COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, VIRGINIA 23219-2000

Stephen C. Brich, P.E.
COMMISSIONER

January 24, 2020

The Honorable Governor Ralph S. Northam
Members of the Virginia General Assembly

Dear Ladies and Gentlemen:

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). This letter provides the information as required by the statute.

ITTF monies are to be used solely for the purposes of funding pilot programs and fully developed initiatives pertaining to high-tech infrastructure improvements that reduce congestion, improve mobility, improve safety, provide up-to-date travel data, or improve emergency response.

The current estimated total value of allocations for projects eligible for ITTF funding ("ITTF Projects") is $122.9 million. This number consists of $107 million, which was allocated to the ITTF for FY 2019 through FY 2024 by the Commonwealth Transportation Board (CTB) pursuant to an action dated June 19, 2018, and $15.9 million of allocations/projections of the CTB pursuant to the portion of the alternative CTB formula dedicated to smart roadway technology projects, prior to enactment of the ITTF, for FY 2019 through FY 2020.

The attached report provides a status update on active projects funded prior to July 2019 and a description of projects approved by the CTB in June 2019.

If you have any questions, please do not hesitate to contact Cathy McGhee, PE, Director of Research and Innovation at cathy.mcghee@vdot.virginia.gov or 804-916-9508, or me.

Sincerely,

Stephen C. Brich, P.E.

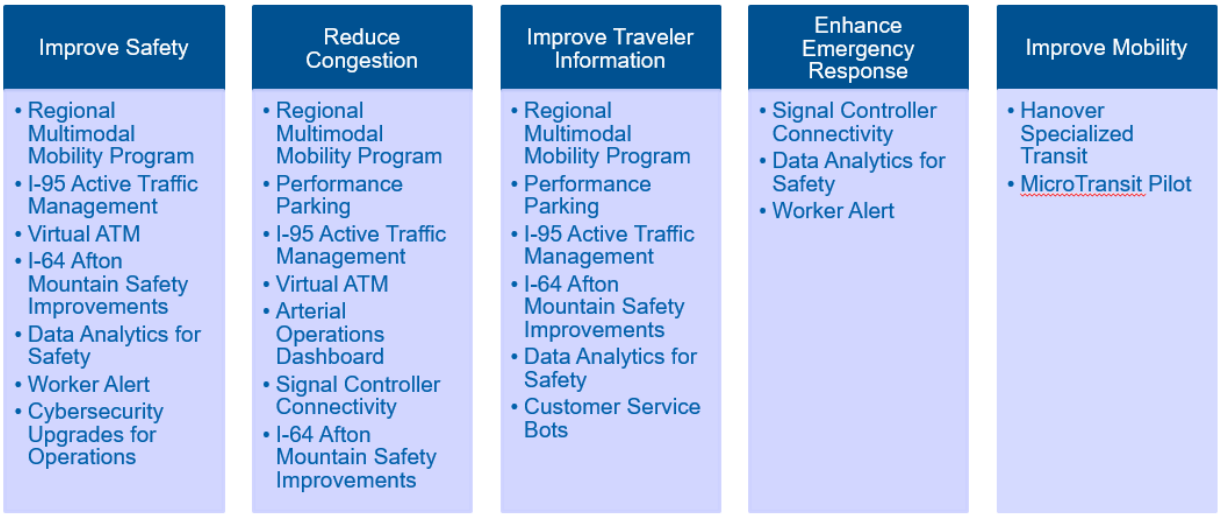
Attachment

Cc: The Honorable Ms. Shannon Valentine
Cathy McGhee, PE

Innovation and Technology Transportation Fund
Report to the General Assembly

Section 33.2-1531 of the *Code of Virginia* establishes 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 that reduce congestion, improve mobility, improve safety, provide up-to-date travel data, or improve emergency response. There are currently thirty-nine projects included in the ITTF program. Of those, thirteen were added with the approval of the Commonwealth Transportation Board (CTB) in June 2019.

This report provides an update of the earlier twenty-six projects and descriptions of the new projects. The graphic below categorizes the new projects according to the ITTF goals that each project will contribute.



Northern Virginia Regional Multi-Modal Mobility Program

Regional Multi-Modal Mobility Program (RM3P) will take a collaborative, integrated, and cohesive approach to improve safety, accessibility, and mobility, and mitigate congestion for the traveling public in the Commonwealth of Virginia, especially in the Northern Virginia region. RM3P will leverage artificial intelligence (AI) and machine learning algorithms to extract information from multiple data sources to provide real-time information for both system operators and the traveling public. The overall program includes five separate but interrelated projects including the development of:

- Data lake/data store
- Parking availability system to facilitate carpooling and transit use
- Mobility as a service (MaaS) dashboard to identify gaps in service that limit transit use
- Decision support tools that create information from multiple data sources

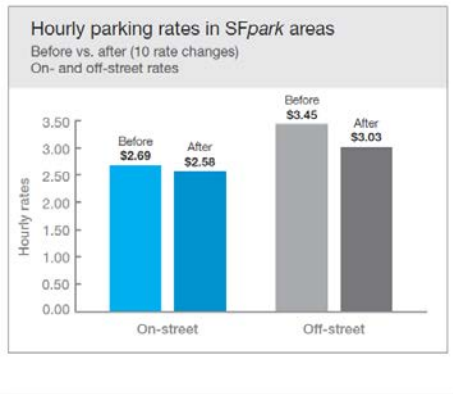
- Commuter incentive program that will reduce congestion during the worst travel conditions by encouraging commuters to travel at a different time, take a different route, or use a different mode

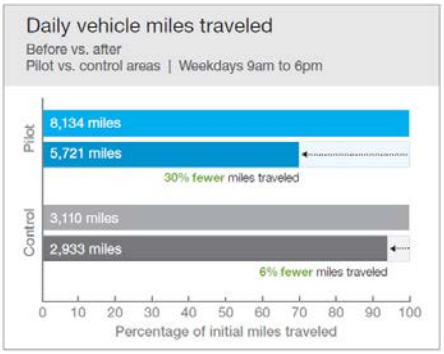
A high level schedule for RM3P is provided below.

March 2019 – July 2019:	Pre-Scoping and securing funding
August 2019 – September 2019:	Program Management Team Selection and project ramp up
October 2019:	Official Project Kickoff Organization setup
October 2019 – April 2020:	Solutioning for 5 Program Elements
February 2020 – July 2020:	Program Element Delivery Team Selection
August 2020 – May 2022:	Development and Delivery (multiple interim deliverables)
June 2021 – September 2022:	Program Element Implementation
April 2020 – October 2022:	Program Evaluation and Closure

Performance Parking in Commercial Corridors

Arlington County experiences high levels of both commuter and commercial traffic. This project will target increases in efficiency for parking in two Metrorail corridors. Smart parking meters will be deployed, along with data-driven variable pricing and real-time information, to optimize utilization of parking spaces and reduce congestion that results from motorists searching for available parking. A similar program in San Francisco resulted in 25% fewer miles traveled, a reduction in parking search times by 43%, and a 30% decrease in greenhouse gas emissions. Concerns about significant increases in parking costs were shown to be unfounded in San Francisco where average parking rates actually declined. This project will be managed locally by Arlington County and is expected to kick off in mid-2020.





I-95 Variable Speed Limits

The Interstate 95 (I-95) corridor is one of the busiest commuter corridors in the Commonwealth while also serving a high number of long-distance travelers. As a result, significant congestion occurs both during the weekday peak periods and during weekend travel times. In general, solutions to commuter-based congestion are different than solutions that target congestion stemming from weekend or long distance travel patterns. Variable speed limits (VSL), or "speed harmonization," is a solution that can target both forms of travel delay. By managing the flow of traffic, VSLs can decrease the impact of queueing by reducing the speed of traffic as it approaches a slowdown. Slowing traffic down gradually – rather than having hard braking at the end of a queue – keeps the overall traffic stream moving smoother and reduces the frequency of rear-end collisions. VSL deployments in Germany have resulted in 5-15% reductions in travel time, 30% reductions in crashes, and 5% increases in throughput. It should be noted that many European countries that experience these benefits have automated speed enforcement as a key part of their deployments. When VSL was deployed on I-66 in Northern Virginia several years ago, benefits were limited due to low rates of compliance with posted speeds. The I-95 deployment will include speed-monitoring capability combined with vehicle identification so that individual drivers can be contacted and provided educational information regarding the benefits of VSL. The compliance data collected will also be useful in determining ways to make VSL more effective in Virginia.

The I-95 VSL project will be coordinated with other projects identified through the I-95 corridor improvement study. Anticipated start date for project design is summer 2020.

Interstate 81 Operational Improvements

The I-81 Corridor Improvement Study identified a number of operational improvements that would enhance incident management and reduce delays. Many of these improvements included the deployment of additional field devices, such as cameras and dynamic message signs, to detect problems and disseminate real-time information to the public. Funds allocated through the ITTF program will seek to use those devices and the data they collect to further improve traffic flow and safety throughout the corridor. Several emphasis areas have been identified for consideration including:

- Commercial vehicle operations and safety
    - Truck parking
    - Decision support/routing
    - Speed differentials
- Incident and work zone management
    - Real-time information
    - Diversion route operations (including traffic signals)
    - Predictive data analytics
- Speed management and enforcement
- Queue warning and management

The I-81 ITTF operational improvement project will be coordinated with the overall I-81 Corridor Improvement program and will be underway in early 2020.

Interstate 64 Operational Improvements

I-64 west of Charlottesville experiences a higher than normal crash rate. A steep grade, frequent fog, and a high number of animal-vehicle collisions all contribute to the crash rate. A number of potential improvements have been considered to enhance safety through the corridor. "Smart" roadway lighting and a congestion management system, including cameras and dynamic message signs, were determined to be the most effective options, given the characteristics of the corridor.

The I-64 operational improvements are part of a larger corridor safety improvement program that will kick off in mid-2020.

Data Analytics for Safety

The Virginia Department of Transportation (VDOT), like other state DOTs, uses a wealth of data to identify safety challenges and appropriate mitigation strategies. Traditionally, this information has focused on historical traffic and crash data. More recently, the addition of other data sources has proven beneficial in determining both safety priorities as well as ways to address them. For example, pavement friction data combined with crash data has been valuable in identifying locations at which high friction surfaces can greatly reduce the occurrence of roadway departure crashes. This project will explore a variety of additional data sources, including census data, land use data, enhanced weather data, special event data, alcohol data (locations of sales and use), health-related data, and data from the Department of Education to identify correlations with roadway safety. AI and machine learning will be applied to the data to create information regarding crash likelihood and potential mitigation strategies that could be beneficial in reducing crash risk.

The scope for the initial build of the platform has been drafted and work will be underway in early 2020.

Arterial Operations Dashboard

The "Arterial Operations Dashboard" is a reporting tool that can provide travel time information and signal performance information in a single tool. The tool will be implemented on arterials across the Commonwealth, beginning with the Corridors of Statewide Significance (CoSS). This 24/7 performance data will facilitate better management of arterials during incidents on the interstates when there are detours and rerouting of traffic, as well as for general everyday use. It is important to note that the tool can be applied to signals owned and operated by our locality partners in addition to VDOT signals.

Overall, the arterial operations dashboard will:

- leverage ongoing efforts to upgrade signal controllers and deploy a central signal system to provide performance metrics on arterials statewide that enable improved real-time operations;
- provide metrics on signal performance and travel time reliability in one tool; and
- begin with an initial deployment on 70 corridor segments (1,128 intersections), ***including corridors through about 50 localities and towns.***

The arterial operations dashboard project will be integrated into the deployment of the statewide central signal software platform. Anticipated deployment is in late 2020.

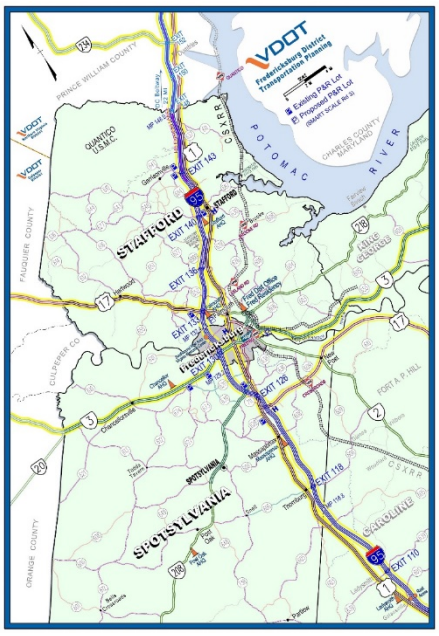
High Speed Communications for Signalized Intersections

VDOT currently operates and maintains over 3,000 signalized intersections across the Commonwealth. In addition to being vital to normal operations on the arterial network, those intersections are often required to serve much higher volumes of traffic when an incident or other special event occurs. The ability to respond to changes in demand, modify signal timing parameters in real time, and monitor the flow of traffic is critical from both a local operations and system-wide perspective. Currently, approximately 35% of VDOT traffic signals lack sufficient communications to operate at peak efficiency. A communications master plan has been developed, which identifies gaps in VDOT's communications network – including these intersections – and an implementation plan is under development that will prioritize the elimination of those gaps. When complete, this effort will contribute to enhanced incident management, improved safety and operations, and reduced overall agency costs by eliminated leased lines.

This will be an ongoing effort, beginning in mid-2020.

Parking Demand Management System

There are a number of park-and-ride lots in the I-95 corridor that serve the Virginia Railway Express. As commuters approach these lots, there is currently no information available on the status of parking availability. This project will deploy sensors at the entrance and exit points of the parking lots to determine the number of available spaces in real time. Dynamic message signs will be deployed to provide information prior to the exit. Additionally, the data will be made available for third-party applications that can more broadly disseminate the data.



This project will begin in early 2020.

Cybersecurity Enhancements for Operations Technology

VDOT's operations program includes a large number of field devices, and each of those is a potential point of vulnerability if the proper cybersecurity controls and processes are not in place. This project will contribute to a larger effort of fully securing the Operations Technology network. Full design of all mitigation strategies is underway, with completion expected in June 2021.

Pilot Program for Innovation

A number of small companies located in Virginia are creating innovative solutions to many of the transportation challenges we face. This program will provide VDOT with the opportunity to partner with the Center for Innovative Technology (CIT) to put out calls for solutions to specific challenges among CIT's network of small and start-up, Virginia-based companies. Responses would then be evaluated, and one or more would be selected for piloting and evaluation. The Commonwealth Transportation Board Innovation and Technology Subcommittee will help to determine the highest priority challenges and the potential innovations to pilot. This will have dual benefits of both improving transportation and providing economic development opportunities to Virginia companies.

Design of the program evaluation criteria is underway, and the first round of concept solicitations is anticipated in summer 2020.

Innovation Program for Localities

Many transportation challenges are encountered at the local level and would benefit from locally derived solutions. This program will allow localities to submit proposals for funding within the ITTF program. All proposals will be required to meet the criteria described in the Code of Virginia (i.e., reduce congestion, improve mobility, improve safety, provide up-to-date travel data, or improve emergency response), and any selected projects will be fully evaluated for potential deployment in other areas of the Commonwealth. The CTB Subcommittee on Innovation and Technology will help to determine which proposals to fund.

It is anticipated that localities will be invited to submit proposals for innovative project funding in fall 2020.

Statewide Technology for Operations

A number of technologies that have been tested or piloted elsewhere could provide significant benefit(s) to Virginia. This project will select a small number of initiatives for deployment and evaluation to determine the best path forward for optimal statewide deployment. Some possible technologies include:

- Customer service bots – automated systems that are capable of handling routine or low-priority calls during high volume events to free customer service agents for higher priority issues

- Worker alert system – an alert system that would provide a geo-fenced presence alert through third-party apps or agency-developed systems when workers are at risk of being struck by an errant vehicle
- Virtual Active Traffic Management (ATM) – a system that utilizes wireless communications and smartphone-based apps to provide the benefits of an ATM without the heavy infrastructure investment

Selected projects will begin in 2020.

In addition to these new projects, there are a number of efforts underway that were funded through previous CTB actions. The following tables provide an update on those projects.

"ITTF Projects" Allocated Funding in FY19[1]					
UPC / Location	**Project Purpose**	**Funding Allocation FY19 Final SYIP**	**Expenditures to Date**	**Expenditures FY 19**	**Status**
104591 Statewide	Interstate ITTF Technology – Equipment Upgrades	$3,379,827	$0	$0	This line item is a funding source for breakout projects
109482 Richmond	Richmond TOC Upgrade to house future transportation technology equipment and operations to improve traffic surveillance and management.	$2,259,880	$0	$0	Construction underway
Grand Total FY-19 Funding Allocation		$5,639,707			

[1] Information concerning FY18 allocations and expenditures for "ITTF Projects" may be found in the FY18 report published on Virginia's Legislative Information System at: https://rga.lis.virginia.gov/Published/2018/RD565

Ongoing / Completed Projects

UPC / Location	Project Purpose	Total Allocations	Expenditures to Date	Expenditures FY-19	Status
105368 Hampton Roads	Prepare design plans for an upgraded control room to improve traffic operations at the Hampton Roads Bridge Tunnel	$695,371	$500,346	$512	Complete; project closeout process underway
105369 Richmond	Prepare design plans for signal improvements for Route 1 from Caroline County to Colonial Heights to improve traffic flow	$525,000	$366,283	$208,493	Design plans underway
105380 Bristol	Improve traffic management at the Big Walker Mountain Tunnel	$368,233	$242,824	$13,549	Preliminary design underway
105381 Bristol	Improve traffic management at the East River Mountain Tunnel	$588,233	$230,371	$13,541	Preliminary design underway
105388 Hampton Roads	Prepare design plans to improve traffic operations at the I-664 Monitor Merrimac Tunnel	$620,448	$433,930	$179,368	Design plans underway
105404 Hampton Roads	Signal improvements for US 60 between New Kent and Newport News to improve traffic flow	$385,000	$277,435	$22,231	Design plans underway
105443 Fredericksburg	I-95 Corridor Technology on Rt. 1, 17; Signal Communications Camera – Prince William to Hanover to improve situation awareness and the management of traffic	$540,000	$358,404	$78,926	Preliminary engineering work underway
105444 Richmond	Signal improvements for US 60 between New Kent and Richmond to improve traffic flow	$180,000	$52,250	$713	Reported complete in FY17; however, the project was placed on hold & then re-started; Construction is underway

UPC / Location	Project Purpose	Total Allocations	Expenditures to Date	Expenditures FY-19	Status
107541 Northern Virginia	Install signal improvements with CCTV improvements for arterial highways in Northern Virginia to improve traffic flow for US 1 - Phase 3	$384,711	$301,238	$9,683	Construction complete; project closeout process underway
107545 Northern Virginia	Install signal and camera improvements on Routes-29, 50, 7, 236 in Northern Virginia to improve traffic flow - Phase 3	$533,206	$369,690	$18,885	Construction complete; project closeout process underway
107663 Fredericksburg	Intelligent Transportation System Deployment – District wide Fredericksburg District – Deployment of various signal related technology	$3,800,000	$160,630	$5,140	Construction underway
107818 Richmond	Intelligent Transportation System Deployment – Districtwide Richmond District – Deployment of various signal related technology	$3,366,250	$518,428	$365,663	Construction underway
109232 Hampton Roads	ITTF Arterial Operation Improvements for US 60, Route 143 & 199 to improve travel on the parallel routes to I-64 around the Williamsburg area.	$1,391,601	$1,120,149	$1,104,435	Construction complete; project closeout process underway
109487 Northern Virginia	I-66 Corridor Technology Advancements for Route 29, 50, 7, & 236 Connected Vehicle Development to promote this emerging technology to improve safety and mobility	$500,000	$500,000	$337,915	Complete; project closeout process underway
109506 Statewide	Statewide Communitywide Adaptive Signal Control	$638,399	$0	$0	This line item is a funding source for breakout projects; awaiting additional funding to develop a new breakout project.
110208 Statewide	Safety Service Patrol Communications Upgrade to improve incident management to minimize delays.	$225,000	$217,946	$456	Complete; project closeout process underway
110497 Northern Virginia	I-95 & I-66 Corridor Technology Advancement – System Security Enhancement for networks & Information Technology systems	$441,047	$393,786	$381,632	Complete; project closeout process underway

UPC / Location	Project Purpose	Total Allocations	Expenditures to Date	Expenditures FY-19	Status
110561 Statewide	I-95 Ramp Metering to improve traffic management and reduce congestion (Design only)	$200,000	$89,529	$2,531	Complete; project closeout process underway
110912 Statewide	Statewide Truck Parking Management System – Phase 1 to improve safety for commercial vehicle operations	$925,000	$813,048	$207,816	Complete; project closeout process underway
111613 Statewide	Statewide Truck Parking Management System – Phase 2 to improve safety for commercial vehicle operations	$1,807,000	$292,543	$146	Design plans underway
111892 Statewide	Advanced Traffic Management System – Phases 1,2,3,4 to support implementation / upgrades to advanced traffic management system; This is VDOT's Master Traffic Control System	$10,900,000	$6,663,351	$3,369,856	Project underway
112254 Statewide	Pedestrian Collision Avoidance System to improve transit travel times & transit system reliability	$250,000	$86,167	$86,167	Retrofits underway
112895 Statewide	Statewide Advanced Traffic Signal Controllers	$3,000,000	$291,569	$288,327	Construction underway
114400 Statewide	Drone Technology	$250,000	$229	$229	Procurement underway