Maryland SHA's TSMO Master Plan Implementation Updates

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State College, Pennsylvania
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AGENDA

TSMO
MARYLAND TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS

1. TSMO Program and Master Plan

2. On-Going and Upcoming Projects

3. Other Initiatives (Architecture Update, Telecommunications Alternatives, etc.)

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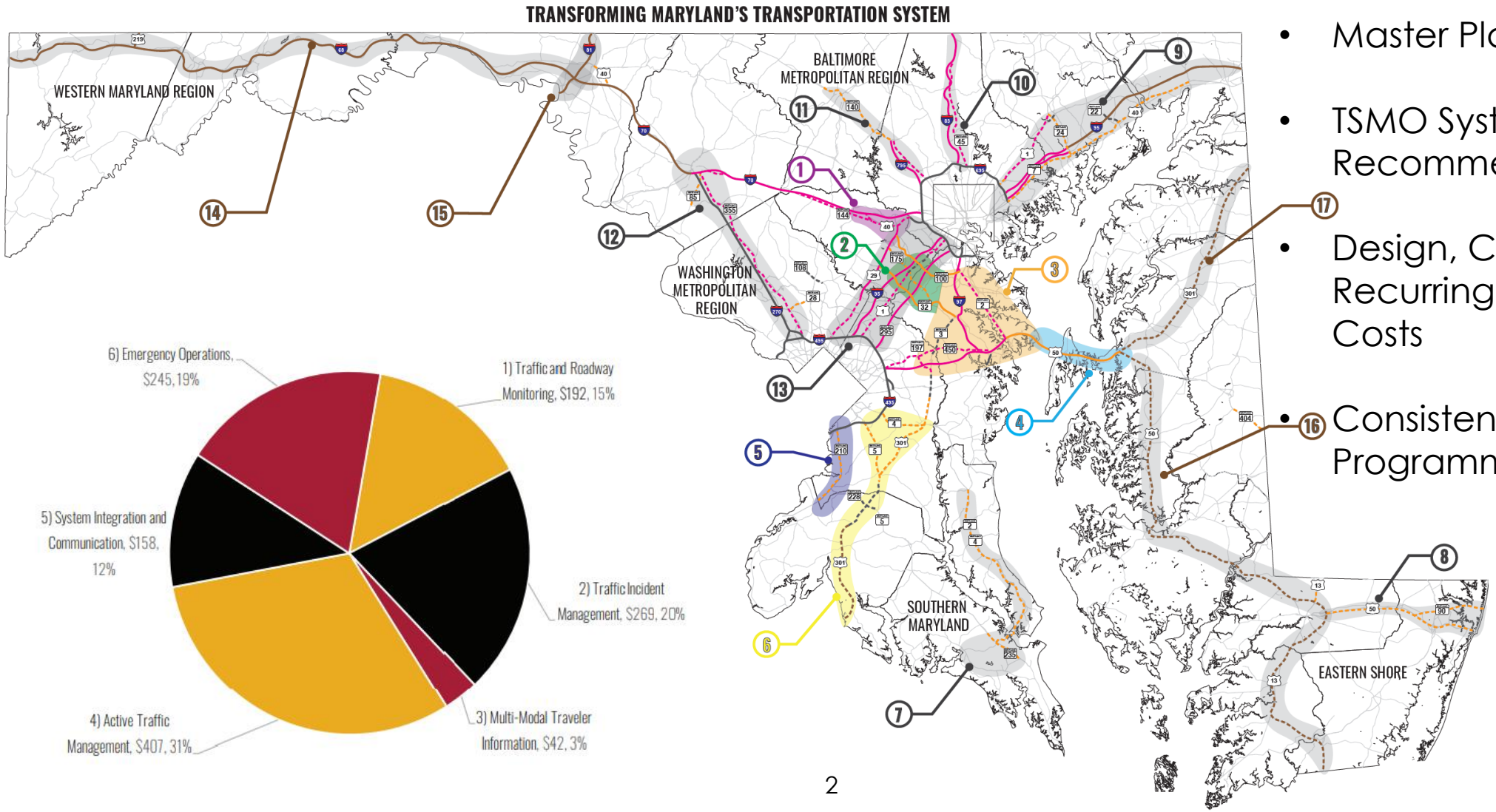
TSMO PROGRAM AND MASTER PLAN



- Master Plan - July 2020
- TSMO Systems and Recommendations
- Design, Construction, Recurring, and O&M Costs
- Consistent Vision and Programming Roadmap

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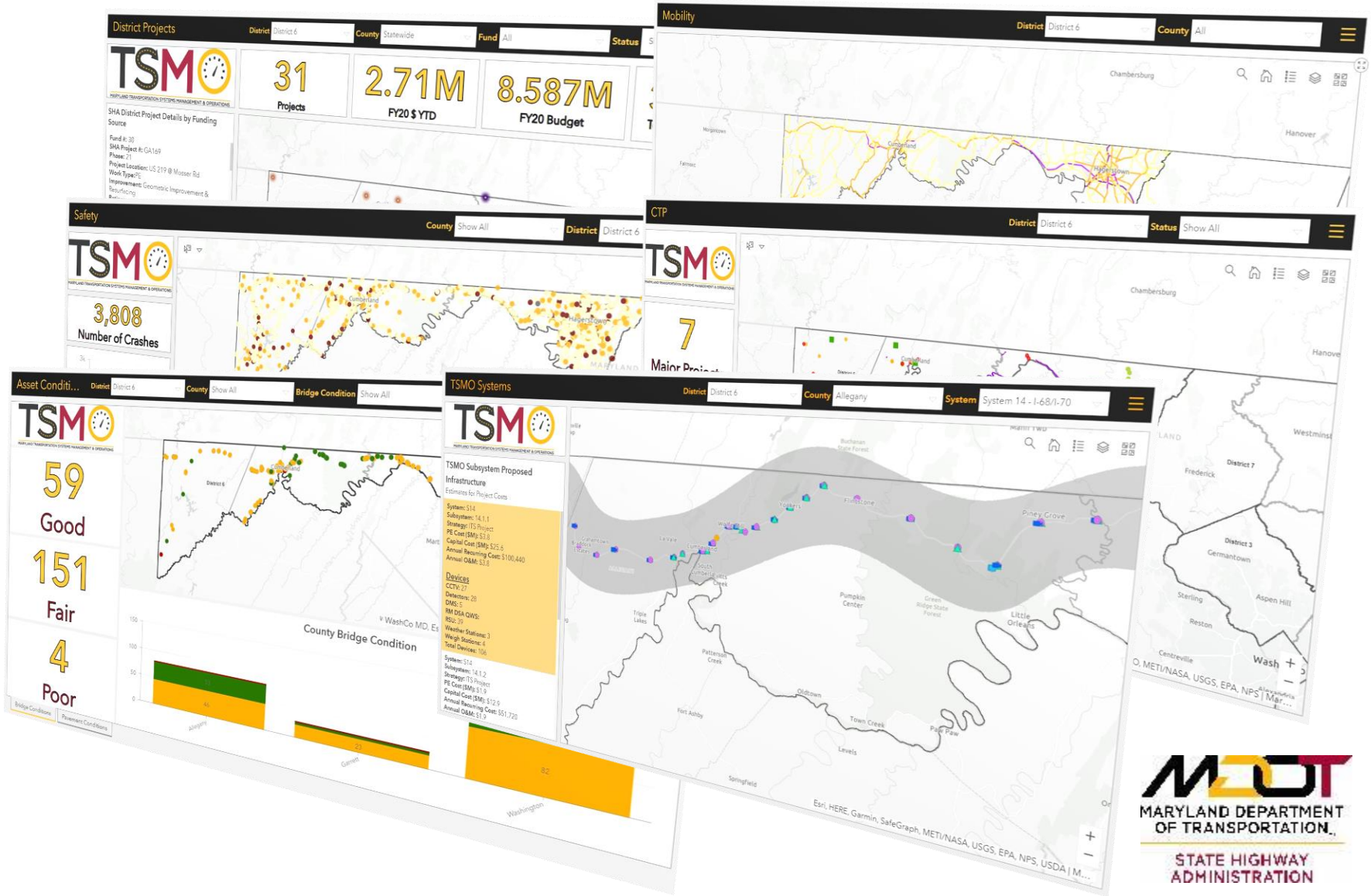
TSMO PROJECTS

- Master Plan
  - TSMO Systems
  - Sub-systems
- Mobility
- Safety
- District Projects
- CTP Projects
- Asset Co



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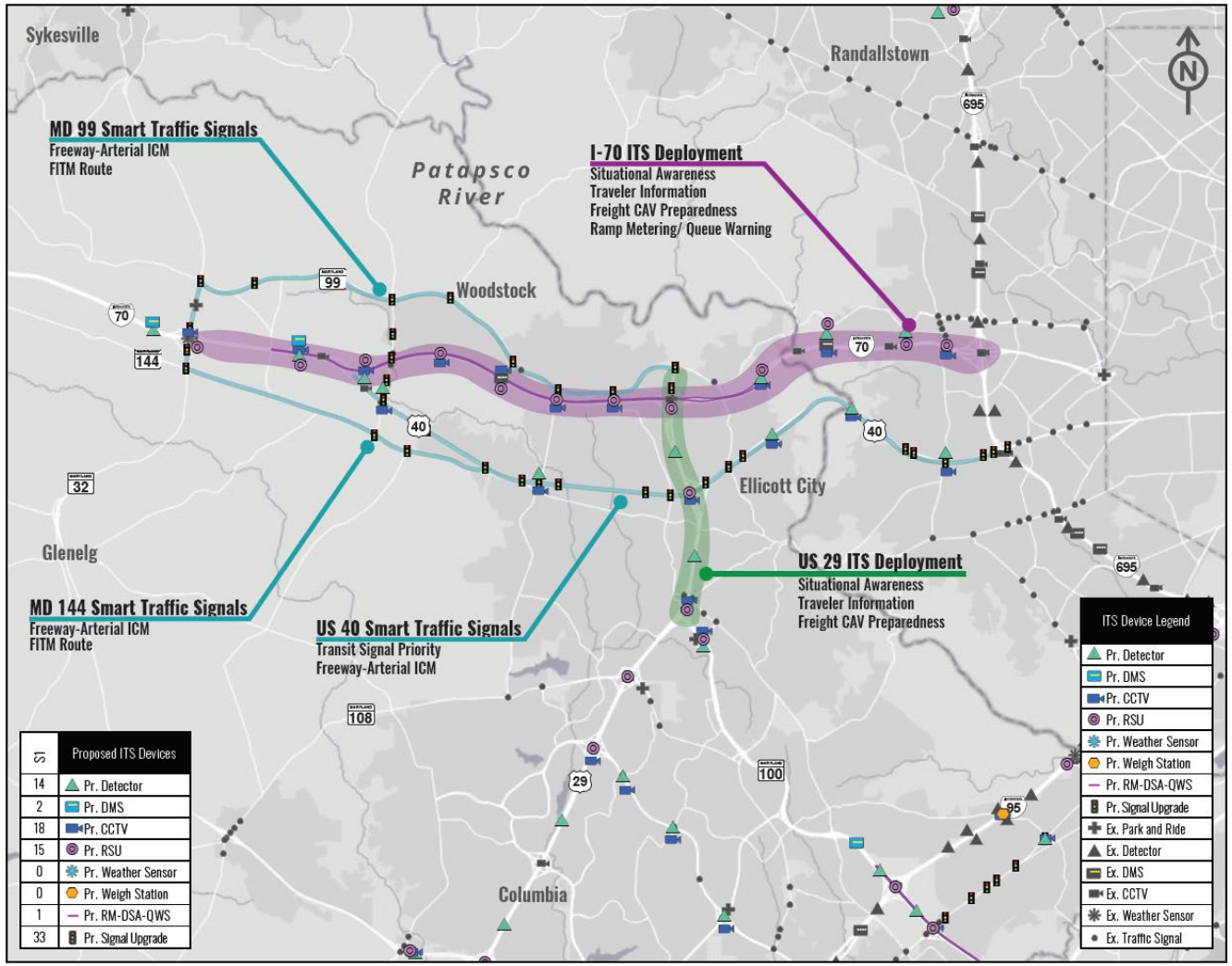
MASTER PLAN DEPLOYMENT



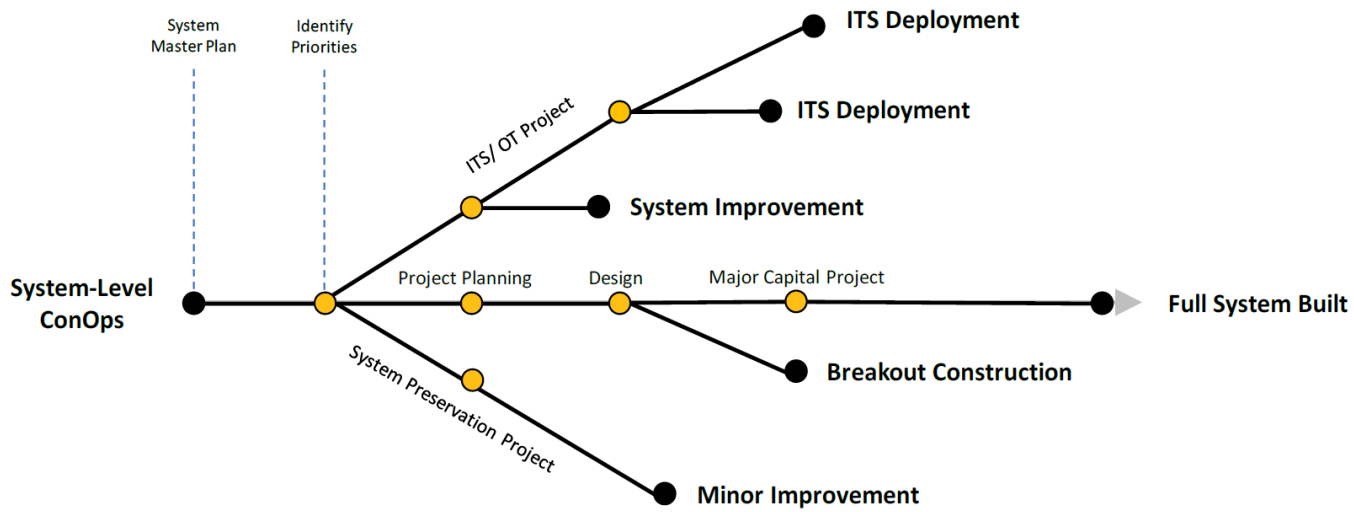
System 1 - I-70/US 40/US 29 between MD 32 and I-695

SUB-SYSTEM DEPLOYMENT:

System 1.1.1 (B/C: 12) Tier 1	I-70 Operational Technology Deployment of CCTV, DMS, traffic detectors, and RSU along I-70 between MD 32 and I-695.	PE: $0.6 M CO: $4.0 M Recurring Cost: $51.6 K Annual O&M: $0.6 M
System 1.1.2 (B/C: 49) Tier 2	US 29 Operational Technology Deployment of CCTV, traffic detectors, and RSU along US 29 between I-70 and MD 100.	PE: $0.1 M CO: $0.9 M Recurring Cost: $14.8 K Annual O&M: $0.1 M
System 1.1.3 (B/C: 96) Tier 2	US 40 Operational Technology Deployment of CCTV and traffic detectors along US 40 between I-70 and I-695.	PE: $0.1 M CO: $0.8 M Recurring Cost: $18.6 K Annual O&M: $0.1 M
System 1.1.4 (B/C: 5) Tier 1	I-70 Ramp Meter/ Queue Warning System Deploy detectors, cameras, and DMS along I-70 between MD 32 and US 29 to implement queue warming/ dynamic speed advisory systems and ramp metering.	PE: $1.5 M CO: $10.3 M Recurring Cost: $106.2 K Annual O&M: $1.5 M
System 1.2.1 (B/C: 7) Tier 1	US 40 Traffic Signal Upgrade Upgrade existing traffic signals along US 40 between I-70 and I-695 to be fully-actuated, equipped with S-Cabinets, have Video Detection, have CAV Equipment, ATMS enabled and have TSP.	PE: $0.4 M CO: $2.7 M Recurring Cost: $12.2 K Annual O&M: $0.4 M
System 1.2.2 (B/C: 4) Tier 1	MD 32 Traffic Signal Upgrade Upgrade existing traffic signals along MD 32 between MD 144 and MD 99 to be equipped with S-Cabinets, have Video Detection, have CAV Equipment, ATMS enabled.	PE: <$0.1 M CO: $0.2 M Recurring Cost: $1.4 K Annual O&M: <$0.1 M
System 1.2.3 (B/C: 11) Tier 2	MD 99 Traffic Signal Upgrade Upgrade existing traffic signals along MD 99 between MD 32 and US 29 to be equipped with S-Cabinets, have Video Detection, have CAV Equipment, ATMS enabled.	PE: $0.1 M CO: $0.9 M Recurring Cost: $5.8 K Annual O&M: $0.1 M
System 1.2.4 (B/C: 1) Tier 2	MD 144 Traffic Signal Upgrade Upgrade existing traffic signals along MD 144 between MD 32 and US 40 to be equipped with S-Cabinets, have Video Detection, have CAV Equipment, ATMS enabled.	PE: $0.1 M CO: $0.4 M Recurring Cost: $2.2 K Annual O&M: $0.1 M
System 1.2.5 (B/C: <1) Tier 3	Marriottsville Traffic Signal Upgrade Upgrade existing traffic signals along Marriotsville Road between MD 144 and MD 99 to be equipped with S-Cabinets, have Video Detection, have CAV Equipment, ATMS enabled.	PE: <$0.1 M CO: $0.3 M Recurring Cost: $2.2 K Annual O&M: <$0.1 M
System 1.3.1 Tier 1	Telecommunications Fiber connections for ITS deployment in sub systems and to provide critical connections for the network	PE: $2.0 M CO: $13.4 M Annual O&M: $0.6 M

OTMO Reorganization

- OTMO Reorganization
  - Signal System Collaboration
  - Mobility Planning and Engineering
  - TMC Structure



Project Delivery

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ONGOING & UPCOMING PROJECTS

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TSMO SYSTEM 1

Project Overview

- Application of ATM strategies to reduce non-recurring congestion, ease recurring congestion at bottlenecks, and improve safety, mobility and situational awareness.

- TSMO System 1 is located within Baltimore and Howard counties and includes I-70, US 29, US 40, MD 144, and MD 99 between I-695 & MD 32

- *Traffic Monitoring & Detection;*
- *Comm. & Signal Upgrades;*
- *Dynamic Speed Advisories;*
- *QW/ Traveler Information;*
- *SRA & Management;*

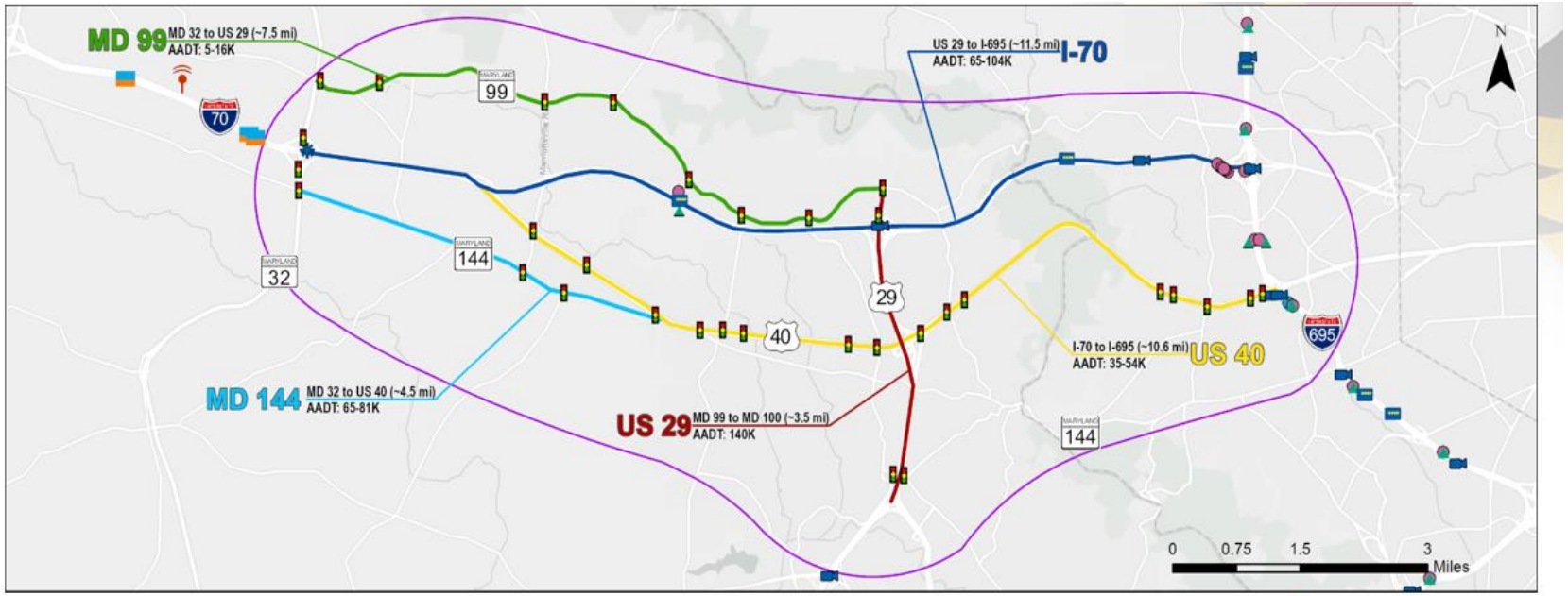
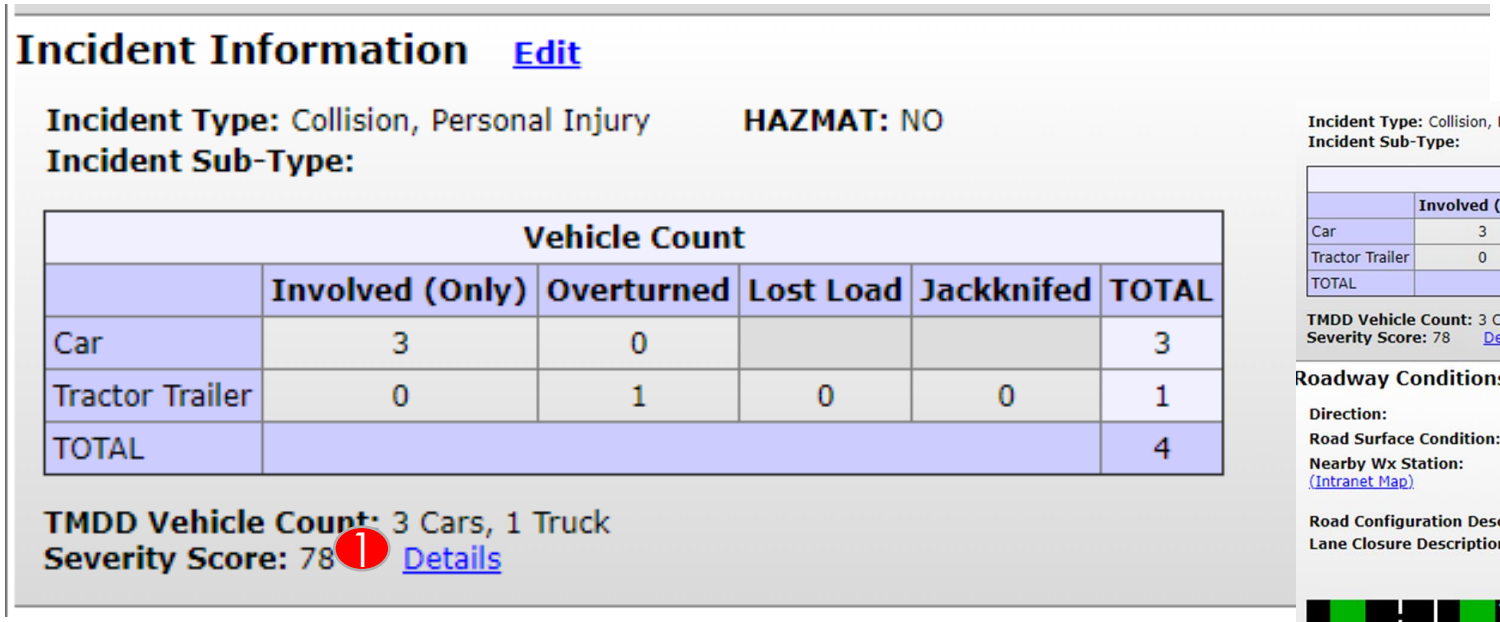


CHART ATMS Release 23

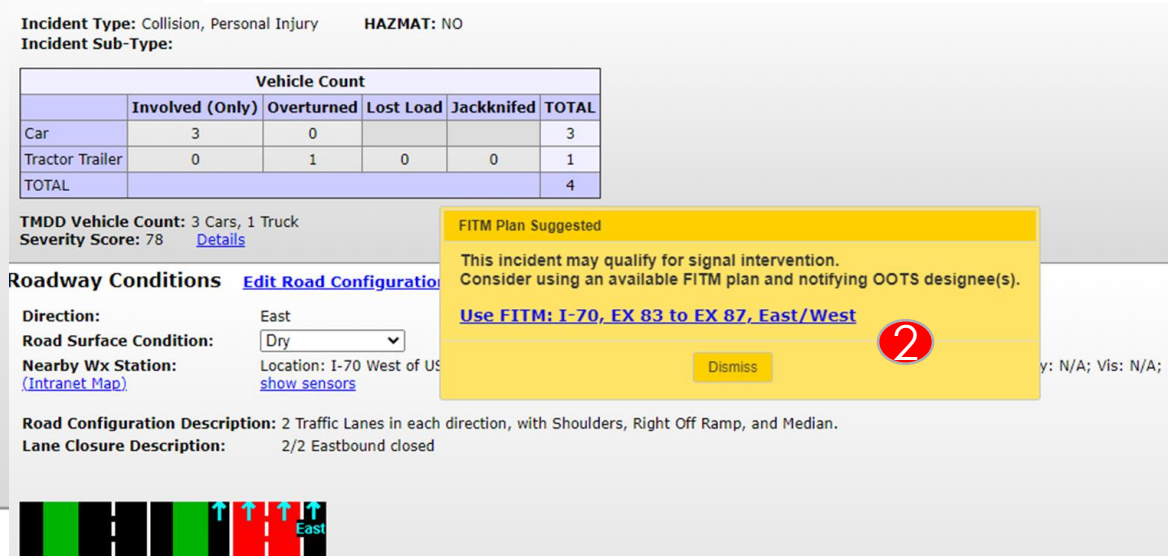


Incident Information Edit

Incident Type: Collision, Personal Injury **HAZMAT:** NO
Incident Sub-Type:

Vehicle Count					
	Involved (Only)	Overturned	Lost Load	Jackknifed	TOTAL
Car	3	0			3
Tractor Trailer	0	1	0	0	1
TOTAL					4

TMDD Vehicle Count: 3 Cars, 1 Truck
Severity Score: 78 1 Details



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FITM Plan Suggested

This incident may qualify for signal intervention.
Consider using an available FITM plan and notifying OOTS designee(s).

Use FITM: I-70, EX 83 to EX 87, East/West 2

Dismiss

Roadway Conditions Edit Road Configuratio

Direction: East
Road Surface Condition: Dry
Nearby Wx Station: Location: I-70 West of US
(Intranet Map) show sensors

Road Configuration Description: 2 Traffic Lanes in each direction, with Shoulders, Right Off Ramp, and Median.
Lane Closure Description: 2/2 Eastbound closed

East

1. Severity Score is always visible in the Incident Information Section of Incident Events.

2. Once the Severity Score threshold is passed this warning message will pop-up. The user may either choose one of the FITMs in the dialogue or dismiss the warning. All user actions are logged. The warning will stay in the users view until action is taken.

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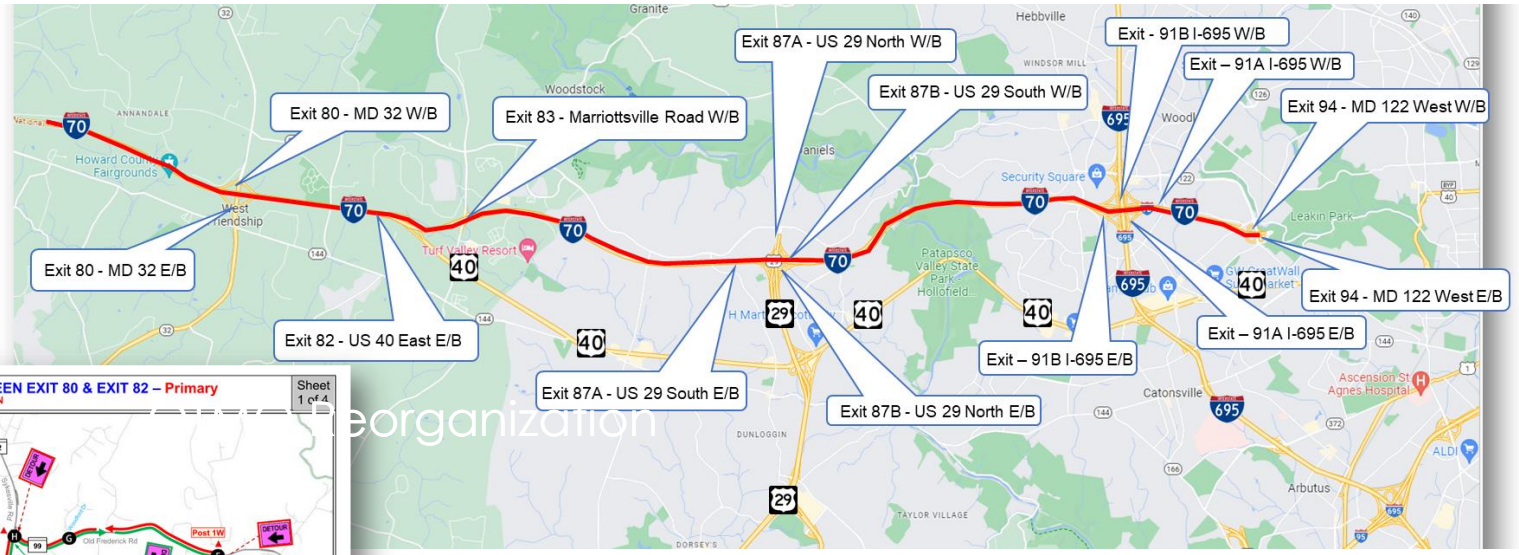
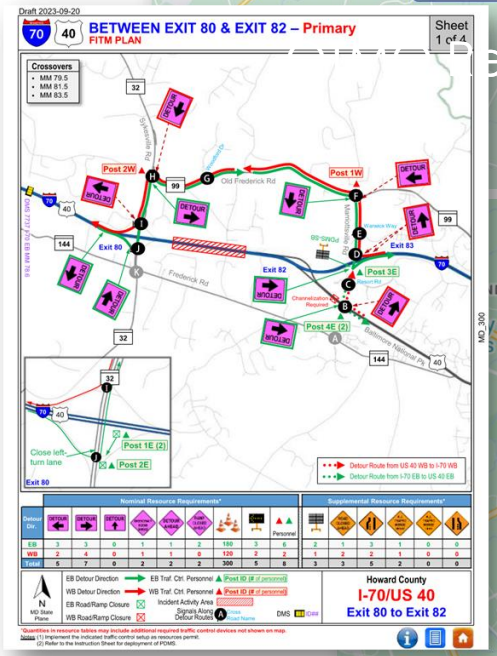
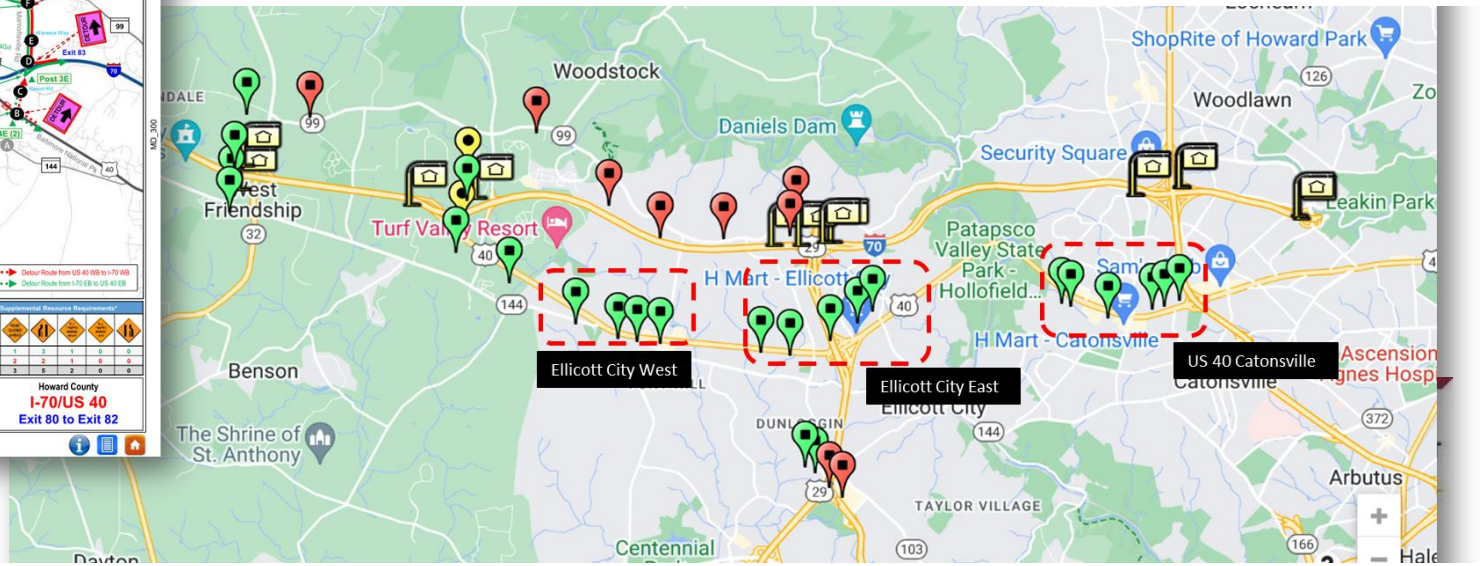
TSMO SYSTEM 1

Incident Signal Timing Plan Development

- Includes 30 intersections (coordinated and isolated)
- Timing plans for use during FITM activations
- OTMO & OOTS coordination
- Close coordination with Howard County DPW





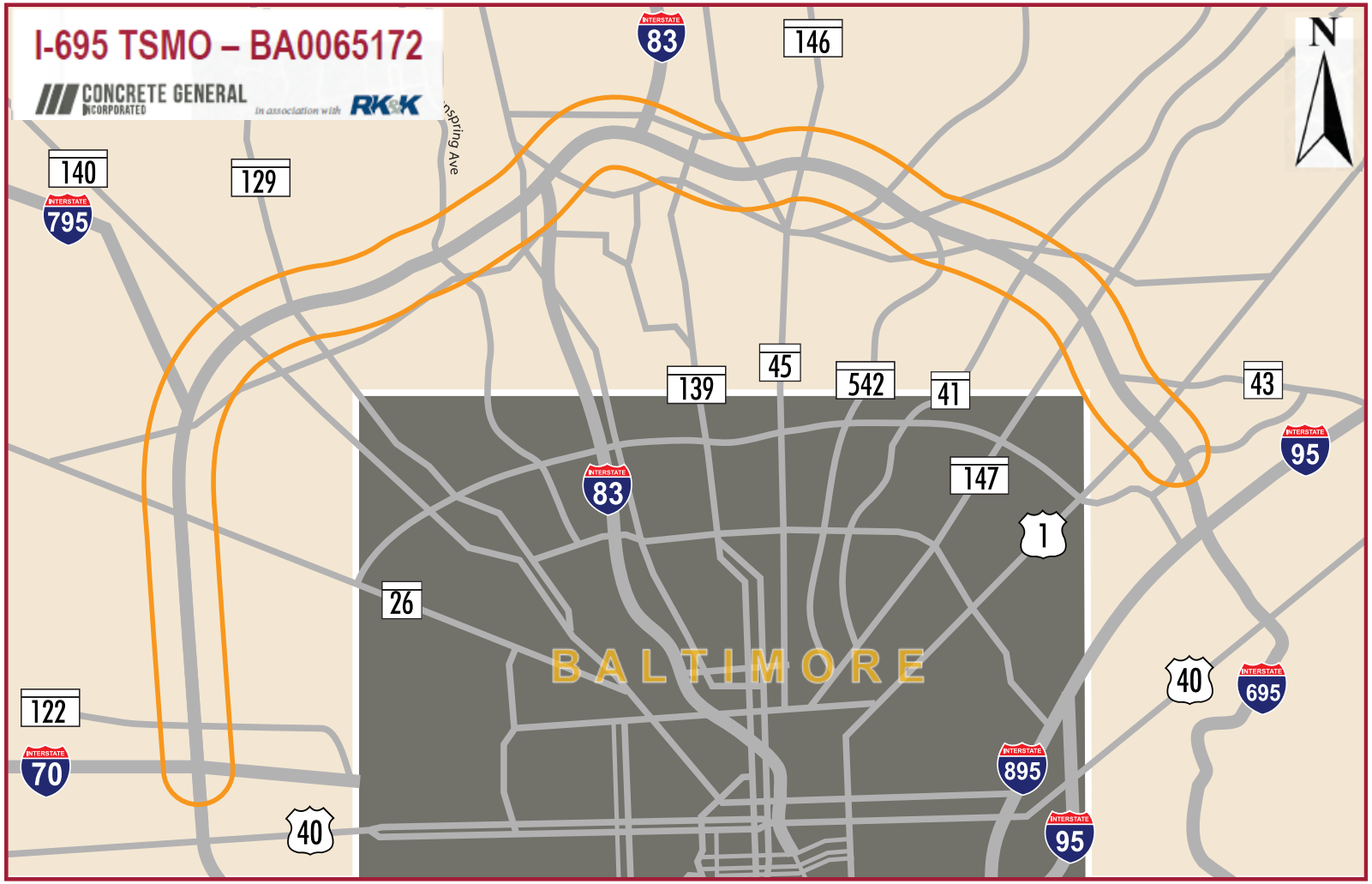


TSMO SYSTEM 1

I-70 (East) Signal Timing Matrix

Base Timing Parameters				INCIDENT PARAMETERS						
				Incident Direction	1 Lane/Shoulder Closure		2 Lane Closure		Complete Closure	
Peak Period	Current Plan #	Current Cycle Length	Peak Flow		Plan #	Incident Cycle Length	Plan #	Incident Cycle Length	Plan #	Incident Cycle Length
AM	Plan #6	150	Eastbound	Eastbound	Plan #41	180	Plan #51	210	Plan #51/#61	210/240
				Westbound	Plan #42	180	Plan #52	210	Plan #52/#62	210/240
				Both	Plan #43	180	Plan #53	210	Plan #53/#63	210/240
Midday	Plan #2	120	Balanced	Eastbound	Plan #41	180	Plan #51	210	Plan #51/#61	210/240
				Westbound	Plan #42	180	Plan #52	210	Plan #52/#62	210/240
				Both	Plan #43	180	Plan #53	210	Plan #53/#63	210/240
PM	Plan #7	150	Westbound	Eastbound	Plan #41	180	Plan #51	210	Plan #51/#61	210/240
				Westbound	Plan #42	180	Plan #52	210	Plan #52/#62	210/240
				Both	Plan #43	180	Plan #53	210	Plan #53/#63	210/240
Overnight	Plan #3	100	Westbound	Eastbound	Plan #41	180	Plan #51	210	Plan #51/#61	210/240
				Westbound	Plan #42	180	Plan #52	210	Plan #52/#62	210/240
				Both	Plan #43	180	Plan #53	210	Plan #53/#63	210/240
Weekends	Plan #2	100	Westbound	Eastbound	Plan #41	180	Plan #51	210	Plan #51/#61	210/240
				Westbound	Plan #42	180	Plan #52	210	Plan #52/#62	210/240
				Both	Plan #43	180	Plan #53	210	Plan #53/#63	210/240

I-695 TSMO PROJECT (I-70 TO MD 43)



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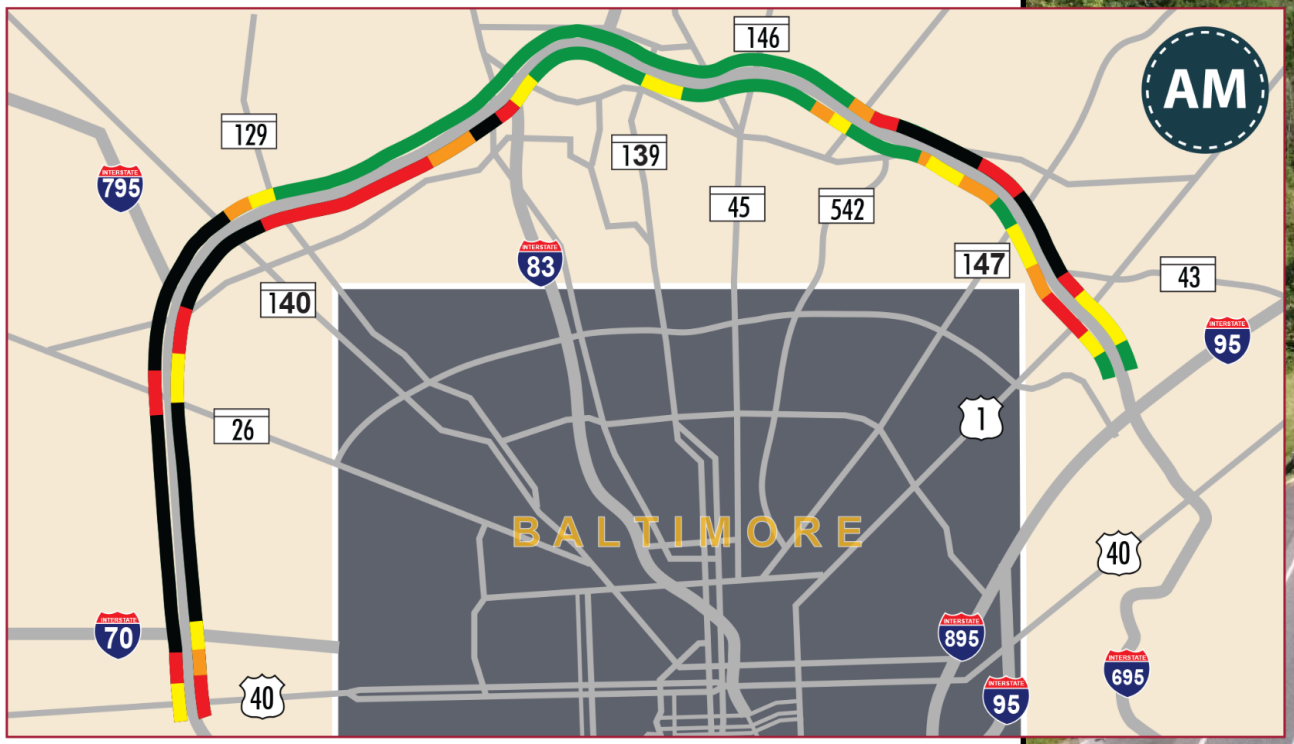
I-695 TSMO PROJECT (I-70 TO MD 43)

I-695 Today



I-695 TSMO PROJECT (I-70 TO MD 43)

Part-Time Shoulder Use (PTSU)

What is?

Shoulder is used as a travel lane during peak travel hours or as needed during incidents to provide congestion relief

How Does it help?

- Provides an additional travel lane, when needed
- Converts back to shoulder use at other times
- Uses existing pavement footprint, where possible
- Limit right-of-way and environmental impacts

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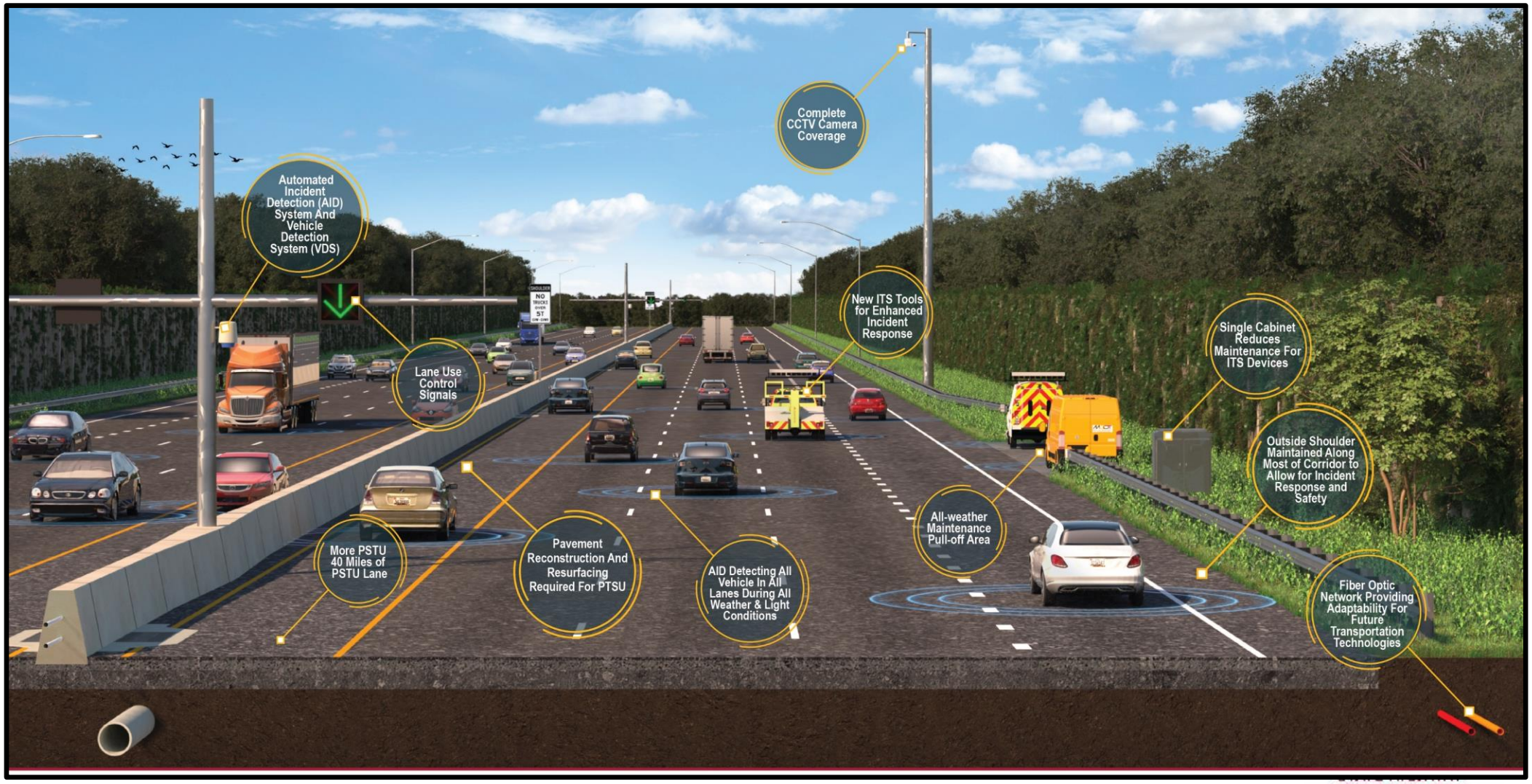
I-695 TSMO PROJECT (I-70 TO MD 43)

Open for Static Operating Hours for Recurring congestion relief

Ability to Open for Incidents; Non-recurring congestion relief

Decision Support System

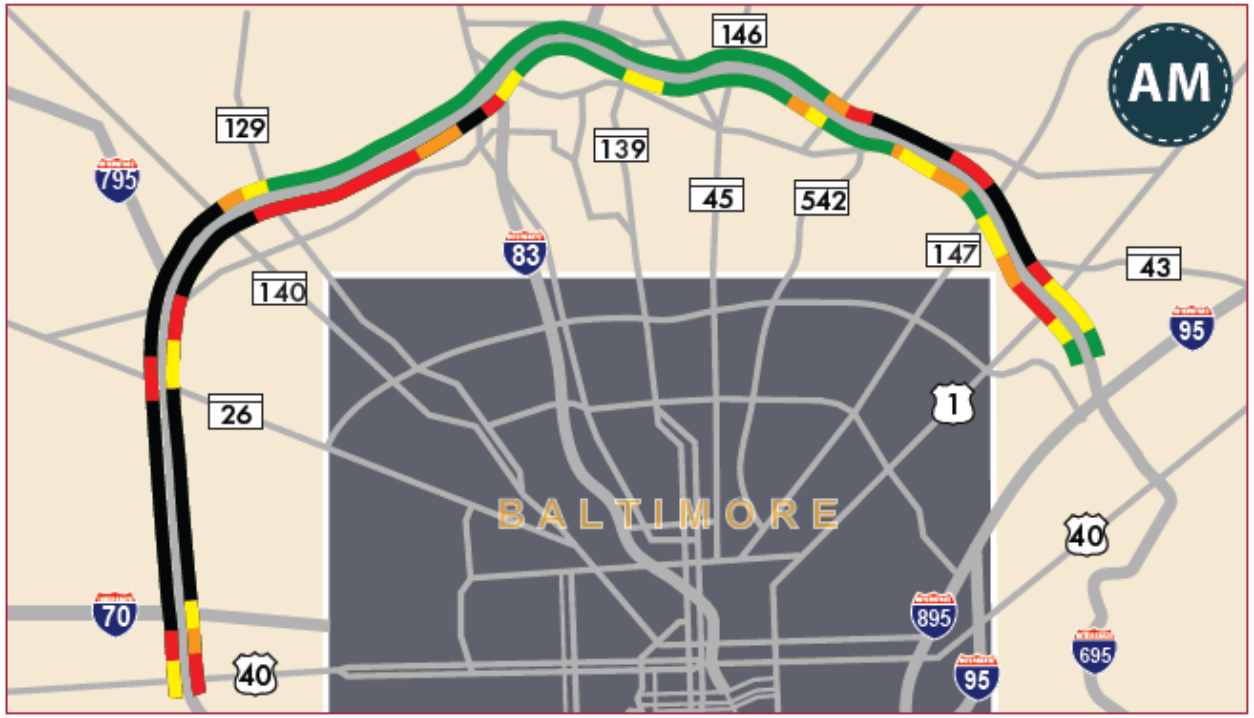


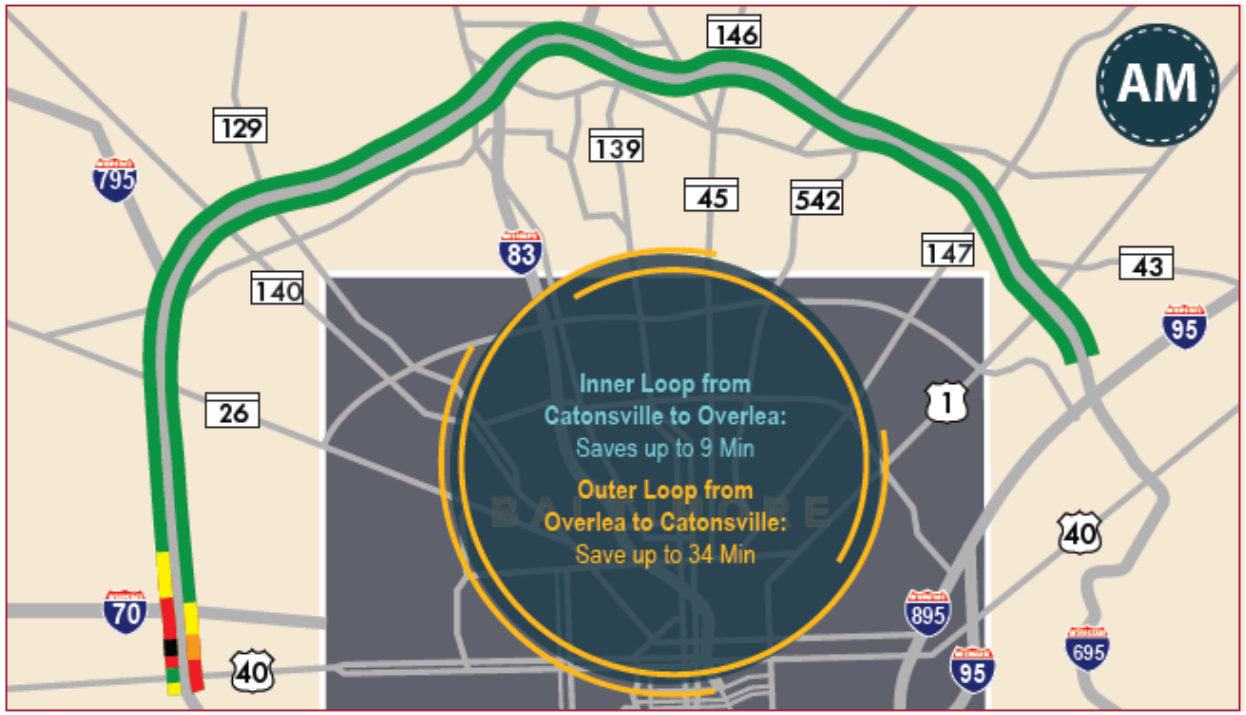
Source: OHD

ADMINISTRATION

I-695 TSMO PROJECT (I-70 TO MD 43)

PTSU Mobility & Safety Improvements





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US 50 ATTAIN GRANT

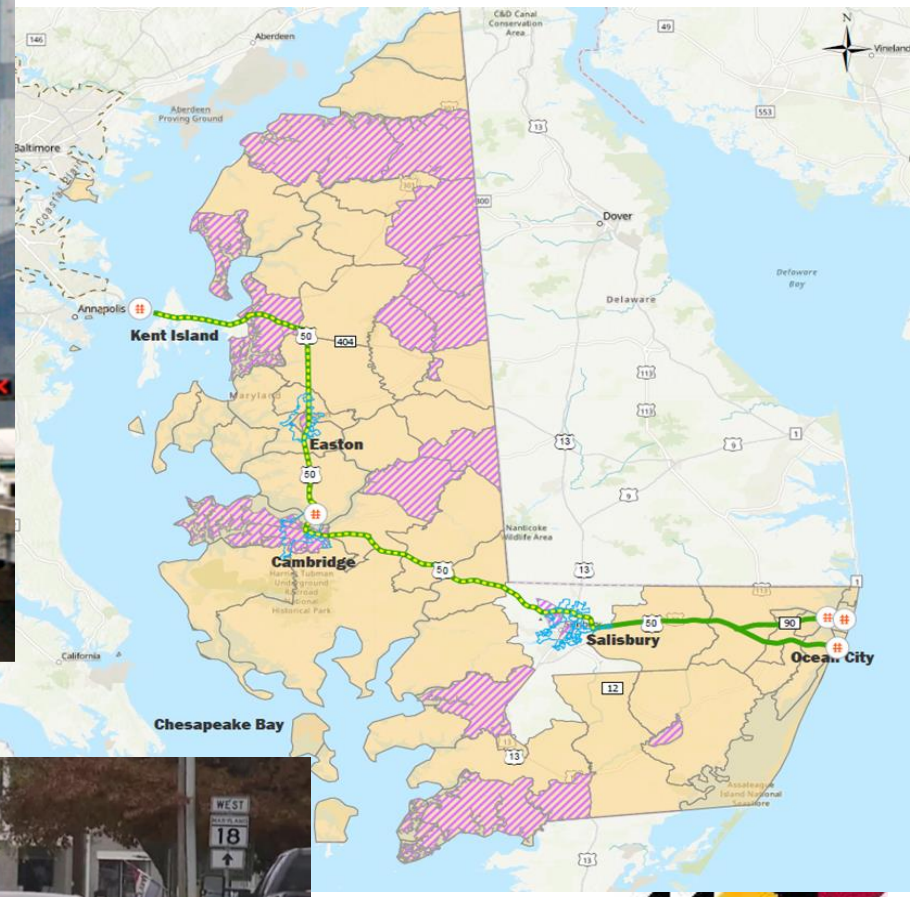
Rural **O**pportunities to **U**se **T**echnology **E**nhancements **(ROUTE)** on US **50**"

$12 M Federal Grant to improve operations and quality of life on Maryland's Eastern Shore

Project area connects Baltimore-Washington Metro to Atlantic beaches

Disadvantaged area

Critical Rural Freight Corridor



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US 50 ATTAIN GRANT

Incident & Event Management

- Q2 Inverse Traffic Responsive Pattern Selection (TRPS) Signal System
- Machine Learning Traffic Prediction
- Incident Signal Timing Plans
- Freeway Incident Traffic Management (FITM) Plans

Traffic Management

- Adaptive Signal Control Technology (ASCT)
- Connected Vehicle Systems: Curve Warning & Signal Timing Phasing & Timing (SPaT)

Traffic Monitoring & Performance

- Automated Traffic Signal Performance Measures (ATSPM)
- Traffic Sensors: CCTV, Volume & Speed Detectors, Origin-Destination & Travel Time Detectors TMC & ATMS Integration

Traveler Information

- Alternative Route Travel Time Signs
- Dynamic Message Signs (DMS)
- Travel Information Via Web Sites
- Push Notifications for Hotel & popular online Vacation Rental Platform Apps

- Signal Phasing & Timing (SPaT)
  - 48 traffic signals
  - Enable future applications:
    - Intelligent Traffic Signal System (I-SIG)
    - Eco-Approach & Departure at Signals
    - Red Light Violation Warning
    - Freight Signal Priority
- Curve Speed Warning
  - 8 horizontal curves on US 50
  - Concentrated in the Cambridge area

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US 50 ATTAIN GRANT

Additional Upgrades & Deployments:

Q² Inverse Traffic Responsive (TR)

- Quality of Life & Queue Management = Q^2
- Inverse signal timing strategy to meters traffic and reduce throughput
- Reduce queues at the Bay Bridge to improve mobility on Kent Island
- Keep long queues out of Easton, Cambridge and Salisbury

Traveler Information

- Real-time and predicted travel times
- Push notifications to smart phones apps (VRBO, Airbnb, Bonvoy, etc.)
- Dynamic Message Signs
- Web Site Route Planning

Traffic Signal Operations

- Incident Signal Timing Plans
- Adaptive Signal Control Technology (ASCT)
- Automated Traffic Signal Performance Measures (ATSPMs)

ITS Infrastructure

The Needs

- 80% of incidents occur off-peak
- 67% of crashes occur on weekends
- Quick detection & response are vital

Infrastructure

- CCTV Cameras
- Volume & Speed Detectors
- Origin-Destination / Travel Time Sensors

Integrate with Existing Software Systems

- CHART ATMS
- RITIS - SHA's big data repository

Other Projects and Initiatives

Maryland Statewide ITS Architecture Update

- Long overdue – last partial update was in 2016
- Full update planned for this go-around

Freight Projects

- Truck Parking Availability Systems
- Freight Data Exchange

Connected and Automated Vehicle (CAV) Support

- Continued support of the broader Maryland CAV Program and Working Group
- Staff and funding support for the Technical and Emergency Responder Subgroups
- Support for CAV Outreach and Education activities
- Maintaining membership and participation in committees to drive implementation and document CAV accomplishments

ITS Deployment within TSMO Systems

- Managing smaller ITS deployment projects that fall within the boundaries of the Next Gear Systems (New device needs/requests, upgrades, and replacements)
- Telecommunications Alternatives

Questions?