

# CRYSTAL CITY – POTOMAC YARD TRANSIT IMPROVEMENTS PROJECT

## TRANSIT OPERATIONS PLAN

January 2012



**THIS PAGE INTENTIONALLY LEFT BLANK**

# **Crystal City Potomac Yard Transitway**

## **Transit Operations Plan**

**January 2012**

**THIS PAGE INTENTIONALLY LEFT BLANK**

## Glossary of Terms

- **Alexandria DASH** – Local bus service operated by Alexandria Transit Company.
- **Boarding/Alighting** – Passengers boarding a bus/passengers exiting a bus.
- **Delay** - The additional travel time experienced by a driver, passenger or pedestrian due to circumstances that impede the desirable movement of traffic. It is measured as the time difference between actual travel time and free-flow travel time.
- **DOD shuttles** – Department of Defense shuttles that operate between Crystal City, the Pentagon, and Navy Annex.
- **Dwell Time** – The scheduled time a vehicle or train is allowed to discharge and take on passengers at a stop, including opening and closing doors.
- **FXC** – Fairfax Connector bus service operated by Fairfax County. Runs Fairfax Connector 597 commuter service from Fairfax County to Crystal City.
- **Headway** – The time interval between vehicles moving in the same direction on a particular route.
- **LCT** - Loudoun County Transit operated by Loudoun County. Runs commuter service from Loudoun County to Crystal City, the Pentagon, and downtown Washington, D.C.
- **LOS** – Level of Service; A qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience.
- **MARTZ** – Private operated commuter bus service from Stafford County to Crystal City, the Pentagon, and downtown Washington, D.C.
- **Metrobus** – Regional and local bus service operated by Washington Metropolitan Area Transit Authority (WMATA).
- **PRTC** – Potomac and Rappahannock Transit Commission. Runs OmniRide commuter service from Lake Ridge and Dale City in Prince William County to Crystal City and the Pentagon.
- **Quick's** – Private operated commuter bus service from Stafford County to Crystal City, the Pentagon, and downtown Washington, D.C.
- **Slug Line** – Informal carpooling which allows drivers to pick up additional passengers in order to use the High Occupancy Vehicle (HOV) lanes during restricted peak hours. This activity is generally called slugging, wherein a commuter desirous of the ride is known as a slug.
- **V/C** – Volume-to-Capacity ratio; compares roadway demand (vehicle volumes) with roadway supply (carrying capacity).
- **VRE** – Virginia Railway Express operates rail passenger commuter service from Stafford and Prince William counties to Alexandria, Crystal City, and downtown Washington, D.C.

**THIS PAGE INTENTIONALLY LEFT BLANK**

## Table of Contents

1.0	Existing Conditions Inventory .....	1-1
1.1	Introduction <del>XXXXXXXXXXXXXXXXXXXX</del> .....	1-2
1.1.1	Key Findings .....	1-2
1.2	Current Bus Routes in Crystal City .....	1-6
1.3	Data Collected .....	1-6
1.4	Data Results .....	1-11
1.4.1	Bus Vehicle Volumes by Stop .....	1-11
1.4.2	Boarding/Alighting Data by Stop – Local Routes .....	1-11
1.4.3	Boarding/Alighting Data by Stop – Long Distance Commuter Services .....	1-12
1.4.4	Other Curb Lane Transportation Users .....	1-12
1.4.5	Traffic Data .....	15
1.4.6	Ridership on Corridor Bus Services .....	16
1.4.7	Headway Separation on the 9S and DOD Shuttles .....	16
1.4.8	Long Distance Express Bus Dwell Times and Schedule Adherence .....	16
1.4.9	Passenger Loads on the 9S .....	16
1.4.10	Driveways and Existing Facilities .....	17
2.0	Transit Service and Operations Plans .....	2-1
2.1	Introduction .....	2-1
2.2	Transit Service Plan .....	2-3
2.2.1	Stop Locations and Amenities .....	2-9
2.2.2	Transit Center Facility .....	2-10
2.2.3	Transit Vehicles .....	2-12
2.2.4	Fare Collection .....	2-13
2.3	Transit & Traffic Operations .....	2-13
2.3.1	Transitway Configuration .....	2-13
2.3.2	Traffic Analysis .....	2-15
2.3.3	Transit-Only Signal Phases and Signal Priority .....	2-16
2.3.4	Transit Travel Time .....	2-16
2.3.5	Ridership and Capacity Utilization .....	2-17
2.3.6	Transit Frequency and Dwell Time .....	2-17
2.4	Access Policy .....	2-19
2.4.1	Purpose and Overview .....	2-19
2.4.2	Crystal City Dedicated Lanes: Options Considered and Analytical Process .....	2-20
2.4.3	Stakeholder Input and Public Involvement .....	2-21
2.4.4	Section E - Crystal City Dedicated Lanes: Policy Approach .....	2-24
2.4.5	Future Access to Exclusive Transitway .....	2-25
2.5	Transit Management and Supervision .....	2-25
2.6	Enforcement .....	2-26
2.6.1	Traffic Circulation .....	2-27
2.6.2	Parking and Moving Violations .....	2-27
2.6.3	Traffic Accidents .....	2-27
2.6.4	Emergency Operations .....	2-28
2.6.5	Delivery Vehicles and Building Access .....	2-28
2.6.6	Taxi and “Slug” Activity .....	2-28
2.7	Cost Estimates .....	2-28
2.7.1	Capital Costs .....	2-28

2.7.2	Operations & Maintenance Costs .....	2-29
3.0	Implementation Plan .....	3-1
3.1	Introduction .....	3-1
3.2	Phasing of Improvements: Infrastructure and Service Changes .....	3-1
3.2.1	Transit Service and Scheduling .....	3-1
3.2.2	Transitway and Stops .....	3-5
3.2.3	Passenger Information Displays .....	3-5
3.3	Bus Fleet: Operations, Maintenance, and Storage Requirements .....	3-6
3.3.1	Capital and Operating Costs .....	3-6
3.3.2	Bus Maintenance and Storage Facility .....	3-6
3.4	Customer Communications and Marketing .....	3-6
3.4.1	Overall Branding .....	3-6
3.4.2	Customer Information – Preliminary Notice of Service Changes .....	3-8
3.4.3	Customer Information – Ongoing Updates After Service Starts .....	3-9
3.5	Transit Management and Supervision .....	3-10
3.5.1	Coordination Meetings .....	3-10
3.5.2	Transitway Operations Management .....	3-10
3.5.3	Transitway Operations Supervisors .....	3-11
3.5.4	Supervisor Training .....	3-12
3.6	Ongoing Evaluation .....	3-13
3.6.1	Enforcement .....	3-13
3.6.2	Evaluation Criteria .....	3-14
3.6.3	Evaluation Process .....	3-14

**List of Figures**

Figure 1-1A:	Crystal City Potomac Yard Transitway Alignment – Arlington .....	1-4
Figure 1-1B:	Crystal City Potomac Yard Transitway Alignment – Alexandria .....	1-4
Figure 1-2A:	Existing Bus Services and Bus Stops – Arlington .....	1-9
Figure 1-2B:	Existing Bus Services and Bus Stops – Alexandria .....	1-9
Figure 1-3:	AM Peak Bus Volumes by Stop Along Future Transitway .....	1-14
Figure 1-4A:	Existing Transportation Uses – Arlington .....	1-19
Figure 1-4B:	Existing Transportation Uses – Alexandria .....	1-19
Figure 2-1:	Crystal City Potomac Yard Transitway Sections .....	2-2
Figure 2-2:	Transitway Premium Service (left) and other services (right) .....	2-8
Figure 2-3:	Rendering of Proposed Transitway Stop in Median of US Route 1 (Alexandria) ....	2-10
Figure 2-4:	Rendering of Proposed Transitway Stop in Crystal City (Arlington) .....	2-10
Figure 2-5:	Existing and Consolidated Transitway Stops .....	2-11
Figure 2-6:	Metrobus Express Livery .....	2-12
Figure 2-7:	Lymmo - Orlando, FL (left) and Healthline - Cleveland, OH (right) .....	2-13
Figure 2-8A:	Weekday Traffic Counts at Crystal Drive, north of 23rd Street (2010) .....	2-15
Figure 2-8B:	Weekday Traffic Counts at Crystal Drive, south of VRE pedestrian signal (2010) ..	2-16
Figure 2-9A:	Existing Transit Activity—AM Peak Period .....	2-17
Figure 2-9B:	Existing Transit Activity—PM Peak Period* .....	2-18
Figure 2-9C:	Future Transit Activity—AM Peak Period (Includes Proposed 9X) .....	2-18
Figure 2-9D:	Future Transit Activity—PM Peak Period (Includes Proposed 9X & Rerouted 9E)	2-19

Figure 2-10: Example Transitway Usage: AM Peak, Consolidated Stop at 18th Street and Crystal Drive ..... 2-22

Figure 2-11: Enforcement officials help maintain transit and traffic operations ..... 2-26

Figure 3-1: Map and Timeline for Implementation of Transitway ..... 3-2

Figure 3-2: Implementation of 9S Service (2013-2014) ..... 3-3

Figure 3-3: Implementation of 9X Service (2013-2014) ..... 3-4

Figure 3-4: “Time Slot” Concept for WMATA Routes and Additional Transit Service ..... 3-5

Figure 3-5: Example WMATA Priority Corridor Branding Elements ..... 3-7

Figure 3-6: Lymmo - Orlando, FL (left) and Healthline - Cleveland, OH (right) ..... 3-8

**List of Tables**

Table 1-1: Summary of Existing Transit Services ..... 1-6

Table 1-2: Existing Transit Services in Crystal City Potomac Yard ..... 1-7

Table 1-3: Data Elements Collected ..... 1-11

Table 1-4: Bus Route Characteristics – Along Future Crystal City Potomac Yard Transitway .. 1-13

Table 1-5: Traffic Data at Key Intersections (2009 and 2010) ..... 15

Table 1-6: Daily Ridership on Corridor Bus Services ..... 16

Table 1-7: Maximum Load by Trip – 9S Loop ..... 17

Table 1-8: Existing Transportation Uses ..... 18

Table 2-1: Summary of Proposed Transit Service Plan ..... 2-5

Table 2-2: Transitway Configuration and Physical Features by Section ..... 2-14

Table 2-3: Estimated Transit Travel Time (2013 Northbound, Proposed 9X Service) ..... 2-16

Table 2-4: Transitway Configuration and Access Policy by Section ..... 2-20

Table 2-5: Enforcement Issues ..... 2-27

Table 2-6A: Estimated Capital Costs, regular 40-foot CNG buses (2011 Dollars) ..... 2-29

Table 2-6B: Estimated Capital Costs, hybrid bus BRT-style branding & livery (2011 Dollars) ...  
..... 2-29

Table 2-7A: Estimated Annual Operations & Maintenance Costs (2011 Dollars) ..... 2-29

Table 2-7B: Estimated Annual Bus Operating Costs for Proposed Transitway Services for 9S  
and 9X (2011 Dollars) ..... 2-30

Table 2-7C: Existing Annual Operating Costs for Route 9S (2011 Dollars) ..... 2-30

Table 2-7D: Estimated Annual Supervision Costs for Proposed Transitway Services for 9S  
and 9X (2011 Dollars) ..... 2-30

Table 2-7E: Estimated Annual Enforcement Costs for Proposed Transitway Services for 9S  
and 9X (2011 Dollars) ..... 2-31

Table 2-7F: Estimated Annual Maintenance Costs for Proposed Transitway Facilities ..... 2-31

Table 3-1: Transitway Management Roles ..... 3-11

Table 3-2: Supervisor Roles and Responsibilities ..... 3-13

Table 3-3: Operator Coordination Meetings - Scheduled Topics ..... 3-14

## **Appendices**

Appendix A: Bus Volumes and On/Offs by Stop - By Route

Appendix B: Field Data Collection Summary Tables

9S and DOD Shuttle Headway Separation

Long Distance Express Bus Dwell Times and Schedule Adherence

Other Curb Lane Transportation Users

Appendix C: Transitway Activity at Crystal Drive and 18th Street South – Proposed & Existing

Appendix D: Crystal City Potomac Yard Transit Operations – Core Stakeholders

Appendix E: Operations Plan and Cost Estimates

Appendix F: Examples of BRT Services and Features

Appendix G: Implementation Checklist

## Executive Summary

The purpose of the Crystal City/Potomac Yard (CCPY) Transit Improvements Project is to provide high-capacity and high-quality transit services in the five-mile corridor between the Pentagon City in Arlington County and the Braddock Road Metrorail Station in the City of Alexandria. The project came about in response to rapid commercial and residential development and redevelopment of the large tracts of open land associated with the former CSXT Potomac rail yard in both jurisdictions. The dedicated transitway and new premium Metrobus service will support growing transit demand from existing and new development in this fast developing corridor.

Arlington County, the City of Alexandria and the Washington Metropolitan Area Transit Authority (WMATA), in cooperation with the Virginia Department of Rail and Public Transportation and the Federal Transit Administration, completed multiple phases of project planning and preparation over the past several years. Currently Arlington County and the City of Alexandria are in the process of completing design for the dedicated transitway. The transitway improvements will include sections of exclusive transitway; sections of mixed traffic; and a section with dedicated curbside transit lanes with enforced time limits. The Transit Service Plan includes a family of premium and local bus services to take advantage of the exclusive/dedicated transit lanes.

The purpose of this project phase, the Crystal City/Potomac Yard Transitway Operations Plan, is to develop detailed transit service operations, transitway access policies and implementation plans to prepare for the opening of the transitway and premium Metrobus service. The transitway will be constructed in phases and open for service in 2013 and 2014.

The final report of the CCPY Transitway Operations Plan is organized into three chapters.

Chapter 1 of this report summarizes the intensive data collection effort tailored to the operations plan. Relevant information includes the frequency and service patterns of existing bus routes; passenger boarding and alighting volumes by stop and time of day; automobile traffic patterns and levels of service; and the locations and use of existing driveways and other infrastructure elements. The analysis highlights differences among the types of service in the corridor—local public transit, long distance commuter routes, and private shuttle services—to provide a basis for the operations plan recommendations and the approach to implementation.

Chapter 2 of the report lays out recommendations for the transit operations plan. Major features of the plan include:

- Extending the physical reach and hours of operation of the current 9S service;
- Implementing a new “9X” premium service along the entire 5-mile transitway corridor between the Braddock Road Metrorail Station and the Crystal City Metrorail Station; and
- Modifying selected other local bus services to maximize opportunities for transitway connectivity.

The operations plan includes a discussion of transitway access and enforcement issues and options, detailing a recommended access policy for those portions of the transitway that are dedicated lanes within existing street right-of-way. The plan also summarizes estimated costs for initiation and ongoing operation of the transit services and facilities.

Chapter 3 comprises the strategy for implementation of the operations plan, detailing such features as bus vehicle image and branding; public communications during the initiation phase of service; transitway supervision and enforcement; and the plan for ongoing monitoring and upgrades to transit service. It includes an implementation checklist (**Appendix G**) that outlines the sequence of steps toward full operation of premium service along the transitway.

## 1.0 Existing Conditions Inventory

### 1.1 Introduction

The purpose of the Crystal City Potomac Yard Transit Operations project is to develop implementation plans to support new transit service and modifications of current service related to the proposed transitway in Arlington County and the City of Alexandria. The transitway alignment is shown in **Figure 1-1A** and **Figure 1-1B**.

This chapter documents the data collection effort that supports development of the implementation plan. Two key areas of focus are: 1) development of a policy that will outline which bus services currently serving the transit corridor will have access to the transitway after it opens; and 2) development of transit service plans for new and modified service to take advantage of the transitway.

The report sections below summarize data collected and identify how each data element will be used in the next steps of the planning process. Section 1.2 provides a brief description of the bus services that currently operate in the project area. Section 1.3 contains a brief description of the data collected and how each data element will support the operations analysis. Section 1.4 contains a description of the actual data collected during this project phase and includes data tables and maps which illustrate the collected data.

The data collection effort was supported by data received directly from service operators and by field work. Data collected included:

- bus vehicle volumes by stop;
- boarding/alighting data by stop;
- traffic data from existing Documented Categorical Exclusions;
- local bus ridership;
- long distance express dwell times;
- headway and passenger loads on Route 9S;
- existing driveways and infrastructure elements; and
- observations on other curb lane transportation users.

There are 16 existing transit routes within the corridor, including local routes operated by Metrobus and Alexandria DASH, and long haul express routes operated by Fairfax Connector, PRTC, Loudoun County Transit, private operators MARTZ and Quick's, and Department of Defense (DOD) shuttles. **Table 1-1** provides a summary of the existing bus services.

#### 1.1.1 Key Findings

- The bus stops located along northbound Crystal Drive from 23<sup>rd</sup> Street South to 15<sup>th</sup> Street South and the Braddock Road Metrorail Station are the most heavily used stops by all of the existing transit services.
- The most heavily used stops by passengers during the peak hour are located at Crystal Drive and 15<sup>th</sup> Street South, the Crystal City Metrorail Station, Crystal Drive and 18<sup>th</sup> Street South, and Braddock Road Metrorail Station.
- Observations showed that average 9S headway separation is greatest at the Crystal Drive & 20<sup>th</sup> Street South in the AM peak. Scheduled 9S headway is 6 minutes between

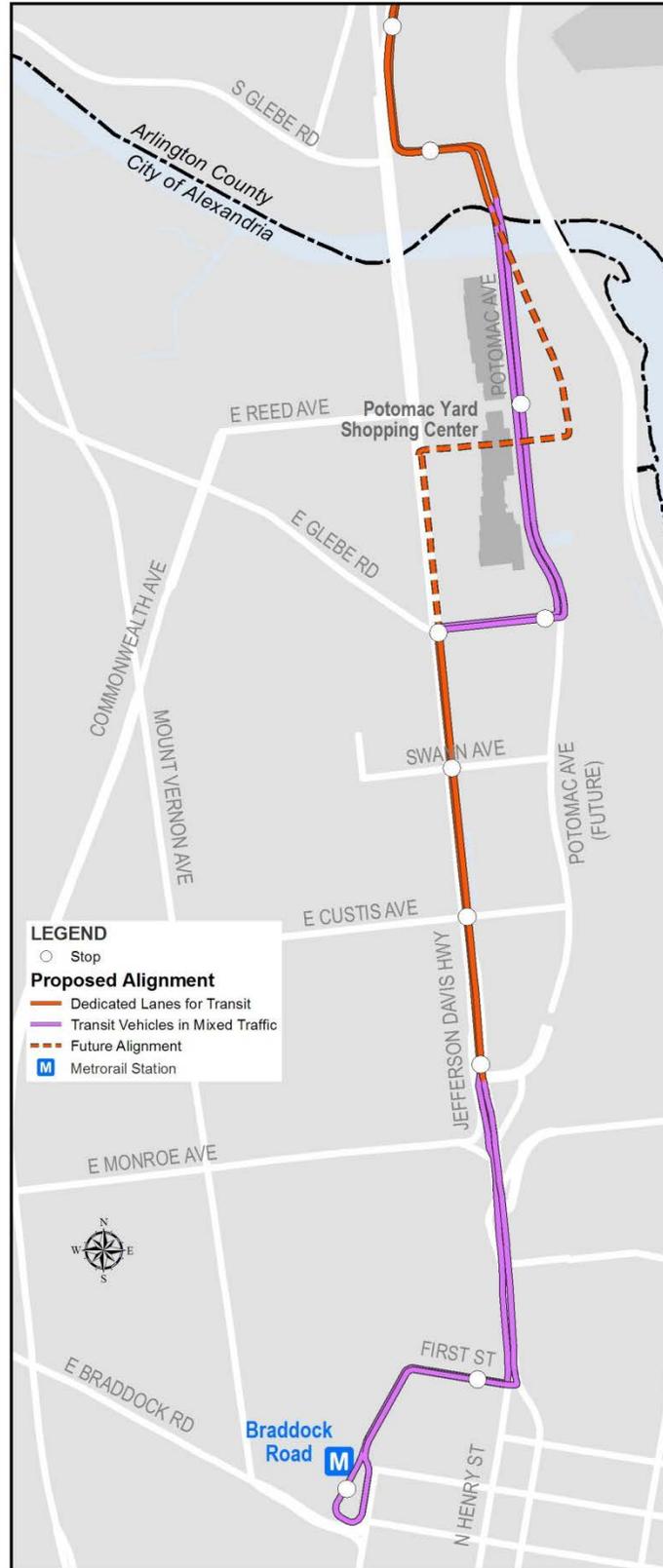
9S buses whereas actual average headway separation was observed at 8 minutes with a significant degree of variability.

- Generally, the maximum load point of the 9S is close to the Crystal City Metrorail Station in both the AM and PM peaks.
- The southbound transitway alignment along South Clark Street between 20<sup>th</sup> Street South and 26<sup>th</sup> Street South includes 12 driveways and two taxi stands. The northbound transitway alignment along Crystal Drive from Potomac Avenue to 15<sup>th</sup> Street South includes 24 driveways, 4 bike share stations, informal Slug Line pick-up locations, and the pedestrian entrance to the Virginia Railway Express (VRE) Station.
- Long distance operators and private employer shuttles have the longest dwell times causing operating conflicts with other transit services along the curb lanes. Observed excessive dwell times have impacted the 9S and other transit services within the corridor, particularly at Crystal Drive and 20<sup>th</sup> Street South, Crystal Drive and 18<sup>th</sup> Street South, and Crystal Drive at the VRE station.

Figure 1-1A: Crystal City Potomac Yard Transitway Alignment – Arlington



Figure 1-1B: Crystal City Potomac Yard Transitway Alignment – Alexandria



**Table 1-1: Summary of Existing Transit Services**

Routes	Peak Headway	Average Weekday Ridership	Transitway Area Served	Peak Frequency Along Transitway
<b>Metrobus Local Routes</b>				
9S	6 minutes	1,796	Follows transitway in Arlington	10 per hour (Crystal City and North Potomac Yard)
9A, E	12 minutes	1,543	Parallel to transitway in Arlington; follows Rt 1 transitway in Alexandria	5 per hour (Rt 1)
10A, B, E	12 minutes	5,823	Generally parallel to transitway in Arlington and Alexandria	n/a
16H	20 minutes	4,160	Follows northern portion of transitway in Arlington	3 per hour (Crystal City)
23A, C	30 minutes	3,475	Follows portion of transitway in Arlington	2 per hour (Crystal City)
<b>Alexandria Transit DASH Routes</b>				
AT2	30 minutes	2,203	Serves Braddock Road Metrorail Station	n/a
AT3	20 minutes	950	Serves Braddock Road Metrorail Station	n/a
AT4	20 minutes	931	Follows transitway south of Monroe Avenue Bridge	3 per hour (Old Town)
AT5	20 minutes	2,255	Serves Braddock Road Metrorail Station	n/a
AT10	30 minutes	731	Parallel to transitway near Potomac Yard shopping center	2 per hour (Potomac Yard shopping center)
<b>Department of Defense (DOD) Shuttles</b>				
DOD (3 routes)	15 minutes (2 routes) 1 hour (1 route)	no data	Follows north portion of transitway in Arlington	5 per hour (Crystal City)
<b>Long Haul Express Routes</b>				
Fairfax Connector 597	2 trips per hour	254	Follows northern portion of transitway in Arlington	2 per hour (Crystal City)
PRTC – Dale City, Lake Ridge	4 trips per hour – each service	582	Follows northern portion of transitway in Arlington	8 per hour (Crystal City)
Loudoun County Transit	11 trips in peak period	787	Follows northern portion of transitway in Arlington	4 per hour (Crystal City)
MARTZ	1 trip in each peak period	no data	Follows northern portion of transitway in Arlington	1 per hour (Crystal City)
Quick's	4 trips in each peak period	no data	Follows northern portion of transitway in Arlington	1 per hour (Crystal City)

## 1.2 Current Bus Routes in Crystal City

Outlined below in **Table 1-2** is a summary of bus routes in the transitway project area, in order to provide an understanding of the existing bus network as well as a foundation for understanding potential changes to this service as the transitway is implemented. These services are also shown graphically in **Figures 1-2A** and **1-2B**.

## 1.3 Data Collected

This section contains a summary description, outlined in **Table 1-3**, of the data collected and the purpose of each data element in future analysis. The results of the data collection are summarized in Section 1.4.

**Table 1-2: Existing Transit Services in Crystal City Potomac Yard**

Route Name	Routing in Project Area	Hours of Service	AM Peak Period Service Frequency in Project Area	# of Stops Served Along Proposed Transitway
<b>Metrobus Local Routes</b>				
9S	Shuttle Loop within Crystal City and Arlington portion of Potomac Yard, via S. Bell Street, S Clark Street, Crystal Drive, and Potomac Avenue	5:45 AM to 7:45 PM	6 minutes	15
9A, E	Rt. 1 in Alexandria and Arlington from Slaters Lane to Eads Street	4:30 AM to 1:30 AM	12 minutes	9A – 8 9E – 9
10A, B, E	Braddock Road Station to Mount Vernon Avenue to 23 <sup>rd</sup> Street South to Eads Street to Pentagon	5:00 AM to 1:00 AM	12 minutes	1
16H	Columbia Pike to Crystal City – Fern Street to 15 <sup>th</sup> Street South to S Bell Street to 18 <sup>th</sup> Street South to Hayes Street	Peak Period, Peak Direction	20 minutes	2
23A, C	23 <sup>rd</sup> Street South to Crystal Drive, Crystal City Metrorail Station, S Bell Street, and S Clark Street	5:30 AM to 12:00 AM	30 minutes	8
<b>Alexandria Transit (DASH)</b>				
AT2	Lincolnia to Braddock Road via Seminary Road, King Street, Fairfax Street and Madison Street. Terminates at Braddock Road Metrorail Station	5:45 AM to 10:15 PM	30 minutes	1
AT3	Hunting Towers to Pentagon via Old Town. Service stops at Braddock Road Metrorail Station	6:30 AM to 9:30 PM	20 minutes	1
AT4	Old Town to Pentagon via I-395. Service stops at Braddock Road Metrorail Station	5:45 AM to 8:00 PM	20 minutes	3
AT5	Landmark to Braddock Road Metrorail Station, via Van Dorn, King Street, Fairfax Street and Madison Street. Terminates at Braddock Road Metrorail Station.	5:15 AM to 11:15 PM	20 minutes	1
AT 10	King Street Metrorail Station to Potomac Yard via Mount Vernon Avenue	6:30 AM to 7:00 PM	30 minutes	1
<b>Department of Defense (DOD) Shuttles</b>				
DOD (3 routes)	Shuttle loop within Crystal City via S Bell Street, S Clark Street, and Crystal Drive	All Day	15 minutes	3
<b>Long Haul Express Trips</b>				
PRTC	From Lake Ridge and Dale City - AM - Enters Crystal City from Pentagon via Eads Street to 12 <sup>th</sup> Street South to S Bell/Clark Streets to 26 <sup>th</sup> Street South to Crystal Drive to 12 <sup>th</sup> Street South and Old Jefferson Davis Hwy. PM – Leaves from S Clark Street and 20 <sup>th</sup> Street South to 26 <sup>th</sup> Street South to Crystal Drive to 12 <sup>th</sup> Street South to Eads Street to Pentagon	Peak Period, Peak Direction	4 trips per hour – each service	8
Loudoun County	From Leesburg, Purcellville, Dulles North, Dulles South - AM – enters Crystal City at 23 <sup>rd</sup> Street South from Rt. 1 – to Crystal Drive to 15 <sup>th</sup> Street South and then leaves via Eads Street. Follows same routing in the afternoon	Peak Period, Peak Direction (2 mid-day trips)	11 trips in peak period	1
Quick's	From Spotsylvania County – AM – Enters Crystal City at 12 <sup>th</sup> Street South – Southbound on S Clark/Bell to 27 <sup>th</sup> Street South to Crystal Drive to 12 <sup>th</sup> Street South. PM – Same routing	Peak Period, Peak Direction	4 trips in peak period	7
MARTZ	From Spotsylvania County – AM – Enter on Clark, cross on 27 <sup>th</sup> Street South and north on Crystal Drive. PM – Start at 27 <sup>th</sup> Street South and Crystal Drive – Northbound on Crystal Drive	Peak Period, Peak Direction	1 trip in each peak period	4

Route Name	Routing in Project Area	Hours of Service	AM Peak Period Service Frequency in Project Area	# of Stops Served Along Proposed Transitway
FXC 597	From Reston – Both AM and PM time periods – enters Crystal City, from Eads Street, on 23 <sup>rd</sup> Street South, to S Clark Street, to 27 <sup>th</sup> Street South to Crystal Drive to 15 <sup>th</sup> Street South (AM trips terminate at Crystal City Metrorail Station)	Peak Period, Peak Direction	2 trips per hour	4

Figure 1-2A: Existing Bus Services and Bus Stops – Arlington

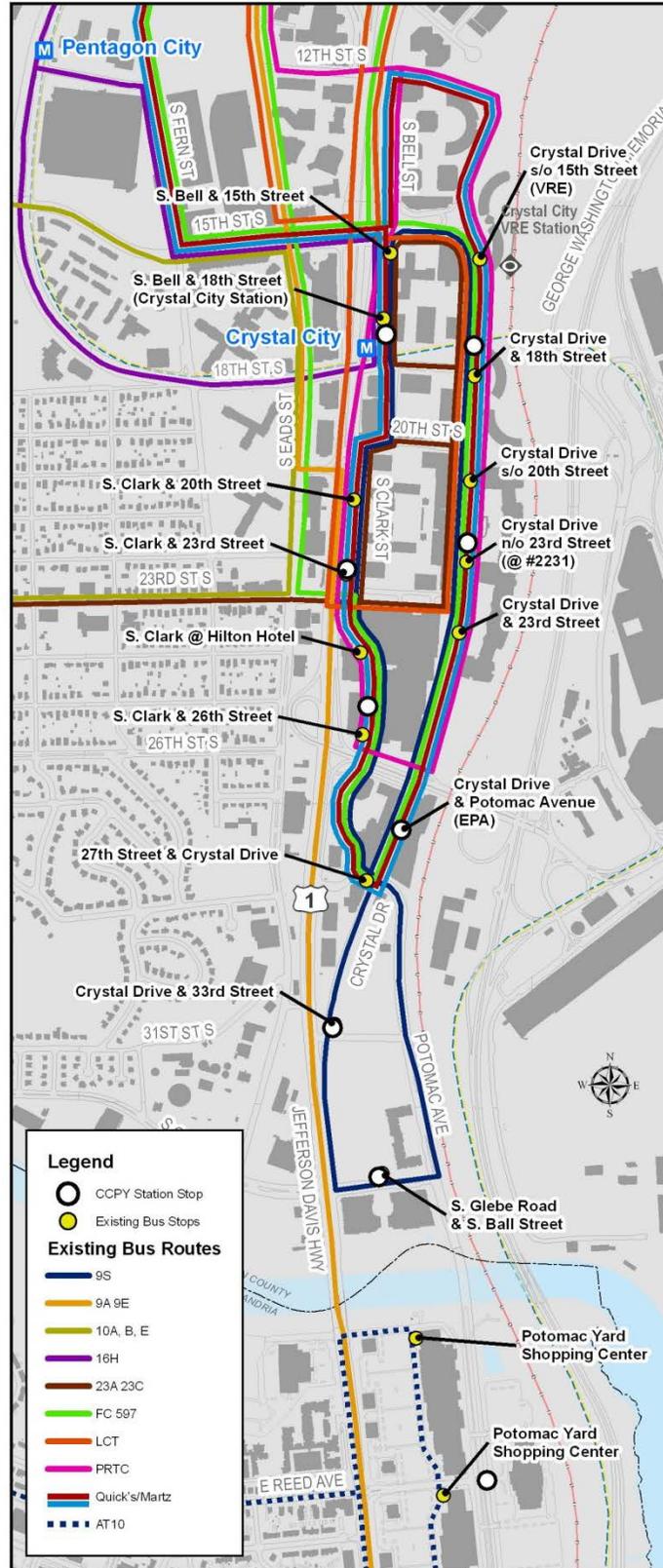
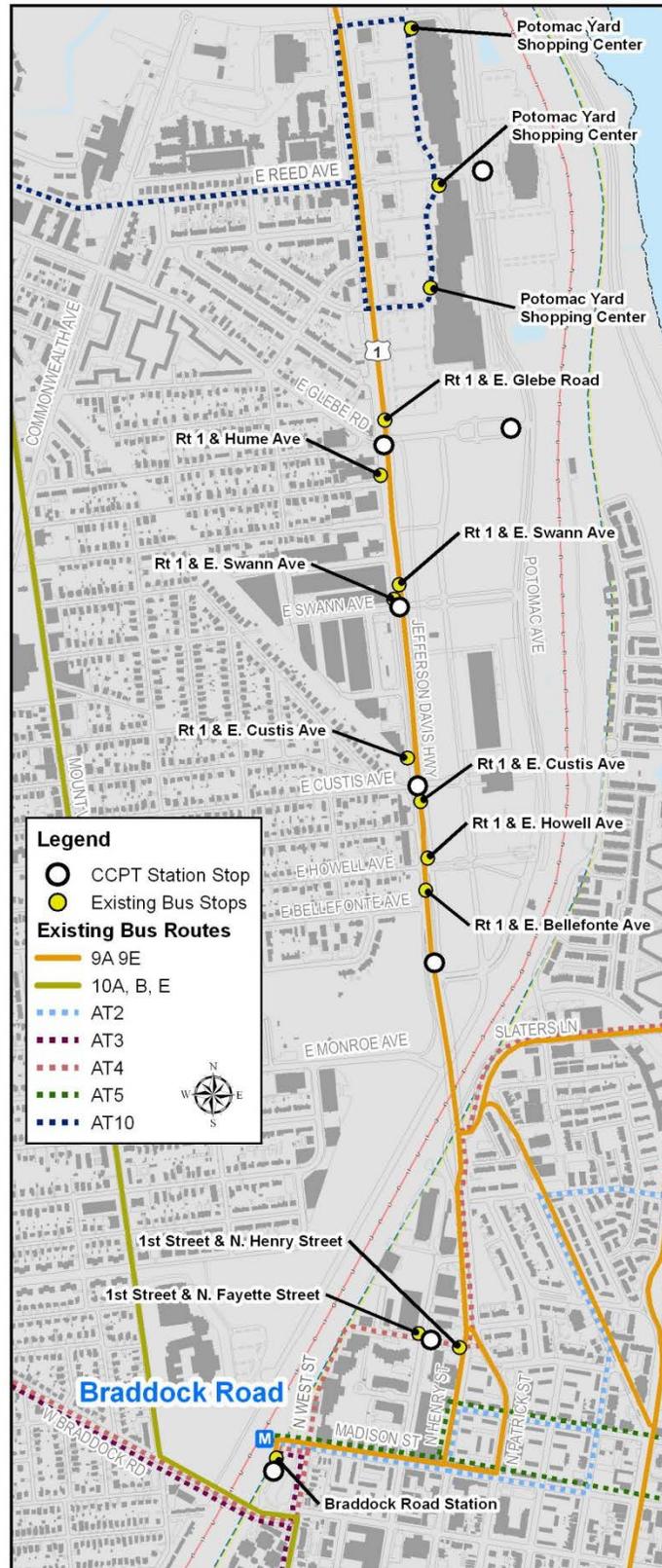


Figure 1-2B: Existing Bus Services and Bus Stops – Alexandria



**Table 1-3: Data Elements Collected**

Data Element	Data Source	Analysis Supported
Bus Vehicle Volumes by Stop	Public Timetables, Information from Department of Defense	Development of policy regarding which routes will have access to transitway.
Boarding/Alighting Activity by Stop – Local Routes	On/Off data from operators, field data collection	Development of policy regarding which routes will have access to transitway.
Boarding/Alighting Activity by Stop – Long Distance Commuter Services	On/Off data from operators, field data collection	Development of policy regarding which routes will have access to transitway.
Other Curb Lane Transportation Users	Field data collection	Development of policy regarding access policy.
Traffic Data	Documented Categorical Exclusions	Transitway operations
Ridership on Corridor Bus Services	Daily Ridership Reports – Operators	Demand estimate for new service
Long Distance Express Bus Dwell Times	Field Data Collection	Development of policy regarding which routes will have access to transitway.
Headway Separation on 9S Shuttle	Field Data Collection	Service reliability analysis, required supervision levels
Peak Period Maximum Vehicle Loads – 9S shuttle	On/Off data from WMATA	Operations Plan Development – Required Capacity
Driveways and Other Transportation Facilities	Field Data Collection	Transitway operations, service reliability analysis

## 1.4 Data Results

Outlined below are the results of the data collection effort by data element.

### 1.4.1 Bus Vehicle Volumes by Stop

Bus vehicle volumes by stop are outlined below in a series of data tables. **Table 1-4** provides a summary of combined bus volumes for each stop for all services operating along the future transitway. The bus volumes are presented for the AM peak hour (7:00 AM – 8:00 AM) and for the mid-day (1:00 PM – 2:00 PM). Included in **Appendix A** are comparable tables for each individual route operating along the future transitway (the data from these individual route tables are summed together to calculate the combined data shown in **Table 1-4**). AM peak combined bus volumes are also shown graphically in **Figure 1-3**. Bus vehicle volumes by stop will be used in the development of policy regarding which routes will have access to the transitway.

### 1.4.2 Boarding/Alighting Data by Stop – Local Routes

Boarding/alighting data by stop for local routes operating along the future transitway is summarized below in **Table 1-4** and in **Appendix A**. **Table 1-4** contains the combined boardings and alightings by stop for all local services running along the future transitway for the AM peak hour (7:00 AM – 8:00 AM). These local services include: 9S; 9A, E; 16H; 23A, C; Alexandria Transit DASH routes; and DOD shuttles. Public operator boarding and alighting data was obtained from the service providers. DOD boarding and alighting data was not readily available and was collected through a field data collection effort. This boarding and alighting data for local routes will be used in the development of policy regarding which routes will have access to the transitway.

### 1.4.3 Boarding/Alighting Data by Stop – Long Distance Commuter Services

Crystal City and the Pentagon are served by long distance express services that are provided by both public and private operators from the outer suburban counties in Virginia. PRTC originates in Prince William County, Fairfax Connector 597 originates in Fairfax County, and LCT originates in Loudoun County. Two private services originate in Spotsylvania County, Martz and Quick's. These services are included in the bus volumes by stop data included in **Table 1-4** but boardings and alightings data by stop were not readily available. Therefore, data on afternoon boardings and morning alightings for these services were collected through a field data collection effort. Data was collected for all public and private express services stopping at individual stops within Crystal City, (between approximately 7:00 and 8:00 AM and 4:30 PM and 6:00 PM). Data from public operators was used as available. Long distance service boarding and alighting data, summarized in **Appendix B**, is used in the development of policy regarding which routes will have access to the transitway.

### 1.4.4 Other Curb Lane Transportation Users

Observations were made in the field on the daily activities of other transportation users of the curb lane, including taxis, delivery vehicles, DOD shuttles, private employer shuttles, and tour buses. This field observation data, summarized in **Appendix B**, will be used in the development of policy regarding access to the transitway.

**Table 1-4: Bus Route Characteristics – Along Future Crystal City Potomac Yard Transitway**

Stop	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Local Boardings/Alightings Peak Hour (7 - 8 AM)		Combined Long Distance Boardings/Alightings Peak Hour*	
		(7 - 8 AM)	(1 - 2 PM)	On	Off	On (5 - 6 PM)	Off (7 - 8 AM)
<b>Southbound</b>							
S. Bell & 15th Street South	9S; 23A, C	15	7	0	8	0	0
S. Bell & 18th Street South (Crystal City Station)	9S; 16H; 23A, C	15	7	155	97	0	0
S. Clark & 20th Street South	9S; 23A, C; PRTC	16	7	21	3	1	0
S. Clark & 23rd Street South	9S; 23A, C; PRTC	16	7	0	7	0	0
S. Clark @ Hilton Hotel	9S; FC 597; PRTC; Quick's	16	5	0	3	20	19
S. Clark & 26th Street South	9S; Martz; Quick's; DOD	19	14	0	67	0	0
27th Street South & Crystal Drive	9S; Martz; Quick's	10	5	0	77	0	0
S. Glebe Road & S. Ball Street	9S	10	5	48	7	0	0
Potomac Yard Shopping Center	AT10	2	1	0	4	0	0
Rt 1 & Hume Ave	9A, E	6	2	3	1	0	0
Rt 1 & E. Swann Ave	9A, E	6	2	0	0	0	0
Rt 1 & E. Custis Ave	9A, E	6	2	2	1	0	0
Rt 1 & E. Bellefonte Ave	9A, E	6	2	0	0	0	0
1st Street & N. Fayette Street	AT 4	8	5	0	0	0	0
Braddock Road Metrorail Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	15	6	14	22	0	0
<b>Northbound</b>							
Braddock Road Metrorail Station	9E; 10A, B, E; AT2; AT3; AT3/4; AT4; AT5	18	11	11	13	0	0
1st Street & N. Henry Street	AT 4	3	1	0	0	0	0
Rt 1 & E. Howell Ave	9A, E	2	2	0	0	0	0
Rt 1 & E. Custis Ave	9A, E	2	2	4	1	0	0
Rt 1 & E. Swann Ave	9A, E	2	2	4	1	0	0
Potomac Yard Shopping Center	AT 10	2	2	4	0	0	0
Rt 1 & E. Glebe Road	9A, E	2	1	0	0	0	0
Crystal Drive & 33rd Street South	9S	10	5	9	3	0	0
Crystal Drive & Potomac Avenue (EPA)	9S	10	5	15	8	23	12
Crystal Drive & 23rd Street South	9S; FC 597; PRTC; Quick's; DOD	16	5	0	0	9	1
Crystal Drive - n/o 23rd Street South (@ #2231)	9S; 23A, C; PRTC; Quick's	16	7	16	4	76	47
Crystal Drive - s/o 20th Street South	9S; 23A, C; FC 597; PRTC; LC Transit; Martz; DOD (n/o 20th Street South)	22	7	0	0	21	13
Crystal Drive - s/o 18th Street South	9S; 23A, C; FC 597; PRTC; Quick's	18	7	7	2	20	9
Crystal Drive - s/o 15th Street South (VRE)	9S; 23A, C; PRTC; Martz; Quick's	15	7	11	13	0	0

\*Data for DOD, Martz, and Quick's boardings and alightings are based on observations made in the field.



### 1.4.5 Traffic Data

Traffic data was compiled from the Updated Documented Categorical Exclusions (December 2010, March 2011) for sections of the Crystal City Potomac Yard Transitway. Traffic data for the key intersections where the future transitway will be located is summarized by time period below in **Table 1-5**. Traffic data at key intersections will be used to support the development of the transitway service operations plan as well as an input into the policy regarding which services can utilize the transitway.

**Table 1-5: Traffic Data at Key Intersections (2009 and 2010)**

Intersection	AM			PM		
	Delay	V/C	LOS	Delay	V/C	LOS
15 <sup>th</sup> Street South/Crystal Drive	32.0	0.65	C	15.5	0.60	B
18th Street South/S Bell Street	22.4	0.30	C	22.5	0.038	C
18th Street South/Crystal Drive	9.8	0.52	A	6.9	0.49	A
20 <sup>th</sup> Street South/Rt 1	71.6	0.73	E	35.1	0.69	D
20 <sup>th</sup> Street South/S Clark Street	28.2	0.25	C	45.7	0.35	D
20 <sup>th</sup> Street South/S Bell Street	11.2	0.03	B	15.3	0.07	C
20 <sup>th</sup> Street South/Crystal Drive	8.3	0.40	A	9.1	0.51	A
Pedestrian Crossing at Crystal Drive – n/o 23 <sup>rd</sup> Street South	7.5	0.41	A	14.6	0.53	B
Midblock Crossing at Crystal Drive – n/o 23 <sup>rd</sup> Street South	7.2	0.37	A	7.0	0.41	A
23 <sup>rd</sup> Street South/Rt 1	80.0	0.093	E	108.4	1.06	F
23 <sup>rd</sup> Street South/S Clark Street	21.5	0.41	C	43.4	0.042	D
23 <sup>rd</sup> Street South/Crystal Drive	35.7	0.38	D	110.2	0.54	F
26 <sup>th</sup> Street South N. Leg/S Clark Street	36.0	0.17	E	26.7	0.40	D
26 <sup>th</sup> Street South S. Leg/S Clark Street	11.6	0.12	B	16.5	0.39	C
26 <sup>th</sup> Street South N. Leg/Crystal Drive	15.1	0.50	B	12.7	0.028	B
26 <sup>th</sup> Street South S. Leg/Crystal Drive	21.7	0.05	C	25.1	0.30	D
Rt 1/E. Glebe Rd	23.0	-	C	29.0	-	C
Rt 1/E. Swann Ave	3.0	-	A	3.0	-	A
Rt 1/E. Custis Ave	11.0	-	B	5.0	-	A
Rt 1/Howell Ave	11.0	-	B	11.0	-	B
Rt 1/Potomac Ave	11.0	-	B	6.0	-	A

### 1.4.6 Ridership on Corridor Bus Services

Daily ridership on corridor bus services is summarized below in **Table 1-6**. This data will provide context for potential ridership on new services developed for the transitway.

**Table 1-6: Daily Ridership on Corridor Bus Services**

Route	Total Daily Boardings	Boardings Along Transitway	Percentage of Boardings Along Transitway
Metrobus 9S	1,796	1,779	99%
Metrobus 9A, E	949	319	21%
Metrobus 10A, B, E	5,823	950	16%
Metrobus 16H	4,160	92	2%
Metrobus 23A, C	3,475	253	7%
AT2	2,203	132	6%
AT3	950	No Data Available	n/a
AT4	931	No Data Available	n/a
AT5	2,255	128	6%
AT10	731	75	10%

### 1.4.7 Headway Separation on the 9S and DOD Shuttles

One of the key elements of the implementation plans will be recommendations regarding the required level of line management and supervision for services along the transitway. As one input into this analysis, headway separation on the 9S route and DOD shuttles were collected through field data collection. This data will be used to identify service reliability by comparing actual headway separation to scheduled headway separation. Data was field collected at a number of stops in Crystal City in both the AM and PM peak hours. The results of the data collection effort are shown in **Appendix B**.

### 1.4.8 Long Distance Express Bus Dwell Times and Schedule Adherence

Data on long distance express bus dwell times and observed arrival times were collected because their boardings and alightings are concentrated at just a few stops prior to the express portion of the trip. These dwell times were collected at stops located in Crystal City in the AM and PM peak hours. The dwell time data is summarized in **Appendix B**, by service provider. The tables containing the dwell time data also contain boarding and alighting data and observed arrival times and scheduled times. This data will be used as part of the analysis to determine a policy regarding which routes will have access to the transitway.

### 1.4.9 Passenger Loads on the 9S

Current passenger loads on the 9S loop provide an understanding of how fully vehicle capacity on the line is currently utilized and thus also provides a foundation for beginning to understand potential vehicle capacity requirements in the future, after the transitway opens. Vehicle loads on the 9S, which come from WMATA on-board ridechecks, are outlined in **Table 1-7**. The data show the maximum load on each trip in the morning peak (6:00 AM – 9:00 AM) and afternoon peak (3:30 PM – 6:30 PM). The maximum load point differs from trip to trip, though generally the maximum load point is close to the Crystal City Metrorail Station in both the AM and PM peaks.

**Table 1-7: Maximum Load by Trip – 9S Loop**

AM Trip	Trip Maximum Load	PM Trip	Trip Maximum Load
6:11 AM	14	3:30 PM	8
6:25 AM	20	3:37 PM	14
6:34 AM	17	3:43 PM	10
6:43 AM	25	3:49 PM	35
6:52 AM	24	3:55 PM	10
6:59 AM	11	4:01 PM	22
7:05 AM	2	4:07 PM	11
7:11 AM	20	4:13 PM	27
7:17 AM	21	4:19 PM	15
7:23 AM	32	4:25 PM	18
7:29 AM	11	4:31 PM	10
7:35 AM	26	4:37 PM	10
7:41 AM	20	4:43 PM	20
7:47 AM	11	4:49 PM	35
7:53 AM	10	4:56 PM	23
7:59 AM	17	5:02 PM	21
8:05 AM	31	5:09 PM	18
8:11 AM	13	5:16 PM	31
8:17 AM	5	5:23 PM	13
8:23 AM	17	5:30 PM	17
8:29 AM	27	5:37 PM	16
8:35 AM	15	5:44 PM	11
8:41 AM	6	5:51 PM	5
8:47 AM	8	5:58 PM	15
8:54 AM	13	6:07 PM	18
8:59 AM	13	6:17 PM	23
		6:28 PM	14

**1.4.10 Driveways and Existing Facilities**

Existing driveways and infrastructure elements, including taxi stands, bike share stations, and slug lines, which may inhibit the operation of transit service along the transitway alignment were inventoried through field data collection. **Table 1-8** summarizes this inventory by street segment. **Figures 1-4A** and **1-4B** show these elements located along the transitway alignment. This data will be used as part of the analysis to determine transitway operations and service reliability.

**Table 1-8: Existing Transportation Uses**

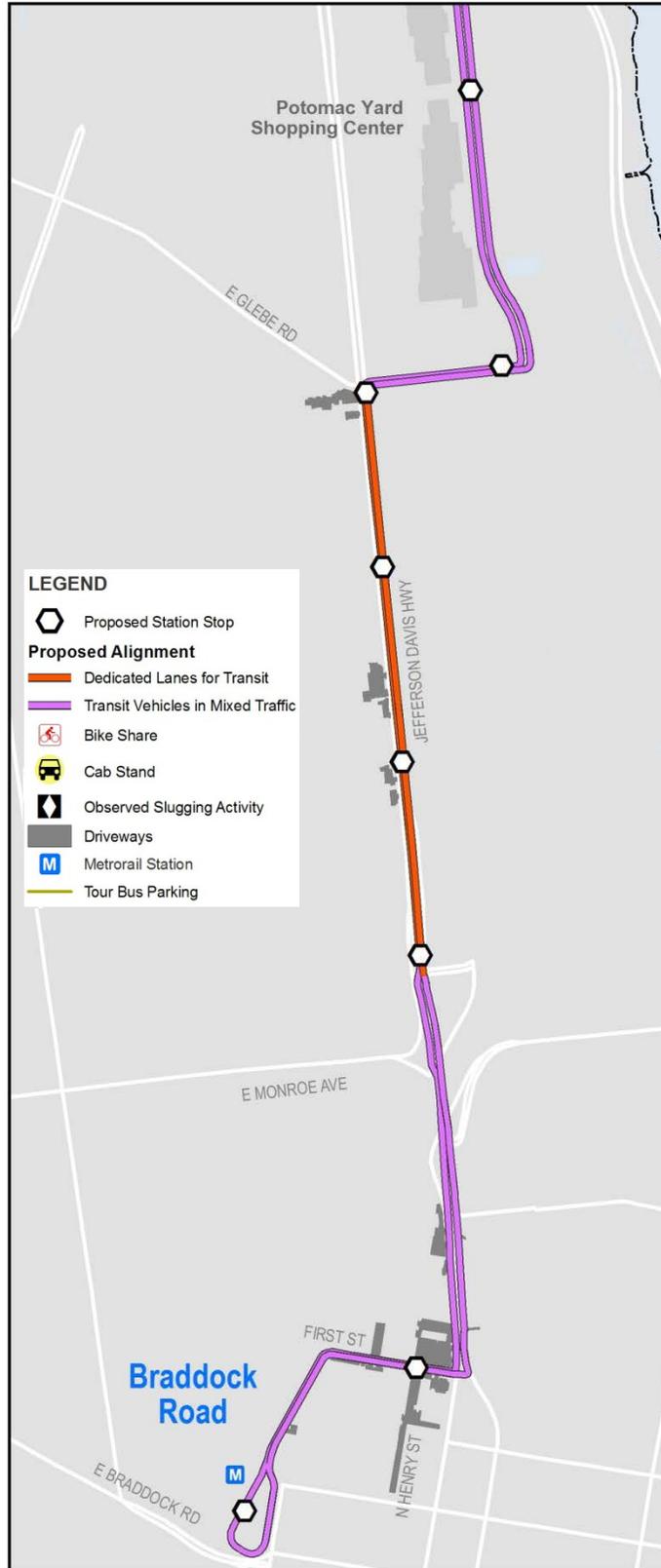
Street Segment			# of Driveways	Other Transportation Uses Located in Segment
On	From	To		
<b>Southbound</b>				
S Bell St	15 <sup>th</sup> St S	18 <sup>th</sup> St S	1	bus bays
	18 <sup>th</sup> St S	20 <sup>th</sup> St S	1	taxi stand; bike share station
20 <sup>th</sup> St S	S Bell St	S Clark St	1	bike share station
S Clark St	20 <sup>th</sup> St S	23 <sup>rd</sup> St S	3	
	23 <sup>rd</sup> St S	26 <sup>th</sup> St S	9	taxi stand at Hilton; taxi stand n/o 26 <sup>th</sup> Street South (east side of road)
26 <sup>th</sup> St S	S Clark St	Crystal Drive	2	
Crystal Drive	Potomac Ave	33 <sup>rd</sup> St S	4	
Potomac Ave	S Glebe	Alexandria City Line	1	bike share station
Rt 1*	E Glebe Rd	E Swann Ave	2	
	E Swann Ave	E Custis Ave	4	
	E Custis Ave	E Bellefonte Ave	2	
	E Monroe Ave	1 <sup>st</sup> St	7	
1 <sup>st</sup> St	N Henry St (Rt 1)	Braddock Road Metrorail Station	2	
<b>Northbound</b>				
1 <sup>st</sup> St	Braddock Road Metrorail Station	N. Henry St (Rt 1)	7	
N Patrick St (Rt 1)	1 <sup>st</sup> St	E Monroe Ave	2	
Crystal Dr	Potomac Ave	26 <sup>th</sup> St S	1	bike share station
	26 <sup>th</sup> St S	23 <sup>rd</sup> St S	5	bike share station
	23 <sup>rd</sup> St S	20 <sup>th</sup> St S	9	bike share station; slugging activity
	20 <sup>th</sup> St S	18 <sup>th</sup> St S	2	bike share station
	18 <sup>th</sup> St S	15 <sup>th</sup> St S	7	slugging activity; entrance to VRE station

\*Transitway located in the median of Jefferson Davis Hwy and will not interfere with infrastructure elements along Rt 1.

Figure 1-4A: Existing Transportation Uses – Arlington



Figure 1-4B: Existing Transportation Uses – Alexandria



## 2.0 Transit Service and Operations Plans

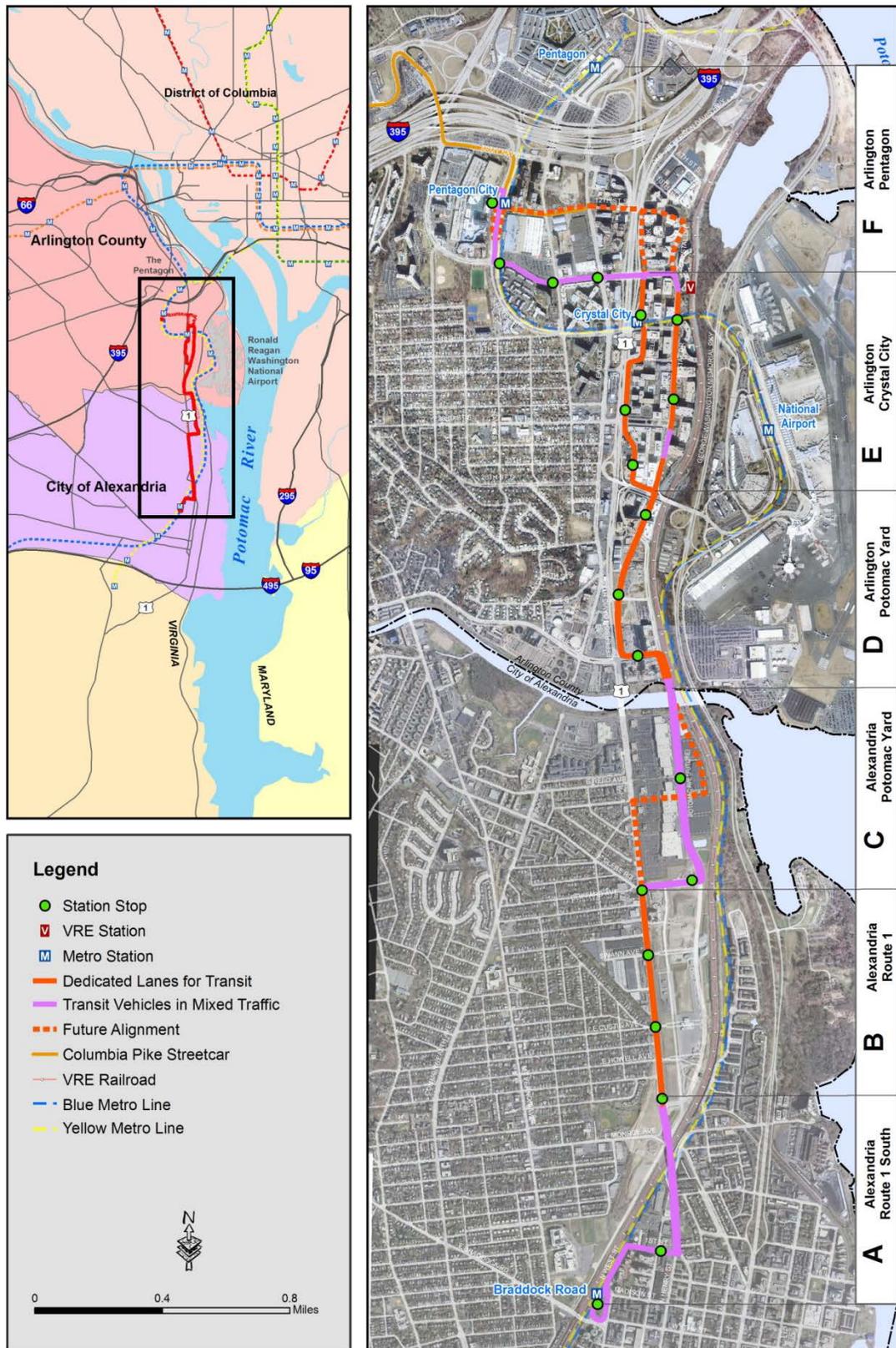
### 2.1 Introduction

The opening of the Crystal City Potomac Yard (CCPY) Transitway, in sections, in 2013 and 2014 will provide the opportunity to implement new premium transit services in the corridor. This new premium service will take advantage of the dedicated transit right-of-way (ROW) resulting from the transitway in order to separate bus service from traffic congestion and delays on the existing street network. Implementation of this new premium transit service will require action on a large number of implementation items ranging from a policy on what types of vehicles will have access to the transitway to the type of marketing campaign that will be used to publicize the new services. The purpose of this Operations Plan is to provide background and recommendations on three key implementation items. These items are:

- 1) The new premium service operating plan, including routes, service frequency by time of day, and proposed hours and days of service;
- 2) The policy on which users of the current street network will have access to the transitway; and
- 3) Premium service management and supervision.

Currently, Arlington County and the City of Alexandria, in cooperation with the Washington Metropolitan Area Transit Authority (WMATA), are in the process of completing design for the CCPY Transitway. The transitway would be owned, funded, managed and maintained by Arlington County and the City of Alexandria. The transitway would run between the Braddock Road Metrorail Station in Alexandria to the Crystal City Metrorail Station in Arlington (ultimately Arlington County would like to extend the transitway to Pentagon City). Although the transitway is contiguous, different sections have different design characteristics. To adequately address these different characteristics and to facilitate environmental documentation requirements the corridor has been divided into sections based on these design characteristics. This division of the transitway continues to be utilized in this service implementation stage of project development. The transitway sections are shown in **Figure 2-1**. Sections A, B and C lie in the City of Alexandria, and Sections D and E lie in Arlington County. As noted, the transitway configuration varies by section. These different configurations will, in turn, impact transit operations in each section. A summary of the characteristics of each section are outlined below.

Figure 2-1: Crystal City Potomac Yard Transitway Sections



Section A – this section will run between the Braddock Road Metrorail Station and the point where the new Potomac Avenue through North Potomac Yards enters US Route 1. Buses, including the new premium transit service, will run in mixed traffic in this section.

Section B – this section will run in the median of US Route 1 between Potomac Avenue and East Glebe Road and will be fully dedicated to transit service, with no other vehicles except emergency vehicles, having access to this portion of the transitway 24 hours a day.

Section C – this section will run through North Potomac Yard, leaving US Route 1 in the vicinity of East Glebe Road and running through the existing shopping center and then into Arlington via Potomac Avenue. Transit will run in mixed traffic in this section when the Alexandria portion of the transitway opens in 2013, though it is planned that this section will ultimately have a exclusive ROW transitway, fully separated from other traffic, once North Potomac Yard is fully developed.

Section D – this section comprises the southernmost portion of the transitway in Arlington between South Glebe Road and 26<sup>th</sup> Street South. The transitway will be fully separated from other traffic and will be fully dedicated to transit vehicles, with no other vehicles except emergency vehicles, having access to the transitway 24 hours a day.

Section E – this section comprises the northern half of the Arlington portion of the transitway between 26<sup>th</sup> Street South and 15<sup>th</sup> Street South, and would consist of a dedicated transit lane that will not be physically separated from general traffic lanes. In this instance, these lanes would be clearly marked to make it clear that these are transit only lanes and a strict enforcement effort will be implemented to ensure these lanes are used by transit vehicles only during peak hours (more detail is provided in the Access Policy section of this document).

Section F – this section will connect the transitway to Pentagon City. In the opening years, the premium service will run in mixed traffic along 15<sup>th</sup> Street South and South Hayes Street. Ultimately, the dedicated lanes will be extended north from 15<sup>th</sup> Street South to 12<sup>th</sup> Street South and transit will run in dedicated lanes along the a newly constructed 12<sup>th</sup> Street South to the Pentagon City Metrorail Station.

## **2.2 Transit Service Plan**

The paragraphs below provide a description of the new “premium” corridor bus service plan proposed to take advantage of the CCPY Transitway. The new “premium service” will provide high-capacity and high-quality bus transit service by operating two routes—the 9S and new 9X services--along the CCPY Transitway alignment. The “premium service” will operate at high-frequency during peak hours, will serve a consolidated number of enhanced transitway stops, and will have a unique Bus Rapid Transit (BRT) style branding scheme different from regular Metrobus routes.

The elements of the service plan include existing service, some of which is proposed to be modified and some which is proposed to remain in its current form, as well as new service. Specifically, the proposed transit service plan assumes that existing routings, service frequencies and hours of service will be maintained for Metrobus routes 9A, 10A, B, E, 16H, 23A, C and Arlington Transit (ART) and Alexandria Transit (DASH) bus routes.

The major modifications in the services are listed below:

- The current 9S service will be extended to the Potomac Yard Shopping Center from its current terminal in the Arlington portion of Potomac Yard. The hours of service of the existing Metrobus route 9S will be extended and service will run on weekends after the transitway opens. This modification will occur after the Arlington portion of the transitway opens (scheduled for 2013). See **Table 2-1**.
- A new “9X” premium service extending along the entire length of the corridor between the Braddock Road Metrorail Station and the Crystal City Metrorail Station would be implemented after the opening of the Alexandria portion of the transitway (scheduled for late 2013), see **Figure 2-2**. The proposed service plan is summarized in **Table 2-1**.
- The 9E will continue to provide service between Braddock Road Metrorail station and Pentagon Metrorail station but it will be rerouted to run along the transitway from East Glebe Road to 15<sup>th</sup> Street South. See **Table 2-1**.

All existing bus routes in the project area were evaluated for potential rerouting onto the transitway alignment. The evaluation considered the opportunity provided by the transitway for efficient transit travel along the corridor, while maintaining a system of interconnected routes that serve corridor neighborhoods and destinations. The rationale for proposed rerouting or maintaining existing routing for each route evaluated are outlined below and summarized in **Table 2-1**.

- 9A: No change to existing routing. This route serves a unique market along Jefferson Davis Highway and through South Eads Street in Crystal City. The route will utilize exclusive transitway lanes and transitway stops along Jefferson Davis Highway between Potomac Avenue and East Glebe Road.
- 9E: Reroute 9E along the transitway from East Glebe Road to 15<sup>th</sup> St South. 9E currently runs between the Pentagon and Braddock Road Metrorail Stations during the peak period only, in the off-peak direction (AM Peak – Southbound; PM Peak – Northbound). 9E is currently underutilized and the rerouting will enhance transitway service during the peak period, in the off-peak direction (including stronger transitway connections to the Pentagon). The route will also utilize exclusive transitway lanes and transitway stops along Jefferson Davis Highway between the future Potomac Avenue and East Glebe Road.
- 10A, B, E: No change to existing routing. The route serves a unique market along Mount Vernon Avenue and through South Eads Street in Crystal City.
- 16H: No change to existing routing. The route serves a different market than the CCPY corridor. The route will utilize dedicated transitway lane and transitway stop near the Crystal City Metrorail station entrance along South Bell Street between 15<sup>th</sup> St South and 18<sup>th</sup> St South.
- 23A, C: No change to existing routing. These routes serve a different market than the CCPY corridor. The routes will utilize dedicated transitway lanes and transitway stops in Crystal City along Crystal Drive and South Bell/South Clark Streets between 23<sup>rd</sup> Street South and 15<sup>th</sup> Street South.
- DASH Routes AT2, AT3, AT4, AT5: No change to existing routing. These routes serve a different market than the CCPY corridor. Routes will connect to the transitway at the Braddock Road Metrorail Station.

- DASH AT10: No change to existing routing. AT10 will continue to make stops at the front of the Potomac Yard Shopping Center. The curb lane in front of the shopping center offers the opportunity for drivers to drop passengers off at the shopping center entrances and layover at the end of their route. In the future, DASH may provide a stop location for AT10 along the proposed transitway to better connect users to the premium services.
- ART Routes 42, 84, 87: No change to existing routing. These routes serve a different market than the CCPY corridor. Routes will connect passengers to the Crystal City-Potomac Yard corridor at Pentagon City.

**Table 2-1: Summary of Proposed Transit Service Plan**

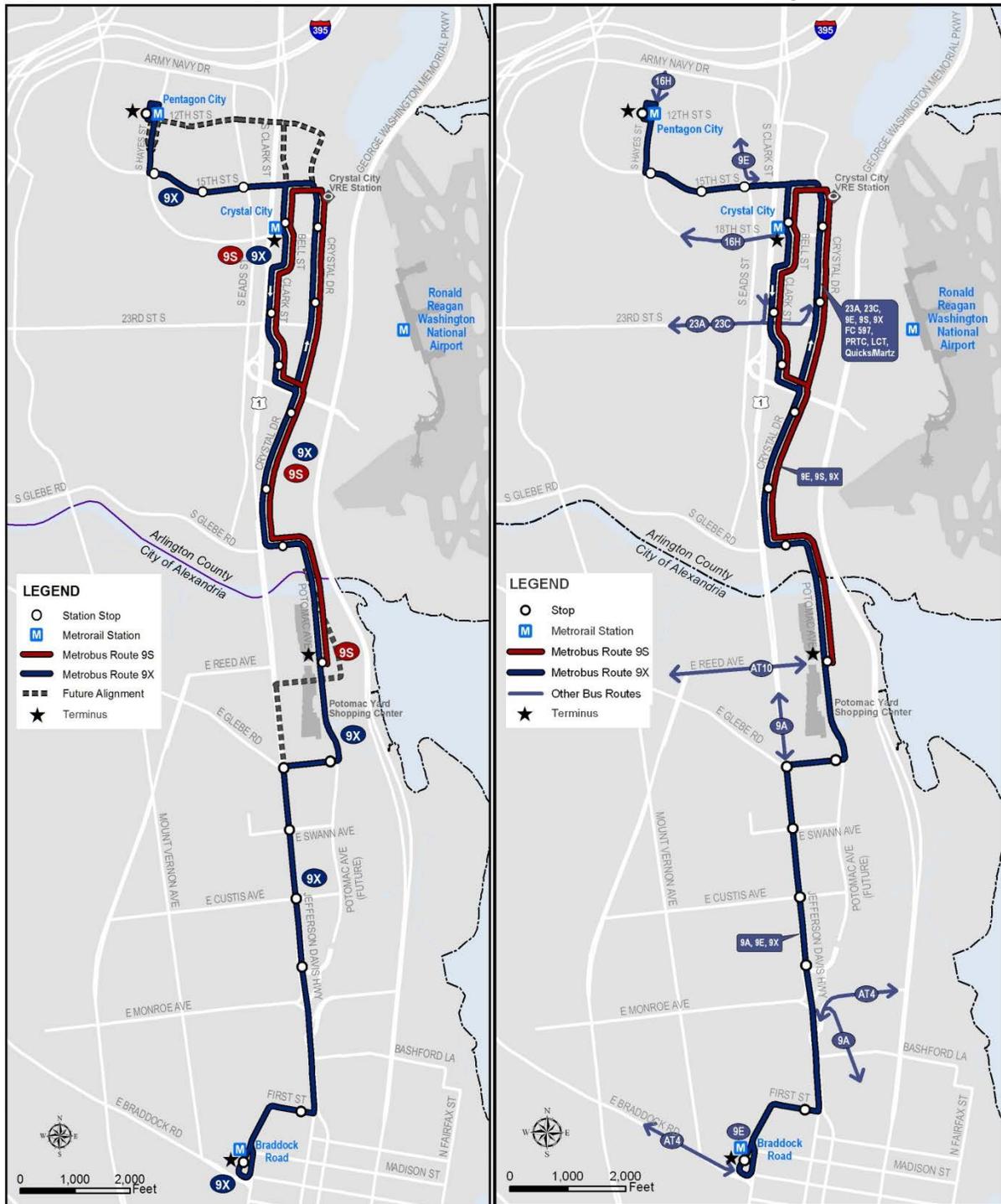
Route Name	Routing in Project Area	Hours of Service		Existing and Proposed Peak/Off-Peak Service Frequencies*	Number of Existing/ Proposed Transitway Stops Served	Proposed Rerouting
		Current	Proposed			
<b>Metrobus Local Routes</b>						
9X	Braddock Road Metrorail Station to the Crystal City Metrorail Station, via Crystal City Potomac Yard Transitway with planned extension to Pentagon City	None	Weekday - 5:30AM to 1:00AM; Sat - 6:30AM to 1:00AM; Sun - 7:30AM to 11:30PM	Weekday Peak - 12 minutes, Weekday Off-Peak - 15 minutes; Weekend - 20 minutes all day Saturday and Sunday	0/16	Proposed new service
9S	Current service: Shuttle loop within Crystal City and Arlington portion of Potomac Yard, via Bell, Clark, Crystal Drive, and Potomac Avenue	5:45AM to 7:45PM; no service on weekends	Weekday - 5:30AM to 1:00AM; Sat - 6:30AM to 1:00AM; Sun - 7:30AM to 11:30PM	Weekday Peak - 6 minutes, Weekday Off-Peak - 15 minutes; Weekend - 20 minutes all day Saturday and Sunday	15 / 9	Extend to Potomac Yard Shopping Center from current terminal
9A	Current service: US Route 1 in Alexandria and Arlington from Slaters Lane to Eads Street	Weekdays 4:30AM to 1:30AM; Sat – 5:30AM to 1:30AM; Sun – 5:00AM – 1:00AM	Same as existing	Weekday Peak - 30 minutes, Weekday off-peak 30 minutes; Saturday all day - 30 minutes Sunday All Day - 40 minutes  No change from current	8** / 14	No change from current routing
9E	Current service: Braddock Road to Pentagon Station, peak period, reverse direction only; no service on weekends	Weekdays 6:30AM to 8:00AM & 4:15PM to 6:30PM	Same as existing	5 trips in the AM peak period, 6 trips in the PM peak period  No change from current	9** / 16	Reroute 9E along transitway from East Glebe Road to 15 <sup>th</sup> Street South

Route Name	Routing in Project Area	Hours of Service		Existing and Proposed Peak/Off-Peak Service Frequencies*	Number of Existing/ Proposed Transitway Stops Served	Proposed Rerouting
		Current	Proposed			
10A, B, E	Current service: Braddock Road Station to Mount Vernon Avenue to 23 <sup>rd</sup> Street to Eads to Pentagon	Weekdays 5:00AM to 1:00AM; Sat - 5:30AM to 1:00AM; Sun – 5:30AM to 12:00AM	Same as existing	12 minutes peak, 30 minutes off-peak; 30 minutes on Saturdays; 60 minutes on Sundays	1 / 1	No change from current routing
16H	Current service: Columbia Pike to Crystal City – Fern Street to 15 <sup>th</sup> to Bell to 18 <sup>th</sup> to Hayes	Peak Period, Peak Direction	Same as existing	20 minutes	2 / 1	No change from current routing
23A, C	Current service: 23 <sup>rd</sup> Street to Crystal Drive, Crystal City Metrorail Station, Bell Street, and Clark Street	Weekdays - 5:30 AM to 12:00 AM; Sat – 6:00 AM to 12:00 AM; Sun – 5:30 AM to 10:30 PM	Same as existing	30 minutes, 30 minutes	8 / 4	No change from current routing
<b>Alexandria Transit (DASH)</b>						
AT 2	Current service: Lincolnia to Braddock Road via Seminary Road, King Street, Fairfax and Madison. Terminates at Braddock Road Metrorail Station	5:45 AM to 10:15 PM	Same as existing	20 min peak 30 min off-peak	1 / 1	No change from current routing
AT 3	Current service: Hunting Towers to Pentagon via Old Town. Service stops at Braddock Road Metrorail Station	6:30 AM to 9:30 PM	Same as existing	20 min peak 60 min off-peak	1 / 1	No change from current routing
AT 4	Current service: Old Town to Pentagon via I-395. Service stops at Braddock Road Metrorail Station	5:45 AM to 8:00 PM	Same as existing	20 min peak 60 min off-peak	3 / 2	No change from current routing
AT 5	Current service: Landmark to Braddock Road Metrorail Station, via Van Dorn, King Street, Fairfax and Madison. Terminates at Braddock Road Metrorail Station.	5:15 AM to 11:15 PM	Same as existing	20 min peak 30 min off-peak	1 / 1	No change from current routing
AT 10	Current service: King Street Metrorail Station to Potomac Yard via Mount Vernon	6:30 AM to 7:00 PM	Same as existing	30 minutes, weekdays and Saturdays; 60 minutes Sundays	1 / 1	No change from current routing

Route Name	Routing in Project Area	Hours of Service		Existing and Proposed Peak/Off-Peak Service Frequencies*	Number of Existing/ Proposed Transitway Stops Served	Proposed Rerouting
		Current	Proposed			
<b>Long Haul Express Services ***</b>						
PRTC	Current service: From Lake Ridge and Dale City - AM - Enters Crystal City from Pentagon via Eads to 12 <sup>th</sup> Street to Bell/Clark to 27 <sup>th</sup> to Crystal Drive to 12 <sup>th</sup> and Old Jefferson Davis Hwy. PM – Leaves from Clark and 20 <sup>th</sup> to Crystal Drive to 20th to Eads to Pentagon	Peak Period, Peak Direction	Same as existing	4 trips per hour – each service	8 / 5	No change from current routing
Loudoun County Transit (LCT)	Current service: From Leesburg, Purcellville, Dulles North, Dulles South - AM – enters Crystal City at 23 <sup>rd</sup> Street from US 1 – to Crystal Drive to 15 <sup>th</sup> Street and then leaves via Eads Street. Follows same routing in the afternoon	Peak Period, Peak Direction (2 mid-day trips)	Same as existing	11 trips in peak period	1 / 2	No change from current routing
Quick's	Current service: From Spotsylvania County – AM – Enters Crystal City at 12 <sup>th</sup> Street – Southbound on Clark/Bell to 27 <sup>th</sup> to Crystal Drive to 12 <sup>th</sup> Street. PM – Same routing	Peak Period, Peak Direction	Same as existing	4 trips in peak period	7 / 6	No change from current routing
MARTZ	Current service: From Spotsylvania County – AM – Enter on Clark, cross on 27 <sup>th</sup> and north on Crystal Drive. PM – Start at 27 <sup>th</sup> and Crystal Drive – Northbound on Crystal Drive	Peak Period, Peak Direction	Same as existing	1 trip in each peak period	4 / 6	No change from current routing
Fairfax Connector FXC 597	Current service: From Reston – Both AM and PM time periods – enters Crystal City, from Eads, on 23 <sup>rd</sup> Street, to Clark Street, to 27 <sup>th</sup> Street to Crystal Drive to 15 <sup>th</sup> Street (AM trips terminate at Crystal City Metrorail Station)	Peak Period, Peak Direction	Same as existing	2 trips per hour	4 / 4	No change from current routing

Notes: \* See **Appendix B** for detailed arrival times and dwell times.  
 \*\* Only stops specifically on the transitway are included.  
 \*\*\* Subject to access policy recommendation.

Figure 2-2: Transitway Premium Service (left) and other services (right)



### 2.2.1 Stop Locations and Amenities

A key element of the service plan will be the location of the stops along the transitway as well as stop characteristics. All existing bus stops along the transitway will be consolidated into a smaller number of transitway stops at the locations outlined below. All services along the transitway, including local services that remain unchanged after the transitway opens, will stop only at the consolidated transitway stops. **Figure 2-5** shows the existing and consolidated transitway stops. It should be noted that with the exception of the proposed 9X, which will run the entire length of the transitway, bus services will utilize only a portion of the transitway. For instance, the 9A, which currently runs on US Route 1, will utilize the portion of the transitway along US Route 1 in Alexandria but will continue in mixed traffic after the dedicated transitway on US Route 1 ends.

All of the proposed transitway stops will provide near-level boarding and will include Intelligent Transportation Systems (ITS) components that will display real-time transit arrival information for services provided by WMATA, ART and DASH; and enhanced passenger amenities including distinctive shelters, benches, and expanded passenger information such as route maps and schedules. The City of Alexandria, Arlington County, and WMATA will coordinate real-time transit information display through the stop design process to ensure that displays are implemented concurrent with opening of transitway sections. The proposed transitway stops are as follows:

#### City of Alexandria

Braddock Road Metrorail Station  
1<sup>st</sup> Street & N. Fayette Street  
US Route 1 & Potomac Avenue  
US Route 1 & E. Custis Avenue  
US Route 1 & E. Swann Avenue  
US Route 1 & E. Hume Avenue  
E. Glebe Road & Potomac Avenue  
E. Reed Avenue, in Potomac Yard  
Shopping Center

#### Arlington County

S. Glebe Road & S. Ball Street  
Crystal Drive & 33<sup>rd</sup> Street South  
Crystal Drive & Potomac Avenue (EPA)  
Crystal Drive, north of 23<sup>rd</sup> Street South  
Crystal Drive & 18<sup>th</sup> Street South  
Crystal City Metrorail Station  
S. Clark & 23<sup>rd</sup> Street South  
S. Clark & 26<sup>th</sup> Street South

Passenger boarding areas in the fully dedicated portion of the transitway in the City of Alexandria would be located along the landscaped median of US Route 1, which would also provide pedestrian refuge areas at street crossings. Stops would include specially designed shelters and real-time passenger information. **Figure 2-3** below shows a three-dimensional rendering of a planned stop along US Route 1.

The stops along the exclusive transitway in the Arlington County portion of Potomac Yard will have covered boarding areas designed to complement adjacent buildings. Stops along the dedicated transit lanes in Crystal City would include specially designed shelters and real-time passenger information. **Figure 2-4** shows a rendering of a planned stop in Crystal City.

**Figure 2-3: Rendering of Proposed Transitway Stop in Median of US Route 1 (Alexandria)**



**Figure 2-4: Rendering of Proposed Transitway Stop in Crystal City (Arlington)**

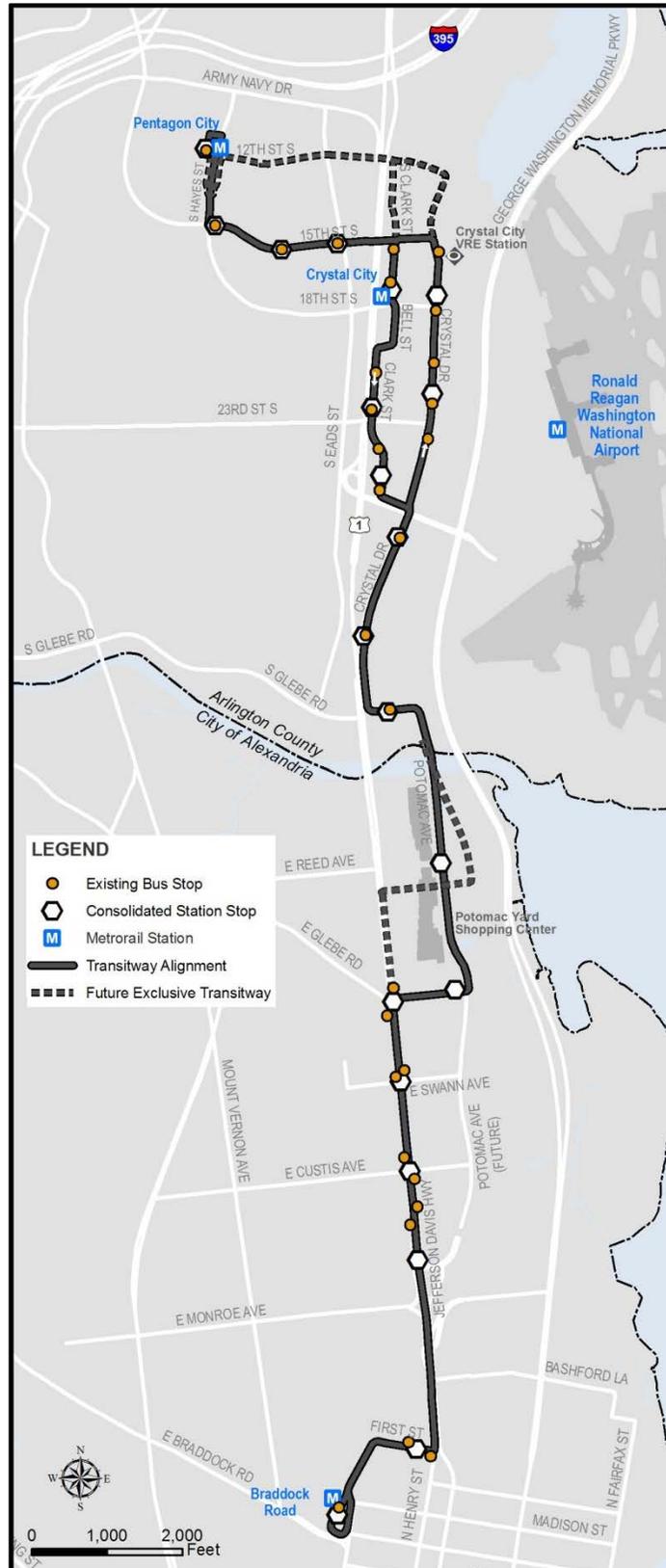


### **2.2.2 Transit Center Facility**

Within the current Crystal City Master Plan, a multimodal transportation center is recommended to be located in the northwest quadrant of the Clark/Bell Street/18th Street intersection. The intent is that this facility would be integrated with development and would directly connect to the Metrorail Station and bring together local, regional, and commuter bus services, the transitway, and other publicly accessible transportation services. This transit center would also accommodate facilities to serve commuting cyclists and also provide opportunities for commuter-oriented retail and services.

The transit center facility will not be complete and available for use at the time of the opening of the transitway in 2013 but will become available at a later date. Depending on the final access policy and decisions regarding where non-WMATA, ART, and DASH services would stop in Crystal City, a temporary facility along 18<sup>th</sup> Street may be developed to handle services such as employer shuttles that would be displaced from the transitway, and as a layover location for long-haul buses.

Figure 2-5: Existing and Consolidated Transitway Stops



### 2.2.3 Transit Vehicles

There are two options for the types of transit vehicles that can be deployed on the two transitway premium services (9S and 9X). The premium services may function as either:

- 1) Part of WMATA Priority Corridor Network (PCN); with existing Metrobus vehicles using the PCN branded Metrobus livery; or
- 2) BRT-style branded service, with the brand specifically unique to the CCPY Transitway corridor.

#### Priority Corridor Network (PCN)

Bus services on the WMATA PCN are branded as Metrobus Express service. Using existing Metrobus vehicles, the PCN branding is incorporated into the bus vehicle livery, timetables, and bus stop flags (see **Figure 2-6**). Current Metrobus vehicles are predominantly 40-foot, low-floor, compressed natural gas (CNG) buses. According to Metrobus policy, boarding shall occur only through the front door but two doors are available for alighting passengers. These buses have a capacity of 39 seated passengers and 24 standees for a maximum capacity of 63 passengers. Metrobus buses have on-vehicle fare boxes that accept fare transactions in cash or by SmarTrip cards. Initially, the CCPY Transitway premium services (9S and 9X) could use Metrobus vehicles with PCN branding.

**Figure 2-6: Metrobus Express Livery**



#### Unique Branding

As stated above, the CCPY Transitway premium services could initially be branded as PCN Metrobus service and utilize existing WMATA vehicles. The other option is to develop and implement a unique brand for the transitway services at the opening of the transitway. Specially designed buses, with a unique livery and design, may be employed to identify the BRT-style premium service associated with the CCPY corridor. The vehicles would be accessible and environmentally friendly like the current fleet of low-floor CNG buses. As demand increases, the feasibility of using articulated buses may be assessed. Unique branding of premium transit services in other cities, such as in Orlando, Florida and Cleveland, Ohio, have set these services apart from other transit services in the area (see **Figure 2-7**). Riders are able to easily identify the premium service and expect the higher quality service associated with the brand.

**Figure 2-7: Lymmo - Orlando, FL (left) and Healthline - Cleveland, OH (right)**



### **2.2.4 Fare Collection**

For the proposed premium transit service in the CCPY corridor, it is assumed that off-board fare collection would be implemented at some point during future operation, but would not be implemented at the time of the transitway opening. In the future, fare vending equipment that includes paper tickets and SmarTrip card updating would be located at most stops; fare validation units would be located at each transit stop and/or on transit vehicles. Fare inspection personnel would conduct routine and random checks of paper tickets and SmarTrip cards by means of handheld devices.

## **2.3 Transit & Traffic Operations**

There are several key analytical considerations that inform recommendations for the transit service plan and access policy. These considerations and the recommended approaches also influence the overall capital and operating costs of the transitway services. Cost estimates are summarized in Section 2.7 of this report.

### **2.3.1 Transitway Configuration**

The transitway project corridor extends approximately five miles from the Braddock Road Metrorail Station in the south to the Pentagon City Metrorail Station in the north. To facilitate analysis and documentation, the corridor is described in sections: A through F, as shown in **Figure 2-1**. The transitway configuration varies by section as shown in **Table 2-2**.

**Table 2-2: Transitway Configuration and Physical Features by Section**

Section	Limits	Configuration	Signal and Intersection Improvements	Example Graphic
A	Braddock Road Metrorail Station in the south to future Potomac Avenue in the north.	Transit vehicles operate in mixed traffic; typical section varies.		
B	Future Potomac Avenue to East Glebe Road.	Transit vehicles operate in exclusive median bus lanes along US Route 1.	<ul style="list-style-type: none"> <li>- Southbound queue jump at Potomac Avenue;</li> <li>- Northbound protected turn at East Glebe Road.</li> </ul>	
C	East Glebe Road through Potomac Yard to the City-County line (at Four Mile Run).	Interim condition: transit vehicles operate in mixed traffic. Future condition: transit vehicles operate in exclusive bus lanes along future street grid.		
D	Crystal Drive from the Arlington County line to 26 <sup>th</sup> Street.	Transit vehicles operate in exclusive transit only right-of-way in this section.	<ul style="list-style-type: none"> <li>- Transit only phase at Potomac Avenue and South Glebe Road</li> <li>- Transit only phase at 26<sup>th</sup> Street South and Crystal Drive</li> </ul>	
E	26 <sup>th</sup> Street to 15 <sup>th</sup> Street, along Crystal Drive northbound and Clark/Bell Streets southbound.	Transit vehicles operate in dedicated curbside lanes with enforced time limits.	<ul style="list-style-type: none"> <li>- Reconfigure Bell Street/18<sup>th</sup> Street intersection</li> <li>- Channelize lanes at Bell Street/20<sup>th</sup> Street intersection</li> </ul>	
F - Pentagon City Extension	From 15 <sup>th</sup> Street and Bell Street (via 12 <sup>th</sup> Street) to the Pentagon City Metrorail station.	Interim condition: transit vehicles operate in mixed traffic. Future condition: Transit operates in dedicated lanes with enforced time limits.		

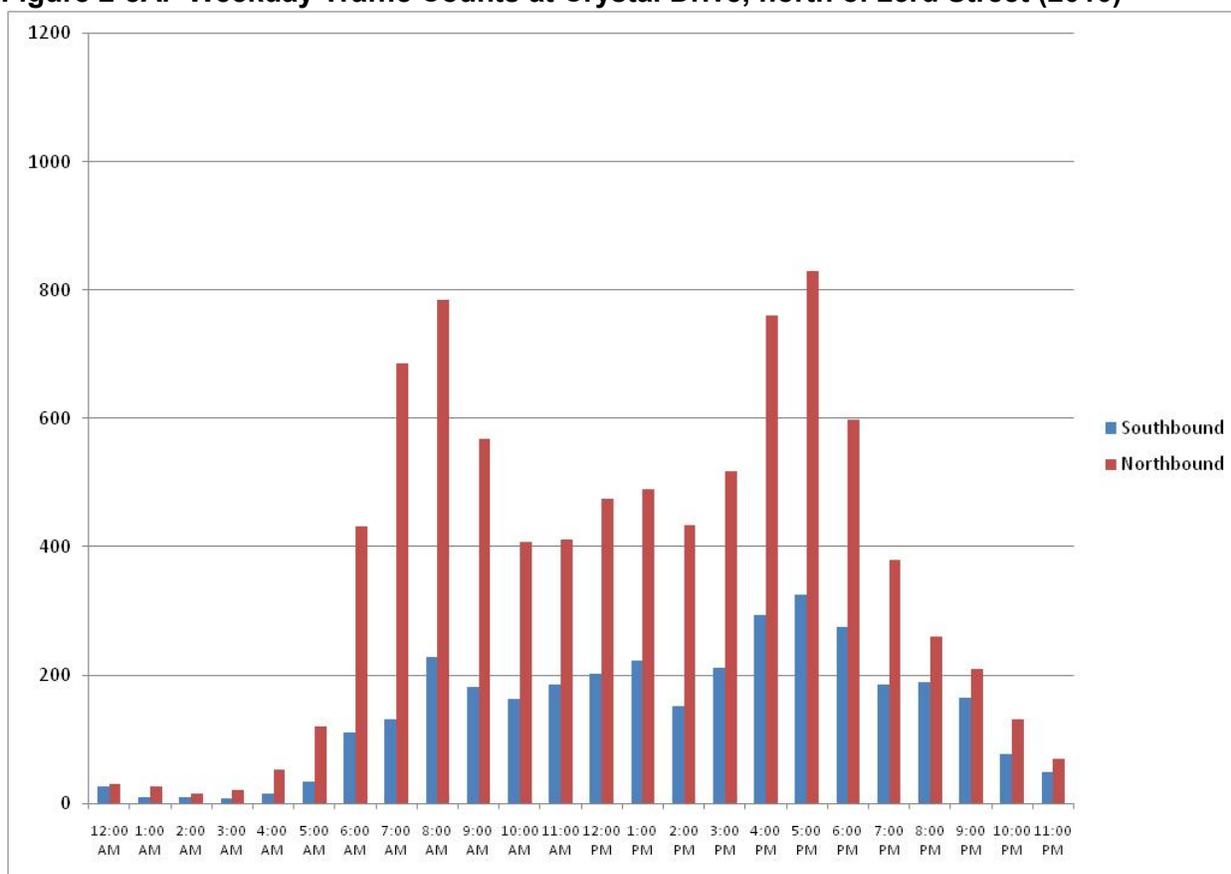
### 2.3.2 Traffic Analysis

The Documented Categorical Exclusion (DCE) updates for the Arlington (December 2010) and Alexandria (March 2011) portions of the CCPY transit corridor describe proposed physical changes to traffic patterns and identify predicted traffic levels of service after implementation of the transitway. Key issues along Arlington sections include predicted effects from converting curb lanes to dedicated lanes for transit.

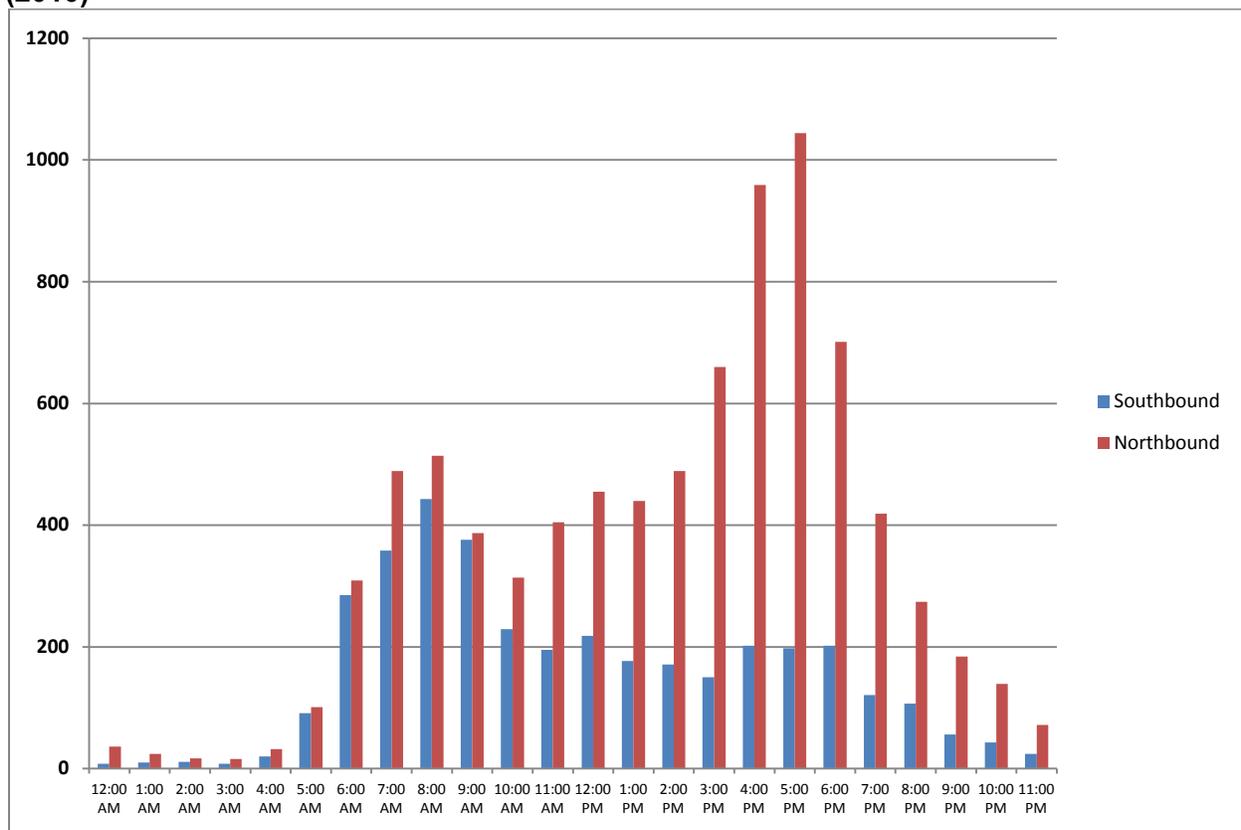
Key issues along the Alexandria transitway sections include transit priority treatments at intersections where transit service enters and exits the median transitway along US Route 1.

**Figure 2-8A** and **Figure 2-8B** below illustrate a typical distribution of general traffic volumes in the Crystal City portion of the corridor under current conditions. The a.m. peak traffic volumes are highest between 8:00 and 9:00 a.m., with high volumes extending from 7:00 a.m. to 10:00 a.m. In the p.m. peak, traffic volumes are highest between 4:00 and 6:00 p.m., with high volumes extending from 3:00 p.m. to 7:00 p.m.

**Figure 2-8A: Weekday Traffic Counts at Crystal Drive, north of 23rd Street (2010)**



**Figure 2-8B: Weekday Traffic Counts at Crystal Drive, south of VRE pedestrian signal (2010)**



### 2.3.3 Transit-Only Signal Phases and Signal Priority

Traffic studies associated with the DCEs assumed the use of transit-only signal phases at key intersections to minimize delays to transit operations. In general, traffic analysis to date has not assumed application of transit signal priority.

### 2.3.4 Transit Travel Time

The project team estimated transitway travel times using current bus schedules, field data, and traffic analysis findings from the DCE reports. Estimated transit travel times are summarized in **Table 2-3**.

**Table 2-3: Estimated Transit Travel Time (2013 Northbound, Proposed 9X Service)**

Section		Travel Time (minutes)			
		AM	PM	Midday	Weekend Midday
From	To				
Braddock Road Station	US Route 1/Reed Ave (Pot Yard)	10.3	11.5	12.6	11.5
US Route 1/Reed Ave	US Route 1/S Glebe Road	1.1	1.4	1.4	1.4
US Route 1/S Glebe Road	Crystal Dr/26th St	3.7	3.5	3.5	2.8
Crystal Dr/26th St	Bell St/15th St	3.6	5.1	4.3	4.1
Bell St/15th St	Pentagon City Station	2.9	4.1	3.4	3.2
Layover		-	-	-	-
<b>Total</b>		<b>21.6</b>	<b>25.6</b>	<b>25.3</b>	<b>23.0</b>

### 2.3.5 Ridership and Capacity Utilization

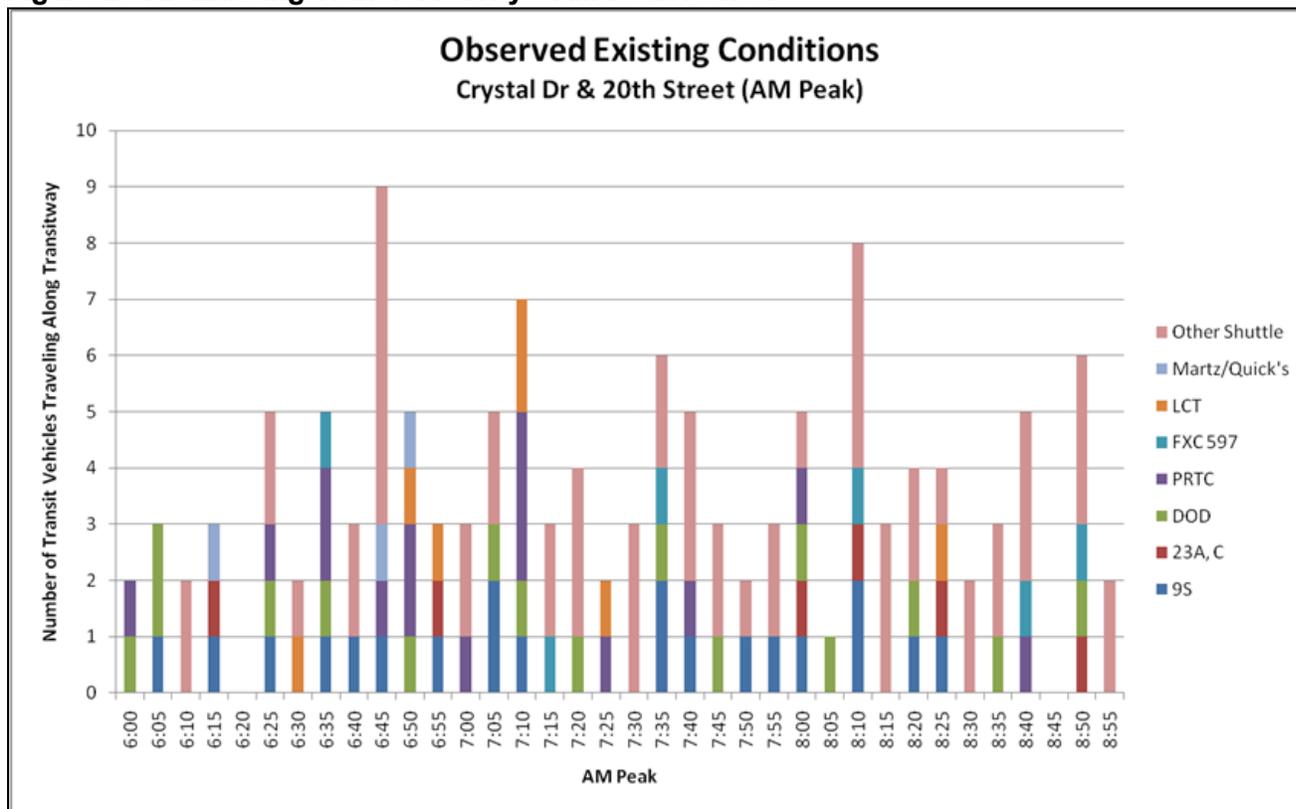
Analysis of current and opening year capacity utilization was completed as a general check of the proposed operating plan. This analysis also provides a basis for estimates of additional transit vehicles that may be required to provide the planned levels of service.

### 2.3.6 Transit Frequency and Dwell Time

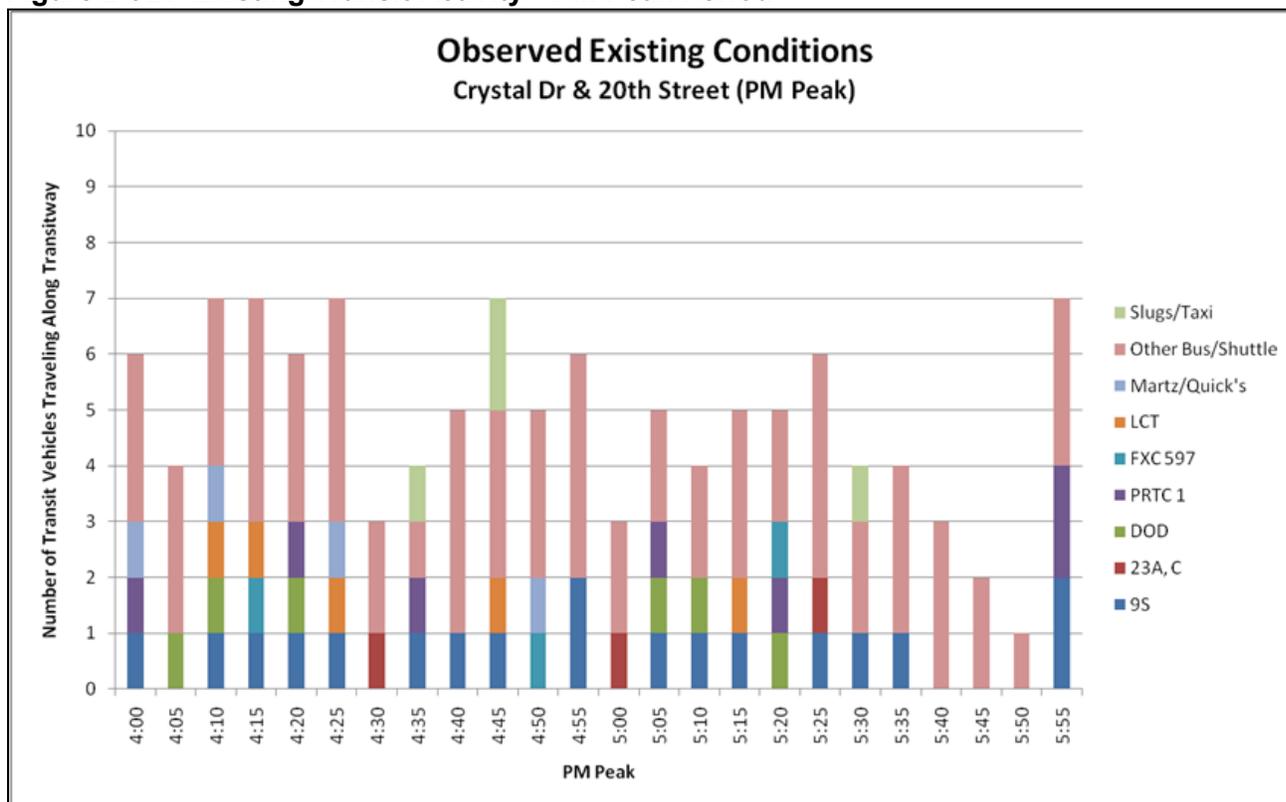
**Figures 2-9A** and **2-9B** depict existing transit volumes respectively for AM and PM peak periods along Crystal Drive – the location where highest volumes occur. **Figures 2-9C** and **2-9D** depict proposed future conditions for transit service volumes along Crystal Drive, assuming consolidated stops, implementation of the 9X, and associated boarding/alighting activity (AM and PM peak).

These figures show that transit service runs at a high combined frequency throughout the morning and evening peak periods, with approximately 45 buses per hour, including private shuttles. Peak transit activity is between 6:00 a.m. and 9:00 a.m., and between 4:00 and 7:00 p.m. Observations of transit activity identify many instances of long dwell times, schedule deviation, and bus bunching (refer to Chapter 1, Existing Conditions). For efficient functioning of proposed transitway service, transit providers must implement strategies to ensure schedule adherence and maintain travel times.

**Figure 2-9A: Existing Transit Activity—AM Peak Period**

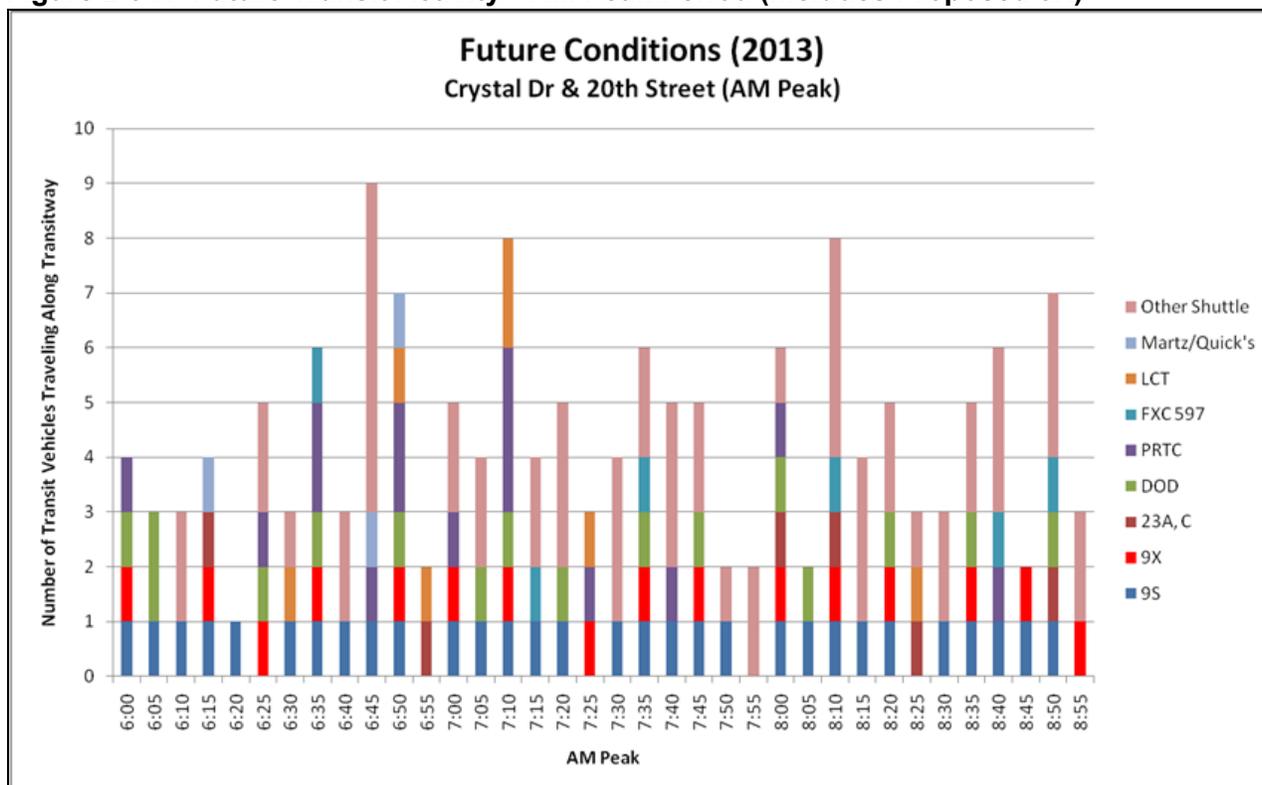


**Figure 2-9B: Existing Transit Activity—PM Peak Period\***

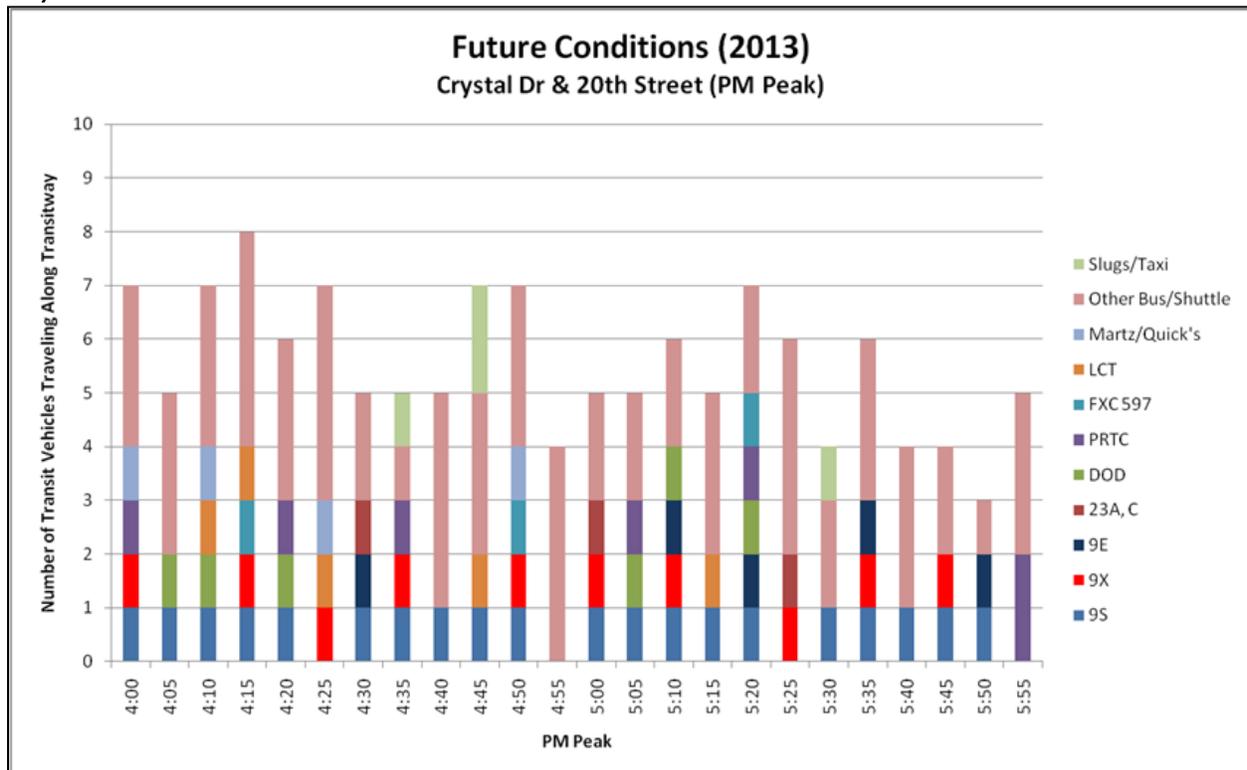


\*Field observations not available for 3:00 to 4:00 p.m.

**Figure 2-9C: Future Transit Activity—AM Peak Period (Includes Proposed 9X)**



**Figure 2-9D: Future Transit Activity—PM Peak Period (Includes Proposed 9X & Rerouted 9E)**



## 2.4 Access Policy

### 2.4.1 Purpose and Overview

The purpose of the transitway is to support high-capacity, high-quality and reliable bus transit service. The use of dedicated lanes/exclusive ROW will allow the premium transitway service to bypass traffic congestion and maintain consistent peak period headway separation, thus ensuring an attractive service for riders.

The purpose of a transit vehicle access policy is to designate which transit services, in addition to the premium service, will have access to the exclusive transitway. As detailed in **Table 2-4**, the recommended access policy differs according to the proposed transitway configuration in different sections of the corridor. In summary:

- The exclusive transitway along US Route 1 in Alexandria, in Arlington Potomac Yard, and in the future redeveloped Alexandria Potomac Yard will be for WMATA, ART, and DASH services only.
- The dedicated curb lanes on Crystal Drive and Clark and Bell Streets will be for WMATA, ART, and DASH services. Other public transit providers may also access the transitway, should they be willing to participate in service coordination and sign a Memorandum of Understanding (MOU) with Arlington County. Arlington County would reserve the right to change access policies should demand growth and transitway operations adversely impact the assigned priority services (WMATA, ART, and DASH).

**Table 2-4: Transitway Configuration and Access Policy by Section**

Section	Limits	Configuration	Access Policy
A	Braddock Road Metrorail Station in the south to future Potomac Avenue in the north.	Transit vehicles operate in mixed traffic; typical cross-section varies.	No restrictions. All vehicles allowed to use this section of the transitway all hours of the day and night
B	Future Potomac Avenue to East Glebe Road.	Transit vehicles operate in barrier-separated, exclusive median bus lanes along US Route 1.	Completely restricted at all times. Only certain permitted services and emergency vehicles will be allowed to use the transitway.
C	East Glebe Road through Potomac Yard to the City-County line (at Four Mile Run).	Interim condition: transit vehicles operate in mixed traffic. Future condition: transit vehicles operate in exclusive bus lanes along future street grid.	Interim - No restrictions. All vehicles allowed to use this section of the transitway all hours of the day and night. Future – Completely restricted at all times. Only certain permitted services and emergency vehicles will be allowed to use the transitway.
D	Crystal Drive from the Arlington County line to 26 <sup>th</sup> Street.	Transit operates in barrier-separated, exclusive transit only right-of-way in this section.	Completely restricted at all times. Only certain permitted services and emergency vehicles will be allowed to use the transitway.
E	26 <sup>th</sup> Street to 15 <sup>th</sup> Street, along Crystal Drive northbound and Clark/Bell Streets southbound.	Transit operates in dedicated curbside lanes with enforced time limits.	Time Restrictions. During peak hours (6:00 to 9:00 a.m. and 4:00 to 7:00 p.m.), only agreed-upon public transit services will have access to the transitway and stops. During off-peak hours and weekends, all vehicles allowed to use this section of the transitway.
F - Pentagon City Extension	From 15 <sup>th</sup> Street and Bell Street (via 12 <sup>th</sup> Street) to the Pentagon City Metrorail station.	Interim condition: mixed traffic Future condition: Transit operates in dedicated lanes with enforced time limits.	Interim condition: No restrictions. Future condition: Time Restrictions. During peak hours, only agreed-upon public transit services will have access to the transitway and stops. During off-peak hours and weekends, all vehicles allowed to use this section of the transitway.

**2.4.2 Crystal City Dedicated Lanes: Options Considered and Analytical Process**

There is a range of potential policy approaches for the dedicated curb-side lanes in Arlington. To initiate discussion among the project team and stakeholders, three conceptual access policy options were evaluated in earlier stages of the analysis. These alternatives were:

- 1) Curb-side transit lanes are exclusive for WMATA, ART, and DASH buses only; other transit users would not have access to the curbside transit lanes.
- 2) Semi-exclusive: all transit vehicles having access to the transitway, but only selected providers having access to transitway stops (other transit services would utilize separate stops that would not be consolidated into the transitway stops.
- 3) Open: the transitway and stops available for use by all public transportation providers, including private employer shuttles.

To evaluate these alternative policies, the project team conducted detailed operations analysis and held two rounds of public outreach and consultation, involving jurisdictions, transit service operators, the public, and other stakeholders in the corridor.

The recommended access policy relies upon the following:

- Technical analysis of transit and traffic operations;
- Consideration of future use of the curb-side dedicated lane for streetcar service; and
- Input from stakeholders and the public.

### **Technical Analysis – Section E Dedicated Curb Lane (Arlington)**

Analysis of transit and traffic operations (see Section 2.3 above) led to the recommendation for three hours of restriction in the a.m. peak and three hours of restriction in the p.m. peak period. The hours of restriction should be clearly signed along this section of the transitway.

To assess the capacity of the dedicated curb lane, the morning peak hour from 7:00 a.m. to 8:00 a.m. was divided into two-minute intervals, as depicted in **Figure 2-10**. This analysis resulted in 30 “slots” per hour. Each slot would accommodate one bus along the dedicated curb lane portion of the transitway. The time-slot analysis was performed to realistically assess the functioning of the proposed transitway with all scheduled WMATA, DASH and ART services and the other services that currently run along Crystal Drive (see **Appendix C**). Once the premium services were assigned slots, other public and private transit providers such as PRTC, Martz and Quick’s were added to the matrix. **Figure 2-10** shows the various transit services occupying each two-minute time slot. The completed time slot matrix shows that most of the existing and proposed transit services could be accommodated in the peak hour on the transitway, barring any emergencies or incidents. Actual scheduling of slots will be done based on 9S and 9X schedules and MOU process with other transit operators.

Given the planned headways of the premium 9S and 9X service, and given observed dwell times and schedule variability of other transit services, future operating plans and access policies would be developed around the framework of 30 two-minute time slots per hour. An MOU outlining transit operations in the transitway for service providers (to be developed by Arlington County and affected transit providers) will reflect the time slot framework, but will be subject to change as transit demand evolves over time.

### **Future Streetcar Service**

In the future, it is planned that the CCPY transitway premium service will ultimately be converted to streetcar service. High service frequency and resulting passenger capacity on the 9S and 9X service will function over time to build a strong transit ridership base in the corridor. Higher capacity streetcar is anticipated as the next major step in development of transit in the US Route 1 corridor. Once the streetcar is implemented, faster streetcar boarding time will make it increasingly important that other transit service is planned around the streetcar so that delays due to boarding or laying over buses may be reduced or eliminated.

#### **2.4.3 Stakeholder Input and Public Involvement**

Core stakeholders involved in the planning process were those persons or entities that have responsibility for the following areas within the project area: law enforcement, traffic management, emergency response, property management and land development, and transit operators currently operating in the proposed CCPY Transitway corridor in Arlington and Alexandria. The complete list of core stakeholders is in **Appendix D**. The project team conducted core stakeholder meetings on two occasions to discuss access policy and related issues; once in April and once in June. Public involvement meetings were also conducted twice during the project planning process, once in April and once in June. Information shared and input received from these meetings is summarized below:

**Figure 2-10: Example Transitway Usage: AM Peak, Consolidated Stop at 18<sup>th</sup> Street and Crystal Drive**

AM Peak	Future Service Plan	
	WMATA Services	Other Services
7:00	9S	
7:02	9X	
7:04		LCT
7:06	9S	
7:08		PRTC
7:10		Quick's
7:12	9S	
7:14	9X	
7:16		PRTC
7:18	9S	
7:20		LCT
7:22	23A, C	
7:24	9S	
7:26	9X	
7:28		FXC
7:30	9S	
7:32		LCT
7:34		PRTC
7:36	9S	
7:38	9X	
7:40		PRTC
7:42	9S	
7:44		
7:46		
7:48	9S	
7:50	9X	
7:52	23A, C	
7:54	9S	
7:56		FXC
7:58		PRTC
8:00	9S	

**Core Stakeholder Meeting on April 6, 2011**

The meeting included a brief presentation to provide background for the study. Discussion focused around two general areas: 1) potential traffic enforcement and emergency management issues; and 2) policy options for controlling access to the proposed transitway. Stakeholders emphasized the need to implement and maintain a transitway that attracts high transit ridership and reduces single-occupancy vehicle travel. There was an appreciation for the variety of transportation services that currently use public streets in Crystal City, including private shuttles.

Stakeholders acknowledged the need to minimize dwell times and layover activity in the proposed transit lanes. Long distance bus operators expressed a desire to continue their current service coverage in order to sustain their current high levels of ridership.

### **Core Stakeholder Meeting on June 21, 2011**

The second stakeholder coordination meeting focused on enforcement and transitway management issues, with a detailed discussion regarding vehicle delays, staging and layover concerns. Overall, the stakeholder group welcomed the discussion and communicated willingness to collaborate on implementation and ongoing refinement of transitway service. There are several enforcement and implementation issues that will be finalized as the project team continues its work and Arlington County takes initial steps in preparing a draft MOU.

### **Public Meeting #1, April 13, 2011**

The meeting began with an open house, where participants had the opportunity to view information presented on display boards and ask questions of project staff. The open house was followed by a presentation, a question and answer session, and break-out sessions where participants were asked to provide input on plans for transit operations and options for transitway access policy. The public had questions and concerns regarding the following issues:

- The anticipated timeframe for opening of Section C of the transitway.
- The anticipated timeframe for opening of Potomac Avenue.
- Support for the two-way conversion of Crystal Drive.
- Support for extension of bus service later into the evenings.
- Concern that long distance bus routes could crowd the transitway, delaying local service.

### **Public Meeting #2, June 27, 2011**

The meeting began with an open house, where participants had the opportunity to view information presented on display boards and ask questions of project staff. The open house was followed by a presentation and a question and answer session where project team members responded to participants' questions and concerns as summarized below.

- The current issues with bus bunching for 9S at Crystal City should be resolved.
- In response to a question about "slugging", Arlington County staff responded that although slug pick-up would not be permitted in the transitway, they could use side streets and other designated locations.
- The project team stated that 10A service will remain unchanged.
- There was concern that the suggested hours of transitway restriction in Crystal City (5:00 - 9:00 a.m. and 3:00 – 8:00p.m.) are greater than needed to support peak transit service.
- With regard to signage and branding of buses, WMATA staff stated that transitway stops would have signage showing premium service, in addition to maps and schedules. Premium service vehicles will have the "Metrobus Express" branding. Having a premium service fleet that is all alike helps WMATA to quickly provide replacement service.
- Attendees welcomed regular coordination meetings between government officials, stakeholders and transit agencies.
- WMATA has recently started a Facebook page and is also on Twitter to connect with and inform transit users.
- There are no plans for transitway restrictions during weekends.
- Tour buses would not be permitted to use the transitway during peak hours but could use side streets and other designated locations.

- The proposed “time slots” show two-minute intervals. However, most buses stop at a location for 15-25 seconds. Therefore a two-minute slot provides an internal flexibility or a cushion to avoid bus conflicts and bunching. Further, there would be supervisors to monitor the transitway.

#### **2.4.4 Section E - Crystal City Dedicated Lanes: Policy Approach**

Based on the research, analysis, and input from the public and stakeholders, the project team developed the following policy recommendation. The dedicated lanes on Crystal Drive and Clark and Bell Streets will be for WMATA, ART, and DASH services, plus other fixed route, scheduled operators who provide transportation services to the general public. Each long distance operator (i.e., PRTC, Fairfax Connector, Loudoun County, Martz, and Quick’s) would work with Arlington County to develop an MOU that would govern their operations along the transitway and use of transitway stops.

Within the MOU, service frequencies and berthing locations would be documented. The MOU would also require providers to seek input from Arlington and WMATA when they propose service changes that would impact the transitway. The MOU may be updated on an annual or semi-annual basis, and will include detailed schedules for transitway use.

The MOU would include terms and conditions for transitway usage. It would specify that use of the transitway is subject to participation in twice-yearly coordination meetings, where all parties (including Arlington County, the City of Alexandria, WMATA, and other regional transit providers) come together to discuss, update, and agree upon the access/service plan for the dedicated lanes. The discussion would also address corridor capacity, service frequencies, berthing schedules, excessive dwell times, schedule adherence issues, and notable ridership fluctuations. Subject to the anticipated MOU, WMATA supervisors would monitor service and operations along the transitway. The long-distance providers would respect the direction provided by WMATA supervisors to ensure smooth functioning of the transitway premium service.

As part of the access policy, Arlington, Alexandria, and WMATA would identify and refine operating strategies to reduce stop congestion, to keep vehicles utilizing the curbside lanes moving effectively, and achieve correct headway separation on the 9S and 9X. These strategies will affect long distance transit providers, private shuttle service, tour bus routing, bicycle access, and special event operations. In the event of unforeseen issues or concerns, Arlington County, the City of Alexandria and WMATA may require long-distance transit providers to attend additional meetings so that such issues can be resolved in a timely manner and premium service can be maintained. Other transit providers may access the transitway, should they be willing to participate in service coordination and sign the MOU with Arlington County. Arlington County reserves the right to change access policies should demand growth and transitway operations adversely impact the assigned priority services (WMATA, ART, and DASH).

#### **Long Distance Providers**

Even though buses can pass each other at the absence of physical barrier, the proposed operating strategies would reduce the sometimes extended dwell times of long distance providers at the consolidated stops or shift their arrival time at the most heavily used bus stops. Another key objective is to identify and reinforce off-transitway layover locations for long haul services that arrive before their scheduled times. Permitted transit vehicles would be able to access the transitway only during revenue service. At times such as start-up and layover

between scheduled trips, the transit vehicles would be required to be off the transitway, preferably at scheduled layover locations. Such strategies or conditions would be outlined in the proposed MOU and become part of the transitway access policy.

### **Private Shuttles**

Given the capacity of the transit lane and the need to ensure reliable operations private shuttles would not have access to the exclusive transitway in Potomac Yard or to the dedicated transit lanes in Crystal City during the periods of restriction. This policy would extend to employer shuttles, hotel and airport shuttles, and DOD shuttles. If the lanes were open to private shuttles, enforcement would be complex, particularly with respect to possible rules about vehicles operating in the transitway lanes but not using the transitway stops. A formal permitting system would be complex and could be considered unfair to newly created shuttle systems or programs. During the hours of transitway restriction, shuttles in Crystal City could be routed along east-west streets as well as the southbound lanes of Crystal Drive.

### **Tour Buses**

Techniques to limit tour bus use of the dedicated lanes to non-restricted times and restrict use of exclusive transitway at all times include clear and concise signage regarding restrictions, frequent communications with and among operators, and rigorous and proactive traffic enforcement.

### **Bicycle Access**

Arlington County and the Crystal City business community are actively promoting walking and cycling as means of travel. The Crystal City transit-dedicated curb lane will allow bicycle travel. However, bicycles will not be permitted to access the exclusive sections of the transitway in Arlington's Potomac Yard and on US Route 1 in Alexandria, at any time.

### **Special Events**

Special events—including parades, runs, and festivals—that close portions of the transitway corridor right-of-way would continue to be scheduled through existing coordination forums so that agency representatives can inform service providers of upcoming road closures and related service detours.

## **2.4.5 Future Access to Exclusive Transitway**

The portions of the transitway that are configured as exclusive right-of-way could accommodate additional transit in the form of regional or long distance services, should the providers choose to expand into Potomac Yard. Future access to exclusive transitway in Arlington County and the City of Alexandria would require transit providers to agree to all terms and conditions set forth in the MOU and would be subject to discussion as part of the proposed semi-annual meetings. Service plans, schedules, etc. would be agreed upon and made part of the MOU before implementation of service extensions or adjustments.

## **2.5 Transit Management and Supervision**

Premium bus services provided by WMATA operating along the transitway would require dedicated supervision working from both stationary and mobile locations to respond to issues along the line. This dedicated supervision is critical for maintaining correct headway separation and ensuring service reliability, both important elements of the high quality premium service envisioned for the transitway. These “street supervisors” would be WMATA employees and

would identify line operational issues including bus bunching, incidents/accidents, and disabled vehicles. Supervisors would be provided with the discretion and power to address these issues in the most appropriate manner. County and City staff have learned from other corridor studies that dedicated supervisors will have no official traffic enforcement authority, but can act as a deterrent to would-be violators. Arlington County and the City of Alexandria would accommodate the additional expense for these WMATA supervisors in their operating budgets.

Supervision would focus on the 9S and 9X services. It would involve proactive management of the two services, with a focus on reliable service and the correct time separation of buses. The focus of this management would be on ensuring that buses arrive at a stop according to the scheduled service frequency. This management approach may involve holding buses at the terminal point or mid-line in order to achieve the correct headway separation, and thus also resulting in even loads of passengers across buses. Without this approach, there is potential for buses to arrive close together, leaving large gaps after. This results in a poor utilization of resources, creates significant inconvenience for riders, and results in deterioration of the premium nature of the 9S and 9X services.

More detailed discussion of this topic is presented in Chapter 3, Implementation, which makes reference to WMATA street supervisor guidance documentation.

## 2.6 Enforcement

Appropriate enforcement of transitway restrictions will be important to ensuring the intended functionality of the transitway and maintaining the positive image of the CCPY corridor. Enforcement approaches have many ramifications, including effects on capital and operating costs.

**Figure 2-11: Enforcement officials help maintain transit and traffic operations**



Restrictions will need to be managed as well as enforced. WMATA “street supervisors” would collaborate with law enforcement personnel to maintain transit and traffic operations. Day-to-day issues for management and enforcement are summarized in **Table 2-5** and discussed in further detail below.

**Table 2-5: Enforcement Issues**

<b>Enforcement Issue</b>	<b>Key Considerations</b>
1. Parking	Restrictions enforced by regular parking enforcement personnel.
2. Bicycles	Allowed use of transitway may be emphasized by signage.
3. Motorcycles	General traffic restrictions apply.
4. Driveway access	Maintain existing driveways; some consolidation required to implement transitway stops.
5. Turning vehicles	Signage indicates where right turns are allowed from within curbside transit lanes.
6. Traffic accidents	Disabled vehicles typically moved to curb lanes—in the case of Crystal City, the transit lanes. Develop protocols for accident management.
7. Emergency operations	Emergency vehicles and personnel will need to use the transitway in the event of emergency operations.
8. Taxis	Maintain existing taxi stands at designated pull-out locations along transitway; create new stands as necessary.
9. Private Shuttles (Rental Car, Hotel, Employer)	Restricted from transitway during peak periods: coordinate preferred stop locations and off-peak usage of curb transit lanes.
10. Charter/Tour Buses	Restricted from transitway during peak periods: coordinate preferred layover locations.
11. Delivery Vehicles	Restricted from stopping in transit lanes at all times; emphasize alternative building access locations.
12. Slug Line Activity	Maintain existing designated slug location in north Crystal City; coordinate locations along east-west streets.

### 2.6.1 Traffic Circulation

The dedicated transit lanes will be clearly marked to identify where they can be entered for right turns, per the Manual on Uniform Traffic Control Devices (MUTCD). The lanes will also be marked with “Bus Only” pavement markings. The lane marking separating the transitway lane from the general purpose lanes may also receive a domed object marker to further dissuade unauthorized vehicles from using the lane.

### 2.6.2 Parking and Moving Violations

Parking along the transitway will be prohibited and enforced according to applicable regulations. While parking violations can be enforced by other personnel, moving violations require a police officer. State and County codes would allow the local police to issue tickets for transitway use violations similar to HOV violations. However, County code traffic violations are not “pre-payable” and lead to increased court expenses. The jurisdictions could impose higher fines for parking or moving violations in the transit lane. However, such a policy may require state authorization. County staff will continue to coordinate with law enforcement officials to develop guidance for parking and moving violations.<sup>1</sup>

### 2.6.3 Traffic Accidents

When there is a traffic accident, disabled vehicles normally would be moved into the curb lane, which will be the bus lane, to resume normal traffic flow. There is a need for more information on what other cities do in traffic accident situations along transit-dedicated curb lanes. There is a need to write protocols for traffic accident management.

<sup>1</sup> According to Parking Enforcement & Restrictions from the City of Berkeley, “Fines for vehicles stopped at a bus zone are set by the State of California and begin at \$250.” Similar fines in New York City range from \$115 to \$150. A ticket for bus lane violation in Seattle is approximately \$124. The maximum fine for bus lane violation in Houston is \$200.

## 2.6.4 Emergency Operations

Emergency vehicles and personnel will need to use the transitway in the event of emergency operations. Protocols are already in place for dealing with sick passengers and other routine events.

## 2.6.5 Delivery Vehicles and Building Access

Delivery vehicles would be prohibited from stopping in transit lanes. This restriction will be applied throughout the day, given alternate means of building access throughout most of the corridor. The majority of service and loading functions will be accommodated on service driveways and interior alleys to avoid conflicts with transitway use. Enforcement of activity within the transitway would focus on restricted periods. As documented in the approved environmental studies, selected driveways and access points may be consolidated or relocated to allow for traffic movement and adequate transit stop locations.

## 2.6.6 Taxi and Slug Activity

The dedicated lanes along curbs will be marked: “No Stopping or Standing At Any Time.” This restriction is to prevent activities - such as deliveries, taxi pick up and drop off, and slug pick up - that could interrupt premium and other transit service. The existing slug line location north of 15<sup>th</sup> Street in Crystal City will be maintained for the first phase of transitway implementation. In general, slug lines would be encouraged along east-west streets in Crystal City and along the southbound lanes of Crystal Drive.

## 2.7 Cost Estimates

The cost estimates associated with the premium transit services include bus capital costs; costs for bus operations; costs for supervision; costs for enforcement; and the costs for the maintenance of the transitway facilities. These various costs are discussed in detail below.

### 2.7.1 Capital Costs

The capital costs associated with premium transit service along the transitway include purchase of transit vehicles. Capital costs for construction and commissioning of the transitway facility and stops are included in the construction project and are not included in this project.

In the opening year the transitway service will utilize regular 40-foot low floor buses running on compressed natural gas (CNG). However, in future the use of BRT-style branded hybrid buses with unique livery may be employed to emphasize the premium nature of the transitway service in the CCPY corridor. The capital cost estimates for these two scenarios – regular buses and BRT-style branded hybrid buses are summarized in **Table 2-6A** and **Table 2-6B** respectively.

The estimated cost of a 40-foot low-floor CNG bus is estimated at \$520,000. The number of buses required to provide the service is calculated in **Appendix E** and includes a spare ratio of twenty percent for regular buses (see **Table 2-6A**). Based on this estimate the capital cost for the proposed transitway service is estimated at \$2.6 million for 9S service and \$3.12 million for 9X service for a total cost of \$5.72 million if regular 40-foot CNG buses are used.

**Table 2-6A: Estimated Capital Costs, regular 40-foot CNG buses (2011 Dollars)**

Route	Regular Buses Required including 20% spare (see O&M plan in Appendix E)	Capital Cost (cost per bus = \$520,000)
9S	5	\$2,600,000
9X	6	\$3,120,000
<b>Total Capital Costs</b>		<b>\$5,720,000</b>

The cost of building the transitway is part of a separate project.

**Table 2-6B: Estimated Capital Costs, hybrid bus BRT-style branding & livery (2011 Dollars)**

Route	BRT-Style Branded/Liveried Buses Required with 40% spare	Capital Cost (cost per bus = \$650,000)
9S	6	\$3,900,000
9X	7	\$4,550,000
<b>Total Capital Costs</b>		<b>\$8,450,000</b>

The estimated cost of a hybrid bus with BRT-style branding and unique livery is estimated at \$650,000. A higher spare ratio of forty percent is required because this would be a unique fleet and therefore spares from the larger WMATA fleet at the assigned garage would not be available to cover circumstances such as breakdowns or a vehicle damaged in an accident. Based on this estimate the capital cost for the proposed transitway service is estimated at \$3.9 million for 9S service and \$4.55 million for 9X service for a total cost of \$8.45 million if branded and liveried special fleet buses are used see **Table 2-6B**.

## 2.7.2 Operations & Maintenance Costs

The operations and maintenance cost estimates include the cost of operating the buses for the premium transit services; the cost of transitway supervision; the cost of enforcement; and the cost of maintaining the transitway facilities and stops. These costs are summarized in **Table 2-7A** and described in detail in the following pages.

**Table 2-7A: Estimated Annual Operations & Maintenance Costs (2011 Dollars)**

Cost Type	Detail	Annual Cost
Bus Operating Costs	9S	\$2,466,036
	9X	\$4,282,949
Supervision Costs	9S	\$160,000
	9X	\$160,000
Enforcement Costs	Arlington	\$330,000
Maintenance Costs	Arlington	\$360,000
	Alexandria	\$304,500
<b>Total Annual Operations &amp; Maintenance Costs</b>		<b>\$8,063,485</b>

Bus Operating Costs - Bus operating cost estimates reflect the proposed transitway service for routes 9S and 9X. **Table 2-7B** is a summary of estimated bus operating costs for the proposed transitway service. A bus operating cost per hour estimate of \$140.83 as provided by WMATA was utilized for cost estimating purposes. The bus operating cost per hour includes the cost of current general street supervision but does not include the dedicated supervisors proposed for 9S and 9X service.

**Table 2-7B: Estimated Annual Bus Operating Costs for Proposed Transitway Services for 9S and 9X (2011 Dollars)**

Route	Weekday Platform Hours*	Saturday Platform Hours*	Sunday Platform Hours*	Annual Weekday Platform Hours, 250 weekdays	Annual Saturday Platform Hours, 57 Saturdays	Annual Sunday Platform Hours, 58 Sundays	Annual Total Platform Hours	Annual Operating Costs @ \$140.83 per platform hour
9S	61.6	19.61	17.12	15400	1117.77	992.96	17,511	\$2,466,036
9X	96.32	58.83	51.36	24080	3353.31	2978.88	30,412	\$4,282,949
<b>Total Annual Operating Costs</b>								<b>\$6,748,985</b>

Assumes 250 weekdays, 57 Saturdays and 58 Sundays

\*See Appendix E for platform hour calculations.

The total annual bus operating costs include the cost of basic supervision and are estimated at \$6,748,985. See **Appendix E** for details of the operations plan that includes details of transit operations, platform hour calculations and estimates for vehicle fleet sizes.

**Table 2-7C** shows the bus operating cost of the current 9S service. It is important to note that the annual bus operating cost of current 9S service at \$1,387,880 should be deducted from total annual bus operating costs of \$6,748,985 to arrive at incremental annual bus operating cost for the transitway service. The resulting net increase in combined bus operating costs for 9S and 9X service is \$5,361,105.

**Table 2-7C: Existing Annual Operating Costs for Route 9S (2011 Dollars)**

Route	Daily Platform Hours			Annual Platform Hours			Annual Operating Costs
	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday	
9S	39.42	0	0	9855	0	0	\$1,387,880
Assumes 250 weekdays, 57 Saturdays and 58 Sundays.							

**Supervision and Enforcement Costs** - The premium transitway service requires regular supervision to ensure reliability of the service, headway separation and schedule adherence. The transitway service would require two additional WMATA supervisor equivalents working a total of twelve hours per day to provide supervision throughout the weekday peak service period. (Each twelve hours of supervision is equivalent to 1.5 times a full-time employee working for eight hours or 1.5 full-time equivalent.) One full-time equivalent (FTE) is estimated at \$80,000 per year. One additional FTE will be required for supervision on weekends. Based on this estimate, the annual cost of transitway supervision is estimated at \$320,000, see **Table 2-7D**.

**Table 2-7D: Estimated Annual Supervision Costs for Proposed Transitway Services for 9S and 9X (2011 Dollars)**

Route	Transitway Supervisors	Full-Time Equivalent (FTE)	Costs
9S	1	1.5	\$120,000
9X	1	1.5	\$120,000
9S and 9X	1 (for weekends)	1	\$80,000
<b>Total Annual Supervision Costs</b>			<b>\$320,000</b>

In addition to supervision, the transitway would also require services to address the enforcement of transitway restriction hours and other issues such as parking and moving violations, and traffic incidents. This would require law enforcement personnel working throughout the service period and is equal to one FTE. Staffing would be the responsibility of

the appropriate jurisdiction. The enforcement costs would be additional only to the Arlington County dedicated lanes and not to other exclusive sections of the transitway. At times, vehicle towing services would be required to remove illegally parked vehicles or disabled vehicles following a traffic incident. Therefore enforcement services require a towing agency for the towing and impounding of vehicles. The towing contract would also take into account the cost of vehicle storage. The annual cost of transitway enforcement is estimated at \$230,000, see **Table 2-7E**.

**Table 2-7E: Estimated Annual Enforcement Costs for Proposed Transitway Services for 9S and 9X (2011 Dollars)**

Enforcement Personnel & Services	Full-Time Equivalent (FTE)	Costs
Number of Enforcement Personnel	1	\$80,000
Cost of Towing Contract (lump sum)*	N/A	\$250,000
<b>Total Annual Enforcement Costs</b>		<b>\$330,000</b>

\* To be recovered (in part) from fines levied on violators

**Maintenance Costs** - In addition to the supervision and enforcement, the transitway facility, stops, and shelters require maintenance including but not limited to sweeping, trash collection, snow removal, cleaning and graffiti removal etc. The cost of maintenance takes into account maintenance of the following:

- Guideway facility (including sections of non-exclusive transitway)
- Station stops
- Other amenities such as trash receptacles, bike lockers etc.

Maintenance activities would be the responsibility of the appropriate jurisdiction based on the transitway section – Arlington County and the City of Alexandria – and would be handled by the respective public works department. The annual cost of transitway maintenance for Arlington County is estimated at \$360,000; the City of Alexandria’s maintenance cost is estimated at \$304,500 per year, (see **Table 2-7F**).

**Table 2-7F: Estimated Annual Maintenance Costs for Proposed Transitway Facilities**

Maintenance Services	Unit	Unit Cost	Quantity	Costs
<b>Arlington County</b>				
Transit Guideway Maintenance (striping, sweeping, snow removal etc.)	per lane mile of exclusive guideway	\$15,000	4.7	\$70,500
Stops - Trash Removal (daily)	per day	\$300	365	\$109,500
Stops - Pressure Cleaning (monthly)	per stop	\$2,000	18	\$36,000
Stops - Painting, Repair (annual)	per stop	\$3,000	18	\$54,000
Stops – Snow Removal (annual)	per stop	\$5,000	18	\$90,000
<b>Arlington County Annual Maintenance Costs</b>				<b>\$360,000</b>
<b>City of Alexandria</b>				
Transit Guideway Maintenance (striping, sweeping, snow removal etc.)	per lane mile of exclusive guideway	\$15,000	3.0	\$45,000
Stops - Trash Removal (twice weekly)	per day	\$300	365	\$109,500
Stops - Pressure Cleaning (monthly)	per stop	\$2,000	15	\$30,000
Stops - Painting, Repair (annual)	per stop	\$3,000	15	\$45,000
Stops – Snow Removal (annual)	per stop	\$5,000	15	\$75,000
<b>City of Alexandria Annual Maintenance Costs</b>				<b>\$304,500</b>

Source: City of Alexandria

**THIS PAGE INTENTIONALLY LEFT BLANK**

## 3.0 Implementation Plan

### 3.1 Introduction

The purpose of Chapter 3 – Implementation Plan is to outline an implementation plan for the opening of the Crystal City Potomac Yard transitway bus service. This implementation plan covers the full range of items that must be addressed as part of the service opening.

Identification of the items that must be addressed during the implementation of new and modified transitway bus services, and the action steps associated with each item, are based on recent WMATA experience with implementation of service restructuring along priority corridors in different parts of the Washington, DC area. Implementation of bus rapid transit (BRT) type service along the Crystal City Potomac Yard corridor presents unique opportunities and challenges, particularly related to the extensive portions of dedicated transitway, and integration of a range of bus services and providers. These challenges have been addressed in other recent BRT applications including the systems in Boston, MA; Cleveland, OH; Los Angeles, CA; Las Vegas, NV; Eugene, OR and York, Ontario. **Appendix F** summarized key features of these BRT applications. **Appendix G** is a checklist customized for implementation of transit service along the Crystal City-Potomac Yard Transitway.

### 3.2 Phasing of Improvements: Infrastructure and Service Changes

Initiation of transit service upgrades along the Crystal City-Potomac Yard Transitway depends upon completion of the physical transitway infrastructure being constructed in the corridor. This section details this interaction and lays out the main elements for implementation.

#### 3.2.1 Transit Service and Scheduling

The Crystal City-Potomac Yard Transitway would be owned, funded, managed and maintained by Arlington County and the City of Alexandria. The transitway service corridor extends between the Braddock Road Metrorail Station in Alexandria and the Crystal City Metrorail Station in Arlington, with some service connecting to Pentagon City. Although the transitway service corridor is contiguous, sections of the physical transitway will be opened in phases. The construction of Arlington and Alexandria portions of the transitway is scheduled to be complete in 2013. **Figure 3-1** illustrates the physical extent of the corridor and implementation timeframes.

The schedule for implementation of transit service corresponds with the schedule for opening the physical transitway sections. The two major steps of service implementation will be:

1. Extending the 9S service to the Potomac Yard Shopping Center in Alexandria in 2013-2014 (see **Figure 3-2**), and
2. Beginning the 9X service along the length of the Crystal City-Potomac Yard corridor in 2013-2014 (see **Figure 3-3**).

Figure 3-1: Map and Timeline for Implementation of Transitway

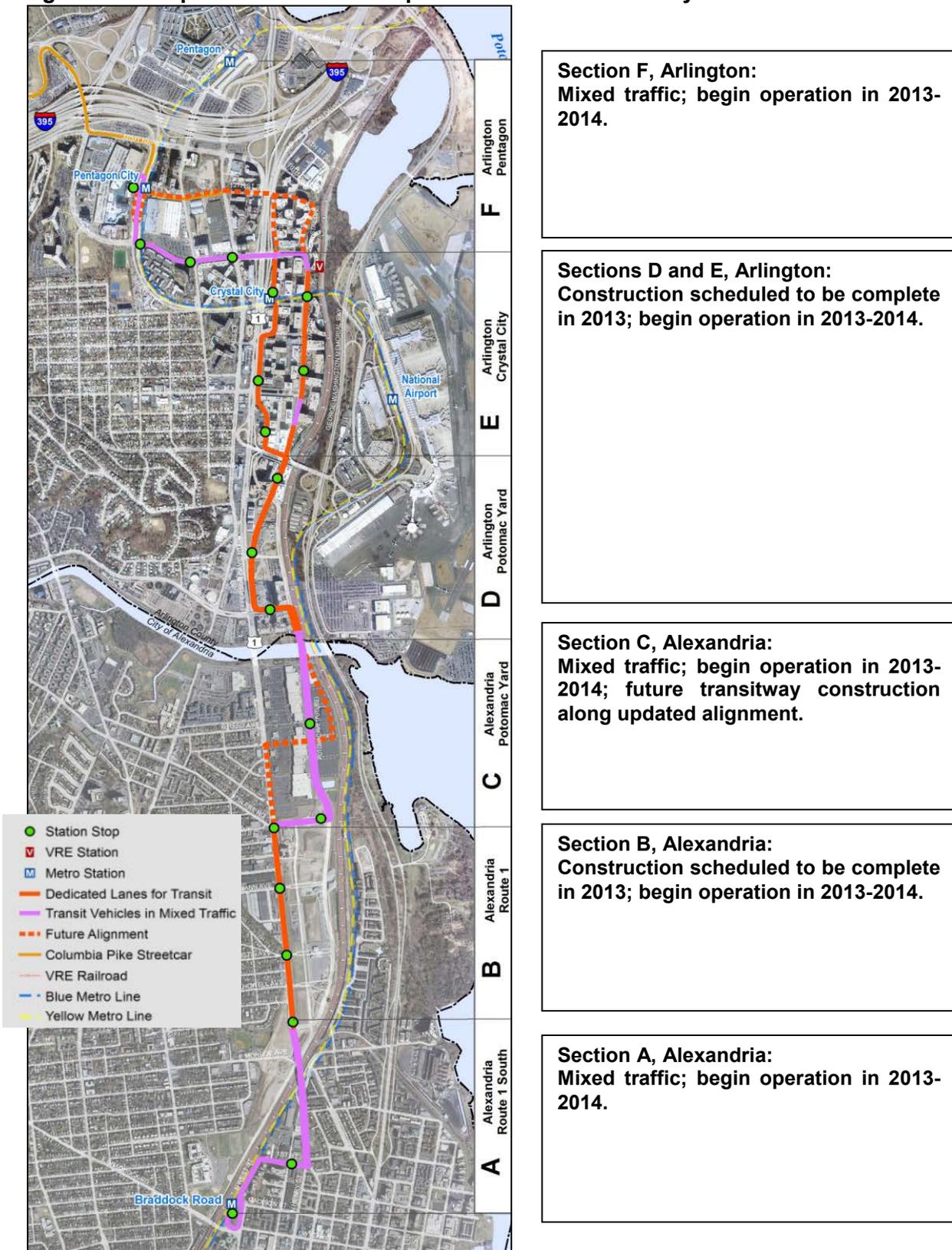
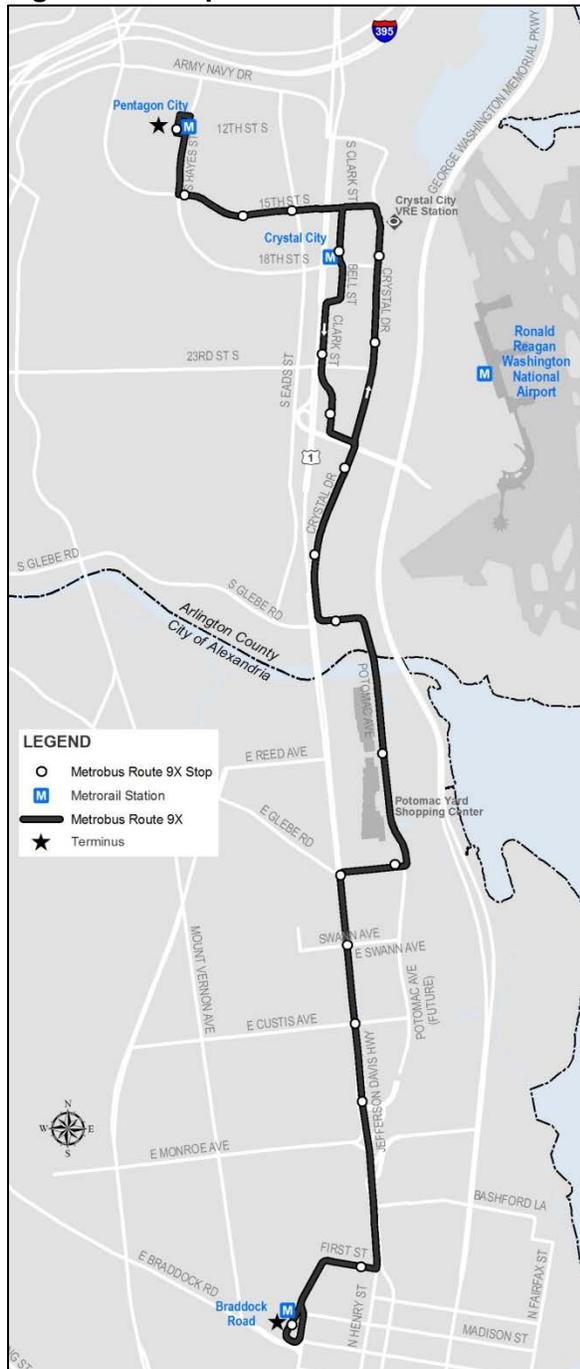




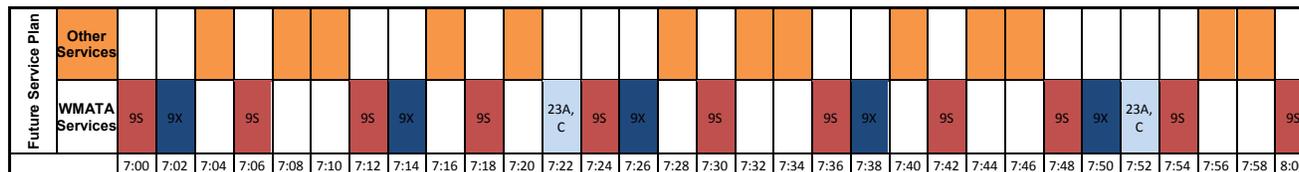
Figure 3-3: Implementation of 9X Service (2013-2014)



Chapter 2 details the transit operating plans and related assumptions. In general, local public transportation services will maintain existing routings, service frequencies and hours of service. No changes are planned for Metrobus routes 9A, 10A, 10B, 10E, 16H, 23A, and 23C. Route 9E will be rerouted to run along the transitway in the peak-hour, off-peak direction (there will be no change in service frequency). No changes are planned for current ART and DASH routes in the project area.

Scheduling the new transit service and modifying existing schedules to better complement the new service will be an iterative process that is refined over the early months and years of transit service. Report Section 3.6, Ongoing Service Evaluation, describes details of the anticipated schedule refinement process. Nevertheless, the initial schedules for corridor operation must be thoroughly evaluated so that the opening days and months of service are as efficient as possible. WMATA service planners will lead this effort, coordinating with other transit service providers. The “time slot” concept described in Chapter 2 provides a structure for allotting service: within a one-hour period at a given location along the transitway, there are 30 two-minute “slots” which may be assigned to corridor buses. **Figure 3-4** illustrates a possible sequence of peak-hour buses in the busiest portion of the transitway, in Crystal City. Metrobus routes 9S and 9X are scheduled at 6- and 12-minute headways, respectively with 23A and 23C service every 30 minutes. The remaining “slots” are available for other services, which include commuter routes operated by PRTC, Fairfax Connector, Loudoun County, and MARTZ and Quick’s.

**Figure 3-4: “Time Slot” Concept for WMATA Routes and Additional Transit Service**



### 3.2.2 Transitway and Stops

Final design is underway for transitway sections and transit stops in the Arlington and Alexandria portions of the CCPY corridor. Construction in both jurisdictions is scheduled to begin in 2012, with completion of the Arlington portions in early 2013 and Alexandria portions in late 2013. The transitway is being designed and will be constructed to accommodate future adaptation to streetcar service.

Physical design has been the subject of extensive coordination among stakeholders and the public. While this Implementation Plan (and the Implementation Checklist in **Appendix G**) includes general timeframes for completion of these facilities, detailed construction phasing is not within the scope of this effort.

### 3.2.3 Passenger Information Displays

This implementation plan does, however, concern itself with several elements of the transit stops that have to do with communication of passenger information. Information to be displayed at each stop includes route maps and schedules, stop identifiers, and electronic real-time arrival information for transitway buses. Report Section 3.4, Customer Communications and Marketing, describes these features in greater detail.

### **3.2.4 Fare Collection**

Several methods of fare collection are potentially applicable along the corridor. For the initial implementation timeframe, fare boxes will remain in place on transit vehicles, and the use of SmarTrip by customers will be encouraged. No new facilities for off-board fare payment are envisioned at the proposed station stops in the near-term. However, station stops are designed to accommodate off-board fare payment in the long-term. It is anticipated that passengers will access the SmarTrip and ticket vending machines already in place at the Metrorail stations along the corridor.

## **3.3 Bus Fleet: Operations, Maintenance, and Storage Requirements**

As detailed in Chapter 2, the “premium” service along the transitway—WMATA routes 9S and 9X—is to be provided in the short term using either standard Metrobus vehicles or a new fleet of uniquely branded buses. Additional local services, including DASH and other WMATA routes, complement this “trunk” service. Other providers, mainly long-distance commuter services, will operate commuter buses along portions of the transitway.

### **3.3.1 Capital and Operating Costs**

Cost estimates for this implementation plan focus on the premium service vehicle fleet and costs to operate and supervise the fleet. Capital costs for construction and commissioning of the transitway facility and stops are included in the construction project and not detailed in this implementation plan.

Estimates of operating and maintenance costs are focused on the premium service. Changes to other local services in the corridor, including rerouting of Metrobus 9E service along the transitway, are minor and would result in minimal changes to overall operating costs. Supervision and enforcement costs are based on local experience for transit supervisory and law enforcement staffing. Facility maintenance costs are based on applicable local and national experience. See Sections 2.7.1 and 2.7.2 for summaries of estimated costs.

### **3.3.2 Bus Maintenance and Storage Facility**

Metrobus transitway fleet vehicles are to be stored and maintained at the existing WMATA Four Mile Run facility. DASH buses serving the corridor are stored and maintained at the new DASH bus facility near Duke Street. Estimated costs for operation of the premium service include vehicle maintenance, in keeping with WMATA system-wide experience. The cost of cleaning and maintaining the facility and station stops is not included. Detailed discussion about transitway maintenance costs is included in Chapter 2.

## **3.4 Customer Communications and Marketing**

This section describes the communications-related actions associated with implementation of the transitway and associated transit operations plan. Note that these actions are summarized in the checklist of **Appendix G**.

### **3.4.1 Overall Branding**

This implementation plan intends to identify the needs and components for branding the premium services and facilities in the transitway corridor. Following the completion of the

Implementation Plan, Arlington County, the City of Alexandria and WMATA will continue discussion of branding needs and develop action plans for implementing each component.

Items for consideration with the two options for branding of the service are as discussed further below:

### Priority Corridor Network (PCN) Branding

The premium service (9S and 9X) may function as a part of WMATA's PCN, whereby it is branded as Metrobus Express Service and the branding will be incorporated into the 9S and 9X bus vehicle livery timetables and bus stop flags in the same manner as the 79 (Georgia Avenue) S9 (16<sup>th</sup> Street) and X9 (H Street-Benning Road) in the District of Columbia. The elements of this branding include:

- A unique Metrobus Express bus livery and bus sign board lettering, including sign board letter colors that are different than on standard Metrobus services;
- A standard Metrobus Express format for the service timetables that clearly identify the service as a premium service;
- An easily recognizable route map that identifies the premium nature of transitway service and its link to the regional Metrorail network; and
- Unique bus flag and stanchion design that distinguishes the premium service from other services that may share a stop.

**Figure 3-5** illustrates some of these branding elements. The Implementation Checklist (**Appendix G**) lists these branding elements under the headings “New Vehicles”, “Customer Communications”, and “Stop Improvements”.

Of special consideration is preparing the required buses with the PCN branded Metrobus livery. Providing sufficient lead time for coordination on this element is important. Previous priority corridor implementation plans have allowed four months for preparation of PCN branded Metrobus livery. Some of the existing 9S-branded services may be converted to PCN branded Metrobus livery in advance of the transitway opening, with the remainder to be converted later. Additional fleet (beyond the existing 9S buses) for the 9X can be converted starting four months prior to opening of the Alexandria portion of the transitway.

**Figure 3-5: Example WMATA Priority Corridor Branding Elements**



### Unique Branding and Livery

When the transitway opens in 2013-2014, it will become the first BRT type service in the region. Its running way, infrastructure and service level will differ markedly from the typical PCN services which are mostly limited stop services in mixed traffic. Having a unique branding and livery would establish a new service with features beyond the PCN and allow the passengers to recognize the premium service.

Unique branding of premium transit services in other cities, such as in Orlando, Florida and Cleveland, Ohio, have set these services apart from other transit services in those areas (see **Figure 3-6**). Riders are able to easily identify the premium service and expect the higher quality service associated with the brand.

**Figure 3-6: Lymmo - Orlando, FL (left) and Healthline - Cleveland, OH (right)**



In the transitway opening year, the 9S and 9X premium service could utilize the current Metrobus vehicles or initiate the unique branding. In the future, a BRT-style branded service with unique livery will be employed to identify the premium service associated with the CCPY corridor. As demand increases, the feasibility of using articulated buses may be assessed.

### 3.4.2 Customer Information – Preliminary Notice of Service Changes

A multimedia marketing effort to inform the public about the service changes and improvements is an essential piece of the implementation steps for the new service. This effort (similar to procedures used by WMATA on other Metrobus Express service starts) will include the development and distribution of information and materials that incorporate the following elements:

- A campaign utilizing traditional media will describe the changes to the existing 9S and other local services as well as the new 9X service that will be implemented as part of the transitway opening. This campaign will incorporate multiple media including posters, bus cards, brochures, and on-board service notices for both service-start stages. A key element of the campaign will be production and distribution of a brochure that contains a map and schedule for services on CCPY for distribution to all businesses and residents in the corridor and for posting at existing stops. Notices of all types will include details on how to access additional information via the WMATA and County/City websites.
- WMATA, Arlington, and Alexandria will make announcements regarding the new and modified service utilizing all existing available electronic media outlets currently utilized. As with the traditional campaign, an electronic media campaign will be completed for each service opening stage. Electronic media outlets will include the WMATA, County,

and City Twitter and Facebook applications; the WMATA, County, and City websites; and email distribution to project contact lists. Coordination between WMATA and the two jurisdictions will be important to ensure that all potential outlets are utilized and that the disseminated information is consistent across all outlets.

For each of the two major implementation stages, kickoff of the process for developing passenger information regarding transitway opening and related service changes will begin at least four months prior to the start of the new service.

### **3.4.3 Customer Information – Ongoing Updates After Service Starts**

There will be numerous required changes to passenger information that is provided to customers after service starts. These changes will include:

- Changes to the public timetable. As noted above, the public timetables for both the 9S and 9X will be part of the overall Metrobus branding effort so changes to the current 9S timetable will be required in terms of both presentation as well as the actual schedule information. Since the 9S and 9X services will act as an integrated whole, both services should be shown on a single timetable once they are both fully operational.
- Stop Amenities.
  - Station Stop Maps - Since the new services will operate along a dedicated transitway, attractive and informative route maps will be an essential element at transitway station stops. WMATA, Alexandria, and Arlington will coordinate on a consistent map design for all station stops that meets the needs of all three agencies.
  - Stop Flags/Stanchions – Since the station stop design is the purview of the two jurisdictions, coordination regarding the design and placement of Metrobus Express bus stop flags or specialized stanchions at each station stop will be required. Planned custom-designed stanchions will house both electronic (LED) and printed information.
  - Stop Schedule Information – Schedule information on the WMATA services stopping at each station stop will have to be developed and deployed to each station stop. WMATA will develop the schedules. Coordination with Alexandria and Arlington will be required for printing and distribution of the schedules.
- Real-Time Arrival Displays. In connection with implementation of coordinated station stop design, both Arlington and Alexandria will be developing the capability to display real-time schedule information at stops along the corridor. Information feeds and displays will be “live” upon initiation of each phase of transitway service. The jurisdictions and WMATA are working to facilitate interface among the systems that process real-time arrival information. At the outset, real-time information will be displayed for the main corridor services; in the future real-time information could be expanded to include Fairfax Connector, PRTC, LCT and other commuter services. Printed schedules will continue to be displayed at transit stops, in addition to the real-time information.
- Electronic Media. Each of the electronic media outlets that are utilized for the dissemination of customer information (including Commuter Store and [www.commuterpages.com](http://www.commuterpages.com)) will be updated with the new passenger information outlined above.

For each of the two major implementation stages, kickoff of the process of developing passenger information for the initiation of service will begin at least four months prior to the start of the new service.

### **3.5 Transit Management and Supervision**

The CCPY transitway would be owned, funded, managed and maintained by Arlington County and the City of Alexandria. The two jurisdictions will take on several management and supervision functions associated with the implementation of the transitway and transitway service. The Implementation Checklist (**Appendix G**) shows the proposed order and timing for initiation of the various management and supervision functions.

#### **3.5.1 Coordination Meetings**

The CCPY Access Policy recommends that the use of the transitway by various long distance providers be subject to participation in semi-annual coordination meetings. These coordination meetings should include all parties including Arlington County, the City of Alexandria, WMATA and other regional public transit providers that will utilize the transitway. The meetings will serve as an opportunity to come together to discuss, update, and agree upon the access/service plan for the dedicated lanes. The discussion would also address corridor capacity, service frequencies, berthing schedules, excessive dwell times, schedule adherence issues, and notable ridership fluctuations. In the event of unforeseen issues or concerns, Arlington County, the City of Alexandria and WMATA may require long-distance transit providers to attend additional meetings so that such issues can be resolved in a timely manner and premium service can be maintained. Over the course of time, it is expected that best management practices will be developed that can also be used to model other dedicated/exclusive transit corridors in the region.

#### **3.5.2 Transitway Operations Management**

Managing day-to-day operations of the transitway is a critical function. Due to the range of services using the transitway, it is also a collaborative function. Arlington County and the City of Alexandria are the owners and managers of the transitway and stations. WMATA is the provider of premium services. Other transit operators have a supporting or cooperative role should they obtain transitway access from the jurisdictions. The detailed roles of Arlington County, the City of Alexandria, WMATA, and other operators are listed in **Table 3-1**.

**Table 3-1: Transitway Management Roles**

<b>Organization</b>	<b>Current and Planned Operations</b>	<b>Functions in Operation of Transitway</b>
Arlington County	Operates, under contract, Arlington Transit routes, none of which currently serve the CCPY corridor	<ol style="list-style-type: none"> <li>1) Construct and maintain transitway and stops within Arlington County;</li> <li>2) Issue permits and monitor transit operator compliance with operating protocols;</li> <li>3) Monitor transitway operations and performance;</li> <li>4) Enforce traffic and parking restrictions along transitway;</li> <li>5) Participate in regular coordination effort among owners and users of the transitway.</li> </ol>
City of Alexandria	Operates, under contract, DASH routes that serve the CCPY corridor (AT2, AT5, AT4, AT3, AT10)	<ol style="list-style-type: none"> <li>1) Construct and maintain transitway and stops within the City of Alexandria;</li> <li>2) Issue permits and monitor transit operator compliance with operating protocols;</li> <li>3) Monitor transitway operations and performance;</li> <li>4) Enforce traffic and parking restrictions along transitway;</li> <li>5) Participate in regular coordination effort among owners and users of the transitway.</li> </ol>
WMATA	Operates transitway bus service (9S, 9X) and other CCPY corridor bus service (9A, 9E, 10A, 10B, 10E, 16H, 23A, 23C)	<ol style="list-style-type: none"> <li>1) Provide dedicated transit supervisors focused on WMATA service;</li> <li>2) Lead coordination for premium service, focusing on scheduling, productivity and on-time performance in the corridor, with input from owners and users of the transitway.</li> </ol>
Virginia Department of Rail and Public Transportation (DRPT)	Issues capital and operating grants to CCPY corridor transit providers.	Participate in regular coordination effort among owners and users of the transitway. Signatory to Memorandum of Understanding.
Potomac and Rappahannock Transportation Commission (PRTC)	Long distance service from Lake Ridge and Dale City	Participate in regular coordination effort among owners and users of the transitway. Signatory to Memorandum of Understanding.
Loudoun County	Long distance service from Leesburg, Purcellville, Dulles North, Dulles South	Participate in regular coordination effort among owners and users of the transitway. Signatory to Memorandum of Understanding.
Fairfax Connector	Long distance service from Reston	Participate in regular coordination effort among owners and users of the transitway. Signatory to Memorandum of Understanding.
Quick's, MARTZ	Long distance service from Spotsylvania County	Participate in regular coordination effort among owners and users of the transitway. Signatory to Memorandum of Understanding.

### 3.5.3 Transitway Operations Supervisors

Dedicated WMATA supervisors are proposed for deployment at the start of new transitway service. These supervisors would be dedicated to the transitway service and would proactively manage the 9S and 9X services with a focus on maintaining correct headway separation between buses. Correct headway separation and service reliability, maintained through this very proactive management of the two lines is essential to maintaining the advantages of providing a branded high-quality premium service along a dedicated transitway.

During the first stage of service, after the opening of the Arlington portion of the transitway, one dedicated supervisor covering the hours from opening to 7:00 PM (approximately 1.5 FTE or 12 hours of supervision) is proposed. Supervisors would position themselves at their discretion but it is proposed that they spend the majority of their time at the southern terminal of the 9S, at the Potomac Yard Shopping Center. This location would allow them to actively manage the line,

holding buses at the terminal in order to maintain headway separation. The supervisors would also have mobile capabilities to respond to emergencies along the line.

During the second stage of service, after the opening of the Alexandria portion of the transitway, it is proposed that the line be covered by two dedicated supervisor equivalents during the two peak periods and that one be deployed during the mid-day (coverage by at least one supervisor would be between 6:00 AM and 7:00 PM) (approximately 1.5 FTE). The first dedicated supervisor would continue to be located at the Potomac Yard Shopping Center to maintain separation on both the 9S (terminal holds) and the 9X (mid-line holds). The second dedicated supervisor would have mobile capabilities to respond to emergencies but would be generally located at the northern or southern terminal to support maintenance of headway separation. One additional FTE will be required for supervision on weekends, see Chapter 2 for estimated annual supervision costs.

### **3.5.4 Supervisor Training**

Regular training of supervisors assigned to the Crystal City Potomac Yard Transitway will be a routine part of transitway operations. In general the WMATA “Supervisor Playbook” used for other Bus Priority Corridors will be customized for the CCPY corridor. Given the unique characteristics of this corridor, particularly sections of dedicated transit operations, training will be customized to enhance supervisor skills and support efficient transitway service. According to the Supervisor Playbook, ongoing training is encouraged for all supervisors. **Table 3-2** defines supervisor roles and responsibilities.

Supervisors who have accumulated experience with the CCPY services will be an important element in the continual improvement of corridor operations. Supervisors would participate in selected management functions, including regular service evaluations and planned regular coordination meetings of all operators. These management sessions will, in turn, serve to inform the supervisors of issues relevant to their day-to-day responsibilities.

**Table 3-2: Supervisor Roles and Responsibilities**

<b>Terminal Supervisor</b>	<b>Mid-Line Supervisor (9X)</b>
Located at Crystal City Metrorail Station, Braddock Road Metrorail Station	Located at Potomac Yard Shopping Center (serves as Terminal Supervisor for 9S)
Supervisors located at the terminals would be responsible for ensuring buses start trips correctly separated from leading bus (exactly one-headway apart)	Supervisors located at the mid-line would be responsible for making mid-route corrections as necessary to maintain correct headway separation.
<b>Example Terminal Corrective Measures</b>	<b>Example Mid-Line Corrective Measures</b>
<i>Bus is running ahead of scheduled headway</i>	<i>Bus is running ahead of scheduled headway</i>
Layover/recover time allowances should restore proper spacing once the bus reaches its terminal and is ready to turn around.	Bus is more than 2 minutes ahead of scheduled headway: Mid-Line Supervisor will hold the “fast” bus at the Mid-Line location (Potomac Yard Shopping Center) for no more than 2 minutes allowing the lead bus to gain headway separation.
<i>Bus is running behind scheduled headway</i>	<i>Bus is running behind scheduled headway</i>
Layover/recover time allowances should restore proper spacing once the bus reaches its terminal and is ready to turn around.	Bus is more than 2 minutes behind scheduled headway: Mid-Line Supervisor will hold the lead bus at the Mid-Line location (Potomac Yard Shopping Center) for no more than 2 minutes allowing the “slow” bus to bridge the headway gap.

### 3.6 Ongoing Evaluation

As the transitway service begins and matures, Arlington, Alexandria, and WMATA staff will continuously monitor transit performance and relationships between the transitway and other activity in the corridor. Transit supervisors and enforcement personnel will be important sources of information on recurring issues and potential improvements. With the known and projected growth of development and travel within the corridor, it will be vital to dynamically adapt the service to satisfy needs of current and potential transit passengers. Accurate performance data, efficiently collected will be a key element of system evaluation.

#### 3.6.1 Enforcement

This Implementation Plan outlines the framework and processes for enforcement. As the owners and managers of the transitway facilities and right-of-way, Arlington County and the City of Alexandria have ultimate responsibility for enforcement of traffic, parking, and transitway use restrictions. It is envisioned that County and City police would have jurisdiction over the following issues:

- Traffic violations including unauthorized automobile use of dedicated portions of the transitway;
- Parking restrictions, including restrictions on delivery vehicle and tour bus parking; and
- Permitted transitway use by public transit providers.

These functions would require a law enforcement professional working throughout the service period. Transitway management and supervisory staff will coordinate regularly with Arlington and Alexandria police and fire officials. WMATA and the two jurisdictions will routinely share data on transitway operations issues with law enforcement representatives, and representatives will be invited to attend regular transitway coordination meetings.

As noted in **Table 3-1**, under Transitway Operations Management, one of the early implementation tasks will be to establish roles and authority for enforcement. Related to this

task will be the need to confirm ticketing protocols for violations. Further, project owners will continue to evaluate traffic management approaches to ensure efficient and smooth transitway service.

### 3.6.2 Evaluation Criteria

Key to the success of transitway performance is ongoing monitoring and evaluation, and resulting changes to management and service. Some of the evaluation criteria would be location-specific whereas others would be applicable to the entire corridor/transitway. The project impacts would be evident in both traffic conditions and transit service.

Transitway service will be evaluated regularly in the following areas:

1. Ridership – boardings per revenue hour by stop and by route
2. On-time performance – schedule adherence, bus bunching, headway separation
3. Transitway operations – blocked stops, slot operation
4. Traffic operations – signal timing, turning movements, incident management
5. Supervisor findings – observations, management strategies applied
6. Safety and Security – at bus stops, on buses, along the transitway
7. Financial performance – farebox recovery, ongoing O&M costs

### 3.6.3 Evaluation Process

Each of the above measures will allow transitway operators to accurately chart levels of demand along the corridor and thus gauge the effectiveness of the service. Review of data associated with these measures will be part of the regular operator coordination meetings, to be held twice yearly, timed to coincide with scheduled WMATA service changes (see **Table 3-3** for suggested topics by meeting). In this way, the levels of service and the timing of enhancements to the service may also be adjusted in timely fashion.

**Table 3-3: Operator Coordination Meetings - Scheduled Topics**

	March Meeting	September Meeting
<b>Routine Service Changes</b>	X	X
<b>Ridership</b>	X	
<b>On-time performance</b>	X	X
<b>Transitway operations</b>	X	X
<b>Traffic operations</b>	X	X
<b>Supervisor findings</b>	X	X
<b>Safety and Security</b>		X
<b>Financial performance</b>	X	

WMATA will provide semi-annual performance report to Arlington County and the City of Alexandria. The city and county staff will prepare a semi-annual report that includes WMATA observations and incorporates enforcement data, customer comments and other operator issues.

## **APPENDICES**

**Appendix A: Bus Volumes and On/Offs by Stop – By Route**

Metrobus Route 9S	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	(7 - 8 AM)	
				On	Off
<b>Southbound – 10 Trips</b>					
S. Bell & 15th Street	9S; 23A, C; 16H	10	5	7	2
S. Bell & 18th Street (Crystal City Station)	9S; 16H; 23A, C	10	5	149	59
S. Clark & 20th Street	9S; 23A, C; PRTC	10	5	22	1
S. Clark & 23rd Street	9S; 23A, C; PRTC	10	5	No Data	No Data
S. Clark @ Hilton Hotel	9S; FXC 597; PRTC	10	5	0	3
S. Clark & 26th Street	9S; Martz; Quick's	10	5	0	61
27th Street & Crystal Drive	9S; Martz; Quick's	10	5	0	77
S. Glebe Road & S. Ball Street	9S	10	5	48	7
<b>Northbound – 10 Trips</b>					
Crystal Drive & 33rd Street	9S	10	5		
Crystal Drive & Potomac Avenue (EPA)	9S	10	5	9	3
Crystal Drive & 23rd Street	9S; FXC 597; PRTC; Quick's	10	5	0	6
Crystal Drive - n/o 23rd Street (@ #2231)	9S; 23A, C; FXC 597; PRTC; Quick's	10	5	0	0
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	10	5	0	0
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	10	5	0	0
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	9	5	7	2

Metrobus 9 A, E	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	(7 - 8 AM)	
				On	Off
<b>Southbound – 6 Trips</b>					
Rt 1 & Hume Ave	9A, E	6	2	3	1
Rt 1 & E. Swann Ave	9A, E	6	2	0	0
Rt 1 & E. Custis Ave	9A, E	6	2	2	1
Rt 1 & E. Bellefonte Ave	9A, E	6	2	0	0
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	0	0	12
<b>Northbound – 2 Trips</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	2	2	0	0
Rt 1 & E. Howell Ave	9A, E	2	2	No Data	No Data
Rt 1 & E. Custis Ave	9A, E	2	2	4	1
Rt 1 & E. Swann Ave	9A, E	2	2	4	1
Rt 1 & E. Glebe Road	9A, E	2	2	0	0

10 A, B, E	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	4	4	10	58
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	8	5	22	17

Metrobus 23 A, C	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	(7 - 8 AM)	
				On	Off*
<b>Southbound – 2 Trips</b>					
S. Bell & 15th Street	9S; 16H; 23A, C	2	2	0	0
S. Bell & 18th Street (Crystal City Station)	9S; 16H; 23A, C	2	2	6	18
S. Clark & 20th Street	9S; 23A, C; PRTC	2	2	0	2
S. Clark & 23rd Street	9S; 23A, C; PRTC	2	2	0	7
<b>Northbound – 2 Trips</b>					
Crystal Drive - n/o 23rd Street (@ #2231)	9S; 23A, C; FXC 597; PRTC; Quick's	2	2	0	0
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	2	2	0	4
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	2	2	0	0
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	2	2	0	0

\*Note: Eastbound AM Peak Hour trip data were unavailable. Estimates based on Westbound PM Peak Hour data.

Metrobus 16H	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	(7 - 8 AM)	
				On	Off
<b>Southbound</b>					
S. Bell & 15 <sup>th</sup> Street	9S, 16H; 23A,C	3	0	0	8
S. Bell & 18th Street (Crystal City Station)	9S; 16H; 23A, C	3	0	0	20

FXC 597	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
				(3 Trips: 4:30 - 5:45 PM)	(2 Trips 7:00 - 8:00 AM)
<b>Southbound</b>					
S. Clark @ Hilton Hotel	9S; FXC 597; PRTC	2	0	15	19
<b>Northbound</b>					
Crystal Drive & 23rd Street	9S; FXC 597; PRTC; Quick's	2	0	8	11
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	2	0	9	10
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	2	0	9	3

PRTC - Lake Ridge	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On (3 Trips: 4:30 - 6:00 PM)	Off 7:00 - 8:00 AM
<b>Southbound</b>					
S. Clark & 20th Street	9S; 23A, C; PRTC	3	0	0	N/A
S. Clark & 23rd Street	9S; 23A, C; PRTC	3	0	0	N/A
S. Clark @ Hilton Hotel	9S; FXC 597; PRTC	3	0	3	N/A
<b>Northbound</b>					
Crystal Drive & 23rd Street	9S; FXC 597; PRTC; Quick's	3	0	4	1
Crystal Drive - n/o 23rd Street (@ #2231)	9S; 23A, C; FXC 597; PRTC; Quick's	3	0	1	N/A
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	3	0	16	0
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	3	0	2	7
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	3	0	8	5

PRTC - Dale City	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On (3 Trips: 4:30 - 6:00 PM)	Off 7:00 - 8:00 AM
<b>Southbound</b>					
S. Clark & 20th Street	9S; 23A, C; PRTC	1	0	1	N/A
S. Clark & 23rd Street	9S; 23A, C; PRTC	1	0	0	N/A
S. Clark @ Hilton Hotel	9S; FXC 597; PRTC	1	0	2	N/A
<b>Northbound</b>					
Crystal Drive & 23rd Street	9S; FXC 597; PRTC; Quick's	1	0	11	0
Crystal Drive - n/o 23rd Street (@ #2231)	9S; 23A, C; FXC 597; PRTC; Quick's	1	0	8	N/A
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	1	0	10	0
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	1	0	10	3
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	1	0	12	4

Loudoun County Transit	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On (2 Trips: 4:30 - 6:00 PM)	Off 7:00 - 8:00 AM
<b>Northbound</b>					
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	4	0	41	36

AT 2	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	2	0	10
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	2	2	11	0

AT 3	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	0	No Data Available	No Data Available
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	0	No Data Available	No Data Available

AT 3/4	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	0	1	No Data Available	No Data Available
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	0	1	No Data Available	No Data Available

AT 4	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
1st Street & N. Fayette Street	AT 4	4	1	No Data Available	No Data Available
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	4	1	No Data Available	No Data Available
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	1	No Data Available	No Data Available
1st Street & N. Henry Street	AT 4	3	1	No Data Available	No Data Available

AT 5	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	3	2	14	0
<b>Northbound</b>					
Braddock Road Station	9E; 10A, B, E; AT 2; AT 3; AT 3/4; AT 4; AT 5	2	2	0	13

AT 10	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
Potomac Yard Shopping Center	AT 10	2	1	0	2
<b>Northbound</b>					
Potomac Yard Shopping Center	AT 10	2	1	2	0

Martz	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		AM Peak (5:59 – 6:06)	(N/A)	PM Peak (4:00 – 4:05)	On	Off
<b>Southbound</b>						
S. Clark & 26th Street	9S; Martz; Quick's	1	0	0	No Data Available	No Data Available
27th Street & Crystal Drive	9S; Martz; Quick's	1	0	1	No Data Available	No Data Available
<b>Northbound</b>						
Crystal Drive - s/o 20th Street	9S; 23A, C; FXC 597; PRTC; LC Transit; Martz	1	0	1	0	1
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	1	0	1	0	0

Quick's	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		AM Peak (5:55 – 7:00)	(N/A)	PM Peak (3:30 – 4:48)	On	Off
<b>Southbound</b>						
S. Clark @ Hilton	9S; FXC 597; PRTC; Quick's	3	0	3	No Data Available	No Data Available
S. Clark & 26th Street (2521 S. Clark St)	9S; Martz; Quick's	1	0	1	No Data Available	No Data Available
27th Street & Crystal Drive	9S; Martz; Quick's	1	0	0	No Data Available	No Data Available
<b>Northbound</b>						
Crystal Drive & 23rd Street	9S; FXC 597; PRTC; Quick's	1	0	1	0	0
Crystal Drive - n/o 23rd Street (@ #2231)	9S; 23A, C; FXC 597; PRTC; Quick's	4	0	4	0	1
Crystal Drive - s/o 18th Street	9S; 23A, C; FXC 597; PRTC; Quick's	2	0	2	0	0
Crystal Drive - s/o 15th Street (VRE)	9S; 23A, C; PRTC; Martz; Quick's	2	0	2	0	0

DOD Shuttle	Services Using Stop	Combined Trips Per Hour Peak	Combined Trips Per Hour Mid-Day	Combined Boardings/Alightings Peak Hour	
		(7 - 8 AM)	(1 - 2 PM)	On	Off
<b>Southbound</b>					
S. Clark & 26th Street	9S; Martz; Quick's; DOD	9	9	No Data Available	No Data Available
<b>Northbound</b>					
Crystal Drive – 23 <sup>rd</sup> Street	9S; FC 597; PRTC; Quick's; DOD	4	4	15	2
Crystal Drive - s/o 20 <sup>th</sup> Street	9S; 23A, C; FC 597; PRTC; LC Transit; Martz; DOD	4	4	16	0

**Appendix B: Field Data Collection Summary Tables - 9S and DOD Shuttle Headway Separation; Long Distance Express Bus Dwell Times and Schedule Adherence and Other Curb Lane Transportation Users**

9S					
Location	Date	Minimum Observed Headway	Max Observed Headway	Observed Headway Separation (minutes)	Average Observed Dwell Time (seconds)
<b>AM Peak</b>					
S. Glebe Rd & S. Bell St	2/8/2011	2	9	6:20	-
Crystal Dr & s/o 23rd St S	4/20/2011	2	16	7:24	10
Crystal Dr & 20th St S	2/9/2011	3	9	7:15	-
	4/20/2011	2	20	8:00	7
	2/25/2010	2	13	6:28	11
Crystal Dr & 18th St S	4/20/2011	0	21	8:30	9
Crystal Dr & 15th St S (VRE)	2/25/2010	0	12	5:30	13
Crystal City Metrorail Station	2/8/2011	0	9	5:42	-
<b>PM Peak</b>					
Crystal Dr & 20th St S	2/9/2011	1	15	6:40	-
	2/24/2010	0	21	6:49	10
Crystal Dr & 18th St S	2/8/2011	3	10	6:40	-
Crystal Dr & 15th St S (VRE)	2/10/2011	4	8	6:13	-
	2/25/2010	0	21	6:00	18
S. Clark St & 23rd St (Hilton)	2/9/2011	3	10	6:18	-

DOD Shuttles					
Location: Crystal Dr & s/o 23rd St S					
Date: 4/20/2011					
AM Peak					
Route	Observed Arrival Time	Observed Headway Separation	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
DOD #4	6:07	-	-	-	No passengers on board
DOD #4	6:25	0:18	-	-	No Stop
DOD #4	6:36	0:11	-	-	No Stop
DOD #4	6:52	0:16	-	-	
DOD #4	7:08	0:16	-	-	No Stop
DOD #4	7:22	0:14	0/1	8	
DOD #4	7:36	0:14	6/0	15	
DOD #4	7:51	0:15	5/0	12	7 cars in queue northbound
DOD #4	8:07	0:16	-	-	No Stop
DOD #4	8:22	0:15	3/0	11	
DOD #4	8:36	0:14	8/0	20	
DOD #4	8:51	0:15	1/0	8	
DOD #8	6:00	-	3/0	18	
DOD #8	7:03	1:03	4/1	15	Merge left into thru lane
DOD #8	8:02	0:59	3/0	20	

Location: Crystal Dr & n/o 20th St S					
Date: 4/20/2011					
AM Peak					
Bus Route	Arrival Time	Observed Headway Separation	Total Observed Ons/Offs	Dwell Time	Notes
DOD #4	7:10	-	12/0	52	
DOD #4	7:24	0:14	4/0	21	
DOD #4	7:39	0:15	-	32	
DOD #4	7:52	0:13	-	28	
DOD #4	8:08	0:16	8/0	35	
DOD #4	8:24	0:16	1/0	13	

<b>PRTC</b>						
Location: Crystal Dr & 18th St S						
Date: 4/20/2011						
AM Peak						
Route	Observed Arrival Time	Scheduled Arrival Time	Schedule Variability (minutes)	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
PRTC - Dale City	6:30	6:28	-2	0/2	20	
PRTC - Lake Ridge	6:31	6:30	-1	-	-	Did Not Stop
PRTC - Dale City	6:38	6:41	3	0/1	135	
PRTC - Dale City	6:50	6:51	1	0/3	23	
PRTC - Dale City	6:52	6:56	4	0/3	28	
PRTC - Lake Ridge	6:52	6:54	2	0/2	51	The bus was delayed by PRTC-Dale City bus when approaching the stop.
PRTC - Lake Ridge	7:04	7:06	2	0/1	19	
PRTC - Lake Ridge	7:27	7:26	-1	0/3	25	
PRTC - Dale City	7:41	7:41	0	0/3	26	
PRTC - Lake Ridge	7:46	7:53	7	0/3	15	
PRTC - Lake Ridge	8:05	8:13	8	-	-	Did Not Stop
Date: 2/8/2011						
PM Peak						
Route	Observed Arrival Time	Scheduled Arrival Time	Schedule Variability (minutes)	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
PRTC - Lake Ridge	4:51	4:49	-2	5/0	30	
PRTC - Dale City	5:03	5:03	0	6/0	36	
PRTC - Lake Ridge	5:26	5:25	-1	3/0	39	
PRTC - Dale City	5:34	5:33	1	0/0	-	Did Not Stop
PRTC - Lake Ridge	5:52	5:48	-4	2/0	19	

PRTC - Other Observations						
Date	Location	Route Name	Bus Arrival Time	Total Observed Ons/Offs	Bus Dwell Time(sec)	Notes
4/20/2011	VRE Station	PRTC	-	0/1	150*	DOD shuttle passed stopped PRTC Bus
4/20/2011	VRE Station	PRTC	7:18	0/4	77*	
4/20/2011	Crystal Dr & 20th St	PRTC	5:59	-	-	@5:59AM
4/20/2011	Crystal Dr & 20th St	PRTC	6:29	0/1	13	
4/20/2011	Crystal Dr & 20th St	PRTC	-	0/1	20	
4/20/2011	Crystal Dr & 20th St	PRTC - Lake Ridge	6:39	0/2	12	Lake Ridge
4/20/2011	Crystal Dr & 20th St	PRTC - Dale City	6:49	-	-	Dale City
4/20/2011	Crystal Dr & 20th St	PRTC - Dale City	6:51	0/2	16	Dale City
4/20/2011	Crystal Dr & 20th St	PRTC - Lake Ridge	6:52	-	-	Lake Ridge
4/20/2011	Crystal Dr & 20th St	PRTC - Lake Ridge	7:26	-	-	Lake Ridge
4/20/2011	Crystal Dr & 20th St		7:41	-	-	
4/20/2011	Crystal Dr & 20th St	PRTC - Lake Ridge	8:04	-	-	Lake Ridge
4/20/2011	Crystal Dr & 20th St	PRTC - Dale City	8:40	-	-	Dale City
4/20/2011	Crystal Dr & 23rd St	PRTC	6:35	-	-	
4/20/2011	Crystal Dr & 23rd St	PRTC	6:38	-	-	
4/20/2011	Crystal Dr & 23rd St	PRTC	6:48	-	-	Passes stopped quicks bus n of 23rd
4/20/2011	Crystal Dr & 23rd St	PRTC D20	6:49	0/1	10	Also stopped N of 23rd 10 Sec.
4/20/2011	Crystal Dr & 23rd St	PRTC L202	6:51	-	-	
4/20/2011	Crystal Dr & 23rd St	PRTC L203	7:01	0/1	7	Also stopped N of 23rd :08
4/20/2011	Crystal Dr & 23rd St	PRTC	7:39	-	-	
4/20/2011	Crystal Dr & 23rd St	PRTC	7:44	-	-	Shuttle stopped in front of 9S north of 23rd (20 secs)
4/20/2011	Crystal Dr & 23rd St	PRTC	8:03	0/3	20	
4/20/2011	Crystal Dr & 23rd St	PRT D208	8:38	0/1	15	
*Some PRTC Buses laying over in the curb lane at 18th Street and in front of the VRE station as their AM run ends; Drivers changing sign to "Not In Service"						

<b>FXC 597</b>						
Crystal Dr & 18th St S						
AM - 4/20/2011						
Route	Observed Arrival Time	Scheduled Arrival Time	Schedule Variability (minutes)	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
FXC 597	6:37	6:50	-13	0/1	28	
FXC 597	7:17	7:20	-3	0/1	20	
FXC 597	7:40	7:50	-10	0/1	11	
FXC 597	8:55	8:50	5	-	-	Did Not Stop
PM - 2/8/2011						
FXC 597	4:48	4:45	-3	13/0	33	
FXC 597	5:20	5:15	-5	5/0	20	
FXC 597	5:58	5:54	-4	2/0	5	

<b>FXC 597 - Other Observations</b>				
<b>AM Peak</b>				
Location: Crystal Dr & s/o 23rd Street S				
Date	Observed Arrival Time	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
4/20/2011	6:35	0/2	12	
4/20/2011	7:13	0/3	13	Metrobus idling North of 23rd - FC must go around
4/20/2011	7:38	-	-	Did Not Stop
4/20/2011	8:07	0/2	8	
4/20/2011	8:12	-	-	Did Not Stop
4/20/2011	8:40	0/2	15	
4/20/2011	8:53	-	-	Did Not Stop; Training
Location: Crystal Dr & 20th Street S				
4/20/2011	6:36	-	-	Did Not Stop
4/20/2011	7:15	0/2	10	
4/20/2011	7:40	0/2	4	
4/20/2011	8:14	-	-	Did Not Stop; Training
4/20/2011	8:43	0/2	6	
4/20/2011	8:54	-	-	Did Not Stop; Training
2/25/2010	7:19	-	-	Did Not Stop
2/25/2010	7:43	-	9	
2/25/2010	8:23	-	7	
<b>PM Peak</b>				
Location: Crystal Dr & s/o 20th Street S				
Date	Observed Arrival Time	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
2/24/2010	4:17	3/0	33	Stops behind LCT vehicle to board, blocking driveway
2/24/2010	4:50	-	17	
2/24/2010	5:20	1/0	6	Stopped before stop b/c of LCT bus

<b>LCT</b>						
Location: Crystal Dr & 20th St S						
AM - 4/20/2011						
Route	Observed Arrival Time	Scheduled Arrival Time	Schedule Variability (minutes)	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
LCT	6:34	6:40	-6	0/25	93	
LCT	6:53	6:55	-2	0/14	42	
LCT	6:56	6:55	1	0/8	25	
LCT	7:09	7:07	2	0/18	68	
LCT	7:13	7:07	6	0/11	55	
LCT	7:24	7:20	4	0/7	31	
LCT	8:28	8:30	-2	0/34	102	
PM - 2/9/2011						
LCT	4:45	4:45	0	38/0	176	
LCT	5:14	5:15	-1	11/0	75	

Other Curb Lane Transportation Users						
Date	Data Element	Location	Observed Arrival Time	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
<b>AM Peak</b>						
2/25/2010	Private Shuttle	Crystal Dr & VRE	6:49	0/1	110	
2/25/2010	Private Shuttle	Crystal Dr & VRE	6:52	2/0	15	
2/25/2010	Private Shuttle	Crystal Dr & VRE	7:11	-	515	
2/25/2010	Private Shuttle (Blue Ridge)	Crystal Dr & VRE	8:28	1/0	5	
2/25/2010	Private Shuttle (Blue Ridge)	Crystal Dr & VRE	8:38	1/0	30	
2/25/2010	Private Shuttle (ANSER)	Crystal Dr & VRE	8:52	1/0	152	
2/25/2010	Private Shuttle (Blue Ridge)	Crystal Dr & VRE	8:56	1/0	5	
2/25/2010	Private auto	Crystal Dr & VRE	7:26	1/0	12	Private auto stopped in curb lane
2/25/2010	Private auto	Crystal Dr & VRE	7:30	1/0	20	Private auto stopped in curb lane; 9S had to pass around
2/25/2010	School bus	Crystal Dr & VRE	7:18	-	17	Stopped north of VRE station at Water Park Towers
2/25/2010	School bus	Crystal Dr & VRE	8:47	-	105	Queued vehicles behind loading school bus
2/25/2010	Pedestrians	Crystal Dr & VRE	7:02	-	120	Heavy pedestrian activity; arrival of VRE train; 2 light cycles for pedestrians to cross Crystal Drive
2/25/2010	Pedestrians	Crystal Dr & VRE	7:14	-	120	Heavy pedestrian activity; arrival of VRE train; 2 light cycles for pedestrians to cross Crystal Drive
2/25/2010	Pedestrians	Crystal Dr & VRE	7:28	-	120	VRE train arrival
2/25/2010	Pedestrians	Crystal Dr & VRE	7:40	-	120	VRE train arrival
2/25/2010	Pedestrians	Crystal Dr & VRE	7:58	-	120	VRE train arrival
2/25/2010	Pedestrians	Crystal Dr & VRE	8:21	-	120	VRE train arrival
2/25/2010	Pedestrians	Crystal Dr & VRE	8:31	-	120	VRE train arrival
2/25/2010	Pedestrians	Crystal Dr & VRE	8:43	-	120	VRE train arrival
4/20/2011	Taxi	Crystal Dr & n/o 23rd St	-	0/2	45	
4/20/2011	Tour Bus	Crystal Dr & VRE	8:20	60/0	150	

Other Curb Lane Transportation Users						
Date	Data Element	Location	Observed Arrival Time	Total Observed Ons/Offs	Observed Dwell Time (seconds)	Notes
<b>PM Peak</b>						
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:21	-	11	
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:33	-	32	
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:36	-	19	
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:37	-	15	
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:46	-	-	
2/24/2010	Private Shuttle	Crystal Dr & VRE	4:52	-	28	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:00	-	15	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:06	-	16	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:14	-	34	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:23	-	33	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:25	1/0	8	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:32	-	16	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:36	-	18	
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:53	-	41	Stopped in front of Water Park Towers
2/24/2010	Private Shuttle	Crystal Dr & VRE	5:54	-	17	
2/24/2010	Private auto	Crystal Dr & VRE	4:09	-	11	Possible slugging activity
2/24/2010	Private auto	Crystal Dr & VRE	4:52	-	20	Possible slugging activity
2/24/2010	Private auto	Crystal Dr & VRE	5:03	-	13	Possible slugging activity
2/24/2010	Private auto	Crystal Dr & VRE	5:03	1	32	Possible slugging activity
2/24/2010	Private auto	Crystal Dr & s/o 20th St	4:38	-	55	
2/24/2010	Private auto	Crystal Dr & s/o 20th St	4:45	1	40	Stopped to let 1 person off behind stopped LCT bus
2/24/2010	Private auto	Crystal Dr & s/o 20th St	4:48	-	14	Possible slugging activity
2/24/2010	Tour Bus/Charter	Crystal Dr & VRE	4:39	-	22	Stopped in curb lane before 9S stop. 9S arrived and dropped off near side of traffic light.
2/24/2010	Taxi	Crystal Dr & s/o 20th St	5:32	1	20	

### Appendix C: Transitway Activity at Crystal Drive and 18<sup>th</sup> Street South – Proposed & Existing

6:00AM to 8:00AM					4:00PM to 6:00PM				
Future Service Plan (to accommodate scheduled WMATA & non-WMATA Services)			Existing Scheduled non-WMATA Services (based on observations at site)		Future Service Plan (to accommodate scheduled WMATA & non-WMATA Services)			Existing Scheduled non-WMATA Services (based on observations at site)	
2-minute time slots	WMATA Services	Other Services			2-minute time slots	WMATA Services	Other Services		
6:00	9S				4:00	9S			
6:02	9X		MARTZ	PRTC	4:02	9X		MARTZ	
6:04		MARTZ			4:04	23A, C		PRTC	
6:06	9S				4:06	9S			
6:08		PRTC			4:08		MARTZ		
6:10					4:10		PRTC		
6:12	9S				4:12	9S			LCT
6:14	9X				4:14	9X			
6:16		Quick's			4:16		LCT		
6:18	9S				4:18	9S			
6:20		PRTC			4:20		PRTC		
6:22	23A, C		Quick's		4:22		FXC		
6:24	9S				4:24	9S		PRTC	FXC
6:26	9X				4:26	9X		Quick's	
6:28		PRTC	PRTC		4:28		Quick's		
6:30	9S		PRTC		4:30	9S			
6:32					4:32	9E			
6:34					4:34	23A, C		PRTC	
6:36	9S				4:36	9S			
6:38	9X				4:38	9X			
6:40		PRTC	PRTC	LCT	4:40		PRTC		
6:42	9S				4:42	9S			
6:44		LCT			4:44		Quick's		
6:46		PRTC			4:46		LCT	Quick's	LCT
6:48	9S				4:48	9S		PRTC	
6:50	9X		PRTC		4:50	9X			
6:52	23A, C		Quick's		4:52		PRTC		
6:54	9S		PRTC	LCT	4:54	9S			FXC
6:56		Quick's	PRTC		4:56		FXC		
6:58		PRTC			4:58		PRTC		
7:00	9S		Quick's		5:00	9S			
7:02	9X				5:02	9X		PRTC	
7:04		LCT			5:04	23A, C			
7:06	9S		PRTC	LCT	5:06	9S			
7:08		PRTC			5:08				
7:10		Quick's			5:10	9E			
7:12	9S				5:12	9S			
7:14	9X				5:14	9X			
7:16		PRTC			5:16		LCT		
7:18	9S				5:18	9S			LCT
7:20		LCT	FXC	LCT	5:20	9E			
7:22	23A, C				5:22		PRTC		
7:24	9S				5:24	9S		PRTC	FXC
7:26	9X		PRTC		5:26	9X			
7:28		FXC			5:28		FXC		
7:30	9S				5:30	9S			
7:32		LCT			5:32	9E		PRTC	
7:34		PRTC			5:34	23A, C			
7:36	9S				5:36	9S			
7:38	9X				5:38	9X			
7:40		PRTC	PRTC		5:40		PRTC		
7:42	9S				5:42	9S			
7:44					5:44				
7:46					5:46		PRTC		
7:48	9S				5:48	9S		PRTC	
7:50	9X		FXC		5:50	9X			
7:52	23A, C		PRTC		5:52	9E			
7:54	9S				5:54	9S			
7:56		FXC			5:56				
7:58		PRTC			5:58				
8:00	9S				6:00	9S			

## Appendix D: Crystal City Potomac Yard Transit Operations – Core Stakeholders

### Core Stakeholders

<u>Organization</u>	<u>Name</u>	<u>Title</u>
PRTC	Eric Marx	Director of Planning & Operations
Fairfax Connector	Nick Perfli	
Loudoun County Transit	Nancy Gourley	Chief, Transit & Commuter Services
DASH	Eric Meyerson	
Quick's	Jason Quick	General Manager
Martz	David Snyder	Regional General Manager
Martz	Harold Turley	Director of Operations
Department of Defense	Lisa Passagaluppi	
Crystal City BID	Angela Fox	
Crystal City BID	Rob Mandle	
Alexandria Police Department	Charlotte Young	Officer
Alexandria Police Department	Dianne Gittins	Captain
Arlington Police Department	Capt. Andy Penn	Commander of the 2nd District
Arlington Police Department	Capt. Kamran Afzal	Head of Special Operations
Metro Police Department	Lt Douglas Durham	Supervisor, MTPD Special Operations Bureau

### Appendix E: Operations Plan and Cost Estimates

#### 9S Service

Weekday	Time Period	No. of Hours	Trip Run Time	Layover Time - 3 minutes	Total Round Trip Cycle Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Platform Hours by Time Period
AM Peak	5:30 AM - 9:30 AM	4	17.0	3	20.0	6	3.3	4	16	1.12	17.92
Mid -Day	9:30 AM - 3:00 PM	5.5	18.4	3	21.4	15	1.4	2	11	1.12	12.32
PM Peak	3:00 PM - 7:00 PM	4	19.3	3	22.3	6	3.7	4	16	1.12	17.92
Evening	7:00 PM - 1:00 AM	6	19.3	3	22.3	15	1.5	2	12	1.12	13.44

19.5

**Total Weekday Platform Hours 61.6**  
**Number of Vehicles Required –**  
**with 20% spare 5**  
**with 40% spare 6**

Saturday	Time Period	No. of Hours	Trip Run Time	Layover Time - 10 minutes	Total Round Trip Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Total Saturday Platform Hours
All Day	6:30 AM - 1:00 AM	18.5	15.4	3	18.4	20	0.9	1	18.5	1.06	<b>19.61</b>

Sunday	Time Period	No. of Hours	Trip Run Time	Layover Time - 10 minutes	Total Round Trip Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Total Sunday Platform Hours
All Day	7:30 AM - 11:30 PM	16	15.4	3	18.4	20	0.9	1	16	1.07	<b>17.12</b>

**9X Service**

Weekday	Time Period	No. of Hours	Trip Run Time	Layover Time - 6 minutes	Total Round Trip Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Platform Hours by Time Period
AM Peak	5:30 AM - 9:30 AM	4	45.4	6	51.4	12	4.3	5	20	1.12	22.4
Mid -Day	9:30 AM - 3:00 PM	5.5	49.0	6	55.0	15	3.7	4	22	1.12	24.64
PM Peak	3:00 PM - 7:00 PM	4	50.6	6	56.6	12	4.7	5	20	1.12	22.4
Evening	7:00 PM - 1:00 AM	6	50.6	6	56.6	15	3.8	4	24	1.12	26.88

19.5

**Total Weekday Platform Hours 96.32**  
**Number of Vehicles Required –**  
**with 20% spare 6**  
**with 40% spare 7**

Saturday	Time Period	No. of Hours	Trip Run Time	Layover Time - 10 minutes	Total Round Trip Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Total Saturday Platform Hours
All Day	6:30 AM - 1:00 AM	18.5	51.5	3	54.5	20	2.7	3	55.5	1.06	<b>58.83</b>

Sunday	Time Period	No. of Hours	Trip Run Time	Layover Time - 10 minutes	Total Round Trip Time	Headway	Vehicles in Service	Rounded Up	Vehicle Hours	Platform Hour Factor	Total Sunday Platform Hours
All Day	7:30 AM - 11:30 PM	16	51.5	3	54.5	20	2.7	3	48	1.07	<b>51.36</b>

**Appendix F: Examples of BRT Services and Features**

City	Service	Guideway Features	Stations/Stop Features
Boston, MA	Silver Line	4 routes operate along an 8.1 mile long transit corridor. Transit operates in dedicated bus tunnel (1.0 mi), dedicated bus-only lanes (2.2 mi), and mixed traffic (4.9 mi) operations; bus-only lanes are painted and marked; small segment of contra-flow bus-only lane marked by raised bendable plastic dividers.	Between the 4 routes, there are 29 stations. Stations include shelters, benches, overhead heating, trash, bike rack, security elements, information kiosks including route and neighborhood maps, and LED variable message sign for real-time passenger information. Transfers to the subway system and commuter rail are located at larger multimodal stations.
Cleveland, OH	HealthLine	7.1 mile long transit corridor. Transit operates in exclusive busway located the median (4.4 mi), physically separated from general traffic, and in mixed traffic (2.7 mi). Bus-only lanes are marked by signage and rumble strips.	36 stations feature enhanced shelters, near-level boarding, and off-board payment. Transit vehicles use precision docking guidance at the median guideway stations, and utilize doors on both sides.
Eugene, OR	EmX	4 mile long transit corridor operates in mixed traffic (1.4 mi) and exclusive busway (2.6 mi), bi-directional in places. Queue jumpers integrated with traffic signals are used to allow buses to move ahead of general traffic. Dedicated transit lanes are marked by raised delineators, pavement coloring, and markings.	16 on-street stations and 2 off-street stations feature enhanced shelters with seating, public art, near-level boarding, and off-board payment. Special sloped plastic curbs allow drivers to achieve precision docking at raised platforms. Transit vehicles utilize doors on both sides.
Los Angeles, CA	Orange Line	14.5 mile long transit corridor. Transit operates mostly in an At-Grade exclusive busway on separate right-of-way, physically separated from general traffic (13.5 mi). A 1 mile long segment of the corridor operates in mixed-traffic.	26 off-street stations and 2 transit centers feature near-level boarding, real-time passenger information, off-board payment, telephones, seating, trash, public art, and security elements. Stations are designed to accommodate 3 transit vehicles and to allow transit vehicles to pass each other.
Las Vegas, NV	MAX	7.6 mile transit corridor. Transit operates on exclusive bus lanes without grade separation (4.7 mi) and in mixed traffic (2.9 mi). Exclusive bus lanes are marked by signage and striping. Transit Signal Priority and a queue jumper are used to ensure reliability.	20 on-street stations and 2 transit centers feature off-board payment, near-level boarding, enhanced shelters, beverage vending, seating, and trash.
York Region, Ontario	Viva	5 routes that operate in four suburban corridors (approximately 50 miles). Currently, the buses operate in mixed traffic until dedicated lanes can be built. Transit signal priority and some bus-only intersection lanes are utilized to improve travel times and reliability. Future busway lanes will be primarily built in the center median of roadways with some locations with curbside lanes.	59 stations along the 5 routes include off-board payment, real-time passenger information, enhanced shelters, and security elements. Several major locations and terminals are served by larger structures.

Sources: APTA Recommended Practice-BUS-BRT-001-10.  
 Characteristics of Bus Rapid Transit for Decision-Making. FTA, February 2009.  
[http://www.nbrti.org/docs/pdf/2009\\_CBRT\\_combined.pdf](http://www.nbrti.org/docs/pdf/2009_CBRT_combined.pdf)  
 TCRP Report 90, Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit. TRB, 2003  
<http://www.trb.org/Main/Blurbs/152921.aspx>

## Appendix G: Implementation Checklist

Note: Start and End dates assume a six-month period of implementation for each service, as shown in the key below.

### Schedule Key

Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	
July 2012					December 2012	January 2013
Begin implementation activities for 9S						Begin 9S service

Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	
May 2013					October 2013	November 2013
Begin implementation activities for 9X						Begin 9X service

### Checklist and Schedule

			9S		9X	
Task		Responsibility	Start Month	End Month	Start Month	End Month
<b>Finalize Plans and Approvals</b>						
1	Arlington & Alexandria will approve operating plan and access policy		1	1	1	1
2	WMATA Board approval of service and budget	WMATA Board	1	1	1	1
3	Arlington, Alexandria and WMATA to develop operating agreements in collaboration. WMATA to retain flexibility about periodic service updates		1	2	1	2
4	Community leader outreach on operating plan and access policy	Arlington, Alexandria	1	3	1	13
<b>Service Changes</b>						
5	Identify terminal stands and layover facilities	WMATA, Arlington, Alexandria	3	3	13	13
6	Update bus systems (Trapeze, Clever, etc.)	WMATA	3	4	13	14
7	Define and redesign schedule	WMATA	3	4	13	14
8	Compile running times, re-block work schedules	WMATA	4	5	14	15
9	Bus and driver assignments	WMATA	6	6	16	16
	Initiate service	WMATA	6	Contd.	16	Contd.
<b>New Vehicles</b>						
10	Acquire fleet for 9S and 9X services	WMATA	3	6	13	16
11	Vehicle branding	WMATA	3	6	13	16
<b>Stop Improvements</b>						
12	Stop and shelter construction	Arlington, Alexandria	1	6	11	16
13	Incorporate schedule data into station electronic information systems	WMATA, Arlington, Alexandria	5	6	15	16
14	Place updated schedules and maps at stops	WMATA	5	6	15	16
15	Remove/eliminate and consolidate bus stops	WMATA, Arlington, Alexandria	4	6	14	16
<b>Customer Communications and Marketing: Pre-Operation</b>						
16	Develop advertising program for new service (posters, bus cards, brochures, etc.)	WMATA, Arlington, Alexandria	3	4	13	14
17	Customer info for service changes, FAQs for agents, etc.	WMATA	5	6	15	16
18	Develop revised maps and timetables	WMATA, Arlington, Alexandria	4	5	14	15
19	Print and distribute printed materials for service changes	WMATA	5	5	15	15
20	Post notifications at existing bus stops	WMATA, Arlington, Alexandria	5	5	15	15
21	Develop, approve, and record on-board audio announcements	WMATA	4	5	14	15

	Task	Responsibility	9S		9X	
			Start Month	End Month	Start Month	End Month
22	On-board new service notices (11 x 17 posters, newsletters, etc.)	WMATA	5	6	15	16
23	Update WMATA website (news, description, schedule, links)	WMATA	5	6	15	16
24	Update Arlington website; publicize via Facebook and Twitter	Arlington	5	6	15	16
25	Update Alexandria website; publicize via Facebook and Twitter	Alexandria	5	6	15	16
26	Update project website	AECOM	5	6	15	16
	<b>Customer Communications and Marketing: Start of Operation</b>					
27	Distribute revised maps, timetables, SmarTrip info.	WMATA	4	5	14	15
28	Update WMATA website (news, description, schedule, links, publicize via Facebook and Twitter)	WMATA	6	7	16	17
29	Update Arlington website; publicize via Facebook and Twitter	Arlington	6	7	16	17
30	Update Alexandria website; publicize via Facebook and Twitter	Alexandria	6	7	16	17
31	Install Station Stop Maps	WMATA, Arlington, Alexandria	6	6	16	16
32	Install Stop schedule information	WMATA, Arlington, Alexandria	6	6	16	16
33	Activate Next bus displays	WMATA, Arlington, Alexandria	6	7	16	17
	<b>Transitway Management</b>					
34	Set regular coordination meetings with owners and operators	WMATA	1	Contd.	1	Contd.
35	Define authority for transitway operator permits	Arlington, Alexandria	2	3	n/a	n/a
36	Issue operator permits	Arlington, Alexandria	4	5	n/a	n/a
37	Develop strategy for traffic and parking enforcement	Arlington, Alexandria	2	3	2	3
38	Obtain required concurrence on traffic and parking enforcement strategy	Arlington, Alexandria	3	4	3	4
39	Initiate enforcement of traffic and parking restrictions	Arlington, Alexandria	6	7	Contd.	Contd.
40	Prepare County/City facility maintenance plans, train staff	Arlington, Alexandria	4	6	14	16
	<b>Enhanced Service Supervision</b>					
41	Define supervisor responsibilities	WMATA	3	3	13	13
42	Identify staffing requirements, fill positions	WMATA	3	5	13	15
43	Develop supervisor playbook of service management strategies	WMATA	3	3	13	13
44	Obtain and install supervisor equipment (radios, hand-held devices, laptops, scout car)	WMATA	5	6	15	16
45	Develop line-specific training for supervisors	WMATA	3	4	13	14
46	Prepare monthly performance report format	WMATA, Arlington, Alexandria	4	4	14	14
47	Supervisor training	WMATA	5	6	15	16
	<b>Line-Specific Driver Training</b>					
48	Prepare FAQs and responses, info card	WMATA	3	4	13	14
49	Develop line-specific training module and materials (final edits)	WMATA	3	4	13	14
50	Attend driver safety meetings to discuss service implementation	WMATA	5	5	15	15
51	Driver training sessions	WMATA	6	6	16	16
	<b>Ongoing Evaluation</b>					
52	Develop data collection protocols and instruments	WMATA, Arlington, Alexandria, others	3	6	13	16
53	Initiate field data collection	WMATA, Arlington, Alexandria, others	7	Contd.	17	Contd.
54	Verify adequacy of data collection	WMATA, Arlington, Alexandria, others	7	12	17	Contd.
55	Hold twice-yearly meetings	WMATA, Arlington, Alexandria, others	1	Contd.	1	Contd.
56	Prepare/submit evaluation report semi-annually, concurrent with operator coordination meetings scheduled for March & September	WMATA, Arlington, Alexandria, others	8	Contd.	20	Contd.

