Weather Responsive Traffic Management (WRTM)

Weather Responsive Traffic Signal Timing

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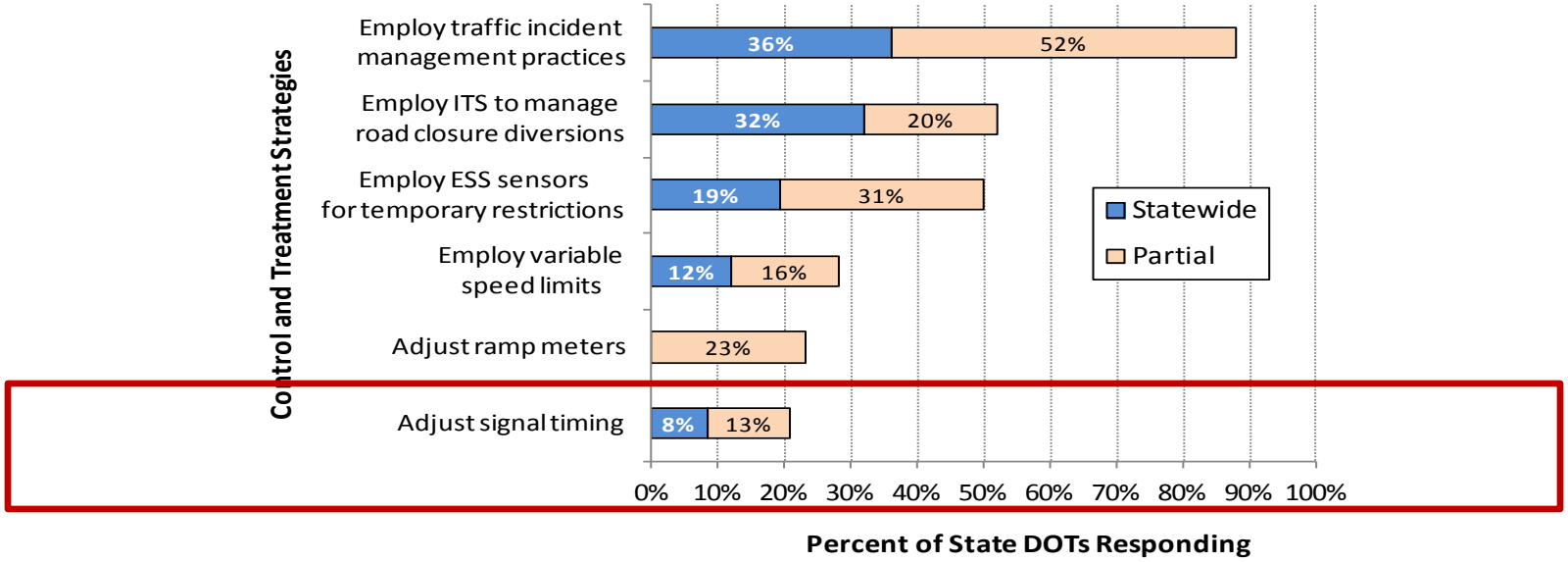
RWMP Stakeholder Meeting

Little Rock, AR

July 16-18, 2013

Weather Responsive Traffic Signal Timing

- Currently, WRTM Strategies in existence have focused on freeways
- Limited implementation of arterial-specific strategies during weather



WRTM Traffic Signal ConOps

- Developed a concept of operations for Weather-Responsive Traffic Signal Operations
  - Full use of weather and road weather resources
  - Performance-based weather-responsive signal timing
  - Continuous evaluation and improvements

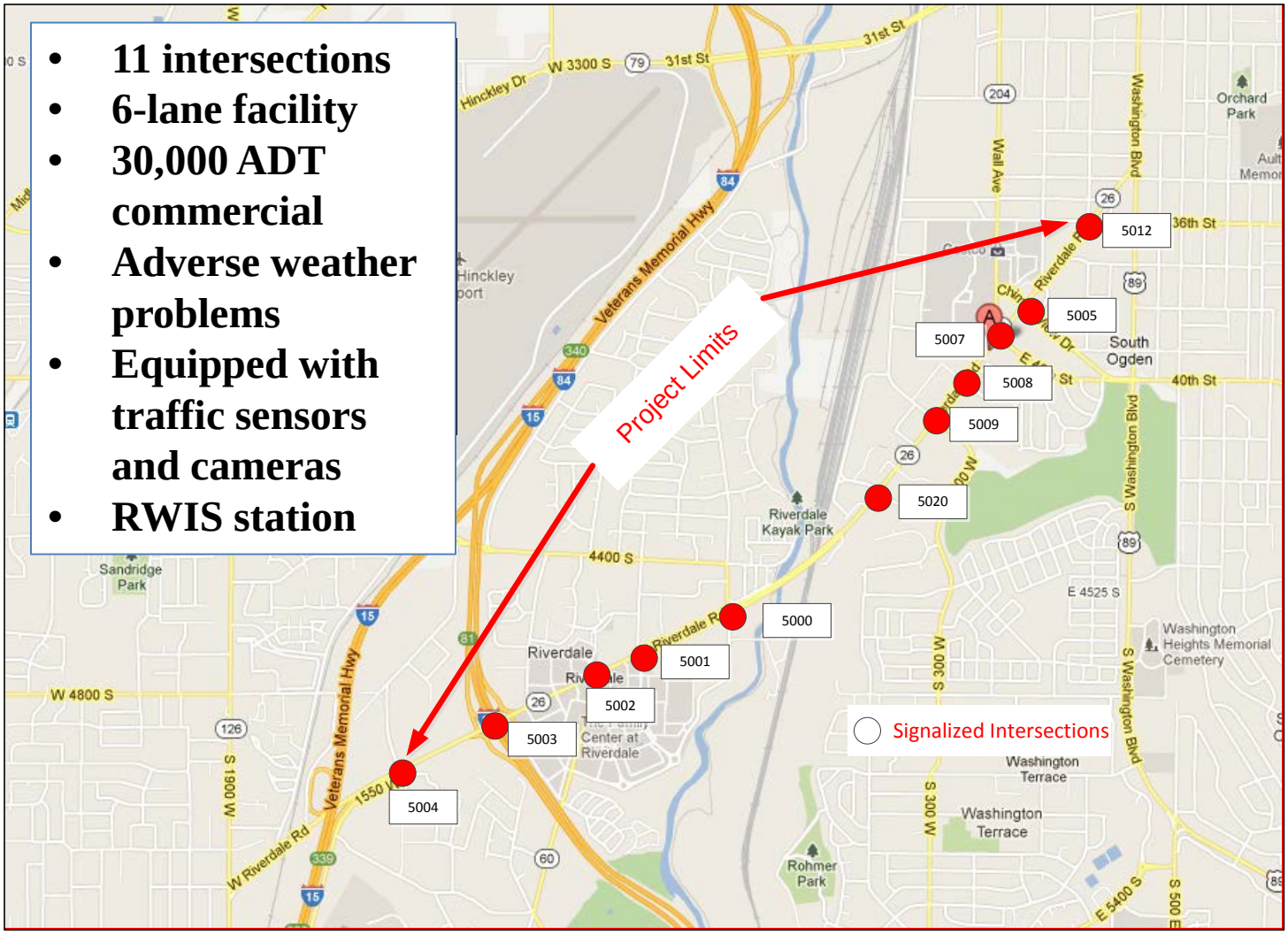
FHWA, Developments in Weather Responsive Traffic Management Strategies, June 2011, FHWA-JPO-11-086, available at ntl.bts.gov/lib/42000/42900/42965/wrtm_final_report_06302011.pdfShare

Implementation in Utah

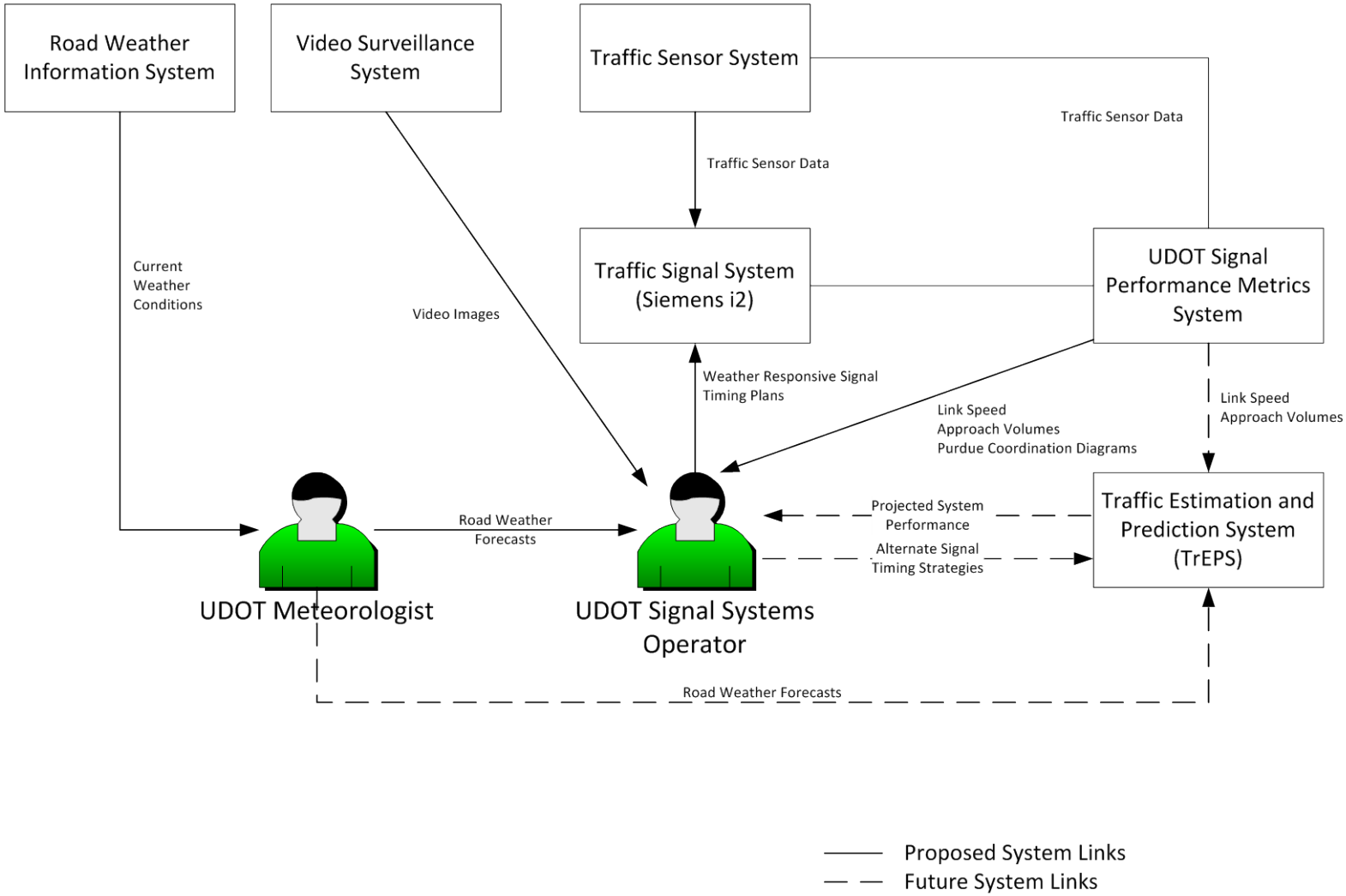
- Implementation Partner: Utah DOT
- Corridor: Riverdale Corridor, Ogden
- Objectives:
  - Maintain a high level of progression on the main-street approaches throughout the duration of the weather event.
  - Maintain an acceptable level of the throughput of traffic for the conditions of the roadway.
  - Maintain equitable service to cross-street traffic during inclement weather events

Traffic Signal Timing in Utah (Riverdale Corridor)

- 11 intersections
- 6-lane facility
- 30,000 ADT commercial
- Adverse weather problems
- Equipped with traffic sensors and cameras
- RWIS station



Traffic Signal Timing in Utah (Riverdale Corridor)



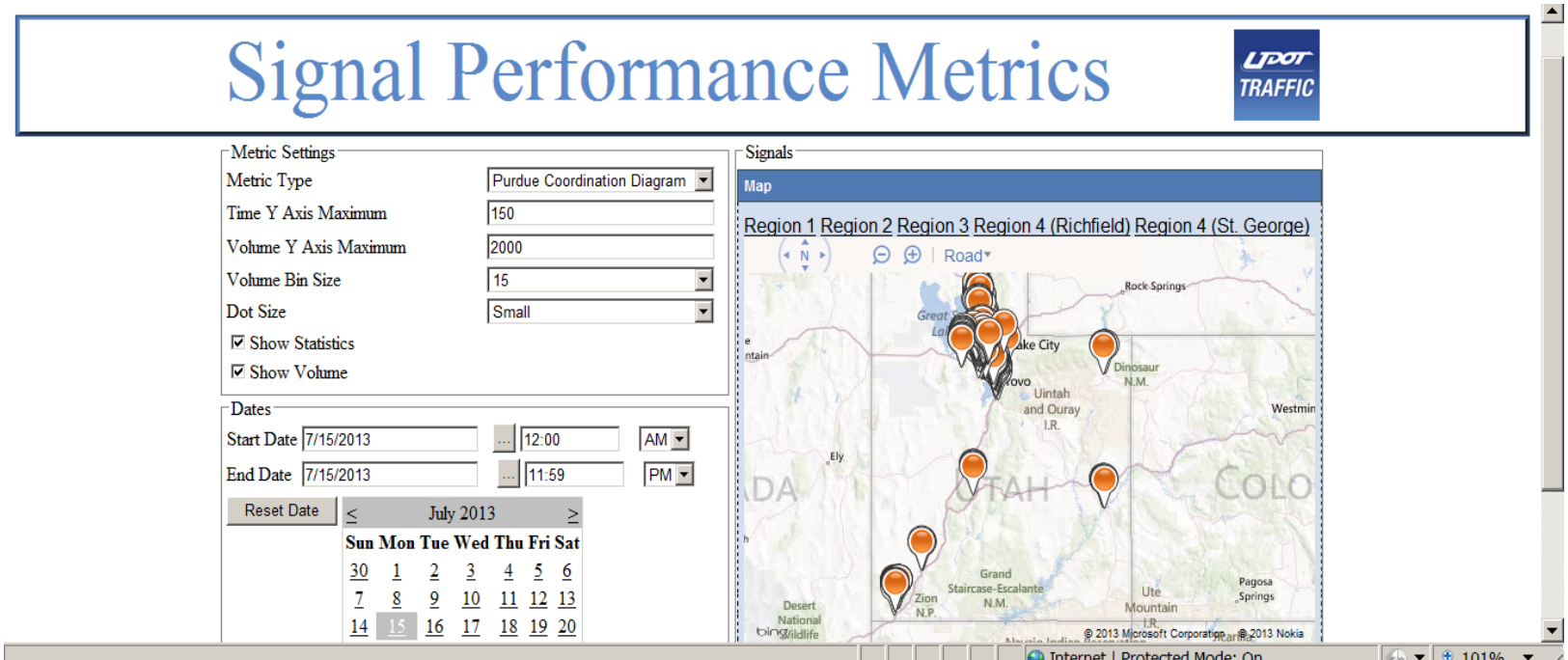
Critical System Components

- RWIS – Installed on Riverdale Corridor
- UDOT Meteorologist
- Setback Count Detectors
- Signal Performance Metrics System

  http://udottraffic.utah.gov/signalperformancemetrics/
- Traffic Estimation and Prediction System (TrEPS) /Decision Support System (to be used next winter)

UDOT Signal Performance System

- Real-Time Performance Monitoring
- Purdue Coordination Diagrams
- Speeds, Link Volumes, Turning Counts
- Written in-house by UDOT programmers
- Analyze and display high-resolution logger data



Deployment Approach

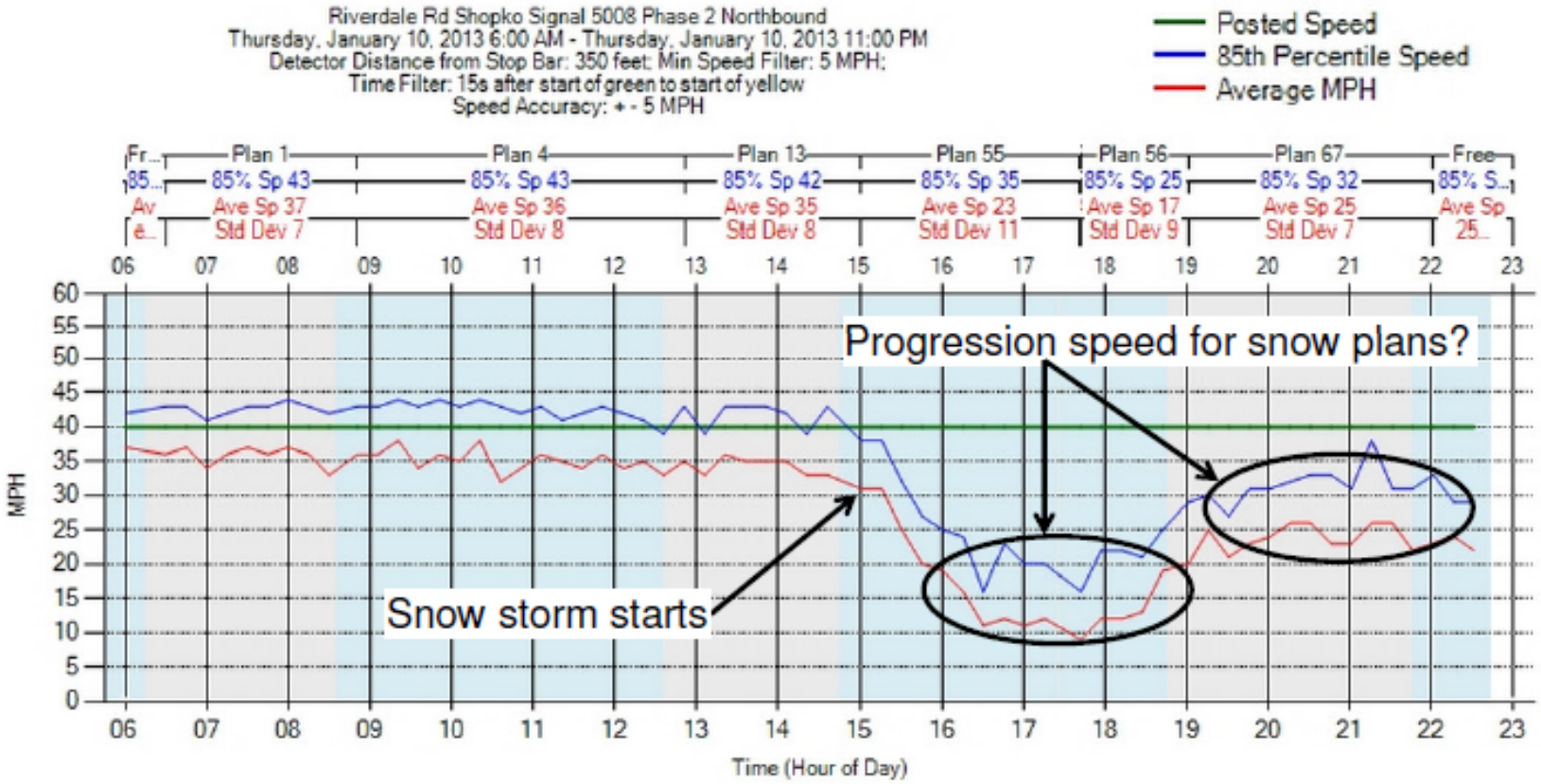
- Created three special traffic signal timing plans (1 for light snow, 2 for heavy snow)
- Deployment approach relied on identifying when to **transition and adjust** plans
  - Pre-Event (Based on Meteorologist and RWIS data)
  - During Event (Based on Travel Speeds and Signal Performance)
  - After Event (Based on Travel Speeds, Signal Performance and Forecast)
  - Post Event Adjustments to the Plan

Evaluation Results

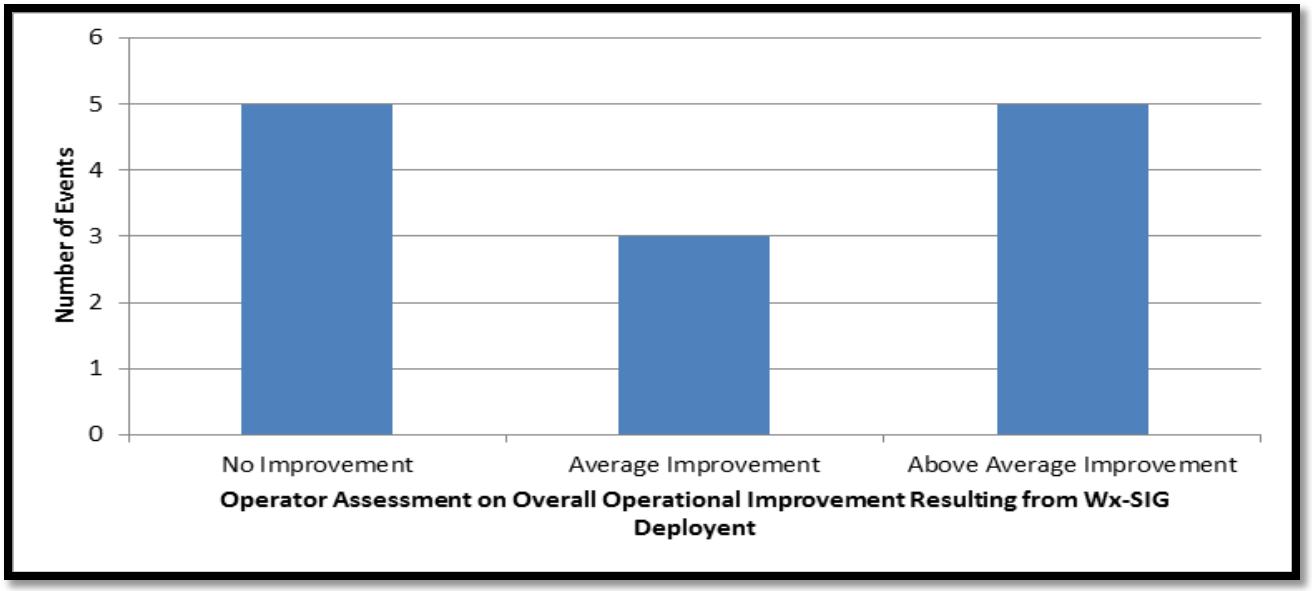
- Operator Assessments
- Signal Performance Data
- Modeling (forthcoming)

Matching timing plans to speeds

Riverdale Rd & Shopko, NB (1/10/2013)



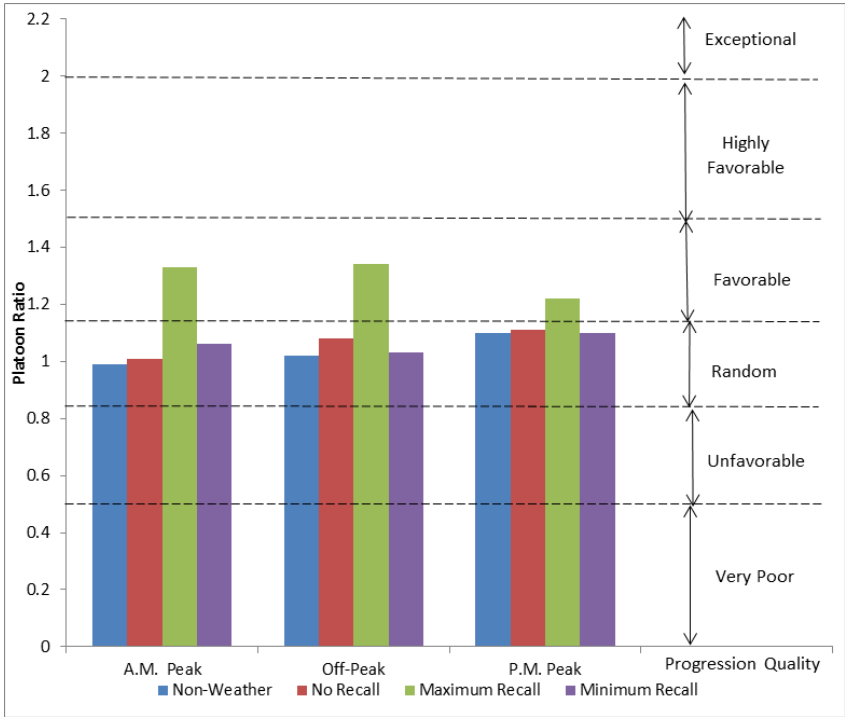
Operator Assessments



- Ability to fine-tune the timing plans by using the PCDs was a major benefit to the study.
- The system reduced the number of “stuck intersections”.
- Expect to continue to implement weather responsive deployments.

Signal Performance Data

- Maintained comparable or better levels of progression to non-weather days
- Arrivals on Green and Platoon Ratio were the key performance measures for progression



Average Percent Arrival on Green for Corridor -- Northbound/Easttbound

Overall Quality of Progression Achieved in the Northbound/Easttbound Direction

TRePS Modeling

- Compare the Do-Nothing to implemented weather plans
- Corridor-level measures (delays, travel times)
- Status
  - Network calibrated
  - Signal timing modeled
  - Results being extracted

Conclusions

- Operating approach to maintain a true weather responsive system in a corridor.
- System led to improved UDOT understanding of
  - how to monitor the corridor during weather events,
  - the nature and the frequency of adjustments to signal plans, and
  - the types of measurement tools needed to manage in real-time.

Lessons Learned

- Changing coordination plans most effective when conditions change travel speeds roughly 5-10 mph.
- Knowing when to deactivate a timing plan requires knowledge about actual conditions in the field. Need fairly close to real-time data to do this effectively.
- Storm intensities have a tendency to ebb and flow throughout the duration of the event. Constant monitoring is necessary.
- Keep the number of WRTM timing plans down to a manageable size.
- Avoid timing plans that utilize maximum recalls for minor and cross-street phases.

Contacts

- Final Report – Forthcoming

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