CAMBRIDGE SYSTEMATICS

Think Forward

TransCAD and the SCAG Model

presented to

Caltrans District 8

Presented
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presented by

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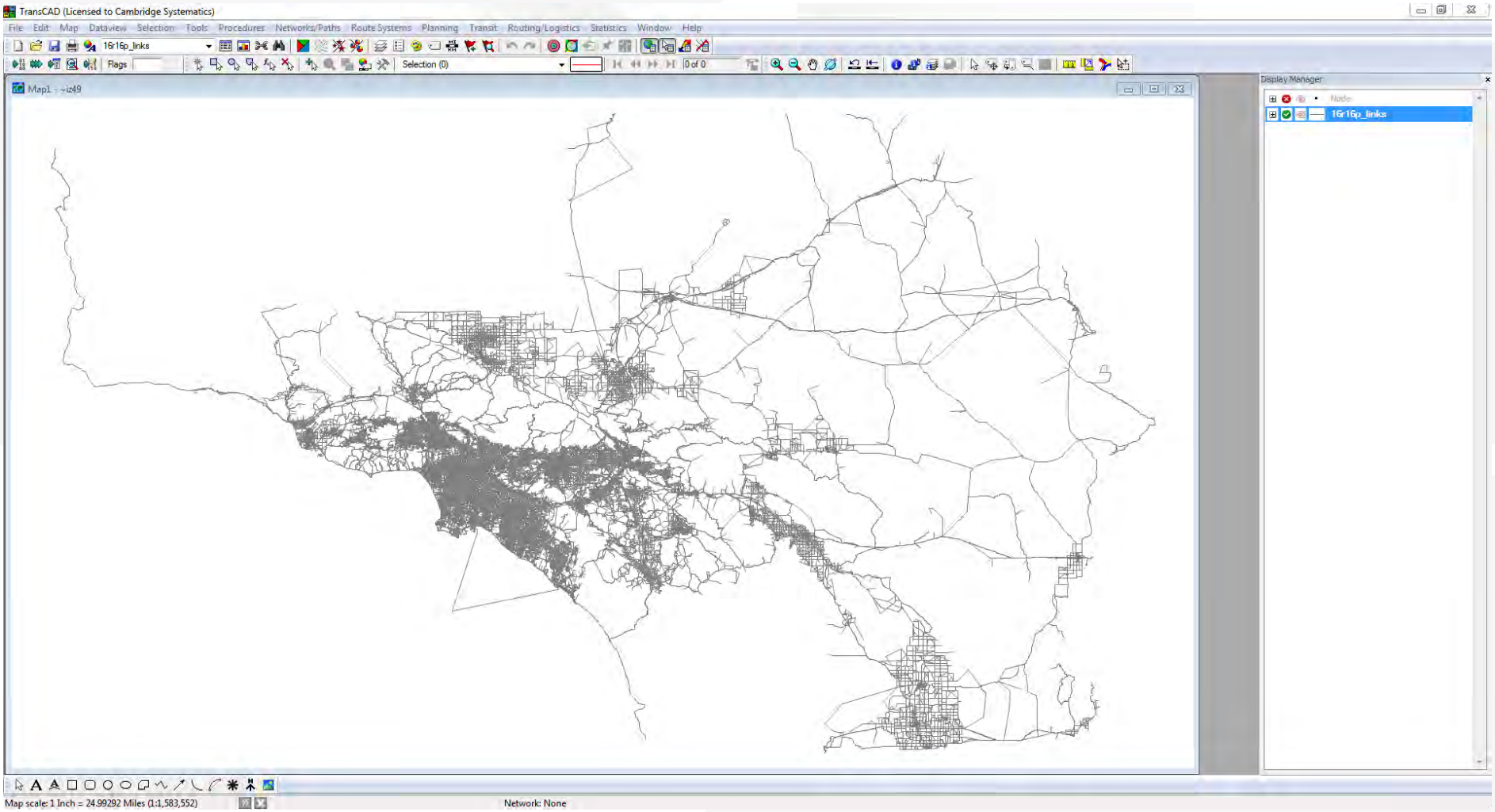
Topics

- 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
- Route System Editing
- Running the SCAG Model
- Advanced Topics?

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
  - Need 9250 to run the SCAG Model

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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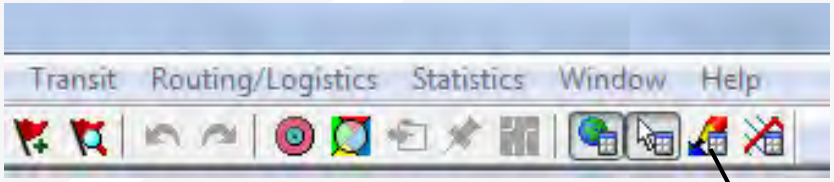
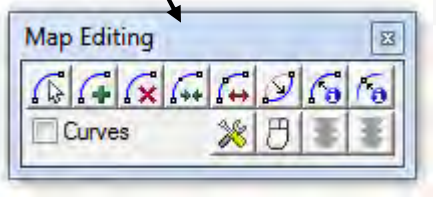
Tools





Drawing toolbox*

* For objects on the map – not for geographic editing

GISDK toolbox

Usually docked at the bottom of the window

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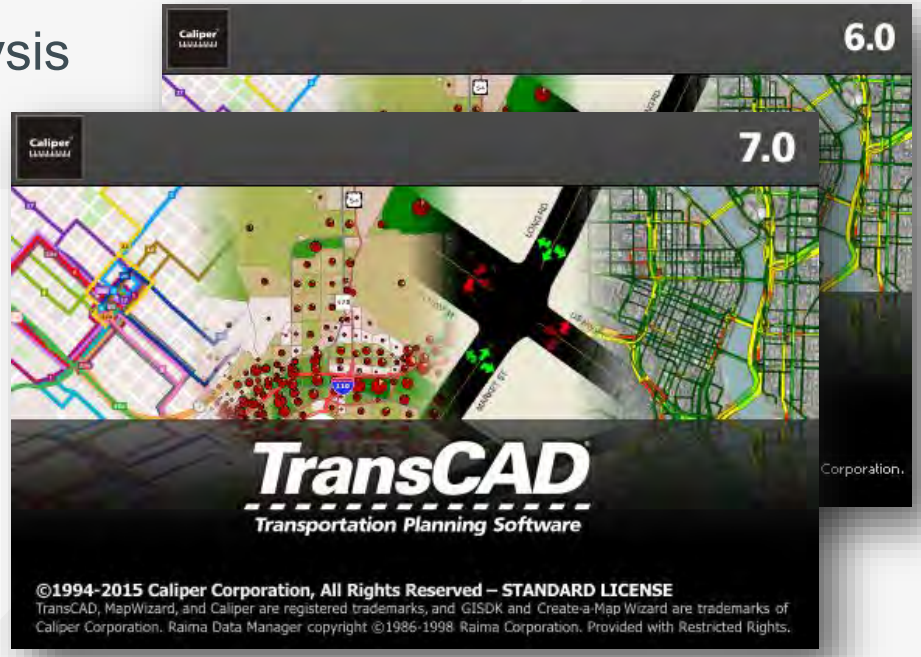
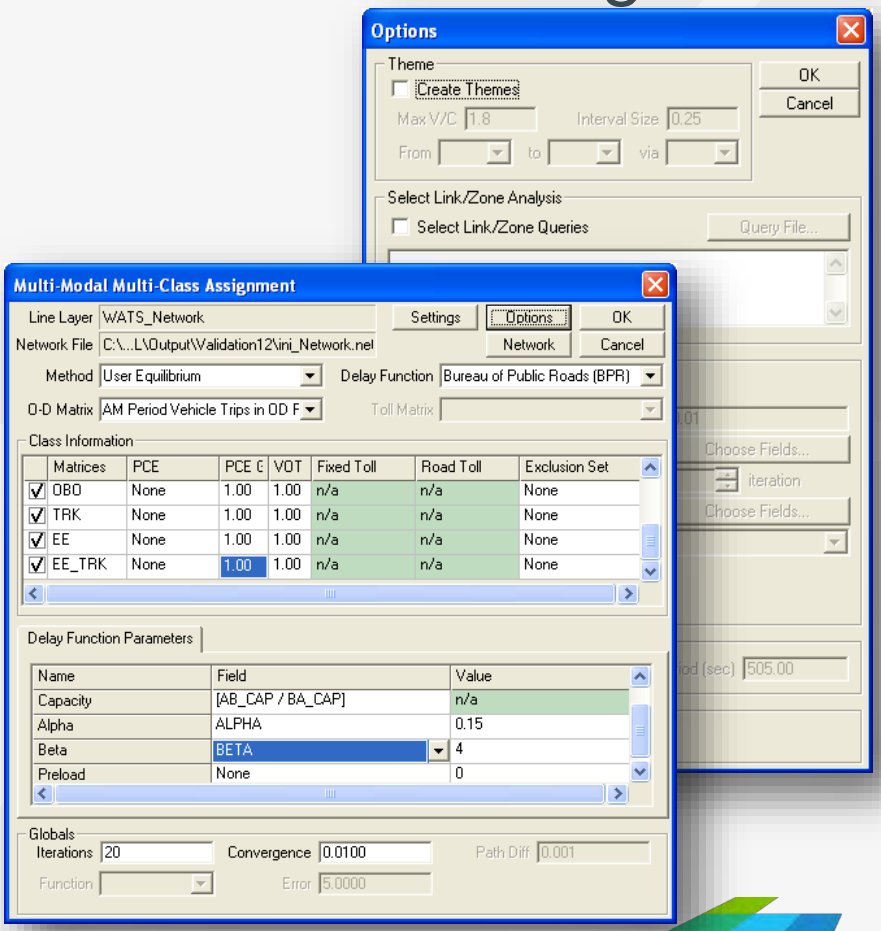
TransCAD Software Overview

- 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



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"



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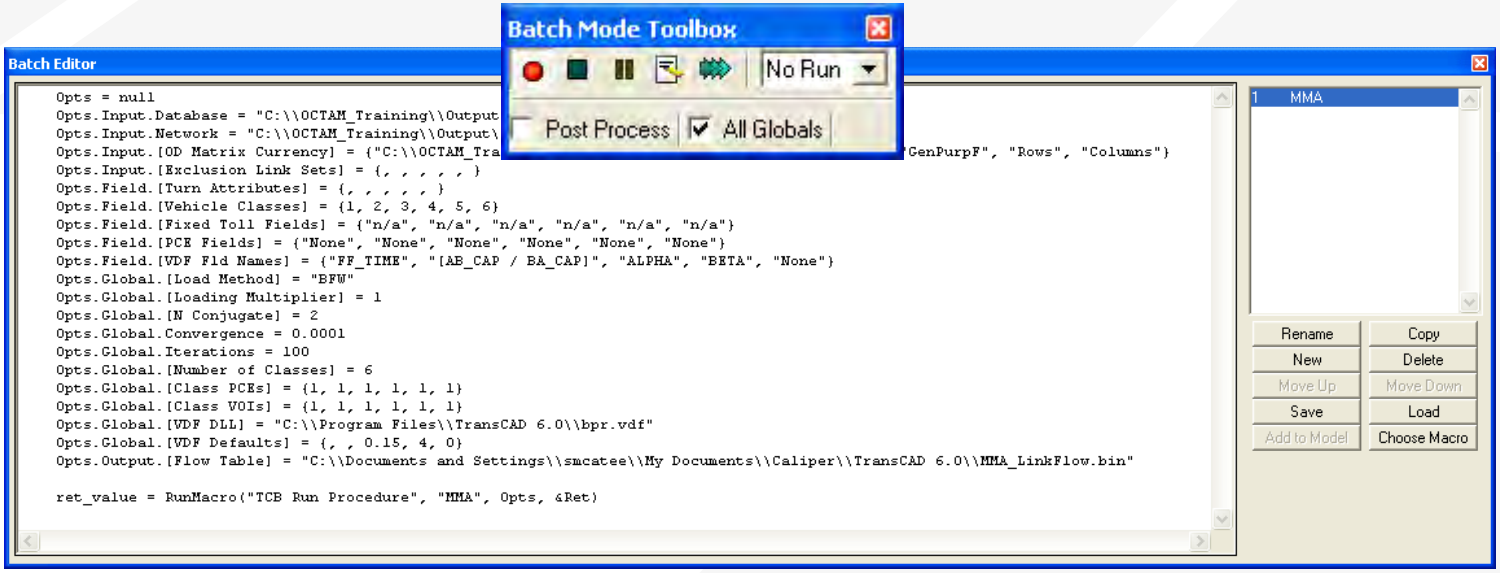
Batch Mode

- 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)



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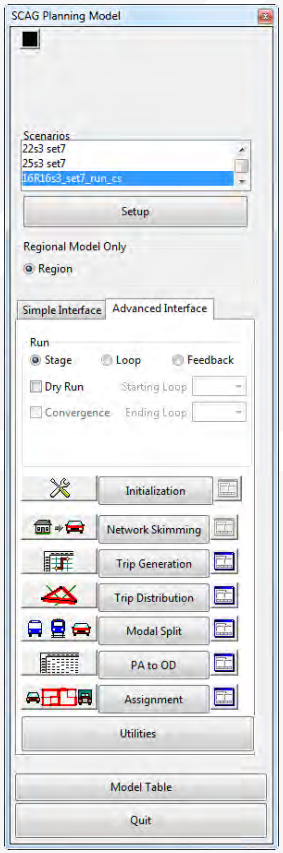
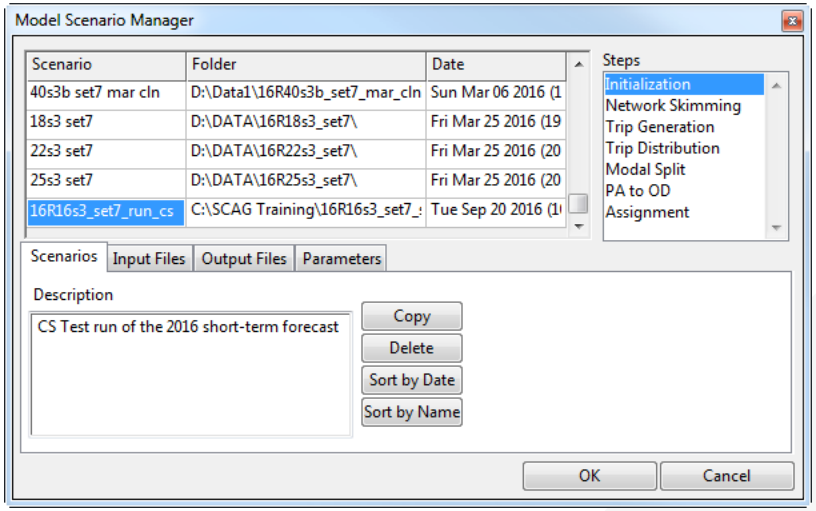
Customized Interfaces

- 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





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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

Dataview1 - 16r16p_links

[Route Name]	[Road Type]	[Route Number]	AB_Facility_Type	BA_Facility_Type	AB_PostedSpeed	BA_PostedSpeed	AB_AMLANES	BA_AMLANES	AB_PMLANES	BA_PMLANES	AB_MDLANES	BA_MDLANES	AB_EVELANE
	Tier 2 Centroid Connector		200	200	25	25	9	9	9	9	9	9	
	Tier 2 Centroid Connector		200	200	25	25	9	9	9	9	9	9	
	Tier 2 Centroid Connector		200	200	25	25	9	9	9	9	9	9	
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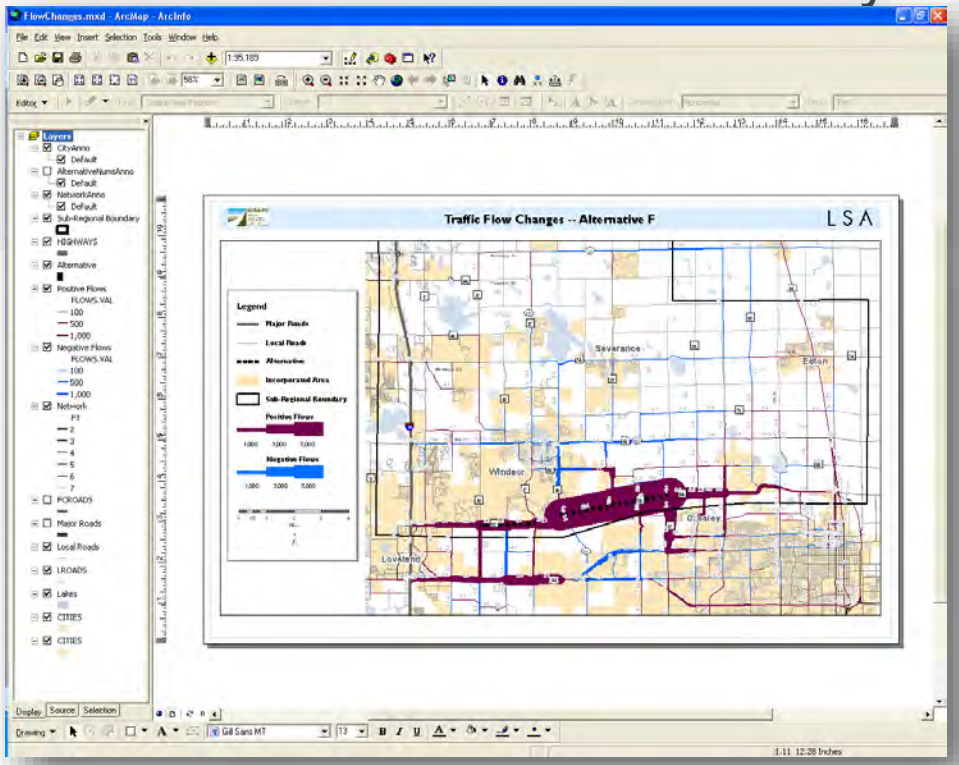
	Tier 2 Centroid Connector		200	200	25	25	9	9	9	9	9	9	

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.



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TransCAD Tips

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File and Data Types

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

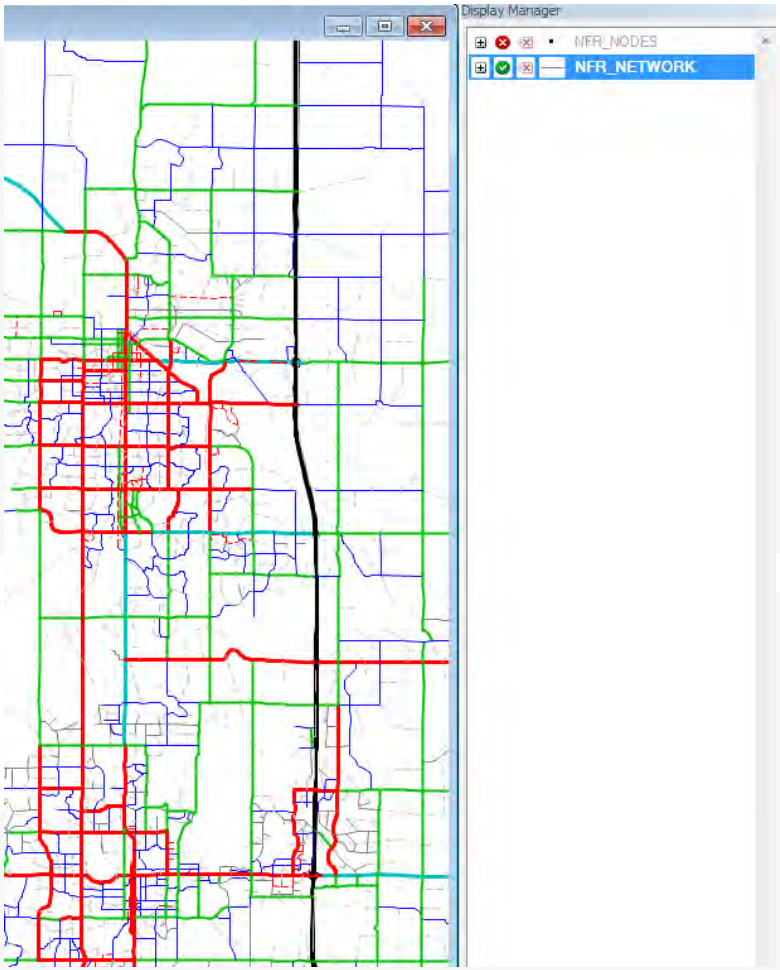
Never use File → Save As → "Dataview (.dvw)" or "Map (.map)" to save a copy for modification!

File and Data Types

- Geographic Files (.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 → Display Manager
- Multiple selection sets
- Many more…



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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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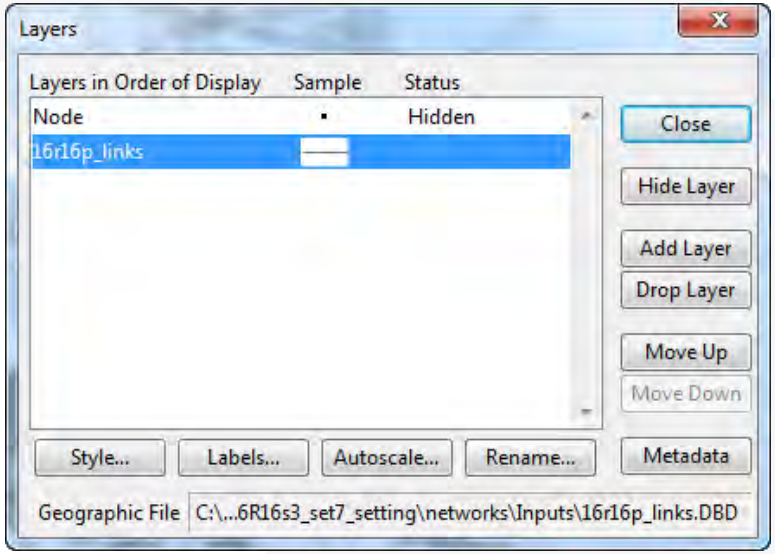
Working with Layers

- Start by opening a map **or** a geographic (dbd) 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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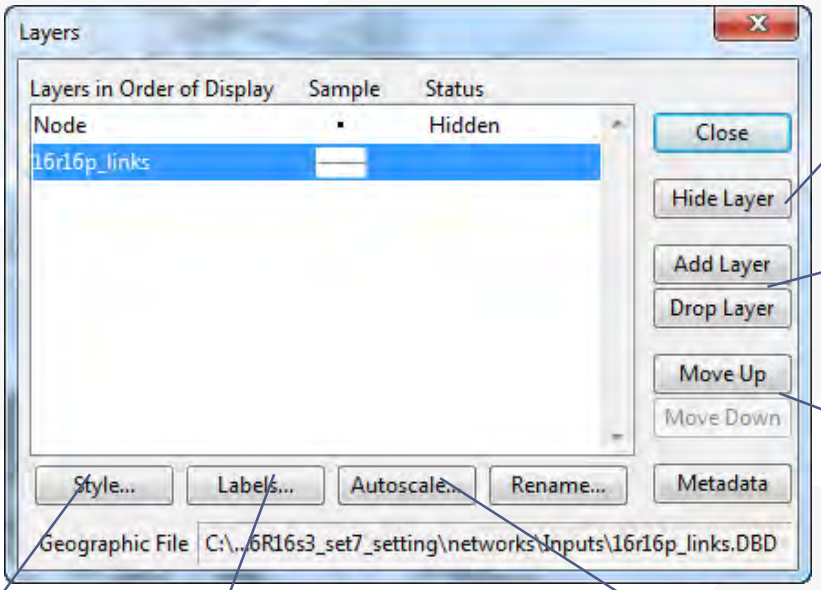
Working with Layers

- **The Layers Dialog ( )**



Hide/show a layer

Add/Drop layers

Re-order layers

Change a layer style

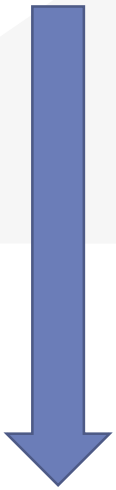
Add/edit labels

Automatically show/hide layers as certain scales

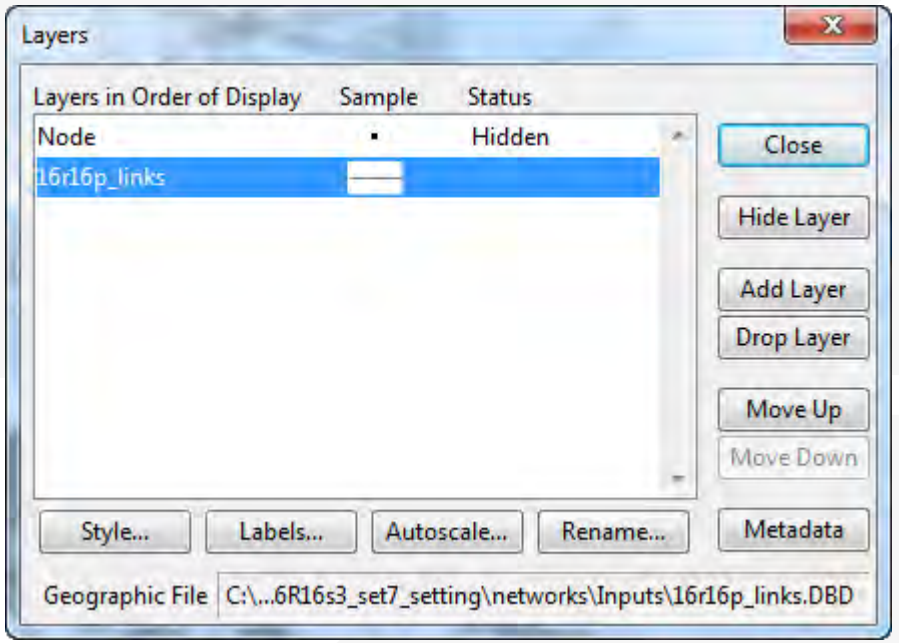
Working with Layers

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

Top layer
(drawn first)



Bottom layer
(drawn last)



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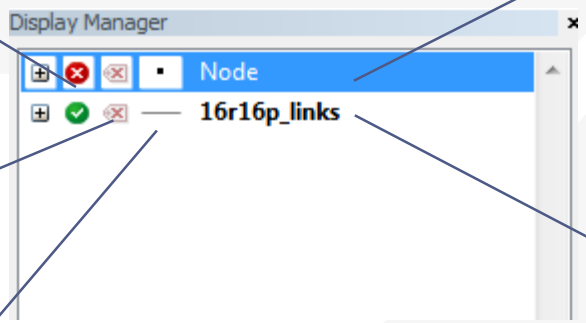
Display Manager

- 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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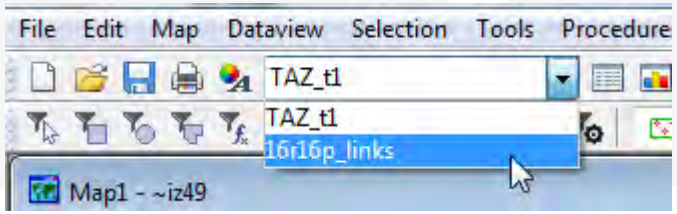
Creating Maps

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



- Change the “default” styles for the layers
  - »  then  , or  , or use the display manager
- Hide or show layers
  - »  or the display manager

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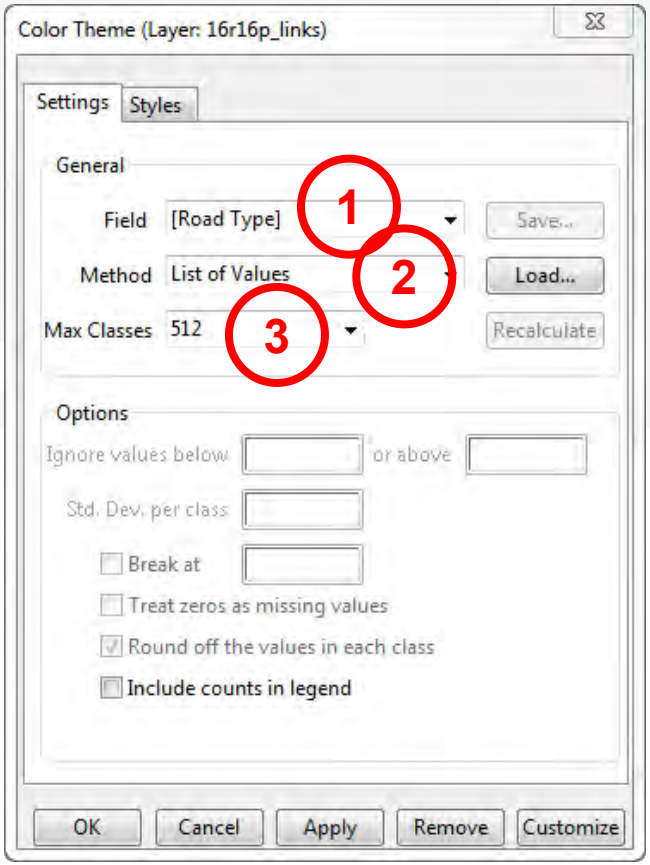
Color and Pattern Themes

- 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!*

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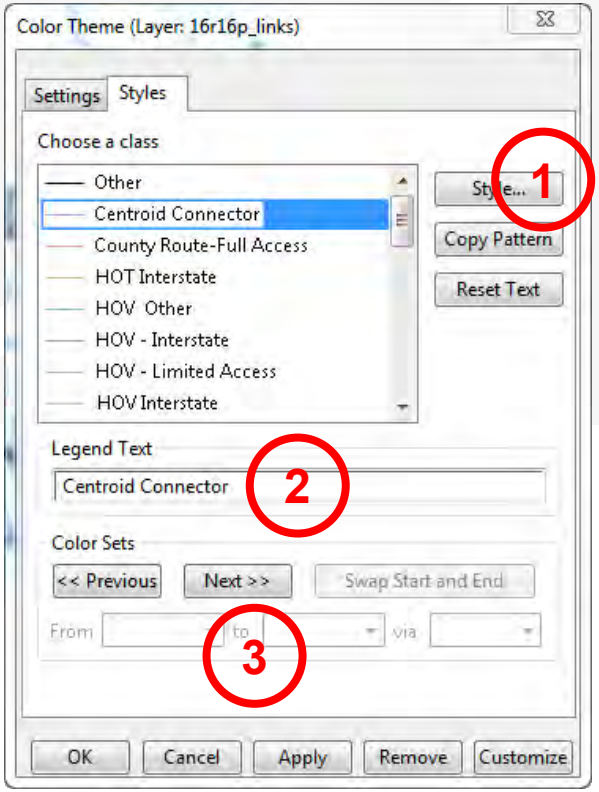
Color and Pattern Themes

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

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Functional Class

Primary Facility Type		Secondary Facility Type	
1	Freeways	10	Freeway
2	HOV	20	HOV 2
		21	HOV 3+
		22	HOV - HOV Connector
3	Expressway / Parkway	30	Undivided
		31	Divided, Interrupted
		32	Divided, Uninterrupted
4	Principal Arterial	20	Undivided
		41	Divided
		42	Continuous Left Turn
5	Minor Arterial	50	Undivided
		51	Divided
		52	Continuous Left Turn
6	Major Col lector	60	Undivided
		61	Divided
		62	Continuous Left Turn

Primary Facility Type		Secondary Facility Type	
7	Minor Collector	70	Undivided
		71	Divided
		72	Continuous Left Turn
		73	Posted Speed 25
		74	Posted Speed 15
8	Ramps	80	Freeway to Freeway Connector
		81	Freeway to arterial
		82	Arterial to freeway
		83	Ramp Distributor
		84	Ramp from Arterial to HOV
		85	Ramp from HOV to Arterial
		86	Collector distributor
		87	Shared HOV Ramps to MF
		88	Truck only
9	Trucks	90	Truck only
100		100	Centroid Connector - Tier 1
200		200	Centroid Connector - 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

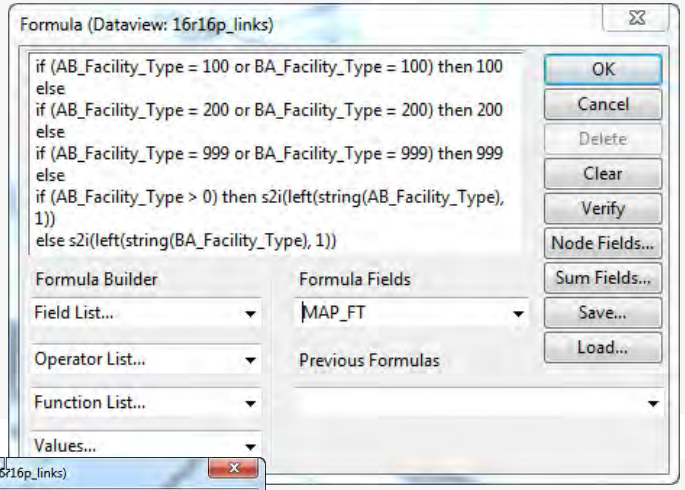
TransCAD Formulas.txt

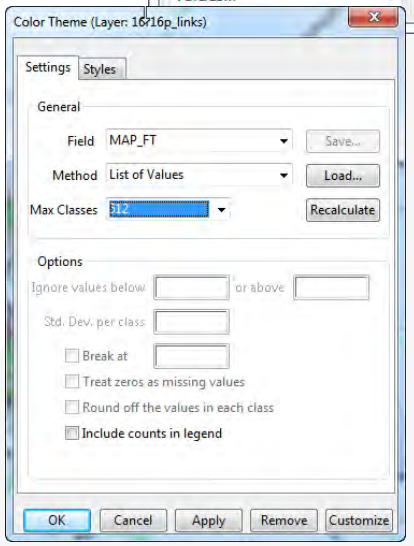
```
MAP_FT:
-------
if (AB_Facility_Type = 100 or BA_Facility_Type = 100) then 100 else
if (AB_Facility_Type = 200 or BA_Facility_Type = 200) then 200 else
if (AB_Facility_Type = 999 or BA_Facility_Type = 999) then 999 else
if (AB_Facility_Type > 0) then s2i(left(string(AB_Facility_Type), 1))
else s2i(left(string(BA_Facility_Type), 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 '16R16pl_links.dbd' and click 'Open' button
2. Add the MAP_FT Formula Field
   - ✓ Dataview→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 Utilties → 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





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Labels

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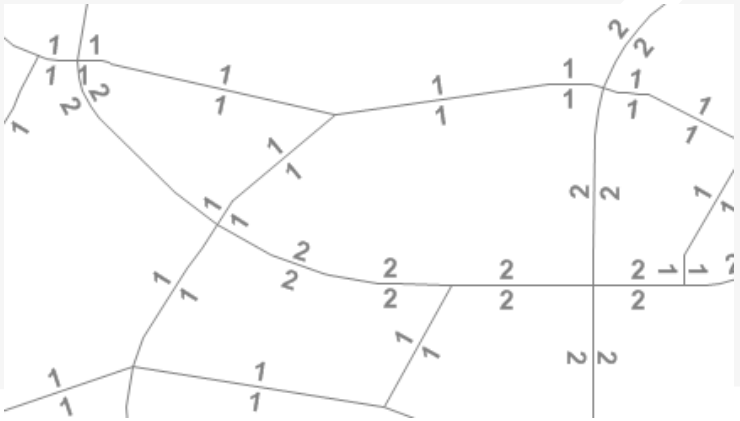
Automatic Labels

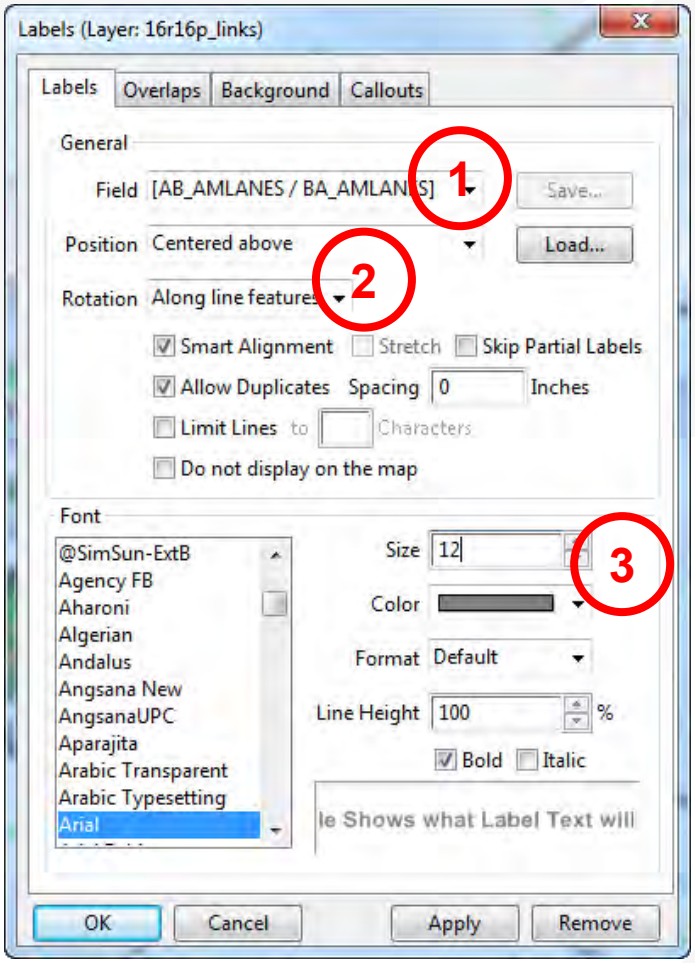
- Labels ( ) can be used to show things including:
  - Traffic Volumes
  - Number of Lanes
  - Centroid Numbers
  - SED/Land Use Data



- Labels can be set differently for different selection sets

Automatic Labels

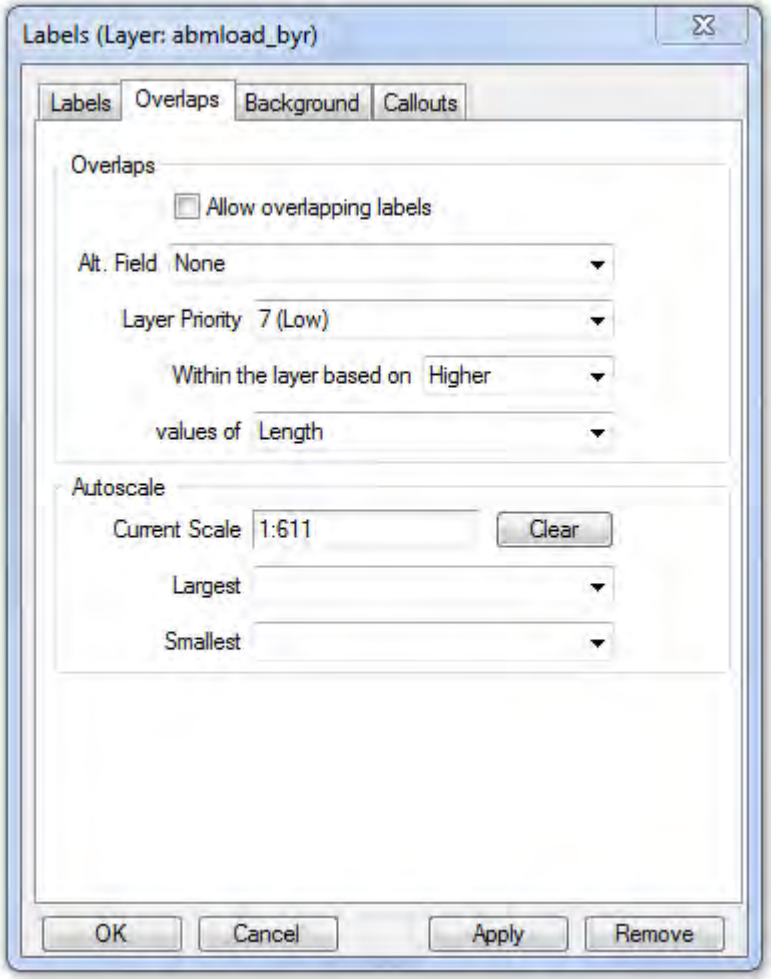
The Labels Tab



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

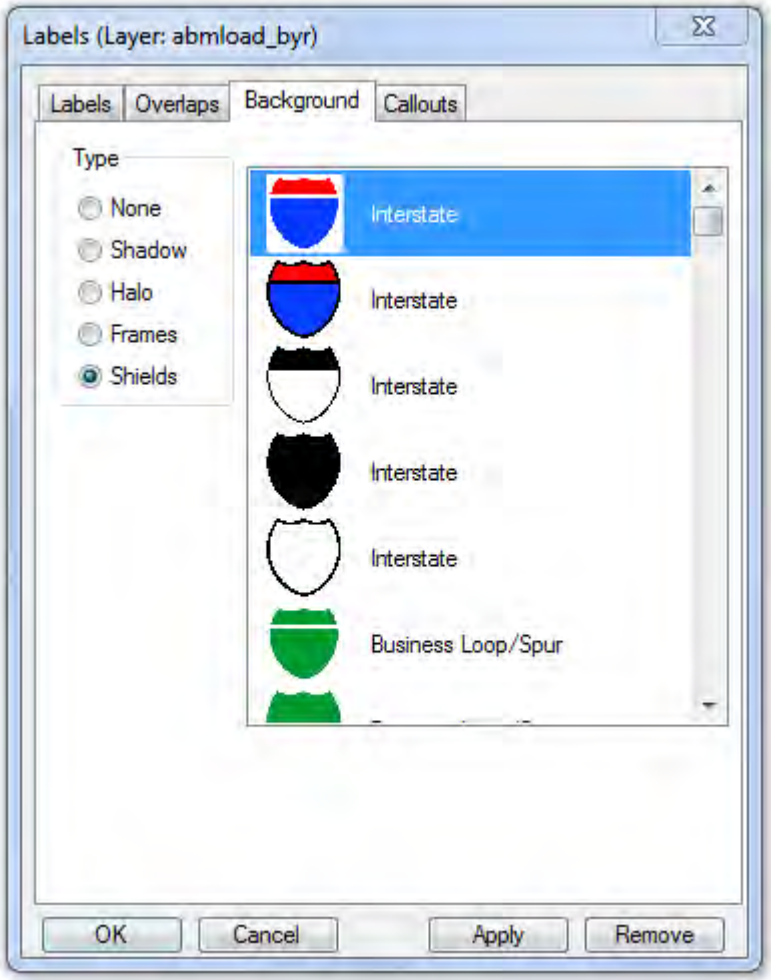
The Overlaps Tab



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

Automatic Labels

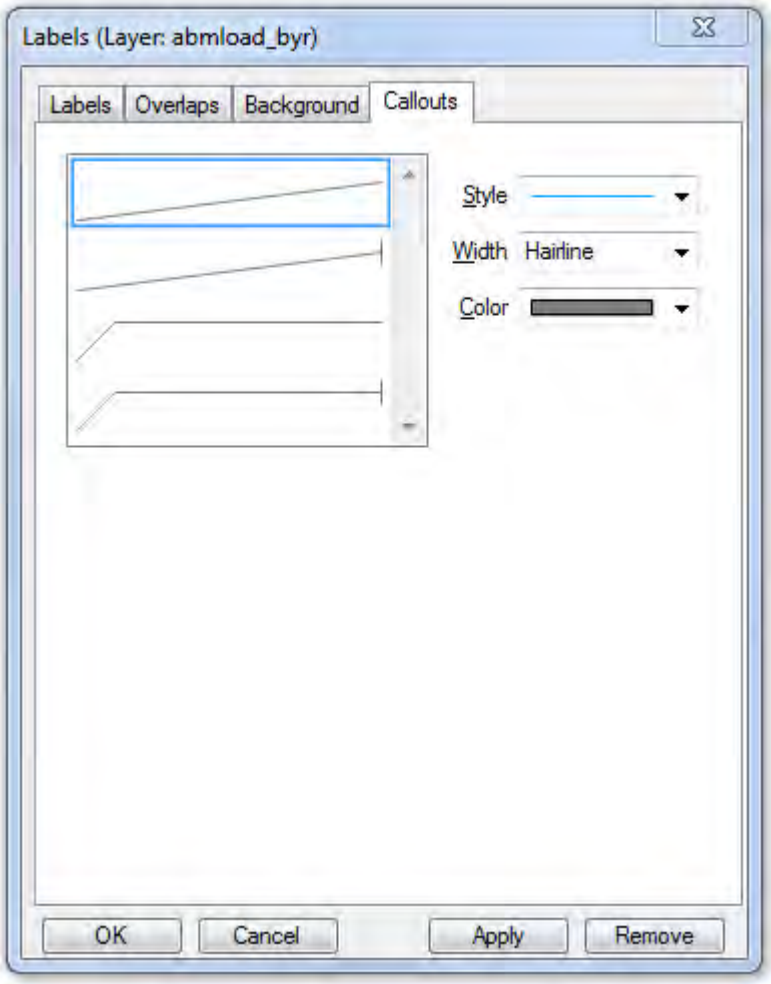
The Background Tab



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

Automatic Labels

The Callouts Tab

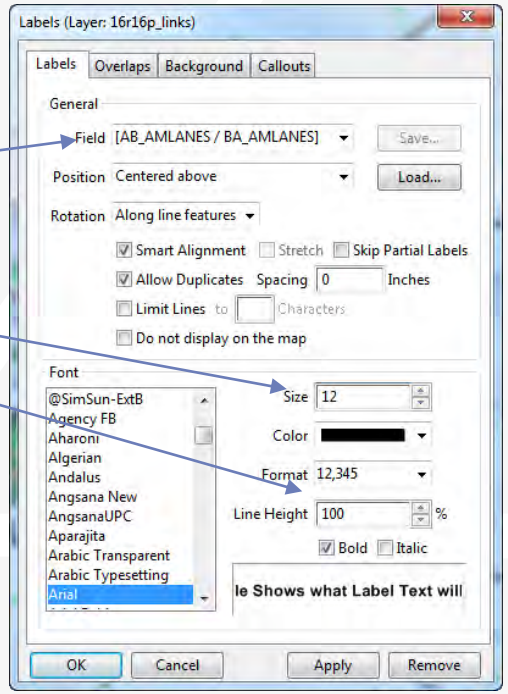


- Set the default callout style to use when labels are manually re-positioned

Practice 2: Add number of lanes labels

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



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Create Scaled Symbol Theme

(also known as bandwidth map)

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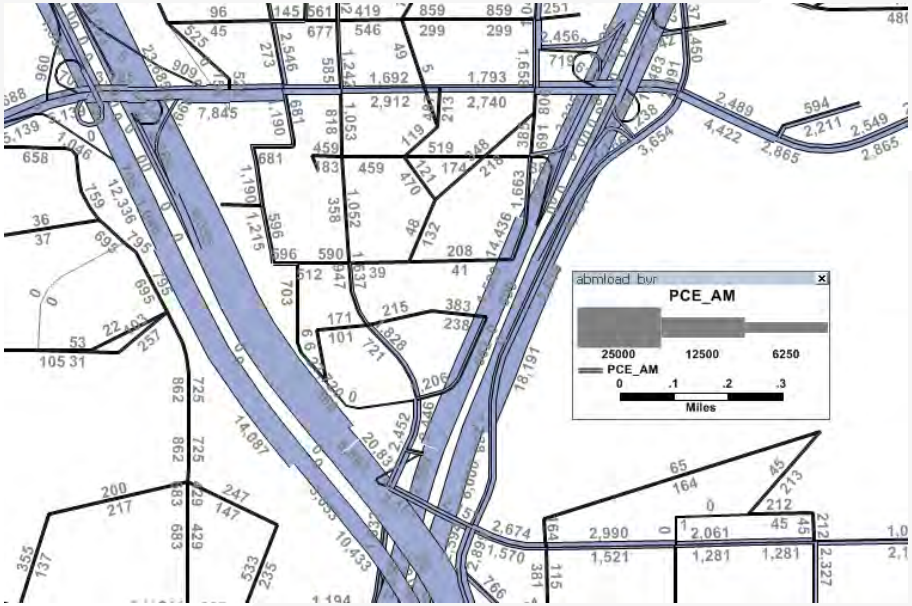
Scaled Symbol Themes

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



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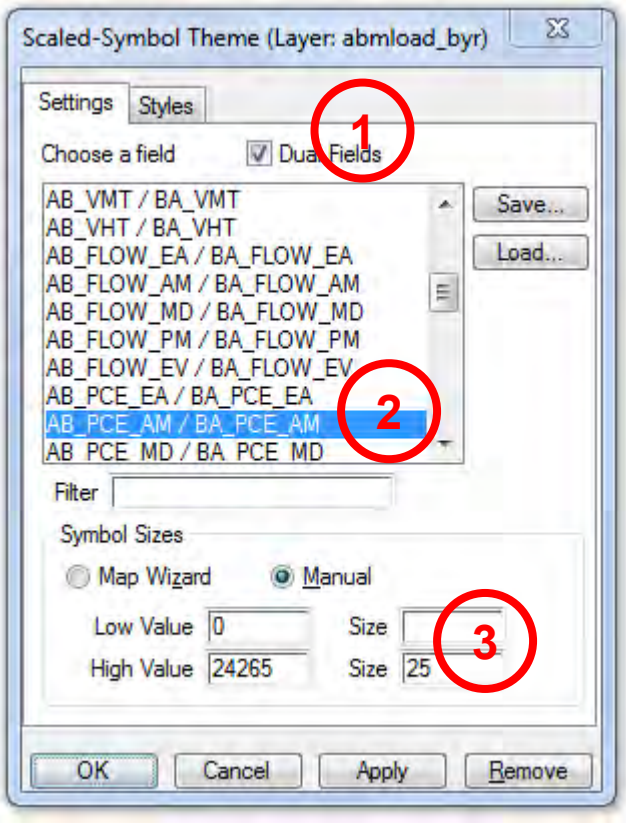
Scaled Symbol Themes

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

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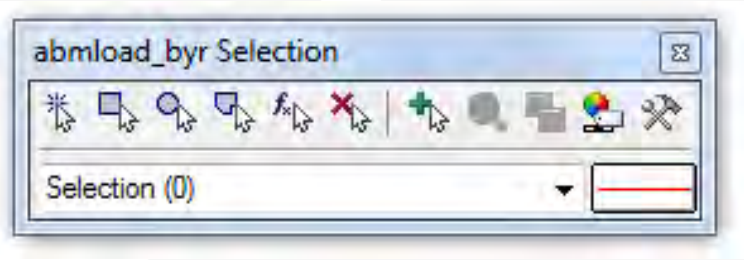
Selection Sets

- 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

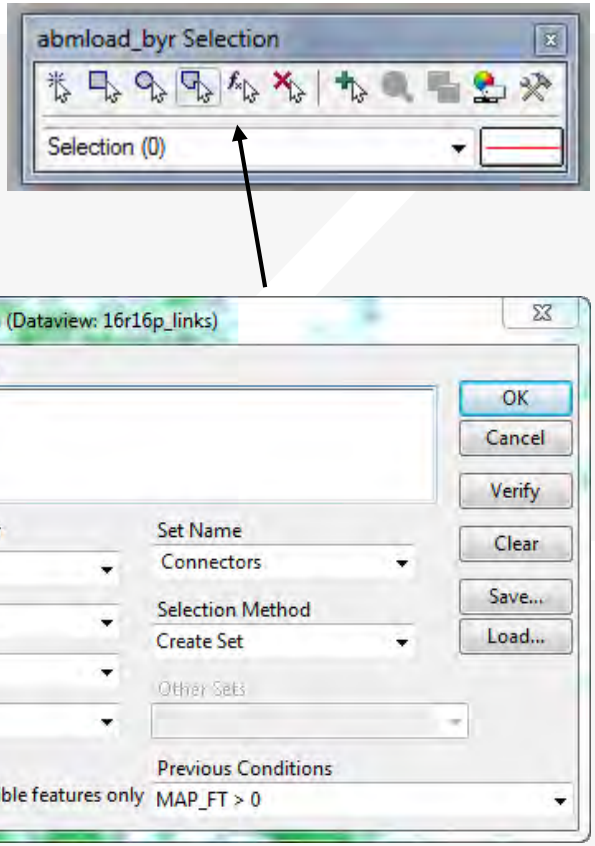


- One map can contain many selection sets
  - Show or hide selected items
  - Format selected items with different colors, styles, and labels

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

CAMBRIDGE SYSTEMATICS

Data Tables (“Dataviews”)

CAMBRIDGE SYSTEMATICS

Working with dataviews

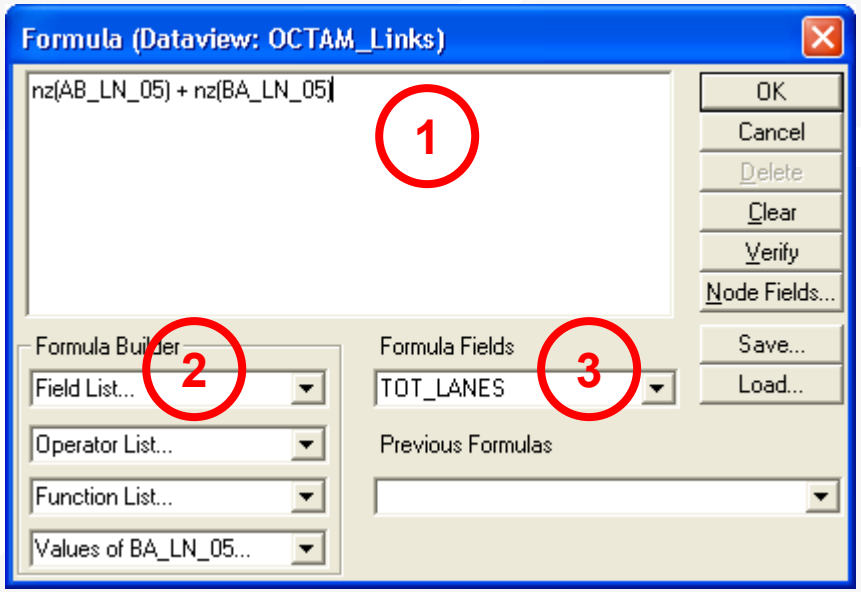
- Open a dataview for any existing layer ()
- Open a standalone table with File → Open
- Add/Remove fields with Dataview → Modify Table
  - (or )
  - Be careful: Changes are permanent once you click “OK”
- Data can be edited directly in the dataview
  - Be careful: Changes are saved as you go
- Create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

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



CAMBRIDGE SYSTEMATICS

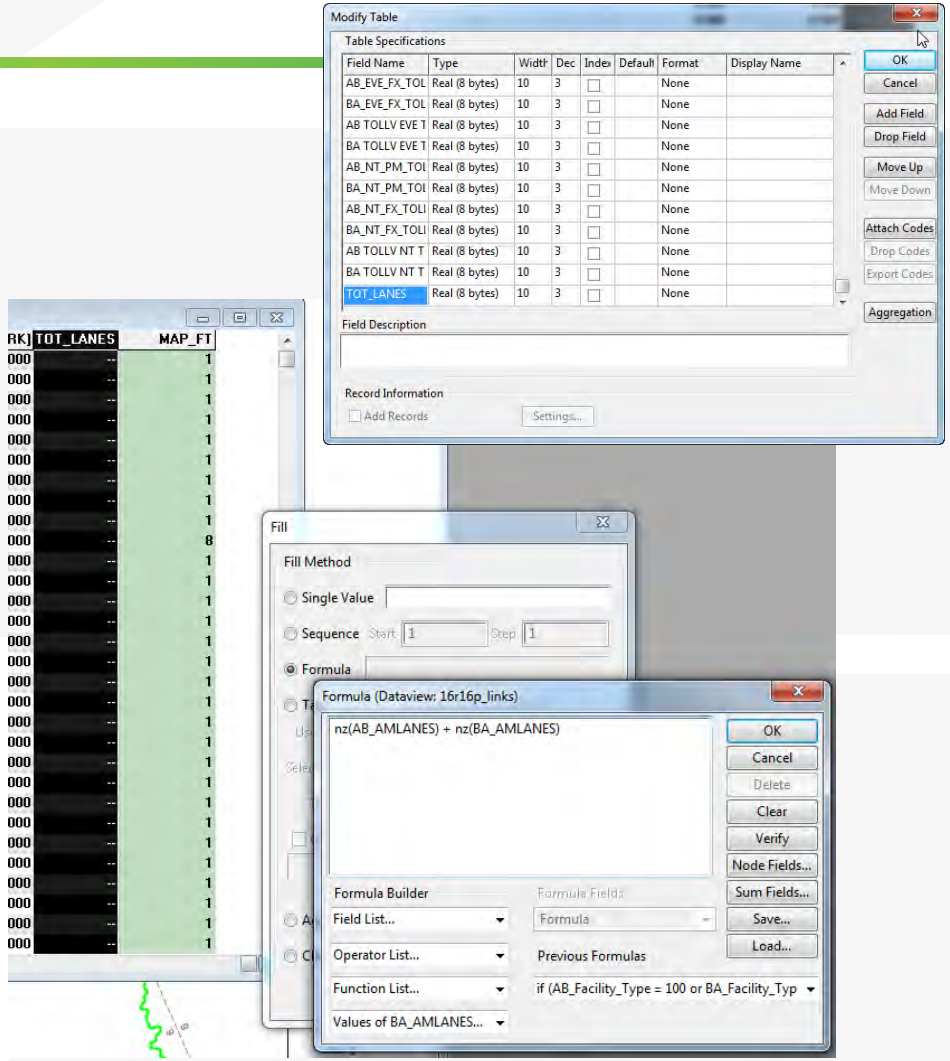
Practice 4: Add total number of lanes in a **NEW FIELD**

- Start with the results from Practice 3
  - ✓ Open the saved map if needed

1. On the top ribbon, click  it will open the links layer daataview table

2. Use Dataview → 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’

3. Go to ‘Dataview’ 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_AMLANES)
   - ✓ Alternatively you can use the formula builder
   - ✓ Click ‘OK’ button.
   - ✓ This fills in two-way number of lanes



Bonus: Try this example using a formula field instead!

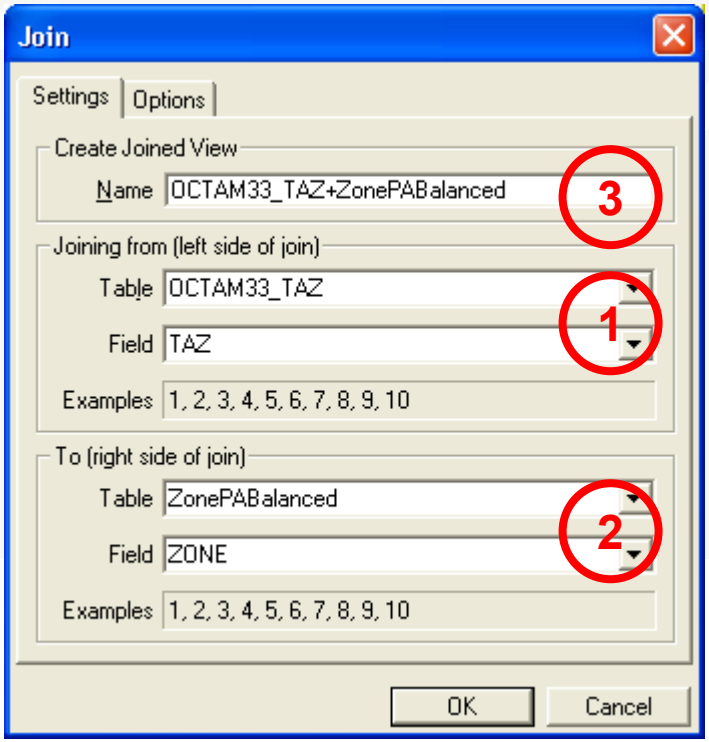
CAMBRIDGE SYSTEMATICS

Joining Data

Joining Data

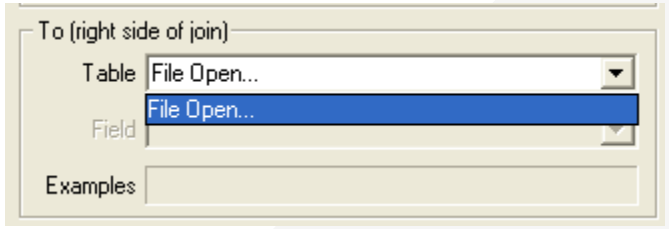
- Layers have an associated data table ()
- Data can be joined () to other tables
  - Roadway Network + Traffic Assignment results
  - TAZ layer + Land Use Data
  - Roadway Network + Lookup Table
  - More…
- This is how traffic assignment results are viewed in TransCAD

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)

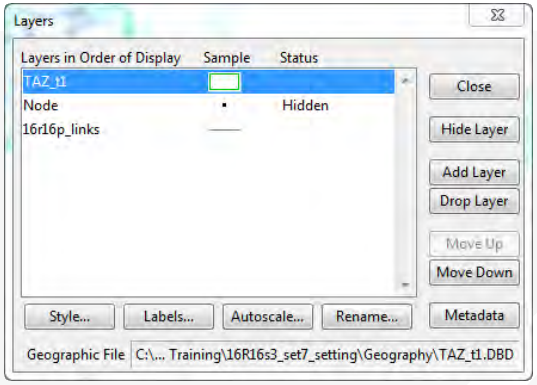
Tip: You can open a file from the join dialog box

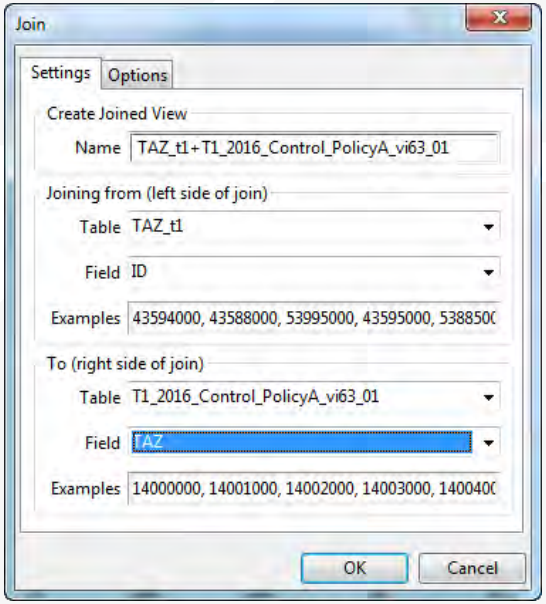


CAMBRIDGE SYSTEMATICS

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

CAMBRIDGE SYSTEMATICS

Printing Maps (Layouts)

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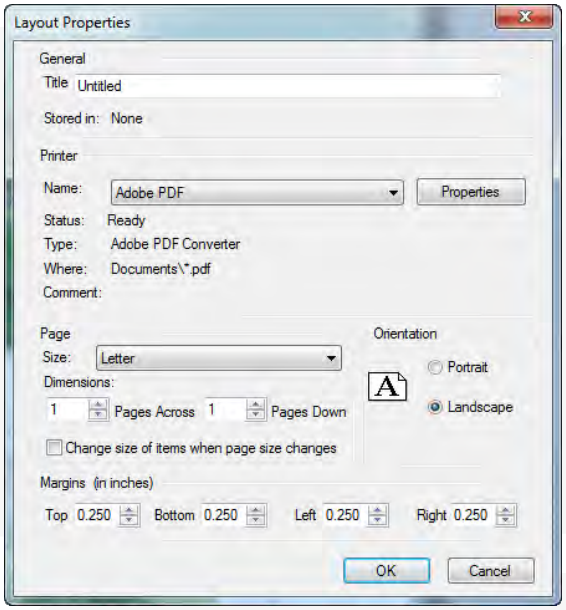
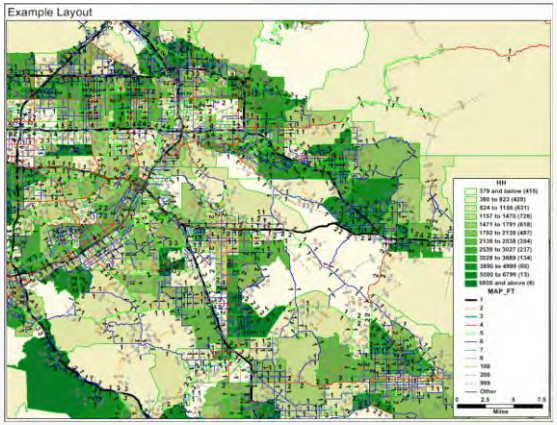
Layouts

- 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.

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 landsape
   - ✓ **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 (A), usually at the bottom of the window
   - ✓ Drag a box, then type a title
   - ✓ Use the pointer to reposition, double-clicking to edit





CAMBRIDGE SYSTEMATICS

More on Networks and Zones

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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…

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

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!**

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	

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

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

$$2.7^2 = 7.3$$

Recap

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

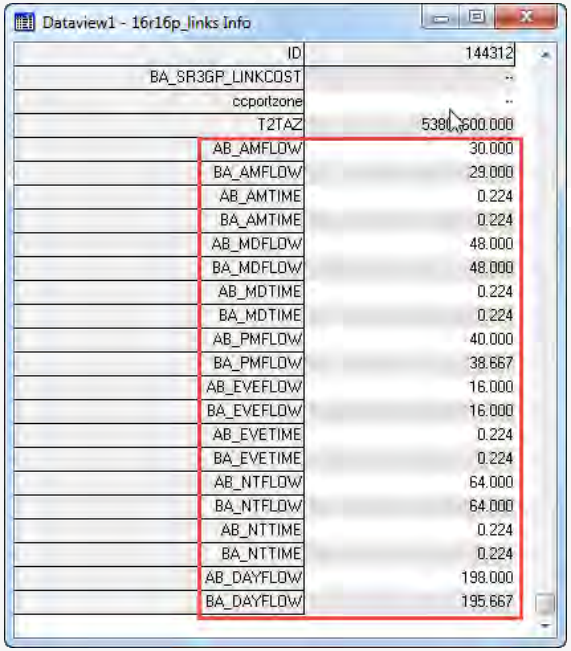
- Saw the SCAG network
  - Facility Type
  - Lanes
- Saw the SCAG TAZ layer and data table
  - Various input SED values
  - Saw how to join to TAZs
  - Note: TAZ vs. SEQ (sequential TAZs)

Highway Assignment

CAMBRIDGE SYSTEMATICS

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



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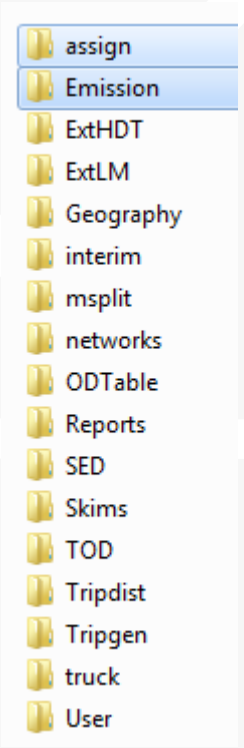
Assignment Results

- 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.dbd
   - ✓ 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

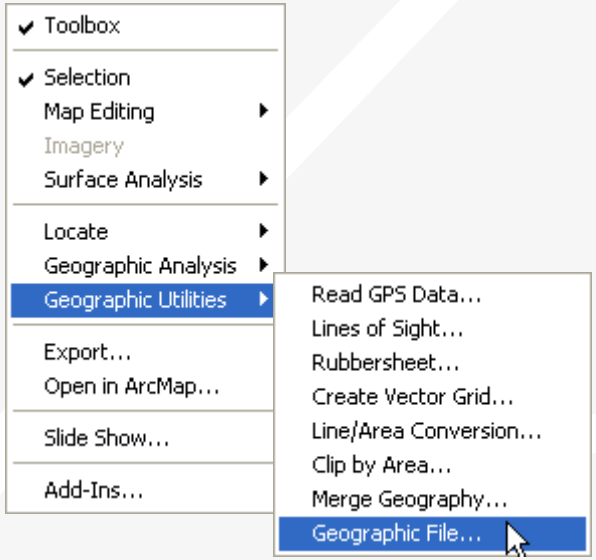
Network Editing

- 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 makes network editing less risky

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 <u>all</u> related files



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Network Editing

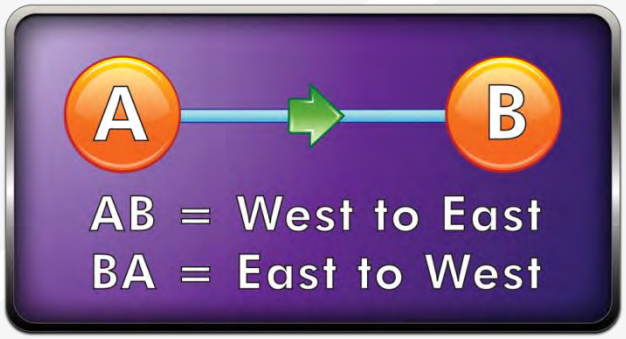
- Once you have made a backup, you can:
  - Edit attributes of existing links
  - Change data for a specific year or for multiple years and alternatives
  - Add new links, delete existing links, or realign existing links
  - Add data for a year not yet included in the network

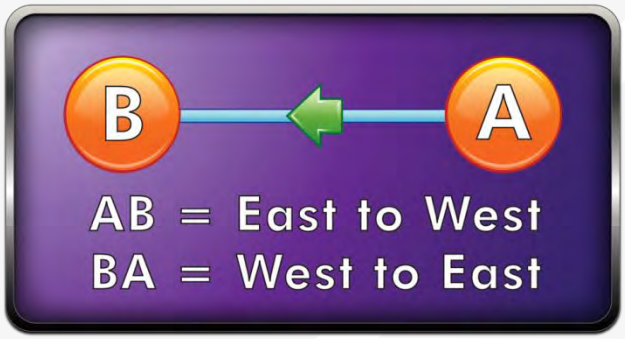
Network Editing

- 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

Network Topology

- Show topology to identify AB and BA directions

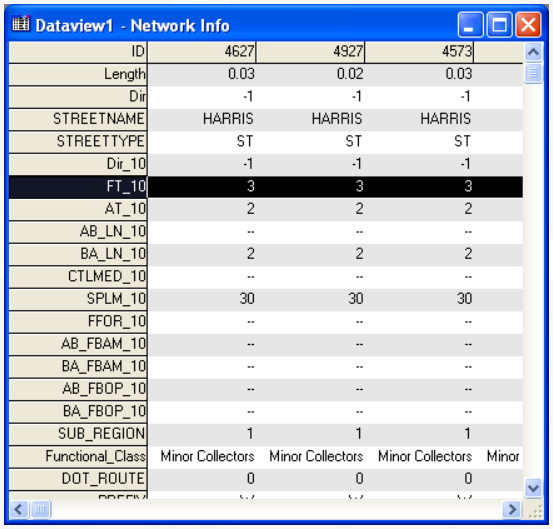




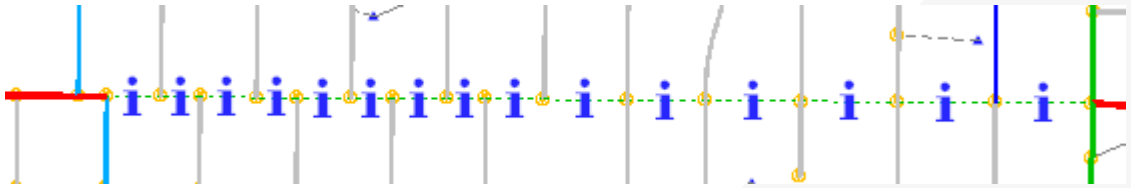
- To identify one-way roads, use the DIR field:
  - 0: Two-way travel
  - 1: A → B travel
  - -1: B → A travel

Network Editing

- Edit attributes of existing links – Method 1
  - To make most edits, use the information tool () 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



ID	4627	4927	4573	
Length	0.03	0.02	0.03	
Dir	-1	-1	-1	
STREETNAME	HARRIS	HARRIS	HARRIS	
STREETTYPE	ST	ST	ST	
Dir_10	-1	-1	-1	
FT_10	3	3	3	
AT_10	2	2	2	
AB_LN_10	--	--	--	
BA_LN_10	2	2	2	
CTLMED_10	--	--	--	
SPLM_10	30	30	30	
FFOR_10	--	--	--	
AB_FBAM_10	--	--	--	
BA_FBAM_10	--	--	--	
AB_FBOP_10	--	--	--	
BA_FBOP_10	--	--	--	
SUB_REGION	1	1	1	
Functional_Class	Minor Collectors	Minor Collectors	Minor Collectors	Minor
DOT_ROUTE	0	0	0	



Network Editing
Alternate Method

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

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**

Network Editing

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

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

Practice: Network Editing

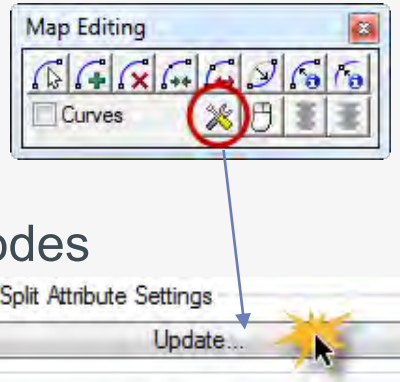
- Show Topology on the network
- Change a roadway to represent a different number of lanes in each direction
- Change a different roadway to a one-way road
  - 0 = Two-Way
  - 1 = A to B
  - -1 = to A

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

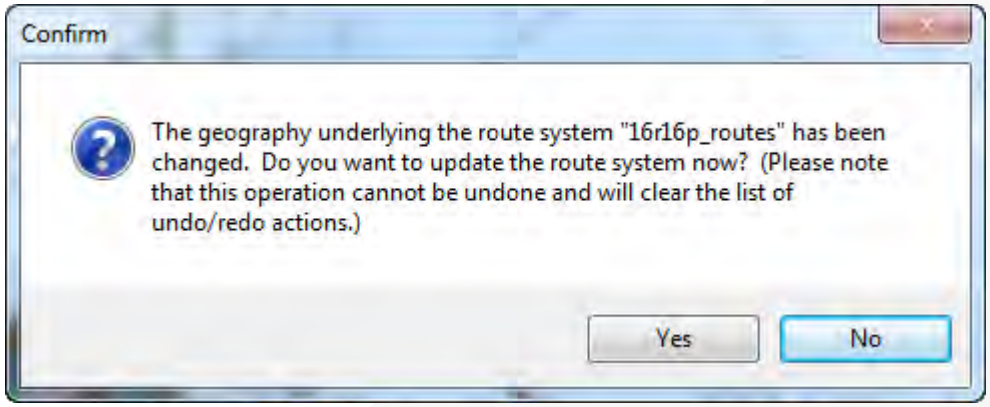
Network Editing

- 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/joined links

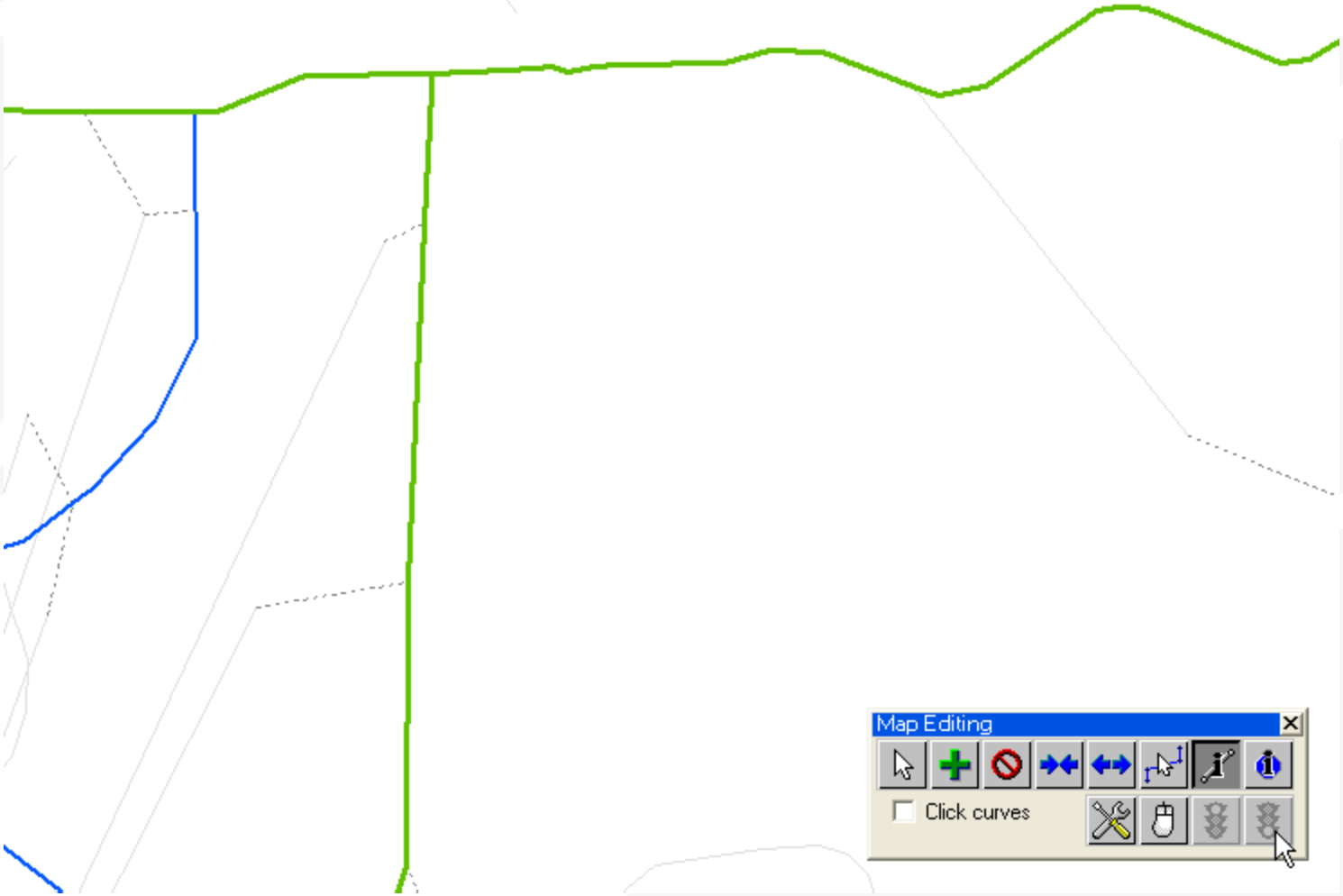


Network Editing

- 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



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 ()

Network Editing

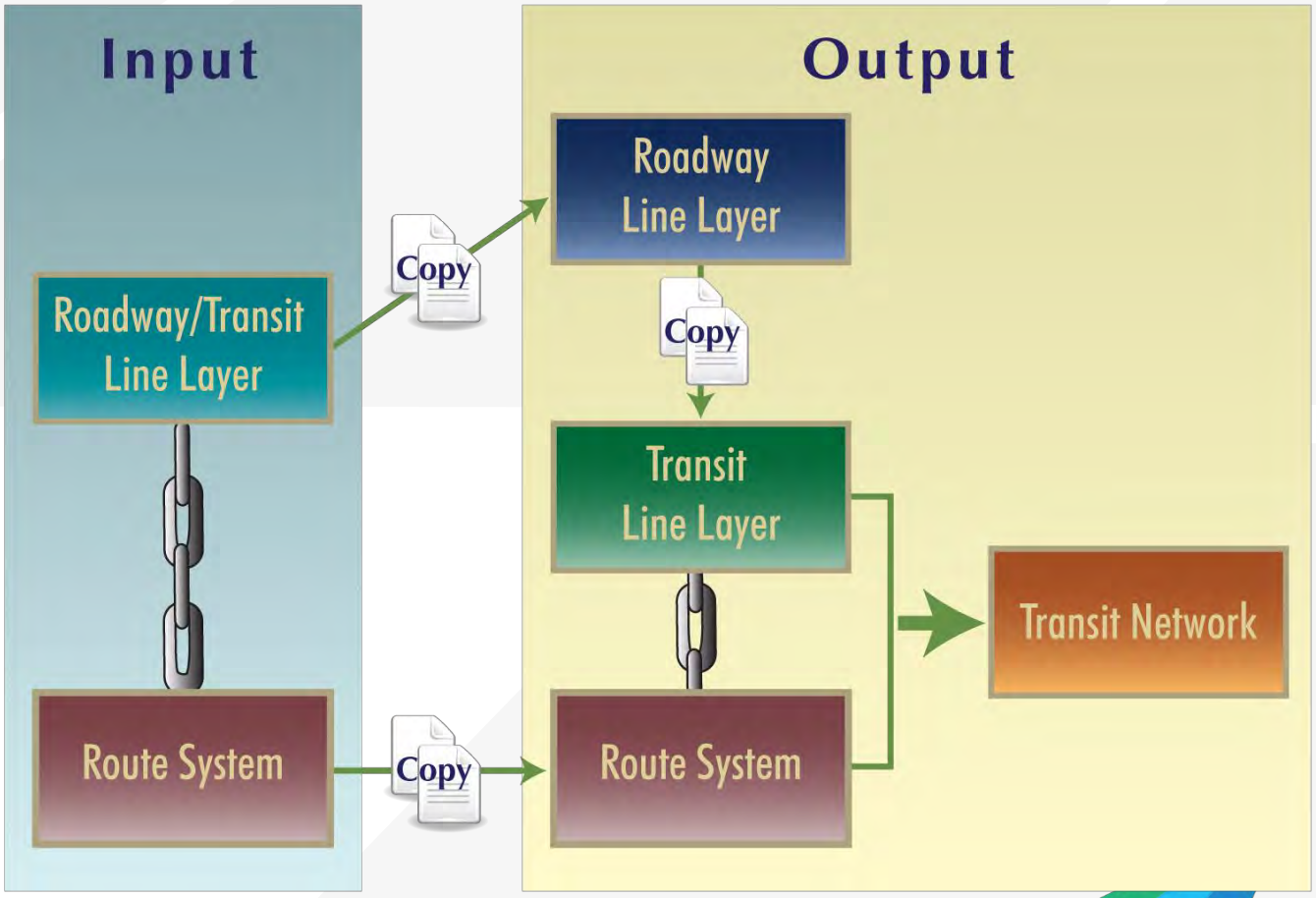
- Things to keep in mind:
  - When splitting links, make sure the data on both pieces still makes sense
  - When adding new roadways, adjust centroid connectors if necessary
  - Adding detail or making corrections?
    - You may need to make edits to base and forecast networks

Route Systems

CAMBRIDGE SYSTEMATICS

Route System Components

- Roadway Links
- Roadway Nodes
- Routes (Lines)
- Route Stops



Route System

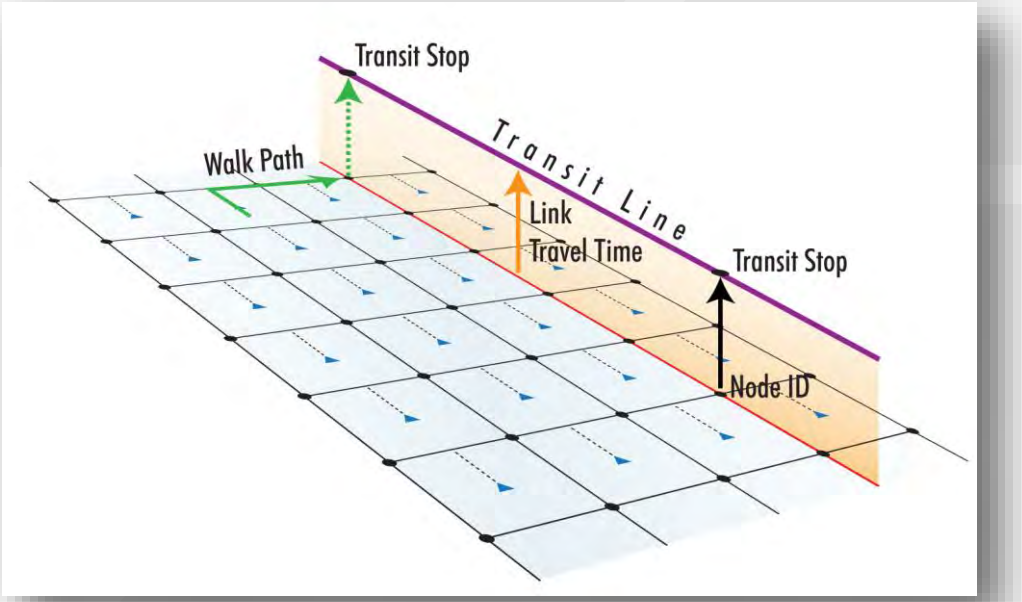
Roadway Links

Roadway Nodes

Routes (Lines)

Route Stops

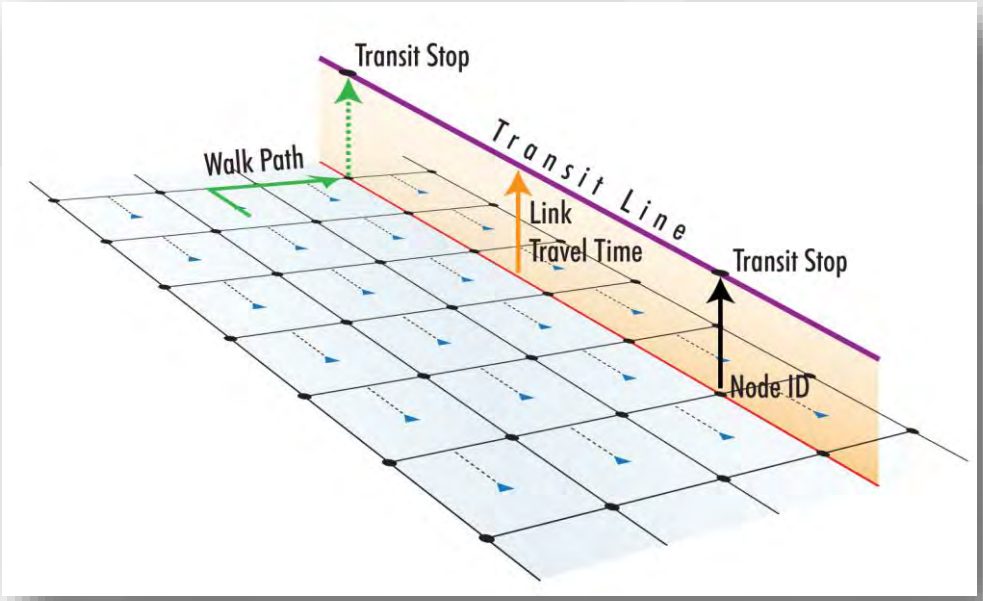
- Travel Time and Distance
- Walk and Drive Access



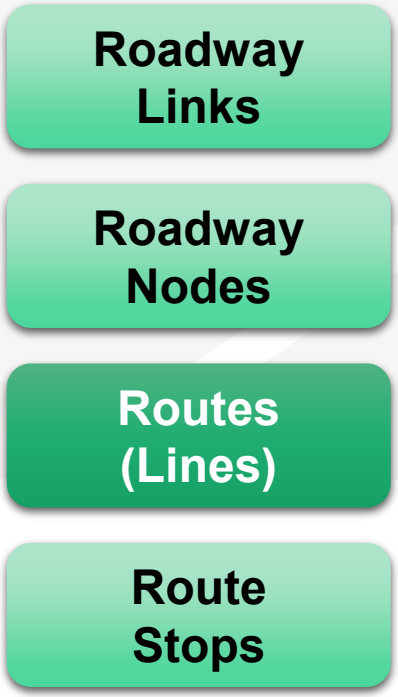
Route System

- Roadway Links
- Roadway Nodes
- Routes (Lines)
- Route Stops

- Centroids linked to Trip Data
- Nodes linked to Stops
- Nodes identified as Park and Rides

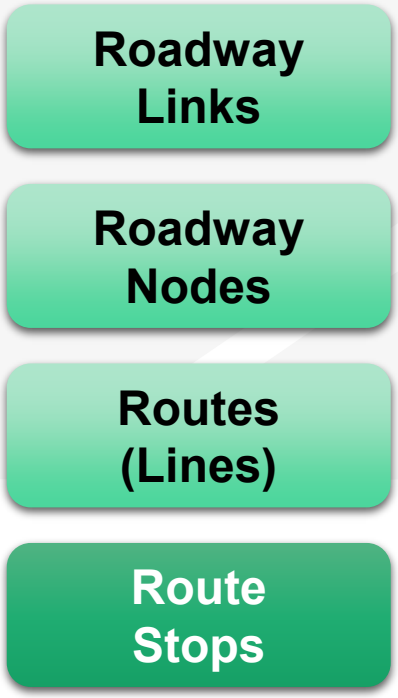


Route System



- Routes follow roadway links
  - Roadways
  - Centroid Connectors (possible, not recommended)
  - Transit only links (e.g., rail, BRT)
- Routes use link data
  - Travel Time
  - Distance
- Routes are stored in a ".rts" file

Route System



- Route Stops are stored in a pair of geographic files
  - managed from the route system
  - Physical Stops are common to all routes crossing a node
    - One required for each direction
  - Route Stops are specific to one and only one route
    - Must be associated with a physical stop

Route/Network Link

- The Route System is linked directly to the Roadway Network by *Complete Filenames*
- If the network is moved or renamed, The Route System will fail to open unless:
  - The roadway network is opened first, or
  - The route system is re-linked to the roadway network

Route/Network Link

- Re-establishing a Link:
  - Route Systems → Utilities → Move
    - Open the dbd file, choose this menu item, then choose a route system
- Checking the Link
  - Close all files
  - Open the route system in TransCAD
  - Verify that the expected network has been loaded

Route System Editing

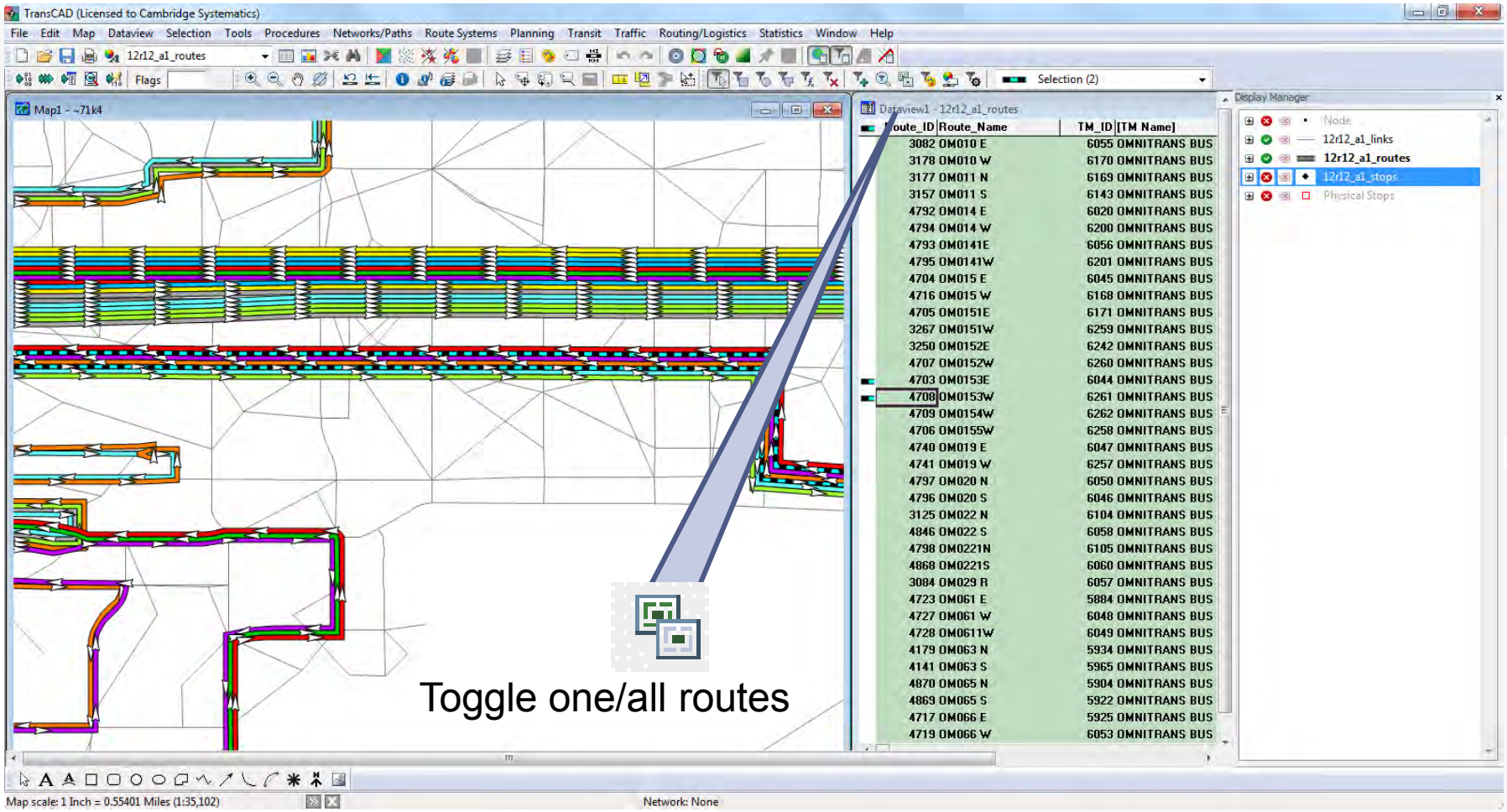
- Start by opening the **input** route system
  - Make sure the correct line layer has been opened
- Create a working ".net" network
  - Use default settings
  - Save this in the input directory
  - Use a temporary filename (e.g., net.net)
- Start the Route Editing Toolbox
  - Route Systems → Editing Toolbox

Note – Check the active layer as you try each step

Route System Display

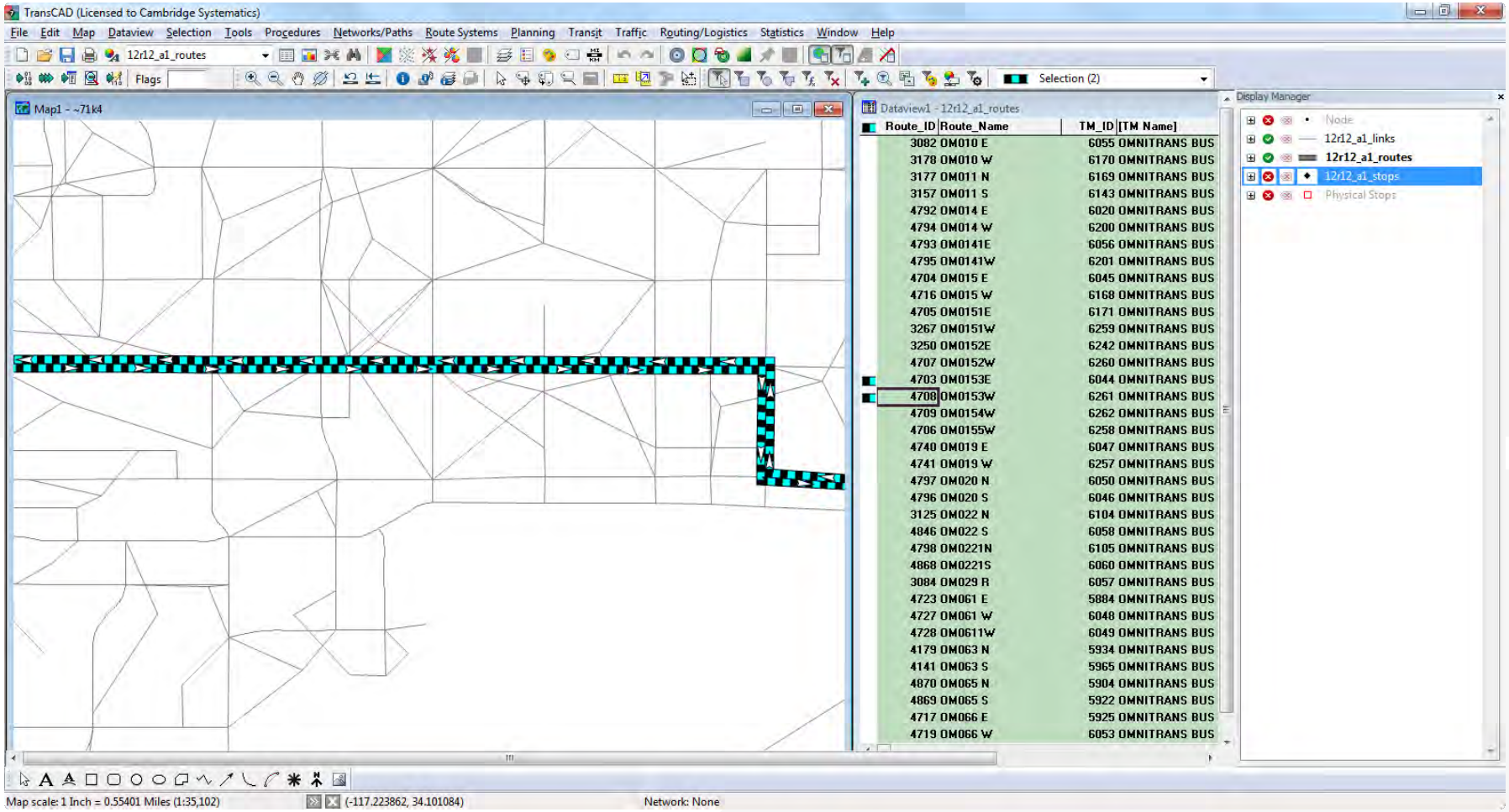
- Many routes can use the same corridor
- Edit route styles () to
  - Show Side by side
  - Show Topology
- Use selection sets to show only a set of routes
- Use screen real estate wisely

Example Editing Workspace



CAMBRIDGE SYSTEMATICS

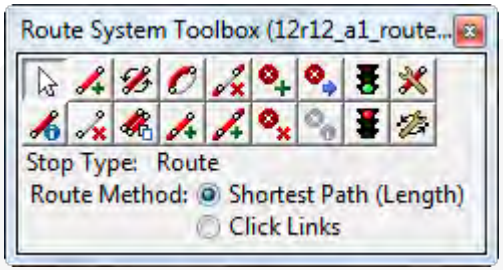
Example Editing Workspace



CAMBRIDGE SYSTEMATICS

Route System Editing

- » Select a route to edit
- » Edit route name
  - other route info can be edited with the standard info tool
- » Add or delete a route
- » Copy a route or add the reverse of a route
- » Realign a route
- » Extend a route or fill in a gap
- » Delete a section of a route
- » Add, delete, or move route stops
- » Save or cancel changes



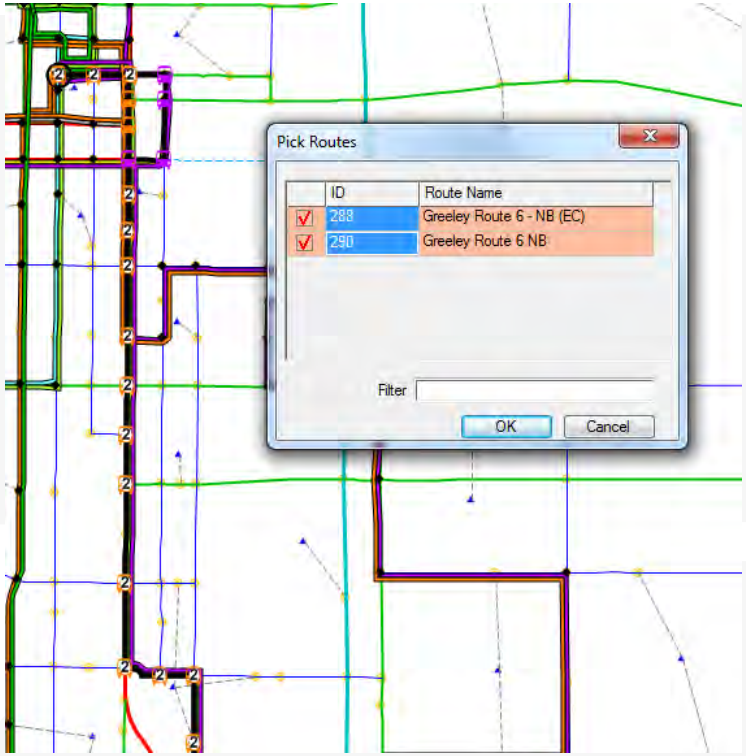
CAMBRIDGE SYSTEMATICS

Route System Editing

- Routes are usually edited by drawing paths
  - Click from node to node along a route
  - Only a few nodes along the route must be selected
- Potential Problem: A route does not take the shortest path between two nodes:
  - Change from **Shortest Path** to **Click Links**
  - Link mode can be especially helpful on freeways

Route System Editing

- Add stops to each route
  - » Manage both physical and route stops
- Stops must be adjacent to a node
- Be consistent
  - » Multiple routes with identical service should have identical stop placement



CAMBRIDGE SYSTEMATICS

Practice: Route Editing

- Use **Route Systems → Utilities → Move** to link the route system and network
- Verify the link
- Make some Changes:
  - Adjust a route headway
  - Add a new route
  - Add and/or remove route stops
  - Add a new Park and Ride

Running the SCAG Model

CAMBRIDGE SYSTEMATICS

Preparing a Computer

- TransCAD 6.0,
  - build 9215 or later
  - 64-bit verison 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

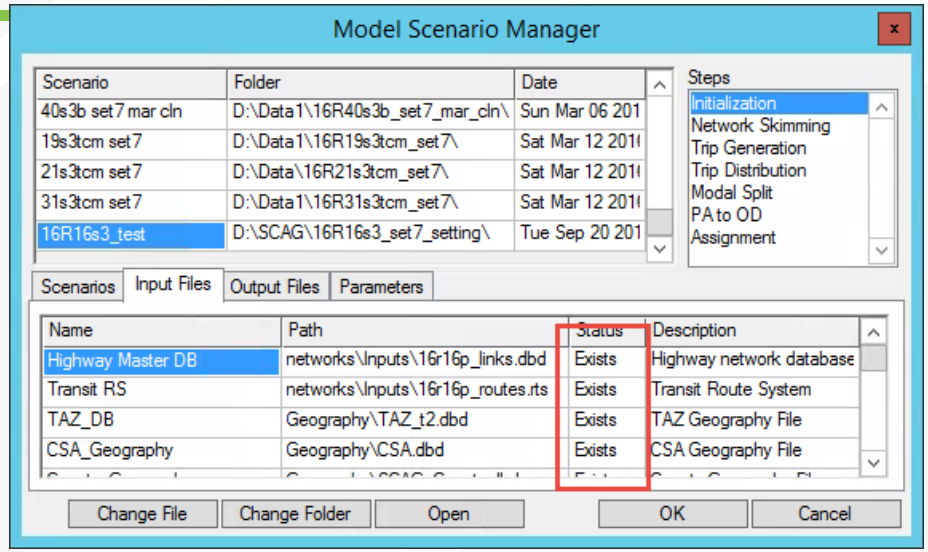
- Request the model from SCAG
  - Go to: http://www.scag.ca.gov/DataAndTools/Pages/Documents.aspx
  - Download the Model Data Request Form
  - Fill out and submit as instructed
- Cheryl Leising may be able to provide a Word version that is easier to fill out

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

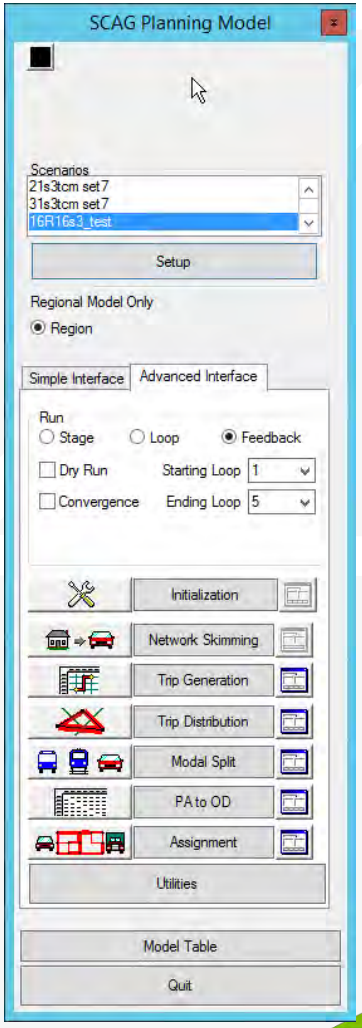
- Start the Add-In
  - » Tools → Add-Ins → SCAG Model v 6.3
- Setup a Scenario
  - » Click “Setup”
  - » Find the scenario to run
    - Example: 16R16s3
    - Make a copy (or work in place if you want)
  - » Set the correct directory on your system
    - Check to make sure Input files are shown as “Exists”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



CAMBRIDGE SYSTEMATICS

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’

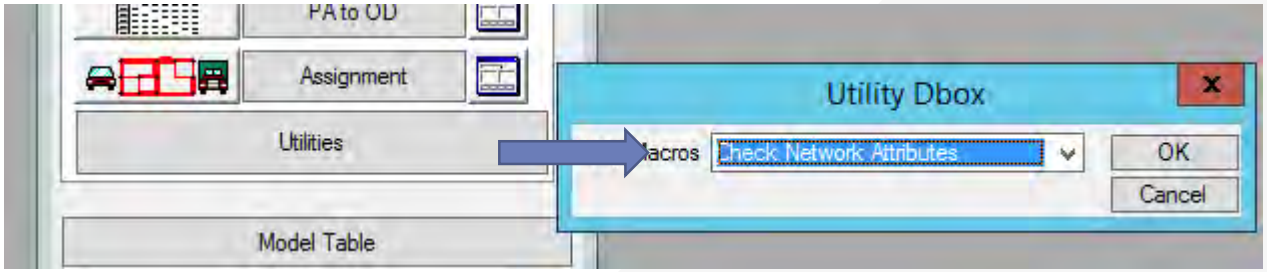


Running for Scenarios

- 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

Quick Run: Network Change

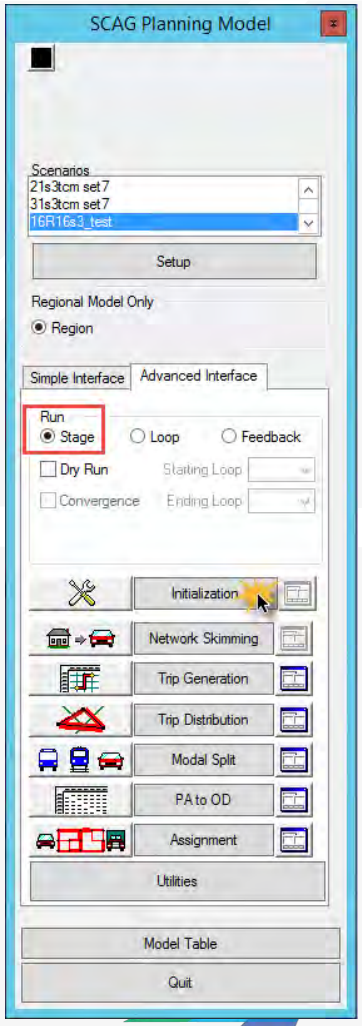
- Copy your entire model scenario folder
  - Alternate: Just backup the original **networks** and **assign** folders
- Modify the **input** highway network file
  - Remember: keep the route system up to date!
- Run the Check Network Attributes utility



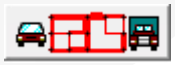
CAMBRIDGE SYSTEMATICS

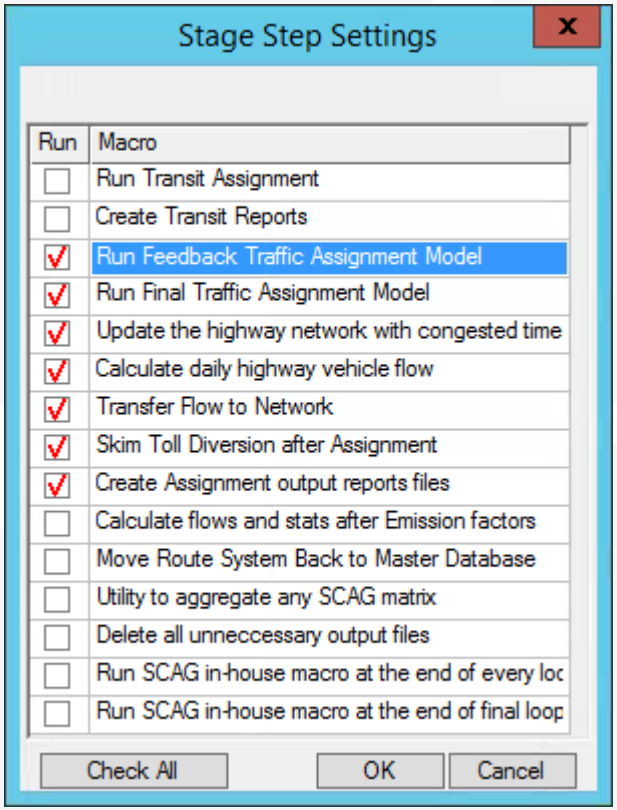
Quick Run: Network Change

- 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**’



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



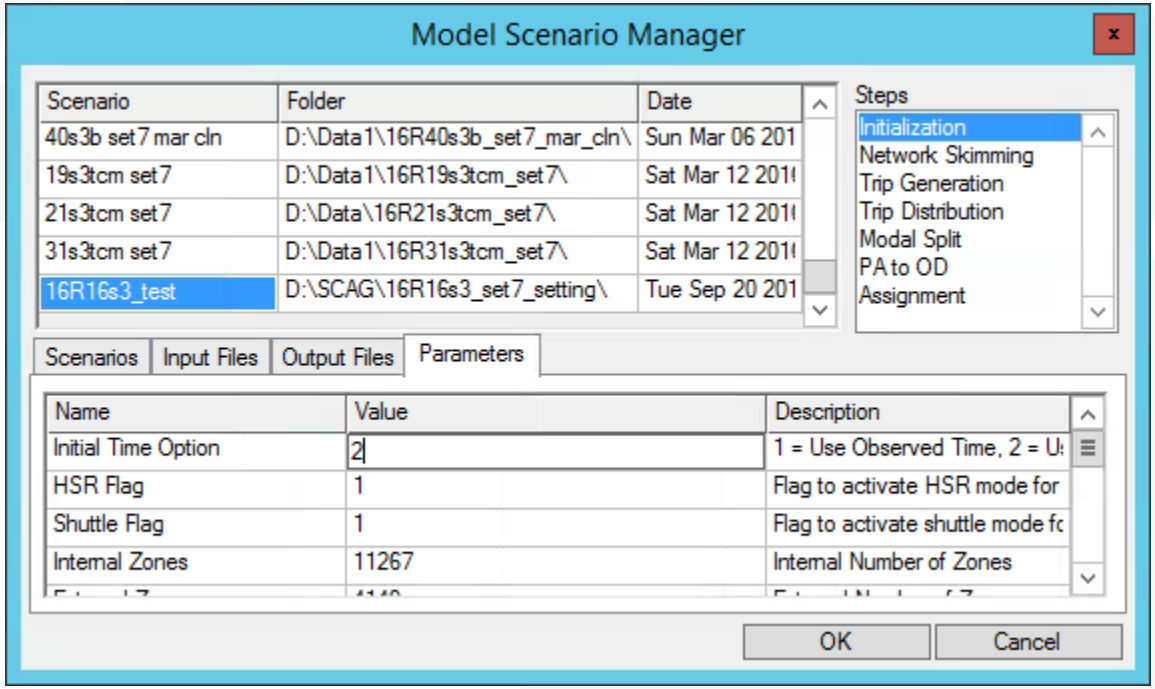
CAMBRIDGE SYSTEMATICS

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

One-Loop run

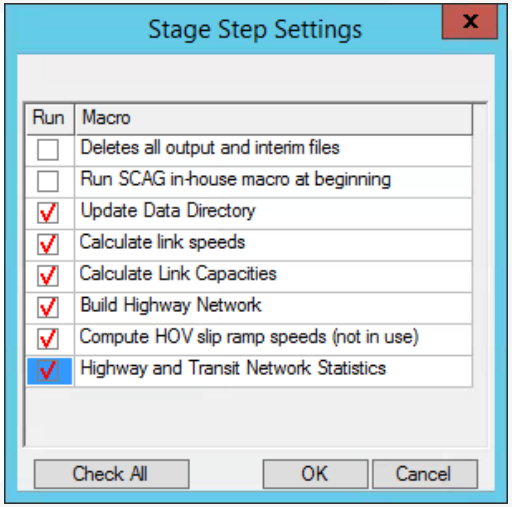
- Edit the scenario (click Setup)
  - Set the **Initial Time Option** to a value of 2
  - Click OK

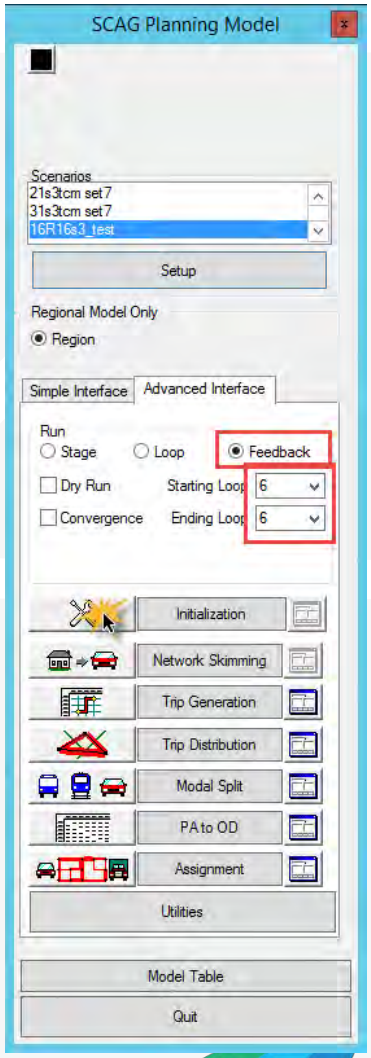


CAMBRIDGE SYSTEMATICS

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

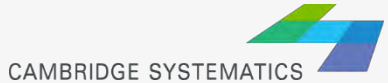




One-Loop run

- 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

Advanced Topics



Advanced Topics

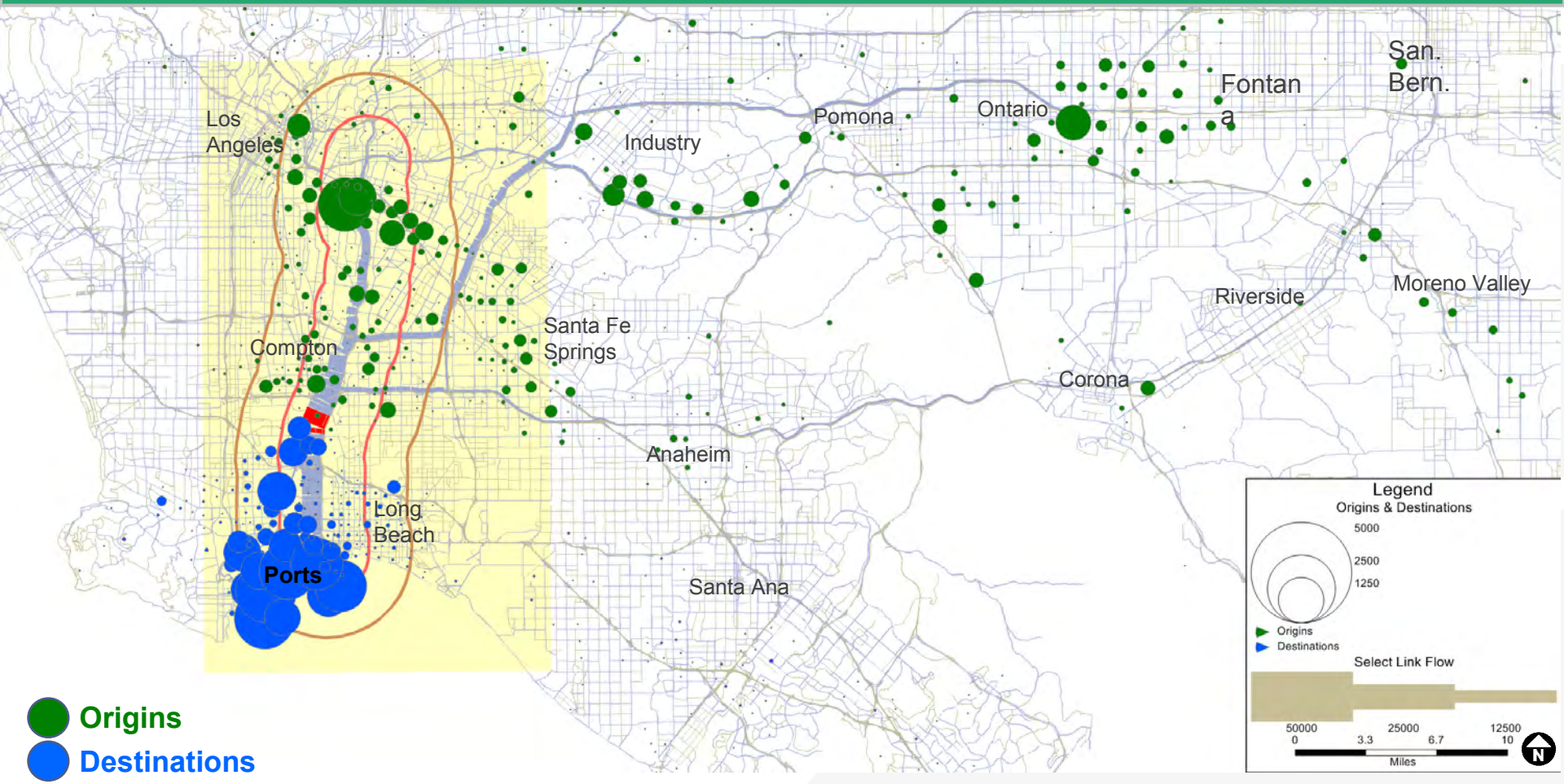
- Matrix Files and OD Tables
  - Matching matrix files to zones/centroids
  - Visualizing trip table data
    - Desire Lines
- Setting up Select Link and Zone Anlaysis
  - Creating a query file
  - Running assignment only with select analysis activated
- Routable Networks
  - Creating and updating a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

Thank You!

Examples

Year 2035 Alternative 5C: Select Link Analysis Daily HHDTs

Southbound 710 Freeway Long Beach Blvd. Location (Pair A)



Origins

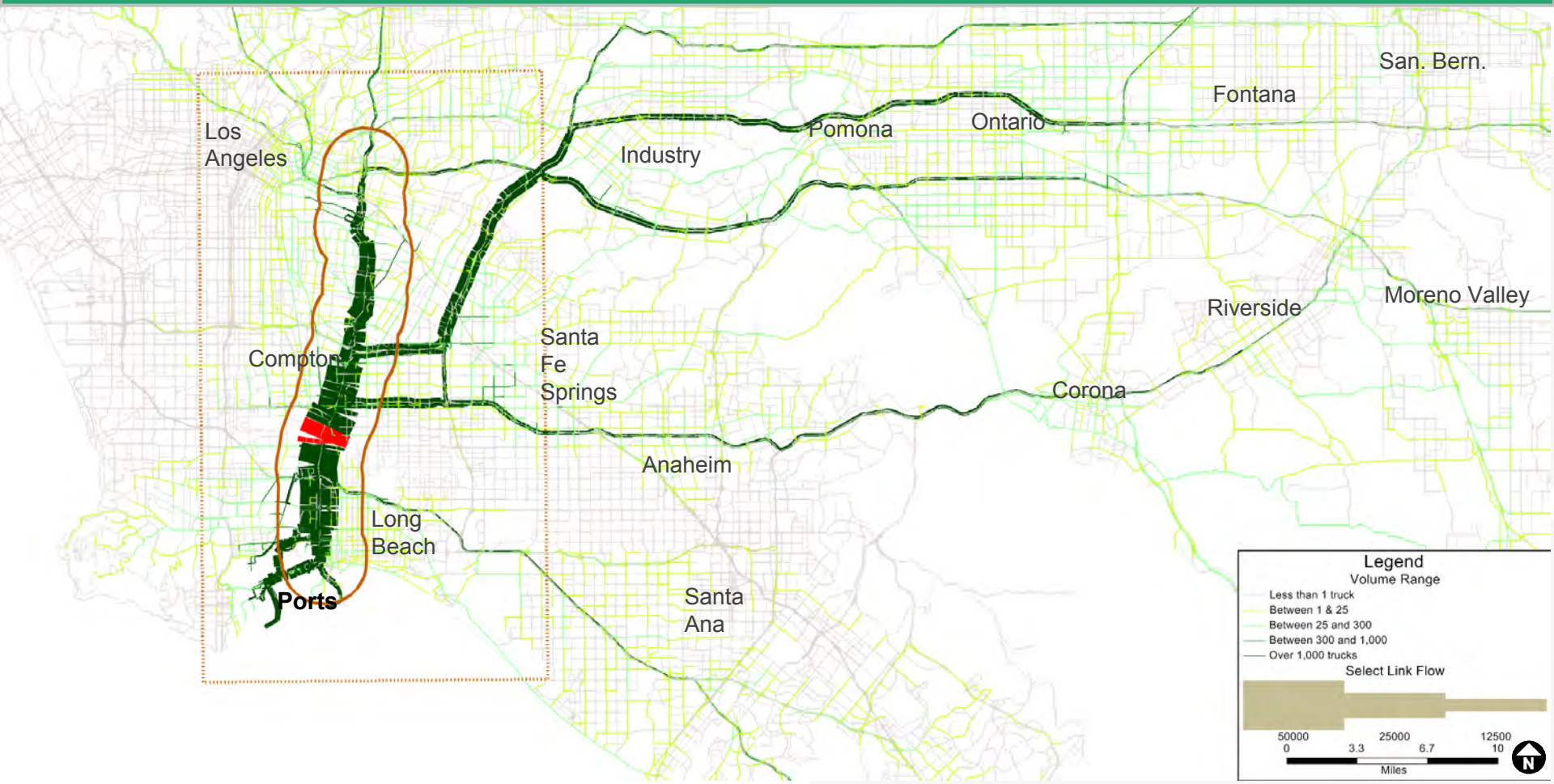
Destinations

** Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS

Year 2035 Alternative 5C: Select Link Analysis Daily HHDTs

Long Beach Blvd Location Bandwidth HHDT Volumes



** Example only: not meant for reading the text in PowerPoint presentation format*

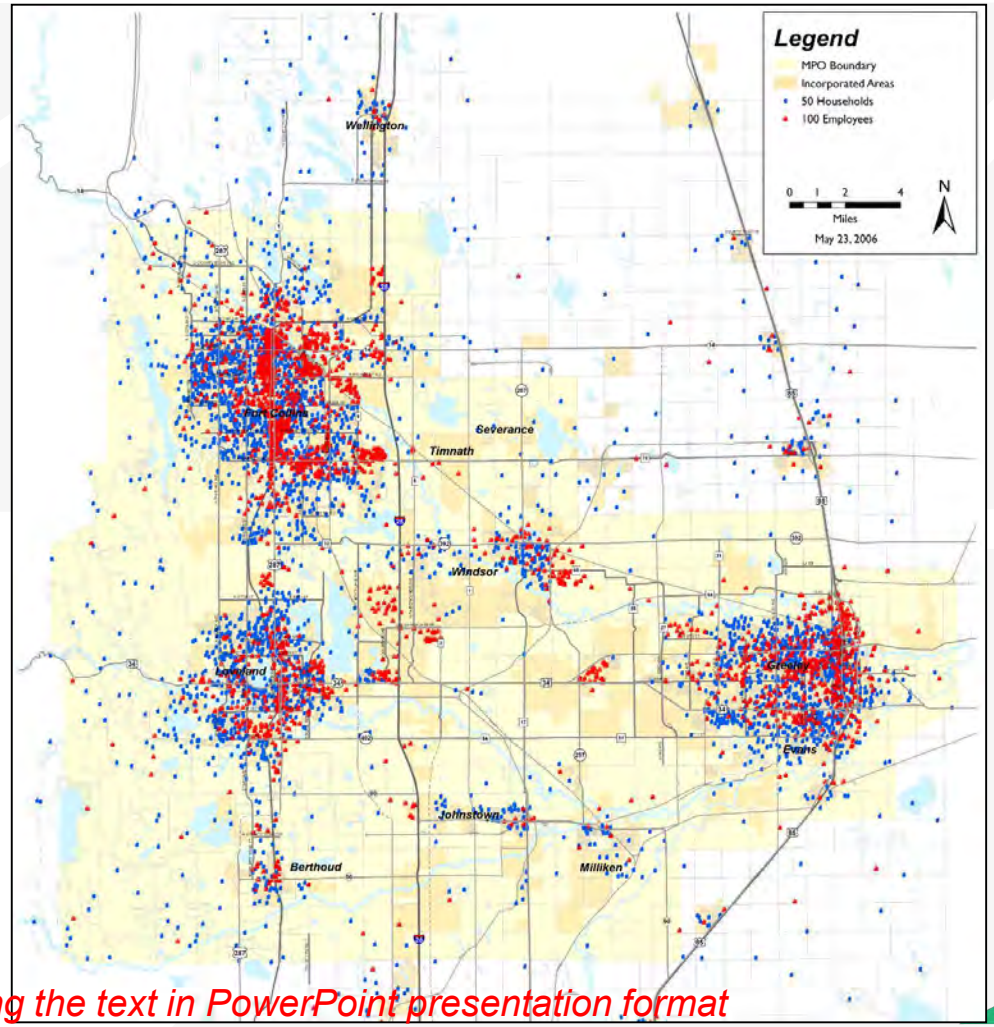
CAMBRIDGE SYSTEMATICS

Household And Employment Growth

Today

50 Households

100 Employees



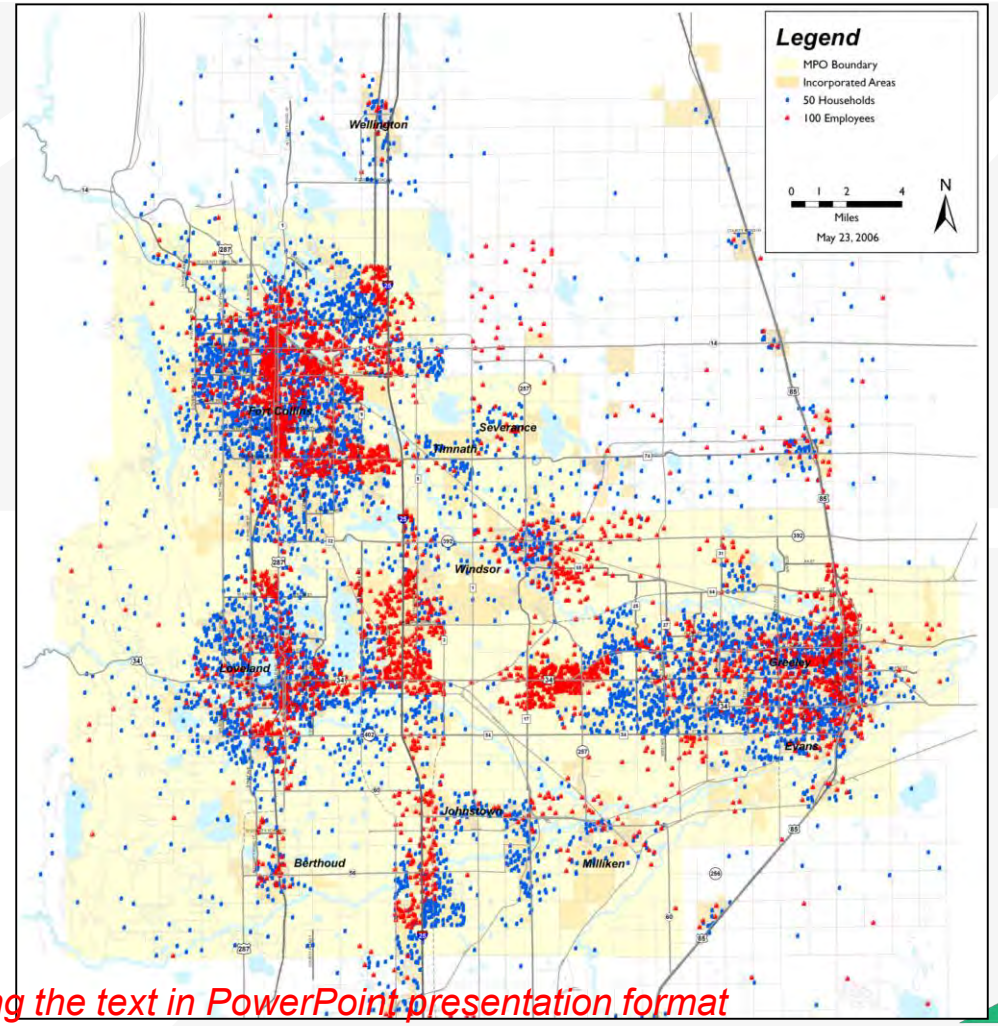
** Example only: not meant for reading the text in PowerPoint presentation format*

Household And Employment Growth

Future

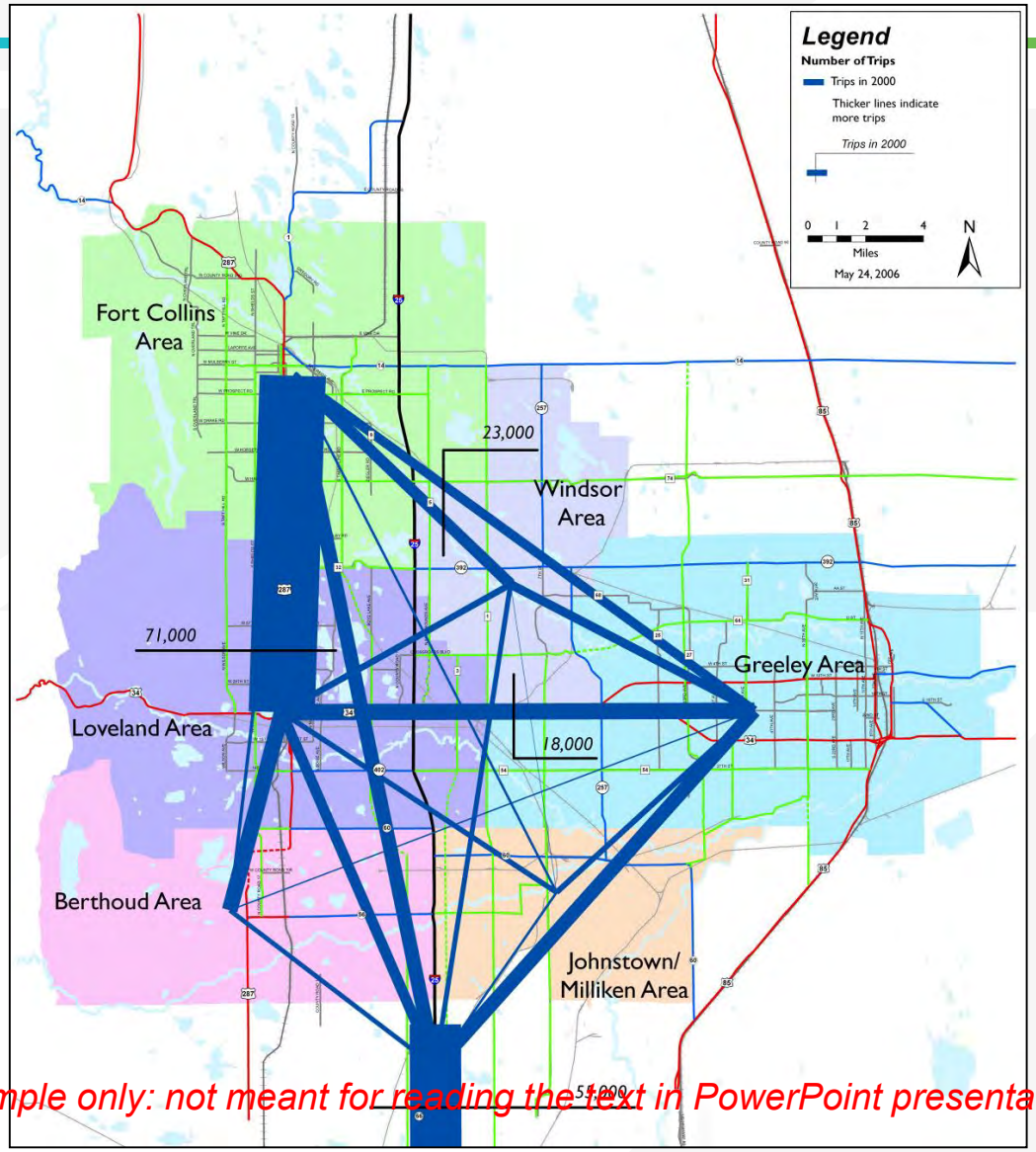
50 Households

100 Employees



** Example only: not meant for reading the text in PowerPoint presentation format*

Travel Patterns

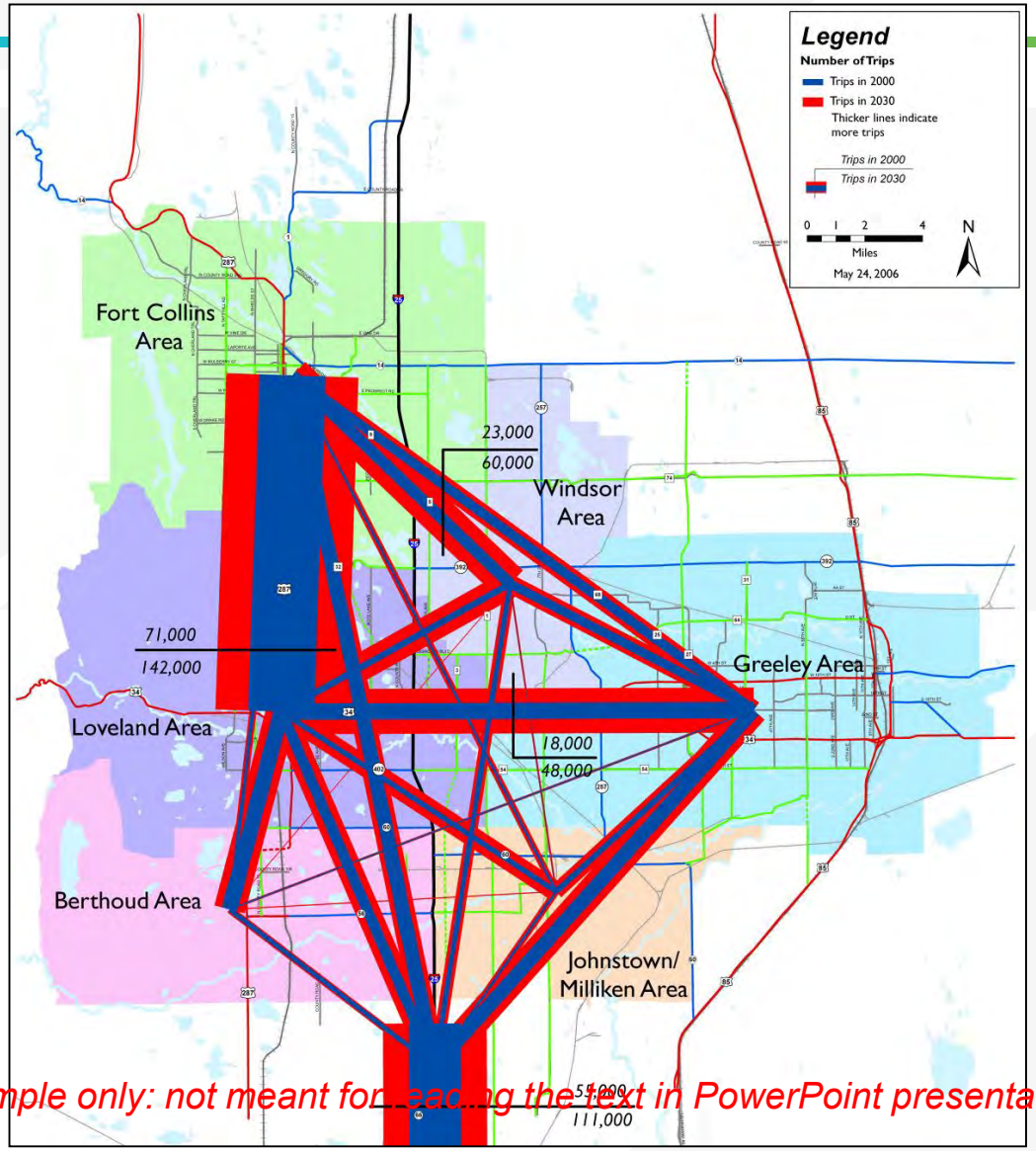


Today

** Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS

Travel Patterns

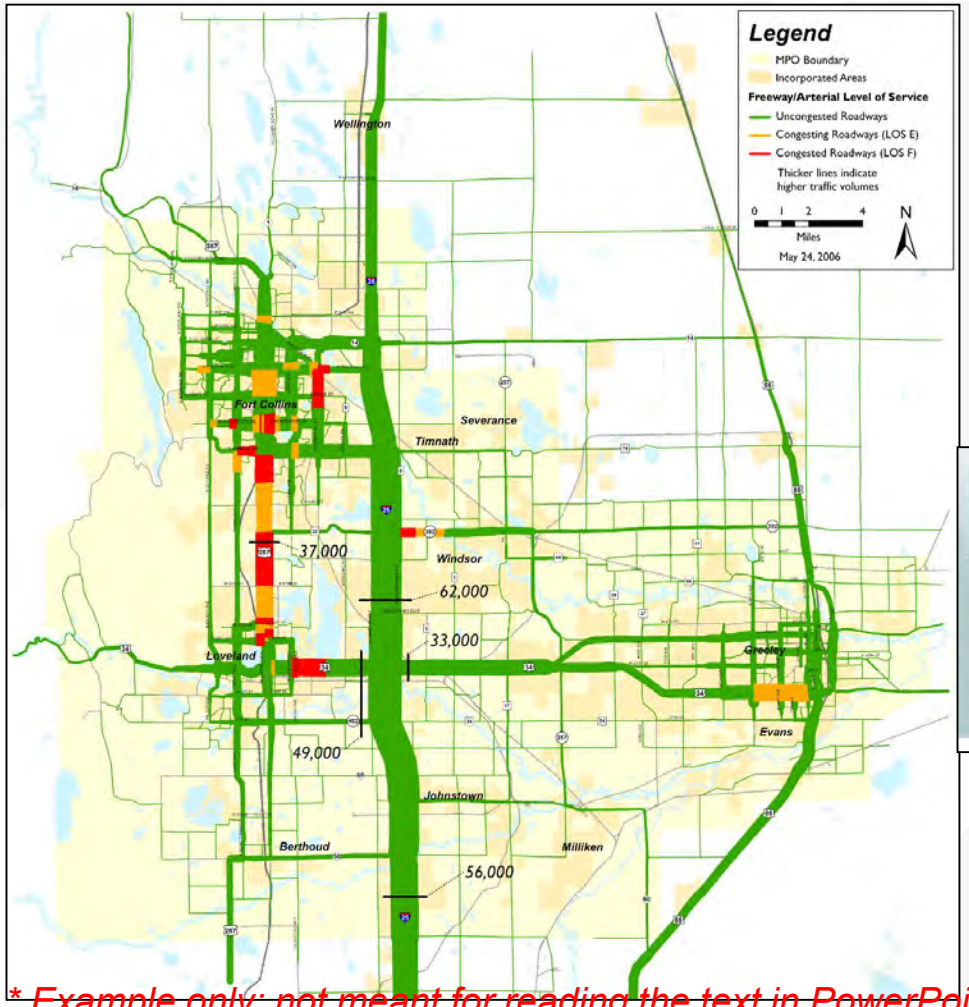


Future

** Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS

Traffic Volumes And Congestion



Today

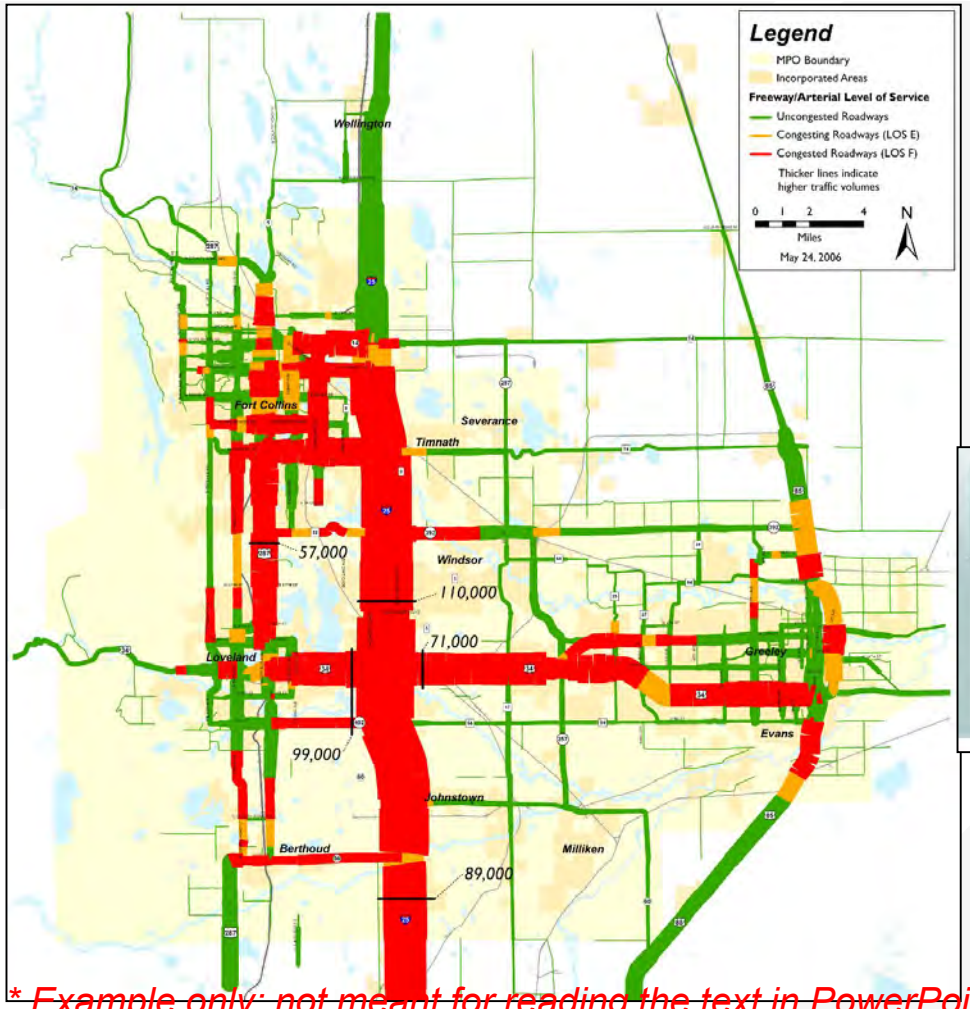
Travel Times

From/To	Today	2030	Increase
Fort Collins to Denver	73 Minutes	119 Minutes	46 Minutes (63%)
Fort Collins to Greeley	37 Minutes	49 Minutes	12 Minutes (32%)
Greeley to Loveland	29 Minutes	39 Minutes	10 Minutes (34%)
Berthoud to Windsor	24 Minutes	37 Minutes	13 Minutes (54%)

** Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS

Traffic Volumes And Congestion



Future

Travel Times			
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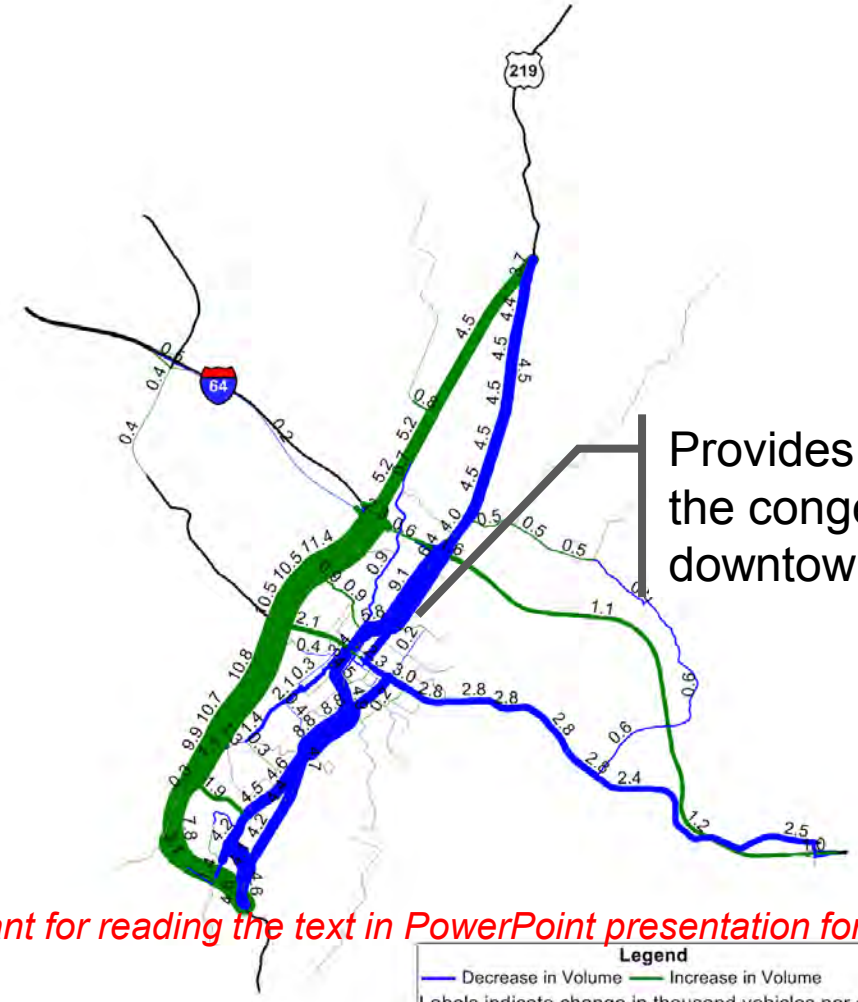
** Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS

Where Does The Traffic Go?

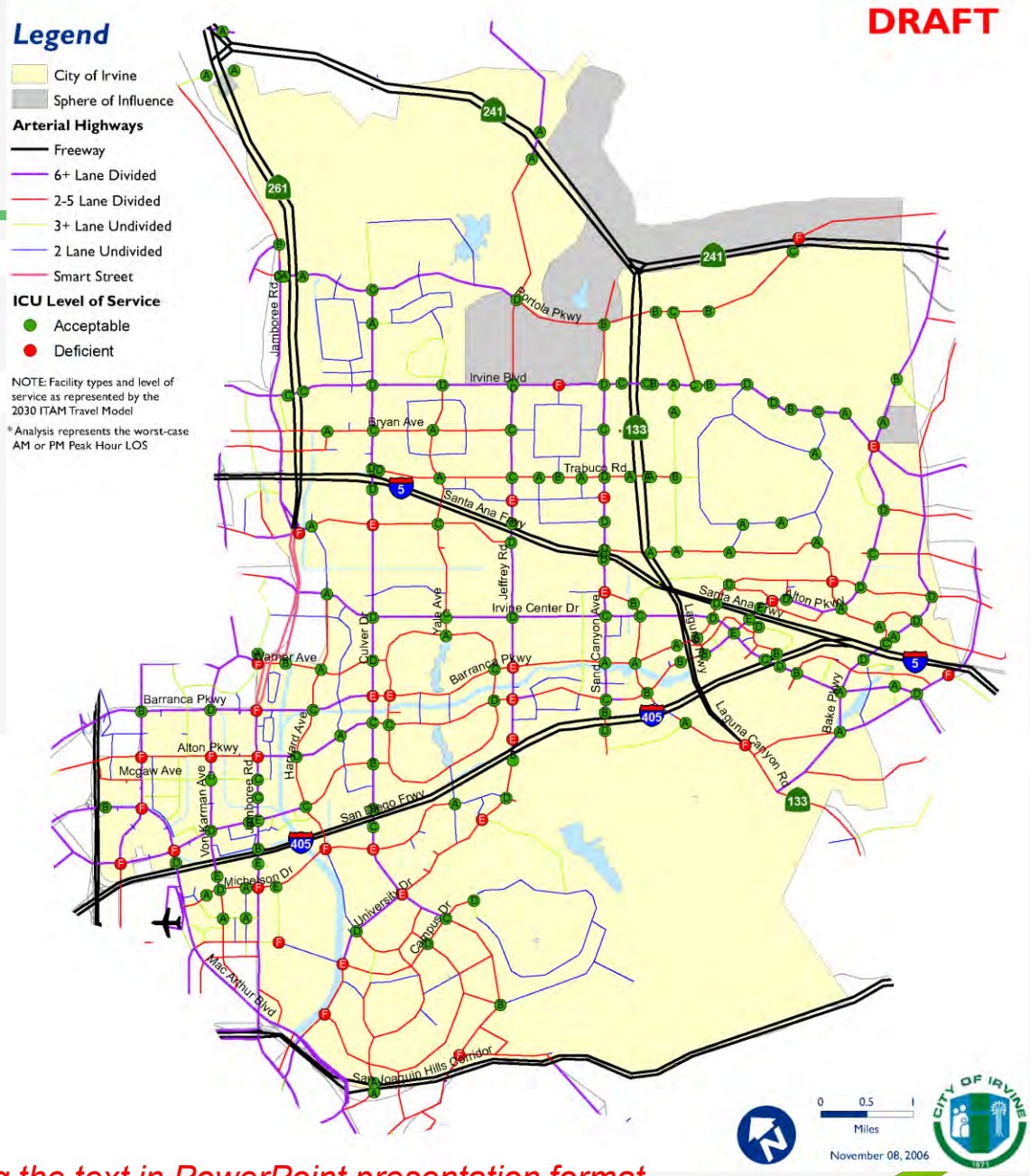
A new parkway serves through traffic



Provides relief in the congested downtown area

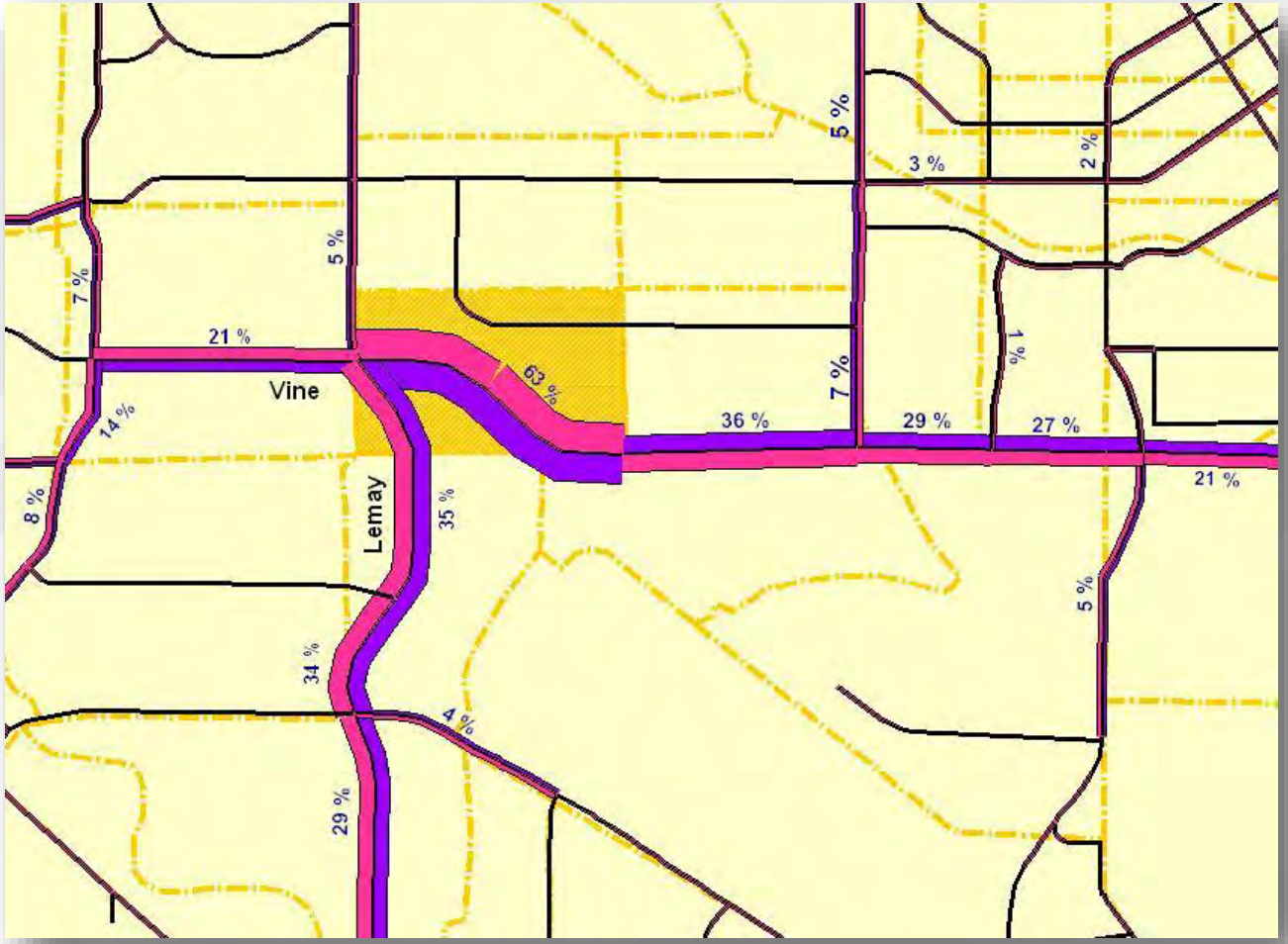
** Example only: not meant for reading the text in PowerPoint presentation format*

Intersection LOS



** Example only: not meant for reading the text in PowerPoint presentation format*

Traffic Impact Analysis



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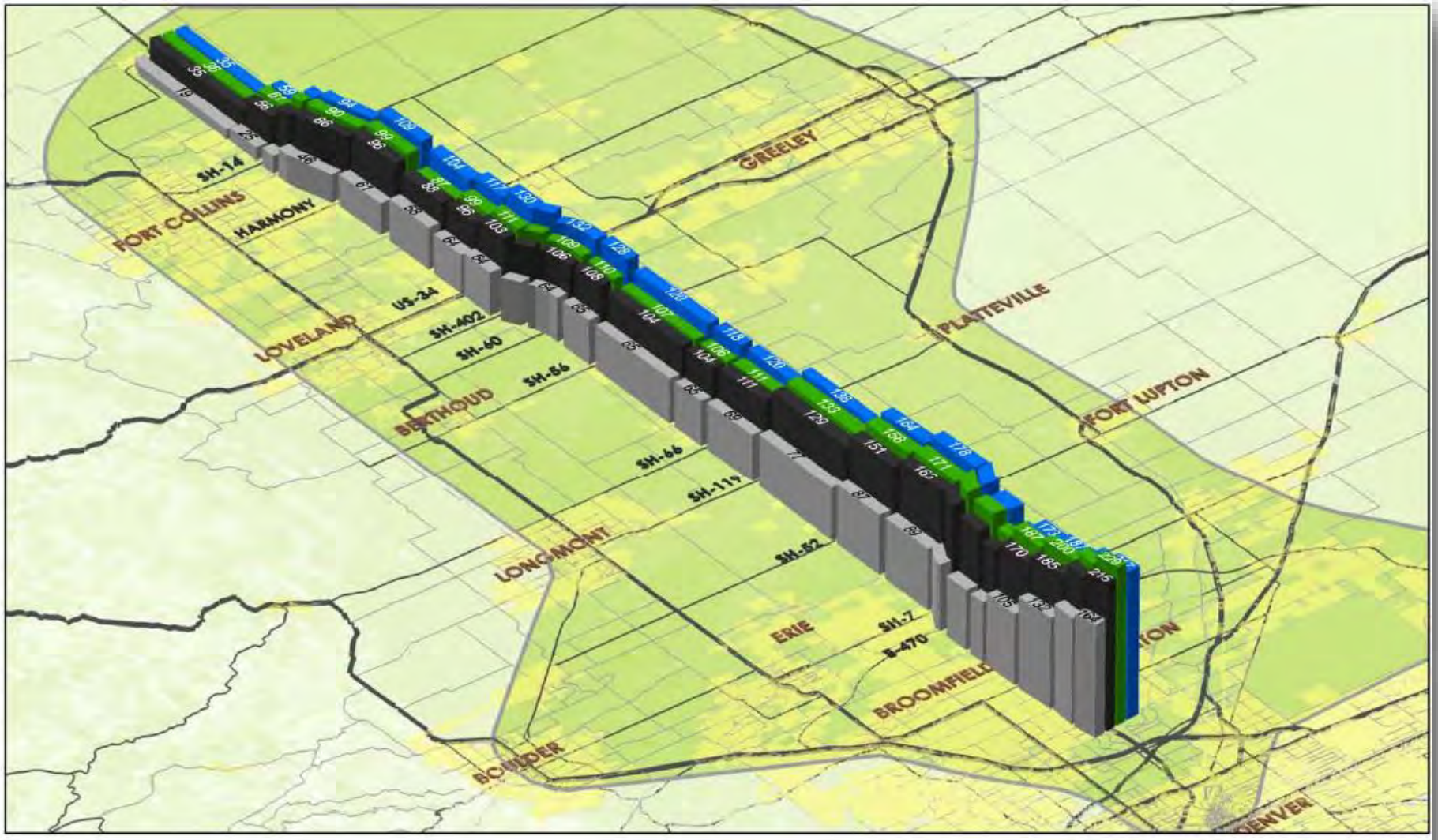
CAMBRIDGE SYSTEMATICS



DEIS Results:
I-25 Daily Traffic Volumes Comparison

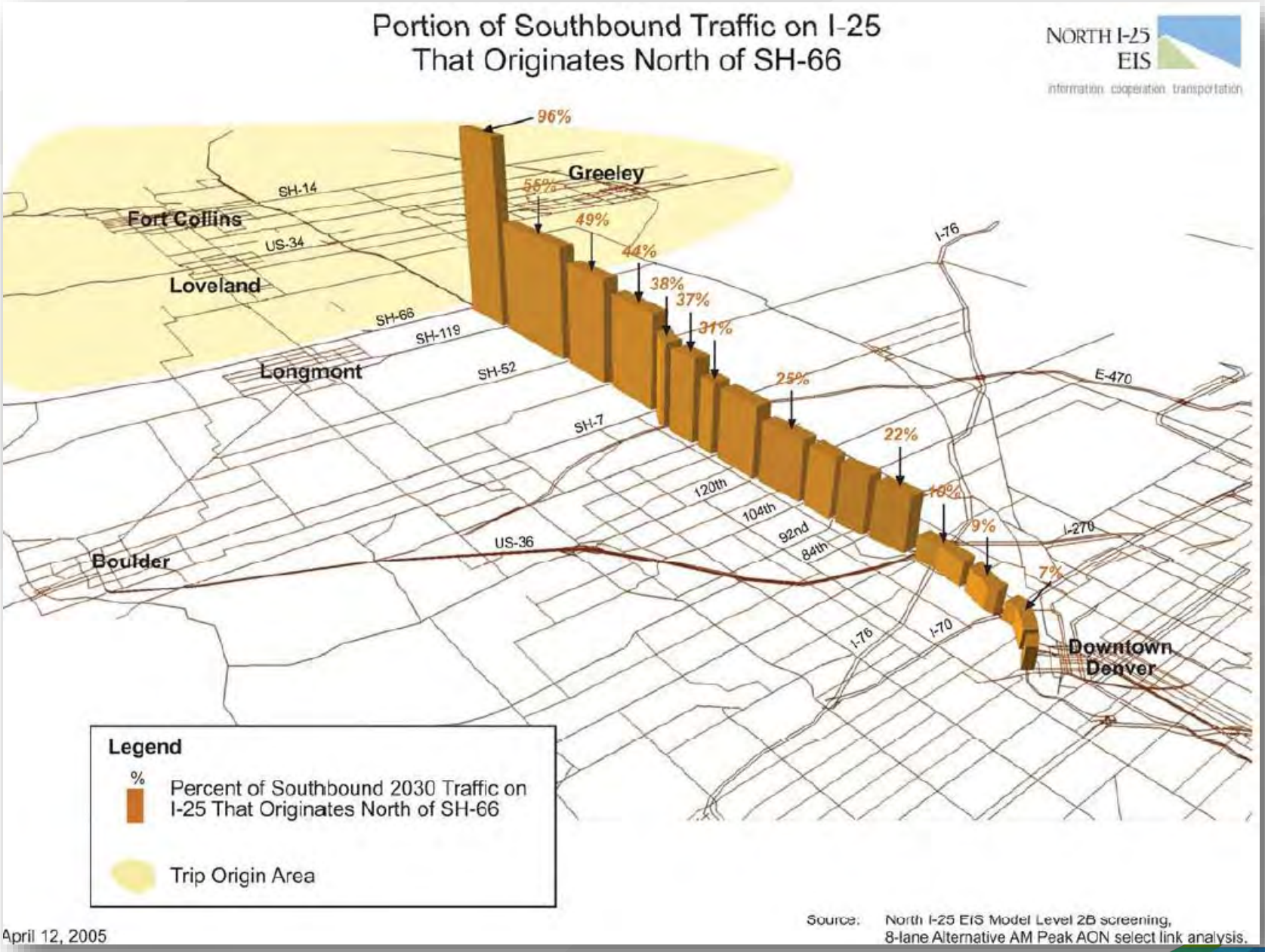
Legend

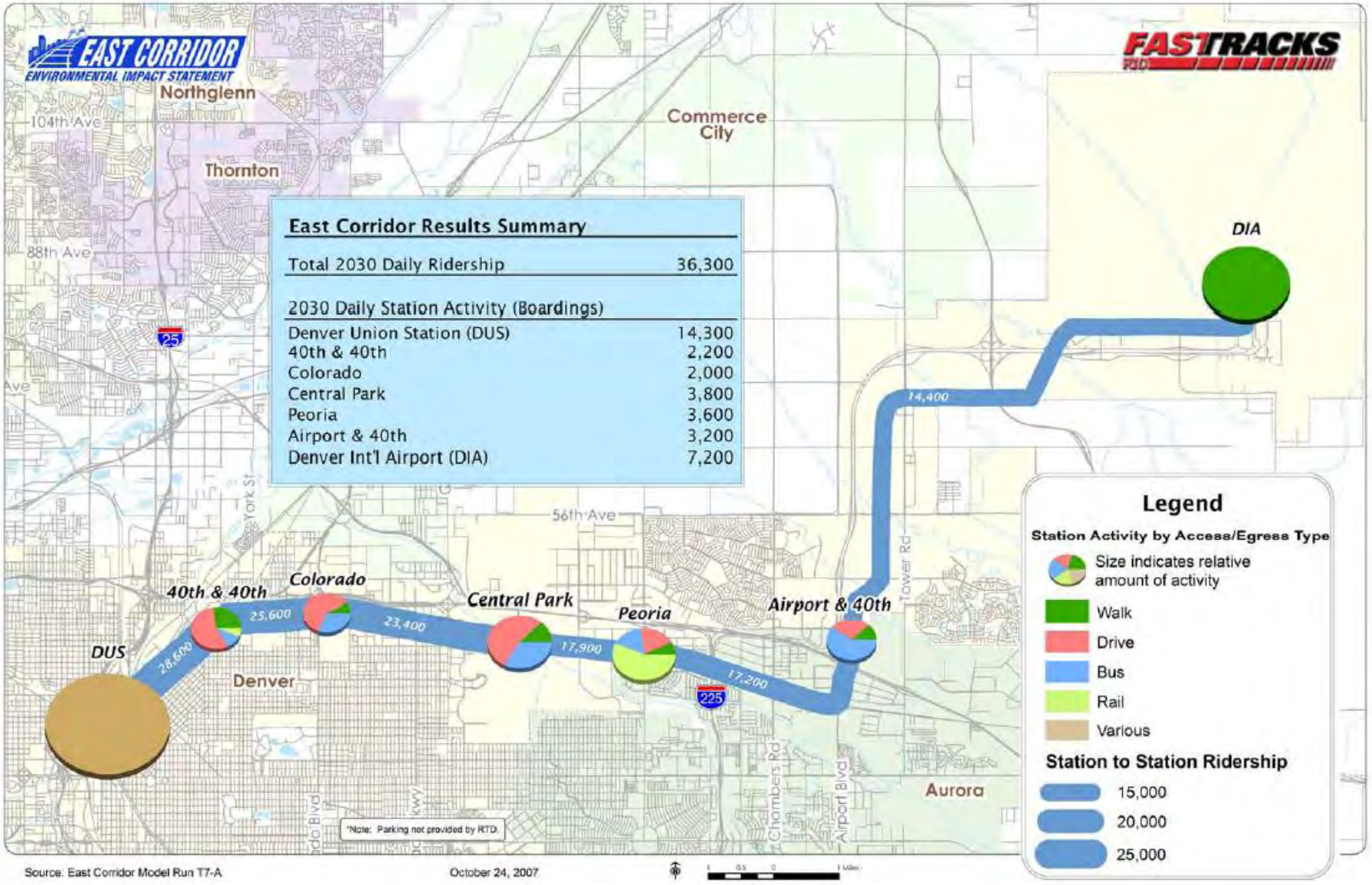
- Existing (Year 2005) Daily Traffic Counts, in thousands
- 2030 No-Action Daily Volumes, in thousands
- 2030 Package B Daily Volumes, in thousands
- 2030 Package A Daily Volumes, in thousands

Sources: 2005 Traffic Counts: North I-25 Travel Demand Forecast Model Runs. January 2007

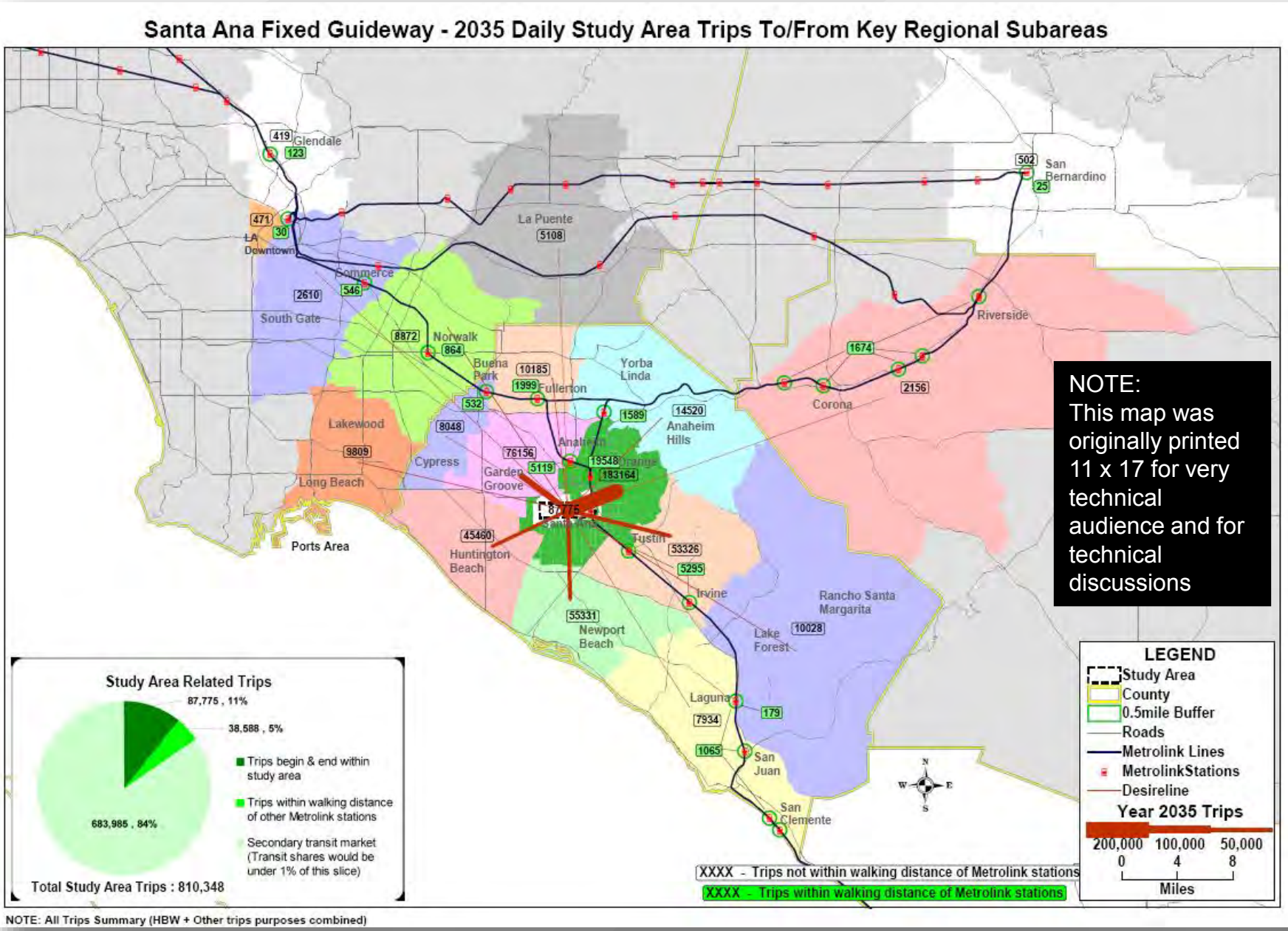
NORTH I-25 EIS
information. cooperation. transportation.

** Example only: not meant for reading the text in PowerPoint presentation format*


Portion of Southbound Traffic on I-25
That Originates North of SH-66
NORTH I-25 EIS
information cooperation transportation
96%
55%
49%
44%
38%
37%
31%
25%
22%
10%
9%
7%
Greeley
Fort Collins
Loveland
Longmont
Boulder
SH-14
US-34
SH-66
SH-119
SH-52
SH-7
US-36
I-76
E-470
120th
104th
92nd
84th
I-270
I-70
Downtown Denver
Legend
%
Percent of Southbound 2030 Traffic on I-25 That Originates North of SH-66
Trip Origin Area
April 12, 2005
Source: North I-25 EIS Model Level 2B screening, 8-lane Alternative AM Peak AON select link analysis.



** Example only: not meant for reading the text in PowerPoint presentation format*



** Example only: not meant for reading the text in PowerPoint presentation format*

Thank you!

More Topics

- GISDK
- MMA
- Select link/zone analysis
- Subarea analysis
- ODME
- Model estimation
- Other planning functions

Transit Networks

CAMBRIDGE SYSTEMATICS

Transit Networks

- Contain all mode and pathbuilder settings
  - Mode.bin table contains mode-specific information
  - Modexfer.bin contains mode-to-mode values
  - Connection between link/node layers
    - Stops tagged to node
- In-program:
  - Create a new transit network
  - Review transit network settings
    - New network
    - Batch-created network

Transit Networks

- Pathbuilding
  - Build transit paths based on network settings
    - Interactive: Test specific paths and try various pathbuilder settings
    - Skim: Build zone-to-zone paths

Practice: Transit Networks

- Create a new transit network based on the route system
  - Review settings
  - Build a few paths interactively
- Change the transit network to a generated file
  - Build similar paths – how are they different?
  - Try changing network settings and observe how paths change
    - Combination factor
    - IVTT/OVTT weights