RITIS for Work Zones

Work Zone Monitoring Dashboard & Collaborative Meetings for Planning of Work Zones

Enabling Decision Making & Effective Communication
Our Goal with RITIS is to:

• Provide tools to make data
  • easily accessible,
  • usable,
  • Understandable, and
  • allowing for insights discovery
To domain experts or the general public

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Context
Improving Work Zone Safety and Mobility
Motivation
Compliance with Final Rule on Work Zone Safety and Mobility

Funding
In 2013 MD SHA and FHWA funded a project to develop a real time performance monitoring tool for work zones using INRIX probe vehicle data and event data.
Data Sources and Key Definitions

- Active work zone information provided by SHA CHART system in real-time.
- Probe vehicle speed information from INRIX.

Queue/Bottleneck

User Delay Cost (UDC)

Calculated using:
- ADT (AADT with adjustment factor)
- Passenger/commercial vehicle percentages
- Speed reduction factor
- Delay
Audience and Goals

**Audience**: Project Engineers and Managers
**Goals:**
- Real time performance
- Alerts when thresholds exceeded
- Potential actions based on identified performance

**Audience**: Public Relations
**Goals:**
- Real time and historical performance
- Responding to complaints and inquiries

**Audience**: Planners and Decision Makers
**Goals:**
- Closure costs
- Review of previous performance
Work Zone Dashboard

Overview
Critical List
Map Delay
<table>
<thead>
<tr>
<th>REGION/EVENT</th>
<th># OF NEARBY INCIDENTS</th>
<th>QUEUE LENGTH (MI)</th>
<th>USER DELAY COST ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD 151 SOUT...</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
<tr>
<td>I-379 OUTER LOOP AT HARFORD RD</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
<tr>
<td>MD 26 EAST/WEST BETWEEN PIKESPO...</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
<tr>
<td>I-83 NORTH AT EXIT 31 MIDDLETOWN RD</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
<tr>
<td>I-695 INNER LOOP AT MP 49.3 (FRANCES SCOTT KEY BRIDGE)</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
<tr>
<td>I-695 OUTER LOOP WEST OF EXIT 1 MD 173 HAWKINS POINT RD (CURTIS CREEK DRAWBRIDGE)</td>
<td>0</td>
<td>0</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

Calvert (3)
## Critical Work Zones

<table>
<thead>
<tr>
<th>SEVERITY/EVENT</th>
<th>LANE STATUS</th>
<th>QUEUE LENGTH (MI)</th>
<th>USER DELAY COST ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical (1)</td>
<td></td>
<td>2.35</td>
<td>$7,781.00</td>
</tr>
<tr>
<td>I-695 INNER LOOP BETWEEN EXIT 12 AND 372 WILKENS AVE AND EXIT 13 AND 144 FREDERICK RD</td>
<td>![Lane Status Icon]</td>
<td>2.35</td>
<td>$7,781.00</td>
</tr>
<tr>
<td>Major (2)</td>
<td></td>
<td>2.51</td>
<td>$9,527.00</td>
</tr>
<tr>
<td>RIVERDALE RD WEST BETWEEN 67TH PL AND MD 410</td>
<td>![Lane Status Icon]</td>
<td>1.01</td>
<td>$5,507.00</td>
</tr>
<tr>
<td>I-695 OUTER LOOP WEST OF EXIT 1 AND 173 HAWKINS POINT RD (CURTIS CREEK DRAWBRIDGE)</td>
<td>![Lane Status Icon]</td>
<td>1.5</td>
<td>$4,020.00</td>
</tr>
</tbody>
</table>
Critical Work Zone Parameters

<table>
<thead>
<tr>
<th>SEVERITY/EVENT</th>
<th>0 miles</th>
<th>5 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD 216 EAST/WEST BETWEEN I-95 AND US 29</td>
<td>$1,450.00</td>
<td>$1,450.00</td>
</tr>
<tr>
<td>MD 26 WEST AT MP 16.7</td>
<td>$3,907.00</td>
<td>$3,907.00</td>
</tr>
<tr>
<td>MD 26 EAST AT DEER PARK RD</td>
<td>$9,925.00</td>
<td>$9,925.00</td>
</tr>
<tr>
<td>MD 528 NORTH FROM 56TH ST TO ZUMA ST</td>
<td>$5,655.00</td>
<td>$5,655.00</td>
</tr>
<tr>
<td>I-95 NORTH PAST EXIT 50 US 1 CATON AVE (LANE SHIFT/LONG-TERM)</td>
<td>$1,28 $8,780.00</td>
<td>$1,28 $8,780.00</td>
</tr>
<tr>
<td>I-95 NORTH PAST EXIT 64 I-95 BALTIMORE BELTWAY/MA 64.3-64.8</td>
<td>$9,007.00</td>
<td>$9,007.00</td>
</tr>
<tr>
<td>I-95 OUTER LOOP AT ARODICK ARDMORE RD</td>
<td>$9,742.00</td>
<td>$9,742.00</td>
</tr>
<tr>
<td>MD 191 EAST AT LELAND ST</td>
<td>$3,318.00</td>
<td>$3,318.00</td>
</tr>
<tr>
<td>I-81 SOUTH FROM MP 0.84 TO MP 3.13</td>
<td>$5,151.00</td>
<td>$5,151.00</td>
</tr>
<tr>
<td>US 40 EAST/WEST FROM WASHINGTON ST TO I-81</td>
<td>$1,772.00</td>
<td>$1,772.00</td>
</tr>
<tr>
<td>MD 79 SOUTH/NORTH BETWEEN MD 17 AND MD 180</td>
<td>$6,082.00</td>
<td>$6,082.00</td>
</tr>
<tr>
<td>I-695 INNER LOOP PAST MP 48.2 (TOLL PLAZA)</td>
<td>$5,558.00</td>
<td>$5,558.00</td>
</tr>
<tr>
<td>MD 45 NORTH BETWEEN OLD PADONIA RD AND BEAVER RUN LA</td>
<td>$4,539.00</td>
<td>$4,539.00</td>
</tr>
<tr>
<td>MD 193 SOUTH/NORTH AT CAPITAL BELTWAY</td>
<td>$1,138.00</td>
<td>$1,138.00</td>
</tr>
<tr>
<td>US 40 EAST/WEST BETWEEN I-70 AND BLENTLINGER RD</td>
<td>$9,216.00</td>
<td>$9,216.00</td>
</tr>
<tr>
<td>MD 136 SOUTH/NORTH AT KERR RD</td>
<td>$3,103.00</td>
<td>$3,103.00</td>
</tr>
<tr>
<td>I-895 NORTH AT POTEE ST ON POTEE ST</td>
<td>$1,843.00</td>
<td>$1,843.00</td>
</tr>
<tr>
<td>MD 64 EAST FROM FRANKS RUN RD TO MD 418</td>
<td>$5,726.00</td>
<td>$5,726.00</td>
</tr>
<tr>
<td>MD 68 EAST/WEST AT MD 61</td>
<td>$4,761.00</td>
<td>$4,761.00</td>
</tr>
<tr>
<td>MD 97 SOUTH/NORTH AT I-70</td>
<td>$4,761.00</td>
<td>$4,761.00</td>
</tr>
</tbody>
</table>
Work Zone Dashboard
# User Delay Cost Information

## User Delay Cost by Corridor and Day of Week

<table>
<thead>
<tr>
<th>Date</th>
<th>I-95</th>
<th>I-695</th>
<th>US-50</th>
<th>I-70</th>
<th>Daily Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wed 4/09/2014</td>
<td>$2,678,358.64</td>
<td>$626,606.88</td>
<td>$229,861.28</td>
<td>$48,652.15</td>
<td>$3,583,478.94</td>
</tr>
<tr>
<td>Thu 4/10/2014</td>
<td>$1,239,852.54</td>
<td>$1,050,702.81</td>
<td>$301,406.33</td>
<td>$77,104.65</td>
<td>$2,669,066.33</td>
</tr>
<tr>
<td>Fri 4/11/2014</td>
<td>$1,806,342.05</td>
<td>$1,105,801.53</td>
<td>$474,634.47</td>
<td>$107,010.25</td>
<td>$3,493,788.29</td>
</tr>
<tr>
<td>Sat 4/12/2014</td>
<td>$3,367,462.76</td>
<td>$107,675.02</td>
<td>$6,721.70</td>
<td>$3,660,917.46</td>
<td></td>
</tr>
<tr>
<td>Sun 4/13/2014</td>
<td>$2,548,281.37</td>
<td>$83,927.57</td>
<td>$8,015.17</td>
<td>$2,677,692.82</td>
<td></td>
</tr>
<tr>
<td>Mon 4/14/2014</td>
<td>$2,661,674.37</td>
<td>$198,868.28</td>
<td>$184,730.13</td>
<td>$3,369,250.33</td>
<td></td>
</tr>
<tr>
<td>Tue 4/15/2014</td>
<td>$2,838,798.60</td>
<td>$905,736.49</td>
<td>$258,710.91</td>
<td>$125,311.87</td>
<td>$4,128,557.87</td>
</tr>
<tr>
<td>Wed 4/16/2014</td>
<td>$2,937,018.16</td>
<td>$500,186.92</td>
<td>$212,687.02</td>
<td>$83,203.90</td>
<td>$3,733,096.00</td>
</tr>
</tbody>
</table>

**Grand Total:** $27,315,848.03

**Cost Per User:** $0.09

**Delay Per User:** 0.16m

**Total Delay:** 33070.24h

**Total User Delay Cost:** $1,105,801.53
## UDC Options and Corridor Selection

### USER DELAY COST BY CORRIDOR AND DAY OF WEEK

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I-95</td>
<td>$2,678,358.64</td>
<td>$1,239,852.54</td>
<td>$1,806,342.05</td>
<td>$3,367,462.75</td>
<td>$2,548,281.10</td>
<td>$2,661,674.91</td>
<td>$2,838,798.60</td>
<td>$2,937,018.16</td>
<td>$20,077,788.75</td>
</tr>
</tbody>
</table>

**Total User Delay Cost**

- Total Delay: $48,000.00
- Cost Per User: $500.00
- Delay Per User: $100.00

**Grand Total:** $27,315,848.03
Map Layers and Options
Individual Work Zone Profile

Map

Settings

Performance Charts

Delay

Work Zone Performance Monitoring

Planned Closure @ I-695 INNER LOOP BETWEEN EXIT 12 MD 372 WILKENS AVE AND EXIT 13 MD 144 FREDERICK RD

Started: Thu, Apr 24, 2014 at 09:24:36 AM
Lane Profile

Segment Speeds

Live CCTV & DMS

Bottlenecks & Nearby Events
Adjusting Parameters
Filtering Results
<table>
<thead>
<tr>
<th>Date</th>
<th>12AM - 4AM</th>
<th>4AM - 8AM</th>
<th>8AM - 12PM</th>
<th>12PM - 4PM</th>
<th>4PM - 8PM</th>
<th>8PM - 12AM</th>
<th>Daily Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thu 4/17/2014</td>
<td>$11.52</td>
<td>$183.00</td>
<td>$9,306.97</td>
<td>$16,405.23</td>
<td>$2,998.90</td>
<td>$567.58</td>
<td>$28,933.30</td>
</tr>
<tr>
<td>Fri 4/18/2014</td>
<td>$6.17</td>
<td>$29.46</td>
<td>$82.00</td>
<td>$221.35</td>
<td>$127.06</td>
<td>$50.00</td>
<td>$516.04</td>
</tr>
<tr>
<td>Sat 4/19/2014</td>
<td>$27.17</td>
<td>$7.65</td>
<td>$3.12</td>
<td>$22.42</td>
<td>$17.28</td>
<td>$46.01</td>
<td>$123.88</td>
</tr>
<tr>
<td>Sun 4/20/2014</td>
<td>$39.81</td>
<td>$24.66</td>
<td>$0.00</td>
<td>$6.13</td>
<td>$26.78</td>
<td>$18.42</td>
<td>$119.80</td>
</tr>
<tr>
<td>Mon 4/21/2014</td>
<td>$2.46</td>
<td>$48.75</td>
<td>$788.33</td>
<td>$103.20</td>
<td>$899.94</td>
<td>$131.35</td>
<td>$1,973.63</td>
</tr>
<tr>
<td>Tue 4/22/2014</td>
<td>$25.38</td>
<td>$264.46</td>
<td>$1,819.65</td>
<td>$5,771.39</td>
<td>$2,675.70</td>
<td>$189.00</td>
<td>$13,745.58</td>
</tr>
<tr>
<td>Wed 4/23/2014</td>
<td>$20.52</td>
<td>$477.24</td>
<td>$12,925.82</td>
<td>$13,993.07</td>
<td>$16,215.27</td>
<td>$80.23</td>
<td>$43,310.14</td>
</tr>
</tbody>
</table>

**Hourly Totals**
- 12AM - 4AM: $133.04
- 4AM - 8AM: $1,033.22
- 8AM - 12PM: $24,923.89
- 12PM - 4PM: $39,522.78
- 4PM - 8PM: $22,918.33
- 8PM - 12AM: $582.59

**Grand Total:** $83,718.66
I don’t have time to watch the Dashboard all day long!

Can’t you just tell me where the problems are?
Work Zone Alerts

CREATE AN ALERT FOR THIS WORK ZONE

Fill out each section to set up an alert for this work zone.

1. Alert me if...
   - [ ] An accident happens near this work zone.
   - [ ] There is a bottleneck that's head or queue includes this work zone.
   - [ ] Speeds in the work zone fell below or exceed a certain range.

2. Alert me by...
   - [ ] Send me an email
   - [ ] Send me a text message

3. Alert me when...
   - Time zone: US/Eastern
   - Time period:
     - Select days of week: [ ] Sun, Mon, Tue, Wed, Thu, Fri, Sat
     - Select hours of day:
       - 12 AM - 6 AM - 12 PM - 6 PM - 12 AM
       - 5:00 AM - 5:00 PM

Create alert
Work Zone Alerts

CREATE AN ALERT FOR THIS WORK ZONE

Fill out each section to set up an alert for this work zone.

1. Alert me if...
   - An accident happens near this work zone.
     Within ___ mile(s) upstream or ___ mile(s) downstream
   - There is a bottleneck that's head or queue includes this work zone.
     Keep in mind the formula for determining bottleneck conditions.
     Alert me only when the queue upstream from the work zone exceeds ___ mile(s)
   - Speeds in the work zone fall below or exceed a certain range.
     When speeds fall below ___ mph
     When speeds rise above ___ mph
     Alert me when speed is out of range for longer than ___ minute(s)
     Alert me when speed returns within range for longer than ___ minute(s)

2. Alert me by...
   - Send me an email
     Alert will be sent to your account email: ivanovn@umd.edu
   - Send me a text message
     Enter your phone number, 3014553626, and select Verizon Wireless, then verify

3. Alert me when...
   - Time zone
     US/Eastern
   - Time period
     Hours of day: 6:00 AM to 5:00 PM

Create alert
Next Steps

I-95 Corridor Coalition Expansion

- I-95 CC awarded $300,000 to deploy to as many agencies as possible.
- Backend re-architecture for scalability across 17 states.
- Data collection to support the application.

Improvements

- Increased spatial granularity of probe vehicle data.
- Multiple probe vehicle data providers.
Planning & Collaborating

The RITIS Meeting tool is being used by construction managers, operations, and others to help plan (on a weekly basis) which work zones are expected to occur, how that might impact traffic, and facilitate a dialogue about how to best manage traffic and safety.
What is RITIS Meeting?

- **It’s a virtual meeting platform**
  - Anytime/anywhere
  - PC or mobile device, such as iPad® (participants only)

- **It’s situational awareness**
  - Weather (radar, alerts, road surface condition)
  - Events/Incidents (construction, crashes, etc.)
  - Probe speed data/DMS messages

- **It’s collaborative decision-making**
  - Leverage multiple layers of data
  - Share documents
  - Discuss ideas & recommendations
  - Conduct attendee polling

- **It’s multi-faceted**
  - Multi-agency/multi-user
  - Plan, respond to, follow-up on
  - Extreme weather, special events, incident management

- **It’s fast and easy**
  - Simple set-up of meetings, creating agendas
  - One-click e-links to send to attendees
  - Intuitive & user-friendly
  - Instant follow-up email with an automatically generated meeting log (MOR)

Cover photos source: http://www.i95coalition.org
After you start a meeting, you’ll see four basic areas of the host’s “meeting in progress” screen:

- **Details/Checklist and Forecast Column**
- **Map/Document Area**
- **Polling Area & Attendance/Questions Column**

### The “Meeting in Progress” Screen

**A** Details/Checklist and Forecast Column

**B** Map/Document Area

**C** The Polling Area & Attendance/Questions Column
Ways to Communicate

Take a Poll:

Enter Notes:

Submit a Question:
You can upload documents into the mapping area for viewing and discussion:

The Map/Document Area – *Show Document*

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**Survival Guide for the Papal Visit:**

1. **Wear comfortable shoes.** You’re going to be doing a lot more walking than you’ve been used to, probably.
2. **Forget driving.** Bringing your car into town will be a non-starter, Mayor Michael Nutter said at a City Hall news conference this morning.
3. **If you live in the ‘burbs, ask a friend to drop you off at the nearest open SEPTA Regional Rail station.** And be sure to purchase your Pope Pass beforehand, ’cause you won’t be able to leave home without it, unless you like long bus rides. More on all this below.
4. **If you live in the city, the news is relatively good:** Your passes and tokens will get you where you need to go. But it will probably be on a bus rather than on rapid transit.

The Map/Document Area - *Traffic-related Data*

Click on the checkboxes in the Layer List to activate or deactivate Incidents and Events, DMS & Probe Speed Data:

Then click on a map icon to bring up more information...
The Map/Document Area - **Weather-related Data**

Click on the checkboxes in the Layer List to activate or deactivate Road Weather, Weather Alerts and Weather Radar:

Then click on a map icon to bring up more information...
The Map/Document Area – **Weather Radar**

Weather Radar includes a total of five conditions and forecasts:

- **Weather Forecast**
- **Chance of Precipitation**
- **Temperature**
- **Snowfall**

*Map displaying various weather data and icons.*
This map shows layers pertaining to evacuation support: routes, staging areas, hospitals, traffic control points, etc.
Click on the checkboxes in the Layer List to activate or deactivate Evacuation Routes, Staging Areas, Comfort Stations, Hospitals, etc.:

Then click on a map icon to bring up more information...
An email, with a complete log of all information, will be automatically generated and sent to all participants.
Collaborative Decision Making

Collaborative Decision Making Tools – Meeting in Progress

Clear, comprehensive, and organized layout of tools and information makes collaborating simple and easy.
Collaborative Decision Making Tools – Meeting in Progress (Cont’d.)

Pre-weather event meeting showing impending weather and incidents.
Collaborative Decision Making

Collaborative Decision Making Tools – Meeting in Progress (Cont’d.)

Running a Poll

The host of the meeting or a designated presenter can share images and documents during the meeting. This person can add and remove annotations on the files they are sharing. In the image below, RITIS Meeting is used during a water main break to identify closures, rerouting, and other items. The meeting host used the drawing tool to walk participants through the event.
Collaborative Decision Making – Meeting Log

A meeting log is generated after every meeting. This log keeps track of all the information shared in the meeting, and is sent out to all the participants afterwards.

MATOC Weather Call: January 26 Event

Host: Taran Hutchinson
District of Columbia

This is the RTI15 Meeting for MATOC Severe Weather Coordination Working Group to discuss the anticipated winter weather event forecasted to impact the region Sunday night into Monday (1/26) morning.

Recommendation:
Recommend MWCOG Snow Call for 3AM Monday (1/26)

We will have a follow up MATOC Weather Call at 2PM Monday (1/26) to discuss how the event is progressing and impacts to PM rush as well as impacts for Tuesday AM rush.

Number of Attending: 9

Forecast:

Current Advisory
NATIONAL WEATHER SERVICE BALTIMORE MD/WASHINGTON DC
1040 AM EST SUN JAN 25 2015

...WINTER WEATHER ADVISORY REMAINS IN EFFECT FROM 2 AM TO 6 PM EST MONDAY...

- PRECIPITATION TYPE: SNOW, POSSIBLY HEAVY AT TIMES.
- ACCUMULATIONS: 1 TO 2 INCHES.
- TIMING: SNOW WILL BEGIN LATE TONIGHT AND CONTINUE THROUGH LATE MONDAY AFTERNOON. THE HEAVIEST SNOWFALL WILL OCCUR BETWEEN EARLY MONDAY MORNING AND EARLY MONDAY AFTERNOON.
- TEMPERATURES IN THE LOW 30S.
- WINDS: NORTHEAST 10 TO 15 MPH.
- IMPACTS: ROADS WILL BE SNOW COVERED AND SLIPPERY WITH VISIBILITIES BEING REDUCED TO NEAR ONE QUARTER MILE AT TIMES. THE COMBINATION OF SNOW COVERED ROADS AND LOW VISIBILITY WILL MAKE TRAVELING DANGEROUS.
- OUTLOOK: SNOW WILL CONTINUE MONDAY NIGHT INTO TUESDAY WITH ADDITIONAL ACCUMULATION POSSIBLE.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A WINTER WEATHER ADVISORY FOR SNOW MEANS THAT PERIODS OF SNOW WILL CAUSE PRIMARILY TRAVEL DIFFICULTIES. BE PREPARED FOR SNOW COVERED ROADS AND LIMITED VISIBILITIES. AND USE CAUTION WHILE DRIVING.

Polls:

Poll #1
When do you recommend a MWCOG Snow Call?
Sunday afternoon (late) (0)
Sunday evening (1)
Monday morning (early), 3AM (4)
Monday morning (late) (0)
5 of 8 Attendance Voted

Shared Media:
Uploaded by: Taran Hutchinson
Time: 1:46 PM
Description: MATOC Road Conditions Table

<table>
<thead>
<tr>
<th>Road Condition 5: IMPASSABLE/ DANGEROUS/ TRENCHERIOUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some roads could be temporarily impassable. This may be the result of severe weather (low visibility, etc.) or road conditions (drifting, excessive wind, snow, wind, snow, heavy snow, severe winter conditions, etc.). Limited access to some areas of some roads.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Road Condition 4: ICY/ SNOW PACKED</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pavement surface is covered with packed snow and/or ice. There may be loose snow on top of the ice or packed snow surface. Traffic conditions may be hazardous. Use extra caution and reduce your speed, especially on hills and curves.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Road Condition 3: SNOW AND/OR SLUSH COVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pavement surface has a layer of loose snow and/or ice. There may be loose snow on top of the snow or ice. Traffic conditions may be hazardous. Use extra caution and reduce your speed, especially on hills and curves.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Road Condition 2: SNOW/SLUSH COVERED W/ WHEEL TRACKS EXPOSED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulations of loose snow or slush up to 2 inches are found on the pavement surface. Loose snow or slush may be over or in areas of packed snow. Regular traffic conditions with some minor variations and delays for slower, drifting snow.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Road Condition 1: CLEAR WEATHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow or snow conditions are minimal. Traffic conditions are normal. Use caution when driving on areas with a small layer of snow or slush.</td>
</tr>
</tbody>
</table>

Table 1: Transportation system status levels

- "Impassable": Insufficient traffic must be maintained to keep the roadway passable. This condition may be caused by severe winter conditions or heavy snowfall.
- "Dangerous": Traffic conditions are hazardous and may be life-threatening to drivers and passengers. Use extreme caution when driving.
- "Trencherious": Some roads could be temporarily impassable. This may be the result of severe weather (low visibility, etc.) or road conditions (drifting, excessive wind, snow, wind, snow, heavy snow, severe winter conditions, etc.). Limited access to some areas of some roads.
- "Packed snow": The pavement surface is covered with packed snow and/or ice. There may be loose snow on top of the ice or packed snow surface. Traffic conditions may be hazardous. Use extra caution and reduce your speed, especially on hills and curves.
- "Dramatic weather conditions": Snow or snow conditions are minimal. Traffic conditions are normal. Use caution when driving on areas with a small layer of snow or slush.
Other tools for evaluating Work Zones

• The Probe Data Analytics Suite has additional features and functionality that can be used to measure the impacts of construction events, and then
Probe Data Analytics Can Supplement RITIS Meeting

- **I-95 Reconstruction in Philadelphia**
- Construction began late 2011; multiple sections underway starting late 2012
- Graphic instantly communicates impacts to wide variety of audiences
- Spatial and temporal
- Great starting point for analysis of changes/issues
### Impact of the Amtrak Derailment & Suspension of SEPTA’s Trenton Line

- Significant travel time increases on I-95 Wednesday and Thursday
- Likely that most Trenton Line riders ended up driving
- Still working on analysis of hourly volumes

### Probe Data Analytics Can Supplement RITIS Meeting

<table>
<thead>
<tr>
<th>Distance</th>
<th>Transient Traffic Time (TT)</th>
<th>Tuesday 5/12, 8:00 AM</th>
<th>Wednesday 5/13, 8:00 AM</th>
<th>Thursday 5/14, 8:00 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>~14 miles</td>
<td>Free Flow Travel Time (TT) = 14 min</td>
<td>Average TT = 39 min, 32 sec (-1 min, 58 sec; or -5.0% vs. average Tuesdays in 2015)</td>
<td>Average TT = 52 min, 33 sec (+10 min, 32 sec; or +21.5% vs. average Wed. in 2015)</td>
<td>Average TT = 48 min, 32 sec (+10 min, 32 sec; or +27.7% vs. average Thurs. in 2015)</td>
</tr>
<tr>
<td>8:00 AM weekday average TT (Jan-April 2015) = 41 min, 30 sec</td>
<td>Hourly volume = 3928</td>
<td>Hourly volume = 4534 (+606 or 15.4% vs. Tues.)</td>
<td>Hourly volume = 4897 (+458 or 21.8% vs. Tues.)</td>
<td></td>
</tr>
</tbody>
</table>
Other Probe Data Analytics Tools

- User Delay Cost tables and Animated Comparison Maps can all be used to help show the impacts of work zones.
These slides were produced using tools developed by the CATT Laboratory.

For more information, contact the Lab Director

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