Santa Cruz County

Stand Alone Transit Model User Guide

Santa Cruz County Regional Transportation Commission

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FEHR & PEERS

Stand Alone Transit Model User Guide

Prepared For:

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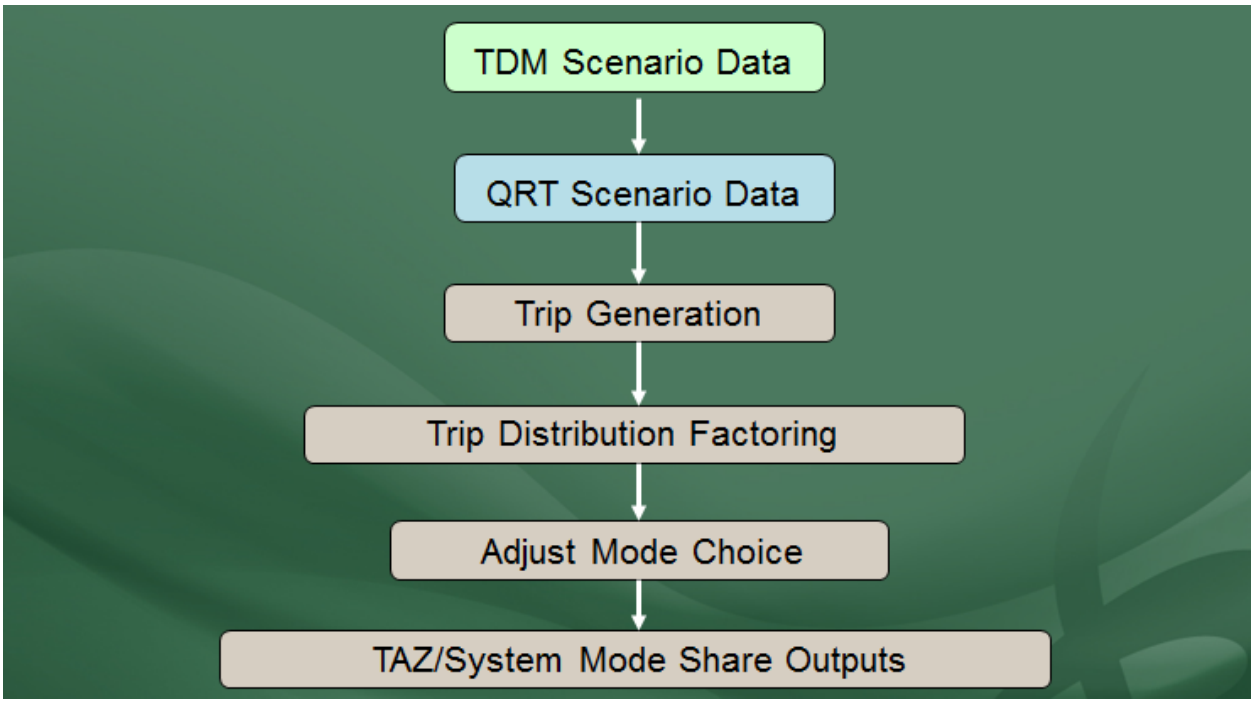
1. DEVELOPMENT OF THE STAND ALONE TRANSIT MODEL

The purpose of the SATM is to refine the travel demand model transit mode share only for trips with access to transit (both starting and ending within ¼ mile of a transit stop) based on changes in actual time (headway), cost (fare), and\or perceived time (amenities).

The following describes development of the Stand Alone Transit Model (SATM) for use in concert with the travel demand model in multimodal proposal evaluation.

1.1 Overview

Using baseline land use and travel data from the travel demand model, the SATM provides additional analysis of potential transit improvements that fill the gaps between real-world transit planning and regional transportation planning using regional models. The following flowchart details the high level steps of the SATM, where the quick-response tool (QRT) represents both the SATM, the SABM, or similar off-model adjustments.



1.2 Integrating Travel Model Outputs

Travel demand models use an iterative process to balance trips throughout the region, and ensuring reasonable results due to land use and transportation network changes. The travel demand output is used as the baseline conditions for the quick response tool. The following flowchart describes the detailed interaction between the travel model and the quick response tool.

1.3 Leveraging Published Research

To analyze the potential benefits of transit amenities, perceived in-vehicle travel time equivalencies are obtained from the TCRP 166 report on Characteristics of Premium Transit Services that Affect Mode Choice. The travel time equivalencies are implemented into the SATM as potential discounts to the perceived transit travel time along a transit route. The amenities discount on transit travel times makes the transit route more attractive and can drive in an increase in the transit mode shares.

1.4 Data Preparation and Integration

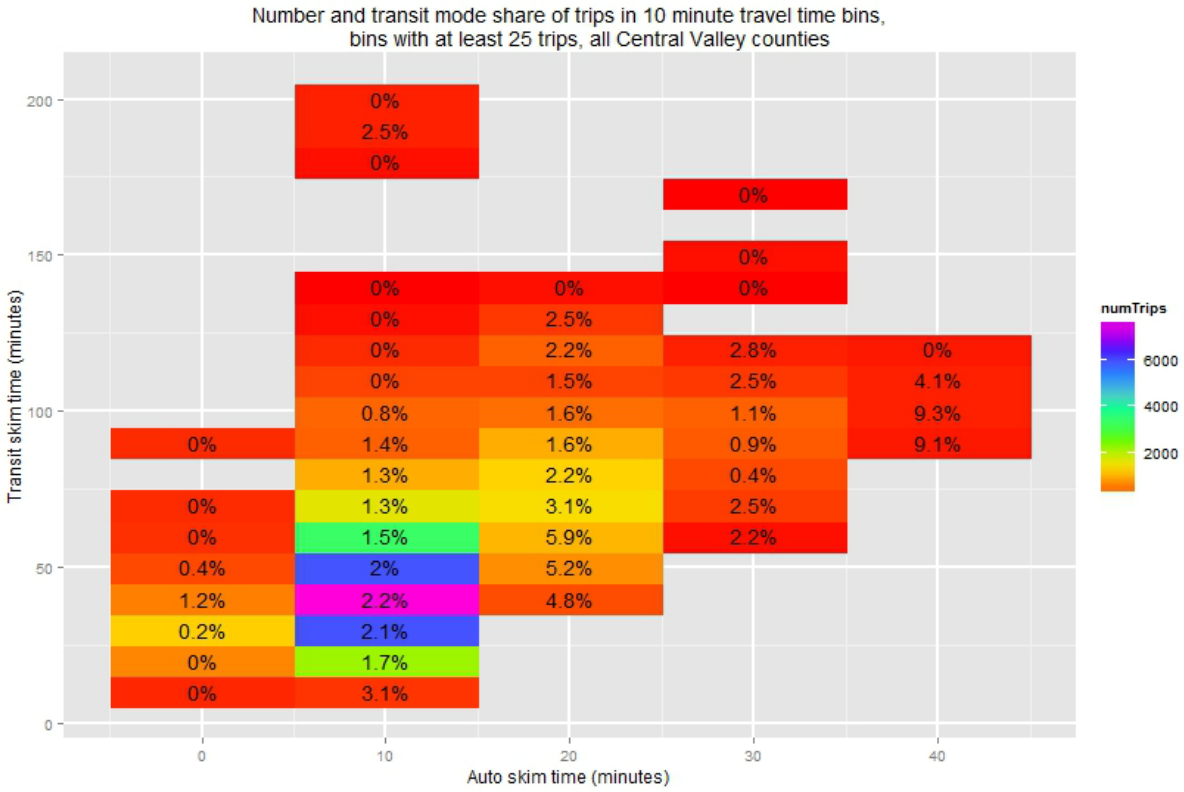
Before it could be used for this project, the California Household Travel Survey data needed to be cleaned and re-weighted. Details about this process can be found in the appendix.

The cleaned and re-weighted CHTS data was used alongside travel model skims from all Central Valley travel models, which provided total distance and both auto and transit travel times for all TAZ-TAZ pairs in the valley for which transit was a possible option. As projects are implemented in Santa Cruz County, the estimation can be updated to reflect local conditions. Each CHTS trip was matched to a single model origin-destination pair using the following process:

1. Select CHTS trips with origin and destination within the same model structure (eg within the same county), including only trips taken by auto or transit.
2. Match each model TAZ to the zip code containing it.
3. Match each CHTS trip to its origin and destination zip code.
4. Because each zip code typically contains many model TAZs, each CHTS trip now has many potential "candidate" model origin and destination TAZs to be matched to.
5. Among all of the candidate origin/destination pairs, select the pair whose distance (as measured by the model skim) is closest to the trip distance reported in the survey.

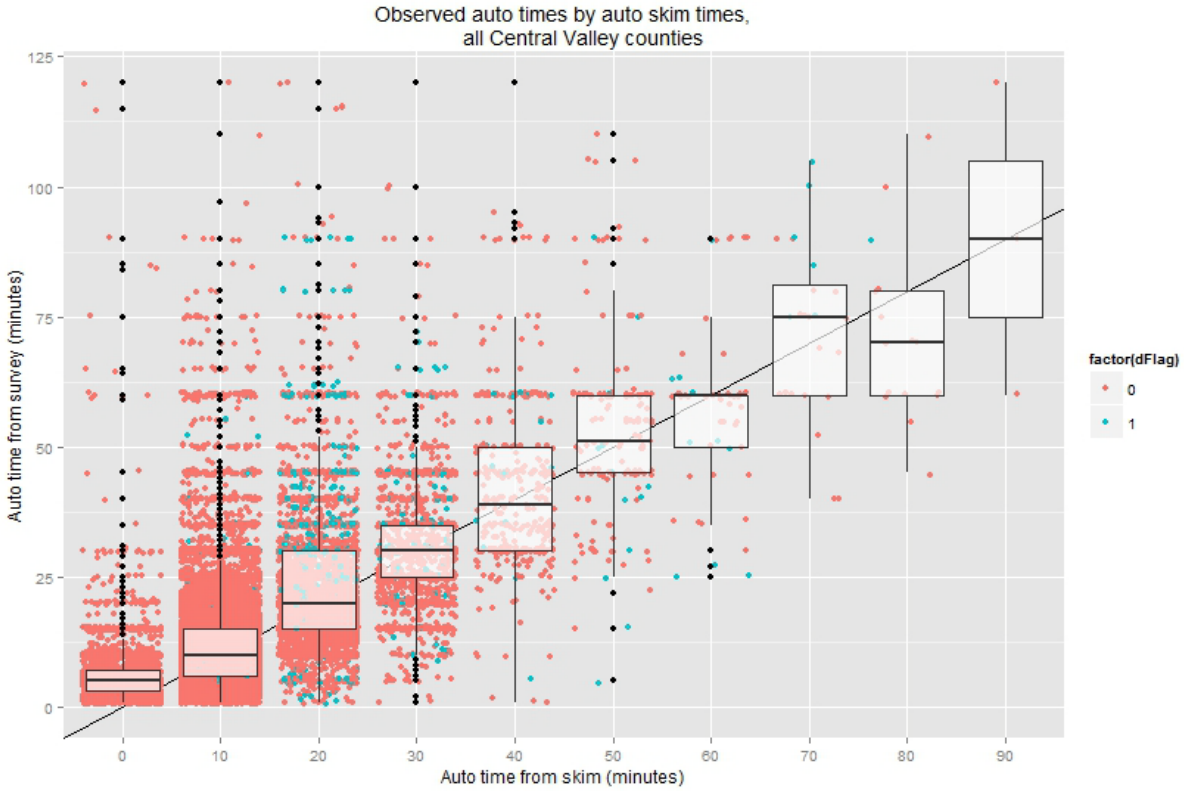
Once each CHTS record has been matched to a model origin and destination, the trips are grouped based on the auto and transit travel times from the model skims; the grouping is based on rounding the skim

times to the nearest 10 minutes. The transit mode share within each group is shown in the figure below, which is also color-coded to reflect the number of trips within each group. Groups ("bins") with fewer than 25 trips are not shown.

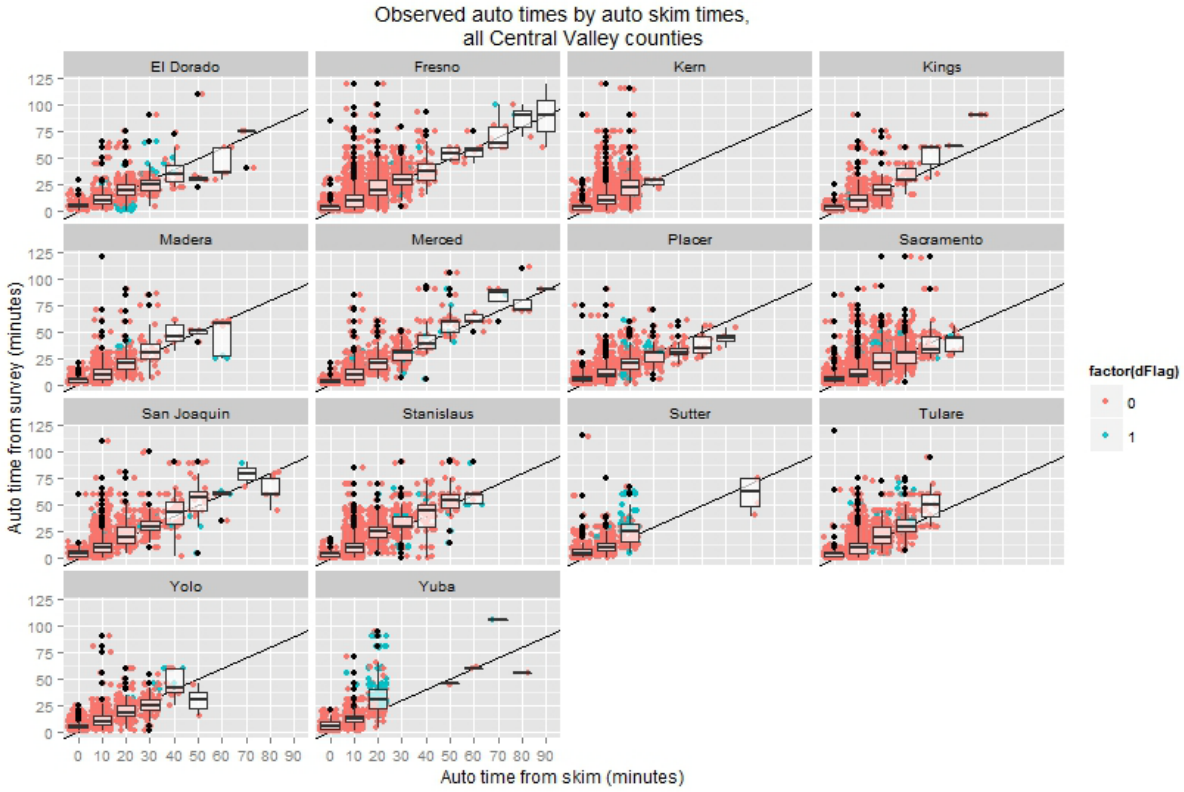


Unsurprisingly, the largest number of trips occur at lower auto and transit travel times, and the highest transit mode shares tend to occur among trips with the lowest modeled transit travel times relative to the auto time.

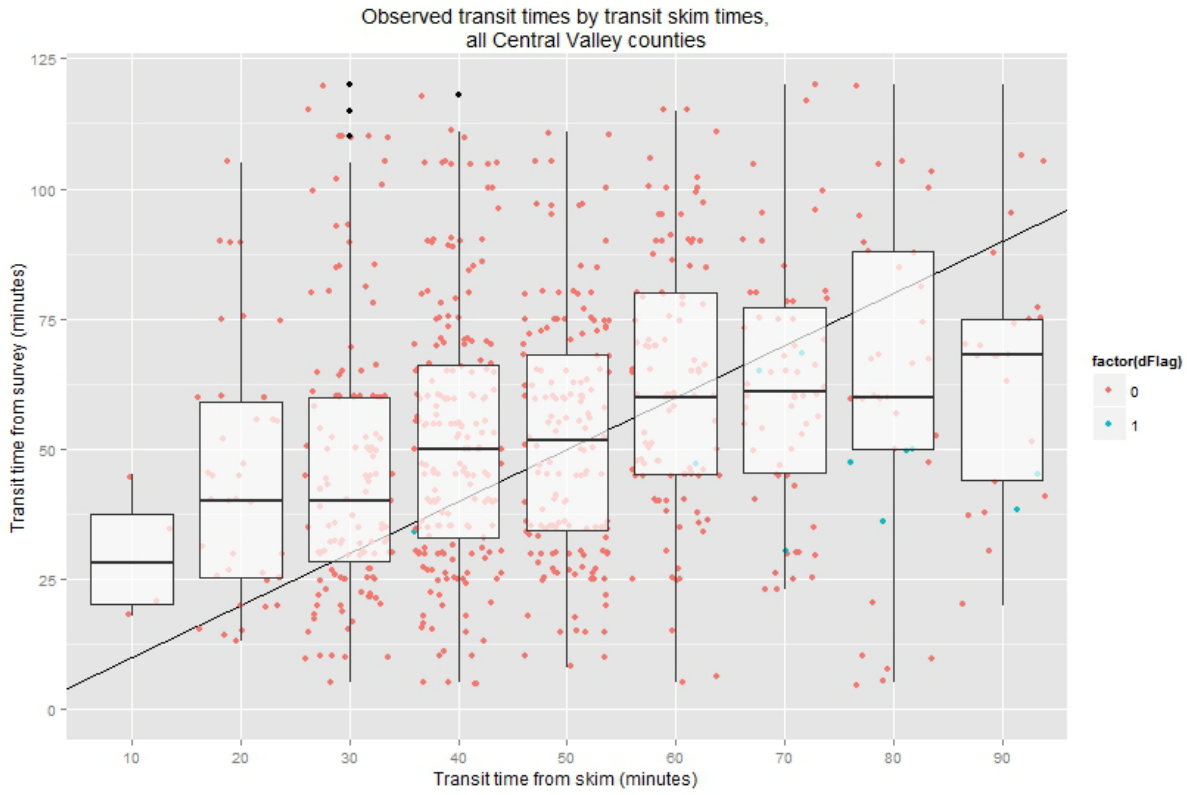
To validate the match of CHTS records to model skims, the actual reported travel time for the mode chosen (whether transit or auto) was compared to the corresponding travel time in the model skim. The figure below shows the correspondence between reported survey auto travel times and model auto travel times. Each box shows the 25th, 50th, and 75th percentile survey time for each skim group, while the points show the times themselves. The diagonal line indicates where the survey and skim times are equal. Red points indicate survey records where the best match to a model origin and destination is a difference of five miles or less; blue points indicate a best match which is more than five miles different.



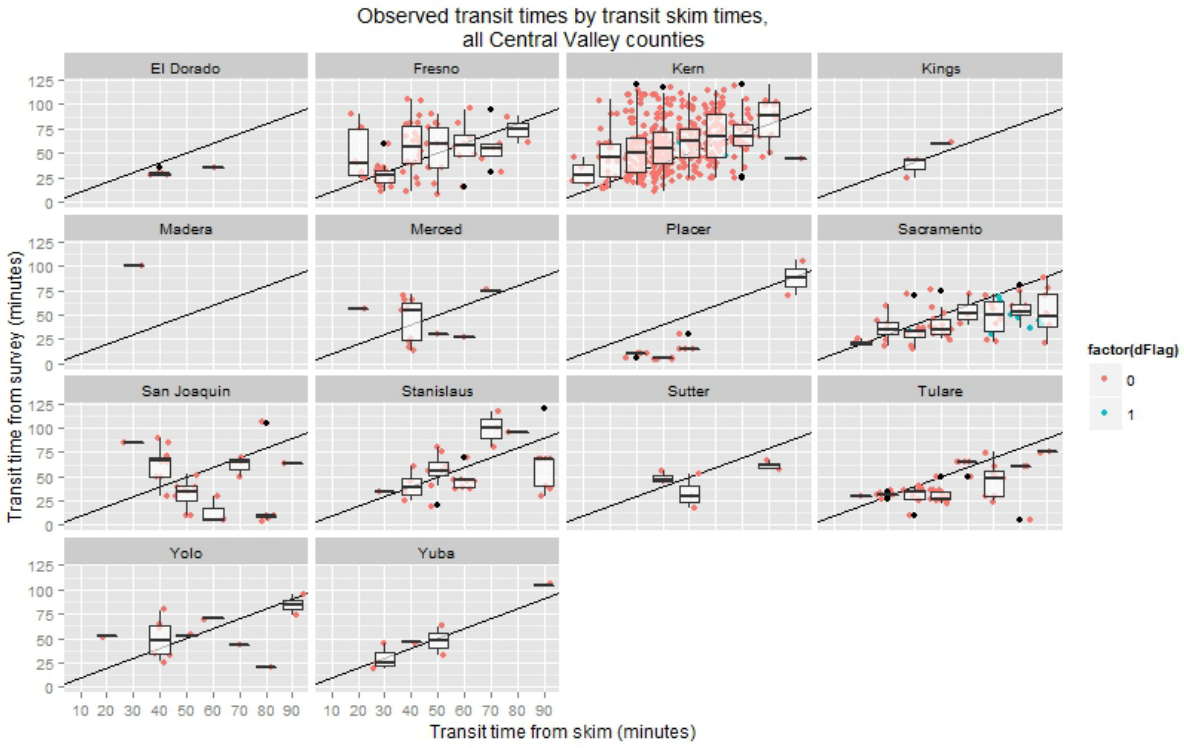
The same data can be viewed on a model-by-model basis, where we see that the poor matches (blue points) are largely found in the larger outlying counties of the SACOG model (El Dorado, Sutter, Yuba). Overall, the match between modeled and surveyed auto travel times is a reasonable one.



The match of model and transit travel times is, unsurprisingly, less precise. Although the overall trend is in the expected direction, with transit trips with longer modeled times being somewhat longer overall than transit trips with shorter modeled times, the match is not as precise as the auto skims. Because many of the models represented do not have mature mode choice models to measure nuances in transit travel times, this is to be expected.



Looking at the transit data on a county-by-county level, it is again easy to see that some models match the observed data well, while others do not; in addition, the distribution of transit trips across counties is also visible.



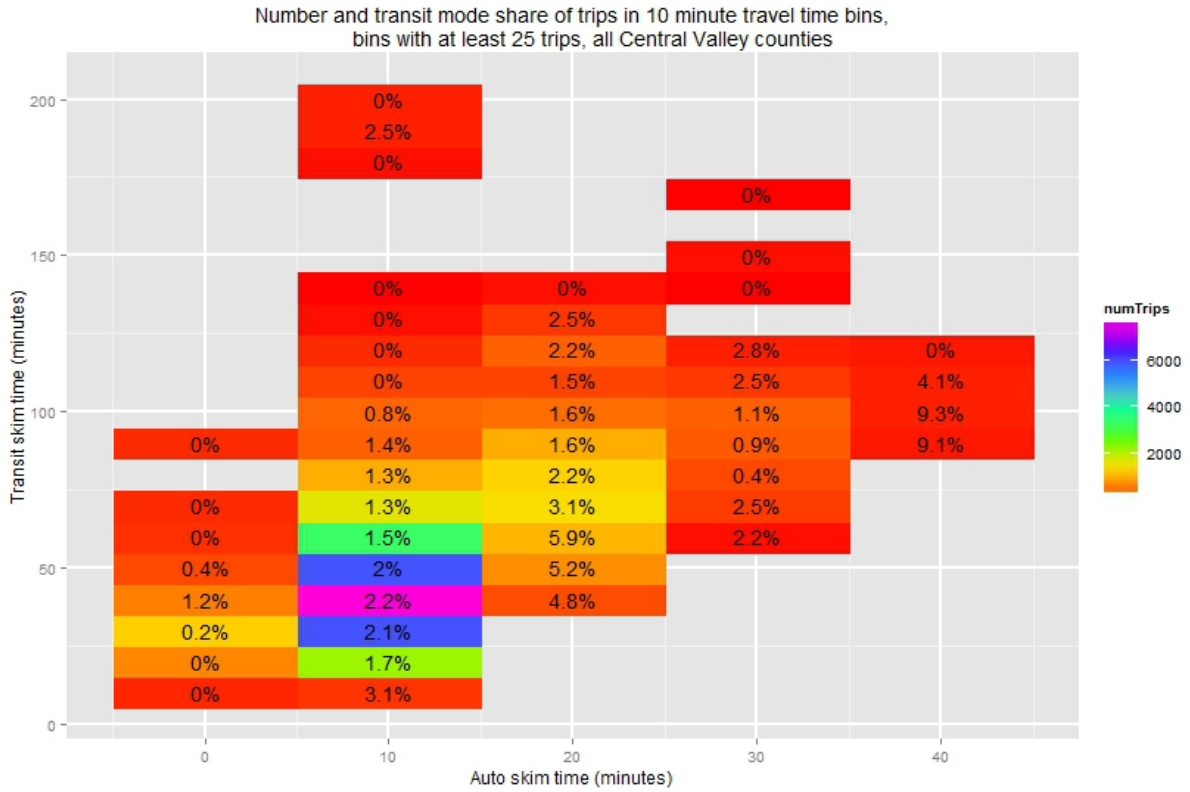
With the California Household Survey data and the model skim data fully integrated, estimation of the SATM is ready to proceed.

1.5 SATM Model Estimation and Application

Estimation of the SATM followed these steps:

1. Use the combined CHTS and model skim data to estimate the elasticity of transit mode shares with respect to transit and auto travel times.
2. Use the research from TCRP 166 to estimate how the presence of certain amenities translates to a decrease in the perceived in-vehicle transit time (IVTT).
3. Combine the decrease in perceived IVTT from transit amenities and fare changes with the actual decrease in transit waiting time from headway changes. Use the resulting total change in perceived transit travel time, together with the elasticity from step 1, to calculate a change in transit mode share.

The combined CHTS and model skim data allows us to associate a transit mode share to each combination of auto and transit travel times, as represented in the figure below.

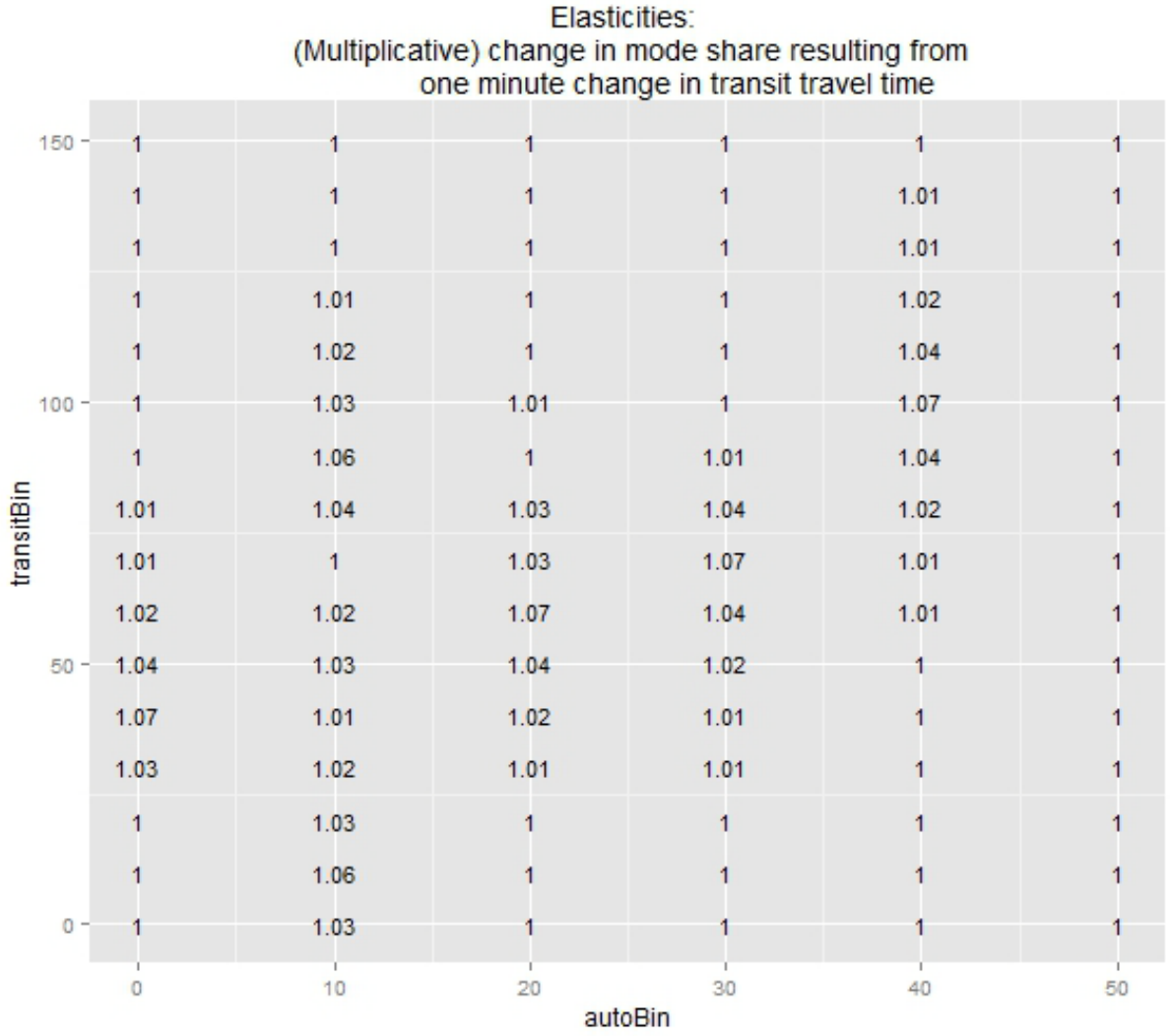


Reading down a column allows us to estimate the effect of an incremental change in transit travel time, with auto travel time fixed.

Elasticities were estimated by calculating the ratio of transit mode shares between two groups with identical auto travel time and minimum (10-minute) difference in transit travel time. These ratios were then smoothed somewhat so that faster travel times did not result in smaller transit mode shares, and so that unreasonably large changes in mode share were decreased. These ten-minute ratios were then converted to one-minute ratios using the formula:

$$One - minute\ ratio = (Ten - minute\ ratio)^{0.1}$$

The resulting one-minute elasticities are shown below. They represent the amount by which the transit mode share is multiplied when (perceived) transit travel time decreases by one minute.

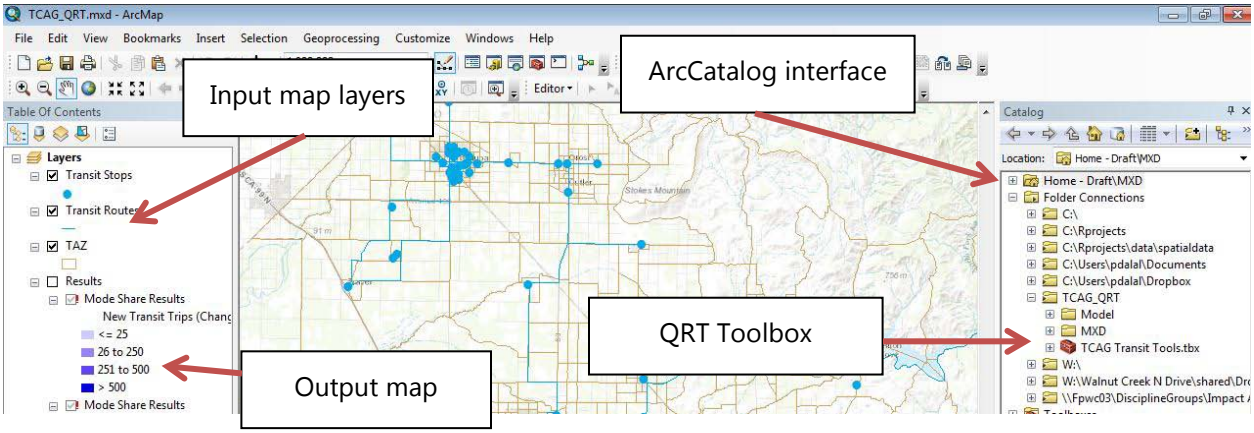


The result is a model which allows the user to see the expected change in transit mode share – and thus in transit trips – which is associated with a set of changes to transit amenities, fares, and headways.

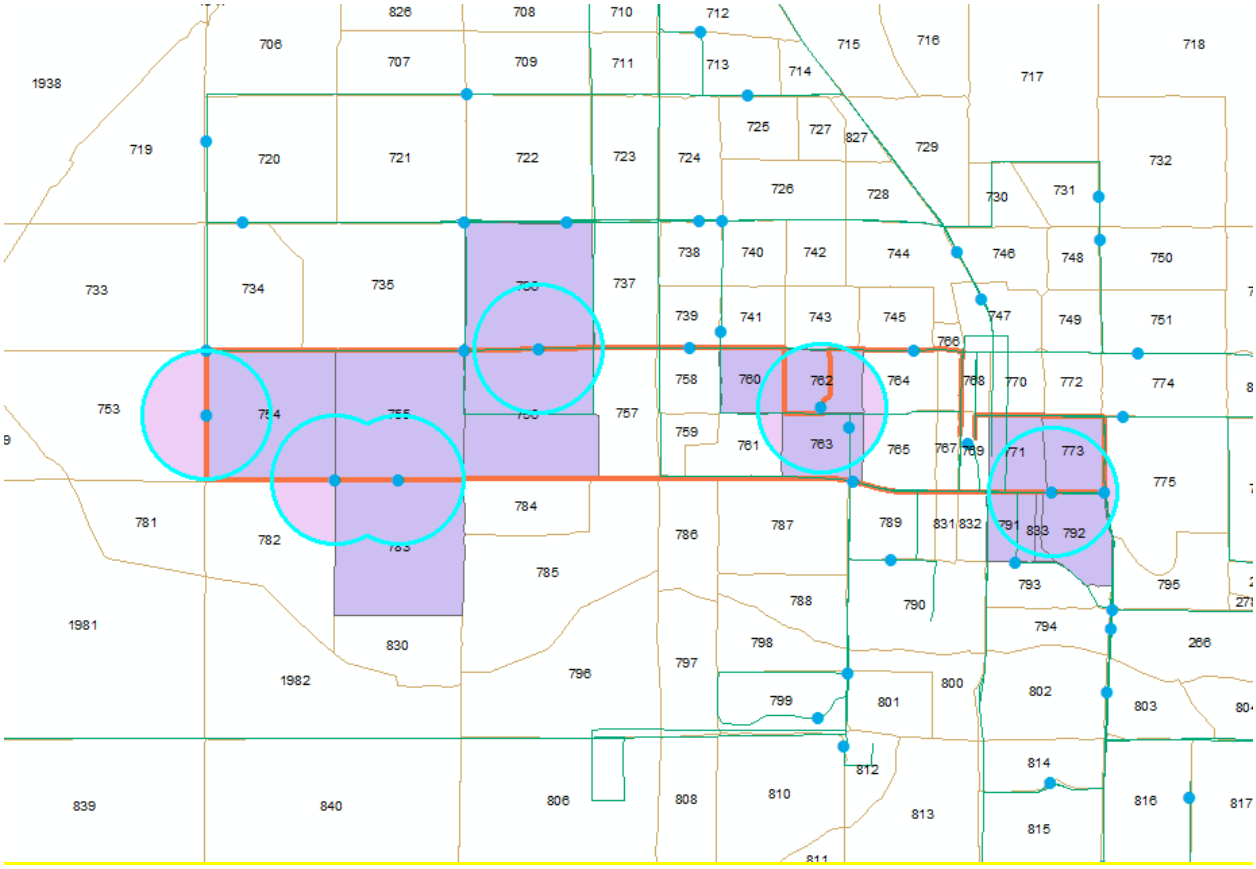
The high level application of the SATM follows these steps:

1. Import baseline conditions from a user-specified travel demand model run outcome
2. Request transit route and amenity changes from the user
3. Model run will estimate total trips and transit trips.
4. Apply elasticities table to estimate mode share changes to transit based on route-level changes
5. Output summary statistics for mode share and transit trips changes

SATM builds upon travel demand model outcomes of trip generation and mode shares and adds additional analysis of incremental transit route changes. The application of the model is developed as an interactive ArcGIS toolbox accessible through the map document. The user will choose the model output for the scenario, make edits to the transit routes, and begin running the model. The figure below shows the elements of the SATM.



The toolbox estimates mode share changes resulting from changes to transit fares, headways and amenities. This analysis requires the tool to identify how a reduction in transit travel times will impact mode shares. Travel times for a route are based on the travel times between the stop locations, shown in the image below as blue circles. To filter these travel times, the tool creates a 1/4 mile buffer around the stop locations and selects all zones with 25% land area within those buffers, shown below. These zones are considered the set of potential origin and destination pairs for this route.



Each zone-pair is associated with the auto and non-auto travel times and the mode shares based on the model output selected for the baseline conditions. The user has included changes to fares, headways, and amenities that are translated into discounts to the transit travel times. For each zone-pair, the discounted transit travel time and the existing auto travel times result in new mode shares, estimated from the elasticity factor table.

At the end of the analysis, the SATM calculates mode shares and total trips for all zones based on the transit attributes.

2. APPLYING THE STAND ALONE TRANSIT MODEL

The SCCRTC Stand Alone Transit Model (SATM) allows the user to add refinements to the transit network that cannot be included in the travel demand model. The SATM analyzes the shift in mode shares when amenities are added to a transit route, such as seat availability, safety, or WiFi availability. The SATM is developed as an ArcGIS toolbox and requires an ArcGIS 10.1 or 10.2 environment and works with outputs from the travel demand model. All SATM scenarios are built on travel demand model run results.

This user guide provides step-by-step instructions to using the SATM to assess changes to mode share and transit ridership for the following scenarios:

- New transit attributes
- Adding amenities, changing fares, and changing headway

2.1 Overview of Applying Stand Alone Transit Tool

The SATM provides a method to analyze the impact of changes in fares, levels of service, or other attributes of a transit mode on mode split when the baseline mode share and baseline values of the attributes are already estimated by the travel demand model. This tool pivots from the model outcomes for the baseline 2010 SCCRTC travel demand model. The SATM evaluates the change in transit amenities and computes the actual and perceived time difference, then shifts modes on TAZs along the appropriate routes, resulting in a mode share change.

To apply the tool, the steps include launching the SCCRTC_ModeShare_SATM .mxd, creating scenario-specific land use zones and transit route GIS layers, running the SATM, and reviewing results.

2.2 Install, Setup, and Run the Stand Alone Transit Tool

This section covers how to install, setup, and run standard scenarios for the SATM in ArcGIS. The preloaded land use and transit route input GIS layers represents scenarios for base year 2010 land use analysis zones and 2010 transit attributes.

2.2.1 Folder Descriptions

Similar to the TDM, the SATM has a recommended directory structure. The model as delivered has a Master directory and a single scenario for the calibrated base condition of 2010.

2.2.1.1 Master

This directory contains GIS data that are the basis of all scenarios and the calibration parameter files for use in the tool. **Do not run tool from Master folder.** Copy the **Master** folder into the Scenario folder. Rename to desired Scenario name. Run tool in Scenario folder. All files will be created in the Scenario folder. Once an initial scenario has been run, make a copy of the scenario and name it as your next desired scenario. Make all changes desired for next run in the new scenario input files. This will allow the tool to utilize previously created intermediate file to reduce run time for additional alternative scenarios. See screenshot above for example of the recommended folder structure.

2.2.1.1.1 MasterScipts

This directory contains the original toolbox and associated python scripts for the SATM.

2.2.1.1.2 MasterShapefiles

Master geodatabase with base GIS layers and default map documents used to create scenario specific GIS layers and all GIS inputs for the toolbox.

2.2.1.1.3 MasterTables

Tables and scripts that are used for analyzing user-imputed transit amenity changes.

- OD_Zone_List.csv-Master key of all TAZ pairs as output from travel model scenario
- SATMelasticities.csv-Mode share elasticities based on existing auto and non-auto travel times between TAZ pairs.
- TCRP166IVTT.csv-Perceived in-vehicle travel time benefits of premium transit attributes as estimated in the 2014 TCRP 166 report on Characteristics of Premium Transit Services that Affect Mode Choice
- <SCENARIONAME>_SATM_InputFromTDM.csv (ex SCCRTC_ExistingConditions)– Travel Demand Model Origin Destination file with Total Modal information. The SCCRTC Existing Conditions file is used by default. To recreate this file for furture planning scenarios, follow SATM Input from TDM.csv development steps in *Generating Input Variables for Transit Tool*.

2.2.2 GIS Layers and Supporting Data Descriptions

This section contains information on the GIS files and supporting files for the SATM.

2.2.2.1 Santa Cruz County Transit Routes

Santa Cruz County transit included in the SCCRTC Transit GIS layer are 2010 Metro routes as provided by the SCCRTC Travel Model. If the bus routes are updated in the travel model, export the new file from the SCCRTC travel model into a shapefile and replace the existing file. The transit routes used in the model exported by the user as shape files are used in the SATM.

All routes are assumed to have no amenities and are given a value of '0'. The user can edit the route headway, fare, and amenities.

2.2.2.2 Stops

Transit stops included in the Stops GIS layer are the 2010 stop locations from the 2010 base year SCCRTC Travel Model,. f the bus stop locations are updated in the travel demand model, export the new file from the SCCRTC travel model (file name) into a shapefile and replace the existing file.

For more details, please see the SCCRTC *Travel Model User Guide on editing stop locations*

2.2.2.3 Schedule and Fare

For more details, please see the SCCRTC *Travel Model User Guide on editing transit system and fares*

2.2.2.4 Amenities

Transit route amenities include stop-level and route-level attributes and their estimated in-vehicle travel times.

- *On-board features*: seating availability, comfort, temperature, vehicle cleanliness , available Wi-Fi,
- *Station design features*: real-time departure information, security, lighting for safety, shelter, proximity to services, station cleanliness, benches,
- *Other*: route identification on transit vehicle, reliability, schedule span, transit frequency, transfer distance, stop distance, parking distance, ease of boarding, and fare machines

2.2.2.5 Travel Times and Costs

Zone-to-zone travel times by auto and transit are used in the tool as the baseline travel times estimated by the travel demand model in the base year 2010 scenario.

2.3 Creating Transit Scenarios in the Stand Alone Transit Tool

The mode share toolbox performs an analysis of mode share and transit trips based on transit route travel times and available amenities. User edits to existing transit attributes result in an analysis of expected total transit trips and mode shares.

Steps involved with running the SATM include:

- Preparing scenario files,
- Editing Transit Inputs,
- Running the SATM toolbox, and
- Reviewing results.

2.3.1 Generating Input Variables for Transit Tool

After running the travel demand model for the base scenario that the transit enhancements will apply to, the origin-destination and trip data for the scenario should be generated. The script create to export the file for the SATM from the travel model included with the installation files is transittool_inputsprep.rsc.

- Before running the script, open the script in a text editor and update a couple of path variables for your specific application, i.e., scenario folder path, and the final transit tool input file name.
- Open TransCAD, and select Tools and GISDK Developer's Kit
- Click  and select the script, then click ok.
- Step 3: Click  and type "prep trntool inputs", then click ok.

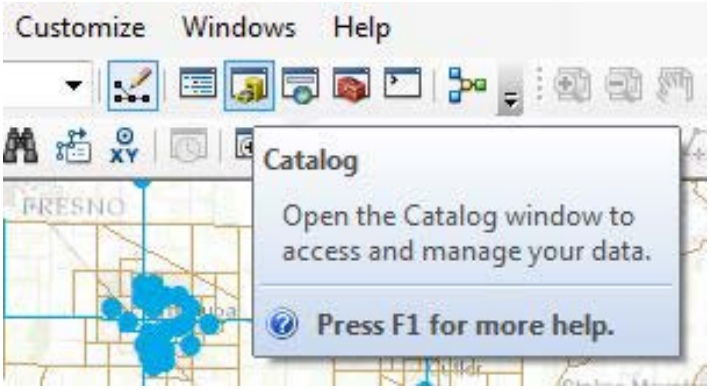
2.3.2 Prepare First Scenario Run

To begin creating a scenario for the Quick Response Tool, you will first locate the SATM Master folder and make a scenario copy of this folder structure.

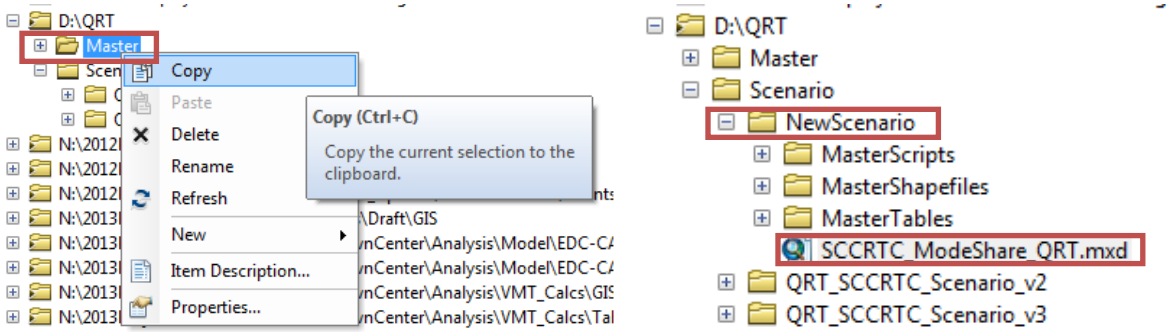
- Open ArcGIS 10.2

The ArcCatalog contains the SCCRTC SATM toolbox, shown above on the right-hand side of the map. If not visible, add the ArcCatalog interface.

- Click on the ArcCatalog toolbox, which will open the ArcCatalog



- Navigate to the SATM directory. Make a copy of the *Master* folder and rename it with a scenario name.

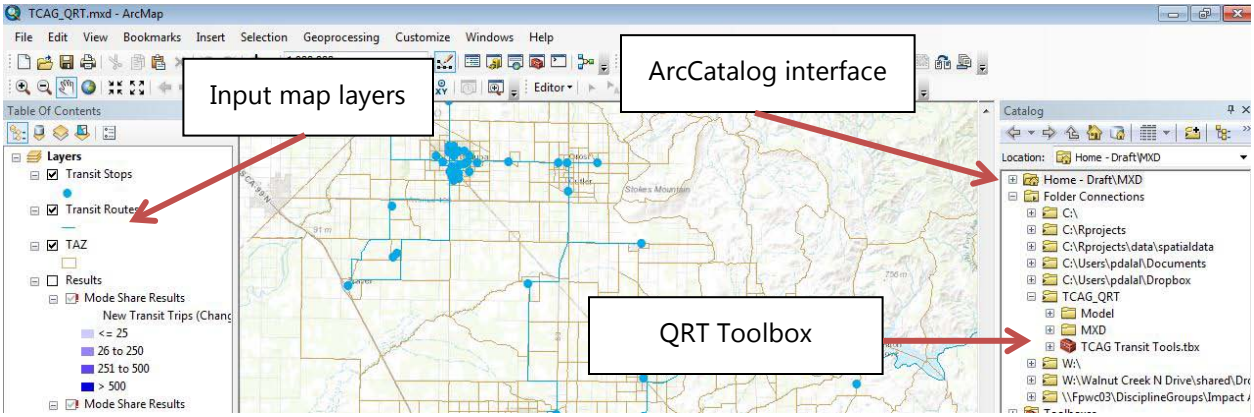


- In your new scenario folder, navigate to the SCCRTC Mode Choice Tools directory, locate ***SCCRTC_ModeShare_SATM .mxd*** and click ***Open***

Current functionality is preloaded input layers that contain the transit data from the 2010 base year SCCRTC travel demand model output.

The map layers you will see are:

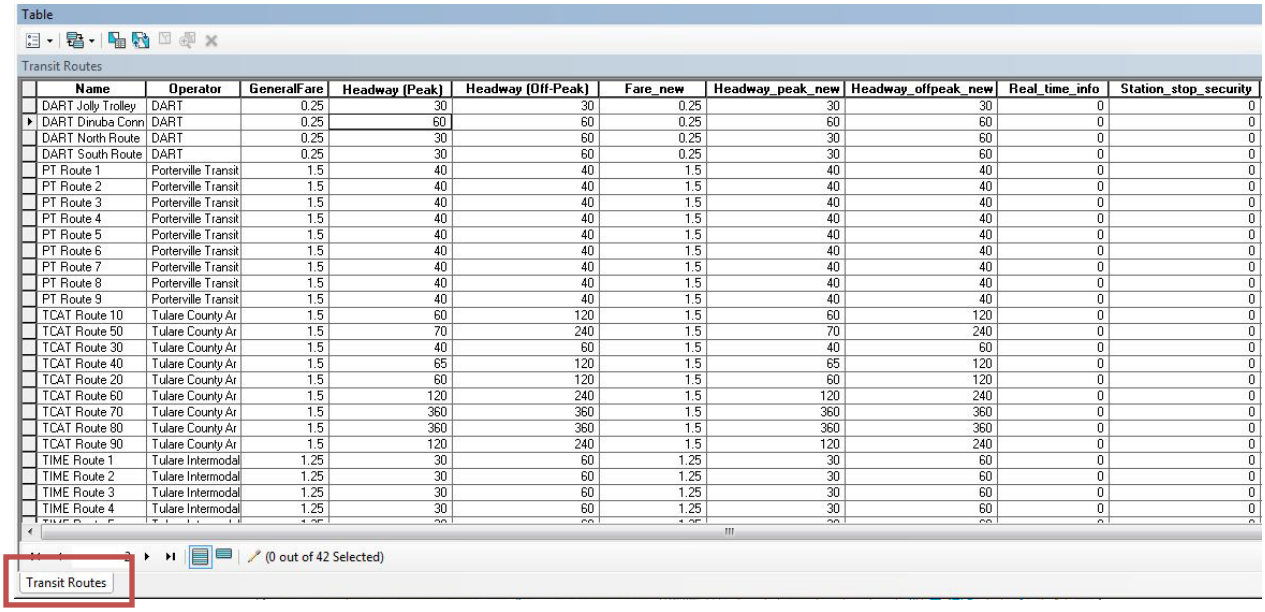
1. **Input** map layers – these files are to be ***edited*** by the user
   a. Transit Routes
   b. TAZ
2. Basemap



2.3.2.1 To Edit Transit Routes Input:

- Right-click on the Transit Routes map layer and click on ***Open Attribute Table***

The attribute table includes the route Name, Operator, and the existing fares and headway. The next two columns are for adjustments to the fare and headways as Fare_new and Headway_new.



Table

Transit Routes

Name	Operator	GeneralFare	Headway (Peak)	Headway (Off-Peak)	Fare_new	Headway_peak_new	Headway_offpeak_new	Real_time_info	Station_stop_security
DART Jolly Trolley	DART	0.25	30	30	0.25	30	30	0	0
DART Dinuba Conn	DART	0.25	60	60	0.25	60	60	0	0
DART North Route	DART	0.25	30	60	0.25	30	60	0	0
DART South Route	DART	0.25	30	60	0.25	30	60	0	0
PT Route 1	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 2	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 3	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 4	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 5	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 6	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 7	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 8	Porterville Transit	1.5	40	40	1.5	40	40	0	0
PT Route 9	Porterville Transit	1.5	40	40	1.5	40	40	0	0
TCAT Route 10	Tulare County Ar	1.5	60	120	1.5	60	120	0	0
TCAT Route 50	Tulare County Ar	1.5	70	240	1.5	70	240	0	0
TCAT Route 30	Tulare County Ar	1.5	40	60	1.5	40	60	0	0
TCAT Route 40	Tulare County Ar	1.5	65	120	1.5	65	120	0	0
TCAT Route 20	Tulare County Ar	1.5	60	120	1.5	60	120	0	0
TCAT Route 60	Tulare County Ar	1.5	120	240	1.5	120	240	0	0
TCAT Route 70	Tulare County Ar	1.5	360	360	1.5	360	360	0	0
TCAT Route 80	Tulare County Ar	1.5	360	360	1.5	360	360	0	0
TCAT Route 90	Tulare County Ar	1.5	120	240	1.5	120	240	0	0
TIME Route 1	Tulare Intermodal	1.25	30	60	1.25	30	60	0	0
TIME Route 2	Tulare Intermodal	1.25	30	60	1.25	30	60	0	0
TIME Route 3	Tulare Intermodal	1.25	30	60	1.25	30	60	0	0
TIME Route 4	Tulare Intermodal	1.25	30	60	1.25	30	60	0	0

(0 out of 42 Selected)

Transit Routes

- Enter new values into *Fare_new* and *Headway_new* by double-clicking on the value you wish to change. Type in the new value.

Table

Transit Routes

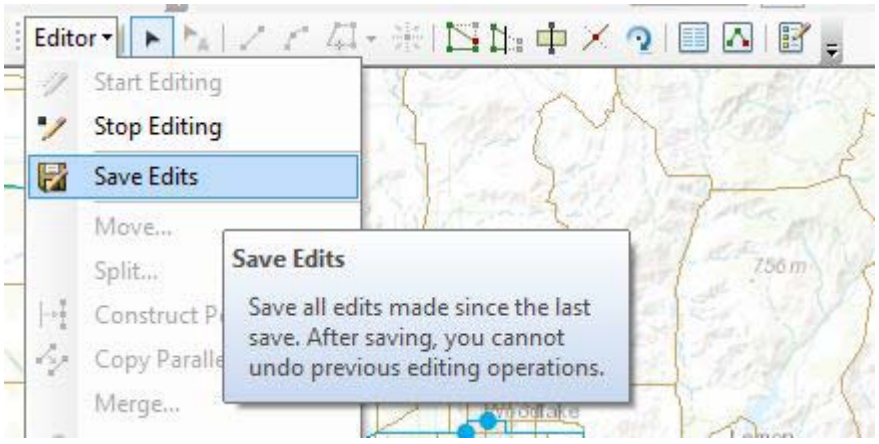
Name	Operator	GeneralFare	Headway (Peak)	Headway (Off-Peak)	Fare_new
DART Jolly Trolley	DART	0.25	30	30	0.25
DART Dinuba Conn	DART	0.25	60	60	0.25
DART North Route	DART	0.25	30	60	0.25
DART South Route	DART	0.25	30	60	0.25
PT Route 1	Porterville Transit	1.5	40	40	1.5
PT Route 2	Porterville Transit	1.5	40	40	1.5
PT Route 3	Porterville Transit	1.5	40	40	1.5
PT Route 4	Porterville Transit	1.5	40	40	1.5

The columns of *amenities* are attributes that can be added to the transit route. Before any edits are made, these columns will be preloaded with the value of ***'0'***. To add an amenity, this value must be changed to a ***'1'*** to indicate "yes," the amenity is present. The types of amenities that can be added are listed in table *Route Amenities Fieldnames and Definitions* at end of document.

- Enter new values for the amenities by double-clicking on the value you wish to change to '1'.

When all transit changes are completed, save the edits with the following steps.

- Save your edits by navigating to the Editor Toolbar and clicking on **Editor** which will open a drop-down menu**.**
- Click on ***Save Edits***



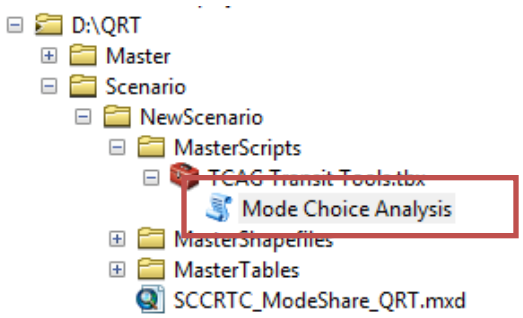
2.3.2.2 Prepare Future Scenario

Once the first scenario run has been completed, the process to prepare further scenario runs is to make a copy of the last scenario folder and rename to the new folder. This will allow the SATM tool to utilize intermediate files that have been created in the last scenario to significantly reduce run time. Repeat the preparation steps list above with the desired changes for the new scenario.

2.4 Running the SATM ToolBox

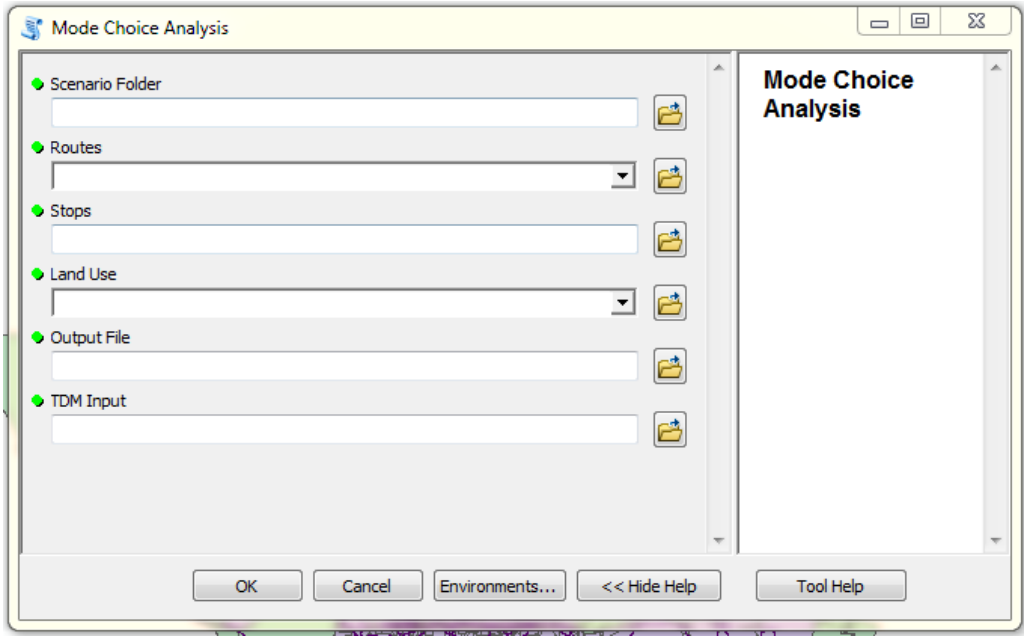
After the land use and transit routes edits are completed and saved, the SATM toolbox is opened to estimate mode share and transit trips changes based on the Update Land Use Zones and Update Routes map layers.

- Navigate to the right-side of the open map in the ArcCatalog window and open the SCCRTC Transit Tools toolbox in your scenario folder by double-clicking on Mode Choice Analysis



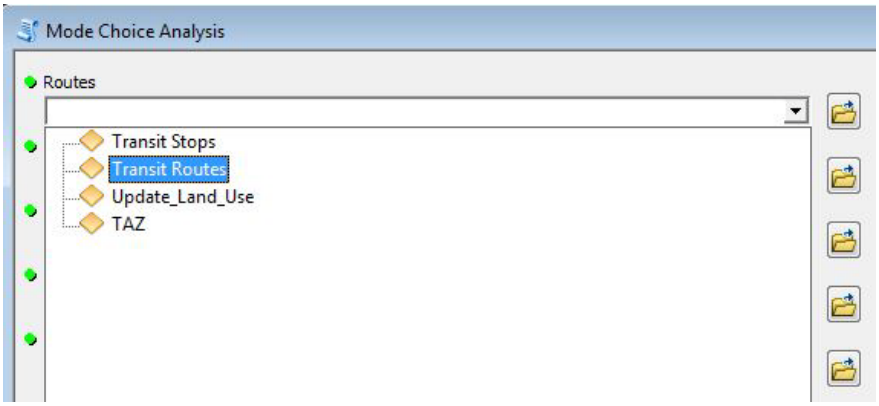
- The toolbox opens to a Mode Choice Analysis dialog box requesting

  - Input the Scenario Folder path.
  - Input map layers for ***Routes***, ***Stops***, and ***Land Use Zones***
  - Output file locations and names for the results ***File*** and ***Report***
  - Input TDM file located in the *MasterTables* folder.

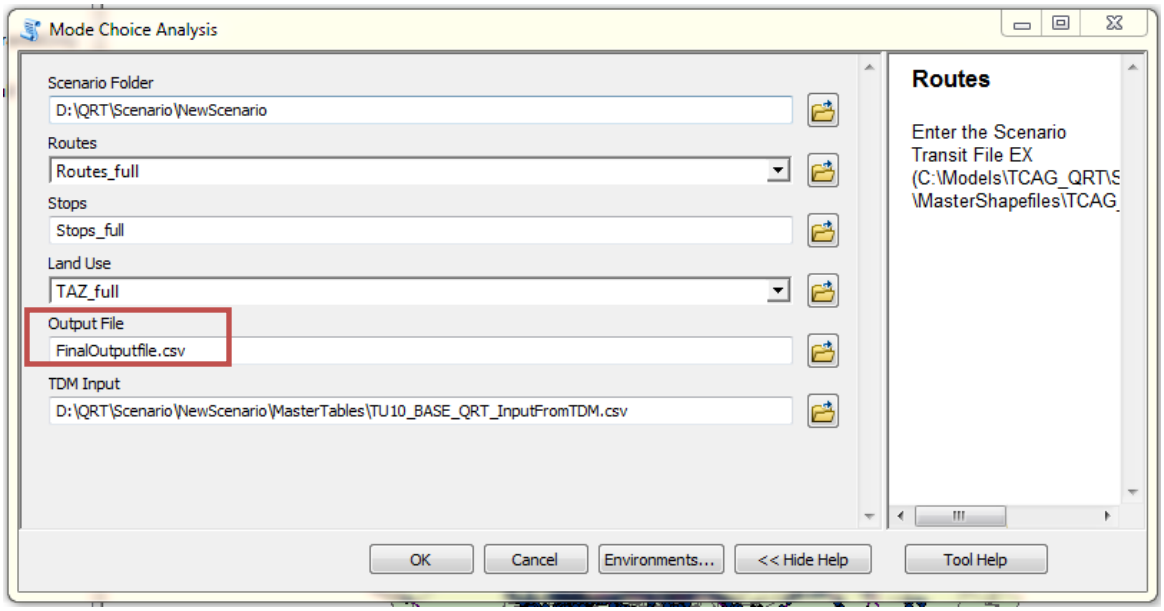


Note: the toolbox requests a map layer for Stops for spatial reference only. This layer is preloaded and is not edited by the user.

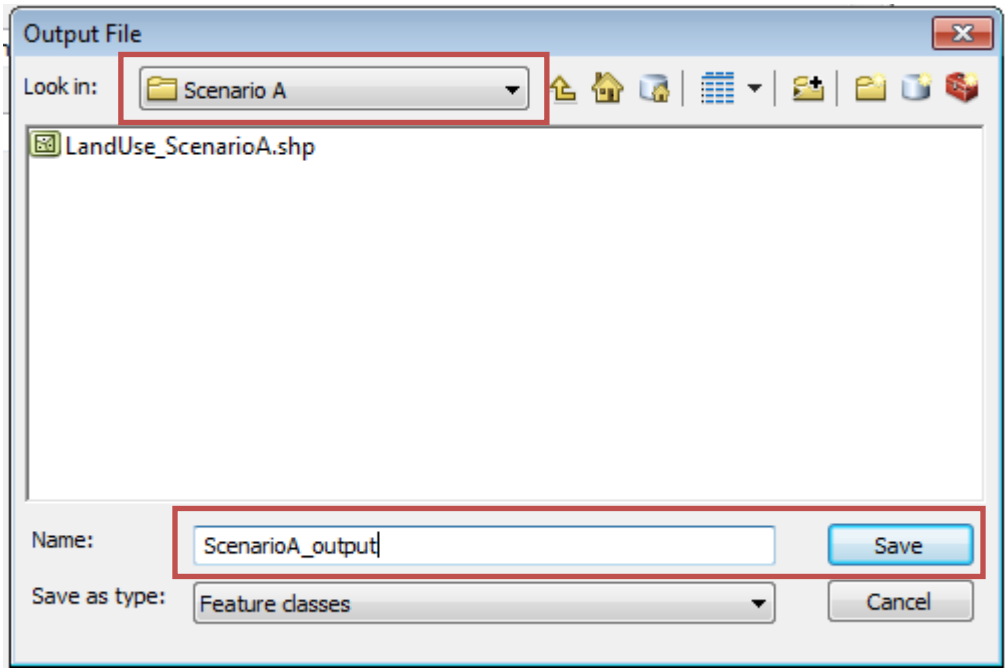
- Add the scenario specific (and user edited) ***Routes*** and ***Land Use Zones*** file by clicking on the down arrow and selecting the map layer that corresponds to each box



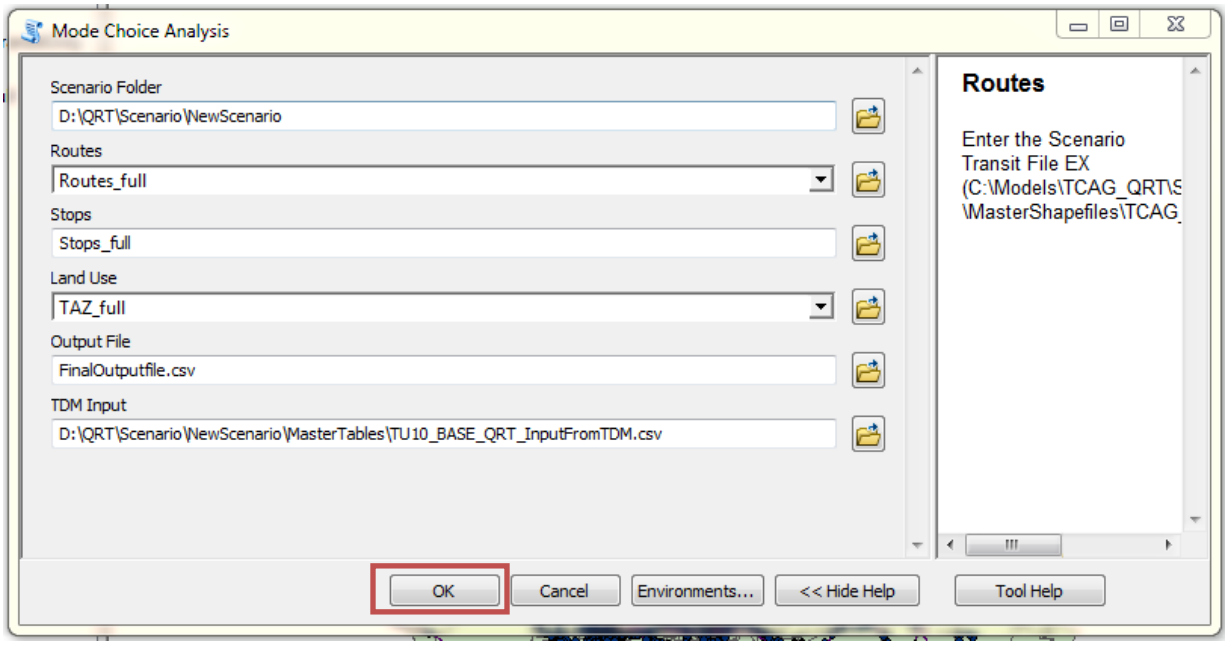
- Once the Routes, Stops and Land Use files are selected, click on the ***Browse Folder*** button next to ***Output File*** to select your Scenario folder for your output



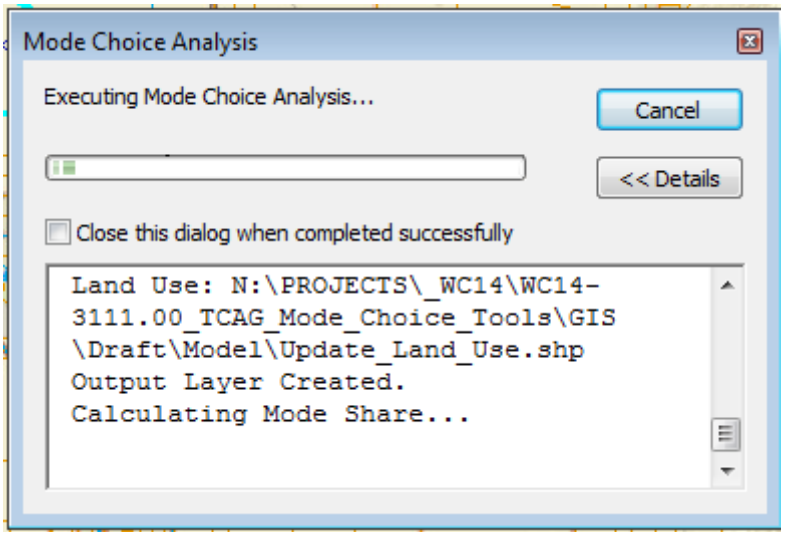
- Navigate to your **scenario folder**, name your output file and click ***Save***



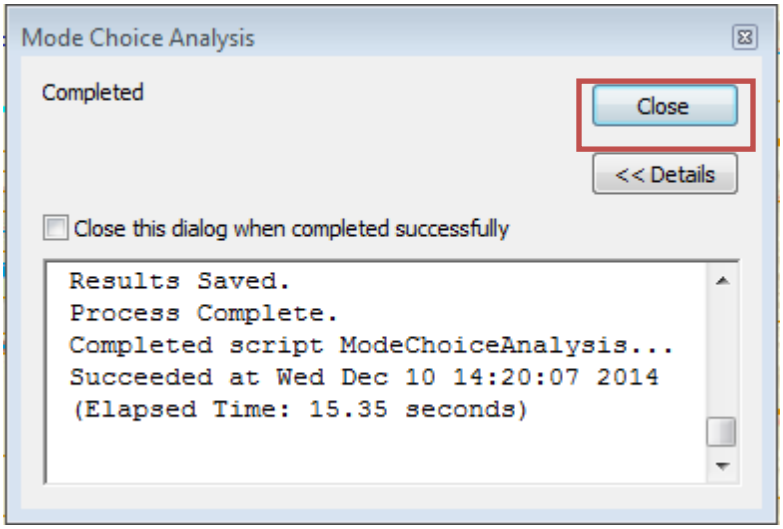
- Repeat for the **Output Report**, then click on **OK**



- The toolbox will run a mode choice analysis based on the user-imputed changes to land use zones and transit routes. This will take a few minutes.



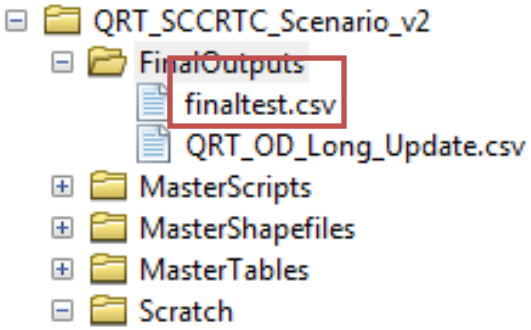
- When complete, click ***Close***



2.5 Stand Alone Transit Model Results

The SATM outputs final summary tables in the scenario folder under the subdirectory folder *FinalOutputs*. The csv file you have specified is the final output summarized at the TAZ level. *SATM_OD_Long_Update.csv* is output summarized at the Origin Destination level. To visualize the results, join the csv table back to the TAZ GIS file.

- Final Outputs



Other files form intermediate steps have also been created and saved in the *Scratch* folder. A detailed logfile of the results can be found in the subdirectory *Logfiles*. Additional GIS processing files can be found in the *"Scratch.gdb"*.

The output file provides o_modeshare, n_modeshare, d_modeshare which are percentages of transit trips relative to total trips within each TAZ where o=original, n=new and d=difference. To get the total number of transit trips per TAZ, multiply each of these columns by o_total_trips_total to get the number of original, new and difference in transit trips per TAZ. The countywide transit modeshare can then be calculated by taking the sum of the (n_modeshare*o_total_trips_total) divided by the sum of the o_total_trips_total. The o_transit_trips_HBW + o_transit_trips_HBO + o_transit_trips_NHB can be summed to get a total number of transit trips to compare to the results of the travel demand model. See Final Summary Output table below for description of data in the output file.

Transit Field Name Descriptions:

origin	Trip Origin Zone
destination	Trip Destination Zone
autoTT	Vehicle travel time
fare	Transit fare
transitTT_wait	Transit - time spent waiting
transitTT_IVTT	Transit - in-vehicle travel time
transitTT_other	Transit - other time spent
transitTT_total	Total Transit Travel Time
transit_trips_HBW	Home-based work transit trips
total_trips_HBW	home-based work total trips
transit_trips_HBO	Home-based other transit trips
total_trips_HBO	Home-based other total trips
transit_trips_NHB	non-home based transit trips
total_trips_NHB	non-home based total trips
transit_trips_total	Total transit trips
total_trips_total	Total trips

Route Amenities Fieldnames and Definitions:

Name	Original	String	Route name
Operator	Original	String	Transit Operator
GeneralFar	Original	Double	Adult/regular fare
hdwy_peak	Original	Short	Peak headway
hdwy_opeak	Original	Short	Off-peak headway
st_times	New	Short	Real-time departure information at stations (yes/no)
st_scrty	New	Short	Station/Stop Security (yes/no)
st_light	New	Short	Station/Stop lighting/safety (yes/no)
st_shltr	New	Short	Station/Stop Shelter (yes/no)
st_prox	New	Short	Proximity to services (yes/no)
st_clean	New	Short	Cleanliness of station/stop (yes/no)
st_bench	New	Short	Station/Stop benches (yes/no)
ob_seat	New	Short	On-board seating availability (yes/no)
ob_comf	New	Short	On-board seating comfort (yes/no)
ob_temp	New	Short	On-board temperature (yes/no)
ob_clean	New	Short	Cleanliness of transit vehicle (yes/no)
ob_wifi	New	Short	Wi-fi on-board (yes/no)
ob_rtnme	New	Short	Route name/number identification (yes/no)
reliable	New	Short	Reliability (yes/no)
sch_span	New	Short	Schedule span (yes/no)
srv_freq	New	Short	Transit frequency (yes/no)
xfer_dist	New	Short	Transfer distance (yes/no)
st_dist	New	Short	Station/Stop distance (yes/no)
pk_dist	New	Short	Parking distance (yes/no)
ease	New	Short	Ease of boarding (yes/no)
farem	New	Short	Fare machines (yes/no)
fare_new	New	Float	Scenario Fare (0 or <Null> value uses GeneralFar input.)
hdwy_peakn	New	Short	Scenario Peak Headway (0 or <Null> value uses original peak headway input.)
hdwy_opeakn	New	Short	Scenario Off-peak headywa (0 or <Null> value uses original off-peak headway input.)
Shape_Leng	New		GIS
Shape_Le_1	New		GIS

Final Summary Output

Name	Type	Description
origin	Zone	Summarized by Zone
o_modeshare	Original	Percent transit trip relative to total trips for each TAZ
n_modeshare	New	Percent transit trips relative to total trips for each TAZ
d_modeshare	Change (*delta*) in	Percent transit trips relative to total trips for each TAZ
o_transittrips	Original	Intermediary column - ignore
n_transittrips	New	Intermediary column - ignore
d_transittrip	Change (*delta*) in	Intermediary column - ignore
o_transit_trips_HBW	Original	Total Home-based work transit trips
o_transit_trips_HBO	Original	Total Home-based other transit trips
o_transit_trips_NHB	Original	Total Non-home based work transit trips
o_all_trips_HBW	Original	Total Home-based work trips
o_all_trips_HBO	Original	Total Home-based other trips
o_all_trips_NHB	Original	Total Non-home based work trips
o_total_trips_total	Original	Total Trips
n_transit_trips_HBW	New	Intermediary column - ignore
n_transit_trips_NHB	New	Intermediary column - ignore
n_transit_trips_HBO	New	Intermediary column - ignore
n_all_trips_HBW	New	Intermediary column - ignore
n_all_trips_HBO	New	Intermediary column - ignore
n_all_trips_NHB	New	Intermediary column - ignore
n_total_trips_total	New	Intermediary column - ignore
d_transit_trips_HBW	Change (*delta*) in	Intermediary column - ignore
d_transit_trips_HBO	Change (*delta*) in	Intermediary column - ignore
d_transit_trips_NHB	Change (*delta*) in	Intermediary column - ignore
d_all_trips_HBW	Change (*delta*) in	Intermediary column - ignore
d_all_trips_HBO	Change (*delta*) in	Intermediary column - ignore
d_all_trips_NHB	Change (*delta*) in	Intermediary column - ignore
d_total_trips_total	Change (*delta*) in	Intermediary column - ignore