Chapter 5

Data Requirements for Microscopic Simulation

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Data Requirements

- In This Section We Will Cover:
  - Geometry Information
  - Demand Information
  - Control Information
  - Field Observations
  - Modeling Information
Geometry Information

- Roadway Layout
- Lane Marking Layout
- Detector and Control Device Locations
- Road Signs (Speed Limits, Exit Distances, etc.)
- Grades
- Other Roadway Features
  - Visual Impact Human Factors/Site Distance
  - Substandard or Lack of Shoulders
  - Overpasses/Underpasses
  - Bridges
Geometry Format

• Available
  • CAD Files and Paper Plans
    • Base Mapping
      • Vertical and Horizontal Alignments
      • Lane Markings
      • Road Signs
      • Source: District or Metro Office
    • Microstation Format
  • Topographical Files
  • Aerial Photos
Geometry Format Pitfalls

• CAD Files
  • Very Accurate (Usually!)
  • Identify Type First: Design, Construction, or Lane Marking Plans
  • Scale Translation, if Used as a Background

• Air Photos
  • Represent Reality if Recently Updated
  • Shows Where People Drive and Actual Sizes of Accel/Decel Lanes
  • Although Ortho-corrected, Short Distances Might be Incorrect
  • Resolution May Not be Sufficient to Distinguish All Details

• A Helicopter Fly-by Video is Possible
Geometry Issues

Why Do You Need:

• Lane Markings
• Lane Selection/Changing Behavior
  • Signs, Acceleration /Deceleration Lanes
• Locations of Substandard Shoulders
• Driver Paths
• Distractions Outside the Roadway
• Distance to Surrounding Intersections
  Important in Calculating “Control Delay”
Demand Information

• Traffic Volumes
  • Instrumented System
  • Un-instrumented System
  • Arterial Turning Movements
Demand Information

• Volumes
  • Boundary Conditions (Entrances and Exits)
    • 15 Minute Counts
    • Simultaneous Counts
    • Un-congested Upstream and Downstream Conditions
  • Turning Movements

• Traffic Demand Scenarios
  • Current Time (Also For Calibration)
  • Build Year Projections
  • 20 Year Build Projections
Instrumented System Demands

• Freeway Mainline, Exit/Entrance Loop Detectors
  • Check For Accuracy
    • Over-counting or Undercounting, Outliers
  • Verify Detector Location
    • Not Always Where the Plans Assume They Are
• Estimate Missing Detectors
  • Conservation Equation Has Limitations
    • Distance Between Good and Bad Detectors (Rare Case)
    • Congestion Between Good and Bad Detectors
  • Historical Data Need Adjustments
Demand Information

• Intersection Demands
  • Available From:
    • City/County
    • Mn/DOT Web Site
    • Schedule Manual Counts
  • No More Than 2 Years Old

• Data Used to Prepare Future Projections
  • Do Reality Check of Future Projections
Demand Information

• Balance Mainline and Exit/Entrance Volumes
  • Minimize Errors From Bad Detection
  • Provide Good Base For Checks and Balances
  • Adjust Based on Entrance Ramp Volume
  • Aim to Guarantee Desired Entrance Ramp Volume While Keeping a Realistic Picture of the Intersection
Demand Information

- Un-instrumented System
  - Need to Collect For Peak Period on 15 Min Intervals:
    - Travel Times
    - Mainline & Ramp Volumes
    - Intersection Turning Movements
  - Scope Project Taking Into Account Manual Data Collection
  - O/D Tables From Planning Models Might be Adequate
    - Balance/Adjust Based on Real Counts
Fleet Composition

- Cars
- Single Body Trucks
- Semi-trailers

- Semi-trailers Important When Roadway Grades are Significant and/or Stop-and-Go Congestion Present
  - Heavy Truck % in CORSIM
  - Individual Volumes and Turning Counts in AIMSUN and VISSIM
Fleet Information
Contact: Mark Levenson (651) 296-8535

• Application: Operational Modeling
• Project Purpose: New Interchange
• Modeling Limits: Provide Both Freeway and Arterial Limits
• Count Stations: Request Electronic File of Fleet Composition by Time of Day & Listing of Stations
• Special Data Requests:
  • Metro Area Managers
  • Rural District Project Manager
Control Information

• Ramp Metering
  • If the Actual Algorithm Cannot be Simulated
    Use Pre-Timed Control
    • Ramp Rates Available in IRIS
    • Historical Ramp Metering Data Available
    • Generate 15 Minute Pre-Timed Equivalents

• Intersection Control
  • Current Signal Design & Timing Plans
  • Future Scenarios Find New Optimized Timing Plans
Field Observations

• Mainline & Ramp Speeds
  • On Detector Station Locations AND Manually on Selected Locations

• Ramp Queues

• Backup Queuing

• Lane Changing Characteristics

• Weave, Merging Behavior

• Lane Drop Behavior
Field Observation Requirement

• Peak Period Observation
• Driving the Freeway
• Monitoring Arterial Operation
• Observe From RTMC Vantage Point
Conclusions

• The More Information About the Site You Have the Better
• Apart From the Necessary, You Need Information That Will Assist on Calibration and Information That Increases the Quality of the Information You Need
• Know Geometry
• Check Quality of Data
• Replicate Control Effects
  • Pre-timed Control Should Not Affect Mainline Volumes