The National Academies of
SCIENCES · ENGINEERING · MEDICINE

TRANSPORTATION RESEARCH BOARD

Guide for transportation performance management and data

Monday, March 30, 2020
2:00-3:30 PM ET

The Transportation Research Board has met the standards and requirements of the Registered Continuing Education Providers Program. Credit earned on completion of this program will be reported to RCEP. A certificate of completion will be issued to participants that have registered and attended the entire session. As such, it does not include content that may be deemed or construed to be an approval or endorsement by RCEP.

RCEP

REGISTERED CONTINUING EDUCATION PROGRAM

Learning Objectives

At the end of this webinar, you will be able to:

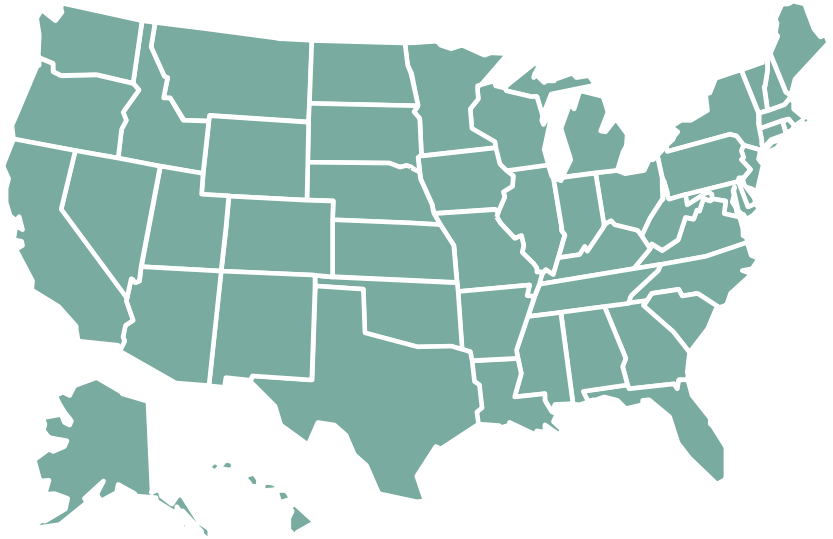
- Describe the different phases of the data life cycle and list activities to be carried out in order to support TPM
- Identify data management improvements based on capability benchmarks for basic and advancing practices
- Integrate tips and examples of practice to avoid common pitfalls in how TPM initiatives are scoped and carried out

NCHRP Report 920 Management and Use of Data for Transportation Performance Management

Spy Pond Partners, LLC
MLP LLC
High Street Consulting
March 30, 2020

NCHRP is a State-Driven Program

- Sponsored by individual state DOTs who
  - Suggest research of national interest
  - Serve on oversight panels that guide the research.



- Administered by TRB in cooperation with the Federal Highway Administration.

Practical, ready-to-use results

- Applied research aimed at state DOT practitioners
- Often become AASHTO standards, specifications, guides, syntheses
- Can be applied in planning, design, construction, operations, maintenance, safety, environment

Today's Speakers

- Frances Harrison, *Spy Pond Partners, LLC*
- Michael Pack, *University of Maryland CATT Lab and MLP, LLC*
- Joe Crossett, *High Street Consulting Group*

Project Motivation

- Transportation Performance Management (TPM) is an established practice that has gained visibility with the MAP-21/FAST Act Requirements
- Successful TPM depends on having the right data and using it effectively
- Agencies face many data challenges – technical and institutional
- A whole life-cycle approach is key to success – from specification to communication of data

NCHRP Project 08-108 Scope

- Examine leading practices regarding data utilization to support TPM
- Identify contributing factors to the effective use of data to support TPM
- Present conclusions, cross-cutting themes, lessons, and strategies to assist practitioners and decision makers to better utilize data to support TPM
- Identify the critical building blocks for transportation practitioners to improve their efforts to specify, define, obtain, store, manage, analyze, use, share, present, and communicate data to support TPM
- Prepare an approach to assist transportation agencies implement a self-assessment on data utilization

NCHRP 08-108 Products

- Guide: Management and Use of Data for Transportation Performance Management
- Research Report with synthesis of literature and stakeholder interviews

Purpose of the Guide

- Data are essential throughout the Transportation Performance Management (TPM) process.
- This guide builds on existing body of knowledge on transportation data assessment and management.
- The guide focuses on **improvement of data utilization** within the TPM process.
- It is **NOT** meant to provide official guidance for MAP-21/FAST Act target setting or reporting.

Target Audience

Guide is intended for transportation agencies:

- State Departments of Transportation (DOTs)
- Metropolitan Planning Organizations (MPOs)
- Local Transportation Departments

Guide targets the following users within agencies:

- Data analysts – looking to better understand data life cycle
- TPM staff – to gaining understanding of data sources and management methods
- TPM staff – to overcoming the cultural divide
- TPM staff – identifying ideas for effective data utilization for individual performance areas

How to Use this Guide

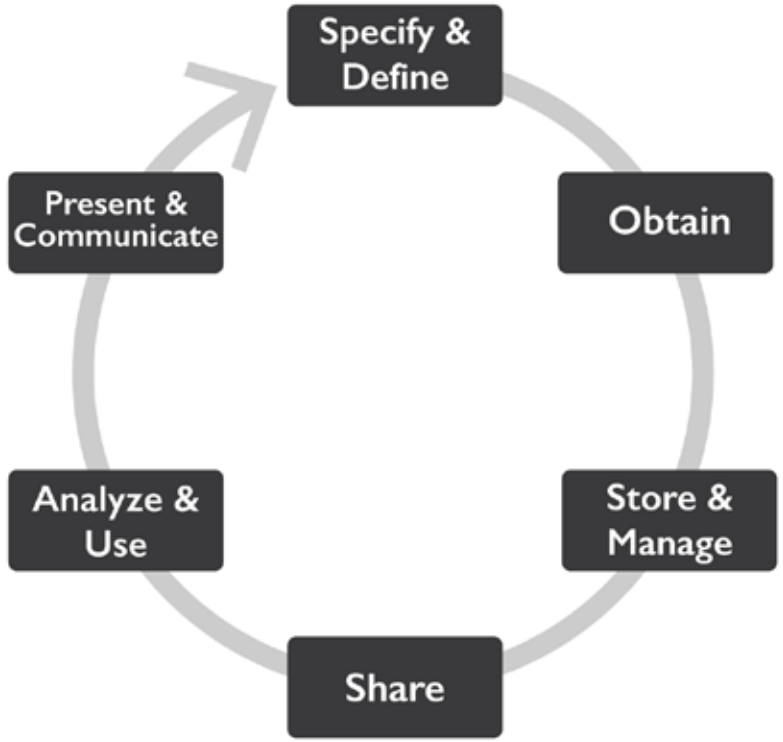
The Guide is designed to be used in different ways:

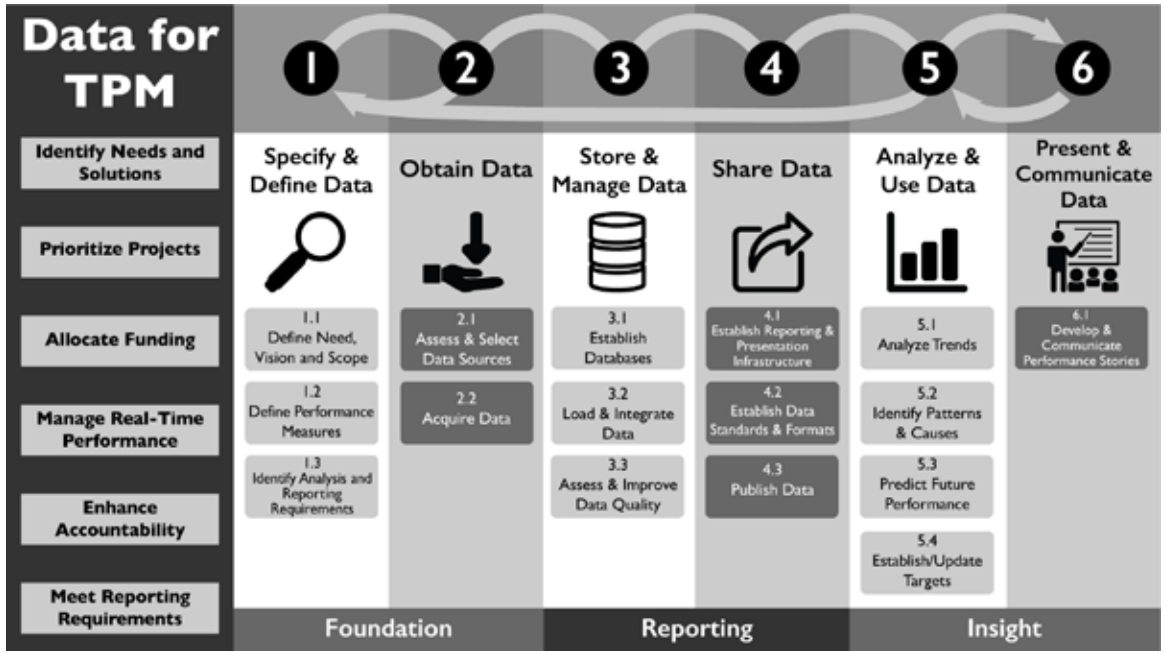
- **Learning** – Read entire guide to understand entire process.
- **Assessment** – Tool to conduct quick assessment of performance data program.
- **Scoping** – Onboarding a new or modified performance measure.
- **Reference** – Source of ideas for improving selected aspects of data programs.

Overview of the Framework

The Guide framework is based on cyclical model of generic data management process.

The cyclical framework is adapted to create a framework for improving data utilization for TPM.





Checklists

Each step is accompanied by "Capability Checklists" that allow quick assessment of capabilities and path to progress.

Right: Example Checklist for Step 4 – Share Data

Capabilities Checklists

Basic

- ☐ Employees are aware of key performance data sources within the agency.
- ☐ There are clear agency policies in place that data should be shared unless the need to protect it is demonstrated.
- ☐ There are protocols defined for how to share data to meet different needs that consider use of state and federal open data portals and hosted or cloud solutions.
- ☐ Open data portals are used to share data.
- ☐ Data explanations are provided in "plain English" to help users understand meaning, sources and limitations.

Advancing

- ☐ Data governance and stewardship structures have been established to facilitate communication about data sharing and identify opportunities for synergies across business units for collaborating or combining data sources
- ☐ Data sharing agreements are used (internal to an agency and between and agency and its partners) that specify what data will be shared, when and how – and establish a clear understanding of data limitations and expectations for use
- ☐ Data are shared in formats that are designed to meet the needs of different users which may include standard reports, data feeds, and dashboards.
- ☐ Data with sensitive elements is sanitized for public distribution.
- ☐ Data contracts and sharing agreements are reviewed to ensure that agency flexibility is retained.

Do's and Don'ts

Each step is also accompanied by a list of "Do's and "Don'ts" that reinforce key points in the guidance

Right: Example for Step 3 – Store and Manage Data

Do:

ü Consider cloud storage to reduce or minimize the agency's IT footprint and make it easier to scale storage up or down based on need.

ü Establish repeatable, automated and documented data loading processes.

ü Take advantage of commercial data integration tools.

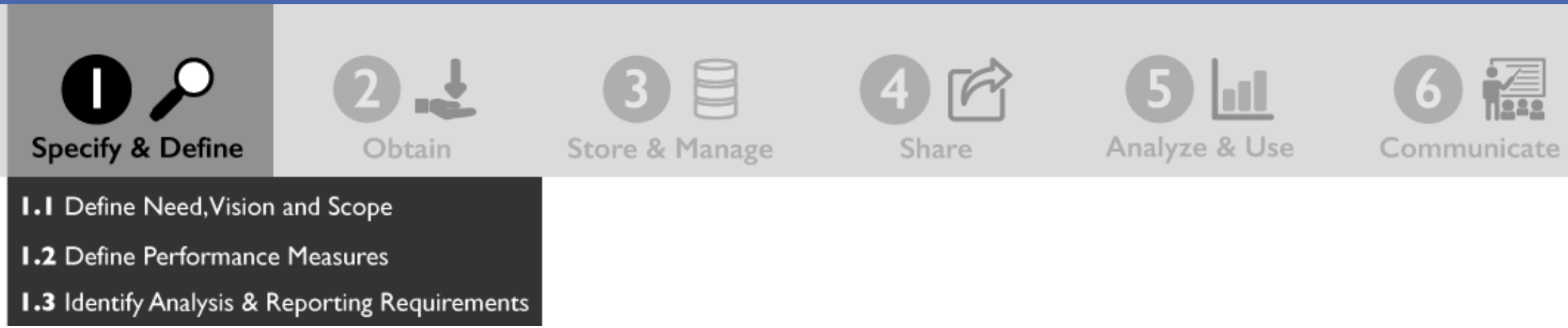
Don't:

X Delete erroneous data records – flag them instead.

X Let the allure of "big data" technologies prevent you from continuing to invest in proven solutions.

X Rely on "ad-hoc" approaches to loading and integrating data.

Step 1: Specify and Define Data

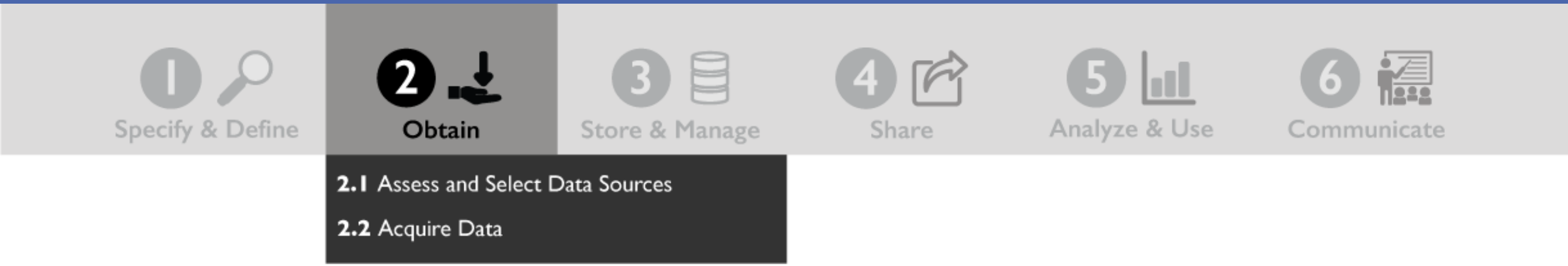


Determine what types of data are needed.

How data will be used within TPM business processes.

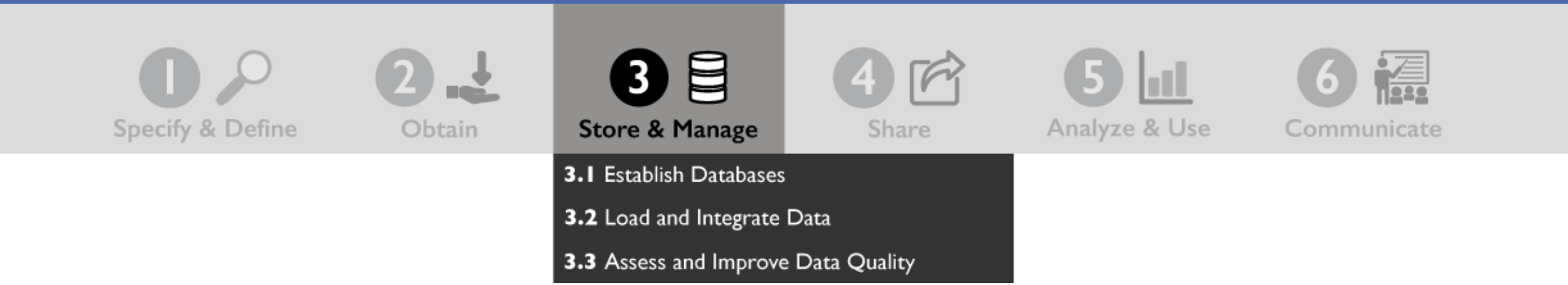
Specify attributes, scope, level of spatial and temporal granularity, and frequency of updates.

Step 2: Obtain Data



Acquire the data needed for calculating performance measures and for understanding trends and root causes of performance results.

Step 3: Store and Manage Data



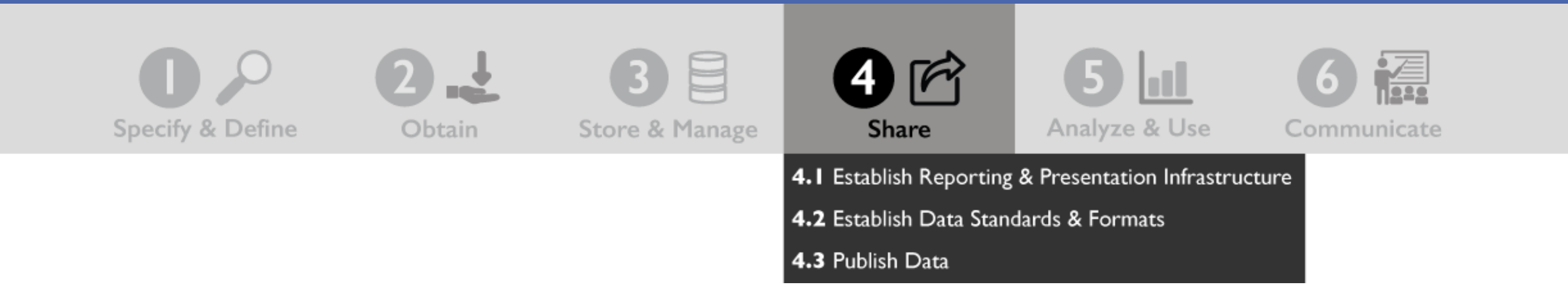
Set up data repositories either within the agency or "in the cloud."

Load, validate, clean and integrate the data.

Document the data for both technical and business users.

Manage access to the data to protect it from unauthorized use and make it accessible to those that need it.

Step 4: Share Data

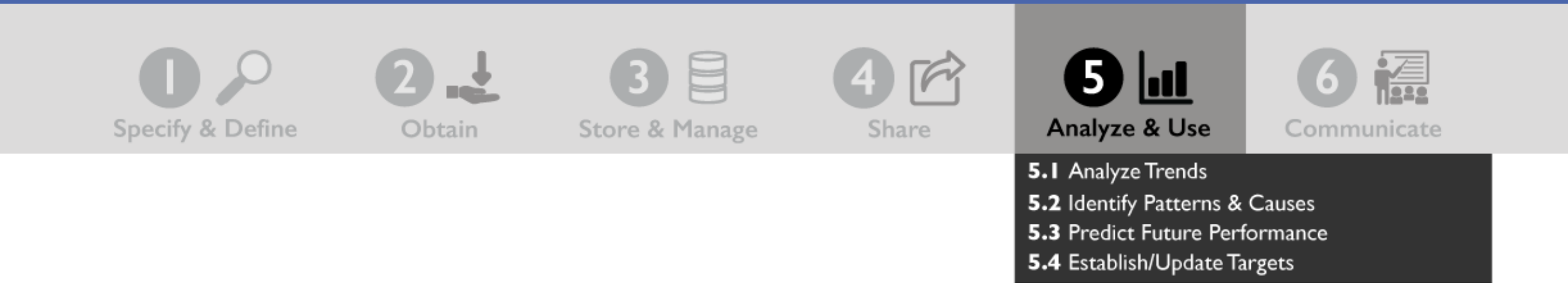


Put the infrastructure in place to produce data products (e.g. reports, maps, portals).

Share data across business units within the agency.

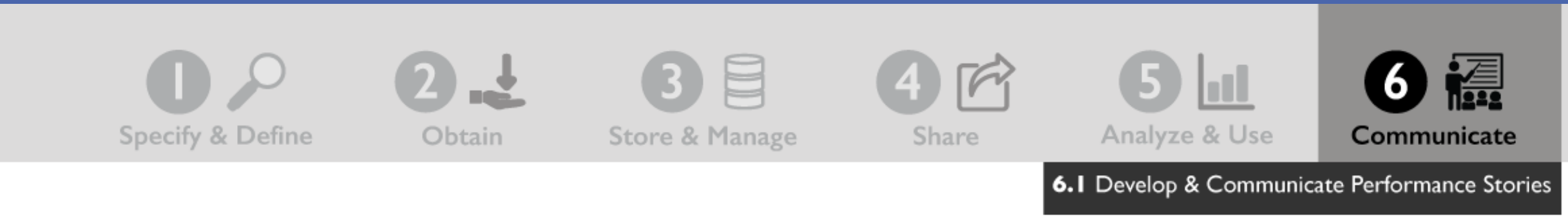
Share data with partner agencies or with the general public.

Step 5: Analyze and Use Data



Configure and use various data analysis tools to understand trends, predict future performance, and formulate performance targets.

Step 6: Present and Communicate Data



Translate data and analysis results into information that can be understood and used by different customers.

Case Study Vignettes

The Guide consists of 11 case study vignettes demonstrating different steps:

A. Arizona DOT Long Range Plan Investment Tradeoffs

B. Caltrans State Highway System Management Plan

C. Florida DOT Transportation Data Portal

D. I-95 Corridor Coalition Probe Vehicle Data Procurement

E. Maryland SHA Incident After Action Reviews

F. MATOC Regional Operations Evaluation

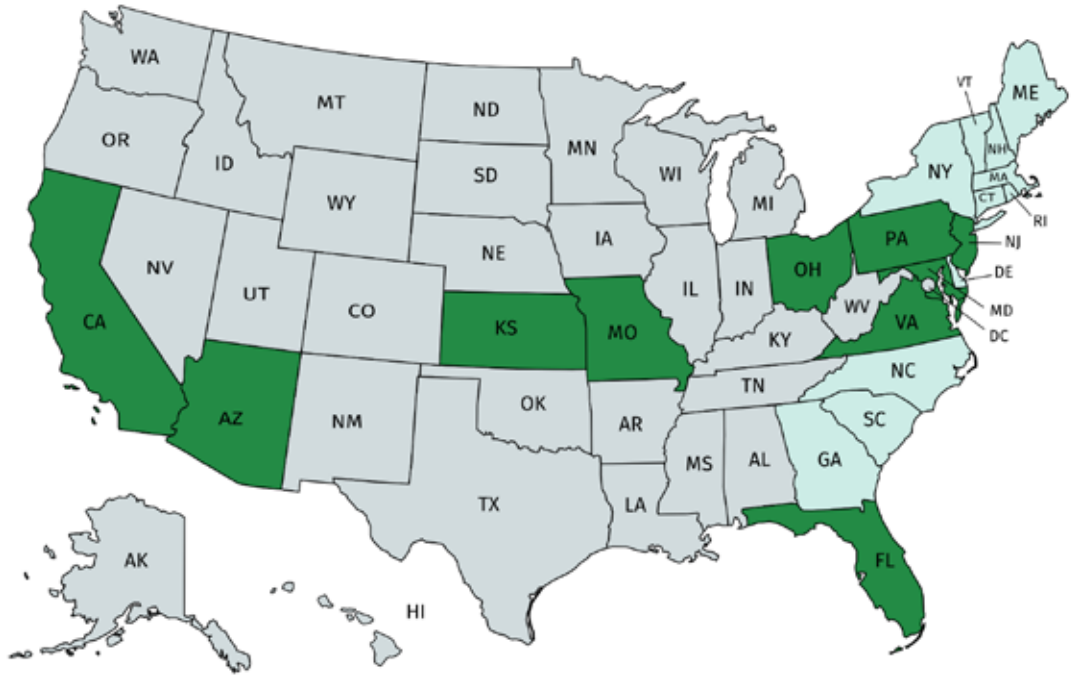
G. Creating a Team of Data Experts to Support TPM at the Mid-America Regional Council

H. New Jersey DOT Project Assessment Reporting

I. Ohio DOT Winter Performance Management

J. PennDOT Statewide Transportation Operations Data Warehousing Business Plan

K. Virginia DOT Pavement Monitoring Program



Arizona DOT Long Range Plan Investment Tradeoffs

Success Factors

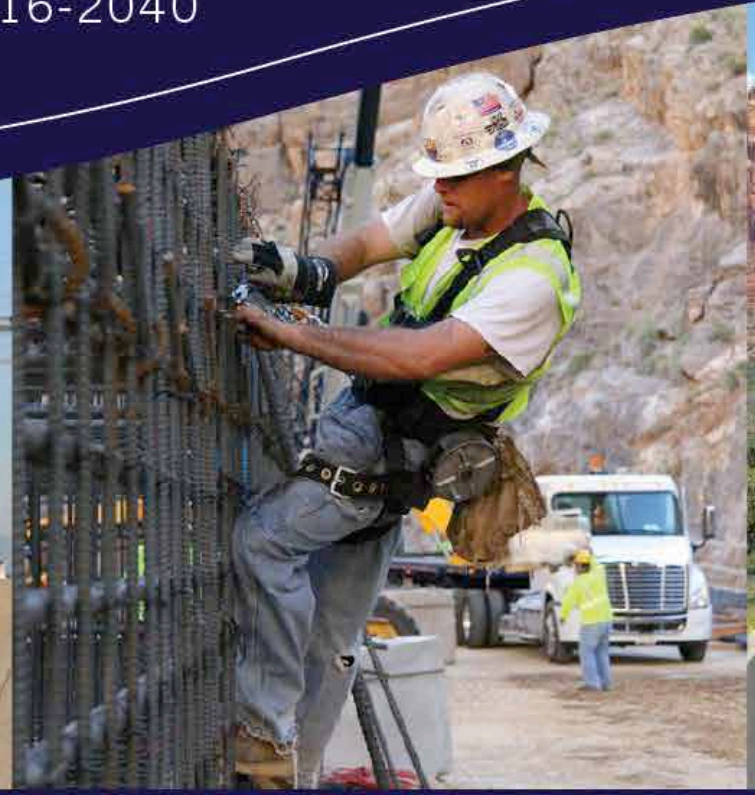
- AZDOT took advantage of available data sets and tools to create projections of future performance under varying investment levels.
- AZDOT provided interactive tools that enabled stakeholders to explore impacts of different investment strategies.
- AZDOT acknowledged that decisions are *informed* – not made by the data and analysis results.

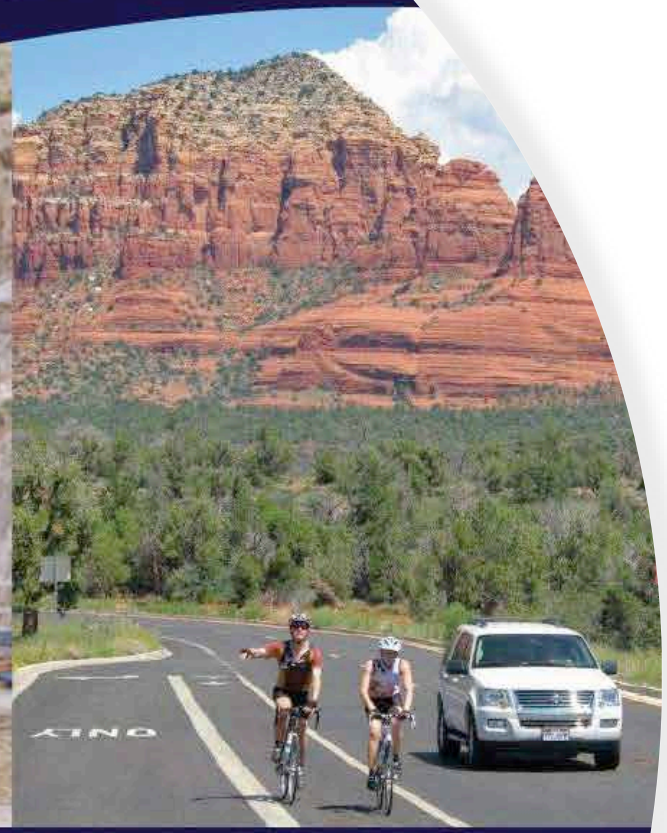
Challenges

- Communicating technical information to stakeholders in clear and succinct manner was challenging because of lack of consistent understanding of definitions, implications of assumptions, and limitations of analysis.

NGE

PORTATION PLAN 2016-2040





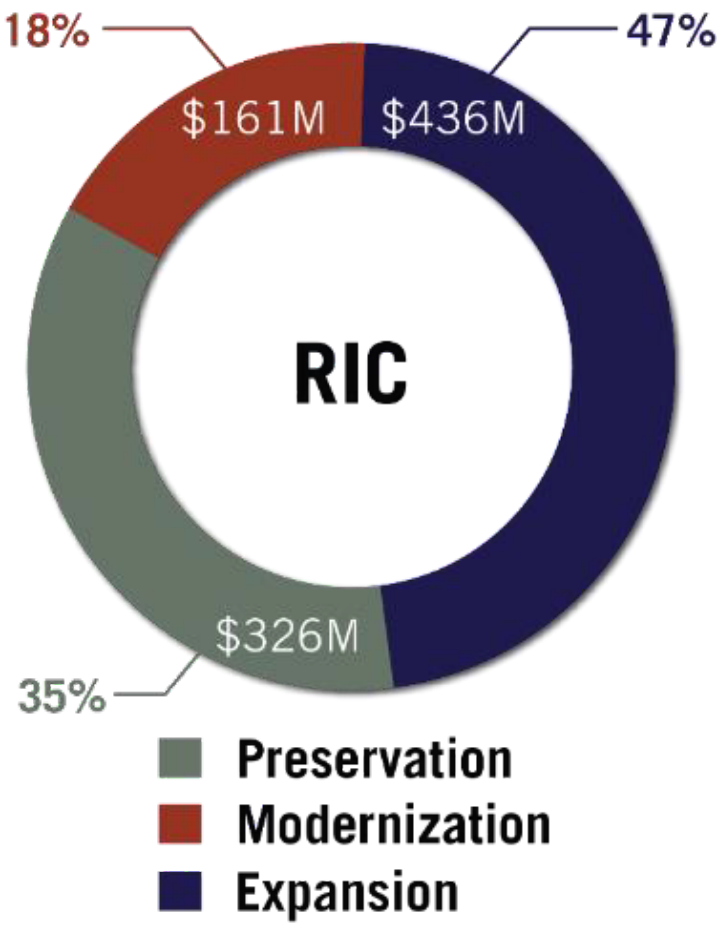
WHAT MOVES YOU ARIZONA 2040

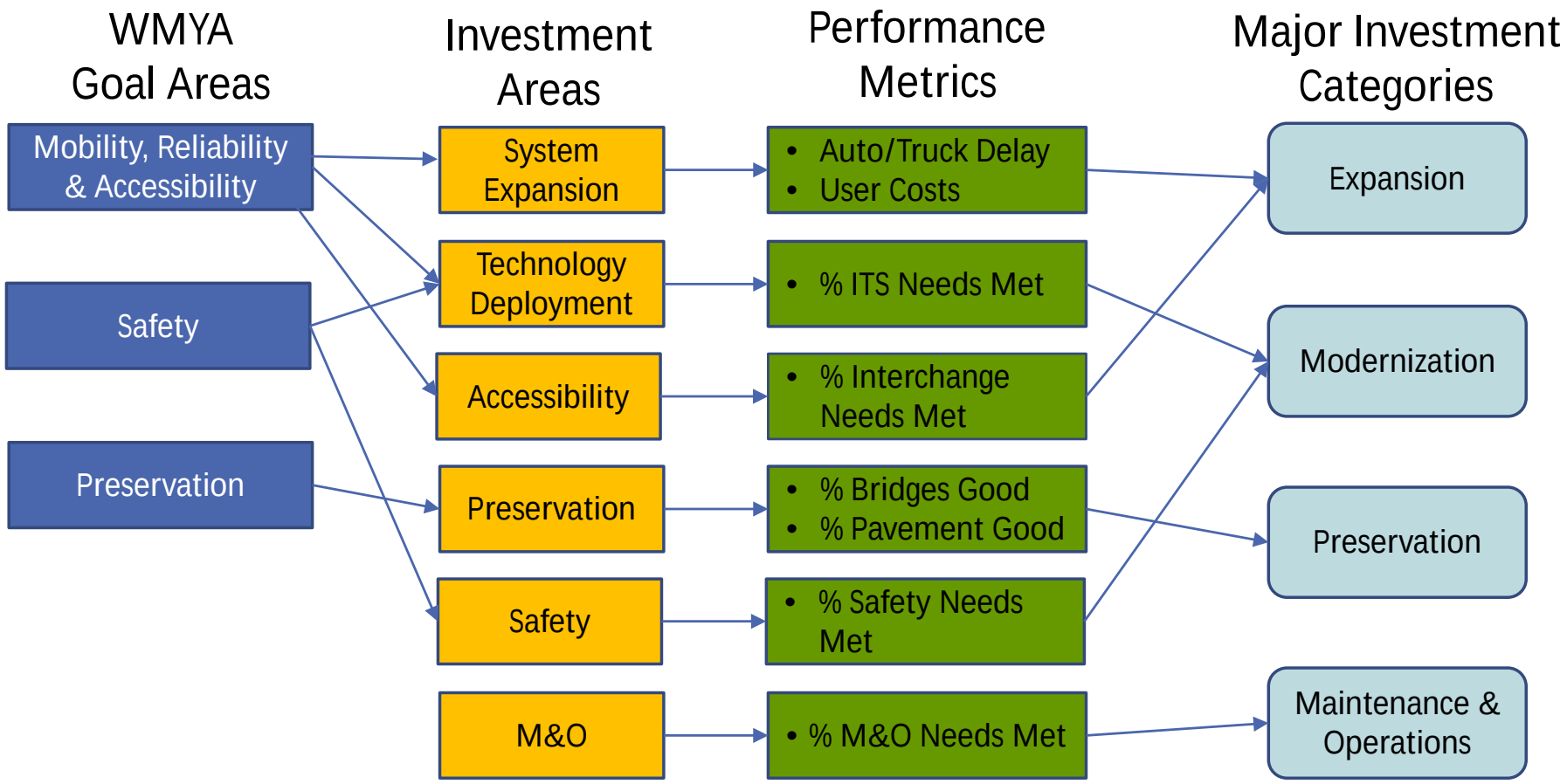
Connecting AZ. Everyone. Every Day. Everywhere.

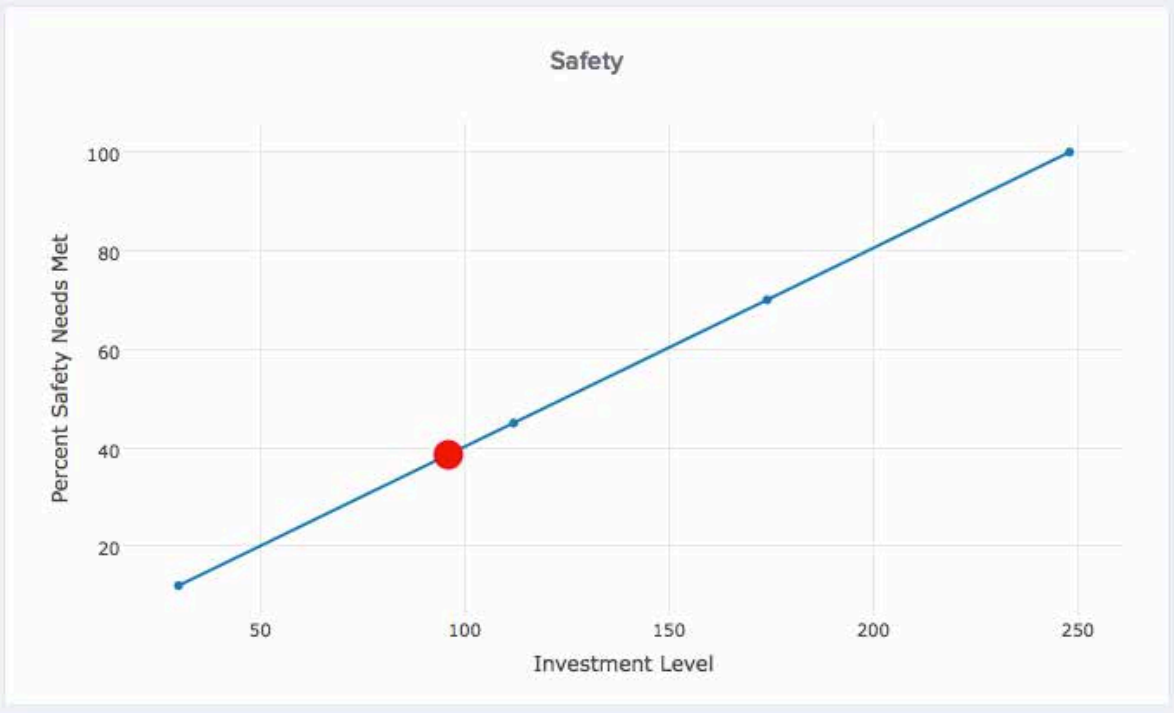
Screenshot

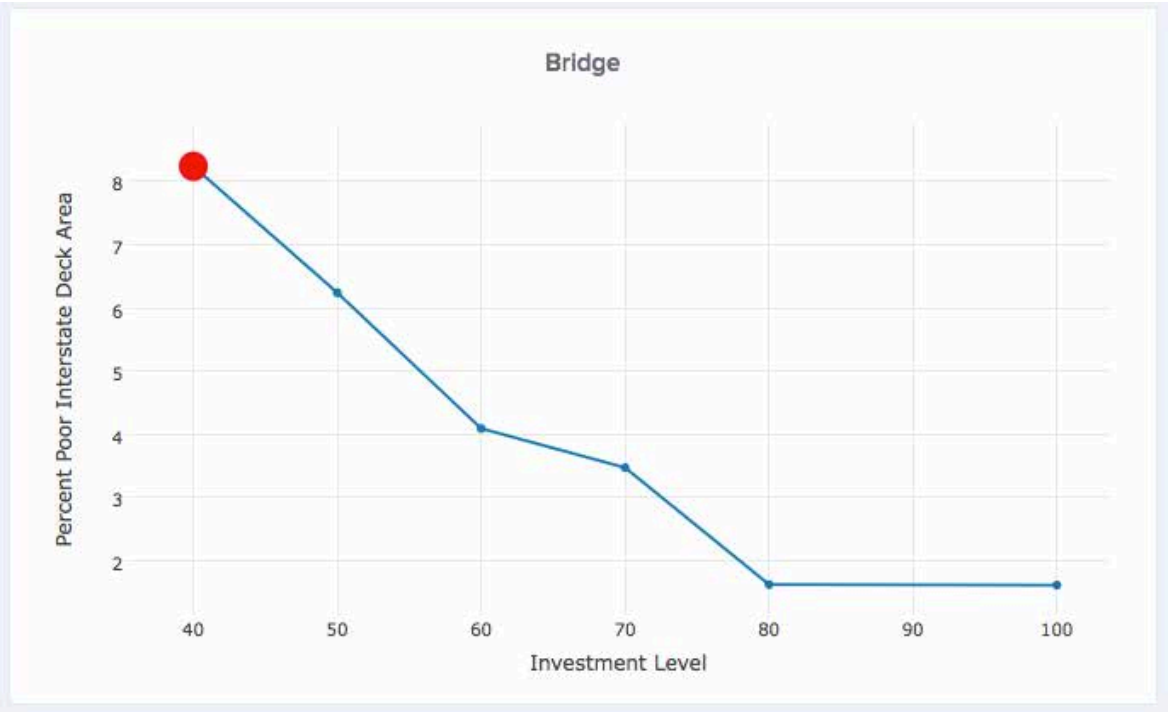
?

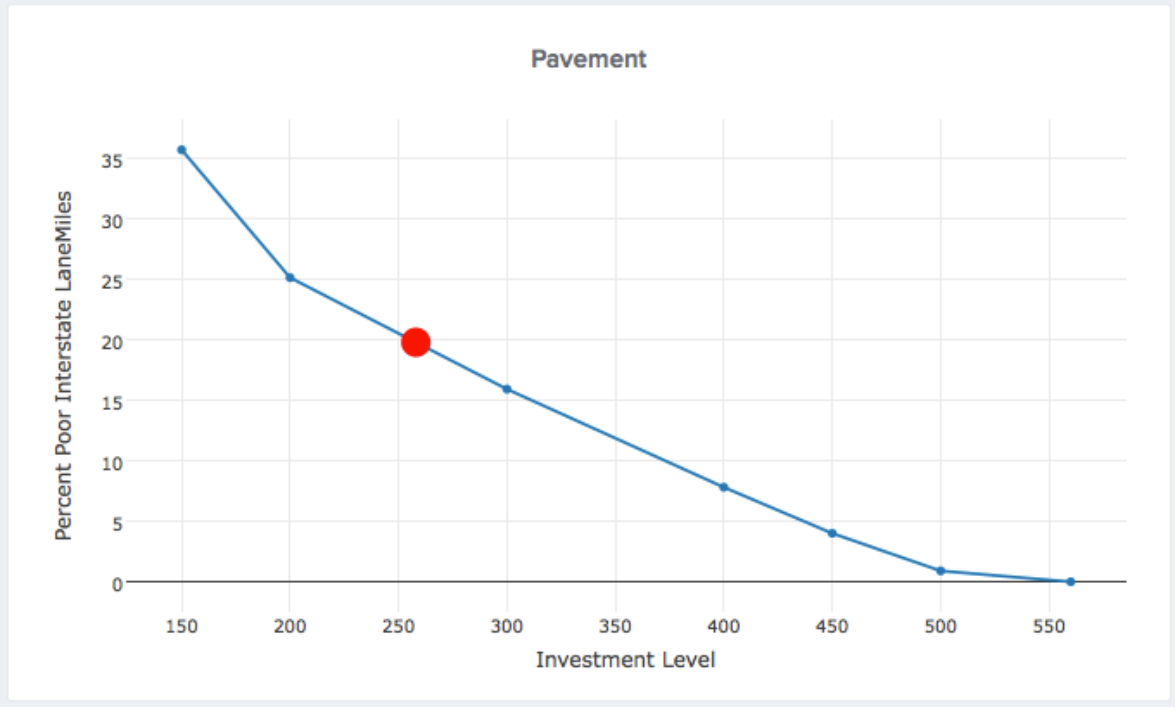
How to use data to support Long Range Plan decisions about how to **align spending of $1 billion/year with consensus priorities of Arizona citizens and businesses**

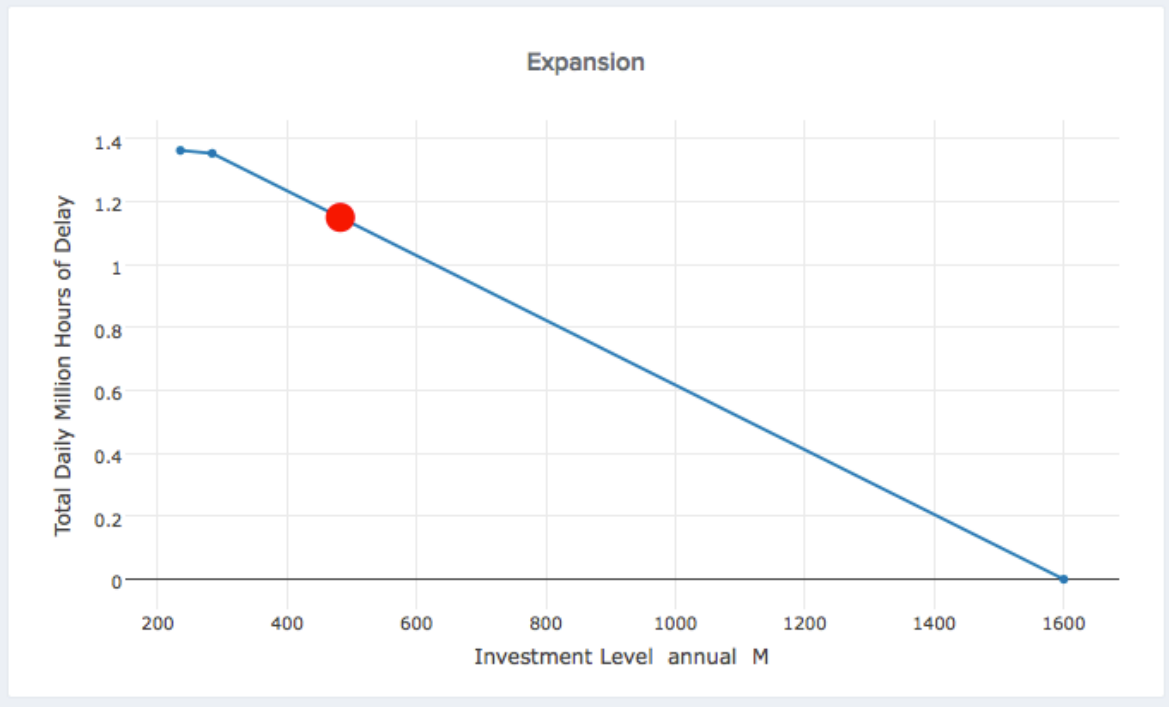



WMYA Goal Areas
Investment Areas
Performance Metrics
Major Investment Categories
Mobility, Reliability & Accessibility
Safety
Preservation
System Expansion
Technology Deployment
Accessibility
Preservation
Safety
M&O
• Auto/Truck Delay
• User Costs
• % ITS Needs Met
• % Interchange Needs Met
• % Bridges Good
• % Pavement Good
• % Safety Needs Met
• % M&O Needs Met
Expansion
Modernization
Preservation
Maintenance & Operations


Safety
Percent Safety Needs Met
100
80
60
40
20
50
100
150
200
250
Investment Level


Bridge
Percent Poor Interstate Deck Area
8
7
6
5
4
3
2
40
50
60
70
80
90
100
Investment Level


Pavement
Percent Poor Interstate LaneMiles
35
30
25
20
15
10
5
0
150
200
250
300
350
400
450
500
550
Investment Level


Expansion
Total Daily Million Hours of Delay
1.4
1.2
1
0.8
0.6
0.4
0.2
0
200
400
600
800
1000
1200
1400
1600
Investment Level annual M

Total Budget
$1,175,000,000
555 1,175 2,295
555 903 1,251 1,599 1,947 2,295
Full Budget Used

Unconstrained Constrained

Allocations Metrics Weights

Safety
30 96 248
30 73.6 117.2 160.8 204.4 248

Bridge
40 100
40 46 52 58 64 70 76 82 88 94 100

Pavement
150 258 560
150 232 314 396 478 560

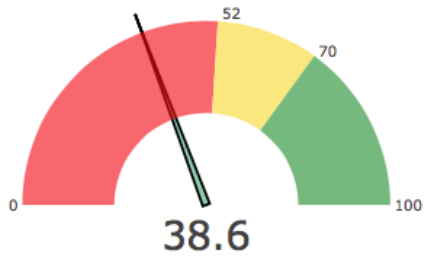
Expansion
235 482 1,600
235 509 783 1,057 1,331 1,600

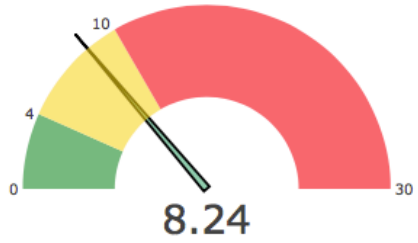
Technology
0 12 134
0 13.4 26.8 53.6 80.4 107.2 134

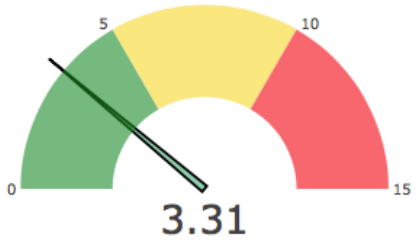
Accessibility
0 67 94
0 9.4 18.8 37.6 56.4 75.2 94

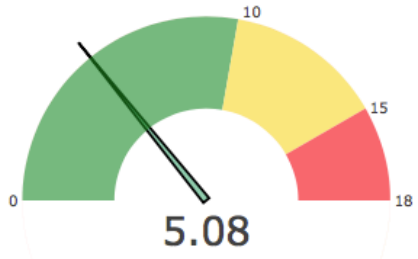
Maint_and_Ops
100 220 259
100 131.8 163.6 195.4 227.2 259

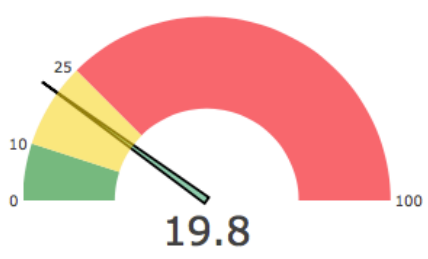
Strategy: Load Strategy Save Current Strategy

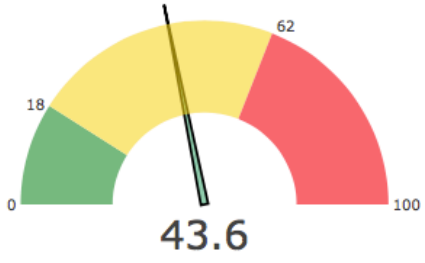
Percent Safety Needs Met


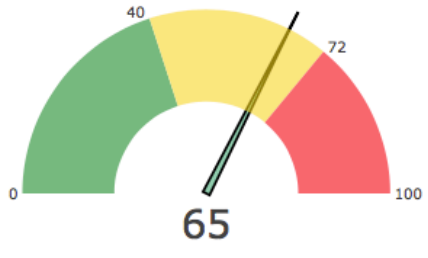
Percent Poor Interstate Deck Area


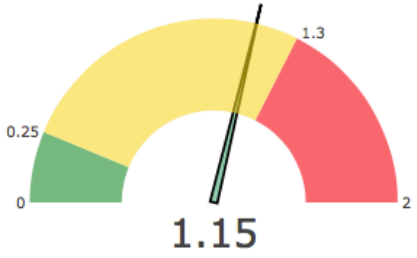
Percent Poor NonInterstate NHS Deck Area


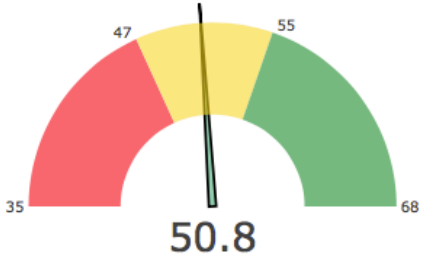
Percent Poor NonNHS Deck Area


Percent Poor Interstate LaneMiles


Percent Poor NonInterstate LaneMiles


Percent Poor NonNHS LaneMiles


Total Daily Million Hours Of Delay


Average Truck Speed


Challenges

- Real time assessment of performance implications of decisions is powerful
- Requires significant support effort:
  - Challenges in developing performance curves
  - The data and analytical support is a big deal
- Overlap and ambiguity raise issues

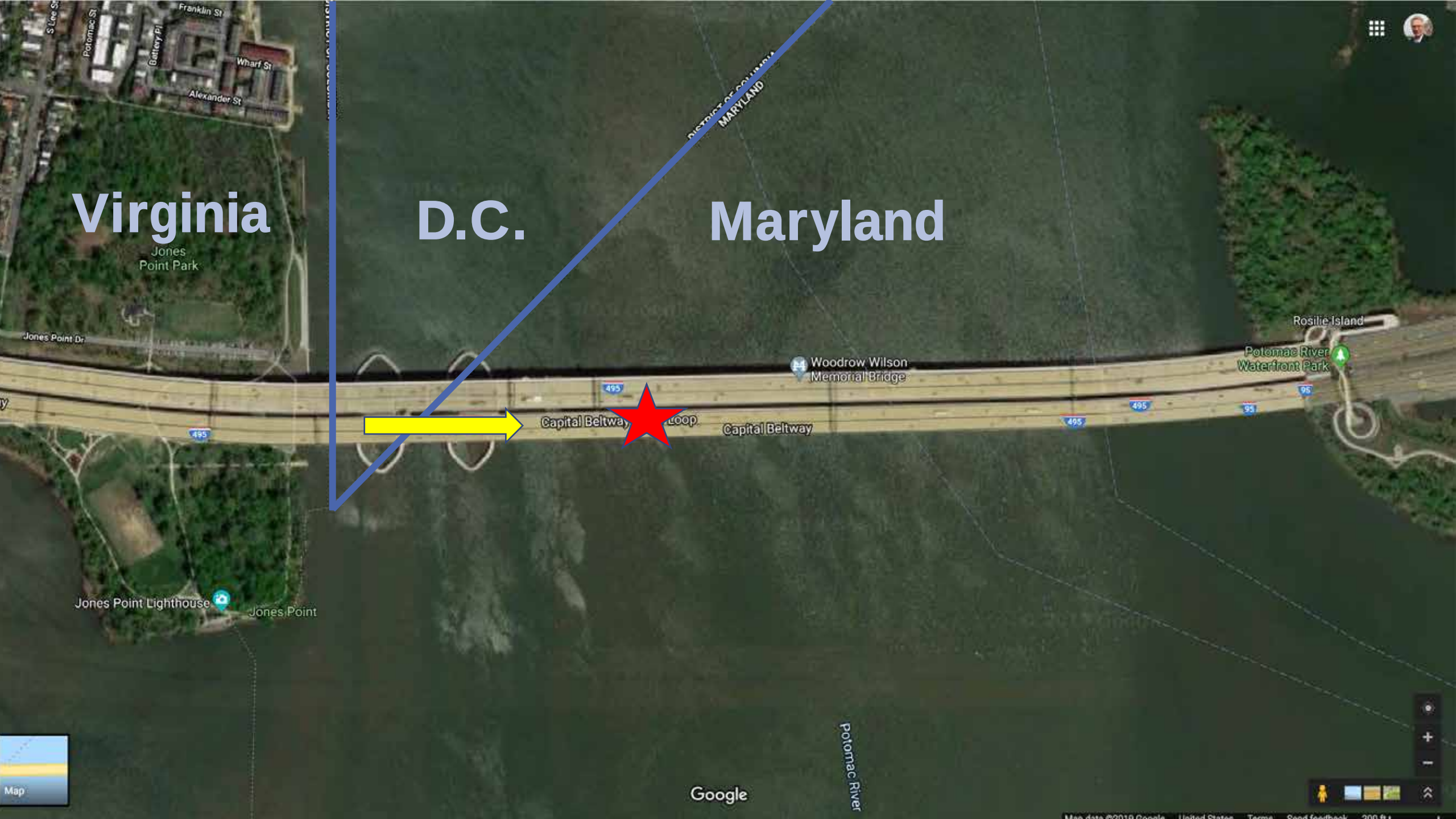
Maryland State Highway Administration's Incident After Action Reviews

Success Factors

- MD SHA spent considerable time over the last couple of decades defining data needs, and dedicating funding and operator training to ensure that all necessary data is collected.
- Analysis tools provide quick access to data and show the benefits of quick clearance practices.
- The reports and visualization provide the agency ammunition for request for funding, positions, and equipment.

Challenges

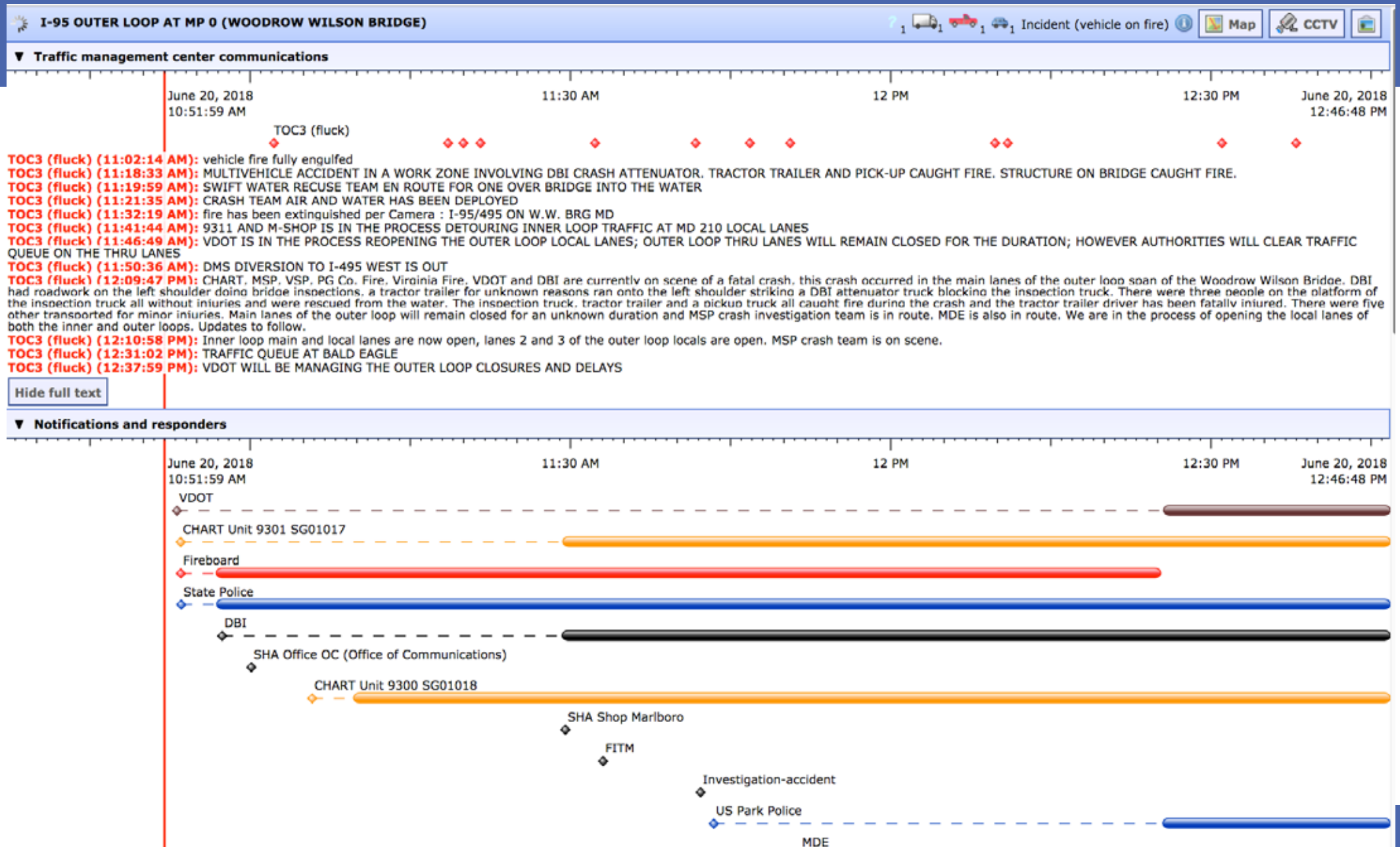
- Operators already have demanding jobs, so asking them to collect more data was an uphill battle.
- Even after the agency made a decision to collect more data, it took a great deal of time to raise funds and enhance systems to add new data fields, train staff, and see a return on investment.


Virginia
D.C.
Maryland
Jones Point Park
Jones Point Dr
Franklin St
Potomac St
Battery Pl
Wharf St
Alexander St
MARYLAND
Woodrow Wilson Memorial Bridge
Capital Beltway
Loop
Capital Beltway
Rosslyn Island
Potomac River Waterfront Park
Jones Point Lighthouse
Jones Point
Potomac River
Google
Map

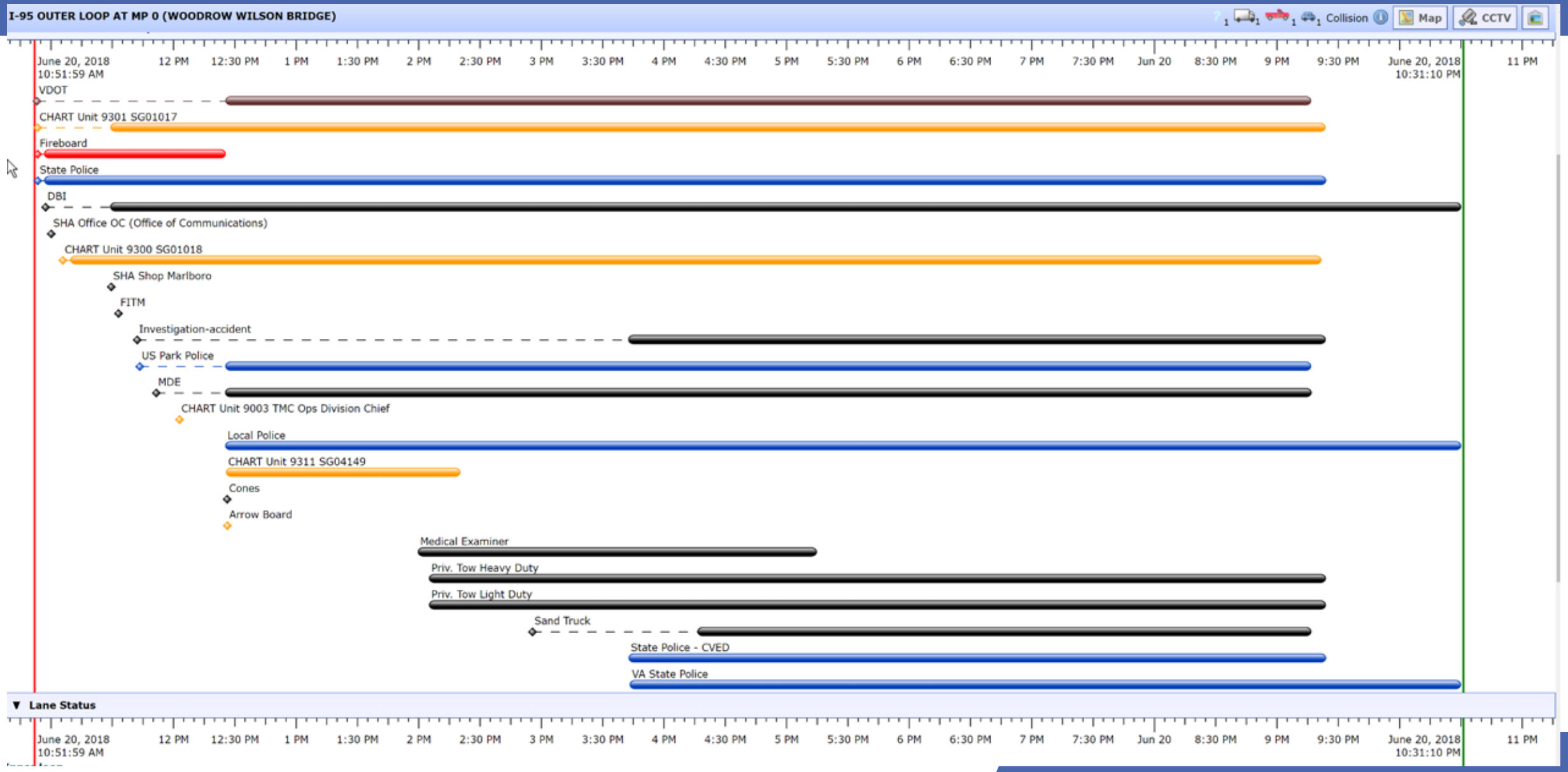
Inspection boom and gondola

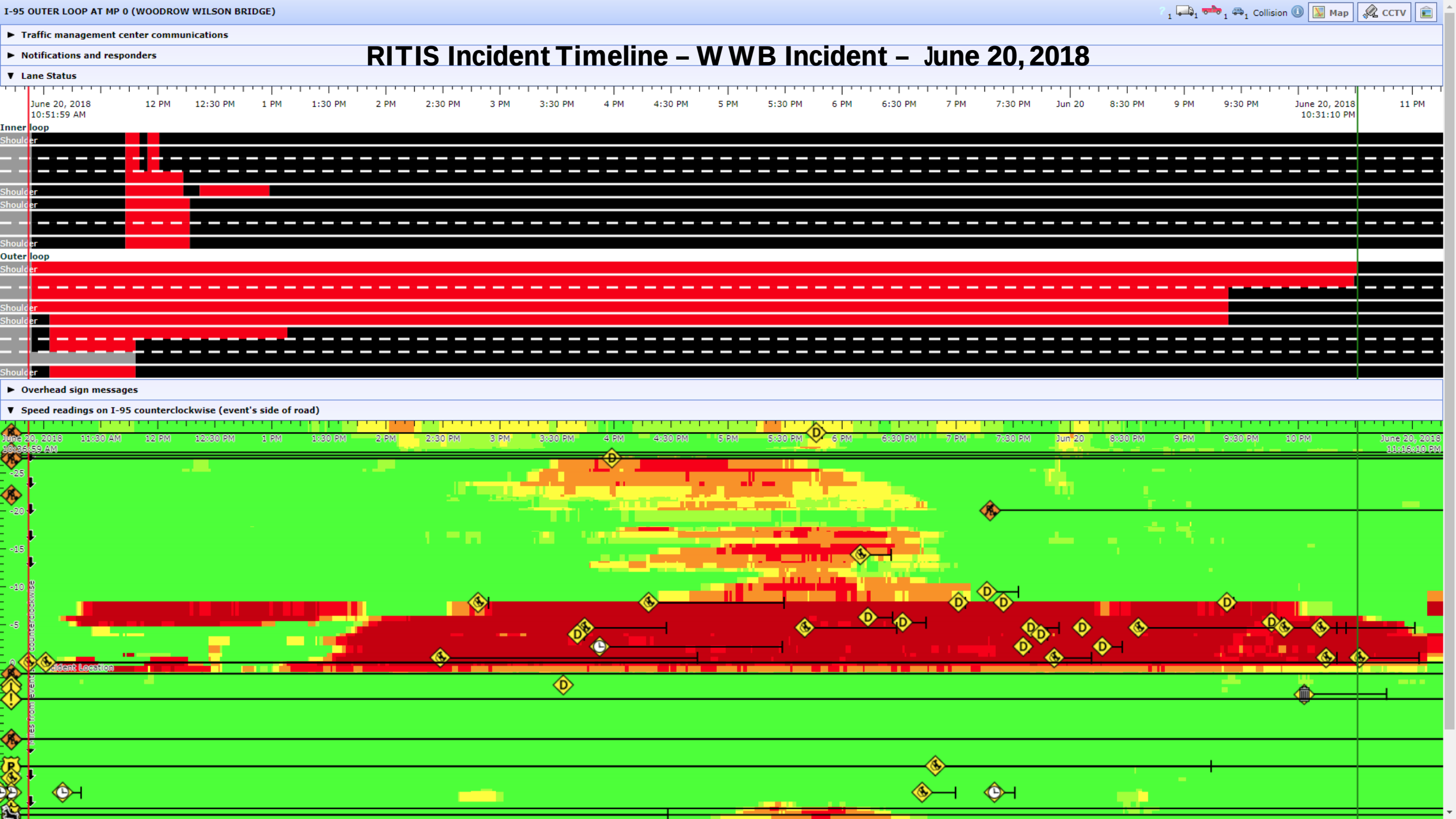
Worker rescue

RITIS Incident Timeline – WWB Incident – June 20, 2018



RITIS Incident Timeline – WWB Incident – June 20, 2018

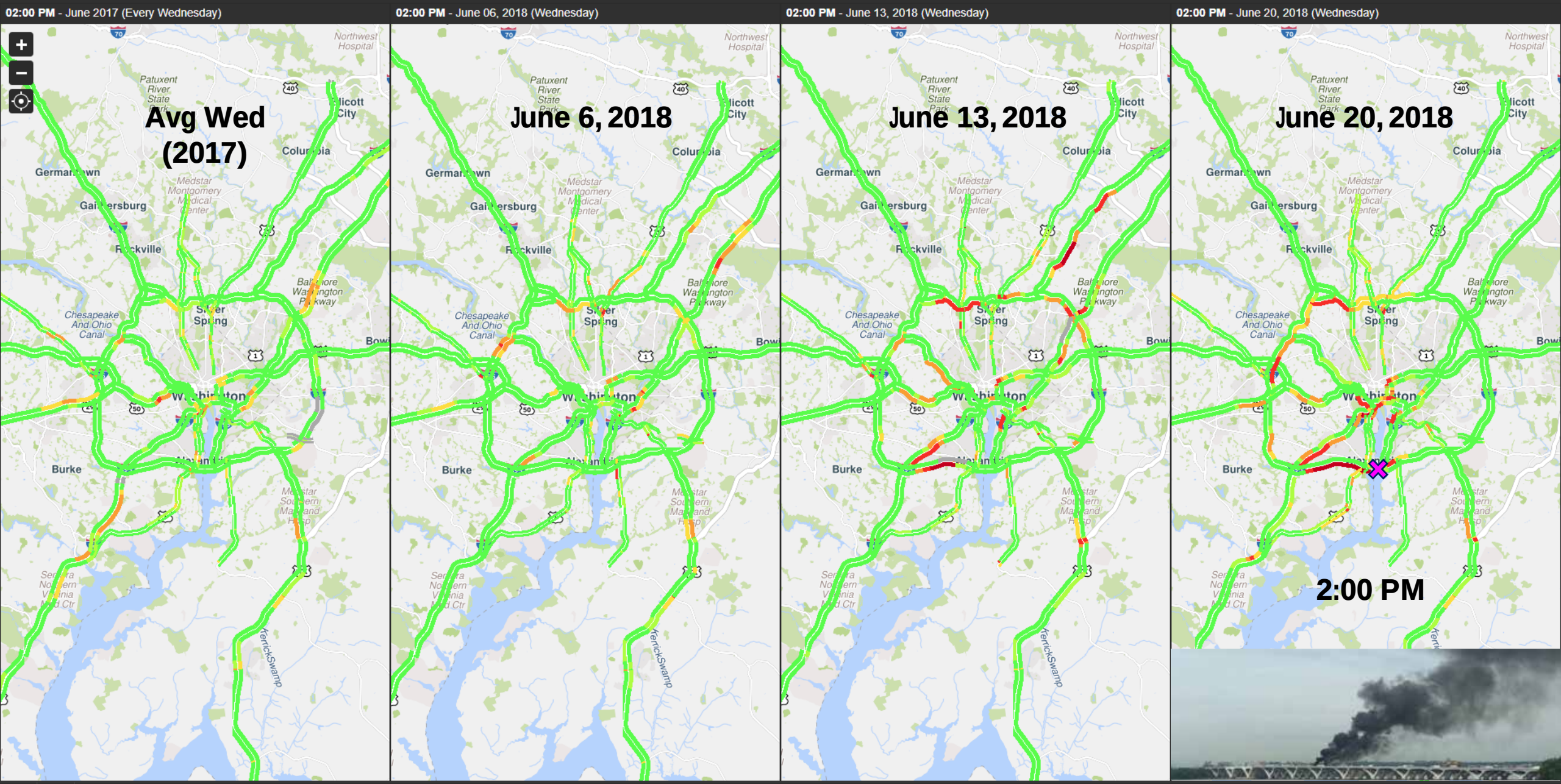



I-95 OUTER LOOP AT MP 0 (WOODROW WILSON BRIDGE)
Collision
Map
CCTV
Traffic management center communications
Notifications and responders
Lane Status
RITIS Incident Timeline – WWB Incident – June 20, 2018
June 20, 2018 10:51:59 AM
12 PM
12:30 PM
1 PM
1:30 PM
2 PM
2:30 PM
3 PM
3:30 PM
4 PM
4:30 PM
5 PM
5:30 PM
6 PM
6:30 PM
7 PM
7:30 PM
Jun 20
8:30 PM
9 PM
9:30 PM
June 20, 2018 10:31:10 PM
11 PM
Inner loop
Shoulder
Shoulder
Shoulder
Shoulder
Outer loop
Shoulder
Shoulder
Shoulder
Shoulder
Overhead sign messages
Speed readings on I-95 counterclockwise (event's side of road)
June 20, 2018 10:36:59 AM
11:30 AM
12 PM
12:30 PM
1 PM
1:30 PM
2 PM
2:30 PM
3 PM
3:30 PM
4 PM
4:30 PM
5 PM
5:30 PM
6 PM
6:30 PM
7 PM
7:30 PM
Jun 20
8:30 PM
9 PM
9:30 PM
10 PM
June 20, 2018 11:16:10 PM
-25
-20
-15
-10
-5
0
Miles from event's counterclockwise
ident Location

Woodrow Wilson Bridge Incident. Wed, June 20, 2018 vs Two Previous Weds vs Avg Wed (2017). National Capital Region.

Probe Data Analytics Trend Map Comparison (Regional)

Congestion 0% 15% 33% 56% 85%

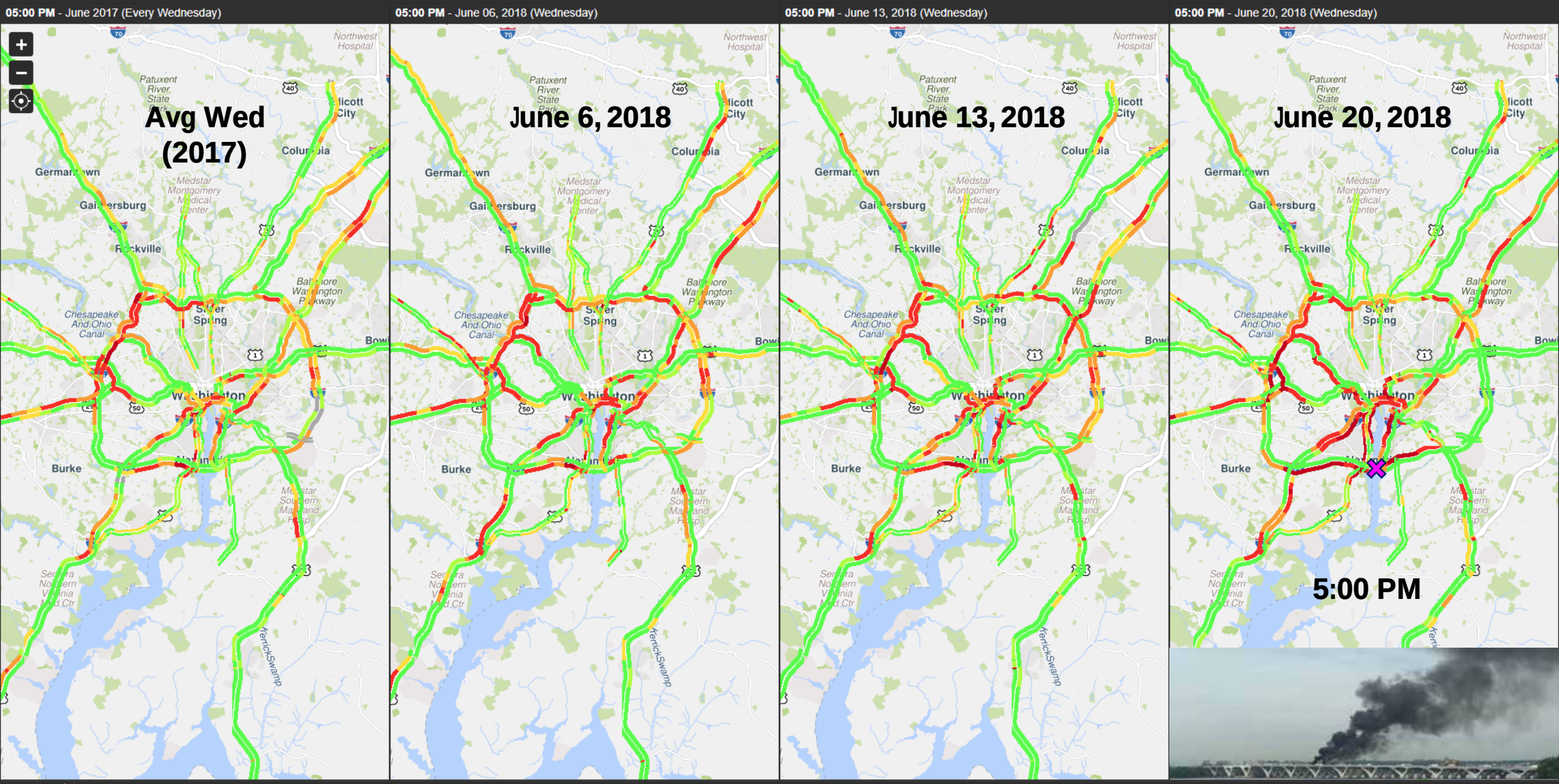


02:00 PM 11:50 PM at 10 minute intervals

Woodrow Wilson Bridge Incident. Wed, June 20, 2018 vs Two Previous Weds vs Avg Wed (2017). National Capital Region.

Probe Data Analytics Trend Map Comparison (Regional)

Congestion 0% 15% 33% 56% 85%

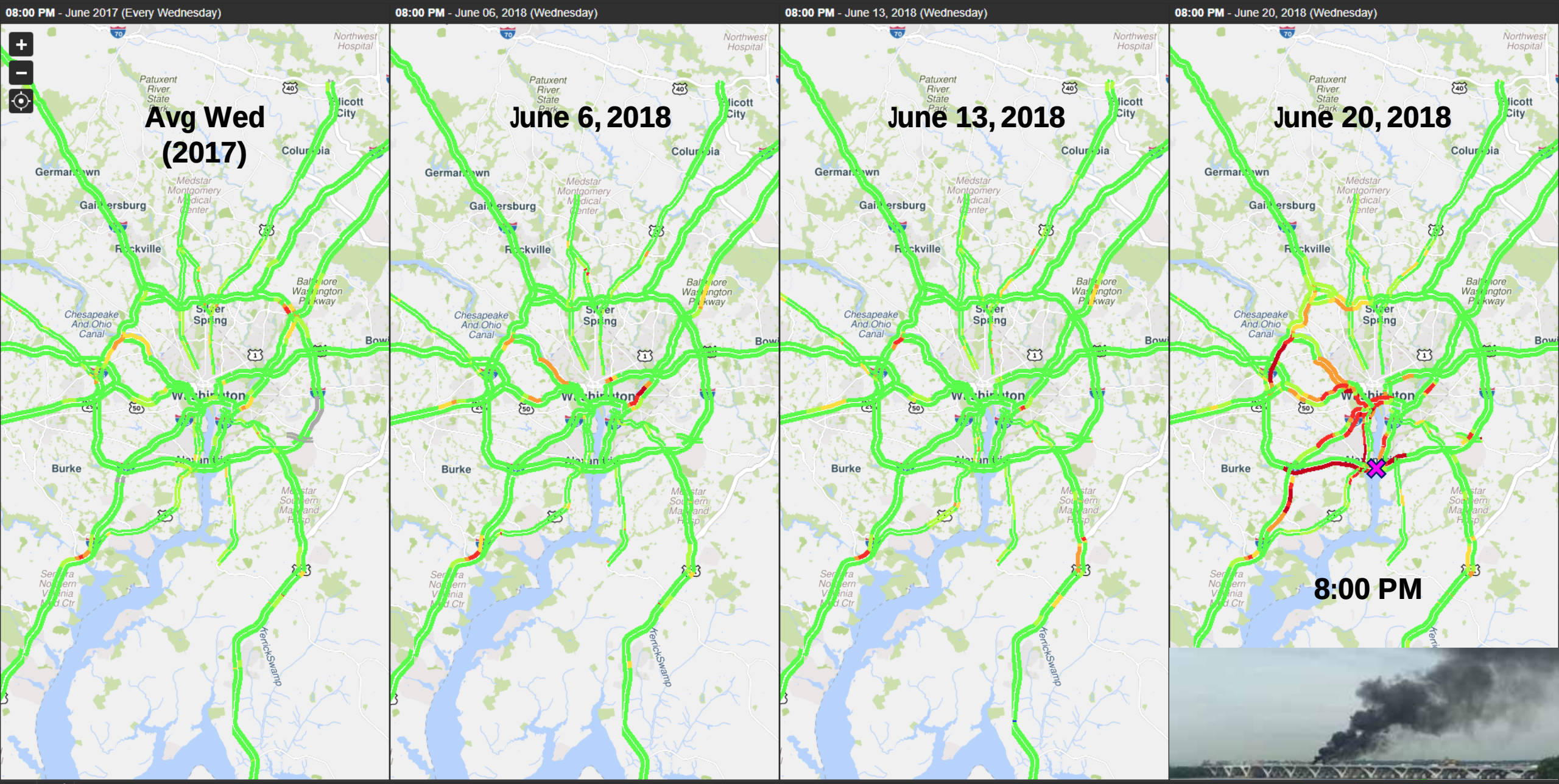


05:00 PM 11:50 PM at 10 minute intervals

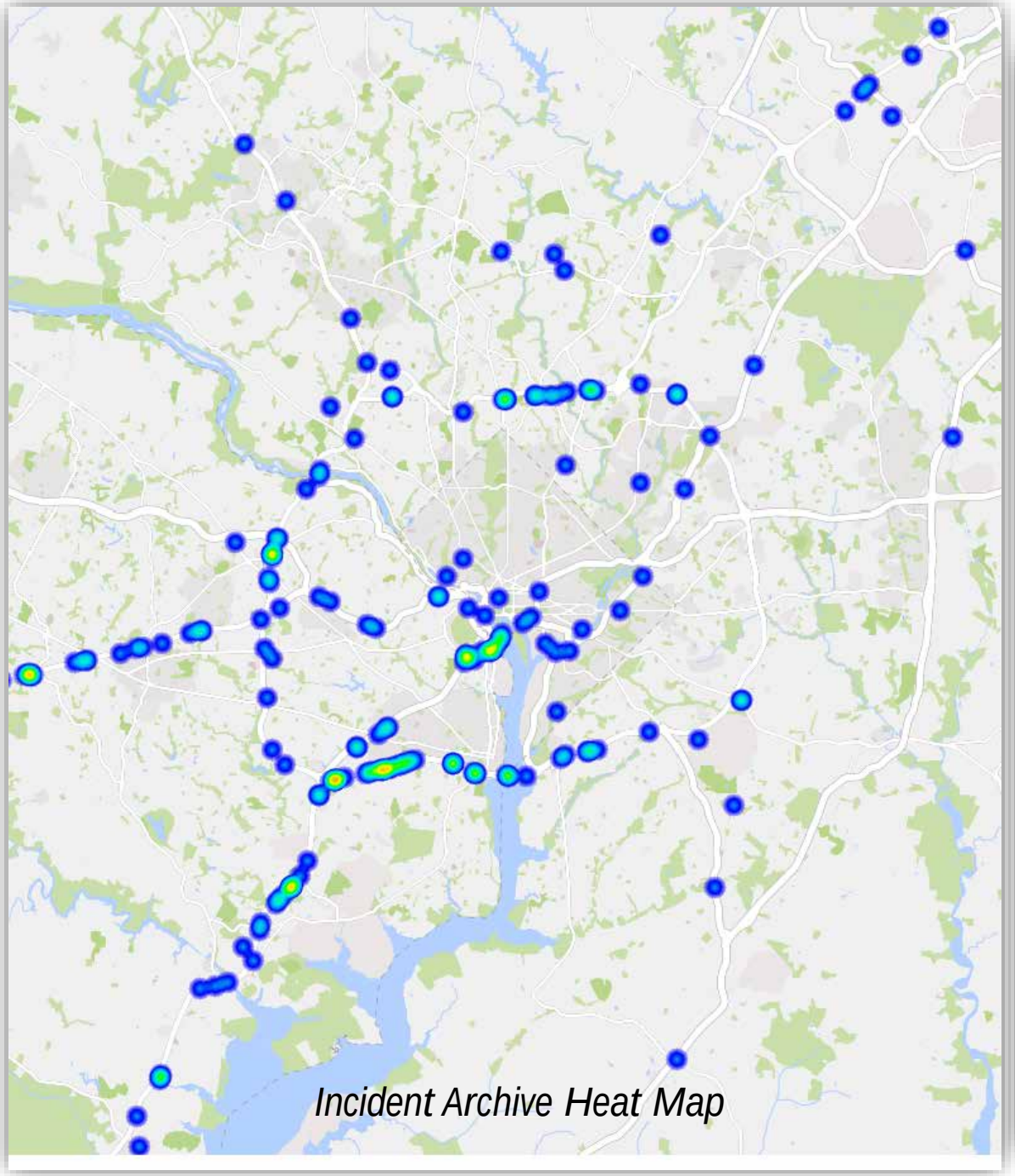
Woodrow Wilson Bridge Incident. Wed, June 20, 2018 vs Two Previous Weds vs Avg Wed (2017). National Capital Region.

Probe Data Analytics Trend Map Comparison (Regional)

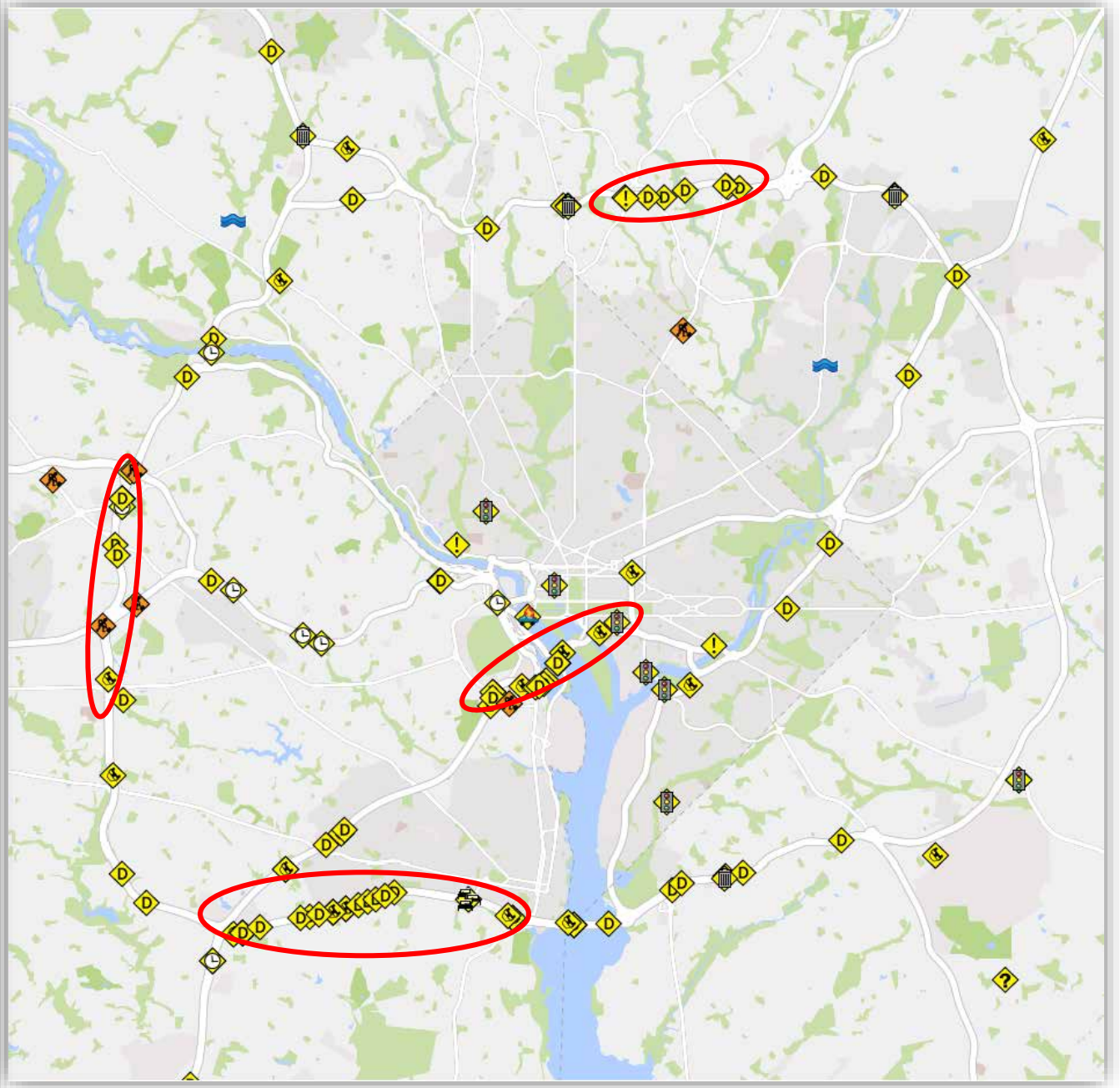
Congestion 0% 15% 33% 56% 85%



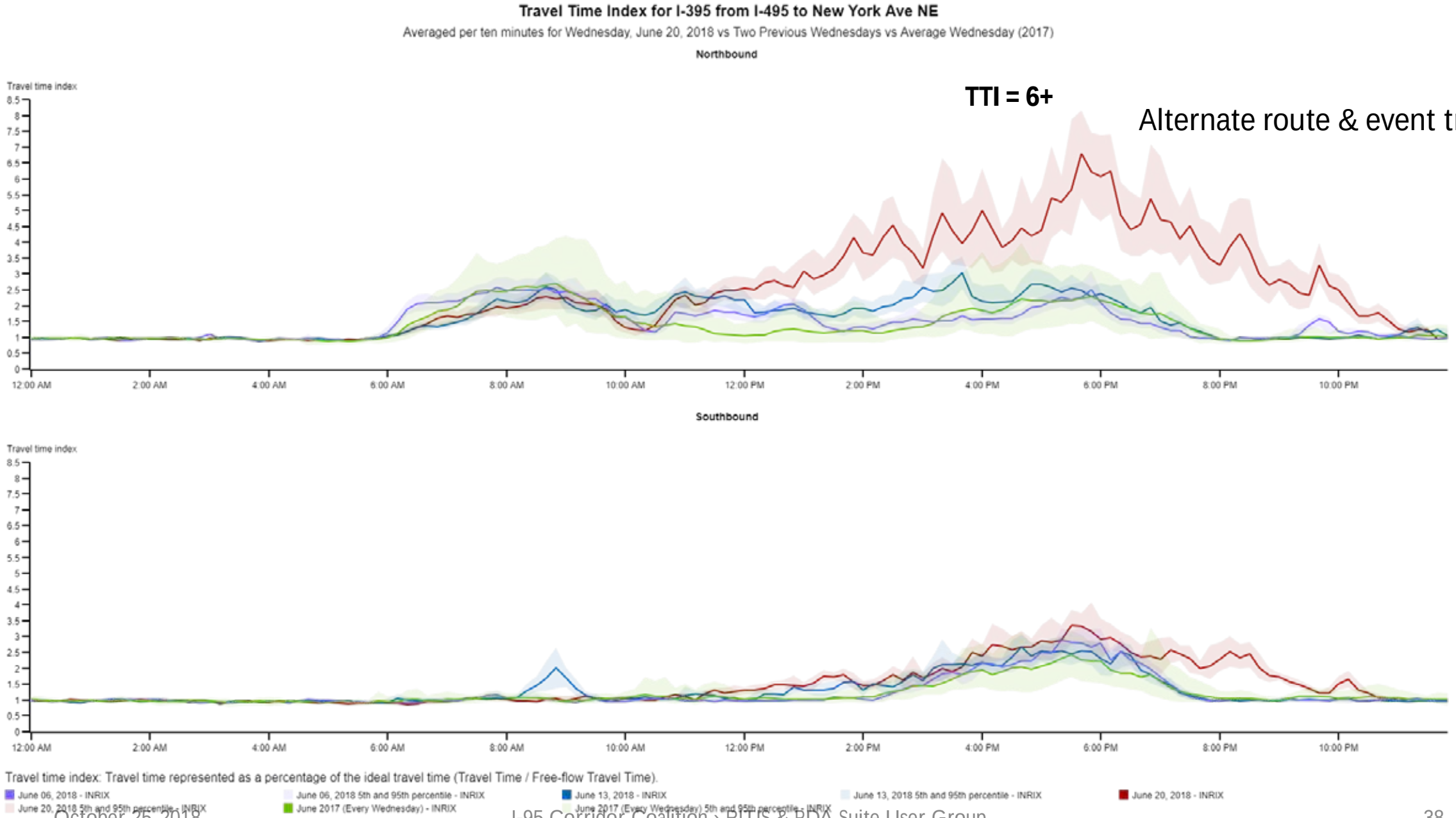
08:00 PM 11:50 PM at 10 minute intervals



RITIS Incident Archive - June 20, 2018 (10:30am-10:30pm)



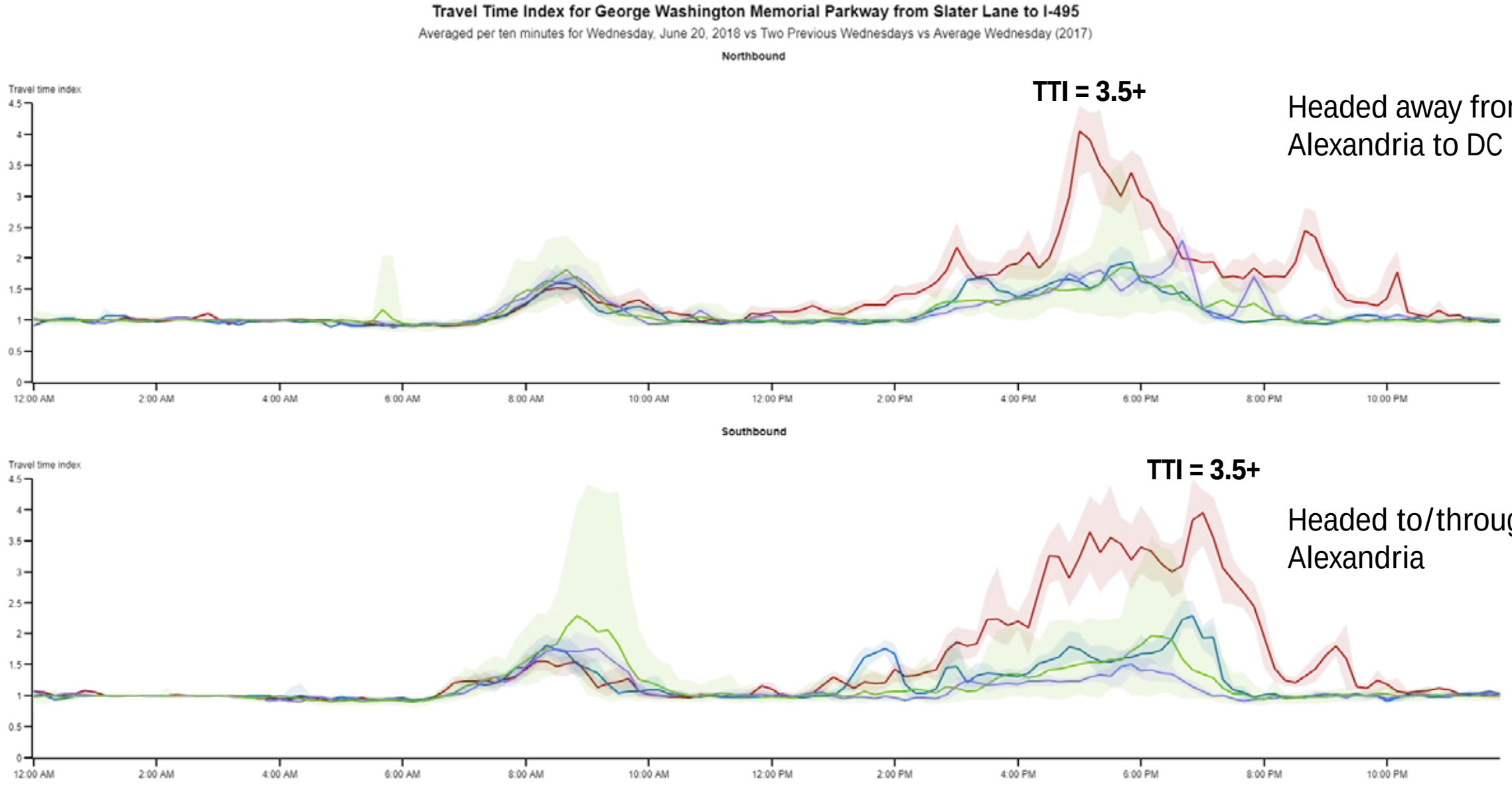
PDA Performance Chart: I-395 from 3rd Street Tunnel to I-495



TTI = 6+

Alternate route & event traffic

PDA Performance Chart: GWMP (in Alexandria)



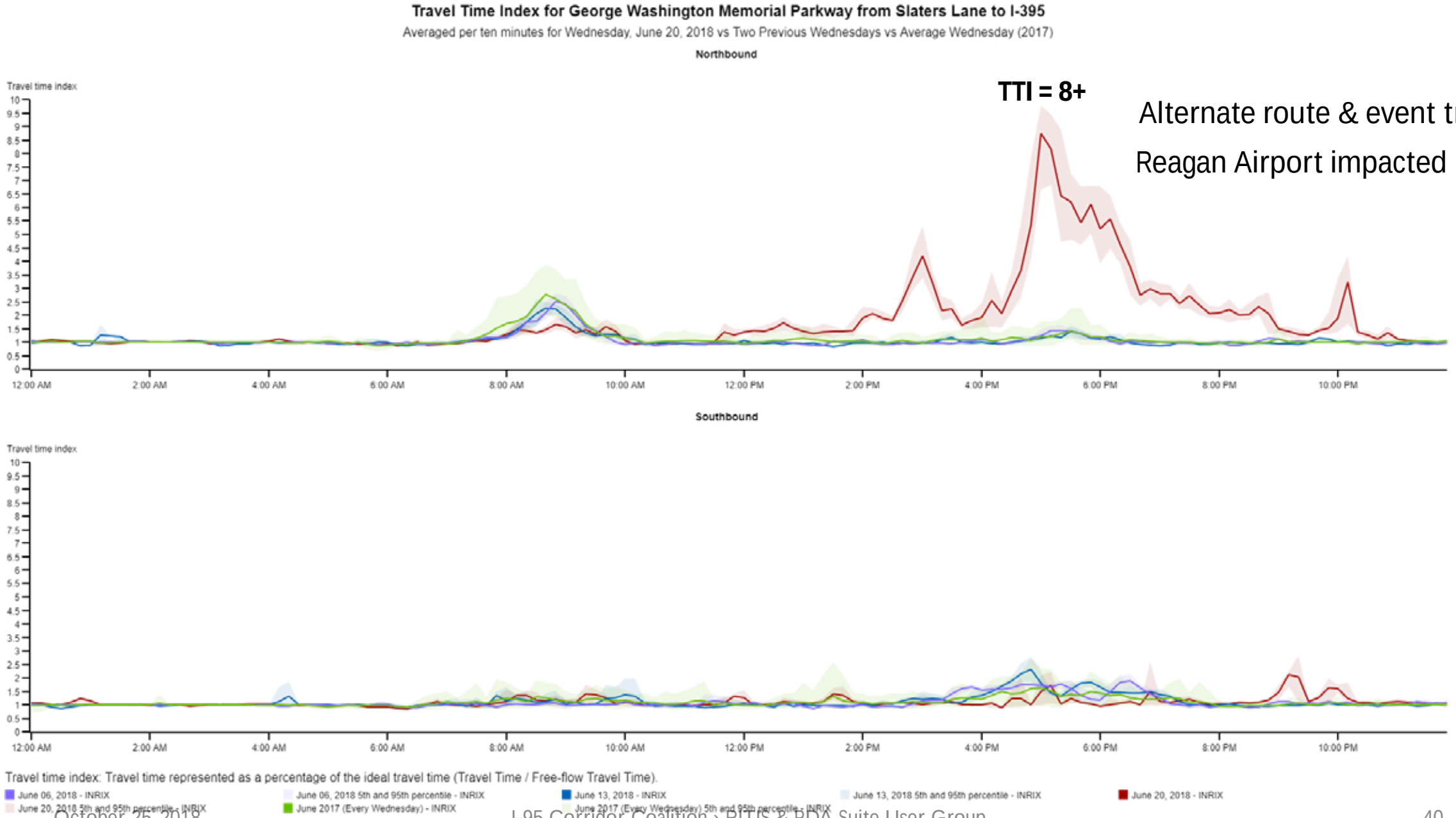
TTI = 3.5+

Headed away from Alexandria to DC

TTI = 3.5+

Headed to/through Alexandria

PDA Performance Chart: GWMP from I-395 to Alexandria

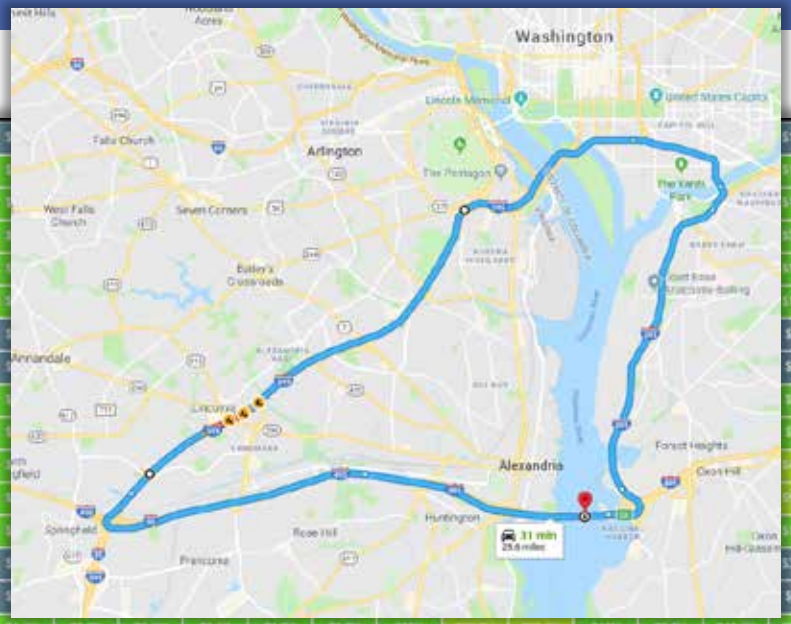


TTI = 8+

Alternate route & event traffic

Reagan Airport impacted

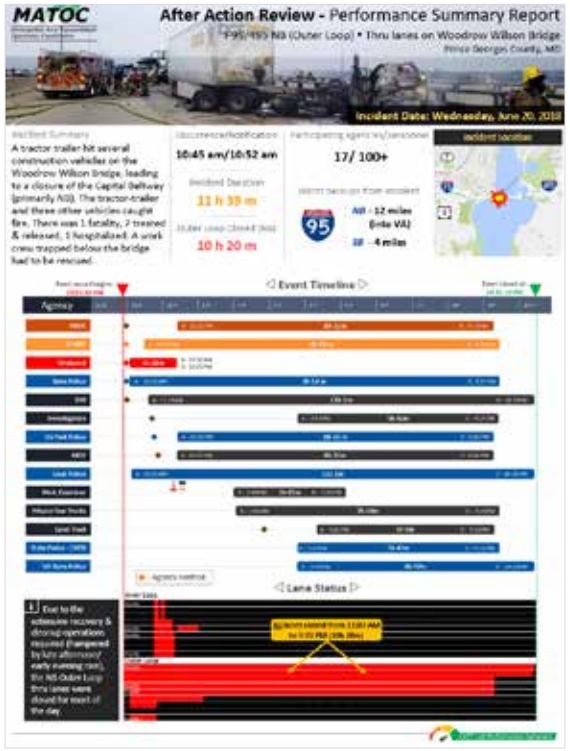
Probe Data Analytics Suite: User Delay Cost

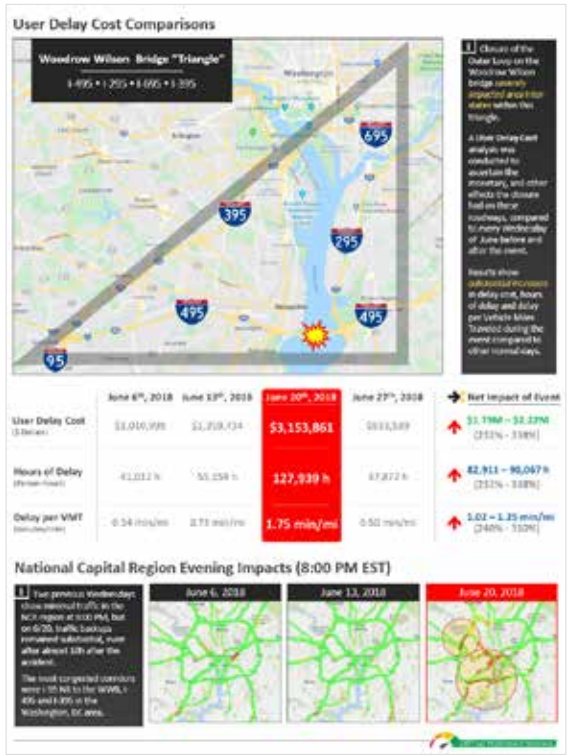


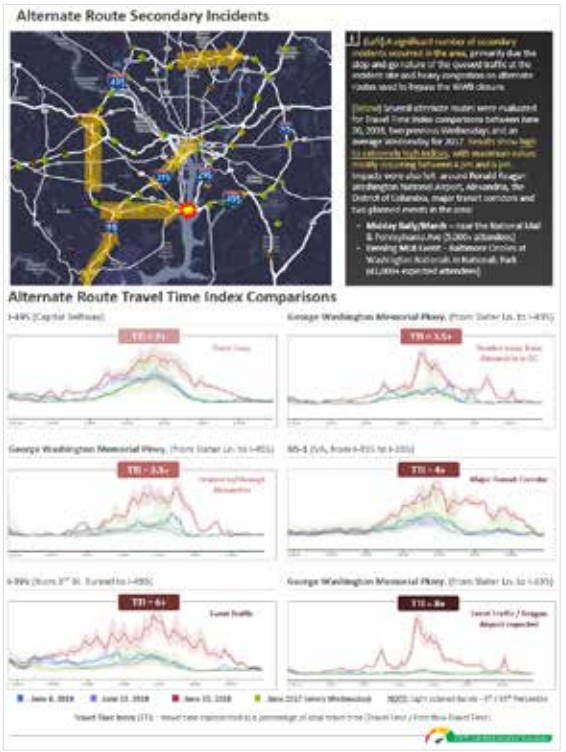
User Delay Cost: I-95/495, I-395, I-695, I-295)		
Generated via Probe Data Analytics Suite Using INRIX speed data		
	Daily Totals	
2018	Vehicle Hours of Delay	Total Cost ($)
Wed, May 9	31,809	$960,564
Wed, May 16	45,140	$1,363,134
Wed, May 23	39,511	$1,193,130
Wed, May 30	20,922	$631,794
Wed, June 6	33,479	$1,010,999
Wed, June 13	45,028	$1,359,735
Wed, June 20	**104,440**	**$3,153,861**
Wed, June 27	30,916	$933,589

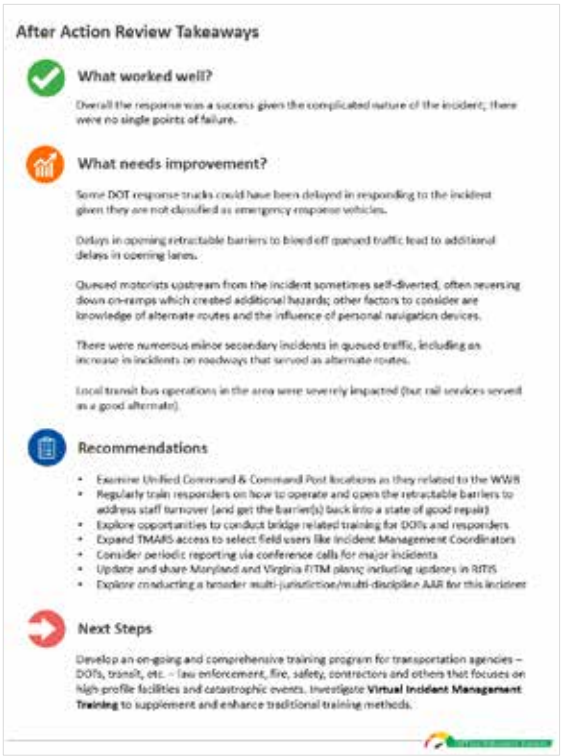
Telling your Story

- Developing AAR Performance Summary Reporting Templates that can be used for communicating with responders, elected officials, and the public
- Tutorials have been produced to show you how to quickly put together these reports (and materials seen in this presentation) using RITIS.









The above is a four-page 11x17 flier AAR template

Lights and Sirens: The Parting of the Seas

Creating a Team of Data Experts to Support TPM at Mid-America Regional Council (MARC)

Success Factors

- MARC developed a top ten list of data elements/sets for automation to determine the right skill sets to acquire.
- Data developers were able to create automated processes for data collection and user-friendly querying capabilities for easy access to data.
- Data developers introduced innovative tools that vastly improved MARC's ability to access and analyze data.

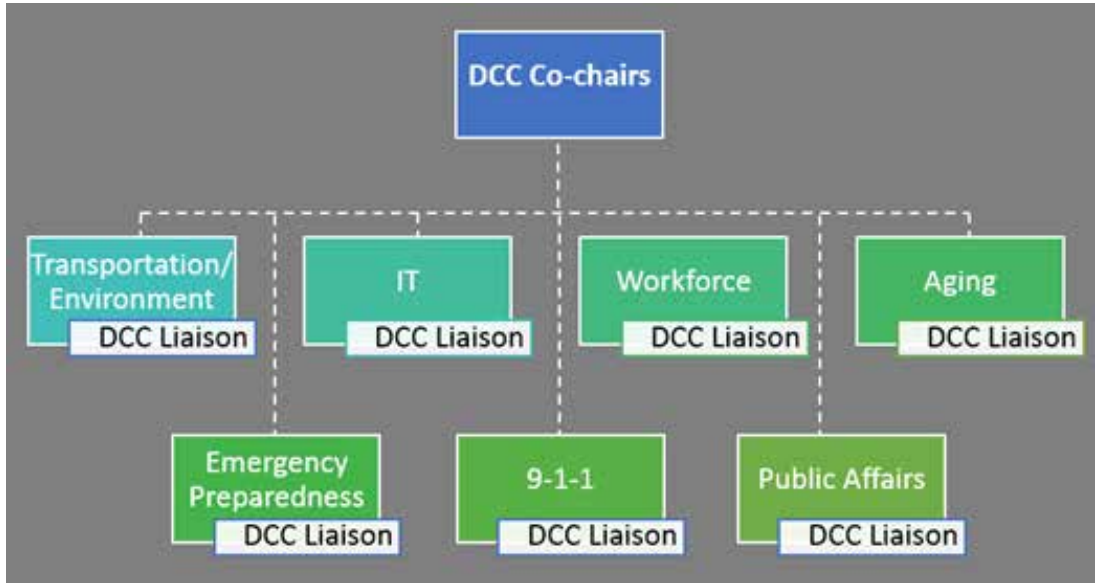
Challenges

- Following the initial success with the new skilled staff, the demands for their services have began to outpace their capacity.


MARC
MID-AMERICA REGIONAL COUNCIL

MARC's Data Coordination Committee

- Leads data management efforts at MARC
- Develops Data Business Plan
- Foster awareness of data initiatives,
- Ensure MARC's data & data processes are accessible to stakeholders
- New support staff



‘Top Five’ Transportation Data Sets for Automation

- Pavement & bridge conditions
- Safety/crash statistics
- National Performance Management Research Data Set (NPMRDS) dataset
- Transit route information
- ‘Network attributes’ (functional classification, etc.)

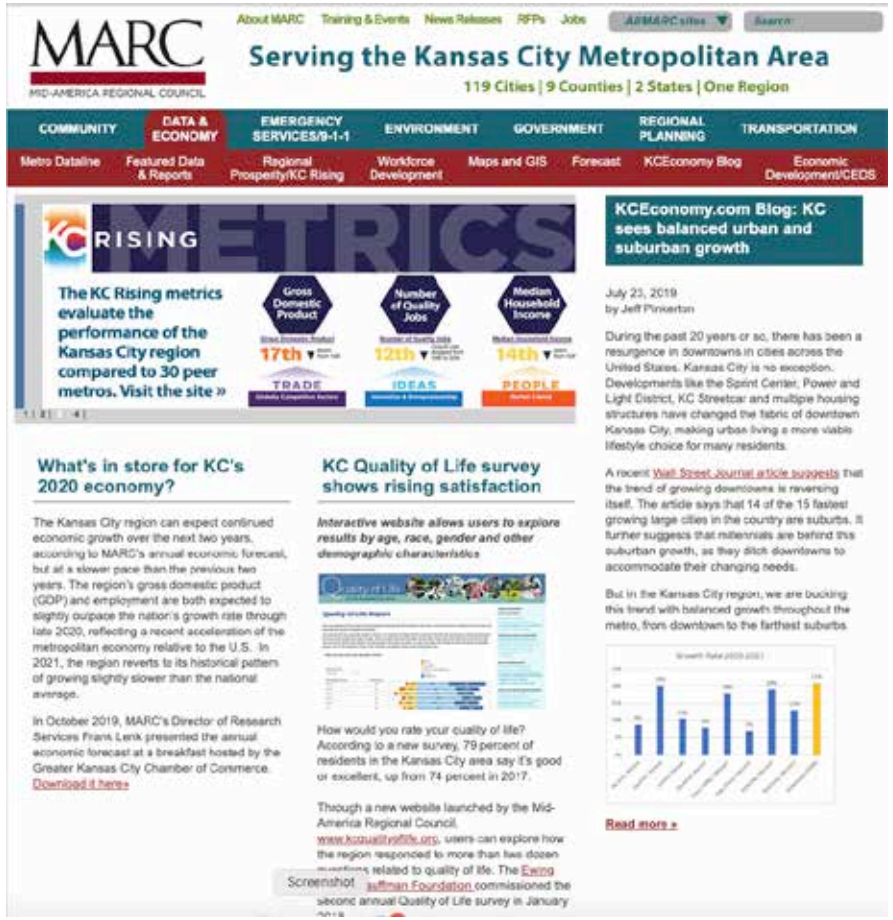
Redefining Staff Needs

- GIS Specialist → Data Developer
- Demographer → Data Developer

Key qualifications:

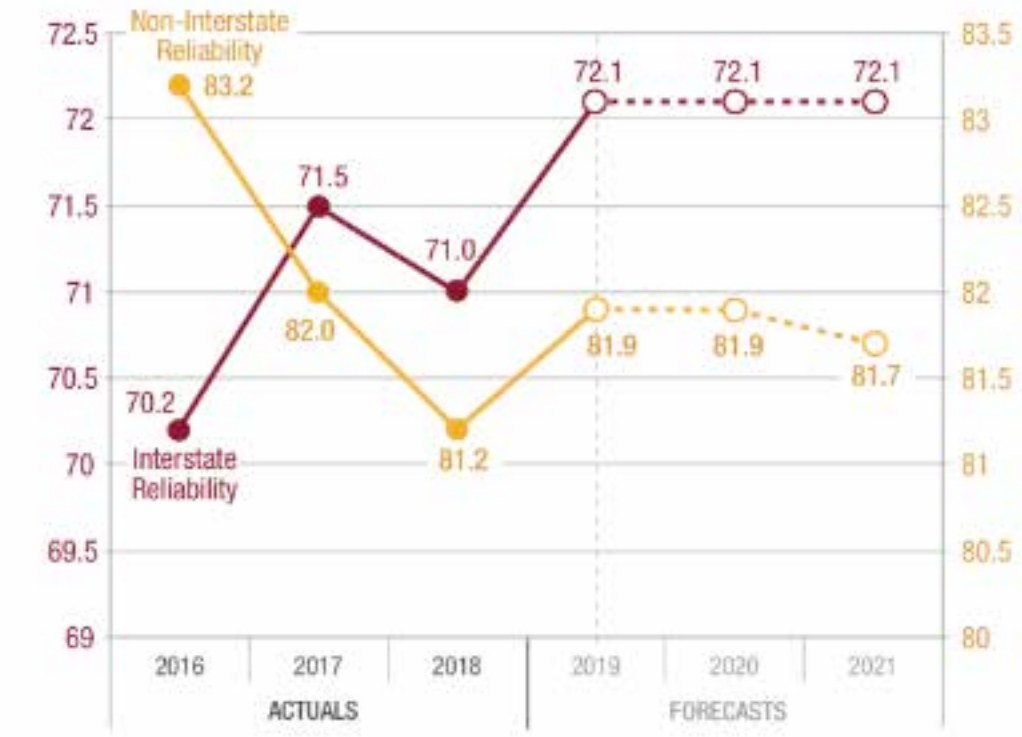
- Data analytics
- Visualization
- Programming skills
- Public sector experience
- Planning background

Benefits – Data automation saves time



- By automating data processes, MARC is able to dedicate more time towards reviewing and analyzing data

Benefits - Diving deeper into data



- New skill sets and innovative tools have vastly improved MARC's ability to access and analyze data

New Jersey DOT Project Assessment Reporting

Success Factors

- NJDOT developed capabilities to communicate project selection reasons using powerful data visualizations that make data interpretation easy.
- NJDOT identified a champion within the agency that took the time to learn to use data/tools.
- They developed trust in data and tools as a result of relatively open system that fully documents how data is interpreted and how calculations are made.

Challenges

- Shifting from prior methodologies that relied heavily on modeling and simulation to one based on actual data was challenging.
- There were concerns that new transparency could potentially show that some projects may not have had the desired impact.

Steps Illustrated

Define Obtain

Store Share

Analyze Present

Agency Types

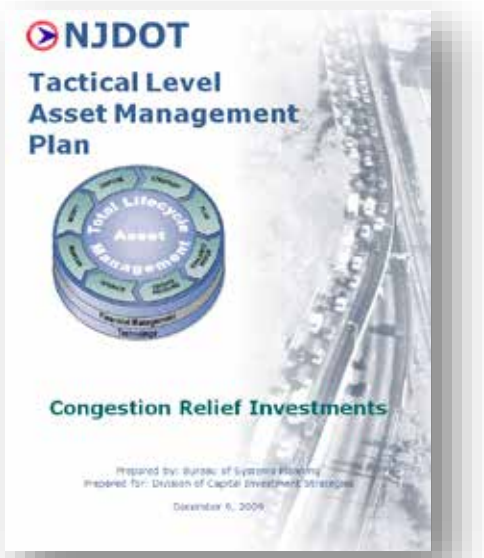
City DOT

Multi-Agency Transit Agency

MPO

New Jersey DOT Project Assessment Reporting

- In the past, Congestion Relief Before & After studies were rare
- Now, there's a distinct need to determine project effectiveness:
  - Called for in the Department's Asset Management construct
  - Needed for various performance reporting:
    - Tactical-level Asset Management Plan
    - Capital Investment Strategy
    - Centerline (Transportation System Performance)
  - Helps to level the playing field for funding
  - May be applicable to MAP-21 reporting criteria
  - It's the right thing to do



- Invested in analytical tools to make determining project effectiveness easier and straightforward

Steps Illustrated

Define | Obtain

Store | Share

Analyze | Present

Agency Types

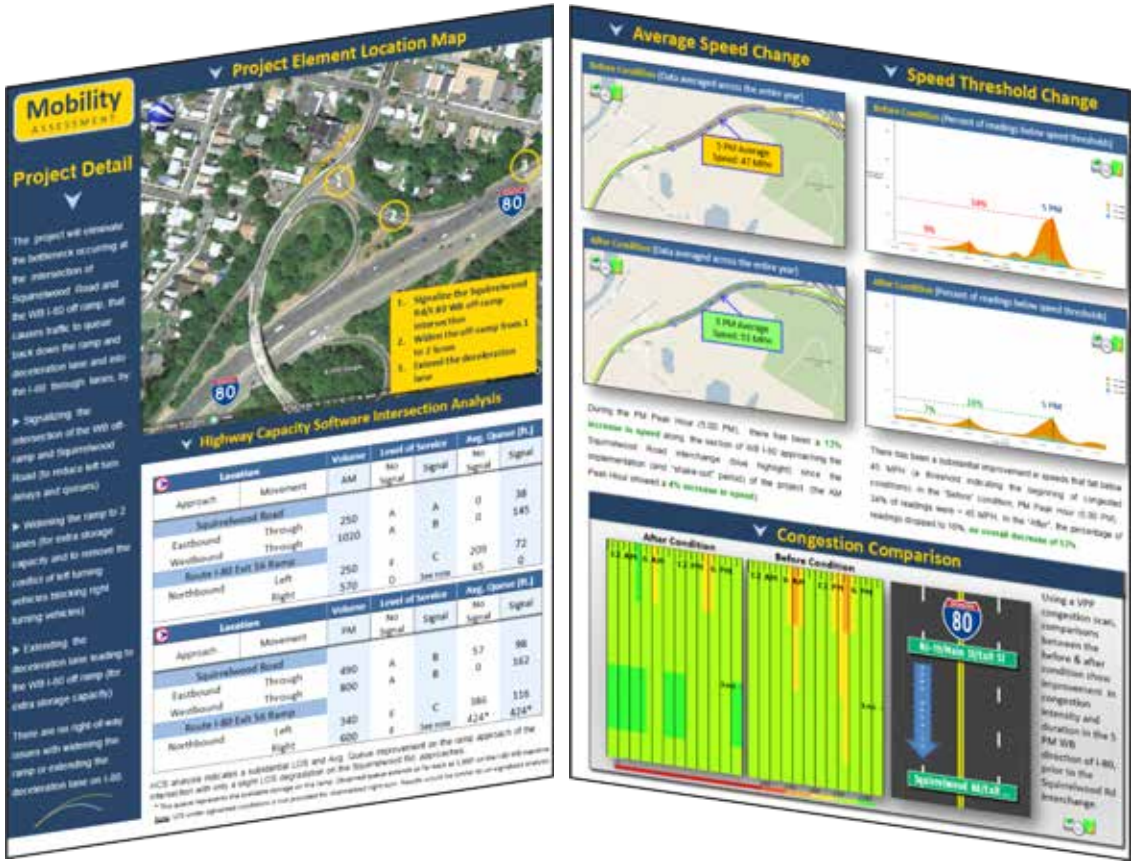
City | DOT

Multi-Agency | Transit Agency

MPO

Developed Reporting Template Before/After Study Guide

Project Performance Assessment Pamphlet



Value

- Ü Easy to read PM summary assessment (other docs TBD)
- Ü Provides accountability in program fund expenditures
- Ü Baseline for determining expected/actual project life
- Ü Supports Capital Program project selection process (expected benefits for that project type)

Project Assessment Summary

July 16, 2012

Technical Toolbox

I-80/Squirrelwood Road

Highway Operational Improvement

Interchange #56; MP 56.76 – 57.47

West Paterson, Passaic County

Start Date: June 8, 2007

Completion Date: March 3, 2008

Construction Cost: $1,282,304

Vehicle Probe Project Suite

The VPP Suite is a Flash-based web site that supports operations, planning, analysis, research & performance measure generation using probe data.

NJ OpenReach

NJ OpenReach is a web-based, multi-modal regional (NY/NJ/CT) tool that integrates incidents, construction, travel times and video.

Google™ Earth

Google™ Earth is a virtual globe and geographical information program that maps the Earth using superimposition of satellite imagery, aerial photography and GIS 3D.

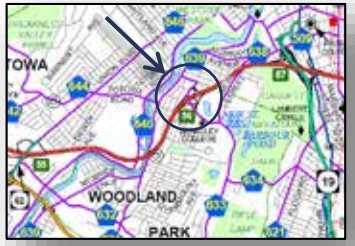
NJ Department of Transportation

This Summary incorporates data, analyses and reports by various NJDOT Units, such as: Data Development, Safety, Mobility and Systems Engineering, Project Management and Systems Planning.

Geographic Context

Route I-80 is a vital east-west interstate facility in northern New Jersey. It provides a continuous route between the Delaware Water Gap (at the PA border) and the George Washington Bridge (at the NY border) and is *essential* in serving the bedroom communities of northeast NJ and New York City, goods movement (local, regional and national) and recreational areas, such as the Pocono Mountains and Delaware Water Gap National Recreation Area.

Squirrelwood Road is classified as a urban minor arterial (County Route 636) and is accessed from I-80 at Interchange 56. This road serves the densely populated municipalities of Paterson and West Paterson in Passaic County.



Project Area Location Map

Project Background

In March, 1990, the I-80/Squirrelwood Road interchange was entered into the NJDOT's Pipeline Process via a Problem Statement generated by Region II.

According to the Problem Statement, inadequate capacity at the unsignalized intersection of the WB exit ramp of I-80 with Squirrelwood Road causes traffic to backup on the ramp and into the I-80 mainline, creating safety and operational problems. There is also a secondary capacity constraint at the intersection of Squirrelwood Road and Glover Avenue that may contribute to this problem.

In June, 1992, a Needs Assessment report was prepared by the Bureau of Transportation and Corridor Analysis. This report described the existing conditions, general characteristics of the surrounding region, traffic analyses and proposed improvement concepts.

Subsequently, a Tier II Screening Report was completed in February, 2005, that presented accident history, revised traffic analyses and proposed traffic control and geometric improvements.

Template Cover

General Project Information

- Project location aerial
- Project name, type and location
- Construction start, end and cost

Technical Toolbox

- VPP Suite
- NJ OpenReach
- Google™ Earth
- NJDOT

Geographic Context

- Roadway types
- Land use
- Traffic profile

Project Background

- Project initiation
- Department pipeline process
- Chronology

Mobility ASSESSMENT

Project Detail

The project will eliminate the bottleneck occurring at the intersection of Squirrelwood Road and the WB I-80 off ramp, that causes traffic to queue back down the ramp and deceleration lane and into the I-80 through lanes, by:

- Signalizing the intersection of the WB off-ramp and Squirrelwood Road (to reduce left turn delays and queues)
- Widening the ramp to 2 lanes (for extra storage capacity and to remove the conflict of left turning vehicles blocking right turning vehicles)
- Extending the deceleration lane leading to the WB I-80 off ramp (for extra storage capacity)

There are no right-of-way issues with widening the ramp or extending the deceleration lane on I-80.

Project Element Location Map

Highway Capacity Software Intersection Analysis

Location		Volume	Level of Service		Avg. Queue (ft.)	
Approach	Movement	AM	No Signal	Signal	No Signal	Signal
Squirrelwood Road						
Eastbound	Through	250	A	A	0	38
Westbound	Through	1020	A	B	0	145
Route I-80 Exit 56 Ramp						
Northbound	Left	250	F	C	209	72
	Right	570	D	See note	65	0

Location		Volume	Level of Service		Avg. Queue (ft.)	
Approach	Movement	PM	No Signal	Signal	No Signal	Signal
Squirrelwood Road						
Eastbound	Through	490	A	B	57	98
Westbound	Through	800	A	B	0	162
Route I-80 Exit 56 Ramp						
Northbound	Left	340	F	C	386	116
	Right	600	F	See note	424*	424*

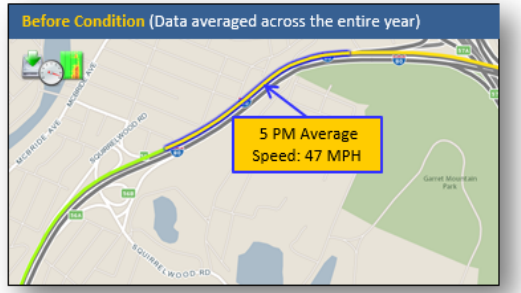
HCS analysis indicates a substantial LOS and Avg. Queue improvement on the ramp approach of the intersection with only a slight LOS degradation on the Squirrelwood Rd. approaches.

* This queue represents the available storage on the ramp. Observed queue extends as far back as 1,500' on the I-80 WB mainline.

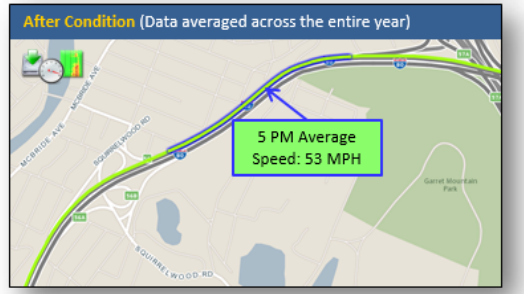
Note: LOS under signalized conditions is not provided for channelized right turn. Results would be similar to un-signalized analysis.

Average Speed Change

Before Condition (Data averaged across the entire year)



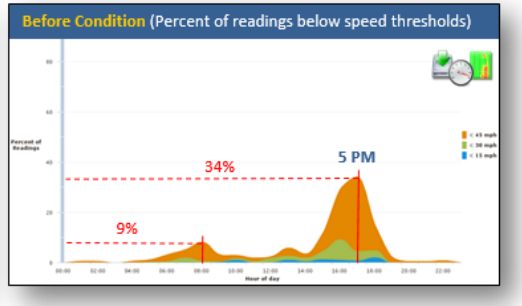
After Condition (Data averaged across the entire year)



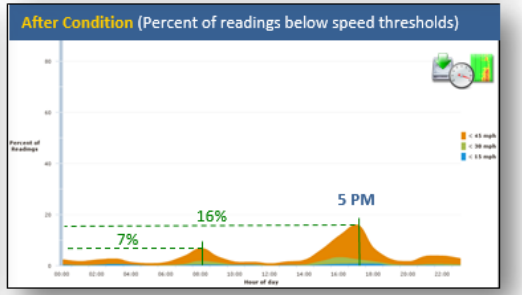
During the PM Peak Hour (5:00 PM), there has been a **13% increase in speed** along the section of WB I-80 approaching the Squirrelwood Road interchange (blue highlight) since the implementation (and "shake-out" period) of the project. (the AM Peak Hour showed a **4% increase in speed**).

Speed Threshold Change

Before Condition (Percent of readings below speed thresholds)

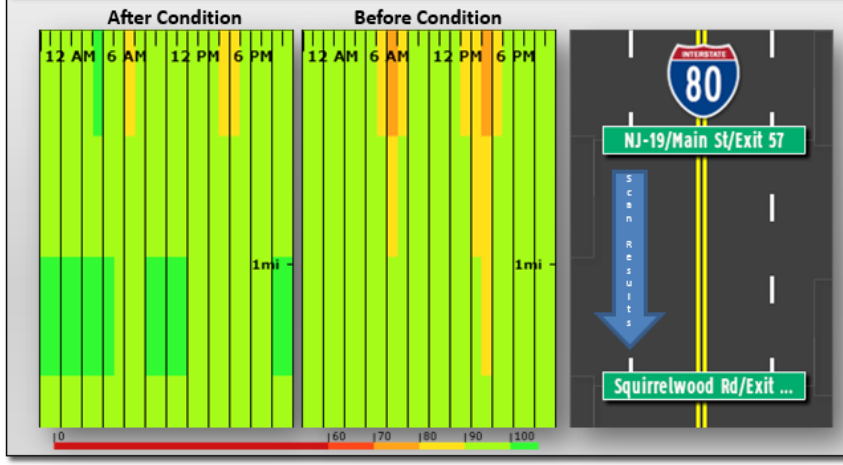


After Condition (Percent of readings below speed thresholds)

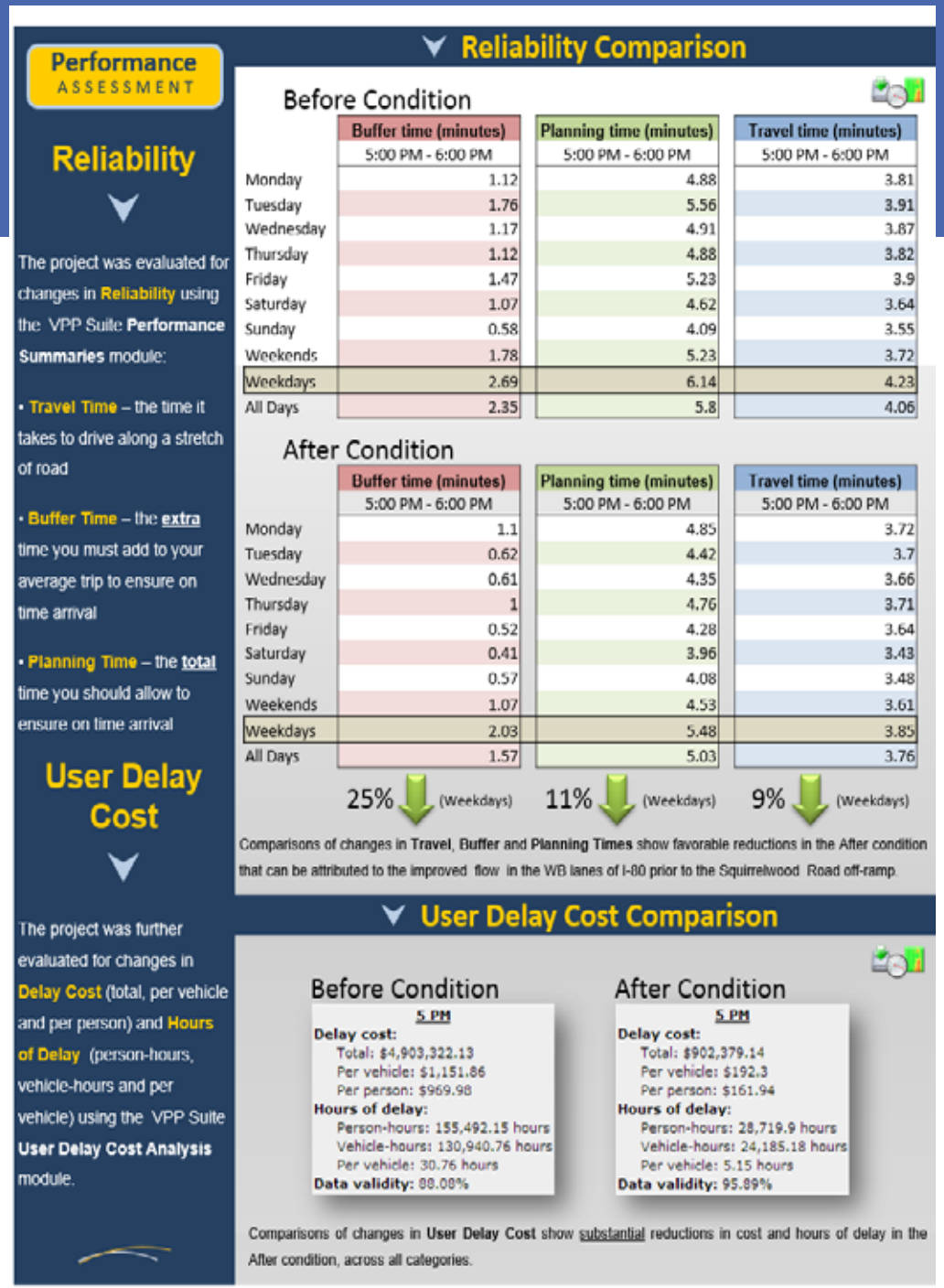


There has been a substantial improvement in speeds that fall below 45 MPH (a threshold indicating the beginning of congested conditions). In the "Before" condition, PM Peak Hour (5:00 PM) , 34% of readings were < 45 MPH. In the "After", the percentage of readings dropped to 16%, **an overall decrease of 53%**.

Congestion Comparison



Using a VPP congestion scan, comparisons between the before & after condition show improvement in congestion intensity and duration in the 5 PM WB direction of I-80, prior to the Squirrelwood Rd Interchange.



Performance ASSESSMENT

Reliability

The project was evaluated for changes in **Reliability** using the VPP Suite **Performance Summaries** module:

- **Travel Time** – the time it takes to drive along a stretch of road
- **Buffer Time** – the **extra** time you must add to your average trip to ensure on time arrival
- **Planning Time** – the **total** time you should allow to ensure on time arrival

User Delay Cost

The project was further evaluated for changes in **Delay Cost** (total, per vehicle and per person) and **Hours of Delay** (person-hours, vehicle-hours and per vehicle) using the VPP Suite **User Delay Cost Analysis** module.

Reliability Comparison

Before Condition

	Buffer time (minutes) 5:00 PM - 6:00 PM	Planning time (minutes) 5:00 PM - 6:00 PM	Travel time (minutes) 5:00 PM - 6:00 PM
Monday	1.12	4.88	3.81
Tuesday	1.76	5.56	3.91
Wednesday	1.17	4.91	3.87
Thursday	1.12	4.88	3.82
Friday	1.47	5.23	3.9
Saturday	1.07	4.62	3.64
Sunday	0.58	4.09	3.55
Weekends	1.78	5.23	3.72
Weekdays	2.69	6.14	4.23
All Days	2.35	5.8	4.06

After Condition

	Buffer time (minutes) 5:00 PM - 6:00 PM	Planning time (minutes) 5:00 PM - 6:00 PM	Travel time (minutes) 5:00 PM - 6:00 PM
Monday	1.1	4.85	3.72
Tuesday	0.62	4.42	3.7
Wednesday	0.61	4.35	3.66
Thursday	1	4.76	3.71
Friday	0.52	4.28	3.64
Saturday	0.41	3.96	3.43
Sunday	0.57	4.08	3.48
Weekends	1.07	4.53	3.61
Weekdays	2.03	5.48	3.85
All Days	1.57	5.03	3.76

25% ↓ (Weekdays) 11% ↓ (Weekdays) 9% ↓ (Weekdays)

Comparisons of changes in **Travel**, **Buffer** and **Planning Times** show favorable reductions in the After condition that can be attributed to the improved flow in the WB lanes of I-80 prior to the Squirrelwood Road off-ramp.

User Delay Cost Comparison

Before Condition

5 PM

Delay cost:
Total: $4,903,322.13
Per vehicle: $1,151.86
Per person: $969.98
Hours of delay:
Person-hours: 155,492.15 hours
Vehicle-hours: 130,940.76 hours
Per vehicle: 30.76 hours
Data validity: 88.08%

After Condition

5 PM

Delay cost:
Total: $902,379.14
Per vehicle: $192.3
Per person: $161.94
Hours of delay:
Person-hours: 28,719.9 hours
Vehicle-hours: 24,185.18 hours
Per vehicle: 5.15 hours
Data validity: 95.89%

Comparisons of changes in **User Delay Cost** show substantial reductions in cost and hours of delay in the After condition, across all categories.

- Back Cover includes
  - Before & After Conditions for Reliability and Travel Time Measures
  - User Delay Cost
  - Vehicle Hours of Delay
  - Person Hours of Delay

NJDOT Project Assessment Summary

$13,650

Traditional Methods

and 182 person-hours *conservatively* estimated for in-house staff using traditional field investigation methods & developing summaries
(Est. consultant services $40K+)

$440

Using Big Data & Analytics

and 3 person-hours using various on-line analytics, probe data, etc.

$340K

Annual Savings

and 4,475 person-hours could be saved by using these tools for 25 similar congestion or mobility-reporting summaries a year
($1M+ for consultants)

Project Assessment Summary
July 16, 2012

Technical Toolbox

Vehicle Probe Project Suite
The VPP Suite is a Flash-based web site that supports operations, planning, analysis, research & performance measure generation using probe data.

NJ OpenReach
NJ OpenReach is a web-based, multi-modal regional (NY/NJ/CT) tool that integrates incidents, construction, travel times and video.

Google™ Earth
Google™ Earth is a virtual globe and geographical information program that maps the Earth using superimposition of satellite imagery, aerial photography and GIS 3D.

NJ Department of Transportation
This Summary incorporates data, analyses and reports by various NJDOT Units, such as: Data Development, Safety, Mobility and Systems Engineering, Project Management and Systems Planning.

I-80/Squirrelwood Road
Highway Operational Improvement
Interchange #56; MP 56.76 – 57.47
West Paterson, Passaic County
Start Date: June 8, 2007
Completion Date: March 3, 2008
Construction Cost: $1,282,304

Geographic Context
Route I-80 is a vital east-west interstate facility in northern New Jersey. It provides a continuous route between the Delaware Water Gap (at the PA border) and the George Washington Bridge (at the NY border) and is essential in serving the bedroom communities of northeast NJ and New York City, goods movement (local, regional and national) and recreational areas, such as the Pocono Mountains and Delaware Water Gap National Recreation Area.

Squirrelwood Road is classified as a urban minor arterial (County Route 638) and is accessed from I-80 at Interchange 56. This road serves the densely populated municipalities of Paterson and West Paterson in Passaic County.

Project Area Location Map

Project Background
In March, 1990, the I-80/Squirrelwood Road interchange was entered into the NJDOT's Pipeline Process via a Problem Statement generated by Township officials.

According to the Problem Statement, inadequate capacity at the unsignalized intersection of the WB exit ramp of I-80 with Squirrelwood Road causes traffic to backup on the ramp and into the I-80 mainline, creating safety and operational problems. There is also a secondary capacity constraint at the intersection of Squirrelwood Road and Glover Avenue that may contribute to this problem.

In June, 1992, a Needs Assessment report was prepared by the Bureau of Transportation and Corridor Analysis. This report described the existing conditions, general characteristics of the surrounding region, traffic analyses and proposed improvement concepts.

Subsequently, a Tier II Screening Report was completed in February, 2005, that presented accident history, revised traffic analyses and proposed traffic control and geometric improvements.

Q&A

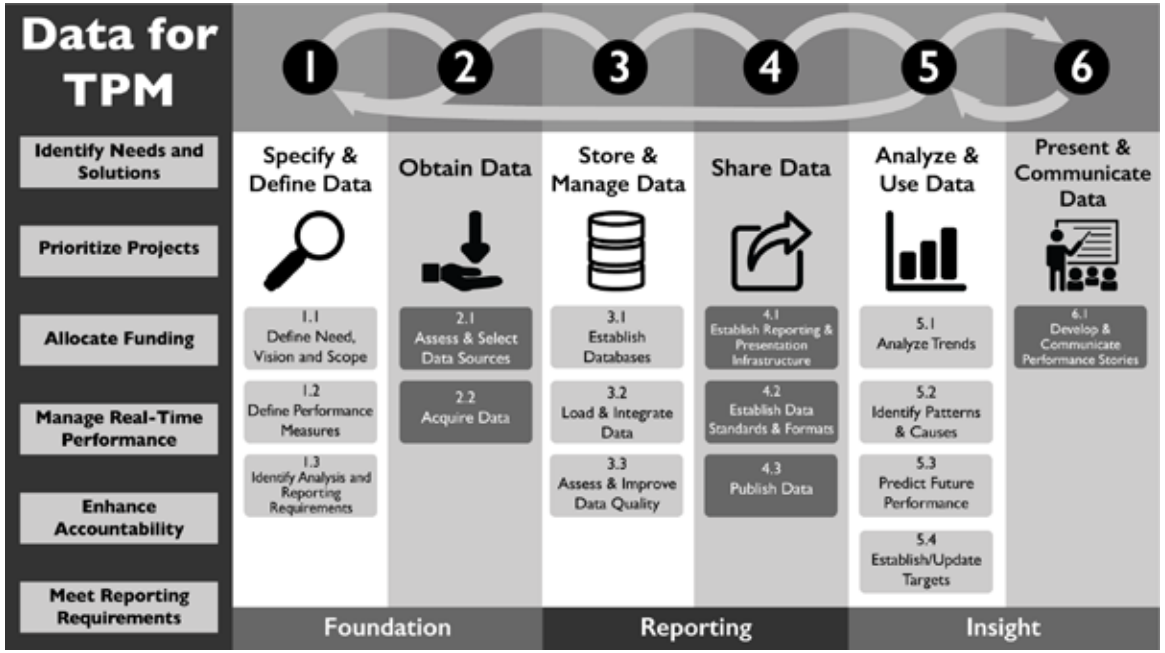
Frances Harrison
fharrison@spypondpartners.com

Michael Pack
packml@umd.edu

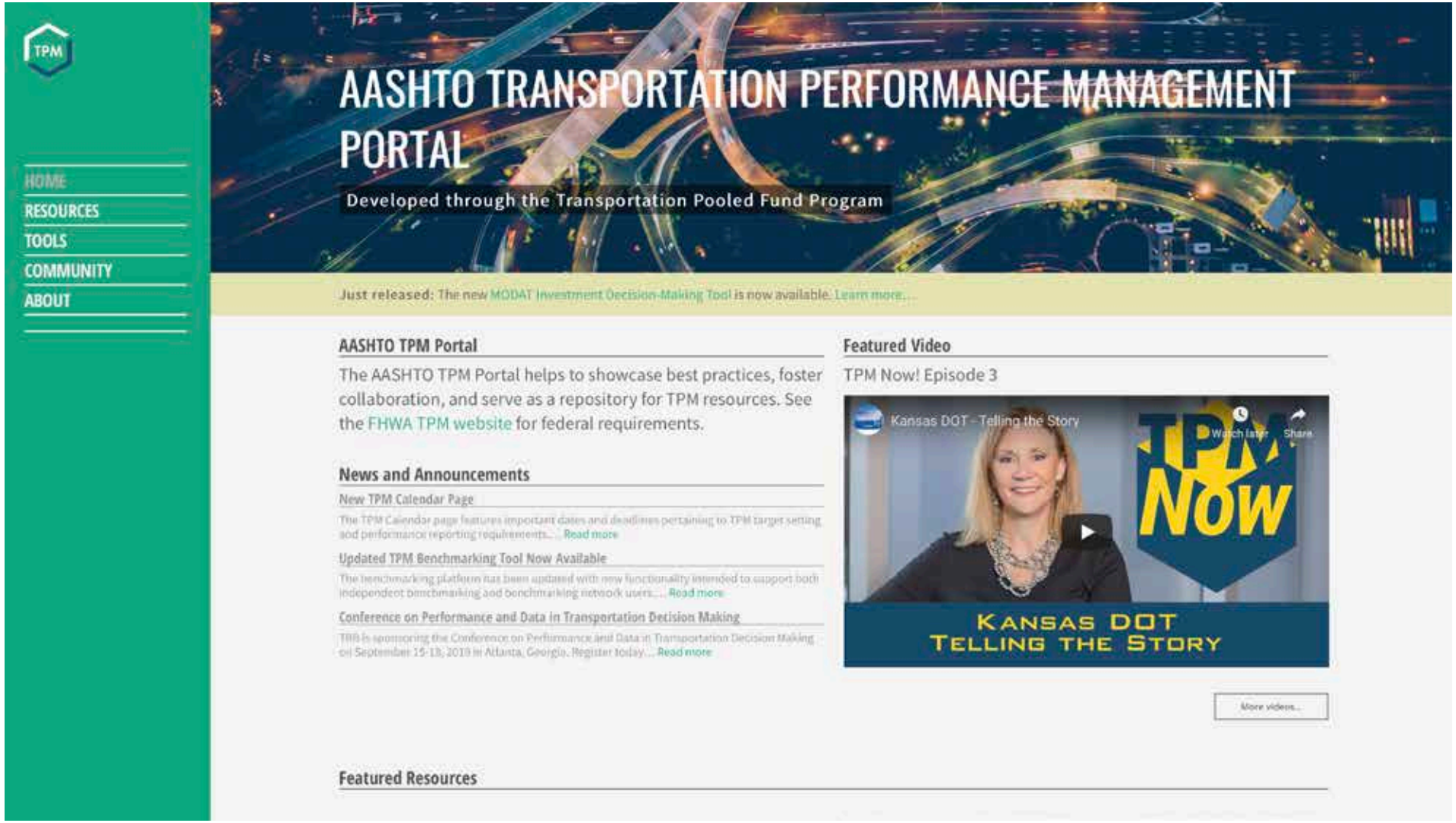
Joe Crosset
crossett@highstreetconsulting.com

Summary

- The Guide provides a flexible framework accompanied by specific advice and steps to take to improve data utilization within the TPM process.
- Case study vignettes provide real-world examples of framework in use and specific success factors and challenges.



TPM Portal (https://www.tpm-portal.com/)



NCHRP 08-108 Panel Members

Ms. Cindy L. Owings-Hutchison (Chair)
Maine DOT

Dr. Imad S. Aleithawe
Mississippi DOT, Waggoner Engineering

Mr. James M. "Jim" Appleton, PLS CP PMP
Caltrans

Mr. Michael S. Bruff, P.E.
City of Durham, NC

Ms. Laurie L. Goudy
Maryland SHA

Mr. Jason Ray Junge, P.E.
Minnesota DOT

Dr. Camille Kamga
University Transportation Research Center
The City College of New York

Simon Randrianarivelo
USDOT

Mr. Mario B. Rojas, IV
Florida International University

Mr. Christopher J. Allen
FHWA Liaison

Dr. Matthew Hardy
AASHTO Liaison

Tom Palmerlee
TRB Liaison

Today's Panelists

- Hyun-A Park, hpark@spypondpartners.com
- Michael Pack, PackML@umd.edu
- Joe Crossett, crossett@highstreetconsulting.com
- Frances Harrison, fharrison@spypondpartners.com

Get Involved with TRB

- Getting involved is free!
- Join a Standing Committee (http://bit.ly/TRBstandingcommittee)
- Become a Friend of a Committee (http://bit.ly/TRBcommittees)
  - Networking opportunities
  - May provide a path to become a Standing Committee member
- For more information: www.mytrb.org
  - Create your account
  - Update your profile


@NASEMTRB


@NASEMTRB


Transportation Research Board

TRB turns 100 on November 11, 2020

Help TRB:

- Promote the value of transportation research;
- Recognize, honor, and celebrate the TRB community; and
- Highlight 100 years of accomplishments.

Learn more at

www.TRB.org/Centennial

#TRB100

MOVING IDEAS: ADVANCING SOCIETY—100 YEARS OF TRANSPORTATION RESEARCH