TxDOT Project 0-1838

Product 1

User's Guide

INSTRUCTIONS FOR USING THE CD-ROM

ACCOMPANYING RESEARCH PAPER 0-1838*:*

TRANSPORTATION CONTROL MEASURE

EFFECTIVENESS IN OZONE NON-ATTAINMENT AREAS

PREPARED AUGUST 2001

Note. This CD-ROM uses the software program TransCAD. To use the CD-ROM, make sure that TransCAD (version 4.0 or later) is installed on the machine, and that the hardware "key" is installed properly. The key, which is approximately 2 in. x 2 in. x ½ in. and is screwed into the printer port, MUST be present to use TransCAD.

Terms and definitions. Definitions for TransCAD terms (e.g., "dataview") can be found in TransCAD's Help section, which is available electronically in the TransCAD menu bar (at the top of the TransCAD window).

Preliminary Steps

Step 1. Make sure TransCAD installed.

Step 2. Insert CD-ROM into CD-ROM drive.

Step 3. Opening the files: Double-click on the hard drive icon (usually labeled "My Computer"); a window will open. Double-click on the CD-ROM drive icon found in the hard drive window; in the CD-ROM window which opens, the user can view all of the files and select which ones s/he wishes to open.

I. Instructions For Using The Files For Supplementary Traffic Inputs To The MOBILE Emissions Factors Models.

VMT Mix files. The main file is *VMT_Mix.wrk*, found in the folder called VMT Mix.

1. Double-click on this workspace (*.wrk) file to open a DFW roadway link network map, a dataview with all the data, and a dataview with all the data and map information.

2. In order to find out the VMT mix on a specific link, click on the Info button in the "Tools" window, then click on the link of interest on the map. Information for that link will appear in another dataview.

3. The Figure below (Figure I-1) is an illustration of what the user can expect to see when the above two steps have been completed.

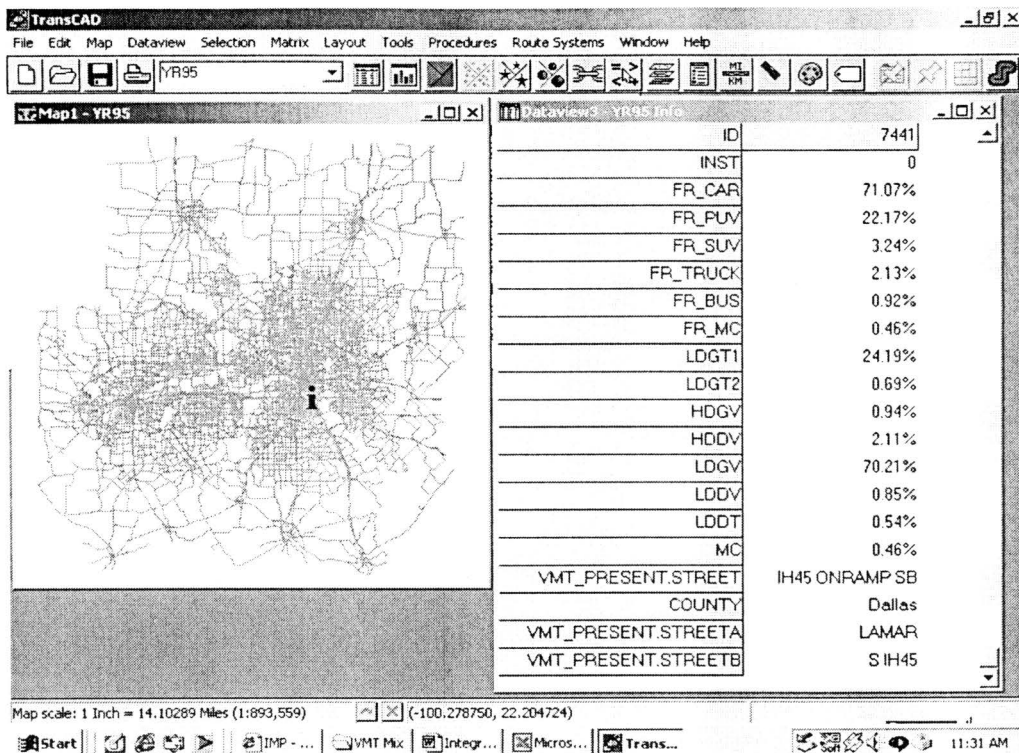*For more information, see *readme-VMT.txt* in the VMT Mix folder.

Figure I-1. Display of the VMT Mix on an IH-45 SB ramp in Dallas, Texas.

Trip Time Duration files. *FVMT.wrk*, found in the Trip and Soak Time Duration folder, is the workspace file that consists of the DFW TAPZ (Traffic Analysis Process Zone) map and the trip time duration data.

1. Double-click on this file to open the DFW TAPZ map and dataviews with all the data and map information.

2. To find the trip time duration information for a certain TAPZ, click on the Info button in the "Tools" window, then click on the TAPZ of interest on the map. Information for that zone will appear in another dataview.

3. The Figure below (Figure I-2) is an illustration of what the user can expect to see when the above two steps have been completed.

*For more information, see *readme-Trip_Duration.txt* (the sections labeled Notational Notes and Trip Duration Variable Indices should be particularly helpful).
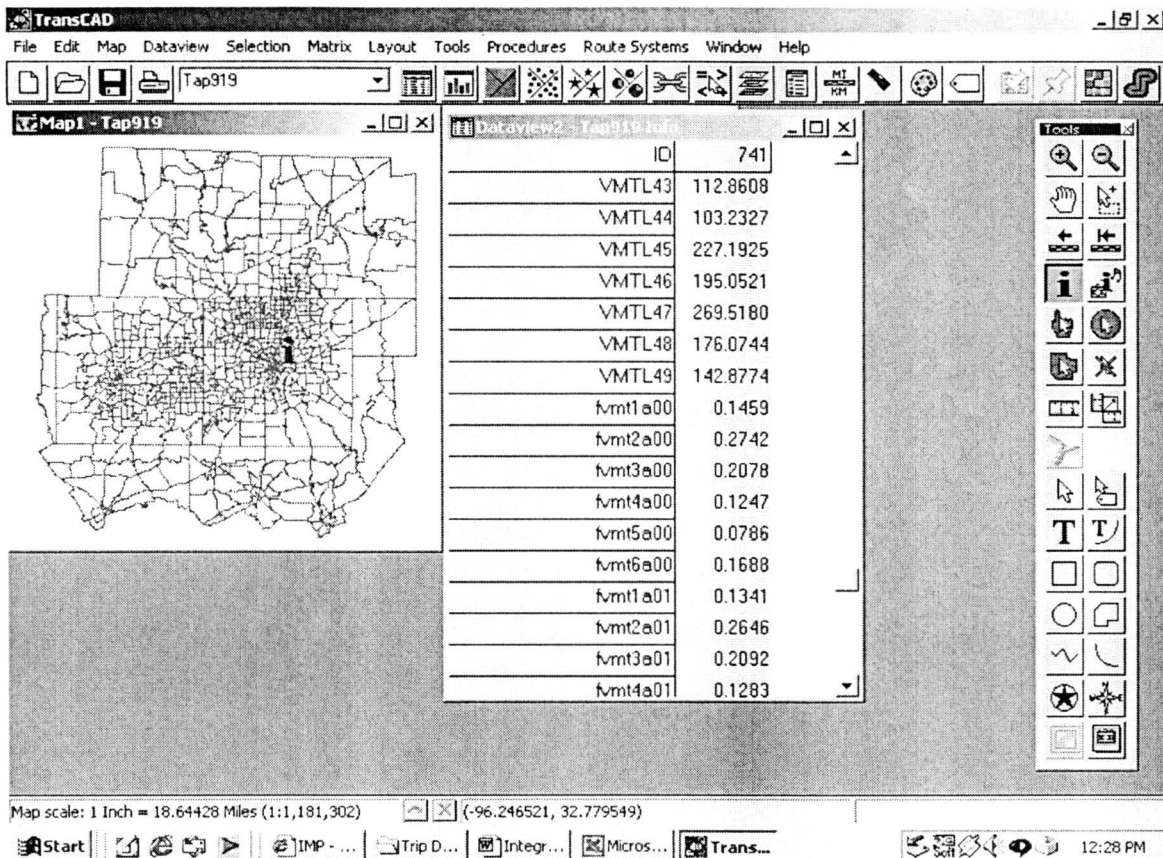
Figure I-2. Some DFW trip time duration model results

Local Road VMT (LRVMT) files. *LRVMT.wrk*, also found in the Trip and Soak Time Duration folder, is the workspace file that consists of the DFW TAPZ map and the local road VMT data.

1. Double-click on this file to open the DFW TAPZ map and dataviews with all the data and map information.

2. To find the LRVMT information for a certain TAPZ, click on the Info button in the "Tools" window, then click on the TAPZ of interest on the map. Information for that zone will appear in another dataview.

3. The Figure below (Figure I-3) is an illustration of what the user can expect to see when the above two steps have been completed.

Variables: TAP1 is the actual TAPZ number, and Total_LRVMT is the TAPZ's total LRVMT, based on an assumed average local speed (20 mph), a assumed number of intrazonal vehicle trips (100), and the model output of mean intrazonal travel time (a more detailed description of this information can be found in the *readme-Trip_Duration*.txt file).
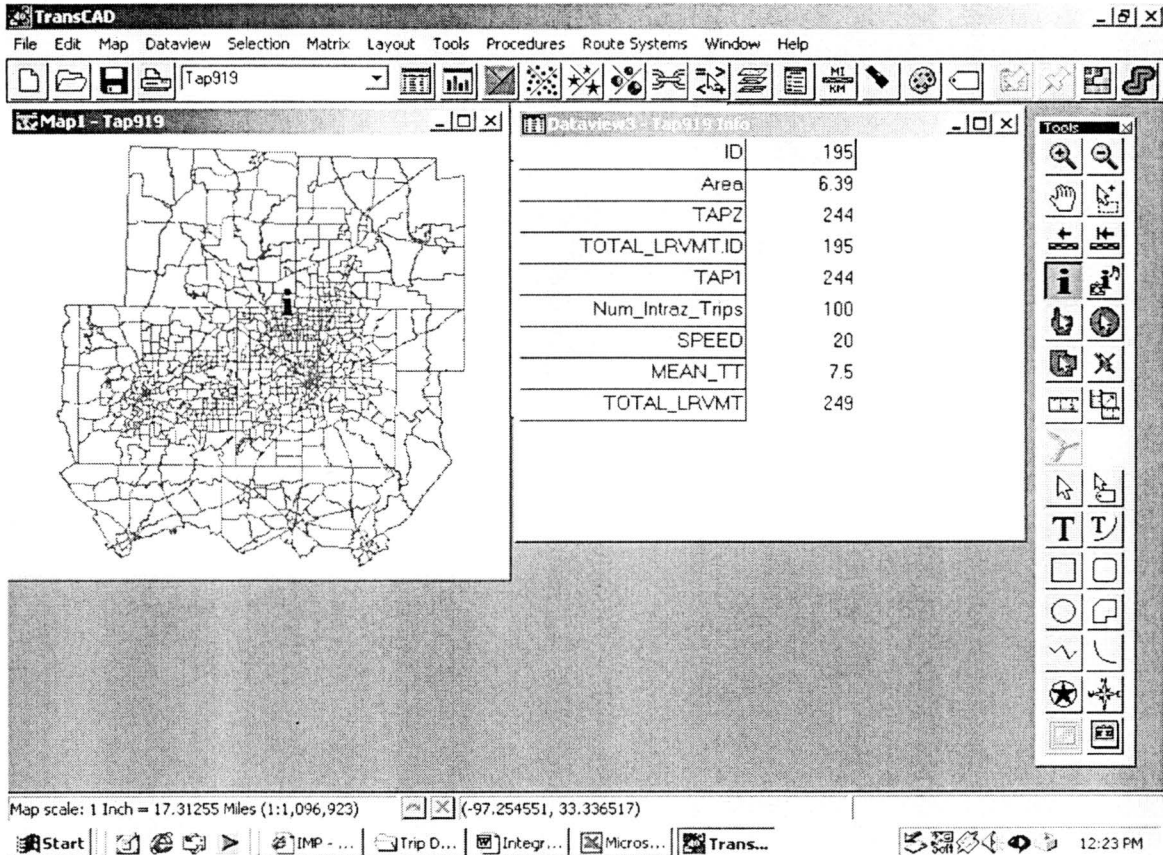

Figure I-3. Local road VMT results

Soak Time Duration files. *Soak-example.wrk*, found in the Trip and Soak Time Duration folder, is the workspace file that consists of the DFW TAPZ (Traffic Analysis Process Zone) map and a sample of soak time duration data.

1. Double-click on this file to open the DFW TAPZ map and dataviews with all the data and map information.

2. To find the soak time duration information for a certain TAPZ, click on the Info button in the "Tools" window, then click on the TAPZ of interest on the map. Information for that zone will appear in another dataview.

3. The Figure below (Figure I-4) is an illustration of what the user can expect to see when the above two steps have been completed.

*For more information, see *readme-Soak_Duration.txt,* found in the Trip and Soak Time Duration folder.
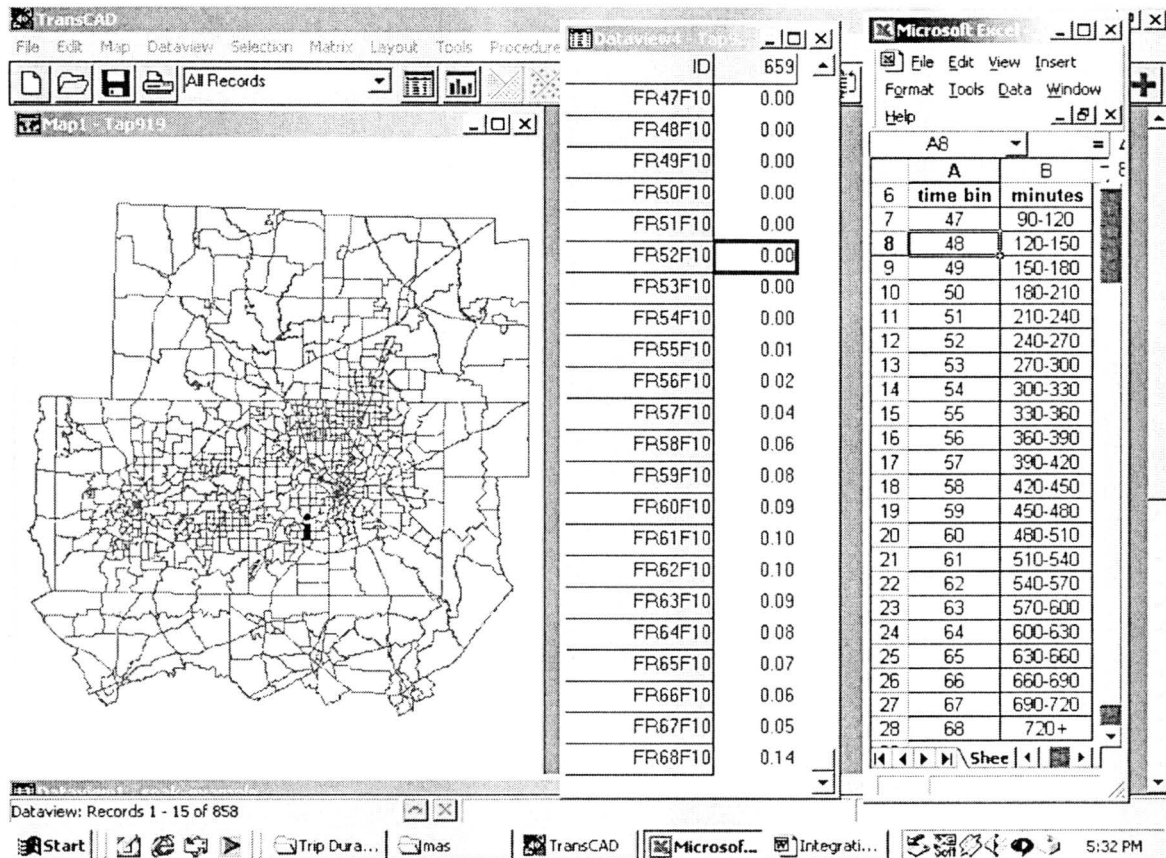

Figure I-4. Soak time duration distribution for morning and home purpose.

II. Instructions for Using the Travel Demand Models in TransCAD: Ordered-Response Probit Model for Trip Generation

To install the trip generation add-in script:

1. Open TransCAD;
2. Go to TransCAD menu "Tools", click "Add-ins";
3. In "Add-ins" window, click "Setup";
4. In "Setup Add-ins" window, click "Add". Type "Ordered-response Model Forecasting" in the Description box, type "ORP" as Name (case sensitive), and "e:\Trip Generation\UI_ORP\orp" in the UI Database box and click "OK".

To run the ordered-response model for trip production model:

1. Open a map (e:\Trip Generation\tsz90\tsz90.map) that contains zonal structure information for the study area;

2. Go to menu "tools" and choose "add-ins". In the "add-ins" window (as shown in Figure II-1), choose "Ordered-response Model Forecasting", and click "OK". The implementation procedure is now activated.
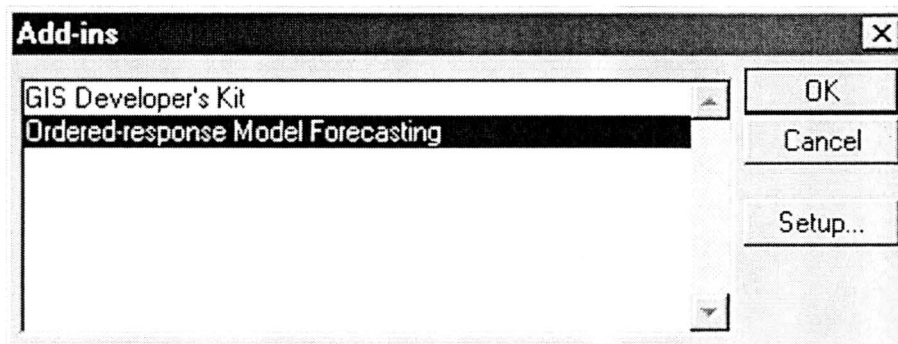

Figure II-1. Add-in window

3. After the add-in procedure is activated, an open-file window (as shown in Figure II-2) will pop up. First, select a household demographic distribution table (e:\Trip Generation\hbw\householdworkers.dbf) and click "open"; then, select a model coefficient table (e:\Trip Generation\hbw\hbw_1.dbf) and click "open";
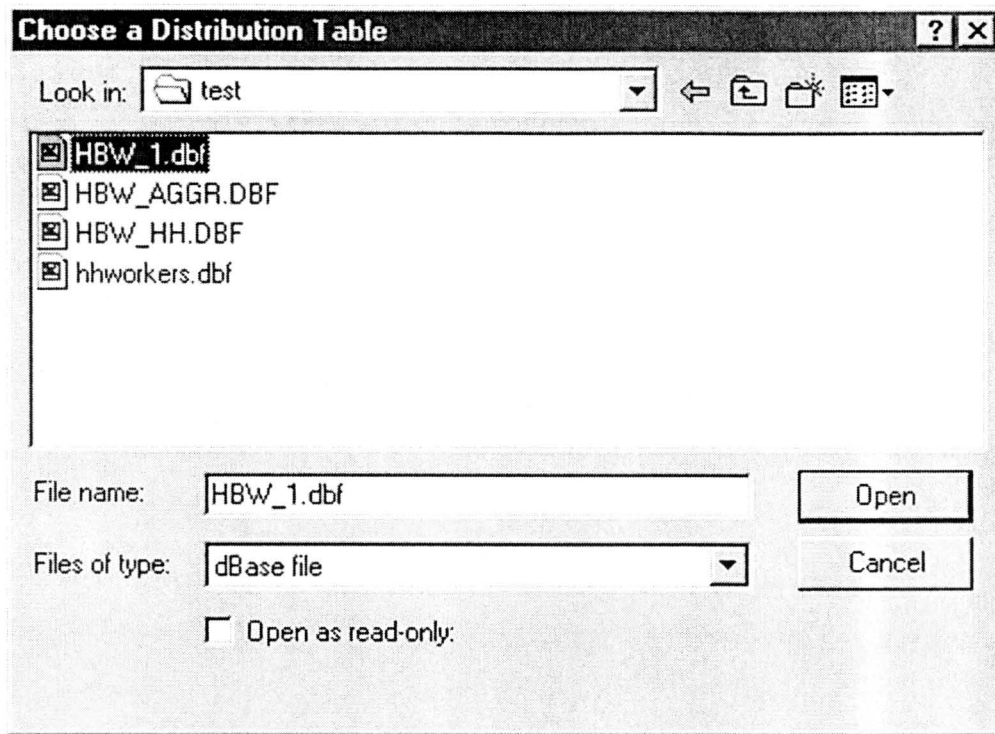
Figure II-2. Open file window

4. An input dialogue box will then ask users to provide information on the number of independent variables in the model coefficient file, the maximum number of trips, and the trip purpose. The user can either choose inputs from pull-down menu or type inputs directly. In this example, the number of independent variables is 2; the maximum number of trips is 6; and the trip purpose is HBW (as shown in Figure II-3).
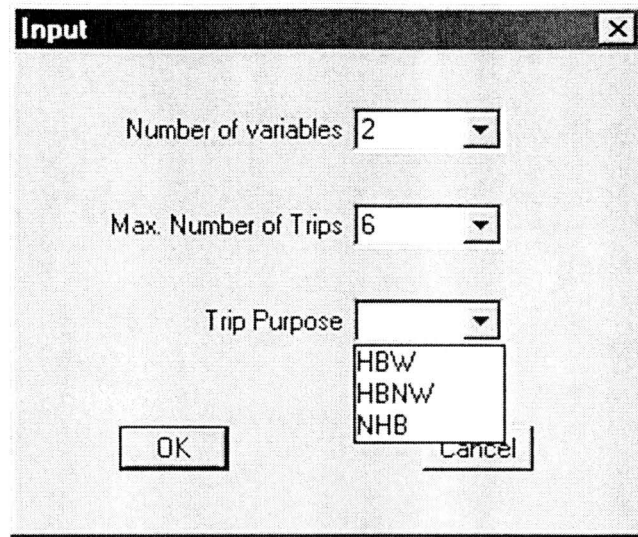
Figure II-3. Input dialog box

5. With all the required inputs TransCAD will calculate the trip productions for different household groups. The user can output the household trip productions to an existing file or save it as a new file.

6. Once the calculation is done, the user has a choice of continuing to implement another trip purpose. If the user selects "no", the ORP module will aggregate trip productions for each TAP and save the TAP level trip productions into a file. The TAP level trip production results are also connected to the map so that the trip production information is provided in the "info" window by clicking on any TAP.

The trip productions for home-based non-work and non-home-based trips are saved in file "tap_production.dbf".

III. Instructions for Using the Disaggregate Attraction End Choice (DAEC) Model for Trip Distribution in TransCAD[**]

1. Input Files required

A prior implementation of the trip production phase is necessary to use the DAEC model. The inputs required for the DAEC macro are summarized in Table III-1. The next section discusses the requirements for the format and contents of the input files.

Table III-1: Input File Formats and Contents for The DAEC Macro

S. No	Inputs	Input File Format	File Fields
1	Trip Production Data (From trip generation phase)	.dbf (DBASE File)	TAPZ, PROD
2	Composite Impedance Matrix	.mtx (TransCAD Matrix)	ROW ID - TAPZ COLUMN ID - TAPZ
3	Socio Demographic Interaction Coefficients (from the DAEC Model)	.dbf (DBASE File)	SDGROUPS, COEFF
4	Land Use Characteristics (from the DAEC Model)	.dbf (DBASE File)	TAPZ,RETAIL, SERVICE, OFFICE, INDUSTRY, INST, TOTEMPL
5	Land Use Coefficients (from the DAEC Model)	Provided by User or .dbf (DBASE File)	LUSE, COEFF

2. Input File Description

The input files listed in Table III-1 are pre-requisites for the DAEC program. It is necessary that the file formats and contents are the same as indicated in Table III-1. This section elaborates on the requirements for file structure and contents to use the DAEC macro.

2.1. Trip Production File

The DAEC macro allows the user to compute trip interchanges from zonal trip productions using traveler socio demographic characteristics and attraction zone characteristics. It is, therefore, necessary to implement the trip production phase before the DAEC macro is used. The trip production file must provide a zone wise trip production count. The zones are identified by their TAP numbers and the productions

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[*] The current version of the DAEC Macro does not function for very large data sets of the order of 900 zones. It is advisable to use the macro for smaller data sets of the order of 100 zones.

from these zones by a field "PROD". In essence, the trip production file must necessarily have two columns - the first column representing the TAP and the second named PROD showing the corresponding trips produced. The trip production file structure is shown in Figure III-1. This file structure allows the user to compute trip interchanges for each trip purpose separately.

Figure III-1: Trip Production File Format

2.2. Impedance Matrix File

An individual's choice of attraction end for a trip is dependent upon the impedance to travel between the production and attraction zones. In this project, a composite impedance matrix has been used for trip distribution. The composite impedance terms capture the combined effect of travel time (both in-vehicle and out-of-vehicle) and cost for each available mode on the utility of choosing a particular attraction zone. The computation of these values has already been discussed in the previous sections. The composite impedance matrix is a square matrix with a size equal to the number of zones in the planning region. The row labels are the production zone ids and the column labels are the attraction zone ids. The number of rows and columns in the impedance matrix should be the same as the number of observations in the trip production file. The matrix file structure and contents are shown in Figure III-2.
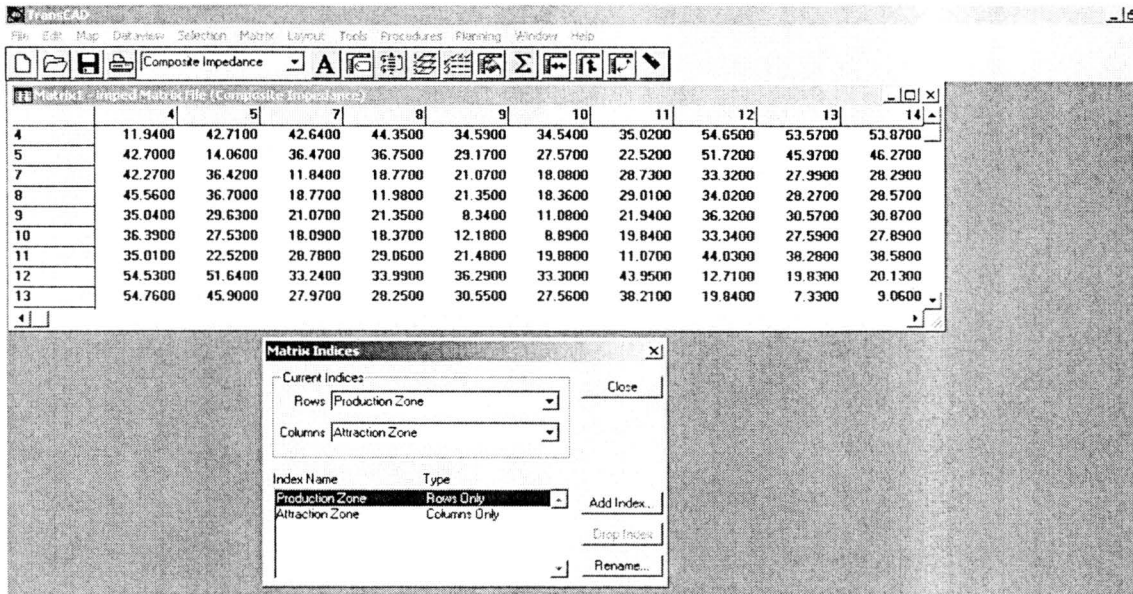
Figure III-2: Impedance Matrix Contents

2.3. Socio Demographic Coefficients

People with different socio demographic characteristics have different perceptions of disutility to travel. For this reason, the composite impedance matrix is not the same for all socio demographic groups. The DAEC model takes this into account through an interaction term between the socio demographic groups and the composite impedance. The DAEC macro, therefore, seeks a socio demographic coefficient file. The number of socio demographic groups varies from one trip purpose to the other. The number of records in the socio demographic coefficient file is the same as the number of socio demographic groups. The socio demographic groups are represented by the field SDGROUPS and the corresponding interaction coefficients by the field COEFF. The file structure is shown in Figure III-3.

Figure III-3: Socio Demographic Interaction Coefficients

2.4. Land Use File

The number of trips attracted to a zone also depends on the attraction zone characteristics. The zonal size measures are proxy measures for the number of elemental destinations within a zone. In the current study, total zonal employment has been introduced as a size measure for the HBW purpose and zonal retail and service employment is used for HBNW and NHB purposes. In addition zonal office, industrial and institute areas have also been included in the model. The DAEC macro, therefore, also seeks a land use file to compute the trip interchanges between the zones. The land use file must contain information on the zonal retail, service, industrial, institute areas and the total zonal employment. The land use file structure is shown in Figure III-4.

Figure III-4: The Land Use File

3. Program Interface and Output File

The DAEC macro guides the user through the input process using dialog boxes and prompt windows. This section describes the input sequence and the program interface.

3.1 Executing the DAEC Macro

The DAEC macro can be executed using the GISDK Toolkit supported by TransCAD. To open the GISDK toolkit, the user can choose **_Tools - Add-ins - GIS Developer's Toolkit_** form the TransCAD window. This will open the GISDK toolkit menu bar shown in Figure III-5.
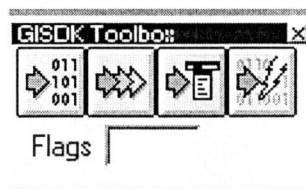

Figure III-5. The GISDK toolbox.

To compile the DAEC macro, the user must choose the ⟐⟨011/101/001⟩ button in the toolbox and then choose the corresponding resource file that contains the source code. The source code can then be executed by clicking on the ⟨⟫⟫⟩ button in the GISDK toolbox. The program will then prompt the user for the name of the macro as shown in Figure III-6. The actual input process starts after the name of the macro has been entered. For the current project, the DAEC macro is titled *TripDistribution*.
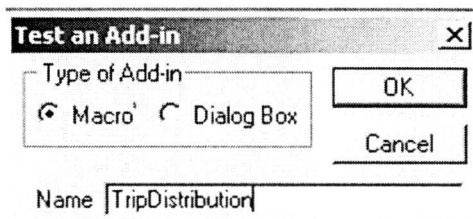
Figure III-6: Input Dialog Box for Name of Macro

3.2 Program Interface

To start with, the DAEC macro prompts the user for the trip purpose, the zone count and the number of socio demographic categories relevant for the current trip purpose. The prompt dialog box is shown in Figure III-7.
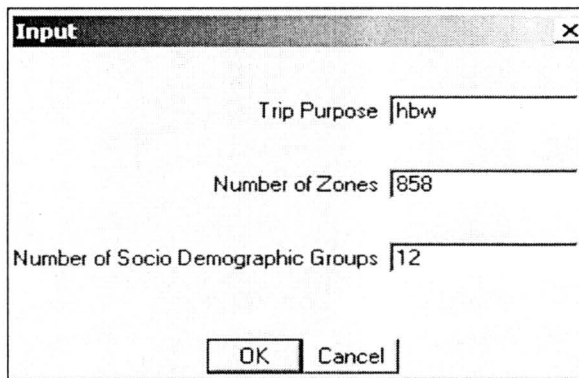
Figure III-7: Trip Purpose and Zone Count Input

Following the trip purpose and zone count inputs, the program prompts the user to choose the composite impedance matrix file. The DAEC macro requires that the

impedance matrix file be in the *.mtx* format supported by TransCAD. The file dialog box is shown in Figure III-8.
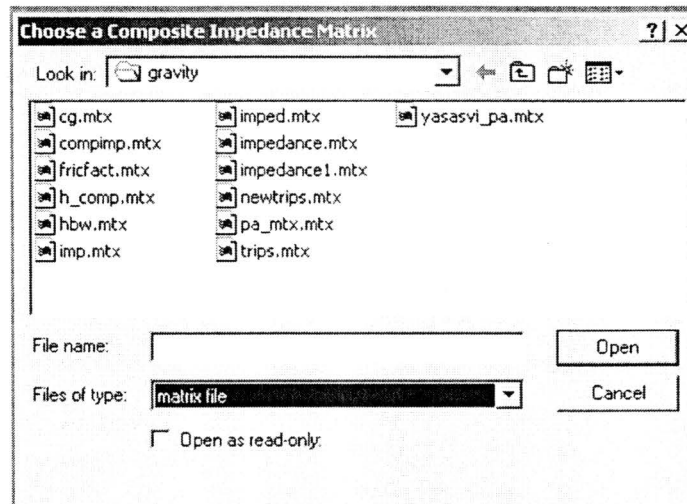

Figure III-8: Impedance File Input

The program then prompts for the trip production file and the socio demographic coefficients in that order. The files need to be in the .dbf format. Figure III-9 shows the file dialog boxes.
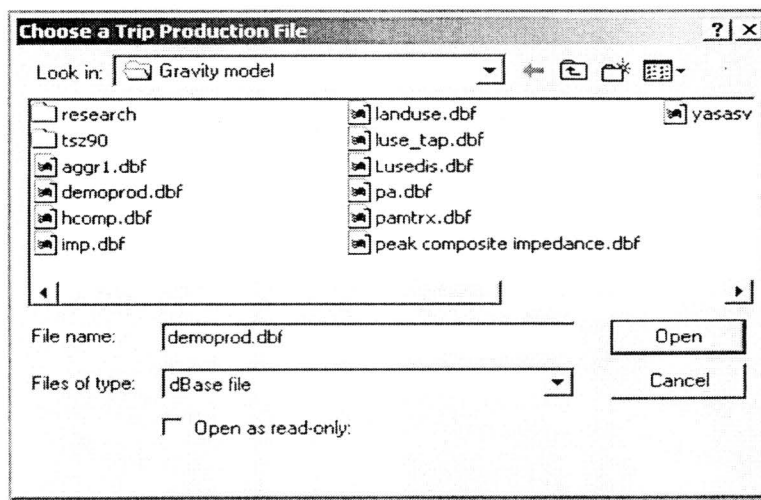

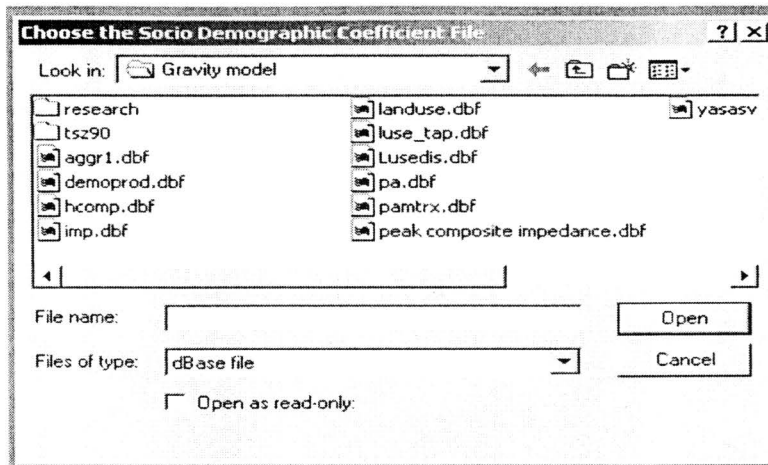**Figure III-9(a): Input Dialog Box for Trip Production File**

Figure III-9(b): Input Dialog Boxes for Trip Production and Socio Demographic Coefficient File

Finally, the DAEC macro prompts for the land use file and the land use coefficients. The prompt dialog box and the input dialog box are shown in Figure III-10.
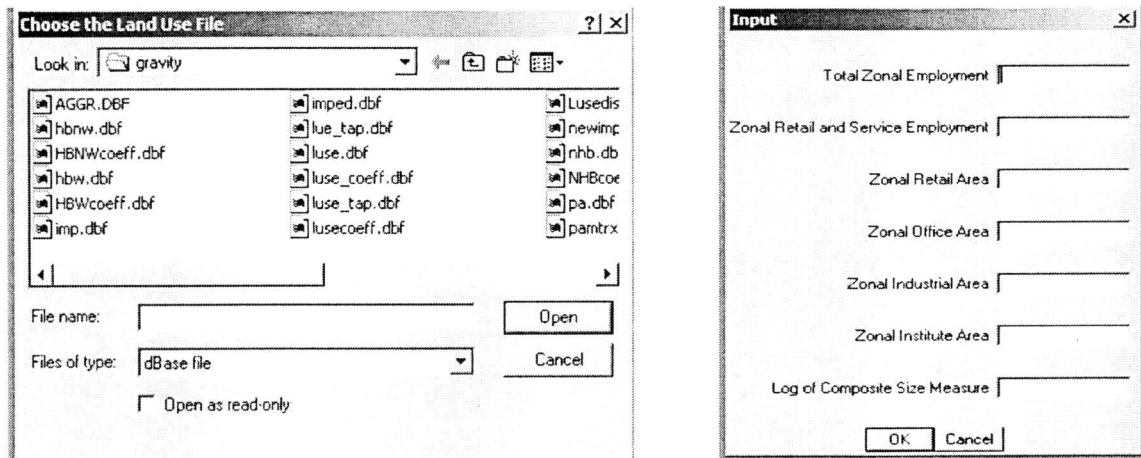

Figure III-10: Land Use File and Coefficient Inputs

3.2 The Trip Interchange Matrix Output

The output from the DAEC macro is a matrix file showing the trip interchanges from one zone to the other. The matrix obtained from the trip distribution stage shows the trips produced from a zone and attracted to every other zone. The program informs the

user about the directory and file path of the trip matrix using a message dialog box. The trip matrix can then be converted to an O-D Matrix using the "PA to OD" function provided by TransCAD. Figure III-11 shows a sample trip matrix output file.

TransCAD - [Matrix1 - newimp Matrix File (H_COMP)]

File Edit Map Dataview Selection Matrix Layout Tools Procedures Planning Window Help

H_COMP

	4	5	7	8	9	10	11	12	13	14	15	
4	623.76	7.19	9.99	8.51	2.14	16.80	22.51	1.06	4.96	5.55	5.77	2.
5	13.01	634.30	31.17	29.67	7.03	66.74	190.54	2.32	15.29	17.04	17.04	4.
7	4.65	7.81	550.73	107.34	7.56	100.67	27.99	3.72	29.90	32.85	27.55	8.
8	2.15	4.58	66.07	310.98	4.34	57.41	16.28	2.08	17.38	19.10	16.09	3.
9	6.58	11.81	53.81	50.23	142.32	410.41	52.83	2.02	16.13	17.78	15.47	3.
10	7.51	19.91	119.55	110.77	49.26	1155.78	97.88	3.56	30.09	33.05	27.54	5.
11	16.11	75.35	44.10	41.68	12.67	129.50	1413.44	2.52	17.92	19.89	18.80	4.
12	0.86	1.04	6.73	6.09	0.51	5.38	2.86	49.22	45.26	48.98	34.49	12.
13	0.43	0.80	6.28	5.93	0.48	5.32	2.38	5.28	751.62	408.37	192.22	7.
14	0.23	0.42	3.23	3.05	0.25	2.73	1.24	2.67	191.05	457.47	140.43	3.
15	0.02	0.04	0.28	0.26	0.02	0.23	0.12	0.19	9.25	14.44	53.05	0.
17	1.83	1.66	13.37	8.07	0.72	7.06	4.29	11.62	62.38	55.73	43.91	229.
18	0.09	0.15	0.88	0.84	0.07	0.74	0.40	0.57	16.59	13.21	8.40	2.
20	0.36	0.30	1.41	1.01	0.10	0.86	0.68	0.74	4.08	4.05	3.97	2.
21	0.80	0.90	3.28	3.15	0.29	2.71	2.06	1.55	15.93	15.55	14.66	5.
22	0.37	0.50	1.87	1.80	0.16	1.54	1.16	0.83	9.41	9.14	8.53	3.

Figure III-11: Trip Interchange Matrix Output

Instructions for Using the Trip Interchanges Workspace to Obtain Trip Information

1.   Opening the Workspace

Open the TransCAD window and go to the File -> Open Work Space option as shown in the picture below.
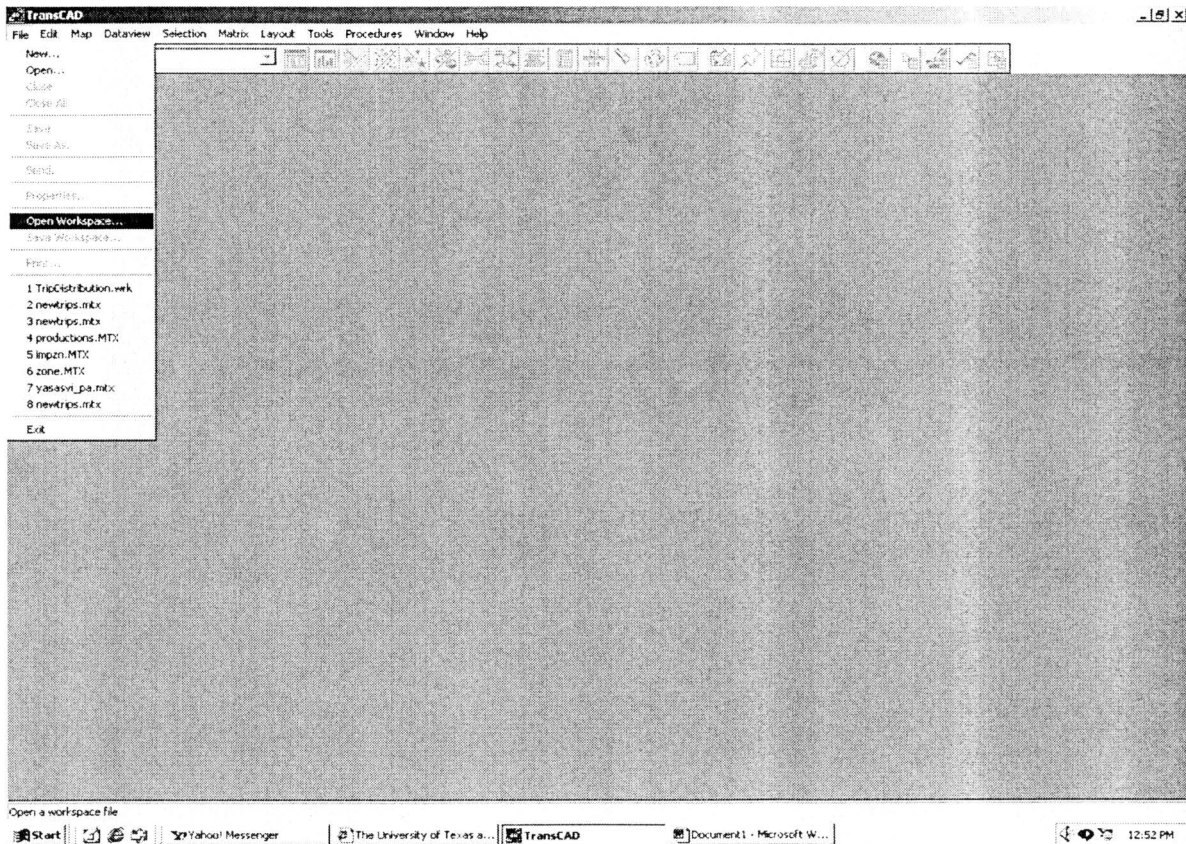

Figure III-12. Opening a TransCAD workspace.

This opens a File Open Dialog box as above. Follow the path shown below:
Trip Distribution -> Output -> TripInterchanges.wrk
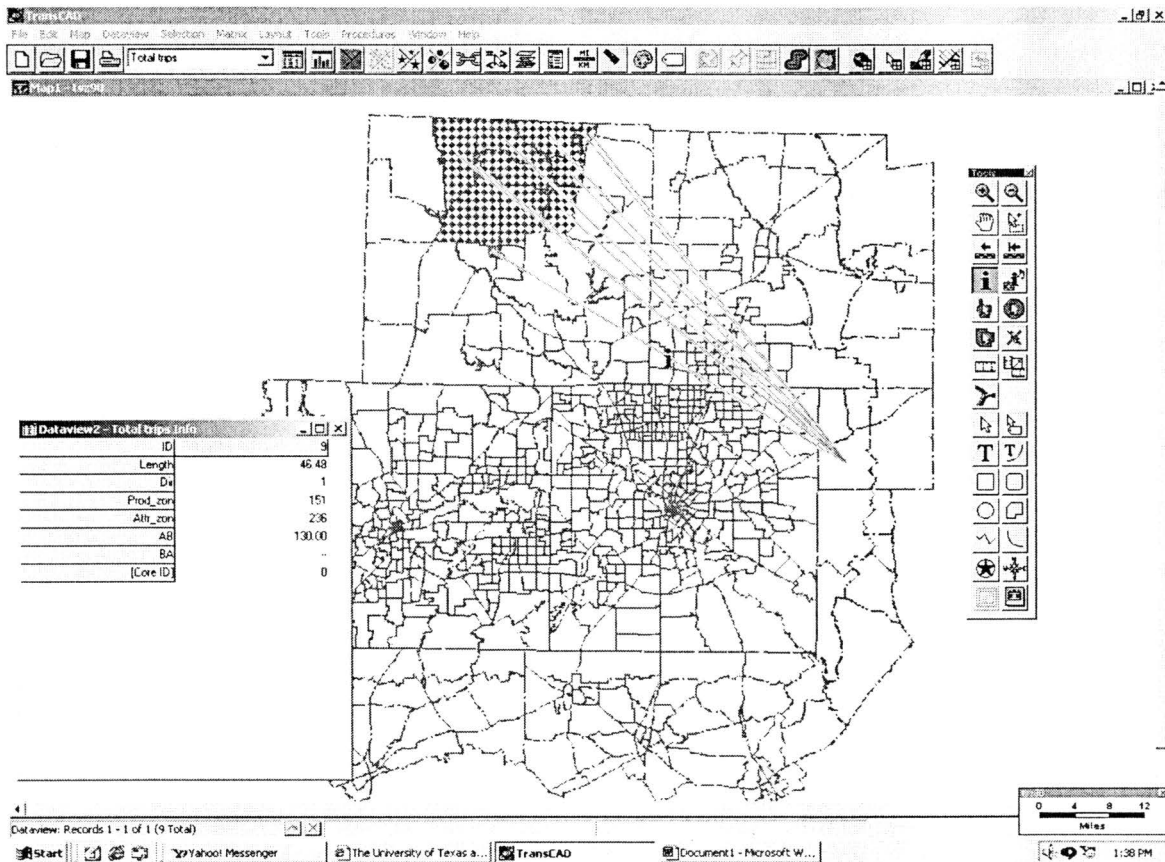This will lead to the screen shown in Figure III-12.

Figure III-13. The Trip Interchange Workspace.

The screen opens with a vertical tool bar as shown. Please note that the desire lines shown are just an example. You can obtain information on trip interchanges between any two zones by using the **Tools ->Geographic Analysis ->Desire Lines** and then suitably choosing the required trip interchange matrix.

The layers in the map are displayed on the **top left hand corner** of the window. Select the required layer to display it. For instance, to view the trips made by driving alone in the AM peak, select the corresponding layer from the menu. To display the trip information, select the $\boxed{\mathbf{i}}$ button from the tool bar. This attaches the "i" to the mouse pointer. Trip interchanges by mode and departure time can now be displayed by clicking on each of the desire lines displayed. The process may be repeated for any of the layers in the map.

IV. Instructions for Using the Mode Choice Models

The mode choice estimation input and output files are saved in "e:\Mode Choice" by trip purpose. The HBW trip files are in "e:\Mode Choice\HBW", the HBNW trip files are in "e:\Mode Choice\HBNW", and the NHB trip files are in "e:\Mode Choice\NHB".

1. Input Files

    a. Model parameter file: hbw.bin (for HBW), hbnw.bin (for HBNW), nhb.bin (for NHB)

    b. LOS file: peak.mtx (for peak hours), NHB(HBNW)_LOS.mtx (for off peak hours)

2. Output Files

    a. For HBW trips: HBWAMOD.MTX (for AM peak hour 7-8 AM), HBWOD.MTX (for 24-hour volume), and HBWPMOD.MTX (for PM peak hour 5-6 PM)

    b. For HBNW trips: HBNWAMOD.MTX (for AM peak hour 7-8 AM), HBNWOD.MTX (for 24-hour volume), and HBNWPMOD.MTX (for PM peak hour 5-6 PM)

    c. For NHB trips: NHBAMOD.MTX (for AM peak hour 7-8 AM), NHBOD.MTX (for 24-hour volume), and NHBPMOD.MTX (for PM peak hour 5-6 PM)