

The logo graphic consists of three overlapping parallelogram shapes. The top one is green, the middle one is blue, and the bottom one is purple. They are arranged in a way that they appear to be part of a larger, abstract shape.

CAMBRIDGE
SYSTEMATICS

Think  Forward

TransCAD and the SCAG Model

presented to

Caltrans District 7

presented by

Cambridge Systematics, Inc.

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Agenda

- TransCAD Overview and Navigation
- Formatting and Viewing Data
- Data Tables and Joining Data
- Printing Maps using Layouts
- Looking at SCAG Highway Assignment
- Roadway Network Editing
- Running the SCAG Model
- Advanced Topics?

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TransCAD Software Overview

- Transportation data management and analysis
- **GIS based** transportation planning analysis
- TransCAD:
 - › Let's you store, retrieve, analyze, and visualize geographic data in new and useful ways
 - › Has tools to apply sophisticated transportation, operations research, and statistical models.
 - › GISDK (development computer programming language)
- Version & build
 - › Version I have open: Version 6.0 r2 Build 9080 32-bit
 - › 64-bit vs. 32-bit

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TransCAD User Interface

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Tools

Most used

- Zoom in
- Pan
- Prev. scale
- Info
- pointer
- Measure
- Intersection Diagram
- Zoom out
- Magnifier
- Initial scale
- Multi-layer info
- Custom Labels
- Measure size

Selection toolbox

These can be docked at the top of the window!

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Tools

Drawing toolbox*

GISDK toolbox

* For objects on the map – not for geographic editing

Usually docked at the bottom of the window

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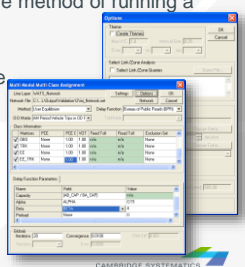
TransCAD Software Overview

- 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

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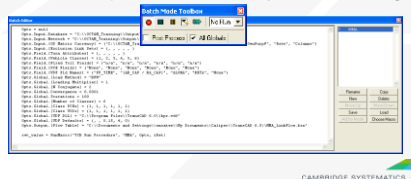
Built In Interface

- Provides an interactive method of running a Travel Model
- Very flexible, but can be a bit tedious to use
- Is enhanced through use of customized "Add-Ins"



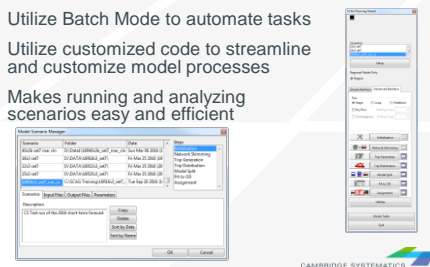
Batch Mode

- 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 settings)



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



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

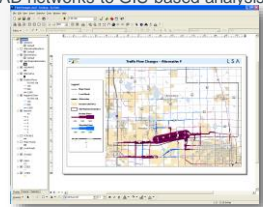
Run	Time	Cost	VMT	VMT/Link
1	1:00:00	1000000	1000000	1000000
2	1:00:00	1000000	1000000	1000000
3	1:00:00	1000000	1000000	1000000
4	1:00:00	1000000	1000000	1000000
5	1:00:00	1000000	1000000	1000000
6	1:00:00	1000000	1000000	1000000
7	1:00:00	1000000	1000000	1000000
8	1:00:00	1000000	1000000	1000000
9	1:00:00	1000000	1000000	1000000
10	1:00:00	1000000	1000000	1000000

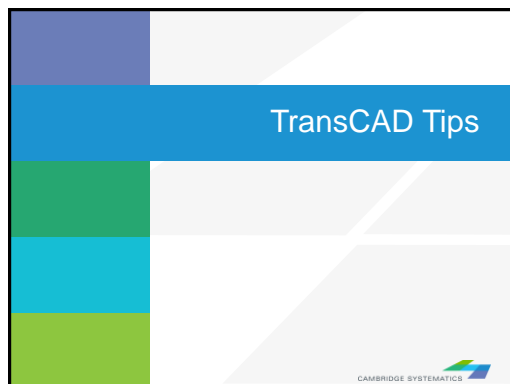
Compatible File Formats

- 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

- Use TransCAD model results in ArcGIS to create high quality maps.
- Link TransCAD networks to GIS-based analysis tools.





File and Data Types

- Data Files actually contain information:
 - » Tables (.bin, .DBF)
 - » Geographic Files or Layers (.dbf, .shp)
 - » Matrices (.mtx)

An illustration of three overlapping document icons representing data files: .bin .DBF, .dpd .shp, and .mtx.

File and Data Types

- Some files do not contain information:
 - » Dataviews (.dvw)
 - » Maps (.map) and workspaces (.wrk)
 - » 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 (.dbf) 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 → Display Manager
- Multiple selection sets
- Many more...

A screenshot of the TransCAD software interface showing a map with various colored lines (red, green, blue) and a display manager panel on the right side.

New in TransCAD 6.0, 7.0

- 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)
- TransCAD 7
 - » Even More multithreading
 - » Improved transit management
 - » Improved elevation data
 - » Pivot tables and charts

Map Basics: Visualizing

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Working with Layers

- Start by opening a map or a geographic (dbf) layer file
 - » Opening a layer will create a new map and add the layer
 - » Opening a map will load all saved layers, settings, etc.
- Access layers with the layers dialog box (☰)

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Working with Layers

- The Layers Dialog (☰)

- Change a layer style
- Add/edit labels
- Automatically show/hide layers as certain scales
- Hide/show a layer
- Add/Drop layers
- Re-order layers

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Working with Layers

- Layers are drawn from **TOP to BOTTOM**

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Display Manager

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


- Hide/show a layer
- Add/edit labels
- Change a layer style
- Node layer is **NOT** active
- Bold text:** links layer is active

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Color Theme


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Creating Maps

- Create a new map by opening a Geographic File (*.dbd)
- Add more layers if desired
 - » then **Add Layer**
- Choose the active layer
 - » Use the dropdown selector
 - » 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

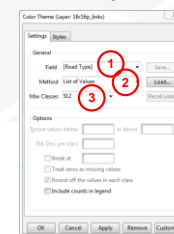


Color and Pattern Themes

- Set feature colors and styles based on attributes
 - » Color Themes () are often used to display facility type on a roadway network
 - » Pattern Themes (Map → Pattern Theme...) is sometimes used to display number of lanes on a roadway network

Color and Pattern Themes

The Settings Tab

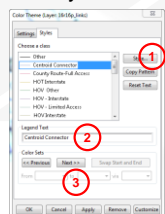


1. Choose a field to represent
2. Choose a method to create categories and number of classes

* Use the Load and Save buttons to store and recall settings
 » *This is a huge time-saver!*

Color and Pattern Themes

The Styles Tab



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

Functional Class

Primary Facility Type	Secondary Facility Type	Primary Facility Type	Secondary Facility Type
1 Freeways	10 Freeway	7 Minor Collector	70 Undivided
2 HOV	20 HOV 2		71 Divided
	21 HOV 3+		72 Continuous Left Turn
	22 HOV - HOV Connector		73 Posted Speed 25
3 Expressway / Parkway	30 Undivided		74 Posted Speed 15
	31 Divided, Interrupted	8 Ramps	80 Freeway to Freeway Connector
	32 Divided, Uninterrupted		81 Freeway to Arterial
4 Principal Arterial	40 Undivided		82 Arterial to Freeway
	41 Divided		83 Ramp Distributor
	42 Continuous Left Turn		84 Ramp from Arterial to HOV
5 Minor Arterial	50 Undivided		85 Ramp from HOV to Arterial
	51 Divided		86 Collector distributor
	52 Continuous Left Turn		87 Shared HOV Ramps to MF
6 Major Collector	60 Undivided		88 Truck only
	61 Divided	9 Tracks	90 Truck only
	62 Continuous Left Turn	100 Central Collector - Tier 1	
		200 Central Collector - Tier 2	

Source: SCAG Model Documentation, Appendix A

Functional Class


- Two Digit FT Codes
 - » Contained in AB_Facility_Type and BA_Facility_Type
 - » Difficult to use for map editing setup (too many details)
- One Digit FT Codes
 - » Not stored on the network
 - » Can be computed

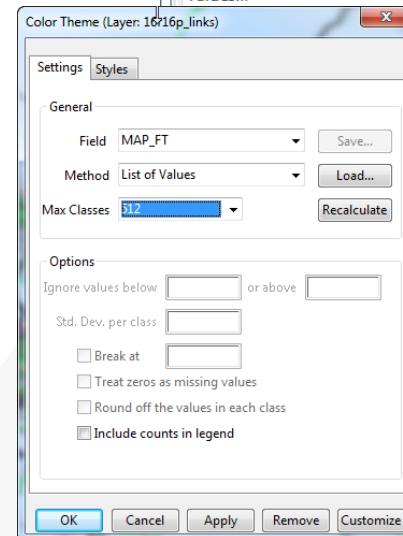
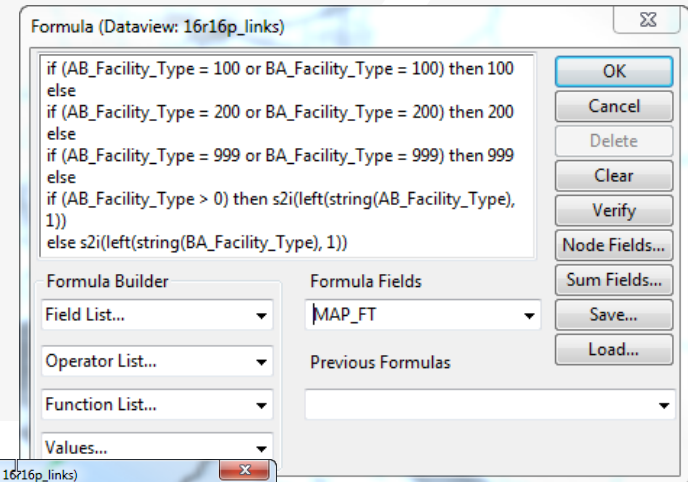
TransCAD Formulas.txt

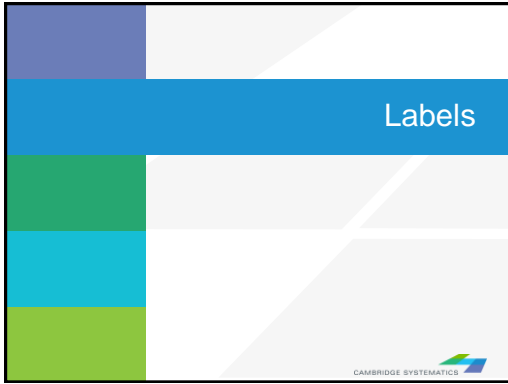
```
MAP_FT:
...
if (AB_Facility_Type = 100 or BA_Facility_Type = 100) then 100 else
if (AB_Facility_Type = 200 or BA_Facility_Type = 200) then 200 else
if (AB_Facility_Type = 99 or BA_Facility_Type = 99) then 99 else
else 32(Left(ToString(BA_Facility_Type), 1))
```

Note: We will discuss formulas in more detail in a later section

Practice 1: Create a color theme for line layer using IFC field

1. Open the SCAG Network File (16R16pl_links.dbd)
 - ✓ File→Open, then in the file type dropdown next to 'File name:' select Geographic File(*.cdf,*.dbd) option
 - ✓ Browse to the location/folder where the geographic file is located and select the 'abmload.dbd' and click 'Open' button
2. Add the MAP_FT Formula Field
 - ✓ Dativew→Formula Fields
 - ✓ Open TransCAD Formuals.txt in notepad, then copy the MAP_FT formula
 - ✓ Paste the formula and name the formula MAP_FT
 - ✓ Click OK
3. On the top ribbon, click  it is called 'color theme map wizard'
4. It opens up a dialog box with two tabs. In the first tab 'Settings' tab:
 - ✓ Select the MAP_FT from the 'Field' drop down options
 - ✓ Select the 'List of Values' from the 'Method' drop down options
 - ✓ Max. Classes: Use the default value (512)
5. Go to the 'Styles' tab
 - ✓ Observe the default styles
 - ✓ Optional: Set a preferred style for each facility type (we will use a shortcut)
6. Go back to the Settings tab, click the Load button.
 - ✓ Choose From Settings File
 - ✓ Browse to and select SCAG Training\Settings.stg
 - ✓ Choose MAP_FT and click OK
 - ✓ Click OK again to complete the color theme dialog box
7. Save the settings (optional, method 1) **Skip this step in training.**
 - ✓ Tools → Geographic Utilities → Geographic file
 - ✓ Click Save Settings
1. Save the settings (optional, method 2) **Use this method in training.**
 - ✓ File –Save As
 - ✓ Save a Map file that you can open later with the settings applied





Automatic Labels

- Labels () can be used to show things including:
 - » Traffic Volumes
 - » Number of Lanes
 - » Centroid Numbers
 - » SED/Land Use Data
- Labels can be set differently for different selection sets

Automatic Labels

The Labels Tab

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

Automatic Labels

The Overlaps Tab

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

Automatic Labels

The Background Tab

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

Automatic Labels



The Callouts Tab

- Set the default callout style to use when labels are manually re-positioned

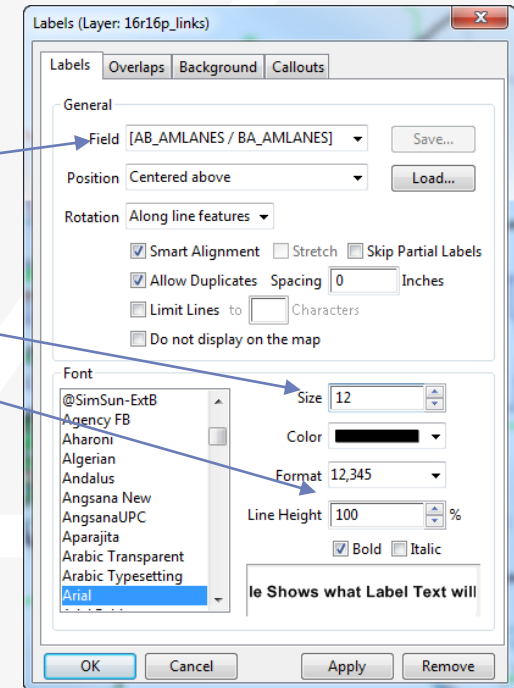
Practice 2: Add number of lanes labels

TIP

Right click on the gray area of the layout and print to pdf.


1. Start with the results from Practice 1
 - ✓ Open the saved map if needed
2. Use the and zoom-in tool () to zoom in to the area of interest
3. On the top ribbon, click the labels icon ()
 - ✓ Select the [AB_AMLANES/BA_AMLANES] field
 - ✓ Change the size and color to match your preference
 - ✓ Change the format to have numbers by comma separated
 - ✓ Click 'OK' button

In training, save the map for future use






Create Scaled Symbol Theme

(also known as bandwidth map)



Scaled Symbol Themes

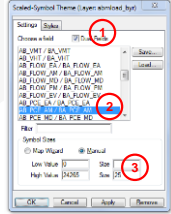

- Scaled Symbol Themes () are often used to:
 - » Display traffic volumes
 - » Display results of a select link or node analysis

Scaled Symbol Themes

The Settings Tab

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

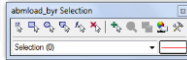




Create Selection Sets





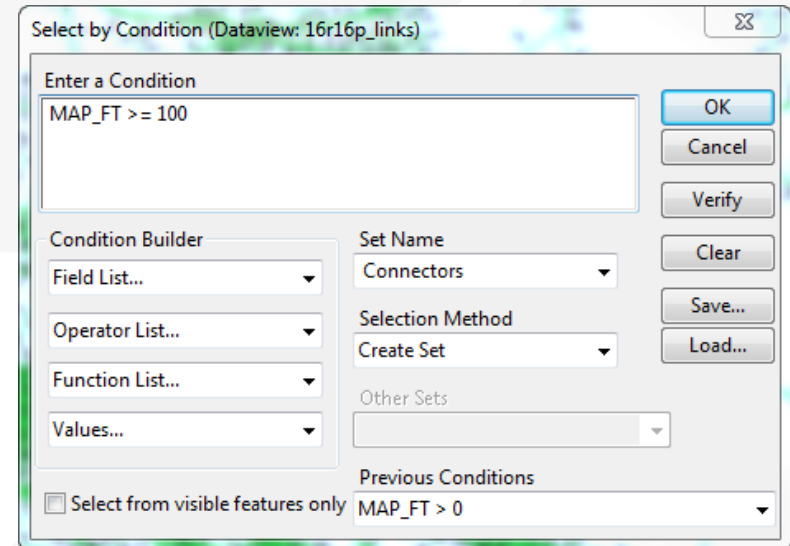
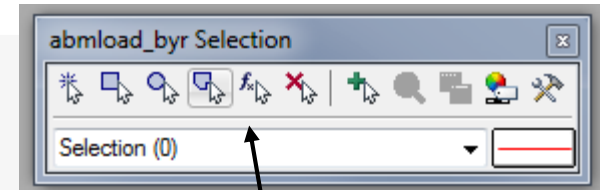
Selection Sets

- Add additional formatting capability
- Useful for analysis and data processing
- Use the Selection Set Toolbox
 - » Select items with a query
 - » Select items by pointing
 - » View the Selection Settings
- One map can contain many selection sets
 - » Show or hide selected items
 - » Format selected items with different colors, styles, and labels

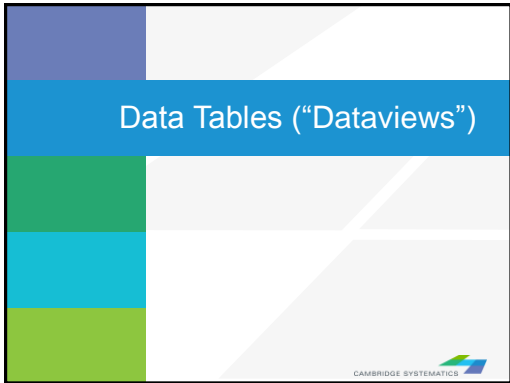



Practice 3: Create selection sets and color and label them

- Start with the results from Practice 2
- ✓ Open the saved map if needed
1. Goto Tools and select 'Selection' or hit F9
 - ✓ This will show the selection toolbox shown to the right
 - ✓ Click select by condition () to open the query builder
 - ✓ Type in condition: MAP_FT >= 100
 - ✓ Type the Set Name (Connectors)
 2. Change the centroid connector lane labels
 - ✓ Open selection settings (Selection → Settings or )
 - ✓ Choose Connectors, then click Style
 - ✓ Set the color to "default gray) – this allows the color theme to override
 - ✓ Click Labels
 - ✓ Set the label to a smaller font size and different color
 - ✓ Close the selection settings
- ✓ **TIP:** You can make other changes to multiple different selection sets, or can hide some features altogether!



In training, save the map for future use



Working with dataviews

- Open a dataview for any existing layer ()
- Open a standalone table with File → Open
- Add/Remove fields with Dataview → Modify Table
 - » (or)
 - » Be careful: Changes are permanent once you click "OK"
- Data can be edited directly in the dataview
 - » Be careful: Changes are saved as you go
- Create formula fields with
- Right-Click on a column header for more options
 - » Including a formula Fill

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Working with Dataviews

- **Formula Field vs. Add Field & Formula Fill**
 - » 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 (*.wrk)

1. 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


The screenshot shows the "Formula" dialog box with the following annotations:


- 1: A red circle around the "Formula" text in the title bar.
- 2: A red circle around the "Field List" dropdown menu.
- 3: A red circle around the "Formula Fields" dropdown menu.

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Practice 4: Add total number of lanes in a NEW FIELD

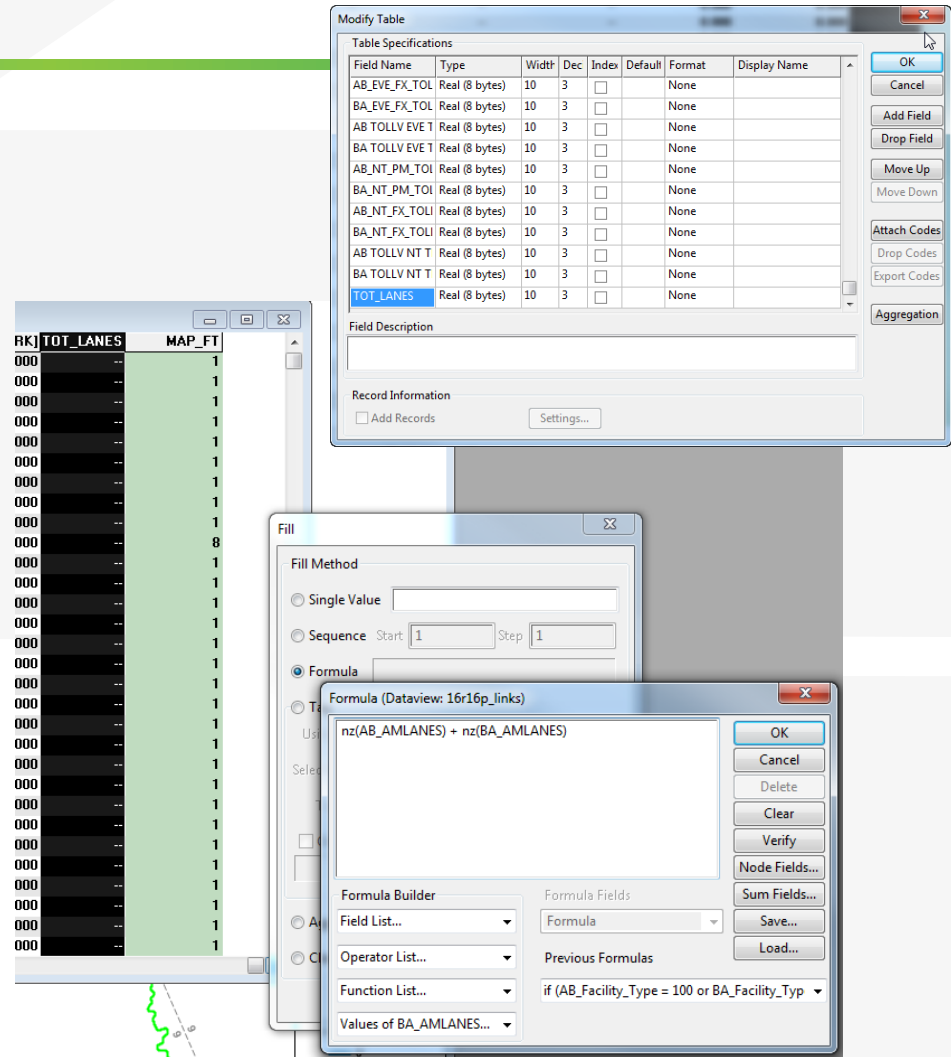
- Start with the results from Practice 3

 - Open the saved map if needed
- On the top ribbon, click  it will open the links layer data view table

Use Data View → Modify Table or click 

 - Click 'Add Field'
 - Name the field "TOT_LANES"
 - You can move the field position using Move Up and Move Down buttons to the right
 - Click 'OK'
- Go to 'Data view' window

 - Right click the top part of the 'TOT_LANES' field
 - Select 'Fill'
 - Select the 'Formula' in the fill method options
 - Type: `nz(AB_AMLANES) + nz(BA_BALANES)`
 - Alternatively you can use the formula builder
 - Click 'OK' button.
 - This fills in two-way number of lanes



The screenshot shows the 'Modify Table' dialog box with the following table specifications:

Field Name	Type	Width	Dec	Index	Default	Format	Display Name
AB_EVE_FX_TOL	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
BA_EVE_FX_TOL	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
AB_TOLLV EVE T	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
BA_TOLLV EVE T	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
AB_NT_PM_TOI	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
BA_NT_PM_TOI	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
AB_NT_FX_TOI	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
BA_NT_FX_TOI	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
AB_TOLLV NT T	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
BA_TOLLV NT T	Real (8 bytes)	10	3	<input type="checkbox"/>		None	
TOT_LANES	Real (8 bytes)	10	3	<input type="checkbox"/>		None	

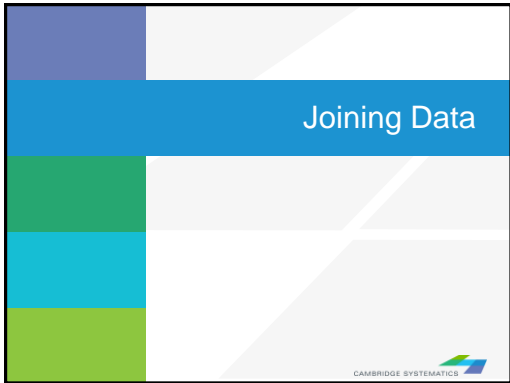
The data view table shows the following columns: RK, TOT_LANES, and MAP_FT. The 'TOT_LANES' column is highlighted in green and contains values ranging from 1 to 8.

The 'Fill' dialog box shows the 'Formula' method selected. The formula entered is: `nz(AB_AMLANES) + nz(BA_AMLANES)`.

The 'Formula (Dataview: 16r16p_links)' dialog box shows the formula builder with the following fields:

- Field List...: Formula
- Operator List...: +
- Function List...: nz
- Values of BA_AMLANES...: if (AB_Facility_Type = 100 or BA_Facility_Typ

Bonus: Try this example using a formula field instead!



Joining Data

- Layers have an associated data table ()
- Data can be joined () 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

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Joining Data

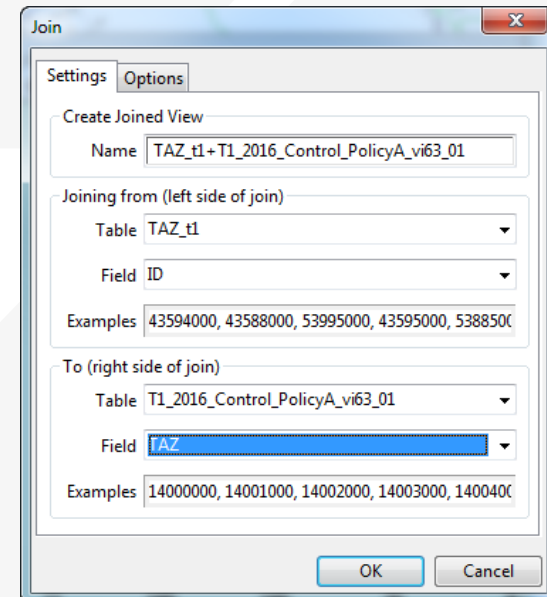
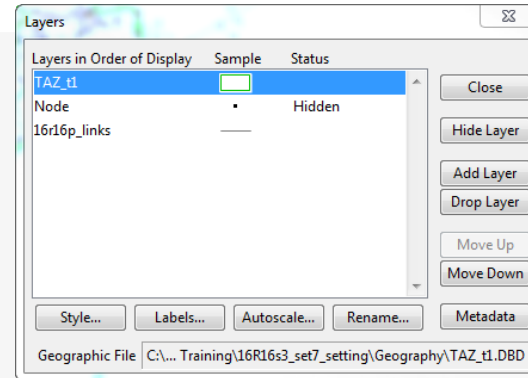
1. Select the Primary join table
 - » Be careful: Check the Field
2. Select the secondary join table
 - » Be careful: Check the Field
3. Create a name for the view, or use the default (do this last)

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

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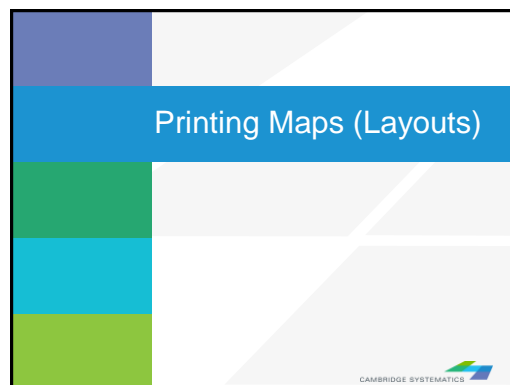
Practice 5: Join the TAZ data to the TAZ layer (Tier 1)

1. Start with the results from Practice 4
 - ✓ Open the saved map if needed
2. Add the TAZ layer to the map
 - ✓ Open the Layers dialog ()
 - ✓ Click Add Layer
 - ✓ Browse to:
16R16s3_set7_setting\Geography\TAZ_t1.dbd
 - ✓ Move the TAZs to be drawn first (top of the list)
 - ✓ Click 'Close'
3. Open the TAZ Data Table
 - ✓ File → Open
 - ✓ File Type Comma- or Tab-delimited Text
 - ✓ Browse to
**16R16s3_set7_setting\SED\Inputs\TAZ_t1.dbd\
T1_2016_Control_PolicyA_vi63_013116.csv**
 - ✓ Note that this is opened as read-only (all cells are green)
4. Create a join from Dataview → join or 
 - ✓ Set the left side of the join to TAZ_t1, field 'ID'
 - ✓ Set the right side of the join to T1_2016_Control_PolicyA_vi63_01
 - ✓ Set the right side join field to TAZ ***NOT TAZPREV**
 - ✓ Click 'OK', then use "info" to review the data
 - ✓ **Warning: Do NOT close the joined view!**



Bonus: Create a shading theme with darker colors for more households. Try again for employment











Layouts

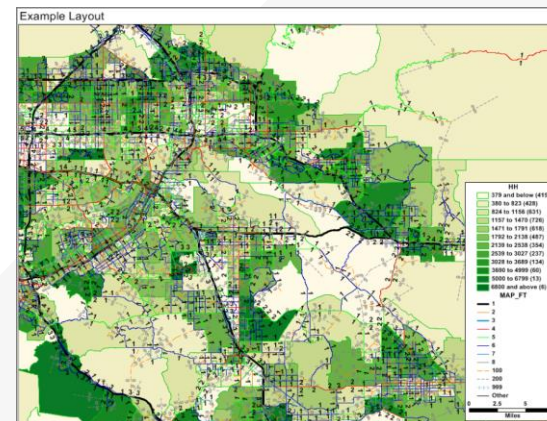
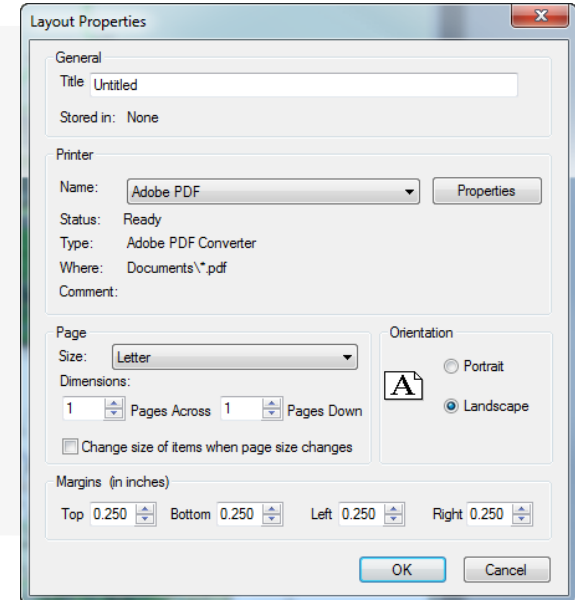
- Allow users to create a page to be printed
 - » Set paper size
 - » Set a specific printer **PDF writers work best!**
- Created from File → New
- Print maps, drawing items, tables, and insets
- Add titles, legends, etc.

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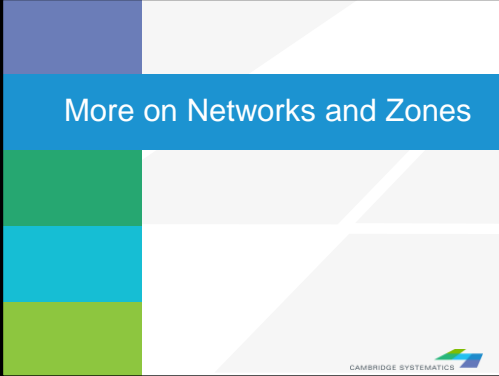


Practice 6: Create a Layout with your map

1. Start with the results from Practice 5
 - ✓ Open the saved map if needed
2. Create a new layout using File → New or 
 - ✓ Check the page settings with File → Properties or 
 - ✓ Select a printer and page size
 - ✓ Set to landscape
 - ✓ **Important:** Un-check Change size of items when page size changes
3. Add your map to the layout using 
 - ✓ Draw a box to place the map
 - ✓ Select Map, check 'Use actual point sizes'
 - ✓ Optionally un-check 'Keep map's aspect ratio'
 - ✓ Click 'OK'
4. Position and edit the legend
 - ✓ Use the pointer tool ()
 - ✓ Drag the legend to a good location
 - ✓ Double-click to edit legend text and contents
5. Add a legend title
 - ✓ Use the 'Freehand Text' tool (), usually at the bottom of the window
 - ✓ Drag a box, then type a title
 - ✓ Use the pointer to reposition, double-clicking to edit



More on Networks and Zones



CAMBRIDGE SYSTEMATICS

User Variables

- Creating your own variables
 - » Additional fields can be added to links & nodes layers
 - » Field names can contain spaces and numbers, and do not have a practical limit to the number of characters
- » HOWEVER...

CAMBRIDGE SYSTEMATICS


User Variables

- Creating your own variables
 - » It is preferable to:
 - Limit field names to 10 characters
 - Avoid using spaces
 - Avoid starting a field name with a number
 - » If these guidelines are followed, compatibility with other GIS programs will be improved
 - Field names that do not follow these guidelines will have truncated or confusing names when exported to a shapefile

CAMBRIDGE SYSTEMATICS

Centroids

- Centroids are special nodes that are linked to socioeconomic data
 - » SCAG's Model has three tiers of TAZs
 - Tier 1: Least amount of detail
 - Tier 2: More detail
 - Tier 3: Used for subarea models.
 - » TAZ numbers match the TAZ layer, data tables, and matrices
 - **Sometimes, files use sequential TAZ numbers instead!**



CAMBRIDGE SYSTEMATICS

Centroids

- Nodes are identified as centroids using the following rules:

Field Name	Contents
Tier1TAZ	User friendly nested TAZ ID numbers (sequenced by county, type, etc)
Tier2TAZ	
ZoneType_Tier1	Internal, External, Airport, or Seaport
ZoneType_Tier2	
Internal_sequence_id_T1	TAZ numbers used internally by TransCAD – but important to model users
Internal_sequence_id_T2	

CAMBRIDGE SYSTEMATICS

Tiered TAZ Structure

- Tier 1 Zones
4,192
- » Used in traffic assignment
- » Results in 17.5 **million** cells per matrix

- Tier 2 Zones
11,350
- » Used in trip generation, distribution, and mode choice
- » Results in 128.9 **million** cells per matrix

Fun with Math:
Why these models take so long

$\frac{4,192}{11,350} = 2.7$	$\frac{17.5 \text{ m}}{128.9 \text{ m}} = 7.3$
$2.7^2 = 7.3$	

CAMBRIDGE SYSTEMATICS

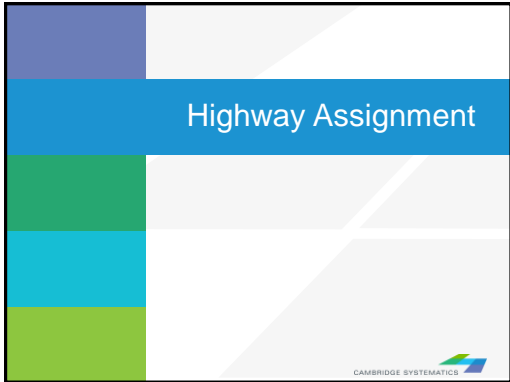


Learned by Example

- Creating maps
- Adding layers
- Setting layer styles, labels, and themes
- Working with data tables
- Joining Views
- Creating layouts for printing

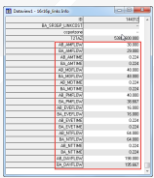
Insight into the SCAG model

- Saw the SCAG network
 - » Facility Type
 - » Lanes
- Saw the SCAG TAZ layer and data table
 - » Various input SED values
 - » Saw how to join to TAZs
 - » Note: TAZ vs. SEQ (sequential TAZs)



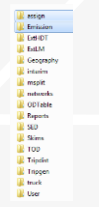
Assignment Results

- Basic Volumes
 - » Located on the **Loaded Network**
 - » Assign\Output\scag_network_loaded.dbd
- Volume and Travel Time for:
 - » Each Period (AM, MD, PM, NT, EVE)
 - » Total daily



Assignment Results

- Detailed Results in a separate table
 - » Join to the network using ID & ID1
 - » By time period or daily
 - » In the assign\Outputs folder
- Processed version in 'emission'
 - » Adjusted as part of SCAG's air quality modeling process
 - » Can be used if desired, but **be consistent within a project!**



Assignment Results

➤ Detailed Results include:

» Basics:

- Total Flow
- Flow by class (e.g., drive alone, shared ride, truck)
- Travel time and speed (congested time by period)


» Extras / Statistics:

- VMT (called V_Dist_T)
- VHT
- Volume to Capacity Ratio ("VOC")
- PCE Values

» Select Link / Zone Results


- Only present if mode was run with assign\inputs>SelectLink.qry

Practice 7: Review Assignment Results

1. Open the output roadway network
 - ✓ Use File → Open
 - ✓ Browse to Assign\Outputs\scag_network_loaded.bin
 - ✓ Review the build-in assignment results
2. Open the detailed assignment results
 - ✓ Use File → Open
 - ✓ Browse to Assign\Outputs\day_flow.bin
3. Create the join from Dataview → Join or 
 - ✓ Left side: link layer and 'ID'
 - ✓ Right side: day_flow and 'ID1'
 - ✓ Click 'OK'
 - ✓ Remember: Do not close the joined view.
4. Use the info tool to review the results

Challenge: Apply what you've learned

5. Label the links with the % share of vehicles that are "Drive Alone"
(Hint: create a formula field)

6. Try creating a bandwidth (scaled symbol) theme showing directional volume
(hint: Use )

Roadway Network Editing

CAMBRIDGE SYSTEMATICS

Network Editing

- Warning: Make a backup copy first!
 - » There is an "Undo" function in TransCAD
 - » Edits are made directly to the network file: You can't close without saving to discard changes
 - » Network files sometimes become corrupt

The Undo function in TransCAD 5+ makes network editing less risky

CAMBRIDGE SYSTEMATICS

Network Editing

- Backing up the Roadway Network
- **Method 1 (recommended):**
 - » Open the network in TransCAD
 - » Use Tools → Geographic Utilities → Geographic File
 - » Click **Archive** to save in a zip file
- **Method 2 (advanced):**
 - » Close all files in TransCAD
 - » Create a zip file with the line layer and route system files
 - » Make sure to get all related files

CAMBRIDGE SYSTEMATICS

Network Editing

- Once you have made a backup, you can:
 - » Edit attributes of existing links
 - » Change data for a specific year or for multiple years and alternatives
 - » Add new links, delete existing links, or realign existing links
 - » Add data for a year not yet included in the network

CAMBRIDGE SYSTEMATICS

Network Editing

- Edit attributes of existing links
 - » Display settings can assist with editing
- Additional labels and/or themes can be useful
 - » Label # of lanes or other values
 - » Show Topology () to see AB vs. BA

CAMBRIDGE SYSTEMATICS

Network Topology

- Show topology to identify AB and BA directions

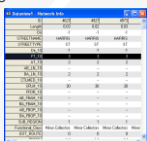

AB = West to East
BA = East to West

AB = East to West
BA = West to East
- To identify one-way roads, use the DIR field:
 - » 0: Two-way travel
 - » 1: A → B travel
 - » -1: B → A travel

CAMBRIDGE SYSTEMATICS

Network Editing


- Edit attributes of existing links – Method 1
 - » To make most edits, use the information tool (i) and edit text in the form that appears
 - » Changes can be undone
 - Each edit action creates an undo point
 - » You can select and fill multiple links with the information tool
 - Multiple values can be filled by right-clicking on row names

77 CAMBRIDGE SYSTEMATICS

Network Editing Alternate Method

- Edit attributes of existing links
Alternate Method
 - » Use the map editing toolbox (M)
 - » Use the Edit Line Attributes (E) button
 - Operation of this tool is similar to using the information button
 - » Edits are saved when the green light (G) is clicked
 - » Use the red (R) light to cancel all unsaved edits
- » The Undo function will undo all edits that are saved at once with the green light



78 CAMBRIDGE SYSTEMATICS

Network Editing

- What Fields do I Edit???
- » **Facility Type**
 - Facility type identifier
- » **Lanes**
 - Directional number of lanes, by time period
 - Aux. lanes (freeway links only)
- » **Direction**
- » **Area Type**
 - Use nearby links as a guide
- » **MODE**
 - 2 for most links (other values are for transit)
- » **Other fields as necessary**

79 CAMBRIDGE SYSTEMATICS

Network Editing

- What Fields do I Edit ??? (cont'd)
 - » Toll coding guidelines
 - Use TOLL, Toll_flag
 - See assigninputs/toll_hot_penalty for toll and express lane coding details
 - » See the SCAG Model User's Guide for more guidance

80 CAMBRIDGE SYSTEMATICS



Practice: Network Editing

- Open the input network file
- Make a backup copy of this network in a folder called "Backup"
 - » Use Tools → Geographic Utilities → Geographic File and archive the network
 - » Add the date to the backup filename
 - » Edit the original network file
- Try using the different editing approaches to:
 - » Change the facility type
 - » Widen a Road

81 CAMBRIDGE SYSTEMATICS

Practice: Network Editing

- Show Topology on the network
- Change a roadway to represent a different number of lanes in each direction
- Change a different roadway to a one-way road
 - » 0 = Two-Way
 - » 1 = A to B
 - » -1 = to A

82 CAMBRIDGE SYSTEMATICS

Network Editing

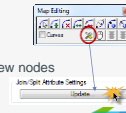
- Adding new links
 - » Use the map editing toolbox (🔧)
 - » Add links using Add Line (📍)
 - To work properly, links must be connected at nodes
 - Existing links may need to be split
 - Avoid splitting links if possible
- » Make sure that links are connected by:
 - Saving edits
 - Moving a node around – do all of the attached links move with it?
 - Canceling the edit

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Network Editing

- Adding New Links
 - » New links need new data!
 - » Copy data from an existing link with similar characteristics
 - Use the Edit Link Attributes (🔗) button
 - Click/shift-click on the new link(s)
 - Shift-click on the similar old link
 - Right-click on the data for the "old" link and choose "Copy Values"
- ⚠ Splitting/Joining Links
 - **Check the split/join settings**
 - Use the split/join tools (🔗🔗)
 - New/moved links may be connected at new nodes
 - Check data on split/join links

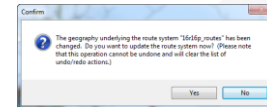


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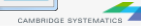


Network Editing

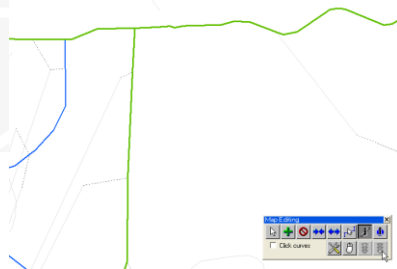
- Keeping Transit up to date
 - » Always add the route system to the network before making edits (link additions, splits, or joins)
 - » Add the route system from networks\Inputs
 - **Note: Make sure to choose the Route System file type**
 - » Make the route system active after every few edits
 - » TransCAD will prompt and update the transit network based on your changes



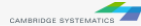
85



Network Editing



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Practice: Network Editing

- Continue editing the input network
- Add, delete, and realign some links
 - » Show topology: Note that the way a new link is created defines its AB direction
- Copy link values from an old road to newly created links
- Split and join links
 - » look at the data that appears on each half
 - » Look at the network editor settings (🔗)

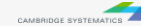
87

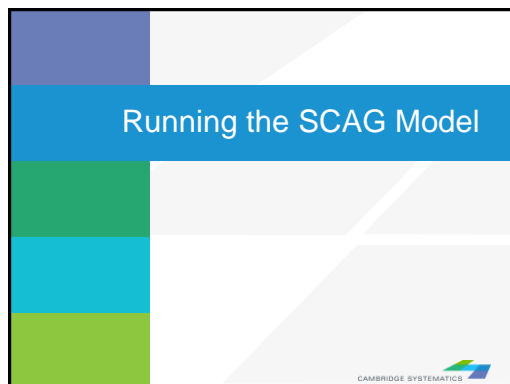


Network Editing

- Things to keep in mind:
 - » When splitting links, make sure the data on both pieces still makes sense
 - » When adding new roadways, adjust centroid connectors if necessary
 - » Adding detail or making corrections?
 - You may need to make edits to base and forecast networks

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Preparing a Computer

- TransCAD 6.0,
 - » build 9215 or later
 - » 64-bit version required
 - » TransCAD 7 not supported (yet)
- Minimum System Requirements
 - » 24GB RAM
 - » 12 CPU cores
 - » 500 GB free on system drive (C:\ Drive)
 - » 800 GB free on model run drive (e.g., D:\ Drive)
 - » 360 GB for model run storage

Requesting the SCAG Model


- Request the model from SCAG
 - » Go to:
 - » <http://www.scag.ca.gov/DataAndTools/Pages/Documents.aspx>
 - » Download the Model Data Request Form
 - » Fill out and submit as instructed
- Cheryl Leising may be able to provide a Word version that is easier to fill out

Installing the SCAG Model

- Install the User Interface (UI)
 - » Follow Instructions provide by SCAG
 - » See **memo model installation v6.3.doc**
 - » You may need administrator privileges
- Copy the model data and model table
 - » Place in a user-specified location
 - Example: D:\SCAG
 - » One directory for each scenario
 - Example: 16R16s3_set7_setting
 - » Model table with scenario information
 - Example: SCAGModelv63q.bin

Running the SCAG Model

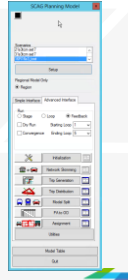
- Start the Add-In
 - » Tools → Add-Ins → SCAG Model v 6.3
- Setup a Scenario
 - » Click "Setup"
 - » Find the scenario to run
 - Example: 16R16s3
 - Make a copy (or work in place if you want)
 - » Set the correct directory on your system
 - Check to make sure Input files are shown as "Exists"
 - » Click 'OK' (be patient while the system responds)



Scenario	Input File	Output File	Description
16R16s3	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	16R16s3_Set7_Setting
16R16s3	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	16R16s3_Set7_Setting
16R16s3	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	16R16s3_Set7_Setting
16R16s3	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	D:\SCAG\16R16s3_Set7_Setting\16R16s3_Set7_Setting.tbl	16R16s3_Set7_Setting

Running the SCAG Model

- Set the model to run "Feedback"
- Leave starting and ending loops at 1 and 5
- Make sure the computer can run for 6 to 10 days without interruptions
- Click 'Initialization'



Running for Scenarios

- Quick Run with network changes only
 - » Trip tables and mode choice does not change
 - » Can be useful for:
 - Testing roadway network changes
 - Running assignment again with select link / zone analysis
- One-Loop Run
 - » Run one complete feedback loop, starting with final loop from a full model
 - » Can be useful for:
 - Large roadway and/or transit scenarios

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Quick Run: Network Change

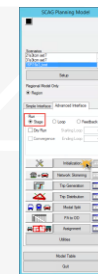
- Copy your entire model scenario folder
 - » Alternate: Just backup the original **networks** and **assign** folders
- Modify the **input** highway network file
 - » Remember: keep the route system up to date!
- Run the Check Network Attributes utility



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Quick Run: Network Change

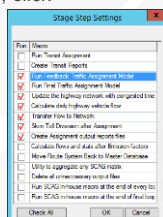
- Double-check the scenario setup. Change directory or filenames if needed
- Set the model to run only a single stage
- Click 'Initialization'
- When asked if you want to delete all files, click 'No'



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Quick Run: Network Change

- When initialization completes, click on the  button next to assignment
 - » Set steps as shown
 - » Click OK
- Click 'Assignment' to run traffic assignment
 - » This will take several hours



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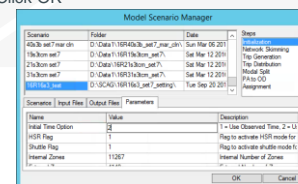
One Loop Run

- Copy your entire model scenario folder
- Modify the **inputs**
 - » Highway network file
 - » Route system File
 - » Socioeconomic Data
- Run the **Check Network Attributes** utility
- Run the **Mergenet Run** utility
 - » This merges speed feedback results with the modified network

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
One-Loop run

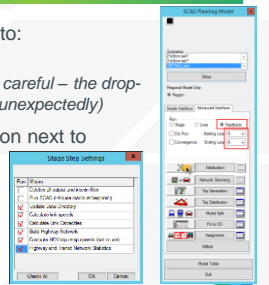
- Edit the scenario (click Setup)
 - » Set the **Initial Time Option** to a value of 2
 - » Click OK



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One-Loop run

- Set the dialog box to:
 - » Run Feedback
 - » Run loop 6 to 6 (*Be careful – the drop-downs can change unexpectedly*)
- Click the  button next to Initialization
 - » Set steps as shown
 - » Click OK



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CAMBRIDGE SYSTEMATICS

One-Loop run

- Click the **Initialization** button to start the run
 - » This should take about a day to complete
- Did you get an error??
 - » Try closing and restarting TransCAD, then picking up where you left off.
 - » Always double-check feedback settings and active steps before starting a run

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CAMBRIDGE SYSTEMATICS

Advanced Topics

Advanced Topics

- Matrix Files and OD Tables
 - » Matching matrix files to zones/centroids
 - » Visualizing trip table data
 - Desire Lines
- Setting up Select Link and Zone Analysis
 - » Creating a query file
 - » Running assignment only with select analysis activated
- Routable Networks
 - » Creating and updating a ".net" Network
 - » Interactive pathbuilding
- Basic Scripting
 - » Batch Recorder
 - » Simple Macro Creation

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CAMBRIDGE SYSTEMATICS

Thank You!

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CAMBRIDGE SYSTEMATICS



CAMBRIDGE
SYSTEMATICS

Think  Forward

TransCAD Tools for Caltrans District 7

presented to

Caltrans District 7

presented by

Cambridge Systematics, Inc.

Ronald West, Sean McAtee & Chao Wang

October 12th of 2016

Agenda

- Procedures to be Automated
 - » Data Extraction for the Air Quality Analysis
 - » Access Database for Transportation Concept Reports (TCRs)
- Automation Plan
 - » Functions

Agenda

- Procedures to be Automated
 - » **Data Extraction for the Air Quality Analysis**
 - » Access Database for Transportation Concept Reports (TCRs)
- Automation Plan
 - » Functions

Flow Chart

Data Extraction for the Air Quality Analysis



Identify Project Links

Identify Direction of Travel

Extract Traffic Assignment Results

Modeled Volumes and Congested
Speeds on each Project Link



Sample Output

Project Link Number	Topological Direction	Direction of Travel	Description	ID	Length	Lanes	AM HDV	AM TOTA	Track Percent	AM Congested Spped (mph)
1	✓	Northbound	PCH between	111693	0.726997	2	71	4687	1.5%	30.3
		Southbound	E. 2 nd Street							
2	✓	Northbound	PCH between	111857	0.420292	3	63	4284	1.5%	35.9
		Southbound	Channel							
3	✓	Eastbound	Loynes Drive	140968	0.195944	2	9	1042	0.9%	33.2
		Westbound	East of							
4	✓	Eastbound	Loynes Drive	2676253	0.247384	2	16	2060	0.8%	31.8
		Westbound	West of							
5	✓	Northbound	PCH between	1658199	0.339207	3	114	6017	1.9%	35.4
		Southbound	Studebaker							
6	✓	Eastbound	E. 2 nd Street	111606	0.174446	3	159	5606	2.8%	43.1
		Westbound	East of PCH							
7	✓	Eastbound	E. 2 nd Street	111692	0.114132	3	85	4139	2.1%	34.9
		Westbound	West of PCH							
8	✓	Inbound	Connector to	1647706	0.315451	9	11	1164	0.9%	25.0
		Outbound								

Input

➤ Critical Inputs

- » Project link number
- » TransCAD link ID
- » Topological direction

➤ Informational Inputs

- » Link length
- » Link description
- » Route number
- » Facility type



Output

- ➔ For each project link, each direction, and each time period
 - » Total truck volume
 - » Total vehicle volume
 - » Truck percent
 - » Congested speed

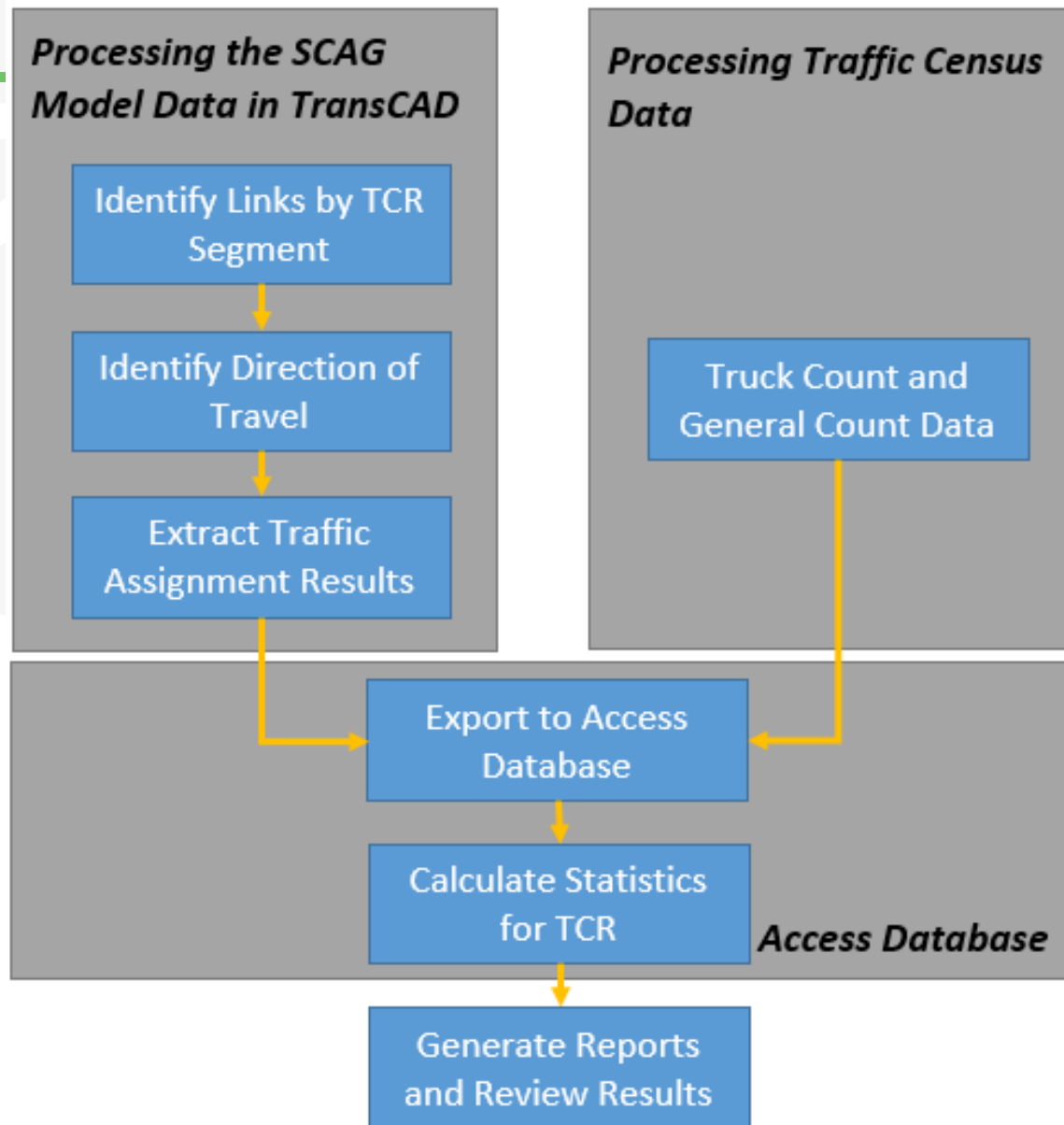
A red, distressed-style stamp with the word "OUTPUT" in bold, uppercase letters, tilted slightly to the right. The stamp has a white background and is set against a light gray background.

Agenda

- Procedures to be Automated
 - » Data Extraction for the Air Quality Analysis
 - » **Access Database for Transportation Concept Reports (TCRs)**
- Automation Plan
 - » Functions

Flow Chart

Access Database
for TCRs



TCR Output

1 Basic System Operations

➤ For Model Base Year and Model Plan Year

- » Daily total vehicle flow
- » Level of Service (LOS)
- » Daily vehicle miles traveled (VMT)



TCR Output

2 Model Plan Year Concept Summary

➤ For Model Plan Year Only

- » Daily total vehicle flow
- » Peak hour directional split
- » Peak hour total flow (both directions)
- » Peak hour truck vehicle flow (both directions)
- » Peak hour truck percent
- » V/C ratio and LOS
- » Total lanes
- » Lanes required to achieve LOS D and LOS F0



TCR Output

3 Base Year Truck Volumes by TCR Segment

➤ From Counts, not from Model

- » Total Vehicle Annual Average Daily Traffic (AADT)
- » Total truck AADT
- » Truck percent
- » 5+ Axle truck AADT
- » 5+ Axle truck percent



Base Year 2008 Truck Count Data



TCR Segment Number	Total AADT	Truck ADT	Daily Truck Percent	5+ Axle Truck ADT	5+ Axle Trucks as Pct of All
1	193,667	16,216	8.4%	6,394	39.4%
2	221,200	17,713	8.0%	7,201	40.7%
3	238,750	17,129	7.2%	7,339	42.8%
4	235,250	15,654	6.7%	7,917	50.6%
5	241,250	14,980	6.2%	8,780	58.6%
6	256,250	15,587	6.1%	9,366	60.1%

TCR Details

- Conventional Highway vs. Freeway State Routes
- Determination of Peak Hour and Peak Direction
- Average Travel Demand Volumes weighted by Link Length

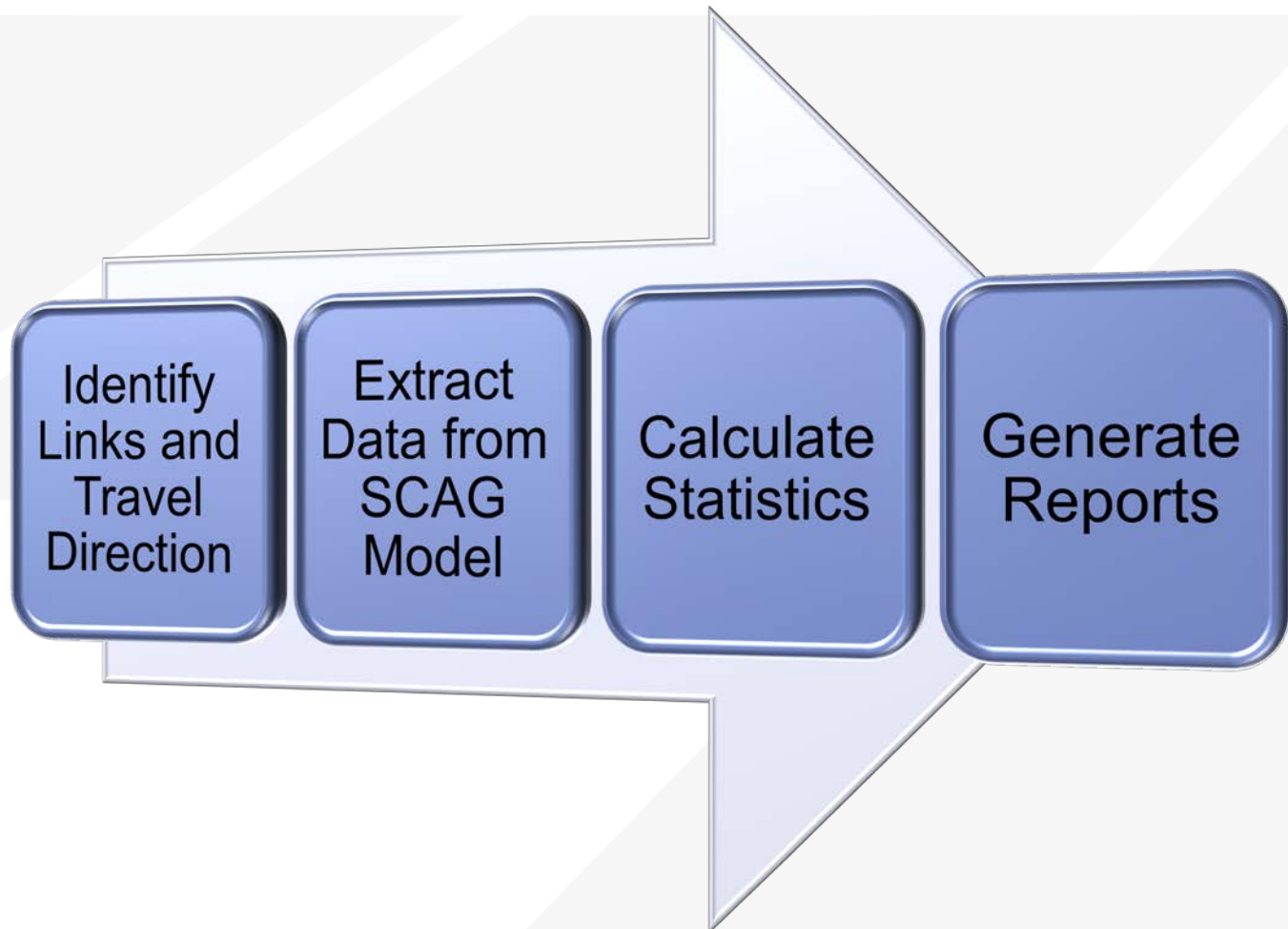
$$V = \frac{\sum_{i=1}^n l_i \cdot v_i}{\sum_{i=1}^n l_i}$$

Agenda

- Procedures to be Automated
 - » Data Extraction for the Air Quality Analysis
 - » Access Database for Transportation Concept Reports (TCRs)
- Automation Plan
 - » **Functions**



Automation Plan



Discussions

