GIS & Travel Demand Modeling in the Southeast: An Analytical Approach with .NET GIS Customization

2007 SERUG Conference

Jacksonville, FL

Presented By:
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Traffic Nightmare - Guess Where It Is?

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Overview of Travel Demand Modeling

- Forecasts future traffic conditions based upon population, employment growth, land use, and roadway/transit network.
- Evaluates performance of system improvements.
- Meets urban transportation planning requirements.
- Quantifies and geographically locates system deficiencies using GIS.
Travel Demand Model Inputs

- Modeling Inputs
  - Existing and forecast socioeconomic data (population, households and employment) from Traffic Analysis Zones (TAZ)
  - Roadway network (Facility Type)
  - Existing travel demand (Trip Generation)
  - Transportation projects inclusion
• Modeling outputs
  - Daily or PM peak system-wide future travel demand
  - Congested roadways (V/C Ratio/LOS)
  - Total volume and capacity
  - System usage-Vehicle Hours Traveled (VHT)
  - Travel Time Index (TTI)
Inputs: Facility Types and SE Data (TAZ)

- Population Change #
- Employment Change #
- TAZ ID#
- Model Network (Facility Type)
- TAZ (Traffic Analysis Zone) Boundary
Travel Demand Model Process Overview

Popular Travel Demand Software:
TP+, TRANPLAN, TransCAD, Viper, Cube, QRS II

TRIP GENERATION ➔ TRIP DISTRIBUTION ➔ MODE CHOICE

ASSIGNMENT ➔ GIS Analysis (ArcGIS)

LOS Distribution
Needs Identification
Detailed Mapping

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TRIP GENERATION

- Number of trips generated by TAZ.
- Socioeconomic (SE) data is input.
- Trip production and trip attraction are output.
Travel Demand Model Process

TRIP DISTRIBUTION

- Where the trips are going
- Complex algorithms to calculate trip distribution
Travel Demand Model Process (Con’t)

MODE CHOICE

- Transportation Choices
  a) Driving
  b) Transit (Bus)
  c) Bicycle
  d) Walking
ASSIGNMENT

Based on origin to destination trips, which network roads will be taken to arrive at final destination.
The Need for a Travel Demand Modeling Tool to Work Seamlessly with ArcGIS for Transportation Planning Purposes
Installing Customized .NET Tool

Welcome to the Carter Burgess ArcMap Calculate LOS Tool Setup Wizard

Select whether you want to repair or remove Carter Burgess ArcMap Calculate LOS Tool.

- Repair Carter Burgess ArcMap Calculate LOS Tool
- Remove Carter Burgess ArcMap Calculate LOS Tool

Cancel  Back  Finish
Software Needed to Create LOS/V Minus C Tool

- C# programming
- Microsoft Visual Studio 2005 (For .exe install desktop program)
- ESRI ArcGIS 9.X
- ArcObjects COM libraries
- Took approximately 2 full days to complete and test the tool
Why Create an Automated Tool Using .NET and ArcObjects?

- Manual process is slower and also has larger margin for error.
- C# programming, .NET 2.0 framework, and Visual Studio 2005 work seamlessly with ESRI ArcGIS and ArcObjects.
- Stand-alone desktop installation program.
- Quick on-the-fly transportation analysis used to aid planners in the location of model deficiencies and transportation program of projects selection for LRTPs and CTPs.

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GIS Integration and Automation after Model Calibration

- Export calibrated (loaded) model network file to shapefile.
- Perform LOS and V/C ratio automation.
- Develop needs identification analysis.
- Develop detailed LOS maps and needs identification for referencing.

*Consult safety data if available.
Outputs: Level of Service (LOS) Using Tool
Outputs: Attributes Using Tool
Outputs: Volume Minus Capacity Using Tool

Choose Correct Facility Type for V Minus C Analysis
Atlanta, GA (2005 LOS)

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Atlanta, GA (2030 V Minus C)
Atlanta, GA (2030 V Minus C and 2030 HG Areas)
Chattanooga, TN (2005 LOS)
 Chattanooga, TN (2030 V Minus C)
Chattanooga, TN (2030 V Minus C and 2030 HG Areas)
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QUESTIONS?

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