# CAMBRIDGE SYSTEMATICS

Think Forward

# TransCAD and the SCAG Model

**presented to**

*Caltrans District 8*

Presented
September 21st and 22nd of 2016

Revisited
February 15th and 16th of 2017

**presented by**

*Cambridge Systematics, Inc.*
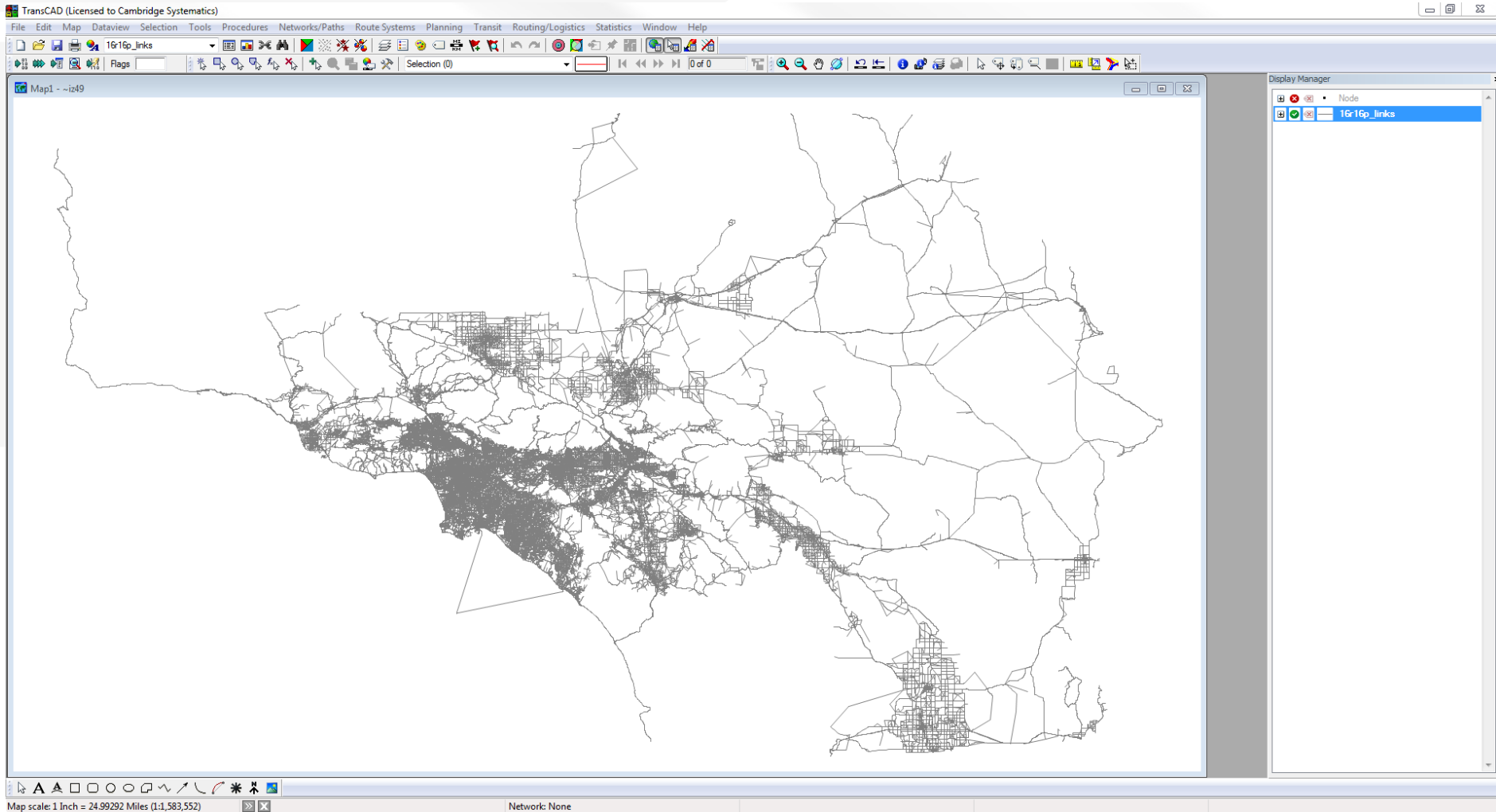
*Sean McAtee, Ron West, Xuan Lui*

# 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?

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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
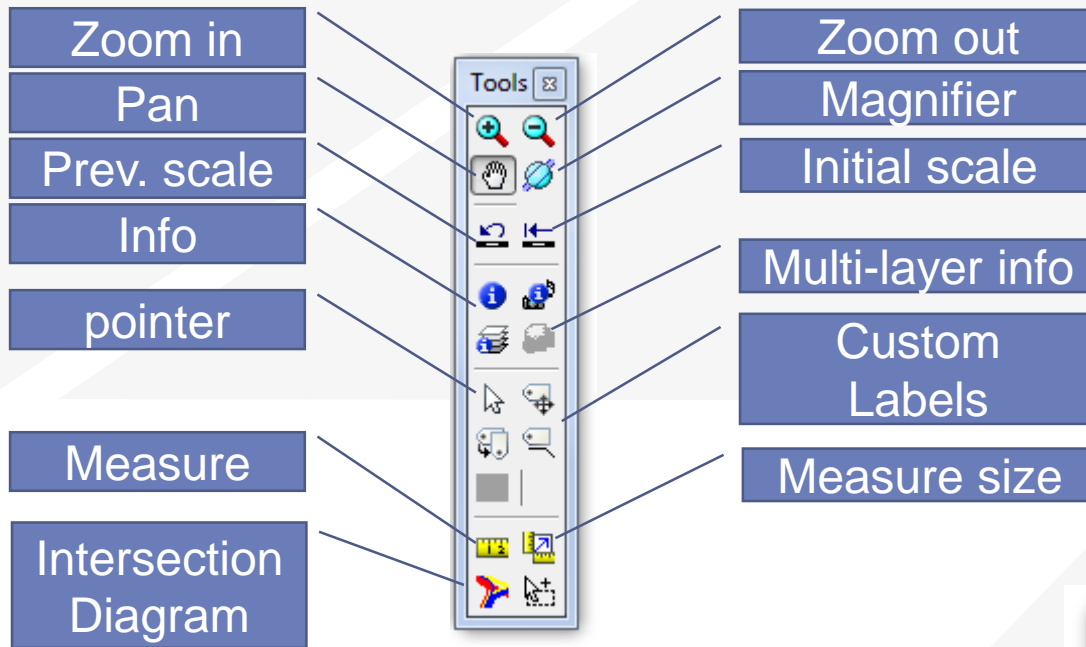  » 64-bit vs. 32-bit
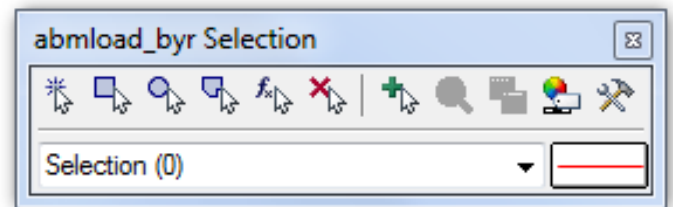  » Need 9250 to run the SCAG Model

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# TransCAD User Interface

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# Tools

Statistics    Window    Help

## Most used

## Selection toolbox

| Zoom in |
| Pan |
| Prev. scale |
| Info |
| pointer |

| Zoom out |
| Magnifier |
| Initial scale |

| Multi-layer info |
| Custom Labels |
| Measure size |

| Measure |
| Intersection Diagram |

Tools

These can be docked at the top of the window!

abmload_byr Selection

Selection (0)

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# Tools



Drawing toolbox*

* For objects on the map – not for geographic editing

Usually docked at the bottom of the window

GISDK toolbox

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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

**CAMBRIDGE SYSTEMATICS**
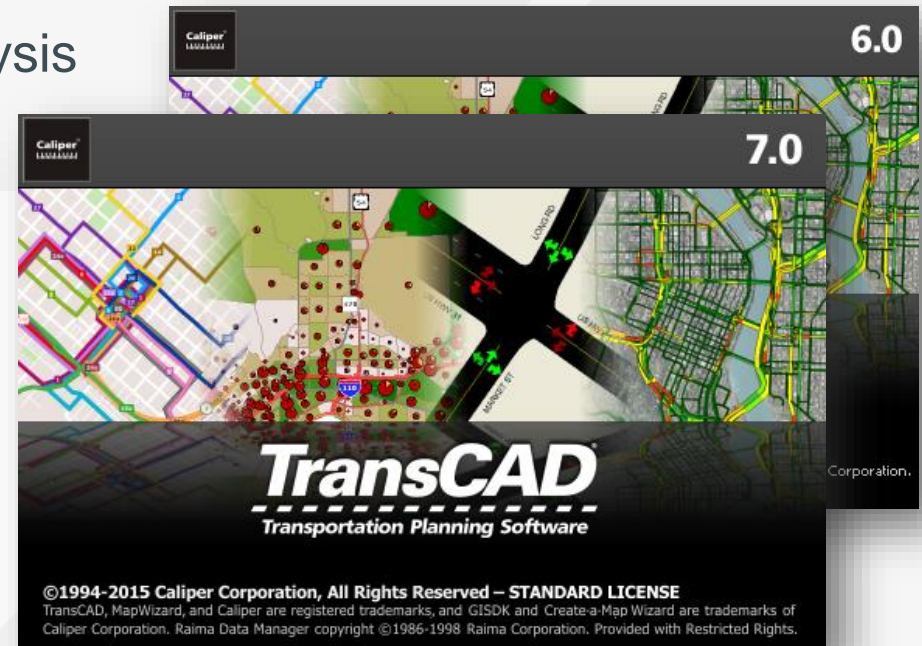
# Built In Interface

➤ 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"

CAMBRIDGE SYSTEMATICS
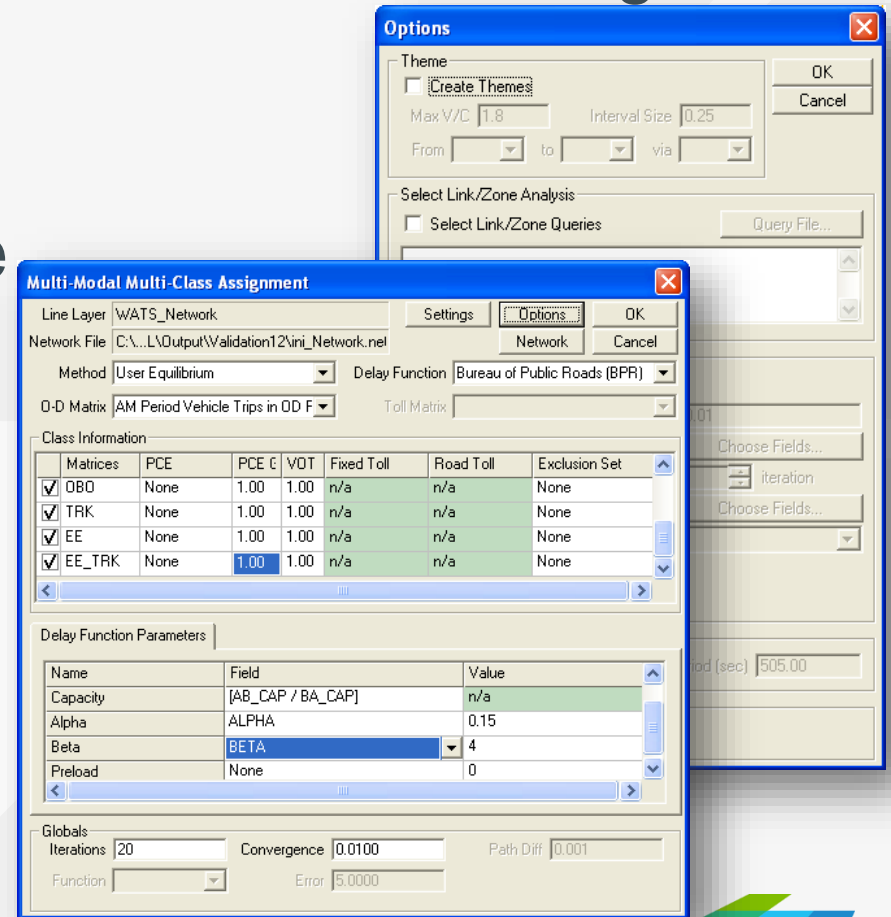
# Batch Mode

- 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)
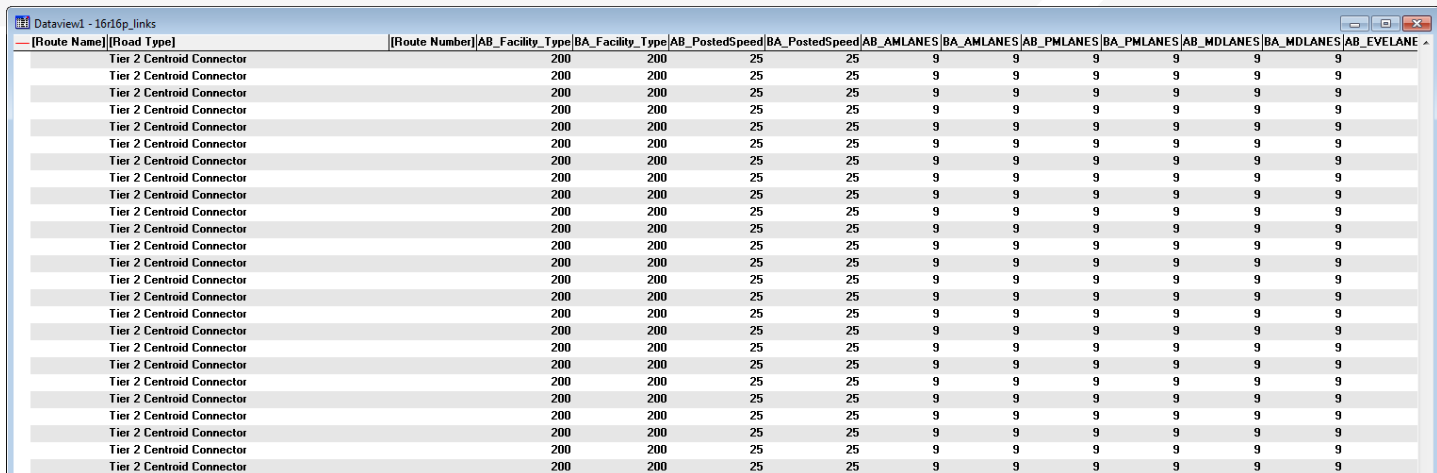
CAMBRIDGE SYSTEMATICS
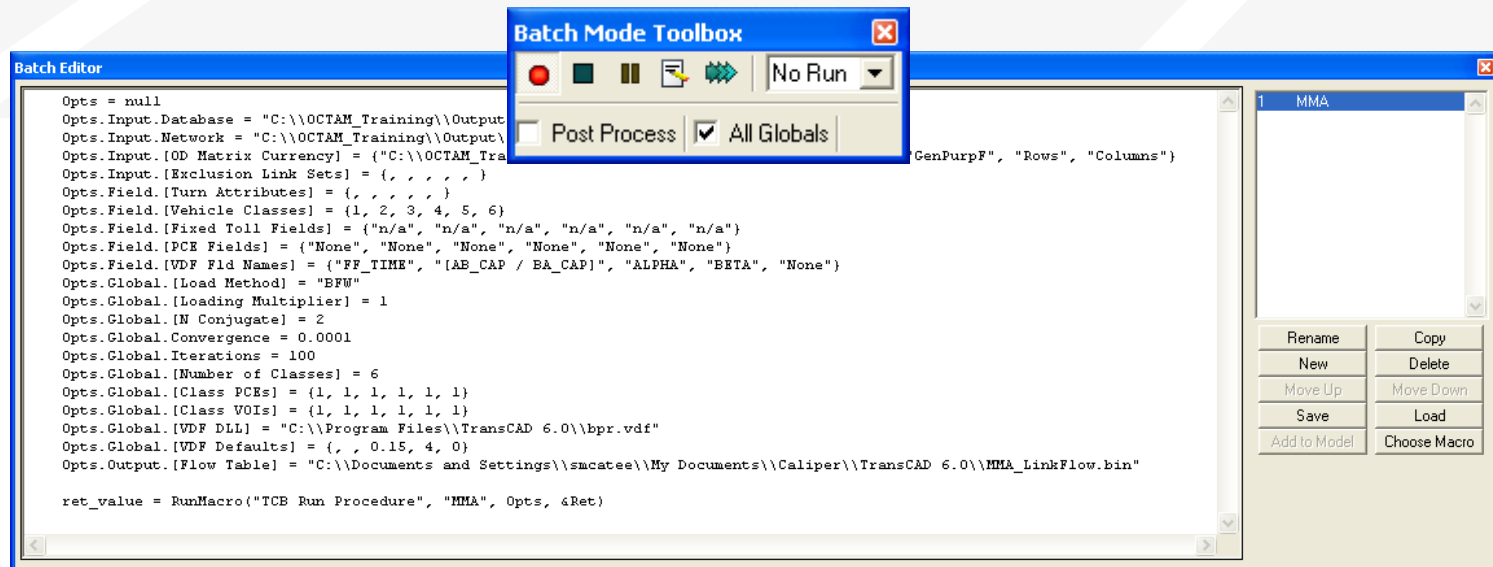
# Customized Interfaces

➤ 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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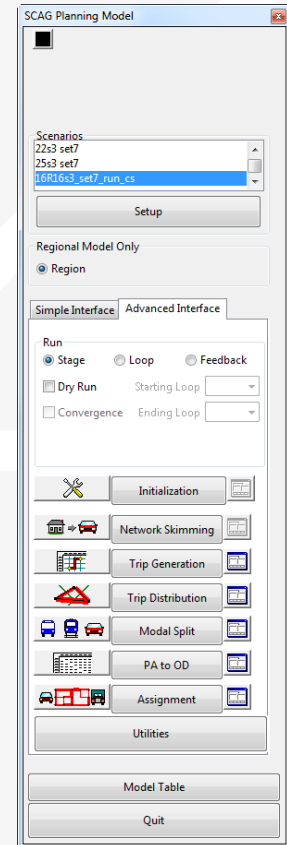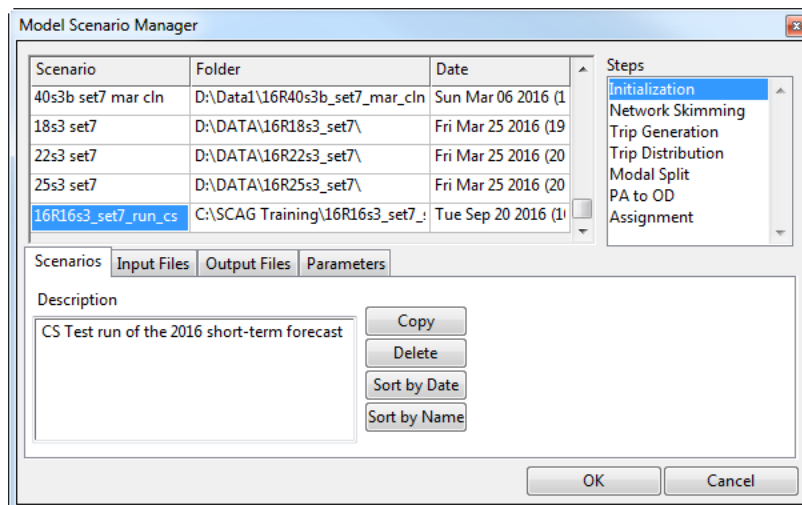
# Open Architecture

- 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

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# 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

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# 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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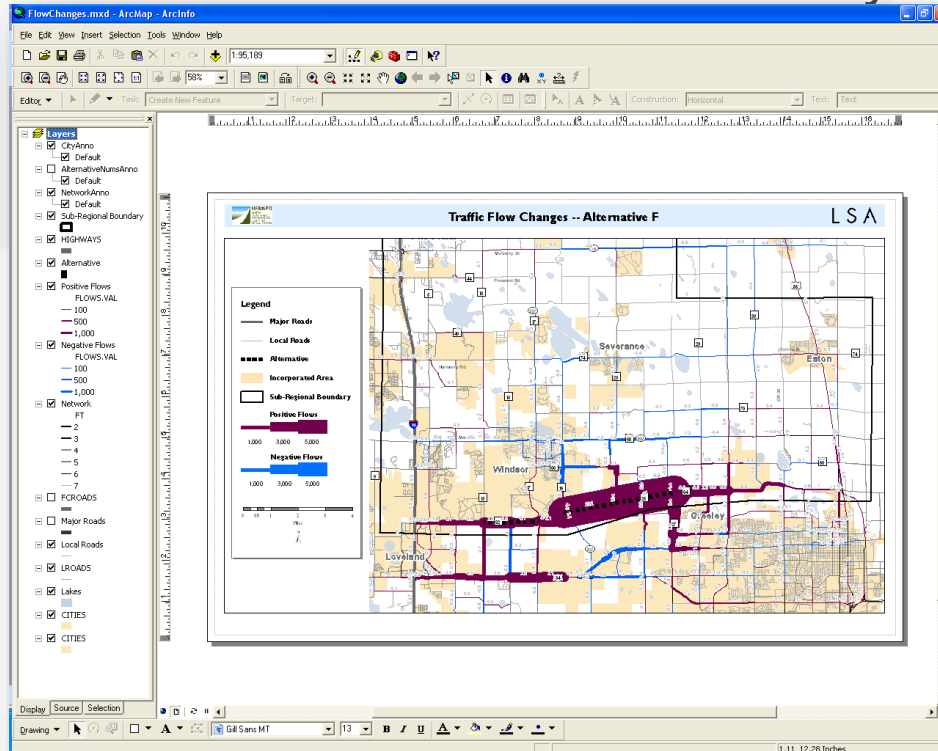
# TransCAD Tips

# File and Data Types

➤ Data Files actually contain information:

» Tables (.bin, .DBF)

» Geographic Files or Layers (.dbd, .shp)

» Matrices (.mtx)

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# File and Data Types

➤ Some files do not contain information:

» Dataviews (.dvw)

» Maps (.map) 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!**

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# 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

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# 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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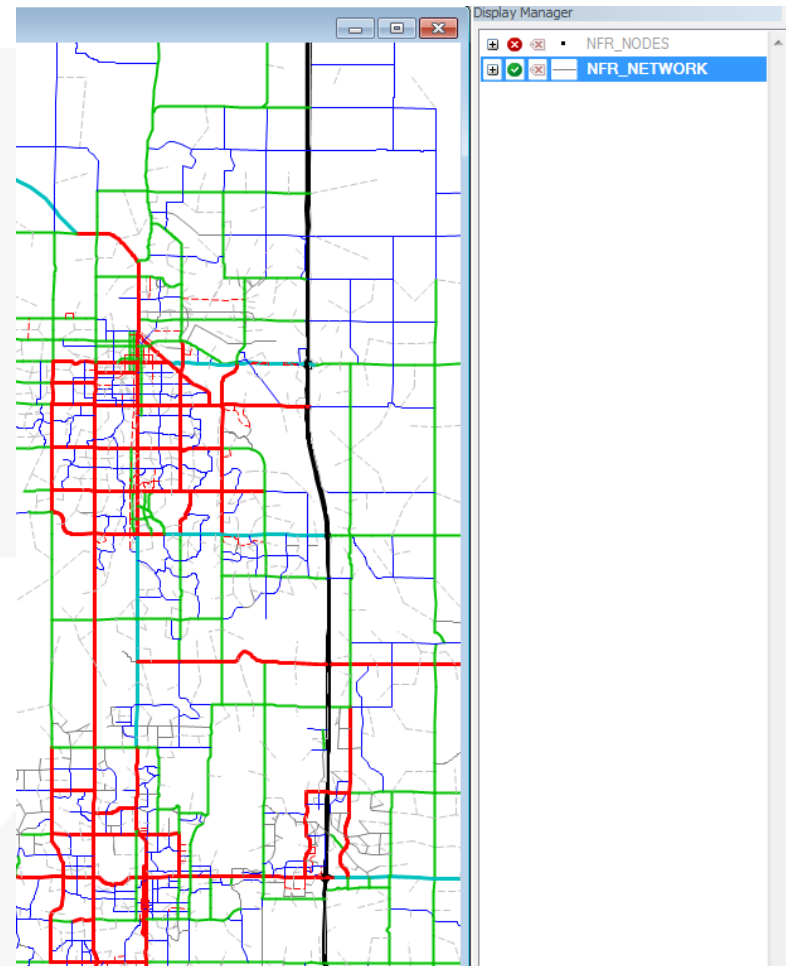
# New in TransCAD 6.0, 7.0

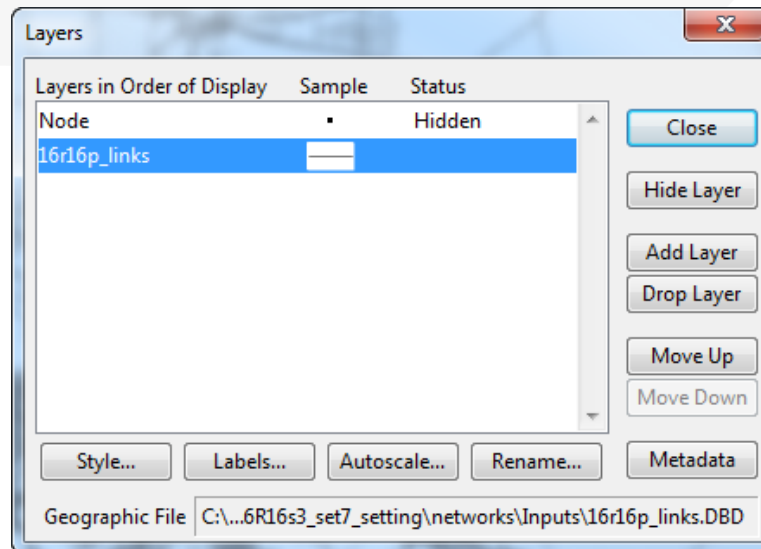- Read and write directly to ESRI Geodatabases

- 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

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# Map Basics: Visualizing
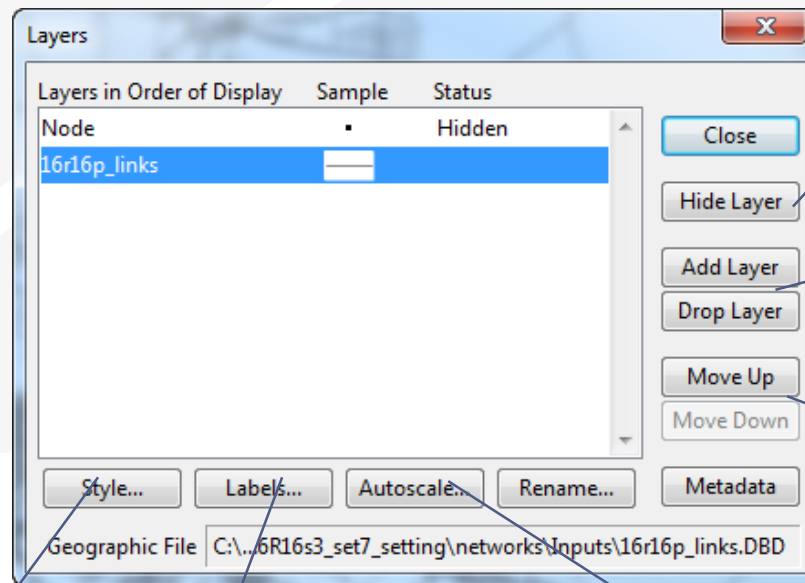
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# Working with Layers

➤ 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

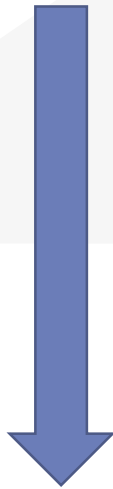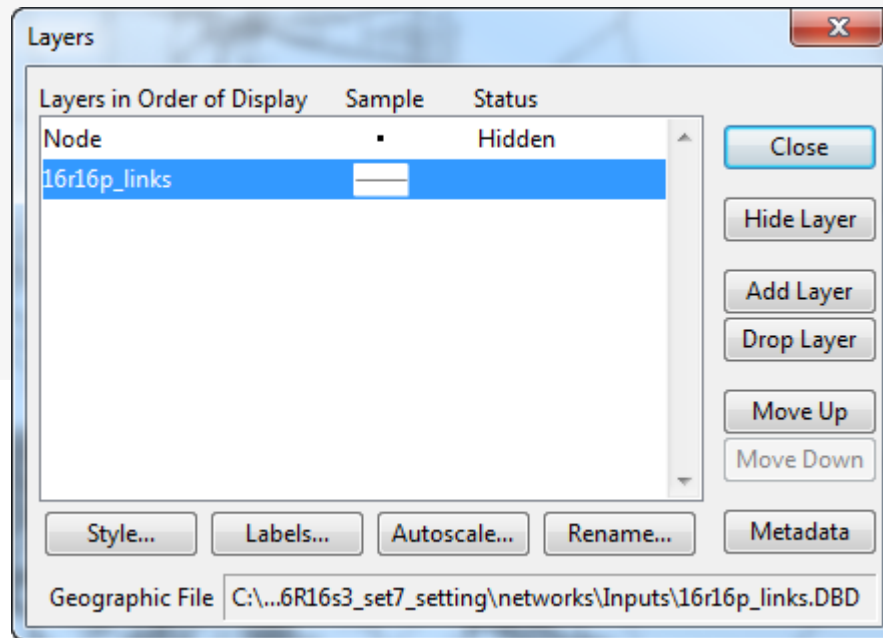Automatically show/hide layers as certain scales

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# Working with Layers

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

Top layer
(drawn first)

Bottom layer
(drawn last)



**Layers**

| Layers in Order of Display | Sample | Status |
|---|---|---|
| Node | . | Hidden |
| 16r16p_links | | |

Close
Hide Layer
Add Layer
Drop Layer
Move Up
Move Down

Style...  Labels...  Autoscale...  Rename...  Metadata

Geographic File  C:\...6R16s3_set7_setting\networks\Inputs\16r16p_links.DBD
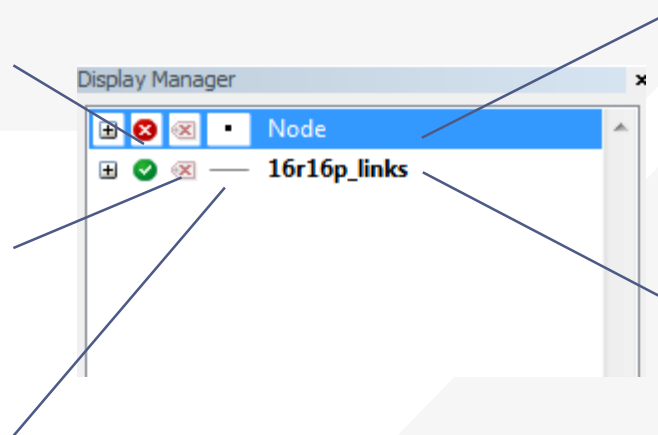
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# Display Manager

➤ 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 |
| --- |

Display Manager

⊞ ❌ ▣ ▪ Node

⊞ ✅ ▣ — **16r16p_links**

| 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

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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

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# 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

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# 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))
```
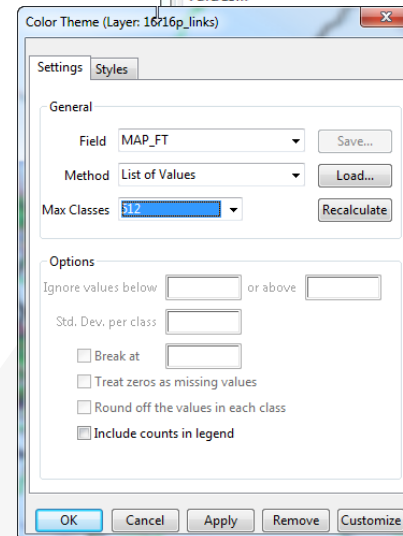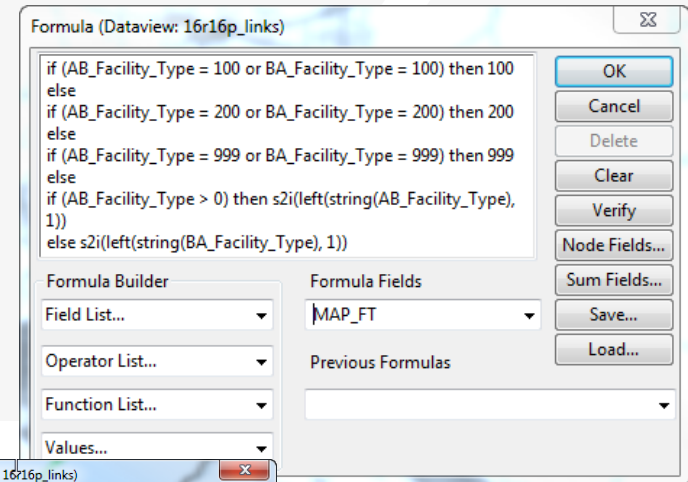
**Note:** We will discuss formulas in more detail in a later section

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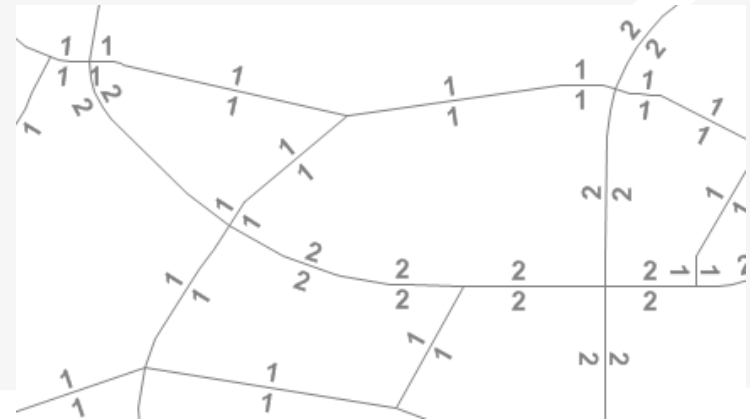# **Practice 1:** Create a color theme for line layer using IFC field

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 [icon] 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
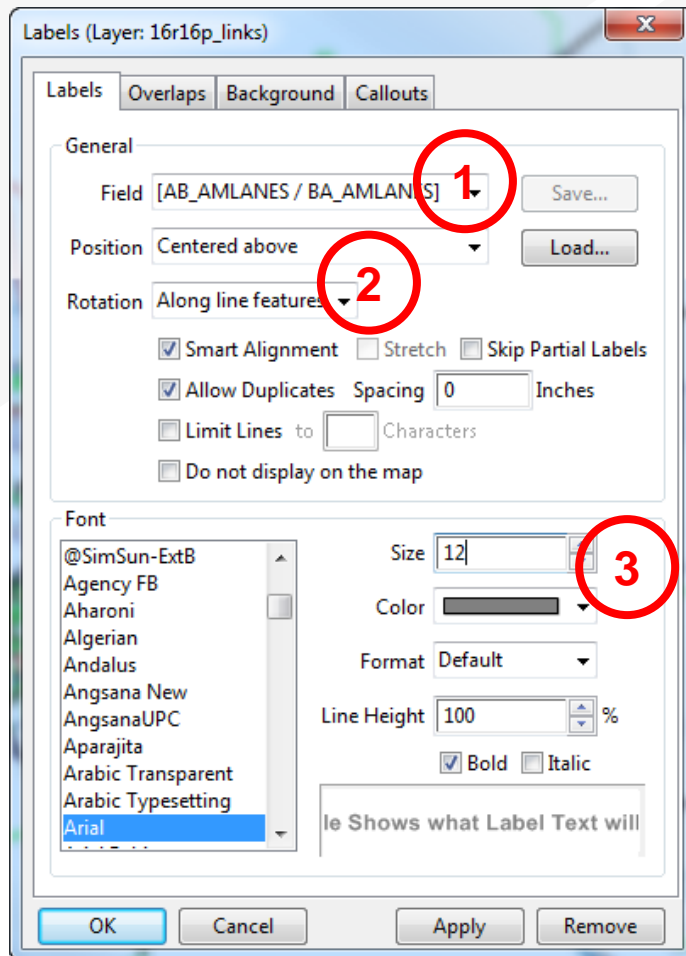   - ✓ Save a Map file that you can open later with the settings applied

32

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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

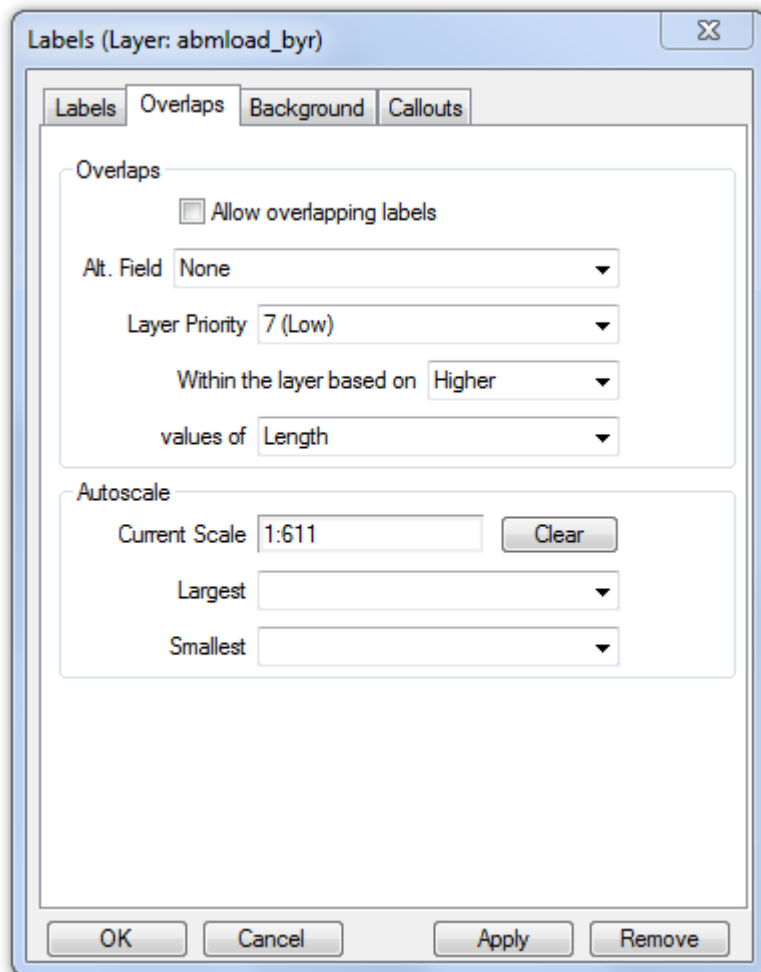## The Labels Tab



1. Select the field to use for labels

2. Set label placement options

   » *Note the "Allow Duplicates" checkbox*

3. Set the label style options

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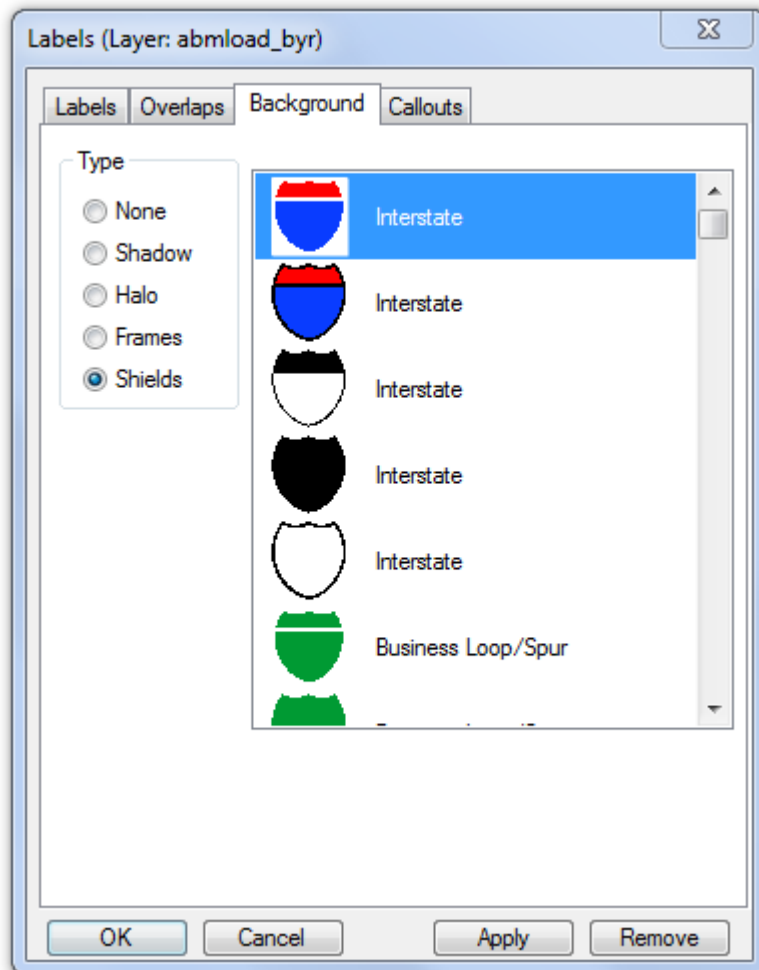
# Automatic Labels

## The Overlaps Tab



➤ Overlapping labels can be allowed if desired

➤ Different layers can have different priorities

➤ Autoscale can turn labels on and off automatically
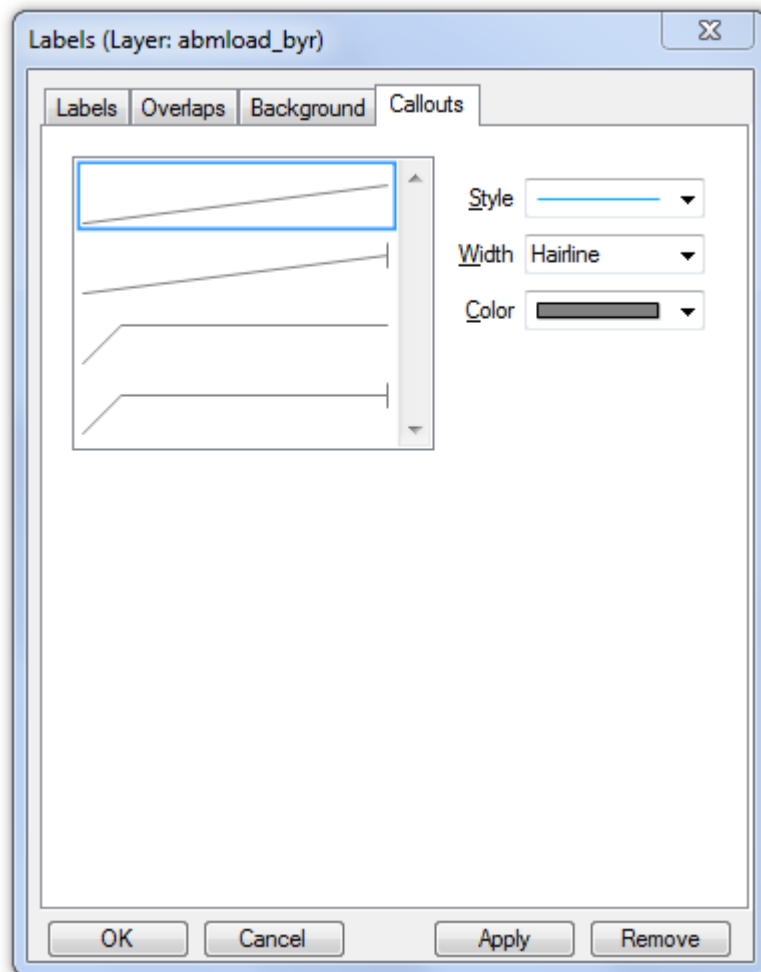
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# Automatic Labels

## The Background Tab



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

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# Automatic Labels
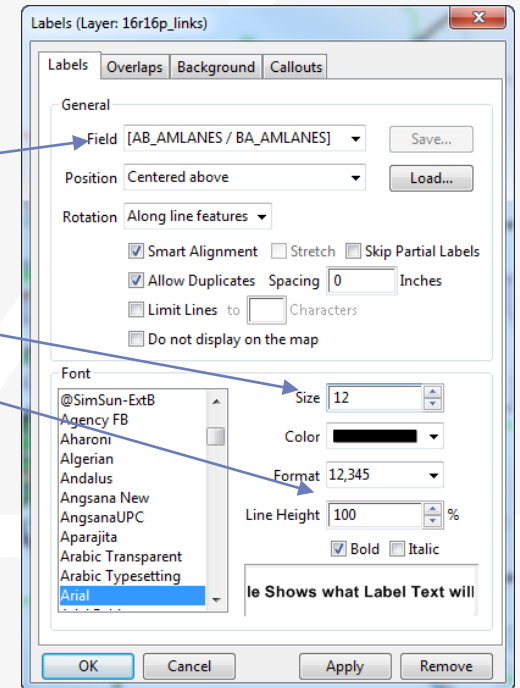
## The Callouts Tab



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

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# **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

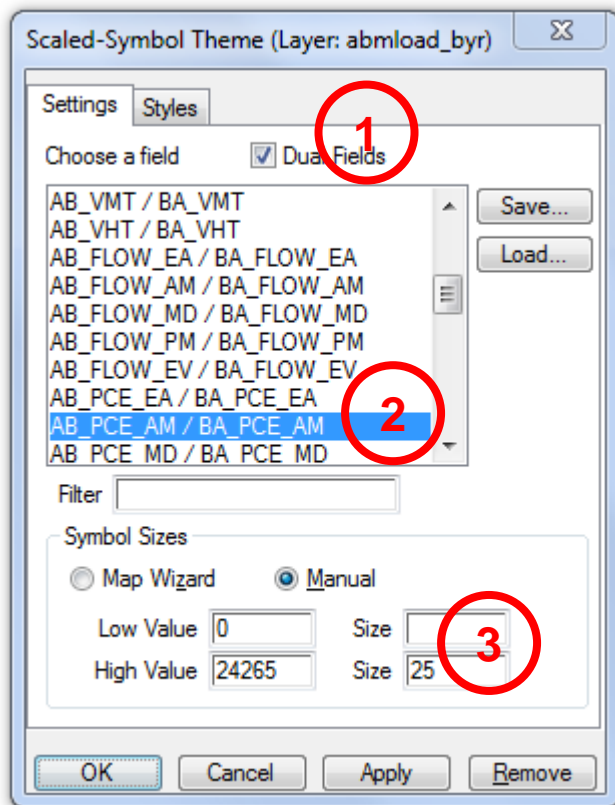➤ Scaled Symbol Themes ( ) are often used to:

» Display traffic volumes

» Display results of a select link or node analysis
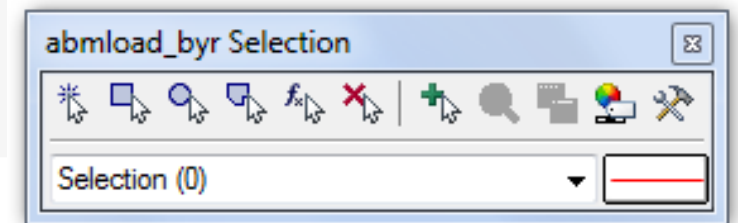
CAMBRIDGE SYSTEMATICS
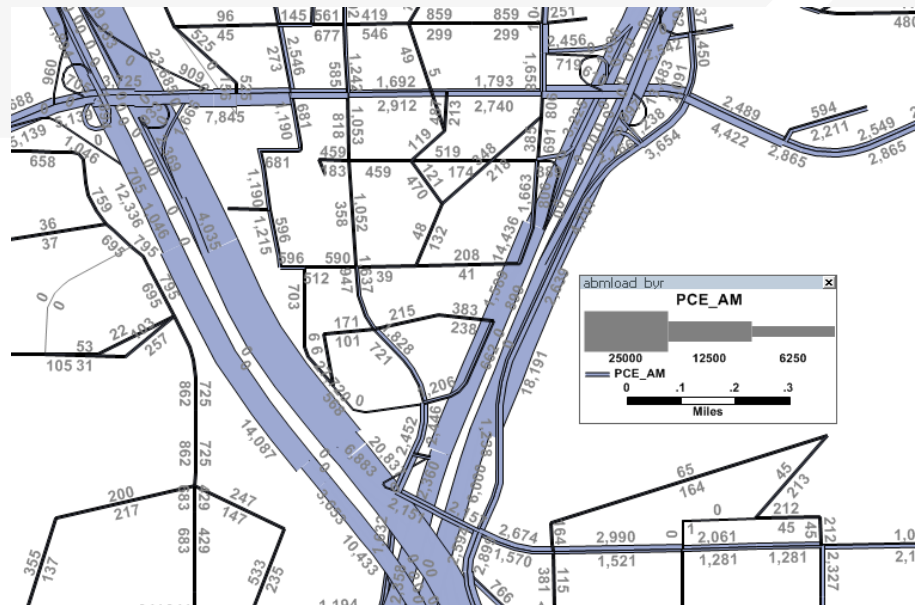
# Scaled Symbol Themes

## The Settings Tab



➤ Show directional fields only, or all fields

➤ Select a field to use

➤ Specify a scale, or let TransCAD specify one automatically

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# Create Selection Sets

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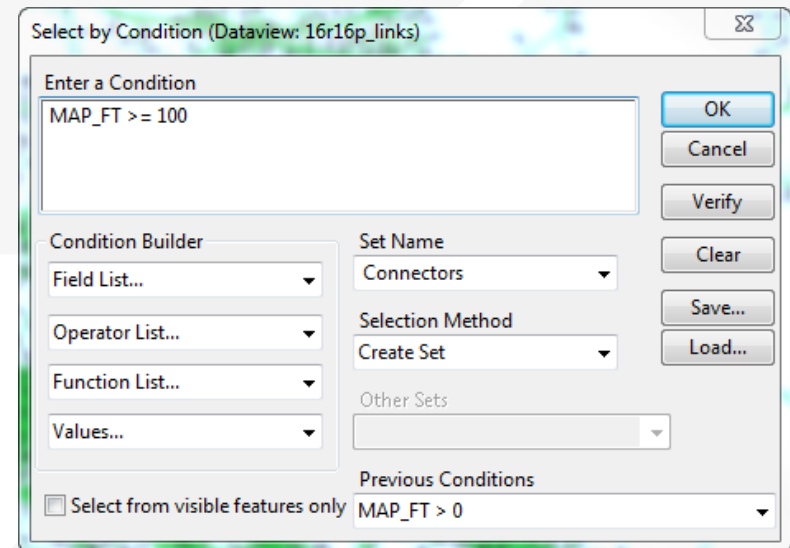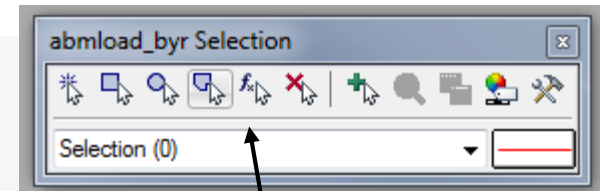# Selection Sets

➤ 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

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# 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 ( $f_x$ ) 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**

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# Data Tables ("Dataviews")

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# 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 $\frac{x \times y}{n}$

➤ 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)
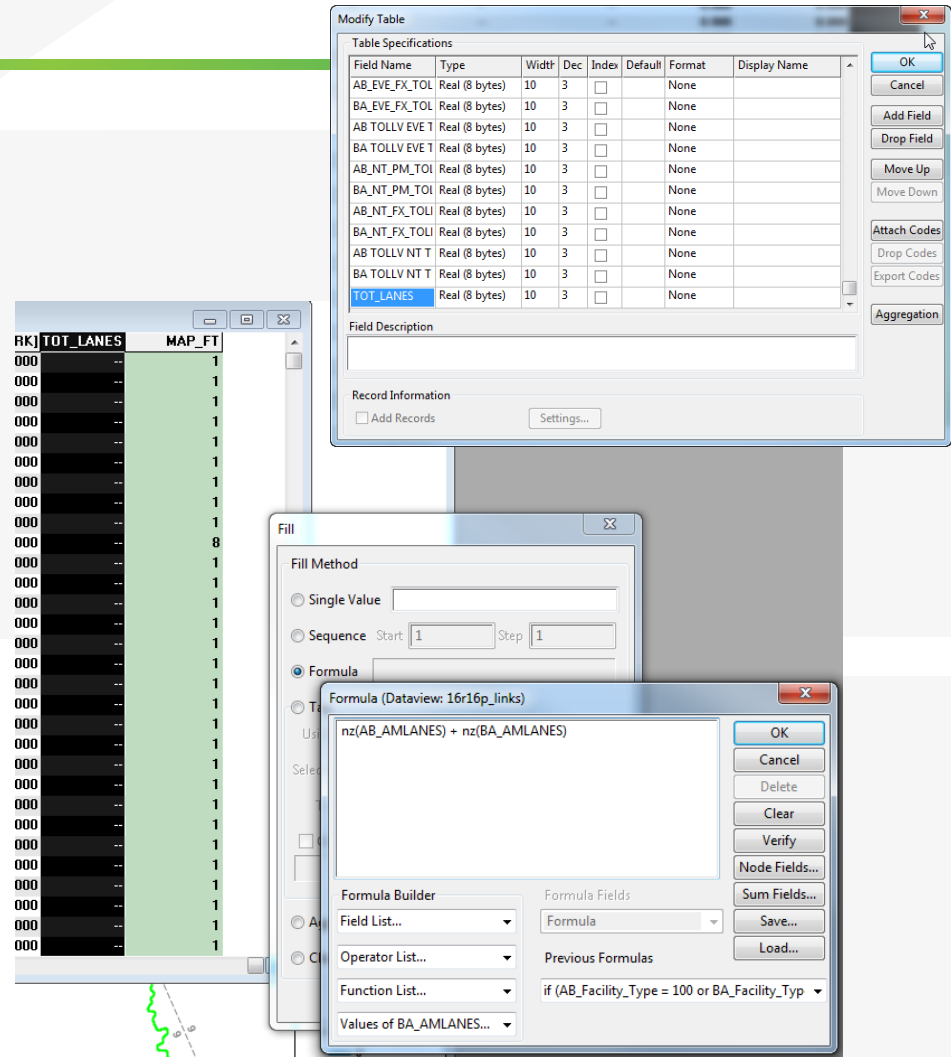
1. Enter a formula

2. Use the Field List to find field names

3. Name the formula field

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



**Formula (Dataview: OCTAM_Links)**

nz(AB_LN_05) + nz(BA_LN_05)

OK
Cancel
Delete
Clear
Verify
Node Fields...
Save...
Load...

Formula Builder
Field List...
Operator List...
Function List...
Values of BA_LN_05...

Formula Fields
TOT_LANES

Previous Formulas

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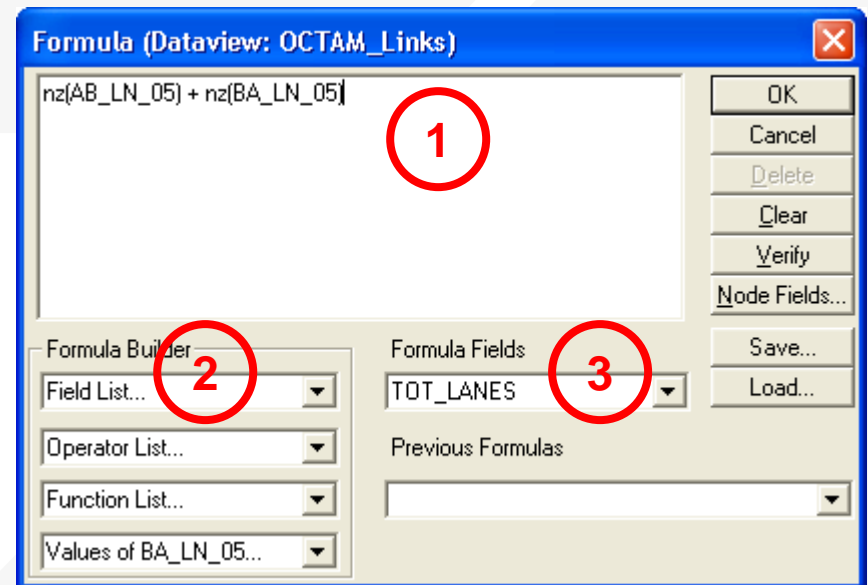
# **Practice 4:** Add total number of lanes in a **NEW FIELD**

➤ **Start with the results from Practice 3**

✓ Open the saved map if needed

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

2. Use Dataview → Modify Table or click [icon]

   ✓ 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!**



49

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# Joining Data

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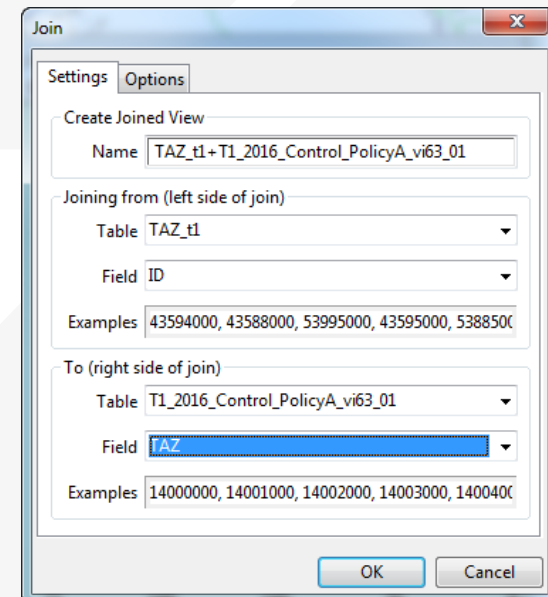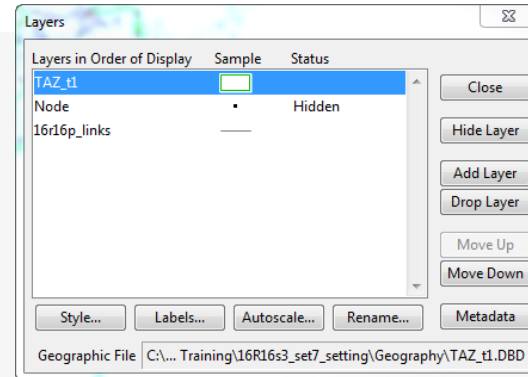
**Bonus:** Create a shading theme with darker colors for more households.  Try again for employment

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# Printing Maps (Layouts)

# 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 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

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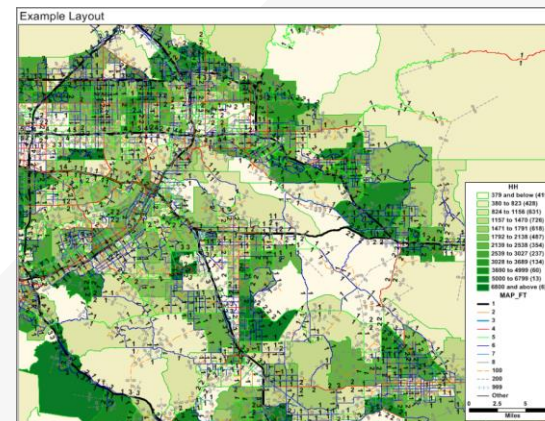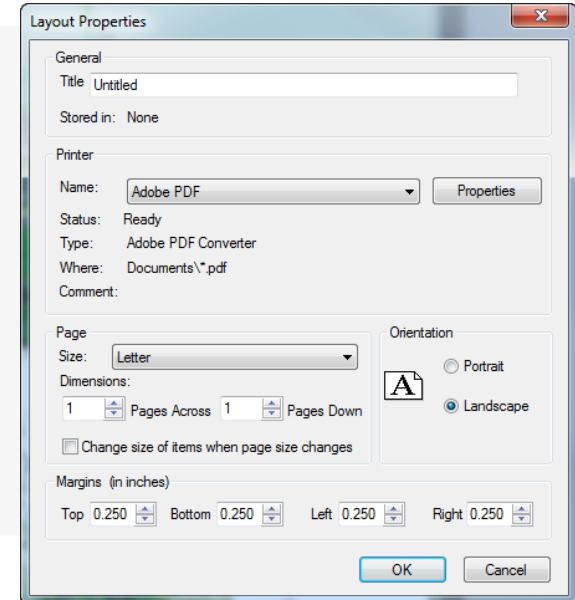
# More on Networks and Zones

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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…

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# 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!**

CAMBRIDGE SYSTEMATICS
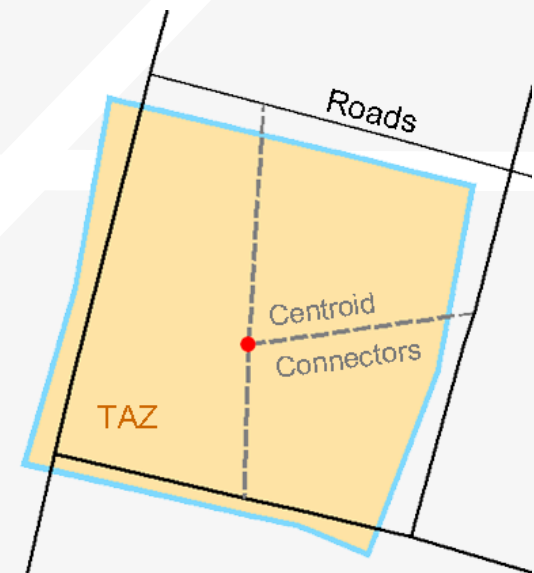
# Centroids

➤ 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 | |

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# 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*

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

$$2.7^2 = 7.3$$

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# Recap

# Learned by Example

- Creating maps

- Adding layers

- Setting layer styles, labels, and themes

- Working with data tables

- Joining Views

- Creating layouts for printing

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# 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)

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# Highway Assignment

# Assignment Results

➤ Basic Volumes

  » Located on the **Loaded Network**
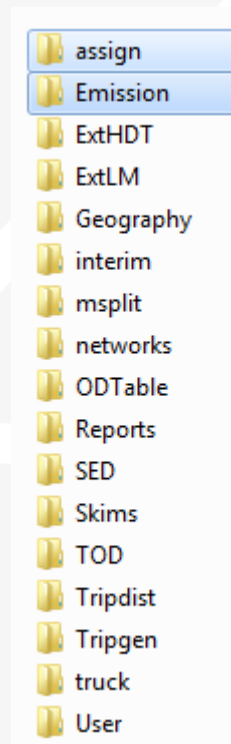
  » Assign\Output\scag_network_loaded.dbd

➤ Volume and Travel Time for:

  » Each Period
    (AM, MD, PM, NT, EVE)

  » Total daily



Dataview1 - 16r16p_links Info

| ID | 144312 |
| --- | --- |
| BA_SR3GP_LINKCOST | -- |
| ccportzone | -- |
| T2TAZ | 5380.600.000 |
| AB_AMFLOW | 30.000 |
| BA_AMFLOW | 29.000 |
| AB_AMTIME | 0.224 |
| BA_AMTIME | 0.224 |
| AB_MDFLOW | 48.000 |
| BA_MDFLOW | 48.000 |
| AB_MDTIME | 0.224 |
| BA_MDTIME | 0.224 |
| AB_PMFLOW | 40.000 |
| BA_PMFLOW | 38.667 |
| AB_EVEFLOW | 16.000 |
| BA_EVEFLOW | 16.000 |
| AB_EVETIME | 0.224 |
| BA_EVETIME | 0.224 |
| AB_NTFLOW | 64.000 |
| BA_NTFLOW | 64.000 |
| AB_NTTIME | 0.224 |
| BA_NTTIME | 0.224 |
| AB_DAYFLOW | 198.000 |
| BA_DAYFLOW | 195.667 |

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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!

assign
Emission
ExtHDT
ExtLM
Geography
interim
msplit
networks
ODTable
Reports
SED
Skims
TOD
Tripdist
Tripgen
truck
User

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# 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

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# **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        )

---

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# Roadway Network Editing

# 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

The Undo function in TransCAD makes network editing less risky

» Network files sometimes become corrupt

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# 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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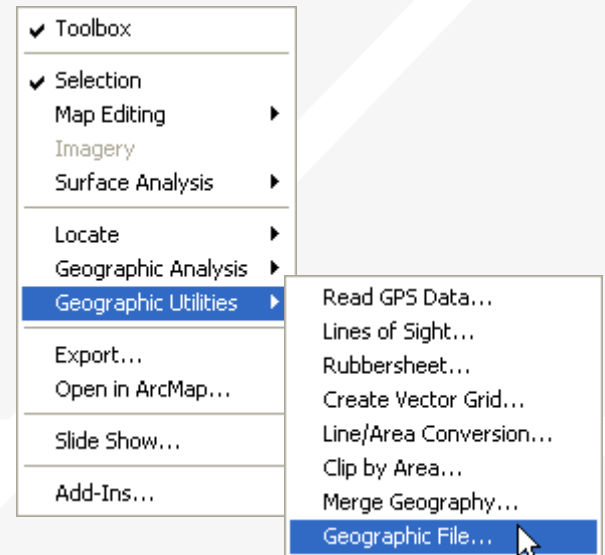
# Network Editing

- 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
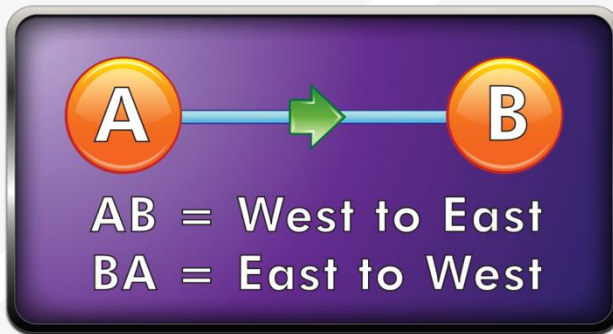  - » Add data for a year not yet included in the network

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# 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
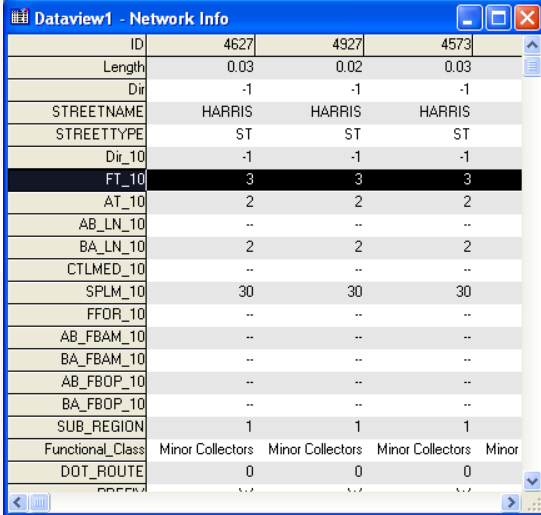
# Network Topology

➤ Show topology to identify AB and BA directions



AB = West to East
BA = East to West

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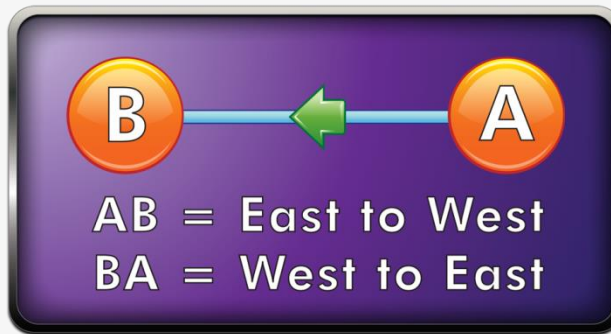
➤ To identify one-way roads, use the DIR field:
  » 0: Two-way travel
  » 1: A → B travel
  » -1: B → A travel

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# 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

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# 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

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# 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**

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# 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

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# **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:
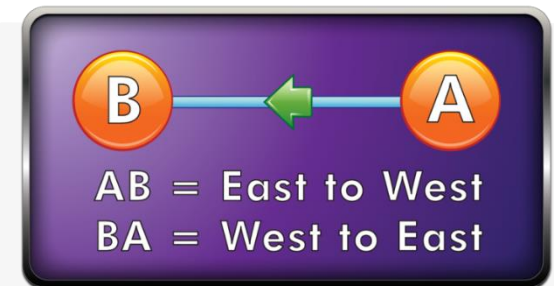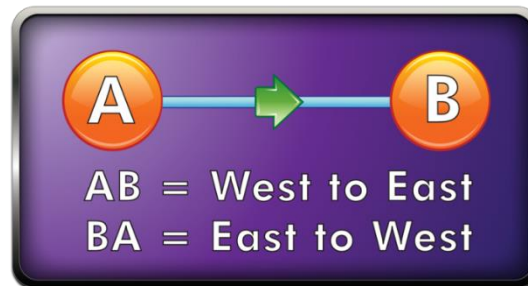
  » Change the facility type

  » Widen a Road

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# **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



AB = West to East
BA = East to West

AB = East to West
BA = West to East

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# 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/joined links

CAMBRIDGE SYSTEMATICS
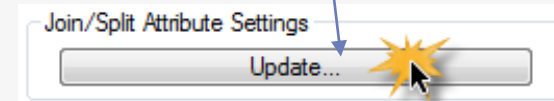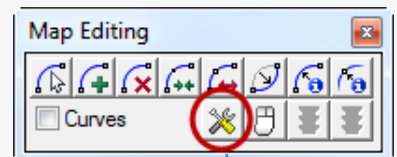
# Network Editing

➤ Keeping Transit up to date

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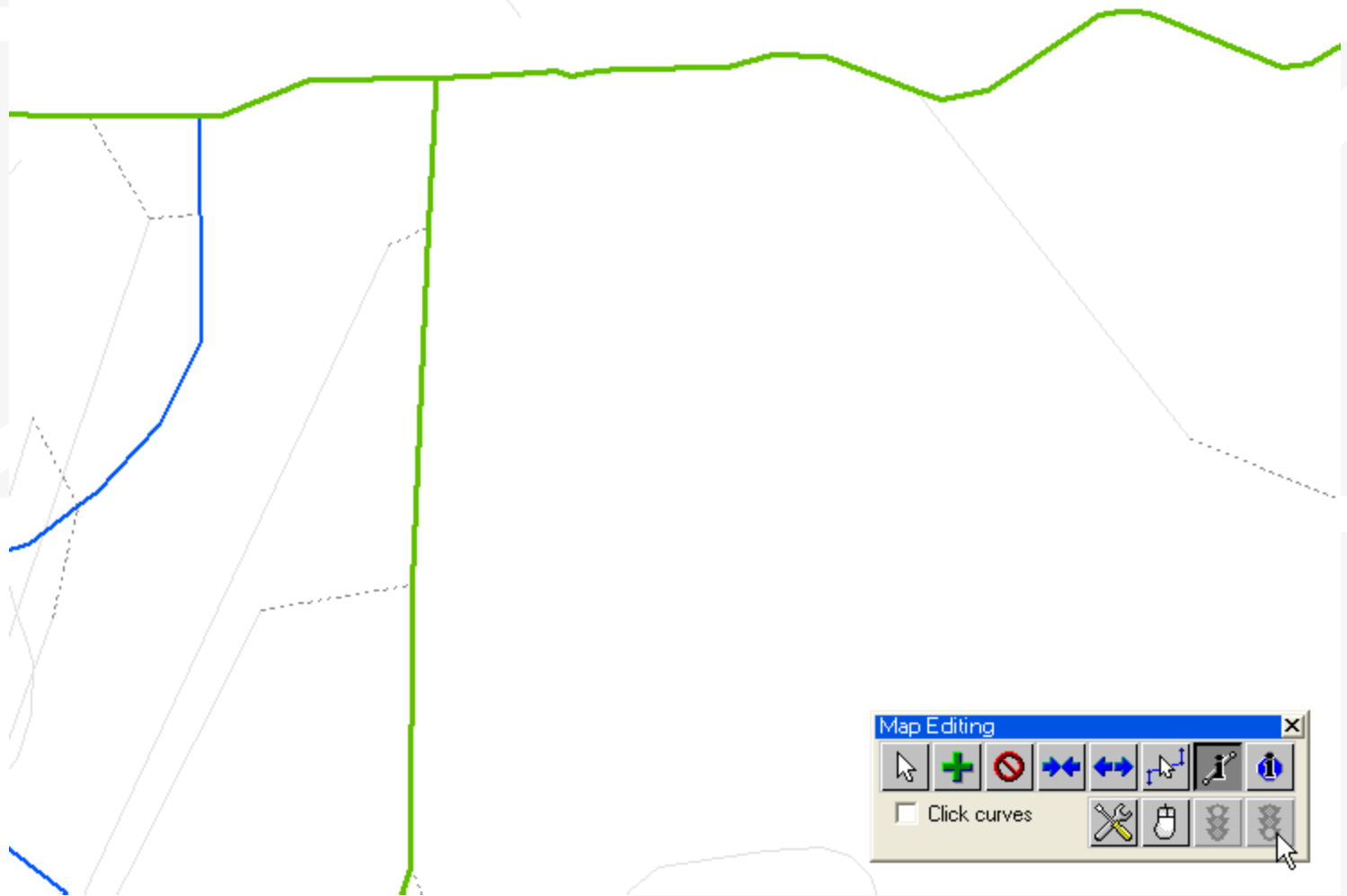- » Add the route system from networks\Inputs
  **Note:** Make sure to choose the Route System file type
- » Make the route system active after every few edits
- » TransCAD will prompt and update the transit network based on your changes



Confirm

The geography underlying the route system "16r16p_routes" has been changed. Do you want to update the route system now? (Please note that this operation cannot be undone and will clear the list of undo/redo actions.)

[ Yes ]   [ No ]

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# Network Editing

CAMBRIDGE SYSTEMATICS
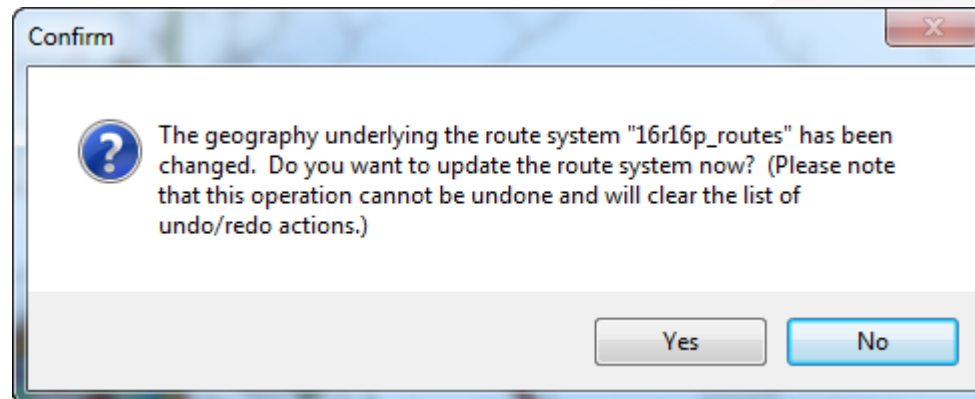
# **Practice:** Network Editing

➤ 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 (  )

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# 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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# Route Systems

# Route System Components

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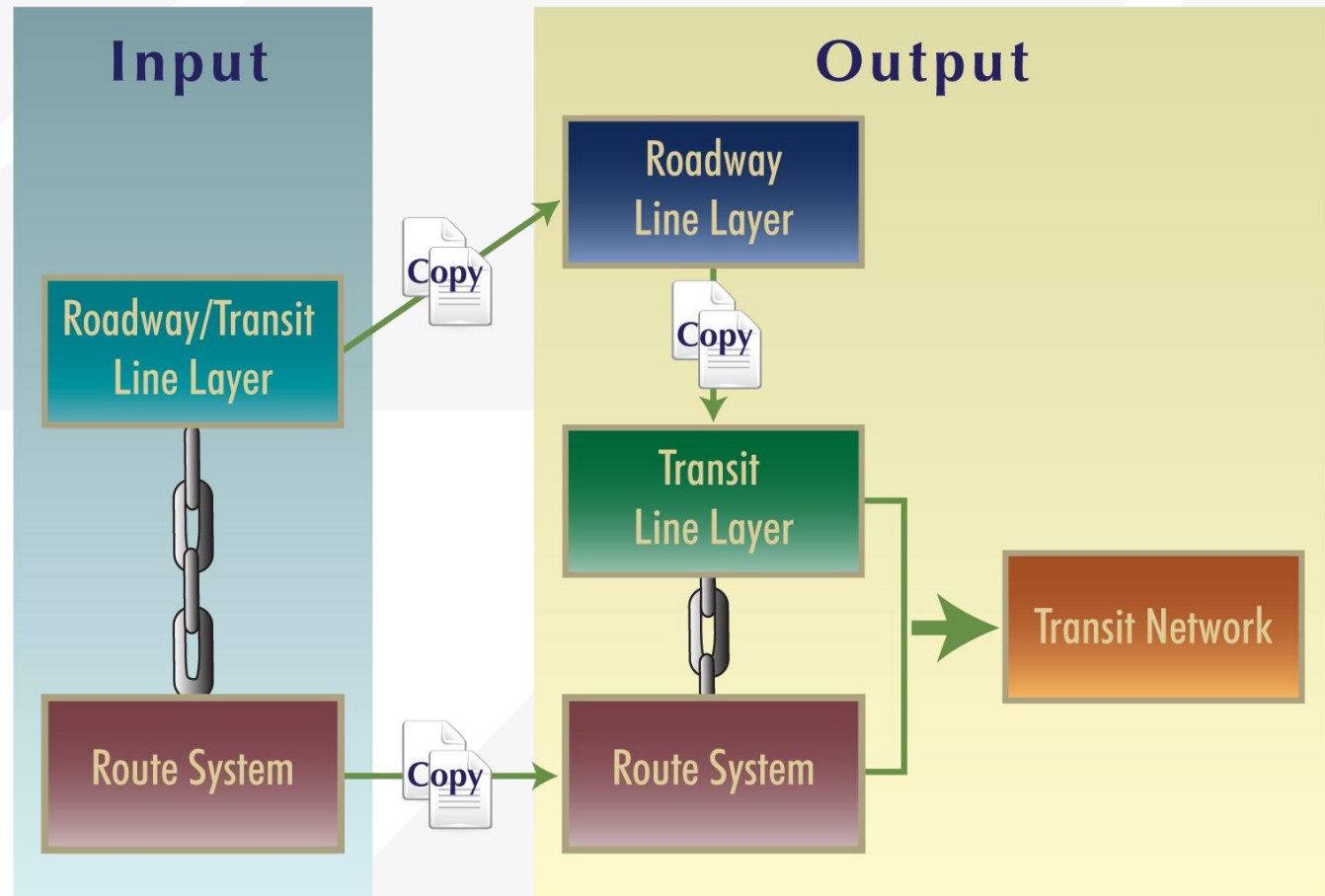
# Route System

**Roadway Links**

**Roadway Nodes**

**Routes (Lines)**

**Route Stops**

» Travel Time and Distance
» Walk and Drive Access

CAMBRIDGE SYSTEMATICS
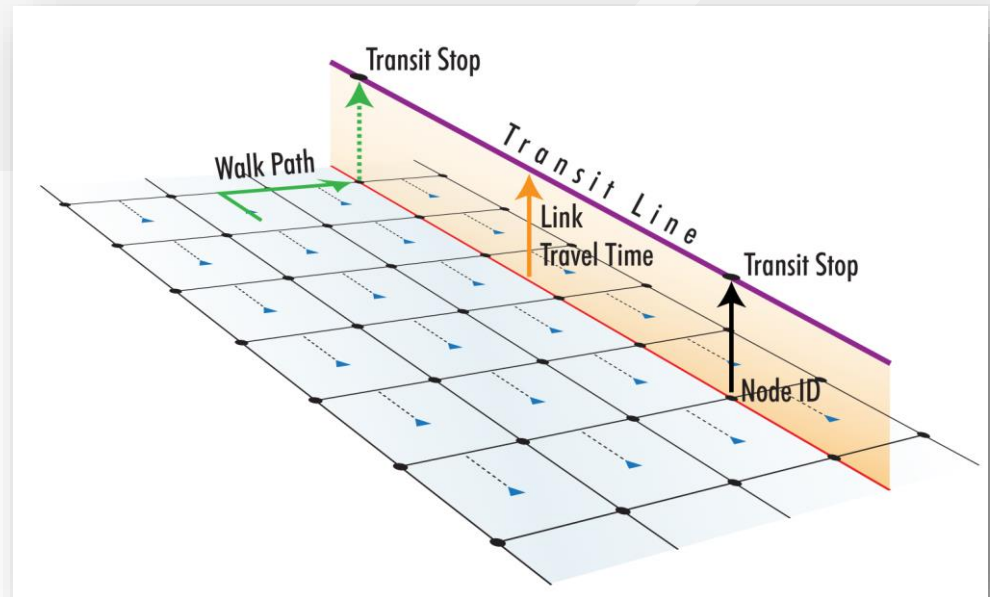
# Route System

**Roadway Links**

**Roadway Nodes**

**Routes (Lines)**

**Route Stops**

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

CAMBRIDGE SYSTEMATICS
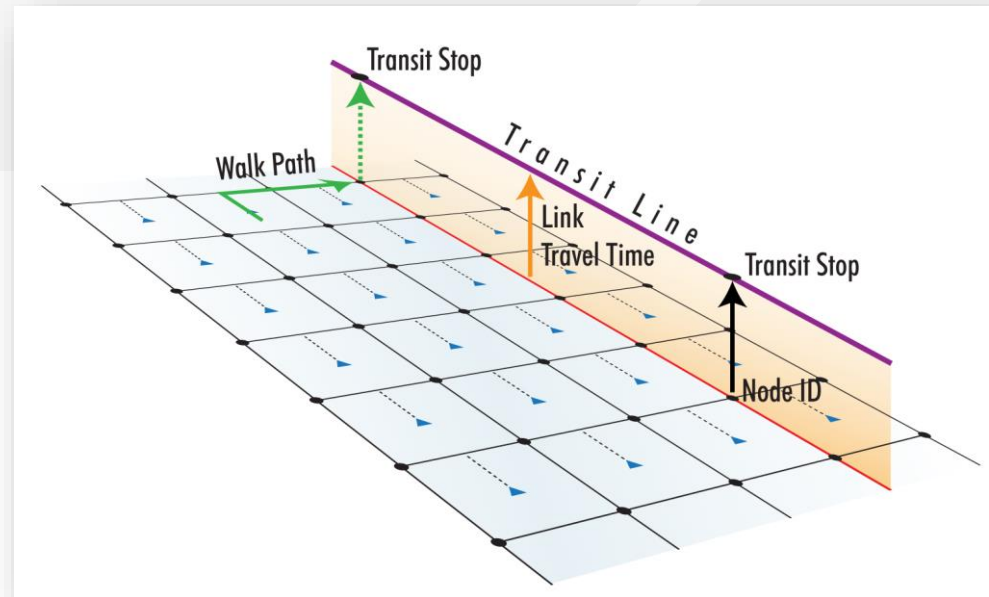
# Route System

**Roadway Links**

**Roadway Nodes**

**Routes (Lines)**

**Route Stops**

» 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

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# Route System

**Roadway Links**

**Roadway Nodes**

**Routes (Lines)**

**Route Stops**

- 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

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# 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

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# 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 **<u>input</u>** 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

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# Example Editing Workspace



Toggle one/all routes

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# Example Editing Workspace

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# 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

Route System Toolbox (12r12_a1_route...

Stop Type: Route
Route Method: ● Shortest Path (Length)
○ Click Links
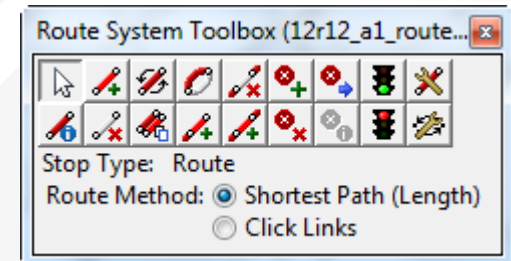
# Route System Editing

➤ 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

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# 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

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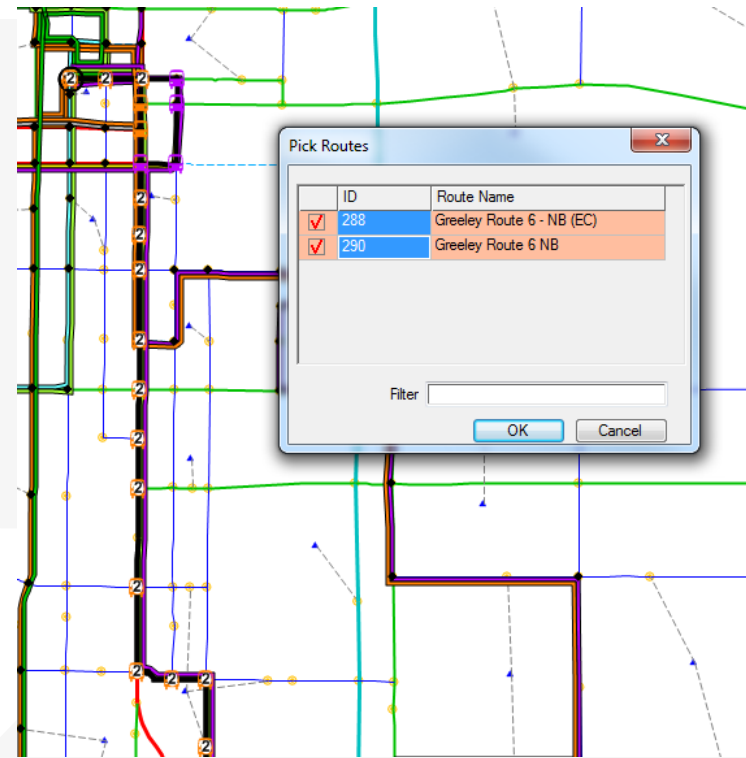
# Practice: Route Editing

➤ 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

CAMBRIDGE SYSTEMATICS

# Running the SCAG Model

# 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

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# 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

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# 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

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# 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
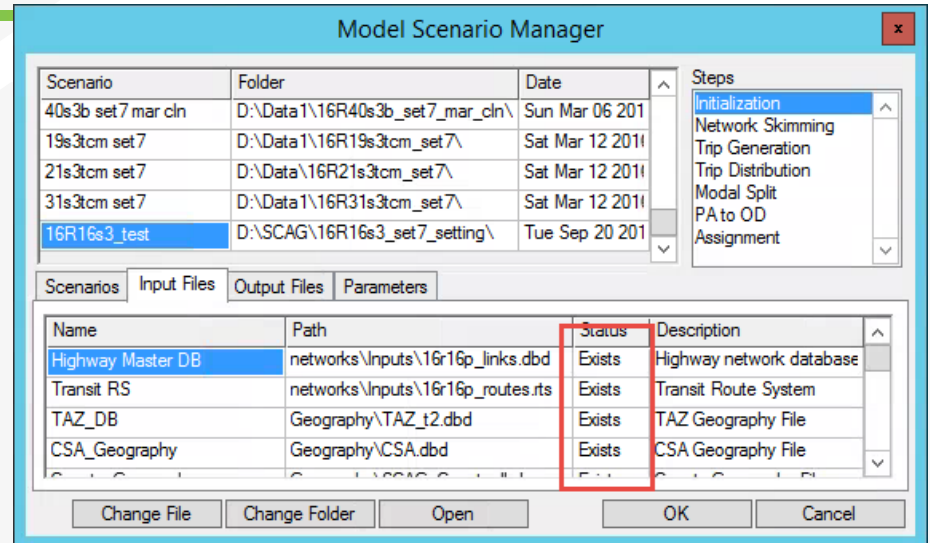
# Running the SCAG Model

- 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'

CAMBRIDGE SYSTEMATICS
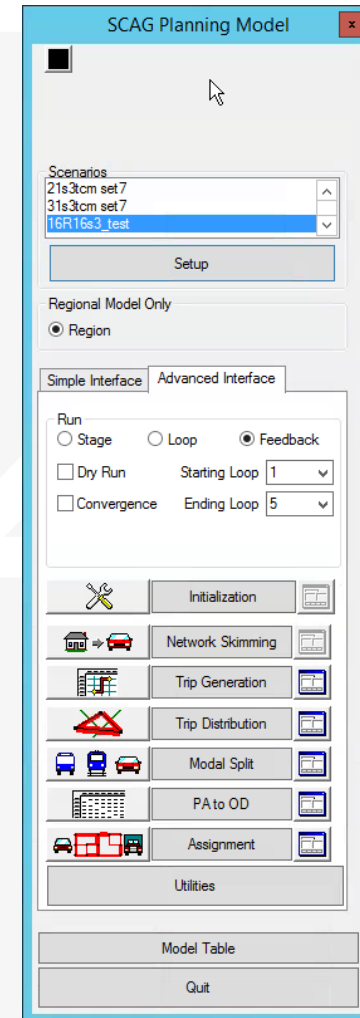
# Running for Scenarios

- 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

CAMBRIDGE SYSTEMATICS

# 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
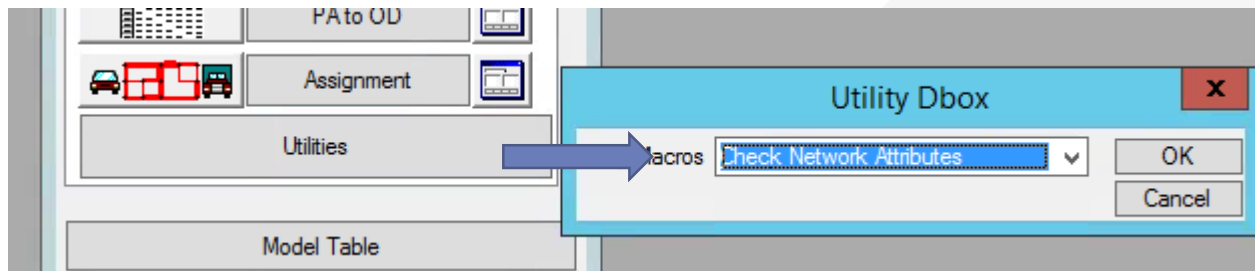
# Quick Run: Network Change

➤ 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**'

CAMBRIDGE SYSTEMATICS
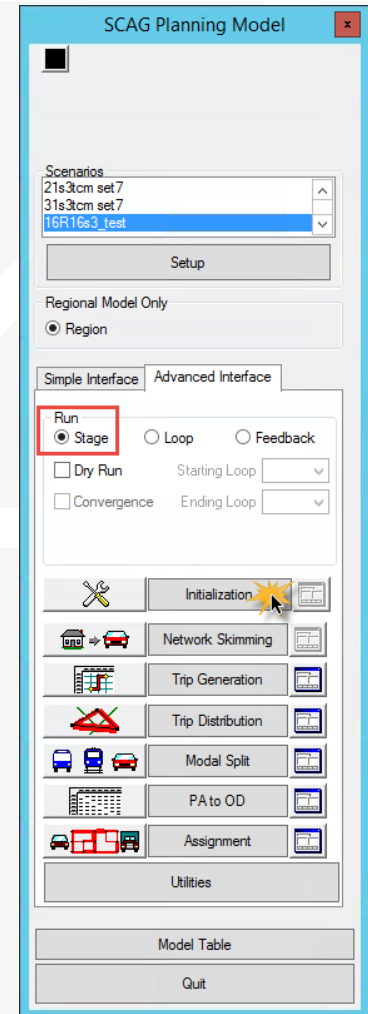
# Quick Run: Network Change

➤ When initialization completes, click on the ▣▣▣ button next to assignment

» Set steps as shown

» Click OK

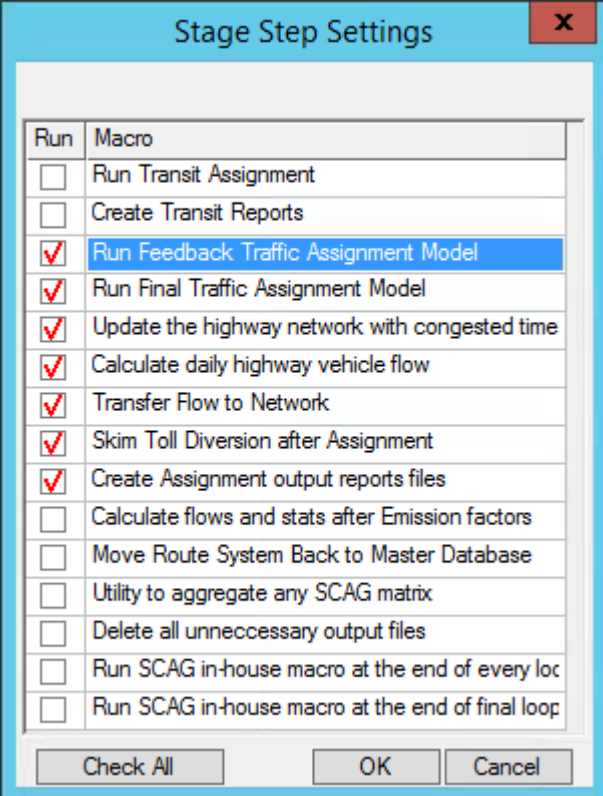➤ Click 'Assignment' to run traffic assignment

» This will take several hours

| Run | Macro |
|-----|-------|
| ☐ | Run Transit Assignment |
| ☐ | Create Transit Reports |
| ☑ | Run Feedback Traffic Assignment Model |
| ☑ | Run Final Traffic Assignment Model |
| ☑ | Update the highway network with congested time |
| ☑ | Calculate daily highway vehicle flow |
| ☑ | Transfer Flow to Network |
| ☑ | Skim Toll Diversion after Assignment |
| ☑ | Create Assignment output reports files |
| ☐ | Calculate flows and stats after Emission factors |
| ☐ | Move Route System Back to Master Database |
| ☐ | Utility to aggregate any SCAG matrix |
| ☐ | Delete all unneccessary output files |
| ☐ | Run SCAG in-house macro at the end of every loc |
| ☐ | Run SCAG in-house macro at the end of final loop |

Stage Step Settings

Check All     OK     Cancel

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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

CAMBRIDGE SYSTEMATICS

# One-Loop run

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

CAMBRIDGE SYSTEMATICS
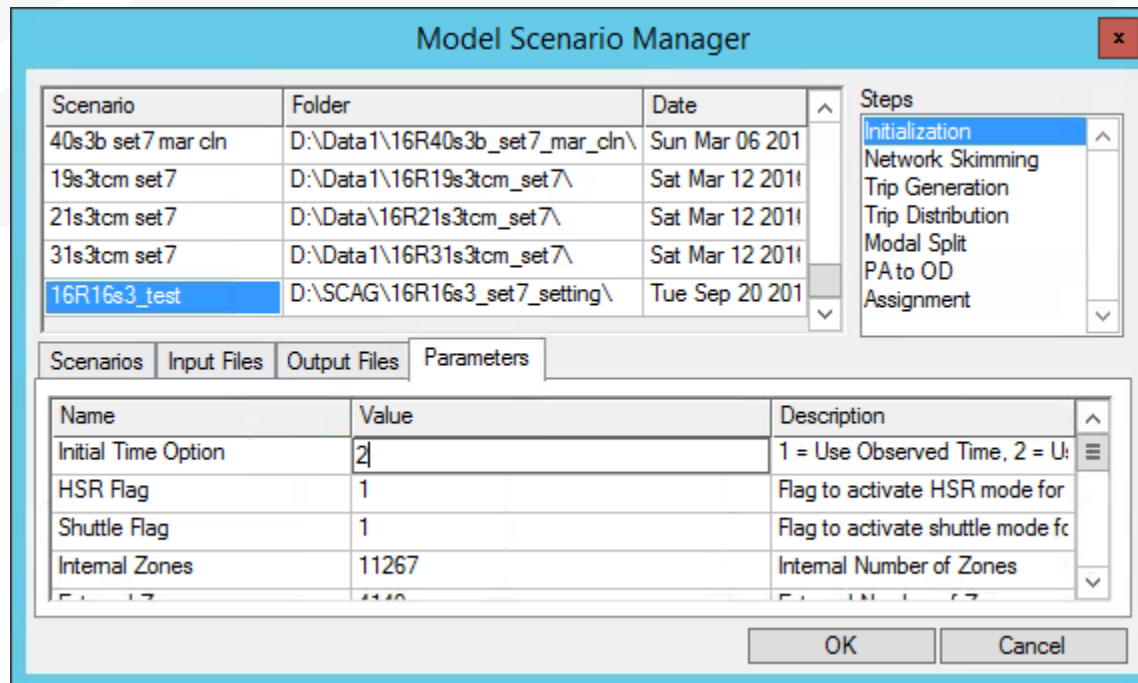
# One-Loop run

➤ 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

CAMBRIDGE SYSTEMATICS
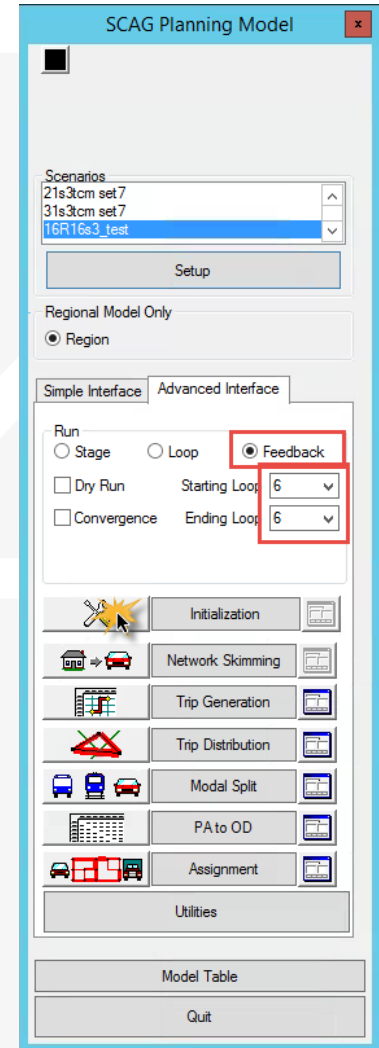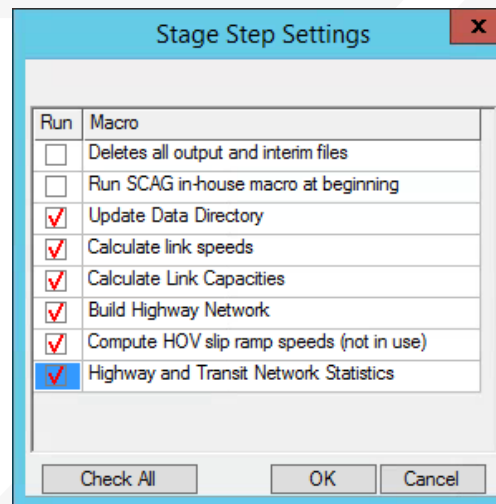
# One-Loop run

➤ 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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# 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

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# Thank You!

CAMBRIDGE SYSTEMATICS

# Examples

**Year 2035 Alternative 5C: Select Link Analysis Daily HHDTs**
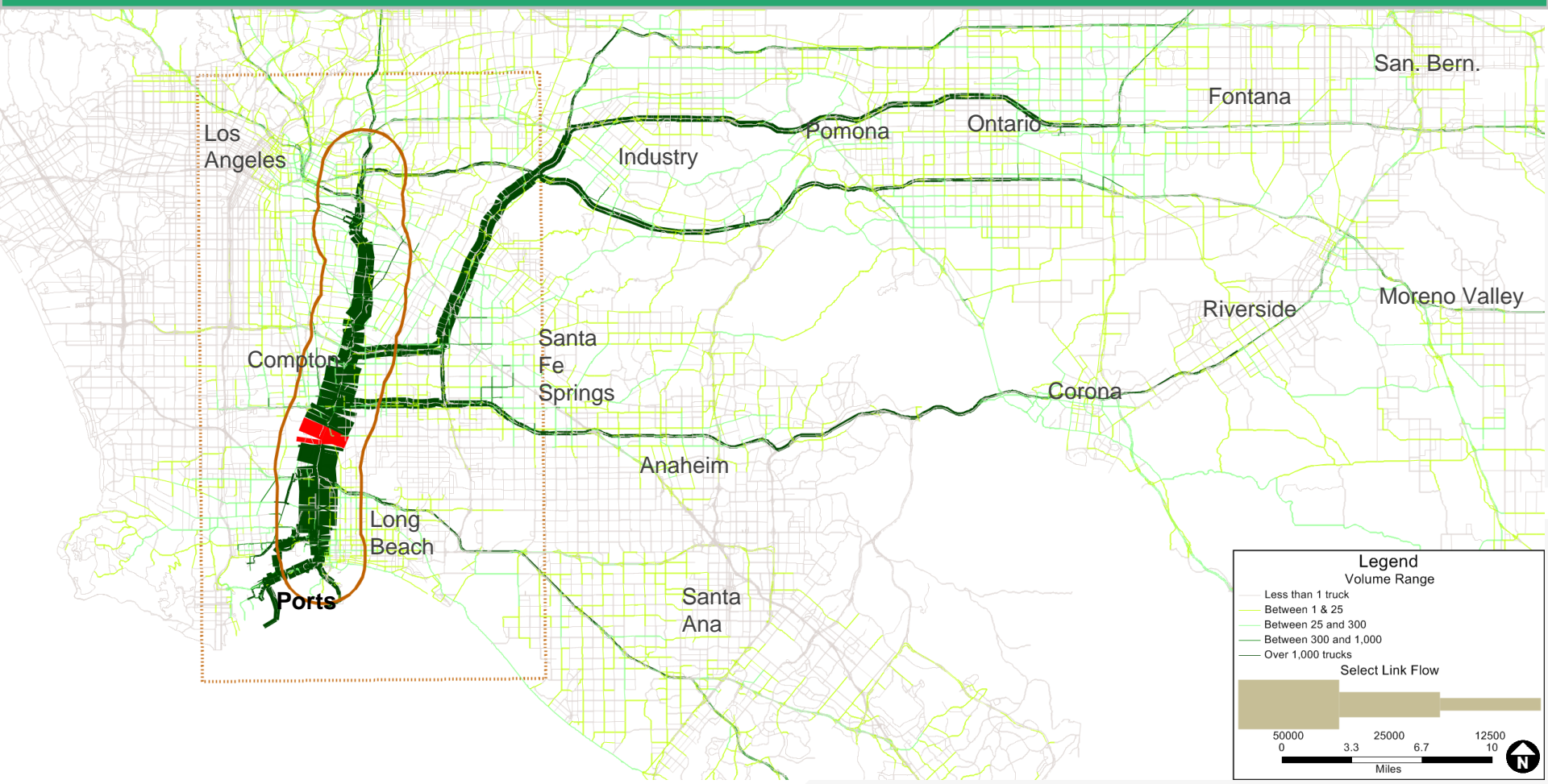Southbound 710 Freeway Long Beach Blvd. Location (Pair A)

Origins
Destinations

Legend
Origins & Destinations
5000
2500
1250
▶ Origins
▶ Destinations

Select Link Flow

50000    25000    12500
0    3.3    6.7    10
Miles

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

123

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**Legend**
Volume Range
— Less than 1 truck
— Between 1 & 25
— Between 25 and 300
— Between 300 and 1,000
— Over 1,000 trucks

Select Link Flow

50000    25000    12500
0    3.3    6.7    10
Miles

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

CAMBRIDGE SYSTEMATICS

# Household And Employment Growth

## Today



| | |
|---|---|
| 🏠 (blue) | 50 Households |
| 🏭 (red) | 100 Employees |

*Legend: MPO Boundary, Incorporated Areas, 50 Households, 100 Employees — May 23, 2006*

*Map labels: Wellington, Fort Collins, Severance, Timnath, Windsor, Loveland, Greeley, Evans, Johnstown, Berthoud, Milliken*
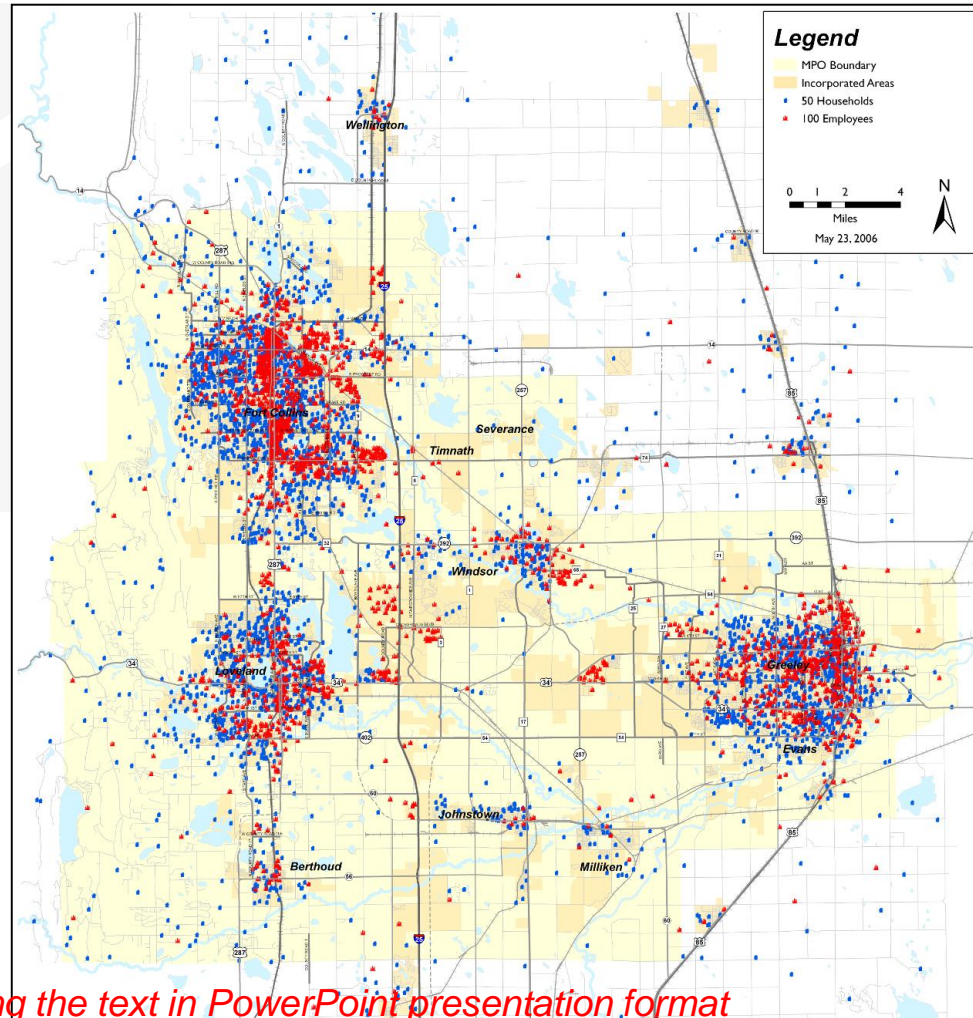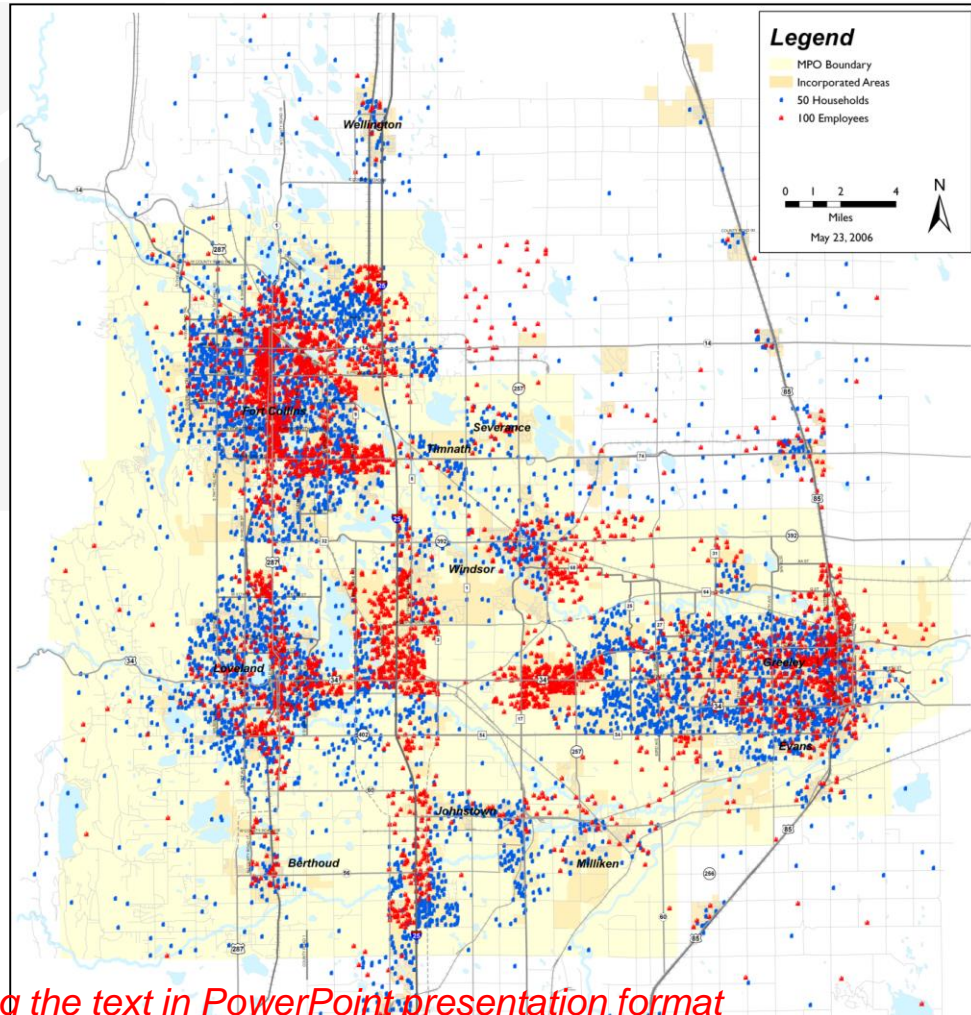
*\* Example only: not meant for reading the text in PowerPoint presentation format*

# Household And Employment Growth

## Future

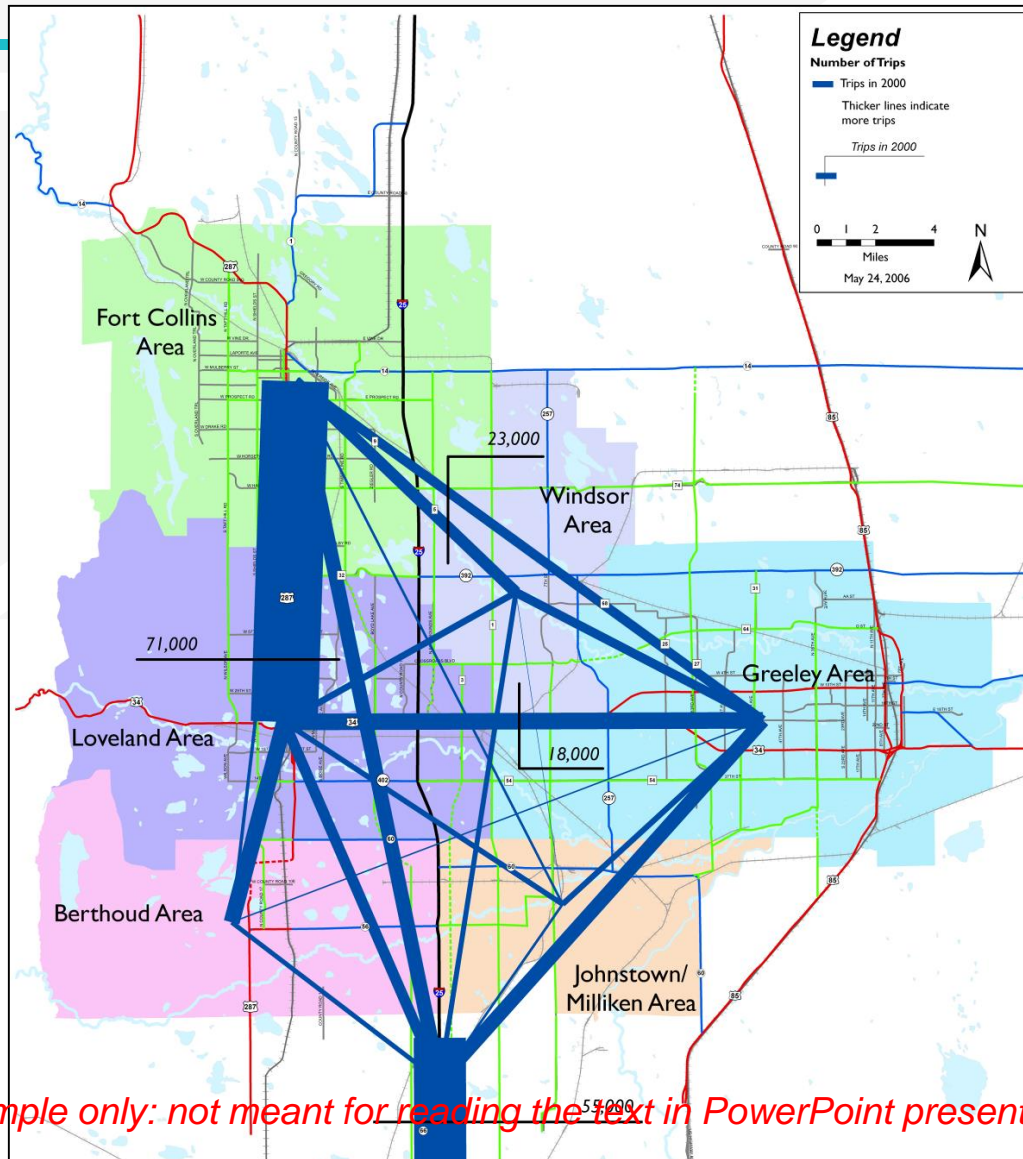**50 Households**

**100 Employees**



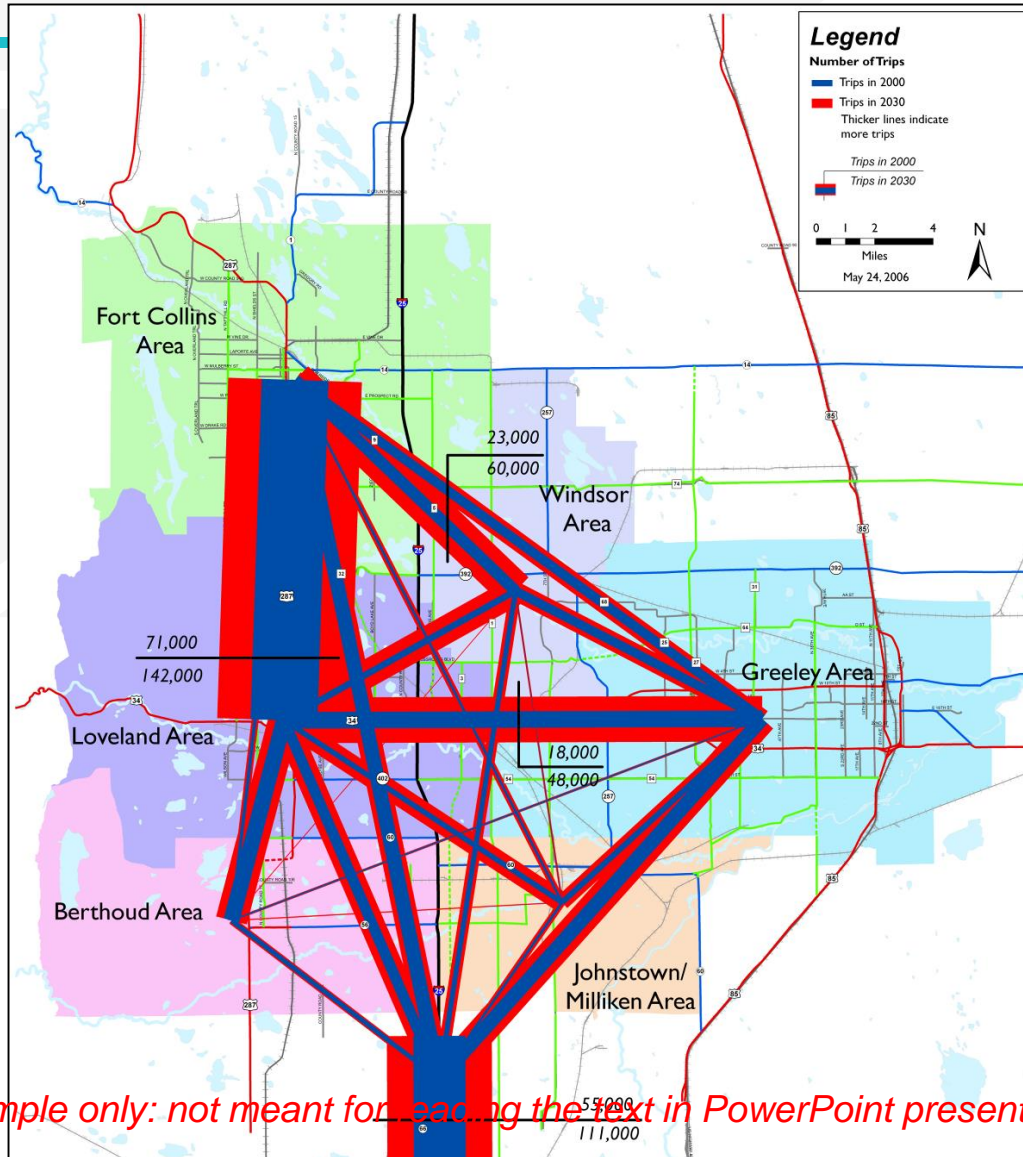*\* Example only: not meant for reading the text in PowerPoint presentation format*

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# Travel Patterns

Today

CAMBRIDGE SYSTEMATICS

# Travel Patterns



Future

128

# Traffic Volumes And Congestion

## Today



**Legend**
MPO Boundary
Incorporated Areas
**Freeway/Arterial Level of Service**
Uncongested Roadways
Congesting Roadways (LOS E)
Congested Roadways (LOS F)
Thicker lines indicate higher traffic volumes

0 1 2 4 Miles
May 24, 2006

| 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*

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# Traffic Volumes And Congestion



Future

| Travel Times | | | |
|---|---|---|---|
| From/To | Today | 2030 | Increase |
| Fort Collins to Denver | 73 Minutes | 119 Minutes | 46 Minutes (63%) |
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| Berthoud to Windsor | 24 Minutes | 37 Minutes | 13 Minutes (54%) |

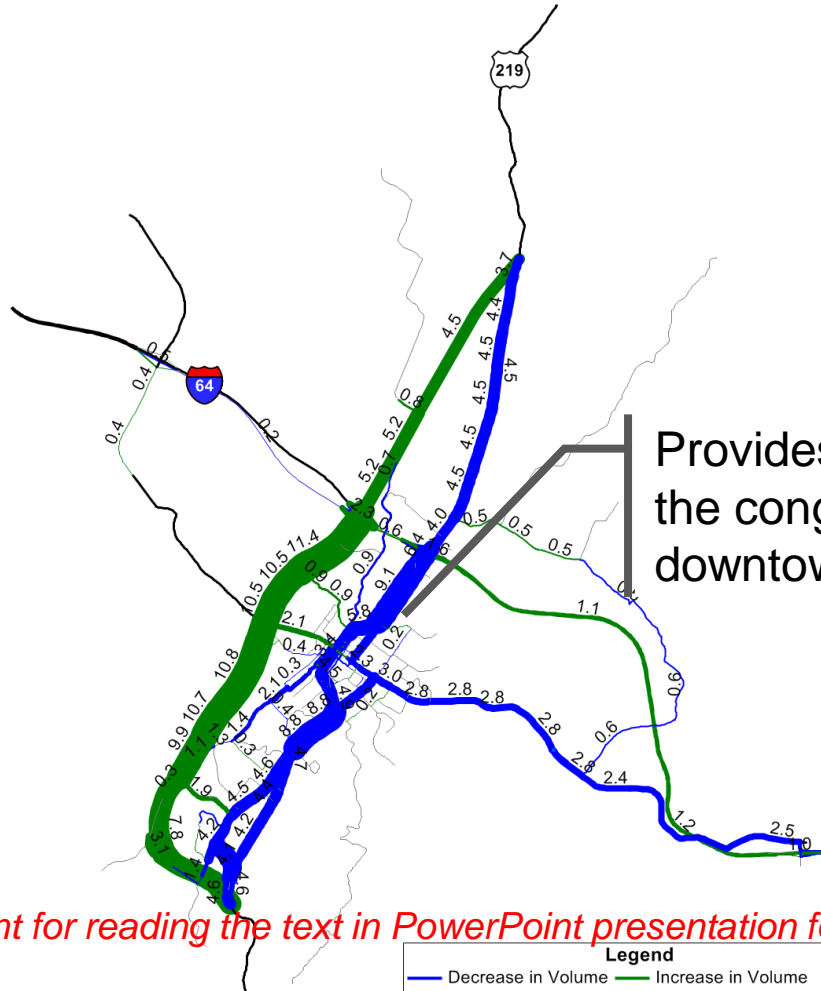*\* Example only: not meant for reading the text in PowerPoint presentation format*

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# 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*

**Legend**
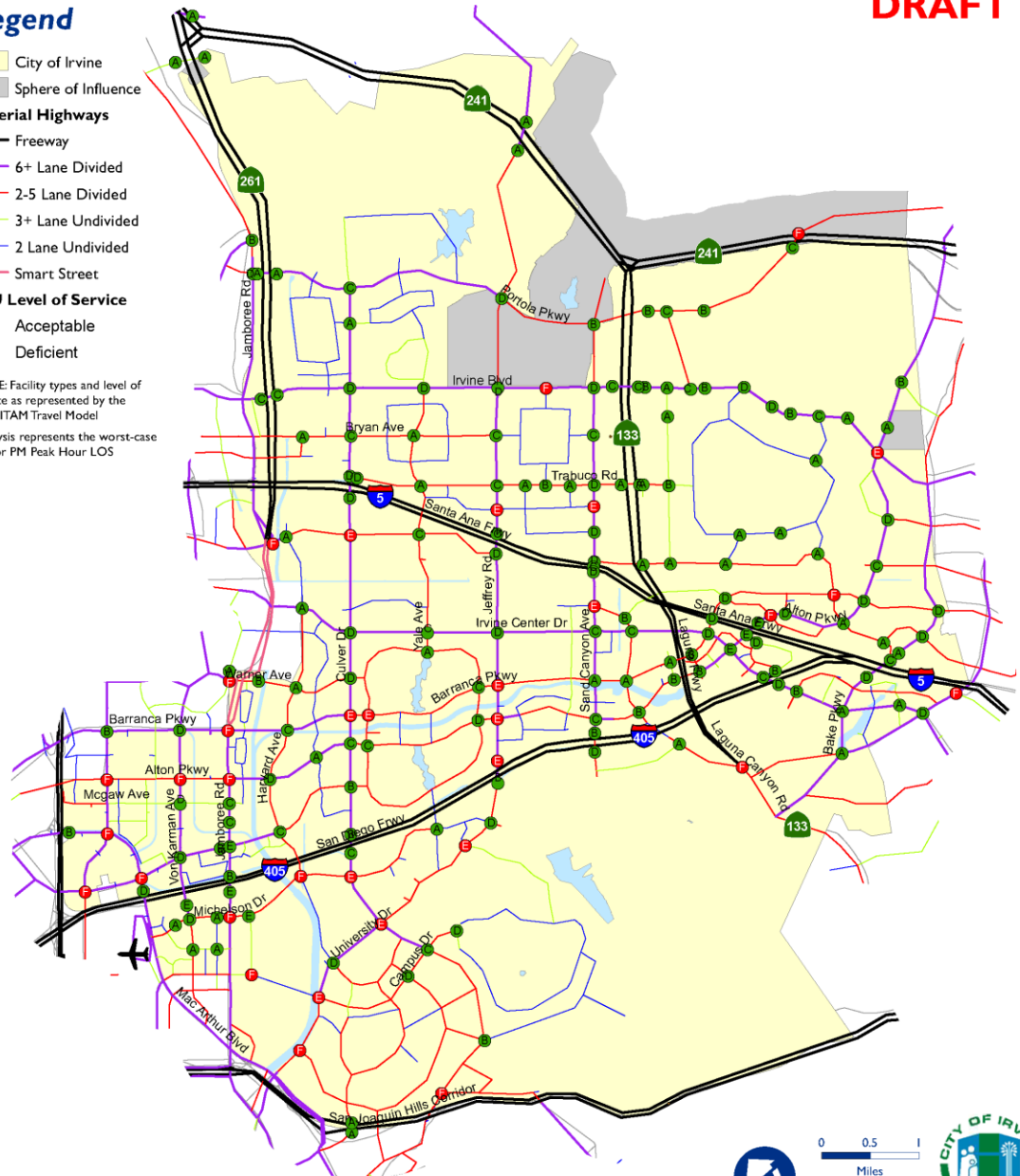—— Decrease in Volume   —— Increase in Volume
Labels indicate change in thousand vehicles per day

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# Intersection LOS

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

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# Traffic Impact Analysis
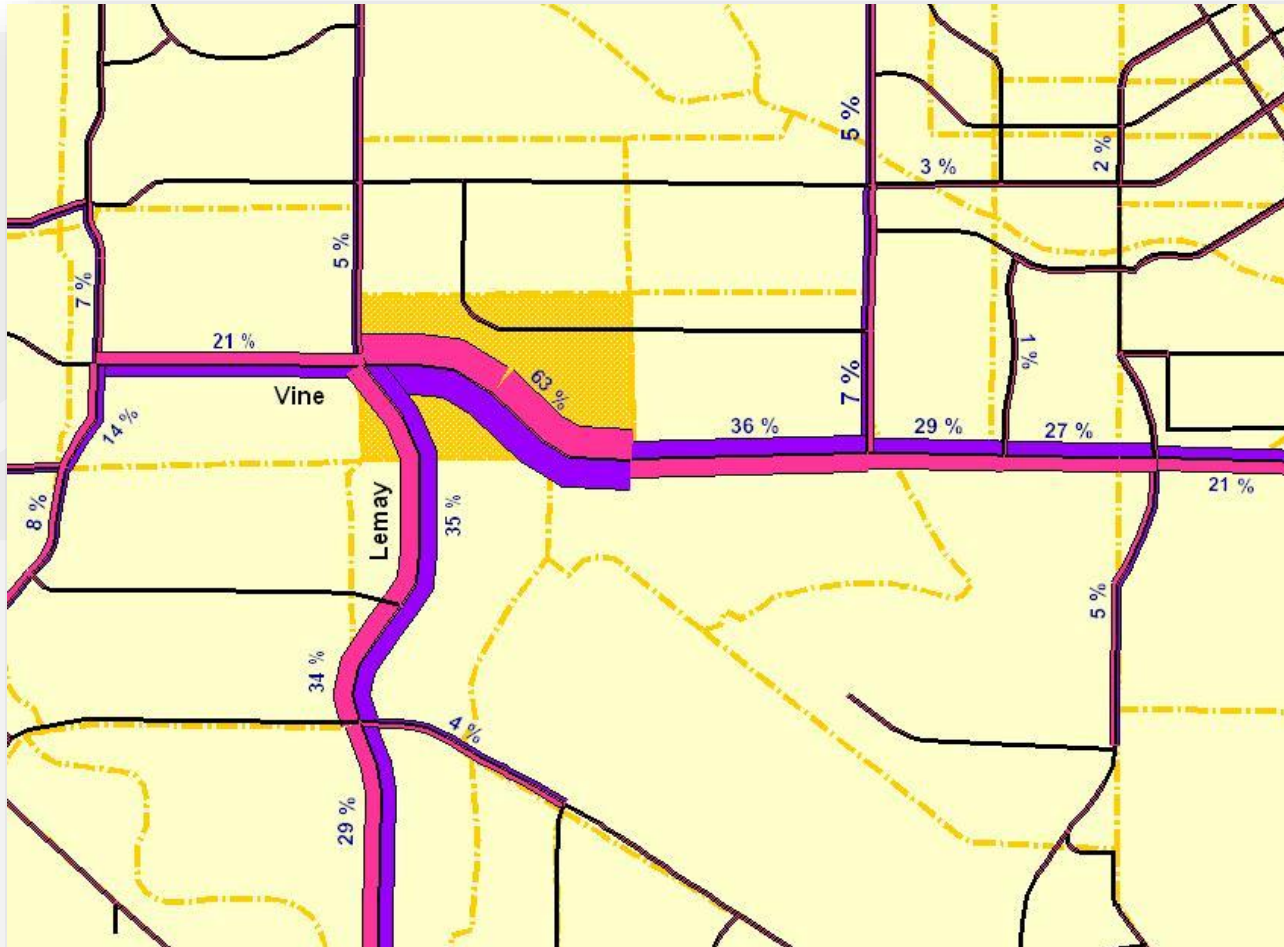


*\* Example only: not meant for reading the text in PowerPoint presentation format*

CAMBRIDGE SYSTEMATICS
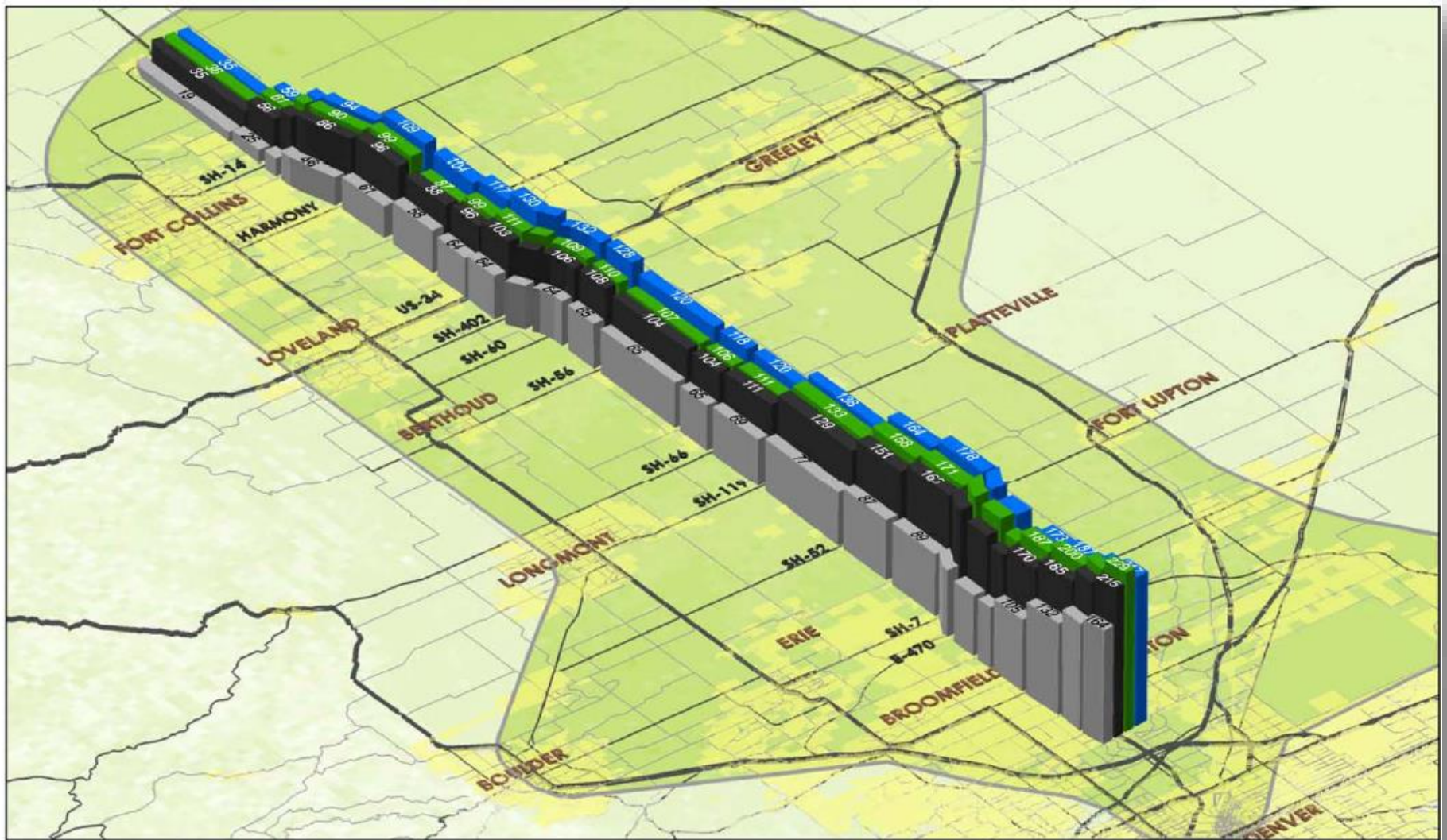
**DEIS Results:**
**I-25 Daily Traffic Volumes Comparison**

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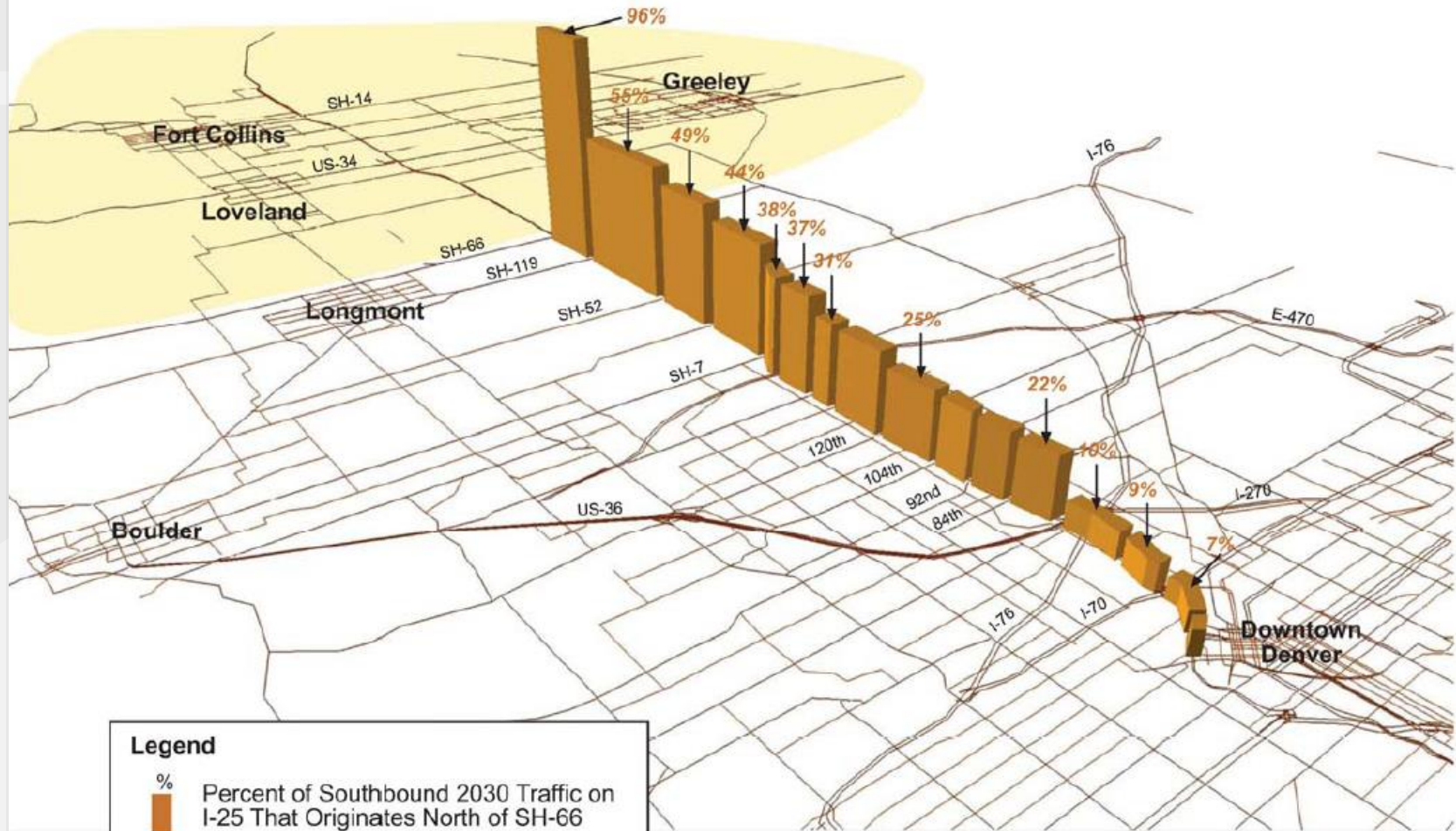Demand Forecast Model Runs. January 2007

**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

NORTH I-25
EIS
information. cooperation. transportation.

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

134

# 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%

SH-14

Fort Collins

US-34

Loveland

SH-66

SH-119

Longmont

SH-52

SH-7

Greeley

I-76

E-470

120th

104th

92nd

84th
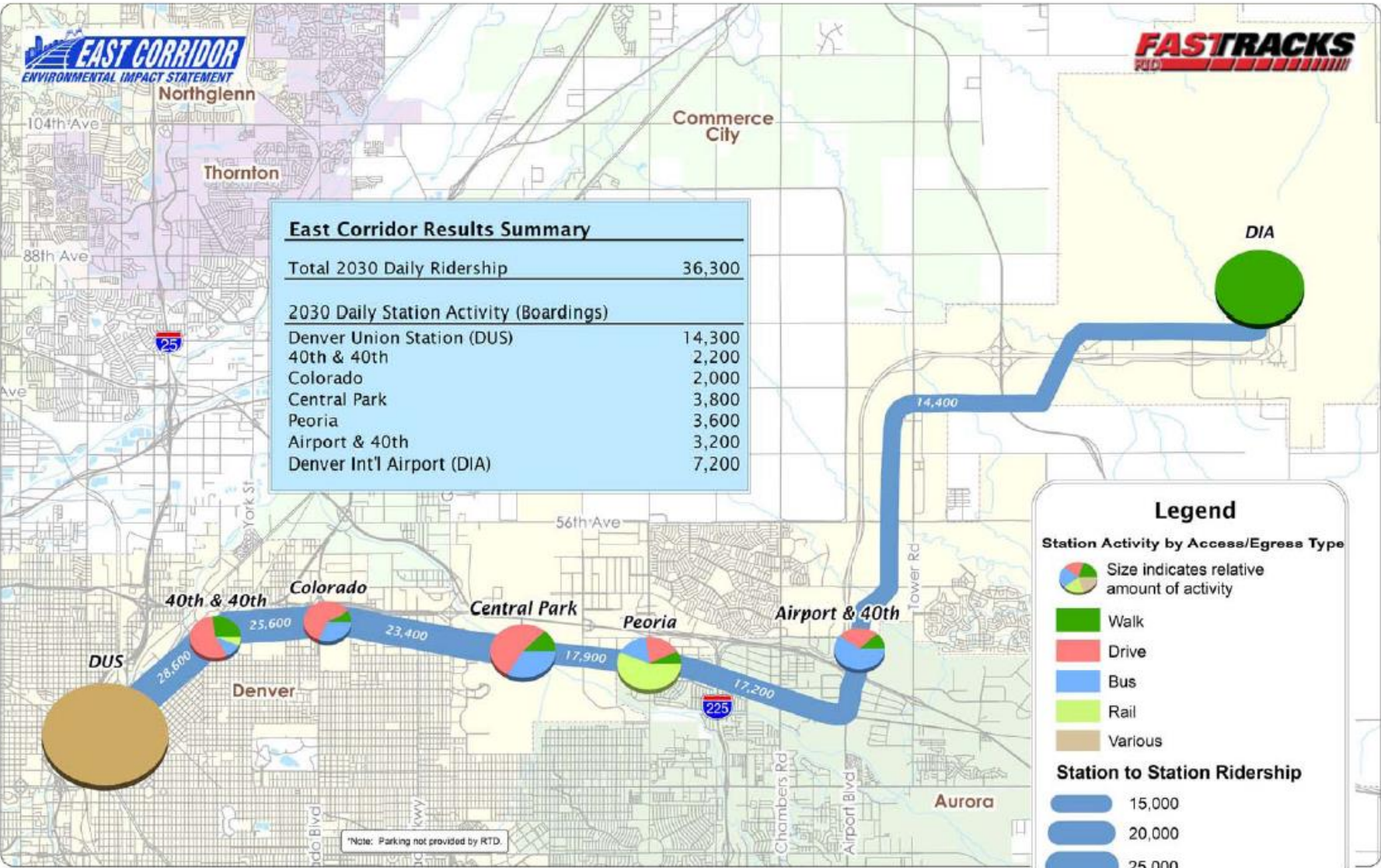
US-36

Boulder

I-76

I-70

I-270

Downtown Denver

## Legend

%    Percent of Southbound 2030 Traffic on I-25 That Originates North of SH-66

Trip Origin Area

Source: North I-25 EIS Model Level 2B screening, 8-lane Alternative AM Peak AON select link analysis.

April 12, 2005

135

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East Corridor Results Summary

Total 2030 Daily Ridership 36,300

2030 Daily Station Activity (Boardings)
Denver Union Station (DUS) 14,300
40th & 40th 2,200
Colorado 2,000
Central Park 3,800
Peoria 3,600
Airport & 40th 3,200
Denver Int'l Airport (DIA) 7,200

Legend

Station Activity by Access/Egress Type
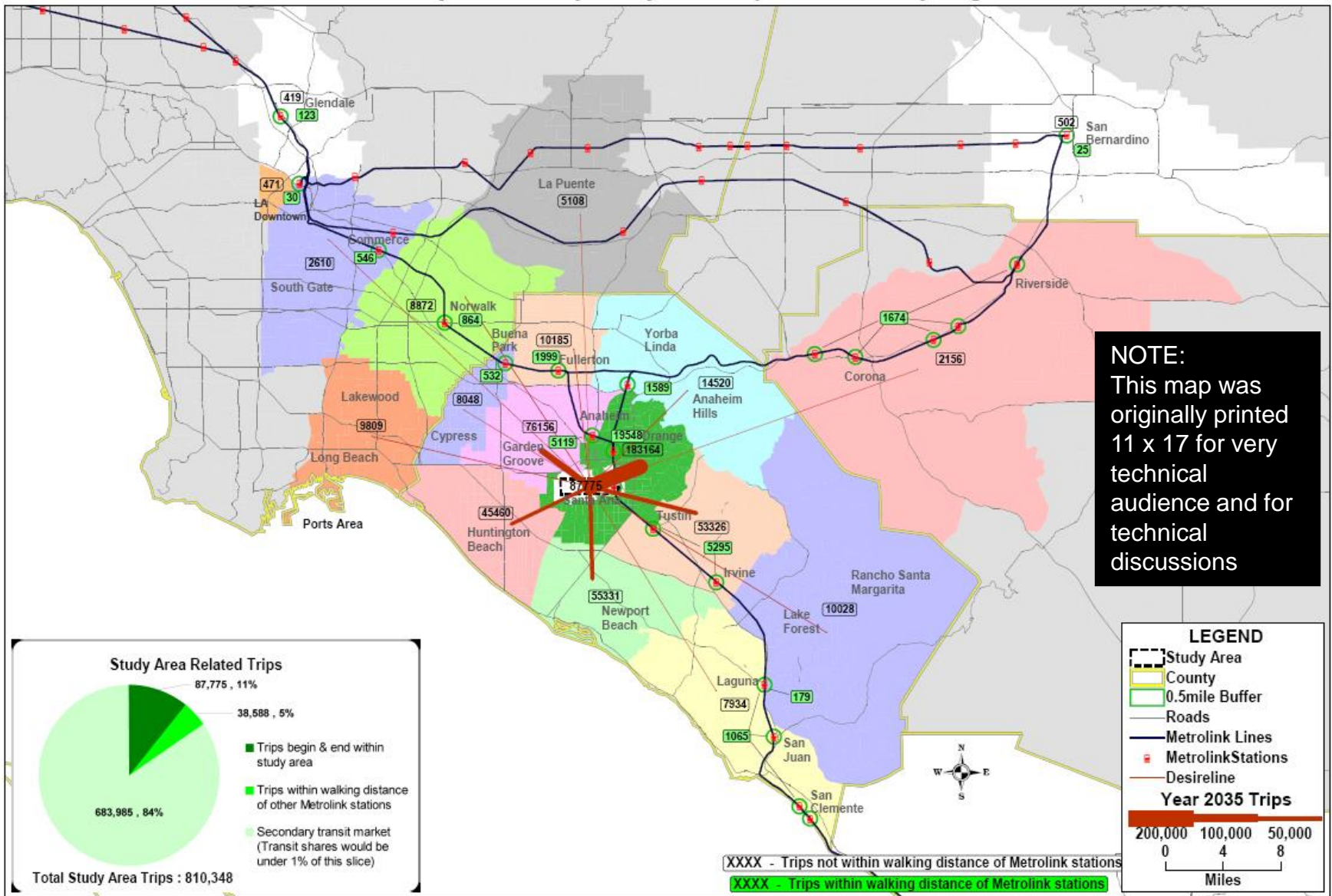
Size indicates relative amount of activity

Walk
Drive
Bus
Rail
Various

Station to Station Ridership

15,000
20,000
25,000

*Note: Parking not provided by RTD.

Source: East Corridor Model Run T7-A          October 24, 2007

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

136

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Santa Ana Fixed Guideway - 2035 Daily Study Area Trips To/From Key Regional Subareas

*NOTE: This map was originally printed 11 x 17 for very technical audience and for technical discussions*

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

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# Thank you!

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# More Topics

- GISDK

- MMA

- Select link/zone analysis

- Subarea analysis

- ODME

- Model estimation

- Other planning functions

# Transit Networks

# 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

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# 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
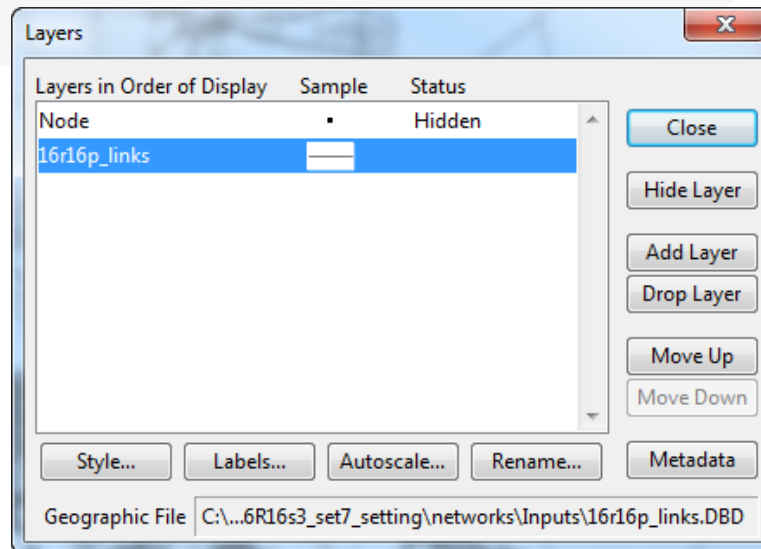
CAMBRIDGE SYSTEMATICS

# 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

CAMBRIDGE SYSTEMATICS
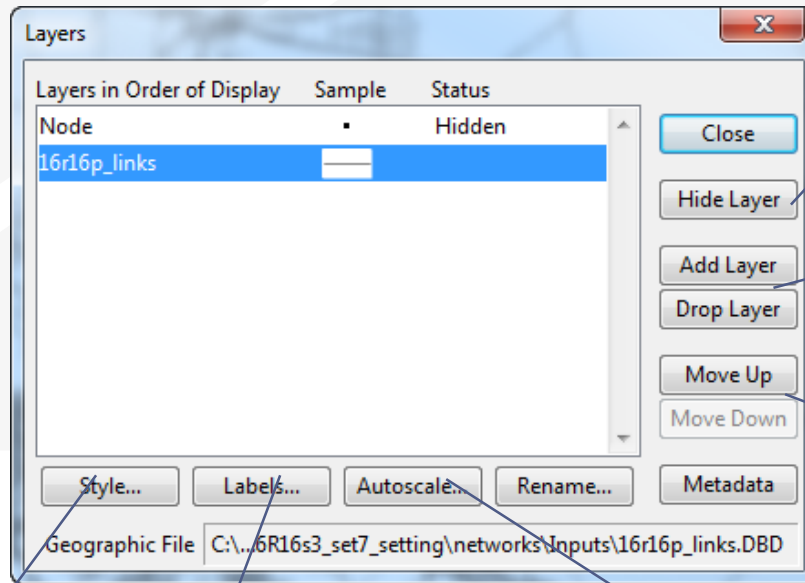
# Map Basics: Visualizing

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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
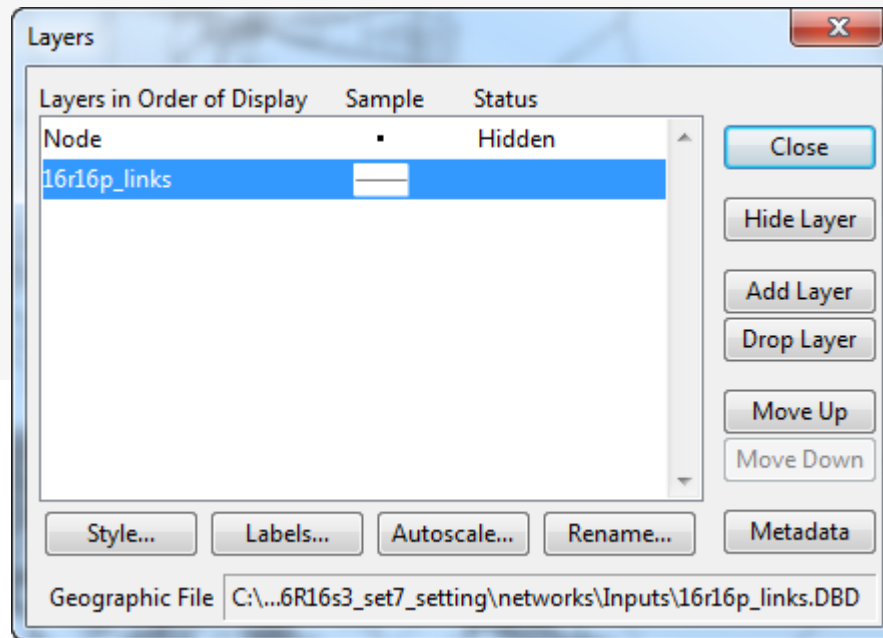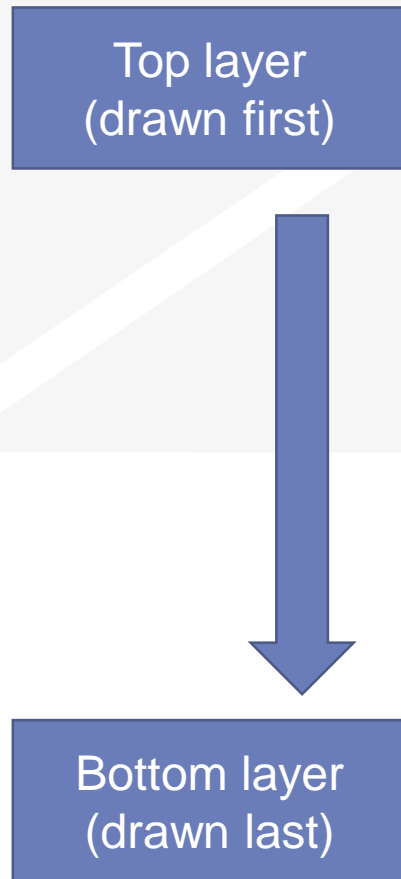
Add/Drop layers

Re-order layers

Change a layer style

Add/edit labels

Automatically show/hide layers as certain scales

CAMBRIDGE SYSTEMATICS

# Working with Layers

- **Layers are drawn from TOP to BOTTOM**
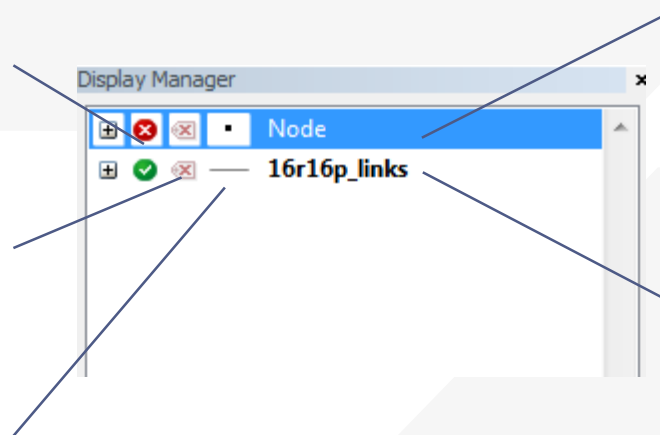
Top layer
(drawn first)

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*
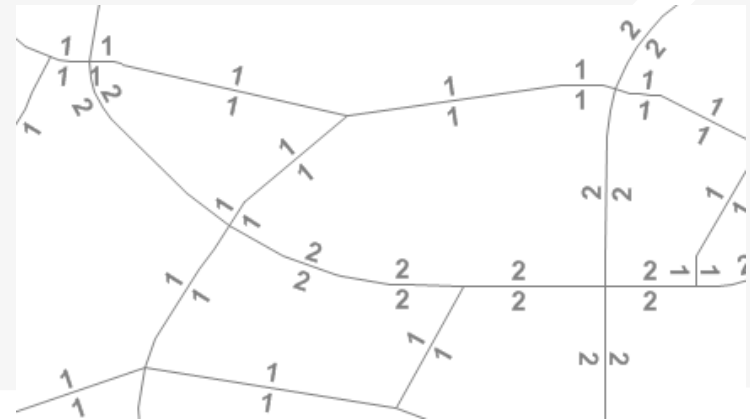
Hide/show a layer

Add/edit labels

Change a layer style

Node layer is **NOT** active

**Bold text:** links layer is active

Display Manager

Node

16r16p_links

CAMBRIDGE SYSTEMATICS

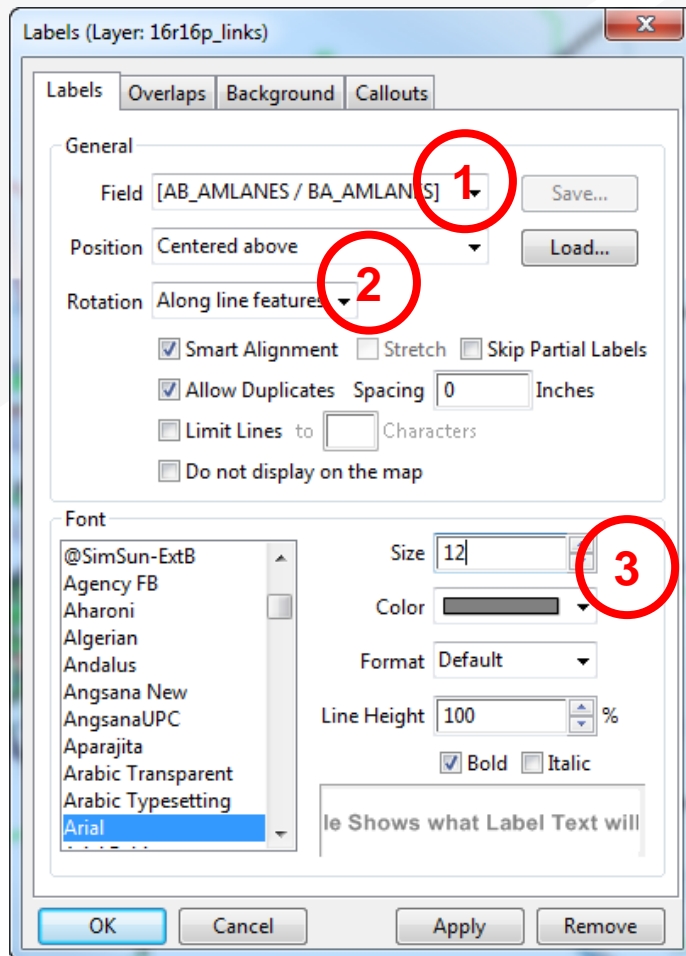# Labels

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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

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# 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

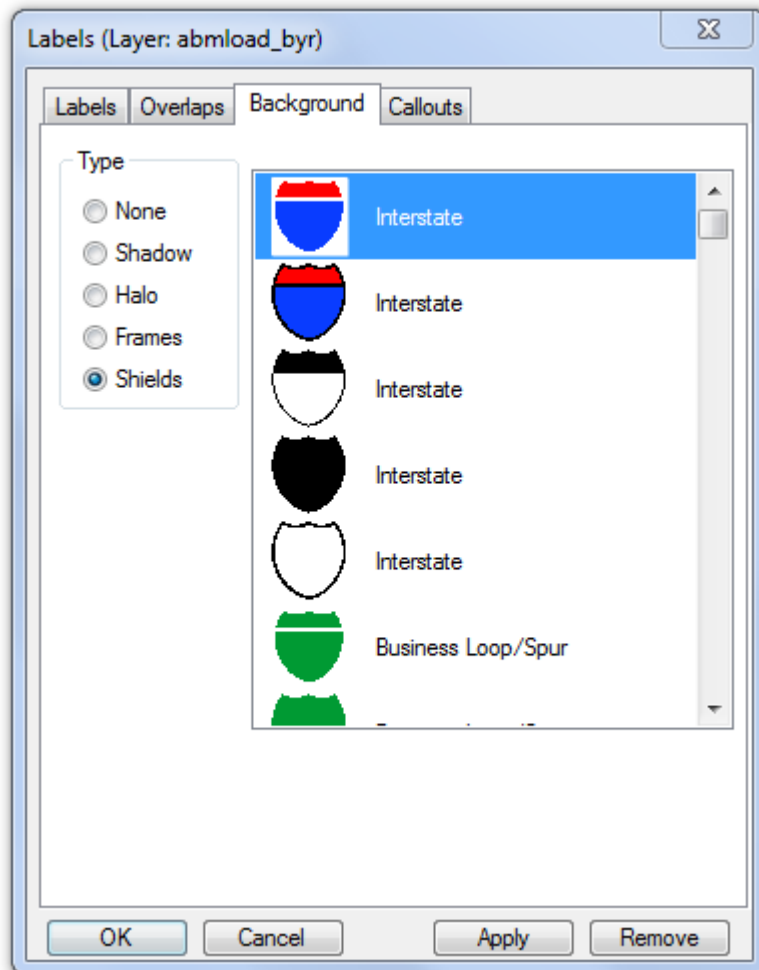CAMBRIDGE SYSTEMATICS

# 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

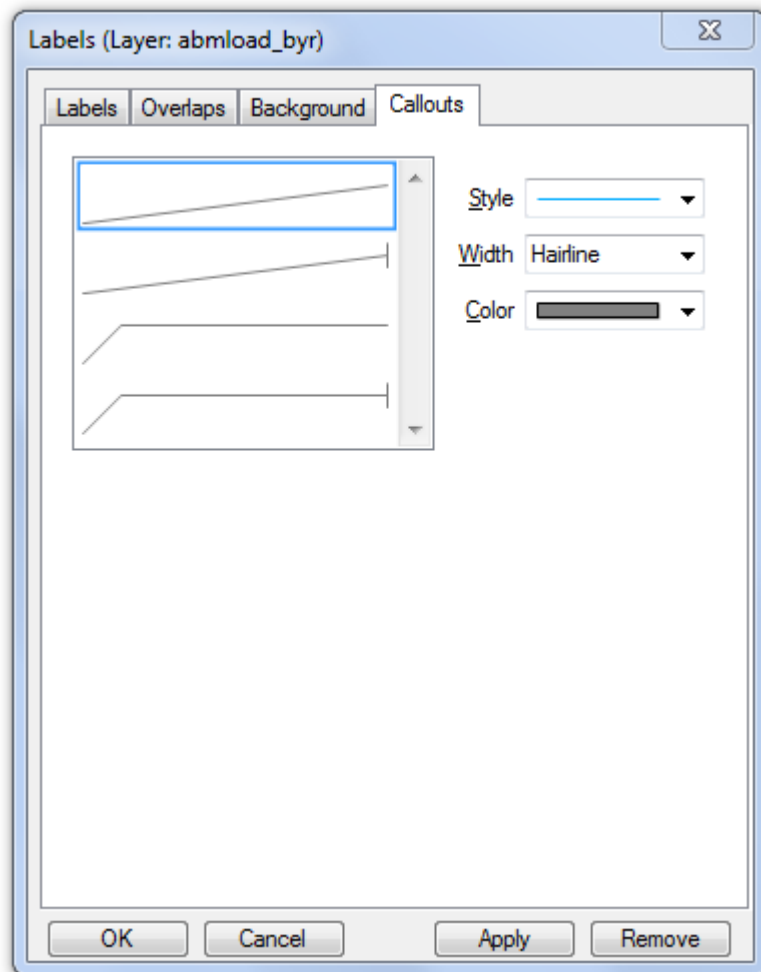# Automatic Labels

## The Background Tab



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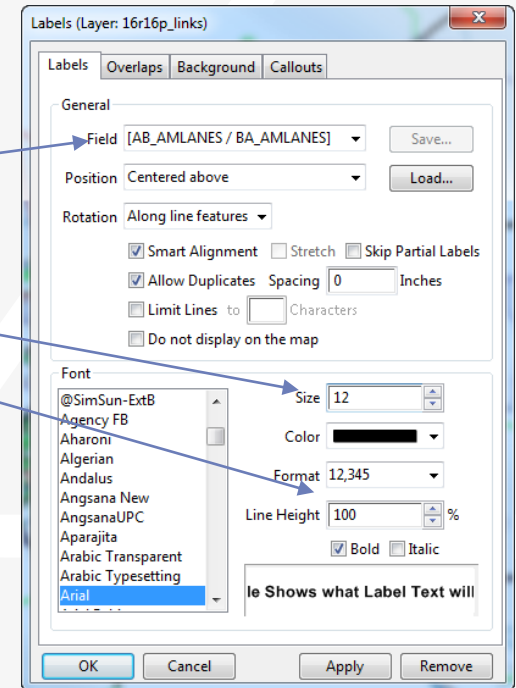
CAMBRIDGE SYSTEMATICS

# Automatic Labels

## The Callouts Tab



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

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# **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**

**CAMBRIDGE SYSTEMATICS**

# Color Theme

# 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

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# 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

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# 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))
```
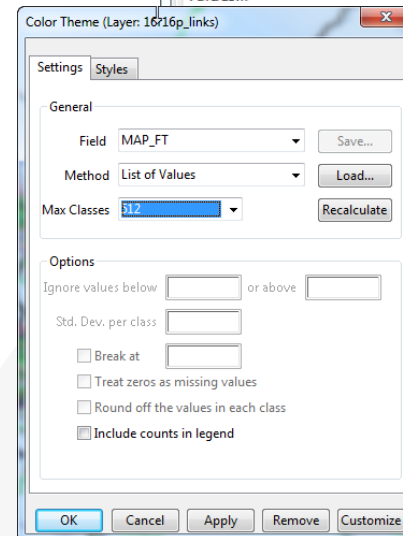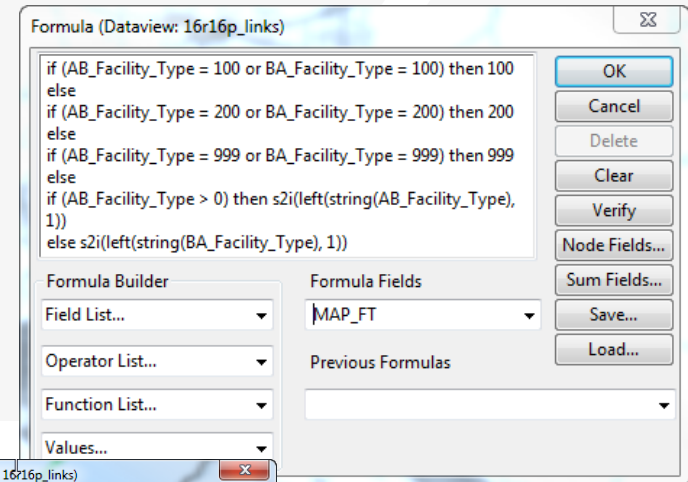
**Note:** We will discuss formulas
in more detail in a later section

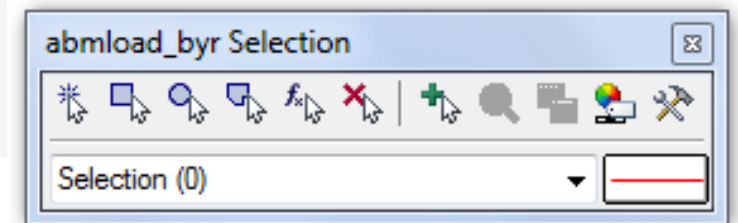# Practice 1: Create a color theme for line layer using IFC field

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 [icon] 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
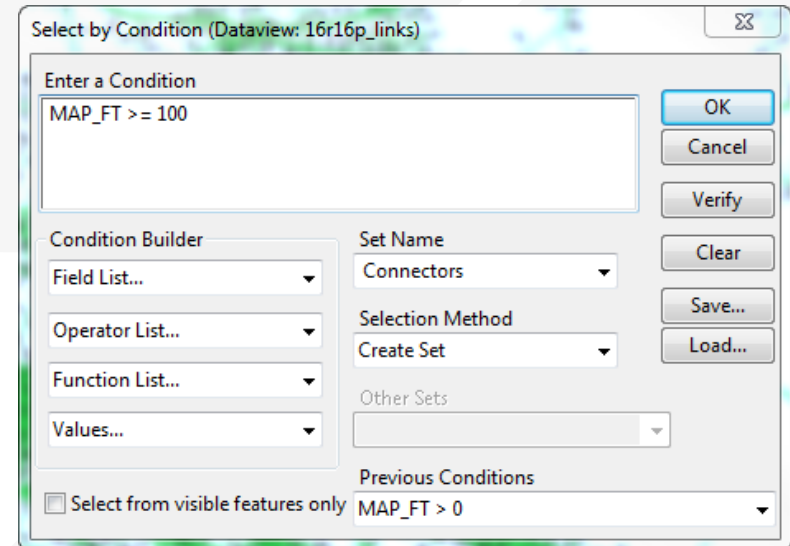
32

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# Create Selection Sets

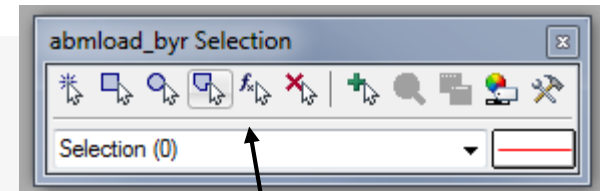# Selection Sets

➤ 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

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# 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 ( $f_x$ )  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**

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