

Final Report

BD548-27

**IDENTIFICATION OF INTERSECTIONS' CRASH
PROFILES/PATTERNS TO INCLUDE UNSIGNALIZED
INTERSECTIONS AND EXPAND THE SAFETY/TRAFFIC
DATABASE**

Part II

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August 2009

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle IDENTIFICATION OF INTERSECTIONS' CRASH PROFILES/PATTERNS TO INCLUDE UNSIGNALIZED INTERSECTIONS AND EXPAND THE SAFETY/TRAFFIC DATABASE Part II		5. Report Date August 26, 2009	
		6. Performing Organization Code	
7. Author(s) Abdel-Aty, M., Kerr, P., Haleem, K., Huang, H.		8. Performing Organization Report No.	
9. Performing Organization Name and Address Center for Advanced Transportation and Systems Simulation, University of Central Florida, P.O. Box 162450, Orlando, FL 32816-2450		10. Work Unit No. (TRAVIS)	
		11. Contract or Grant No. BD548RPWO#27	
12. Sponsoring Agency Name and Address Florida Department of Transportation 605 Suwannee St. MS 30 Tallahassee, Florida 32399 (850)414-4615		13. Type of Report and Period Covered Final Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract The aim of the web site development aspect of this project was to add functionality to the signalized intersection crash profiles web site that was delivered as part of the previous project, 'Identification of Intersections' Crash Profiles/Patterns Phase II, Client/Server Computer Application Deployment' and integrate functionality to support the research on unsignalized intersections performed under this project. This required significant changes to both the web site and underlying database.			
17. Key Word Unsignalized intersections, traffic safety, unsignalized intersection classification, Internet, database		18. Distribution Statement	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 38	22. Price

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CHAPTER 1. INTRODUCTION

1.1 Overview

After the submission of the final report 'Identification of Intersections' Crash Profiles/Patterns Phase II, Client/Server Computer Application Deployment' it was noted that more functionality was required for the web site that was developed in order to make it a more meaningful resource. The desired functionality was the inclusion of more signalized intersection inventory fields beyond what was included in the previous project. These fields encompass intersection geometry, roadside hazard, traffic control, signal timing, timing plans and traffic characteristics.

In addition, as part of this project, research was performed to categorize unsignalized intersections and create a web site that parallels the site created for the signalized intersections. This portion of the final report seeks to describe the changes to the existing web site as well as the sister web site created for the unsignalized intersections.

CHAPTER 2. MODIFICATIONS TO SIGNALIZED INTERSECTION WEB SITE

2.1 Site Navigation

The navigation of the site was enhanced using cascading style sheets (*css*) which controlled the appearance and behavior of an unordered list. To the user the site navigation appears as a drop down menu underneath the site title (see Figure 1 in the Appendix). Hovering the mouse cursor over the content areas causes submenus to appear. To maintain accessibility, the navigation system is part of an HTML unordered list which is demonstrated by disabling the styles in the browser (see Figure 2 in the Appendix). The navigation system is held within a .NET user control that is embedded near the top of every web page within the site. Appearing before the navigation links is a link that allows a user using a assistive device such as a screen reader to bypass the navigation of each page. This skip navigation link is hidden from the visual user.

The web pages of the two sister sites are stored within the same web application. Switching between the two sites is performed easily by hovering the mouse cursor over the 'home link' and clicking on the link that appears below it (see Figure 3 in the Appendix).

2.2 Enhanced Intersection Inventory

The original web site was designed to store only data that was used to classify signalized intersections. These data included:

- County

- Node number
- Number of legs
- State Road number/name
- State Road milepoint(s)
- Number of lanes
- Annual average daily traffic
- Speed limit
- Directionality (one way, two way, ramp)

The web site and database were expanded to include a multitude of fields of data and are divided into similar areas on different web pages. A signalized intersection does not have to be categorized in order for the extra data to be submitted. The data are:

- Geometry data (see Figure 5 in the Appendix)
 - Degree of horizontal curve
 - Select percent of grade
 - Surface width
 - Surface type
 - Median width (ft.)
 - Median type
 - Shoulder type (by approach)
 - Offset of left turn lanes (by roadway)
 - Skew angle
 - Channelization
 - Refuge island

- Distance to nearest upstream signalized intersection (by approach)
- Rural/urban designation
- Roadside hazard (see Figure 6)
 - Clear zone (by approach)
 - Sideslope (by approach)
 - Off-road features (by approach)
 - Guardrail (by approach)
 - Recoverable (by approach)
- Traffic Control (see Figure 7, Figure 8 and Figure 9 in the Appendix)
 - Type of control
 - Signal installation type
 - Traffic detection type
 - Signal control system
 - Back plates (by approach)
 - Late night flashing operation
 - Flashing start time (24 hr clock)
 - Flashing end time (24 hr clock)
 - Right turn restriction (by approach)
 - Crosswalk (by approach)
 - Pedestrian signal (by approach)
 - Auditory alerts (by approach)
 - Enforcement lights
 - Northbound left turn

- Northbound through
 - Southbound left turn
 - Southbound Through
 - Eastbound left turn
 - Eastbound Through
 - Westbound left turn
 - Westbound Through
- Automated red light running cameras (by approach)
- Dilemma zone detection control system
- Transverse rumble strips (by approach)
- Rumble strips - distance from intersection (ft.) (by approach)
- Lane line, arrow, and other pavement marking(by approach)
- Cross street sign (by approach)
- Advance directional signing, street name signing (by approach)
- Roadway lighting (by approach)
- High mast lighting (by quadrant)
- Bus stop location (by approach, by side)
- Signal timing (see Figure 10 in the Appendix)
 - Cycle length, in seconds
 - Signal coordination
 - Protected/permitted left turn operation (by approach)
 - Flashing yellow arrow for permissive left turn (by approach)
 - Leading/lagging left turn operation (by approach)

- Leading pedestrian phase, in seconds (by approach)
- Timing plan (see Figure 11 in the Appendix) – this page was modeled after the spreadsheet used by the Orange County Traffic Operations Department. On this page, the user can also download the timing plan in Microsoft Excel format.
 - Basic timing
 - Min green (sec)
 - Vehicle gap (sec)
 - Max green 1 (sec)
 - Max green 2 (sec)
 - Yellow (sec)
 - All-red (sec)
 - Walk (sec)
 - Flashing don't walk (sec)
 - Recall/memory
 - Detector delay (sec)
 - Dual entry
 - Overlap
 - Flash
 - Speed limit (mph)
 - Crossing distance (ft)
 - Pedestrian clearance (sec)
 - Coordination plans
 - Cycle

- Split 1
 - Split 2
 - Split 3
 - Split 4
 - Split 5
 - Split 6
 - Split 7
 - Split 8
 - Offset
 - Lagging phases
 - Coordination implemented
- Daily plan
- Pattern
- Traffic characteristics (see Figure 12 in the Appendix)
 - Average daily traffic
 - North-South roadway
 - East-West roadway
 - Pedestrian volume count
 - North-South roadway
 - East-West roadway
 - Truck percentage
 - North-South roadway
 - East-West roadway

- Peak hour
 - Start time (military time)
 - End Time (military time)
- Peak hour turning movement
 - Northbound approach
 - Left turn
 - Through
 - Right
 - Southbound approach
 - Left turn
 - Through
 - Right
 - Eastbound approach
 - Left turn
 - Through
 - Right turn
 - Westbound approach
 - Left turn
 - Through
 - Right

When the signalized intersection web site was created, a master list of nodes was provided by the Florida Department of Transportation (FDOT) to populate the database table of intersections. This master list included county, node number, roadway id, mile point, route name

and cross street. Unfortunately, it did not indicate which intersections were signalized. Therefore, the entire inventory was included within the signalized intersection web site. With the development of the unsignalized portion of the web site, it became apparent that a method to convert an unsignalized intersection that was stored in the database as a signalized intersection was necessary. To access this new feature, the user starts at the 'intersection inventory' page (see Figure 13 in the Appendix) which now includes a new column titled 'convert'. For each intersection that has not been categorized as a signalized intersection, a link is provided in the 'convert' column to access another page that will confirm and perform the conversion (see Figure 14 in the Appendix).

CHAPTER 3. DEVELOPMENT OF THE UNSIGNALIZED INTERSECTION WEB SITE

3.1 Overview

The unsignalized section of the web site was developed to categorize unsignalized intersections and provide statistical analyses using crash data. This section parallels the signalized section and utilizes a similar design with the major exception of the color scheme. The signalized section uses a light blue background with black text while the unsignalized section uses a light green background with black text (see Figure 15 in the Appendix). Both sections are presented as two different sites but are part of the same web application. They are combined as one because the pages that perform inserting or modifications of data in the database require logging in. By including the two sections in one application, once a user has logged into one site, he or she can navigate from one site to the other without having to log in again.

3.2 Shared Functionality

The unsignalized and signalized sections are tightly integrated in that they share some functionality. From either section, a user can download the summarized crash data, upload crash data from the Crash Analysis/Reporting (CAR) application housed on the FDOT mainframe, modify which counties are in which districts and manage users.

3.3 Similar Functionality

The unsignalized section, like the signalized section, allows users to upload a file of intersection data rather than modify individual records, review the inventory of unsignalized intersections by county (see Figure 16 in the Appendix), view the category descriptions (see Figure 17 in the Appendix), produce statistical tables based on the most current crash data (see Figure 18 in the Appendix), insert new unsignalized intersections (see Figure 19 in the Appendix) and modify existing unsignalized intersections (see Figure 20 in the Appendix).

The statistic output pages are the same as the signalized intersection pages in that analysis is divided into overall, collision type, severity, light condition, surface condition, month, day of week and time of day. For each of these, the following data are provided:

- The total number of crashes that occurred at this intersection in the most recent year that data is available.
- The average number of crashes per year and standard deviation for the same category of intersection from the same county from the past 3 years. The number of intersections is provided at the top of the column.
- The average number of crashes per year and standard deviation for the same category of intersection from the same district from the past 3 years. The number of intersections is provided at the top of the column.
- The average number of crashes per year and standard deviation for the same category of intersection from the state from the past 3 years. The number of intersections is provided at the top of the column.
- The percentile for the state is provided in the last column. The choice of 80th, 85th, 90th and 95th percentile is available when selecting the intersection.

CHAPTER 4. SITE DEFINITION

4.1 Location

The site was developed using the Microsoft .NET 2.0 framework on a Windows server 2003 computer. In development, it is running in a subdirectory of the root domain.

4.2 Security

The site, as mentioned in section 3.1, requires the user to be logged in to perform data inserts and modifications. The site uses the .NET Forms Authentication protocol and restricts access based on roles. There are two authenticated roles: manager and district. The manager role is able to perform higher level tasks such as maintaining users and modifying district boundaries. The manager role is able to modify all intersection data through the web site. Users of the district role are able to modify data for their district.

4.3 Database

For development purposes, Oracle Database Express Edition 10g Release 2 (10.2) was used to create the table, views, procedures and packages. The Oracle Express Edition allowed for the development of a compatible relational database without having to acquire fee based licenses. At deployment, scripts can be generated to recreate the database schema and data within FDOT's Oracle environment.

In order for the web site to be able to communicate with the Oracle database, the Oracle Data Access Components 10.2.0.2.21 were installed.

4.4 Accessibility

To test the site's accessibility, the Web Accessibility Evaluation Tool toolbar was downloaded from the web site <http://wave.webaim.org> and installed as a toolbar in Mozilla Firefox (see Figure 21 in the Appendix). Each page was processed using the toolbar to evaluate each page's accessibility. The toolbar found that all but two pages have no known errors. The two pages that failed are the pages for inserting and modifying the timing plan data for the signalized intersections. These pages have so many data fields that it was more convenient to organize them in a grid similar to a spreadsheet. These pages fail because there is no corresponding label for each input field.

APPENDIX

Screen Shots from the Signalized and Unsignalized Web Sites



Signalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
------	------	-----------	----------	--------	------

	New Intersection
Analysis Data	Update Intersection
Geometry	Districts
Roadside Hazard	Users
Traffic Control	
Signal Timing	
Timing Plan	
Traffic Characteristics	

**Welcome to the
Safety**

In Florida, it is estimated that close to 100,000 signalized intersections exist. Since the signalized intersection crash rate is even worse. The elements that affect crash occurrence or severity. In order to improve intersection safety, FDOT has supported a project, Identification of Intersections' Crash Profile/Patterns (BC355), to determine which crash patterns are abnormally high at intersections of different configurations and traffic levels, and, thus, to effectively develop countermeasures. The purpose of this website is to encourage the implementation of the project research results and to facilitate the signalized intersection safety analysis.

In this project, 45 major intersection types are defined based on the geometric/configuration (e.g., the number of intersection legs, the number of through lanes on major- and minor-roads, roadway types for major- and minor-roads), and then traffic volume and traffic characteristic (e.g., speed limit) factors. The same intersection classification criteria will be used for this web application. The crash patterns for each type of intersection can be identified based on the most recent available crash data, which include crash averages by type, Severity, Light Condition, Surface Condition, Month, Week, and Hourly distributions within a certain county, for a district or even for the overall state as shown in the webpage Analysis. These numbers will serve as a crash profile manual that could be used as reference values that could assist in identifying intersections with specific problems, e.g., high number of fatal crashes or high number of angle crashes, etc.

Only intersections with at least one state road are considered. The crash data for these intersections have been updated to the most recent 3 years by retrieving the FDOT Crash Analysis Reporting System (CAR). The state road intersections currently include those within Brevard, Hillsborough, Miami-Dade, Orange and Seminole counties and will grow over time until it encompasses all areas of the state beyond just the 5 counties that were considered. Users can download the existing crash data from the web server into their PCs in either XML (Extensible Markup Language) or CSV (Comma Separated Values) file formats, or upload crash data of their counties to the web server to include and analyze intersections in their jurisdiction. Users can view all state road intersections for a specific county under Inventory for their Node Number, Mile Point, Intersection Name, Category, etc. (Mile Point, Intersection Name, and Category are blank for an unidentified intersection). By using the function in the Manage webpage, users can add a new intersection or update an existing intersection's characteristics when changes occur in its geometry, traffic volume, or/and the speed limit.

The [final report](#) for the project Identification of Intersections' Crash Profile/Patterns (BC355) is available from the [FDOT Completed Safety Projects](#) website. You will need to have Adobe Acrobat to view the report. You can [download Adobe Acrobat Reader](#) from Adobe's website.

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Figure 1. Enhanced visual navigation

[Skip Navigation](#)




Signalized Intersection Crash Profiles

- [Home](#)
 - [Unsignalized Intersections](#)
- [Data](#)
 - [Download Summarized Crash Data](#)
 - [Upload Crashes](#)
 - [Upload Intersections](#)
- [Inventory](#)
 - [View Intersections](#)
 - [View Categories](#)
- [Analysis](#)
 - [Intersection](#)
 - [Milepoint](#)
 - [Node](#)
- [Manage](#)
 - [New Intersection](#)
 - [Analysis Data](#)
 - [Geometry](#)
 - [Roadside Hazard](#)
 - [Traffic Control](#)
 - [Signal Timing](#)
 - [Timing Plan](#)
 - [Traffic Characteristics](#)
 - [Update Intersection](#)
 - [Analysis Data](#)
 - [Geometry](#)
 - [Roadside Hazard](#)
 - [Traffic Control](#)
 - [Signal Timing](#)
 - [Timing Plan](#)
 - [Traffic Characteristics](#)
 - [Districts](#)
 - [Users](#)
- [Help](#)

[Analysis by Milepoint](#)

Figure 2. Site navigation with styles disabled



Signalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
Unsignalized Intersections					

**Welcome to the FDOT Signalized Intersection
Safety Analysis Website!**


In Florida, it is estimated that close to 40% of crashes occurred at intersections or the approach to intersections. Since the signalized intersections are generally larger intersections, the safety status for these intersections is even worse. The elements that affect the frequency of intersection crashes are not well understood and, consequently, it is difficult to predict the effectiveness of specific intersection improvements that are aimed at reducing crash occurrence or severity. In order to improve the safety at signalized intersection, FDOT has supported a project, Identification of Intersections' Crash Profile/Patterns (BC355), to determine which crash patterns are abnormally high at intersections of different configurations and traffic levels, and, thus, to effectively develop countermeasures. The purpose of this website is to encourage the implementation of the project research results and to facilitate the signalized intersection safety analysis.

In this project, 45 major intersection types are defined based on the geometric/configuration (e.g., the number of intersection legs, the number of through lanes on major- and minor-roads, roadway types for major- and minor-roads), and then traffic volume and traffic characteristic (e.g., speed limit) factors. The same intersection classification criteria will be used for this web application. The crash patterns for each type of intersection can be identified based on the most recent available crash data, which include crash averages by type, Severity, Light Condition, Surface Condition, Month, Week, and Hourly distributions within a certain county, for a district or even for the overall state as shown in the webpage Analysis. These numbers will serve as a crash profile manual that could be used as reference values that could assist in identifying intersections with specific problems, e.g., high number of fatal crashes or high number of angle crashes, etc.

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Figure 3. Switching between sites



Signalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
------	------	-----------	----------	--------	------

Update Existing Intersection Analysis Data


You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

<ol style="list-style-type: none"> 1. Select County 2. Select Node 3. Select Number of Intersection Legs <i>Use Road 1 for state roads</i> 4. Enter Name of Road 1 5. Enter Milepoint of Road 1 6. Select Number of Through Lanes in Road 1 7. Enter AADT of Road 1 (all lanes) 8. Enter Speed Limit of Road 1 9. Enter Directionality of Road 1 10. Enter Name of Road 2 11. Enter Milepoint of Road 2 12. Select Number of Thru Lanes in Road 2 13. Enter AADT of Road 2 (all lanes) 14. Enter Speed Limit of Road 2 15. Enter Directionality of Road 2 16. Select year of this change 	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="border-bottom: 1px solid #ccc;">Orange</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">00049</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">4</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">SR-438 (Silver Star Rd)</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">0</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">2</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">16552</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">45</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">Two Way</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">SR-437 (Ocoee-Apopka)</td></tr> <tr><td style="border-bottom: 1px solid #ccc;"></td></tr> <tr><td style="border-bottom: 1px solid #ccc;">2</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">0</td></tr> <tr><td style="border-bottom: 1px solid #ccc;"></td></tr> <tr><td style="border-bottom: 1px solid #ccc;">Two Way</td></tr> <tr><td style="border-bottom: 1px solid #ccc;">2002</td></tr> <tr><td style="text-align: center;"><input type="button" value="Submit"/></td></tr> </table>	Orange	00049	4	SR-438 (Silver Star Rd)	0	2	16552	45	Two Way	SR-437 (Ocoee-Apopka)		2	0		Two Way	2002	<input type="button" value="Submit"/>
Orange																		
00049																		
4																		
SR-438 (Silver Star Rd)																		
0																		
2																		
16552																		
45																		
Two Way																		
SR-437 (Ocoee-Apopka)																		
2																		
0																		
Two Way																		
2002																		
<input type="button" value="Submit"/>																		

Year	County	Node	Intersection	Milepoint	AADT	Speed Limit	Category
2002	Orange	00049	SR-438 (Silver Star Rd) & SR-437 (Ocoee-Apopka)	0	8276	45	2

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Center for Advanced Transportation Systems Simulation.
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Figure 4. Analysis data



Signalized Intersection Crash Profiles


Home	Data	Inventory	Analysis	Manage	Help
------	------	-----------	----------	--------	------

**Update Existing Intersection
Roadside Hazard Data**

You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

1. Northbound Approach	Clear Zone	<input type="text"/>
	Sideslope	<input type="text"/>
	Off-road features	<input type="text"/>
	Guardrail	<input type="text"/>
	Recoverable	<input type="text"/>
2. Southbound Approach	Clear Zone	<input type="text"/>
	Sideslope	<input type="text"/>
	Off-road features	<input type="text"/>
	Guardrail	<input type="text"/>
	Recoverable	<input type="text"/>
3. Eastbound Approach	Clear Zone	<input type="text"/>
	Sideslope	<input type="text"/>
	Off-road features	<input type="text"/>
	Guardrail	<input type="text"/>
	Recoverable	<input type="text"/>
4. Westbound Approach	Clear Zone	<input type="text"/>
	Sideslope	<input type="text"/>
	Off-road features	<input type="text"/>
	Guardrail	<input type="text"/>
	Recoverable	<input type="text"/>

Figure 6. Roadside hazard



Signalized Intersection Crash Profiles

Home
Data
Inventory
Analysis
Manage
Help

Update Existing Intersection
Traffic Control Data

You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

1. Type of Control	<input type="text"/>
2. Signal Installation Type	<input type="text"/>
3. Traffic Detection Type	<input type="text"/>
4. Signal Control System	<input type="text"/>
5. Back Plates	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
6. Late Night Flashing Operation	<input type="text"/>
Flashing Start Time (24 hr clock)	<input type="text"/>
Flashing End Time (24 hr clock)	<input type="text"/>
7. Right Turn Restriction	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
8. Crosswalk	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
9. Pedestrian Signal	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>

Figure 7. Traffic control

10. Auditory Alerts	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
11. Enforcement Lights	
Northbound Left Turn	<input type="text"/>
Northbound Thru	<input type="text"/>
Southbound Left Turn	<input type="text"/>
Southbound Thru	<input type="text"/>
Eastbound Left Turn	<input type="text"/>
Eastbound Thru	<input type="text"/>
Westbound Left Turn	<input type="text"/>
Westbound Thru	<input type="text"/>
12. Automated Red Light Running Cameras	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
13. Dilemma Zone Detection Control System	
	<input type="text"/>
14. Transverse Rumble Strips	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
15. Rumble Strips - Distance from Intersection	
Northbound Approach (ft.)	<input type="text"/>
Southbound Approach (ft.)	<input type="text"/>
Eastbound Approach (ft.)	<input type="text"/>
Westbound Approach (ft.)	<input type="text"/>
16. Lane line, Arrow, and other Pavement Marking	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>
17. Cross Street Sign	
Northbound Approach	<input type="text"/>
Southbound Approach	<input type="text"/>
Eastbound Approach	<input type="text"/>
Westbound Approach	<input type="text"/>

Figure 8. Traffic control (continued)

18. Advance Directional Signing, Street Name Signing

Northbound Approach

Southbound Approach

Eastbound Approach

Westbound Approach

19. Roadway Lighting

Northbound Approach

Southbound Approach

Eastbound Approach

Westbound Approach

20. High Mast Lighting

Quadrant 1

Quadrant 2

Quadrant 3

Quadrant 4

21. Bus Stop Location

Northbound Approach (Near Side)

Northbound Approach (Far Side)

Southbound Approach (Near Side)

Southbound Approach (Far Side)

Eastbound Approach (Near Side)

Eastbound Approach (Far Side)

Westbound Approach (Near Side)

Westbound Approach (Far Side)

Year	County	Node	Intersection	Milepoint	AADT	Speed Limit	Category
2002	Orange	00049	SR-438 (Silver Star Rd) & SR-437 (Ocoee-Apopka)	0	8276	45	2

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Figure 9. Traffic control (continued)


BASIC TIMING								
Phase	1	2	3	4	5	6	7	8
Direction	EBL	WB	SBL	NB	WBL	EB	NBL	SB
Min Green (sec)								
Vehicle Gap (sec)								
Max Green 1 (sec)								
Max Green 2 (sec)								
Yellow (sec)								
All-Red (sec)								
Walk (sec)								
Flash Don't Walk (sec)								
Recall/Memory								
Detector Delay (sec)								
Dual Entry								
Overlap								
Flash								
Speed Limit (mph)								
Crossing Distance (ft)								
Ped Clearance (sec)								

COORDINATION PLANS					
Coordination Pattern	1/1/1	2/1/1	3/1/1	4/1/1	5/1/1
Cycle					
Split 1					
Split 2					
Split 3					
Split 4					
Split 5					
Split 6					
Split 7					
Split 8					
Offset					
Lagging Phases					
Coord Implemented					

DAILY PLAN					
Source Day	Equate 1	Equate 2	Equate 3	Equate 4	Equate 5

Day	Time	Pattern
<input type="text"/>	<input type="text"/>	<input type="text"/> remove
<input type="button" value="Add"/>	<input type="button" value="Submit"/>	

Figure 11. Timing plan



Signalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
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Update Existing Intersection
Traffic Characteristics Data


You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

1. Average Daily Traffic
 - North-South roadway
 - East-West roadway
2. Pedestrian Volume Count
 - North-South roadway
 - East-West roadway
3. Truck Percentage
 - North-South roadway
 - East-West roadway
4. Peak Hour
 - Start Time (military time)
 - End Time (military time)
5. Peak Hour Turning Movement
 - Northbound Approach
 - Left Turn
 - Thru
 - Right Turn
 - Southbound Approach
 - Left Turn
 - Thru
 - Right Turn
 - Eastbound Approach
 - Left Turn
 - Thru
 - Right Turn
 - Westbound Approach
 - Left Turn
 - Thru
 - Right Turn

Year	County	Node	Intersection	Milepoint	AADT	Speed Limit	Category
2002	Orange	00049	SR-438 (Silver Star Rd) & SR-437 (Ocoee-Apopka)	0	8276	45	2

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Figure 12. Traffic characteristics



Signalized Intersection Crash Profiles

Home | Data | Inventory | Analysis | Manage | Help


View Intersection Inventory

Select county: Brevard

Node Inventory for Brevard County						
Node Number	Mile Point	Intersection	Category	Link	Convert	
00002	0.27	SR-9 &		Update	unsignalized	
00003	0.3790	SR-9 &		Update	unsignalized	
00033	25.31	SR-9 &		Update	unsignalized	
00043	35.98	SR-9 &		Update	unsignalized	
00044	36.2010	SR-9 &		Update	unsignalized	
00051	41.3070	SR-9 &		Update	unsignalized	
00058	35.4320	SR-9 &		Update	unsignalized	
00061	31.4250	SR-9 &		Update	unsignalized	
00063	31.0130	SR-9 &		Update	unsignalized	
00072	20.5260	SR-9 &		Update	unsignalized	
00079	13.6020	SR-9 &		Update	unsignalized	
00085	9.4250	SR-9 &		Update	unsignalized	
00097	0.4480	SR-9 &		Update	unsignalized	
00105	3.9790	SR-9 &		Update	unsignalized	
00130	22.0610	SR-9 &		Update	unsignalized	
00158	14.3320	SR-9 &		Update	unsignalized	
00163	10.5040	SR-9 &		Update	unsignalized	
00175	4.2480	SR-9 &		Update	unsignalized	
00180	0.9580	SR-9 &		Update	unsignalized	

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Figure 13. Statewide node inventory by county



Signalized Intersection Crash Profiles

Home | Data | Inventory | Analysis | Manage | Help

Confirm Node Conversion

Are you sure you want to convert the following intersection to an unsignalized intersection?

Road 1: SR 9


Road 2:

Mile Point: 0.27

Node Number: 00002

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Figure 14. Converting to unsignalized intersections



Unsignalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
------	------	-----------	----------	--------	------

**Welcome to the FDOT Unsignalized Intersection
Safety Analysis Website!**


Unsignalized intersections are the most frequent types of intersections in the U.S. Unsignalized intersections include intersections with stop control, yield control, and no traffic control. Unsignalized intersections can be differentiated from their signalized counterparts in that their operational functions take place without the presence of a traffic signal.

In the US, around 700,000 motor-vehicle crashes reported by police officers occur annually at stop-controlled intersections, with one third of these crashes involving injuries and more than 3,000 being fatal. One important reason for this high crash frequency is the unfamiliarity of drivers with traffic operations at unsignalized intersections when compared to those of signalized intersections. In order to improve the safety at unsignalized intersections, FDOT has supported a project, Identification of Intersections' Crash Profiles/Patterns to Include Unsignalized Intersections and Expand the Safety/Traffic Database (BD 548-27), so as to determine which crash patterns are abnormally high at intersections of different configurations and traffic levels, and, thus, to effectively develop countermeasures tailored to the specific problem(s). The purpose of this Web site is to encourage the implementation of the project results and to facilitate the unsignalized intersection safety analysis.

In this project, 60 major unsignalized intersection categories are defined based on the geometric configuration (e.g., the number of intersection legs and median type on the major approach), and traffic characteristics (e.g., traffic volume and speed limit). The crash patterns for each type of intersection can be identified based on the most recent available crash data which include crash averages by Type, Severity, Lighting Condition, Surface Condition, Month, Week, and Hourly distributions within a certain county, for a district or even for the overall state as shown in the Web page analysis. These numbers will serve as a crash profile manual that could be used as reference values that could assist in identifying intersections with specific problems, e.g., high number of fatal crashes or high number of rear-end crashes, etc.

The crash data for these intersections have been updated to the most recent 3 years by retrieving the FDOT Crash Analysis Reporting System (CAR). The analyzed intersections currently include those within Orange, Brevard, Hillsborough, Miami-Dade, Leon and Seminole Counties and has the capacity to grow over time until it encompasses all areas of the state beyond those 6 counties. Users can download the summarized crash data from the Web server into their PCs in either XML (Extensible Markup Language) or CSV (Comma Separated Values) file formats, or upload crash data of their counties to the web server to include and analyze intersections in their jurisdiction. Users can view unsignalized intersections for a specific county under inventory for their Node Number, Mile Point, Intersection Name, Category, etc. (Mile Point, Intersection Name, and Category are blank for any unidentified intersection). By using the Manage section of the Web site, authorized users can add a new intersection or update an existing intersection's characteristics when changes occur in its geometry, traffic volume, or/and the speed limit.

Figure 15. Unsignalized section home page



Unsignalized Intersection Crash Profiles

Home
Data
Inventory
Analysis
Manage
Help

View Intersection Inventory

Select county Orange

Node Inventory for Orange County

Node Number	Mile Point	Intersection	Category	Link
00034	0.125	SR 537 & Morgan St.		Update
00038	0.56	SR 537 & Charlotte St.		Update
00039	0.601	SR 537 & Vining St.		Update
00040	0.631	SR 537 & Pennsylvania Ave		Update
00041	0.68	SR 537 & E. Miller St.		Update
00042	0.69	SR 537 & Florida Ave		Update
00043	0.75	SR 537 & E. Maple St.		Update
00044	0.848	SR 537 & Smith St		Update
00046	0.95	SR 537 & Joiner St		Update
00047	1.008	SR 537 & E Bay St		Update
00050	0.045	SR 437 & Lee St.		Update
00121	2.496	SR 435 & Windhover Dr.		Update
00129	6.21	SR 435 & Church St.		Update

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Figure 16. Unsignalized intersection inventory



Unsignalized Intersection Crash Profiles


[Home](#) [Data](#) [Inventory](#) [Analysis](#) [Manage](#) [Help](#)

Unsignalized Intersection Categories

Category	Main Type	Category Classification
1		Ramps (including non-controlled ramps)
2	Yield	Regular intersections, access points and parking lots
3		2x4 with 1-way stop on the minor
4	Urban and rural directional and mixed restricted medians with two-way major road	2x4 with no control on the minor
5		2x6 with 1-way stop on the minor
6		2x6 with no control on the minor
7		2x8 with 1-way stop on the minor
8		2x2 and 2x3 with 1-way stop on the minor
9		2x4 with no control on the minor
10	Urban and rural closed restricted medians with one-way major road	2x4 and 2x5 with 1-way stop on the minor and AADT <= 34000
11		2x4 and 2x5 with 1-way stop on the minor and AADT > 34000
12		2x6 with 1-way stop on the minor and AADT <= 50000
13		2x6 with 1-way stop on the minor and AADT > 50000
14		2x6 with no control on the minor
15		2x8 with 1-way stop on the minor
16		2x2, 2x4, 2x5 and 2x6 with no control on minor
17		2x2 and 2x3 with 1-way stop on minor and AADT <= 15000
18		2x2 and 2x3 with 1-way stop on minor and AADT > 15000
19		2x4 with 1-way stop on minor and AADT <= 19000 and SL <= 45
20		2x4 with 1-way stop on minor and AADT <= 19000 and SL > 45
21		2x4 with 1-way stop on minor and 19000 < AADT <= 27000 and SL <= 45
22		2x4 with 1-way stop on minor and 19000 < AADT <= 27000 and SL > 45
23		2x4 with 1-way stop on minor and 27000 < AADT <= 39000 and SL <= 45
24		2x4 with 1-way stop on minor and 27000 < AADT <= 39000 and SL > 45
25	Urban 3 legs with unrestricted medians (i.e., open, undivided, 2WLT and markings)	2x4 with 1-way stop on the minor and AADT > 39000 and SL <= 45
26		2x4 with 1-way stop on the minor and AADT > 39000 and SL > 45
27		2x5 with 1-way stop on the minor and AADT (major) <= 22000
28		2x5 with 1-way stop on the minor and 22000 < AADT <= 30000
29		2x5 with 1-way stop on the minor and 30000 < AADT <= 42000
30		2x5 with 1-way stop on the minor and AADT > 42000
31		2x6 with 1-way stop on the minor and AADT (major) <= 45000
32		2x6 with 1-way stop on the minor and 45000 < AADT <= 50000
33		2x6 with 1-way stop on the minor and 50000 < AADT <= 58000
34		2x6 with 1-way stop on the minor and AADT > 58000
35		2x7 with 1-way stop on the minor
36		2x8 with 1-way stop on the minor
37		3x4 and 3x6 with 1-way stop on the minor
38	Urban 4 legs with unrestricted medians (i.e., open, undivided, 2WLT and markings)	2x2 with 2-way stop or "no control/stop" on the minor
39		2x3 with 2-way stop or no control or "no control/stop" on the minor
40		2x4 with 2-way stop on the minor and AADT (major) <= 25000
41		2x4 with 2-way stop on the minor and AADT > 25000
42		2x4 with "no control/stop" on the minor
43		2x5 with 2-way stop on the minor and AADT (major) <= 32000
44		2x5 with 2-way stop on the minor and AADT > 32000
45		2x5 with no control and "no control/stop" on the minor
46		2x6 with 2-way stop on the minor and AADT (major) <= 55000
47		2x6 with 2-way stop on the minor and AADT > 55000
48		2x6 with "no control/stop" on the minor
49		2x7 with 2-way stop on the minor
50		2x8 with 2-way stop or "no control/stop" on the minor
51	Rural 3 legs with unrestricted medians (i.e., open, undivided, 2WLT and markings)	2x2 and 2x4 with no control on the minor
52		2x2 with 1-way stop on the minor
53		2x4 with 1-way stop on the minor
54	Rural 4 legs with unrestricted medians (i.e., open, undivided, 2WLT and markings)	2x2 and 2x4 with 2-way stop on the minor
55		2x2 and 2x4 with "no control/stop" on the minor
56	Urban and rural two 3-legged with directional and mixed medians (two minor roads exist, but separated by directional and mixed medians, and two-way major road)	2x4 with 1-way stop on the minor
57		2x6 with 1-way stop on the minor
58	Urban and rural two 3-legged with closed medians (two minor roads exist, but separated by closed medians, and one-way major road)	2x4 and 2x6 with 1-way stop on the minor

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Figure 17. Unsignalized intersection categories



Unsignalized Intersection Crash Profiles

Home | Data | Inventory | Analysis | Manage | Help

Analysis by Intersection

1. Select County: Brevard

2. Select Roadway: SR 3


3. Select Intersecting Roadway: Alma Blvd

4. Select State Percentile: 80th

Intersection: SR 3 & Alma Blvd
 Node: 02840
 Roadway ID: 70140000
 Milepoint: 1.838
 Category Number: 29

Summarized Crash Data					
	Crashes in 2007	Average Number of Crashes Per Intersection for Previous 3 Years (Standard deviation in parentheses)			State 80th Percentile
		County n=8	District n=35	State n=51	
Totals	2	1.92 (3.05)	1.76 (2.01)	2.31 (2.42)	3.33
Collision Type					
Rear End	1	0.54 (0.69)	0.47 (0.57)	0.65 (0.8)	1
Head On	0	0.12 (0.25)	0.09 (0.19)	0.09 (0.19)	0.33
Angle	0	0.58 (0.87)	0.49 (0.73)	0.52 (0.69)	0.67
Left Turn	1	0.33 (0.69)	0.26 (0.49)	0.29 (0.49)	0.67
Right Turn	0	0 (0)	0.02 (0.08)	0.05 (0.13)	0
Sideswipe	0	0.04 (0.12)	0.05 (0.14)	0.15 (0.29)	0.33
Pedestrian/Bicycle	0	0.17 (0.47)	0.1 (0.29)	0.11 (0.26)	0.33
Other	0	0.12 (0.25)	0.3 (0.38)	0.46 (0.6)	1
Severity					
PDO	1	0.54 (0.89)	0.58 (0.78)	1.06 (1.44)	1.67
Possible Injury	0	0.54 (0.43)	0.5 (0.47)	0.61 (0.69)	1
Non-Incapacitating Injury	0	0.37 (0.68)	0.47 (0.59)	0.46 (0.54)	0.67
Incapacitating Injury	1	0.46 (1.17)	0.21 (0.61)	0.18 (0.52)	0.33
Fatal	0	0 (0)	0.01 (0.06)	0.01 (0.05)	0
Light Condition					
Daylight	2	1.54 (2.38)	1.29 (1.64)	1.7 (1.93)	2.33
Dusk	0	0 (0)	0.04 (0.11)	0.04 (0.11)	0
Dawn	0	0 (0)	0.01 (0.06)	0.01 (0.07)	0
Dark (with street lights)	0	0.29 (0.49)	0.35 (0.39)	0.46 (0.47)	0.67
Dark (without street lights)	0	0.08 (0.24)	0.08 (0.18)	0.07 (0.17)	0
Surface Condition					
Dry	1	1.54 (2.16)	1.57 (1.63)	1.99 (2)	2.67
Wet	1	0.29 (0.7)	0.14 (0.38)	0.25 (0.49)	0.33
Slippery	0	0 (0)	0.02 (0.08)	0.03 (0.09)	0
Other	0	0.08 (0.24)	0.03 (0.12)	0.04 (0.13)	0
Month					
January	0	0.17 (0.25)	0.12 (0.18)	0.21 (0.31)	0.33
February	1	0.08 (0.24)	0.11 (0.23)	0.13 (0.24)	0.33
March	0	0.12 (0.25)	0.15 (0.22)	0.22 (0.29)	0.33
April	0	0 (0)	0.13 (0.32)	0.22 (0.37)	0.67
May	0	0.33 (0.53)	0.14 (0.32)	0.18 (0.32)	0.33
June	0	0.17 (0.25)	0.18 (0.34)	0.18 (0.35)	0.33
July	0	0.04 (0.12)	0.05 (0.14)	0.1 (0.23)	0.33
August	0	0.12 (0.25)	0.13 (0.22)	0.18 (0.28)	0.33
September	0	0.08 (0.24)	0.12 (0.23)	0.22 (0.31)	0.33
October	0	0.04 (0.12)	0.18 (0.28)	0.24 (0.32)	0.67
November	0	0.42 (0.68)	0.24 (0.38)	0.25 (0.35)	0.33
December	1	0.33 (0.69)	0.19 (0.37)	0.2 (0.35)	0.33
Day of Week					
Monday	0	0.08 (0.24)	0.09 (0.19)	0.12 (0.2)	0.33
Tuesday	0	0.12 (0.25)	0.23 (0.42)	0.27 (0.45)	0.33
Wednesday	0	0.21 (0.31)	0.31 (0.41)	0.4 (0.49)	0.67
Thursday	1	0.25 (0.46)	0.3 (0.34)	0.36 (0.41)	0.67
Friday	1	0.33 (0.62)	0.27 (0.41)	0.35 (0.48)	0.67
Saturday	0	0.67 (1.36)	0.34 (0.75)	0.5 (0.83)	0.67
Sunday	0	0.25 (0.24)	0.23 (0.28)	0.33 (0.42)	0.67
Hour of Day					
00:00 - 06:00	0	0 (0)	0.14 (0.26)	0.16 (0.25)	0.33
06:01 - 09:00	0	0.17 (0.25)	0.18 (0.26)	0.25 (0.3)	0.33
09:01 - 11:00	0	0.08 (0.15)	0.08 (0.14)	0.16 (0.27)	0.33
11:01 - 13:00	0	0.17 (0.47)	0.2 (0.47)	0.26 (0.47)	0.33
13:01 - 15:00	0	0.42 (0.68)	0.24 (0.43)	0.27 (0.44)	0.33
15:01 - 18:00	1	0.46 (0.91)	0.31 (0.55)	0.44 (0.66)	0.67
18:01 - 24:00	1	0.62 (1.16)	0.61 (0.81)	0.78 (0.88)	1

Figure 18. Unsignalized intersection statistical output page



Unsignalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
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**Insert New Unsignalized Intersection
Analysis Data**

You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

Select County	<input type="text"/>
Enter Node Number	<input type="text"/>
Select Number of Intersection Approaches/Legs	<input type="text"/>
Land Use	<input type="text"/>
<hr/>	
Road 1 (Always use State Road)	
Road 1 - Enter Road Name	<input type="text"/>
Road 1 - ADT	<input type="text"/>
Road 1 - Roadway ID	<input type="text"/>
Road 1 - Milepoint	<input type="text"/>
Road 1 - Average Speed Limit ?	<input type="text"/>
<div style="border: 1px solid gray; background-color: #f0f0f0; padding: 2px;"> <p><i>If the speed limit changes at the intersection, enter the average of the two approaches.</i></p> </div>	
Road 1 - Is the predominant median for this segment a Two Way Left Turn median?	<input type="text"/>
Approach 1 - Select Direction of Travel Lanes	<input type="text"/>
Approach 1 - Select Number of Normalized Lanes ?	<input type="text"/>
Approach 1 - Select Median Type	<input type="text"/>
Approach 2 - Select Direction of Travel Lanes	<input type="text"/>
Approach 2 - Select Number of Normalized Lanes ?	<input type="text"/>
Approach 2 - Select Median Type	<input type="text"/>
<hr/>	
Road 2	
Road 2 - Control Type	<input type="text"/>
Road 2 - Roadway Type ?	<input type="text"/>
Approach 3 - Enter Road Name	<input type="text"/>
Approach 3 - Select Direction of Travel Lanes	<input type="text"/>
Approach 3 - Select Number of Through Lanes ?	<input type="text"/>
Approach 3 ends at a T-Intersection and Approach 4 does not exist <input type="checkbox"/>	
Approach 4 - Enter Road Name	<input type="text"/>
Approach 4 - Select Direction of Travel Lanes	<input type="text"/>
Approach 4 - Select Number of Through Lanes ?	<input type="text"/>
<input type="button" value="Submit"/>	

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Figure 19. Insert new unsignalized intersection



Unsignalized Intersection Crash Profiles

Home	Data	Inventory	Analysis	Manage	Help
------	------	-----------	----------	--------	------

**Update Existing Unsignalized Intersection
Analysis Data**

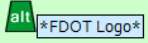

You are logged in under the "manager" role.
You may modify data for all Districts.
[Log in as a different user](#)

Select County	<input type="text"/>
Select Node Number	<input type="text"/>
Select Number of Intersection Approaches/Legs	<input type="text"/>
Land Use	<input type="text"/>
<hr/>	
Road 1 (Always use State Road)	
Road 1 - Enter State Road Name ?	<input type="text"/>
Road 1 - ADT	<input type="text"/>
Road 1 - Roadway ID	<input type="text"/>
Road 1 - Milepoint	<input type="text"/>
Road 1 - Average Speed Limit ?	<input type="text"/>
Road 1 - Is the predominant median for this segment a Two Way Left Turn median?	<input type="text"/>
Approach 1 - Select Direction of Travel Lanes	<input type="text"/>
Approach 1 - Select Number of Normalized Lanes ?	<input type="text"/>
Approach 1 - Select Median Type	<input type="text"/>
Approach 2 - Select Direction of Travel Lanes	<input type="text"/>
Approach 2 - Select Number of Normalized Lanes ?	<input type="text"/>
Approach 2 - Select Median Type	<input type="text"/>
<hr/>	
Road 2	
Road 2 - Control Type	<input type="text"/>
Road 2 - Roadway Type ?	<input type="text"/>
Approach 3 - Enter Road Name	<input type="text"/>
Approach 3 - Select Direction of Travel Lanes	<input type="text"/>
Approach 3 - Select Number of Through Lanes	<input type="text"/>
Approach 3 ends at a T-Intersection and Approach 4 does not exist <input type="checkbox"/>	
Approach 4 - Enter Road Name	<input type="text"/>
Approach 4 - Select Direction of Travel Lanes	<input type="text"/>
Approach 4 - Select Number of Through Lanes	<input type="text"/>
<input type="button" value="Submit"/>	

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Figure 20. Update existing unsignalized intersection





h1 Unsignalized Intersection Crash Profiles

Home | Data | Inventory | Analysis | Manage | Help

h2 Analysis Intersection

1. Select County

2. Select Roadway

3. Select Intersecting Roadway

4. Select State Percentile

Run Analysis

Intersection: SR 3 & Alma Blvd
Node: 02840
Roadway ID: 70140000
Milepoint: 1.838
Category Number: 29

Figure 21. The WAVE toolbar in Mozilla Firefox