

---

---

# *National Center for Intermodal Transportation for Economic Competitiveness*

---

---

Final Report 540

## **Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway Departures in Curve Locations**

by

Helmut Schneider, Ph.D.  
Eric Newman

*LSU*

---

---



Supported by:



**TECHNICAL REPORT STANDARD PAGE**

1. Report No. <b>FHWA/LA.14/540</b>		2. Government Accession No.	3. Recipient's Catalog No.
4. Title And Subtitle <b>Development of a Tool for Documenting, Tracking, Recording, and Analyzing Improvements to Intersection Sites and Roadway Departures in Curve Locations</b>		5. Report Date April 2015	
		6. Performing Organization Code LTRC Project Number: 12-4SA State Project Number: 30000544	
7. Author(s) Helmut Schneider, Ph.D. and Eric Newman		8. Performing Organization Report No.	
9. Performing Organization Name and Address Highway Safety Research Group Department of Information and Decision Sciences Louisiana State University 3535 Nicholson Ext. Baton Rouge, LA 70803		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address Louisiana Department of Transportation and Development P.O. Box 94245, Baton Rouge, LA 70804-9245, and National Center for Intermodal Transportation for Economic Competitiveness Mississippi State University, MS 39762		13. Type of Report and Period Covered <b>Final Report</b> <b>July 2012 – June 2014</b>	
		14. Sponsoring Agency Code	
15. Supplementary Notes <b>Conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration and funded by the Office of the Assistant Secretary for Research and Technology (OST-R) of the U.S. Department of Transportation</b>			
16. Abstract The principal objectives and scope of this project were to provide a software tracking tool to improve decision-making for highway safety. A literature search revealed that purchasing and customizing existing software was not feasible and a new solution would be developed in-house. Requirement gathering and analysis was conducted and documented. The application was programmed as a web-based solution for collecting data on low-cost safety improvements and analyzing the effectiveness of the improvements. All programming and testing was conducted in house. The application was piloted by the Louisiana Department of Transportation and Development (DOTD). Minor changes were programmed, as requested. Upon DOTD's satisfaction of the final product, the application and user manual were delivered on schedule.			
17. Key Words Highway safety improvement tracking; Strategic Highway Safety Plan		18. Distribution Statement Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.	
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages 64	22. Price



## **Project Review Committee**

Each research project will have an advisory committee appointed by the LTRC Director. The Project Review Committee is responsible for assisting the LTRC Administrator or Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings.

LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

### ***LTRC Manager***

Kirk Zeringue  
Research Manager

### ***Members***

Bert Moore  
James Chapman  
Betsey Tramonte  
John Broemmelsiek  
Marie Walsh  
Terri Monaghan  
Dean Tekell  
April Renard

### ***Directorate Implementation Sponsor***

Janice Williams, P.E.  
DOTD Chief Engineer



**Development of a Tool for Documenting, Tracking, Recording, and  
Analyzing Improvements to Intersection Sites and Roadway Departures in  
Curve Locations**

by  
Helmut Schneider, Ph.D.  
Eric Newman

BEC 2200A Nicholson Extension  
Louisiana State University  
Baton Rouge, LA 70803

LTRC Project No. 12-4SA  
State Project No. 300-00-0544

conducted for

Louisiana Department of Transportation and Development  
Louisiana Transportation Research Center  
and  
National Center for Intermodal Transportation for Economic Competitiveness  
Mississippi State University

The contents of this report reflect the views of the author/principal investigator who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the views or policies of the Louisiana Department of Transportation and Development or the Louisiana Transportation Research Center. This report does not constitute a standard, specification, or regulation.

April 2015



## **ABSTRACT**

The principal objectives and scope of the project were to provide a software tracking tool to improve decision-making for highway safety. A literature search revealed that purchasing and customizing existing software was not feasible and a new solution would be developed in house. Requirement gathering and analysis was conducted and documented. The application was programmed as a web-based solution for collecting data on low-cost safety improvements and analyzing the effectiveness of the improvements. All programming and testing was conducted in house. The application was piloted by the Louisiana Department of Transportation and Development (DOTD). Minor changes were programmed, as requested. Upon DOTD's satisfaction of the final product, the application and user manual were delivered on schedule.





## **ACKNOWLEDGMENTS**

This research project is associated with the Louisiana Transportation Research Center (LTRC)/Louisiana State University (LSU) partnership with the National Center of Intermodal Transportation for Economic Competitiveness (NCITEC). The project was completed due to the support of the Louisiana Transportation Research Center and DOTD. The authors would like to express sincere thanks to Dan Magri of DOTD and Cory Hutchinson, Xiguang Zhao, Mark Verret, Jeff Dickey, and Omer Soysal of LSU's Highway Safety Research Group for their expertise, support, and guidance.



## **IMPLEMENTATION STATEMENT**

Louisiana’s Strategic Highway Safety Plan (SHSP) implementation strategy calls for the “aggressive deployment of low cost safety treatments in a systematic manner based on both historic data and roadway characteristics.” To assess the effectiveness of the deployed improvements, the authors have developed a web-based application with data tracking capabilities and an analysis tool. This application provides the DOTD a system that tracks and analyzes the effectiveness of safety improvements. This data will improve the decision-making process for future projects conducted by DOTD.



## TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGMENTS .....	v
IMPLEMENTATION STATEMENT .....	vii
TABLE OF CONTENTS.....	ix
INTRODUCTION .....	1
OBJECTIVE .....	3
SCOPE .....	5
METHODOLOGY .....	7
Literature Review.....	7
Requirement Gathering.....	7
Business Requirements .....	7
Business requirement input and output.....	8
Software Design.....	8
System Architecture.....	9
Data .....	9
Operating Environment.....	9
Programming and/or Software Preparation .....	10
Final Report .....	10
DISCUSSION OF RESULTS .....	11
Existing Software and Resources.....	11
Requirements – Tracking Safety Improvements.....	12
User Types and Characteristics.....	12
Functional Process Requirements .....	13
Requirements – Crash Analysis .....	15
Methodology .....	15
Security .....	18
User Access.....	18
Password Reset by the User .....	18
Password Reset by the System Administrator .....	18
Project Management .....	18
Project Information .....	18
Project Site Location.....	19
Documenting Safety Improvements .....	20
Documenting Safety Improvements for Signage .....	20
Documenting Safety Improvements for Pavement Improvements.....	21

Site Improvement Documentation .....	21
Pre-Improvement Documentation.....	22
Post-Improvement Documentation .....	22
Crash Analysis .....	22
Project Sites .....	22
Timeframe of Comparison.....	23
Analysis Results.....	23
Benefits Assessment .....	25
CONCLUSIONS AND RECOMMENDATIONS .....	27
Application Maintenance .....	27
Personnel and Security.....	27
Nonessential Inventory .....	27
User Manual.....	27
Additional Features .....	28
ACRONYMS, ABBREVIATIONS, AND SYMBOLS .....	29
REFERENCES .....	31
APPENDIX A.....	33
Database Table Structure .....	33
APPENDIX B .....	41
Reference Data.....	41
APPENDIX C .....	61
Analysis Data Requirements.....	61

## INTRODUCTION

Intermodal transportation system planning, design, improvement, performance evaluation, and economic assessment include safety improvements, because they lower the overall cost of transportation. State Departments of Transportation (DOTs) are charged with the development and implementation of Strategic Highway Safety Plans (SHSP) as required by the Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU).

SHSP have broader impacts on passenger and freight transportation than the impact on the overall cost of the transportation system. Many states' SHSPs, as Louisiana's, include an infrastructure focus area that addresses the locations of the majority of serious injury and fatal crashes, specifically intersections and roadway departures in the vicinity of curves. Specifically, the Federal Highway Administration (FHWA) Highway Safety Improvement Program (HSIP) states, "Intersection safety is a national, state, and local priority." Intersections represent a disproportionate share of the safety problem. As a result, organizations such as the FHWA, NHTSA, the Institute of Transportation Engineers (ITE), the American Automobile Association (AAA), and other private and public organizations are devoting resources to help reduce the problem.

Louisiana has been recognized as a "focus" state for intersections by the FHWA. Factors included an intersection crash rate that was higher than the national average. Subsequently, Louisiana's SHSP implementation strategy calls for the "aggressive deployment of low-cost safety treatments in a systematic manner based on both historic data and roadway characteristics." Many states have the same problems, with respect to intersection and road departure crashes, and are at similar stages of deployment of their SHSPs. Thus, evaluating roadway safety improvements is a common challenge among all state DOTs.

A system with data tracking and analysis capabilities is required to assess the effectiveness of deployed safety improvements. Such a system will allow the DOTs to make better decisions in the future based on crash frequencies at the treated locations. This data will improve the decision-making process for future projects conducted by DOTs. The specific objectives and scope of this project was to provide a software tracking tool to improve decision-making for highway safety. The process of adapting existing software was not feasible. A new web-based solution was developed to meet the specific requirements and needs of DOTs.





## **OBJECTIVE**

The objective of this research project was to provide an easy to use tool to identify and track the effectiveness of treatments and countermeasures for roadway departures related to curves and intersection improvements for both local and state roads. Louisiana's data will be used as a test to populate the intersection tool with existing data, test the modules with limited data that becomes available, and train personnel in the use and maintenance of the tool. However, the software built will be shown to be applicable to other states' data.



## **SCOPE**

The literature review for this project was based on web searches to determine software solutions rather than a review of scientific literature. This review was not a standard literature search, since the main objective was to determine if software solutions were available for free or for purchase. The lack of appropriate software required the development of a new application. The application tracks all safety improvements made by the DOTD, but is applicable to any state DOT. It is not meant to serve as an inventory of all signage and pavement applications at a project site. It is only to store signage and pavement applications that were removed, replaced, or newly installed during the road improvement project. The analysis portion of the new application will provide before-and-after crash data for road improvement project sites.



## **METHODOLOGY**

This project was divided into five tasks: Literature Review, Requirement Gathering and Analysis, Programming and/or Software Preparation, and Final Report.

### **Literature Review**

An extensive review was conducted to include all available software that could be used for tracking and analyzing highway safety projects. An evaluation was also made of the option of developing software in house. This evaluation also included an initial data and system requirements analysis. Upon review, it was determined that purchasing an existing configurable software package, which could be tailored to this project's needs, was not a feasible option. Justification for developing a new software product, en lieu of purchasing an existing product, is discussed within the *Discussion of Results* section of this report.

### **Requirement Gathering**

A comprehensive understanding of the end-user needs and requirements was completed by meeting with all of the relevant stakeholders. Goals of the system were determined, based on the collected requirements, and form the base of the developed application. The functional requirements were compiled, documented, and illustrated using appropriate flowcharts and diagrams.

### **Business Requirements**

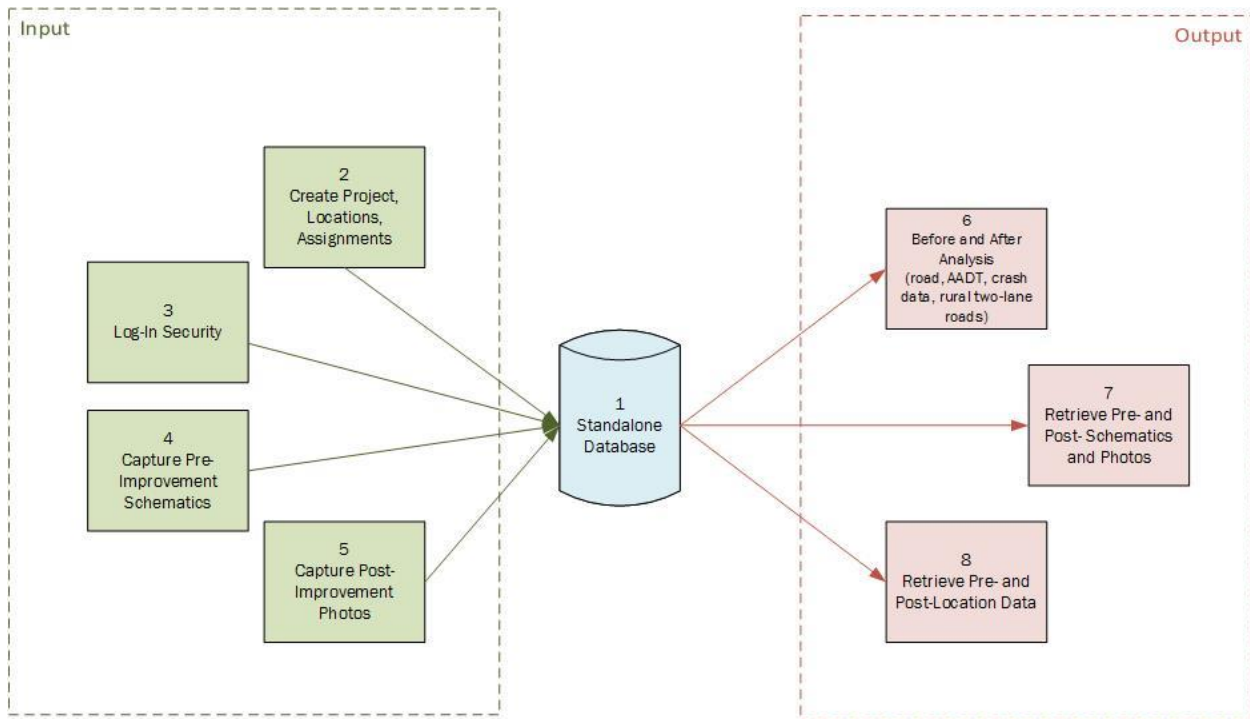
The following are the high level business requirements gathered for the application.

1. Create a standalone database containing all required data (user accounts, road improvements, lat/long coordinates of road improvements, crash data, etc.).
2. Create a project, multiple project locations, and project assignments.
3. Security in the form of protecting data, preventing unauthorized access, and requiring all users to log in.

*NOTE: Each user is assigned one user type. Multiple user types are not assigned to users.*

4. Provide the ability to upload the pre-improvement schematic layout of the work to be performed by the contractor and post-improvement photos of said work.
5. Integrate road, Average Annual Daily Travel (AADT) and crash data to perform “before and after” crash analysis.

6. Incorporate the Highway Safety Manual (HSM), Crash Modification Factors (CMFs), and Safety Performance Functions (SPFs) for rural two-lane roads.
7. Retrieve pre- and post-improvement schematics and photos for each project location.
8. Retrieve pre- and post-improvement data for each project location. Data types include:
  - a. Safety improvements present and added (list provided by DOTD)
  - b. Current size of signage
  - c. Added size of signage
  - d. Number of signage added
  - e. Current number of signage
  - f. Date added



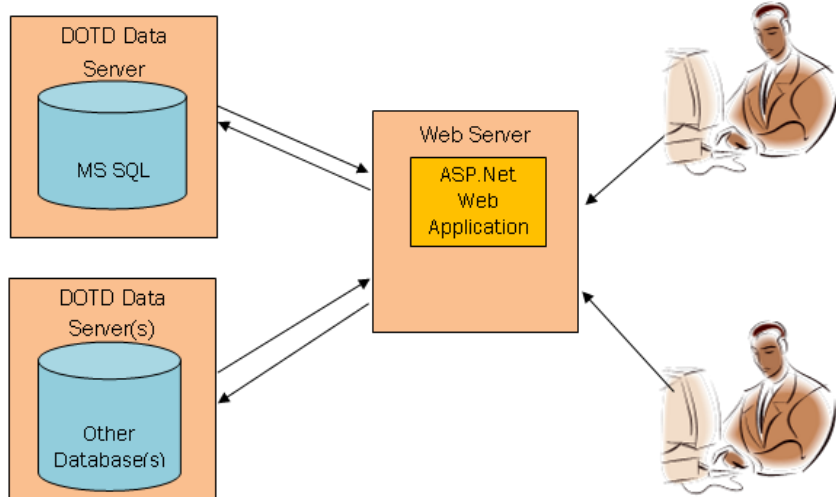
**Figure 1**  
**Business requirement input and output**

### Software Design

The database will be implemented using Microsoft SQL Server 2012 software. The front end of the application will be developed using Microsoft Visual Studios in C#, HTML5, JavaScript, and Ajax. The application will be deployed and hosted on a HSRG IIS web server.

## System Architecture

The data system consists two main parts: a central database management system for the uploading, storage, and management of data and a client application to allow users access and interact with the data.



**Figure 2**  
System architecture

## Data

The table structure of the database was designed to include all data identified in the various requirements analysis meetings. The data fell in two categories: *Captured* and *Referenced*. Captured data are entered by the user. This is not pre-existing data within the database. Reference data are not completed by the user. This data already exists within the database and the user is presented with the appropriate data option based on user selection. See Appendix A for the database table structure. [1]

## Operating Environment

The application is functionally efficient and easy to maintain (as required). It operates with the following web browsers: Microsoft Internet Explorer, Mozilla Firefox, and Google Chrome. The application is accessible from smart devices.



### **Programming and/or Software Preparation**

Programming was based on the requirements analysis and is geared toward the data available from DOTD. Existing road data will vary from state to state. An installable software package, applicable to other states' data, was also produced. The code for the application is included, so that other state DOTs can configure the application based on the data available to them. Parties interested in obtaining the application should contact the LTRC.

### **Final Report**

This final report includes information on all data compiled and software produced. In addition, User and Installation manuals were also written. The User Manual was given to the user (DOTD) and provides all operating procedures for the application. The Installation Manual is applicable to all other DOTs that will install and configure the software application. Both manuals can be found at the end of this report. The requirement of a benefits assessment, for future marketing purposes, is located in the *Conclusions* section of this report.

## DISCUSSION OF RESULTS

### Existing Software and Resources

The literature review was not a standard literature search, since the main objective was to determine the availability of software solutions. The review was based on web searches to determine software solutions rather than a review of scientific literature.

It was determined, based on the review's findings, that readily available software packages were not clearly capable of meeting all of the project objectives. The packages identified were not designed to provide the detailed tracking of road improvement projects over years as required for this project [1]. Much of the software would have to be modified to meet the specific requirements [2].

While there are some very useful tools available for highway safety, there are currently no free software tools readily available that are clearly capable of meeting all of the objectives outlined in the proposal [3]. There are few software available that deal with the specific issues addressed in this proposal. The most often cited and promoted on the FHWA website is SafetyAnalyst [4]. This software was developed as a cooperative effort by FHWA and participating state and local agencies. AASHTO manages distribution, technical support, maintenance, and enhancement of the software as a licensed AASHTOWare product.

SafetyAnalyst is used by 14 state DOTs to various degrees. The SafetyAnalyst software tools require information regarding roadway characteristics, traffic volume, and crash data for the road network. There are some limitations of the software with respect to crash data and traffic flow of freeway interchanges that are significantly different from those of basic freeway segments as address SafetyAnalyst's limitations in this regard by instead proposing a different solution using GIS and spatial manipulation techniques to identify/separate the interchange data from the basic freeway data [5]. They also found that using state-specific SPFs rather than the locally-calibrated nation-level SPFs from SafetyAnalyst's default allowed for a better-fitted model. Overall, while SafetyAnalyst provides a set of software tools which can be used by state and local highway agencies for highway safety management, the tool is not designed to provide the detailed tracking of projects over years as required by this proposal [6]. Much of the software would have to be modified to meet the specific requirements.

There are other commercial software products that focus on analysis crash locations at intersections and road segments [7]. But none focus on tracking road improvements specifically.

## Requirements – Tracking Safety Improvements

The primary function of the system is a web-based application that allows users to cooperatively collect information and location data for road improvement projects. Users have the ability to analyze the effectiveness of treatments and countermeasures by comparing location crash rates before and after the improvements. The user interface is accessible on standard computer web browsers, tablets and portable computer devices.

### User Types and Characteristics

During the requirements analysis, it was determined that the application should allow for six user groups. The roles and responsibilities for each user group are defined below.

**System Administrator.** The system administrator performs project administrative and user management tasks. The system administrator's objectives for the tool are to (1) create, edit, delete and deactivate the project manager, data entry, project engineer, viewer, and analyst user accounts and (2) perform the same functions as a project manager. This user is not intended to have an IT background. During the requirements gathering, it was determined that a project manager (described below) would have the duties described in the first objective (above) in addition to those of the project manager. However, the application is built so one user can only be assigned one *User Type* role. Therefore, since the objectives of system administrator could not be limited to the duties described in the first objective, this user was also granted the same user rights as the project manager.

**Project Manager.** The project manager creates projects/locations and assigns/reviews tasks. The project manager's objectives for the tool are to (1) create, modify and/or delete projects, (2) create, modify and/or delete project sites, (3) assign data entry users and project engineers to projects and sites, (4) create, modify and/or delete improvements to sites, and (5) export completed road improvement project information to generate "before and after" reports.

**Data Entry.** The data entry user creates project sites and site details. The data entry's objectives for the tool are to (1) create, modify and/or delete project sites and (2) create, modify and/or delete improvements to sites.

**Project Engineer.** The project engineer adds data to the system, uploads pictures and accepts/rejects contractor tasks. The project engineers' objectives for the tool are to (1) input and/or upload site improvement pictures, (2) approve site improvements, and (3) export completed road improvement project information.

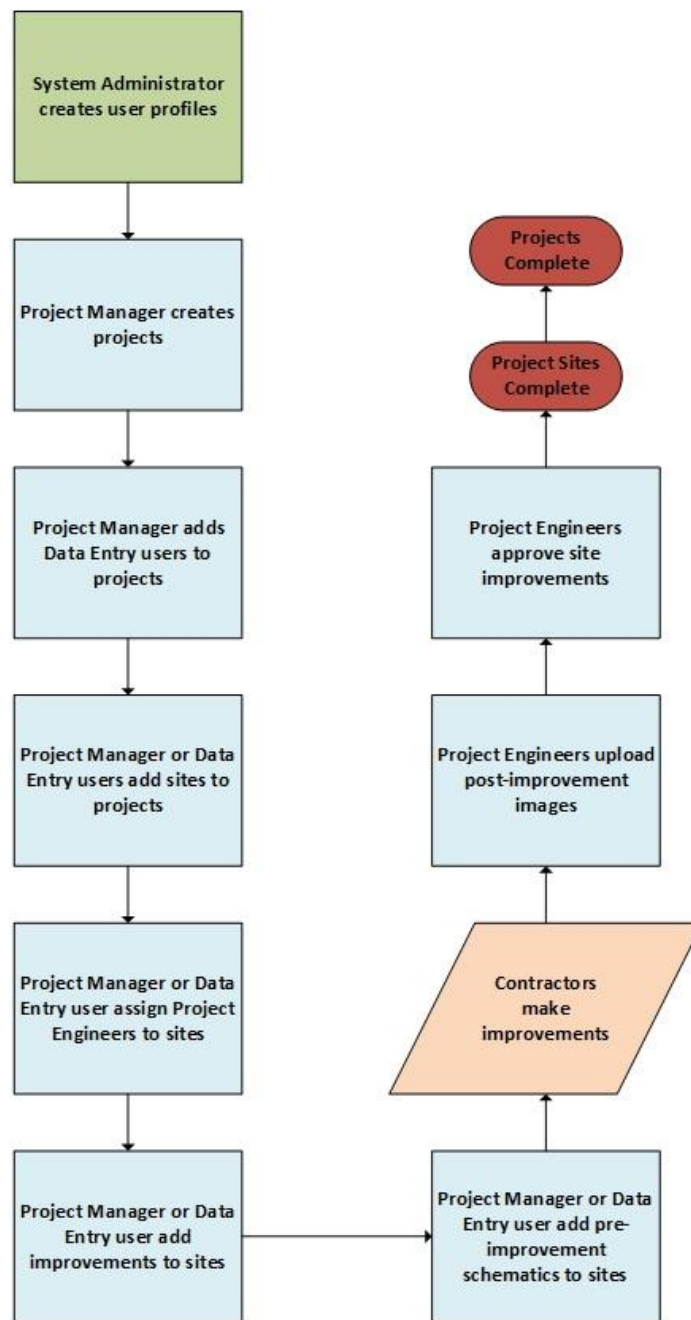
**Analyst.** The analyst searches road improvement and crash data, and performs analysis and calculations using this data and other DOTD databases. The analyst's objectives for the tool are to (1) easily search for safety improvement locations, (2) retrieve "before and after" crash analysis results and (3) export analysis results.

**Viewer.** The viewer views any project information during the project and after project completion. The viewer's objectives for the tool are to (1) view projects, (2) view project sites, (3) view project site improvements, and (4) view all pre-improvement and post-improvement images.

### **Functional Process Requirements**

The following is an overview of a project as it is created and resides in the developed system. It is not intended to explain how the user will interact with the system interface to accomplish specific tasks. Procedures for the completion of tasks is contained in the user manual. The contents of that document are included at the end of this report.

1. Create user profiles – The system administrator creates profiles for users.
2. Create project – The first step in the lifecycle of a project begins when a project manager creates a new project.
3. Assign data entry users to the project – The project manager selects data entry users to add/edit project and/or site information.
4. Add sites to the project – The project manager or assigned data entry user adds sites to the project.
5. Assign project engineer to each site – The project manager or data entry user selects a project engineer for each site.
6. Add improvements to sites – The project manager or data entry user will add improvements to each site.
7. Add pre-improvement schematic – The project manager or data entry user will upload a schematic of the site with the improvements to be made.
8. Work performed – Improvements at the project site are performed by a contractor. Add post-improvement images. The project engineer will upload photos of all improvements made at the site.
9. Approval or Rejection of site improvements – The project engineer accepts or rejects the project site improvements and enters the total number of post-improvement signs.
10. Project Site Complete – Construction is complete. All photos and improvements have been approved. All project site data is locked and cannot be edited.
11. Project Complete – A project is complete when all project sites, for the project, have been approved.



**Figure 3**  
End-to-end process

## Requirements – Crash Analysis

The analysis performed with the application is intended to help analyze the effectiveness of treatments and countermeasures by comparing location crash rates before and after the improvements. This analysis is restricted to only the locations where safety improvements were implemented and tracked with this application. It is part of the web-based application and is not a separate application unto itself. Analysis can be performed by all user types.

### Methodology

The application uses an Empirical Bayes (EB) method to calculate expected crashes for a defined period before and after site improvement. The EB method is designed to overcome two issues with crash prediction models: sparse datasets and regression to the mean. Over a short period of time, many sites have no or few crashes. It is unlikely that the short time frame captured the true frequency of crashes resulting in low precision for the crash prediction model. Regression to the mean bias can occur when a site experiences an abnormally high or low number of crashes in one year followed by a return to a more typical crash frequency the following year. The EB method uses both the observed number of crashes at a site and the predicted number of crashes at similar sites based on the Safety Performance Function. The main equation is given by [10-3] and [11-1] in the Highway Safety Manual.

$$N_{\text{predicted}} = N_{\text{spf}} C \prod CMF_i$$

The expected crash frequency given by [A-4, 5] in HSM is

$$N_{\text{expected}} = w N_{\text{predicted period}} + (1 - w) N_{\text{observed period}}$$

$$w = \frac{1}{1 + k \sum_{\text{study years}} N_{\text{predicted}}}$$

$$N_{\text{predicted period}} = \sum_{\text{study years}} N_{\text{predicted}}$$

$$N_{\text{observed period}} = \sum_{\text{study years}} N_{\text{observed}}$$

**Data Requirements.** Required data inputs include crash data from LADOTD for the years of study and site characteristics data for the years of study. Default values are used where site characteristics data is unavailable as shown in Appendix C. Output data are the predicted and expected average crash frequency for the sites under consideration.

**Expected Crashes.** The procedure to calculate expected crashes is as follows:

1. Define the period  $Y$  of the study;

2. Get the site(s) to be studied;
3. Get the over-dispersion parameters  $k$  for each site;
4. Get the calibration factor  $C$  for each site;
5. Obtain the number of observed crashes  $N_{obs}$  for each site for each year.
6. Calculate the predicted number of crashes  $N_{pred}$  for each site for each year:
  - a. Calculate  $N_{spf}$  for each site for each year
  - b. Calculate  $N_{Pred}$  for each site for each year

$$N_{Predicted} = N_{spf} C \prod_i CMF_i$$

7. Calculate the EB-constant  $w$  for each site for the period  $y \in Y$  of the study using (Appendix\_HSM\_Part\_C, pa: A-22, Eq. A-5)

$$w = \frac{1}{1 + k \sum_Y N_{Predicted}}$$

8. Calculate the expected number of crashes  $N_{expc}$  for the site per period using the EB equation using (Appendix\_HSM\_Part\_C, pa: A-22, Eq. A-4):

$$N_{Expected} = w N_{Predicted} + (1 - w) N_{Observed}$$

9. Calculate average expected number of crashes for a site over the period of the study using

$$N_{Avg} = \frac{\sum_Y N_{Expected}}{|Y|}$$

Sample results are displayed in Tables 1 and 2.

Table 1 Statistics for before and after periods of selected sites (K: Average over-dispersion, W: EB weight)

Site PK	SITE ID	SITE NAME	Site Type	LOGMILE FROM	LOGMILE TO	Period	Total Observed	Total Predicted	Total Expected	Average Observed	Average Predicted	Average Expected	K	W
6	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	1	4	5.4	4.8	2	2.7	2.4	0.136	0.575
6	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	2	3	2.7	2.8	3	2.7	2.8	0.137	0.728
7	012-09-1-010	5725BasileEuniceHwy	Non-Intersection	0.25	0.78	1	2	3.3	2.7	1	1.7	1.3	0.272	0.527
7	012-09-1-010	5725BasileEuniceHwy	Non-Intersection	0.25	0.78	2	0	1.6	1.2	0	1.6	1.2	0.262	0.699
8	012-09-1-010	1305BasileEuniceHwy	Non-Intersection	0.24	0.42	1	0	3.3	1.7	0	1.7	0.9	0.272	0.527
8	012-09-1-010	1305BasileEuniceHwy	Non-Intersection	0.24	0.42	2	0	1.6	1.2	0	1.6	1.2	0.262	0.699
9	012-09-1-010	5787basileuniceHwy	Non-Intersection	0	0.52	1	0	3.3	1.7	0	1.7	0.9	0.272	0.527
9	012-09-1-010	5787basileuniceHwy	Non-Intersection	0	0.52	2	0	1.6	1.2	0	1.6	1.2	0.262	0.699

Table 2 Statistics of selected sites in each year of before and after periods (K: Average over-dispersion, C: Calibration factor, CMF: Total crash modification factor)

Site PK	SITE ID	SITE NAME	Site Type	LOGMILE FROM	LOGMILE TO	Period	Year	Observed	SPF	Predicted	AAOT	K	C	CMF
6	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	1	2010	2	2.4	2.7	5100	0.135	0.97	1.172
6	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	1	2011	2	2.4	2.7	5200	0.137	0.97	1.172
6	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	2	2012	3	2.4	2.7	5200	0.137	0.97	1.172
7	012-09-1-010	5725BasileEuniceHwy	Non-Intersection	0.25	0.78	1	2010	0	1.4	1.7	6400	0.281	0.97	1.191
7	012-09-1-010	5725BasileEuniceHwy	Non-Intersection	0.25	0.78	1	2011	2	1.4	1.6	5900	0.262	0.97	1.191
7	012-09-1-010	5725BasileEuniceHwy	Non-Intersection	0.25	0.78	2	2012	0	1.4	1.6	5900	0.262	0.97	1.191
8	012-09-1-010	1305BasileEuniceHwy	Non-Intersection	0.24	0.42	1	2010	0	1.4	1.7	6400	0.281	0.97	1.191
8	012-09-1-010	1305BasileEuniceHwy	Non-Intersection	0.24	0.42	1	2011	0	1.4	1.6	5900	0.262	0.97	1.191
8	012-09-1-010	1305BasileEuniceHwy	Non-Intersection	0.24	0.42	2	2012	0	1.4	1.6	5900	0.262	0.97	1.191
9	012-09-1-010	5787basileuniceHwy	Non-Intersection	0	0.52	1	2010	0	1.4	1.7	6400	0.281	0.97	1.191
9	012-09-1-010	5787basileuniceHwy	Non-Intersection	0	0.52	1	2011	0	1.4	1.6	5900	0.262	0.97	1.191
9	012-09-1-010	5787basileuniceHwy	Non-Intersection	0	0.52	2	2012	0	1.4	1.6	5900	0.262	0.97	1.191



## Security

Access to the application is password protected. The designated system administrator must create all user accounts. This ensures that only the appropriate individuals have access to the application.

### User Access

A User ID and Password are required to access to application. Users must obtain a user account from the system administrator. A user ID and password, which can later be changed by the user, are created during the account setup.

### Password Reset by the User

A password is created by the system administrator when setting up all user accounts. This password is provided to the user for their initial access. When logged in, the user can change their password at any time. The application does not force a user, even upon initial log in, to change a password. It is the user's responsibility to ensure their password remains confidential.

### Password Reset by the System Administrator

If a user cannot remember their log-in password then they must contact the system administrator. The system administrator can reset the password and provide the new password to the user. This ensures that the application remains accessible to approved users.

## Project Management

The first step in the lifecycle of a project begins when a new project is created. Each project may (and often does) contain multiple project sites. Information regarding the overall scope of the project is entered when a project is created.

### Project Information

The information captured when creating a project within the application is standard for all projects. Fields that contain finite options are presented to the user in a dropdown menu format. If the data in a field is not finite then the user manually enters the data.

**State Project Number.** The standard format of every project number is H.#####. It may be necessary to enter projects into the application out of sequential order. Therefore, the application does not auto-generate the number. The user creating the project must manually enter the project number. Project numbers will later be associated with projects sites. Each project number can be associated with many project sites. Project sites can be associated with many project numbers (in the case of multiple site improvements for multiple projects).

**Region Type.** Each project is considered to be district-wide or parish-wide. Therefore, the user selects either *District* or *Parish* from a *Region Type* dropdown menu. Each project can be associated by one region type. A region type can be associated with many projects.

**Region.** The region is presented in dropdown menu format. Selections cannot be made until the Region Type is chosen, because they are dependent on the previous selection. If region type is selected as *District* then the user will only be presented with the names of the district headquarters. If region type is selected as *Parish* then the user will only be presented a list of parish names. This prevents a region type and region data conflict.

**Project Begin and End Dates.** When the user selects the *Project Begin Date* or *Project End Date* field or selects the dropdown arrows within the fields (depending on the internet browser) then a calendar popup displays. The date displays in MM/DD/YYYY format when a date is selected from the calendar. The user may also manually enter the date in this format (if preferred). The application requires that the end date cannot be before the begin date.

### **Project Site Location**

The information captured when creating a project site within the application is standard for all project sites. Fields that contain finite options are presented to the user in a dropdown menu format. If the data in a field is not finite then the user manually enters the data.

**State Project Number Assignment.** Each project site is assigned to a current project (number). This selection is presented in dropdown menu format due to the finite list of options. This prevents the user from entering a non-existent project number.

**Parish Assignment.** The parish location is assigned to each site. This was implemented because district-wide projects cover many parishes. This specifies the location within districts of each project site.

**Site Type.** Each project site is considered to be an intersection or non-intersection. Therefore, the user selects either *Intersection* or *Non-Intersection* from a *Site Type* dropdown menu. This must be defined for each site because this information will be utilized when performing crash analysis.

**Intersection and LRS ID.** This information must be manually entered by the user. If *Intersection* is selected as the *Site Type* then an intersection ID should be entered by the user. If *Non-Intersection* is selected as the *Site Type* then an LRS ID should be entered by the user. This entry is independent of the site type, so it is the user's responsibility to enter the appropriate ID.

**Logmile From and To.** The user must manually enter the begin and end point of the project site. These logmile points are on file at the DOTD. An LRS ID can extend for many miles. The logmiles mark a smaller segment of an LRS ID. This segment is the location of the project site.

**Construction Begin and End Dates.** When the user selects the *Construction Begin Date* or *Construction End Date* field or selects the dropdown arrows within the fields (depending

on the internet browser) then a calendar popup displays. The date displays in MM/DD/YYYY format when a date is selected from the calendar. The user may also manually enter the date in this format (if preferred). The application requires that the end date not precede the begin date. This information will be used in pre- and post-improvement crash analysis, so crashes that occur during the construction timeframe will not be included in the analysis.

## **Documenting Safety Improvements**

A standardized method has been implemented for documenting pre- and post-improvement signage and pavement markings. Fields that contain finite options are presented to the user in a dropdown menu format. If the data in a field is not finite then the user manually enters the data. The data collected are only of those signs or pavement markings related to the implemented low cost safety improvements. It is not intended to serve as an inventory of any and all signs and pavement markings at the project site.

### **Documenting Safety Improvements for Signage**

Information (detailed below) for all existing signs to be replaced is captured. Each sign/size combination to be removed will require an entry. New signage is entered into the application in the same manner. Each newly installed sign/size combination will also require its own entry. All signage information was gathered from the FHWA's Manual on Uniform Traffic Control Devices (MUTCD).

**Sign Selection.** The user chooses the appropriate sign via a dropdown menu. Image icons display beside the sign name and sign code. Icons were created for those signs that are (anticipated to be) used the most. An *Image not Available* icon was created for all other signs. The creation of sign images was limited due to project time constraints and the large number of signs contained with the MUTCD.

**Filtering the Dropdown Menu.** The user may filter the contents of the signage dropdown by typing a sign name or code. This reduces the size of the list that the user will navigate. It is not required that the list is filtered and the user can return to the comprehensive list (if the list was previously filtered).

**Sign Sizes.** The user chooses the appropriate sign size via a dropdown menu. The size options available are dependent upon the type of sign selected. Therefore, the sign size options have been limited to only those applicable to the sign selected. Due to the various sign shapes, the sizes are presented in overall height and overall width (in inches).

**Pre- and Post-Improvement Sign Quantity.** The user manually enters the number of signs (of the selected sign name and size combination) that will be replaced. The sign quantity after improvements will be zero if the sign was replaced with a larger sign. The larger signs

existing quantity will be zero, since the sign/size combination will only exist after the improvement.

**Reason for the Signage Changes.** The user chooses the reason for the site improvement via a dropdown menu. The user is restricted to a list, in lieu of manual entry, of the reasons that account for most improvements. The options and an explanation of each option are:

Condition – the sign or pavement marking is of unacceptable condition.

New Install/Marking – the sign or pavement marking does not currently exist at the project site.

Size Increase (Signs) – the sign is to be replaced with a larger version of the same sign (regardless of condition).

Other – improvements made for reasons that are not covered by the previous three options.

### **Documenting Safety Improvements for Pavement Improvements**

Information (detailed below) for all pavement markings to be implemented or replaced are captured. All pavement improvement information was collected during the functional requirement gathering process.

**Pavement Markings.** The user chooses the appropriate pavement improvement via a dropdown menu. The user is restricted to a list, in lieu of manual entry, of possible pavement marking improvements.

**Reason for the Pavement Marking Changes.** The user chooses the reason for the site improvement via a dropdown menu. This is the same list that is presented for changes in signage. The user is restricted to the list, in lieu of manual entry, of the reasons that account for most improvements.

**Construction Type.** The user chooses the appropriate type of construction performed via a dropdown menu. The following explains the three options available to the user:

NEW – new construction; the pavement marking does not currently exist at the project site.

REMOVE – the pavement marking currently exists at the project site, will be removed, and will not exist when construction is complete.

REPLACE – the pavement marking currently exists at the project site and will be reapplied.

### **Site Improvement Documentation**

There are two instances when documents must be added to the site. A pre-improvement PDF aerial schematic of the planned improvements and post-improvement JPEG images of the completed improvements.

### **Pre-Improvement Documentation**

A PDF document, typically an aerial schematic, of the planned improvements is added when signage and pavement markings are being added to a project site. The document type accepted is limited to PDF and can consist of a file with multiple pages. This format is widely used and will be more easily accessible by various computers. It will not require the user to download a specialized, and not so common, document viewer. Only one document can be saved to the Site Improvements page. An uploaded schematic will overwrite the previous one. The application does not require the addition of the document. If the document upload were to be required then any added improvements could not be saved until the upload of the PDF. This allows flexibility to the user, so site improvements can be modified at various times.

### **Post-Improvement Documentation**

The project engineer user type is able to upload multiple JPEG images of the completed improvements. The application does not require the addition of the document. The location of images is on the same page as the sign and pavement improvements and pre-improvement PDF (Site Improvements page). It can only be added at a later date, so requiring its addition would prevent saving project site improvements during the setup process.

## **Crash Analysis**

A standardized method has been implemented for analyzing location specific crash information. The application restricts the user analysis to only the locations where safety improvements were implemented and tracked with this application. Fields that contain finite options are presented to the user in a dropdown menu format or calendar (for dates). Crash analysis is not limited to only the *Analyst* user type. All users have access to perform crash analysis.

### **Project Sites**

Upon sign-in, the user is presented a list of all sites where safety improvements were implemented and tracked with this application. The information is in a spreadsheet format. Each row represents one project site. The following information is provided for each site:

State Project Number

Site Name

Parish Name

Site Type

Intersection ID / LRS ID

Logmile From

Logmile To

Construction Begin Date

Construction End Date  
Approval Status

**Filter.** The user can reduce the amount of viewable project sites by applying the parish filter. This allows the user to view only projects sites within a specific parish as well as reduce the number of viewable sites to more easily identify specific sites.

**Site Selection.** The application does not limit the analysis to one project site at a time. The user can select as many sites as desired, regardless of project number, parish, or site type (intersection vs. non-intersection).

### **Timeframe of Comparison**

The before and after crash analysis includes the time period before the installation of treatments and countermeasures and the period after the installation is complete. Crashes that may occur at a project site during the construction/installation phase will not be reflected in the analysis output. To include crashes that occur during this period will not produce an accurate pre- and post-improvement crash analysis.

**Before and After Period.** The user has the option of performing analysis for one, two or three year time periods. The number selected represents the number of years to be analyzed before safety improvements were made at the location and the number of years after the safety improvements were completed.

The HSM states that, typically, a minimum of three years of crash data is used for analysis. Multiple years of data are preferable to avoid the Regression to the Mean (RTM) phenomenon. RTM describes a situation in which crash rates are artificially high during the before period and would have been reduced even without an improvement to the site. Therefore, the default timeframe for this application is three years. Selecting the default will look at data from the three years before safety improvement installation began and data from the three years after the improvements were installed.

### **Analysis Results**

The results page is separated into four sections: sites selected, results from the selected timeframe, results for each year within the selected timeframe and an information log.

**Sites Selected.** The project sites selected are presented in the same format as described in *Project Sites* on the previous page. This is a reminder to the user of which project sites were selected for analysis.

**Results from the Selected Timeframe.** Analysis for the entire selected timeframe is reflected in the same spreadsheet format. There are two rows of information for each site. The

first is the “before” analysis and the second is the “after” analysis. The following information and results are provided for each site:

State Project Number

Intersection ID / LRS ID

Site Name

Site Type

Logmile From

Logmile To

Period

Begin Date

End Date

Total Observed

Total Predicted

Total Expected

Average Observed

Average Expected

K

W

**Results for Each Year within the Selected Timeframe.** “Before and After” analysis for each year within the selected timeframe is reflected in spreadsheet format. There are two rows of information for each year and site. For example, if “3” was the timeframe selected then there are “before” and “after” analyses for years one, two, and three (six total rows). The following information and results are provided for each site:

State Project Number

Intersection ID / LRS ID

Site Name

Site Type

Logmile From

Logmile To

Period

Year Begin/End Date

Observed

SPF

Predicted

AADT (minor, major)

K

C

CMF

**Information Log.** This section details missing information, in the analysis calculations, that were replaced with default values. Any missing data *could* alter the final results, so this information is provided to the user.

### **Benefits Assessment**

This project developed a single web-based data management application that provides both detailed tracking of low-cost road safety improvement projects over years *and* the ability to analyze their effectiveness (in regard to crash reductions).

The web-based feature makes it accessible on standard computer web browsers, tablets and portable computer devices. The application's ability to both collect project data and perform analysis means that user access is not limited by location or function. Another benefit of being we-based, means that software will not have to be installed on each computer that will access the data.

Data quality and reliability is aided by the standardization of how project data is entered into the application and by the validation rules that prohibit invalid entries. Project data will grow over time as new low cost safety improvements are implemented. This will allow, as crash reduction effectiveness is evaluated, for more accurate and cost effective decisions over time.





## **CONCLUSIONS AND RECOMMENDATIONS**

The result of this project is the web-based LaSET application. The site address is <http://laset.lsu.edu>. The discussion of the results explains the reasoning behind the site's functionality. An installable software package applicable to other states' data was also produced. Installation instructions for that package are at the end of this report.

### **Application Maintenance**

It is recommended that DOTD keep up to date with changes in signage and pavement applications. Changes or additions to names, codes, sizes and icons will require updates to the database. Additionally, the DOT should keep up to date with changes to the HSM that may affect the application's crash analysis computations. All changes will require the combined efforts of LSU HSRG and DOTD, for LaSET, since the HSRG hosts the site on its server.

### **Personnel and Security**

It is recommended that one employee be designated as the application's primary system administrator. A second employee should also have administrator rights in the event that the primary administrator is absent.

This application is accessible to the public, in theory, since it resides on the World Wide Web. All efforts and security updates should be applied to ensure that only those with proper access rights can navigate beyond the Login page.

### **Nonessential Inventory**

This application should serve as a repository for low cost safety improvements. It is not intended to serve as an inventory of all signage and pavement markings that will exist, as is, before and after improvements are applied to a project site. Only signage and pavement markings that are replaced or removed should be captured with this application.

### **User Manual**

The developed manual is specific to the needs of DOTD. A copy of the manual is included at the end of this report. It should be modified to suit the needs of individual DOTs. All references to LaSET, in verbiage and screen captures, should be removed or replaced.

### **Additional Features**

Any DOT utilizing the application should consider adding a feature that will give the administrator the ability to add sign names, codes, sizes, and icons within the application. This currently must be done outside of the application, on the database side, by someone with IT skillsets that are not held by the typical user.

Consideration should be given to expanding the type of analysis that can be performed with the application. This may include crash comparisons of similar road types that received safety improvements or how crash rates are affected by each type of improvement. Such analyses are outside the scope of this project, but should be addressed in the future.

## ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AAA	American Automobile Association
AADT	Average Annual Daily Travel
AASHTO	American Association of State Highway and Transportation Officials
CMF	Crash Modification Factor
DOT	Department of Transportation
DOTD	Department of Transportation and Development
FHWA	Federal Highway Administration
GIS	Geographic Information System
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
ITE	Institute of Transportation Engineers
JPEG	Joint Photographic Experts Group
LaSET	Louisiana Safety Evaluation Tool
LRSID	Linear Reference System Identification
LSU	Louisiana State University
LTRC	Louisiana Transportation Research Center
MUTCD	Manual on Uniform Traffic Control Devices
NCITEC	National Center of Intermodal Transportation for Economic Competitiveness
NHTSA	National Highway Traffic Safety Administration
PDF	Portable Document Format
RTM	Regression to the Mean
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users
SHSP	Louisiana’s Strategic Highway Safety Plan
SPF	Safety Performance Function
VPN	Virtual Private Network



## REFERENCES

1. “Standard Highway Signs.” FHWA, U.S. Department of Transportation, 2004.
2. Pollack, R.; Cobb, L.; and Tan, C. *FHWA Data and Safety Analysis Tools*. Publication No. FHWA-SA-09-002. FHWA, U.S. Department of Transportation, 2009. Accessed January, 2013. [http://safety.fhwa.dot.gov/tools/data\\_tools/fhwasa09002/](http://safety.fhwa.dot.gov/tools/data_tools/fhwasa09002/)
3. “Crash Modification Factors Clearinghouse.” FHWA, U.S. Department of Transportation. Accessed January, 2014. <http://www.cmfclearinghouse.org/>
4. “Interactive Highway Safety Design Model (IHSDM),” IHSDMDownload, Accessed January, 2013. <http://www.ihsdm.org/wiki/Welcome>
5. “Highway Safety Manual Case Study 2: Implementing a New Roadway Safety Management Process with *SafetyAnalyst* in Ohio.” FHWA, U.S. Department of Transportation. Accessed January, 2013. <http://www.safetyanalyst.org/whitepapers/module1.pdf>
6. Lu, J.; Gan, A.; Haleem, K.; Alluri, P; and Liu, K. *Comparing Locally Calibrated and SafetyAnalyst-Default Safety Performance Functions for Florida’s Urban Freeways*. Report No. 12-4730 Proceedings from the 2012 TRB 91st Annual Meeting. Washington, D.C., 2012.
7. “Software Tools for Safety Management of Specific Highway Sites.” *SafetyAnalyst*. White Paper for Module 1—Network Screening. August 2010.
8. “GIS-Based Crash Referencing and Analysis System.” Publication No. FHWA-RD-99-081, Feb. 1999.



## APPENDIX A

### Database Table Structure

<b>PROJECT</b>	
PROJECT_PK	int
STATE_PROJECT_NUM	nvarchar(12)
COST	money
REGION_CODE_TYPE	nvarchar(12)
REGION_CODE_ID	int
PROJECT_BEGIN_DATE	date
PROJECT_END_DATE	date
CONTRACTOR	nvarchar(250)
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>SITE</b>	
PROJECT_PK	int
SITE_PK	int
PARISH_NAME	nvarchar(255)
SITE_TYPE	nvarchar(16)
SITE_ID	nvarchar(50)
SITE_NAME	nvarchar(255)
LOGMILE_FROM	float
LOGMILE_TO	float
CONTROL_SECTION	nvarchar(6)
CONSTRUCTION_BEGIN_DATE	date
CONSTRUCTION_END_DATE	date
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>SITE IMPROVEMENTS</b>	
PROJECT_PK	int
SITE_PK	int
IMP_PK	int
IMP_CODE_ID	nvarchar(18)
SIGN_PK	int
SIGN_EXIST_SIZE	nvarchar(10)
SIGN_QTY_EXISTING	int
SIGN_IMP_SIZE	nvarchar(10)
SIGN_QTY_IMP	Int



SIGN_CONDITION	nvarchar(8)
PAVEMENT_PK	int
PAVEMENT_EXISTING	nvarchar(3)
PAVEMENT_CONDITION	nvarchar(8)
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)
<b>SITE_DOCS</b>	
PROJECT_PK	int
SITE_PK	int
DOC_PK	int
DOCUMENT	image
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>SITE_IMPROVEMENT_DOCS</b>	
PROJECT_PK	int
SITE_PK	int
IMP_PK	int
DOC_PK	int
DOCUMENT	image
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>SITE_IMPROVEMENT_APPROVAL</b>	
PROJECT_PK	int
SITE_PK	int
IMP_PK	int
APPROVAL_FLAG	boolean
REASON_DESCRIPTION	nvarchar(250)
SIGN_QTY_APPROVAL	int
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>USER</b>	
USER_PK	int
USER_ID	nvarchar(15)
USER_PASSWORD	nvarchar(25)
USER_EMAIL	nvarchar(50)
USER_NAME_FIRST	nvarchar(20)

USER_NAME_LAST	nvarchar(20)
USER_ROLE_CODE_ID	nvarchar(5)
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	nvarchar(15)

<b>PROJECT_MANAGER_STUDENT_WORKER</b>	
ID_PK	int
PROJECT_PK	int
USER_PK	int
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)

<b>SITE_PROJECT_ENGINEER</b>	
ID_PK	int
PROJECT_PK	int
SITE_PK	int
USER_PK	int
CREATE_DATE	datetime
CREATE_USER_ID	nvarchar(15)

<b>CODES</b>	
CODE_TYPE	nvarchar(12)
CODE_ID	nvarchar(8)
CODE_DESCRIPTION	nvarchar(40)

<b>SIGNS</b>	
SIGN_PK	int
SIGN_ID	nvarchar(8)
SIGN_TYPE	nvarchar(15)
SIGN_COST	money

<b>SIGNS_SIZE</b>	
SIGN_PK	int
SIGN_SIZE_PK	int
SIGN_SIZE_HEIGHT	int
SIGN_SIZE_WIDTH	int

<b>SIGNS_CATEGORY</b>	
SIGN_CATEGORY_PK	int
SIGN_PK	int

SIGN_CATEGORY_NAME	nvarchar(11)
<b>PAVEMENT</b>	
PAVEMENT_PK	int
PAVEMENT_TYPE	nvarchar(50)
PAVEMENT_SUBTYPE	nvarchar(50)
PAVEMENT_COST	money

<b>PARISH</b>	
PARISH_CD	int
PARISH_NAME	nvarchar(255)
DISTRICT_CD	int

<b>DISTRICT</b>	
DISTRICT_CD	int
DISTRICT_NAME	nvarchar(255)

<b>INTERSECTION</b>	
TWO_LANE_UID (PK)	int
LOCATION_UID (FK)	int
SEGMENT_LENGTH	float
AADT	float
LENGTH_HORIZONTAL	float
RADII_HORIZONTAL	float
SPIRAL_TRANSITION_PRESENT	bit
SUPERELEVATION_VARIANCE_HORIZONTAL	float
PERCENT_GRADE	float
LANE_WIDTH	float
SHOULDER_TYPE	float
SHOULDER_WIDTH	float
LIGHTNING_PRESENT	bit
DRIVEWAY_DENSITY	float
PASSING_LANE_PRESENT	bit
SHORT_FOUR_LANE_PRESENT	float
CENTER_TWO_LANE_LEFT_TURN_PRESENT	bit
CENTERLINE_RUMBLE_PRESENT	bit
ROADSIDE_HAZARD_RATING	bit
AUTOMATED_SPEED_ENFORCEMENT_USED	bit
CREATE_DATE	datetime
CREATE_USER_ID	int
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	int

<b>HIGHWAY</b>	
MULTI_LANE_UID (PK)	int
LOCATION_UID (FK)	int
SEGMENT_LENGTH	float
AADT	float
LANE_WIDTH	float
SHOULDER_WIDTH	float
LIGHTING_PRESENT	bit
AUTOMATED_SPEED_ENFORCEMENT_USED	bit
SLIDESLOPE	float
MEDIAN_WIDTH	float
CREATE_DATE	datetime
CREATE_USER_ID	int
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	int

<b>DOTD_CRASH</b>	
CRASH_UID (PK)	int
CRASH_NUM	nvarchar(20)
DOTD_CRASH_NUM	int
HWY_TYPE_CD	nvarchar(2)
PRI_HWY_NUM	int
BYPASS_CD	nvarchar(2)
MILEPOST	float
STL_ROUTE	nvarchar(6)
ADT	int
CONTROL_SECTION	nvarchar(6)
DOTD_DISTRICT	nvarchar(2)
FUNCTIONAL_CLASS	nvarchar(2)
HIGHWAY_CLASS	nvarchar(1)
LOGMILE	float
LOGMILE_FROM	float
LOGMILE_TO	float
LAT	float
LONG	float
MEDIAN_WIDTH	smallint
MILEPOINT	float
MILEPOST_FROM	float
MILEPOST_TO	float
NUM_LANES	smallint
PARISH_CD	nvarchar(2)
PAVEMENT_TYPE	nvarchar(2)
PAVEMENT_WIDTH	smallint
SECTION_LENGTH	float
HWY_TYPE_FLAG	nvarchar(1)
HWY_NUM_FLAG	nvarchar(1)
BYPASS_FLAG	nvarchar(1)
SPOTTED_BY	nvarchar(1)
DIRECTION	nvarchar(1)
SECTION_OID (FK)	int
TYPE_ACC	nvarchar(1)
URBAN_AREA	nvarchar(1)

INTERSECTION	Bit
MILEPOINT_FROM	float
MILEPOINT_TO	float
IRS_ID	nvarchar(18)
IRS_LOGMILE	float
CRASH_YEAR	smallint
CREATE_DATE	datetime
CREATE_USER_ID	int
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	Int

<b>HWY_SECTION</b>	
ROUTE	nvarchar(6)
SECTION	smallint
SUBSECTION	smallint
YEAR	smallint
STATE_CODE	nvarchar(2)
FIPS_PARISH	smallint
PLACE_CODE	nvarchar(5)
SECTION_LENGTH	float
MILEPOINT_FROM	float
TRAVEL_ROUTE_CAT	nvarchar(1)
TRAVEL_ROUTE_NUM	nvarchar(5)
DOMAIN	nvarchar(2)
GOVT_LEVEL_CONTROL	nvarchar(2)
ADMIN_CLASS	nvarchar(1)
FED_AID_SYS_TRAV	nvarchar(1)
FED_AID_SYS_DESIG	nvarchar(1)
TOLLRAOD	nvarchar(1)
FED_AID_URBAN_AREA	nvarchar(1)
FUNCTIONAL_CLASS	nvarchar(2)
HIGHWAY_CLASS	nvarchar(1)
SPECIAL_SYSTEM	nvarchar(2)
MUNICIPALITY	nvarchar(1)
CENSUS_CATEGORY	nvarchar(1)
POP_GROUP	nvarchar(1)
PKWY_TRUCKS	nvarchar(1)
ACCESS_CONTROL	nvarchar(1)
ADT	int
ROW_WIDTH	smallint
SHOULDER_TYPE_PRI	nvarchar(1)
PAVEMENT_TYPE_PRI	nvarchar(2)
PAVEMENT_WIDTH_PRI	smallint
NUM_LANES	smallint
MEDIAN_TYPE	nvarchar(1)
SHOULDER_TYPE_OTH	nvarchar(1)
PAVEMENT_TYPE_OTH	nvarchar(2)
PAVEMENT_WIDTH_OTH	smallint
NO_LANES_OTH44	smallint
NEUT_GROUND_WIDTH	smallint
OLD_FUNC_CLASS	nvarchar(2)
PROPOSED_ELIMINATE	nvarchar(1)

SHOULDER_WIDTH_PRI	smallint
SHOULDER_WIDTH_OTH	smallint
NHS_FLAG	nvarchar(1)
NHS_SEGMENT	nvarchar(3)
CLASS_STATION	nvarchar(4)
NHS_LINK	nvarchar(1)
TRUCK_ROUTE	nvarchar(1)
ACC_ROUTE	nvarchar(5)
ACC_MILEPOST_FROM	float
ACC_MILEPOST_TO	float
CONTROL_SECTION	nvarchar(6)
LOGMILE_FROM	float
LOGMILE_TO	float
ADT_STATION_NUM	nvarchar(6)
CSECT_OPP_ROUTE	nvarchar(1)
FED_AID_STATUS	nvarchar(1)
DISTRICT	nvarchar(2)
PARISH	nvarchar(2)
URBAN_AREA_CODE	nvarchar(5)
FORMATTED_ROUTE	nvarchar(9)
OID(PK)	int
LRS_ID	nvarchar(18)
HWY_TYPE_CD	nvarchar(1)
PRI_HWY_NUM	int
BYPASS_CD	nvarchar(1)
ACC_HWY_TYPE_CD	nvarchar(1)
ACC_PRI_HWY_NUM	int
ACC_BYPASS_CD	nvarchar(1)
CSECT_DIRECTION	int
MILEPOST_DIRECTION	Int
MILEPOST_LENGTH	float
CSECT_LENGTH	float
MILEPOINT_TO	float
MAP_LENGTH	float
CREATE_DATE	datetime
CREATE_USER_ID	int
LAST_UPDATE_DATE	datetime
LAST_UPDATE_USERID	int



## APPENDIX B

### Reference Data

REGION TYPE	REGION ID
DISTRICT	2 - 8, 58, 61, 62
PARISH	1 - 64

DISTRICT CODE	DISTRICT NAME
2	BRIDGE CITY
3	LAFAYETTE
4	SHREVEPORT
5	MONROE
7	LAKE CHARLES
8	ALEXANDRIA
58	CHASE
61	BATON ROUGE
62	HAMMOND

PARISH CODE	PARISH NAME	DISTRICT CODE
1	ACADIA	3
2	ALLEN	7
3	ASCENSION	61
4	ASSUMPTION	61
5	AVOUELLES	8
6	BEAUREGARD	7
7	BIENVILLE	4
8	BOSSIER	4
9	CADDO	4
10	CALCASIEU	7
11	CALDWELL	58
12	CAMERON	7
13	CATAHOULA	58
14	CLAIBORNE	4
15	CONCORDIA	58
16	DESOTO	4
17	EAST BATON ROUGE	61
18	EAST CARROLL	5
19	EAST FELICIANA	61
20	EVANGELINE	3
21	FRANKLIN	58
22	GRANT	8
23	IBERIA	3
24	IBERVILLE	61
25	JACKSON	5



26	JEFFERSON	2
27	JEFFERSON DAVIS	7
28	LAFAYETTE	3
29	LAFOURCHE	2
30	LASALLE	58
31	LINCOLN	5
32	LIVINGSTON	62
33	MADISON	5
34	MOREHOUSE	5
35	NATCHITOCHE	8
36	ORLEANS	2
37	OUACHITA	5
38	PLAQUEMINES	2
39	POINTE COUPEE	61
40	RAPIDES	8
41	RED RIVER	4
42	RICHLAND	5
43	SABINE	8
44	ST. BERNARD	2
45	ST. CHARLES	2
46	ST. HELENA	62
47	ST. JAMES	61
48	ST. JOHN	62
49	ST. LANDRY	3
50	ST. MARTIN	3
51	ST. MARY	3
52	ST. TAMMANY	62
53	TANGIPAHOA	62
54	TENSAS	58
55	TERREBONNE	2
56	UNION	5
57	VERMILLION	3
58	VERNON	8
59	WASHINGTON	62
60	WEBSTER	4
61	WEST BATON ROUGE	61
62	WEST CARROLL	5
63	WEST FELICIANA	61
64	WINN	8

<b>SITE TYPE</b>	<b>SITE ID</b>
INTERSECTION	INTERSECTION_ID
NON-INTERSECTION	LRS_ID
CONTROL SECTION	CONTROL_SECTION

<b>SIGN NAME</b>	<b>SIGN CODE</b>	<b>SIGN ICON NAME</b>
2 MILES (1 LINE) (ENGLISH)	W16-3a	Image_Not_Available_SM
2 MILES (2 LINE) (ENGLISH)	W16-3	Image_Not_Available_SM
270 DEGREE LOOP	W1-15	Image_Not_Available_SM
4-WAY	R1-3	R1-3_4-WAY_Sm

500 FT (1 LINE) (ENGLISH)	W16-2a	Image_Not_Available_SM
500 FT (2 LINE) (ENGLISH)	W16-2	Image_Not_Available_SM
500 FT (2 LINE) (ENGLISH)	W16-4	Image_Not_Available_SM
8:30 AM TO 5:30 PM	S4-1	Image_Not_Available_SM
ACTIVATED BLANK-OUT	R3-1a	R3-1a_ADVICATED BLANK-OUT_Sm
ACTIVATED BLANK-OUT	R3-2a	Image_Not_Available_SM
ADDED LANE	W4-3L	Image_Not_Available_SM
ADDED LANE	W4-3R	W4-3R_ADDED LANE_SM
ADVANCE INTERSECTION LANE CONTROL	R3-8	R3-8_Advance Intersection Lane Control_SM
ADVANCE INTERSECTION LANE CONTROL	R3-8a	R3-8a_Advance Intersection Lane Control_SM
ADVANCE INTERSECTION LANE CONTROL	R3-8b	R3-8b_Advance Intersection Lane Control_SM
ADVANCE PARKING AREA DISTANCE	D5-3	Image_Not_Available_SM
ADVANCE REST - WELCOME SIGN	D5-9	Image_Not_Available_SM
ADVANCE REST AREA - TOURIST INFORMATION CENTER SIGN	D5-7	Image_Not_Available_SM
ADVANCE REST AREA DISTANCE	D5-1	Image_Not_Available_SM
ADVANCE REST AREA DISTANCE	D5-1a	Image_Not_Available_SM
ADVANCE REST AREA DISTANCE	D5-1b	Image_Not_Available_SM
ADVANCE REVERSIBLE LANE CONTROL TRANSITION	R3-9g	Image_Not_Available_SM
ADVANCE REVERSIBLE LANE CONTROL TRANSITION	R3-9h	Image_Not_Available_SM
ADVANCE STREET NAME	D3-2	Image_Not_Available_SM
ADVANCE STREET NAME PLAQUE	W16-8	Image_Not_Available_SM
ADVANCE STREET NAME PLAQUE	W16-8a	Image_Not_Available_SM
ADVANCE WEIGH STATION DISTANCE	D8-1	Image_Not_Available_SM
ADVISORY CURVE SPEED (ENGLISH)	W13-5	W13-5_ADVISORY CURVE SPEED (ENGLISH)_SM
ADVISORY RAMP SPEED	W13-3	W13-3_ADVISORY RAMP SPEED_SM
ADVISORY SPEED (ENGLISH)	W13-1	W13-1_ADVISORY SPEED (ENGLISH)_SM
ADVISORY SPEED (ENGLISH)	W13-2	W13-2_ADVISORY SPEED (ENGLISH)_SM
AHEAD PLAQUE	W16-9p	Image_Not_Available_SM
AIRPORT	I-5	Image_Not_Available_SM
ALL WAY	R1-4	R1-4_ALL WAY_Sm
ALTERNATE AUXILIARY	M4-1	Image_Not_Available_SM
ALTERNATE AUXILIARY	M4-1a	Image_Not_Available_SM

ALTERNATIVE FUEL	D9-11a	Image_Not_Available_SM
AMBULANCE STATION	D9-13b	Image_Not_Available_SM
AREA CLOSE	EM-2	Image_Not_Available_SM
ARROW PLAQUE	W16-5pL	Image_Not_Available_SM
ARROW PLAQUE	W16-5pR	Image_Not_Available_SM
ARROW PLAQUE	W16-6pL	Image_Not_Available_SM
ARROW PLAQUE	W16-6pR	Image_Not_Available_SM
AXLE WEIGHT LIMIT	R12-2	Image_Not_Available_SM
BE PREPARED TO STOP	W3-4	Image_Not_Available_SM
BEGIN AUXILIARY	M4-11	Image_Not_Available_SM
BEGIN RIGHT TURN LANE - YIELD TO BIKES	R4-4	Image_Not_Available_SM
BICYCLE DETOUR	M4-9c	Image_Not_Available_SM
BICYCLE HILL PLAQUE	W7-5	Image_Not_Available_SM
BICYCLE HILL PLAQUE	W7-5a	Image_Not_Available_SM
BICYCLE PARKING	D4-3	Image_Not_Available_SM
BICYCLE PEDESTRIAN DETOUR	M4-9a	Image_Not_Available_SM
BICYCLE ROUTE	D11-1	Image_Not_Available_SM
BICYCLE ROUTE	M1-8	Image_Not_Available_SM
BICYCLE ROUTE	M1-9	Image_Not_Available_SM
BICYCLE SLIPPERY WHEN WET	W8-10	Image_Not_Available_SM
BICYCLE SLIPPERY WHEN WET PLAQUE	W8-10a	Image_Not_Available_SM
BICYCLE TRAFFIC	W11-1	W11-1_BICYCLE TRAFFIC_SM
BICYCLE WRONG WAY	R5-1b	Image_Not_Available_SM
BICYCLISTS USE THE PEDESTRIAN SIGNAL	R9-5	Image_Not_Available_SM
BICYCLISTS YIELD TO PEDESTRIANS	R9-6	Image_Not_Available_SM
BIKE ACTUATION	R10-22	Image_Not_Available_SM
BIKE LANE	R3-17	Image_Not_Available_SM
BIKE LANE AHEAD	R3-17a	Image_Not_Available_SM
BIKE LANE ENDS	R3-17b	Image_Not_Available_SM
BIKEWAY NARROWS	W5-4a	Image_Not_Available_SM
BLASTING ZONE AHEAD	W22-1	Image_Not_Available_SM
BRAZOS RIVER	I-3	Image_Not_Available_SM
BRIDGE ICES BEFORE ROAD	W8-13	W8-13_BRIDGE ICES BEFORE ROAD_SM
BUMP	W8-1	W8-1_BUMP_SM
BUS STATION	I-6	Image_Not_Available_SM
BY-PASS AUXILIARY	M4-2	Image_Not_Available_SM
BY-PASS AUXILIARY	M4-3	Image_Not_Available_SM
CAMPING	D9-3	Image_Not_Available_SM
CAR POOL INFORMATION	D12-2	Image_Not_Available_SM
CARDINAL DIRECTION AUXILIARY	M3-1	Image_Not_Available_SM
CARDINAL DIRECTION AUXILIARY	M3-2	Image_Not_Available_SM
CARDINAL DIRECTION AUXILIARY	M3-3	Image_Not_Available_SM
CARDINAL DIRECTION AUXILIARY	M3-4	Image_Not_Available_SM

CATTLE TRAFFIC	W11-4	Image_Not_Available_SM
CENTER (RIGHT) (LEFT) LANE CLOSED AHEAD	W9-3	Image_Not_Available_SM
CENTER LANE CLOSED	W9-3a	Image_Not_Available_SM
CHANNEL 9 MONITORED	D12-3	Image_Not_Available_SM
CHEMICAL SHELTER	EM-7d	Image_Not_Available_SM
CHEVRON ALIGNMENT	W1-8L	W1-8L_CHEVRON ALIGNMENT_SM
CHEVRON ALIGNMENT	W1-8R	W1-8R_CHEVRON ALIGNMENT_SM
CIRCULAR INTERSECTION	W2-6	W2-6_CIRCULAR INTERSECTION_SM
COMBINATION JUNCTION	M2-2	Image_Not_Available_SM
COMBINATION REST AREA STATE WELCOME CENTER EXIT DIRECTION	D5-10	Image_Not_Available_SM
COMBINATION REST AREA STATE WELCOME CENTER NEXT RIGHT	D5-11	Image_Not_Available_SM
COMBINATION REST AREA TOURIST INFO CENTER EXIT DIRECTION	D5-8	Image_Not_Available_SM
COMBINED SPEED LIMIT (ENGLISH)	R2-4a	R2-4a_COMBINED SPEED LIMIT (ENGLISH)_Sm
COMINATION U-TURN & LEFT TURN PROHIBITION	R3-18	R3-18_Combination U-Turn & Left Turn Prohibition_SM
COMMERCIAL VEHICLES EXCLUDED	R5-4	Image_Not_Available_SM
COUNTY ROUTE	M1-6	Image_Not_Available_SM
CROSS ON GREEN LIGHT ONLY	R10-1	Image_Not_Available_SM
CROSS ONLY AT CROSS WALKS	R9-2	Image_Not_Available_SM
CROSS ONLY ON WALK SIGNAL	R10-2a	Image_Not_Available_SM
CROSS ROAD	W2-1	W2-1_CROSS ROAD_SM
CROSSOVER	D13-1	Image_Not_Available_SM
CROSSOVER	D13-2	Image_Not_Available_SM
CURVE	W1-2	Image_Not_Available_SM
CURVE (ENGLISH)	W1-2a L	Image_Not_Available_SM
CURVE (ENGLISH)	W1-2a R	Image_Not_Available_SM
DEAD END	W14-1	W14-1_DEAD END_SM
DEAD END	W14-1aL	Image_Not_Available_SM
DEAD END	W14-1aR	Image_Not_Available_SM
DECONTAMINATION CENTER	EM-6d	Image_Not_Available_SM
DEER TRAFFIC	W11-3	Image_Not_Available_SM
DESTINATION	D1-1	Image_Not_Available_SM
DESTINATION	D1-1a	Image_Not_Available_SM
DESTINATION	D1-1bL	Image_Not_Available_SM
DESTINATION	D1-1bR	Image_Not_Available_SM
DESTINATION	D1-1c	Image_Not_Available_SM
DESTINATION	D1-2	Image_Not_Available_SM
DESTINATION	D1-2a	Image_Not_Available_SM

DESTINATION	D1-3	Image_Not_Available_SM
DESTINATION	D1-3a	Image_Not_Available_SM
DETOUR	M4-8	Image_Not_Available_SM
DETOUR	M4-9L	Image_Not_Available_SM
DETOUR	M4-9R	Image_Not_Available_SM
DETOUR	W20-2	Image_Not_Available_SM
DETOUR (INSIDE ARROW)	M4-10L	Image_Not_Available_SM
DETOUR (INSIDE ARROW)	M4-10R	Image_Not_Available_SM
DIESEL FUEL	D9-11	Image_Not_Available_SM
DIP	W8-2	W8-2_DIP_SM
DIRECTIONAL ARROW AUXILIARY	M5-1	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M5-2	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-1	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-2	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-3	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-4	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-5	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-6	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-7	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-8	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY	M6-9	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-1	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-2	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-3	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-4	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-5	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-6	Image_Not_Available_SM
DIRECTIONAL ARROW AUXILIARY (BICYCLE FACILITIES)	M7-7	Image_Not_Available_SM
DISTANCE	D2-1	Image_Not_Available_SM
DISTANCE	D2-2	Image_Not_Available_SM

DISTANCE	D2-3	Image_Not_Available_SM
DIVIDED HIGHWAY	W6-1	W6-1_DIVIDED HIGHWAY_SM
DIVIDED HIGHWAY	W6-1a	
DIVIDED HIGHWAY CROSSING	R6-3	R6-3_DIVIDED HIGHWAY CROSSING_SM
DIVIDED HIGHWAY CROSSING	R6-3a	Image_Not_Available_SM
DIVIDED HIGHWAY ENDS	W6-2	Image_Not_Available_SM
DIVIDED HIGHWAY ENDS	W6-2a	Image_Not_Available_SM
DIVIDED ROAD	W6-1b	Image_Not_Available_SM
DIVIDED ROAD ENDS	W6-2b	Image_Not_Available_SM
DO NOT BLOCK INTERSECTION	R10-7	R10-7_DO NOT BLOCK INTERSECTION_SM
DO NOT DRIVE ON TRACKS	R15-6a	Image_Not_Available_SM
DO NOT DRIVE ON TRACKS LIGHT RAIL SYMBOL	R15-6	Image_Not_Available_SM
DO NOT ENTER	R5-1	R5-1_DO NOT ENTER_SM
DO NOT PASS	R4-1	R4-1_Do Not Pass_SM
DO NOT PASS STOPPED TRAIN	R15-5a	Image_Not_Available_SM
DO NOT STOP ON TRACKS	R8-8	R8-8_DO NOT STOP ON TRACKS_SM
DOUBEL REVERSE CURVE (2 LANES)	W24-1aL	Image_Not_Available_SM
DOUBEL REVERSE CURVE (2 LANES)	W24-1aR	Image_Not_Available_SM
DOUBLE ARROW	W12-1	W12-1_DOUBLE ARROW_SM
DOUBLE REVERSE CURVE (1 LANE)	W24-1L	Image_Not_Available_SM
DOUBLE REVERSE CURVE (1 LANE)	W24-1R	Image_Not_Available_SM
DOUBLE REVERSE CURVE (3 LANES)	W24-1bL	Image_Not_Available_SM
DOUBLE REVERSE CURVE (3 LANES)	W24-1bR	Image_Not_Available_SM
DRAW BRIDGE AHEAD	W3-6	Image_Not_Available_SM
EMERGENCY DIAL 911	D12-4	Image_Not_Available_SM
EMERGENCY MEDICAL CARE	D9-13c	Image_Not_Available_SM
EMERGENCY MEDICAL SERVICES	D9-13	Image_Not_Available_SM
EMERGENCY NOTIFICATION	I-13	Image_Not_Available_SM
EMERGENCY NOTIFICATION	I-13a	Image_Not_Available_SM
EMERGENCY PARKING ONLY	R8-4	R8-4_EMERGENCY PARKING ONLY_SM
EMERGENCY SHELTER	EM-7a	Image_Not_Available_SM
EMERGENCY SIGNAL	R10-13	R10-13_EMERGENCY SIGNAL_SM
EMERGENCY SIGNAL AHEAD	W11-12p	Image_Not_Available_SM
EMERGENCY SNOW ROUTE	R7-203	Image_Not_Available_SM
EMERGENCY STOPPING ONLY	R8-7	R8-7_EMERGENCY STOPPING ONLY_SM
EMERGENCY VEHICLE	W11-8	Image_Not_Available_SM

END	M4-8b	Image_Not_Available_SM
END AUXILIARY	M4-12	Image_Not_Available_SM
END AUXILIARY	M4-6	Image_Not_Available_SM
END BLASTING ZONE	W22-3	Image_Not_Available_SM
END DETOUR	M4-8a	Image_Not_Available_SM
END REVERSE LANE	R3-9i	Image_Not_Available_SM
END ROAD WORK	G20-2	Image_Not_Available_SM
END SCHOOL ZONE	S5-2	Image_Not_Available_SM
ENHANCED REFERENCE LOCATION SIGNS	D10-4	Image_Not_Available_SM
ENTERING ROADWAY LANE ADDED	W4-6	Image_Not_Available_SM
ENTERING ROADWAY MERGE	W4-5	W4-5_ENTERING ROADWAY MERGE_SM
EQUESTRIAN TRAFFIC	W11-7	Image_Not_Available_SM
EXAMPLES OF DESIGN APPLICATIONS RECREATIONAL & CULTURAL INTEREST SIGNS	RM-140	Image_Not_Available_SM
EXEMPT	R15-3/10-1a	Image_Not_Available_SM
EXIT CLOSED	E5-2a	Image_Not_Available_SM
EXIT ONLY	E5-3	Image_Not_Available_SM
EXIT OPEN	E5-2	Image_Not_Available_SM
FALLOUT SHELTER	EM-7c	Image_Not_Available_SM
FARM MACHINERY TRAFFIC	W11-5	Image_Not_Available_SM
FARM MACHINERY TRAFFIC	W11-5a	Image_Not_Available_SM
FINES HIGHER	R2-6	R2-6_FINES HIGHER_Sm
FLAGGER	W20-7	Image_Not_Available_SM
FLAGGER	W20-7a	Image_Not_Available_SM
FOOD	D9-8	Image_Not_Available_SM
FOREST ROUTE	M1-7	Image_Not_Available_SM
FREEWAY ENTRANCE	D13-3	Image_Not_Available_SM
FREEWAY ENTRANCE	D13-3aL	Image_Not_Available_SM
FREEWAY ENTRANCE	D13-3aR	Image_Not_Available_SM
FRESH OIL (TAR)	W21-2	Image_Not_Available_SM
GAS	D9-7	Image_Not_Available_SM
GOLF CART TRAFFIC	W11-11	Image_Not_Available_SM
HAIRPIN CURVE	W1-11	Image_Not_Available_SM
HANDICAMPT	W11-9	Image_Not_Available_SM
HANDICAPPED ACCESSIBLE	D9-6	Image_Not_Available_SM
HAZARDOUS MATERIAL	R14-2	Image_Not_Available_SM
HAZARDOUS MATERIAL	R14-3	Image_Not_Available_SM
HIGHWAY RAIL GRADE CROSSING (CROSS BUCK)	R15-1	R15-1_HIGHWAY RAIL GRADE CROSSING (CROSS BUCK)_SM
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-1	W10-1_HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING_SM
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-2L	Image_Not_Available_SM
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-2R	Image_Not_Available_SM
HIGHWAY-RAIL GRADE	W10-3L	Image_Not_Available_SM

CROSSING ADVANCE WARNING		
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-3R	Image_Not_Available_SM
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-4L	Image_Not_Available_SM
HIGHWAY-RAIL GRADE CROSSING ADVANCE WARNING	W10-4R	Image_Not_Available_SM
HILL	W7-1	W7-1_HILL_SM
HILL	W7-1a	Image_Not_Available_SM
HILL	W7-1b	Image_Not_Available_SM
HILL BLOCKS VIEW	W7-6	Image_Not_Available_SM
HILL PLAQUE	W7-2	Image_Not_Available_SM
HILL PLAQUE	W7-2b	Image_Not_Available_SM
HILL PLAQUE	W7-3	Image_Not_Available_SM
HILL PLAQUE	W7-3a	Image_Not_Available_SM
HILL PLAQUE	W7-3b	Image_Not_Available_SM
HITCH HIKING PROHIBITED	R9-4a	Image_Not_Available_SM
HORIZONTAL ALIGNMENT	W1-10L	Image_Not_Available_SM
HORIZONTAL ALIGNMENT	W1-10R	Image_Not_Available_SM
HORSE AND BUGGY TRAFFIC	W11-14	Image_Not_Available_SM
HOSPITAL	D9-13a`	Image_Not_Available_SM
HOSPITAL	D9-2	Image_Not_Available_SM
HOV	W16-11	Image_Not_Available_SM
HOV LANE AHEAD (OVERHEAD)	R3-15	Image_Not_Available_SM
HOV LANE AHEAD (OVERHEAD)	R3-15a	Image_Not_Available_SM
HURRICANE EVACUATION ROUTE	EM-1	Image_Not_Available_SM
HURRICANE SHELTER	EM-7b	Image_Not_Available_SM
IN-STREET PEDESTRIAN CROSSING	R1-6	R1-6_IN-STREET PEDESTRIAN CROSSING_Sm
IN-STREET PEDESTRIAN CROSSING	R1-6a	R1-6a_IN-STREET PEDESTRIAN CROSSING_Sm
INTERMEDIATE ENHANCED REFERENCE LOCATION	D10-5	Image_Not_Available_SM
INTERMEDIATE REFERENCE LOCATION SIGNS	D10-1a	Image_Not_Available_SM
INTERMEDIATE REFERENCE LOCATION SIGNS	D10-2a	Image_Not_Available_SM
INTERMEDIATE REFERENCE LOCATION SIGNS	D10-3a	Image_Not_Available_SM
INTERSTATE ROUTE (1,2 DIGITS)	M1-1	M1-1_INTERSTATE ROUTE_SM
JUNCTION AUXILIARY	M2-1	Image_Not_Available_SM
KEEP LEFT	R4-8	R4-8_KEEP LEFT_SM
KEEP LEFT/RIGHT TO PEDESTRIANS AND BICYCLISTS	R9-7	R9-7_KEEP LEFT-RIGHT TO PEDESTRIANS AND BICYCLES_SM



KEEP OFF MEDIAN	R11-1	R11-1_KEEP OFF MEDIAN_SM
KEEP RIGHT	R4-7	R4-7_Keep Rights-SM
KEEP RIGHT	R4-7a	R4-7a_Keep Right_SM
KEEP RIGHT	R4-7b	R4-7b_KEEP RIGHT_SM
LANE ENDS	W4-2L	Image_Not_Available_SM
LANE ENDS	W4-2R	Image_Not_Available_SM
LANE ENDS MERGE LEFT (RIGHT)	W9-2	W9-2L_LANE ENDS MERGE LEFT (RIGHT)_SM
LEFT (RIGHT) TURN SIGNAL	R10-10L	R10-10L_LEFT-RIGHT TURN SIGNAL_SM
LEFT (RIGHT) TURN SIGNAL	R10-10R	Image_Not_Available_SM
LEFT DIAGONAL ARROW PLAQUE	W16-7pL	Image_Not_Available_SM
LEFT DIAGONAL ARROW PLAQUE	W16-7pR	Image_Not_Available_SM
LEFT ON GREEN ARROW ONLY	R10-5	Image_Not_Available_SM
LEFT SHOULDER CLOSED	W21-5aL	Image_Not_Available_SM
LEFT SHOULDER CLOSED	W21-5bL	Image_Not_Available_SM
LEFT TURN PROHIBITION	R3-2	Image_Not_Available_SM
LEFT TURN SIGNAL YIELD ON GREEN	R10-21	Image_Not_Available_SM
LEFT TURN YIELD ON GREEN	R10-12	R10-12_LEFT TURN YIELD ON GREEN_SM
LIBRARY	I-8	Image_Not_Available_SM
LIBRARY	I-8p	Image_Not_Available_SM
LIGHT RAIL ACTIVATED BLANK-OUT SYMBOL	W10-7	Image_Not_Available_SM
LIGHT RAIL DIVIDED HIGHWAY SYMBOL	R15-7	R15-7_LIGHT RAIL DIVIDED HIGHWAY SYMBOL_SM
LIGHT RAIL DIVIDED HIGHWAY SYMBOL	R15-7a	Image_Not_Available_SM
LIGHT RAIL DO NOT PASS	R15-5	Image_Not_Available_SM
LIGHT RAIL ONLY CENTER LANE	R15-4c	Image_Not_Available_SM
LIGHT RAIL ONLY LEFT LANE	R15-4b	Image_Not_Available_SM
LIGHT RAIL ONLY RIGHT LANE	R15-4a	Image_Not_Available_SM
LIGHT RAIL STATION	I-12	Image_Not_Available_SM
LITTER CONTAINER	D9-4	Image_Not_Available_SM
LODGING	D9-9	Image_Not_Available_SM
LOOK	R15-8	Image_Not_Available_SM
LOOSE GRAVEL	W8-7	Image_Not_Available_SM
LOOSE GRAVEL	W8-8	Image_Not_Available_SM
LOW CLEARANCE (ENGLISH)	W12-2	W12-2_LOW CLEARANCE (ENGLISH)_SM
LOW CLEARANCE (ENGLISH)	W12-2p	Image_Not_Available_SM
LOW GROUND CLEARANCE HIGHWAY-RAIL GRADE CROSSING	W10-5	Image_Not_Available_SM
LOW SHOULDER	W8-9	W8-9_LOW SHOULDER_SM
MAINTAIN TOP SAFE SPEED	EM-4	Image_Not_Available_SM
MANDATORY MOVEMENT	R3-5a	R3-5a_MADATORY

LANE CONTROL		MOVEMENT LANE CONTROL_Sm
MANDATORY MOVEMENT LANE CONTROL	R3-5b	R3-5b Lane Control Plaques_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5c	Image_Not_Available_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5d	Image_Not_Available_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5e	Image_Not_Available_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5f	R3-5F Lane Control Plaques_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5g	Image_Not_Available_SM
MANDATORY MOVEMENT LANE CONTROL	R3-5L	R3-5L_MANDATORY MOVEMENT LANE CONTROL_Sm
MANDATORY MOVEMENT LANE CONTROL	R3-5R	R3-5R_MANDATORY MOVEMENT LANE CONTROL_Sm
MANDATORY MOVEMENT LANE CONTROL	R3-7L	R3-7L_Mandatory Movement Land Control_SM
MANDATORY MOVEMENT LANE CONTROL	R3-7R	R3-7R_Mandatory Movement Lane Control_SM
MEDICAL CENTER	EM-6a	Image_Not_Available_SM
MERGE	W4-1L	Image_Not_Available_SM
MERGE	W4-1R	W4-1R_MERGE_SM
METRIC	R12-6	Image_Not_Available_SM
MINIMUM SPEED (ENGLISH)	R2-4	R2-4_MINIMUM SPEED LMIT(ENGLISH)_Sm
MON-FRI	S4-6	Image_Not_Available_SM
MON-FRI (3 LINES)	R10-20a	Image_Not_Available_SM
MOTOR-DRIVEN CYCLES PROHIBITED	R5-8	Image_Not_Available_SM
MOTORIST SERVICES SIGN	D9-18	Image_Not_Available_SM
MOTORIST SERVICES SIGN	D9-18a	Image_Not_Available_SM
MOTORIST SERVICES SIGN	D9-18b	Image_Not_Available_SM
MOTORIST SERVICES SIGN	D9-18c	Image_Not_Available_SM
MOTORIST SERVICES SIGN	D9-18e	Image_Not_Available_SM
MOTORIST SERVICES SIGN	E2-2	Image_Not_Available_SM
MOTORIST SERVICES SYMBOL SIGN	E1-5	Image_Not_Available_SM
MOTORIST SERVICES SYMBOL SIGN	E2-3	Image_Not_Available_SM
NARROW BRIDGE	W5-2	Image_Not_Available_SM
NATIONAL NETWORK	R14-4	Image_Not_Available_SM
NATIONAL NETWORK PROHIBITED	R14-5	Image_Not_Available_SM
NATIONAL PARK	D7-1	Image_Not_Available_SM
NATIONAL PARK ARROW	D7-2	Image_Not_Available_SM
NEXT CROSSING	W10-14	Image_Not_Available_SM
NEXT REST AREA (XX MILES)	D5-6	Image_Not_Available_SM
NEXT SERVICES XX MILES	D9-17	Image_Not_Available_SM

(ENGLISH)		
NIGHT SPEED LIMIT (ENGLISH)	R2-3	R2-3_NIGHT SPEED LIMIT (ENGLISH)_Sm
NO BICYCLES	R5-6	R5-6_NO BICYCLES_SM
NO CENTER STRIPE	W8-12	Image_Not_Available_SM
NO GATES OR LIGHTS	W10-13	Image_Not_Available_SM
NO HITCH HIKING	R9-4	Image_Not_Available_SM
NO MOTOR VEHICLES	R5-3	R5-3_NO MOTOR VEHICLES_SM
NO OUTLET	W14-2	W14-2_NO OUTLET_SM
NO OUTLET	W14-2aL	Image_Not_Available_SM
NO OUTLET	W14-2aR	Image_Not_Available_SM
NO PARKING	R7-1	R7-1_NO PARKING_SM
NO PARKING	R7-107	R7-107_NO PARKING_SM
NO PARKING	R7-2	R7-2_NO PARKING_SM
NO PARKING	R7-2a	R7-2a_NO PARKING_SM
NO PARKING	R7-3	Image_Not_Available_SM
NO PARKING	R7-4	Image_Not_Available_SM
NO PARKING	R7-5	Image_Not_Available_SM
NO PARKING	R7-6	R7-6_NO PARKING_SM
NO PARKING	R7-7	R7-7_NO PARKING_SM
NO PARKING	R7-8	Image_Not_Available_SM
NO PARKING	R8-3	R8-3_NO PARKING_SM
NO PARKING (SYMBOL)	R8-3a	R8-3a_NO PARKING (SYMBOL)_SM
NO PARKING (WITH TRANSIT LOGO)	R7-107a	R7-107a_NO PARKING (WITH TRANSIT LOGO)_SM
NO PARKING EXCEPT ON SHOULDER	R8-2	Image_Not_Available_SM
NO PARKING ON PAVEMENT	R8-1	Image_Not_Available_SM
NO PARKING PLAQUE	R8-3c	Image_Not_Available_SM
NO PARKING PLAQUE	R8-3d	Image_Not_Available_SM
NO PARKING, BIKE LANE	R7-9	R7-9_NO PARKING, BIKE LANE_SM
NO PARKING, BIKE LANE	R7-9a	R7-9a_NO PARKING, BIKE LANE_SM
NO PARKING/RESTRICTED PARKING (COMBINED SIGN)	R7-200	Image_Not_Available_SM
NO PARKING-TIME	R7-108	R7-108_NO PARKING- TIME_SM
NO PASSING ZONE	W14-3	W14-3_NO PASSING ZONE_SM
NO PEDESTRIAN CROSSING	R9-3	R9-3_NO PEDESTRIAN CROSSING_SM
NO PEDESTRIAN CROSSING	R9-3a	R9-3a_NO PEDESTRIAN CROSSING_SM
NO SIGNAL	W10-10	Image_Not_Available_SM
NO STOPPING EXCEPT ON SHOULDER	R8-6	Image_Not_Available_SM
NO STOPPING ON PAVEMENT	R8-5	Image_Not_Available_SM
NO TRAFFIC SIGNS	W18-1	Image_Not_Available_SM
NO TRAIN HORN	W10-9	Image_Not_Available_SM

NO TRUCKS	R5-2	R5-2_NO TRUCKS_SM
NO TRUCKS	R5-2a	R5-2a_NO TRUCKS_SM
NO TURN ON RED	R10-11	Image_Not_Available_SM
NO TURN ON RED	R10-11a	R10-11a_NO TURN ON RED_SM
NO TURN ON RED	R10-11b	R10-11b_NO TURN ON RED_SM
NO TURNS	R3-3	R3-3_NO TURNS_Sm
NON-MOTORIZED TRAFFIC PROHIBITED	R5-7	R5-7_NON-MOTORIZED TRAFFIC PROHIBITED_SM
NUMBER OF TRACKS	R15-2	Image_Not_Available_SM
OFF-INTERSTATE BUSINESS ROUTE (LOOP) (1,2 DIGITS)	M1-2	Image_Not_Available_SM
OFF-INTERSTATE BUSINESS ROUTE (SPUR) (1,2 DIGITS)	M1-3	Image_Not_Available_SM
ON RAMP	W13-4	Image_Not_Available_SM
ONCOMING TRAFFIC HAS EXTENDED GREEN	W25-1	Image_Not_Available_SM
ONCOMING TRAFFIC HAS EXTENDED GREEN	W25-2	Image_Not_Available_SM
ONE DIRECTION LARGE ARROW	W1-6L	Image_Not_Available_SM
ONE DIRECTION LARGE ARROW	W1-6R	W1-6R_ONE DIRECTION LARGE ARROW_SM
ONE LANE BRIDGE	W5-3	W5-3_ONE LANE BRIDGE_SM
ONE LANE ROAD	W20-4	Image_Not_Available_SM
ONE WAY	R6-1L	R6-1L_ONE WAY_SM
ONE WAY	R6-1R	R6-1R_ONE WAY_SM
ONE WAY	R6-2R	R6-2R_ONE WAY_SM
OPTIONAL MOVEMENT LANE CONTROL	R3-6L	R3-6L_OPTIONAL MOVEMENT LANE CONTROL_Sm
OPTIONAL MOVEMENT LANE CONTROL	R3-6R	R3-6R_OPTIONAL MOVEMENT LANE CONTROL_Sm
PARK AND RIDE	D4-2	Image_Not_Available_SM
PARKING AREA	D4-1	Image_Not_Available_SM
PARKING AREA ARROW & DISTANCE	D5-3c	Image_Not_Available_SM
PARKING AREA EXIT DIRECTION	D5-4	Image_Not_Available_SM
PARKING PLAQUE	R8-3b	Image_Not_Available_SM
PASS WITH CARE	R4-2	R4-2_Pass With Care_SM
PAVEMENT ENDS	W8-3	Image_Not_Available_SM
PEDESTRIAN CROSSWALK	R9-8	Image_Not_Available_SM
PEDESTRIAN DETOUR	M4-9b	Image_Not_Available_SM
PEDESTRIAN TRAFFIC	W11-2	W11-2_PEDESTRIAN TRAFFIC_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-3	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-3a	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-3b	Image_Not_Available_SM
PEDESTRIAN TRAFFIC	R10-3c	Image_Not_Available_SM

SIGNAL		
PEDESTRIAN TRAFFIC SIGNAL	R10-3d	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-3e	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-4	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-4a	Image_Not_Available_SM
PEDESTRIAN TRAFFIC SIGNAL	R10-4b	Image_Not_Available_SM
PEDESTRIANS AND BICYCLES PROHIBITED	R5-10b	Image_Not_Available_SM
PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES PROHIBITED	R5-10a	Image_Not_Available_SM
PEDESTRIANS PROHIBITED	R5-10c	Image_Not_Available_SM
PHOTO ENFORCED	R10-19	Image_Not_Available_SM
PHOTO ENFORCED	W16-10	Image_Not_Available_SM
PICNIC AREA	D5-5c	Image_Not_Available_SM
PILOT CAR FOLLOW ME	G20-4	Image_Not_Available_SM
PLAYGROUND	W15-1	Image_Not_Available_SM
POLICE	D9-14	Image_Not_Available_SM
PREFERENTIAL ONLY LANE AHEAD (GROUND MOUNTED)	R3-10	Image_Not_Available_SM
PREFERENTIAL ONLY LANE AHEAD (GROUND MOUNTED)	R3-10a	R3-10a_Preferential Only Lane Ahead (Ground Mounted)_SM
PREFERENTIAL ONLY LANE AHEAD (GROUND MOUNTED)	R3-10b	Image_Not_Available_SM
PREFERENTIAL ONLY LANE AHEAD (OVERHEAD)	R3-13	Image_Not_Available_SM
PREFERENTIAL ONLY LANE AHEAD (OVERHEAD)	R3-13a	Image_Not_Available_SM
PREFERENTIAL ONLY LANE ENDS (GROUND MOUNTED)	R3-12	Image_Not_Available_SM
PREFERENTIAL ONLY LANE ENDS (GROUND MOUNTED)	R3-12a	Image_Not_Available_SM
PREFERENTIAL ONLY LANE ENDS (GROUND MOUNTED)	R3-12b	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION	R3-11	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION (GROUND MOUNTED)	R3-11a	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION (GROUND MOUNTED)	R3-11b	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION (GROUND MOUNTED)	R3-11c	Image_Not_Available_SM

PREFERENTIAL ONLY LANE OPERATION (OVERHEAD)	R3-14	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION (OVERHEAD)	R3-14a	Image_Not_Available_SM
PREFERENTIAL ONLY LANE OPERATION (OVERHEAD)	R3-14b	Image_Not_Available_SM
PROPANE GAS	D9-15	Image_Not_Available_SM
RAMP NARROWS	W5-4	Image_Not_Available_SM
RAODSIDE PARK DISTANCE	D5-5d	Image_Not_Available_SM
RECYCLING	I-11	Image_Not_Available_SM
REDUCED SPPED (SCHOOL) ZONE AHEAD	S4-5	Image_Not_Available_SM
REDUCED SPPED (SCHOOL) ZONE AHEAD	S4-5a	Image_Not_Available_SM
REFERENCE LOCATION SIGNS	D10-1	Image_Not_Available_SM
REFERENCE LOCATION SIGNS	D10-2	Image_Not_Available_SM
REFERENCE LOCATION SIGNS	D10-3	Image_Not_Available_SM
REGISTRATION CENTER	EM-6c	Image_Not_Available_SM
REST AREA EXIT DIRECTION	D5-2	Image_Not_Available_SM
REST AREA EXIT DIRECTION	D5-2a	Image_Not_Available_SM
REST AREA GORE SIGN	D5-2b	Image_Not_Available_SM
REVERSE CURVE	W1-4L	Image_Not_Available_SM
REVERSE CURVE	W1-4R	W1-4R_RESERVE CURVE_SM
REVERSE TURN	W1-3L	Image_Not_Available_SM
REVERSE TURN	W1-3R	Image_Not_Available_SM
REVERSIBLE LANE CONTROL	R3-9d	Image_Not_Available_SM
REVERSIBLE LANE CONTROL	R3-9f	Image_Not_Available_SM
RIDE WITH TRAFFIC	R9-3c	Image_Not_Available_SM
RIGHT (CENTER) (LEFT) LANE CLOSED	W20-5	Image_Not_Available_SM
RIGHT (LEFT) LANE ENDS	W9-1	W9-1_RIGHT(LEFT) LANE ENDS_SM
RIGHT ON RED ARROW AFTER STOP	R10-17a	Image_Not_Available_SM
RIGHT SHOULDER CLOSED	W21-5aR	Image_Not_Available_SM
RIGHT SHOULDER CLOSED	W21-5bR	Image_Not_Available_SM
RIGHT TURN PROHIBITION	R3-1	R3-1_RIGHT TURN PROHIBITION_Sm
RIGHT TWO LANES CLOSED	W20-5a	Image_Not_Available_SM
ROAD CLOSED	R11-2	R11-2_ROAD CLOSED_SM
ROAD CLOSED	W20-3	Image_Not_Available_SM
ROAD CLOSED - LOCAL TRAFFIC ONLY	R11-3a	Image_Not_Available_SM
ROAD CLOSED - LOCAL TRAFFIC ONLY	R11-3b	Image_Not_Available_SM
ROAD CLOSED TO THRU TRAFFIC	R11-4	R11-4_ROAD CLOSED TO THRU TRAFFIC_SM
ROAD MACHINERY	W21-3	

ROAD NARROWS	W5-1	W5-1_ROAD NARROWS_SM
ROAD USE PERMIT REQUIRED FOR THRU TRAFFIC	EM-5	Image_Not_Available_SM
ROAD WORK	W20-1	Image_Not_Available_SM
ROAD WORK NEXT 5 MILES	G20-1	Image_Not_Available_SM
ROADSIDE PARK ARROW	D5-5b	Image_Not_Available_SM
ROUGH CROSSING	W10-15	Image_Not_Available_SM
RUNAWAY VEHICLES ONLY	R4-10	Image_Not_Available_SM
RV SANITARY STATION	D9-12	Image_Not_Available_SM
SCENIC AREA ARROW	D6-1	Image_Not_Available_SM
SCENIC AREA EXIT DIRECTION	D6-3	Image_Not_Available_SM
SCENIC OVERLOOK DISTANCE	D6-2	Image_Not_Available_SM
SCHOOL	S1-1	Image_Not_Available_SM
SCHOOL	S4-3	Image_Not_Available_SM
SCHOOL BUS STOP AHEAD	S3-1	Image_Not_Available_SM
SCHOOL SPEED LIMIT (WHEN FLASHING) (ENGLISH)	S5-1	Image_Not_Available_SM
SEATBELT	R16-1	R16-1_SEATBELT_SM
SHARE THE ROAD	W16-1	Image_Not_Available_SM
SHOULDER DROP OFF	W8-9a	Image_Not_Available_SM
SHOULDER WORK	W21-5	Image_Not_Available_SM
SIDE ROAD	W2-2L	Image_Not_Available_SM
SIDE ROAD	W2-2R	W2-2R_SIDE ROAD_SM
SIDEWALK CLOSED	R9-9	Image_Not_Available_SM
SIDEWALK CLOSED AHEAD CROSS HERE	R9-11	Image_Not_Available_SM
SIDEWALK CLOSED CROSS HERE	R9-11a	R9-11a_SIDEWALK CLOSED CROSS HERE_SM
SIDEWALK CLOSED USE OTHER SIDE	R9-10	Image_Not_Available_SM
SIGNAL AHEAD	W3-3	W3-3_SIGNAL AHEAD_SM
SIGNAL AHEAD	W3-3a	W3-3a_SIGNAL AHEAD_SM
SKEWED CROSSING	W10-12	Image_Not_Available_SM
SLIPPERY WHEN WET	W8-5	W8-5_SLIPPERY WHEN WET_SM
SLOW TRAFFIC AHEAD	W23-1	Image_Not_Available_SM
SLOWER TRAFFIC KEEP RIGHT	R4-3	R4-3_Slower Traffic Keep Right_SM
SNOWMOBILE TRAFFIC	W11-6	Image_Not_Available_SM
SOFT SHOULDER	W8-4	Image_Not_Available_SM
SPEED HUMP	W17-1	W17-1_SPEED HUMP_SM
SPEED LIMIT (ENGLISH)	R2-1	R2-1_SPEED LIMIT (ENGLISH)_Sm
SPEED REDUCTION	W3-5	W3-5_SPEED REDUCTION_SM
STATE LINE	I-2	Image_Not_Available_SM
STATE ROUTE (1,2 DIGITS)	M1-5	Image_Not_Available_SM
STAY IN LANE	R4-9	R4-9_STAY IN LANE_SM
STOP	R1-1	R1-1_STOP_Sm

STOP AHEAD	W3-1	W3-1_STOP AHEAD_SM
STOP AHEAD	W3-1a	W3-1a_STOP AHEAD_SM
STOP HERE ON RED	R10-6	R10-6_STOP HERE ON RED_SM
STOP HERE ON RED	R10-6a	Image_Not_Available_SM
STOP HERE WHEN FLASHING	R8-10	R8-10_STOP HERE WHEN FLASHING_SM
STORAGE SPACE SYMBOL	W10-11	Image_Not_Available_SM
STORAGE SPACE XX FEET (ENGLISH)	W10-11a	Image_Not_Available_SM
STORAGE SPACE XX FEET (ENGLISH)	W10-11b	Image_Not_Available_SM
STREET NAME	D-3	Image_Not_Available_SM
SURVEY CREW	W21-6	Image_Not_Available_SM
TELEPHONE	D9-1	Image_Not_Available_SM
TELEPHONE	D9-1a	Image_Not_Available_SM
TELEPHONE	D9-1b	Image_Not_Available_SM
TEMPORARY AUXILIARY (INTERSTATE)	M4-7	Image_Not_Available_SM
TEMPORARY AUXILIARY (INTERSTATE)	M4-7a	Image_Not_Available_SM
THIS SIDE OF SIGN	R7-202	Image_Not_Available_SM
THREE LANE REVERSE CURVE	W1-4cL	Image_Not_Available_SM
THREE LANE REVERSE CURVE	W1-4cR	Image_Not_Available_SM
THRU TRAFFIC MERGE LEFT	W4-7	W4-7_THRU TRAFFIC MERGE LEFT_SM
TO AUXILIARY	M4-13	Image_Not_Available_SM
TO AUXILIARY	M4-5	Image_Not_Available_SM
TO ONCOMING TRAFFIC	R1-2a	R1-2a_TO ONCOMING TRAFFIC_Sm
TOURIST INFO CENTER	D5-7a	Image_Not_Available_SM
TOURIST INFORMATION	D9-10	Image_Not_Available_SM
TOW AWAY ZONE	R7-201	Image_Not_Available_SM
TOW AWAY ZONE	R7-201a	Image_Not_Available_SM
TRACKS OUT OF SERVICE	R8-9	Image_Not_Available_SM
TRAFFIC CIRCLE PLAQUE	W16-12p	Image_Not_Available_SM
TRAFFIC CONTROL POINT	EM-3	Image_Not_Available_SM
TRAFFIC DOES NOT STOP	W4-4a	Image_Not_Available_SM
TRAFFIC DOES NOT STOP	W4-4b	Image_Not_Available_SM
TRAFFIC DOES NOT STOP	W4-4p	Image_Not_Available_SM
TRAFFIC LAWS PHOTO ENFORCED	R10-18	R10-18_TRAFFIC LAWS PHOTO ENFORCED_SM
TRAFFIC SIGNAL SPEED	I1-1	Image_Not_Available_SM
TRAILER CAMPING	D9-3a	Image_Not_Available_SM
TRAIN STATION	I-7	Image_Not_Available_SM
TRAINS MAY EXCEED XX MPH	W10-8	Image_Not_Available_SM
TRAVEL INFO CALL 511	D12-5	Image_Not_Available_SM
TRUCK AUXILIARY	M4-4	Image_Not_Available_SM
TRUCK CROSSING	W11-10	Image_Not_Available_SM
TRUCK CROSSING	W8-6	Image_Not_Available_SM



TRUCK ESCAPE RAMP	W7-4	Image_Not_Available_SM
TRUCK ESCAPE RAMP	W7-4b	Image_Not_Available_SM
TRUCK ESCAPE RAMP	W7-4c	Image_Not_Available_SM
TRUCK ESCAPE RAMP PLAQUE	W7-4d	Image_Not_Available_SM
TRUCK ESCAPE RAMP PLAQUE	W7-4e	Image_Not_Available_SM
TRUCK ESCAPE RAMP PLAQUE	W7-4f	Image_Not_Available_SM
TRUCK LANE 500 FEET	R4-6	R4-6_Truck Lane 500 Feet_SM
TRUCK PARKING	D9-16	Image_Not_Available_SM
TRUCK ROLLOVER	W1-13	Image_Not_Available_SM
TRUCK ROUTE	R14-1	R14-1_TRUCK ROUTE_SM
TRUCK SPEED LIMIT	R2-2	R2-2_TRUCK SPEED LIMIT_Sm
TRUCKS USE RIGHT LANE	R4-5	R4-5_Trucks Use Right Lane_SM
T-SYMBOL	W2-4	W2-4_T-SYMBOL_SM
TURN	W1-1L	Image_Not_Available_SM
TURN	W1-1R	W1-1R_TURN_SM
TURN (ENGLISH)	W1-1a L	Image_Not_Available_SM
TURN (ENGLISH)	W1-1a R	Image_Not_Available_SM
TURN OFF 2-WAY RADIO AND CELL PHONE	W22-2	Image_Not_Available_SM
TURNING TRAFFIC MUST YIELD TO PEDESTRIANS	R10-15	Image_Not_Available_SM
TWO DIRECTION LARGE ARROW	W1-7	W1-7_TWO DIRECTION LARGE ARROW_SM
TWO LANE REVERSE CURVE	W1-4bL	Image_Not_Available_SM
TWO LANE REVERSE CURVE	W1-4bR	Image_Not_Available_SM
TWO WAY LEFT TURN ONLY (GROUND MOUNTED)	R3-9b	R3-9b_Two Way Left Turn Only (Ground Mounted)_SM
TWO WAY TRAFFIC	W6-3	W6-3_TWO WAY TRAFFIC_SM
TWO WAY TRAFFIC	W6-4	Image_Not_Available_SM
TWO-WAY LEFT TURN (OVERHEAD MOUNTED)	R3-9a	R3-9a_Two-Way Left (Overhead Mounted)_SM
U.S. ROUTE MARKER FOR INDEPENDENT USE (1,2 DIGITS)	M1-4	Image_Not_Available_SM
UNEVEN LANES	W8-11	Image_Not_Available_SM
USE CROSSWALK	R9-3b	Image_Not_Available_SM
USE LANE WITH ARROW	R10-8	Image_Not_Available_SM
USE NEXT CROSSING	W10-14a	Image_Not_Available_SM
UTILITY WORK AHEAD	W21-7	Image_Not_Available_SM
U-TURN PROHIBITED	R3-4	R3-4_U-TURN PROHIBITED_Sm
U-TURN YIELD TO RIGHT TURN	R10-16	Image_Not_Available_SM
VAN ACCESSABLE	R7-8a	Image_Not_Available_SM
VAN ACCESSABLE	R7-8b	Image_Not_Available_SM
VEHICLES WITH LUGS PROHIBITED	R5-5	Image_Not_Available_SM
WALK ON LEFT FACING TRAFFIC	R9-1	Image_Not_Available_SM

WEATHER ROUTE	D12-1	Image_Not_Available_SM
WEIGH STATION	R13-1	Image_Not_Available_SM
WEIGH STATION EXIT DIRECTION	D8-3	Image_Not_Available_SM
WEIGH STATION NEXT RIGHT (OPEN) (CLOSED)	D8-2	Image_Not_Available_SM
WEIGHT LIMIT	R12-1	R12-1_WEIGHT LIMIT_SM
WEIGHT LIMIT	R12-3	Image_Not_Available_SM
WEIGHT LIMIT	R12-4	Image_Not_Available_SM
WEIGHT LIMIT	R12-5	Image_Not_Available_SM
WELCOME CENTER	D5-9a	Image_Not_Available_SM
WELFARE CENTER	EM-6b	Image_Not_Available_SM
WHEN CHILDREN ARE PRESENT	S4-2	Image_Not_Available_SM
WHEN FLASHING	S4-4	Image_Not_Available_SM
WHEN FLASHING	W16-13	Image_Not_Available_SM
WINDING ROAD	W1-5L	Image_Not_Available_SM
WINDING ROAD	W1-5R	W1-5R_WINDING ROAD_SM
WORKERS	W21-1	Image_Not_Available_SM
WORKERS	W21-1a	Image_Not_Available_SM
WRONG WAY	R5-1a	R5-1a_WRONG WAY_SM
YIELD	R1-2	R1-2_YIELD_Sm
YIELD AHEAD	W3-2	Image_Not_Available_SM
YIELD AHEAD	W3-2a	W3-2a_YIELD AHEAD_SM
YIELD HERE TO PEDESTRIANS	R1-5aL	R1-5aL_YIELD HERE TO PEDESTRIANS_Sm
YIELD HERE TO PEDESTRIANS	R1-5aR	R1-5aR_YIELD HERE TO PEDESTRIANS_Sm
YIELD HERE TO PEDESTRIANS	R1-5L	R1-5L_YIELD HERE TO PEDESTRIANS_Sm
YIELD HERE TO PEDESTRIANS	R1-5R	R1-5R_YIELD HERE TO PEDESTRIANS_Sm
Y-SYMBOL	W2-5	Image_Not_Available_SM

IMPROVEMENT TYPE	SUBTYPE	AVG. COST
STRIPING	PAINT	N/A
	THERMO	N/A
RAISED PAVEMENT MARKERS	NONREFLECTIVE	N/A
	REFLECTIVE	N/A
LEGENDS & SYMBOLS	OTHER	N/A
	ARROWS	N/A
	BICYCLE	N/A

	DIAMOND	N/A
	EXIT	N/A
	STOP AHEAD	N/A
	LANE ENDS	N/A
	PEDESTRIAN CROSSING	N/A
	RR CROSSING	N/A
	SCHOOL CROSSING	N/A
	SCHOOL ZONE	N/A
	SHIELD	N/A
	YIELD	N/A

CODE TYPE	ID	DESCRIPTION
ROLE	ADMIN	SYSTEM ADMINISTRATOR
ROLE	PM	PROJECT MANAGER
ROLE	PMSW	PROJECT MANAGER STUDENT WORKER
ROLE	AE	AREA ENGINEER
ROLE	USER	GENERAL USER
ROLE	VIEW	VIEWER
SITE	INT	INTERSECTION
SITE	NONINT	NONINTERSECTION
REGION	DIST	DISTRICT
REGION	PAR	PARISH
IMPROVEMENT	SN	SIGN
IMPROVEMENT	PV	PAVEMENT MARKING
APPROVAL	Y	ACCEPT
APPROVAL	N	REJECT
REASON	C	CONDITION
REASON	S	SIZE INCREASE (SIGNS)
REASON	NI	NEW INSTALL/MARKING

## **APPENDIX C**

### **Analysis Data Requirements**

SITE_TYPE	FEATURE	TABLE (FINAL)	COLUMN NAME (FINAL)	UNITS	NOTE IN HSM	NOTE	EQUATION	USED FOR
2L2W	Length of segment	DmndOTDHWYS.scdb ns	SECTION_LENGTH	mile			10-6	Nspf
2L2W	AADT	DmndOTDHWYS.scdb ns	ADT	vehicles per day			10-6	Nspf
2L2W	Lane width	DmndOTDHWYS.scdb ns	from (pavement_width_prt shoulder_width_prt)/num_lanes	feet	see remark		10-11	CMF
2L2W	Shoulder width	DmndOTDHWYS.scdb ns	SHOULDER_WIDTH_PRT	feet			10-12	CMF
2L2W	Shoulder type	DmndOTDHWYS.scdb ns	SHOULDER_TYPE_PRT		paved/gravel/composite/turf		10-12	CMF
2L2W	Presence or absence of horizontal curve	CURVE	HTYPE_ARC		curve/tangent; see remark		10-13 to 16	CMF
2L2W	Length of horizontal curve	CURVE	ASSET_LENGTH (convert to miles from feet)	miles		includes spiral transitions, if present	10-13	CMF
2L2W	radius of curvature	CURVE	RADIUS	feet			10-13	CMF
2L2W	Presence of spiral transition curve		not collected		1 if present; 0 if not; 0.5 if present at one but not both ends of the horizontal curve		10-13	CMF
2L2W	Horizontal Curves: Superelevation variance		not collected				10-14 to 16	CMF
2L2W	Grade		not collected	percent			Ex 10-19	CMF
2L2W	Driveway density		not collected	driveways per mile			10-17, 19	CMF
2L2W	Presence or absence of centerline rumble strips		not collected		0.94 for two-lane undivided highways with no separation other than a centerline marking between the lanes in opposite directions of travel. Otherwise the value of this CMF is 1.00		pa: 36	CMF
2L2W	Presence or absence of a passing lane (requires 'Presence or absence of a short four-lane section')	DmndOTDHWYS.scdb	not collected		0.75 for a conventional passing or climbing lane; 0.65 for total accidents over the length of the short four-lane section.		pa: 37	CMF
2L2W	Presence or absence of a two-way left-turn lane	DmndOTDHWYS.scdb ns	not collected					
2L2W	driveway-related accidents as a proportion of total accidents	DmndOTDHWYS.scdb ns	not collected				10-18, 19	CMF
2L2W	left-turn accidents susceptible to correction	DmndOTDHWYS.scdb ns	not collected		by a TWLTL as a proportion of driveway-related accidents			
2L2W	Roadside hazard rating (to be used in 'Roadside Design')		not collected				10-20	CMF
	Presence or absence of roadway segment lighting		not collected					
	proportion of total nighttime accidents for unlighted roadway segments that involve a fatality or injury		not collected					
2L2W	proportion of total nighttime accidents for unlighted roadway segments that involve property damage only		not collected				10-21	CMF
	proportion of total nighttime accidents for unlighted roadway segments that occur at night		not collected					

2L2W	Presence or absence of automated speed enforcement	INTERSECTION	not collected		0.93			none	CMF
INT-2L2W	Number of intersection legs	INTERSECTION	Calculated from intersection file and basemap		(3 or 4) (minor road stop or signal control)	To determine SITE_TYPE	none	ALL	
INT-2L2W	Type of traffic control	INTERSECTION	not collected			To determine SITE_TYPE	none	ALL	
INT-2L2W	Intersection skew angle	INTERSECTION	not collected	degrees departure from 90 degrees			10-22, 23	CMF	
INT-2L2W	Number of approaches with intersection left-turn lanes (requires intersection traffic control)	INTERSECTION	not collected		(0, 1, 2, 3, or 4), not including stop-controlled approaches; Minor road stop control, traffic signal		Ex 10-21	CMF	
INT-2L2W	Number of approaches with intersection right-turn lanes (requires intersection traffic control)	INTERSECTION	not collected		(0, 1, 2, 3, or 4), not including stop-controlled approaches; Minor road stop control, traffic signal		Ex 10-22	CMF	
INT-2L2W	Presence or absence of intersection lighting		not collected						
INT-2L2W	proportion of total accidents for unlighted intersections that occur at night		not collected		see defaults			10-24	CMF
INT-2L2W	AADT_min	INTERSECTION	ADT_1					10-8	Nspf
INT-2L2W	AADT_maj	INTERSECTION	ADT_2					10-8	Nspf
MULTI-LANE	Divided Undivided Segment	DmDOTDHWYSecIo	MEDIAN_TYPE					Section 11.7.1 and 11.7.2	CMF
MULTI-LANE	Length of roadway segment	DmDOTDHWYSecIo	SECTION_LENGTH	mile					
MULTI-LANE	AADT	DmDOTDHWYSecIo	ADT	vehicles per day					
MULTI-LANE	Presence of median and median width	DmDOTDHWYSecIo	NEUT_GROUND_WIDTH	feet		if NEUT_GROUND_WIDTH =0, then no median		Ex 11-28	CMF
MULTI-LANE	Side slope		not collected						
MULTI-LANE	Shoulder widths	DmDOTDHWYSecIo	SHOULDER_WIDTH_P	feet				Ex 11-23	CMF
MULTI-LANE	proportion of total accidents constituted by related accidents	DmDOTDHWYSecIo	use default						
MULTI-LANE	Shoulder type	DmDOTDHWYSecIo	SHOULDER_TYPE_PRI		0.27 (default)			Ex 11-22	CMF
MULTI-LANE	Lane width	DmDOTDHWYSecIo	from (pavement_width_pri/lanes)	feet					
MULTI-LANE	proportion of total accidents constituted by related accidents	DmDOTDHWYSecIo	use default						
MULTI-LANE	proportion of total accidents constituted by related accidents	DmDOTDHWYSecIo	use default		0.5 (default)			11-13; Ex 11-18, 11-16; Ex 11-25	CMF

	Presence of lighting		not collected						
	proportion of total nighttime accidents for unlighted roadway segments that involve a fatality or injury		not collected						
MULTI-LANE	proportion of total nighttime accidents for unlighted roadway segments that involve property damage only		not collected					11-15; Ex 11-24; 11-17; Ex 29	CMF
	proportion of total nighttime accidents for unlighted roadway segments that occur at night		not collected						
MULTI-LANE	Presence of automated speed enforcement		not collected		1 for noninjury crashes; 0.83 in exists for all types of injury accidents			none	CMF
INT-MULTI-LANE	Number of intersection legs	INTERSECTION	Calculated from intersection file and basemap		(3 or 4)			none	ALL
INT-MULTI-LANE	Type of traffic control	INTERSECTION	not collected		(minor road STOP or signalized)			none	ALL
INT-MULTI-LANE	Intersection skew angle	INTERSECTION	not collected		(stop controlled intersections)			11-18, 19	CMF
INT-MULTI-LANE	Number of approaches with intersection left-turn lanes (requires intersection traffic control)	INTERSECTION	not collected		(stop controlled intersections)			Ex 11-32, 33	CMF
INT-MULTI-LANE	Number of approaches with intersection right-turn lanes (requires intersection traffic control)	INTERSECTION	not collected		(stop controlled intersections)			Ex 11-34	CMF
INT-MULTI-LANE	Presence or absence of lighting		not collected		see defaults				
	proportion of total accidents for unlighted intersections that occur at night		not collected						
	SITE TYPE (2 Lane or Multi-Lane)	DINDOTDHWYSections	NIM_LANES (HIGHWAY_CLASS)				212W, ML, 35T, 45T, 45G		
	Multi-lane Divided	DINDOTDHWYSections	MEDIAN_TYPE						
	Intersection Type (Number of Intersection Legs and Type of Traffic Control)	INTERSECTION	Legs calculated, default traffic control						
	Field to relate CURVE with HWY_SECTION	CURVE	CURVE_SQML_ID						

A light gray world map is centered in the background of the page. The text is overlaid on this map.

# Safety Evaluation Tool

## *Installation Manual*

---



## Installation of the Safety Evaluation Website

Assumptions: This web application is a Microsoft .Net application. It has been installed and tested on Microsoft IIS versions 6 and 7. The database is a Microsoft SQL Server database. The backup database provided runs on Microsoft SQL Server 2008 R2.

The installation guidance provided here involve the general steps to get the website setup. There may be additional tasks that are necessary for a successful installation depending on the target environment.

### Installation

1. Copy website folder to a location accessible by web server that will host the site.
2. Create a website through the IIS manager. (Steps will vary depending on version of IIS).  
*Note: Ensure user account used to run the application pool has read/write access to the database.*
3. Restore database backup to target database server that will host LASET database. (Details will depend on environment)
4. Modify web.config file in website to point to database restored in Step 3.
  - a. Line 13 – change connection string by replacing <db server> with valid database server name.
  - b. Line 13 – change connection string by replacing <database> with the valid database name.



Louisiana Safety Evaluation Tool

User Manual

## Table of Contents

<b>LOGGING IN AND OFF</b> .....	3
Log into LaSET.....	3
Log off from LaSET.....	4
<b>USER MANAGEMENT</b> .....	4
Create a new User.....	4
View Existing Users.....	5
Edit a User.....	7
Delete a User.....	8
Password Reset by the System Administrator.....	8
Password Reset by the User.....	9
<b>CREATING NEW PROJECTS AND SITES</b> .....	10
Create a New Project.....	11
Create a New Project Site.....	12
Assign a Project Site to a Project Engineer.....	14
Remove a Project Engineer Assignment from a Project Site.....	15
Assign a Project to a Data Entry User.....	15
Remove a Data Entry User Assignment from a Project.....	16
<b>Project Site Improvements</b> .....	17
View Site Improvements.....	17
Update Signage for a Project Site.....	18
Edit Signage for a Project Site.....	19
Update Pavement Markings for a Project Site.....	19
Remove Signage and Pavement Markings.....	19
Upload a Document for Site.....	20
<b>Update Projects and Project Sites</b> .....	21
Edit Project Details.....	21
Delete a Project.....	21
Edit a Project Site.....	22
Delete a Project Site.....	22
<b>Project Site Approval</b> .....	23
Post-Construction Site Approval.....	23
Remove Post-Construction Site Approval.....	24
Upload Post-Improvement Photo for Site.....	25
Remove Post-Improvement Photo for Site.....	25
<b>VIEWER FUNCTIONALITIES</b> .....	26
View Existing Users.....	26
View Projects.....	28
View Project Sites and Site Improvements.....	29
View Project Engineer Site Assignments.....	30
View Data Entry Project Assignments.....	31
<b>Crash Analysis</b> .....	31
Filtering and Sorting Site List.....	31
Selecting Sites for Analysis.....	33
Viewing Analysis Results.....	33
Exporting Analysis Results.....	34

## LOGGING IN AND OFF

The procedures in this section apply to all users.

### [Log into LaSET](#)

1. Open an internet browser.
2. Type <http://lasetdev.lsu.edu> in the address bar.  
The LaSET login page displays.



Figure 1: Log in screen of LaSET.

3. Enter the *User ID* and *Password* in their respective fields.
4. Click **Log In**.

The *User Homepage* displays with *User Role* and *User Name* displayed in the upper right of the page (see Figure 2).

*NOTE:* Check the *Remember ME?* box to save the password for future logins.

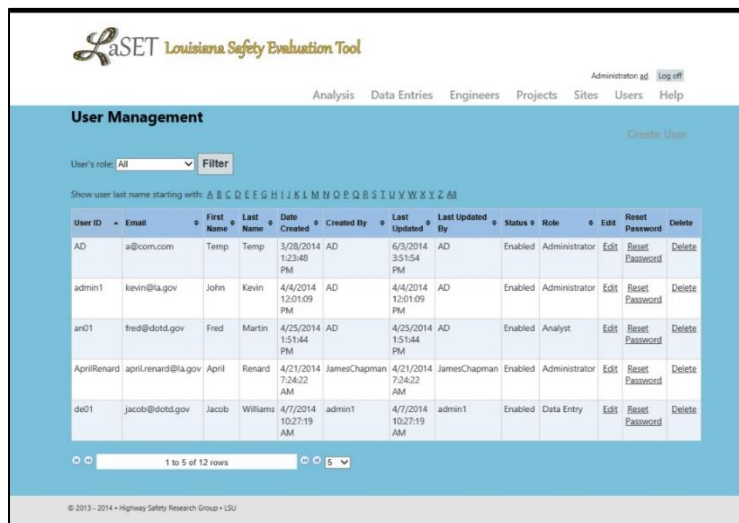


Figure 2: User Home page of LaSET.

## [Log off from LaSET](#)

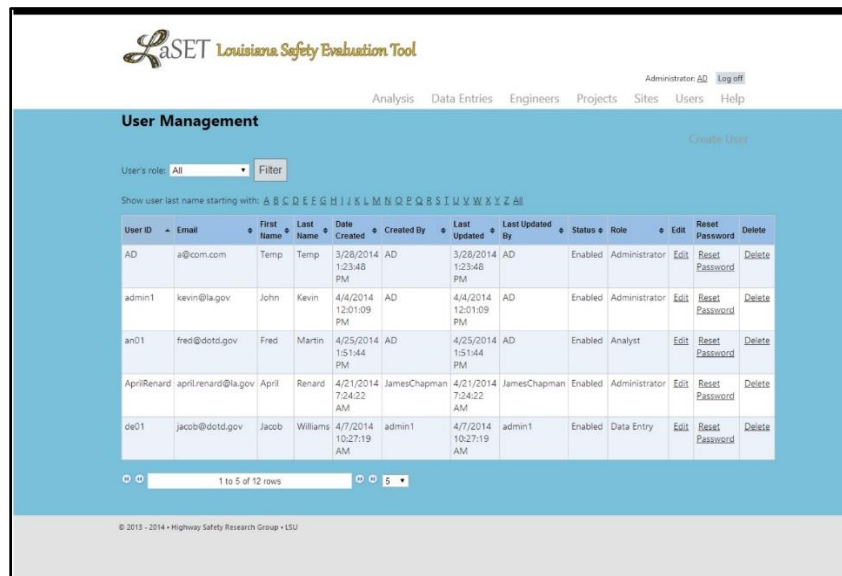
1. Click **Log off** in the top right-hand corner of the home page.  
The *LaSET Login* page displays (see Figure 1).

## USER MANAGEMENT

The procedures in this section, except for *Password Reset by the User*, apply to administrators. The procedures for *Password Reset by the User* apply to all users.

### [Create a new User](#)

1. Click **Users** in the *Options Menu*.  
The *User Management* page displays.



User ID	Email	First Name	Last Name	Date Created	Created By	Last Update	Last Updated By	Status	Role	Edit	Reset Password	Delete
AD	a@com.com	Temp	Temp	3/28/2014 1:23:48 PM	AD	3/28/2014 1:23:48 PM	AD	Enabled	Administrator	Edit	Reset Password	Delete
admin1	kevin@la.gov	John	Kevin	4/4/2014 12:01:09 PM	AD	4/4/2014 12:01:09 PM	AD	Enabled	Administrator	Edit	Reset Password	Delete
an01	fred@dotd.gov	Fred	Martin	4/25/2014 1:51:44 PM	AD	4/25/2014 1:51:44 PM	AD	Enabled	Analyst	Edit	Reset Password	Delete
AprilRenard	april.renard@la.gov	April	Renard	4/21/2014 7:24:22 AM	JamesChapman	4/21/2014 7:24:22 AM	JamesChapman	Enabled	Administrator	Edit	Reset Password	Delete
dew01	jacob@dotd.gov	Jacob	Williams	4/7/2014 10:27:19 AM	admin1	4/7/2014 10:27:19 AM	admin1	Enabled	Data Entry	Edit	Reset Password	Delete

Figure 3: User Management page of LaSET.

2. Click **Create User**.  
The *Create a New User* page displays.

**Create a new user:**

User ID

Password

Confirm Password

Email Address

First Name

Last Name

Role Name  
Analyst

Create

Figure 4: Creating a new user.

3. Enter all user information displayed.
4. Select the appropriate *Role Name* of the user from the drop down box.
5. Click **Create**.

The *User Created Confirmation* page displays.

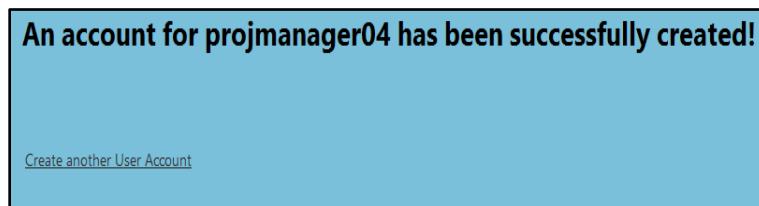


Figure 5: User Created Confirmation and option of creating another user.

6. Do you wish to create another user?  
Yes- Select **Create another User Account** and go back to Step 3.  
No- The process is complete.

### [View Existing Users](#)

1. Click **Users**.
2. The *User Management* displays (see Figure 3, p. 4).  
Proceed to Step 3 to sort by *User Role*.  
OR  
Proceed to Step 4 to sort by columns.  
OR  
Proceed to Step 6 to adjust the number of viewable records.  
  
*Sort by User Role*
3. Select the desired User role from the *User Role* dropdown list.
4. Click **Filter**.  
Users of only the selected user type are listed.

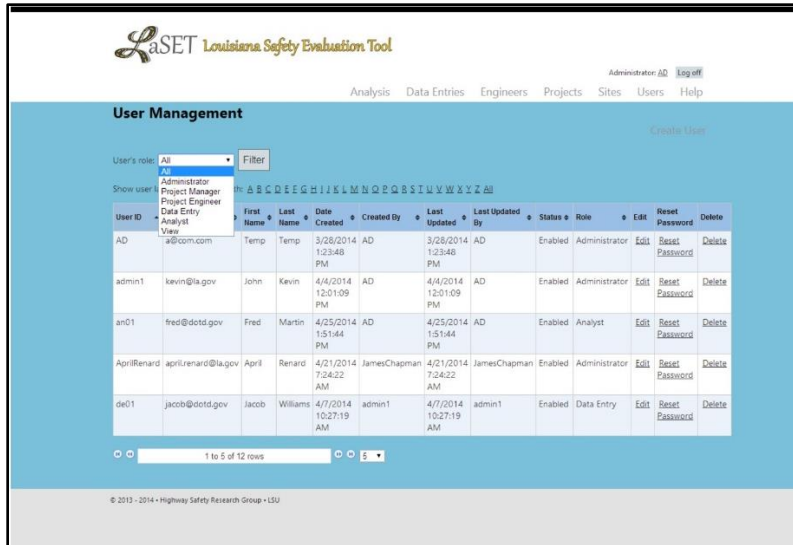


Figure 6: Sorting users by user type.

*Sort by Columns*

5. Click any column header to sort users, by that column, in ascending order.
6. Click the same column header to sort users in descending order (if desired).

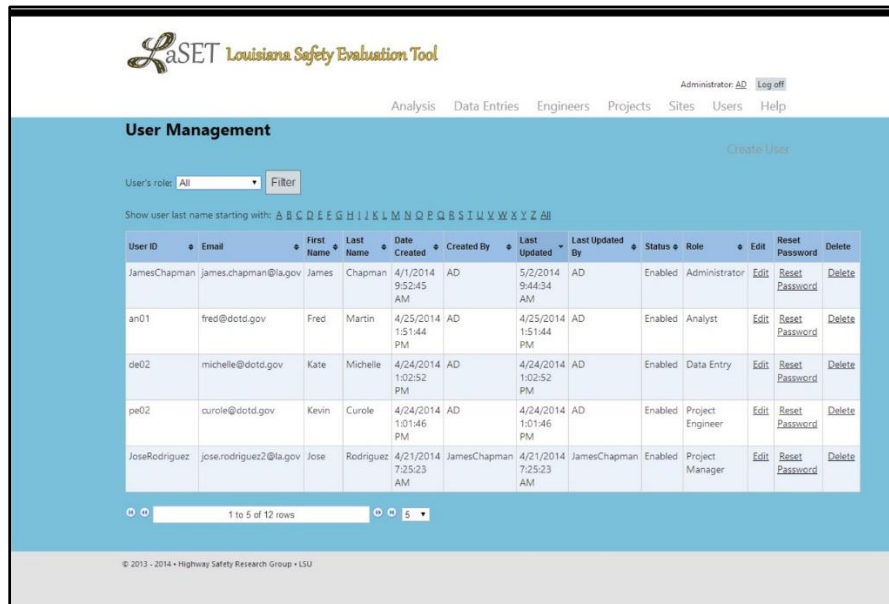


Figure 7: Sorting users by column.

*Adjust the Number of Viewable Records*

7. Click the **Record Number** dropdown (located at the bottom of the page).
8. Select the desired number of viewable records.  
The list increases/decreases based on selection.

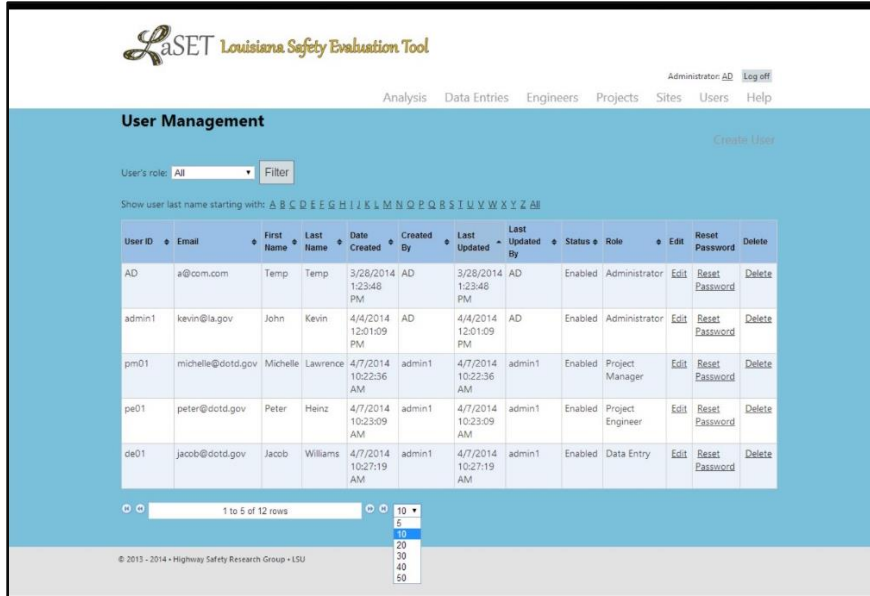


Figure 8: Adjusting the number of viewable records.

## Edit a User

1. Click **Users**.  
The *User Management* page displays (see Figure 3, p. 4).
2. Locate the desired user in the list (see the *Sort by User's Role* section for easier search).
3. Click the **Edit** link that is associated with the user to be modified.  
The *Edit User* page displays.

The 'Edit User' form includes the following fields and options:

- Email Address: a@com.com
- First Name: Temp
- Last Name: Temp
- Current Status: Enabled (dropdown)
- Role Name: Administrator (dropdown)
- Save button
- Back to List link

Figure 9: Edit User page

4. Edit the appropriate information in the following fields:  
*Email address*  
*First name*  
*Last name*



*Current Status* dropdown menu (to Enable/Disable)  
*Role Name* dropdown menu

5. After making the desired changes, click **Save**.  
The *User Update Confirmation* message displays.  
*NOTE*: If changes are not required then click **Back to List** (see figure 9).
6. If you wish to edit another user then click **Edit another User** and return to Step 2.

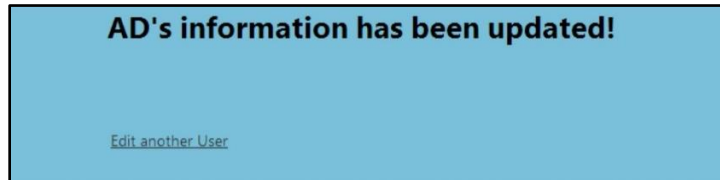


Figure 10: User Update Confirmation and option of editing another user.

### Delete a User

1. Click **Users**.  
The *User Management* page displays (see Figure 3, p. 4).
2. Locate the desired user in the list (see the *Sort by User's Role* section for easier search).
3. Click the **Delete** link associated that is associated with the user to be deleted.  
The *Delete User Confirmation* page displays (see Figure 11, p. 8).

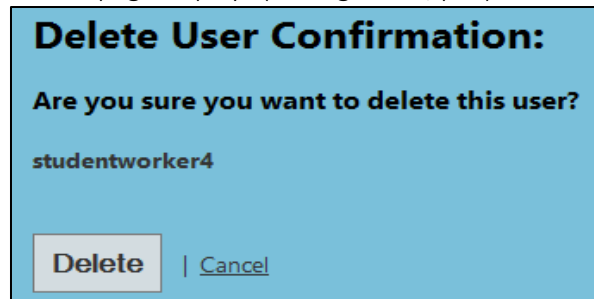


Figure 11: Deleted User Confirmation and Cancel option.

4. Click **Delete** to remove the user (or **Cancel** to avoid deletion).

### Password Reset by the System Administrator

1. Click **Users**.  
The *User Management* page displays (see Figure 3, p. 5).
2. Locate the desired user in the list (see the *Sort by User's Role* section for easier search).
3. Click the **Reset Password** link that is associated with appropriate user.  
The *Reset Password* page displays.

**Reset Password for: AD**  
New Password  
.....  
Confirm New Password  
.....  
Save  
[Back to List](#)

Figure 12: Reset password screen.

4. Enter the new password in the *New Password* and *Confirm Password* fields.
5. Click **Save**.  
The *Password Reset Confirmation* page displays.  
*NOTE:* Click **Back to List** to cancel the password reset process.
6. Do you wish to reset another user password?  
Yes- Click **Reset Password for another User Account** and return to Step 2.  
No- The process is complete.

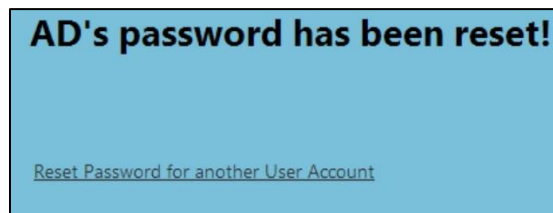


Figure 13: Password reset confirmation creation confirmation.

### [Password Reset by the User](#)

1. Click the [User ID](#) link in the top-right hand corner.

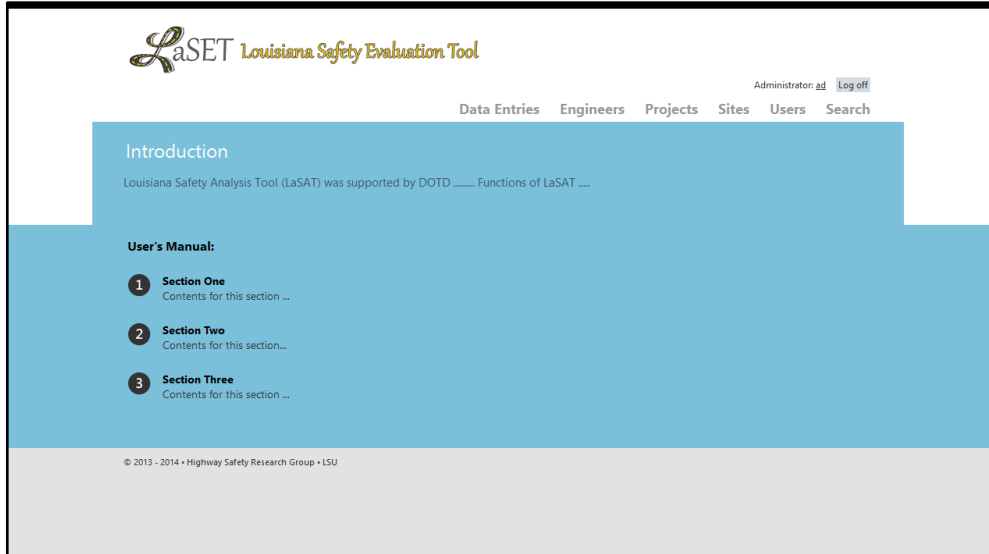


Figure 14: Home page of LaSET

2. Enter the current password in the *Current Password* field.
3. Enter the new password in the *New Password* and *Confirm New Password* fields.

Figure 15: Change Password page

4. Click **Change Password**.  
The *Password Reset Confirmation* page displays.

**Your password has been changed!**

Figure 16: Password reset confirmation creation confirmation.

## CREATING NEW PROJECTS AND SITES

The procedures in this section apply to administrators, project managers and data entry users.

## Create a New Project

1. Click **Projects** in the *Options Menu*.  
The *Project Management* page displays.

State Project Number	Project Description	Project Cost	Region Type	Region	Contractor Information	Project Begin Date	Project End Date	Project Created Date	Project Created By	Project Last Updated Date	Project Last Updated By	Edit	Delete
H.000000	Project details	\$150,000.00	District	Chase	contractor details	4/1/2014 12:00:00 AM	10/31/2014 12:00:00 AM	4/7/2014 10:26:17 AM	admin1	5/2/2014 8:25:11 AM	AD	Edit	Delete
H.000001	Road Safety Measures	\$210,201.50	Parish	ACADIA	C01	5/1/2014 12:00:00 AM	9/30/2014 12:00:00 AM	4/22/2014 3:12:55 PM	AD	4/22/2014 3:12:55 PM	AD	Edit	Delete
H.000002	Highway Safety Improvements	\$2,500,000.00	Parish	EVANGELINE	C02	8/1/2014 12:00:00 AM	1/30/2015 12:00:00 AM	4/22/2014 3:15:48 PM	AD	4/22/2014 3:15:48 PM	AD	Edit	Delete
H.000003	Highway Safety Measures	\$3,000,000.00	Parish	JEFFERSON DAVIS	C03	9/1/2014 12:00:00 AM	12/31/2014 12:00:00 AM	4/22/2014 3:16:49 PM	AD	4/22/2014 3:16:49 PM	AD	Edit	Delete
H.005454	Parish Road Safety Measures	\$500,000.00	Parish	ALLEN	C04	11/1/2014 12:00:00 AM	2/15/2015 12:00:00 AM	4/22/2014 3:20:26 PM	AD	4/22/2014 3:22:02 PM	AD	Edit	Delete

Figure 17: Project Management page

2. Click **Create Project** in the top right-hand corner.  
The *Create Project* page displays.
3. Enter the details of the new project in the following fields:
  - State Project Number* (required to be in H.##### format)
  - Project Description*
  - Project Cost*
  - Contractor Information*
4. Click the **Region Type** dropdown and select from the following:
  - District*
  - Parish*
5. Click the **Region** dropdown and make the appropriate selection:
  - If *Region Type* is *District* then select the appropriate district headquarters.
  - If *Region Type* is *Parish* then select the appropriate parish name.
6. Click the **Project Begin Date** field (or select the dropdown arrow).  
A calendar displays.



Figure 18: Calendar.

7. Select the appropriate date (or enter it in the *MM/DD/YYYY* format).  
*NOTE:* Click the left or right arrow, in the month/year calendar heading, to change months.
8. Click the **Project End Date** field.  
A calendar displays.
9. Repeat Steps 7 - 8 and then proceed to Step 10.
10. Click **Create**.

Figure 19: Create a new project.

The *Project Management* page displays and the newly created project is reflected in the project list.

State Project Number	Project Description	Project Cost	Region Type	Region	Contractor Information	Project Begin Date	Project End Date	Project Created Date	Project Created By	Project Last Updated Date	Project Last Updated By	Edit	Delete
H.000002	description one	\$1,000,000.00	District	Chase	contractor zero	3/31/2014 12:00:00 AM	5/1/2014 12:00:00 AM	3/28/2014 1:53:17 PM	AD	3/28/2014 2:39:32 PM	AD	Edit	Delete
H.000003	Project Three	\$123,456.78	District	Bridge City	Contractor One	4/1/2014 12:00:00 AM	4/30/2014 12:00:00 AM	3/31/2014 1:27:51 PM	AD	3/31/2014 1:27:51 PM	AD	Edit	Delete
H.000004	Project Number Four	\$987,654.01	Parish	CLAIBORNE	Contractor Two	4/1/2014 12:00:00 AM	5/30/2014 12:00:00 AM	3/31/2014 1:29:12 PM	AD	3/31/2014 1:29:12 PM	AD	Edit	Delete
H.000009	hwy	\$1,000,000.00	District	Alexandria	matt	1/1/0001 12:00:00 AM	1/1/0001 12:00:00 AM	3/31/2014 9:04:50 AM	AD	3/31/2014 9:18:32 AM	AD	Edit	Delete

Figure 20: Newly created project appears in the list.

### [Create a New Project Site](#)

1. Click **Sites** in the *Options Menu*.  
The *Sites Management* page displays.

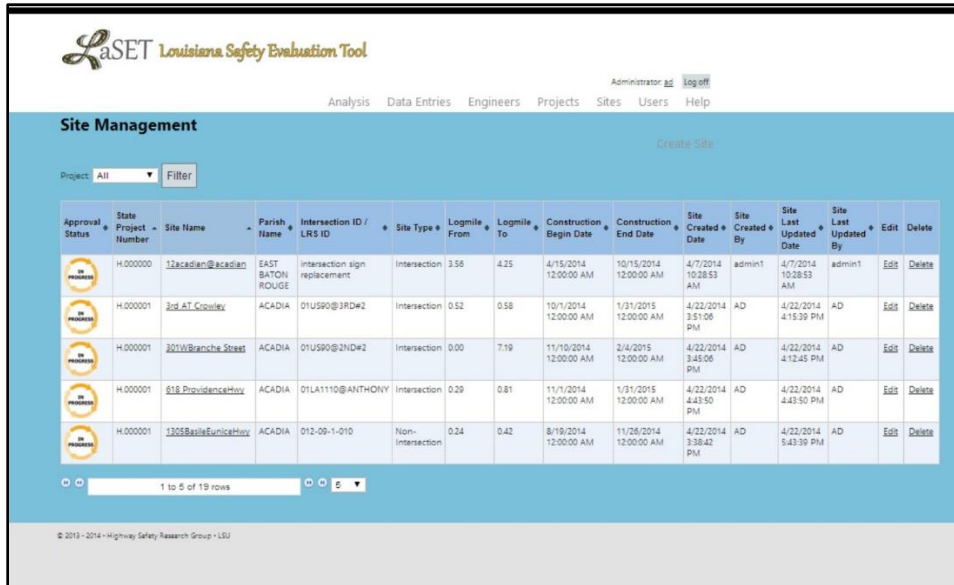


Figure 21: Sites Management page.

2. Click **Create Site**.  
The *Create Site* page displays.

Figure 22: Sites Management page

3. Click the **State Project Number** dropdown and make the appropriate selection.
4. Click the **Parish Name** dropdown and select the Parish in which the project site is located.
5. Click the **Site Type** dropdown and select from the following:  
*Intersection*  
*Non-Intersection*
6. Enter the details of the new project in the following fields:  
*Intersection ID/LRS ID* (based on *Site Type* selection)  
*Site Name*  
*Logmile From*  
*Logmile To*
7. Click the **Construction Begin Date** field (or select the dropdown arrow).

- A calendar displays (see Figure 18, p10).
- Select the appropriate date (or enter it in the *MM/DD/YYYY* format).  
*NOTE:* Click the left or right arrow, in the month/year calendar heading, to change months.
  - Click the **Construction End Date** field.  
A calendar displays.
  - Repeat Steps 7 -8 and then proceed to Step 10.
  - Click **Create**.  
The *Site Management* page displays and the newly created project site is reflected in the list.

### Assign a Project Site to a Project Engineer

- Click **Engineers** in the *Options Menu*.  
The *Project Engineer Management* page displays.

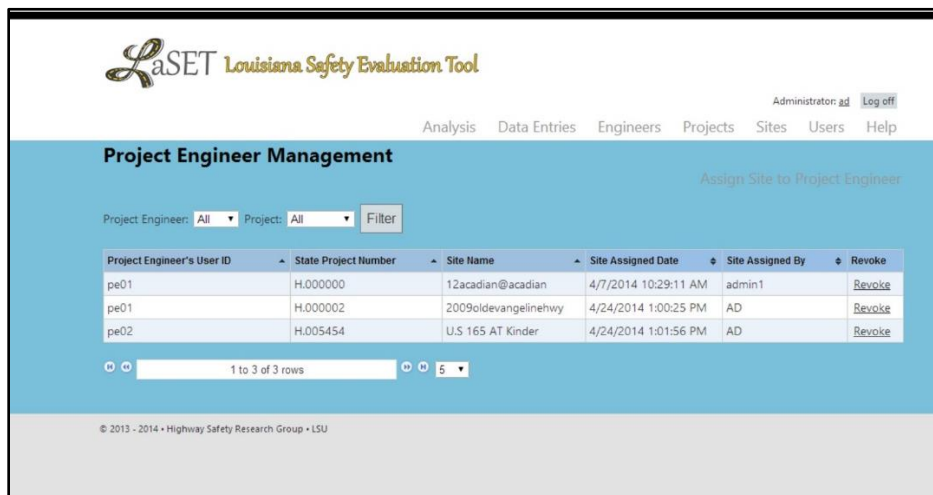


Figure 23: Project Engineer Management page.

- Click **Assign Site to Project Engineer** in the top right-hand corner.
- The *Project Engineer Site Assignment* page displays.

**Assign a site of a project to an Engineer :**

**Project Engineer's User ID**  
pe

**State Project Number**  
H.000002

**Site Name**  
road safety

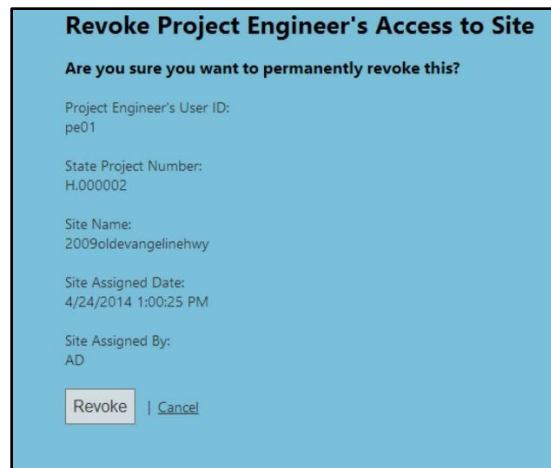
|

Figure 24: Assigning a site to project engineer

- Click the **Project Engineer's User ID** dropdown menu and select the desired user.
- Click the **State Project Number** dropdown menu and select the desired project number.
- Click the **Site Name** dropdown menu and select the desired site.
- Click **Assign**.  
The *Project Engineer Management* page displays and the new assignment is reflected in the list.  
*NOTE:* Click **Cancel** to cancel the assignment process.

## Remove a Project Engineer Assignment from a Project Site

1. Click **Engineers** in the *Options Menu*.  
The *Project Engineer Management* page displays.
2. Click the **Project Engineer's User ID** dropdown menu and select the desired user.
3. Click **Filter**.
4. Click the **Revoke** link located at the end of the row of the appropriate assignment (see Figure 23, p. 13).  
The *Revoke Project Engineer's Access* page displays.



**Revoke Project Engineer's Access to Site**

Are you sure you want to permanently revoke this?

Project Engineer's User ID:  
pe01

State Project Number:  
H.000002

Site Name:  
200901devangelinehwy

Site Assigned Date:  
4/24/2014 1:00:25 PM

Site Assigned By:  
AD

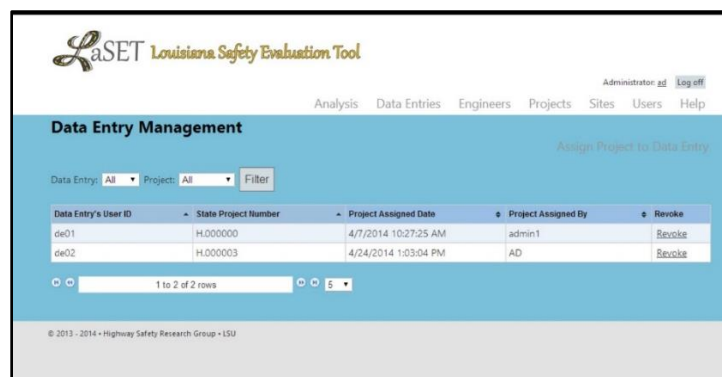
| [Cancel](#)

Figure 25: Revoke a Project Engineer Assignment.

5. Click **Revoke**.  
The *Project Engineer Management* page displays and the assignment is no longer listed.  
**NOTE:** Click **Cancel** to cancel the process.

## Assign a Project to a Data Entry User

1. Click **Data Entries** in the *Options Menu*.  
The *Data Entry Management* page displays.



**LaSET Louisiana Safety Evaluation Tool**

Administrator [ad](#) [Log off](#)

[Analysis](#) [Data Entries](#) [Engineers](#) [Projects](#) [Sites](#) [Users](#) [Help](#)

**Data Entry Management** [Assign Project to Data Entry](#)

Data Entry: [All](#) Project: [All](#)

Data Entry's User ID	State Project Number	Project Assigned Date	Project Assigned By	Revoke
de01	H.000000	4/7/2014 10:27:25 AM	admin1	<a href="#">Revoke</a>
de02	H.000003	4/24/2014 1:03:04 PM	AD	<a href="#">Revoke</a>

1 to 2 of 2 rows | 5

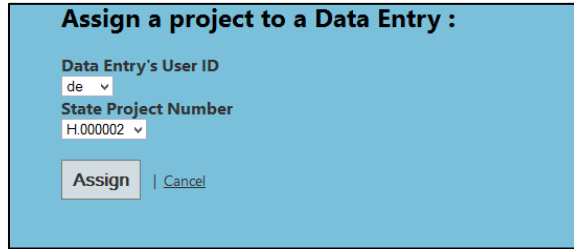
© 2013 - 2014 - Highway Safety Research Group - LSU

Figure 26: Data Entry Management page.

2. Click **Assign Project to Data Entry**.



The *Data Entry Assignment* page displays.



**Assign a project to a Data Entry :**

Data Entry's User ID  
de

State Project Number  
H.000002

Assign | Cancel

Figure 27: Assigning a project to a data entry user.

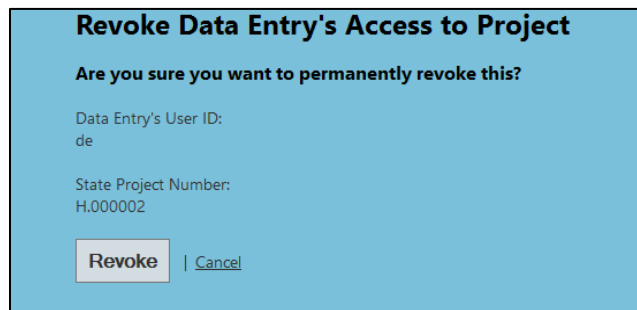
3. Click the **Data Entry User** dropdown and select the desired user.
4. Click the **State Project Number** dropdown menu and select the desired project number.
5. Click **Assign**.

The *Data Entry Management* page displays and the new assignment is reflected in the list.

*NOTE:* Click **Cancel** to cancel the assignment process.

#### [Remove a Data Entry User Assignment from a Project](#)

1. Click **Data Entries** in the *Options Menu*.  
The *Data Entry Management* page displays.
2. Click the **Data Entry User's ID** dropdown menu and select the desired user.
3. Click **Filter**.
4. Click the **Revoke** link located at the end of the row of the appropriate assignment.  
The *Revoke Data Entry Access* page displays.



**Revoke Data Entry's Access to Project**

Are you sure you want to permanently revoke this?

Data Entry's User ID:  
de

State Project Number:  
H.000002

Revoke | Cancel

Figure 28: Revoke a Data Entry user assignment.

5. Click **Revoke**.  
The *Data Entry Management* page displays and the assignment is no longer listed.  
*NOTE:* Click **Cancel** to cancel the process.

## PROJECT SITE IMPROVEMENTS

The procedures in this section apply to administrators, project managers and data entry users.

### [View Site Improvements](#)

1. Click **Sites** in the *Options Menu*.  
The *Sites Management* page displays.

Approval Status	State Project Number	Site Name	Parish Name	Intersection ID / LRS ID	Site Type	Logmile From	Logmile To	Construction Begin Date	Construction End Date	Site Created Date	Site Created By	Site Last Updated Date	Site Last Updated By	Edit	Delete
	H.000000	13Acadian@Acadian	EAST BATON ROUGE	intersection sign replacement	Intersection	3.56	4.25	4/15/2014 12:00:00 AM	10/15/2014 12:00:00 AM	4/7/2014 10:28:53 AM	admin1	4/7/2014 10:28:53 AM	admin1	Edit	Delete
	H.000001	3rd AT Coulee	ACADIA	01US90@3RD#2	Intersection	0.52	0.58	10/1/2014 12:00:00 AM	1/21/2015 12:00:00 AM	4/22/2014 3:51:00 PM	AD	4/22/2014 4:15:39 PM	AD	Edit	Delete
	H.000001	201W Branche Street	ACADIA	01US90@2ND#2	Intersection	0.00	7.19	11/10/2014 12:00:00 AM	2/4/2015 12:00:00 AM	4/22/2014 3:45:06 PM	AD	4/22/2014 4:12:45 PM	AD	Edit	Delete
	H.000001	618 Providence Hwy	ACADIA	01LA1110@ANTHONY	Intersection	0.29	0.81	11/1/2014 12:00:00 AM	1/21/2015 12:00:00 AM	4/22/2014 4:43:50 PM	AD	4/22/2014 4:43:50 PM	AD	Edit	Delete
	H.000001	1305BasilEunice Hwy	ACADIA	012-05-1-010	Non-Intersection	0.24	0.42	8/19/2014 12:00:00 AM	11/26/2014 12:00:00 AM	4/23/2014 3:38:42 PM	AD	4/22/2014 5:43:39 PM	AD	Edit	Delete

Figure 29: The list of project sites.

2. Click the **Project** dropdown and select the appropriate Project Number.
3. Click **Filter**.  
Only project sites for the selected project number display in the list.  
*NOTE:* An *Approval Status* is displayed for each project site. The three status options are:
  - = The project site improvements have been approved by the project engineer.
  - = The project site improvements have been rejected by the project engineer.
  - = The project site improvements have not been completed or the completed improvements are awaiting the project engineer's review.
4. Click the desired Site Name within the list.
5. The *Site Improvements* page displays and reflects any previously added improvements and documents (see Figure 30, p. 17).

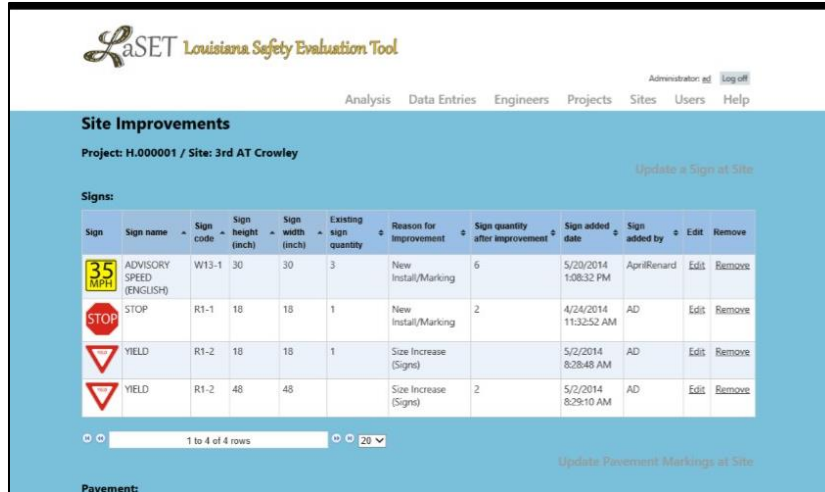


Figure 30: Project site improvements.

### [Update Signage for a Project Site](#)

1. Complete Steps 1-5 in the *View Site Improvements* section (p. 16).
2. Click **Update a Sign at Site** on the right-hand side of the page. The *Update a Sign at Site* page displays.

Figure 31: Updating project site signage.

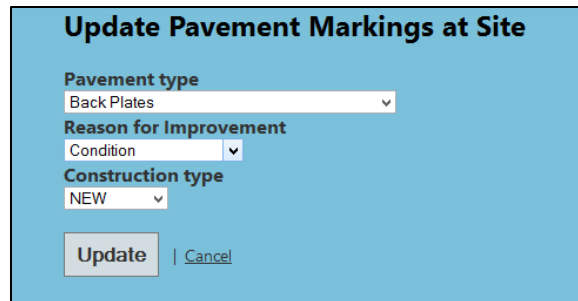
3. Click the **Sign name/code** dropdown and select the desired sign from the list.
  4. Click the **Sign Size** dropdown and select the desired size from the list.
  5. Enter the number of selected signs, currently existing at the site, in *Existing Sign Quantity*.
  6. Click the **Reason for Improvement** drop-down and select one of the following options:
    - Condition
    - Other
    - New Install/Marking
    - Size Increase (Signs)
- NOTE: If New Install/Marking is selected then The Existing Sign Quantity should equal zero (0).*
7. Enter the number of signs (at the selected size), that will exist after improvements are made, in the *Sign Quantity After Improvement* field.
  8. Click **Update**.
- The *Site Improvements* page displays and reflects the new sign information.
- NOTE: Click **Cancel** to cancel the sign update process.*

### [Edit Signage for a Project Site](#)

1. Complete Steps 1-5 in the *View Site Improvements* section (p. 16) if needed.
2. Click the **Edit** link located near the end of the row of the appropriate sign.  
The *Edit Signage* page displays and all previously added sign information.
3. Complete the appropriate steps, 3-7, in the previous section to properly edit the sign information.
4. Click **Save**.  
The *Site Improvements* page displays and reflects the new sign information.  
*NOTE:* Click **Cancel** to cancel the edit process.

### [Update Pavement Markings for a Project Site](#)

1. Complete Steps 1-5 in the *View Site Improvements* section (p. 16).
2. Click **Update Pavement Markings at Site** on the right-hand side of the page.  
The *Update Pavement Marking at Site* page displays.



**Update Pavement Markings at Site**

**Pavement type**  
Back Plates

**Reason for Improvement**  
Condition

**Construction type**  
NEW

**Update** | **Cancel**

Figure 32: Updating project site pavement markings.

3. Click the **Pavement Type** dropdown and select the desired improvement from the list.
4. Click the **Reason for Improvement** drop-down and select one of the following options:
  - Condition*
  - Other*
  - New Install/Marking*
  - Size Increase (Signs)*
5. Click the **Construction Type** dropdown and select one of the following options:
  - New*
  - Remove*
  - Replace*
6. Click **Update**.  
The *Site Improvements* page displays and reflects the new pavement marking information.  
*NOTE:* Click **Cancel** to cancel the pavement marking update process.

### [Remove Signage and Pavement Markings](#)

1. Complete Steps 1-5 in the *View Site Improvements* section (above).
2. Click the **Remove** link located at the end of the row of the improvement to be removed.  
The *Removal Confirmation* page displays.

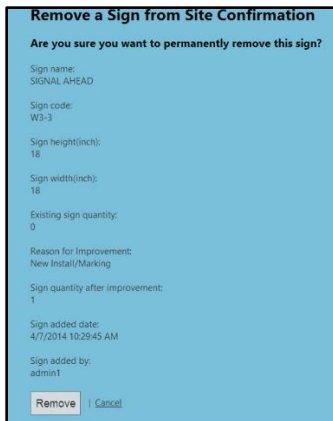


Figure 33: Remove improvements from a project site.

3. Click **Remove**.

The *Site Improvements* page displays and the improvement is no longer listed.

**NOTE:** Click Cancel to cancel the improvement removal process.

### Upload a Document for Site

1. Complete Steps 1-5 in the *View Site Improvements* section (above).
2. Click **Upload a Document for Site** on the right-hand side of the page. The *Upload Document* page displays.

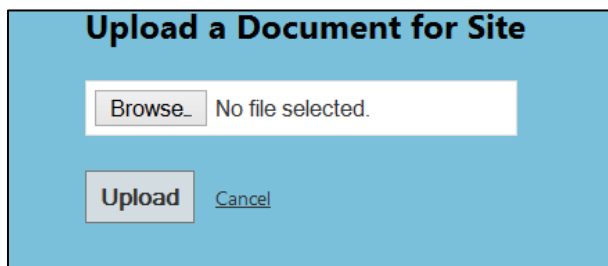


Figure 34: Uploading a document for a project site.

**NOTE:** Only one PDF document can be saved for a project site. Uploading a document will overwrite an existing one.

3. Click **Browse** (or **Choose File**, depending on the internet browser). A file explorer window opens.

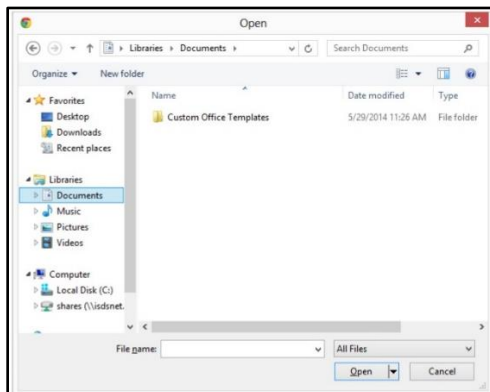


Figure 35: Locating the appropriate file.

4. Navigate to the folder that contains the appropriate PDF file.
5. Select the file and click **Open**.  
The file explorer window closes and the file name displays to the right of the Browse button.
6. Click **Upload**.  
The *Site Improvements* page displays with the viewable document.  
*NOTE:* Click **Cancel** to cancel the document upload process.

## UPDATE PROJECTS AND PROJECT SITES

The procedures in this section apply to administrators, project managers and data entry users.

### Edit Project Details

1. Click **Projects** in the *Options Menu*.  
The *Project Management* page displays.
2. Click the **Edit** link associated with the desired state project number.  
The *Edit Project* page displays.
3. Change any of the following:
  - State Project Number*
  - Project Description*
  - Project Cost*
  - Region Type*
  - Region*
  - Contractor Information*
  - Project Begin Date*
  - Project End Date*
4. Click **Save**.  
The *Project Management* page displays and reflects all changes to the project details.

### Delete a Project

1. Click **Projects** in the *Options Menu*.  
The *Project Management* page displays.
2. Click the **Delete** link associated with the desired state project number.  
The *Delete Project Confirmation* page displays.

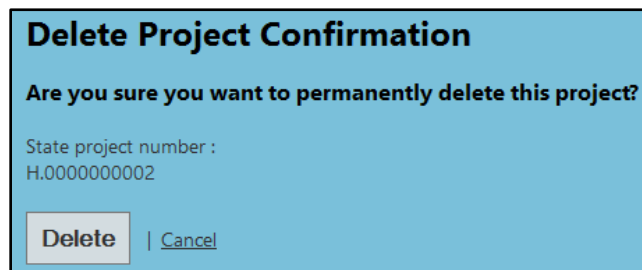


Figure 36: Delete a Project Confirmation page.

3. Click **Delete**.  
The *Project Management* page displays and the project is no longer listed.

**NOTE:** Click **Cancel** to cancel the deletion process.

**Important:** A project cannot be deleted if sites are associated with it. Deleting such a project would result in the project's deletion as well as all sites and improvements contained within the project. An error message displays if there is an attempt to delete such a project.

### Edit a Project Site

1. Click **Sites** in the *Options Menu*.  
The *Sites Management* page displays.
2. Click the **Edit** link associated with the desired project site.  
The *Edit Site* page displays.
5. Change any of the following:
  - State Project Number*
  - Parish Name*
  - Site Type*
  - Intersection ID / LRS ID*
  - Site Name*
  - Logmile From*
  - Logmile To*
  - Construction Begin Date*
  - Construction End Date*
6. Click **Save**.  
The *Site Management* page displays and reflects all changes to the site details.

### Delete a Project Site

1. Click **Sites** in the *Options Menu*.  
The *Sites Management* page displays.
2. Click the **Delete** link associated with the desired project site.  
The *Delete Site Confirmation* page displays.

**Delete Site Confirmation**

**Are you sure you want to permanently delete this site?**

State Project Number :  
H.000000

Site Name :  
12acadian@acadian

Parish Name :  
EAST BATON ROUGE

Site Type :  
Intersection

Intersection ID / LRS ID :  
intersection sign replacement

Logmile From :  
3.56

Logmile To :  
4.25

Construction Begin Date :  
4/15/2014 12:00:00 AM

Construction End Date :  
10/15/2014 12:00:00 AM

|

Figure 37: Delete a Project Site Confirmation page.

3. Click **Delete**.

The *Site Management* page displays and the project site is no longer listed.

**NOTE:** Click **Cancel** to cancel the deletion process.

***IMPORTANT:*** A project site cannot be deleted if improvements have been added and are associated with it. An error message displays if there is an attempt to delete such a project site.

## PROJECT SITE APPROVAL

The procedures in this section apply to project engineers.

### Post-Construction Site Approval

1. Complete Steps 1-5 in the *View Site Improvements* section (above).

The screenshot displays the 'Project Site Approval' interface. It features three main sections: 'Signs', 'Pavement', and 'Improvements'. Each section includes a table with columns for various attributes and a 'Reason for Improvement' dropdown. The 'Signs' table has one row with a 'MADE NOT AVAILABLE' icon. The 'Pavement' table has one row for 'Back Plates'. The 'Improvements' table shows 'No Record Found!'. There are also buttons for 'Add Approval to for Site' and 'Upload a Post Improvement Document for Site'. A footer contains the copyright information: '© 2013 - 2014 • Highway Safety Research Group • LSU'.

Signs:								
Sign	Sign name	Sign code	Sign height(inch)	Sign width(inch)	Existing sign quantity	Reason for Improvement	Sign quantity after improvement	
	2 MILES (1 LINE) (ENGLISH)	W16-3a	12	30	1	Condition	1	

Pavement:		
Pavement Markings	Reason for Improvement	Construction type
Back Plates	Condition	NEW

Improvements:		
Post Improvement	Uploaded Date	Remove
No Record Found!		

Figure 38: Project Site Approval.

2. Click **Add Approval to for Site**.

The *Update Approval for Site* page displays.



Figure 39: Project site approval details.

3. Click the **Approval Status** dropdown and select one of the following:  
*Accept*  
*Reject*
4. Enter notes regarding the project site in the *Reason Description* field.
5. Enter the total number of installed signs in the *Sign Quantity of Approval* field.
6. Click **Add**.  
 The *Site Improvements and Approval* page displays and the approval information is listed.  
 NOTE: Click **Cancel** to cancel the approval process.

#### Remove Post-Construction Site Approval

1. Complete Steps 1-5 in the *View Site Improvements* section (above).
2. Click **Delete Approval for Site**.  
 The *Delete Approval for Site* page displays.

Figure 40: Deleting a prior project site's approval.

3. Click **Delete**.  
 The *Site Improvements and Approval* page displays and the approval information is no longer listed.
4. NOTE: Click **Cancel** to cancel the approval deletion process.

## Upload Post-Improvement Photo for Site

1. Complete Steps 1-5 in the *View Site Improvements* section (above).
2. Click **Upload a Post Improvement Document for Site** on the right-hand side of the page.  
The *Upload an Improvement Document* page displays.

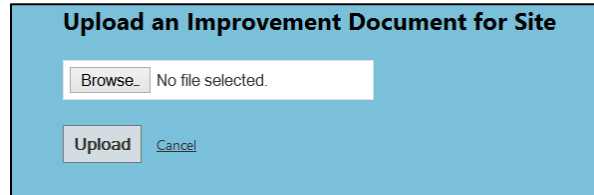


Figure 41: Uploading photos for a project site.

*NOTE:* Multiple JPEG files can be saved for a project site. Uploading additional photos will *not* overwrite any existing ones.

3. Click **Browse** (or **Choose File**, depending on the internet browser).  
A file explorer window opens.
4. Navigate to the folder that contains the appropriate JPEG file.
5. Select the file and click **Open**.  
The file explorer window closes and the file name displays to the right of the Browse button.
6. Click **Upload**.

The *Site Improvements and Approval* page displays with the viewable photos.

*NOTE:* Click **Cancel** to cancel the photo upload process.

## Remove Post-Improvement Photo for Site

1. Complete Steps 1-5 in the *View Site Improvements* section (above).
2. Scroll to locate the photo to be removed.

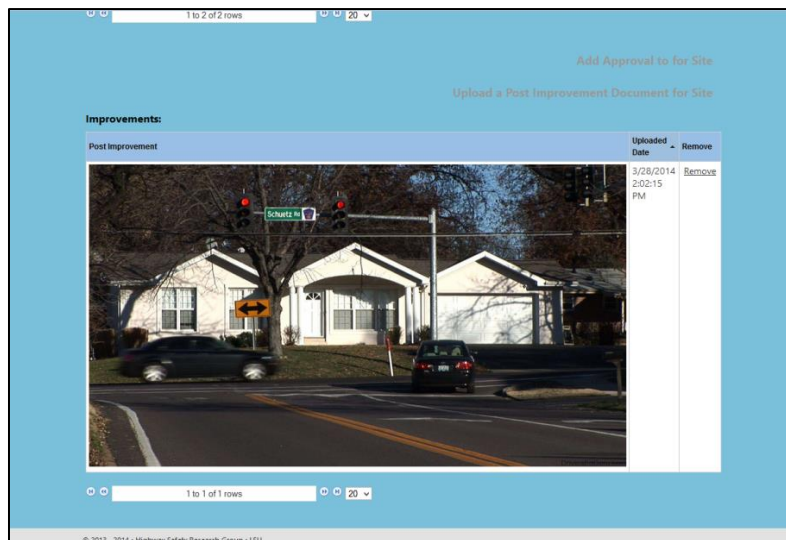


Figure 42: Locating and deleting pot-improvement photos.

3. Click the **Remove** link on the right side of the photo.  
The *Photo Removal Confirmation* page displays.

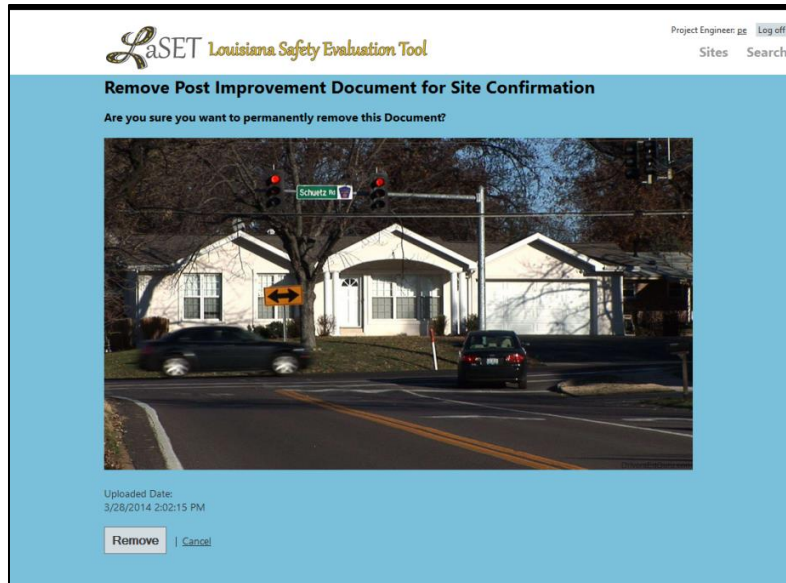


Figure 43: Confirming the removal of a project site's photo.

4. Click **Remove**.  
The *Site Improvements and Approval* page displays and the photo no appears.  
*NOTE:* Click **Cancel** to cancel the photo deletion process.

## VIEWER FUNCTIONALITIES

The viewer user type provides read only access to all levels of user and project information. This includes current and completed projects.

### [View Existing Users](#)

1. Click **Users** in the *Options Menu*.
  2. The *User Management* displays (see Figure 3, p. 4).  
Proceed to Step 3 to sort by *User Role*.  
OR  
Proceed to Step 4 to sort by columns.  
OR  
Proceed to Step 6 to adjust the number of viewable records.
- Sort by User Role*
3. Select the desired User role from the *User Role* dropdown list.
  4. Click **Filter**.  
Users of only the selected user type are listed.

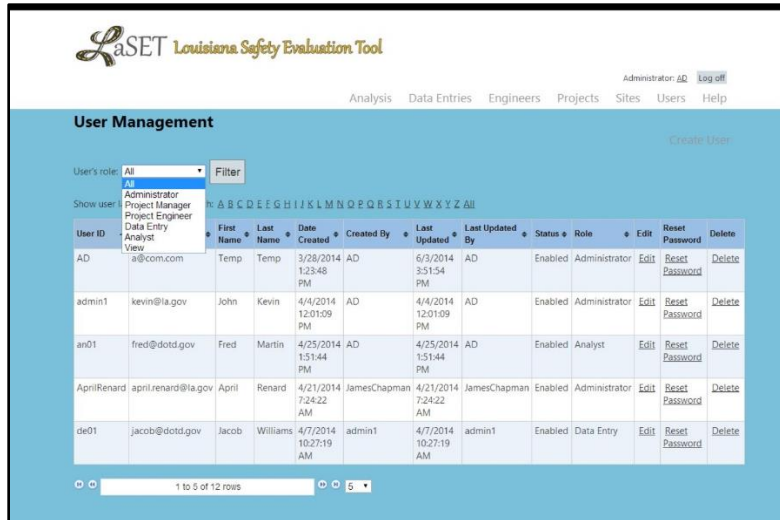


Figure 44: Sorting users by user type.

### Sort by Columns

5. Click any column header to sort users, by that column, in ascending order.
6. Click the same column header to sort users in descending order (if desired).

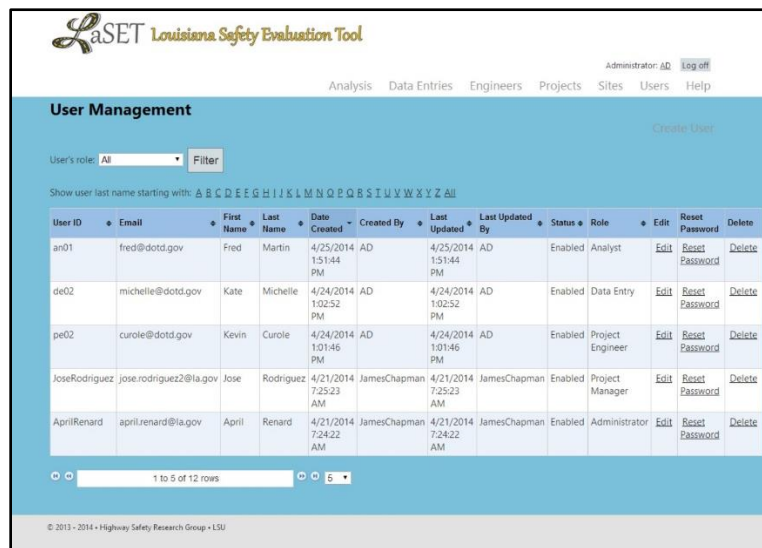


Figure 45: Sorting users by column.

### Adjust the Number of Viewable Records

7. Click the **Record Number** dropdown (located at the bottom of the page).
8. Select the desired number of viewable records.  
The list increases/decreases based on selection.

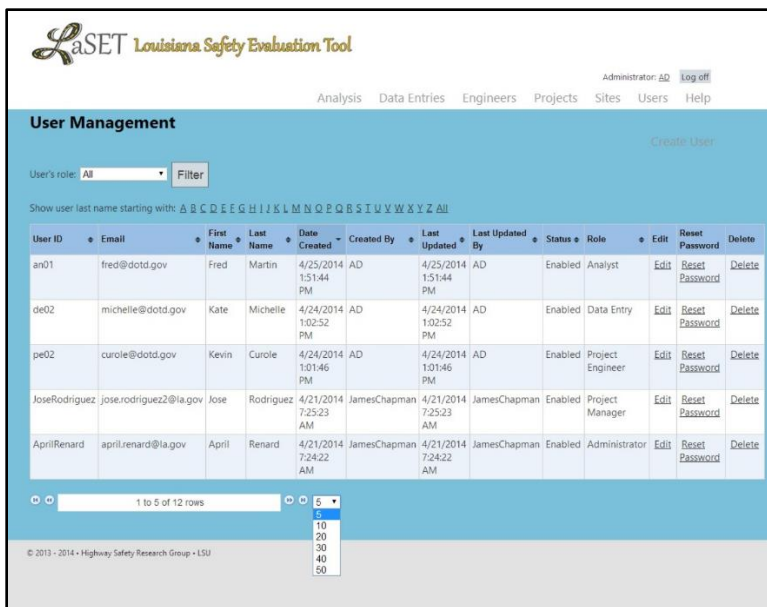


Figure 46: Adjusting the number of viewable records.

## View Projects

1. Click **Projects** in the *Options Menu*.  
The *Project Management* page displays.

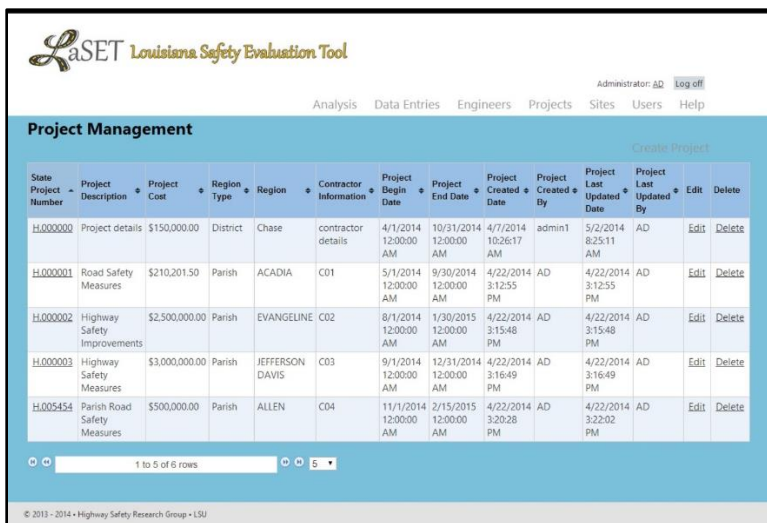


Figure 47: Project Management page

2. View the following project information:  
*State Project Number*

Project Description  
 Project Cost  
 Region Type  
 Region  
 Contractor Information  
 Project Begin Date  
 Project End Date  
 Project Created Date  
 Project Created By  
 Project Last Updated Date  
 Project Last Updated By

- Click the desired **State Project Number** within the list to display this information for one project.

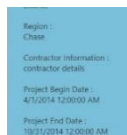


Figure 48: Project Details page

### [View Project Sites and Site Improvements](#)

- Click **Sites** in the *Options Menu*.  
 The *Sites Management* page displays.

Approval Status	State Project Number	Site Name	Parish Name	Intersection ID / LRS ID	Site Type	Logmile From	Logmile To	Construction Begin Date	Construction End Date	Site Created Date	Site Created By	Site Last Updated Date	Site Last Updated By	Edit	Delete
APPROVED	H.000000	37acadian@acadian	EAST BATON ROUGE	Intersection sign replacement	Intersection	3.56	4.25	4/15/2014 12:00:00 AM	10/15/2014 12:00:00 AM	4/7/2014 10:28:53 AM	admin1	4/7/2014 10:28:53 AM	admin1	Edit	Delete
APPROVED	H.000001	308 AT Crossway	ACADIA	01US90@3RDW2	Intersection	0.52	0.58	10/1/2014 12:00:00 AM	1/31/2015 12:00:00 AM	4/22/2014 3:51:06 PM	AD	4/22/2014 4:18:39 PM	AD	Edit	Delete
APPROVED	H.000001	302W Banche Street	ACADIA	01US90@2NDW2	Intersection	0.00	7.19	11/10/2014 12:00:00 AM	2/4/2015 12:00:00 AM	4/22/2014 3:45:06 PM	AD	4/22/2014 4:12:45 PM	AD	Edit	Delete
APPROVED	H.000001	618 Providence Hwy	ACADIA	01LA110@ANTHONY	Intersection	0.29	0.81	11/1/2014 12:00:00 AM	1/31/2015 12:00:00 AM	4/22/2014 4:43:50 PM	AD	4/22/2014 4:43:50 PM	AD	Edit	Delete
APPROVED	H.000001	1305 Basile Function Hwy	ACADIA	012-08-1-010	Non-Intersection	0.24	0.42	8/19/2014 12:00:00 AM	11/26/2014 12:00:00 AM	4/22/2014 3:38:42 PM	AD	4/22/2014 5:43:39 PM	AD	Edit	Delete

Figure 49: The list of project sites.

- Click the **Project** dropdown and select the appropriate Project Number.
- Click **Filter**.  
 Only project sites for the selected project number display in the list.  
**NOTE:** An *Approval Status* is displayed for each project site. The three status options are:

- ✓ : The project site improvements have been approved by the project engineer.
- ✗ : The project site improvements have been rejected by the project engineer.



: The project site improvements have not been completed or the completed improvements are awaiting the project engineer’s review.

4. Click the desired **Site Name** within the list.
5. The *Site Improvements* page displays and reflects any previously added improvements, documents and photographs.

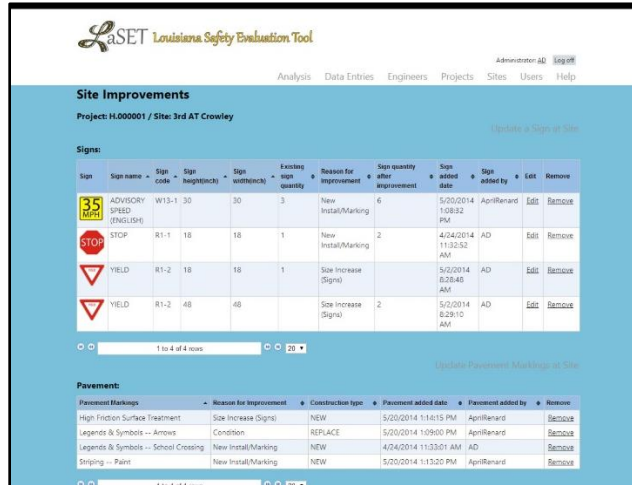


Figure 50: Project site improvements.

### [View Project Engineer Site Assignments](#)

1. Click **Engineers** in the *Options Menu*.  
The *Project Engineer Management* page displays.

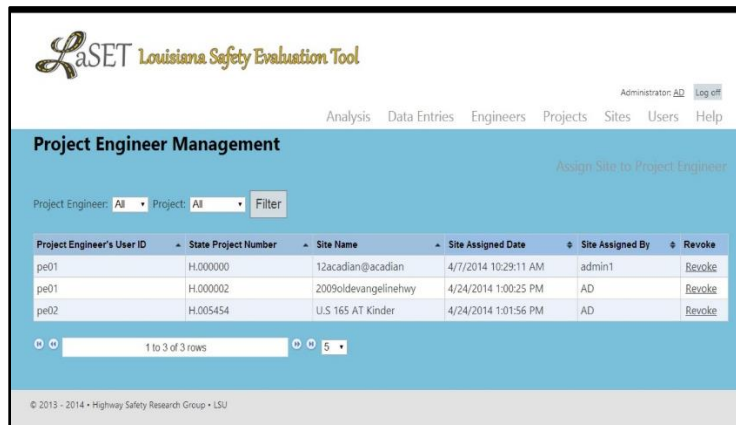


Figure 51: Project Engineer Management page.

2. View the following assignment information:
  - Project Engineer's User ID*
  - State Project Number*
  - Site Name*
  - Site Assigned Date*
  - Site Assigned By*
3. (Optional) Click the **Project Engineer** or **Project** dropdown menu and select the desired user or project.

- Click **Filter**.  
If filtered by *Project Engineer* then the list displays all project sites assigned to the selected user.  
If filtered by *Project* then the list displays only projects site assignments that fall under the selected project number.

### [View Data Entry Project Assignments](#)

- Click **Data Entries** in the *Options Menu*.  
The *Data Entry Management* page displays.

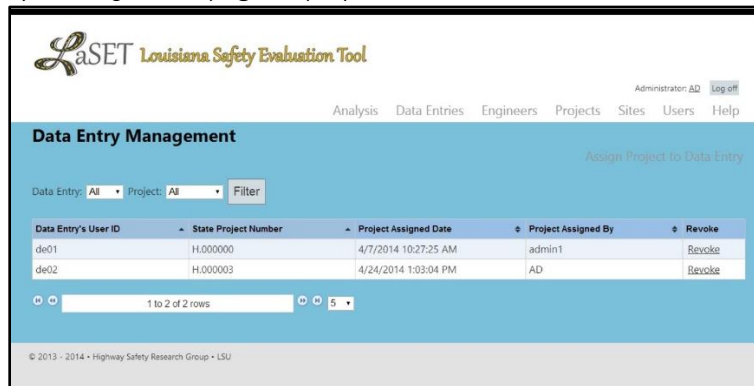


Figure 52: Data Entry Management page.

- View the following assignment information:  
*Data Entry's User ID*  
*State Project Number*  
*Site Name*  
*Site Assigned Date*  
*Site Assigned By*
- (Optional) Click the **Data Entry** or **Project** dropdown menu and select the desired user or project.
- Click **Filter**.  
If filtered by *Data Entry* then the list displays all projects assigned to the selected user.  
If filtered by *Project* then then list displays all data entry users assigned to the selected project number.

## CRASH ANALYSIS

The analysis objectives for the tool are to easily search for safety improvement locations, retrieve “before and after” crash analysis results and export analysis results.

### [Filtering and Sorting Site List](#)

- Click **Analysis** in the *Options Menu*.  
A list of all project sites displays.  
Proceed to Step 2 to filter by *Parish*.  
OR  
Proceed to Step 4 to sort by columns.  
OR  
Proceed to Step 6 to adjust the number of viewable records.



*Sort by Parish*

2. Click the **Parish** dropdown menu and select the desired parish.
3. Click **Filter**.

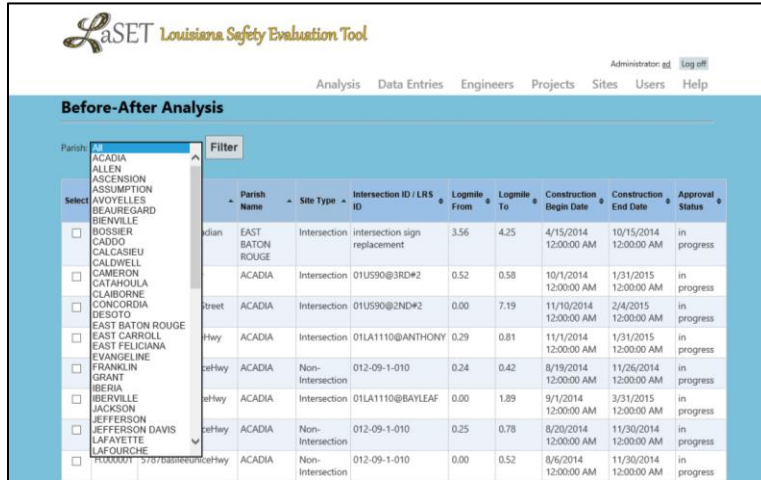


Figure 53: Sorting Sites by Parish

*Sort by Columns*

4. Click any column header to sort sites, by that column, in ascending order.
5. Click the same column header to sort users in descending order (if desired).

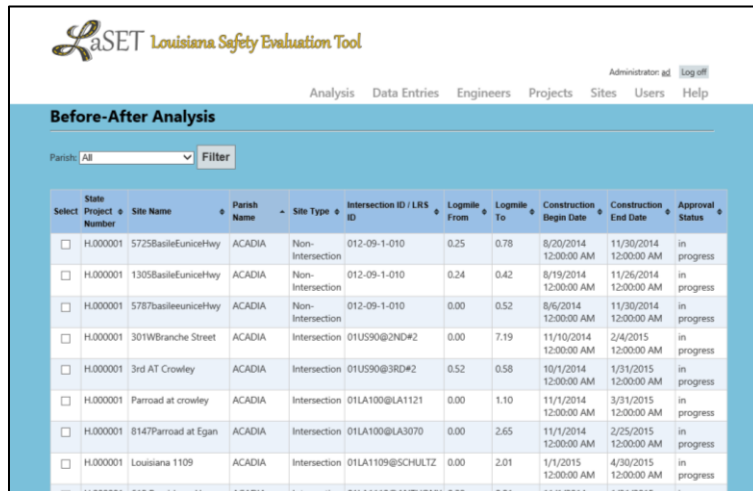


Figure 54: Sorting Sites by Column

*Adjust the Number of Viewable Records*

6. Click the **Record Number** dropdown (located at the bottom of the page).
7. Select the desired number of viewable records. The list increases/decreases based on selection.

<input type="checkbox"/>	H.000001	1504 ProvidenceHwy	ACADIA	Intersection	01LA110@BAYLEAF	0.00	1.89	9/1/2014 12:00:00 AM	3/31/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.005454	US 165 AT Kinder	ALLEN	Intersection	02US165@2ND	0.23	3.53	1/2/2015 12:00:00 AM	3/31/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.005454	4th Avenue AT Kinder	ALLEN	Intersection	02US165@4TH	0.34	3.81	9/10/2014 12:00:00 AM	2/28/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.005454	US 165 AT Oberlin	ALLEN	Intersection	02US165@4TH#2	0.00	13.85	9/10/2014 12:00:00 AM	1/31/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.005454	16170US 165 AT Kinder	ALLEN	Non-Intersection	014-03-2-010	0.01	10.78	1/1/0001 12:00:00 AM	1/1/0001 12:00:00 AM	in progress
<input type="checkbox"/>	H.009791	LA 429 at LA 22	ASCENSION	Non-Intersection	264-04-1-010	4.92	5.15	8/13/2014 12:00:00 AM	2/13/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.000000	12acadian@acadian	EAST BATON ROUGE	Intersection	intersection sign replacement	3.56	4.25	4/15/2014 12:00:00 AM	10/15/2014 12:00:00 AM	in progress
<input type="checkbox"/>	H.000002	2009soldevangelinewhy	EVANGELINE	Intersection	01LA100@BLUFF	0.00	1.98	10/1/2014 12:00:00 AM	12/31/2014 12:00:00 AM	in progress
<input type="checkbox"/>	H.000002	1491oldevangelinewhy	EVANGELINE	Intersection	01LA100@MAPLE	0.34	0.99	10/1/2014 12:00:00 AM	3/31/2015 12:00:00 AM	in progress
<input type="checkbox"/>	H.000003	3rdStreet AT Jennings	JEFFERSON DAVIS	Intersection	01US90@3RD	0.00	0.50	9/1/2014 12:00:00 AM	12/31/2014 12:00:00 AM	in progress

1 to 19 of 19 rows

Period Duration (Year)  
3

Predict

Figure 55: Adjusting the number of viewable records.

### Selecting Sites for Analysis

1. Click the **Select** box that corresponds to the site(s) to be analyzed.
2. Select the number of years to be analyzed from the *Period Duration* dropdown list.  
*NOTE: This number represents the number of years to be analyzed before safety improvements were made at the location and the number of years after the safety improvements were complete.*
3. Click **Predict**.  
The *Predictive Results* page displays.

### Viewing Analysis Results

1. Review the *Selected* section for an overview of the sites selected for analysis.
2. View the *Results Per Period* section for the before and after results of the time span selected. This includes:

<i>State Project Number</i>	<i>Total Observed</i>
<i>Intersection ID / LRS ID</i>	<i>Total Predicted</i>
<i>Site Name</i>	<i>Total Expected</i>
<i>Site Type</i>	<i>Average Observed</i>
<i>Logmile From</i>	<i>Average Predicted</i>
<i>Logmile To</i>	<i>Average Expected</i>
<i>Period</i>	<i>K</i>
<i>Begin Date</i>	<i>W</i>
<i>End Date</i>	

3. View the *Results Per Year* section for the before and after results for each individual year within the time span selected. This includes:

<i>State Project Number</i>	<i>Site Type</i>
<i>Intersection ID / LRS ID</i>	<i>Logmile From</i>
<i>Site Name</i>	<i>Logmile To</i>

	<i>Period</i>	<i>AADT (minor, major)</i>
	<i>Year Begin/End Date</i>	<i>K</i>
<i>Observed</i>		<i>C</i>
<i>SPF</i>		<i>CMF</i>
<i>Predicted</i>		

- View the *Log Information* section for missing information, in the analysis calculations, that were replaced with default values (and *could* alter the final results).

### Exporting Analysis Results

The analysis results can be exported to Microsoft Excel, but must be done for each section (Results Per Period, Results Per Year and Log Information). The process of exporting the data is optimized for Google Chrome and Mozilla Firefox. Recent releases of Microsoft Internet Explorer to not support the Export functionality.

- Identify the web browser of choice.  
Proceed to Step 2 to export with *Google Chrome*.  
OR  
Proceed to Step 4 to export with *Mozilla Firefox*.  
OR  
Proceed to Step 8 to export with *Microsoft Internet Explorer*.

#### Export with Google Chrome

- Click the **Export Data to Excel** button located below the appropriate section heading. The file automatically downloads.

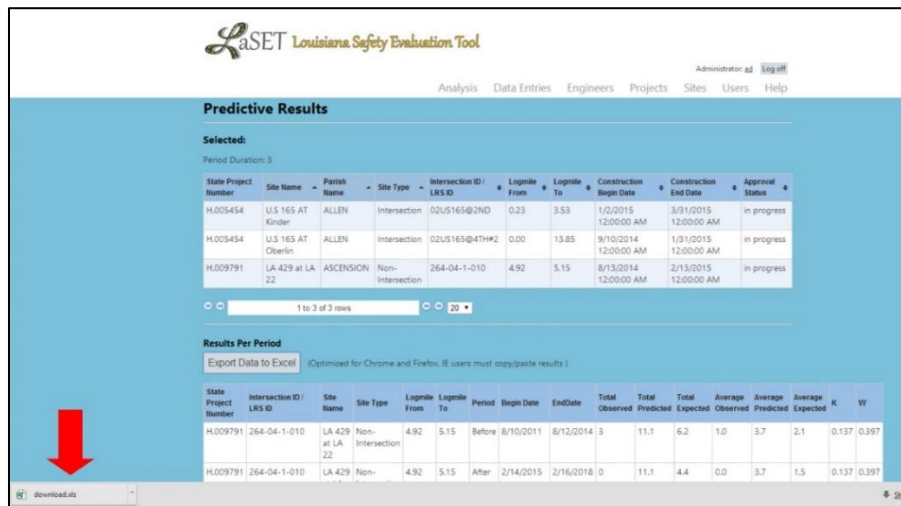


Figure 56: The downloaded file from exporting in Chrome.

- Click the **download file**.  
Microsoft Excel opens and reflects the same information that is viewable in the browser.

State Project Number	Intersection ID / LRS ID	Site Name	Site Type	Logmile From	Logmile To	Period	Begin Date	EndDate	Total Observed	Total Predicted	Total Expected	Average Observed	Average Predicted	Average Expected	K	W
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	Before	8/10/2011	8/12/2014	3	11.1	6.2	1.0	3.7	2.1	0.137	0.397
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	After	2/14/2015	2/16/2018	0	11.1	4.4	0.0	3.7	1.5	0.137	0.397
H.005454	02U5165@2ND	U.S 165 AT Kinder	Intersection	0.23	3.53	Before	1/1/2015	1/1/2015	0	0	0	0	0	0	0	0
H.005454	02U5165@2ND	U.S 165 AT Kinder	Intersection	0.23	3.53	After	4/1/2015	4/3/2018	0	0	0	0	0	0	0	0
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	Before	9/7/2011	9/9/2014	0	0	0	0	0	0	0	0
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	After	2/1/2015	2/3/2018	0	0	0	0	0	0	0	0

Figure 57: The exported results in Microsoft Excel.

*Export with Mozilla Firefox*

- Click the **Export Data to Excel** button located below the appropriate section heading. A new window displays.

The screenshot shows the LaSET web application interface. The 'Predictive Results' section is active, displaying a table of project data. A dialog box is overlaid on the screen, asking the user what they want to do with the downloaded file. The 'Open with Microsoft Excel (default)' option is selected.

Figure 58: Exporting the results with Firefox.

- Click the **Open with** radial button.
  - Choose *Microsoft Excel* from the dropdown menu.
  - Click **OK**.
- Microsoft Excel opens and reflects the same information that is viewable in the browser.

State Project Number	Intersection ID / LRS ID	Site Name	Site Type	Logmile From	Logmile To	Period	Begin Date	EndDate	Total Observed	Total Predicted	Total Expected	Average Observed	Average Predicted	Average Expected	K	W
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	Before	8/10/2011	8/12/2014	3	11.1	6.2	1.0	3.7	2.1	0.137	0.397
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	After	2/14/2015	2/16/2018	0	11.1	4.4	0.0	3.7	1.5	0.137	0.397
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	Before	9/7/2011	9/9/2014	0	0	0	0	0	0	0	0
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	After	2/1/2015	2/3/2018	0	0	0	0	0	0	0	0

Figure 58: The exported results in Microsoft Excel.

*Export with Microsoft Internet Explorer*

- Highlight the data that you wish to export: Left-click the upper left corner of the data, hold the mouse button down while dragging the cursor down to the bottom right corner of the data and release the mouse button.

**Results Per Period**  
Export Data to Excel (Optimized for Chrome and Firefox. IE users must copy/paste results)

State	Project Number	Intersection ID / LRS ID	Site Name	Site Type	Logmile From	Logmile To	Period	Begin Date	End Date	Total Observed	Total Predicted	Total Expected	Average Observed	Average Predicted	Average Expected	K	W
IA	009791	264-04-1-010	A-420 at La 25	Non-Intersection	4.92	5.12	Before	3/10/2011	3/12/2011	0	11.0	2.0	0.0	0.0	2.0	0.133	0.333
IA	009791	264-04-1-010	A-420 at La 25	Non-Intersection	4.92	5.12	After	2/14/2011	2/16/2011	0	11.0	4.0	0.0	0.0	1.0	0.133	0.333
IA	005454	2015165@20NC	165 AT Kinder	Intersection	3.23	3.53	Before	12/30/2011	1/1/2012	0	0.0	0.0	0.0	0.0	0.0	0.404	1.000
IA	005454	2015165@20NC	165 AT Kinder	Intersection	3.23	3.53	After	4/1/2011	3/9/2011	0	0.0	0.0	0.0	0.0	0.0	0.404	1.000
IA	005454	2015165@411HP	165 AT Oberlin	Intersection	11.00	11.00	Before	3/7/2011	3/9/2011	0	0.0	0.0	0.0	0.0	0.0	0.404	1.000
IA	005454	2015165@411HP	165 AT Oberlin	Intersection	11.00	11.00	After	2/1/2011	2/9/2011	0	0.0	0.0	0.0	0.0	0.0	0.404	1.000

**Results Per Year**  
Export Data to Excel (Optimized for Chrome and Firefox. IE users must copy/paste results)

State	Project	Intersection ID /	Site	Site Type	Logmile	Logmile	Period	Year Begin/End	Observed	Predicted	Expected	AADT	Minor	K	C	CMF
-------	---------	-------------------	------	-----------	---------	---------	--------	----------------	----------	-----------	----------	------	-------	---	---	-----

Figure 59: Highlighting the data within the browser.

- Right-click within the data. A popup menu displays.

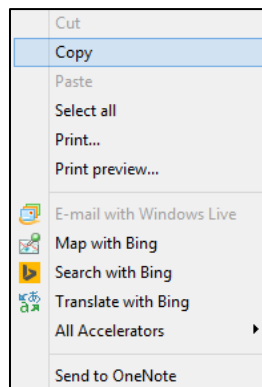


Figure 60: Copying the data within the browser.

- Click **Copy**.
- Open Microsoft Excel.
- Right-click within the spreadsheet. A popup menu displays.

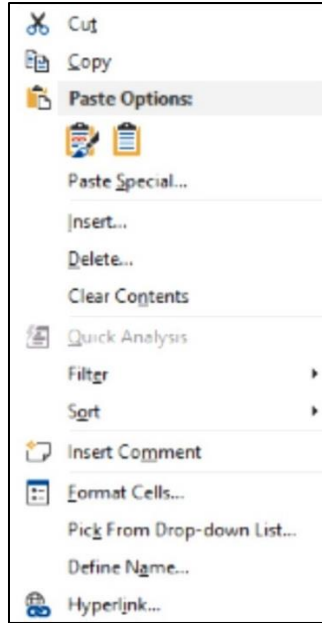


Figure 60: Pasting the data within the browser.

13. Click the preferable **Paste Icon**.

Microsoft Excel reflects the same information that is viewable in the browser.

State Project Number	Intersection ID / LRS ID	Site Name	Site Type	Logmile F	Logmile T	Period	Begin Date	EndDate	Total Obs	Total Pred	Total Expe	Average C	Average P	Average E	K	W
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	Before	8/10/2011	8/12/2014	3	11.1	6.2	1	3.7	2.1	0.137	0.397
H.009791	264-04-1-010	LA 429 at LA 22	Non-Intersection	4.92	5.15	After	2/14/2015	2/16/2018	0	11.1	4.4	0	3.7	1.5	0.137	0.397
H.005454	02U5165@2ND	U.S 165 AT Kinder	Intersection	0.23	1.53	Before	12/30/2011	1/1/2015	0	0	0	0	0	0	0.494	1
H.005454	02U5165@2ND	U.S 165 AT Kinder	Intersection	0.23	1.53	After	4/1/2015	4/3/2018	0	0	0	0	0	0	0.494	1
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	Before	9/7/2011	9/9/2014	0	0	0	0	0	0	0.46	1
H.005454	02U5165@4THR2	U.S 165 AT Oberlin	Intersection	0	13.85	After	2/1/2015	2/3/2018	0	0	0	0	0	0	0.46	1

Figure 61: The pasted information in Microsoft Excel.

This public document is published at a total cost of \$250. 42 copies of this public document were published in this first printing at a cost of \$250. The total cost of all printings of this document including reprints is \$250. This document was published by Louisiana Transportation Research Center to report and publish research findings as required in R.S. 48:105. This material was duplicated in accordance with standards for printing by state agencies established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.