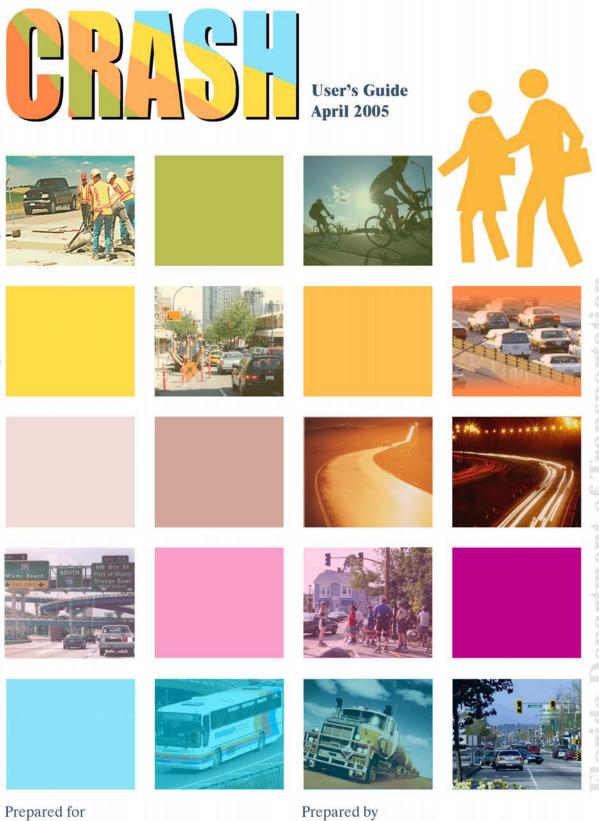
State Safety Office

Florida Department of Transportation



Prepared by Lehman Center for Transportation Research Florida International University

User's Guide

Crash Reduction Analysis System Hub (CRASH)

Version 1.0

(Contract No. BD015, RPWO #4)

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in cooperation with

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during a given period a Development of CRFs ba improvement projects. comprehensive crash data safety improvement project maintained separately at va CRF development and safet a user-friendly web applic project data to facilitate Reduction Analysis System	a result of implementin sed on the before-and-after While the Florida Departm base for the state roadway s octs. Consequently, historic rious district offices in variou ety program evaluation. This ation designed to systematic the continual process of n Hub (CRASH), also provid	e expected reduction in crashes that will occur ng a proposed safety improvement project. It method requires the use of historical safety ment of Transportation (FDOT) maintains a system, it does not have a central database for cal data for safety improvement projects are us formats and are not easily accessible for both suser's guide provides instructions on the use of cally maintain statewide safety improvement updating CRFs. The system, called Crash des capabilities to perform benefit-cost analysis analyses to evaluate the effectiveness of safety
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DISCLAIMER

The opinions, findings and conclusions expressed in this publication are those of the authors and not necessarily those of the State of Florida Department of Transportation.

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INTRODUCTION

While the Florida Department of Transportation (FDOT) maintains a comprehensive crash database for the state roadway system, it does not have a central database for safety improvement projects. Consequently, historical data for safety improvement projects are maintained separately at various district offices in various formats and are not easily accessible for developing CRFs and for other purposes. This user's guide provides instructions on a web-based database application that was developed to systematically maintain statewide safety improvement project data to facilitate the continual process of updating CRFs. The system, called the Crash Reduction Analysis System Hub (CRASH), can perform the following tasks in an automated manner:

- 1. Record and maintain improvement projects,
- 2. Update CRFs using the latest available improvement project and crash data,
- 3. Apply the latest CRFs in the benefit-cost analyses of specific projects, and
- 4. Perform before-and-after analyses to evaluate the effectiveness of safety programs.

In addition, the system provides various functions for data retrieval and exportation for various analysis and reporting purposes.

SYSTEM COMPONENTS

The CRASH program was designed as a Microsoft ASP.NET web application that works with Microsoft ACCESS databases. The system in its initial version consists of the following four major database components:

- 1. Safety improvement projects since 1992
- 2. Historical crash records from 1984 through 2003
- 3. Crash reduction factors and associated statistics
- 4. User management information.

Figure 1 shows the initial screen of the system, which includes the following six functional components (front-end) that work with the above databases (back-end):

- 1. **Project Analysis**: This component allows one to perform the following functions:
 - Start New Project: To perform a new benefit-cost analysis for a project.
 - Edit Projects: To make changes to one or more previously saved analysis projects.
 - View Projects: To view one or more previously saved analysis projects.

Administration	Online Help	Contacts
Administration	Outine Help.	Contacts
Project Analysis	Historical Projects	
CRAS	Crash Reduction	n Analysis System Hub

Figure 1. CRASH Main Menu

- 2. Historical Projects: This component allows one to perform the following functions:
 - Add Project: To enter information for an existing project of which analysis has been performed.
 - Edit Projects: To add post-construction information for projects that have been completed or are under construction.
 - View Projects: To view projects that have been completed or are under construction.
 - Generate HSIP Report: To generate the standard Highway Safety Improvement Program (HSIP) report.
 - Before-After Analysis: To generate before-and-after statistics for selected projects to evaluate their effectiveness.
- 3. **Future Development**: This component is reserved for future development in support of FDOT application of SafetyAnalyst, a new system currently under development by the Federal Highway Administration. For more information about the project, please visit the SystemAnalyst homepage at <u>http://www.safetyanalyst.org/</u>.
- 4. **Administration**: This component is mainly used by the system administrator or a designated person in the FDOT Central Office to perform the following functions:
 - User Management: To manage usernames and passwords for access to various system components (for system administrator only).
 - View CRFs: To generate the list of current Florida CRFs and to view detailed summary statistics associated with the calculation of each CRF.

- Update CRFs: To update the crash reduction factors after the new project and data are added (for system administration only).
- Maintain Types: To add and edit safety improvement project types (for system administrator only).
- Assign Types: To review projects and assign improvement types to projects (for system administrator only).
- Append New Records: To append crash records from a new data year (for system administrator only).
- 5. **Online Help**: This component provides access to the CRASH online help, tabulated CRFs from other states, state-by-state CRFs, and the final report for the project that develops this web application.
- 6. **Contact**: This component lists contact information for technical support and general information on the system.

To access any of these functional components, click the corresponding over-sized button shown in either orange or white color.

SYSTEM ACCESS REQUIREMENTS

CRASH runs as a web application on the FDOT intranet system. To access the CRASH website, you must first be given authorization via the assignment of a User Name and a Password. This authorization is in addition to the authorization you need for access to FDOT's Intranet. The current contact for access authorization is:

Patrick A. Brady, P.E. FDOT Safety Office 605 Suwannee Street, M.S. 53 Tallahassee FL 32399-0450 Phone: (850) 245-1502 or (850) 245-1500 Fax: (850) 245-1554 SC 205-1554 Email: patrick.brady@dot.state.fl.us

Depending on your need, you may be assigned access to certain pages and functionalities. The **User Management** section details such assignment by the System Administrator, which is a person in the Central Office who is in charge of CRASH system maintenance. Figure 2 shows the login screen that prompts you for a User Name and a Password. When the system is idled for more than half hour, you will be prompted this screen when trying to resume the session.

		nalysis System H		Logout
Project Analysis Historical Projects F	rture Development	Administration	Online Help	Contacts
User Nam Password				
	Login			

Figure 2. CRASH Login Screen

BROWSER REQUIREMENTS

CRASH can be accessed through a regular web browser. While it has not been tested on other browsers, the system has been well-tested on Internet Explorer (IE). The minimum display resolution is 1024x768. This is also the recommended resolution.

PROJECT ANALYSIS

This component allows you to quickly and conveniently perform a benefit-cost analysis for a potential improvement project, add a new improvement project to the project database, and view or edit an existing project. Analysis projects selected for implementation can be saved to the FDOT database and contribute directly to the continued update of CRFs.

Data Variables

Variables for improvement projects can be pre-construction and post-construction. Data for preconstruction variables are entered during a benefit-cost analysis. Data for post-construction variables are entered only after a project is selected and the construction is completed. Preconstruction variables include those in the standard benefit-cost analysis form, plus several variables required for Highway Safety Improvement Program (HSIP) reporting. Figure 3 shows, as a CRASH report, the standard benefit-cost analysis form used by FDOT. Postconstruction variables include those that are known only after a project is selected and approved for construction, including the beginning and ending of construction period.

Submitted by	_	CO-MRM										ty Priority	
Date Submitte	ed	1/13/2005							-		Envi	ironmenta	Stud
Project No.	_				WPA	No		_	Skid (I.D.) _				
Iternative No	· _						2133232		_	NB 3258:		Speed .	
District 2	_ Co	ounty/Section	n <u>72290</u>)	SubSect	ion _	000	_	State Road _	933	L	J.S. Road	002
		Loc	1	Loc 2	Loc	3	Loc	4	Loc 5	l	.oc 6		
Beginning N	filepost	1.9	<u> </u>										
Ending Mile	post	2.61	11									Total	Lengt
Length		0.71	11									0.7	'11
Node													
escription (of Locatio	n/Facility Ty	rpe <u>1-95</u> ,	AT 1-295 NOR	TH END (DF TO\	WN						
ause of Cra	sh Proble	ems (list and	discuss)										
		-t- (1) -td	-K	DOBDWAY	иненти	0							
Proposed In	nproveme	ents (list and	discuss)	ROADWAY	YLIGHTIN	6							
		1999	2000	2001	2002			AVG	14. Cra	sh Inforn	nation fo	r Facility	
No. of Cra	shes	10	9	9	13			10	Cost/	Crash		\$50,0	000
No. of Cra Reduced	shes	8	1	4	3			4	1 1	Cleanup st Rate			200 0%
			1										
Type of	Crash	CRF(%)	Number o		s to	1		t of Imp	provements				
		0(.0)	Crashes	prevent	ted	1	Type Now		Cost	Life	CF	Annua	al Cos
Angle		90.46	2	2		1	R-0-W P.E.C.E.I.		\$10,740	20	0.0944	1	\$1.014
Fixed-Obj	ect	16.58	11	3		C.	Structure						1 - 1
			0	0	_	1	Roadway		\$29,150	20	0.0944	1	\$2,752
Right-Tur	n	75.70	-			1	Contingen Signals/Sig		\$20,550	10	0.1424	1	\$2,926
Left-Turn		70.11	0	0		1	Subtotal		420,000		0.1424		\$6,692
Rear-End		-14.45	10	-2		1	Change in		nance				
Head-On		100.00	1	1		1	rash Clea)ther	nup					(\$800
Sideswipe	,	50,86	1	1		1	Total						\$5,892
Pedestria			0	-	_								1.1
		-55.48		0			Benefits						
Ran-Off-R	d	73.12	8	6			Crash Redi Other	uction:	No. <u>4</u>	at _	\$50,000	\$2	00,000
Others		55.20	8	5			Other						
Total			41	16		Tot	al Annual	Benefit				\$2	00,000
	I					17.	Benefit-Co	ost Rati	0				33.94
epared by				Ap	oproved b	у					Da	ate	
mments/Cra	ish Reduc	ction Method	d:										
	tinas:												
gh Crash Li:	anngs.												

State of Florida Department of Transportation SAFETY OFFICE BENEFIT-COST ANALYSIS

Figure 3. Standard Benefit-Cost Analysis Form as Displayed in CRASH

Start a New Benefit-Cost Analysis

To perform a new benefit-cost analysis, select the **Project Analysis**|**Start New Project** menu item. This will bring up the screen shown in Figure 4, which shows the top portion of the benefit-cost analysis form. In this form, you can press the Tab key to move from one field to another. Some of the fields are self-calculated, which are obviously not accessible by either the Tab key or the mouse pointer.

oject Analysis	Historical Pro	ojects Fu	ture Deve	lopment	Adr	ninistration	Onli	ne Help	Conta
		Florid	la Departn	nent of Tra	insporta	ition			
		Safety F	Project B	Benefit-	Cost A	nalysis			
🖲 Crash Based	O Non-Crash	Based							
1. Submitted by	CO-MRM					5.	x	Safety Prior	ity
2. Date Submitted 1	/13/2005	(mm/dd/yy	/уу)					Environmer	ntal Stud
3. Project No.			WPA No.			Skid (I.D.)			
4. Alternative No.			FM No.	2133232		SN	NB 325838	Speed	50
6. District 2 (County/Section	72290	Subsec	ction 000		State Road	933	U.S. Road	0023
7.	Loc 1	Loc 2	Lo	ic 3	Loc 4	Loc 5	Lo	: 6	
Beginning Milepo	st 1.9								
Ending Milepost	2.611							Tota	al Length
Length	0.711							0.71	1
llode					1				
8. Description of Lo	ation/Facility 1	уре							
I-95 AT I-295 NO	RTH END OF TO	WN							
). Cause of Crash Pi	roblems (list a	nd discuss)							
weighter an	NALOS STUDIES 100 100 100								~
									~

Figure 4. Standard Benefit-Cost Analysis Form in CRASH

The first item on the form is for specifying whether an improvement project is crash based or non-crash based. The default is crash based, which is for projects that are being considered in response to specific crash problems. Unlike crash based projects, which are reactive in nature, non-crash based projects would include proactive projects such as school zone signing, pavement markings, sidewalks, elder driver programs, etc. When the non-crash based option is selected, item 9 of the form will change from "Cause of Crash Problems" to "Non-crash Based Project Justification".

The location fields, including County and Section, Subsection, Beginning Milepost, and Ending Milepost, are required for a project to be saved. Up to six different locations of a project may be entered. This is used when a project involves multiple disjointed locations, for example, improve lighting at several interchanges.

An important capability of the benefit-cost analysis form is that it allows you to automatically retrieve crash statistics and CRFs into the form for calculation. This replaces the previously time-consuming, non-repeatable, and potentially error-prone manual data entry process.

Important: To help the State improve the accuracy of crash reduction factors, it is important that a project is described in as much detail as possible.

Retrieve Crash Records into Analysis

Once the data have been entered in the location fields, you can simply select a data year from the dropdown menu, as shown on the bottom left corner of Figure 5, to automatically retrieve crash statistics. As soon as a specific data year is selected, the crash records that are specific to the project location will be automatically retrieved, summarized, and displayed. Up to five years of crash records may be included in the analysis.

			Florida De	epartn	nent of	Fransj	oortatio	n			
		Sa	fety Pro	ject E	Benefi	t-Co	st Ana	alysis			
💿 Crash Based	🔿 Non-Cr	ash Base	d								
1. Submitted by	CO-MRM							5	x	Safety Prior	ity
2. Date Submitted	1/13/2005	(mi	m/dd/yyyy)							Environmer	ntal Study
3. Project No.			WP	A No.				Skid (I.D.)			
4. Alternative No.			F	M No.	2133232	2		SN	NB 325838	Speed	50
6. District 2	County/Sec	tion 7229	0 5	Subsec	tion 00	0	S	tate Road	933	U.S. Road	0023
7.	Loc	: 1	Loc 2	Lo	c 3	Lo	oc 4	Loc 5	E Lo	oc 6	
Beginning Milep	ost 1.9										
Ending Milepost	2.611									Tota	l Length
Length	0.711									0.71	1
Node											
8. Description of Lo	cation/Facil	ity Type									
I-95 AT I-295 NO	RTH END OF	TOWN									~
9. Cause of Crash F	robleme (li	iet and die	(199)								Y
s. cause of crash r	Toblems (ii	st and dis	cuss)								~
											~
10. Proposed Impro	ovements (I	ist and dis	scuss)								
ROADWAY LIGH	TING										~
											V
								- L			
	1999 💙	2000 💙	2001 💙	2002	*	*	AVG.			mation for Fa	cility
11. No. of Crashes	10	9	9	13			10		st/Crash	50000	
No. of Crashes	3	1	1	2			2		ash Cleanu		
12. Reduced	~			-			-	1 Internet	erest Rate	0.07	

Figure 5. Automated Crash Record Retrieval

Apply Crash Reduction Factors

To obtain an estimate of the number of crashes to be prevented as a result of an improvement project(s), the CRFs associated with the particular type of project(s) must be specified. To do this:

1. Click the **Get CRF** button on the form shown in Figure 6. The screen shown in Figure 7 will pop up.

	+ Ch	eck appli	cable crash	n types		15. Annual Cost of Improvements	
	All	Cle	ear 🛛	Get CRF		Type Cost Life CF	Annual Cost
						A. R-O-W	
13.	Type of	CRF(%)	Number of	Crashes to be	+	B. P.E.C.E.I. 10740 20 0.0944	1014
	Crash	CRF(70)	Crashes	Prevented	Ť	C. Structure	
	Angle	82.00	2	2	 Image: A start of the start of	D. Roadway 29150 20 0.0944	2752
	Fixed-Object	3.00	11	0		E. Contingency	
				-		F. Signals/Signing 20550 10 0.1424	2926
	Right-Turn	70.00	0	0		G. Subtotal	6692
	Left-Turn	39.00	0	0	✓	H. Change in Maintenance	
	Rear-End	-9.00	10	0	>	I. Crash Cleanup	-400
	Head-On	100.00	1	1	>	J. Other	
	Sideswipe	22.00	1	0	~	K. Total	6292
	Pedestrian	-69.00	0	0	~	16. Benefits	
	Ran-Off-Road	16.00	8	1	 Image: A start of the start of	A. Crash Reduction: No. 2 at 50000	100000
	Others	44.00	8	3	~	B. Other	
	Total		41	7		C. Other	400000
	Wet Only		🔘 Night	t-Time Only		Total Annual Benefit	100000
	💿 Day & Nig	aht	O Dav-	Time Only		17. Benefit-Cost Ratio	15.89

Figure 6. Automated CRF Retrieval

- 2. Select to apply either a single CRF based on the total crashes (default) or detailed CRFs for different crash types.
- 3. Select whether to apply standard or user-defined CRFs. Choose up to four different improvement types if a project involves multiple improvements. The aggregated CRFs, shown on the last column of Figure 7, will be automatically calculated based on the following formula and:

$$CRF_{1} = CRF_{1} + (1 - CRF_{1})CRF_{2} + (1 - CRF_{1})(1 - CRF_{2})CRF_{3} + \dots$$

where

$$CRF_t$$
 = Aggregated CRF,

- CRF_1 = CRF for the first improvement project,
- CRF_2 = CRF for the second improvement project, and
- CRF_3 = CRF for the third improvement project.

	Туре 1	Туре 2	Туре 3	Type 4	
Туре	 ● Standard Find ○ User-Defined 	Standard Find ○ User-Defined	 Standard Find ○ User-Defined 	 Standard Find ○ User-Defined 	
Type Code	1	12			
Type Description	New signal at channelized intersection	New LT channelization w/o LT phase	 × × 	~ ~	Aggregated CFR (%)
Total CFR	44.00	20.00			55.20
Angle CRF	82.00	47.00			90.46
Fixed-Obj. CRF	3.00	14.00			16.58
Right-Turn CRF	70.00	19.00			75.70
Left-Turn CRF	39.00	51.00			70.11
Rear-End CRF	-9.00	-5.00			-14.45
Head-On CRF	100.00	37.00			100.00
Sideswipe CRF	22.00	37.00			50.86
Pedestrian CRF	-69.00	8.00			-55.48
Ran-Off-Rd CRF	16.00	68.00			73.12
Others CRF	44.00	20.00			55.20
Wet	53.00	38.00			70.86

Figure 7. Screen for Selecting Crash Reduction Factors

To use standard CRFs, click the **Find** button in Figure 7 to bring up the screen shown in Figure 8, which shows a list of available improvement types. Note that on this list, the number of projects (N) available to develop the CRFs is given at the end of each improvement type in parentheses. It is advisable to use only those with a project sample size of at least five. You will be prompted an advisory message when an improvement type with a sample size less than five is selected. You can select an improvement type from the list by clicking the appropriate item. The corresponding CRFs will be listed on the right. Click **Accept** to retrieve the CRFs and exit from the screen.

If the CRFs for a specific improvement type are not available, they must be obtained from another source and entered manually as user-defined CRFs. To use CRFs from other sources (i.e., user-defined), simply enter the factors in the appropriate fields manually. When CRFs are user-defined, a "**" note will appear on top of the selected CRFs to indicate that the CRFs being used are non-standard. Tables 3-6 to 3-13 and Appendix B of the final report for this project provide some CRFs developed by other states.

Once the CRFs are selected, you can click the **Accept** button to retrieve the CRFs into the benefit-cost analysis form. By default, all CRFs for different crash types are included. You may uncheck any crash types that are not applicable to the specific improvement project (see Figure 6). Unchecked crash types are excluded from the analysis.

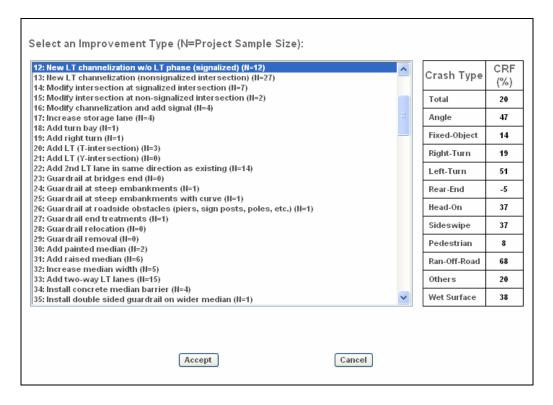


Figure 8. Screen for Selecting CRFs

The list of improvement type selected will be listed under the **Selected CRF Safety Improvement Type(s)** box, as shown on Figure 9 as part of the pre-construction additional information for HSIP report. If only one improvement type has been selected, it will be listed as the Assigned Safety Improvement Type in the last box on the form. If more than one improvement type has been selected, this box will show "0-Improvement Type Not Assigned". You can click the dropdown button to show the list of improvement type and select one that is the primary improvement type. Note that the assignment of improvement type can also be performed through Administration Assign **Types** menu option, which allows a group of projects to be assigned by a specific person. See the Assign Types subsection for additional information on this option.

After an analysis form is completed, it may be saved to the database by clicking the **Save** button at the bottom of the benefit-cost analysis form. A saved project may be edited or viewed using the **Project Analysis**|**Edit Projects** and **Project Analysis**|**View Projects**,

respectively. To print the form, simply click the **Print** button. This will bring up a print preview screen. Clicking on the **Print** button again on this screen will send the screen to the printer. You may also click the **Send to Historical** button to transfer the entered data into the historical project form, where information on project construction can be entered. See the **Historical Projects** section for more information on historical projects.

Prepared by		Approved by		Date (mr	m/dd/yyyy)
Comments/Crash Redu	ction Method				
					A
High Crash Listings					
					~
					×
e-Construction (additional		~		~	<u>_</u>
intersect/Spot Improvemer	nt? 🔘 Yes	◯ No	Divided/Undivided?	💿 Divi	ded 🔿 Undivided
CTST Project?	🔘 Yes	💿 No	Interstate/Turnpike	? 🔿 Tur	npike 🔵 Interstate
Rural/Urban?	🔘 Rural	💿 Urban	Data from FDOT/Loc	al? 🔿 FDO)T 🔿 Local
Cost of Evaluated Improver	nents (\$1,000)		Number of Lanes:	4:4 Lanes	*
Primary Funding Source:	SS/ACSS: STP, S	afety			*
Expected Life of Project:					*
Selected CRF Safety Improv	/ement Type(s):				
65: New roadway segment	lighting				
A	ant Times				
Assigned Safety Improvem 65: New roadway segment	21				~
, cognon					

Figure 9. Pre-Construction Information for HSIP Report

Edit and View Projects

Saved projects can be either edited or viewed. In general, district users are allowed to view all projects from all districts, but can only edit projects from their own districts. Editing projects can also include deletion of a project record(s) from the database.

To edit or view projects, you select **Project Analysis**|**Edit Projects** and **Project Analysis**|**View Projects**, respectively. You will be presented a set of filters as shown in Figure 10. The filters allow you to retrieve only a subset of the projects that meet the filter conditions. Any combinations of the filters can be used. All filters are independent, except for the District and County. In this case, you are allowed to select only a county that is under a selected district. When a filter is left unspecified, it is not used and no constraints will be imposed based on that filter.

F R		Crash Reduction A	nalysis System H	ub	Logout
Project Analysis	Historical Projects	Future Development	Administration	Online Help	Contacts
F	Sele	ect Safety Improveme	ent Projects		
	All Improvement Types			*	
D	istrict	District 1 🗸			
C	ounty	Charlotte]		
S	ection Number]		
F	M No.]		
F	roject Milepost	Begin	End		
		Submit	Reset		

Figure 10. Project Filters to Select Projects for Editing and Viewing

Once the filters are specified, you can click the **Submit** button to retrieve all projects that satisfy the filter conditions. All retrieved projects will be listed. Figures 11 and 12 each shows an example of a list of retrieved projects. The list includes several major location variables, plus the FM Number and the project status. You can click the column header to sort the list. Clicking once will sort the list in the ascending order and clicking it again will sort it in the descending order.

For the **Status** column, a project can be assigned one of the following status:

- 1. Analysis: The project is still in the analysis stage and may or may not be implemented.
- 2. Construction: The project is being constructed, but the construction has not been completed.
- 3. Completed: The project has been completed and the construction periods have been entered.

To view the details of a specific project, you can click the one of the **Action** columns. Two actions, **Edit** and **Delete**, are available for the **Edit** project list and one action, **View**, is available for the **View** project list. Clicking in the **Edit** or **View** button will retrieve the project information for the selected record onto the benefit-cost analysis form. Clicking the **Delete** button will delete the record after user confirmation.

			s Future	Developi	nent A	ldministrat		Online Help	Cont
			Edit Safet	ty Impro	vement F	Projects			
EM No	District	County	Section	<u>Sub</u>	<u>BMP</u>	EMP	<u>Status</u>	Action	Action
4166871	7	10	10150	000	2.720	2.849	analysis	Edit	Delete
4146871	6	87	87034	000	2.369	3.641	analysis	Edit	Delete
2282691	4	86	86200	000	3.632	4.008	analysis	Edit	Delete
4162971	7	02	02030	000	4.500	4.500	analysis	Edit	Delete
4166871	7	10	10150	000	2.780	2.780	analysis	Edit	Delete
2094012	2	72	72060	000	4.113	4.317	analysis	Edit	Delete
2097252	2	72	72100	000	2.051	2.261	analysis	Edit	Delete
2081164	2	71	71030	000	2.950	3.150	analysis	Edit	Delete
2104094	2	78	78050	000	2.726	2.926	analysis	Edit	Delete
209683	2	72	72014	000	3.547	3.547	analysis	Edit	Delete
2103944	2	78	78002	000	2.594	2.594	analysis	Edit	Delete
2096424	2	72	72080	000	4.957	4.957	analysis	Edit	Delete
2095284	2	72	72090	000	2.079	2.833	analysis	Edit	Delete
2086282	2	72	72050	000	3.952	4.228	analysis	Edit	Delete
2113781	2	26	26000	110	4.312	4.312	analysis	Edit	Delete
	5	77	77060	000	4.452	4.555	analysis	Edit	Delete
	4	93	93110	000	3.010	3.306	analysis	Edit	Delete
	4	16	16180	000	4.249	4,442	analysis	Edit	Delete

Figure 11. List of Projects for Editing

HR			Crash Rec	luction A	nalysis Sy	stem Hul		Logout
Project Analysis	Historica	l Projects	Future Deve	lopment	Administr	ation	Online Help	Contacts
		Vie	w Safety Im	proveme	nt Project	5		
						-		
EM No	District	<u>County</u>	Section	<u>Sub</u>	<u>BMP</u>	<u>EMP</u>	<u>Status</u>	Action
4166871	7	10	10150	000	2.720	2.849	analysis	View
4146871	6	87	87034	000	2.369	3.641	analysis	View
2282691	4	86	86200	000	3.632	4.008	analysis	View
4162971	7	02	02030	000	4.500	4.500	analysis	View
4166871	7	10	10150	000	2.780	2.780	analysis	View
2094012	2	72	72060	000	4.113	4.317	analysis	View
2097252	2	72	72100	000	2.051	2.261	analysis	View
2081164	2	71	71030	000	2.950	3.150	analysis	View
2104094	2	78	78050	000	2.726	2.926	analysis	View
209683	2	72	72014	000	3.547	3.547	analysis	View
2103944	2	78	78002	000	2.594	2.594	analysis	View
2096424	2	72	72080	000	4.957	4.957	analysis	View
2095284	2	72	72090	000	2.079	2.833	analysis	View
2086282	2	72	72050	000	3.952	4.228	analysis	View
2113781	2	26	26000	110	4.312	4.312	analysis	View
	5	77	77060	000	4.452	4.555	analysis	View
	4	93	93110	000	3.010	3.306	analysis	View
	1	16	16180	000	4.249	4.442	analysis	View

Figure 12. List of Projects for Viewing

HISTORICAL PROJECTS

Historical projects are projects that have been adopted for implementation. Unlike projects under Project Analysis, historical projects are those that are either under construction or have been constructed.

Add Historical Projects

To add a historical project of which benefit-cost analysis has been performed, select the **Historical Projects** Add Project menu item. This will bring up a form similar to the one for benefit-cost project analysis. Unlike for a new project, this form does not allow you to define CRFs or calculate crashes reduced (see Figure 13), like in project analysis. Another difference is that this form contains input for F.M. number and construction date (see Figure 14), while the other does not.

Type of Crash	CRF(%)	Number of Crashes	Crashes to be Prevented	15. Annual Cost of Improveme Type Cost A. R-0-W	ents Life	CF	Annual Co
Angle	90.42	22	19	B. P.E.C.E.I. 17000	10	0.1424	2421
Fixed-Object	62.11	1	1	C. Structure			
Right-Turn	90.99	1	1	D. Roadway 20000	10	0.1424	2848
Left-Turn	59.79	16	10	E. Contingency F. Signals/Signing			
Rear-End	-8.65	17	0	G. Subtotal			5269
Head-On	100.00	0	0	H. Change in Maintenance			
Sideswipe	36.83	5	2	I. Crash Cleanup			-4500
Pedestrian	100.00	0	0	J. Other K. Total			769
Ran-Off-Rd	55.87	0	0				105
Others	60.22	4	3	16. Benefits	_		
Total		66	36	A. Crash Reduction: No. 9 B. Other	at	1000	9000
Wet Only	I	🔵 Night-	Time Only	C. Other			
💿 Day & Nigl	nt	🔘 Day-T	ime Only	Total Annual Benefit			9000
				17. Benefit-Cost Ratio			11.70

Figure 13. Pre-calculated Number of Crashes Prevented

Prepared by		Approved by	r	Date (mm/dd/y	ууу)
Comments/Crash Red	uction Method				
Uinte Constat Listin as					
High Crash Listings					~
L					
re-Construction (additiona	al information for	HSIP Report):			
Intersect/Spot Improvem	ent? 💿 Yes	◯ No	Divided/Undivided?	💿 Divided	🔘 Undivided
CTST Project?	○Yes	💿 No	Interstate/Turnpike?	🔘 Turnpike	🔘 Interstate
Rural/Urban?	🔘 Rural	💿 Urban	Data from FDOT/Local?	○ FDOT	OLocal
Cost of Evaluated Improve	ements (\$1,000) 5	82	Number of Lanes: 6:6	Lanes	*
Primary Funding Source:	SS/ACSS: STP, S	Safety			*
Expected Life of Project:	02. Traffic signa	ls (service life	=15 years)		*
Selected CRF Safety Impro	ovement Type(s):				
Assigned Safety Improve 126: Traffic signals, resur	21	liabtina			
120. Tranc signals, resu	racing, curriance	s, nyriting			
ost-Construction:					
B.I. No.	Constru	ction Dates (mr	m/dd/yyyy): Begin 10/4/2000	End 6/28/	2001
	Save		Back		

Figure 14. Construction Period Information for Historical Projects

Edit and View Historical Projects

These two functions are similar to the ones described for project analysis. The only difference is that the form for historical projects contains construction date but the project analysis form does not. See the previous section on project analysis for related details.

Generate HSIP Report

This function is to generate the Highway Safety Improvement Programs (HSIP) annual report for selected projects. The function is accessed through the **Historical Projects**|**Generate HSIP Report** menu item. Figure 15 shows the screen for applying a set of filters to identify desirable projects. Once the filters are specified, you can click the **Submit** button to start generating statistics for the report. Figure 16 shows a sample HSIP report. Click the **Print** button at the bottom of the screen to print the report.

ER	ASH Crash Re	duction Analysis	s System Hu		Logout
Project Analysis	Historical Projects Future Dev	elopment Adm	inistration	Online Help	Contacts
	Select Proje	cts for HSIP Rej	port		
	District District 5	County	All Counties		
	Project Years: From 2002	T	0 2004	•	
	Number of Months Before Construction	in:	36		
	Minimum Number of Months Before C	onstruction:	12	L	
	Number of Months After Construction		36		
	Minimum Number of Months After Co	nstruction:	12		
	Submit (May take several minutes)	Ca	ncel		

Figure 15. Filters for Project Selection for HSIP Report

5	TATE <u>Bonida</u> FIPS CODE (Apha)	<u>F</u> <u>L</u>		H Evaluat		AY SA Th	FETY Ie ann	impro Ual R	EPORT VEMEN EPORT TED SA	T PRO			NTS				Pag	elofi		
FM	PRIMARY	SAFETY	COSTOF	C RASH BASED					NUMBERO	F C RASHI	5				E/ALUATION	١OL	UME	RURAL	NUMBER	DIVIDED
NUMBER	FUNDING SOURC E	IMPROVEMENT TYPE	evaluated Improvements				BEFOR					AFTER			STATUS	Before AADT	After AADT	or URBAN	of LANES	or UNDIVIDI
					hb a	Fat	hj.	P00	TOTAL	Max	Fat	hj	P00	TOTAL		MAD				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
4066271	55	40	\$250,000	Y	36	0	44	42	86	24	0	0	0	0	Р	21331	0	U	4	D
4066061	55	108	\$629,000	٧	36	0	13	1	14	24	0	10	6	16	Р	23393	23500	R	4	D
4064121	55	114	\$33,000	γ	36	0	0	0	0	24	0	0	0	0	Р	0	0	R	2	U
406705	55	11	\$453,000	٧	36	1	6	2	9	24	0	0	0	0	Р	7722	0			
406662	55	108	\$563,000	γ	36	0	65	27	92	24	1	19	15	35	Р	24799	27571			
406411	55	40	\$259,000	Y	36	0	18	14	32	12	0	\$	4	7	Р	29094	34429			
404312	55	14	\$1,055,000	٧											Р					
404024	55	40	\$302,000	٧	36	0	20	9	29	12	0	5	0	5	Р	25431	25000			
409049	SH	12	\$391,000	γ	36	1	5	2	8	12	0	\$	1	4	Р	8912	7650			
406641	SH	12	\$478,000	Y	36	1	53	29	83	24	0	19	11	30	Р	40837	39367	R	4	D

Figure 16. HSIP Annual Report

Perform Before-and-After Analysis

CRASH can perform a before-and-after analysis for any selected projects. For example, one can select improvement projects from a particular district for a certain period of time to quickly evaluate if the crash rates have significantly improved due to the projects. Figure 17 includes a number of filters to allow you to select the desired projects for analysis. Once the filters are specified, you can click the **Submit** button to start the automated analysis process. Because of the intensive data retrieval and calculations involved, the process may take up to several minutes, depending on the size of projects selected. By default, all projects in the database will be included. The output summary statistics are presented in the following four tables:

- 1. The **Project Summary** table lists all the projects used in the calculation (see Figure 18) of CRFs for a specific improvement type.
- 2. The **Before Construction Period** table shows the crash statistics associated with the "before-construction" period of each project, including crashes, mean ADT, study period, and total exposure associated with each improvement project (see Figure 19).
- 3. The After Construction Period table is similar to the Before Construction Period table, but includes data for projects after the construction periods (see Figure 20).
- 4. The **Crash Summary** table shows the crash summary statistics for all projects, including crashes, crash rates, crash reduction factors, Poisson test statistics, and whether the Poisson test is significant (see Figure 21). The Poisson test is based on a 95% level of confidence.

	vsis System H	ub	Logout
Project Analysis Historical Projects Future Development Ad	dministration	Online Help	Contacts
Select Projects for Before-and-Afte	r Analysis		
District District 6 V County	All Counties	~	
Project Years: From 2000	To Any Year	¥	
Number of Months Before Construction:	36		
Minimum Number of Months Before Construction:	12		
Number of Months After Construction:	36		
Minimum Number of Months After Construction:	12		
Submit (May take several minutes)	Cancel		

Figure 17. Filters for Project Selection for Before-and-After Analysis

ect An	alysis	HISTORICA	l Projects	Future	e Deven	opment	Admin	istration	Online He	elp Con
				Select	ted Pr	ojects S	ummary	/		
No.	FM No.	District	County	Section	Sub	BMP	EMP	Length	Begin Date	End Date
1	406802	6	87	87120	000	8.562	8.562	0.000	5/6/2002	8/10/2002
2	406801	6	87	87020	000	6.260	6.308	0.048	8/14/2002	11/2/2002
З	405608	6	87	87044	000	3.144	6.219	3.075	3/11/2002	7/26/2002
4	250147	6	87	87027	000	0.596	0.760	0.164	1/5/2000	6/9/2000
5	250146	6	87	87260	000	0.000	0.772	0.772	7/16/2001	11/27/2001
6		6	87	87017	000	0.129	0.190	0.061	2/12/2001	7/23/2001
7		6	87	87038	000	3.000	3.080	0.080	4/3/2000	6/3/2000

Figure 18. Project List for a Before-and-After Analysis

Proje	ect An	alys	is	Hi	storic	al Pr	ojects		Futur	e Deve	elopm	nent	Adı	ninistra	ation		Or	nline	Help	C	ontacts
						Bef	ore-(Cons	struc	tion	Peri	od of	Sele	cted F	Proje	cts					
Project	Total	Fatal	Injury	/PDO	Urban	Rura	INight	Day	Rear End	Angle		Right Turn		Fixed Object	Head On	Ped	Ran- Off- RD	Wet	Mean ADT	Study Period	Exposure
1	38	0	26	12	0	0	5	33	9	0	12	0	1	0	0	0	0	5	54605	3	0.00
2	19	0	9	10	0	0	6	12	7	0	8	0	0	0	0	0	0	6	36921	3	0.16
3	1290	2	659	629	364	0	275	981	575	70	240	18	46	16	17	5	13	154	63036	З	17.69
4	49	0	22	27	49	0	3	43	26	1	16	0	2	2	0	0	0	8	26204	3	0.39
5	26	1	13	12	15	0	11	15	2	1	1	0	2	10	0	1	7	8	39615	3	2.79
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
7	6	0	3	3	6	0	1	5	2	0	2	0	1	0	1	0	0	1	49917	3	0.36
Total	1428	3	732	693	434	0	301	1089	621	72	279	18	52	28	18	6	20	182	n/a	n/a	21.40

Figure 19. Before Statistics for a Before-and-After Analysis

Proj	ect Ai	nalys	sis	His	storio	al Pro	ojects	s	Futu	ire De	velop	ment	Ac	lministi	ation		0	nline	e Help	C	ontacts
						Aft	er-C	on	struo	tion	Peri	od of	fSele	cted F	roje	cts					
Project	Total	Fatal	Injury	PDO	Urbar	nRural	Night	Day	Rear End	Angle		Right Turn		Fixed Object	Head On	Ped	Ran- Off- RD	Wet	Mean ADT	Study Period	Exposur
1	15	0	12	3	0	0	4	11	3	1	5	0	0	1	0	0	0	3	65767	1	0.00
2	3	0	3	0	0	0	1	2	2	1	0	0	0	0	0	0	0	-1	38833	1	0.06
3	533	3	268	262	0	0	106	419	230	99	83	7	26	9	3	1	0		61670	1	5.77
4	20	0	7	13	0	0	5	15	5	2	2	1	1	1	0	0	0	4	29850	З	0.45
5	27	0	12	15	0	0	15	10	6	2	1	0	3	9	0	0	3	16	40704	2	1.91
6	16	1	6	9	0	0	8	7	0	3	3	1	0	0	0	0	0	0	95875	2	0.36
7	1	0	0	1	U	0	0	1	1	0	0	U	0	0	0	0	0	U	50500	3	0.37
	615	4	308	303	0	0	139	465	247	108	94	9	30	20	3	1	3	82	n/a	n/a	8.91

Figure 20. After Statistics for a Before-and-After Analysis

	Historic	al Projects	Future	e Develop	ment Adı	ninistration C)nline Help Conta
		Cr	ash Sum	imary of	Selected P	rojects	
Data Summary	Number Crash Before	Number Crash After	Crash Rate Before	Crash Rate After	Actual Crashes Reduced (%)	Poisson Test for Significant Crashes Reduced (%)	Significance
Total	1428	615	66.740	69.043	-3	4	No significant change
Fatal	3	4	0.140	0.449	-220	81	Significantly worse
Injury	732	308	34.211	34.578	-1	6	No significant change
PDO	693	303	32.389	34.016	-5	6	No significant change
Urban	434	0	20.284	0.000	100	8	Significantly better
Rural	0	0	0.000	0.000	0	0	***
Night	301	139	14.068	15.605	-11	9	Significantly worse
Day	1089	465	50.896	52.203	-3	5	No significant change
Rear-End	621	247	29.024	27.729	4	7	No significant change
Angle	72	108	3.365	12.125	-260	19	Significantly worse
Left-Turn	279	94	13.040	10.553	19	10	Significantly better
Right-Turn	18	9	0.841	1.010	-20	37	No significant change
Sideswipe	52	30	2.430	3.368	-39	22	Significantly worse
Fixed-Object	28	20	1.309	2.245	-72	30	Significantly worse
Head-On	18	3	0.841	0.337	60	37	Significantly better
Pedestrian	6	1	0.280	0.112	60	60	Significantly better
Ran-Off-Road	20	3	0.935	0.337	64	35	Significantly better
Wet Surface	182	82	8.506	9.206	-8	12	No significant change

Figure 21. Summary for a Before-and-After Analysis

ADMINISTRATION

This limited-access component allows the system administrator or a designated person to perform the following tasks:

- 1. Manage user accounts and assign access privileges.
- 2. View CRF summary statistics for specific improvement types (access not limited)
- 3. Update CRFs
- 4. Maintain safety improvement types
- 5. Assign new safety improvement types to projects
- 6. Append new crash records

User Management

The User Management page is accessed from the Administration|User Management menu item. It allows the System Administrator to assign set up accounts for new users, edit existing accounts, including deletion of accounts, and grant user privileges in terms of permission to view or edit projects for specific jurisdictions. Figure 22 shows the main screen of the function, which lists all the existing accounts. To add a new user, click the Add New User button at the bottom. This will bring up the screen in Figure 23, which allows a new user name and password to be specified. Both the user name and the password are not case sensitive and up to 20 alphanumeric characters may be specified for each. A new user can be either from the Central Office or from a specific district. He or she can be given privilege to edit and/or view projects from either their own district or all districts. Figures 24 and 25 show the screens with similar fields, but for editing and deleting an existing user account, respectively.

ject Analysis	Historical Projects	Future De	evelopment Adr	ninistration 0	nline Help	Contac
		Use	r Management			
User Name	Password	District	Edit Permission	View Permission	Action	Action
admin	admin9785	Central	All Districts	All Districts	Edit	
JohnSmith	District1Safty	District 1	District 1	District 1	Edit	Delete
janesmith	SafetyNo1	Central	All Districts	All Districts	Edit	Delete
johndoe	Heat2005	District 6	District 6	All Districts	Edit	Delete
	GoMarlin	Central	All Districts	All Districts	Edit	Delete

Figure 22. User Management Main Screen

CR/		Crash Reduction A	nalysis System I	Hub	Logout
Project Analysis	Historical Projects	Future Development	Administration	Online Help	Contacts
		Add New Use	r		
	User Nar	ne: janedoe			
	Passwor	GoMarlin			
	District:	Central 💙			
	Edit Per	nission: All Districts	~		
	View Pe	mission: All Districts	~		
		Submit	Back		

Figure 23. Assign New User

Project Analysis	Historical Projects	Crash Reduction A Future Development	Administration	Online Help	Contacts
		Edit User			
	User Nan	ne: johndoe			
	Password	Heat2005			
	District:	District 6 💙			
	Edit Pern	nission: District 6 💌			
	View Per	mission: All Districts	*		

Figure 24. Edit User Account Information

Project Analysis	Historical Projects	Future D	evelopment	Administration	Online Help	Contacts
		1	Delete User			
	User Na	ime:	janedoe			
	Passwo	ird:	GoMarlin			
	District:		Central			
	Edit Pe	rmission:	All Districts			
	View Pe	ermission:	All Districts			

Figure 25. Delete a User

View CRF Summary Statistics

This function can be accessed from the **Administration**|**View CRFs** menu item. Selecting this menu item will bring up the screen shown in Figure 26, which allows you to select either to view an Excel summary table listing all up-to-date CRFs from Florida by clicking the link, or to view the detailed calculations of a specific improvement type by selecting from a list of available improvement types and then clicking **View**. In the Excel summary table, the table title will show the date the last time the CRFs were updated (see next section). The output for a specific improvement type includes summary statistics presented in the following four tables:

- 1. The **Project Summary** table lists all the projects used in the calculation (see Figure 27) of CRFs for a specific improvement type.
- 2. The **Before Construction Period** table shows the crash statistics associated with the "before-construction" period of each project, including crashes, mean ADT, study period, and total exposure associated with each improvement project (see Figure 28).
- 3. The **After Construction Period** table is similar to the **Before Construction Period** table, but includes data for projects after the construction periods (see Figure 29).
- 4. The **Crash Summary** table shows the crash summary statistics for all projects, including crashes, crash rates, crash reduction factors, Poisson test statistics, and whether the Poisson test is significant (see Figure 30). The Poisson test is based on a 95% level of confidence.

Project Analysis	Historical Projects	Future Development	Administration	Online Help	Contacts
		View CR	Fs		
	1. <u>View CRFs for all imp</u>	<u>provement types,</u> or			
	2. View detailed CRF st	•	nprovement type:		
	03 Add signal and chai 04 Modify signal at chai 05 Modify signal at noi 06 Modify both signal 07 Modify signal and a 08 Remove signal 09 Add flashing warnii 10 Interconnect traffic 11 New LT channelizat 12 New LT channelizat 13 New LT channelizat 14 Modify intersection	channelized intersection nnelization annelized intersection n-channelized intersection and channelization (dd channelization) r signals tion w/ LT phase (signaliz tion w/ LT phase (signaliz tion (nonsignalized inters a t signalized intersection a ton-signalized intersection a ton and add signal	red) ized) section) sn		
	18 Add turn bay 19 Add right turn 20 Add LT (T-intersect			~	



									<i></i>	
				F	Projec	t Summ	ary			
Improv	ement Typ	e: 1	New sign	al at chan	nelizeo	d intersect	tion			
<u>No.</u>	FM No.	District		Section	<u>Sub</u>	<u>BMP</u>	EMP	<u>Length</u>	Begin Date	End Date
1		1	16	16030	000	18.300	18.500	0.200	11/1/1978	2/1/1979
2		1	16	16180	000	23.700	24.700	1.000	2/1/1979	9/1/1979
3		2	26	26004	000	0.641	0.741	0.100	3/1/1978	1/1/1980
4		5	79	79050	000	12.116	12.216	0.100	1/1/1980	3/1/1980
-5		4	89	89040	000	3.028	3.567	0.539	11/1/1977	9/1/1978
6	2563691	7	14	14120	000	9.862	10.062	0.200	2/17/1997	6/9/1997
7	2082351	2	71	71020	000	12.447	12.447	0.000	4/23/1999	8/30/1999
8	2558371	7	10	10090	000	10.084	10.084	0.000	9/28/1998	1/11/1999
9	2558891	7	10	10160	000	12.754	12.754	0.000	3/12/1999	12/1/1999
10	241036	5	79	79030	000	4.990	4.993	0.003	2/2/2000	5/26/2000
11	4112011	7	10	10075	000	16.470	16.471	0.001	7/15/2002	9/5/2002
12	255791	7	10	10150	000	1.774	1.974	0.200	5/13/1996	9/2/1996
13	2564201	7	14	14120	000	23.279	23.528	0.249	10/1/2001	3/2/2002

Figure 27. Project Summary Table

Proje	ect An	alys	is	His	torica	al Pro	jects		10000	e Dev	1000	1.1.1.1.1.1.1.1.1.1.1	Analys Ad	ministr	1			nline	Help		ogout ontacts
mprove	ement	Тур	ie: 1		New s	signal	at cł	100		e-Co d inter			n Per	iod							
Project	Totali	atal	Injury	PDO	Urban	Rural	Hight	Day	Rear End	Angle	Left Turn		Side Swipe	Fixed Object	Head On	Ped	Ran- Off- RD	Wet	Mean ADT	Study Period	Exposure
1	76	2	35	39	76	0	11	61	15	40	9	3	2	1	1	Ũ	1	9	13207	3	4.34
2	137	1	63	73	0	137	12	97	18	48	31	8	18	4	0	0	3	31	11759	3	14.18
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11737	3	2.57
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
5	23	0	10	13	0	23	3	16	12	0	4	1	2	2	0	1	0	3	5075	3	3.55
6	15	0	12	3	0	15	1	12	3	8	4	0	0	0	0	0	0	3	15007	3	0.27
7	7	0	2	5	7	0	0	7	1	3	1	2	0	0	0	0	0	1	40571	3	0.00
8	21	1	11	9	0	21	7	13	0	18	2	0	1	0	0	0	0	1	9157	3	0.00
9	0	0	0	0	0	0	0	D	0	0	0	0	0	0	0	0	0	0	0	3	0.00
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
12	56	2	34	20	56	0	18	35	10	25	14	0	2	5	0	0	0	2	32214	3	0.59
13	37	0	27	10	0	18	3	30	15	2	7	0	0	1	0	0	2	7	10935	3	0.25
Total	372	6	194	172	139	214	55	271	74	144	72	14	25	13	1	1	6	57	n/a	n/a	25.73

Figure 28. Crash Summary Table for Before-Construction Period

							jects		r utu	e Dev	ciopii	lient	Hu	ministr	ation		0	mine	Help		ontacts
								I	After	-Con	stru	ctior	n Peri	od							
mprove	ement	Тур	be: 1		New s	ignal	at cl	nann	elize	d inter	secti	on									
Project	Totall	Fatal	Injury	PDO	Urban	Rural	Night	Day	Rear End	Angle	Left Turn	Right Turn	Side Swipe	Fixed Object	Head On	Ped	Ran- Off- RD	Wet	Mean ADT	Study Period	Exposure
1	45	0	19	26	45	0	8	33	20	3	11	1	5	1	0	0	3	8	13101	3	4.30
2	74	1	37	36	0	74	16	53	29	10	10	4	14	2	0	Ō	2	11	14429	3	17.38
3	4	0	2	2	4	0	1	2	0	0	3	0	0	1	0	0	0	0	13540	3	2.97
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
5	40	1	17	22	0	40	8	28	22	0	5	0	3	4	0	1	0	1	6868	3	4.81
6	8	0	6	2	0	7	3	5	6	0	2	0	0	0	0	0	0	2	16488	3	0.30
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
8	4	0	1	3	0	4	2	2	1	1	0	0	0	1	0	0	0	0	9200	3	0.00
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.00
12	40	1	26	13	40	0	15	21	14	10	9	0	0	4	0	1	1	7	32088	3	0.59
13	31	0	22	9	0	0	4	27	4	6	12	0	1	2	0	0	0	3	11052	2	0.17
Total	246	3	130	113	89	125	57	171	96	30	52	5	23	15	0	2	6	32	n/a	n/a	30.51

Figure 29. Crash Summary Table for After-Construction Period

roject Analysis	Historic	al Projects	: Futur	e Develop	ment 📔 Adı	ministration 0	online Help Contac
					Summary		
Improvement Ty Data Summary	ype: 1 Number Crash Before	New sign Number Crash After	al at chan Crash Rate Before	nelized in Crash Rate After	Actual Crashes Reduced (%)	Poisson Test for Significant Crashes Reduced (%)	Significance
Total	372	246	14.456	8.063	44	8	Significantly better
Fatal	6	3	0.233	0.098	58	60	No significant change
Injury	194	130	7.539	4.261	43	12	Significantly better
PDO	172	113	6.684	3.704	45	12	Significantly better
Urban	139	89	5.401	2.917	46	14	Significantly better
Rural	214	125	8.316	4.097	51	11	Significantly better
Night	55	57	2.137	1.868	13	22	No significant change
Day	271	171	10.531	5.605	47	10	Significantly better
Rear-End	74	96	2.876	3.147	-9	19	No significant change
Angle	144	30	5,596	0.983	82	13	Significantly better
Left-Turn	72	52	2.798	1.704	39	19	Significantly better
Right-Turn	14	5	0.544	0,164	70	41	Significantly better
Sideswipe	25	23	0.971	0.754	22	31	No significant change
Fixed-Object	13	15	0.505	0.492	3	43	No significant change
Head-On	1	0	0.039	0.000	100	116	No significant change
Pedestrian	1	2	0.039	0.066	-69	116	No significant change
Ran-Off-Road	6	6	0.233	0.197	16	60	No significant change
Wet Surface	57	32	2.215	1.049	53	21	Significantly better

Figure 30. Crash Summary Table

Update CRFs

This function, accessible from the Administration|Update CRFs menu item, is to update the existing CRFs with data from new projects. It is performed by either the system administrator or a designated person. The method implemented in this version of CRASH is based strictly on the simple before-and-after study method (refer to chapter 2 for more details on this method). Figure 31 shows the screen for specifying the number of months you wish to include for the before and after construction period. You can also specify the desired minimum number of months before and after project construction to be included in the calculation. Thus, projects that have not yet met the minimum number of months will not be included in the calculation. You must specify the years for which the improvement projects are to be included. This allows you to exclude projects from a certain period. For example, if you want to include only projects that have been completed since 1990, you would enter 1990 in the From year field.

roject Analysis	Historical Projects	Future Development	Administration	Online Help	Contacts
	Cal	culate Crash Reductio	on Factors		
	Number of Months Bet	fore Construction:	36		
	Minimum Number of M	1onths Before Construction	n: 12		
	Number of Months Aft	er Construction:	36		
	Minimum Number of M	1onths After Construction:	12		
	Project Years: From	2000	To Any Year	*	

Figure 31. Screen for Selecting Project Time Periods for CRF Calculation

Maintain Improvement Types

The maintenance of improvement types involves the following three tasks:

- 1. Add a new improvement type
- 2. Edit an existing improvement type
- 3. Delete an existing improvement type

To perform these tasks, select the **Administration**|**Maintain Types** menu item. This will bring up the screen shown in Figure 32, which lists all existing improvement types defined in the database.

To create a new improvement type, click the **Add New Type** button at the bottom of the screen (see Figure 32) to bring up the screen shown in Figure 33. By default the screen will list the next available improvement type number. You may overwrite this with another number that is not already used. Once the name for a new improvement type is specified, click the **Submit** button and the new improvement type will be added to the existing list.

To edit an existing improvement type, click the corresponding **Edit** link to bring up the screen shown in Figure 34. Only the name of an improvement type can be changed. Make all the necessary changes and then click the **Submit** button to execute the change.

To delete an existing improvement type, click the **Delete** link of the corresponding improvement type on the list in Figure 32 to bring up the screen shown in Figure 35. When an existing type is deleted, all projects, if any, that have been assigned the improvement type will be reassigned the "0" improvement type, which means the projects have not been assigned an improvement type.

	Improvement Type Maintena		
	inprovement Type maintena	nce	
Туре	Improvement Type Description	Action	Action
1	New signal at channelized intersection	Edit	Delete
2	New signal at non-channelized intersection	Edit	Delete
3	Add signal and channelization	Edit	Delete
4	Modify signal at channelized intersection	Edit	Delete
5	Modify signal at non-channelized intersection	Edit	Delete
6	Modify both signal and channelization	Edit	Delete
7	Modify signal and add channelization	Edit	Delete
8	Remove signal	Edit	Delete
9	Add flashing warning signal (signalization)	Edit	Delete
10	Interconnect traffic signals	Edit	Delete
11	New LT channelization w/ LT phase (signalized)	Edit	Delete
12	New LT channelization w/o LT phase (signalized)	Edit	Delete
13	New LT channelization (nonsignalized intersection)	Edit	Delete
14	Modify intersection at signalized intersection	Edit	Delete
15	Modify intersection at non-signalized intersection	Edit	Delete
16	Modify channelization and add signal	Edit	Delete
17	Increase storage lane	Edit	Delete
18	Add turn bay	Edit	Delete
19	Add right turn	Edit	Delete
20	Add LT (T-intersection)	Edit	Delete
21	Add LT (Y-intersection)	Edit	Delete

Figure 32. Main Screen for Maintenance of Improvement Types

F R		Crash Reduction A	nalysis System H	ub	Logout
Project Analysis	Historical Projects	Future Development	Administration	Online Help	Contacts
	Cr	reate a New Improve	ment Type	-	
	Type Code: 128 Type Description (no m	nore than 50 characters):			
	type new type descript	tion here			
	5	Submit	Back		

Figure 33. Screen for Creating a New Improvement Type

Edit An Existing Improvement Type Type Code: 1 Type Description (no more than 50 characters): Hew signal at channelized intersection	Type Code: 1 Type Description (no more than 50 characters):	Project Analysis	Historical Projects	Future Development	Administration	Online Help	Contact
Type Description (no more than 50 characters):	Type Description (no more than 50 characters):		Edi	it An Existing Improv	ement Type		
			Type Code: 1				
New signal at channelized intersection	llew signal at channelized intersection		Type Description (no n	nore than 50 characters):			
			New signal at channeli	zed intersection			

Figure 34. Screen for Modifying an Existing Improvement Type

Project Analysis	Historical Projects	Crash Reduction A Future Development	nalysis System H Administration	Ub Online Help	Logout Contacts
	Dele	te An Existing Impro	vement Type		
	Type Code: 1 Type Description: Ne	w signal at channelized in	tersection		
	0	Delete	Cancel		

Figure 35. Screen for Deleting an Existing Improvement Type

Assign Improvement Types

Determining the appropriate improvement type is the task of a person who is experienced in safety improvement projects. The manager uses the project description for a project and then assigns an appropriate improvement type to it. For CRF development purposes, only one

improvement type may be assigned, even tough a project may involve multiple improvements.

To assign an improvement type:

- Select the Administration Assign Types menu item to bring up the screen in Figure 36
- 2. Use any combination of the filters shown in the screen to limit the desirable list of projects to be assigned a new improvement type of or changed to another improvement type. For convenience, you can select only projects that have not been assigned an improvement type by selecting the second radio button on the screen. Once the filters are specified, click the **Submit** button to retrieve the desired projects.
- 3. From the list of projects, identify the project that needs to be assigned an improvement type by clicking the **Assign** link that corresponds to the project. This will bring up the screen shown in Figure 37. Click an improvement type from the list box.
- 4. Click the **Assign** button to bring up the screen shown in Figure 38.

Project Analysis	Historical Projects	Future Development	Administration	Online Help	Co
	In	nprovement Type As	signment		
	Project selection	⊙ All projects			
		Only projects no	t assigned an impr	rovement type	
	District	District 1	•		
	County	All Counties	•		
	Section Number				
	Project Milepost	Begin	End		
	Construction Year	From 2002	То	Any Year 💌	

5. Click the **View** button to review the complete project information.

Figure 36. Screen for Selecting Project to Assign an Improvement Type

		Projects	Future Deve	lopment	Administ	ration	Online Help	Cont
		In	nprovemen	t Type As	ssignment			
<u>FM No</u>	<u>District</u>	<u>County</u>	<u>Section</u>	<u>Sub</u>	<u>BMP</u>	<u>EMP</u>	<u>Type</u>	Action
4092341	1	12	12010	000	15.571	17.923	67	Assign
4092331	1	16	16006	000	1.491	4.343	40	Assign
4092311	1	16	16110	000	1.785	3.004	65	Assign
4092251	1	12	12060	000	11.912	12.413	65	Assign
4043731	1	17	17010	000	3.254	6.133	65	Assign
1977021	1	16	16280	000	3.395	4.231	19	Assign
4092321	1	12	12011	000	7.851	8.835	40	Assign
404372	1	17	17008	000	2.221	4.812	65	Assign
4043622	1	07	07060	000	15.930	16.932	65	Assign
404369	1	12	12010	000	24.646	25.990	108	Assign
404365	1	09	09000	000			108	Assign
		01	01628	000	3.395	4.231	40	-

Figure 37. Identified List of Projects for Improvement Type Assignment

FR			Crash	Reductior	Analy	sis Sys	tem Hut		Logout
Project Analysis	Historic	al Projects		Development		dministrat	in the second se	Online Help	Contacts
			Improven	nent Type	Assigi	nment			
5	FM No.	District	County	Section	Sub	BMP	EMP	Action	
	4092341	1	12	12010	000	15.571	17.923	View	
55	None Assigned Imp 67 New Please assigr	lighting at ii	ntersection	ollowing ava	ilable in	nprovemer	nt types:		
	01 Hew sig 02 New sig 03 Add sig 04 Modify : 05 Modify : 06 Modify : 07 Modify : 08 Remove 09 Add flas 10 Intercor	nal at non-c nal and chai signal at cha signal at noi both signal signal and a e signal shing warnii	hannelized nnelization nnelized int n-channelize and channeli dd channeliz ng signal (si	intersection ersection ed intersectio ization zation	on				
	1.2	Assi	yn			Cane	el		

Figure 38. Screen for Selecting an Improvement Type to Assign

Append New Crash Records

CRASH includes a function to allow crash records to be appended to its crash record database. It assumes that the file being imported consists of the following 38 variables (in the same listed order) in the comma-delimited format:

- 1. Crash Report Number
- 2. Crash Date
- 3. Time of Crash
- 4. DOT County Number
- 5. Section Number
- 6. Subsection Number
- 7. Located Mile-point
- 8. Nearest Node Number
- 9. Located Route Id (lowest-numbered "SR" route)
- 10. DOT Site Location
- 11. Side of Road (for 1st harmful event)
- 12. Lane of Accident (for 1st harmful event)
- 13. Road Surface Condition (crash report form)
- 14. Lighting Condition (crash report form)
- 15. Weather Condition (crash report form)
- 16. Traffic Control (1st value from crash report form)
- 17. Road Conditions at Time of Crash (1st value from crash report form)
- 18. Crash Rate Class Category (CAR code)
- 19. Average Daily Traffic (RCI)
- 20. Crash-Level Alcohol Involved Code (crash report form)
- 21. 1st Harmful Event for At-Fault Vehicle (crash report form)
- 22. Vehicle Type for At-Fault Vehicle (crash report form)
- 23. Vehicle Use Code for At-Fault Vehicle (crash report form)
- 24. First Point of Impact for At-Fault Vehicle (crash report form)
- 25. Vehicle Movement Code for At-Fault Vehicle (crash report form)
- 26. Direction of Travel for At-Fault Vehicle (crash report form)
- 27. 1st Contributing Cause Driver/ Pedestrian for At-Fault Section (crash report form)
- 28. Driver/ Pedestrian Age for At-Fault Section (based on driver/ped birth date from crash report form)
- 29. Vehicle Type for Next Vehicle (crash report form)
- 30. Vehicle Use Code for Next Vehicle (crash report form)
- 31. 1st Point of Impact for Next Vehicle (crash report form)
- 32. Vehicle Movement Code for Next Vehicle (crash report form)
- 33. Direction of Travel for Next Vehicle (crash report form)
- 34. Contributing Cause Driver/ Pedestrian for Next Section (crash report form)
- 35. Driver/ Pedestrian Age for Next Section (based on driver/ped birth date from crash report form)
- 36. Total Number of Vehicles in Crash
- 37. Total Number of Traffic Fatalities in Crash (Traffic Fatality is person with Injury

Severity value of "5")

38. Total Number of Injuries in Crash (Injury is person with Injury Severity value of "2", "3" or "4")

Figure 39 shows the screen for importing new crash records. It can be accessed from the **Administration**|**Append New Records** menu item. The first column of the screen shows the list of variables in the database as listed above. The second column lists the crash data years and the corresponding number of crash records stored already stored in the system crash database for each year.

To import data for a new crash year, type in the file path and name as shown in Figure 38. Alternatively, one can click the **Browse** button to navigate to the file folder where the desired input file resides. After a file is specified, click the **Append** button to start appending crash records to the database. CRASH will first detect if the file is of the right format. CRASH will proceed with the data importation only if the format the specified file is of the correct format.

To avoid duplicated records, CRASH will check the Crash Report Number (first field), which is unique, of each record to determine if it is an existing record in the database. If so, the duplicated records will be listed altogether in a box and you will be asked whether to replace them with the existing records. As soon as the appending process is completed, the list of crash record statistics on the screen will be updated. You may select to append multiple years of records at once (not recommended, however), or appending the crash records for a single year in multiple appends (e.g., one for each district).

/ariables ID Name	Stati	stics Total	Crast	n record file to be ap	ppended:			
1 Crash Number	Year	Crash	c:\to	mp\data.txt	Browse			
2 Crash Date		Records						
3 Crash Time		146523			iining the variables listed o			
4 DOT County Number		148938	the le	eft in the comma-del	imited format)			
5 Section Number		146009						
6 Subsection Number		138560	Append					
7 Located Mile-point	and the second data	139469	Append					
8 Nearest Node Number		146859						
9 Located Route ID		144861						
10 DOT Site Location	10000	128385						
11 Side of Road		132147						
12 Lane of Accident		110034						
13 Road Surface Condition		107881						
14 Lighting Condition		92 102941 91 102821 90 113782						
15 Weather Condition	and the second se							
16 Traffic Control	CONSTR-							
17 Road Conditions	1989	135712						
18 Crash Rate Class Category	1988	135673						
19 Average Daily Traffic (RCI)	1987	130043						
Grash Lauri Alashal Imushuad	1986	129781						
20 Crash-Level Alcohol Involved Code	1985	133855						
21 1st Harmful Event for At-Fault	1984	122812						
²¹ Vehicle	40.02	171932						

Figure 39. Screen for Appending New Crash Records