Advanced Software for State-wide Integrated Sustainable Transportation Monitoring & Evaluation (ASSIST-ME)

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ASSIST-ME

Advanced Software for State-wide Integrated Sustainable Transportation System Monitoring and Evaluation

• GIS-based **post-processing tool** to analyze, summarize and visualize transportation planning model output

• Central tool to compile, analyze, and compare multiple datasets
  – Model data (NJRTM-E, NYBPM & potentially others)
  – Real-world data (many)

• Does not require in-depth knowledge of the model(s) or expertise in GIS

• Customizable to agency/organization needs or datasets
ASSIST-ME Framework

Model Output
- 8 million residents, 3.6 million jobs in Northern New Jersey
- 15.3 million people in adjoining areas
- 23,000 miles of roads
- 250 bus routes, 12 rail lines

Field Data

End User Application

Analysis

Reports

Output Visualization

\[
\frac{PVB}{PVC} = \sum_{i} \frac{B_i}{(1 + d)^t} \quad \frac{C_i}{(1 + d)^t}
\]
Current ASSIST-ME Functionalities

ASSIST-ME currently consists of the following modules:

- **Visualization of data** such as speed, vehicle miles traveled, volume / capacity (V/C) ratio
- **Analysis of OD Demand** between various zones in the network
- **Analysis of travel times and paths** on a loaded network
- **Creation of Reports** and selective exporting of analyses
- **Benefit-cost Analysis** for Capital Investment Projects
ASSIST-ME Data Visualization & Analysis

- Microscopic Statistics Calculated
  - Vehicle Miles Traveled (VMT)
  - Average Speed
  - Average Volume-to-Capacity (V/C) Ratio
  - Person Miles Traveled (PMT)
  - Vehicle Hours of Delay (VHD)

- Visualization using a color scheme based on metrics (speed, V/C, etc.)

- Various analysis/selection methods
  - Manual (link)
  - Network-wide
  - County
  - Route
  - Functional Class
Manual Selection of Links

NYMTC NYBPM Network
Selection by County

NYMTC NYBPM Network
Selection by Route
Selection by Functional Class
ASSIST-ME – Network Comparison

NJTPA NJRTM-E Network
ASSIST-ME – OD Analysis

• Time
  – Year (based on model forecasts)
  – Time of the day (AM, PM, Midday, Night)

• Mode of travel
  – SOV, HOV, Truck, etc.

• Feature Selection
  – Manually selected ODs
  – ODs located within a county
  – Inter-county trips
OD Analysis Visualization
ASSIST-ME – Travel Path Analysis

• Travel times, costs and travel paths are analyzed using model output

• The output contains travel times on each link, the possible paths between the chosen set of ODs can be calculated from the k-shortest path algorithm

• Various OD selection options
  – Manually selected ODs
  – ODs located within a county
  – Inter-county trips
  – Network-wide OD selection
ASSIST-ME – Path Visualization & Analysis

NYMTC NYBPM Network
Shortest Path Comparison in Two Scenarios
ASSIST-ME Customized Analysis - NJCOST

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<th>Year 2015</th>
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Daily Benefit

\[
\frac{PVB}{PVC} = \frac{\sum_{t=0}^{T} \frac{B_t}{(1 + d)^t}}{\sum_{t=0}^{T} \frac{C_t}{(1 + d)^t}}
\]

Note: This is based on a specialized cost study for Northern New Jersey. For more information see Ozbay et al., “Cost of Transporting People in New Jersey, Phase 2” NJDOT/FHWA Report No. FHWA/NJ-2007-003 (2007).
ASSIST-ME – Report Generation
Ongoing & Future Enhancements to ASSIST-ME
Field Data in ASSIST-ME

- Wealth/underutilization of real field data
  - Sensors/detectors
  - Volume counts & Toll Plaza data
  - GPS/Probe vehicle data (INRIX – Google)
  - Weigh-in-motion (WIM) data
  - Bluetooth, ETC-readers (TRANSMIT)

- Centralize all relevant field data with an easy-to-use user interface

- Field-data/Model-data comparisons
  - Connect with NJRTM-E model output to compare or “fill in the blanks”
NJDOT Volume Counts

Roadway Information and Traffic Counts

Traffic Count Locations:
- Classification 48hrs
- Volume 48hrs
- Continuous Volume
- Weigh-in-Motion
- Intersection Count


Continuous Volume: This type of station counts the number of vehicles hourly for 365 days / year.

Weigh-in-Motion (WIM) station captures volume, classification, and weights of vehicles for 365 days / year.

Intersection Count: It is a turning movement count to analyze traffic flows at intersections. A typical turning movement count will include AM (7am to 9am), Noon (11am to 1pm) and PM (4pm to 6pm) peak counts.

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[Map Image]
NYSDOT Traffic Data Viewer
INRIX Speed Data on NJRTM-E
ASSIST-ME/WIM

Long-Term Monitoring System

The WIM system detects a heavy truck and triggers the network.

Records are accessed remotely, downloaded and analyzed.

Sensor Network

The LVDT-Cable system and strain transducers record and store records.

Flowchart:
- Load Data
- Select Data Type: Raw ASCII CLA
- Select Station(s): Single, Double, Route-based, Multiple
- Select Type of Analysis
  - Data Filters On/Off
  - Counts
  - Class
  - Comparison
  - Duration
  - Graphs
  - Tables
  - Reports
ASSIST-ME/WIM Interface

- Check details and set the station
- Select type of analysis and the date
- Select the station from the map

Excel Report

Results in the form of table and graph
ASSIST-ME/WIM Output

Large Truck Weekday Volume 2009, I-95, MP 1.2

Variability of Large Truck Weekday Volume -2009 I-95, MP 1.2, SB

Normalized Time Distribution by Vehicle Category, I-95, MP 1.2, SB

Durational Graph NJ-31, NB

ASSIST-ME/WIM Output

Large Truck Weekday Volume 2009, I-95, MP 1.2

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Durational Graph NJ-31, NB
Cross-model Comparison & Field Data Integration

Field Data (Example)

- Avg. Speed: 25 mph
- V/C: 0.95
Applications of ASSIST-ME

- Currently adapted to NJRTM, NJRTM-E, NYBPM
  - Being used by NJDOT, NYMTC, NYSDOT, NJ Transit

- Critical studies using ASSIST-ME:
  - Evaluation of TIGER projects for NJDOT
    - Obtained benefit-cost analyses in a time span of 2-3 weeks
  - USDOT New York City Freight Demand Initiative
    - Post-processed NYBPM output of time-of-day freight shift modeling
    - Evaluated impacts in terms of network-link changes and path/travel time changes for trucks bound for Manhattan from all origins
  - Evaluation of Economic Impact of various road improvements in New Jersey
    - Evaluated the benefits of five long term capital improvement projects proposed by NJDOT
ASSIST-ME Future

• ASSIST-ME is conceived/designed as a central tool for traffic engineers and planners
  – Visualize/compare model output
  – Post-process output for economic analysis
  – View/use real data in conjunction with model data for planning

• Future of ASSIST-ME is open, and should suit the projected needs of planners to assist and encourage using all potential data sources in the decision-making process
Thanks for Listening

http://rits.rutgers.edu

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