Trip Assignment models in TransCAD

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Trip Assignment Procedures

• Goal: understand how to use TransCAD to:
  – Generate inputs for trip assignment
  – Run trip assignment
  – Understand, interpret and analyze procedure results
Trip Assignment

• Trip assignment models take the estimated flow of trips from zone to zone and assign them to the network to determine network flow on links or routes

• The output of trip assignment models is typically link flows or route riderships

• If links contain capacities, congestion can also be measured

• Usually, each mode is assigned separately
Example: Highway Assignment
Example: Transit Assignment
Assignment Methods #1

• All or Nothing
  – All traffic flow between an O-D pair is assigned to the shortest path connecting the origin and destination

• Incremental Assignment
  – Traffic flow is assigned in steps. After a partial flow is assigned, link costs are recalculated and the next set of flows is assigned based on new link costs
• Capacity Restraint
  – Approximates equilibrium solution by iterating between all or nothing loadings and recalculating travel times based on congestion function, reflecting link capacity
Assignment Methods #3

• User Equilibrium

  – Iterative method that makes an all or nothing assignment, calculates flows, calculates travel times based on capacity restraints and uses congested travel times in the next iteration

  – In this model no travelers can improve their travel times by changing paths.
Assignment Methods #4

• Stochastic User Equilibrium
  – A generalization of user equilibrium that adds a random perturbation to the calculated travel times.

• System Optimum
  – This model minimizes total system travel time such that no user can change paths without increasing total travel time on the network.
Required Inputs for Traffic Assignment

• OD matrix containing vehicle (or passenger) volumes. The IDs in the rows and columns must match the node IDs in the network
• Line geographic file open in a map window
• TransCAD network associated with the line database
Example: Assignment Setup
Network Attributes

• Time: travel time to traverse link
• Capacity: upper flow limit on link
• Preload: background flow on link (e.g. buses)
• Link Type: code representing type of link
• Alpha: alpha parameter in BPR function
• Beta: beta parameter in BPR function
• Not all attributes are required
Parameter Settings

• Iterations: maximum iterations to perform
• Convergence: convergence criteria to stop iterations, based on maximum absolute change in link flows between iterations
• Alpha: global default BPR value
• Beta: global default BPR value
• Not all parameters are required
Getting Ready to Do Traffic Assignment

• Choose File-Close All, then choose File-Open or click on the toolbar.

• Open the workspace TR_ASSGN.WRK in TCW\TUTORIAL. TransCAD displays the UTOWN scenario.

• Make the Street layer the working layer.

• Open the network file UTOWN.NET.
Performing a Traffic Assignment

• Choose [*FF_Time] from the Time drop-down list.
• All the other settings are correct. Click OK.
• Enter MYASSIGN as the output filename and click OK. TransCAD performs the assignment, generates a summary report file and joins the flow file to the streets layer.
Displaying Assignment Results

- Make your map the active window.
- Choose Map-Scaled Symbol Theme.
- Choose AB_Flow in the Field drop-down list and click OK. TransCAD shows the flow on the line layer.
- Click on the toolbar.
- Choose AB_Flow in the Field drop-down list and click OK. TransCAD shows the volume on each link in each direction.
- ALSO: Planning>Planning Utilities>Create flow map
Assignment Options #1

• Preloading
  – Fixed background volumes on links, for trips that are not contained in OD matrix but do affect link travel times and BPR functions (e.g. bus and truck trips)
  – Input is through an extra network field

• Critical Link Analysis
  – Report of estimated volume between each O-D pair that uses the critical links
  – Input is line selection set
Assignment Options #2

• Cold Start Analysis
  – To report emission-related flow data, for specified length of cold start period

• Flow Range Tabulation
  – Frequency distribution matrix of assigned link flows

• V/C Range Tabulation
  – Frequency distribution matrix of assigned volume-to-capacity ratios
Report File Outputs

- Assignment inputs and results
- Total vehicle hours assigned
- Total vehicle miles assigned
Binary Table Outputs

• For all links:
  – Flow for each direction and total flow
  – Cost for each direction and maximum cost
  – Volume-to-capacity ratios
  – Cold start flows (optional)