Caltrans District 6 & 10 Forecasting On-Call
Reviewing & Editing Model Inputs
Wednesday, January 11, 2017
2:00 pm – 4:00 pm – On-line Meeting*
(reserved 2hrs to allow Q&A, with primary content targeted at 1hr)

1. **Introductions – 5 minutes**
   - Caltrans D6, D10, HQ
   - Amador, Calaveras, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tulare, Tuolumne
   - Consultants

2. **Cube GIS Window for VMIP Models (Geodatabase) – 20 Min**
   - Highway Network
   - Transit Network

3. **Cube GIS Window for VMIP Models (.NET and .LIN) – 10 Min**
   - Highway Network
   - Transit Network

4. **Land Use, Demographics, and Interregional for VMIP Models – 10 Min**
   - TAZ Control Totals
   - Household Socioeconomic Detail (SED)
   - Household and job income
   - Interregional travel and trip balancing
   - Through trips

5. **Brief demo in TransCAD for same features described in Cube – 5 Min**
   - Highway Network
   - Land Use
   - Through trips

6. **Other Items and Wrap Up**

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https://global.gotomeeting.com/join/534416733

Use your microphone and speakers (VoIP) - a headset is recommended. Or, call in using your telephone.

Dial +1 (669) 224-3412
Access Code: 534-416-733

MIP MODEL DATA PREPERATION AND REVIEW

PREPARE SCENARIO INPUT DATA

Network Links

A recommended practice is to check the highway network for accurate information and link connectivity before running model scenarios. The master network should be checked prior to running the Input Processing application and compared to the RTP project list. After running the Input Processing application, the scenario network outputs in tabular form (lane miles by facility type, changes form 2005) and network form (.NET and geodatabase) should be reviewed.

Each model has a master network file called *MPO_MASTERNETWORK.NET or HWYNET* if contained in the geodatabase. The master network file contains links and nodes, which can be checked for accuracy within Cube.

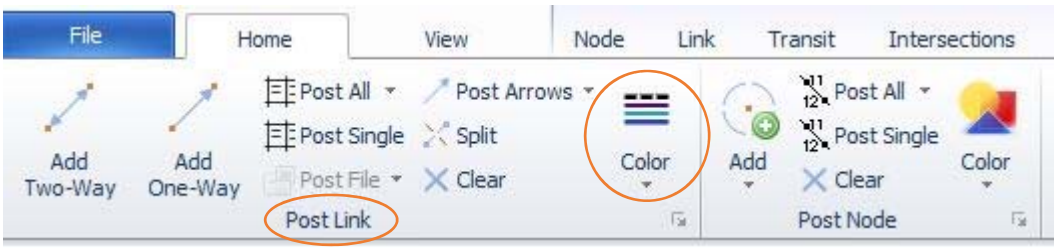
The first step is to open the master network file in Cube and visually inspect the density of the network file in rural, suburban, and urban areas. Cube automatically visualizes the network links as blue and the centroid connectors as grey. The information below describes how to color code the link by variable values (i.e. Functional Type).

Highway Network

Changes to any network link attribute are described below using Facility Types and a .NET file as the primary example. The geodatabase example follows the .NET instructions.

Facility types categorize the network according to the type of service provided by the roadway. Examples of facility types include freeways, highways, expressways, and arterials. During assignment, the facility type is used to determine link capacity and volume delay functions, and ultimately impacts total volumes assigned to the links.

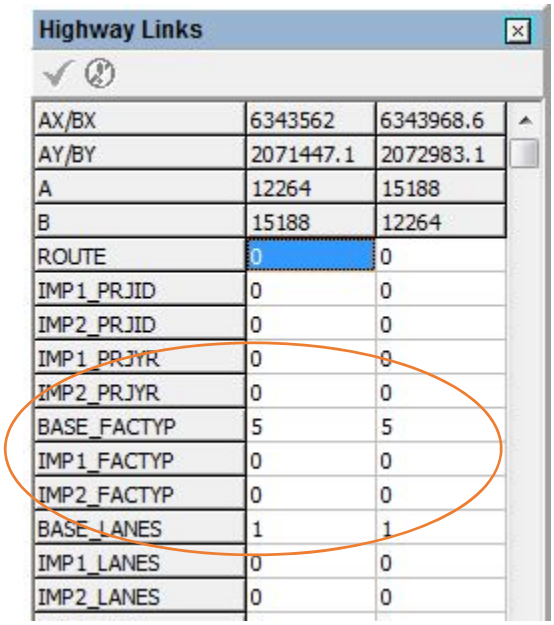
Facility types can be checked by color-coding the links with the facility type categories. This can be done in Cube under the **Home** tab**,** and clicking on **Post Link Color**. See **CREATING MAPS USING VMIP MODELS** for instructions on using Arc GIS for the scenario output network(s).



Any errors in facility types can be fixed in two ways.

1. Fixing facility type errors manually – best for editing a few links

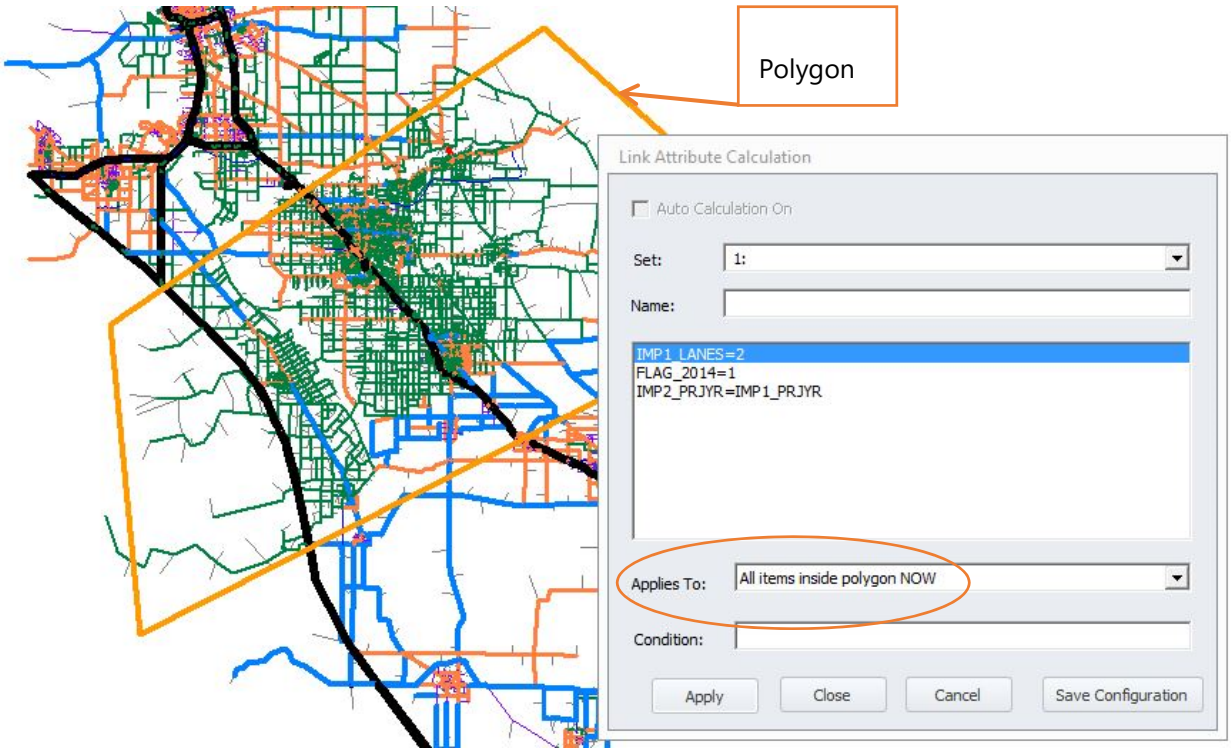
By clicking on the link, Cube opens a window with the link attributes. Located the facility type field and input the correct facility type for the base year and any improvement year facility types if applicable. Note, this is only for errors in facility types, not upgrades.



2. Fixing facility type errors by calculation – best for editing many links

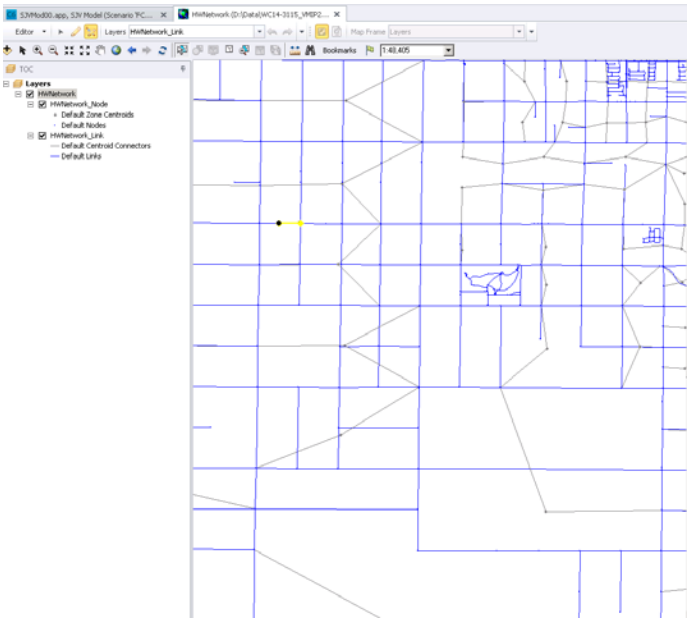
Under the **Link** tab is **Compute**, in which the change to facility type is entered as an equation. This method is best used with a polygon boundary. A polygon boundary can be drawn around the incorrect links by clicking on New under the Drawing Layer Tab.

Once the polygon is drawn, the facility types can be changed using **Link, Compute** and applying changes inside/outside the polygon boundaries. Additional conditions can be added if needed.



The same process can be repeated for **speeds**, **number of lanes**, and **area type**.

1. To edit the network in GIS, edit the highway network and the file will automatically open in an ArcGIS editor window.

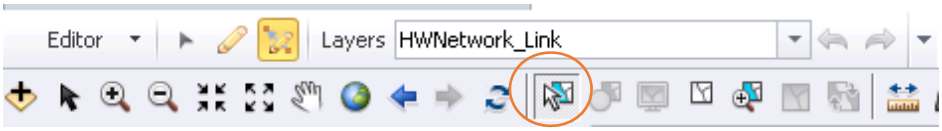


2. Switch the active layer to the HWNetwork_Link and select 

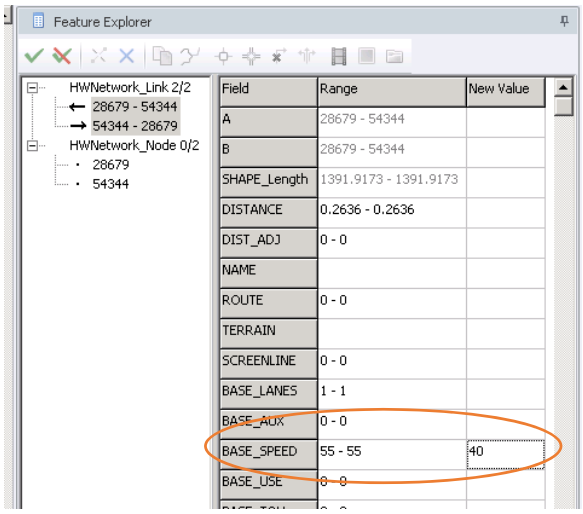
under the Edit menu.

3. Feature explorer is used to view and edit the attributes of the links and nodes, and is often hidden to the right of the screen. Click it and then click the pin to have it easily accessible.

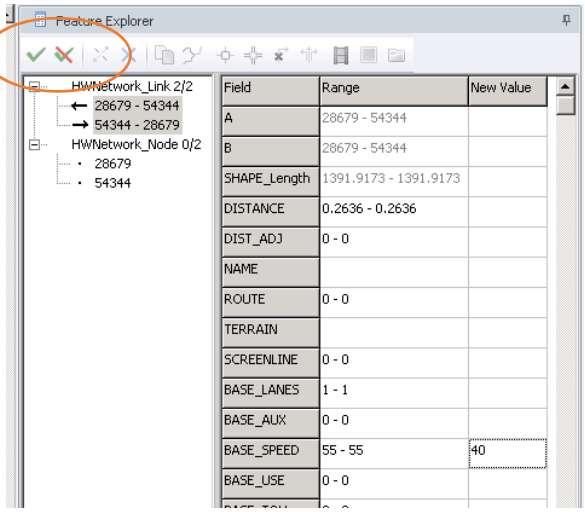
4. Using the Select Feature tool, select the link(s).

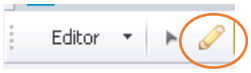


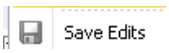
5. To edit all links at once, enter the new value in the column on the right. To edit links by direction, first select roadway based on direction and A-B node.



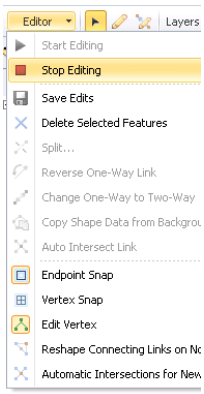
6. To save the changes on the link, click  . To reject the changes, click 



7. To add new links, use the Create Feature tool. 

8. After making edits, keep or reject them in the Feature Explorer and then 

under the ArcGIS editor.
9. To exit Edit mode, select Stop Editing



Link improvement logic checks

To minimize the coding of networks, the MIP models only require future projects to be coded as the project year, project number, and the values of the key variables after a project is implemented. The checks described in this section are intended to validate continuity and accuracy of the network improvements. The logic implemented in the Master to Scenario network assume chronologic progression from BASE to IMP1 then to IMP2. The Master to Scenario process compares the network year defined in the catalog to the IMP1_PRJYR and if the year is equal or greater, implements the values in IMP1, then checks IMP2_PRJYR and implements IMP2 values if the year is equal or greater. The PRJYR is the value when the project is complete (i.e. open to traffic or closed to traffic). The IMP1 and IMP2 value should be coded as the value at the end of the project, not the change in value. For example, a roadway changing from 1 lane in each direction to 2 lanes in each direction in 2018 should have BASE_LANES=1, IMP1_PRJYR=2018, IMP2_LANES=2, and the other IMP1 attributes such as facility type, use code, etc the same as BASE.

1. IMP_PRJYR exists but no change in lanes #
    - IMP1_PRJYR<>0 & (BASE_LANES=IMP1_LANES) or
    - IMP2_PRJYR<>0 & (IMP1_LANES=IMP2_LANES)

2. Lanes # change but no IMP_PRJYR
    - (IMP1_LANES<>0 & (BASE_LANES<>IMP1_LANES)) & IMP1_PRJYR=0 or
    - (IMP2_LANES<>0 & (IMP1_LANES<>IMP2_LANES)) & IMP2_PRJYR=0

3. 3+ improvement links – the Standard Network Variables have been set up to track only 2 improvements.
    - BLDYEAR<>0 & IMPYEAR<>0 & DELYEAR<>0 or
    - BLDYEAR<>0 & IMPYEAR<>0 & IMPYEAR1<>0 or
    - BLDYEAR<>0 & DELYEAR<>0 & IMPYEAR1<>0 or
    - IMPYEAR<>0 & DELYEAR<>0 & IMPYEAR1<>0

4. Out-of-order years
    - (IMP1_PRJYR<>0 & IMP2_PRJYR<>0) & IMP1_PRJYR>=IMP2_PRJYR

5. IMP1_PRJID and IMP2_PRJID missing on all improvement projects

Network Nodes

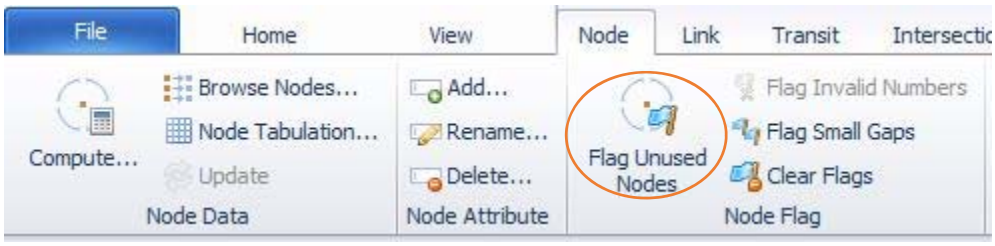
Cleaning network nodes is recommended for the model development team but not recommended for by MPO staff. If incorrect nodes are removed, the model will not complete a full estimation.

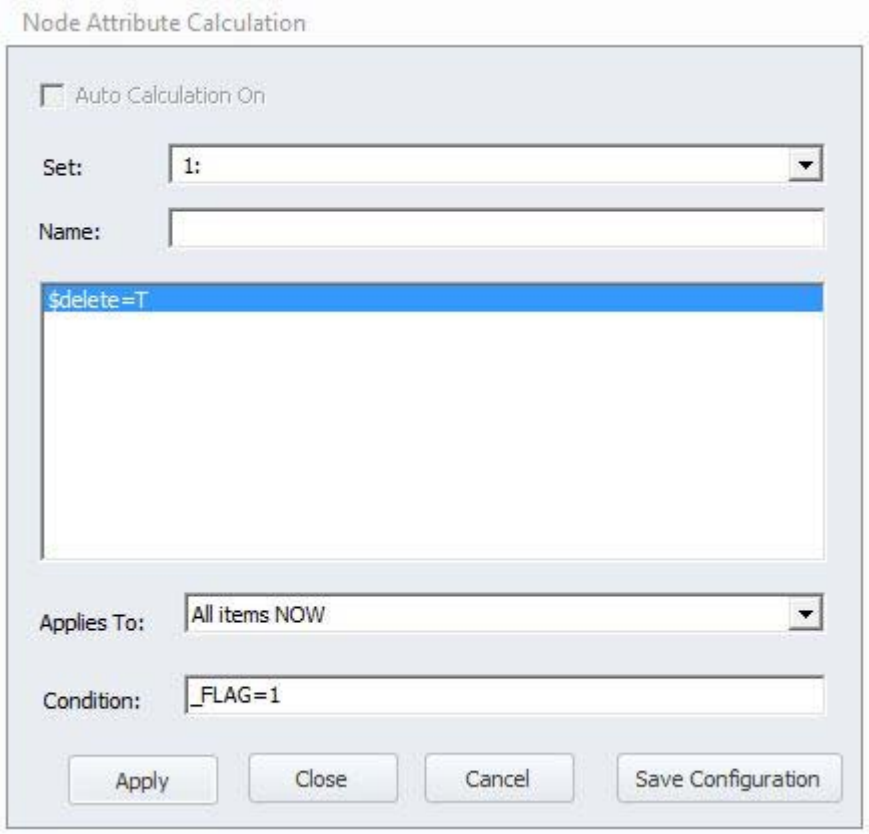
A common error is the presence of 'overlapping' nodes where one node is not connected and therefore an 'unused' node. If scenario land use is associated to the unused node, the model will run, but it will estimate no impact from the scenario inputs. Since the land use inputs are located in a separate parameter workbook, it is important to have the correct node attached to the roadway.

1. The first step is to check if the unused nodes have the same ID as the underlying TAZ.

   Save the network file as a test network.

   Flag unused nodes in the Node tab and delete all flagged nodes under the Node, Compute tab. The formula is $delete=T, the condition is _FLAG=1. This removes all unused nodes from the dataset.

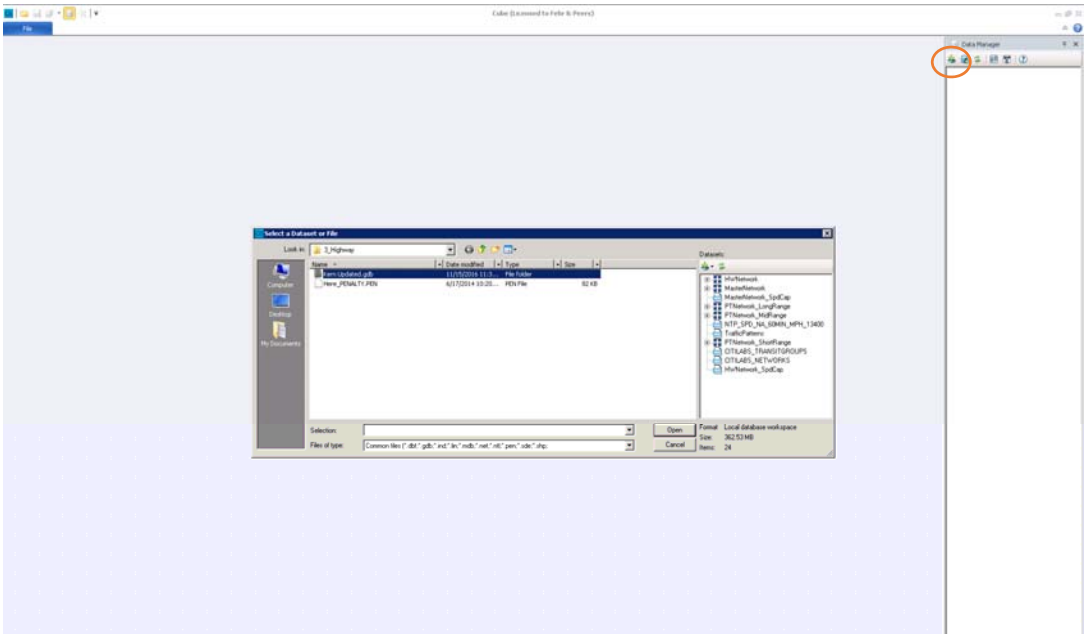


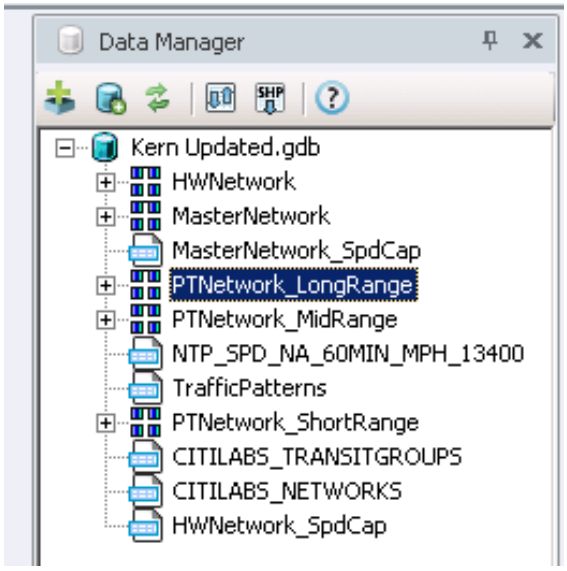


Transit Network

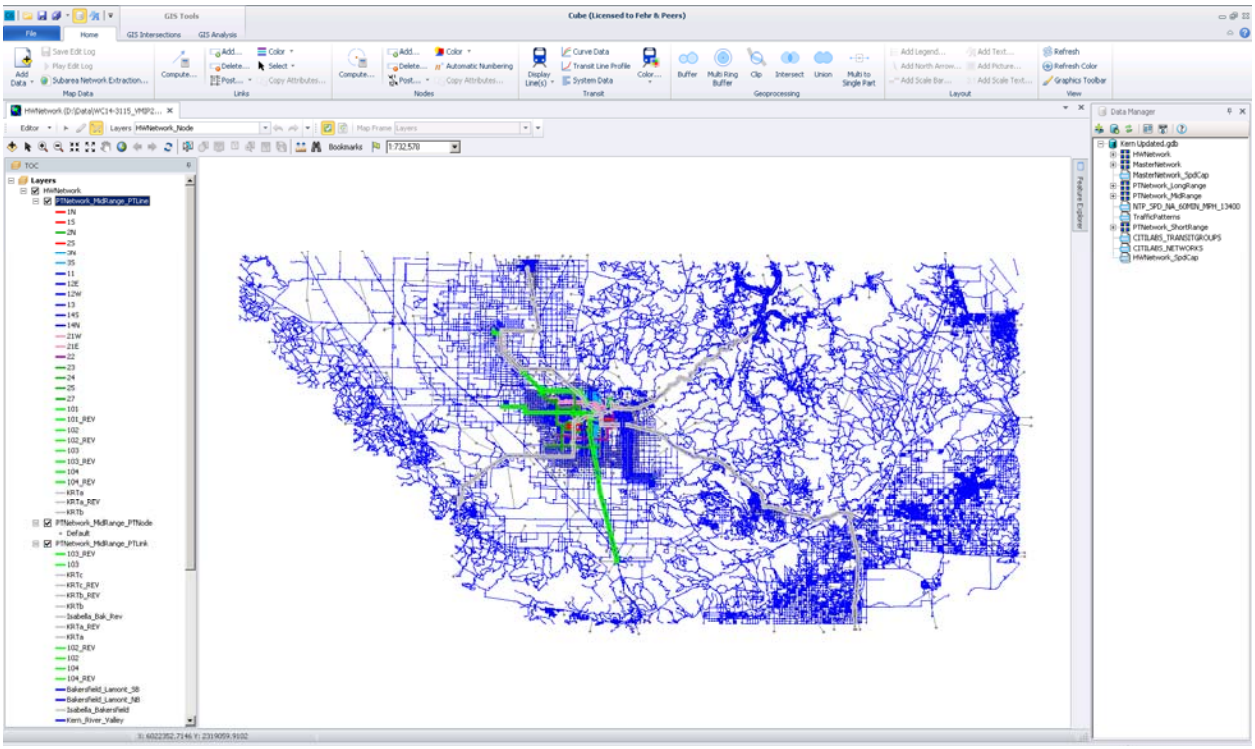
The transit lines require the highway network to display and function, so opening the transit line file will automatically open the associated highway network in an ArcGIS editor window.

1. Load the Highway geodatabase in the Data Manager by Clicking Add Data and browsing to the 3_Highway directory.

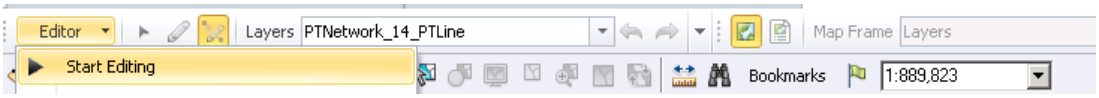




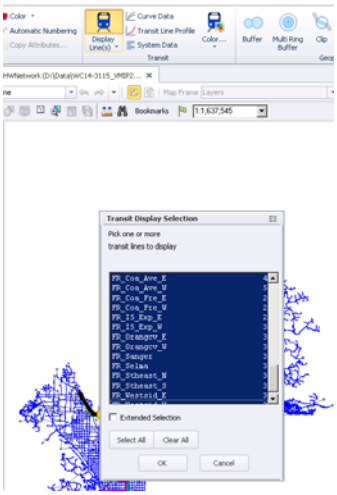
2. To load the transit lines, double click on the PT network you wish to open. The transit line and highway network will open



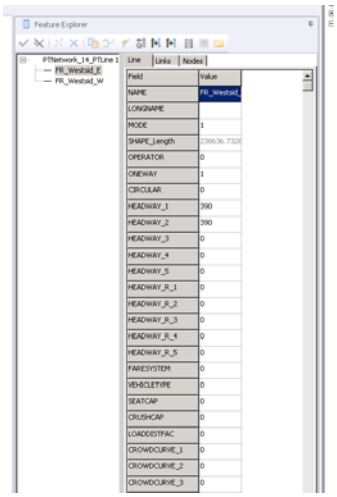
3. Similar to highway editing, switch the active layer to the transit line and select Start Editing under the Edit menu.



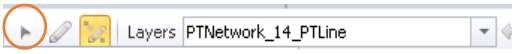
4. To show only lines needing to be edited, click the Display Lines and then select the desired line (click to select\clear multiple lines)



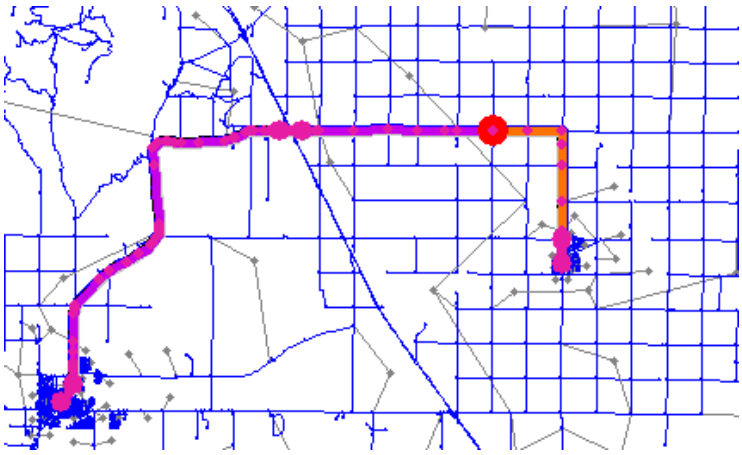
5. Feature explorer is used to view and edit the attributes of the line, and is often hidden to the right of the screen. Click it and then click the pin to have it easily accessible.



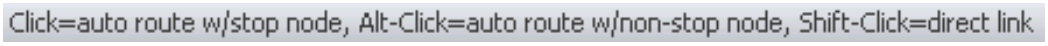
6. Using the Edit Feature tool, select the line and then double click a node\stop to begin editing from that location in the direction of travel.

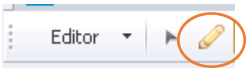


7. The node selected is large and magenta, with the previous nodes/links to the edit point shows in magenta and the remainder shows in orange.

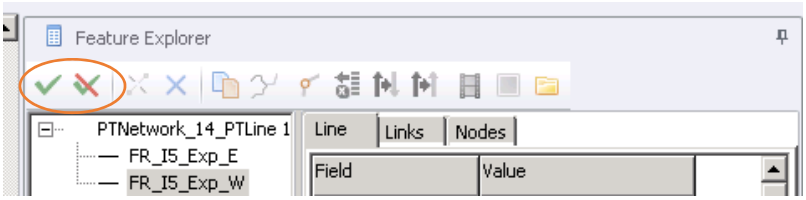


8. The bottom of the screen gives helpful hints on modifying the transit lines

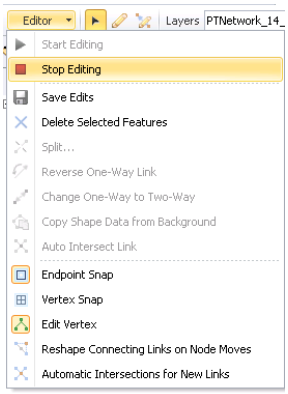


9. To add new lines, use the Create Feature tool. 

10. After making edits, keep or reject them in the Feature Explorer and then Save Edits under the ArcGIS editor.



11. To exit Edit mode, select Stop Editing

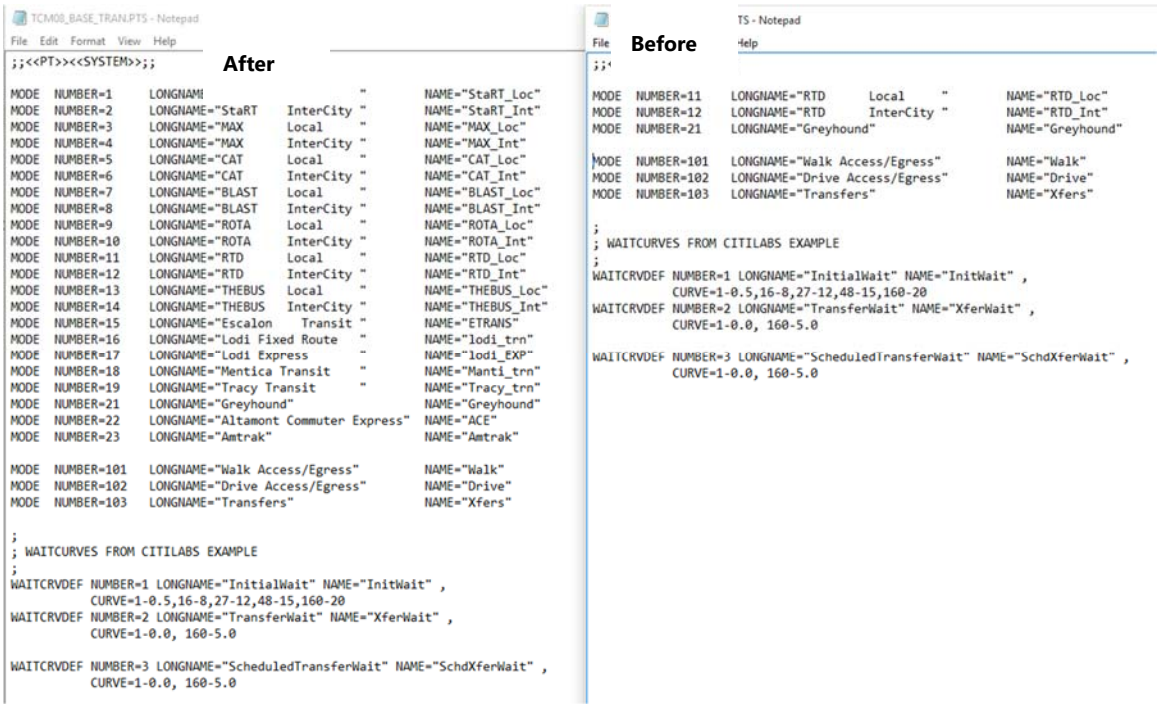


Transit System, Factors, and Fares

After adding or modifying the transit lines, the transit system, fares, and factors files might also need to be updated if new modes or operators are added. If only lines are changed within an existing operator, mode, and fare system these files do not need to be updated.

1. Using a text editor, edit the Public Transport System (PTS), Fare System (FAR), and Factors (FAC) files to remove the lines no longer needed. Keeping the same mode number as in the original is preferred so the sub-area and full model can transfer data easily back and forth. Save files with the sub-area model name. Remember to change the file type from TXT to all.

PTS



TCM08_BASE_TRAN.PTS - Notepad

File Edit Format View Help

After

```
;;<<PT>><<SYSTEM>>;;

MODE  NUMBER=1     LONGNAM                    "        NAME="StaRT_Loc"
MODE  NUMBER=2     LONGNAME="StaRT    InterCity "      NAME="StaRT_Int"
MODE  NUMBER=3     LONGNAME="MAX      Local     "      NAME="MAX_Loc"
MODE  NUMBER=4     LONGNAME="MAX      InterCity "      NAME="MAX_Int"
MODE  NUMBER=5     LONGNAME="CAT      Local     "      NAME="CAT_Loc"
MODE  NUMBER=6     LONGNAME="CAT      InterCity "      NAME="CAT_Int"
MODE  NUMBER=7     LONGNAME="BLAST    Local     "      NAME="BLAST_Loc"
MODE  NUMBER=8     LONGNAME="BLAST    InterCity "      NAME="BLAST_Int"
MODE  NUMBER=9     LONGNAME="ROTA     Local     "      NAME="ROTA_Loc"
MODE  NUMBER=10    LONGNAME="ROTA     InterCity "      NAME="ROTA_Int"
MODE  NUMBER=11    LONGNAME="RTD      Local     "      NAME="RTD_Loc"
MODE  NUMBER=12    LONGNAME="RTD      InterCity "      NAME="RTD_Int"
MODE  NUMBER=13    LONGNAME="THEBUS   Local     "      NAME="THEBUS_Loc"
MODE  NUMBER=14    LONGNAME="THEBUS   InterCity "      NAME="THEBUS_Int"
MODE  NUMBER=15    LONGNAME="Escalon    Transit "     NAME="ETRANS"
MODE  NUMBER=16    LONGNAME="Lodi Fixed Route   "      NAME="lodi_trn"
MODE  NUMBER=17    LONGNAME="Lodi Express       "     NAME="lodi_EXP"
MODE  NUMBER=18    LONGNAME="Mentica Transit    "     NAME="Manti_trn"
MODE  NUMBER=19    LONGNAME="Tracy Transit      "     NAME="Tracy_trn"
MODE  NUMBER=21    LONGNAME="Greyhound"               NAME="Greyhound"
MODE  NUMBER=22    LONGNAME="Altamont Commuter Express"  NAME="ACE"
MODE  NUMBER=23    LONGNAME="Amtrak"                  NAME="Amtrak"

MODE  NUMBER=101   LONGNAME="Walk Access/Egress"      NAME="Walk"
MODE  NUMBER=102   LONGNAME="Drive Access/Egress"     NAME="Drive"
MODE  NUMBER=103   LONGNAME="Transfers"               NAME="Xfers"

;
; WAITCURVES FROM CITILABS EXAMPLE
;
WAITCRVDEF NUMBER=1 LONGNAME="InitialWait" NAME="InitWait" ,
          CURVE=1-0.5,16-8,27-12,48-15,160-20
WAITCRVDEF NUMBER=2 LONGNAME="TransferWait" NAME="XferWait" ,
          CURVE=1-0.0, 160-5.0

WAITCRVDEF NUMBER=3 LONGNAME="ScheduledTransferWait" NAME="SchdXferWait" ,
          CURVE=1-0.0, 160-5.0
```

TS - Notepad

File Help

Before

```
;;<

MODE  NUMBER=11    LONGNAME="RTD      Local     "      NAME="RTD_Loc"
MODE  NUMBER=12    LONGNAME="RTD      InterCity "      NAME="RTD_Int"
MODE  NUMBER=21    LONGNAME="Greyhound"               NAME="Greyhound"

MODE  NUMBER=101   LONGNAME="Walk Access/Egress"      NAME="Walk"
MODE  NUMBER=102   LONGNAME="Drive Access/Egress"     NAME="Drive"
MODE  NUMBER=103   LONGNAME="Transfers"               NAME="Xfers"

;
; WAITCURVES FROM CITILABS EXAMPLE
;
WAITCRVDEF NUMBER=1 LONGNAME="InitialWait" NAME="InitWait" ,
          CURVE=1-0.5,16-8,27-12,48-15,160-20
WAITCRVDEF NUMBER=2 LONGNAME="TransferWait" NAME="XferWait" ,
          CURVE=1-0.0, 160-5.0

WAITCRVDEF NUMBER=3 LONGNAME="ScheduledTransferWait" NAME="SchdXferWait" ,
          CURVE=1-0.0, 160-5.0
```

FAR

After

```
    NUMBER=1,
    NAME="StaRT_Loc",
    LONGNAME="StaRT    Local     ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=1

FARESYSTEM,
    NUMBER=2,
    NAME="StaRT_Int",
    LONGNAME="StaRT    InterCity ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3

FARESYSTEM,
    NUMBER=3,
    NAME="MAX_Loc",
    LONGNAME="MAX      Local     ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3

FARESYSTEM,
    NUMBER=4,
    NAME="MAX_Int",
    LONGNAME="MAX      InterCity ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=1

FARESYSTEM,
    NUMBER=5,
    NAME="CAT_Loc",
    LONGNAME="CAT      Local     ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3

FARESYSTEM,
    NUMBER=6,
    NAME="CAT_Int",
    LONGNAME="CAT      InterCity ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3

FARESYSTEM,
    NUMBER=7,
    NAME="BLAST_Loc",
    LONGNAME="BLAST    Local     ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=1
```

Before

AR - Notepad

File Edit Format View Help

```
FARESYSTEM,
    NUMBER=11,
    NAME="RTD_Loc",
    LONGNAME="RTD      Local     ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3

FARESYSTEM,
    NUMBER=12,
    NAME="RTD_Int",
    LONGNAME="RTD      InterCity ",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=3
FARESYSTEM,
    NUMBER=21,
    NAME="Greyhound",
    LONGNAME="Greyhound",
    STRUCTURE=FLAT, SAME=SEPARATE,
    IBOARDFARE=20
```

FAC

After

```
/*F            ration*/

VALUEOFTIME=23*15          ; based on assumption in

FARESYSTEM=1 , MODE=1
FARESYSTEM=2 , MODE=2
FARESYSTEM=3 , MODE=3
FARESYSTEM=4 , MODE=4
FARESYSTEM=5 , MODE=5
FARESYSTEM=6 , MODE=6
FARESYSTEM=7 , MODE=7
FARESYSTEM=8 , MODE=8
FARESYSTEM=9 , MODE=9
FARESYSTEM=10, MODE=10
FARESYSTEM=11, MODE=11
FARESYSTEM=12, MODE=12
FARESYSTEM=13, MODE=13
FARESYSTEM=14, MODE=14
FARESYSTEM=15, MODE=15
FARESYSTEM=16, MODE=16
FARESYSTEM=17, MODE=17
FARESYSTEM=18, MODE=18
FARESYSTEM=19, MODE=19
FARESYSTEM=21, MODE=21
FARESYSTEM=22, MODE=22
FARESYSTEM=23, MODE=23

MAXFERS=2                   ; not a maximum, routes
EXTRAXFERS1 = 2             ; CITILABS EXAMPLE
EXTRAXFERS2 = 1             ; CITILABS EXAMPLE
SPREADFACT  = 1.1           ; min time then x fact C
SPREADFUNC  = 2             ; CITILABS EXAMPLE combi
SPREADCONST = 5             ; min transit time x 1.1

/*For Route Enumeration and Evaluation*/
; no  XFERPEN for now
;XFERPEN = 1,FROM=1 TO=1
;XFERPEN = 1,FROM=1 TO=2
;XFERPEN = 1,FROM=1 TO=3
;XFERPEN = 1,FROM=2 TO=1
;XFERPEN = 1,FROM=2 TO=2
;XFERPEN = 1,FROM=2 TO=3
;XFERPEN = 1,FROM=3 TO=1
;XFERPEN = 1,FROM=3 TO=2
;XFERPEN = 1,FROM=3 TO=3
```

Before

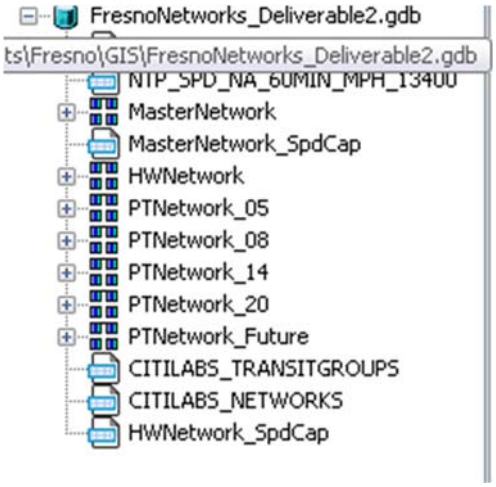
TRAN.FAC - Notepad

```
            imeration*/

VALUEOFTIME=23*15          ; based on assumption in standard script

FARESYSTEM=11, MODE=11
FARESYSTEM=12, MODE=12

FARESYSTEM=21, MODE=21


MAXFERS=2                   ; not a maximum, routes with more than 2 transfers i
EXTRAXFERS1 = 2             ; CITILABS EXAMPLE
EXTRAXFERS2 = 1             ; CITILABS EXAMPLE
SPREADFACT  = 1.1           ; min time then x fact CITILABS EXAMPLE model was cr
SPREADFUNC  = 2             ; CITILABS EXAMPLE combination of generalized cost c
SPREADCONST = 5             ; min transit time x 1.1 then add 5 min

/*For Route Enumeration and Evaluation*/
; no  XFERPEN for now
;XFERPEN = 1,FROM=1 TO=1
;XFERPEN = 1,FROM=1 TO=2
;XFERPEN = 1,FROM=1 TO=3
;XFERPEN = 1,FROM=2 TO=1
;XFERPEN = 1,FROM=2 TO=2
;XFERPEN = 1,FROM=2 TO=3
;XFERPEN = 1,FROM=3 TO=1
;XFERPEN = 1,FROM=3 TO=2
;XFERPEN = 1,FROM=3 TO=3

/*For Route Evaluation*/
ALPHA = 1.0                 ; CITILABS EXAMPLE
LAMBDAW = 0.2               ; CITILABS EXAMPLE
LAMBDAA = 0.2               ; CITILABS EXAMPLE
CHOICECUT=0.05              ; CITILABS EXAMPLE
IWAITCURVE=1,  N=10001-29999
XWAITCURVE=2,  N=10001-29999
XWAITCURVE=3,  N=10001-29999
WAITFACTOR=1.4,N=10001-29999
```

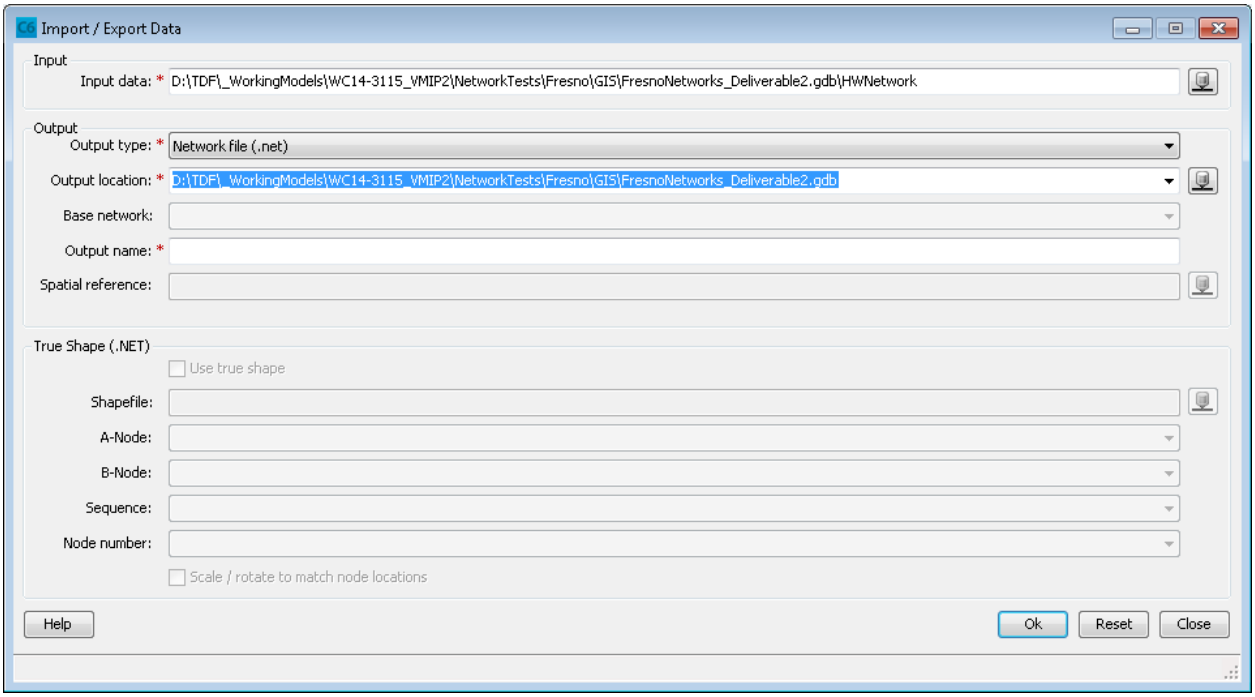
Option to use/export .NET or .LIN files in VMIP 2 Models

Although GIS files are needed to do special analysis, sometimes you may want to share or edit the Cube format files rather than GIS based files.

Master files in geodatabase

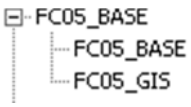


Right click and export the master to .net or .lin as appropriate

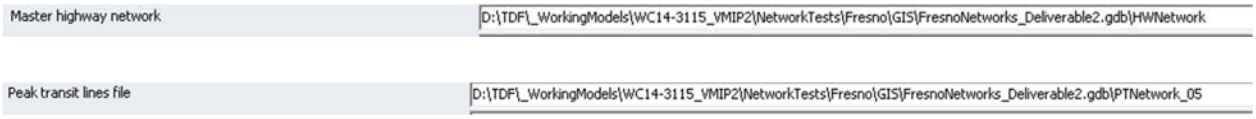


Edit file in Cube as usual, remembering to have the transit lines on as you edit the master network (and remembering that roadways will turn on/off based on the year and lanes)

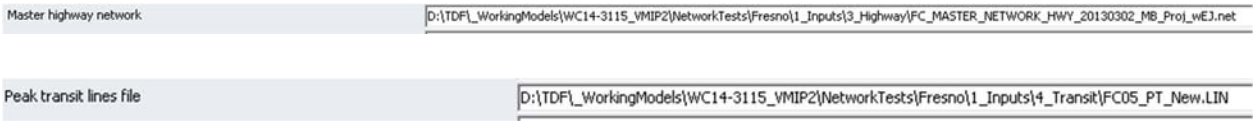
Save with a unique name and create a new scenario referring to the file.



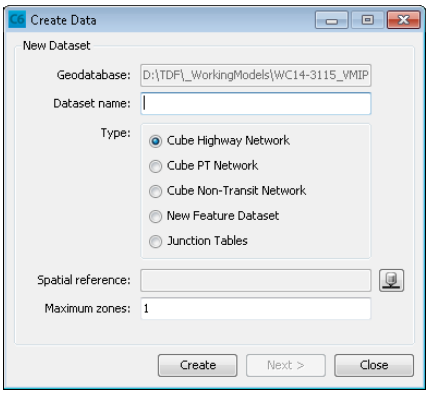
Original GIS master network key



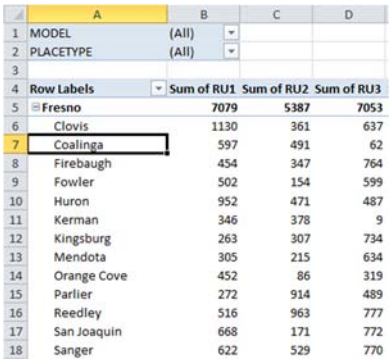
.Net and .LIN network keys



To import the .NET or .LIN back into GIS, the original master geodatabase will be used and Add data to an existing geodatabase for the edited highway or transit network.



Land Use Preparation



	A	B	C	D
1	MODEL	(All)		
2	PLACETYPE	(All)		
3				
4	Row Labels	Sum of RU1	Sum of RU2	Sum of RU3
5	Fresno	7079	5387	7053
6	Clovis	1130	361	637
7	Coalinga	597	491	62
8	Firebaugh	454	347	764
9	Fowler	502	154	599
10	Huron	952	471	487
11	Kerman	346	378	9
12	Kingsburg	263	307	734
13	Mendota	305	215	634
14	Orange Cove	452	86	319
15	Parlier	272	914	489
16	Reedley	516	963	777
17	San Joaquin	668	171	772
18	Sanger	622	529	770

The *1_Inputs_Support* directory contains the spreadsheet VMIP2_LandUsePrep_MODEL.XLSX. This file is the TAZ level disaggregate control total for each land use category (10 residential, 21 employment, 4 group quarters population, and 3 school enrolment) for the validation year and SB 375 years. Although the travel model aggregates the land use categories for travel forecasting, the land use preparation spreadsheet allows for more disaggregate land use planning at the TAZ level. The NOTES worksheet contains the data dictionary.

To update the land use for any of the years that are included and\or for years other than the SB 375 years, the data from adjacent years can be interpolated\extrapolated or other forecasting methods (UPlan, Envision Tomorrow, etc) can be used to obtain the control totals.

Socio-Economic Data Preparation

The *1_Inputs_Support* directory contains the spreadsheet VMIP2_SCENARIOPrep.XLSX. This spreadsheet is used to develop the socio-economic data (SED), gateway productions and attractions (Gateways), special generators (SpecialGenerators) and TAZ data (TAZ_Date) for a specific scenario. This spreadsheet contains four main types of data: **Inputs**, **Outputs**, **Local Factors**, and **Interregional Factors**.

The input to the file is the scenario Land Use developed in the VMIP2_LandUsePrep_MODEL.XLSX which is copied and pasted as values into the LU_Detailed worksheet. The detailed land uses are automatically aggregated and summarized into the travel model categories on the LU_Input_Template using the residential classification and NAICS equivalencies shown in the Land Use table. Once aggregated, the travel model residential land use categories are multiplied by the factors obtained from the Census on the SED_Cross_ClassRates_Template , with the resulting cross-classified households, population, employment, group quarters population, and school enrolment being calculated on the SED_Final worksheet.

Local Factors

Local factors include the cross-classification of the households, employment sector income (high, medium, and low), and aggregation of land use variables for the travel model. Although the spreadsheet contains demographics at the TAZ level based on Census as a starting point, scenarios wishing to change the demographics (household size, income, average population per household, or age distribution) can make changes at the zone level by adjusting the values on the SED_Cross_ClassRates_Template worksheet. Conditional formatting is implemented to flag where the total does not add to 100% within a classification. The data for parking pricing, developed area, transit headways (for models without transit networks), EJ, AirBasin, and the employment by income is a TAZ level variable on the TAZ_Interim worksheet. The

variables are updated as needed at a TAZ level and the employment by income values are currently at a county level, and all of these values should be evaluated for each scenario. Changing the aggregation of land use is only recommended during model development since the trip generation rates must be consistent with the land use aggregation. The TAZ local and interregional information are combined on the TAZ_Data worksheet and used in the model process.

Special Generators

The SpecialGenerators is the final worksheet that is scenario dependent. The values are used to adjust the trips being generated by the model land use to match a target for a special generator and can be the total trips when no land use is used in the model or an adjustment value when the land use is included in the model.

The following pages contain examples of each of the worksheets and the Trip Generation section contains a flowchart showing how the files integrate to produce trips by purpose by zone.

VMIP2_SCENARIOPrep.XLSX

LU_Detailed

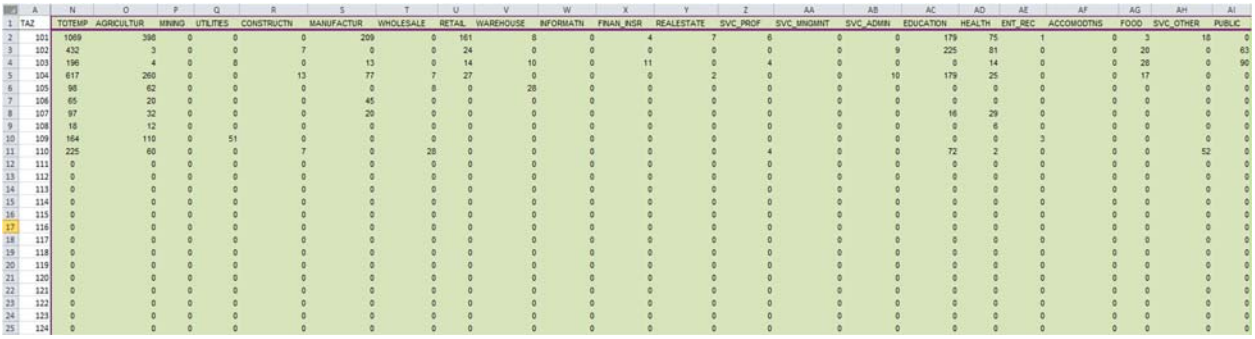
- Geographic information is in white and includes TAZ and Jurisdiction

	A	B
1	TAZ	Jurisdiction
2	101	Arvin
3	102	Arvin
4	103	Arvin
5	104	Arvin
6	105	Arvin
7	106	Arvin
8	107	Arvin
9	108	Arvin
10	109	Arvin
11	110	Arvin
12	111	Arvin_Spare

- Residential information is in light orange and includes total households by unit types 1-10 based on Census. The units are occupied households.

	A	C	D	E	F	G	H	I	J	K	L	M
1	TAZ	TOTHH	RU1	RU2	RU3	RU4	RU5	RU6	RU7	RU8	RU9	RU10
2	101	1480	943	59	105	0	165	0	0	0	208	0
3	102	324	246	10	36	0	3	0	0	0	29	0
4	103	515	290	50	18	0	33	0	0	0	124	0
5	104	936	656	62	169	0	39	0	0	0	10	0
6	105	20	14	1	4	0	1	0	0	0	0	0
7	106	11	6	1	0	0	1	0	0	0	3	0
8	107	27	21	1	3	0	0	0	0	0	2	0
9	108	6	4	0	1	0	1	0	0	0	0	0
10	109	15	7	1	2	0	2	0	0	0	3	0
11	110	1119	658	32	32	0	37	0	0	0	349	11
12	111	0	0	0	0	0	0	0	0	0	0	0
13	112	0	0	0	0	0	0	0	0	0	0	0
14	113	0	0	0	0	0	0	0	0	0	0	0

- Employment information is in light green and includes total employees and detailed employee types. The units are total employees by zone.



- Group Quarters Population information is in dark green and includes dorm, assisted living, military, and institutional population (prison, mental health, etc). The units are persons excluding employees and household population.

	A	AJ	AK	AL	AM
1	TAZ	POPDORM	POPASSIS	POPMILITA	POPINST
2	101				
3	102				
4	103				
5	104				
6	105				
7	106				
8	107				
9	108				

- School enrolment information is in dark blue and includes elementary, high school, and college enrolment. The units are students and excludes employees.

	A	AN	AO	AP
1	TAZ	ELEM	HS	COLLEGE
2	101	720	0	0
3	102	571	2473	0
4	103	0	0	0
5	104	1510	0	0
6	105	0	0	0
7	106	0	0	0
8	107	0	0	0
9	108	0	0	0
10	109	0	0	0
11	110	871	0	0

LU_Input_Template

This worksheet aggregates the residential and employment data from the LU_Detailed worksheet.

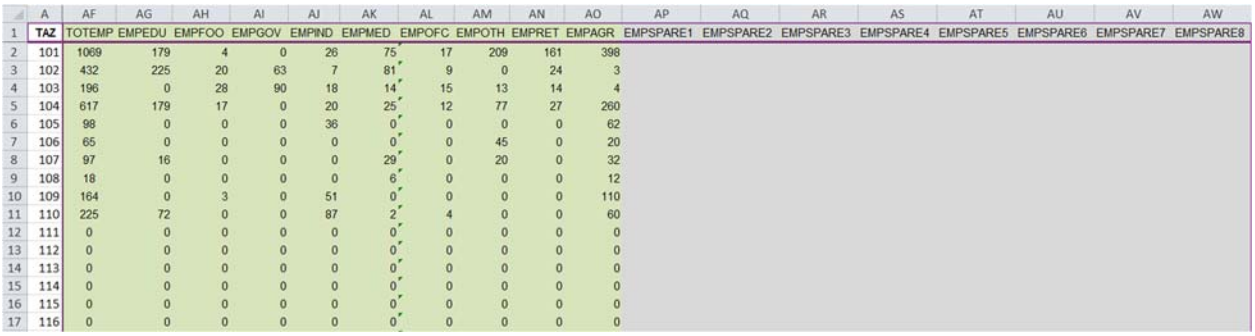
- Geographic information is in white and includes TAZ and Jurisdiction, and relations to Census 2010

	A	B	C	D	E	F	G	H	I	J
1	TAZ	STATE	COUNTY	PUMA	CITY	TRACT	BLOCKGROUP	BLOCK	MODEL	PLACETYPE
2	101	CA	Kern	2905	Arvin	063032	60290063032	2002	KERNCOG	
3	102	CA	Kern	2905	Arvin	063011	60290063011	1020	KERNCOG	
4	103	CA	Kern	2905	Arvin	063012	60290063012	2024	KERNCOG	
5	104	CA	Kern	2905	Arvin	063041	60290063041	1016	KERNCOG	
6	105	CA	Kern	2905	Arvin	063041	60290063041	1016	KERNCOG	
7	106	CA	Kern	2905	Arvin	063012	60290063012	2024	KERNCOG	
8	107	CA	Kern	2905	Arvin	063011	60290063011	1020	KERNCOG	
9	108	CA	Kern	2905	Arvin	063031	60290063031	1005	KERNCOG	
10	109	CA	Kern	2905	Arvin	060073	60290060073	3544	KERNCOG	
11	110	CA	Kern	2905	Arvin	062021	60290062021	1546	KERNCOG	
12	111	CA	Kern	2905C	Arvin	0	0	0	KERNCOG	

- Residential information is in light orange and includes total households by unit types 1-10 based on Census and residential groups 1-3, with spares in grey. The units are occupied households.

	A	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
1	TAZ	TOTHH	RU1	RU2	RU3	RU4	RU5	RU6	RU7	RU8	RU9	RU10	RUG1	RUG2	RUG3	RUG1SPARE	RUG2SPARE	RUG3SPARE	RUG4SPARE	RUG5SPARE	RUG6SPARE	RUG7SPARE
2	101	1480	943	59	105	0	165	0	0	0	208	0	1002	270	208							
3	102	324	246	10	36	0	3	0	0	0	29	0	256	39	29							
4	103	515	290	50	18	0	33	0	0	0	124	0	340	51	124							
5	104	936	656	62	169	0	39	0	0	0	10	0	718	208	10							
6	105	20	14	1	4	0	1	0	0	0	0	0	15	5	0							
7	106	11	6	1	0	0	1	0	0	0	3	0	7	1	3							
8	107	27	21	1	3	0	0	0	0	0	2	0	22	3	2							
9	108	6	4	0	1	0	1	0	0	0	0	0	4	2	0							
10	109	15	7	1	2	0	2	0	0	0	3	0	8	4	3							
11	110	1119	658	32	32	0	37	0	0	0	349	11	690	69	360							
12	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
13	112	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
14	113	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
15	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
16	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
17	116	0	0	0	0	0	0	0	0	0	0	0	0	0	0							

- Employment information is in light green and includes total employees aggregated by type with spares in grey. The units are total employees by zone.



A	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
TAZ	TOTEMP	EMPEDU	EMPFOO	EMPGOV	EMPIND	EMPMED	EMPOFC	EMPOTH	EMPRET	EMPAGR	EMPSPARE1	EMPSPARE2	EMPSPARE3	EMPSPARE4	EMPSPARE5	EMPSPARE6	EMPSPARE7	EMPSPARE8
101	1069	179	4	0	26	75	17	209	161	398								
102	432	225	20	63	7	81	9	0	24	3								
103	196	0	28	90	18	14	15	13	14	4								
104	617	179	17	0	20	25	12	77	27	260								
105	98	0	0	0	36	0	0	0	0	62								
106	65	0	0	0	0	0	0	45	0	20								
107	97	16	0	0	0	29	0	20	0	32								
108	18	0	0	0	0	6	0	0	0	12								
109	164	0	3	0	51	0	0	0	0	110								
110	225	72	0	0	87	2	4	0	0	60								
111	0	0	0	0	0	0	0	0	0	0								
112	0	0	0	0	0	0	0	0	0	0								
113	0	0	0	0	0	0	0	0	0	0								
114	0	0	0	0	0	0	0	0	0	0								
115	0	0	0	0	0	0	0	0	0	0								
116	0	0	0	0	0	0	0	0	0	0								

- Group Quarters Population information is in dark green and includes dorm, assisted living, military, and institutional population (prison, mental health, etc). The units are persons excluding employees and household population.

A	AX	AY	AZ	BA
TAZ	POPDORM	POPASSIST	POPMILITARY	POPINST
101	0	0	0	0
102	0	0	0	0
103	0	0	0	0
104	0	0	0	0
105	0	0	0	0
106	0	0	0	0
107	0	0	0	0
108	0	0	0	0
109	0	0	0	0
110	0	0	0	0
111	0	0	0	0
112	0	0	0	0
113	0	0	0	0
114	0	0	0	0
115	0	0	0	0
116	0	0	0	0

- School enrolment information is in dark blue and includes elementary, high school, and college enrolment. The units are students and excludes employees.

A	BB	BC	BD
TAZ	ELEM	HS	COLLEGE
101	720	0	0
102	571	2473	0
103	0	0	0

SED_Final

This worksheet is the product of the percentage allocation on SED_Cross_ClassRates_Template and the control total on LU_Input_Template with the result being cross-clarified households and population, employment, group quarters population, and student enrolment by TAZ.

- Geographic information is in white and includes TAZ and Jurisdiction, and relations to Census 2010

	A	B	C	D	E	F	G	H	I	J
1	TAZ	STATE	COUNTY	PUMA	CITY	TRACT	BLOCKGROUP	BLOCK	MODEL	PLACETYPE
2	101	CA	Kern	2905	Arvin	063032	60290063032	2002	KERNCOG	
3	102	CA	Kern	2905	Arvin	063011	60290063011	1020	KERNCOG	
4	103	CA	Kern	2905	Arvin	063012	60290063012	2024	KERNCOG	
5	104	CA	Kern	2905	Arvin	063041	60290063041	1016	KERNCOG	
6	105	CA	Kern	2905	Arvin	063041	60290063041	1016	KERNCOG	
7	106	CA	Kern	2905	Arvin	063012	60290063012	2024	KERNCOG	
8	107	CA	Kern	2905	Arvin	063011	60290063011	1020	KERNCOG	
9	108	CA	Kern	2905	Arvin	063031	60290063031	1005	KERNCOG	
10	109	CA	Kern	2905	Arvin	060073	60290060073	3544	KERNCOG	
11	110	CA	Kern	2905	Arvin	062021	60290062021	1546	KERNCOG	
12	111	CA	Kern	2905C	Arvin	0	0	0	KERNCOG	

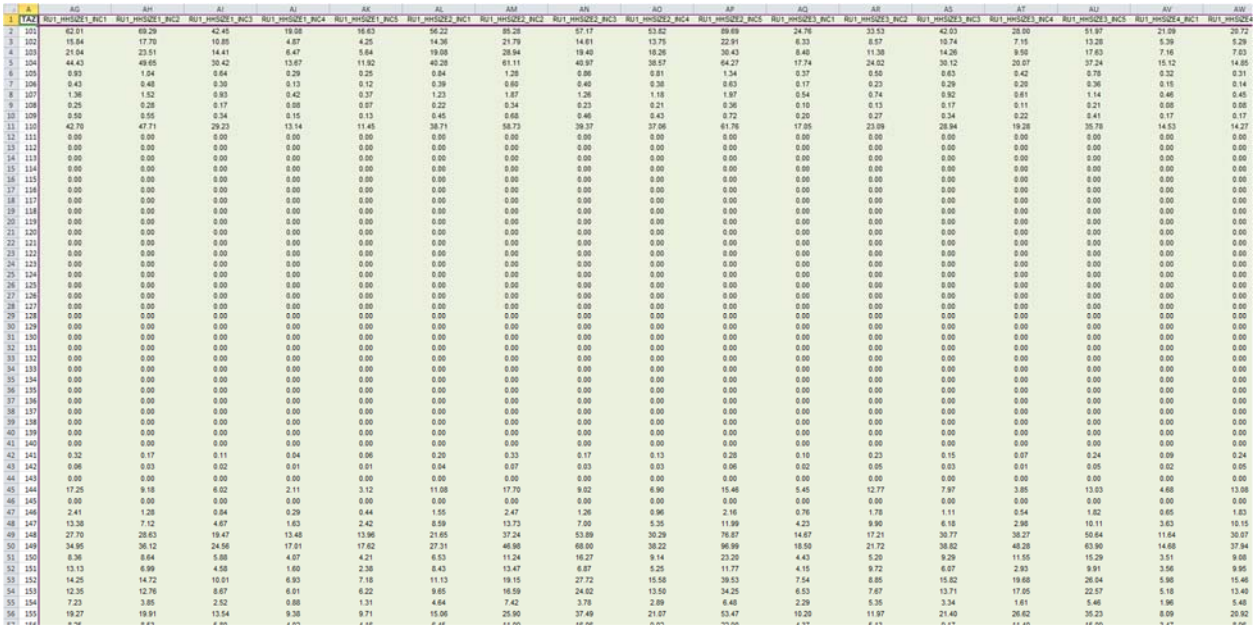
- Residential household information is in light orange and includes total households, total household population, and households by aggregated group types, with spares in grey.

	A	K	L	M	N	O	P	Q	R	S	T	U	V
1	TAZ	TOTHH	TOTPOP	RUG1	RUG2	RUG3	RUG1SPARE	RUG2SPARE	RUG3SPARE	RUG4SPARE	RUG5SPARE	RUG6SPARE	RUG7SPARE
29	128	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	129	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	131	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	132	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	133	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	134	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	135	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	136	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	137	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39	138	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	139	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41	140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	141	5.00	14.91	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
43	142	1.00	2.98	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	143	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	144	364.00	1046.76	272.00	9.00	83.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
46	145	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47	146	40.00	118.53	38.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
48	147	278.00	800.45	211.00	3.00	64.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49	148	775.00	2222.27	772.00	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	149	1468.00	3800.48	974.00	410.00	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Residential population information is in light blue and includes household population by aggregated group types, with spares in grey. Population is not used directly in the model except for the age of population. Total households, population, and households by group are not used to generate trips but are in the calculation of per-capita performance measures and residential development density.

	A	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1	TAZ	RU1_HHPOP	RU3_HHPOP	RU6_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP	RUG1SPARE_HHPOP
2	101	2275.06	471.01	365.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	102	581.25	68.03	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	103	771.98	88.97	218.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	104	1630.23	362.85	17.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	105	34.06	8.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	106	15.89	1.74	5.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	107	49.95	5.23	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	108	9.08	3.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	109	18.16	6.98	5.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	110	1566.66	120.37	633.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	118	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	121	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Residential household cross-classified information by household type and then by income, and household size is in light green. Cross-classified residential units are the generator of home-based productions and minor amount of non-home based productions and attractions.



- Residential households by age of the head of household in purple and is aggregated by residential unit group type. The households by age of head of house is used to modify trip generation by purpose.

	A	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO
1	TAZ	RU1_AGE1524	RU1_AGE2564	RU1_AGE6574	RU1_AGE75	RU3_AGE1524	RU3_AGE2564	RU3_AGE6574	RU3_AGE75	RU9_AGE1524	RU9_AGE2564	RU9_AGE6574	RU9_AGE7
2	101	760.57	142.15	43.59	55.69	238.86	31.14	0.00	0.00	163.99	19.12	6.96	17.93
3	102	194.32	36.32	11.14	14.23	34.50	4.50	0.00	0.00	22.86	2.67	0.97	2.50
4	103	258.08	48.23	14.79	18.90	45.12	5.88	0.00	0.00	97.76	11.40	4.15	10.69
5	104	545.00	101.86	31.24	39.90	184.01	23.99	0.00	0.00	7.88	0.92	0.33	0.86
6	105	11.39	2.13	0.65	0.83	4.42	0.58	0.00	0.00	0.00	0.00	0.00	0.00
7	106	5.31	0.99	0.30	0.39	0.88	0.12	0.00	0.00	2.37	0.28	0.10	0.26
8	107	16.70	3.12	0.96	1.22	2.65	0.35	0.00	0.00	1.58	0.18	0.07	0.17
9	108	3.04	0.57	0.17	0.22	1.77	0.23	0.00	0.00	0.00	0.00	0.00	0.00
10	109	6.07	1.13	0.35	0.44	3.54	0.46	0.00	0.00	2.37	0.28	0.10	0.26
11	110	523.75	97.89	30.02	38.35	61.04	7.96	0.00	0.00	283.83	33.08	12.05	31.03
12	111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	118	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Residential household population by age range is in green. The resident by age is used to generate school trips.

	A	DP	DQ	DR	DS	DT	DU	DV	DW
1	TAZ	POP0005	POP0514	POP1517	POP1824	POP2554	POP5564	POP6574	POP75
2	101	439.16	689.65	272.97	447.99	1011.60	124.44	126.05	0.00
3	102	52.62	117.76	78.61	70.78	264.33	54.49	21.30	40.40
4	103	137.07	220.96	43.86	161.19	401.34	52.09	38.93	23.58
5	104	220.40	414.76	117.21	309.57	660.21	187.34	84.15	17.03
6	105	4.69	8.82	2.49	6.59	14.05	3.99	1.79	0.36
7	106	2.91	4.69	0.93	3.42	8.52	1.11	0.83	0.50
8	107	4.41	9.87	6.59	5.93	22.16	4.57	1.79	3.39
9	108	1.67	2.37	0.84	1.74	4.35	1.20	0.39	0.00
10	109	0.63	3.56	2.55	4.49	8.07	4.90	4.64	1.58
11	110	230.85	436.34	192.80	370.74	962.56	83.72	36.60	6.52
12	111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Employment information is in light green and includes total employees aggregated by type with spares in grey. Employees generate home-based attractions and non-home based productions and attractions. For schools, employees generate the non-school related purposes (i.e. home-work) and the household population and school enrolment generate the school related purpose.

	A	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO
1	TAZ	TOTEMP	EMPEDU	EMPFOO	EMPGOV	EMPIND	EMPMED	EMPOFC	EMPOTH	EMPRET	EMPAGR	EMPSPARE	EMPSPARE	EMPSPARE	EMPSPARE	EMPSPARE	EMPSPARE	EMPSPARE	EMPSPARE
2	101	1069.00	179.00	4.00	0.00	26.00	75.00	17.00	209.00	161.00	398.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	102	432.00	225.00	20.00	63.00	7.00	81.00	9.00	0.00	24.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	103	196.00	0.00	28.00	90.00	18.00	14.00	15.00	13.00	14.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	104	617.00	179.00	17.00	0.00	20.00	25.00	12.00	77.00	27.00	260.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	105	98.00	0.00	0.00	0.00	36.00	0.00	0.00	0.00	0.00	62.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	106	65.00	0.00	0.00	0.00	0.00	0.00	0.00	45.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	107	97.00	16.00	0.00	0.00	0.00	29.00	0.00	20.00	0.00	32.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	108	18.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	109	164.00	0.00	3.00	0.00	51.00	0.00	0.00	0.00	0.00	110.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	110	225.00	72.00	0.00	0.00	87.00	2.00	4.00	0.00	0.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	111	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	112	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	113	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	114	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	115	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	116	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	117	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	118	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	121	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Group Quarters Population information is in dark green and includes dorm, assisted living, military, and institutional population (prison, mental health, etc). The group quarters population does not generate trips.

	A	EP	EQ	ER	ES
1	TAZ	POPDORM	POPASSIS	POPMILITA	POPINST
2	101	0.00	0.00	0.00	0.00
3	102	0.00	0.00	0.00	0.00
4	103	0.00	0.00	0.00	0.00
5	104	0.00	0.00	0.00	0.00
6	105	0.00	0.00	0.00	0.00
7	106	0.00	0.00	0.00	0.00
8	107	0.00	0.00	0.00	0.00
9	108	0.00	0.00	0.00	0.00
10	109	0.00	0.00	0.00	0.00
11	110	0.00	0.00	0.00	0.00
12	111	0.00	0.00	0.00	0.00
13	112	0.00	0.00	0.00	0.00
14	113	0.00	0.00	0.00	0.00
15	114	0.00	0.00	0.00	0.00
16	115	0.00	0.00	0.00	0.00
17	116	0.00	0.00	0.00	0.00

- School enrolment information is in dark blue and includes elementary, high school, and college enrolment. The school enrolment generates the attractions of school based trips.

	A	ET	EU	EV
1	TAZ	ELEM	HS	COLLEGE
2	101	720.00	0.00	0.00
3	102	571.00	2473.00	0.00
4	103	0.00	0.00	0.00
5	104	1510.00	0.00	0.00
6	105	0.00	0.00	0.00
7	106	0.00	0.00	0.00
8	107	0.00	0.00	0.00
9	108	0.00	0.00	0.00
10	109	0.00	0.00	0.00

SED_Cross_ClassRates_Template

This worksheet has the same structure as the worksheet with the exception that the values are average (population for household) or percentage. This worksheet is based on data at a Census geography (Block Group, Place, or PUMA) but can be modified at a TAZ level.

Interregional Factors

The two primary required input updates for subarea model are the gateway station weights and the through trips. The gateway station weights attract/produce beyond the model study area, so when the subarea model is developed the relative proportion of trips at each gateway should be evaluated and updated as needed. The through trips are those that travel from one gateway to another gateway without stopping in the model area.

Gateways

The station weights are productions and attractions by purpose at each gateway that interact with the trips generated within the study area. The station weights can remain constant over time and the values will be used as percentages rather than absolute values, but should be evaluated to ensure the land use growth and travel patterns warrant the distribution of trips remaining constant.

The interregional factors include the internal and external percentage of trips by purpose, gateway productions and attractions, and home-work income distribution at the gateways. The interregional values on the ix_xi worksheet (internal external trips by purpose by Census place) and the income distribution for home-work trips on the Gateway HML worksheet are based on the CHTS, while the gateway values on the Gateways_Raw worksheet are derived from the Statewide model. The interregional data only need to be updated for scenarios where the results of trip generation are not balanced for home-work by income or when significantly different scenarios are being developed. The values can be updated based on the Statewide model or modified to test alternative scenarios. The gateway values and high/medium/low income data are combined into the Gateways Final worksheet for use in the model.

IX_XI

The percentage of trips that are imported (IX) or exported (XI) by purpose and Census Place, with home-work purposes being by high, medium, and low income.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Name	countyNa	HBWH_ix	HBWH_xi	HBWM_ix	HBWM_xi	HBWL_ix	HBWL_xi	HBS_ix	HBS_xi	HBK_ix	HBK_xi	HBC_ix	HBC_xi	HBO_ix	HBO_xi	WBO_ix	WBO_xi	OBO_ix	OBO_xi
2	Armona	Kings	0.35	0.378	0.267	0.2	0.076	0.215	0.093	0.026	0.013	0.053	0.086	0.057	0.066	0.046	0.048	0.151	0.059	0.125
3	Arvin	Kern	0.048	0.123	0.055	0.045	0.049	0.03	0	0.01	0	0	0.009	0.01	0	0.003	0.036	0.024	0.035	0.043
4	Atwater	Merced	0.072	0.033	0.058	0.153	0.062	0.008	0	0.007	0	0.021	0.086	0.057	0.041	0	0.045	0.074	0	0
5	Avenal	Kings	0.35	0.378	0.267	0.2	0.076	0.215	0.093	0.026	0.013	0.053	0.086	0.057	0	0.046	0.048	0.151	0.059	0.125
6	Bakersfield	Kern	0.061	0.016	0.014	0.009	0.003	0.011	0.004	0.013	0	0	0	0.012	0.025	0.015	0.011	0.013	0.011	0.007
7	California City	Kern	0.048	0.123	0.055	0.045	0.049	0.03	0.046	0.01	0	0.031	0.009	0.01	0.595	0.04	0.036	0.024	0.035	0.043
8	Ceres	Stanislaus	0.08	0.004	0.059	0.011	0.074	0.015	0	0.005	0	0	0.086	0.057	0.017	0	0.018	0.023	0.033	0.027
9	Chowchilla	Madera	0.453	0.073	0.193	0.095	0.298	0.11	0.1	0	0.011	0.009	0.086	0.057	0.409	0.22	0.176	0.098	0.163	0.121
10	Clovis	Fresno	0.064	0.067	0	0.088	0.015	0.057	0	0	0	0.006	0.027	0.14	0.037	0.029	0.014	0	0.006	0.01
11	Coalinga	Fresno	0.064	0.067	0.078	0.088	0.015	0.057	0.015	0.023	0.007	0.002	0.027	0.14	0.052	0.179	0.052	0.022	0.039	0.031
12	Corcoran	Kings	0.35	0.378	0.267	0.2	0.076	0.215	0.093	0.026	0.013	0.053	0.086	0.057	0.069	0.006	0.048	0.151	0.059	0.125
13	Cutler	Tulare	0.085	0.09	0.06	0.081	0.126	0.039	0.021	0.059	0.005	0.004	0.264	0.011	0.038	0.028	0.052	0.07	0.037	0.044
14	Delano	Kern	0.048	0.123	0.055	0.045	0.049	0.03	0.006	0	0	0.013	0.009	0.01	0.015	0.018	0.036	0.024	0.121	0.043

Gateway HML

The percentage of high, medium, and low home-work trips at each gateway for imported (IX) or exported (XI) trips.

	A	B	C	D	E	F	G	H	I	J
1					IX			XI		
2	Node	Region Co	Region Na	Hwy Nam	HBWH %	HBWM %	HBWL %	HBWH %	HBWM %	HBWL %
3	43	2	West	SR 198 W	50%	25%	25%	50%	25%	25%
4	44	2	West	Panoche	50%	25%	25%	50%	25%	25%
5	45	2	West	Mercey H	50%	25%	25%	50%	25%	25%
6	61	1	North	SR 99 N	20%	57%	23%	19%	34%	48%
7	62	1	North	SR 41 N	26%	43%	31%	22%	29%	49%

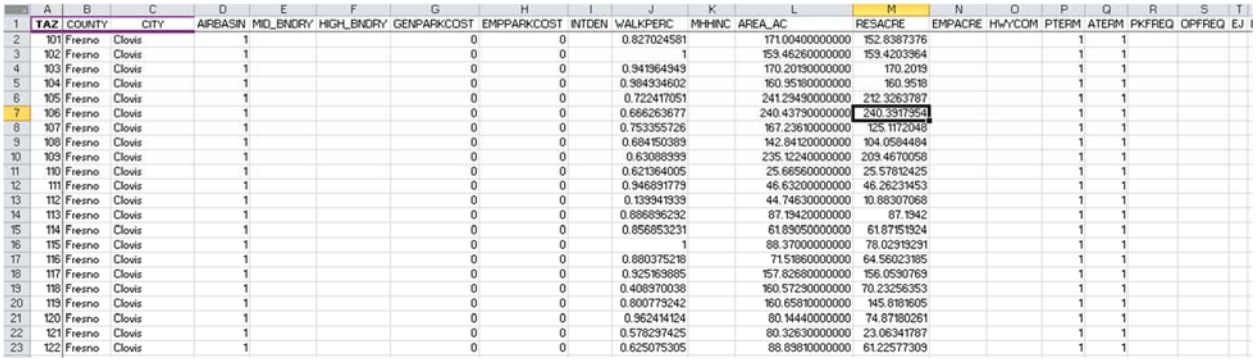
Gateways_Raw

The relative value of imported (IX) or exported (XI) trips for each purpose by gateway. The initial values are based on observed trips and the gateways are balanced to the internal trip generation. Home-work trips for high, medium, low are set as the same value if gateway percentages are used. If the number of trips are estimated independently, the percentages should be set at 100% in the Gateway HML worksheet.

	A	B	C	D	E	F	G	H	I	J	K	O	P	Q	R	S	T	U	V	W	X	AB
1	; TAZ	HWH_P	HWM_P	HWL_P	HS_P	HK_P	HC_P	HO_P	WO_P	OO_P	HY_P	HWH_A	HWM_A	HWL_A	HS_A	HK_A	HC_A	HO_A	WO_A	OO_A	HY_A	SPECIALSTR
62	61	17888	17888	17888	737	0	34	4566	1139	8084	729	3509	3509	3509	642	0	25	3406	5821	2144	729	
63	62	14121	14121	14121	2563	0	60	8153	770	4497	476	938	938	938	110	0	22	2988	2630	1460	476	
64	63	10927	10927	10927	1666	0	45	6153	850	7152	491	1301	1301	1301	709	0	25	3408	4044	2158	491	
65	64	2495	2495	2495	618	0	14	1855	113	716	87	99	99	99	7	0	2	323	347	200	87	
66	65	71	71	71	7	0	0	33	10	35	3	18	18	18	7	0	0	19	25	16	3	
67	66	825	825	825	19	0	14	1883	464	1061	200	3199	3199	3199	3089	0	29	3926	796	1130	200	
68	67	1835	1835	1835	41	0	10	1393	532	967	147	2328	2328	2328	857	0	15	2003	772	780	147	
69	68	461	461	461	87	0	4	475	413	296	62	1415	1415	1415	87	0	6	766	240	539	62	
70	69	2660	2660	2660	225	0	13	1809	1132	760	149	2372	2372	2372	33	0	5	672	501	1010	149	
71	70	1288	1288	1288	399	0	9	1223	695	395	75	846	846	846	7	0	1	134	219	516	75	
72	71	8870	8870	8870	917	0	28	3776	2131	3462	482	4704	4704	4704	240	0	9	1224	2134	3662	482	
73	72	9	9	9	1	0	0	3	1	4	0	2	2	2	1	0	0	2	3	2	0	
74	73	3570	3570	3570	699	0	13	1722	490	1086	125	492	492	492	9	0	1	119	458	588	125	
75	74	782	782	782	194	0	5	629	132	330	39	234	234	234	67	0	2	255	177	86	39	
76	75	5151	5151	5151	508	0	15	3010	884	2146	192	897	897	897	112	0	4	554	630	933	192	

TAZ_Interim

The basic internal TAZ information such as Airbasin, total and developed area, terminal times, and transit frequency (for scenarios or models using synthetic transit). Hard coded.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	TAZ	COUNTY	CITY	AIRBASIN	MID_BNDRY	HIGH_BNDRY	GENPARKCOST	EMPPARKCOST	INTDEN	WALKPERC	MHHINC	AREA_AC	RESACRE	EMPACRE	HWYCOM	PTERM	ATERM	PKFREQ	OPFREQ	EJ
2	101	Fresno	Clovis	1			0	0		0.827024581		171.00400000000	152.8387376			1	1			
3	102	Fresno	Clovis	1			0	0		1		159.46260000000	159.4203964			1	1			
4	103	Fresno	Clovis	1			0	0		0.941964949		170.20190000000	170.2019			1	1			
5	104	Fresno	Clovis	1			0	0		0.984934602		160.95180000000	160.9518			1	1			
6	105	Fresno	Clovis	1			0	0		0.722417051		241.29490000000	212.3263787			1	1			
7	106	Fresno	Clovis	1			0	0		0.666263677		240.43790000000	240.3317354			1	1			
8	107	Fresno	Clovis	1			0	0		0.753355726		167.23610000000	125.1172048			1	1			
9	108	Fresno	Clovis	1			0	0		0.684150389		142.84120000000	104.0584484			1	1			
10	109	Fresno	Clovis	1			0	0		0.63088999		235.12240000000	209.4670058			1	1			
11	110	Fresno	Clovis	1			0	0		0.621364005		25.665600000000	25.57812425			1	1			
12	111	Fresno	Clovis	1			0	0		0.946831779		46.632000000000	46.26231453			1	1			
13	112	Fresno	Clovis	1			0	0		0.139941939		44.746300000000	10.88307068			1	1			
14	113	Fresno	Clovis	1			0	0		0.886896292		87.194200000000	87.1942			1	1			
15	114	Fresno	Clovis	1			0	0		0.856853231		61.890500000000	61.87151324			1	1			
16	115	Fresno	Clovis	1			0	0		1		88.370000000000	78.02919291			1	1			
17	116	Fresno	Clovis	1			0	0		0.880375218		71.518600000000	64.56023185			1	1			
18	117	Fresno	Clovis	1			0	0		0.925163885		157.82680000000	156.0590769			1	1			
19	118	Fresno	Clovis	1			0	0		0.408970038		160.57230000000	70.23256353			1	1			
20	119	Fresno	Clovis	1			0	0		0.800773242		160.65810000000	145.8181605			1	1			
21	120	Fresno	Clovis	1			0	0		0.962414124		80.144400000000	74.87180261			1	1			
22	121	Fresno	Clovis	1			0	0		0.578297425		80.326300000000	23.06341787			1	1			
23	122	Fresno	Clovis	1			0	0		0.625075305		88.838100000000	61.22577309			1	1			

Through Trips

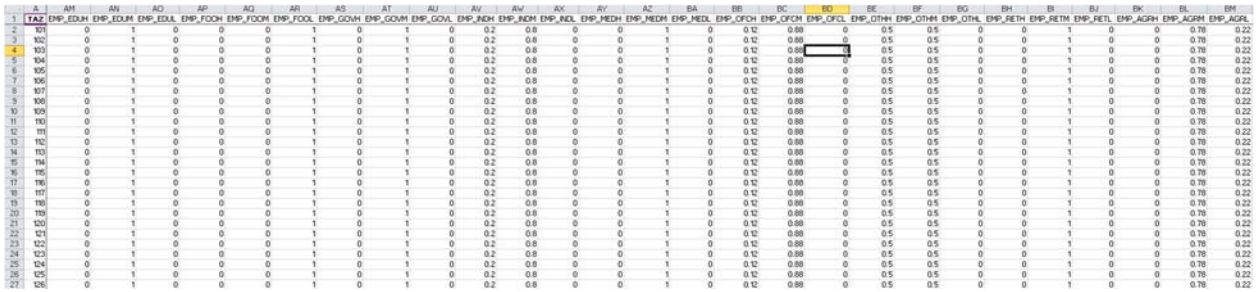
The through trips can be obtained by running select link on the Statewide model and outputting the OD matrix, using big data, or assumed to be similar to the original model depending on the scale difference between the original and subarea model. A common approach is to calibrate the internal trips, and the count at the gateways is the difference between internal generated\attractive trips and the through trips.

The following process should be implemented after determining the values of through trips, to update the through trip file:

1. Use the existing through trip structure and change the values for the daily through trips by purpose.
    a. Column A is the origin zone (1-100)
    b. Column B is the purpose (1=HW 2=HS 3=HK 4=HC 5=HO 6=WO 7=OO 8=HY . Although replaced by the truck matrix, the other purposes are 9=TS 10=TM 11=TH)
    c. Column C is the matrix file (always 1)
    d. Column D repeats the origin number (1-100 same as A)
    e. Columns E-DA are the destination with E=1 and DA=100
2. Save the file as a CSV when finished editing

Economic Factors

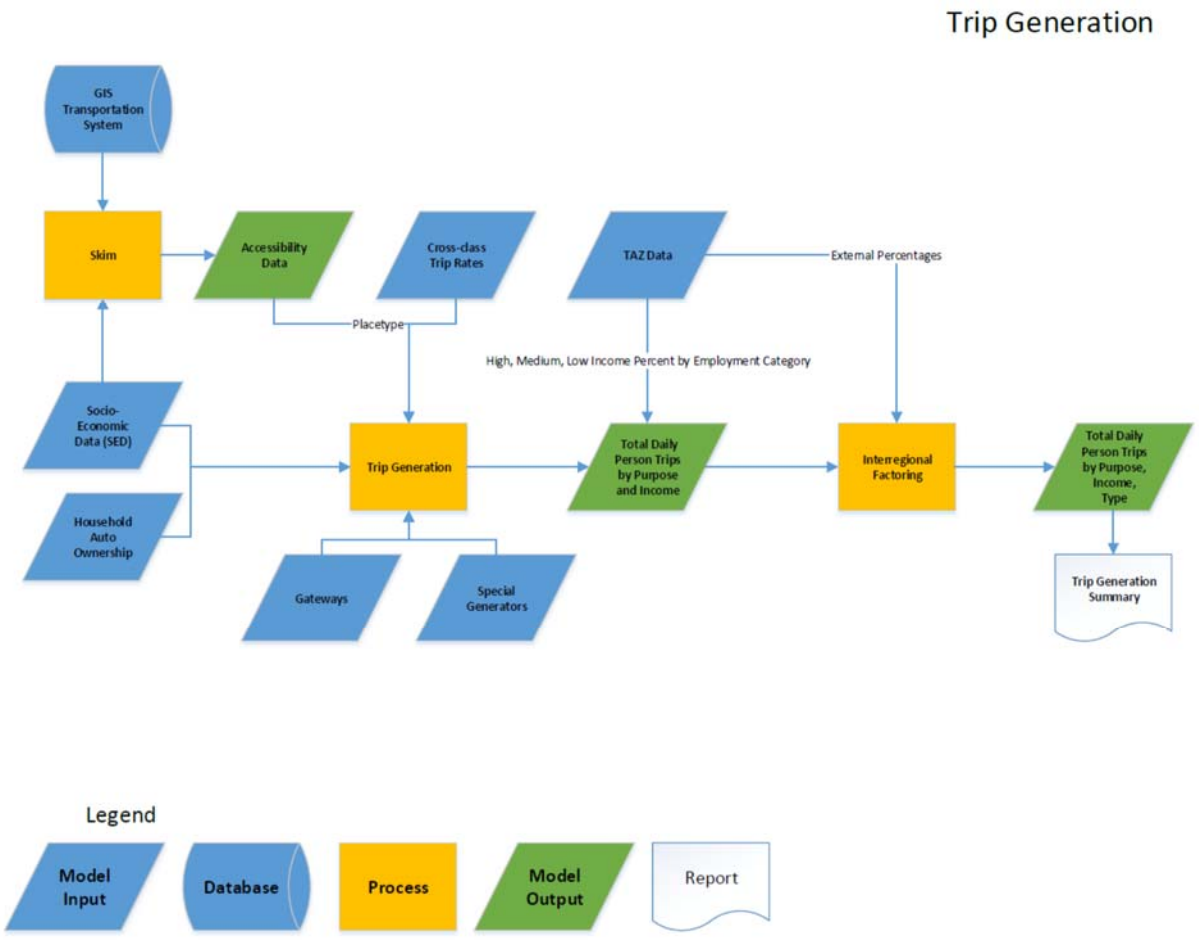
The percentage of employees by job type for high, medium, and low income groups. Hard coded.



The hard coded information on this tab combined with the lookup value for imported and exported trips by each Census place are combined into the TAZ_Data worksheet.

Trip Generation

When changing the land use control totals, socio-economic data assumptions (household income, size, etc), evaluating large development projects or specific/general plans, or significant changes within our outside the model area, checking the trip generation balancing and interregional travel from the Statewide Model is appropriate. The flowchart on the following page describes how the data and processes for trip generation interact and where the interregional factors come are integrated with the model. The flowchart on the subsequent page shows the interaction with the Statewide model (or household survey/Big Data). For instructions on changing the inputs, see the previous sections for Land Use Preparation or Socio-Economic Data Preparation. The Non-Highway Validation spreadsheet summarizes the production and attraction balancing by purpose, and the following section describes using the trip generation spreadsheet to adjust the local and interregional factors to balance the trip generation.



Other Factors

The model was estimated and calibrated to reflect the base year travel conditions and to roughly approximate data from multiple sources (CHTS, HPMS, traffic counts, etc). The inputs such as demographics, income ranges, split between job classes, etc as described in the previous sections along with associated the interregional travel are the most frequently modified inputs to reflect scenarios or assumptions, but other factors such as auto operating cost, vehicle ownership\availability, sensitivity to mode, value of time, are generally assumed constant. Calibration factors are usually only modified based on new data refer to the Model Development Report to determine when\how to update the values.

CREATING MAPS USING VMIP MODELS

Although the base and model data can be used to make many different maps, the recommended maps to review inputs and most often used output maps are automated and have GIS files and MXD map files included with the model structure. The information below summarizes the maps already included in the model and highlights the process for setting up, reviewing, and modifying the maps.

OVERVIEW OF VMIP MODEL GIS MAPS AND DATA

Before starting to make maps, some key things to keep in mind.

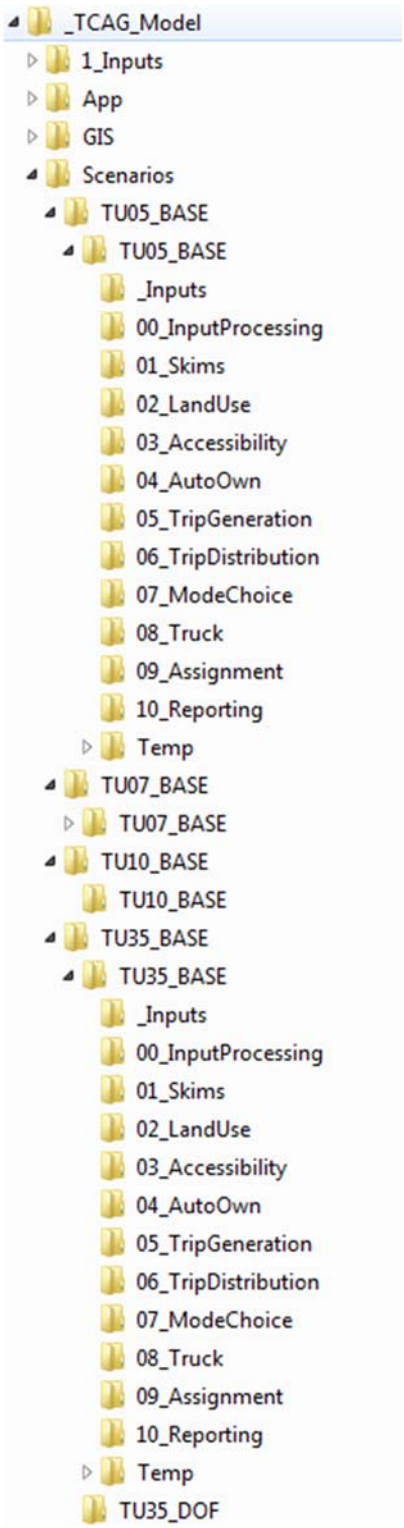
- Cube Catalog and Application Manager rely on the relationships (parent, child, sibling) between scenarios and inherited attributes (i.e. file locations and variable values). This concept was replicated in the included GIS map MXD files by referencing model data in a relative file structure (see details below)
- Base data that do not change by scenario are located in the Master.GDB and all other scenario specific data are contained in the Results.MDB within the scenario directory.
- To make maps using different symbology or variables, refer to the documentation tables for list of variables and values.

GIS MODEL DIRECTORY STRUCTURE

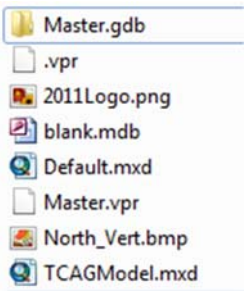
- Model Directory
    - 1_Inputs: Input files, Parameters Workbooks, Scenario Summary
    - App: Model scripts and applications
    - GIS
        - Master.gdb: street centerline files, city and county boundary, TAZ boundary
        - Blank.mdb: empty template geodatabase correctly projected for each model. When model is run file is copied as Results.mdb in the scenario directory. During the model run, scenario highway networks (input and loaded) and post-processer results are copied for access by the scenario MXD.
        - Default.mxd: template map file used for input review before running full model and output mapping for scenarios. When model is run file is copied as SCENARIO_NAME.mxd in the scenario directory. Relative reference to Master.gdb and Results.mdb
        - MODELNAME.mxd: Master map file used for displaying the basic comparisons of standard scenarios (2005, validation year, 2020, 2035, and 2040). Relative link to Master.gdb and Results.mdb for standard scenarios.

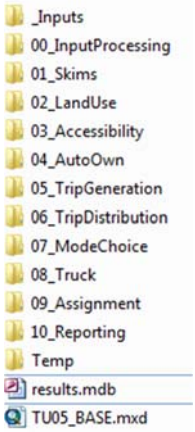
        - Images and layer files for background information or layout file for printing: F&P logo, north arrow, and National Geographic topographic and aerial maps.
- Scenarios: Model runs. Example for 2 years and 3 scenarios below
    - SCENARIOYR1_BASE
        - SCENARIOYR1_NAME1
            - Model directories (13 directories of model data)

        - Results.mdb
        - SCENARIOYR1_NAME1.mxd
    - SCENARIOYR1_NAME2
        - Model directories (13 directories of model data)
        - Results.mdb
        - SCENARIOYR1_NAME2.mxd
    - SCENARIOYR1_NAME3
        - Model directories (13 directories of model data)
        - Results.mdb
        - SCENARIOYR1_NAME3.mxd
- SCENARIOYR2_BASE
    - SCENARIOYR2_NAME1
        - Model directories (13 directories of model data)
        - Results.mdb
        - SCENARIOYR2_NAME1.mxd
    - SCENARIOYR2_NAME2
        - Model directories (13 directories of model data)
        - Results.mdb
        - SCENARIOYR2_NAME2.mxd
    - SCENARIOYR2_NAME3
        - Model directories (13 directories of model data)
        - Results.mdb
        - SCENARIOYR2_NAME3.mxd



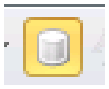
An example from the Tulare model is shown in the image to the right, with the directory tree expanded. Contents of the GIS directory (left) and the TU05_BASE scenario (right).

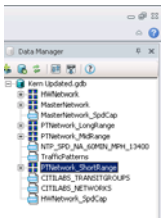




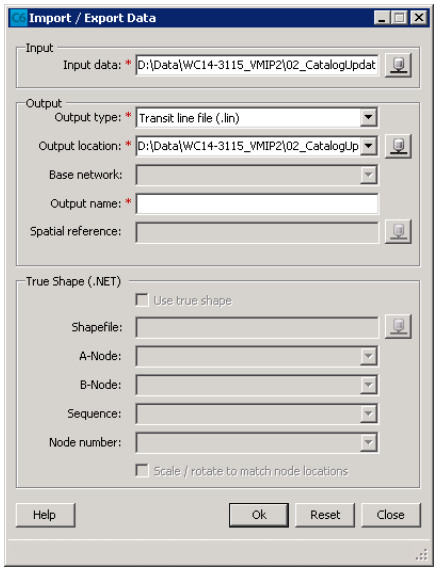
IMPORTING\EXPORTING DATA FROM GEODATABASES

The GIS maps can only work with GIS based data (geodatabases and shape file), not the Cube standard files (highway .NET or transit .LIN). Cube has an easy to use data manager to import and export data between the different formats.

- If the database is not already loaded, click on  and load the data in the 01_Inputs\3_Highway



- To export a highway network or transit line, right click on the layer and select Export. Select the output location (default is the geodatbase so most likely change to a directory instead) and output type (this example is .LIN), enter a file name for the output, and then click OK. After the Operation Complete message shows up, click Close.



- To import a highway network or transit line, the same dialog box is used as export but the Input data should be a .NET or .LIN.

- For a highway network, a shape file that relates to the .NET can be specified for a true shape display within the geodatabse.
- For a .LIN, an underlying highway network must also be specified.

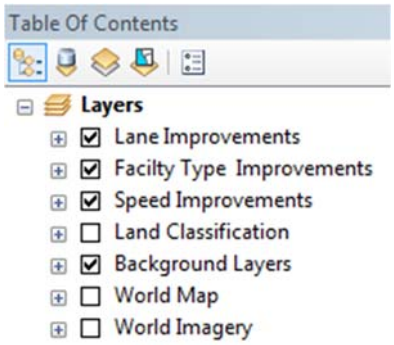
Other datasets can also be added to the geodatabase, but it is recommended that most other files be added to the master geodatabase rather than the highway database to limit file size, maximize usability, and reduce the risk of corrupting the highway or transit networks.

MASTER MODEL MAP FILE

The MODELNAME.mxd is used to map the inputs for the standard scenarios (2005, validation year, 2020, 2035 and 2040) and is contained within the MODELDIRECTORY\GIS folder with relative link to the scenario results geodatabase for only two levels of scenario directories following the MODELDIRECTORY\Scenarios\Level1\Level2\Results.mdb

The master model map file contains three basic types of information:

- Highway network lanes, facility type and speed
- TAZ boundary
- Background layers such as county or city boundary, and aerial or topographic maps

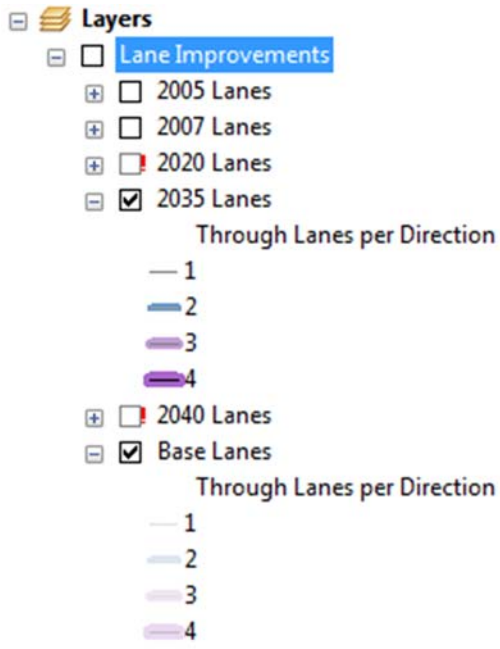


The Table of Contents of this Map file is shown below to the right.

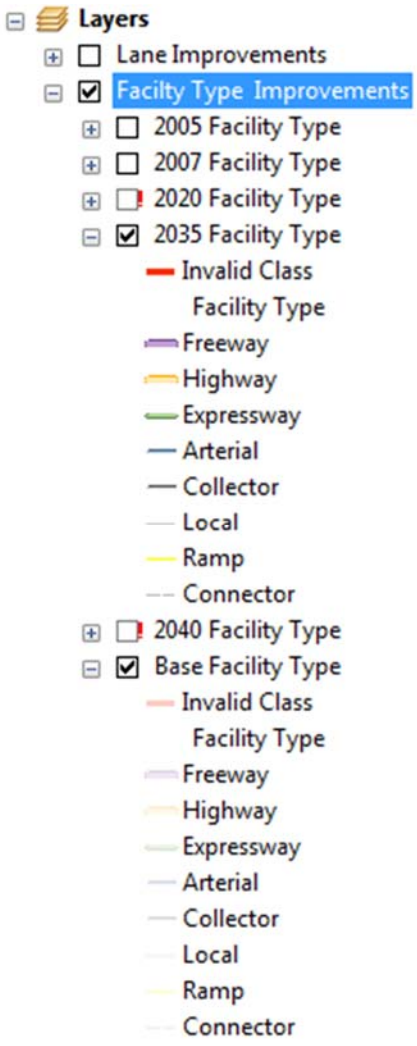
MASTER MAP HIGHWAY DATA

The highway network lanes, facility type, and speed are bold colors for the scenario year (after improvements are implemented), with the same symbology but muted intensity for the validation year. By overlaying the information and toggling on or off, the changes between years can quickly be seen. The change between the validation year and the scenario year are not yet standard outputs, but will be in upcoming enhancements. A discussion of each of the primary highway network maps is in the following sections.

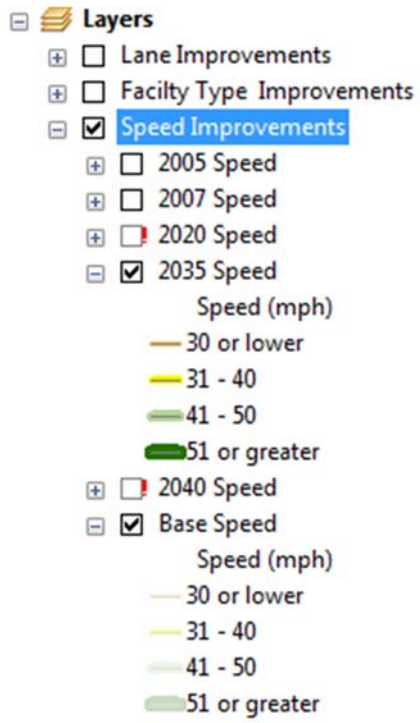
Master Map Lane Improvements



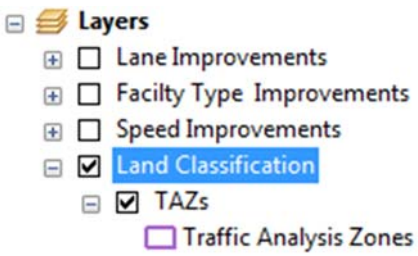
Master Map Facility Type Improvements



Master Map Speed Improvements

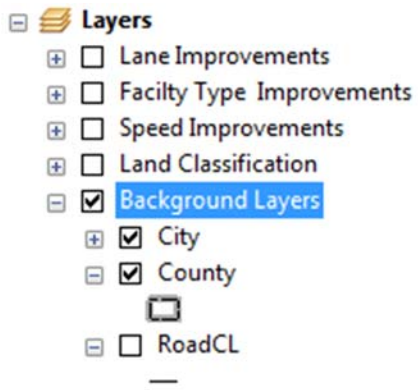


Master Map TAZ Data



MASTER MAP BACKGROUND DATA

Master Map Background Base Data



COMMON VARIABLES AND VALUES FOR CREATING GIS MAPS

This section has most commonly used variables and values. For full descriptions see the model documentation.

LAND USE

Type	Attribute	Description	Units
Geographic	TAZ	Traffic Analysis Zone ID	
	STATE	State	
	COUNTY	County	
	PUMA	Census Public Use Microdata Area	
	CITY	City	
	TRACT	Census tract ID	
	BLOCK	Census block ID	
	MODEL	Model ID	
	PLACETYPE [1]	Placetype category	
Residential	TOTHH	Total Households	Households
	RU1, RU2, … RU10 [2]	Households by Residential Unit Type	Households
	RUG1, RUG2, RUG3 [2]	Households by Residential Unit Type Groups	Households
	RUG1SPARE, … RUG7SPARE	Unused in current model but available for expanding grouping of residential unit types.	
Non-residential [3]	TOTEMP	Total employees	Employees
	EMPEDU	Educational Services (61-63)	Employees
	EMPFOO	Accommodations (721), Food Services (722), Arts, Entertainment and Recreation (71)	Employees
	EMPGOV	Public Administration (92)	Employees
	EMPIND	Utilities (22), Construction (23), Other Services Except Public Administration (81), Wholesale Trade (42), Transportation and Warehousing (48-49)	Employees
	EMPMED	Health Care and Social Assistance (62)	Employees

	EMPOFC	Information (51), Finance and Insurance (52), Real Estate, Rental and Leasing (53), Professional, Scientific, and Technical Services (54), Management of Companies and Enterprises (55), Administrative/Support, Waste Management & Remediation (56)	Employees
	EMPOTH	Mining, Quarrying, Oil and Gas Extraction (21), Manufacturing (31-33)	Employees
	EMPRET	Retail Trade (44-45)	Employees
	EMPAGR	Agriculture, Forestry, Fishing and Hunting (11)	Employees
	EMPSPARE1, … EMPSPARE8	Unused in current model but available for expanding employment categories	
	POPDORM	Group Quarters population: School (Dormitory, Fraternity, Sorority)	People
	POPASSIST	Group Quarters Population: Medical (Assisted living, retirement home)	People
	POPMILITARY	Group Quarters Population: Military (Military base if not special generator)	People
	POPINST	Group Quarters Population: Institutionalized population (prison, mental health, etc)	People
	ELEM	Elementary and middle school enrollment	Student Enrollment
	HS	High school enrollment	Student Enrollment
	COLLEGE	College enrollment	Student Enrollment
Scenario	YEAR	Scenario year	
	SCEN	Scenario name	
	MPO	MPO	
	Comments	Scenario comments	

Notes:

1. See Table 3.2-3 for place type categories.
2. See Table 3.2-4 for residential unit type categories.
3. Non-residential description contains NAICS sector number(s).

Source:

ROADWAY NETWORKS

Highway network variables and values are listed below.

Highway Facility Type (FACTYP)
1. Freeway
2. Highway
3. Expressway
4. Arterial
5. Collector
6. Local
7. Ramp: Freeway-Freeway
8. Ramp: Slip
9. Ramp: Loop
10. Connector: Dist. ≤ 0.25
11. Connector: Dist. > 0.25

Master network variables

Attribute	Description
Nodes	
X	X-coordinate of node in Nad 83
Y	Y-coordinate of node in Nad 83
N	Node number
TAZ	Traffic Analysis Zone Number
DISTRICT	Super district number used for aggregation
SOI	Sphere of influence used to number TAZs alphabetically
STYINT	Study location number used to record turning movements when non-zero
COUNTY	County where node is located

Attribute	Description
JURISDICTION	Political jurisdiction where node is located
COMMUNITY	Community/district name
Links	
A	A node
B	B node
DISTANCE	Distance in miles
NAME	Local street name
ROUTE	Numerical state route number
TERRAIN	Terrain (F=Flat , R=Rolling, M=Mountain)
JURISDICTION	Political jurisdiction where link is located location
SCREENLINE	Screenline by direction (See Figures 3-1.1 through 3.1.10)
XXXX_PRJID [1]	RTP Project ID number
XXXX_PRJYR [1]	RTP Project Opening Year
XXXX_FACTYP [1]	Facility type by year [2]
XXXX_AREATYP [1]	Area type by year [2]
XXXX_LANES [1]	Number of directional through travel lanes by year [2]
XXXX_AUX [1]	Auxiliary lane (0=no, 1=yes)
XXXX_SPEED [1]	Free-flow speed in miles-per hour by year [3]
XXXX_CAPCLASS [1]	Capacity class by year (derived from Terrain, Facility type, and Area Type) [2]
XXXX_CAPACITY [1]	Vehicle per hour (calculated based on Lanes and CapClass) [4]
XXXX_USE [1]	Identifies vehicle prohibitions by year [5]
XXXX_TOLL [1]	Code used for cost on toll facilities by year [3]
AREATYP	Character to store scenario variable
AIRBASIN	Air basin number for air quality or County number in multi-county models
TSM	Transportation System Management
EJ	Environmental Justice designation (0 or 1)

Notes:

XXXX represents BASE (calibration/validation year), IMP1 (status after first improvement), and IMP2 (status after second improvement). In addition to calibration/validation year which varies by MPO, required years to be covered by improvement are 05, 20, 35, and 40.

See Tables 3.3-2 for details on CapClass by Terrain, Facility Type, and Area Type.

See Tables 3.3-3 for Speed ranges by Terrain, Facility Type, and Area Type.

See Tables 3.3-4 for details on Capacity by Terrain, Facility Type, and Area Type.

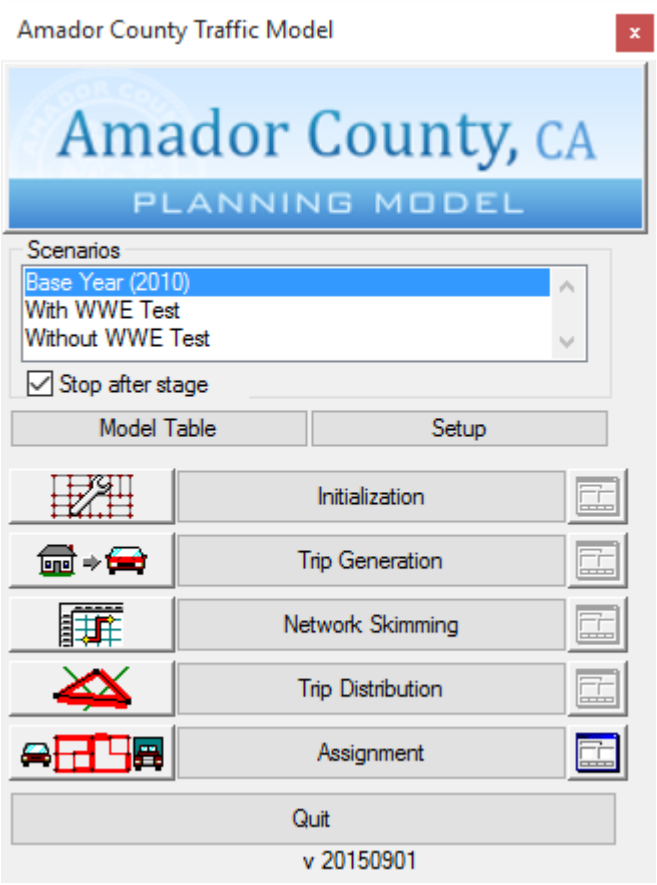
0 or 1=facility open to all (“general purpose”) ; 2=Carpool 2; 3=Carpool 3+; 4=Combination trucks prohibited; 5=Walk or bike only

TRANSCAD MODEL DATA PREPERATION AND REVIEW

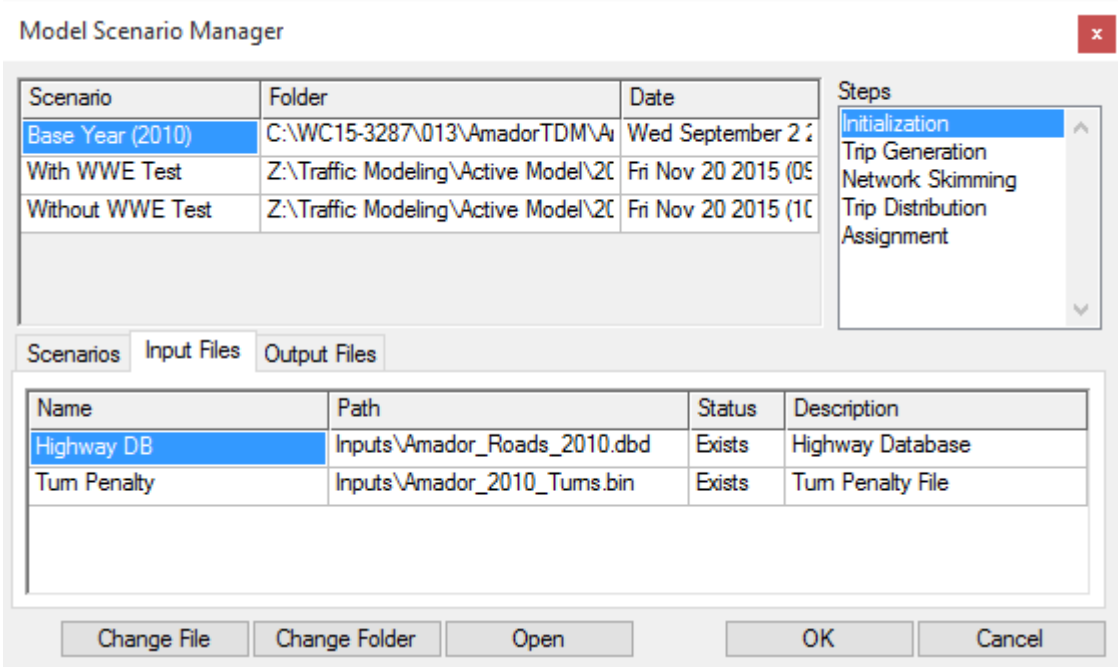
A recommended practice is to check the highway network geographic file for accurate information and link connectivity before running model scenarios. The first step is to open the network geographic file in TransCAD and visually inspect the attributes. The second step is to review and update the land use data. The final step is to review update the through trips.

Although browsing the directory structure is possible, the easier and recommended method for interacting with the files for each scenario is by using the scenario manager. Using the scenario manager reduces the time searching for files and also edits the files being used by the model directly. It is also a second chance to check that the files being edited are correctly linked to the scenario.

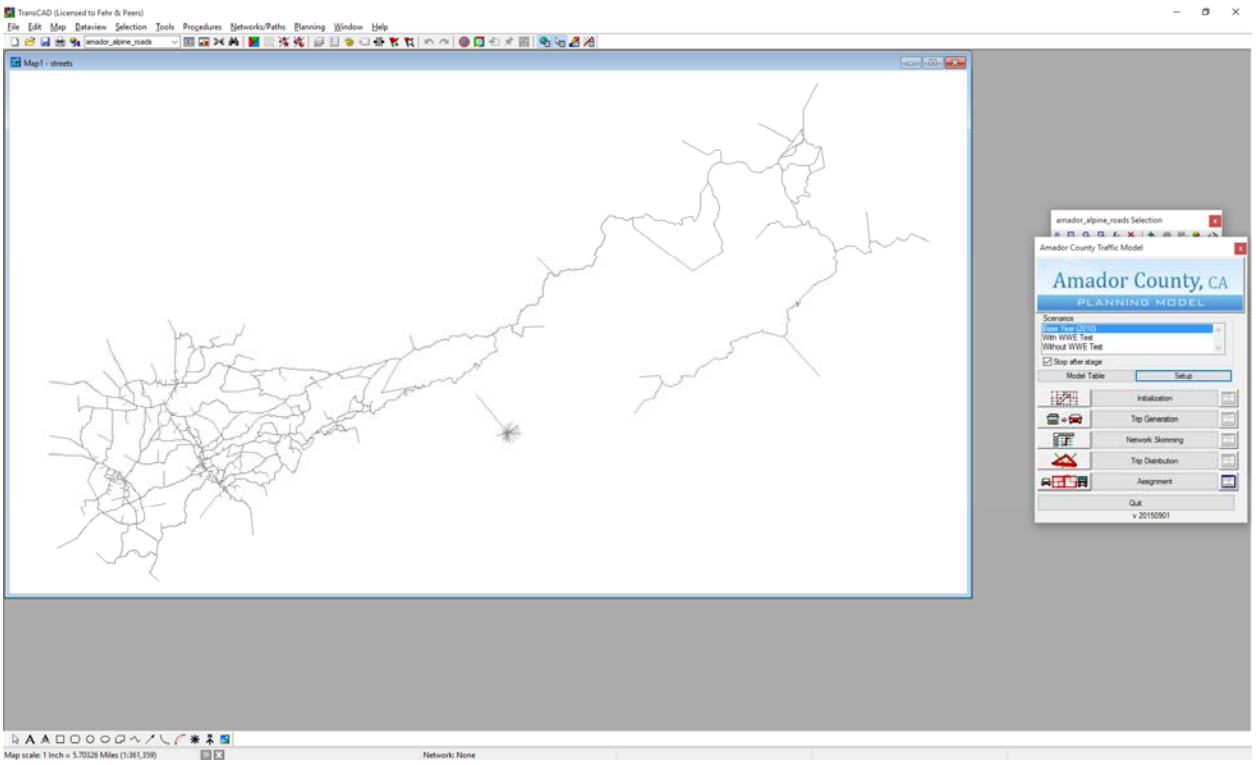
- Select **Tools->Add-ins->Amador County Traffic Model**
- The user interface will appear with the pre-defined scenarios



- Click Setup and select the appropriate scenario, Initialization in the Steps box, and Highway DB in the Input Files tab. Then click Open



- The roadway network geographic files opens. Click OK to close the dialog box.



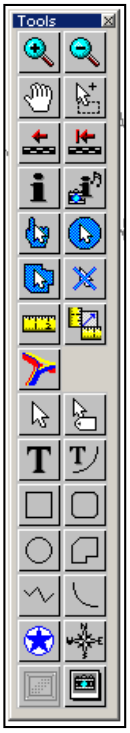
DISPLAYING DATA

The most common task for model users is to display data produced by the model. This section explains how to display various types of data produced by TransCAD models.

DISPLAYING NETWORK DATA

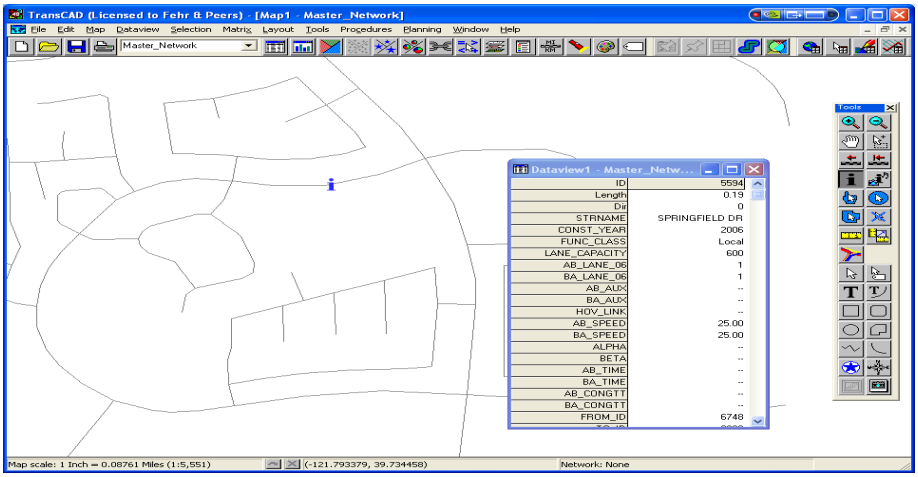
Follow these steps to display network data.

1. In TransCAD, open the master network file. The road link layer displays as the default.
2. The toolbox (a window filled with various icons) should appear on the right side of the screen. If it does not, click **Tools || Toolbox** to activate it.

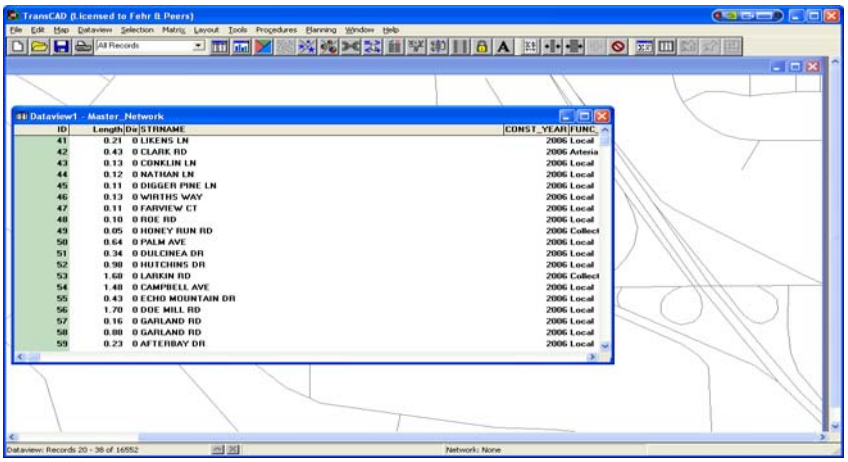


TransCAD's main toolbox

3. Click the Information icon (), then click any link. The link attributes will appear in a new window.



4. To see the attributes of all links simultaneously, click the New Dataview () icon. A new window with a dataview will appear.



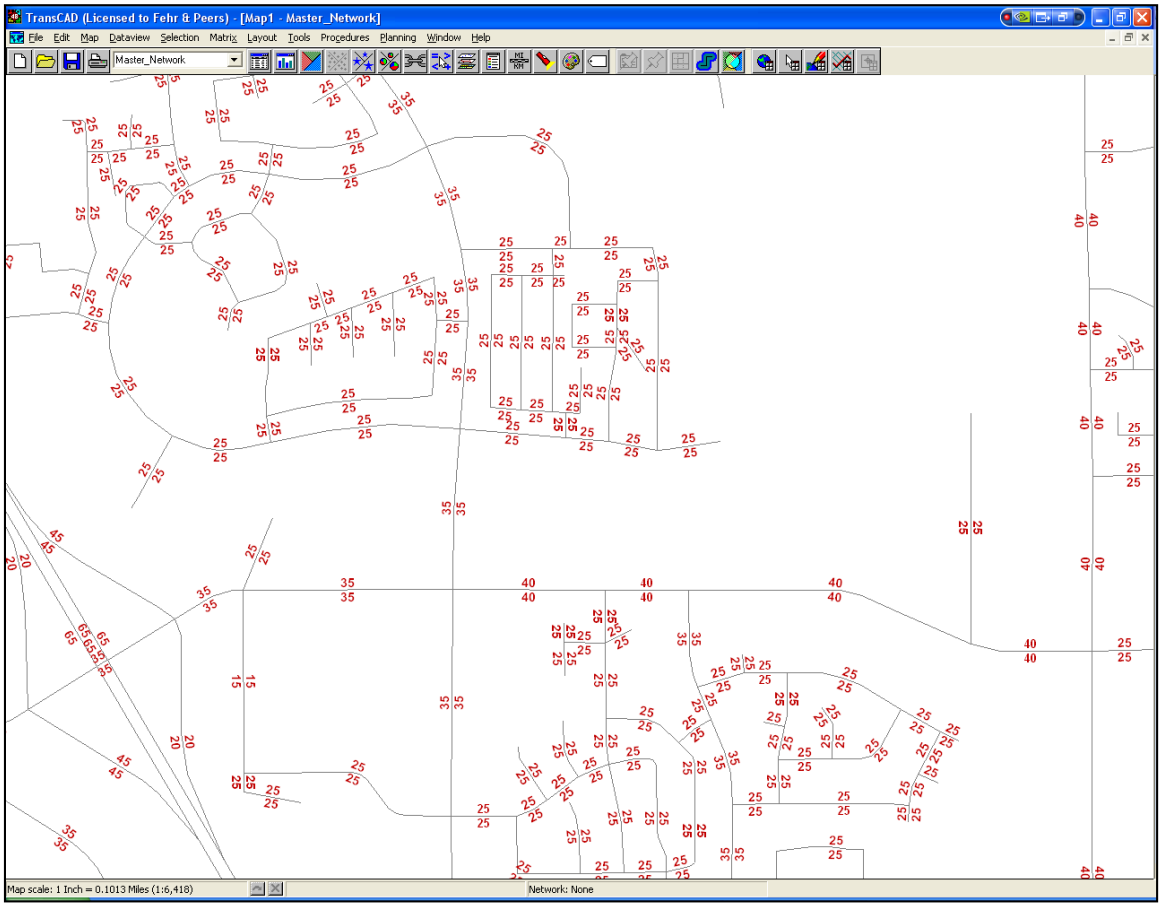
5. If you right-click within this window you can sort and manipulate this data in various ways. For example, it is often useful to sort data so you can quickly find links.

6. Close the dataview window and zoom in on an area using the Zoom () icon in the toolbox.

7. Click the Automatic Labels icon (). The Automatic Labels window opens with a pull-down selection of fields to display. Choose a field, such as speed or capacity. You can then choose the font and position for the labels.

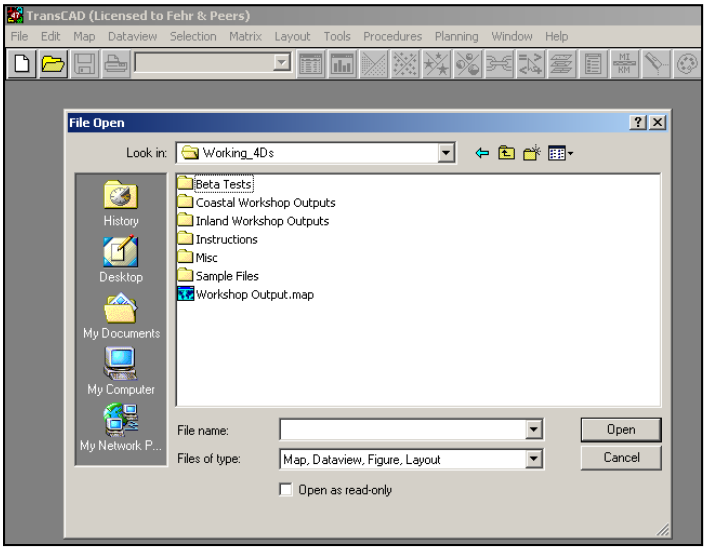
   You can experiment with options such as "Allow Duplicates" and "Frames" until you find a style that meets your needs.

The figure below is a typical TransCAD display of link speeds.



In addition to displaying network data through TransCAD, the loaded network is also saved as a GIS shape file so it can be viewed in any GIS software.

DISPLAYING TABULAR DATA



Most of the data in the model is stored in the tabular format in *.dbf, *.bin, and *.mtx files. Follow these steps to display this data:

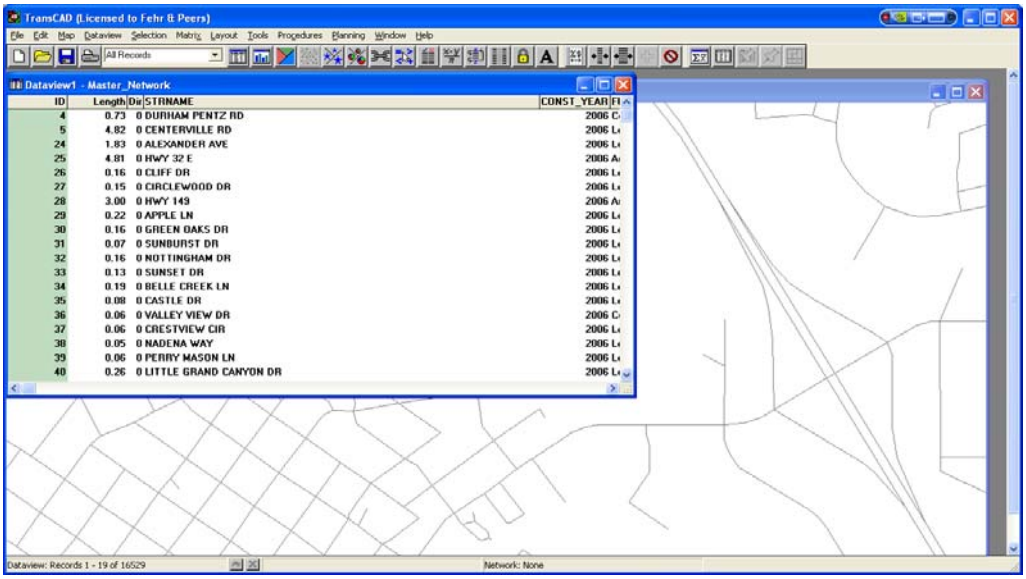
1. Click on the “open file” icon at the top of the screen. A new window appears.
2. Select the file type from the drop-down menu.
3. Double-click on a file name. The data appears in a new window.

DISPLAYING OTHER MODEL ATTRIBUTES STORED OUTSIDE THE NETWORK FILES

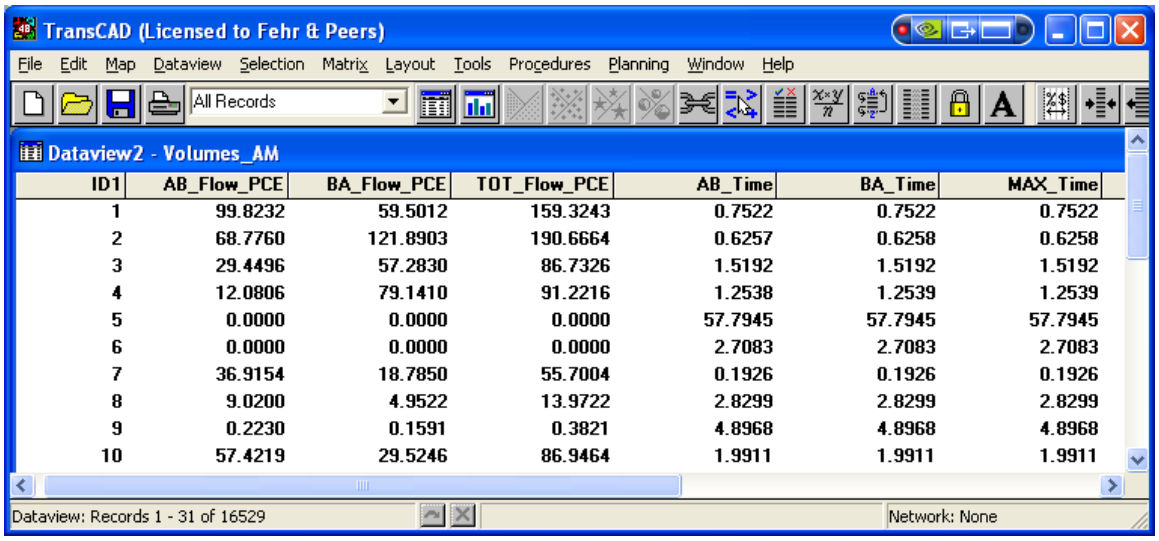
Most traffic modeling software packages produce loaded network files that have fields showing all link attributes. TransCAD is different in that it stores output link attributes in tabular format.

Any link or node attributes in a file could be manually linked (joined) to the network using the common field (Link ID or Node ID, respectively) in order to display the desired data. This process is summarized below:

1. In TransCAD, open a Network file (*.DBD). The Link Layer (streets) displays as the default.

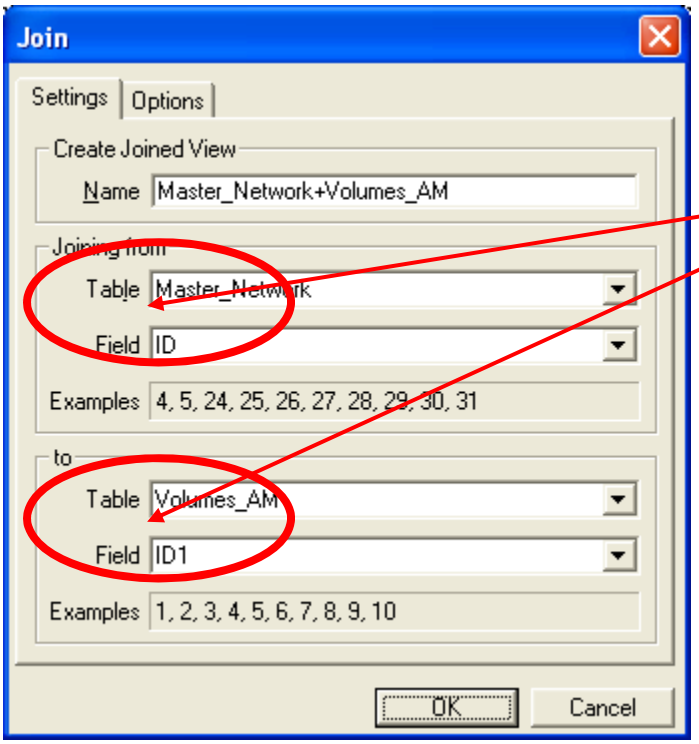


2. Open the desired network-related database file



ID1	AB_Flow_PCE	BA_Flow_PCE	TOT_Flow_PCE	AB_Time	BA_Time	MAX_Time
1	99.8232	59.5012	159.3243	0.7522	0.7522	0.7522
2	68.7760	121.8903	190.6664	0.6257	0.6258	0.6258
3	29.4496	57.2830	86.7326	1.5192	1.5192	1.5192
4	12.0806	79.1410	91.2216	1.2538	1.2539	1.2539
5	0.0000	0.0000	0.0000	57.7945	57.7945	57.7945
6	0.0000	0.0000	0.0000	2.7083	2.7083	2.7083
7	36.9154	18.7850	55.7004	0.1926	0.1926	0.1926
8	9.0200	4.9522	13.9722	2.8299	2.8299	2.8299
9	0.2230	0.1591	0.3821	4.8968	4.8968	4.8968
10	57.4219	29.5246	86.9464	1.9911	1.9911	1.9911

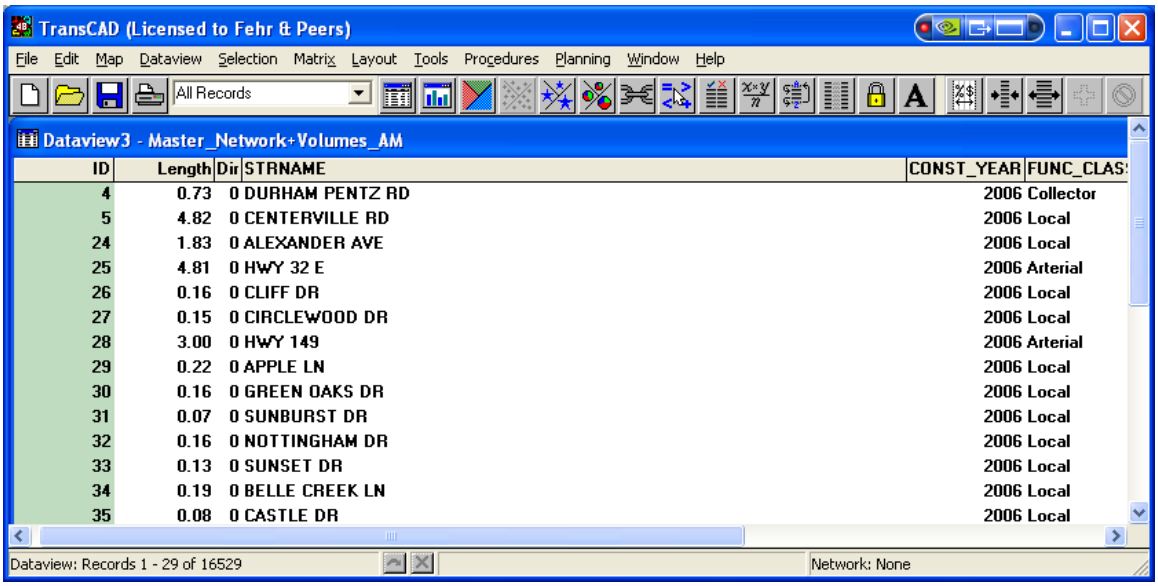
3. Click **Dataview || Join…** or Join () on the tool bar. The Join window opens. Make sure the table names are correct.



To join databases, you must identify a field that is common to both databases. In this case, the field is named differently: "ID" and "ID1". But ID=1 in the "Network" table is the same link as ID1=1 in

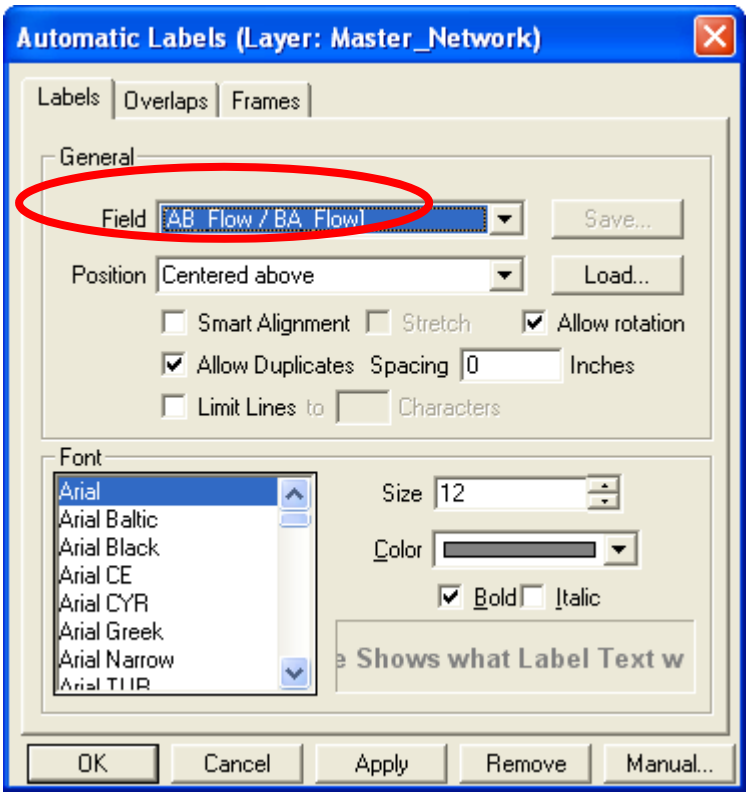
4. Click **OK**. Now, two database sets are joined, which means the data can be accessed from the network. If you scroll across the table, you will find that it now contains the fields from both files. If both files use the same field names, TransCAD will change them slightly to keep the names unique

(the altered field names are temporary and will automatically revert to their original names when the files are no longer joined). Hence the “ID” and “ID1” names in the above example.

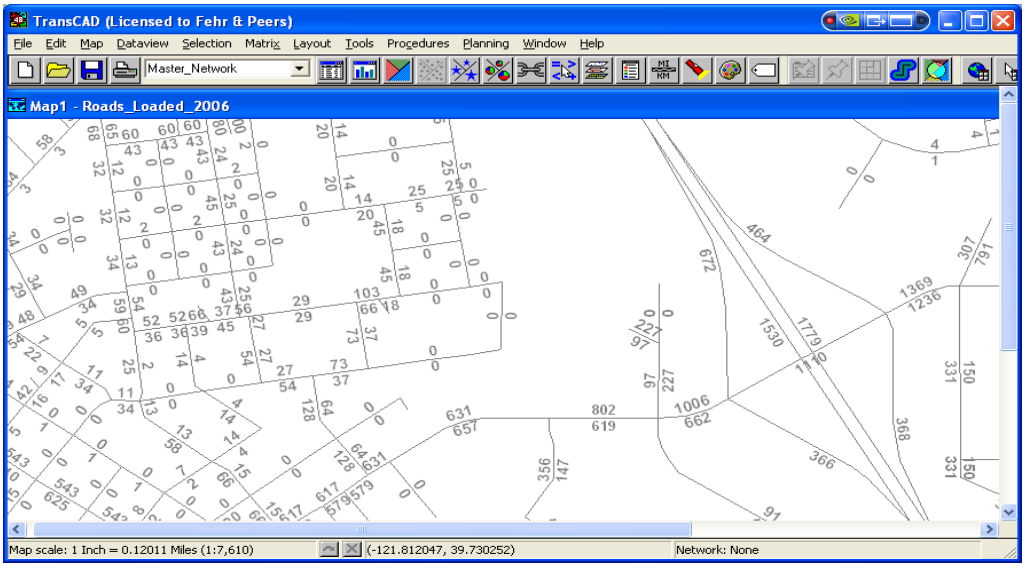


ID	Length	Dir	STRNAME	CONST_YEAR	FUNC_CLAS
4	0.73	0	DURHAM PENTZ RD	2006	Collector
5	4.82	0	CENTERVILLE RD	2006	Local
24	1.83	0	ALEXANDER AVE	2006	Local
25	4.81	0	HWY 32 E	2006	Arterial
26	0.16	0	CLIFF DR	2006	Local
27	0.15	0	CIRCLEWOOD DR	2006	Local
28	3.00	0	HWY 149	2006	Arterial
29	0.22	0	APPLE LN	2006	Local
30	0.16	0	GREEN OAKS DR	2006	Local
31	0.07	0	SUNBURST DR	2006	Local
32	0.16	0	NOTTINGHAM DR	2006	Local
33	0.13	0	SUNSET DR	2006	Local
34	0.19	0	BELLE CREEK LN	2006	Local
35	0.08	0	CASTLE DR	2006	Local

5. Click **Labels** on the tool bar; the Label window appears. Display the data set by selecting the appropriate attribute in the **Field** menu. Select other options (Allow Duplicates, Font, Size, Color) as necessary.



6. Click **OK**. TransCAD will display the desired data in a figure like the one shown below.

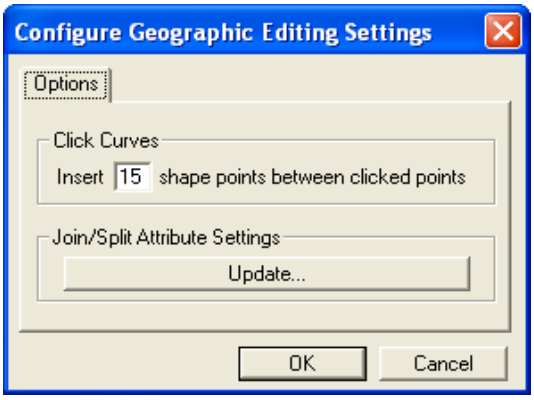


CONFIGURING THE LINK ATTRIBUTE SETTINGS

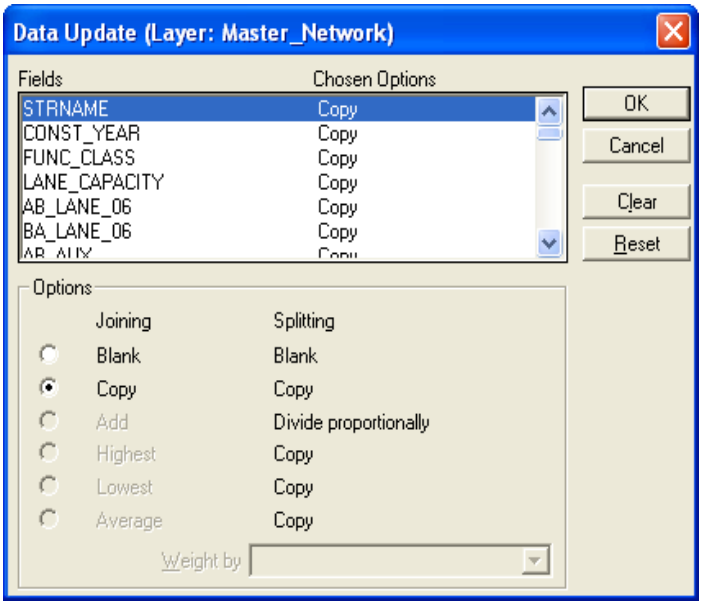
Before you edit the network file in TransCAD, you need to configure the Geographic Editing Setting, which determines how TransCAD handles the link attribute data when links are merged or split.

1. Open the Map Editing Toolbox by selecting “Toolbox” from the **Tools || Map Editing** menu. Refer to “Using the Line Editing Tools,” page 570, in the *TransCAD User’s Guide* for a detailed description of each icon in the Toolbox.

2. Click **Configure Settings** () in the Map Editing Toolbox, then click **Update** in the Configure Geographic Editing Settings dialog box.



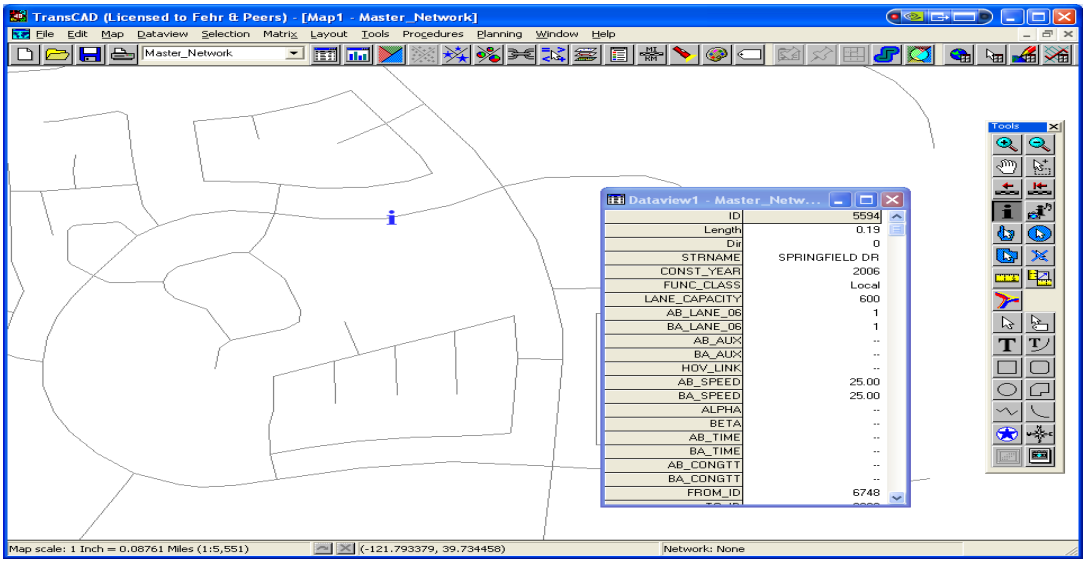
3. In the Data Update dialog box, choose an appropriate option for each data field. For example, splitting a link should not change the free flow speeds, so select “copy” for that field. In contrast, splitting a link should change the length, so for that field, select “divide proportionally.” When finished, click **OK**. You are now ready to edit the network file.



EDITING THE ATTRIBUTES OF A SINGLE LINK

Follow these steps to edit the attributes of a single link.

1. Open the network file (*.DBD) using TransCAD. Zoom in to where you want to edit.
2. Use the “info” icon to select the link that you want to edit. A new window displays the attributes of the chosen link.
3. Double-click any attribute to change the stored value.



The network and node variables are listed in the table below.

Field	Description
Link Layer Attributes	
ID	Model roadway link ID number
Length	Length of link in miles
Dir	Flag for one-way streets. 0=two-way, 1=one-way
Name	Street Name
AB_LANE / BA_LANE	Number of lanes in AB and BA direction
AB_CAP / BA_CAP	Capacity in AB and BA direction
AB_SPEED / BA_SPEED	Free-flow speed in AB and BA direction
FUNC_CODE	Code for roadway functional classification
FUNCTIONA1	Text description of roadway functional classification
Daily_CNT	Field where daily traffic count data can be stored (not used in this version of the model)
AB_Hourly_Capacity / BA_ Hourly_Capacity	Total hourly capacity (lanes multiplied by AB/BA_CAP)
AB_Daily_Capacity / BA_ Daily_Capacity	Total daily capacity (hourly capacity multiplied by 12)
Alpha	Traffic assignment parameter
Beta	Traffic assignment parameter
From_ID	Placeholder for GIS database correspondence (not used in this version of the model)
To_ID	Placeholder for GIS database correspondence (not used in this version of the model)
Max_Dev_24	Caltrans' maximum allowable deviation for corresponding traffic counts
Node Layer Attributes	
TAZ	TAZ number for each centroid
Study_Intersection	Identification of study intersections. The turning movement volumes will be populated for nodes with any numeric value.

Notes: Bold indicates the input network fields.

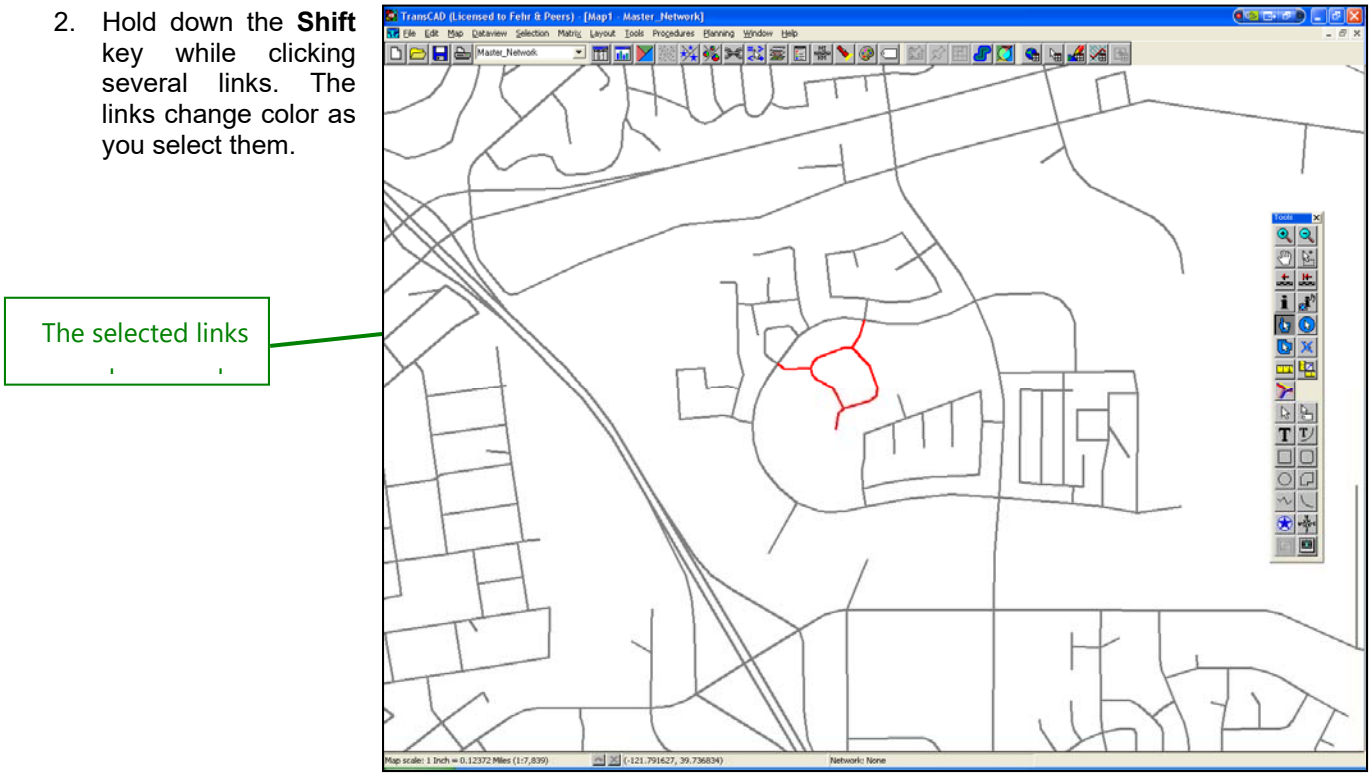
Other fields in the model network are kept for informational purpose.

Network attributes with AB and BA labels store directional information. If a link is drawn from point A to point B, the point A to point B direction is the AB direction, and it is also called topology direction.

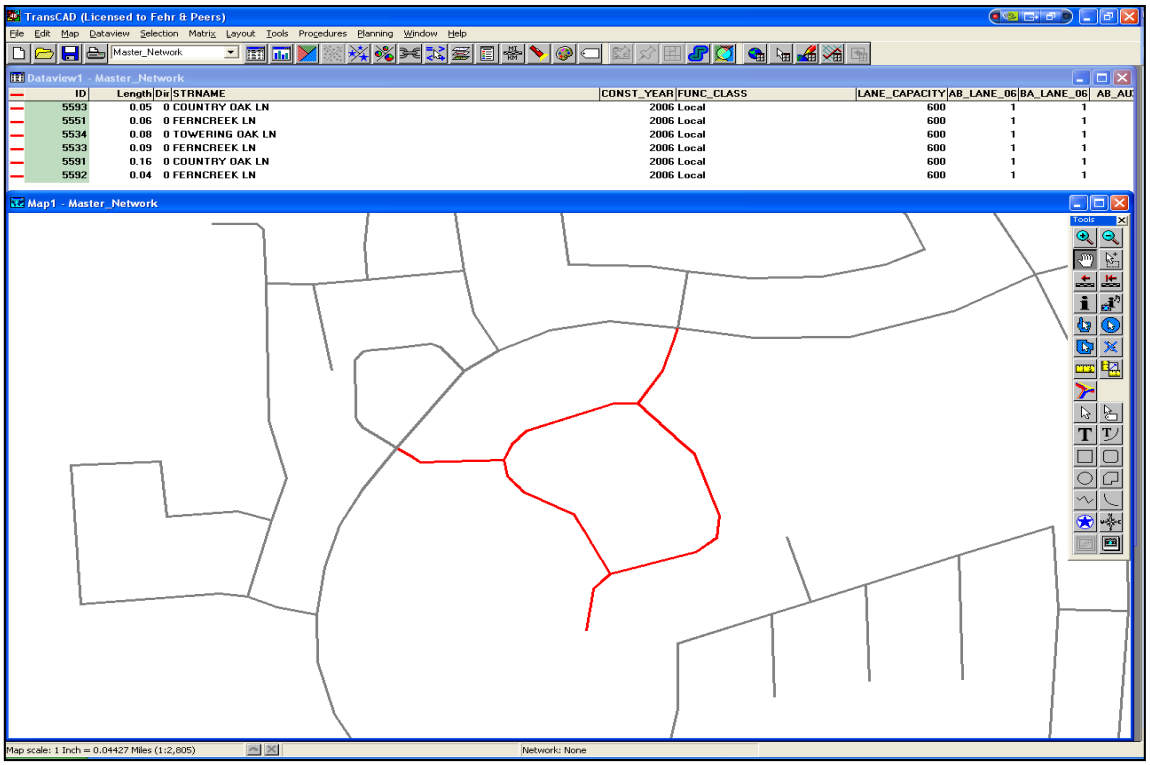
EDITING THE ATTRIBUTES OF MULTIPLE LINKS

Follow these steps to edit the attributes of multiple links.

1. Click the Select by Pointing icon in the map editing toolbox ().
2. Hold down the **Shift** key while clicking several links. The links change color as you select them.



3. Click the New Dataview icon () at the top of the screen. Open the dropdown box (which is located just to the left of the New Dataview button) and choose “Selection.” The attributes of the chosen links display.

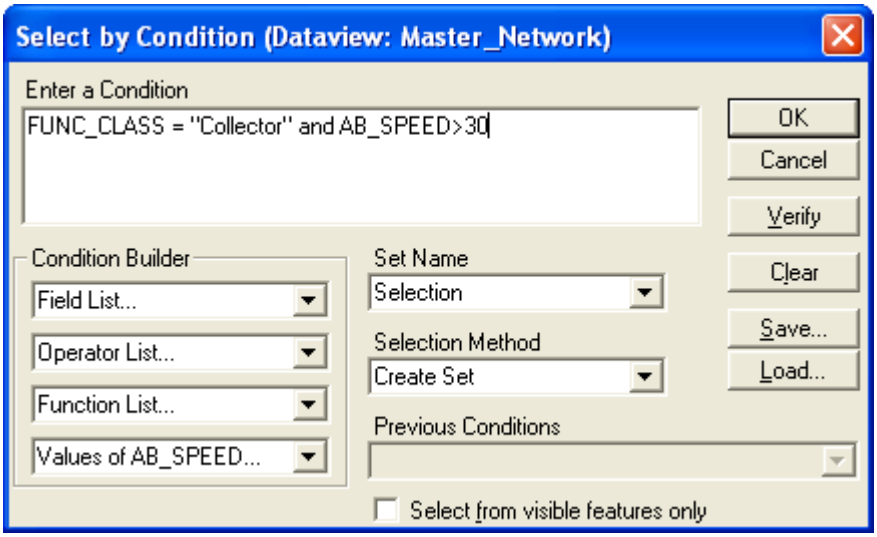


4. Click any of this data to change it. You can also click on a field name to change all of the data in a field, or click-and-drag to select several cells. You can then right-click to fill in the selected cells with a value or with a formula.

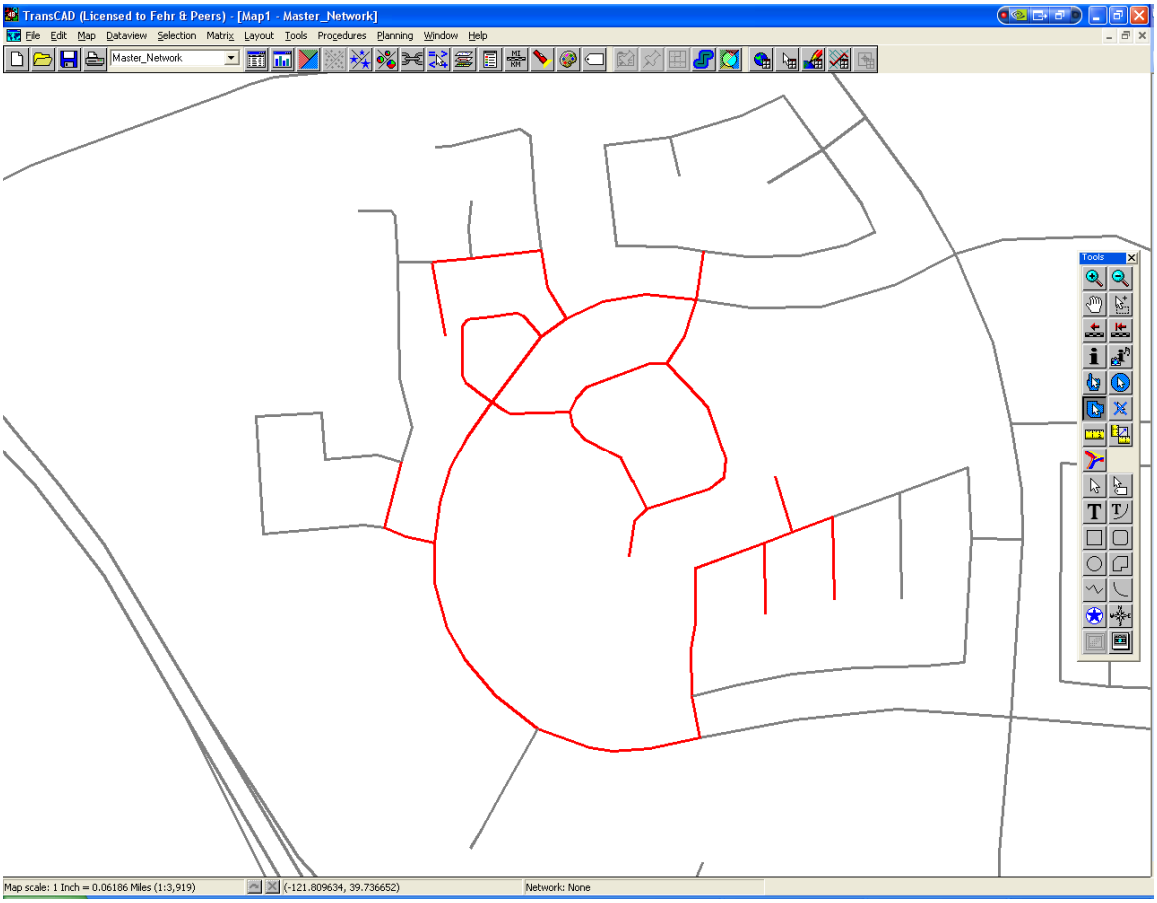
5. A second way to select several links at a time is to use **Selection || Select by Condition**. A new window will appear. You can then use the menus to create a condition to evaluate, similar to a "query" function. For example, if you want to select all links on collectors that had speeds higher than 30 MPH, you would do the following:

    - Under "field list" select "Func_Class"
    - Under "Operator List" select "="
    - Under "Values of "Func_Class" select "Collector"
    - Then in the condition box type "and"
    - Under "field list" select "AB_SPEED"
    - Under "Operator List" select ">"
    - Under "Values of "AB_SPEED" select "30"

The formula should now read: Func_Class = "Collector" and AB_SPEED > 30. Click **OK**, and TransCAD will select all links meeting this condition.



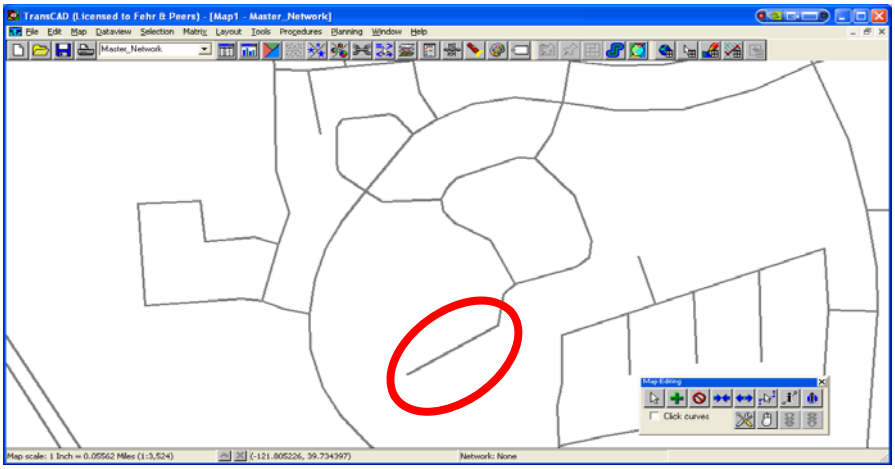
6. A third way to select multiple links is with the Select by Shape () function in the map editing toolbox. You can then use the mouse to draw an enclosed polygon. When you double-click to signal that you are finished your selection, all of the enclosed links will be selected.



ADDING A LINK

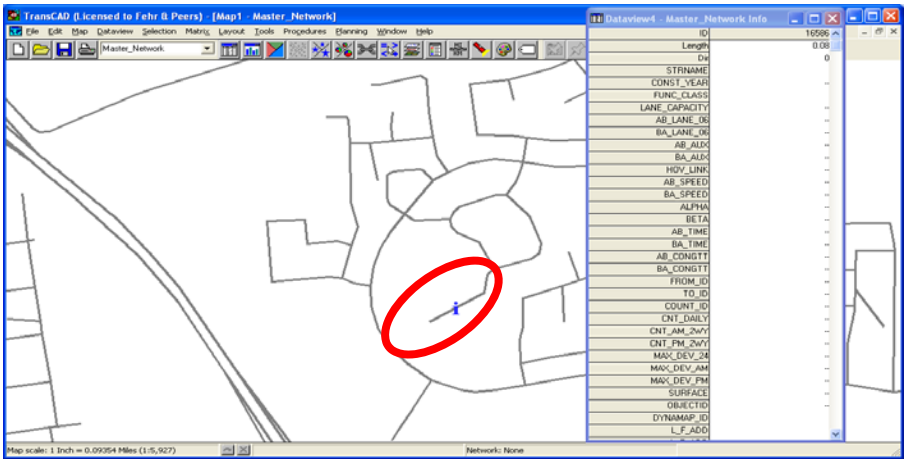
Follow these steps to add a link.

1. Open the network file (*.DBD) and zoom to where you want to add the link.
2. Open the Map Editing Toolbox by clicking Toolbox under **Tools || Map Editing**.

3. Click the **Add Line** icon in the Map Editing Toolbox. Click on the starting node and then double click on the ending node. To save, click the green light (**Save Edit**) icon.
4. 

Adding a Link with the Map Editing Toolbox

5. Select the added link with the **Info** icon and fill the input data (e.g., link speeds, capacity, etc.)



Inputting the Attributes of the New Link

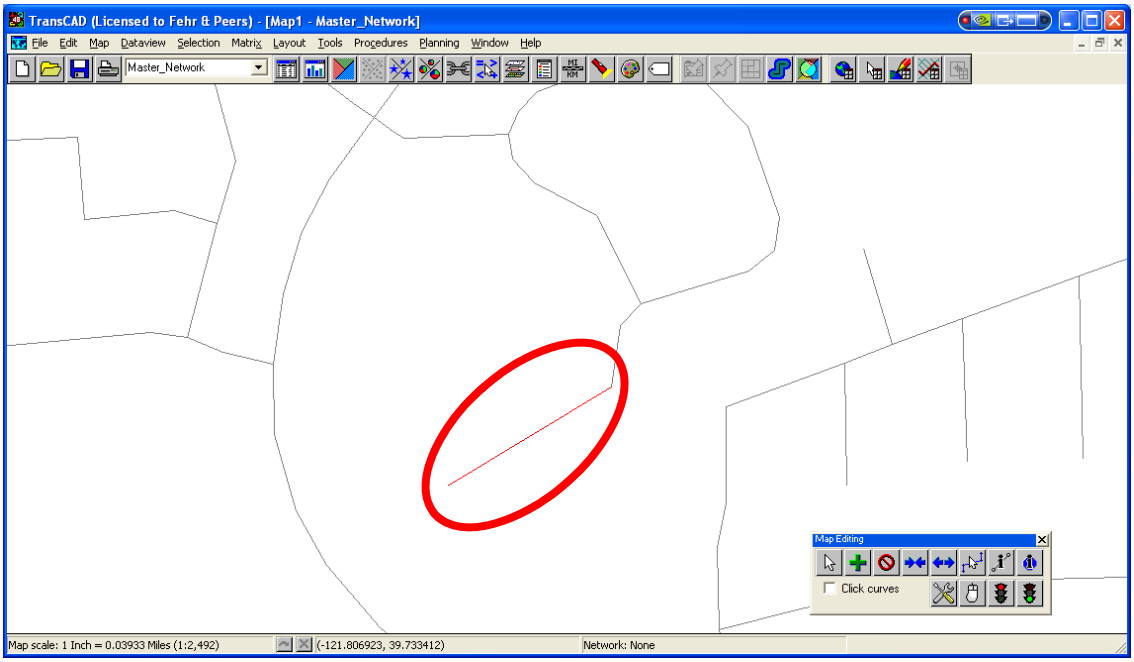
6. Since TransCAD continually updates the file, you can finish by closing the file. You do not need to save the file.

7. Deleting a Link

Follow these steps to delete a link.

1. Open the network file (*.DBD) and zoom to where you want to delete the link.
2. Open the Map Editing Toolbox by clicking Toolbox under **Tools || Map Editing**.

3. Click the **Delete Line** icon () in the Map Editing Toolbox and select the link or multiple links you want to delete. The selected links will change from black to red in color.



4. To save, click the **Save Edit** icon ().

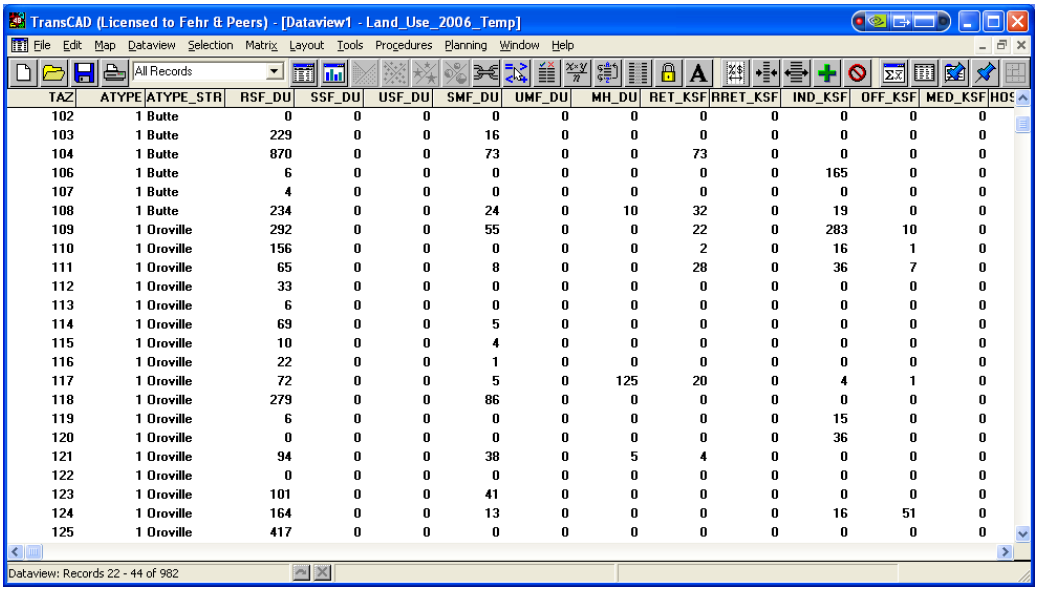
EDITING OTHER DATA

This chapter describes how to edit other data.

EDITING LAND USE DATA

Follow these steps to edit land use data.

1. Open the land use file (e.g., *Land_Use_2006.dbf*).



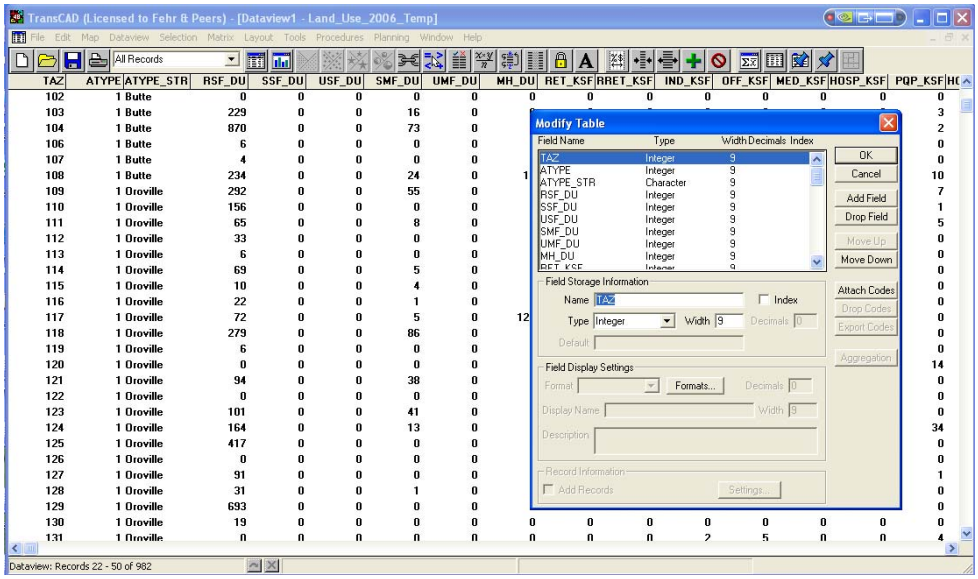
TAZ	ATYPE	ATYPE_STR	RSF_DU	SSF_DU	USF_DU	SMF_DU	UMF_DU	MH_DU	RET_KSF	RRET_KSF	IND_KSF	OFF_KSF	MED_KSF	HOS
102	1	Butte	0	0	0	0	0	0	0	0	0	0	0	
103	1	Butte	229	0	0	16	0	0	0	0	0	0	0	
104	1	Butte	870	0	0	73	0	0	73	0	0	0	0	
106	1	Butte	6	0	0	0	0	0	0	0	165	0	0	
107	1	Butte	4	0	0	0	0	0	0	0	0	0	0	
108	1	Butte	234	0	0	24	0	10	32	0	19	0	0	
109	1	Oroville	292	0	0	55	0	0	22	0	283	10	0	
110	1	Oroville	156	0	0	0	0	0	2	0	16	1	0	
111	1	Oroville	65	0	0	8	0	0	28	0	36	7	0	
112	1	Oroville	33	0	0	0	0	0	0	0	0	0	0	
113	1	Oroville	6	0	0	0	0	0	0	0	0	0	0	
114	1	Oroville	69	0	0	5	0	0	0	0	0	0	0	
115	1	Oroville	10	0	0	4	0	0	0	0	0	0	0	
116	1	Oroville	22	0	0	1	0	0	0	0	0	0	0	
117	1	Oroville	72	0	0	5	0	125	20	0	4	1	0	
118	1	Oroville	279	0	0	86	0	0	0	0	0	0	0	
119	1	Oroville	6	0	0	0	0	0	0	0	15	0	0	
120	1	Oroville	0	0	0	0	0	0	0	0	36	0	0	
121	1	Oroville	94	0	0	38	0	5	4	0	0	0	0	
122	1	Oroville	0	0	0	0	0	0	0	0	0	0	0	
123	1	Oroville	101	0	0	41	0	0	0	0	0	0	0	
124	1	Oroville	164	0	0	13	0	0	0	0	16	51	0	
125	1	Oroville	417	0	0	0	0	0	0	0	0	0	0	

2. You can change the land use data directly in this window. When you finish, close the window. TransCAD saves the file automatically. Note that since the land use file is in DBF format, you can also use Excel to edit this file.

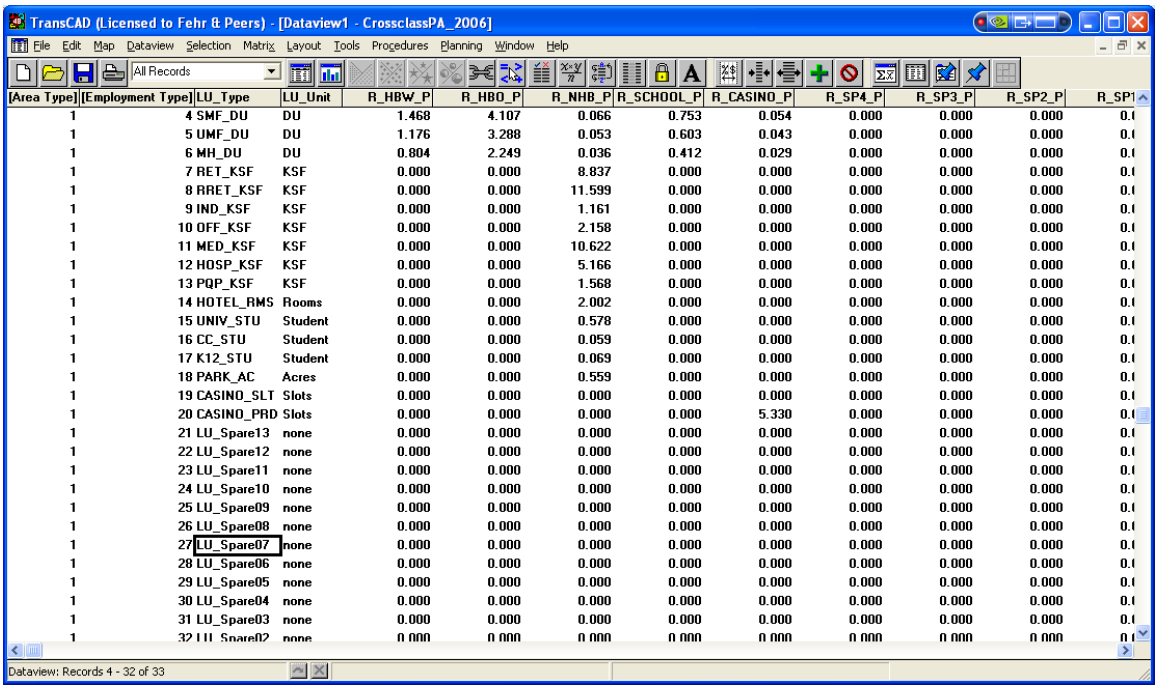
ADDING A NEW LAND USE TYPE

Follow these steps to add a new land use type.

1. Open the land use file (*Land_Use_2006.dbf*).
2. Click **Dataview || Modify Table**. A new window appears.



3. Ordinarily, adding a land use would involve changing several files, such as the resource file, in ways that are difficult for most users. We have simplified this in the BCAG model by having spare land uses already in the land use file. Once the **modify table** window is open, scroll down to one of the spare land uses, such as LU_SPARE07, and change the name to the name of the new land use. Click **OK** and **YES** to close the window, and then enter the data for the new land use as described in Step 2 above.
4. You must now open the cross-classification file (*CrossclassPA_2006*) and change the name of the spare land use to match the name of the new land use. You must also add the trip generation rates associated with the new land use.



[Area Type]	[Employment Type]	LU_Type	LU_Unit	R_HBW_P	R_HBO_P	R_NHB_P	R_SCHOOL_P	R_CASINO_P	R_SP4_P	R_SP3_P	R_SP2_P	R_SP1
1	4	SMF_DU	DU	1.468	4.107	0.066	0.753	0.054	0.000	0.000	0.000	0.0
1	5	UMF_DU	DU	1.176	3.288	0.053	0.603	0.043	0.000	0.000	0.000	0.0
1	6	MH_DU	DU	0.804	2.249	0.036	0.412	0.029	0.000	0.000	0.000	0.0
1	7	RET_KSF	KSF	0.000	0.000	8.837	0.000	0.000	0.000	0.000	0.000	0.0
1	8	RRET_KSF	KSF	0.000	0.000	11.599	0.000	0.000	0.000	0.000	0.000	0.0
1	9	IND_KSF	KSF	0.000	0.000	1.161	0.000	0.000	0.000	0.000	0.000	0.0
1	10	OFF_KSF	KSF	0.000	0.000	2.158	0.000	0.000	0.000	0.000	0.000	0.0
1	11	MED_KSF	KSF	0.000	0.000	10.622	0.000	0.000	0.000	0.000	0.000	0.0
1	12	HOSP_KSF	KSF	0.000	0.000	5.166	0.000	0.000	0.000	0.000	0.000	0.0
1	13	PQP_KSF	KSF	0.000	0.000	1.568	0.000	0.000	0.000	0.000	0.000	0.0
1	14	HOTEL_RMS	Rooms	0.000	0.000	2.002	0.000	0.000	0.000	0.000	0.000	0.0
1	15	UNIV_STU	Student	0.000	0.000	0.578	0.000	0.000	0.000	0.000	0.000	0.0
1	16	CC_STU	Student	0.000	0.000	0.059	0.000	0.000	0.000	0.000	0.000	0.0
1	17	K12_STU	Student	0.000	0.000	0.069	0.000	0.000	0.000	0.000	0.000	0.0
1	18	PARK_AC	Acres	0.000	0.000	0.559	0.000	0.000	0.000	0.000	0.000	0.0
1	19	CASINO_SLT	Slots	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	20	CASINO_PRD	Slots	0.000	0.000	0.000	0.000	5.330	0.000	0.000	0.000	0.0
1	21	LU_Spare13	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	22	LU_Spare12	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	23	LU_Spare11	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	24	LU_Spare10	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	25	LU_Spare09	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	26	LU_Spare08	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	27	LU_Spare07	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	28	LU_Spare06	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	29	LU_Spare05	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	30	LU_Spare04	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	31	LU_Spare03	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
1	32	LU_Spare02	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0

5. Once the land use file and cross-classification file have been updated, the resource file must be updated. To do this, open the resource file (*.rsc), search for "LU_Spare07" and replace it with the new land use name. Then recompile as described in Section 2.2, Compiling the Model Script File.

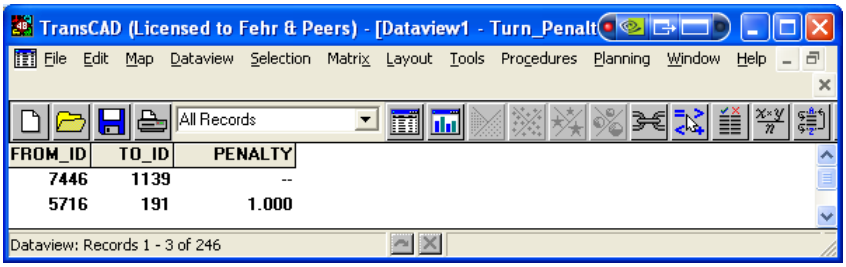
The land use attributes and units are shown in the table below

Land Use Type		Unit	Daily Vehicle-Trip Generation Rates
SF_DU	Single-Family Residential (dwelling unit)	DU	5.71
MF_DU	Multi-Family Residential (dwelling unit)	DU	3.69
CBD_KSF	Central Business District (1,000 square feet)	KSF	14.85
SC_KSF	Major Shopping Center (1,000 square feet)	KSF	34.20
GC_KSF	General Commercial (1,000 square feet)	KSF	28.61
OFF_KSF	Office (1,000 square feet)	KSF	10.04
LI_KSF	Light Industrial (1,000 square feet)	KSF	3.38
MED_KSF	Medical (1,000 square feet)	KSF	3.43
ES_ENR	Elementary School (student enrollment)	Students	1.16
PARK_ACRE	City Park (acres)	Acres	7.36
HS_ENR	High School (student enrollment)	Students	1.16
PRISON	Mule Creek State Prison (trips per weekday)	Trips	1.00
SKI	Ski Area (trips per typical spring/fall weekday)	Trips	1.00
CASINO	Casino (trip per weekday)	Trips	1.00
WINE	Wineries (trips per typical spring/fall weekday)	Trips	1.00
REC	Recreation (trips per typical spring/fall weekday)	Trips	1.00

EDITING THE TURN PENALTIES

Follow these steps to edit the turn penalties.

1. Open the Turn Penalty file (e.g., *Turn_Penalties_2006.bin*).
2. If you are changing an existing turn penalty, you can edit it within this window.
3. If you are adding a new turn penalty, click **Edit || Add Record** and then type the number of records you want to add. The window should now look like this (null means turn prohibition, and numbers indicate delay in minutes):

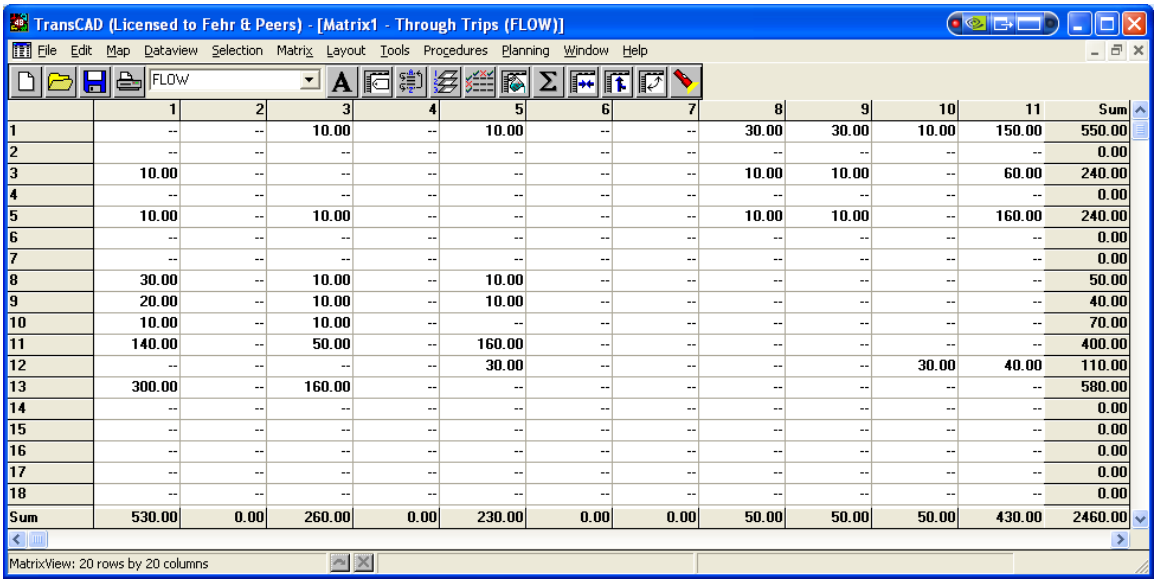


4. You can now add new turn penalties by editing the data in this window. Turn penalties are based on the ID of the “From” and “To” link. For example, in the window above, the turn from link 7446 to link 1139 is prohibited. To find the link ID, open the master network file and click on the Information button ().

EDITING THROUGH TRIPS

Follow these steps to edit through trips, which are trips that begin and end outside of the model area.

1. Using TransCAD, open the Through Trips file (e.g., *Through_Trips_2006.MTX*).



	1	2	3	4	5	6	7	8	9	10	11	Sum
1	--	--	10.00	--	10.00	--	--	30.00	30.00	10.00	150.00	550.00
2	--	--	--	--	--	--	--	--	--	--	--	0.00
3	10.00	--	--	--	--	--	--	10.00	10.00	--	60.00	240.00
4	--	--	--	--	--	--	--	--	--	--	--	0.00
5	10.00	--	10.00	--	--	--	--	10.00	10.00	--	160.00	240.00
6	--	--	--	--	--	--	--	--	--	--	--	0.00
7	--	--	--	--	--	--	--	--	--	--	--	0.00
8	30.00	--	10.00	--	10.00	--	--	--	--	--	--	50.00
9	20.00	--	10.00	--	10.00	--	--	--	--	--	--	40.00
10	10.00	--	10.00	--	--	--	--	--	--	--	--	70.00
11	140.00	--	50.00	--	160.00	--	--	--	--	--	--	400.00
12	--	--	--	--	30.00	--	--	--	--	30.00	40.00	110.00
13	300.00	--	160.00	--	--	--	--	--	--	--	--	580.00
14	--	--	--	--	--	--	--	--	--	--	--	0.00
15	--	--	--	--	--	--	--	--	--	--	--	0.00
16	--	--	--	--	--	--	--	--	--	--	--	0.00
17	--	--	--	--	--	--	--	--	--	--	--	0.00
18	--	--	--	--	--	--	--	--	--	--	--	0.00
Sum	530.00	0.00	260.00	0.00	230.00	0.00	0.00	50.00	50.00	50.00	430.00	2460.00

2. You can edit the data directly in this window. Remember to make the flows equal in both directions (i.e., if you set the flow from 1 to 9 at 500 trips per day, then the flow from 9 to 1 should also be 500 trips per day).
3. Since TransCAD instantly updates the changes, you need only close the file to save it.