Alaska Department of
Transportation & Public Facilities

WRTM – What is It and How Can We Use It

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24 October, 2012

What is WRTM

Weather Responsive Traffic Management (WRTM) is the implementation of ***traffic advisory***, ***control***, *and* ***treatment strategies*** *in direct response to, or in anticipation of, developing* ***roadway and visibility issues*** *that result from* ***deteriorating or forecasted weather conditions***

Congestion Delays - Motivation

- Weather causes 25% of all non-recurring congestion delays.

  Total delay of 5 billion hours/year

- On average, in weather-related crashes each year:
  - 7,400 fatalities
  - 629,000 injuries
- Annual cost of weather-related crashes: $42 billion
- Weather plays a role in 25% of all crashes

Congestion Pie - Sources

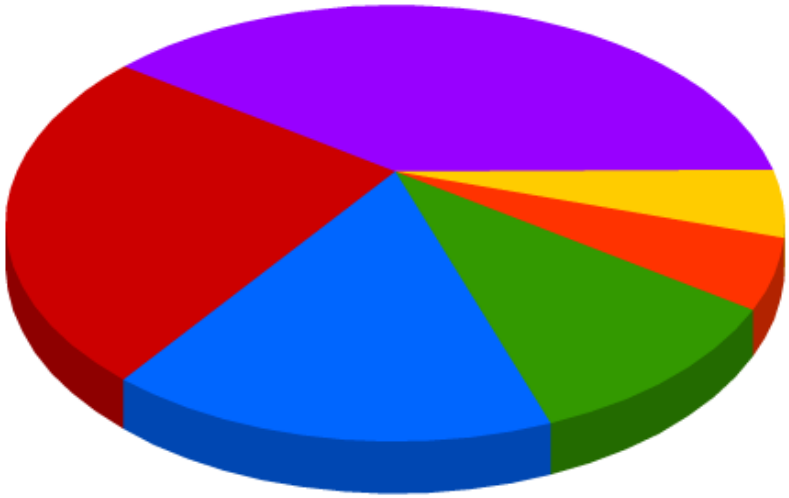
The Congestion Pie

Total traffic delay from all causes on the nation's roadways is about 5 billion hours per year. The pie graphic shows national estimates of congestion by source.

Mouse over the pie to see the associated percentage in the table.

Capacity Constrains	40.0%
Traffic Incidents	25.0%
Bad Weather	15.0%
Work Zones	10.0%
Poor Signal Timing	5.0%
Special Events	5.0%

Source: Federal Highway Administration



Weather Impacts on Congestion

- Roadway Capacity
  - Snow covered roads may cover road markings or restrict/close lanes
  - Reduced through put and turning movements
  - Flooding/ponding may restrict or close lanes
  - High winds may restrict vehicles or close lanes
  - Icy or wet pavements may slow traffic

Weather Impacts on Congestion

- Roadway Friction
  - Increased risk of skids and crashes
  - Reduced speed and increased speed variability
  - Increased difference between slower and faster vehicles
  - Changes in the rates that vehicles can accelerate and decelerate
  - Required transportation agency actions for snow plow, sand, and chemicals

Weather Impacts on Congestion

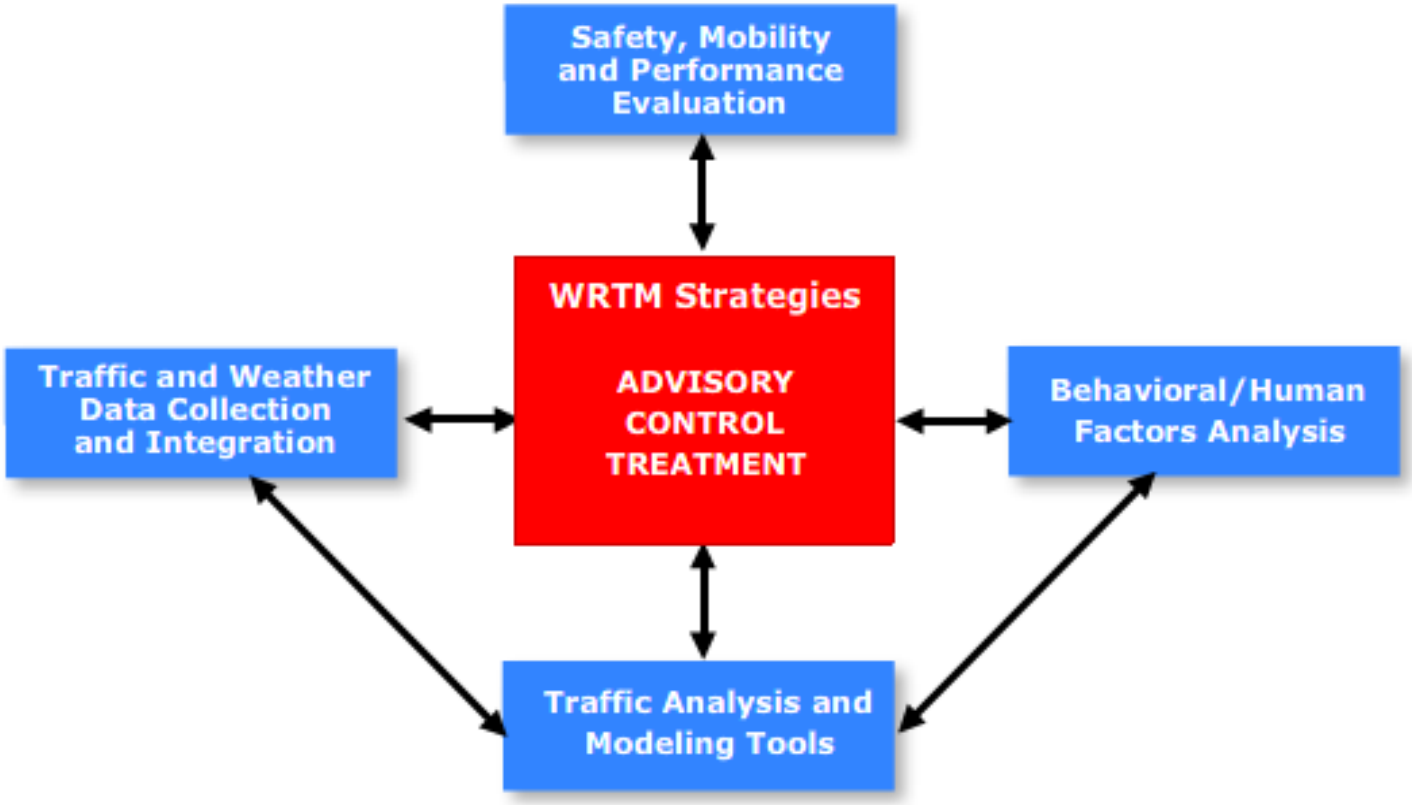
- Visibility
  - Increased perception/reaction times . Snow, rain, dust, and smoke can reduce legibility distance to signs and traffic control devices
  - Rapid and variable condition changes
- Driver Stress
  - Work load and distraction
  - Impaired decision-making capacity
  - Confidence factor leads to slower driving

WRTM Strategies

WRTM Framework

- Motorist advisory, warning, and alert systems
- Speed management strategies
- Vehicle restriction strategies
- Road restriction strategies
- Traffic signal control strategies
- Traffic incident management
- Personnel/asset management
- Maintenance coordination

WRTM Implementation



Traffic and Weather Data Collection and Integration

- Traffic Stream and Event Data:
  - Flow
  - Speed
  - Densities (gap, headway, occupancy, 85 percentile)
  - Incidents
  - Closures
  - Work Zones
- Weather Data
  - Current observations and nowcasts
  - Forecasts (deterministic & probabilistic) – NWS and private provider

Traffic and Weather Data Collection and Integration

- Pavement Condition Data:
  - Pavement and sub-surface temperatures
  - Treatments
  - Pavement condition, i.e., friction
  - CCTV
- Asset/Infrastructure Data
  - Power and communication
  - ITS inventory & location referencing
  - TAM asset inventory

Traffic and Weather Data Collection and Integration

- Other Partner's Data
  - Law enforcement
  - Transit
- Customer Feedback and Observation Data:
  - Outages
  - Social media
  - Problem reporting
  - Media

Safety, Mobility, and Performance Evaluation

- Ensure implemented strategies have the intended safety and mobility impacts.
- Demonstrated mobility, safety, and cost benefits can support the case for additional or refined WRTM strategies.

Advisory Categories

- Passive warning systems- static signs
- Active warning systems – static signs with flashing beacons
- Pre-trip road condition information & forecast systems
- Enroute weather alerts & pavement condition information

Advisory Strategies

- High Wind, flood, & low visibility warning systems
- In-vehicle displays – Thompson Pass
- Dynamic message signs (DMS)
- High advisory Radio (HAR)
- Road Weather Information System web pages
- 511 Traveler Information Systems
- Social Media

Control Categories

- Vehicle restrictions
- Route restrictions
- Traffic signal timing
- Speed management
- Traffic incident management

Control Strategies

- *Seasonal weight restrictions*
- *Tire chains/alternative traction devices*
- *Parking restrictions*
- *Lane and/or road closures*
- *Access control*
- *Signal interval and phase control for snow*

Control Strategies

- *Ramp metering*
- *Speed advisories*
- *Variable speed limits*
- *Traffic incident management*

Treatment Categories

- Anti-icing & pre-treatment
- Crew & material optimization
- Enhanced operations & maintenance communications

Treatment Strategies

- *Maintenance Decision Support System (MDSS)*
- *Chemical selection, application rate, and application timing*
- *CCTV*
- *Mobile data collection*
- *Data sharing & integration*

Anticipated WRTM Benefits

- Reduced crashes, injuries, and fatalities:
- Improved trip reliability for travelers
- Reduced agency cost
- Reduced restrictions placed on commercial truck traffic
- Reduced fuel use and emissions
- Increased traveler, operator, and maintenance staff satisfaction
- Improved pavement quality and reduced pavement damage due to weather-related conditions

References

FHWA Road Weather Management

Weather Responsive Traffic Management Overview

WRTM - New Approaches to Improve Safety and Mobility

WRTM Concept of Operations

Developments in WRTM Strategies

Integrating Clarus Data in Traffic Signal Operation: A Surviable Real-Time Weather-Responsive System

Guidelines for Disseminating Road Weather Advisory & Control Information

Guidelines for the use of Variable Speed Limit Systems in Wet Weather

Use of Mobile Data for WRTM Models