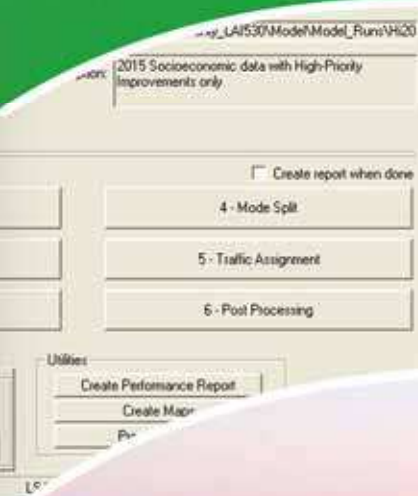


Springfield-Sangamon County Regional Travel Model

Technical Memorandum #12 – Model User's Guide

June 29, 2009



Scenario	Status
Base2004	
E+C 2015	
2015 High	
2015 Medium	
E+C 2030	
REC2030	
REC80 with 6L fwy	done
REC2030 + SH 3	done
2015 Medium + SH3	done
Base2004 + Unsignalized	done
2030 + Unsignalized	done
2030 + Signalized	done
2030 + Signalized + Grdn	done

Move Up

Move Down



LSA

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Springfield-Sangamon County Regional Travel Model

Technical Memorandum #12 – Model User’s Guide

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Springfield-Sangamon County **Regional Travel Model**

Technical Memorandum #12 – Model User’s Guide

INTRODUCTION

The Model User’s Guide provides instructions on operation of the Springfield Sangamon County Regional Travel Model (SSC RTM). Information is also provided regarding the location and format of inputs for each model step.

The SSC RTM is run from the TransCAD software platform through a customized user interface. This interface provides access to built-in TransCAD processes as well as custom calculations developed specifically for the Springfield-Sangamon County Regional Planning Commission. Scenario and file management is achieved through a scenario management system integrated into the custom user interface. This User’s Guide provides instructions on installation and operation of the model. A basic understanding of the TransCAD software program is required to get the most out of the SSC RTM. However, users unfamiliar with the software should be able to perform some modeling tasks with the assistance of this guide.

SYSTEM REQUIREMENTS

The SSC RTM must be run on a computer running Windows 2000 or Windows XP and the TransCAD software program. The program may also work in later versions of windows, but has not been specifically tested. Users must be logged in as administrators or “Power Users” to successfully run the travel model. Specific system requirements are shown in Table 12.1.

The listed requirements are suggested minimums; a computer that does not meet these requirements may still succeed in running the SSC RTM. High processor speeds, multiple processor cores, and additional memory may reduce the amount of time required to run the model. The required disk space for installation must be available on the drive where TransCAD has been installed. The required disk space for additional scenarios can be on a local or network drive and must be available before attempting to run the model. However, model run times will increase if the model is run from a network drive instead of a local drive.

Table 12.1: System Requirements

Operating System	Windows 2000 or Windows XP
TransCAD Software	Version 5.0 (Build 1545 or later recommended)
Microsoft Office (including Access)	Version 2003 or later required
Disk Space (Installation only)	10 MB
Disk Space (Each scenario)	80 MB for each additional scenario

Installation of the SSC RTM consists of two steps: installing the model add-in and copying the model data files. Instructions for each step are provided below.

INSTALLING THE MODEL ADD-IN

Recommended Method: Running the Installation Program

To install the SSC RTM, run the Setup.exe file on the installation media. If the model has been previously installed, the installation program will update the SSC RTM to the most current version. The installation program will not overwrite custom scenario lists created by the user. If the user has modified model data on the local computer, it is recommended that only the model add-in is installed from the installation program to avoid accidentally overwriting data files.

Once installation is complete, a new item will be available in the TransCAD Add-Ins list: SSC Model. To access the Add-Ins, choose Tools → Add-Ins from the TransCAD menu. Once an add-in has been used once, it will be available in the recently used Add-Ins list shown directly under the Tools menu.

The installation program does not provide an uninstall function. To uninstall the model, use the following steps:

1. Delete the “SSC RTM” folder from Program Files (Usually C:\Program Files\SSC RTM),
2. Choose Tools → Setup Add-Ins... from the TransCAD menu and remove the entry for the SSC Model,
3. Remove any data (as desired) from local or network drives.

Removal of the SSC RTM in this manner may delete scenario lists created by the user.

Alternate Method: Manual Installation

In most cases, the SSC RTM should be installed using the installation program described above. However, there may be some cases where the user prefers to install the model by copying files manually. The installation program performs these steps as described below. The install program does not modify the Windows Registry.

The travel model add-in can be installed by copying the “SSC RTM” folder from the installation media to the local Program Files directory.

- If the installation media is located at drive *D:*, the SSC RTM folder can be found at *D:\Manual Install\SSC RTM*.
- The directory should be placed in *C:\Program Files\SSC RTM*

Once the add-in files have been copied, the model must be added to the TransCAD Add-Ins list. To do this, open TransCAD and:

1. Select Tools → Setup Add-Ins... from the menu,
2. Click “Add” to add a new Add-In,

3. Fill the data in as follows:
 - a. **Type:** Dialog Box
 - b. **Description:** “SSC Model”
 - i. Note: This value can be adjusted based on user preference
 - c. **Name:** “SSC Model”
 - i. Note: this must be exact and is case sensitive
 - d. **UI Database:** Click “Browse...” and locate C:\Program Files\SSC RTM\model_ui.dbd
 - e. **In Folder:** None
4. Click “OK”

This will add the SSC Model the TransCAD Add-Ins list.

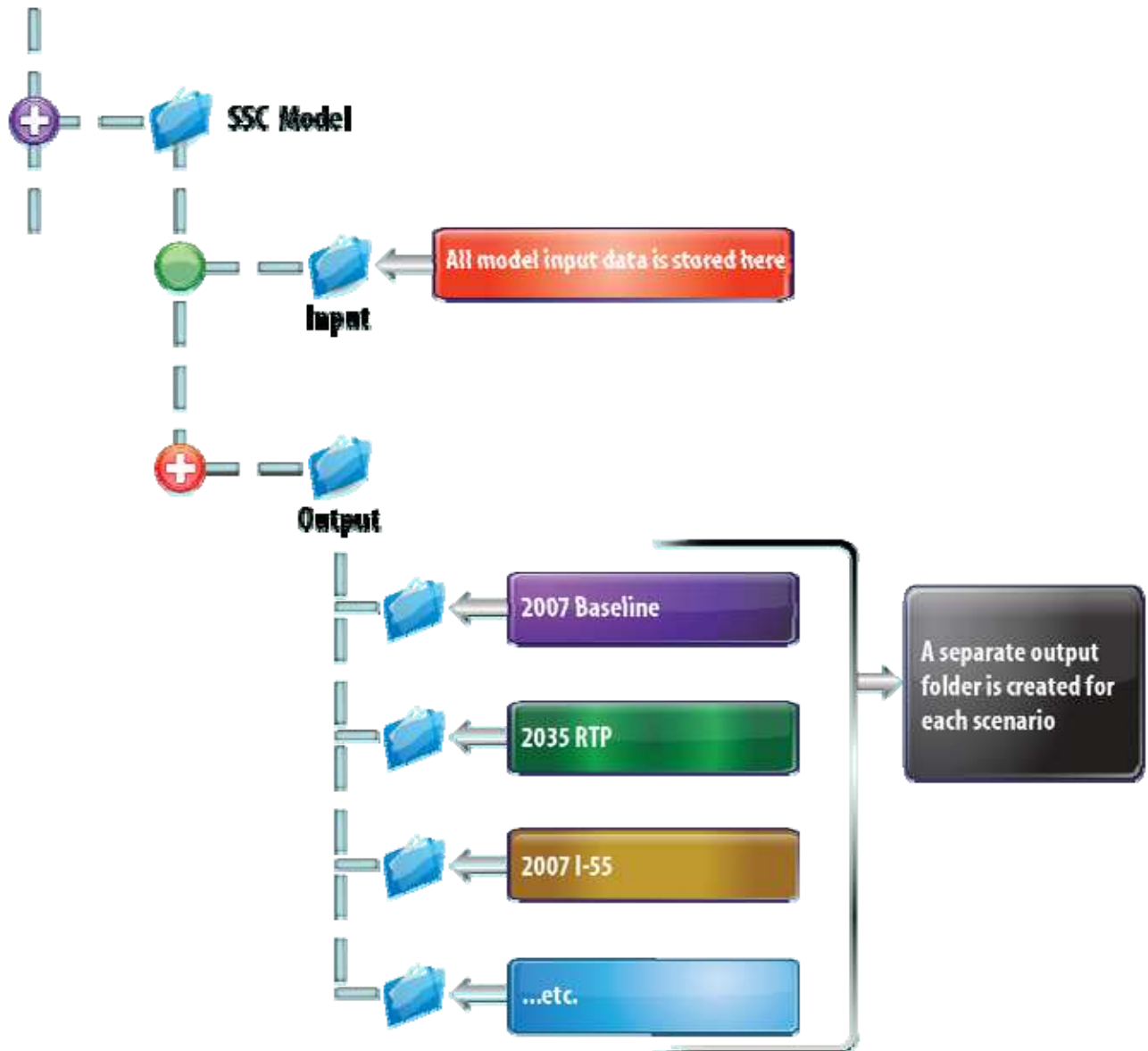
Copying Data Files

If data files are not installed using the installation program, model data files must be copied from the installation media to a location on a local or network drive. The folder titled “SSC Model” contains all data files needed to run the SSC RTM, including networks, socioeconomic data, and model parameters. The entire “SSC Model” directory should be copied from the installation media to the computer from which the model will be run. If the user has modified model data from a previous version on the local computer, specific instructions provided with the updated version should be followed.

Directory Structure

The “SSC Model” directory is structured to provide efficient and straightforward organization of travel model input and output files. While TransCAD and the customized user interface are flexible enough to allow for nearly any directory structure, it is recommended that the default directory structure shown below is used.

Figure 12.1: Recommended Directory Structure



RUNNING THE MODEL

The SSC RTM is controlled through a series of dialog boxes. These dialog boxes allow the user to specify custom model run settings or to copy settings from a previously defined scenario. Users may also run the travel model, create reports and maps, and specify model run options. Steps required to complete a successful model run are described below.

Preparing the Model Database

The Input folder contains an Access Database file called “SSCDatabase.mdb.” This file contains specific external station data, special generator data, socioeconomic, and other TAZ data for multiple timeframes. Socioeconomic data and external station data can be loaded from an Excel (.xls) file or can be edited directly from the Access database. Remaining model data can be edited from within Access.

Database Tips	
Office 2003	To prevent the model database from becoming unacceptably large, compact the file occasionally by using “Tools → Database Utilities → Compact and Repair Database” (This is not necessary when use Microsoft Office Version 2007 or later)
Office 2007	When opening the database in Office 2007, a Security Warning will appear at the top of the application. The user must click on the Options... button and enable the VBA Macro content in the database in order to use the program interface.

The model database provides an easy and convenient way to organize the necessary input data required to run the travel model. Data entry forms are provided to allow easy access to frequently used data.

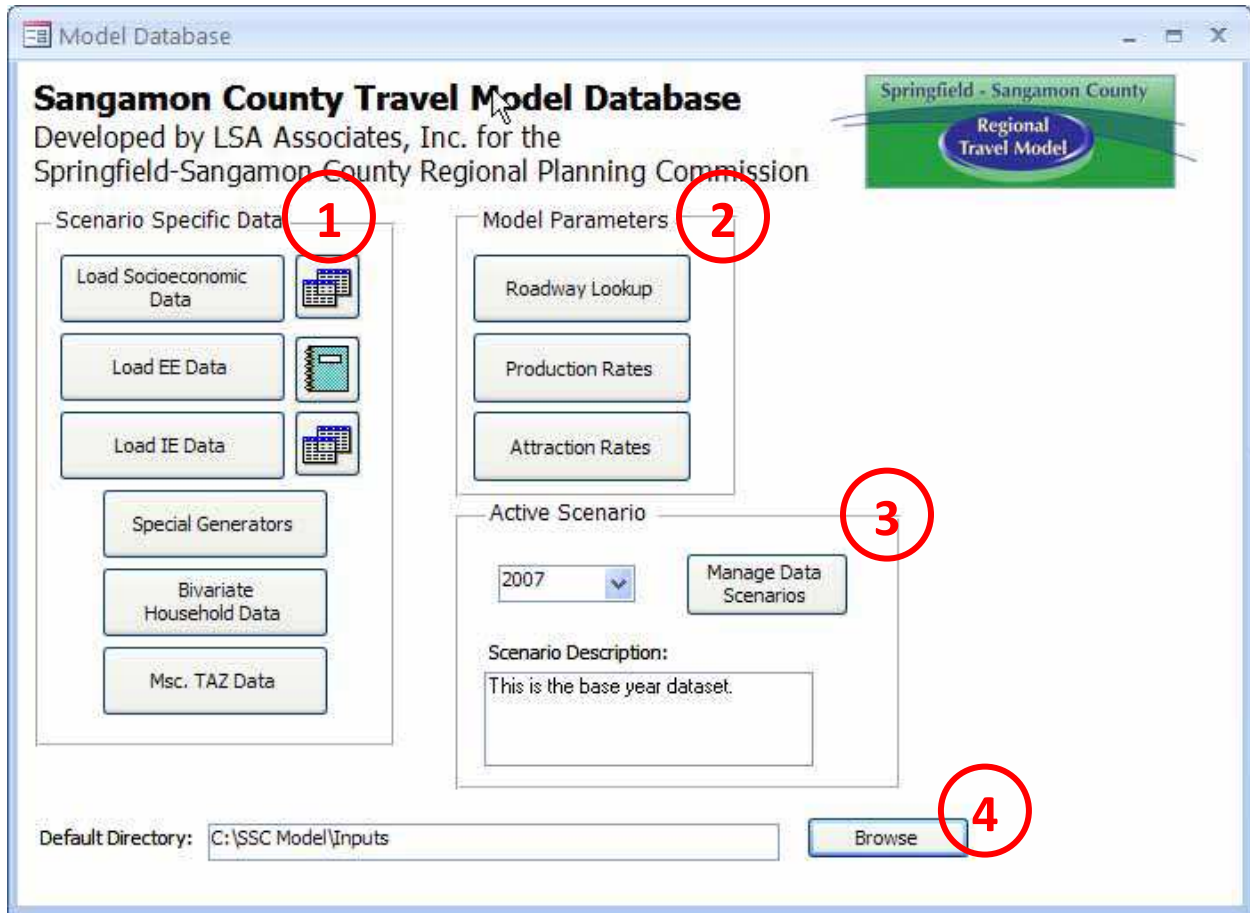
Getting Around the Database Interface

When the database is opened, an interface form provides access to commonly used functionality. The interface is divided into four main sections as described below and noted in Figure 12.2.

1. Scenario Specific Data: This section allows the user to modify the contents of data that may vary by data scenario.
2. Model Parameters: this section allows the user to view or modify commonly accessed model parameters.
3. Active Scenario: This section allows the user to select a data scenario and manage data scenarios.

4. Default Directory: The user can browse to the local or network model input directory to avoid needing to navigate to the directory when importing data (this is a convenience feature only).

Figure 12.2: Main Database Interface



Data Scenarios

Most of the data contained in the model database, such as speed lookup tables, friction factor parameters, and volume delay parameters, does not vary over time. When this data is edited, changes will apply to all model runs referencing the modified model database. However, socioeconomic data, external station data, special generator values, and other TAZ data vary with each model run. Therefore, these datasets are stored in “data scenarios” within the model database. When the model is run, a specific data scenario must be selected. Only data from the referenced data scenario will be used.

The Access database can contain any number of data scenarios. The database provided with the travel model contains one base year data scenario and one forecast year data scenario. These data scenarios should not typically be edited. Instead, additional datasets can be created by copying an

existing data scenario and then editing data and/or importing data from an external file. The steps below describe the process required to create a new data scenario using the database interface.

How to Add a New Data Scenario


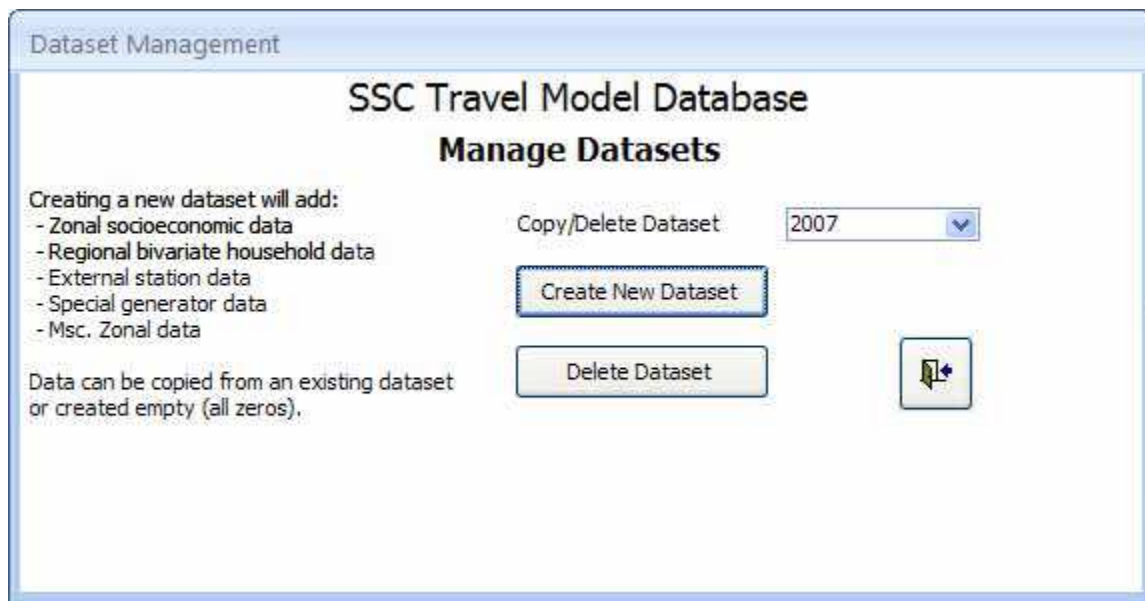
1. Click on the “Manage Data Scenarios” button on the main database dialog.
2. Select a data scenario (e.g. 2007) that will be copied into a new data scenario.
→ Then, click on the “Create New Dataset” button.
3. Enter a name for the new data scenario (e.g. 2007B or 2012).
4. Exit the data management dialog by clicking on the  button.
5. On the main dialog, make the newly created dataset active.
6. Import and/or edit scenario specific data as desired

Figure 12.3: Scenario Management Dialog Box



Editing or Importing Socioeconomic Data

Socioeconomic data is stored for each data scenario within the model database. Data can be edited directly from Access or using spreadsheet software. The instructions below assume that a new data scenario has already been created and selected. To split TAZs, please see the additional instructions in the appropriate section of this document.

How to Edit Socioeconomic Data (Spreadsheet Method)

1. Make a copy of the spreadsheet called “SSCSocioData_2007.xls” and name it “SSCSocioData_2007A.xls.”
2. Open this spreadsheet and make changes on the tab called “SocioData.” Take care when editing data, since the tab named “SocioDataForAccess” is linked to this sheet.
3. Save changes to the spreadsheet.
4. Import the updated spreadsheet using the database interface – click on the “Load Socioeconomic Data” button.

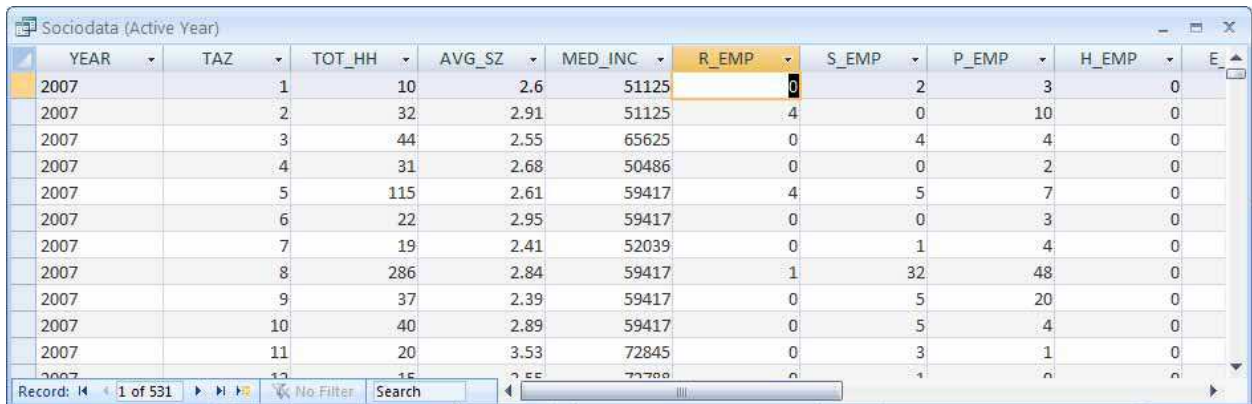
Figure 12.4: Socioeconomic Data Spreadsheet



TAZ	Households	Household Income	Avg Household Size	Total Employment	Disaggregated Employment Data					
					Basic	Retail	Service	Health	Education	Leisure
1	10.0	51,125	2.60	5	3	0	2	0	0	0
2	32.0	51,125	2.91	14	10	4	0	0	0	0
3	44.0	65,625	2.55	8	4	0	4	0	0	0
4	31.0	50,486	2.68	3	2	0	0	0	0	1
5	115.0	69,417	2.61	168	7	4	5	0	149	3
6	22.0	59,417	2.95	3	3	0	0	0	0	0
7	19.0	52,039	2.41	5	4	0	1	0	0	0
8	206.0	59,417	2.84	85	48	1	32	0	0	4

How to Edit Socioeconomic Data (Database Method)

1. Click the edit table button next to “Load Socioeconomic Data.”
→ Socioeconomic data for the active year will be shown.
2. Modify the desired variables.
→ A description of each field will be shown in the Access status bar at the bottom of the screen when a data cell is selected.
3. Close the table.
→ It is not necessary to save the table when closing, as edits are saved as they are made.



YEAR	TAZ	TOT_HH	AVG_SZ	MED_INC	R_EMP	S_EMP	P_EMP	H_EMP	E
2007	1	10	2.6	51125	0	2	3	0	
2007	2	32	2.91	51125	4	0	10	0	
2007	3	44	2.55	65625	0	4	4	0	
2007	4	31	2.68	50486	0	0	2	0	
2007	5	115	2.61	59417	4	5	7	0	
2007	6	22	2.95	59417	0	0	3	0	
2007	7	19	2.41	52039	0	1	4	0	
2007	8	286	2.84	59417	1	32	48	0	
2007	9	37	2.39	59417	0	5	20	0	
2007	10	40	2.89	59417	0	5	4	0	
2007	11	20	3.53	72845	0	3	1	0	
2007	12	15	2.55	72700	0	4	0	0	

Alternate Methods

TransCAD

Socioeconomic data tables can be opened in TransCAD by browsing to the database file, selecting the query named **Sociodata (Active Year)** and selecting TAZ as the unique field. This will allow data to be edited for the active year only, as set in the Access Database interface. This approach is similar to the method for editing Misc. TAZ data described below.

Access

Socioeconomic data is stored in the table **aSEData**. This table can be edited directly if necessary. However, this method should only be used by those familiar with the data structure of the Access database.

Editing the Bivariate Household Distribution

The regional bivariate distribution of households by income and size can be edited for each data scenario using a form accessible from the main database dialog box. Alternately, this data can be edited directly in the table named “bRegBivarPct.”

It is not necessary to edit the bivariate household data unless reliable forecast data is available.

Editing Special Generator Data

Special generator data can be edited using the table accessible from the main database dialog. When a new dataset is created, special generator values will be copied from an existing dataset or will be created blank, so they should be adjusted in most cases. Alternately, special generator values can be edited directly in the table called “aSpecialGen.”

Editing or Importing External Station Data

External trip data can be loaded into the model database from the included external trip Excel spreadsheet files. If external trips need to be edited, a copy of one of the excel sheets should be made and modified. The modified external trip data can then be loaded into the Access database. The tabs within the spreadsheet named “ee_export” and “ie_export” are linked to more easily readable tables in the spreadsheet. Data on these tabs is read by the model database. IE data and EE data can be imported using the “Load IE Data” and “Load EE Data” buttons.

IE data can also be edited directly from the database by clicking the View/Edit Data button. EE data cannot be edited from the interface and should always be imported from a spreadsheet.

Alternately, external station data can be edited directly in the tables named “aEETrips” and “aIETrips.” This method is not recommended in most cases.

Editing Area Type and Other TAZ Data

Area type and other TAZ data are stored in the model database for each data scenario. It is particularly important that area type is updated prior to running the model for forecast conditions. Area type can be edited directly from the model database, or it can be edited graphically in TransCAD. The data contained in the Misc. TAZ Data Table is further described in Table 12.2.

Avoid Stale Data!

Area Type is a key input data item that must be kept current to produce reliable model results. Area Type is included in both the TAZ dataset and the roadway line layer. Both of these datasets should be kept current.

When preparing forecast datasets, areas that are currently rural but planned for development should have Area Type updated in both the TAZ and link datasets.

Table 12.2: Misc. TAZ Data Table Contents

Field	Description	
YEAR	Data Scenario ID (do not change)	
TAZ	TAZ Number (do not change)	
AT	Area Type:	
	1	Central Business district (CBD)
	2	Urban
	3	Suburban
	4	Rural
RURAL_COMM	Rural and rural communities	
	1	Rural area or distinct rural community with suburban area type
	0	Not rural or a rural community
	<i>Note:</i> this field should be updated when Area Type changes from rural to suburban directly adjacent to the Springfield area.	
SUB_REGION	Sub-region Identifier (for summary report):	
	1	Springfield
	2	Chatham
	3	Small Places
	4	Rest of County
URBANIZED	Urban/Rural Identifier (for summary report):	
	1	Urbanized area
	2	Rural area
CUSTOM1	Set to 1 to include zones in custom summary areas	
CUSTOM2		
EXTERNAL	Set to 1 for external station zones	

The recommended approach for editing of the Misc. TAZ Data is to join the TAZ data table to a layer in the TransCAD software. However, it is also possible to edit the data from Access directly.

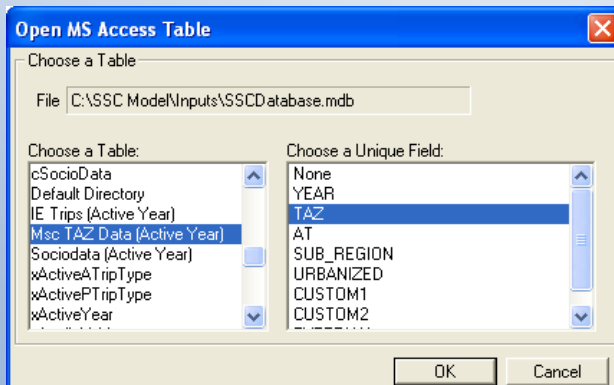
How to edit Other TAZ Data (TransCAD – Recommended Method)

1. Open the Access Database and set the Active Scenario as desired.
2. Open TransCAD and create a map that includes the TAZ layer.
3. In TransCAD, open the query named “Misc TAZ Data (Active Year).” This is an updateable query that only shows the data for the selected year.
→ See the sidebar below for detailed instructions
4. In TransCAD, join the TAZ dataview to the “Misc TAZ Data (Active Year)” dataview
5. Modify the desired variables.
→ Data can be edited graphically using selection sets, dataviews, and the info tool.
6. Close the joined dataview (and other items as desired).
→ It may be desirable to save the joined dataview and TransCAD map for easy access to the dataset.

Opening Access Data in TransCAD

TransCAD provides the capability to open and edit tables and queries stored in an Access database. This allows data stored in the database to be edited directly from TransCAD using graphical tools. An Access table or query can be opened in TransCAD using the following steps:

1. Choose File → Open from the TransCAD menu.
→ Alternately, choose **File Open...** from a TransCAD Join dialog
2. Browse to the desired folder and open the database file
→ Be sure to change the file type to **MS Access Table (*.mdb, *.accdb)**
3. Choose the table and unique field as shown below
→ If no unique field is chosen, the table will be opened read-only



4. After clicking on OK, the table will be opened in a new TransCAD dataview. Changes made to the table are saved directly to the database as they are made.

How to edit Other TAZ Data (Access – Alternate Method)

1. Click the “Misc. TAZ Data” button in the database interface.
2. Modify the desired variables.
3. Close the table.
→ It is not necessary to save the table when closing, as edits are saved as they are made.

It is also possible to edit the “aZoneData” table directly, but this approach is not recommended.

Editing Other Model Parameters (GUI Accessible)

Some model parameters can be viewed or edited from the Access Database interface. These parameters do not vary by data scenario. These values should not be edited except when the model is undergoing a major update or recalibration. Parameters that can be viewed or modified from the interface include:

- **Roadway Lookup Table:** Includes network values that are based on link facility type and area type. These values are stored in the table named “aRoadwayLookup.”
- **Production Rates:** Includes production rates for each trip purpose. These values are stored in the table named “bProductionRates.”
- **Attraction Rates:** Includes attraction rates for each trip purpose (including WBO production allocation rates). These values are stored in the table named “bAttractionRates.”

Editing Other Model Parameters (Not GUI Accessible)

Some model parameters that are rarely adjusted cannot be edited from interactive forms. These parameters must be edited by modifying the Access tables listed in Table 12.3 Data and parameters not accessible from the GUI are denoted with an asterisk.

Table 12.3: Tables in the Access Database

Table Name	Contents
aDisaggIncome*	household income disaggregation curves
aDisaggSize*	household size disaggregation curves
aEETrips	EE trip table (scenario specific)
aIETrips	IE trip table (scenario specific)
aLoadingFactors*	Peak period to peak hour conversion factors (Note: all conversion factors are equal to 1 in the SSC RTM)
aRoadwayLookup	Roadway attribute lookup table
aSEData	Socioeconomic data table (scenario specific)
aSpecialGen	Special generator data (scenario specific)
aTerminalTime*	Terminal time lookup table by area type

Table Name	Contents
aZoneData	Misc. TAZ Data (scenario specific)
bAttractionRates	Trip attraction rates
bProductionRates	Trip production rates
bRegBivarPct	Regional bivariate distribution of households by income and size (scenario specific)
zBikeParams*	Bicycle parameters for the distance-based non-motorized mode split model
zCongWeights*	Peak/off-peak weights by purpose for shortest path matrices
zFricFacParams*	Gamma function parameters for the gravity model
zLOS_Cap*	Level of service capacities for post-processing
zPeriodFactors*	Time of day PA to OD conversion factors
zTransitShares*	Transit shares by area type and trip purpose for motorized mode split
zWalkParams*	Walk parameters for the distance-based non-motorized mode split model

* Data in these tables are not accessible from the GUI.

Preparing the Model Network

The SSC RTM uses one integrated roadway network file that contains roadway conditions for multiple scenarios and alternatives. While this network structure provides many benefits and allows for efficiencies when editing the network files, the structure may be difficult to understand at first. Table 1 includes a description of network link fields used by the travel model and is annotated to indicate each field's purpose. **Fields highlighted in yellow are not typically present in the input network.** If they are included in the input network, they are automatically filled by the travel model in a copy of the network made in the output directory. If they are not present, they are added to the copy of the network in the output directory. Attributes that are not listed in Table 12.4 contain supplemental information and are not used directly by the travel model.

Table 12.4: Roadway Network Link Attributes

Field Name	Description	
ID	TransCAD ID (Read Only)	
Length	Length in Miles (Do not edit – managed by TransCAD)	
Dir	Direction of Flow (Edit with care – use Dir_yy instead)	
STNAME	Street Name (optional)	
STTYPE	Street type (e.g., Ave, Dr, St)	
ZIP	Link zip code	
FT	Facility Type:	
	1	Freeway
	2	Expressway
	3	Principal Arterial
	4	Minor Arterial

Field Name	Description
	5 Collector
	6 Ramp
	7 Freeway/Freeway Ramp
	8 Centroid Connector
AT	Area Type
	1 Central Business District (CBD)
	2 Urban
	3 Suburban
	4 Rural
ABLANES BALANES	Directional number of lanes
FF_OR	Override Freeflow Speed
SPDLIM	Speed Limit
AB_FBAM BA_FBAM AB_FBOP BA_FBOP	Copied MSA speed feedback results for use in the first iteration of speed feedback (used only when speeds are not initialized)
Dir_yy	Direction of Flow for specified network scenario
FT_yy	Facility Type for specified network scenario
AT_yy	Area Type for specified network scenario
ABLANES_yy BALANES_yy	Directional number of lanes for specified network scenario
FF_OR_yy	Override Freeflow Speed for specified network scenario
AB_FBAM_yy BA_FBAM_yy AB_FBOP_yy BA_FBOP_yy	Copied MSA speed feedback results for the specified network scenario
ALT	Primary alternative identifier
ALT2	Secondary alternative identifier
...	See the network documentation for a discussion of traffic count data fields
DO_NCHRP	NCHRP Adjustments will be performed for links with a "1" in this attribute.
EST_CNT	Count to be used for NCHRP-255 adjustments. Required for all links with a "1" in DO_NCHRP.
base_vol	Calibrated volume to be used for NCHRP-255 adjustments. Required for all links with a "1" in DO_NCHRP.
SCRLINE	Screenline identifier
fin_cnt	Validation count
FF_SPD	Output freeflow speed
AB_OPSPD BA_OPSPD AB_PKSPD BA_PKSPD	Output peak and off-peak speeds for trip distribution
FF_TIME	Output freeflow travel time
AB_OPTIME BA_OPTIME AB_PKTIME BA_PKTIME	Output peak and off-peak travel times for trip distribution

Field Name	Description
LANE_CAP	Hourly per-lane capacity
AB_CAP	Directional hourly capacity
BA_CAP	
ALPHA	Volume delay parameters
BETA	

yy = 2-digit network scenario code or "AL"

A list of node layer fields is presented in Table 12.5. Fields shown in green are managed by TransCAD and do not need to be edited.

Table 12.5: Roadway Network Node Attributes

Field Name	Description
ID	TransCAD ID
Latitude	Latitude
Longitude	Longitude
Model	Set to 1 for intersection/shape nodes and 2 for centroids. <i>Note: This field is not used by the model. It is for reference and mapping purposes only. It can be updated using the "Identify Model Nodes" utility.</i>
Zone	TAZ Number (null for non-centroid nodes)
External	Set to 1 for external stations <i>Note: This field is not used by the model – external stations are identified in the Misc. TAZ data table instead. This field is for reference and mapping purposes only.</i>

Editing the Model Network

Attributes on both the line and node layer can be edited using the info tool (i) available in the TransCAD map toolbox. To edit attributes for multiple lines or nodes at the same time, click and then shift-click on multiple features. Selected features will be shown in a different color or style to indicate that they have been selected. Next, data for all selected features can be modified in the data window that appears. To fill all records at once, click on the row heading, and then choose Fill. The records can be filled with a single value or by using one of the other options presented. Line attributes can also be edited using the special editing toolbox as described in the TransCAD help topic *Editing Line Attributes*, accessible from the TransCAD online help system.

Line features can be added, modified, or deleted using the standard TransCAD editing tools. For more information, refer to the TransCAD help topics *Editing Line Features* and *Using the Line Editing Tools*. After adding new network links, it is often useful to use the Copy Values feature in TransCAD, which is further described in the help topic titled *Copying Values*.

The node layer that accompanies the network line layer cannot be edited independently. To add or remove nodes from the network, edit the line layer. For specific instructions regarding editing of independent point layers and polygon (area) layers, refer to the TransCAD help topics that describe editing point features and area features.

Network Structure

To illustrate the concept behind the network structure, a simplified example link data table is shown below. While this table only shows facility type information, lane, speed override, and area type information follow a similar theme. In this example network:

- Link 100 exists as a principal arterial (FT = 3) in 2007 and all subsequent years
- Link 200 is programmed as a principal arterial (exists in 2012 and later)
- Link 300 is recommended to be built as a collector (FT = 5) in 2030
- Link 300 is built as a minor arterial (FT = 4) instead of a collector if alternative 1 is activated.
- Link 400 is built as a minor arterial if alternative 2 is activated.
- Link 500 exists in 2007 and all future years as a collector, but is closed if alternative 3 is activated.

Example Link Dataset

ID	FT_07	FT_12	FT_30	FT_AL	ALT
100	3	3	3	--	--
200	--	3	3	--	--
300	--	--	5	4	1
400	--	--	--	4	2
500	5	5	5	--	3

Network Scenarios

As demonstrated above, the network file can contain data for multiple “years,” each represented by a two-digit numeric identifier. The network provided includes the 2007 network scenario.

Additional network scenarios can be created by adding new fields to the roadway network file and naming them with the appropriate suffix. It is generally useful to then fill these new fields with data from another network scenario already present in the network. This can be done automatically by using the “Edit Network Year” utility and then modifying the resulting data to represent the desired roadway network. Manually adding these fields is not recommended.

Specific Turn Penalties

The calibrated SSC RTM uses a small number of specific turn prohibitions. The turn penalty file can be modified by loading the roadway network layer and turn penalty table into TransCAD and then using the TransCAD turn penalty toolbox, which is accessed by choosing “Networks/Paths → Turn Penalty Toolbox” from the TransCAD menu. For detailed instructions on editing turn penalties, see the topic *Using the Turn Penalty Toolbox* in the TransCAD help system. This topic can be found under *Turn Penalties, Toolboxes* in the online help index.

Collecting the Required Data

To successfully run the travel model, various data files are required. These files, listed in Table 12.6, must be present in the model input folder prior to starting a model run. Once the model has been installed on a computer, all of the required files are included in the input directory.

Table 12.6: Model Input Files

ID	File	Description and Notes
1	Roadway Network	The Roadway “Line Layer” is the TransCAD Geographic File containing the roadway network.
2	Turn Penalty File (Optional)	Specific turn penalties are used in the calibrated base year model. However, the model can be run without this file present to run the model without specific turn penalties.
3	Model Database	The Model Database contains various information items and is required to run the model.
4	TAZ Layer	The TAZ geographic file. The only required field is “TAZ” which must contain the TAZ number. This file is used for mapping only, but is included as a required input file to ensure that the file is available.
5	Select Link/Node Query (Optional)	If a query file is identified and present, select link/node analysis will be run during the Traffic Assignment step. A select link/node query file can be created from the TransCAD Menu, under: <i>Planning → Assignment Utilities → Select Link/Zone Query Builder</i>

Creating and Running a Scenario

After the input data has been collected, a scenario must be defined from the model dialog box. Scenarios are accessible from the scenario toolbox and contain the following information:

- Input directory,
- Output directory,
- Filenames,
- Network year,
- Network alternative(s), and
- Other parameters.



Warning: The Advanced tab in the Scenario Editor allows the user to edit values that are not often changed. The advanced interface does not prevent the user from entering invalid or inconsistent data, which may cause the model to crash or produce invalid results.

Scenarios can be copied based on existing scenarios or can be created from scratch using default settings. Figures 2 through 6 show the scenario toolbox and editor that are used to manage scenarios along with annotations describing the available functions.

When creating or editing a scenario, use the steps listed below. ***It is best to perform these steps in order.***

1. Specify a scenario name and identify the scenario input and output directories.
2. As necessary, identify input files by name. Most files will be found automatically, but some files may need to be located manually.
3. After the status for all required files is shown as “Exists,” edit the scenario settings on the General tab. Note that network and data year settings do not need to match. For example, it is possible to run a scenario based on the 2007 roadway network and 2035 socioeconomic data.

Simple Approach

The model dialog box provides a great deal of flexibility in how the model is run, but in most cases a very simple approach can be taken.

1. To run a standard, complete model run simply start the model dialog box, create a scenario (remember to select an appropriate output directory), and click on Step 1 – Prepare Networks. The model will be run with the standard default settings.
2. To automatically create a performance report when the model run is complete, select the appropriate checkbox.
3. If buttons are grayed out and cannot be used, this is usually due to missing input files or invalid settings.

Once the model run is complete, utilities can be used to create standard maps or create a performance report. Maps and performance reports are created in the scenario directory. As with input files, output filenames for maps and summary reports can be changed from the scenario manager.

Running Speed Feedback

Speed feedback can be enabled for a scenario from within the scenario editor. When enabled, speed feedback will only be run if:

1. The model is *not* set to stop after each step, and
2. The model is started from Step 1, 2, or 3.

Otherwise, the model will be run as if the selected scenario is not set to run speed feedback. When the model is run with speed feedback enabled, a file named “Feedback.txt” is created in the model output directory. This file is updated as the model runs and contains a history of speed feedback convergence process. The file can be used to determine whether speed feedback has converged successfully or additional iterations are needed. Furthermore, the file can be opened while the model is running to check speed feedback convergence progress in real time.

Figure 12.5: The Scenario Toolbox

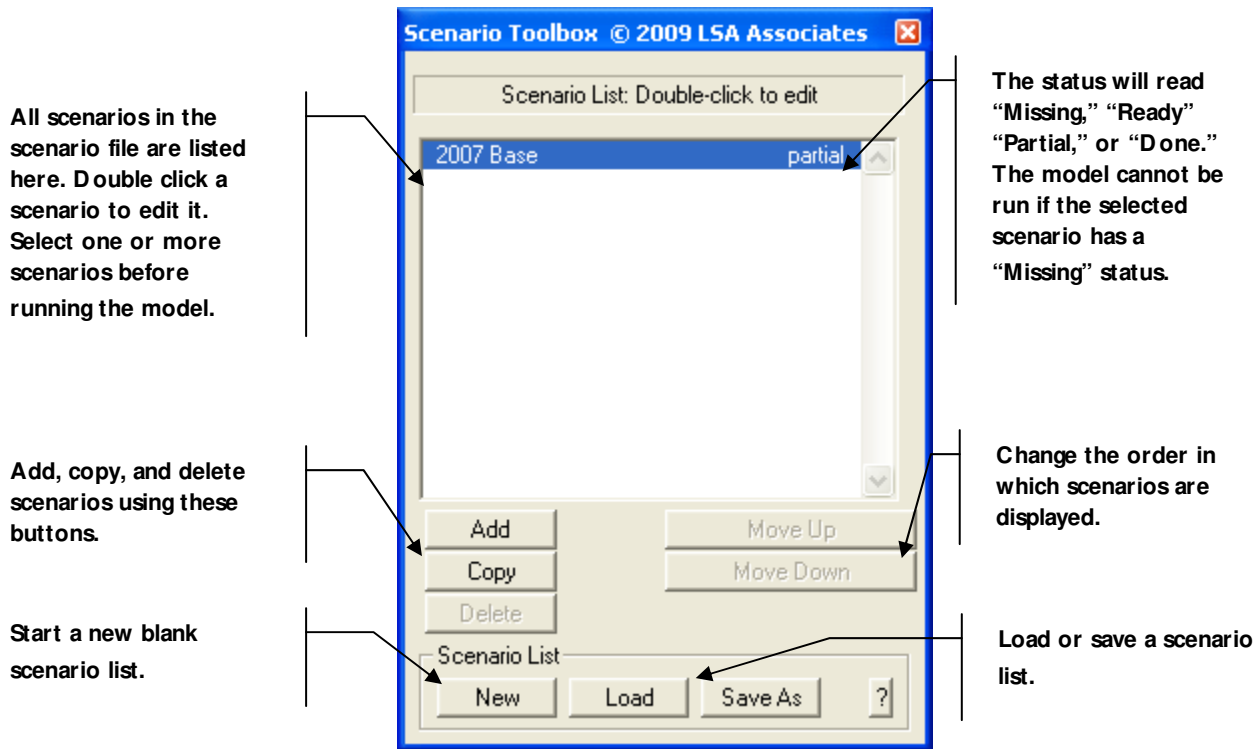


Figure 12.6: The Scenario Editor (Input Tab)

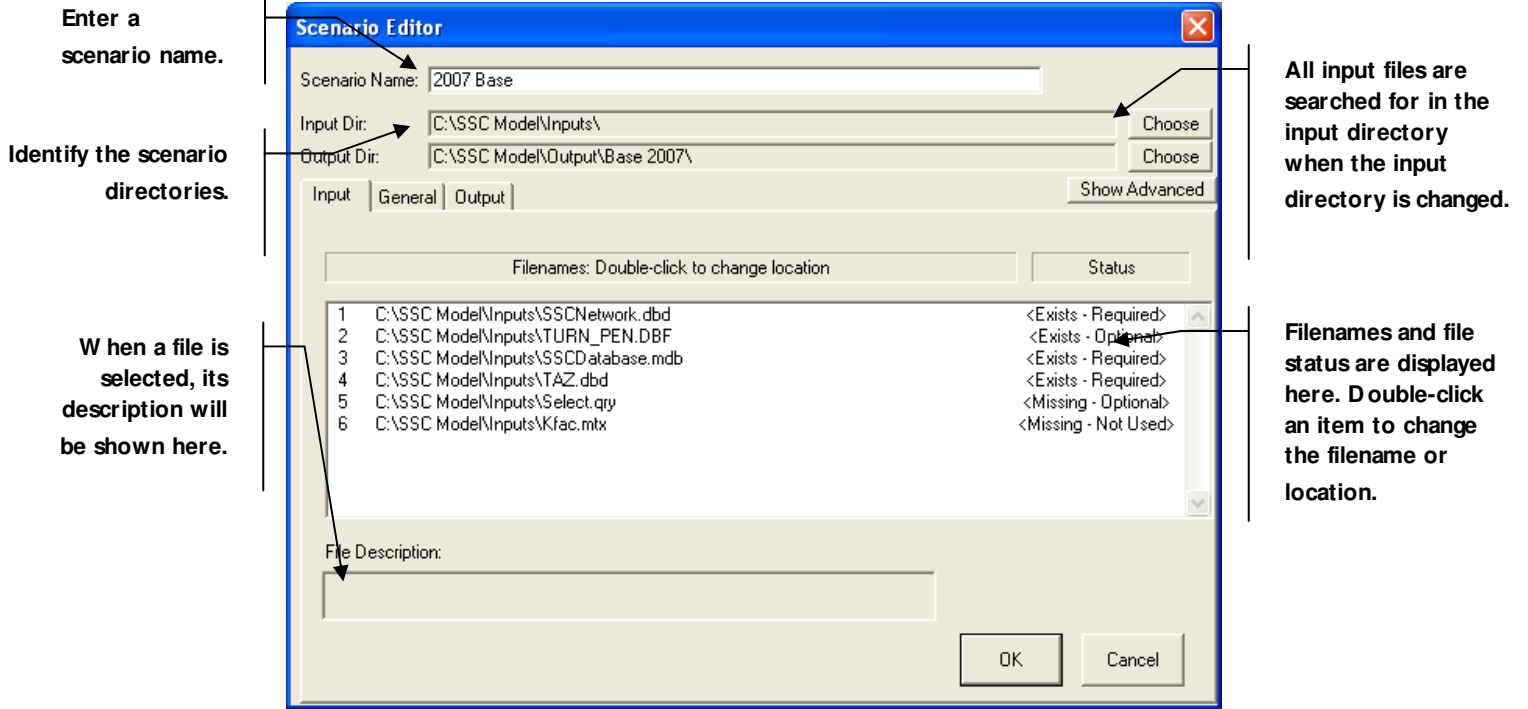


Figure 12.7: The Scenario Editor (General Tab)

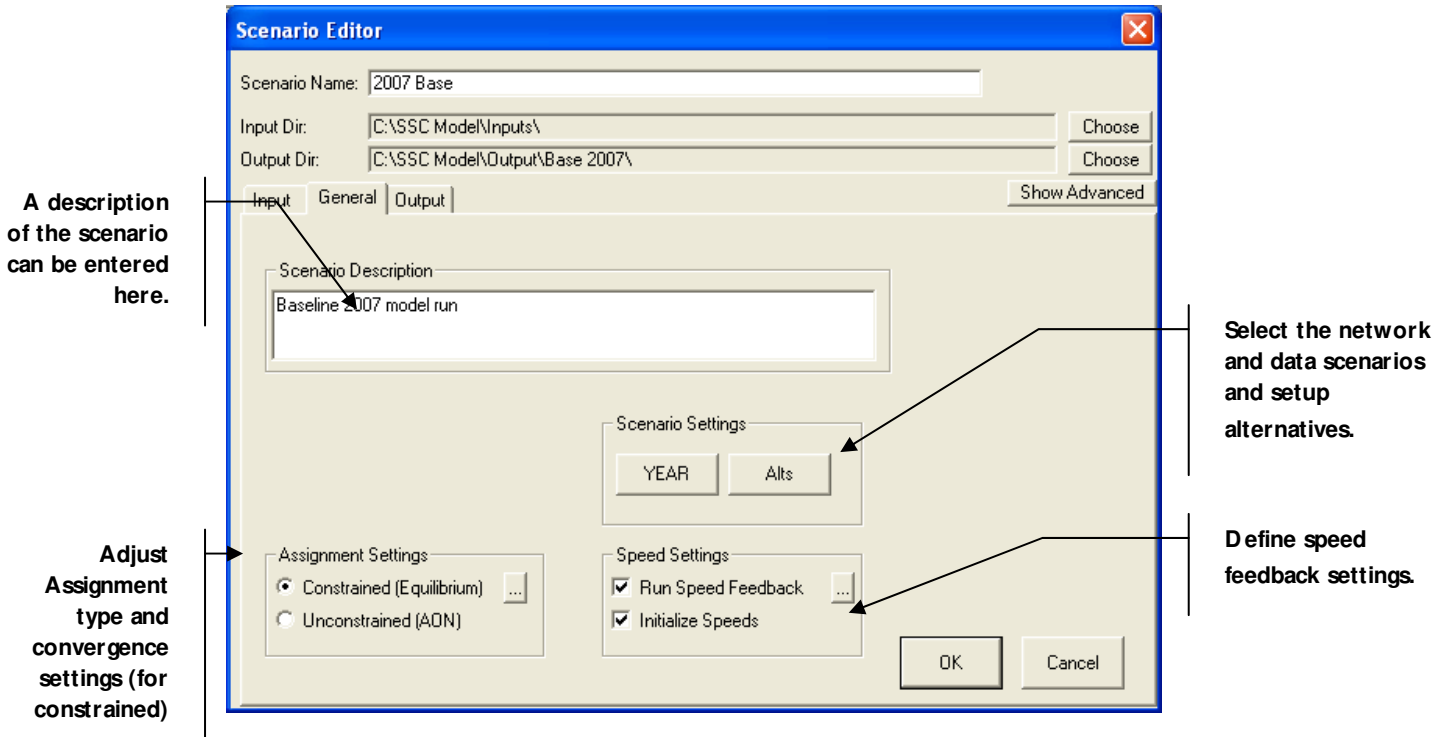


Figure 12.8: The Scenario Editor (Output Tab)

The screenshot shows the 'Scenario Editor' window with the 'Output' tab selected. The 'Scenario Name' is '2007 Base'. The 'Input Dir' is 'C:\SSC Model\Inputs\' and the 'Output Dir' is 'C:\SSC Model\Output\Base 2007\'.

Callouts:

- Different model stages are listed here. Files for the selected stage are shown.** (Points to the 'Stages' list on the left)
- When a file is selected, its description will be shown here.** (Points to the 'File Description' text box at the bottom)
- Filename and file status are displayed here. Double-click an item to change the filename or location.** (Points to the file list table)

Stages	Files	Filename: Double-click to change location	Status
Network Preparation	1	C:\SSC Model\Output\Base 2007\RoadwayNetwork.dbd	<Exists>
Trip Generation	2	C:\SSC Model\Output\Base 2007\ini_Network.net	<Exists>
Roadway Skimming			
Trip Distribution			
Trip Assignment			
Post-Processing			

Figure 12.9: The Scenario Editor (Advanced Tab)

The screenshot shows the 'Scenario Editor' window with the 'Advanced' tab selected. The 'Scenario Name' is '2007 Base'. The 'Input Dir' is 'C:\SSC Model\Inputs\' and the 'Output Dir' is 'C:\SSC Model\Output\Base 2007\'.

Callouts:

- The advanced tab provides access to rarely changed values.** (Points to the 'Advanced' tab)
- Available data is shown here.** (Points to the 'Detailed Value' field)
- Data edits are made here.** (Points to the 'Apply' and 'Reset' buttons)
- Tables, Parameters, or Access Data can be selected here.** (Points to the 'Table', 'Params', and 'Access' radio buttons)

Stages	Parameter Values: Select to Edit	Detailed Value
Network Preparation	{HBW, HBS, HBO, WBO, OBO}	
Trip Generation	{0.0, 0.0, 0.0, 0.0, 0.0}	
Roadway Skimming	{P, P, P, WBO_PA, OBO}	
Trip Distribution	{1, 12, 13}	
Trip Assignment	{S1, S2, S3, S4, S5}	
Post-Processing	{99.0, 99.0, 99.0}	

Figure 12.10: The Model Dialog Box

The dialog box is titled "SSC Regional Travel Model v. 0.2 - DRAFT". It features a logo for "Springfield - Sangamon County Regional Travel Model" on the left. On the right, there are fields for "Directory:" (C:\SSC Model\Output\Base 2007\), "Scenario:" (Baseline 2007 model run), and "Description:". Below these are checkboxes for "Stop after each step" (unchecked), "Create report when done" (checked), and "Debug Mode" (unchecked). A central area contains six model steps in a grid: "1 - Prepare Networks", "2 - Trip Generation", "3 - Trip Distribution", "4 - Mode Split", "5 - Trip Assignment", and "6 - Post Processing". Each step has a three-dot menu icon. At the bottom, there is a section for "Utilities and Options" with buttons for "Edit Network Year", "Copy Feedback Results", "Identify Model Nodes", and "Quit".

Annotations:

- Left side:** "If checked, only the selected model step will be run. If unchecked, subsequent steps will be run as well." (points to "Create report when done")
"Click on a model step to run that step." (points to "1 - Prepare Networks")
"Sub-steps can be deactivated (for troubleshooting purposes, use with caution)." (points to the three-dot menu of "3 - Trip Distribution")
- Right side:** "A performance report can be created when the model run is complete." (points to "Create report when done")
"Debug mode disables error handling. This can help with troubleshooting, but prevents TransCAD from 'cleaning up' after a crash." (points to "Debug Mode")
"Utilities can be run from this area." (points to the "Utilities and Options" section)

USING SELECT LINK/NODE ANALYSIS

The SSC RTM can optionally run a select link and/or node analysis on the daily traffic assignment results. This tool tracks all of the traffic that travels across a link, node, or zone. Results are provided on each link as well as in a select trip table.

To run a select analysis, a select link/node query file must be created with the TransCAD Select Link/Zone Query toolbox. This toolbox can be accessed by choosing “Planning → Assignment Utilities → Select Link/Zone Query Builder” from the TransCAD menu. One query file can contain any number of select link and/or zone definitions. The query file can be saved with any name, but must end with a “.qry” extension. For more details on operation of the Select Link/Zone Query toolbox, see the TransCAD program documentation.

Once a select query file has been created, it must be identified from the main model dialog box. To do this, identify the desired file from the Input tab in the Scenario Editor. To disable select link/zone analysis, delete or rename the select query file. If the select query file reads <Missing – Optional> in the Scenario Editor, select link/zone analysis will not be run.

Note: Large, complex select link and zone queries may cause travel model run times to increase significantly.

VIEWING MODEL RESULTS

Model Data Files

Results from each step of the travel model process are stored in the output directory. Results include balanced and unbalanced PA tables, shortest path (Skim) matrices, zone to zone trip tables and assignment results. The contents of each model output file is described in Table 12.7 and also described in the output section of the Scenario Editor.

Table 12.7: Model Output Files

Model Step	ID	Filename	Description
Network Preparation	1	RoadwayNetwork.dbd	Output roadway network line layer
	2	ini_Network.net	Output routable roadway network
Trip Generation	1	tgn_SocioBV.bin	Bivariate socioeconomic data
	2	tgn_ZonePA.bin	Unbalanced Trip Productions and Attractions
	3	tgn_ZonePABalanced.bin	Balanced Trip Productions and Attractions
Roadway Skimming	1	dst_skm_op.mtx	Off-peak shortest path (skim) matrix
	2	dst_skm_pk.mtx	Peak shortest path (skim) matrix
	3	dst_skm_wt.mtx	Weighted shortest path (skim) matrix
Trip Distribution (Includes mode split)	1	dst_ZonePA.mtx	Distributed Person trips in PA format
	2	ms_ZonePA.mtx	Person trips in vehicles in PA format
	3	non_auto.mtx	Transit and non-motorized person trips in PA format
Trip Assignment	1	asn_AutoOD.mtx	OD Vehicle trips by trip type and time periods
	2	Flow_AM1.bin	AM peak hour traffic assignment results
	3	Flow_PM1.bin	PM peak hour traffic assignment results
	4	Flow_OP1.bin	Off-peak traffic assignment results
Post Processing	1	Flow_AM_per.bin	AM peak period traffic assignment results*
	2	Flow_PM_per.bin	PM peak period traffic assignment results*
	3	Flow_OP_per.bin	Off-peak period traffic assignment results*
	4	Flow_24.bin	24-Hour traffic assignment results
	5	Summary.html	HTML summary report

* For the SSC RTM, peak period results are the same as peak hour results output from trip assignment.

24-Hour Flow Table

One of the key output files from the SSC RTM is the 24-hour traffic flow file. This file contains the combined results of the AM, PM, and off-peak traffic assignment. In addition, the table includes traffic volumes that have been adjusted using techniques documented in the National Cooperative Highway Research Program Report #255 (NCHRP-255). If select link and/or zone analysis has been run, these results will be present in the file as well. The data contained in the 24-hour traffic flow table generally consistent with peak period and peak hour flow tables and are documented in Table 12.8.

Table 12.8: 24-Hour Flow Table Data

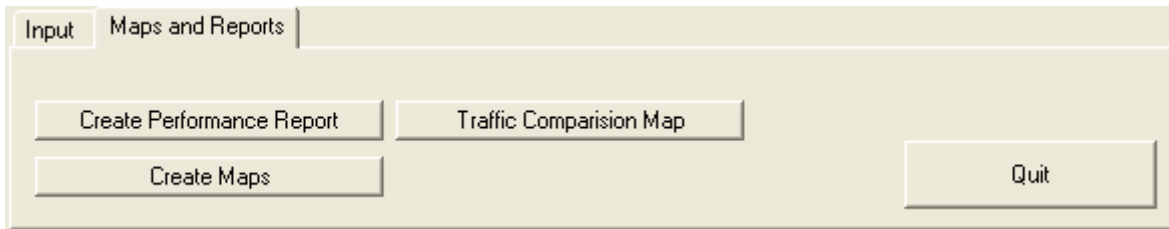
Field Name	Description
ID1	Link ID (Used to join flows to the geographic file)
AB_VOC BA_VOC	Directional volume to capacity ratio*
AB_Time BA_Time	Directional congested travel time*
AB_Speed BA_Speed	Directional congested speed*
AB_VMT BA_VMT TOT_VMT	Directional and total vehicle miles traveled (VMT)
AB_VHT BA_VHT TOT_VHT	Directional and total vehicle hours traveled (VHT)
AB_Flow BA_Flow TOT_Flow	Directional and total traffic volumes
AB_Flow_NCHRP BA_Flow_NCHRP TOT_Flow_NCHRP	Directional and total traffic volumes (Adjusted using the NCHRP-255 techniques described in the post-processing section of this guide)
METHOD_NCHRP	Indicates the NCHRP-255 method used to adjust volumes: 1 = Average 2 = Difference 3 = Ratio
LOS_CAP	Level of Service Capacity
LOS_VC	Level of Service volume to capacity ratio
LOS_NUM	Number indicating level of service
LOS	Letter indicating level of service
LOS_MAP	Letter indicating level of service used for mapping (This field can be modified to visually “smooth” LOS values while keeping a record of the originally calculated value)

* 24-hour values represent VMT-weighted daily average.

Automated Maps

Automated maps can be created from the Maps and Reports tab on the main model dialog box, shown in Figure 12.11. When the “Create Maps” utility is run, a set of maps will be placed in the model output directory. When the “Traffic Comparison Map” utility is run, a map comparing the traffic volumes from two different model scenarios will be created. Each map that can be created is described further below, and map filenames are summarized in Table 12.9.

Figure 12.11: Map and Report Utilities



Validation or Volume Maps

Validation maps present a comparison of travel model volumes and observed count volumes for the 24-hour assignment. These maps are only intended for use with the 2004 calibrated base scenario and display unadjusted model results. Links are labeled with the raw model volume in thousands and, on links with counts, the traffic count in parentheses using the same scale. Multiple versions of the same validation map are created, with the default map scope set to different parts of the county.

Validation maps can be changed to simple volume maps by changing the label field from “lbl” to “lbl2.” This will remove the traffic count information from the link labels.

Level of Service Maps

Level of service maps present 24-hour traffic volumes labeled in thousands and are color coded based on level of service calculations. To enable manual “smoothing” of level of service calculations, a field called “LOS_MAP” is added to the flow tables. The Level of Service map is based on this attribute which can be adjusted to produce a smoother level of service map. This field is initially identical to the “LOS” field, which should be left unadjusted to provide a record of the calculated level of service results.

Traffic Comparison Map

The traffic comparison map presents the differences in traffic flow between two scenarios. Links that increase in the selected scenario (as compared to the “baseline” scenario) are shown in magenta, while links experiencing traffic decrease are shown in blue. To create a traffic comparison map, follow these steps:

1. Select a scenario; this will be the “Alternative” scenario (only one alternative scenario can be selected at a time).
2. Click on the “Traffic Comparison Map” button.
3. Select the baseline scenario from the list that appears.

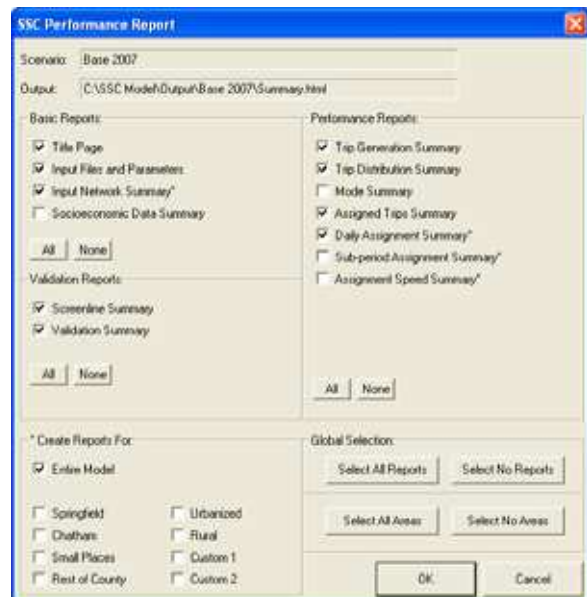
For best results, the input network file for each scenario should be identical. If links have been split or added, closely verify results in these areas.

Table 12.9: Map Output Files

Filename	Description
BAND.map	Volume bandwidth map
LOS.map	Volume bandwidth and level of service map
VOL_REG.map VOL_SP.map VOL_CH.map VOL_SD.map	Simple validation or volume map, with pre-set scopes: REG = Regional scope SP = Springfield CH = Chatham SD = Springfield Downtown
Comparison.map	Traffic comparison map

Performance Report

When the model is run, a performance report can be created. This is an HTML report file that summarizes model inputs and outputs. Each section of the report can be turned on or off from the performance report dialog box which is accessed when the “create report when done” checkbox is activated. Alternately, a performance report can be created from the utilities section of the main model dialog box. However, a performance report can only be created if the selected scenario has been successfully completed. An error will occur if the user attempts to create a performance report for an incomplete scenario. After the performance module has been successfully run, a file called “Summary.html” will be created in the model run directory.



POST PROCESSING

While raw travel model results can be useful, they are often processed to produce more meaningful or accurate information. Two post-processors are used with the SSC RTM to improve the usefulness and quality of travel model output data.

Count-Based Link Volume Adjustments (NCHRP 255)

While every effort has been made to produce a well calibrated and validated travel model, discrepancies between model results and counts will always exist. To rectify these discrepancies, methods described in NCHRP 255¹ are used to adjust 24-hour model results based on traffic count data. On roadway links where count data is unavailable, estimates of existing traffic volumes are used in place of traffic counts.

The first of three adjustment methods is the ratio method, defined in Equation (1).

$$V_R = \frac{C}{A_b} A_f \quad (1)$$

Where:

V_R = Adjusted volume using the ratio method

C = Observed or estimated traffic count

A_b = Base year assignment volume

A_f = Forecast year assignment volume

The second adjustment method, the difference method, is described in Equation (2).

$$V_D = (C - A_b) + A_f \quad (2)$$

Where:

V_D = Adjusted volume using the difference method

C = Observed or estimated traffic count

A_b = Base year assignment volume

A_f = Forecast year assignment volume

In most cases the average of V_R and V_D is taken to arrive at V_A , the adjusted volume using the average method. In cases where base year error or forecast traffic growth is exceptionally high, the ratio method, and therefore the average method, can produce unreasonable results. In these cases, the difference method is used instead.

¹Chapter 4, *Highway Traffic Data for Urbanized Area Project Planning and Design*, National Cooperative Highway Research Program (NCHRP) Report 255, December 1982

The first criteria that is evaluated when choosing an adjustment method is the growth factor (GF), defined as A_f / A_b . This factor quantifies the error in the base year assignment on each link in the roadway network. If either of the criteria presented in Table 12.10 is met on a particular link, use of the ratio method may result in very high growth rates, so the difference method is used to adjust that link. An allowance is made for higher growth rates on links with volumes less than 1,000 vehicles per day.

Table 12.10: Volume Growth Factor Adjustment Criteria

Growth Factor	Model Volume
at least 3 and less than 4	less than 1,000
at least 4	at least 1,000

If growth factor criteria do not preclude use of the ratio method for adjustment, the error factor (EF) is evaluated. The error factor quantifies the error in the validated model results and is defined as the maximum of A_f / C and C / A_f . If the error factor for a link is greater than 2, the average method may result in unreasonably high or low volumes so the difference method is used instead.

NCHRP-255 Data Requirements

NCHRP link adjustments are only made for links where all of the following conditions are met:

- DO_NCHRP = 1,
- EST_CNT contains a valid traffic count or estimated traffic count, and
- BASE_VOL contains the 2007 calibrated base year traffic volume

Because a 2007 base year traffic volume is a required input to this process, adjustments are not made to future roadway links. Adjustments can be made to roadway links that are widened or otherwise modified in the future, as long as they exist in the base year network.

Level of Service Analysis

Link level of service (LOS) is calculated each time the SSC RTM is run. A separate set of Level of Service capacities are used to calculate volume to capacity ratios (V/C ratios) for definition of link LOS. The resulting V/C ratios are used along with level of service cutpoints to determine level of service for each freeway, expressway, and arterial link. Level of service is not calculated for centroid connector, and ramp links. Although the level of service calculations are based on 24-hour volumes, they are designed to approximate a peak-hour level of service.

The level of service capacities included in the SSC RTM have been successfully applied at a planning level in numerous jurisdictions. However the link-based level of service analysis does not represent congestion due to poor access control or intersection deficiencies. If level of

service results are inconsistent with expected results, capacities can be adjusted by editing the values found in the zLOS_Cap table in the Access database. Level of service capacities are listed in Table 12.11.

Table 12.11: Level of Service Capacities

Facility Type	Daily Per-Lane LOS Capacity
1 – Freeway	20,000
2 – Expressway	12,000
3 – Principal Arterial	9,000
4 – Minor Arterial	8,000
5 – Collector	6,000

V/C ratio cutpoints used in the level of service analysis are based on values presented in the *Highway Capacity Manual* and are listed in Table 12.12. The listed V/C cutpoints for Freeway/Expressway are used by the SSC RTM as cutpoints for the freeway and expressway facility types. The Arterial/Collector cutpoints are used for the Principal Arterial, Minor Arterial, and Collector facility types. Level of service is not computed on ramps or centroid connectors. While level of service values are computed for collector streets, this information should be used with caution as validation standards for collector streets are not as rigorous as for arterials, expressways, and freeways.

Table 12.12: V/C Cutpoints by Level of Service

	A	B	C	D	E	F
Freeway/Expressway	0.31	0.50	0.71	0.87	1	1.11
Arterial/Collector	0.51	0.67	0.79	0.90	1	1.11