# TransCAD Travel Demand Model Training

*presented to*

**Caltrans**

*January 4-5, 2016*

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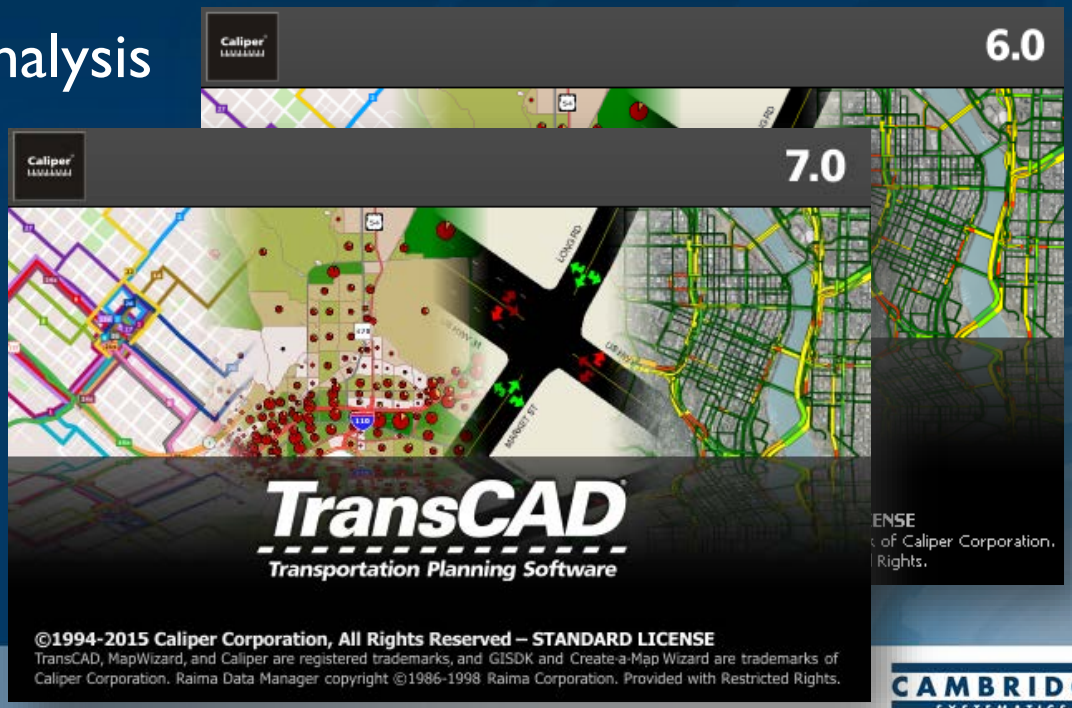
# Agenda

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

# TransCAD Basics

# Built-In Forecasting Tools

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



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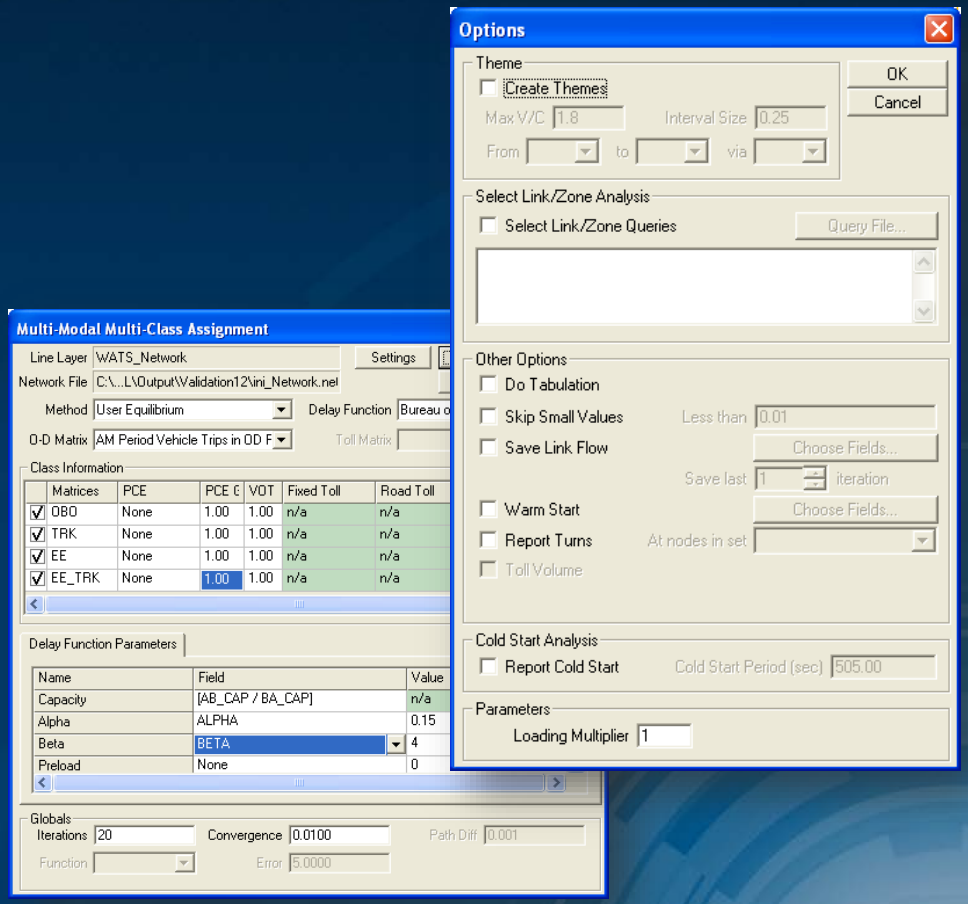
# Built In Interface

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



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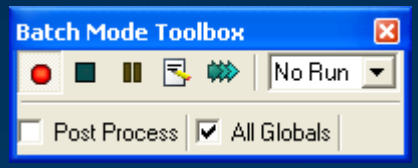
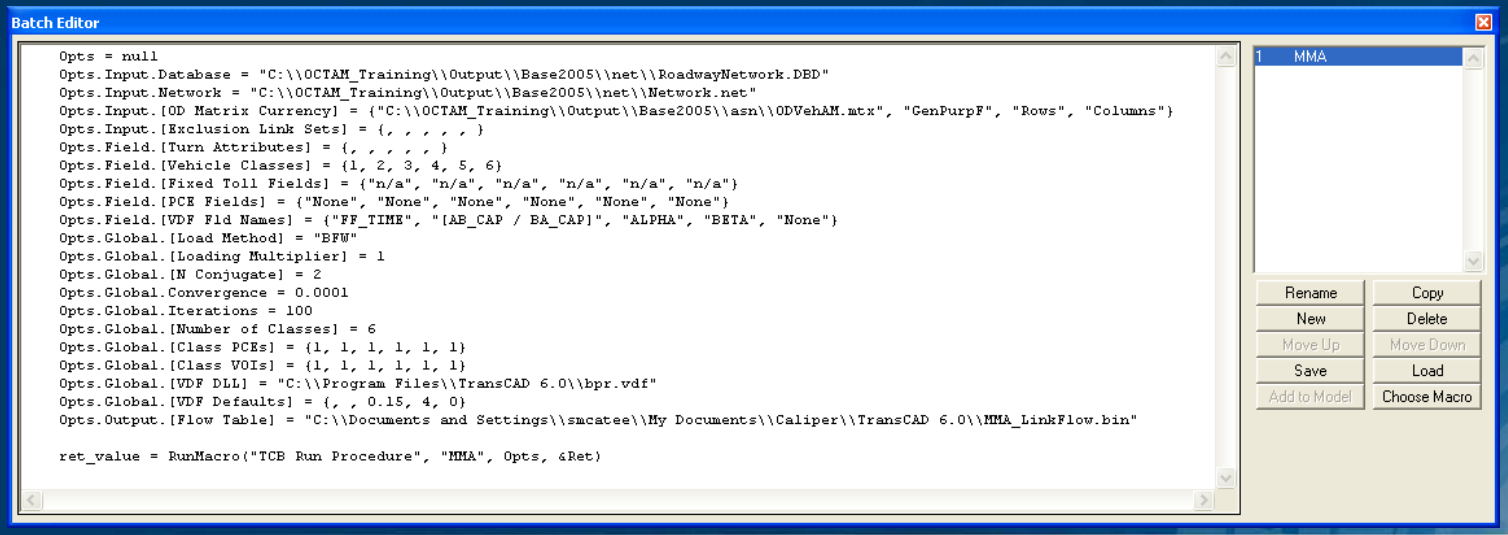
# Batch Mode

- 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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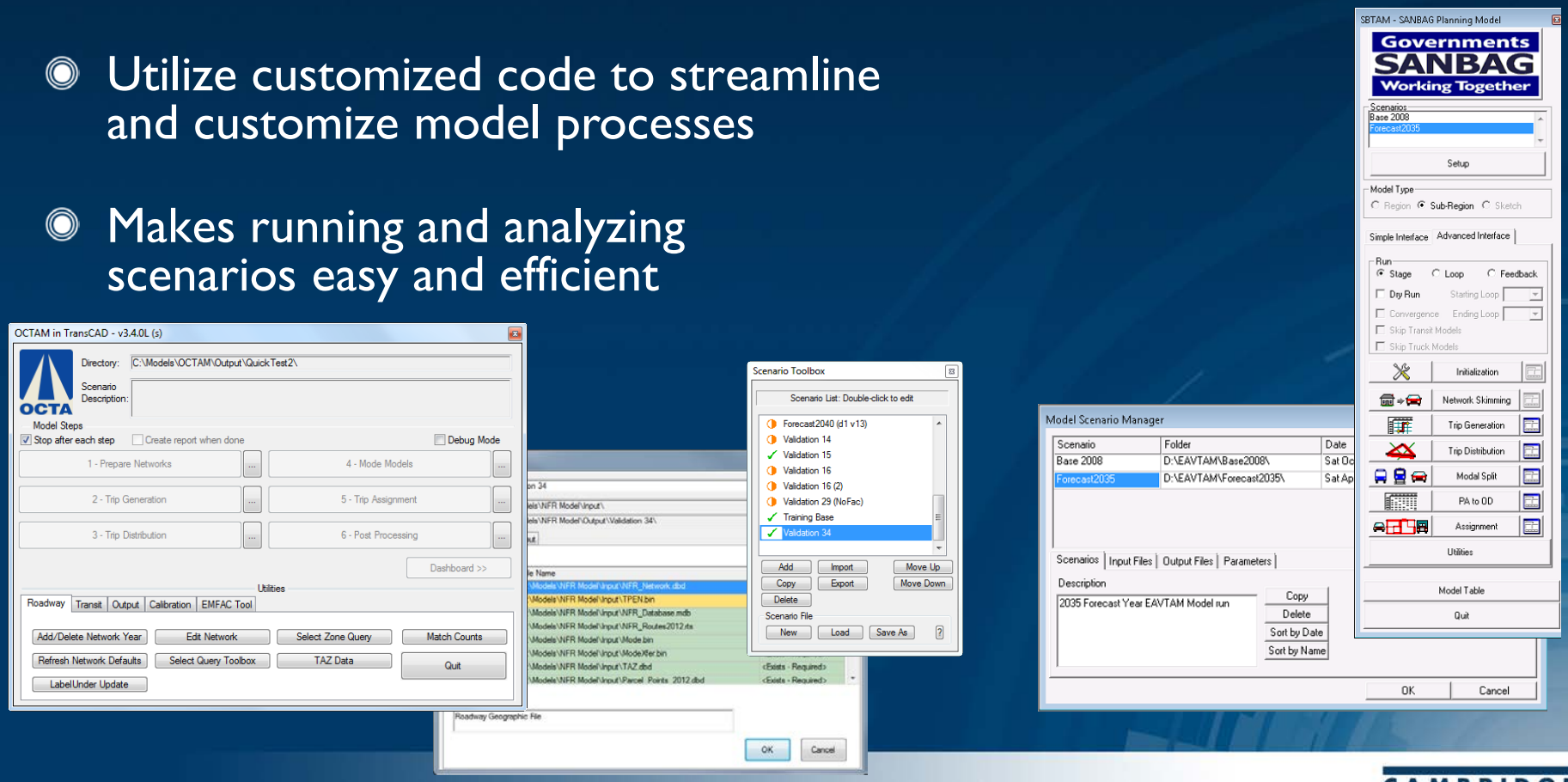
# Customized Interfaces

- 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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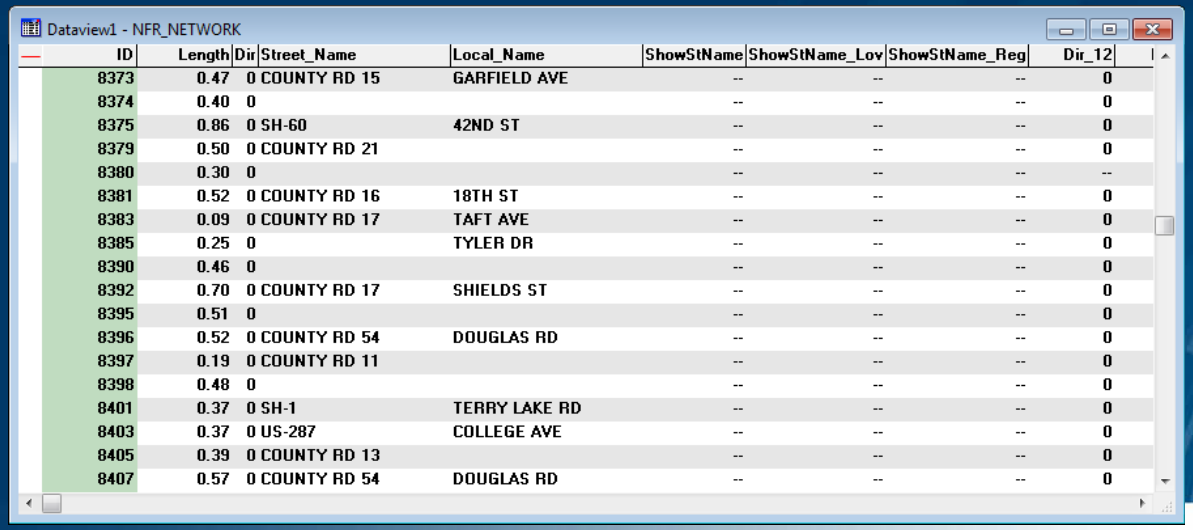
# Open Architecture

- 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 - NFR_NETWORK

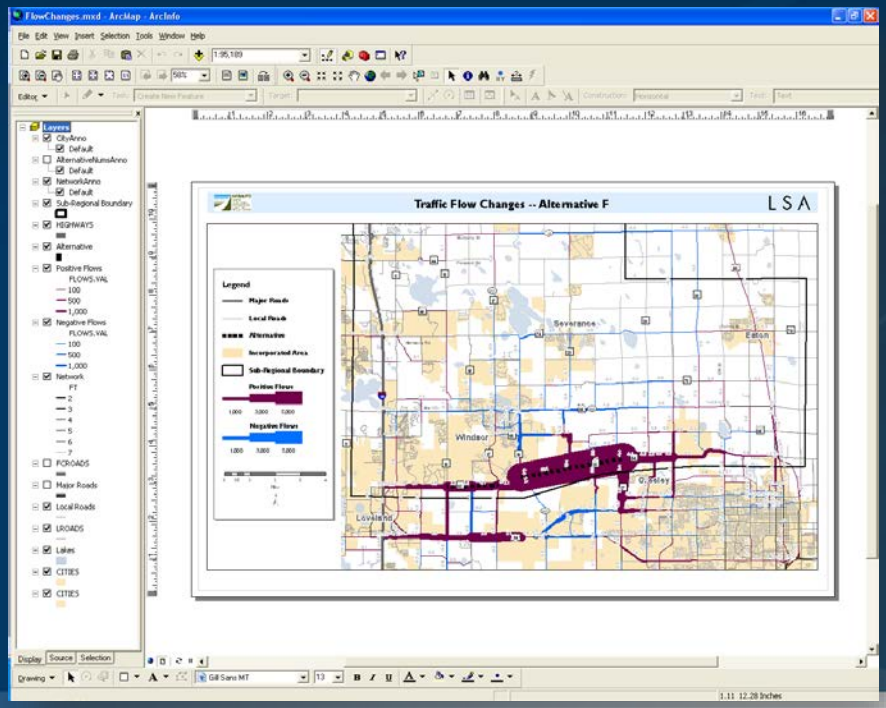
| ID | Length | Dir | Street_Name | Local_Name | ShowStName | ShowStName_Lov | ShowStName_Reg | Dir_12 |
|---|---|---|---|---|---|---|---|---|
| 8373 | 0.47 | 0 | COUNTY RD 15 | GARFIELD AVE | -- | -- | -- | 0 |
| 8374 | 0.40 | 0 | | | -- | -- | -- | 0 |
| 8375 | 0.86 | 0 | SH-60 | 42ND ST | -- | --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

# 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

# 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)
  - » Matrix Views (.mvw)
- These files refer to other file types that contain data
  - » Same concept as a project file (.mxd) in ArcMAP

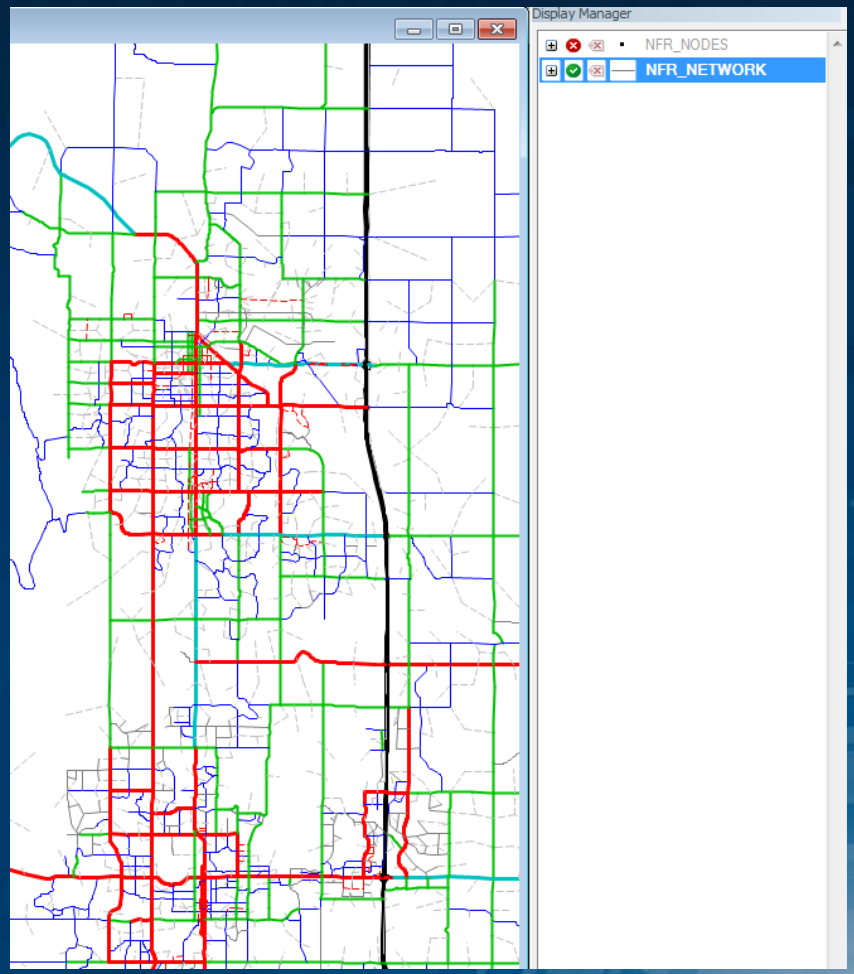

**Never use File → Save As → "Dataview (.dvw)" or "Map (.map)" to save a copy for modification!**

# 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

- Read and write directly to ESRI Geodatabases
- Improved Mapping Features
  - » Label customization
  - » Transparency
- Under the Hood
  - » 64-bit architecture
  - » More multithreading
  - » New procedures (e.g., drive egress to transit)

# Example Model QuickStart: OCTAM

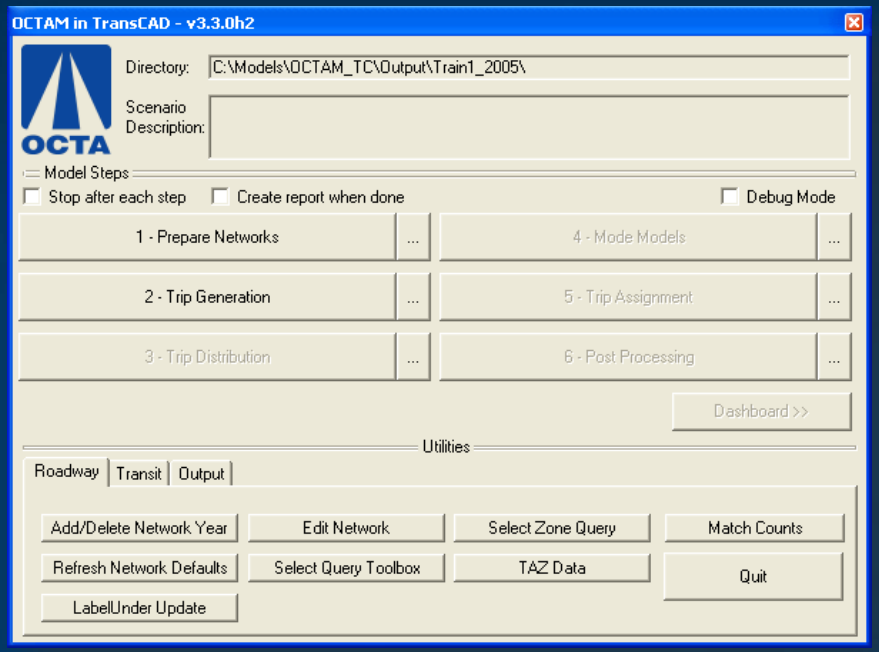
# Installing a Model

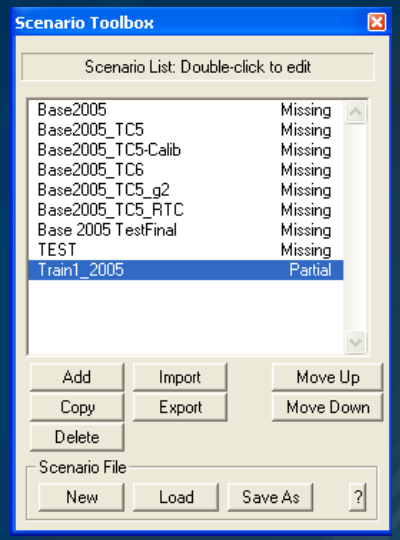
- Setup Packages
  - » Require specific TransCAD version
  - » Include detailed instructions and tools
  - » Complete input datasets
  - » Often include partial output datasets
- Training Package
  - » Includes a sample OCTAM dataset
  - » OK to modify files – we can always restore the originals

The model has already been installed on the training computers

# Starting OCTAM: Interactive Tour

- Run from Tools → Add-Ins → OCTAM
  - » *Or just Tools → OCTAM after the first run*
- Dialog Box Tour



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# Using the Dashboard: Interactive Tour

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

# Relevant Models

# OCTAM

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

# RivTAM

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

# SBTAM

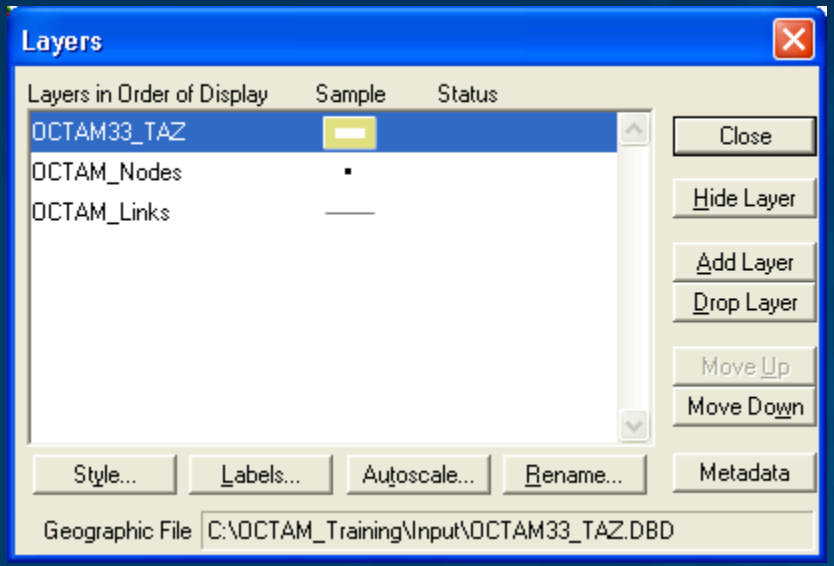
- Built with the SCAG Sub-Regional Modeling Tool
  - » Draws directly on SCAG networks, zones, and data
  - » Enhanced within San Bernardino County
  - » Zone aggregation far from SB County
  - » Runs using a specific version of the SCAG model interface

Mapping Basics

# Visualizing Data

# Working with Layers

- Start by opening a map **or** a layer
  - » 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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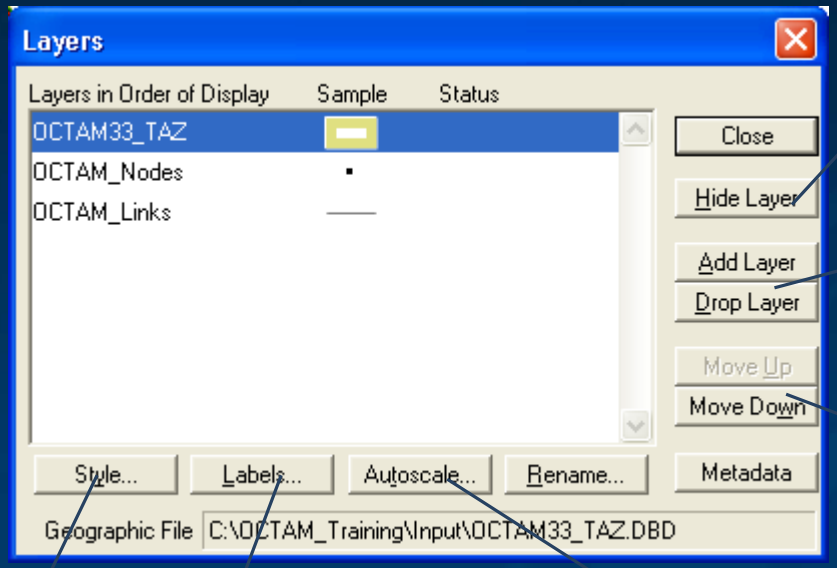
# Working with Layers

- **The Layers Dialog ( )**




Hide/show a layer

Add/Drop layers

Re-order layers

Change a layer style

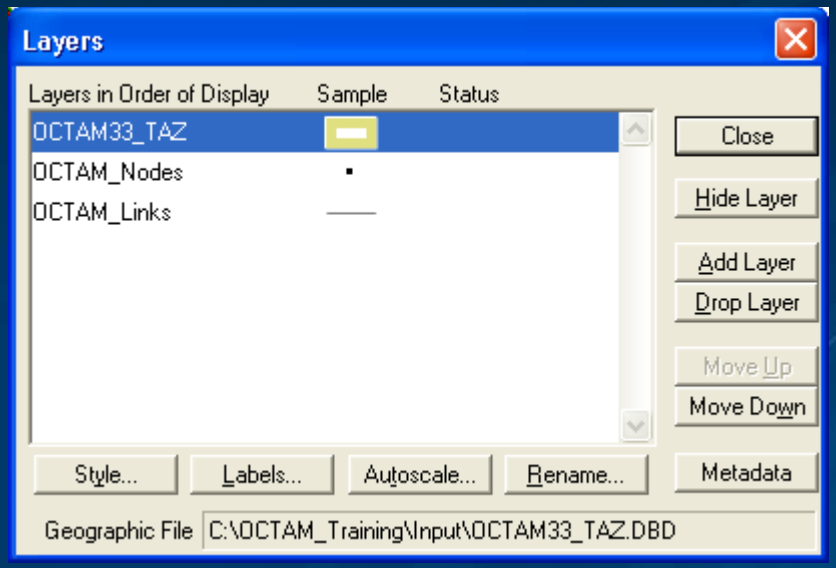
Add/edit labels

Automatically show/hide layers as certain scales

# Working with Layers

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

Bottom layer
(drawn first)




Top layer
(drawn last)



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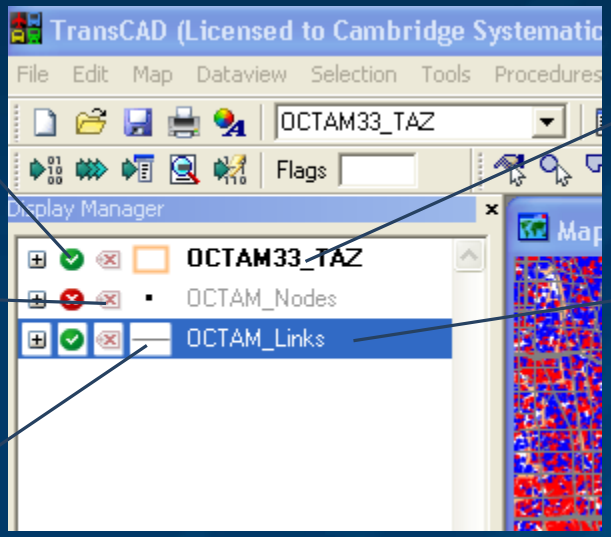
# Display Manager

- 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

OCTAM33_TAZ is active

OCTAM_Links is **NOT** active



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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 at the top of the screen:
     (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

# Working with dataviews

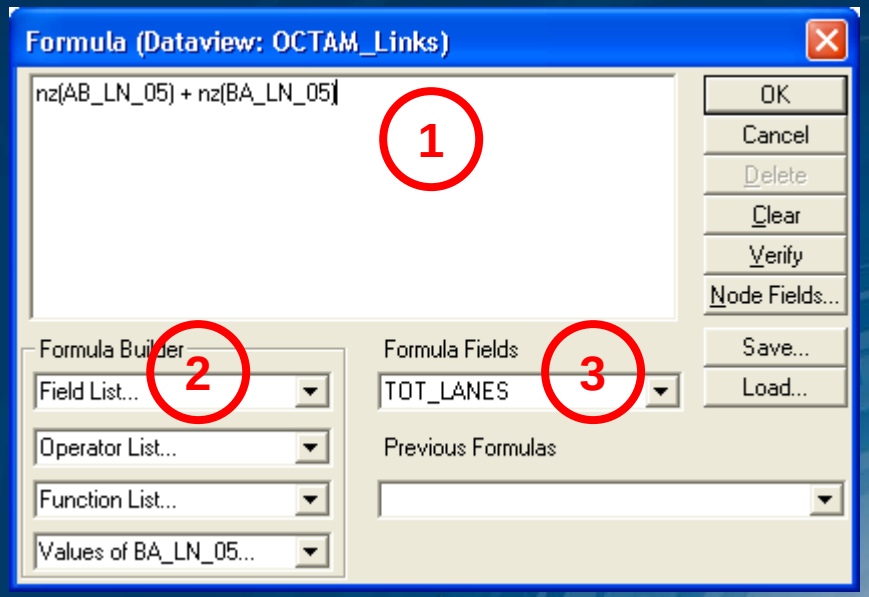
- Open a dataview for any existing layer (  )
- Open a standalone table with File → Open
- Add/Remove fields with Dataview → Modify Table (or  )
  - » Be careful: Changes are permanent once you click "OK"
- Data can be edited directly in the dataview
  - » Be careful: Changes are saved as you go
- Create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

# Working with dataviews

- Formula ***Fill*** vs. Formula ***Field***
  - » Formula ***Fill*** adds new data and saves values in the table
  - » Formula ***Fields*** are updated when other values change, but are not stored in the data table
    - Formula fields are stored in a map, dataview (*.dvw), or workspace

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*



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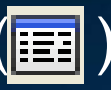
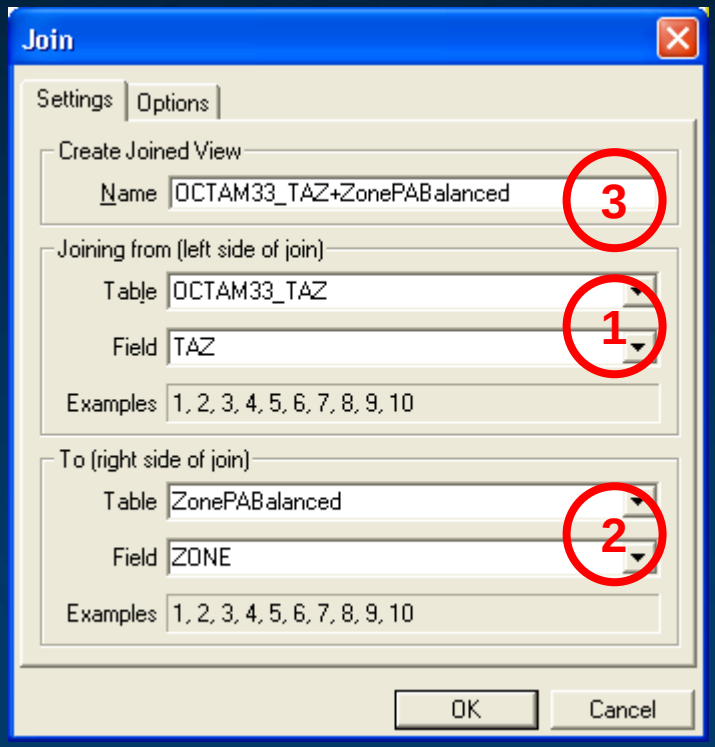
# Practice: Create a Total Lanes formula

- Start with the map from the last practice exercise
- Open the link layer dataview
- Create a new formula field named TOT_LANES
  - » nz(AB_LN_05) + nz(BA_LN_05)
- Try adding a new field called TOT_LANES2
  - » Fill this field with the same formula
  - » What happens on freeway links if we exclude the nz() function?

# Joining Data

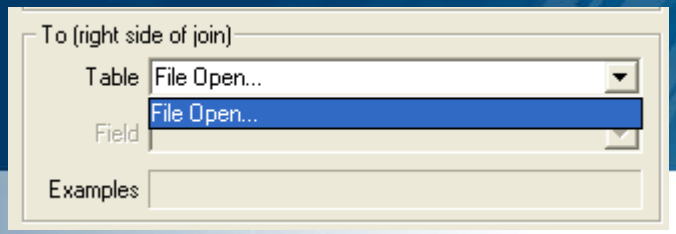
- Layers have an associated data table (  )
- Data can be joined (  ) to other tables
  - » Roadway Network + Traffic Assignment results
  - » TAZ layer + Land Use Data
  - » Roadway Network + Lookup Table
  - » More…
- This is how traffic assignment results are viewed in TransCAD

# 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*



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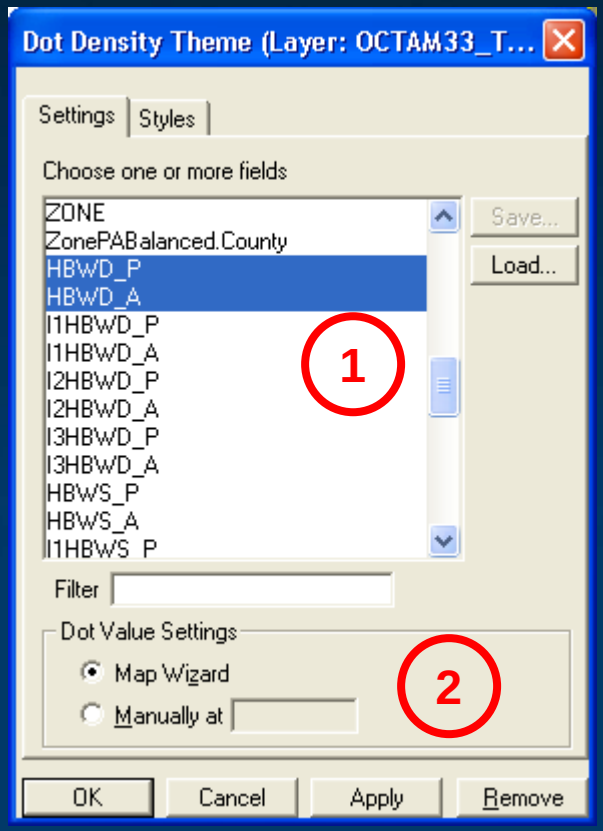
# Dot Density Themes

- Dot Density ( ) Themes can be used to
  - » Show land use or socioeconomic data
  - » Display trip ends
  - » Etc…

# Dot Density Themes

## The Settings Tab




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



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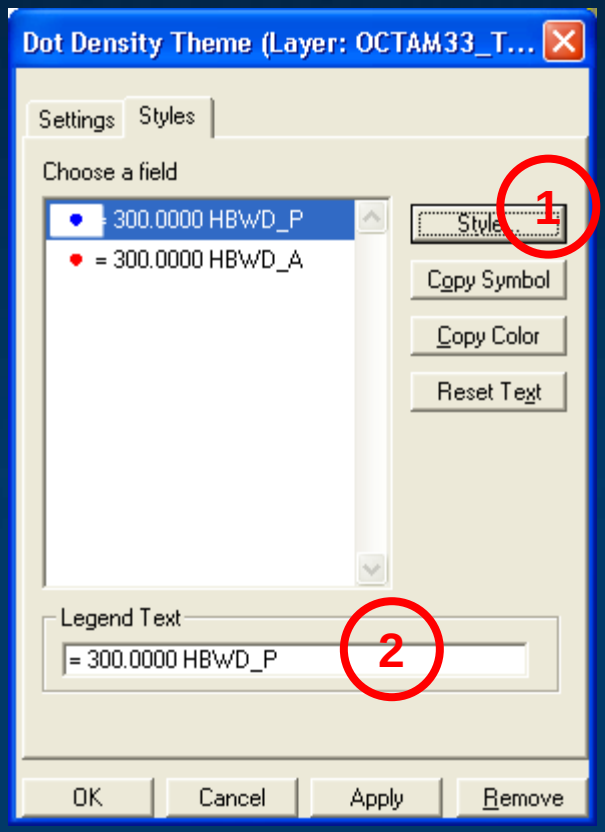
# Dot Density Themes

## The Settings Tab




1. Select a symbol
2. Specify the legend text



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# Practice: Create a Production/Attraction Theme

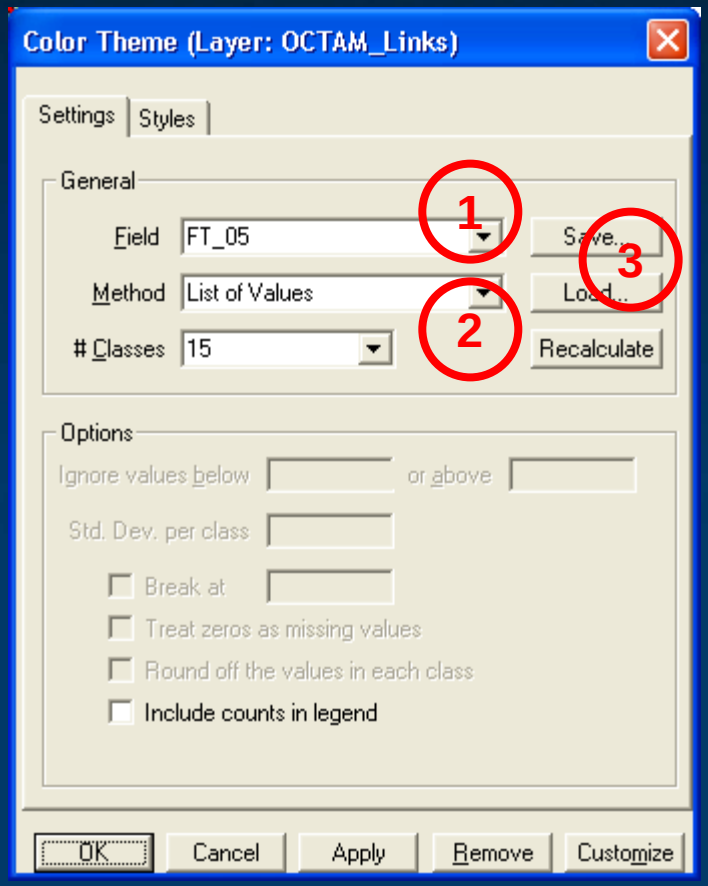
- Open the TAZ layer in TransCAD
  - » *Input\OCTAM34_TAZ.dbd*
- Join the balanced PA table to the TAZ layer
  - » *Output\gen\ZonePABalanced.bin*
  - » Reminder: Use the correct join fields!
- Create a dot-density theme
  - » Use different colors for P and A
  - » Try using house icons for productions and factory or office icons for attractions
  - » Clean up the legend

# Color and Pattern Themes

- Set feature colors and styles based on attributes
  - » Color Themes (  ) are often used to display facility type on a roadway network
  - » Pattern Themes (Map → 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
3. Use the Load and Save buttons to store and recall settings
   - » *This is a huge time-saver!*



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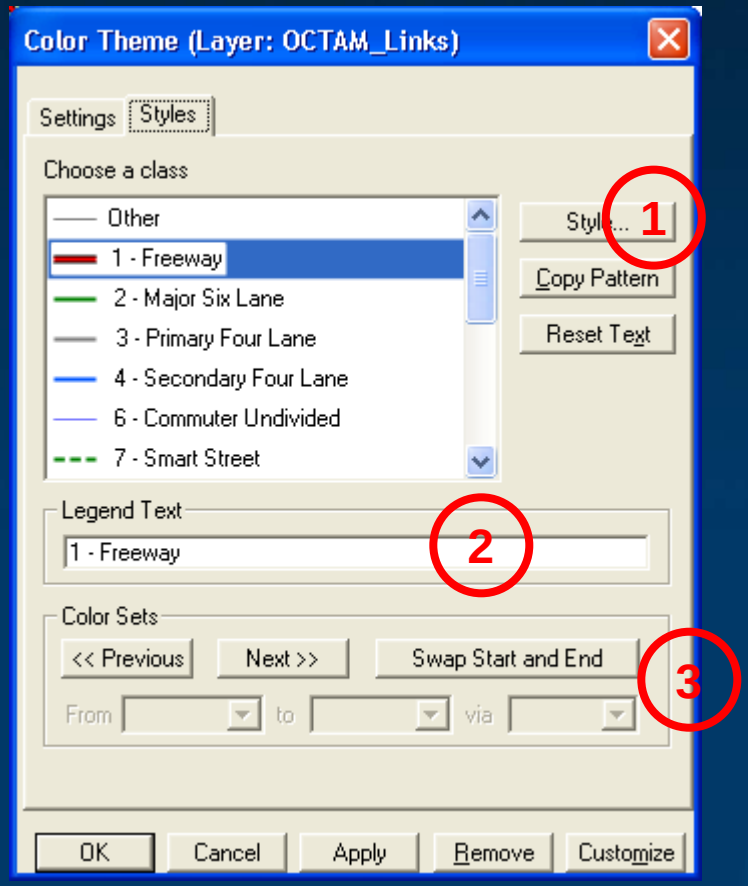
# Color and Pattern Themes

## 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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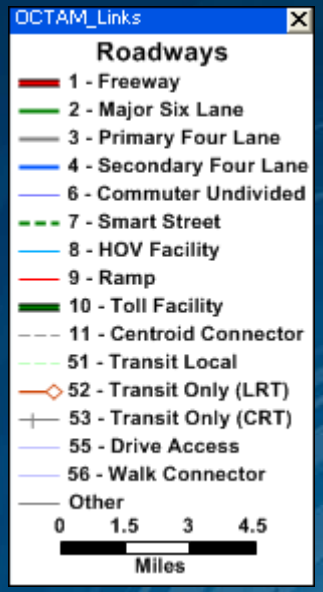
# Practice: Re-create a facility type theme

- Open the OCTAM Input roadway network
  - » Input/oct40hwyrail.dbd
- Use Save Settings to save the current theme
- Remove the current theme
- Re-create the theme manually
  - » Use the FT styles shown here →
- Now – Re-load the saved settings
  - » *Note: You may need to zoom out to the entire region for this to work correctly.*



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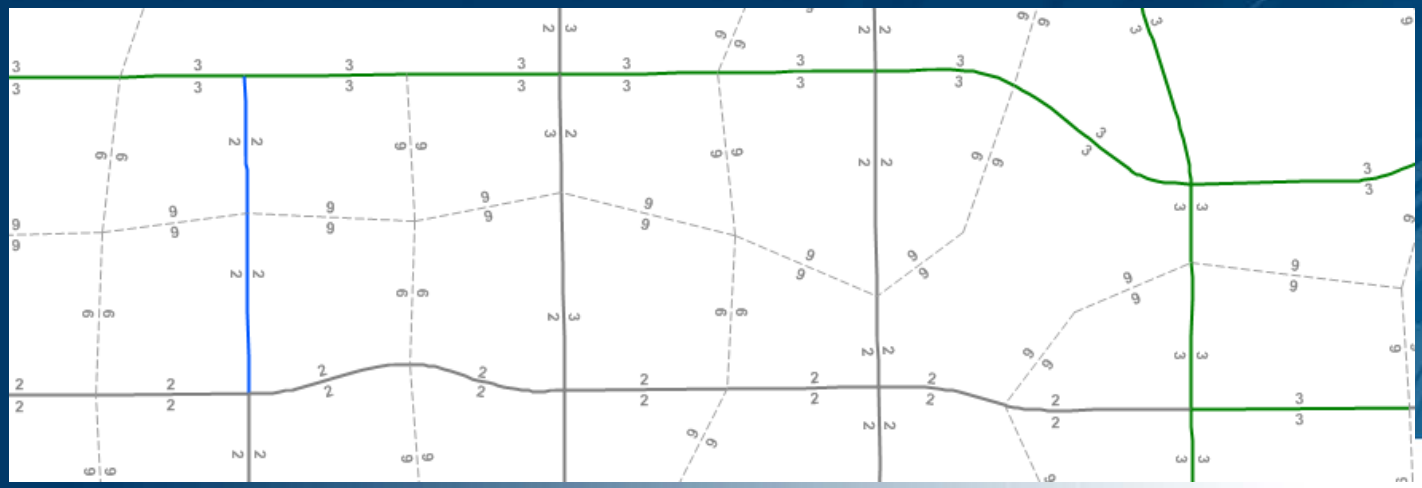
# Automatic Labels

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





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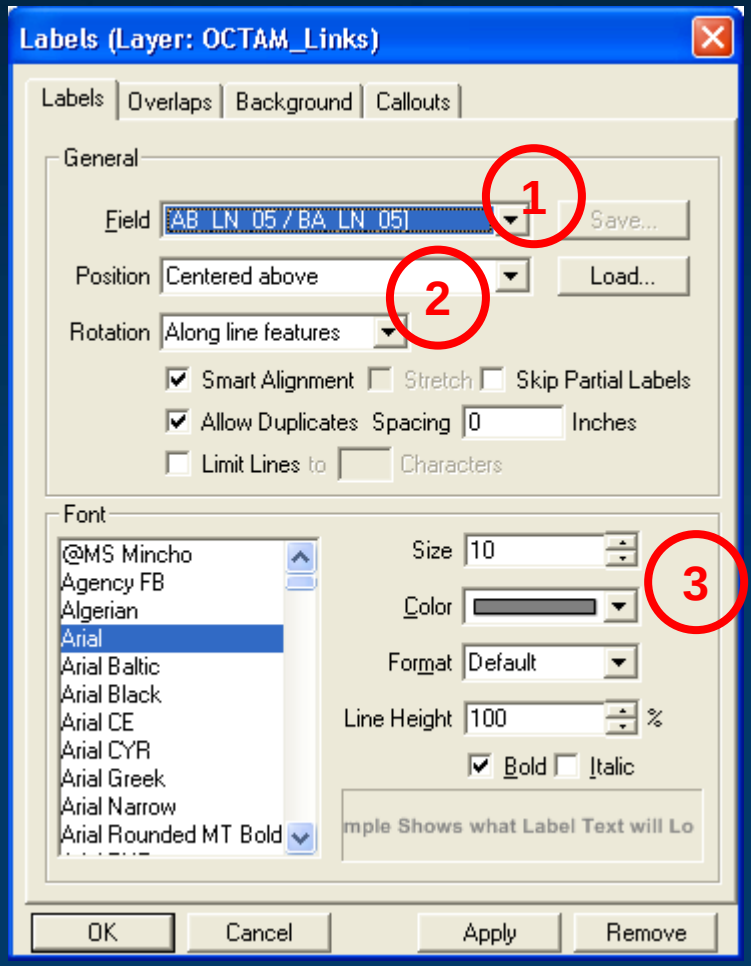
# Automatic Labels

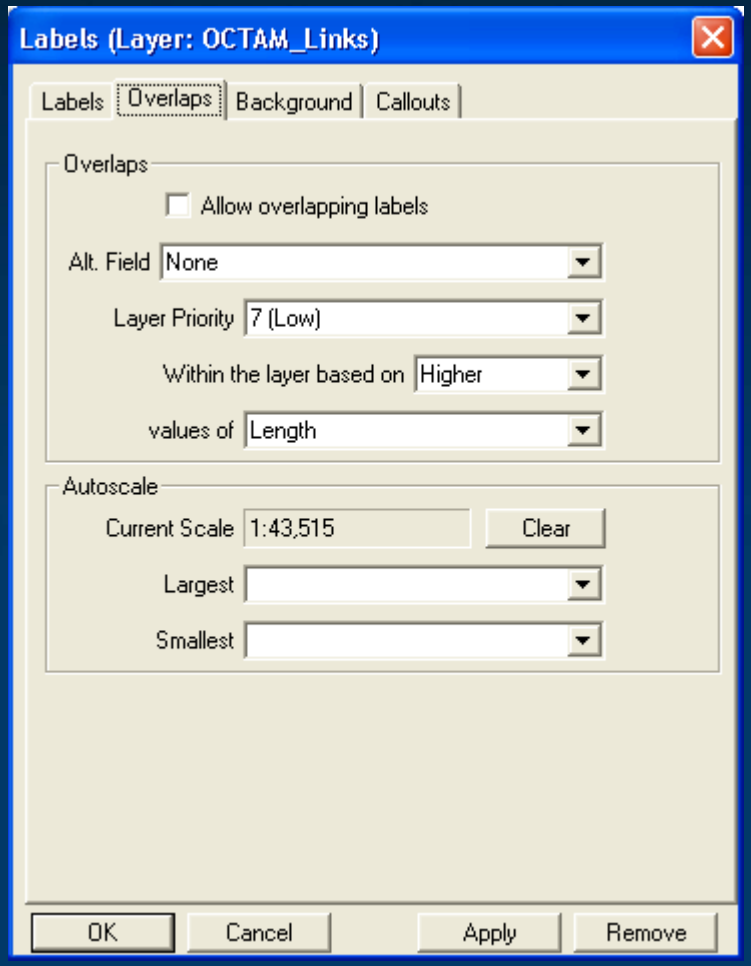
## The Labels Tab




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

# 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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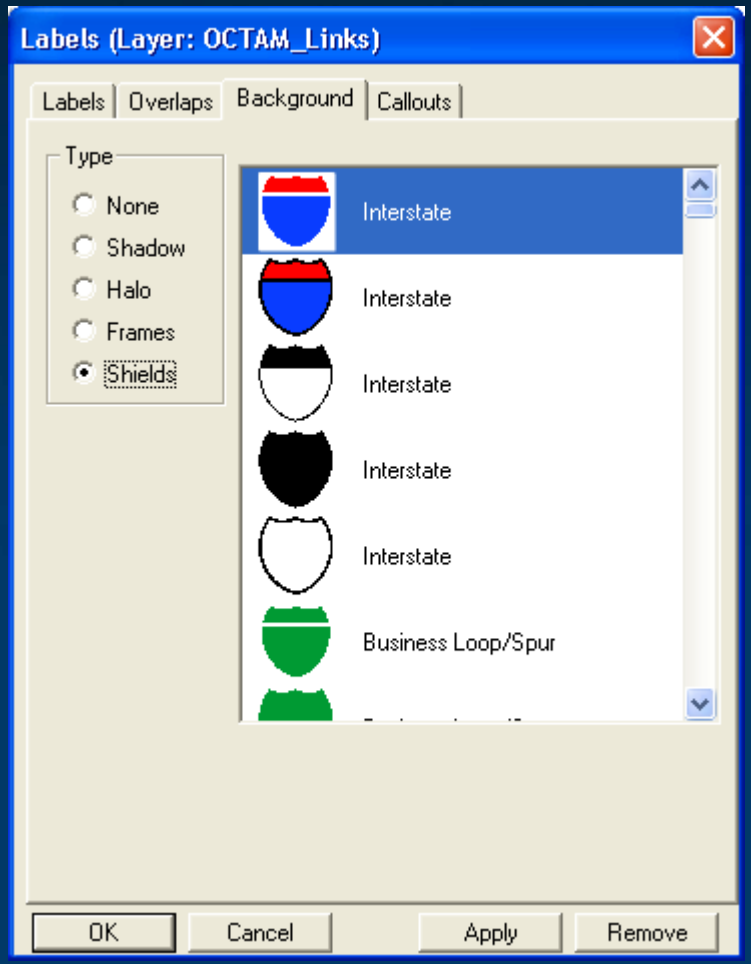
# Automatic Labels

## 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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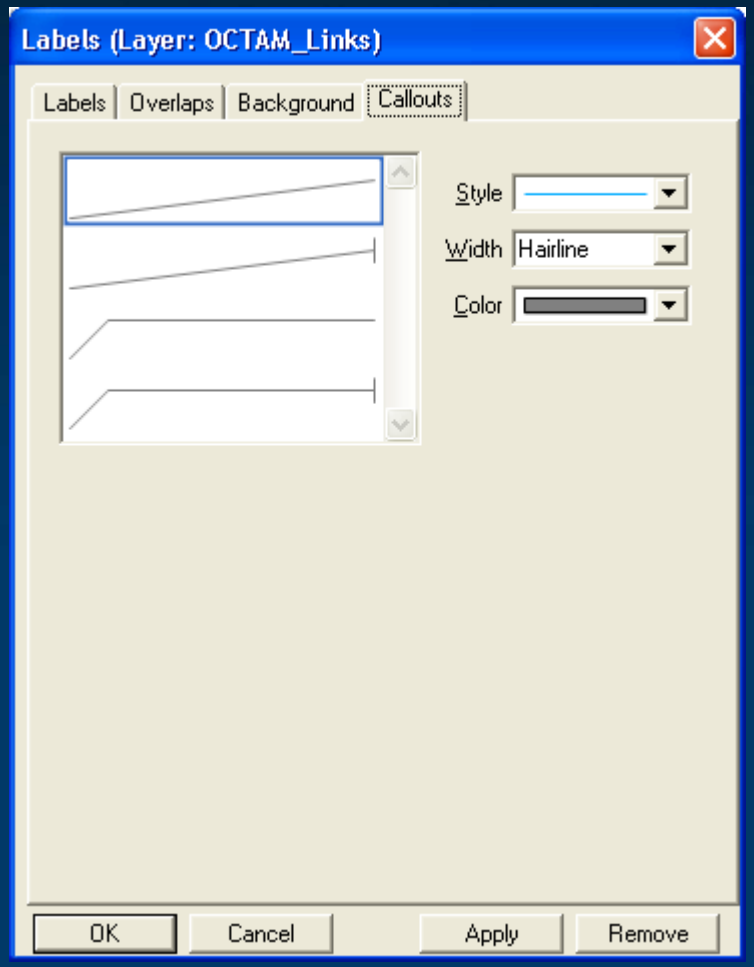
# Automatic Labels

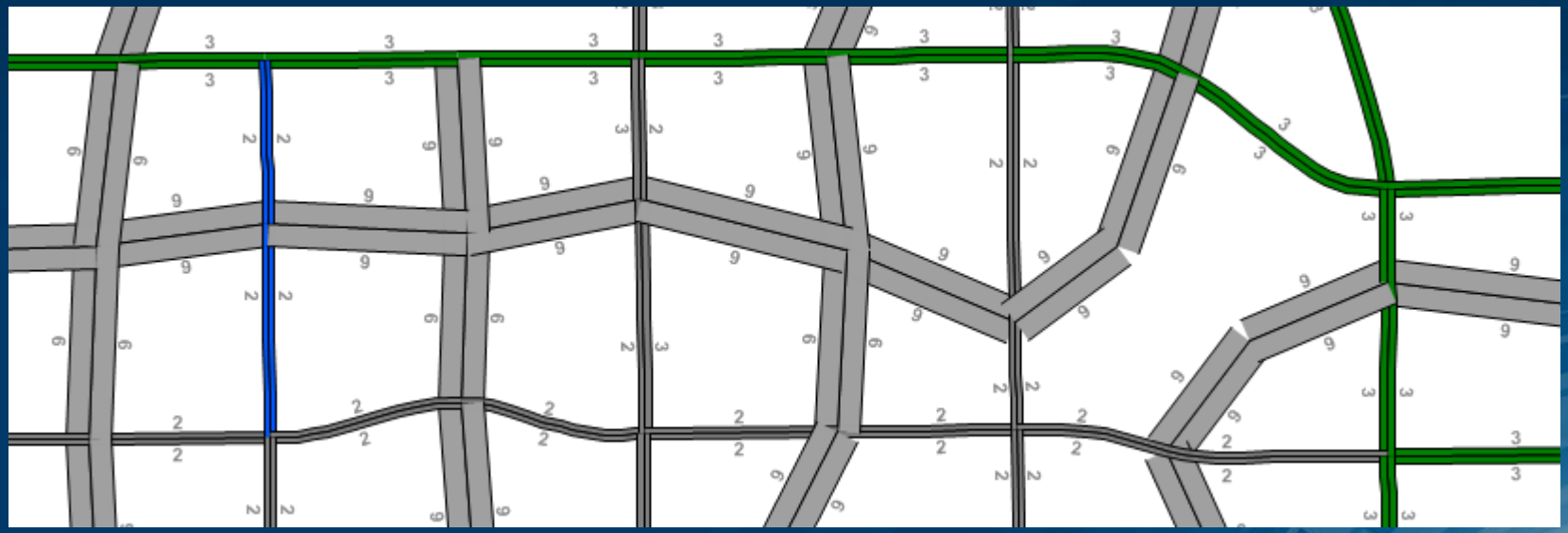
## The Callouts Tab




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

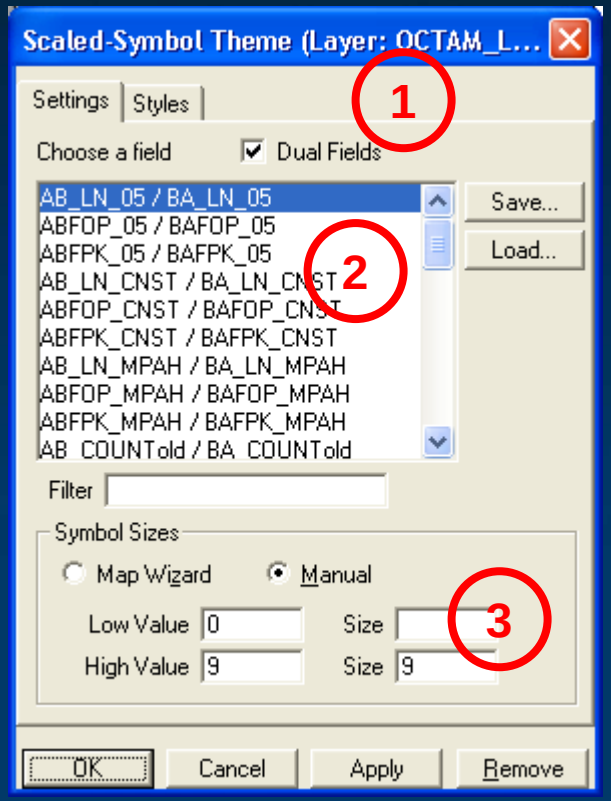
# Scaled Symbol Themes

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



# Scaled Symbol Themes

## The Settings Tab



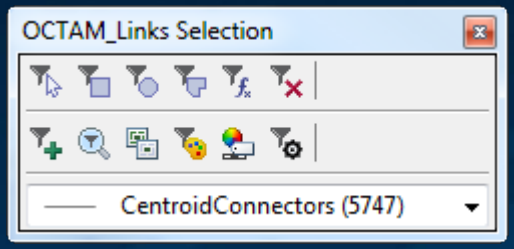

- Show directional fields only, or all fields
- Select a field to use
- Specify a scale, or let TransCAD specify one automatically

# Practice: Display number of lanes

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

# Selection Sets

- Add additional formatting capability
- Useful for analysis and data processing
- Use the Selection Set Toolbox
  - » 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: Suppress centroid connector info

- Start with the map from the last practice exercise
- Select all centroid connectors
  - » Selection → Select by condition (  ) then FT_10 = 11
  - » **OR:** Selection → Select Centroids
- Set centroid connectors to have a line width of 0.5 pixels
  - » This will override the scaled symbol theme
- Set centroid connectors to have a "Null" label
  - » Use a formula field, label with the formula "null"

**Extra Credit**

- Then, Hide centroid connectors alltogether

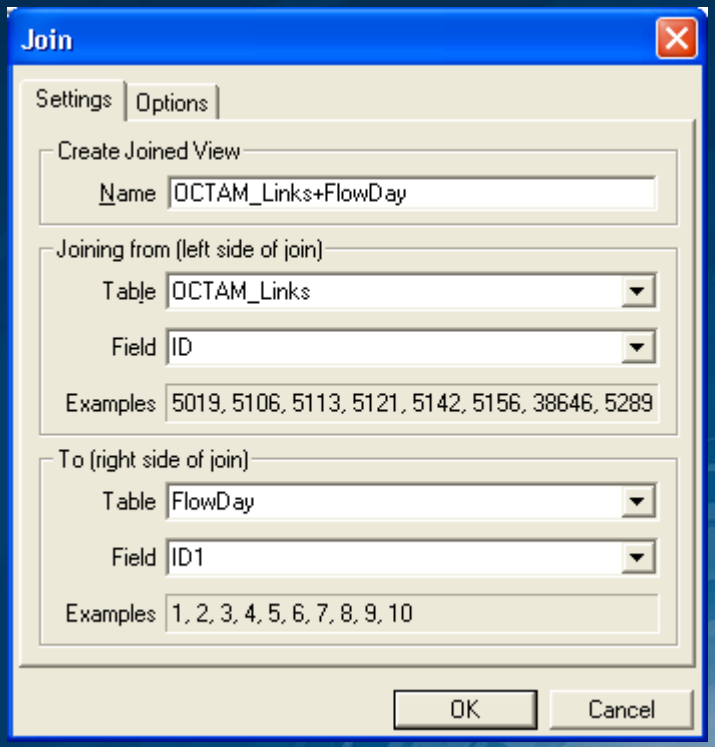
# Challenge: Level of Service Map

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

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

# Challenge: Level of Service Map

- Open the roadway network file
  - » *Input\OCTAMNetwork.bin*
- Join the assignment results using the default join settings
  - » *Output\asn\FlowDAY.bin*

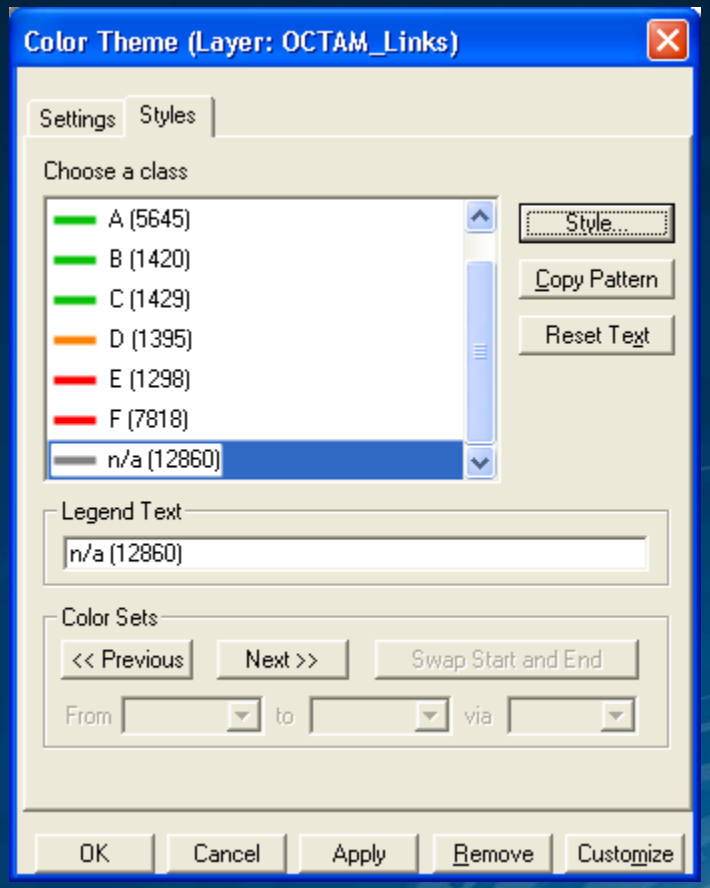





CAMBRIDGE SYSTEMATICS

# Challenge: Level of Service Map

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

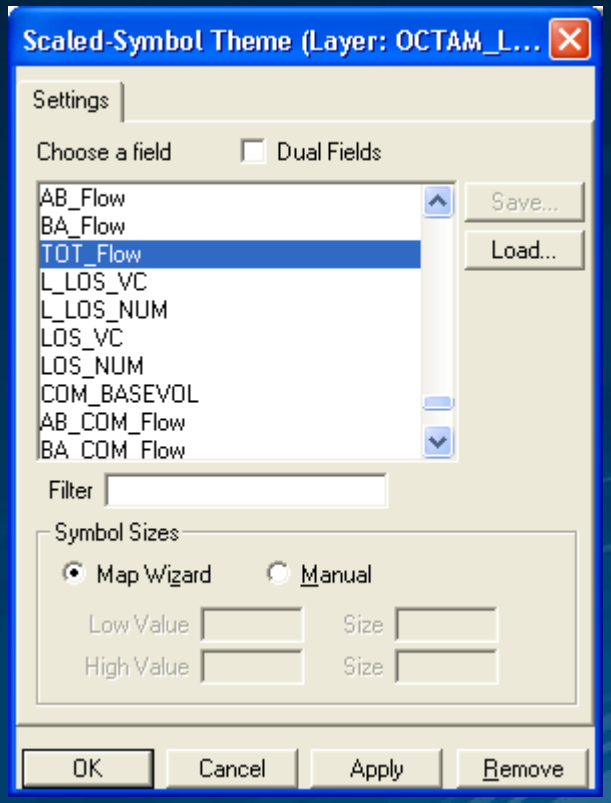





CAMBRIDGE SYSTEMATICS

# Challenge: Level of Service Map

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






CAMBRIDGE SYSTEMATICS

# Challenge : Level of Service Map

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

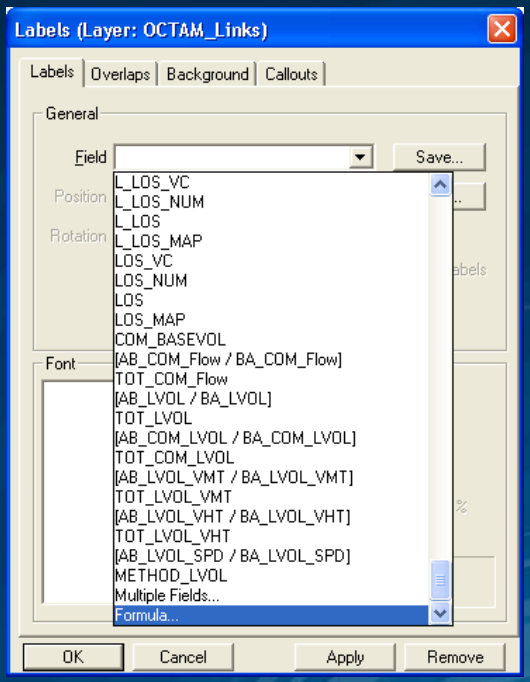
The Format function controls how the label is displayed

TOT_Flow is the variable containing traffic volumes

Format(TOT_Flow/1000,"*.")

Show volumes in thousands of vehicles

Don't show anything to the right of the decimal*




* See the TransCAD help for more details on format strings



CAMBRIDGE SYSTEMATICS

# Challenge : Level of Service Map

- Create a Selection set (  )named “CC”
  - » *FT_10 = 11*
- Change selection set settings:
  - » Selection → Settings or 
  - » Change the centroid connector line style, color, or labels

  --- Or ---

  - » Make the centroid connectors invisible

# Challenge : Level of Service Map

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

# Challenge : Level of Service Map

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

# Challenge : Level of Service Map

- Save your finished map