



Emerging Trends in Interstate Operations and Management in Virginia

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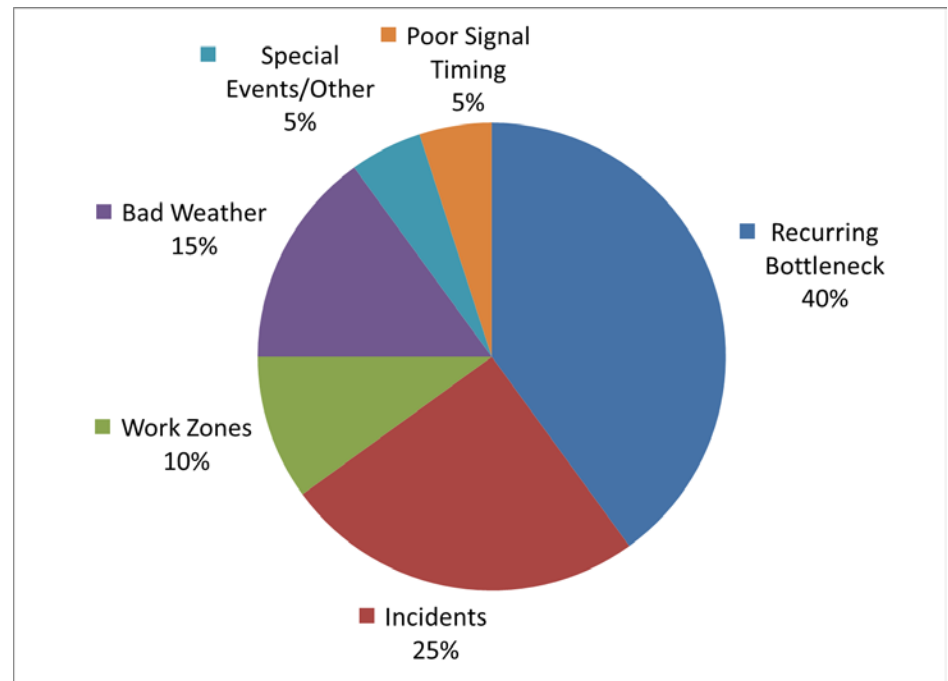
Virginia's Interstate Network

- VDOT operates 1,118 miles of interstate, ranging from congested urban facilities to rural, mountainous interstates.
- 5 Traffic Operations Centers cover entire system
- VDOT also operates 56,416 miles of primary and secondary roads.



Using Operations and Management to Address Interstate Congestion

- Primary focus is on mitigating non-recurring events
- Improve reliability of trips under unusual conditions



Source: Cambridge Systematics and TTI, 2004

Trends in Interstate Operations in Virginia

- Improved data and analytics
- Improved incident response
- Active traffic management
- Pricing as a management tool
- Integrated corridor management
- Connected and automated vehicle applications

Improving Data and Analytics

- DOTs have historically been restricted to data generated by point sensors
- Partnerships with crowd sourced data providers have increased coverage
 - Probe travel time data (INRIX)
 - Incident data (Waze)
 - New cloud data portal for app providers
- New Big Data analytical tools
- Emerging connected vehicle data sets



Improving Rural Incident Management

- Rural areas have lower levels of monitoring, fewer parallel routes
- Implemented first responder pilot using VDOT to provide coordination with first responders on lane blocking incidents at known rural hotspots
- 20% reduction in lane clearance time, 14% reduction in incident duration



I-66 Active Traffic Management

- Major commuting corridor with frequent recurring and nonrecurring congestion
- In September 2015, VDOT activated ATM system that included:
 - Advisory Variable Speed Limits
 - Lane Control Signals
 - Dynamic Hard Shoulder (previously a static time of day system)

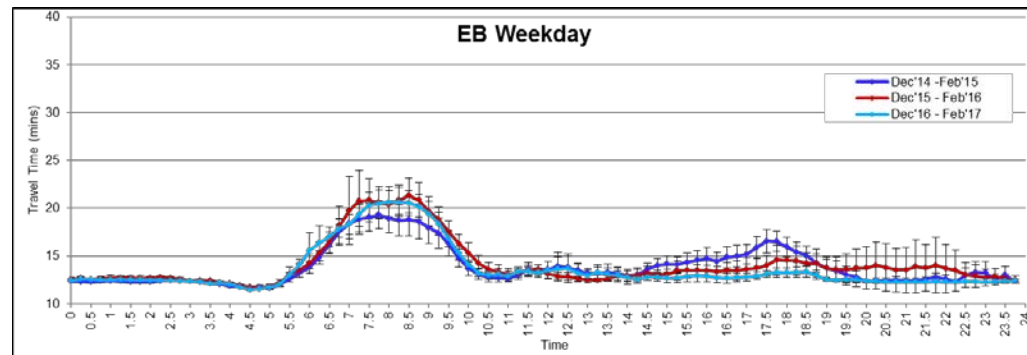


I-66 Active Traffic Management

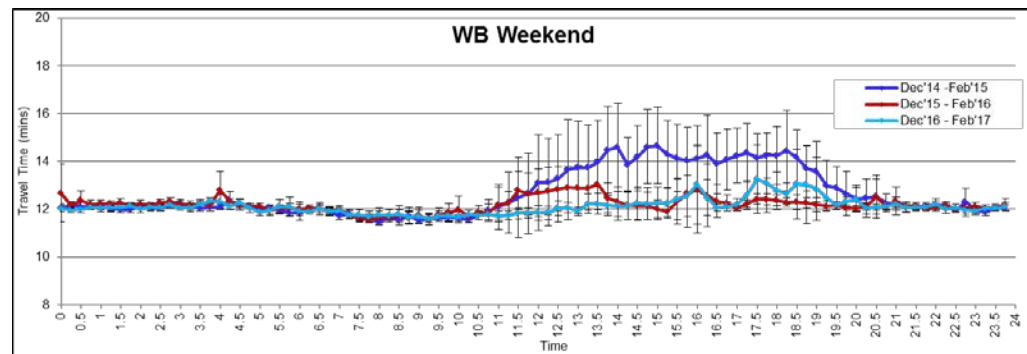


- Travel times improved 4 to 10% during weekday off peak periods, 7 to 15% on weekends
- Up to 25% reduction in crashes

EB Weekdays



WB Weekends



I-77 Variable Speed Limits



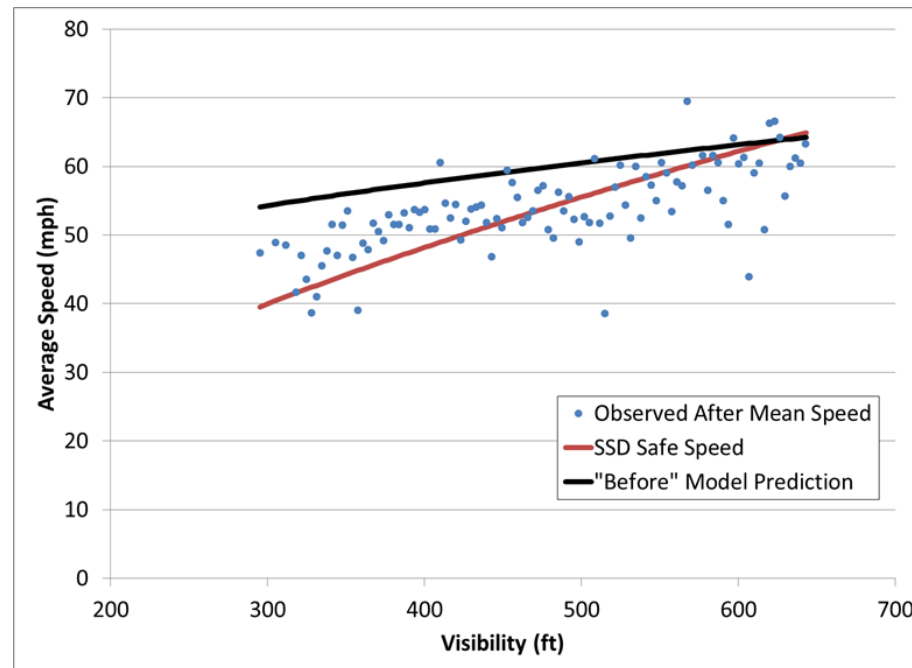
- Rural mountainous area prone to severe fog events
- Significant unsafe driving behavior during fog
- Implemented VSL system to dynamically reduce speeds based on visibility data
- System active in October 2016



I-77 Variable Speed Limits



- Real time VSL feedback has reduced speed and improved compliance



Priced Managed Lane Projects



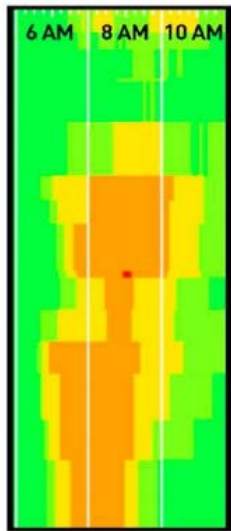
- Pricing has been used to manage demand and encourage HOV utilization
- Open facilities:
 - I-95 Express Lanes
 - I-495 Express Lanes
 - Elizabeth River Tunnels
- Planned facilities
 - I-64 in Hampton Roads
 - I-66 Inside the Beltway
 - I-66 Outside the Beltway



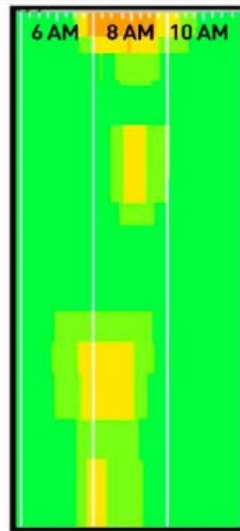
Priced Managed Lane Projects



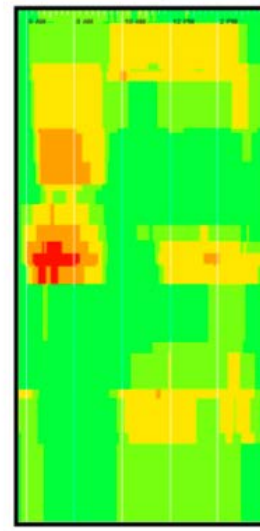
2012 Pre-Opening



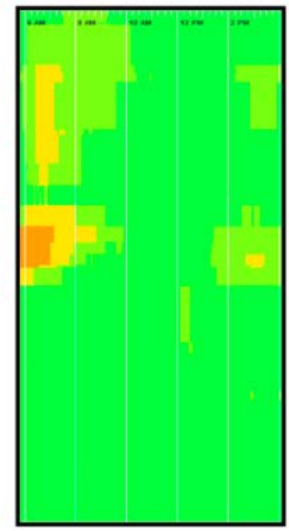
2013 Post-Opening



2014 Pre-Opening



2015 Post-Opening



Northbound I-495 GP Speeds

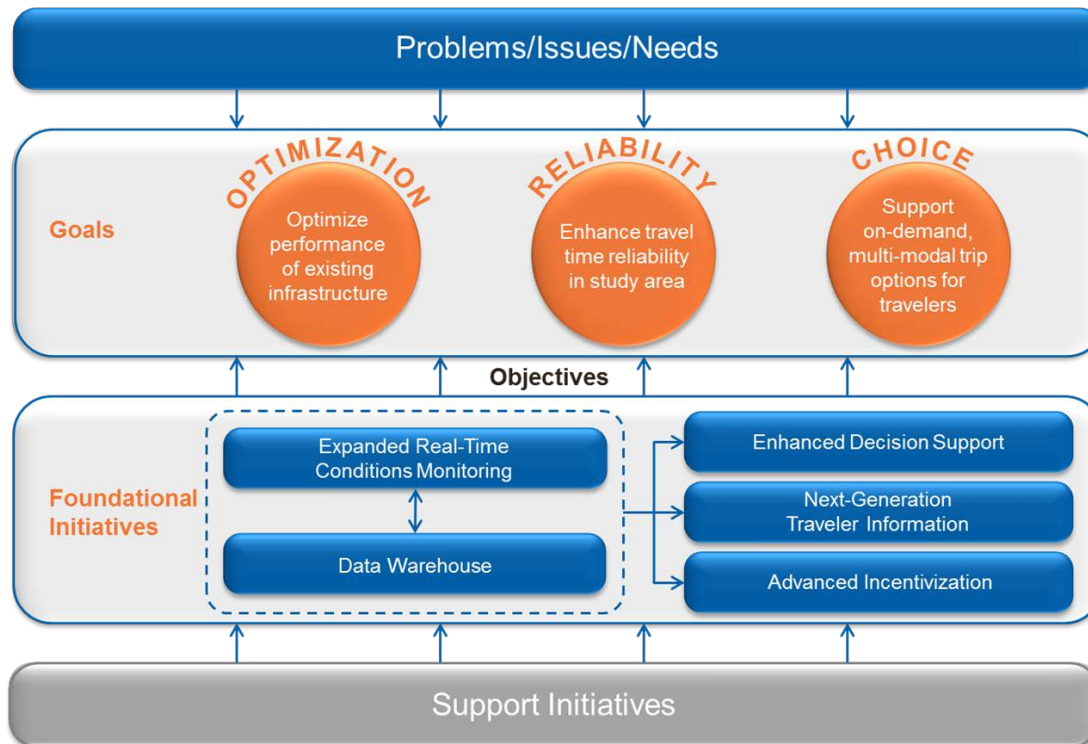
Northbound I-95 GP Speeds



Integrated Corridor Management



- Planning initiatives underway to look at multimodal mobility on I-95 and I-66
- Connection with freeways, arterials, transit, and parking

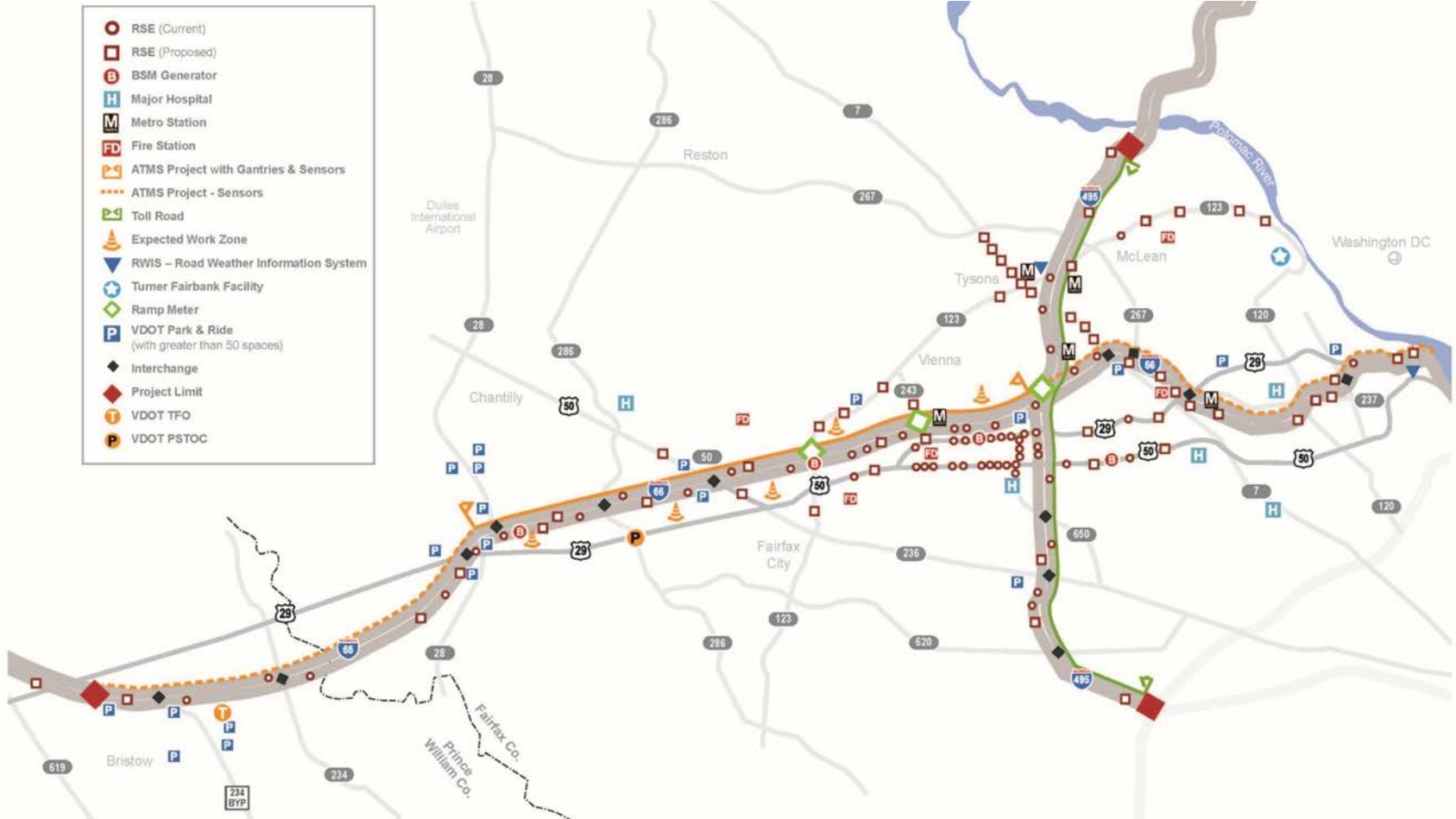


Planning for Connected and Automated Vehicles



- VDOT has been active in connected and automated vehicles for many years
 - Lead state in connected vehicle pooled fund study
 - Developed Virginia Connected Corridor and Virginia Automated Corridor for testing
 - Key partnerships with state universities
 - Moving towards integration with TOCs

Virginia Connected Corridors

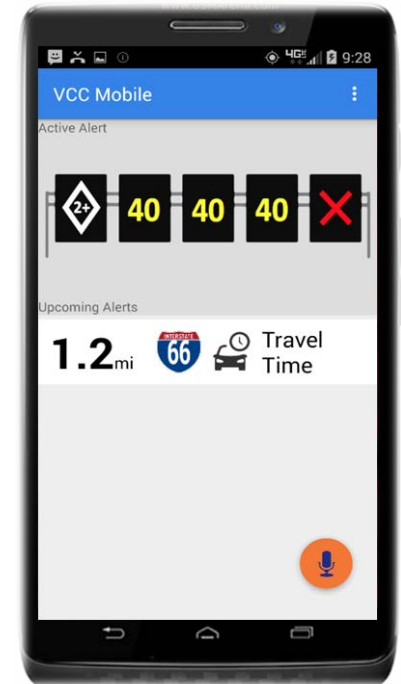


Virginia Connected Corridors



Transportation Needs	VDOT Performance Measures & Goals	CV Applications (Priority indicated within parenthesis)
<p>Reduce recurring congestion I-66 corridor currently experiences average travel speeds of approximately 40 mph during the peak periods</p>	<p>Delay Vehicle Hours of Delay GOAL: Reduce VHD</p>	
<p>Increase travel reliability I-66 has a PTI value over 3 during both the morning and evening peak periods</p>	<p>Reliability Planning Time Index GOAL: Reduce PTI</p>	
<p>Reduce non-recurring congestion Incident duration in the Northern Region has averaged 52 minutes over the last year</p>	<p>Duration Incident Duration GOAL: Reduce Incident duration by 5 min in 5 years</p>	
<p>Reduce crashes Facilities within the VCC experienced 2961 crashes (5 fatal and 70 severe injury crashes) in 2014</p>	<p>Safety Number of crashes GOAL: Reduce fatal & injury crashes by 3% per year (from 2010 baseline)</p>	

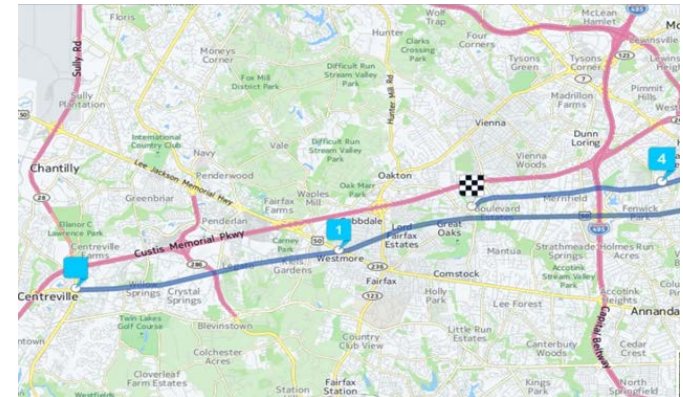
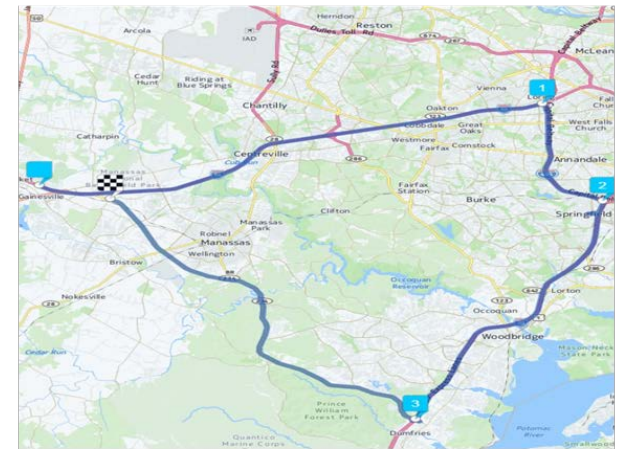
(1) Advanced Traveler Information	(2) Work Zone Alerts for Drivers and Workers	(3) Incident Scene Alerts for Drivers	(4) Red Light Violation Warning System	(5) Queue Warning	(6) V2V – Forward Collision Warning
(7) V2V – Emergency Electronic Brake Light	(8) Parking Availability	(9) Probe Enabled Traffic Monitoring	(10) Integrated Traffic Signal System	(11) Transit Signal Priority	(12) Emergency Vehicle Preemption



Virginia's Automated Corridor



- Partnership between VDOT, DMV, Here, Transurban and led by VTTI to enable advanced automated vehicle technologies in Virginia
- VDOT has committed to maintaining standards for completeness of marking and retro-reflectivity properties



Themes Moving into the Future

- Continued emphasis on real-time management of facilities, including active traffic control
- Continued improvement in availability, diversity, and analysis of data
- Increased coordination in operations between freeways, arterials, and transit
- Integration with future connected and automated vehicle applications

Questions?

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