

# Multimodal Coordination for Bus Priority Hotspots

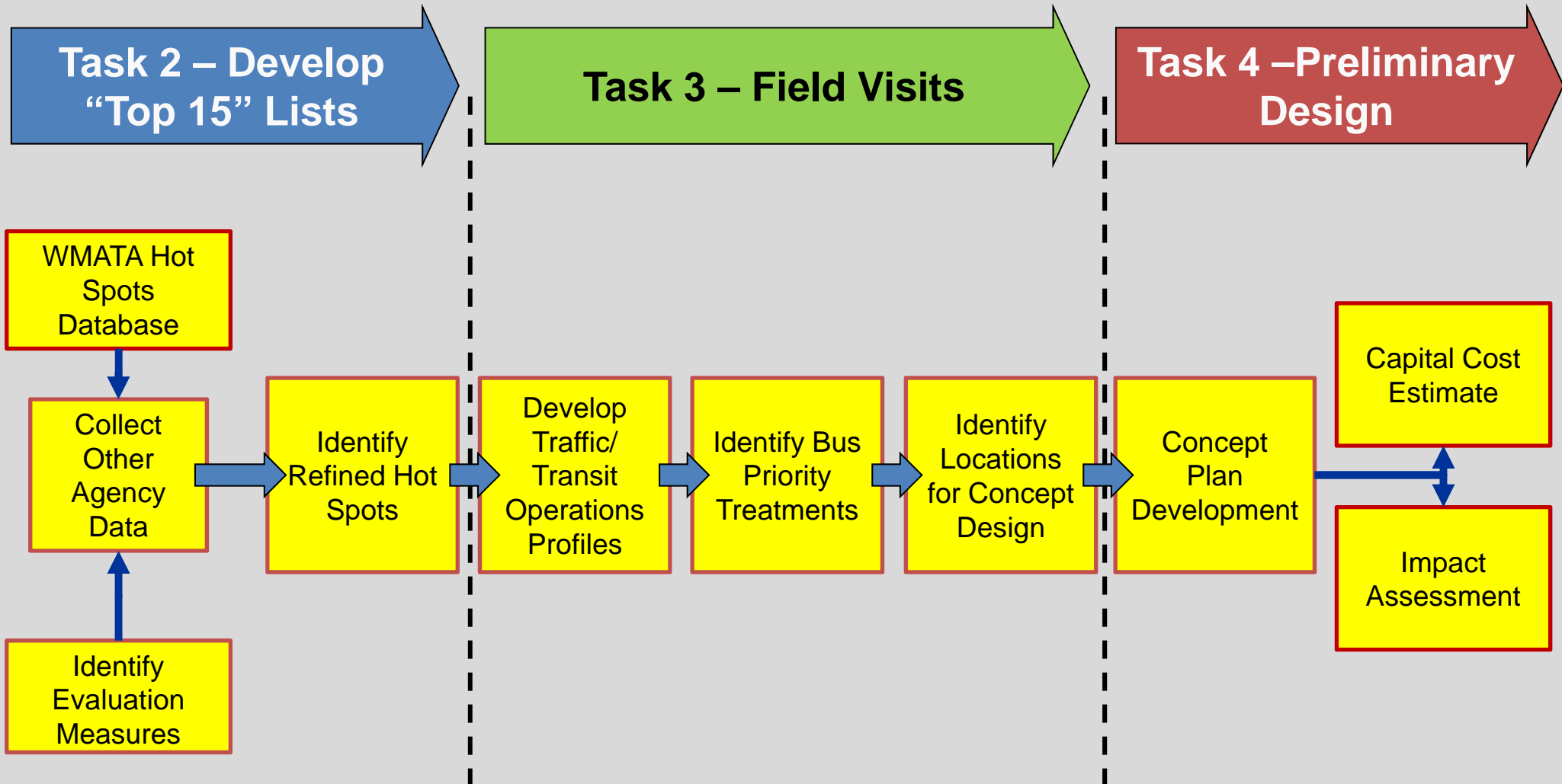


Presentation to TPB MOITS

**July 10, 2012**

Eric Randall & Andy Meese

Study goals – develop a prioritized list of Top 10 Hot Spots, provide input on implementation of bus priority treatments, and scope possible costs, savings, and impacts.



# Task 2 – Develop “Top 15” Lists / Initial Hotspot Database

---

- Top 15 sites initially identified in each jurisdiction: three lists
  - AM peak delay, PM peak delay, All-day delay

## Process:

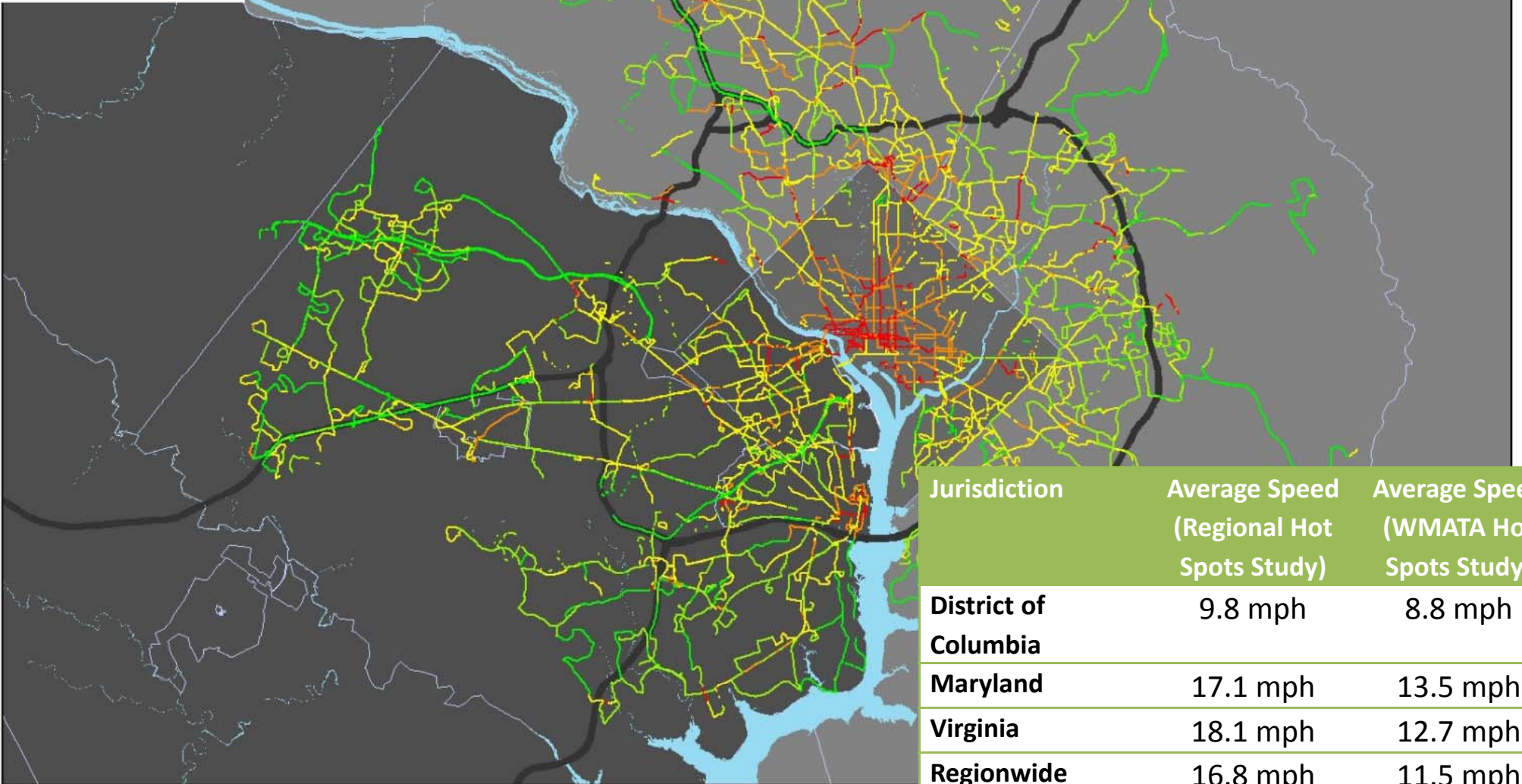
1. Utilized existing bus speed data from and other agencies for locations without WMATA data
  - Input into NavTeq data layers on a road segment basis
2. Used number of bus trips for all agencies to weight roadway segments
3. Developed Hot Spots list based on scores
  - Segment Score =  $(15\text{mph} - \text{speed}) \times \text{Number of Buses in time period}$

# Regional Bus Speeds

## Legend

### All Day Speed

- 0 - 7.5 mph
- 7.6 - 10 mph
- 10.1 - 15 mph
- 15.1 - 20 mph
- 20.1 - 75 mph
- Interstate



Jurisdiction	Average Speed (Regional Hot Spots Study)	Average Speed (WMATA Hot Spots Study)
District of Columbia	9.8 mph	8.8 mph
Maryland	17.1 mph	13.5 mph
Virginia	18.1 mph	12.7 mph
Regionwide	16.8 mph	11.5 mph

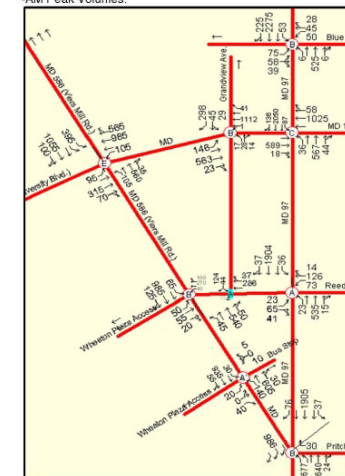
# Task 3 – Field Verification Process

- Initial desktop inventory and traffic assessment
  - Turning movements
  - Intersection level of service
  - Lane configuration
  - Bus stop locations
  - Bus routings
- Data collection worksheet
  - Sidewalks, curb ramps, and crosswalks
  - Traffic and pedestrian signals
  - Bike lanes
  - Parking restrictions
  - Roadway width
  - Posted speed limits
- Identified critical peak period for hot spot site evaluation

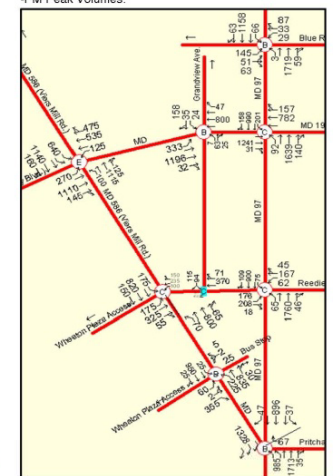
LOCATION: VIERS MILL RD-REEDEE RD-AMHERST AVE		MD	
DATE: 2/7/2012		PB (PHONE)	SWA (PHONE)
TIME: 4:30 PM - 5:30 PM		Joe Barr (857-205-8054)	Randy Burks (301-514-3918)
MEET AT: 4:00 PM Wheaton Metro		Brian Lavery (202-213-6914)	Alyssa May (860-803-7261)

- CHECKLIST:**
- Complete field worksheet
  - Complete at least 2 runs in each direction with Go Pro Camera
- Go Pro Instructions:
1. Use the suction cup to FIRMLY attach the Go Pro Camera to the roof of your car.
  2. Press and hold the button on the FRONT of the camera to power the device ON.
  3. Press the shutter button on the TOP of the camera to begin recording.
  4. MAKE SURE THE RED LIGHT IS FLASHING, OTHERWISE, THE CAMERA IS NOT RECORDING!
  5. When finished recording, press the shutter button on TOP to stop recording.
  6. Turn the device off by pressing the power button on the FRONT.
  7. Download video and name file 07PM1\_Viers

**ADDITIONAL DATA:**  
 -Viers Mill Rd-Reedee Rd-Amherst Ave Limits: Georgia Ave to MD 193  
 -Ranked 12 AM, 8 PM and 4 All Day  
 -AM Peak Volumes:



-PM Peak Volumes:

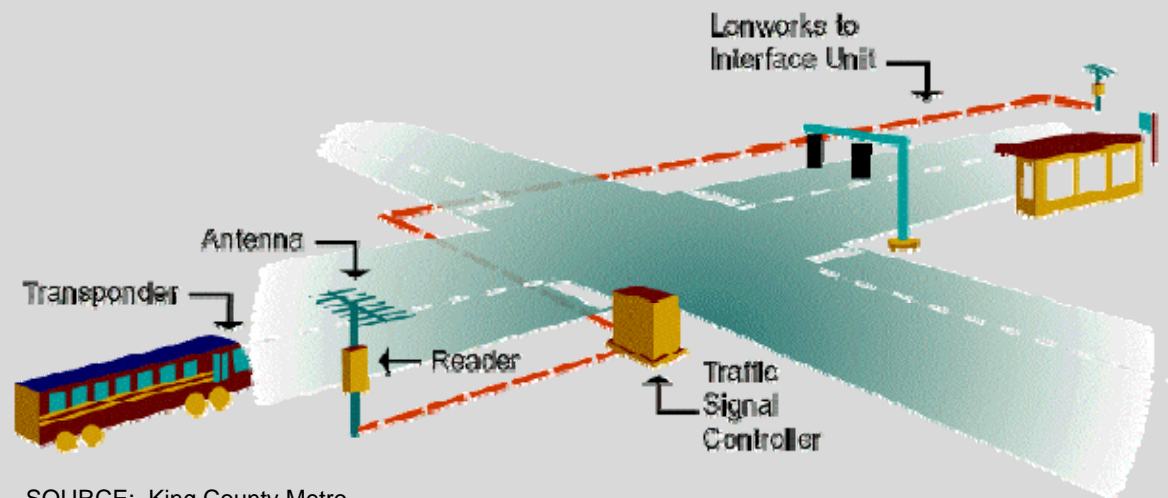


# Identify Bus Priority Treatments

- Corridor/Segment-Level
  - Exclusive Lanes
  - Signal priority – system application (TSP)
  - Passive Signal Coordination
  - Stop Consolidation
- Intersection-Level
  - Isolated TSP
  - Queue-jump signal
  - Bypass Lane
  - Curb Extension
  - Stop Relocation



SOURCE: TCRP Report 118 (5)



SOURCE: King County Metro

# Task 4 – Concept Plan Development

---

- Concept Layouts with infrastructure improvements
  - Six locations (two each: DC, MD, VA)
  - Minimal or no ROW impact
  - 15% level of design
  - Use of scaled aerial photography
- Capital Cost Estimates
  - Limited number of quantities
  - Prior approval of unit costs
  - Could translate to FTA SCC format




# *Example:* Field Verification Summary - DC

Street(s)		Rankings			Potential for Improvements			
		Daily	AM	PM	Physical	Transit	Signal	Long-Term
	Virginia Ave. NW	1	2					
	Wisconsin Ave. NW	9			x	x		
	7 <sup>th</sup> St. NW/SW	10	14	3			x	
	Connecticut Ave.	11		2				
1	14 <sup>th</sup> St. NW	13	10	8	<b>X</b>	<b>X</b>		
	Thomas Circle & 14 <sup>th</sup> St. NW	15		9				
2	New York Ave./N. Capitol St.				<b>X</b>		<b>X</b>	
	13 <sup>th</sup> St. NW		4	5	x			
	Georgia Ave. NW		9		x		x	
	16 <sup>th</sup> St. NW		12			<b>X</b>		

x = Some potential for improvements

**X** = Strong potential for improvements

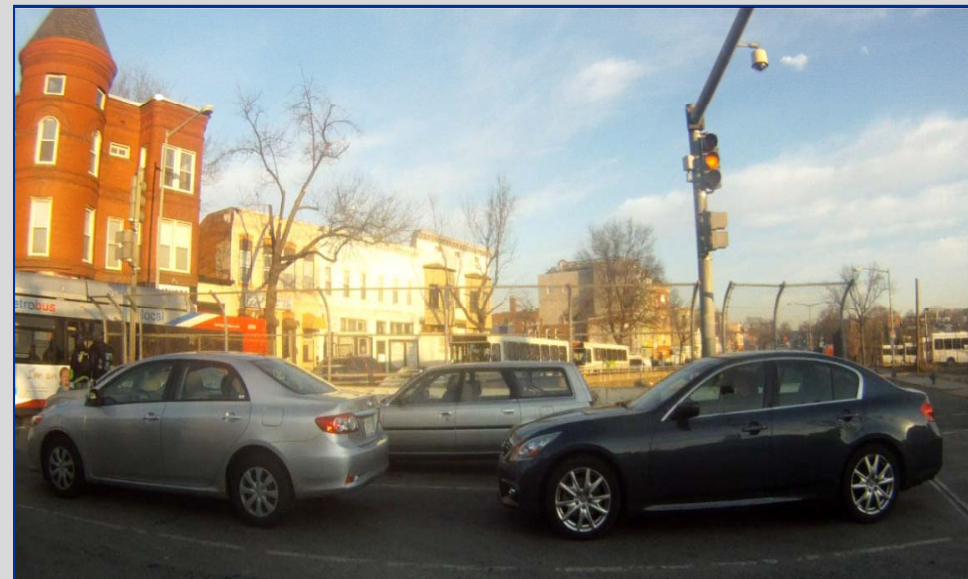
 = Recommended for concept design



# ***Example Design: DC #2 – N. Capitol St.***

---

- Problems Observed
  - Six-lane undivided section heavily congested
    - AM queues spill back to 4<sup>th</sup> St past Florida Ave.
  - Significant bus congestion on N. Capitol St. service roads
    - Very busy stops
    - Buses in SB service lane significantly delayed by 5 - 8 minutes (max delay 11 minutes).

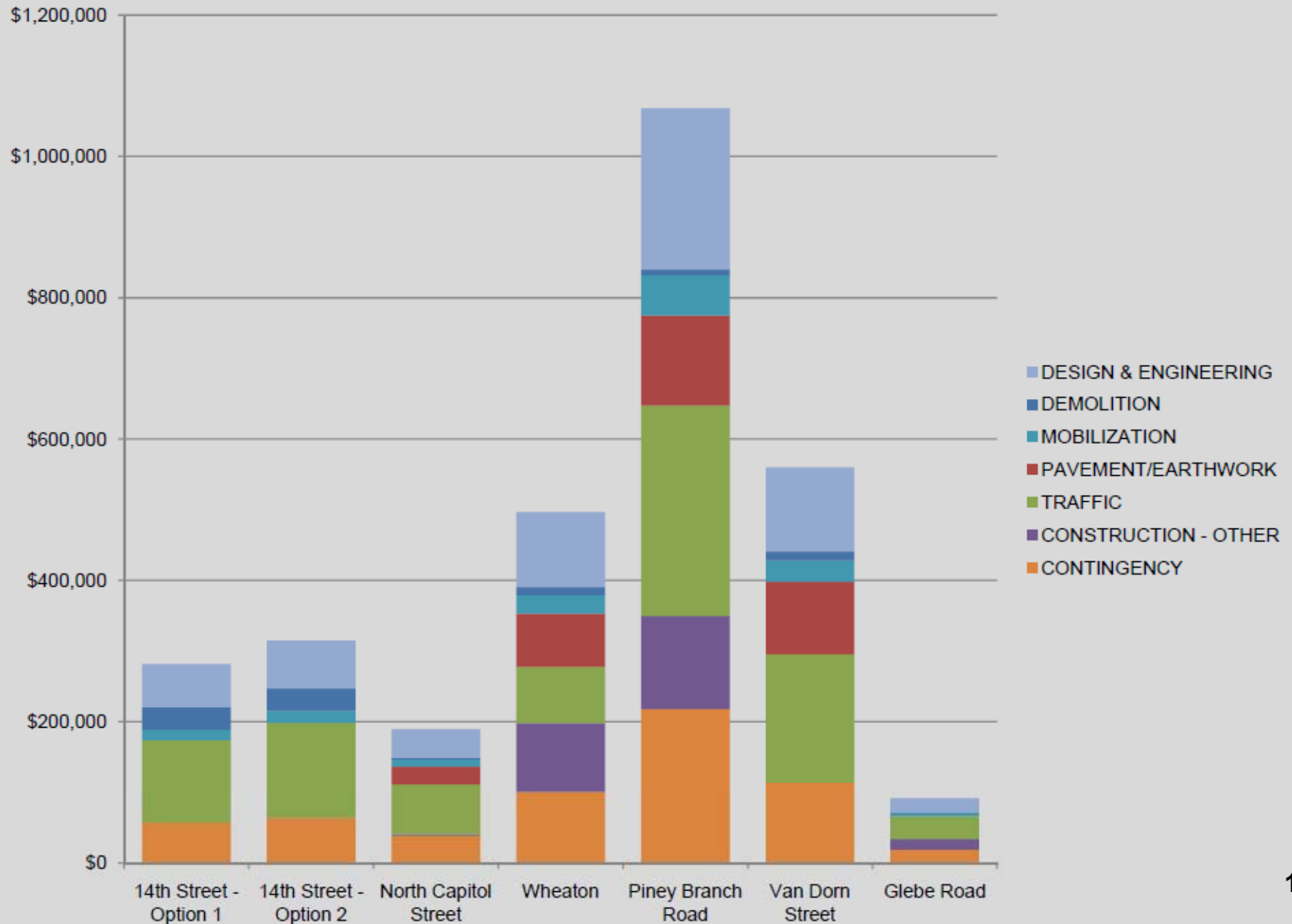


# *Example Design: DC #2 – N. Capitol St.*

- Potential physical improvements
  - Bus lanes along N. Capitol St. service roads
- Potential signal timing improvements
  - Review signal timing at New York Ave./N. Capitol St. to reduce SB queuing
  - Deploy point control traffic officer to reduce intersection blockage



# Comparison of Capital Costs



# Task 4 – Impact Assessment

---

- Transit Operations
  - Unit travel time savings
  - On-time performance
  - Estimated bus operating cost savings – 5 & 20 years
  - MWCOG PCN Study and TCRP Synthesis 83
- Traffic Operations
  - Intersection LOS
  - Arterial Speeds
  - Queues
- Before and after impact summary

# Example: DC #2 – N. Capitol St.

## Traffic Impacts

- Queues and delays for vehicles and buses along New York Ave and North Capitol Street are related to downstream congestion

NY/N. Capitol SB RAMP	HCM Avg. Control Delay	HCM V/C Ratio	HCM LOS	SB Approach LOS
Existing AM	9	0.61	A	D
Queue Jump & Bus Lane Conversion AM	11.6	0.67	B	D
Split Adjustment AM	8.9	0.61	A	D
Existing PM	14.2	0.75	B	D
Queue Jump & Bus Lane Conversion PM	16.9	0.87	B	D
Split Adjustment PM	61.3	0.8	E	D

NY/N. Capitol NB RAMP	HCM Avg. Control Delay (Sec.)	HCM V/C Ratio	HCM LOS
Existing AM	9.7	0.61	A
Queue Jump & Bus Lane Conversion AM	12	0.66	B
Split Adjustment AM	9.6	0.61	A
Existing PM	14.3	0.83	B
Queue Jump & Bus Lane Conversion PM	9.3	0.82	A
Split Adjustment PM	65.7	0.89	E

# Preliminary Operating Cost Savings

---

- Highly conservative estimate
- Time savings of individual improvements applied to bus volumes & multiplied by WMATA FY13 *non-regional service* platform hour cost
  - Bus lane time savings calculated from TCRP Report 118
  - Queue-jump & TSP time savings derived from Synchro outputs
- Based on 7 weekday peak hours only
  - 6-9 AM; 3-7 PM
  - “Shoulders” of peak discounted at 80% of time savings

# Example: MD #2 – Piney Branch Road

## Preliminary Bus Ops Impacts

---

- For some locations, able to estimate potential operating benefits and resulting cost savings

	Annual Time Savings (pl hr)	Annual cost savings	5-year cost savings (discounted)	20-year cost savings (discounted)
Queue-Jumps	173.0	\$19,058	\$89,743	\$289,817
TSP	466.3	\$51,378	\$241,933	\$781,301
Total	639.2	\$70,436	\$331,676	\$1,071,118

- However, the Synchro model only works for medium-scale priority treatments, not single locations. More costly microsimulation would be needed to assess single locations.

# Multimodal Coordination and Bus Hot Spots Study

## – *Conclusions / Final Steps*

---

- Overall, specific bus priority improvements are fairly modest.
    - Minimal or no impact on general traffic LOS
    - Capital costs are sizable: ~\$100K per intersection
      - However, costs are reduced if integrated with other work, such as re-paving, signal upgrades, etc.
    - Benefits are also modest; indeterminate for single locations
  - Noteworthy that many Hot Spots locations already under study (i.e., corridor studies) or have planned improvements (e.g., Glebe Rd).
- 
- Final deliverables received from consulting team. Final comments received from regional participants.
    - TPB Staff will conduct final review and distribute final Task 4 report – end of July.



# Multimodal Coordination and Bus Hot Spots Study

## – *Further Application*

---

- The findings of this study offer both:
  - For some locations, an independent assessment of potential improvements and the associated costs and impacts.
  - More broadly, the study provides a general process for assessing bus hot spots and their potential costs and impacts that can be used for future efforts.
- Task #2 developed a list of “Top 15” Hot Spots for DC, MD, and VA (AM, PM, and all-day)
  - Prioritized locations provide an opportunity for further analysis of potential bus priority treatments by jurisdictions.

---

# Extra Slides

# Study Objectives

---

- Identify opportunities for roadway improvements that could increase average bus speed and on-time performance.
  - Builds on previous Priority Corridor Network (PCN) study, with its 20 year vision for surface transit enhancements.
- “Hot Spots” are specific intersections or segments in which modest investments in bus priority improvements could improve bus operations and reduce operating subsidies.
  - Builds on previous WMATA work for the Metrobus network, by including regional transit information.
- Study goal is to develop a prioritized list of Top 10 Hot Spots, providing input on implementation of bus priority treatments, and scoping possible costs, savings, and impacts.

# Study Participants

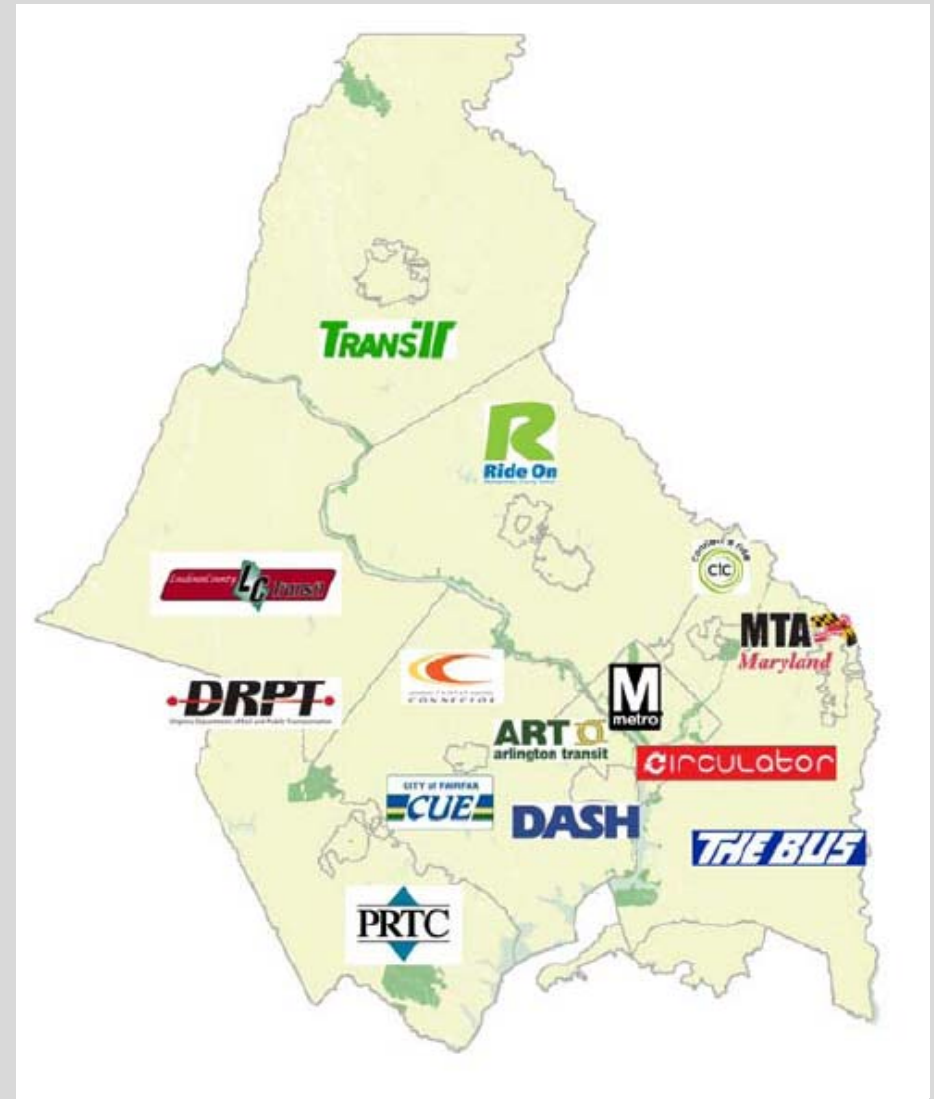
---

- Coordination - **TPB**
- Technical Advisor – **WMATA Office of Long-Range Planning**
- Data and Observations – **Regional Transit Providers**
- Direction & Feedback – **Regional Stakeholders**
- Data Analysis, Field Verification, Reports – **Consultant Team**
  - **Parsons Brinckerhoff** – Prime, Hot Spots Verification, Design Concepts
  - **Foursquare ITP** – Database Development, Hot Spots List
  - **Sabra, Wang & Associates** – Traffic Analysis

# Regional Bus Systems

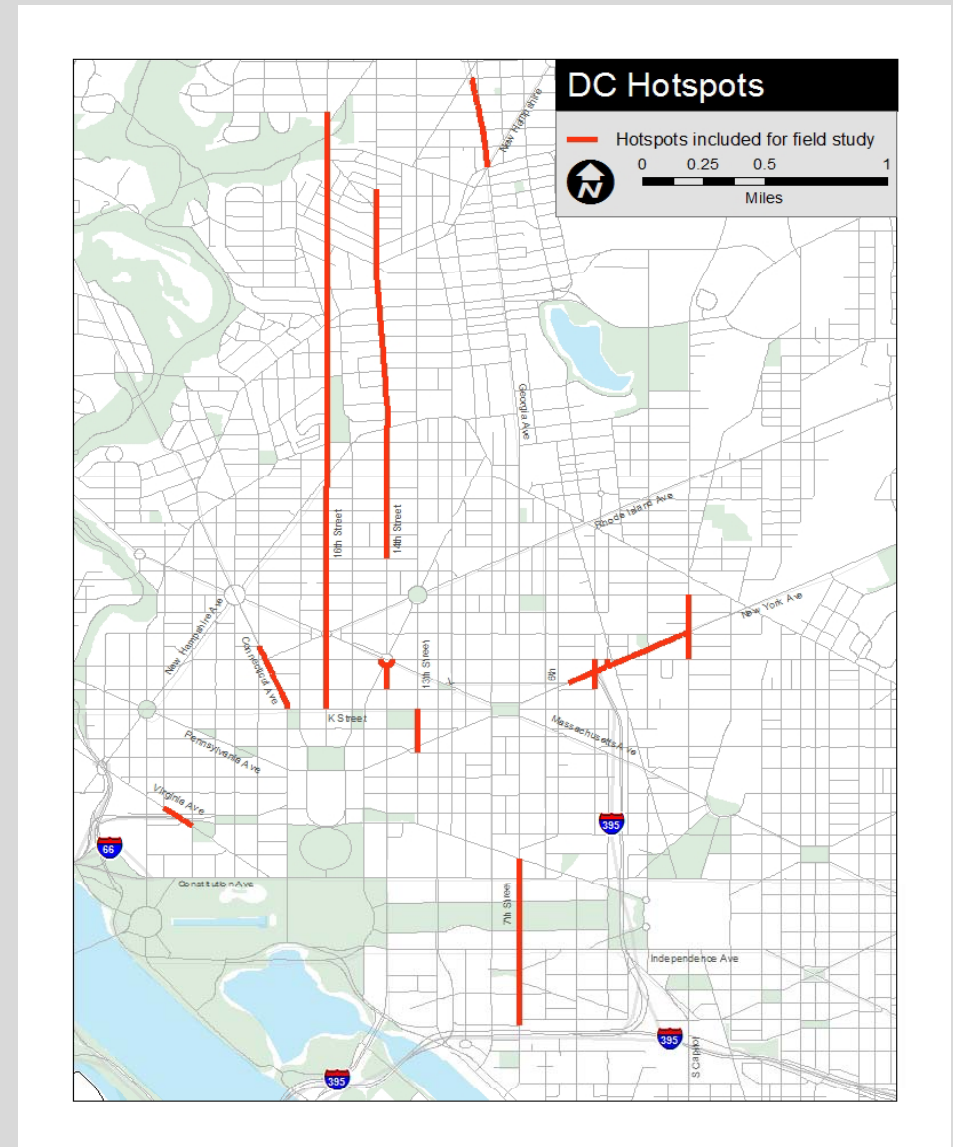
---

- Core Agencies
  - Metrobus
  - Ride On
  - Fairfax Connector
  - DASH
  - DC Circulator
  - ART
  - CUE
  - The BUS
- Commuter Bus
  - MTA Commuter Bus
  - Omni-Ride
  - LC Transit
- Non Core Agencies
  - TransIT
  - Connect-a-Ride



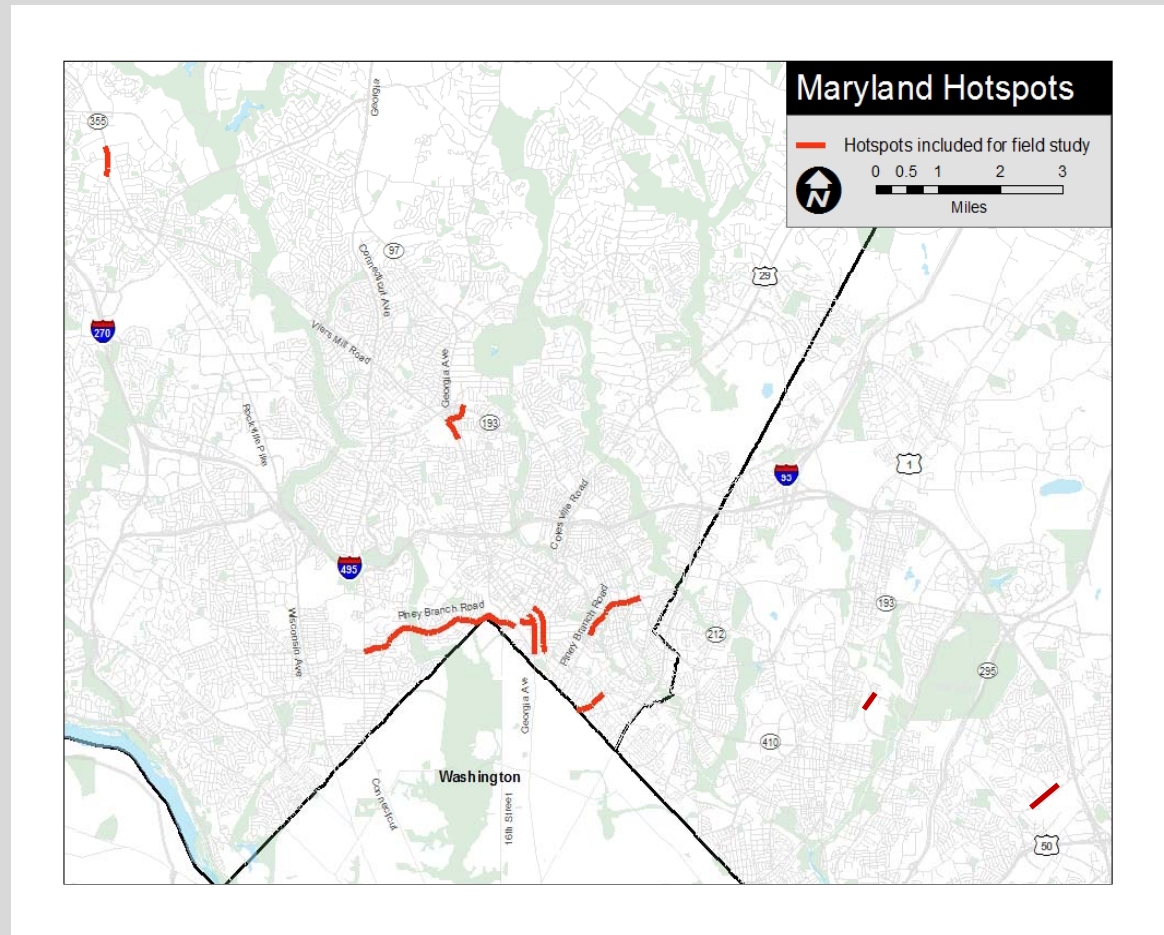
# Top 10 DC Hotspots

- Virginia Ave. NW – E St. to D St.
- Georgia Ave. NW – Upshur St. to New Hampshire Ave.
- Wisconsin Ave. NW & Q St.
- 7<sup>th</sup> St. NW/SW – I-395 to Pennsylvania Ave.
- Connecticut Ave. – K St. to Jefferson Pl.
- 14<sup>th</sup> St. NW – Corcoran to Otis Sts.
- Thomas Circle (southern half) & 14<sup>th</sup> St. NW (to L St.)
- New York Ave./N. Capitol St.
- 13<sup>th</sup> St. NW – H St. to K St.
- 16<sup>th</sup> St. NW – K St. to Shepherd St.



# Top 10 Maryland Hotspots

- Georgia Ave. – 13<sup>th</sup> St. to Colesville Rd.
- River Rd. at Paint Branch Dr.
- Veirs Mill Rd./Reedie Dr./Amherst Ave.
- Fenton St. – MD 410 to Colesville Rd.
- East-West Hwy. – Georgia Ave. to Connecticut Ave.
- Piney Branch Rd. – MD 193 to Sligo Ave.
- Carroll Ave. – Maple St. to Ethan Allen Rd.
- Hungerford Dr. – Washington St. to Ivy League Ln.
- Annapolis Rd. – Finns Ln to Riverdale Rd.
- Wayne Ave. – Georgia Ave. to Colesville Rd.



# Top 10 Virginia Hotspots

- Wilson Blvd. – Ft. Myer Dr. to Moore St.
- Lynn St. – Key Bridge to 19<sup>th</sup> St.
- Joyce St. – Columbia Pike to Army-Navy Dr.
- Gallows Rd. – Belleforest Dr. to Inova Hospital
- Army Navy Dr. – Eads St. to Joyce St.
- Van Dorn St. – Eisenhower Ave. to Franconia Rd.
- SB Glebe at Arlington Blvd.
- Patriot Dr. – Lafayette Forest Dr. to Heritage Dr.
- Eisenhower Ave. – Van Dorn St. to Van Dorn Metrorail station
- Route 123 – Jermantown Rd. to Folin Ave.

