



COMMONWEALTH *of* VIRGINIA  
Office of the  
SECRETARY *of* TRANSPORTATION

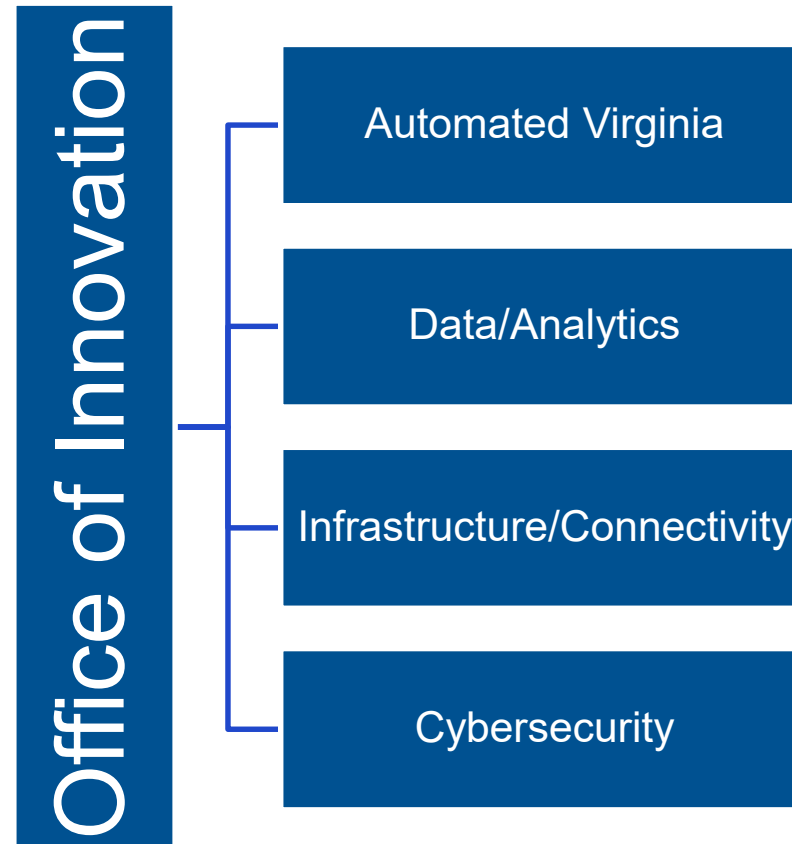
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Director of Research and Innovation

# Office of Transportation Innovation

Drive and enable innovation in Virginia's transportation ecosystem to ensure advanced technology and ideas are leveraged to solve the most pressing transportation issues.



# Office of Innovation – Initial Focus Areas



# Innovation and Technology Transportation Fund

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

- Reducing congestion
- Improving mobility
- Improving safety
- Providing up-to-date travel data
- Improving emergency response

*ITTF projects are guided by the members of the CTB Innovation and Technology Subcommittee*

# ITTF Project Selection

Projects can be recommended by VDOT, DRPT, or localities

Projects are evaluated based on:

- **Contribution to innovation**
- **Potential for transferability**
- **Applicability across modes**
- **Anticipated benefit**
- **Acceptability of risk**

# ITTF Projects Currently Funded

- In January 2016, the Board was briefed on the ITTF and provided a spreadsheet of proposed projects
  - 7 projects proposed for Smart Roadway Technology Funds at \$25,931,214
  - 24 projects proposed for ITTF funds at \$74,771,332
- At February 2016 CTB meeting, approval for funding for ITTF was granted

# Currently Funded Projects

- **HRBT Control room upgrades**
- **Big Walker and East River Mountain Tunnel lane control systems**
- **Arterial corridor signal improvements (various locations, statewide)**
- **CCTV camera upgrades/enhancements (arterial corridors, NOVA region)**
- **HRBT Overheight detection system**
- **MMMBT traffic and safety improvements**
- **ITS Deployment – Fredericksburg**
- **ITS Deployment - Richmond**
- **Richmond TOC upgrades**
- **SSP Communications upgrade**
- **I-95 Ramp Metering (PE)**
- **Statewide truck parking management (I-81/I-95)**
- **ATMS statewide central system upgrade**
- **Statewide transit enabling technology (FY21)**
- **Community wide adaptive signal systems (FY21)**
- **Pedestrian collision avoidance (transit)**
- **Statewide advanced traffic signal controllers**
- **UAS Technology Pilot (crash reconstruction)**
- **Statewide emerging technology research**

# Proposed Projects

Automated Virginia	Infrastructure/Connectivity	Data/Analytics	Cybersecurity	Other
<ul style="list-style-type: none"><li>• Virtual ATMS</li><li>• I-95 Active Traffic Management</li><li>• Hanover Specialized Transit</li><li>• MicroTransit Pilot</li><li>• Worker Alert</li></ul>	<ul style="list-style-type: none"><li>• Signal Controller Connectivity</li></ul>	<ul style="list-style-type: none"><li>• Regional Multimodal Mobility Program</li><li>• Data Analytics for Safety</li><li>• Performance Parking</li><li>• Customer Service Bots</li><li>• Arterial Operations Dashboard</li></ul>	<ul style="list-style-type: none"><li>• Cybersecurity Upgrades for Operations</li></ul>	<ul style="list-style-type: none"><li>• I-64 Afton Mountain Safety Improvements</li><li>• Pilot Program for Innovation</li><li>• Local Innovations</li></ul>



# Proposed Projects

## Improve Safety

- Regional Multimodal Mobility Program
- I-95 Active Traffic Management
- Virtual ATM
- I-64 Afton Mountain Safety Improvements
- Data Analytics for Safety
- Worker Alert
- Cybersecurity Upgrades for Operations

## Reduce Congestion

- Regional Multimodal Mobility Program
- Performance Parking
- I-95 Active Traffic Management
- Virtual ATM
- Arterial Operations Dashboard
- Signal Controller Connectivity
- I-64 Afton Mountain Safety Improvements

## Improve Traveler Information

- Regional Multimodal Mobility Program
- Performance Parking
- I-95 Active Traffic Management
- I-64 Afton Mountain Safety Improvements
- Data Analytics for Safety
- Customer Service Bots

## Enhance Emergency Response

- Signal Controller Connectivity
- Data Analytics for Safety
- Worker Alert

## Improve Mobility

- Hanover Specialized Transit
- MicroTransit Pilot

# Northern Virginia Regional Multi-Modal Mobility Program (RM3P)

- Builds off an Integrated Corridor Management planning grant
- Includes four distinct but inter-related tasks
  - Enhance commuter parking data
  - Develop a Mobility as a Service (MaaS) Dynamic Service Gap Dashboard
  - Implement and AI-based decision support system with prediction
  - Deploy a data driven tool to incentivize customer mode and route choice
- Total cost - \$15 million

# Performance Parking Deployment in Commercial Corridors

- **Focus on Arlington County's two Metrorail corridors to provide data-driven variable pricing coupled with real-time information**
- **Goal is to reduce congestion as travelers search for available parking (balance demand geographically)**
- **Similar program in San Francisco showed decreases in time to find a parking spot, reduced emissions, and lower vehicle miles traveled**
- **Total cost: \$5.4 million**

# I-95 Variable Speed Limits

- **Experience internationally has shown VSL/speed harmonization to be effective in reducing congestion**
  - Germany saw 5-15% reduction in travel time, 30% decrease in crashes, 5% increase in throughput
  - United Kingdom saw 20% fewer property damage only crashes and 10% fewer injury crashes
- **Project will include compliance monitoring/education**
- **Total cost: \$ 15 million**

# I-64 Afton Mountain Safety Improvements

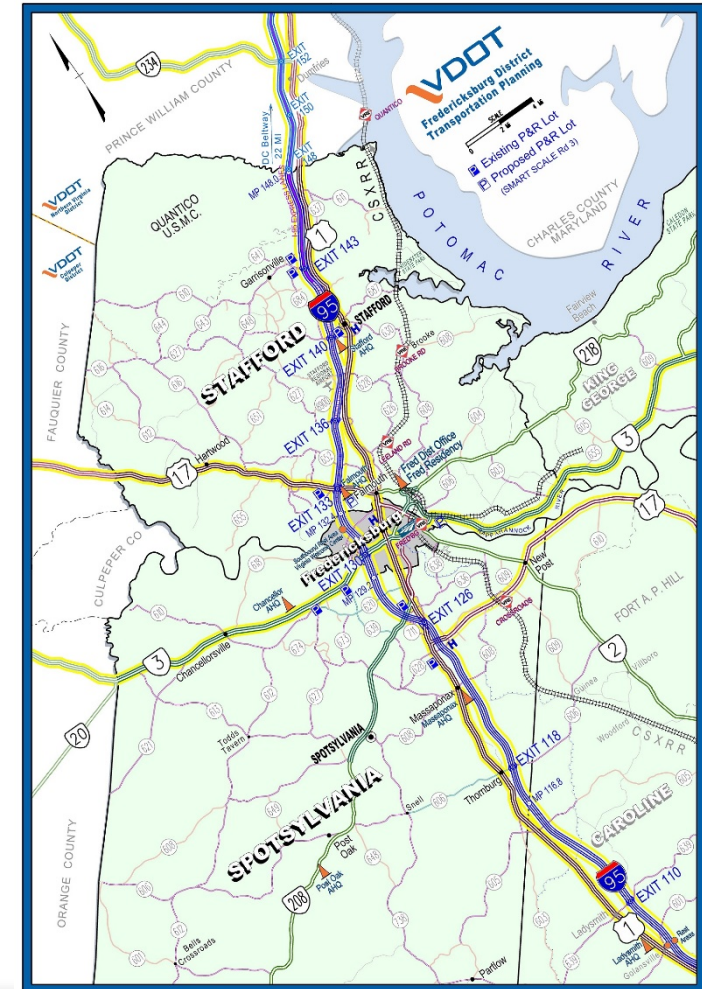
- Safety during the PM peak travel westbound is the biggest single concern
- Evaluating a range of potential strategies:
  - ATM designed to mitigate high speeds and speed differentials at the top of the mountain where fog is most likely
  - Speed feedback signs
  - Dynamic signing to alert trucks to travel in the right lane during the PM peak
  - Flashing chevrons, enhanced signs and markings, modified operation of existing fog lights
- Total cost: \$5 million

# Innovative Transit Pilots

- **Hanover County Specialized Transit Program**
  - Target ambulatory and non-ambulatory services in rural and suburban areas through partnerships with reservation companies and TNCs to provide services
- **Microtransit Pilot**
  - Provide mobility-on-demand rideshare services using small to medium sized vehicles operating within pre-defined zones
- **Total cost: \$300,000 (\$150,000 each)**

# Parking Demand Management System

- Provide real-time parking information for 8 park & ride lots on I-95 that support VRE
- Sensors at entry and exit
- Real-time information display and publication to portal for further dissemination
- Total Cost: \$1,950,000



# Data Analytics for Safety

- Integrate a variety of data (crash, weather, event, pavement condition, traffic/congestion, etc.) in a data platform to which artificial intelligence tools can be applied.
- Extension of the decision support tool developed in the RM3P project to address a wider range of safety challenges
- Nevada pilot indicated a 17% reduction in crashes through repositioning of assets
- Total cost: \$2 million



# Pilot Program for Innovation

- **Pilot program in partnership with the Center for Innovative Technology can bridge the gap between VDOT-identified transportation challenges and entrepreneurs who have potential solutions**
- **CTB Subcommittee for Innovation and Technology will help to identify high priority issues to put forward as problem statements**
- **Total cost: \$1.5 million**

# Innovation Program for Localities

- Initiative to fund locally identified innovative strategies that meet the goals of the ITTF program
- Working group of VDOT and DRPT staff will prioritize submitted projects on the basis of congestion relief, safety improvement, innovation, and potential for widespread deployment
- Total cost: \$2 million

# Statewide Technology for Operations

- There are a number of strategies that have been tested or piloted that could result in significant operational improvement statewide
  - Customer service bots – handle routine or low-priority calls during high volume events to free customer service agents for higher priority issues
  - Worker alert system – emergency responders on the roadside are at high risk. Alert system would provide a geo-fenced presence alert through 3<sup>rd</sup> party apps or agency developed systems
  - Virtual ATM – provides benefits of an ATM without the heavy infrastructure investment
- Total cost: \$2 million

# High-Speed Communications Upgrades for Signalized Intersections

- Real-time monitoring and operations of traffic signals requires reliable communications between the field controllers and the central system
- Currently, approximately 35% of signals statewide have substandard communications
- Effort will leverage a variety of approaches (VDOT fiber, resource sharing, leased lines, etc) to facilitate effective communications with all intersections
- Total cost: \$4.7 million

# Arterial Operations Dashboard

- Leverage ongoing efforts to upgrade signal controllers and a central signal system
- Dashboard will provide metrics on signal performance and travel time reliability
- Initial deployment on 70 corridor segments (1,128 intersections) including corridors through about 50 localities and towns
- Three to five corridors will combine automated signal performance metrics and travel time metrics to improve real-time operations
- Total cost: \$1.25 million

# Cyber Security Upgrades for Operations

- **As technology advances, cyber security becomes a critical component of operations. Connected and automated vehicles will only increase this criticality**
- **VDOT has completed a cyber security assessment of the operations technology program**
- **Strategies to mitigate identified vulnerabilities have been developed**
  
- **Total cost: \$2 million**



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