Product 0-4410-P3

DIVERTING CONTAINERIZED FREIGHT FROM TEXAS HIGHWAYS: INSTRUCTIONS FOR USING THE FREIGHT ASSIGNMENT AND MODE CHOICE MODELS

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Abstract:
The objective of this document is to provide the user with instructions to install and use TransCAD embedded models to display container flows on Texas road and rail infrastructure, and to conduct mode choice analysis to establish the potential for diverting containerized freight from road to rail. In addition, the system and program requirements for installation, installation instructions, and user guidelines are provided. Additional supporting information to ensure the effective use of the platform is discussed in two appendices.

Keywords:

TransCAD, containerized freight, mode choice, freight assignment

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1. Introduction

Forecasts of port container volumes increasing by 3 to 5 percent per year, resulting in the doubling of container volumes in 10 years, have resulted in major container ports on both the east and west coasts funding studies to explore the need for future investments— for example, increasing container terminal capacity, enhancing intermodal connections, and enhancing landside access to the ports— that will accommodate this increased demand.

The objective of this document is to:

- provide the user with instructions to install and use TransCAD embedded models to display container flows on Texas road and rail infrastructure; and
- conduct mode choice analysis to establish the potential for diverting containerized freight from road to rail.

In addition, the system and program requirements for installation, installation instructions, and user guidelines are provided. Supporting information to ensure the effective use of the platform is also discussed in the appendices.

2. System and Software Requirements

To run this application, the user requires TransCAD Version 4.0 Beta or higher. The hardware requirements for this application are minimal: a personal computer running Windows 98, Me, NT, 2000, or XP; a CD-ROM drive; 256 MB Ram; and 1 GB hard disk space or more if installing data on a hard disk.

2.1 Installation Instructions

Warning!

Before proceeding with the installation, copy the entire contents of folder **4410** from the CD-ROM onto your computer's hard drive (**C:**). Ensure that the path to the folder is **C:\4410**. This is ***critical*** to the execution of the source code.

To install the Container Flow Representation application:

1. Start the TransCAD 4.0 application.
2. Choose Tools-Add-ins.
3. Click Setup. The Setup Add-ins dialog box will appear.
4. Click Add.
5. Click the Macro radio button (see Figure 2.1).
6. Type "4410 Flow Representation" in the Description text box.
7. Type "Commodity Flows" in the Name text box.
8. Type "C:\\4410\\Inputs\\Embedded\\flow_rep" in the UI Database text box.
9. Click OK to install the add-in and return to the Add-ins dialog box.

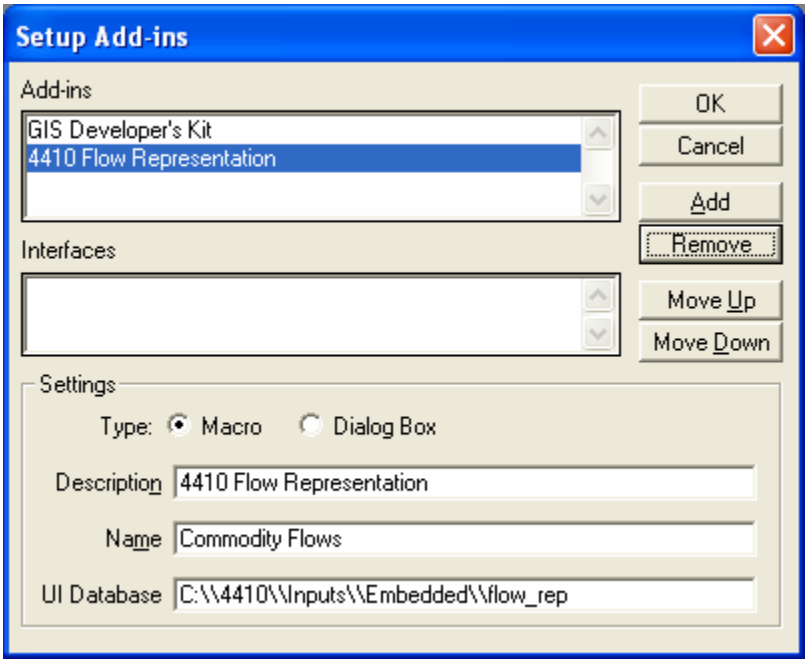


Figure 2.1 Installing 4410 Flow Representation Application

To install the Mode-split Analysis application:

1. Choose Tools-Add-ins.
2. Click Setup. The Setup Add-ins dialog box will appear.
3. Click Add.
4. Click the Macro radio button (see Figure 2.2).
5. Type “4410 Mode Split Analysis” in the Description text box.
6. Type “Commodity Flows” in the Name text box.
7. Type “C:\\4410\\Inputs\\Embedded\\mode_split” in the UI Database text box.
8. Click OK to install the add-in and return to the Add-ins dialog box.

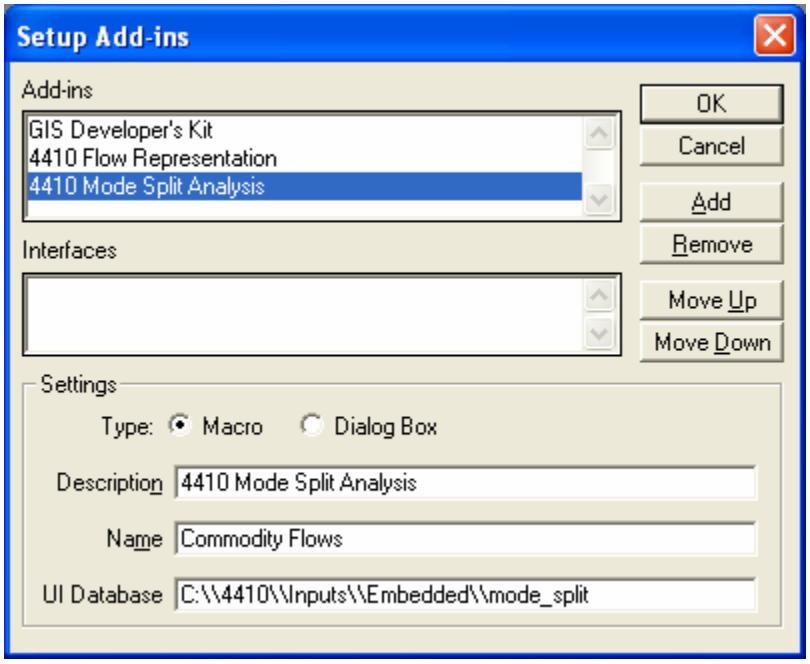


Figure 2.2 Installing 4410 Mode-split Analysis Application

3. Overview: TransCAD Platform and Embedded Models

Given commodity data by mode in terms of container flows (i.e., number of containers), container tonnages, or total tonnages, the embedded assignment model can display container flows—that is, the number of containers—on the road and rail network in Texas. The following flows are distinguished:

- Texas county-to-county flows;
- Mexico-Texas flows;
- Mexico flows that pass through Texas;
- U.S. states-Texas flows; and
- Through Texas flows.

Given total commodity tonnage data between specified origin-destination pairs, the developed tool can perform mode-split analysis using an embedded mode choice model.

The objective of this section is to provide an overview of the use of the TransCAD platform in displaying available container data and the use of the embedded mode-split model to conduct mode-split analysis. Appendix A provides a detailed overview of the embedded system files.

3.1 Overview of Inputs and Modeling System

The input tables required by the modeling system are summarized in Table 3.1. All input tables must be in dBASE format and should have the precise structure laid out in the sample tables provided in Appendix B. As indicated in Table 3.1, some of the input tables have default values available to the user. These default values can be updated as improved data becomes available.

Table 3.1 Input Data Tables

Input Table	Description	Comments
Commodity Data	Commodity origin-destination data in terms of total tonnages, containerized tonnages, or container numbers.	Necessary input (1998 Reebie data and 1998 Rail Waybill data available)
Zonal Demographics	Zonal demographic characteristics (relevant to the modal-split model being applied), such as population, area, income, number of employees, number of establishments	Optional input, embedded data available (1996)
Impedance	Inter zonal distances	Optional input, embedded data available
Modal-Split Model Parameters	Estimated coefficients (specific to commodity class) for the variables used in the modal-split model, such as distance, log of distance, shipment size, etc.	
Conversion Factors	Factors to estimate percentage of commodity tonnage that is containerized and to convert container tonnage to number of containers.	Embedded data

The outputs of the modal-split and traffic assignment models are available in both a tabular form and a digitized display overlaid on the map of Texas. The mode-split analysis is performed in two steps. First, the mode-split application is run with the available origin-destination commodity tonnage as input to estimate the commodity tonnage moved by mode. When completed, the traffic assignment step requires the analyst to use the output generated from the mode split as input to assign the flows to the network (i.e., flow representation).

If the available input data is mode-specific flow data (i.e., tonnage or number of containers), then the assignment model performs the traffic assignment. In the traffic assignment step, the rail and road container flows are loaded onto the shortest path routes on the Texas road and rail networks, following an all-or-nothing assignment procedure. The container flows by commodity are stored as an attribute of the link that forms part of the route between each origin-destination pair. Selecting a link opens the attribute table corresponding to that link and displays the total container flows (number of containers) by commodity transported on that link. This data is also available in dBASE format and can be exported to other applications.

3.2 Flow Representation

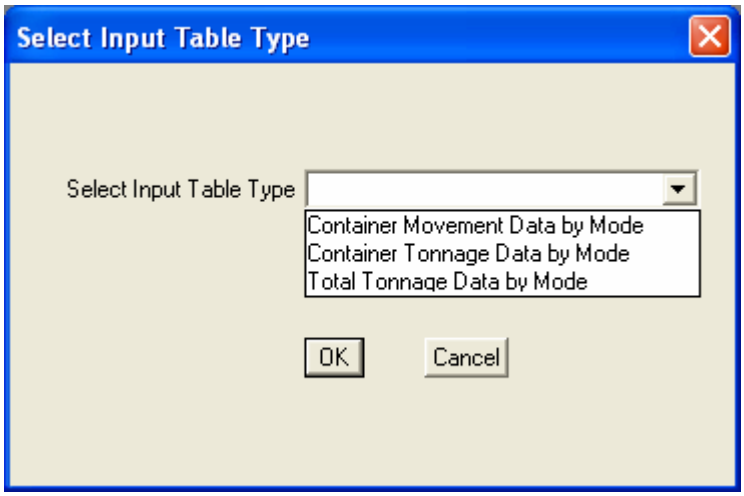
3.2.1 Instructions for "GIS Platform Demo"

The following step-by-step instructions serve as a user guideline to conduct flow representation. The sample runs use the default datasets and sample input data files embedded in the system.

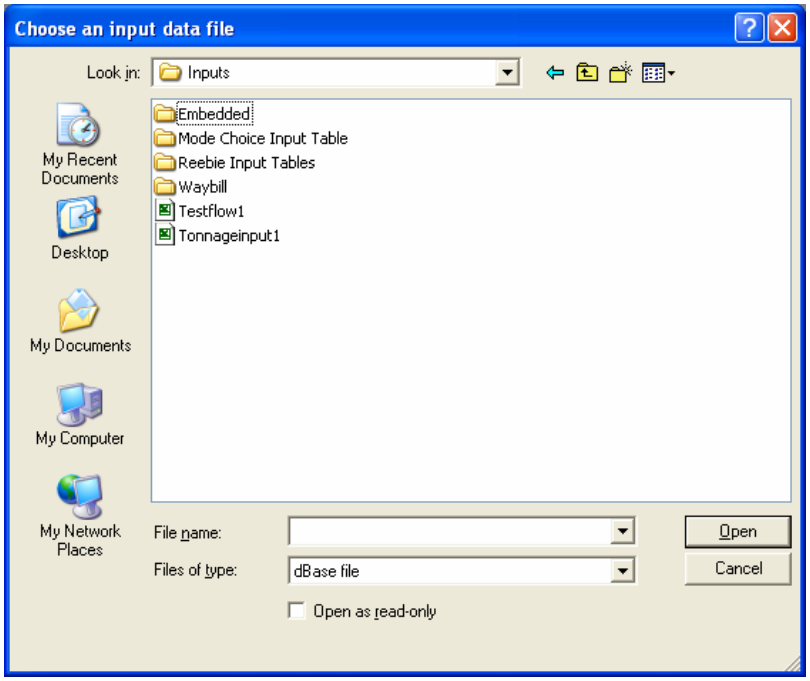
1. Open TransCAD and choose *Tools – Add-ins*. Select "4410 Flow Representation" and click OK.
2. A Welcome Screen will appear. Click Continue.

3. A Commodity Flows Procedure dialogue box will appear (see below). Click Yes.

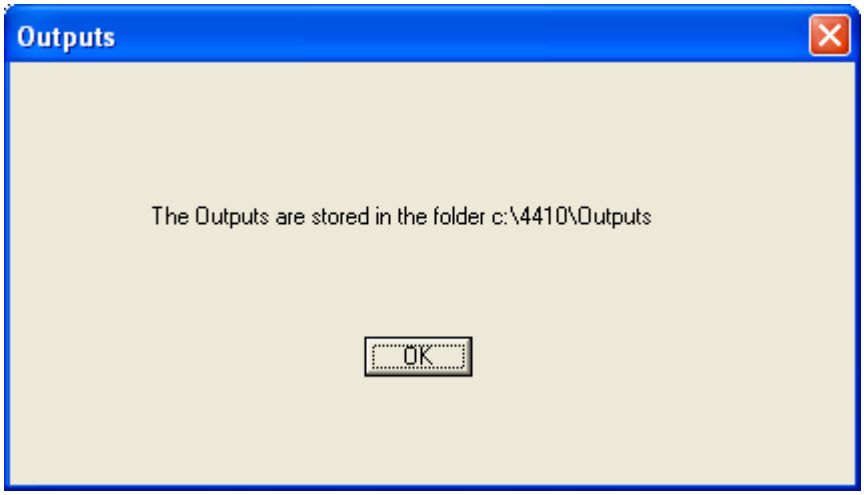
4. A drop-down dialog box asking the user to select the input type table will appear. The user has to select the appropriate input table type depending on the available data (i.e., number of containers moved by mode, container tonnage moved by mode, or total tonnage moved by mode). A number of input tables have been embedded. For more information, see Appendix A.



5. For demonstration purposes, select Container Movement Data by Mode and click OK. A sample input table is included for demonstration purposes. From the dialog box that appears, select the input data file Testflow1.dbf located at **C:\4410\Inputs\Testflow1.dbf** and click Open. This sample input table contains the number of containers moved by rail and truck between specified origins and destinations.



6. The system performs network assignments in the background. Once done, the outputs are saved in the output folder in the form of maps and tables (see below).



For example, the output maps for the road traffic assignment will be saved in **C:\4410\Outputs\Traffic Assignment by Road\Using Flow Input.** The rail maps will be saved within **C:\4410\Outputs\Traffic Assignment by Rail\Using Flow Input** and the tables will be saved within the **C:\4410\Outputs\Tables** folders. The application terminates once the user clicks OK.

7. The user may examine the outputs in TransCAD. For example, if the analyst wants to view the assignment of the agricultural containers moved by rail, the following steps are required in TransCAD: (1) click File-Open, (2) select Agricultural Products (**C:\4410\Outputs\Traffic Assignment by Rail\Using Flow Input\Agricultural Products),** and (3) click Open. The following map will appear.

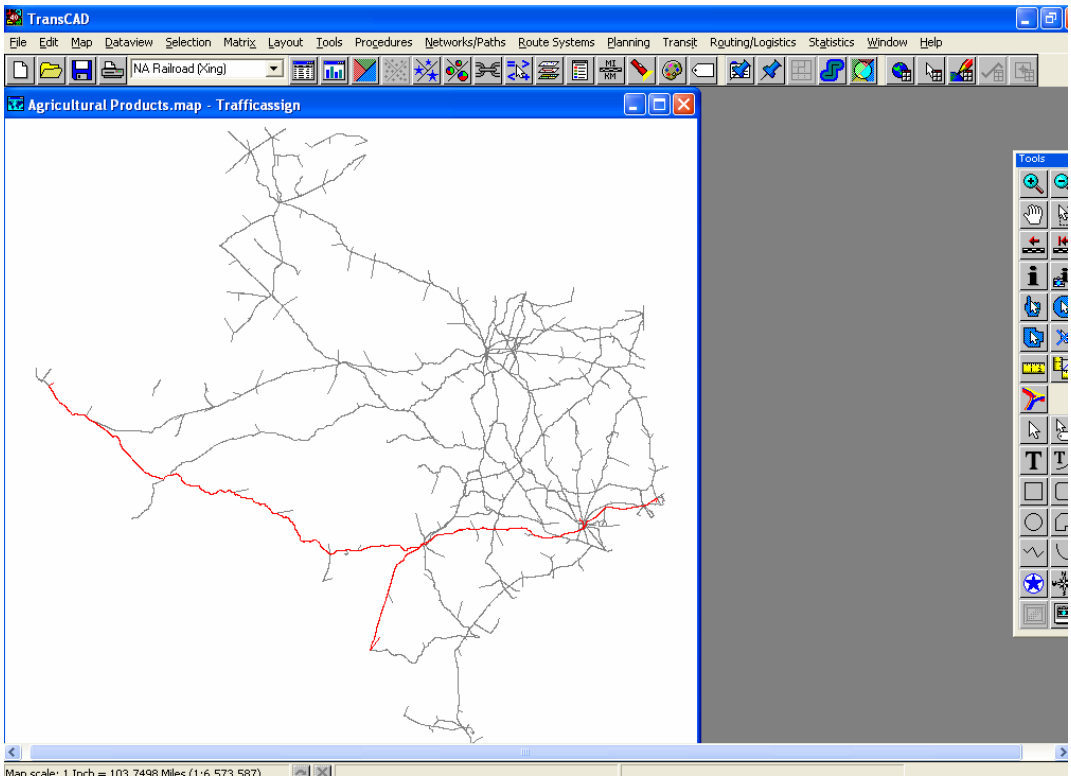


Table 3.2 describes the outputs in the **\Traffic Assignment by Road\Using Flow Input** and **\Traffic Assignment by Rail\Using Flow Input** subfolders.

Table 3.2 Outputs

Output	Description	Comments
Traffic Assignment by Road (Maps)	The seven commodity-specific maps display the total container flows on the Texas highway layer for each origin-	Stored in \\Outputs\\Traffic Assignment by Road\Using Flow Input. Seven commodity-specific maps and one

	destination pair. One additional map displays the total container flows for all commodities for each origin-destination pair.	additional map that display total truck container flows.
Traffic Assignment by Rail (Maps)	The seven commodity-specific maps display the total container flows on the Texas rail layer for each origin-destination pair. One additional map displays the total container flows for all commodities for each origin-destination pair.	Stored in \\Outputs\\Traffic Assignment by Rail\Using Flow Input. Seven commodity-specific maps and one additional map that displays total rail container flows.

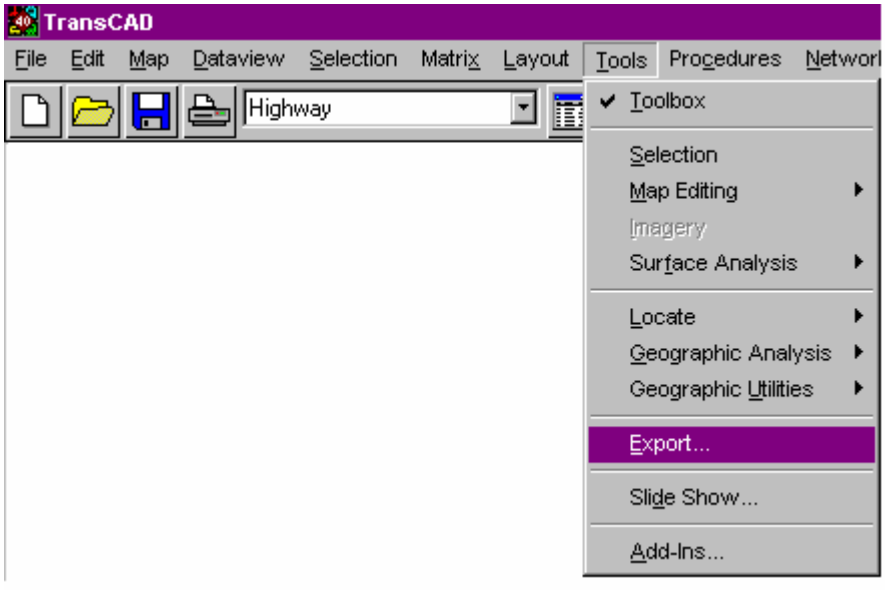
Warning!

These output files must be saved to prevent them from being replaced when the model is run again.

3.2.2 Exporting Outputs

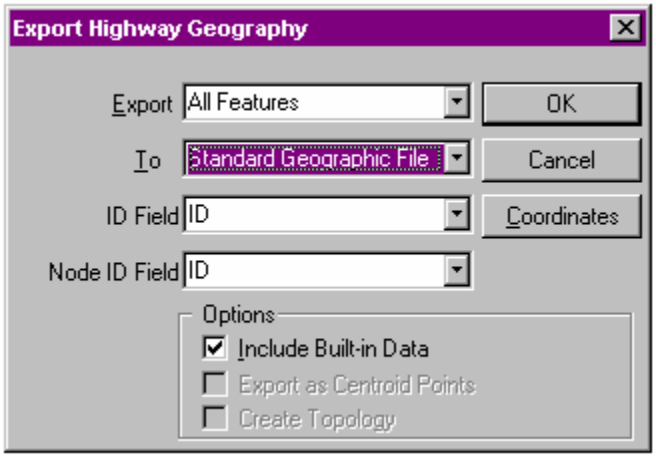
Each time the assignment model is run, the output files are replaced. The analyst has to save a copy of the outputs by exporting them as geographic files. The following steps are required to export the layers associated with the network and each commodity.

Select the appropriate layer. When exporting the road network, the user must select the "Highway" layer (see below). When exporting the rail network, the user needs to select the "NA Railroad." Click Tools on the main tool bar and then Export.

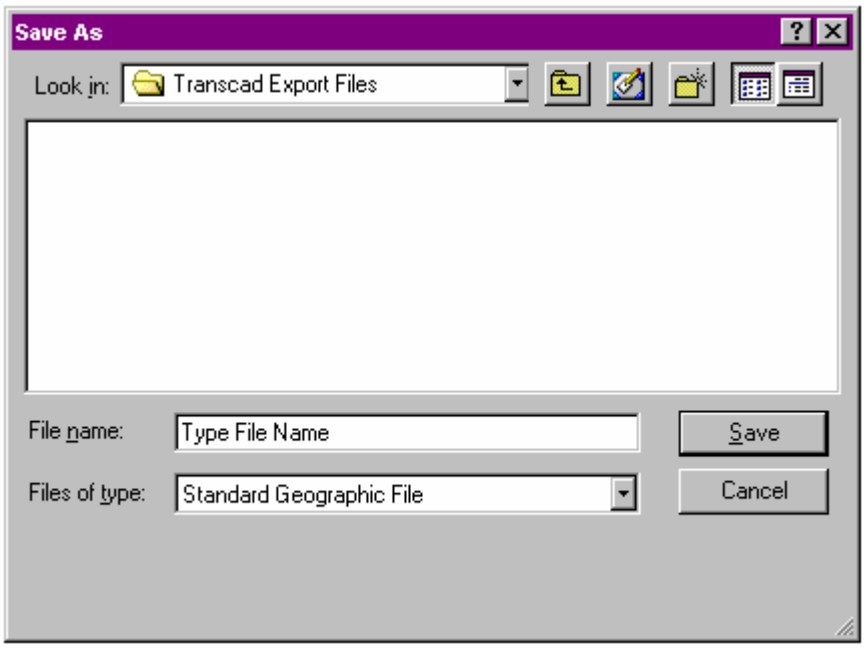


When the export box (see below) appears, select

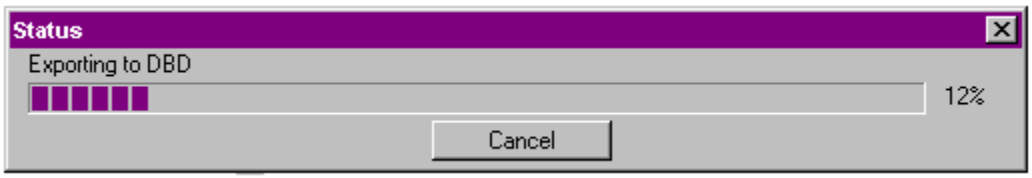
- Export - All Features,
- To - Standard Geographic File,
- ID Field - ID,
- Node ID Field - ID, and
- Options - Include built-in data. Click OK.



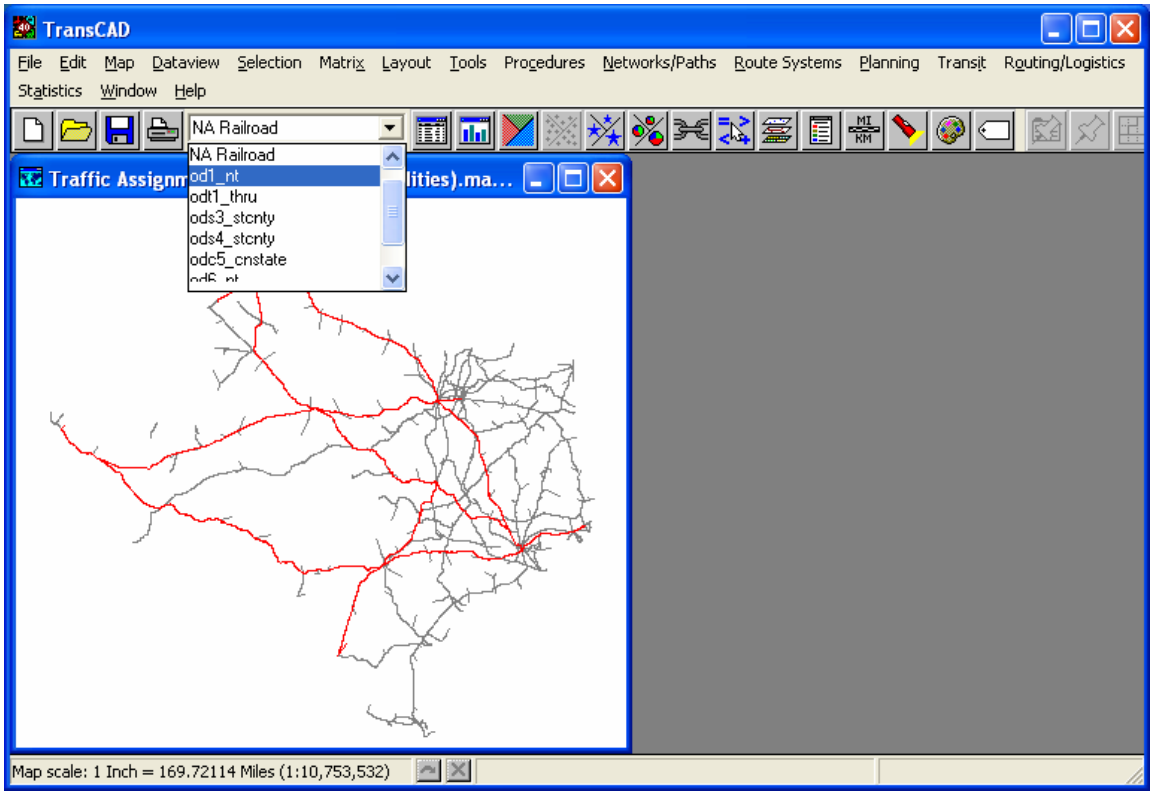
A "save as" box will appear (see below). Specify a file location, such as the TransCAD Export files folder shown below, and file name. Renaming the layers when exporting is not advised. Click Save.



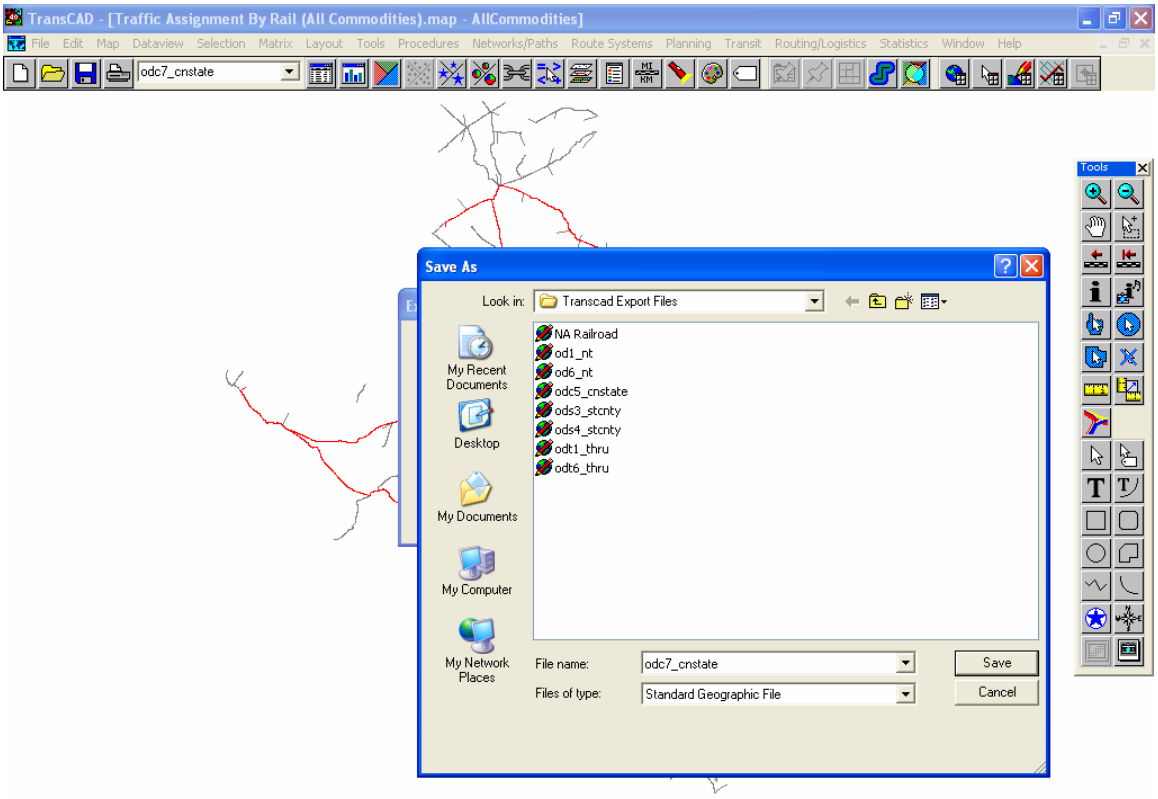
A status bar will appear (see below). The file has been exported once the status bar disappears.



These steps must be repeated for each layer of the map. The user can export the layers for each commodity or for all commodities depending on the purpose of analysis.

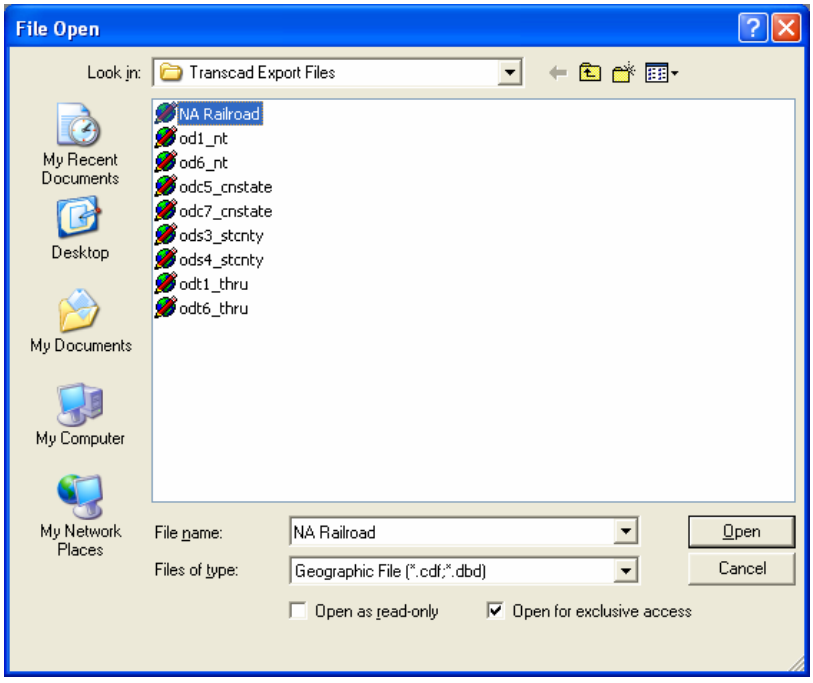


For example, if the analyst is interested in the container flows of all commodities on the rail network, the layers highlighted above need to be exported one by one and saved in the specified location (see below).

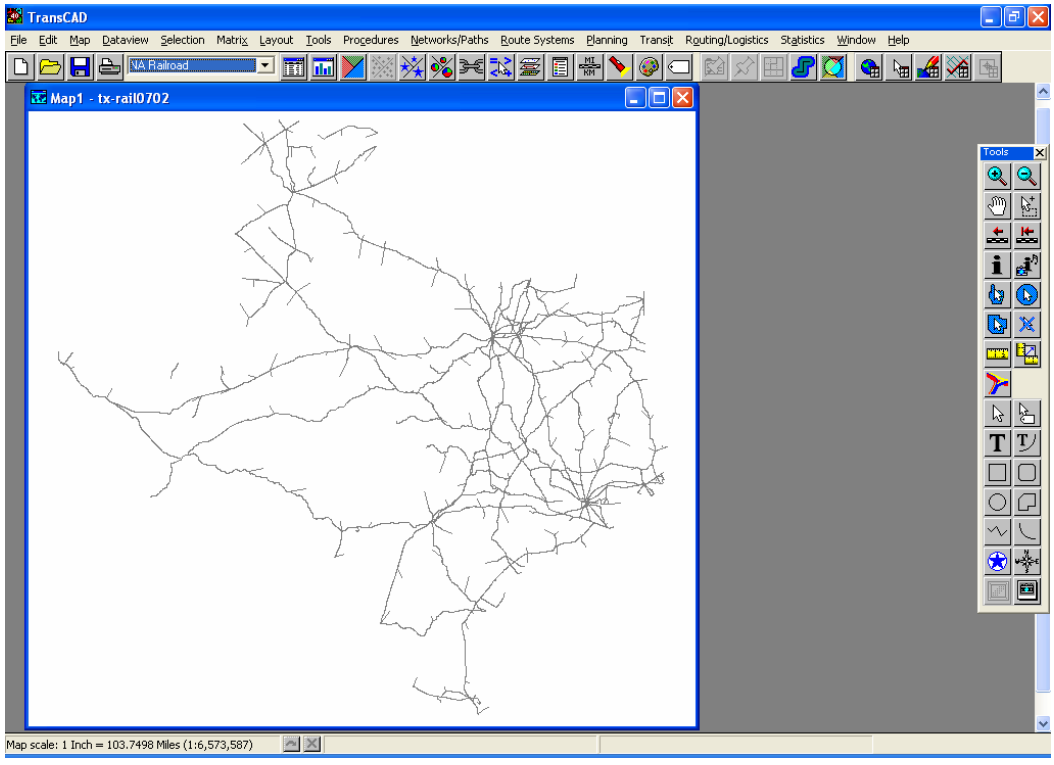


Once all of the layers are exported and saved as geographic files, the analyst is required to compile the map. The following steps must be undertaken in TransCAD:

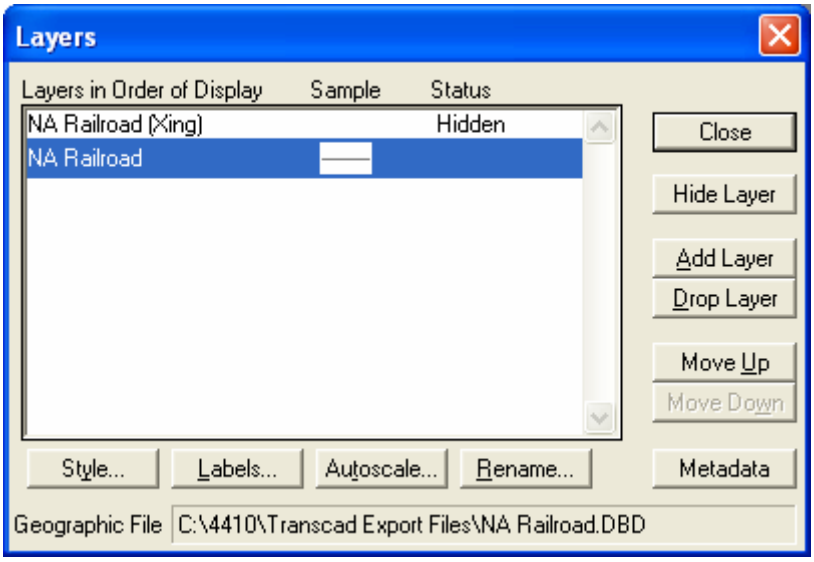
1. Click File Open and open the appropriate network layer—in this case, NA Railroad.



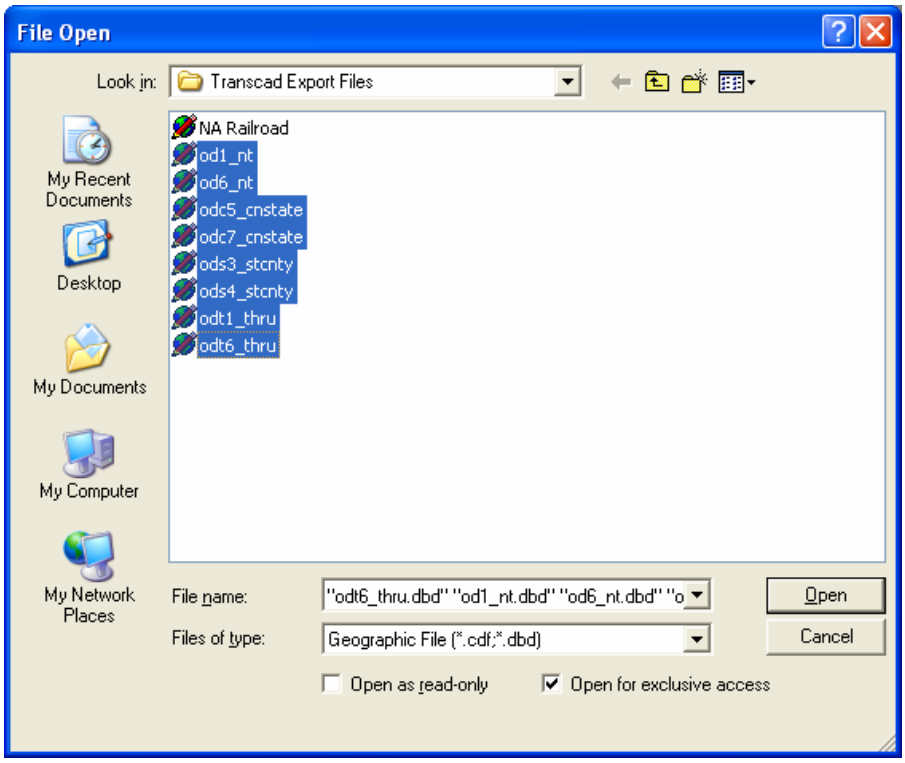
The rail network will appear (see below).



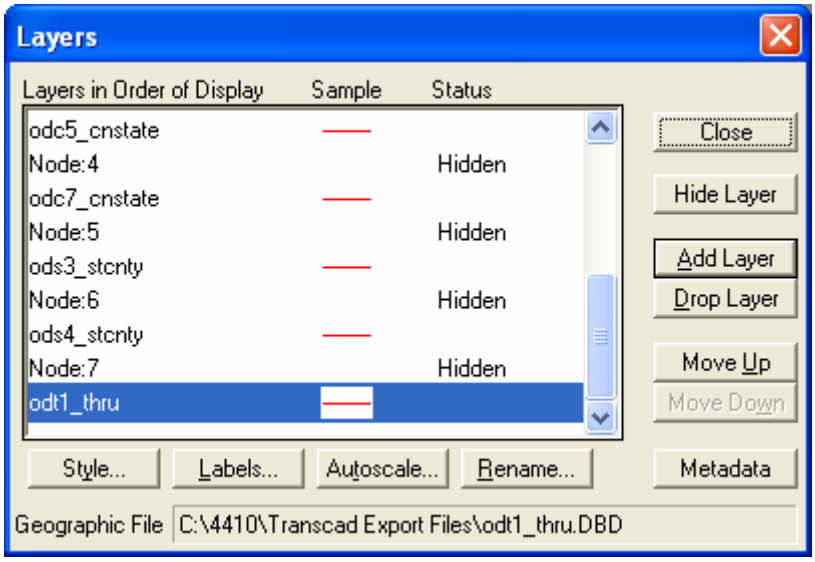
2. Click Map Layers—  on the main tool bar—and the Layers Box will appear.



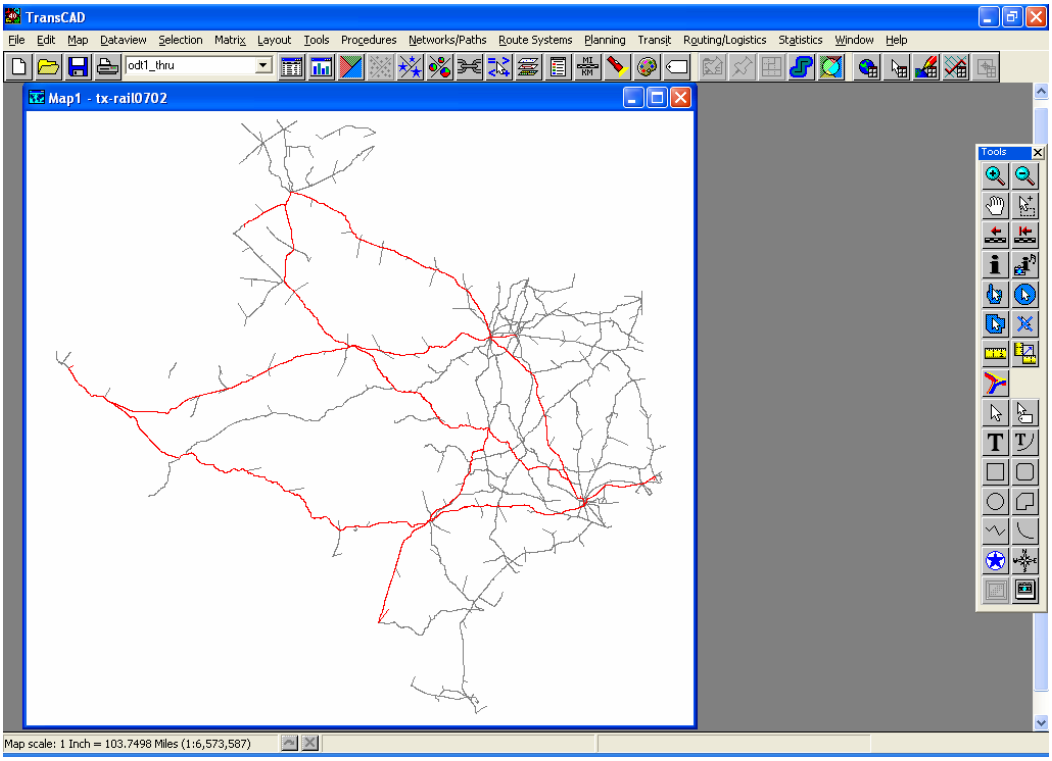
3. Click Add Layer and highlight the layers to be added (see below). Click Open.



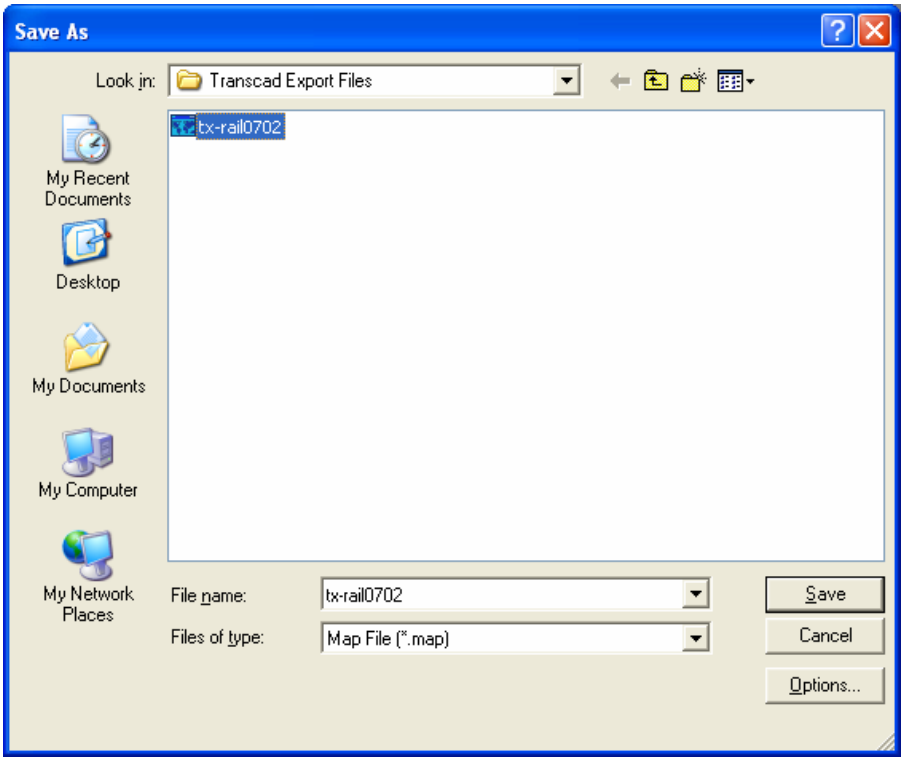
The following box will appear. The analyst can change the color or thickness of each of the layers (see Chapter 5).



4. Click Close. The following map will appear.



5. Finally, the analyst must save the compiled map. Click File-Save As. Specify the map location, the file name, and ensure that the file type is Map File (*.map).

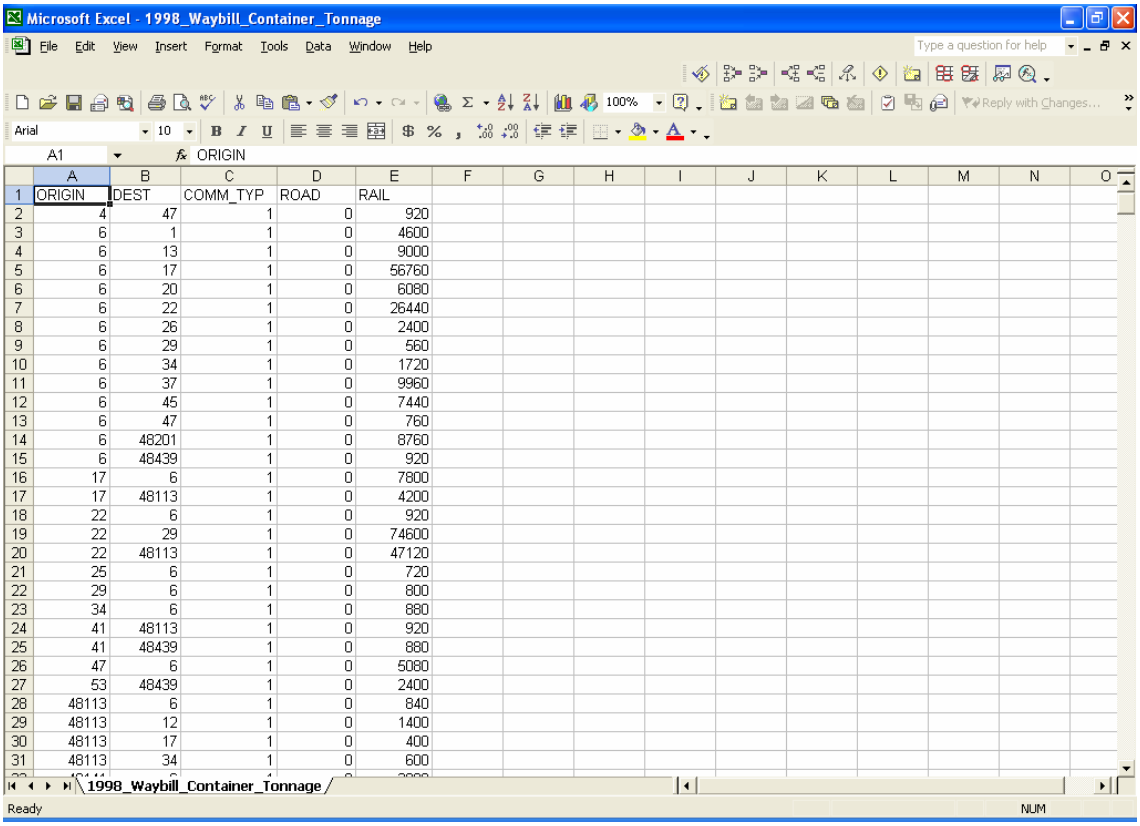


6. Click Save.

3.2.3 Case Studies

Display Current Container Data: Rail Waybill Sample

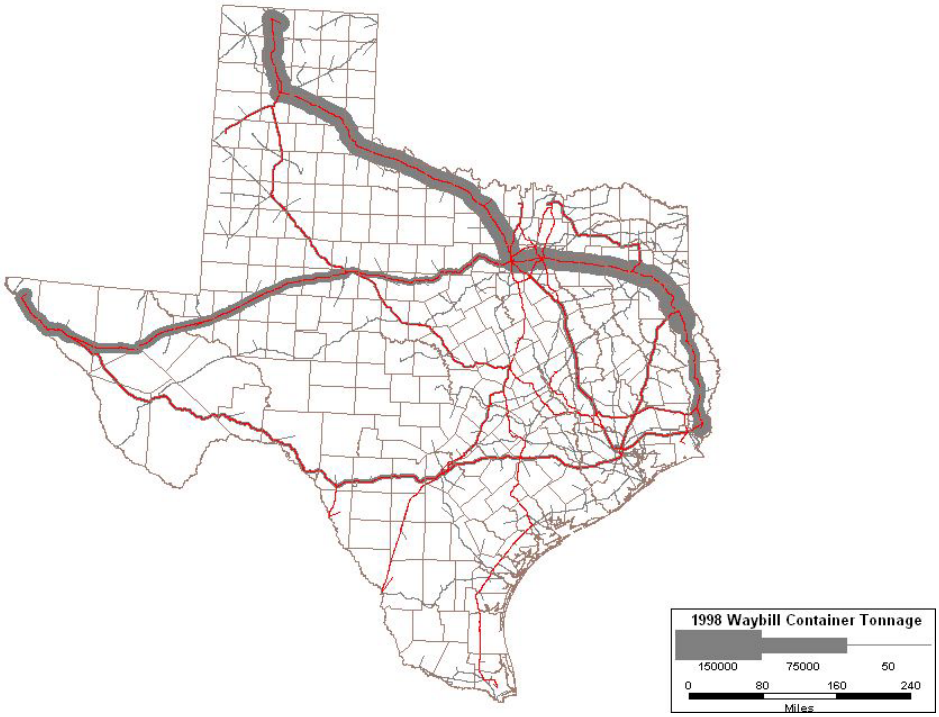
The Rail Waybill Sample captures the following rail container data: origin, destination, commodity type, containerized tonnage, and number of containers. The 1998 Rail Waybill Sample was obtained from the Texas Transportation Institute. Input tables (i.e., container flows and container tonnage) were compiled in the required format (see Figure 3.1 below for an excerpt from the 1998 Rail Waybill Sample container tonnage input table). Figure 3.2 shows the 1998 container flows displayed on the rail infrastructure. For additional information on the required format of input tables, see Appendix B.



Microsoft Excel - 1998_Waybill_Container_Tonnage

	A	B	C	D	E
1	ORIGIN	DEST	COMM_TYP	ROAD	RAIL
2	4	47	1	0	920
3	6	1	1	0	4600
4	6	13	1	0	9000
5	6	17	1	0	56760
6	6	20	1	0	6080
7	6	22	1	0	26440
8	6	26	1	0	2400
9	6	29	1	0	560
10	6	34	1	0	1720
11	6	37	1	0	9960
12	6	45	1	0	7440
13	6	47	1	0	760
14	6	48201	1	0	8760
15	6	48439	1	0	920
16	17	6	1	0	7800
17	17	48113	1	0	4200
18	22	6	1	0	920
19	22	29	1	0	74600
20	22	48113	1	0	47120
21	25	6	1	0	720
22	29	6	1	0	800
23	34	6	1	0	880
24	41	48113	1	0	920
25	41	48439	1	0	880
26	47	6	1	0	5080
27	53	48439	1	0	2400
28	48113	6	1	0	840
29	48113	12	1	0	1400
30	48113	17	1	0	400
31	48113	34	1	0	600

Figure 3.1 Excerpt from the 1998 Rail Waybill Sample Container Tonnage Input Table



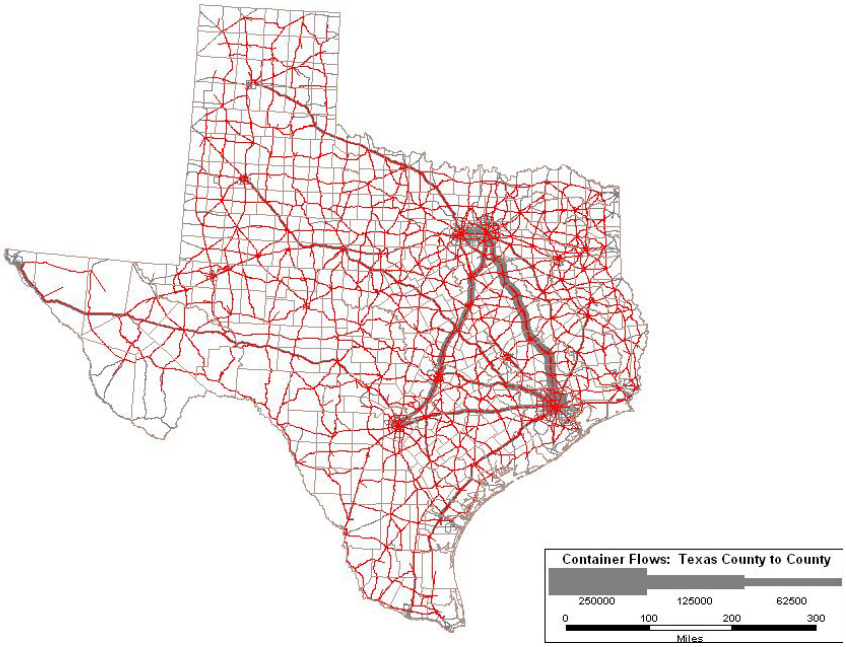
Source: 1998 Rail Waybill Sample

Figure 3.2 1998 Rail Waybill Container Flows

The output files can be located at **\\4410\1998 Rail Waybill Data** on the CD-ROM that accompanies this document.

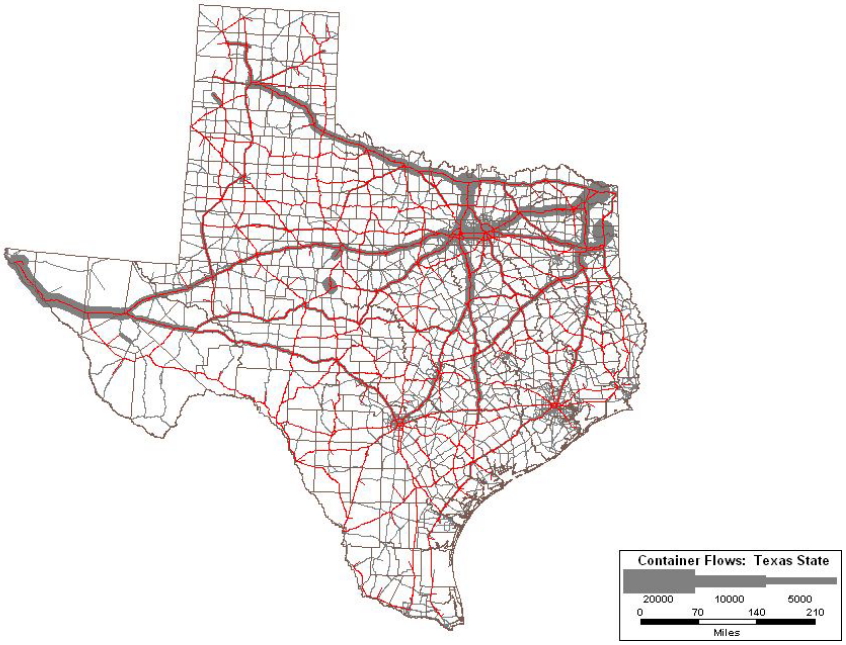
3.2.4 Simulated Truck and Rail Container Flows

The GIS platform also can be used to display estimated/simulated container data. Truck and rail container flow data were estimated using the 1998 Reebie data (see 4410-1 entitled "What We Know About Containerized Freight Movement in Texas" for a detailed description of the procedure followed). The estimated 1998 truck container flows are displayed in Figures 3.3 to 3.7. The estimated 1998 rail container flows are displayed in Figures 3.8 to 3.10.



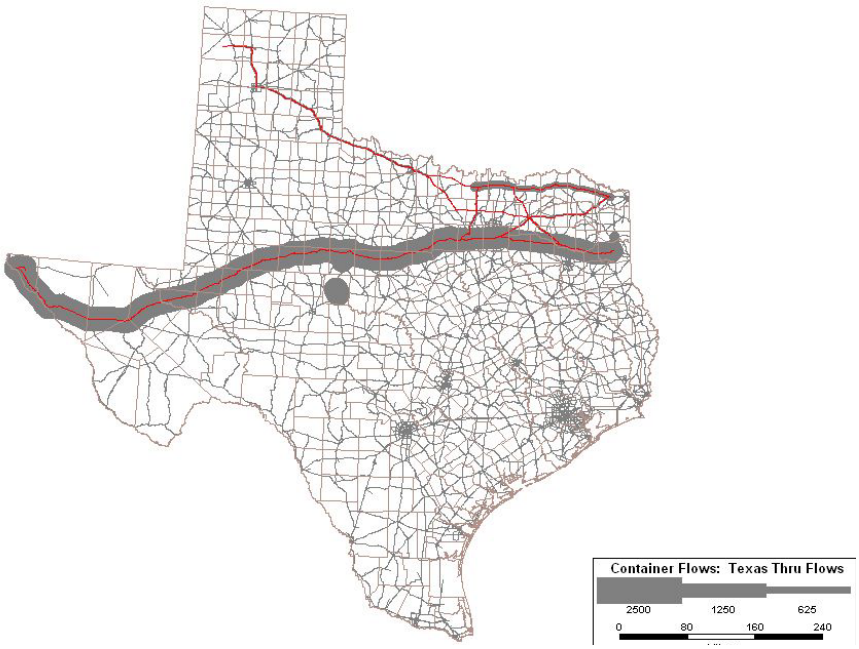
Source: Reebie TRANSEARCH Freight Database 1998

Figure 3.3 1998 Reebie Truck Container Flows: Texas County-to-County Flows



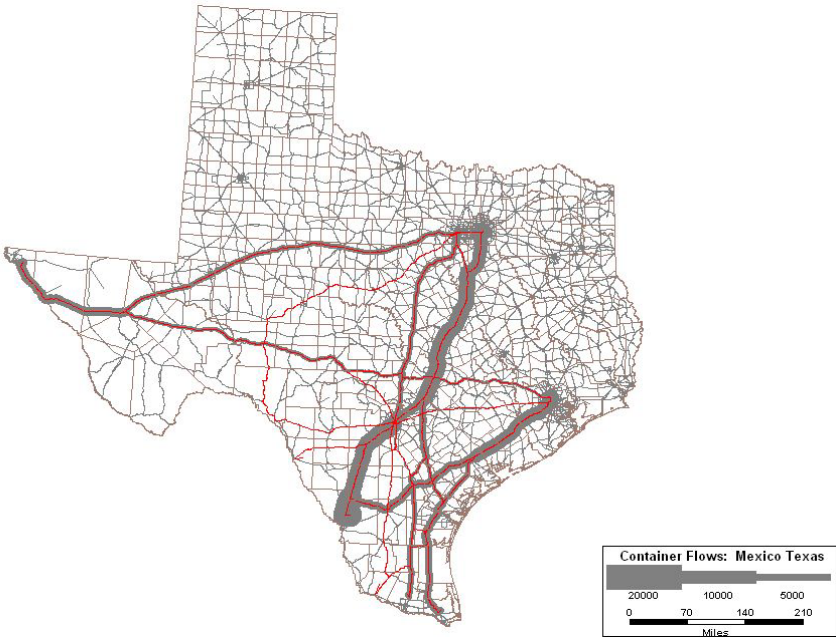
Source: Reebie TRANSEARCH Freight Database 1998

Figure 3.4 1998 Reebie Truck Container Flows: Texas-U.S. State Flows



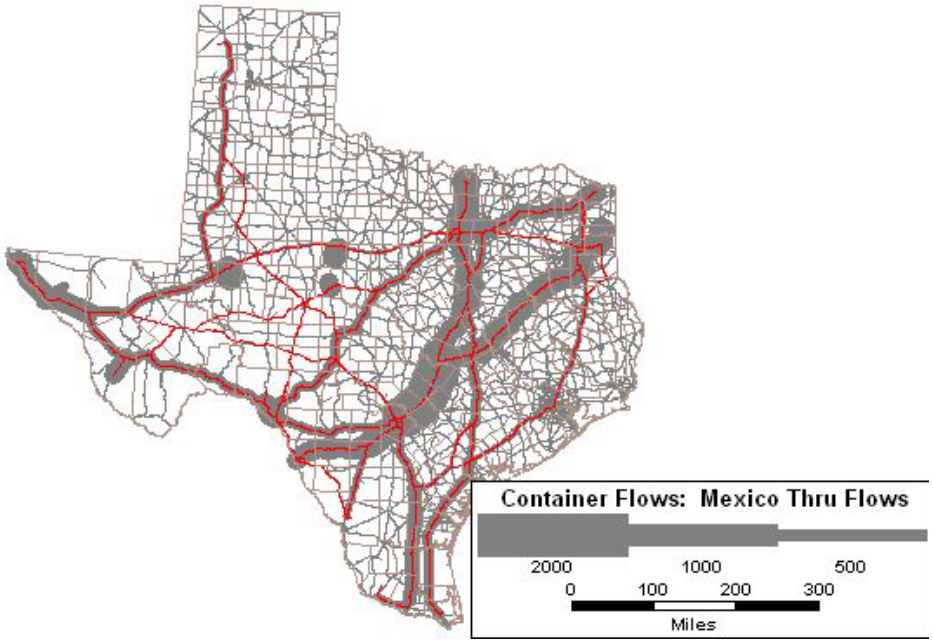
Source: Reebie TRANSEARCH Freight Database 1998

Figure 3.5 1998 Reebie Truck Container Flows: Texas Through Flows



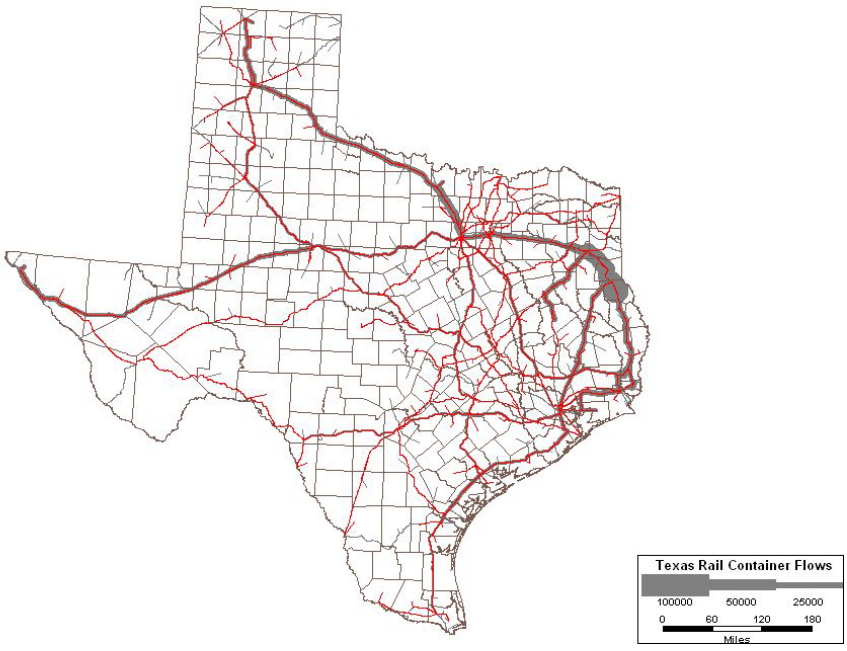
Source: Reebie TRANSEARCH Freight Database, 1998

Figure 3.6 1998 Reebie Truck Container Flows: Texas-Mexico Flows



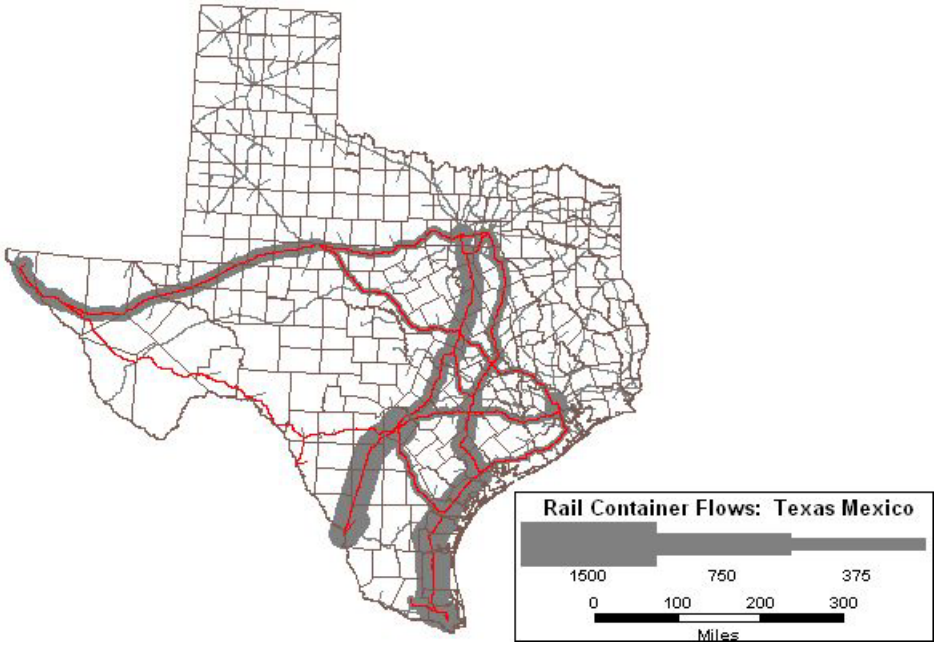
Source: Reebie TRANSEARCH Freight Database 1998

Figure 3.7 1998 Reebie Truck Container Flows: Mexico Through Texas Flows



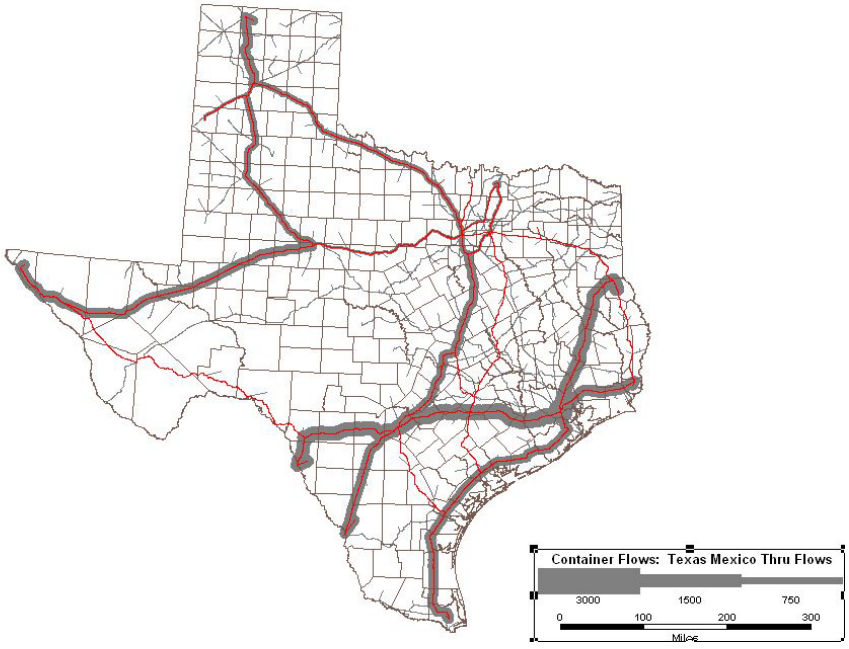
Source: Reebie TRANSEARCH Freight Database 1996

Figure 3.8 1998 Reebie Rail Container Flows: Texas Flows



Source: Reebie TRANSEARCH Freight Database 1996

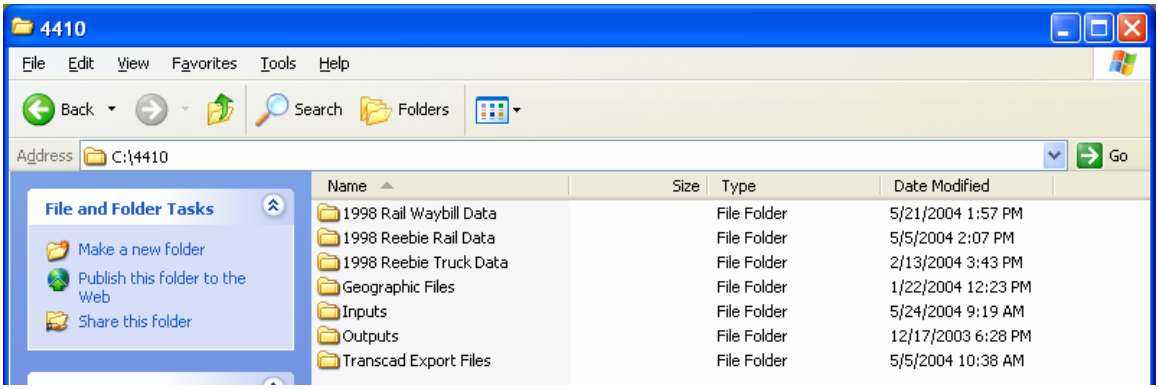
Figure 3.9 1998 Reebie Rail Container Flows: Texas-Mexico Flows



Source: Reebie TRANSEARCH Freight Database 1996

Figure 3.10 1998 Reebie Rail Container Flows: Mexico Through Texas Flows

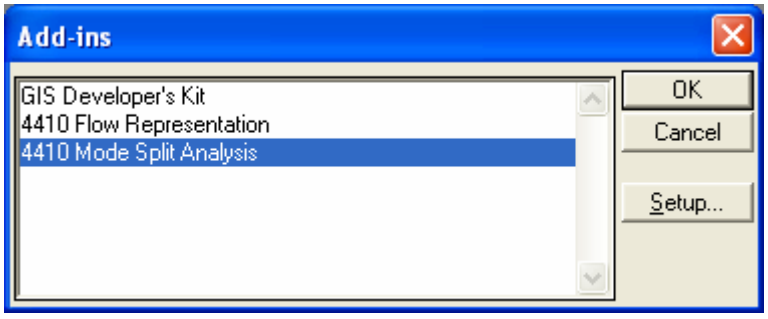
The outputs have been exported and saved to three different folders: 1998 Rail Waybill Data, 1998 Reebie Rail Data, and 1998 Reebie Truck Data (see below). The maps will display in TransCAD when the user clicks on the map symbol  .



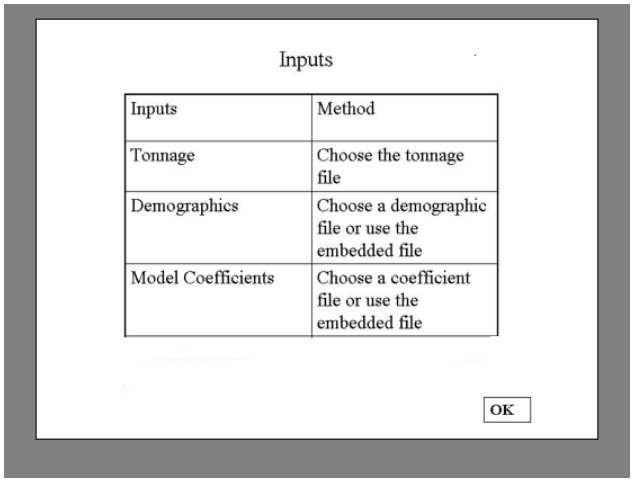
3.3 Mode Choice Analysis

The following step-by-step instructions serve as a user's guideline to conduct mode choice analysis. The sample runs use the default datasets and sample input data files embedded in the system.

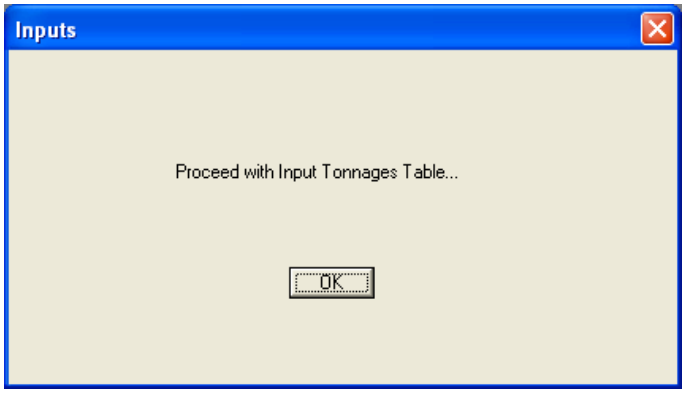
1. Open TransCAD and choose *Tools* – *Add-ins*. Select "4410 Mode Split Analysis" and click OK.



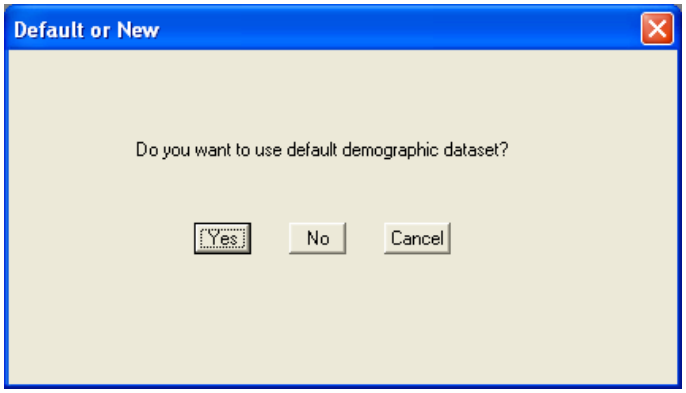
2. This is followed by a display of the input requirements for the analysis (see below). Click OK to proceed with inputs.



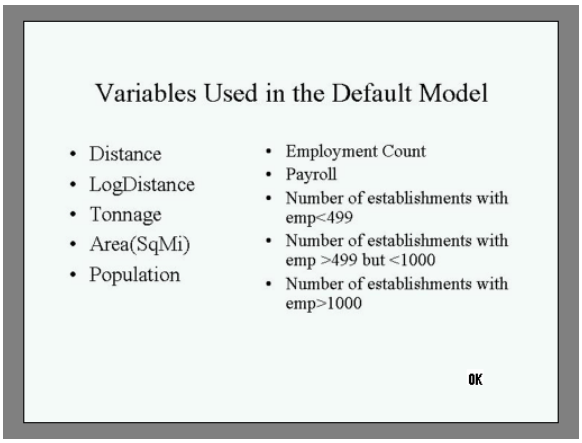
3. The Inputs dialogue box asks the user to proceed with the Input Tonnages Table. Click OK.



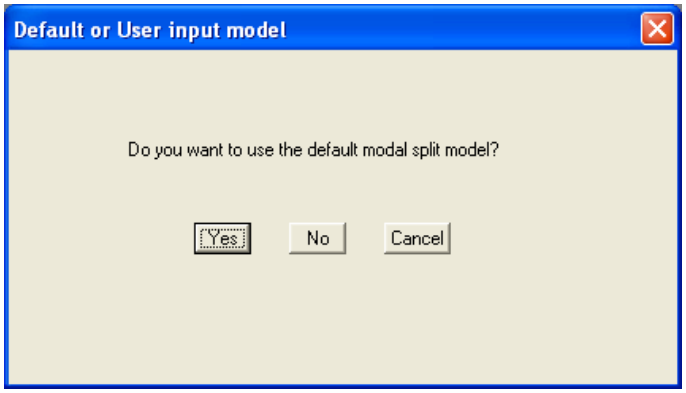
4. Specify the location of the Input Tonnages Table. A sample input tonnages table is embedded for demonstration purposes and can be located at **C:\4410\Inputs\Tonnageinput1.dbf.** Click Open.
5. The Default or New dialogue box will appear. Click Yes to use the default dataset for zonal sociodemographics.



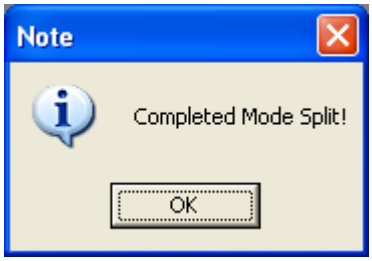
6. A display of all the variables used in the default mode-split model will appear. Click on OK.



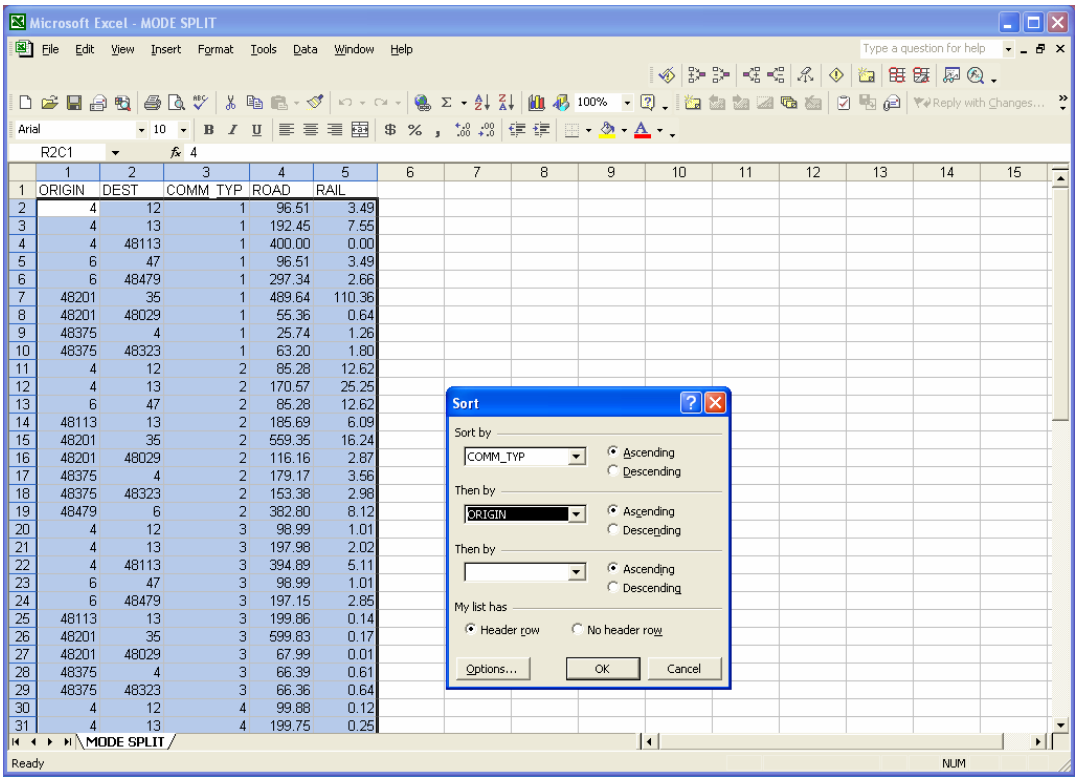
7. The Default or User Input Model dialogue will appear. Click Yes when the system prompts the user to use the default modal-split model.



8. The mode-split analysis will begin. When the application ends, a prompt is displayed informing the user that the mode-split component has been completed. The outputs are stored in **C:\4410\Outputs\MODE SPLIT.**

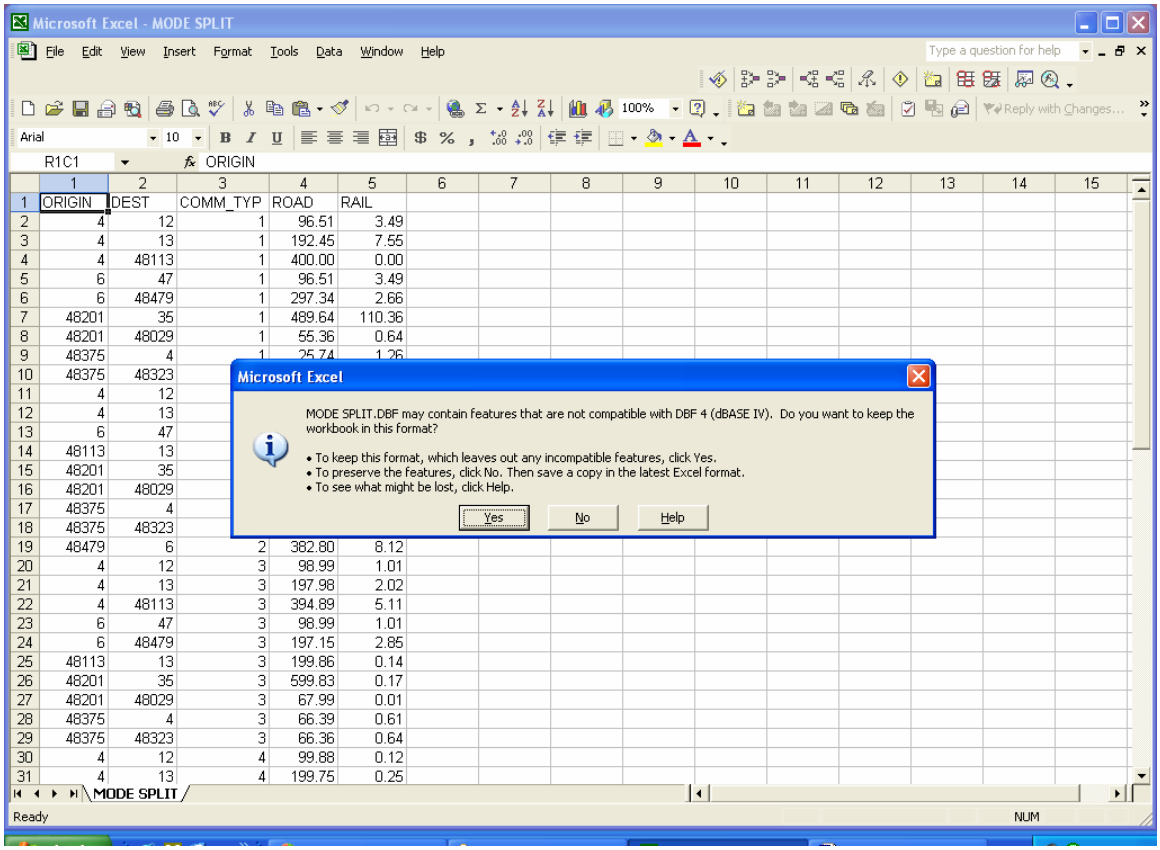


9. Open the MODE SPLIT.dbf file in Excel and sort the data by Comm_Typ and Origin (see below).



ORIGIN	DEST	COMM_TYP	ROAD	RAIL
4	12	1	96.51	3.49
4	13	1	192.45	7.55
4	48113	1	400.00	0.00
6	47	1	96.51	3.49
6	48479	1	297.34	2.66
48201	35	1	489.64	110.36
48201	48029	1	55.36	0.64
48375	4	1	25.74	1.26
48375	48323	1	63.20	1.80
4	12	2	85.28	12.62
4	13	2	170.57	25.25
6	47	2	85.28	12.62
48113	13	2	185.69	6.09
48201	35	2	559.35	16.24
48201	48029	2	116.16	2.87
48375	4	2	179.17	3.56
48375	48323	2	153.38	2.98
48479	6	2	382.80	8.12
4	12	3	98.99	1.01
4	13	3	197.98	2.02
4	48113	3	394.89	5.11
6	47	3	98.99	1.01
6	48479	3	197.15	2.85
48113	13	3	199.86	0.14
48201	35	3	599.83	0.17
48201	48029	3	67.99	0.01
48375	4	3	66.39	0.61
48375	48323	3	66.36	0.64
4	12	4	99.88	0.12
4	13	4	199.75	0.25

10. Save the file as a dbf file. Click Yes when prompted "To keep this format, which leaves out any incompatible features, click Yes." (see below).



11. Assign the container flows to the network following the procedures described in Section 3.2. The outputs will be stored in **C:\4410\Outputs** under the Traffic Assignment by Rail and Traffic Assignment by Road subfolders, respectively. As explained earlier, these outputs must be exported to a different folder—TransCAD Export Files in this example. Once the files are exported, the user must compile the maps. The rail and truck maps obtained are illustrated in Figures 3.11 and 3.12, respectively.

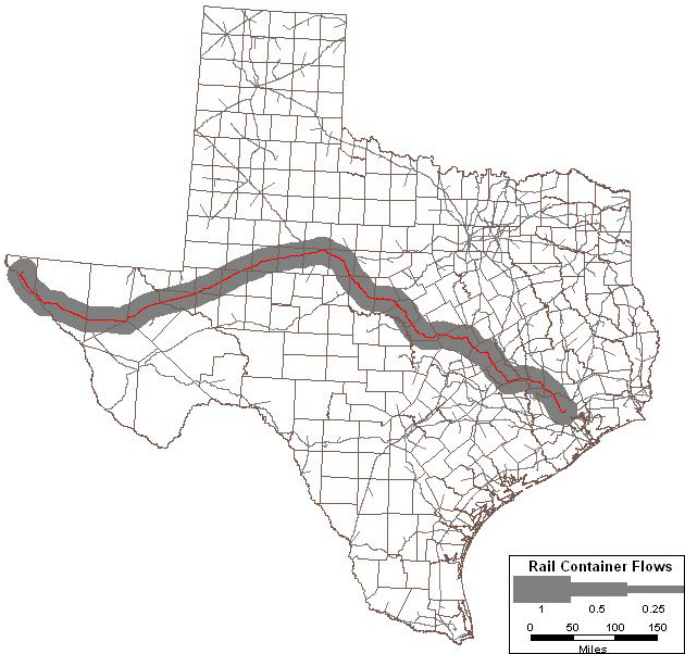


Figure 3.11 Tonnageinput1: Rail Container Flows

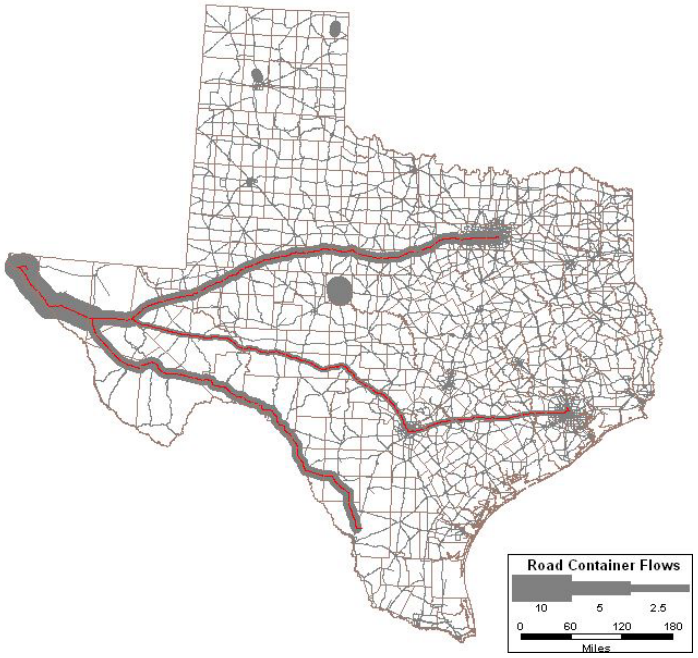


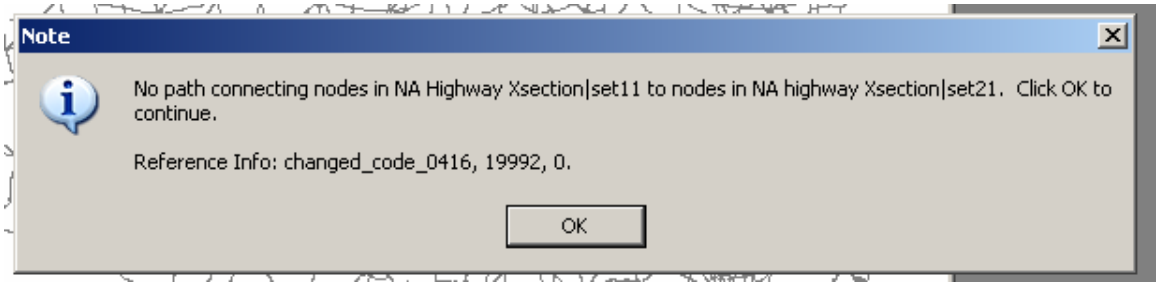
Figure 3.12 Tonnageinput1: Road Container Flows

4. Error Messages: Input Table Errors

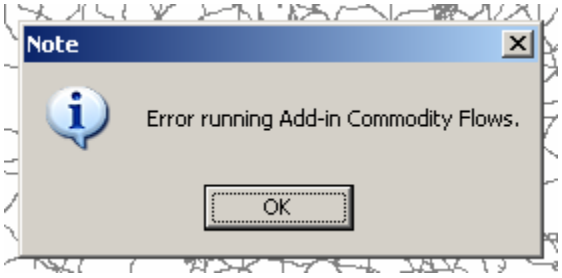
Common input table errors include: (a) incorrect Federal Information Processing Standards (FIPS) codes, (b) the same origin and destination county, (c) incorrect sorting of the data contained in the input table, and (d) incorrect commodity codes. This section highlights some of the common errors and how to correct them.

4.1 Same Origin and Destination County

When the origin and destination of a shipment is given as the same county, TransCAD will display an error message: "No patch connecting nodes in …." (see below).



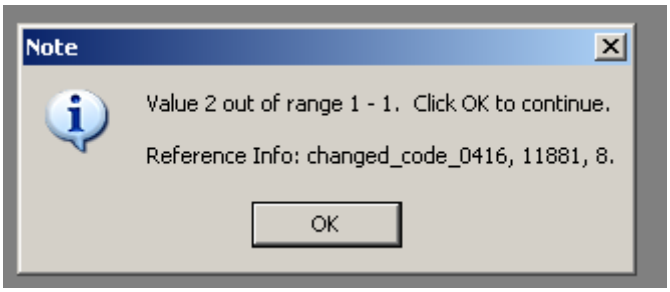
When the user clicks OK, the following dialogue box will appear.



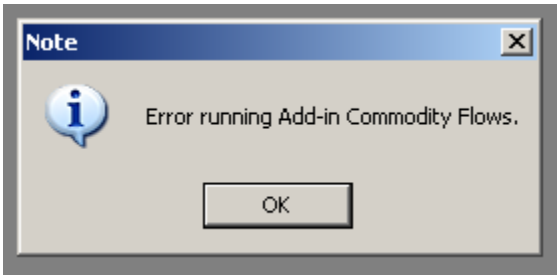
The assignment and mode choice models were developed to assign and estimate intercounty and interstate container flows—not intracounty flows. Thus, the user needs to examine the input table and delete any records that have the same origin and destination county.

4.2 Value-Out-of-Range

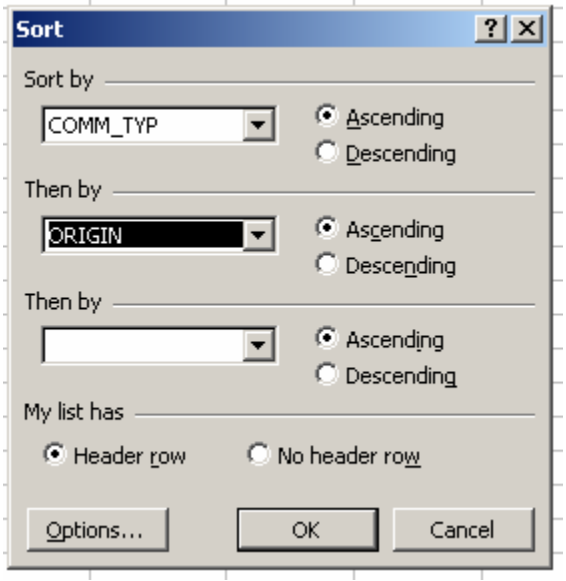
Incorrect sorting of the data contained in the input table will result in the "Value-out-of-range" error. The value-out-of-range error, however, can also occur if a record misses the commodity type (see below).



When the user clicks OK, the following dialogue box will appear.



To rectify the incorrect sorting of the data, the data in the container flow input table needs to be sorted by Comm_Typ and Origin (see below). The tonnage input tables need to be sorted by origin only.



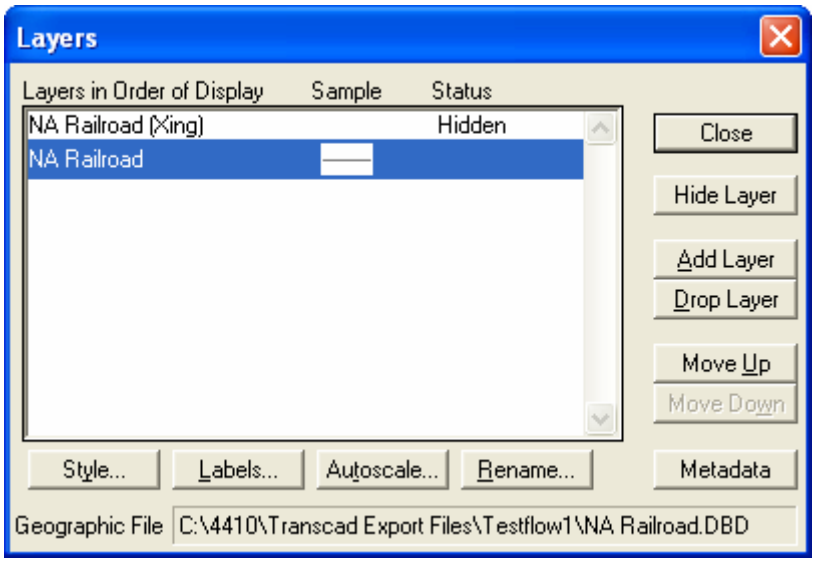
If the value-out-of-range error is due to omitted data, the user is advised to inspect the record and enter the appropriate data. If it is impossible to enter the omitted data, delete the record.

Finally, it is important to note that an input table may contain more than one error. TransCAD will display an error message for the first error that it comes across. The user might have to run the data a few times to identify and correct all the errors contained in an input table.

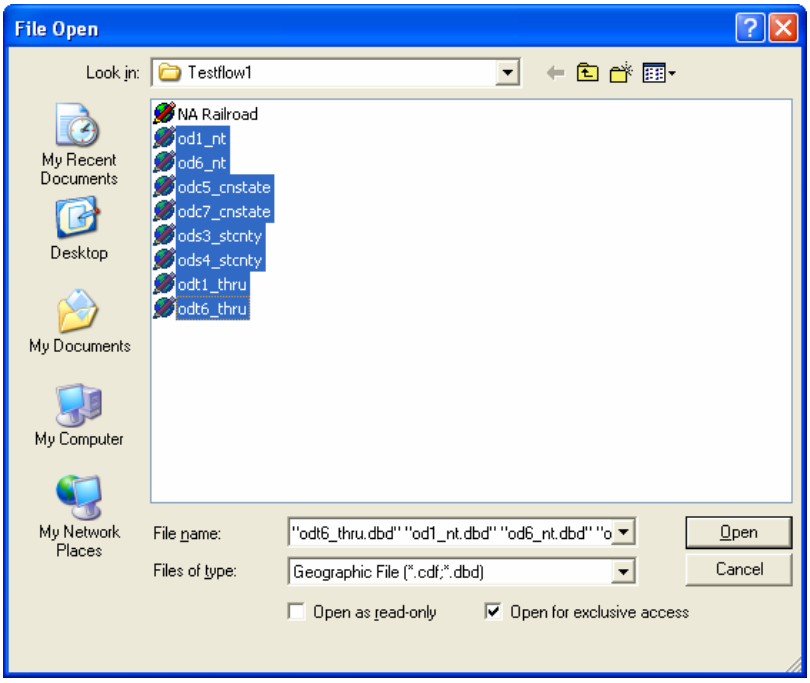
5. Using TransCAD 101

5.1 Adding a Layer

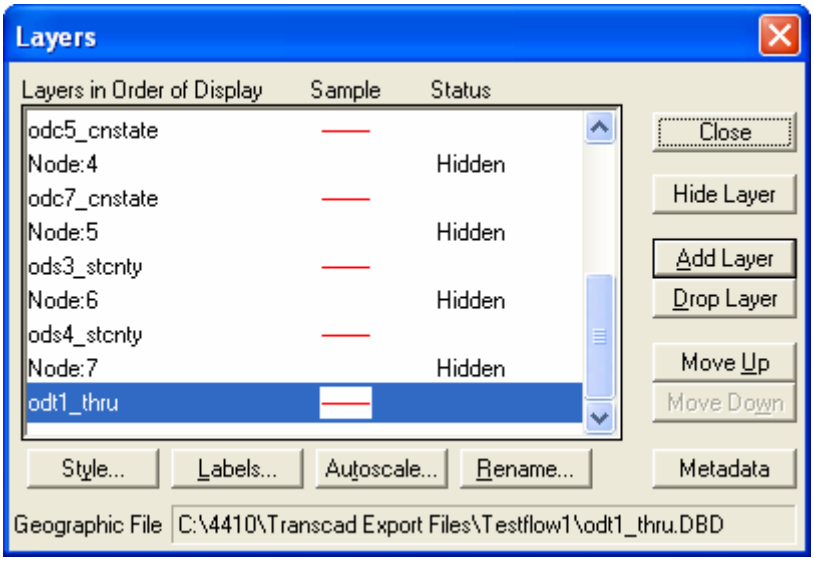
Layers (geographic files) can be added to a map file; for example, the different commodity layers can be added to the rail network. Click on the map layers  button. The Layers box will appear (see below).



Click on Add Layer. The File Open dialogue box will appear (see below). Specify the location of the geographic file(s) for the layer(s) to be added. In this example, the geographic files are located at **C:\4410\Transcad Export Files\Testflow1.** Click Open.



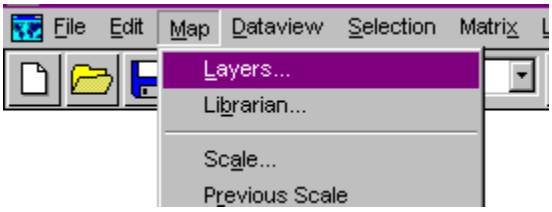
The Layers dialogue box will reappear with the new layer(s) added (see below).



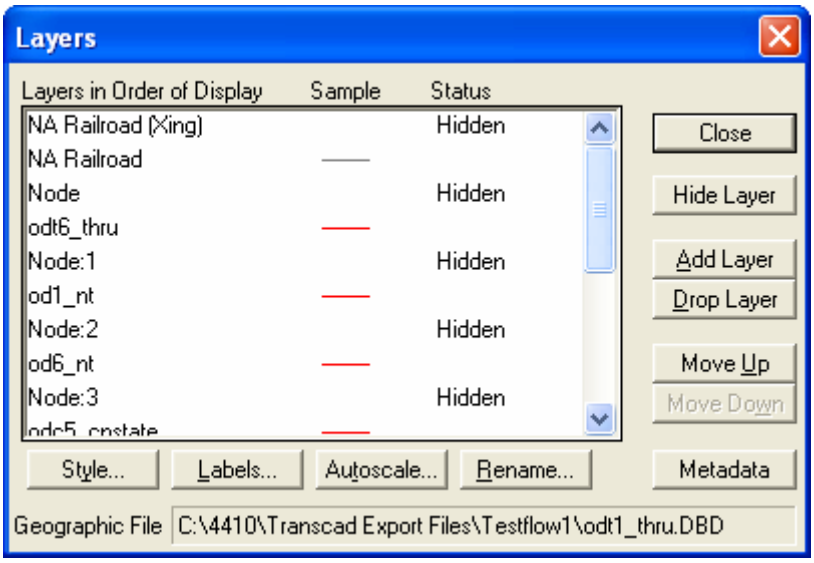
Click Close.

5.2 Turning on Layers

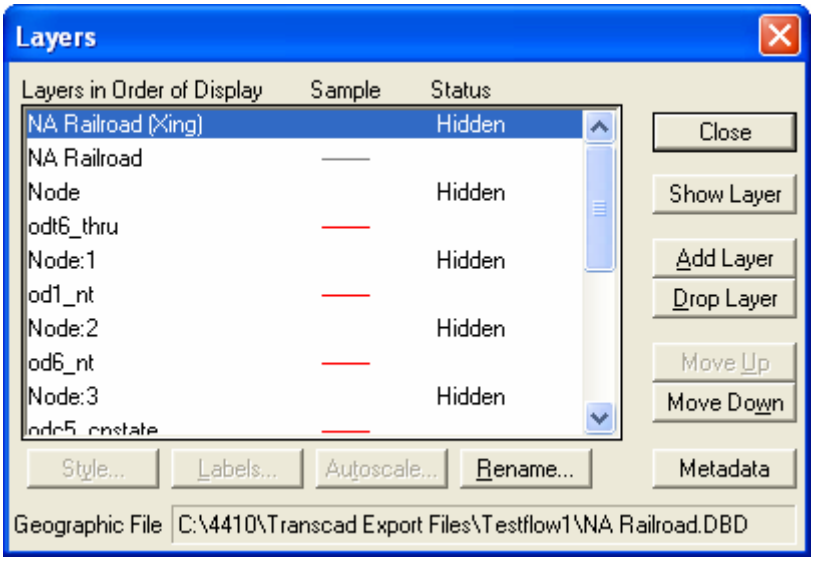
To “turn on/hide” a layer, click Map on the main tool bar and select Layers.



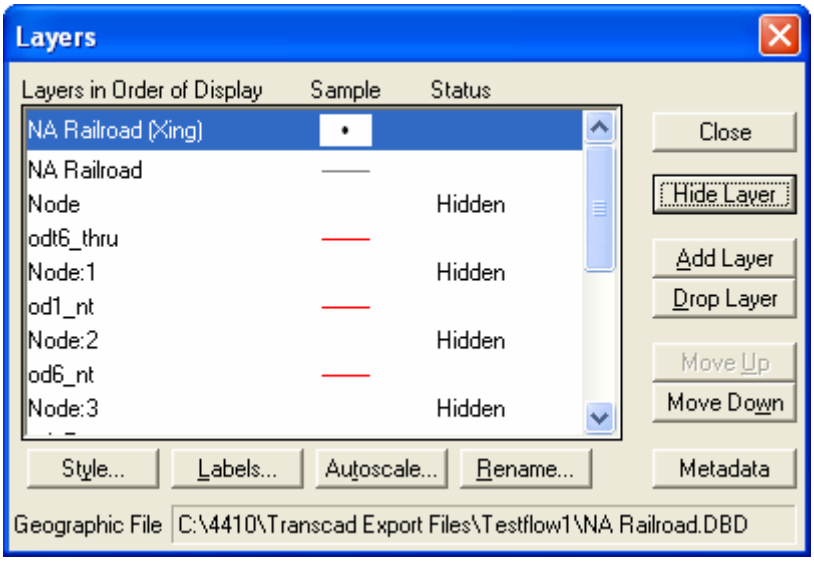
The Layers dialogue box will appear.



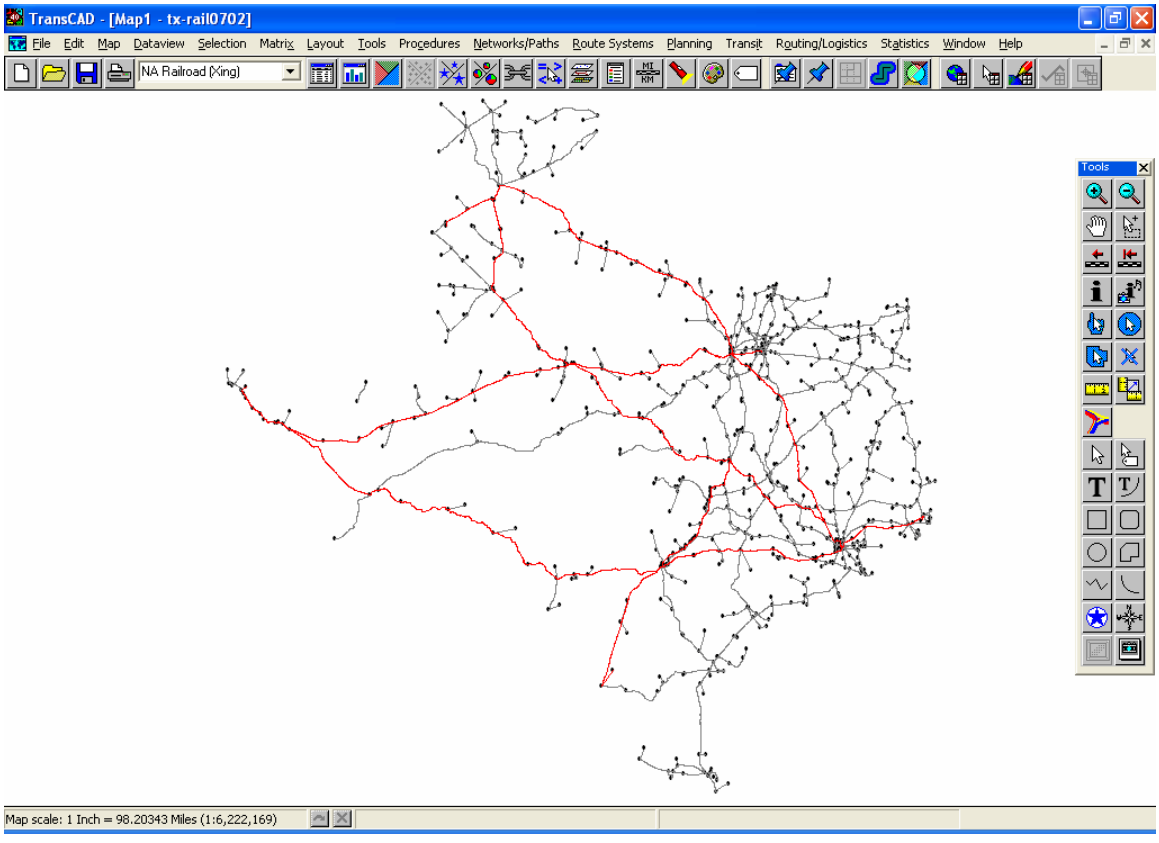
To "turn on" a hidden layer, highlight the layer by clicking on the layer. In this example, highlight the hidden layer labeled NA Railroad (Xing).



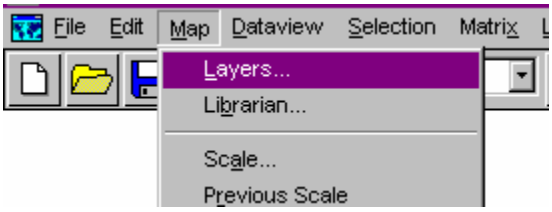
Click Show Layer. In this example, the hidden layer was a node layer and thus a node appears under the "Sample" heading (see below).



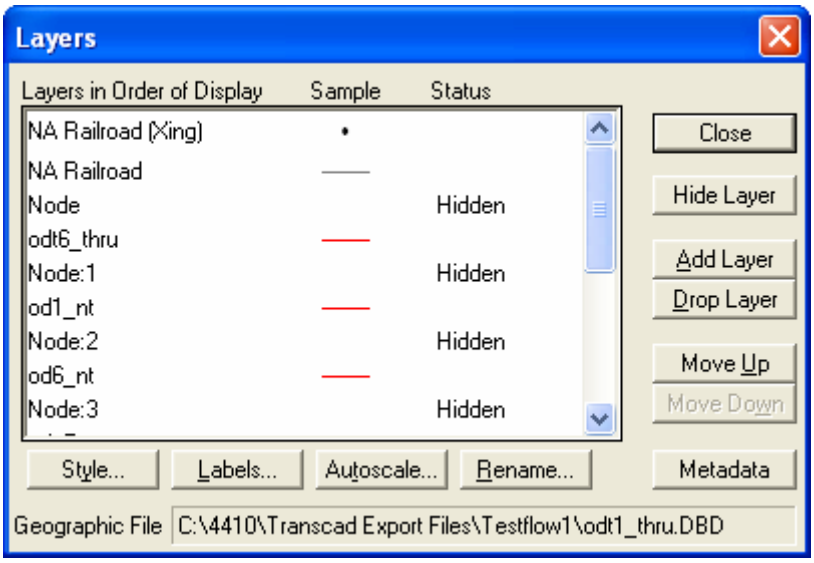
When the user clicks Close, the map with the node layer displayed will appear (see below).



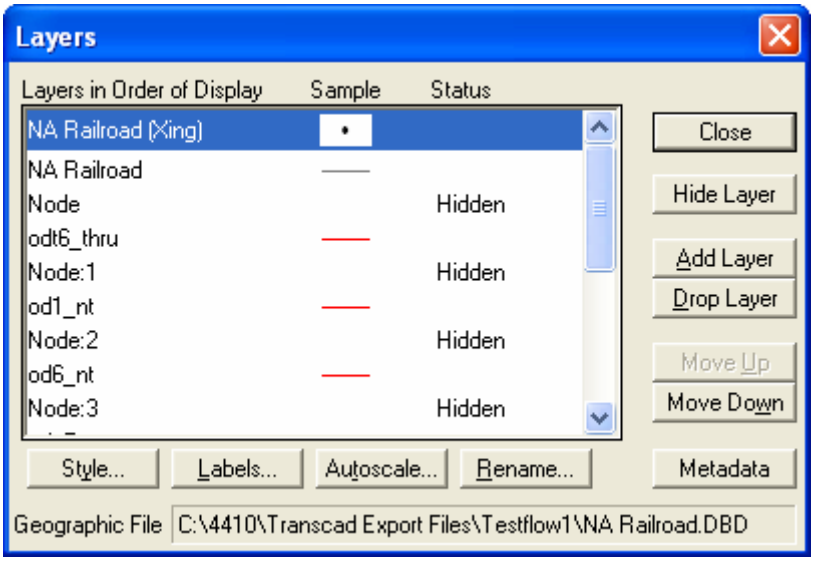
To "hide" a displayed layer, click Map on the main tool bar and select Layers.



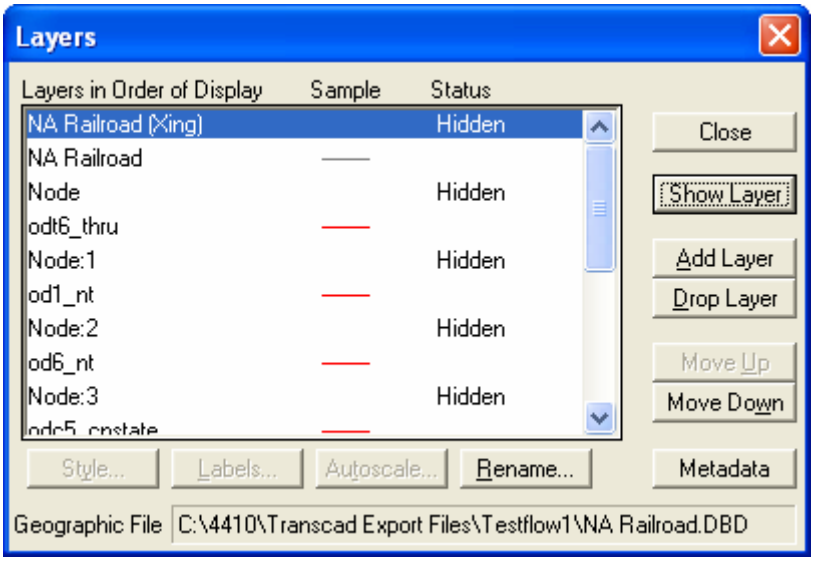
The Layers dialogue box will appear.



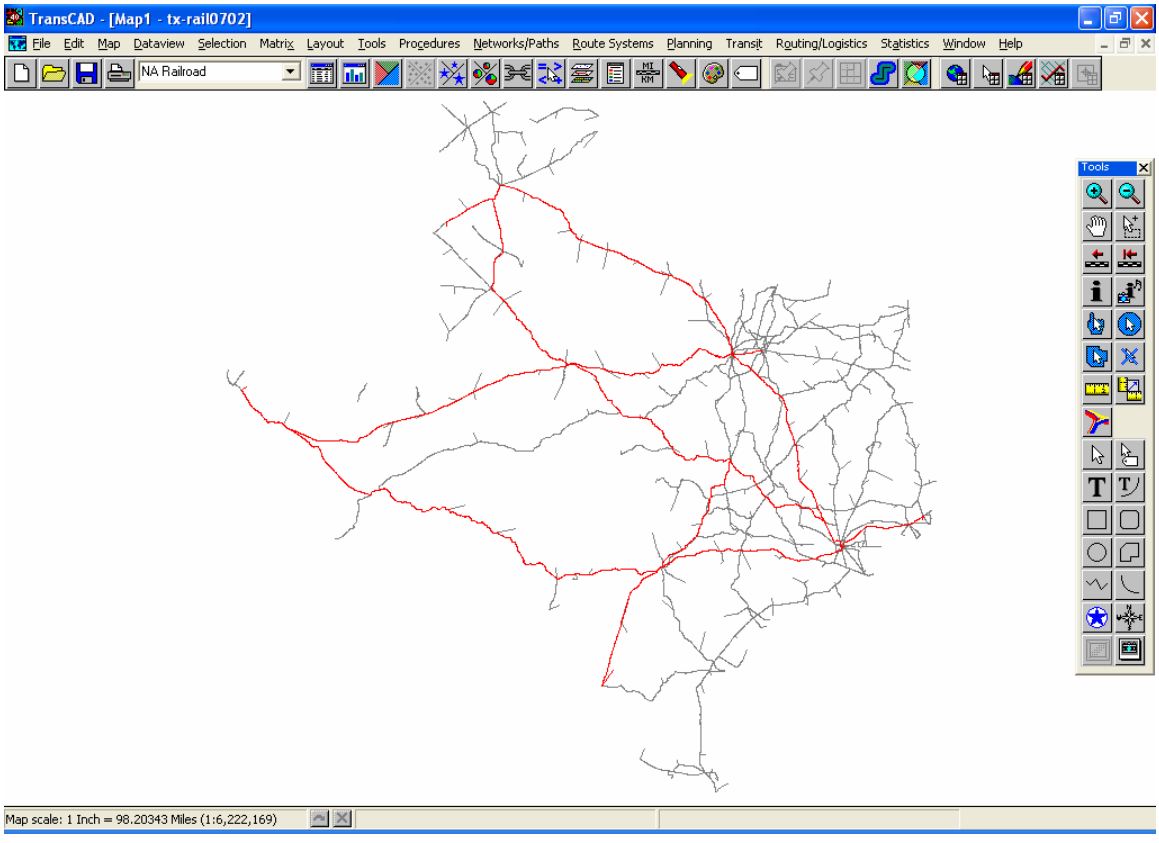
To "hide" a layer, highlight the displayed layer by clicking on the layer. In this example, highlight the layer labeled NA Railroad (Xing).



Click Hide Layer. Hidden will appear under the "Status" heading (see below).

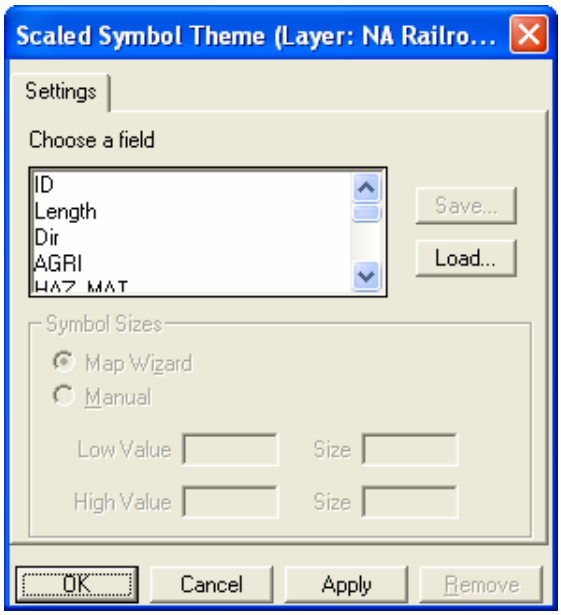


When the user clicks Close, the map without the node layer displayed will appear (see below).

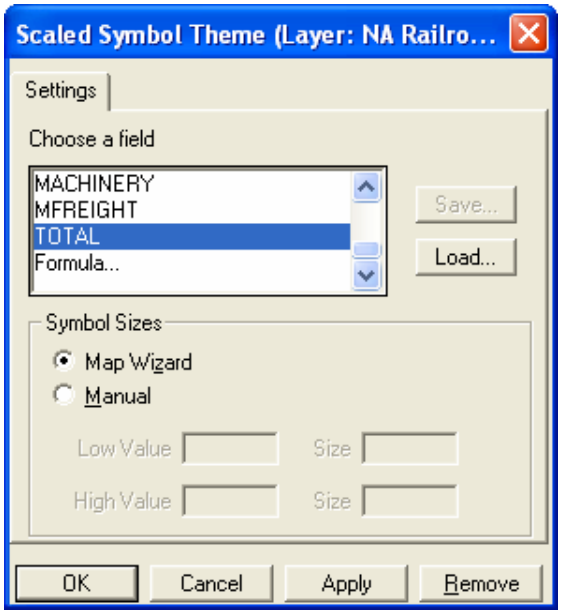


5.3 Line Thickness

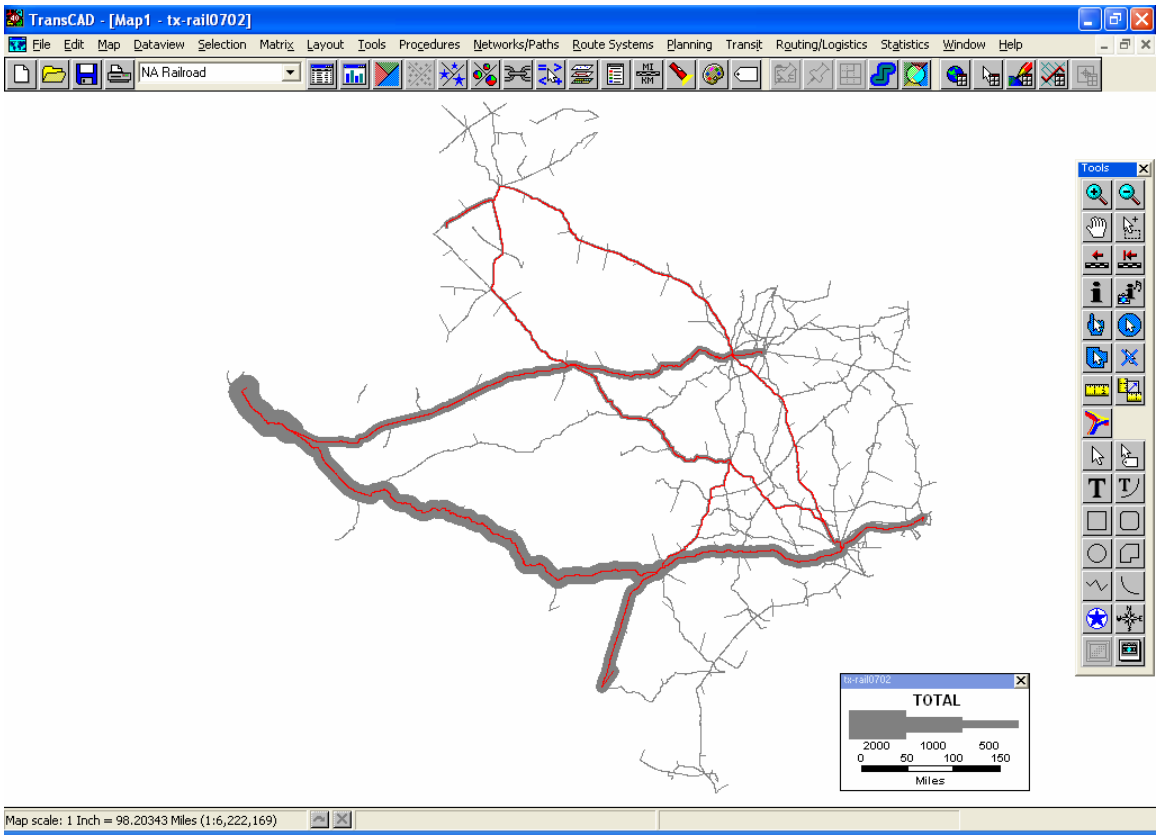
It is useful to display the relative number of containers on the network by varying the link line thickness. To do this, the analyst must click on the Scaled Symbol Theme Map wizard button  . A Scaled Symbol Theme box will open (see below). Select the appropriate field (variable) that the user wants to display through a scaled symbol by highlighting the field in the Choose a field section of the Scaled Symbol Theme box.



For example, if the analyst wants to display the total number of containers moved on the rail network, then Highlight TOTAL in the Choose a field section (see below). TransCAD will automatically apply three symbol sizes (band widths), if the Map Wizard setting is selected. Alternatively, the user can specify the bandwidths desired by selecting the Manual option and specifying the desired value breaks.

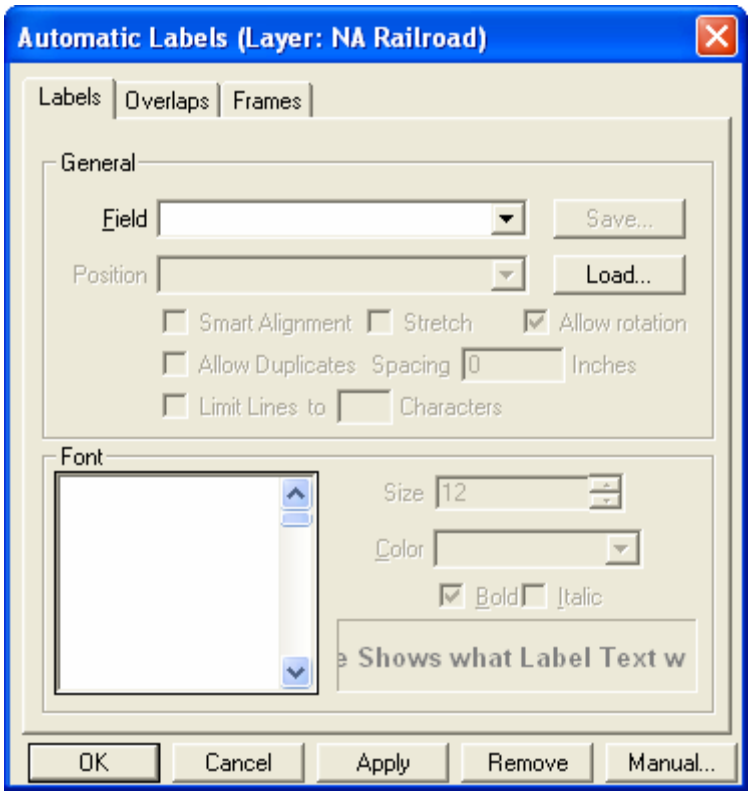


When the user clicks OK, a map with the scaled link container flows will appear (see below for an example).

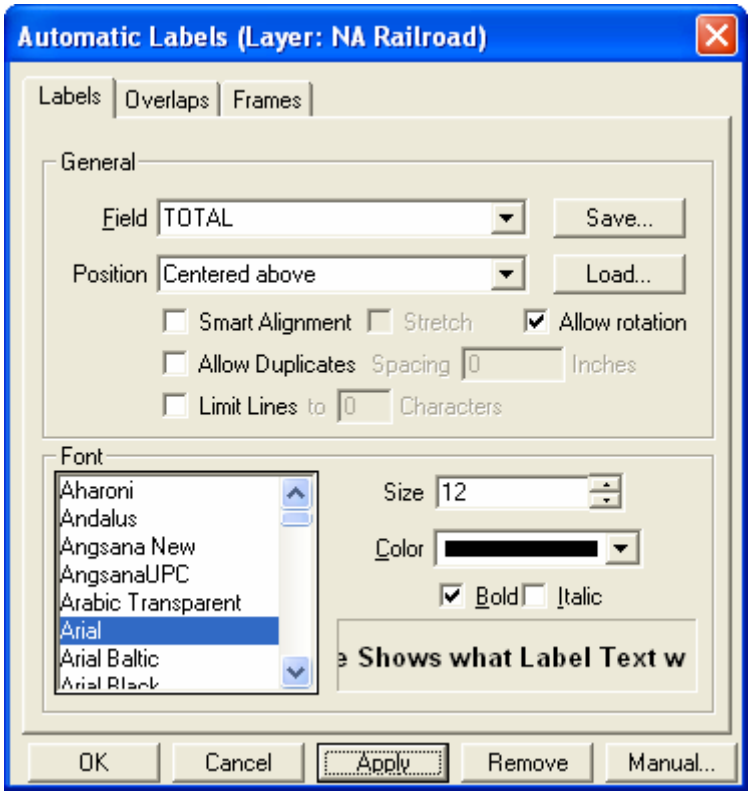


5.4 Labeling

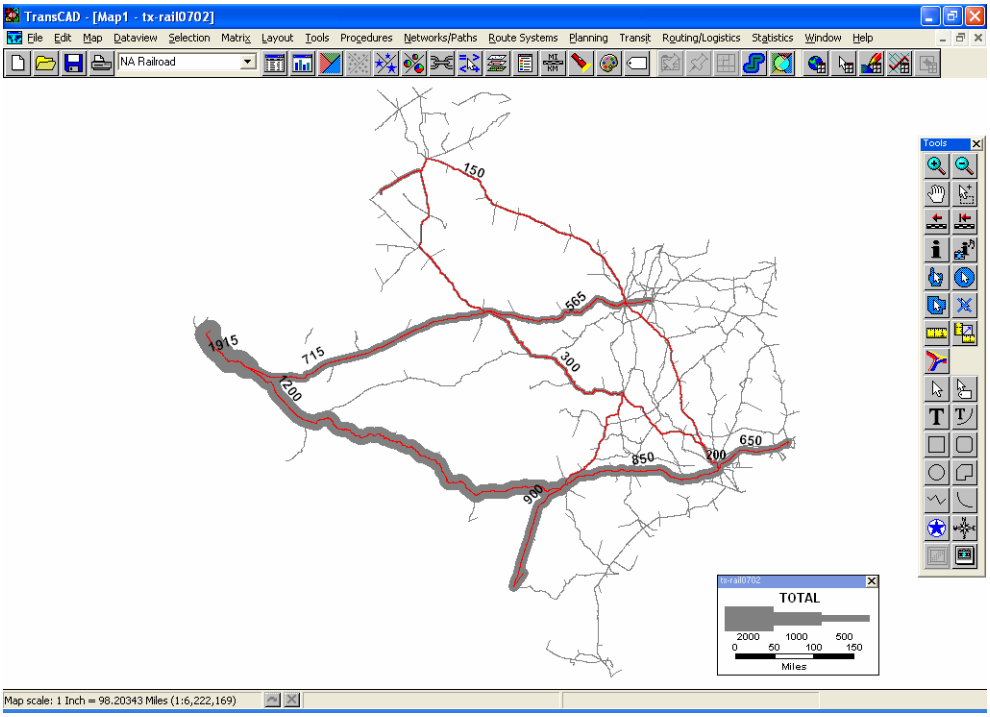
The user can label map layer attributes, i.e., number of containers, by clicking the Automatic Labels button  . The Automatic Labels box will appear (see below).



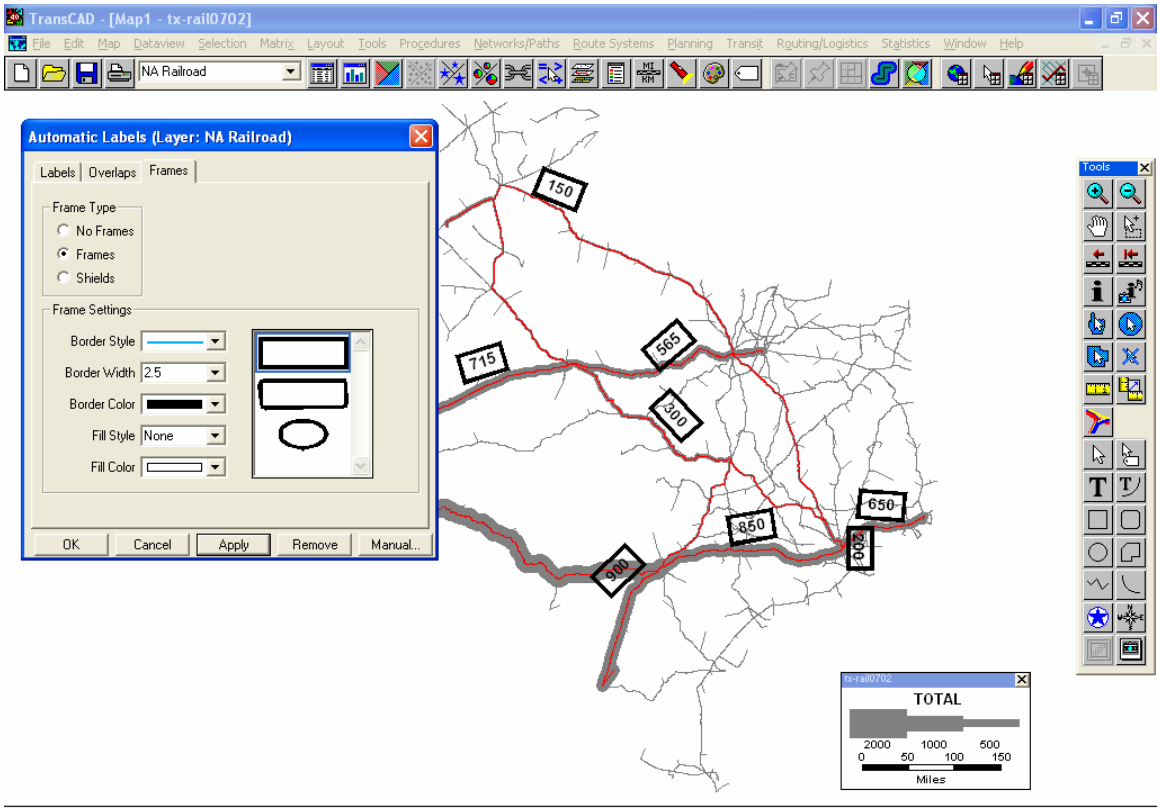
The Automatic Labels box has three tabs: (a) Labels, (b) Overlaps, and (c) Frames. Select the first tab: Labels. First, specify the field that will be labeled, for example, the total number of containers. Thus, select TOTAL in the Field Section (see below). Second, select the preferred position of the label, for example, Centered above. The user can also select Smart Alignment (whether special label locating logic should be used to place a label in a more aesthetically pleasing location) or Allow rotation (whether line labels should be rotated), etc. Finally, the user can specify the format of the text to be used in the label.



When the user clicks OK, a labeled map indicating container flows will appear (see example below).

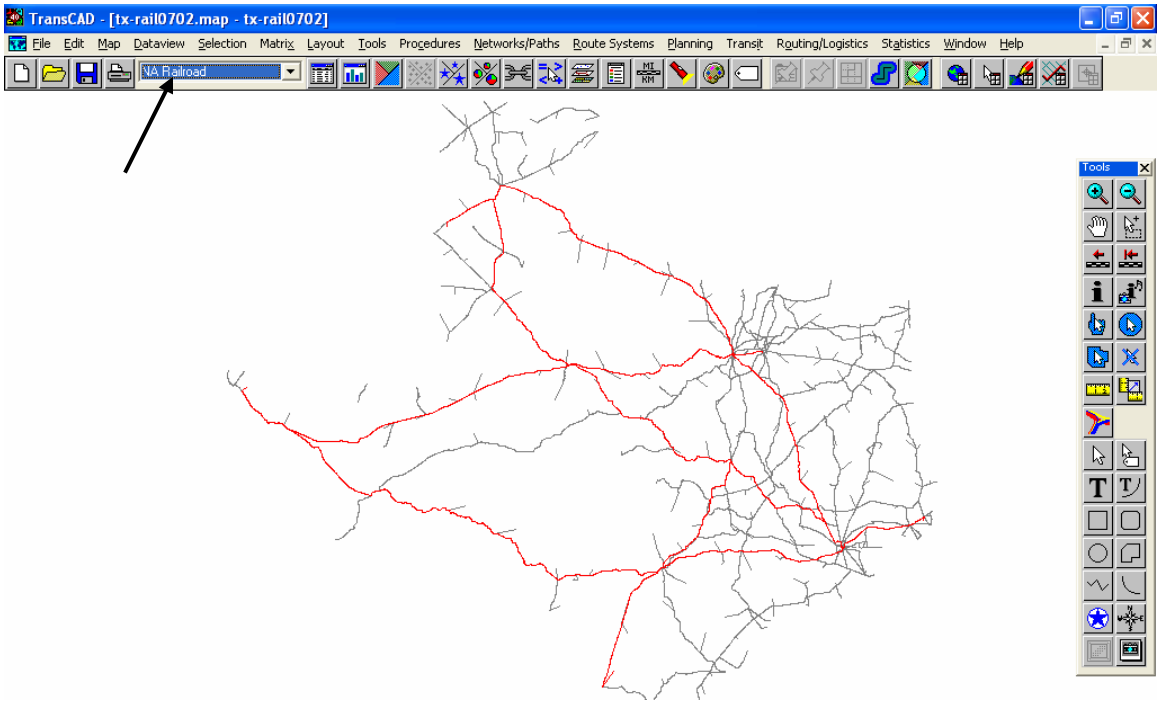


The labels can be made to appear "sharper" by specifying a white background or by putting a frame around the text. Click on the Frames tab and select Frames (see below). Specify the desired Frame Settings, i.e., Border Style, Border Width, Border Color, Fill Style, and Fill Color. Click OK.

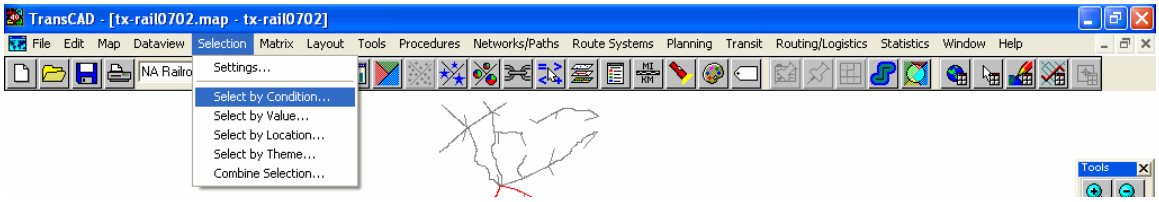


5.5 Selecting by Condition

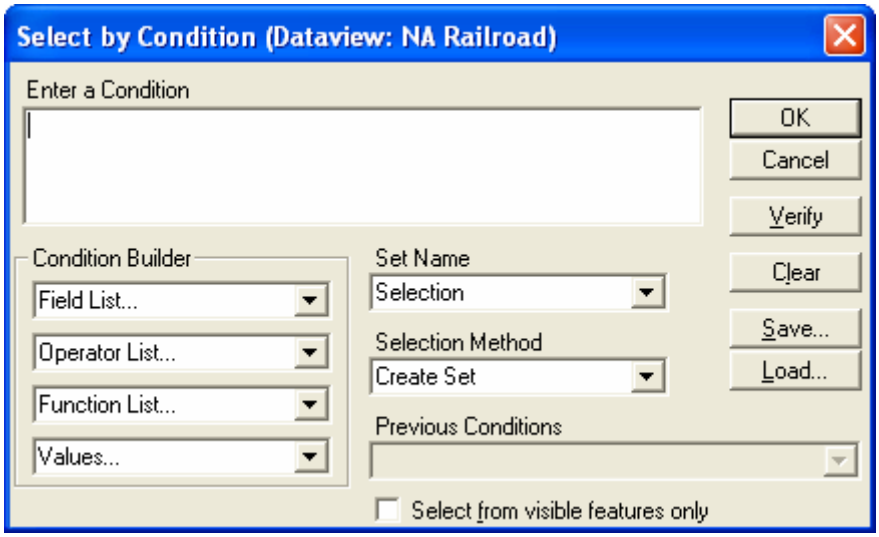
The "Select by Condition" function in TransCAD can be used, for example, to display those network links on which containers move or those links on which containerized hazardous materials move. To illustrate the use of this TransCAD function, the instructions for selecting the rail links on which more than 500 containers move are presented below. Open the rail map located at **C:\4410\Transcad Export Files\Testflow1\tx-rail0702.** Select the NA Railroad line layer (see below).



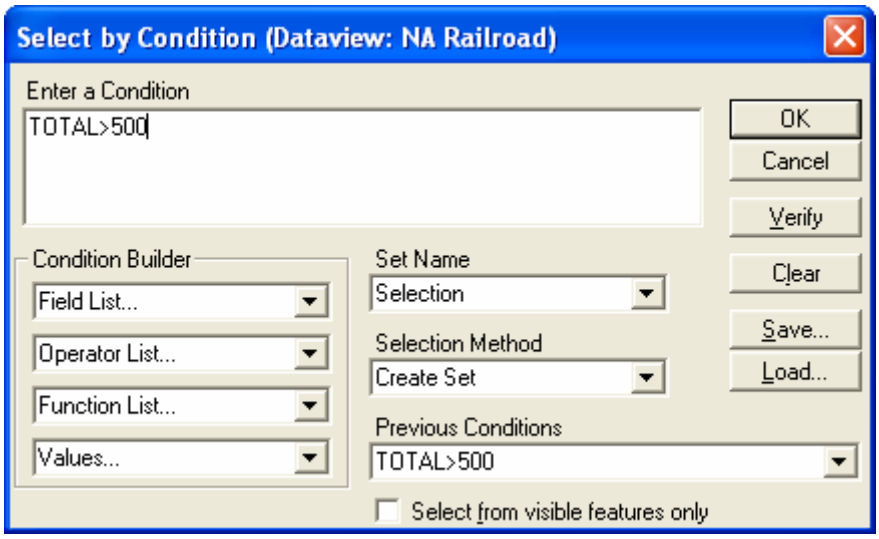
Click Selection and Select by Condition (see below).



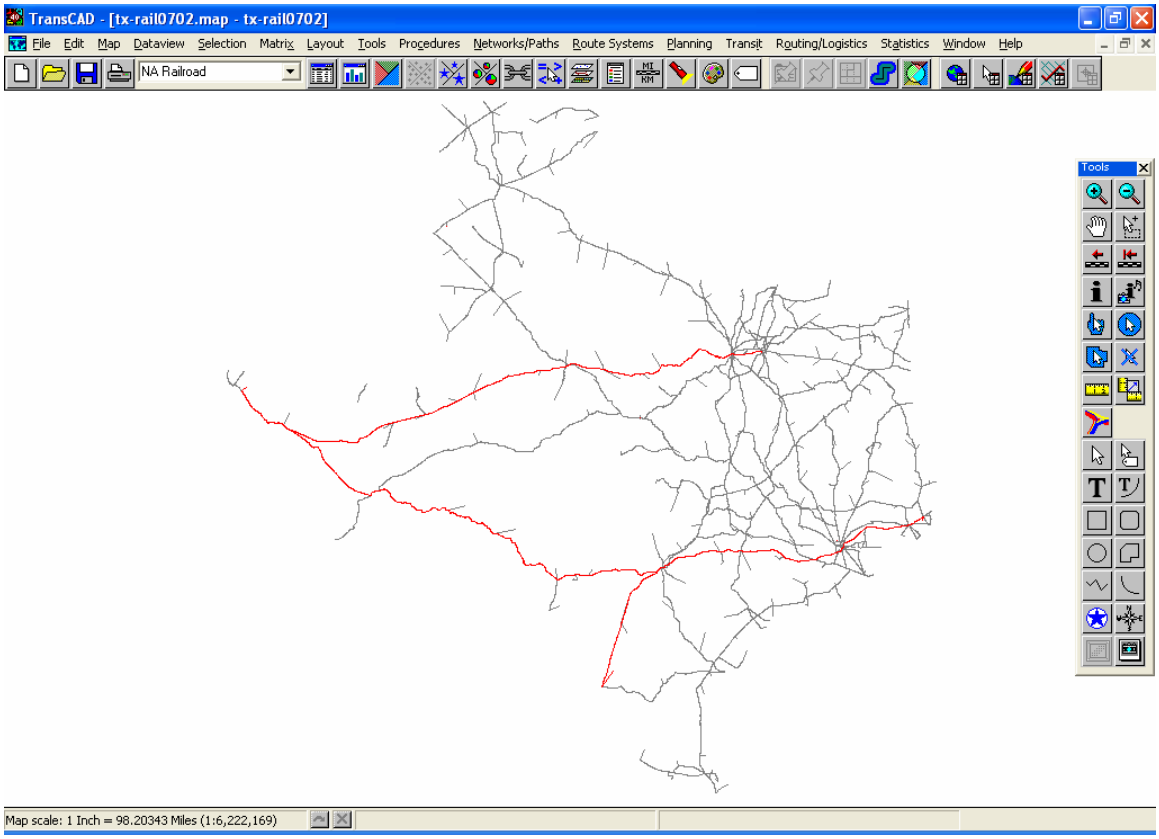
A Select by Condition dialogue box will appear (see below).



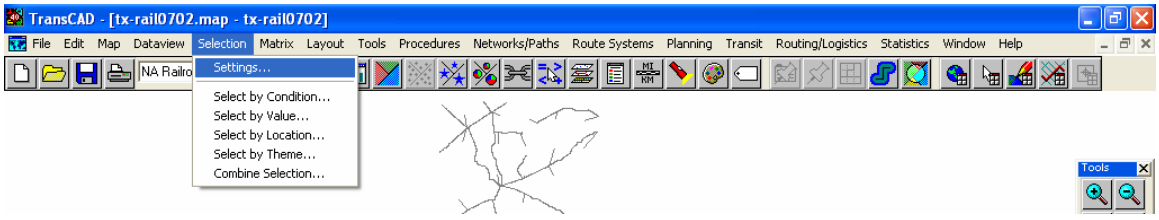
To select only those rail links on which more than 500 containers move: Type TOTAL>500 in the Enter a Condition section.



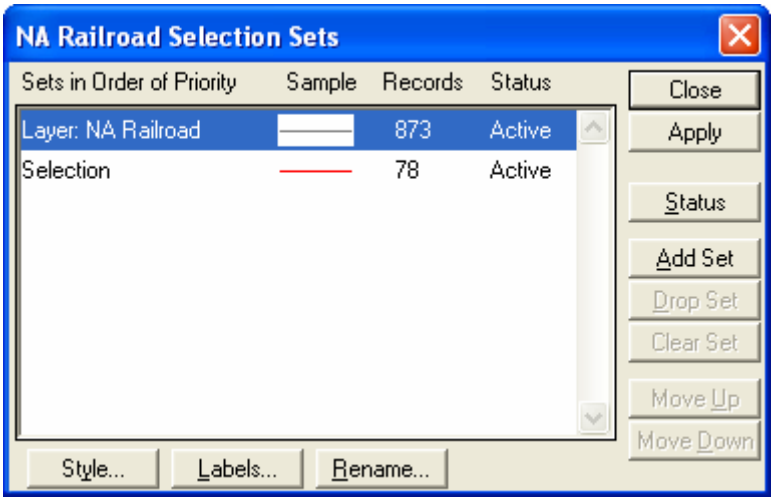
When the user clicks OK, a map will appear with the rail links that move more than 500 containers highlighted (see below).



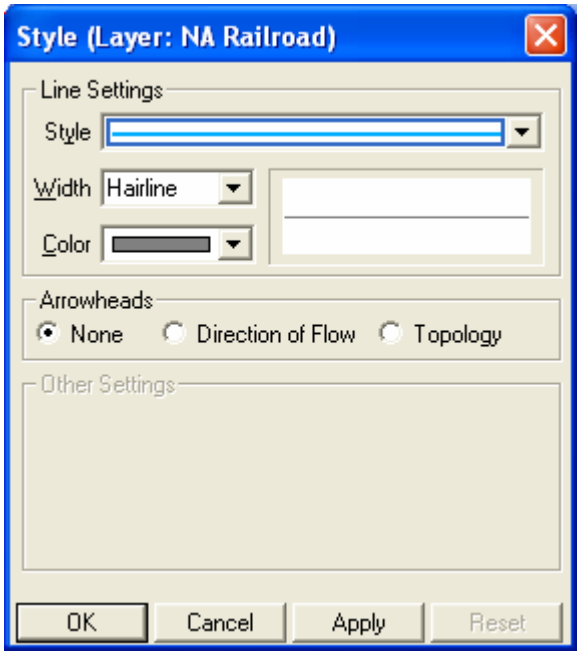
The user can change the line attributes (color or line thickness) of the highlighted links that were Selected by Condition by choosing Selection on the main tool bar and clicking Settings (see below).



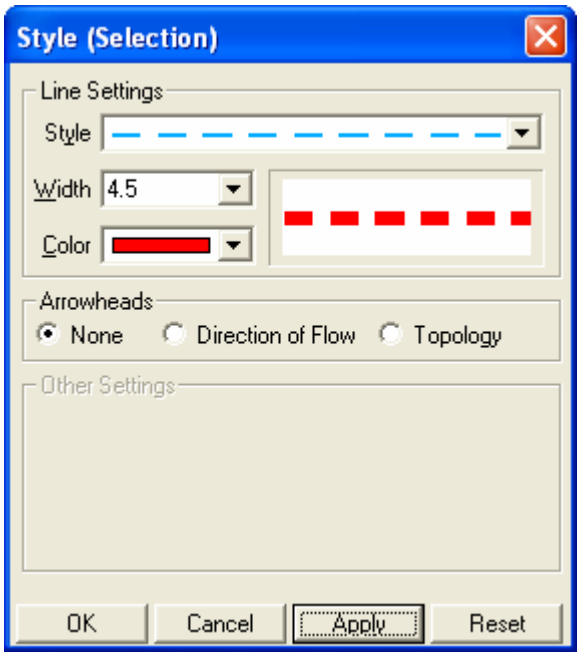
The NA Railroad Selection Sets dialogue box will appear.



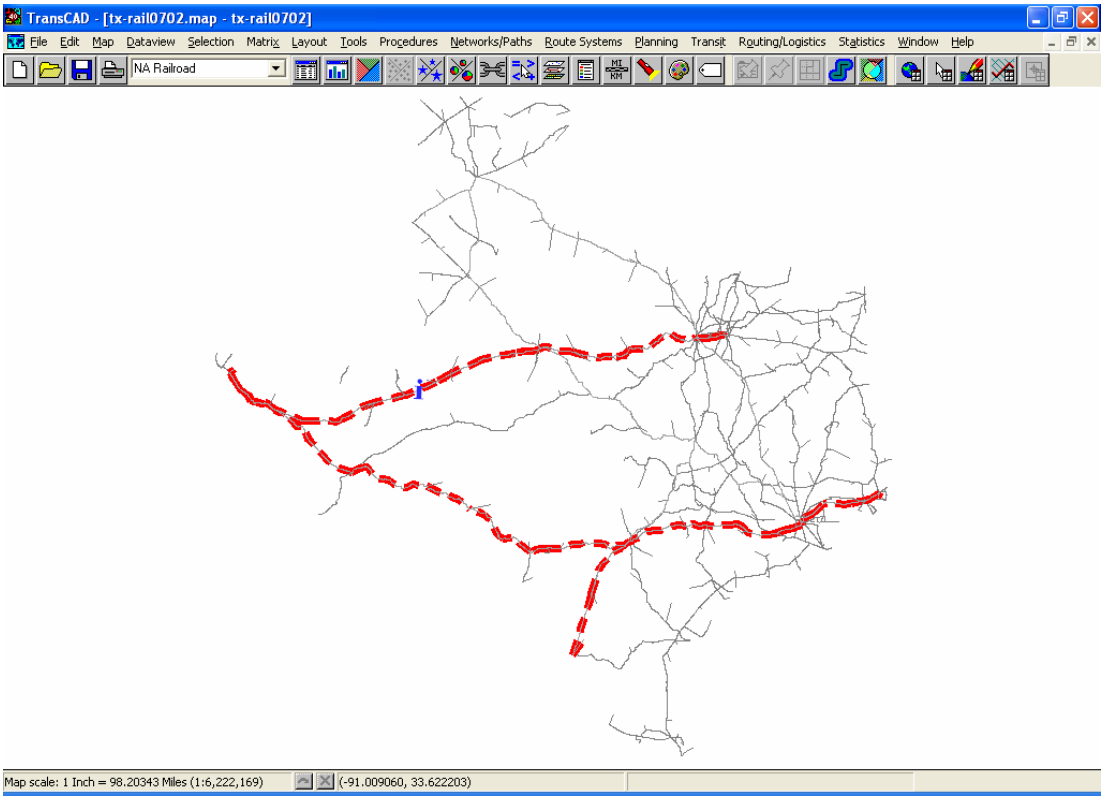
Click Style. The Style dialogue box (see below) will appear.



The style, width, and color settings of the link lines can be changed in this box (see below).



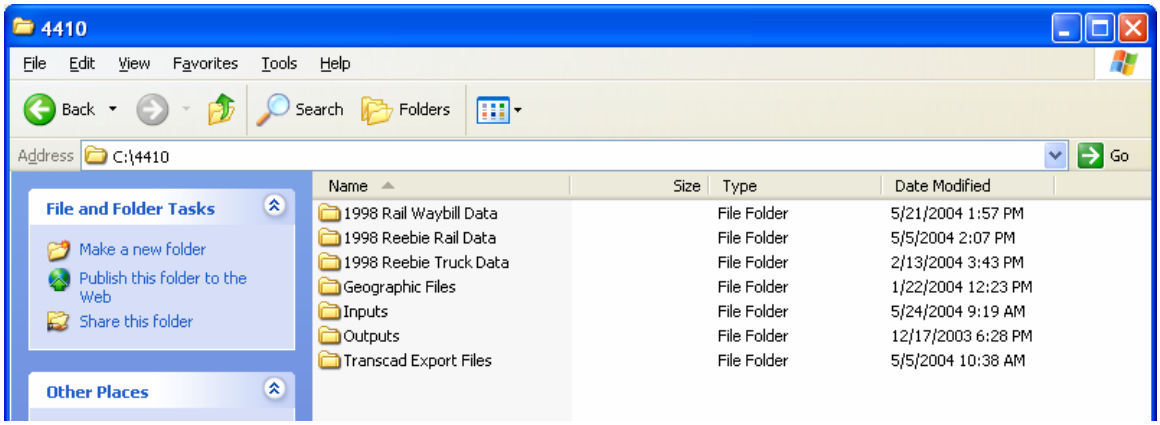
When the user clicks OK, the map below will appear.


TransCAD - [tx-rail0702.map - tx-rail0702]
File Edit Map Dataview Selection Matrix Layout Tools Procedures Networks/Paths Route Systems Planning Transit Routing/Logistics Statistics Window Help
NA Railroad
Map scale: 1 Inch = 98.20343 Miles (1:6,222,169)
(-91.009060, 33.622203)

Appendix A: System Files

CD Contents

Windows Explorer can be used to review the system files once the contents of the CD are copied to the folder **C:\4410**. When the user displays the contents of the 4410 folder, the following is displayed:



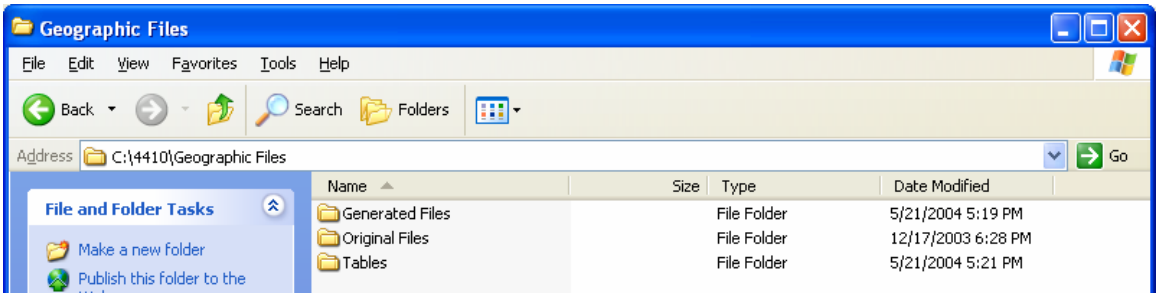
Within the 4410 folder, there are seven subfolders:

- 1998 Rail Waybill Data containing the 1998 Rail Waybill rail outputs;
- 1998 Reebie Rail Data containing the 1998 Reebie rail outputs;
- 1998 Reebie Truck Data containing the 1998 Reebie truck outputs;
- Geographic Files;
- Inputs;
- Outputs; and
- TransCAD Export Files containing the test outputs.

Geographic Files

Within the Geographic Files subfolder, there are three subfolders:

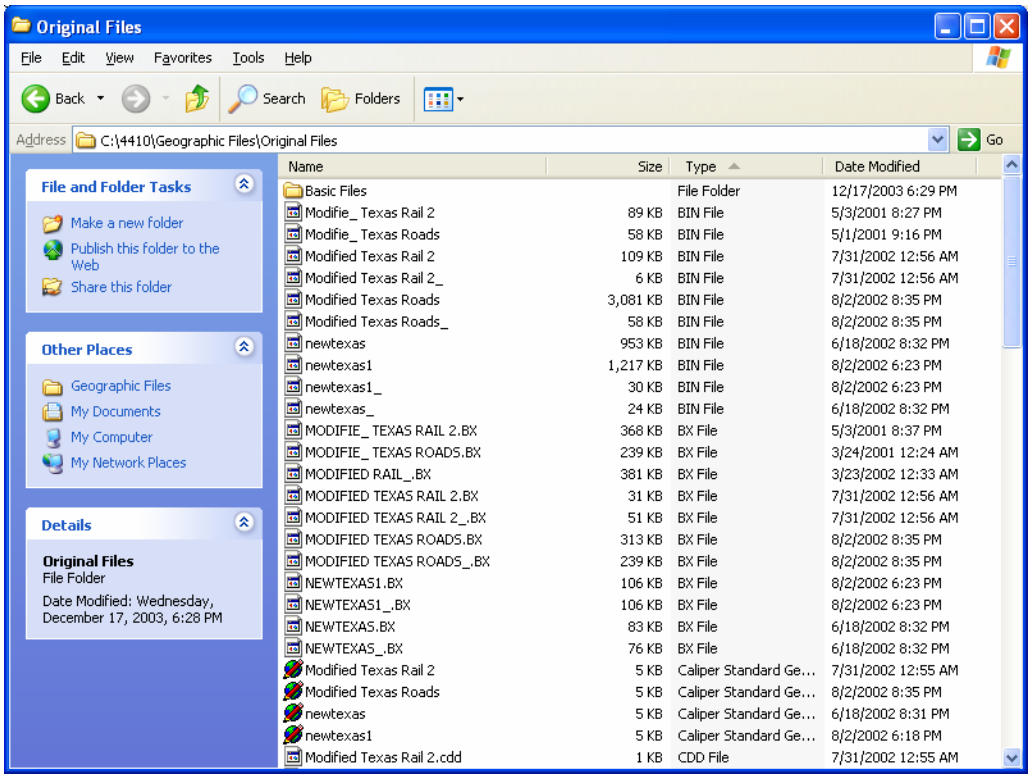
- Generated Files;
- Original Files; and
- Tables (see below).



The Generated Files folder is used by the GIS Platform to store the files created by the software when running. The Original Files folder contains the original network files that the GIS Platform uses. The Tables folder contains tables used by the GIS Platform.

Original Files

The Original Files folder contains a subfolder labeled Basic Files, which contains the files used to create the files in the Original Files folder (see below).



In this project, three networks were specified:

- Texas road network,
- Texas rail network, and

- The road network carrying containers through traffic.

Three different types of files describe each network: (a) a geographic file; (b) a map file; and (c) a network file. A matrix of how these files relate to each other is given in Table A.1 below. These file names must be exactly as stated in Table A.1 for the model to be executed successfully.

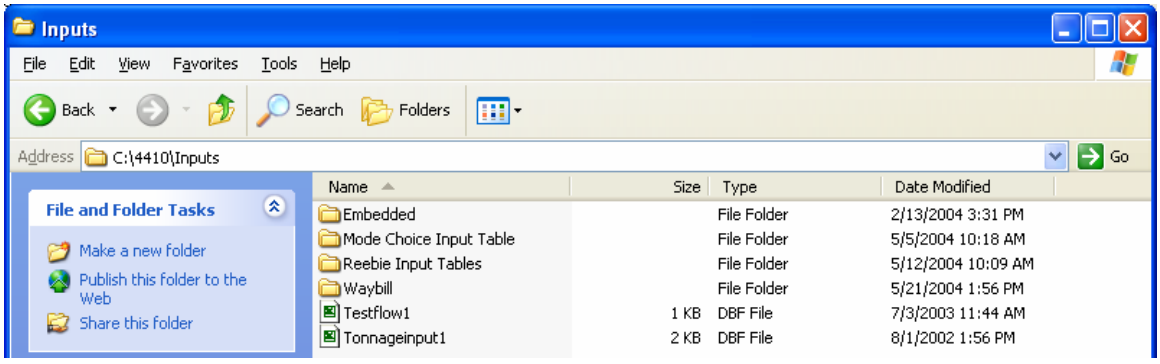
Table A.1 TransCAD Files

		File Type		
		Geographic	**Map**	**Network**
Network	**Rail**	ModifiedTexasrail2.dbd	Rail.map	Railnetwork.net
	Road	ModifiedTexasroads.dbd	Road.map	Roadnetwork.net
	Road Through	Newtexas1.dbd	Mapthru1.map	Newroadnetwork

Inputs

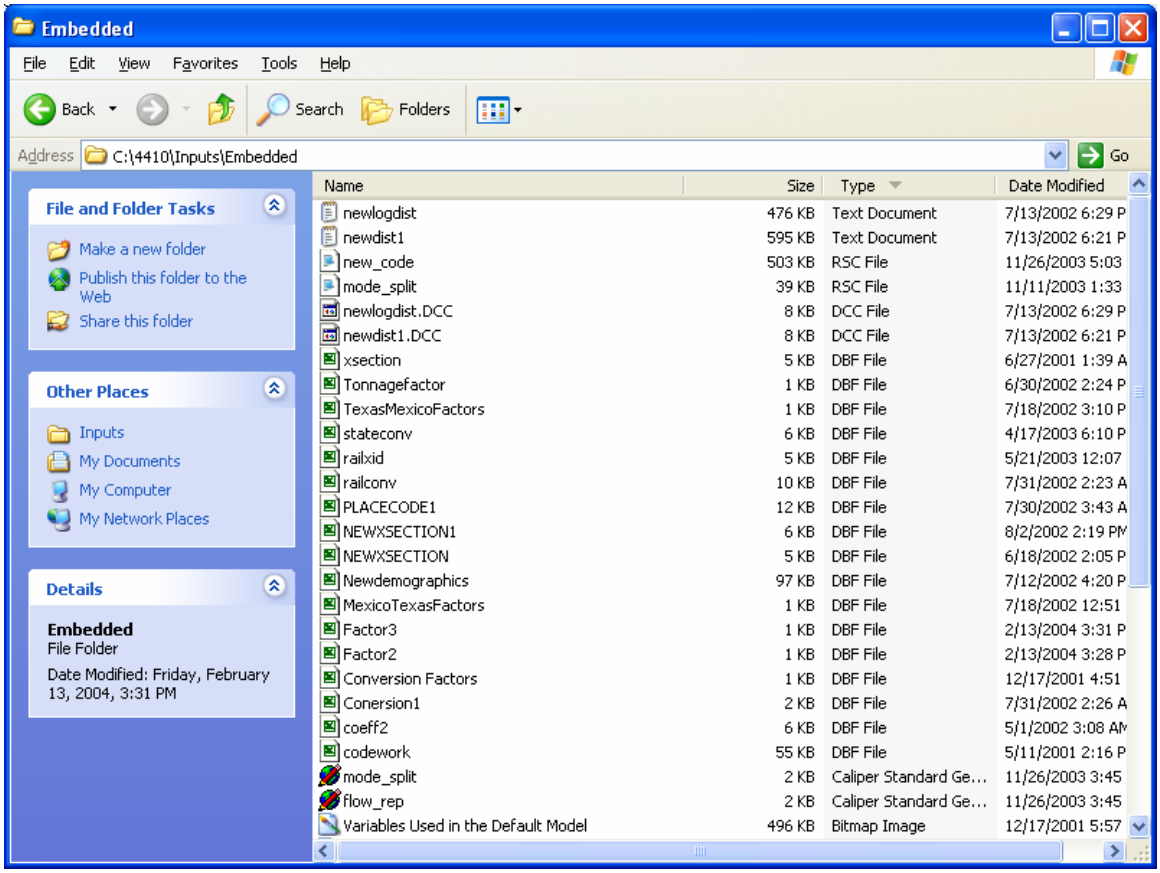
The Inputs folder contains four subfolders and two dBASE (*.dbf) files:

1. Embedded folder;
2. Mode Choice Input Table folder;
3. Reebie Input Tables folder;
4. Waybill folder;
5. Testflow1; and
6. Tonngeinput1.



Embedded Folder

The embedded folder contains files that capture the assumptions required to execute the assignment and mode-split analysis. These files include the assumptions about Texas-Mexico flows, the conversion factors used in estimating container tonnage and flows, and map-related tables.



Model-Related Tables

- Newdemographics.dbf—Demographic information by county for each of the variables (for example, population and industrial establishments) included in the model. The original demographic data was compiled from data published by the U.S. Census Bureau, the County Business Patterns, and the Bureau of Economic Analysis.
- Coeff2—The estimated mode-split model coefficients based on the 1996 Reebie data by commodity type.

- Newdist1.txt—Intercounty distance table in txt format. A txt file format was used, because Excel cannot support more than 256 columns of data.
- Newlogdist.txt—Logarithm of the distance between each county-county pair. A txt file format was used, because Excel cannot support more than 256 columns of data.
- Codework.dbf—This table relates each of the county/state numbers to the county/state name with a prefix "F," because in the distance and log distance tables created, the column variable name had to start with a letter as opposed to an integer. Data in the Excel format cannot have a column name beginning with a numeral.
- Placecode1.dbf—This table relates the Origin and Destination to the FIPS value.
- Stateconv.dbf—This table relates road container flows in and through Texas from other U.S. states with an "entry county" into Texas. Each U.S. state other than Texas is associated with a Texas county FIPS as the entry (or exit) into (or out of) Texas.
- Railconv.dbf—This table relates rail container flows in and through Texas from other U.S. states with an "entry county" into Texas. Each U.S. state other than Texas is associated with a Texas county FIPS as the entry (or exit) into (or out of) Texas. In addition, if the origin or destination is California, Arizona, or New Mexico, two points of entry are assumed with the flow being split between these two points. The points of entry for these states are El Paso and Parmer. Equal flow assignments were based on the rail flow density maps for Texas included in the Texas Transportation Plan.
- Xsection.dbf—This table is important for assigning traffic to the road network. It associates each county in Texas with a node in the road network. Hence, each O-D pair is not only associated with the Texas counties, but also indirectly with corresponding nodes in the road network.
- Railxid.dbf—This table is important for assigning traffic to the rail network. Similar to the Xsection.dbf file, it associates each county in Texas with a node

in the rail network. Hence each O-D pair is not only associated with the Texas counties, but also indirectly with corresponding nodes in the rail network.

- Newxsection.dbf—This table is important for assigning road traffic in the case of through Texas flows or flows from different states into a Texas county or out of a Texas county. The road network specified consists of the interstates and a few major highways only.

Texas-Mexico Tables

Origin-destination data by commodity and border crossing is not available for the movement of goods between Mexico and Texas. The share of goods moving through each Texas border port of entry/exit by commodity was thus estimated based on the available literature.

- TexasMexicoFactors—This table provides the port of exit split for goods leaving Texas and entering Mexico by road and rail for each commodity type. Four origins in Texas and seven border destination counties that represent the port of exits into Mexico were assumed. The modal flows by commodity were assigned among each of these O-D pairs, totaling 28 records.
- MexicoTexas Factors—This table provides the port of entry split for goods entering Texas from Mexico by commodity type for road and rail. Four Texas destinations and seven border entry counties that represent the port of entry into Texas were assumed. The modal flows by commodity were assigned among each of these O-D pairs, totaling 28 records.

Conversion Factor Tables

Commodity origin-destination input tables can be compiled in terms of commodity tonnages by road and rail, container commodity tonnages by road and rail, or container commodity flows by road and rail. If compiled in terms of commodity tonnages, conversion factors need to be applied to convert total commodity tonnages to container tonnages and eventually to container flows. Two conversion factors were specified to accomplish this. These factors are described below.

- Factor 3.dbf—Factor 3 converts total tonnage into containerized tonnage. The factor was calculated based on the percentage of containerized tonnage captured in the 2001 Transborder Surface Freight Database (see Table A2 and A3 below).

Table A2 Factor 3: Containerized Truck Tonnage

Commodity Code	Containerized Tonnage	Total Tonnage	Factor 2-Truck
1	7,851,573	186,486,290	0.04
2	8,915,098	588,847,182	0.02
3	21,640,382	895,906,586	0.02
4	102,455,719	2,971,351,698	0.03
5	150,052,618	4,123,837,920	0.04
6	40,078,043	2,793,486,283	0.01
7	11,411,282	367,068,348	0.03

Table A3 Factor 3: Containerized Rail Tonnage

Commodity Code	Containerized Tonnage	Total Tonnage	Factor 2-Rail
1	60,478	242,244	0.2
2	21,925,891	314,675,285	0.1
3	2,697,028	1,633,350,110	0.002
4	26,312,653	1,844,451,189	0.01
5	140,111,452	3,563,096,127	0.04
6	4,541,973	246,709,254	0.02
7	429,000	18,921,594	0.02

Table A4 Factor 3: Conversion Factors for Estimating Containerized Tonnage

Commodity	Truck	Rail
Agricultural Products	0.040	0.200
Construction Materials	0.020	0.002
Food	0.030	0.010
Hazardous Materials	0.020	0.070
Machinery & Equipment	0.010	0.020
Manufacturing Products	0.040	0.040
Mixed Freight Shipment	0.030	0.020

Source: 2001 Transborder Surface Freight Database

- Factor 2.dbf—Table A5 presents the conversion factors embedded for converting container tonnage to container flows, i.e., number of containers. For the truck mode, Reebie Associates "quick" conversion factor for a truck of 15.8 tons per container is used. This number represents an average weight per container for all commodities transported by truck. The conversion factor for rail is based on the 1996 Carload Waybill Sample.

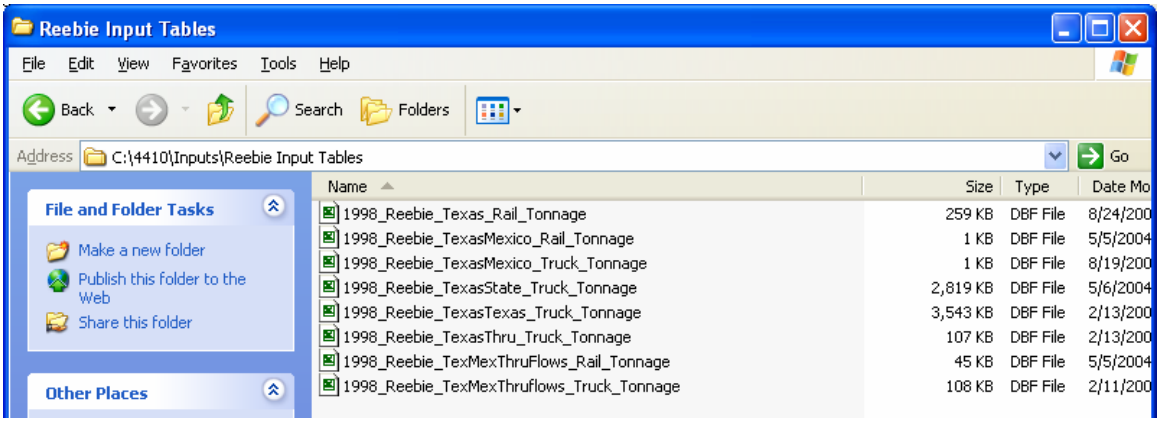
Table A5 Embedded Conversion Factor 2: Converting Containerized Tonnage into Number of Containers

Commodity	Truck	Rail
Agricultural Products	15.8	21.4
Construction Materials	15.8	16.8
Food	15.8	19.8
Hazardous Materials	15.8	19.4
Machinery & Equipment	15.8	11.8
Manufacturing Products	15.8	15.7
Mixed Freight Shipment	15.8	15.1

Source: Reebie Data for Truck and Carload Waybill Sample for Rail

Input Tables

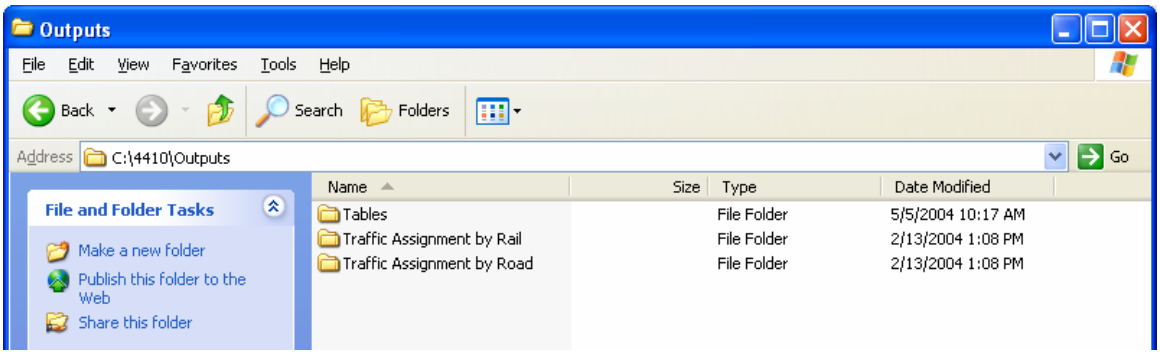
The remaining three subfolders and two dBASE (*.dbf) files contain a number of input tables to demonstrate the system or contain available truck and rail data. The Mode Choice Input Table folder contains sample data—Mode Split Input Table — to demonstrate the mode choice model. The Reebie Input Tables folder contains a number of input tables by mode and trip type (see below). The Waybill folder contains the 1998 Rail Waybill Carload Sample data in terms of container tonnage and container flows in Texas. Finally, Testflow1 and Tonngeinput1 are sample input tables to demonstrate the assignment model using a container flow and container tonnage input table, respectively.



Outputs

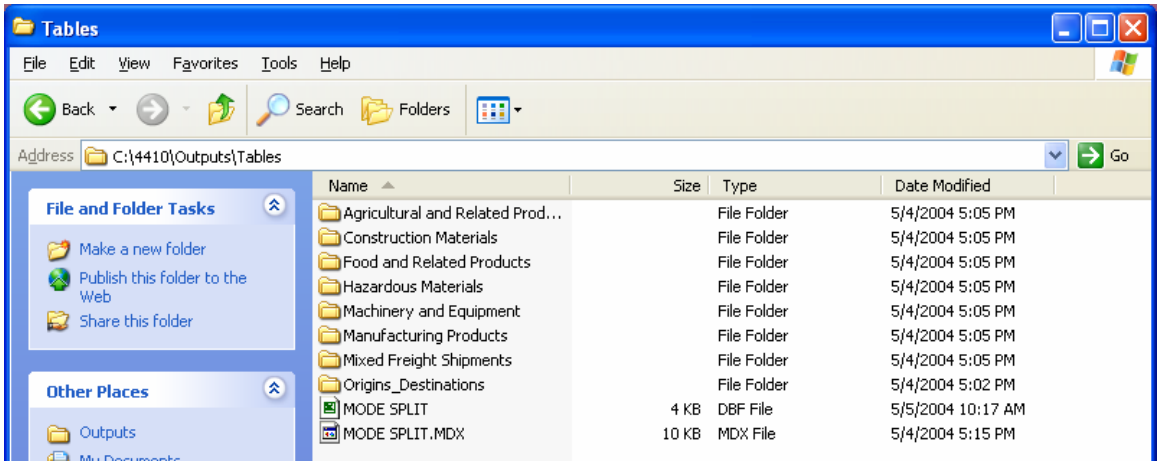
Within the Outputs folder, there are three subfolders:

1. Tables
2. Traffic Assignment by Rail
3. Traffic Assignment by Road



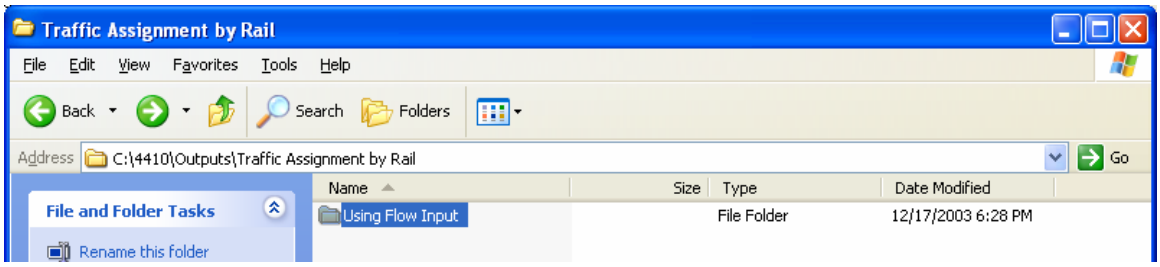
Tables

Within the Tables subfolder, there are eight subfolders and two files containing the generated tables of the modal outputs in tabular format. The eight subfolders contain the data tables that relate to the seven aggregated commodity groups and origin and destination tables generated as part of the assignment model. The two files are generated as part of the mode choice model.

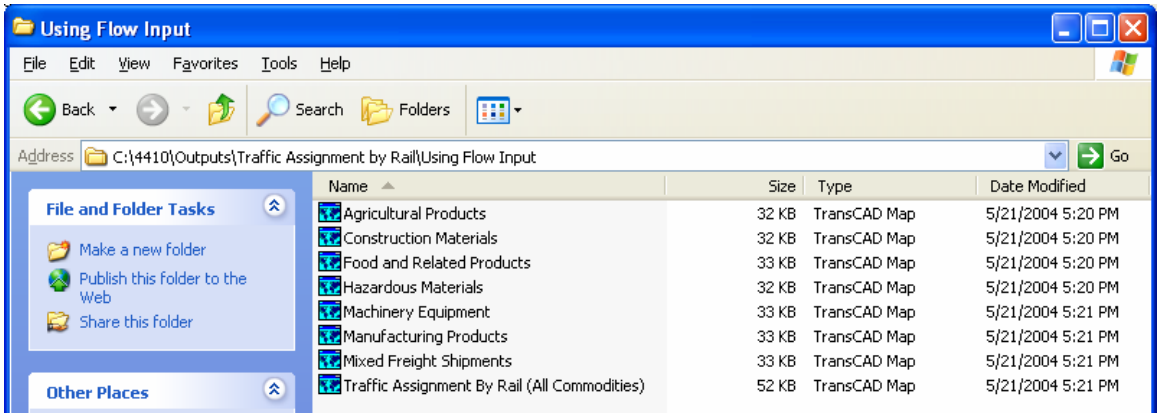


Traffic Assignment by Rail

Within the Traffic Assignment by Rail folder, there is another subfolder labeled Using Flow Input (see below).

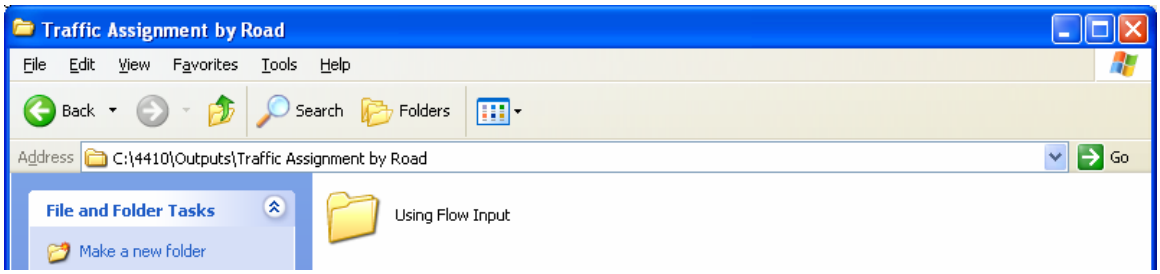


The Using Flow Input Folder contains eight map files—one for each commodity and one for all commodities. These maps display the model results, i.e., container flows by commodity and for all commodities. These eight map files are replaced whenever the GIS system is run. Model outputs must be exported as described in Section 3.2.2 of this report.

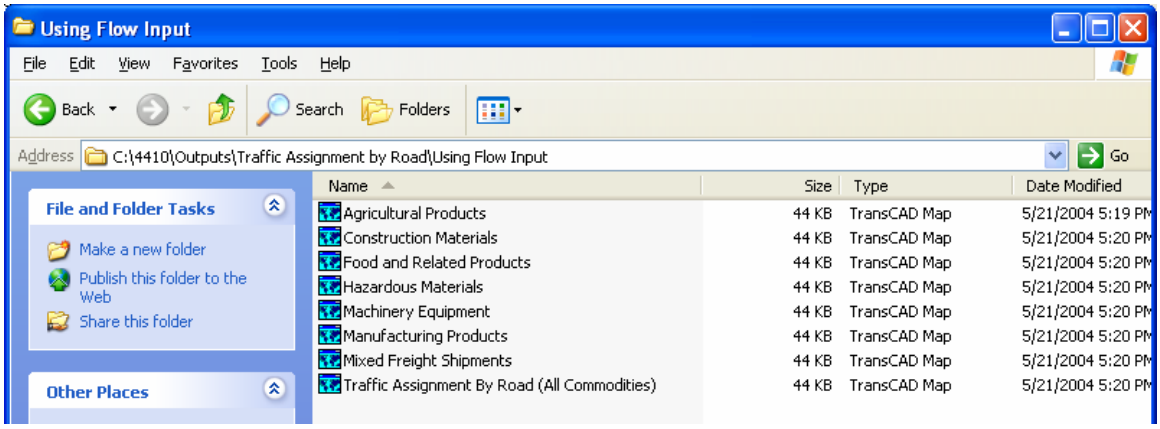


Traffic Assignment by Road

Within the Traffic Assignment by Road folder, there is another subfolder labeled Using Flow Input (see below).



The Using Flow Input Folder contains eight map files—one for each commodity and one for all commodities. These maps display the model results, i.e., truck container flows by commodity and for all commodities. These eight map files are replaced whenever the GIS system is run. Model outputs must be exported as described in Section 3.2.2 of this report.



Appendix B: Input Tables

Different types of input tables are embedded in the system. Three of these input table types can be updated as more accurate or updated data becomes available: (1) commodity data for each origin-destination pair in terms of total tonnage, containerized tonnage or number of containers by mode (i.e., flow input tables), or total commodity tonnage for each origin-destination pair (i.e., mode choice input tables); (2) zonal demographic data such as population, area, income, number of employees, number of establishments required for the mode choice analysis; and (3) the conversion factors discussed in Appendix A. Each of these different types of input tables has a different structure. The objective of Appendix B is to provide an overview of these different input tables that have been embedded and can be updated.

Commodity Data Input Tables

The flow input tables required for traffic assignment to the road and rail network can be compiled to capture commodity data for each origin-destination by road and rail in terms of (a) total freight tonnage, (b) containerized freight tonnage, or (c) the number of containers. The mode choice input tables required for "what if analysis" capture total commodity tonnage information for each origin-destination. Origin-destination information is expressed in terms of the Federal Information Processing Standards (FIPS) codes. Each state has a unique two-digit FIPS code (see Table B1).

Table B1 STATE FIPS Codes

State	FIPS	State	FIPS	State	FIPS	State	FIPS
Alabama	1	Idaho	16	Missouri	29	Rhode Island	44
Alaska	2	Illinois	17	Montana	30	South Carolina	45
Arizona	4	Indiana	18	Nebraska	31	South Dakota	46
Arkansas	5	Iowa	19	Nevada	32	Tennessee	47
California	6	Kansas	20	New Hampshire	33	Texas	48
Colorado	8	Kentucky	21	New Jersey	34	Utah	49
Connecticut	9	Louisiana	22	New Mexico	35	Vermont	50
Delaware	10	Maine	23	New York	36	Virginia	51
Florida	12	Maryland	24	North Carolina	37	Washington	53
District of Columbia	11	Massachusetts	25	North Dakota	38	West Virginia	54
Georgia	13	Michigan	26	Ohio	39	Wisconsin	55
Oklahoma	40	Minnesota	27	Oregon	41	Wyoming	56
Hawaii	15	Mississippi	28	Pennsylvania	42		

At the county level the FIPS code is 5 digits. The first 2 digits represent the state (48 being Texas) and the final 3 digits represent the county (see Table B2). It is important to note that all of the Texas County FIPS codes are odd.

Table B2 Texas FIPS Codes

FIPS	Place	FIPS	Place	FIPS	Place	FIPS	Place
48001	Anderson	48129	Donley	48257	Kaufman	48385	Real
48003	Andrews	48131	Duval	48259	Kendall	48387	Red River
48005	Angelina	48133	Eastland	48261	Kenedy	48389	Reeves
48007	Aransas	48135	Ector	48263	Kent	48391	Refugio
48009	Archer	48137	Edwards	48265	Kerr	48393	Roberts
48011	Armstrong	48139	Ellis	48267	Kimble	48395	Robertson
48013	Atascosa	48141	El Paso	48269	King	48397	Rockwall
48015	Austin	48143	Erath	48271	Kinney	48399	Runnels
48017	Bailey	48145	Falls	48273	Kleberg	48401	Rusk
48019	Bandera	48147	Fannin	48275	Knox	48403	Sabine

FIPS	Place	FIPS	Place	FIPS	Place	FIPS	Place
48021	Bastrop	48149	Fayette	48277	Lamar	48405	San Augustine
48023	Baylor	48151	Fisher	48279	Lamb	48407	San Jacinto
48025	Bee	48153	Floyd	48281	Lampasas	48409	San Patricio
48027	Bell	48155	Foard	48283	La Salle	48411	San Saba
48029	Bexar	48157	Fort Bend	48285	Lavaca	48413	Schleicher
48031	Blanco	48159	Franklin	48287	Lee	48415	Scurry
48033	Borden	48161	Freestone	48289	Leon	48417	Shackelford
48035	Bosque	48163	Frio	48291	Liberty	48419	Shelby
48037	Bowie	48165	Gaines	48293	Limestone	48421	Sherman
48039	Brazoria	48167	Galveston	48295	Lipscomb	48423	Smith
48041	Brazos	48169	Garza	48297	Live Oak	48425	Somervell
48043	Brewster	48171	Gillespie	48299	Llano	48427	Starr
48045	Briscoe	48173	Glasscock	48301	Loving	48429	Stephens
48047	Brooks	48175	Goliad	48303	Lubbock	48431	Sterling
48049	Brown	48177	Gonzales	48305	Lynn	48433	Stonewall
48051	Burleson	48179	Gray	48307	McCulloch	48435	Sutton
48053	Burnet	48181	Grayson	48309	McLennan	48437	Swisher
48055	Caldwell	48183	Gregg	48311	McMullen	48439	Tarrant
48057	Calhoun	48185	Grimes	48313	Madison	48441	Taylor
48059	Callahan	48187	Guadalupe	48315	Marion	48443	Terrell
48061	Cameron	48189	Hale	48317	Martin	48445	Terry
48063	Camp	48191	Hall	48319	Mason	48447	Throckmorton
48065	Carson	48193	Hamilton	48321	Matagorda	48449	Titus
48067	Cass	48195	Hansford	48323	Maverick	48451	Tom Green
48069	Castro	48197	Hardeman	48325	Medina	48453	Travis
48071	Chambers	48199	Hardin	48327	Menard	48455	Trinity
48073	Cherokee	48201	Harris	48329	Midland	48457	Tyler
48075	Childress	48203	Harrison	48331	Milam	48459	Upshur
48077	Clay	48205	Hartley	48333	Mills	48461	Upton
48079	Cochran	48207	Haskell	48335	Mitchell	48463	Uvalde
48081	Coke	48209	Hays	48337	Montague	48465	Val Verde
48083	Coleman	48211	Hemphill	48339	Montgomery	48467	Van Zandt
48085	Collin	48213	Henderson	48341	Moore	48469	Victoria
48087	Collingsworth	48215	Hidalgo	48343	Morris	48471	Walker

FIPS	Place	FIPS	Place	FIPS	Place	FIPS	Place
48089	Colorado	48217	Hill	48345	Motley	48473	Waller
48091	Comal	48219	Hockley	48347	Nacogdoches	48475	Ward
48093	Comanche	48221	Hood	48349	Navarro	48477	Washington
48095	Concho	48223	Hopkins	48351	Newton	48479	Webb
48097	Cooke	48225	Houston	48353	Nolan	48481	Wharton
48099	Coryell	48227	Howard	48355	Nueces	48483	Wheeler
48101	Cottle	48229	Hudspeth	48357	Ochiltree	48485	Wichita
48103	Crane	48231	Hunt	48359	Oldham	48487	Wilbarger
48105	Crockett	48233	Hutchinson	48361	Orange	48489	Willacy
48107	Crosby	48235	Irion	48363	Palo Pint	48491	Williamson
48109	Culberson	48237	Jack	48365	Panola	48493	Wilson
48111	Dallam	48239	Jackson	48367	Parker	48495	Winkler
48113	Dallas	48241	Jasper	48369	Parmer	48497	Wise
48115	Dawson	48243	Jeff Davis	48371	Pecos	48499	Wood
48117	Deaf Smit	48245	Jefferson	48373	Polk	48501	Yoakum
48119	Delta	48247	Jim Hogg	48375	Potter	48503	Young
48121	Denton	48249	Jim Wells	48377	Presidio	48505	Zapata
48123	Dewitt	48251	Johnson	48379	Rains	48507	Zavala
48125	Dickens	48253	Jones	48381	Randall		
48127	Dimmit	48255	Karnes	48383	Reagan		

The assignment model can be used to display freight movements originating outside of the state and destined for Texas, freight from Texas moving to out-of-state destinations, and freight movements through the state with neither an origin nor destination in Texas. The model assigns these out-of-state origins and destinations to a specific Texas county assumed to be the entry or exit point into or out of the state. The entry/exit points were determined by examining the Federal Highway Administration's flow maps (see Table B3).

Table B3 State FIPS Conversion to Texas FIPS

State FIPS	Texas FIPS	State FIPS	Texas FIPS	State FIPS	Texas FIPS
1	48203	22	48203	38	48097
4	48141	23	48037	39	48037
5	48037	24	48037	40	48097
6	48141	25	48037	41	48205
8	48097	26	48037	42	48037
9	48037	27	48097	44	48037
10	48037	28	48203	45	48203
11	48037	29	48097	46	48097
12	48203	30	48097	47	48203
13	48203	31	48097	49	48205
16	48205	32	48205	50	48037
17	48037	33	48037	51	48037
18	48037	34	48037	53	48205
19	48097	35	48141	54	48037
20	48097	36	48037	55	48037
21	48037	37	48203	56	48097

The embedded models (assignment and mode choice) consider seven aggregated commodity groups. Table B4 provides a data dictionary to enable the user to aggregate data captured in terms of the Harmonized Tariff Schedule or the Standard Transportation Commodity Code into the required seven commodity groups.

Table B4 Commodity Data Dictionary

Aggregated Commodity Code	Aggregated Commodity Description	Harmonized Tariff Schedule	Standard Transportation Commodity Code
1	Agricultural & Related Products	1,2,3,6,13,41,42	01, 08, 09, 31
2	Hazardous Materials	27,28,29,30,31,34, 35,36,38,93	13, 19, 28, 29, 40, 48
3	Construction Materials	25,26,32,44,68,70	10, 11, 14, 24, 32
4	Food & Related Products	4,5,7,8,9,10,11,12, 14,15,16,17,18,19, 20,21,22,23,24	20, 21
5	Manufacturing Products	33,37,39,41,43,45, 46,47,48,49,50,51, 52,53,54,55,56,57, 58,59,60,61,62,63, 64,65,66,67,69,71, 72,73,74,75,76,78, 79,80,81,82,83,86, 87,88,89,90,91,92, 94,95,96	22, 23, 25, 26, 27, 30, 33,34, 37, 38, 39
6	Machinery & Equipment	84,85	35, 36
7	Mixed Freight Shipments	97,98	41, 42, 43, 44,45, 46, 47

Table B5 provides the Harmonized Tariff Schedule two-digit code and commodity description. These commodity codes are used in the Transborder Surface Freight Database.

Table B5 Harmonized Tariff Schedule

Code	Commodity Description
01	Live Animals
02	Meat and Edible Meat Offal
03	Fish and Crustaceans, Molluscs and Other Aquatic Invertebrates
04	Dairy Produce; Bird Eggs; Natural Honey; Edible Products of Animal Origin, Not Elsewhere Specified or Included
05	Products of Animal Origin, Not Elsewhere Specified or Included
06	Live Trees and Other Plants; Bulbs, Roots and the like; Cut Flowers and Ornamental Foliage
07	Edible Vegetables and Certain Roots and Tubers
08	Edible Fruit and Nuts; Peel of Citrus Fruit or Melons
09	Coffee, Tea, Mate, and Spices
10	Cereals
11	Products of the Milling Industry; Malt; Starches; Inulin; Wheat Gluten

Code	Commodity Description
12	Oil Seeds and Oleaginous Fruits; Miscellaneous Grains; Seeds and Fruit; Industrial or Medicinal Plants; Straw and Fodder
13	Lac; Gums; Resins and Other Vegetable Saps and Extract
14	Vegetable Plaiting Materials; Vegetable Products Not Elsewhere Specified or Included
15	Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes
16	Preparations of Meat, of Fish, or of Crustaceans, Molluscs or Other Aquatic Invertebrates
17	Sugars and Sugar Confectionary
18	Cocoa and Cocoa Preparations
19	Preparations of Cereals, Flour, Starch or Milk; Bakers' Wares
20	Preparations of Vegetables, Fruit, Nuts, or Other Parts of Plants
21	Miscellaneous Edible Preparations
22	Beverages, Spirits, and Vinegar
23	Residues and Waste from the Food Industries; Prepared Animal Feed
24	Tobacco and Manufactured Tobacco Substitutes
25	Salt; Sulfur; Earths and Stone; Plastering Materials, Lime and Cement
26	Ores, Slag and Ash
27	Mineral Fuels, Mineral Oils and Products of Their Distillation; Bituminous Substances; Mineral Waxes
28	Inorganic Chemicals; Organic or Inorganic Compounds of Precious Metals, of Rare-Earth Metals, of Radioactive Elements or of Isotopes
29	Organic Chemicals
30	Pharmaceutical Products
31	Fertilizers
32	Tanning or Dyeing Extracts; Tannins and Their Derivatives; Dyes, Pigments, and Other Coloring Matter; Paints and Varnishes; Putty and Other Mastics; Inks
33	Essential Oils and Resinoids; Perfumery, Cosmetic or Toilet Preparations
34	Soap, Organic Surface-Active Agents, Washing Preparations, Lubricating Preparations, Artificial Waxes, Prepared Waxes, Polishing or Scouring Preparations, Candles and Similar Articles, Modeling Pastes, "Dental Waxes" and Dental Preparations with a Basis
	Of Plaster Of Plaster
35	Albuminoidal Substances; Modified Starches; Glues; Enzymes
36	Explosives; Pyrotechnic Products; Matches; Pyrophoric Alloys; Certain Combustible Preparations
37	Photographic or Cinematographic Goods
38	Miscellaneous Chemical Products
39	Plastics and Articles Thereof
40	Rubber and Articles Thereof
41	Raw Hides and Skins (Other than Fur Skins) and Leather
42	Articles of Leather; Saddlery and Harness; Travel Goods, Handbags and Similar Containers; Articles of Animal Gut (Other than Silkworm Gut)
43	Fur Skins and Artificial Fur; Manufactures thereof

Code	Commodity Description
44	Wood and Articles of Wood; Wood Charcoal
45	Cork and Articles of Cork
46	Manufactures of Straw, of Esparto or of Other Plaiting Materials; Basketware and Wickerwork
47	Pulp of Wood or of Other Fibrous Cellulosic Material; Waste and Scrap of Paper or Paperboard
48	Paper and Paperboard; Articles of Paper Pulp, of Paper or of Paperboard
49	Printed Books, Newspapers, Pictures and Other Products of the Printing Industry; Manuscripts, Typescripts, and Plans
50	Silk
51	Wool, Fine or Coarse Animal Hair; Horsehair Yarn and Woven Fabric
52	Cotton
53	Other Vegetable Textile Fibers; Paper Yarn and Woven Fabrics of Paper Yarn
54	Man-Made Filaments
55	Man-Made Staple Fibers
56	Wadding, Felt and Nonwovens; Special Yarns; Twine, Cordage, Ropes and Cables and Articles Thereof
57	Carpets and Other Textile Floor Coverings
58	Special Woven Fabrics; Tufted Textile Fabrics; Lace; Tapestries; Trimmings; Embroidery
59	Impregnated, Coated, Covered or Laminated Textile Fabrics; Textile Articles of a Kind Suitable for Industrial Use
60	Knitted or Crocheted Fabrics
61	Articles of Apparel and Clothing Accessories, Knitted or Crocheted
62	Articles of Apparel and Clothing Accessories, Not Knitted or Crocheted
63	Other Made-Up Textile Articles; Needle Craft Sets; Worn Clothing and Worn Textile Articles; Rags
64	Footwear, Gaiters and the like; Parts of such Articles
65	Headgear and Parts Thereof
66	Umbrellas, Sun Umbrellas, Walking Sticks, Seatsticks, Whips, Riding Crops, and Parts Thereof
67	Prepared Feathers and Down and Articles Made of Feathers or of Down; Artificial Flowers; Articles of Human Hair
68	Articles of Stone, Plaster, Cement, Asbestos, Mica or Similar Materials
69	Ceramic Products
70	Glass and Glassware
71	Natural or Cultured Pearls, Precious Or Semiprecious Stones, Precious Metals; Metals Clad with Precious Metal, and Articles Thereof; Imitation Jewelry; Coin
72	Iron and Steel
73	Articles of Iron or Steel
74	Copper and Articles Thereof
75	Nickel and Articles Thereof
76	Aluminum and Articles Thereof
77	Reserved for Possible Future Use
78	Lead and Articles Thereof
79	Zinc and Articles Thereof
80	Tin and Articles Thereof

Code	Commodity Description
81	Other Base Metals; Cermets; Articles Thereof
82	Tools, Implements, Cutlery, Spoons and Forks, of Base Metal; Parts Thereof of Base Metal
83	Miscellaneous Articles of Base Metal
84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts Thereof
85	Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Reproducers, Television Image and Sound Recorders and Reproducers, and Parts and Accessories of Such Articles
86	Railway or Tramway Locomotives, Rolling Stock and Parts Thereof; Railway or Tramway Track Fixtures and Fittings and Parts Thereof; Mechanical (including Electromechanical) Traffic Signaling Equipment of All Kinds
87	Vehicles, Other than Railway or Tramway Rolling Stock, and Parts and Accessories Thereof
88	Aircraft, Spacecraft, and Parts Thereof
89	Ships, Boats, and Floating Structures
90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus; Parts and Accessories Thereof
91	Clocks and Watches and Parts Thereof
92	Musical Instruments; Parts and Accessories of Such Articles
93	Arms and Ammunition; Parts and Accessories Thereof
94	Furniture; Bedding, Mattress Supports, Cushions and Similar Stuffed Furnishings; Lamps and Lighting Fittings, Not Elsewhere Specified or Included; Illuminated Signs, Illuminated Nameplates and the Like; Prefabricated Buildings
95	Toys, Games, and Sports Equipment; Parts and Accessories Thereof
96	Miscellaneous Manufactured Articles
97	Works of Art, Collectors' Pieces and Antiques
98	Special Classification Provisions
99	(Imports Only) Temporary Legislation; Temporary Modifications Established Pursuant to Trade Legislation; Additional Import Restrictions Established Pursuant to Section 22 of the Agricultural Adjustment Act, As Needed

Source: http://www.usitc.gov/taffairs.htm

Table B6 provides the commodity descriptions of the Standard Transportation Commodity Codes. These commodity codes are used in both the Reebie TRANSEARCH database and the Carload Waybill Sample.

Table B6 Standard Transportation Commodity Code

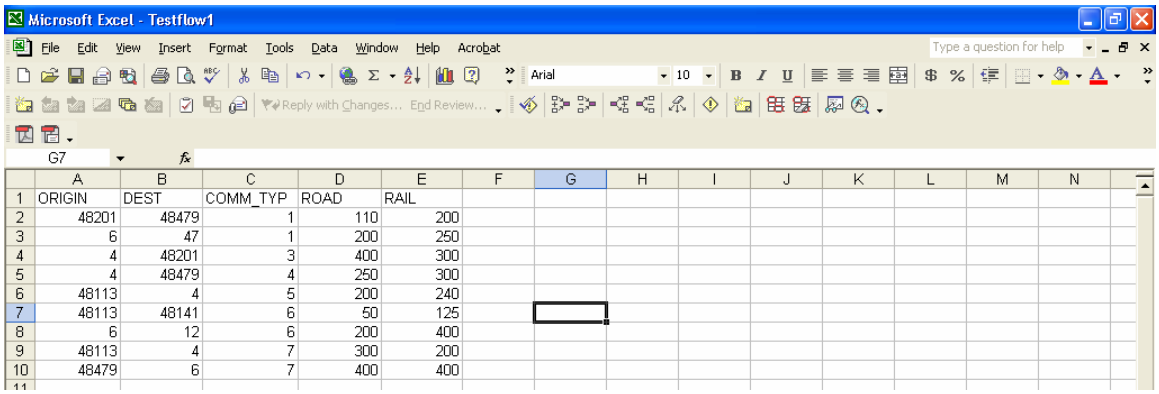
STCC Code	Commodity Description	STCC Code	Commodity Description
1	Farm products	29	Petroleum or coal products
8	Forest products	30	Rubber or miscellaneous plastics products
9	Fresh fish	31	Leather or leather products
10	Metallic ores	32	Clay, concrete, glass, or stone products
11	Coal	33	Primary metal products
13	Crude petroleum, natural gas or gasoline	34	Fabricated metal products
14	Nonmetallic ores, minerals, excluding fuels	35	Machinery, excluding electrical
19	Ordnance or accessories	36	Electrical machinery, equipment, or supplies
20	Food and kindred products	37	Transportation equipment
21	Tobacco products, excluding insecticides	38	Instruments, photographic goods, optical goods, watches, or clocks
22	Textile mill products	39	Miscellaneous products of manufacturing
23	Apparel or other finished textile products or knit apparel	40	Waste or scrap materials not identified by producing industry
24	Lumber or wood products, excluding furniture	41	Miscellaneous freight shipments
25	Furniture or fixtures	42	Containers, carriers or devices, shipping returned empty
26	Pulp, paper, or allied products	48	Waste hazardous materials or waste hazardous substances
27	Printed matter	--	Commodity unknown
28	Chemicals or allied products		

Flow Input Tables

All the flow input tables have the same structure, consisting of five columns labeled as follows (see figure below for an example):

1. ORIGIN
2. DEST
3. COMM_TYP
4. ROAD
5. RAIL

The road and rail flows can be expressed in terms of (a) total freight tonnage, (b) containerized freight tonnage, or (c) the number of containers.



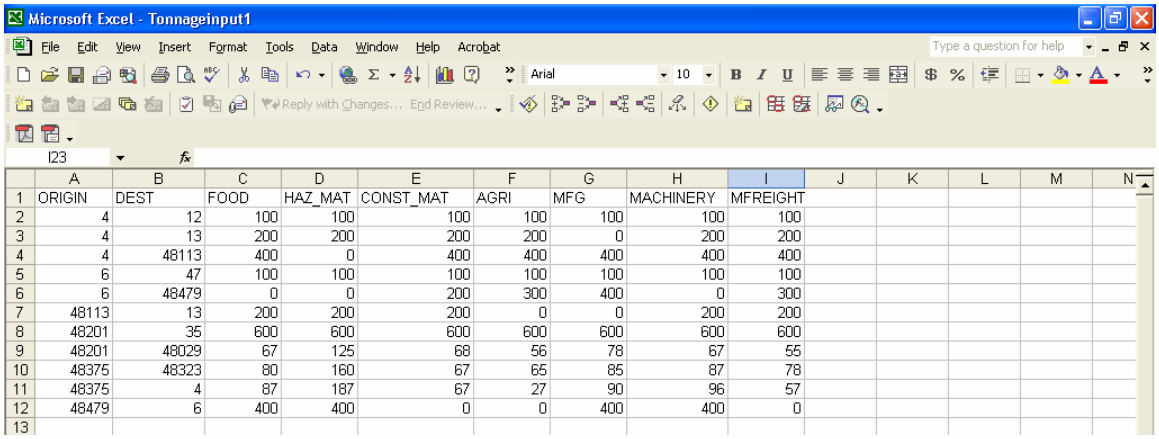
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ORIGIN	DEST	COMM_TYP	ROAD	RAIL									
2	48201	48479	1	110	200									
3	6	47	1	200	250									
4	4	48201	3	400	300									
5	4	48479	4	250	300									
6	48113	4	5	200	240									
7	48113	48141	6	50	125									
8	6	12	6	200	400									
9	48113	4	7	300	200									
10	48479	6	7	400	400									

Mode Choice Input Tables

The mode choice input tables—tonnage input tables—consist of nine columns labeled as follows (see figure below for an example):

1. ORIGIN
2. DEST
3. FOOD
4. HAZ_MAT
5. CONST_MAT
6. AGRI
7. MFG
8. MACHINERY
9. MFREIGHT

The last seven columns contain the total tonnage for each of the seven commodity groups.


Microsoft Excel - Tonnageinput1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ORIGIN	DEST	FOOD	HAZ_MAT	CONST_MAT	AGRI	MFG	MACHINERY	MFREIGHT					
2	4	12	100	100	100	100	100	100	100					
3	4	13	200	200	200	200	0	200	200					
4	4	48113	400	0	400	400	400	400	400					
5	6	47	100	100	100	100	100	100	100					
6	6	48479	0	0	200	300	400	0	300					
7	48113	13	200	200	200	0	0	200	200					
8	48201	35	600	600	600	600	600	600	600					
9	48201	48029	67	125	68	56	78	67	55					
10	48375	48323	80	160	67	65	85	87	78					
11	48375	4	87	187	67	27	90	96	57					
12	48479	6	400	400	0	0	400	400	0					
13														

Note: Origin and destination information is expressed in terms of the FIPS codes.

Warning!

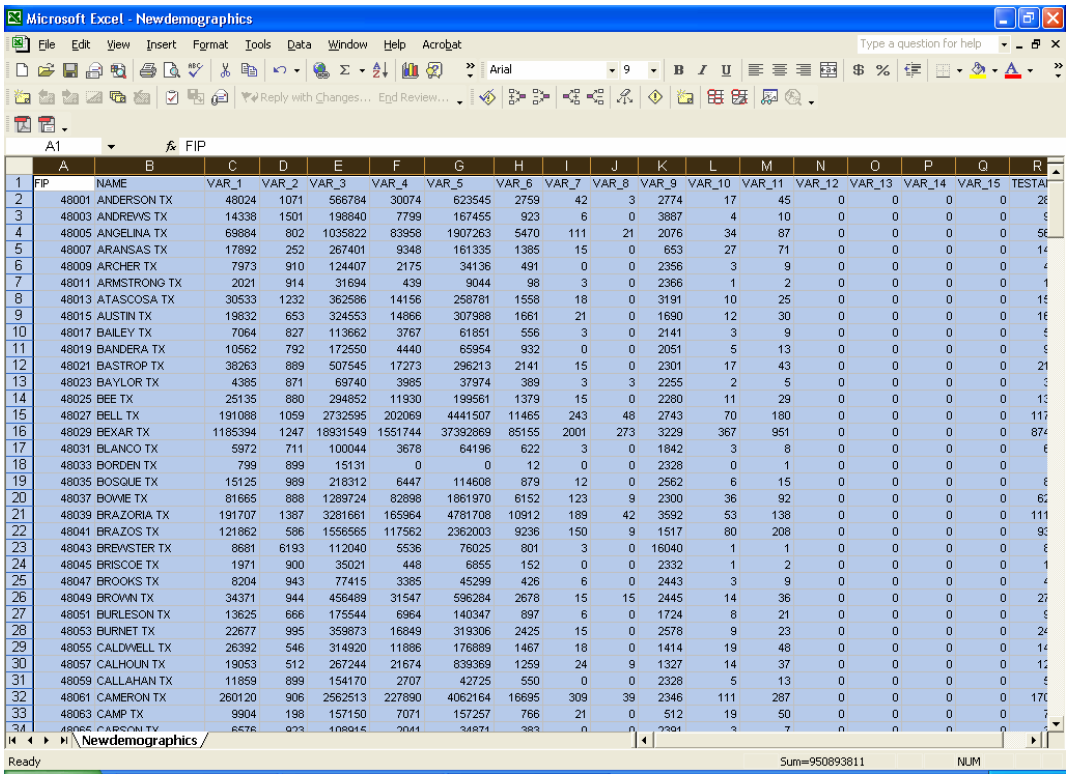
Each record or row must have a unique origin and destination pair. In other words, if the first record had an origin of 48201 and a destination of 48253, no other record in the database can or should have an origin of 48201 and a destination of 48253. If there are two records with the same origin and destination combination, the program will fail.

Zonal Demographics Input Table

Various zonal demographic characteristics relevant to the zonal modal-split model, such as population, area, income, number of employees, number of establishments, etc., are captured in the demographics input table. The demographics input table consists of fifteen columns. Each of the columns is labeled and represents the following (see figure below for an example):

1. FIP — County FIPS number
2. NAME — County name
3. VAR_1 — Population (in millions)
4. VAR_2 — Square miles (in 1/1000 sq. mi.)
5. VAR_3 — Personal income (in millions)
6. VAR_4 — Employment count (in millions)
7. VAR_5 — Payroll (in millions)
8. VAR_6 — Number of establishments with employee count <500 (in 10,000s)

9. VAR_7 — Number of establishments with employee count >500 & <1000 (in 1000s)
10. VAR_8 — Number of establishments with employee count >1000 (in 100s)
11. VAR_9 — Square kilometers (in 1/1000 sq. km.)
12. VAR_10 — Population density (in 100 persons per sq. km.)
13. VAR_11 — Population density (in 100 persons per sq. mi.)
14. VAR_12, VAR_13, VAR_14, VAR_15 — provision for new variables input by user
15. TESTAB — Total number of establishments



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	FIP	NAME	VAR_1	VAR_2	VAR_3	VAR_4	VAR_5	VAR_6	VAR_7	VAR_8	VAR_9	VAR_10	VAR_11	VAR_12	VAR_13	VAR_14	VAR_15	TESTAI
2	48001	ANDERSON TX	48024	1071	566784	30074	623545	2759	42	3	2774	17	45	0	0	0	0	28
3	48003	ANDREWS TX	14338	1501	198840	7799	167455	923	6	0	3887	4	10	0	0	0	0	9
4	48005	ANGELINA TX	69684	802	1035822	83958	1907263	5470	111	21	2076	34	87	0	0	0	0	58
5	48007	ARANSAS TX	17892	252	267401	9348	161335	1385	15	0	653	27	71	0	0	0	0	14
6	48009	ARCHER TX	7973	910	124407	2175	34136	491	0	0	2356	3	9	0	0	0	0	4
7	48011	ARMSTRONG TX	2021	914	31694	439	9044	98	3	0	2366	1	2	0	0	0	0	1
8	48013	ATASCOSA TX	30533	1232	362586	14156	258781	1558	18	0	3191	10	25	0	0	0	0	15
9	48015	AUSTIN TX	19832	653	324553	14866	307988	1661	21	0	1690	12	30	0	0	0	0	16
10	48017	BAILEY TX	7064	827	113662	3767	61851	556	3	0	2141	3	9	0	0	0	0	5
11	48019	BANDERA TX	10562	792	172550	4440	65954	932	0	0	2051	5	13	0	0	0	0	9
12	48021	BASTROP TX	38263	889	507545	17273	296213	2141	15	0	2301	17	43	0	0	0	0	21
13	48023	BAYLOR TX	4385	871	69740	3985	37974	389	3	3	2255	2	5	0	0	0	0	3
14	48025	BEE TX	25135	880	294852	11930	199561	1379	15	0	2280	11	29	0	0	0	0	13
15	48027	BELL TX	191088	1059	2732595	202069	4441507	11465	243	48	2743	70	180	0	0	0	0	117
16	48029	BEXAR TX	1185394	1247	18931549	1551744	37392869	85155	2001	273	3229	367	951	0	0	0	0	874
17	48031	BLANCO TX	5972	711	100044	3678	64196	622	3	0	1842	3	8	0	0	0	0	6
18	48033	BORDEN TX	799	899	15131	0	0	12	0	0	2328	0	1	0	0	0	0	
19	48035	BOSQUE TX	15125	989	218312	6447	114608	879	12	0	2562	6	15	0	0	0	0	8
20	48037	BOWIE TX	81665	888	1289724	82898	1861970	6152	123	9	2300	36	92	0	0	0	0	62
21	48039	BRAZORIA TX	191707	1387	3281661	165964	4781708	10912	189	42	3592	53	138	0	0	0	0	111
22	48041	BRAZOS TX	121862	586	1556565	117562	2362003	9236	150	9	1517	80	208	0	0	0	0	93
23	48043	BREWSTER TX	8681	6193	112040	5536	76025	801	3	0	16040	1	1	0	0	0	0	8
24	48045	BRISCOE TX	1971	900	35021	448	6855	152	0	0	2332	1	2	0	0	0	0	1
25	48047	BROOKS TX	8204	943	77415	3385	45299	426	6	0	2443	3	9	0	0	0	0	4
26	48049	BROWN TX	34371	944	456489	31547	596284	2678	15	15	2445	14	36	0	0	0	0	27
27	48051	BURLESON TX	13625	666	175544	6964	140347	897	6	0	1724	8	21	0	0	0	0	9
28	48053	BURNET TX	22677	995	359873	16849	319306	2425	15	0	2578	9	23	0	0	0	0	24
29	48055	CALDWELL TX	26392	546	314920	11886	176889	1467	18	0	1414	19	48	0	0	0	0	14
30	48057	CALHOUN TX	19053	512	267244	21674	839369	1259	24	9	1327	14	37	0	0	0	0	12
31	48059	CALLAHAN TX	11859	899	154170	2707	42725	550	0	0	2328	5	13	0	0	0	0	9
32	48061	CAMERON TX	260120	906	2562513	227890	4062164	16695	309	39	2346	111	287	0	0	0	0	170
33	48063	CAMP TX	9904	198	157150	7071	157257	766	21	0	512	19	50	0	0	0	0	7
34	48065	CARSON TX	6576	923	108915	2041	34871	383	0	0	2391	3	7	0	0	0	0	

Note: If a variable is not being used, enter coefficient zero in above coefficient table. Do not omit any columns in above coefficient table. New variables not described here may be input as Vars 12 through 15.

Saving an Input Table as a DBF File

The three input table types highlighted in this Appendix—the commodity data, including flow input tables and mode choice input tables; zonal demographic data; and conversion factors input tables—must be in the dbf file format. Excel is, however, limited to 65,536 rows/records. If the input table exceeds these limits, the data must be edited in a program, such as SPSS, and saved as a dbf file.

Save an Excel file in DBF Format

An Excel file can be saved as a dbf file as follows:

1. Click File and Save As.
2. Name the file and select DBF 4 (dBASE IV) as the file type.
3. Click Save.
4. A message will appear: "The selected file type does not support workbooks that contain multiple sheets." Click OK.
5. Another message will appear: "The file.dbf may contain features that are not compatible with DBF 4 (dBASE IV). Do you want to keep the workbook in this format?" Click YES.
6. Click File and then Exit.
7. Another message will appear: "Do you want to save the changes you made to 'the file.dbf'?" Click NO.