Traffic Ticker
A Real-Time Statewide Operations Dashboard

Maggie McNamara
March 9, 2016
Data Source
Crowd Sourced Probe Vehicle Data
Data Source
Crowd Sourced Probe Vehicle Data

- 1886 miles of Interstates in Indiana
- 151,714,570 Interstate Records on 2677 segments in 2016 so far
- 35,867,272,608 records in the 2010 to 2015 INRIX data for Indiana.
- Without good graphics and analysis techniques this is Data Rich Information Poor (DRIP)
<table>
<thead>
<tr>
<th>Time</th>
<th>Speed</th>
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<tbody>
<tr>
<td>17:30</td>
<td>67</td>
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<td>17:31</td>
<td>67</td>
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<td>17:32</td>
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<td>17:43</td>
<td>67</td>
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<tr>
<td>17:44</td>
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</tr>
</tbody>
</table>

Median: 68 mph
Probe Vehicle Data
15-Minute Aggregation

Median speed over fifteen minutes
One-minute reported segment speed

[i] [ii]
Indiana Mobility Reports
Yearly Statewide Analysis

2011 Indiana Interstate Mobility Report
Summary Version

Stephen Remias, Thomas Brennan, Gannon Grimmer, Edward Cox, Deborah Horton, Darcy Bullock

2012 Indiana Mobility Report
Summary Version

2013 Indiana Mobility Report
Summary Version

Christopher Day, Stephen Remias, Howell Li, Michelle Hukker, Margaret McNamara, Edward Cox, Deborah Horton, Darcy Bullock

http://docs.lib.purdue.edu/imr/
Mobility Report Performance Measures

Hours of speed < 45 mph

Almost 2600 hours in a year
Mobility Dashboards
Crowd Sourced Probe Vehicle Data – Tools

INDOT Mobility Dashboards

Delta Speeds
Queuing
Speed Profiles
Travel Time
Interstate Traffic Ticker

Delta Speed Map
Congestion Profile Diagrams
I-65 N Detour Traffic Ticker
SR-37 Upgrade Traffic Ticker

Created by the Purdue Traffic Lab
Indiana Maps
Major Interstates and INDOT Management Districts
Traffic Ticker

Colored by District (see map)

Crash

Colored by Road

Colored by Speed bin

Filters
Use Case: Incidents

Back of Queue crash Nov. 13, 2015
Back of Queue Crash
Crash location and context

MM 124 – Work Zone

Exit 137 to SR 1 and US 40

MM 127 – Crash Location
Traffic Ticker

November 13 Back-of-Queue Crash Example

Time of crash

Traffic stopped
Longitudinal Speed Profiles
November 13 Back-of-Queue Crash Example

Route
- Interstate 70
- Mile Marker: 100 to 157

Date Range
- 2015-11-13 to 2015-11-14

Day of Week
- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- All Weekdays

Time of Day
- 06:00 to 18:00
- Exclude selected time period (for overnight analysis)

Maximum Hours Axis Value
- Set y-axis values to

Generate Graph
“As of 2 p.m., Indiana State Police in the Indianapolis area said they worked more than 140 calls for crashes, slide offs or disabled vehicles. No one was seriously injured in any of the incidents.”

wishtv.com
Use Case: Winter Operations – January 10th Snowstorm Overview and Radar (1/09-10)
January 10th Snowstorm

Crawfordsville District

As of 1/10 15:31, 16 trucks out
January 10th Snowstorm
Fort Wayne District

As of 1/10 15:31, 96 trucks out
January 10th Snowstorm
Greenfield District

As of 1/10 15:31, 124 trucks out

>250 total miles

Net short wave radiation flux
Median Precipitation
Median Temperature

Temperature [°C]
Liquid Precipitation Equiv. [mm]
Net short wave radiation flux
Median Precipitation
Median Temperature
January 10th Snowstorm
LaPorte District

As of 1/10 15:31, 62 trucks out

Large temperature range
January 10th Snowstorm
Seymour District

As of 1/10 15:31, 94 trucks out
January 10th Snowstorm
Vincennes District

As of 1/10 15:31, 108 trucks out
Case Study: I-65 N Detour
Wildcat Creek Bridge Closure

Using Real-Time Probe Vehicle Data to Manage Unplanned Detour Routes

By Margaret McNamara, Howell Li, Stephen Remias, Lucy Richardson, Edward Cox, Deborah Horton, and Darcy M. Bullock

The unexpected closure of an interstate is a massive undertaking involving a variety of stakeholders. Such was the case in August 2015, when pier settlement of the Wildcat Creek Bridge on I-65 N in Indiana, USA required an unplanned closure of a 37-mile stretch of the interstate for approximately 31 days. The detour route had little existing intelligent transportation systems (ITS) infrastructure to assist engineers with managing operations. To fill this information need, real-time crowdsourced probe vehicle data were used to create real-time dashboards hosted on a website for use by Indiana Department of Transportation (INDOT) engineers and public safety officials to monitor mobility and queueing on the 62-mile detour route. This paper describes how the real-time dashboards were used to proactively identify congestion problems, as well as measure the impact of mitigation measures.

Route Diversion
The southbound bridge was too narrow to support bidirectional traffic, so the northbound traffic was diverted onto US-52 at mile marker 141 (Lebanon, IN) and returned to I-65 just north of Lafayette at Exit 193 (Figure 1a). This stretch of interstate usually carries an average annual daily traffic of 24,000 vehicles, including about 9,500 trucks, and it is an important connector between Indianapolis, IN and Chicago, IL, USA.

Figure 1 shows the area of the closure and detour, with callout 1 of Figure 1b marking the location of the closed bridge. The detour consisted of US-52, SR-28, and US-231, shown in Figure 1a. INDOT deployed fifteen dynamic message signs (DMS) that were used to direct drivers, advising them of turns and potential queues. Additionally, there were 40 trafficcontrol signs marking the direction of the detour and 19 other signs, including warning signs for traffic lights and work zones. Figure 1b, callouts ii, iii, and iv mark temporary signals that were installed, and callout v marks a four-way stop that was converted to a two-way stop, which are discussed later in the article.

http://tinyurl.com/indetour
Case Study: I-65 N Detour

Interstate Diversion

Bridge Closed on Aug 6
(AADT ~ 35000)
Trucks ~ 5000

NB I-65 closed from MM 141 to 178 (~ 37 miles)

Diversion Route
Case Study: I-65 N Detour
Repairs in Progress

35000 vehicles?
Making Real Time Decisions and Separating Fact from Fiction
Case Study: I-65 N Detour
How Bad Was It? – Using Metrics to Change the Narrative

- Reporter drove official detour right after the closure, wrote article for local newspaper
- Took 4 hours to drive ~60 miles
- Said “Moral of the story is that the INDOT detour route is essentially ineffective.”
- “Plan for it to take an absurd amount of time.”
Case Study: I-65 N Detour
Detour Route

4-way stop
Signal at US-52 & SR-28
Signal at SR-28 & US-231
Signal at US-52 & SR-47

DMS
Trailblazing
Other
Traffic Summary
US-52 N (I-65 to SR-28)

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary
SR-28 (US-52 to SR-231)

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary
US-231 (SR-28 to US-52)

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary
US-231 N (US-52 to SR-18)

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary
US-231 N (SR-18 to I-65)

Segment Speed Profile

Cumulative Traffic Ticker
Traffic Summary

Total

Segment Speed Profile

Cumulative Traffic Ticker
Case Study: I-65 N Detour

Daily Northbound Volumes on Detour Route
Case Study: I-65 N Detour
River Road – Volumes Week of 7/25 vs. Week of 8/15

![Graph showing volume (veh/h) before and after detour on River Road, with data for each day of the week from Saturday to Friday.](image-url)
Case Study: I-65 N Detour

Detour Ticker

I-65 N closed


Corridor is retimed to prioritize US-231 N

Challenging week for incidents

I-65 N reopens

Stopped traffic is mitigated – fewer long queues
Case Study: I-65 N Detour
SR-28 / US-231 Temporary Signal
Case Study: I-65 N Detour
Impact of Signalization

Temp signal at 52/28 addressed
Temp signal at 28/231 addressed
ISP Dispatch, Mon INDOT changed from 4 way stop to 2 way stop
Now chasing second order effects

Showing miles operating < 25 mph
Case Study: I-65 N Detour
Engagement with Public Safety
Case Study: I-65 N Detour

Engagement with Public Safety
National Performance Measures
Where are the Problems Nationally?

>$600 Billion in Freight to/from/through
National Performance Measures
Where are the Problems Nationally?

Performance Measures can be used to identify anomalies.
Relative Travel Time Deficit

Performance Measures can be used to identify anomalies

Source: timesunion.com
National Performance Measures

I-80 Coast-to-Coast
National Performance Measures

I-80: Sunday January 24, 2016
Traffic Ticker: Catching On
Ohio – I-70 and I-75

Ohio Interstate System Dashboards

Display
- Speed limit for congestion: > 65 mph
- Congested Speed
- Date Range: 2015-11-30 to 2015-12-10
- Refresh

15-Minute Summary: 2015-12-11 01:45 UTC

Purdue INRIX
Traffic Ticker: Catching On
Riyadh, Saudi Arabia – King Abdullah Rd.
Traffic Ticker: Catching On
Coming Next: Utah

“[Traffic Ticker] is the best statewide dashboard I have seen.”

- Carlos Braceras
UDOT Director
Traffic Ticker

Questions?

Contact: Maggie McNamara
mcnamar0@purdue.edu

http://its.ecn.purdue.edu/mobility/dashboards/traffic_ticker/index.html