Travel Times in Work Zones
I-35 Between Hinckley and Duluth, Minnesota

Dave Mavec, Minnesota DOT
Reed Leidle, Safety Signs
Tina Roelofs, Athey Creek Consultants
Project Background

• In 2012, 3 separate large construction projects occurred on I-35 between Hinckley and Duluth, MN
• I-35 is a rural freeway recreational route with high traffic volumes over holidays and weekends
• MnDOT desired to provide motorists with travel time information through the construction work zones
AltRoute MN-23

Location of 2012 I-35 Construction Projects

Duluth, MN

Alternate Route MN-23

Hinckley, MN
Project Locations
Sign Deployment
Sign Locations

- Hinckley: 50 MILES, Travel Time: 53 MIN
- Hinckley: 34 MILES, Travel Time: 36 MIN
- Cloquet: 41 MILES, Travel Time: 37 MIN
- Moose Lake: 30 MILES, Travel Time: 29 MIN
- Travel Time to Duluth:
  - VIA 35: 62 MIN
  - VIA 23: 73 MIN
Project Partners

• MnDOT
• Prime Contractor - Safety Signs
• Evaluator - Athey Creek Consultants
• Athey Creek was hired by MnDOT to:
  – To document the process MnDOT followed, identifying what worked well and what did not in a rural setting; and
  – To examine and summarize the data that MnDOT collected to articulate a recap of the project to help MnDOT understand what to expect in similar deployments.
Evaluation Approach

• Interview project stakeholders to document:
  – Planning and Procurement
  – Project Execution

• Performance Evaluation
  – Travel Time Comparison Results
  – Public Perception

• Groups Interviewed
  – MnDOT District 1
  – MnDOT Office of Traffic, Safety and Technology
  – MnDOT Metro District RTMC
  – MnDOT Office of Construction and Innovative Contracting
  – Contractor
Project Contracting

• Contract
  – Design-Bid-Build
  – Best Value Procurement
  – Stand-alone contract

• Bidding Process
  – Technical Proposals (8 received)
  – 4 Technical Proposals approved by MnDOT
  – 2 Contractors submitted a price proposal
Project Contracting Lessons Learned

• MnDOT Perspective
  – Best Value Method Allowed MnDOT to select a qualified contractor

• Contractor Perspective
  – Stand alone contract preferred
  – Previous experience criteria requirement in the RFP was too limiting and did not allow innovation for proposed systems
System Requirements and Performance Criteria

• System requirements
  – MnDOT identified the locations and details of roadside static signs
  – Contractor identified the quantity and location of sensors were not specified
  – Contractor created and maintained a website showing sign locations and real-time travel times at each sign

• Performance criteria
  – Operation 24/7
  – Allowable accuracy for each sign ranged from 5 to 15 minutes
System Requirements and Performance Criteria Lessons Learned

• MnDOT Perspective
  – Performance based specifications transferred risk to Contractor
  – More detail (e.g. sensor spacing, detection capabilities) would have increased accuracies
  – Tradeoffs exist when considering cost versus system performance
  – Define terms ("latency")
  – State that current traffic data must be used to calculate travel times

• Contractor Perspective
  – Detailed plans and specifications would have transferred more risk to MnDOT
  – Include a separate bid item for additional equipment to be added (e.g. sensors)
  – Add a disclaimer to the signs “estimated travel times”
  – Define terms to avoid misunderstandings
• Travel Times Comparison
  – Contractor used a series of sensors to calculate travel times
  – MnDOT drove I-35 on weekends during peak traffic times and recorded displayed travel times at each sign and actual drive time
## Travel Time Comparison Results

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Drive Runs Conducted*</td>
<td>145</td>
</tr>
<tr>
<td>Number of Travel Times Compared per Run</td>
<td>7</td>
</tr>
<tr>
<td>Total Number of Instances Comparing Displayed vs. Actual Travel Times</td>
<td>1015</td>
</tr>
<tr>
<td>Number of Instances Out of Specification</td>
<td>51</td>
</tr>
<tr>
<td>% Instances Out of Specification (51 instances out of 1015 MnDOT vehicle runs conducted)</td>
<td>5.0%</td>
</tr>
<tr>
<td>Average Time Out of Specification (mins)</td>
<td>12.3</td>
</tr>
</tbody>
</table>

*The Travel Time Display System was operational 24 hours a day/7 days a week. The Vehicle Travel Time Runs were only conducted on weekends when traffic volumes were expected to be high. Therefore, the total number of instances (1015) does not reflect performance during the entire duration the system was in operation.
Travel Time Comparison Method
Lessons Learned

• MnDOT Perspective
  – Describe the comparison method in the specifications
  – Consider alternate methods for comparing travel times
  – Increase the number of comparisons for floating car data collection

• Contractor Perspective
  – Describe the comparison method in the specifications
  – Floating car method did not generate enough data points
Public Perception Results

• MnDOT Customer Relations Survey Results
  • Real-time Travel Time display system was well received among respondents
  • Nearly 100% of respondents noticed the travel time signs and remembered seeing travel time information
  • Signage can be 10 minutes off and still satisfy most users
  • Suggested improvements included:
    – Additional signage with information regarding secondary destinations
    – Information about upcoming exit closures related to alternate route suggestions
    – Additional signage earlier to allow more time for planning
    – Provide more lead time ahead of exits
Conclusions

• Travel time accuracies were generally acceptable to the public
• The system fulfilled a need identified by the public to provide information about travel times and alternate routes during the construction
• The MN-23 alternate route was not utilized as much as desired to reduce congestion levels on I-35
Contact

Dave Mavec, MnDOT
dave.mavec@state.mn.us

Reed Leidle, Safety Signs
reed@safetysigns-mn.com

Tina Roelofs, Athey Creek Consultants
roelofs@acconsultants.org