Incorporating Safety into Transportation Planning

December 31, 2013

Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area

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Prepared by the:

Metropolitan Transportation Planning Organization
for the Gainesville Urbanized Area

With Assistance from:

North Central Florida Regional Planning Council
2009 NW 67th Place
Gainesville, FL 32653
352.955.2200

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Executive Summary

Transportation safety is a vital part to the overall health and well being of the residents of the Gainesville urbanized area and Alachua County. Safety is defined by the United States Department of Transportation as freedom from harm resulting from unintentional acts or circumstances. The primary goal of transportation safety planning is to improve safety by supporting efforts to develop policies, programs, and projects related to pedestrians, bicyclists, transit users, truckers and motorists on the roadways and highways of Alachua County.

A primary purpose of this technical report is to strengthen the foundation for identifying and solving safety issues in the Long Range Transportation Plan. This will be accomplished through the analysis of motor vehicle crashes on the road network, and presentation of various strategies and countermeasures to improve safety. The process is to be data-driven and have measurable performance measures.

Institutionalizing safety is a key step in incorporating safety into transportation planning. Much research has been conducted on how to increase safety on our transportation networks. One conclusion is that safety needs to become institutionalized as part of the safety planning process. Two authoritative studies were reviewed that describe a proposed methodology on how to formalize safety in the planning process. This is discussed in detail in Chapter 2. The following seven steps provide the foundation for this methodology:

1. Include Safety Experts on Planning Committees
2. Incorporate Safety into Goals and Objectives
3. Identify Safety Issues
4. Establish Safety Performance Measures
5. Collect and Analyze Safety Data
6. Utilize Safety as a Decision Factor
7. Monitor and Evaluate the Effectiveness of Safety Programs and Projects

Florida has identified areas of emphasis in improving transportation safety and has set a goal of reducing the number of serious injuries and fatalities by five percent each year. The recommendations for incorporating safety into the planning process start with focusing on the priority areas established in Florida. The Florida Department of Transportation, in partnership with the Federal Highway Administration and representatives from all segments of Florida's traffic safety community, developed the 2012 Strategic Highway Safety Plan. The State Highway Safety Plan focuses on the following eight Emphasis Areas:

1. Aggressive Driving
2. **Intersection Crashes**
3. **Vulnerable Road Users (pedestrians, bicyclists, and motorcyclists)**
4. **Lane Departure Crashes**
5. Impaired Driving
6. At-Risk Drivers (aging road users and teens)
7. Distracted Driving
8. **Traffic Data**

Four of the items can be addressed in the transportation planning process and are identified above in bold (2, 3, 4 and 8). Florida's State Highway Safety Plan is a statewide, data-driven plan that addresses the "4 E's" of safety – Engineering, Enforcement, Education, and Emergency response. The four emphasis areas examined in this plan primarily focus on "Engineering" from the "4 E's" of safety.

The review and analysis of accident data is a foundation for incorporating safety into the planning process. Data is available from both the Florida Department of Transportation and Signal Four Analytics. Individual accident data from January 1, 2007 through mid-December 2013 has been incorporated into a Geographic Information System that allows more detailed spatial analysis. This database should be updated on a regular basis to provide the most up-to-date information to support decision-making. This data is used throughout the report and is presented in both tables and illustrations.

Performance measures are data-driven and used to evaluate how well Alachua County is achieving a reduction in accidents with fatalities and serious injuries.

Chapter I
Introduction

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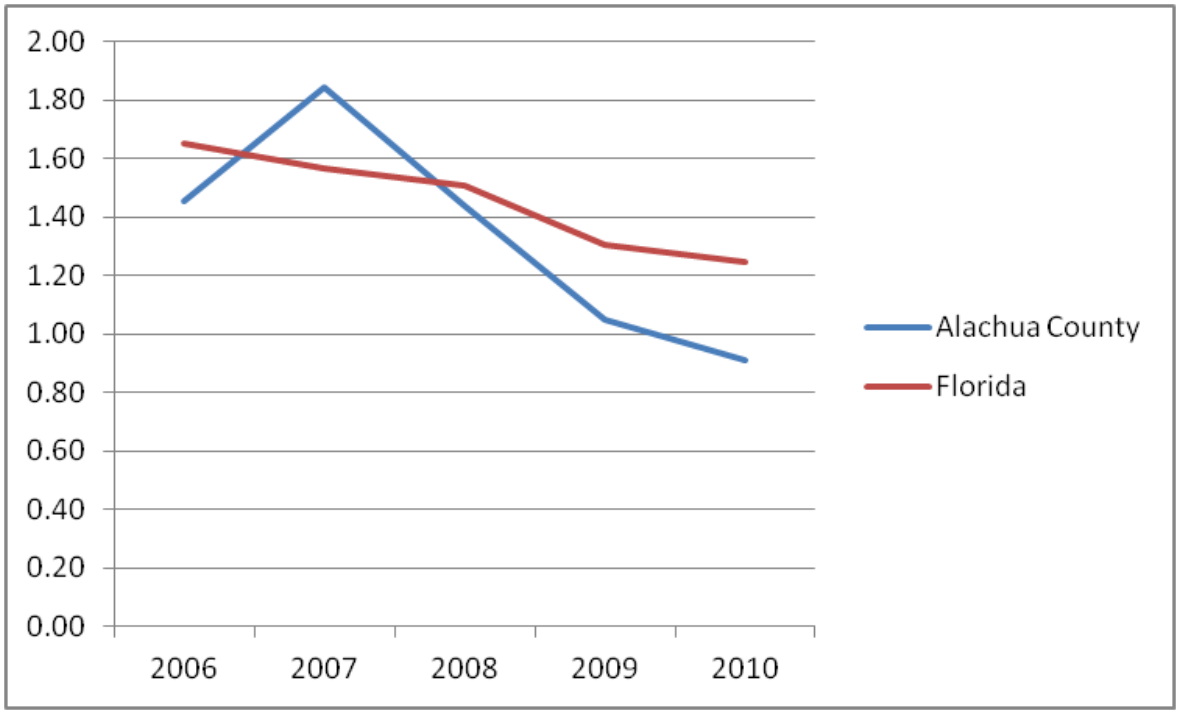
Chapter I: Introduction

A. Introduction

Motor vehicle crashes and fatalities have a major impact on the safety and well being of motorists, pedestrians and bicyclists using the transportation system. According to the National Highway Transportation Safety Administration, in 2007 over 41,000 people were killed and nearly 2.5 million were injured in crashes across the nation. In the state of Florida, over 3,200 people were killed and over 212,000 injured. In Alachua County, 18 people were killed and over 200 were injured. Crashes have a major impact on the safety and well being of all motorists and pedestrians using the transportation system.

As displayed in Illustrations 1, from 2006 through 2016, Alachua County experienced an overall decline in number of fatalities per 100 million vehicle miles traveled. The County has dropped below the statewide average since 2008. The same historical trend has also been prevalent during the same time period for crashes with injuries. State level data for 2011 on had not been released by the Florida Department of Transportation as of the completion date of this report.

Illustration 1
Florida versus Alachua County Fatality Rates
per 100 Million Vehicle Miles Traveled



B. Federal Safety Planning Requirements

The passage by Congress of the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users" in 2005 established a greater emphasis for Metropolitan Planning Organizations to incorporate safety in the transportation planning process. Specifically, safety must now be addressed as a stand-alone factor at both the Metropolitan Planning Organization and state level. In addition Metropolitan Planning Organization's must integrate safety into the Long Range Transportation Plan process, and identify specific safety strategies that will improve the overall performance of the transportation system, while maximizing the safety and mobility of both citizens and goods.

Safety has been traditionally viewed as an issue to be addressed during the design phases of transportation projects, or as an operational issue for enforcement agencies and is typically not integrated in the metropolitan planning organization's long term transportation planning process. According to a recent report by the National Highway Cooperative Research Program, "Incorporating Safety into Long-Range Transportation Planning", the integration of safety into the transportation planning process is paramount to the Long-Range Transportation Plan. According to the Report:

Travel safety is affected by how the transportation system is designed, constructed, operated, and maintained. The economic impact of motor vehicle crashes is staggering. According to a study of 85 urban areas in the U.S., the cost has reached $164.2 billion per year in just those communities, or an average of $1,051 per person in 2005. According to National Highway Traffic Safety Administration the economic impact of crashes, in 2000 dollars, is $230.6 billion per year, or an average of $820 for every person living in the U.S.

Crashes represent a major source of nonrecurring congestion, which is estimated in some locations to account for half of all congestion. Evidence from suggests many crashes are preventable. More than 31 percent of U.S. fatalities involve alcohol. Distracted drivers who are texting while driving is an increasing problem. The decrease in injuries due to the increased use of seatbelts over the past 20 years shows that injuries can be mitigated through focused safety programs.

"Moving Ahead for Progress in the 21st Century Act" (Public Law 112-141), was signed into law by President Obama on July 6, 2012. This resulted in funding $105 billion for surface transportation programs at for fiscal years 2013 and 2014. This is the first long-term highway authorization enacted since 2005. It is reported to be a milestone for the U.S. economy and the Nation's surface transportation program. The goal is to transform policy and programmatic frameworks into a guide for transportation system growth and development. The Act is designed to create a streamlined and performance-based surface transportation program and builds on many of the highway, transit, bike, and pedestrian programs and policies established in 1991. This program provides guidance on safety programs and related topics:

- Highway Safety Improvement Program eligibility and reporting
- Strategic Highway Safety Plan
- High Risk Rural Roads
- State safety data systems
- Penalty transfer provisions
- Older road users
- Railway-highway crossings

Not all part of "Moving Ahead for Progress in the 21st Century Act" is fully implemented at this time, including final performance measures for states and Metropolitan Planning Organizations.

C. State Safety Planning Requirements

The Florida Strategic Highway Safety Plan was first developed to be in compliance with requirements from the "Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users." All states were required to develop a Strategic Highway Safety Plan to provide a comprehensive framework for reducing highway fatalities and serious injuries on all public roadways. To meet federal requirements and ensure an organized statewide approach to safety planning, the Florida Department of Transportation developed the Florida State Highway Safety Plan in 2006.

- As part of the State Highway Safety Plan process, a coalition of federal, state and local government agencies, law enforcement, and transportation safety advocates developed four emphasis areas to allocate resources and efforts over the next five years. They include:

- Aggressive Driving: Reduce the rate of fatalities and serious injuries involving aggressive driving;

- Intersection Crashes: Reduce the rate of fatalities and serious injuries occurring at intersections;

- Vulnerable Road Users: Pedestrians, Bicyclists, and Motorcyclists – Reduce the rate of fatalities and serious injuries involving vulnerable road users; and

- Lane Departure Crashes: Reduce the rate of fatalities and serious injuries involving lane departures.

Intersection and lane departure crashes and accidents involving pedestrian and bicyclist vulnerable road users can be addressed as part of the long range transportation planning process.

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Chapter II
Institutionalizing Safety into the Transportation Planning Process

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Chapter II: Institutionalizing Safety into the Transportation Planning Process

A. Introduction

Transportation safety is a vital part to the overall health and well being of all residents of and visitors to Florida. Safety is defined by the United States Department of Transportation as freedom from harm resulting from unintentional acts or circumstances. The primary goal of transportation safety planning is to improve safety by supporting efforts to develop policies, programs, and projects related to pedestrians, bicyclists, transit users, truckers and motorists on the roadways and highways of Alachua County.

The goals, objectives and policies related directly to safety in the next update of the Long Range Transportation Plan are intended to improve the safety of the transportation system. The benefits realized from an effective safety program include safer roadways and intersections, reduced fatalities and injuries, improved mobility

The purpose of this Technical Report is to strengthen the foundation for including safety in the future updates of Long Range Transportation Plans. This will be accomplished through the analysis of motor vehicle crashes on the road network, and presentation of various strategies and countermeasures to improve safety.

B. Include Safety Experts on Planning Committees

Putting the safety experts on current teams or having separate safety-specific teams. The latter is more of the path that the Gainesville Metropolitan Transportation Planning Organization has already taken. Below are some of the suggestions. Other suggested plans include: "The transportation planning process brings together agencies, elected officials, municipalities, system users, and citizens to provide input and suggestions for transportation projects."

The committees organized to guide the Metropolitan Planning Organization and Department of Transportation planning processes may not include representatives of the safety community, such as safety engineers, law enforcement, emergency responders, safety educators, or other safety practitioners. Some committee representatives may have an interest and level of expertise in safety, but it is unlikely they perceive their roles as representing safety interests because they were assigned to the committee for different reasons. Transportation and safety stakeholders may perceive the State Highway Safety Plan development process as the vehicle to manage transportation safety issues, rather than the Long Range Transportation Plan and Transportation Improvement Plan. However, the Long Range Transportation Plan and Transportation Improvement Plan are important vehicles for incorporating elements of safety into all transportation projects.

Adding safety professionals to existing Metropolitan Planning Organization and Department of Transportation multidisciplinary committees would be helpful and provide safety expertise to transportation planners who tend to be "generalists" with broad understanding across all the planning factors. Crashes generally are associated with multiple contributing factors; therefore, considering safety from only a transportation planning or engineering perspective may result in overlooking other effective measures. Ongoing access to safety expertise in the decision-making process is necessary to ensure safety receives equal consideration with other planning factors.

Multidisciplinary collaboration provides planners with the resources for considering transportation system safety. Strategies for starting and growing these relationships include:

- Invite safety representatives to join existing committees or develop a new committee or coalition to represent safety interests. In some case, adding a new committee to the decision-making structure is difficult because of Metropolitan Planning Organization requirements. However, the other committees represent a variety of interests and disciplines, and adding safety professional to those committees is advisable. The Washington Department of Transportation includes safety professionals in decision-making when safety projects and programs are under consideration. However, a fully institutionalized safety integration approach would include representatives of the safety community in all decision-making exercises. Another option is to form a safety task force or coalition outside the institutionalized decision-making structure that influences decisions made by the standing committees. The Mid-America Regional Council, the Metropolitan Planning Organization for Kansas City, adopted this approach.

- Attend and State Highway Safety Plan steering committee meeting or a safety summit. This forum presents an opportunity to make connections with state safety professionals and identify their regional equivalents. It also is an opportunity to identify safety champions and leaders. Regular attendance at safety meetings enables planners to learn from example and observe firsthand how the State Highway Safety Plan fosters collaboration.

- Ask the State Highway Safety Plan coordinator or manager to recommend safety professionals for engaging in the Long Range Transportation Plan steering and advisory committees. State Highway Safety Plan coordinators work with all the safety disciplines; hence, the recommendations will move beyond transportation planning and engineering and include other nontraditional partners, such as persons who address road user behavior issues. This segment of the safety community may be missing at the planning table because the funding streams and requirements are outside the traditional Department of Transportation and Metropolitan Planning Organization structures. However, their input, as well as their resources, can make an important contribution.

- Invite local law enforcements, emergency personnel, business with an interest in safety, such as trucking and insurance companies, and other safety experts to state and regional Technical Advisory Committee meetings where planning staff can explain the transportation planning process and the mutual benefits gained from collaboration. Ask for their ideas and insights into the most pressing safety issues.

- Engage the Department of Transportation District/Division Regional Engineers and Federal Highway Administration Division Staff in safety issues. They already may attend Metropolitan Planning Organization Technical Advisory Committees. Charging them with responsibility for safety planning will encourage them to provide insight into the statewide safety concerns, funding sources, and information on other resources, such as data and analysis tools.

- Establish safety as a regular agenda item for Metropolitan Planning Organization Technical Advisory Committee meetings. Inserting safety into the discussion encourages participation, giving safety professionals a role to play and a voice in the decision-making process.

- Focus the effort and identify how project planners and safety professionals can work together to demonstrate the importance and benefits of safety for all transportation projects. For example, corridor studies are usually a multimodal undertaking and could involve elements of bicycle, pedestrian, bridge, parking, and road safety.

- As relationships and trust grow between planners and the safety community, identify additional agencies, partners, and stakeholders to provide expertise on critical areas. For example, if

pedestrian crashes near schools are issues in a community, engage the principal and teachers in specific planning efforts."

The current members of the Technical Advisory Committee include: Alachua County Department of Planning and Development, Alachua County Environmental Protection Department, Alachua County Public Works, Alachua County School Board, City of Gainesville Bicycle/Pedestrian Program, City of Gainesville Regional Transit System, City of Gainesville Department of Community Development, City of Gainesville Public Works, Florida Department of Environmental Protection, Florida Department of Transportation, Gainesville Regional Airport, Gainesville Regional Utilities, North Central Florida Regional Planning Council, St. Johns River Water Management District, University of Florida Campus Planning, and University of Florida Parking and Transportation.

C. Incorporate Safety into Goals and Objectives

Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users requires the transportation planning process to provide for consideration of projects and strategies that accomplish the eight planning factors. Safety is listed as a planning factor, but it is not always given equal consideration in the vision, mission, and goals of the Long Range Transportation Plan, which eventually affects the objectives and performance measure.

The long-range planning process combines technical analysis with community and agency participation to envision a transportation future. Information from the travel demand model is widely used in stakeholder or public meetings to demonstrate the benefits of capital project in terms of mobility, air quality, accessibility, and transit. However, the models is not capable of explain the safety benefits of these same projects. Although safety specific models and tools are becoming available, particularly at the state level, they are not yet widely used by a planner, which makes it difficult to quantify the safety benefits of a transportation project or elevate it as a primary goal.

To develop or refine safety goals and objectives safety must be portrayed as a priority to the public, stakeholders, and decision-makers. Examining the data and asking the multidisciplinary committee to comment on the most pressing safety issues could result in creating a snapshot of the safety challenges facing a community at any point in time. This information can be presented to stake-holders, decision-makers, and members of the public to create a vision, goals, and objectives for the Plan.

The goals and objectives not only convey to the community a sense of what the transportation planning process:

- To effectively incorporate safety into the vision, goals, and objectives of the Long Range Transportation Plan, it is important to identify methods (e.g., forecasting tools, public outreach) for setting meaningful safety goals. Some include:

- Develop a regional safety report on general crash statistics to serve as a resource document that, continually updates stakeholders and the public about the important of safety.

- Use the regional safety report during stakeholder and public visioning session and set the stage for adopting safety as a key transportation goal.

- Create maps to depict intersections, road segments, and corridors in the transportation network with the greatest promise for improving safety in the same way the travel model depicts the most congested roadways/

- Consider adopting the "National Strategy on Highway Safety."

a. Vision Statement

The Gainesville Urbanized Area will have a multimodal transportation system that integrates land use and transportation planning and investments to promote community well-being through good and healthy relationships with the region's other communities and natural systems. Specific outcomes will be:

1. sustainable, safe, secure, energy efficient and livable land use patterns and complementary context-sensitive transportation networks that provide mobility choices within and between compact, mixed-use, multimodal-supportive development;
2. balanced east-west Gainesville Urbanized Area growth to reduce socioeconomic disparity through increased transportation mobility and accessibility;
3. transportation infrastructure investments that direct growth to existing infill and redevelopment areas;
4. greenbelts to preserve natural and agricultural lands between all municipalities in the Alachua County region through compact land use patterns served by express transit service and park-and-ride facilities; and
5. a network of Rapid Transit Facilities connecting regional employment centers in order to enhance the economic competitiveness of the area.

b. Goal Statement 3: Safety for Mobility and Accessibility

Develop and maintain a safe transportation system that supports increased mobility and better accessibility for all users and neighbors of transportation facilities and services.

c. Objectives

2.1 Address existing and potential safety problems on or adjacent to transportation corridors through an interagency planning and prioritization process.

2.2 Implement techniques to calm traffic in residential, educational and commercial areas where walking and bicycling are common.

2.3 Implement a comprehensive Safe Routes to School Program to increase the percentage of children walking or bicycling to school.

2.4 Increase safety for vulnerable road users, including the elderly, children, pedestrians, bicyclists, motorcyclists and motor scooter riders.

2.5 Implement techniques and roadway design to reduce fatalities and serious injuries from common intersection crashes, lane departure crashes, and aggressive driving.

2.6 Improve performance through safety improvements and countermeasures.

2.7 Coordinate with the Florida Department of Transportation to implement the Florida Strategic Highway Safety Plan.

2.8 Incorporate safety-related strategies, plans and activities (including transit safety) in the Safety Element of the long range transportation plan.

D. Identify Safety Issues

Identifying safety issues a key first step in the safety process. This should be a data driven process and one with measurable outcomes.

a. Fatality Analysis Reporting System

Data are important to planners for many reasons, including fostering and building relationships and demonstrating the importance of safety projects and programs. Planners can use the data to identify safety problems, evaluate alter-native strategies, justify proposed projects, and establish performance measures. Without data, agencies risk identifying perceived, rather than actual dangers. Common data issues involve not only collection and management, but also analysis.

b. Data Collection and Management

States and Metropolitan Planning Organizations generally examine three types of data–crash, roadway, and travel data. Other considerations might include demographic and land use data, as well as the characteristics of the built environment. Data and data management systems differ from state to state. Data may be managed by Department of Transportation's, Departments of Motor Vehicles, State Highway Safety Offices, or other state agencies. In some cases, enforcement agencies and emergency responders collect crash data and keep internal systems. In some states, the crash information is centralized; but in others, it may not be, especially in the case of data on local roads. Some states have data on the local road system, while others focus on the state system. Planners may work with the multidisciplinary committee and use these relationships to identify state and regional data needs and gaps. Once planners have the data, which can be very basic or more sophisticated, they usually have the ability to:

- Identify high-crash corridors, intersections, and/or facility types (ideally via Geographic Information System mapping);
- Determine crashes types (e.g., rear-end collisions, lane departures);
- Identify roadway facility types where crashes are likely to occur;
- Identify contributing factors (e.g., failure to yield at a stop sign, excessive speed, distraction);
- Identify roadway characteristics associated with crashes, such as lane width, pavement markings, signage, etc.;
- Determine key human factors or behaviors associated with the number and severity of crashes (e.g., nonuse of safety belts or helmets, alcohol or drug impairment, etc.);
- Determine crash risk inequities across jurisdictional boundaries by using travel data to establish crash rates; and
- Conduct road safety audits to further understand the safety needs.

E. Establish Safety Performance Measures

States and Metropolitan Planning Organizations use various sources of data in the planning process to identify areas for improvements in the transportation network. Integrating safety considerations represents a significant opportunity for transportation officials to enhance safety performance. Integration also provides decision-makers with current information on the safety characteristics of the transportation system, such as the number and rate of serious injury crashes.

The challenge is identifying how to measure progress since safety improvements made in the long range plan may not take effect for a number of years.

Safety information is particularly important for quantifying safety needs, identifying goals to guide transportation planning efforts, and focusing attention and resources on safety-related challenges. Performance measures can help to set priorities for capital improvements, demonstrate progress toward goals in statewide and metropolitan plans.

Numerous methods are available to identify trends in safety on our road networks.. As an early example, in 2008, the Governors Highway Safety Association and the National Highway Traffic Safety Administration used a panel of experienced professionals to develop performance measures which all states are required to report annually.

Possible performance measures include the number, frequency, severity, and cost of crashes. Often safety is most affected by road user behavior, vehicle operations, roadway conditions, and other factors, many of which are outside the influence of the transportation planning process.

The data used to estimate safety outcomes are derived from law enforcement reports and can be aggregated at the desired level. The National Highway Traffic Safety Administration maintains a census of detailed crash reports for all fatal crashes as part of the Fatality Analysis Reporting System. In Florida detailed, geocoded data is available to calculate the following measures:

- Number of fatalities;
- Fatality rate by Vehicle Miles Traveled;
- Number of serious injuries;
- Crashes involving vulnerable populations including pedestrians and bicycle users; and
- Rate of serious injuries by Vehicle Miles Traveled.

States also often track behavioral measures, such as:

- Observed seat belt use;
- The number of safety belt citations;
- Number of impaired driving arrests; and
- Number of speeding citations issued.

Distracted driving due to texting and cell phone use represent a relatively new safety challenge that is a new hazard on our roadways.

The Florida Department of Transportation uses the goal of a five percent decrease in fatalities and serious injuries as two of its performance measures.

F. Collect and Analyze Safety Data

Data analysis is important to planners for many reasons, including fostering and building relationships and demonstrating the importance of safety projects and programs. Planners can use the data to identify safety problems, evaluate alter-native strategies, justify proposed projects, and establish performance measures. Without data, agencies risk identifying perceived, rather than actual dangers. Common data issues involve not only collection and management, but also analysis.

States and metropolitan planning organizations generally examine three types of data – crash, roadway, and travel data. Other considerations might include demographic and land use data, as well as the characteristics of the built environment. Data and data management systems include information available from the Florida Department of Transportation and from Signal Four Analytics housed at the University of Florida. This data includes geocoded locations and Shapefiles available for use in Geographic Information Systems. This information allows the following:

- Identify high-crash corridors, intersections, and/or facility types (ideally via Geographic Information System mapping);
- Determine crashes types (e.g., rear-end collisions, lane departures);
- Identify roadway facility types where crashes are likely to occur;
- Identify contributing factors (e.g., failure to yield at a stop sign, excessive speed, distraction);
- Identify roadway characteristics associated with crashes, such as lane width, pavement markings, signage, etc.;
- Determine key human factors or behaviors associated with the number and severity of crashes (e.g., nonuse of safety belts or helmets, alcohol or drug impairment, etc.);
- Determine crash risk inequities across jurisdictional boundaries by using travel data to establish crash rates; and
- Conduct road safety audits to further understand the safety needs.

This information can then be presented to stakeholders, the public, and decision-makers to shape or refine the goals, objectives, and measures in appropriate plans. It can be used in a standalone planning documents, such as a bicycle or pedestrian safety plans. Finally, presenting the information emphasizes to decision-makers the importance of collecting and analyzing data to support science-based decision-making. Data analyses help planners accomplish the following tasks:

- Identify Systemic Safety Issues as Well as High-Risk Corridors, Road Segments, and Intersections – By describing safety problems quantitatively, an agency knows the magnitude of the problem and can focus its efforts and rally support for areas with the greatest potential to improve safety.
- Identify Crash Types – Data analysis is used to discern trends in the frequency of crash types to identify possible effective safety countermeasures.
- Track Performance – Safety data analysis allows managers to determine the extent to which they are achieving the stated goals and objectives.
- Select and Prioritize Projects – Analysis of safety data guides managers to select and implement appropriate systemic improvements to the transportation network and identify projects to improve safety at high-risk locations. It identifies high-risk groups such as younger and older road users, and impaired drivers, motorcyclists, and pedestrians. Managers use these data to select and prioritize countermeasures with the greatest potential for reducing death and injury.
- Utilize Low-Cost Safety Improvements – Systematic identification of safety deficiencies may assist in identifying and implementing low-cost safety improvements which spread safety funds more widely.

G. Utilize Safety as a Decision Factor

Long Range Transportation Plans and State Transportation Improvement Plans are two major planning documents required as part of the current transportation planning process. Development of the state and metropolitan Long Range Transportation Plans depend upon the collaborative participation of relevant transportation-related agencies and organizations; open, timely, and meaningful public involvement; and technical approaches (data analysis and travel model results). These inputs establish the critical goals, strategies, and policies that guide the long-term transportation vision and the near-term transportation investment decisions.

Planners prioritize programs and projects for funding in the State Transportation Improvement Plan based on a number of unique factors, but central to this is the consideration of how well the proposed projects meet the goals laid out in the Long Range Transportation Plan. To effectively consider safety as a key decision factor, it must be present in the Long Range Transportation Plan as a goal and defined by supporting strategies and policies.

The safety goal(s), strategies, and policies established in the Long Range Transportation Plan can be developed from a top down or bottom up approach. In a top down approach, the state or metropolitan transportation agency has the tools (e.g., data, collaborative partnerships, forecasting tools) to develop a goal and data driven strategies and policies. These serve as the overarching principles to guide the development of safety-specific strategies and policies in other, standalone modal or policy plans.

In a bottom up approach, the safety strategies and policies from other planning documents, such as the Congestion Management Process, the State Highway Safety Plan, and Bicycle and Pedestrian Plans guide the development of the goal(s), strategies, and policies in the Long Range Transportation Plan or are adopted as is, into the Long Range Transportation Plan.

The State Highway Safety Plan update process is a data driven, collaborative effort. It brings safety, transportation, health, enforcement, and education professionals together to identify the safety problems in the state and develop creative solutions. Coordinating with State Highway Safety Plan stakeholders to identify the emphasis areas, strategies, and action items from the State Highway Safety Plan that bear relevance to future transportation system safety is a point of departure for updating the safety goals and strategies in the Long Range Transportation Plan.

Strategies for incorporating safety into the Long Range Transportation Plan include:

- Identify the necessary resources (e.g., data, tools) or partnerships to comprehensively develop safety as a goal with supporting strategies and policies in the Long Range Transportation Plan.
- Use the State Highway Safety Plan emphasis areas as a guide when developing the safety goal, policies, and strategies for the Long Range Transportation Plan. For example, if intersection safety is identified as a priority area in the State Highway Safety Plan, identify relevant strategies and policies for intersections in the Long Range Transportation Plan.
- Adopt the relevant safety goals, policies, and strategies in standalone transportation plans, such as the Bicycle and Pedestrian Plan, into the Long Range Transportation Plan.
- Identify specific multimodal safety strategies.
- Include a safety element of safety chapter in the Plan addressing multimodal safety (i.e., Transit Safety, Highway Safety, Bike/Pedestrian Safety, Freight Safety).

Prioritization is the process for evaluating and selecting individual transportation projects. The goals, strategies, and policies established in the Long Range Transportation Plan serve as one of the filters for ranking, scoring, and selecting transportation programs and projects. Other common filters include financial assumptions and political interests. However, in general, the programs and projects that best meet the transportation goals are included and prioritized in the State Transportation Improvement Plan.

Safety should be included as an element in the scoring mechanism. Sometimes, planners believe safety is a consideration in all transportation projects and programs; hence, they do not see the need to single out safety as a ranking factor. However, many of the standards included in engineering manuals have not been evaluated for impact on safety. Therefore, it is incorrect to assume all projects will protect or enhance safety.

H. Monitor and Evaluate the Effectiveness of Safety Programs and Projects

The primary purposes of system performance monitoring and evaluation are to ensure programs and projects are on track and being implemented appropriately; identify opportunities for course correction to improve performance; and provide feedback to the overall process for future improvements in the planning and programming process. Routine system monitoring provides an agency with the information necessary to evaluate both system and project-level outcomes. The evaluation process analyzes the data and compares the results to expected outcomes.

Evaluation requires a fairly high level of data and analysis to determine the success or failure of safety programs and projects. Planners regularly see fatality trends, which enables them to evaluate the performance measures, goals, and objectives and where appropriate, program new analysis methods and projects.

Performance measures monitor the effectiveness of a system by comparing pro-gram and project results to benchmarks or targets. Performance measures are the most reliable method for detecting and correcting problems, but tracking progress relies on data collection, data quality, and data management systems. Planning agencies can develop performance measures based on the available data and, at the same time, plan for improved data collection and additional future performance measures.
The ultimate goal is to utilize the information to influence and refine the original performance measures, vision, goals, and objectives. The feedback is used in subsequent planning cycles to highlight deficiencies or successes and incorporate appropriate changes. Effective monitoring and evaluation systems ensure critical safety programs and projects are selected, implemented, and evaluated. When monitoring, it is important to:

- Track and monitor the data or leverage existing tracking mechanisms to measure performance.
- Monitor the data, at least once a year, to analyze trends; measure project effectiveness; and modify the goals, objectives, and performance measures in planning documents.
- Work through the multidisciplinary committee. A variety of agencies may monitor operations and system performance. Considering the performance measures developed by other agencies may save time and generate additional ideas, discussion, and consensus.
- Create a comprehensive evaluation plan early in the planning process. The plan should document the desired achievements and performance measures, identify the data for monitoring progress and methods for tracking and analyzing the information, and establish a feedback mechanism for updating future plans.
- Set aside resources to support evaluation.
- Assign evaluation responsibilities to a person or agency.
- Analyze data at least annually to ensure projects and programs are on target to meet expected long-term performance.
- Engage the multidisciplinary committee in the evaluation process since it is a potential source for information, and the members will provide input into future goals, objectives, and projects.

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Chapter III
Florida Areas of Emphasis

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Chapter III: Florida Areas of Emphasis

A. Introduction

The Florida Department of Transportation, in partnership with the Federal Highway Administration and representatives from all segments of Florida's traffic safety community, developed the 2012 Strategic Highway Safety Plan. Florida's State Highway Safety Plan is a statewide, data-driven plan that addresses the "4 E's" of safety – Engineering, Enforcement, Education, and Emergency response.

To update the State Highway Safety Plan, Florida followed a process similar to the update effort used for the 2006 State Highway Safety Plan. The first task was to revisit the State Highway Safety Plan emphasis areas to decide, through a careful review of the data, whether to make any changes. In October 2011, the State Highway Safety Plan Executive Committee reviewed the data and selected the following eight Emphasis Areas for the 2012 State Highway Safety Plan update:

1. Aggressive Driving;
2. Intersection Crashes;
3. Vulnerable Road Users (pedestrians, bicyclists, and motorcyclists);
4. Lane Departure Crashes;
5. Impaired Driving;
6. At-Risk Drivers (aging road users and teens);
7. Distracted Driving; and
8. Traffic Data.

Two of the selected emphasis areas, impaired driving and traffic data, were Continuing Priority Areas in the 2006 State Highway Safety Plan. In the case of the distracted driving emphasis area, public attitude drove the selection. Surveys conducted by the Department of Highway Safety and Motor Vehicles found Floridians believe distracted driving is a major problem, a conclusion supported by a number of national studies. Specific data were not available on distracted driving because previously it was reported on the Florida crash form under careless driving. With the 2011 revision in the crash form, there is an explicit category and reporting codes for distracted driving and law enforcement agencies now collect this important data.

Florida is also focusing on three Continuing Priority Areas not listed as emphasis areas in the plan, including occupant protection, commercial vehicles, and work zone safety. These important areas will continue to receive attention from Florida Department of Transportation and its safety partners through existing programs and initiatives.

The Vision and Mission from the 2006 State Highway Safety Plan were retained:

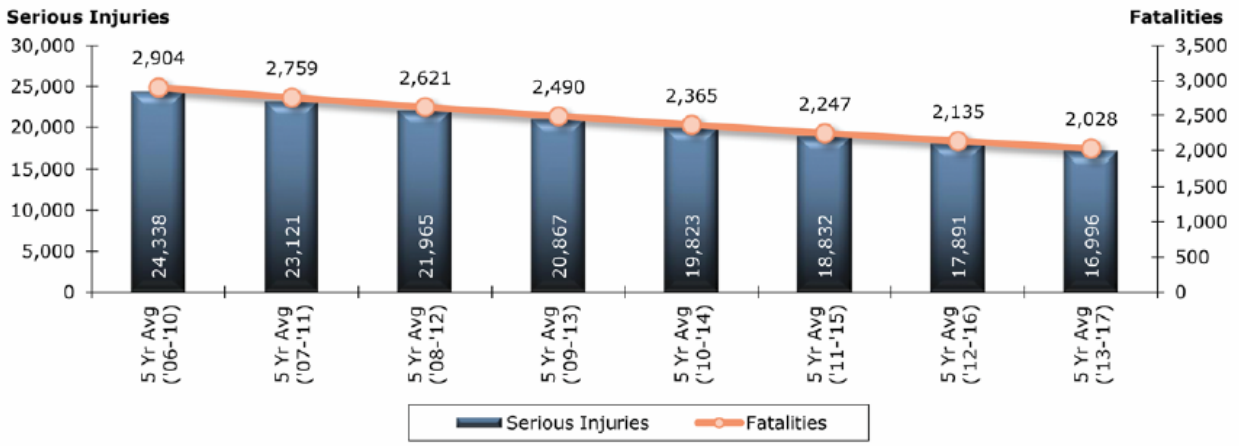
- Vision: To provide a safer surface transportation system for residents, businesses, and visitors.

- Mission: The State of Florida, utilizing engineering, enforcement, education, and emergency response, will focus resources where opportunities for safety improvements are greatest.

However, the plan's goal was changed to achieve a five percent annual reduction in the actual number of fatalities and serious injuries rather than a reduction in the rate. Using the five-year averages from 2006 to 2010 as a baseline, the 2012 State Highway Safety Plan goal is to reduce fatalities from 2,904 to 2,028 for 2013 to 2017, and reduce serious injuries from 24,338 (2006 to 2010) to 16,996 for 2013 to 2017.

Illustration 2 shows a five percent annual reduction in fatalities and serious injuries from the 2006 to 2010 five-year average.

Illustration 2
Five-Percent Annual Reduction in Fatalities and Serious Injuries from 2006-2010 (Five-Year Average)



Some caution is necessary when reviewing emphasis area data in the plan. In one case, data show significant decreases in fatalities and serious injuries from one year to the next. These changes may relate to revisions in the reporting process where a definition of what constitutes a crash type has changed. For instance, lane departure fatalities dropped from 1,711 in 2007 to 892 in 2008. The definition of lane departures was modified in 2008 to exclude at intersection or influenced-by-intersection crashes leading to the large drop in fatalities.

There are also overlaps in the data among the emphasis areas. For instance, a pedestrian fatality that occurs at an intersection will show up as a fatality in both the Vulnerable Road Users and Intersection Crashes emphasis areas. A similar example would be a lane departure crash that involves a motorcyclist. As noted earlier, codes to report distracted driving became available with the 2011 crash report update, prior to that time distracted driving was an attribute under the report's narrative section. This is why the number of fatalities and injuries from different sources do not necessarily exactly match.

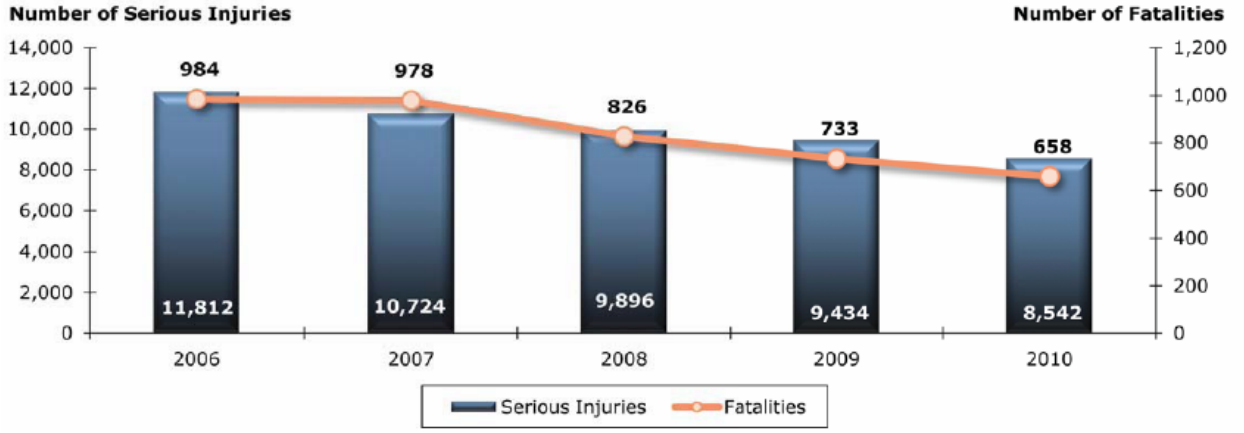
B. Intersection Crashes

Nearly 29 percent of the statewide traffic fatalities, which occurred from 2006 to 2010 are intersection related. Crashes which occur at or within 250 feet of signalized and unsignalized intersections are defined as intersection related. Identified as an emphasis area in the 2006 Strategic Highway Safety Plan, Florida improved intersection design and operation from minimum to optimal standards through implementation of an Intersection Safety Implementation Plan developed in 2006.

a. The Challenge

Between 2006 and 2010, 4,179 people died in intersection-related crashes on Florida roads and highways, and a staggering 50,408 were seriously injured.5 Intersection-related fatalities and serious injuries have declined from 12,796 in 2006 to 9,200 in 2010 (Illustration 3).

Illustration 3
Intersection Crash Fatalities and Serious Injuries
from 2006-2010 (Five-Year Average)



In 2006, the Florida Department of Transportation developed an Intersection Safety Implementation Plan to lay out a more detailed strategy to improve intersection safety. Implementation of the plan included several significant improvements. Most of these improvements were made on state maintained roadways.

Based on research of best practices and input from Federal Highway Administration, Florida Department of Transportation adopted new intersection signal designs which included requirements for a signal head per lane, retro reflective back plates, and no diagonal signal head displays. The new signal designs were adopted as policy for all new state road designs and are detailed in the Plans Preparation Manual. Florida Department of Transportation encourages local agencies to adopt the new intersection signal designs on their projects.

In addition to the traditional approach to implementing intersection improvements which uses crash data to identify high-crash locations and implement countermeasures specific to the location, Florida Department of Transportation began using a systemic approach to achieve the intersection crash reduction goal.

This approach starts with a set of low-cost, effective countermeasures and searches the crash data system to identify intersections where the countermeasures can be deployed in a cost-effective manner. The first use of the systemic approach focused on stop sign control on side streets of high-speed divided highways. The systemic approach was adopted as Florida Department of Transportation policy in 2009. To address pedestrian-related crashes at intersections Florida Department of Transportation began encouraging the Districts to review signal timing for pedestrians. Techniques deployed include setting appropriate walk times, and use of advanced pedestrian or pedestrian only phases.

b. Strategies

The Florida State Highway Safety Plan Intersection Crashes Emphasis Area identified the following seven strategies:

- Increase safety of intersections for all users;
- Identify systemic intersection safety improvements, update the Intersection Safety Plan and encourage implementation at the local level;
- Promote improved access management at the State and local level;
- Consider including safety in the planning/value engineering manual;
- Update policies, guidelines, handbooks, and training based on the Highway Safety Manual;

- Increase education programs designed to provide targeted information to drivers; and
- Increase targeted enforcement activities at high crash locations and increase public education on intersection safety.

The lead "E" selected for the Intersection Crashes Emphasis Area to ensure the action plan is focused and stays on track is "Engineering."

C. Vulnerable Road Users/Bicycles and Pedestrians

The Vulnerable Road Users Emphasis Area addresses crashes involving bicyclists, pedestrians, and motorcyclists. In the 2006 State Highway Safety Plan, this Emphasis Area Team focused on providing local and state agencies with the data, skills, and tools to identify effective safety countermeasures in the "4 E's" (engineering, education, enforcement, and emergency response); making strategic safety investments and focusing resources where opportunities for safety improvements are greatest for vulnerable road users; and establishing mobility strategies consistent with safety for these users. The challenges presented by vulnerable road users may be similar, but the solutions are often unique to a specific user type. In the following sections bicyclists and pedestrians will be discussed together and motorcyclists will be discussed separately.

a. The Challenge

Between 2006 and 2010, 534 bicyclists died in traffic crashes on Florida roads and highways, and 3,744 were seriously injured. Bicycle fatalities and serious injuries have declined from 928 in 2006 to 800 in 2010. The majority of fatally injured bicyclists belong to the 45-54 age group followed by 35-44; 90 percent of the fatalities were male. The 10 counties in Florida with the highest number of bicycle fatalities during this time period were: Broward, Miami-Dade, Orange, Palm Beach, Hillsborough, Duval, Pinellas, Lee, Pasco, and Alachua. These counties represented 61 percent of bicycle fatalities from 2006 through 2010 (Illustration 4). Between 2006 and 2010, 2,520 pedestrians died in traffic crashes on Florida roads and highways, and a staggering 8,504 were seriously injured.

Illustration 4
Bicycle Fatalities and Serious Injuries in Motor Vehicle Crashes from from 2006 to 2010

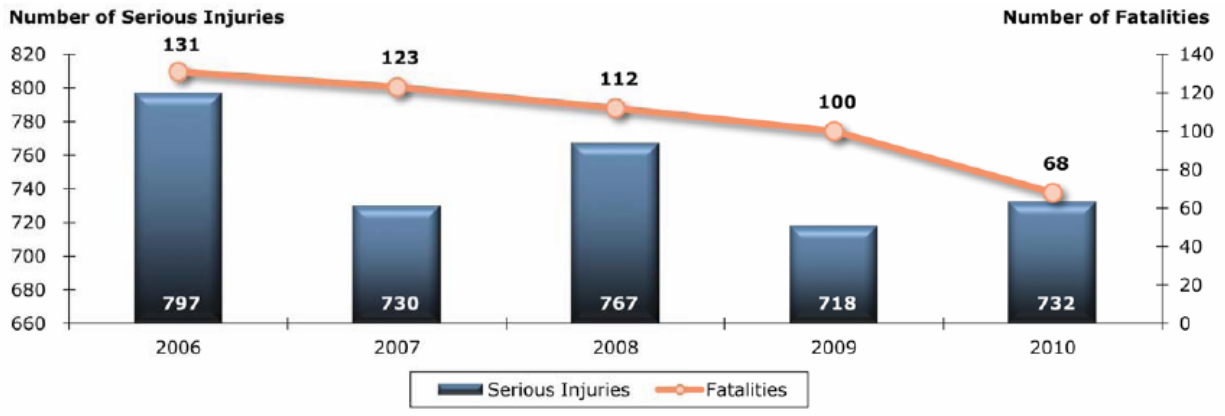
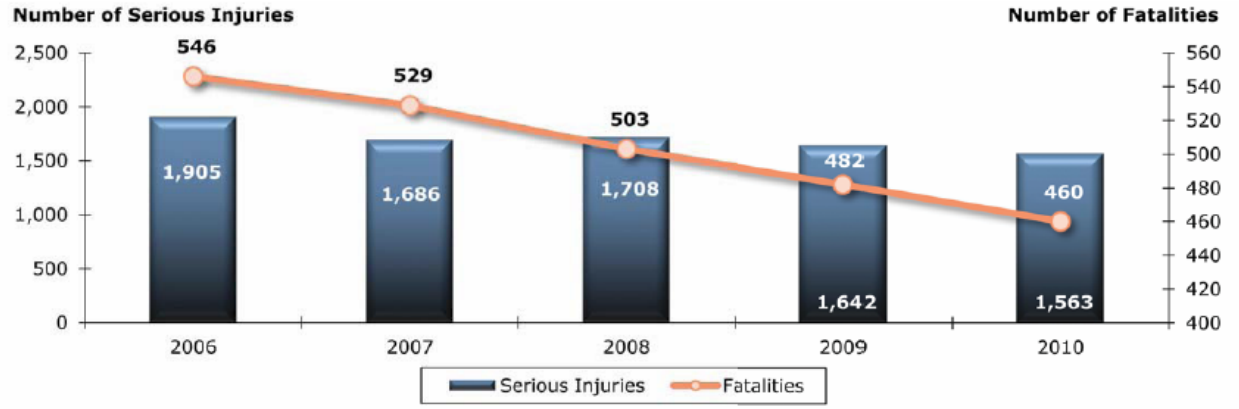


Illustration 5
Pedestrian Fatalities and Serious Injuries in Motor Vehicle Crashes
From 2006 to 2010



Pedestrian fatalities and serious injuries declined from 2,451 in 2006 to 2,023 in 2010 as shown in Illustration 5. Male drivers between the ages 25-34 years represented the highest number of pedestrian-related fatalities and serious injuries followed by male drivers in the age group of 35-44 years.

Most of the fatal and serious injury pedestrian crashes occurred in the winter months with a peak during January and March. Between 2006 and 2010, 50 percent of pedestrian fatalities and serious injuries occurred when pedestrians did not cross roadways at an intersection.

b. Accomplishments

Progress has been made in addressing bicycle and pedestrian safety. As an example, several counties began mapping bicycle/pedestrian crashes using Geographic Information System; a web-based Geographic Information System tool was developed for mapping pedestrian and bicycle crashes on the State Highway System; the Florida Department of Highway Safety and Motor Vehicles made data available for access by state and local agencies; and information was obtained from local governments and Metropolitan Planning Organizations on the type of data collected and the locations of pedestrian/ bicycle crashes.

Multiple studies were conducted to determine countermeasure and safety improvement effectiveness with evaluation results published in several formats to promote best practices, including a DVD on pedestrian best practices. Various training programs were conducted across the State, including Pedestrian/Law Enforcement Training, Department of Health Livable Communities Workshops, Federal Highway Administration Pedestrian Safety Workshops, workshops for elder road users and road safety audit courses.

Florida Department of Transportation established a standing statewide "Partnership Council" on bicycle and pedestrian mobility to promote the livability, health, and economic benefits of bicycle and pedestrian activity and provide guidance to the Florida Department of Transportation, its partners and other stakeholders on policy matters and issues affecting Florida's bicycle and pedestrian transportation needs. The Council identified focus areas for recommendations and best practices organized consistent with the "4 E's" (education, enforcement, engineering, and emergency response) and funding. Council safety recommendations have addressed data gathering, development of measures of system and facility safety, and cost-effective safety education, training, and enforcement. The Council will focus on four areas for

2012/2013: contributions to connecting the existing bicycle/pedestrian system, safety, cultural changes, and health.

The web-based Florida Pedestrian/Bicycling Safety Resource Center was established to provide Floridians access to pedestrian/bicycle safety brochures, videos, a lending library, educational materials, promotional items, and their quarterly newsletter. The Center provides in excess of 325,000 resources statewide annually.

The 2011 Dangerous by Design identified the Orlando-Kissimmee, Tampa-St. Petersburg-Clearwater, Jacksonville, and Miami-Fort Lauderdale-Pompano Beach in the top 10 of the most dangerous metro areas for pedestrians in the nation. Florida Department of Transportation elevated bicycle and pedestrian safety to a departmental focused initiative and appointed a champion and designated a state bicycle/pedestrian safety program manager in the Safety Office to lead the Bicycle/Pedestrian Focused Initiative in the fall of 2011 and spring of 2012.

Florida conducted a National Highway Traffic Safety Administration assessment of the Pedestrian Safety Program in January 2012, and conducted roundtable discussion meetings in Tampa, Bartow, Miami, Fort Lauderdale, Deland, Jacksonville, and Tallahassee in August and September 2012.

c. Contribution To The 2012 Strategic Highway Safety Plan Goal

Through the implementation of the Pedestrian and Bicycle Strategic Plan, the Vulnerable Road Users Emphasis Area member agencies and their partners will reduce the number of pedestrian and bicycle fatalities and serious injuries by five percent annually through 2017, based on a five-percent annual reduction from the baseline of 2006-2010 average.

d. Strategies

To impact the State Highway Safety Plan goal, the Vulnerable Road Users Emphasis Area identified six bicycle/pedestrian strategies and one strategy for all vulnerable road users:

- Increase awareness and understanding of safety issues related to Vulnerable Road Users;
- Increase compliance with traffic laws and regulations related to pedestrian and bicycle safety through education and enforcement;
- Develop and use a systemic approach to identify locations and behaviors prone to pedestrian and bicycle crashes and implement multidisciplinary countermeasures;
- Encourage adequate funding levels for effective pedestrian and bicycle safety programs and initiatives;
- Promote, plan, and implement built environments (urban, suburban, and rural) which encourage safe bicycling and walking; and o Support national, state, and local legislative
- Initiatives and policies that promote bicycle and pedestrian safety.

The lead "E" selected for the Vulnerable Road Users/Bicycles and Pedestrians Emphasis Area to ensure the action plan is focused and stays on track is "Education."

D. Lane Departure Crashes

Lane-departure crashes also were an emphasis area in the 2006 State Highway Safety Plan. These crashes include running off the road, crossing the center median into an oncoming lane of traffic, and sideswipe crashes. Running off the road also may involve a rollover or hitting a fixed object. Head-on collisions are related to crashes involving departure from the roadway. One of the most severe types of

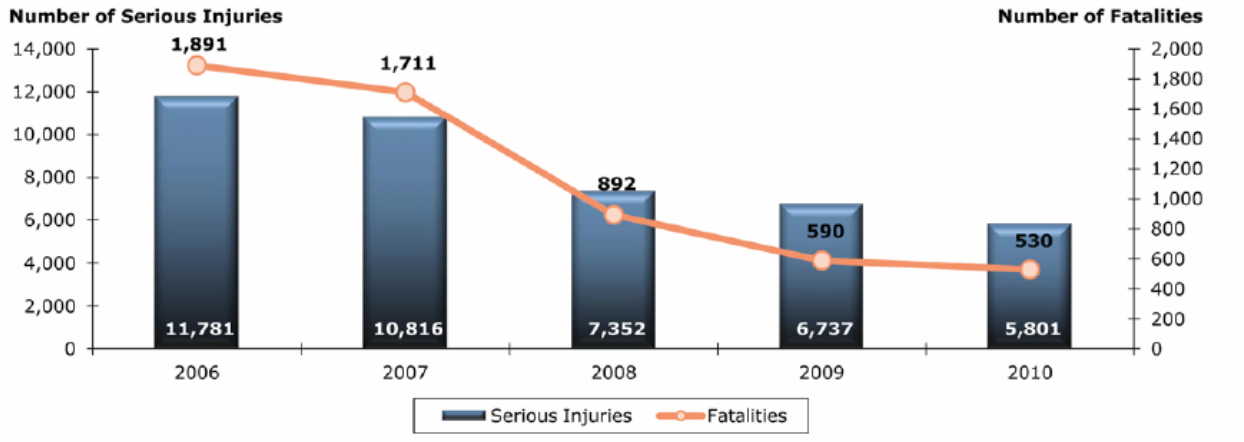
crashes occurs when a vehicle crosses into an opposing traffic lane and crashes head on with an oncoming vehicle. Nationally, this type of severe crash occurs primarily on rural two-lane roadways and limited access roadways with narrow medians. The severity of these crashes is compounded by the additive nature of vehicle speeds at the time of collision, especially when vehicles collide with other vehicles traveling toward them as opposed to stationary objects. When a vehicle leaves the roadway, the result is often disastrous. To reduce the serious injuries and fatalities resulting from lane departures, efforts must be made to keep vehicles from leaving the road or crossing the center median, reduce the likelihood of vehicles overturning or crashing into roadside objects, and minimize the severity of an overturn.

a. The Challenge

In Florida, fatalities and serious injuries related to lane-departure crashes have declined since 2006. Nearly 39 percent of statewide traffic fatalities can be attributed to lane-departure crashes. In 2008, the definition of lane departure was modified to exclude at-intersection or influenced-by-intersection crashes. The new criteria are crashes not at or influenced by an intersection, involving any contributing cause, including a driver who passes improperly or drives on the wrong side/way, or a harmful event involving head-on, sideswipe, collision with a parked car. It can also be a vehicle that hits a fixed object (except for traffic gates and fixed objects above the road), construction barricade, crash attenuator; a vehicle that runs into a ditch/culvert or water, overturns, or crosses the median.

The change in definition is related to the decline in lane-departure fatalities and serious injuries while transitioning from 2007 to 2008 (Illustration 6). However, even if the previous definition were to be used, there continues to be a decline in the number of lane-departure crashes.

Illustration 6
Lane Departure Fatalities and Serious Injuries in Motor Vehicle Crashes
For 2006 to 2010



b. Accomplishments

Florida has taken significant steps to implement the lane-departure strategies identified in the 2006 State Highway Safety Plan:

- A requirement for audible pavement markings was included in the Florida Department of Transportation Plans Preparation Manual in 2008. The road miles of audible pavement marking installed include 120 miles in 2009; 195 miles in 2010; and 224 miles in 2011.
- A median crossing/median barrier program was implemented and has shown great success for numerous locations implemented statewide.
- The use of Safety Edge is being piloted on the State Highway System to mitigate crashes associated with pavement edge drop-off.

The Florida Green Book Committee has adopted language for the use of Safety Edge in the draft 2013 Florida Green Book. A few Florida law enforcement agencies converted to the new crash reporting system in the fourth quarter of 2010. Those crash data have not been included.

Move Over legislation was adopted in 2002 requiring drivers approaching an emergency or law enforcement vehicle parked along a roadway to vacate the lane closest to that vehicle as soon as it is safe to do so. Working with the Florida Highway Patrol, Florida Department of Transportation installed advisory road signs to remind drivers to move over, installed "Move Over. It's the Law." stickers on all Florida fuel pumps, and produced television commercials and brochures to educate the driving public.

c. Contribution To The 2012 Strategic Highway Safety Plan Goal

Through the implementation of the Lane Departure Emphasis Area Action Plan, member agencies and their partners will reduce the number of lane departure related fatalities and serious injuries by five percent annually.

d. Strategies

The Florida State Highway Safety Plan Lane-Departure Emphasis Area identified the following four strategies: o Improve engineering practices to reduce lane departure crashes; o Improve law enforcement practices to better capture data related to lane-departure crashes; o Increase public education to reduce lane-departure crashes; and o Partner with emergency responders to reduce severity of lane-departure crashes. The lead "E" selected for the Lane Departure Emphasis Area to ensure the action plan is focused and stays on track is “Engineering.”

E. Traffic Records

Traffic Data and Decision Support was identified as a Continuing Priority Area in Florida's 2006 Strategic Highway Safety Plan. With the National Highway Traffic Safety Administration requirements and funding for traffic records, the State Highway Safety Plan Steering Committee felt this area was being addressed in a comprehensive fashion. The Continuing Priority Area designation was meant to ensure traffic records aligned with the overall State Highway Safety Plan where possible and appropriate.

In October 2010, following a review of the data and State's safety needs, the State Highway Safety Plan Executive Committee selected Traffic Records to be elevated to one of eight Emphasis Areas for the 2012 State Highway Safety Plan update.

a. The Challenge

The State Highway Safety Plan is just one of many documents and transportation planning processes which rely on the state's traffic information systems data to make planning and investment decisions. States constantly strive to improve the quality, accessibility, and integration capabilities of their six traffic records information systems (crash data, roadway inventory, citation/adjudication, EMS/ injury control, driver license/driver history, and vehicle registration).

The Florida Department of Transportation Safety Office requested and hosted two traffic records technical assessments in 2011. The Federal Highway Administration Crash Data Improvement Program Assessment and the National Highway Traffic Safety Administration Traffic Records Assessment provided recommendations for improvements to Florida's traffic records information systems.

b. Accomplishments

Florida's Traffic Records Coordinating Committee facilitates the planning, coordinating, and implementation of projects to improve the State's six traffic records information systems. Using the 2011 assessment results as an impetus, the Traffic Records Coordinating Committee developed a five-year Traffic Safety Information System Strategic Plan in 2012 to provide a blueprint for measuring progress towards advancing the accessibility, accuracy, completeness, timeliness, and uniformity of Florida's traffic records information systems and strengthening the Traffic Records Coordinating Committee program. The plan also provides Florida agencies with a common basis for moving ahead with traffic records systems upgrades, integration, and data analysis required to conduct highway safety analyses in the State.

c. Strategies

The Florida Traffic Safety Information System Strategic Plan focuses on five emphasis areas, referred to as goals in the Plan, and sets forth the specific actions and projects that will be undertaken over the next five years to accomplish these goals. Following is an overview of the Traffic Safety Information System emphasis areas:

- Provide ongoing coordination in support of multiagency initiatives and projects which improve traffic records information systems;
- Develop and maintain complete, accurate, uniform, and timely traffic records data;
- Provide the ability to link traffic records data;
- Facilitate access to traffic records data; and
- Promote the use of traffic records data.

The lead "E's" selected for the Traffic Records emphasis area to ensure the action plan is focused and stays on track are Engineering and Education.

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Chapter IV
Analysis of Accident Data

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Chapter IV: Analysis of Accident Data

A. Introduction

The analysis of accidents generally includes three types of data – crash, roadway, and travel data. Other considerations include normalizing crash data according to the total number of miles traveled or other factors. Data and data management systems include information available from the Florida Department of Transportation and from Signal Four Analytics housed at the University of Florida.

This data includes geocoded locations and Shapefiles available for use in Geographic Information Systems. This information allows the following analyses:

- Identify high-crash corridors and intersections;
- Determine crashes types (e.g., rear-end collisions, lane departures);
- Identify roadway facility types where crashes are likely to occur;
- Identify contributing factors (e.g., failure to yield at a stop sign, excessive speed, distraction);
- Determine key human factors or behaviors associated with the number and severity of crashes (e.g., nonuse of safety belts or helmets, alcohol or drug impairment, etc.); and
- Determine crash risk inequities across jurisdictional boundaries by using travel data to establish crash rates.

This information can then be presented to stakeholders, the public, and decision-makers to shape or refine the goals, objectives, and measures in appropriate plans.

B. Sources of Crash Data

1. Signal Four Analytics

Florida Signal Four Analytics is an interactive, web-based system designed to support the crash mapping and analysis needs of law enforcement, traffic engineering, transportation planning agencies, and research institutions in the state of Florida.

This system was developed by the GeoPlan Center at the University of Florida, and funded by the State of Florida through the Traffic Records Coordinating Committee. The system is available for use over the internet to authorized, non-commercial public agencies or other organizations in Florida.

Traffic crash data is available in great volume, but making sense of this data remains a challenge to law enforcement, transportation planners, and traffic engineers. These professionals need powerful, accessible, and affordable tools to explore the spatial and logical relationships that drive decisions on resource allocation and project prioritization.

The boundaries of the Gainesville Urbanized Area and Alachua County are contained as geographic selection criteria which make it easy to select the various record sets used in this report. The Data is can be downloaded and imported into a Excel spreadsheet which allows analysis using Excel, Access or Arc-GIS software.

Table 1
Total Number of Records Contained in Signal Four Analytics Database
as of December 30, 2013

Data Items:	Quantity
Crash reports	1,075,130
Fatal crashes	12,345
Injury crashes	408,662
Prop. damage crashes	654,123
Fatalities	13,591
Injuries	687,326
Property damages	$ 358.81m
Violations	1,047,421
Vehicles	2,000,743
Drivers	1,934,141
Passengers	824,804
Non-motorists	26,605
Pedestrians	15,683
Cyclists	10,261
All other	661

Signal Four Analytics was a main source of crash data statistics used in this report. The web address is http://s4.geoplan.ufl.edu and additional information is available from project director Dr. Ilir Bejleri by email at ilir@ufl.edu or by phone at 954.214.7885.

a. Data Capabilities

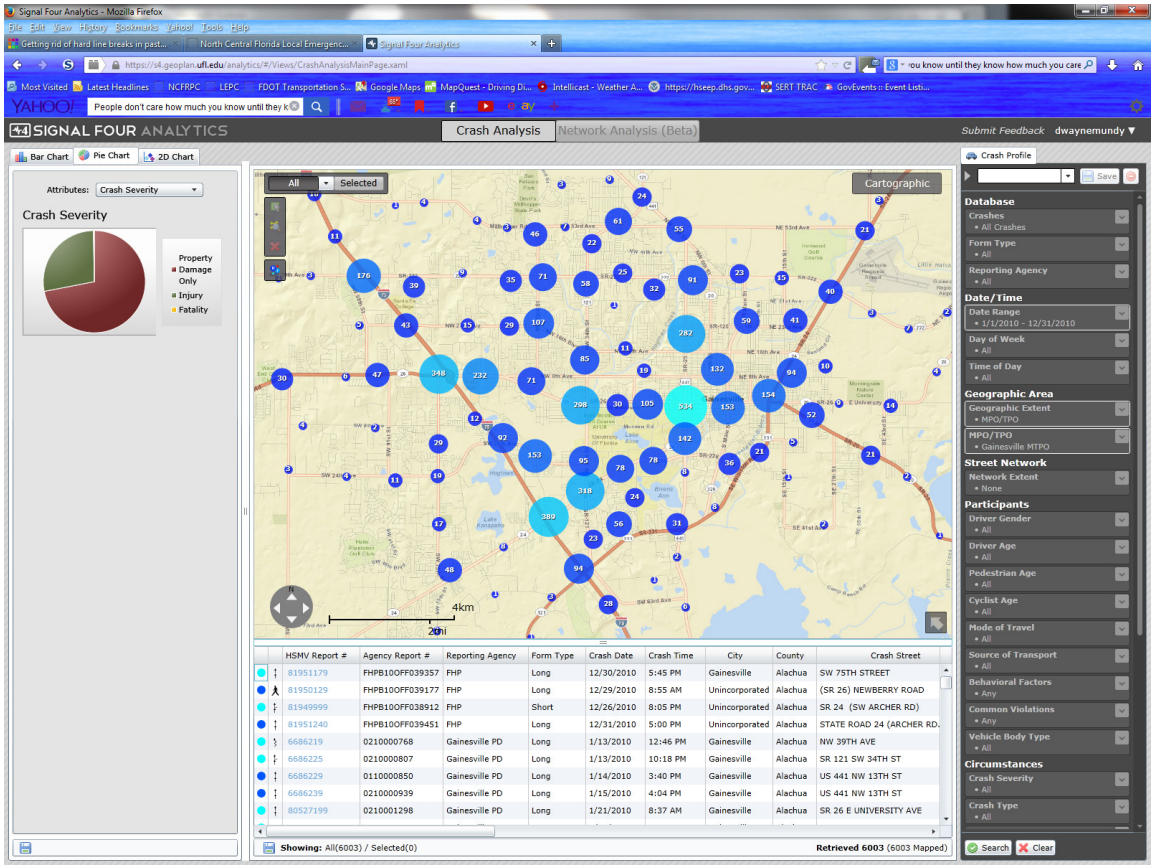
Quality of analysis is inextricably tied to the timeliness of data. Signal Four Analytics loads crash data nightly into the database. The data is received in the Florida statewide standard Extensible Markup Language format developed at the GeoPlan Center in partnership with the Florida Department of Highway

Safety and Motor Vehicles. All crash attributes relevant for analysis are imported. Furthermore, each crash is geo-located, meaning the street address is mapped to a geographic point that can be shown on an interactive map.

b. Map Visualization

Crash data can be viewed spatially in the context of a map. The system can present the data as individual points, or collectively as clusters. The map views allow analysts to quickly gain an intuitive understanding of the spatial distribution of crashes. Further map visualization methods are currently under development. The following screen shot shows the map, a chart of the selected data set, data table at the bottom center, and the selection criteria on the right.

Illustration 7
Sample Screen Shot of Signal Four Analytics Data Portal



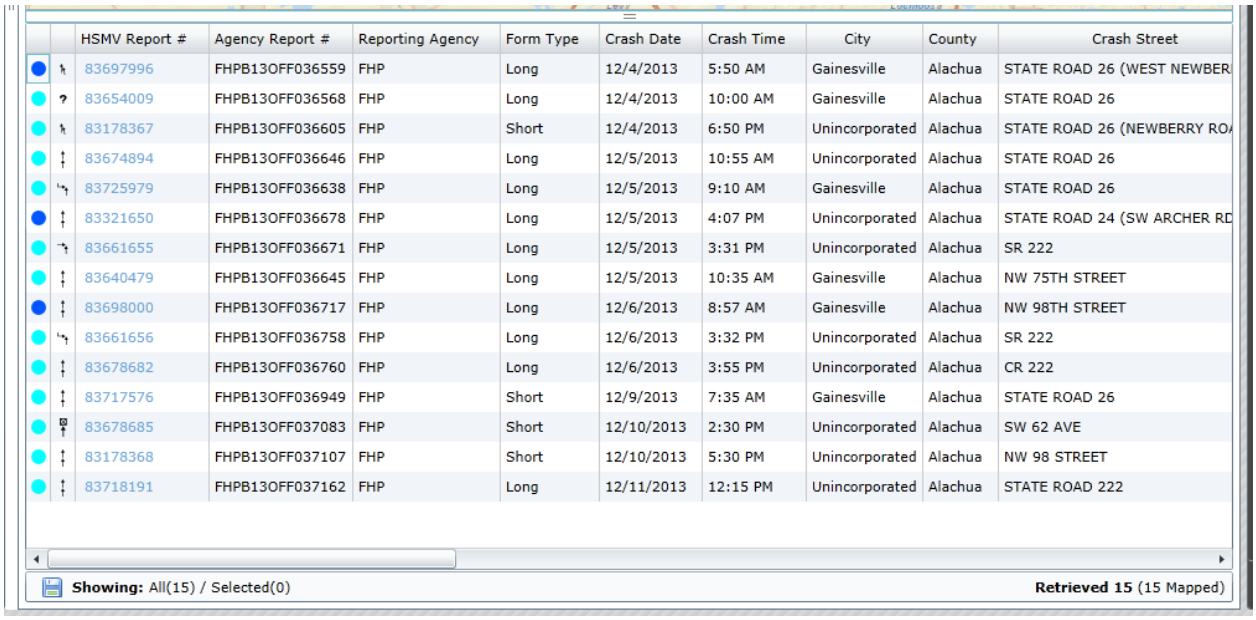
c. Selection Filters

Making sense of crash data requires narrowing down the data according to its scope – defined as date range and geographic area – and crash profile. Analysis is driven by a user-defined set of filters, each further restricting the result set. Factors include date ranges and behavioral factors such as alcohol, drug and distraction involvement.

d. Data Tables

Crash attributes and derived statistics can be viewed in tabular format. Tables interact with the map view – as records are selected, associated points are highlighted on the map (and vice-versa). The Tables can be downloaded in a comma separated values format which can be imported into a Geographic Information System, an Excel spreadsheet or an Access relational database.

Illustration 8
Sample Screen Shot of Signal Four Analytics Data Portal



HSMV Report #	Agency Report #	Reporting Agency	Form Type	Crash Date	Crash Time	City	County	Crash Street
83697996	FHPB13OFF036559	FHP	Long	12/4/2013	5:50 AM	Gainesville	Alachua	STATE ROAD 26 (WEST NEWBER
83654009	FHPB13OFF036568	FHP	Long	12/4/2013	10:00 AM	Gainesville	Alachua	STATE ROAD 26
83178367	FHPB13OFF036605	FHP	Short	12/4/2013	6:50 PM	Unincorporated	Alachua	STATE ROAD 26 (NEWBERRY RO
83674894	FHPB13OFF036646	FHP	Long	12/5/2013	10:55 AM	Unincorporated	Alachua	STATE ROAD 26
83725979	FHPB13OFF036638	FHP	Long	12/5/2013	9:10 AM	Gainesville	Alachua	STATE ROAD 26
83321650	FHPB13OFF036678	FHP	Long	12/5/2013	4:07 PM	Unincorporated	Alachua	STATE ROAD 24 (SW ARCHER RD
83661655	FHPB13OFF036671	FHP	Long	12/5/2013	3:31 PM	Unincorporated	Alachua	SR 222
83640479	FHPB13OFF036645	FHP	Long	12/5/2013	10:35 AM	Gainesville	Alachua	NW 75TH STREET
83698000	FHPB13OFF036717	FHP	Long	12/6/2013	8:57 AM	Gainesville	Alachua	NW 98TH STREET
83661656	FHPB13OFF036758	FHP	Long	12/6/2013	3:32 PM	Unincorporated	Alachua	SR 222
83678682	FHPB13OFF036760	FHP	Long	12/6/2013	3:55 PM	Unincorporated	Alachua	CR 222
83717576	FHPB13OFF036949	FHP	Short	12/9/2013	7:35 AM	Gainesville	Alachua	STATE ROAD 26
83678685	FHPB13OFF037083	FHP	Short	12/10/2013	2:30 PM	Unincorporated	Alachua	SW 62 AVE
83178368	FHPB13OFF037107	FHP	Short	12/10/2013	5:30 PM	Unincorporated	Alachua	NW 98 STREET
83718191	FHPB13OFF037162	FHP	Long	12/11/2013	12:15 PM	Unincorporated	Alachua	STATE ROAD 222

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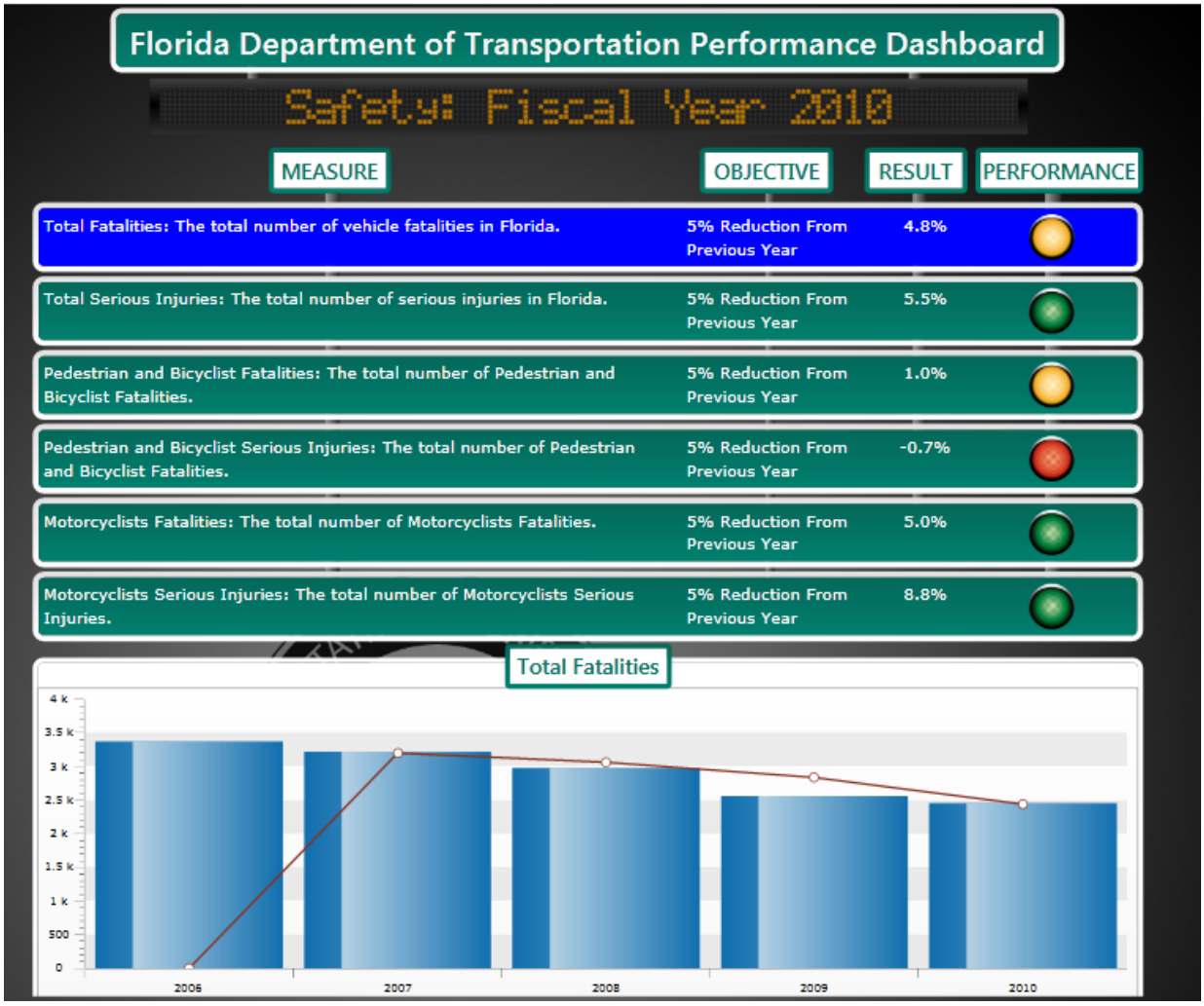
2. Florida Department of Transportation

The Florida Department of Transportation has a variety of data available on its "Florida Traffic Safety Portal." This report used the performance measures developed for the state of Florida and data for the intersections identified as high crash intersections

Illustration 9
Sample Screen Shot of Florida Transportation Performance Dashboard



C. Crash Type and Severity Analysis

This section provides a summary and analysis of the overall crash statistics for intersections and segments of the Alachua County major road network. Data reported in this report was originally entered on the Florida Long Form Crash Report before being extracted for import into Signal Four Analytics. The Long Form must be used for crashes involving an injury or non-traffic violations (i.e., Driving under the influence or suspended license), but may be used at the discretion of the law enforcement agency on any crash.

It should be noted that the crashes should be scrutinized to determine the proper location of the at-fault party to their respective intersection (or segment) approach.

Table 2
Annual Alachua County Crash Severity Data Summary
Based on Data from Signal Four Analytics

Year	All Crashes			Bicycle and Pedestrians		
	Crashes With Fatalities	Crashes With Serious Injuries	Crashes With Property Damage Only	Crashes With Fatalities	Crashes With Serious Injuries	Crashes With Property Damage Only
2007	23	1696	4213			
2008	15	1682	3935			
2009	13	1750	3887	6	176	24
2010	17	1667	4319	0	156	30
2011	12	1506	2690	1	126	22
2012	16	1221	2668	3	134	15

Illustration 10
Crash Type versus Severity for Alachua County, 2009

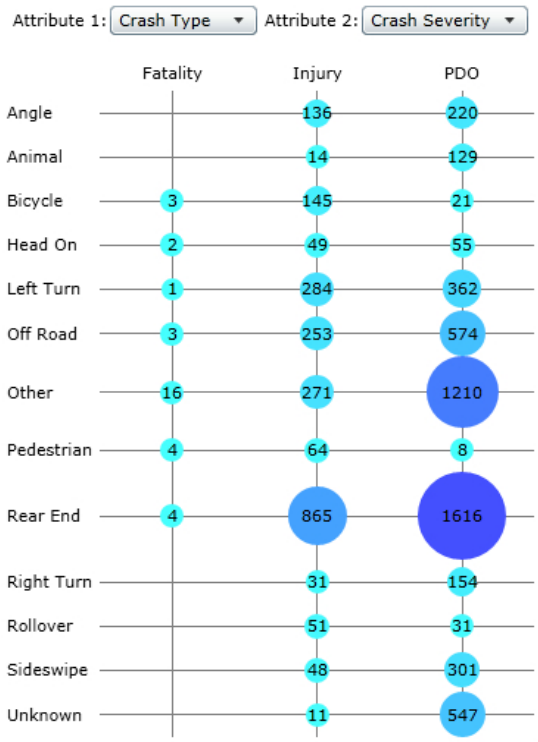


Illustration 11
Crash Type versus Severity for Alachua County, 2010

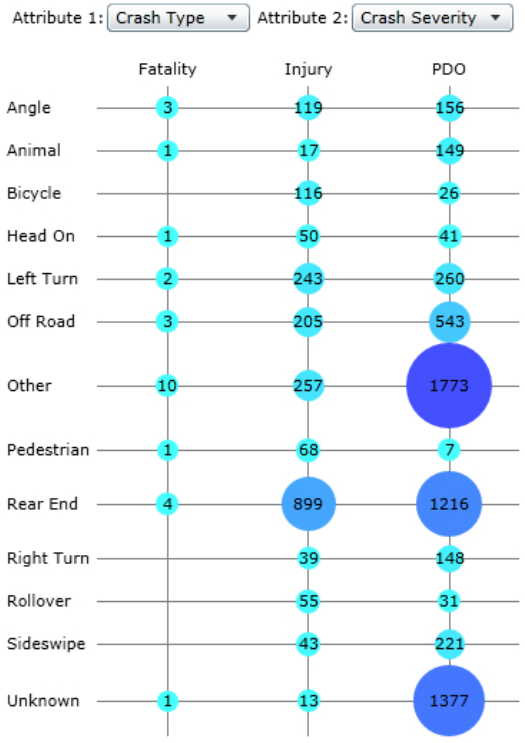


Illustration 12
Crash Type versus Severity for Alachua County, 2011

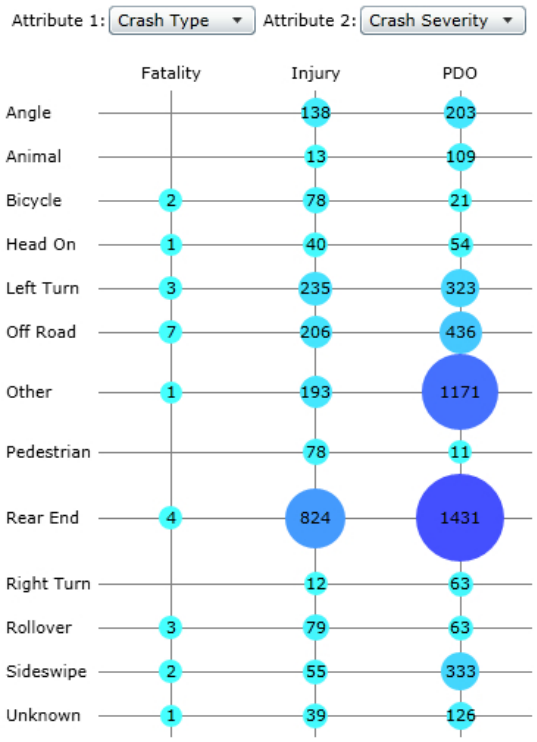


Illustration 13
Crash Type versus Severity for Alachua County, 2012

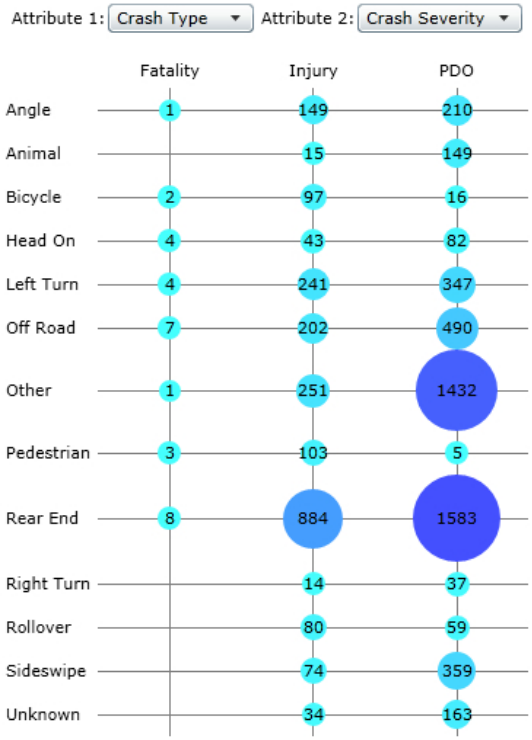


Table 3
Alachua County Crash Type versus Year, 2007-2012
Based on Data from Signal Four Analytics

	Crash Type							
Year	Angle	Animal	Bicycle	Head On	Left Turn	Off Road	Pedestrian	Grand Total
2007	290	33	138	92	577	460	66	1656
2008	247	35	156	87	536	448	76	1585
2009	297	42	150	69	572	425	56	1611
2010	207	27	128	65	448	425	58	1358
2011	257	20	89	60	477	305	60	1268
2012	224	17	82	72	381	294	70	1140
Grand Total	1609	187	782	503	3171	2548	424	9224

	Crash Type						
Year	Other	Rear End	Right Turn	Rollover	Sideswipe	Unknown	Grand Total
2007	1057	1888	145	36	235	915	4276
2008	976	1910	127	30	214	790	4047
2009	869	2210	158	27	264	511	4039
2010	1137	1838	159	28	200	1283	4645
2011	344	2028	66	79	296	127	2940
2012	674	1619	35	57	263	117	2765
Grand Total	5620	12310	705	288	1565	3887	24375

D. High Crash Roadway Segment Analysis

This section provides a summary and analysis of the overall crash statistics for segments of the Alachua County Major Road Network. Data reported in this report was prepared using Florida Long Form Crash Report data extracted from the Florida Department of Transportation Crash Data Management System. The road segments identified in Table 4 and Illustrations 14, 15 and 16 depict the top five percent of the highest crash prone roadway segments in the county.

Table 4
High Crash Road Segments As Identified by the
Florida Department of Transportation, 2013

Road Name	Number of Crashes	Fatalities	Injuries	Property Damage Only
State Road 222 (39th Avenue NE)	171	0	95	112
State Road 222 (39th Avenue NE)	156	0	100	86
State Road 24 (13th Street NW)	397	0	185	256
State Road 25 (13th Street NW)	208	0	105	127
State Road 25 (13th Street NW)	186	0	106	102
County Road 329 (13th Blvd NW)	185	0	104	108
State Road 331 (11th Street SE)	164	0	114	93
State Road 26 (8th Avenue NW)	1250	1	594	822
State Road 26 (8th Avenue NW)	208	0	94	142
State Road 26 (8th Avenue NW)	375	0	176	244
State Road 24 (8th Avenue NW)	172	0	109	95
State Road 26a (2nd Avenue SW)	197	0	110	119
State Road 24 (Archer Rd)	1042	1	595	644
State Road 24 (Archer Rd)	191	1	109	112
State Road 24 (Archer Rd)	206	1	117	115
State Road 121 (34th Street NW)	890	1	478	567
State Road 121 (34th Street NW	430	0	210	277
State Road 93 (Interstate 75)	176	6	108	111

Illustration 14
High Crash Road Segments Identified by the Florida Department of Transportation

Illustration 15
High Crash Road Segments In Gainesville As Identified by the Florida Department of Transportation

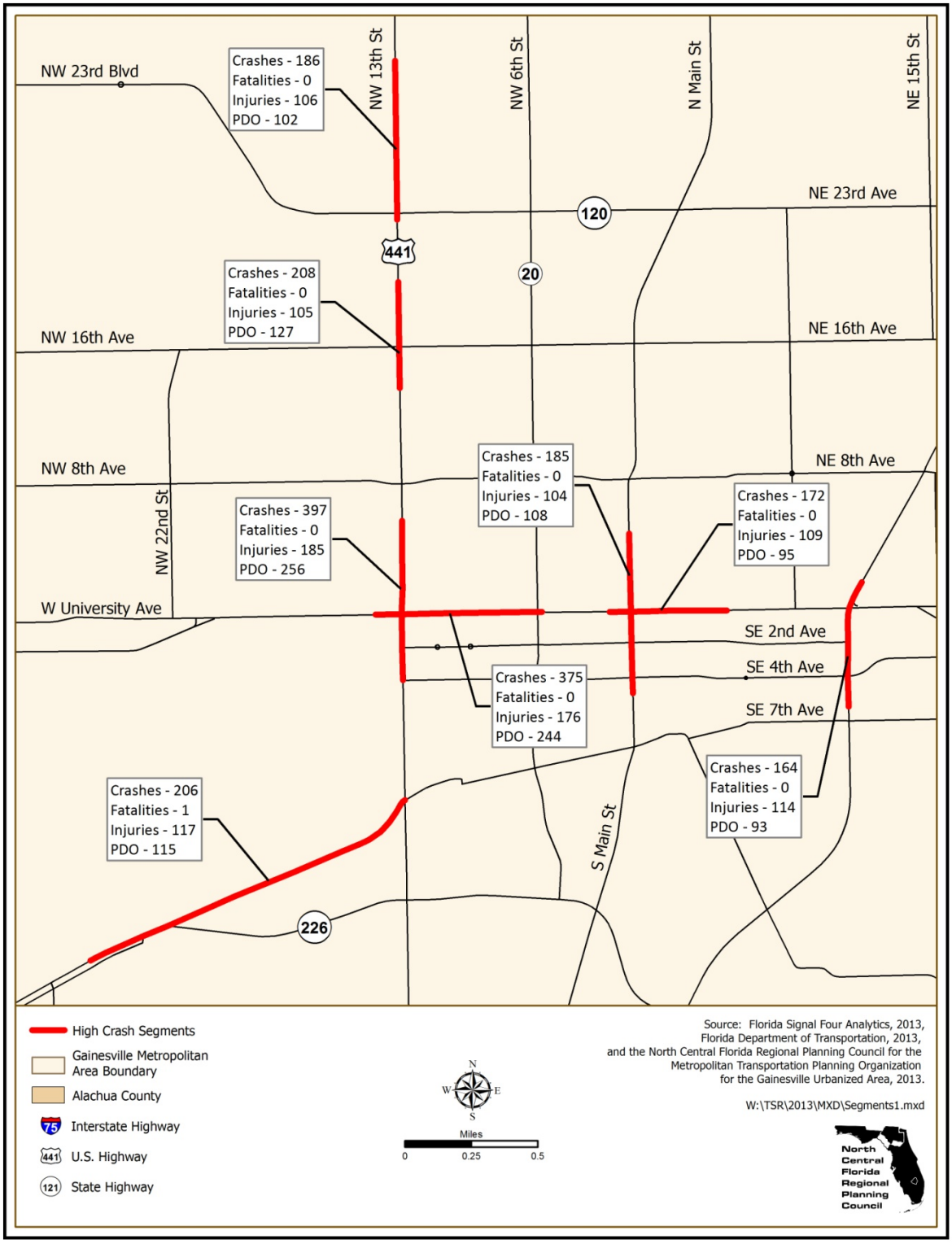
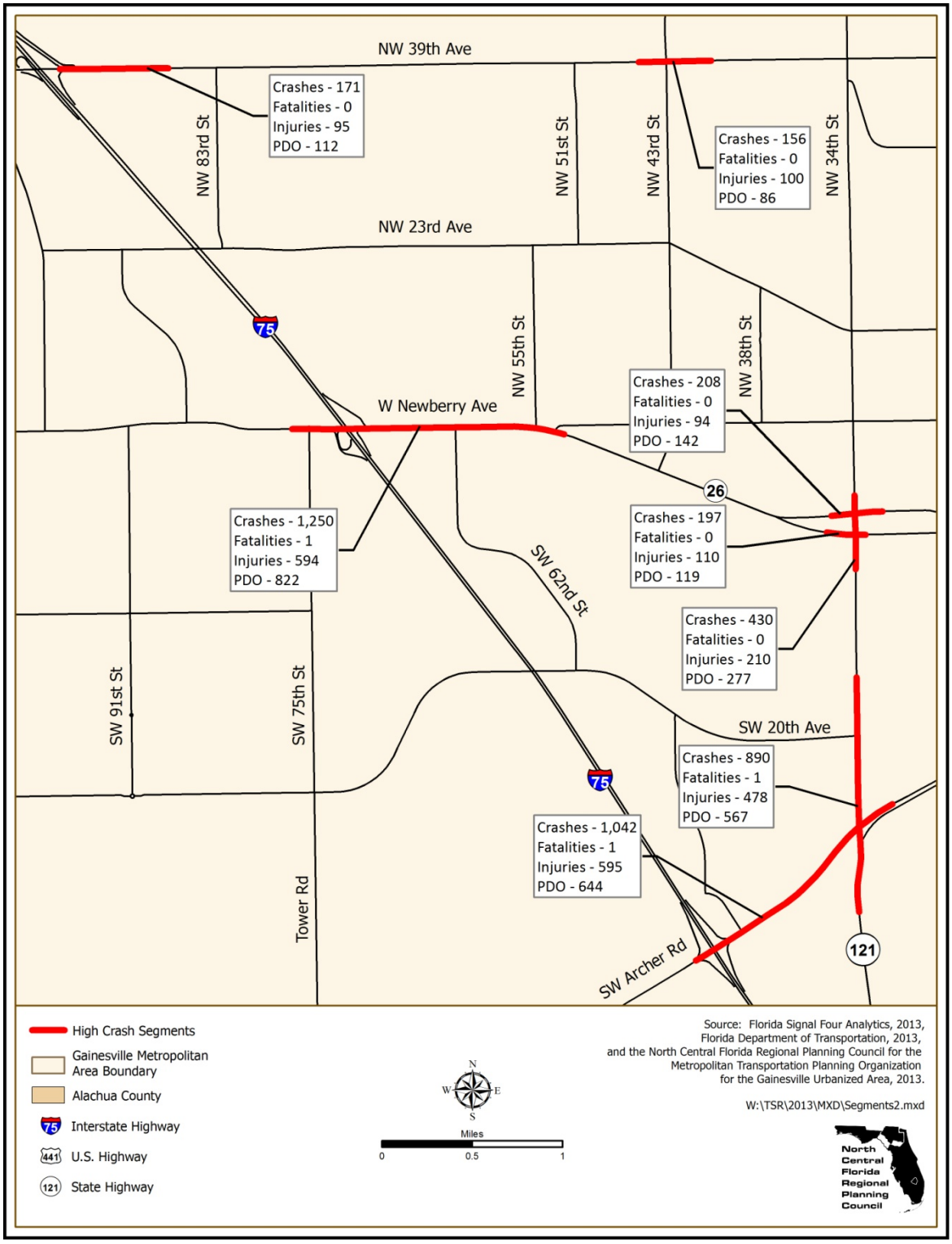


Illustration 16
High Crash Road Segments Near Interstate 75
As Identified by the Florida Department of Transportation



E. Top Crash Intersections

This section provides a summary and analysis of the overall crash statistics for intersections in the Alachua County Major Road Network. Data reported in this report was originally contained on using Florida Long Form Crash Report data extracted from the Florida Department of Transportation Crash Data Management System. The road segments identified in Illustrations 17, 18, 19, 20, 21 and 22 depict the top five percent of the highest crash prone intersections in the county.

Illustration 17 shows the information as contained in the Signal Four Analytics database. The remaining Illustrations in this section present the intersections with crash rate in the top five percent in the county.

Illustration 17
Alachua County Top Crash Intersections

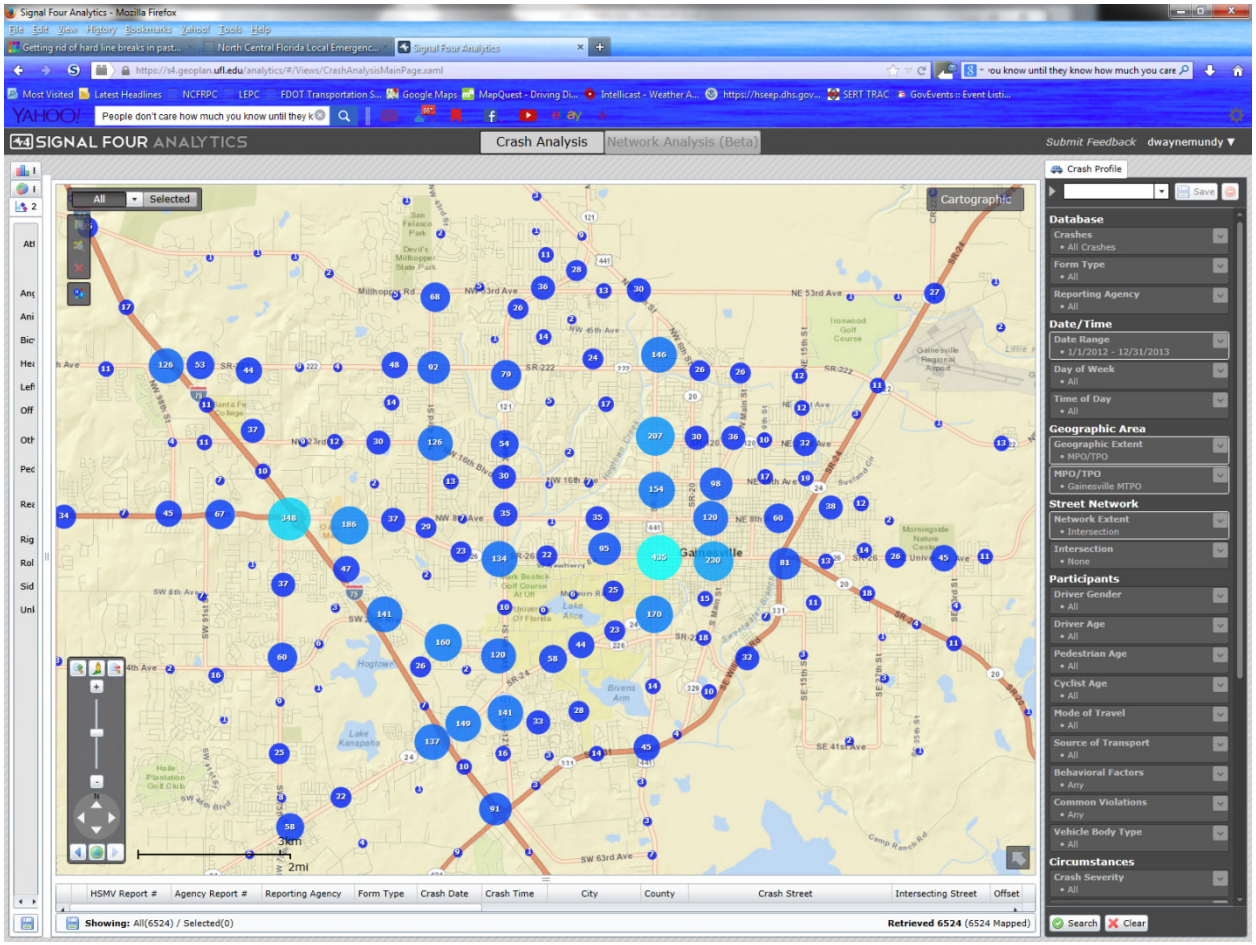


Illustration 18
Top Crash Intersections - Northwest Gainesville Area

Illustration 19
Top Crash Intersections - Archer Road Area

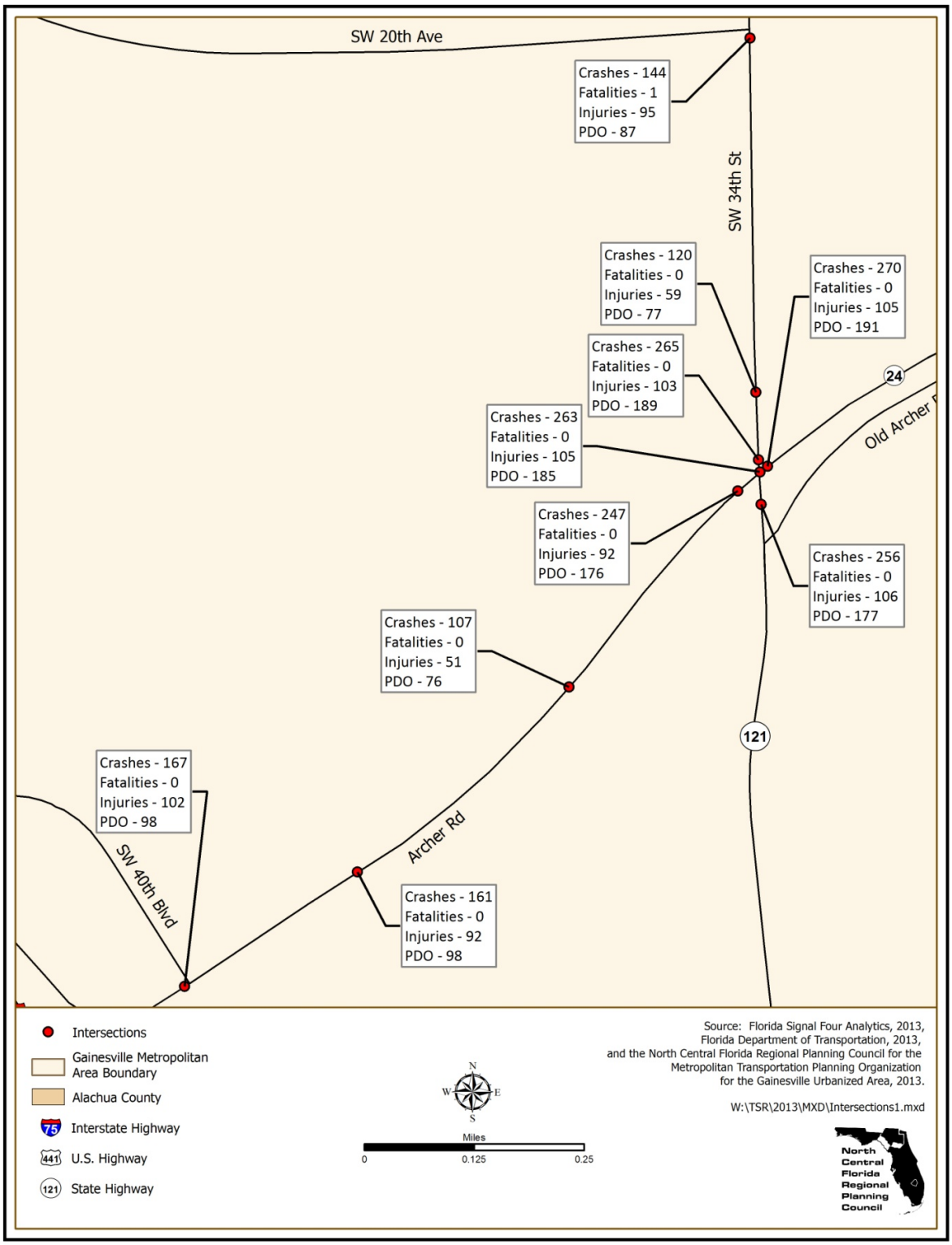


Illustration 20
Top Crash Intersections - Newberry Road and Interstate 75 Area

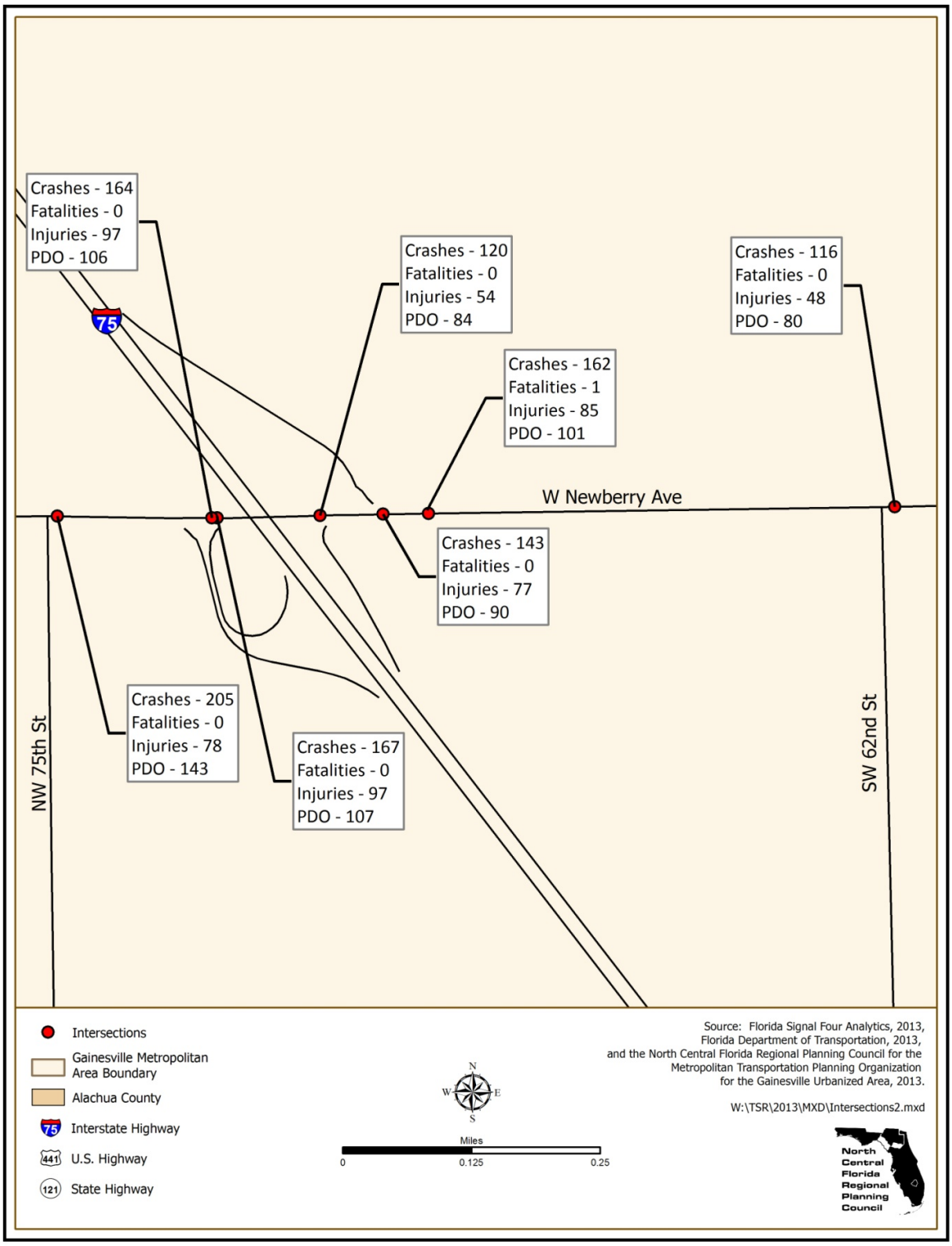


Illustration 21
Top Crash Intersections - University of Florida Area

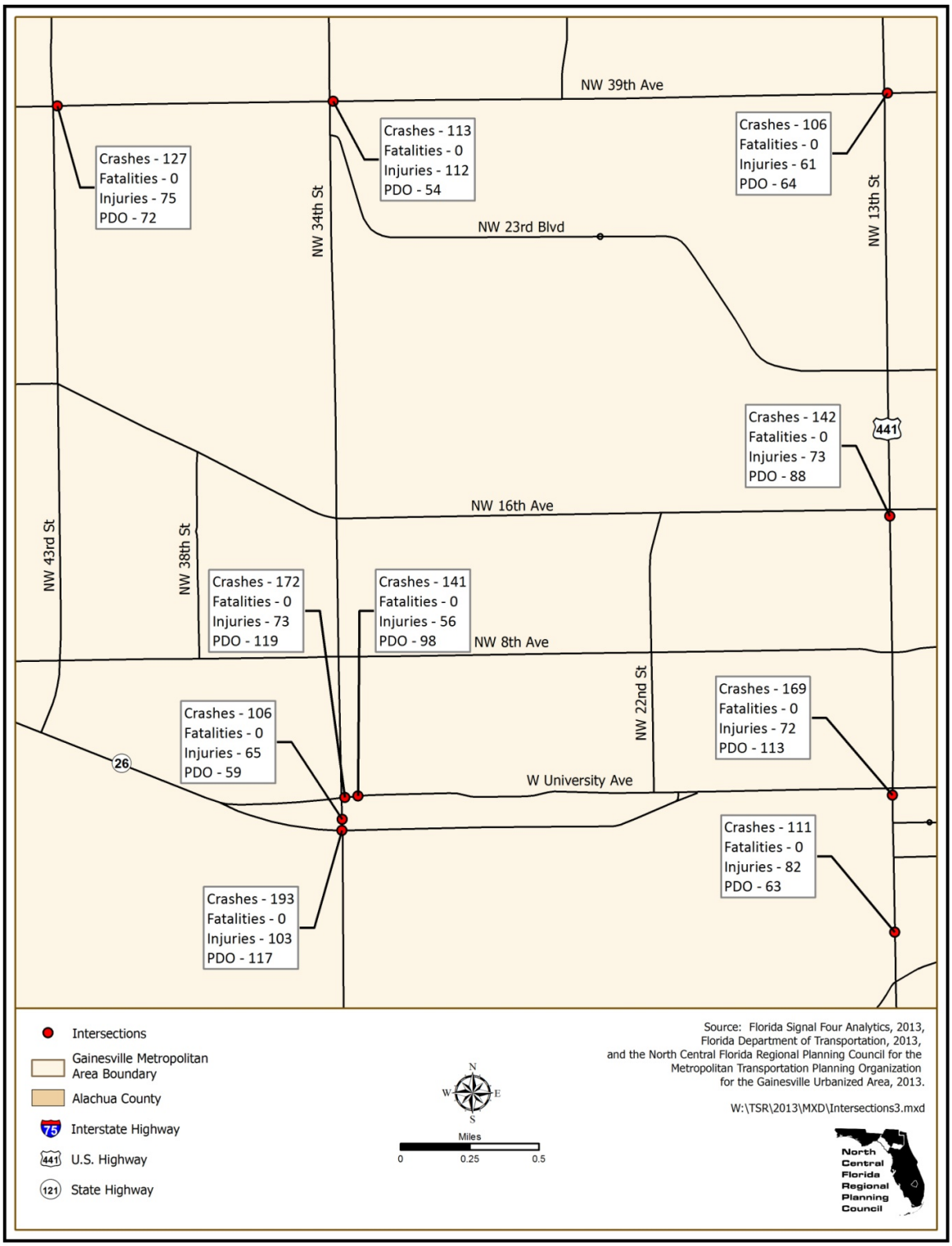
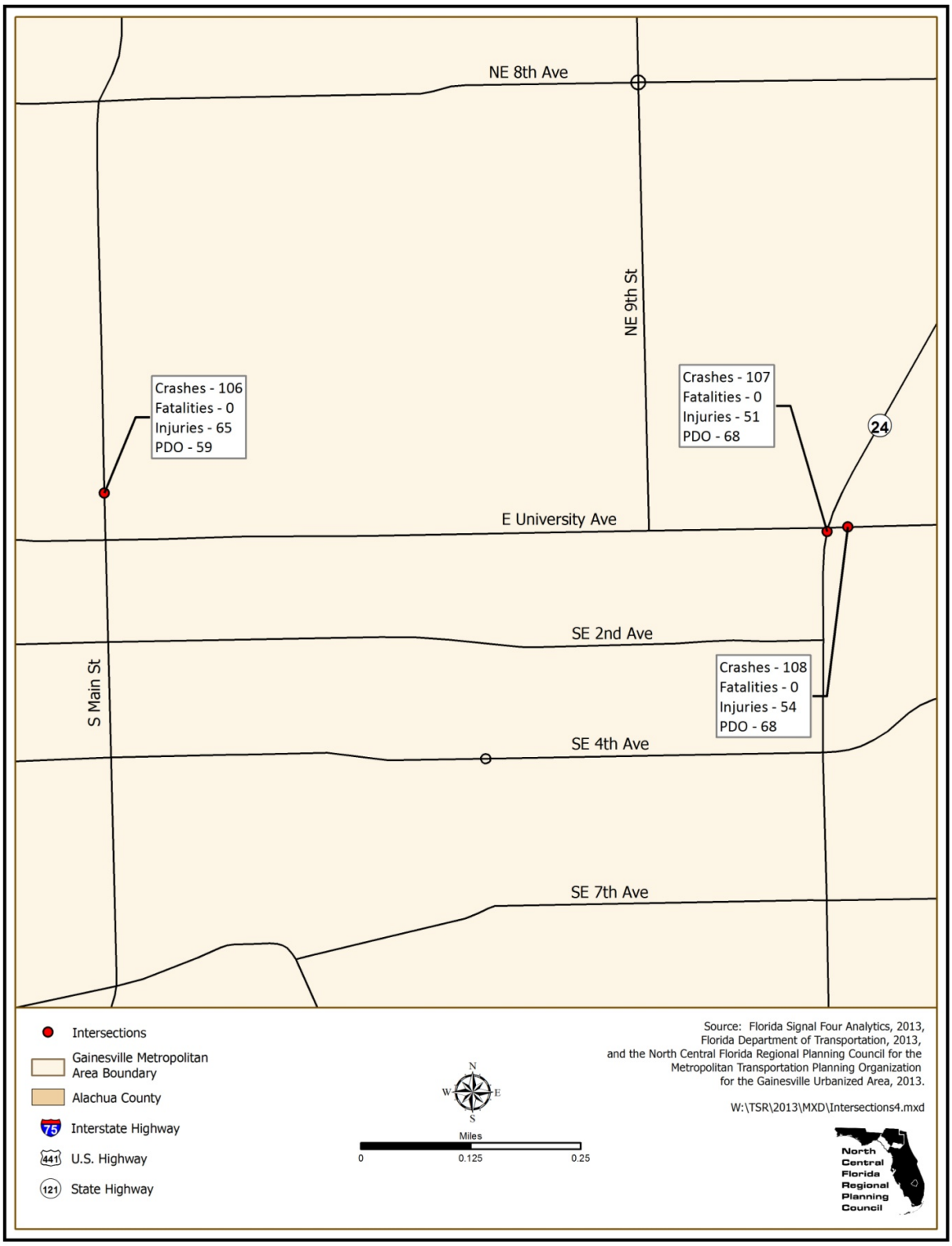


Illustration 22
Top Crash Intersections - East University Avenue Area



Chapter V
Performance Measures

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Chapter V: Performance Measures

A. Introduction

The State Transportation Safety Plan's goal is to achieve a five percent annual reduction in the actual number of fatalities and serious injuries. This was changed from the 2006 goal of having a reduction in the rate based upon the number of vehicle miles traveled. The

B. Florida Department of Transportation Performance Dashboard

The following Illustrations present the most recent performance measures used by the Florida Department of Transportation on its website.

Illustration 23
Florida Performance Measure - Total Fatalities

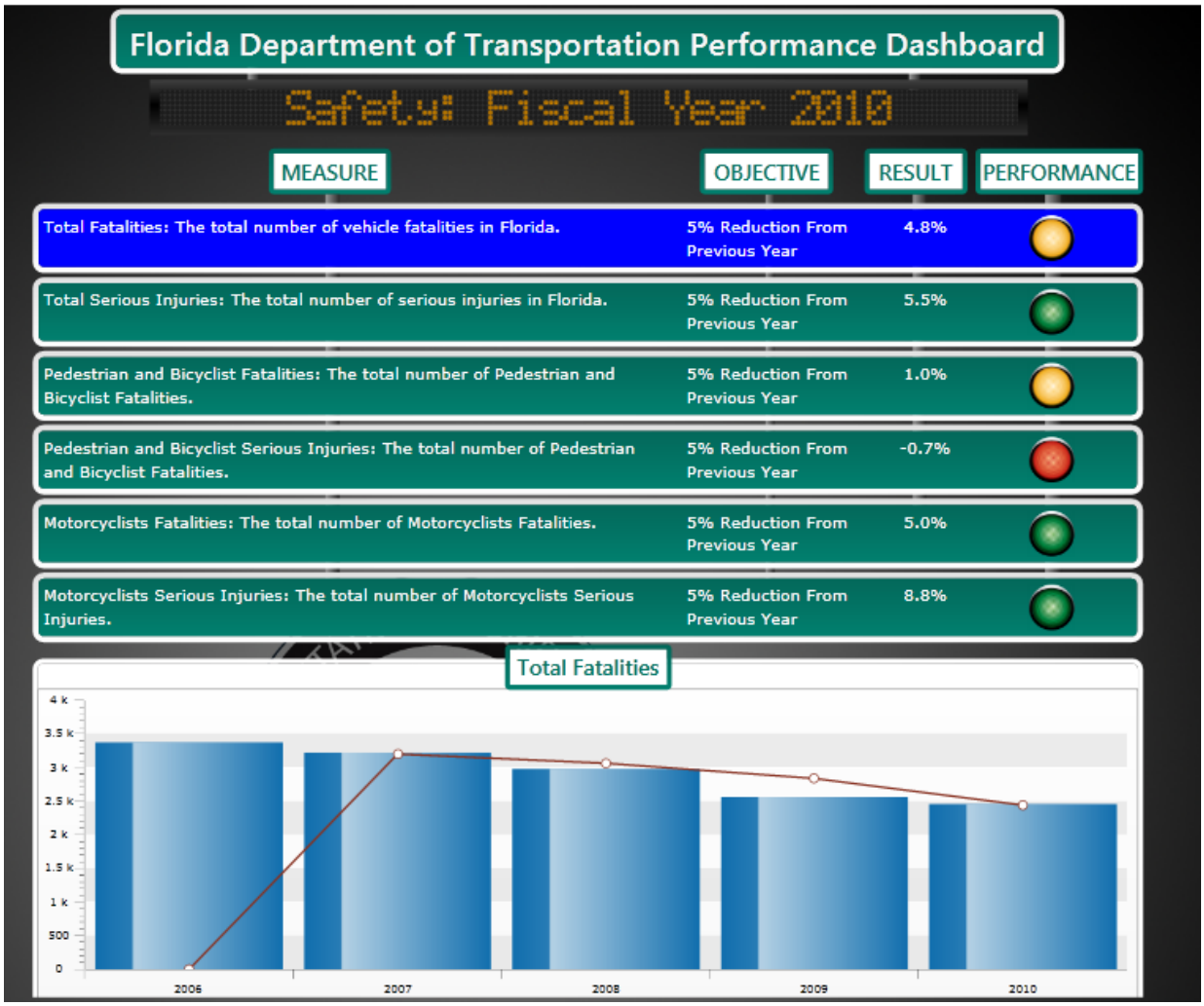


Illustration 24
Florida Performance Measure - Pedestrian and Bicycle Fatalities

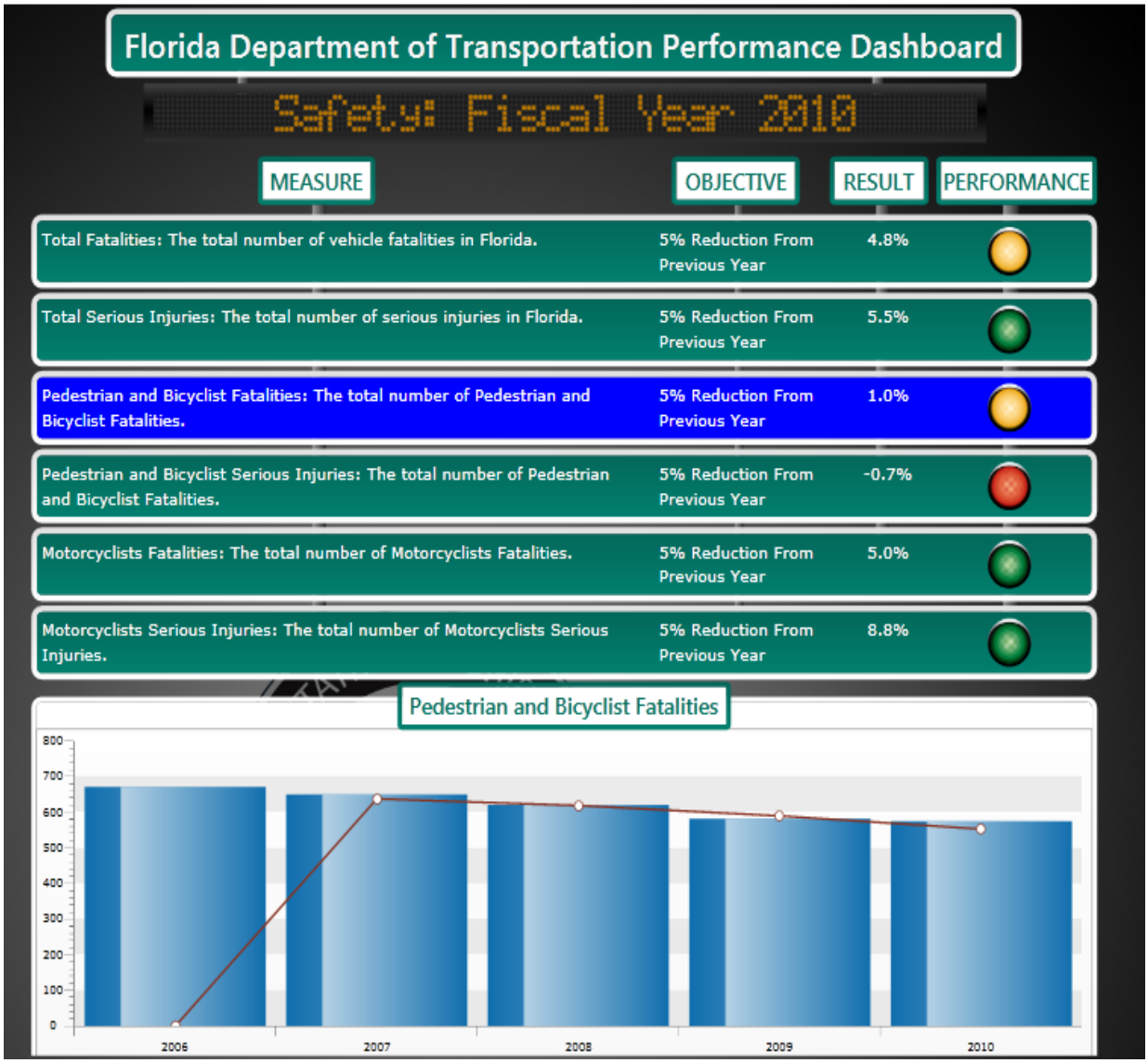
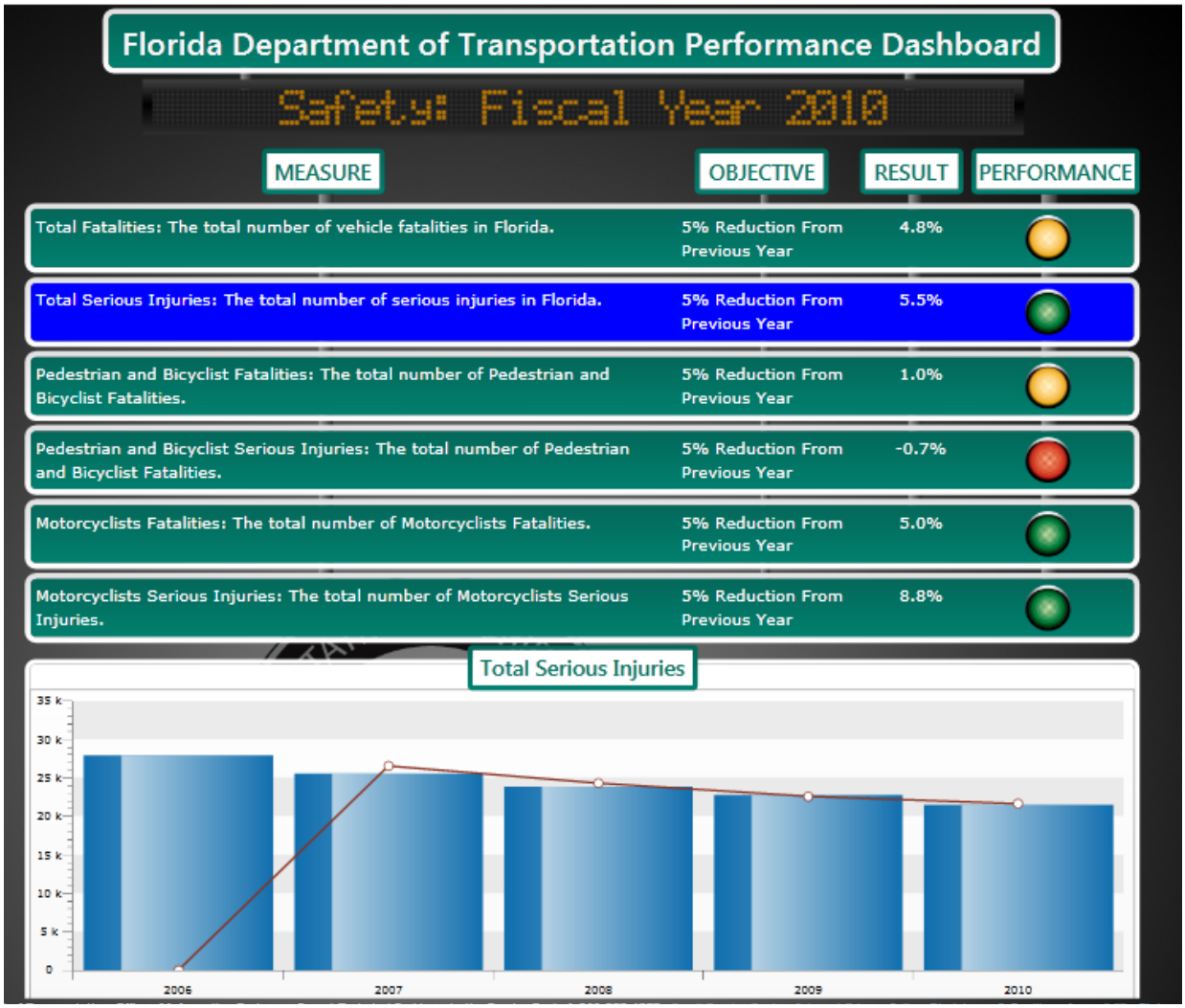


Illustration 25
Florida Performance Measure - Total Serious Injuries



C. Alachua County Performance Measures

Possible performance measures include the total number of crashes and percentage of change from year to year. Tables 5 and 6 present a variety of crash data for Alachua County for 2007 through 2012. The first set of numbers in each table count the number of crash severity types and the second set the number of people that were either injured or killed.

Table 5
Alachua County Crash Counts Based on Signal Four Analytics and the Florida Department of Transportation Data

Number of Crashes					Number of People	
Year	Total Number of Crashes	With Fatalities	With Serious Injuries	With Property Damage Only	Fatalities	Serious Injuries
2007	7,757	51	2,172	5,555	60	3,311
2008	7,526	45	2,135	5,363	47	3,009
2009	7,483	33	2,232	5,228	34	3,198
2010	8,098	26	2,137	5,948	29	3,110
2011	6,434	24	2,012	4,404	28	2,980
2012	7,247	30	2,231	5,003	40	3,403

Table 6
Alachua County Crash Annual Percent Changes Based on Signal Four Analytics and the Florida Department of Transportation Data

Year	Number of Crashes				Number of People	
	Total Number of Crashes	With Fatalities	With Serious Injuries	With Property Damage Only	Fatalities	Serious Injuries
2008	-3%	-12%	-2%	-3%	-22%	-9%
2009	-1%	-27%	5%	-3%	-28%	6%
2010	8%	-21%	-4%	14%	-15%	-3%
2011	-21%	-8%	-6%	-26%	-3%	-4%
2012	13%	25%	11%	14%	43%	14%

Possible performance measures included in Tables 7 and 8 calculate the accident rate based on the number of miles traveled. The crash rates and percentage of change from year to year are presented for Alachua County for 2007 through 2012. The first set of numbers count the number of crashes and the second set the number of people that were either injured or killed.

Table 7
Alachua County Crashes per Vehicle Miles Traveled Based on Data from Signal Four Analytics and the Florida Department of Transportation

Crash Rates per 100 Million Vehicles Miles Traveled					Rates of Number of Victims per 100 Million Vehicle Miles Traveled	
Year	Total Number of Crashes	With Fatalities	With Serious Injuries	With Property Damage Only	Fatalities	Serious Injuries
2007	251	1.7	70	180	1.9	107
2008	258	1.5	73	184	1.6	103
2009	262	1.2	78	183	1.2	112
2010	283	0.9	75	208	1.0	109
2011	227	0.8	71	155	1.0	105
2012	261	1.1	80	180	1.4	122

Table 8
Alachua County Crashes per Vehicle Miles Traveled
Annual Percent Changes Based on Data from Signal Four Analytics and the Florida Department of Transportation

Crash Rates per 100 Million Vehicles Miles Traveled					Rates of Number of Victims per 100 Million Vehicle Miles Traveled	
Year	Total Number of Crashes	With Fatalities	With Serious Injuries	With Property Damage Only	Fatalities	Serious Injuries
2008	-3%	-12%	-2%	-3%	-22%	-9%
2009	-1%	-27%	5%	-3%	-28%	6%
2010	8%	-21%	-4%	14%	-15%	-3%
2011	-21%	-8%	-6%	-26%	-3%	-4%
2012	13%	25%	11%	14%	43%	14%

Vulnerable road users including pedestrians and bicycles are a Florida area of emphasis. Possible performance measures include the total number of crashes and percentage of change from year to year. Tables 9 and 10 present a variety of crash data for these two groups for Alachua County for 2007 through 2012.

Table 9
Alachua County Total Number of Crashes
Involving Bicycles and Pedestrians
Based on Data from Signal Four Analytics

Year	Bicycle Crashes			Pedestrian Crashes		
	Total Crashes	With Fatalities	With Serious Injuries	Total Crashes	With Fatalities	With Serious Injuries
2007	158	131	4	81	70	7
2008	168	151	4	101	93	2
2009	169	150	3	76	69	4
2010	142	118	0	76	73	1
2011	101	80	2	91	90	0
2012	115	100	2	112	109	3

Table 10
Alachua County Annual Percent Changes in the Number of Crashes
Involving Bicycles and Pedestrians
Based on Data from Signal Four Analytics

Year	Bicycle Crashes			Pedestrian Crashes		
	Total Crashes	With Fatalities	With Serious Injuries	Total Crashes	With Fatalities	With Serious Injuries
2008	6%	15%	0%	25%	33%	-71%
2009	1%	-1%	-25%	-25%	-26%	100%
2010	-16%	-21%	-100%	0%	6%	-75%
2011	-29%	-32%	200%	20%	23%	-100%
2012	14%	25%	0%	23%	21%	300%

Chapter VI Recommendations for Implementation

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Chapter VI: Recommendations for Implementation

A. Introduction

The following recommendations have been developed to help incorporate safety into the transportation planning process. First, a formal process needs to be developed and refined to look at safety as a key factor when making transportation planning decisions. The process should focus on the areas of emphasis that have been set for Florida and especially the four which are most suitable for being impacted in the long term planning process.

The overall process should be data driven. In Florida there is good access to quality accident and crash data, primarily through Signal Four Analytics housed at the GeoPlan Center at the University of Florida. This data can be evaluated to provide performance measures that provide an overall picture that shows if safety is improving or not and progress made towards the State measure of decreasing a number of measures by five percent per year. There should be an ongoing process of updating and reviewing safety measures. The final step is identifying which planned future projects are in high crash areas so that can be considered as part of the priority setting process.

B. Formalizing Safety in the Planning Process

Two authoritative studies have looked in depth at how to formalize safety in the planning process, as detailed in Chapter 2. The following steps are discussed

1. Include Safety Experts on Planning Committees
2. Incorporate Safety into Goals and Objectives
3. Identify Safety Issues
4. Establish Safety Performance Measures
5. Collect and Analyze Safety Data
6. Utilize Safety as a Decision Factor
7. Monitor and Evaluate the Effectiveness of Safety Programs and Projects

C. Florida Areas of Emphasis

The recommendations for incorporating safety into the planning process start with focusing on the priority areas established in Florida. The Florida Department of Transportation, in partnership with the Federal Highway Administration and representatives from all segments of Florida's traffic safety community, developed the 2012 Strategic Highway Safety Plan. The State Highway Safety Plan focuses on the following eight Emphasis Areas:

1. Aggressive Driving;
2. **Intersection Crashes;**
3. **Vulnerable Road Users (pedestrians, bicyclists, and motorcyclists);**
4. **Lane Departure Crashes;**
5. Impaired Driving;
6. At-Risk Drivers (aging road users and teens);
7. Distracted Driving; and
8. **Traffic Data.**

Four of the items can be addressed in the transportation planning process and are identified above in bold (2, 3, 4 and 8). Florida's State Highway Safety Plan is a statewide, data-driven plan that addresses the "4 E's" of safety – Engineering, Enforcement, Education, and Emergency response. The four emphasis areas examined in this plan primarily focus on "Engineering" from the "4 E's" of safety.

D. Update and Review of Accident Data and Performance Measures

The review and analysis of accident data is a foundation for incorporating safety into the planning process. Data is available from both the Florida Department of Transportation and Signal Four Analytics. Individual accident data from January 1, 2007 through mid-December 2013 has been incorporated into a Geographic Information System that allows more detailed spatial analysis. This database should be updated on a regular basis to provide the most up-to-date information to support decision-making.

1. Archer Road Corridor Example

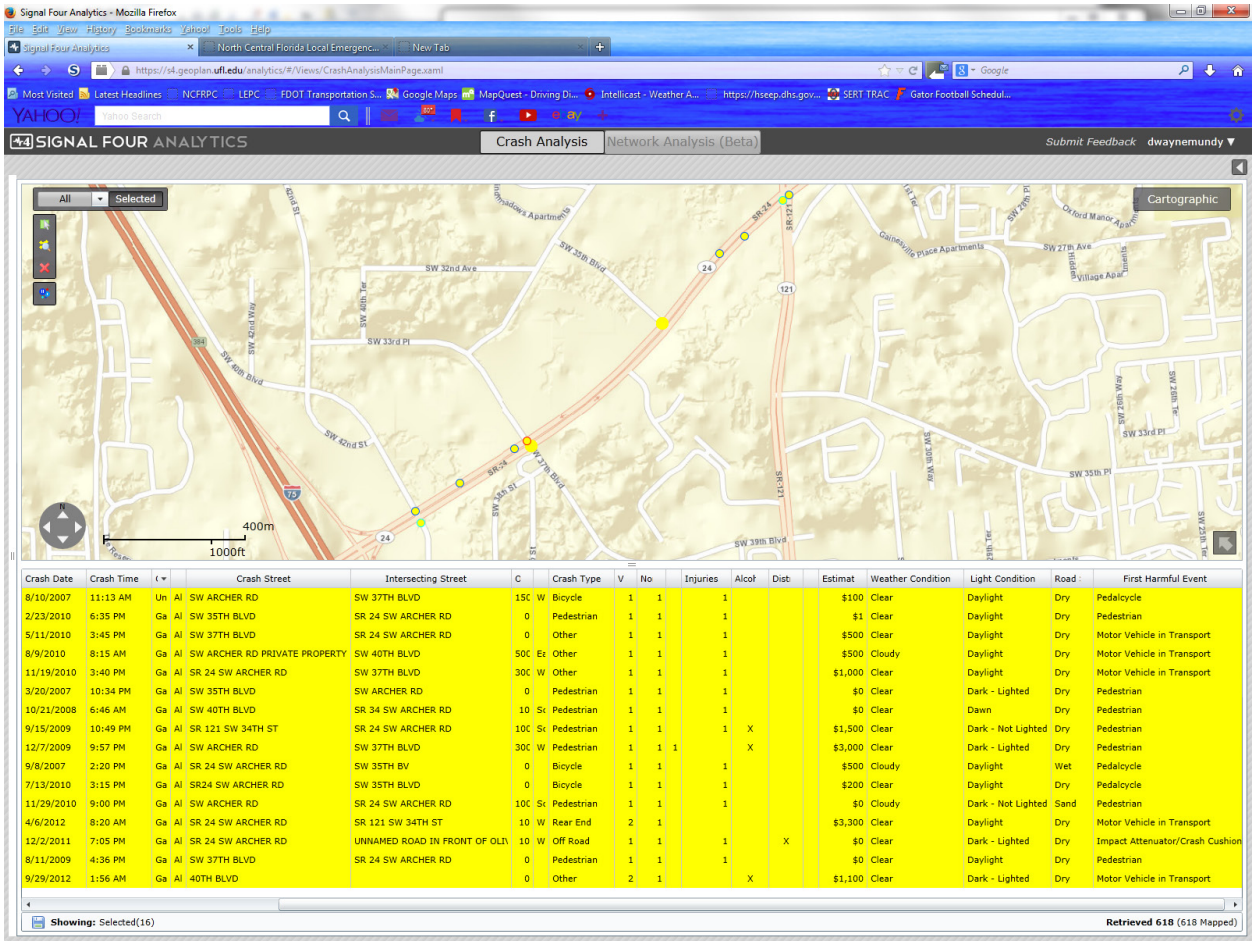
The Archer Road corridor between Interstate 75 and 34th Street is a good example of ability of the use of geocoded crash data is help identify high crash areas and evaluate the effectiveness of safety improving projects. The following illustrate the impacts of safety enhancements which were completed in 2007.

The Archer Road corridor is one of the high crash segments identified in Alachua County and it also contains some high crash intersections. Safety improvements made on the segment were completed at the end 2011. Improvements included raising median and extending turn lanes. Using crash data from Signal Four Analytics the effectiveness of the enhancements is measureable.

Table 11
Archer Road Corridor Accidents per Year for
2009 through November 2013 Based on Data from Signal Four Analytics

Number of Accidents	Start Date	End Date
336	1/1/2009	12/31/2009
282	1/1/2010	12/31/2010
201	1/1/2011	12/31/2011
78	1/1/2012	12/31/2012
25	1/1/2013	11/7/2013

Illustration 26
Archer Road Corridor Pedestrian Accidents
from 2007 through 2013 Based on Data from Signal Four Analytics



Crash Date	Crash Time	Crash Street	Intersecting Street	Crash Type	Injuries	Estimat	Weather Condition	Light Condition	Road	First Harmful Event
8/10/2007	11:13 AM	SW ARCHER RD	SW 37TH BLVD	Bicycle	1	$100	Clear	Daylight	Dry	Pedalcycle
2/23/2010	6:35 PM	SW 35TH BLVD	SR 24 SW ARCHER RD	Pedestrian	1	$1	Clear	Daylight	Dry	Pedestrian
5/11/2010	3:45 PM	SW 37TH BLVD	SR 24 SW ARCHER RD	Other	1	$500	Clear	Daylight	Dry	Motor Vehicle in Transport
8/9/2010	8:15 AM	SW ARCHER RD PRIVATE PROPERTY	SW 40TH BLVD	Other	1	$500	Cloudy	Daylight	Dry	Motor Vehicle in Transport
11/19/2010	3:40 PM	SR 24 SW ARCHER RD	SW 37TH BLVD	Other	1	$1,000	Clear	Daylight	Dry	Motor Vehicle in Transport
3/20/2007	10:34 PM	SW 35TH BLVD	SW ARCHER RD	Pedestrian	1	$0	Clear	Dark - Lighted	Dry	Pedestrian
10/21/2008	6:46 AM	SW 40TH BLVD	SR 34 SW ARCHER RD	Pedestrian	1	$0	Clear	Dawn	Dry	Pedestrian
9/15/2009	10:49 PM	SR 121 SW 34TH ST	SR 24 SW ARCHER RD	Pedestrian	1	$1,500	Clear	Dark - Not Lighted	Dry	Pedestrian
12/7/2009	9:57 PM	SW ARCHER RD	SW 37TH BLVD	Pedestrian	1	$3,000	Clear	Dark - Lighted	Dry	Pedestrian
9/8/2007	2:20 PM	SR 24 SW ARCHER RD	SW 35TH BV	Bicycle	1	$500	Cloudy	Daylight	Wet	Pedalcycle
7/13/2010	3:15 PM	SR24 SW ARCHER RD	SW 35TH BLVD	Bicycle	1	$200	Clear	Daylight	Dry	Pedalcycle
11/29/2010	9:00 PM	SW ARCHER RD	SR 24 SW ARCHER RD	Pedestrian	1	$0	Cloudy	Dark - Not Lighted	Sand	Pedestrian
4/6/2012	8:20 AM	SR 24 SW ARCHER RD	SR 121 SW 34TH ST	Rear End	1	$3,300	Clear	Daylight	Dry	Motor Vehicle in Transport
12/2/2011	7:05 PM	SR 24 SW ARCHER RD	UNNAMED ROAD IN FRONT OF OLI	Off Road	1	$0	Clear	Dark - Lighted	Dry	Impact Attenuator/Crash Cushion
8/11/2009	4:36 PM	SW 37TH BLVD	SR 24 SW ARCHER RD	Pedestrian	1	$0	Clear	Daylight	Dry	Pedestrian
9/29/2012	1:56 AM	40TH BLVD		Other	2	$1,100	Clear	Dark - Lighted	Dry	Motor Vehicle in Transport

E. Identify Projects in the Long Range Plan Which have Potential Safety Issues

The follow projects are located in high crash priority areas and are included in one of the identified plans. This table indicates both which plan or list the projects are contained in as well as the status of their funding and if they are under construction.

Table 12
Identification of Top Plan Recommendations Located in High Crash Areas

Safety-Related Project Recommendations	Long Range Transportation Plan- Cost Feasible Plan	Transportation Improvement Program	List of Priority Projects
Intelligent Transportation System- coordinated traffic signal system	F	UC	UC
Intelligent Transportation System- dynamic message signs/video monitoring	PI	PF	PF
NW 34 Street turn lanes	PI	PF	PF
Interstate 75 NW 39 Avenue Interchange- interchange improvement (Safety Funded)	PI	PF	-
SE 16 Avenue Transportation System Management Project (Safety Funded)	F	F	F
SW 62 Boulevard Access Management Study	-	-	NF
Santa Fe College Area Traffic Study	-	-	NF
University Avenue/Waldo Road Bicycle/Pedestrian Safety Modifications	-	-	NF
NW 13 Street/NW 6 Street Intersection Realignment	-	-	NF
Traffic Management System- conversion to flashing yellow	-	PF	PF

F - Funded
NF - Not Funded (unfunded 2013 List of Priority Projects Safety Priority)
PF - Partially Funded
PI - Partially Implemented
UC - Under Construction

Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area

Transportation Improvement Program Team

Scott R. Koons, AICP, Executive Director

Marlie Sanderson, AICP, Director of Transportation Planning

* Dwayne Mundy, Public Safety and Regulatory Compliance Program Director

* Michael Escalante, AICP, Senior Planner

** Michael DePalma, Associate Planner

** Kevin Parrish, Information Technology and Property Management Director

** Carol Laine, Executive Assistant to the Executive Director

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Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area

2009 NW 67th Place
Gainesville, Florida 32653-1603
352.955.2200

www.ncfrpc.org/mtpo