7 Safety, Efficiency and Goods Movement

Introduction

Pinellas County strives to ensure that people and goods can be moved through its transportation system safely and efficiently. Providing for transportation safety is a basic function of local government. Pinellas County addresses the safety needs of motorists through the Site Plan Review Process and the application of the CIP/CIE. Accident data is also monitored to identify operational problems that are typically addressed through small-scale improvements such as the installation of a traffic signal or closing a median opening.

The MPO's 2007 State of the System Report listed the County's top 20 intersections and road sections with the highest number of crashes in 2005.[1] US Highway 19 is prominent on both lists. Six of the top eight intersections are on US Highway 19. These include the intersections of Gulf-To-Bay Boulevard, Drew Street, Tampa Road, Park Boulevard, Sunset Point Road and 118th Avenue. The Gulf-To-Bay Boulevard intersection is first on the list with 124 crashes. US Highway 19 from Klosterman Road to Alderman Road tops the list of high accident road sections with 226 crashes. Ulmerton Road was second on the list with 154.

Regarding bicycle and pedestrian safety, with an expanding infrastructure, more bicyclists and walkers are being introduced into road corridors and intersections where potential conflicts with vehicular traffic become a more serious concern. More attention must be paid to ensuring their safety as they navigate across Pinellas County's busy roadways. The intersection of Alternate US Highway 19 and Curlew Road has been a high profile example of how an increased demand for bicycle and pedestrian travel has created unique challenges for engineers and planners trying to provide safer accommodations for these travel modes. Despite the existence of sidewalks and pedestrian countdown signals at the intersection, the high volume of vehicle and pedestrian/bicycle traffic there has resulted in six accidents since 2002. Although there are some unique circumstances associated with the Alternate US Highway 19/Curlew Road intersection, issues concerning bicycle and pedestrian safety at street crossings are expected to become more commonplace throughout the County as more people take to their local trails, bicycle lanes and sidewalks.

On some roads where there are lengthy gaps between intersections, consideration also needs to be given to establishing signalized mid-block crossings and/or traffic calming measures allowing walkers and bicyclists to safely cross the street without having to travel to the nearest intersection. Pedestrians and bicyclists will typically not go out of their way to cross a street at the nearest intersection. It is anticipated that Pinellas County will need to work with the MPO to identify locations on County roads where accommodations for mid-block crossings as well as cross walk enhancements (e.g., striping, pavement variation, pedestrian controlled signals, etc.) are needed.

In November 2004, the Surface Transportation Policy Project (STPP) published its latest "Mean Streets" report, which identified the most dangerous places to bike and walk in the

United States. The Tampa Bay area, including Pinellas County, was ranked second worst in the Country behind Orlando, based on the danger to pedestrians in 2002/03.[2] In 2002/03, there were more than 800 reported motor vehicle crashes in Pinellas County involving pedestrians and bicyclists, an increase of 26 percent over the previous year.

Bicycle and pedestrian safety is an especially critical issue for children. In 2003, nearly 900 children ages 14 and under were killed and 25,000 were injured in pedestrian accidents involving vehicles in the US. Each year about 175 children are killed by vehicles in between school and home. At the other end of the age spectrum, Americans age 70 and over suffer the highest rate of pedestrian fatalities.

Regarding the elderly, Linda Bailey's "Aging Americans: Stranded Without Options," indicated that 21 percent of those 65 and older do not drive and half of non-drivers in this age group stay home due to a lack of transportation options. Examples of the types of measures necessary to create urban environments in Pinellas County which are friendlier to seniors who choose to walk or ride a bicycle include: providing crosswalks with refuge medians and/or countdown signals; sidewalks that are buffered from the street; parking lots that are easily navigable; bus stops with sidewalks connecting them to the surrounding sidewalk network; and increased education and enforcement efforts designed to heighten motorists' awareness of pedestrians and bicyclists.

The BCC's action to pursue the creation of grade-level bicycle lanes that are marked with striping and signs on County arterial roads was an example of the County's recognition of the importance of bicycle safety. Awareness of pedestrian safety issues, in particular, has been heightened by the attention the Tampa Bay area has received from the local and national media. Pinellas County has actively addressed pedestrian safety through the efforts of the MPO's Pedestrian Transportation Advisory Committee which includes County staff among its membership.

The notion of improving the safety and efficiency in local transportation systems was a major emphasis area in SAFETEA-LU. The legislation encourages State and local governments to maximize the efficiency of their roadways while ensuring that transportation systems are safe and properly maintained. As discussed in Chapter One, Pinellas County faces a number of constraints precluding infrastructure expansion as a solution to its roadway congestion problems. Transportation demand management and encouraging alternative transportation modes were previously discussed as strategies needed to address roadway congestion and to increase mobility. Additional strategies that directly seek to improve the operational efficiency of roadway systems fall under the guise of transportation system management (TSM). The County's efforts in TSM primarily revolve around the use of intelligent transportation system and advanced transportation management system technology such as the coordination of traffic signals in the County and traffic monitoring devices. In terms of the preservation and maintenance of its transportation system, the County focuses on dedicating local funding sources to roadway and bridge maintenance and repair.

In the area of goods movement, freight transportation plays a key role in the economic well-being of any community. Movement of freight to and from Pinellas County occurs primarily through heavy trucks and the St. Petersburg-Clearwater International Airport. Consequently, the County's efforts to facilitate the efficient movement of goods revolve around the

implementation of the MPO's Countywide Truck Route Plan and the provision of airport accommodations for freight carriers (e.g., United Parcel Service, Federal Express).

Safety

Historically, safety provisions regarding the transportation system in Pinellas County have been oriented toward vehicular traffic. Through the Site Development and Platting Section of the Land Development Code, as applied through the site plan review process, Pinellas County ensures that roadways are constructed in accordance with County and State engineering standards. Roadways constructed by Pinellas County through the CIP/CIE adhere to the same standards. In addition, application of the Access Management System Section of the Land Development Code addresses the safety needs of the motoring public by limiting driveway connections on County arterial roads. By managing access to these facilities, Pinellas County reduces the potential for conflicts between vehicles entering and exiting the driveways and oncoming traffic.

Consistent with its efforts toward establishing an integrated multi-modal transportation system, Pinellas County is highly sensitive to the needs of bicyclists and pedestrians in regards to safety. The County recognizes that safety is paramount to creating a bicycle and pedestrian-friendly environment throughout Pinellas County.

Pedestrian Safety

Pedestrian safety is an issue of national significance. In 2003, 4,749 pedestrians were killed in traffic crashes in the United States, 11 percent of all traffic related accidents reported.[3] Florida is second only to the District of Columbia in states with the highest rate of pedestrian fatalities, with 2.94 fatalities per 100 thousand people.[4] Approximately 16 percent of all traffic-related fatalities in the United States in 2003 were pedestrians.[5] Pedestrian fatalities remained fairly constant in Florida between 1999 and 2004, but spiked to a 10 year high in 2005 with 576.[6] Pedestrian injuries have remained fairly constant since 1995, with 7,500 injuries reported in 2005.[7] Crashes involving pedestrians reported in Pinellas County in 2005 were 282, compared to 349 reported in 2003.[8]

Traffic safety experts from the United States DOT, Oregon DOT and FDOT point out that the problem of pedestrian safety is attributable to a "near-universal lack of awareness" of pedestrian needs in the planning and design of roadway projects.[9] They also contend that citizens need to be better educated about their dual roles as motorists and pedestrians and that laws protecting pedestrians need to be more stringently enforced.[10] These assessments translate into a three-pronged approach to deal with pedestrian safety, involving engineering, education and enforcement.

Engineering

Pinellas County focuses primarily on the engineering aspect of pedestrian safety whereas the MPO's Pedestrian Transportation Advisory Committee (PTAC) takes the lead role in coordinating education and enforcement efforts. Pinellas County includes pedestrian considerations in the design of road improvement projects implemented through the CIP/CIE. In addition to constructing sidewalks alongside the paved roadway, Pinellas County constructs electronically-controlled crosswalks at major

intersections. In addition, the County provides mid-block crosswalks for special purposes as determined through public hearings/workshops held to receive public comment about the scheduled project. An example of this includes a pedestrian overpass crossing County Road 296 at the intersection of 98th Street that was constructed in 1994. The purpose of the overpass is to provide safe access for children and families crossing the road to and from a Little League baseball facility. In 1995, 54th Avenue North from Park Street to 66th Street was improved to a four-lane divided facility. Included in the project was a grade-level crosswalk with a flashing light and pedestrian refuge island at a median located 0.25 mile east of Park Street. The crosswalk provides a safe avenue for a large concentration of elderly citizens living in the area seeking access to a nearby church, shopping center and a condominium complex. Finally, it should be noted that all new road projects constructed within commercial corridors by the County include raised medians which "add significantly" to the safety of pedestrians crossing divided roadways.[11]

Education, Enforcement and Land Use

Regarding education and enforcement, the County regularly participates, through its membership in PTAC, in the Pedestrian Awareness Day Program. The Program utilizes local media to publicize and promote safe practices for motorists and walkers. The event takes place on the first Monday following Daylight Savings Time in the fall. Responsibility for enforcement of pedestrian safety laws rests with the local law enforcement agencies. However, as members of PTAC, municipal and County police officers are able to coordinate law enforcement initiatives with the pedestrian plans of the MPO and participating local governments.

In addition to engineering, education and enforcement issues, land use plays a major role in pedestrian safety. In many areas of the County traversed by commercial corridors, adjacent developments are separated by large parking areas with no walkways. As well as discouraging pedestrian activity, this also creates an unsafe environment for walkers who choose to access commercial buildings from nearby locations.

Bicycle Safety

On a national scale, bicycle fatalities are not occurring at the alarming rate of pedestrian fatalities. There were 622 bicycle fatalities resulting from vehicle crashes in 2003.[12] This is 28 percent less than the 859 fatalities reported in 1990. There is also a decline in the number of injuries involving bicyclists with 46 thousand in 2003 compared to 68 thousand in 1993.[13] According to a 2005 National Center for Statistics and Analysis Report, Florida is the highest ranking state for bicycle fatalities related to traffic accidents with 6.97 fatalities per million people.[14] This accounts for approximately 3.5 percent of the total traffic accidents in the State. Bicycle injuries in Florida have decreased from approximately 6,700 in 1995 to 4,300 in 2005.[15] The total number of crashes involving bicyclists in Pinellas County was 442 in 2005, a decrease of 19 since 2003.[16]

There is no local data available to account for the causes of these injuries. However, state-wide information indicates that the primary cause of traffic-related bicycle accidents for children is the bicyclist failing to yield while the primary cause for adults is the motorist

failing to yield.[17] It should also be noted that people between the ages of 7 to 18 represent the largest portion of the bicycle-riding population in the United States.[18]

As with pedestrian safety, engineering, education and enforcement are the key points from which to address bicycle safety. The objectives of the MPO's bicycle planning efforts are based on these points as well as encouragement of bicycle travel. Also like pedestrian safety, the County's efforts regarding bicycle safety are focused on engineering. Education and enforcement fall primarily under the auspices of the MPO's Bicycle Advisory Committee (BAC).

Engineering

Pinellas County's major efforts regarding bicycle safety were discussed in Chapter Four as strategies to encourage bicycle travel. These efforts revolve around the implementation of on-road bicycle lanes as well as off-road facilities such as the Pinellas Trail. In addition to encouraging bicycle travel, these strategies are effective measures toward ensuring safe conditions for bicyclists. Off-road trails provide greater safety for bicyclists simply by taking them away from traffic. On-road bicycle lanes substantially improve safety conditions by creating a greater sense of awareness among motorists regarding the accommodation of bicyclists and by legitimizing their presence.[19] In addition, the County's policy of striping and providing signage for bicycle lanes is well suited to addressing the problem of motorists failing to yield by heightening their awareness of bicyclists on the road.

Education and Enforcement

The BAC engages in educational activities concerning bicycle safety through its various public involvement efforts such as public speaking appearances at schools, public displays and the distribution of informational materials. Issues addressed by the BAC in this effort include helmet usage, crash prevention, observance of traffic laws and responsible bicycling behavior. Regarding enforcement, the BAC works with local police departments and the Sheriff's Office to place a greater emphasis on the enforcement of traffic laws pertaining to and affecting bicyclists.

Residential Traffic Management Program

Pinellas County introduced a new "traffic calming" initiative, the Residential Traffic Management Program, with its adoption by the Board of County Commissioners (BCC) in October 1997. The Program focuses on the concerns of neighborhoods experiencing adverse conditions resulting from speeding motorists using their local streets to bypass busy arterial and collector roads. Residents from these areas frequently complain about the noise and pollution of bypassing motorists and the hazards they presents in terms of the safety of pedestrians, joggers, bicyclists and children playing in the neighborhood. The Program revolves around the implementation of traffic control measures such as installing roundabouts, speed humps and narrowing streets and intersections to reduce travel speeds while discouraging non-local traffic.

Under this program, traffic calming measures are investigated for particular neighborhoods in response to residents' concerns, and/or as a result of field reviews conducted by County

staff. If warranted by an initial review of the situation, traffic studies intended to obtain more detailed information about the particular situation are conducted. If the speeding conditions are considered minor, less than 12 miles per hour above the posted speed limit, the County may rectify the situation by working with the Sheriff's Office on increasing enforcement activity. As an alternative, the County may seek to reduce the posted speed limits or distribute flyers to neighborhood residents to raise their level of awareness of the problem. If the speeding problem is deemed to be excessive, Pinellas County would initiate the implementation of appropriate traffic control measures.

Hurricane Evacuation[20]

As a densely populated urbanized county surrounded on three sides by water, hurricane evacuation is a critical issue for Pinellas County. The Tampa Bay Region Hurricane Evacuation Study published in 2000 indicated that as many as 238,601 people (approximately 27 percent of the county's total population) are classified as "population-at-risk" within Evacuation A zones, which include intercoastal and coastal areas and the barrier islands. "Population-at-risk" refers to the number of persons residing in evacuation zones or mobile homes who would be directly affected by an evacuation order. For storms requiring evacuation of people within B zones, located further inland, the population-at-risk increases to nearly 39 percent of the county's population.

The problem is compounded by the shortage of available public shelter space. Pinellas County is actively involved in a public education and information campaign to discourage people who do not need to evacuate from using public shelter. In addition, the County has established the Host Home Program to encourage residents, organizations, businesses, churches, etc., located outside of evacuation zones to provide shelter space for people living within the evacuation zones.

In addition to reducing the demand for public shelters, the Host Home Program also reduces the need for people to seek shelter outside of the County. This serves to limit the amount of traffic accessing the major roads of the County designated as hurricane evacuation routes (see Figure 7-1). The need to convince people to seek safe shelter within the County, either in a public shelter or through the Host Home Program, is underscored by the Tampa Bay Regional Planning Council Hurricane Evacuation Study. The Study indicates that none of the "critical roadway locations/segments" would be sufficient to allow for timely evacuation of people that the Study projected to evacuate in the event of hurricane. This includes residents and visitors within storm surge areas, all mobile homes and a small portion of the "non-vulnerable" population.

Pinellas County currently seeks to increase the capacity of the hurricane evacuation routes through participation in the development of road improvement priorities established in the MPO Transportation Improvement Program (TIP). The County also limits the traffic demand on these facilities through the application of the Concurrency Management System and by implementing capacity improvements through the CIE/CIP and the TIP.

Transportation System Management

Transportation System Management (TSM) is the application of strategies designed to improve mobility by optimizing the efficiency of transportation systems. As defined by Berman and

Judycki of the Federal Highway Administration, TSM incorporates both "supply side" operational/engineering strategies (e.g., intersection and signal improvements) and "demand-side" strategies that seek to reduce travel demand (e.g., carpooling, bicycling, etc.). However, transportation agencies in the State of Florida such as FDOT and the MPOs generally recognize TSM strategies as operational/engineering (excluding large-scale capacity improvements such as adding through-lanes) in nature. Central to the County's TSM activity is the implementation of intelligent transportation system (ITS) strategies designed to improve the efficiency of the local transportation system.

Intelligent Transportation Systems

Regarding operating efficiency, the County is relying on the utilization of ITS tools to expedite and better coordinate the movement of vehicular traffic on the major road network. In an effort to maximize the efficiency of local transportation systems, ITS has gained considerable momentum in recent years throughout the Country as well as in Pinellas County.

Intelligent transportation systems involve the application of advanced technology solutions to improve traffic flow while reducing travel times. These systems include a wide range of applications, from automated fare boxes on public buses, and electronic accident information signs to centralized signal systems and vehicle detection devices. A number of ITS technologies are currently in place in Pinellas County including PSTA's automated farebox system and an automated pre-paid toll (Sun Pass) system for motorists entering or departing from the Skyway Bridge. In addition, traffic monitoring cameras and adaptive control signals have been installed in selected locations in the County.

The major emphasis of current and planned ITS initiatives in Pinellas County is on arterial roadway management through the implementation of advanced traffic management system (ATMS) and freeway management system applications. This employs a variety of detectors, cameras, and communication systems to monitor traffic, optimize signal timings on major arterials, and control the flow of traffic.

These management systems include, as examples, the installation of dynamic message signs that provide traveler information and video monitoring equipment that provides for better incident management and emergency response. Four priority corridors are identified in the MPO Plan for the implementation of ATMS improvements. These include Gulf-to-Bay Boulevard, US Highway 19, Ulmerton Road and East Lake/McMullen Booth Road, where the County has installed monitoring equipment.

Pinellas County employs ITS to coordinate its signal timing patterns on an ongoing basis. It uses a computerized interconnected signal system to monitor fluctuations in traffic volumes. The system is designed to respond to the peak hour flow of traffic at certain times of the day. The system also responds to changes in peak hour travel. This enhances the ability of the system to synchronize signal timings in order to allow for more "green time" on the more heavily traveled roads during peak travel periods. Together with the cities of Clearwater and St. Petersburg, Pinellas County is continuing to enhance the system to respond to the peak flow of traffic during evenings and weekends, as well as during commuting hours so that travel times will decrease. The implementation of

advanced computer-controlled signal systems, such as Pinellas County's, have been reported to improve system-wide travel times by as much as 25 percent.[21]

As part of its Comprehensive Plan Evaluation and Appraisal process, Pinellas County distributed transportation surveys in conjunction with the MPO's Long Range Transportation Plan Update in 2004 to collect the opinions of local citizens regarding various transportation issues. The surveys indicated a strong desire for the implementation of ITS applications to address traffic congestion. Nearly 70 percent of the respondents ranked improved coordinated signal timing as a top priority for addressing traffic congestion. Computer controlled traffic signals with the capacity to change in response to traffic conditions was the popular choice when asked about priorities for various ITS strategies.

To support its efforts to implement ATMS and ITS projects, Pinellas County instituted a one-cent gasoline sales tax (the 9th cent) in FY 2007/08 to provide a dedicated funding source. he availability of Federal funding for these projects is limited since they have to compete against non-ITS projects, including road construction, for the same monies.

Access Management

Access management serves to reduce the "variety and spacing of events" to which drivers must respond, thereby resulting in improved operating conditions and fewer accidents.[22] That access management improves safety conditions is supported by the fatality rates of fully controlled access roads having one-third of the number of fatalities as roads with no access control.[23] Access management strategies (i.e., the control of median openings and spacing between driveways) are implemented by the County through the application of the Access Management Section of the Land Development Code as administered through the site plan review process. Through application of the Code, Pinellas County seeks to minimize the number of driveways permitted on arterial roadways by requiring shared access with adjoining properties and/or locating driveways onto secondary streets, where feasible. Permit requests involving median cuts are also reviewed against the Code to ensure that the spacing of median openings is maintained to the fullest extent possible.

Goods Movement

In Pinellas County, demand for goods movement is generated largely by retail trade, construction, manufacturing, and wholesale trade operations. Together, they comprise 34 percent of the County's employment.[24] Trucks, the CSX Railroad and the St. Petersburg-Clearwater International Airport are the three primary sources of goods movement in Pinellas County. The locations of the Airport and the CSX Railroad are displayed in Figure 6-1.

Freight carrying trucks move the largest number of goods through Pinellas County. The heaviest truck traffic in Pinellas County occurs on facilities that serve the County's most industrialized areas. As an example, 70th Avenue between US Highway 19 and 49th Street, 28th Street between Gandy Boulevard and Roosevelt Boulevard and Ulmerton Road between Starkey Road and US Highway 19 and between Roosevelt Boulevard and Martin Luther King Jr./9th Street serve the mid-Pinellas County area where the highest concentration of the County's major employers and manufacturing industries are located. These facilities carry the highest percentage of truck traffic in the County, between 9 and 17 percent of their total traffic volumes.[25]

The low volume of activity on the CSX railroad indicates a small percentage of goods moved through this mode. Rail usage is measured in million gross ton miles (MGTM), which incorporates the weight of freight and the rolling stock. Lines carrying less than 5 MGTM are classified by the railroad industry as "light density" lines which are candidates for abandonment.[26] The CSX railroad carries less than 1 MGTM in 1994 and is one of the most seldom used lines in the Tampa Bay Region.[27]

The mainstay of revenue-producing operations at the St. Petersburg-Clearwater International Airport is scheduled air passenger service. However, growth in cargo shipments has increased dramatically. In 2000, 21 thousand pounds of incoming and outgoing cargo was shipped. In 2006, over 57 thousand pounds was shipped, a 171 percent increase.

The MPO Countywide Truck Route Plan designates facilities suitable for heavy truck use during daylight hours as well as routes where truck traffic is permitted at all hours (unlimited). The Plan is currently awaiting amendment pending the completion of a goods movement study. The purpose of the Truck Route Plan is to facilitate the efficient movement of trucks on roads that are better designed to accommodate higher speeds and the turning movements of heavy vehicles while minimizing their impact on residential neighborhoods. Pinellas County implements the Truck Route Plan through the application of the Truck Routing Section of the Land Development Code, which is enforced by local law enforcement agencies. It should also be noted that the Land Development Code contains provisions regulating the shipment of hazardous materials by trucks. This section of the Code pertains to the placing of warning placards and is also enforced by local police.

Road and Bridge Maintenance

To ensure the operational efficiency of Pinellas County's transportation system, it is necessary to ensure it is adequately maintained. As the County continues to pursue the completion of its long-range plan for roadway improvements, the need for pavement maintenance and rehabilitation becomes more pronounced. The County is currently responsible for maintaining over 2,650 lane miles of roads. The State average for pavement rehabilitation costs for a lane mile of road is approximately $13,150. By comparison, the average cost of constructing a lane mile of road in Pinellas County is more than $2 million. In 2003, the Pinellas County Public Works Department estimated a backlog in pavement preservation needs that amounted to over $10 million. Also in 2003, it was estimated that $56.7 million was needed to cover the costs of anticipated maintenance costs on County roads over the next 20 years.

Along with roadways it maintains, Pinellas County is responsible for the upkeep of 120 bridges for pedestrian as well as vehicular traffic. The Public Works Department has identified 38 bridges that will exceed this life span over the next 20 years. The total cost of replacing these bridges is estimated at $124 million. An additional $31 million would be needed to maintain them.

Endnotes

Chapter Seven

1. 2006 State of the System Trends and Conditions, Prepared for the MPO by Renaissance Planning Group, pages 18 and 19.
2. Environmental Working Group Report, Surface Transportation Policy Project, Mean Streets: Pedestrian Safety and Reform of the Nation's Transportation Law, (Washington, D.C., 2004).
3. National Center for Statistics and Analysis, Traffic Safety Facts 2003 Data, (Washington, D.C.), p. 1.
4. Ibid., p. 4.
5. Ibid., p. 4.
6. Florida Department of Transportation and the Center for Urban Transportation Research at the University of South Florida, Impact of Transportation – Transportation Safety Trends and Conditions Report 2007, p. 7.
7. Ibid.
8. 2006 State of the System Trends and Conditions, Prepared for the MPO by Renaissance Planning Group, p. 22.
9. Darcy Lewis, "Pedestrian Safety Shouldn't Take A Back Seat," Traffic Safety, July/August 1996, p. 20.
10. Ibid.
11. Steven A. Smith, "The Suburban Pedestrian Crossing Dilemma," Transportation Research News, 164, January-February 1993, p. 12.
12. National Highway Traffic Safety Administration (NHTSA) Center for Statistics and Analysis, Traffic Safety Facts 2006 Data, (Washington, D.C.), pp 1-4.
13. Ibid.
14. National Highway Traffic Safety Administration (NHTSA) Center for Statistics and Analysis, Traffic Safety Facts 2005 Data, (Washington, D.C.), pp 1-4.
15. Florida Department of Transportation and the Center for Urban Transportation Research at the University of South Florida, Impact of Transportation – Transportation Safety Trends and Conditions Report 2007, p. 6.
16. 2006 State of the System Trends and Conditions, Prepared for the MPO by Renaissance Planning Group, p. 22.
17. Theo Petritsch, P.E., State Pedestrian/Bicycle Coordinator provided this information by phone, June 18, 1997. In addition an Orange County study indicated bicyclist failure to yield as the number one cause of bicycle injuries for children and motorist failure to yield as the number one cause of adult bicycle injuries. Orlando Urban Area MPO, June 1996.
18. National Sporting Goods Association, "Sports Participation in 1994," Mt. Prospect, Illinois, p. 259.
19. FHWA Publication, The National Bicycling and Walking Case Study No. 4: Measures To Overcome Impediments to Bicycling and Walking, (Washington, D.C., 1993), p. 36.
20. Information in this section is based on the Tampa Bay Region Hurricane Evacuation Study 2000 and the accompanying Transportation Model Support Document prepared by the Tampa Bay Regional Planning Council for the Florida Department of Community Affairs, April 2000.

21. Institute of Traffic Engineers, A Toolbox For Alleviating Traffic Congestion, (Washington, D.C., 1989), p. 37.
22. FHWA Publication No. FHWA-RD-91-044, Safety Effectiveness of Highway Design Features Volume 1: Access Control, (Washington, D.C., 1992), p. 2.
23. Ibid.
24. Pinellas County Economic Development, "Non-agricultural employment in Florida: Tampa-St. Petersburg MSA," July 21, 2006.
25. Pinellas County Metropolitan Planning Organization 2004 data on heavy truck percentages.
26. Tindale-Oliver and Associates and Wilbur Smith Associates, Pinellas County MPO Goods Movement Study Technical Memorandum #1: Profile of Goods Movement, 1996, p. 19.
27. Ibid.