

Congestion Management and Crash Mitigation Process: State of the System

Prepared For:



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Approved June 5, 2012

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State of the System

Introduction

The Tampa Bay region is the 19th largest metropolitan area in the United States. Hillsborough County, at its geographic center, has the largest population and employment base in the region. In 2009, Hillsborough County's population was estimated at 1.2 million, and is expected to grow to 1.7 million by 2035. During that time, the number of jobs is forecast to grow more than 50 percent – from 785,000 in 2009 to nearly 1.2 million in 2035. The number of miles traveled each year in Hillsborough County is already twice any adjacent county.

Hillsborough County's transportation network contains nearly 5,000 miles of roads, sidewalks, and bicycle lanes and trails. To ensure the system is operating efficiently to move people and goods, the Hillsborough County Metropolitan Planning Organization (MPO) developed a Congestion Management and Crash Mitigation Process (CM/CMP). The CM/CMP focuses on short and mid-term strategies, with emphasis placed on addressing congestion without increasing automobile capacity on roads. The CM/CMP's systematic approach uses accurate, up-to-date information to assess performance of the elements of the transportation system and identifies alternative strategies for managing congestion and reducing crashes.

The CM/CMP cycle (**Figure 1**) identifies goals and develops objectives to achieve them; measures current conditions against the objectives to determine benchmarks and trends; implements appropriate solutions to ensure the goals are met; and measures impacts of the strategies. The CM/CMP and its evaluation is part of the Long Range Transportation Plan's (LRTP's) project selection and prioritization process.

The Hillsborough County MPO Technical Advisory Committee guided selection of the goals and objectives, as follows, as well as the performance measures:

- **Improve Reliability of Travel**
 - Reduce the frequency and severity of automobile crashes, focusing on the highest crash areas
 - Minimize the effect of unscheduled incidents
- **Shift Peak-Hour Trips to Modes of Travel Other than Single-Occupant Cars**
 - Improve the attractiveness of transit and high-occupancy vehicle trips
 - Improve the safety and comfort of bicycling and walking trips
- **Reduced Peak-Hour Impacts**
 - Improve peak-hour operations
 - Reduce peak-hour demand on our roadways

Hillsborough County is moving in the desired direction in regards to most measurements and is working successfully towards its goals. Some performance measures have one point of data which sets a benchmark; when conditions are evaluated again, or more data becomes available, trends will be revealed.

Hillsborough County's transportation system has:

- 620 lane-miles of limited access highways
- 184 lane-miles of toll roads
- 3,236 lane-miles of arterials and collector roads
- 359 miles of on-road bicycle lanes
- 12 miles of multi-use trails
- 400 miles of sidewalks

Figure 1: Congestion Management and Crash Mitigation Process



Source: Delaware Valley Regional Planning Commission, 2009

In Hillsborough County, 20 percent of residents and 43 percent of jobs are clustered in eight percent of the land area:

- Westshore
- Brandon
- Downtown Tampa
- University of South Florida

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Trends

The following trends illustrate the big picture of transportation in Hillsborough County. How are people getting around? How feasible are mobility options? And how is the driving experience for most people?

The average Hillsborough commuter will see commute costs grow from around \$700 per year to over \$1,200 in 2020.

Texas Transportation Institute, 2011

System-Wide Trends

Are people driving fewer miles on poorly performing and congested roads?



Do more people have access to public transportation?



Are more people using carpools and vanpools?



Are there more miles of bikeways and sidewalks available?



Trend: Vehicle miles of travel in poor levels of service

1. *Are people driving fewer miles on poorly performing and congested roads?* In 2009, 46.3 percent of the miles driven in Hillsborough County were on roads that experience delay due to overcapacity (i.e. roads carrying more traffic than they were designed for). This was a minimal increase from 46.0 percent in 2004.

Improving access management, traffic signal systems, and walking and cycling conditions can make roads throughout the county safer.

Trend: Percentage of the roadway network served by transit

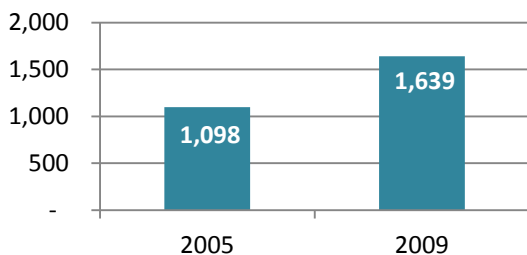
2. *Do more people have access to public transportation?* Areas with at least 3 household or 4 employers per acre can typically support hourly transit. In 2009, 77% of these transit-supportive areas were served by transit, up slightly from 2004 when 75.6% had transit service. Convenient access to public transportation is essential in capturing “choice” riders, people who have options, but choose to take transit.

Trend: Number of vanpools and carpools

3. *Are more people using carpools and vanpools?* The number of carpools and vanpools registered with the Tampa Bay Area Regional Transportation Authority (TBARTA) rideshare program (formerly Bay Area Commuter Services) in Hillsborough County increased by more than half from 1,098 in 2005 to 1,639 in 2009, as shown in **Figure 2**.

In 2010, 9.9 percent of workers (approximately 55,000 people) in Hillsborough County commuted to work via carpool, up from 9.6 percent in 2006. *American Community Survey*

Figure 2: Carpool and Vanpool Use in Hillsborough County



Source: Tampa Bay Area Regional Transportation Authority

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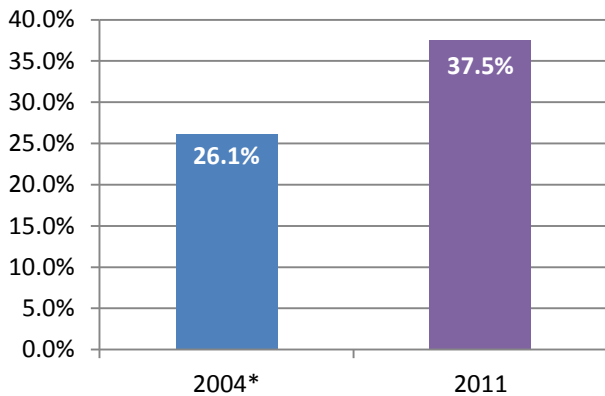
Trend: Bikeway and sidewalk miles as compared to roadway miles

4. *Are there more miles of bikeways and sidewalks available?* Centerline miles of bikeways and sidewalks are expressed as a percentage of centerline miles of roads, not including limited access roads. Data available for this measurement shows an increase from 26.1 percent in 2004 to 37.5 percent in 2011, as shown in **Figure 3**. However, 2004 data includes only sidewalks, while 2011 includes bikeways and trails as well. Streets with sidewalks on at least one side of the road are included. Bikeways include either on-road bike lanes or separated trails.

Hillsborough County has:

- 359 miles of on-road bicycle lanes
- 12 miles of multi-use trails
- 400 miles of sidewalks
- 3,236 lane-miles of roads where walking and biking are allowed

Figure 3: Bikeway, Trail, and Sidewalk Miles Compared to Road Miles



Source: Hillsborough MPO CMP ITS Plan, 2004; Hillsborough County MPO, 2012
*Includes sidewalk data only

There is a concerted effort by implementing agencies to build sidewalks and bikeways along new or expanded roadways and to fill gaps on existing roads; however there are approximately 800 lane-miles along arterials and collector roads that do not yet have sidewalks on either side of the roadway throughout Hillsborough County.

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GOAL: Improve Reliability of Travel

Drivers can anticipate and plan for typical morning or afternoon rush hour. However, they are less tolerant of unexpected congestion due to incidents such as disabled vehicles, crashes, weather, construction, and other unexpected events. Congestion cannot be eliminated, but making it more predictable reduces negative impacts on the economy and quality of life.

Disabled vehicles account for two-thirds of unexpected congestion, while scheduled or emergency road work makes up only two percent. Clearing crashes, disabled vehicles, debris, and cargo promptly allows the flow of traffic to resume. Additionally, unexpected congestion may initiate secondary crashes, which are responsible for an estimated 20 percent of all collision and 18 percent of all freeway fatalities.

Drivers face approximately four minutes of recovery time for every one minute that a freeway lane was blocked.

US DOT Traffic Incident Management Handbook, 2010

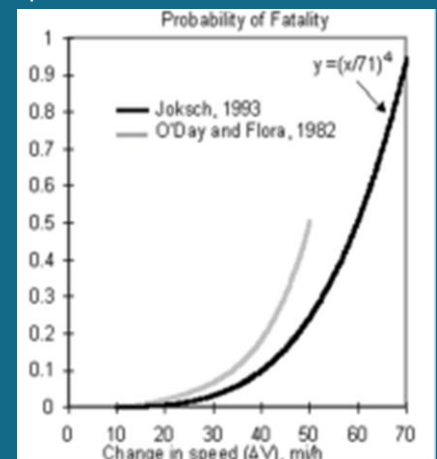
Goal - Improve Reliability of Travel	
Are there fewer automobile crashes?	
Are automobile crashes cleared more quickly?	
Do commuters need to factor in less "buffer" time to ensure on-time arrivals?	

Strategy: Reduce frequency and severity of crashes

1. *Are there fewer automobile crashes?* The average number of crashes per 1,000,000 vehicle miles traveled decreased seven percent from 182 in 2002 to 169 in 2007.

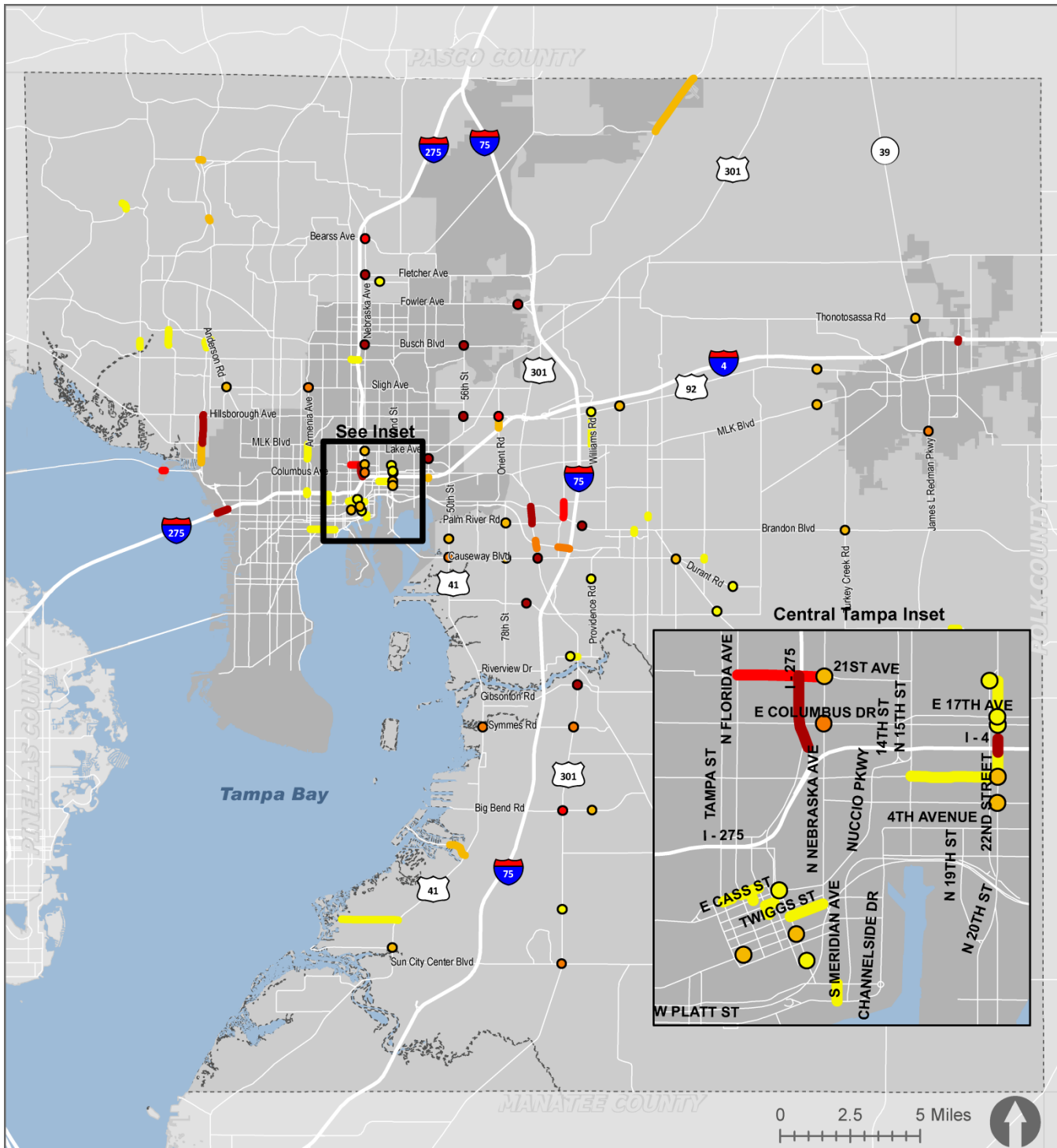
Identifying high frequency crash locations provides opportunity to improve safety and reduce crashes. **Figure 4** shows intersections and segments with high crash rates clustered in Downtown Tampa and along 21st/22nd Streets north and south of Interstate 4 in Ybor City. **Table 1** lists the top 50 intersections for crashes in Hillsborough County. While the intersection with the highest number of crashes from 2007 to 2009 was SR 60 at Brandon Town Center Drive, US 301 at Big Bend Road had the highest crash rate, or highest number of crashes per 1,000,000 vehicles that entered the intersection.

The risk of a crash being fatal increases exponentially with speed.



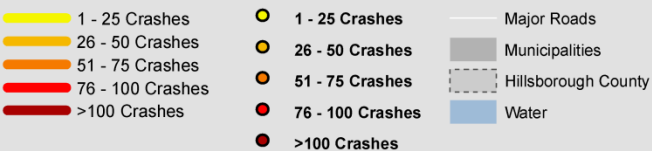
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Figure 4: High Crash Segments and Intersections



Are there fewer automobile crashes?

Intersections and Segments with Highest Crash Rates



Source: Hillsborough County MPO 2010
Data Years: 2005-2007



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Table 1: Crash Rates at Top 50 Intersections

Street Name	Intersecting Street	Crash Rate*	No. of Crashes	Street Name	Intersecting Street	Crash Rate*	No. of Crashes
SR 60	BRANDON TOWN CTR 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	MORRIS BRIDGE RD/FOWLER	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 AV	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

Source: Hillsborough County MPO 2035 LRTP, 2005-2007

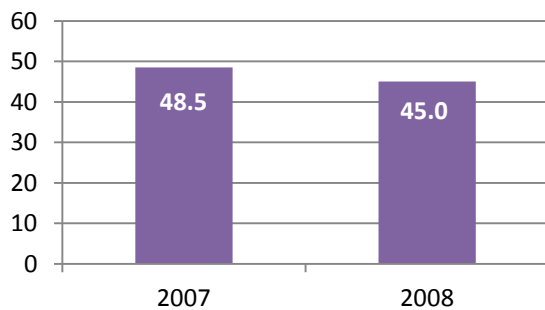
* Crash rate is the number of crashes per 1,000,000 vehicles entering the intersection

Strategy: Minimize the effect of unscheduled incidents

2. Are automobile crashes cleared more quickly? Average crash clearance times for select roads in Hillsborough County were used to measure this performance criterion. In 2007, it took an average of 48½ minutes to clear crashes. In 2008, that time was reduced to 45 minutes, as shown in **Figure 5**. Highest rates of injury crashes were found on limited-access facilities – Interstate4, Interstate275, and Interstate75 – that also carry high volumes of traffic, and therefore have the greatest potential to cause delay. On urban arterials, bicycle, pedestrian, and automobile crashes impact everything from time spent in traffic, personal safety, and automobile insurance rates.

Crash rates in Hillsborough County are two to four times the national average.

Figure 5: Average Clearance Time for Crashes on Select Roads (in minutes)



Source: Hillsborough County MPO, Hillsborough County Public Works

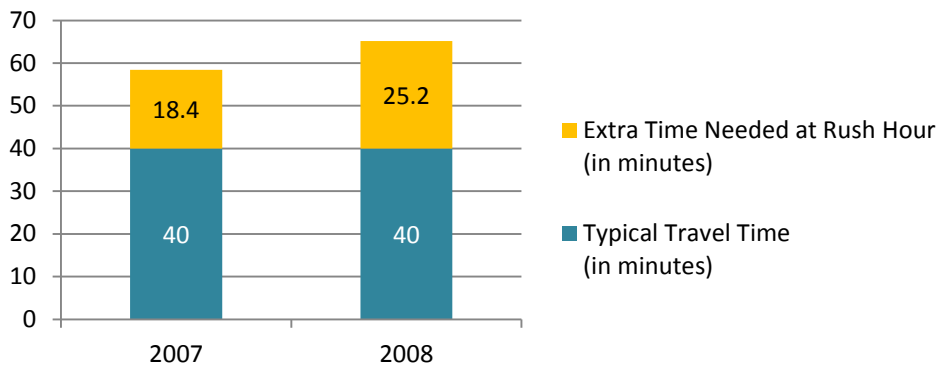
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3. Do commuters need to factor in less "buffer" time to ensure on-time arrivals?

In 2007, the BTI required travelers to buffer their anticipated travel time by an additional 46 percent; in other words someone with a 40-minute commute would need to allow for 58 minutes during rush hour, as illustrated in **Figure 6**. In 2008, the figure rose to 63 percent; the same 40-minute commute would require a buffer time that increased the trip to 65 minutes. Currently, BTI is measured and tracked at only a handful of locations on interstate facilities (Interstates 4 and 275), as shown in **Figure 7**.

The Buffer Time Index (BTI) is the extra time a motorist needs to reach a destination on time.

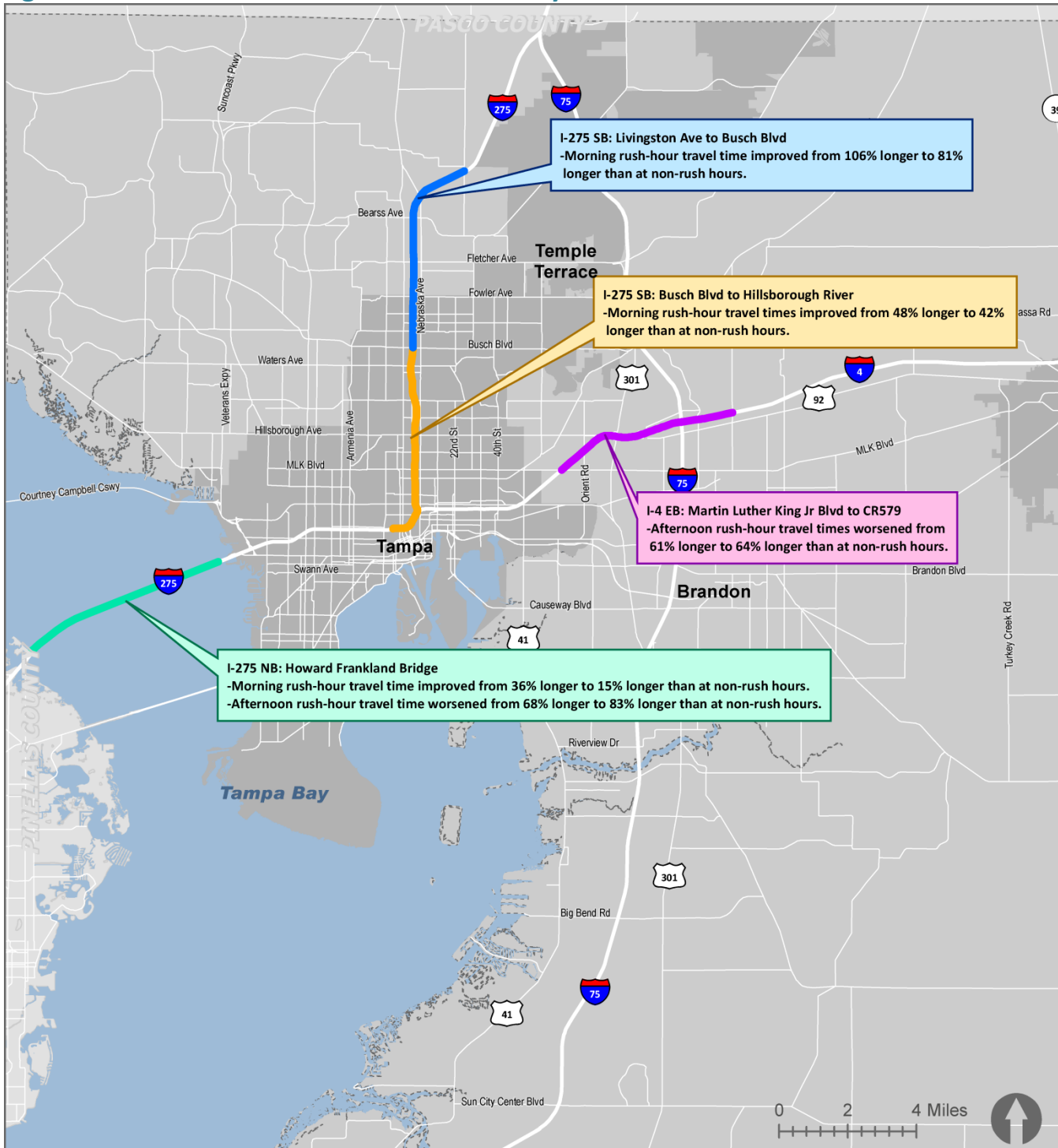
Figure 6: Extra Time Needed at Rush Hour for Typical 40-minute Commute



Source: Florida Department of Transportation, Intelligent Transportation System Annual Performance Measure Report, 2010

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Figure 7: Extra Travel Time on Select Roadways



Do commuters need to factor in less "buffer" time to ensure on-time arrivals? Buffer Time Index (Extra travel time needed at rush-hour)

- █ I-275 Southbound: Livingston Ave to Busch Blvd
- █ I-275 Southbound: Busch Blvd to Hillsborough River
- █ I-275 Northbound: Howard Frankland Bridge
- █ I-4 Eastbound: Martin Luther King Jr Blvd to CR579
- Major Roads
- Municipalities
- Hillsborough County
- Water

Source: FDOT ITS Annual Performance Measure Reports, 2010
Data Years: 2007, 2008



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The following best practices are used in this and other communities to improve reliability of travel by decreasing crashes and increasing safety.

Best Practices

Medians

In College Station, Texas, raised medians along an arterial road reduced crashes by nearly 60 percent by reducing conflict points by 26 percent.

TTI, Estimating the Impacts of Access Management Techniques, 2004

Photo source: FHWA Safety Program, Safety Benefits of Raised Medians and Pedestrian Refuge Areas



Road Diets

The road diet implemented on Nebraska Avenue in Tampa, changed the configuration from four-lanes undivided to two-lanes with a center turn lane, bicycle lanes, bus pull-outs, and crosswalks, reducing crashes by 40 percent.

FDOT Road Safety Audit, 2011

Photo source: Tampa Bay Online, "Redesigned Nebraska Avenue Significantly Safer," 2011



Roundabouts

A study of five Maryland roundabouts showed a 70 percent reduction in total crashes. Injury crashes were reduced by 88 percent and fatalities by 100 percent. Roundabouts are not always circular, as the image shows.

FHWA, Roundabouts – The Maryland Experience, 2009

Photo source: New York Times, November 18, 2010



Incident Clearance

Statewide, FDOT Road Rangers responded to nearly 352,000 calls in 2010, up almost 20 percent from 2009.

FDOT (www.dot.state.fl.us/trafficoperations/traf_incident/rrangers/rdranger.shtm)

Photo source: safehighways.org



FDOT's Rapid Incident Scene Clearance (RISC) program offers incentives for private towing companies to clear major incidents more quickly. From 2010 to 2011, the average duration of RISC incidents decreased by 21 minutes.

Photo source: Sunguide Disseminator, 2009



Dynamic Warning Signs

Variable speed limits and dynamic warning signs are often used as speed harmonization strategies. Dynamic signs may warn drivers of unexpected delays due to incidents or severe weather, while variable speed limits ensure traffic is not traveling too fast for the conditions.

Photo source: FHWA, Office of Operations, Synthesis of Active Traffic Management Experiences in Europe and the United States



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Recommended Strategies to Consider

The following are recommendations for analyses that could further identify issues and opportunities to improve the reliability of travel by decreasing crashes and increasing safety.

- Identify areas for better access management
 - Construct raised median barriers near major intersections
 - Construct parallel access roads
 - Implement driveway turn restrictions (right-in, right-out channelization)
 - Restrict access using driveway closures, consolidations
 - Restrict cross-median access near intersections
- Identify areas for road diets, roundabouts, speed reduction, traffic calming, and other measures
- Track incidents by location
- Evaluate route diversion plans
- Focus on education and awareness for:
 - Aggressive and careless drivers
 - County safety programs (Safe Routes to School, Safe Kids Tampa)
 - Bicycle and pedestrian safety
 - Buckle-up programs
 - Motorcycle safety
 - Driving safety for teenagers and older drivers
 - Secondary hazards in vicinity of crashes; quicker primary hazard clearance

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GOAL: Shift Peak-Hour Trips to Modes Other than Single Occupant Car

It is not the goal of the CMP or any transportation plan to simply move traffic as fast as possible. In fact, moving vehicular traffic more quickly causes repercussions in other identified priority areas, such as unsafe pedestrian and bicycling environment. This goal is to provide real alternatives to sitting in traffic, which help the entire system.

Bus ridership has been increasing in recent years in spite of the fact that travel by public transportation can be difficult and time-consuming. In fact, in a sample of 99 trips between major destinations in Hillsborough County, 47% took more than an hour longer by bus than by personal automobile, up from 42% in 2004. While more Hillsborough County residents have access to public transportation, overall level of service is lacking, with only 31 percent of the residents and workers experience acceptable service based on frequency, comfort, and access (transit level-of-service “D” or better).

Biking and walking is also increasing. While many trips are for recreation, more bike and walk trips are made during commute times for transportation purposes. Nationally, 40 percent of all trips are within two miles of home, and 50 percent of the working population commutes five miles or less to work. Yet, 82 percent of trips less than five miles are taken by personal vehicles. This presents an opportunity to shift vehicle trips to non-motorized modes.

Development patterns in Hillsborough County are denser than Charlotte or Salt Lake City, where ridership on recently built rail lines has exceeded expectations.

Goal - Shift Peak-Hour Trips to Modes Other Than Single Occupant Car	
Are fewer buses delayed by congestion?	
Are more people walking and biking?	
Is it getting safer to walk and bike?	

Strategy: Improve the attractiveness of transit and high-occupant vehicle trips

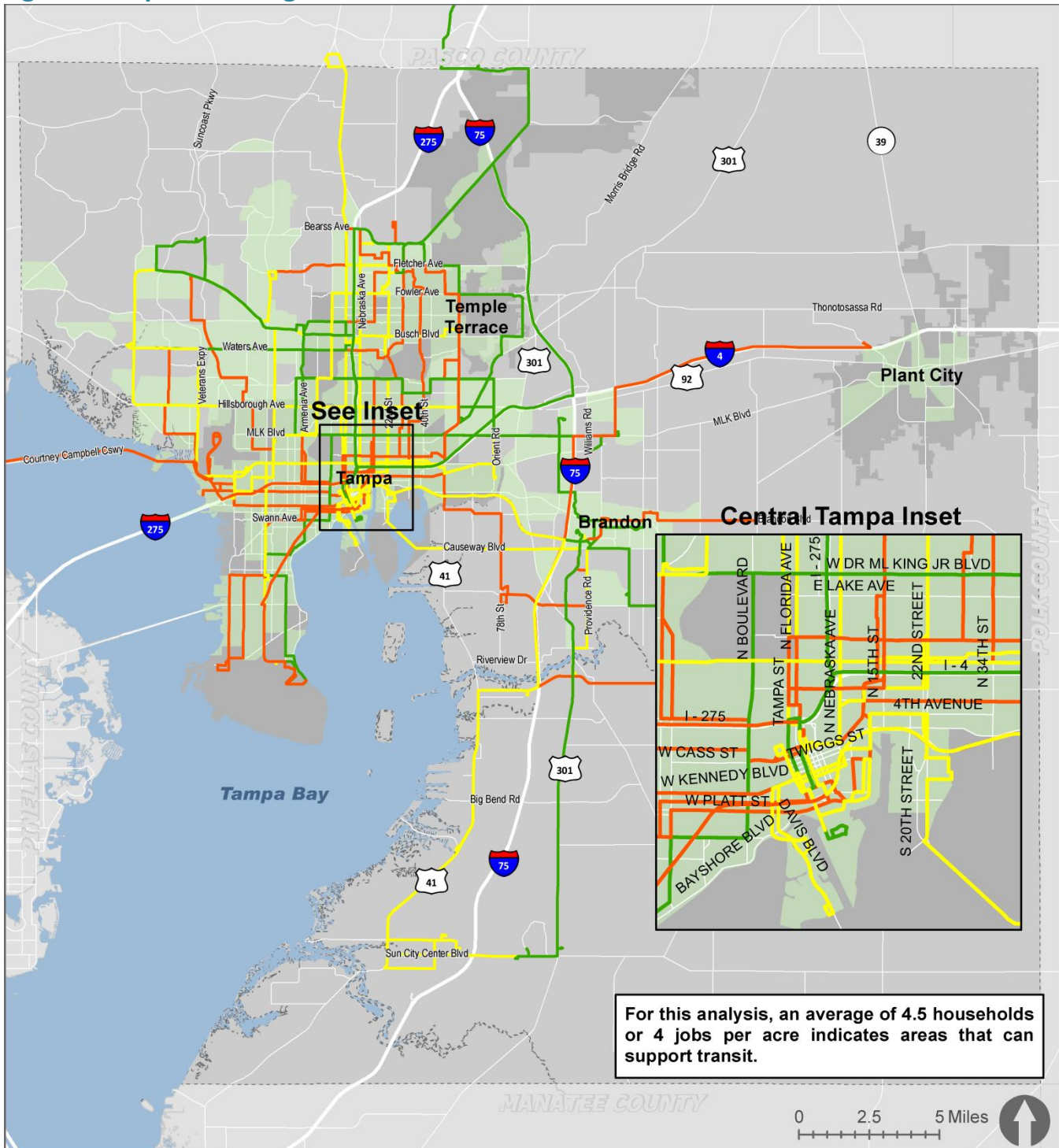
1. *Are fewer buses delayed by congestion?* In 2011, 9.8 percent of Hillsborough Area Regional Transit’s (HART) daily transit runs were delayed by congestion, an improvement from 11.2 percent in 2010. Reducing this number allows transit to compete with personal vehicle travel times, making it a more practical option. **Figure 8** shows HART’s routes sorted by the average amount of delay. The highest occurrences of delay tend to happen on the longer routes along some of the most congested arterials.

Hillsborough County is served by HART’s:

- 31 local bus routes
- 14 commuter express routes
- 3-mile streetcar system serving Downtown Tampa, Channelside, and Ybor City
- Door-to-door on-demand paratransit service

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Figure 8: Impact of Congestion on HART Service



Are fewer buses delayed by congestion?

Delayed Transit Runs

Percentage of Runs Delayed

- Less than 1%
- 1 - 25%
- 26 - 50%
- Transit Supportive Area

- Major Roads
- Municipalities
- Hillsborough County
- Water

Source: Hillsborough County MPO, 2010; HART, 2012
 Data Years: 2009 (Transit Supportive Area); July 2011 (Routes Delayed)

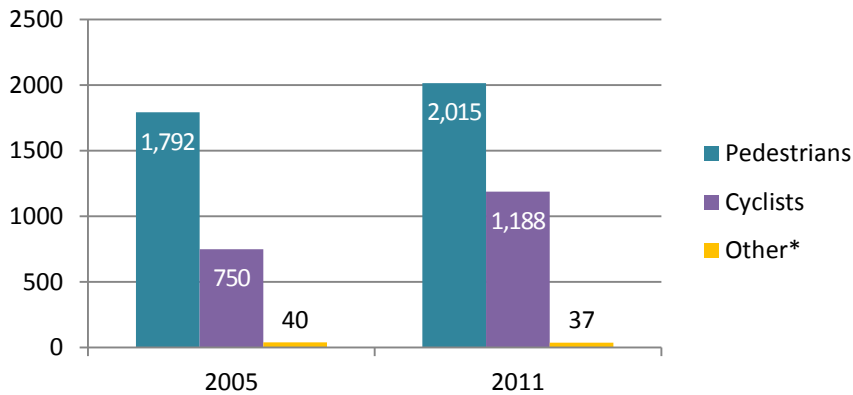


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Strategy: Improve the safety and comfort of bicycling and walking trips

2. Are more people walking and biking? While the majority of trips are still made in a personal car, more people are walking and biking. As shown in **Figure 9**, 2,586 pedestrians and bicyclists were counted at 20 different locations throughout the county in 2005. In 2011, at the same 20 locations, 3,240 pedestrians and bicyclists were counted, a 25 percent increase.

Figure 9: Pedestrian and Bicycle Counts at 20 Locations

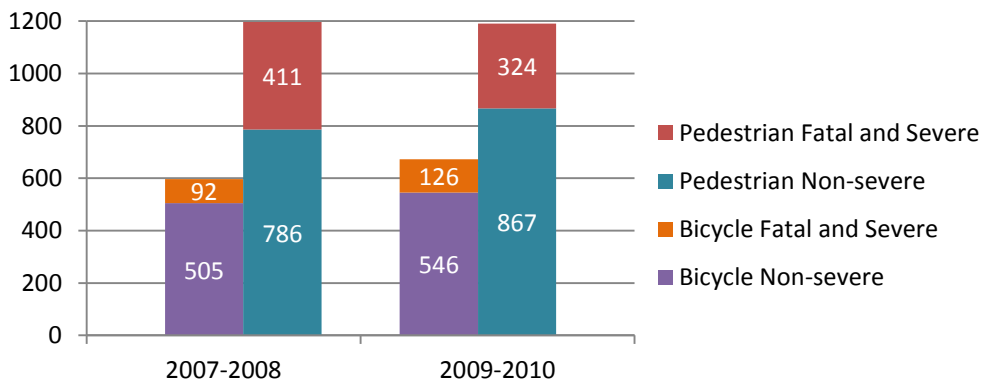


Source: Hillsborough County MPO, 2011

* Other includes scooters, rollerblades, and strollers.

3. Is it getting safer to walk and bike? Transportation for America consistently ranks the Tampa Bay area as one of the most unsafe places for pedestrians and bicyclists, validated by the increase in total bicycle and pedestrian crashes from 1,794 in 2007-2008, to 1,863 in 2009-2010, a 3.85 percent increase. As shown in **Figure 10**, severe and fatal pedestrian crashes decreased 21 percent while severe and fatal bicycle crashes increased nearly 37 percent, a major concern that is being addressed. **Figure 11** shows crash locations involving bicyclists and pedestrians from 2005 to 2008. Crash locations indicate where people are walking and cycling most and future infrastructure efforts could be focused. Data shows Downtown Tampa, the University of South Florida, and University of Tampa areas have the highest numbers of crashes.

Figure 10: Pedestrian and Bicycle Crashes



Source: Hillsborough County MPO, 2012

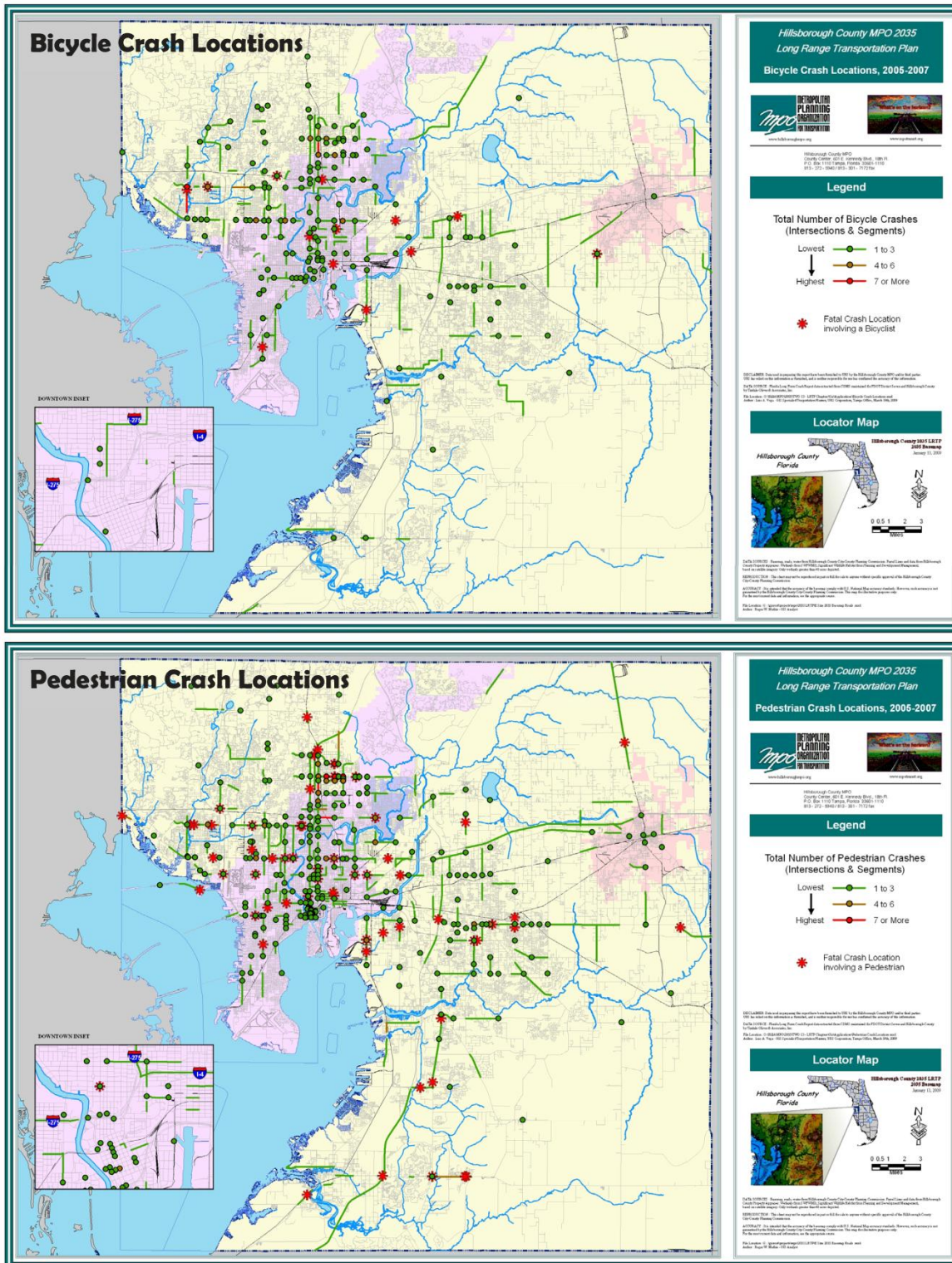
Looking over 5 years of data, there were 176 fatal traffic crashes....45 of those involved pedestrians and cyclists.

That's over 25% of all traffic crashes involving walking or biking when those modes only make up about 1% of all trips.

Trends & Conditions CUTR/FDOT

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Figure 11: Bicycle and Pedestrian Crash Locations



Is it getting safer to walk and bike? Bicycle and Pedestrian Crash Locations

Source: Hillsborough County MPO LRTP
Data Years: 2005 - 2007



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The following best practices are used in this and other communities to shift travelers to other modes than single-occupant cars.

Best Practices

Signal Priority

Chicago Bus Rapid Transit with signal priority improved bus travel time up to 20 percent and increased ridership.

Chicago Metropolitan Planning Council, Bus Rapid Transit: Chicago's New Route to Opportunity, August 2011

Photo Source: Chicago Metropolitan Planning Council, 2011



Exclusive Guideway

Transit in separate right of way can compete with automobile travel time between major activity centers. In Hillsborough County, 68 percent of the same sample of trips between major destinations could be faster by transit after L RTP rail and premium bus is implemented.

Hillsborough County MPO, Transit Level of Service Evaluation, 2009

Photo Source: Eugene, Oregon, Jacobs Engineering, 2008



Queue Jump

In a study for a potential right turn lane queue jump concept, LeeTranin Lee County, Florida estimated 59 percent of drivers will pay to bypass a congested intersection using a grade separated intersection.

Lee County Department of Transportation, Construction Value Priced Queue Jumps, 2003

Photo source: southeastroads.com (existing non-tolled grade-separated interchange)



Minneapolis increased biking 3.8 percent by investing in comprehensive facilities, maintenance, and public information.

Minneapolis Post, "As the snow melts, the metro area gets ready for its most bike-friendly spring yet," 2011

Photo Source: The Line Media, 2011



Bicycle and Pedestrian Network Investment

Since 2007, New York City has built pedestrian spaces, more than 250 miles of bike lanes, and other facilities. The result is double the biking, 35 percent fewer pedestrian fatalities, and the fewest traffic fatalities in decades.

NYCDOT, Prospect Park West Bicycle Path and Traffic Calming Update, 2011

Photo source: NYCDOT, 2011



Portland's steady investment in bikeways and safety programs has shown a cycling increase of 300 percent since 2000 using count trends on its roads and bridges.

City of Portland Bureau of Transportation, 2011 Bicycle Counts Report

Photo source: City of Portland Bureau of Transportation, 2011



Safety Outreach

The Hillsborough County MPO developed a bicycle and pedestrian safety outreach campaign to address the high number of severe bicycle and pedestrian crashes. The campaign seeks to educate pedestrians, bicyclists, and motorists on rules of the road.

Photo Source: Bicycle & Pedestrian Safety Outreach Campaign, 2012



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Recommended Strategies to Consider

The following are recommendations for analyses that could further identify issues and opportunities to shift travelers to other modes than single-occupant cars.

- Evaluate transit emphasis corridors for designated lane queue jumps and traffic signal priority
- Evaluate highest latent demand arterials and collectors for best practice treatments:
 - Bike lanes
 - Sharrows
 - Signage
 - Crossing treatments
- Perform Pedestrian and Bicycle Safety Audits, focusing on:
 - Sidewalk gaps
 - Pedestrian refuge islands and mid-block crossings
 - Pedestrian/bicycle over/underpasses
 - ADA-compliant access to transit stops and stations
 - Crosswalk signage and markings
 - Grade crossings (railroad crossings)
 - ADA-compliant crosswalks and curb ramps
 - Advanced Technology Systems (motion activated sensors, activated lighting and signage) and emerging safety-related technologies
 - Lighting conditions at intersections
 - Countdown pedestrian signals
 - Bicycle lanes/shoulders
 - “No Turn on Red” at active pedestrian intersections
 - Standard walkability checklist for pedestrians
- Coordinate land use planning with congestion management
- Promote mobility management to shift single-occupant travel to alternative modes through:
 - Bicycle/Pedestrian and Transit integration (connections, improved access)
 - HOV/HOT lanes
 - Expanded Park n Ride facilities
 - Expanded Telecommuting options
 - Expanded Ridesharing programs
 - Transit service improvements
 - Improved/expanded shuttle services

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GOAL: Reduce Peak-Hour Impacts



Recurring daily rush hour congestion occurs when more vehicles are on the roadway than it was designed to accommodate. Freeways react differently to high volumes of traffic than arterials do, operating efficiently at 90 percent of its designed capacity. On local roads, capacity is a factor in congestion, however traffic signals can exacerbate the delay.

Reducing the number of vehicles on the road during peak hours is one option for addressing delay. Coordinating signalized intersections along corridors to best allow traffic flow is an additional improvement that has a noticeable impact on congestion at a relatively low cost, when compared to adding lanes to increase capacity. Recent studies by Hillsborough County Public Works showed an improvement in roadway capacity up to 15 percent using better coordination or active management of signals. These improvements can offer a 30:1 or better benefit-to-cost ratio when fuel and travel time savings are calculated.

Measuring recurring congestion and delay is data-intensive and often cost-prohibitive. Data collection methods differ between the cities and Hillsborough County, making a uniform assessment of all the roads in the county difficult. While the City of Tampa has the capability to adjust signals remotely, the County does not, making signal retiming costly and time-intensive. Additionally, signal systems in different jurisdictions are not currently coordinated with one another.

Between 1990 and 2010, the Tampa metro area's population grew by 37 percent, while its levels of congestion increased 136 percent.

Texas Transportation Institute, 2011

Goal - Reduce Peak-Hour Impacts	
Do people spend fewer hours in congestion?	
Are drivers able to travel at the posted speed limit?	

Strategies: Improve peak-hour operations; reduce peak-hour demand on our roadways

1. *Do people spend fewer hours in congestion?* This question is answered by tracking two performance measures: delay at the top 50 intersections and general cumulative vehicle hours of delay (VHD). VHD is calculated using the Tampa Bay Regional Planning Model to identify the difference in speeds between free flow travel and congested travel. In 2006, an average of 213 VHD were experienced per mile of congested roads.

Data for this performance measure can be collected again when the model is used for the next LRTP update. Measuring congestion in this manner shows that although limited access highways carry more traffic, some of the worst congestion occurs on major arterials such as Bruce B Downs Boulevard, Hillsborough Avenue, and State Road 60.

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It is estimated that without building any road projects or implementing more efficient transit service, the level of VHD would increase to 1,585 by 2035. If the adopted 2035 Plan was followed, that figure would be 1,200, approximately four times today's level of congestion.

Knowing exactly where the congestion occurs allows the MPO and jurisdictions to make the best use of limited funds and invest where it will have the greatest impact. At this time, level of service or level of delay measurements for intersections in the City of Tampa are not available, therefore **Table 2** and **Figure 12**, listing and showing the top 50 most congested intersections based on level of service does not include intersections in the City of Tampa.

Hillsborough County MPO's 2035 L RTP identifies \$15 billion in needed road projects. However, if funding were available to build every project identified, congestion would still escalate.

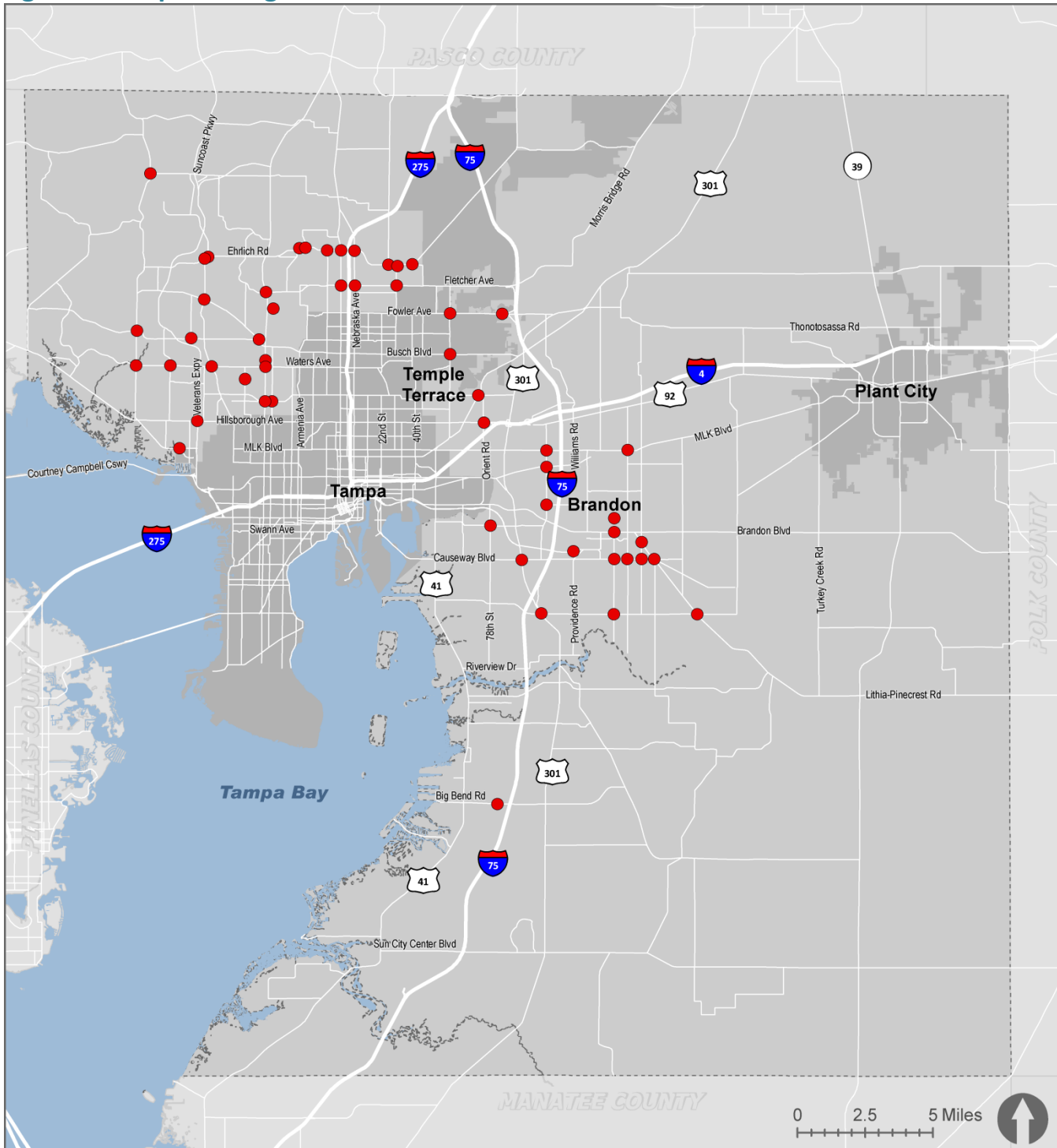
Table 2: Top 50 Congested Intersections (unincorporated Hillsborough County)

Street Name	Intersecting Street	Street Name	Intersecting Street
Bearss Ave	Livingston Ave	Hillsborough Ave (US 92)	Orient Rd
Bearss Ave	Nebraska Ave (US 41)	Humphrey St	Dale Mabry Hwy (SR 597)
Bearss Ave	Bruce B Downs Blvd	IDS Ped Crossing	Orange Grove Dr
Bearss Ave	Florida Ave (US 41 Bus)	Lambright St	Himes Ave
Bearss Ave	Lake Emerald Blvd	Linebaugh Ave	Gunn Hwy
Bearss Ave	Lake Magdalene Blvd	Linebaugh Ave	Henderson Rd
Bearss Ave	North Blvd	Linebaugh Ave	Sheldon Rd
Big Bend Rd (SR 672)	East Bay HS	Lithia Pinecrest Rd	Bryan Rd
Bloomingdale Ave	Kings Ave	Lumsden Rd	Bryan Rd
Bloomingdale Ave	Lithia Pinecrest Rd	Lumsden Rd	Kings Ave
Bloomingdale Ave	US 301	Lumsden Rd	Lithia Pinecrest Rd
Brandon Pkwy	Town Center Blvd	Lumsden Rd	Parsons Ave
Broadway Ave (CR 574)	Falkenburg Rd	Memorial Hwy	Bray Rd
Bruce B Downs	Skipper Rd	MLKing Blvd (SR 574)	Falkenburg Rd
Busch Blvd	56 St (SR 583)	MLKing Blvd (SR 574)	Parsons Ave
Causeway Blvd	US 301	Palm River Rd	78 St
Crestwood Elementary Ped Crossing	Manhattan Ave	Pine Crest Manor Blvd	Dale Mabry Hwy (SR 597)
Ehrlich Rd	Hutchinson Rd	Sligh Ave	Harney Rd
Ehrlich Rd	Turner Rd	SR 60 (Brandon Blvd)	Kings Ave
Fletcher Ave	Bruce B Downs Blvd	Van Dyke Rd	Gunn Hwy
Fletcher Ave	Dale Mabry Hwy (SR 597)	Victoria St	Kings Ave
Fletcher Ave	Florida Ave (US 41 Bus)	Waters Ave	Anderson Rd
Fletcher Ave	Nebraska Ave (US 41)	Waters Ave	Dale Mabry Hwy (SR 597)
Fowler Ave (SR 582)	56 St	Waters Ave	Hanley Rd
Fowler Ave (SR 582)	Morris Bridge Rd	Waters Ave	Sheldon Rd
Gunn Hwy	Lynn Rd	Woodberry Rd	Falkenburg Rd
Hillsborough Ave (SR 580)	Veterans Expy NB On-ramp		

Source: Hillsborough County Public Works Department

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Figure 12: Top 50 Congested Intersections



Do people spend fewer hours in congestion? Top 50 Most Congested Intersections

- Congested Intersection
- Major Roads
- Municipalities
- Hillsborough County
- Water

Data does not include City of Tampa intersections



Source: Hillsborough County Development Services, Transportation Division
Data Years: 50 Most Congested Intersections January 201

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2. Are drivers able to travel at the posted speed limit? Data for this performance measure is not readily available for all corridors in the county. While coordinated signal data is not available for the City of Tampa, **Figure 13** shows the signalized intersections within the city.

Data is available however, for four corridors showing the average travel speed as compared to the posted speed limit as a result of signal timing studies:

- Dale Mabry Highway – Lambright Street to Lutz Lake Fern Road
- SR 60 – Falkenburg Road to Bryan Road
- SR 60 – Orient Road to US Highway 301
- SR 60 – Mt Carmel Road to Mulrennan Road

Synchronizing traffic signals has shown to reduce overall delay and allow travel closer to the posted speed limit. Several corridors have coordinated signals throughout Hillsborough County. Signal timing studies were conducted for 16 of the corridors to measure the effectiveness of the coordinated system, as shown on **Figure 14a**, however data was not collected uniformly by different agencies. Data collected for the four studies listed above allowed average travel speeds to be identified, as shown in **Figure 14b**. Signal timing studies are planned for the remaining corridors. It is recommended that average travel speeds be reported between signals to better understand how they differ from the posted speed limit.

When considering roadway design speeds, not only is faster not better for pedestrians and cyclists sharing the roadway with motorists, but when speeds increase, so must the distance between vehicles. **Figure 15** displays the results of a study conducted by the Chicago Metropolitan Agency for Planning showing that the greatest number of vehicles can travel in a lane when moving at 35 mph.

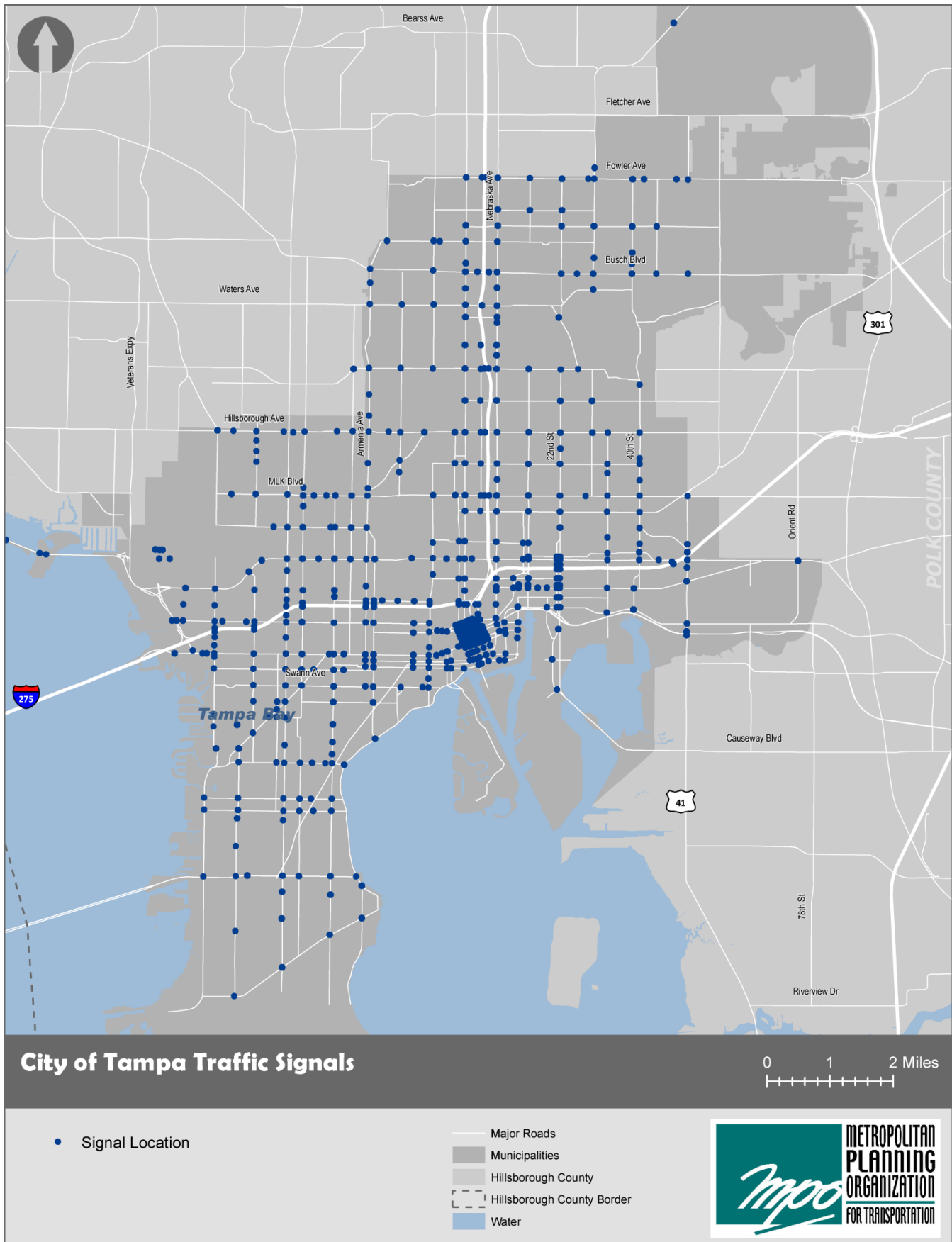
The effect of speed on pedestrian fatalities cannot be understated. **Figure 16** clearly demonstrates the likelihood of a pedestrian dying in a crash with a motorist as the vehicle speed increases. These fatalities have enormous impact on the families involved, the community's sense of safety, and in the case of congestion, can cause long, unexpected delays.

For each \$1 spent on signal timing improvements on SR 60 in Brandon, the benefit would be \$114 in saved fuel and travel time.

AlbeckGerken, Inc., 2010

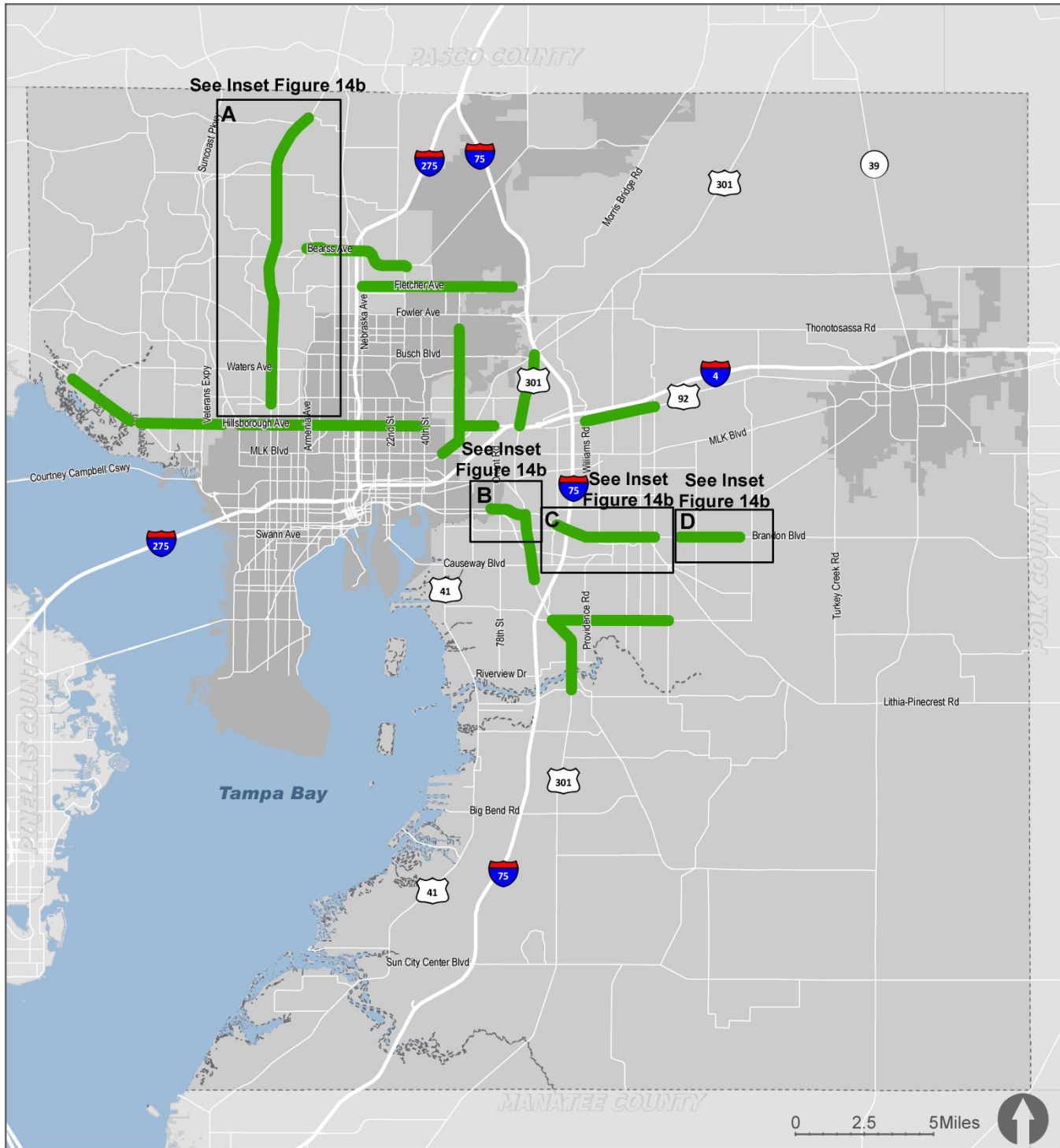
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Figure 13: City of Tampa Signalized Intersections



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Figure 14a: Previously Studied Corridors with Coordinated Signals



Are drivers able to drive the posted speed limit?

Previously Studied Corridors with Coordinated Signals

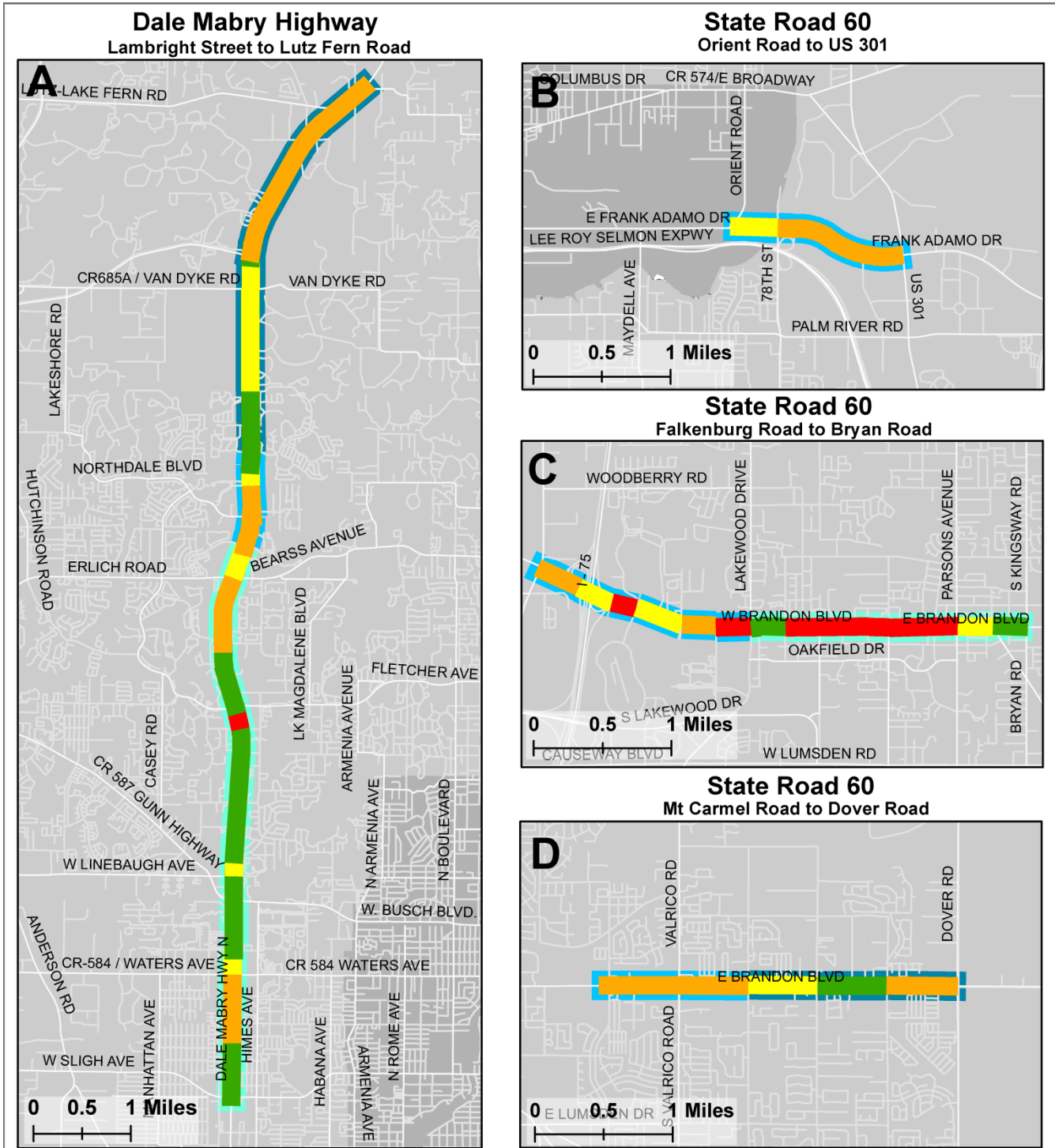
- Previously Studied Corridors with Coordinated Signals
- Major Roads
- Municipalities
- Hillsborough County
- Water

Source: Albeck Gercken, Inc., 2012
Data Years: 2007-2010



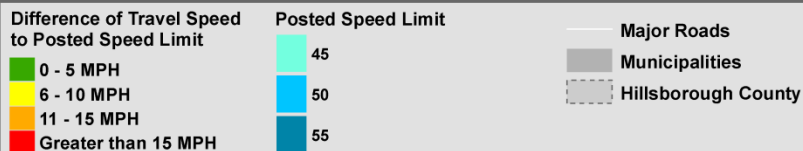
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Figure 14b: Average Travel Speeds on Select Corridors



Are drivers able to drive the posted speed limit?

Average Travel Speeds on Select Corridors



Source: Albeck Gercken, Inc., 2012
 Data Years: 2009 (State Road 60); 2010 (Dale Mabry Highway)



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Figure 15: Optimum Speed for Moving the Most Vehicles

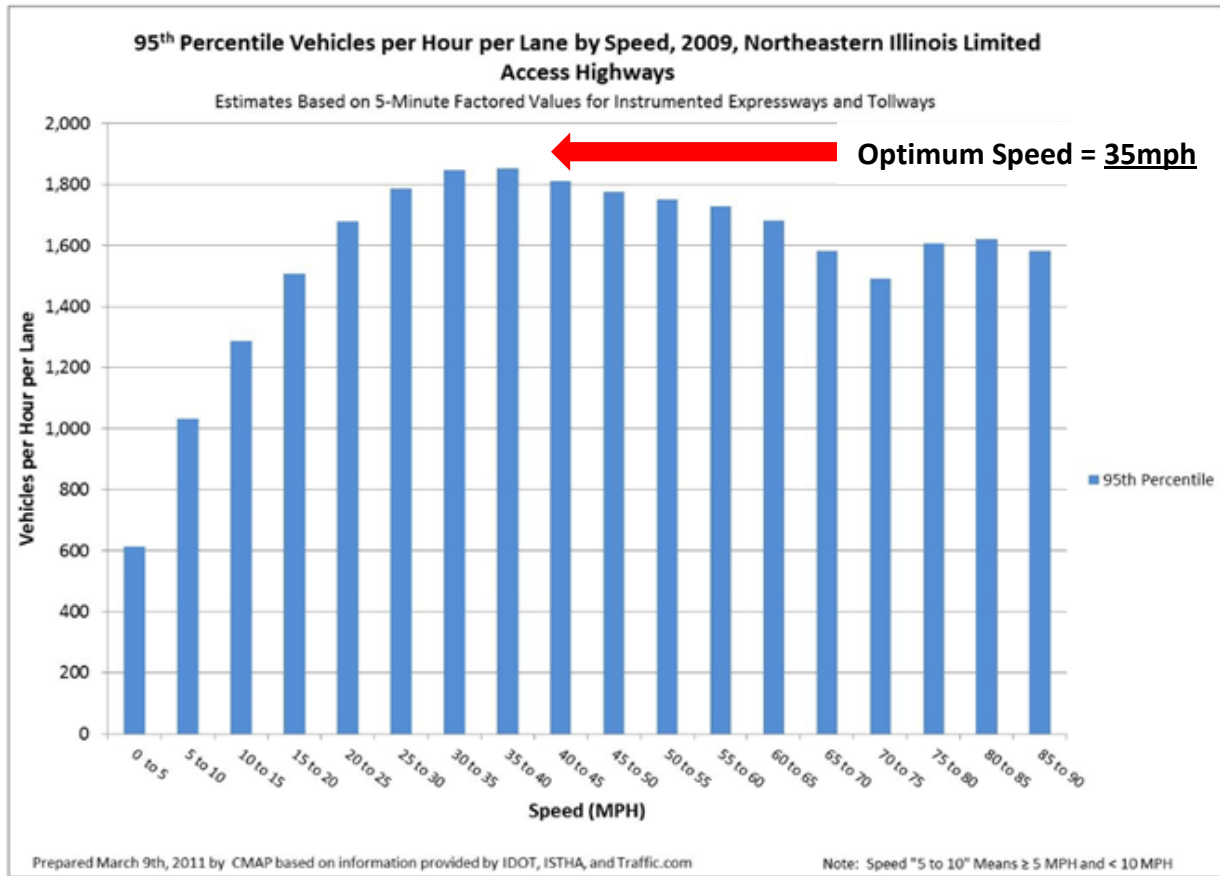
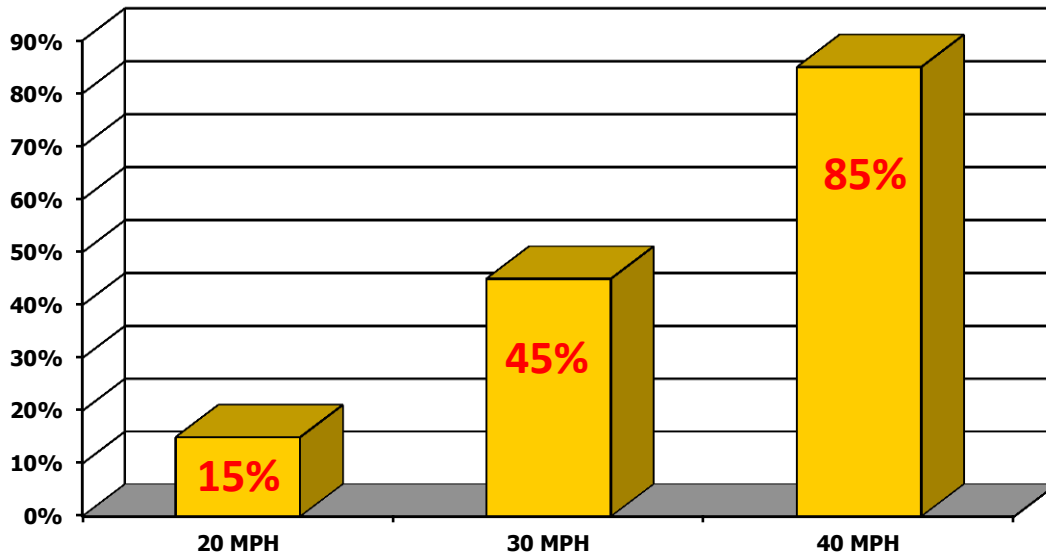


Figure 16: Probability of Pedestrian Fatality with Increasing Speed



Publication No. FHWA-SA-00-010

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The following best practices are used in this and other communities to reduce peak-hour impacts.

Best Practices

Coordinated Signals

Bloomington traffic signal project reduced delay by 43 percent.
Hillsborough County Travel Time & Delay Report for Bloomington Ave, 2010

Photo source: Florida Avenue Coordinated Signals, Jacobs Engineering, 2011



Convertible or Reversible Lanes

The Maryland State Highway Administration repurposed existing right-of-way into two 2.7-mile reversible lanes on Connecticut Avenue in Washington, DC instead of adding two new lanes to the roadway.
Reversible Lane Operation for Arterial Roadways: The Washington, DC, USA Experience

Photo Source: www.dcist.com, 2008



The three-lane reversible expressway built in Selmon Expressway median minimizes the footprint of the expressway. Use has exceeded projections and greatly reduced congestion and commute times between Tampa and the eastern suburbs of the county.

Federal Highway Administration, Designing Excellence, 2009

Photo Source: Federal Highway Administration



Peak-hour Parking Restrictions

Richmond, VA, rated fourth best city for commuters, prohibits parking on downtown streets from 7 – 9 a.m. and 4 – 6 p.m.

Kiplinger's Personal Finance: 10 Best Cities for Commuters, 2011

Photo source: Miami, Florida peak-hour parking restrictions, Gannett Fleming



Queue Jump

A single point urban interchange (grade separated intersection) at CR 865 and Summerlin Road in Lee County, Florida allows thru-traffic to bypass the signalized intersection.

Photo source: southeastroads.com



Left Turn Restrictions

Restricting left turns to medianu-turns (often called Michigan U-turns) reduces left-turn collisions and increases traffic flow.

Federal Highway Administration, Alternative Intersections and Interchanges Informational Report, 2009

Photo source: American Automobile Association (AAA), Michigan



Variable Price Tolling

Interstate 95 in Miami uses variable toll pricing to provide an option for commuters to pay a toll to bypass congestion. Tolls vary based on the time of day and level of congestion on free travel lanes.

Florida Department of Transportation, 95 Express

Photo source: The Miami Herald, 2012



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Best Practices (Cont.)

Ramp Metering

Installing ramp metering on Minneapolis freeway ramps resulted in a 22 percent decrease in freeway travel time, translating to a systemwide savings of 25,000 hours. Freeway speeds also increased seven percent.

US Department of Transportation Research and Innovative Technology Administration, 2001

Photo source: University of Houston, 2011



High-Occupancy Vehicle Incentives

Virginia allows hybrid vehicles with one occupant (registered with Virginia auto tags) to travel free of charge on high-occupancy vehicle lanes. In California, vehicles meeting specific emission standards (Clean Air Vehicles) are permitted to travel in HOV lanes free of charge.

Virginia Department of Transportation; California Department of Motor Vehicles

Photo source: University of California, Berkley, Institute of Transportation Studies, 2011.



Mixed Use Development

Mixed use developments generate fewer vehicle trips than conventional, single-use development, especially if located in a walkable neighborhood, close to transit service.

Institute of Transportation Engineers

Photo source: US Environmental Protection Agency



Recommended Strategies to Consider

The following recommendations for analyses could further identify issues and opportunities to reduce peak-hour impacts.

- Update ITS Master Plan
- Implement Transportation Demand Management Strategies through:
 - Congestion pricing
 - Alternative work hours and telecommuting
 - Guaranteed Ride Home Program for carpool and transit users
 - Alternative mode marketing and education to increase demand
 - Safe Routes to Schools Program (education, outreach, and infrastructure)
 - Preferential or free parking for Higher Occupancy Vehicles
- Study feasibility of peak-hour parking and turn restrictions
- Complete a Reversible Lanes Market Study
- Complete a Peak-Hour Parking and Turn Restrictions Feasibility Study
- Review the results of the THEA/HART Variable Pricing Study
- Complete High Occupancy Vehicle Study
- Identify average travel speed along corridors while conducting Traffic Signal Timing Studies
- Implement land use and growth management strategies, focusing on:
 - Negotiated demand management agreements as a condition of new development approval
 - Trip reduction ordinances to spread the burden between existing and new developments
 - Infill development-supportive policies
 - Transit oriented development/mixed-use development
 - Design guidelines for pedestrian oriented development encourage pedestrian activity