

USER'S MANUAL FOR THE TRAFFIC INCIDENT MANAGEMENT BENEFIT-COST (TIM-BC) TOOL (VERSION: 2.0)

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FOREWORD

The *User's Manual for the Traffic Incident Management Benefit-Cost (TIM-BC) Tool* provides State and local engineers, decisionmakers, and other users with methods for evaluating and comparing the monetary value of TIM programs. In this version 2.0, the TIM-BC Tool features different sub-tools for eight different TIM strategies, including safety service patrol, driver removal laws, authority removal laws, shared quick clearance goals, pre-established towing service agreements, dispatch collocation, TIM Task Forces, and SHRP2 training.

Through the use of texts and screenshots of the tool, the user will become familiar with the TIM-BC tool, including all the eight sub-tools, and will be able to enter information into the software to obtain benefit elements and the benefit-cost ratios of various TIM projects.

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16. Abstract This document serves as a user's manual for the Traffic Incident Management Benefit-Cost Tool (TIM-BC) Version 2.0, which is used to assist State and local engineers and decisionmakers with evaluating and comparing a variety of traffic incident management programs. The document describes how to use the tool by providing detailed instructions and screenshots of the tool.			
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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1. Purpose

The purpose of this document is to describe to users how to use Federal Highway Administration's (FHWA's) Traffic Incident Management Benefit-Cost (TIM-BC) Tool Version 2.0, featuring eight sub-tools for various TIM strategies. The tool can be downloaded at the link from FHWA website.¹

2. Introduction

The TIM-BC tool was developed primarily to assist State and local engineers and decision-makers in conducting the associated benefits to costs estimations related to a wide range of TIM strategies and determine the return on investment.


The following are the requirements for use of the Web-based tool:

- 37MB hard disk space; Microsoft® Windows® operating system, versions XP, 7, or 8.
- Microsoft Internet Explorer® browser version 10 or above, Google® Chrome™ browser version 41 or above, Mozilla® Firefox® browser version 37 or above, and equivalent browsers.
- Microsoft Excel® spreadsheet software.

If you are using a downloaded package of the software, after you unzip the package, go to folder "...\\Production" and double-click "index.html" to open this tool. Alternatively, click the shortcut "LAUNCH THE TIM-BC TOOL" directly.

Data must be entered by the user in order to get estimates from the tool. These data are described in Section 3, Required User Inputs. If exact local values are not known for an entry, a general estimate can be made by using regional or national default values.

The web-based TIM-BC tool's home page consists of a series of links for each of the eight (8) TIM programs through which users can navigate. This is shown in Figure 1 below. Each of these TIM programs also consist of a series of screens beginning with high-level program information, then with segment-specific information, and ending with a summary screen showing the calculated benefit elements and the benefit-cost ratio.

A description of each of the screens is discussed as follows. The user can move directly to any of these screens by clicking the button .

¹ <http://www.fhwa.dot.gov/software/research/operations/timbc/>. (Note that the website is still under construction when this version of the user's manual is completed.)

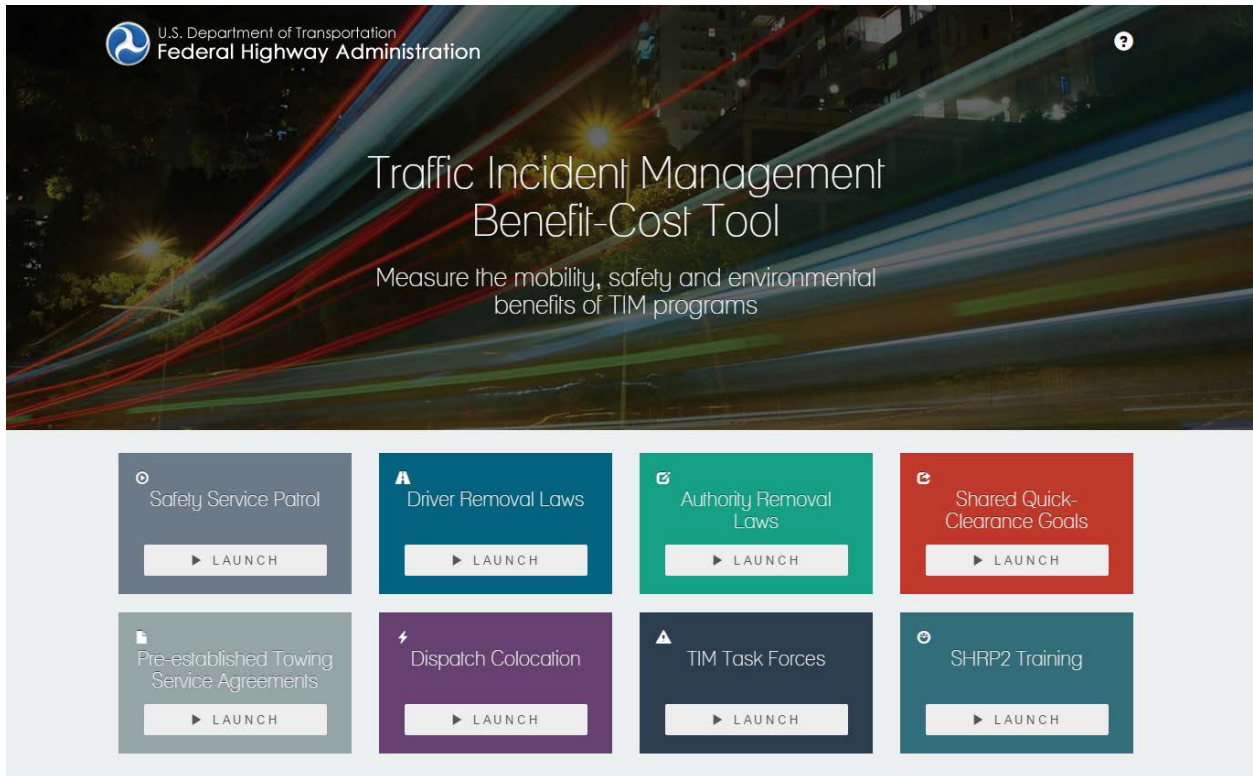



Figure 1. Screenshot. TIM-BC Tool Homescreen.

- **Home Screen.** Users can begin a new project or load an existing project file from this screen. Users can also click the “Learn More” link for resources about the tool, as well as click the  button to see more information about the tool, such as whom to contact with questions or if issues are found.
- **Project Name.** This screen allows users to enter or modify the name of the current project.
- **Project Details.** On this screen, users enter project-level information, including the State in which the program is located, the number of segments in the program, the duration of the study period, the annual number of incidents on the program roadway, and the annual total program cost. The user can open a cost calculator to estimate a cost if the total is unknown.
- **Segment Information.** This screen allows users to enter the details about the specific segment of the program. If more than one segment exists in the current project, users can switch between segments on this screen. This screen requires the following types of input: roadway geometry, traffic information, incident information, and project operation time and incident duration savings. The list of all required inputs is included in Section 3, Required User Inputs.
- **Project Output.** This screen summarizes the calculated benefits and benefit-cost ratio of the program based on user inputs. It calculates benefits in terms of delay savings (in hours), fuel savings (in gallons), secondary incidents prevented, and emissions savings (MT (in metric tons)). Users can generate text reports with the results on this screen.

3. Required User Inputs

The required user inputs listed below are essential to develop accurate estimates of benefits and costs. The data elements are arranged in the order they appear in the tool, assuming users move through the tool in the default order. The tables below describe, for each required input, the acceptable data types and ranges.

3A. Project Name Screen

Tables 1 through 4 show the acceptable data elements for the various fields. Refer to the Microsoft® Excel® spreadsheet “TIM_BC_Input_Output_Variables.xlsx” for more detailed explanations of each variable used in this tool.

Table 1: Acceptable data elements for Project Name/Project Title fields.

ID	Information	Corresponding Interface Element	Format/Type	Valid Options	Required Input?
1	Program Name/Project Title	Text entry box	String	Any string	Yes

3B. Project Details Screen

Table 2: Acceptable data elements for the Project Details screen.

ID	Information	Corresponding Interface Element	Format/Type	Valid Options	Required Input?
2	State	Drop-down box	String	Any of the 50 United States and the District of Columbia	Yes
3	Annual Program Cost	Text entry box	Double or Long	Any value > 0	Yes, unless cost details (#3a–3h) are provided.
4	Number of incidents on program roadway	Text entry box	Long	Any integer ≥ 0	Yes
5	Number of segments in program roadway	Text entry box	Integer	Any integer between 0 and 30	Yes
6	Study Period Duration in months	Text entry box	Integer	1, 2, 3, ... 12	Yes

3Bi. Cost Calculator Sidebar

If the overall total annual program cost (element 3 in Table 2) is not known by the user, relevant program information and data can be entered into the sidebar in the following fields to build the cost:

Table 3. Acceptable data elements for the cost calculator.

ID	Information	Corresponding Interface Element	Format/Type	Valid Options	Required Input?
3a	Patrol vehicle type	Text entry box	String	Any string	Yes, unless overall annual program cost estimate (#3) is provided.
3b	Driver's salary (\$/hour)	Text entry box	Double	Any value > 0	
3c	Fuel (gal/month)	Text entry box	Double	Any value > 0	
3d	Vehicle maintenance (\$/month)	Text entry box	Double	Any value ≥ 0	
3e	Hours per day	Text entry box	Integer	Any integer ≥ 0	
3f	Days per month	Text entry box	Integer	Any integer ≥ 0	
3g	Number of vehicles	Text entry box	Integer	Any integer ≥ 0	
3h	Provided Gas (\$/month)	Text entry box	Double	Any integer ≥ 0	
3i	Other (\$/month)	Text entry box	Double	Any integer ≥ 0	

3C. Segment Information Screen

Table 4. Acceptable data elements for Segment Information fields.

ID	Information	Corresponding Interface Element	Format/ Type	Valid Options	Required Input?
6	Segment Number	Drop-down box	String	Segment #, where # = (1, 2, 3, ... n) and "n" is user input #5	Yes
7	Segment Region	Drop-down box	String	Various options within State chosen in input #2	Yes
8	Program Operation Time on Segment	Option selection	1, 2, or 3 options to select	AM Peak, PM Peak, Off-Peak	Yes
9	Study Period Duration in months	Text entry box	Integer	1, 2, 3, ... 12	Yes
10	Incident Duration Savings Metric	Option selection	Toggle button	Average duration, by lane blockage	Yes
11	Average Duration Savings (minutes)	Text entry box	Double	≥ 0	Only if "Average Duration" is selected in input #10.
12a	Shoulder Blockage (duration savings)	Text entry box	Double	≥ 0	Only if "By Lane Blockage" is selected in input #10.
12b	One-Lane Blockage (duration savings)	Text entry box	Double	≥ 0	
12c	Two-Lane Blockage (duration savings)	Text entry box	Double	≥ 0	
12d-g	Duration savings estimates for three-, four-, five-, and six-lane blockages	Text entry box	Double	≥ 0	
13	Segment length in miles	Text entry box	Double	≥ 0	Yes
14	Number of traffic lanes by direction	Text entry box	Integer	Any number between 2 and 6	Yes
15	General terrain	Drop-down box	String	Flat, Level, Rolling hills, Mountainous	Yes
16	Horizontal curvature	Drop-down box	String	Straight, Mild, Sharp	Yes
17	Posted mainline speed limit, miles per hour (mph)	Text entry box	Integer	37.3–74.5 mph (Note that this value is the actual speed range for calculation. Since the speed may be	Yes

				reduced according to ramp density and curvature, the actual input range may be slightly different than this.)	
18	Traffic volumes (veh/h/ln) by operation time	Text entry box	Long	500–2200 veh/h/ln	Yes
19	Truck percentage by operation time	Text entry box	Double	0–25	Yes
20	Weather type and percentage	Drop-down box (weather type); text entry box (percentage)	String, double	Weather: Clear, Light Rain, Heavy Rain, Snow, Fog, Icy conditions, Low Visibility, Wind; Percentage: 0–100	No
21	Average Incident Duration (min)—by Operation time and lane blockage	Text entry box	Double	1–240 minutes	Yes
22	Number of managed incidents in study period—by operation time and lane blockage	Text entry box	Integer	> 0	Yes
23	Percentage of estimated secondary incidents	Text entry box	Double	>= 0	Yes

4. Use Case: Estimating Benefits and Costs for an SSP Program

The graphical user interfaces of the eight sub-tools are similar to each other. The remainder of this User’s Manual uses SSP-BC sub-tool as an example and demonstrates how users would progress through each main screen of the SSP-BC Subtool to get an estimate of the benefit-cost ratio of their SSP program. The subsections include instructions and screenshots from the SSP-BC sub-tool.

4A. Home Screen

The Home Screen welcomes users to the SSP-BC Subtool. From this screen, users can initiate a variety of processes, described below. A screenshot of the Home screen is displayed in Figure 2.

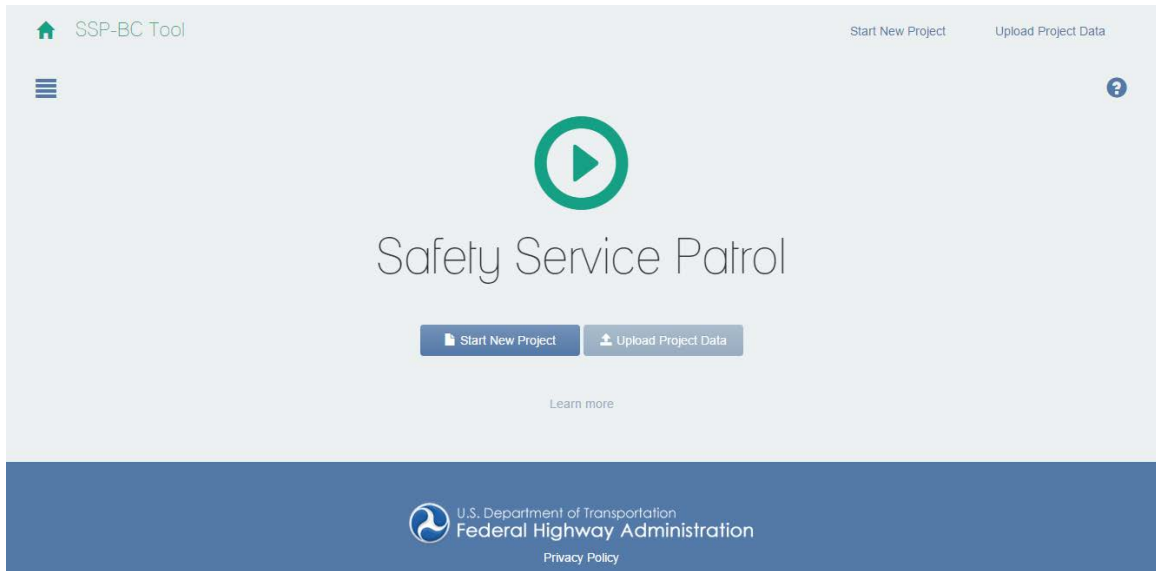


Figure 2: Screenshot. The Home screen.

The Home screen provides users with the following options:

- **About/Information:** This screen, accessed by clicking the question mark icon, explains the purpose, development, and version of the SSP-BC Subtool. It also includes contact information for users to ask questions or provide feedback regarding the tool. This screen is displayed in Figure 3.

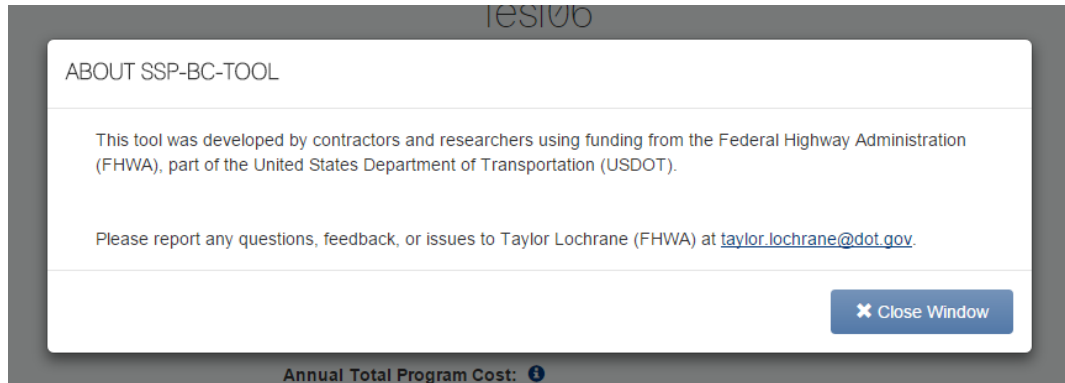



Figure 3: Screenshot. The About screen.

- **Learn More:** This screen, shown in Figure 4, explains the history and purpose of the tool. It describes the requirements for using the tool, including computer settings and Internet browser requirements needed to run the tool. The screen also includes a link to the User's Manual (the document you are reading) and a resource explaining the calculations of benefits and costs. Users can get to this screen by clicking on the Home screen.
- **Go To Main Page:** The icon  at the upper left corner can help users return the main page as shown in Figure 1.

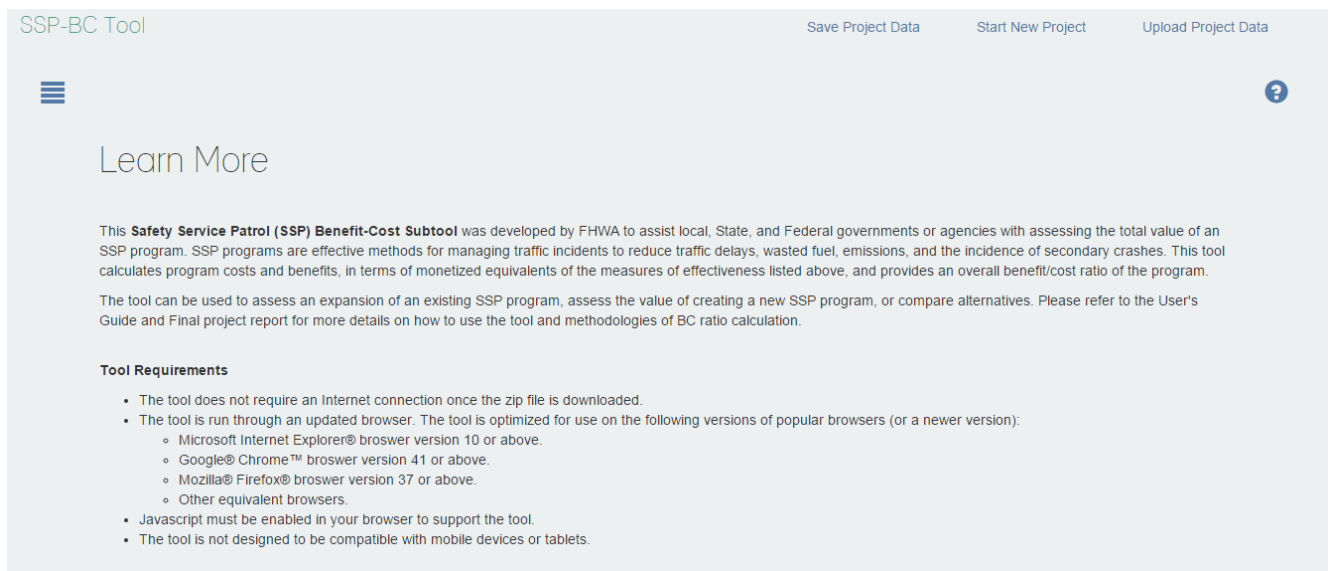


Figure 4: Screenshot. Learn More screen.

- **Start New Project:** Click the “Start New Project” button on the Home screen to create a new SSP program configuration on which to estimate benefits and costs. This selection walks the user through a set of data entry pages where users enter details about the SSP program.
- **Upload Project Data:** Click the “Upload Project Data” button on the Home screen to import a data file for a previously entered SSP program configuration on which benefits and costs were estimated. When users select this option, a dialog box (Figure 5) opens to allow users to select a file saved locally on their computer for import.



Get Started

Start New Project

Upload Project Data

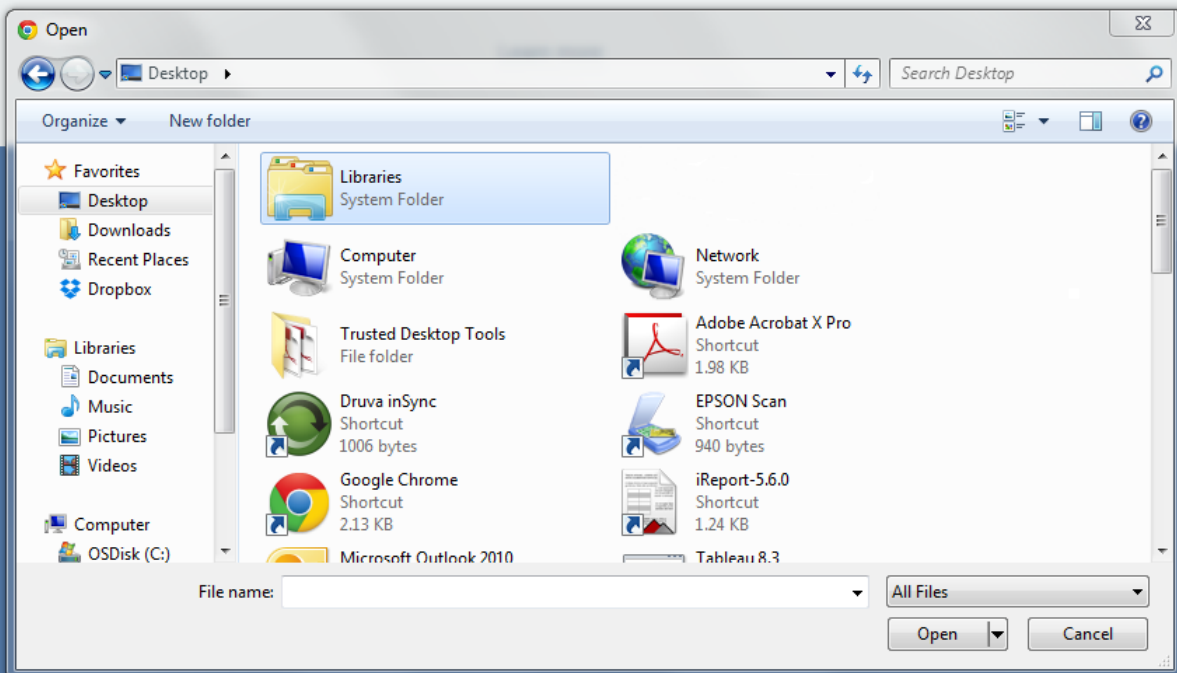


Figure 5: Screenshot. Open Dialog Box after user clicks Upload Project Data button.

Note that the file selected from this dialog box:

- Must be a file generated by the SSP tool during a previous session and saved locally to the user or another user's computer.
- Must have a .json extension.
- Must not be modified by the user or another user after being saved during the initial session.

The tool also includes a sidebar to aid in navigation between screens. This sidebar is available from any screen in the tool. For the current project, it allows users to switch easily between the Home screen, Project Name screen, Project Details screen, Segment Information screen, and the Project Output screen. As required information is entered into each screen, the following screens become activated and selectable. Users cannot select a screen from the sidebar if required inputs on earlier screens are not entered. An image of the sidebar is shown in Figure 6.

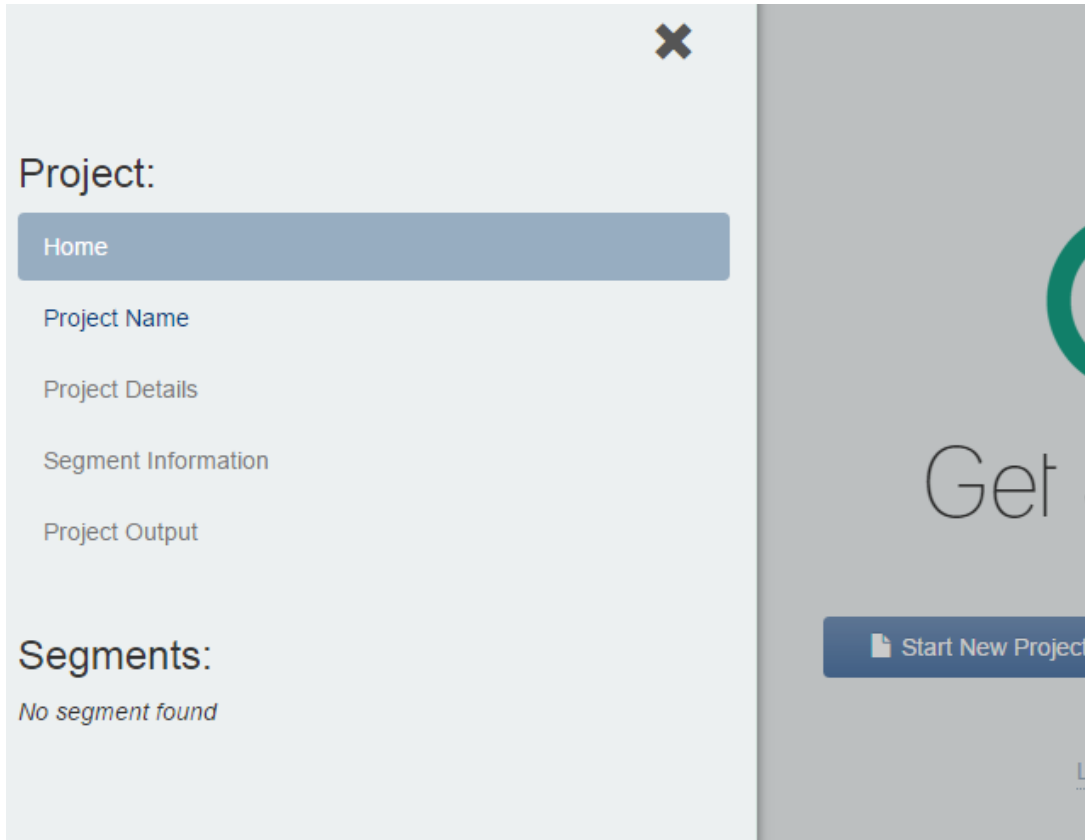


Figure 6: Screenshot. Project sidebar.

4B. Project Name Screen

The first screen requiring user input is the Project Name screen. On this screen, users enter a name for the SSP project, such as “Northern Virginia Safety Service Patrol Program.” This name should describe the project as it will be used in any reports and saved data files.

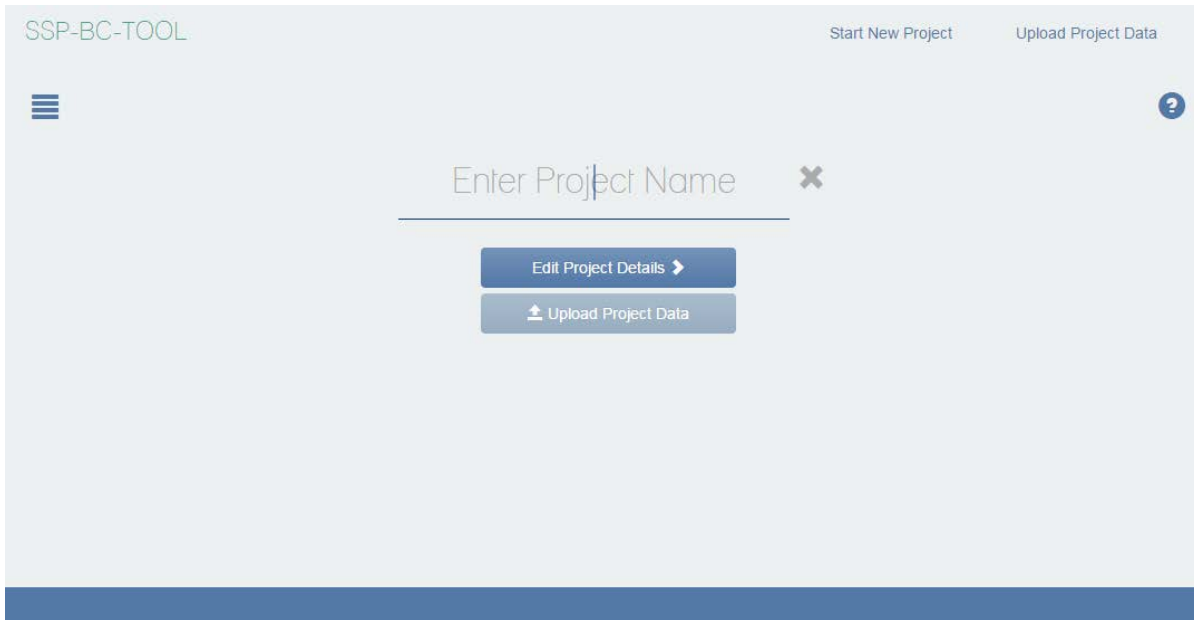


Figure 7: Screenshot. Enter Project Name screen.

The main screen for entering the project name is shown in Figure 7. Position the cursor in the text entry area and type the new name (Figure 8). Click the “x” to the right of the text entry area to delete the entry and start over.



Figure 8: Screenshot. Demonstration of typing new project name.

4C. Project Details Screen

The Project Details screen (shown in Figure 9) includes fields for the user to enter project-level information, including:

- The State where the program operates.
- The number of segments of SSP operation (each up to 20 miles long).
- The duration, in months, of the study period. This entry relates to the numerical entries in the rest of the tool. For example, if 12 months is entered here, all numerical estimates based on a time period should be for this 12-month period.
- The number of annual incidents on the program roadway.
- Annual total program cost:
 - If the user knows the annual total program cost, it can be entered in the data entry box on this screen.

- If users do not know the annual total program cost, they can click the “Calculate” button on the right. This opens the Calculate Program Cost sidebar, which is explained below.

SSP-BC-TOOL

Save Project Data Start New Project Upload Project Data

Example

State: ⓘ
Alabama

Number of Segments: ⓘ
1

Study period duration in months: ⓘ
12

Number of Annual Incidents on Program Roadway: ⓘ
0

Annual Total Program Cost: ⓘ
0

Calculate

Project Name Segment Input

Figure 9: Screenshot. Project Details screen.

Figure 10 shows an example of data entered on the Project Details screen. Note that for any of the data entry fields on this screen, the user can hover over the “i” icon to the right of each label for a tooltip of the expected data entry value.

Example

State: ⓘ
Alabama

Number of Segments: ⓘ
1

Study period duration in months: ⓘ
12

Number of Annual Incidents on Program Roadway: ⓘ
525

Annual Total Program Cost: ⓘ
56518.68

Calculate

← Project Name Segment Input →

Figure 10: Screenshot. Example data entry on Project Details screen.

The Calculate Program Cost screen (shown in Figure 11) assists the user with estimating annual program costs. The user can enter an annual fixed cost value in the upper data entry field, which may represent something like IT system costs that are fixed throughout the annual period.

The user builds additional cost components by entering data into the rows (Figure 12). Users enter the numerical data, such as a driver’s hourly rate, hours worked per day, days worked per month, and resource use estimates, required in each column of the table to get costs related to each patrol vehicle type in the SSP program. If there are additional distinct patrol vehicle types in the SSP program, users can click the “Add Row” button to show additional rows for data entry.

For each row in the table, the monthly costs are calculated in the Monthly Total column. The annual estimate of total costs, including the fixed cost component, is shown at the top just under the Sidebar heading.

After completing the information in the sidebar, users click “Submit” to return to the Program Details screen. The calculated annual total program cost appears in the appropriate blank on this screen and will be carried forward through the tool.

Calculate Program Cost ✕

Annual Total: \$ 0

Annual Fixed Cost:

Patrol Vehicle Type	Number of Vehicles	Driver's Hourly Rate (\$/hr)	Working Hours per Day	Working Days per Month	Fuel (gal/month)	Provided Gas (\$/month)	Vehicle Maintenance (\$/month)	Other (\$/month)	Monthly Total
Vehicle Type	0	0	0	0	0	0	0	0	\$ 0

Figure 11: Screenshot. Calculate Program Cost screen.

An example of a completed Calculate Program Cost screen is shown in Figure 12.

Calculate Program Cost ✕

Annual Total: \$ 56518.68

Annual Fixed Cost:

Patrol Vehicle Type	Number of Vehicles	Driver's Hourly Rate (\$/hr)	Working Hours per Day	Working Days per Month	Fuel (gal/month)	Provided Gas (\$/month)	Vehicle Maintenance (\$/month)	Other (\$/month)	Monthly Total
Type 1	2	15	4	20	100	0	150	180	\$ 3709.89

Figure 12: Screenshot. Example Data Entry on Calculate Program Cost screen.

4D. Segment Information Screen

The Segment Information screen is the heart of the user's data entry for the SSP-BC Subtool. Figure 13 shows a full screenshot of the Segment Information screen.

The screenshot displays the 'Full Segment Information' screen of the SSP-RC-TOOL. The interface is divided into three main panels, each outlined in red:

- Left Panel:** Contains 'Segment' information (Segment 1, Modesto, CA) and 'Roadway Geometry' (Segment Length: 10 miles, Ramps: 0, Lanes: 2, Terrain: Flat, Curvature: Straight). It includes 'Calculate Rate' and 'Reset Information' buttons.
- Central Panel:** Contains 'SSP Program Information' (Operation Time: AM Peak, Incident Duration: 10 minutes) and 'Traffic Information' (Speed Limit: 70 MPH, AM Peak Traffic Volume: 2000, Truck Percentage: 12%).
- Right Panel:** Contains 'Incident Information' for the AM Peak, showing a table of incident severity and duration, and a 'Percentage of Estimated Secondary Incidents' of 4.

Figure 13: Screenshot. Full Segment Information screen.

Users should note this section refers to the three panels, outlined in red rectangles, shown in Figure 12. Those panels are referred to as the “Left Panel,” “Central Panel,” and “Right Panel.” The tool can identify erroneous data entered by the users. If there are input errors, the panel remains blue. The panel turns green, as shown in Figure 13, once all inputs are correct. The tool can detect potential errors by turning the input box red. As long as the panel is green, the tool will be able to calculate final results.

The images in this section each focus on a panel of the screen so that more details can be shown. Each of the features is described subsequently, beginning with Figure 14.

Segment:

Segment 1

Interstate 99 NB

Huntsville, AL

Roadway Geometry

SEGMENT LENGTH IN MILES: 15

NUMBER OF RAMPS: 2

NUMBER OF TRAFFIC LANES BY DIRECTION: 2

GENERAL TERRAIN: Rolling Hills

HORIZONTAL CURVATURE: Mild Curves

Calculate Ratio Reset Information

Figure 14: Screenshot. Segment screen with data entered.

Figure 14 shows the left panel of the Segment screen in which users enter the following information:

- **Segment selection:** From the drop-down menu, users select which segment is currently being edited. The number of segment choices available in this menu is directly related to the number of segments entered on the Project Information screen.
- **Description:** Under the Segment drop-down menu, users can enter a brief description of the current segment, such as “Interstate 99 NB.” This field is limited to plain text.
- **Region selection:** Under the Description field, users select from the drop-down menu the region where the program operates. The regional choices are directly based on the State selected on the Project Information screen.
- **Segment Length in Miles:** Users can enter a positive integer to indicate the length of the segment in miles.
- **Number of ramps:** Users can enter the number of entry and exit ramps within the segment, using a whole number zero or greater.

- **Number of traffic lanes by direction:** Users can enter the number of traffic lanes in one direction on the segment by entering a whole number from two through six. The data in this box will update the quantity of user entry boxes in the other panels of this screen.
- **General terrain:** Users can select from one of the options to indicate the grade of the segment. The options available are Flat, Level, Rolling Hills, and Mountainous, which equate to around 0 percent, 2 percent, 5 percent, and 10 percent grade on the roadway, respectively. If the actual grade is not equal to one of these options, users should select the one that best approximates the actual grade.
- **Horizontal curvature:** Users can select the horizontal curvature of the segment. The options available are Straight, Mild Curves, and Sharp Curves. If the actual horizontal curvature is not equal to one of these options, users should select the one that best approximates the actual curvature or run the tool using two different scenarios for this field to determine the benefit-cost ratio.

This screen also includes the Calculate Ratio and the Reset Information buttons, shown in Figure 14. The Calculate Ratio button collects all the user inputs (for all the segments) and calculates the benefit and cost elements. Note that this button should not be selected until all required inputs for each segment have been entered correctly (i.e., all panels turn green). Otherwise, the results on the Results screen may include partial segments or incorrect information. The Reset Information button resets **all** user entries on the Segment Information screen (for **all** segments) to the starting, or default, values.

SSP Program Information

OPERATION TIME: ⓘ

- AM Peak
- PM Peak
- Weekday Off Peak
- Weekend

INCIDENT DURATION:

Choose how to enter savings: ⓘ

Average Duration | **By Lane Blockage**

ENTER AVERAGE DURATION SAVINGS: (Minutes)

Figure 15: Screenshot. SSP Program Information screen.

Figure 15 displays the SSP Program Information screen (also shown in the top-center of Figure 13). This screen allows users to choose the operational time (AM Peak, PM Peak, Weekday Off Peak, or Weekend) to be incorporated in the analysis. Users need to enter the average savings of their SSP program as a single averaged value by types of lane blockages, if any. Users can use the recommended values provided in the tool or use the local value from field data.

Traffic Information ✓

POSTED MAINLANE SPEED LIMIT (MPH):

Time	Traffic Volume (VEH/H/Lane)	Truck Percentage (0-100)
AM PEAK	<input type="text" value="2700"/>	<input type="text" value="12"/>

Weather Information (ensure selections add up to 100%)

WEATHER	PERCENTAGE (0-100)
<input type="text" value="Clear"/> ▼	<input type="text" value="80"/>
<input type="text" value="Light Rain"/> ▼	<input type="text" value="15"/>
<input type="text" value="Snow"/> ▼	<input type="text" value="5"/>

Figure 16: Screenshot. Traffic Information screen.

Figure 16 displays the Traffic Information screen, also seen in the bottom-center of Figure 13. This lower part in the Central Panel allows users to enter Posted Mainlane Speed limits (in mph), Traffic Volume (veh/h/ln), and Truck Percentage numbers (0–100) of the target roadway segment. Users can also enter weather information for this segment. Note that the Free-Flow Speed (FFS) used in this tool will be based on ramp density and roadway curvature. The range of speed used in calculations should be within the range of 37.3-74.5 mph (60-120 kilometers per hour), within which the tool results are most accurate. If the calculated speed used in real calculation is out of that range, after clicking “Calculate Ratio,” an error message displays, indicating the calculated/reduced speed is out of range. Users should either adjust speed input or ramp/curvature input to make the calculation valid. The tool still produces suggested results by using the nearest reasonable value to your input on the variable bounds in its calculation.

Traffic volume ranges should be from 500–2,200 vehicles per hour per lane (VEH/H/L), the range within which the tool results are most accurate. If entered values are out of the range, the tool will use the nearest reasonable value to your input on the variable bounds in its calculation.

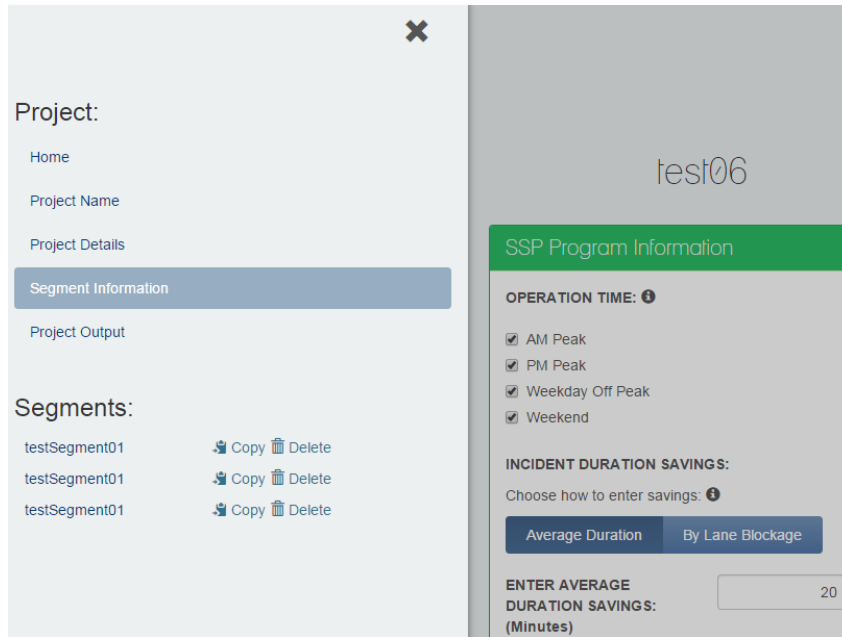


Figure 17: Screenshot. Segment cloning function.

Additionally, the tool offers a convenient function for cloning segments, as shown in Figure 17. When users have completed all inputs for one segment, and if the information is similar across all project segments, users can directly copy segments and modify new segments as needed.

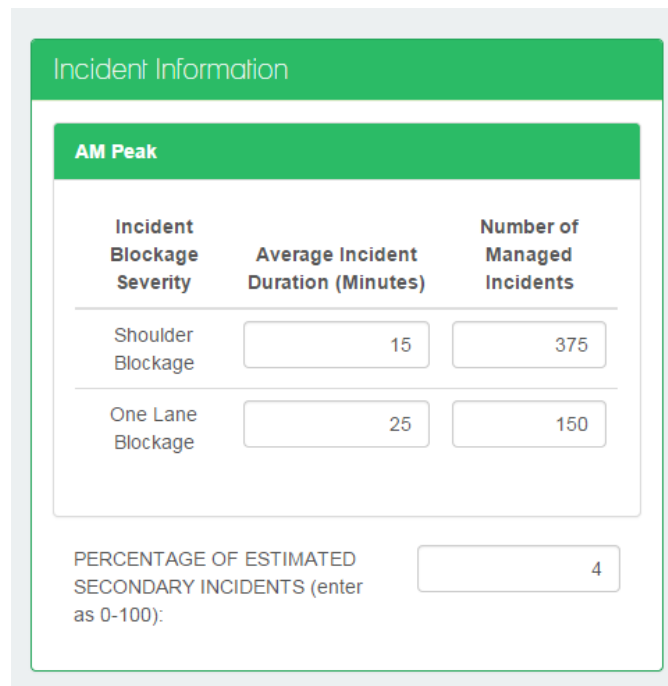


Figure 18: Screenshot. Incident Information screen.

This right panel of the Segment Information screen, shown in Figure 18, allows users to input detailed information for current incident information (including Incident Blockage

Severity, Average Incident Duration (Minutes), Number of Managed Incidents, and Percentage of Estimated Secondary Incidents) for each analysis period and lane blockage condition. The Average Incident Duration field is for current conditions with SSP implemented. The Incident Duration Savings field (see Figure 15) will be added to the number to obtain the Incident Duration without SSP. Note that it is better to keep both incident durations with and without SSP within the range of 1–14,400 minutes, a range within which the tool calculation results will be most accurate. The tool will use the nearest reasonable value to your input in its calculation if entered values are out of the range.

4E. Project Output Screen

Test_Case_2

Segments:

Select All Select None

Test2_seg1

Test2_seg2

PRODUCE REPORT

Savings

Study period duration: 12 months

DELAY SAVINGS (HOURS):	87.01	<input checked="" type="checkbox"/>
FUEL (GALLONS):	-17802.79	<input checked="" type="checkbox"/>
SECONDARY ACCIDENTS:	2.35	<input checked="" type="checkbox"/>
HYDROCARBON (HC, MT):	-1.09	<input type="checkbox"/>
CARBON MONOXIDE (CO, MT):	-8.13	<input type="checkbox"/>
NITROGEN OXIDE (NO _x , MT):	-0.54	<input type="checkbox"/>
CARBON DIOXIDE (CO ₂ , MT):	-175.45	<input type="checkbox"/>
SULFUR OXIDE (SO _x , MT):	-2.82	<input type="checkbox"/>

BENEFIT-COST RATIO OF CHOSEN FACTORS:

8.45

Figure 19: Screenshot. Project Output/Calculate Ratio screen.

The Project Output screen (Figure 19) displays after you click “Calculate Ratio.” You can view the results on the right panel directly, but you can also access a printable PDF report with more detailed results by clicking the “PRODUCE REPORT” button.