TRB’s National Cooperative Highway Research Program (NCHRP) Project 03-108

Guidance on Quantifying Benefits of Traffic Incident Management Strategies

31 July 2014
Guidance for Quantifying Benefits of TIM (NCHRP 03-108)

Project Objective – Develop concise guidance to quantify & monetize TIM outcomes
- Guidance to address varying resources and data availability
- Demonstrative Applications
- Audience is TIM program mid-level managers & analysts

Research Approach
✓ Review past and ongoing efforts on TIM performance measures, outcomes, and monetization
✓ Engage State Stakeholder and broader public on guidance needs
☐ Compare methods for estimating and monetizing TIM outcomes using multiple data sources
☐ Share finding with demonstrative applications
How Do TIM Strategies Provide Benefits?

- TIM strategic, tactical, and support activities aim to affect/enhance incident detection, verification, mitigation, response and clearance

Reducing traffic demand (headed for the bottleneck) leads to:

- Reduce incident duration
- Increase incident responder safety
- Provide increased motorist assistance

Incident scene:

- Increase flow of traffic through bottleneck (squeeze more traffic through during the incident response) (lower the effective Capacity Reduction Factor)
Common Terminology for TIM conversation

- **Activities**
  - strategic, tactical, and support activities such as safety patrol, scene management, and training

- **Strategic**
  - Develop partnerships, policies & legislation
  - Incident response training
  - Public outreach and education
  - Measuring progress
  - Program resources and funding

- **Tactical**
  - Surveillance and detection
  - Mobilization and response
  - Traffic control
  - Clearance and recovery

- **Support**
  - Implementation of new technology
  - Data integration and sharing
  - Cost / recovery management
Common Terminology for TIM conversation

- **Activities**: strategic, tactical, and support activities such as safety patrol, scene management, and training
- **Performance measures**: recorded/aggregated data specific to TIM including incident characteristics and *timeline*

*Incident Timeline Data*  

*Performance Measurement Database*  
*(incident type, lanes involved roadway data, response vehicles, weather conditions)*
Common Terminology for TIM conversation

- **Activities**: strategic, tactical, and support activities such as safety patrol, scene management, and training

- **Performance measures**: recorded/aggregated data specific to TIM including incident characteristics and *timeline*

- **Outcomes**:
  - *Mobility* – delay & reliability
  - *Environmental* – emissions, fuel
  - *Safety* – secondary incidents, responder incidents
  - *Traveler/public satisfaction* – motorist satisfaction
  - *Cost reduction* – operational efficiencies

**ALL OUTCOMES CAN BE QUANTIFIED**

**SOME OUTCOMES CAN BE MONETIZED**
Measures To Outcomes: Mobility

- Motorist Delay is quantified using four classes of methods
  1. Empirical analysis
  2. Simulation modeling
  3. Queuing, Regression
  4. Generalized impact parameter aggregation

![Diagram showing cumulative traffic volume (Veh) vs time (Hour)]
Measures to Outcome – Delay Example

- **Empirical Analysis with Parameters/assumptions**
  1. Estimate baseline delays by facilities, times of day, day of week, weather using archived data on speed, flow type data.
  2. Estimate delay during incidents using above parameters and by incident duration.
  3. Regression or other method correlating incident duration to delay.
  4. Estimate reduction in incident duration from TIM activities.
  5. Apply step 3 to estimate delay reduction.

- **Simulation Tools**
  - CORSIM
  - RIMS
  - FREEVAL
  - VISSIM
  - PARAMICS

![Graph showing vehicle-hours of delay vs. duration of incident.](image)
Measures To Outcomes

- **Environmental**
  - Fuel use and emissions typically computed from delay savings applying parameters

- **Safety**
  - Secondary incidents estimated by applying parameters
  - Incidents involving responders are infrequent; national stats

- **Traveler Satisfaction**
  - Motorist assistance valuation – ask motorists to put a price tag on assistance
  - Motorist Assistance Satisfaction

- **Operational Efficiencies** estimated from program assessments

Monetized Benefits

- Delay Savings
- Fuel Savings
- Emissions Reduction
- Identification
- Preventability
- Severity
- Averted Secondary Incidents
- Surveys
Four Different TIM Programs
Four Practices for TIM Outcomes

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<th>Delay</th>
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*TIME analysis conducted in 2006
NCHRP 03-108 Project Next Step

- Select subset of methods to test using different data sets to assess variations in benefits estimates

Data > Method > Quantify > Method > Monetize

- Datasets
- Delay
  - Method 1
  - Method 2
- Delay Results
- Secondary Crashes
  - Method 1
  - Method 2
- Secondary Crash Results
- Emissions
  - Method 1
  - Method 2
- Emission Reduction
- Fuel Consumption
  - Method 1
  - Method 2
- Fuel Savings
- Monetized Benefit Analysis
- Monetized Benefit Result