TransCAD Travel Demand Model Training

presented to

Caltrans

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Agenda

- TransCAD Basics
- TransCAD Tips
- OCTAM Model QuickStart
- Visualizing Data



TransCAD Basics

Built-In Forecasting Tools

- 4-Step Travel Model
- Model Calibration/Estimation Utilities
- GIS-Based Roadway and Transit Data
- Intermediate Results Analysis
- Matrix Editor
- Spatial Analysis Tools



Built In Interface

Provides an interactive method of running a Travel Model

Multi-Mo

Network F Meth

> Class Ini Mat 🗸 ОВС 🗸 TRK V EE V EE_ < Delay Fr Name Capac Alpha Beta Preloa < Globals Iteratio

- Very flexible, but can be a bit tedious to use
- Is enhanced through use of customized "Add-Ins"

	Options 🔀
	Theme OK Create Themes Cancel Max V/C 1.8 From to via Image: State Sta
	Select Link/Zone Analysis
	Select Link/Zone Queries Query File
dal Multi Clare Arrigomont	
val multi-class assignment	
er wars_network	De Tabulation
	Skip Small Values Less than 0.01
IN AM Period Vehicle Trips in UD F	Save Link Flow Choose Fields
ormation	Save last 1 🕂 iteration
None 1.00 1.00 p/a p/a	Warm Start Choose Fields
None 1.00 1.00 n/a n/a	
None 1.00 1.00 n/a n/a	
TRK None 1.00 1.00 n/a n/a	JToll Volume
nction Parameters	Cold Start Analysis
Field Value	
	Parameters
BETA 4	Loading Multiplier 1
None 0	
18 20 Convergence 0.0100 Pat	h Diff 0.001



Batch Mode

settings)

Settings from the interface can be saved

With looping, repetitive tasks can be automated (e.g., run assignment 5 times with different input data but mostly similar



Batch Editor		×
Opts = null Opts.Input.Database = "C:\\OCTAM_Training\\Output\\Base2005\\net\\RoadwayNetwork.DED" Opts.Input.Network = "C:\\OCTAM_Training\\Output\\Base2005\\net\\Network.net" Opts.Input.Op Matrix Currency] = (*C:\\OCTAM_Training\\Output\\Base2005\\asn\\ODVehAM.mtx", "GenPurpF", "Rows", "Columns") Opts.Input.[Exclusion Link Sets] = {, , , , } Opts.Field.[Turn Attributes] = {, , , , } Opts.Field.[Vehicle Classes] = {1, 2, 3, 4, 5, 6} Opts.Field.[Fixed Toll Fields] = {"None", "None", "None", "None", "None", "None", "None", "None", "Opts.Field.[Icad Hethod] = "FF" Opts.Global.[Load Hethod] = "FF" Opts.Global.[Load Multiplier] = 1	1 MMA	2
<pre>Opts.Global.(N Conjugate) = 2 Opts.Global.Convergence = 0.0001 Opts.Global.Iterations = 100 Opts.Global.[Vumber of Classes] = 6 Opts.Global.[Class PCEs] = (1, 1, 1, 1, 1, 1) Opts.Global.[Class VOIs] = (1, 1, 1, 1, 1, 1) Opts.Global.[Class VOIs] = (1, 1, 1, 1, 1, 1) Opts.Global.[VDF DLL] = "C:\\Program Files\\TransCAD 6.0\\bpr.vdf" Opts.Global.[VDF Pefaults] = {, , 0.15, 4, 0}</pre>	Rename New Move Up Save Add to Model	Copy Delete Move Down Load Choose Macro
Opts.Output.[Flow Table] = "C:\\Documents and Settings\\smcatee\\My Documents\\Caliper\\TransCAD 6.0\\MMA_LinkFlow.bin" ret_value = RunMacro("TCB Run Procedure", "MMA", Opts, &Ret)		



Customized Interfaces

- Created with the GISDK scripting language
- Utilize Batch Mode to automate tasks
- Utilize customized code to streamline and customize model processes
- Makes running and analyzing scenarios easy and efficient



BTAM - SANBAG Planning Model Governments SANBAG

Scenarios Base 2008

Model Tupe

Stage

Working Togethe

Setup

C Region @ Sub-Region C Sketch

Simple Interface Advanced Interface

C Loop

C Feedback

Open Architecture

Allows for inclusion of any amount or type of data

Requires deliberate and careful definition of input data requirements

Almost any aggregate travel model algorithm that can be thought up can be implemented in TransCAD

m	Dataview1 - N	IFR_NETWORK	¢						x
-	ID	Length	Dir Street_Name	Local_Name	ShowStName Sho	owStName_Lov	ShowStName_Reg	Dir_12	1 🔺
	8373	0.47	0 COUNTY RD 15	GARFIELD AVE				0	
	8374	0.40	0					0	
	8375	0.86	0 SH-60	42ND ST				0	
	8379	0.50	0 COUNTY RD 21					0	
	8380	0.30	0						
	8381	0.52	O COUNTY RD 16	18TH ST				0	
	8383	0.09	0 COUNTY RD 17	TAFT AVE				0	
	8385	0.25	0	TYLER DR				0	
	8390	0.46	0					0	
	8392	0.70	0 COUNTY RD 17	SHIELDS ST				0	
	8395	0.51	0					0	
	8396	0.52	0 COUNTY RD 54	DOUGLAS RD				0	
	8397	0.19	O COUNTY RD 11					0	
	8398	0.48	0					0	
	8401	0.37	0 SH-1	TERRY LAKE RD				0	
	8403	0.37	0 US-287	COLLEGE AVE				0	
	8405	0.39	0 COUNTY RD 13					0	
	8407	0.57	0 COUNTY RD 54	DOUGLAS RD				0	-
									- F - 3



Compatible File Formats

- TransCAD can read and write data to/from many universally accepted file formats.
 - » GIS (Shapefile, Geodatabase)
 - » Spreadsheet
 - » Database
 - » Text
 - » HTML (with add-in)
 - » Traffic Software (with add-in)
 - » Others



GIS Applications

- Ise TransCAD model results in ArcGIS to create high quality maps.
- Ink TransCAD networks to GISbased analysis tools.





TransCAD Tips

File and Data Types

O Data Files actually contain information:

- » Tables (.bin, .DBF)
- » Geographic Files or Layers (.dbd, .shp)
- » Matrices (.mtx)



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File and Data Types

Some files do not contain information:

- » Dataviews (.dvw)
- » Maps (.map)
- » Matrix Views (.mvw)

These files refer to other file types that contain data
 Same concept as a project file (.mxd) in ArcMAP

Never use File → Save As → "Dataview (.dvw)" or "Map (.map)" to save a copy for modification!



File and Data Types

Geographic Files (.dbd) are GIS layers and can be edited and viewed.

- » We Use Line Layers as "roadway networks"
- Route Systems (.rts) contain transit information
 - » Route systems are linked to line layers
- Routable Network Files (.net, .tnw) are routable networks used internally by TransCAD.
 - » Routable network files must be created before running certain tasks.
 - » Separate networks for roadway and transit



Useful Features

- Saved Workspaces
- Undo and Redo
- Copy and Paste directly between TransCAD and other programs (e.g., Excel)
- The Display Manager
 - » Show it from Map \rightarrow Display Manager
- Multiple selection sets
- Many more...





New in TransCAD 6.0

- Read and write directly to ESRI Geodatabases
- Improved Mapping Features
 - » Label customization
 - » Transparency
- Under the Hood
 - » 64-bit architecture
 - » More multithreading
 - New procedures

 (e.g., drive egress to transit)



Example Model QuickStart: OCTAM

Installing a Model

- Setup Packages
 - » Require specific TransCAD version
 - » Include detailed instructions and tools
 - » Complete input datasets
 - » Often include partial output datasets
- Training Package
 - » Includes a sample OCTAM dataset
 - » OK to modify files we can always restore the originals

The model has already been installed on the training computers



Starting OCTAM: Interactive Tour

\odot Run from Tools \rightarrow Add-Ins \rightarrow OCTAM

 \rightarrow Or just Tools \rightarrow OCTAM after the first run

Dialog Box Tour

OCTAM in TransCAD - v3.3.0h2			2
Directory: C:\Models\OCTAM_TC\O Scenario Description: Model Steps	utput\"	Train1_2005\	
🔲 Stop after each step 🛛 🗍 Create report when dor	ne		🔲 Debug Mode
1 - Prepare Networks		4 - Mode Mod	iels
2 - Trip Generation		5 - Trip Assign	ment
3 - Trip Distribution		6 - Post Proce	ssing
	1	tilities	Dashboard >>
Roadway Transit Output		unces	
Add/Delete Network Year Edit Network		Select Zone Query	Match Counts
Refresh Network Defaults Select Query Too	lbox	TAZ Data	Quit
LabelUnder Update			

Scenario Tool	юх			×
Scena	rio List: Double	-click	to edit	
Base2005 Base2005_TI Base2005_TI Base2005_TI Base2005_TI Base2005_TI Base2005_TI Base2005_TI Base2005_TI Base2005_TI Tain1_2005	C5 C5-Calib C6 C5_g2 C5_RTC estFinal		Missing Missing Missing Missing Missing Missing Partial	J
Add	Import		Move Up	
Сору	Export		Move Dow	n
Delete				
C Scenario File				
New	Load	Sav	e As 🧧	ł



Using the Dashboard: Interactive Tour

- Click the Dashboard button
- Create a:
 - » Volume Map
 - Click on some links with the info (1) button to view data
 - » Transit Stops Map
 - Turn on the map legend ()
 - Click on some stops with the info (
) button to review the data
 - » TAZ Trip Generation
 - Turn on the map legend ()
 - Click on some stops with the info (
) button to review the data



Relevant Models

OCTAM

Originally based on the SCAG Model » Maintained separately » Kept up to date by OCTA » Independent network data » Independent model structure » Coordination with SCAG



RivTAM

Directly based on the SCAG Model
 » Draws directly on SCAG networks, zones, and data
 » Enhanced within Riverside County
 » Runs using a modified version of the SCAG model interface



SBTAM

Built with the SCAG Sub-Regional Modeling Tool

- » Draws directly on SCAG networks, zones, and data
- » Enhanced within San Bernardino County
- » Zone aggregation far from SB County
- » Runs using a specific version of the SCAG model interface



Mapping Basics

Visualizing Data



Working with Layers

- Start by opening a map <u>or</u> a layer
 - » Opening a layer will create a new map and add the layer
 - » Opening a map will load all saved layers, settings, etc.

 \odot Access layers with the layers dialog box (\rightleftharpoons)

Layers	X
Layers in Order of Display Sample Status	
OCTAM33_TAZ 🔼	Close
OCTAM_Nodes •	
OCTAM Links	<u>H</u> ide Layer
	Add Layer
	<u>D</u> rop Layer
	Move <u>U</u> p
	Move Do <u>w</u> n
Style Labels Autoscale <u>R</u> ename	Metadata
Geographic File C:\OCTAM_Training\Input\OCTAM33_TAZ.DB	D



Working with Layers The Layers Dialog (

	Layers		the second second second
	Layers in Order of Display Sample St OCTAM33_TAZ	atus	Hide/show a layer
	OCTAM_Nodes •	Hide Layer	
		<u>A</u> dd Layer <u>D</u> rop Layer	Add/Drop layers
		Move Up Move Do <u>w</u> n	
	Style Labels Autoscale Geographic File C:\0/CTAM_Training\Input	Metadata	Re-order layers
Change a layer style	Add/edit labels	Automatically show/hide layers as certain scales	



Working with Layers

Layers are drawn from TOP to BOTTOM





Display Manager

- Activate from Map \rightarrow Display Manager
- Quick access to layers, settings, etc.
 - » Right-click for more settings, including make working layer





Creating Maps

Create a new map by opening a Geographic File (*.dbd)

Add more layers if desired



- Choose the active layer
 - » Use the dropdown selector at the top of the screen: OCTAM_Links
 - (Or use the display manager) -
- Change the "default" styles for the layers
 - then Style... , or 🎲 , or use the display manager
- Hide or show layers
 - or the display manager



Working with dataviews

Open a dataview for any existing layer (

- \odot Open a standalone table with File \rightarrow Open
- Data can be edited directly in the dataview
 - » Be careful: Changes are saved as you go
- Create formula fields with ^{x×y}/_n
- Right-Click on a column header for more options
 Including a formula Fill



Working with dataviews

- Formula Fill vs. Formula Field
 - » Formula Fill adds new data and saves values in the table
 - » Formula *Fields* are updated when other values change, but are not stored in the data table
 - Formula fields are stored in a map, dataview (*.dvw), or workspace
- I. Enter a formula
- 2. Use the Field List to find field names
- 3. Name the formula field

Tip: nz([Field]) converts null values to zero values

Formula (Dataview: OCTAM	Links)	
nz(AB_LN_05) + nz(BA_LN_05)		OK
	(1)	Cancel
		<u>D</u> elete
		<u>C</u> lear
		⊻erify
		<u>N</u> ode Fields
- Formula Builder	Formula Fields	Save
Field List	TOT_LANES	Load
Operator List	Previous Formulas	
Function List		•
Values of BA_LN_05 💌		



Practice: Create a Total Lanes formula

- Start with the map from the last practice exercise
- Open the link layer dataview
- Create a new formula field namedTOT_LANES
 » nz(AB_LN_05) + nz(BA_LN_05)

- Try adding a new field called TOT_LANES2
 » Fill this field with the same formula
 - » What happens on freeway links if we exclude the nz() function?



Joining Data

Layers have an associated data table (

- Data can be joined (³) to other tables
 - » Roadway Network + Traffic Assignment results
 - » TAZ layer + Land Use Data
 - » Roadway Network + Lookup Table
 - » More...
- This is how traffic assignment results are viewed in TransCAD



Joining Data

Join 🔀
Settings Options
Create Joined View
Name OCTAM33_TAZ+ZonePABalanced 3
Joining from (left side of join)
Table OCTAM33_TAZ
Field TAZ
Examples 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
To (right side of join)
Table ZonePABalanced
Field ZONE
Examples 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
OK Cancel

- I. Select the Primary join table
 - » Be careful: Check the Field
- 2. Select the secondary join table
 - » Be careful: Check the Field
- 3. Create a name for the view, or use the default (do this last)

Tip:You can open a file from the join dialog box

To (right sid	le of join)
Table	File Open 💌
Field	File Open
Examples	

Dot Density Themes

Ot Density ()) Themes can be used to

- » Show land use or socioeconomic data
- » Display trip ends
- » Etc...



Dot Density Themes

The Settings Tab

ot Density Theme (Layer: OCTAM33_T 🔀
Settings Styles
Choose one or more fields
ZONE ZonePABalanced.County HBWD_P HBWD_A
I1HBWD_P I1HBWD_A I2HBWD_P I2HBWD_A I3HBWD_A HBWS_P HBWS_A I1HBWS_P
Filter
Dot Value Settings
• Map Wizard
C Manually at
OK Cancel Apply <u>R</u> emove

- I. Select a field (or fields) to use
- 2. Specify a scale, or let TransCAD specify one automatically



Dot Density Themes

The Settings Tab I. Select a symbol



2. Specify the legend text



Practice: Create a Production/Attraction Theme

Open the TAZ layer in TransCAD

» Input\OCTAM34_TAZ.dbd

Join the balanced PA table to the TAZ layer

- » Output\gen\ZonePABalanced.bin
- » Reminder: Use the correct join fields!
- Create a dot-density theme
 - » Use different colors for P and A
 - » Try using house icons for productions and factory or office icons for attractions
 - » Clean up the legend



Color and Pattern Themes

Set feature colors and styles based on attributes

- » Color Themes () are often used to display facility type on a roadway network
- » Pattern Themes (Map \rightarrow Pattern Theme...) is sometimes used to display number of lanes on a roadway network



Color and Pattern Themes

The Settings Tab

Color Theme (Layer: OCTAM_Links)	\mathbf{X}
Settings Styles	
General	
Field FT_05	
Method List of Values	2
# Classes 15 - 2 Recalcula	ite
Options Ignore values below Std. Dev. per class Break at Treat zeros as missing values Round off the values in each class Include counts in legend	
Cancel Apply <u>R</u> emove Custo	mize

- I. Choose a field to represent
- 2. Choose a method to create categories and number of classes
- 3. Use the Load and Save buttons to store and recall settings
 - » This is a huge time-saver!



Color and Pattern Themes

The Styles Tab

Color Theme (Layer: OCTAM_Links)	
Settings Styles	
Choose a class	
🔄 — Other 🔄 Style 1	
- 1 - Freeway	
- 2 · Major Six Lane	
4 - Secondary Four Lane	
6 - Commuter Undivided	
7 - Smart Street	
Legend Text	
1 · Freeway	
<pre></pre>	3
From 🔽 to 🔍 via	
	4
OK Cancel Apply <u>R</u> emove Custo <u>m</u> ize	

- I. Choose a style for each class
- 2. Select a legend text for each class
- 3. Choose from pre-defined color settings if desired



Practice: Re-create a facility type theme

Open the OCTAM Input roadway network

- » Input/oct40hwyrail.dbd
- O Use Save Settings to save the current theme
- Remove the current theme
- Re-create the theme manually <u>> Use</u> the FT styles shown here
- Now Re-load the saved settings
 - » Note: You may need to zoom out to the entire region for this to work correctly.





Labels () can be used to show things including:

- » Traffic Volumes
- » Number of Lanes
- » Centroid Numbers
- » Socioeconomic/Land Use Data

Labels can be set differently for different selection sets



The Labels Tab

Labels (Layer: OCTAM_Links)			
Labels Overlaps Background Callou	uts		
General			
Field AB LN 057 BA LN 051	Save		
Position Centered above	Load		
Rotation Along line features	5		
🔽 Smart Alignment 🔲 Str	retch 🔲 Skip Partial Labels		
Allow Duplicates Spacin	ng 0 Inches		
	aracters		
@MS Mincho Si:	ize 10 📑		
Agency FB Algerian <u>C</u> ol			
Arial Arial Form	nat Default		
Arial Black Arial CE Line Heig	ght 100 🕂 %		
Arial CYR Arial Greek	☑ <u>B</u> old Italic		
Arial Narrow Arial Rounded MT Bold 🗸 mple Sho	ows what Label Text will Lo		
OK Cancel	Apply Remove		

- I. Select the field to use for labels
- 2. Set label placement options
 - » Note the "Allow Duplicates" checkbox
- 3. Set the label style options



The Overlaps Tab

Labels (Layer: OCTAM_Links)	
Labels Overlaps Background Callouts	
Overlaps	
Alt. Field None	
Layer Priority 7 (Low)	
Within the layer based on Higher	
values of Length	
Autoscale	
Current Scale 1:43,515 Clear	
Largest 📃	
Smallest 🗨	
OK Cancel Apply	Remove

- Overlapping labels can be allowed if desired
- Different layers can have different priorities
- Autoscale can turn labels on and off automatically



The Background Tab

Labels (Layer: O	CTAM_Link	(\$)	X
Labels Overlaps	Background	Callouts	
Type C None C Shadow		Interstate	
C Halo C Frames		Interstate	
Shields		Interstate	
		Interstate	
	\bigcirc	Interstate	
		Business Loop/Spur	
			~
ОК	Cancel	Apply	Remove

Shadows, halos, frames, or shields can be added to labels to create better looking and more informative maps



The Callouts Tab

Labels (Layer	: OCTAM_Li	nks)		
Labels Overla	aps Backgrou	nd Callo	uts	
			<u>S</u> tyle <u>W</u> idth Hairlin <u>C</u> olor	
ОК	Cancel		Apply	Remove

Set the default callout style to use when labels are manually repositioned



Scaled Symbol Themes

- Scaled Symbol Themes () are often used to:
 - » Display traffic volumes
 - » Display results of a select link or node analysis





Scaled Symbol Themes

The Settings Tab

Scaled-Symbol Theme (Layer: OCT/	\M_L 🔀
Settings Styles 1	
Choose a field 🔽 Dual Fields	
AB_LN_057BA_LN_05	Save
	Load
AB_LN_CNST/BA_LN_CNST2	
ABFOP_CNST / BAFOP_CNST	
AB LN MPAH / BA LN MPAH	
ABFOP_MPAH / BAFOP_MPAH	
Filter	
- Sumbol Sizes	
C Map) (card C Manual	
	$\bigcirc \square$
Low Value 0 Size	3
High Value 9 Size 9	
Cancel Applu	Bemove

- Show directional fields only, or all fields
- Select a field to use
- Specify a scale, or letTransCAD specify one automatically



Practice: Display number of lanes

Open the OCTAM Input roadway network

- » Input/oct40hwyrail.dbd
- Add number of lanes labels to the map
 - » Label with AB_LN_10 / BA_LN_10
 - Hint: Pick the AB field and TransCAD will detect the BA field for you
- Create a number of lanes scaled symbol theme



Selection Sets

- Add additional formatting capability
- Useful for analysis and data processing
- Use the Selection Set Toolbox \bigcirc
 - » Select items with a query: 💃
 - » Select items by pointing: 🌇 🍗 🍗
 - » View the Selection Settings:



- One map can contain many selection sets \bigcirc
 - » Show or hide selected items
 - » Format selected items with different colors, styles, and labels





Practice: Suppress centroid connector info

- Start with the map from the last practice exercise
- Select all centroid connectors
 - » Selection \rightarrow Select by condition (\mathbb{T}_{1}) then FT_10 = 11
 - » **OR:** Selection \rightarrow Select Centroids
- Set centroid connectors to have a line width of 0.5 pixels
 <u>> This will override the scaled symbol theme</u>
- Set centroid connectors to have a "Null" label
 » Use a formula field, label with the formula "null"
- Then, Hide centroid connectors alltogether



Extra

Credit

This challenge covers the most common mapping tools available in TransCAD and demonstrates creation of a commonly used map

All of these steps can be completed using the information presented so far, along with details provided in the slides that follow



Open the roadway network file

- » Input\OCTAMNetwork.bin
- Join the assignment results using the default join settings

» Output\asn\FlowDAY.bin

Join		ิล
Settings Op	itions	
- Create Join	ned View	
<u>N</u> ame	OCTAM_Links+FlowDay	
Joining from	n (left side of join)	
Table	OCTAM_Links	
Field	ID 💌	
Examples	5019, 5106, 5113, 5121, 5142, 5156, 38646, 5289	
To (right sid	de of join)	
Table	FlowDay	
Field	ID1	
Examples	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
	OK Cancel	



- Remove the existing color theme
- Set the "Default" link style to a
 3-pixel line ³
- Add a color theme to display Level of Service (LOS)
- Set the colors as shown

Color Theme (Layer: OCTAM_Links)	
Settings Styles	
Choose a class	
 A (5645) B (1420) C (1429) D (1395) E (1298) F (7818) 	<u>C</u> opy Pattern Reset Te <u>x</u> t
n/a (12860)	
Legend Text n/a (12860)	
Color Sets << Previous	rt and End
OK Cancel Apply <u>R</u> emo	ove Custo <u>m</u> ize



- Use a bandwidth theme to display traffic volume (TOT_Flow)
- The Map wizard will automatically choose bandwidth sizes,
- Symbol Sizes can be entered manually to improve readability

Scaled-Symbol	Theme	(Layer:	OCTA	«_L 🔀
Settings				
Choose a field	E Du	ual Fields		
AB_Flow BA_Flow TOT_Flow L_LOS_VC L_LOS_NUM LOS_VC LOS_NUM COM_BASEVOL AB_COM_Flow PA_COM_Flow				Save
Filter Symbol Sizes • Map Wizard Low Value High Value	C	<u>M</u> anual Size Size		
OK C	Cancel	Appl	y	<u>R</u> emove



Our Use a formula label (to show traffic volumes in thousands)





Create a Selection set (^f) named "CC" » FT_10 = 11

Change selection set settings:

» Selection \rightarrow Settings or 🏪



---- Or ----

» Make the centroid connectors invisible



- Experiment with the different available tools and customize the map
- Our Use the information tool () to view the data that is contained on the links and nodes
 - » This is similar to the identify tool in ArcMAP



- Show centroids and label them with the TAZ number
 - » Start by showing the nodes layer from the Map Layers () dialog box or the Display Manager
 - » Select centroid nodes
 - Selection \rightarrow Select by condition (\mathbb{T}_{1}) then ZONE > 0
 - **OR:** Selection \rightarrow Select Centroids
 - » Add a label to the centroid selection set
 - » Hide non-centroid nodes (from Selection \rightarrow Settings)



Save your finished map



