Potomac Yard Multimodal Transportation Study

ALEXANDRIA, VA

PREPARED FOR:

CITY OF ALEXANDRIA VIRGINIA

PREPARED BY:

Kimley-Horn and Associates, Inc.

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Potomac Yard Multimodal Transportation Study
ALEXANDRIA, VA

REPORT

POTOMAC YARD MULTIMODAL TRANSPORTATION STUDY

Prepared for:

Department of Planning & Zoning
City Hall, 301 King Street, Room 4130
Alexandria, VA 22314

Prepared by:

Kimley-Horn and Associates, Inc.

13221 Woodland Park Road, Suite 400
Herndon, Virginia 20171

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Kimley-Horn and Associates, Inc.

Table of Contents

1. Introduction and Executive Summary **1**
1.1. Overview 1
1.2. Study Purpose 1
1.3. Public Involvement 2
1.4. Executive Summary 3

2. Background Information **8**
2.1. Study Area 8
2.2. Description of On-site Development 8
2.3. Description of Nearby Uses 10
2.4. Description of Existing Roadways 12
2.5. Description of Programmed Transportation Improvements 12

3. Analysis of Existing Conditions **13**
3.1. Introduction 13
General Transportation Issues 13
3.2. Street Network 14
Study Area Streets 14
Street Descriptions 14
Study Intersections 16
Traffic Data 18
Intersection Capacity Analysis 19
US Route 1 Corridor Travel Times and Speeds 22
3.3. Transit Network 24
3.4. Pedestrian and Bicycle Network 27
Pedestrian Network 27
Bicycle Network 32
3.5. Parking 34
3.6. Summary 34

4. 2030 Future Conditions without Development **35**
4.1. 2030 Future Transportation Network without Development 35
4.2. 2030 Future Traffic Volumes without Development 38
2030 Base Turning Movement Volumes 38
Traffic Due to Nearby Approved and Unbuilt Developments 40
2030 Future Traffic Volumes without Development 40
4.3. 2030 Future Conditions without Development Capacity Analysis 42
Intersection Capacity Analysis 42
US Route 1 Corridor Travel Times and Speeds 43
Impact on Local Streets 44
4.4. Conclusions on 2030 Future Conditions without Development 44

5. Traffic Modeling Process and Methodology **45**
5.1. Existing Potomac Yard Trips to be Removed 45
5.2. Transportation Analysis Zones 46
5.3. Person Trip Generation 46

5.4. Mode Choice Assumptions 49
5.5. Internal Trips 49
5.6. Mode Split 50
5.7. Pass-by Trips 51

6. Site Trip Distribution and Assignment 53
6.1. Trip Distribution 53
6.2. Trip Assignment 53

7. 2030 Future Conditions with Potomac Yard Development in Landbays F and L 54
7.1. 2030 Future Transportation Network with Development 54
7.2. 2030 Future Traffic Volumes with Development 57
7.3. 22030 Future Conditions with Development Capacity Analysis 57
Intersection Capacity Analysis 57
US Route 1 Corridor Travel Times and Speeds 60
Impact on Local Streets 61
7.4. Conclusions on 2030 Future Conditions with Potomac Yard Development 62

8. Multimodal Transportation Recommendations 63
8.1. Best Practices for Transportation In Urban Environments 63
Alexandria's Transportation Vision and Master Plan 62
Transportation Planning Concepts and Best Practices 64
Citywide Experience 68
Regional Experience 69
8.2. Transportation Demand Management 70
Background 70
Recommendations 72
8.3. Street Network 73
Background 73
Recommendations 75
8.4. Traffic Calming 78
Background 78
Recommendations 79
8.5. Transit Network 81
Background 81
Recommendations 81
8.6. Pedestrian and Bicycle Network 85
Background 85
Recommendations 85
8.7. Parking 89
Background 89
Recommendations 90
8.8. Phasing of Improvements 92
Background 92
Phase Analysis 92
Phased Recommendations 94

Appendix

1.0 Introduction and Executive Summary

1.1 Overview

Potomac Yard is one of the most important redevelopment properties in Alexandria. The City is developing a small area plan, which will focus on the northernmost parcel of Potomac Yard, an approximately 70-acre site currently occupied by big-box retail.

A century ago, Potomac Yard was one of the busiest railroad yards in the eastern United States. By the 1980s, rail operations ceased and planning began for redevelopment of the site. Along with the completion of a significant environmental cleanup program in the late 1990s, initial redevelopment included the construction of retail stores within an automobile-dependent site design on the northernmost parcel.

To supplement the current Potomac Yard approvals and zoning, the City is preparing a small area plan that will consider proposed redevelopment and rezoning for Landbay F (±70 acres). As a part of the small area plan, this multimodal transportation analysis is being prepared to study existing and future transportation conditions that will support the vision of the small area plan in the context of a redeveloped North Potomac Yard.

This report documents existing transportation conditions, future conditions without development including the planned transportation improvements and nearby development, analysis of conditions with development, and potential transportation improvements. The study report makes recommendations for future conditions for transportation demand management, streets, transit, bicycles, pedestrians, and parking related to Landbay F.

1.2 Study Purpose

This study was performed concurrently with the land use plan development effort for North Potomac Yard to make recommendations for the future multimodal transportation network. The resulting transportation recommendations will become an appendix to the North Potomac Yard Small Area Plan (Landbay F). This study also will be used to comply with Virginia Department of Transportation (VDOT) traffic study requirements under Chapter 527 of the 2006 Code of Virginia.

1.3 Public Involvement

Meaningful public involvement is important in developing community-focused transportation plans. A community's citizens have an intimate knowledge of the places where they live and travel and of the transportation problems they encounter. To make sure the transportation plan considered citizen concerns and interests, input was solicited from the general public as well as through the Potomac Yard Planning advisory committee, City staff, and various stakeholders. The advisory group involved in the planning and public workshops held during the process are described below.

Potomac Yard Plan Advisory Group

In the development of the Potomac Yard Small Area Plan, City staff, and the consultant team were advised by the Potomac Yard Planning Advisory Group (PYPAG), established to guide the planning process. The team will be informed also by the Potomac Yard Metrorail Station Feasibility Work Group, which explored the technical and financial feasibility of constructing a new Metrorail station to serve Potomac Yard.

PYPAG Transportation Subcommittee

This subcommittee was formed to focus on transportation aspects of the planning process. The subcommittee's stated purpose was, "*To focus PYPAG involvement in the Potomac Yard Multimodal Transportation Study, in support of the development of the City's Small Area Plan for Potomac Yard.*" Members of the subcommittee had a set of responsibilities that included:

1. *Providing initial input to City staff and transportation consultant*
   - *Verify transportation needs in Potomac Yard, including multimodal access and relationships to adjacent landbays and neighborhoods (meeting/walkthrough)*
   - *Validate existing conditions, as described in the "Existing Transportation Conditions Summary" (to be developed as part of the study)*
2. *Reviewing and participating in the transportation analysis*
   - *Provide feedback on the findings from the analysis of existing and future transportation conditions*
   - *Participate in the development of recommendations on multimodal transportation solutions, including, but not limited to: streets, sidewalks, trails, transit routes, Metro station, parking, and travel demand management*
3. *Articulating study results to PYPAG and Alexandria citizens*
   - *Participate in presentation of transportation study results at PYPAG meetings*
   - *Advocate for transportation solutions as integral pieces of overall Potomac Yard Small Area Plan*

Public Workshop

A public workshop was conducted on January 31, 2009.

PYPAG Transportation Subcommittee field visit focused on existing conditions

1.4 Executive Summary

Site Location

Potomac Yard is located in the northeast corner of Alexandria. Arlington County and Four-Mile Run are immediately north, the Potomac River is to the east, Old Town Alexandria is to the south, and the residential neighborhoods of Del Ray and Lynnhaven are to the west. Potomac Yard is shown in the regional context in **Figure 1-1: Regional Context**. Landbay F is located in the north of Potomac Yard. Its location relative to other landbays in Potomac Yard is shown in **Figure 1-2: Potomac Yard Landbays**.

Description of Proposed Development

The land use scenario contained in the Master Plan may vary slightly in the type and location of density within the overall Potomac Yard site; however, it will be within an order of magnitude of the overall density analyzed in this study. The development analyzed in this transportation study for Potomac Yard Landbay F is as follows:

- Hotel: 300 rooms
- Office: 1,475,000 square feet (sf)
- Residential Units: 4,750 dwelling units (apartments and condominiums)
- Retail
  - 170,000 sf large-format retail
  - 70,000 sf grocery store
  - 670,000 sf specialty retail
  - 90,000 sf movie theater

The proposed development program for Landbay F described in the aforementioned will replace the existing large-format retail, specialty retail, and movie theater that currently exist on the site. The following possible future development in Potomac Yard Landbay L also was considered for this transportation study and is included in the future conditions analysis:

- Residential Units: 1,000 dwelling units (apartments and condominiums)
- Specialty Retail: 10,000 sf

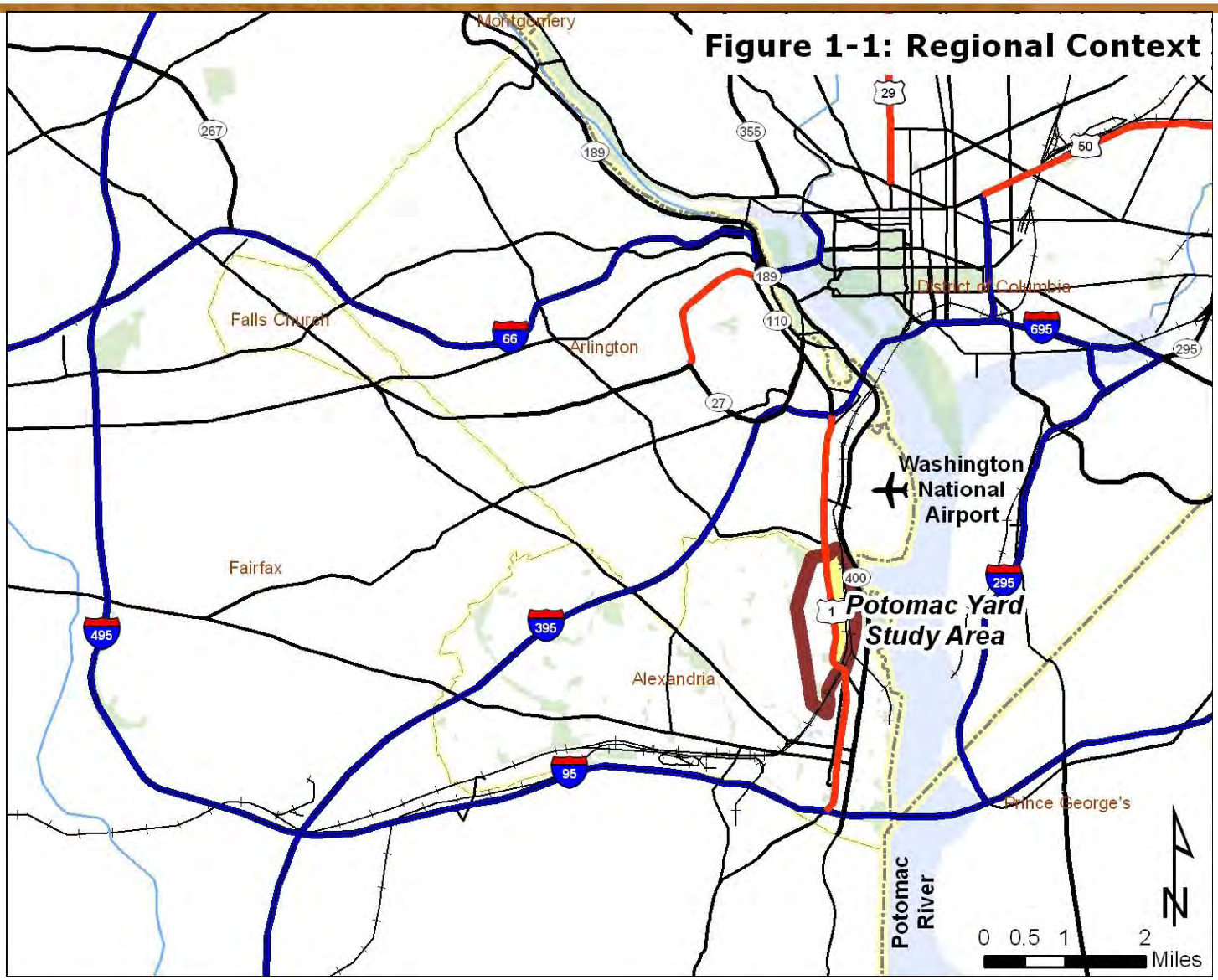


Figure 1-1: Regional Context

Figure 1-2: Potomac Yard Landbays

Principal Findings, Conclusions, and Recommendations

Existing Conditions - Existing transportation conditions in the study area vary. The existing retail center's auto-dependent configuration supports a limited number of transportation choices and many of the major street corridors in the study area are focused on moving automobiles. Intersection level of service (LOS) analyses show that most study area intersections operate acceptably.

Potomac Yard is served by transit services that include Metrorail, Metrobus, City bus services, and paratransit. The study area is proximate to regional trails including the Four-Mile Run trail and the Mount Vernon Trail.

2030 Future Conditions without Development - The analysis of 2030 future conditions without development considers the combined effects of the addition of approved unbuilt development, regional traffic growth, and programmed transportation improvements. Based on a review of VDOT data, daily traffic volumes on study area streets have not increased since 2001. Programmed transportation improvements include Potomac Avenue, an interconnected street grid in Potomac Yard between Landbays F and L, new trail connections, and the Crystal City/Potomac Yard Transitway. Findings from this analysis indicate that intersections along US 1, Mount Vernon Avenue, and Commonwealth Avenue are nearing capacity.

Key Assumptions - The analysis of 2030 future conditions with development considers the combined effects of the subtraction of existing Potomac Yard trips, the addition of trips from the proposed development, and recommended transportation improvements. Vehicular trips generated by the proposed development were calculated based on assumptions regarding internal trip-making, mode split, pass-by, and trip distribution.

The proposed transportation network within Potomac Yard Landbay F includes pedestrian and bicycle facilities, an interconnected network of streets, Potomac Avenue, the Crystal City/Potomac Yard Transitway, and a future Metrorail station. The proposed transportation network described in the Master Plan may vary slightly in the specific Landbay F street network, Transitway alignment, and Metrorail station configuration; however, it will result in similar future transportation conditions as those analyzed in this study. With the combination of an intentionally planned and designed compact mixed-use development, many convenient multimodal transportation options, a strong transportation demand management program, and parking management, the redevelopment of Potomac Yard will generate trips at a much lower rate per square foot than the existing retail center. Within the adjacent neighborhoods, traffic calming measures are recommended to preserve desirable street characteristics and minimize local street attractiveness for non-local traffic.

2030 Future Conditions with Development - With the recommended multimodal transportation network, most intersections will operate acceptably as shown in **Table 1-1**.

Table 1-1
Intersection Levels of Service (LOS) and
Average Delay in Seconds for Weekday PM Peak Hour

Intersection	Existing Conditions	2030 Future Conditions without Development	2030 Future Conditions with Development
1. US 1 and S. Glebe Road	C (29)	C (32)	C (29)
2. US 1 and driveway (near Four-Mile Run)	C (22)	C (23)	B (13)
3. US 1 and future Crescent Place	N/A	N/A	A (7)
4. US 1 and future Lincoln Avenue	N/A	N/A	A (8)
5. US 1 and E. Reed Avenue	C (22)	E (71)	E (67)
6. US 1 and future Diamond Avenue	N/A	N/A	A (3)
7. US 1 and Evans Lane	C (24)	B (17)	B (15)
8. US 1 and future Wesmond Drive	N/A	N/A	B (11)
9. US 1 and E. Glebe Road	D (37)	F (83)	F (94)
10. US 1 and Hume Avenue	A (1)	A (3)	A (2)
11. US 1 and Swann Avenue	A (2)	A (6)	A (6)
12. US 1 and E. Custis Avenue	A (2)	A (5)	A (4)
13. US 1 and E. Howell Avenue	A (2)	B (14)	B (12)
14. US 1 and existing E. Monroe Avenue/future Potomac Avenue	E (63)	C (28)	E (63)
15. US 1 and Slaters Lane	B (15)	B (17)	B (17)
16. Commonwealth Avenue and E. Glebe Road	B (11)	B (11)	B (17)
17. Commonwealth Avenue and Mt. Vernon Avenue	A (6)	C (31)	D (37)
18. Mt. Vernon Avenue and E. Braddock Road	B (13)	C (32)	C (33)
19. Potomac Avenue and future Crescent Drive	N/A	N/A	A (0)
20. Potomac and future Lincoln Avenue	N/A	N/A	A (9)
21. Potomac Avenue and future Reed Avenue	N/A	N/A	A (8)
22. US 1 and future Diamond Avenue	N/A	N/A	A (9)
23. Potomac Avenue and future Evans Lane	N/A	N/A	A (5)
24. Potomac and future Wesmond Drive	N/A	N/A	A (3)
25. Potomac Avenue and E. Glebe Road	N/A	C (21)	A (9)

* Future conditions assume the construction of the transitway on US 1, Diamond Road, and Potomac Avenue
** Under Future Conditions with Development, US 1 signals are timed with lead-lag left turns and coordinated with 140-second cycle length. Potomac Avenue is timed with coordinated, 90-second cycle length signals.
*** See transportation analysis appendix for further discussion of intersection LOS analysis
Source: Kimley-Horn and Associates, Inc.

The results of the intersection capacity analysis in **Table 1-1** show that with the exception of the following intersections, study area intersections will operate acceptably:

- US 1 and E. Reed Avenue: LOS E
- US 1 and E. Glebe Road: LOS F
- US 1 and Potomac Avenue: LOS E

Additional intersection lanes or a better balanced distribution of traffic among all intersections and streets along US 1 would allow for traffic to be accommodated acceptably. The additional north-south capacity created by adding Potomac Avenue, the improvement of US 1 through the provision of left turn lanes at intersections, the improvement to side-street approaches to intersections, and US 1 signal retiming and coordination will help to offset the effects of increased traffic volumes.

Phasing Analysis - An analysis was completed to estimate the quantity of development that could be accommodated by the street network within each of the three phases of transportation infrastructure implementation. Assuming that the transitway and Metrorail station represent the most significant transportation investments, the following three phases of implementation were developed:

- Phase 1: Prior to transitway and Metrorail station
- Phase 2: Transitway fully implemented and operational
- Phase 3: Transitway and Metrorail station implemented and operational

The phasing analysis was based on considerations such as traffic volumes, other development in the area, trip-making characteristics of differing levels of development, and major road improvements. Levels of development which can be accommodated within each phase are summarized in the following:

- **Phase 1: Prior to transitway and Metrorail station –** 0.50 floor area ratio (FAR) assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario. As density levels on Landbay F increase to meet or exceed 0.50 FAR, high-frequency local transit services would need to be operated to either the Braddock Road or Crystal City Metro stations and the transitway would need to begin substantial construction with the intention of reaching completion and operational status prior to overall densities in Landbay F meeting or exceeding 0.75 FAR.
- **Phase 2: Transitway implemented and operational –** 0.75 FAR assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario. As density levels on Landbay F increase to meet or exceed 1.25 FAR, services on the transitway would need to be in full operation with service frequencies and duration similar to Metrorail service. At the same time, the Potomac Yard Metrorail station would need to be under construction with the intention of reaching completion and operational status prior to overall development densities in Landbay F meeting or exceeding 1.25 FAR.
- **Phase 3: Transitway and Metrorail station implemented and operational** – 1.25 FAR assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario

2.0 Background Information

2.1 Study Area

Potomac Yard is located in northeast Alexandria. The study area encompasses the existing and future network of streets bounded by the following:

- Mount Vernon Avenue and Commonwealth Avenue on the west (from Braddock Road on the south end of this corridor to Four-Mile Run on the north end)
- CSX/Metrorail corridors (Potomac Yard limits) on the east
- Four-Mile Run on the north
- Braddock Road from Mount Vernon Avenue to Wythe Road on the south

The Potomac Yard area and project study area are shown in **Figure 2-1: Study Area**.

2.2 Description of On-site Development

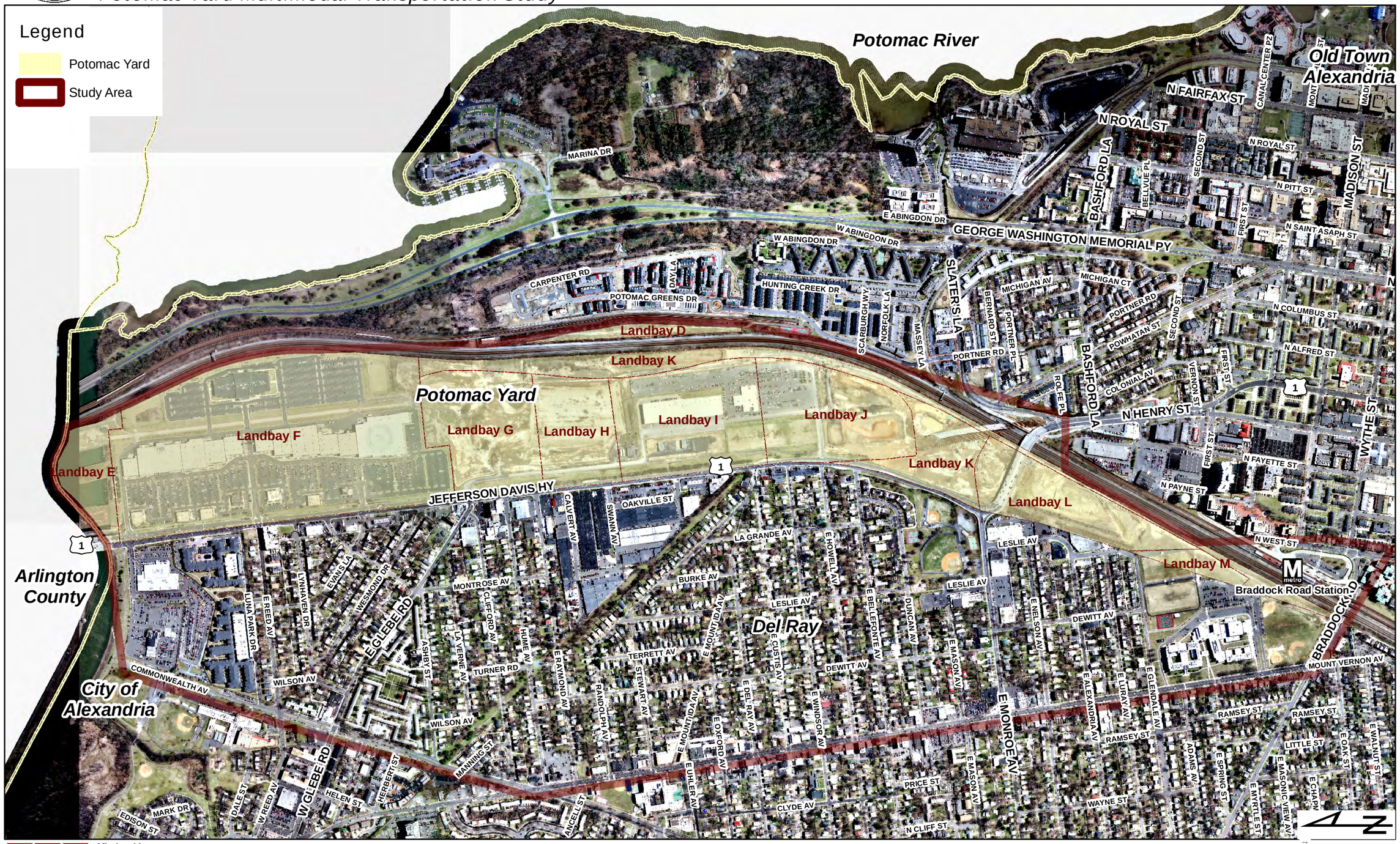
Potomac Yard is currently zoned as a Coordinated Development District (CDD). As defined by the City of Alexandria, CDDs are established for large areas that will have significant development related impacts on the City and require coordination among multiple property owners. CDDs are used to promote development consistent with the city's master plan. Potomac Yard is part of the Potomac Yard/Potomac Greens Small Area Plan and CDD #10, which was approved by City Council on October 16, 1999 along with a Concept Plan and associated conditions. The Concept Plan describes the total acreage, proposed uses and maximum densities, and minimum open space requirements for each landbay. Approved development levels for the entire CDD are the following:

Existing Potomac Yard Retail Center

- Hotel: 623 hotel rooms (an estimated 456,250 sf @ 650 sf/room +50 ,000 sf)
- Office: 1.9 million sf
- Residential units: 2,200 dwelling units (an estimated 3.3 million sf @ 1,500 sf/unit)
- Retail: 824,000 sf
- Total development: about 6.5 million sf

For Landbay F, the concept plan permitted a maximum of 600,000 sf of retail. Landbay F currently contains large-format retail, specialty retail, and a movie theater. **Figure 2-2**: **Existing Potomac Yard Land Use** shows the existing land use in Potomac Yard.

Figure 2-1: Study Area



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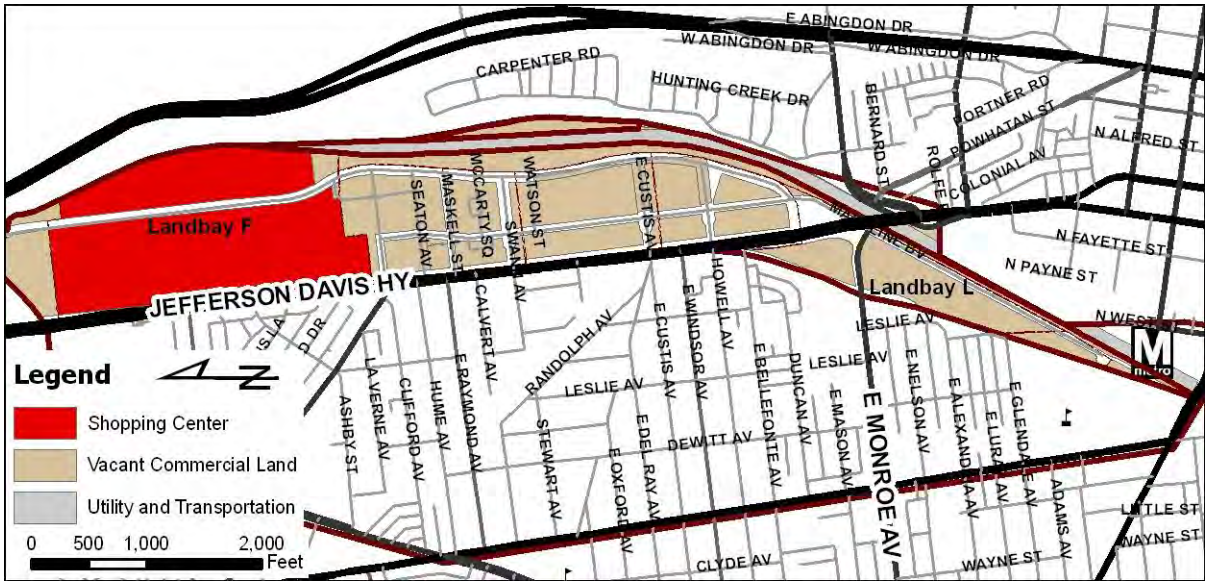


Figure 2-2: Existing Potomac Yard Land Uses

2.3 Description of Nearby Uses

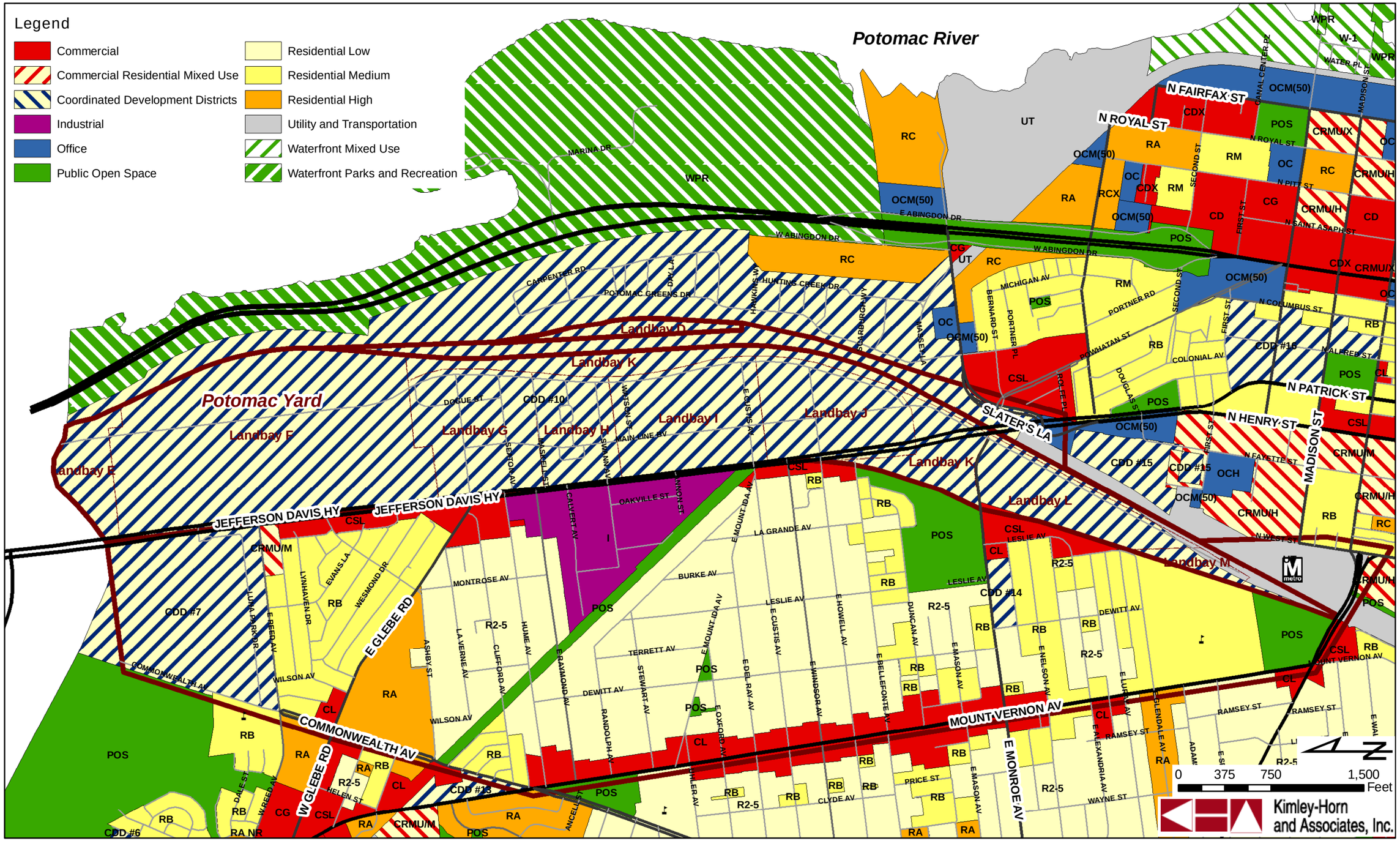
Potomac Yard is bordered by residential, commercial, industrial, and institutional land uses. The existing zoning in the vicinity of Potomac Yard is shown in **Figure 2-3: Existing Zoning**[1].

Since the approval of the CDD in 1999, on June 14, 2008 City Council approved the following:

- A transfer of 765,000 sf of office gross floor area from Landbay J and Landbay L to Landbay H. Landbay H had previously been approved for the development of townhouses.
- The plan for the development of linear park – Landbay K. Landbay K is a 24 acre open space generally located between Potomac Avenue and the railroad tracks. It is intended to provide passive and active recreation opportunities such as pedestrian paths, playgrounds serving multiple age groups, and active recreation facilities such as basketball and tennis courts and soccer fields.
- Plans for Potomac Yard rail park, dog park, and the pedestrian bridge. The rail park is located between the railroad and Metro tracks near Potomac Avenue and Potomac Greens. The dog park was approved for a location on Monroe Avenue west of the US 1 Monroe Avenue Bridge. The pedestrian bridge was approved to extend from Potomac Greens across the Metrorail and railroad tracks to the linear park west at Potomac Avenue and the Town Center.

[1] City of Alexandria 2009 Zoning map and City of Alexandria 2009 GIS data

Figure 2-3: Existing Zoning



2.4 Description of Existing Roadways

The existing street network examined as part of this study includes major streets such as US 1, E. Braddock Road, and Mount Vernon Avenue as well as the local street grid in Del Ray. A brief description of the area street system is included in **Chapter 3, Section 2: Study Area Roadways**.

2.5 Description of Programmed Transportation Improvements

US 1 Monroe Avenue Bridge

New US 1 Monroe Avenue Bridge

A new bridge was constructed over Monroe Avenue on US 1. The new US 1 Monroe Avenue Bridge has a straightened alignment. The project was completed as a part of the Potomac Yard development plan for Landbays G, H, I, and J. The new bridge provides four travel lanes and two dedicated turning lanes. In addition, a multiuse pedestrian/bicycle facility is provided on the east side of the bridge and a sidewalk will be located on the west side of the bridge. This transportation study was started prior to the bridge being completed.

US 1 Widening for Transit

As a part of planned redevelopment in Landbay F, right-of-way will be dedicated and improved for US 1 to be widened to accommodate transit lanes to support the Crystal City/Potomac Yard Transitway. No widening is programmed to increase the number of general purpose vehicle travel lanes.

Crystal City/Potomac Yard (CCPY) Transitway

The CCPY Transitway will travel through Potomac Yard and extend to Crystal City on the north and the Braddock Road Metrorail Station on the south. The concept of dedicated right-of-way for transit was adopted by the Alexandria City Council under the Transportation Master Plan. The future transit service is envisioned to operate efficiently within dedicated lanes to the maximum extent feasible. The initial service concept for the CCPY corridor is bus rapid transit; however, as demand and usage increase, conversion to streetcar or similar rail transit is possible.

Bicycle and Pedestrian Improvements

As part of the Potomac Yard development plan for Landbays G, H, I, and J, a multi-use trail will be constructed in Potomac Yard Park. A pedestrian bridge also will be provided from Potomac Yard Park across the railroad tracks to Potomac Greens.

3.0 Analysis of Existing Conditions

3.1 Introduction

This chapter of the report examines the existing multimodal transportation conditions in the Potomac Yard area. Included are descriptions of existing transportation issues, the street network, transit network, and bicycle/pedestrian networks.

General Transportation Issues

Understanding existing general transportation issues proximate to Potomac Yard provides a basis for creating an optimal multimodal transportation system for the future. Most of the existing transportation issues are related to the existing auto-centric Potomac Yard development. The existing retail center's auto-dependent configuration supports a limited number of transportation choices. The transportation issues in the study area include the following:

Existing US 1 Crosswalk at Swann Avenue

- US 1 caters almost exclusively to automobiles. Serving as a major regional facility, US 1 handles high traffic volumes and traffic signals are configured to progress through traffic and minimize green-time for side streets.
- US 1 is a barrier for pedestrians and bicyclists. There is little pedestrian and bicycle activity between Potomac Yard and Del Ray and Lynnhaven. While sidewalks, crosswalks, and pedestrian signals are provided at some intersections, the configuration of development in Potomac Yard is not inviting for pedestrians or bicyclists.

US 1 and Howell Avenue

- Gaps exist in the bicycle and pedestrian networks. There are regional multi-use trails such as Four-Mile Run and the Mount Vernon Trail in the vicinity of the study area; however, direct access to these trails does not exist.
- Potomac Yard is not designed to engage transit use. A number of bus routes serve Potomac Yard; however, the availability of parking and lack of facilities discourages transit use.
- Abundance of surface parking. The visibility and size of the parking lots is an indication to the user that the development is automobile-oriented.

3.2 Street Network

The existing street network examined as part of this study includes major roadways such as US 1, E. Braddock Road, and Mount Vernon Avenue as well as the local street grid in Del Ray and Lynnhaven. The following is a brief description of the area street system, study intersections, and intersection operations.

Study Area Streets

Classification

Alexandria uses a functional classification system to characterize its streets based on connectivity and access. The classifications align with the functional classifications of the Federal Highway Administration (FHWA) and VDOT. Alexandria's system consists of expressways, arterials, primary collectors, residential collectors, and local streets. These are described briefly in the following:

- ***Expressways*** are controlled access facilities and provide movement for high volumes of people and goods over long distances. They do not provide access to adjacent properties.
- ***Arterials*** serve as primary links in Alexandria and to surrounding communities. Access is provided to adjacent land on a limited basis. Measures such as preferential signalization, signal progression, and linear continuity are provided on these streets. Arterials also may provide dedicated transit lanes.
- ***Primary Collectors*** provide access to major adjacent properties such as neighborhood shopping centers, mixed use hubs, and high schools. Primary collectors carry a mix of local and long-distance travel and link arterials.
- ***Residential Collectors*** carry relatively short trips and a large percentage of residential trips. They provide direct service to residential areas, local parks, neighborhoods, businesses, and schools. They connect local streets to higher classified streets.
- ***Local Streets*** provide direct access to homes, shopping, businesses, and other adjacent land. The local streets connect to collector streets and cut through traffic should be discouraged. For more information regarding the City of Alexandria's functional classification system, refer to the City of Alexandria's 2008 *Comprehensive Transportation Master Plan*.

Street Descriptions

US 1 – Looking south at Reed Avenue

US 1: US 1 is a north-south arterial that connects Alexandria to the Metropolitan Washington Region. To the north, US 1 connects to Arlington County, Washington, D.C., and Maryland. To the south, US 1 connects to Old Town Alexandria, Fort Belvoir, and Richmond. US 1 generally parallels I-95 along the entire Eastern seaboard. North of Slaters Lane, US 1 also referred to as Jefferson Davis Highway is primarily a four-lane divided street with signals at major intersections and left-turn lanes at most intersections.

E. Braddock Road: Braddock Road is an east-west arterial between Commonwealth Avenue and N. West Street. Braddock Road connects between the northwestern Alexandria neighborhoods, the Braddock Road Metrorail station, and Old Town Alexandria. Between Mount Vernon Avenue and N. West Street, E. Braddock Road has a four-lane divided cross-section. West of Mount Vernon Avenue, it has a two-lane divided cross-section with on-street parking on both sides of the road.

Mount Vernon Avenue: Mt. Vernon Avenue is a north-south arterial between Commonwealth Avenue and E. Braddock Road. North of Commonwealth Avenue, Mt. Vernon Avenue is a primary collector street. Mt. Vernon Avenue is an important corridor for the Del Ray community of the City of Alexandria. In the study area, it has a two-lane undivided cross-section with on-street parking on both sides.

Commonwealth Avenue: Commonwealth Avenue is a north-south primary collector street between Reed Avenue and King Street. Commonwealth Avenue connects for the Del Ray community. Between Reed Avenue and Ashby Street, it has a two-lane divided cross-section with on-street parking on both sides of the street. Between Ashby Street and Mount Vernon Avenue, Commonwealth Avenue has a two-lane undivided cross-section.

E. Glebe Road: Glebe Road is an east-west primary collector connecting to S. Glebe Road in Arlington County and US 1 in Alexandria. In the study area, E. Glebe Road has a two-lane undivided cross-section and accommodates on-street parking on one or both sides.

E. Monroe Avenue: Monroe Avenue is an east-west primary collector street between Mount Vernon Avenue and US 1. Monroe Avenue provides an important connection between Russell Road and US 1. In the study area, E. Monroe Avenue has a two-lane undivided cross-section with on-street parking.

Slaters Lane: Slaters Lane is an east-west primary collector street between US 1 and the George Washington Memorial Parkway. In the study area, Slaters Lane has a four-lane undivided cross-section.

E. Reed Avenue: Reed Avenue is an east-west residential collector connecting Mount Vernon Avenue and US 1 in the Del Ray community of the City of Alexandria. In the study area, E. Reed Avenue has a two-lane undivided cross-section with on-street parking.

Local Streets: Evans Lane, Hume Avenue, Swann Avenue, Custis Avenue, and Howell Avenue are all classified as local streets. These streets provide access to property in Del Ray and Lynnhaven. Between Commonwealth Avenue, Mount Vernon Avenue, and US 1, these roads generally accommodate a two-lane undivided cross-section with on-street parking.

Study Intersections

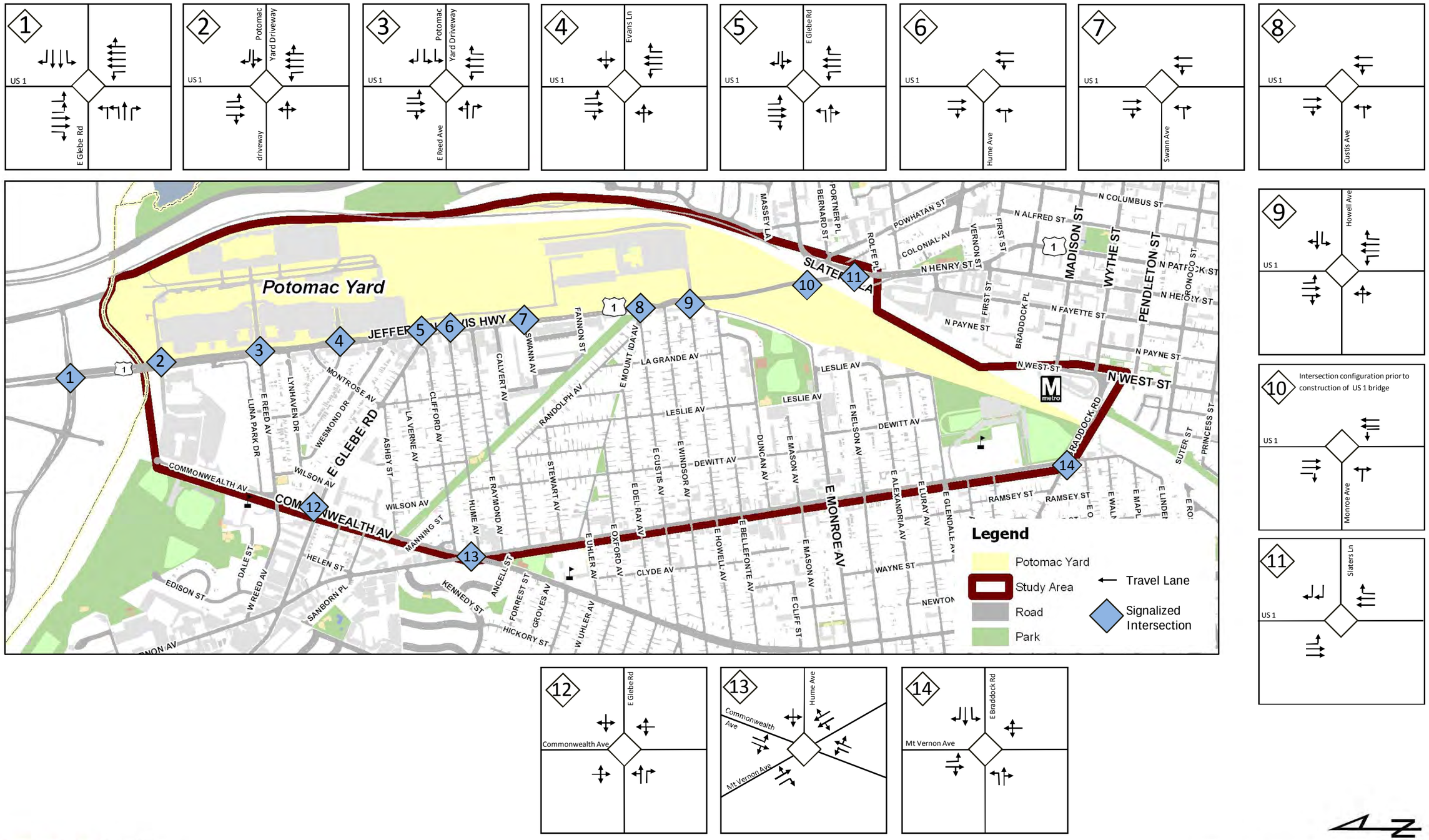
The vehicular impact of the Potomac Yard development was considered quantitatively for a specific set of signalized existing and future signalized intersections. The impact of development also was studied qualitatively for other intersections in the study area. Existing intersections identified for quantitative study are the following:

1. US 1 and S. Glebe Road (in Arlington County)
2. US 1 and Potomac Yard driveway (near Four-Mile Run)
3. US 1 and E. Reed Avenue/Potomac Yard driveway
4. US 1 and Evans Lane/Potomac Yard driveway
5. US 1 and E. Glebe Road/Potomac Yard driveway
6. US 1 and Hume Avenue
7. US 1 and Swann Avenue
8. US 1 and E. Custis Avenue
9. US 1 and E. Howell Avenue/Potomac Yard driveway
10. US 1 and E. Monroe Avenue
11. US 1 and Slaters Lane
12. Commonwealth Avenue and E. Glebe Road
13. Commonwealth Avenue and Mount Vernon Avenue
14. Mount Vernon Avenue and E. Braddock Road

Each of these study intersections is signalized. The existing laneage at the study intersections is shown in **Figure 3-1: Existing Intersection Laneage and Traffic Control**.

Potomac Yard Multimodal Transportation Study

Figure 3-1: Existing Intersection Laneage and Traffic Control



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Traffic Data

Traffic data used for this study includes traffic counts conducted in January and February of 2009 by Kimley-Horn and Associates, Inc. and counts performed in previous studies. This data was used to establish current weekday PM peak hour traffic conditions. The PM peak hour was selected for the analysis in this study since it represents a condition with significant commuter traffic and considerable retail traffic. A review of existing traffic counts shows that there are heavier vehicle turning movements at some intersections in the weekday AM or Saturday peak hours than in the weekday PM peak hour. This stated, the weekday PM peak hour was still found to experience the highest overall traffic volumes.

The 2009 count data was compared with count data from the 2004 Potomac Yard Infrastructure Traffic Analysis and the 2007 Potomac Village Traffic Analysis. The comparison found that traffic volumes did not change significantly between 2004, 2007, and 2009. VDOT Daily Traffic Volume Estimates from 2004 through 2007 (most recent available) confirm that traffic volumes along US 1 did not increase. In 2004, VDOT reported an annual average daily traffic volume of 41,000 vehicles per day. In 2007, VDOT reported an annual average daily traffic volume of 40,000 vehicles per day. The demonstrated stabilization of traffic volumes along the corridor is consistent with the experience of little new development being completed in the vicinity of the study area and the US 1 Monroe Avenue Bridge construction.

A detailed comparison of weekday PM peak hour turning movement count data from 2009 and 2004 (Potomac Yard Infrastructure Traffic Analysis) showed that the southbound US 1 through traffic volume (peak direction traffic in the weekday PM peak hour) increased negligibly in this period. The northbound US 1 through traffic volume increased by approximately 150 vehicles per hour.

To adjust the data to 2009, the Potomac Yard Infrastructure Traffic Analysis weekday PM peak hour counts were increased by 150 vehicles in the northbound trough direction. Southbound US 1 through volumes and left and right turning movements to and from US 1 were not adjusted.

The following list is a summary of the data source for existing traffic counts at each of the study intersections:

1. US 1 and S. Glebe Road	2008 Crystal City Multimodal Transportation Study
2. US 1 and Potomac Yard driveway	2007 Potomac Village Traffic Analysis
3. US 1 and E. Reed Avenue/Potomac Yard driveway	2007 Potomac Village Traffic Analysis
4. US 1 and Evans Lane/Potomac Yard driveway	2007 Potomac Village Traffic Analysis
5. US 1 and E. Glebe Road/Potomac Yard driveway	2007 Potomac Village Traffic Analysis

6. US 1 and Hume Avenue	2004 Potomac Yard Infrastructure Traffic Analysis
7. US 1 and Swann Avenue	2004 Potomac Yard Infrastructure Traffic Analysis
8. US 1 and E. Custis Avenue	2004 Potomac Yard Infrastructure Traffic Analysis
9. US 1 and E. Howell Avenue/Potomac Yard driveway	2004 Potomac Yard Infrastructure Traffic Analysis
10. US 1 and E. Monroe Avenue*	2004 Potomac Yard Infrastructure Traffic Analysis
11. US 1 and Slaters Lane	January 2009 counts and Potomac Yard Infrastructure Traffic Analysis
12. Commonwealth Avenue and E. Glebe Road	January 2009 counts
13. Commonwealth Avenue and Mt. Vernon Avenue	January 2009 counts
14. Mt. Vernon Avenue and E. Braddock Road	January 2009 counts

*Reflects condition where Monroe Avenue is open to traffic prior to US 1 bridge construction

Raw traffic count data is provided in **Appendix A**.

Intersection Capacity Analysis

Intersection capacity analyses were conducted using existing weekday PM peak hour turning movement volumes for study intersections. The capacity analyses were conducted using Synchro, which utilizes methodologies contained in the *Highway Capacity Manual, 2000 Edition* (HCM) for signalized and unsignalized intersections. According to the HCM, capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a fixed time duration. Operating conditions are described by level of service (LOS), which is a qualitative measure that describes operational conditions of an intersection or roadway and motorist perceptions within a traffic stream. The HCM defines six levels of service, LOS A through F, with A being the best and F the worst. **Table 3-1** shows levels of service and the ranges of delay per vehicle for intersections signalized and unsignalized. Alexandria's goal is to maintain an overall LOS D or better during peak traffic periods.

Table 3-1: Level of Service and Ranges of Delay		
Level of Service (LOS)	Delay per Vehicle (seconds)	
	Signalized Intersections	Unsignalized Intersections
A	≤ 10	0-10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: *Highway Capacity Manual, 2000 Edition*

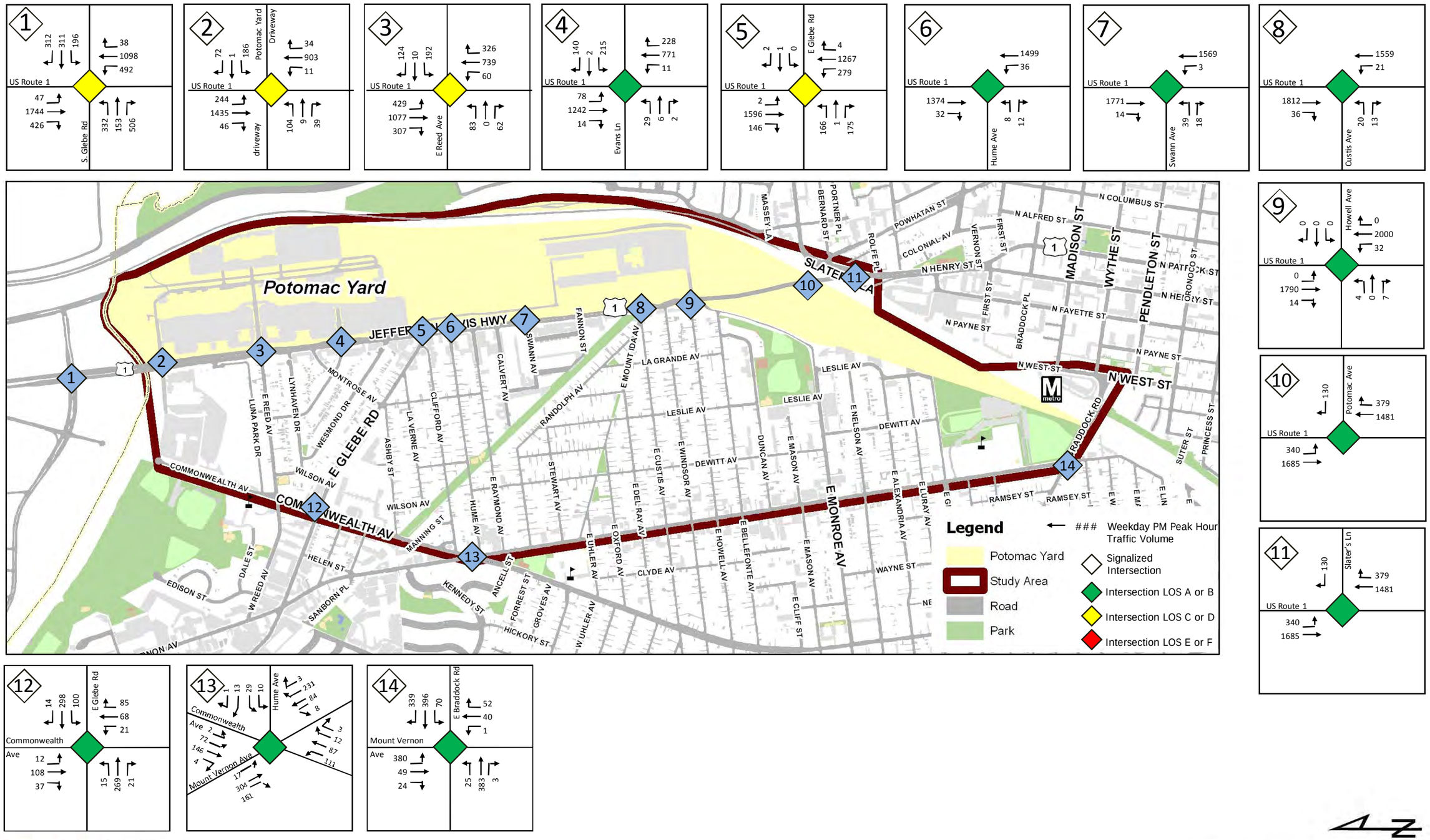
Existing conditions analyses were based on existing weekday PM peak hour turning movement volumes, existing laneage, and existing traffic control at the study intersections. Results of the intersection capacity analyses are summarized in **Table 3-2** and **Figure 3-2: Intersection Volumes and Levels of Service**. A table showing the existing levels of service by lane group is provided in **Appendix B**. The Synchro HCM reports with existing levels of service are provided in **Appendix C**.

Table 3-2: Existing Conditions Intersection Levels of Service (LOS) and Average Delay for the Weekday PM Peak Hour	
Signalized Intersection	LOS (sec/veh)
1. US 1 and S. Glebe Road	C (31)
2. US 1 and Potomac Yard driveway (near Four-Mile Run)	C (23)
3. US 1 and E. Reed Avenue/Potomac Yard driveway	C (29)
4. US 1 and Evans Lane/Potomac Yard driveway	B (15)
5. US 1 and E. Glebe Road/Potomac Yard driveway	C (28)
6. US 1 and Hume Avenue	A (2)
7. US 1 and Swann Avenue	A (3)
8. US 1 and E. Custis Avenue	A (1)
9. US 1 and E. Howell Avenue/Potomac Yard driveway	A (2)
10. US 1 and E. Monroe Avenue	B (19)
11. US 1 and Slaters Lane	B (16)
12. Commonwealth Avenue and E. Glebe Road	A (8)
13. Commonwealth Avenue and Mt. Vernon Avenue	C (31)
14. Mt. Vernon Avenue and E. Braddock Road	C (32)

*Reflects condition where Monroe Avenue is open to traffic prior to US 1 bridge construction
Source: Kimley-Horn and Associates, Inc.

Potomac Yard Multimodal Transportation Study

Figure 3-2: Existing Intersection Volumes and Levels of Service



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0 375 750 1,500 2,250 Feet

The analysis shows that most study intersections operate at acceptable levels of service under existing conditions. The intersection of US 1 and E. Monroe Avenue operated at an unacceptable LOS prior to the US 1 Monroe Avenue Bridge being completed.

The local street network to the west and south of Potomac Yard provide convenient opportunities for vehicle, pedestrian, bicycle, and transit travel due to the interconnected nature of the network. The interconnected network of streets allows for efficient dispersion of traffic allowing the unsignalized intersections to operate efficiently.

US 1 Corridor Travel Times and Speeds

There are many measures of effectiveness that can be used to benchmark or document the traffic operations of a street. These include level of service, amount of average delay, speed, length of traffic back-up (queue), and travel time. Travel time is a useful measure in documenting a corridor's performance as it is relatively easy to measure, straightforward to explain to a broad audience, and simple to compare from one year to another and between similar corridors under similar conditions during the course of time.

The weekday PM peak hour was used in the Potomac Yard evaluation since it represents the busiest period for major travel corridors serving Potomac Yard. A summary of PM peak hour average travel speed and time for the approximately 1.7-mile section of US 1 between S. Glebe Road and Slaters Lane is shown in the following:

- **Northbound:** 22.3 mph, 4.5 minutes
- **Southbound:** 20.9 mph, 5 minutes

As a benchmark for comparison, existing and future, Alexandria staff measured PM peak hour travel times for several important corridors in its urban core as shown in **Table 3-3**.

Table 3-3: Average PM Peak Hour Travel Speed and Time for Urban Roadways in Alexandria

Location/Direction	Average Travel Speed (mph)	Average Travel Time (in minutes for 1.7 miles*)
US 1 Southbound in Old Town	5.3	19.0
US 1 Northbound in Old Town	13.0	8.0
Washington Street Southbound	8.8	11.5
Duke Street (Westbound)	14.4	7.0
Duke Street (Eastbound)	11.6	9.0

* This is the equivalent time required to travel 1.7 miles, which is the same as the length of US 1 from S. Glebe Road to Slaters Lane
Source: City of Alexandria

During morning and afternoon peak hours, some back-ups occur on US 1; however, traffic congestion is not persistent. By contrast, conditions for bicycles and pedestrians are relatively poor, owing to the significant vehicular focus along the US 1 corridor and the lack of high-quality facilities and conditions. Currently, transit usage is low (compared to other parts of the city) along the corridor similarly owing to a vehicular focus along US 1 with regard to urban design, land use, and limited transit service.

The majority of traffic travels north/south along US 1 and correspondingly, traffic signal timings are devised to progress this traffic as efficiently as possible, while offering side-streets and pedestrians the minimum amount of time needed to serve demand reasonably. Currently, US 1 along Potomac Yard operates with reasonable levels of delay during normal weekday and weekend peak periods. Under average weekday peak period conditions, vehicles on US 1 do not wait through multiple signal cycles at normal intersections, traffic flows relatively steadily throughout the corridor, and travel speeds are moderate typical of an urban roadway. Based on field observations, travel speed is higher and travel time is less on US 1 in the Potomac Yard corridor than on other similar length and character urban corridors in Alexandria such as US 1 in Old Town, Washington Street, and Duke Street.

3.3 Transit Network

The Potomac Yard study area is directly served by commuter bus services. The area also is served indirectly by Metrorail and Virginia Railway Express. Existing transit services are shown in **Figure 3-3: Existing Transit Network** and described in the following:

Metrorail Services: **The** Potomac Yard study area is served by the Yellow and Blue lines via the Crystal City and Braddock Road stations. The Braddock Road station currently has some short-term vehicle parking, bicycle parking, and car sharing available in addition to being served by Metrobus and DASH. The Crystal City station currently has bicycle parking and car sharing available in addition to being served by Metrobus and ART.

Metrobus: Routes in the vicinity of the Potomac Yard study area are the following:

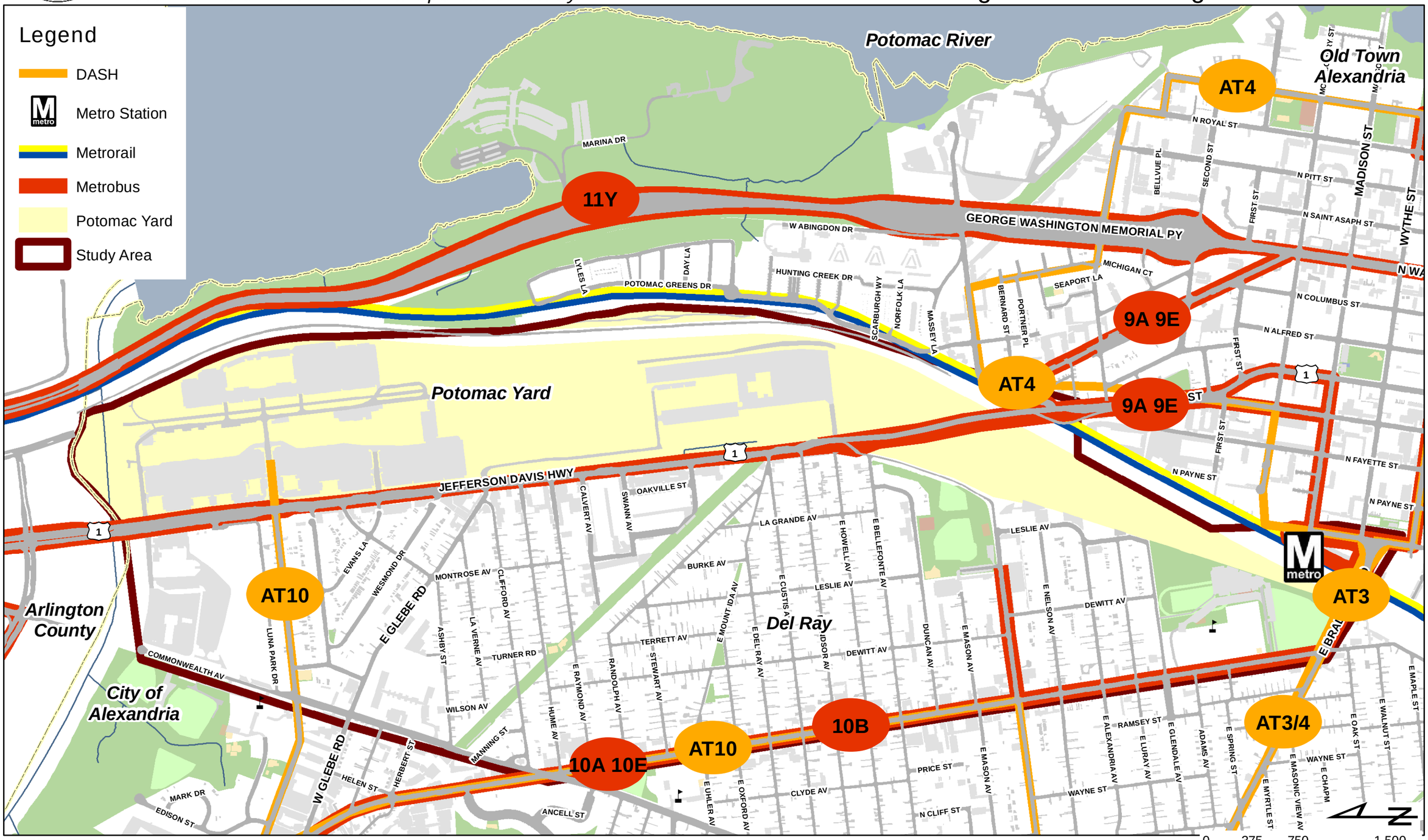
- Metrobus Routes 9A and 9E (Huntington – Pentagon Line) provides service between the Huntington, Braddock Road, and Pentagon Metrorail stations. Routes 9A runs through Old Town and Potomac Yard along US 1. Route 9A provides service every 30 minutes every weekday and Saturday and service every 40 to 60 minutes on Sunday. Route 9E runs from the Braddock Road to the Pentagon Metrorail station along US 1 and service is provided in the southbound direction during the weekday AM peak period and northbound direction during the weekday PM peak period.

- Metrobus Routes 10A and 10E (Hunting Towers-Pentagon Line) provides service between Hunting Towers, Braddock Road Metrorail station, Crystal City, and the Pentagon Metrorail station. Through the Potomac Yard area, Routes 10A and 10E provide service along Mount Vernon Avenue and Braddock Road. Route 10A provides service every weekday, Saturday, and Sunday and the Route 10E line is provided in the northbound direction during the weekday AM peak period and southbound direction during the weekday PM peak period.

Route 10E Metrobus

- Metrobus Route 10B (Hunting Towers-Ballston Line) provides service between Hunting Towers, Braddock Road Metrorail station, Shirlington, and the Ballston-MU Metrorail station. Through the Potomac Yard area, Route 10B provides service along Mount Vernon Avenue and Braddock Road on weekdays, Saturdays, and Sundays.

Figure 3-3: Existing Transit Network



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- Metrobus Route 11Y (Mount Vernon Express Line) provides service from Mount Vernon to the Potomac Park in the District of Columbia. Through the Potomac Yard area, Route 11Y runs along the George Washington Memorial Parkway. This is an express service running northbound during the weekday AM peak period and southbound during the PM peak period every 15 to 20 minutes. The number of stops is restricted to reduce travel times. The closest bus stop is at the intersection of Abingdon Drive and Slaters Lane.

DASH routes in the vicinity of the Potomac Yard study area are the following:

- Routes AT3 and AT4 provide service between Hunting Towers, Alexandria City Hall, Braddock Road Metrorail station, Shirlington, and the Pentagon Metrorail station. Through the Potomac Yard area, Routes AT3 and AT4 run along Braddock Road, N. West Street, and Pendleton Street. Routes AT3 and AT4 service is provided every 20 minutes during weekday AM and PM peak periods and Route AT4 also provides Saturday service every 60 minutes. A Route AT3-4 Loop is provided during the weekday mid-day and during evenings, Saturdays, and Sundays every 60 minutes.
- Route AT10 provides service between the Potomac Yard shopping center and the King Street Metrorail Station. Through the Potomac Yard area, Route AT10 runs along Reed Avenue, Mount Vernon Avenue, Monroe Avenue, and Commonwealth Avenue.

Route A10 DASH Bus

DOT is the City of Alexandria's paratransit service. Users must meet eligibility requirements. Trips are provided by taxis and wheelchair accessible vans. DOT provides service throughout the City of Alexandria, City of Falls Church, Arlington County, Fairfax County, and Fairfax City. DOT service operates seven days a week and is by advance reservation.

3.4 Pedestrian and Bicycle Network

There are numerous existing pedestrian and bicycle facilities located in the study area. A summary of these facilities and analysis from the City of Alexandria Pedestrian and Bicycle Mobility Plan are described below. The existing pedestrian and bicycle networks are shown in **Figure 3-4: Pedestrian and Bicycle Network**.

PYPAG Transportation Subcommittee site visit at existing US 1 crosswalk

Pedestrian Network

Pedestrian facilities include multi-use paths, sidewalks, crosswalks, pedestrian signals, and pedestrian push buttons. Sidewalks run along many roads in the study area. **Table 3-4** summarizes the sidewalk coverage on study area streets.

Table 3-4: Existing Sidewalk Locations

Street	From	To	Sidewalks
US 1	Four-Mile Run	E. Glebe	both sides
US 1	E. Glebe	E. Monroe	east side
US 1	E. Monroe	Slaters Lane	east side
E. Braddock Rd	Mt. Vernon	US 1	both sides
Commonwealth Ave	Four-Mile Run	E. Reed	east side
Commonwealth Ave	E. Reed	Mt. Vernon	both sides
E. Glebe Road	Commonwealth	US 1	both sides
E. Monroe Avenue	Mt. Vernon	US 1	both sides
Mt. Vernon Avenue	Commonwealth	Braddock Road	both sides
Slaters Lane	US 1	Powhattan	south side
E. Reed Avenue	Commonwealth	US 1	both sides
Local Streets	in Del Ray community		generally both sides

Source: Kimley-Horn and Associates, Inc.

Figure 3-5: Existing Pedestrian Walking Conditions along Roadways shows the results of the pedestrian network evaluation along streets included in the 2007 Bicycle and Pedestrian Mobility Study**.** The results show that conditions are not ideal along the following:

- West side of US 1 from Four-Mile Run to Slaters Lane
- East side of US 1 from Slaters Lane to East Glebe Road
- North side of East Glebe Road from Commonwealth Avenue to US 1
- Some portions of Monroe Avenue from Mount Vernon Avenue to US 1

Figure 3-4: Existing Pedestrian and Bicycle Network

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Figure 3-5: Existing Walking Conditions along Roadways
Source: City of Alexandria Pedestrian and Bicycle Mobility Plan, November 2007 Draft, Figure 11

Table 3-5 presents an inventory of pedestrian facilities at the study intersections.

Table 3-5: Existing Pedestrian Accommodations at Study Intersections

Intersection	Crosswalks*	Pedestrian Signals
1. US 1 and S. Glebe Road	all legs	yes
2. US 1 and Potomac Yard driveway (near Four-Mile Run)	all legs	yes
3. US 1 and E. Reed Avenue/Potomac Yard driveway	all legs	yes
4. US 1 and Evans Lane/Potomac Yard driveway	all legs	yes
5. US 1 and E. Glebe Road/Potomac Yard driveway	all legs	yes
6. US 1 and Hume Avenue	E, N, S legs	no
7. US 1 and Swann Avenue	S, E, W legs	yes
8. US 1 and E. Custis Avenue	N leg	yes
9. US 1 and E. Howell Avenue/Potomac Yard driveway	N/A	N/A
10. US 1 and E. Monroe Avenue	N leg	yes
11. US 1 and Slaters Lane	all legs	yes
12. Commonwealth Avenue and E. Glebe Road	N, NE, SE, SW legs	yes
13. Commonwealth Avenue and Mt. Vernon Avenue	S, E, W legs	yes
14. Mt. Vernon Avenue and E. Braddock Road	all legs	yes

Legend
* N – Northbound leg
S – Southbound leg
W – Westbound leg
E – Eastbound leg
NE – Northeast leg
SE – Southeast leg
Source: Kimley-Horn and Associates, Inc.

Figure 3-6: Roadway Crossing Conditions shows the assessment of the condition of street crossings for pedestrians and bicycles included in the 2007 Bicycle and Pedestrian Mobility Study. The results show that the crossings of US 1 at the Potomac Yard driveway (Four-Mile Run), E. Reed Avenue, Evans Lane, E. Glebe Road, Hume Avenue, E. Raymond Avenue, Custis Avenue, and Windsor Avenue have highly deficient crossing conditions.

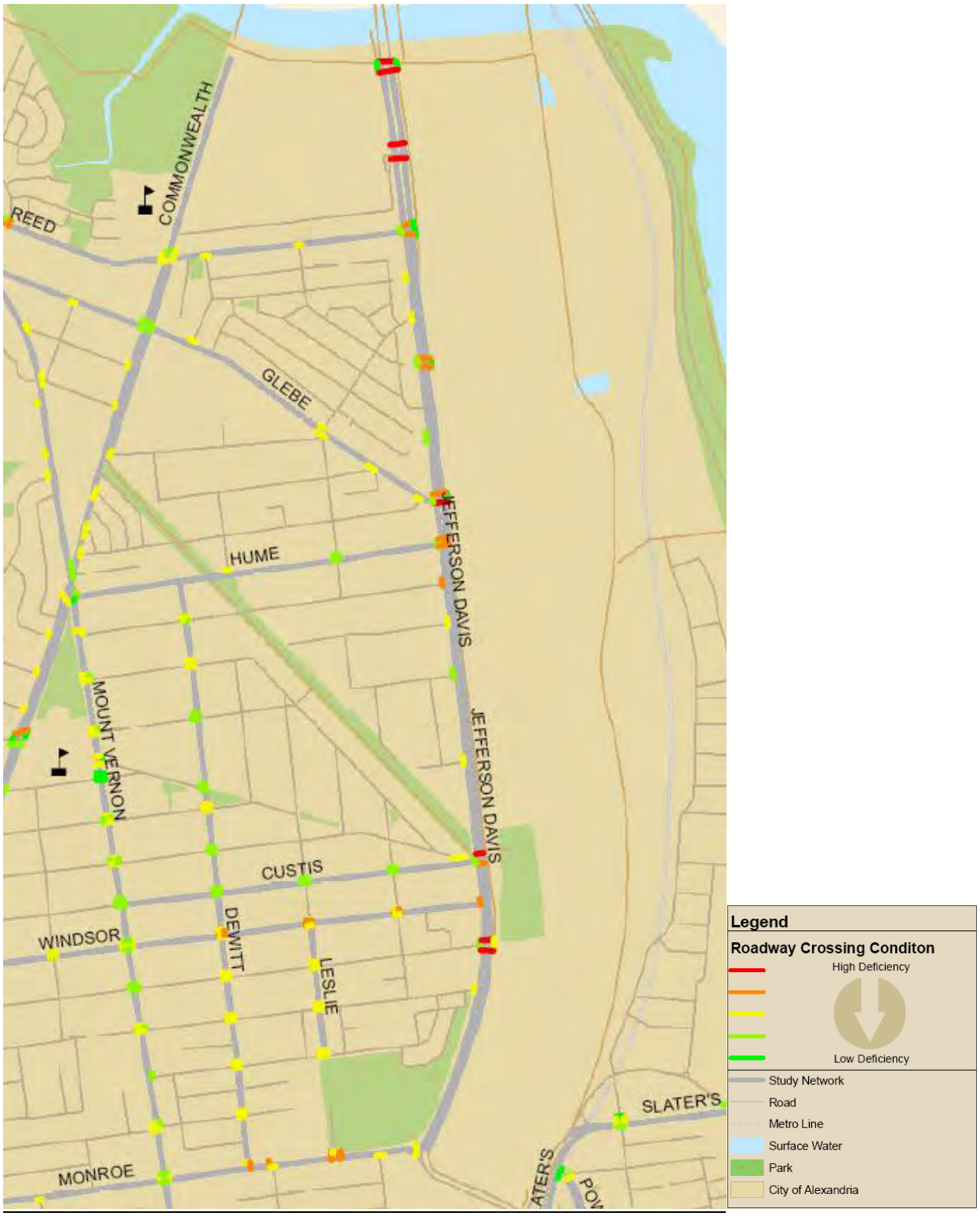


Figure 3-6: Roadway Crossing Conditions
Source: City of Alexandria Pedestrian and Bicycle Mobility Plan, November 2007 Draft, Figure 12

Bicycle Network

On-street facilities include bike lanes and signed bike routes. Off-street facilities include side paths, cycle tracks, and other facilities that follow the alignment of a road and trails that are separated from a road.

Multi-use trail and bus shelter along US 1 – looking north

Bicycle facilities in the study area include the following:

- An asphalt path along the east side of US 1. The path runs from the Potomac Yard driveway just south of Four-Mile Run to Custis Avenue.
- A path along Four-Mile Run from Mount Vernon Avenue to US 1. This trail provides access to the Four-Mile Run trail in Arlington County, which leads to the W&OD trail.
- The Mount Vernon Trail is located east of Potomac Yard along the George Washington Memorial Parkway. There is currently no direct access from Potomac Yard in Alexandria to the Mount Vernon Trail. The nearest access is immediately to the north in Arlington County.
- A relatively short off-street trail located in the Mt. Jefferson Park and Greenway in the Del Ray community to the west of Potomac Yard.
- On-street facilities in the study area are located along the following streets:
  - Commonwealth Avenue
  - Mt. Vernon Avenue, Dewitt Avenue
  - E. Windsor Avenue
  - Leslie Avenue between E. Windsor Avenue and E. Monroe Avenue
  - E. Monroe Avenue
  - Slaters Lane.

Figure 3-7: Bicycle Level of Service shows results from the bicycle level of service (BLOS) included in the 2007 Bicycle and Pedestrian Mobility Study. The results of the BLOS show that the on-street bicycle facility on Commonwealth Avenue from E. Glebe Road to Mount Vernon Avenue has an existing BLOS of A and Mount Vernon Avenue from Commonwealth Avenue to Monroe Avenue has an existing BLOS of C.

Figure 3-7: Bicycle Level of Service
Source: City of Alexandria Pedestrian and Bicycle Mobility Plan, November 2007 Draft, Figure 15

3.5 Parking

There is an abundant supply of free-of-charge surface parking at the existing retail center. The parking occupancy is higher on weekends and holidays than average weekday peak periods.

3.6 Summary

Existing transportation conditions in the study area vary. Many of the major street corridors in the study area are focused on moving automobiles. The existing retail center has a suburban configuration and adjacent US 1 is auto-oriented. Intersection LOS analyses show that most study area intersections operate acceptably. Signal timing along US 1 is set to progress through traffic. The intersection of US 1 and E. Monroe Avenue operated at an unacceptable LOS prior to the completion of the new US 1 Monroe Avenue bridge. The local street grid to the south and west of Potomac Yard efficiently disperses traffic and allows most intersections to operate acceptably.

The Potomac Yard study area is served by transit services that include Metrorail, Metrobus, City bus services, and paratransit. The existing Potomac Yard shopping center is not designed to encourage transit use.

The study area is proximate to regional trails including the Four-Mile Run trail and the Mount Vernon Trail. There is a well-developed sidewalk network in the Del Ray community to the west and south of Potomac Yard. In Potomac Yard, there is an asphalt path along the east side of US 1. Additional connectivity to nearby regional trails, completing the sidewalk network, establishing an interconnected network of bicycle facilities, and improving crossings should be considered to enhance non-vehicular conditions in the study area.

4.0 2030 Future Conditions without Development

This chapter examines the 2030 conditions without proposed redevelopment in Potomac Yard Landbay F. Included in this chapter are descriptions of the future transportation network, future traffic volumes without development, and future conditions without development traffic analysis results.

4.1 2030 Future Transportation Network without Development

The following are transportation improvements that have been planned and are anticipated to be completed prior to 2030.

US 1 Widening for Transit: As a part of the planned redevelopment in Landbay F, right-of-way will be dedicated and improved for US 1 to be widened to accommodate transit lanes to support the Crystal City/Potomac Yard Transitway. No widening is programmed to increase the number of general purpose vehicle travel lanes.

Crystal City/Potomac Yard (CCPY) Transitway: The CCPY Transitway will travel through Potomac Yard and extend to Crystal City on the north and the Braddock Road Metrorail Station on the south. The concept of dedicated right-of-way for transit was adopted by the Alexandria City Council under the Transportation Master Plan. The future transit service is envisioned to operate efficiently within dedicated lanes to the maximum extent feasible. The initial service concept for the CCPY corridor is bus rapid transit; however, as demand and usage increase, conversion to streetcar or similar rail transit is possible.

The proposed alignment of the transit corridor is shown in **Figure 4-1: Crystal City/Potomac Yard Transitway Alignment under Future Conditions without Development**. The CCPY service will operate in mixed traffic lanes northbound until crossing the Monroe Avenue bridge. The route will operate on dedicated transit lanes north of the bridge on US 1 and continue through Potomac Yard, turning north on Potomac Avenue, and travelling to Arlington County. Prior to the proposed development in Landbay F, the transitway will travel between US 1 and Potomac Avenue on E. Glebe Road as an interim route. The transit corridor along US 1 will be median-running. A final determination has not been made as to technology and the final design vehicle. This study assumes that the entire transit corridor will be located in the median.

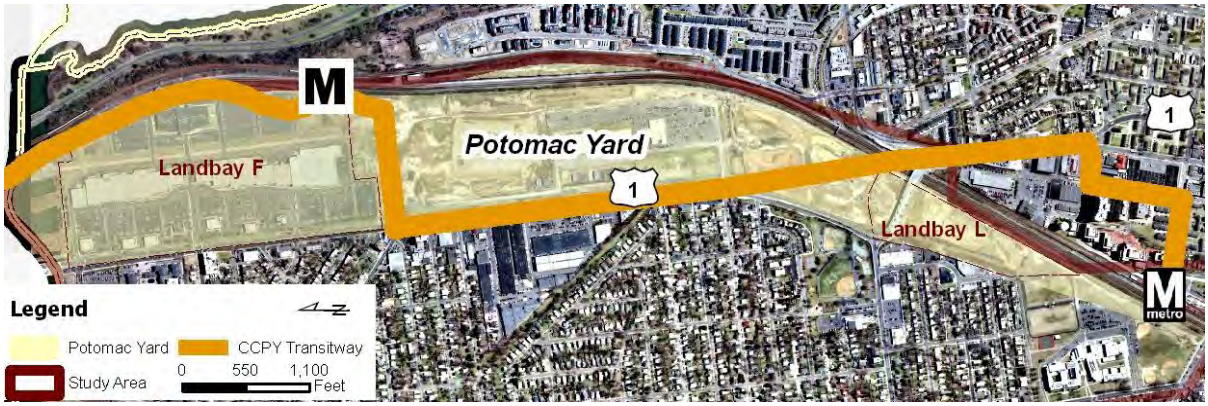


Figure 4-1: Crystal City/Potomac Yard Transitway Alignment under Future Conditions without Development

Potomac Avenue: This new major street will connect US 1 on the south to Arlington to the north and will provide additional north/south capacity to the transportation network.

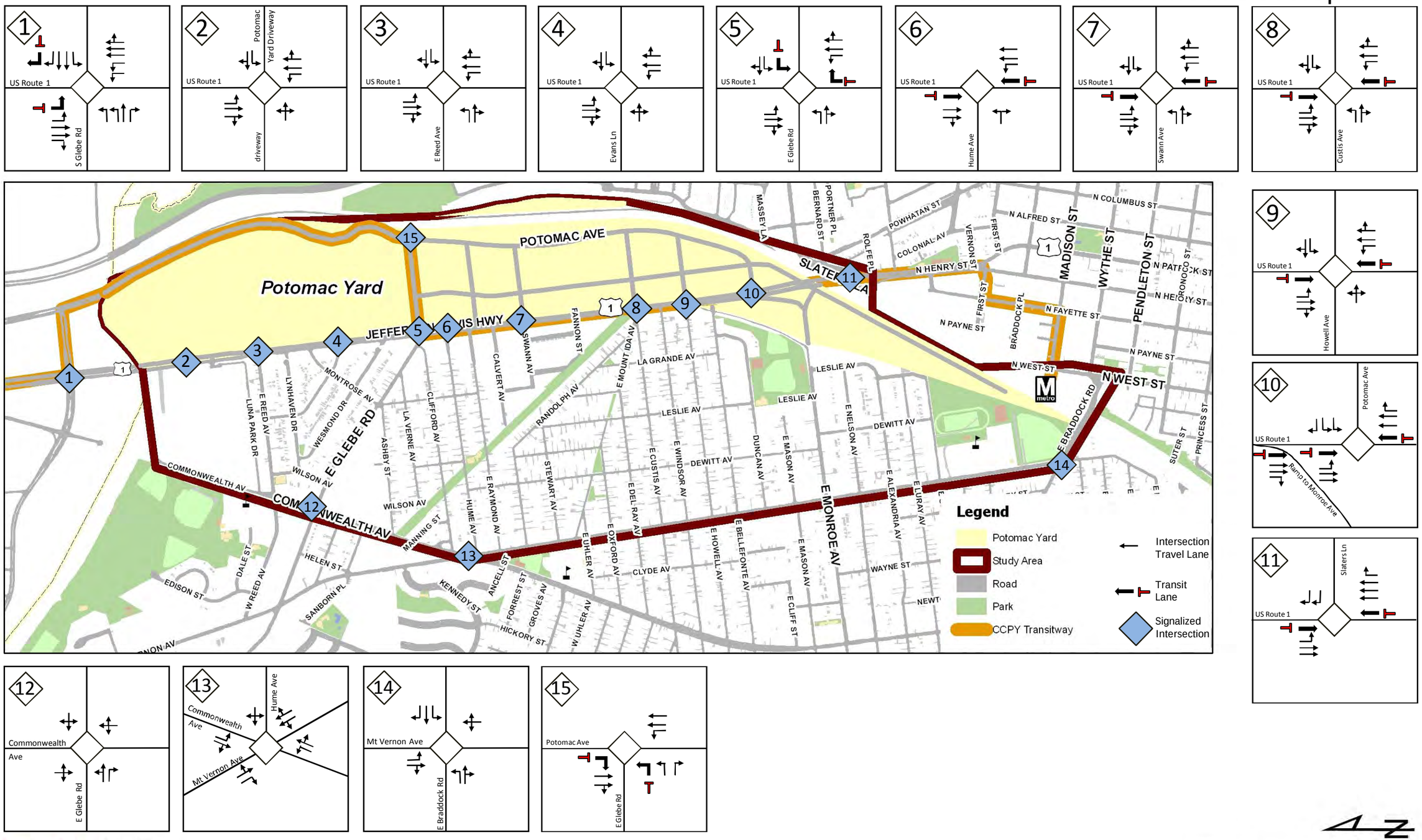
Internal Street Network: A fine-grained interconnected network of streets will be constructed in Potomac Yard in the landbays located between Landbays F and L.

New Landbay K Bicycle/Pedestrian Connection: This trail connection will connect Potomac Yard directly to Four-Mile Run through a linear park connecting Braddock Road and Four-Mile Run, enhancing its access to the regional major trail network. In future development phases, a pedestrian bridge also will be provided from Potomac Yard Park across the railroad corridor to Potomac Greens as a part of the new Metrorail station.

Laneages at the study intersections are shown in **Figure 4-2: 2030 Future Intersection Laneage and Traffic Control without Development** for the future transportation network without development. **Figure 4-2** also shows the tentative CCPY alignment as currently planned by City staff.

Potomac Yard
Multimodal Transportation Study

Figure 4-2: Future Intersection Laneage and Traffic Control without Development



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4.2 2030 Future Traffic Volumes without Development

Future weekday PM peak hour turning movement volumes without development are the traffic volumes that will travel through study area intersections without the proposed redevelopment in Potomac Yard Landbay F in 2030. Future traffic volumes without development are anticipated to increase from the existing traffic volumes due to non-specific regional traffic growth, development activity in Crystal City, and nearby approved and unbuilt developments.

2030 Base Turning Movement Volumes

To forecast additional traffic volumes attributed to regional traffic growth, data from VDOT daily traffic counts was reviewed from 2001 to 2007. **Table 4-1** summarizes data available from VDOT's daily counts for study area streets.

Table 4-1
Summary of VDOT Historical Data and Traffic Growth

			Average Daily Traffic (veh/day)			Total Traffic Growth		
Street	**From**	**To**	**2001**	**2004**	**2007**	**2001 to 2004**	**2004 to 2007**	**2001 to 2007**
US 1	Monroe	North City line	43,000	41,000	40,000	-1.6%	-0.8%	-1.2%
Slaters Lane	US 1	GW Parkway	12,000	12,000	11,000	0.0%	-2.9%	-1.4%
Commonwealth	Mt. Vernon	Reed	4,100	3,700	4,200	-3.4%	4.3%	0.4%
Mt. Vernon	Braddock	Commonwealth	9,600	8,500	8,600	-4.0%	0.4%	-1.8%
Monroe	Russell	US 1	13,000	10,000	9,900	-8.4%	-0.3%	-4.4%
E. Glebe	Mt. Vernon	US 1	8,500	9,600	10,000	4.1%	1.4%	2.7%
Reed	Mt. Vernon	US 1	4,100	3,600	3,500	-4.2%	-0.9%	-2.6%
Custis	Russell	Rosscrest	310	310	320	0.0%	1.1%	0.5%
US 1	Rt. 241 (S of Alexandria)	South City line	57,000	58,000	53,000	0.3%	-1.8%	-0.7%
US 1	Monroe	North City line	-	43,000	41,000	-	-0.9%	-
US 1	NCL	Route 233	52,000	-	53,000	-	-	0.2%

Source: VDOT

Based on a review of VDOT data, daily traffic volumes on study area streets have not increased since 2001. The lack of growth is attributed to the minimal development activity in the area, the presence of high-quality transit, and capacity limitations on streets. The only street that experienced an increase in daily traffic was E. Glebe Road. This increase can be attributed to the traffic diversion during US 1 Monroe Avenue bridge construction project. It

also should be noted that Monroe Avenue showed a large decrease in daily traffic volume, which can be attributed to its partial closure during US 1 bridge construction. The main source of future traffic growth on study area streets is likely to be created by the Potomac Yard development.

Travel demand will continue to grow as Alexandria and the Washington D.C. region will experience further influxes of population, employment, and services. In 2006, The National Capital Regional Transportation Planning Board (TPB) undertook the Regional Mobility and Accessibility Scenario Study to examine the impacts of alternative transportation and land use scenarios in the region. The study found that under current regional plans, freeway and arterial lane miles in the region will increase by 16 percent while daily vehicle miles traveled will increase by 37 percent by 2030. Based on this finding, it can be inferred that road corridors across the region will experience more congestion in 2030 than today and that currently planned increases in road capacity will not adequately meet projected demand.

In addition to a distributed growth scenario, the TPB study also considers a scenario focusing on transit-oriented development that assumed that 70 percent of new jobs and 80 percent of new housing would be located adjacent to transit stations (half mile from rail, quarter mile from bus) and that the existing transit network would be expanded to include currently funded projects. Under this analysis, auto use and congestion decreased and transit trips increased compared to the 2030 baseline.

In urban localities such as Alexandria, Arlington, and the District of Columbia, travel growth will manifest itself not only on streets, but also in the form of more transit, walking, and bicycling trips. This understood, Potomac Yard assumes a level of general traffic growth on US 1 at a rate less than would be used in an environment with fewer modal choices. The evaluation conducted for the 22-year period assumes a conservative one percent per year growth factor for weekday PM peak hour turning movement volumes up to a maximum of 10 percent on US 1. This general growth is intended to reflect increases in traffic attributable to general city growth and currently unknown development in the vicinity of Potomac Yard. This factor is applied to the northbound and southbound through movements only. The resulting 2030 weekday PM peak hour base turning movement volumes are shown in **Appendix D**.

Traffic Due to Nearby Approved and Unbuilt Developments

Nearby approved and unbuilt developments included in this study are the Potomac Yard South Tract (One Potomac Yard and The Eclipse on Center Park), Potomac Greens, and Potomac Yard Landbays G, H, I, J, and K. Forecasted weekday PM peak hour trips generated by each of the approved and unbuilt developments was determined from respective traffic studies for each development[1] . The traffic generated by the approved and unbuilt developments is shown in **Table 4-2**.

Table 4-2
Weekday PM Peak Hour Trips Generated by Nearby Approved and Unbuilt Developments

Development Site	PM Peak Hour Trips		
	Total	In	Out
Potomac Yard South Tract	1,844	424	1,420
Potomac Greens	1,960	502	1,458
Potomac Yard Landbays G, H, I, J, and K	2,362	856	1,506
Total	**6,166**	**1,782**	**4,384**

Source: Potomac Yard Infrastructure Traffic Analysis

The assignment of the trips generated by the approved and unbuilt developments was taken from the traffic impact studies for each development. The weekday PM peak hour trip assignments for each development are shown in **Appendix D**.

It is possible that Landbay L will be developed in the future. There are no current approvals for development in Landbay L; possible future development is considered in the Future Conditions with Development section.

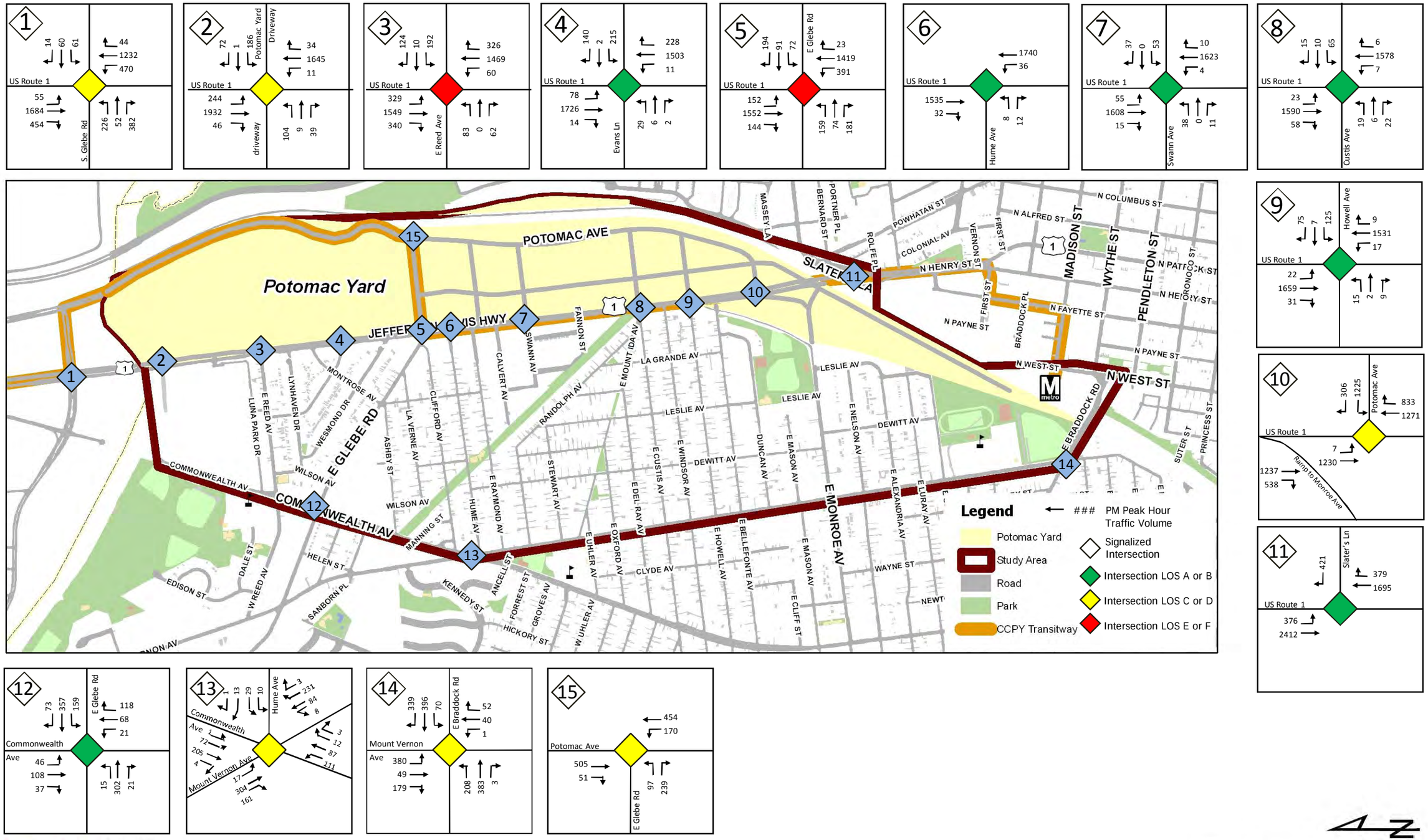
2030 Future Traffic Volumes without Development

The 2030 weekday PM peak hour future turning movement volumes without development were calculated by adding the existing turning movement volumes increased by the 10 percent growth factor along US 1 with the turning movement volumes generated by the approved and unbuilt developments. The weekday PM peak hour turning movement volumes at study area intersections are shown in **Figure 4-3: 2030 Future Turning Movement Volumes and Levels of Service without Development**.

[1] Potomac Yard Infrastructure Traffic Analysis performed by Wells and Associates, Inc. dated February 10, 2005 and revised on December 2, 2005.

Potomac Yard
Multimodal Transportation Study

Figure 4-3: Future Volumes without Development



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4.3 2030 Future Conditions without Development Intersection Capacity Analysis

The 2030 future conditions without development analysis was based on the 2030 future transportation network without the development and accompanying future turning movement volumes without development.

Intersection Capacity Analysis

Level of service results of this analysis are summarized in **Table 4-3**. A table showing the existing levels of service by lane group is provided in **Appendix B**. The Synchro HCM reports for future conditions without development are provided in **Appendix E**.

Table 4-3
2030 Future Conditions without Development Intersection Levels of Service (LOS) and Average Delay for the Weekday PM Peak Hour

Signalized Intersection	Existing Conditions (sec/veh)	2030 Future Conditions without Development (sec/veh)
1. US 1 and S. Glebe Road	C (29)	C (32)
2. US 1 and Potomac Yard driveway (near Four-Mile Run)	C (22)	C (23)
3. US 1 and E. Reed Avenue/Potomac Yard driveway	C (22)	E (71)
4. US 1 and Evans Lane/Potomac Yard driveway	C (24)	B (17)
5. US 1 and E. Glebe Road/Potomac Yard driveway	D (37)	F (83)
6. US 1 and Hume Avenue	A (1)	A (3)
7. US 1 and Swann Avenue	A (2)	A (6)
8. US 1 and E. Custis Avenue	A (2)	A (5)
9. US 1 and E. Howell Avenue/Potomac Yard driveway	A (2)	B (14)
10. US 1 and E. Monroe Avenue/future Potomac Avenue	E (63)	C (28)
11. US 1 and Slaters Lane	B (15)	B (17)
12. Commonwealth Avenue and E. Glebe Road	B (11)	B (11)
13. Commonwealth Avenue and Mt. Vernon Avenue	A (6)	C (31)
14. Mt. Vernon Avenue and E. Braddock Road	B (13)	C (32)
15. Potomac Avenue and S. Glebe Road	N/A	C (21)

* Future conditions assume the construction of the transitway on US 1, E. Glebe Road, and Potomac Avenue
** Under Future Conditions without Development, US 1 signals are timed with lead-lag left turns and coordinated with a 140-second cycle length. The intersection of Potomac Avenue and E. Glebe Road is timed with a 90-second cycle length.
Source: Kimley-Horn and Associates, Inc.

The results of the 2030 future conditions without development intersection capacity analysis shows that several of the study area intersections operate near-, at-, or over-capacity under future conditions without development during the PM peak hour. The following intersections were found to operate near-, at-, or over-capacity under future conditions without development:

- US 1 and E. Reed Avenue: LOS E
- US 1 and E. Glebe Road: LOS F

US 1 Corridor Travel Times and Speeds

Table 4-4 shows a summary of travel times and average speeds on US 1 in the study area under conditions without the proposed development. The Synchro travel time reports for future conditions without development are provided in **Appendix E**.

Table 4-4
2030 Future Conditions without Development
Average PM Peak Hour Travel Speeds and Times for US 1

Scenario	Southbound			Northbound		
	Speed (mph)	Travel Time (min)	Increase in Travel Time (from existing)	Speed (mph)	Travel Time (min)	Increase in Travel Time (from existing)
Existing	20.9	5.0	-	22.3	4.5	-
Future Conditions without Development	13.6	7.5	50%	14.8	7.0	56%

* Future conditions assume the construction of the transitway on US 1, E. Glebe Road, and Potomac Avenue
** Under Future Conditions without Development, US 1 signals are timed with lead-lag left turns and coordinated with a 140-second cycle length. The intersection of Potomac Avenue and E. Glebe Road is timed with a 90-second cycle length.
Source: Kimley-Horn and Associates, Inc.

As the level of traffic increases, contributed to by a number of factors, weekday PM peak hour travel speed and delay increase.

Impact on Local Streets

In addition to reduction in travel speed on US 1, volumes will increase on some local and minor collector streets. Future weekday PM peak hour volume forecasts were prepared for E. Reed Avenue, E. Glebe Road, Hume Avenue, Swann Avenue, Custis Avenue, and Howell Avenue within the study area. To ensure that the study was suitably conservative, as shown in **Table 4-5**, E. Reed Avenue and E. Glebe Road were assumed to carry the majority of forecasted local and minor collector street traffic.

Table 4-5
2030 Future Conditions without Development
Additional PM Peak Hour Two-Way Volume (number of vehicles)

Scenario	E. Reed Avenue	E. Glebe Road	Hume Avenue	Swann Avenue	Custis Avenue	Howell Avenue
Future Conditions without Development	0	277	0	0	56	32

Source: Kimley-Horn and Associates, Inc., Reference: Potomac Yard Infrastructure Traffic Analysis

4.4 Conclusions on 2030 Future Conditions without Development

The analysis of 2030 future conditions without development considers the combined effects of the addition of approved unbuilt development, regional traffic growth, and programmed transportation improvements. Findings from this analysis indicate that intersections along US 1, Mount Vernon Avenue, and Commonwealth Avenue are nearing capacity. Based on these findings, for the area to continue to accommodate increases in development and maintain an adequately functioning vehicular transportation network, measures to increase non-auto mode share along with strategic vehicular capacity-enhancing modifications to area streets and intersections will need to be implemented.

5.0 Traffic Modeling Process and Methodology

This chapter summarizes the travel demand methodology used to develop Potomac Yard Landbay F and L traffic forecasts. The proposed redevelopment and rezoning of Landbay F is the focus of this study. Landbay L also may be developed in the future. A possible development scenario for Landbay L was considered for this transportation study as part of the Future Conditions with Development. The forecast process consisted of the following steps:

- Summarizing existing Potomac Yard trips to be removed
- Identifying transportation analysis zones (TAZ)
- Generating person trips
- Developing internal Potomac Yard trip-making assumptions
- Developing mode split assumptions
- Developing pass-by trip assumptions
- Assigning vehicular trips to transportation network

The following sections describe each part of the forecast development process.

5.1 Existing Potomac Yard Trips to be Removed

Redevelopment of Potomac Yard Landbay F will result in a removal of trips generated by the existing shopping center. The existing Potomac Yard Landbay F weekday PM peak hour turning movement volumes were computed by adding the total entering and exiting traffic at the US 1 driveways. **Table 5-1** shows the total estimated PM peak hour traffic volumes generated by Potomac Yard Landbay F. Existing Potomac Yard trips to be removed are shown in **Appendix F**.

Table 5-1
Existing Potomac Yards Trips to be Removed

	Total	In	Out
PM Peak Hour	1,695	965	728
Daily*	19,513	11,129	8,384

*Estimated using the ratio of daily to PM peak hour trip generation rates
Source: Kimley-Horn and Associates, Inc.

5.2 Transportation Analysis Zones

Transportation analysis zones (TAZ) represent specific geographic areas, generally bounded by roads or other physical features. The land uses in each TAZ are aggregated and used as the basis for the generation of person trips. In the Potomac Yard model, four TAZs in Landbay F and one in Landbay L represent the study area. These are shown in **Figure 5-1: Study Area TAZs**.

5.3 Person Trip Generation

In the model process, land use development totals ultimately need to be translated into trips by mode—vehicle trips, walking and bicycle trips, and transit trips. To develop trips by mode, a person trip generation calculation was conducted by using rates published by the Institute of Transportation Engineers (ITE) and by applying appropriate factors to account for the planned mixed-use and multimodal conditions of Potomac Yard.

The ITE *Trip Generation Manual* summarizes data collected at thousands of developments of various types and sizes related to the number of trips entering and exiting the sites. The manual provides a summary rate and/or equation to estimate the number of trips generated based on independent variables such as gross floor area, number of dwelling units, and employees. The manual is the industry-recognized standard for trip generation. The majority of data contained in the manual was collected in suburban areas and development with a single land use. For this reason, it is necessary to make adjustments to account for mixed use development and urban conditions with a consequential mode split.

Land uses for each block in the study area were provided by the City and aggregated into TAZs. For this analysis, the land use scenario assumes the proposed 2.5 FAR in Landbay F and possible 2.0 FAR in Landbay L. The land use scenario contained in the final Master Plan may vary slightly in the type and location of density within the overall Potomac Yard site; however, it will be within an order of magnitude of the overall density analyzed in this study. A summary of the future land use information studied is shown in **Table 5-2**.

Figure 5-1: Study Area TAZs

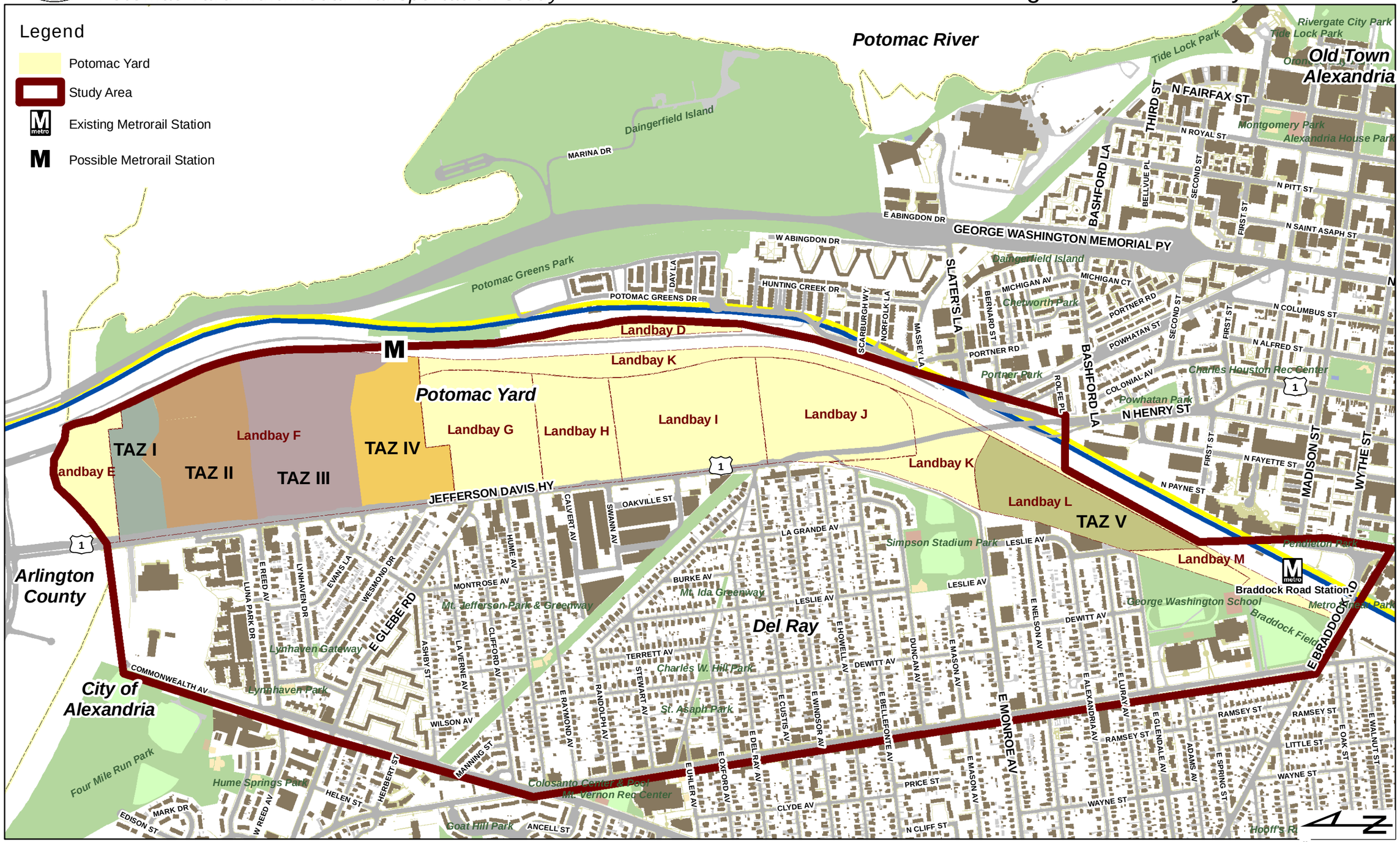

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Table 5-2 Proposed Landbay F Development Totals (2.5 FAR) and Potential Landbay L Development Totals (2.0 FAR)	
Landbay F	
Hotel	300 rooms
Office	1,475,000 sf
Residential	4750 dwelling units
Retail	
Large-Format	170,000 sf
Grocery Store	70,000 sf
Specialty	670,000 sf
Movie Theater	90,000 sf
Landbay L	
Residential	1,000 dwelling units
Specialty Retail	10,000 sf

Assumptions
Residential units are an average of 1,000 square feet per dwelling unit
Hotel rooms are an average of 750 square feet per room
Source: City of Alexandria

Weekday PM peak hour and daily person trips generated for each TAZ using rates provided in the ITE *Trip Generation Report, 8th Edition*. **Table 5-3** summarizes the PM peak hour and daily person trips generated by Potomac Yard Landbays F and L.

Table 5-3
Person Trips Generated by Proposed Landbay F Development and Potential Landbay L Development

Land Use	Daily	PM Peak Hour		
		Total	In	Out
Landbay F				
Office	16,240	2,198	968	1,230
Residential	31,591	2,946	1,296	1,650
Hotel	2,751	177	78	99
Retail	41,608	3,153	1,433	1,720
Total Landbay F	***92,190***	***8,474***	***3,775***	***4,699***
Landbay L				
Residential	6,650	620	273	347
Retail	443	27	12	15
Total Landbay L	***7,093***	***647***	***285***	***362***

Source: Kimley-Horn and Associates, Inc.

5.4 Mode Choice Assumptions

To accurately represent the anticipated trip-making patterns associated with the redevelopment of Potomac Yard, assumptions were developed to assign trips to transit, walk, bicycle, and auto modes. Assumptions were based on local, regional, and national experience and evidence at similar scale redevelopment projects in like contexts. Specifically, WMATA's *2005 Development-Related Ridership Survey* was consulted in addition to data from the Crystal City, Braddock Road, and King Street Metro stations and the U.S. Census, Journey to Work survey. Generally guiding the development of travel mode choice assumptions were the following:

- Potomac Yard will have compatible and complementary uses developed in a compact transit-oriented form supportive of non-auto trip-making (live/work/play)
- City policies encourage non-auto travel through strategic incentives and disincentives. This includes the Travel Demand Management program of the City of Alexandria TMP.
- Potomac Yard is within the urban core of Alexandria and the region with good access to all modes of transportation
- Potomac Yard is a natural extension of Alexandria's urban fabric
- Potomac Yard is proximate to surrounding compact residential neighborhoods
- Potomac Yard is proximate to Metrorail
- Significant transit investment for many technologies is planned locally and regionally and will positively affect Potomac Yard. Investments include the transit corridors in the Alexandria TMP, Arlington County's Master Transportation Plan transit corridors, and others included in the Washington Metropolitan Council of Governments long-range plan.
- Local and regional vehicular transportation networks have a finite car-carrying capacity. TCRP Report 128 found that a key road characteristic in supporting transit use is the location of a transit corridor adjacent to a highly congested auto corridor.

5.5 Internal Trips

Due to the mixture of land uses planned, many trips will have origins and destinations within Potomac Yard. In general, the propensity for trips to be "captured" internally varies based upon the conditions of the area – the pedestrian friendliness of the urban design, the configuration of the development, the availability and convenience of non-auto travel modes, and the mixture and sizes of uses.

Using methodologies outlined by ITE, the volume of internal capture trips was determined for Landbays F and L. The development and design patterns of Potomac Yard will encourage that trips be made by walking and biking. All internally captured trips were assigned to walk or bicycle modes. A table with a summary of internal trips for weekday PM peak hour trips is provided in **Appendix F**.

5.6 Mode Split

Non-internal trips were divided into external transit trips and external vehicle trips. External transit trips were assumed to be primarily accommodated on the CCPY transitway, Metrobus, DASH buses, and Metrorail (if applicable). Based on data provided by the City, Journey to Work information from the 2000 U.S. Census, and information contained in WMATA's *2005 Development-Related Ridership Study*, factors were developed to reflect the desirability of walking, bicycling, and taking transit to make external trips.

Logic and experience from data suggest that the TAZs closest to transit will have the highest rate of transit use. In the future, the combination of additional transit services, an improved urban environment, and improved pedestrian and bicycling facilities will likely result in more people having better access to and being more willing to use transit. As the land use in Potomac Yard further diversifies and the area becomes more active during more hours of the day, transit usage in currently off-peak periods and directions is likely to increase, similar to other urban villages in Alexandria and the greater Washington metropolitan area. The general assumptions for mode splits are shown in **Table 5-4**.

Table 5-4
Proposed Trip Generation Mode Split Assumptions

Land Use	Transit – Metrorail*	Transit – Metrobus, DASH, and CCPY	Pedestrian and Bicycle (non-auto)	Auto	Total
Office (adjacent to transit station)	35%	11%	6%	48%	100%
Office (within 1/4 mile of transit station)	21%	9%	6%	64%	100%
Residential (adjacent to transit station)	54%	1%	16%	29%	100%
Residential (within 1/4 mile of transit station)	48%	1%	15%	36%	100%
Residential (within 1/4 to 1/2 mile of transit station)	31%	5%	10%	54%	100%
Hotel	27%	4%	31%	38%	100%
Entertainment (theater)	26%	6%	11%	57%	100%
Retail (all, excluding large format)	29%	8%	27%	36%	100%
Retail (large format)	9%	5%	14%	73%	100%

Source: Kimley-Horn and Associates, Inc., References: WMATA 2005 Development-Related Ridership Study and 2000 U.S.

The location for each block of development and distance from the proposed Metrorail station is shown in **Figure 5-2.** A table with a summary of trips assigned to each mode is provided in **Appendix F**.

5.6 Pass-by Trips

Large retail centers such as the existing shopping center at Potomac Yard attract trips that are already on the network. These "pass-by" trips are not new trips, rather they are trips that stop at Potomac Yard during their primary trip. An example of a pass-by trip is that of a person stopping at a retail store on the way home from work. The PYPAG has a desire to maintain a strong retail presence in Landbay F. The proposed land use plan includes large format retail uses that will generate pass-by trips. For this analysis, it was assumed that 25 percent of the large format retail use trips will be pass-by trips. This is consistent with VDOT guidelines. A table with pass-by trips is provided in **Appendix F**.

Figure 5-2: Distances from Metrorail Stations

6.0 Site Trip Distribution and Assignment

6.1 Trip Distribution

Following the assignment of internal trips and trips assigned to transit and other non-auto modes, the remaining vehicular trips were assigned to the street network for the PM peak hour. By reviewing the existing traffic patterns, considering nearby employment, shopping, and housing areas, and comparing data from the traffic study for Potomac Yard Landbays G, H, I, J, and K (the Potomac Yard Infrastructure Analysis)[2], external distributions of trips were established. The Potomac Yard Infrastructure Analysis distributions were altered to assign a greater percentage of traffic from Potomac Yard Landbays F and L to the north on Potomac Avenue. With the proposed development, Potomac Avenue will extend north across Four-Mile Run to Potomac Yard in Arlington. It will connect to S. Glebe Road and Crystal Drive. In the future, Crystal Drive will be a two-way street and 12th Street S. in Arlington County will be extended from S. Eads Street to S. Fern Street. Potomac Avenue and Crystal Drive will act as a main street along the east side of Potomac Yard and Crystal City and attract local and some regional trips. Directional distribution of trips for Potomac Yard Landbays F and L is shown in **Table 6-1.**

Table 6-1
Trip Distribution

Direction	Distribution
To/From North on US 1	26%
To/From Northwest on S. Glebe Road	7%
To/From North on George Washington Memorial Parkway	3%
To/From West on Reed Avenue and E. Glebe Road	10%
To/From West on Custis Avenue and Monroe Avenue	12%
To/From South on US 1 and Washington Street	30%
To/From North on Potomac Avenue	12%
Total	**100%**

Source: Kimley-Horn and Associates, Reference: Potomac Yard Infrastructure Analysis

6.2 Trip Assignment

The assignment of Potomac Yard weekday PM peak hour vehicular trips to the area road network is shown in the **Appendix F**.

[2] Potomac Yard Infrastructure Traffic Analysis performed by Wells and Associates, Inc. dated February 10, 2005 and revised on December 2, 2005

7.0 2030 Future Conditions with Potomac Yard Redevelopment in Landbay F

This chapter of the report examines 2030 future conditions with the proposed redevelopment plan for Potomac Yard Landbay F as well as with possible future development for Landbay L. This chapter includes an analysis and summary of 2030 future traffic volumes with the proposed development.

7.1 2030 Future Transportation Network with Development

The proposed transportation network with the proposed redevelopment of Potomac Yard Landbay F will include programmed transportation improvements discussed and assumed in the 2030 future conditions without development, as well as, the following:

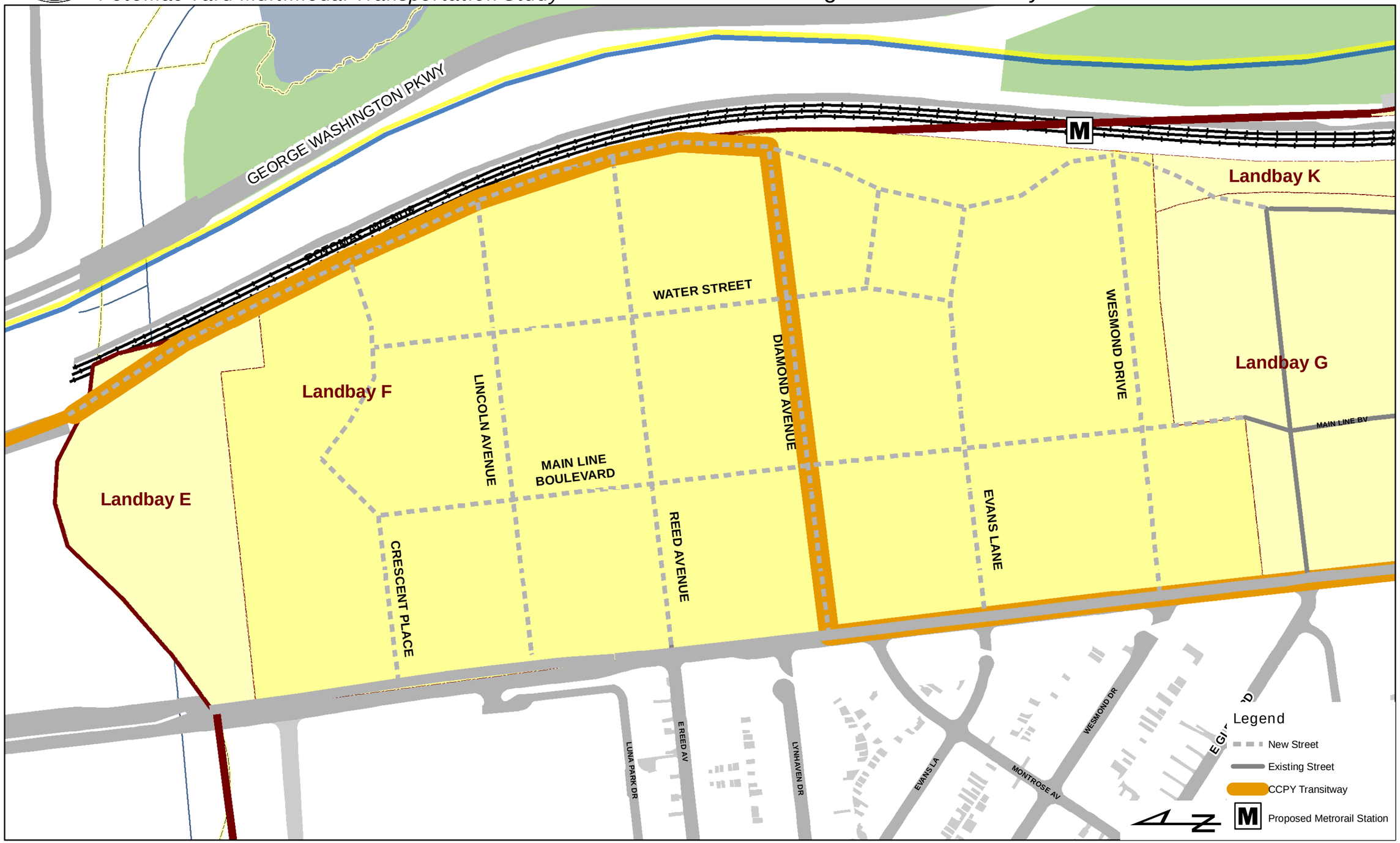
Future Metrorail Station: A feasibility study is being performed for a potential Metrorail station likely to be located adjacent to Landbay F. The Metrorail station is needed to accommodate the planned development within Landbay F.

Internal Street Network: Landbay F would develop with a fine-grained interconnected network of streets.

Crystal City/Potomac Yard (CCPY) Transitway: The CCPY Transitway will travel through Potomac Yard and extend to Crystal City on the north and the Braddock Road Metrorail station on the south. The concept of dedicated right-of-way for transit was adopted by the Alexandria City Council under the Transportation Master Plan. The future transit service is envisioned to operate efficiently within dedicated lanes to the maximum extent feasible. The initial service concept for the CCPY corridor is bus rapid transit; however, as demand and usage increase, conversion to streetcar or similar rail transit is possible. The transitway will travel between US 1 and Potomac Avenue on the new internal street network of Landbay F. While a final determination has not been made, this study assumes the alignment will be along Diamond Road.

The proposed transportation network within Potomac Yard Landbay F includes pedestrian and bicycle facilities, an interconnected network of streets, Potomac Avenue, the Crystal City/Potomac Yard Transitway, and a future Metrorail station. The proposed transportation network described in the Master Plan may vary slightly in the specific Landbay F street network, transitway alignment, and Metrorail station configuration; however, it will result in similar future transportation conditions as those analyzed in this study.The proposed street network in Landbay F is shown in **Figure 7-1: Landbay F Framework Street Network**. The proposed future transportation network and study area intersection laneage used in the traffic analysis are shown in **Figure 7-2: Proposed Future Intersection Laneage and Traffic Control with Development**.

Figure 7-1: Landbay F Framework Street Network



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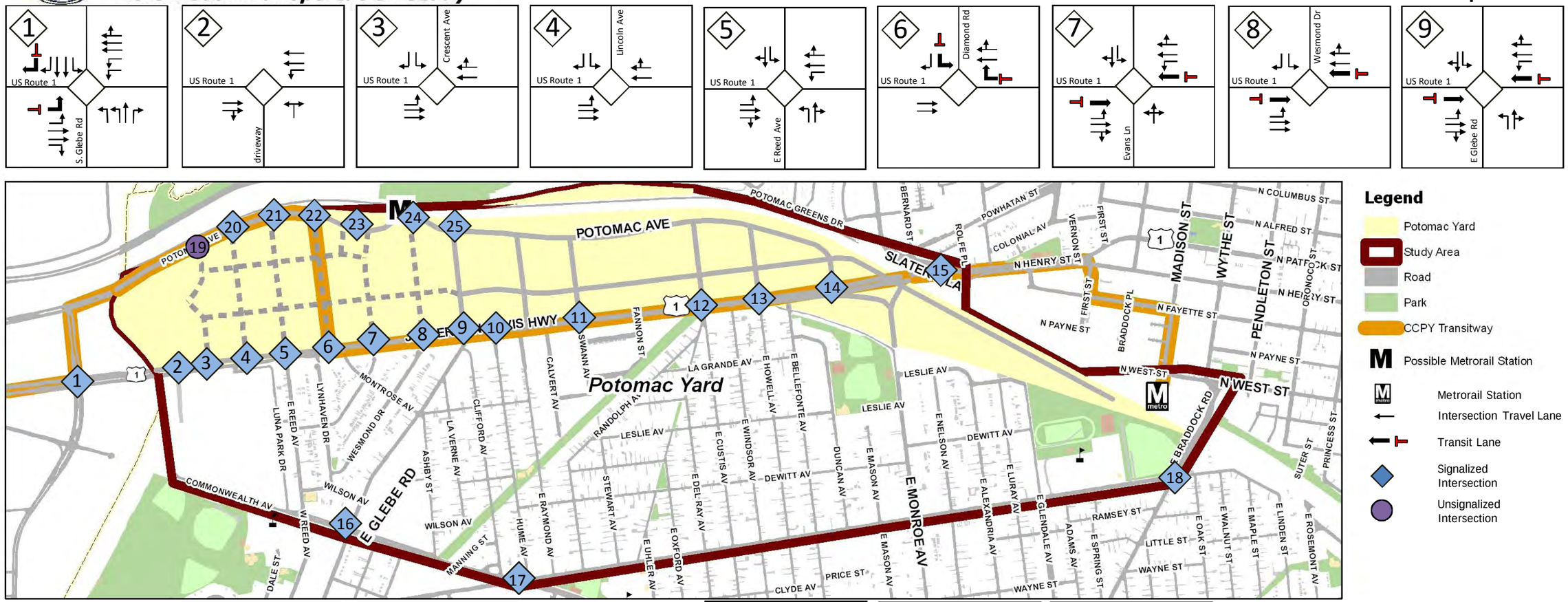
Potomac Yard
Multimodal Transportation Study

Figure 7-2: Proposed Future Intersection Laneage and Traffic Control with Development



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0 375 750 1,500 2,250 Feet

7.2 2030 Future Traffic Volumes with Development

Weekday PM peak hour volumes analyzed in this scenario were created by aggregating future volumes without development and volumes generated by Potomac Yard Landbays F and L and subtracting volumes generated by the existing Potomac Yard retail center. **Figure 7-3** shows the 2030 future weekday PM peak hour volumes with development.

7.3 2030 Future Conditions with Development Capacity Analysis

The 2030 future conditions with development analysis was based on the proposed 2030 transportation network and 2030 future weekday PM peak hour volumes with development.

Intersection Capacity Analysis

Level of service results of this analysis are summarized in **Table 7-1**. The Synchro HCM reports with future conditions without development levels of service are provided in **Appendix G**.

Table 7-1
2030 Future Conditions with Development Intersection Levels of Service (LOS) and Average Delay in Seconds for Weekday PM Peak Hour

Intersection	Existing Conditions	2030 Future Conditions without Development	2030 Future Conditions with Development
1. US 1 and S. Glebe Road	C (29)	C (32)	C (29)
2. US 1 and driveway (near Four-Mile Run)	C (22)	C (23)	B (13)
3. US 1 and future Crescent Place	N/A	N/A	A (7)
4. US 1 and future Lincoln Avenue	N/A	N/A	A (8)
5. US 1 and E. Reed Avenue	C (22)	E (71)	E (67)
6. US 1 and future Diamond Avenue	N/A	N/A	A (3)
7. US 1 and Evans Lane	C (24)	B (17)	B (15)
8. US 1 and future Wesmond Drive	N/A	N/A	B (11)
9. US 1 and E. Glebe Road	D (37)	F (83)	F (94)
10. US 1 and Hume Avenue	A (1)	A (3)	A (2)
11. US 1 and Swann Avenue	A (2)	A (6)	A (6)

* Future conditions assume the construction of the transitway on US 1, Diamond Road, and Potomac Avenue
** Under Future Conditions with Development, US 1 signals are timed with lead-lag left turns and coordinated with 140-second cycle length. Potomac Avenue is timed with coordinated, 90-second cycle length signals.
*** See page 57 for further discussion of intersection LOS analysis

Table 7-1 (continued) 2030 Future Conditions with Development Intersection Levels of Service (LOS) and Average Delay in Seconds for Weekday PM Peak Hour			
Intersection	**Existing Conditions**	**2030 Future Conditions without Development**	**2030 Future Conditions with Development**
12. US 1 and E. Custis Avenue	A (2)	A (5)	A (4)
13. US 1 and E. Howell Avenue	A (2)	B (14)	B (12)
14. US 1 and existing E. Monroe	E (63)	C (28)	E (63)
15. US 1 and Slaters Lane	B (15)	B (17)	B (17)
16. Commonwealth Avenue and E. Glebe	B (11)	B (11)	B (17)
17. Commonwealth Avenue and Mt. Vernon	A (6)	C (31)	D (37)
18. Mt. Vernon Avenue and E. Braddock	B (13)	C (32)	C (33)
19. Potomac Avenue and future Crescent	N/A	N/A	A (0)
20. Potomac and future Lincoln Avenue	N/A	N/A	A (9)
21. Potomac Avenue and future Reed	N/A	N/A	A (8)
22. US 1 and future Diamond Avenue	N/A	N/A	A (9)
23. Potomac Avenue and future Evans Lane	N/A	N/A	A (5)
24. Potomac and future Wesmond Drive	N/A	N/A	A (3)
25. Potomac Avenue and E. Glebe Road	N/A	C (21)	A (9)

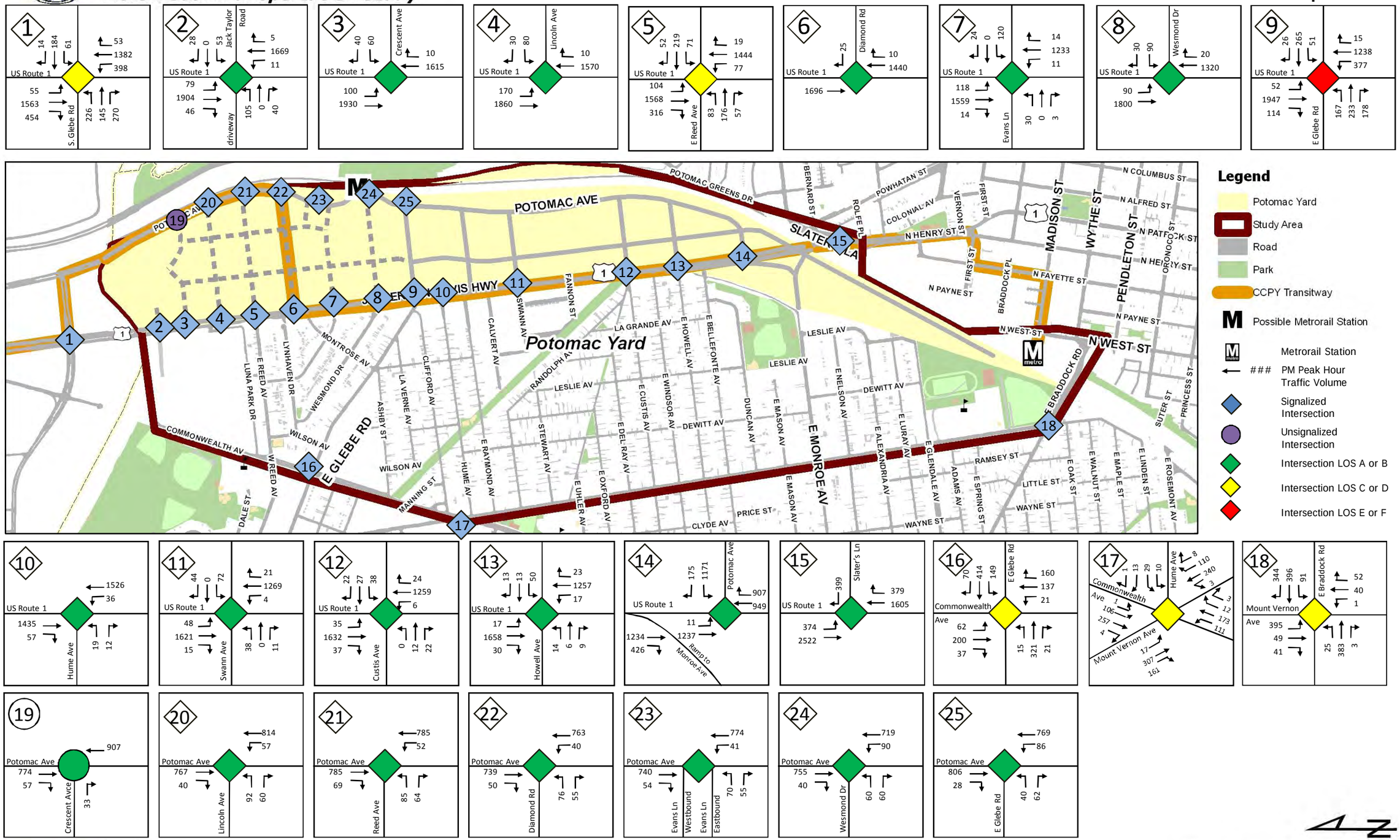
* Future conditions assume the construction of the transitway on US 1, Diamond Road, and Potomac Avenue
** Under Future Conditions with Development, US 1 signals are timed with lead-lag left turns and coordinated with 140-second cycle length. Potomac Avenue is timed with coordinated, 90-second cycle length signals.
*** See page 57 for further discussion of intersection LOS analysis

The results of the 2030 future conditions with development intersection capacity analysis shows that several of the study area intersections operate near-, at-, or over-capacity under future conditions with development during the PM peak hour. The following intersections were found to operate near-, at-, or over-capacity under future conditions without development:

- US 1 and E. Reed Avenue: LOS E
- US 1 and E. Glebe Road: LOS F
- US 1 and Potomac Avenue: LOS E

Potomac Yard
Multimodal Transportation Study

Figure 7-3: Future Intersection Volumes and Levels of Service with Development



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For the projected level of development to be accommodated at acceptable LOS at the US 1 and E. Glebe Road intersection, assuming that vehicle trip assignments occur as rigidly as assumed in this traffic study, additional intersection modifications would be needed. Without further widening intersections and streets, traffic could instead be accommodated by more even distribution among all intersections and streets along US 1. Understanding that interconnected networks of streets facilitate the balancing of traffic at intersections, the proposed interconnected network of new streets within Landbay F will facilitate the balancing of turning movements among the many intersections with US 1. As a result of the balancing of traffic across the network, operation of study area intersections are anticipated to be acceptable.

It is recommended that the eastbound (Glebe Road) leg of the intersection be modified to provide an exclusive left-turn lane, through lane, and right-turn lane. With this improvement, the calculated overall level of service for the intersection will remain LOS F; however the improvement will reduce the impact of development on the eastbound (Glebe Road) approach by reducing delay and queue lengths. The level of service calculation assumes that the pedestrian phase will be called each signal, which is conservative since it will not be called each cycle. On cycles when the pedestrian signal is not called, the US 1 mainline will receive more green time and perform at a better level of service.

Similar to the poor level of service calculated for the intersection of US 1 and E. Glebe Road, the LOS E experienced at the intersection of US 1 and Potomac Avenue may be attributed to an over-assignment of westbound left turns from Potomac Avenue to US 1. Operations at the intersection are likely to be better than calculated because the traffic will balance among the many intersections along US 1.

With the future street network completed, the remaining study intersections are anticipated to operate at acceptable LOS. The additional north-south capacity created by adding Potomac Avenue, the improvement of US 1 through the provision of left turn lanes at intersections, and the improvement to side-street approaches to intersections will help to efficiently move traffic. To provide further efficiency within the street network, signals will be retimed and coordinated to accommodate the transitway, pedestrian and bicycle movements, and vehicular traffic.

US 1 Corridor Travel Times and Speeds

Table 7-2 shows a summary of weekday PM peak hour travel times and average speeds on US 1 in the study area under existing conditions, under conditions without the proposed development, and under conditions with the proposed development.

Table 7-2 2030 Future Conditions with Development Average Weekday PM Peak Hour Travel Speeds and Times for US 1						
	Southbound			Northbound		
Scenario	Speed (mph)	Travel Time (min)	Increase in Travel Time (from existing)	Speed (mph)	Travel Time (min)	Increase in Travel Time (from existing)
Existing	20.9	5.0	-	22.3	4.5	-
Future Conditions without Development	13.1	7.5	50%	14.7	7.0	56%
Future Conditions with Development	16.6	7.0	40%	12.1	8.5	89%

* Future conditions assume the construction of the transitway on US 1, Diamond Road, and Potomac Avenue
**Under Future Conditions with Development, US 1 signals are timed with lead-lag left turns and coordinated with 140-second cycle length. Potomac Avenue is timed with coordinated, 90-second cycle length signals.
Source: Kimley-Horn and Associates, Inc.

As shown in the table, as the level of traffic increases, contributed to by a number of factors, weekday PM peak hour travel speed decreases and delay increases on US 1.

Impact on Local Streets

In addition to reduction in travel speed on US 1, volumes will increase on some local streets and minor collector streets. Future forecasts were prepared for E. Reed Avenue, E. Glebe Road, Hume Avenue, Swann Avenue, Custis Avenue, and Howell Avenue within the study area. As shown in **Table 7-3**, to be conservative E. Reed Avenue and E. Glebe Road were assumed to carry forecasted local and minor collector street traffic.

Table 7-3 2030 Future Conditions with Development Additional Weekday PM Peak Hour Two-Way Traffic (number of vehicles)						
Scenario	E. Reed Avenue	E. Glebe Road	Hume Avenue	Swann Avenue	Custis Avenue	Howell Avenue
Future Conditions without Development	0	277	0	0	56	32
Future Conditions with Development	470	414	0	0	0	0

Note: No traffic was assigned to Custis or Howell Avenues to internationally reflect a worst-case conditions on other east-west streets.
Source: Kimley-Horn and Associates, Inc.

7.4 Conclusions on 2030 Total Future Conditions with Potomac Yard Development

With the addition of traffic volumes that will accompany the proposed redevelopment of Potomac Yard Landbay F as well as possible future development of Landbay L, analyses indicate that all study intersections will operate acceptably with the exception of the intersection of US 1 and E. Glebe Road. To accommodate forecasted volumes associated with the proposed redevelopment on Potomac Yard Landbay F, the following measures should be considered:

- Increasing capacity on streets intersecting US 1 (E. Reed Avenue, E. Glebe Avenue, and Evans Lane) by providing additional lanes.
- Adding an additional east-west connection between Commonwealth Avenue and US 1 to the west of Potomac Yard Landbay F to increase capacity and spread trips along local and minor collector streets.
- Increasing non-auto mode share. The increase in non-auto mode share will need to be supported by policies to discourage single-occupant vehicle travel and the facilities, programs, and services to support these policies.
- Encouraging the use of Potomac Avenue to better balance traffic in the north/south direction.
- Balancing the assignment of Potomac Yard Landbay F trips to the entire Potomac Yard street network.

8.0 Multimodal Transportation Recommendations

This chapter presents multimodal transportation recommendations in support of the redevelopment of Potomac Yard Landbay F. Future transportation and development policies and multimodal infrastructure are anticipated to allow the development to meet or exceed the goals for internal capture and mode split that were used in forecasting and evaluating traffic generated by the proposed development. Transportation recommendations in this chapter are described in the following sections:

- **Transportation Demand Management (TDM):** policies, strategies, and programs consistent with city policies that promote and encourage transportation choice
- **Street Network:** general street and intersection recommendations
- **Traffic Calming:** recommendations and guidelines for local streets
- **Transit:** recommendations for the CCPY transitway, Metrorail, and bus service
- **Bicycle and Pedestrian:** general guidelines and future network configuration
- **Parking:** curb space management guidelines, parking requirements, and other programs and policies to manage parking demand
- **Phasing of Improvements:** the implementation of transportation recommendations to correspond with anticipated phases of development

8.1 Best Practices FOR Transportation in Urban Environments

Urban places and cities follow a very different model for moving people than do suburban areas. The focus of suburban areas is primarily on vehicular level of service and the movement of vehicles. In successful urban areas, the focus is on the movement of people by all modes of transportation—walking, bicycling, transit, and driving. There are many points to consider with regard to transportation in urban environments and these points are supported by the visions, goals, objectives, and strategies in the City of Alexandria Comprehensive Transportation Master Plan (the TMP).

Alexandria's Transportation Vision: *The City of Alexandria envisions the enhancement of its transportation system to further promote and encourage the use of alternative travel modes while reducing dependence on travel by private automobile. The City's multimodal approach and planning efforts will foster the establishment of transit-oriented, pedestrian-friendly villages, focused on the creation, preservation, and enhancement of neighborhoods. This will result in increased community cohesion and the formation of a more urban, vibrant, and sustainable city. Promoting a balance between travel efficiency and quality of life will provide Alexandrians real opportunities for travel mode choice, and continued environmental and economic sustainability.*

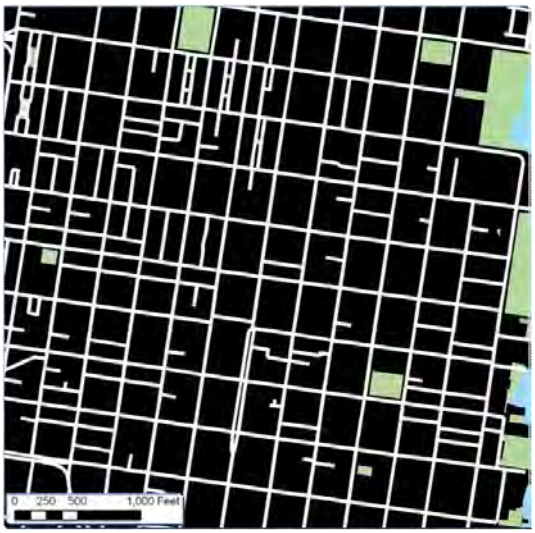
Transportation Master Plan: *The City expects that any amendment to the Potomac Yard/Potomac Greens Small Area Plan which results in density beyond what is currently approved will include reasonable provisions to address the development and funding of an additional Metrorail station.*

Transportation Planning Concepts and Best Practices

Congestion: To achieve some transportation system goals, planning for a manageable level of traffic congestion is a good practice and is an important factor in increasing transit ridership, bicycle usage, and pedestrian activity. Slow speeds make non-auto modes more attractive, competitive, and in some cases safer. Alexandria's TMP sought to focus transit investments on mobility needs in corridors where transit can specifically address issues such as traffic flow in congested areas and be coupled with access to Metrorail stations and coordinated parking, pedestrian, and bicycle improvements.

Design for all day: Often, roads and intersections are designed so that traffic (auto) volumes during the busiest 15 minutes of the busiest hour of one day a week can be accommodated with little to no delay. Results of this approach can include the creation of large intersections that are unfriendly to all non-auto modes, high transportation infrastructure costs, unrealistic expectations from drivers, and vehicle carrying capacity that goes mostly underused 23 or more hours of the day.

Interconnected network of streets: Not only does a grid or web of streets spread the load of traffic over many, rather than few streets, it allows different streets to perform different functions, including serving different users. The TMP focuses on the ability of streets to safely accommodate all modes of travel through an "emphasis on reducing the size of larger blocks through the redevelopment site planning process" and "creation of a street-grid where possible that reduces the traffic load on arterial streets, resulting in reduced travel distances to destinations, reduced vehicle miles, and creating more direct access to services."



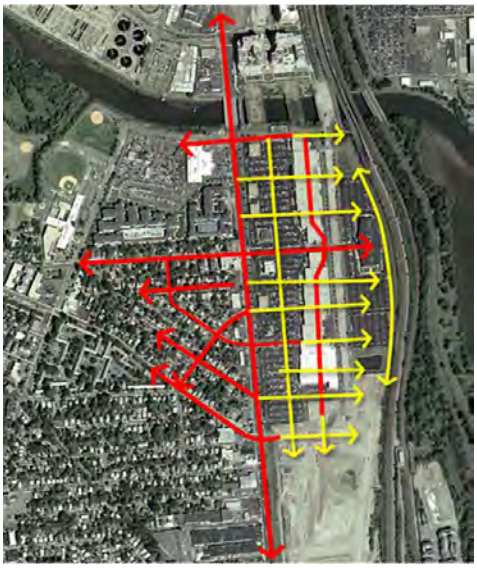
Example of a fine-grained street network: Old Town Alexandria

Example of a less-connected street network: Fairfax County, Fair Lakes Area

The proposed Potomac Yard network will be comprised of a set of north-south and east-west streets. The network will provide the following benefits:

- Complementing the street network in the existing neighborhoods to the west of US 1
- Enabling each street to be narrower and become less of a barrier to pedestrian and bicycle connectivity and accommodation
- Better managing traffic by limiting choke points and distributing traffic among many, rather than fewer, streets
- Providing more opportunities for pedestrians to cross streets, reducing walk travel time and distance, which will encourage more trips to be made by pedestrians
- Permitting more efficient emergency responses
- Increasing the amount of curbspace, which can be used for loading, passenger pick ups/drop offs, and on-street parking

Existing Potomac Yard Area Street Network



Conceptual Future Potomac Yard Area Street Network

Interconnectivity between all modes of Transportation: Successful urban areas deliberately plan, encourage, and create connections between all modes of transportation. The TMP advocates that new transit services be fully integrated with existing regional services and coordinated with proposed future services to best serve the City's citizens. Similarly, the TMP recognizes the importance and value of the connection between transit, pedestrians, and bicycles. The TMP recommends additional sidewalks and pathways as well as bike racks of buses, bike infrastructure, and supporting programs to increase usage of transit services and offer more opportunities for bicycling and walking.

Complete Streets: The street network defines spaces for pedestrians, bicycles, transit, landscaping, moving vehicles, and parked vehicles. In the overall street network, individual streets perform different functions and accommodate different modes in different ways. Every street does not have to accommodate all modes, but within the entire network of streets, each mode must be accommodated. The accommodation of pedestrians, bicycles, transit, and vehicles were considered in the development of the future street network for Potomac Yard. Elements to be included on Potomac Yard streets, some of which are shown in **Figure 8-1: Elements of a Complete Street,** are the following:

- 14- to 20-foot sidewalks and landscape strips or tree wells
- Bicycle lanes, sidepaths, and shared-use paths
- 10- to 12-foot wide travel lanes for general vehicles and 12-foot wide travel lanes for transit vehicles
- 8-foot wide parallel parking lanes (includes gutter pan)
- Left-turn lanes at major intersections
- High-visibility crosswalks with accessible curb ramps at marked crosswalks
- Pedestrian count-down signal heads at all signalized intersections and pedestrian crossings
- Pedestrian push buttons where the pedestrian signal phase needs to be called
- Curb extensions that shadow on-street parking and reduce pedestrian crossing distances at intersections
- Median refuge islands at marked crosswalks on roadways with long crossings

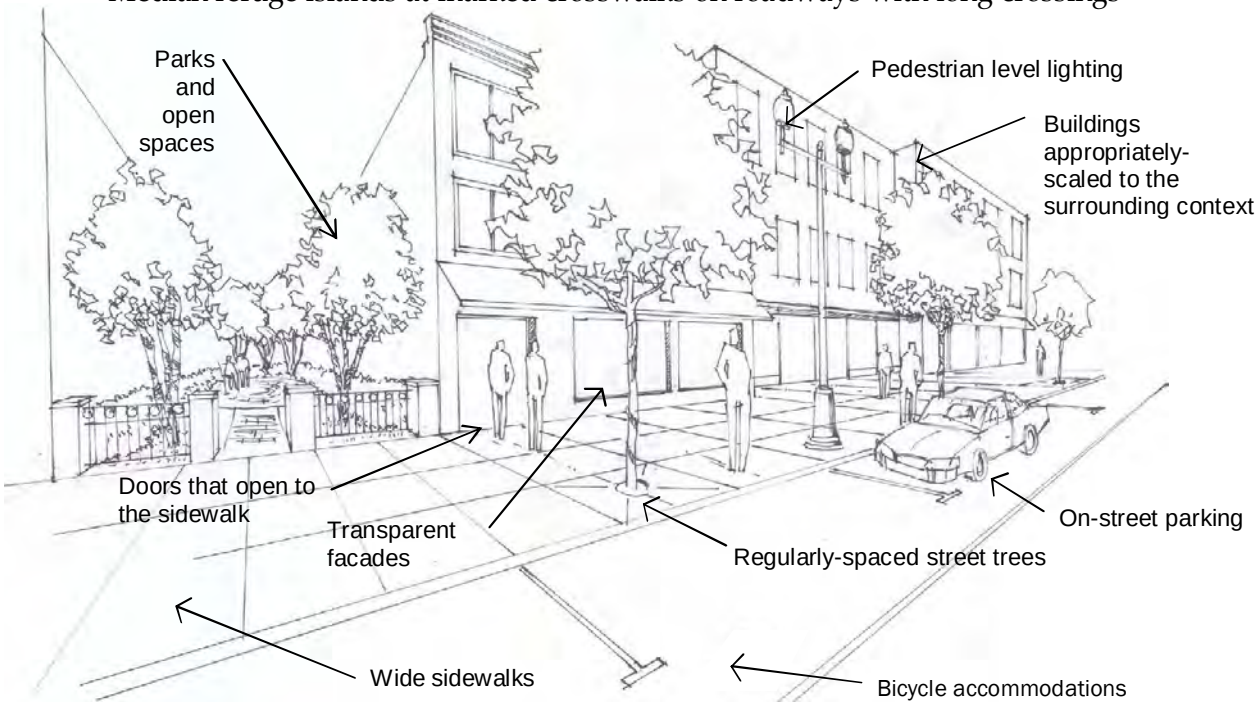


Figure 8-1: Elements of a complete street

Compact urban form/density: With greater densities and complementary uses close to one another, there is a much higher probability that people will walk, bicycle, and take transit from one place to another. The TMP "advocates policy to encourage future transit supportive land-use" by reviewing all new land use and development adjacent to designated transit corridors to encourage an appropriate mixture and density around transit stations.

People-moving capacity: In urban areas, capacity in common terms refers to the system's ability to move people, whether they choose to drive, walk, bicycle, or take transit. A diverse system has a much greater ability to move a larger number of people from place to place. The TMP states that "the City of Alexandria policy regarding its street network is targeted toward providing mobility for all users and alternatives to the private automobile" and calls for the City to develop a "Complete Streets" policy developing multimodal corridor design guidelines.

Quality of the experience: Consistent with the previous points, the quality of, and consideration of future investment in the transportation system should not be determined by a single mode, which is often the case. The TMP "seeks to initiate an unprecedented paradigm shift, putting Alexandrian's first and providing them with innovative options for transportation. The successful implementation of this Plan [the TMP] will allow all Alexandrians the opportunity to choose, on a daily basis, if they want to walk, bike, or take transit to their destination."

Vehicle speed: While high vehicular travel speeds may be appealing to through traffic, they are not always viewed favorably by residents, businesses, bicyclists, transit users, or pedestrians along the same street. In urban places, slow and steady is a much more successful approach to corridor operations. The TMP states that the "most dangerous areas for walking have high-speed roads and poor pedestrian facilities." The traffic calming section of the TMP provides a list of measures that the City uses to slow traffic and make streets safer for pedestrians and bicyclists.

Travel time: Travel time will never be equal among all modes, but should be competitive based on value—actual monetary cost of the trip, quality of travel experience, time, and other similar considerations. The transit section of Alexandria's TMP understands that transit is not viewed as a comparable alternative to the private automobile. To make transit more competitive, reliable, and attractive, the recommended solution presented in the TMP is to "secure dedicated, congestion-free, transit rights-of-way for future transit services using advanced technology."

Parking: Great places aren't limited by the parking they can provide or the vehicular trips they can accommodate. Whether or not a parking space is available and how much parking will cost, heavily influences people's decision whether or not to drive to a place. Parking should be available for those that choose to drive and are willing to pay its cost. At the same time, incentives—financial and otherwise—should be provided to those that choose not to drive. The TMP states that a comprehensive parking management strategy that is fully integrated with the City's plans for transit, streets, bicycles, and pedestrians, functions in coordination with these plans—furthering the City's overall goals and wider transportation vision. The plan also provides parking management principles that include shared parking, parking pricing, peak parking management, and maximum parking ratios.

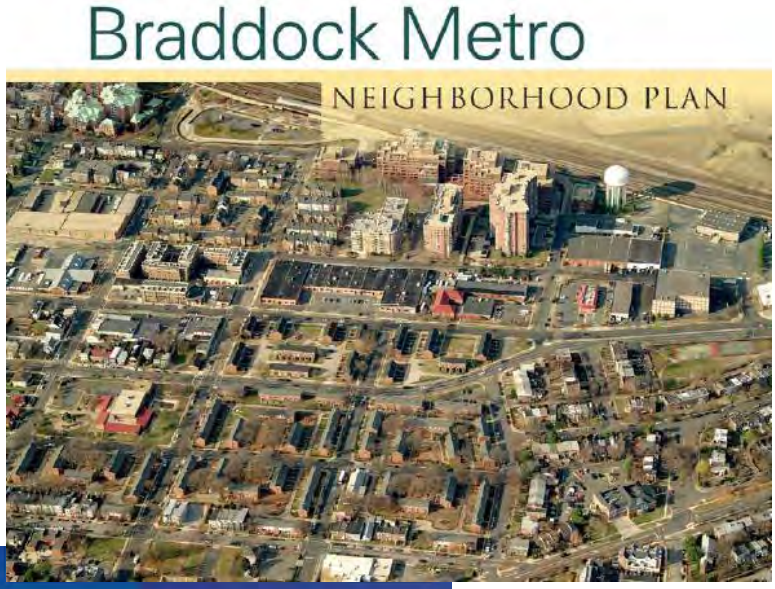
Columbia Heights Shopping Center, Washington, D.C.

Columbia Heights Parking Garage
Source: Washington Post Article Entitled "*At NW Mall, So Many Spaces, So Little Need*"

Citywide Experience in Implementing Best Practices

Much like its regional neighbors, Alexandria has departed from auto-centric policies and planning practices. While the City continues to implement improvements to its transportation system to benefit vehicles, significant road widening to accommodate increases in travel demand is not at the center of the City's transportation improvement program. At a practical level, street rights-of-way are very constrained and the value (benefit vs. actual cost) of widening streets to accommodate, in some cases non-Alexandria

traffic, is low. In general, Alexandria's overall transportation focus is oriented toward making the most efficient use of the existing vehicular network (while protecting neighborhoods) and increasing the people-moving capacity of the transportation and transit systems.



Braddock Metro Neighborhood Plan

Eisenhower Avenue Development

Regional Experience in the Urban Core

Locating housing, services, and employment where it can be well-served by transit is at the center of the overall growth strategy of Alexandria, Arlington, and the District of Columbia. The cost of allowing development in locations that are not, or could be conveniently served by transit, is too high. One of the land use policies included in the City of Alexandria's comprehensive plan states that large-scale and high density office concentrations should be limited to designated areas where high density concentrations are appropriate and where the traffic impacts on residential neighborhoods will be relatively limited.

Being at the urban core of the region, Alexandria, Arlington, and the District of Columbia recognize that widening streets to accommodate regional traffic growth is not beneficial to the health of their communities. Instead, each of these areas has chosen to diversify their transportation system and increase its ability to move people through approaches that include:

- **Vehicular lane reductions:** removing vehicular travel lanes on streets to make more room for pedestrians, bicycles, and transit users
- **Pedestrian network additions and enhancements:** new sidewalks, widened sidewalks, pedestrian safety improvements at intersections and between blocks (bulb-outs, pedestrian heads, pavement markings, medians, etc.), and similar measures
- **Bicycle network additions and enhancements:** bike lanes, paths, bike parking areas, bike sharing, bike stations, and other facilities
- **Transit service increases and facilities improvements:** shelters, benches, lighting, paved waiting areas, more frequent service, longer trains, more routes, more direct routes, super stops, BRT/transitway planning
- **Parking and Transportation Demand Management (TDM):** limiting parking, charging a fee for parking, sharing parking, transit passes, unbundling parking cost, transit incentives, required TDM plans and monitoring, and similar measures

As each of these areas has become more dense and populations have either stabilized or grown in the last 20 years, traffic growth on many major roadways has been moderate or has simply not occurred. Using Wilson Boulevard in Arlington as an example because it is well-documented, the volume of daily traffic has not changed in the corridor in more than 20 years, despite the significant increase in density. In 1980, Wilson Boulevard carried approximately 19,500 vehicles per day. Measured in 2000, Wilson Boulevard was carrying 18,600 vehicles per day. To accommodate the tremendous increases in density in the corridor, transit, walk, and bicycle mode shares have increased exponentially.

8.2 Transportation Demand Management

Background

The City's transportation vision is to encourage use of alternative modes of transportation, reducing dependence on the private automobile. Potomac Yard is envisioned as a transit-oriented, pedestrian-friendly, urban place. It will have a multimodal transportation network and facilities that include a Metrorail station, the CCPY transitway, bicycle facilities, and pedestrian accommodations.

TDM will be used to ensure that travel behavior that underlies the assumptions in this study will become reality. The City of Alexandria's Local Motion program promotes transportation choice. With strategic implementation, TDM can have a significant impact in reducing vehicular trips to and from Potomac Yard, as it has in other areas of Alexandria.

Alexandria's Local Motion includes travel tools, programs, and resources including news, notices, useful links. Local Motion is administered by the City's Office of Transit Services and Programs. A list of programs includes:

- **Air Quality Action Days** – a workplace-based outreach program notifying participants of unhealthful air days and encouraging alternative forms of transportation on these days
- **Carshare Alexandria!** – the City provides a monetary incentive to residents and businesses to encourage use of carsharing service
- **Employer Services** – the City provides an Employer Services Outreach Specialist to work with businesses to find transportation solutions for employees tailored to each organization. Applicable programs and solutions include:
  - eNews, Local Motion display, RSS feed
  - Local Motion employer kits
  - Bike to Work Day
  - Metro SmartBenefits® and Metrochecks

Alexandria's Local Motion Webpage

- **Guaranteed Ride Home** – Commuter Connections provides a free ride home to eligible commuters
- **Local Motion Ambassadors** – volunteers who live and/or work in the city assist with promoting transit, walking, and bicycling as realistic travel options
- **Telework** – the Telework!VA program, administered by the Virginia Department of Rail and Public Transportation, provides financial assistance for companies establishing or expanding telework programs

In the proposed Potomac Yard development, TDM programs that encourage travel modes other than single occupancy vehicles will contribute in a significant way to creating a livable development and protecting the adjacent residential neighborhoods. Over time, the vehicular transportation network is likely to steadily approach capacity and traffic delays will increase on major roadways, which will increase the value of other travel choices available in an area.

Regardless of whether and at what density Potomac Yard Landbay F is developed, US 1 will eventually reach its vehicular capacity. If local trips do not use available road capacity, inevitably regional trips will consume the available capacity. When Alexandria further urbanizes, a larger proportion of all trips made on US 1 are likely to be local and of a shorter length. The investments in the multimodal transportation network that are already planned in addition to those that will be partially funded through the proposed development of Landbay F will create substantial people moving capacity to accommodate increases in travel demand associated with continued development in Alexandria as well as in Potomac Yard specifically. Coupled with a strong network of multimodal transit options, TDM can help to improve the quality and number of transportation choices in the community.

Recommendations

The following TDM measures are recommended for the proposed development:

- Require the establishment of a Transportation Management Plan (TMP) district. All new development will be required to participate in the TMP district.
- Establish a district-wide TMP, managed by a coordinator to oversee TDM strategies which include:
  - Carsharing – allocate curb space to carsharing service and advertise the Carshare Alexandria! program
  - Ridesharing program – advertise Alexandria Rideshare and provide incentives for ridesharing
  - Transit – provide services (Metrorail, CCPY Transitway, Metrobus, DASH) and incentives to use transit (see section **8.5: Transit Recommendations**)
- Pedestrian and bicycle - provide a high-quality network and amenities (see section **8.6: Pedestrian and Bicycle Recommendations**)
- Parking – employ appropriate parking ratios, require shared parking, and implement parking management (see section **8.7: Parking Recommendations**)
- Employ aggressive TDM performance measures. The TMP coordinator should establish benchmarks and evaluate current and future TDM strategies and make necessary adjustments to achieve the goals of the plan to reduce single occupant vehicle trips and increase travel by other modes.

8.3 Street Network

Background

The recommended interconnected street network for Potomac Yard will complement the existing street network. The street network serving Potomac Yard Landbay F will be comprised of US 1, Main Line Boulevard, Water Street, and Potomac Avenue in the north-south direction and seven east-west streets north of E. Glebe Road. When complete, Potomac Avenue will be a new major route that will connect US 1 to the south with Crystal Drive in Arlington to the north. It will provide additional north-south capacity for local and regional trips helping to relieve US 1 and other north-south corridors.

Street hierarchy determines what elements and functions should have priority on a given street. In this study, street categories include Primary, A, B, and C, which are described in the following:

- **Primary streets** focus on providing mobility and are critical in moving longer trips made by any mode of transportation. These streets should have high-quality pedestrian accommodation, transit facilities, (shelters, benches, etc.) and may provide bicycle facilities on-street or adjacent to the street.

Example of a Primary Street: Washington Street, Alexandria, VA

- **Class A streets** connect an area to the primary street network and are critical in distributing people once they leave the primary street network. These streets have few individual site driveways and accommodate all modes of transportation relatively equally. They should provide high-quality pedestrian accommodation and also may accommodate bicycles and on-street parking. Class A streets in Alexandria include King Street, Mount Vernon Avenue in Del Ray, and 18th Street.

Example of a Class A Street: Mount Vernon Avenue in Del Ray, Alexandria, VA

- **Class B streets** provide a balance of mobility and access to land. They typically provide high-quality pedestrian accommodation, accommodate bicycles, and have on-street parking. Class B streets typically have individual driveways and allow some on-street loading and service. An example of a Class B street in Alexandria is Cameron Street.

Example of a Class B Street: Cameron Street, Alexandria, VA

- **Class C streets** accommodate local land access and service functions such as loading and unloading. They provide varying levels of pedestrian accommodation, often have no specific bicycle accommodation, and may allow on-street parking. Class C streets typically have frequent individual driveways, on-street loading, and service activities.

Recommendations

Corridor Cross-sections – **Figure 8-2** shows the recommended street network with the number of lanes and street hierarchy for each new street in Landbay F. **Table 8-1** shows recommendations for elements of each type of street in the Potomac Yard network.

Table 8-1
General Recommendations for Street Elements

Element	Hierarchy				
	Type A without transit	**Type A with transit**	**Type B without transit**	**Type C without transit**	**Type C with transit**
Width of Pedestrian Realm (sidewalk and landscape strip)	18 to 22 feet	20 feet (minimum)	18 to 20 feet	20 feet (minimum)	14 feet
On-street Parking	Both sides of street	Depends on transit configuration	One or both sides of street	Both sides of street	Both sides of street
Bicycle Facility (where applicable)	5 foot bicycle lane or 14 foot sharrow lane	None	5 foot bicycle lane or 14 foot sharrow lane	None	None
Vehicular Lane Width	10 to 11 feet	12 feet	11 feet	12 feet	12 feet
Turn Lane Width (where applicable)	10 to 12 feet	None	None	10 to 12 feet	None
Transit Lane Width	None	12 feet	None	None	12 feet

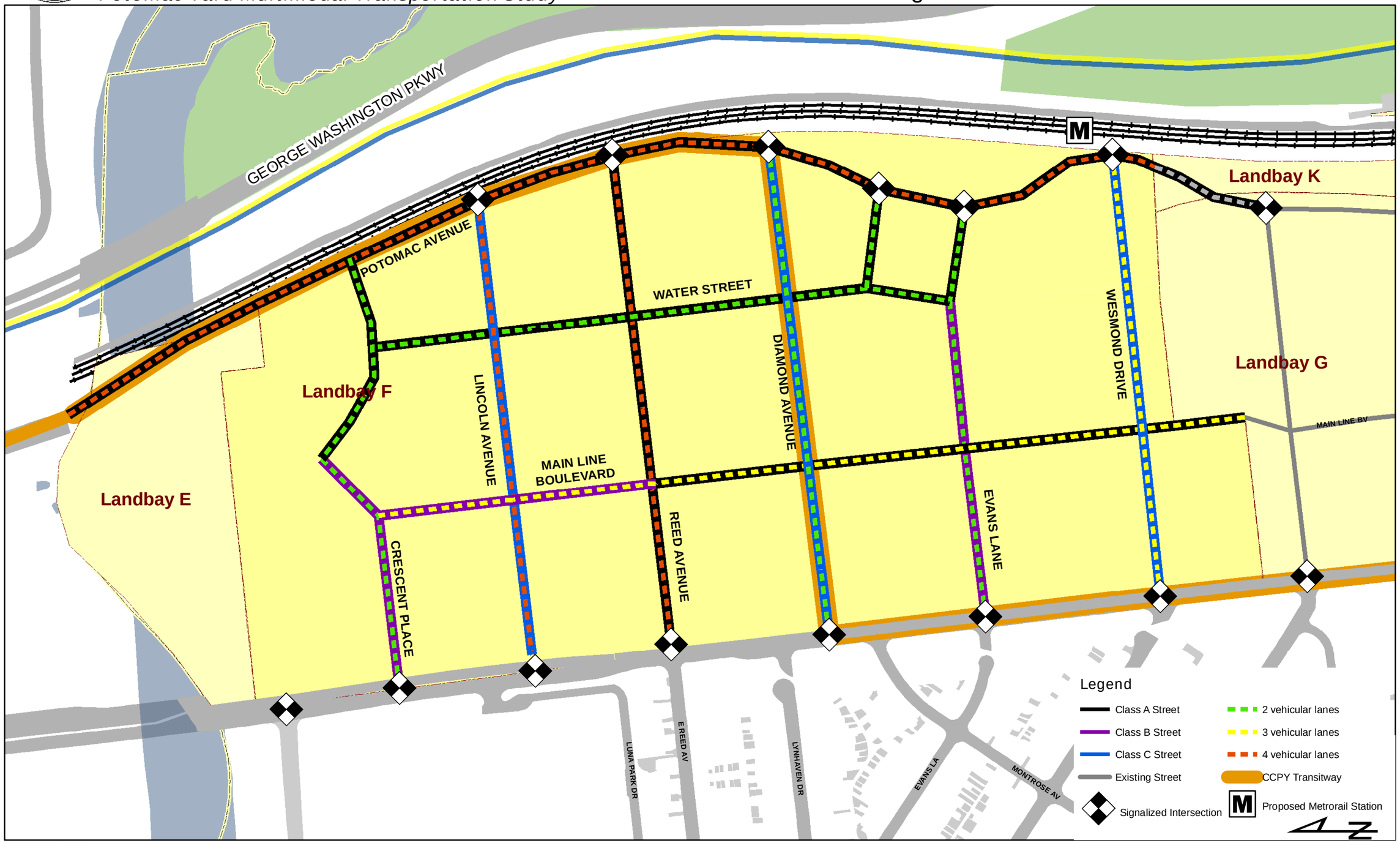
Source: Kimley-Horn and Associates, Inc.; Reference: City of Alexandria

Intersection Traffic Control and Laneage – The recommended points of access for Potomac Yard Landbay F, future intersection laneage, and traffic control are shown in **Figure 8-3: Recommended Future Intersection Traffic Control and Laneage**.

The traffic signal at the intersection of US 1 and future Diamond Road will have a transit phase and vehicular access will be restricted to right-in, right-out. The traffic signal at the intersection of Potomac Avenue and future Diamond Road also will have a transit phase.

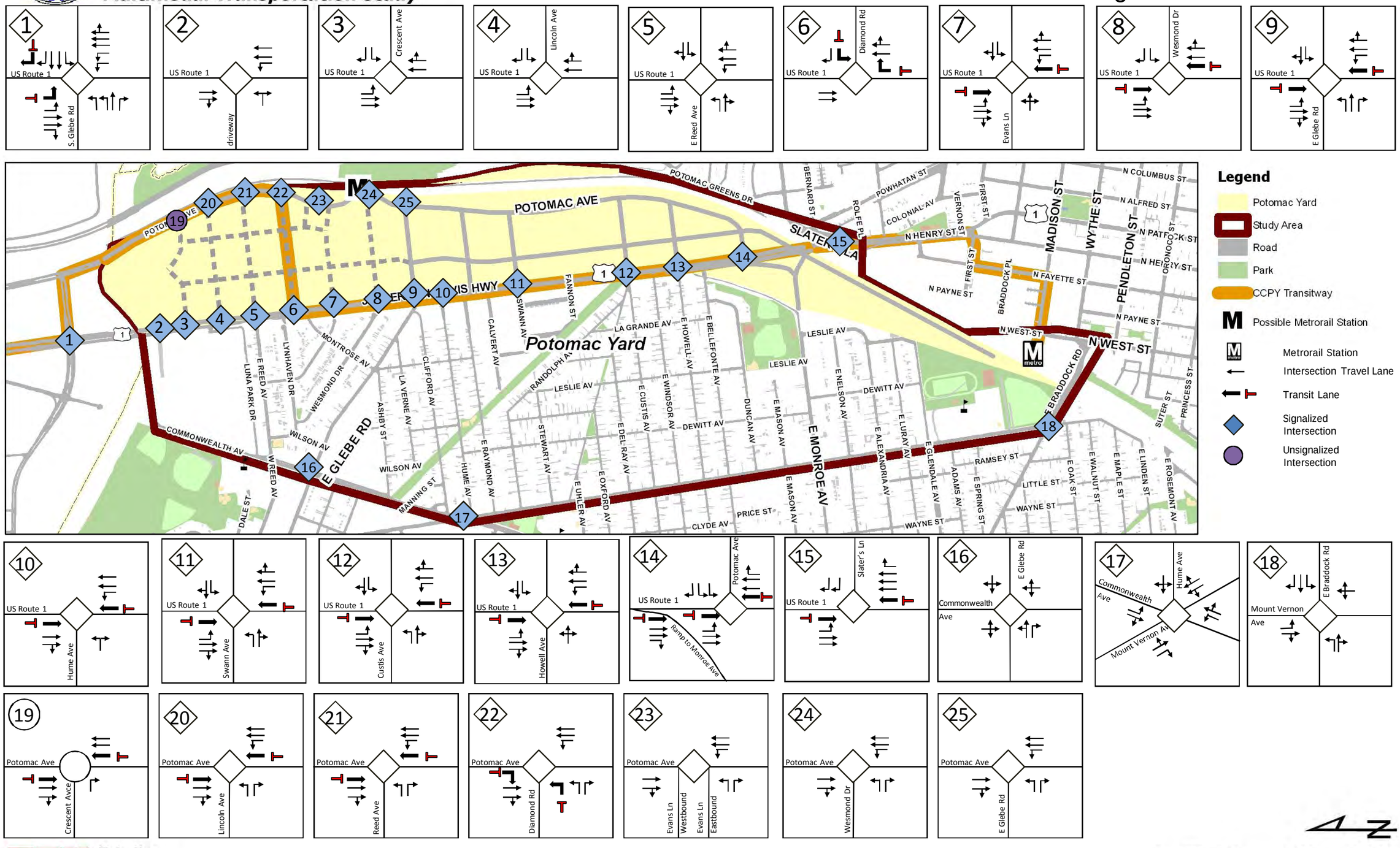
Commonwealth Ave – Extend a new east-west public street between Commonwealth Avenue and US 1. The new street will intersect with US 1 at an existing signalized intersection at a location yet to be determined between Four-Mile Run and Reed Avenue.

Figure 8-2: Recommended Street Network



Potomac Yard
Multimodal Transportation Study

Figure 8-3: Recommended Future Intersection Laneage and Traffic Control



Modifications to Existing Intersections – Modifications are recommended to improve safety and operations as well as accommodate the future transitway. With the implementation of the transitway, the following intersections should be modified to provide an exclusive left-turn lane, an exclusive through lane, and a shared through and right-turn lane in the northbound (US 1) and southbound (US 1) directions:

- US 1 and Commonwealth Avenue extension
- US 1/Reed Avenue
- US 1/Evans Lane
- US 1/E. Glebe Road*

*The intersection of US 1 and E. Glebe Road should be modified to provide an exclusive left-turn lane, through lane, and right-turn lane in the eastbound (Glebe Road) direction.

Additional recommendations for these intersections include:

- Evaluation of signal cycle length to improve traffic progression and side-street operations at intersections along US 1
- Implementation of lead-lag left-turn phasing to improve intersection operations
- Removal of existing split phasing at side street approaches at US 1 intersections
- Modification of signal phasing for side street approaches at US 1 intersections to include left-turn phases as needed

8.4 Traffic Calming

Background

Connectivity between Potomac Yard and adjacent neighborhoods is important. The recommended street network within Potomac Yard Landbay F will be spaced to complement the street network in Del Ray and Lynhaven. Increased connectivity within the local street network is beneficial to improving local mobility and access as well as in helping to distribute local trips on the local street network.

The appropriate application of traffic calming measures will help to preserve desirable street characteristics in neighborhoods adjacent to Potomac Yard. Existing local streets in Del Ray and Lynhaven, illustrated in **Figure 8-4: Typical Local Street**, already incorporate natural traffic calming features such as narrow travel lanes, on-street parking, and appropriate streetscapes. Comprehensive application of additional traffic calming measures can further minimize the attractiveness of neighborhood streets to cut-through traffic.

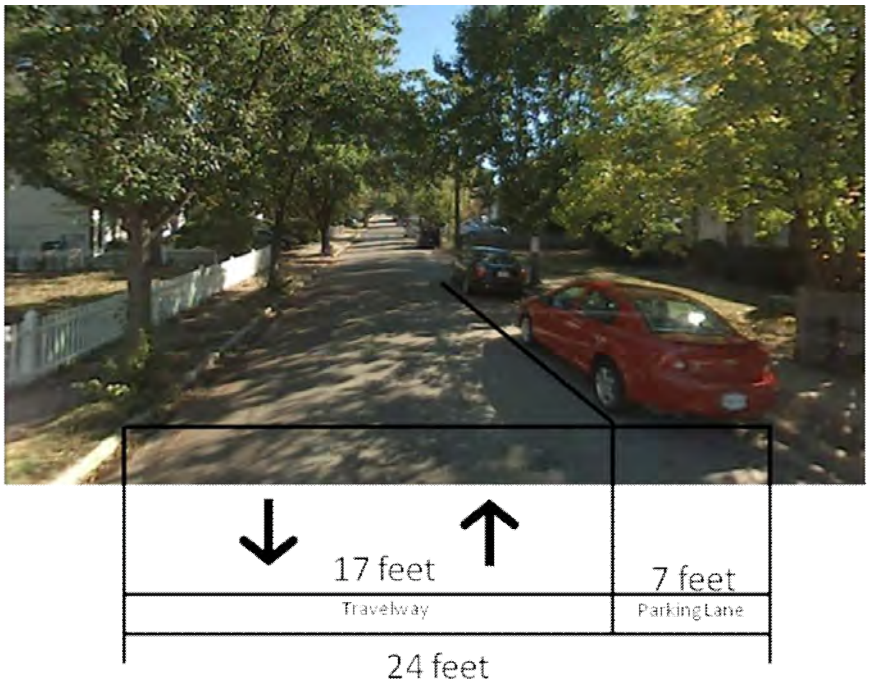


Figure 8-4 Typical Local Street (Custis Street)

Recommendations

Measures to enhance connectivity with adjacent neighborhoods are recommended to include:

- Allowing all turning movements at the intersection of US 1 and E. Reed Street
- Studying the possibility of allowing all turning movements at the intersections of US 1 and Evans Lane, Wesmond Road, and Lynhaven Street

Prior to development levels in Potomac Yard Landbay F exceeding existing vehicular trip generation levels of existing Potomac Yard Landbay F, preliminary traffic calming measures are recommended to be installed as shown in **Figure 8-6: Preliminary Traffic Calming Plan**. Measures are recommended to include:

- Vertical and street entrance treatments on Luna Park Drive, Clifford Avenue, Hume Avenue, E. Del Ray Avenue, E. Custis Avenue, E. Windsor Avenue, E. Howell Avenue, E. Bellefonte Avenue, and E. Monroe Avenue
- Mini circles at the intersections of Clifford Avenue and Turner Road, Hume Avenue and Turner Road, E. Del Ray Avenue and Dewitt Avenue, E. Custis Avenue and Dewitt Avenue, and E. Howell Avenue and Dewitt Avenue

Following the implementation of the traffic calming measures in the Preliminary Traffic Calming Plan, traffic volumes and speeds should be recorded on key local streets to establish a baseline for future evaluation. As development continues in Potomac Yard Landbay F, traffic volumes and speeds should be reviewed periodically. Local or collector

streets in the area bounded by E. Reed Avenue to the north, Monroe Avenue to the south, US 1 to the east, and Commonwealth Avenue to the west and have access to US 1 (signalized or unsignalized), as well as Russell Road, should be monitored as to traffic speed and volume. If speed and/or volume meet the criteria described in the City of Alexandria's Neighborhood Traffic Calming Program (NTCP) Guide, it is recommended to consider the installation of appropriate traffic calming measures. The NTCP guide includes a traffic calming toolbox with measures such as gateways, diverters, pedestrian refuge islands, bulb outs, pavement markings, street narrowing, speed cushions, and similar street and intersection modifications.

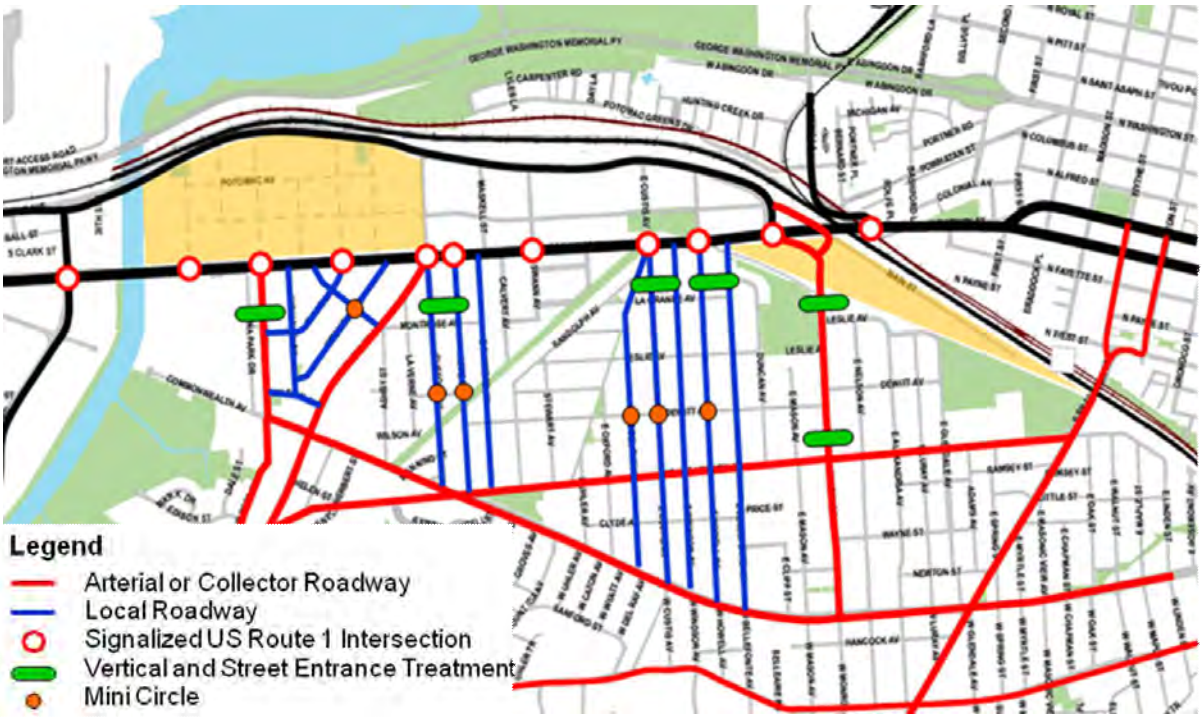


Figure 8-6: Preliminary Traffic Calming Plan

Example Mini Circles

8.5 Transit Network

Background

The Potomac Yard study area will be served by new transit services to supplement existing regional services, City bus services, and City paratransit. In addition to planning a transit system with a wide array of services, connectivity between transit services, biking, and walking is essential to ensuring travel choice for area residents, workers, and visitors.

Multimodal Transportation Facility – There will be more transportation options available for residents, workers, and visitors of Potomac Yard. A facility to intentionally connect and coordinate transportation services would perform a vital function in encouraging travel choice.

Metrorail Services – The Potomac Yard study area will be better served by the Yellow and Blue lines when a new station is constructed between Crystal City and Braddock Road. The proximity of the proposed new Metrorail station to Landbay F and other adjacent Potomac Yard landbays is anticipated to support a higher transit mode share than bus and transitway services would achieve alone.

CCPY Transitway – The Crystal City/Potomac Yard Transitway is planned to travel through Potomac Yard and extend north to the Crystal City Metrorail Station in Arlington County and south to the Braddock Road Metrorail Station. In Alexandria, the transit corridor would run between the Braddock Road Metro station and Four-Mile Run. From the Braddock Road Metro station, the CCPY service would follow Madison Street, Fayette Street, and First Street to US 1, where it would turn north. The service then would travel north on US 1, turn east on future Diamond Road travelling through Potomac Yard Landbay F. It then would turn north on Potomac Avenue and travel to Arlington County. In the study area, the transitway is planned to operate in dedicated lanes that are compatible with the operating requirements of bus rapid transit or streetcar. The initial service concept for the corridor is median-running bus rapid transit.

Bus Services – Bus services will continue to be important in Potomac Yard. They will provide service to local destinations and to the CCPY Transitway and to Metrorail.

Recommendations

Transit system recommendations are shown on **Figure 8-7: Recommended Transit Network** and further described in the following:

Multimodal Transportation Facility

- Construct a multimodal transportation facility east of Potomac Avenue between Diamond Avenue and Wesmond Drive as shown in **Figure 8-7**. (This location is adjacent to the proposed Potomac Yard Metrorail station). The facility is recommended to:

- Accommodate Metrorail, the Crystal City/Potomac Yard Transitway, bus services, and other publicly accessible transportation services
- Provide elements to accommodate commuting bicyclists and provide commuter-oriented retail and services

Metrorail

- Coordinate with WMATA, the National Park Service (NPS), the Federal Highway Administration (FHWA), transit agencies, CSX, and the landowners in Potomac Yard to resolve issues related to the new Metrorail station such as impacts on NPS property, scenic easements, wetlands, BAR, financing, and phasing
- Construct a new Metrorail station adjacent to Potomac Yard Landbay F as shown in **Figure 8-7** that includes a pedestrian bridge between Landbay F and Potomac Greens

CCPY Transitway

- Reserve right-of-way along US 1 north of Diamond Road to allow for possible future continuation of the dedicated transitway along US 1 into Arlington County
- Coordinate with Arlington County to the extent feasible in the selection of the transit technology and design vehicle for the CCPY Transitway
- Explore options to incorporate innovative and sustainable technologies into the transitway, such as:
  - Solar or hybrid electric power
  - Wayside energy storage substations
  - LED lighting
  - Water-efficient landscaping
  - Recycled building materials
- Design the CCPY Transitway stations as Smart Stations. The TMP identifies design features that should be included in smart stops, shelters, and stations such as:
  - Wireless technology for personal passenger information
  - Environmental design and operation
  - Weather protected interior spaces with seating, lighting, off-vehicle fare collection, and vendors

Swift bus station in Washington State with seating, shelter, information kiosk, and ticket vending machines
Source: Community Transit

- Construct the CCPY Transitway with stations at the following locations:
  - Median of US 1 at the intersection with E. Glebe Road
  - Median of US 1 at the intersection with Diamond Road
  - Median of Potomac Avenue at the intersection with Diamond Road

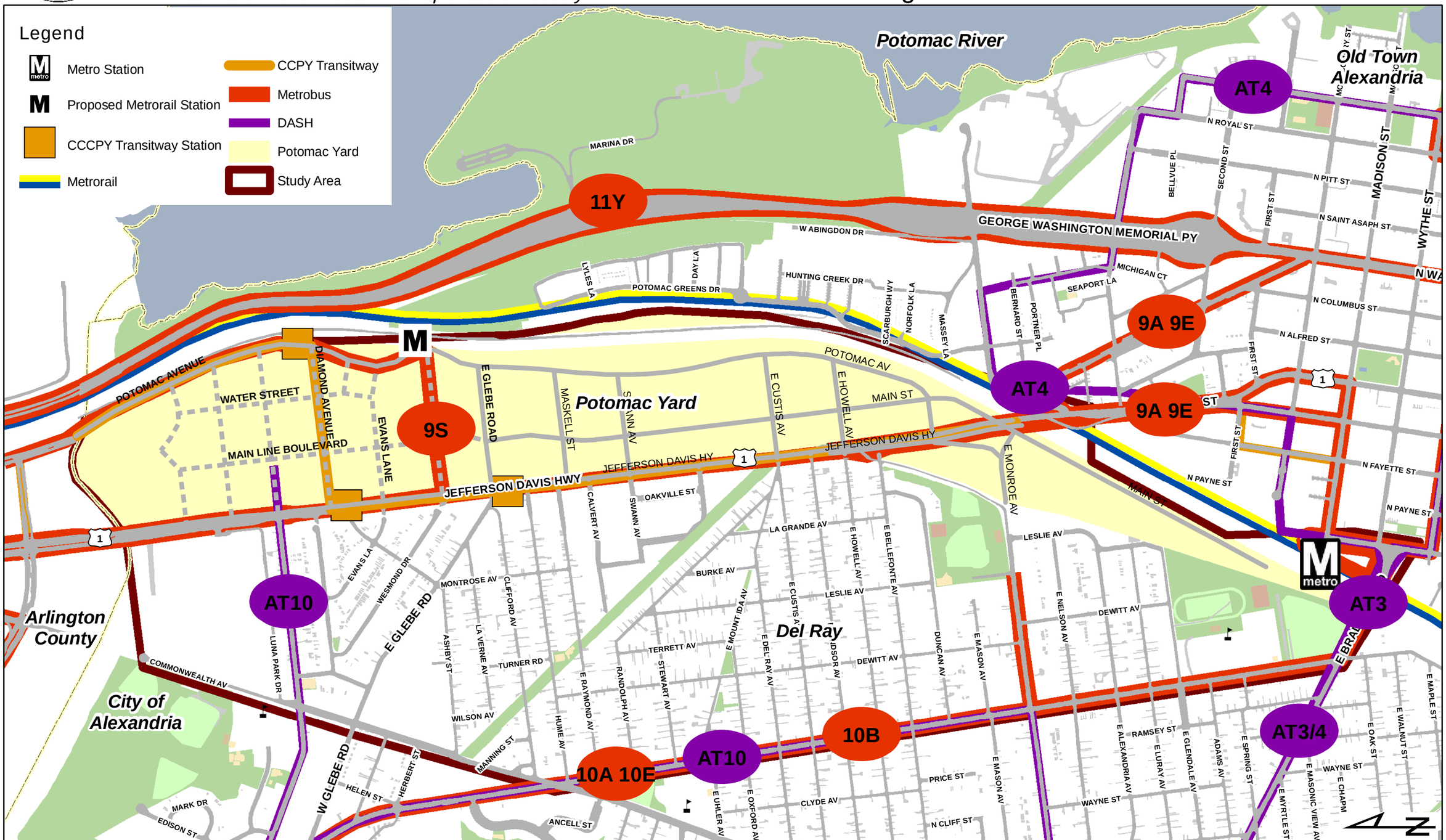
Bus Services

- As needed, maintain and supplement existing Metrobus and DASH services to provide shorter headways and off-peak or weekend service
- Provide connections between bus services, the transitway, and Metrorail
- Study the possibility of extending the 9S CCPY shuttle service south into Alexandria
- Provide bus shelters with benches and travel information, and at high volume bus stops in Potomac Yard, consider stops having features of the Smart Stops, Shelters, and Stations listed in the TMP
- Provide circulator bus service within Potomac Yard and consider extension to serve adjacent neighborhoods. It should provide connectivity to transitway stations and the Metrorail station

Metrobus Route 9S service in Crystal City

Bus Pad and Bus Shelter on Valley Drive in Alexandria

Figure 8-7: Recommended Transit Network



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8.6 Pedestrian and Bicycle Network

Background

Providing safe and efficient pedestrian and bicycle facilities is essential to accommodating the proposed development in Potomac Yard and creating a vibrant and sustainable place. Every trip, even those made by car or transit, begins with walking. This alone necessitates design of places that accommodate pedestrians. The future transportation network has been planned so that walking and bicycling will represent a sizable proportion of future trips. To meet that goal, the pedestrian and bicycle networks should be interconnected, consistent, safe, and serve the area's residents, employees, and visitors. This plan identifies a system of pedestrian and bicycle facilities to serve the transportation and recreation needs of the proposed development's residents, employees, and visitors. The facilities will connect to the existing local and regional trail networks and future facilities in other parts of Potomac Yard and surrounding areas.

Recommendations

Pedestrian Facilities

Generally, pedestrian accommodations should include the following:

- High-quality sidewalks on both sides of every street within the proposed development
- Sidewalk buffers (utility/landscape strips)
- High-visibility marked crosswalks with accessible curb ramps (may be high-visibility crosswalk)
- Median crossing islands on streets with more than three lanes, especially on streets with high volumes of traffic
- Curb extensions (blub-outs)
- Pedestrian crosswalk signals at all signalized intersections
- Pedestrian push buttons where the pedestrian signal phase needs to be called
- Pedestrian level lighting

Unsignalized street crossing with sidewalks, marked crosswalk, accessible curb ramps, and curb extensions on Valley Drive

Bicycle Facilities

Figure 8-8: Recommended Bikeway and Trail Network shows the existing, planned, and recommended bicycle and trail network. The recommended trail network will promote mobility within the proposed development and connectivity to other parts of Potomac Yard and regionally. The following are recommended:

Off street facilities

- Construct a shared-use path along the east side of Potomac Avenue and coordinate with Arlington County to construct a direct connection across Four-Mile Run. Construct a shared-use path along the east side of Potomac Yard Landbay L connecting to the Braddock Road Metrorail station. These paths will connect to the planned path along Potomac Yard Landbays G, H, I, and J. The shared-use path along the east side of Potomac Yard will connect to Arlington County, the planned pedestrian bridge from Potomac Yard Park across the railroad track to Potomac Greens, and Braddock Road Metrorail station.
- Construct a shared-use path in the linear park along the north side of Potomac Yard Landbay F. The path should connect to the existing path along Four-Mile Run from Mount Vernon Avenue to US 1. This trail would provide access to the Four-Mile Run trail in Arlington County, which leads to the W&OD trail.
- Extend the existing shared-use trail located in Mt. Jefferson Park and Greenway in the Del Ray community from its existing terminus to US 1.
- Maintain/improve the existing sidepath along the east side of US 1 along the Potomac Yard Landbay F frontage.
- A portion of the proposed Metrorail station will serve as a pedestrian bridge

On street facilities

- Construct bicycle lanes on E. Reed Street from US 1 to the shared-use trail along the east side of Potomac Yard.
- Construct shared lanes with sharrow markings on Evans Lane from US 1 to Potomac Avenue. Provide a connection to the shared-use trail along the east side of Potomac Yard.
- Construct shared lanes with markings on Main Line Boulevard from Lincoln Avenue to E. Glebe Road.
- Designate the following as shared roadways:
    - Crescent Place from US 1 to Water Street
    - Diamond Road from US 1 to Potomac Avenue
    - Wesmond Road from Route 1 to Potomac Avenue

Example of the Use of Shared Lane Markings ("Sharrows") on Mount Vernon Avenue in Alexandria

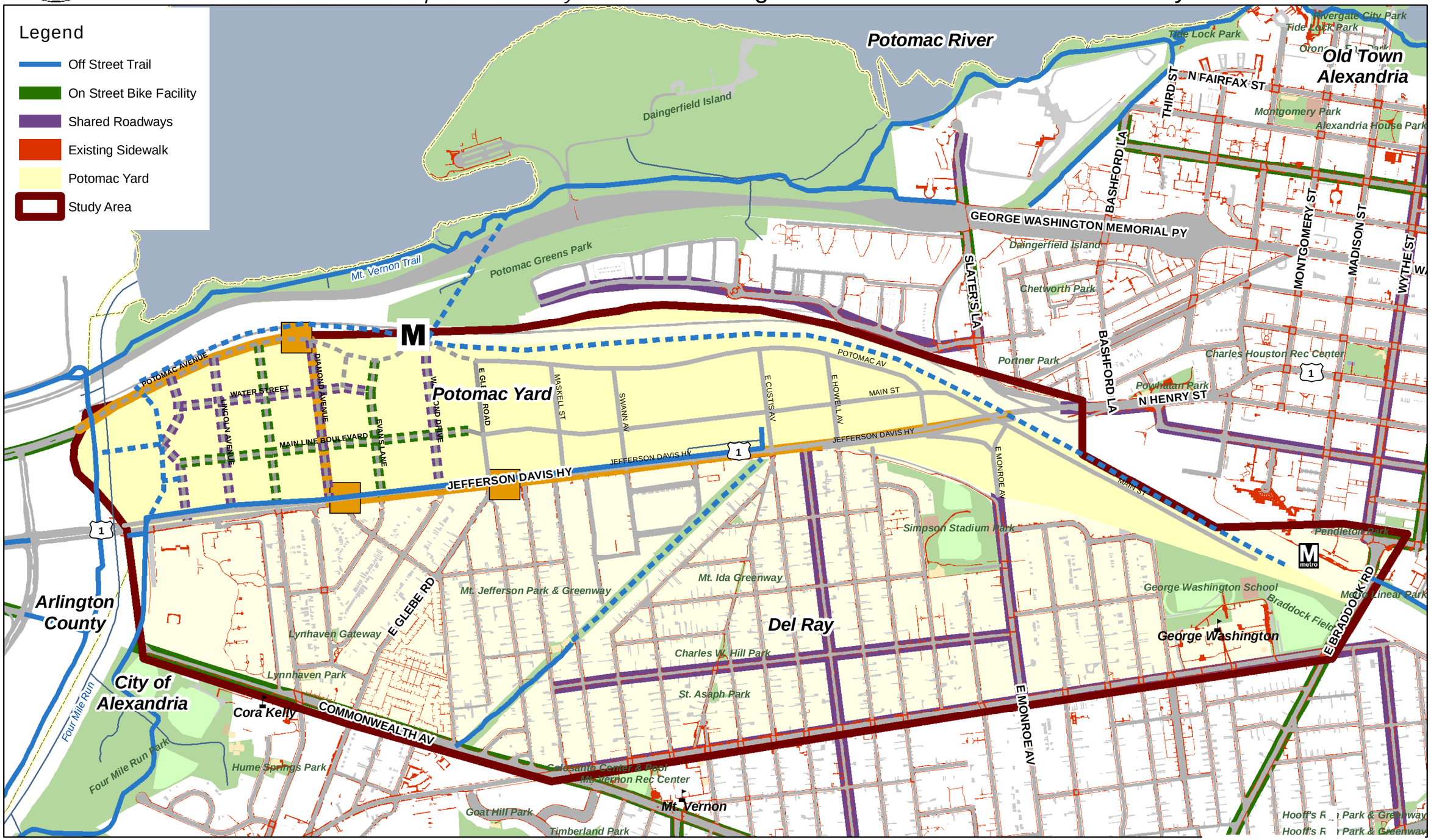
Bicycle Parking

- Install bicycle racks throughout Potomac Yard Landbay F
- Install bicycle lockers at the multimodal transportation facility and at Crescent Park or nearby

Bicycle Locker at Metrorail Station
Source: www.wmata.com

The different bicycle facilities recommended are further described in Appendix E of the City of Alexandria Pedestrian and Bicycle Mobility Plan. For general guidance on bicycle facility design, the most recent AASHTO Guide for the Development of Bicycle Facilities or VDOT Bicycle Facility Guidelines should be followed. Alexandria's guideline for the shared lane marking is included in Appendix E of the City of Alexandria Pedestrian and Bicycle Mobility Plan.

Figure 8-8: Recommended Bikeway and Trail Network



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8.7 Parking

Background

Parking is an essential part of the transportation system. Two main types of parking, short-term and long-term parking, should be accommodated in a mixed-use environment. The way parking is provided is a key determinant in travel mode choice. Thus, parking management is one of the most influential elements in travel demand management. Parking spaces in an urban area are a valuable commodity. On-street parking requires curb space which competes with other uses such as loading, emergency functions, and service activity. Off-street parking is expensive and adds significantly to the cost of development. It often utilizes capital that could otherwise be allocated to other infrastructure. This section describes parking management, off-street parking requirements for Potomac Yard Landbay F, and on-street parking and curb space management.

Parking Management – Parking management focuses on maximizing the use of the parking supply without encouraging more vehicle trips.

Shared Parking – Shared parking offers the chance to efficiently use the same parking spaces for multiple land uses and complementary peak demand times, thereby reducing the number of total spaces needed in an area. Shared parking also promotes a "park once" strategy where drivers can park and then use another mode of transportation to travel between destinations in the same general area. When each business provides their own on-site parking, there far less incentive for people to park once and then walk to other locations. Potomac Yard Landbay F will have a mix of land uses that can benefit from shared parking.

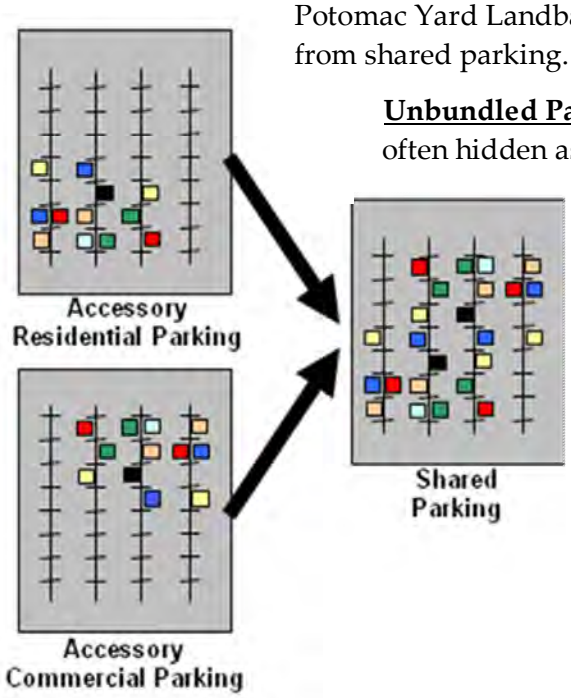

Figure 8-9: Shared Parking Exhibit

Unbundled Parking Costs – Parking is never free, but it is often hidden as part of the sale or rental price of housing and commercial space. Bundling its cost with residential and commercial property rents results in higher vehicle ownership and more traffic. When the true cost of parking is revealed, people are better able to make travel decisions.

Parking Cash-Out or Transit Passes – In addition to providing free or reduced price parking for employees, employers should be encouraged to offer the cash value of the parking subsidy to any employee who does not drive to work. Alternately, the employer could offer employees a transit pass or other comparable subsidy to those that do not drive and park.

Optimized Parking Use/User Information – Given the expense of building parking in urban environments, it makes financial sense to optimize the use of the existing parking system prior to expanding the number of spaces. An optimized parking system has the potential to be 85 percent or more occupied during peak periods, whereas non-optimized systems are typically viewed as full at a much lower usage. To reach levels of occupancy near to and above 85 percent, it is typically necessary to provide information as to the location and number of available spaces in real-time to those searching for parking. Parking guidance systems achieve this and also have the ability to monitor parking utilization.

Comprehensive Parking Wayfinding Signage – Signage guides drivers to desired parking areas and helps to reduce trip-making associated with searching for parking. Parking wayfinding signs are typically located on key ingress routes and at key decision points along routes. Signage typically provides information that indicates the location of parking and its intended purpose (short- or long-term, public or private, pay or free).

Parking Ratios – Traditionally, parking ratios are established to ensure that enough parking is provided on a site to accommodate the maximum parking demand. When minimum parking requirements are used, they may contribute to an increase traffic in an area by making parking overly convenient and thus making driving disproportionately attractive as related to other modes of transportation. Minimum parking requirements often discourage developers, employers, residents, and other property owners from implementing strategies that reduce traffic and parking demand. An alternative to parking minimums, parking maximums constrain the number of parking spaces that can be placed on-site at new developments. Parking maximums have been shown to successfully reduce traffic volumes and congestion because there is less parking available to attract people with their cars. The use of parking maximums is not new in Alexandria; the City has already established parking maximums in parts of the Eisenhower East plan.

Recommendations

Off-street Parking

The following off-street parking requirements are recommended for Potomac Yard Landbay F:

- Locate all parking below ground, to the extent feasible.
- Parking garage access should be provided from the east-west streets within Potomac Yard Landbay F. No access should be provided from US 1, Potomac Avenue, or Main Line Boulevard.
- Establish a shared parking district for Potomac Yard Landbay F. The district will have its own set of parking requirements which should include:
  - *Recommended parking ratios will be added at a later date*
  - Reserved preferential parking spaces for rideshare vehicles

- A minimum of one carsharing space for every 20 dedicated on-site parking spaces
- Shared parking
- Unbundling the full cost of parking from the cost of housing units (rental and condominium), commercial space, and from the costs of other goods and services, with limited exceptions
- Encouragement for employers to offer alternatives to a parking space for those who do not drive

- Implement a parking guidance system
- Comprehensive parking wayfinding signage

Curb Space Management and On-Street Parking

The following is recommended for curb space management:

- Allocation of curb space depending on the specific land uses of the adjacent block. Based on potential to serve the most users and support the overall transportation system, the following hierarchy is recommended in the planning of curb space in Potomac Yard Landbay F:

  1. Safety features like fire hydrants, curb nubs for pedestrians, and sight lines for drivers
  2. Public multi-user vehicles (e.g. bus stops, taxi-stands, and carsharing)
  3. Periodic/temporary uses (e.g. shuttles and private buses, vending, loading and deliveries)
  4. Dedicated short-term parking (e.g. paratransit drop0off and short-term meters)
  5. Long-term parking of vehicles (e.g. tour buses, valet parking, and all-day meters)

Zipcar on-street parking space

- Dedicate remnant areas in parking lanes or garages for the exclusive use of small vehicles such as microcars, scooters, bicycles, and motorcycles
- Appropriately locate features such as curb nubs, fire hydrants, and bus stops to maximize available curb space length
- Minimize the number and sizes of driveway curb cuts
- Consider using multi-space pay-and-display parking meters to increase parking capacity, minimize clutter on the sidewalk, provide better revenue control, and benefit users

The following is recommended for on-street parking:

- Parking on both sides of A, B, and C (typology) streets in Potomac Yard Landbay F dependent on curb space management hierarchy
- Parking meter rates and time limits to encourage turnover and space availability in retail areas
- Rates at long-term meters higher than off-street parking
- Operate parking meters to 9:00 p.m. in areas of Landbay F that serve entertainment and restaurant activities

8.8 Phasing of Improvements

Background

To accommodate the travel demand increases attributed to the redevelopment of Potomac Yard Landbay F, a robust multimodal transportation network is recommended. The capital program for the recommended future transportation network will include large investments such as the transitway, the reconstruction of US 1, and future Metrorail station, as well as other investments such as the construction of new local streets, sidewalks, and bicycle facilities. Due to the cost associated with the large investments in the transportation system, some of the recommended transportation infrastructure is likely to be built in phases. Assuming that the transitway and Metrorail station represent the most significant investments, the following three phases of implementation were developed and the development levels accompanying the phases are described in this section:

- Phase 1: Prior to transitway and Metrorail station
- Phase 2: Transitway implemented and operational
- Phase 3: Transitway and Metrorail station implemented and operational

Phasing Analysis

An analysis was completed to estimate the quantity of development that could be accommodated by the street network within each of the three phases of transportation infrastructure implementation. Within the analysis, the major multimodal transportation recommendations of the plan were assigned to the three phases. Specific levels of development, based on acceptable traffic operations thresholds, were identified for each phase.

As major transit investments begin operation and larger quantities of mixed-use development are occupied, trip-making patterns of the development will shift toward non-auto modes of transportation. The larger quantity of development that is a part of Phase 3 will produce far fewer vehicle trips per square foot of development than Phases 1 and 2.

Trip generation evaluations to determine the density (of development) levels for Phases 1 and 2 was performed based on assumptions discussed in Chapters 5 and 7. Existing traffic count data at the existing driveways for Potomac Yard was used to understand the number of vehicular trips generated by the existing retail center.

Trip generation calculations performed for the 2.5 FAR scenario were used to measure the number of vehicle trips that will be generated by full Landbay F buildout. The difference between the vehicular trips that will generated by full Landbay F buildout and existing volumes were one measure used to evaluate the level of development that could be accommodated within each phase. Generally, it is recommended that occupied development in Landbay F generate an equal or lesser number of vehicular trips than the difference between existing traffic generation and full build-out (Landbay F) traffic generation. The traffic volume threshold tabulation is shown in **Table 8-2: Threshold Estimation**.

Table 8-2
Threshold Estimation
(number of vehicular trips)

	PM Peak Hour			Daily		
	Total	**In**	**Out**	**Total**	**In**	**Out**
2.5 FAR Scenario	3,950	1,790	2,160	41,860	20,900	20,960
Existing Retail	-1,700	-970	-730	-19,510	-11,130	-8,380
Threshold	**2,250**	**820**	**1,430**	**22,350**	**9,770**	**12,580**

Note: Numbers of vehicular trips shown are rounded to the nearest 10.
Source: Kimley-Horn and Associates, Inc.

In addition to the specific trip threshold analysis, other elements such as other development in the area, trip-making characteristics of differing levels of development, and major road improvement phasing were considered in establishing development thresholds for each phase. Specific considerations such as US 1 modification phasing, local street and intersection modification implementation, and potential currently unknown development in the vicinity of Potomac Yard were among the other factors reviewed. Based on the quantitative and qualitative evaluations, the following summarizes the development levels associated with each major infrastructure phase:

- **Phase 1: Prior to transitway and Metrorail station –** 0.50 FAR assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario. As density levels on Landbay F increase to meet or exceed 0.50 FAR, high-frequency local transit services would need to be operated to either the Braddock Road or Crystal City Metro stations and the transitway would need to begin construction with the

intention of reaching completion and operational status prior to overall densities in Lanbay F meeting or exceeding 0.75 FAR.

- **Phase 2: Transitway implemented and operational –** 0.75 FAR assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario. As density levels on Landbay F increase to meet or exceed 1.25 FAR, services on the transitway would need to be in full operation with service frequencys and duration similar to Metrorail service. At the same time, the Potomac Yard Metrorail station would need to be under construction with the intention of reaching completion and operational status prior to overall development densities in Landbay F meeting or exceeding 1.25 FAR.
- **Phase 3: Transitway and Metrorail station implemented and operational –** 1.25 FAR assuming that the land use mix is approximately equivalent to the 2.5 FAR scenario.

Phased Recommendations

The Potomac Yard Landbay F plan includes new streets, reconfiguration of existing intersections, additions to the bicycle and pedestrian network, and significant investment in transit. The phasing of street improvements will depend on the pace and location of redevelopment. The exception to this will be Potomac Avenue, which will be extended north to Arlington County as required as part of existing planning and zoning approvals. The recommended phasing of major transportation elements is described in the following:

Prior to Redevelopment

- Potomac Avenue – extend to Arlington County *(Section 8.3)*

With Redevelopment of Any Level

- Establish and/or monitor the TMP district
- Implement traffic calming measures as needed to manage traffic on neighborhood streets
- Construct internal streets serving the blocks being developed with appropriate vehicle lanes, pedestrian, bicycle, and on-street parking facilities *(Section 8.3 and Section 8.7).* The specific details of the street construction need to be specified prior to rezoning of the property.
- Connect Main Line Boulevard *(Section 8.3)*
- Install shelters and/or smart stops at bus stops along developing blocks as appropriate *(Section 8.5)*
- Improve the existing bicycle and pedestrian sidepath along the east side of US 1 along Landbay F frontage *(Section 8.6)*
- Install bicycle parking along developing blocks as appropriate *(Section 8.6)*
- Follow parking requirements of the shared parking district *(Section 8.7)*

Phase 1: Prior to Transitway and Metrorail Station

- Establish a TMP district and write the transportation management plan *(Section 8.2)*
- Implement the preliminary traffic calming plan *(Section 8.4)*
- Extend Metrobus Route 9S service to Potomac Yard Landbay F *(Section 8.5)*
- Construct a shared-use path along the east side of Potomac Yard Landbay F and coordinate with Arlington County to construct a direct connection across Four-Mile Run *(Section 8.6)*
- Construct a shared-use path in the linear park along the north of Potomac Yard Landbay F connecting to the existing path along Four-Mile Run at US 1 *(Section 8.6)*
- Extend the existing shared-use trail located in the Mt. Jefferson Park and Greenway in the Del Ray community from its existing terminus to US 1 *(Section 8.6)*
- Establish a shared parking district *(Section 8.7)*
- Implement a parking guidance system and comprehensive wayfinding signage *(Section 8.7)*

Transitway

- Construct the transitway between Braddock Road Metrorail station and Arlington *(Section 8.5)*
- Construct intersection improvements at the following locations *(Section 8.3)*:
  - US 1/Jack Taylor Road
  - US 1/E. Reed Avenue
  - US 1/Evans Lane
  - US 1/E. Glebe Road
- Retime signals along US 1 between Arlington and Potomac Avenue *(Section 8.3)*
- Begin operation of an internal bus circulator service *(Section 8.5)*

Phase 2: Transitway Implemented and Operational

Prior to the occupancy of any development in Phase 2, the transitway is recommended to be implemented as well as the following major improvements:

- Monitor TDM performance measures and adjust transportation management plan accordingly to achieve performance goals if needed *(Section 8.2)*
- Monitor local streets in adjacent neighborhoods and implement additional traffic calming measures as needed *(Section 8.4)*

Metrorail Station

- Construct the Metrorail station *(Section 8.5)*
- Construct portion of the Metrorail station to serve as a pedestrian bridge *(Section 8.5)*
- Construct the multimodal transportation facility *(Section 8.5)*

Phase 3: Transitway and Metrorail Station Implemented and Operational

Prior to the occupancy of any development in Phase 3, the transitway, Metrorail station, and multimodal transportation facility are recommended to be implemented as well as the following major improvements:

- Monitor TDM performance measures and adjust transportation management plan accordingly to achieve performance goals if needed (*Section 8.2)*
- Monitor local streets in adjacent neighborhoods and implement additional traffic calming measures as needed *(Section 8.4)*