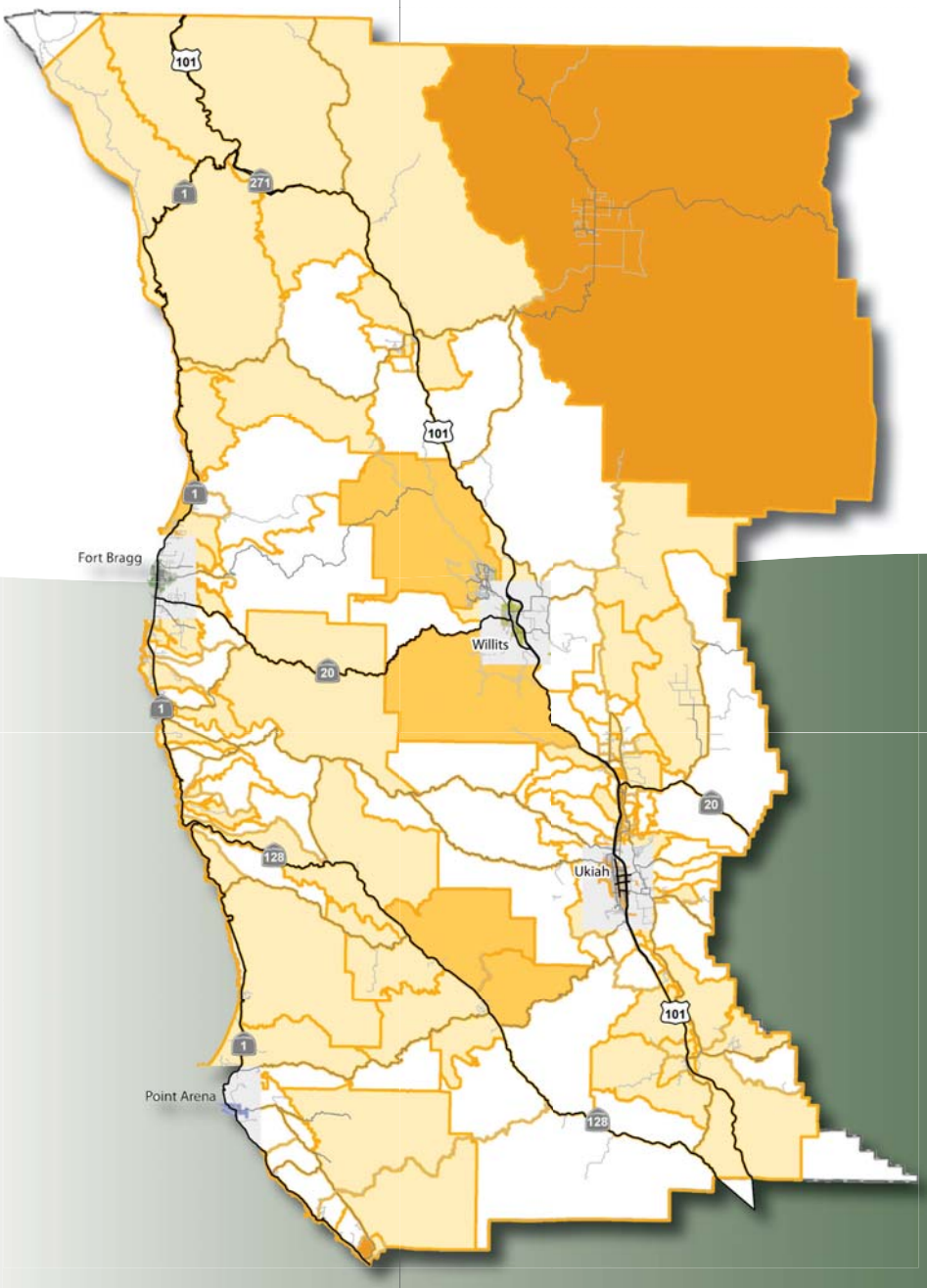
User's Guide

MENDOCINO COUNTY TRAVEL DEMAND MODEL



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CHAPTER 1. INTRODUCTION

This manual provides staff from Mendocino County and MCOG with practical advice on how to best develop scenarios for the Mendocino Council of Governments (MCOG) Travel Demand Forecasting (TDF) Model as an analysis tool for traffic studies. The manual assumes that the reader already has a working knowledge of GIS, and will know how to find the appropriate roadway links and/or travel analysis zones (TAZs) to modify. This manual does not include any information about the model's TransCAD interface; it assumes that consultant or Caltrans staff are proficient in TransCAD and can follow the steps outlined in sections 2.3 and 3.3 for taking the GIS edits and translating them into the files needed to run the model. For information regarding the development of the MCOG TDF Model, see the *MCOG Travel Demand Model Development Report*.

CHAPTER 2. LAND USE DATA

2.1 FILE STRUCTURE

The land use data is contained in the "MCOG_TAZs" GIS layer, sent to MCOG staff. The layer contains a map of the TAZs in the Mendocino County TDF model. The land use attributes are shown below in Table 1. The shaded rows correspond to attributes that should not be modified by the GIS user.

TABLE 1
LAND USE ATTRIBUTES IN TAZ LAYER

Attribute Name[1]	Definition	Notes
ID	ID Number	Do not change
TAZ	TAZ Number	Do not change
ACRES	Area of the TAZ in acres	Do not change
CITY	City / town / unincorporated place	Do not change
ATYPE	Trip Generation area type	Do not change
SEASONLYxx	Seasonal residential units	Not being used in the TDF model
SF_DUxx	Single family residential units	
MF_DUxx	Multi-family residential units	
K8_STUDxx	Students (kindergarten – 8th grade)	
HS_STUDxx	High School Students	
AS_STUDxx	College / University / Adult School Students	
HOTELRMSxx	Hotel Rooms	Includes rooms in motels, B&Bs
AGGENxx	Agricultural / Farming jobs	
AGWINERYxx	Winery Jobs	
COM_HIGHxx	High-Generating Commercial Jobs	Grocery stores, major retailers such as Walmart, Costco
COM_MEDxx	Medium-Generating Commercial Jobs	General retail uses, ranging from clothing stores to post offices
COM_LOWxx	Low-Generating Commercial Jobs	Specialized retail uses, such as art galleries, auto repair shops
OFFICExx	Office / Service Jobs	
MEDICALxx	Medical Jobs	
ENT_HIGHxx	High-Generating Entertainment Jobs	Tourist-related uses such as resorts, casinos, or popular attractions such as health clubs
ENT_LOWxx	Low-Generating Entertainment Jobs	Businesses with low trip generation on typical weekdays, such as theaters and clubs.
RESTRNTxx	Restaurant Jobs	
INDHEAVYxx	Heavy Industrial Jobs	

TABLE 1
LAND USE ATTRIBUTES IN TAZ LAYER

Attribute Name[1]	Definition	Notes
INDLIGHTxx	Light Industrial Jobs	
GOVPBLCxx	Government / Public Jobs	

1. Each land use with an "xx" extension occurs corresponds to three different attributes in the layer. The digits "09", "20" and "30" for "xx" represent 2009, 2020 and 2030 land uses, respectively.

Source: Fehr & Peers, 2010

2.2 FILE MODIFICATION

To modify land use assumptions, the user edits the appropriate field or fields above. Some important things to keep in mind:

- Attributes shaded in gray in Table 1 are not land uses but supplemental information needed to run the TDF model. They should not be changed.
- Some user judgment may need to be exercised to determine the precise category to which nonresidential land uses correspond. Appendix A contains a correspondence table linking SIC codes to the land use categories in the Mendocino County TDF model, This table was followed in most cases when converting InfoUSA job data into TDF model land uses, but specific local knowledge was occasionally used.
- Always be sure to check the units. Nonresidential land uses are expressed in units of *jobs* in this data, unlike many models which express them in square feet or acres.

2.3 USE IN TDF MODEL

This section is for the benefit of the travel demand modeler, likely to be either a Caltrans or consultant staff member.

The ultimate model user will:

1. Copy the directory "2020" or "2030" which contains all of the model files to a new folder which will correspond to a new scenario about to be run.
2. Open the MCOG_TAZs.dbf file which will have been modified as a result of a land use planning scenario, and copy the attributes from the appropriate year(s) into the model input file "Land_Use_2020.dbf" or "Land_Use_2030.dbf."
    a. The user should only copy the data and *not* the top row of attribute names, because the attribute names in the GIS layer are slightly different from those in the model input files. This was unavoidable due to GIS maximum character limitations.
    b. The user should check that the final five rows of those dbf files do not get overwritten. Those rows correspond to "TAZs" 7081, 7082, 7084, 7085 and 7086 which are the model gateways.
3. The model will then be ready to run with the new land use information.

CHAPTER 3. MODEL NETWORK

3.1 FILE STRUCTURE

The network data is contained in the "MCOG_Master" GIS layer, sent to MCOG staff. The layer contains the roadway network for the Mendocino County TDF model. The network attributes are shown below in Table 2. The shaded rows correspond to attributes that should not be modified by the GIS user. If any new links are added, the fields in these shaded rows can be left blank (except for ID and LENGTH, which will be automatically assigned by GIS).

TABLE 2
NETWORK ATTRIBUTES IN TAZ LAYER

Attribute Name	Definition	Notes
ID	ID Number	Do not change
LENGTH	Roadway Length (miles)	Do not change
DIR	0=Two-way, 1=One-way in the A node ➔ B node direction, -1= One-way in the B node ➔ A node direction	All divided freeway links and ramps should be one-way
OBJECTID	Not used	
FUNC_CLASS	Roadway Type	See "file modification" for guidelines
NAME	Roadway Name	
YR_BUILT	Year Built	Model will only use the roadway if this value is less than or equal to the model year being run
FROM_ID	"A" Node ID	TransCAD user will update
TO_ID	"B" Node ID	TransCAD user will update
LANE_CAPAC	Capacity Per Lane (vehicles per hour)	See "file modification" for guidelines – it varies by the "Func_Class" field
AB_LANE_09 / BA_LANE_09[1]	Lanes in 2009	
AB_LANE_20 / BA_LANE_20[1]	Lanes in 2020	
AB_LANE_30 / BA_LANE_30[1]	Lanes in 2030	
AB_AUX / BA_AUX[1]	Auxiliary lanes	
HOV_LINK	1=link is an HOV facility, 0 otherwise	
AB_SPEED / BA_SPEED[1]	Free flow speed	See "file modification" for guidelines – it varies by the "Func_Class" field
POST_SPEED	Posted speed (not used)	
AB_TIME / BA_TIME	Free flow travel time	Do not change - will be calculated during model run
AB_CONGTT / BA_CONGTT	Congested travel time	Do not change - will be calculated during model run
ALPHA	Parameter for traffic assignment	TransCAD user will update
BETA	Parameter for traffic assignment	TransCAD user will update

TABLE 2
NETWORK ATTRIBUTES IN TAZ LAYER

Attribute Name	Definition	Notes
Other fields after BETA	Fields used for base year validation, volume-loading, and record-keeping	Do not change

1. The "AB / BA" distinction corresponds to the two different directions on each link. The "AB" direction depends on the "network topology," which is how the roads were drawn. It does not consistently correspond to a geographic direction. The topology can be viewed in GIS. In the vast majority of cases, the values above for lanes and speed will be the same in both directions on a given link.

Source: Fehr & Peers, 2010

3.2 FILE MODIFICATION

If a new link is added to the network, the fields that need to be updated by the user are those not shaded in Table 2 above. Each new link must be assigned a functional class. The various functional classes used in the model are shown in Table 3 with their suggested lane capacities, typical speeds, and example of roads in Mendocino County that fall into that classification.

TABLE 3
ROADWAY FUNCTIONAL CLASSES IN MENDOCINO COUNTY TDF MODEL

Class Name	Default Capacity Per Lane (vehicles per hour)	Typical Speeds (miles per hour)	Examples
Freeway	2,000	55-65	US Highway 101 in Ukiah
Ramp	1,500	40	Ramps at Highway 101 interchanges
Rural Arterial	700-1,000	40-50	State Route 1
Urban Arterial	900-1,000	35-40	State Street in Central Ukiah
Rural Collector	700	40-55	State Route 253
Major Collector	600	30-35	Low Gap Road
Minor Collector	500	25-30	Redemeyer Road
Local	400	25	Church Street
Centroid Connector (CC)	n/a	25	Not actual roads

Source: Fehr & Peers, 2010.

The capacity and speed values in Table 3 should serve as guidelines, because roadway speeds and capacities can vary considerably depending on several factors such as location, built environment, frequency of stops, grade, or roadway quality. Specific knowledge about a road should always take precedence over the default assumptions. For example, speeds on extremely curvy stretches of SR 1, a rural arterial, were reduced from 50 to 40 MPH.

Centroid connectors are hypothetical roads that represent the access from an entire TAZ onto the roadway network. New TAZs and centroid connectors should not be added by the GIS user. If land use from a large proposed development does not access the network at the same point as any existing TAZ, the consultant may consider adding a TAZ to the model.

3.3 USE IN TDF MODEL

This section is for the benefit of the travel demand modeler, likely to be either a Caltrans or consultant staff member.

The ultimate model user will:

1. Obtain from the GIS user a description of the modifications made to the network shape file.
2. Open the modified shape file into TransCAD, which can open shape files directly.
3. Check the modifications for connectivity and reasonableness of all values
4. Export to a standard TransCAD geographic layer.
5. Make the following edits to account for the new roads:
    a. Update the "FROM_ID" and "TO_ID" fields by filling them with the values of the corresponding node fields (It's easiest to do this for all the links in the network at once, even though most didn't change).
    b. Update the "ALPHA" and "BETA" fields for any new links, using the default values for those links' functional classes, as shown in Table 4.

TABLE 4
DEFAULT ALPHA AND BETA VALUES IN MENDOCINO COUNTY TDF MODEL

Class Name	Alpha	Beta
Freeway	0.78	2.50
Ramp	0.78	2.50
Rural Arterial	0.65	4.50
Urban Arterial	0.40	5.50
Rural Collector	0.70	4.00
Major Collector	0.70	4.00
Minor Collector	0.70	4.00
Local	0.78	3.80
Centroid Connector (CC)	0.15	4.00

Source: Source: Fehr & Peers, 2010.

APPENDIX A
SIC CODE AGGREGATION GUIDELINES

The table below shows some general suggestions for how to allocate land uses into the categories used in the Mendocino County Travel Demand Model. This should not be used as a substitute for local and/or specific knowledge about whether a land use is likely to be a high or low trip generator.

SIC CODE AGGREGATION GUIDELINES

Employment Group	SIC Code	Description
Retail – High	54, 554	Grocery Stores, Gas Stations,
Retail – Medium	52-53, 56-57, 591-592	Hardware, Department Stores, Clothing, Furniture, Electronics, Drug Stores, Liquor
Retail - Low	551-553,555-559, 593-599,71-72, 75-76	Auto Dealers, Specialty Stores, Personal Services, Auto & General Repair
Restaurants	58	Restaurants
Entertainment - High	70110301-70110304, 7991, 7997	Casinos, resorts, Health Clubs
Entertainment - Low	78-79 (except 7991, 7997), 84	Entertainment, Recreation, Museums
Hotels	70 (except 70110301-70110304)	Lodging (except casinos and resorts)
Office	60-67, 73, 81, 83, 87, 89	Finance, Insurance, Real Estate, Business Services, Legal, Social, Engineering, Accounting, Research
Medical	80	Medical
Agricultural	1-9,10-14	Agriculture
Heavy Industrial	10-17, 40-49	Forestry, Fishing, Mining, Construction, Transportation, Communications, Utilities
Light Industrial	20-39, 50-51	Manufacturing, Wholesale Trade
K-12	821	K-12
College / University	822	College / University
Public	823-829, 86, 91-97	Libraries, Vocational Schools, Organizations, Public Administration, Government

Note on code systems: three or more digit codes above are *subsets of their first two digits.* So for example, in the table immediately above, the codes that begin with '59' are divided into two subsets, 591-592 (drug and liquor stores, which are medium-generating retail), and 593-599 (other types of specialty stores, which are lower-generating). Conversely, any code that is just two digits contains all three and four digit codes that share those first two digits. For example, the '82' covering schools in the 6-category table includes 821 (grades K-12) and 822 (colleges).