I-76 Corridor Management:
Opening Lanes and Offering Options to Regional Mobility

Transportation Engineering and Safety Conference

The Penn Stater Hotel and Conference Center

State College, Pennsylvania

December 7, 2017

TRANSFORM76.COM

Agenda

- **Moderator:** Stan Niemczak, Jacobs

- **Policy Development; Regional & Statewide Perspectives**
  Glenn Rowe, Chief, Highway Safety and Traffic Operations, Pennsylvania Department of Transportation

- **National ICM/ATDM Perspectives**
  James Paral, Transportation Management Specialist, Federal Highway Administration

- **Traffic Operations; ITS Strategies; Regional Transportation Management Center Operations and Integration; ICM Concept of Operations**
  Manny Anastasiadis, Senior Traffic Operations Manager, Pennsylvania Department of Transportation District 6-0

- **King of Prussia Rail Extension; On-Corridor Station Improvement Projects; Traveler Information**
  Elizabeth Smith, Manager of Long Range Planning, SEPTA

- **I-76 Parallel Corridors Signal Operations; PennDOT Traffic Signal Ownership & Maintenance Pilot Program; Municipal Outreach**
  Dave Adams, Traffic Signals and Safety Manager, Pennsylvania Department of Transportation District 6-0

- **Incident Management and Emergency Responder Coordination; State Police Partnership; Peer Agency Information Sharing**
  Chris King, Manager, Office of Transportation Operations Management, DVRPC

- **Project Management and Delivery**
  Jay Roth, Transportation Group Manager, Jacobs

- **I-76 ITS Concept of Operations; ATM Strategies Development; ITS & Systems Design**
  Brian Depan, ITS Design & Construction Manager, Jacobs

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Schuylkill Expressway Timeline

- 1932 – Original vision: Riverside parkway connecting Fairmount Park & Valley Forge Park
- 1949 – Construction begins on 1st section – PA Turnpike to US 1
- 1950 – Design year (1970) volume estimated at 35,000 VPD
- 1954 – 1st Section of the Schuylkill Expressway Opens
- 1956 – Designated as I-76
- 1957 – Walt Whitman Bridge opened
- **1960 – 1st Operational Study of I-76 performed – daily traffic at 70,000 VPD**
- 1963 – King of Prussia Plaza opened

Schuylkill Expressway Timeline

- 1967 – Philadelphia R&B group The Soul Survivors release the single “Expressway to your Heart”
- 1981 – Daily traffic volumes approach 85,000 VPD in Montgomery County & 135,000 VPD in the City of Philadelphia
- 1982 – Schuylkill Expressway Reconstruction Project
- 1991 – Vine Street Expressway (I-676) completed
- **2002 – ITS: PennDOT & DRPA install detectors, CCTV cameras, DMS, and communications to better manage traffic**
- 2010 – Daily traffic volumes exceeded 117,000 VPD in Montgomery County & approached 180,000 VPD in the City of Philadelphia

Policy Development;
Regional & Statewide Perspectives

Glenn Rowe, Chief, Highway Safety and Traffic Operations
Pennsylvania Department of Transportation

Why Transportation System Management and Operations (TSMO)?

Congestion

PENNSYLVANIA'S CONGESTION RELATED COSTS ARE HIGHER THAN THE NATIONAL AVERAGE

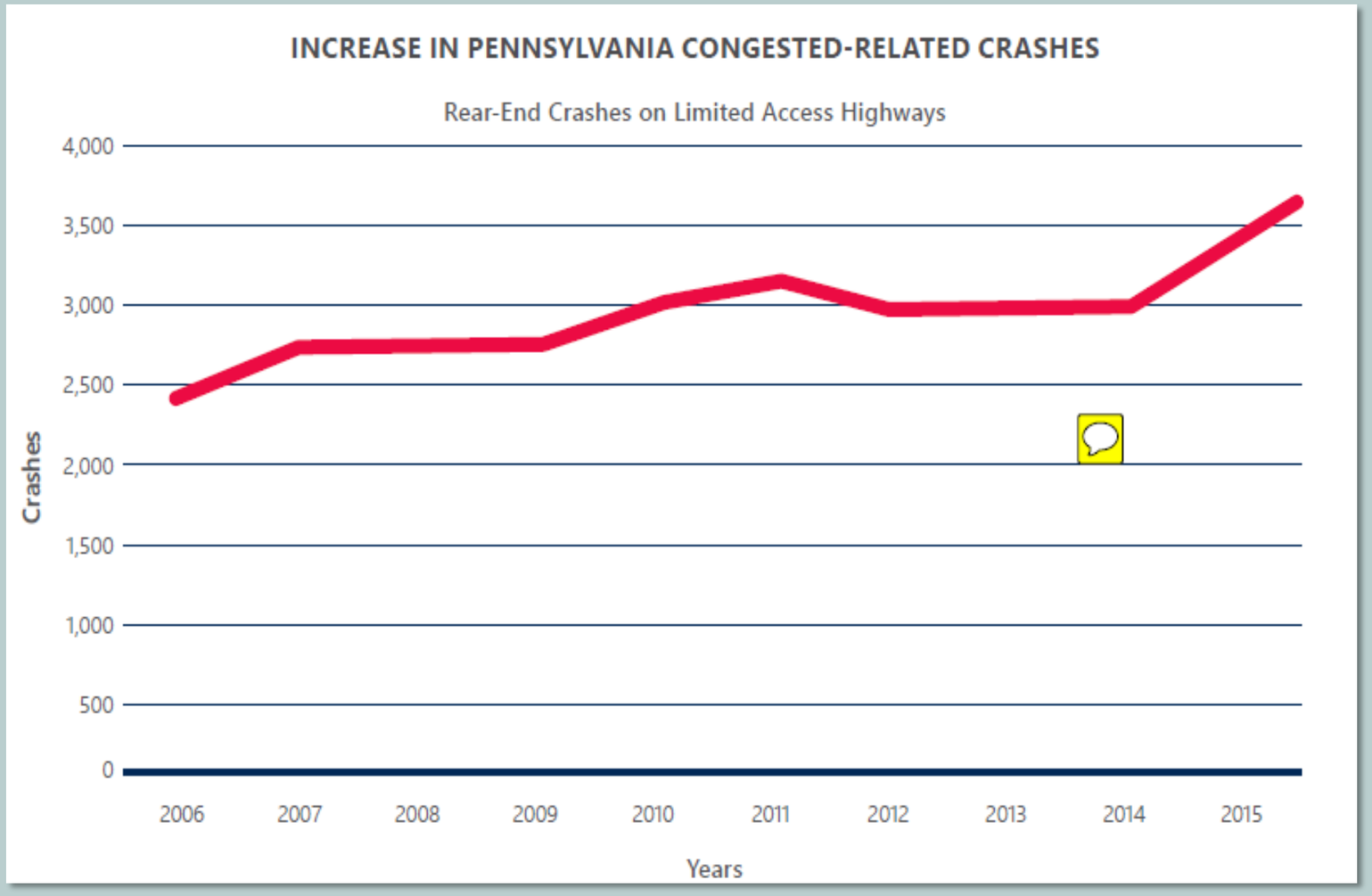
URBAN (≥ 500,000 PEOPLE)

ANNUAL HOURS OF DELAY	ANNUAL CONGESTION COST	ANNUAL EXCESS FUEL CONSUMED IN GALLONS
PENNSYLVANIA 73.018M	PENNSYLVANIA $1.697M	PENNSYLVANIA 36.769M
NATIONALLY 71.990M	NATIONALLY $1.649M	NATIONALLY 31.936M

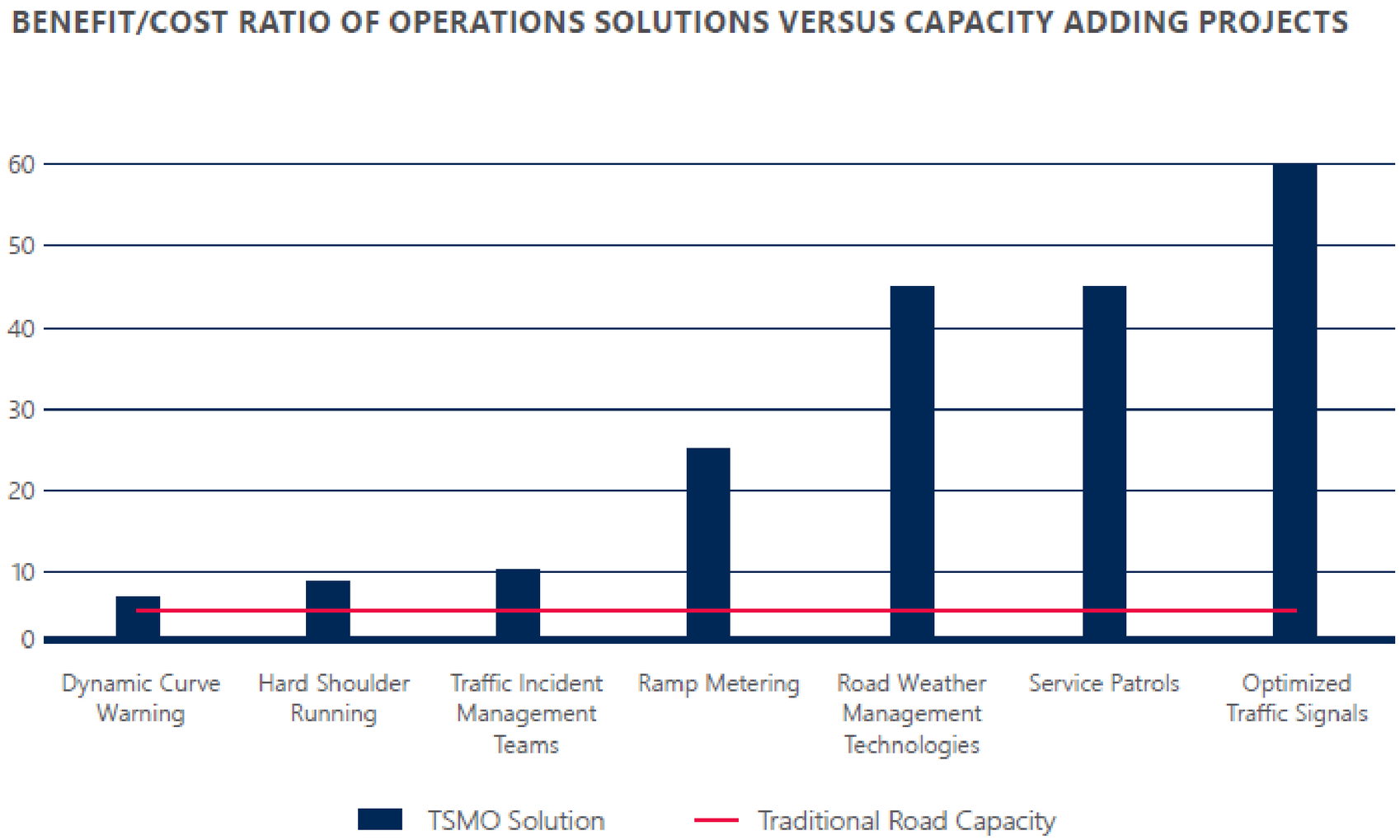
RURAL (< 500,000 PEOPLE)

ANNUAL HOURS OF DELAY	ANNUAL CONGESTION COST	ANNUAL EXCESS FUEL CONSUMED IN GALLONS
PENNSYLVANIA 2.789M	PENNSYLVANIA $67M	PENNSYLVANIA 1.408M
NATIONALLY 2.651M	NATIONALLY $62M	NATIONALLY 1.243M

Safety



TSMO: Bang for your buck!

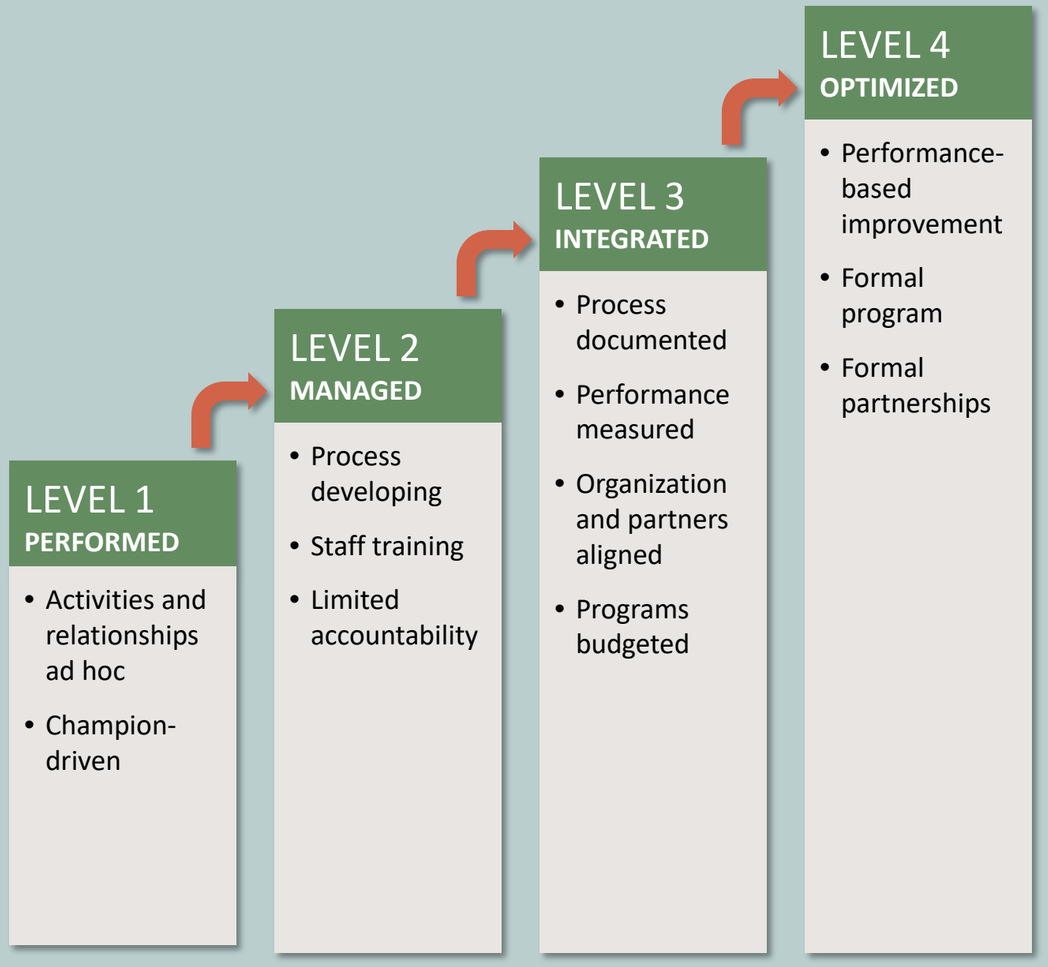


Capability Maturity Model

PENNDOT CMM SELF-ASSESSMENT COMPARED TO OTHER STATES

Dimension	Level 1 Performed	Level 2 Managed	Level 3 Integrated	Level 4 Optimizing
Business Processes	11	10	2	0
Systems and Technology	7	12	3	1
Performance Measurement	9	11	3	0
Culture	8	11	4	0
Organization and Staffing	8	9	6	0
Collaboration	4	12	6	1

Business Processes – formal scoping, planning, programming, and budgeting
Systems and Technology – systems architecture, interoperability, standardization, and documentation
Performance Measurement – measures definition, data acquisitions, analysis, and utilization
Culture – understanding, leadership, policy commitment, outreach, and program authority
Organization and Staffing – organizational structure, staff capacity development, and retention
Collaboration – relationships with public safety agencies, local governments, MPOs/RPOs, and private sector



TSMO Toolbox

TSMO Solution	Causes of Congestion					
	Bottlenecks	Traffic Incidents	Inclement Weather	Work Zones	Poor Signal Timing	Special Events
Integrated Corridor Management	X	X	X	X	X	X
Hard Shoulder Running	X	X				X
Managed Lanes	X	X	X			X
TIM Teams		X				
Freeway Service Patrols		X		X		X
Smart Work Zones				X		
Traffic Signal Enhancements					X	
Transit Signal Priority					X	
Traveler Information		X	X	X		X
Ramp Metering	X	X				X
Bridge De-icing			X			
Commercial Vehicle Operations						
Dynamic Lane Assignment						X
Junction Control						X
Queue Warning						X
Variable Speed Displays		X	X	X		
Dynamic Rerouting		X		X		X
RWIS			X			
Dynamic Curve Warning						
Traffic Management Center Operations	X	X	X	X	X	X
Traffic Incident Detection		X				
DMS		X		X		X
CCTV	X	X	X	X		X

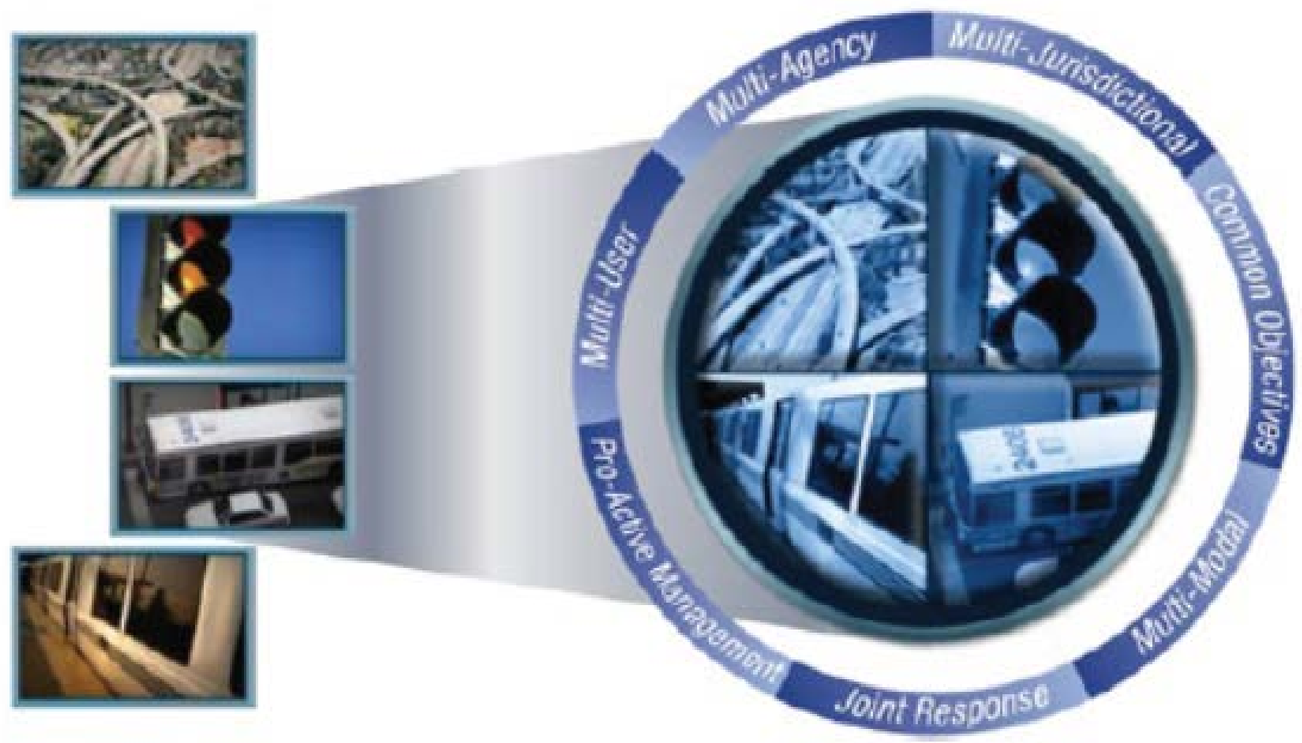
Integrated Corridor Management

What is Integrated Corridor Management?

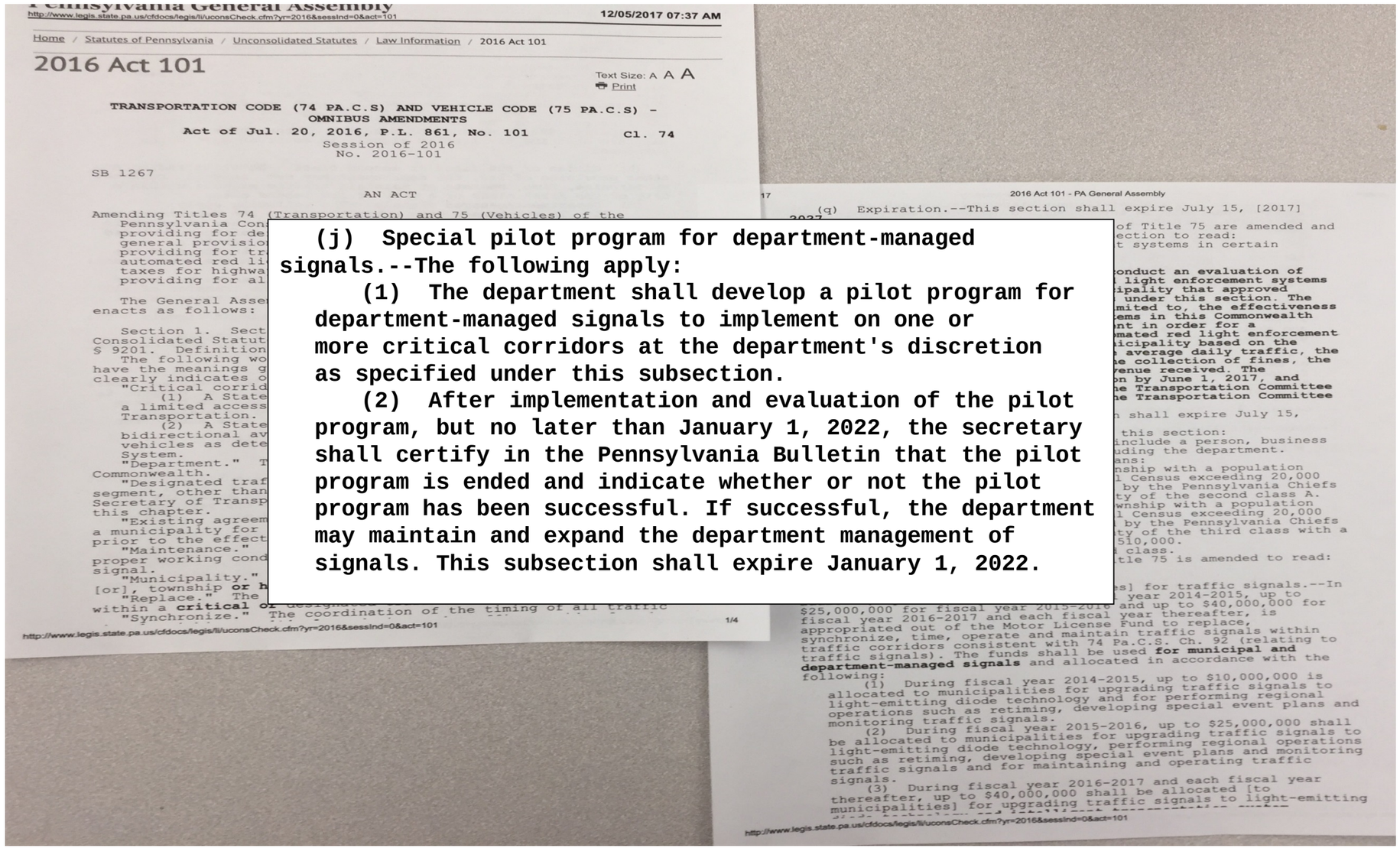
- *the coordination of individual network operations between adjacent facilities that creates an interconnected system capable of cross-network travel management*

ICM combines two fundamental concepts:

- active management
- integration



2016 Act 101



Pennsylvania General Assembly
http://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2016&sessInd=0&act=101 12/05/2017 07:37 AM

Home / Statutes of Pennsylvania / Unconsolidated Statutes / Law Information / 2016 Act 101

2016 Act 101

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TRANSPORTATION CODE (74 PA.C.S) AND VEHICLE CODE (75 PA.C.S) - OMNIBUS AMENDMENTS
Act of Jul. 20, 2016, P.L. 861, No. 101 Cl. 74
Session of 2016
No. 2016-101

SB 1267

AN ACT

Amending Titles 74 (Transportation) and 75 (Vehicles) of the Pennsylvania Cons
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The General Asse
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(2) A State
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"Maintenance."
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"Municipality."
[or], township **or h**
"Replace." The
within a **critical** or
"Synchronize." The coordination of the timing of all traffic

http://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2016&sessInd=0&act=101 1/4

(j) Special pilot program for department-managed signals.--The following apply:

(1) The department shall develop a pilot program for department-managed signals to implement on one or more critical corridors at the department's discretion as specified under this subsection.

(2) After implementation and evaluation of the pilot program, but no later than January 1, 2022, the secretary shall certify in the Pennsylvania Bulletin that the pilot program is ended and indicate whether or not the pilot program has been successful. If successful, the department may maintain and expand the department management of signals. This subsection shall expire January 1, 2022.

17 2016 Act 101 - PA General Assembly

(q) Expiration.--This section shall expire July 15, [2017]

of Title 75 are amended and
ection to read:
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e Transportation Committee

h shall expire July 15,

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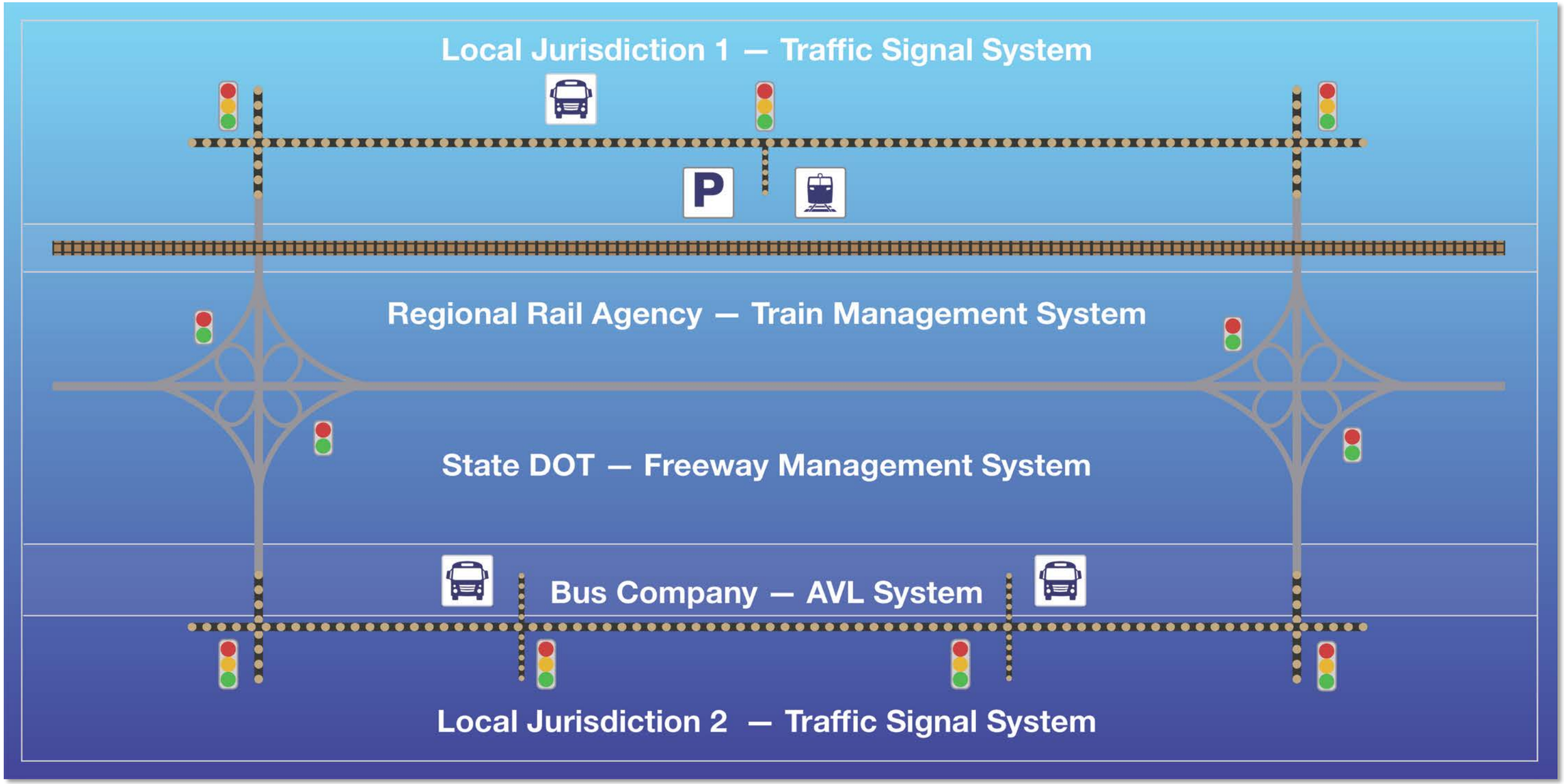
s] for traffic signals.--In
year 2014-2015, up to
$25,000,000 for fiscal year 2015-2016 and up to $40,000,000 for fiscal year 2016-2017 and each fiscal year thereafter, is appropriated out of the Motor License Fund to replace, synchronize, time, operate and maintain traffic signals within traffic corridors consistent with 74 Pa.C.S. Ch. 92 (relating to traffic signals). The funds shall be used **for municipal and department-managed signals** and allocated in accordance with the following:
(1) During fiscal year 2014-2015, up to $10,000,000 is allocated to municipalities for upgrading traffic signals to light-emitting diode technology and for performing regional operations such as retiming, developing special event plans and monitoring traffic signals.
(2) During fiscal year 2015-2016, up to $25,000,000 shall be allocated to municipalities for upgrading traffic signals to light-emitting diode technology, performing regional operations such as retiming, developing special event plans and monitoring traffic signals and for maintaining and operating traffic signals.
(3) During fiscal year 2016-2017 and each fiscal year thereafter, up to $40,000,000 shall be allocated [to municipalities] for upgrading traffic signals to light-emitting

http://www.legis.state.pa.us/cfdocs/legis/li/uconsCheck.cfm?yr=2016&sessInd=0&act=101

National ICM/ATDM Perspectives

James Paral, Transportation Management Specialist
Federal Highway Administration

Integrated Corridor Management

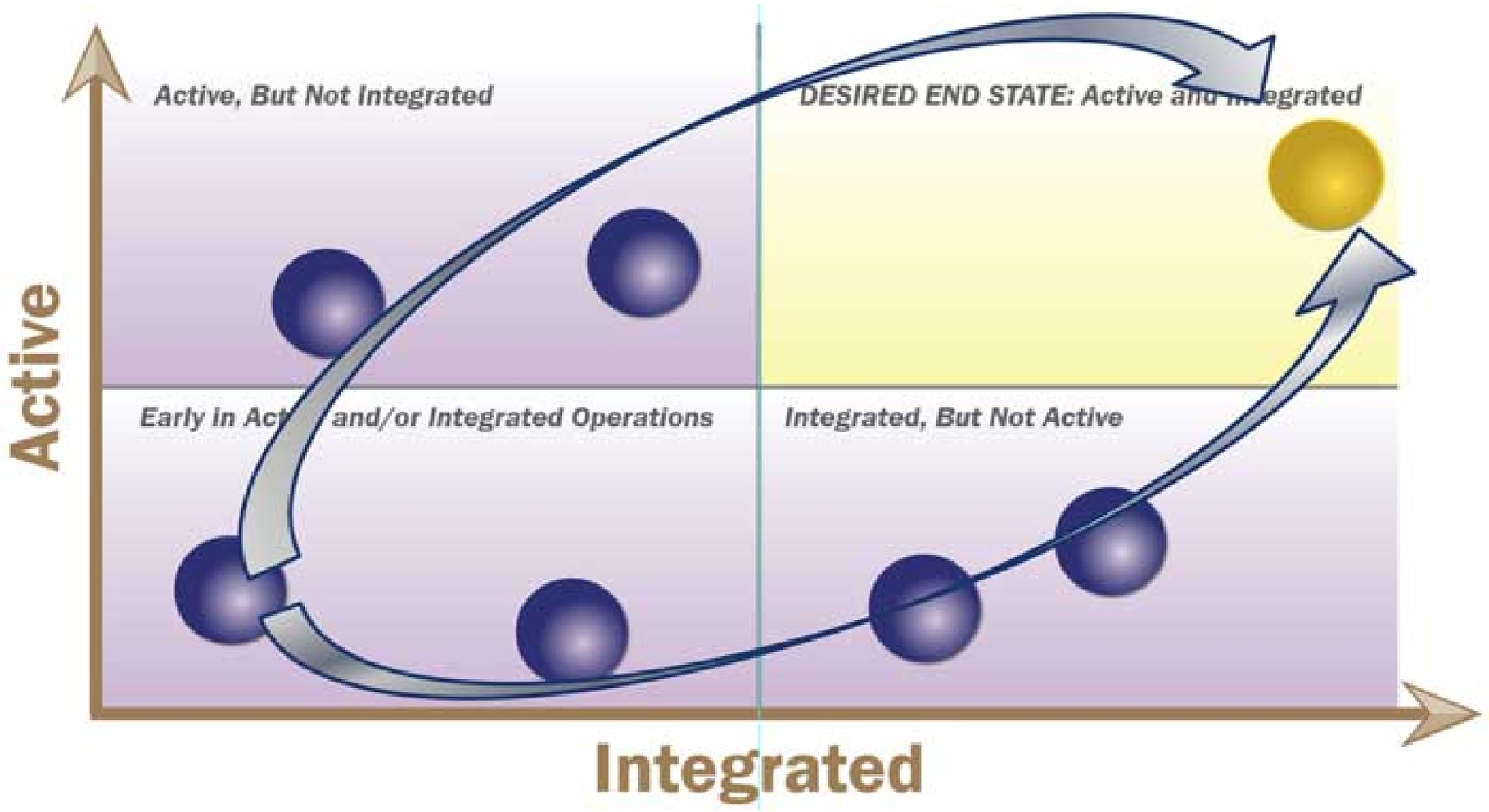


US DOT ICM Website

- Clearinghouse for ICM knowledge and technology transfer
- Publications, briefs, videos, webinars, lessons learned, external resources, etc.
- Click link below for more information

https://www.its.dot.gov/research_archives/icms/knowledgebase.htm

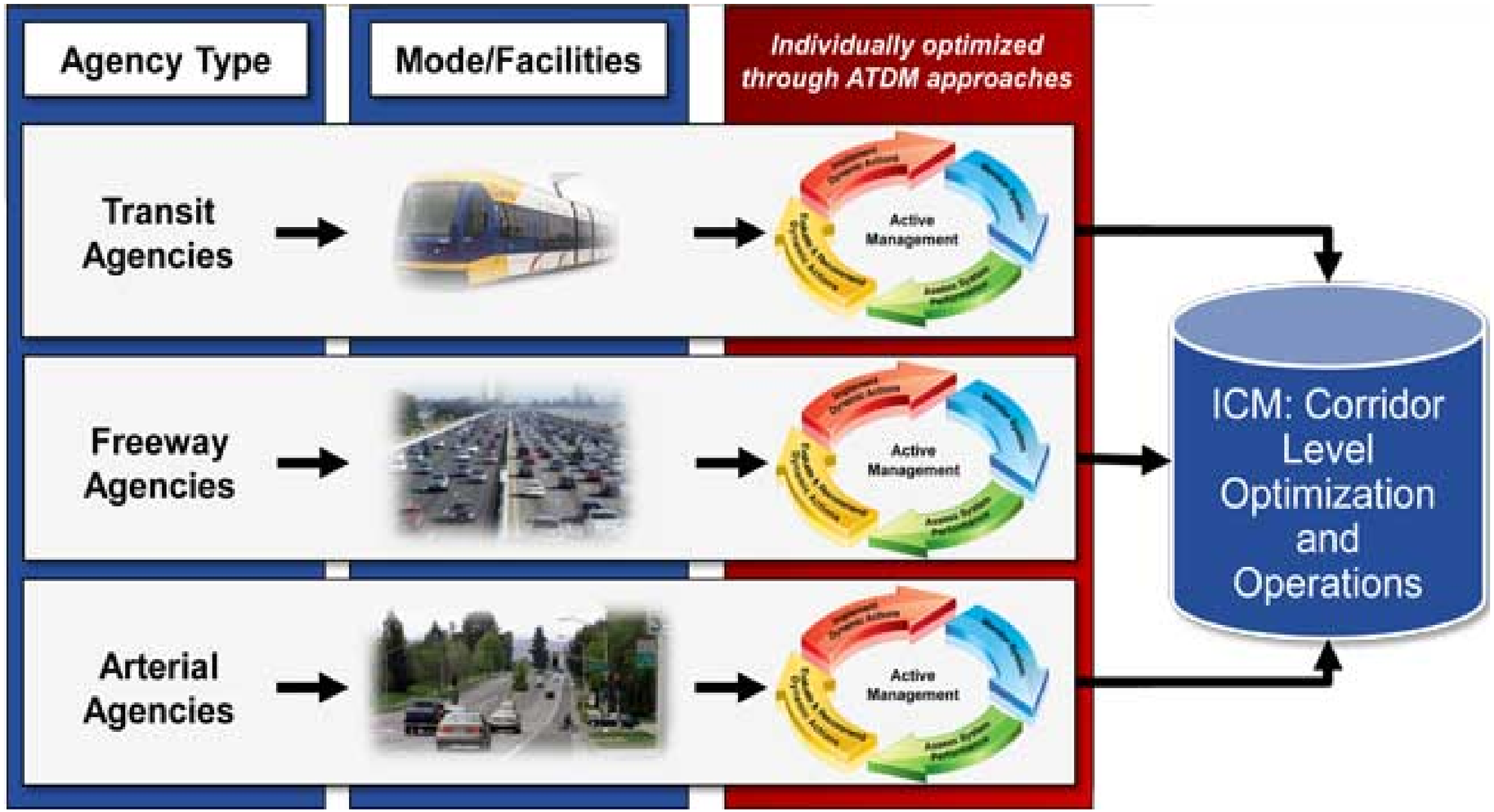
ICM & ATDM


Active, But Not Integrated
DESIRED END STATE: Active and Integrated
Early In Act and/or Integrated Operations
Integrated, But Not Active
Active
Integrated

What is Active Management?

The fundamental concept of taking a dynamic approach to a performance-based process

Active Management in a Corridor



Moving Towards Active Management

Transportation Agency Operators:

Moving from Static to Proactive Management

- High complexity, high reward
- Emerging

- Low risk
- Proven

Proactive Management

- Respond to predicted changes in supply & demand
- Ability to delay or eliminate breakdowns

Responsive Management

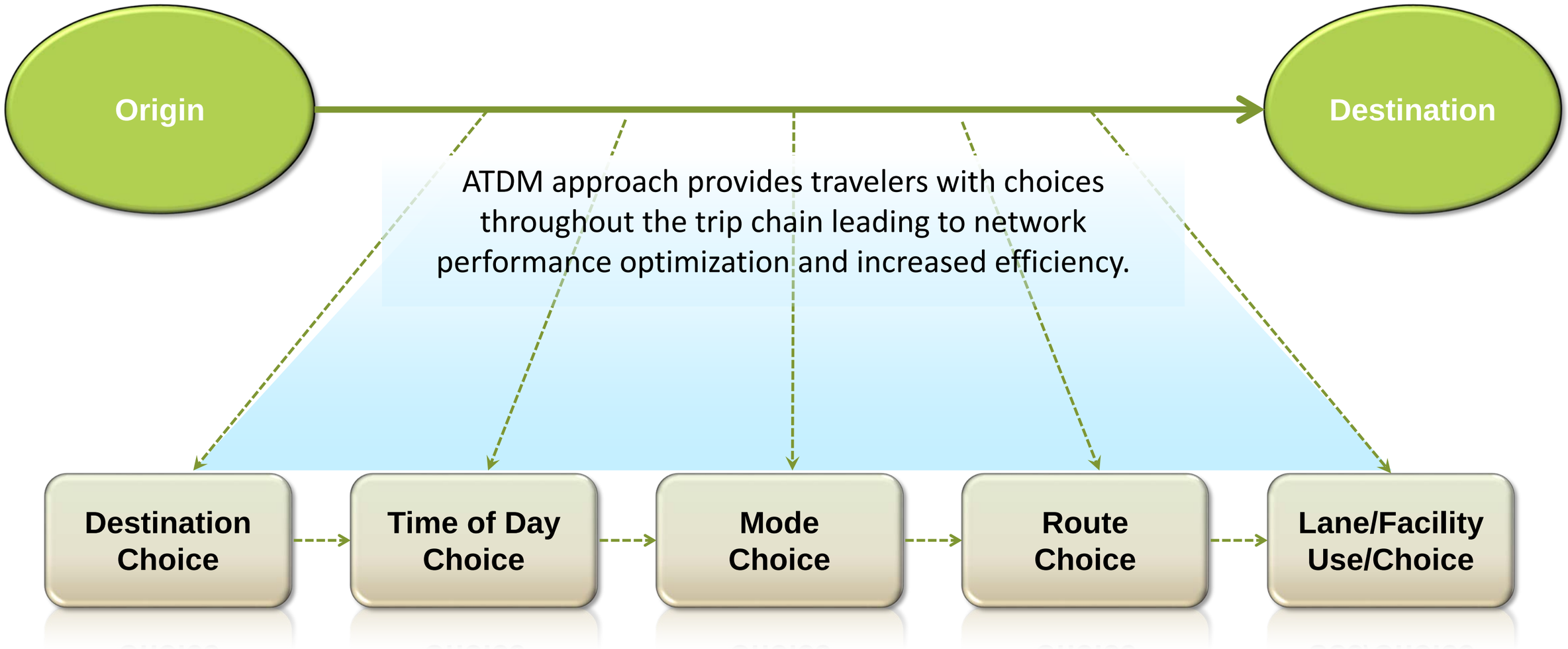
- Respond to current conditions
- Account for traffic impacts due to conditions
- Reduce time of degraded operation

Static Management

- Time of day
- Set-it and forget it
- Will work when there is limited variability

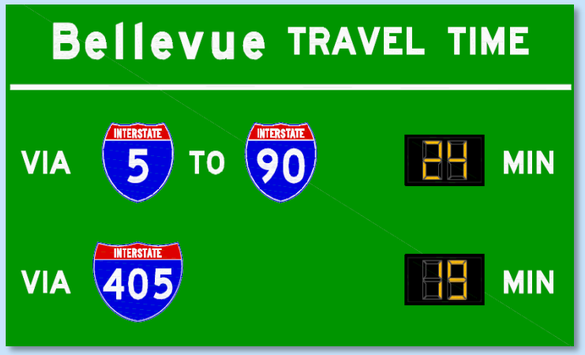
Actively Managing Operations

ATDM Throughout the Trip Chain



Examples of Active Management Strategies

Active Demand Management



Active Traffic Management

Active Parking Management

Active Traffic Management Example:
VA I-66's Active Traffic Management System

NOVA's I-66 Active Traffic Management System:

- Intended to improve safety and incident management.
- Includes new sign gantries, shoulder and lane control signs, speed displays, incident and queue detection, and increased traffic camera coverage.

http://www.virginiadot.org/projects/northernvirginia/i-66_atms.asp

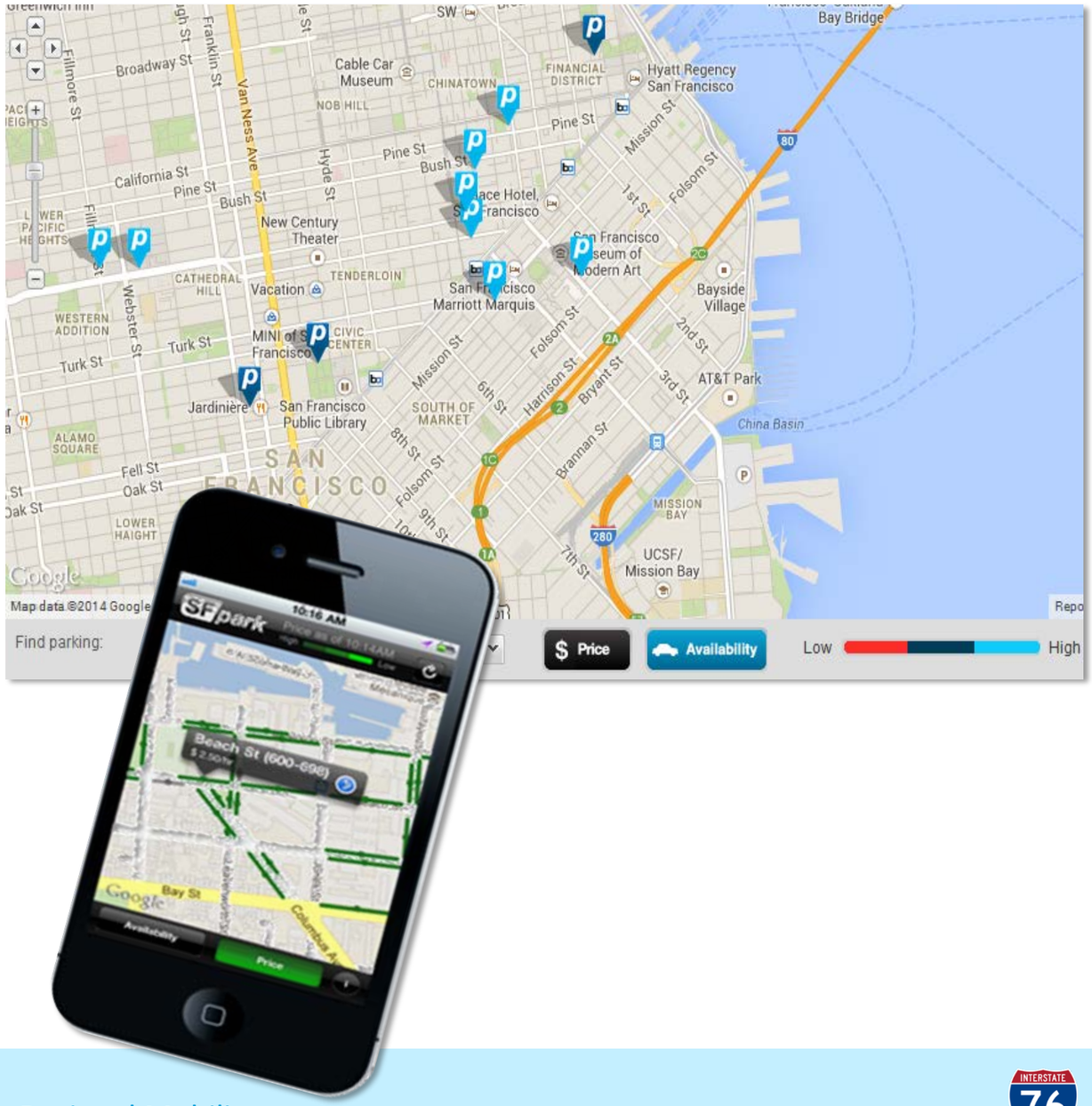
Examples of ATM Benefits in US

Active Parking Management Example: San Francisco's SF*park* System

SF*park*:

- Periodically adjusts meter and garage pricing to match demand.
- Reduces demand in overused areas by encouraging drivers to park in underused areas and garages.
- Readjusts parking patterns throughout San Francisco to make parking easier to find.

http://sfpark.org/about-the-project/



FHWA ATDM Website

- Clearinghouse for ATDM knowledge and technology transfer
- Publications, briefs, videos, webinars, lessons learned, external resources, etc.
- Click link at right for more information

http://ops.fhwa.dot.gov/atdm/about/program.htm

ATDM & ICM Program Contact for PA

Federal Highway Administration

Jim Paral

james.paral@dot.gov

717.221.3465

Traffic Operations; ITS Strategies; Regional Transportation Management Center Operations and Integration; ICM Concept of Operations

Manny Anastasiadis, Senior Traffic Operations Manager
Pennsylvania Department of Transportation
District 6-0

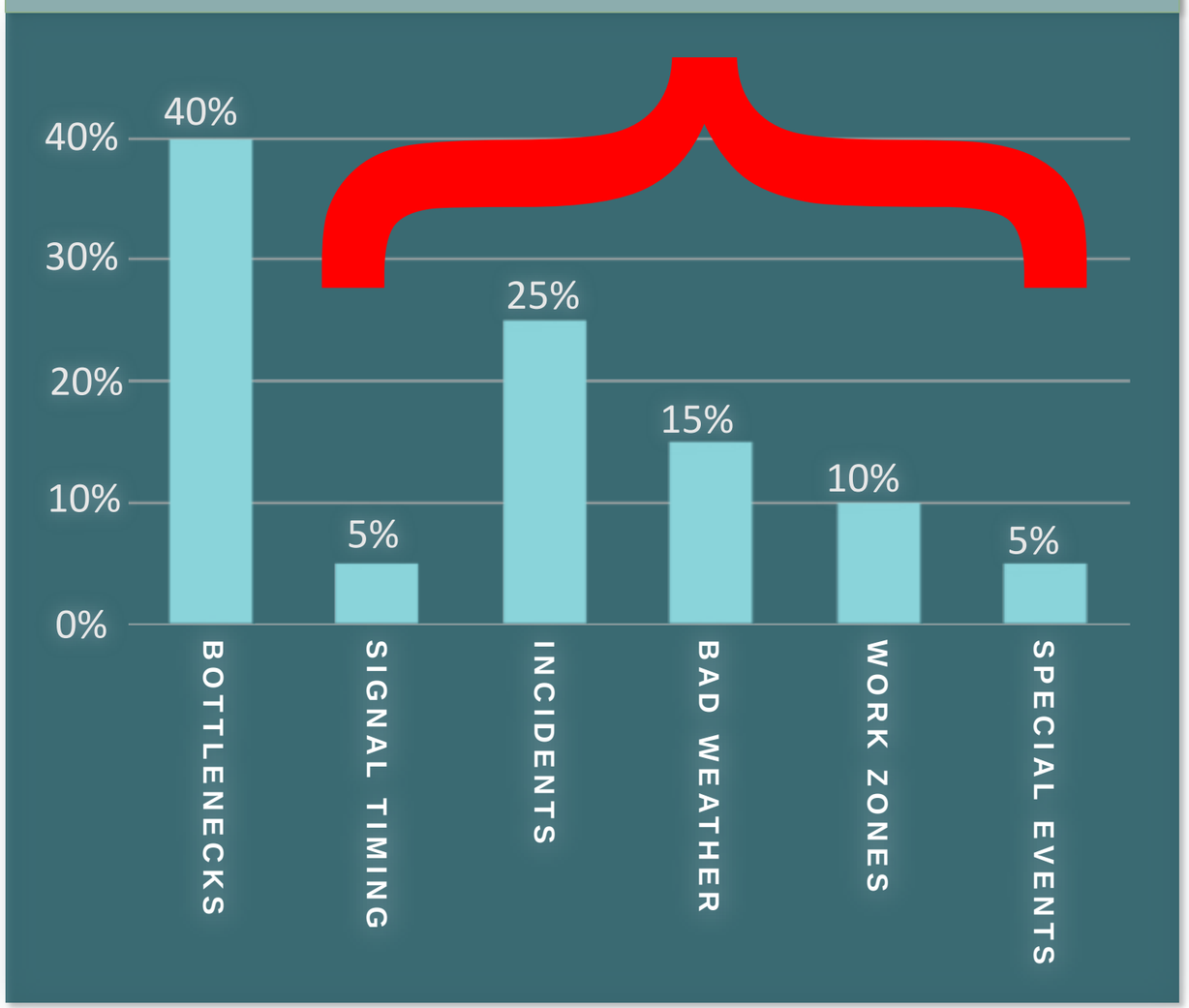
Congestion Reduction and Traffic Planning Solutions for the I-76 Corridor

Built It, Renew It and Operate It

Delivering the system's benefits to our customers

Benefits of Operations

National Causes of Delay



Benefits of Operations Initiatives

- Region-wide impact
- Prompt implementation
- High benefit and low cost
- Positive public response

Active Traffic Management/ICM

Operate Efficiently

1. Real Time Monitoring/Performance Measures
2. Real Time Incident Mitigation
3. Real Time Signal Management
4. Real Time Partner Coordination

Manage Demand and Strategically Add Capacity

1. Real Time Parking Information
2. Real Time Traffic and Transit Vehicle Information
3. Real Time Lane Management
4. Ramp Metering

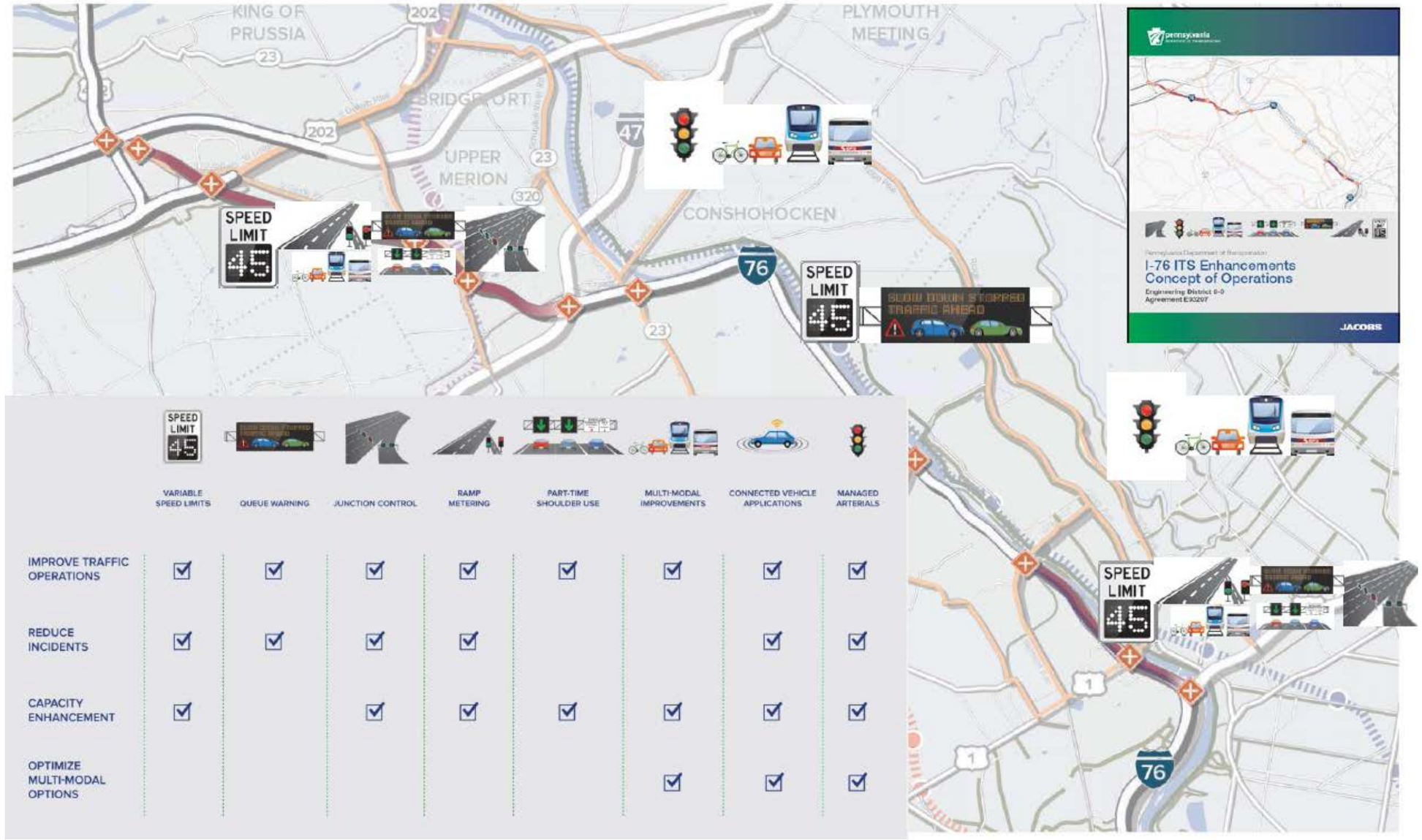
Enhance Safety

PennDOT District 6 – Active Traffic Management

Part-Time Shoulder Use – District 6-0 Projects Underway or Being Considered for Development

- I-76 (Schuylkill Expressway) from US 202 to I-476 (Blue Route), and I-76 WB from US 1 to Belmont Avenue
- I-467 (Blue Route) from West Chester Pike to I-95, plus I-95 SB to US 322
- US 422 from PA 29 to US 202
- US 30 Reconstruction from Coatesville to Downingtown

I-76 ICM – Project Focus/Limits



Active Traffic Management Strategies

Variable Speed Limits

Queue Detection / Warning

Ramp Metering

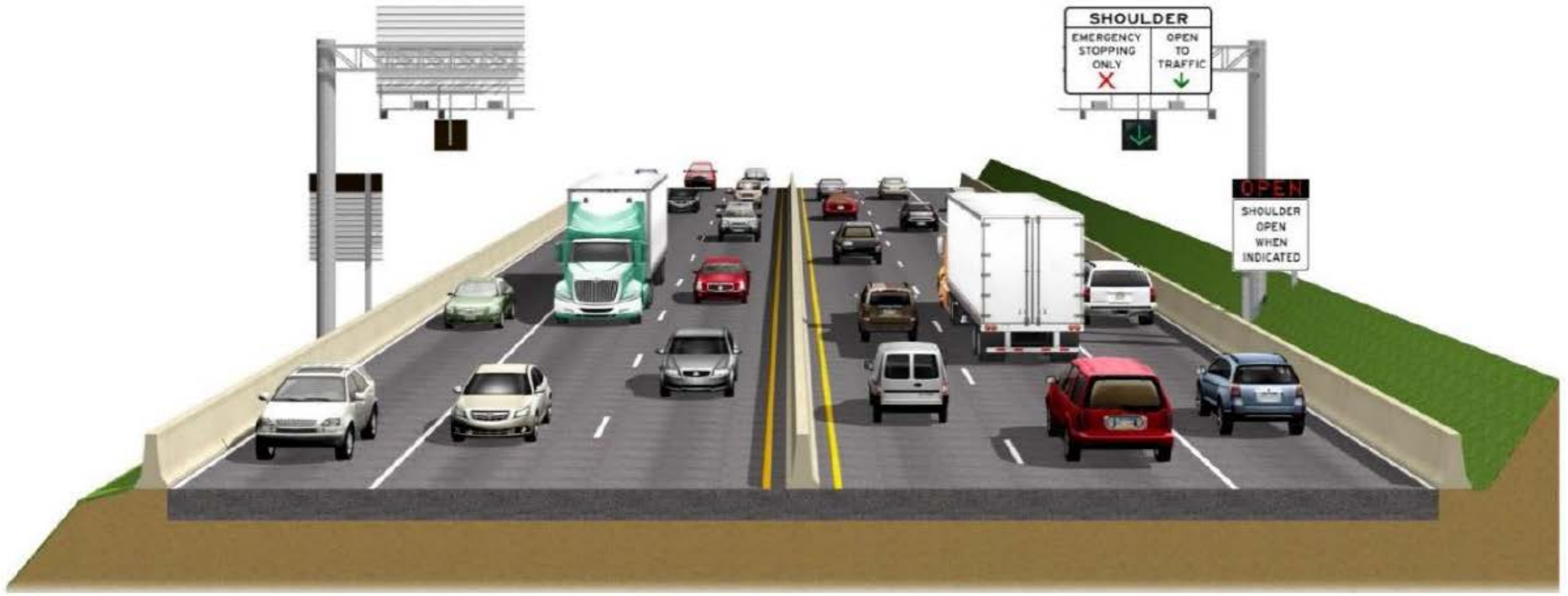
Dynamic Lane Assignments and Junction Control

Proactive Management of Traffic Signals

Multimodal Transit Improvements

PennDOT District 6 – Active Traffic Management

Part-Time Shoulder Use



Increased Expressway Service Patrol Coverage

PennDOT District 6 – Active Traffic Management

Benefits of Part-Time Shoulder Use

- Smaller operational footprint requiring less R/W
- Less environmental impacts
- Faster project delivery
- More economical
- Scope is scaled to fit the traffic demand

Congestion Management – Traffic Management/Arterials

- **Traffic Signal Upgrade**
- **Public safety agency collaboration**
- **Local government/MPO/RTPA cooperation**
- **Trail Improvement and end trail connections to transportation facilities**
- **Transit Improvements–Real Time Headway Improvements (Bus/Rail)**
  - Additional Train Cars, Buses in Real Time
  - Additional Bus Service and Employer Shuttles
  - Parking Garages, Park And Ride Lots and Real Time Parking Information
- **Corridor Intelligent Transportation Systems Expansion**
  - Camera/Travel Time Detectors
  - Dynamic Message Signs on Arterials
  - Software
  - Transit Priority

Traveler Information – Transit Real Time Vehicle Information

Beginning at 10pm on Wednesday, 11/15.

- **SEPTA Hopes to Make Commutes Smoother with Launch of Newest App.**
- Is your train's arrival time a mystery? SEPTA's hoping to fix that once again.
- The transit authority launched the latest version of its app for iPhone and Android users Wednesday night, promising the most up-to-date information on travel times and easier-to-understand navigation as well as alerts to improve the commuting experience for SEPTA's often-frustrated customers.
- SEPTA's app was built with customer feedback in mind, the agency said in an announcement. The feedback likely wasn't to difficult to locate– customers' complaints are easily found on social media. Inaccurate travel times are a recurring theme.
- Philadelphia Inquirer

Regional Traffic Management Center – Signal Operations

Floor Operations

- Implementing incident timings
  - Monitor Arterials and coordinate response similar to Freeways.
  - Strive to Maximize throughput of the entire system through travel time, incident notification posted on DMS and coordination with partners.

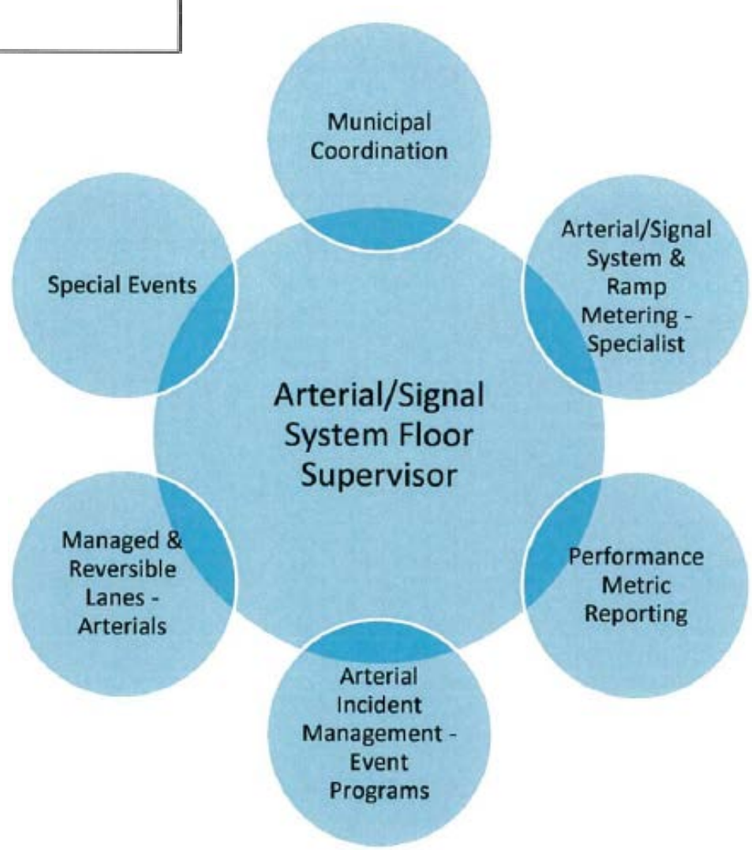
Other Every Day Activities

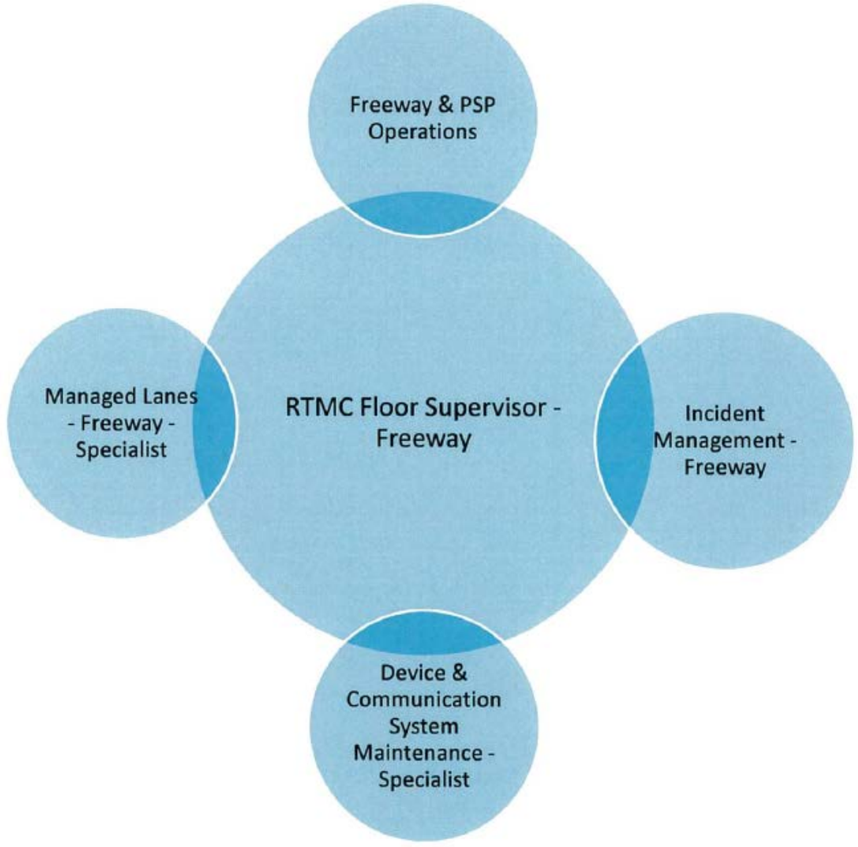
- Ensure complete communications with corridor's and proper function of system components.
  - Determine what the timings should be and download to signal systems.
  - Coordinate repair needs with partners.

RTMC: Real Time Operations (Workforce)

Overall TSMO PROGRAM

- Operations Monitoring
- System Management
- Incident/Event Response
- Reporting





Thank You

- Rendering of Proposed RTMC
- Capital Authorization In Place (Funds Already In Place on the TIP)

King of Prussia Rail Extension;
On-Corridor Station Improvement Projects;
Traveler Information

Elizabeth Smith, Manager of Long Range Planning
SEPTA

I-76 Transit Snapshot

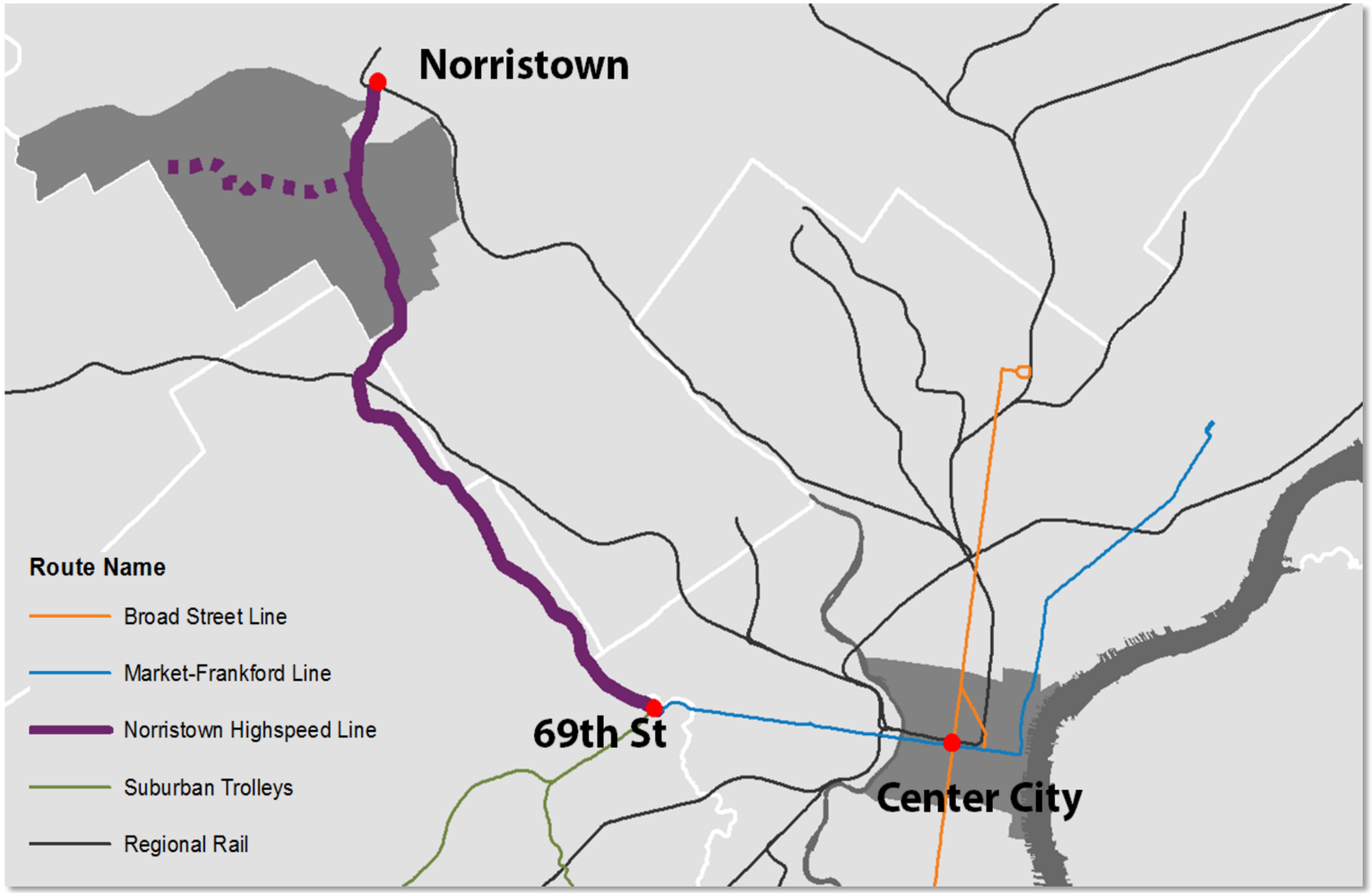
- Currently have 5 bus routes that utilize I-76 as part of their route, with combined route ridership of over 9,000 riders per day.
- Few parallel alternative routes available between Center City and Main Line/KOP
- Due to congestion and uncertainty in trip times, these bus routes are low performers in terms of on-time performance

Short Term Transit Projects

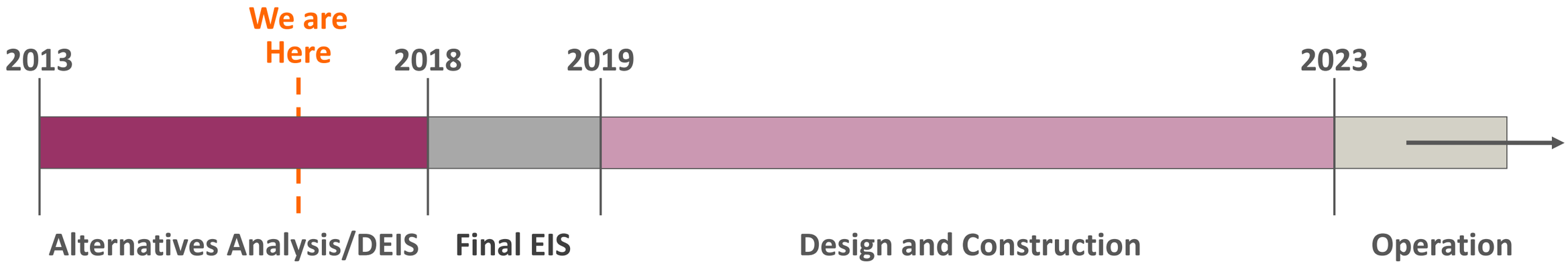
- Nearby station improvements and enhanced parking capacity
  - Conshohocken Station
- Potential for variable message signing to alert drivers to alternate SEPTA service
  - Next to arrive trains
  - Total trip time
  - Parking availability

Long Term Transit Projects

- King of Prussia Rail



Long Term Transit Projects



- 4.5 miles in length, 5 stations, almost 10,000 riders per day
- Total capital cost of $1.2 B
- Significant travel time savings – 30 minutes each way

I-76 Parallel Corridors Signal Operations; PennDOT Traffic Signal Ownership & Maintenance Pilot; Municipal Outreach

Presented by

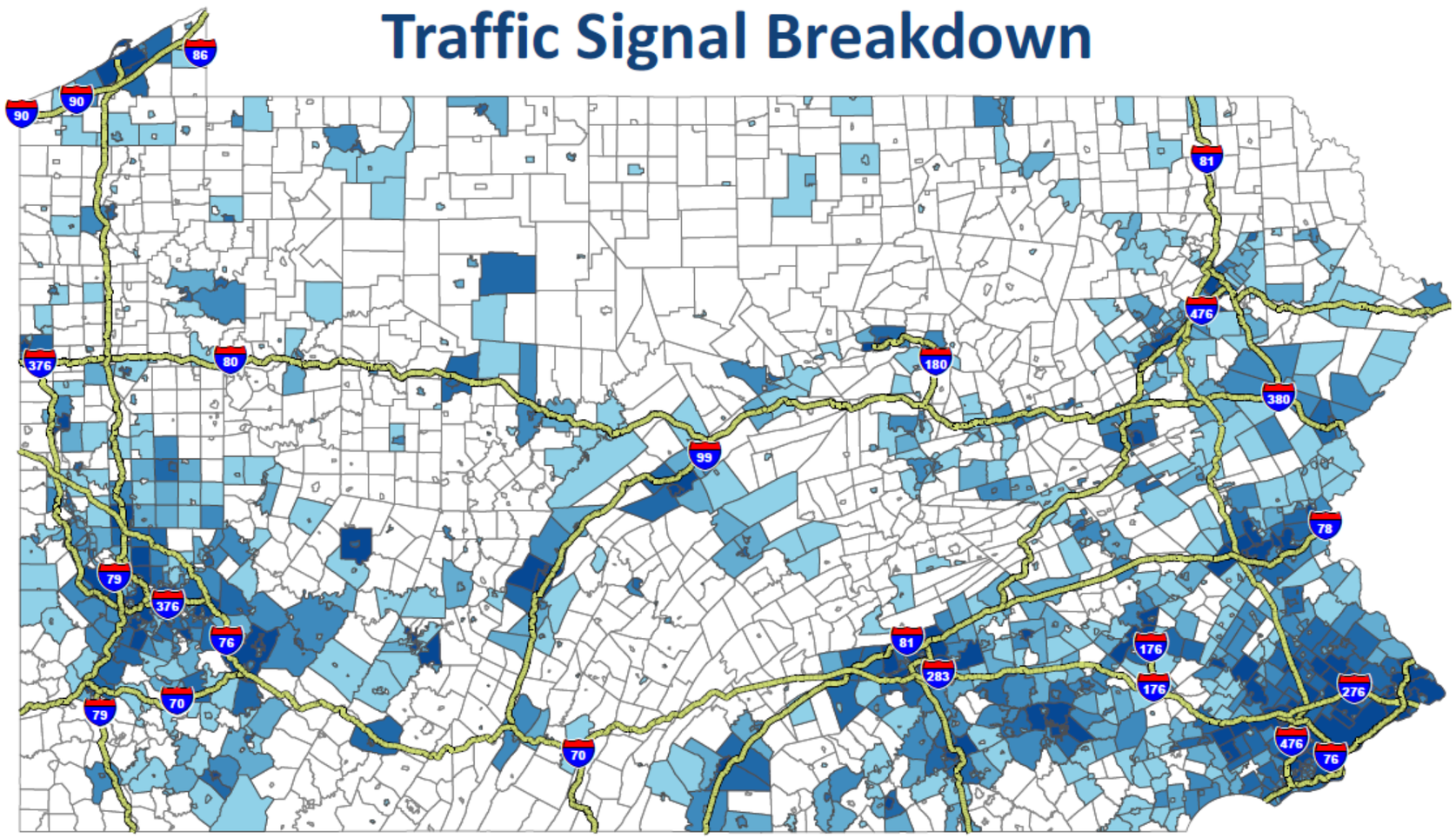
David L. Adams, PE, Traffic Signals Manager

PennDOT District 6-0

TRANSFORM76.COM

I-76 Parallel Corridors - Traffic Signal Operations

- What's the problem?



- 1,200 municipal signal owners
- 14,000 signals in Pennsylvania
- 75% own less than 10 signals
- 80%+ maintained by contractors
- 10,500 (77%) on state highways

I-76 Parallel Corridors - Traffic Signal Operations

- How did we get here?

I-76 Parallel Corridors - Traffic Signal Operations

- How did we get here?

I-76 Parallel Corridors - Traffic Signal Operations

- How did we get here?

Lester Wire
Salt Lake City Police Department

William Potts
Detroit Police Department

I-76 Parallel Corridors - Traffic Signal Operations

How did we get here?

- Act 403 of 1929
- Act 360 of 1937
- Late 1940s
  – Earliest records of Department of Highways issuing signal permits
  – Engineering District performed study with Central Office issuing permit
- 1970s – Engineering District performs study AND issues permit

I-76 Parallel Corridors - Traffic Signal Operations

I-76 Parallel Corridors - Traffic Signal Operations

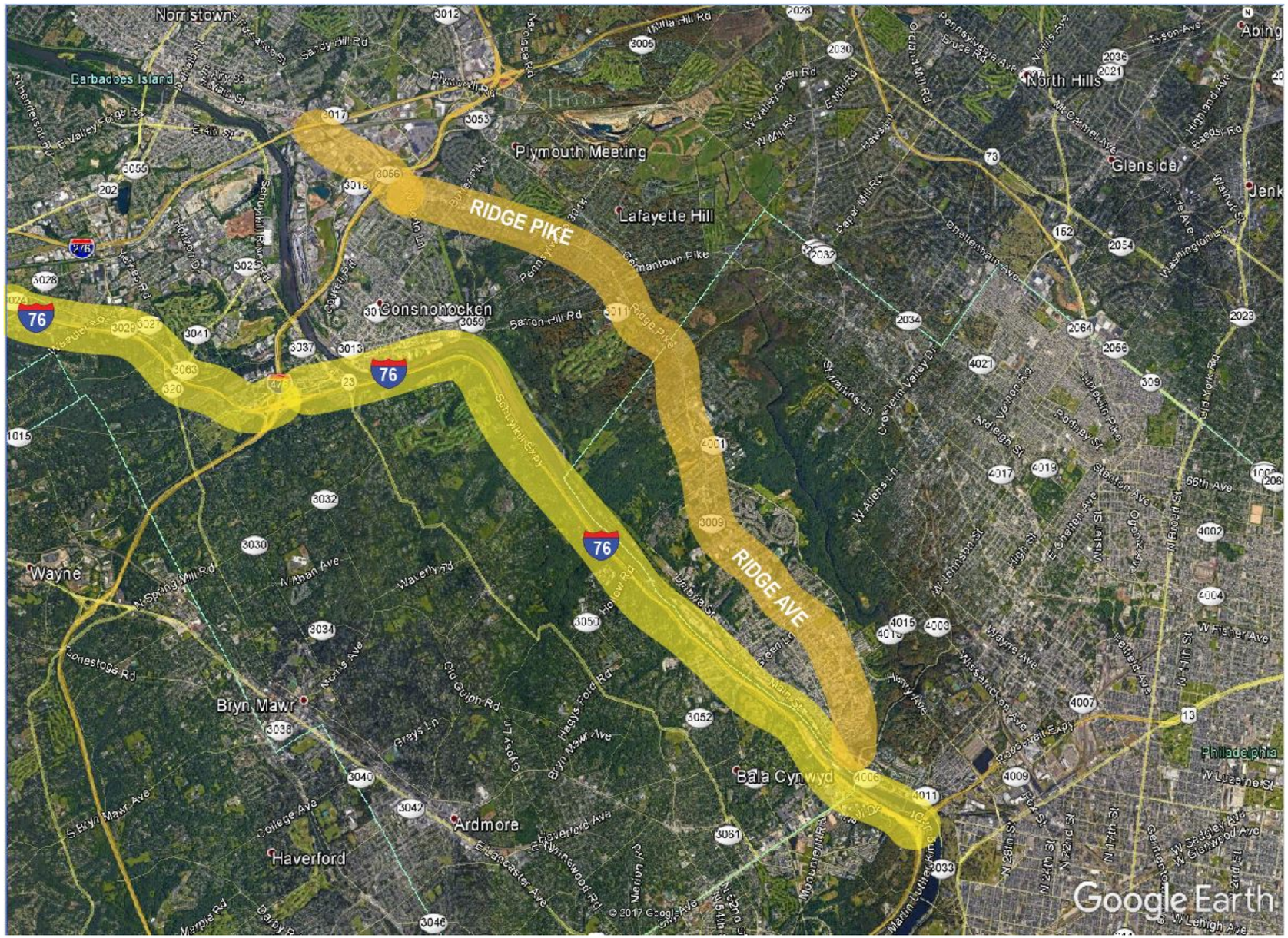
Pennsylvania Act 101 (2016)

- Act 101 (2016) updated Act 89 of 2013 which created Title 75, Section 9511(e.1) - new funding program for signalized corridors.
- Gives PennDOT the authority to install, replace, synchronize, time, own, operate or maintain traffic signals
- Authorized for state highways or local roadways
- Allows Secretary of Transportation to identify a Pilot Program for PennDOT managed traffic signals, with notification in PA Bulletin
- Pilot Program Evaluation completed by January 2022

The critical corridors adjacent to I-76 were identified as candidates for this Pilot Program

I-76 Parallel Corridors - Traffic Signal Operations

I-76 Parallel Corridors - Traffic Signal Operations



I-76 Parallel Corridors - Traffic Signal Operations

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I-76 Parallel Corridors - Traffic Signal Operations

Municipal Feedback & Concerns

- Generally positive feedback regarding PennDOT Signal Ownership & Maintenance transfer
- Define roles and responsibilities in emergency response
- Concern regarding Outages and Response Times
- Local Project Coordination
- Existing In-house municipal signal maintenance staff
- PennDOT maintenance contracts & staffing
- Liability transfer to PennDOT

I-76 Parallel Corridors - Traffic Signal Operations

Regional Traffic Signal Operations and Management Plan

- Command and Control Software Requirements
- Performance Measures Reporting
- Maintenance Contracts
- Sustainable Municipal Partnership & Engagement
- Municipal Cooperative Maintenance Agreements
- Signal System Concept of Operations
- PennDOT Traffic Signal Operations Staffing
- Equipment Requirements and Standards

I-76 Parallel Corridors - Traffic Signal Operations

- Advancing the Program - Next Steps

2017	2018	2019	2020	2021
Municipal & Stakeholder Engagement (Program Input & Goal Setting; Concurrent Project Coordination; Incident Management Subcommittee)				
	Project Delivery (Phased Deployments) - Design and Construction of Traffic Signal Improvements			
	Development and Deployment Traffic Signal Command and Control Software			
	Municipal Agreements		Ownership Transfers / PennDOT Begins Maintenance Responsibility	
	Concept of Operations Development		PennDOT Active Management of Corridors	
			Pilot Program Monitoring and Evaluation	

A full assessment and evaluation of this Pilot Program is due to the Secretary of Transportation in January 2022.

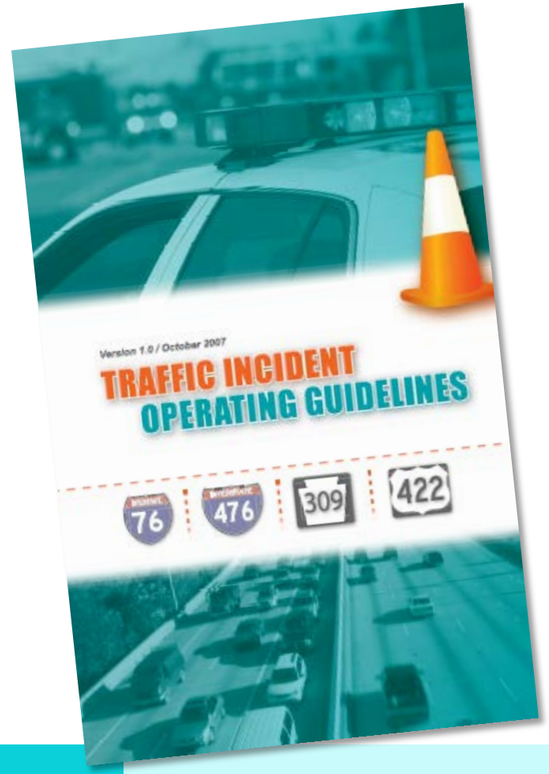
Incident Management and Emergency Responder Coordination; State Police Partnership; Peer Agency Information Sharing

Chris King, Manager, Office of Transportation Operations Management, DVRPC

I-76/I-476 Crossroads Traffic Incident Management Task Force (IMTF)

- Established in 1999
- 1st Corridor TIM Team in Pennsylvania
- Includes portions of Philadelphia, Montgomery and Delaware Counties
- Covering portions of I-76, I-476, US 202, US 422, PA Turnpike
- Stakeholders include PennDOT, PA State Police, PA Turnpike, Montgomery County, local fire, police, EMS, towing and other applicable agencies
- Successes

–Traffic Incident Operating Guidelines



FHWA Part Time Shoulder Use Peer Exchange

- June 7, 2016
- FHWA's Viewpoint
  - National Shoulder Use Overview
  - A Local Perspective
- Peer Panel Discussion of Shoulder Use and Across the Country
  - Virginia
  - Washington State
  - Minnesota
  - Michigan
- Opportunity for responders to express any issues and concerns

Additional Outreach

Virginia DOT / I-66 HSR Scanning Tour

- September 20-21, 2016
- Representatives from PA State Police, PennDOT Central Office, District 6 and Lower Merion Township Fire Department
- Firsthand look at their I-66 Part Time Shoulder Use Lanes and Virginia DOT Traffic Management Center in Fairfax
  - Discuss with Virginia DOT and local responders about operation and emergency response

I-76 ICM – Emergency Responders Meeting

- September 19, 2017
- Provide I-76 ATM Updates, Scope and schedule and discuss in detail responder concerns and issues

Identified Concerns by Local Emergency Responders

- Communications
- Response
- Pre-Planning
- Traffic Management

Identified Concerns by Local Emergency Responders

<u>Communications</u>

- Incident verification and getting correct information to responders
- Responders need direct communication with PennDOT and PSP
- CAD integration is needed…overcoming technological and institutional barriers

<u>Response</u>

- How do we get there in gridlock?
- Limited space – “splitting” traffic not an option in large parts of project area
- What about debris? What about abandoned vehicles?
- Swing gates, turnarounds

Identified Concerns by Local Emergency Responders

Pre-Planning

- Potential response strategies may be against longstanding procedures.
- First responder needs must be included in the planning phase (i.e. accessibility for responder vehicles)
- Adjacent access areas must be identified, developed, and maintained

Traffic Management

- Responders don’t always have the manpower to close lanes, manage traffic, etc.
- Vehicles restrictions on shoulder lanes? No trucks?

Looking Ahead

- Operational Scenarios
- Opportunity to use IMTF as a forum and outreach
- Discussion to form subcommittee of IMTF to regarding Traffic Signals to gain more municipal input to the operation of signals during incident when PennDOT takes ownership.

Project Management and Delivery

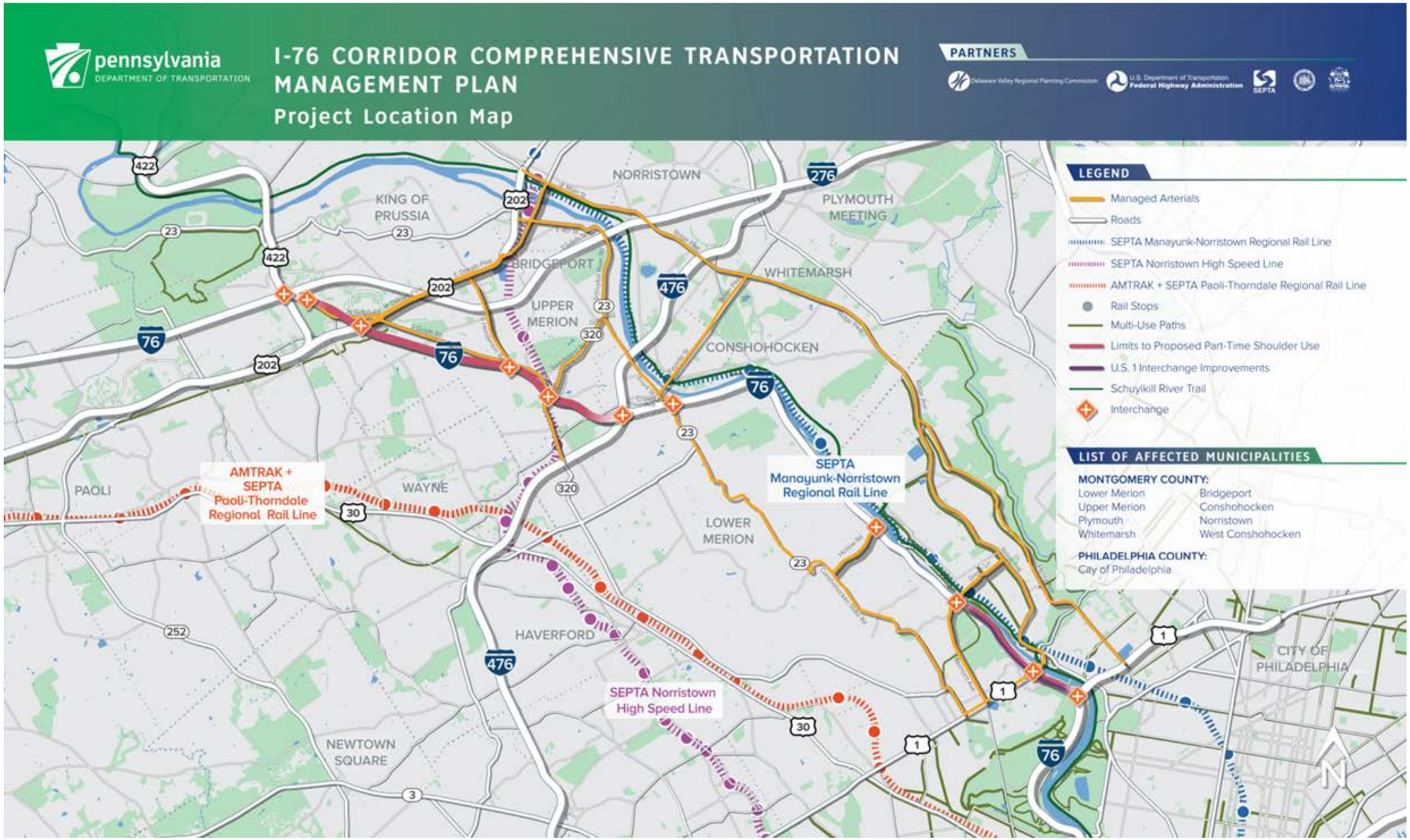
Jay Roth, Transportation Group Manager

Jacobs

I-76 ICM = Operational Improvement Program

Traditional Improvements	Operational Improvements
Standard Highway Design Approach (capacity & criteria)	Performance Based, Practical Design (flexibility & metrics)
Expand by adding lanes with full width shoulders	More effectively utilize existing geometry with minimal expansion
Larger Project Footprint	Little Widening Required. Limited Right of Way
Significant Environmental Clearance & Permitting Required	Limited Environmental Impacts
Significant Construction Impacts and Duration (approx. 10-15 years)	Reduced Construction Impacts and Duration (approx. 4-6 years)
High Construction Cost – More Difficult to Fund	Required Funding Available for Programming

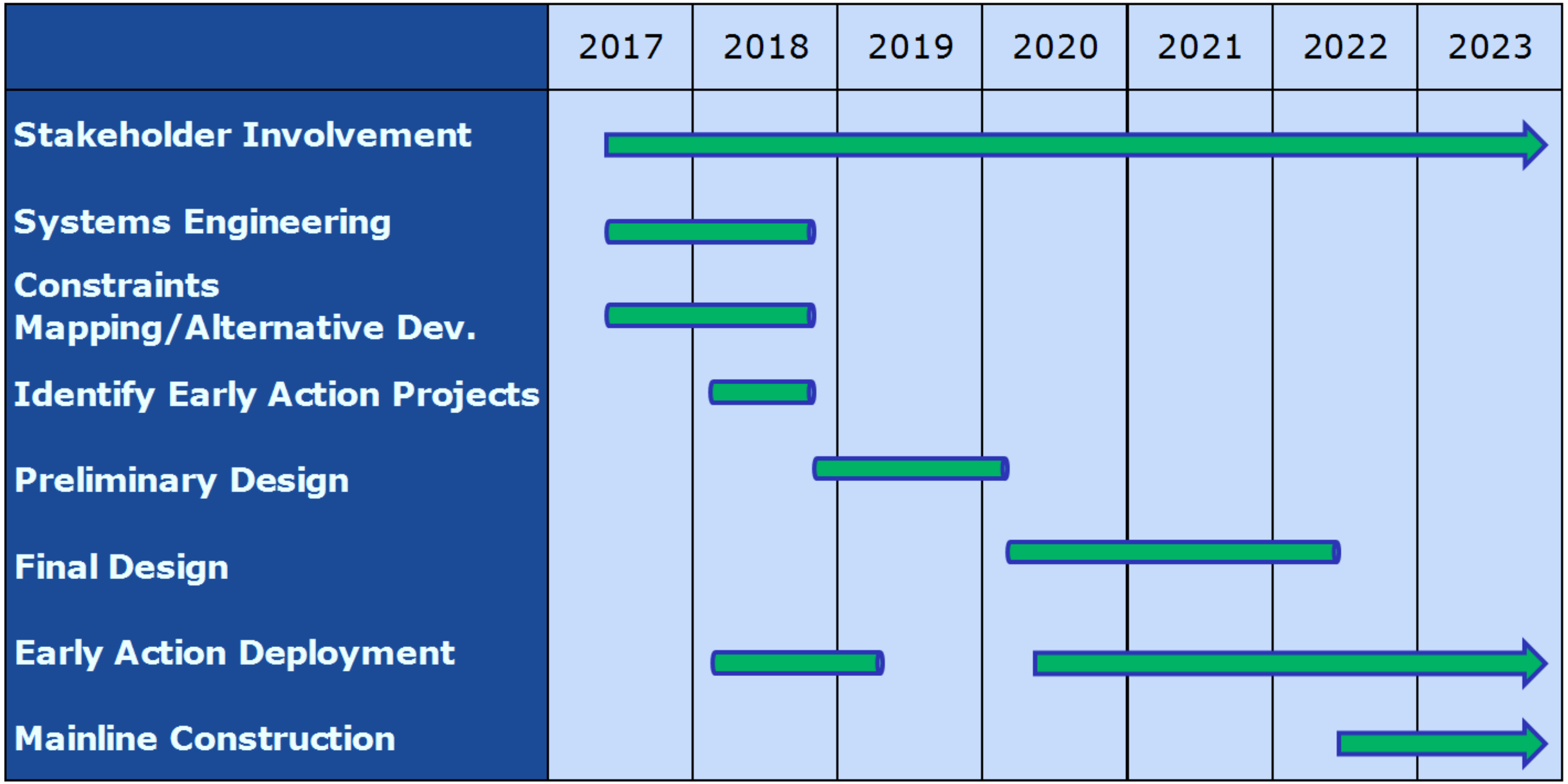
Project Limits and Scope



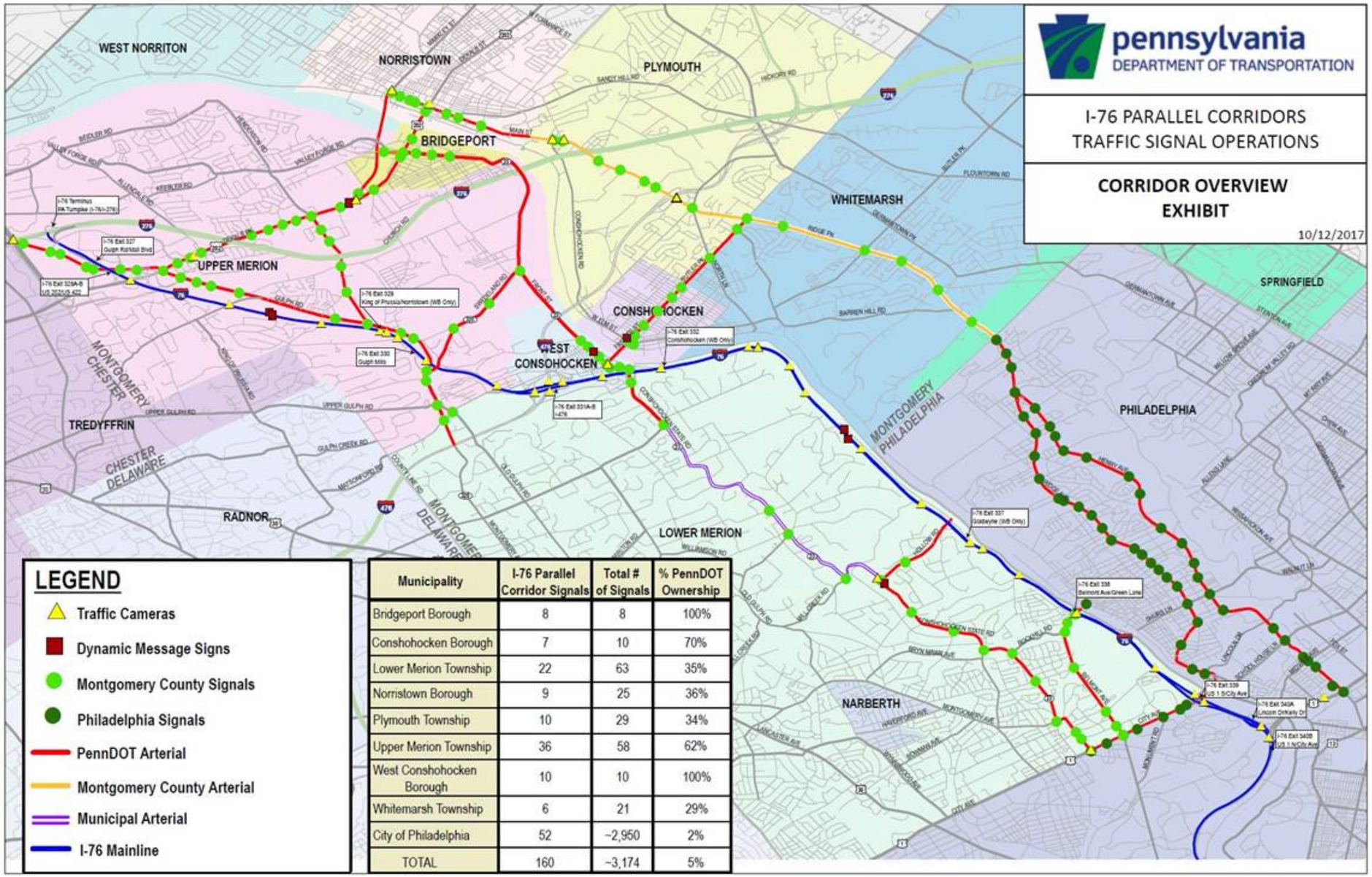
Approach & Execution

	Public and Stakeholder Involvement Track	Civil Design Track	ITS Design Track
Performance Based Practical Design	• Launch website & social media • Initial stakeholder meetings • IMC visioning	• Survey and mapping • Baseline infrastructure assessment • Utility, ROW, and environmental investigations • Establish design criteria and line & grade	• Systems engineering analysis • DVRPC model coordination • Traffic and safety analysis • Preliminary device layout
ATM Gate 1: Project Alternative Selection			
Alternative Development	• Public meeting #1 (progress and input) • SEPTA and multimodal outreach • IMC tabletop exercises	• Continue field work and base plans • Determine primary bid package composition • Overhead bridge CEE and design field view	• Develop software requirements • Ramp metering site analysis • Coordinate arterial corridor enhancements
ATM Gate 2: Identify Early Action Projects and Final Design Scope			
Design Field View and Early Action Deployment	• Public meeting #2 (early action areas and ATM education) • Stakeholder meetings and coordination • IMC early action project approval	• Overhead bridge final design • Pull-off and access ramp design • Mainline sections preliminary design and NEPA clearances	• Preliminary ITS design • Final design for early action ITS • Develop ITS continuity plan • Identify connected vehicle applications
ATM Gate 3: Complete Early Action Design and Main Section Design Field View Approval			
Final Design and Early Action Implementation	• Public meeting #3 (early action and final design) • Stakeholder updates and SEPTA messaging • IMC mainline project approval	• Construct early action bridges • Construct early action pull-offs and ramps • Mainline sections final design, clearances, and permits	• Implement early action ITS • Complete ITS design for shoulder running and junction control
ATM Gate 4: Final Design Complete – Early Action Complete/Ongoing and Major Project Let			

Overall Schedule



Program-Wide Coordination



Municipality	I-76 Parallel Corridor Signals	Total # of Signals	% PennDOT Ownership
Bridgeport Borough	8	8	100%
Conshohocken Borough	7	10	70%
Lower Merion Township	22	63	35%
Norristown Borough	9	25	36%
Plymouth Township	10	29	34%
Upper Merion Township	36	58	62%
West Conshohocken Borough	10	10	100%
Whitemarsh Township	6	21	29%
City of Philadelphia	52	~2,950	2%
TOTAL	160	~3,174	5%

Stakeholder & Public Outreach

- Meeting regularly with the I-76 ICM Executive Stakeholders, Advisory Committee and Emergency Responders
- Website & Project Branding Underway
  - Website URL: www.TRANSFORM76.com
- Provide a clearinghouse for educational and public outreach materials, as well as cover all ongoing corridor enhancement projects
- Developing Social Media Accounts in line with an overall communications plan
- Go Live – Before start of Early Action (VSL / QW) contractor activities on the corridor in Spring 2018

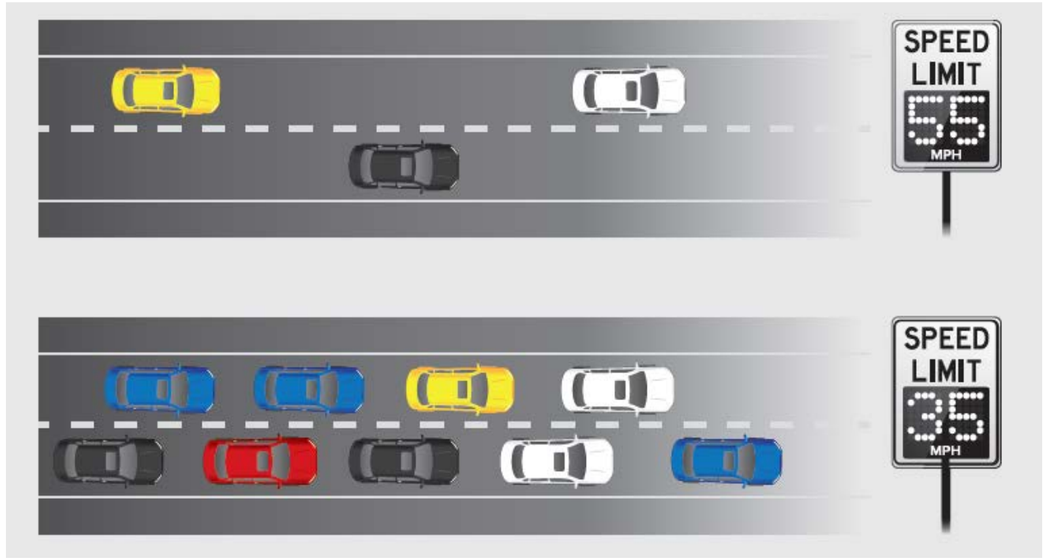
I-76 ITS Concept of Operations; ATM Strategies Development ITS & Systems Design

Brian DePan, ITS Design & Construction Manager
Jacobs

TRANSFORM76.COM

Variable Speed Limit and Queue Warning Early Action

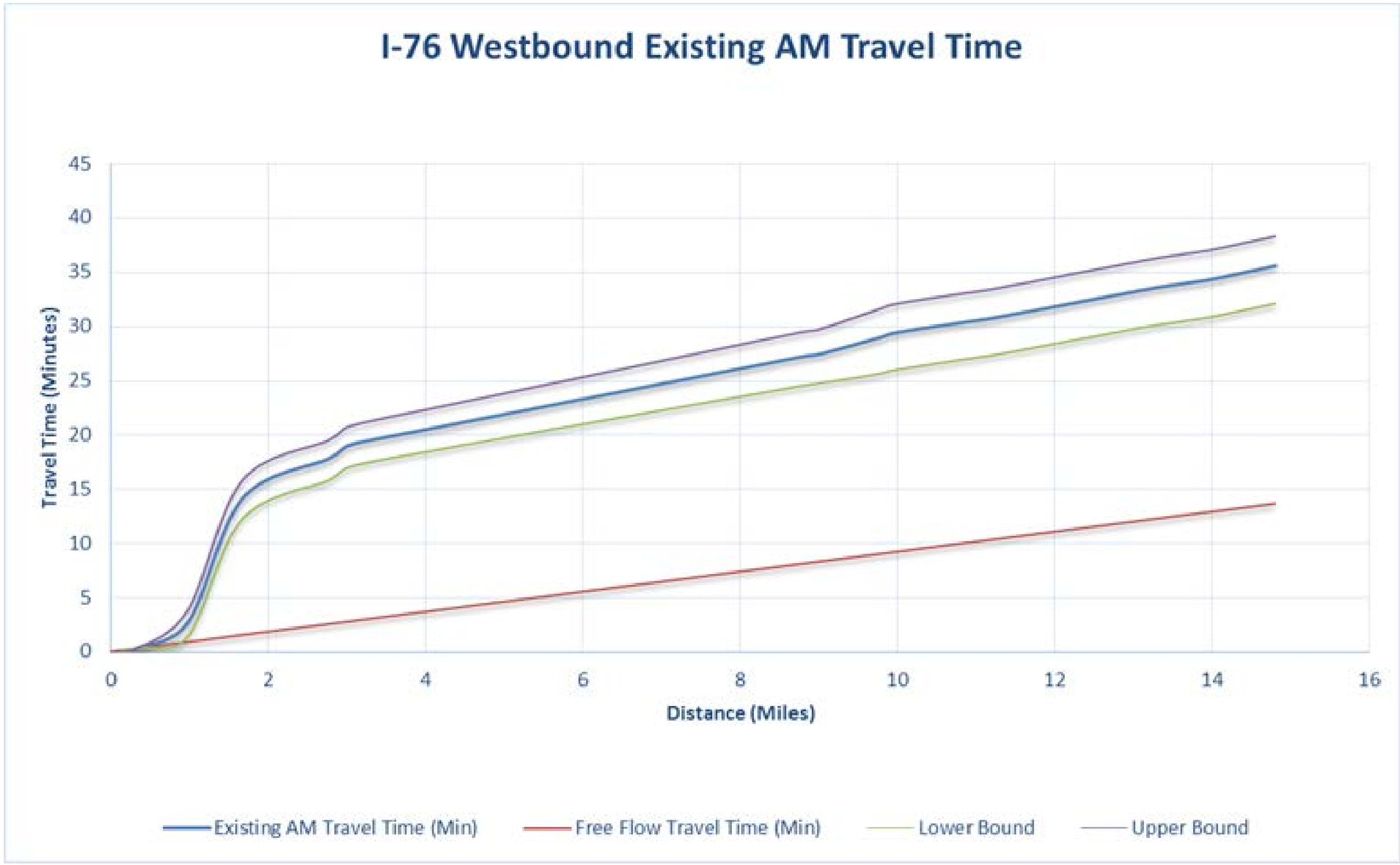
- Primary Goal – Reduce Rear-End Crashes and Harmonize Flow
- Overall Status
  - Design Nearing Completion
  - Project Let Date – February, 2018
  - Construction Start Date – April, 2018
  - Construction Complete – December, 2018
  - Go-Live – March, 2019
- Project Elements
  - 73Variable Speed Limit Signs
  - Nine(9) Dynamic Message Signs
  - New ATMS Software Module



Systems Engineering/Preliminary ITS Scoping

- Validating Concept of Operations
- Developing Systems Requirements
- Emergency Response Scenarios
- ITS Architecture Conformance
- Developing ATM/ICM Design Criteria
  - Gantry Spacing, Layout, Configuration
  - Junction Control & Lane Use Concepts
  - Emergency Pull-off and Access Needs/Constraints
  - Ramp Metering Warrants
  - Communications/Power Redundancy

Traffic Modeling



Safety Analysis