Synopsis of National Weather RD&T & Traffic Operations

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What Are The Issues?

- Accuracy of Weather Prediction
- Effects of Different Types of Weather Events
- Weather Events/Conditions are not Uniform in a Region
- Human Factors are Unknown
- Weather Effects Vary By Region
Our Challenges

- No Analysis Tools are Ready to Address Weather Issues
- No “Cookie Cutter” Solutions Here
- Complex Human Factors Issues
- Issues Largely Ignored
- Changing the Mindset
What We Have Done

- Synthesis of Current Practices
- Parameters Sensitivity Analysis in CORSIM
- RWIS Connectivity Issues Identified
How Do We Get There? (Control)

- Address Human Factors Issues
- Improve Traffic Analysis Tools
- Develop Solutions and Strategies
- Field Test and Experiments
How Do We Get There? (Others)

- Developing Proactive Management Tools
- Improving Weather Forecasting
- Developing Localized and Regional Forecasts
- Education and Training (Change Mindset)
Weather Events: rain, snow, sleet, ice, fog, high wind, flooding, etc.

Weather Impacts: reduced pavement friction, reduced visibility, reduced vehicle maneuverability, lane obstruction & submersion, traffic control devices damage, etc.

Traffic Model Parameters: max speeds, max acceleration/deceleration rates, acceptable gaps for car-following/lane changing/intersection crossing, start-up lost times, discharge headways, etc.

Roadway capacities
Traffic demand
Traffic control

Traffic Simulation Models

Traffic Network Performance Measures
How to Link Weather and Traffic Analysis Tools

- Identify weather data relevant to driver’s behaviors, traffic operations, and traffic modeling
  - Accuracy at the road surface
  - Direct impacts
    - driver’s behaviors
    - roadway conditions
  - Significant relations with traffic modeling parameters
How to Link Weather and Traffic Analysis Tools (Cont’d)

- Understand and model drivers’ behaviors in different weather conditions
  - Car-following
  - Lane-changing, merging, diverging, weaving
  - Responses to traffic signals, ramp metering signals, traffic signs, etc.
How to Link Weather and Traffic Analysis Tools (Cont’d)

- Understand traffic flow parameters and their relations in bad weather
  - Speeds
    - max. speeds, min. speeds
  - Densities
    - critical densities, jam densities
  - Flows
    - roadway capacities
    - intersection capacities
  - Relations of speeds, densities, and flows
How to Link Weather and Traffic Analysis Tools (Cont’d)

- Model dissemination of travel and weather information systems
  - Web-based applications
  - Interactive telephone systems (511)
  - Dynamic message signs
  - Radios (e.g., Highway advisory radios)
  - In-vehicle displays
How to Link Weather and Traffic Analysis Tools (Cont’d)

- Understand drivers’ responses to travel and weather information
  - Pre-trip planning
    - travel modes
    - departure times
    - routes
    - destinations
    - trip cancellation
  - En-route diversion
Weather significantly affects traffic flows

Weather-specific traffic operations strategies can help in bad weather

Traffic simulation models currently do not account for weather

Closing the gap requires

- Traffic Research
  - Understanding of driver’s behaviors in bad weather
  - Modeling weather effects with weather-related data
- Weather Research
  - Quality data relevant to traffic operations
  - Time scale, spatial resolution,
  - Observed vs. forecast parameters