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USER GUIDE

UF Transportation Institute McTrans

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Introduction

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Acknowledgements

McTrans Center, University of Florida Transportation Institute PO Box 116585, Gainesville FL 32611-6585 Telephone: 1-800-226-1013 Fax: 352-392-6629 Web: mctrans.ce.ufl.edu Email: mctrans@ce.ufl.edu

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Getting Started

Getting Started

Software Requirements

- 1. Windows 7 or higher
- 2. HCS Streets
- 3. Microsoft .NET 4.5 or higher

Note: Although HCS Streets Reliability may work on Windows Vista and Windows XP, detailed testing was not performed on these platforms.

Urban Street Reliability Analysis

Urban Street Reliability analyses evaluate the travel time reliability experienced by motorists on an urban street facility. Travel time reliability reflects the distribution of trip travel time over an extended period of time. The distribution arises from the occurrence of a number of factors that influence travel time (e.g., weather events, incidents, work zone presence, etc.) The distribution describes *how often* these factors occur and *how bad* operations are as a result. The methodology of the application uses the HCM Chapter 17 procedure.

General Controls

Menu Items

New – Creates a new Streets Reliability file (*.xsr) and starts a new analysis project; shortcut is Ctrl+N

Open - Opens an existing Streets Reliability file (*.xsr); shortcut is Ctrl+O

Example Folder - Opens folder with all HCS examples in File Explorer

Save - Saves an opened Streets Reliability file (*.xsr) using the current file name; shortcut is Ctrl+S

Save As... – Saves an opened Streets Reliability file (*.xsr) using a specified file name; shortcut is F12

Close - Closes an existing Streets Reliability file (*.xsr); shortcut is Ctrl+W

Units

USC Units – Changes the units of the current file to U.S. Customary

Metric Units - Changes the units of the current file to Metric

Print - Bring up printer selection and prints a USR report to the printer or specified file type; shortcut is Ctrl+P

Print Preview – Displays preview of current report before printing; shortcut is Ctrl+F2

Report

Formatted Report – Displays formatted report including the most important values; shortcut is F4

Text Report – Displays text report with all input, intermediary, and final results; shortcut is F6

Default Settings – Opens a dialog box for user to input defaults for Analyst, Agency, and Jurisdiction, which will be applied to all new files; also allows selection of USC or SI units, which will be applied to all new files; shortcut if Alt+F

Help

Contents – Provides access to glossary, acknowledgements, copyrights, and information on the Chapter HCM procedure; shortcut is Ctrl+F1

Index – Allows user to search for keywords within the glossary

Search - Allows user to search for keywords within the Contents

User Guide - Opens a comprehensive user guide in PDF format; shortcut is Ctrl+G

HCM6 Reference Guide – Opens the McTrans website in the default web browser to access the Highway Capacity Manual Reference Guide PDF

HCS Updates – Sends the HCS version number anonymously without any personally identifiable information to McTrans to check for a newer version

HCM/HCS Training - Opens the McTrans Training Page in the default web browser to view the latest training opportunities

HCQS Web Page – Opens the TRB Highway Capacity and Quality of Service Committee page in the default web browser

Support

Frequently Asked Questions – Opens the McTrans support page for HCS in the default web browser

HCS on the Web - Opens the McTrans HCS Overview page in the default web browser

McTrans on the Web – Opens the McTrans home page in the default web browser

E-mail McTrans – Composes a new e-mail addressed to McTrans in the default e-mail client with registration number, serial key, module, and version number already populated in the Subject field

About HCS – Opens an about window with software version information, EULA, general acknowledgements, contact information, and other relevant links

Exit – Exits the HCS Streets Reliability module; shortcut is Alt+F4

Urban Streets Reliability

HCM Chapter 17

The Highway Capacity Software (*HCS*) faithfully implements the methodology prescribed in the Highway Capacity Manual (HCM) for analyzing travel time reliability on an urban street. This chapter's methodology relies on methodologies in other HCM chapters to compute the desired performance measures. Specifically, the methodology for aggregating segment performance measures to obtain an estimate of facility performance is described in Chapter 16. The methodology for evaluating the individual segments is described in Chapter 18. The methodologies in Chapters 16 and 18 are applicable to an urban street facility that typically has a length of 1 mi (or 1.6 km in metric) or more in downtown areas and 2 mi (or 3.2 km in metric) or more in other areas.

At its core, the reliability methodology consists of hundreds of repetitions of the urban street facility methodology presented in Chapter 16. In contrast to the Chapter 16 methodology, where the inputs represent average values for a defined analysis period, the reliability caries the demand, capacity, geometry, and traffic control inputs to the facility methodology with each repetition (i.e., scenario).

The reliability methodology can be used to evaluate the following sources of unreliable travel time:

- Demand fluctuations,
- Weather,
- Traffic incidents,
- Work zones,
- Special events,
- Inadequate base capacity, and
- Traffic control devices on urban streets.

Demand fluctuations are represented in the methodology in terms of systematic and random demand variation by hour of day, day of week, and month of year. Fluctuations due to diversion are not addressed directly by the methodology but can be optionally provided by the analyst for work zones and special events through the demand specified in an alternative dataset.

LIMITATIONS OF THE METHODOLOGY

Because the reliability methodology is based on applying the urban streets methodologies multiple times, they inherit the limitations of those methodology, as described in Chapters 16, 18, and 19, respectively. The reliability methodology has additional limitations as described in the following paragraphs.

In general, the urban street reliability methodology can be used to evaluate the performance of most urban street facilities. However, the methodology does not address the events or conditions in the following list:

- Truck pickup and delivery (double parking);
- Signal malfunction;
- Railroad crossing;
- Railroad and emergency vehicle preemption;
- Signal plan transition; and
- Fog, dust storms, smoke, high winds, or sun glare.

Lane or shoulder blockage due to truck pickup-and-delivery activities in downtown urban areas can be considered incident-like in terms of the randomness of their occurrence and the temporal extent of the event. The dwell time for these activities can range from 10 to 20 min.

A signal malfunction occurs when one or more elements of the signal system are not operating in the intended manner. These elements include vehicles detectors, signal heads, and controller hardware. A failure of one or more of these elements typically results in poor facility operation.

A railroad crossing the facility at a midsegment location effectively blocks traffic flow while the train is present. Train crossing time can be lengthy (i.e., typically 5 to 10 min) and can result in considerable congestion extending for one or more subsequent analysis periods.

Railroad preemption occurs when a train crosses a cross-street leg of a signalized intersection. The signal operation is disrupted for several cycles after train clearance.

When a new timing plan is invoked, the controller goes through a transition from the previous plan to the new plan. The transition period can last several cycles, during which traffic progression is significantly disrupted.

Some weather conditions that restrict driver visibility or degrade vehicle stability are not addressed by the methodology. These conditions include fog, dust storms, smoke, and high winds.

Operational Data

Base Dataset

On the Base Dataset page, the user is required to load a base file to run an Urban Streets Reliability analysis. There are two options when using a base file: *Select Base File* and *Create Base File*. The program requires the HCS Streets module for both these options. The *Select Base File* button opens a dialog that allows users to open an existing HCS Streets (*.xus) files. The *Create Base File* button launches the Streets module where a user can create a new HCS Streets dataset. If HCS is already installed on the computer, then the Streets module should open when this button is clicked. If HCS is not installed, an error will popup and HCS will need to be installed on the computer to continue with the Urban Streets Reliability analysis.

The Base Dataset page shows a summary of the data from the Streets file. When a Streets file is loaded, the required information from the dataset is extracted for reliability analysis. Two sections appear when the Streets file is loaded: *Street intersections and segments graph* and *Street general information*. The number of intersections and segments, along with the distance between the intersections and the posted speed limit are displayed graphically in the first section. The second section lists out the Street Name, Analysis Name, Analysis Year, Analysis Date, Start Time, Period Duration, number of periods, File Name, and any comments taken directly from the Streets file.

Analysis

The Analysis page is used to specify the duration of the reliability reporting period. There are three main sections in the analysis page: *Reporting Period*, *Study Period*, and *Analysis Summary*.

The reliability reporting period represents the specific days over which the travel time distribution is to be computed, for example, all nonholiday weekdays in a year. The period is specified by start and end dates as well as by the days of week being considered. The start and end dates can be selected by clicking the calendar in the respective textbox and selecting the date on the calendar or by typing the date in the format MM/DD/YYYY. The days of week to be considered in a reliability analysis can be selected by clicking the checkboxes provided for each day of the week.

If these values are not changed by the user, the following defaults will be used:

- Start Date: 1/1/2011
- End Date: 1/1/2012
- Days of Week: Mon, Tue, Wed, Thu, Fri (all weekdays)

The number of days should be reflected under each month based on the information input for reporting period. The reliability reporting period is used with the study period to describe the temporal representation of the performance measure fully (e.g., average travel time on nonholiday weekdays from 4:00 to 6:00 p.m. for the current year).

The study period is the time interval (within a day) that is represented by the performance evalutation. It consists of one or more consecutive analysis periods. The default analysis Start Time is taken from the base dataset and can be edited if needed. The End Time is calculated based on the Start Time, number of periods, and duration of Period from the base dataset. End Time and Duration cannot be edited in the Streets Reliability program, but can instead be changed in the base dataset through Streets.

The analysis summary includes: Total number of analysis days, Number of scenarios per day, Number of standard scenarios, and Total Number of scenarios. The Number of standard scenarios is the Total number of analysis days multiplied by the Number of scenarios per day. The Total Number of scenarios is the number of standard scenarios and alternate scenarios (if any).

Weather

A main source of variability that leads to travel time unreliability is weather. Weather events can affect capacity and possibly demand. The Reliability methodology provides default values for use by location.

On the weather page, a drop-down list is located at the top left of the screen where a city with available weather data can be chosen. A city can also be typed into the search bar, which will then match and select the city from the drop down list.

Once a city is selected, *Load Regional Weather* needs to be selected for the weather data to be reflected in the page. This button automatically imports historical weather data for the selected city from a local database file that is distributed with the program. The fields in the table can edited if necessary. If a mistake is made and the user wants to revert back to the previous values, then the *Reset to Regional Default* can be selected to discard recent changes and restore default values for the selected city.

Under the Weather Data table are also weather factors affecting demand. These include: *Pavement runoff duration for snow event (h), Demand change factor for dry weather, Demand change factor for rain event,* and *Demand change factor for snow event.* The defaults for these are 0.5 hours, 1.0, 1.0, and 0.8, respectively. The user has the option of changing these values if necessary. The duration of pavement runoff for a snow event is required. An appropriate local value should be established for the subject facility if possible.

Demand

Another main source of variability that leads to travel time unreliability is the temporal variability in traffic demand both regular variations by hour of the day, day of the week, and month or season of the year and random variations between hours and days. The Demand page is used to display user inputs related to demand and to specify demand factors.

One of the required inputs is the *Urban Street Funtional Class*. There are three urban street functional classes considered: *Expressway*, *Principal Arterial*, and *Minor Arterial*. The default in the program is *Expressway*. Once selected, the defaults for *Hours of the Day Ratios*, *Days of the Week Ratios*, and *Months of the Years Ratios* are displayed. Similar to the table on the Weather page, the fields in these tables can be edited if necessary. The *Base Dataset Traffic Count Date* is automatically set to the date found in the Streets base file, but can also be changed if necessary. Similar to the Analysis page, the date can be selected by clicking the calendar in the textbox and selecting the date on the calendar or by typing the date in the format MM/DD/YYYY. Depending on the date selected, the *Base Demand Ratio* is calculated using *Hours of the Day Ratios*, *Days of the Week Ratios*, and *Months of the Year Ratios*.

Incident

Another main source of variability that leads to travel time unreliability are incidents that block travel lanes or otherwise affect traffic operations and thus capacity. The Incident page is used to specify user inputs related to incidents, their frequencies, reponse time, clearance time, and distributions. There are three tabs within the Incident page: *General, Clearance Time*, and *Distribution*.

The *General* tab displays the crash frequency adjustment factors for different weather types, the incident response time in minutes for different weather types, the incident detection time in minutes, shoulder presence, and the average crashes per year for both segments and intersections. All these fields are pre-populated with the default values provided in Chapter 17. The shoulder presence checkbox is used to switch the different input tables for incident distirbutions. If the checkbox is checked, the input table under the Distribution tab will include *Shoulder* in the *Incident Location - Affected* column. If the checkbox is unchecked, the input table will only display *One Lane* and 2+ *Lanes* under the *Incident Location - Affected* column. Rows form under "Average Crashes per Year" depending on the number of Segments and the number of Intersections coded in the Streets Base File loaded for analysis. Segments will display before Intersections.

The *Clearance Time* tab displays a table with the incident clearance time in minutes for different incident types, which are based on Street Location, Event Type, Lane Location, Severity, and Weather Type. *Street Location* includes *Segment* and *Intersection. Event Type* includes *Crash* or *Non-Crash. Lane Location* includes *One Lane*, *2*+ *Lanes*, or *Shoulder. Severity* types include fatality/injury (*FI*) and property-damage-only (*PDO*) if the Event Type is Crash, and *Breakdown* and *Other* if the Event Type is Non-crash. Weather Types include *Dry*, *Rainfall*, *Wet Pavement*, and *Snow or Ice*.

The *Distribution* tab displays a table with the incident proportions based on *Street Location*, *Incident Type*, *Incident Location*, and *Incident Severity*.

Scenarios

The Scenarios page displays two sections: Scenario Generation Settings and Progress Status.

The checkboxes in the *Scenario Generation Settings* indicate whether or not the user wants to include the corresponding variability in the reliability analysis. The three variables include: *Weather, Demand*, and *Incident*. If a checkbox is unchecked, then the variable is not considered in the analysis. For example, if the *Incident* checkbox is unchecked, then incident scenarios will not be generated. Unique seed numbers are separately established for weather events, demand variation, and incidents. A seed is used so that the sequence of random events can be reproduced. For a given set of three seed numbers, a unique combination of weather events, demand levels, and incidents is estimated for each analysis period in the reliability reporting period. The user can also specify to randomize demand volume for every analysis period by checking the checkbox. This checkbox is automatically checked for an Urban Streets Reliability File (*.xsr).

Progress Status displays the *Replication* number currently generating, the *Scenarios Generated* out of the total number of scenarios, and the time elapsed in seconds for generating scenarios. If the user chooses to stop generating scenarios, a Cancel button is located below *Time Elapsed*.

Once all scenarios are generated, "Scenario Generation Completed." will display after *Scenarios Generated*. The user may select Save or Close from the menu if saving the scenarios generated is needed. If the user selects Save, a pop-up will appear asking if the user wants to save the scenarios generated. If the user selects Close, a pop-up will appear asking if the user wants to save the reliability analysis. Then, a second pop-up will appear asking if the user wants to save the scenarios generated, then each of the Streets files will be saved to a folder, based on the replication (R1, R2, R3, etc.), where the Streets Reliability (*.xsr) file is saved.

Events

Once all scenarios are generated, the Events page will display event predictions. There are four tabs for the Event Predictions: *Summary, Weather, Demand,* and *Incident.* Tabs will be populated depending on which types of

scenarios were included under the *Scenario Generation Settings*. If the number of replications specified by the user was greater than 1, the drop-down list next to *Replication* can be used to switch between replications.

Under *Summary*, the user can specify how many scenarios per page to display by selecting a number from the drop-down list in the upper left hand corner of the section. Since all scenarios cannot be displayed on the page, navigation buttons (<< First, < Previous, Next >, and Last >>) can be found at the bottom of the screen. The current page out of the total number of pages is also displayed at the bottom of the screen. On each Summary page, a table will be displayed with the Analysis Period, Weather Event, Precipitation Rate, Demand Factor, Incident Occurrence, and Incident Count.

Under *Weather*, the user can specify how many Weather details per page are displayed by selecting a number from the drop-down list in the upper left hand corner of the section. Since all scenarios cannot be displayed on the page, navigation buttons (<< First, < Previous, Next >, and Last >>) can be found at the bottom of the screen. The current page out of the total number of pages is also displayed at the bottom of the screen. On each Weather page, a table will be displayed with the Date, Precipitation RN, Precipitation (Yes/No), Temperature RN, Temperature (F), Snow/Rain, Precipitation Rate RN, Precipitation Rate (in./h), Total Precipitation RN, Total Precipitation (in.), Precipitation Start RN, Precipitation Start Time, Precipitation Duration (h), Time Wet After Precipitation (h), Day/Night?, Total Event Duration (h), End of Precipitation, and Wet Pavement End. A horizontal scroll bar is placed under the table to view all columns.

Under *Demand*, the user can specify how many Demand details per page are displayed by selecting a number from the drop-down list in the upper left hand corner of the section. Since all scenarios cannot be displayed on the page, navigation buttons (<< First, < Previous, Next >, and Last >>) can be found at the bottom of the screen. The current page out of the total number of pages is also displayed at the bottom of the screen. On each Demand page, a table will be displayed with the Analysis Period, Weather, Weather Factor, Hour Factor, Day Factor, Month Factor, Total Factor, and Total/Base. A horizontal sroll bar is placed under the table to view all columns.

Under *Incident*, there are two other tabs: *Crash Frequency* and *Other*. For each of the segments and intersections coded in the base dataset, the *Crash Frequency* tab displays the Observed Average Crash Frequency, Number of Years, Hours of Dry Weather, Hours of Rainfall, Hours of Wet Pavement, Hours of Snowfall, Hours of Snow Pavement, Crash Frequency Adjustment Factor for Rainfall, Crash Frequency Adjustment Factor for Snowfall, Crash Frequency Adjustment Factor for Snow Pavement, Crash Frequency for Dry Weather, Crash Frequency for Rainfall, Crash Frequency Adjustment Factor for Snow Factor for Snowfall, Crash Frequency for Wet Pavement, Crash Frequency for Dry Weather, Crash Frequency for Rainfall, Crash Frequency for Wet Pavement, Crash Frequency for Snowfall, and Crash Frequency for Snow Pavement.

The *Other* tab displays a Parameters section in which a user can set a date, a time, and a segment or intersection to gather information on incidents. Similar to the Analysis page and Demand page, the date can be selected by clicking the calendar in the textbox and selecting the date on the calendar or by typing the date in the format MM/DD/YYYY. A drop-down list with different hours of the day can be used to select a time and a drop-down list with the different segments and intersections can be used to select which segment or intersection is needed for information. Below these drop-downs is a Query button, which the user can click to check for incidents starting at the selected query hour. Once clicked, tables will appear for three subtabs: *Determination, Duration,* and *Location*.

The Determination tab displays Proportion, Frequency per Hour, exp (-fi x pi), Random Number, and Incident? for different types of incidents.

The *Duration* tab displays values for the following variables: Location, Incident type, Number of lanes involved, Incident severity, Weather, Incident detection time (min), Incident response time, dry weather (min), Incident clearance time (min), Average incident duration (min), Standard deviation of incident duration (min), Average incident duration of incident duration (h), Random number, Gamma function alpha parameter (mean²/variance), Gamma function beta parameter (mean/variance), Duration (h), Rounded duration (nearest 15 min) (h), Incident start time, and Incident end time.

The *Location* tab displays values for the following variables: Incident number; Incident type, location and severity; Random number; Location index; Location; and Directional probabilities for EB, WB, NB, and SB.

Summary

Once all scenarios are generated, the *Summary* page will display Scenario Details. If the number of replications specified by the user was greater than 1, the drop-down list next to *Replication* can be used to switch between replications. In the Scenario Details, the following are displayed for each scenario: *Scenario ID*, Analysis *Period*, *Travel Time FWD* (*s*), *Travel Time REV* (*s*), *Travel Speed FWD* (*mi/h*), *Travel Speed REV* (*mi/h*), and *Facility Delay* (*veh-h*). Hovering over each *Scenario ID* will show the path for the file location.

Urban Streets Reliability Report

The Report page displays the results of the analysis in the form of tables and graphs. There are two reports available to the user: the formatted report and the text report. The formatted report is initially displayed, but the user can switch to the text report by clicking the *Switch to Text Report* button located at the top of the screen. Similarly, if the user has the text report displayed, the *Switch to Formatted Report* button located at the top of screen can be used to display the formatted report instead.

The formatted report provides an overview of the results in a table. There are four sections in the table: Base Dataset Analysis, Realiability Input Summary, Reliability Performance Measure Results, and Travel Time results for each replication. Base Dataset Analysis provides general information that can be found in the base dataset. Reliability Input Summary provides general information on the reliability analysis and the random seed summary. The random seed numbers displayed on this report are for the first replication. Random seed numbers for each replication can be found in the text report. Reliability Performance Measure Results provides information on the following performance measures for each major street direction: Vehicle miles traveled (veh-m), Number of Scenarios, Base free-flow travel time (s), Mean TTI, 80th percentile TTI, 95th percentile TTI (PTI), Reliability rating (%), and Total delay (veh-h). The last section of the table includes information on travel time for each replication. The average travel time and the 95th percentile travel time is provided in the formatted report, but more information can be found in the text report. Below the table are two graphs displaying the Travel Time Frequency Distribution for both the Major Street Forward and Reverse directions.

The text report provides more detailed results. The results for the major street forward direction are displayed first and then the results for the other major street reverse direction is displayed. The following performance measures are displayed for each major street direction: Vehicle Miles Traveled (veh-mi), Base Free-Flow Speed (mi/h), Base Free-Flow Travel Time (s), Reliability Rating, and Number of Scenarios. Following this is information for each replication. Each replication displays the Random Number Seeds for Weather, Demand, and Incident. Then the Average, Standard Devaition, Skewness, Median, 5th Percentile, 10th Percentile, 80th Percentile, 85th Percentile, and 95th Percentile are displayed for Travel Time (s), Travel Speed (mi/h), Stop Rate (stops/veh), Running Time (s), Through Delay (s/veh), and Total Delay (veh-hr).

How To

Create a New File

1. From the Start screen, there are three options for creating a new file:



Note: A new file can be created if an existing file is already open; you do not need to start from the Start screen.

a. Selecting *File > New* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "New"



b. Selecting "New File..." from the Start screen; this can be found below in the red box

HCS Streets Reliability		- O X
E Start New File Open File Example Folder Recent	STREETS RELIABILITY	Help Topics HCS Updates HCS on the Web McTrans on the Web HCM/HCS Training E-mail McTrans About HCS
1	HCS2022	1.5
	UT Transportation Institute McTrans	1315
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c. Using keyboard shortcut "Ctrl+N"

2. Once a new file is created, you will be brought to the Base page

-	StreetsReliability1.xsr* - Streets Reliability
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🚔 StreetsReliability1.xsr * - Streets Reliability	-		×
START BASE ANALYSIS WEATHER DEMAND INCIDENT SCENARIOS EVENTS SUMMARY REPORT			
1. Please select a Base Dataset.			
Select Base File Create Base File			
			\sim
Back			Next
Copyright © 2021 University of Florida. All Rights Reserved. HCS*	Streets Reliability Versi	on 2022	2 (USC)

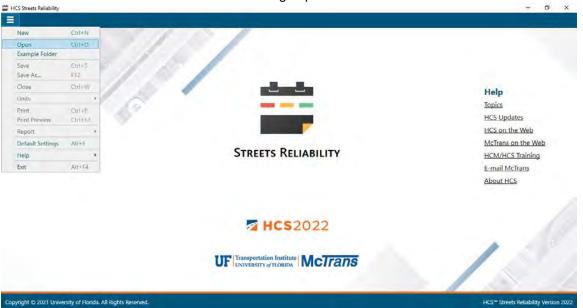
Open an Existing File

1. From the Start screen, there are six options for opening an existing file:



Note: A file can be opened even if another file is currently open; you do not need to start from the Start screen.

a. Selecting *File > Open* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Open"



b. Selecting "Open File..." from the Start screen; this can be found below in the red box

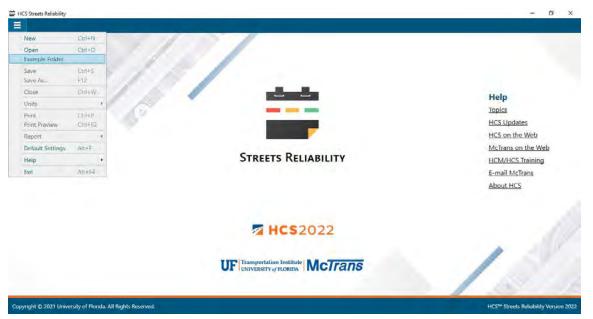
HCS Streets Reliability		- 0 X
Start New File Open File Example Folder Recent	STREETS RELIABILITY	Help Topics HCS Updates HCS on the Web McTrans on the Web HCM/HCS Training E-mail McTrans About HCS
	HCS2022	1.18
	UF Transportation Institute McTrans	18 6
Copyright © 2021 University of Florida. All Rights R	eserved.	HCS [™] Streets Reliability Version 2022

c. Using the keyboard shortcut "Ctrl+O"

d. Selecting a file under the Recent files list from the Start screen; this can be found below in the red box



e. Selecting *File > Example Folder* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Example Folder". Opening the example folder will open the path of the HCS example files in File Explorer. The desired example file can be double-clicked or right-clicked and selecting 'Open', which will open the example file in the Streets Reliability program.



f. Selecting "Example Folder..." from the Start screen; this can be found below in the red box. Opening the example folder will open the path of the HCS example files in File Explorer. The desired example file can be double-clicked or right-clicked and selecting 'Open', which will open the example file in the Streets Reliability program.

HCS Streets Reliability	- 0 X
Start New File Open File Example Folder Recent STREETS RELIABILITY	Help Topics HCS Updates HCS on the Web McTrans on the Web HCM/HCS Training E-mail McTrans About HCS
MCS2022	18
UNIVERSITY of FLORIDA MCTRANS	18 5
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2. Once an existing file is opened, you will be brought to the Base page

	S WEATHER DEMAND INCIDENT SCENARIOS EVENTS SUMMARY REPOR	RT
¢	Select Base File Create Base File Street intersections and segments graph 1 1800 ft 2	€
Back	Street general information Street Analyst Analysis Year Analysis Date 9/7/2011 12:00:00 AM Start Time 7:00 Period Duration 15 Minutes Periods 1 File Name StreetsBase1.xus Comment HCS Export	Next

Save a File

- 1. There are five options for saving an open file:
 - a. Selecting *File > Save* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Save"

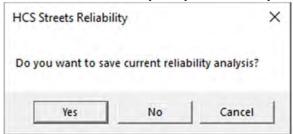
StreetsReliability1.xsr - Streets Reliability-	- 0' X
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Report , 35 mph	
Default Settings Au+6	
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Exit vide+64	Next
Street general information Street Analysis Analysis Year 2017 Analysis Date 3/2/2017 15 Minutes Periods 1 File Name Streets1-MotorizedVehicle.acus Comment Chapter 30; Example Problem 1	
Copyright © 2021 University of Florida. All Rights Reserved.	HCS [™] Streets Reliability Version 2022 (USC)

b. Selecting *File > Save As...* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Save As..."

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rielp.		(\rightarrow)
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	Street general information Street Analyst Analysis Year 2017 Analysis Date 3/2/2017 Start Time 7:00 Period Duration 15 Minutes Periods 1 File Name Streets 1-Motorized Vehicle xus Comment Chapter 30; Example Problem 1	
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- c. Using the keyboard shortcut "Ctrl+S" for Save
- d. Using the keyboard shortcut "F12" for Save As

e. Exiting the program or closing the file without saving changes beforehand; this will prompt you to save the current reliability analysis before anything is closed



- i. Selecting "Yes" will save the file if it is an existing file. If the file has not been previously saved, the Save As dialog box will pop up allowing you to change the file name and save it.
- ii. Selecting "No" will exit the program or close the file without saving the file
- iii. Selecting "Cancel" will prevent the file from closing
- iv. If you have generated scenarios and then decide to exit the program or close the file, you will receive two prompts: the aforementioned prompt and a Save Scenarios prompt

Save Scenarios		×
Do you want to save g	generated Reliabili	ty Scenarios?
	Yes	No

- 1. Selecting "Yes" will save all the scenario files generated and create folders based on the number of replications
- Selecting "No" will exit the program or close the file without saving the scenario files generated

Note: Using Save with an existing file will save a file without prompting you to specify a file name. Using Save with a new file will bring up the Save As dialog box for you to specify a file name for saving. Using Save As will always bring up the Save As dialog box for you to specify a file name for saving.

Close a File

- 1. There are three options for closing an open file:
 - a. Selecting *File > Close* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Close"

and the second se	DEMAND INCIDENT SCENARIOS EVENTS SUMMARY REPORT	
CHI+D	Select Base File Create Base File	
Ctrl+S F12	Street Intersections and segments graph	
Ctri+W		
Ctri+P Ctri+FA	1800 ft	
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	Street general information Street Analyst Analysis Vear 2017 Analysis Date 3/2/2017 12:00:00 AM Start Time 7:00 Period Duration 15 Minutes Periods 1 File Name Streets1-MotorizedVehicle.xus Comment Chapter 30: Example Problem 1	
	Cirl+S FEZ Cirl+W Cirl+P Cirl+FA	CriteD CriteS Fiz CriteV CriteS CriteV CriteS CriteV CriteS CriteV CriteS Crite

- b. Using the keyboard shortcut "Ctrl+W"
- c. Exiting the program itself; please see How To: Exit the Program

Exit the Program

1. From the Start screen, there are three options for exiting the program:

🚔 HCS Streets Reliability	- 🗆 X
Start New File Open File Example Folder Recent STREETS RELIABILITY	Help Topics HCS Updates HCS on the Web McTrans on the Web HCM/HCS Training E-mail McTrans About HCS
MCS2022	15
UF Transportation Institute McTrans	19-5
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Note: The program can be exited even if a file is still open; you do not need to start from the Start screen.

a. Selecting *File > Exit* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Exit"



- b. Using the keyboard shortcut "Alt+F4"

HCS Streets Reliability		- 🗆 X
Start New File Open File Example Folder Recent	STREETS RELIABILITY	Help Topics HCS Updates HCS on the Web McTrans on the Web HCM/HCS Training E-mail McTrans About HCS
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Load a Base File

1. On the Base page, there are two options to load a base file: 'Select Base File' and 'Create Base File'



a. 'Select Base File' will bring up an Open dialog box to allow selection of an existing Streets (*.xus) file

😂 StreetsReliability 1.xsr * - Streets Reliability	- 0 X
■ START BASE ANALYSIS WEATHER DEMAND INCIDENT SCENARIOS EVENTS SUMMARY	REPORT
1. Please select a Dara Daravet	
Select Base File Create Base	ile
ack	
Copyright © 2021 University of Florida. All Rights Reserved.	HCS** Streets Reliability Version 2022 (USC)

Open			× TS SUMMARY REPORT	
Organize + New folder	Name Alternative Intersections H55	Date modified 11/18/2021 \$11 AM 11/18/2021 \$12 AM	Create Base File	
OneDrive - University This PC Network	Streets Reliability Interchanges1-Diamond.xus Interchanges2-Diamond.WahQurueSpillback.rus Interchanges3-DiamondWahQurueSpillback.rus Interchanges5-DiamondWahQurueSpillback.rus Interchanges5-DiamondWahQurueSpillback.rus Interchanges5-DiamondWahQueentitesection.x Signals1-ActionizedVahIdgueentitesection.x Signals1-ActionizedVahIdgueentitesection.x Signals1-ActionizedVahIdgueentitesection.x	1/20/2021 204 PM 3/2/2017 5:35 PM 3/2/2017 5:35 PM 3/10/2017 5:51 PM 3/16/2017 5:51 PM 3/16/2017 4:52 PM 3/10/2017 6:52 PM 3/10/2017 6:52 PM 3/2/2017 2:59 PM	Ры 200 200 200 200 200 200 200 200 200 20	Ē
File nar		S Storet): Files ("Jous) Open Cancel		

b. Create Base File' opens the *HCS Streets* program allowing you to create a Streets (*.xus) file which can then be saved and loaded into *HCS Streets Reliability* using the 'Select Base File' button

	START BASE ANALYSIS WEATHER DEMAND INCIDEN	T SCENARIOS EVENTS SUMMARY REPORT	
Back		I. Fiesse select a Geor Dataset. Select Base File	→ Next
Сору	right © 2021 University of Florida. All Rights Reserved.		HC5 ^{***} Streets Reliability Version 2022 (USC)

File View Edit V		Version 2022	×	
1 Contraction	Open	New		
€ Back	Select mode to			→ Next

Load Regional Weather

1. On the Weather page, a weather location must be selected for an analysis if Weather is included in scenario generation.

			7.1	lease sele	ict a Wea	ther Local	tion.								
	Choose Nearest City	_	٥.	L	oad Re	gional	Weathe	r	Re	eset to	Region	al Defa	ult		
	Current Location:														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	Total normal precipitation (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	Total normal snowfall (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
0	Days with precipitation*	0	0	0	0	0	0	0	0	0	0	0	0		0
E	Average temperature (degree F)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		7
Back	Precipitation rate (in.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Next
	*Precipitation of 0.01 inch or more Pavement runoff duration for snow even Demand change factor for dry weather Demand change factor for rain event Demand change factor for snow event		0.5												

2. A drop down list of U.S. cities is provided. You can open the list by selecting the down arrow and scrolling through to search for a particular city or you can type a city in the box which will find the location in the list.

			1. Please se	ieur a vica	itiler Loca	uon.									
	Choose Nearest City	ρ		Load Re	egional	Weath	er	R	eset to	Region	al Defa	ult			
	ABERDEEN, SD ABILENE, TX		â												
	AKRON, OH ALAMOSA, CO		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
	ALBANY, NY		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	ALBUQUERQUE, NM ALLENTOWN, PA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	ALPENA, MI		0	0	0	0	0	0	0	0	0	0			
E	AMARILLO, TX ANCHORAGE, AK		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			G
Back	ANNETTE, AK APALACHICOLA, FL		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			Next
	ASHEVILLE NC Pavement runoff duration for snow event	t (h) 0.5													
	Demand change factor for dry weather	1													
	Demand change factor for rain event	1													
	Demand change factor for snow event	0.8													
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StreetsReliability1.xsr* - Str	ets Reliability NALYSIS WEATHER DEMAND INCIDENT GAINESVILLE FL Current Location:		1. Please sei	lect a Wea	ther Loca	ition.		-	eset to Sep	Region	al Defai		HCS [™] Streets I	teliability Versi	
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📛 StreetsReliability1.xsr* - Str	ets Reliability NALYSIS WEATHER DEMAND INCIDENT GAINESVILLE_FE Current Location: Total normal precipitation (in.) Total normal snowfall (in.) Days with precipitation*	Jan Fel 0.0 0.0 0.0 0.0	 Mar 0.0 0.0 0.0 	Load Re Apr 0.0 0.0	egional May 0.0 0.0	Weather Jun 0.0 0.0	er Jul 0.0 0.0	Aug 0.0 0.0	Sep 0.0 0.0	Oct 0.0 0.0	Nov 0.0 0.0	Ult Dec 0.0 0.0	HCS TM Streets I	–	
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📛 StreetsReliability1.xsr* - Str	ets Reliability INALYSIS WEATHER DEMAND INCIDENT CANESVILLE, FL Current Location: Total normal precipitation (in.) Total normal snowfall (in.) Days with precipitation* Average temperature (degree F) Precipitation rate (in.)	Jan Fel 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	I. Please set • <	Load Re Load Re 0.0 0.0 0 0.0	May 0.0 0.0 0.0 0.0	Jun 0.0 0.0 0.0	Jul 0.0 0.0 0.0	Aug 0.0 0.0 0.0 0.0	Sep 0.0 0.0 0 0.0	Oct 0.0 0.0 0 0.0	Nov 0.0 0.0 0	Ult Dec 0.0 0.0 0 0.0	HCS [™] Streets I	keliabilīty Versi	œ ×
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3. Once a city is selected, click the 'Load Regional Weather' button. This will populate the table below with information based on the location selected.

	GAINESVILLE, FL		х •		and Pa	gional	Month		D	orat to	Region	al Dofa	ult	
	Current Location: GAINESVILLE, FL					gionar	Weath		1	eset to	Region	ai Dela	uit	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	Total normal precipitation (in.)	3.51	3.39	4.26	2.86	3.23	6.78	6.1	6.63	4.37	2.5	2.17	2.56	
	Total normal snowfall (in.)					0		0		0	0	0		
	Days with precipitation*	8	7	7	5	6	14	15	16	11	7	6	6	
~	Average temperature (degree F)	54.3	57	62.5	67.6	74.3	79.2	80.9	80.4	77.8	70.1	62.8	56.3	1
	Precipitation rate (in.)	0.145	0.116	0.216	0.183	0.285	0.19	0.232	0.206	0.193	0.137	0.154	0.106	(
ick	*Precipitation of 0.01 inch or more													1
	Pavement runoff duration for snow e	vent (h)	0.5]										
	Demand change factor for dry weath	er	1	[
	Demand change factor for rain event		1											
	Demand change factor for snow even	t	0.8											

- 4. This table is editable so individual cells can be changed if necessary.
- 5. If cells are changed, and you wish to reload the defaults of your chosen location, a 'Reset to Regional Default' button is provided.

Generate Scenarios

1. On the Scenarios page, Scenario Generations Settings are provided.

Scenario Generation Settings						
		Weather	Demand	Incident		
1	nclude	V	V	V		
1	Random Seed*	82	11	63		
	landom seed is a wi	hole number in	range (0., 100)			
	Randomize D	emand Volume	e for every analy	ysis period		
	Number of re	plications*		2		
*Number of time	s each scenario is g	enerated to mir	nimize any bias	that rare events n	ay cause.	9
						Next
	(Senerate Sc	enarios			Next
Progress Status						
	1 F *Number of time	Include Random Seed* *Random seed is a wi ☑ Randomize [Number of times each scenario is g	Weather Include Image: Comparison of the second of t	Weather Demand Include Image: Comparison of the second s	Weather Demand Incident Include Image: Comparison of the second of the sec	Weather Demand Incident Include Image: Comparison of the second sec

2. Checkboxes are provided for Weather, Demand, and Incident to indicate whether or not to consider the input provided on their respective pages in the scenario generation process.

	Scenario Generation Setting	IS				Ĩ	
			Weather	Demand	Incident		
		Include	~		•		
		Kandom Seed*	82	11	63		
		*Random seed is a w		and the second			
		Randomize [Demand Volum	e for every anal	ysis period		
		Number of re	plications*		2		
Back	Progress Status	3	Generate Sc	enarios]	Next

3. Random Seed numbers are provided for Weather, Demand, and Incident so that a sequence of random events can be reproduced.

₩ St			Streets Reliability	Contract Contractor	DEMAND INCIDE	NT SCEN	ARIOS E	VENTS SU	JMMARY REP	ORT	-		×
Back)		Scenario G Scenario G Progress S	Seneration Sett	ings Include Random Seed* Rondom seed is a wi Randomize D Number of rej ber of times each scenario is g	Weather 2 82 2000 number for 2000 volum 2000 volum 2000 volum 2000 volum 2000 volum 2000 volum 2000 volum 2000 volum 2000 volume 2000 v	Demand I 11 range (U.: 100] e for every anal nimize any bias	Incident 63 ysis period 2]				(→ Next
Сору	rright © 202	1 Univer	sity of Florida. A	ll Rights Reserve	ed.					HCS™ Streets Reliab	oility Versi	on 202	2 (USC)

	Scenario Generation Settin	gs				
		Include	Weather	Demand	Incident	
		Random Seed*	2	~		
		*Random seed is a wi	82	11	63	
		Randomize D			ysis period	
		Number of re	plications*		2	
Back	Progress Status		Senerate Sc	renarios		 Next

5. The number of replications can be indicated before scenario generation. This is the number of times each scenario is generated to minimize any bias that rare events may cause. For example, if there are 260 scenarios in an analysis and 2 replications, each replication will have 260 scenarios or a total of 520 scenarios. The default number of replications is 1.

	Scenario Generation Se	ttings	Weather	Demand	Incident		
		Include	V				
		Random Seed*	82	11	63		
		*Random seed is a wh	nole number in	range (0., 100]			
		🗹 Randomize D	emand Volume	e for every anal	ysis period		
		Number of rej	olications*		2		
Back		mber of times each scenario is g	Senerate Sc		that rare events may co	duse.	(→) Next
	Progress Status						

6. Once everything is set, click on the 'Generate Scenarios' button to start the scenario generation process. ⇒ streetsReliability1xsr*- Streets Reliability

	Scenario Generation Settings						
		Weather	Demand	Incident			
	Include	V	V	V			
	Random	02	11	63			
		ed is a whole number in domize Demand Volum		burie pariod			
			e for every and				
		er of replications*		2 that rare events may cause.			
(Back		Generate Se	cenarios			Ç	→ Next
	Progress Status						
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7. When scenario generation starts, the Progress Status section will indicate the current replication generating scenarios, the current number of scenarios generated within the replication, and the time elapsed for scenario generation. There is also a progress bar at the bottom of the window to indicate scenario generation is in progress.

Next

8. When scenario generation is done, Scenarios Generated will say "Scenario Generation Completed." [#] StreetsReliability1.xsr*- Streets Reliability - □ ×

START		INCIDENT SCENARIOS EVENTS SUMMARY REPORT	
	Scenario Generation Settings		
	Progress Status		
	See	Replication : 2 enarios Generated : Scenario Generation Completed. Time Elapsed : 0 hours 1 minutes 51 seconds Cancel	
George Back			→ Next
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9. The Events, Summary, and Report pages will be populated with results after completion of scenario generation.

			Replicatio	n 1 ~			- i	
	Event Predictions			_	2			
	Summary	Weather	Demand	Incident			11	
	Scenarios per page : 20 ~							
	Analysis Period	Weather Event	Precipitation Rate	Demand Factor	Incident Occurrence	Incident Count		
	1/3/2011 7:00:00 AM	Dry		0.768	No.			
	1/4/2011 7:00:00 AM	Dry		0.768	No			
~	1/5/2011 7:00:00 AM	Dry		0.783	No			1
()	1/6/2011 7:00:00 AM	Dry		0.807	No			(-
ack	1/7/2011 7:00:00 AM	Dry		0.901	No			1
ack	1/10/2011 7:00:00 AM	Dry		0.768	No			N
	1/11/2011 7:00:00 AM	Dry		0.768	No			
	1/12/2011 7:00:00 AM	Dry		0.783	No			
	1/13/2011 7:00:00 AM	Dry		0.807	No			
	1/14/2011 7:00:00 AM	Dry		0.901	No			
	1/17/2011 7:00:00 AM	Dry		0.768	No			
	1/18/2011 7:00:00 AM	Dry	1	0.768	No			
	1/19/2011 7:00:00 AM	Dry		0.783	No			
	1/20/2011 7:00:00 AM	Dry		0.807	No			
	1/21/2011 7:00:00 AM	Dry		0.901	No			
	1/24/2011 7:00:00 AM	Dry	-	0.768	No			
	1/25/2011 7:00:00 AM	Dry Dry		0.768	No			

JIANI	BASE ANALY	SIS WEATHER DE	MAND INCID	ENT SCENARIO	S EVENTS SUN	IMARY REPOR	I	-
				Replication 1 ~				
6	Scenarios Detai	ls						٦ ا
	Scenario ID	Analysis Period	Travel Time FWD (s)	Travel Time REV (s)	Travel Speed FWD	Travel Speed REV	Facility Delay (veh-h)	
	<u>S1</u>	1/3/2011 7:00:00 AM	48.228	48.205	25.448	25.459	10.383	
	52	1/4/2011 7:00:00 AM	48.427	48.411	25.343	25.351	10.484	
	\$3	1/5/2011 7:00:00 AM	48.278	48.291	25.421	25.414	10.484	
	<u>\$4</u>	1/6/2011 7:00:00 AM	49.079	49.064	25.006	25.014	11.056	
	\$5	1/7/2011 7:00:00 AM	51.695	51.729	23.74	23.725	12.768	
	\$6	1/10/2011 7:00:00 AM	48.341	48.339	25.388	25.389	10.444	1
-)	\$7	1/11/2011 7:00:00 AM	48.225	48.221	25.449	25.451	10.31	(-
/	58	1/12/2011 7:00:00 AM	48.34	48.337	25.388	25.39	10.509	
ck	59	1/13/2011 7:00:00 AM	48.568	48.576	25.269	25.265	10.88	N
	\$10	1/14/2011 7:00:00 AM	50.902	50.903	24.11	24.11	12,463	
	S11	1/17/2011 7:00:00 AM	48.23	48.042	25.446	25.546	10.305	
	\$12	1/18/2011 7:00:00 AM	48.182	48.162	25.472	25.482	10.283	
	\$13	1/19/2011 7:00:00 AM	48,723	48.724	25,189	25.188	10.636	
	\$14	1/20/2011 7:00:00 AM	49.014	48.986	25.039	25.053	11.022	
	\$15	1/21/2011 7:00:00 AM	51.003	50.856	24.063	24.132	12.502	
	516	1/24/2011 7:00:00 AM	48.198	48.198	25.463	25.463	10.296	
	<u>\$10</u> \$17	1/25/2011 7:00:00 AM	48.234	48.204	25.444	25.465	10.385	
	518		48.724	48.731	25.188	25.185	10.638	
		1/26/2011 7:00:00 AM			25.188		10.038	
	<u>\$19</u>	1/27/2011 7:00:00 AM	48.875	48.879	25.111	25.108	10.957	
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View Results of the Analysis

After editing all the necessary inputs and generating scenarios, results of the analysis can be found in the form of tables on the Events and Summary pages, and in the form of reports on the Report page.

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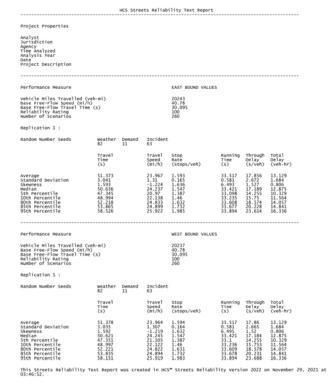
			Destant I			
			Replication 1 **			
Event Prediction	ons				2.1	
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Scenarios per pa	ge: 20 -					
Analysis P	eriod Weather E	vent Precipitati	ion Rate Dema	and Factor	Incident Occurrence	Incident Count
1/3/2011 7:00	LOO AM Dry			0,746	No	
1/4/2011 7:00				0.746	No	
1/5/2011 7:00				0.762	No	
1/6/2011 7:00				0.785 0.876	No No	
1/10/2011 7:0				0.746	No	
1/11/2011 7:0				0.746	No	
1/12/2011 7:0	0:00 AM Dry			0.762	No	
1/13/2011 7:0				0.785	No	
1/14/2011 7:0				0.876	No	
1/17/2011 7:0 1/18/2011 7:0				0.746 0.746	No No	
1/19/2011 7:0				0.762	No	
1/20/2011 7:0				0.785	No	
1/21/2011 7:0	0:00 AM Dry			0.876	No	
1/24/2011 7:0	0:00 AM Dry			0.746	No	
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eets Reliability ANALYSIS WEATHER Scenarios Deta Scenarios Deta Scenario ID S1 S2 S3 S4 S5 S6 S7 S2 S3 S5 S6 S7 S2 S1 S1 S1 S12 S12 S12 S13 S14 S15 S16 S17 S18	d. DEMAND INCID ils Analysis Period 1/3/2011 7:00:00 AM 1/4/2011 7:00:00 AM 1/4/2011 7:00:00 AM 1/1/2011 7:00:00 AM 1/1/2011 7:00:00 AM 1/11/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/12/2011 7:00:00 AM 1/24/2011 7:00:00 AM 1/24/2011 7:00:00 AM 1/25/2011 7:00:00 AM 1/25/2011 7:00:00 AM	Travel Time FWD (s) 46.865 47.03 46.991 47.584 49.617 46.951 46.717 47.046 47.333 49.009 46.723 46.89 47.344 47.413 46.894 47.345	EVENTS SUM Replication 1 •• Travel Time REV (s) 46.844 47.015 47.001 47.572 49.646 46.949 46.713 47.043 47.043 47.4 49.01 46.72 46.844 47.391 49.076 46.683 46.844 47.351	Travel Spee (m/h) 26,181 26,099 26,111 25,799 26,614 26,27 26,609 25,509 25,604 25,509 25,604 25,502 25,604 25,502 25,509 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,5000 25,50000 25,50000000000	Image: Constraint of the system d FWD Travel Speed R (mi/h) 3 26.199 5 26.104 7 26.111 1 25.798 5 24.721 26.141 26.144 7 26.088 5 25.892 2 2.5.041 7 26.269 4 26.289 2 2.5.008 3 25.922 2 2.5.014 7 26.269 4 26.199 2 2.5.937 2 2.5.018 3 26.284 3 2.5.029 4 26.199 2 2.5.919	V Facility Delay (veh-h) 9.86 9.951 9.964 10.472 12.031 9.912 9.779 9.987 10.341 11.774 9.775 10.096 10.433 11.813 9.775 9.861 10.098
eets Reliability ANALYSIS WEATHER © Scenarios Deta Scenario ID S1 S2 S3 S4 S5 S5 S5 S5 S5 S7 S2 S2 S1 S1 S11 S12 S13 S14 S15 S15 S15 S15 S15 S15 S15 S15	d. DEMAND INCID ils Analysis Period 1/3/2011 7:00:00 AM 1/4/2011 7:00:00 AM 1/5/2011 7:00:00 AM 1/5/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/21/2011 7:00:00 AN 1/22/2011 7:00:00 AN	Travel Time FWD (s) 46.865 47.03 46.991 47.584 49.617 46.951 46.717 46.718 47.584 49.009 46.723 46.89 47.344 47.344 47.413 46.694 46.694 46.89 1 46.89 1 47.344 47.343 47.345 47.345	EVENTS SUM Replication 1 * Travel Time REV (a) 46.844 47.015 47.001 47.572 49.646 46.949 46.713 47.043 47.4 49.01 46.871 47.344 47.391 49.076 46.683 46.644 47.351 47.303	Travel Spec (mi/h) 26.181 26.099 26.111 25.79 24.733 26.14 26.27 26.64 26.27 26.64 26.27 26.64 26.25 25.54 26.25 25.54 26.25 25.54 25.555 25.54 25.555 25.5555 25.5555555555	Image: Second state	V Facility Delay (vef-h) 9.86 9.951 9.964 10.472 12.031 9.912 9.779 9.987 10.341 11.774 9.775 10.096 10.433 11.813 9.767 9.861 10.098 10.377
eets Reliability ANALYSIS WEATHER Scenarios Deta Scenario ID S1 S2 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S2 S5 S6 S7 S8 S9 S10 S11 S2 S1 S1 S1 S2 S3 S4 S5 S5 S5 S5 S5 S5 S5 S5 S5 S5	d. DEMAND INCID IIIS Analysis Period 1/3/2011 7:00:00 AM 1/3/2011 7:00:00 AM 1/5/2011 7:00:00 AM 1/5/2011 7:00:00 AM 1/1/2011 7:00:00 AM 1/1/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/13/2011 7:00:00 AM 1/22/2011 7:00:00 AM	Travel Time FWD (s) 46.865 47.03 46.991 47.584 49.617 46.951 46.717 46.717 46.717 46.717 47.333 49.617 47.341 47.334 46.723 46.89 47.344 47.344 46.694 46.872 47.345 47.299 47.299	EVENTS SUM Replication 1 ** Travel Time REV (s) 46.844 47.015 47.001 47.572 49.646 46.949 46.713 47.043 47.4 47.043 47.4 47.391 49.076 46.693 46.644 47.351 47.303 49.013 40.013	Travel Spee (mi/h) 26.18 26.09 26.11 25.59 26.44 26.26	EPORT	V Facility Delay (veh-h) 9.86 9.951 9.954 10.472 12.031 9.912 9.779 9.987 10.341 11.774 9.783 9.775 10.096 10.433 11.813 9.767 9.861 10.098 10.377 11.777
eets Reliability ANALYSIS WEATHER © Scenarios Deta Scenario ID S1 S2 S3 S4 S5 S5 S5 S5 S5 S5 S5 S5 S5 S5	d. DEMAND INCID ils Analysis Period 1/3/2011 7:00:00 AM 1/4/2011 7:00:00 AM 1/5/2011 7:00:00 AM 1/5/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/1/2/2011 7:00:00 AN 1/21/2011 7:00:00 AN 1/22/2011 7:00:00 AN	Travel Time FWD (s) 46.865 47.03 46.991 47.584 49.617 46.951 46.717 47.393 1 47.393 46.717 47.393 46.89 47.341 47.344 47.344 47.345 46.872 47.345 47.345 47.345 47.345 47.299 49.016 46.84	EVENTS SUM Replication 1 * Travel Time REV (a) 46.844 47.015 47.001 47.572 49.646 46.949 46.713 47.043 47.4 49.01 46.871 47.344 47.391 49.076 46.683 46.644 47.351 47.303	Travel Spec (mi/h) 26.181 26.099 26.111 25.79 24.733 26.14 26.27 26.64 26.27 26.64 26.27 26.64 26.25 25.54 26.25 25.54 26.25 25.54 25.555 25.54 25.555 25.5555 25.5555555555	Constraint Constraint d FWD Travel Speed River (m/h) 26.199 5 26.104 7 26.111 1 25.798 5 24.721 26.14 26.141 7 26.088 5 25.892 2 25.041 7 26.269 4 26.199 2 25.008 3 26.284 4 26.199 7 25.937 1 25.008 3 26.284 4 26.199 7 25.937 1 25.008 2 25.919 7 25.944 2 25.04 2 26.216	V Facility Delay (vef-h) 9.86 9.951 9.964 10.472 12.031 9.912 9.779 9.987 10.341 11.774 9.775 10.096 10.433 11.813 9.767 9.861 10.098 10.377

	1		UCC Charata Da	Hability Danast				-			
	-		HCS Streets Re	наршту кероп	_	_	_	_			
U.	Project Properties			_	_	_	_	_			
	Analyst	1	Jurisdiction		Agency						
I.	Time Analyzed	-	Analysis Year		Date						
L	Project Description							-			
L	Base Dataset Analysi	5			_		_				
	Base Dataset File	StreetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM	Base Datas	set Analyst		-			
	Start Time	07:00	End Time	07:15	Feriod Dura	ation	00	15			
I.	Number of Periods	1	Intersections	2	Segments		1	1.			
L	Comments	HCS Export		2			-	-			
8	Reliability Input Sumr	mary			-		_				
1	Reporting Start Date	1/1/2011	Reporting End Date	1/1/2012	Random 5	eed Summa	iry				
)	Analysis Days	260	Weather Location	GAINESVILLE, FL	-	Weather	Demand	Incident			
	Urban Street Class	UrbanPrincipal	Base Demand Ratio	0.077	Include	Y.	Y	Y			
	Shoulder Presence	Yes	Number of Replications	1	Seed	82	-11	63			
L	Reliability Performan	ce Measure Results	East	Bound	1	West	Bound				
	Vehicle miles traveled ((veih-mi)	20.				237				
	Number of Scenarios		21				60				
I.	Base free-flow travel tin	me (s)	30.				095				
	Mean TTI		1.7		-		707				
1	80th percentile TTI		1,7		-		735				
	95th percentile TTI (PT	1)	1.6				932				
1	Reliability rating (%)		1	30	129	1	00				
	Total delay (veh-h)		and the second second	13	1,129	-	-	Concerning of the			
	Replication		Average TT	95th Percentile TT		age TT	95th Perc				
	1		51.373	58.526	51.	378	58	151			
11	Average		51 373	58.526	51	178	58	151			

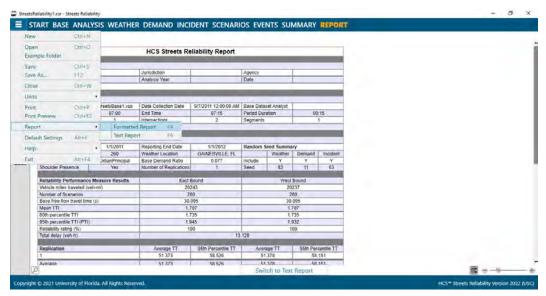
- 2. There are two options for reports: Formatted and Text
 - a. Formatted reports show the most important results in a presentable format.

		HCS Streets Re	incoming response		_	_	
Project Properties							
Analyst	1	Jurisdiction		Agency		-	
Time Analyzed		Analysis Year		Date			
Project Description		Milalysis teal		Date	_		
Project Description	-				_		
Base Dataset Analysi	5						_
Base Dataset File	StreetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM	Base Datas	et Analyst	-	
Start Time	07:00	End Time	07:15	Period Dura	ation	00	15
Number of Periods	1	Intersections	2	Segments			1
Comments	HCS Export			-			
the second second	and the second second				_		
Reliability Input Sum							
Reporting Start Date	1/1/2011	Reporting End Date	1/1/2012	Random Se	eed Summa		
Analysis Days	260	Weather Location	GAINESVILLE, FL		Weather	Demand	Inciden
Urban Street Class	UrbanPrincipal	Base Demand Ratio	0.077	Include	Y	Y	Y
Shoulder Presence	Yes	Number of Replications	1	Seed	82	11	63
Dellability Deda	Manuar Desult	Fred	Designed	-	10/	Bound	
Reliability Performan		East E 202				Bound 237	
Vehicle miles traveled	(ven-mi)			-			
Number of Scenarios Base free-flow travel tir	an lai	26				60 095	
Mean TTI	ne (s)	30.0			- 11	095	
80th percentile TTI		1.7	2.0			735	
95th percentile TTI (PT	20	1.9		-		332	
Reliability rating (%)	ŋ	1.9				00	
Total delay (veh-h)		1		.129		00	_
total delay (ven-n)	_		15	129	_		-
Replication		Average TT	95th Percentile TT	Avera	ige TT	95th Pen	centile TT
1		51,373	58.526		378	58.	151
Average		51.373	58,526	51	378	58	151
Standard deviation		0	0		0		3
95th% Confidence Inte	rval	51.373 - 51.373	58.526 - 58.526		- 51.378		- 58.151
Southe Connactice Into	r v do	±0%	±0%		0%		1%
1 m		2010	2010			-	
265 52 39 26 213 20		avel Time Frequency	Distribution (Forwa	rd)			
48	50	52 5 Trave	4 56 al Time (sec)	58		60	62
52-52-	TI IIII	ravel Time Frequency	Distribution (Reven	se)			
26- 26- 26- 213						_	-

b. Text reports show a more detailed analysis in plain text.



- 3. The type of report displayed can be changed by using the main menu items, keyboard shortcuts, or toggle buttons found under the report
 - a. Main Menu Items
 - i. To switch to the Formatted Report, select *File > Report > Formatted Report* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen, hovering over "Report", and then selecting "Formatted Report".



ii. To switch to the Text Report, select *File > Report > Text Report* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen, hovering over "Report", and then selecting "Text Report".

START BASE ANALYSI	S WEATHER DEM	AND IN	CIDENT SCENA	RIOS E	VENTS S	SUMMARY REPORT	
ew Col+N							
en Ctrl+0 ample Folder	HCS Stre	ts Reliab	ility Text Report				
we Ctrl+S							
we As F12							
nits +							
int Ctrl+P							
int Preview Ctri+/2	Formatted Report	F4	EAST BOUND VALUES				
efault Settings Alt+F	Text Report	FÓ	20243				
	/h) me (s)		40.78 30.095 100				
dt Alt+Fd			260				
Replication 1 :							
Random Number Seeds	weather Demand 82 11	Incident 63					
	Travel Time (s)	Travel Speed (mi/h)	Stop Rate (stops/veb)	Running Time (s)	Through Delay (s/veh)	Total Delay (veh-hr)	
Average Standard Deviation Skewness Nedian Sth Percentile 10th Percentile 85th Percentile	51.373 3.041 1.593 50.636 47.345 48.994 52.218 53.665	23.967 1.31 -1.224 24.237 20.97 22.138 24.833 24.833	1.593 0.165 1.636 1.547 1.557 1.46 1.632 1.733	33.517 0.581 6.495 33.421 33.098 33.235 33.608	17.856 2.672 1.527 17.189 14.255 15.75 18.574 20.328	13.129 1.684 0.806 12.875 10.329 11.564 14.057 14.643	
95th Percentile	53.865 58.526	24,899 25.922	1.732 1.985			14.541	
2				Swit	ch to For	matted Report	E = -6

- b. Keyboard Shortcuts
 - i. Formatted Report: keyboard shortcut is "F4"
 - ii. Text Report: keyboard shortcut is "F6"
- c. Report Toggle Buttons
 - i. A toggle button is available at the bottom of the screen underneath the report.
 - ii. If the formatted report is currently being displayed, the toggle button will say "Switch to Text Report" which will allow you to display the text report if clicked.

		HCS Streets Re	liability Report					
12								
Project Properties		The second second						
Analyst		Jurisdiction		Agency				
Time Analyzed	1	Analysis Year		Date				
Project Description	1			Long to the				
Base Dataset Analysi		1		-				
Base Dataset File	StreetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM		iset Analyst			
Start Time	07:00	End Time	07:15	Period Du		00		
Number of Periods	1	Intersections	2	Segments	8			
Comments	HCS Export	_	_	_	_	_		
Reliability Input Sum	nary					_		
Reporting Start Date	1/1/2011	Reporting End Date	1/1/2012	Random	Seed Summa	ry		
Analysis Days	260	Weather Location	GAINESVILLE, FL		Weather	Demand	Incident	
Urban Street Class	UrbanPrincipal	Base Demand Ratio	0.077	Include	Y	Y	Y	
Shoulder Presence	Yes	Number of Replications	1	Seed	82	11	63	
Reliability Performan	an Managura Deputta	East B	Dound	-	West	Downd		
Vehicle miles traveled		202		-	20			
Number of Scenarios	(ve)-(iii)	202				50		
Base free-flow travel tin	me (s)	30			30			
Mean TTI		1.7	2.5.5		1.7	202		
80th percentile TTI		1.7			1.7			
95th percentile TTI (PT	1)	1.9			1.9			
Reliability rating (%)	2	10	197		1			
Total delay (veh-h)				.129				

iii. If the text report is currently being displayed, the toggle button will say "Switch to Formatted Report" which will allow you to display the formatted report if clicked.

Stree	tsReliabili	ty1.xsr - St	reets Reliability		_	_							×
= s	START	BASE	ANALYSIS	WEATHEI	R DEMA	ND IN	CIDENT SCEN	IARIOS E	/ENTS S		ORT		
					HCS Street	a Reliab	ility Text Repor	t					
	Analy Juris Agenc Time Analy Date	diction											
€ Back	Vehic Base Base	rmance M le Miles Free-Flo Free-Flo bility R r of Sce	Travelled (w Speed (mi/) w Travel Tim	veh-mi) h) e (s)	-		EAST BOUND VALU 20243 40.78 30.095 100 260	JES					
	Repli	cation 1	4										
	Rando	m Number	Seeds	Weather 82	Demand 11	Incident	8. F.T						
				Travel Time (s)		Travel Speed (mi/h)	Stop Rate (stops/veh)	Running Time (s)	Through Delay (s/veh)	Total Delay (veh-hr)			
	Skewn Media 5th P 10th 80th	lard Devi	e le le	51.373 3.041 1.593 50.636 47.345 48.994 52.218		23.967 1.31 -1.224 24.237 20.97 22.138 24.833	1.593 0.165 1.636 1.547 1.387 1.46 1.632	33.517 0.581 6.493 33.421 33.098 33.235 33.608	17.856 2.672 1.527 17.189 14.255 15.75 18.574	13.129 1.684 0.806 12.875 10.329 11.564 14.057			
	Q						Switch to Fe	ormatted Re	nort			 	-+

4. The magnification of the report currently being displayed can be changed using the zoom slider found at the bottom right-hand corner of the screen.

		HCS Streets Re	liability Report					
1000		TICS Streets No	anability Report				-	
Project Properties					_			
Analyst	1	Jurisdiction		Agency	-		-	
Time Analyzed	1	Analysis Year		Date				
Project Description								
							10	
Base Dataset Analys				-				
Base Dataset File	StreetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM		iset Analyst		15	
Start Time	07:00	End Time	07:15	Period Du		00		
Number of Periods	1	Intersections	2	Segments				
Comments	HCS Export			_	_	_		
Reliability Input Sum	mary		_	_	_	_		
Reporting Start Date	1/1/2011	Reporting End Date	1/1/2012	Random	Seed Summa	ry		
Analysis Days	260	Weather Location	GAINESVILLE, FL		Weather	Demand	Incident	
Urban Street Class	UrbanPrincipal	Base Demand Ratio	0.077	Include	Y	Y	Y	
Shoulder Presence	Yes	Number of Replications	1	Seed	82	11	63	
Reliability Performan	co Moseuro Posulte	East	Bound	-	West	Bound		
Vehicle miles traveled	A CONTRACTOR OF A CARD OF	202				237		
Number of Scenarios	(von m)		50	-		60		
Base free-flow travel t	me (s)	30.1				095		
Mean TTI		1.7	07			707		
80th percentile TTI		1.7	35		1.7	735		
95th percentile TTI (P	ΓΙ)	1.9)45		1.9	932		
		10	00		1	00		
Reliability rating (%)								

- a. To zoom in, drag the slider to the right; to zoom out, drag the slider to the left
- b. Clicking the plus (+) button will zoom in; clicking the minus (-) button will zoom out
- c. Holding down "ctrl" on the keyboard and scrolling up on the mouse wheel will zoom in; holding down "ctrl" on the keyboard and scrolling down on the mouse wheel will zoom out

Print a Report

- 1. There are four options for printing a report:
 - a. Selecting *File > Print* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Print"

	itreets Reliabilit	Y						-
TART BASE	ANALYS	IS WEATHE	R DEMAND INC	DENT SCENARI	OS EVENTS	SUMMARY	REPORT	
W	Ctri+N							
pen	CD1+O		HCS Streets Re	liability Report				
ample Folder		1.0						
ive	Ctrl+S				(
ve As	F12		Junsdiction		Agency			
ose	Ctrl+W		Analysis Year		Date			
	CONTRACT	0.0						
iits					1			
nt	Chi+P	reetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM				
int Preview	Ctrl+F2	07:00	End Time	07:15	Period Duration	00		
		1	Intersections	2	Segments			
eport	•	Export						
efault Settings	Alt+F	1 and 1 and 1		_		_		
elp		1/1/2011	Reporting End Date	1/1/2012	Random Seed	Summary		
		260	Weather Location	GAINESVILLE, FL	W	sather Demand	Incident	
eil.	AU1+84	JrbanPrincipal	Base Demand Ratio	0.077	Include	Y Y	Y	
Shoulder Pres	ence	Yes	Number of Replications	1	Seed	82 11	63	
Reliability Pe	rformance Me	easure Results	East	Bound		West Bound		
Vehicle miles !				243		20237		
Number of So	enarios		2	60		260		
Base free-flow	v travel time (s))	30	095		30.095		
Mean TTI			13	707	1	1,707		
80th percentile	e TTI		1.3	735		1.735		
95th percentile	e TTI (PTI)		13	945		1.932		
Reliability ratin			1	00	11	100		
Total delay (ve	eh-h)	_		13	129			
Replication		_	Average TT	95th Percentile TT	Average T	T 95th Per	entile TT	
			51.373	58.526	51.378	58	51	
1					the second se			
1 Average			51.373	58.526	51 378	58	51	

b. Selecting *File > Print Preview* from the main menu; this can be found by selecting the three lines in the top left-hand corner of the screen and then selecting "Print Preview"

etsReliability1.xsr -	Streets Reliabilit	ty.							- 0
START BAS	E ANALYS	IS WEATHE	R DEMAND INC	DENT SCENARI	OS EVE	NTS SU	MMARY	REPORT	
ew	Ctrl+N								
pen kample Folder	Civi+D		HCS Streets Re	eliability Report					
ive	Ctrl+S		the second s		-	_	_		
we Asu	Et2	-	Jurisdiction	1	Agency		1		
			Analysis Year		Date				
ose	Ctrl+W	-			_	_	_		
nds		-							
int.	Ctrl+P	reetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM			1 2		
int Preview	CtrileF2	07:00	End Time	07:15	Period Du	ation	00		
eport		Export	Intersections	2	Segments				
		Export		-	-	_	_		
efault Settings	Alt+F								
elp		1/1/2011 260	Reporting End Date Weather Location	1/1/2012 GAINESVILLE FL	Random 5	eed Summa Weather	Demand	Incident	
10	Alt+F4	UrbanPrincipal	Base Demand Ratio	0.077	Include.	Yeather	Vemano	Y	
Shoulder Pre	isence	Yes	Number of Replications		Seed	82	11	63	
Reliability P	erformance Mr	asure Results	East	Bound		West	Bound		
	traveled (veh-r			243			237	-	
Number of S			2	60	1	2	60		
	w travel time (s))		095			095		
Mean TTI				707			707		
80th percent				735			735		
95th percent				945			932		
Reliability rat			1	00	180	1	00		
Total delay (v	/en-n)	_	ili	13	129		-		
Replication	1		Average TT	95th Percentile TT	Aver	age TT	95th Peri	entile TT	
1			51,373	58.526		.378	58.	51	
Average			51,373	58.526		378	58	51	
0							Report		B = -5

- c. Using keyboard shortcut "Ctrl+P" for Print
- d. Using keyboard shortcut "Ctrl+F2" for Print Preview

- 2. Print
 - a. Using Print will bring up a Print dialog box where you can select which printer to print to

Select Printer	
Microsoft Print to PDF Microsoft XPS Document Writer OneNote for Windows 10	
<	>
Status: Ready Location: Comment:	Preferences Find Printer
Page Range C All C Selection C Pages: C Pages:	Number of copies: 1

3. Print Preview

a. Using Print Preview will bring up a window where you can view how the report will look on paper before sending it to the printer

		HCS Streets Re	eliability Report				
A COLUMN TO A COLUMN		And a lot of the lot o					
Project Properties		1.000				-	
Analyst		Jurisdiction		Agency			
Time Analyzed		Analysis Year		Date			
Project Description				_		_	_
Base Dataset Analysis							-
Base Dataset File	StreetsBase1.xus	Data Collection Date	9/7/2011 12:00:00 AM	Base Data	set Analyst		
Start Time	07.00	End Time	07:15	Period Du	ration	00	15
Number of Periods	1	Intersections	2	Segments			1
Comments	HCS Export						
Reliability Input Summ							
Reporting Start Date	1/1/2011	Reporting End Date	1/1/2012	Pandom	Seed Summa	in in	
Analysis Days	260	Weather Location	GAINESVILLE, FL	reamagent	Weather	Demand	Incide
Urban Street Class	UrbanPrincipal	Base Demand Ratio	0.077	Include	Y	Y	Y
Shoulder Presence	Yes	Number of Replications		Seed	82	11	63
and and a second of the	and a starter		-	-	A	-	
Reliability Performance			Bound			Bound	
Vehicle miles traveled (veh-mi)		243			237	
Number of Scenarios			60	1		60	
Base free-flow travel tin	ne (s)		095	-		095	
Mean TTI			707	-		707	
80th percentile TTI			735 945	-		735 932	
95th percentile TTI (PT)	1)		945	-		932	
Reliability rating (%) Total delay (veh-h)		1		129	1	ço.	
rotal Delay (Ven-ft)	_	-	13	129	-	-	
Replication		Average TT	95th Percentile TT	Ave	age TT	95th Per	IT eithed
1		51.373	58.526	51	.378	58	151
Average		51.373	58.526	5	.378	58.	151
Standard deviation		0	0		0	1	0
95th% Confidence Inter	val	51.373 - 51.373	58.526 - 58.526	51.378	8-51.378	58.151	- 58.151
		±0%	±0%		096	=	196

b. The print icon in the toolbar found in the top left-hand corner can then be selected



c. A print dialog box will pop up where you can select which printer to print to

neral	
Select Printer	
Microsoft Print to PDF	
Alicrosoft XPS Document Writer	
ConeNote for Windows 10	
<	>
Status: Ready	Preferences
Location:	Freierences
Comment:	Find Printer
Page Range	
(All	Number of copies: 1
C Selection C Current Page	Number of copies. 11
	Fam
C Pages	Collate

Glossary of Terms

50th Percentile TTI

The ratio of the 50th percentile highest travel time to the travel time at the base free-flow speed. This measure can be used for trend analysis and to demonstrate changes in performance resulting from an operational strategy, capacity improvement, or change in demand.

80th Percentile TTI

The ratio of the 80th percentile highest travel time to the travel time at the base free-flow speed. This measure has been found to be more sensitive to operational changes than the PTI, which makes it useful for comparison and prioritization purposes.

95th Percentile TTI

See Planning Time Index (PTI).

Agency

This field is provided to document the agency or company associated with this analysis or project.

Analysis Period

The time interval used for the performance evaluation. It can range from 15 min to 1 h, with longer durations in this range sometimes used for planning analyses. A shorter duration in this range is typically used for operational analyses.

Analysis Year

This field is provided to document the year for which the analysis is being performed.

Analyst

The field is provided to document the name of the analyst.

Annual Delay

Annual delay represents the average vehicle hours of travel or person hours of travel occurring minus what would occur under free-flow conditions. Delay is useful because economic analyses have a long history of monetizing delay.

Base Crash Frequency

The methodology requires the base crash frequency for each segment and for each intersection along the subject facility. The base crash frequency is an estimate of the expected crash frequency for the segment or intersection when no work zones are present or special events occur. The estimated should include all severity levels, including property-damage-only (PDO) crashes. Crash frequency is provided in units of crashes per year, regardless of the duration of the reliability reporting period.

Base File

The base file provides all the required input data for the urban street segments methodology described in HCM Chapter 18. The base file contains the required input data to execute HCM Chapter 17's reliability methodology. It consists of all the data needed to evaluate the base HCM facility methodology for a single study period, plus data that describe the variations in demand, weather, and so forth that occur over the course of the reliability reporting period, along with the frequency of a particular event's occurrence. The majority of the reliability-specific input data can be defaulted when they are not available locally, but the analyst is encouraged to supply facility-specific data whenever feasible.

The user has the option to load a base file or create a base file. Clicking on 'Load Base File' will open a dialog box to allow the user to select a Streets (*.xus) file for the user to open and load into the Streets Reliability program. Once loaded, a Street intersections and segments graph of the base file will be displayed on the page, along with general information. Clicking on the 'Create Base File' will open the HCS Streets program to allow the user to create a new base file for use in the Streets Reliability program.

Please also see *Data Depository*.

Crash Frequency Adjustment Factors for Inclement Weather

Inclement weather conditions can increase the likelihood of crashes. Crash frequency adjustment factors are required for the following conditions:

- Rainfall,
- Snowfall,
- Wet pavement (not raining), and
- Snow or ice on pavement (not snowing).

The crash frequency adjustment factor is the ratio of hourly crash frequency during the weather event to the hourly crash rate during clear, dry hours. It is computed by using one or more years of historical weather data and crash data for the region in which the subject facility is located.

The adjustment factor for a specific weather condition is computed from (*a*) the number of hours for which the weather condition exists for the year and (*b*) the count of crashes during those hours. An hourly crash frequency for the weather condition $f_{c,wea}$ is computed by dividing the crash count by the number of hours. By a similar technique, the hourly crash frequency is computed for dry pavement hours $f_{c,dry}$. The crash frequency adjustment factor for the weather condition *CFAF*_{wea} is computed as the ratio of the two frequencies (i.e., *CFAF*_{wea} = $f_{c,wea}/f_{c,dry}$).

The crash frequency adjustment factor includes consideration of the effect of the weather even on traffic volume (i.e., volume may be reduced because of bad weather) and on crash risk (i.e., wet pavement may increase the potential for a crash).

The following are the default values for the crash frequency adjustment factor of each weather condition:

- Rainfall: 2.0
- Wet pavement (not raining): 3.0
- Snowfall: 1.5
- Snow or ice on pavement (not snowing): 2.75

Crash Location Categories

The categorization of crashes by location is determined by using the definitions given in *Highway Safety Manual* (HSM) Section A.2.3, found in Appendix A of HSM Volume 2. The HSM states that "Intersection crashes include crashes that occur at an intersection (i.e., within the curb limits) and crashes that occur on the intersection legs and are intersection related. All crashes that are not classified as intersection or intersection-related crashes are considered to be roadway segment crashes."

Data Depository

Every reliability analysis requires a base dataset. This dataset describes the traffic demand, geometry, and signal timing conditions for the intersections and segments along the facility during the study period, when no work zones are present and no special events occurs.

Please also see *Base File*.

Date

This field is provided to document the date when the analysis is performed.

Day-of-Week Demand Ratios

The following HCM exhibit provides the default day-of-week demand ratios (ADT/AADT):

Day	Demand Ratio
Sunday	0.87
Monday	0.98
Tuesday	0.98
Wednesday	1.00
Thursday	1.03
Friday	1.15
Saturday	0.99

Source: Hallenbeck et al. (9).

See also Time Period Adjustment Factors.

Demand Change Factors

The three "demand change factors" account for a change in traffic demand due to weather conditions. One factor describes demand change during dry weather (by definition it has a values of 1.0). A second factor describes the demand change during a rain event. The third factor describes the demand change for a snow event. During a step of the methodology, the demand volume is multiplied by the demand change factor corresponding to the weather associated with a given analysis period. A factor less than 1.0 corresponds to a reduction in demand during the event.

Research indicates that urban street traffic demand tends to drop 15% to 30% during snow events. These motorists likely altered the start time of their commute or stayed home to avoid the bad weather. In the absence of local data, a default value of 0.80 may be used for snow events.

The research is less clear on the effect of rain on traffic demand. The effect of rain may vary with the trip purpose and the annual frequency of rain events in the vicinity of the subject facility. A default factor values of 1.0 is recommended for rain events. These default values are summarized in the following HCM exhibit:

Input Data Item	Default Value
Demand change factor for dry weather	1.00
Demand change factor for rain event	1.00
Demand change factor for snow event	0.80
Pavement runoff duration for snow event	0.5 h

See Duration of Pavement Runoff for the input data item in the last row.

Demand Pattern Data

Demand pattern data are used by the reliability method to adjust the demand volumes in the base and alternative datasets to reflect demands during all the other time periods in the reliability reporting period. The data include (a) adjustment factors to account for demand variation by hour of day, day of week, and month of year; and (b) adjustment factors to account for change in traffic demand due to weather conditions.

Details per page

A drop down selection is provided to indicate how many scenario results to show on the page.

Duration of Pavement Runoff

The duration of pavement runoff for a snow event is required. It is defined as the period of time after the snow stops falling that snowpack (or ice) covers the pavement. After this time period elapses, the pavement is exposed and drying begins. This time is likely a function traffic volume, snow depth, and agency snow removal capabilities. An appropriate local value should be established for the subject facility if that is possible. If such a value is not available, the default value provided in the last row of the HCM exhibit can be used. See *Demand Change Factors* for the exhibit.

Facility Evaluation

The facility evaluation stage consists of two tasks that are repeated in sequence for each analysis period. The analysis periods are evaluated in chronological order.

First, the dataset associated with a given analysis period is evaluation by using the urban street facility methodology. The performance measures output by the methodology are then archived.

Second, the dataset associated with the next analysis period is modified, if necessary, on the basis of the results of the current analysis period. Specifically, the initial queue input value for the next analysis period is set equal to the residual queue for the current analysis period.

Failure or On-Time Measures

The percent of trips (or percent of time) with space mean speeds above (on time) or below (failure) one or more target values (e.g., 35, 45, and 50 mi/h; or 56, 72, 80 km/h in metric). These measures address how often trips succeed or fail in achieving a desired travel time or speed.

Functional Class

The functional class of the subject facility is a required input when the analyst chooses to use the default time period adjustment factors. These factors are used for estimating the traffic volume during each of the various scenarios that make up the reliability reporting period.

The following functional classes are considered:

- Urban expressway,
- Urban principal arterial street, and

• Urban minor arterial street.

An urban principal arterial street emphasizes mobility over access. It serves intra-area travel, such as that between a central business district and outlying residential areas or that between a freeway and an important activity center. It is typically used for relatively long trips within the urban area or for through trips that enter, leave, or pass through the city. An urban minor arterial street provides a balance between mobility and access. It interconnects with and augments the urban principal arterial street system. It is typically used for trips of moderate length within relatively small geographic areas.

The methodology addresses roadways that (a) have one of the aforementioned classes and (b) do not have full access control. If a roadway has full access control then it is considered to be a freeway and the analyst should use the Freeway methodology.

Hour-of-Day Demand Ratios

Hour	Expre	ssway	Principa	Arterial	Minor Arterial	
Starting	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Midnight	0.010	0.023	0.010	0.023	0.010	0.028
1 a.m.	0.006	0.015	0.006	0.014	0.006	0.023
2 a.m.	0.004	0.008	0.005	0.010	0.004	0.021
3 a.m.	0.004	0.005	0.005	0.006	0.002	0.008
4 a.m.	0.007	0.005	0.009	0.006	0.002	0.005
5 a.m.	0.025	0.009	0.030	0.010	0.007	0.005
6 a.m.	0.058	0.016	0.054	0.017	0.023	0.011
7 a.m.	0.077	0.023	0.071	0.024	0.067	0.018
8 a.m.	0.053	0.036	0.058	0.035	0.066	0.030
9 a.m.	0.037	0.045	0.047	0.046	0.054	0.048
10 a.m.	0.037	0.057	0.046	0.056	0.051	0.054
11 a.m.	0.042	0.066	0.050	0.054	0.056	0.057
Noon	0.045	0.076	0.053	0.071	0.071	0.074
1 p.m.	0.045	0.073	0.054	0.071	0.066	0.071
2 p.m.	0.057	0.074	0.063	0.072	0.060	0.069
3 p.m.	0.073	0.075	0.069	0.073	0.062	0.067
4 p.m.	0.087	0.075	0.072	0.073	0.063	0.071
5 p.m.	0.090	0.071	0.077	0.073	0.075	0.068
6 p.m.	0.068	0.063	0.062	0.063	0.070	0.067
7 p.m.	0.049	0.051	0.044	0.052	0.053	0.056
8 p.m.	0.040	0.043	0.035	0.044	0.044	0.049
9 p.m.	0.037	0.037	0.033	0.038	0.035	0.040
10 p.m.	0.029	0.032	0.026	0.033	0.033	0.035
11 p.m.	0.019	0.023	0.021	0.026	0.019	0.024

The following HCM exhibit provides the default hour-of-day demand ratios (ADT/AADT):

Source: Hallenbeck et al. (9).

See also *Time Period Adjustment Factors*.

Incident Clearance Time

The Time from the arrival of the first response vehicle to the time when the incident and service vehicles no longer directly affect travel on the roadway. This time varies by incident location, type, and severity. Clearance times are weather-dependent. Incident clearance times are reported in minutes and for street location (segment or intersection), incident type (crash or noncrash), lane location (shoulder, one lane, two or more lanes), severity

(fatal/injury or PDO), and weather condition (dry, rainfall, wet pavement, snowfall or snow or ice on pavement) (96 total values).

	7.000			Clearance Time by Weather Condition (min)				
Street Location	Event Type	Lane Location	Severity*	Dry	Rain- fall	Wet Pavement	Snow Or Ice ^b	
Segment	Crash	One lane	FI	56.4	42.1	43.5	76.7	
			PDO	39.5	28.6	29.7	53.7	
		2+ lanes	FI	56.4	42.1	43.5	76.7	
			PDO	39.5	28.6	29.7	53.7	
		Shoulder	FI	56.4	42.1	43.5	76.7	
			PDO	39.5	28.6	29.7	53.7	
	Non-	One lane	Breakdown	10.8	5.6	5.7	14.7	
	crash		Other	6.7	2.4	2.8	9.1	
		2+ lanes	Breakdown	10.8	5.6	5.7	14.7	
			Other	6.7	2.4	2.8	9.1	
		Shoulder	Breakdown	10.8	5.6	5.7	14.7	
			Other	6.7	2.4	2.8	9.1	
Signalized	Crash	One lane	FI	56.4	42.1	43.5	76.7	
intersection			PDO	39.5	28.6	29.7	53.7	
		2+ lanes	FI	56.4	42.1	43.5	76.7	
			PDO	39.5	28.6	29.7	53.7	
		Shoulder	FI	56.4	42.1	43.5	76.7	
		the later with	PDO	39.5	28.6	29.7	53.7	
	Non-	One lane	Breakdown	10.8	5.6	5.7	14.7	
	crash		Other	6.7	2.4	2.8	9.1	
		2+ lanes	Breakdown	10.8	5.6	5.7	14.7	
			Other	6.7	2.4	2.8	9.1	
		Shoulder	Breakdown	10.8	5.6	5.7	14.7	
			Other	6.7	2.4	2.8	9.1	

Default values for incident clearance time are provided in the following HCM exhibit:

Source: Zegeer et al. (1).

Notes: "FI = fatal or injury crash; PDO = property-damage-only crash.

^b Applies to snowfall and to snow or ice on pavement (but not snowing).

Incident Detection Time

The time period starting with the occurrence of the incident and ending when the response officials are notified of the incident. Incident detection time is reported in minutes. The default incident detection time for all weather conditions is 2.0 minutes.

Incident Location Distribution

The incident location distribution is used by the incident generation procedure to assign incident to specific locations on the facility. Research indicated that this distribution varies by incident location, type, and severity. The following incident proportions are required:

- Proportion of crash and noncrash incidents by street location (segment or intersection) (four total values); proportions should total 1.000 for a given street location;
- Proportion of shoulder, one-lane, and two-or-more-lane incidents by street location and event type (crash or noncrash) (12 total values); proportions should total 1.000 for a given street location and event type

combination; a 0.000 proportion should be assigned to values involving a shoulder location if no shoulders exist on the facility;

- Proportion of fatal/injury and PDO crashes by street location and lane location (12 total values); proportions should total 1.000 for a given street location and lane location combination; and
- Proportion of breakdown and other noncrash incident by street location and lane location (12 total values); proportions should total 1.000 for a given street location and lane location combination.

The four proportions identified in the previous list are multiplied together to obtain the desired incident location distribution factors. One factor is obtained for each combination of street location, incident type, incident location, and incident severity. The computed factors should total 1.000 for a given street location.

The default incident distribution with shoulder presence is provided in the following HCM exhibit:

	Incident Type		Incident Location		Incident Severity		1.000
Street Location	Туре	Pro- portion	Lanes Affected	Pro- portion	Severity*	Pro- portion	Joint Proportion
Segment	Crash	0.358	1 lane	0.335	FI	0.304	0.036
Co. M. Contra		0.000			PDO	0.696	0.083
		- T I	2+ lanes	0.163	FI	0.478	0.028
				1.22	PDO	0.522	0.030
			Shoulder	0,502	FI	0.111	0.020
- 14					PDO	0.889	0.160
	Non-	0.642	1 lane	0.849	Breakdown	0.836	0.456
	crash	1000			Other	0.164	0.089
		-	2+ lanes	0.119	Breakdown	0.773	0.059
					Other	0.227	0.017
			Shoulder	0.032	Breakdown	0.667	0.014
6 6 4					Other	0.333	0.007
						Total:	1.000
Signalized	Crash	0.310	1 lane	0.314	FI	0.378	0.037
intersection					PDO	0.622	0.061
			2+ lanes	0.144	FI	0.412	0.018
					PDO	0.588	0.026
		JI	Shoulder	0.542	FI	0.109	0.018
1.1					PDO	0.891	0.150
Y	Non-	0.690	1 lane	0.829	Breakdown	0.849	0.486
	crash				Other	0.151	0.086
		1	2+ lanes	0.141	Breakdown	0.865	0.084
					Other	0.135	0.013
			Shoulder	0.030	Breakdown	0.875	0.018
					Other	0.125	0.003
	-				N. Contract of	Total:	1.000

Source: Zegeer et al. (1).

Note: "FI = fatal or injury crash; PDO = property-damage-only crash; other = not breakdown (e.g., debris).

The default incident distribution without shoulder presence is provided in the following HCM exhibit:

	Incident Type		Incident Location		Incident Severity		1.20.5
Street Location	Туре	Pro- portion	Lanes Affected	Pro- portion	Severity	Pro- portion	Joint Proportion
Segment	Crash	0.358	1 lane	0.837	FI	0.304	0.091
					PDO	0.696	0.209
			2+ lanes	0.163	FI	0.478	0.028
	1.1.1				PDO	0.522	0.030
	Non-	0.642	1 lane	0.881	Breakdown	0.836	0.473
	crash	1.11			Other	0.164	0.093
			2+ lanes	0.119	Breakdown	0.773	0.059
					Other	0.227	0.017
	A second s					Total:	1.000
Signalized	Crash	0.310	1 lane	0.856	FI	0.378	0.100
intersection					PDO	0.622	0.165
			2+ lanes	0.144	FI	0.412	0.018
	1				PDO	0.588	0.026
	Non-	0.690	1 lane	0.859	Breakdown	0.849	0.503
	crash				Other	0.151	0.089
	1000		2+ lanes	0.141	Breakdown	0.865	0.084
	1.0				Other	0.135	0.013
	1 2					Total:	1.000

Source: Zegeer et al. (1).

Note: "FI = fatal or injury crash; PDO = property-damage-only crash; other = not breakdown (e.g., debris).

Incident Query

For event predictions, the user can set parameters to check for incidents "starting" at the query hour. The date, time, and segment/intersection must be specified. Then a 'Query' button can be selected, which will display any incidents for that query.

Incident Response Time

The time period from the receipt of incident notification by officials to the time the first response vehicle arrives at the scene of the incident. This time will likely vary among jurisdictions and facilities, depending on the priority placed on street system management and the connectivity of the street system. Response times are weather-dependent. Incident response times are reported in minutes and for five weather categories (dry, rainfall, wet pavement, snowfall, snow or ice on pavement).

The following are the default response times for the five weather categories:

- Clear, dry: 15.0 min
- Rainfall: 15.0 min
- Wet pavement (not raining): 15.0 min
- Snowfall: 20.4 min
- Snow or ice on pavement (not snowing): 20.4 min

Jurisdiction

This field is provided to document any jurisdiction convention or project related information.

Mean TTI

The ratio of the average travel time to the travel time at the base free-flow speed. This measure can be used for the same purposes as the 50th percentile TTI. However; the mean TTI will typically have somewhat higher values than the 50th percentile TTI because of the influence of rare, very long travel times in the distribution.

Misery Index

This measure is useful as a descriptor of near-worst-case conditions on rural facilities.

Month-of-Year Demand Ratios

The following HCM exhibit provides the default month-of-year demand ratios (ADT/AADT):

Month	Expressway	Principal Arterial	Minor Arteria	
January	0.802	0.831	0.881	
February	0.874	1.021	0.944	
March	0.936	1.030	1.016	
April	0.958	0.987	0.844	
May	1.026	1.012	1.025	
June	1.068	1.050	1.060	
July	1.107	0.991	1.150	
August	1.142	1.054	1.110	
September	1.088	1.091	1.081	
October	1.069	0.952	1.036	
November	0.962	0.992	0.989	
December	0.933	0.938	0.903	

Source: Hallenbeck et al. (9).

See also Time Period Adjustment Factors.

Nearest City

The nearest city is a required input when the analyst chooses to use the default weather data. The analyst selects from 284 U.S. cities. Please see *Regional Weather* for additional information.

Please see *Regional Weather* for additional information.

Number of Replications

The number of replications indicates the number of times each scenario is generated to minimize any bias that rare events may cause.

Planning Time Index (PTI)

The ratio of the 95th percentile highest travel time to the travel time at the base free-flow speed. This measure is useful for estimating how much extra time travelers must budget to ensure an on-time arrival and for describing near-worst-case conditions on urban facilities. Also 95th Percentile TTI.

Project Description

This field is provided for the user to document the analysis with any information for identification purposes.

Random Number Seed

A random number seed is used with the Monte Carlo methods in the reliability methodology. A seed is used so that the sequence of random events can be reproduced. Unique seed numbers are separately established for weather events, demand variation, and incidents. For a given set of three seed numbers, a unique combination of weather events, demand levels, and incidents is estimated for each analysis period in the reliability reporting period.

Regional Weather

The nearest city is a required input when the analyst chooses to use the default weather data. The analyst selects from 284 U.S. cities. A search bar and/or drop down menu is provided for the user to select a city. Once a city is selected, the 'Load Regional Weather' button needs to be selected for city-specific data to be applied to the weather event statistics table. If certain values need to be overridden, the user has the option to edit the data. However, if values need to be reset, a 'Reset to Regional Default' button is provided to reapply the city-specific values. See *Weather Event Statistics* for more information.

Reliability Rating

The percentage of vehicle-miles traveled on the facility associated with a TTI less than 2.50. This threshold approximated the point beyond which urban street facility travel times become much more variable (i.e., unreliable).

Reliability Reporting Period

The specific days over which reliability is to be computed, for example, all weekends in a year. A typical reporting period for a reliability evaluation is 6 to 12 months. The period is specified by start and end dates as well as by the days of week being considered. The reliability reporting period is used with the study period to describe the temporal representation of the performance measure fully (e.g., average travel time on weekdays from 4:00 to 6:00 p.m. for the current year).

Replication Selection

A drop down selection is provided to indicate which results to show based on the replication number.

Running Time

The time a vehicle spends in motion.

Scenario

A unique combination of traffic demand, capacity, geometry, and traffic control conditions. It can represent one or more analysis periods, provided that all periods have the same combination of demand, capacity, geometry, and control.

Scenario Dataset Generation

The scenario dataset generation procedure uses the results from *Scenario Generation*, *Weather Event Generation*, *Traffic Demand Variation Generation*, and *Traffic Incident Generation* to develop one HCM dataset for each analysis period in the reliability reporting period. Each analysis period is considered to be one scenario. The base dataset is modified to reflect conditions present during a given analysis period. Traffic volumes are modified at each intersection and driveway. Saturation flow rates are adjusted at intersections influenced by an incident or a weather event, and speed are adjusted for segments influenced by an incident or a weather event. Dates and times represent a common basis for tracking events and conditions from one analysis period to the next.

Scenario Generation

The scenario generation stage consists of four sequential procedures: (a) weather event generation, (b) traffic demand variation generation, (c) traffic incident generation, and (d) scenario dataset generation. Each procedure generates in chronological order the set of analysis periods that make up the reliability reporting period.

Checkboxes are provided to indicate whether or not to include weather, demand, and/or incidents when generating scenarios. The user can also choose whether or not to randomize demand volume for every analysis period. Once these are specified, along with the random seed numbers and the desired number of replications, the user can click the 'Generate Scenarios' button to start the scenario generation process.

Semi-Standard Deviation

A one-sided standard deviation, with the reference point at the base free-flow speed instead of the mean. It provides the variability distance from free-flow conditions.

Shoulder Presence

The indication of the presence of outside (i.e., right-side) shoulders is a required input when the analyst chooses to use the default incident location data. This input is specified for the facility.

For a shoulder to be considered present, it must be wide enough to store a disabled vehicle (so that the vehicle does not block traffic flow in the adjacent traffic lane). If on-street parking is allowed, the analyst will need to determine whether occupancy would need to be less than 30% to provide reasonable assurance of the opportunity to move a disabled vehicle from the through lanes to an open stall.

Special Event

Short-term events that produce intense traffic demands on a facility for limited periods of time. These demands may be addressed by temporary changes in the facility's geometry or traffic control characteristics, or both. Example special events include major sporting events, concerts, and festivals.

Standard Deviation

The standard statistical measure.

Stop Rate

The average number of full stops per vehicle. A *full stop* is defined to occur at a signalized intersection when a vehicle slows to zero (or a crawl speed, if in queue) as a consequence of the change in signal indication from green to red, but not necessarily in direct response to an observed red indication. A *full stop* is defined to occur at an unsignalized intersection when a vehicle slows to zero (or a crawl speed, if in queue) as a consequence of the control device used to regulate the approach.

Study Period

The time interval (within a day) that is represented by the performance evaluation. It consists of one or more consecutive analysis periods. A typical study period is 1.0 to 6.0 h in duration and is stated to represent specific times of the day and days of the week (e.g., weekdays from 4:00 to 6:00 p.m.). If oversaturated conditions occur during the study period, at least the first analysis period should be undersaturated. The maximum study period duration is 24 h.

The geometric design elements and traffic control features of the facility must be unchanged during the study period. Thus, the intersection lane assignments and signal timing plan should be the same throughout the study period. In addition, if the directional distribution of traffic volume changes significantly during the day, separate study periods should be established for each time period where the directional distribution is relatively constant.

Study Section

The length of facility over which reliability is to be computed. Since reliability is computed through traffic only, the length of the facility should not be so long that through traffic is a low percentage of total traffic on the facility. The length of facility to be evaluated should be less than the distance a vehicle traveling at the average speed can achieve in 15 min.

Through Delay

Through delay represents the sum of two delay sources. One source is the delay due to the traffic control at the boundary intersection. It is called control delay. The other delay is that due to the negotiation of intersection geometry, such as curvature. It is called geometric delay.

Time Analyzed

This field is provided to document the time frame of the analysis as morning peak, afternoon peak, existing conditions, future projections, etc.

Time Period Adjustment Factors

The methodology requires day-of-week and month-of-year factors, expressed as ratios of the average day-of-week and average month-of-year demand. Also required are hour-of-day factors expressed as a percentage of AADT. The specific factors needed are described in the following list.

- Hour-of-day factors for each hour of the study period (up to 24, but typically six or fewer in practice),
- Day-of-week factors for each day included as part of the reliability reporting period (up to seven), and
- Month-of-year factors for each month included as part of the reliability reporting period (up to 12).

Default hour-of-day, day-of-week, and month-of-year traffic demand adjustment factors are given in HCM exhibits. The factors should be replaced with data from permanent traffic count stations whenever available for streets that are similar to the subject facility and located near it. See also *Hour-of-Day Demand Ratios*, *Day-of-Week Demand Ratios*, and *Month-of-Year Ratios*.

Traffic Counts

The date and time of the traffic count represented in the base dataset is a required input. If the base dataset demands are computed by using planning procedures, they are assumed to represent average day volumes. In this case, a date does not need to be provided by the analyst. However, the time of day for which the estimated volumes apply is still needed. The date and time of the traffic count represented in an alternative dataset is also a required input.

Traffic Demand Variation Generation

The traffic demand variation procedure identifies the appropriate traffic demand adjustment factors for each analysis period in the reliability reporting period. A set of factors accounts for systematic demand variation by hour of day, day of week, and month of year.

Traffic Incident Generation

The traffic incident procedure generates incident dates, times, and durations. It also determines incident types (i.e., crash or noncrash), severity levels, and locations on the facility. Location is defined by the intersection or segment on which the incident occurs and whether the incident occurs on the shoulder, in one lane, or in multiple lanes. The procedure incorporates weather and traffic demand variation information from the previous procedures in generating incidents.

Travel Speed

The ratio of segment length to through-movement travel time.

Travel Time

Travel time is a versatile measure, since it can be monitored over time (for trend analysis), monetized (in calculating benefits), and used in the calculation of other measures (e.g., delay), Facility lengths usually remain the same over time, allowing apples-to-apples comparisons of travel times estimated for a facility in different years or under different circumstances. Travel time is measured in minutes. Travel time is computed as the sum of segment running time and through-movement control delay at the downstream boundary intersection.

Travel Time Index (TTI)

The ratio of the actual travel time on a facility to the travel time at the base free-flow speed.

Weather Event Generation

The weather event procedure generates rain and snow events during the reliability reporting period. The dates, times, types (i.e., rain or snow), and durations of severe weather events are generated. These data are used to adjust the saturation flow rate and speed of facility traffic for each analysis period. The procedure also predicts the time after each weather event that the pavement remains wet or covered by snow or ice, since the presence of these conditions influences running speed and intersection saturation flow rate.

Weather Event Statistics

A reliability evaluation requires the weather data identified in the following list. These data represent averages by month of year for a recent 10-year period

- Total normal precipitation (in., or cm. in metric),
- Total normal snowfall (in., or cm. in metric),
- Number of days with precipitation of 0.01 in. (or 0.025 cm. in metric) or more (days),
- Normal daily mean temperatures (°F, or °C in metric), and
- Precipitation rate (in./h, or cm./h in metric).

Default values for the aforementioned statistics are available from the National Climatic Data Center (NCDC) for 284 locations in the United States.

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