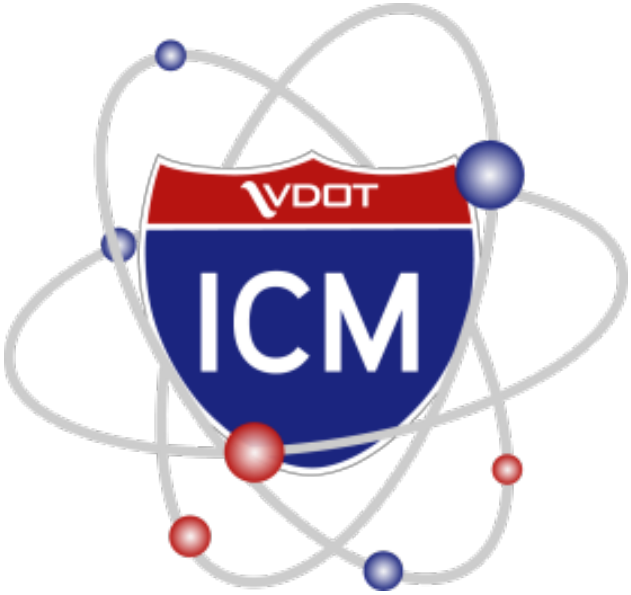


I-95/I-395 Integrated Corridor Management Initiative Update

Chris Francis

Operations and Security Division, VDOT, Richmond, VA

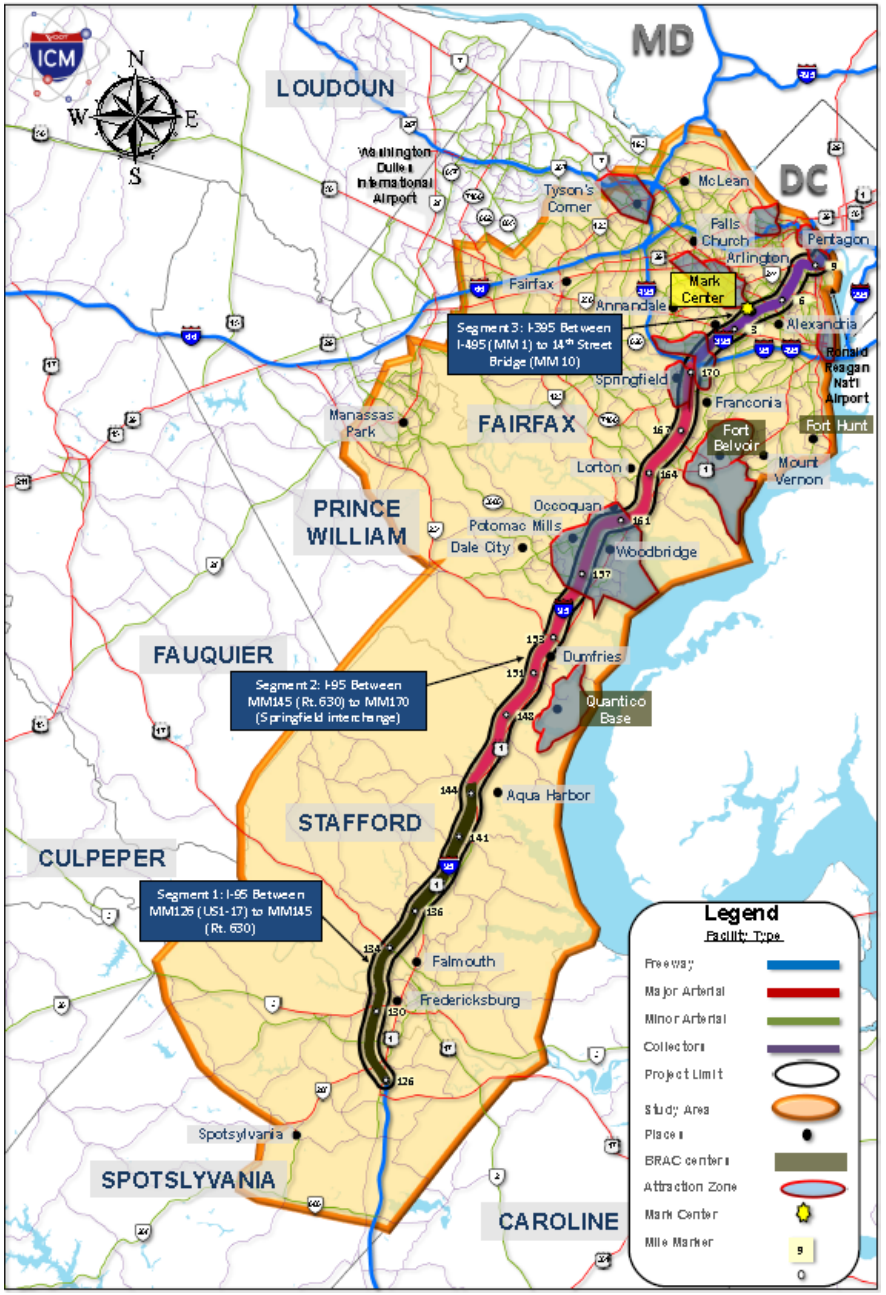
Commuter Connections Subcommittee Meeting

Metropolitan Washington Council of Governments

Washington, DC, September 18, 2012

Status

- I-95 / I-395 ICM ConOps & Project Development Task began October, 2011
- Extensive internal and external outreach resulted in definition of ICM strategies and Concept of Operations
- ICM Roll Out - Project work packages defined based on corridor-wide and segment needs, addressing “low hanging fruit” with an ICM Partnership to implement more complex multi-modal applications.



Key ICM Deliverables

- Concept-of-Operations
- ICM Architecture and Systems Engineering Management Plan
- Deployment Plan w/Multi-modal Work Packages (Corridor-wide and Segment-based)
- ICM Partnership - Institutional Framework for ICM Implementation

Significant Congestion ***ICM Systems*** ***Managing All Corridor Capacity***

multi-agency collaboration and coordination

Stakeholder Engagement & Project Development

VDOT Internal Discussion → Narrow the field → Strawman Development

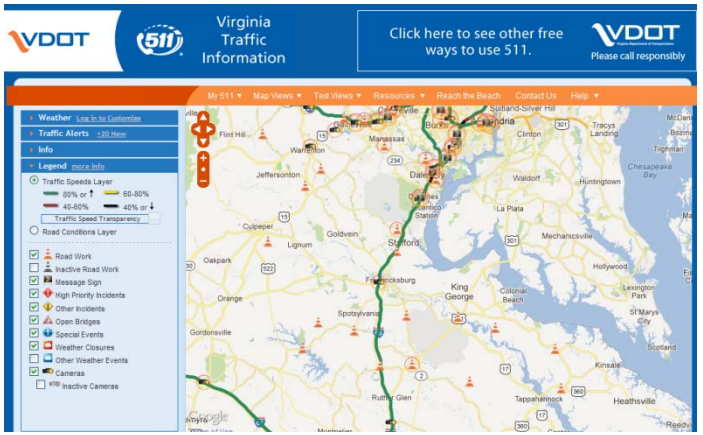
VDOT and Multi-Modal Stakeholders

Project and Operational Knowledge	***Needs and Functional Input***	***Coordination On System Elements***	***Operational Roles and MOU Needs***
Operations, Traffic, and Travel Demand	Stakeholder Needs	System Architecture	Performance Measures
As-Built Infrastructure and ITS Assets	Technology Options	Technology Definitions	Refined System Concept
Transit Projects and TDM Initiatives	Overall ICM Approach	System Locations	Roles and Responsibilities
Roadway Projects and Transit/TDM Initiatives	Coordination with Transit / Other	Technology Deployment Plan	Multi-modal Operational Scenarios
Corridor Assessment (Baseline)	Project Needs and Strategy Formulation	Deployment Recommendations	Concept of Operations

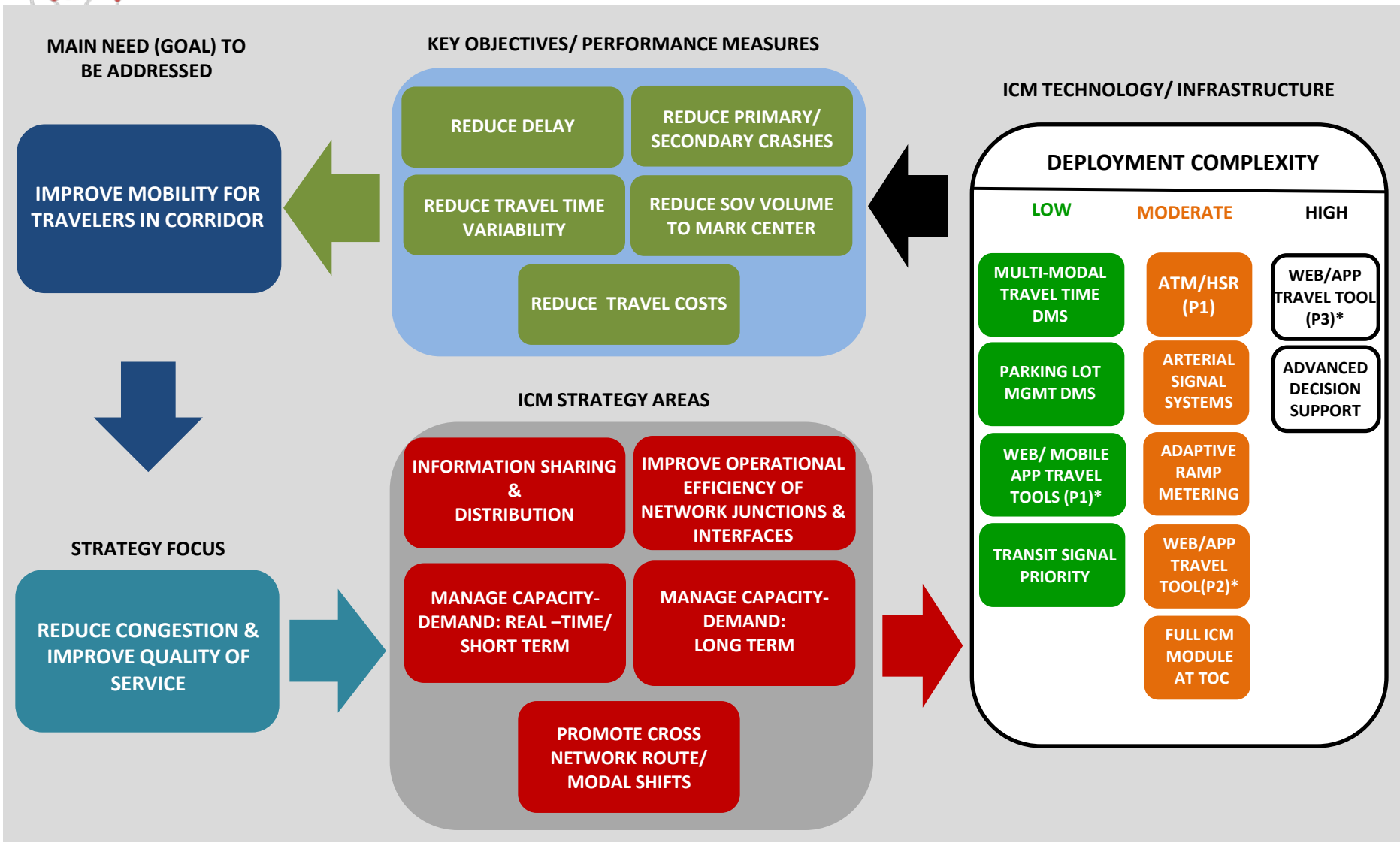
ICM Project Development Activities

Needs Highlight

- Need real-time, multi-modal, end-to-end, traveler information data and services
- Need a single access point to an integrated multi-modal trip planning to include TDM options
- Need real-time parking availability
- Need enhanced incident management
  - Local incident info from local police CAD
  - Arterial incident coordination
- Need optimized signal operations
- Need to address Mark Center traffic impact



ICM Vision for I-95 / I-395 Corridor



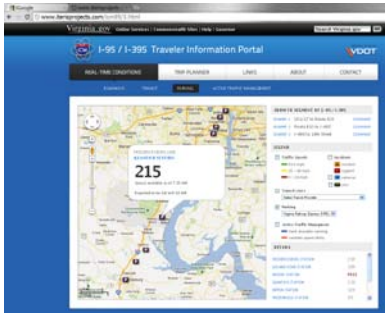
Emphasis Areas

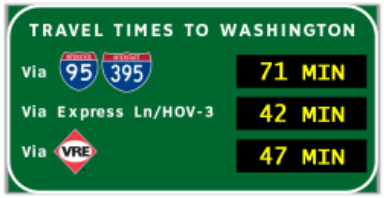
- **Operations-Related Work Packages**
  - Segment-based (but includes central hardware/software)
  - Infrastructure-oriented
  - En-route orientation
  - Benefits to various modes
  - TMP-related offsets could be at least $3.96M of above

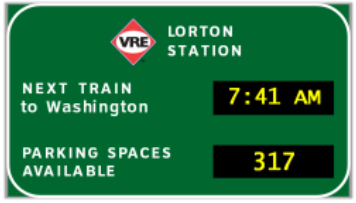
- **Traveler Information-Related Work Packages**
  - Corridor-wide
  - Build on 511 / current rideshare initiatives
  - Pre-trip orientation
  - Encourage mode shift, moves from SOV to HOV and transit
  - Entire investment could qualify as a TMP-related offset

- **Decision Support and Performance Management Systems are future elements**

ICM Concept Applications







- **Travel Time Information for All Travel Modes**
  - Pre-trip and en-route travel time information for multiple travel modes along the corridor (95/395. HOT, US1, bus, train)
  - Delays, congestion, restrictions at bases / work locations
  - Personal trip planning tool (end-to-end, compare/mix travel modes)
  - Address road and transit options and available parking should transit, carpool or slugging option be considered by the traveler
- **Real-time Parking Management and Guidance**
  - Park-and-ride space and guidance information (VDOT, VRE, WMATA parking facilities near I-95) for travelers entering the corridor via arterials, where they may have two or more options relative to parking and either carpooling, slugging or using transit.
  - Comparative travel time information for transit options (including next bus / train departure) would be presented along with parking space availability.

TDM is a key focus of ICM Applications

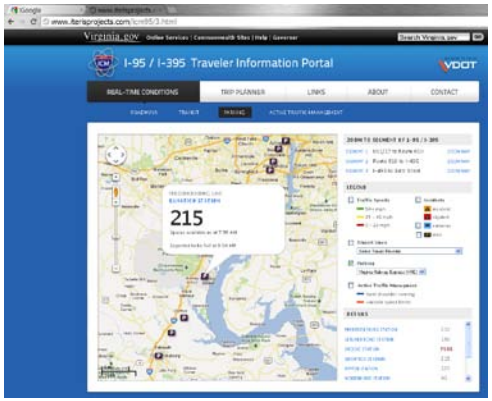
- Achieving the goals to increase dynamic rideshare, change of mode and time of travel will be facilitated through improved transparency of information provided:
  - Travel times for all modes
  - Real-time availability of parking spaces at existing parking areas
- Better informed travelers will make better decisions on mode, time and route of travel

	Traveler Information-Related Packages			
TDM GOALS	Integrated Single Info Gateway	Kiosks	Expanded Multi-Modal and Parking Info	Personalized Multi-Modal Real-Time Trip Planning
Increase Carpooling	Provide links to carpool providers, improve awareness of corridor operational status	Improve awareness of corridor operational status	Real-time parking info promotes use of carpool / rideshare staging areas at new/different facilities	Provide trip planning capability with modal option for rideshare requests and responses (integrate with Commuter Connections, dynamic ridesharing systems). Providing parking status info between ICM and rideshare providers permits ability to arrange trips from specific park-and-ride locations, assuring availability of parking for rideshare users.
Increase Dynamic Rideshare	Provide links to carpool providers, improve awareness of corridor operational status	Improve awareness of corridor operational status	Real-time parking info promotes use of carpool/rideshare staging areas at new/different facilities	SEE ABOVE
Increase Transit Use	Increase awareness of transit options in the event that an incident on I-95 or 395 results in transit being more convenient.		Increase awareness of transit options in the event that an incident on I-95 or 395 results in transit being more convenient. Parking info can assist in facilitating mode shift where needed.	Provides flexible options for trip planning, including transit for part, most or all of a corridor trip, using real-time information for all modes.
Change Time of Travel	Better awareness of travel conditions prior to all times of travel	Potential encouragement to wait till later to travel home	Provide predictive information on when parking or transit is full on daily basis, encourage travel before heart of peak period.	Provide flexible options for travel based on time and mode, including ability to arrange rides, carpools or vanpools at whatever time the person is traveling

	Operations-Related Packages			
TDM GOALS	Multi-Modal and Parking Information Systems	Arterial Enhanced Signal Operations	Freeway Active Traffic Management	ICM Central Systems
Increase Carpooling	Real-time parking info promotes use of carpool/slugline staging areas at new/different facilities	Enhancing signal operations between park-and-ride and I-95 can reduce delays	Use of HOV restrictions for hard-shoulder running and HOV bypass lanes at new ramp meters may encourage carpool use as best means of reducing delay	Systems required for multi-modal/parking information systems deployment
Increase Dynamic Rideshare	Real-time parking info promotes use of carpool/slugline staging areas at new/different facilities		Use of HOV restrictions for hard-shoulder running and HOV bypass lanes at new ramp meters may encourage carpool use as best means of reducing delay	
Increase Transit Use	Increase awareness of transit options in the event that an incident on I-95 or 395 results in transit being more convenient. Parking info can assist in facilitating mode shift where needed.	Providing traffic signal priority may reduce travel time and enhance schedule adherence.	Use of HOV restrictions for hard-shoulder running and HOV bypass lanes at new ramp meters favors transit by allowing it to bypass meter queues while at the same time benefitting from the demand control strategies on the mainline that are provided through metering.	
Change Time of Travel		Reinforce better periods to travel through improved operating parameters / performance	Provide more favorable restrictions for earlier periods (e.g., no HOV restriction for hard-shoulder running lane in Stafford during first hour of peak, HOV-3 after)	

Information-Related Packages

- Integrated Single Information Gateway
- Expanded Multi-Modal and Parking Information for 511
- Personalized Multi-Modal Real-Time Trip Planning
- Kiosk Installations



Information-Related Packages

- Integrated Single Information Gateway
  - Create corridor-focused web and mobile access point within 511
  - Add transit data access to 511 interface
  - Corridor-based traffic, travel time, and transit status information
  - Basis for additional Transit / TDM activities
- Expanded Multi-Modal and Parking Information for 511
  - Create distinct tabs and interfaces for traffic, ATM-related info (speeds, shoulder status), each transit carrier, parking facilities)
  - Requires data from park-and-ride information projects (operations related)
  - Would greatly benefit and support dynamic ridesharing activities through sharing of parking information with rideshare systems / services

Information-Related Packages

- Personalized Multi-Modal Real-Time Trip Planning
  - Add access and interface to commuter connections and dynamic ridesharing services including sharing of parking and system status info with those services
  - Develop personal multi-modal trip planner interface allowing incorporation of road, transit, rideshare options and reservations
  - Would integrate transit and rideshare options and arrangements into trip planning mechanism
- Kiosk Installations
  - Corridor-based traffic, travel time, and transit status information
  - Locate at:
    - Pentagon, Mark Center, Ft Belvoir, MC Quantico, Pentagon City Mall, Landmark Mall, Franconia-Springfield Metro Station, Potomac Mills

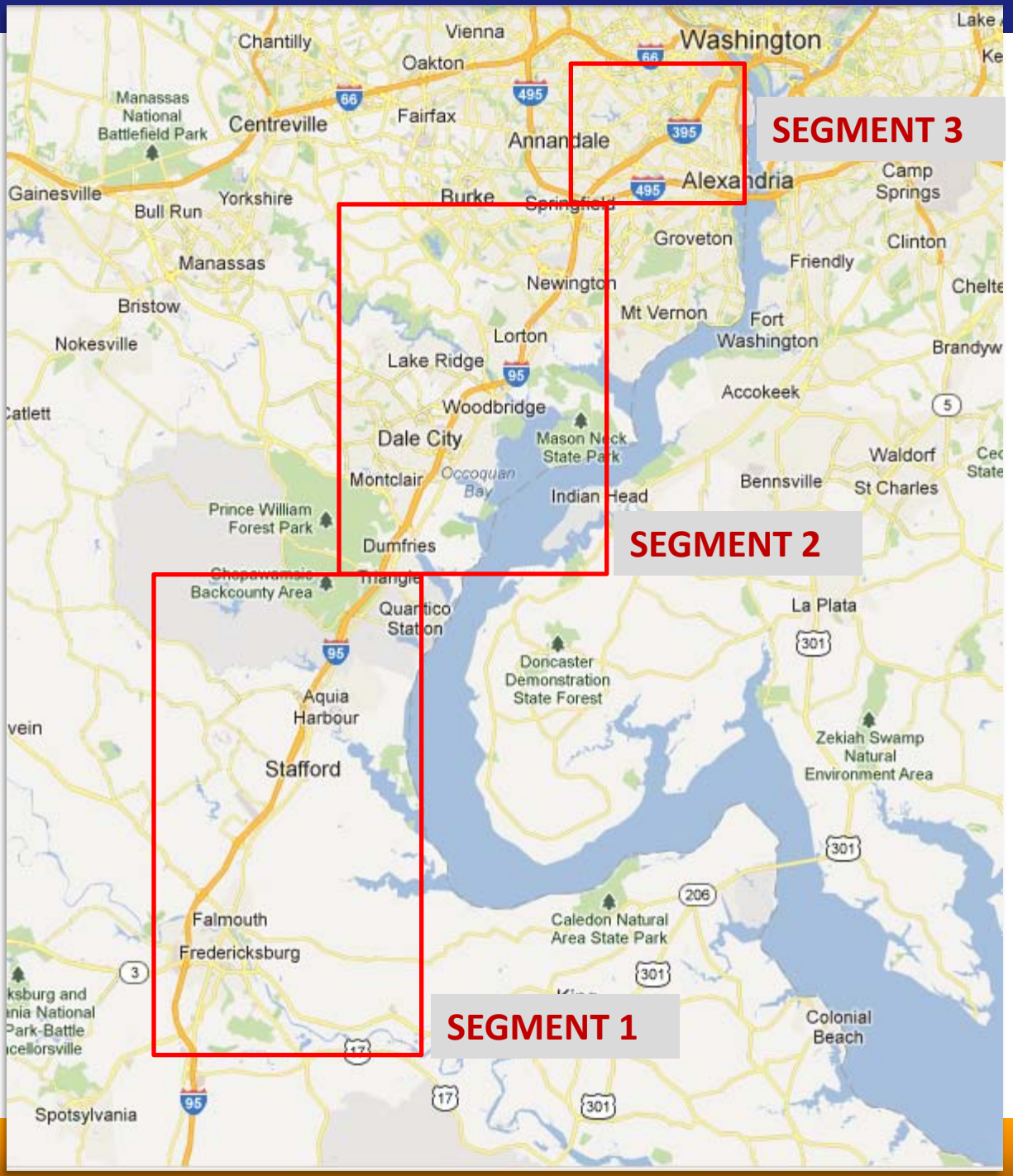
Operations-Related Packages

3 SEGMENTS

MM 126-145

MM 145 – 170 (Springfield)

I-395 (MM 0 – 10)



Project ID #	Project Element (Segment 1)	Location	TDM / Transit Support	Potential Trips Influenced (est.)
1a1	Active Traffic Management / Hard Shoulder Running	MM 138 - 145	HOV-2, transit only for peak period use	14,000
1b1	Enhanced Arterial Signals	US 1 MM 126 to US 17	Signal priority for express buses.	4400
1b2	Enhanced Arterial Signals	Route 3 I-95/ US1	Enhance access from park-and-ride, signal priority for express buses.	2200
1c1*	P&R Management and Guidance	MM 139-145	Encourage shifting of demand, increase dynamic rideshare options**.	3500
1c2	P&R Management and Guidance	MM 126-139	See #1c1 above	2200
1c3*	Comparative Travel Time System	MM 126-145	Compare mode and lane options	14,000
* Elements of these projects support TMP Mitigation of Express Lanes Project ** Required for providing parking information as part of Traveler Information enhancement activities				

Fulfillment of TDM Goals Segment 1

Project ID #	Project Element (Segment 1)	Increase Carpooling	Increase Dynamic Rideshare	Increase Transit Use	Change Time of Travel
1a1	Active Traffic Management / Hard Shoulder Running (MM138-145)	Indirect		Indirect	
1b1	Enhanced Arterial Signals (US 1)			Direct (if TSP used)	
1b2	Enhanced Arterial Signals (Route 3)			Direct (if TSP used)	
1c1*	P&R Management and Guidance (Stafford)	Direct	Direct	Direct	Indirect
1c2	P&R Management and Guidance (Frederickburg)	Direct	Direct	Direct	Indirect
1c3*	Comparative Travel Time System				

Project ID #	Project Element (Segment 2)	Location	TDM / Transit Elements	Potential Trips Influenced (est.)
2a1*	P&R Management and Guidance	Dale City/ Woodbridge	Encourage shifting of demand, increase dynamic rideshare options**	15,400
2a2*	P&R Management and Guidance	Lorton/ S. FFX County	See #2a1 above**	5,900
2a3*	Comparative Travel Time System	Dale City/ Woodbridge	Compare mode and lane options	15,400
2b1	Ramp Queue Warning - Quantico	Exit Ramps to Quantico	Improve safety, reduce access delay	8,400
2c1	Ramp Metering – PW & FFX Counties	PW/ Fairfax Counties	Include HOV meter bypass lane to favor HOV and transit at entrance ramps	21,300
2d1*	Enhanced Arterial Signals US1 in PW Co.	US 1 (PW County)	Express bus signal priority and overall flow enhancement	2,000
2e1*	Enhanced Arterial Signals US1 to I-495	Woodbridge to I-95/I-495	Express bus signal priority	3,000
2e2*	Enhanced Arterial Signals – Dale City	Dale City Area	Emphasis on express bus signal priority as well as overall accessibility from P+R	4,000

* Elements of these projects support TMP Mitigation of Express Lanes Project

** Required for providing parking information as part of Traveler Information enhancement activities

Fulfillment of TDM Goals Segment 2

Project ID #	Project Element (Segment 2)	Increase Carpooling	Increase Dynamic Rideshare	Increase Transit Use	Change Time of Travel
2a1*	P&R Management and Guidance	Direct	Direct	Direct	Indirect
2a2*	P&R Management and Guidance	Direct	Direct	Direct	Indirect
2a3*	Comparative Travel Time System			Indirect	Indirect
2b1	Ramp Queue Warning - Quantico				Indirect
2c1	Ramp Metering – PW & FFX Counties	Indirect	Indirect	Indirect	Indirect
2d1*	Enhanced Arterial Signals US1 in PW Co.			Direct (if TSP used)	
2e1*	Enhanced Arterial Signals US1 to I-495			Direct (if TSP used)	
2e2*	Enhanced Arterial Signals – Dale City			Direct (if TSP used)	

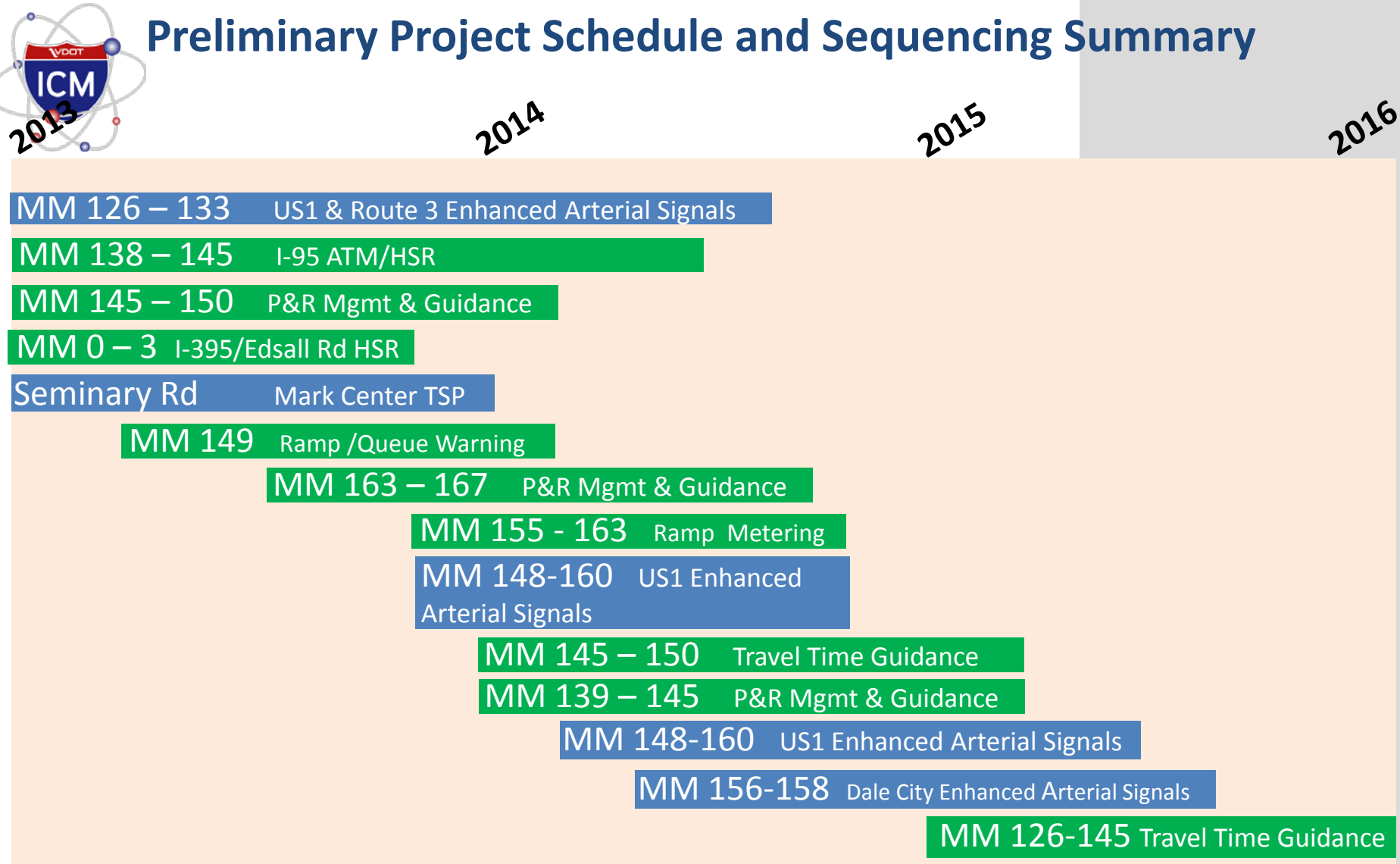
Segment 3 Overview

Project ID #	Project Element (Segment 3)	Location	TDM / Transit Elements	Potential Trips Influenced (est.)
3a1	Enhanced Arterial Signals – Transit Signal Priority	Seminary Rd Mark Center to I-395	Express bus signal priority	2000 (assuming 30% transit use to Mark Center)
3b1	Hard Shoulder Running	I-395 at Edsall Rd	Reduce traffic bottlenecks	35,000

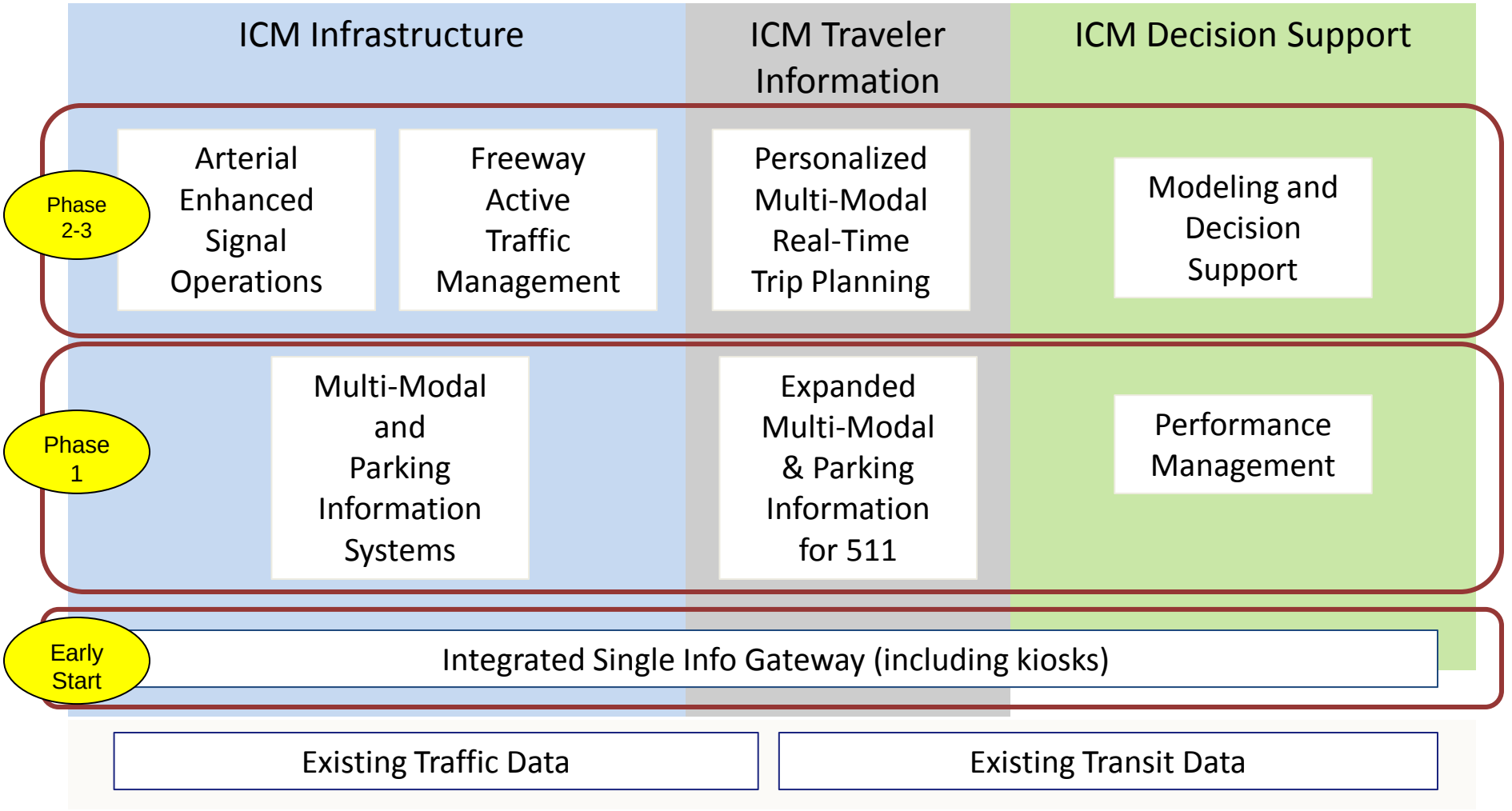
Fulfillment of TDM Goals Segment 3

Project ID #	Project Element (Segment 3)	Increase Carpooling	Increase Dynamic Rideshare	Increase Transit Use	Change Time of Travel
3a1	Enhanced Arterial Signals – Transit Signal Priority (Mark Ctr / Seminary)			Direct	
3b1	Hard Shoulder Running (395/Edsall)				

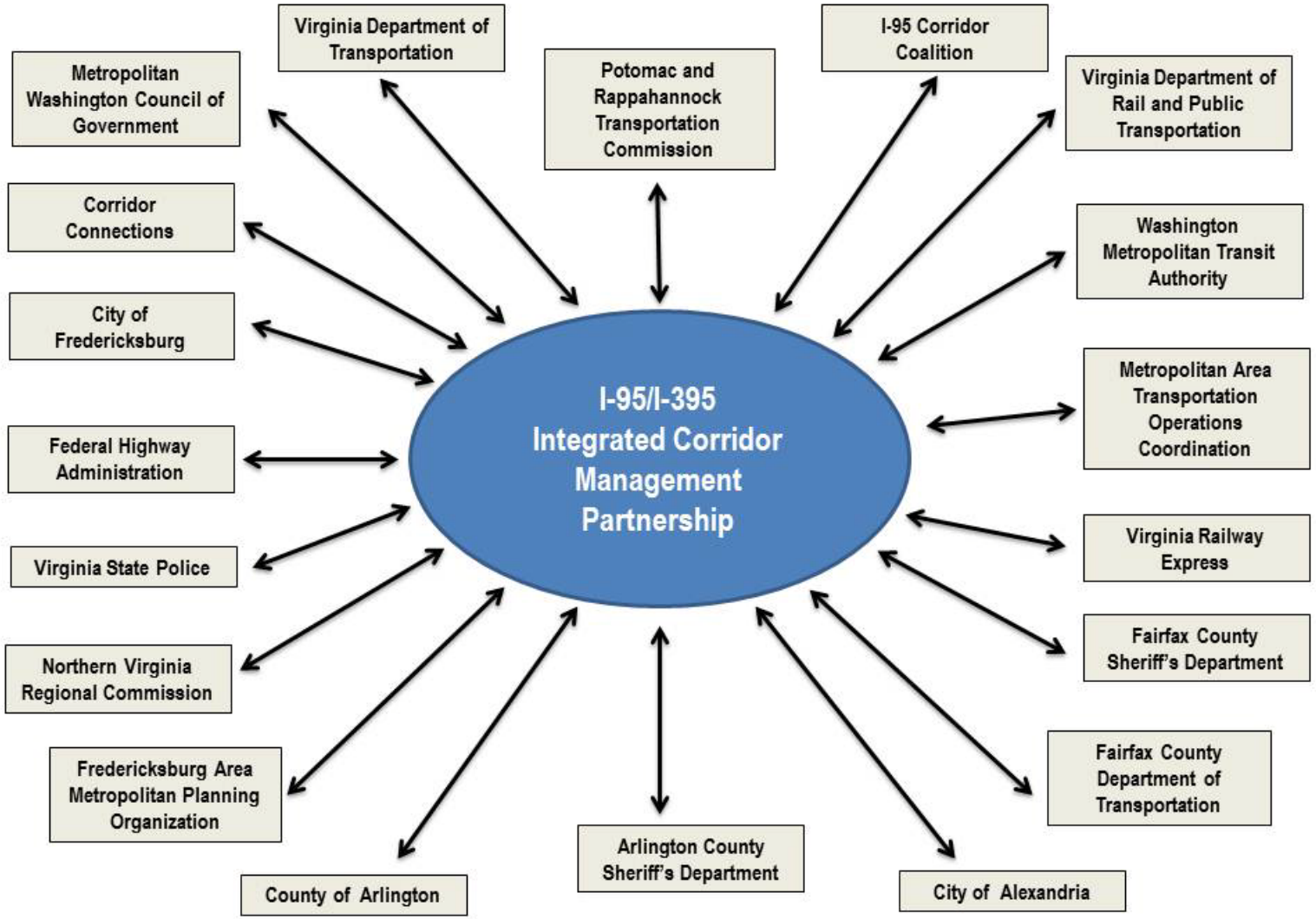
Preliminary Project Schedule and Sequencing Summary



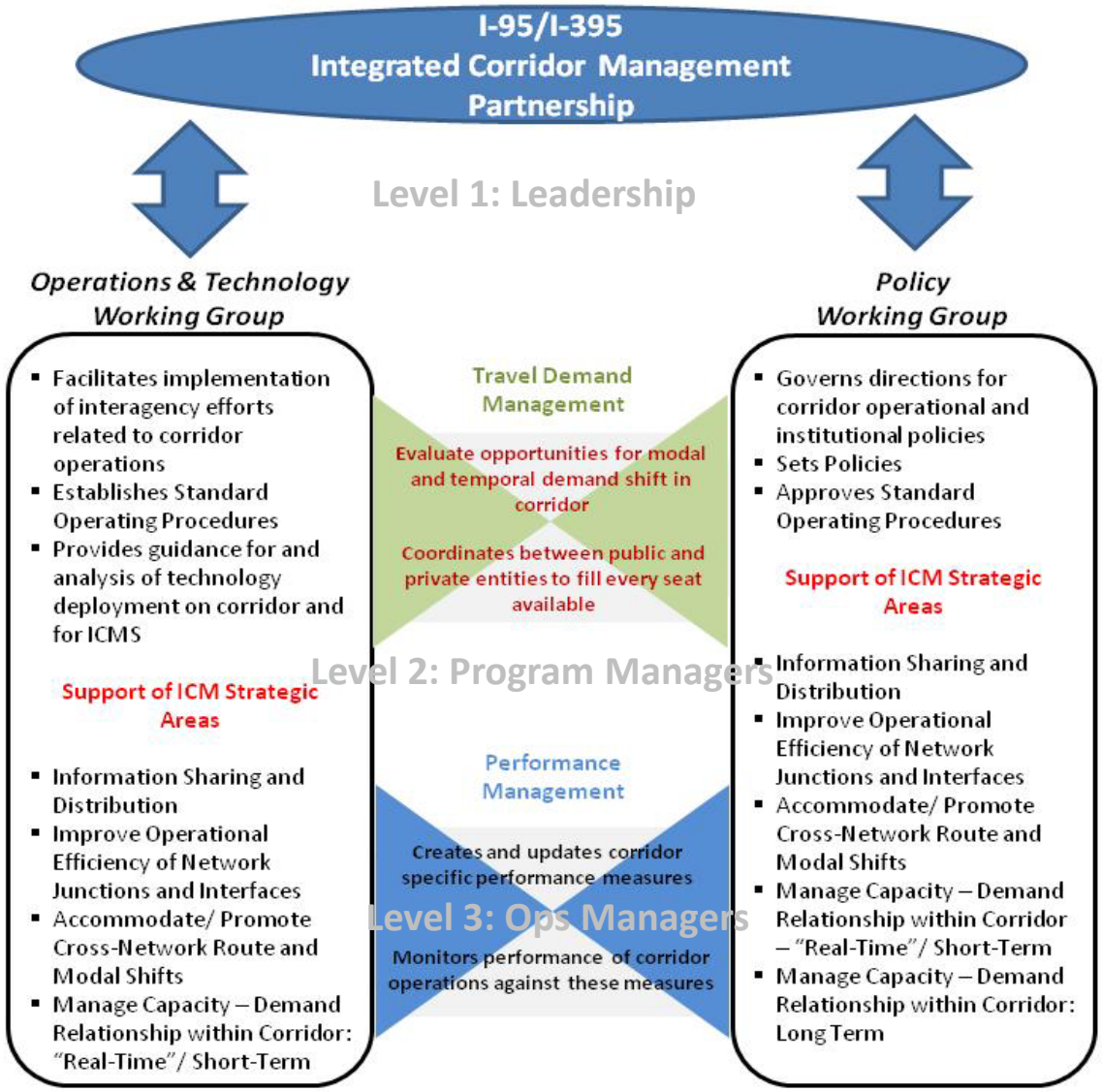
Deployment View:
Project Packages Derived from "Building Blocks"



Institutional View: The ICM Partnership



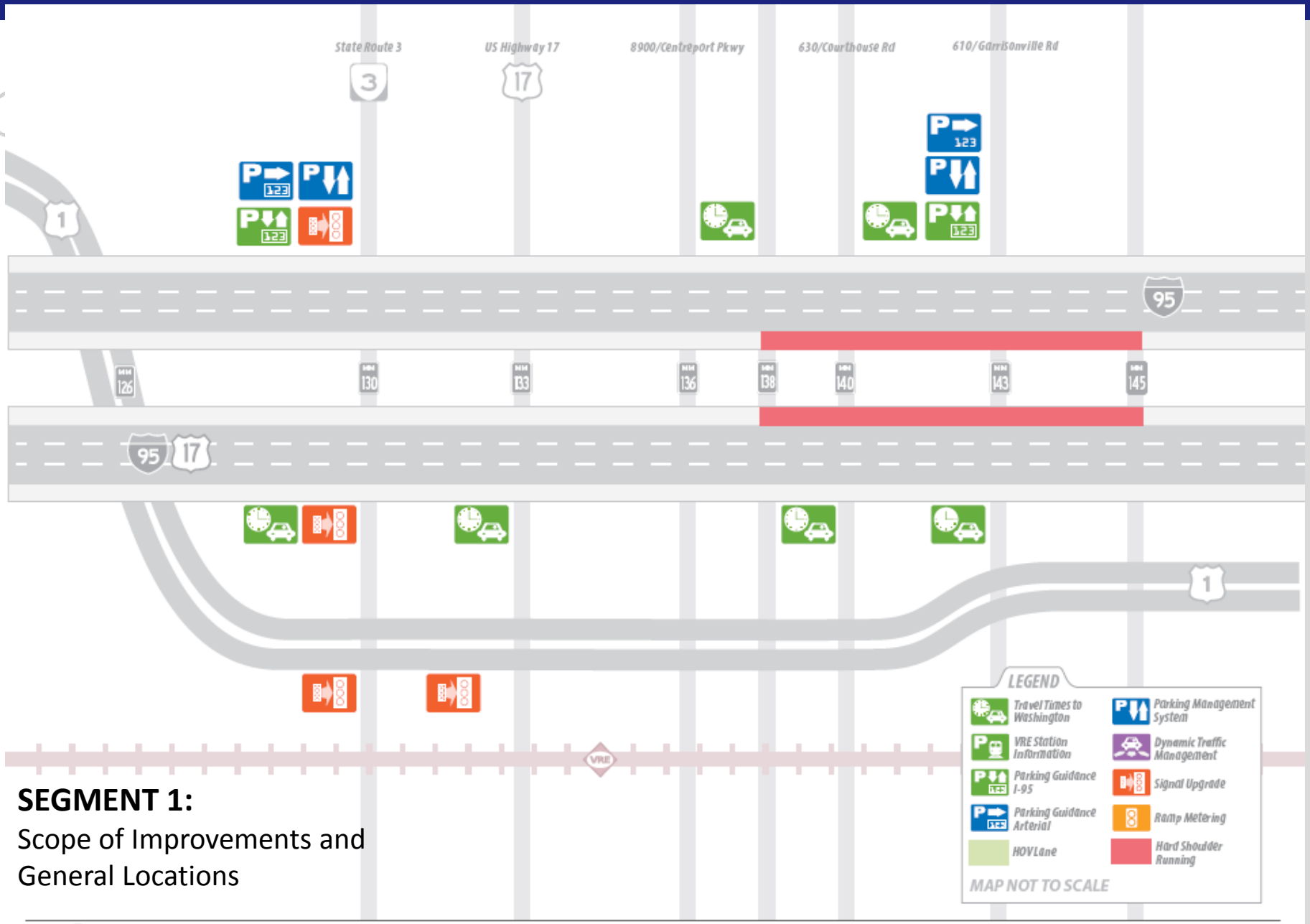
Working Group Structure



Feedback

- Any further transit and TDM activities in corridor related to ICM activities we should address or know about?
- Coordination needs
- Other

TYPICAL ICM CONCEPT EXAMPLES



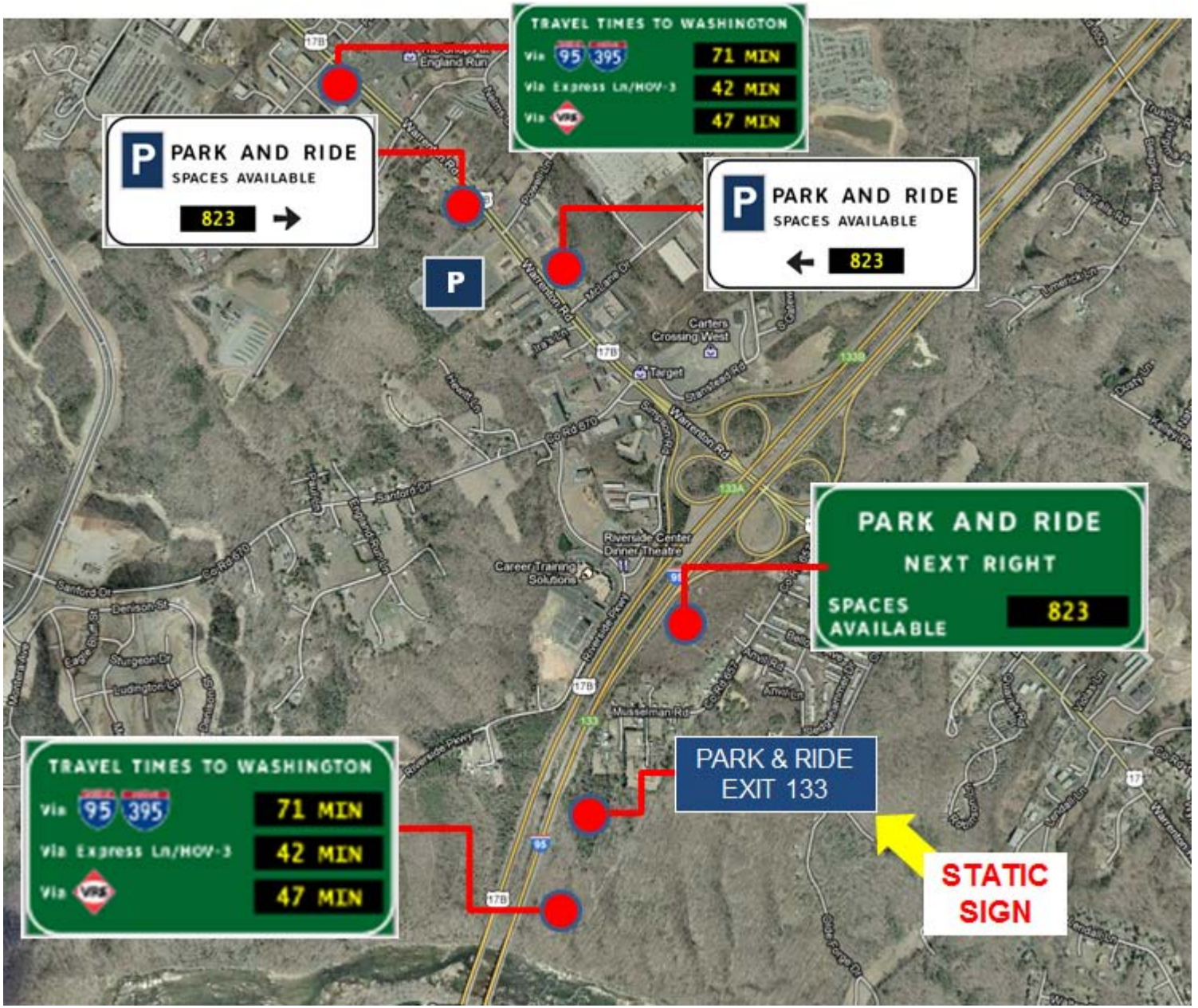
SEGMENT 1:
Scope of Improvements and General Locations

PROJECT PACKAGE 1

1A1 - ATM/Hard Shoulder Running I-95 (MM 138-145)
1B1 - Arterial Enhanced Signal Operations (US 1)
1B2 - Arterial Enhanced Signal Operations (Route 3)

1C1 - Park and Ride Management and Guidance System (MM 139-145)
1C2 - Park and Ride Management and Guidance System (MM 126-139)
1C3 - Comparative Multi-Modal Travel Time Signage (MM 126-145)

Example @ US 17/ Warrenton Rd



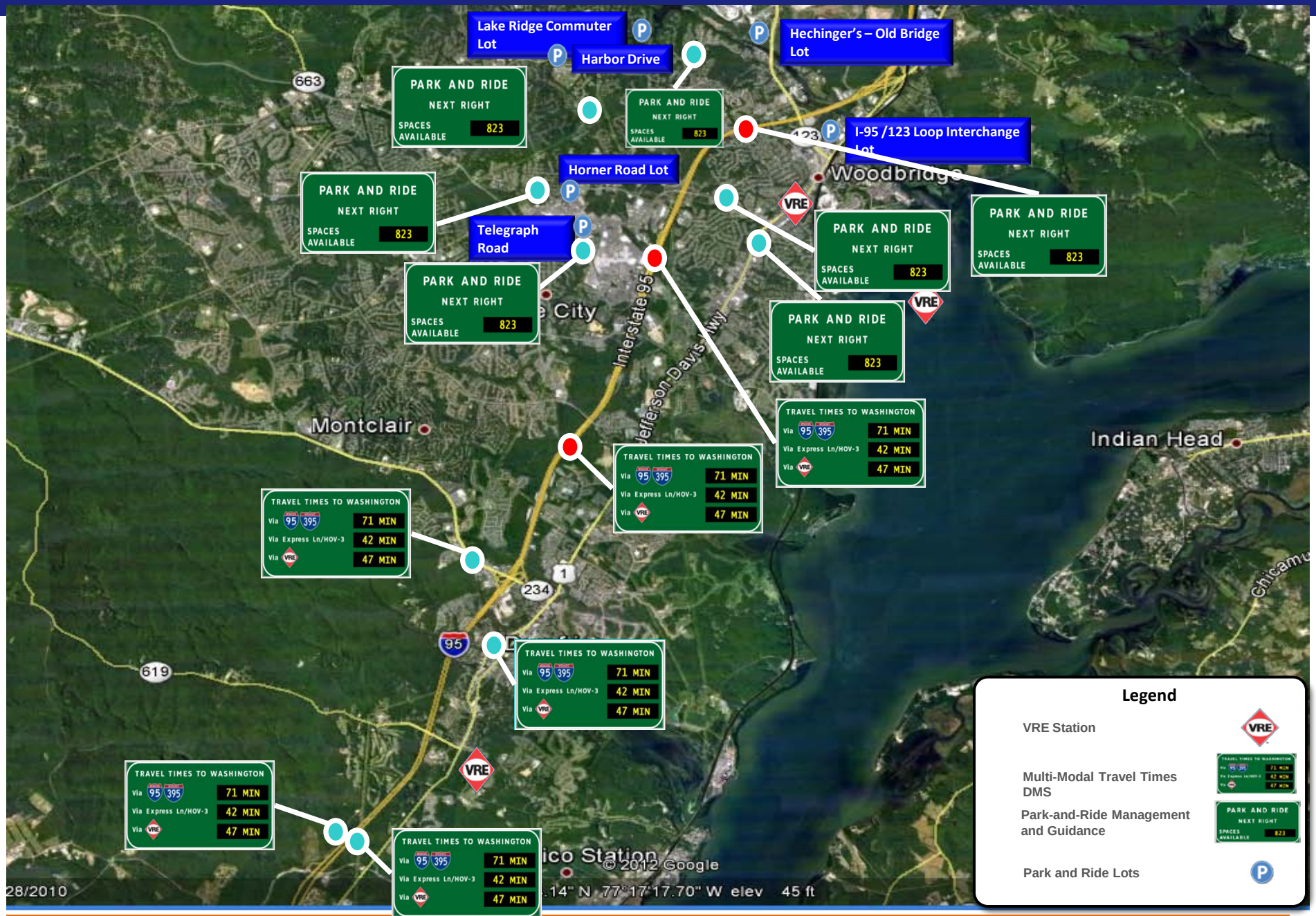
Proposed Hard Shoulder Running (MM 139 to MM 145)

Major Gantry (1/2 mile Spacing) HSR (left shoulder), Speed Restriction)

Major Gantry (1/2 mile Spacing) Normal Operation, No HSR

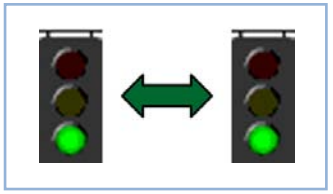
Mini-Gantry (between Major Gantries HSR)

Mini-Gantry (between Major Gantries No HSR)

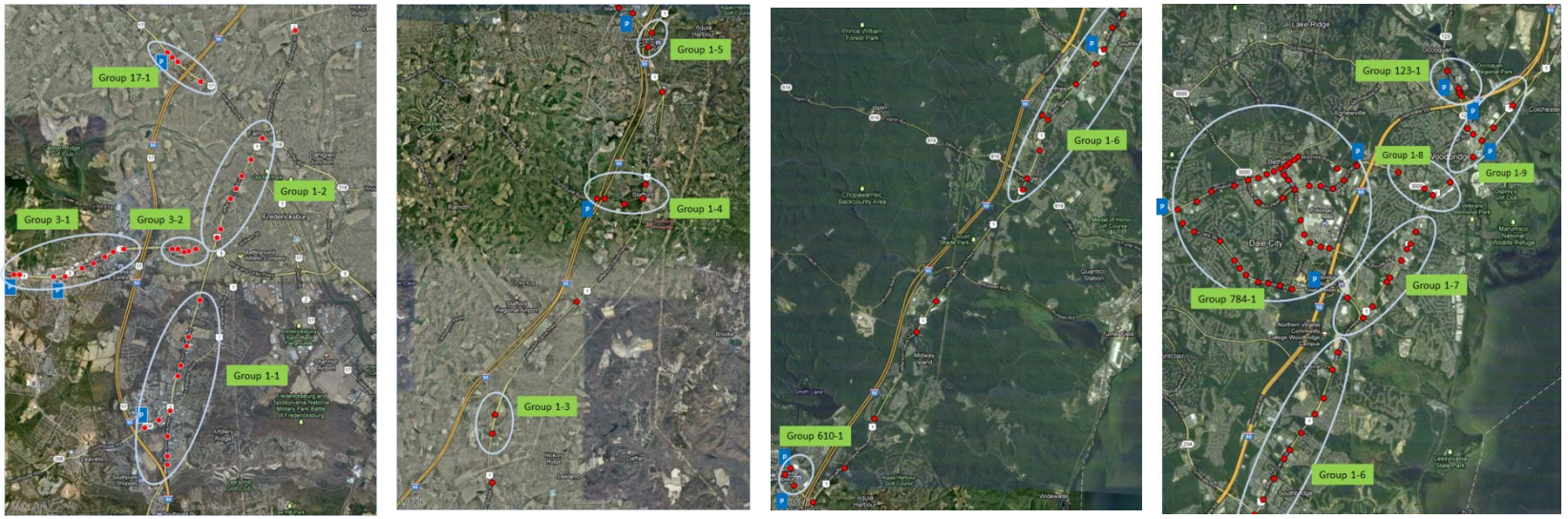


Park & Ride Management & Guidance Systems/ Comparative Travel Time signage (Dale City to Woodbridge)

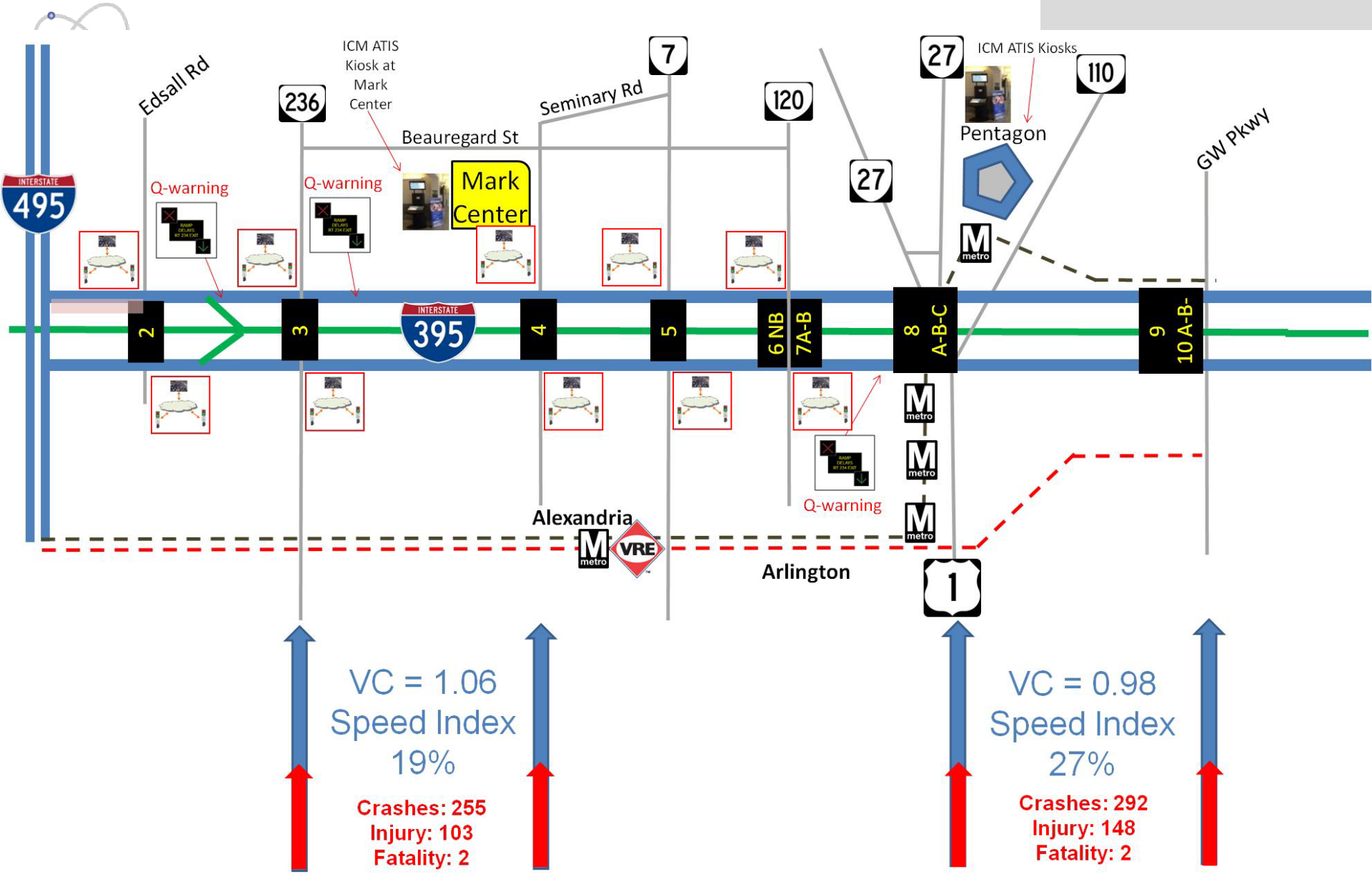
Future Activities: Arterials



CANDIDATE SIGNAL GROUPS



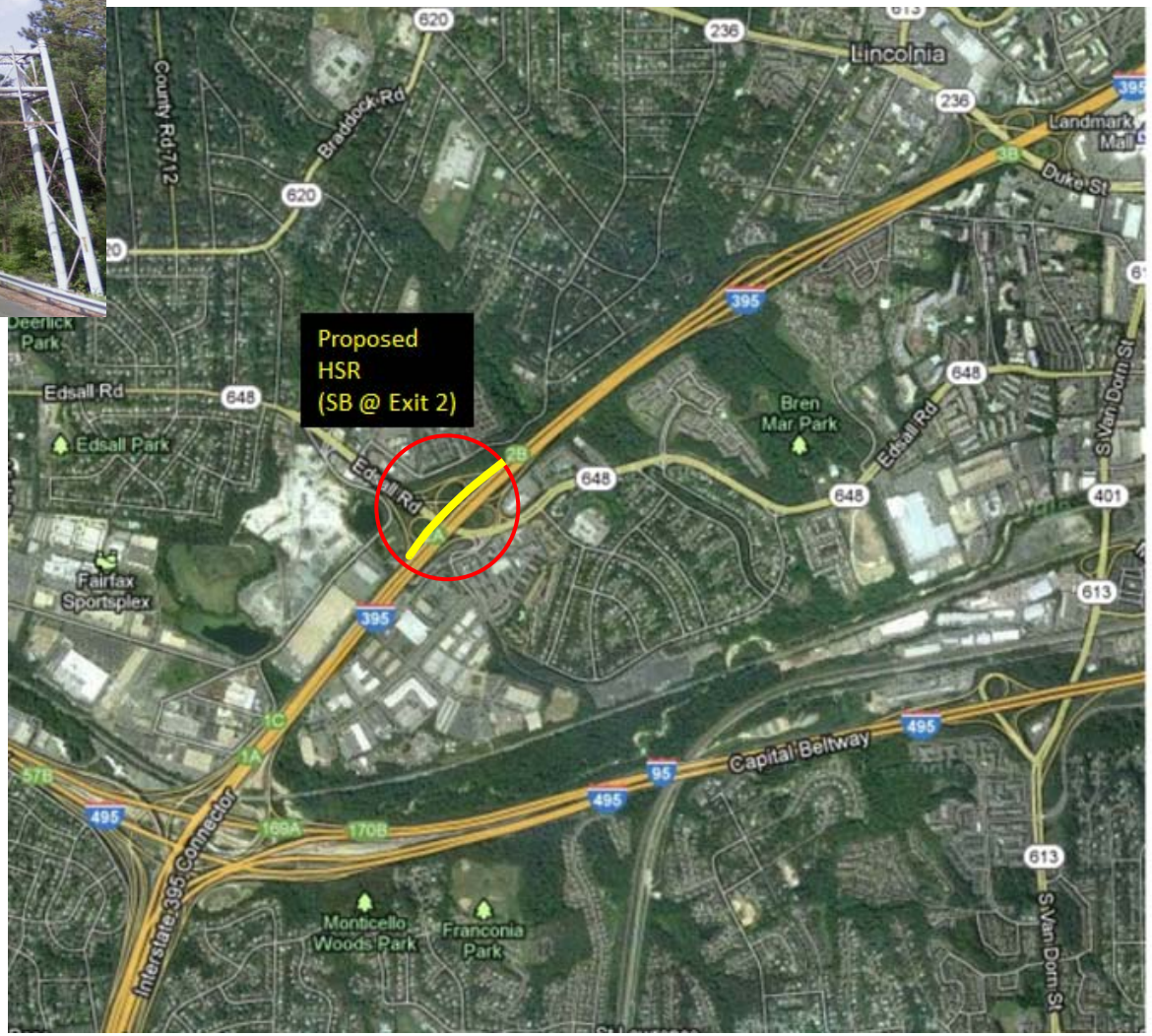
- Transit signal priority along express bus routes
- Adaptive control along:
  - Arterial alternate routes (incidents, congestion)
  - Key routes between park-and-ride and I-95



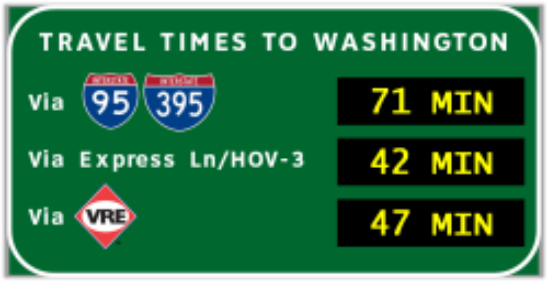
ICM Deployment Concept – Segment 3 (MM 170-14th St Bridge)

I-395 south / Edsall Rd proposed HSR

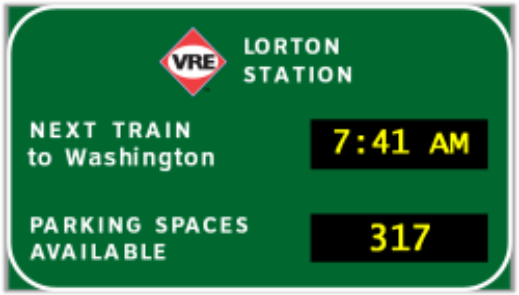
DMS on three Edsall Rd exit direction signs. Propose 2 mini-gantries thru interchange to permit additional peak capacity on shoulder



Multi-Modal Travel Times on DMS / Park-and-Ride Management and Guidance



Comparative Travel Times

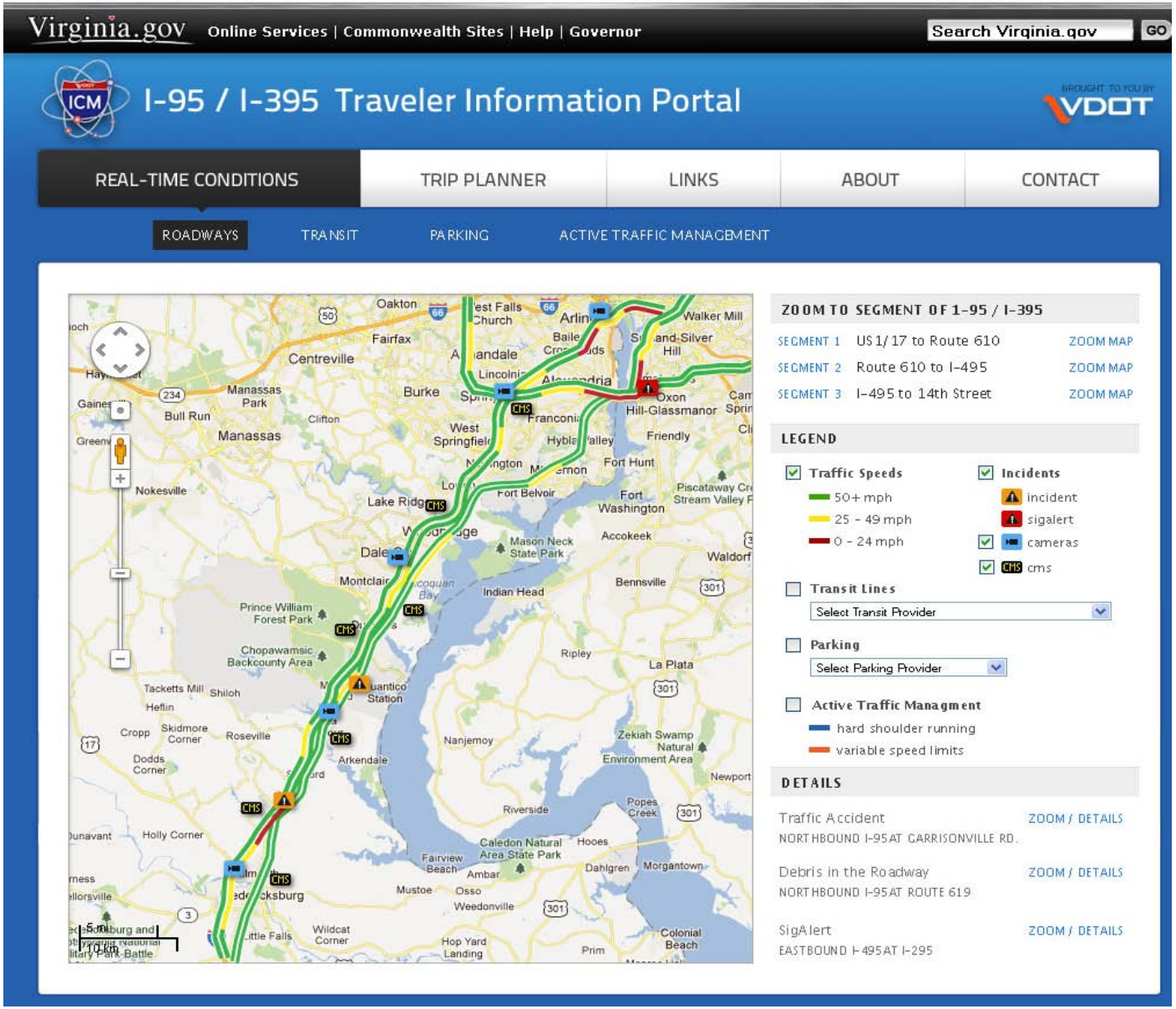


Rail Station Info

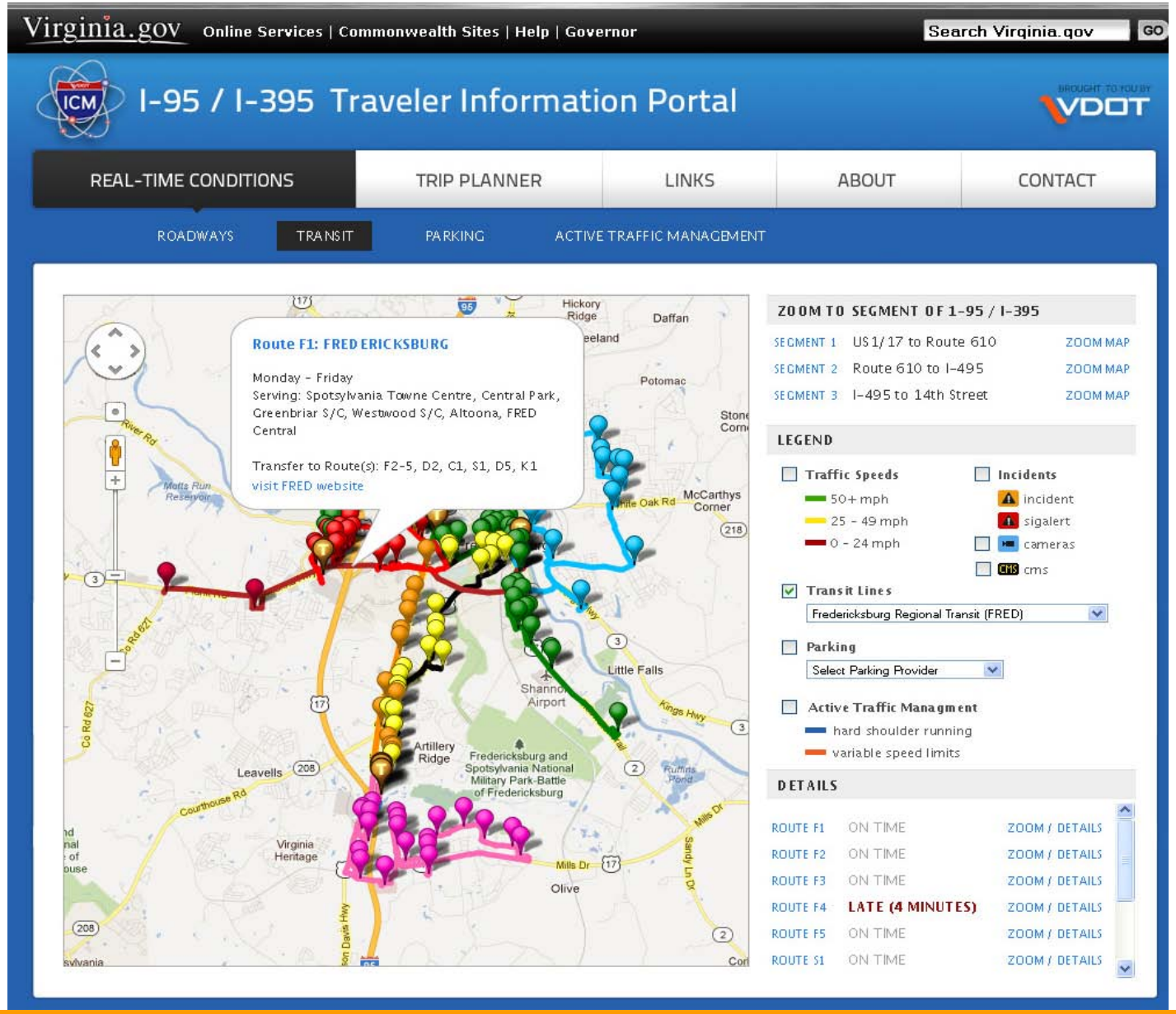
Parking Info

"Reach the Beach" Example (recently commissioned)

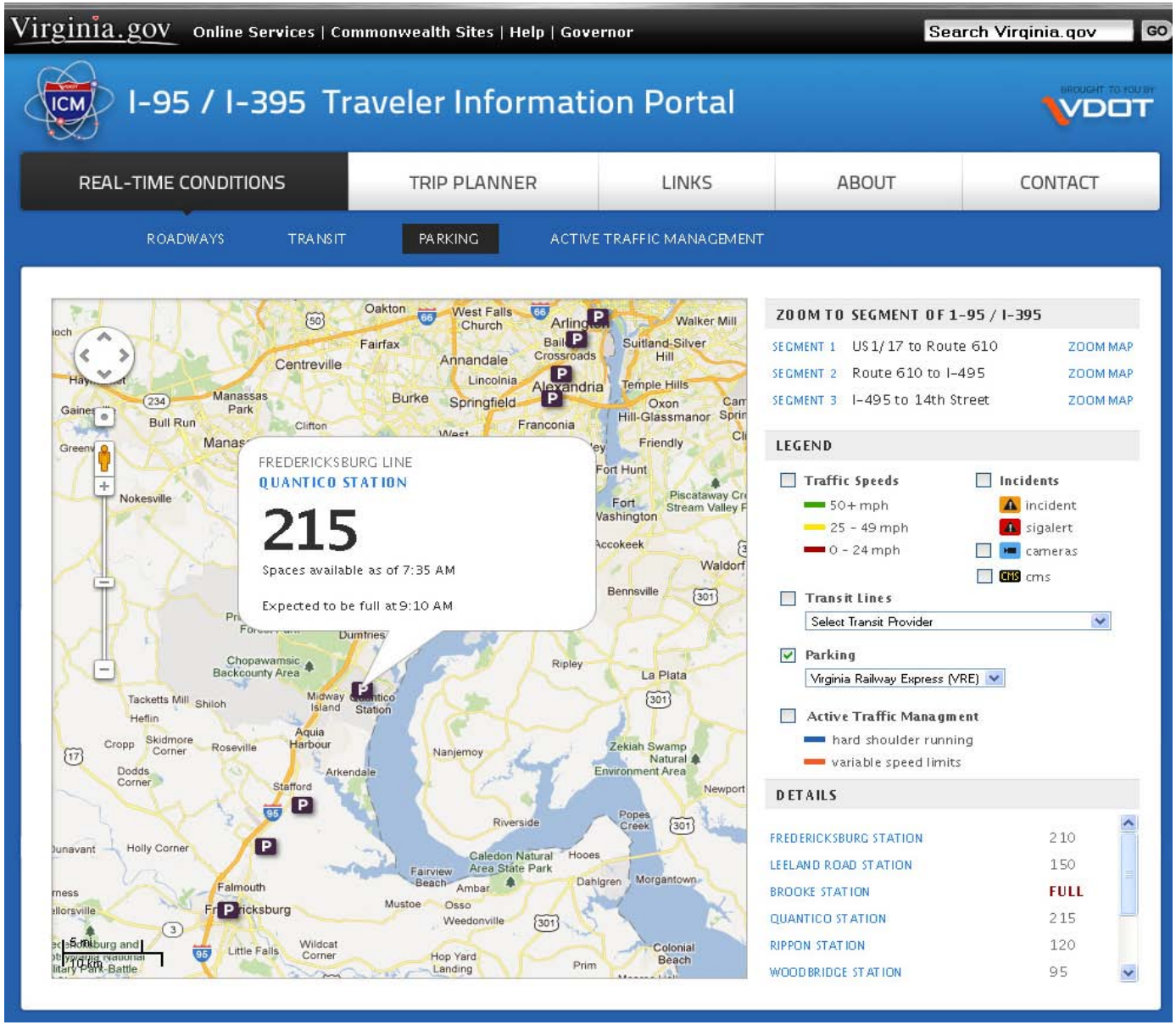
Visualization – "Landing Page"



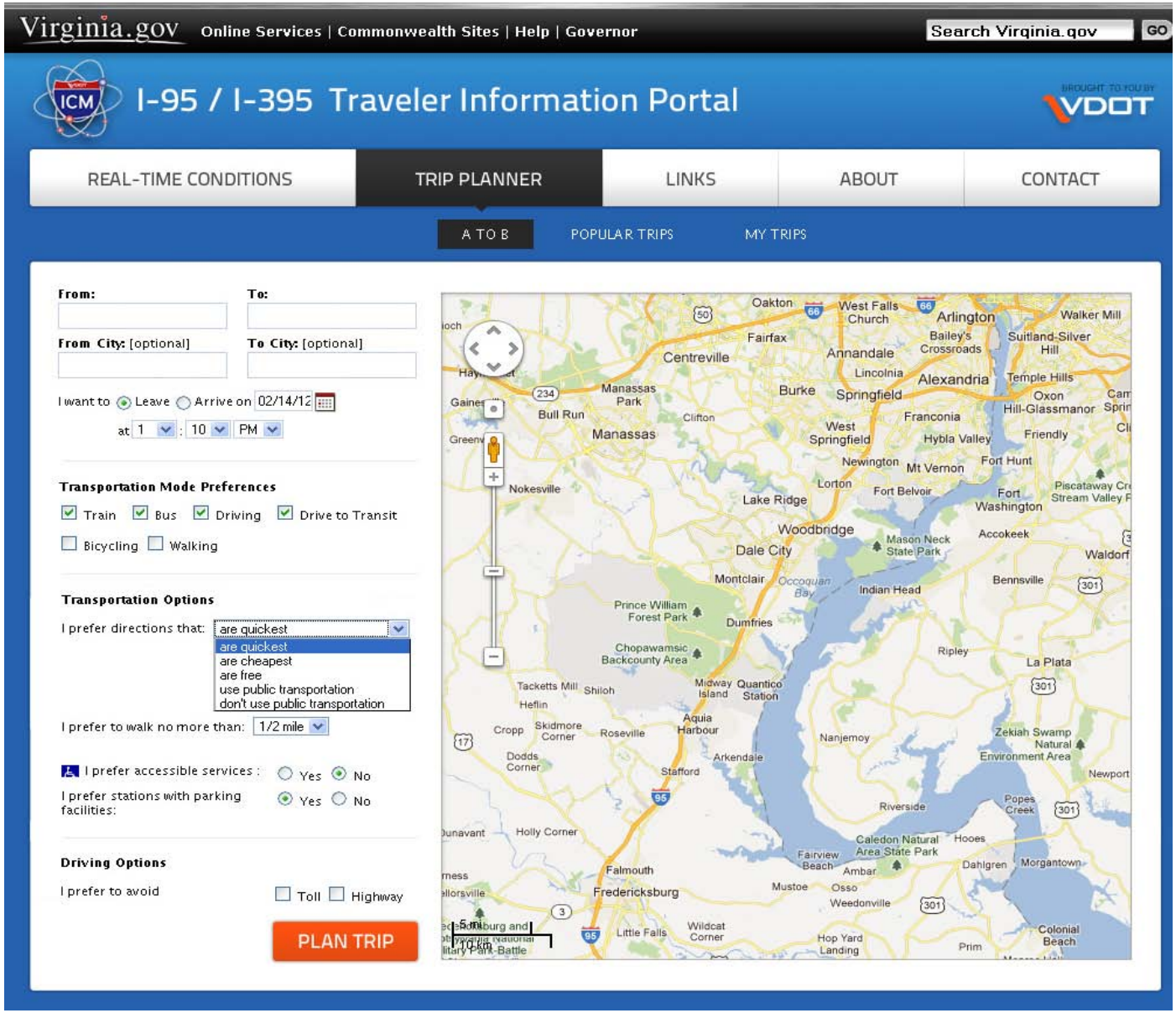
Visualization – Transit Info



Visualization – Parking Info



Visualization – Trip Planner (new and pre-selected trips)



Visualization – Generate Itinerary