COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION

Stephen C. Brich, P.E.
Commissioner

1401 East Broad Street
Richmond, Virginia 23219

(804) 482-5818
Fax: (804) 786-2940

December 17, 2024

The Honorable Governor Glenn Youngkin
Members of the Virginia General Assembly

Dear Governor Youngkin and Honorable Members of the General Assembly:

Section 33.2-1531 of the *Code of Virginia* directs the Commissioner of Highways to report annually on the use of moneys in the Innovation and Technology Transportation Fund (ITTF). ITTF monies are to be used solely for the purposes of funding pilot programs and fully developed initiatives related to high-tech infrastructure improvements. The term "high-tech infrastructure improvements" pertains to projects or programs that reduce congestion, improve mobility, improve safety, provide up-to-date travel data, or improve emergency response.

In accordance with § 33.2-1531 of the *Code of Virginia*, I am submitting the attached report to you which serves to report on the use of the moneys in the ITTF over the past year. If you have any questions, please do not hesitate to contact me at (804) 387-0037.

Sincerely,

Stephen C. Brich, P.E.
Commissioner of Highways

c: The Honorable W. Sheppard Miller III
G. Michael Fitch, Ph.D.
Mr. E. Kevin Gregg

Attachment

Innovation and Technology Transportation Fund (ITTF)

Report to the General Assemby

2024

TABLE OF CONTENTS

Cover Photo: Downtown Richmond Virginia

WHAT IS THE ITTF?

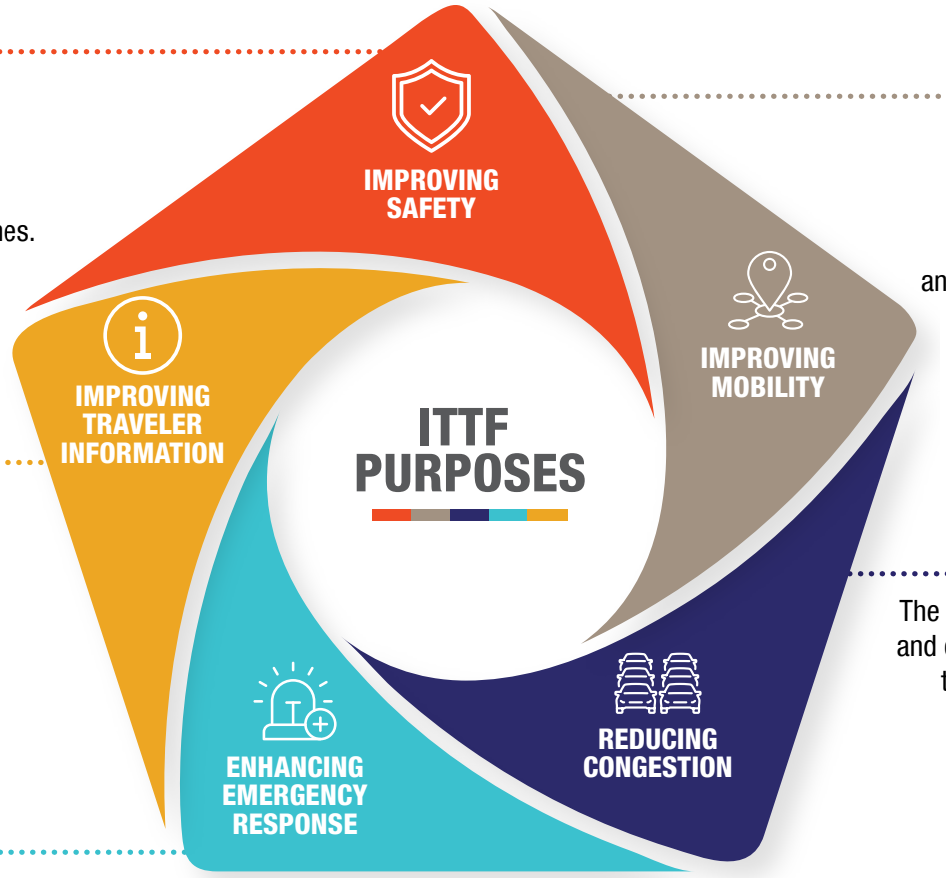
Section 33.2-1531 created the Innovation and Technology Transportation Fund (ITTF). ITTF monies are to be used solely for the purposes of funding pilot programs and fully developed initiatives pertaining to high-tech infrastructure improvements. "High-tech infrastructure improvements" relate to projects or programs that reduce congestion, improve mobility, improve safety, provide up-to-date travel data, or improve emergency response.

Section 33.2-1531 of the Code of Virginia directs the Commissioner of Highways to report annually on the use of monies in the Innovation and Technology Transportation Fund.

ITTF Focuses

Per Code of Virginia Section 33.2-1531, ITTF projects must address one or more goals: reduce congestion, improve mobility, improve safety, provide up-to-date travel data, and improve emergency response.

The ITTF provides funding specifically for the purposes of funding pilot programs and fully developed initiatives pertaining to high-tech infrastructure improvements:



The ITTF program enhances road safety through innovative technologies and strategies, aligning with the agency's commitment to reducing crashes.

The ITTF program advances mobility through investments in smart infrastructure and transportation innovation, creating a more connected and accessible transportation network for the Commonwealth.

The ITTF program empowers travelers with real-time updates on road conditions, closures, and road impacting events, facilitating more informed and efficient travel.

The ITTF program leverages technology and data-driven approaches to optimize traffic flow, reduce bottlenecks, and improve overall congestion for the traveling public.

The ITTF program integrates technology to expedite first responders' access to incident information, to enable swift and effective responses to critical situations.

PROJECTS STATUS

ACTIVE PROJECTS

as of August 31, 2024

36
Active Projects

$117M
Active Projects Value

COMPLETED PROJECTS

November 2023 – August 2024

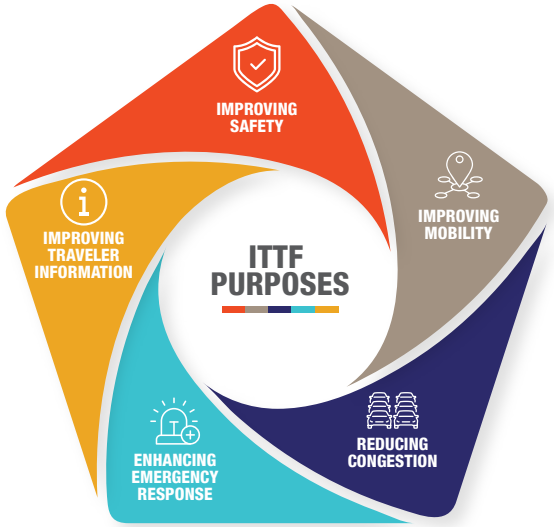
18
Completed Projects

NEW PROJECTS

19
Projects

$48M
Projects Value

ITTF FOCUS AREAS



PROJECT STATUS SUMMARY

The duration of each project varies based on its complexity. A simple ITTF project may be completed within a year. Complex projects may take multiple years to complete.

7
Scoping/Study

8
Design

20
Installation

PROJECT UPDATES

This section features significant projects that have multi-year evaluations.

Arlington County Dynamic Parking Pricing

ITTF PURPOSES

2024 UPDATE

- VDOT and Arlington County are evaluating the Arlington County Dynamic Parking Pricing.
- The first two quarters consisted of a steady roll-out of the system, with growing use.
- Four quarters of data will be collected to conduct the full evaluation.

PROJECT DESCRIPTION

- The Arlington County-managed project aims to implement a data-driven, variable-pricing system and a traveler information system for parking on metered blocks in Arlington County's two Metrorail corridors (Rosslyn-Ballston and Pentagon City/Crystal City) and in up to three County-owned, off-street parking areas within those corridors that are regulated using parking meters.
- The system includes technology to detect parking space occupancy, integrate with the existing payment methods, and apply dynamic pricing for 4,563 metered on-street spaces and three off-street, paid-parking facilities in the two major Metrorail corridors in Arlington.
- The project's purpose is to improve the user experience with metered parking.

Overview

Location	Arlington County
VDOT District	Northern Virginia
Route	US-1, Clarendon Blvd., Wilson Blvd., Fairfax Dr.
City/County	Arlington County
Category	Advanced Mobility Technology
Project Cost	$5,099,284
2024 Milestones	Installation completed 10/2023. Evaluation extended to collect data through mid-2025. Report expected by October 2025.

Roadway Characteristics: US-1 in Arlington (2023 data)

Annual Vehicle Hours of Delay	8,400

Benefits

Focus	Metrics	Anticipated Results
Congestion	Vehicle Hours of Delay(VHD)	Lower delay with fewer repeated trips looking for parking
Congestion	Increased Road Capacity	Reduced double parking will open travel lanes
Information	Increased Parking Information	Public can access Arlington County website about parking cost and availability

I-95 Variable Speed Limit (VSL) System

ITTF PURPOSES

2024 UPDATE

- VDOT's Research Council continues to monitor the success of the I-95 VSL system, which continues to yield positive results.

Project Purpose

VDOT has installed variable speed limits on the I-95 northbound corridor between mile markers 115 and 130 in Caroline and Spotsylvania Counties. This is to address crashes caused by unexpected speed differentials when encountering congestion or lane-impacting events. LED signs displaying variable speed limits between 35 mph and the posted speed limit (65 or 70 mph), along with dynamic message boards, provide real-time information to drivers. The speed limits are reduced only when necessary based on traffic speed and volume data collected by vehicle detectors. Enforcement authorities have access to real-time changes in the posted speed limits.

Project Description

(ITTF Funded Portion for I-95 VSL)

- Develop the algorithms for the I-95 Variable Speed Limit technology.
- From 115 to 130 (15 miles), VSL is located on I-95 NB. It includes:
  - Algorithm Enhancements for Work Zones
  - Automated Detector Monitoring and Alerts
  - Active System Management
  - System Evaluation Support

Project Description

(Other Funding Sources for I-95 VSL)

- System integration
- I-95 VSL Infrastructure (detectors, signs, cameras)

Overview

Location	I-95 in Spotsylvania County/City of Fredericksburg
VDOT District	Fredericksburg
Route	I-95
City/County	Fredericksburg, Spotsylvania, Caroline
Category	Advanced Roadway Technology
Project Cost	$2,404,000 (ITTF Funding for the I-95 VSL Algorithm)
2024 Milestones	Year 2 evaluation conducted. Project complete.

Roadway Characteristics

Crashes	2023–2024	2022–2023	2021 Pre-Implementation
Total Crashes	247	286	291
Fatal + Injury Crashes	51	58	67
Daily Traffic Volume	50K – 63K	49K - 57K	47K – 57K

Benefits

Safety 2023 – 2024	
Total Crashes	-44 crashes from year prior to activation (-15.1%)
Fatal + Injury Crashes	-16 crashes from year prior to activation (-23.9%)
Rear End Crashes	-58 crashes from year prior to activation (-32.5%)

Mobility (based on data from 6 AM-8 PM)

In 2023-24, average travel times over the entire week have declined 6.3% versus the year prior to VSL activation. Sunday average travel time has declined 14.8%.

In 2023-2024, reliability has improved by an average of 17.5% over the entire week.

SELECT PROJECT FACT SHEETS

Projects that have either:

- Completed scoping studies
- Completed the design phase
- Finished the installation

Big Walker Mountain Tunnel (BWMT) and East River Mountain Tunnel

ITTF PURPOSES

Description

- Design of an automated traffic management control system to quickly and safely stop interstate traffic from entering the tunnels during emergency closures or unplanned operational closures. System components include:
  - Dynamic message signs to alert traffic of the tunnel closure
  - Variable speed limit signs and warning signs
  - Automatic gates, traffic signal, stop bar, alarm bells, and cameras at the stopping point prior to the tunnel entrance
  - Manual gates at the nearby interstate on ramps
  - Design of median crossovers at the tunnel portals.
- Deployment of advanced communication and tunnel closure technologies will mitigate the impact of tunnel events. The mountain tunnels have limited support resources due to their topography.
- Installation funding is anticipated to be made available through VDOT's Special Structures funding.

Overview

Location	Mountain tunnels on I-77 at WV/VA border and near Bland/Wythe County line	
VDOT District	Bristol	
Route	I-77	
City/County	Bland County	
Category	Advanced Roadway Technology	
Project Cost	Big Walker Mountain Tunnel	East River Mountain Tunnel
Design	$360,294 (ITTF)	$603,611(ITTF)
Construction	$8.5M (non-ITTF)	$9.3M (non-ITTF)
2024 Milestones	Completed design plans. Identified alternative funding sources for installation.	
Delivery Date	This project is being considered for Special Structures funding. Upon receiving funding, a delivery date will be defined.	

Roadway Characteristics (2023 data)

Metrics	Big Walker Mountain Tunnel	East River Mountain Tunnel
Annual Vehicle Hours of Delay	95,858 (MM41-67) – I-77 and tunnels	
Annual Cost of Delay	$4.01M (MM41-67)	
Median Incident Duration	11 minutes	34 minutes
Daily Traffic Volume	15381	16347
# Work Zones @ Tunnel	17	4
# Tunnel Incidents Requiring Lane Closures	267	6

Benefits

Focus	Metrics	Anticipated Results
Safety	Secondary Incidents	Fewer events Eliminates need for control room operator to leave post to support interstate traffic closure
Congestion	Vehicle Hours of Delay (VHD)	Reduction in VHD
Emergency Response	Response Time	Shorter Incident Response Time
	Clearance Time	Reduced Clearance Times
Travel Data	# Notifications	Improved situational awareness with traffic stoppage alerts

ITTF PURPOSES

Description

The purpose of this project was to develop a data system to support transportation safety analytics projects. The project improves safety by facilitating analytics projects that will result in data-driven recommendations for transportation safety improvements to:

- Make timely, relevant, and trusted data and information available from the system of record in accessible formats to support decision making and proactive communication to stakeholders and the public.
- Streamline workflows by reducing duplication of data, saving time associated with data requests, and automating recurring reporting and compliance-related activities.
- Reduce time spent tracking and validating data.
- Maintain data security and confidentiality while improving transparency.
- Combine data from disparate programs to facilitate pattern identification, promote insights, and improve reporting and visualizations.

TRANSPORTATION DATA HUB

Overview

Location	Statewide
VDOT District	Statewide
Route	N/A
City/County	Statewide
Category	Furnish Travel Information
Project Cost	$2,183,578
2024 Milestones	Deployment completed.
Delivery Date	July 2024

This pilot successfully highlighted the importance of easy data access across different program areas within the agency. Since the commencement of this pilot, VDOT has initiated a systematic program for data mastering including:

- Declaring data as an asset in a Department Memorandum
- Developing a Master Data Roadmap

Projected Benefits

The pilot data system (called Transportation Data hub) is now available for use by safety analytics projects.

It is anticipated that future analytics projects using the data system will yield recommendations for transportation safety improvements. The pilot data system will allow projects to gather needed data more efficiently. The pilot system can be used to support development of various analytical tools:

- **MPO Safety Tool**
  Metropolitan regional and jurisdictional data-driven safety-planning and target-setting model based on crash-outcome, socio-economic, population, travel, and resource-spending factors.
- **Systemic Tool**
  The Systemic Tool is a data-driven process based on analytical techniques to identify widely dispersed, high-risk roadway features associated with target collision types for fatal and serious injury crashes. Low-cost countermeasures can then be broadly implemented across the system at those locations.

ITTF PURPOSES

Description

- This project is part of the larger RM3P, which includes an AI-based Decision Support System, a Commuter Parking Information System, and a Data-Exchange Platform.
- Dynamic Incentivization is a data-driven system that will incentivize drivers to modify their travel mode choices and behaviors based on real-time travel events and conditions impacting mobility in the Northern Virginia area.
- The incentives will be offered dynamically, when the transportation system is congested, to encourage travelers to modify their travel modes and time of travel, thereby reducing the impact of adverse events and benefitting overall transportation network performance for all users.
- The incentives will be offered by regional agencies, business partners, and third-party providers. The incentives may include free or discounted consumer products, discounts on transportation costs, and opportunities to save for larger rewards.
- The effort extends the incentivization concepts, previously used in Northern Virginia only during major construction projects, to responding day-to-day to significant recurring and non-recurring congestion events.
- The Dynamic Incentivization project is jointly managed by the Virginia Department of Transportation and the Department of Rail & Public Transportation.

Dynamic Incentivization

Project Partnering Agencies

VDOT Virginia Department of Transportation

DRPT Virginia Department of Rail and Public Transportation

Northern Virginia Transportation Authority

Regional TDM Partners

Reward Contributors

Overview

Location	Greater Northern Virginia
VDOT District	Northern Virginia
Route	Multiple Routes
City/County	District Wide
Category	Advanced Mobility Technology
Project Cost	$3,500,000
2024 Milestones	Contract Awarded to Metropia in March 2024.
Delivery Date	September 2026

Roadway Characteristics – All of Northern Virginia District (2023 data)

Annual Vehicle Hours of Delay	8M
Annual Vehicle Hours Cost of Delay	$216M
Total # Incidents/Year	3,564
Median Incident Duration	28 minutes
Daily Traffic Volume	Varies by road

Benefits

Focus	Metrics	Anticipated Results
Mobility	Travel Time Index	Improved travel times with travel behavior changes, reducing volumes A 3% - 10% improvement in reliability with all RM3P projects
	HOT/HOV Lane Use Transit Use	Increase in usage
Congestion	Vehicle Hours of Delay (VHD)	May be reduced from 132K to 700K hours per year with all RM3P programs
	Volume	Changes in volumes during peak periods or events
Travel Data	# Incentives Used # Users	Increased awareness

Regional Multi-Modal Mobility Program (RM3P) Commuter Parking Information System

ITTF PURPOSES

Description

- The Parking project is part of the larger Regional Multi-Modal Mobility Program (RM3P), which includes an AI-based Decision Support System, Dynamic Incentivization, and a Data-Exchange Platform.
- The Commuter Parking Information System (CPIS) will provide a real-time, app-based parking information system that provides reliable information about parking availability at lots serving bus, vanpool, and carpool commuters.
- The CPIS will use crowd-sourcing technology that does not require additional infrastructure at individual parking lots.
- Ultimately, the project will provide occupancy data at more than 50 commuter parking lots in Northern Virginia and Fredericksburg. The system will be scalable to additional parking facilities under the terms of a cooperative purchasing agreement.
- Initially, the project will be rolled out to six commuter parking lots during a six-month proof-of-concept phase, during which the technology will be tested and validated. If the proof-of-concept is successful, the technology will then be deployed at the remaining parking lots.
- Nearly 40 partners and stakeholders are supporting VDOT in the CPIS initiative, including VRE, WMATA, MWCOG, NVTA, FAMPO, and numerous counties and cities.

Overview

Location	Greater Northern Virginia, Fredericksburg
VDOT District	Northern Virginia, Fredericksburg
Route	Multiple Routes
City/County	District Wide
Category	Advanced Mobility Technology
Project Cost	$2,800,000
2024 Milestones	Contract Awarded to ParkZen in August 2024. Launch Proof-of-Concept Phase in November 2024.
Delivery Date	The three-year service will initially become available in early 2025 and it will be rolled out incrementally over the next 2-3 years as more lots are deployed.

Roadway Characteristics – All of Northern Virginia District (2023 data)

Annual Vehicle Hours of Delay	8M
Annual Vehicle Hours Cost of Delay	$216M
Total # Incidents/Year	3,564
Median Incident Duration	28 minutes
Daily Traffic Volume	Varies by road

Benefits

Focus	Metrics	Anticipated Results
Mobility	Travel Time Index	Improved travel times with travel behavior changes, reducing volumes A 3% - 10% improvement in reliability with all RM3P projects
Congestion	Vehicle Hours of Delay (VHD)	May be reduced from 132K to 700K hours per year with all RM3P programs
	Commuter Parking Lot Usage	Increase in commuter lot use – reduction in overall single-occupant vehicles
Travel Data	# system users	Increased awareness of parking availability at commuter lots

Animal Detection Warning System Study

ITTF PURPOSES

Description

- Study focused on the feasibility of using animal detection and driver warning systems with an emphasis on preventing elk strikes along Route 460 in Buchanan County. The population of elk is increasing in this area of Virginia after being reintroduced by the Virginia Department of Wildlife Resources between 2012 and 2014.
- Findings of the study indicate that a pilot test would be feasible on Route 460. Several potential technologies were identified, including radar, short and long-range thermal cameras, and buried cable systems.
- A reduction in animal-vehicle collisions may occur when similar animal detection technologies are introduced.

Photo Credit: Nicholas Huff

Photo Credit: Mark Hill

Overview

Location	Southwest Virginia
VDOT District	Bristol
Route	U.S. 460 (Kentucky state line to Grundy)
City/County	Buchanan County
Category	Advanced Roadway Technology
Project Cost	Study - $170K; Pilot Project - $640K
2024 Milestones	Study completed August 2024. Pilot project scheduled.
Delivery Date	December 2026

Roadway Characteristics (2023 data for identified route above)

Daily Traffic Volume	3,458
Total # Animal Strikes/Year	6
Total # Incidents/Year	60

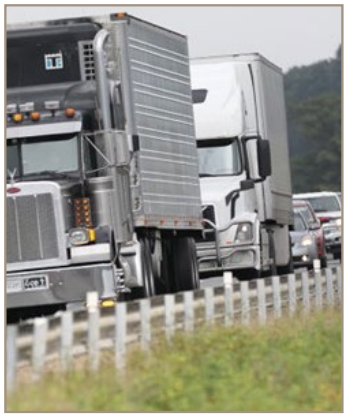
Benefits

Focus	Metrics	Anticipated Results
Safety	Animal Collisions	Fewer events
	Secondary Incidents	Fewer events
Travel Data	# Notifications	Improved situational awareness

ITTF PURPOSES

Description

- Independent data providers have developed travel information apps, including those for the commercial vehicle (CV) industry.
- Advanced warning information about upcoming stopped travel queues and advance congestion warning may enable commercial vehicles to adjust their routes or speeds in a timely manner, which may prevent rear-end collisions or commercial vehicle volumes on congested highways.
- VDOT and other states along the east coast are participating in purchasing a service with a third-party commercial vehicle information app. This VDOT-paid service sponsors the inclusion of free stopped queue and congestion alerts to commercial vehicles using the Electronic Logging Device (ELD) feature from Drivewyze, a 3rd party app.
- Through Drivewyze, the Commercial Vehicle Safety Alerts service aims to reduce crashes and fatalities related to secondary crashes, work zones, and emergency events. This is accomplished by leveraging existing capabilities in a novel way to provide real-time alerts to trucks on their ELD and mobile apps that are traveling on certain Virginia corridors and locations.
- The Virginia Transportation Research Council will complete an evaluation of service's impact on mobility and safety.



Overview

Location	Statewide
VDOT District	Statewide
Route	Statewide
City/County	District Wide
Category	Advanced Mobility Technology Commercial Vehicles
Project Cost	$1,000,000
2024 Milestones	VDOT sponsored pilot test of data. Commercial Vehicle Safety Alerts (Drivewyze) data from INRIX.
Delivery Date	Awarded contract task order to provide service through January 2025.

Roadway Characteristics – All Interstates (2023 data)

Number of tractor trailer crashes	7,336
Annual vehicle hours of delay	17.7M

Benefits

Focus	Metrics	Anticipated Results
Safety	Reduction in Crashes	Fewer rear-end collisions as commercial vehicles are warned of approaching queues
Mobility	Travel Time Index	Improved reliability with less delay caused by incidents
Congestion	Vehicle Hours of Delay (VHD)	Less delay with fewer incidents by preventing rear-end collisions & providing rerouting opportunities
Travel Data	# Notifications	Increased usage of travel information apps

I-664 / Route 17 Corridor Management Phase I – Development

ITTF PURPOSES

Description

- A corridor management program will provide greater tools to manage traffic with changing volumes due to incidents. In Newport News and Suffolk, traffic patterns may change when incidents occur on one of the two James River Crossings (US 17 and I-664).
- The planned system includes advanced traffic signal technology to provide longer green cycles during incidents, message signs to promote re-routing, camera monitoring systems, and traffic detectors. Together, these tools will enable VDOT to manage the travel corridor between Newport News and Suffolk.

Overview

Location	I-664 Corridor between US 17 in Suffolk to Warwick Blvd in Newport News
VDOT District	Hampton Roads
Route	US 17, US 60 (Warwick Boulevard), I-664
City/County	Newport News, Suffolk
Category	Advanced Roadway Technology
Project Cost	$118,280
2024 Milestones	Scoping completed April 2024. Project advancing to design.
Delivery Date	September 2025

Roadway Characteristics (2023 data)

Metrics	I-664 (Exit 5 – 9)	US 17 (I-664 – US 60 Warwick Blvd)	US 60 (US 17 – I-664)
Annual Vehicle Hours of Delay	468K	80K	6.3K
Annual Cost of Delay	$19.6M	$3.3M	$264K
# Incidents	1,419	479	N/A
Median Incident Duration	14 Minutes	15 Minutes	N/A
Daily Traffic Volume	32,262	24,890	12,890

Benefits

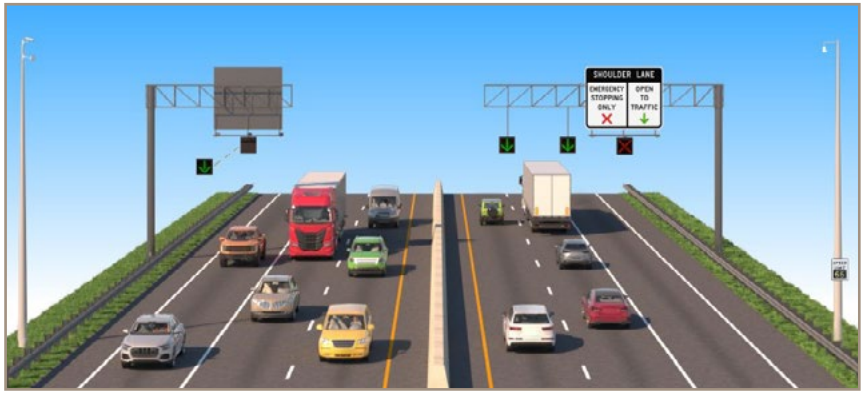
Focus	Metrics	Anticipated Results
Safety	Secondary Incidents	Fewer events
Mobility	Travel Time Index	May provide a 3% - 10% improvement in reliability
Congestion	Vehicle Hours of Delay (VHD)	May be reduced from 8K to 45K hours per year
Emergency Response	Incident Detection Time	Faster detection with increased camera monitoring
	Incident Response Time	Shorter Incident Response Time
Travel Data	# Notifications	Improved situational awareness

Route 288 Hard Shoulder Running

ITTF PURPOSES

Description

- Deployment of Intelligent Transportation System (ITS) infrastructure and necessary pavement improvements to implement the use of Hard Shoulder Running (HSR) on State Route 288 northbound between Route 711 (Huguenot Trail) in Powhatan County and Route 6 (Patterson Avenue), in Goochland County.
- Technologies include lane control, traffic detectors, message signs, automated incident detection cameras, and changeable speed limit signage.
- The HSR will provide additional capacity during peak travel periods.



Overview

Location	Greater Richmond
VDOT District	Richmond
Route	288
City/County	Goochland, Powhatan
Category	Advanced Roadway Technology
Project Cost	$26,298,570 ITTF & $8,000,000 CVTA funds
2024 Milestones	Preliminary scoping completed. Concept of operations completed, May 2023.
Delivery Date	April 2028

Roadway Characteristics – Patterson Ave to Robious Rd (2023 data)

Annual Vehicle Hours of Delay	18K
Annual Cost of Delay	$536K
Median Incident Duration	48 minutes
Daily Traffic Volume	52,253

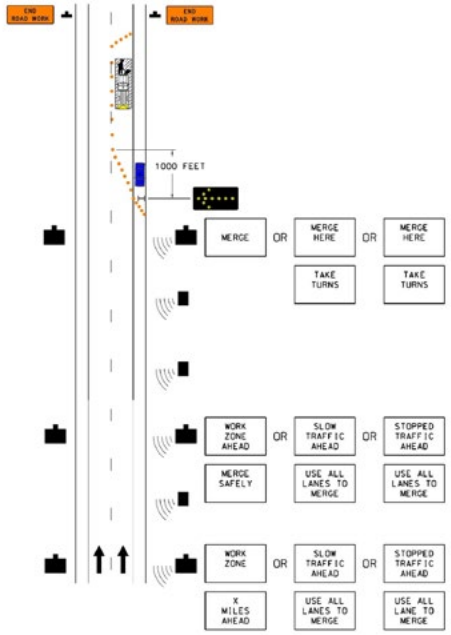
Benefits

Focus	Metrics	Anticipated Results
Safety	Secondary Incidents	Fewer events
	Crash Rates	Fewer events
Mobility	Travel Time Index	Improved Travel Time Index
Congestion	Vehicle Hours of Delay (VHD)	Reduction in VHD
Emergency Response	Incident Detection Time Incident Response Time	Faster Incident Detection Time Shorter Incident Response Time

ITTF PURPOSES

Description

- Zipper Merge with Queue Warning Systems is an advanced work zone safety strategy. This system notifies motorists using portable message signs and traffic sensors of stopped or slow traffic based on the travel speed leading up to the work zone. It also directs the motorist to use both travel lanes until reaching a defined merging point, and then alternate vehicles in a zipper manner into the open travel lane.
- The Zipper Merge with Queue Warning Systems can reduce the length of work zone backups by as much as 40%.
- VDOT piloted a Zipper Merge and Queue Warning Systems on a bridge rehabilitation site on southbound I-81, south of the Tom's Brook interchange. VDOT plans to test the Zipper Merge and Queue Warning Systems strategy at other locations and prepare an evaluation of the project.



Overview

Location	Two test sites located in the Staunton District (I-81 SB at MM 288-294) and in the Culpeper District (I-66 WB at MM 32).
VDOT District	Culpeper, Staunton
Route	I-81 SB at MM 288-294 and I-66 WB at MM 32
City/County	Fauquier, Shenandoah
Category	Advanced Roadway Technology
Project Cost	$600,000
2024 Milestones	Pilot tests completed.
Delivery Date	The evaluation report is under review through the National Cooperative Highway Research Program for release by August 2025.

Roadway Characteristics – Interstate Highway System

# Incidents	138,494
# Work Zone Incidents	3,018

Benefits

Focus	Metrics	Anticipated Results
Safety	Reduced Collisions in Work Zones	Fewer events
	Reduced Collisions in Traffic Queues	Fewer events
Mobility	Travel Time Index	Improved travel time reliability
Congestion	Vehicle Hours of Delay (VHD)	Reduction in VHD

ITTF PURPOSES

Description

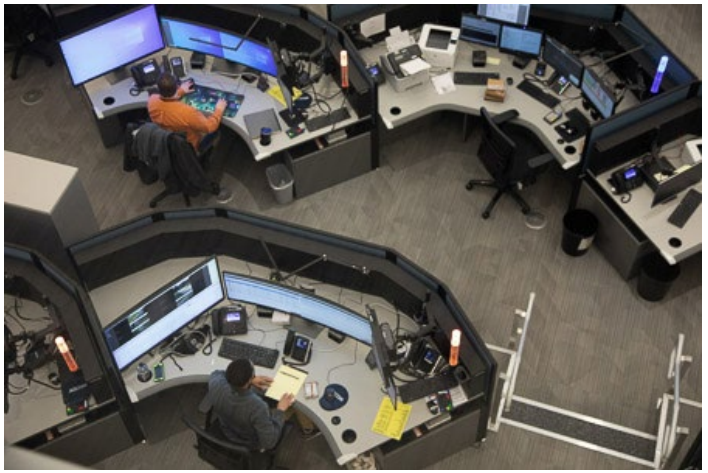
- Traveler information and traffic management systems are dependent on reliable data.
- VDOT operates over 10,000 transportation technology devices, such as traffic cameras, traffic data monitors, message signs, etc. VDOT also provides real-time information to the public via 511 and alerts. Third-party travel information providers also use VDOT data.
- Multiple parties have operation and maintenance roles to keep the transportation technology devices functioning reliably and accurately.
- An identity and access management system with new associated processes was deployed to improve security for VDOT's transportation technology environment (network, systems, devices, etc.), which will:
  - Provide greater automation and efficiencies in the provisioning of access to key traffic operations systems and other assets
  - Reduce errors when access is provisioned, which will improve system security
  - Improve ongoing monitoring of accounts and access to meet security policy objectives
  - Ensure privileged access requirements are being met
  - Improve system reliability

Overview

Location	Statewide Tool
VDOT District	Statewide
Route	N/A
City/County	N/A
Category	Advanced Transportation Technologies
Project Cost	$1,361,000
2024 Milestones	Implemented system. Evaluation underway.
Delivery Date	Evaluation report is expected by October 2025.

Benefits

Focus	Metrics	Anticipated Results
Travel data	Time to provision to get travel data	Reduce from average of 4 business days to provision to under 1 business day to provision account and other required access and permissions
	Accuracy of identity, account, and system access	The identity access management system and corresponding process updates are now enforcing input of accurate user/identity attributes and other associated information with minimal data quality issues



ITTF PURPOSES

Description

- VDOT has a master plan to implement advanced technologies based on the ATSPM.
- ATSPM will offer VDOT the ability to manage its traffic signal program proactively by updating signal retimings based on performance and data.
- In order to advance ATSPM, VDOT must provide foundational projects such as: high speed communications to the signals, advanced traffic controllers, and ATSPM Software.
- VDOT established multiple projects to advance the ATSPM. The following table defines the foundational projects completed in 2023.
- The ATSPM's full deployment is funded by multiple funding sources.
- The VDOT Central Signal System will benefit from these real-time data communication projects.

Overview

Location	Statewide
Category	Signal Detection Upgrades
Foundation Projects Cost	$8,131,000
2024 Milestones	Eight foundational projects completed. 7 remaining projects are in the design or installation phase.
Delivery Date	ATSPM targeted completion is December 2025.

Benefits – for the complete ATSPM Program

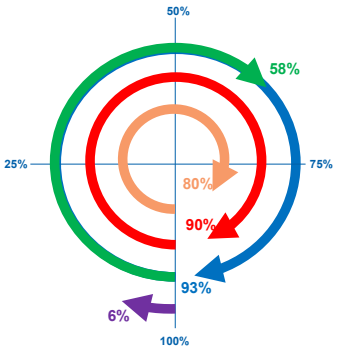
Focus	Metrics	Anticipated Results
Safety	Collisions	Reduced number and reduced severity
Mobility	Travel Time Reliability	Improved reliability with vehicle detection
Congestion	Vehicle Hours of Delay (VHD)	Less delay waiting for traffic lights
Emergency Response	Incident Duration	First responders able to reach incidents faster with emergency vehicle preemption
Information	Information for Connected Vehicles	Increased real-time intersection operation data without additional cost

Benefits – for the foundational projects

January 2022

3,137 Traffic Signals Statewide

- High Speed Communications (2506 – 80%)
- ATC / D4 Migration (2808 – 90%)
- KITS Deployment (Configured – 2915 – 93%)
- KITS Deployment (Live – 1829 – 58%)
- ATSPM (Active – 196 – 6%)

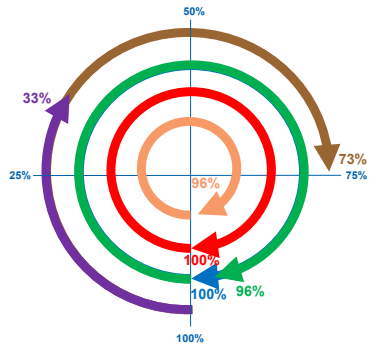


With ITTF and Other Funding

September 2024

3,184 Traffic Signals Statewide

- High Speed Communications (3064 – 96%)
- ATC / D4 Migration (3184 – 100%)
- KITS Configured (3184 – 100%)
- KITS Live (3064 – 96%)
- ATSPM Configured (2314 – 73%)
- ATSPM Active (1043 – 33%)



2024 ATSPM Program – Foundational Projects Completed

#	Project Name	Description	Date Completed
1	Signal Technology: Route 1	Installed updated cabinets and infrastructure at signals along Route 1 in Fredericksburg District.	January 2024
2	Fiber Communication for Signals: Route 1	Installed fiber optic lines to support advanced signal strategies along Route 1 in Spotsylania County.	January 2024
3	Fiber Communications for Signals: Staunton District	Installed fiber optic lines to support advanced signal strategies at multiple locations in VDOT's Staunton District.	February 2024
4	Fiber Communications for Signals: Route 234	Installed fiber optic lines to support advanced signal strategies along Route 234 in Prince William County.	March 2024
5	Fiber Communications for Signals: Route 50	Installed fiber optic lines to support advanced signal strategies along Route 50 in Fairfax County.	March 2024
6	Signal Technology: Route 1	Installed updated cabinets and infrastructure at signals along Route 1 in Stafford County.	March 2024
7	Fiber Communications for Signals: Richmond District	Installed fiber optic lines to support advanced signal strategies at multiple locations in VDOT's Richmond District.	April 2024
8	Fiber Communications for Signals: Fredericksburg District	Installed fiber optic lines to support advanced signal strategies at multiple locations in VDOT's Fredericksburg District.	April 2024

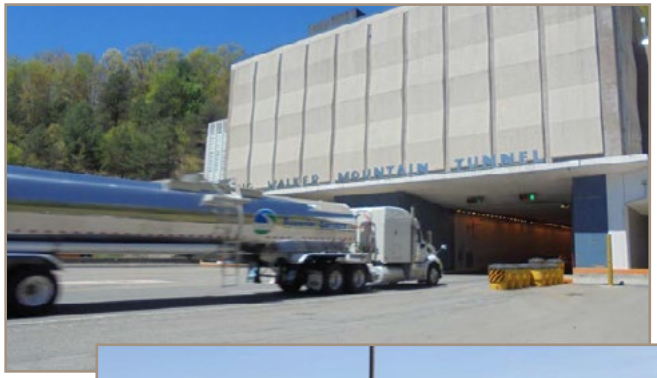
FY25 ITTF PROJECTS

Big Walker Mountain Tunnel (BWMT): Permanent Tunnel Work Zone / Lane Closure Technology

ITTF PURPOSES

Description

- This project uses innovative solutions for managing frequent lane closures at BWMT, which happened 434 times in 2022 due to maintenance, debris removal, and emergencies.
- Current methods involve a manual system where a tunnel control room operator physically closes the lane. Potential solutions to be considered include using an autonomous Truck Mounted Attenuator (TMA), smart work zone connected technology, or an automated flagger device.



Overview

Location	Big Walker Mountain Tunnel
VDOT District	Bristol
Route	I-77
City/County	Bland County
Innovative Elements	Autonomous Truck Mounted Attenuator Smart Work Zone Technology Automated Flagger Device
Project Cost	$2,250,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Roadway Characteristics (2023 data)

I-77 (MM41–67)	
Annual Vehicle Hours of Delay	92K
Annual Cost of Delay	$3.8M
BWMT (Tunnel Only)	
Annual Vehicle Hours of Delay	11K
Annual Vehicle Hours Cost of Delay	$458K
Total # Incidents/Year	29
Average Daily Traffic Volume	15,381

Benefits

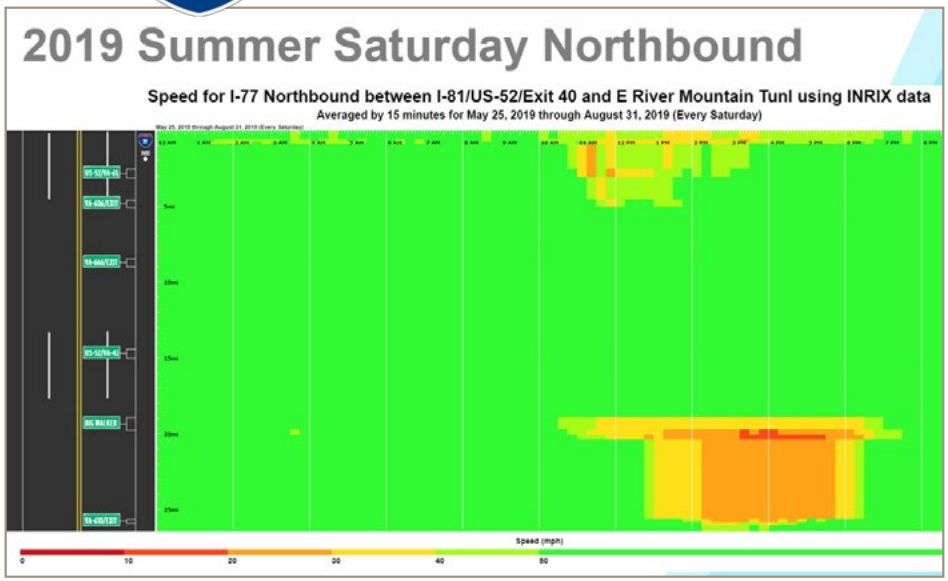
Focus	Metrics	Anticipated Results
Safety	Collisions	Automating the lane-closure process improves the safety of both responders and the traveling public
Emergency Response	Response Time Clearance Time	Automating the lane-closure process improves response time

I-77 Traffic Queue Detection

ITTF PURPOSES

Description

- This project is to implement a Traffic Queue Detection system on I-77 that alerts travelers about traffic congestion and provides estimated arrival times through existing dynamic message signs.
- The system can be localized to tunnel vicinities or extended to the I-81/I-77 corridors in the District.



I-77 Northbound traffic heatmap

Overview

Location	Southwestern Virginia Interstates
VDOT District	Bristol, Salem
Route	I-77 (from I-81 to West Virginia State Line)
City/County	Multiple
Innovative Elements	Queue Detection
Project Cost	$1,700,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Roadway Characteristics – I-77 from I-81 to the West Virginia State Line (2023 data)

Annual Vehicle Hours of Delay	94K
Annual Vehicle Hours Cost of Delay	$3.9M
Total # Incidents/Year	754
Average Daily Traffic Volume	14,936

Benefits

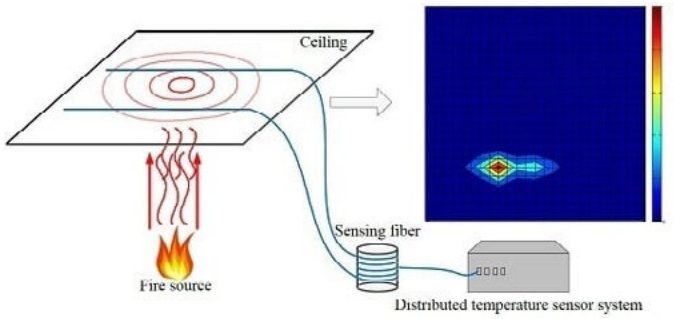
Focus	Metrics	Anticipated Results
Safety	Collisions	Advance queue detection and warning improves safety
Congestion	Vehicle Hours of Delay (VHD)	Advance queue detection and warning mitigates congestion
Travel Data	# Response Plans # Notifications	Improving informational alerts to travelers regarding anticipated queuing is the primary objective

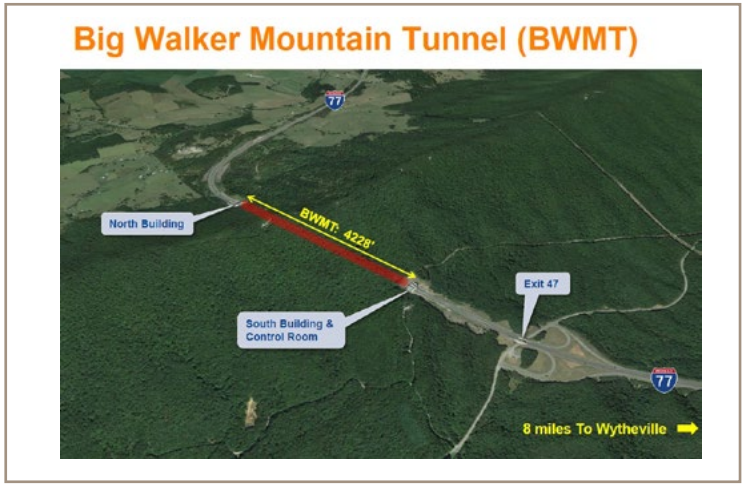
Big Walker Mountain Tunnel (BWMT): Tunnel Thermal Detection

ITTF PURPOSES

Description

- This project is to install fiber optic detection technology with supporting thermal detection cameras within the tunnels at BWMT to more effectively detect vehicle fires.
- This will replace the current system where a control room operator manually monitors CCTV footage for signs of smoke and crashes. The new system will offer greater reliability and faster fire detection.





Overview

Location	Big Walker Mountain Tunnel
VDOT District	Bristol
Route	I-77
City/County	Bland
Innovative Elements	Thermal Detection Cameras Fiber-based Thermal Detection System
Project Cost	$875,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Roadway Characteristics (2023 data)

I-77 (MM41–67)	
Annual Vehicle Hours of Delay	92K
Annual Cost of Delay	$3.8M
BWMT (Tunnel Only)	
Annual Vehicle Hours of Delay	11K
Annual Vehicle Hours Cost of Delay	$458K
Total # Incidents/Year	29
Average Daily Traffic Volume	15,381

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Enhanced ability to detect vehicle fires and inform first responders leads to improved traveler safety
Emergency Response	Response Time Clearance Time	Enhanced ability to detect vehicle fires and inform first responders leads to improved incident response

Big Walker Mountain Tunnel (BWMT): Hazardous Materials Placard Reader

ITTF PURPOSES

Description

- This project will install hazardous material (HAZMAT) placard readers in the BWMT to identify and classify the type of hazardous material transported at any given time.
- The readers, which have been tested with a 96-99% accuracy rate, will provide essential information during accidents. Approximately 300+ HAZMAT vehicles use the tunnel daily.
- The project is an extension of the completed Virginia Tech Transportation Institute/VDOT Transportation Research Council research projects.

Overview

Location	Big Walker Mountain Tunnel
VDOT District	Bristol
Route	I-77
City/County	Bland
Innovative Elements	Computer Vision
Project Cost	$875,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Roadway Characteristics (2023 data)

I-77 (MM41–67)	
Annual Vehicle Hours of Delay	92K
Annual Cost of Delay	$3.8M
BWMT (Tunnel Only)	
Annual Vehicle Hours of Delay	11K
Annual Vehicle Hours Cost of Delay	$458K
Total # Incidents/Year	29
Average Daily Traffic Volume	15,381

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Improved safety resulting from enhanced situational awareness of HAZMAT from proposed technology
Emergency Response	Response Time Clearance Time	Improved incident response resulting from enhanced first responder situational awareness of HAZMAT from proposed technology

Statewide Sidewalk and Crosswalk Management Tool

ITTF PURPOSES

Description

- This project intends to use innovative aerial/remote sensing technologies combined with automated sensing to create an inventory of sidewalk facilities and crosswalks across Virginia, displayed in an interactive map format for public access.
- This comprehensive data, including sidewalk width, crosswalk presence, length of each feature, and maintenance responsibility, will aid in travel planning, identify infrastructure gaps, assist in pedestrian trip forecasting, inform ADA compliance, and improve overall safety and mobility for all modes.

Overview

Location	Statewide
VDOT District	Statewide
Route	Multiple
City/County	Multiple
Innovative Elements	Remote Sensing Technology Machine Learning Interactive Map
Project Cost	$350,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	March 2026

Roadway Characteristics (2023 data)

Confirmed Miles of Sidewalk	4,078
Estimated Miles of Sidewalk	20,000+
Total Pedestrian Crashes	1,540
Total Pedestrian Killed or Seriously Injured (KSI) Crashes	550

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Improved understanding of pedestrian facilities will reduce infrastructure gaps leading to safer pedestrian networks
Mobility	Response Time Clearance Time	Mobility benefits from resultant investments in pedestrian facilities
Travel Data	# Response Plans # Notifications	The primary purpose of this project is to improve the collection and dissemination of data related to pedestrian facilities statewide

ITTF PURPOSES

Description

- The project seeks to expand the buildout of state-owned fiber to connect priority transportation technology devices, provide redundant communication rings to promote communications resiliency, expand Automated Traffic Signal Performance Measures (ATSPM) capabilities, and support the application of advanced transportation technologies along priority corridors in the future, including, but not limited to, Connected Autonomous Vehicles.
- 16 sites have been identified.

#	Location
BR01	460-83-58-19 Point Coal Loop ($898K)
BR05	US 11 Bristol Point ($738K)
CU02	US29 Culpeper Central ($253K)
FR01	US17 / VA 218 to District Office ($1,985K)
FR04	I-95 VSL ($1,246K)
FR06	VA3 to Culpeper ($144K)
HR01	17 Hampton Roads Coleman Bridge ($6,410K)
HR07	VA 7 603, US 60 Williamsburg ($634K)
LY03	US 29 Lynchburg North to Culpeper ($521K)
LY04	US 58 Danville – South Boston ($131K)
NV01	I-66 WMATA NoVA ($106K)
NV02	US 29 Gainsville ($270K)
NV04	District Hubs (Node 9 to 12) ($1,299K)
RI01	I-295 from 250 to I-95 ($920K)
ST02	I-81 Staunton North Gap ($7,882K)
ST03	I-81 / I-66 Osprey ($1,790K)

Overview

Location	Statewide
VDOT District	Statewide
Route	Multiple
City/County	Multiple
Innovative Elements	ATSPM Expansion CAV Applications
Project Cost	$25,000,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	10-36 Months (Variable by Site)

Project Characteristics (2023 data)

Miles of Fiber	348.6
Devices Directly Impacted	105
Devices Indirectly Impacted	215

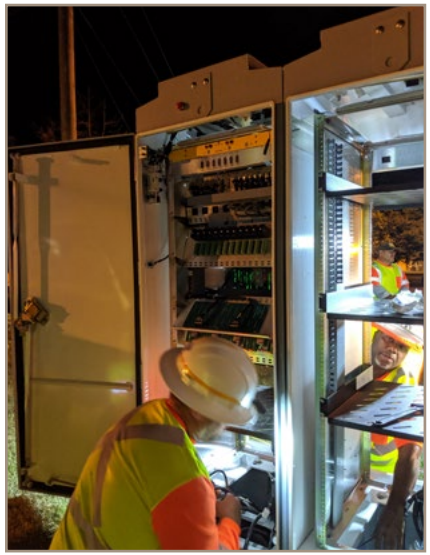
Benefits

Focus	Metrics	Anticipated Results
Safety	Number of Collisions	Improved safety as a direct result of reduction of the total number of collisions
Mobility	Response Time Clearance Time	Improved response time as a direct result of the fiber communication
Congestion	Vehicle Hours of Delay (VHD)	Lower vehicle hours of delay due to more resilient networks
Travel Data	# Response Plans # Notifications	Increased number of notifications leading to more robust travel data

ITTF PURPOSES

Description

- This project expands the ATSPM program by installing controllers and central processing unit enhancements throughout Northern Virginia.
- The resulting ATSPMs will provide congestion and mobility benefits to the area.
- This project will provide full deployment of ATSPMs in the Northern Virginia District, which will allow for advanced strategies to improve mobility.



Overview

Location	Northern Virginia
VDOT District	Northern Virginia
Route	Multiple
City/County	Multiple
Innovative Elements	Automated Traffic Signal Performance Measures Advancement Updated CPUs
Project Cost	$2,000,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	November 2025

Project Characteristics – All Northern Virginia District (2023 data)

Total VDOT Signals	1,477
Advanced Transportation Controllers Replacements	850

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	The updated platform will advise VDOT on where safety improvements can be made.
Mobility	Response Time Clearance Time	The updated platform will advise VDOT on where mobility improvements can be made.
Congestion	Vehicle Hours of Delay (VHD)	The updated platform will advise VDOT on where congestion improvements can be made.
Travel Data	# Response Plans # Notifications	Improvement in traveler experiences is anticipated as a secondary benefit of ATSPMs.

ATSPM Projects on US 29, VA 3, US 250

ITTF PURPOSES

Description

- This project aims to acquire detection equipment and formulate an updated coordination plan to implement Automated Traffic Signal Performance Metrics (ATSPM) for enhanced real-time traffic data and improved signal timings. The objectives are to alleviate congestion, enhance safety, and improve emergency response. Additionally, the project aims to enhance the overall driver experience by exploring the use of innovative technologies. These technologies include LIDAR detection/data-collection and AI processors to identify “near misses” between vehicles and verify red light-running events. Compliance with EO-30 (AI) will be required.

Overview

Location	Central Virginia
VDOT District	Culpeper
Route	US-29, VA-3, US-250
City/County	Charlottesville/Orange & Madison Counties
Innovative Elements	LIDAR Detection/Data-Collection AI Processing Near Misses Automated Traffic Signal Performance Metrics
Project Cost	$873,000
2024 Milestones	Added to VDOT’s Six Year Improvement Program
Delivery Date	August 2025

Roadway Characteristics (2023 data)

Annual Vehicle Hours of Delay	596,000
Cost of Delay	$24,900,000
Total Crashes	70
Average Daily Traffic Volume	132,900,000
Travel Time Index	US 29 – 1.3, VA 3 – 1.3, US 250 – 2.5

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Improved safety as a direct result of mobility and congestion improvements
Mobility	Response Time Clearance Time	Improved mobility through real-time adjustments to signal timings
Congestion	Vehicle Hours of Delay (VHD)	Improved congestion mitigation through real-time adjustments to signal timings
Travel Data	# Response Plans # Notifications	Use of real-time data streams to make decisions to improve congestion and mobility

I-81 Quick Look Advanced Monitoring Display

ITTF PURPOSES

Description

- This project will implement a feature to display the status of the I-81 Corridor (Bristol, Salem and Staunton). This feature will visually indicate the flow of traffic using color codes: green for normal flow, yellow for slowing, red for creeping, and black for stopped traffic. The display, in the form of a ribbon, will allow traffic operation center staff to interpret traffic conditions within the system.
- The proposed technology has been implemented in Pennsylvania and was recommended in the ***VDOT I-81 Advanced Technologies Study***.

Overview

Location	Traffic Operation Centers
VDOT District	Bristol, Salem, Staunton
Route	I-81
City/County	All counties on I-81 Corridor
Innovative Elements	Advanced Video Tool Advanced Traffic Management Systems Enhancements
Project Cost	$500,000/District ($1,000,000 Total)
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	October 2025

Roadway Characteristics – All I-81 (2023 data)

Metrics	Salem	Staunton
Annual Vehicle Hours of Delay	426K	453K
Annual Vehicle Cost of Delay	$17.8M	$18.9K
Total # Incidents/Year	5,135	7,839
Vehicle Miles Traveled	1.3B	1.7B
# of Miles	172.8	302

Benefits

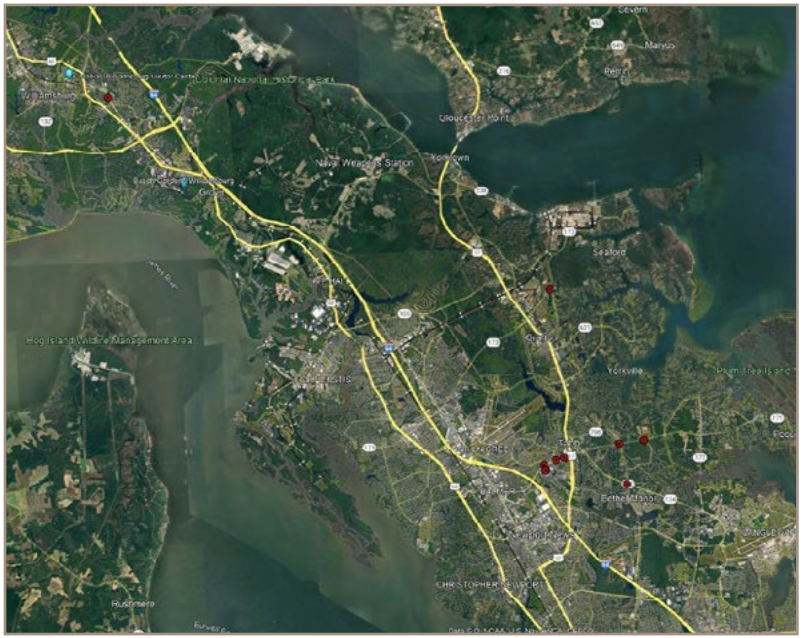
Focus	Metrics	Anticipated Results
Congestion	Vehicle Hours of Delay (VHD)	By alerting staff to changes in traffic conditions, responses to improve congestion can be implemented faster.
Travel Data	# Response Plans # Notifications	The primary purpose of this project is to make existing travel data usable in real time to VDOT staff.

Hampton Roads Signal Preemption

ITTF PURPOSES

Description

- The Hampton Roads Transportation Operations Subcommittee (HRTO) aims to standardize a preemption scheme across Hampton Roads to minimize delays for emergency vehicles at traffic signals.
- The project will validate the entities preempting signals and identify any unauthorized sources.
- Its goal is to fill gaps in signal preemption coverage, particularly in urban areas, improving safety and consistency for emergency response vehicles.



Overview

Location	Hampton Roads
VDOT District	Hampton Roads
Route	Multiple
City/County	York
Innovative Elements	Signal Preemption
Project Cost	$175,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2025

Project Characteristics – Route 17 York County (2023 data)

Number of Signals (require preemption)	9
Total Crashes	50
Average Daily Traffic Volume	30,943

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Safety improvements resulting from faster incident response times
Emergency Response	Response Time Clearance Time	Signal preemption is a proven strategy to improve incident response times.

ITTF PURPOSES

Description

- The project will develop and deploy advanced portable camera trailers at strategic locations to better detect crashes and other major incidents.
- This is aimed at overcoming limitations in current detection systems for more rapid responses.
- The capabilities and effectiveness of this system will be evaluated during the implementation.
- The project will test the system on I-664 in the vicinity of Monitor Merrimac Memorial Bridge Tunnel.

Overview

Location	Hampton Roads
VDOT District	Hampton Roads
Route	Multiple
City/County	Multiple
Innovative Elements	Advanced CCTV trailers Computer Vision Alarms
Project Cost	$500,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	October 2025

Roadway Characteristics – All Hampton Roads District (2023 data)

Work Zone Related Crashes	1,136
Work Zone Related Killed or Seriously Injured Crashes	33

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	Automatic detection of crashes in work zones allows for faster response times by first responders which, in turn, contributes to incident safety.
Emergency Response	Response Time Clearance Time	Automatic detection of crashes in work zones leads to faster response times by first responders.

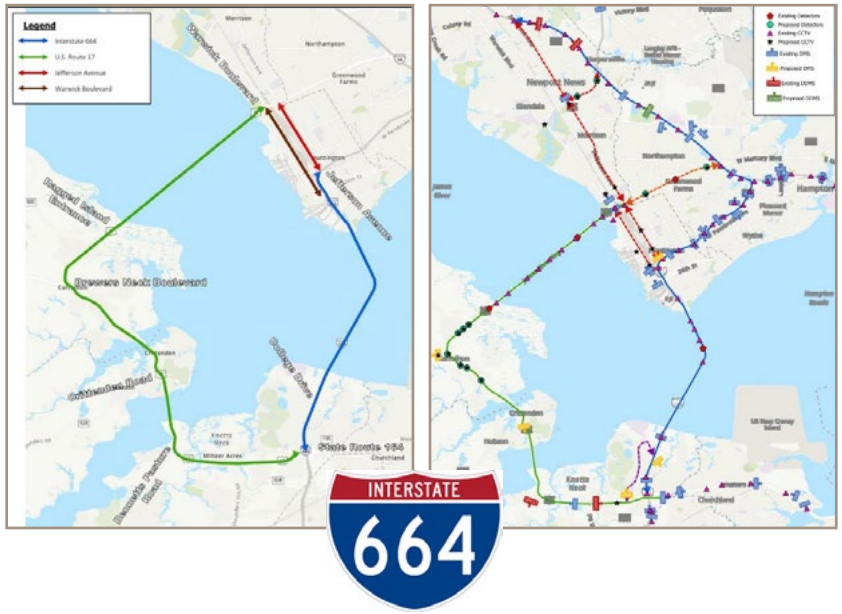
I-664 / Route 17 Bridge Road Integrated Corridor Management Phase II – Development

ITTF PURPOSES

Description

- Phase II of the Route 17 Integrated Corridor Management (ICM) project is focused on further developement of traffic control assets for enhanced management of a key detour route that handles approximately 28,000 vehicles daily. A concept of operations study, using ITTF funds, has been completed.
- The project aims to improve communications to drivers and incident management using automated control and notification systems, connected with local Transportation Operation Centers. The estimated cost of this phase is $4.84 million, which will cover design, construction, and project oversight.

I-664/Bridge Road Integrated Corridor Management Operations Concept



Overview

Location	Hampton Roads James River Crossings
VDOT District	Hampton Roads
Route	I-664, US-17, US-60
City/County	Newport News, Norfolk
Innovative Elements	Integrated Corridor Management Automated Control and Notification Systems
Project Cost	$4,840,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	September 2025

Roadway Characteristics (2023 data)

Metrics	I-664 (Exit 5 – 9)	US 17 (I-664 – US 60 Warwick Blvd)	US 60 (US 17 – I-664)
Annual Vehicle Hours of Delay	468K	80K	6.3K
Annual Cost of Delay	$19.6M	$3.3M	$264K
# Incidents	1,419	479	N/A
Median Incident Duration	14 Minutes	15 Minutes	N/A
Daily Traffic Volume	32,262	24,890	12,890

Benefits

Focus	Metrics	Anticipated Results
Mobility	Response Time Clearance Time	Improved mobility choice made possible by the ICM system
Congestion	Vehicle Hours of Delay (VHD)	An important objective of ICM is to reduce congestion by informing motorists of alternative routes.
Emergency Response	Response Time Clearance Time	A primary aim of this project is to improve incident management using automated control systems.
Travel Data	# Response Plans # Notifications	The software system will provide drivers with travel data.

High-Speed Signal Communications for Lynchburg District

ITTF PURPOSES

Description

- The project aims to implement high-speed communications for real-time control and management of transportation systems in Lynchburg, improving latency, safety, mobility, and emergency response. It involves the use of ATSPMs for real-time data collection and signal timing adjustments, and encrypted communications for enhanced security.

Location
24 @ 122: 9017: Bedford County
29B @ 726: 7102: Pittsylvania County
29B @ 40: 7105: Pittsylvania County
29B @ 57: 7104: Pittsylvania County
122 @ 655: 9018: Bedford County

Location
460 @ 122: 9022: Bedford County
460B @ 15: 7301: Prince Edward County
501 @ JP: 1541: Campbell County
501 @ 654: 4102: Halifax County
622 @ 682: 1513: Campbell County
654 @ 659: 4111: Halifax County

Overview

Location	South Central Virginia
VDOT District	Lynchburg
Route	11 Intersections
City/County	Campbell, Halifax, Pittsylvania, Prince Edward, Bedford
Innovative Elements	Automated Traffic Signal Performance Measure (ATSPM)
Project Cost	$1,246,800
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2025

Roadway Characteristics (2023 data for VDOT's Lynchburg District):

Metric	US 29	US 460	US 501
Annual Vehicle Hours of Delay	20,000	12,000	11,000
Cost of Delay	$830,000	$480,000	$460,000
Average Daily Volume	20,000	18,000	13,000

Benefits

Focus	Metrics	Anticipated Results
Mobility	Response Time Clearance Time	This project aims to provide the infrastructure necessary to deploy ATSPMs, which improve mobility.
Congestion	Vehicle Hours of Delay (VHD)	Less traffic signal delay

Traffic Signal Technical Upgrades and Corridor Retiming Enhancements

ITTF PURPOSES

Description

- The project improves traffic flow and safety at signalized intersections by using real-time performance measures to identify unused green time and potential malfunctions.
- The project will use SmartMicro Radar Detection sensors and MioVision 360 cameras, which provide detailed traffic data and can detect up to 256 vehicles simultaneously.
- This data-driven approach will support traffic signal timing optimization, thereby reducing congestion, emissions, and fuel consumption and increasing safety.

Overview

Location	South Central Virginia
VDOT District	Lynchburg
Route	US-221, US-460, US-501, US-29
City/County	Amherst, Appomattox, Bedford, Campbell, Lynchburg
Innovative Elements	SmartMicro Radar Detection
Project Cost	$735,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Project Characteristics – Number of Impacted Intersections

Amherst County	7
Appomattox County	4
Bedford County and Lynchburg	10
Campbell County	3

Benefits

Focus	Metrics	Anticipated Results
Safety	Number of collisions	Reduced number of collisions
Mobility	Response Time Clearance Time	Faster clearance and response times
Congestion	Vehicle Hours of Delay (VHD)	Reduced vehicle hours of delay

Ramp Preemption System

ITTF PURPOSES

Description

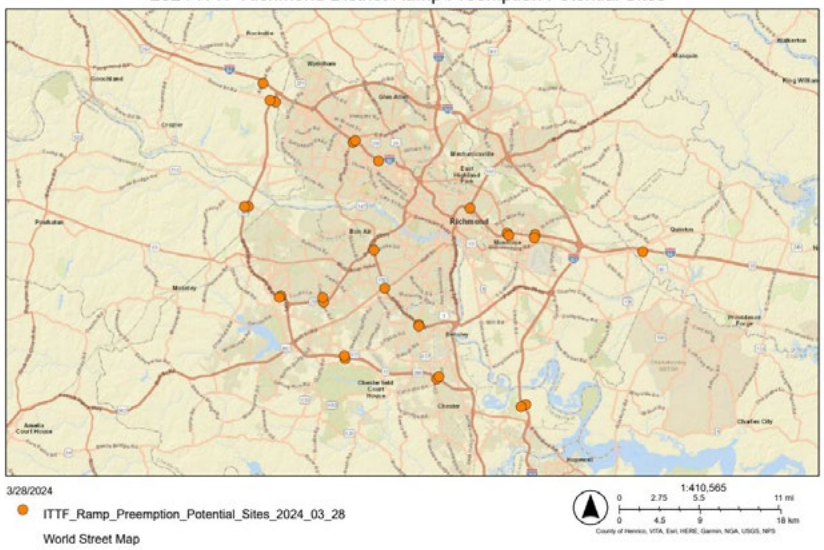
- This project will implement Queue Detection Systems on signalized interstate ramps in the Richmond District to prevent traffic congestion from affecting mainline routes.
- Expansion of the current I-95 system aims to enhance traffic flow on other limited-access routes.

COUNTY WITH NUMBER OF LOCATIONS

- Chesterfield – 14
- Goochland – 3
- Henrico – 8
- New Kent – 1
- Powhatan – 2

28 Locations

2024 ITTF Richmond District Ramp Preemption Potential Sites



Overview

Location	Greater Richmond
VDOT District	Richmond
Route	Multiple
City/County	Chesterfield, Goochland, Henrico, New Kent, Richmond
Innovative Elements	Ramp Preemption
Project Cost	$750,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Project Characteristics – All Richmond District (2023 data)

Crashes at Ramps	620
Annual Vehicle Hours of Delay	1.87M

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	By mitigating backups onto the mainline, this project reduces the likelihood of rear-end collisions.
Congestion	Vehicle Hours of Delay (VHD)	This project reduces congestion by getting stopped vehicles off of the interstate routes.

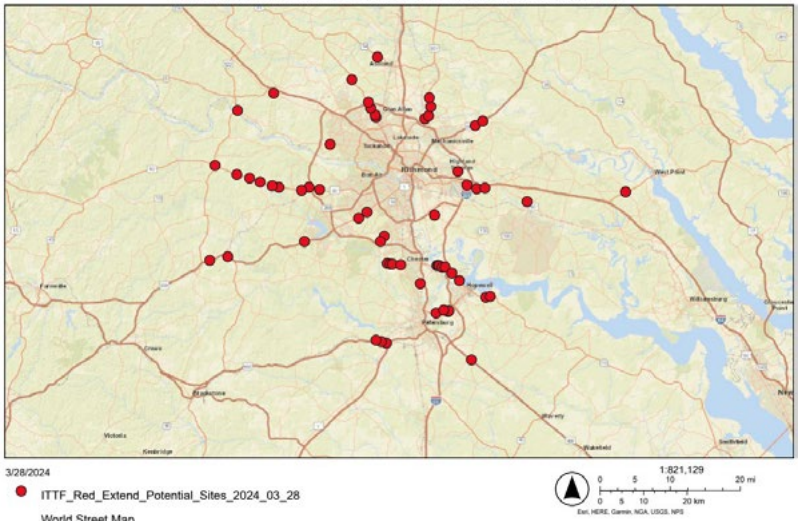
Red Light Extend on High Speed & High-Volume Truck Routes

ITTF PURPOSES

Description

- This project proposes to install or modify vehicle detection systems at traffic signals to extend red-light duration when large, fast-moving vehicles are identified, thereby reducing the risk of crashes.
- Initially piloted at Route 460 & Cox in Dinwiddie, the expansion will focus on high-speed, truck-heavy intersections. Intersections will be evaluated and prioritized accordingly.

2024 ITTF Richmond District Red Extend Potential Sites



Overview

Location	Greater Richmond
VDOT District	Richmond
Route	Multiple
City/County	Multiple
Innovative Elements	Real-Time Detection Integration with Signals
Project Cost	$500,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2026

Project Characteristics – All Richmond District (2023 data)

Crashes at Intersections	12,500
Crashes Involving Heavy Vehicles at Intersections	812

Benefits

Focus	Metrics	Anticipated Results
Safety	Collisions	This project specifically aims to improve safety at intersections by reducing the likelihood of conflicts with heavy vehicles.

COUNTY WITH NUMBER OF LOCATIONS

- Amelia – 2
- Chesterfield – 21
- Dinwiddie – 3
- Goochland – 3
- Hanover – 8
- Henrico – 9
- New Kent – 2
- Powhatan – 6
- Prince George – 7

61 Locations

Portable Intelligent Transportation System (ITS) Camera for Incident Monitoring

ITTF PURPOSES

Description

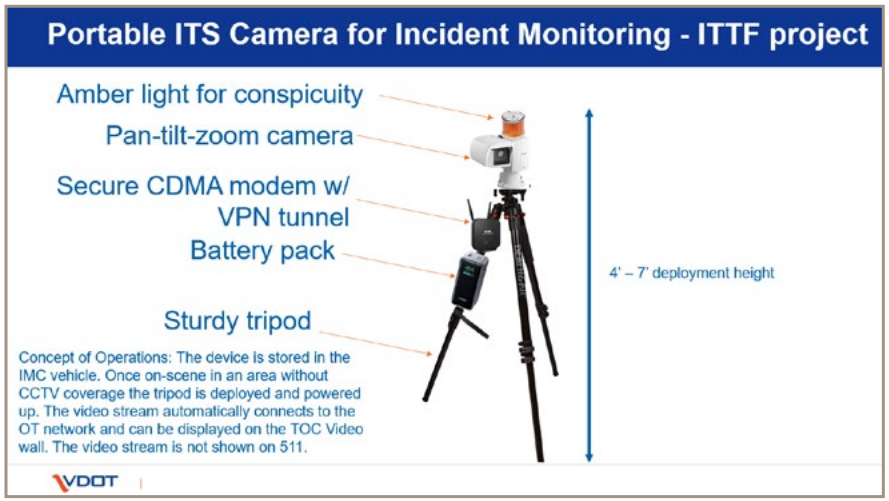
- This project proposes a portable, robust, and waterproof camera system to improve incident management on roadways.
- This quick deploy portable camera system will provide a real-time feed of a roadway incident directly to the Traffic Operations Center (TOC), offering visibility and situational awareness where no camera coverage is available. This system will be easier and faster to deploy than other portable camera systems.
- The system will also record incidents for post-incident analyses, facilitating improvements in processes and faster clearance times.

Overview

Location	Greater Roanoke
VDOT District	Salem
Route	Multiple
City/County	Multiple
Innovative Elements	Portable Intelligent Transportation Systems
Project Cost	$100,000
2024 Milestones	Added to VDOT's Six Year Improvement Program
Delivery Date	December 2025

Roadway Characteristics – All Salem District (2023 data)

Total Crashes	11,369
Number of CCTVs	125



Benefits

Focus	Metrics	Anticipated Results
Emergency Response	Response Time Clearance Time	Live camera footage of high-risk areas will provide the Traffic Management Center with the ability to respond to incidents faster.
Travel Data	# Response Plans # Notifications	The primary purpose of this project is to increase the video coverage of the District.

APPENDIX

The Appendix contains a list of all active ITTF projects effective August 31, 2024. Completed projects are excluded.

#	UPC	VDOT District	Description	$	Current Phase	Tentative Delivery Date
1	105388	Hampton Roads	Improved Communications for I-664 Monitor Merrimac Memorial Bridge Tunnel	$620,448	Installation	12/2024
2	107058	Hampton Roads	Newport News Citywide Signal Retiming	$1,910,000	Design	11/2026
3	108666	Hampton Roads	Monitor Merrimac Memorial Bridge Tunnel Traffic & Safety Improvements	$7,123,664	Installation	03/2026
4	109506	Statewide	Community Wide Adaptive Signal Systems	$3,172,507	Installation	01/2025
5	111892	Statewide	Active Traffic Management System Enhancements (Releases 1, 2, 3, & 4)	$12,233,789	Advancing Release 4	06/2025
6	112895	Statewide	Statewide Advanced Traffic Signal Controllers	$3,000,000	Installation	01/2025
7	115832	Northern Virginia	Arlington County Dynamic Parking Pricing	$5,099,284	Evaluation	12/2025
8	115854	Statewide	Arterial Operations Program Management Dashboard	$1,250,000	Installation	03/2025
9	115855	Statewide	High Speed Communications Design Arterials – Statewide	$749,110	Installation	01/2025
10	116803	Statewide	High Speed Communication Arterials – Northwest	$490,000	Installation	07/2025
11	116811	Statewide	High Speed Communication Arterials – Southwest	$300,000	Installation	12/2025
12	117436	Culpeper	Afton Mountain Safety Improvements for I-64	$3,410,586	Installation	05/2025
13	119199	Statewide	Smarter Lighting Initiative	$500,000	Design	12/2025
14	119332	Statewide	Data Driven Management Program for Pavement	$300,000	Design	01/2025
15	119404	Statewide	Tunnel Speed Guide Lights	$1,000,000	Installation	08/2025

#	UPC	VDOT District	Description	$	Current Phase	Tentative Delivery Date
16	119406	Statewide	Automated Speed Enforcement Pilot	$1,500,000	Installation	06/2025
17	119408	Lynchburg	High-Water Monitoring System – Lynchburg	$550,000	Scoping	07/2026
18	119720	Statewide	Regional Multi-Modal Mobility Program – Decision Support System & AI Tool	$8,390,000	Installation	11/2027
19	119721	Statewide	Regional Multi-Modal Mobility Program – Dynamic Incentivization	$3,500,000	Installation	09/2026
20	120369	Statewide	Smart Parking Data Collection, Validation & Outreach (an RM3P activity)	$4,800,000	Installation	11/2027
21	120820	Staunton	High Speed Communications for Signals	$750,000	Installation	12/2024
22	121564	Statewide	Leveraging Connected Car Data for Improved Safety	$500,000	Scoping	12/2025
23	121643	Statewide	Smart Intersection Deployment Support	$1,000,000	Design	05/2026
24	121648	Culpeper	Interchange Lighting at Exit 99	$2,640,000	Scoping	07/2028
25	121653	Statewide	Northern Virginia/Fredericksburg Cooperative Freeway Management	$3,000,000	Scoping	08/2026
26	121654	Statewide	Develop and Implement a Statewide Network Operating Center	$1,000,000	Installation	12/2025
27	121667	Statewide	Regional Multi-Modal Mobility Program – Supporting Data Services	$5,000,000	Installation	09/2028
28	121668	Statewide	Real-Time Information Dissemination for Commercial Motor Vehicles	$1,000,000.	Installation	06/2026
29	121670	Statewide	Advanced Road Weather Information Systems Study	$500,000	Scoping	08/2026
30	121698	Northern Virginia	Dynamic Ramp Metering for I-66 & I-395	$1,100,000	Scoping	09/2025

#	UPC	VDOT District	Description	$	Current Phase	Tentative Delivery Date
31	121712	Statewide	Resiliency Improvements for Timely Travel Data Systems – Network Operation Center	$650,000	Installation	06/2025
32	121775	Lynchburg	Automated Traffic Signal Performance Measures – Technical Upgrades and Enhancements	$720,000	Design	08/2025
33	121822	Statewide	Statewide Fiber Network Stability Enhancements	$2,987,095	Installation	12/2024
34	122147	Richmond	Hard Shoulder Running Technology Implementation for State Route 288	$26,298,570 (ITTF) $8,000,000 (Other)	Design	04/2028
35	122451	Statewide	High Speed Communications for Advanced Technology Signals	$475,000	Design	12/2024
36	122764	Hampton Roads	Hampton Roads Bridge Tunnel Over-Height Technology	$9,100,000	Design	07/2026
37	125029	Hampton Roads	Hampton Roads Signal Preemption	$175,000	New Project – Added in 2024	12/2025
38	125030	Hampton Roads	I-664 / Route 17 Bridge Road Integrated Corridor Management Phase II	$4,840,000	New Project – Added in 2024	9/2025
39	125032	Hampton Roads	Mobile Crash / Fire Notification Tools	$500,000	New Project – Added in 2024	10/2025
40	125206	Bristol	Big Walker Mountain Tunnel – Hazmat Placard Reader	$875,000	New Project – Added in 2024	12/2026
41	125207	Bristol	I-77 Traffic Queue Detection	$1,700,000	New Project – Added in 2024	12/2026
42	125208	Bristol	Big Walker Mountain Tunnel – Thermal Detection	$875,000	New Project – Added in 2024	12/2026
43	125374	Richmond	Red Light Extend on High Speed & High Volume Truck Routes	$500,000	New Project – Added in 2024	12/2026
44	125376	Richmond	Ramp Preemption System	$750,000	New Project – Added in 2024	12/2026

#	UPC	VDOT District	Description	$	Current Phase	Tentative Delivery Date
45	125726	Bristol, Salem, Staunton	I-81 Quick Look Advanced Monitoring System	$1,000,000	New Project – Added in 2024	10/2025
46	125829	Culpeper	ATSPM Projects on US 29, VA 3, US 250	$873,000	New Project – Added in 2024	8/2025
47	126014	Lynchburg	Traffic Signal Technical Upgrades and Corridor Reiming Enhancements	$735,000	New Project – Added in 2024	12/2026
48	126015	Lynchburg	High Speed Communications for Lynchburg District Signals	$1,246,800	New Project – Added in 2024	6/2026
49	126100	Bristol	Big Walker Mountain Tunnel – Permanent Work Zone / Lane Closure Technology	$2,250,000	New Project – Added in 2024	12/2026
50	126129	Statewide	Statewide Transportation Technology Project NOTE: There are 16 breakout projects.	$25,000,000	New Project – Added in 2024	10 to 36 months (varies per each of the 16 breakout projects).
51	126225	Bristol	Animal Detection Warning System Pilot	$640,000	New Project – Added in 2024	12/2026
52	126241	Hampton Roads	HRBT Over-Height Systems Integration	$4,000,000	New Project – Added in 2024	1/2027
53	126454	Salem	Portable ITS Camera for Incident Monitoring	$100,000	New Project – Added in 2024	12/2025
54	T29378	Statewide	Statewide Sidewalk and Crosswalk Management Tool	$350,000	New Project – Added in 2024	3/2026
55	T29379	Northern Virginia	Northern Virginia Traffic Signal Controllers	$2,000,000	New Project – Added in 2024	11/2025

Innovation and Technology Transportation Fund (ITTF)

Report to the General Assembly

2024