SAN DIEGO MESOSCOPIC ASSIGNMENT MODEL

ITE Western District Conference
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Project Introduction

• Current Project
  – Region-wide 24 hour mesoscopic dynamic traffic assignment (DTA) model for San Diego
  – One-way integration with SANDAG activity–based model (ABM)
  – Near term system management scenarios

• Desired Outcome
  – Analysis of projects that improve system efficiency

• Future Roadmap
  – Full integration of DTA and ABM with feedback
  – Future year model runs
  – Enhanced system management scenarios
Traffic Assignment Hierarchy

- **Macroscopic**: Static user equilibrium used in 4-Step and ABM models
- **Mesoscopic**: Time-dependent user equilibrium with realistic, but simplified vehicle simulation
- **Microscopic**: Realistic simulation of driver behavior and interactions
Why Mesoscopic DTA?

- Congestion Duration
- Dynamic Tolling
- Travel Time Reliability
- Refined Speeds for Air Quality Analysis
- Launching Point for New Integrated Corridor Management Projects
Mesoscopic DTA Benefits

- System Management Strategies
  - Traffic signal coordination
  - Variable speed limits
  - Ramp metering
  - Traveler information systems

- Transit Improvement Projects
  - Transit queue jumps
  - Transit only lanes
Model Dimensions

- **Zones**
  - 4984 internal
  - 12 external

- **Network**
  - 40,000+ Links
  - 30,000+ Nodes
  - 3600+ Signalized intersections
  - 320 Ramp meters
  - 270 Transit lines

- **Trip List (ABM)**
  - 8.9M Vehicle trips
  - 12 Vehicle classes
    - Auto
    - Truck
    - Bus

- **Duration**
  - 24 hours
Data Interfaces

Integrated Corridor Management System
- RAMS
- RMIS
- CPS
- Manual Signal Parameters

Validation Data
- Traffic Counts
- Historical Travel Times

SANDAG GIS (TCOVED)
- Links & Nodes
- Transit Routes

Aimsun Network

Parameters
GIS Network Database

- **TCOVED Master Network Framework**
  - Road & transit network data
  - Contains all future project phasing
- **Goal:** Support Meso and Macro Networks in 1 GIS Database
Challenges with Existing Structure

• Network Attributes Configured for Macroscopic Assignment
  – Missing minor intersection approaches
  – Missing intersection details:
    • U-turns
    • Shared turn approaches
    • Turn bay lengths
    • No turn on red signage
  – Controller IDs and signal timing details
  – 3,600+ signalized intersections
Calibration Process

• Mesoscopic One-Shot
  – Used for network and data validation
  – Iterative approach between geographic and time aggregations
    • Individual cities → large subareas → entire region
    • AM → PM → off-peak → combinations → 24hr

• Dynamic User Equilibrium (DUE)
  – Convergence tests
  – Trip list tests
Network Validation Process

• Follow the Red Brick Road
Network Validation Process

• Signal Timing Issues
Demand Calibration

• Demand from ABM
  – No ODME for trip lists
  – Diurnal distributions

• Evaluation of area with heavy travel demand
  – Colleges
  – Hospitals
  – Military
  – Shopping
  – Airport
  – Attractions
**DRAFT Results**

- **DUE Convergence**
  - AM RGAP < 0.5
  - 20 iterations

- **Runtime**
  - 1/3 of real time
  - 3 hour AM period
    - 20 iterations
    - 18 hour runtime

- **Count Validation**
  - Freeway $R^2 > 0.8$
Project Team

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