242-page) CMP include a state-of-the-system report, identification of bottlenecks, and travel time reliability as well as a monitoring program for selected arterial roadways. Additional sections of the report include a brief discussion of strategies and an assessment of those strategies.

Monitoring of the region’s roadways is conducted both through aerial photography and INRIX data, but the MPO also relies on travel demand modeling to forecast future areas of congestion. Occupancy counts were conducted at park-and-ride facilities, with few of those parking areas having substantial unused capacity. The CMP also cites no less than eight surveys conducted by the MPO or its partners, which aid in the monitoring of the effectiveness of strategies as well as providing data inputs to performance measures. Floating car studies are conducted every three years to ascertain speed and travel times on selected routes. An important data source for truck congestion is the American Transportation Research Institute (ATRI) fleet truck speed data for the FHWA Freight Performance Measures (FPM) project. The Texas Transportation Institute’s annual Urban Mobility Report provides an indicator of how the region is dealing with congestion over time and as compared against other large metropolitan areas.



Strategies for managing congestion fall into three categories: operational, demand management and capacity-increasing projects; the first two categories and their associated strategies area are shown below (*note: the following text is copied directly from the CMP report*).

Demand Management

- Commuter Connections Program – Including strategies such as Telework, Employer Outreach, Guaranteed Ride Home, Liver Near Your Work, Carpooling, Vanpooling, Ridematching Services, Car Free Day, and Bike To Work Day.
- Promotion of local travel demand management – Local demand management strategies are documented in the main body of the CMP Technical Report.
- Public transportation improvements – The Washington region continues to support a robust transit system as a major alternative to driving alone.
- Pedestrian and bicycle transportation enhancements as promoted and tracked through the Bicycle and Pedestrian Planning program – The number of bicycle and pedestrian facilities in the region has increased in recent years; the District of Columbia bikesharing program was one of the first of its kind in North America.
- Land use strategies – Including those promoted by the Transportation-Land Use Connections (TLC) Program.

Operational Management

- High Occupancy Vehicle (HOV) facilities – Existing HOV facilities include I-66, I-95/I-395, I-270, US-50 and the Dulles Toll Road.
- Variably-Priced Lane Facilities – Facilities that are planned or currently under construction include the Maryland Intercounty Connector (ICC) (all lanes will be tolled as a variable-rate express toll facility), the Northern Virginia Capital Beltway High Occupancy Toll (HOT) lanes, and the Northern Virginia I-95/I-395 HOT lanes.
- Incident Management – Notably the Metropolitan Transportation Operations Coordination (MATOC) program, whose development the TPB helped shepherd, uses real-time transportation systems monitoring and information sharing to help mitigate the impacts of non-recurring congestion.
- Intelligent Transportation Systems are considered, particularly through the Management, Operations, and Intelligent Transportation Systems (MOITS) program

and committees. Examples include traffic signal optimization, safety service patrols, and traveler information.

Few capacity increasing projects have been completed in recent years, with a reliance on demand and operational management strategies predominating in the capital region.

Detailed scenario planning began in 2001 that considered the impact of land use changes on congestion, with Phase II of the program beginning in 2007.

Performance metrics cited in the CMP report include the following:

- Ratio of free-flow speed to congested speed;
- Travel Time Buffer Index;
- Planning Time Index, or the ratio of the 95th-percentile travel time to free flow travel time;
- Travel speeds for buses and for automobiles;
- Volume-to-Capacity ratios (transit stations only);⁵
- Parking lot utilization rates (transit stations only);
- Annual average truck speeds below 45mph (trucks only);
- Level-of-Service, as calculated through aerial photography estimates of traffic density; and
- Average travel time and 85th-percentile speed for all time periods.

For the I-95 corridor, a corridor of premier importance to the region, additional analyses were conducted, such as comparing buffer and planning time indices by the day of the week or monthly over a period two years.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

- Utilizing parking lot occupancy values through an aerial photography scan would be a unique addition to transit performance measures; the use of the Texas

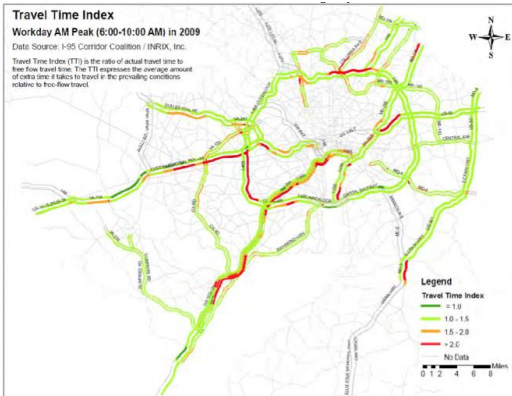


Figure 12. Travel Time Index (Figure 19 from CMP)

⁵ Washington Metropolitan Area Transit Authority, "Metrorail Station Access & Capacity Study," April, 2008. Page 46. Website (www.wmata.com/pdfs/planning/Final%20Report_Station%20Access%20&%20Capacity%20Study%202008%20Apr.pdf).



Transportation Institute’s annual congestion survey is an easy way to compare Hillsborough to other regions and indicate total congestion conditions over time.

- The use of various data collection methodologies, including surveys, aerial photography, INRIX data, and floating car studies represents one of the most comprehensive data collection efforts reviewed.
- The MWCOG focuses more directly on specific corridors, and spends additional time and effort on collecting and analyzing data as well as sources of congestion in these areas.

Capital Area District (CDTC; Albany, New York)

The Capital District was reviewed as a best practice for its CMP during the recent (2011) CMP Guidance update project sponsored by FHWA and USDOT. The MPO views that it is perceived as a “turf neutral” facilitator, building consensus among its member agencies. The performance measures from the long-range transportation plan (“New Visions” Plan) were all included in the CMP, providing a direct linkage between the CMP and the LRTP. The New Visions Plan has a set of 31 planning and investment principles contained in Appendix A of the Plan generally focusing on management, preservation, multi-modal systems, and enhancing regional economic potential. Appendix B of the Plan contains 13 strategies and 47 specific “actions” that describe how the MPO and its partners will fulfill the principles. In fact, all of the documentation for the CMP has been integrated into the LRTP fairly seamlessly.

Performance measures used in the CMP include some fairly novel metrics, but that are nevertheless easy to understand by the lay public: excess person hours of delay (time spent in conditions with worse than LOS D as compared to time spent in conditions at LOS D)⁶ and number of residential/commercial conflict points as two examples. Non-recurring delay due to construction and accidents is emphasized heavily in the CMP, as the MPO’s public process has indicated that non-recurring delay is not tolerated as well as recurring delay due to capacity constraints. The MPO notes in its presentation on the CMP that the focus of the MPO and other transportation agencies on recurring delay and the public’s higher dissatisfaction

⁶ A variant of this metric is used in the ARC example as well (the Travel Time Tax).

CDTC at a Glance

	CDTC	HC
Population (millions)	0.8	1.1
Members (number)	~20	8
2030 Growth (percent)	5	49
Organization Structure*	I	C

CDTC has the noteworthy practice of requiring complete consensus by all communities affected by any decision.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

Impact of Non-Recurring Congestion

“ANALYSIS USING THE TRAVEL DEMAND MODEL INDICATED THAT WIDENING THE NORTHWAY WOULD RESULT IN FILLING UP WITH TRAFFIC ON THE DAY OF OPENING; WITHOUT REDUCING INCIDENT DELAY.

HOWEVER, THE PLANNING AND DESIGN PROCESS STILL TENDS TO FOCUS EXCLUSIVELY ON RECURRING DELAY.”



levels with non-recurring (unplanned-for) delay was important in their thought process for developing the CMP.

In terms of data collection and monitoring, CDTC had access to a statewide database known as “MIST” which measures expressway speeds by lane every 15 minutes of every day. This dataset aided greatly in the development of a system-wide metric that compares recurring to non-recurring delays. The measure of predictability of trip travel time was developed by TTI (Texas Transportation Institute): ratio of time at the 95th percentile worst day as compared to free flow. This metric implies that a trip with a value greater than 1.0 would take longer than free-flow conditions would predict; a 1.0 the same amount of time; and a value of less than 1.0 anticipates that the travel speeds are actually higher than the posted speeds on the roadway.

For prioritizing new (capacity-increasing) roadway projects, the CDTC determined that the presence of existing or anticipated future congestion was not sufficient to program a major new construction project. Betterment of access control, demand strategies, and lowering accident risk potential are requirements for any new capacity-increasing project, as is the consideration of the impact to other modes of travel. As a result, the CDTC has established a Regional Operations Committee that focuses on proposing M&O (maintenance and operations) strategies to include in the Transportation Improvement Program (TIP).

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

1. The performance measures used in the CMP and the LRTP are the same, providing little opportunity for conflicts between the two planning processes.
2. Notable performance measures include excess person hours of delay and number of driveway conflicts.
3. If a corridor is shown to have current or future congestion, that fact alone is insufficient to warrant the programming of a capacity-increasing project. Impacts to non-automotive modes of travel, accident potential, and other contextual factors learned from the public engagement process play a determining role of how the MPO expends scarce capital.
4. The MPO places a heavy emphasis on non-recurring congestion, management, operations, and preservation as it prioritizes its actions.



Atlanta Regional Commission (ARC; Atlanta, GA)

The 18-county MPO service area centered on Atlanta provides information to many customers on many different planning products. Regional “Snapshots” provide short summaries of these products, including the CMP. The physical size of the MPO probably also poses some challenges in terms of data collection, manipulation, and long-term monitoring, all of which are required elements of a Congestion Management Process. The ARC relies fairly heavily on third-party datasets, particularly INRIX, for its travel time and congestion measures, probably in part due to its extensive land area and transportation system.⁷ These performance measures notably include average congested speed and a “Travel Time Tax,” which is simply the amount of additional time spent in traffic due to congestion (as compared to free-flow conditions). The latter can be expressed in terms of a simple example: a Travel Time Tax of 10% means that a given trip takes 10% longer to conduct due to traffic congestion. Interestingly, the ARC uses this performance measure at a corridor as well as a system-wide level of geography.

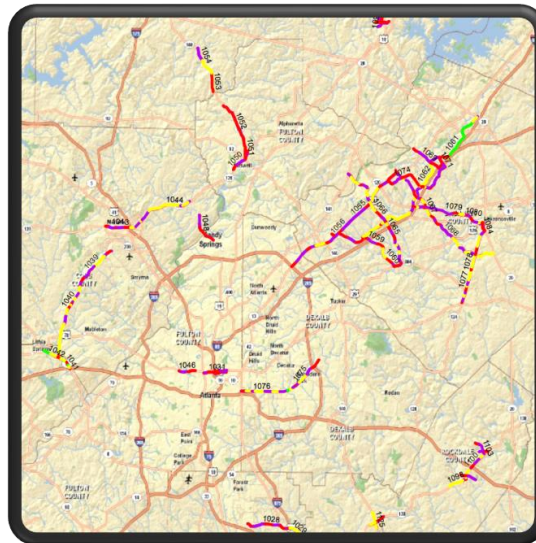


Figure 13. ARC Travel Time Congestion Map (Jacobs, 2009)

The ARC has also spent a lot of time considering how to provide a robust CMP and products from the CMP, including a report on regional data sources, collection,

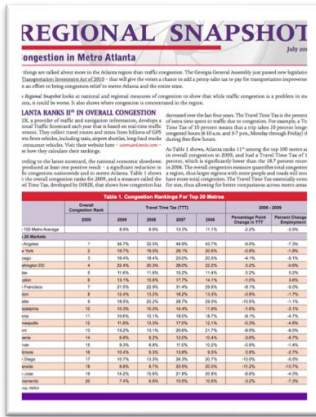
ARC at a Glance

	ARC	HC
Population (millions)	4.4	1.1
Members (number)	~30	8
2030 Growth (percent)	35	49
Organization Structure*	C	C

ARC stretches across 18 counties in its MPO planning area, and uses a lot of quick fact summaries to explain its work.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

⁷A sample of the Travel Time Tax measure can be found on the INRIX website. The Charlotte Region ranks 31st in the nation (as compared to its 33rd place ranking in population) in the 2010 dataset provided by INRIX (<http://scorecard.inrix.com/scorecard/Top100Metros.asp>).



and management (August, 2009). This report includes the results of a survey conducted of many of the region's traffic engineers to gather information on data being collected, formats, and uses in terms of monitoring congestion. Each data source available to the ARC is summarized in terms of its geographic coverage, quality and update frequency. Issues with data include data quality, common geographic references (along a linear system, for example), quantity of data, complexity of data, and variations in update procedures.

This report describes the creation of a framework for data collection and management based on the existing conditions and the stated desire to rely less on travel model data and more on field data in the CMP. Other factors in the development of the CMP include a need for multimodal analysis; identification of congested corridors (which receive 70% of the project prioritization weight), better monitoring practices, standardization of formatting, and enhanced travel model calibration datasets. Each of these elements is discussed in the clearinghouse construct, along with a set of recommended actions to address each one. Of particular note was the convening of a "Traffic Vendor Workshop" in May 2009 to begin the process of coordinating these disparate datasets. A standing subcommittee of the ARC technical committee deals exclusively with management and operations at the MPO level.

A second report dealt with the results of an actual data collection and reporting exercise. The report included results of travel time "runs" in 57 corridors (about 200 centerline miles) throughout the region, with each corridor having six travel time runs conducted to produce an average speed and TTI (Travel Time Index). The TTI is simply the posted speed divided by the actual travel speed. While the TTI uses travel speeds like the Travel Time Tax, the two measures are potentially conveying subtly different information, since the TTI considers actual speeds relative to posted speed limits instead of "free flow" travel speeds. The operational output to a Travel Time Index measure included the following level-of-service (LOS) for roadway segments.

- LOS A = (TTI) < 1.19
- LOS B = (TTI) 1.19 to 1.32
- LOS C = (TTI) 1.32 to 1.64
- LOS D = (TTI) 1.64 to 2.00 (approaching congestion)
- LOS E = (TTI) 2.00 to 2.70 (congested)
- LOS F = (TTI) > 2.70 (severely congested)



Intersection delays were measured as well, with seconds of delay equating to a LOS level (below “E” was considered unacceptable delay).

The travel time runs, while relied upon heavily in the data collection report, were not the only data collected and used to identify congested roadway segments. The ARC utilized average daily traffic counts (ADT) and intersection turning movement counts (TMC) to identify congested roadway segments and capacity limitations of certain turning movements at individual intersections.

The final documentation reviewed was the 2007 ARC Congestion Management Process Report; a more up-to-date version was not available at the time of this writing. The identification of a study network was complicated by the existence of a pre-existing Regional Strategic Transportation System (RSTS). The RSTS was defined as roadways with one or more of the following characteristics:

- National Highway System (NHS) which includes Interstate freeways and highways;
- State Routes;
- Cross-Regional Facilities identified during the *Mobility 2030* RTP update and revised during the development of the RSTS;
- New corridors that are included in *Mobility 2030* and would provide strategic network connections; and
- Existing and future regional transit service corridors.

Statistics for this network are provided in the chart shown in [Figure 14](#). “Premium Transit” refers to express service such as bus rapid transit; many of these miles are proposed and are not yet in existence.

The Congestion Management Process Network (CMPN) was somewhat different than the RSTS:

- All interstate and freeway facilities;
- All HOV facilities;

ARC Network	Miles	Miles/Centerline Road Miles
NHS + State Road	2,800	11.2%
Arterial Road	1,200	4.8%
Rail	48	0.2%
Premium Transit	273	1.1%

Figure 14. ARC RSTS Network

- All major mobility corridors, as referenced by (A) State-numbered Routes; and (B) principal arterials in the ARC travel demand model. Connecting links between these routes were also included even if they did not meet these two criteria; and
- Other roadways that were identified by public outreach or analysis, or roads that provide strategic connections.

About two-thirds of the existing RSTS and CMPN facilities were the same; a reconciliation process was conducted to produce a final CMP network. (Statistics were not readily available for the final CMP network.)

The performance measures cited in the 2007 CMP report made use of the FHWA/USDOT interim guidance on CMP development in that intensity, duration and extent were explicitly identified in the CMP report. The Travel Time Index (intensity), total daily congested hours (duration), total vehicular delay expressed as a percentage of total delay (extent), average TTI, average congested hours and average percent delay were used as performance measures with the last three being used at a system-wide level only. Both the existing and proposed (LRTP-derived) future networks were examined using these performance metrics. Additionally, subareas determined by a land use typology were examined using these same three performance measures.

Appendices to the CMP describe the performance of specific corridors and roadway segments; a “bottleneck” analysis; and some additional pilot studies. The pilot studies for specific subareas include more diverse measures than those ascribed to the main body of the CMP report, such as pedestrian crossing delays, crashes, and incident response times. Another interesting metric was the use of proximity to fire stations combined with crash data to derive a reliability ranking of the facilities on the CMPN.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

1. The ARC provides a “snapshot” of its CMP (and other products), providing a quick overview to a segment of the populace that wants a straightforward summary of a complex planning process.



2. The key performance measure for delay is the Travel Time Tax, a measure provided through INRIX, a third-party provider of data culled from some cellular telephone records.
3. The use of specific criteria to identify a network creates a semi-solid basis for creating the CMP network; additional criteria are needed to “flesh out” the network to ensure connectivity and respect public opinion.
4. One of the process elements conducted to begin the coordination between various agencies in charge of data collection/management – a “Traffic Vendor Workshop” – has some validity in the HCMPO planning area as well, although the smaller geographic area makes this recommendation less compelling. Similarly, a standing technical subcommittee on management and operations may be considered, with the same caveat that the smaller number of jurisdictions in HCMPO would require less staff time.
5. The CMP reports’ use of intensity, duration, and extent in its definition of network study area(s) and performance measures provides a direct connection back to FHWA/USDOT guidance.

Hampton Roads Transportation Planning Organization (HRTPO; Chesapeake, VA)

Hampton Roads is remarkable for its geography that emphasizes the importance of bridges and the naval station that employs 96,000 people, the largest such facility in the world. The HRTPO identifies five congestion management strategies in the CMP Update (2010):

1. Eliminating person trips / reduce VMT;
2. Shift trips to non-auto modes;
3. Shift trips from SOV to HOV;
4. Improve roadway operations; and
5. Add capacity.

Level-of-Service (LOS) was used to identify candidate congested corridors; additional criteria were used to winnow that large number (1,480 lane-miles in severe congestion, defined as LOS “E” or “F”) down to a manageable subset of facilities that were considered

HRTPO at a Glance

	<i>HR</i>	<i>HC</i>
<i>Population (millions)</i>	<i>1.7</i>	<i>1.1</i>
<i>Members (number)</i>	<i>20</i>	<i>8</i>
<i>2030 Growth (percent)</i>	<i>21</i>	<i>49</i>
<i>Organization Structure*</i>	<i>C</i>	<i>C</i>

HRTPO was the last MPO to go through a full merger of another MPO, more than two decades ago.

**S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council*

the most important. Level-of-service, freight, safety, travel speeds, and national significance. The ranking criteria and the weights assigned to different values are shown in [Figure 15](#).

CMP CRITERIA	ARTERIALS		FREEWAYS	
	VALUE	SCORE	VALUE	SCORE
Existing LOS (10 point max.)	LOS A-D	0	LOS A-D	0
	LOS E	8	LOS E	8
	LOS F	10	LOS F	10
Freight (5 point max.)	Daily # of Trucks		Daily # of Trucks	
	≤ 500	0	≤ 1500	0
	501 - 1000	2	1501 - 3000	2
	> 1000	3	> 3000	3
	Daily % of Trucks		Daily % of Trucks	
	≤4%	0	≤4%	0
	4% - 8%	1	4% - 8%	1
>8%	2	>8%	2	
Safety (5 point max.)	Percentile		EPDO Rate Per MVMT	
	0th - 25th	0	≤1	0
	25th - 50th	0	1 - 2	0
	50th - 75th	3	2 - 3	3
	75th - 100th	5	>3	5
HRPDC 2005 Travel Time (2 point max.)	LOS A-D	0	LOS A-D	0
	LOS E	1	LOS E	1
	LOS F	2	LOS F	2
NHS/Strahnet (3 point max.)	None	0	None	0
	NHS	2	NHS	2
	STRAHNET	3	STRAHNET	3

Figure 15. CMP Segment Ranking Criteria and Weights (HRTPO, 2010)



Segments were evaluated as described, but also grouped into 41 congested corridors that were again evaluated using the CMP segment ranking methodology, daily traffic volumes, number of roadway lanes, and length of roadway segment. The top six freeway and top 10 arterial corridors were included in the CMP Congested Corridors list. Each of these corridors was examined in detail to determine specific recommendations to improve performance. However, constraints on obtaining reliable data for non-roadway facilities and travel modes limited the congestion analysis to traffic delay on roadway.

The HRTPO CMP report includes a comprehensive listing of congestion management strategies arranged in a tiered format according to the five broad strategies listed above. A sample for Strategy #1 (Eliminate Person Trips or Reduce VMT) is shown as Figure 16. The brief description after each congestion mitigation “tool” provides a quick and straightforward way of understanding each tool. Additional detail is provided on several of the strategies, including developing land use and activity centers; enhancing public transportation; and transportation demand management. Specifically, the report details what is already happening in the MPO for each of these strategies.

Strategy #1 Eliminate Person Trips or Reduce VMT	Growth Management/Activity Centers
	1-1 Land Use Policies/Regulations Encourage more efficient patterns of commercial or residential development in defined areas. Specific land use policies and/or regulations that could significantly decrease both the total number of trips and overall trip lengths, as well as making transit use, bicycling and walking more viable include, but are not limited to the following: <ul style="list-style-type: none"> - Encouraging development in existing centers and/or communities (i.e. infill development) - Discouraging development outside of designated growth areas - Promoting higher density and mixed uses in proximity to existing or planned transit service - Establishing a policy for new and existing subdivisions to include sidewalks, bike paths, and transit facilities where appropriate
	Congestion/Value Pricing
	1-2 Road User Fees/HOT Lanes Includes area-wide pricing fees, time-of-day/congestion pricing and tolls. Most appropriately applied to freeways and expressways. Requires infrastructure to collect user fees. High Occupancy Toll (HOT) lanes – combines HOV and pricing strategies by allowing single occupancy vehicles to gain access to HOV lanes by paying a toll.
	1-3 Parking Fees Market-based strategy designed to modify mode choice by imposing higher costs for parking private automobiles. Most appropriately applied to parking facilities in urban environments.
Transportation Demand Management	
1-4 Telecommuting Encouraging employers to consider telecommuting options full- or part-time to reduce travel demand.	
1-5 Employee Flextime Benefits/Compressed Work Week Encouraging employers to consider allowing employees to maintain a flexible schedule - thus allowing the employee the option to commute during non-peak hours.	

Figure 16. Sample Listing of Toolbox Strategies (HRTPO, 2010)

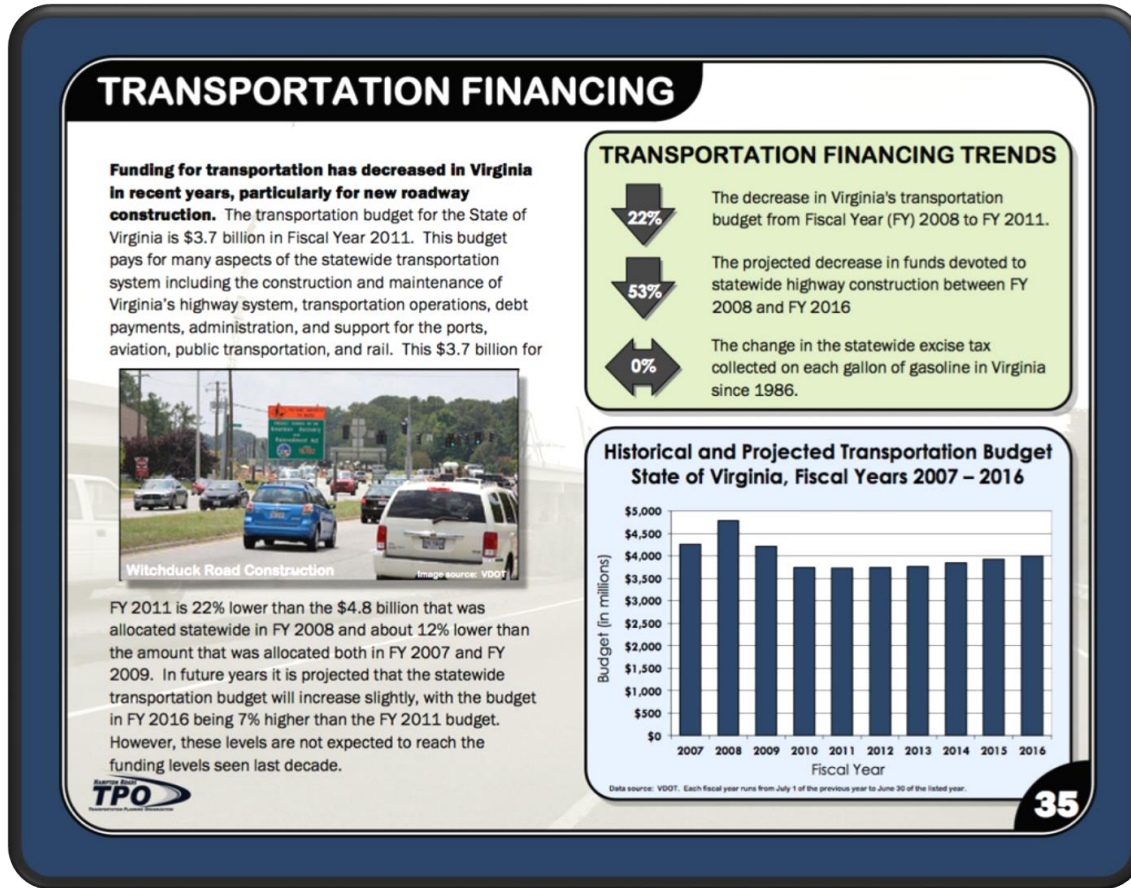


Figure 17. Financial Summary (HRTPO)

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

1. The HRTPO identified congestion corridors, then narrowed those down to a prioritized number based on the significance of the roadway along five dimensions: safety, national significance, travel speeds, freight, and level-of-service. The narrowed list made identifying specific strategies feasible.
2. The level of detail and comprehensiveness of the strategies – for the auto mode of travel – in the report seemed a good fit for the purpose of the CMP.
3. Detailed information and data was contained in appendices, not in the main body of the report. Level-of-Service charts included a color-coding scheme to easily identify which roadway segments were operating at a below-acceptable LOS. Public commentary on congestion



management and related strategies is a separate appendix.

4. A separate “State of Transportation” report independent from the CMP provides a visually appealing summary of the trends in transportation in the MPO, by mode, including pavement condition, bridge condition (again – an especially critical factor for this MPO), and information on roadway safety, commuter trends, and congestion trends. Each topic is limited to 1-2 pages in most cases (transportation financing being a notable exception), again emphasizing the readability of the document. The first page of the “Transportation Financing” summary is shown as [Figure 1Z](#).

Mid-America Regional Council (MARC; Kansas City, MO)

MARC has had an adopted congestion management policy since at least 2001. This policy describes what will be included in the CMS.⁸ The network, performance measures, data collection/monitoring program, identification/evaluation of congestion management strategies, and evaluation of effectiveness are laid out in some detail.

The CMS network is comprised of NHS routes; routes with ADT of 25,000 or more on segments of at least one mile in length; and routes with “high” levels of transit service.

Performance measures include daily LOS based on observed volume-to-capacity (V/C) ratios; peak period levels of service based on speeds and travel times; and the ratio of AM and PM peak average speeds compared to posted speed limits.

Data collection supports these performance measures and includes travel time runs, travel model outputs, and acquisition/management of traffic count data from state, local and private agencies.

⁸The CMS acronym denoting Congestion Management System was in use until 2007 when the “System” was replaced by “Process.”

MARC at a Glance

	MARC	HC
Population (millions)	1.8	1.1
Members (number)	20	8
2030 Growth (percent)	19	49
Organization Structure*	C	C

With only 20 voting members representing two states, nine counties and 120 municipalities, MARC has a strong representational structure.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

Strategies are described in a separate “toolbox” document prepared by Cambridge Systematics in 2001.

Evaluation strategies include modeling and before-and-after studies.

The policy document describes very specifically how the CMS/P relates to the long-range transportation plan (LRTP), Transportation Improvement Program (TIP), and special studies conducted by the MPO. Notably, the CMS provides performance information for project sponsors; identification of roadway segments for detailed studies; and the toolbox provides strategies for ultimate inclusion in the LRTP. Finally, the CMS Policy describes how the CMS/P will be updated and reviewed:

- Update every three years in advance of the update of the LRTP;
- Data collection every three years;
- Performance evaluated every three years;
- Regional travel model updated every three years;
- Traffic data added as it is reported to MARC; and
- Occasional updates to policy and other elements on an as-needed basis.

The Enhanced CMS (ECMS) Toolbox document (CS, 2001) breaks down strategies, by mode, in terms of congestion impacts, implementation costs, implementation timeframe (short-, medium-, and long-term), and analysis method. The eight different modal types are:

1. Highway Projects;
2. Transit Projects;
3. Bicycle and Pedestrian Projects;
4. Transportation Demand Management (TDM) Strategies;
5. Intelligent Transportation System (ITS) and Transportation System Management (TSM) Strategies;
6. Access Management Strategies;
7. Land Development Strategies; and
8. Parking Management Strategies.

Figure 18 illustrates a sample (for the transit mode) of this toolbox layout. The implementation cost is also presented in generalized terms.



Strategies/Projects	Congestion Impacts	Implementation Costs	Implementation Timeframe	Analysis Method
<p>2a. Reducing Transit Fares This encourages additional transit use, to the extent that high fares are a real barrier to transit.</p>	<ul style="list-style-type: none"> • Reduce daily VMT • Reduce congestion • Increase ridership 	<ul style="list-style-type: none"> • Lost in revenue per rider • Capital costs per passenger trip • Operating costs per passenger trip • Operating subsidies needed to replace lost fare revenue • Alternative financial arrangements need to be negotiated with donor agencies 	<ul style="list-style-type: none"> • Short-term: Less than one year 	<ul style="list-style-type: none"> • Regional Travel Model • DM Evaluation Model
<p>2b. Increasing Bus Route Coverage or frequencies This provides better accessibility to transit to a greater share of the population. Increasing frequency makes transit more attractive to use.</p>	<ul style="list-style-type: none"> • Increase transit ridership • Decrease travel time • Reduce daily VMT 	<ul style="list-style-type: none"> • Capital costs per passenger trip • Operating costs per trip • New bus purchases likely 	<ul style="list-style-type: none"> • Short-term: 1 to 5 years (includes planning, engineering, and construction) 	<ul style="list-style-type: none"> • TDM Evaluation Model • Regional Travel Model
<p>2c. Implementing Park-and-Ride Lots These can be used in conjunction with HOV lanes and/or express bus services. They are particularly helpful for encouraging HOV use for longer distance commute trips.</p>	<ul style="list-style-type: none"> • Reduce regional VMT (up to 0.1 percent) • Increase mobility and transit efficiency 	<ul style="list-style-type: none"> • Structure costs for transit stations 	<ul style="list-style-type: none"> • Medium-term: 5 to 10 years (includes planning, engineering, and construction) 	<ul style="list-style-type: none"> • TDM Evaluation Model • Regional Travel Model
<p>2d. Implementing Rail Transit This best serves dense urban centers where travelers can walk to their destinations. Rail transit from suburban areas can sometimes be enhanced by providing park-and-ride lots.</p>	<ul style="list-style-type: none"> • Reduce daily VMT 	<ul style="list-style-type: none"> • Capital costs per passenger • New systems require large up-front capital outlays and ongoing sources of operating subsidies, in addition to funds that may be obtained from federal sources, under increasingly tight competition. 	<ul style="list-style-type: none"> • Long-term: 10 or more years (includes planning, engineering, and construction) 	<ul style="list-style-type: none"> • Regional Travel Model

Figure 18. Sample CMS Strategies "Toolbox" (CS, 2001)

MARC also contracted the preparation of a performance measures report and implementation plan (for implementing the CMP). MARC provides a distinct monitoring tool in the style of a regional report card to communicate and monitor the effectiveness of the CMS/P strategies. A sample of this report layout is provided as [Figure 19](#).

ACCESSIBILITY					
FACTOR	MEASURE		DESIRED TREND		ACTUAL TREND
Level of transit service	Population within ½ mile of fixed-route transit service	↑	Population living within ½ mile of fixed-route transit stops	↓	-5.27% (2000–2010)
	Ridership	↑	Annual unlinked passenger trips ¹	↓	-9.22% (2008–2009)
	Revenue service hours	↑	Annual hours of operating service	↑	+7.15% (2008–2009)
Environmental justice	Transportation investment in environmental justice tracts ²	↑	Percent of total federal funds invested in environmental justice tracts	N/A	Awaiting data release in October 2011

ECONOMIC VITALITY					
FACTOR	MEASURE		DESIRED TREND		ACTUAL TREND
Transportation costs	Affordability	↓	Combined housing and transportation costs as a percent of median income	N/A	Awaiting release of 2010 data

CLIMATE CHANGE / ENERGY USE					
FACTOR	MEASURE		DESIRED TREND		ACTUAL TREND
Vehicle miles traveled	System-wide vehicle miles traveled	↓	Total vehicle miles traveled	↓	-4.37% (2007–2008)
		↓	Total vehicle miles traveled per person	↓	-4.65% (2007–2008)
Vehicle occupancy	Vehicle occupancy rate	↑	Number of vehicle occupants	↓	-0.62% (2008–2009)
Carbon dioxide	System-wide carbon dioxide emissions	↓	Tons of carbon dioxide emitted	N/A	No plans set to monitor in future

Figure 19. Sample Performance Measures Progress Report Summary (HRTPO, June 2011)

MARC has also created a CMP network viewer (<http://gis.marc2.org/cms/>), although only the street name is provided as information in the database for each roadway link at the time of this writing.



Finally, MARC conducted a best practices review in January 2000 that is similar to this one. This review identifies a “typical” CMS (again, using the terminology in vogue at the time), beginning with how the CMS is integrated into the planning process of the MPO. The points of integration include providing data to various studies; supporting fast-moving/high benefit projects; promoting thoughtful consideration of alternatives to capacity expansion; and addressing regional- or project-level impacts. The CMS helps prioritize options for further study, and suggested that five tiers of actions are represented in many CMS/P documents and processes: decrease trip-making, mode shift to non-auto modes, mode shift to high-occupancy auto modes, system management strategies, and actions that increase highway capacity as a last resort. To monitor the effectiveness of these strategies, MPOs used travel time runs; changes to v/c ratios or LOS; or monitoring number, severity, and clearance times for accidents. MPOs and State DOTs use various analysis tools such as ART_PLAN (part of the quality/level-of-service software developed by Florida DOT), Arizona’s ARAP (Arizona Roadway Analysis Program), or travel demand model simulations.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

1. The Mid-America Regional Council (MARC) contracted out a suite of studies in the early 2000’s that provided them with peer reviews, strategies, policies, performance measures, and a data collection / management approach (though this last is not quite as exhaustive as the one conducted for the Atlanta Regional Commission MPO).
2. The list of performance measures (for example, those shown in [Figure 19](#)) is comprehensive; go well beyond direct explanations of congestion; and are presented in an intuitive fashion.
3. Similarly, the strategies (another “toolbox”) are described very well; referenced by mode of travel; and are described through to implementation costs as well as benefits.
4. Although not necessarily recommended, MARC does not appear to have a single, comprehensive CMP report. However, they do present an annual reporting of conditions to their boards and the public.

PSRC at a Glance

	PSRC	HC
Population (millions)	3.7	1.1
Members (number)	43	8
2030 Growth (percent)	23	49
Organization Structure*	C	C

In spite of a complex organization, the MPO does excellent work, receiving AMPO's Overall Achievement Award in 2010 for its Transportation 2040 Plan.

*S=Independent MPO;
M=Hosted by Municipality;
C=Hosted by Regional Council

Puget Sound Regional Council (PSRC; Seattle, WA)

The Puget Sound CMP is contained in a single document that presents information as an existing conditions report. The CMP study area is divided into 12 regional subareas termed "SMART Corridors." Pavement and bridge condition information are presented as well as data on multi-modal systems. Performance measures are not shown but are being discussed for inclusion in 2012. The PSRC CMP is shaped not only by federal law, but also by Washington State policies, particularly VMT reduction targets, as well as the regional governance structure of the PSRC itself. The PSRC is very much oriented towards accomplishing regional growth strategies adopted in 2008 (VISION 2040 Plan); the long-range transportation plan and CMP are intended to support the goals outlined in that growth management policy. The CMP document notes that the CMP and the LRTP are linked in several specific ways:

- Land Use Planning – The denser, more "urban" forms in the VISION 2040 Plan will reduce trips and vehicle miles of travel, resulting in improved mobility.
- Managing System Demand – The region will invest in non-SOV modes of travel.
- Transportation System Management and Operations – Since non-recurring events account for 60% of congestion, investments in ITS can expand capacity without expensive capital outlays.
- Strategic Capacity Expansion – As noted in the MARC best practices review (CS, 2000), when all else fails, expanding the roadway capacity is needed.
- Additionally, the CMP evaluation step was used to measure progress towards achieving the VISION 2040 Plan objectives.

The SMART (Safe and Sustainable; Multimodal; Accessible; Reliable/Resilient; and Technology) Corridors were chosen based on perceptions of travel patterns and "commutesheds," those areas that represent collective origins and destinations (and all the transportation facilities in-between) for work trips. An Appendix (Appendix B) of the Transportation 2040 Plan includes project listings ordered by the SMART Corridors, an example of a direct linkage between the LRTP and CMP. [Figure 20](#) illustrates the location of the SMART Corridors.

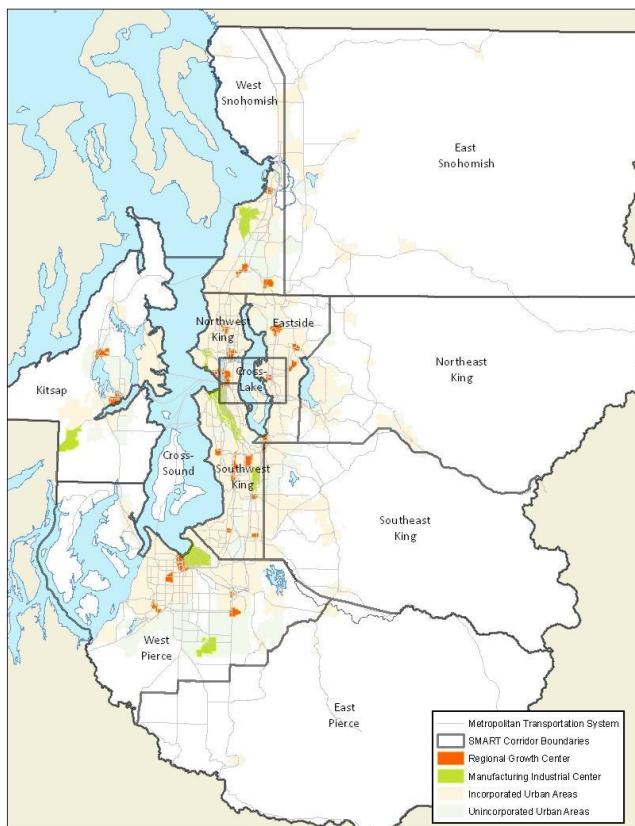
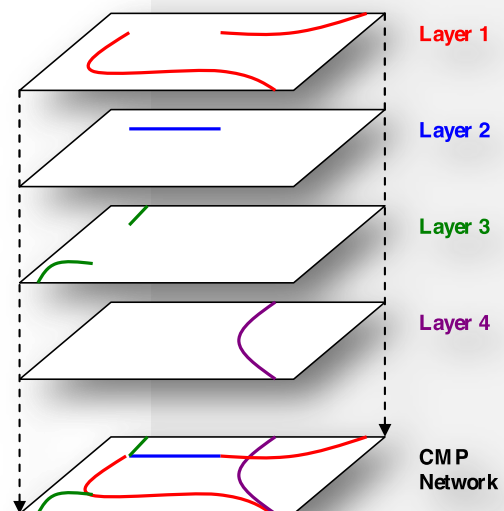


Figure 20. SMART Corridors in PSRC



The specific transportation network elements within each SMART Corridor were selected using a layered approach, as well as multi-modal and freight considerations. The “layers” of evaluation included factors like existing congestion, system performance, priority corridors for investment, bottlenecks/chokepoints, “key” arterials identified by a Traffic Operations Committee, “key” transit corridors identified by stakeholders, T1/T2 freight routes, and critical infrastructure and emergency management routes. These criteria were applied to routes that are in the Metropolitan Transportation System, or MTS. A facility on the MTS is critical to the social or economic health of the Region. Finally, 25 key arterials were identified through a 2009 ITS plan.

The CMP for Puget Sound identifies the Highway Performance Monitoring System (HPMS) as a resource for volume, cross-section, and pavement condition information. Areas that were operating at 70% or less of their peak efficiency were identified as bottlenecks (roadway narrows) or chokepoints (traffic congestion at intersections).

Each of the 12 SMART Corridors in the CMP has a description of existing conditions, important land uses, arterials, pavement condition, accidents, transit services, and existing TDM and TSM programs as well as freight, transit, and bike/pedestrian facilities.

Although the current CMP does not attempt to assign projects within the report or provide feedback monitoring on strategies, a report contracted by PSRC does provide a good review of their travel time study methodology. Equipment and personnel needs are described in some detail, as are methodological approaches to collecting, manipulating, and storing the data.

Candidate Practices for Use in the Hillsborough County MPO Congestion Management Process

1. The use of SMART Corridors could be applied to the primary corridors in HCMPO (frequently, high-volume corridors receive special attention and detail in the CMP). The presentation of the corridors and their description is very user-friendly and comprehensive, displaying accident, pavement condition, transit, bike/pedestrian, and roadway information in a condensed format.



2. The identification of chokepoints and bottlenecks fits in very well with the short- and medium-term implementation focus of the CMP generally, creating quick successes.
3. The detailed overview of the PSRC travel time study methodology, which is GPS-driven, may be useful should HCMPO decide to collect or expand its collection of travel time data.

2.0 Data Resources and Performance Measurement

The acquisition and management of data dealing with the transportation systems in Hillsborough County and the definition of performance measures that describe the transportation system's performance are inextricably linked. Data is used to populate performance measures. For example, a simple volume-to-capacity (V/C) ratio that compares the ability of a street to handle traffic and the amount of traffic that uses (or is forecasted to use) that street requires detailed data about traffic volumes and the capacity of the street segment operating at a specified level-of-service, both of which may change at different times of the day. This section describes data collection strategies, existing data resources, measuring performance in a way that is tied to the goals of the HCMPO, and finishing with a simple performance "report card," a table that summarizes the outcomes of the CMP.

Data Resources

A review of data resources was conducted for this project in order to ensure a degree of alignment between the data demands of the performance measurement estimation and evaluation of strategies and the data inputs that would be required. Florida DOT and FDOT District Seven; Hillsborough County and Hillsborough County MPO; and Hillsborough Area Regional Transit (HART) were sources of information for data that these agencies manage.

Florida is somewhat unique in that Florida Statutes (Chapter 339.177) require a traffic congestion management process. All of Florida's twenty-five Metropolitan Planning Organizations (MPOs) currently operate a Multimodal Management Process (MMP). Typically a Florida MPO's MMP:

1. Identifies the location of congestion by measuring the system's performance
2. Identifies the causes of congestion;
3. Reflects collaboration of a multi-disciplinary local steering committee with FDOT representation;
4. Recommends strategies to alleviate congestion which can be implemented quickly, inexpensively and can avoid the addition of general purpose lanes of roadway;



5. Is corridor-based; and
6. Provides a link between the short-range transportation improvement program (TIP) and the long-range planning process (LRTP).

The HCMPO MMP, and the State's requirements in general, mirror the federal requirements for a CMP in a number of ways, such as requiring the identification of causes of congestion, adaptation of strategies to alleviate congestion, and provides a short-term link between the transportation improvement program and long-range transportation plan. However, the Florida MMP statute was created in 1993 before the federal law changed to require a "process" instead of a system, and therefore bears some of the hallmarks of that era of federal legislation. Notably, the State statutes still point towards management system requirements not only for congestion but also for bridges, highway safety, pavement, public transportation, and intermodal facilities – the five management systems that were discontinued at the federal level.

The following is a brief description of the primary datasets available at the State level for populating performance measures.

Portable Traffic Monitoring Sites (PTMS) - PTMS are used on high volume urban arterials and help to provide Annual Average Daily Traffic (AADT). They count traffic for 3-7 days and are moved from location to location on an annual or quarterly basis.

Strategic Intermodal System Roads – This dataset provides locations of designated corridors that play a critical role in moving people and goods to and from other regions.

Average Daily Traffic Counts - ADTs are collected and compiled by FDOT. ADTs are essential in assessing the levels of congestion on a roadway, as well as being the foundation for calibrating the regional travel demand model (which in turn outputs performance measures). ADTs are collected at traffic monitoring sites.

Transit Riders – HART collects ridership information with passenger counters on mounted on the entrance to the buses. Not all buses are equipped with this counting device so the authority rotates buses through different routes in order to take an average count for all routes. These numbers indicate a volume of people travelling a corridor.

HART revenue hours and miles – Revenue hours and miles is a measure of bus efficiency.

HART On-Time Transit Data – All 70 buses are equipped with Auto Vehicle Locators (AVL). AVLs utilize GPS to record the exact location of the buses and are able to record the routes. Reports can be generated on demand for each route’s aggregated travel time; data is retained for historical tracking.

Table 9 identifies the key characteristics (“metadata”) for each data source.

Table 9. Data Sources

Name	Brief Description of Contents	Responsible Agency Contact Information	Agency Respon sible	Date / Frequency of Update	Scale of Data	Format of Data
Portable Traffic Monitoring Sites	The FDOT GIS PTMS shapefile provides feature class information on Florida Portable Traffic Monitoring Sites, the monitoring sites provide total volume of traffic on a highway segment for one year, divided by the number of days in the year.	Transportation Statistics Office 605 Suwanee Street Tallahassee, FL 32399 Tallahassee (ftp://ftp.dot.state.fl.us/fdot/co/planning/transtat/gis/shapefiles/aadt.zip)	FDOT	2011 / weekly	State of Florida at a scale of 1:24,000 with a projection system of Universal Transverse Mercator (UTM) 17 North zone and a horizontal datum of North American 1983 (NAD 1983). The map units are in meters.	Shapefile
Strategic Intermodal System Roads	The FDOT Strategic Intermodal System Roads feature class provides spatial information on existing and emerging SIS roads, derived from table SISFACTP. "Un-built Planned Add" facilities are not included.	Transportation Statistics Office 605 Suwanee Street Tallahassee, FL 32399 Tallahassee (ftp://ftp.dot.state.fl.us/fdot/co/planning/transtat/gis/shapefiles/aadt.zip)	FDOT	2011 / weekly	State of Florida at a scale of 1:24,000 with a projection system of Universal Transverse Mercator (UTM) 17 North zone and a horizontal datum of North American 1983 (NAD 1983). The map units are in meters.	Shapefile



Table 9, Continued

Name	Brief Description of Contents	Responsible Agency Contact Information	Agency Responsible	Date / Frequency of Update	Scale of Data	Format of Data
Average Daily Traffic Counts	The Annual Average Daily Traffic Roadways feature class	Transportation Statistics Office 605 Suwanee Street Tallahassee, FL 32399 Tallahassee (ftp://ftp.dot.state.fl.us/fdot/co/planning/transat/gis/shapefiles/aadt.zip)	FDOT	2011 / Annually	Line features on major corridor / routes in the State of Florida at a scale of 1:24,000.	Shapefile
HART Transit Riders	Riders of HART buses	Steve Felgenbaum Manager of Service Planning HART 1201 East 7th Avenue Tampa, FL 33605 Tel: (813) 384-6559 FAX: (813) 223-7976 (FelgenbaumS@gohart.org)	HART	2011 / Once every 4 months	Aggregated to route-level data from individual bus monitors. However, the native data "unit" would be each stop location.	MS-Excel spreadsheet
HART Revenue Hours and Miles	Automatic Passenger Counter Reports			2011 / Once every 3 years		MS-Excel spreadsheet
HART On-Time Data	On-time performance data			Perpetually, Reports produced as needed		MS-Excel spreadsheet

Directions of Congestion Management

The HCMPO has a history of producing a wealth of data that directly or indirectly describes the performance of its transportation systems. Based on this information, some specific trends can be identified, as well as recommendations based on those trends that influence the way in which future strategies for congestion management should be considered. The following are summaries of trends by mode of transportation and the major issues that the region can expect, followed by a summary of conditions and resulting recommendations.

Highway Performance

The Tampa and Hillsborough County area are the victims of their own success: success in attracting people and jobs to their region. Between 2006 and 2035 the Region's population is expected to grow by 47%, while the number of lane-miles of roadway will grow at one-fourth the rate of population growth during the same time period: 11.7%. The price of this growth has been high for the average family: the Region has the highest combined cost for housing and transportation of the top 28 metropolitan statistical areas (MSAs); one-third of a working class family's income is spent on transportation. While over 2,100 jobs and \$343 million in personal income are estimated to be a result of the 2035 CAA18 (Sales Tax) scenario, the costs of transportation to the average consumer will still be high – as will the amount of time they can expect to spend in congested conditions.

The LRTP calls for \$15billion of expanded roadway capacity, but the results are only incremental improvements to standard measures of roadway congestion. [Table 10](#) illustrates the magnitude of some of these changes between the large set of improvements (“Build”) and what would happen if only projects that were committed to now were constructed (“No-Build”). Changes in predicted accidents and severity are relatively unchanged, as are miles of travel experiencing uncongested or moderately congested conditions (volume-to-capacity or V/C ratios of 0 to 1.2). The greatest positive impact of this investment is seen in reductions in total delay (compared to uncongested, or free-flow, conditions) and time spent in severely congested (V/C over 1.5) conditions. Even these positives are somewhat misleading, as only 2.8% of travel occurs in the 2006 model under severely congested condition of V/C greater than 1.5 – a category which jumps to between 30% and 40% of all vehicle miles traveled in



Measure	2006	2035 No-Build	2035 Build (CAA18)	Percent Change 2006 to No-Build	Percent Change 2005 to Build	Difference			
						No-Build to Build	06 to No-Build	06 to Build	No-Build to Build
Accidents	120	205	202	71%	68%	-1%			
Injuries	77	131	129	70%	68%	-2%			
Fatalities	0.46	0.8	0.79	74%	72%	-1%			
Evacuation Routes	1,922	2,089	2,211	9%	15%	6%			
V/C Ratio (Overall)	0.63	1.08	1.02	71%	62%	-6%			
0 to 0.9	53.00%	16.70%	20.30%	-68%	-62%	22%			
0.91 to 1.0	13.80%	6.10%	6.30%	-56%	-54%	3%			
1.01 to 1.2	20.40%	12.90%	13.20%	-37%	-35%	2%			
1.21 to 1.5	10.10%	23.80%	28.50%	136%	182%	20%			
1.5+	2.80%	40.60%	31.80%	1350%	1036%	-22%			
Total Vehicle Hours of Delay	355,637	2,166,080	1,629,232	509%	358%	-25%			

Table 10. Automobile-Related Performance Trends

the Build and No-Build scenario, respectively. Also notable is the observation that the category of congested conditions just below the worst level markedly increases as some travel moves from severely congested to heavily congested (V/C of 1.21 to 1.50).

The conclusions from this set of observations on the automobile driver and passenger impacts of planned, future improvements to roadway capacity include the following:

1. As many researchers have noted, while roadway capacity increases help alleviate congestion, the relief is temporary under conditions where high population and employment growth occurs – especially if growth occurs in a dispersed manner and congestion is measured on a regional basis. Note that an 11.7% increase in roadway

lane miles (sales tax scenario for 2035) yields about a 6% difference in the volume-to-capacity ratio compared to the No-Build option; for every 1% increase in system expansion, the result is about a 0.5% decrease in the V/C ratio. This statistic is also indicating much worse performance over the 2006 base year in either the No-Build or Build scenario.

2. There are hidden economic and social costs attributable to a high level of infrastructure investment in highway capacity, as well as having highly congested conditions. Impacts to mobility, accessibility, neighborhood traffic concerns, emissions, water quality, social structures, and certain business types become more likely due to construction and secondary and cumulative effects.
3. Since much of the population and employment growth are beyond the control of the HCMPO, it is necessary to account for this growth when considering performance measures for transportation. For example, while a 10% increase in vehicle hours of delay may seem like negative performance, it is less likely to seem so in the face of a 40% increase in population over the same measurement period.
4. Additions to highway capacity alone are insufficient to meet the needs of a rapidly growing region – other alternatives that allow people to bypass congestion and the effects of congestion are warranted, including investments in public transit, bicycling, walking, travel demand management, and operational improvements. These alternative modes of travel are discussed in the following section.

Alternative Modes of Travel Performance

As noted previously, even under very high levels of roadway capacity investments, congested conditions become more the norm than the exception in 2035. If a degree of congested conditions for automobile users is to be expected, then an emphasis on alternatives to automobile travel become more important to the consumer of travel services in the Region. Public transportation investment is the most obvious and largest target for capital allocations after highways, although the performance of buses operating in general traffic is dependent to a degree on the performance of the roadway.



The following tables illustrate some of the forecasted through improvements cited in the 2035 Long-Range Transportation Plan (Table 11) and data collected over the past decade at 20 locations around the Region (Table 12).

Table 11. Forecasted Alternative Mode Figures

Measure	2006	2035 No-Build	2035 Build (CAA18)	Percent Change 2006 to No-Build	Percent Change 2006 to Build	Difference			
						No-Build to Build	06 to No-Build	06 to Build	No-Build to Build
Bus Route Miles	1,370	1,254	1,935	-8%	41%	54%	—	■	■
Rail Route Miles	2	3	59	50%	2850%	1867%	—	■	■
Transit Hours	2,754	3,102	7,860	13%	185%	153%	—	■	■
Local Bus Riders	28,684	57,008	87,291	99%	204%	53%	—	■	—
Express Bus Riders	435	898	26,085	106%	5897%	2805%	—	■	■
Rail Boardings	296	1,230	47,096	316%	15811%	3729%	—	■	—
Jobs within 1/3-mile of TLOS B or Better Transit	7%	15.50%	17.30%	121%	147%	12%	■	■	—
Population within 1/3-mile of TLOS B or Better Transit	13.00%	23.00%	55.00%	77%	323%	139%	—	■	—
Major Roads with Sidewalk	n/a	324	558	n/a	n/a	72%			
Major Roads with Bikeways	n/a	369	601	n/a	n/a	63%			

The amount of service anticipated by the (sales tax enhanced) Build scenarios are large, increasing the size of the bus and rail systems by over 40% and by a factor of 28 times the 2006 system, respectively. These investments in public transportation, however, actually result in even larger gains in ridership than the percent change in the system coverage. Rail

boardings, in particular, change from less than 300 in 2006 to over 47,000 in 2035. Without the sales tax scenario, however, the No-Build future, while increasing overall ridership compared to the base year of 2006 numbers, is many times smaller than the Build ridership. Not surprisingly, the number of jobs and people with access to transit also increases, as do miles of major roadways with bicycle and / or pedestrian accommodations.

The HCMPO also periodically counts 20 stations around the Region in terms of bicycle and pedestrian traffic, resulting in useful trend data (Table 12).

Table 12. Recent Bicycle/Pedestrian Trends (20 counts per collection year)

User Characteristic	2000	2005	2011	Difference			2000 to 2005	2005 to 2011	2000 to 2011
				Percent Change 2000 to 2005	Percent Change 2005 to 2011	Percent Change 2000 to 2011			
Total Bikes/Peds	2,458	2,586	3,240	5%	25%	32%	—	■	■
Walk	1,713	1,792	2,015	5%	12%	18%	—	■	■
Bicycle	745	750	1,188	1%	58%	59%	—	■	■
7 AM - 9 AM	356	421	484	18%	15%	36%	—	—	■
9 AM - 4 PM	1,423	1,678	1,827	18%	9%	28%	■	—	■
4 PM - 7 PM	679	876	929	29%	6%	37%	■	—	■
Male	1,683	1,783	2,269	6%	27%	35%	—	■	■
Female	775	797	969	3%	22%	25%	—	■	■
Child	168	69	51	-59%	-26%	-70%	■	—	■
Teen	495	411	574	-17%	40%	16%	■	■	—
Adult	1,527	1,671	2,439	9%	46%	60%	—	■	■
Mature Adult	268	434	176	62%	-59%	-34%	■	■	—
Helmet Used	116	175	321	51%	83%	177%	—	—	■



Adult pedestrians and cyclists have increased at these 20 locations, although males consistently outnumber females by a better than 2:1 ratio. The number of children and older adults using the system has decreased, even as overall numbers of pedestrians and cyclists have gone up. Also noteworthy is that peak period pedestrians and cyclists have increased faster than mid-day users, implying that the pedestrian and cycling modes are being used to a greater degree by commuters.

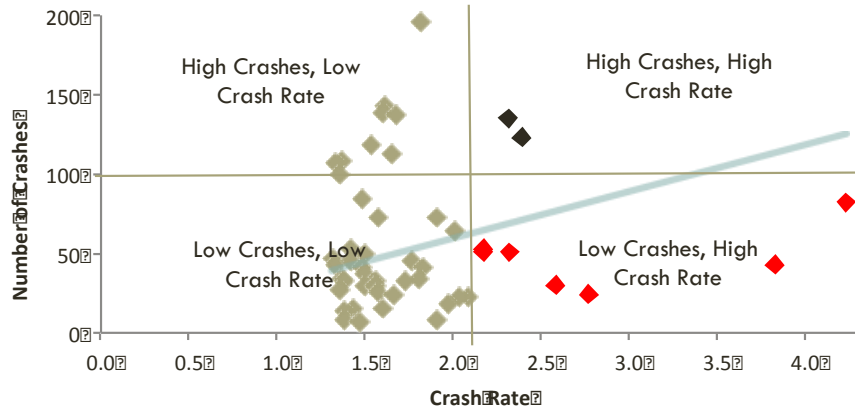
The conclusions about public transportation users, cyclists and pedestrians from this set of data are somewhat mixed, although the trends from the past as well as the future indicate substantial increases in the number of people taking these modes of travel. The following are some additional observations about alternative mode trends, past and forecasted.

1. While transit ridership will increase in the future, major investments in the transit system components result in percentage gains in riders of both the bus and rail systems forecasted in the future that are larger than the percentage of system expansion would suggest. When an expansion in either the bus or rail system of 1% is made, the ridership increases by 5%.
2. The trends in some segments of the population to favor more walking and bicycle-riding appear positive as well, although more detailed investigations (surveys) of users would be needed to clarify the reasons behind some of the trends noted, such as increases in middle-aged and peak period walkers/bikers, and decreases in youth and older pedestrians and cyclists.
3. The 20 data points currently being collected may be insufficient to comfortably draw a conclusion about walking and biking in a region as large, dynamic, and diverse as Hillsborough County. Collecting more data more frequently (e.g., once every three years) would help create better clarity in the trends as well as to begin to understand the benefits of investments in different types of walking and biking environments. Assessing accident data is particularly problematic with low samples, since more accidents involving pedestrians and cyclists will logically occur where there is more walking and cycling – a “high accident location” may really only be a place where there are many pedestrians and cyclists compared to other parts of the County.

4. Latent demand (based primarily on complimentary land uses in close proximity) can also be used to supplement raw count data to help determine infrastructure priorities.

Safety and Operations Performance

The final category of trend assessment is safety and operation statistics. While not a separate mode of travel per se, safety and operational considerations are often obscured by larger trends. Intersection locations with the highest crash rates contribute in an important way to the overall level of delay and reliability that a travel could expect to see in a corridor. [Table 13](#) on the following page lists the top 50 highest crash rate intersections in the Region, ordered by number of crashes. Note that some locations have a much higher crash rate than other locations; assuming we would expect to see a direct and proportional correlation between traffic volumes and crash frequencies, then intersections like Big Bend Road and US 301 are outliers that may have substandard geometries or other conditions that are promoting the high crash rate. By charting these accidents in a graph like the one below (the linear trend line is shown in blue), the importance of addressing these intersections can be determined.



Locations with high crash rates and high crash volumes (black symbols) are the most important to study and fix, while intersections with low numbers of crashes but high crash rates probably indicate locations (red symbols) where there is a substandard geometry or other condition that could be addressed fairly quickly and effectively. Countermeasures like improving left-turn offsets, signal phasing, markings, traffic circle replacements, enforcement, and signage could help avoid some of the future intersections – creating crash diagrams for each of the high-priority intersections would be necessary to gain a better understanding of the conditions creating the high crash rates, as would field observations.



Table 13. Top 50 Highest Crash (Rate) Intersections

Street Name	Intersecting Street	Crash Rate	Crashes	Street Name	Intersecting Street	Crash Rate	Crashes
SR 60	BRANDON TOWN CENTER DR	1.8	195	SR 585	(N 22nd) 7TH AVE	1.3	43
US 301	CAUSEWAY BLVD	1.6	143	US 92	BRANCH FORBES RD	1.8	41
US 92	56TH ST	1.6	139	SR 45	21ST AVE	1.5	41
US 41	40TH ST	1.7	137	SR 45	LAKE AVE	1.5	37
US 301	GIBSONTON DR	2.3	135	SR 574	FORBES RD	1.8	34
SR 582	(FOWLER) MORRIS BRIDGE RD	2.4	123	SLIGH AVE	ANDERSON RD	1.4	34
US 41	FLETCHER AVE	1.5	119	US 41	SHELL POINT RD	1.7	33
CR 676	FALKENBURG RD	1.7	112	CR 579A	BELL SHOALS RD	1.4	33
SR 580	56TH ST	1.4	109	SR 39	SAM ALLEN RD	1.6	32
US 41	BUSCH BLVD	1.3	107	US 41	BUSINESS 17TH AVE	2.6	30
US 41	BEARSS AVE	1.4	100	CR 573	PALM RIVER RD	1.5	30
US 92	ORIENT RD	1.5	84	US 41	BUSINESS JEFFERSON ST	1.6	29
US 301	BIG BEND RD	4.2	82	BIG BEND RD	SUMMERFIELD BLVD	1.4	26
SR 39	JAMES L REDMAN PKWY	1.9	72	JEFFERSON ST	WHITING ST	1.6	25
US 41	CAUSEWAY BLVD	1.6	72	PROVIDENCE RD	PROVIDENCE LAKES BLVD	2.8	24
SR 45	COLUMBUS DR	2.0	64	CR 640	MILLER RD	1.7	24
US 301	SUN CITY CENTER BLVD	2.2	53	15TH ST	131ST AVE	2.1	23
ARMENIA AVE	SLIGH AVE	1.4	53	SR 585	(N 22nd) COLUMBUS DR	2.0	23
US 41	SYMMES RD	2.3	51	SR 585	(N 22nd) 21ST ST	2.0	18
US 301	SYMMES RD	2.2	51	US 92	WILLIAMS RD	1.6	15
US 41	BUSINESS KENNEDY BLVD	1.5	50	SR 585	(N 22nd) 17TH AVE	1.4	15
SR 676	78TH ST	1.3	47	US 301	19TH AVE NE	1.4	14
US 92	COUNTY ROAD 579	1.8	46	JEFFERSON ST	CASS ST	1.9	8
SR 60	TURKEY CREEK RD	1.4	45	DURANT RD	SAINT CLOUD AVE	1.4	8
SR 585	(N 22nd) PALM AVE	3.8	43	RIVERVIEW DR	KRYCUL AVE	1.5	6

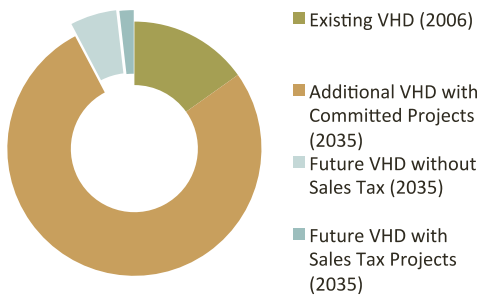
Once an accident occurs, the amount of time required to respond, assess, and clear an accident is critical to reducing traveler delay on a roadway. This type of delay, which along with construction- and weather-induced delays comprise “non-recurring” congestion, is not typically analyzed in travel demand models but is responsible for a large percentage of delay (note: the Albany, NY MPO has suggested that non-recurring congestion is responsible for more than 50% of total delay on major roadways in their region). Additionally, secondary accidents are often the result of more cars encountering the rear of the queue or being otherwise distracted by the accident recovery efforts, further emphasizing the need for a quick response after an accident occurs.

The local trend in the recovery time for accidents in the Hillsborough County area has recently dropped, according to research conducted in 2010 for the CMP update process. A reduction of three minutes – from an average of 48 down to 45 minutes – was recorded for the 67,000 incidents that were reported in 2009 in FDOT District 7. However, other measures of performance are sending the signal that crash recovery efforts still have room for improvement:

- The Buffer Time Index for some segments of roadway were 0.80, implying that an additional 80% of the average travel time was required to ensure on-time arrival
- Some arterials have very high signal-related delay, including SR 60, Bruce B. Downs Boulevard, and Hillsborough Avenue
- The quantity and level of data detail on the major road system are important issues, since only certain segments of Interstate currently have real-time traffic data collected continuously

The most congested segments of roadway in the HCMPO are shown in the following table. These congestion levels are based on traffic counts and generalized level-of-service thresholds; actual capacity and flow studies might produce different results. Hillsborough County (unincorporated) prepares a similar listing based on period 24- and 72-hour counts conducted throughout the unincorporated areas of the County.

The magnitude of the impact of growth on these corridors is considerable: in all, the number of vehicular hours of delay on these roads is expected to grow from approximately 355,000 hours in 2006 to over 2.1 million hours in 2035, even if currently committed improvements are constructed – a growth factor of six. The impact of projects that can be afforded without a sales tax results in a 23% reduction in delay over the future alternative; a 1% sales tax contributes another 3% reduction. The chart at left illustrates how these reductions compare to the large growth in travel and delay.





Existing Congested Major Corridors	Segment Length (Miles)	Existing Congested Major Corridors	Segment Length (Miles)
Bearss Ave / Bruce B Downs Blvd from 30th St to Cross Creek Rd	6.5	Sheldon Rd from Hillsborough Ave to Ehrlich Rd	5.8
SR 580 / Hillsborough Ave from Pinellas/ Hills Co Line to Memorial Hwy	4.8	I-75 from Selmon Crosstown Expwy / SR 618 to I-4	5
I-275 from Pinellas / Hillsborough Co Line to I-4	7.4	US 92 / SR 574 / MLK Jr Blvd from I-4 to I-75	3.5
SR 60 / Adamo Dr from US 301 to I-75	1.5	Gunn Hwy from Dale Mabry Hwy to Veterans Expy	4.5
SR 60 / Courtney Campbell Causeway from Pinellas / Hillsborough Co Line to Eisenhower Blvd	6.5	US 301 from Big Bend Road to Selmon Crosstown Expwy / SR 618	11
SR 580 / Hillsborough Ave from Memorial Hwy to Dale Mabry Hwy	5	US 92 / Gandy Blvd from Pinellas / Hills Co Line to Dale Mabry Hwy	9
SR 60 / Adamo Dr from 50th St to US 301	3	I-75 from Big Bend Rd to Leroy Selmon Crosstown Expwy / SR 618	10
Bearss Ave / Bruce B Downs Blvd from Florida Ave to 30th St	2.4	I-275 from Bearss to I-75 N	7
US 41 from Bearss to Hillsborough / Pasco Co Line	6	SR 60 / Adamo Dr from Channelside Dr to 50th St	3
Dale Mabry Hwy from Hillsborough Ave to US 41	13	Veterans Expwy from Hillsborough Ave to Dale Mabry Hwy N	13.2
Gunn Hwy from Veterans Expy to Hillsborough / Pasco Co Line	8.6	Selmon Crosstown Expwy from Willow Ave to I-75	10
Kennedy Blvd from I-275 to Dale Mabry Hwy S	2.1	Westshore Blvd from Kennedy Blvd to Spruce St / Boy Scout Blvd	1
I-275 from I-4 to Bearss	8.5	US 92 / SR 574 / MLK Jr Blvd from I-75 to Alexander St	12
I-75 from I-4 to I-275	13	N Suncoast Expwy (Hillsborough / Pasco / Hernando Counties from SR 589 /	54
Dale Mabry Hwy / US 92 from Kennedy Blvd to Hillsborough Ave	3.6	US 301 from I-4 to Fowler Ave	4.7
Fowler Ave from I-275 to I-75	7	I-75 from Manatee / Hillsborough Co Line to Big Bend Rd	12
US 301 from Fowler Ave to Hillsborough / Pasco Co Line	11	Selmon Crosstown Expwy from Gandy Blvd to Willow Ave	1
US 301 from Leroy Selmon Crosstown Expwy / SR 618 to I-4	4.5	Brandon Prkwy from I-75 to CR 676 / Lumsden Rd	2.4
SR 60 / Kennedy Blvd / Memorial Hwy (from Westshore Blvd to Courtney Campbell Causeway	2.5	US 92 / SR 574 / MLK Jr Blvd from I-275 to I-4	4.2
SR 60 from I-75 to Turkey Creek Rd	10	US 301 from Manatee / Hillsborough Co Line to Big Bend Road	11.5
Boy Scout Blvd / Spruce St from Memorial Highway to Dale Mabry	2.5	US 92 from Alexander St to Hillsborough / Polk Co Line	5
SR 574 / MLK Jr Blvd from Dale Mabry Hwy to I-275	3	US 41 from Busch Blvd to Bearss	4
I-4 from I-275 to I-75	8	CR 39 from SR 674 to SR 60	16.5
I-4 from I-75 to Hillsborough / Polk County Line	18	US 41 from Manatee / Hillsborough Co Line to Big Bend Rd	14
Westshore Blvd from Gandy Blvd to Kennedy Blvd	3.6	Branch Forbes Rd from SR 574 to Thonotosassa Rd	3
US 41 from Big Bend Rd to Selmon Crosstown Expwy	10	Gibson Rd from US 41 to I-75	2.1
Dale Mabry Hwy / US 92 from Interbay Blvd to Kennedy Blvd	5	Crosstown / I-4 Connector from Selmon Expwy /SR 618 to I-4	0.8

Table 14. Top 50 Most Congested Roads in Tampa

The recent (as of this writing) efforts at improving Intelligent Transportation Systems (ITS) technologies and practices within HCMPO have already yielded some new insights on the data resources that are on-line now and new resources, such as the new traffic management center and a new county-wide simulation in Synchro software. This latter will provide information beyond what the current, macro-scale travel demand model can offer, such as better estimations of vehicular delay, fuel consumption, carbon emissions, and detailed level-of-service estimations for roadway segments and intersections. Additional work for crash data analysis along all signalized corridors will also be a part of the ITS mission. The benefit-cost ratios for operational strategies is dramatic: the top ten priority corridors for ITS improvements are estimated to yield better than a 36:1 benefit-cost ratio based on estimates of savings in fuel consumption and vehicular hours of delay.

The conclusions obtained from studying the current ITS effort and CMP studies conducted over the past two years are:

1. Technology-based improvements continue to gain traction in many high-growth communities since they are often easier and cheaper to implement than physical expansions of roadway capacity, and have a smaller impact footprint on the environment and communities
2. The amount of growth in travel through 2035 overwhelms the relatively small changes that major highway capacity expansion efforts will yield; hence, operational improvement strategies should accompany new roads and expanded road projects, as well as stand-alone ITS upgrades/retrofits of existing roadways. Even with an estimated additional 15% capacity improvement from ITS technologies added on top of the physical improvements, the HCMPO Region will incur ever-larger amounts of vehicular delays.
3. To understand, assess, and communicate the benefits of ITS and operational strategies requires a lot of data, including acquisition, management, and distribution strategies
4. Data currently resides in different places within HCMPO and can be hard to access. Better coordination between different entities responsible for data collection would provide more information to the planning and prioritization process at HCMPO.



5. HCMPO should take advantage of FDOT's recent decision to acquire INRIX (data collected from private GPS users) to replace and supplement ground-based efforts at collecting travel time information on roadway corridors and segments

Performance Measurement

The role of performance measures in the CMP can't be overestimated, as they are literally the linkage between the objectives of the MPO and the strategies that are used to address elements of congestion. Performance measures should be clear, inform one or more goals of the CMP, not duplicate each other with overlapping information, and have data available or fairly easily obtained to evaluate the measure. These characteristics of performance measures are described below.

Data Availability relates to how easily information that allows an evaluation with the measure can be accessed and managed. Data sets created from field observations over a large area have poor availability; data sourced from existing information and a reliable source, appropriate scale, and in a manageable format is highly available.

The **Uniqueness** of a performance measure characterizes how little the measure overlaps descriptions from one or more other performance measures. For example, volume-to-capacity ratios, link travel delay, and level-of-service on link segments measure very similar components of congestion. While less overlap is desired, some measures may impart important nuances about components of congestion that would help measure the effectiveness of a particular strategy.

Clarity refers to the ability of the performance measure to be easily grasped by a variety of audiences, technical and non-technical alike. Because the CMP is intended to be accessed publicly and convey the state of the transportation system to a broad audience, the clarity of a performance measure is a necessary characteristic.

Purposes of performance measures refer to how well each measure illuminates one or more goals in the CMP. A clear relationship should exist between the measure and the goals in the long-range transportation plan, for example.

The following shows how the goals, performance measures and strategies align with each other, and provide a convenient summary of how Hillsborough County MPO will approach congestion management in its region.

MPO Context Measures

The HCMPO should establish some baseline performance measures that consider the entire MPO and its movement towards established congestion and service goals. A number of measures have appeared in past, adopted planning documents such as safety action plans, transit development plans, and the MPOs' own long-range transportation plan. Citing past measures can provide continuity with past data sets as well as a degree of surety that this information can be collected and managed for future CMP updates.

The first measure, volumes of traffic in order of level-of-service, is collected typically by the travel demand modeling process, and provides an intuitive sense of the performance of the system or for certain classes (e.g., arterial, interstate) that are represented in the model. Volume groupings are another way to stratify the VMT by level-of-service assessment.

The second measure, percent of population within close proximity to public transportation, addresses both a demand (land use density) and supply (number, location and length of routes) factor. Changing land use over time would cause this metric to rise, as would providing more transit service. One potential change to this measure is to compute a statistic that relates both numbers of people resident (or working) near transit with the quality of that transit service, typically expressed as frequency of service to each transit stop. This measure was used in the *2035 Long-Range Transportation Plan*.

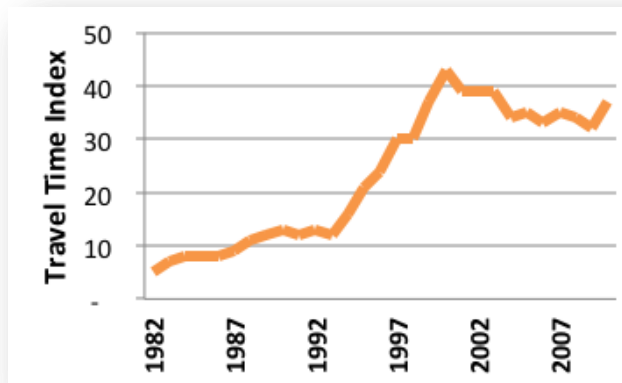
Another potential adjustment is simply comparing bikeway facilities (e.g., bicycle lanes, sharrows, markings, wide outside lanes or striped shoulders) and sidewalk facilities (typically, only sidewalks, adjacent paths or parallel greenways) to the number of street centerline miles. Places that have a high ratio of sidewalk-to-street miles can make a claim of being a more "walkable" place. Comparing the number of bikeway facility and sidewalk centerline miles to street centerline miles produces a ratio between 0 (no bike or pedestrian facilities) to 2.0 (bikeway and sidewalks are present along both sides of the street for every street in the study area). The latter is a stated goal, for example, in the comprehensive pedestrian plan (November 2004) adopted by the HCMPO.



Table 15. Contextual Performance Measures

Our Measure of Performance	Data Collection Needs	Success Means...	Strategies for Improvement
VEHICLE MILES OF TRAVEL IN POOR LEVELS-OF-SERVICE	MPO-maintained database	The percent of VMT in the in the lower (E and F) levels of service would be reduced at each monitoring report	<ul style="list-style-type: none"> • Access management program • HOV / HOT lanes • Signal timing and coordination • Accident management programs
PERCENT POPULATION WITH ACCESS TO PUBLIC TRANSPORTATION	MPO analysis	The percent of the population in a subarea or in the MPO within 1/4-mile and 3/4-mile of a transit stop would increase at each monitoring report	<ul style="list-style-type: none"> • Promotion of Regional Activity Centers • Develop TIA guidelines for the design of alternative modes of travel • Overlay districts for densities and form • MPO review of major developments • Growth management restrictions
NUMBER OF VANPOOLS AND CARPOOLS	TBARTA-maintained database	The number of vanpools and carpools in a subarea or the entire MPO/TBARTA service area would increase at each monitoring report	<ul style="list-style-type: none"> • Car-Sharing programs • Ridematching services • Compressed/flexible workweeks • Employer outreach/mass marketing • Parking cash-out • Preferential carpool / vanpool parking • Alternative commute subsidies • Bridge, Cordon or Congestion Pricing
BIKEWAY AND SIDEWALK CENTERLINE MILES EXPRESSED AS A RATIO TO ROADWAY CENTERLINE MILES	MPO-maintained database	The number of bikeway and sidewalk miles would increase compared to total street centerline miles to produce a ration that would increase with each CMP monitoring report	<ul style="list-style-type: none"> • Sidewalk “gap” closure program • New bicycle & pedestrian facilities • More requirements for private developments to create on- and off-site bicycle and pedestrian facilities
IMPROVE TAMPA-ST. PETERSBURG STANDING IN NATIONWIDE CONGESTION INDEX	Database and annual performance report maintained by Texas Transportation Institute (TTI)	A part of the HCMPO mobility report should include statistics from this report for the Tampa-St. Petersburg area, incl. percent VMT and percent of the system that is congested	<ul style="list-style-type: none"> • All of the strategies previously listed are viable options for changing this standing; however, measures that lower VMT and operational improvements are most relevant to the TTI statistics.

Finally, the TTI (Texas Transportation Institute) Annual Urban Mobility Report provides an often-cited and useful comparison of the Tampa-St. Petersburg metropolitan area to other metropolitan peers across the country. The report is published annually, and considers population as a normalizing factor among the metropolitan areas. The TTI Travel Time Index value for our region is shown below; other measures such as fuel consumption and congestion costs are also reported in the annual compilation of statistics.



The next three tables illustrate how specific performance measures can enhance the HCMPO's understanding of specific goals that have been adopted by the agency for mobility and safety. As with the context measures, specific strategies are identified that will address each objective, and data requirements and sources are noted.

Goal	Our Measure of Performance <i>(Alternative Performance Measure)</i>	Data Collection Needs	Success Means...	Strategies for Improvement
WE WOULD LIKE TO (A) REDUCE THE FREQUENCY AND SEVERITY OF CRASHES, FOCUSING ON THE HIGHEST CRASH AREAS; AND (B) MINIMIZE THE EFFECT OF UNSCHEDULED INCIDENTS				
<p style="text-align: center; font-size: 2em; font-weight: bold;">1</p> <hr/> <p style="text-align: center; color: #4F81BD;">Improve Reliability of Travel</p>	<p>1.1 REDUCED CRASH RATES IN TOP 50 AREAS</p> <p><i>(Reduction in delay due to incidents)</i></p>	Crash data; average daily traffic or annual average daily traffic volumes at each of 50 areas to produce crash rates that are independent of total vehicular volumes	A reduction in the rate of vehicular crashes between each successive CMP monitoring report in each corridor or subarea	<ul style="list-style-type: none"> • Imaging for surveillance and detection • Roadside assistance program expansion (e.g., Road Ranger program) • Emergency Management Systems (EMS) • Emergency vehicle preemption • Road weather information • Traffic Management Centers (TMCs) • Curve speed warning system • Work zone management
	<p>1.2 REDUCED MINUTES OF CLEARANCE TIME PER ACCIDENT ON LIMITED ACCESS FACILITIES</p>	Undetermined; better coordination with first responders or traffic data center is required	A reduction in the average and median clearance times for accidents within a specified corridor segment, subarea, or MPO-wide	
	<p>1.3 REDUCED BUFFER TIME INDEX (BTI)</p> <p><i>(Planning Time Index)</i></p>	AirSage data set OR travel time data collection program	A lowering of the BTI in each corridor or subarea between each successive CMP monitoring report	

Notes and Commentary

Identifying appropriate performance measures for reliability has traditionally been challenging, since oftentimes there are not comprehensive databases devoted to assessing the amount of time it takes to reach, manage, and clear an accident. Third-party information using either cell-phone tracking or global positioning system (GPS) tracking could provide a solution; other options would be to coordinate with first responders to understand if systematic records are being kept now or could start to be recorded.

The selection of which intersections should appear on the CMP report – and on subsequent CMP reports – would have to be decided by staff and board members.

The Buffer Time Index (BTI) is a lucid measure of performance for reliability, but it can be slightly more difficult to explain to a lay audience, and does not necessarily compare easily against average travel times, for example. Typically, some confidence interval (e.g., 90% or 95%) is established, so that the actual measure would be described as, “the amount of additional time required to reach a particular destination (e.g., work) from a particular origin (e.g., home) 95% of the time.”

Goal	Our Measure of Performance <i>(Alternative Performance Measure)</i>	Data Collection Needs	Success Means...	Strategies for Improvement
WE WOULD LIKE TO (A) IMPROVE THE ATTRACTIVENESS OF TRANSIT & HOV TRIPS; AND (B) IMPROVE THE SAFETY & COMFORT OF BICYCLING & WALKING TRIPS				
<p style="text-align: center; font-size: 2em; font-weight: bold;">2</p> <p><i>Shift Peak-Hour Trips to Modes of Travel Instead of Single-Occupant Cars</i></p>	<p>2.1 DAILY TRANSIT RUNS DELAYED BY CONGESTION</p>	<p>Information about the on-time performance of HART routes</p>	<p>A reduction in the number of transit runs that are not late at the end of the run</p>	<ul style="list-style-type: none"> • Transit signal priority systems • Dynamic routing/scheduling • Service Coordination (buses/trains sharing real-time information) • Queue avoidance lanes • Use of shoulders for transit vehicles during peak periods
	<p>2.2 INCREASE IN THE NUMBER OF PEOPLE BIKING AND WALKING</p>	<p>Bicycle counts; Pedestrian counts</p>	<p>Increase in the number of cyclists and pedestrians in a corridor or subarea relative to the population change in that same area</p>	<ul style="list-style-type: none"> • Safe Routes to School initiatives • Improve pedestrian facilities at intersections • Sidewalk “gap” closure program • Creation of new bicycle and pedestrian facilities
	<p>2.3 REDUCTION IN THE TOTAL SEVERE AND FATAL BICYCLE AND PEDESTRIAN CRASHES</p> <p><i>(Reduction in bike/pedestrian crash rates, OR percent of population within easy reach of transit)</i></p>	<p>Information on bicycle and pedestrian crashes from Hillsborough County crash management system mapped to specific locations; preferably with information on types/causes and cyclist & pedestrian volumes to facilitate countermeasures and control for cyclist/pedestrian volumes</p>	<p>A reduction in the number of crashes overall as well as a reduction in the number of fatalities, relative to changes in the population in the corridor or subarea being monitored</p>	<ul style="list-style-type: none"> • Addition of bicycle racks at public transit stations / stops • Bike sharing programs • Bicycle / Pedestrian education programs • Bicycle and/or Pedestrian corridor safety studies & implementation

Notes and Commentary

Bicycle and pedestrian count data is relatively sparsely collected at this point in time; additional count locations would probably be required in any of the corridors that the MPO might select for detailed monitoring. Information on bicycle and pedestrian crashes is much easier to access, but must always be

balanced against the total “window of exposure” that increases when more people use bicycles or walk more frequently. Hence, the number of bicycle and pedestrian counts should be coordinated with the crash data locations.

Goal	Our Measure of Performance <i>(Alternative Performance Measure)</i>	Data Collection Needs	Success Means...	Strategies for Improvement
WE WOULD LIKE TO (A) IMPROVE PEAK-HOUR OPERATIONS; AND (B) REDUCE PEAK-HOUR DEMAND ON OUR ROADWAYS				
<p style="text-align: center; font-size: 2em; font-weight: bold;">3</p> <p style="color: #4F81BD; font-weight: bold;">Reduced Peak-Hour Impacts</p>	<p>3.1 DECREASE DELAY AT TOP 50 INTERSECTIONS</p> <p><i>(Cycle failures or queue lengths; OR number of signals in coordination)</i></p>	<p>A study of the signals being monitored, including turning movement counts (TMCs) and an intersection capacity analysis to compute delay (note: this would also produce a level-of-service value)</p>	<p>A reduction in the amount of delay, measured in minutes of lost time, at each of the 50 intersections (note: if these locations are focused in the same corridors that are being monitored, then this would help target improvement strategies that would benefit the entire corridor)</p>	<ul style="list-style-type: none"> • Freeway ramp metering • Arterial traffic calming (e.g., narrowing, landscaping) • Red-Light camera enforcement • Traffic signal timing • Probe or remote traffic monitoring • Safety Improvements • Turn Lane construction or extension • Roundabout construction • Implementation of dynamic signal coordination • Strengthen access management policies
	<p>3.2 VEHICLE HOURS OF DELAY ALONG THE TOP 50 ROADWAY SEGMENTS</p> <p><i>(Volume-to-Capacity Ratio; OR Travel Time Index)</i></p>	<p>AirSage dataset OR floating car (travel time) studies conducted in every corridor being monitored</p>	<p>A reduction in the amount of delay, measured in minutes of lost time, for each of the 50 roadway segments being monitored</p>	
	<p>3.3 GREEN-TO-RED SIGNAL RATIO</p> <p><i>(CSPI, or Corridor Synchronization Performance Index)</i></p>	<p>Signal timing plans for the corridor, OR using field observations at individual intersections to record cycle failures</p>	<p>An increase in the number of green signals to red signals in a corridor implies that better coordination between signals, more effective access management, and overall better traffic flow are being achieved.</p>	

Notes and Commentary

Intersection delay accounts for a significant share of total delay in a corridor in urbanized areas; hence, decreasing delays at intersections (3.1) will have the effect of reducing delays in corridors and along roadway segments in corridors (3.2). Although these two measures would almost certainly move in tandem, the overlap may be worthwhile in the sense that addressing delay in corridors between intersections would use a different set of strategies, such as access management, than would intersection improvement strategies like better coordination, changing the geometries, and so forth.

Collecting data for either would require some new resources in the form of acquiring and manipulating the third-party (e.g., AirSage) dataset or conducting numerous floating car studies. Note that each floating car study typically requires between four and eight “runs” in each direction for each time period being studied. Therefore, if peak hour delay is the focus of this particular Goal, a minimum of eight morning and eight afternoon floating car “runs” would be required to collect the data to produce a reliable estimate of actual travel times. Many such studies include a mid-day series of “runs,” since mid-day peaks are fairly prevalent in areas with high levels of office-based employment. Generators such as universities may have still other peak periods that would require additional data collection outside of the morning, mid-day, and afternoon peak periods.

Modern signal timing strategies in urban corridors (e.g., where signal spacing is typically four per mile or less) relies heavily on signal coordination so that vehicles can travel through the corridor in a well-defined “platoon” that experiences minimal delays at several intersections. While average travel speeds are the most commonly used way of measuring signal coordination performance, factors others than signal coordination may influence average speeds. Motorists may also be sensitive to a relatively small scale of operating speeds that an average may not accommodate. Two measures were reviewed to address the concept of improving corridor flow: green-to-red signals encountered, and the CSPI (Corridor Synchronization Performance Index). The green-to-red signal ratio was chosen mainly because it offered an intuitive way of communicating the desirable minimal stopping frequencies in a corridor. The CSPI, which involves a point system developed in Orange County, CA using speed, stops per mile, and green-to-red ratio, is more robust but also much more difficult to understand and communicate to a lay audience. Achieving a goal of four greens per red signal would be very desirable, and implies that “runs” of seven or eight consecutive green signals are frequent occurrences.

The final product of these measurements, and perhaps the only one that many people would see, is a “report card” or table that summarizes the performance measures by connecting them to the goals of the MPO at one end and the preferred and real outcomes at the other end. It is desirable to have this table presented in a way that is very intuitive to a large audience; previous sections of this report note practices in other parts of the country that take advantage of color-coding to represent performance, or using simple symbology like up or down arrows to reflect real or desired trends.

Table 16 on the following page is a partial representation of some of the data and trends that were immediately available to the MPO. At the far left are the goals and their respective performance measures; the middle section addresses the actual data in terms of past, current, and changes between them; and the section at far right reports on both the desired and real trends occurring in the MPO. Note that for this example (A) not all of the data were readily available, (B) a green-yellow-red color signature was used to quickly display if the performance measure outcome was heading in the right direction, posted little change, or was headed in the opposite direction; and (C) if the trend was improving in light of the population increases that the MPO is facing. For example, while the nationwide congestion index (a contextual, or background, measure) showed only a moderate change, it nevertheless improved significantly compared to the change in population.

Once the data is collected for the remaining cells, the report card can be completed fairly easily. The representation of the performance trend symbols is automated, and updates whenever a new value is entered into the “data” section cells.



Table 16. Sample Performance Report Card

	Performance Measures	DATA				TRENDS				
		Previous	Current	Change		Desired	Actual		Beats Population Change	
Context	Vehicle miles of travel in poor level-of-service VMT in conditions of LOS "E" and "F"	46.0%	46.3%	1%		↓	●		✓	
	Percent population with access to public transportation Population (compared to total population in Hillsborough County) within 3/4-mile of a public transit route or stop	57.8%	N/A	N/A		↑	N/A		N/A	
	Number of vanpools and carpools	1098	1639	49%		↑	✓		✓	
	Bikeway and Sidewalk Centerline Miles expressed as a percent of roadway centerline miles	26.1%	37.5%	44%		↑	✓		✓	
	Hillsborough-St. Petersburg Metro Area standing in nationwide congestion index	1.19	1.16	-3%		↓	●		✓	
Goal 1	1.1 Reduced crash rates in top 50 areas	182	169	-7%		↓	✓		✓	
	1.2 Reduced minutes of clearance time per incident on limited access facilities	48	45	-6%		↓	✓		✓	
	1.3 Reduced Buffer Time Index (BTI) <i>BTI is the additional time needed to traverse route to ensure (95% confidence) that arrival is on-time, divided by the average travel time</i>	0.46	0.63	38%		↓	✗		✗	
Goal 2	2.1 Daily transit runs delayed by congestion	11.2%	9.8%	-13%		↓	✓		✓	
	2.2 Increase in the number of people biking and walking	2,586	3,240	25%		↑	✓		✓	
	2.3 Reduction in total severe+fatal bicycle and pedestrian crashes	Total 965	Sev+Fat 285	Total 879	Sev+Fat 257	Total -9%	Sev+Fat -10%	Total ✓	Sev+Fat ✓	Total ✓
Goal 3	3.1 Decrease delay at top 50 intersections	N/A	N/A	N/A		↓	N/A		N/A	
	3.2 Vehicle hours of delay (thousands) along the top 50 roadway segments	213	N/A	N/A		↓	N/A		N/A	
	3.3 Green-to-Red Signal Ratio <i>Number of green signals encountered on a roadway segment compared to the number of red signals encountered, expressed as a percentage (e.g., 200% is a 2:1 green-to-red ratio)</i>	N/A	N/A	N/A		↑	N/A		N/A	

3.0 Updating the Congestion Management Process

The Congestion Management Process differs in one key respect from the original Congestion Management System, one of six “systems” originally promulgated in the Intermodal Surface Transportation Efficiency Act of 1991: the CMP has to be repeatedly updated, and the results of each compared to previous “runs” to ensure that progress is being made on the congestion mitigation performance measures adopted in the CMP.

The following text provides an illustration of a step-by-step procedure for validating the goals and objectives; performance measures and targets; and strategies contained in the CMP. Each step in the CMP update process indicates both the federal requirements for that step contained in the CMP legislation (Title 23 Sec. 450.320, see also [Appendix A.1](#)) as well as the best practice strategies encountered in the research conducted for this report. At the end of this section a summary of the anticipated costs in terms of staff hours and/or private consulting or vendor costs are attributed to each task in the CMP update.



Step 1. Developing Objectives

The HCMPO has carefully defined objectives for the CMP. Generally, the CMP objectives should be aligned closely with or are identical to those found in the long-range transportation plan and other adopted policies and plans. Further, once the objectives are formalized there should be very little need to make significant changes to the objectives in each subsequent update of the CMP since those changes may also change the performance measures and therefore impair the ability of the MPO to measure progress over time, a key objective of the CMP itself. The goals and objectives for the HCMPO Congestion Management Process are as follows:

Goal Number One. Improve Reliability of Travel

- Objective 1.1: Reduce the frequency & severity of crashes focusing on the highest crash areas
- Objective 1.2: Minimize the effect of unscheduled incidents

Goal Number Two. Shift Peak-Hour Trips to Modes of Travel Instead of Single-Occupant Cars

- Objective 2.1: Improve the attractiveness of transit & HOV trips
- Objective 2.2: Improve the safety & comfort of bicycling & walking trips

Goal Number Three. Reduced Peak-Hour Impacts

- Objective 3.1: Improve peak-hour operations
- Objective 3.2: Reduce peak-hour demand on our roadways

Goal Number Four. MPO System-Wide Trends

- Objective 4.1: Ensure that the MPO as a whole is moving in the right direction
- Objective 4.2: Understand our congestion management performance compared to our peers

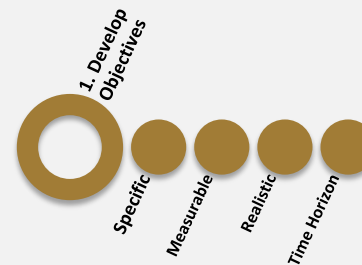
While these goals and objectives should not change with every CMP update, they should be approved by the HCMPO policy and technical boards at the outset of every CMP update process, alongside the performance metrics used to evaluate each objective.

WHAT THE FEDERAL REGS SAY

The CMP has to be integrated to the rest of the MPO planning process. The congestion management objectives should be coordinated with local stakeholders since the concept of congestion may vary among communities. In addition to congestion, managing demand for single-occupant vehicle travel and improving operations are explicitly stated in the regulations.

BEST PRACTICE CONCEPTS

Goals and objectives are aligned with those in the LRTP and growth management policies/plans. Generally, this linkage is so strong that separate objectives for the CMP are seldom discussed. HRTPO does have measurable objectives that it employs, but these are more in the form of performance measures that come later in the CMP design.



WHAT THE FEDERAL REGS SAY

The CMP regulations, while not specifically calling out how study areas will be defined, do reference both the MPO “area” and subareas, specifically corridors and bottlenecks. The latter is an important term, since the elimination of safety issues or bottlenecks can be accomplished with capacity increasing projects without going through the full congestion management process.

BEST PRACTICE CONCEPTS

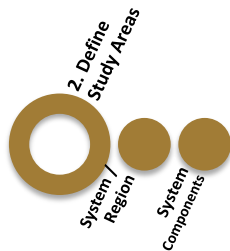
Corridors are commonly called out in the CMPs of other metropolitan planning organizations; bottlenecks (and/or “chokepoints”) are less commonplace but still occur with some regularity. Bottlenecks reference locations that have a disproportionately large impact on congestion and operations.

Step 2. Define Study Areas

The MPO is the default study area for the CMP. However, the focus on short-term solutions; the size and complexity of the MPO study area; and the need to have more detailed studies conducted on the most problematic and heavily used corridors translates into a need for addressing individual corridors. Smaller areas, called “bottlenecks,” should also be defined since they often represent a key point in a corridor that has to be addressed if substantial congestion relief is to occur. Examples of bottlenecks can include narrow bridges, interchanges with poor / outdated geometries, and intersections with an insufficient number of turning lanes, insufficient turning bay storage, or geometrical problems.

The HCMPO has not identified the corridors and bottleneck locations that it wishes to study in more detail in the CMP, but some fundamental principles in selecting these locations should be used in the CMP update process. Like objectives, these study areas should not experience many changes from CMP to CMP, since the evaluation of them over time is the most important output of the CMP to measure progress in alleviating problems.

Corridors that merit additional attention in the CMP are identified in at least two ways, the results of which should be cross-validating: either a computerized travel demand model is employed that can display congested “links” in the roadway network, or through surveys of professional staff, officials, and the general public. Hence, each CMP update should conduct a two-tiered deficiency analysis, with congested links (measured by volume-to-capacity ratios greater than 1.0) in a travel model, and survey results from digital (or paper-based format equivalents) should be used to identify those corridors that are the most congested in the MPO. The MPO itself is another study area, and to ensure that the MPO is “moving in the right direction (Objective 4.1), the HCMPO should be compared against other MPOs in the annual Texas Transportation Institute’s measurement of congested regions around the country.





Step 3. Performance Measures

The HCMPO has already associated objectives and performance measures; like the previous two steps, subsequent updates that change the performance measures should be extremely rare in order to preserve data continuity and allow temporal comparisons of performance.

For the CMP update, the HCMPO should ensure that data is still available to populate each performance measure; otherwise, a substitute measure may have to be employed (or the MPO will have to finance additional data collection activities).

Objective →	Reduce the frequency & severity of crashes focusing on the highest crash areas	Minimize the effect of unscheduled incidents	Improve the attractiveness of transit & HOV trips	Improve the safety & comfort of bicycling & walking trips	Improve peak-hour operations	Reduce peak-hour demand on our roadways	Ensure that the MPO as a whole is moving in the right direction	Understand our congestion management performance compared to our peers
Performance Measure ↓								
1.1 Reduced crash rates in top 50 areas	■	■			■		■	
1.2 Reduced minutes of clearance time per accident	■	■	■		■		■	
1.3 Reduced Buffer Time Index (BTI)		■			■		■	
2.1 Daily transit runs delayed by congestion			■		■	■	■	
2.2 Increase in the number of people biking and walking			■	■	■	■	■	
2.3 Reduction in the frequency and severity of bicycle and pedestrian crashes	■			■			■	
3.1 Decrease delay at top 50 intersections		■	■		■		■	
3.2 Vehicle hours of delay along the top 50 roadway segments			■		■		■	
4.1 Vehicle miles of travel by level-of-service					■		■	
4.2 Percent population with access to public transportation					■	■	■	
4.3 Number of vanpools and carpools					■	■	■	
4.4 Bikeway and Sidewalk Centerline Miles expressed as a ratio to roadway centerline miles			■	■	■		■	
4.5 Improve Hillsborough County MPO standing in nationwide congestion index							■	■

Legend: ■=Directly Applicable Measure; ▣=Indirectly Applicable Measure

Figure 21 is a list of performance measures described in this report, and the objectives that they describe. Note that some performance measures may describe more than one category (goal) of objective, albeit if only as an indirect measurement.

WHAT THE FEDERAL REGS SAY
 Objectives and performance measures are paired together in the CMP regulations, and must be developed in concert with various stakeholders. Performance measures describe the effectiveness of congestion relief and “mobility enhancement” strategies so that the MPO and its partners can periodically reevaluate and supplement or substitute with new strategies.

BEST PRACTICE CONCEPTS
 Few MPOs have defined “targets,” instead opting for describing a directional trend in performance. Performance measures go well beyond automobile congestion, and include measures of safety, transit performance, and bicycle/pedestrian attractiveness. MARC describes a desired trend direction for each measure, as well as a numerical evaluation based on historic data.

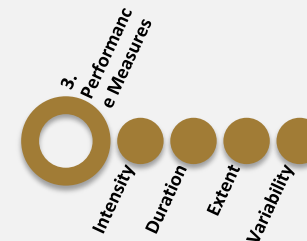


Figure 21. Performance Measures and Relationship to Objectives

WHAT THE FEDERAL REGS SAY

Data collection should be coordinated with other agencies (and the MPO) and efforts, especially ITS planning. Data collected should describe the location, extent, duration, causes, and effectiveness of strategies dealing with congestion issues in the study areas.

BEST PRACTICE CONCEPTS

Creating new datasets is not a specified objective of the CMP, and making maximum use of existing data resources is the preferred way of acquiring data to populate the CMP performance measures. Travel demand models, traffic counts, accident databases, and third-party resources that collect data from cell phones and GPS units are commonplace resources. Special studies at intersections (or other bottleneck areas) and in high-priority corridors are recommended.



Step 4. Collect and Monitor Data

Unlike the first three steps in the CMP update process, the collection and monitoring of data will be one of the more time-consuming steps in the process, and one of the areas that will result in changes in the CMP report between updates. Data collection has to support both the performance measures that indicate if a strategy is working and the identification of study areas (corridors and bottlenecks).

The HCMPO will collect data on each of the identified study areas, corridors and bottlenecks identified in Step 2. By mode, the following table lists data needs for each CMP update.

Table 17. Data Items and Source(s)

Mode	Data Item	Source(s)
Transit	Ridership	TBARTA
	Route Times	TBARTA
	On-Time Performance, by Transit Stop (in corridors)	TBARTA**
	Vanpools and Carpools	TBARTA
	Percent Population within Quarter-Mile of Transit	TBARTA/HCMPO*
Automobile	Crash Rates @ 50 Intersections	HCMPO*
	Vehicular Delay @ 50 Intersections	FDOT/HCMPO**
	Congested & Free-Flow Travel Times	HCMPO/INRIX***
	Miles of Travel by Level-of-Service	HCMPO
	Pedestrian- and Bicycle-Related Crashes	HCMPO*
Bicycle & Pedestrian	Bike & Pedestrian Facility Miles	HCMPO*
	Roadway Centerline Miles	HCMPO*
MPO-Wide	Nationwide Metro Area Travel Time Index Score	TTI

*Data item is likely to require collection or calculation, including mapping to study corridors

**Data item is likely to be time-consuming to gather

***Data item is purchased from third-party vendor/supplier

As can be seen in [Table 17](#), several data items will require important levels of resources, including staff time (or private consulting funds) and time from MPO partner organizations. In addition to these sources the MPO should work with FDOT to acquire and map average daily traffic counts (ADTs), and work with member agencies to standardize and manage location counts conducted during traffic impact assessments for new/expanded developments.



Step 5. Evaluation of Problems

The primary purpose of Step Five is to take the data gathered in Step Four and create a clear, brief picture of the conditions in each study area and bottleneck, as well as the possible causes of poor performance (as described by the performance measures from Step Three). Since the CMP cannot support a deep examination of every problem, sketch planning tools and qualitative, group assessments should be used to support the preliminary identification of issues and what kind of approach might be required to further study issues in the more complex study areas and bottlenecks. Frequently, the study of problems and the identification of strategies to help address the problem(s) occur nearly simultaneously, so Steps Five and Six often occur together. The focus of the current discussion is to outline how to present information for study areas, corridors, and bottlenecks (which are assumed to be intersection or interchange areas less than one-half-mile in length).

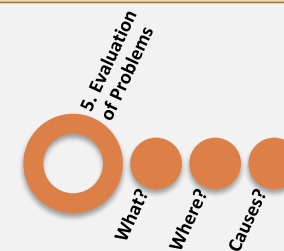
For Areas: The use of charts indicating desired trends, actual trends and the use of color coding is recommended. Typically, areas will have a fairly high-level review and focus on basic infrastructure and service issues like network connectivity, land use / development, and policy concerns. Therefore, mapping is going to be limited to showing basic service patterns such as the location of sidewalk gaps, poor bicycle suitability, high delay intersections and road segments, and low transit service frequencies (for example).

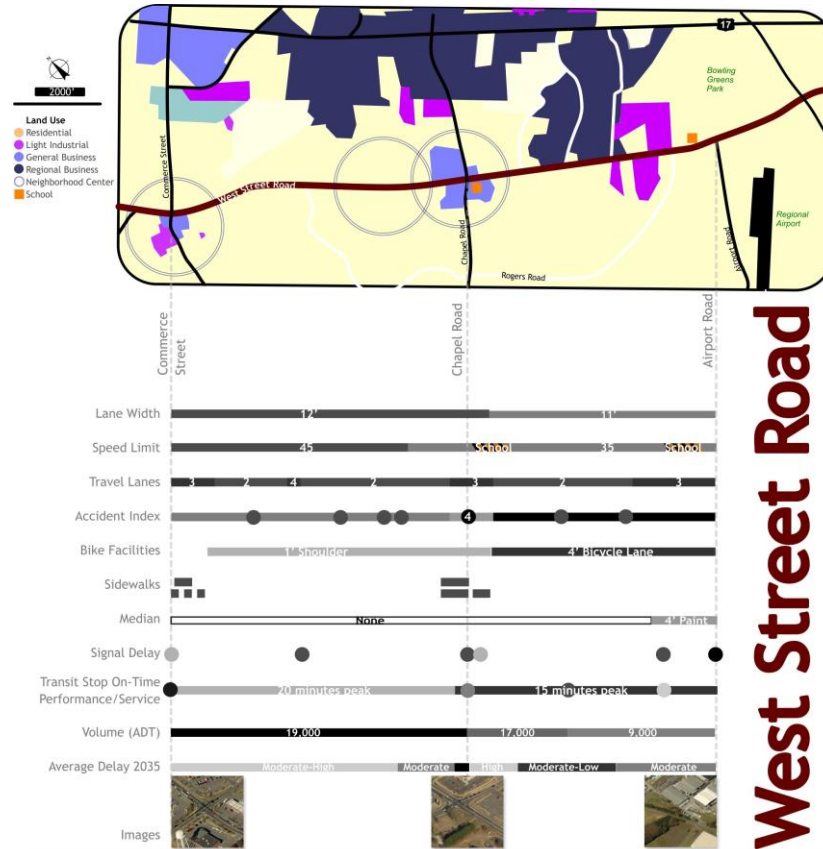
For Bottlenecks: Small areas around bridges, intersections, interchanges, or any place where capacity or travel demand changes should be shown as small diagrams with a location map and key statistics on traffic volumes as well as a description of the issues at this location. A chart illustrating delay for each movement at the intersection during peak periods would also be useful for illustrating the traffic conditions at each location; separate diagrams would present pedestrian crossing and cycling provisions; accident diagrams; and other potential constraints such as lighting levels, approach speeds, and nearby land uses or topography.

For Corridors: Using strip maps like those shown in the Capital (Washington, DC) Region MPO that can illustrate land use, signalized intersection locations, presence of sidewalks or bike lanes, or any other information including performance measures, pictures, and future cross-sections. The 2005 CMP already employs strip mapping in a “congestion report card” format. [Figure 22](#) on the next page illustrates another example of a strip map using a fictitious street.

WHAT THE FEDERAL REGS SAY
Like other facets of the CMP, the evaluation of problems should be done in cooperation with the relevant stakeholders and service providers in each study area or corridor. FDOT, HART, TBARTA, and land use/transportation planning or engineering staff from MPO member agencies would be typical participants.

BEST PRACTICE CONCEPTS
Separating out detailed studies for high-profile, heavily traveled, or rapidly developing corridors is a key feature of many CMP efforts, and allows a greater focus and depth on solving complex issues. However, providing a clear and succinct summary of “current conditions” and an initial perspective on the causes of congestion are the key outputs of this step. The clever use of mapping and color-coded charts to explain large quantities of data quickly is a hallmark of many CMPs.





The West Street Road corridor serves as both a relief valve for US 17 to the north and as an important commercial corridor in its own right, although lower-density residential zoning and uses predominate currently in this transitioning urban corridor. Transit service and access control are presently minimal, as are pedestrian and bicycling facilities. Commercial nodes at important intersections mark neighborhood centers in the local land use plan. Congestion performance will remain moderate in 2035 except at the Chapel Road intersection where congestion remains high. Circumferential collectors around this development node would improve the area, as would more mixed-use and interconnected, multi-modal friendly development patterns.

Figure 22. Sample Strip Map Diagram Hillsborough County MPO Congestion Management Process Report



The assessment of strategies typically falls into quantitative and qualitative evaluations. Qualitative assessments have an important value to the CMP, since the CMP is tied to an update schedule that limits that amount of time to a point that few quantitative assessments can withstand. [Table 18](#) suggests the range of assessment actions that MPOs typically can invoke during the CMP update or in-between updates to create a stronger technical underpinning for recommending various strategies.

Table 18. Assessment Techniques

More ▲ ▲	<p>Travel Demand Models. Regional travel models have the ability to create maps based on measures of delay for automobile and transit modes, dynamically calculating the mode shares as a function of travel time and demographic inputs. These models in general have a limited ability to assess signal-induced delay and thereby assess intersection improvements; calculate benefits for bicycle and pedestrian modes of travel; and have a limited ability to assess internally captured trips from “smart growth” developments.</p>
	<p>Microsimulation Models. A number of models, such as VISSIM and SynchroProfessional / SimTraffic are well-developed and already in widespread use that allow determinations of level-of-service, delay, queue lengths, cycle failures, fuel consumption and other variables. The added benefits of a visual simulation of traffic allow for the easy communication of results to a broad audience.</p>
	<p>Sketch Planning Tools. Tools such as Florida DOT’s Quality Level-of-Service Q/LOS model can provide quick, multi-modal assessments of capital improvements, while other tools can quickly assess the relative benefits of ITS strategies (IDAS), land use strategies (CommunityViz), and policy changes (STEAM).</p>
▲ ▲ Less Complex Similar	<p>Qualitative Models. The creation of complex technical models relative to their actual ability to accurately predict the effects of congestion measures suggests a relatively low cost-benefit ratio. The use of qualitative assessments by a group of qualified technical specialists or conducted by an outside consultant can provide quick assessments of many strategies relatively inexpensively, and account for factors that are considered intangible to more quantitative tools.</p>

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WHAT THE FEDERAL REGS SAY

Federal regulations state clearly that operations, management, public transportation strategies should be examined for congestion solutions as well as projects that increase single-occupant vehicle capacity. Even in locations where more SOV capacity is recommended, demand management and operations strategies should be employed as part of the project design.

BEST PRACTICE CONCEPTS

CMPs seldom go into the necessary level of detail required by complex traffic and land use interactions; many CMPs rely on parallel or out-of-process corridor studies to “feed” information to the CMP. Strategies are selected using a combination of qualitative and “stepped” quantitative analytic methods that range from qualitative assessments to microsimulation.



Step 6. Selection of Strategies

The CMP is required to consider non-capacity (for single-occupant vehicles) solutions first before programming a capital-intensive project to widen lanes or construct new roadways. The ability of the MPO by itself to implement these strategies is extremely limited in the majority of cases; the MPO must rely on the state department of transportation, local governments (especially in the case of land use strategies), and transit operators to as partners.

Figure 23 on the following page highlights many of the non-capacity-increasing strategies in popular use or at least being considered in many parts of the country arranged in four general groupings: demand management, alternative mode promotion, traffic operations, and land use techniques. Each technique is described by three factors:

Term-Effectiveness: The period in which the maximum return on investment could be achieved; 1-5 years is (S)hort-Term; 6-15 years is (M)edium-Term; and 16-25 years is (L)ong-Term. Some techniques may require a longer period to implement simply due to the required coordination between agencies or creating a successful design.

Recurring or Non-Recurring: The type of congestion causal factor that the technique is most likely to address; (R)ecurring congestion refers to typical peak-period congestion created by over-capacity conditions; (N)on-recurring refers to both construction- and accident-related delays.

Public Acceptance: The degree to which the public and elected officials may be expected to support the implementation of the technique. This evaluation is highly subjective, and some of the more controversial measures may still receive significant support in the face of severe congestion. The categories are (L)ow acceptance; (M)oderate acceptance; and (H)igh acceptance. Note that a high level of acceptance may sometimes refer to a condition of apathy towards the measure by the general population, while a low level of acceptance may also refer to a low level of adoption of the technique by the general population.

The following list of strategies is a starting point; additional measures may be conceived in the evaluation stage and subsequent, more detailed analyses.



Strategy	Public Acceptance			Term Effectiveness			Strategy		
	Public Acceptance	Congestion Type	Term Effectiveness	Public Acceptance	Congestion Type	Term Effectiveness			
Traffic Operations	Imaging for surveillance and detection	H	N	S	L	R	S	Carpooling	
	Service patrols (e.g., Road Ranger)	H	N	M	L	R	M	Car-Sharing programs	
	Emergency Management Systems (EMS)	H	N	S	L	R	S	Ridematching services	
	Emergency vehicle signal preemption	H	R	S	H	R	S	Guaranteed Ride Home Program	
	Bus Signal Preemption	M	R	S	L	R	S	Vanpooling	
	Road weather information	H	N	M	M	R	S	Telecommuting promotion	
	Traffic Management Centers (TMCs)	H	N	M	M	RN	M	Access management program	
	Curve speed warning system	H	N	S	M	R	S	Compressed/flexible workweeks	
	Work zone management	H	N	S	M	R	M	Employer outreach/mass marketing	
	Dynamic traffic signal systems	M	R	M	M	R	M	Parking cash-out or carpool parking incentives	
	Roundabout constructions	M	RN	S	M	R	M	Alternative commute subsidy program	
	Freeway ramp metering	L	RN	M	L	R	L	HOV lanes	
	Variable speed limits	M	R	M	L	R	L	Variably priced lanes	
	Arterial Traffic Calming	M	N	S	L	R	M	Cordon or Congestion Pricing	
	Red-Light camera enforcement	M	N	S	L	R	L	Bridge tolling	
	Traffic signal timing	M	R	S	H	R	M	Electronic payment systems	
	Reversible Lanes or movable medians	M	RN	M	H	R	ML	Improvements/added capacity to rail, trolley, and bus transit	
	Land Use	Parking Management & Information Systems	H	R	S	H	R	M	Safe Routes to School initiatives
		Probe Traffic Monitoring	H	RN	S	H	R	S	Park-and-ride lot improvements
		Advanced Traveler Information Systems	H	RN	M	H	R	S	Improve pedestrian facilities at intersections
511 Traveler Information		H	RN	S	M	R	M	Sidewalk gap closure program	
Variable Message Signs (VMS)		H	RN	S	H	R	M	Creation of new bicycle and pedestrian facilities	
Highway Advisory Radio (HAR)		H	RN	S	H	R	S	Addition of bicycle racks at public transit stations / stops	
Transit Information Systems		H	R	S	M	R	M	Bike sharing programs	
Safety Improvements		H	N	S	H	R	M	Bicycle / Pedestrian education program implementation	
Turn Lane construction or extension		H	R	S	H	R	M	Transit signal priority systems	
Promotion of Regional Activity Centers		M	R	M	M	RN	S	Dynamic routing/scheduling	
Alternative Modes	Transportation-land use plans with local	H	R	M	H	RN	M	Service Coordination (buses/trains sharing real-time	
	Live-Work Proximity Incentives	M	R	L	M	RN	L	Require Health Impact Analysis of major projects and	
	Develop TIA guidelines for alternative modes,	H	R	M	H	R	S	Enhance transit amenities	
	Develop overlay districts to manage	M	R	M	H	R	M	Use of shoulders for transit vehicles during peak periods	
Require MPO review of regional-scale	M	R	L	H	R	S	Bicycle and Pedestrian access to transit improvements		
Growth management restrictions	M	R	L	M	R	L	Adopt connectivity standard around activity centers		

Demand Management

Alternative Modes

Symbol Legend:
 Term Effectiveness: (S)hort, (M)id, (L)ong
 Congestion Type: (R)ecurring, (N)on-Recurring, or Both
 Public Acceptance: (L)ow, (M)edium, (H)igh

Figure 23. Strategy Matrix

WHAT THE FEDERAL REGS SAY

The CMP regulations are generally silent on how the recommended solutions from Step 6 are to be implemented, but do reinforce that travel reduction and operations strategies will be considered a part of SOV capacity-increasing projects. Further, the CMP will identify an implementation schedule, responsibilities for implementation, and possible funding sources.

BEST PRACTICE CONCEPTS

Most CMPs do not spend much time on specifying funding sources and implementation responsibilities; however, the financial constraint requirements for the long-range transportation plan can be used to help direct the revenue sources, funding amounts, and scheduling of projects. This is another linkage between the long-range planning process and the CMP.



Step 7. Programming and Implementation

The responsibility for programming operational and capacity-increasing (e.g., widenings or construction of roadways on new location), signal improvements, and other construction activities falls into the purview of federal, state, local, and private entities. For example, Florida DOT manages the Strategic Intermodal System (SIS) including major roadways that connect to strategic terminals, adjacent states, or meet volume thresholds. The CMP would not propose to over-ride existing funding responsibilities, but to call out those responsibilities already reflected in the long-range transportation plan or, if necessary, identify the responsibility and schedule of actions not already contained in the adopted LRTP.

The HCMPO has programming authority that can derive from the CMP. For example, the METROPLAN Orlando MPO has developed a set-aside to finance recommendations identified in the CMP. Projects that cannot be immediately financed or financed within the anticipated revenue horizon of the long-range transportation plan may fall into the “illustrative” section of the LRTP; that is, projects without any identified funding source. The financial plan for the LRTP should be used as the starting point for identifying the scheduling and financing responsibilities for project implementation. In subsequent CMP updates, the financial plan for both efforts can be considered as one and the same document to avoid duplicating efforts. Specific recommendations for CMP implementation include the following:

- Ensure that the HCMPO project priority system includes only CMP-driven projects, or at least gives CMP projects a heavier weight in the scoring system;
- Create an ongoing program and set-aside to conduct one, detailed corridor (or major bottleneck) study each year in the annual work program – the results would become part of the following year CMP, so performance measures, strategies, and other aspects of the CMP would be carried into the scope of work for the corridor studies;
- Create a funding set-aside with Surface Transportation Program for CMP implementation for short-range (less than five-year completion dates) projects; and
- Create a sample overlay district “template” language that can be adopted for new, SOV capacity-increasing projects that reflect desired objectives for complete streets, access management controls, and land use / development patterns that help to preserve the peak period capacity of those streets and promote alternative modes.



Step 8. Evaluate Strategies

In a very real sense, the final step of the CMP is simply to create a CMP update in order to assess progress on the performance measures and objectives since the last update. Each update has to answer several questions:

- Have we progressed in accordance with our performance measures for the identified subareas, corridors, and bottlenecks?
- What were the strategies that were chosen for implementation, and are those strategies working or do they need to be eliminated or modified?
- Are the objectives, study areas, and performance measures still in alignment with what our public, elected officials, technical officials, and technical evaluations are telling us?

The HCMPO would begin this task by conducting a “consumer survey” of people in each study area, focusing on how and if the corridor has improved over the past five years. The results of this survey, as well as data collected on average daily traffic volumes, and updating the results of performance measures, would be used to help a technical committee steer the CMP update. The specific targets of this committee would to answer the three questions posed above, and to recommend updates to the CMP document. Obviously, mapping, technical analyses, and data collection/presentations would have to be updated for every study area in the CMP.

It is worthwhile to note that the federal CMP guidance document⁹ emphasizes livability and sustainability as important evaluation factors. Specifically, three concepts are called out:

1. Developing congestion management objectives that account for community issues, not just vehicle traffic;
2. Using multimodal performance measures that focus on people not just vehicles; and
3. Considering the most appropriate congestion management strategies for specific locations based on contributions to communities and neighborhoods.

⁹ Federal Highway Administration, “Congestion Management Process: A Guidebook,” USDOT. April, 2011.

WHAT THE FEDERAL REGS SAY

Federal regulations state clearly that operations, management, public transportation strategies should be examined for congestion solutions as well as projects that increase single-occupant vehicle capacity. Even in locations where more SOV capacity is recommended, demand management and operations strategies should be employed as part of the project design.

BEST PRACTICE CONCEPTS

The National Capital Region (Washington, DC) conducts an annual “State of the Commute” survey to help it evaluate its TDM program. MPOs are increasingly becoming the go-to source for transportation data and expertise, and can serve as a clearinghouse (if not the primary gatherer) of relevant congestion data items.



Costs of Updating the Congestion Management Process

The initial costs of creating the first CMP should be larger both in terms of time (of staff) and money (for private consultant assistance and service vendors for traffic counts) than subsequent updates. For example, once a microsimulation of a particular corridor has been created, subsequent updates usually mean updating turning movement and volume data, and occasionally lane configuration and capacity changes. An example of a recurring cost that would not necessarily decrease is the acquisition of third-party data based on cell-phone and/or GPS tracking. The following table (Table 19) can be used to help evolve a CMP work plan that respects first-year (for the framework described in this document) “start-up” costs, and the costs that can be expected for subsequent year updates of the CMP.

Table 19. Estimated CMP and CMP Update Costs

CMP Update Task	First CMP		Subsequent CMPs		Task Notes
	Hours	\$1,000	Hours	\$1,000	
1. CMP Objectives	24	0	16	0	<i>The objectives should remain relatively unchanged between CMP updates</i>
2. Define Study Areas	60	0	24	0	<i>Study areas should change minimally if at all between CMP updates</i>
3. Performance Measures	8	0	8	0	<i>Performance measures are tied to objectives and shouldn't alter much</i>
4. Collecting Data and Monitoring	120	80	120	80	<i>Includes \$40,000 for third-party data*; vendor and consultant services</i>
5. Evaluation of Problems	80	40	60	30	<i>Includes set-up for corridor mapping, Q/LOS sketch planning models</i>
6. Selection of Strategies	120	25	120	25	<i>Includes alternatives evaluation and consultant service agreements</i>
7. Program and Implementation	60	0	40	0	<i>Staff time integrating recommendations into adopted policies and plans</i>
8. Evaluation of Strategies	80	0	40	0	<i>Monitoring and presenting results to technical steering committee</i>
TOTALS	552	\$145	428	\$135	

*Note: FDOT has purchased a statewide INRIX dataset and will likely release it for HCMPO's use at no cost.

As previously mentioned, the CMP tasks should be incorporated into LRTP updates, and these efforts collectively should enhance actions that are already a core part of the HCMPO planning process. Since the HCMPO has already considered performance measures, that particular task is not going to be particularly onerous in the formation of the CMP following this framework.

Appendix A.1: Congestion Management Language in Federal Code

Title 23 Sec. 450.320 Congestion management process in transportation management areas.

(a) The transportation planning process in a TMA shall address congestion management through a process that provides for safe and effective integrated management and operation of the multimodal transportation system, based on a cooperatively developed and implemented metropolitan-wide strategy, of new and existing transportation facilities eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53 through the use of travel demand reduction and operational management strategies.

(b) The development of a congestion management process should result in multimodal system performance measures and strategies that can be reflected in the metropolitan transportation plan and the TIP. The level of system performance deemed acceptable by State and local transportation officials may vary by type of transportation facility, geographic location (metropolitan area or subarea), and/or time of day. In addition, consideration should 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 and safety of those lanes.

(c) The congestion management process shall be developed, established, and implemented as part of the metropolitan transportation planning process that includes coordination with transportation system management and operations activities. The congestion management process shall include:

- (1) Methods to monitor and evaluate the performance of the multimodal transportation system, 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. 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:

- (i) Demand management measures, including growth management and congestion pricing;
- (ii) Traffic operational improvements;
- (iii) Public transportation improvements;
- (iv) ITS technologies as related to the regional ITS architecture; and
- (v) 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 decisionmakers 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.

Appendix A.2: Transportation Management Language in State (Florida) Statutes

339.177 Transportation management programs.

(1) The Department of Transportation shall, in cooperation with metropolitan planning organizations and other affected governmental entities, develop and implement a separate and distinct system for managing each of the following program areas:

- (a) Highway pavement;
- (b) Bridges;
- (c) Highway safety;
- (d) Traffic congestion;
- (e) Public transportation facilities and equipment; and
- (f) Intermodal transportation facilities and equipment.

(2) Each metropolitan planning organization within the state must develop and implement a traffic congestion management system. The development of the state traffic congestion management system pursuant to subsection (1) shall be coordinated with metropolitan planning organizations so that the state system is reflective of the individual systems developed by the metropolitan planning organizations.

(3) The management systems required by this section should be developed and implemented so as to provide the information needed to make informed decisions regarding the proper allocation of transportation resources. Each system must use appropriate data gathered at the state or local level to define problems, identify needs, analyze alternatives, and measure effectiveness.

(4) Any transportation management system that is in existence on July 1, 1993, and that complies with this section and applicable federal law may continue to be used by the department in lieu of the development of a system under this section.

History.—s. 61, ch. 93-164.

Appendix B: Glossary

Concurrency | Necessary public facilities and services to maintain the adopted level of service standards are available when the impacts of development occur

Capacity | The amount or volume of traffic that a roadway can accommodate at a specified level-of-service

Congestion Management Process | The CMP is a federally mandated action for metropolitan planning organizations with more than 200,000 people in their urbanized area documenting how the MPO identifies, evaluates, and recommends alternatives for addressing traffic congestion

Constrained Roadway or Facility | Roadways which cannot be widened by adding through lanes due to significant physical, economic, environmental, policy or social constraints. Alternative transportation modes, transportation system management improvements such as, but not limited to, auxiliary lanes at intersections, bicycle and pedestrian facilities, or intelligent transportation systems, or improvements to parallel roadways will be considered instead of expansion.

Corridor | A corridor may consist of a road, several parallel roads, or mass transit facility which generally serve similar trip origins and destinations

FHWA | Federal Highway Administration of the US Department of Transportation

FTA | Federal Transit Administration of the US Department of Transportation

Intermodal Surface Transportation Efficiency Act | Federal law describing procedures and programs for transportation in the U.S., enacted in 1991 and expired in 1997

Intelligent Transportation System | ITS is an umbrella term for a range of technologies including processing, control, communication and electronics, that are applied to a transportation system



Level-of-Service | LOS is a qualitative measure describing operational conditions of traffic flow, and its perception by motorists and/or passengers. Six levels-of-service are defined for each type of facility. Roads are given letter designations, from "A" to "F", with LOS "A" representing the best operating conditions and LOS "F" the worst.

Long-Range Transportation Plan | A minimum 20-year vision of future transportation projects and programs, a portion of which (the "cost affordable plan") is constrained to the forecasted revenues that the metropolitan planning organization planning study area will receive

Metropolitan Planning Organization | Formed in cooperation with the state, develops transportation plans and programs for the metropolitan area. For each urbanized area, a Metropolitan Planning Organization (MPO) must be designated by agreement between the Governor and local units of government representing 75% of the affected population (in the metropolitan area), including the central cities or cities as defined by the Bureau of the Census, or in accordance with procedures established by applicable State or local laws (23 U.S.C. 134(b)(1)/Federal Transit Act of 1991 Sec. 8(b)(1)).

Metropolitan Transportation Improvement Program | A federally-required capital program adopted by metropolitan planning organizations

Mode (of Travel) | The specific method chosen to make a trip including walk, bicycle, motorcycle, automobile, van, taxi, carpool, and mass transit

Multi-Modal Transportation System | A comprehensive transportation system including, but not limited to, the following options of mode-choice: fixed-guideway transit, bus, auto, truck, motorcycle, bicycle and pedestrian.

Single-Occupant Vehicle | A SOV is a motor vehicle occupied by one person

State Transportation Improvement Program | A federally-required, four-year capital program adopted by the State Department of Transportation at least every two years

Strategic Intermodal System (SIS) | A network of statewide and interregional significance integrating transportation facilities, services, various modes of transportation and linkages to regionally important facilities

Transit (or Mass Transit) | Passenger services provided by public, private, or non-profit entities, utilizing vehicles that hold relatively large numbers of people such as vans, buses, and fixed guideway vehicles

Transportation Management Associations | TMAs are partnerships between business and local government to help solve local transportation problems associated primarily with rapid suburban growth

Transportation System | A transportation system is the sum of all forms or modes of transportation, which taken together, provide for the movement of people and goods in Hillsborough County

Transportation Systems Management | A TSM is a process for planning and operating a unitary system of urban transportation. This views automobiles, public transportation, taxis, pedestrians, and bicycles as elements of one single urban transportation system. The key objective of TSM is to coordinate these individual elements through operating, regulatory and service policies so as to achieve maximum efficiency and productivity for the system.

Transportation Management Area | A TMA is an urbanized area with a population over 200,000 (as determined by the latest decennial census) or other area when designation is requested by the Governor and the MPO (or affected local officials), and officially designated by the Administrators of the FHWA and the FTA. The TMA designation applies to the entire metropolitan planning area(s) and is required to develop a Congestion Management Process and undergo external process compliance certification reviews.

Transportation Efficiency Act for the 21st Century | Federal law describing procedures and programs for transportation in the U.S., enacted in 1998 and expired in 2003

Vehicle Miles of Travel | VMT is the product of traffic volume multiplied by the length of travel

Volume to Capacity Ratio | The V/C ratio compares traffic volume to roadway capacity. Values approaching 1.0 indicate progressively more congested conditions; v/c ratios of greater than 1.0 indicate a LOS of "E" or "F."