

An aerial photograph showing a river winding through a landscape with some buildings and infrastructure. A large blue rectangular overlay is positioned on the left side of the image, containing white text.

RiverHouse
Phased Development Site Plan

Multimodal Transportation Assessment

June 2023

Updated October 2023

N NELSON
NYGAARD

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INTRODUCTION

This report presents the findings of a Multimodal Transportation Assessment (MMTA) undertaken for the proposed RiverHouse phased development site plan (PDSP) in Arlington, VA. The RiverHouse site comprises 36.6 acres in the Pentagon City area of Arlington, bounded by S. Joyce St. to the east, 16th St. S. to the south, S. Lynn St. to the west, and Army Navy Dr. to the north. The existing site consists of three residential towers with 1,676 total residential units served by 1,820 surface and structured parking spaces. The site is currently zoned mostly RA6-15 and is shown as high density residential on the northern portion of the site and high-medium residential on the southern portion of the site in the General Land Use Plan (GLUP).

The proposed PDSP would preserve the existing residential towers and add 1,878 new residential units and approximately 52,000 square feet (sf) of new retail and amenity commercial space. Site plans for Landbays S, C, and N, would add 1,668 units with 27,759 sf of retail. Landbay F would add the remaining residential units and amenity space.¹ These new developments are largely concentrated on the existing surface parking lots. As a result, the PDSP provides nearly 2,000 new homes and 52,000 sf of retail and amenity space with fewer than 350 net new parking spaces.

The eastern edge of the site is within 1000' of the entrance to the Pentagon City Metrorail station (served by the Blue and Yellow lines), while the furthest corners of the site are just over ½ mile from that station. Metrobus route 10A runs along S. Joyce St. adjacent to the site, while numerous Metrobus and Arlington Transit (ART) routes stop at Pentagon City station and/or along S. Army Navy Dr. near the site. S. Army Navy Dr. includes painted bike lanes that are currently being upgraded to protected bike lanes. S. Joyce St. includes painted bike lanes but planning has begun to upgrade them to protected facilities.

Purpose of Study

The purpose of this study is to evaluate the transportation network in the vicinity of the RiverHouse development and identify any transportation impacts that may result from the proposed development. This report includes a description of the existing and proposed development, an evaluation of the existing multi-modal network, and findings of a vehicular analysis utilizing the Synchro software.

The proposed RiverHouse plan consists of two related elements. The first, the PDSP, addresses the entire site, including buildings to be preserved, new buildings for which 4.1 site

¹ Traffic analysis will use 2032 as the year of full build-out, recognizing that is a conservative estimate of the earliest possible completion date.

plans have been submitted (Landbays N, C, and S), and new buildings for which 4.1 site plans will be submitted at some point in the future (Landbay F). This MMTA is conducted for the full PDSP, as appropriate given the focus of transportation analysis on disclosure and mitigation of the impacts of site-wide changes. The second element of the RiverHouse redevelopment plans includes 4.1 Special Exception site plans, each of which is accompanied by a Transportation Management Plan (TMP) describing site-specific demand-management and other approaches to encourage multimodal travel. Detailed 4.1 plans accompany the PDSP for projects on Landbays S, C, and N. Future 4.1 Special Exception site plans will be submitted for Landbay F.

The scope of the report and analysis was discussed with and approved by Arlington County staff. The methodology follows the guidelines outlined by Arlington County and VDOT on the evaluations of site development.

Study Tasks

The following tasks were completed as a part of this study.

- A preliminary scoping meeting was held in May 2022 with Arlington County staff to discuss parameters of the study and relevant background information. For analysis of a potential road-diet on S. Joyce St., a scoping form and supporting memo were developed and approved in August 2022. A revised MMTA scoping form was submitted in June 2023 and a scoping meeting held on June 14, 2023. The approved MMTA scoping form is included as Appendix A to this report.
- Field visits in the vicinity of the site were performed to collect information relating to existing traffic controls, signal timings, roadway geometry, traffic flow characteristics, sidewalk conditions, bicycle facilities and transit stop amenities.
- Traffic counts at the study area intersections were conducted in Spring 2019 and updated in September 2023 during the morning and afternoon peak periods.
- Future developments in the vicinity of the site were assumed to be in place for the analysis of future traffic conditions. The 2022 Pentagon City Sector Plan (PCSP) describes possible future development at the RiverHouse site as well as throughout the sector. In addition, other specific developments and redevelopments are approved and/or underway as of 2022.
- Traffic volumes for the proposed RiverHouse PDSP were generated based on the methodology outlined in Trip Generation, 11th Edition published by the Institute of Transportation Engineers (ITE).
- Intersection capacity analyses were performed for the morning and afternoon peak hours at the study area intersections using Synchro software.

- An analysis of recent crash data was conducted with methodology outlined in recent Arlington County guidance.
- A Transportation Management Plan (TMP) framework was developed as required to meet County regulations.

Contents of Study

This report contains nine (9) chapters as follows:

- **Project Summary** describes the location, planning context, proposed development, and study area.
- **Study Area Overview** reviews the current transportation context of the project area and describes County mobility plans.
- **Project Design** provides details of the transportation components of the proposed development, including both on-site changes and proposed modifications to the surrounding street network.
- **Walking and Rolling** summarizes existing and future access to the site for people on foot and on personal vehicles (bicycles, scooters, mobility-assist devices, etc.), reviews walking and rolling routes to and from the project site, outlines impacts, and presents recommendations as needed.
- **Transit Facilities and Network** summarizes the existing and future transit service adjacent to the site, reviews how the project's transit demand will be accommodated, outlines impacts, and presents recommendations as needed.
- **Estimated Travel Demand** outlines the expected trips to and from the proposed project. It summarizes the expected mode splits, multimodal trip generation, and trip distribution of the project.
- **Traffic Analysis** provides a summary of the existing and future roadway facilities, and existing and future roadway capacity in the study area. It summarizes the distribution and routing assumptions used in the analysis. This chapter highlights the vehicular impacts of the project, including presenting mitigation measures for minimizing impacts as needed.
- **Safety Analysis** presents data on recent crashes near the site and examines factors contributing to them. It also describes planned improvements to improve safety outcomes.
- **Transportation Management Plan (TMP)** outlines the various components of the plan to encourage walking, rolling, and transit through a variety of techniques and incentives.

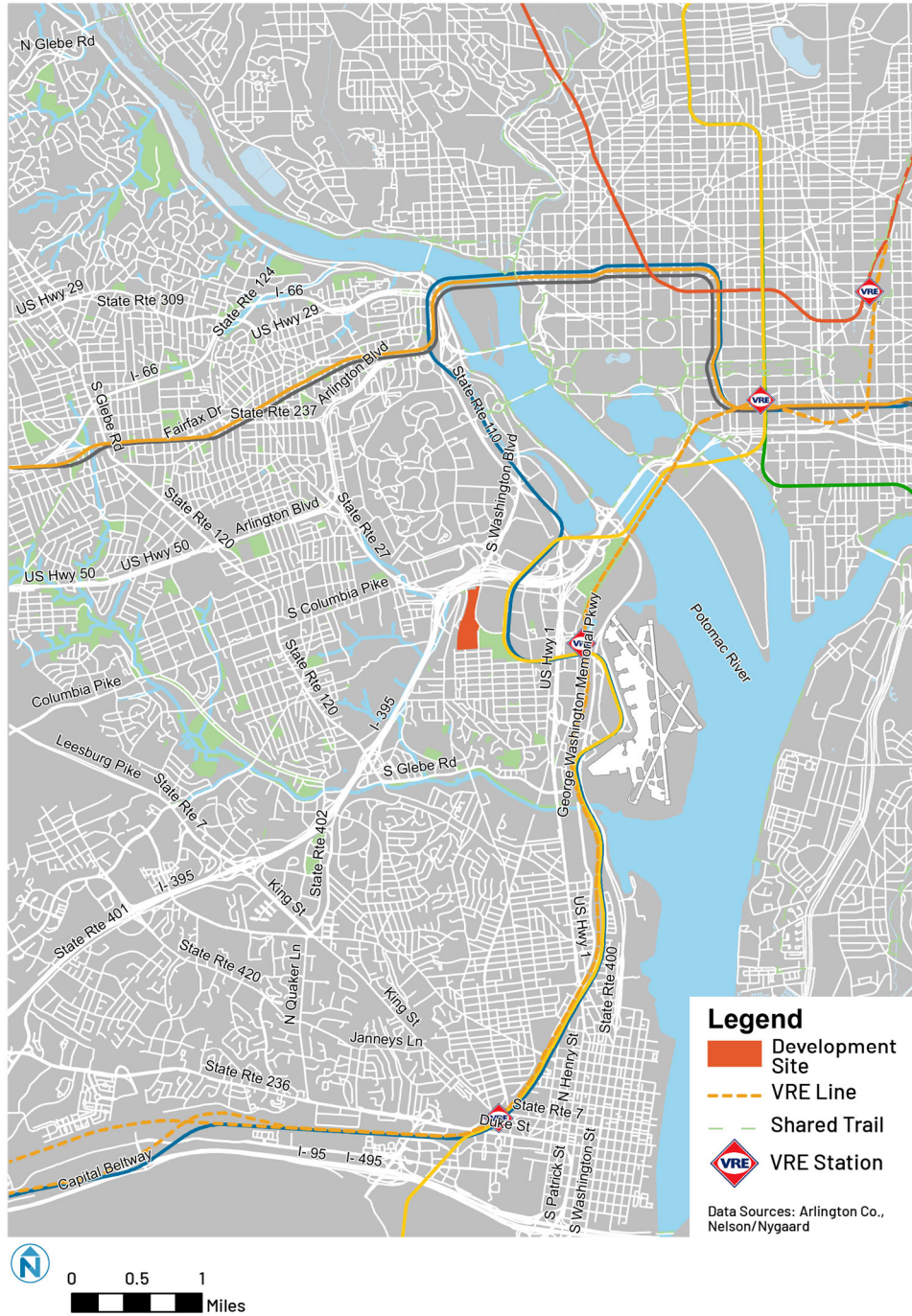
- **Summary and Conclusions** presents the recommended mitigation measures by mode and presents overall findings.

PROJECT SUMMARY

Site Location

The RiverHouse PDSP site is a part of the Pentagon City area in Arlington, VA. Figure 1 shows the site and its immediate vicinity. Figure 2 shows the regional location of the project. The RiverHouse site comprises 36.6 acres, bounded by S. Joyce St. to the east, 16th St. S. to the south, S. Lynn St. to the west, and Army Navy Dr. to the north. The existing site includes three residential towers with 1,676 total residential units served by 1,820 surface and structured parking spaces. The site is primarily zoned RA6-15 and is shown as high density residential on the northern portion of the site and high-medium residential on the southern portion of the site in the General Land Use Plan (GLUP).

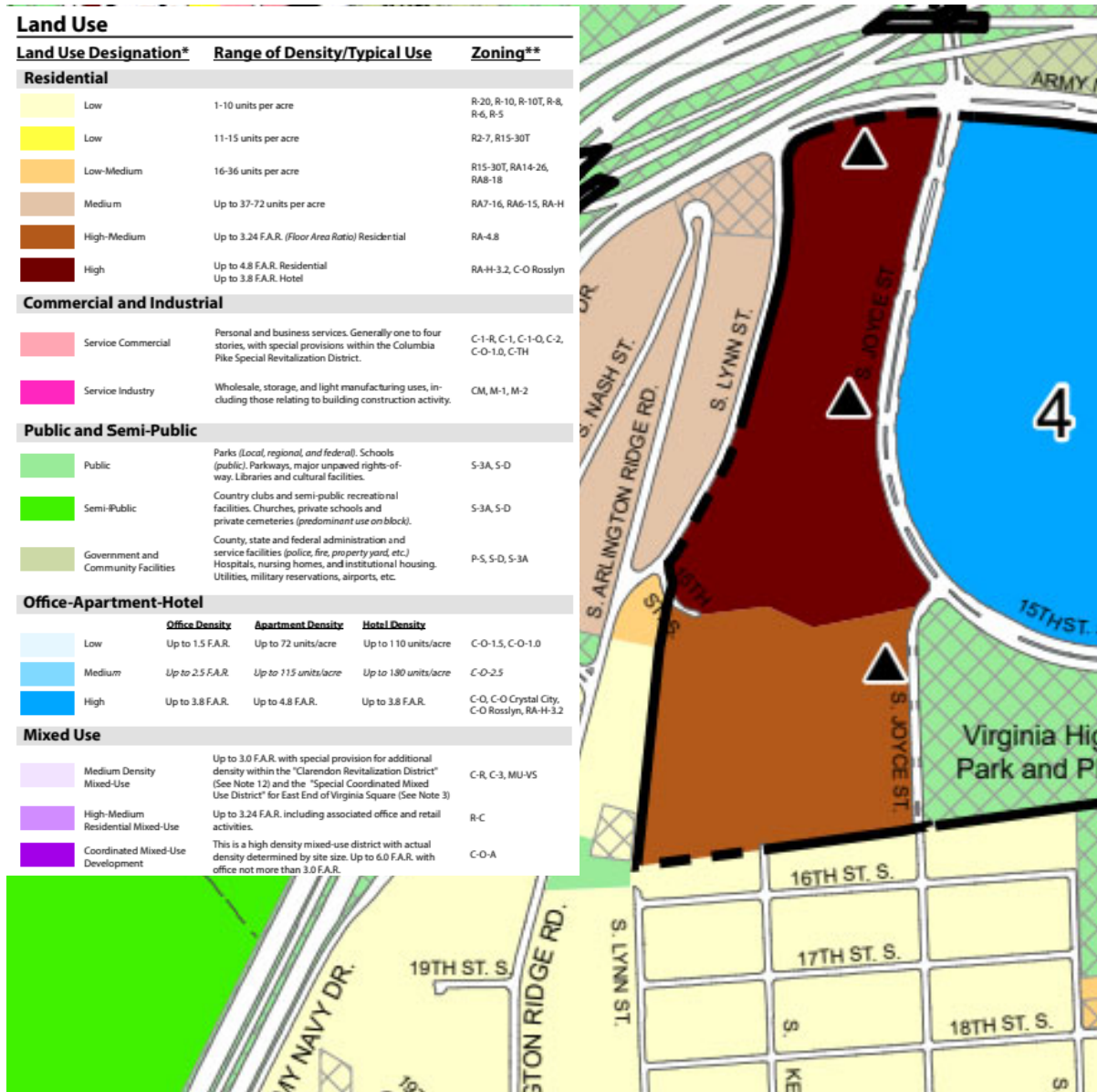
Figure 2 Regional Transportation Facilities



General Land Use Plan Recommendations

According to Arlington County's Future General Land Use Plan (GLUP), the RiverHouse site is listed as a mix of high residential and high-medium residential land uses. The GLUP map is shown in Figure 3.

Figure 3: General Land Use Plan Map (June 2022)



Maximum Development Allowed by Zoning

The RiverHouse property is currently zoned a mix of RA6-15, C-O-2.5, and R2-7. Across the entire site, current zoning allows a maximum of 1,720 residential units. Under the Pentagon City Sector Plan approved in 2022, the RiverHouse property can accommodate 2,637 units at base density, and up to 5,493 units at maximum allowable density. Figure 4 provides further detail.

Figure 4: Maximum Development Under Current & PCSP Zoning

SITE AREA: 36.6 ACRES (1,595,203 square feet)	DENSITY ALLOWED/ TYPICAL USE	MAXIMUM DEVELOPMENT (units)
"RA6-15" By-Right 35.5 ACRES (1,5454.68 square feet)	48.4 units/acre	1,717
"C-O-2.5" By-Right 1.1 ACRES (46,903 square feet)	2.2 units/acre	2
"R2-7" By-Right 0.1 ACRES (2,832 square feet)	12.4 units/acre	1
Total By-Right Density		1,720
"RA6-15" Site Plan Pentagon City Sector Plan Base Density	72 units/acre	2,637
"RA6-15" Site Plan Pentagon City Sector Plan Maximum Density	150 units/acre	5,493

Proposed Phased Development Site Plan

The proposed PDSP would preserve the existing residential towers and add 1,878 new residential units and approximately 52,000 square feet (sf) of new retail and amenity commercial space. Site plans for Landbays S, C, and N, would add 1,668 units with 27,759 sf of retail. Landbay F would add the remaining residential units and amenity space. These new developments are largely concentrated on the existing surface parking lots. As a result, the PDSP provides nearly 2,000 new homes and 52,000 sf of retail and amenity space with fewer than 350 net new parking spaces.

The proposed site plan is shown in Figure 5, and the development program is shown in Figure 6.

Figure 5: RiverHouse PDSP and Landbays (Source: PDSP Submission, Sheet CIV260)

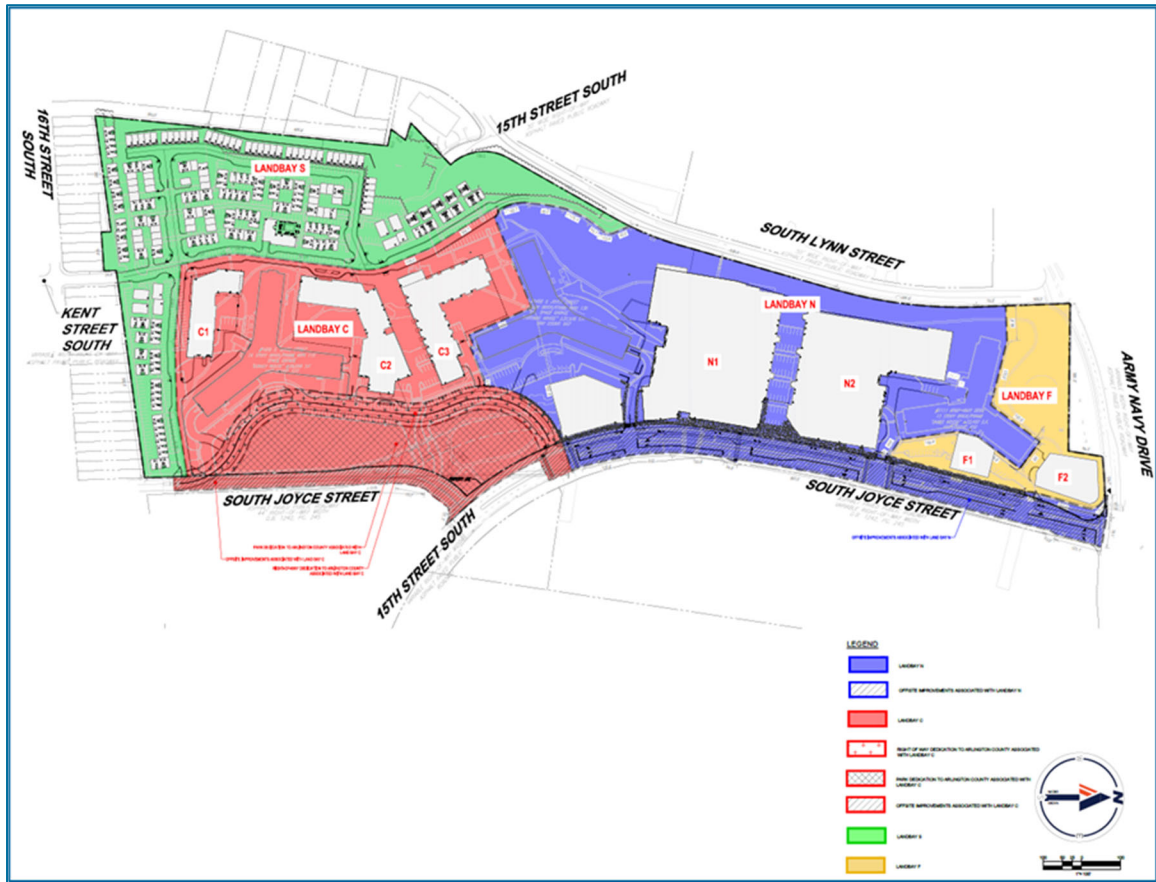


Figure 6: RiverHouse PDSP Development Program (Source: PDSP Submission, Sheet G005)

PARKING PROVIDED							
Use			Units/SF	Proposed Ratio	Proposed Spaces	Provided Location of Spaces	
Residential	Existing Multifamily	James (Existing)	452	0.46 Spaces/Unit	198	0 Surface 198 N1/N2 Garage	
		Potomac (Existing)	647	0.52 Spaces/Unit	331	130 Potomac Garage 9 Surface 192 N1/N2 Garage	
		Ashley (Existing)	577	0.6 Spaces/Unit	339	115 Ashley Garage 89 C1 Garage 135 C2 Garage	
	New Multifamily	C1		102	0.5 Spaces/Unit	51	51 C1 Garage
		C1 Visitor Parking			0.05 Spaces/Unit	6	6 C1 Garage
		C2		185	0.74 Spaces/Unit	126	126 C2 Garage
		C2 Visitor Parking			0.05 Spaces/Unit	10	10 C2 Garage
		C3		164	1.6 Spaces/Unit	248	248 C3 Garage
		C3 Visitor Parking			0.05 Spaces/Unit	9	9 C3 Garage
		N1		952	0.5 Spaces/Unit	276	276 N1/N2 Garage
	N2				201	201 N1/N2 Garage	
	N1/N2 Visitor Parking			0.05 Spaces/Unit	10	10 N1/N2 Garage	
	New TH Multifamily	TH Multifamily Res.		265	0.45 Spaces/Unit	162	101 Garage 61 On-street
		TH Multifamily Visitor			0.05 Spaces/Unit	14	14 On-street
	Landbay F Future new Multifamily	F1		24,000		0	0
		F2		210	0.4 Spaces/Unit	84	84 Garage
	Retail ^a	N1		14,680	1/1,000 SF	15	15 N1 Garage - Ground Floor
		N2		13,079	1/1,000 SF	13	13 N2 Garage - Ground Floor
	Additional Parking	on-street				60	60 On-street
	Total					2,153	

Scope and Limits of the Study Area

The study area for analyzing transportation impacts is generally bounded by S. Hayes St. to the east, I-395 to the west, Army-Navy Dr. to the north, and 16th St. S. to the south. The multimodal study area is depicted in Figure 7 and includes the study intersections listed below and shown in Figure 8:

1. S Joyce St & Army Navy Dr (Signalized)
2. S Joyce St & RH driveway 1
3. S Joyce St & RH driveway 2 (Signalized)
4. S Joyce St & RH driveway 3
5. S Joyce St & RH driveway 4
6. S Joyce St & Pentagon Row driveway (Signalized)
7. S Joyce St & 15th St S
8. 15th St S & Rd (Signalized)
9. S Joyce St & RH driveway 5
10. S Joyce St & RH driveway 6
11. S Joyce St & RH driveway 7
12. S Joyce St & RH driveway 8
13. S Joyce St & 16th St S
14. S Kent St & 16th St S

15. Arlington Ridge Rd & I-395 Ramps (Signalized)
16. Arlington Ridge Rd & S Lynn St
17. S Lynn St & RH driveway 9
18. S Hayes St & 15th St S (Signalized)
19. S Lynn St & Army Navy Dr

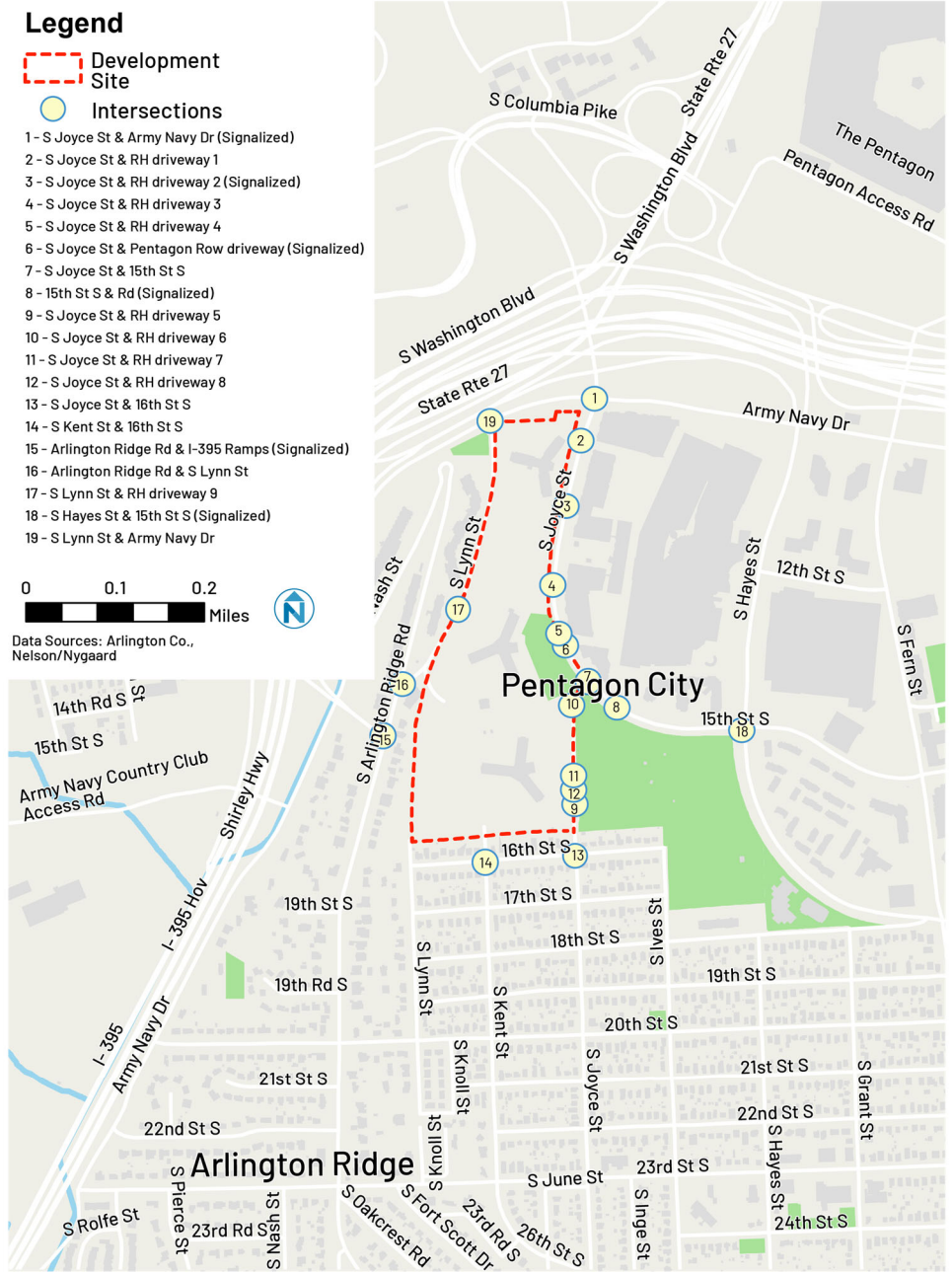
Data Sources

Sources of data for this study include Arlington County, the Virginia Department of Transportation (VDOT), the Institute of Transportation Engineers (ITE) Trip Generation, 11th Edition, National Household Travel Survey (NHTS), and the office files and field reconnaissance efforts of Nelson\Nygaard Consulting Associates.

Figure 7: Development Site and Multimodal Study Area



Figure 8: Study Intersections



STUDY AREA OVERVIEW

This chapter reviews the existing conditions of the transportation network surrounding the site and includes an overview of the site location, including a summary of the major transportation features of the area and of future regional projects. Detailed attributes of the various modes operating within the study area will be highlighted in the following chapters.

The following conclusions are reached within this chapter:

- The site is surrounded by an extensive regional and local transportation system that will accommodate the existing and new residents of the proposed development.
- The site is well served by public transportation with access to the Metrorail's Blue and Yellow lines, the VRE, and several local and regional bus lines.
- The site is surrounded by a well-connected pedestrian environment. In the vicinity of the site, sidewalks generally meet standards recommended by the Arlington County Master Transportation Plan with some gaps in the system.
- The site has access to several on- and off-street bicycle facilities, including bicycle lanes on S. Eads St., 12th St. S., S. Hayes St., 15th St. S., 18th St. S., and S. Bell St., which connect to the Mt. Vernon Trail to the east and Four Mile Run Trail to the south. Capital Bikeshare stations are located on S. Joyce St. across from Landbay N (16 bikes/docks) and on S. Joyce St. across from Landbay S (15 bikes/docks).
- A reconfiguration of S. Joyce St. is proposed as part of this project. It includes construction of a two-way cycle track on the west (RiverHouse) side of S. Joyce St. from Army Navy Dr. to 15th St. S., and the relocation of S. Joyce St. from its intersection with 15th St. S. to the southern end of RiverHouse.
- Several local initiatives will positively impact the study area, including the S. Eads St. Complete Street project, Army Navy Dr. Complete Street and PBL Missing Link projects, the 12th St. S. Complete Street project, S. Arlington Ridge Rd. & S. Lynn St. Safety Improvements, the 15th St. S. Complete Street project, and the Route 1 Multimodal Improvements Study.

Current Transportation Context

Regional Access

The proposed development site offers easy access to local vehicle and transit-based transportation choices that connect it to locations in Virginia, the District of Columbia, and Maryland, as illustrated in Figure 2. Several major thoroughfares, including VA-27 (Washington Boulevard), VA-244 (Columbia Pike), Route 1 (Richmond Hwy), and VA-110, lead

to the RiverHouse neighborhood. The arterials establish connections to the Capital Beltway (I-495) and I-95, as well as to I-395, I-66, and George Washington Memorial Parkway. Vehicular access closer to the site is provided by minor arterials, collectors, and local roads.

The Pentagon City Metro Station, Pentagon Metro Station, and Crystal City Metro Station are all accessible to the location and provide access to the Blue and Yellow Lines, which link to locations in Virginia, the District of Columbia, and Maryland. Both lines provide access to the central area of Pentagon City: the Blue Line connects Springfield, Virginia, with Largo, Maryland, while the Yellow Line connects Huntington, Virginia, with Greenbelt, Maryland. Both lines link to the Red Line, which runs directly to Union Station, a center for commuter train services including Amtrak, MARC, and VRE in addition to all other Metrorail lines, giving access to much of the Washington, DC metropolitan region. The Crystal City VRE station is a 9–17-minute metro ride, 8-minute bike trip, or 18-minute walk from the RiverHouse site.

The Mount Vernon Trail is approximately 1 mile from the RiverHouse site. It is an 18-mile off-street bicycle route that runs beside the Potomac River from George Washington's Mount Vernon residence to Theodore Roosevelt Island, and it is just across the river from downtown Washington, DC. Rosslyn and the District can be reached by bicycle thanks to the Mount Vernon Trail's connections to the W&OD, Four Mile Run, and Custis Trails in Arlington County and the Capital Crescent Trail in Washington, DC. A thorough analysis of the current bicycle infrastructure is presented on the Walking and Rolling chapter of this MMTA.

Overall, the location is highly accessible via a number of local street, highway, public transportation, and cycling choices, creating simple trips for traveling within and throughout Virginia, the District of Columbia, and Maryland.

Local Access

Figure 9 illustrates the numerous local transportation alternatives close by that accommodate car, bus, walking, and bicycle trips under the existing conditions. A local vehicular network comprised of several small arterials and collectors, such as S. Arlington Ridge Rd., Army Navy Dr., S. Joyce St., S. Hayes St., and 23rd St. S., serves the site in addition to a number of major arterials. Additionally, the location is accessible via an existing network of local roads.

The site is accessible by several bus services, including links to a number of Virginia neighborhoods, the District, and additional Metro stations. Existing cycling facilities, most notably the Mount Vernon Trail, connect the site to regions within Arlington, Virginia, and the District. There are bicycle lanes on S. Eads St., S. Joyce St. and Army Navy Dr. A detailed review of existing and proposed bicycle facilities and connectivity is provided in a later chapter of this report.

Most sidewalks near the study area meet Americans with Disabilities Act (ADA) standards and standards recommended by the Arlington County Master Transportation Plan. Predicted

pedestrian routes offer well-connected pedestrian facilities, such as those to public transportation stops, retail areas, nearby residential areas, and community amenities. A detailed review of existing and proposed pedestrian access and infrastructure is provided in a later chapter of this report.

In general, the site is surrounded by a well-connected local transportation network that makes multi-modal transportation possible.

Figure 9: Study Area Local Transportation Facilities



Capital Bikeshare

Capital Bikeshare serves the region with more than 5000 shared bikes and ebikes at 600 stations in seven jurisdictions including Arlington. Riders can access bikes as a single use, daily pass, or annual membership. Two Capital Bikeshare stations are located adjacent to the RiverHouse site, as described in Table 1.

Table 1: Capital Bikeshare Stations

Location	No. of Bikes/Docks
1. Pentagon Row Plaza (opposite Landbay N)	16
2. Virginia Highlands Park (opposite Landbay S)	15

Car Sharing

Car-sharing service in Arlington is provided by Zipcar, a private company that provides registered users access to a variety of automobiles. Zipcar has designated spaces for their vehicles. Three (3) Zipcar locations are currently located within a half-mile of the site. These locations and the number of available vehicles are listed in Table 2.

Table 2: Car Share Locations

Location	No. of Vehicles
1. 901 S. 15th St., Arlington, VA 22202	1
2. 1480 South Fern Street, Arlington, VA 22202	1
3. 1800 Jefferson Davis Hwy., Arlington, VA 22202	1

Shared Micro-Mobility Devices

Six (6) shared micro-mobility companies provide “dockless” Shared Mobility Device (SMD) service in Arlington County: Bird, Helbiz, Lime, Link, Veo and Spin. The devices are provided by private companies that give users access to a variety of e-scooter and e-bicycle options. While operators are encouraged to deploy devices in a corral if there is enough room, riders are encouraged to end trips at corrals but are not required to do so. All riders must end trips and park safely and courteously. The operators fleet sizes based on the County’s 2022 fleet cap are as follows:

Table 3: Shared Micro-Mobility Devices Fleet Size

Operator Name	E-Scooter Fleet Allocation	E-Bike Fleet Allocation
Bird	667	150
Helbiz	105	250
Lime	245	200
Link	333	-
Spin	650	-
Veo	-	400
Total	2,000	1,000

Walk and Bike Score

The website Walkscore.com rates locations based on proximity to useful destinations and ease of access to them by walking. Destinations include retail and other uses but also quality bike connections and transit services. RiverHouse currently has a walk score of 88 (or "Very Walkable"), a transit score of 75 (or "Excellent Transit"), and a cycling score of 88 (or "Very Bikeable"). Figure 10 and Figure 11 illustrate heat maps for walkability and bikeability as well as the neighborhood boundaries the surround the study area.

The study area is considered "Very Walkable" because of the availability of neighborhood-serving retail establishments in the area that allow for multiple errands to be accomplished in one day by foot. The study area is considered to have "Excellent Transit" because of the Pentagon City, Pentagon and Crystal City Metro Stations in close proximity. The study area is considered "Very Bikeable" because of its proximity to numerous bicycle lanes and trails, low traffic roads, and generally flat topography.

Figure 10: Walk Score Heat Map (WalkScore.com)



Figure 11: Bike Score Heat Map (WalkScore.com)



Future Mobility Priorities

Arlington County's mobility vision is for a "system that provides equity and access to all users." Six goals support that vision:

- Provide High-Quality Transportation Services
- Move More People Without More Traffic
- Promote Safety
- Establish Equity
- Manage Effectively and Efficiently
- Advance Environmental Sustainability²

Arlington County plans to accomplish these goals by implementing the following policies:

- Integrate Transportation with Land Use
- Support the Design and Operation of Complete Streets
- Manage Travel Demand and Transportation Systems³

Under these policies come mode specific policies which will be implemented through future projects and initiatives that are planned or already in the works for Pentagon City and Arlington County as a whole. Figure 12 shows the Master Transportation Plan map for RiverHouse and the surrounding area.

² Arlington County Master Transportation Plan (MTP) (2017), <https://www.arlingtonva.us/Government/Projects/Plans-Studies/Transportation-Plans-Studies/Master-Transportation-Plan>, accessed 12/2022.

³ Arlington County MTP 2017

Figure 12: RiverHouse in the Master Transportation Plan (2017)

Legend

Arterial-Street Typologies

- Type A
- Type B
- Type C
- Type D
- Type E
- Type F

Neighborhood Streets

- Urban Center Local
- Residential or Commercial
- Local Street
- Shared Street
- Pedestrian Priority Street

Limited-Access Routes



High-Occupancy-Incentive Corridors

- I-66, I-395,
- VA Rte. 110, VA Rte. 27

Public Transportation Facilities

- Metro Blue Line
- Metro Orange Line
- Metro Yellow Line
- Metro Silver Line
- Railroad

Public Parks



Federal-Owned Lands



Bicycle/Pedestrian Trails

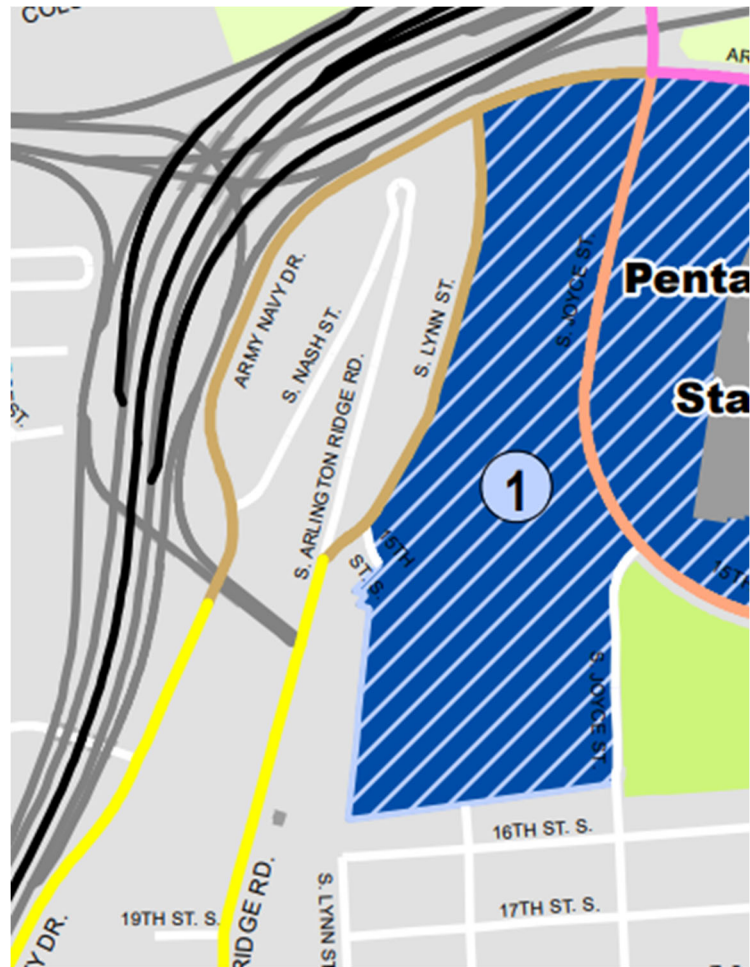
- 1 Existing Major Trail Projects
- 2 Planned Major Trail Projects

Transit Facilities

- 1 Existing/Completed Transit Projects
- 2 Planned Transit Projects

Intersection/Bridge Roadways

- 1 Existing/Completed Projects
- 2 Planned Roadway Projects



County-Wide Initiatives⁴

- **Pedestrians:** The County will implement policies with the focus of accommodating intra-county travel. These policies include initiatives focused on enhancing safety, security, pedestrian mobility, and accessibility for marginalized people. Arlington plans to use these policies to increase walking trips while also managing and maintaining pedestrian facilities.
- **Bicycles:** Arlington’s bicycle policies will inform the development of bikeways and transportation programs to support bicycling as a mode of transportation within the County. Arlington plans to complete the bikeway network, incentivize bicycling as a mode of transportation through safety and amenity enhancements. Data will be collected to help improve the maintenance and management of these facilities.
- **Premium Transit Network:** Arlington will institute Premium, Primary, and Secondary Transit Networks (PrTN, PTN, STN) to focus investment on corridors projected to support most of the anticipated future trips. The PrTN and PTN will both support high frequency bus service that provides rides all day. New passenger amenities will be included on the PrTN as well. The STN will serve as the main service for intra-county transit mobility.
- **Metrorail System Capacity Improvements:** New rail cars are being purchased to enable more eight-car trains to fully utilize the station platform capacity and alleviate the capacity issues causing riders to have to let trains pass until they can comfortably enter a car. Additional bus routes are planned to create more “one seat” rides from Arlington County into the District of Columbia. “One seat” rides are trips that eliminate the need for transfers between modes or vehicles. The changes are to be bolstered by planned re-routings of trains in Northern Virginia allowing the system to move more passengers without building new infrastructure. In addition, a new infill Metrorail station recently opened in the Alexandria portion of Potomac Yard. This station will serve new development including a Virginia Tech campus and other employment, retail, and recreation opportunities attractive to RiverHouse residents.
- **Station Enhancements and Access Improvements:** Arlington County will implement improvements to Metrorail stations to increase passenger flow and help make the stations more accessible. There will also be a focus on multimodal transportation improvements in the forms of enhancing how pedestrians and bicyclists approach the stations. Improvements consist of better street markings and

⁴ Arlington County MTP (2017)

crossings, widened sidewalks, wayfinding, bicycle lanes, and secure and covered bicycle parking.

PROJECT DESIGN

This chapter describes the details of the RiverHouse PDSP and its immediately surrounding context. It includes on-site features including buildings, parking, access, loading, and internal circulation. It also details adjacent streets including their walking, biking, and transit features.

RiverHouse PDSP

The RiverHouse PDSP site is a part of the Pentagon City area in Arlington, VA. Figure 1 shows the study area and its immediate vicinity. Figure 2 shows the regional location of the project. The RiverHouse site comprises 36.6 acres, bounded by S. Joyce St. to the east, 16th St. S. to the south, S. Lynn St. to the west, and Army Navy Dr. to the north. The existing site consists of three residential towers with 1,676 total residential units served by 1,820 surface and structured parking spaces, for a parking ratio of 1.09 spaces per unit. The site is primarily zoned RA6-15 and is shown as high density residential on the northern portion of the site and high-medium residential on the southern portion of the site in the General Land Use Plan (GLUP).

The proposed PDSP would preserve the existing residential towers and add 1,878 new residential units and approximately 52,000 square feet (sf) of new retail and amenity commercial space. Site plans for Landbays S, C, and N, would add 1,668 units with 27,759 sf of retail. Landbay F would add the remaining residential units and amenity space. These new developments are largely concentrated on the existing surface parking lots. As a result, the PDSP provides nearly 2,000 new homes and 52,000 sf of retail and amenity space with fewer than 350 net new parking spaces. The proposed PDSP is shown in Figure 5, and the development program is shown in Figure 6.

The remaining residential towers – Ashley (to the south), Potomac (in the center), and James (to the north) – continue to provide 1,676 units but with parking reduced from 1,820 spaces (1.09 per unit) to 868 spaces (blended 0.52 per unit). Landbay S, on the southern portion of the RiverHouse property, provides 265 townhouse and similar format residences along with 176 parking spaces, 75 on-street, for a parking ratio of 0.45 spaces per unit. Landbay C includes three new buildings:

1. C1, a multifamily residential building just south of the existing Ashley tower, with 102 units and 57 spaces (including 6 visitor spaces) for a ratio of 0.56 spaces per unit;
2. C2, a multifamily (anticipated senior housing) residential building just north of the existing Ashley tower, with 185 units and 136 parking spaces (including 10 visitor spaces) for a ratio of 0.74 spaces per unit; and

3. C3, a multifamily (anticipated condo) residential building just south of the existing Potomac tower, with 164 units and 257 spaces (including 9 visitor spaces) for a ratio of 1.6 spaces per unit.

Landbay N comprises two buildings sharing a below-grade garage. Together they provide 952 residential units and 27,759 square feet of retail space sharing 515 garage spaces, for an effective ratio of 0.5 spaces per unit, 0.05 visitor spaces per unit, and 1 space per 1000 square feet of retail.

Landbay F will comprise two buildings, one residential and the other amenity space for it and the existing James residential tower. The future buildings will include 210 residential units and 84 parking spaces for a ratio of 0.4 spaces per unit.

Adjacent Roadways

Adjacent roadways include S. Joyce St. to the east, 16th St. S. to the south, S. Lynn St. to the west, and Army Navy Dr. to the north. Army Navy Dr. currently includes three travel lanes in each direction adjacent to RiverHouse, but it is currently being reconstructed to include protected bike lanes. (See “Walking and Rolling” Chapter.) It is classified in the MTP as a Type D Arterial, as is S. Lynn St. along the western edge of the RiverHouse site. 16th St. S. is classified as a Neighborhood Local street, as is the segment of S. Joyce St. along the southeastern edge of the RiverHouse site. S. Joyce St. along the majority of the eastern edge is classified as a Type A Arterial. Figure 13 indicates where typical cross-sections are taken for existing streets, and those dimensions are shown in Figure 14. Figure 16 shows the future elements and dimensions proposed as part of the RiverHouse PDSP.

Figure 13: Existing Street Cross-Section Location Key (Source: PDSP Submission, Sheet CIV703)

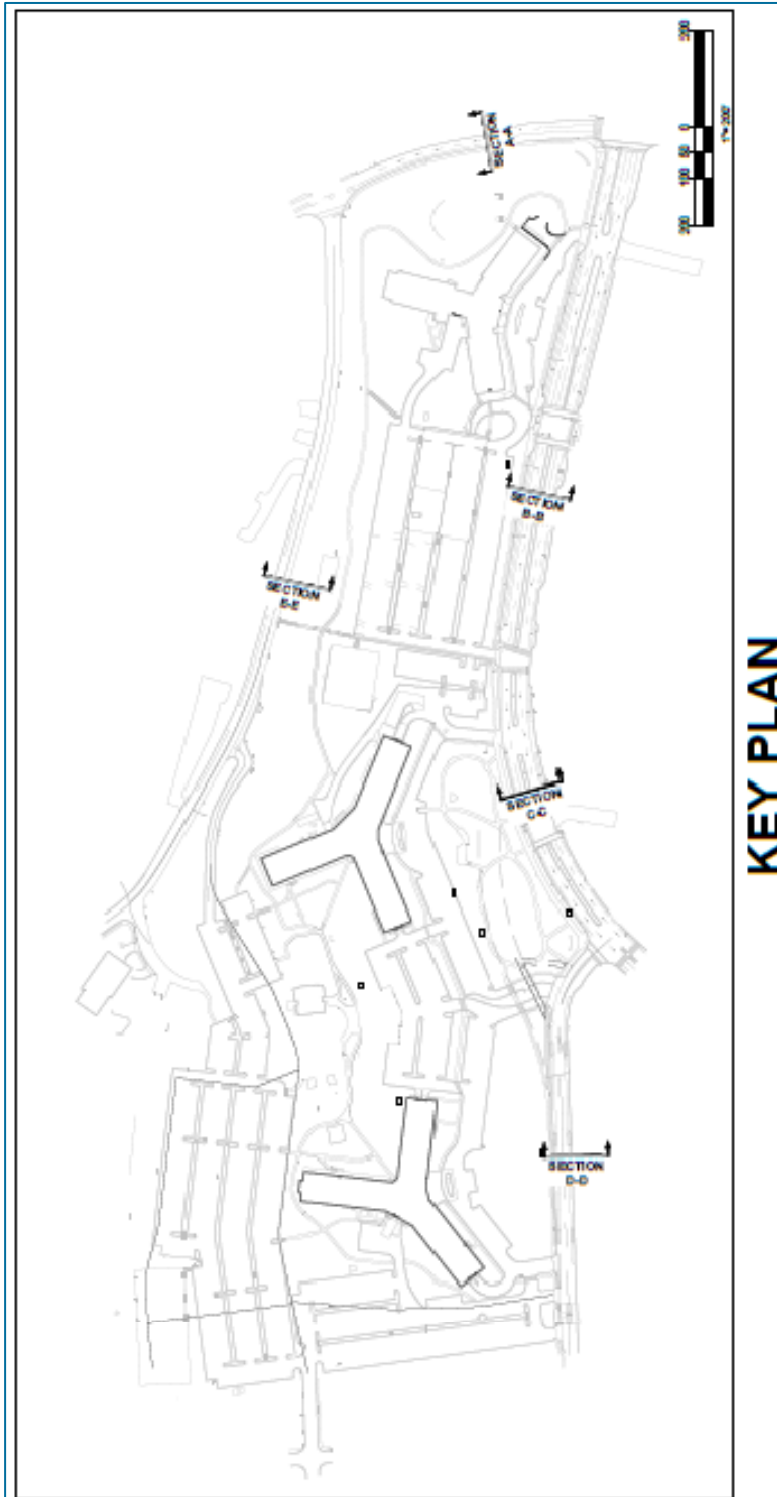


Figure 14: Existing Street Cross-Sections (Source: PDSP Submission, Sheet CIV703)

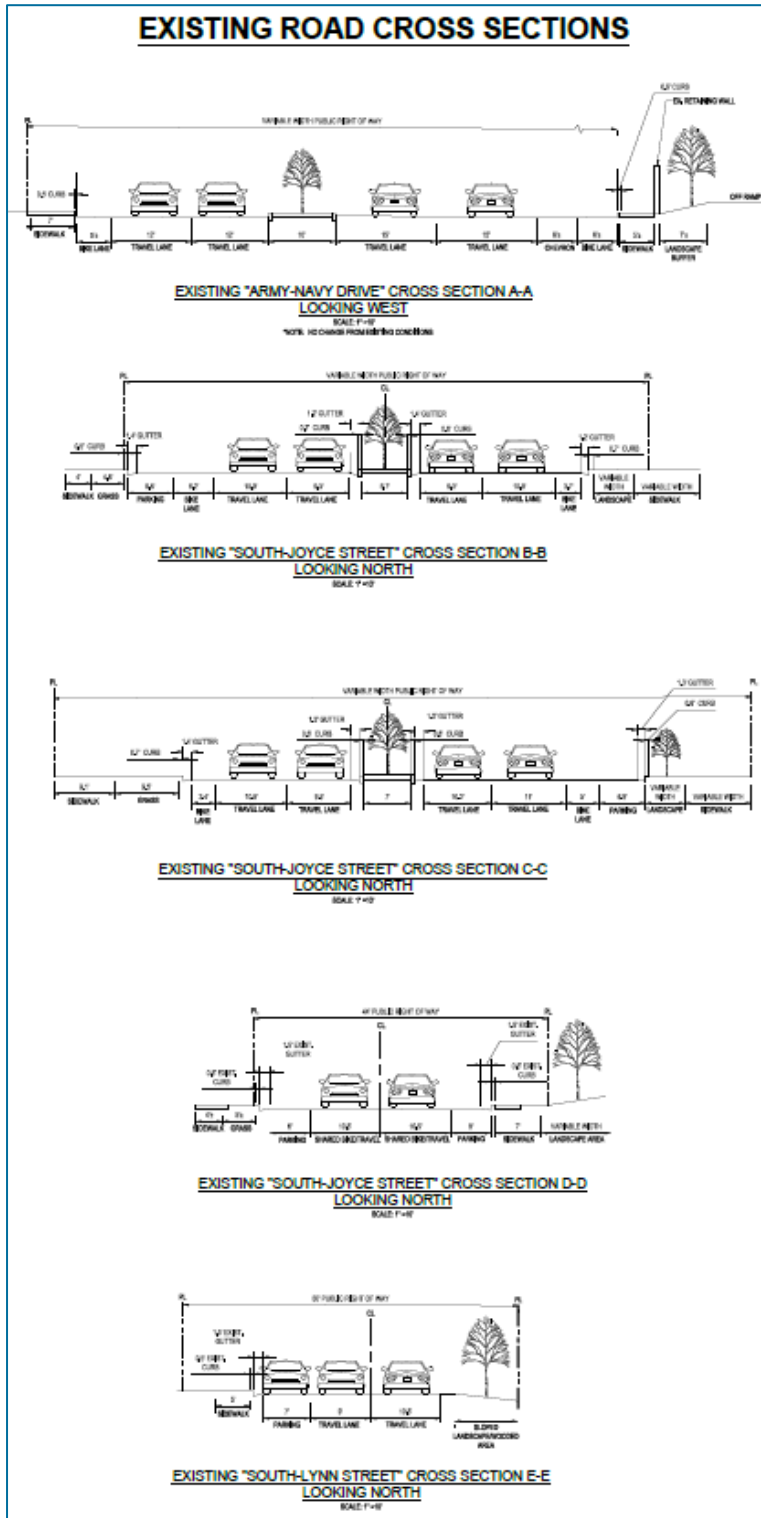


Figure 15: Proposed Street Cross-Section Location Key (Source: PDSP Submission, Sheet CIV704)

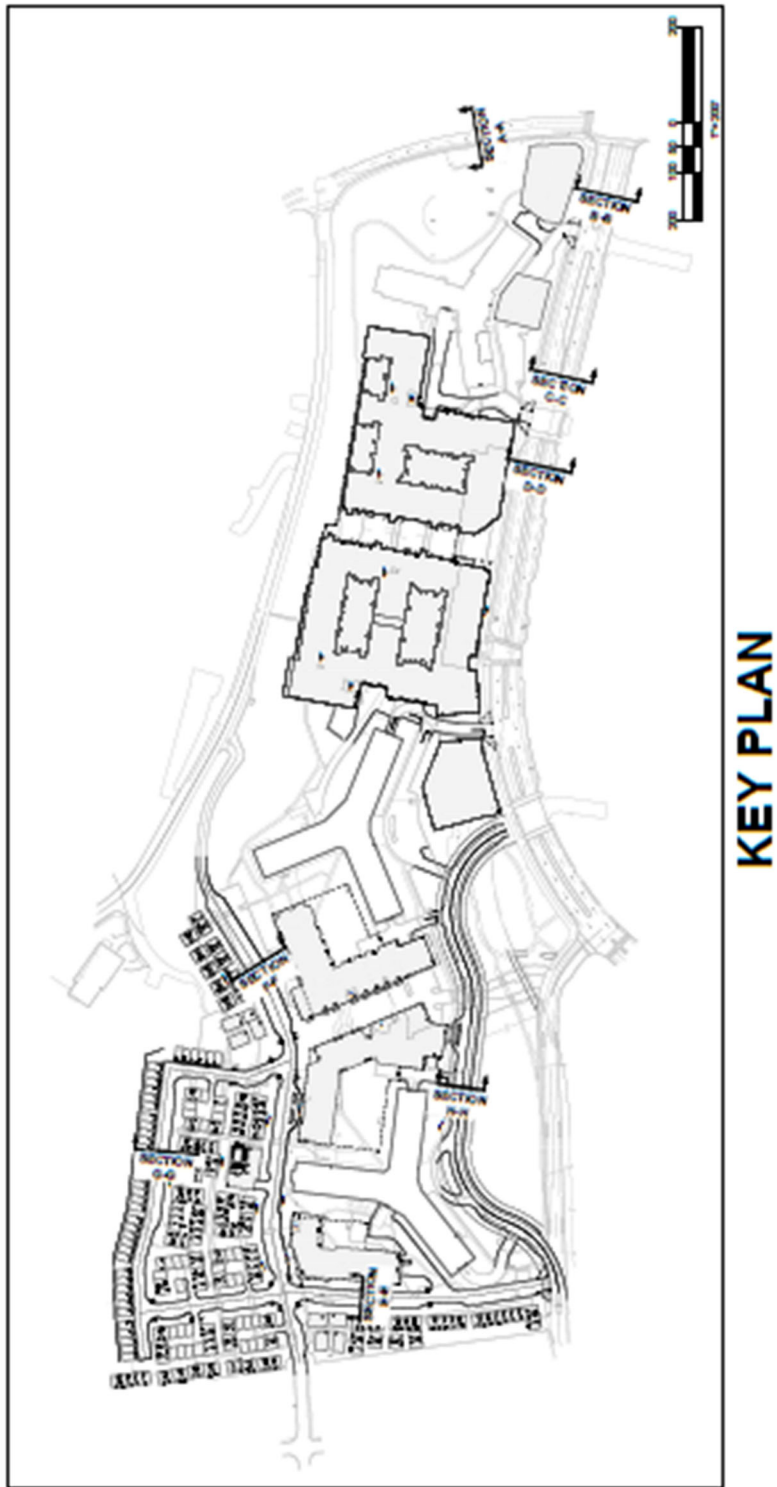
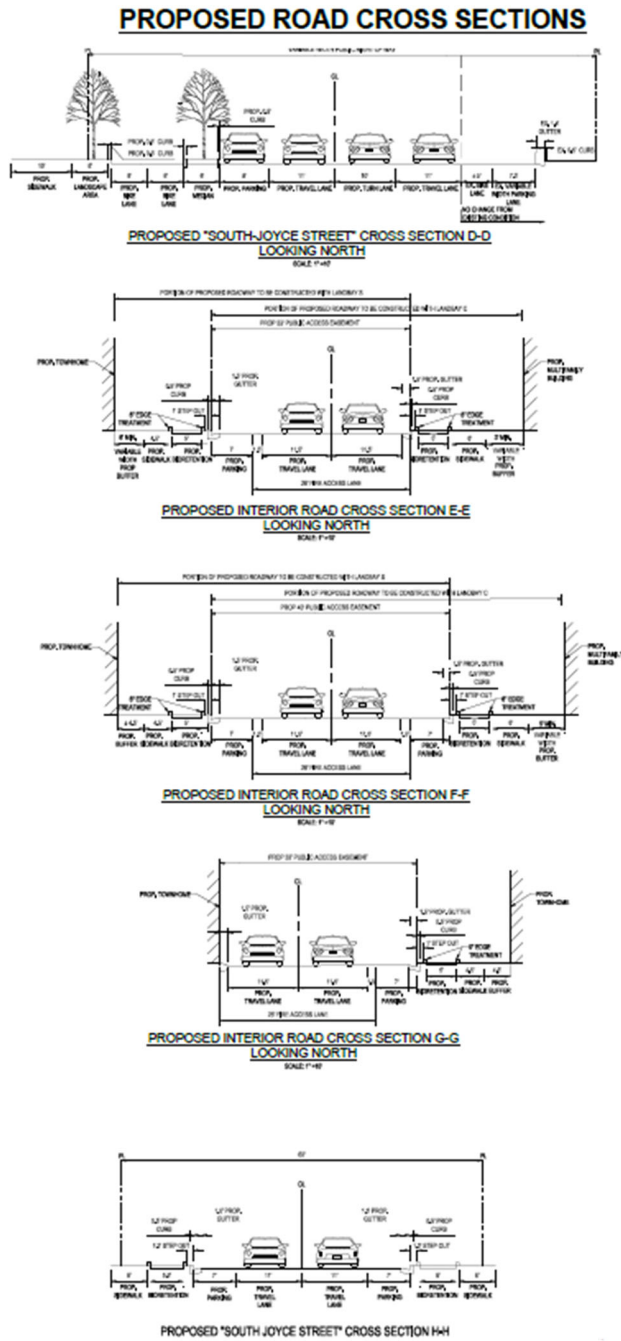
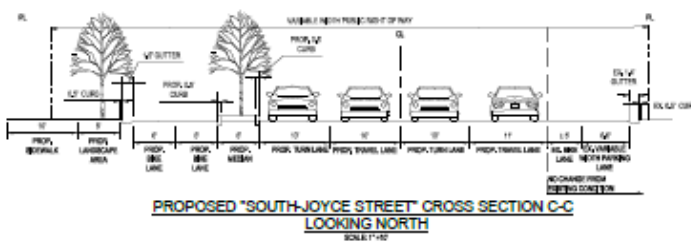
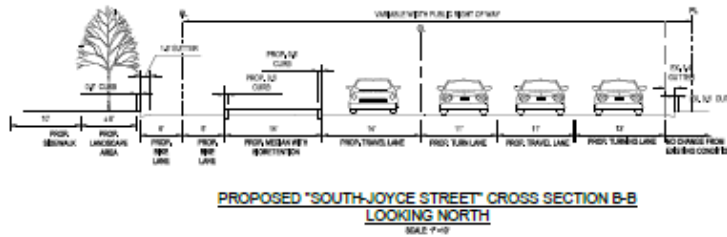
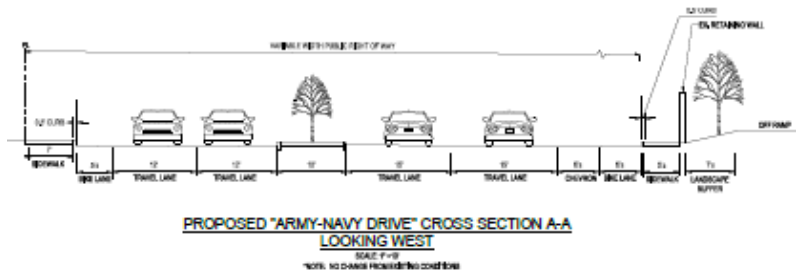


Figure 16: Proposed Street Cross-Sections (Source: PDSP Submission, Sheet CIV704)





Road Diet of S. Joyce St. Arterial Segment

The PDSP proposes significant changes to S. Joyce St., in both the arterial segment between Army Navy Dr. and 15th St. S., and in the local segment between 15th St. S. and 16th St. S. The arterial segment is proposed for a road diet. Separate analysis prepared for Arlington County supported the feasibility and desirability of this road diet, under all reasonable future traffic scenarios and is included as Appendix B.

S. Joyce St. between Army Navy Dr. (to the north) and 15th St. S. (to the south) currently consists of two (2) vehicle travel lanes in each direction, separated by a center median that transitions to a left-turn lane at some intersections. Each direction of S. Joyce St. includes a painted bike lane between the vehicle travel lanes and an on-street parallel parking lane, which is occasionally replaced by curb extensions to facilitate safer crossing by people walking or rolling. Beyond the curb, each direction includes a small grass buffer and then a sidewalk, currently four (4) feet wide on the RiverHouse (west) side and of varying but more ample width on the east (Pentagon Row) side.

The proposed road diet for S. Joyce St. is described in Figure 17 and Figure 18, using the color scheme shown. While keeping the east curb as currently located, the proposed cross-section includes (from east to west) the current parking lane (periodically replaced by curb extensions), painted bike lane, one (1) northbound vehicle travel lane, one (1) center turn lane (or median), one (1) southbound vehicle travel lane, a parking lane, a buffer area, a two-way protected cycle track, the curb, a buffer area, and a more ample sidewalk. Specific dimensions are shown on Figure 17 (for existing conditions) and Figure 18 (proposed road diet).

Figure 17: S. Joyce St. Existing Configuration

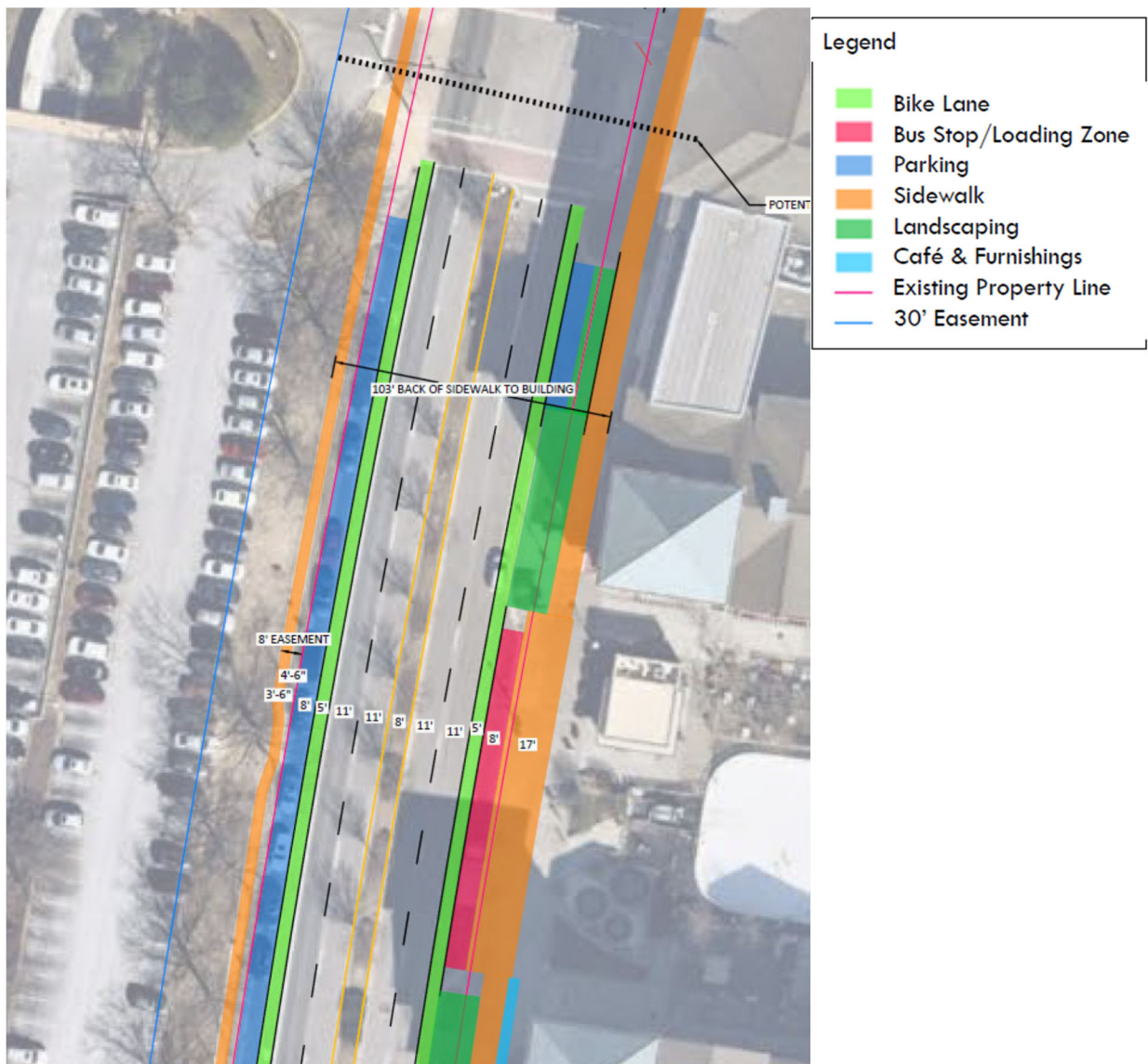
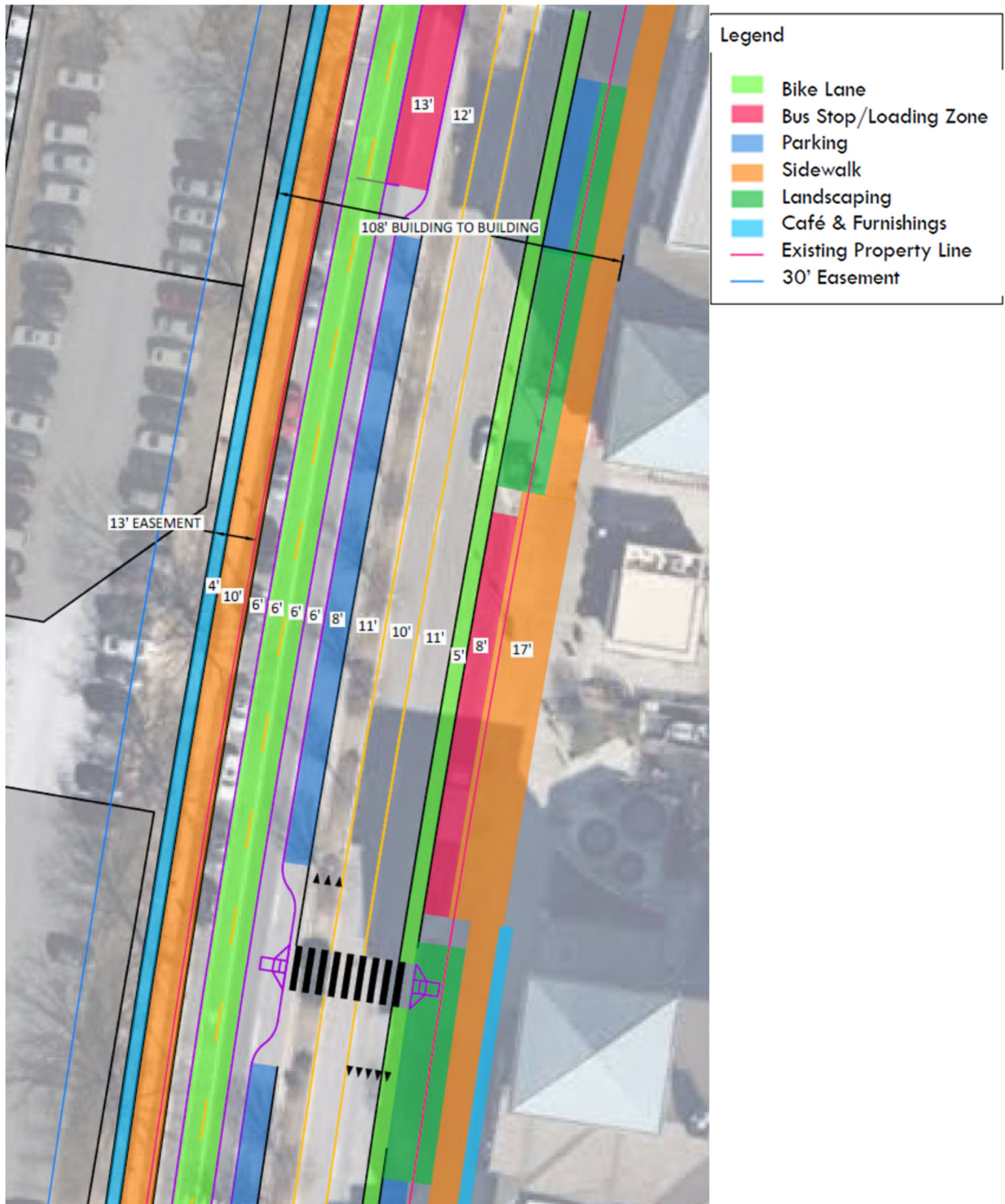


Figure 18: S. Joyce St. Proposed Road Diet Conditions



Realignment of S. Joyce St. Neighborhood Local Segment

At the intersection of S. Joyce St. with 15th St. S., S. Joyce St. continues running north/south while 15th St. S. runs east/west. A southbound traveler wishing to remain on S. Joyce St. must make a right turn, while a westbound traveler on 15th St. S. must make an unprotected left. Northbound travelers on S. Joyce St. must make an unprotected left to continue on S. Joyce St. past 15th St. N. The segment of S. Joyce St. south of 15th St. S. has a very different character than described above. Its cross-section includes one travel lane in each direction, and on-street parking in segments.

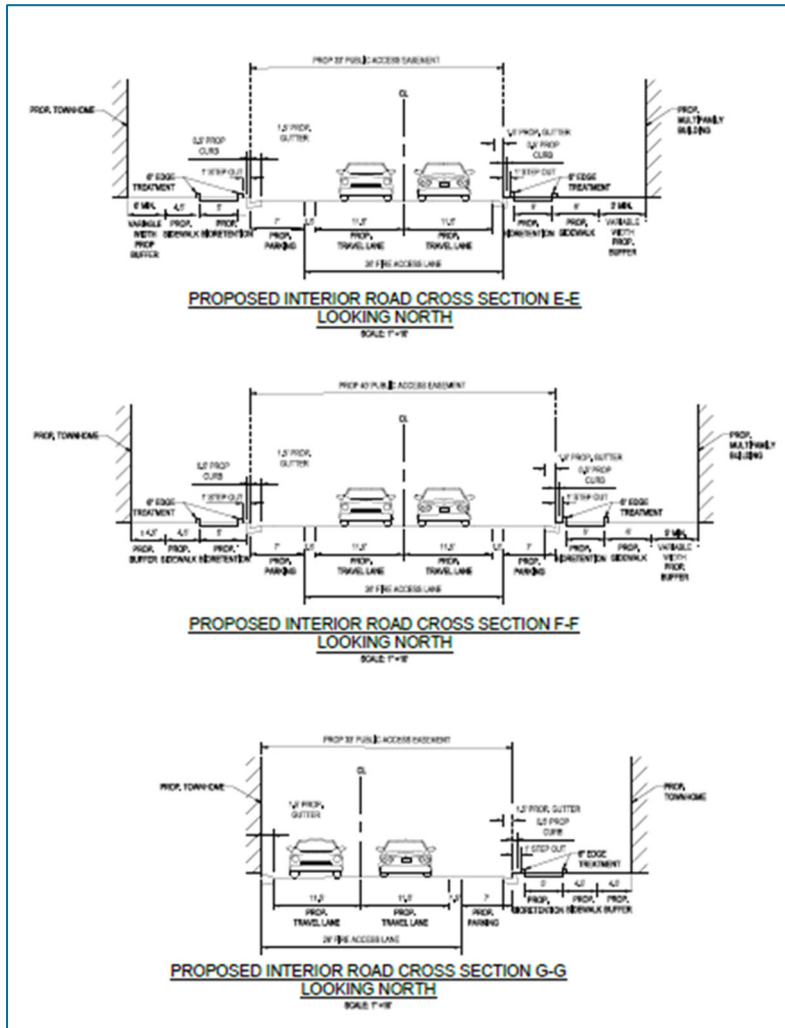
Arlington County requested the relocation of this segment to connect at the current signal at Grace Murray Hopper Park, where a driveway that connects from the east could be a future segment of 14th St. S. The RiverHouse PDSP reflects this relocation, allowing for an expanded Virginia Highlands Park. The resulting street maintains its function as a Neighborhood Local, with one travel lane in each direction and on-street parking in segments.

Site Access and Circulation

The RiverHouse PDSP illustrates significant improvements in access to and circulation through the site for people walking, rolling on or in personal vehicles, or in cars and other motor vehicles. Figure 20 shows these access and circulation paths for people walking or rolling.

A new internal access road connected to S. Kent St. at the southern boundary of the site and continuing north through to S. Lynn St is proposed. It is anticipated that this street will almost entirely serve for site access and not through traffic as the demand for that through movement should be quite low. This street provides for pickup/dropoff access to the Landbay C buildings as well as direct access to many of the Landbay S townhouse-format residences. Other internal streets also serve Landbay S, connecting S. Kent St. to S. Joyce St., and forming a new block west of the street connected to S. Kent St. These streets also provide access to the Ashley tower's garage and loading bay. Figure 19 shows proposed dimensions for these new internal streets; the key showing the locations of those cross-sections is in Figure 13.

Figure 19: Internal Roadways (Proposed)



Loading

Site-specific loading details will be addressed at the site plan level. The PDSP documents that loading will be provided within existing and new buildings, and will be accessed from site driveways. Figure 21 depicts street connections, driveway connections, and garage/loading access locations for the RiverHouse PDSP.

Figure 20: Green Ribbon Circulation Diagram

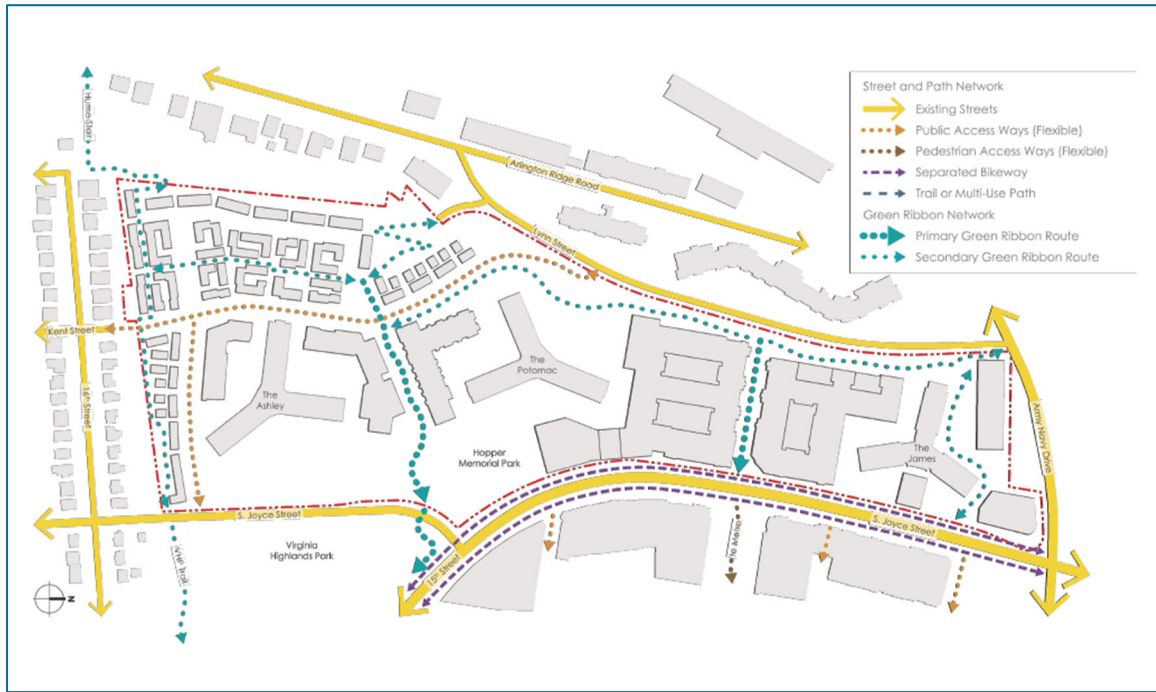
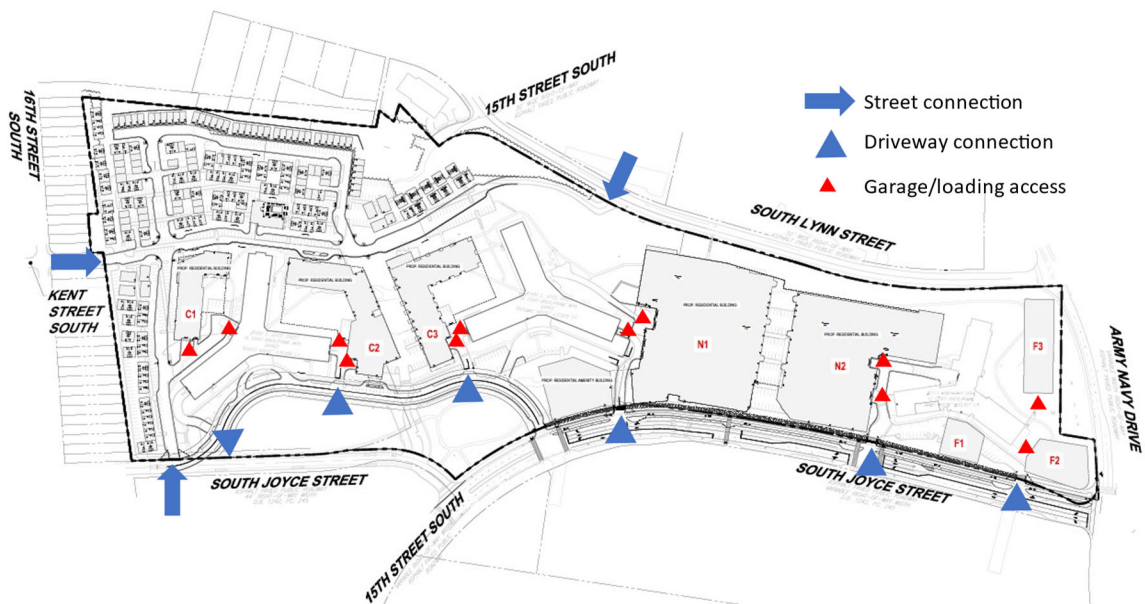


Figure 21: Site Access for Vehicles and Loading



Parking

The existing RiverHouse site provides 1,820 vehicle parking spaces, of which 1,491 are located in surface lots. Redevelopment proposed in the RiverHouse PDSP will replace most of the surface lots. Vehicle parking is provided throughout the site, as described in Figure 22. Access points to garages are indicated in Figure 21.

- On Landbay S, 816 surface parking spaces are being replaced by 265 townhouse-format residential units with 101 garage spaces and 75 on-street spaces.
- On Landbay C, 215 surface parking spaces will be replaced by 451 high-rise residential units (a mix of rental, condo, and senior housing) served by 444 parking spaces in underground garages. The new underground garages in Landbay C will also provide 230 spaces partially replacing the surface lots that currently serve the Ashley tower.
- On Landbay N, 531 existing spaces in surface lots and a two-level garage will be replaced by 952 mid-rise residential units and ~28,000 square feet of retail space, served by 487 parking spaces in a new underground garage. This new garage will also provide 390 spaces partially replacing the garage and surface parking that currently serves the James and Potomac towers.
- Future Landbay F will provide 210 high-rise residential units and 84 garage parking spaces.

Figure 22: Proposed Vehicle Parking Quantities and Locations

PARKING PROVIDED								
Use			Units/SF	Proposed Ratio	Proposed Spaces	Provided Location of Spaces		
Residential	Existing Multifamily	James (Existing)	452	0.46 Spaces/Unit	198	0 Surface 198 N1/N2 Garage		
		Potomac (Existing)	647	0.52 Spaces/Unit	331	130 Potomac Garage 9 Surface 192 N1/N2 Garage		
		Ashley (Existing)	577	0.6 Spaces/Unit	339	115 Ashley Garage 89 C1 Garage 135 C2 Garage		
		New Multifamily	C1		102	0.5 Spaces/Unit	51	51 C1 Garage
			C1 Visitor Parking			0.05 Spaces/Unit	6	6 C1 Garage
			C2		185	0.74 Spaces/Unit	126	126 C2 Garage
	C2 Visitor Parking				0.05 Spaces/Unit	10	10 C2 Garage	
	C3			164	1.6 Spaces/Unit	248	248 C3 Garage	
	C3 Visitor Parking				0.05 Spaces/Unit	9	9 C3 Garage	
	New TH Multifamily	N1		952	0.5 Spaces/Unit	276	276 N1/N2 Garage	
		N2				201	201 N1/N2 Garage	
		N1/N2 Visitor Parking			0.05 Spaces/Unit	10	10 N1/N2 Garage	
	Landbay F Future New Multifamily	TH Multifamily Res.		265	0.45 Spaces/Unit	162	101 Garage 61 On-street	
		TH Multifamily Visitor			0.05 Spaces/Unit	14	14 On-street	
	Retail ^A	F1		24,000		0	0	
		F2		210	0.4 Spaces/Unit	84	84 Garage	
	Additional Parking		on-street			60	60 On-street	
	Total					2,153		

Bicycle and Pedestrian Facilities

S. Joyce St. adjacent to the RiverHouse site is proposed to be redesigned to provide ample and attractive space for walking and safe rolling, as described in the previous section on Adjacent Roadways. Other site boundaries including Army Navy Dr. and S. Lynn St. are proposed to remain as-is. Internal streets are designed to ensure low vehicle speeds and thereby support a safe and attractive environment for walking and biking.

Bike parking is provided throughout the site, as detailed in the 4.1 site plans. Each building in Landbays C and N is providing secure, convenient indoor bike storage meeting code requirements of 1 space per 2.5 residential units, 1 spaces per 50 residential units for visitors, and 1 space per 2 employees.

- Landbay S: bike parking provided in individual townhouse-format units and garages
- Landbay C: multifamily building (44 spaces), senior building (64 spaces), condo building (78 spaces)
- Landbay N: 409 spaces
- Landbay F: to be included in 4.1 filing

Curbside Management

The S. Joyce St. frontage presents the major curbside management challenge for the RiverHouse site. The proposed redesign of S. Joyce St. to be a more full-featured complete street puts more demands on the curb than the current regime of on-street parking and two bus stops requires. The new S. Joyce St. will have multiple layers of curbs: adjacent to the sidewalk will be a buffered, protected two-way cycletrack, beyond which will be a mix of on-street parking, turn lanes, and bus stops, depending on the location. For more detail, see the design in Appendix B.

WALKING AND ROLLING

This chapter presents and assesses the existing and planned facilities to support safe, convenient walking and rolling (whether on bikes, scooters, wheelchairs, or other personal vehicles) around the RiverHouse site.

Pentagon City's initial design was not developed with bicycles in mind. S. Hayes St. and S. Joyce St., among other streets, now feature on-street bicycle facilities thanks to street improvements. A protected bike facility and other improvements are under construction along Army Navy Dr, with additional sections to follow as part of the PenPlace redevelopment.⁵

Bike/Pedestrian Existing Conditions

The Pentagon City study area is host to many on-street bike lanes and other bicycle facilities. Regional trails in the vicinity include Arlington's Four Mile Run Trail and the Mount Vernon Trail along the George Washington Memorial Pkwy (which has a direct trail connection to Crystal Dr. in the study area). Other local trails and shared-use paths include the Alexandria Four Mile Run Trail and Nature Path, Potomac Yard Trail along Potomac Ave, Washington Blvd Trail, Route 1 Path south of Four Mile Run, and Long Bridge Park Path. The Crystal City Metro Station has infrastructure supporting travel by bike to ride north to south and east to west of the station. There is a disproportionate number of facilities that run east to west influencing most bicycle volumes to utilize the north to south facilities more often. Figures 23 and 24 map the existing pedestrian and bike infrastructure, respectively.

⁵ Pentagon City Sector Plan 2022

Figure 23: Existing Pedestrian Infrastructure Network

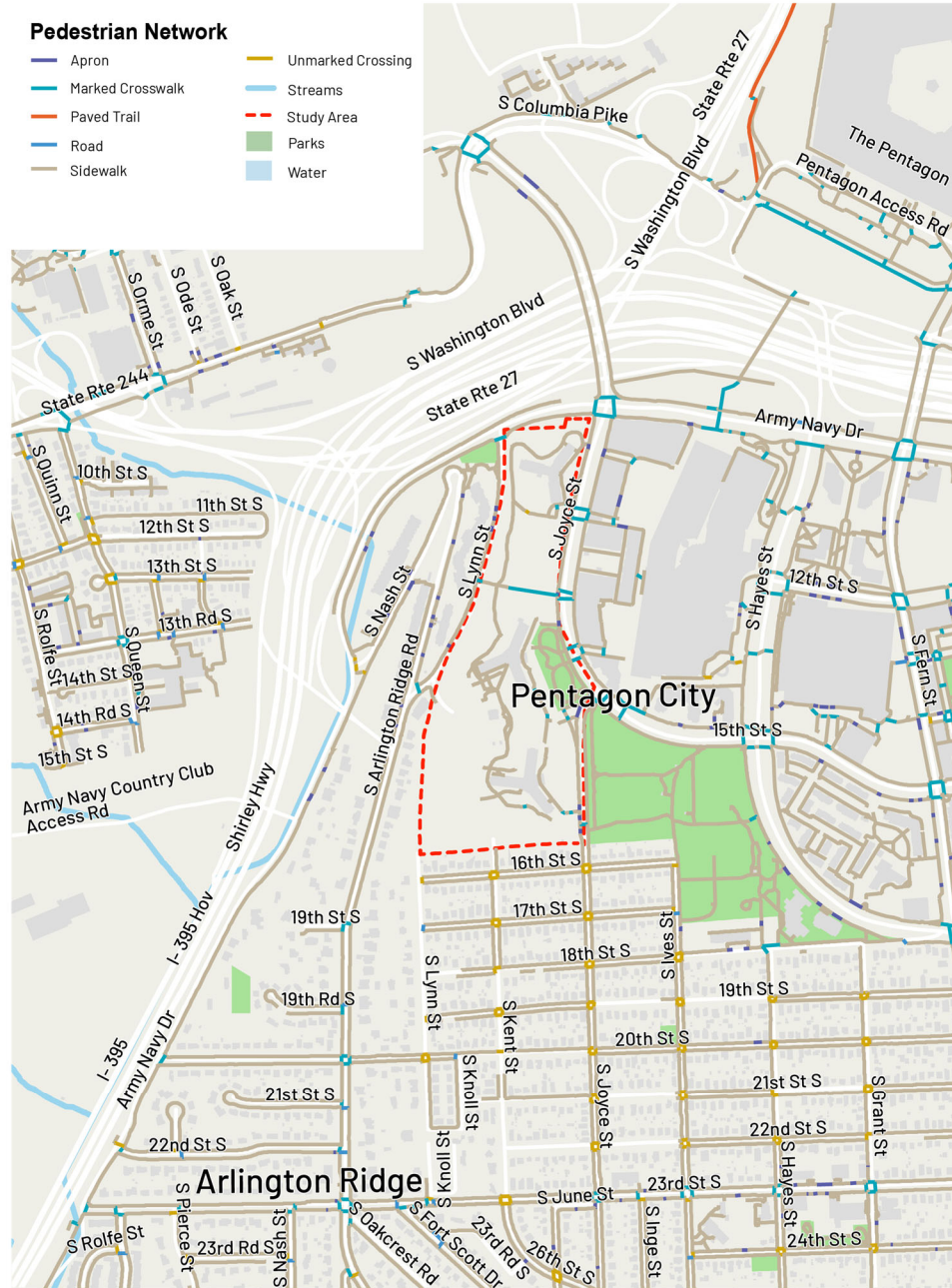


Figure 25: Street and Path Network (Pentagon City Sector Plan 2022)

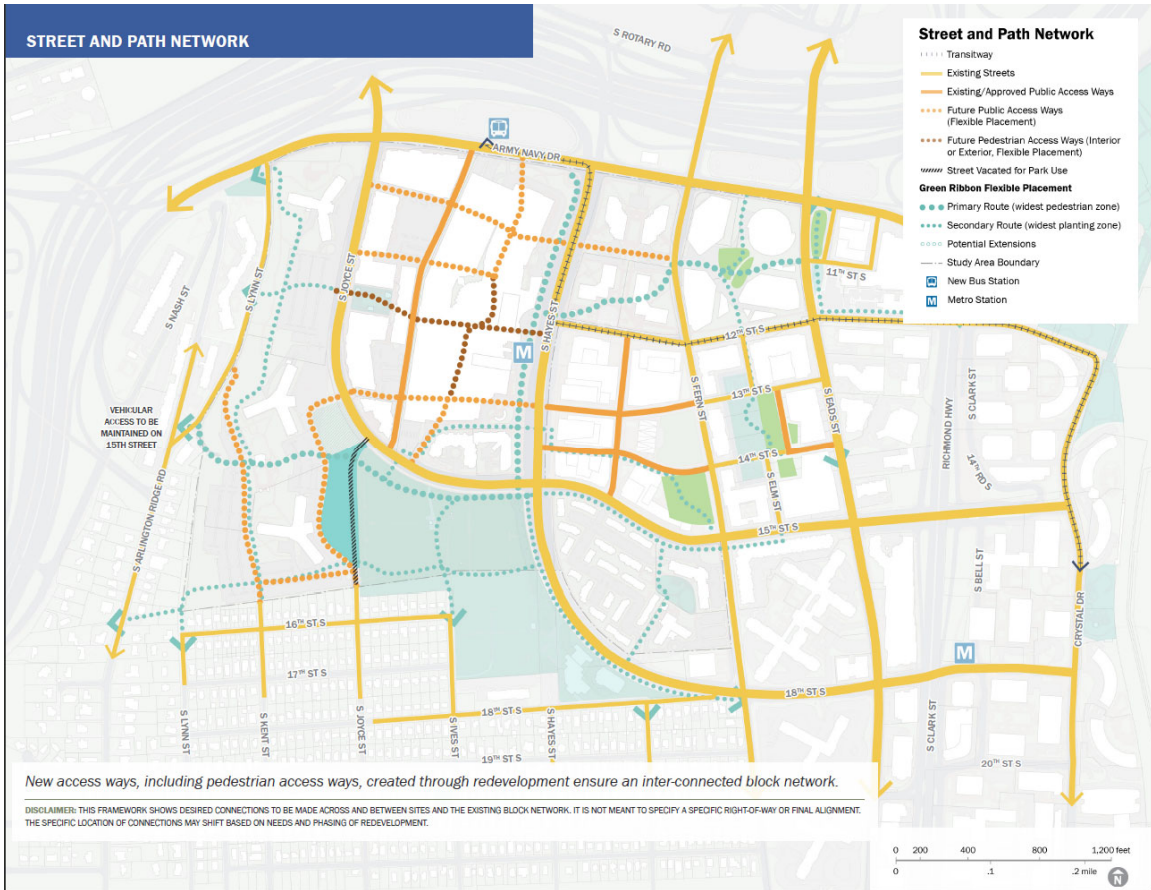
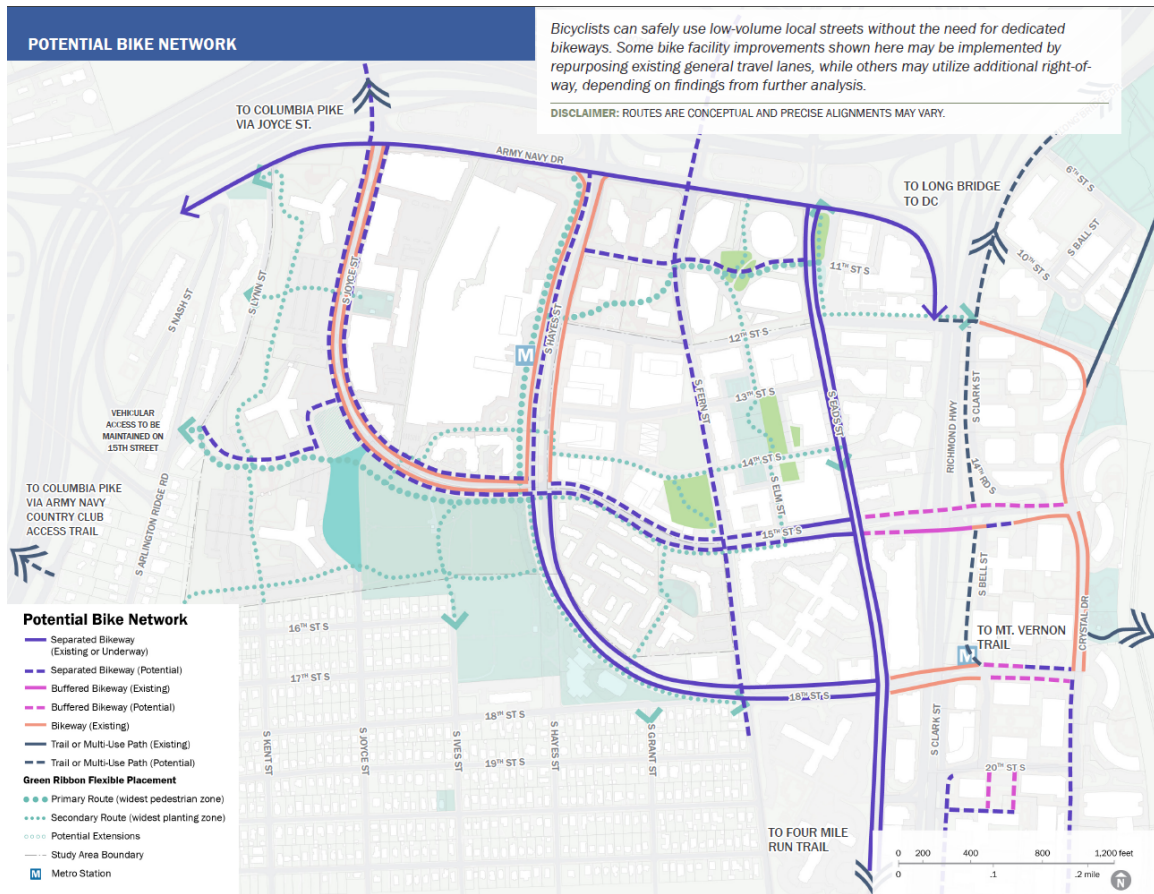


Figure 26: Potential Bike Network (Pentagon City Sector Plan 2022)



Arlington County developed a Bicycle Element for the MTP and included the following goals:

- Provide an environment in which people of all ages and abilities can get places by bicycle safely and comfortably.
- Make all of Arlington accessible by bicycle using easy-to-follow, low-stress routes.
- Increase the mode share of bicycle travel, aiming to have the population of persons who bicycle for transportation be demographically reflective of the population of Arlington overall.
- Provide an excellent trail system that serves the needs of people walking and bicycling for transportation and for recreation.
- Properly manage, maintain, and operate the infrastructure that supports bicycling in Arlington.
- Integrate bicycling into an efficient, sustainable, and equitable transportation system.

Planned/Recommended Changes

The improvements proposed by the Arlington County Board in Fall 2021 will support east-west links to Pentagon City with the goal of increasing cycling mode share and comfort in the Pentagon City area.⁶ The bicycle network will continue to provide connections to activity centers, Metrorail and VRE, local trail networks, and Washington, DC, as well as Alexandria. Figure 26 and Figure 27 illustrate projects underway and planned to improve the bike infrastructure around RiverHouse.

Some planned and under-construction bicycle projects from the Bicycle Element of the MTP and other planning documents that could impact the study area are listed below⁷:

- **Army Navy Dr.:** Reconstruct Army Navy Dr. between 12th St. S. and S. Joyce St. to include a bidirectional protected bicycle lane. This 1.6-mile corridor is currently under construction.⁸ An additional phase will fill the “Army Navy Dr. PBL Missing Link” west of S. Joyce St., anticipated to be completed by 2025.⁹
- **Buffered/Protected Bike Lanes:** S. Joyce St. is proposed to be reconstructed as part of the RiverHouse redevelopment to include a two-way protected cycletrack on the west (RiverHouse) side. Separately, the County’s “15th St. S. Complete Streets Project” will improve biking and walking conditions between its intersections with S. Joyce St. and S. Hayes St. East of the study area, a combination of fully and partially buffered/protected bike lanes are planned in Crystal City for 15th St. S. and 18th St. S. as well as a pair of protected bike lanes on Crystal Dr. and Clark St./Bell St. These will provide better access to the Mt. Vernon Trail and other regional connections including into DC.
- **Shared-Use Path:** The Green Ribbon defined in the Pentagon City Sector Plan is principally a walking path. It is not intended to be a high-speed trail and will be designed to encourage slower speeds. Parallel bikeways alongside the Green Ribbon are indicated to accommodate higher volumes and speed of bicycle travel in some sections. Sections of the Green Ribbon are proposed to be implemented as part of the RiverHouse redevelopment.

⁶ Pentagon City Sector Plan (2022).

⁷ Pentagon City Sector Plan (2022), <https://www.arlingtonva.us/Government/Projects/Plans-Studies/Land-Use/Pentagon-City-Planning-Study>, accessed 10/2022.

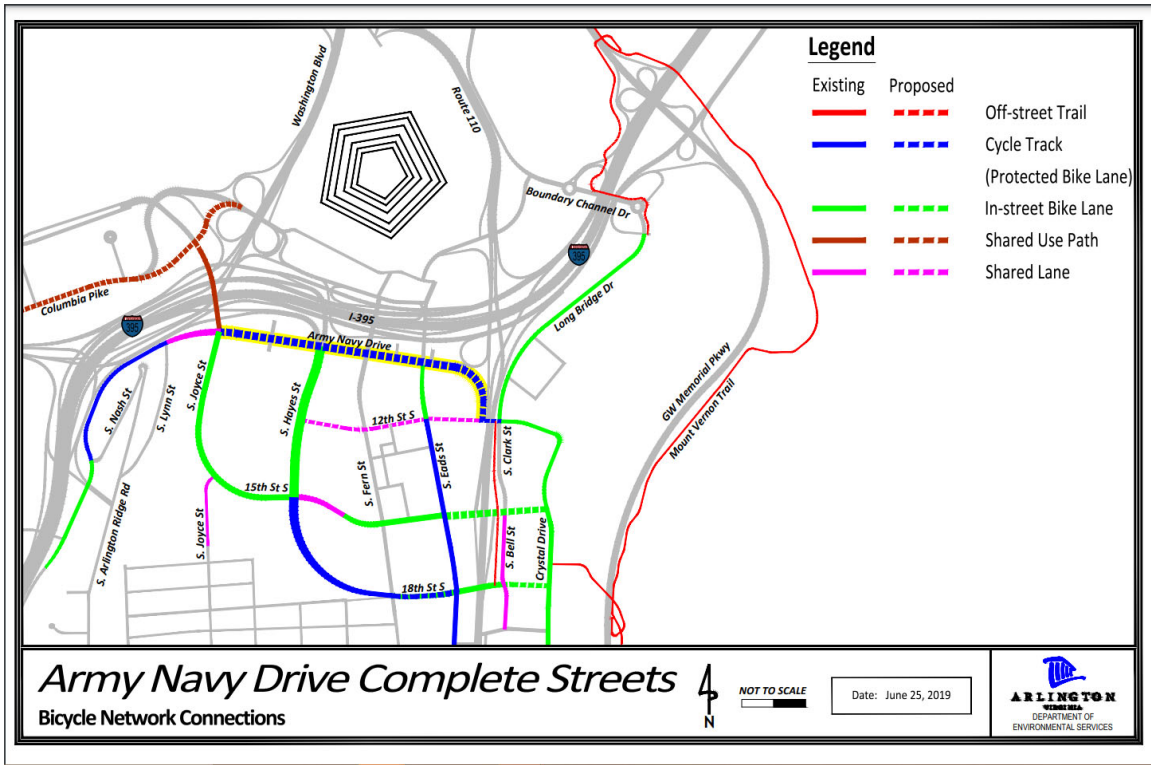
⁸ “Army Navy Drive Complete Street,” <https://www.arlingtonva.us/Government/Projects/Project-Types/Transportation-Projects/Army-Navy-Drive-Complete-Street>, accessed 1/2023.

⁹ “Army Navy Drive PBL Missing Link,” <https://www.arlingtonva.us/Government/Projects/Project-Types/Transportation-Projects/Army-Navy-Drive-PBL-Missing-Link>, accessed 1/2023.

- **Army Navy Country Club Emergency Access Road:** Construct an emergency access street suitable for bicycle and pedestrian use, from the edge of the Hoffman Boston School in the Arlington View neighborhood to Army Navy Drive in the Arlington Ridge/Pentagon City area. The facility will utilize public easement across the country club property and an existing public street underpass of Shirley Highway (I- 395) to enhance north-south access for pedestrians and bicyclists. Initiate construction prior to August 2032 to vest the public easement. (0.7 mile)
- **20th St. S. Bicycle Boulevard:** Develop a bicycle boulevard on 20th St. S., between S. Fern St. and Army Navy Dr., to provide a low-stress bicycling route through the Arlington Ridge and Aurora Highlands neighborhoods and to connect with other bikeways in the Pentagon City area. (0.9 mile)
- **Mount Vernon Trail Widening:** Widen the pavement of the entire Mount Vernon Trail between the Roosevelt Island parking area and Four Mile Run to a minimum 12-foot pavement width. (NPS) (4.8 miles)
- **Four Mile Run Trail Enhancements:** Widen the Four Mile Run Trail pavement to a minimum of 10 feet of paved width where trail usage averages at least 1,000 persons per day and natural features would not be significantly impacted. Undertake spot safety improvements to enhance safety and reduce conflicts between users between Columbia Pike and Shirlington Road including below the George Mason Drive overpass. Incorporate the trail improvements identified in the Four Mile Run Valley – Park Master Plan (1.8 miles)
- **Four Mile Run Bridge:** Construct a bicycle/pedestrian bridge over Four Mile Run to connect S. Eads Street to Commonwealth Avenue and connect the two trails paralleling Four Mile Run on the Arlington and Alexandria sides of the stream. Also identified in the Four Mile Run Restoration Master Plan. (Arlington, Alexandria) (0.2 mile)

Figure 27 shows the Army Navy Dr. protected bike lanes and other existing and then-proposed improvements near the RiverHouse site.

Figure 27: Army Navy Complete Streets Bike Network (Army Navy Dr Complete Street Open House 2019)



TRANSIT FACILITIES AND NETWORK

This chapter discusses the existing and planned transit facilities in the vicinity of the site, accessibility to transit, and evaluates the overall transit impacts of the project.

The RiverHouse site is well connected to many local and regional transit options. By walking distance, there are:

- 22 bus stops and 1 Metrorail station within 0.25 miles of the site.
- 53 bus stops and 1 Metrorail station within 0.5 miles of the site.

Figure 28 illustrates the locations of rail stations and bus stops relative to the redevelopment site, as well as the 14 bus routes that serve stops within 0.5 miles of the site.

In terms of multimodal interchanges or transit hubs, Pentagon City Metro Station serves as the closest facility located 0.5 miles to the east of the RiverHouse site. It can be accessed on foot through the Pentagon Row and Pentagon City malls, or around the malls via South Joyce Street. Pentagon City on South Hayes Street features a dedicated bus-only siding, direct access to the Metrorail underground portal, and sheltered bicycle racks. There is also a dedicated driveway for pick-ups and drop-offs by car.

Pentagon Metro Station is the area's major bus interchange, and a hub for intercity and regional connections. This facility alone serves 38 bus routes, of which 30 are weekday commuter express buses from other counties in Virginia. A full inventory of regional bus connections accessible at the Pentagon Metro Station is listed in Table 4.

The RiverHouse site also has access to intercity rail services operated by the Virginia Railway Express (VRE), providing external connections to Manassas and Fredericksburg. The closest VRE station is located 1 mile east of the site at Crystal City Train Station on Crystal Drive.

Figure 29 illustrates the possible extent of travel by public transit 30, 60, and 90 minutes from the RiverHouse site, assuming 5pm on a weekday. This "transit shed" is sizeable, with most of Washington D.C. and large parts of Arlington and Alexandria accessible within 60 minutes. The 90 minute shed brings much of the rail and commuter bus network into play, with connections as far as Manassas and Prince William County and extensive parts of Maryland.

Figure 28: Existing Transit Services and Facilities Serving the RiverHouse Site*

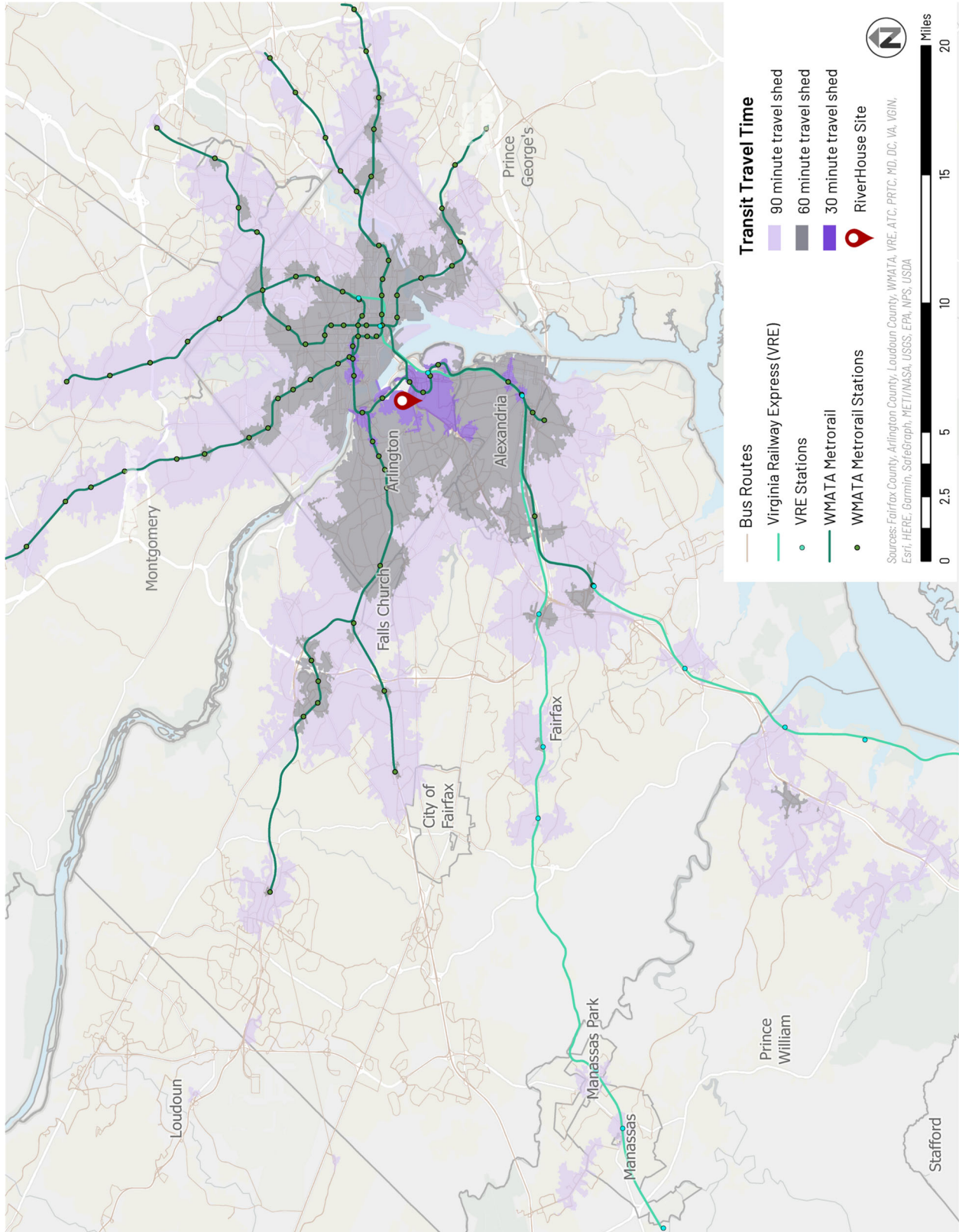


*Other bus routes in the vicinity that exclusively serve The Pentagon or Crystal City and do not serve the RiverHouse site were omitted from this map.

Table 4: Bus Service Inventory at Pentagon Metro Station

Pentagon Metro Station Bus Services – Local and Regional Connections			
Route No.	Route Name	Service Provider	Classification
35	Van Dorn Metro - Yoakum Pkwy - Beauregard St - Pentagon Metro	Alexandria Transit Company DASH	Local Bus
103	Braddock Metro - Russell Rd - Glebe Rd - Pentagon Metro	Alexandria Transit Company DASH	Commuter Bus
104	Braddock Metro - Cameron Mills Dr - Parkfairfax - Pentagon Metro	Alexandria Transit Company DASH	Commuter Bus
42	Ballston-Pentagon	Arlington Transit	Local Bus
87	Pentagon Metro - Army Navy Drive - Shirlington	Arlington Transit	Local Bus
306	GMU - Pentagon	Fairfax County Connector	Commuter Bus
393	Saratoga - Pentagon - Mark Center	Fairfax County Connector	Commuter Bus
394	Saratoga - Pentagon Express	Fairfax County Connector	Commuter Bus
395	Gambrill - Pentagon Express	Fairfax County Connector	Commuter Bus
396	Backlick - Pentagon Express	Fairfax County Connector	Commuter Bus
599	Pentagon - Crystal City Express	Fairfax County Connector	Commuter Bus
698	Vienna Pentagon	Fairfax County Connector	Commuter Bus
834/835	Annandale - Pentagon	Fairfax County Connector	Commuter Bus
282/682	Dulles South, East Gate - Pentagon, Crystal City	Loudoun County Transit	Commuter Bus
284/684	Dulles South, East Gate - Pentagon, Crystal City	Loudoun County Transit	Commuter Bus
482/882	Leesburg, Dulles North - Pentagon, Crystal City	Loudoun County Transit	Commuter Bus
602	Manassas	PRTC OmniRide	Commuter Bus
612	Gainesville - Pentagon - L'Enfant Plaza - Navy Yard	PRTC OmniRide	Commuter Bus
942	Stafford-Pentagon	PRTC OmniRide	Commuter Bus
D-100	Dale City - Washington	PRTC OmniRide	Commuter Bus
D-200	Dale City - Pentagon & Rosslyn/Ballston	PRTC OmniRide	Commuter Bus
D-300	Dale City - Washington Navy Yard	PRTC OmniRide	Commuter Bus
L-100	Lake Ridge - Washington	PRTC OmniRide	Commuter Bus
L-200	Lake Ridge - Pentagon & Crystal City	PRTC OmniRide	Commuter Bus
MC-100/200	Montclair	PRTC OmniRide	Commuter Bus
RS	RS South Route 1	PRTC OmniRide	Commuter Bus
10A	Alexandria-Pentagon	WMATA Metrobus	Local Bus
16A/C/E	Columbia Pike	WMATA Metrobus	Local Bus
17B/G/K/M	Kings Park - North Springfield	WMATA Metrobus	Commuter Bus
18G/J	Orange Hunt	WMATA Metrobus	Commuter Bus
18P	Burke Centre	WMATA Metrobus	Commuter Bus
21C	Landmark-Holmes Run Parkway	WMATA Metrobus	Commuter Bus
22A/F	Barcroft-South Fairlington	WMATA Metrobus	Local Bus
28F	Skyline City	WMATA Metrobus	Commuter Bus
29G	Annandale	WMATA Metrobus	Commuter Bus
7A	Landmark-North Fairlington	WMATA Metrobus	Local Bus
7M	Mark Center - Pentagon	WMATA Metrobus	Local Bus
8W	Foxchase-Seminary Valley	WMATA Metrobus	Commuter Bus

Figure 29: Transit Travel Shed from the RiverHouse Site, Weekday 5pm



Rail Service

Metrorail services are operated by WMATA, while regional commuter rail services are provided by the Virginia Railway Express (VRE). Besides Pentagon City Metro Station, the redevelopment site is also located 1 mile away from both Pentagon Metro and Crystal City Metro Stations. Table 5 summarizes the service spans as of 2022.

Table 5: Rail Service Information

Route Name	Operating Agency	Classification	Weekday		Weekend	
			Service Span	Headway	Service Span	Headway
Metro Blue Line	WMATA Metrorail	Metro Heavy Rail	5AM - 12AM	Every 15 minutes	7AM - 12AM	Every 15 minutes
Metro Yellow Line	WMATA Metrorail	Metro Heavy Rail	5AM - 12AM	Every 15 minutes	5AM - 12AM	Every 15 minutes
Manassas Line	Virginia Railway Express	Intercity Rail	5AM - 9AM, 1PM - 8PM	Every 30-50 minutes	-	-
Fredericksburg Line	Virginia Railway Express	Intercity Rail	5AM - 9AM, 1PM - 8PM	Every 20-40 minutes	-	-

Crystal City Train Station is located on the east side of Crystal Drive, by the Crystal City Water Park. The station proper is accessible by a small unnamed driveway with limited wayfinding information. The VRE shares its tracks with Amtrak services, however the latter does not serve this station. Both VRE lines terminate at Washington D.C. Union Station as their northernmost extent, and respectively provide connections to Manassas and Fredericksburg. VRE services do not operate on weekends or holidays, specifically targeting office commuters as their primary ridership base. As of October 2022, the Manassas Line sees an average daily ridership of 2,400 for both directions, while the Fredericksburg Line sees 4,400 boardings each day across all trains.

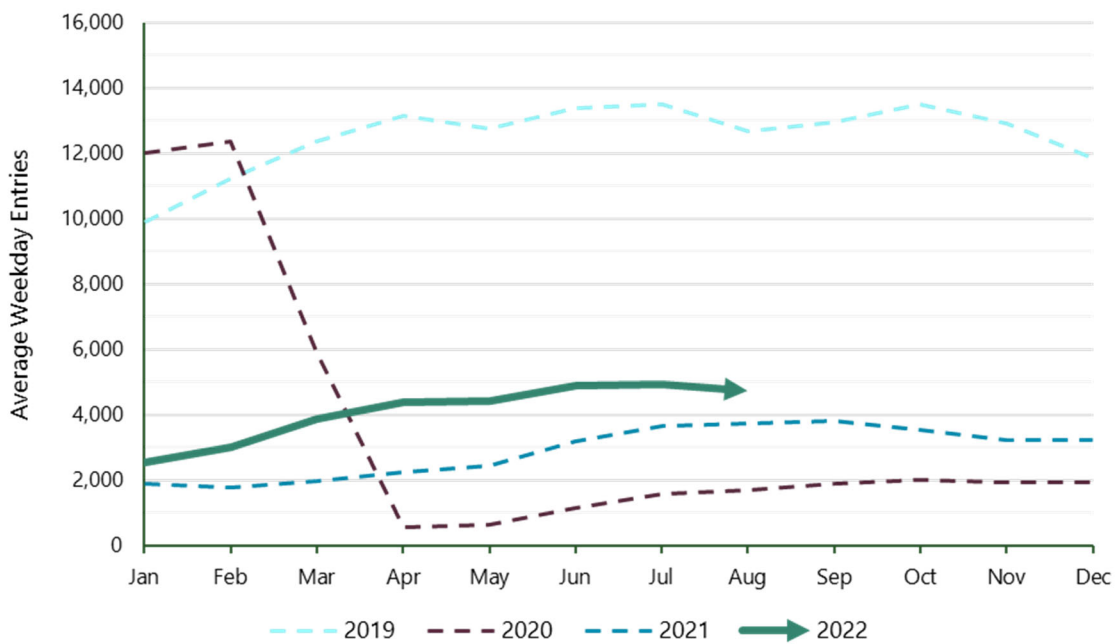
As previously described, Pentagon City Metro Station serves as a significant multimodal transit hub in proximity to the RiverHouse site. Metrorail Blue and Yellow Lines serve this station, providing regional connections to downtown Washington D.C., University of Maryland and Largo, Maryland to the northeast; Alexandria, Ronald Reagan Washington National Airport, and Springfield, Virginia to the south and southwest. Each Metrorail line operates week-round at 15 minute headways, which is effectively doubled to 7.5 minute headways by the overlap of both Blue and Yellow Lines.

Prior to the COVID-19 pandemic, WMATA Metrorail ridership at Pentagon City Metro Station ranged from 10,000-14,000 entries each day. However, ridership collapsed in 2020 to less than 2,000 entries per day, seeing an 80-85% decline. As of 2022, passenger activity at Pentagon City has gradually rebounded to roughly 35% of pre-pandemic levels, illustrated in Figure 30 below.¹⁰

Entry and exit activity at Pentagon City Metro Station has largely retained its peak hour commute patterns that existed prior to the pandemic, with sharp peaks of activity between 6AM-9AM and 3PM-6PM on weekdays (Figure 31). The afternoon peak sees greater activity than the morning peak, which suggests that people are travelling to Pentagon City for recreational reasons or errands during after work hours.

Pentagon City Metro Station is embedded at the intersection of three shopping malls and multiple department stores, making it a prominent regional destination for recreation. This is reflected by substantial ridership activity on weekends, with consistent station entries and exits throughout the day (Figure 32). When considered on top of bus ridership, it can be surmised that the Pentagon City area sees consistent and large levels of foot traffic, from both residents and visitors alike.

Figure 30: Pentagon City Metro Station - Average Weekday Entries by Month, 2019-2022



¹⁰ <https://www.wmata.com/initiatives/ridership-portal/>

Figure 31: Pentagon City Metro Station - Average Weekday Activity by Time of Day, August 2022

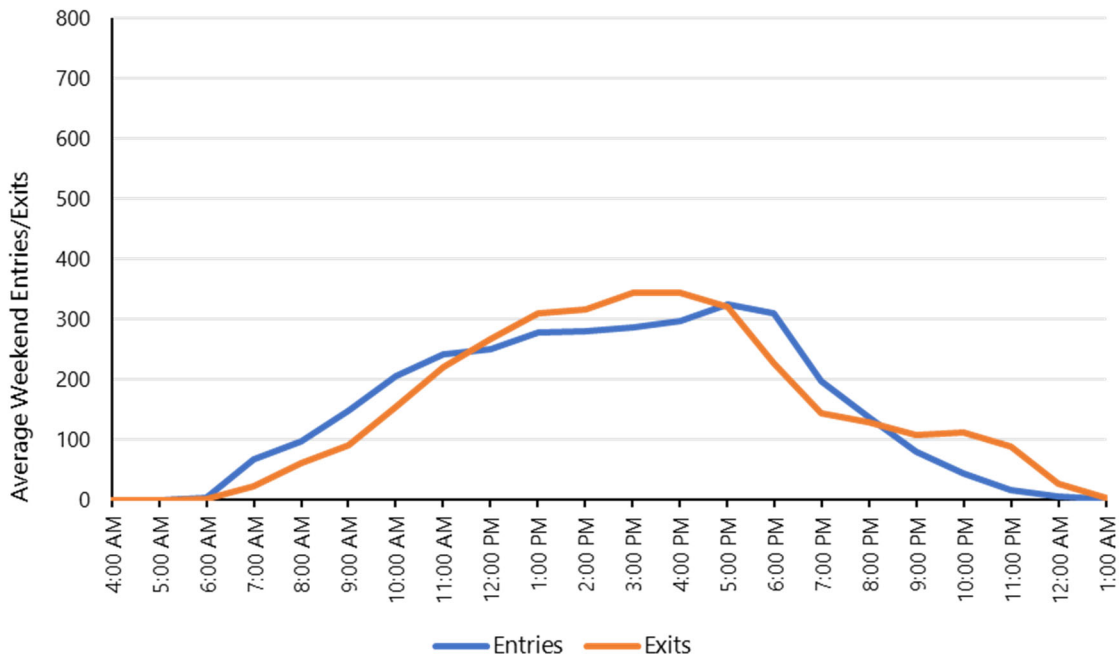
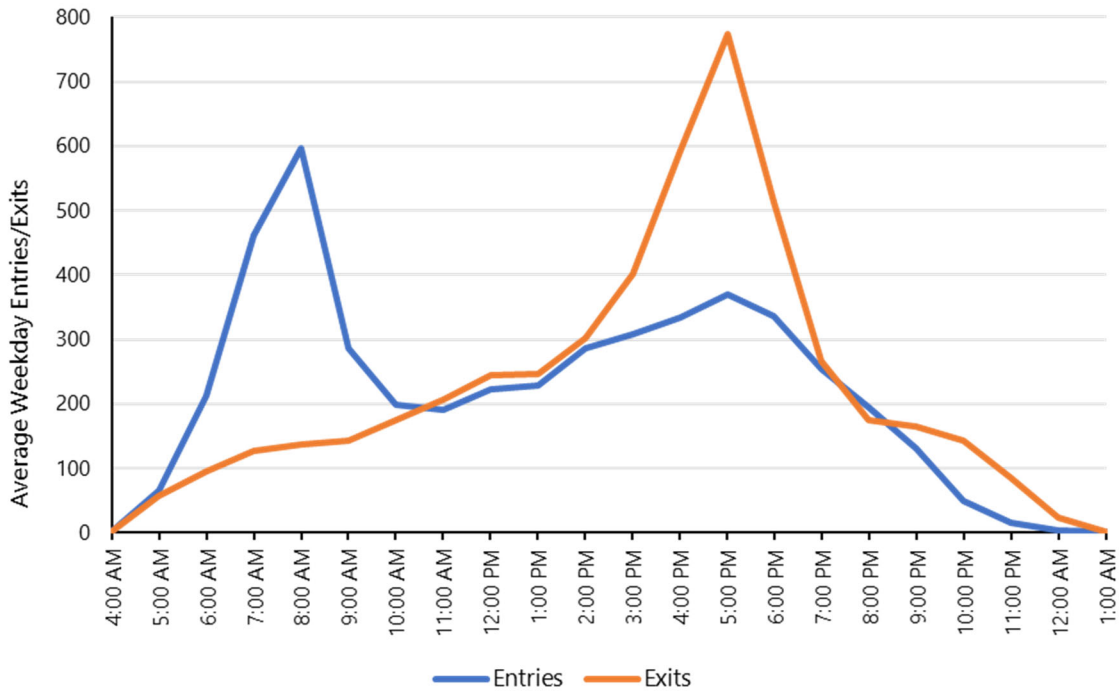


Figure 32: Pentagon City Metro Station - Average Weekend Ridership by Time of Day, August 2022



Bus Service

The site is served by 22 bus stops within a quarter-mile radius, with ten (10) to the site’s west and north on Army Navy Drive, one (1) across the I-395 Freeway on the Columbia Pike, six (6) to the east on South Joyce Street, and five (5) at the Pentagon City Metro Station interchange on South Hayes Street.

There are 14 publicly operated bus routes serving the immediate (quarter-mile) vicinity of the RiverHouse site. These routes are operated by WMATA Metrobus, WMATA Metroway, Arlington Transit (ART), and the Fairfax County Connector. The privately operated Washington Deluxe Bus Company also operates a coach service to New York City from the nearby Pentagon City Metro Station. An inventory of available bus routes and their service spans is provided in Table 6.

The majority of these 14 public bus routes operate at 15-30 minute headways, with the Metroway being the only high frequency route (under 15 minute headways).

The bus route with the closest stop to the RiverHouse site is WMATA Metrobus 10A, which stops right by the site on S Joyce St and provides connections between Alexandria and the Pentagon. This route sees 34 boardings on an average weekday, and would likely be the primary choice for RiverHouse commuters travelling to and from the Pentagon.

WMATA also operates a Bus Rapid Transit (BRT) route, Metroway MW1, which runs every 12 minutes from the Pentagon City Metro Station to Braddock Road Station in Alexandria. While both ends of the route terminate at a WMATA Blue/Yellow Metrorail Station, the Metroway serves as a high-capacity, high-frequency transit option that bridges the destinations between rail stations.

Figure 33: BRT Route MW1 - Average Weekday Boardings by Month, 2022

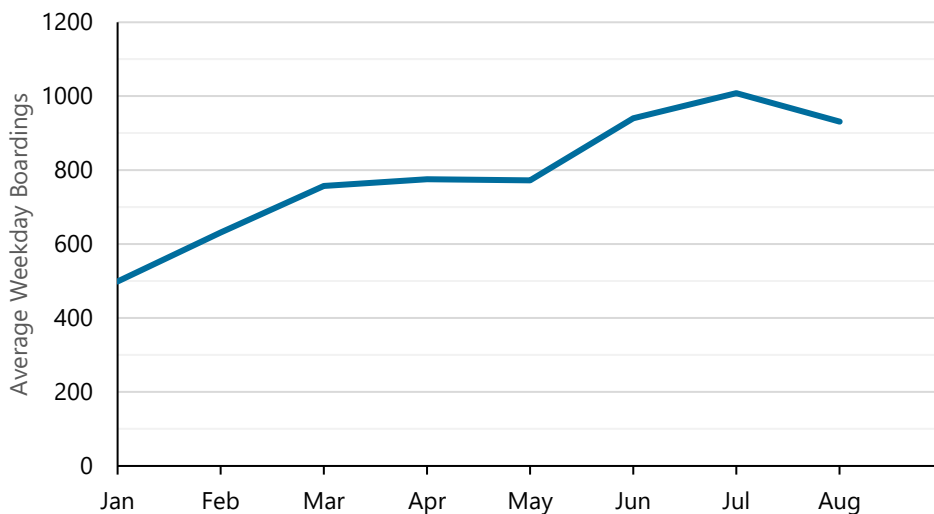
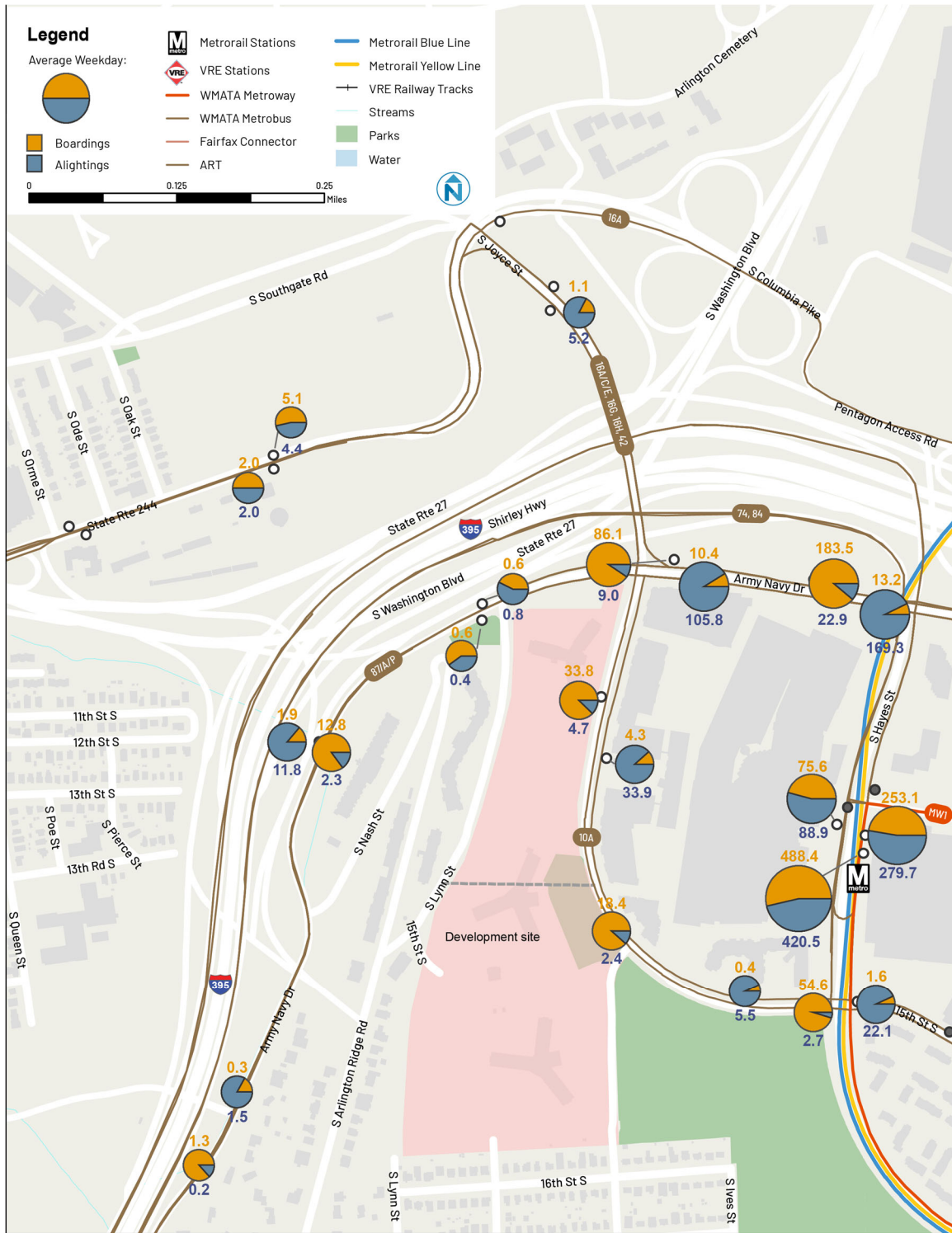


Table 6: Weekday Bus Service Information (within 0.25 miles)

Route Name	Operating Agency	Classification	Policy Headway	Weekday																							
				04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	01	02	
7A Landmark-North Fairlington	WMATA	Local Bus	M-F, 20-30 mins																								
10A Alexandria-Pentagon	WMATA	Local Bus	M-F, 30 mins																								
16A Columbia Pike	WMATA	Local Bus	M-F, 30 mins																								
16C Columbia Pike	WMATA	Local Bus	M-F, 30 mins																								
16E Columbia Pike	WMATA	Local Bus	M-F, 30 mins																								
16G Columbia Pike-Pentagon City	WMATA	Local Bus	M-F, 24 mins																								
16H Columbia Pike-Pentagon City	WMATA	Local Bus	M-F, 24 mins																								
22A Barcroft-South Fairlington	WMATA	Local Bus	M-F, 60 mins																								
42 Ballsbln-Pentagon	ART	Local Bus	M-F, 15-30 mins																								
87 Pentagon Metro - Shirlington	ART	Local Bus	M-F, 15-30 mins																								
87A Pentagon Metro - Shirlington	ART	Local Bus	M-F, 20 mins																								
87P Pentagon Metro - Shirlington	ART	Local Bus	M-F, 20 mins																								
599 Pentagon-Crystal City Express	Fairfax Connector	Commuter Bus	M-F, 20-40 mins																								
MW1 Metroway-Potomac Yard	WMATA	Bus Rapid Transit	M-F, 12 mins																								
- Washington Deluxe DC to NYC*	Washington Deluxe	Intercity Bus	N/A																								

Figure 34: Stop-Level Average Weekday Boarding and Alighting (Bus-Only)



Planned and Upcoming Transit Projects

Several transit-related projects and facilities are planned or under development around the RiverHouse Site. Highlights are captured in Table 7.

Table 7: Planned Transit Improvement Projects

Project	Construction	Opening
Second Elevator at Pentagon City Metro Station (S Hayes St)	Fall 2021	Spring 2023
Crystal City-Potomac Yard Transitway Extension to Pentagon City	Fall 2022	Summer 2025
Pentagon City Center Bus Bays Project	TBD	TBD
Army Navy Drive Complete Streets Project	Fall 2022	Summer 2025
Columbia Pike Premium Transit Network	Summer 2018	Spring 2023
Columbia Pike Multimodal Street Improvements / Arlington National Cemetery Defense Access Roads (DAR) Project	Spring 2022 Fall 2021	Summer 2025

Sources: *Transportation Projects, Arlington County Government*

<https://www.arlingtonva.us/Government/Projects/Project-Types/Transportation-Projects>

The Army Navy Drive Complete Streets Project, combined with the Transitway Extension to Pentagon City, will see Metroway BRT and other bus services to Alexandria connected directly to the heart of Pentagon City. In conjunction with each other, these projects will bring travel time reductions, bus priority lanes, and the conversion of an existing parking lot into a multi-route bus hub just north of Army Navy Drive between S Joyce St and S Hayes St. The existing busway currently ends in Crystal City, on 15th Street S. Construction on the Army Navy Drive Complete Streets broke ground on 25th October, 2022.

The Columbia Pike Premium Transit Network will significantly enhance Arlington Transit services travelling from the west, featuring new stations, expanded service spans, and a new network of high frequency bus services bridging the Columbia Pike with Pentagon City and Crystal City. Transit Signal Prioritization (TSP) improvements are also being considered.

ESTIMATED TRAVEL DEMAND

This chapter outlines the transportation demand of the proposed RiverHouse development. It reviews the trip generation from the existing uses, the expected mode splits and multimodal trip generation, which forms the foundation to the traffic operations analysis.

Mode Split Methodology

Mode split is the percentage of travelers using individual modes of transportation when traveling whether that be commuting or other day to day activities. The primary source of mode split information was based on data from Arlington County staff who reviewed mode share data for sources including 1) the 2016 American Community Survey (ACS), 2) the 2016 Arlington County Commercial Building Survey, and 3) the 2007-2008 Metropolitan Washington Council of Governments (MWCOC) Regional Household Travel Survey with Arlington County add-on data. Arlington County Mode Share assumptions for the different areas of the County are shown in Table 8 below.

Table 8: Arlington County Mode Share Assumptions using Household Travel Survey Data (Productions)

Mode	Vehicle %	Transit %	Active %	Total
Ballston	35%	56%	9%	100%
Clarendon/Courthouse	39%	52%	9%	100%
Columbia Pike Corridor	59%	34%	7%	100%
Crystal City	32%	59%	9%	100%
I-66 Corridor	52%	41%	7%	100%
North Arlington	76%	17%	7%	100%
Pentagon City	27%	64%	9%	100%
Rosslyn	32%	58%	9%	100%
Route 50 Corridor	58%	35%	7%	100%
S. Arlington/Shirlington	52%	41%	7%	100%

Based upon the proposed land-uses on the RiverHouse site, the following mode split for the residential and commercial uses has been assumed.

Table 9: Proposed Mode Split for RiverHouse Site

Mode	Condo/Apartment	Townhome	Commercial
Walk/Bike	9%	9%	20%
Transit	64%	64%	40%
Vehicular	27%	27%	40%

Trip Generation Methodology

Trip generation for the proposed development is shown in Table 10. The trip generation methodology uses ITE Trip Generation 11th Edition vehicle-trip equations based on “General Urban/Suburban” conditions. Equations and rates for ITE 11th Edition Person Trips and “Center City Core” and “Dense Multi-Use Urban” settings were evaluated for use. However, that methodology does not provide rates to match each use in this project’s urban setting, so can not apply here. In order to derive multimodal trips for the development, the following methodology applies:

1. Estimate vehicle trips based on ITE 11th Edition equations for “General Urban/Suburban” conditions.
2. Estimate person trips by adjusting the calculated vehicle trips based on average vehicle occupancies reported in Table 16 of the 2017 National Household Travel Survey (NHTS; presented in Table 11).
3. Estimate mode-specific person trips from total person trips by applying mode splits (noted in Table 10). Mode splits are based on census data with adjustments made for use (i.e., higher assumed vehicle mode split for commercial than multifamily residential).
4. Convert person trips to vehicle trips based on the same 2017 NHTS Table 16 average vehicle occupancies.

Table 10: Multimodal Trip Generation of RiverHouse PDSP

Use	Units	ITE LUC	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
High-Rise Residential	1,676 DU	222	109 veh/hr	344 veh/hr	453 veh/hr	327 veh/hr	209 veh/hr	536 veh/hr	7,609 veh/day
Person Trips(1)			128 ppl/hr	406 ppl/hr	534 ppl/hr	386 ppl/hr	247 ppl/hr	633 ppl/hr	8,979 ppl/day
Walk/Bike 9%			12 ppl/hr	37 ppl/hr	48 ppl/hr	35 ppl/hr	22 ppl/hr	57 ppl/hr	808 ppl/day
Transit 64%			82 ppl/hr	260 ppl/hr	342 ppl/hr	247 ppl/hr	158 ppl/hr	405 ppl/hr	5,746 ppl/day
Vehicular 27%			29 veh/hr	93 veh/hr	122 veh/hr	88 veh/hr	56 veh/hr	145 veh/hr	2,054 veh/day
Mid-Rise Residential	1,218 DU	221	117 veh/hr	333 veh/hr	451 veh/hr	290 veh/hr	185 veh/hr	475 veh/hr	5,786 veh/day
Person Trips(1)			138 ppl/hr	394 ppl/hr	532 ppl/hr	342 ppl/hr	219 ppl/hr	561 ppl/hr	6,827 ppl/day
Walk/Bike 9%			12 ppl/hr	35 ppl/hr	48 ppl/hr	31 ppl/hr	20 ppl/hr	50 ppl/hr	614 ppl/day
Transit 64%			88 ppl/hr	252 ppl/hr	340 ppl/hr	219 ppl/hr	140 ppl/hr	359 ppl/hr	4,369 ppl/day
Vehicular 27%			32 veh/hr	90 veh/hr	122 veh/hr	78 veh/hr	50 veh/hr	128 veh/hr	1,562 veh/day
Low-Rise Residential	265 DU	220	32 veh/hr	95 veh/hr	127 veh/hr	89 veh/hr	62 veh/hr	151 veh/hr	1,908 veh/day
Person Trips(1)			38 ppl/hr	113 ppl/hr	150 ppl/hr	105 ppl/hr	73 ppl/hr	178 ppl/hr	2,251 ppl/day
Walk/Bike 9%			3 ppl/hr	10 ppl/hr	14 ppl/hr	9 ppl/hr	7 ppl/hr	16 ppl/hr	203 ppl/day
Transit 64%			24 ppl/hr	72 ppl/hr	96 ppl/hr	67 ppl/hr	47 ppl/hr	114 ppl/hr	1,441 ppl/day
Vehicular 27%			9 veh/hr	26 veh/hr	34 veh/hr	24 veh/hr	17 veh/hr	41 veh/hr	515 veh/day
Senior Residential	185 DU	252	13 veh/hr	24 veh/hr	37 veh/hr	25 veh/hr	21 veh/hr	46 veh/hr	599 veh/day
Person Trips(1)			15 ppl/hr	28 ppl/hr	44 ppl/hr	30 ppl/hr	25 ppl/hr	55 ppl/hr	707 ppl/day
Walk/Bike 9%			1 ppl/hr	3 ppl/hr	4 ppl/hr	3 ppl/hr	2 ppl/hr	5 ppl/hr	64 ppl/day
Transit 64%			10 ppl/hr	18 ppl/hr	28 ppl/hr	19 ppl/hr	16 ppl/hr	35 ppl/hr	453 ppl/day
Vehicular 27%			3 veh/hr	6 veh/hr	10 veh/hr	7 veh/hr	6 veh/hr	12 veh/hr	162 veh/day
High-Rise Res (F)	210 DU	222	14 veh/hr	43 veh/hr	57 veh/hr	41 veh/hr	26 veh/hr	67 veh/hr	953 veh/day
Person Trips(1)			16 ppl/hr	51 ppl/hr	67 ppl/hr	48 ppl/hr	31 ppl/hr	79 ppl/hr	1,125 ppl/day
Walk/Bike 9%			1 ppl/hr	5 ppl/hr	6 ppl/hr	4 ppl/hr	3 ppl/hr	7 ppl/hr	101 ppl/day
Transit 64%			10 ppl/hr	33 ppl/hr	43 ppl/hr	31 ppl/hr	20 ppl/hr	51 ppl/hr	720 ppl/day
Vehicular 27%			4 veh/hr	12 veh/hr	15 veh/hr	11 veh/hr	7 veh/hr	18 veh/hr	257 veh/day
Total Residential			284 veh/hr	840 veh/hr	1,124 veh/hr	772 veh/hr	503 veh/hr	1,276 veh/hr	16,855 veh/day
Person Trips			335 ppl/hr	991 ppl/hr	1,326 ppl/hr	912 ppl/hr	594 ppl/hr	1,505 ppl/hr	19,889 ppl/day
Walk/Bike			30 ppl/hr	89 ppl/hr	119 ppl/hr	82 ppl/hr	53 ppl/hr	135 ppl/hr	1,790 ppl/day
Transit			215 ppl/hr	634 ppl/hr	849 ppl/hr	583 ppl/hr	380 ppl/hr	964 ppl/hr	12,729 ppl/day
Vehicular			77 veh/hr	227 veh/hr	304 veh/hr	209 veh/hr	136 veh/hr	344 veh/hr	4,551 veh/day
Retail	51,759 sf	820	27 veh/hr	17 veh/hr	43 veh/hr	84 veh/hr	92 veh/hr	176 veh/hr	1,916 veh/day
Person Trips(1)			32 ppl/hr	19 ppl/hr	51 ppl/hr	100 ppl/hr	108 ppl/hr	208 ppl/hr	2,260 ppl/day
Walk/Bike 20%			6 ppl/hr	4 ppl/hr	10 ppl/hr	20 ppl/hr	22 ppl/hr	42 ppl/hr	452 ppl/day
Transit 40%			13 ppl/hr	8 ppl/hr	21 ppl/hr	40 ppl/hr	43 ppl/hr	83 ppl/hr	904 ppl/day
Vehicular 40%			11 veh/hr	7 veh/hr	17 veh/hr	34 veh/hr	37 veh/hr	70 veh/hr	766 veh/day
Total Site			311 veh/hr	856 veh/hr	1,168 veh/hr	857 veh/hr	595 veh/hr	1,452 veh/hr	18,771 veh/day
Person Trips			367 ppl/hr	1,011 ppl/hr	1,378 ppl/hr	1,011 ppl/hr	702 ppl/hr	1,713 ppl/hr	22,150 ppl/day
Walk/Bike			37 ppl/hr	93 ppl/hr	130 ppl/hr	102 ppl/hr	75 ppl/hr	177 ppl/hr	2,242 ppl/day
Transit			227 ppl/hr	642 ppl/hr	869 ppl/hr	623 ppl/hr	423 ppl/hr	1,047 ppl/hr	13,633 ppl/day
Vehicular			87 veh/hr	233 veh/hr	321 veh/hr	242 veh/hr	173 veh/hr	415 veh/hr	5,317 veh/day

Notes: (1) Person Trip conversion based on average vehicle occupancies noted in Table 16 of 2017 National Household Travel Survey

Table 11: 2017 NHTS Average Vehicle Occupancies**Table 16.** Average Vehicle Occupancy for Selected Trip Purposes
(Person Mile per Vehicle Mile)

Survey Year	Trip Purpose				
	To / From Work	Shopping	Other Family / Personal Errands	Social / Recreation	All Purposes
1977	1.30	2.10	2.00	2.40	1.90
1983	1.29	1.79	1.81	2.12	1.75
1990	1.14	1.71	1.84	2.08	1.64
1995	1.14	1.74	1.78	2.04	1.59
2001	1.14	1.79	1.83	2.03	1.63
2009	1.13	1.78	1.84	2.20	1.67
2009 MOE	0.05	0.78	0.84	1.20	0.67
2017	1.18	1.82	1.82	2.10	1.67
2017 MOE	0.01	0.05	0.13	0.04	0.04

TRAFFIC ANALYSIS

This chapter provides a summary of an analysis of the existing and future roadway capacity in the study area for the 2032 horizon year with and without the proposed RiverHouse development. The analysis included use of the SYNCHRO modeling software to ascertain potential vehicular impacts of the proposed development and a discussion of potential improvements.

The purpose of the roadway capacity analysis is to:

- Determine the existing capacity of the study area roadways;
- Determine the overall impact of the proposed development on the study area roadways; and
- Discuss any needed improvements and mitigation measures to accommodate the additional vehicular trips generated by the proposed development.

The capacity analysis focuses on the morning and afternoon commuter peak hours, as determined by the existing traffic volumes in the study area.

Study Area, Scope and Methodology

This section outlines the assumptions used to develop the existing and future roadway capacity analysis, including volumes, roadway geometries, and traffic operations. The scope of the analysis contained within this report was extensively discussed with and approved by Arlington County staff. The general methodology follows national, Arlington County, and VDOT guidelines on the preparation of transportation impact evaluations of site development.

Capacity Analysis Scenarios

The vehicular capacity analyses are performed to determine if the proposed development will lead to adverse impacts on the adjacent roadway network. This process is undertaken by comparing future scenarios: (1) without the proposed development (Background conditions) and (2) with the proposed development constructed (Future conditions).

Specifically, this chapter examined the following analysis scenarios:

1. 2023 Existing Conditions
2. 2032 Future Conditions without the development (2032 Background)
3. 2032 Future Conditions with the development (2032 Future)

Study Area

The study area for analysis includes nineteen (19) intersections for which detailed capacity analyses will be undertaken.

Based on the site location, its access points and the distribution of the projected future trip generation the following intersections were chosen and agreed upon with the County.

1. S Lynn Street & Army Navy Drive
2. S Joyce Street & Army Navy Drive (Signalized)
3. S Joyce Street & RiverHouse driveway 1
4. S Joyce Street & RiverHouse driveway 2
5. S Joyce Street & RiverHouse driveway 3
6. S Joyce Street & RiverHouse driveway 4
7. S Joyce Street & Pentagon Row driveway
8. S Joyce Street & 15th Street South
9. 15th Street S & Fashion Centre parking entrance
10. S Joyce Street & RiverHouse driveway 5
11. S Joyce Street & RiverHouse driveway 6
12. S Joyce Street & RiverHouse driveway 7
13. S Joyce Street & RiverHouse driveway 8
14. S Joyce Street & 16th Street S
15. S Kent Street & 16th Street S
16. Arlington Ridge Road & I-395 Ramps
17. Arlington Ridge Road & S Lynn Street
18. S Lynn Street & RiverHouse driveway 9
19. S Hayes Street & 15th Street South

Figure 7 shows the vehicular study area intersections. Roadway characteristics, including classification, number of lanes, speed limit, the presence of on-street parking, and average daily traffic volumes (ADT) are outlined in Table 12.

Table 12: Existing Roadway Network

Roadway	Classification*	Lanes	Speed	On-Street Parking	ADT**
S Joyce Street	Minor Arterial (VDOT) Arterial Type A (Arlington)	4-5	25 mph	Yes	8,300
Army-Navy Drive	Major Collector (VDOT) Arterial Type B (Arlington)	4-5	25 mph	Yes	6,100
15 th Street	Minor Arterial (VDOT) Arterial Type A (Arlington)	4-5	25 mph	Yes	8,300
S. Lynn Street	Major Collector (VDOT) Arterial Type D (Arlington)	2	25 mph	Yes	1,800
S Kent Street	Neighborhood Minor (Arlington)	2	25 mph	Yes	n/a

*From VDOT and Arlington GIS

** VDOT ADT Data

Traffic Volume Assumptions

The following section reviews the traffic volume assumptions and methodologies used in the roadway capacity analyses.

Existing Traffic Volumes

The existing traffic volumes are comprised of turning movement count data collected by the consultant team in September 2023. Based on the average peak hours from all of the count data, the system peak hours assumed were 8:00 AM to 9:00 AM for the morning peak hour and 4:45 PM to 5:45 PM for the afternoon peak hour. The existing turning movement counts are included in Appendix C.

The existing peak hour traffic volumes for intersections within the study area are shown in Figure 35 and Figure 36.

Figure 35: Existing AM Peak Hour Vehicle Volumes

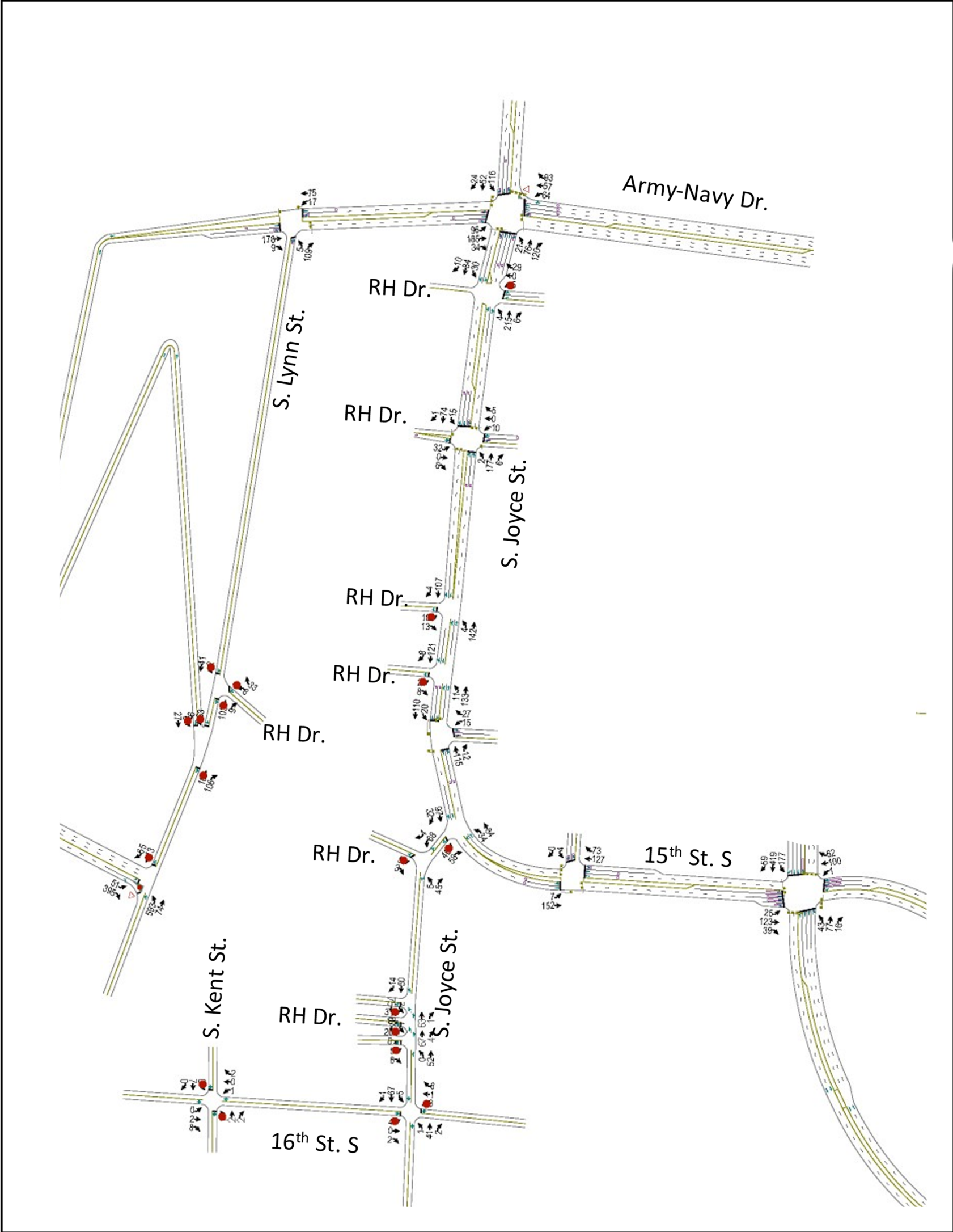
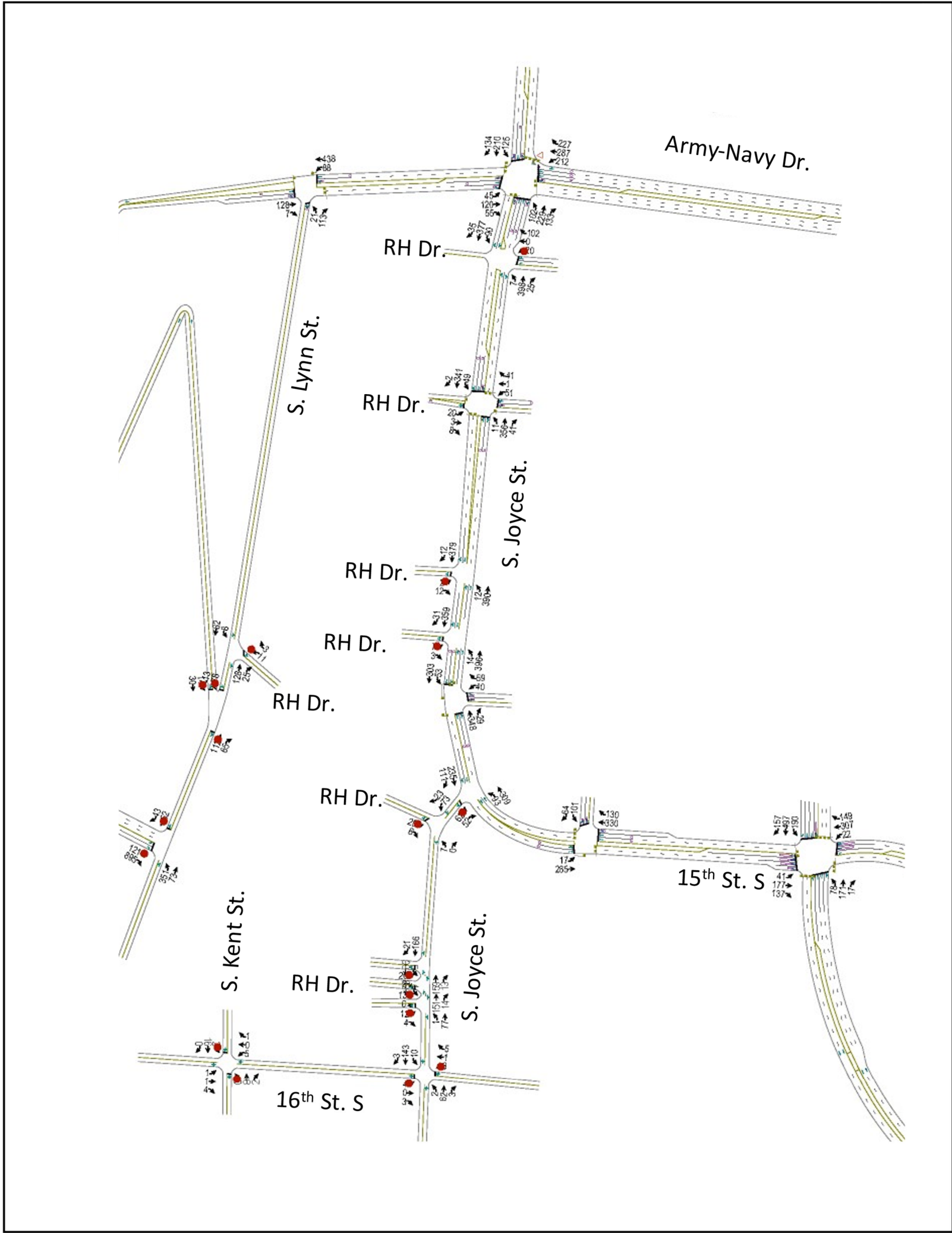


Figure 36: Existing PM Peak Hour Vehicle Volumes



2032 Background Traffic Volumes

Traffic projections for the 2032 Background Conditions consist of the existing volumes with the addition of a) an annual vehicle trip growth rate of 0.4% (in order to remain consistent with recently completed studies for other nearby developments); and b) traffic growth along local roadways in the study area generated by developments expected to be completed prior to the 2032 horizon year (known as background developments).

Background Developments

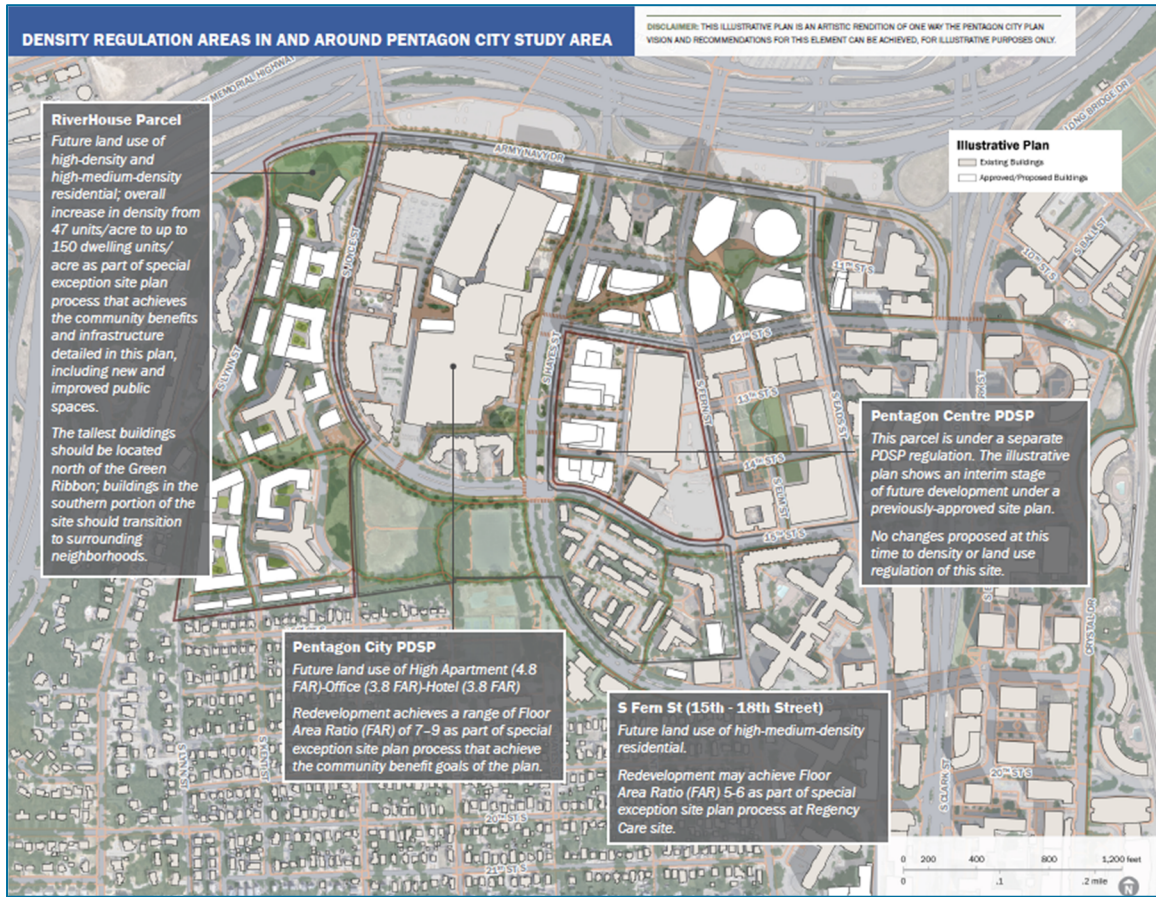
As part of the scoping process Arlington County staff requested that recently approved development projects as well as those considered under the recently adopted Pentagon City Sector Plan (PCSP) be included in the development of total future forecasts of traffic volumes. Recently approved projects include:

- Metropolitan Park 6 & 7/8 (approved 12/14/2019)
- PenPlace (approved 4/23/22)
- Americana Hotel (approved 4/22/23)
- 400 11th Street (approved 10/19/19)

The PCSP describes allowable redevelopment throughout the sector, including RiverHouse plus specific callouts for other areas identified on page 47 of the approved draft PCSP (and highlighted in Figure 37 and Table 13 below):

- Pentagon City PDSP
- Pentagon Centre PDSP
- S. Fern Street (15th to 18th Street)
- TSA/DEA block (not specifically noted on diagram)

Figure 37: Pentagon City Sector Plan Density Regulations



To reflect this anticipated redevelopment in the “background” of future traffic forecasts, the model requires translation of FARs into anticipated square footage by use and number of housing units. Specifically, the analysis requires:

- Total square feet of commercial office space
- Total square feet of retail and restaurant space
- Total square feet of community facilities
- Total number of housing units

The anticipated number of future housing units for the Pentagon City PCSP area is described on page 28 of the adopted draft PCSP. Similar information is required for the non-residential uses described above.

Table 13: Background Development Densities per PCSP

Uses/ Development		Office	Residential*	Residential Units	Commercial	Hotel
	PenPlace	2,800,000	0	0	14,600 daycare	
					26,500 community space	
					391,800 amenity space	
					94,400 retail	
	Met Park 6,7,8	2,100,000	0	0	55,000 retail	
	Americana Hotel			644	3,800 retail	
	400 11 th Street			306	10,908 retail	
PCSP Phase 1						
	Brookfield	570,600	623,800	567	40,000	0
	Simon (infill sites along Hayes/Army Navy)	0	212,000	193	14,000	212,000
	Regency Care (additional building)	0	124,400	113	0	0
	Total	570,600	960,200	873	54,000	212,000
PCSP Phase 2						
	Simon (garage redevelopment on 12th Street)	266,000	460,400	419	20,200	0
	Brookfield (2nd office building)	556,175	0	0	17,000	0
	Total	822,175	460,400	419	37,200	0
PCSP Phase 3						
	FRIT/Westpost (parking lot infill)	400000	285000	259	0	0
	Total	400,000	285,000	259	0	0

* Residential Uses (as described in the Sector Plan) rely on an average size of 1,100 SF when converted to unit totals for each phase

The total traffic generated by the background developments in 2032 is shown in Table 14. Trips generated by the approved background developments in 2032 are included in Appendix E. The traffic volumes generated by background developments within the greater study area were added to the existing traffic volumes and the annual growth in order to establish the 2032 Background traffic volumes. Trip distribution assumptions for the background developments were based on the distributions included in their respective studies or based on those determined for the RiverHouse development and altered where necessary based on anticipated travel patterns. The traffic volumes for the 2032 Background conditions are shown on Figure 38 and Figure 39.

Table 14: Traffic Generated by 2032 Background Developments

Development	AM Peak Hour			PM Peak Hour			Daily
	In	Out	Total	In	Out	Total	Total
Pen Place	486	111	597	146	407	553	13,462
Met Park	283	41	325	58	238	296	9,704
Americana Hotel	23	66	89	54	39	93	n/a
400 11 th Street	12	30	42	23	17	40	n/a
Brookfield	96	44	141	55	98	153	3,584
Simon	62	47	109	51	68	120	2,539
FRIT	60	21	81	23	54	76	2,152
Regency	3	6	9	6	5	11	154
Total Trips	1026	366	1392	417	926	1343	31,596

Figure 38: Background AM Peak Hour Vehicle Volumes

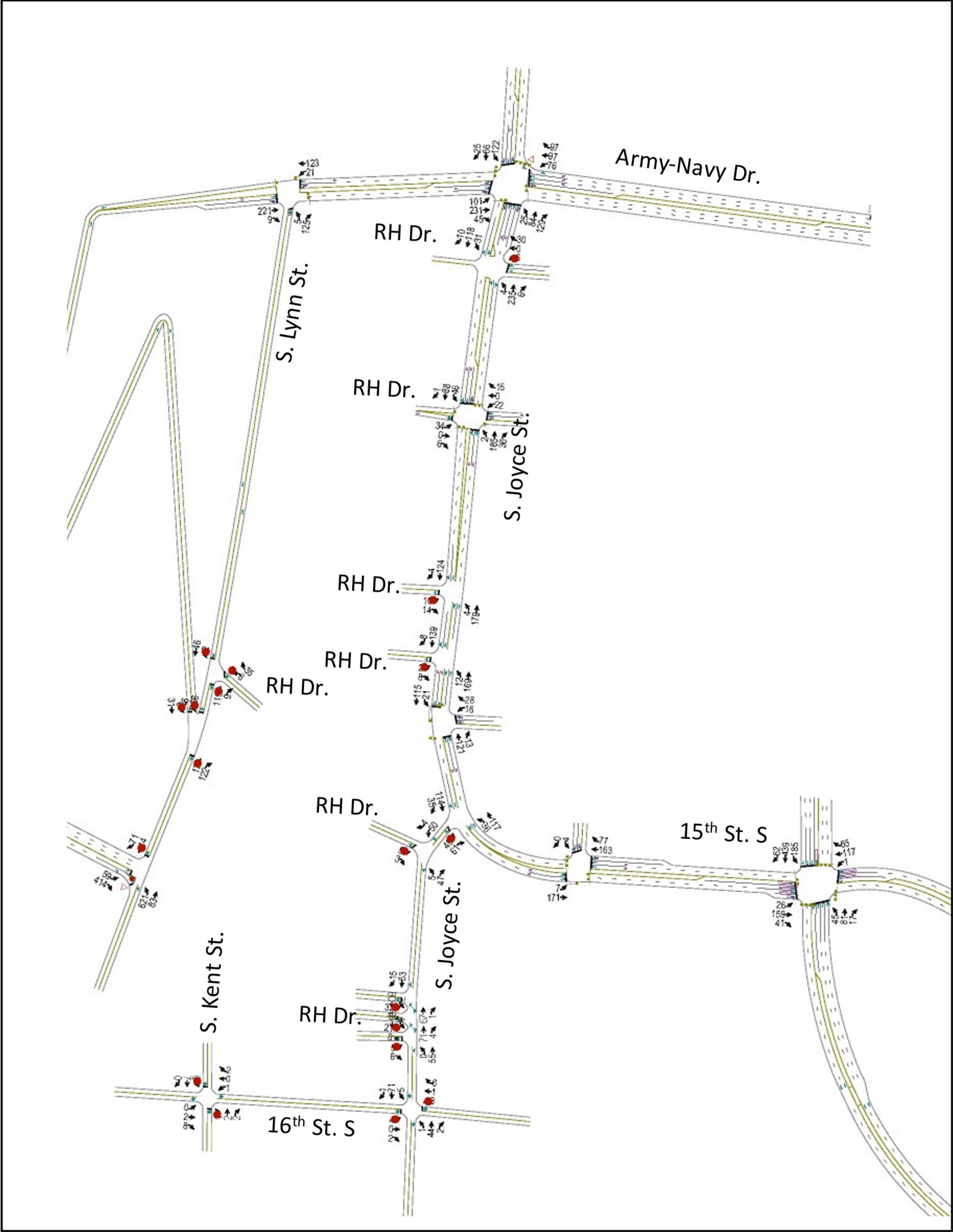
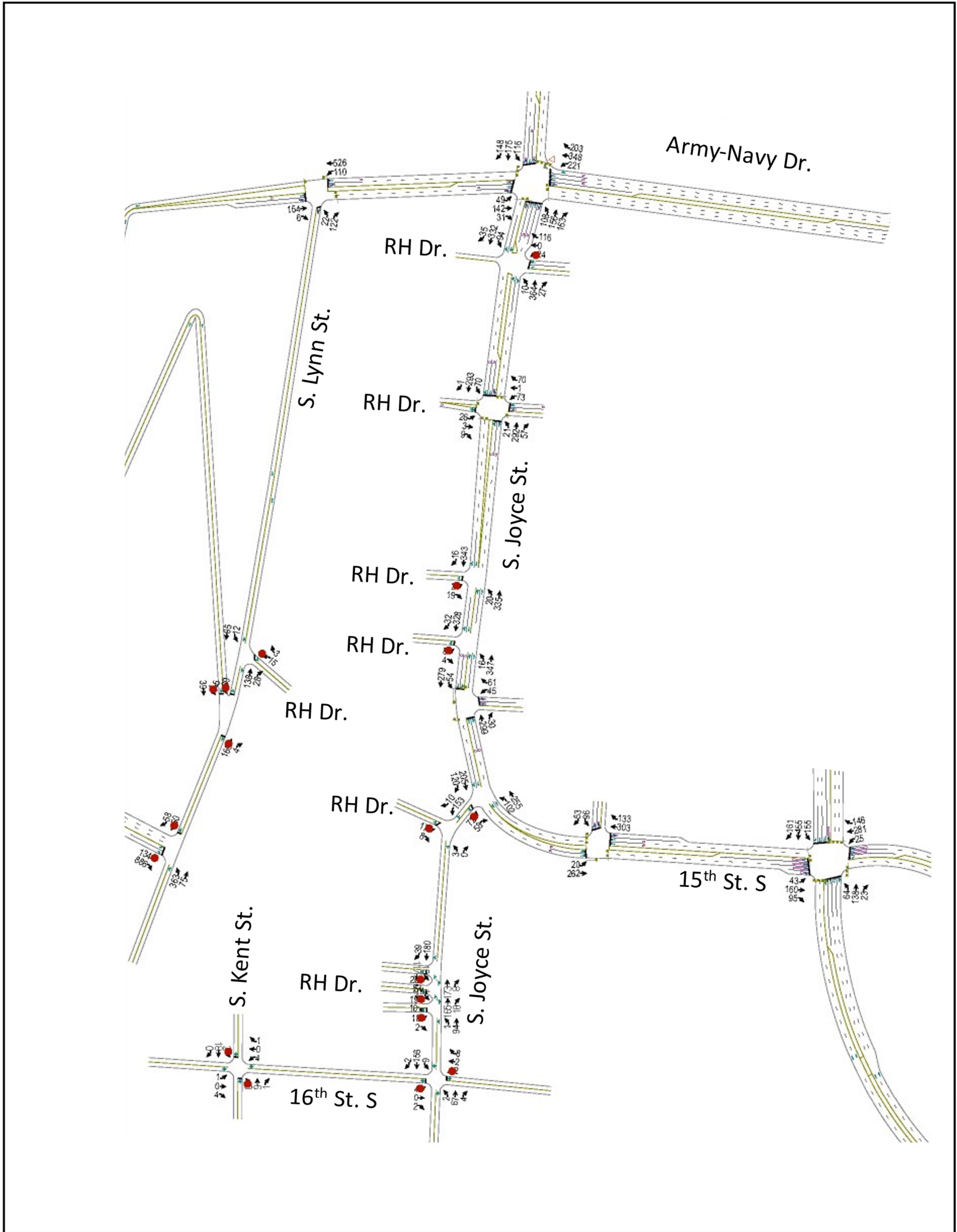


Figure 39: Background PM Peak Hour Vehicle Volumes



2032 Future Condition Traffic Volumes

The 2032 Future Conditions traffic volumes consist of the 2032 Background volumes with the addition of the traffic volumes generated by the proposed development (site-generated trips), shown in Table 10.

Trip distribution analysis assesses where individual trips will access the surrounding street and multimodal network. This analysis focuses on the potential impacts of private vehicle trips at the numerous entry/exit points (driveways) onto the surrounding street network. Parking access is currently available via driveways connecting to S. Joyce St., S. Kent St., and S. Lynn St. Table 15 shows the distribution of vehicle trips based on existing vehicle counts.

Based upon analysis of the existing vehicle trip distribution and future development, the potential future vehicle trip distribution would be as shown in Figure 40, resulting in future site driveway volumes as shown in Table 16.

Based on the trip distribution and assignment assumptions, site-generated trips were distributed through the study area intersections. The site-generated traffic volumes for the 2032 horizon year are shown in Appendix G. The 2032 Future Conditions traffic volumes, which are comprised of existing volumes, background developments, and the proposed development are shown in Figure 41 and Figure 42.

Figure 40: RiverHouse Site Trip Distribution



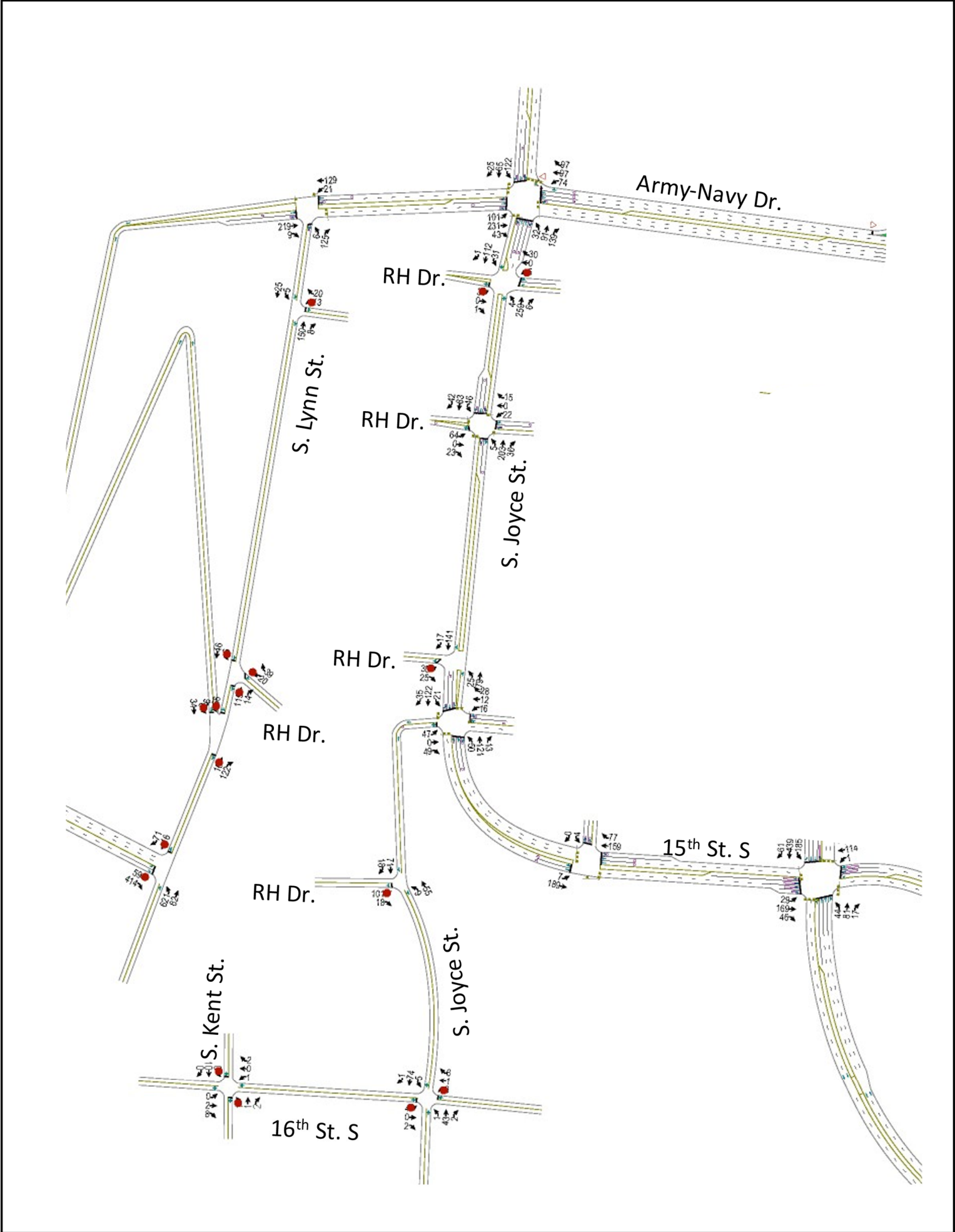
Table 15: Existing Driveway Trip Counts

Driveway	AM System Peak: 8:00 – 9:00am				PM System Peak: 4:45 – 5:45pm			
	In	Out	Total	Dist. %	In	Out	Total	Dist. %
S Joyce Street/HT-BBB Driveway/RiverHouse Driveway 1	12	-	12	4%	37	-	37	8%
S Joyce Street/Loft Driveway/RiverHouse Driveway 2	2	38	40	14%	3	37	40	9%
S Joyce Street/RiverHouse Driveway 3	5	23	28	10%	29	20	49	11%
S Joyce Street/RiverHouse Driveway 4	18	10	28	10%	44	12	56	13%
S Joyce Street/RiverHouse Driveway 5	9	8	17	6%	13	24	37	8%
S Joyce Street/RiverHouse Driveway 6	20	37	57	20%	46	22	68	16%
S Joyce Street/RiverHouse Driveway 7	2	28	30	10%	8	28	36	8%
S Joyce Street/RiverHouse Driveway 8	4	11	15	5%	18	12	30	7%
S Kent Street/16th Street S	4	7	11	4%	10	19	29	7%
S Lynn Street/RiverHouse Driveway 9	11	41	52	18%	38	17	55	13%
Total	87	203	290	100%	246	191	437	100%

Table 16: Estimated Future Driveway Trip Counts

Driveway	AM System Peak: 8:00-9:00am				PM System Peak: 4:45-5:45pm			
	In	Out	Total	Dist. %	In	Out	Total	Dist. %
S. Joyce Street/RiverHouse Driveway 1	4	12	15	5%	11	7	18	4%
S Joyce Street/RiverHouse Driveway New 1 (North)	10	34	44	14%	50	42	92	22%
S Joyce Street/RiverHouse Driveway New 2 (Center)	38	50	88	27%	82	27	109	26%
S Joyce Street/RiverHouse Driveway New 3 (South)	23	108	130	41%	51	63	114	27%
S Lynn Street/RiverHouse Driveway	9	17	25	8%	32	13	45	11%
S Kent Street/16th Street S	4	13	17	5%	17	20	36	9%
Total	87	233	320	100%	242	173	415	100%

Figure 41: Future 2032 AM Peak Hour Vehicle Volumes



Geometry and Operations Assumptions

The following section reviews the roadway geometry and operations assumptions made and the methodologies used in the 2032 horizon year.

2022 Existing Geometry and Operations Assumptions

The geometry and operations assumed in the existing conditions scenario are those present when the data collection occurred. The Nelson\Nygaard team made observations and confirmed the existing lane configurations and traffic controls at the intersections within the study area. Existing signal timings and operations were obtained from Arlington County and confirmed during field visits.

A description of the roadways within the study area is presented in Table 12. The existing local roadway network including lane configurations and intersection control is detailed in and illustrated in Figure 43.

2032 Background Geometry and Operations Assumptions

Based on industry standards, a background improvement is considered if the improvement is fully funded and has a timeline for completion prior to or at the build-out of the proposed development. With these standards, there are the following geometric and operational improvements to be included in the 2032 Background analysis:

1. Army Navy Drive Complete Street

The Army Navy Drive Complete Street project includes the following changes to roadway geometry and operations to Army Navy Drive from S. Joyce Street to S Hayes Street and the reconfiguration of the Army Navy Drive and S Joyce Street intersection to convert:

- The southbound approach remains unchanged.
- The eastbound approach from one left-turn lane, one thru lane and one right-turn lane to one left-turn lane, one thru lane and one thru/right-turn lane
- The westbound approach from one left-turn lane, two thru lanes, and one thru/right lane to one left-turn lane, one thru lane, and one right-turn lane.
- The northbound approach from one left-turn lane, two thru lanes and one right-turn lane to one left-turn lane, one thru lane and one thru/right lane.

- Signal timing and phasing modifications to incorporate a protected cycle track along the south side of Army Navy Drive.

2032 Future Geometry and Operations Assumptions (with proposed development)

The configurations and traffic controls for the 2032 Future Conditions were based on those for the 2032 Background Conditions with the addition of the RiverHouse development. Site access to the RiverHouse development was altered by consolidating the existing access drives from ten (10) to three (3). Additionally S Joyce Street at 15th Street South is relocated to a modified intersection creating a signalized S. Joyce St/S. Joyce St. intersection opposite the Pentagon Row parking access.

The cross-section of S Joyce Street is also reconfigured to enable a road diet from 15th Street S. to Army Navy Drive. The reconfiguration changes from a four-lane cross section to a two-lane cross section with the incorporation of a west-side two-way protected cycletrack and is highlighted in Figure 18.

The 2032 Future Condition lane configurations and intersection control is detailed in and illustrated in Figure 44.

Figure 43: Existing Roadway Lane Configuration

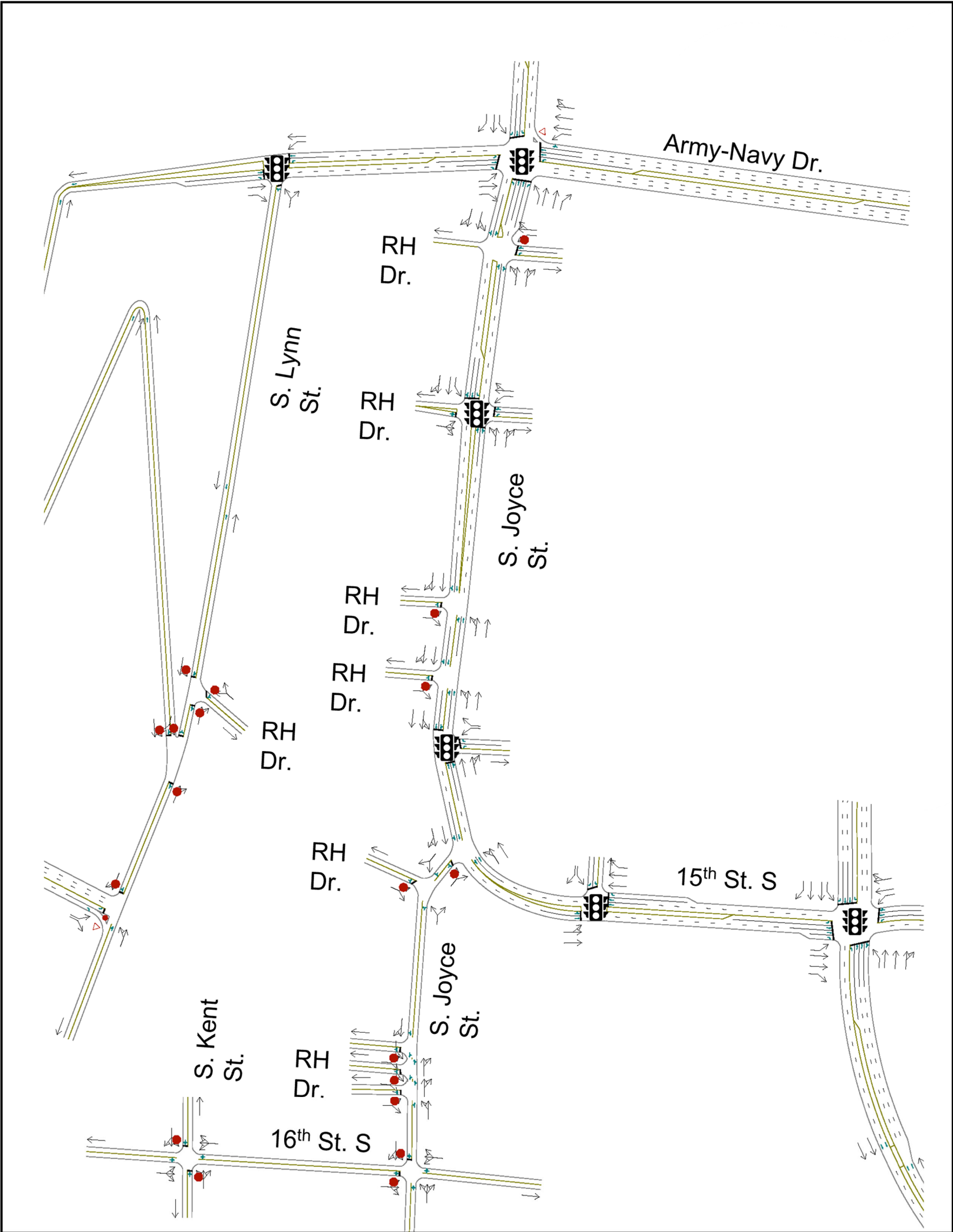
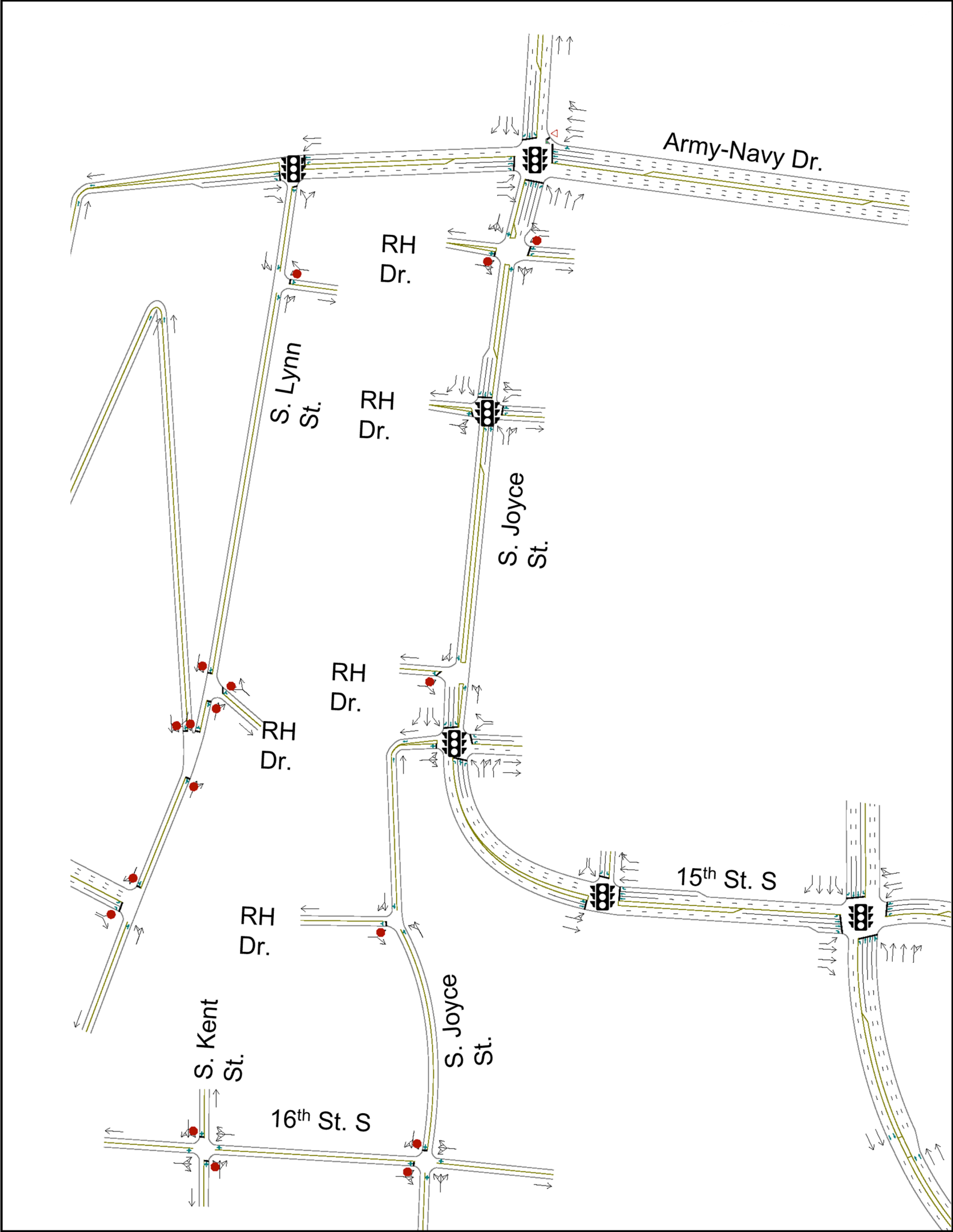


Figure 44: Future Roadway Lane Configuration



Operations Analysis Results

The vehicle traffic analysis considered the Level of service calculations for existing, background and future conditions without and with development in accordance with Highway Capacity Manual (HCM) methodology, as computed by Synchro 11 software. Typical Synchro parameters in this analysis are consistent with those values provided in VDOT's TOSAM and Arlington County standards.

- Intersection Level of Service (LOS)
- Intersection Volume to Capacity Ratio (V/C)
- Queue Length

Level of Service and Delay

The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. A LOS grade is a letter grade based on the average delay (in seconds) experienced by motorists traveling through an intersection. LOS results range from "A" being the best to "F" being the worst. LOS E is typically used as the acceptable LOS threshold in Arlington County; although LOS F is sometimes accepted in urbanized areas if vehicular improvements would be a detriment to safety or non-auto modes of transportation. For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of E or better for each movement at the intersections.

The LOS capacity analyses were based on: (1) the peak hour traffic volumes; (2) the lane use and traffic controls; and (3) the Highway Capacity Manual (HCM) methodologies (using the *Synchro* software). The average delay of each movement and LOS is shown for the signalized intersections in addition to the overall average delay and intersection LOS grade. The HCM does not give guidelines for calculating the average delay for a two-way stop-controlled intersection, as the approaches without stop signs would technically have no delay. Detailed analysis worksheets for the existing, background and future conditions are contained in the Appendix.

Queuing Analysis

In addition to the capacity analyses, a queuing analysis was performed at the study intersections. The queuing analysis was performed using *Synchro* software. The 50th percentile queue lengths are shown for each lane group at the study area signalized intersections. The 50th percentile queue is the maximum back of queue on a median cycle. For unsignalized intersections, only the 95th percentile queue is reported for each lane group (including free-

flowing left turns and stop-controlled movements) based on the HCM 6th Edition calculations. Queuing information is included in the Synchro worksheets in the Appendix.

2023 Existing Conditions Analysis

The Existing (2022) results of the intersection capacity analyses for the AM and PM peak hours are expressed in level of service (LOS) and delay (seconds per vehicle) per movement and presented in Table 17 and Table 18. The capacity analysis results indicate that all intersections operate at acceptable LOS under the Existing (2023) Conditions.

2032 Background Conditions Analysis (without the proposed development)

The Background (2032) results of the intersection capacity analyses for the AM and PM peak hours are expressed in level of service (LOS) and delay (seconds per vehicle) per movement and presented in Table 17 and Table 18. The capacity analysis results indicate that all intersections operate at acceptable LOS under the Background (2032) Conditions.

2032 Future Conditions Analysis (with the proposed development)

The Background (2032) results of the intersection capacity analyses for the AM and PM peak hours are expressed in level of service (LOS) and delay (seconds per vehicle) per movement and presented in Table 17 and Table 18. The capacity analysis results indicate that all intersections operate at acceptable LOS under the Future (2032) Conditions with the exception of the following intersection:

- S. Hayes St at 15th Street S
 - southbound left-turn movement in the PM peak hour

Table 17 Capacity Analysis Results - AM Peak Hour

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
S Joyce St & Army Navy Dr (Signalized)	EBL	C	25.4	0.29	50	C	26.3	0.32	53	C	26.3	0.32	53
	EBT	C	26.0	0.37	100	C	27.8	0.46	130	C	27.8	0.46	130
	EBR	A	4.2	0.08	0	A	6.2	0.11	0	A	6.0	0.11	0
	WBL	C	22.5	0.27	26	C	25.5	0.37	33	C	25.5	0.37	33
	WBTR	A	8.0	0.12	2	A	9.3	0.15	8	A	9.3	0.15	8
	NBL	B	12.2	0.04	8	B	11.7	0.05	9	B	10.7	0.06	11
	NBT	B	12.2	0.05	14	B	11.6	0.05	15	B	10.5	0.06	16
	NBR	A	6.9	0.18	0	A	5.9	0.19	0	A	4.9	0.21	0
	SBL	B	14.3	0.22	40	B	14.5	0.23	42	B	14.5	0.23	42
	SBT	B	12.2	0.06	16	B	12.4	0.08	21	B	12.4	0.08	21
	SBR	A	0.8	0.03	0	A	0.9	0.04	0	A	0.9	0.04	0
	Intersection	B	15.3	-	-	B	16.3	-	-	B	15.9	-	-
S Joyce St & RH driveway 1	EB	-	-	-	-	-	-	-	-	B	13.0	0.01	0
	WBL	B	12.2	0.01	1	B	12.2	0.01	0	B	13.5	0.02	0
	WBTR	A	9.7	0.05	4	A	9.9	0.05	4	B	10.9	0.06	4
	NB	A	7.4	0.01	0	A	7.5	0.01	0	A	7.5	0.01	0
	SB	A	2	0.03	2	A	8.1	0.03	2	A	8.2	0.03	2
	Intersection	A	1.6	-	-	A	1.5	-	-	A	1.6	-	-
S Joyce St & RH driveway 2 (Signalized)	EB	A	5.3	0.08	5	A	5.4	0.08	5	A	6.5	0.18	14
	WBL	A	7.0	0.02	2	A	7.2	0.04	4	A	7.3	0.05	4
	WBTR	A	4.7	0.01	0	A	0.1	0.02	0	A	0.1	0.02	0
	NB	B	14.7	0.16	28	B	12.9	0.44	30	B	10.2	0.37	49
	SBL	B	12.7	0.03	5	B	12.8	0.11	14	B	12.2	0.13	13
	SBT (R)	B	12.3	0.06	12	B	11.8	0.07	13	B	11.7	0.12	22
	SBR	-	-	-	-	-	-	-	-	A	5.4	0.07	2
	Intersection	B	12.4	-	-	B	11.2	-	-	A	9.1	-	-
S Joyce St & RH driveway 3	EB	A	9.3	0.03	2	A	9.5	0.03	2	B	11.2	0.11	8
	NB	A	7.5	0.01	0	A	7.5	0.01	0	A	7.7	0.02	2
	SB	A	0	0	0	A	0	0	0	-	-	-	-

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
	Intersection	A	0.9	-	-	A	0.8	-	-	A	2.0	-	-
S Joyce St & RH driveway 4	EB	A	9.0	0.01	0	A	9.2	0.01	0	-	-	-	-
	NB	A	7.5	0.01	0	A	7.6	0.01	0	-	-	-	-
	SB	A	0	0	0	A	0	0	0	-	-	-	-
	Intersection	A	0.6	-	-	A	0.5	-	-	-	-	-	-
S Joyce St & Pentagon Row driveway (Signalized)	EB	-	-	-	-	-	-	-	-	C	32.6	0.67	12
	WB	A	7.1	0.03	-	A	7.1	0.03	3	B	8.5	0.08	10
	NB	A	7.7	0.09	0	A	7.7	0.10	11	B	18.0	0.25	43
	SB	B	15.7	0.11	0	B	15.5	0.11	20	B	15.6	0.24	43
	Intersection	B	10.6	-	-	B	10.5	-	-	B	18.7	-	-
S Joyce St & 15th St S	WB	B	11.4	0.19	18	B	11.8	0.21	16	-	-	-	-
	NB	A	7.7	0.03	2	A	7.8	0.03	2	-	-	-	-
	SB	A	0.0	0.0	0	A	0.0	0.0	0	-	-	-	-
	Intersection	A	4.4	-	-	A	4.2	-	-	-	-	-	-
15th St S & Mall Main Garage (Signalized)	EB	A	6.7	0.11	10	A	6.7	0.13	11	A	6.8	0.14	12
	WB	A	5.2	0.13	7	A	5.4	0.14	10	A	5.4	0.14	10
	SB	A	6.2	0.01	1	A	6.2	0.01	1	A	6.2	0.01	1
	Intersection	A	5.8	-	-	A	6.0	-	-	A	6.0	-	-
S Joyce St & RH driveway 5	EB	A	9.1	0.01	1	A	9.0	0.01	1	-	-	-	-
	NB	A	0.8	0.0	0	A	0.7	0.0	0	-	-	-	-
	SB	A	0	0.05	0	A	0	0.04	0	-	-	-	-
	Intersection	A	0.9	-	-	A	1.0	-	-	-	-	-	-
S Joyce St & RH driveway 6	EB	A	9.5	0.05	4	A	9.6	0.05	4	-	-	-	-
	NB	A	7.4	0.01	0	A	7.4	0.01	0	-	-	-	-
	SB	A	0	0.00	0	A	0	0.00	0	-	-	-	-
	Intersection	A	2.2	-	-	A	2.2	-	-	-	-	-	-
S Joyce St & RH driveway 7	EB	A	9.2	0.01	2	A	9.3	0.01	0	-	-	-	-
	NB	A	7.4	0.01	0	A	7.4	0.01	0	-	-	-	-
	SB	A	0	0.00	0	A	0	0.00	0	-	-	-	-
	Intersection	A	1.8	-	-	A	1.7	-	-	-	-	-	-

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
S Joyce St & RH driveway 8	EB	A	9.0	0.01	0	A	9.0	0.01	0	B	10.3	0.17	12
	NB	A	0.0	0.0	0	A	0.0	0.0	0	A	7.4	0.01	0
	SB	A	0	0.00	0	A	0	0.00	0	-	-	-	-
	Intersection	A	0.7	-	-	A	0.7	-	-	A	4.7	-	-
S Joyce St & 16th St S	EB	A	9.3	0.01	0	A	9.4	0.01	0	A	9.4	0.01	0
	WB	A	9.1	0.02	2	A	9.1	0.02	2	A	9.1	0.02	2
	NB	A	7.4	0.01	0	A	7.4	0.01	0	A	7.4	0.01	0
	SB	A	7.4	0.01	0	A	7.4	0.01	0	A	7.4	0.01	0
	Intersection	A	1.8	-	-	A	1.7	-	-	A	1.7	-	-
S Kent St & 16th St S	EB	A	0	0	0	A	0	0	0	A	0	0	0
	WB	A	7.2	0.01	0	A	7.2	0.01	0	A	7.2	0.01	0
	NB	A	8.8	0.01	0	A	8.8	0.01	0	A	8.7	0.01	0
	SB	A	9.2	0.02	0	A	9.2	0.02	0	A	9.3	0.03	0
	Intersection	A	5.3	-	-	A	5.3	-	-	A	5.9	-	-
Arlington Ridge Rd & S Lynn St	EB	A	8.1	0.11	8	A	8.1	0.12	8	A	8.2	0.12	8
	NB	A	7.3	0.15	10	A	7.4	0.17	12	A	7.4	0.17	12
	SB	A	7.5	0.05	4	A	7.5	0.06	4	A	7.6	0.06	4
	Intersection	A	7.6	-	-	A	7.6	-	-	A	7.7	-	-
S Lynn St & RH driveway 9	WB	A	7.1	0.02	2	A	7.2	0.06	4	A	7.4	0.08	6
	NB	A	7.7	0.15	10	A	7.9	0.17	12	A	8.0	0.18	12
	SB	A	7.4	0.05	2	A	7.5	0.07	4	A	7.6	0.07	4
	Intersection	A	7.5	-	-	A	7.7	-	-	A	7.8	-	-
S Hayes St & 15th St S (Signalized)	EBL	C	31.6	0.17	16	C	31.8	0.18	17	C	32.1	0.19	19
	EBT	C	33.2	0.25	43	C	33.9	0.31	56	C	34.0	0.33	59
	EBR	A	0.5	0.11	0	A	0.5	0.11	0	A	0.6	0.12	0
	WBL	D	54.0	0.01	0	D	54.0	0.01	0	D	54.0	0.01	0
	WBTR	D	37.1	0.34	16	D	38.4	0.36	22	D	38.0	0.35	20
	NBL	D	50.9	0.44	34	D	52.2	0.46	35	D	51.6	0.45	35
	NBTR	B	11.3	0.06	2	B	11.5	0.07	2	B	11.6	0.07	2
	SBL	E	69.6	0.80	144	E	72.9	0.82	151	E	73.0	0.82	151

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
	SBT	B	12.8	0.28	57	B	12.9	0.29	61	B	13.0	0.29	61
	SBR	A	2.8	0.10	1	A	3.0	0.11	1	A	3.0	0.11	1
	Intersection	C	28.1	-	-	C	29.2	-	-	C	29.1	-	-
S Lynn St & Army Navy Dr	EBT	A	8.0	0.26	27	A	8.5	0.33	35	A	8.5	0.32	35
	EBR	A	4.0	0.02	0	A	4.0	0.02	0	A	4.0	0.02	0
	WBL	A	6.6	0.05	3	A	6.9	0.07	3	A	6.9	0.07	3
	WBT	A	7.1	0.13	12	A	7.7	0.22	21	A	7.8	0.22	22
	NB	A	2.6	0.18	1	A	2.6	0.20	1	A	2.6	0.20	1
	Intersection	A	6.1	-	-	A	6.7	-	-	A	6.7	-	-

Table 18 Capacity Analysis Results - PM Peak Hour

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
S Joyce St & Army Navy Dr (Signalized)	EBL	B	15.6	0.20	13	B	15.7	0.23	13	C	27.3	0.28	26
	EBT	B	14.1	0.21	34	B	13.8	0.24	39	C	24.5	0.28	74
	EBR	A	3.1	0.10	28	A	1.5	0.06	1	A	4.8	0.09	0
	WBL	C	25.7	0.57	104	C	27.0	0.63	109	D	47.0	0.89	164
	WBTR	B	13.0	0.32	58	B	15.4	0.34	72	B	16.5	0.39	73
	NBL	B	15.3	0.26	40	B	14.9	0.26	42	B	12.3	0.26	40
	NBT	B	14.1	0.16	47	B	13.3	0.11	31	B	10.6	0.10	30
	NBR	A	6.2	0.22	3	A	5.2	0.27	0	A	4.4	0.25	14
	SBL	C	24.2	0.41	63	C	22.5	0.35	57	B	14.7	0.24	50
	SBT	C	20.8	0.34	103	B	19.9	0.29	83	B	13.9	0.22	62
	SBR	A	3.7	0.22	0	A	3.7	0.24	0	A	2.7	0.20	0
Intersection	B	15.0	-	-	B	15.3	-	-	B	17.4	-	-	
S Joyce St & RH driveway 1	EB	-	-	-	-	-	-	-	-	E	43.9	0.03	2
	WBL	C	24.8	0.13	10	C	23.8	0.15	10	E	35.3	0.21	14
	WBTR	B	12.7	0.24	18	B	12.8	0.26	20	B	14.6	0.29	24
	NB	A	8.3	0.01	0	A	8.2	0.01	0	A	8.3	0.01	0
	SB	A	9.0	0.10	6	A	8.9	0.10	6	A	9.0	0.11	8
	Intersection	A	3.0	-	-	A	3.6	-	-	A	3.6	-	-
S Joyce St & RH driveway 2 (Signalized)	EB	A	6.0	0.05	4	A	6.2	0.07	5	A	6.4	0.20	14
	WBL	A	7.8	0.11	10	A	8.2	0.16	14	A	8.2	0.15	13
	WBTR	A	3.0	0.07	0	A	2.6	0.12	0	A	2.7	0.15	13
	NB	B	19.9	0.33	67	B	18.1	0.31	56	C	21.6	0.56	126
	SBL	B	14.8	0.17	16	B	15.3	0.22	24	B	13.5	0.28	17
	SBT (R)	B	14.7	0.25	58	B	14.0	0.21	53	B	14.2	0.45	88
	SBR	-	-	-	-	-	-	-	-	A	4.2	0.08	3
	Intersection	B	15.6	-	-	B	13.8	-	-	B	14.5	-	-
S Joyce St & RH driveway 3	EB	B	12.0	0.03	2	B	11.5	0.04	2	C	18.6	0.15	10
	NB	A	8.9	0.02	0	A	8.8	0.02	0	A	8.5	0.05	2

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
	SB	-	-	-	-	-	-	-	-	-	-	-	-
	Intersection	A	0.4	-	-	A	0.6	-	-	A	1.2	-	-
S Joyce St & RH driveway 4	EB	C	15.7	0.03	2	B	14.8	0.04	-	-	-	-	-
	NB	A	8.8	0.02	2	A	8.7	0.02	-	-	-	-	-
	SB	-	-	-	-	-	-	-	-	-	-	-	-
	Intersection	A	0.4	-	-	A	0.5	-	-	-	-	-	-
S Joyce St & Pentagon Row driveway (Signalized)	EB	-	-	-	-	-	-	-	-	A	3.6	0.22	8
	WB	A	4.5	0.12	8	A	4.6	0.12	9	A	4.7	0.12	9
	NB	A	9.0	0.27	34	A	8.6	0.24	28	B	12.2	0.44	65
	SB	C	22.2	0.28	64	C	20.1	0.27	60	B	14.4	0.41	96
	Intersection	B	13.8	-	-	B	12.7	-	-	B	11.2	-	-
S Joyce St & 15th St S	EB	C	20.6	0.35	32	C	21.0	0.39	36	-	-	-	-
	NB	A	8.7	0.1	6	A	8.7	0.1	6	-	-	-	-
	SB	-	-	-	-	-	-	-	-	-	-	-	-
	Intersection	A	3.9	-	-	A	4.7	-	-	-	-	-	-
15th St S & Mall Main Garage (Signalized)	EB	A	7.2	0.22	21	A	7.2	0.21	19	A	7.2	0.22	20
	WB	A	7.3	0.23	22	A	5.8	0.22	20	A	5.9	0.22	21
	SB	A	5.4	0.15	15	A	5.5	0.14	14	A	5.8	0.20	20
	Intersection	A	6.3	-	-	A	6.2	-	-	A	6.2	-	-
S Joyce St & RH driveway 5	EB	A	9.2	0.04	3	A	9.6	0.04	3	-	-	-	-
	NB	A	7.6	0.01	0	A	7.6	0.01	0	-	-	-	-
	SB	A	0	0.07	0	A	0	0.07	0	-	-	-	-
	Intersection	A	2.5	-	-	A	1.4	-	-	-	-	-	-
S Joyce St & RH driveway 6	EB	B	10.4	0.05	2	B	11.0	0.05	2	-	-	-	-
	NB	A	7.7	0.01	0	A	7.8	0.01	0	-	-	-	-
	SB	-	-	-	-	-	-	-	-	-	-	-	-
	Intersection	A	1.0	-	-	A	0.9	-	-	-	-	-	-
S Joyce St & RH driveway 7	EB	B	10.1	0.03	2	B	10.3	0.05	2	-	-	-	-
	NB	A	7.6	0.01	0	A	7.7	0.01	0	-	-	-	-
	SB	-	-	-	-	-	-	-	-	-	-	-	-

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
	Intersection	A	0.7	-	-	A	1.0	-	-	-	-	-	-
S Joyce St & RH driveway 8	EB	B	10.0	0.03	2	B	10.3	0.02	2	B	11.9	0.15	10
	NB	A	7.6	0	0	A	7.7	0	0	A	7.9	0.02	2
	SB	-	-	-	-	-	-	-	-	-	-	-	-
	Intersection	A	0.6	-	-	A	0.5	-	-	A	2.4	-	-
S Joyce St & 16th St S	EB	B	10.3	0.02	2	B	10.7	0.02	2	B	10.3	0.01	0
	WB	A	9.9	0.01	0	A	9.8	0.03	2	A	9.6	0.02	0
	NB	A	7.6	0.01	0	A	7.7	0.01	0	A	7.6	0.01	0
	SB	A	7.5	0.01	0	A	7.5	0.01	0	A	7.4	0.01	0
	Intersection	A	1.4	-	-	A	1.3	-	-	A	1.2	-	-
S Kent St & 16th St S	EB	A	7.2	0.01	0	A	7.2	0.01	0	A	7.2	0.01	0
	WB	A	7.3	0.01	0	A	7.3	0.01	0	A	7.2	0.01	0
	NB	A	9.2	0.02	0	A	9.3	0.02	0	A	9.2	0.02	0
	SB	A	9.4	0.04	2	A	9.4	0.04	2	A	9.5	0.07	4
	Intersection	A	7.5	-	-	A	7.9	-	-	A	8.4	-	-
Arlington Ridge Rd & S Lynn St	EB	A	8.5	0.15	10	A	8.6	0.16	10	A	8.6	0.16	12
	NB	A	8.3	0.23	18	A	8.6	0.23	18	A	8.6	0.28	18
	SB	A	7.9	0.1	6	A	7.9	0.1	6	A	7.8	0.1	4
	Intersection	A	8.3	-	-	A	8.5	-	-	A	8.5	-	-
S Lynn St & RH driveway 9	WB	B	10.0	0.02	2	B	10.4	0.03	2	B	10.7	0.06	4
	NB	A	0	0	0	A	0	0	0	A	0	0	0
	SB	A	7.6	0.01	0	A	7.6	0.01	0	A	7.7	0.02	2
	Intersection	A	0.8	-	-	A	1.0	-	-	A	1.6	-	-
S Hayes St & 15th St S (Signalized)	EBL	D	35.8	0.36	23	D	35.8	0.36	24	D	44.6	0.46	28
	EBT	C	27.3	0.24	49	C	27.5	.22	44	C	29.8	0.26	51
	EBR	A	3.3	0.30	0	A	1.0	0.21	0	A	1.4	0.24	0
	WBL	B	13.5	0.11	7	B	14.6	0.12	7	D	41.6	0.13	15
	WBTR	B	16.5	0.65	54	B	16.3	0.61	45	D	46.2	0.69	113
	NBL	E	68.7	0.74	62	E	55.8	0.61	51	F	83.9	0.67	55
	NBTR	D	39.8	0.14	49	D	38.5	0.12	41	B	10.6	0.12	30

Intersection	Movement	Existing				Background				Future			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
	SBL	E	77.0	0.84	149	E	66.7	0.73	121	E	65.6	0.73	125
	SBT	B	19.0	0.40	89	B	18.0	0.34	82	B	14.6	0.33	69
	SBR	A	7.3	0.32	17	A	6.3	0.31	17	A	4.7	0.29	7
	Intersection	C	27.2	-	-	C	24.5	-	-	C	30.0	-	-
S Lynn St & Army Navy Dr	EBR	A	7.4	0.01	0	A	7.5	0.01	0	A	4.1	0.01	0
	EBT	B	14.9	0.17	49	B	14.9	0.20	61	A	7.7	0.24	24
	WBL	B	15.0	0.20	31	B	14.7	0.26	35	A	9.5	0.32	20
	WBT	B	19.1	0.55	173	C	20.3	0.66	190	D	36.7	0.94	141
	NB	A	4.5	0.17	8	A	4.4	0.19	8	A	3.0	0.22	3
	Intersection	B	15.5	-	-	B	16.4	-	-	C	24.1	-	-

2032 Mitigations

As described in the Geometry and Operations section of this report, the proposed development will include several improvements to adjacent roadways, including the road diet of S. Joyce Street adjacent to the development site.

In addition to the proposed improvement to S. Joyce Street, mitigation measures have been identified based on Arlington County. The proposed development is considered to have an impact at an intersection if any of the following conditions are met:

- The overall intersection or any movement operates at LOS F in the future conditions with the proposed development where it operates at LOS E or better in the background conditions without the proposed development;
- The overall intersection or any movement operates at LOS F during the background condition and the delay increases by more than 10 percent in the future conditions with the proposed development;
- For local streets, if any 95th percentile queue length in the future condition exceeds the available capacity and increases by more than 150 feet compared to background conditions; or
- For regional streets, if any 95th percentile queue length exceeds the available capacity in the future conditions with the proposed development.

Following these guidelines, there are impacts to two (2) intersections under Future (2032) Conditions. Mitigation measures were tested at these intersections, with results shown in Table 19 below, with detailed Synchro reports included in the Appendix. The following conclusions were made:

- S. Hayes Street at 15th Street S.

Under Future (2032) Conditions, during the afternoon peak hour, delay for southbound left movement increased to LOS F

The increase in delay at this intersection attributable to the proposed development can be mitigated through signal timing adjustments.

Table 19 Mitigated Capacity Analysis - S. Hayes St at 15th Street S.

Intersection	Movement	Future (2032) AM Peak Hour				Future (2032) PM Peak Hour			
		LOS	Delay (s)	V/C	Queue (ft) 50 th %	LOS	Delay (s)	V/C	Queue (ft) 50 th %
S Hayes St & 15th St S (Signalized)	EBL	C	32.1	0.19	19	D	45.4	0.467	28
	EBT	C	34.0	0.33	59	C	30.0	0.26	51
	EBR	A	0.6	0.12	0	A	1.4	0.24	0
	WBL	D	55.0	0.01	0	D	39.9	0.13	15
	WBTR	D	38.6	0.35	20	D	44.5	0.69	115
	NBL	D	51.9	0.45	35	E	63.5	0.52	53
	NBTR	B	14.1	0.07	13	B	10.3	0.12	28
	SBL	E	64.0	0.73	151	E	58.4	0.68	125
	SBT	B	12.2	0.29	56	B	18.0	0.35	81
	SBR	A	2.5	0.11	1	A	6.2	0.30	12
	Intersection	C	27.7	-	-	C	29.2	-	-

2037 Future Conditions Analysis (with proposed development)

The Future (2037) results of the intersection capacity analyses for the AM and PM peak hours are expressed in level of service (LOS) and delay (seconds per vehicle) per movement and included in the Appendix. The capacity analysis results indicate that all intersections operate at acceptable LOS under the Future (2037) Conditions with the exception of the following intersection:

- S. Hayes St at 15th Street S
 - southbound left-turn movement in the PM peak hour

2037 Mitigations

As described in the Geometry and Operations section of this report, the proposed development will include several improvements to adjacent roadways, including the road diet of S. Joyce Street adjacent to the development site.

In addition to the proposed improvement to S. Joyce Street, mitigation measures have been identified based on Arlington County. The proposed development is considered to have an impact at an intersection if any of the following conditions are met:

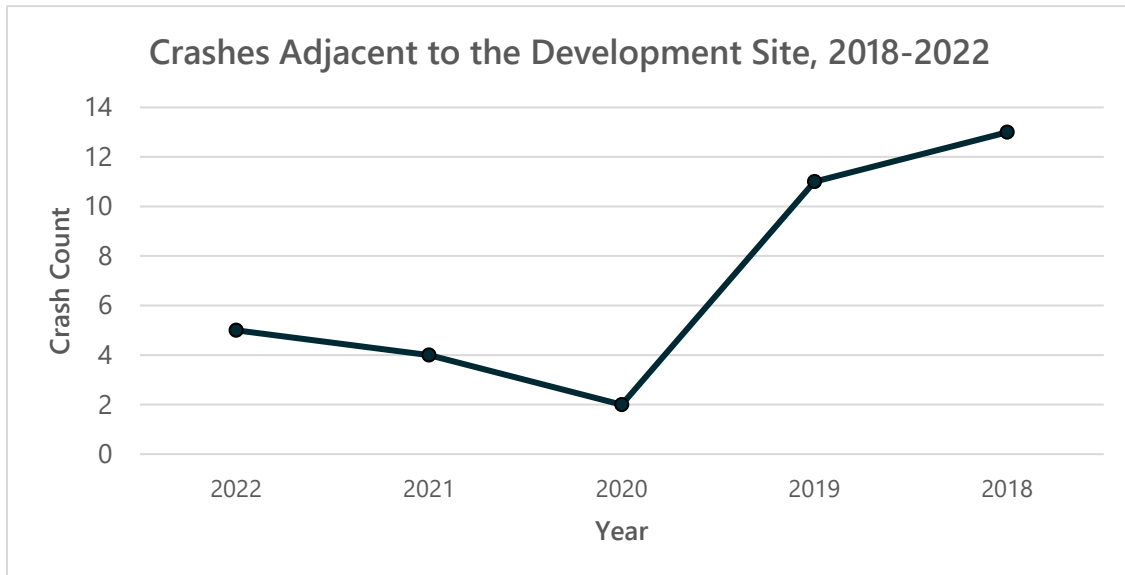
- The overall intersection or any movement operates at LOS F in the future conditions with the proposed development where it operates at LOS E or better in the background conditions without the proposed development;
- The overall intersection or any movement operates at LOS F during the background condition and the delay increases by more than 10 percent in the future conditions with the proposed development;
- For local streets, if any 95th percentile queue length in the future condition exceeds the available capacity and increases by more than 150 feet compared to background conditions; or
- For regional streets, if any 95th percentile queue length exceeds the available capacity in the future conditions with the proposed development.

Following these guidelines, there are impacts to one intersection under Future (2037) Conditions. Mitigation measures as outlined under the 2032 Conditions would be incorporated under the 2037 Conditions at 15th Street S and S. Hayes Street.

SAFETY ANALYSIS

The safety analysis was conducted according to guidelines provided by the Arlington County Department of Environmental Services (Safety Analysis Guidance, May 2021). Crash data from the last five years (2018 to 2022) occurring adjacent to the site was obtained from the VDOT Crash Analysis Tool. These include crashes along segments of S. Lynn St., 16th St. S., S. Joyce St., and Army Navy Dr. bordering the site as well as at study intersections, excluding those that are not directly adjacent to the site (intersections 8, 15 and 18).

A total of 35 crashes occurred adjacent to the development site from 2018 to 2022 (Figure 45 and Figure 46). A large majority of these crashes occurred in the first two years, with 13 in 2018 and 11 in 2019. Between 2019 and 2020, crash occurrences near the site decreased dramatically, with only 2 crashes recorded in 2020. Despite a slight upward trend since 2020, crash counts in recent years remain much lower than before the pandemic.

Figure 46: Historical Crash Data

General Crash Characteristics

Crash Severity

VDOT codes crash severity using the KABCO scale, as per Model Minimum Uniform Crash Criteria (MMUCC) published by the National Highway Traffic Safety Association (NHTSA). The KABCO scale assigns one of the following levels of crash severity based on the most severe injury to any person involved in the crash:

- K: Fatal Injury
- A: Suspected Serious Injury
- B: Suspected Minor Injury
- C: Possible Injury
- O: Property Damage Only (No Apparent Injury)

More detailed definitions and information can be found in VDOT's Crash Data Analysis Manual Version 1.0 (November 2017).

While no crashes from 2018 to 2022 resulted in fatal injuries, 40% of crashes were classified as A (Suspected Minor Injury), and almost half of the crashes resulted in suspected or possible injuries. Of these, one (1) crash resulted in suspected serious injury. The breakdown of crashes by severity on the KABCO scale is shown in Table 20.

Table 20: Crashes by Severity

Severity	Count	% of Total
K: Fatal Injury	0	0%
A: Suspected Serious Injury	1	3%
B: Suspected Minor Injury	14	40%
C: Possible Injury	1	3%
O: Property Damage Only	19	54%
Total	35	100%

Collision Type

Of fifteen (15) possible collision types defined by VDOT, seven (7) distinct collision types occurred adjacent to the development site from 2018 to 2022. Angle collisions were the most common collision type, accounting for 49% of crashes. Pedestrian collisions, in which a vehicle collides directly with a pedestrian, were the second most common at 20%. The breakdown of crashes by collision type is shown in Table 21.

Table 21: Crashes by Collision Type

Collision Type	Count	As % Total
Rear End	3	9%
Angle	17	49%
Head On	1	3%
Sideswipe – Same Direction	3	9%
Fixed Object – Off Road	1	3%
Pedestrian	7	20%
Other	3	9%
Total	35	100%

Crash Factors

Many factors can contribute to crashes and predict their frequency and severity. This section reviews some of the common environmental, behavioral, and vehicle characteristics that contribute to crashes. It also includes a more detailed analysis of crashes involving pedestrians and bicyclists.

Environmental Factors: Light Condition

Of the 35 crashes analyzed, 33 of them (94%) occurred in daylight or on lighted roads at night. This suggests that light conditions are not a strong predictor or cause of crashes around the site.

Table 22: Crashes by Light Condition

Light Condition	Count	As % Total
Dawn	2	6%
Daylight	18	51%
Dusk	0	0%
Darkness – Road Lighted	15	43%
Darkness – Road Not Lighted	0	0%
Darkness – Unknown Road Lighting	0	0%
Total	35	100%

Behavioral Factors: Driver Behavior

Risky or negligent driver behavior, whether intentional or not, can often contribute to crashes and increase their severity. Table 23 shows the crash counts by driver behaviors, including speeding, alcohol consumption, and distracted driving. Of these three behaviors, distracted driving was most common and was reported in 17% of crashes, while alcohol consumption was least common and was reported for one (1) crash. Half of the distracted driver incidents resulted in visible injury (severity level B), and the single alcohol-related crash also resulted in visible injury. Two of the four (4) speeding-related crashes led to injuries, including one crash with severity level A: Suspected Serious Injury. Data on this crash indicates that the driver was driving 25 mph over the speed limit and collided with a fixed object off the road. While this does not necessarily indicate that driver behavior is a primary cause of crashes, it suggests that dangerous driver behavior may increase the severity of a crash.

Table 23: Crashes by Driver Behavior

Driver Behavior	Count	As % Total
<i>Speeding?</i>		
Yes	4	11%
No	31	89%
<i>Alcohol Involved?</i>		
Yes	1	3%
No	34	97%
<i>Distracted Driver?</i>		
Yes	6	17%
No	29	83%

Vehicle Characteristics: Large Truck and Motorcycle Involvement

In the last five years, no crashes near the development site involved motorcycles. Two (2) crashes involved large trucks, with each resulting in property damage only. This data suggests that vehicle size is not a strong predictor of crash frequency or severity in the vicinity of the site.

Table 24: Crashes by Vehicle Characteristics

Vehicle Characteristics	Count	As % Total
<i>Large Truck Involved?</i>		
Yes	2	6%
No	33	94%
<i>Motorcycle Involved?</i>		
Yes	0	0%
No	35	100%

Pedestrian- and Bicyclist-Involved Crashes

Seven (7) crashes involved pedestrians and one (1) crash involved a bicyclist, accounting for 20% and 3% of crashes respectively. All pedestrian- and bicyclist-involved crashes resulted in

injuries: 88% (7 out of 8) were severity level B: Suspected Visible Injury, with one crash involving two injured pedestrians. Most of these crashes did not involve any of the driver behaviors identified above, with just one distracted driver incident.

Table 25: Crashes by Pedestrian/Bicyclist Involvement

Pedestrian/Bicyclist Involvement	Count	As % Total
<i>Pedestrian Involved?</i>		
Yes	7	20%
No	28	80%
<i>Bicyclist Involved?</i>		
Yes	1	3%
No	34	97%

Findings

The streets surrounding the proposed RiverHouse redevelopment have shown a modest number of crashes over the recent five-year period. Since the start of the pandemic, crash numbers have declined significantly, though they seem to be gradually growing again. Of note, 40% of all crashes near RiverHouse were at or near the intersection of Army Navy Dr. and S. Joyce St. Current and proposed changes including the Army Navy Dr. Complete Streets project (under construction), the Army Navy Dr. Protected Bike Lane Missing Link (in planning), and the S. Joyce St. road diet proposed as part of this project will contribute to much safer conditions at this intersection, for all travelers whether in motor vehicles, on bikes, or walking. Six (6) of the seven (7) crashes involving people walking were along S. Joyce St., where conditions will also be substantially improved by the road diet proposed as part of this project.

TRANSPORTATION MANAGEMENT PLAN (PRELIMINARY)

This preliminary Transportation Management Plan (TMP) accompanies the Phased Development Site Plan (PDSP) and Site Plans (4.1) for RiverHouse. It considers the proposal by JBG SMITH (the Developer) as described below and responds to the current Standard Site Plan Conditions (revised July 1, 2018) and specifically condition #41. The draft TMP will be expanded and negotiated during the Site Plan process involving Arlington County staff, County Commissions, the Site Plan Review Committee, and other stakeholders. The ultimate goal of the Final TMP will be to ensure the RiverHouse site plan incorporates an appropriate set of travel demand management (TDM) services and approaches to provide quality alternatives to driving and parking, create incentives for travelers to use those alternatives, and manage resulting travel to/from the site.

As Developer, JBG SMITH agrees to obtain approval from the County Manager of a Final TMP prior to the issuance of the first Certificate of Occupancy (CO) for each building in the Site Plan or as defined in adopted Site Plan conditions. The Final TMP will comply with all adopted Site Plan conditions.

Upon approval of the TMP by the County Manager, the Developer agrees to implement all elements of the TMP with assistance, when appropriate, by agencies of the County. The Developer agrees to ensure consistency between this TMP and the Parking Management Plan (PMP), to the extent TMP provisions are applicable to the operation and management of parking facilities.

The TMP for each building will include a schedule and description of implementation and continued operation, throughout the life of the Site Plan, of all elements which may include but not be limited to the following:

A. Participation and Funding

1. Establish and maintain an active, ongoing relationship with Arlington Transportation Partners (ATP), or successor entity as designated by Arlington County Commuter Services (ACCS), on behalf of the property owner and at no cost to the Developer.
2. Designate and keep current a member of building management as Property Transportation Coordinator (PTC) to be primary point of contact with the County and undertake the responsibility for coordinating and completing all Transportation Management Plan obligations. The PTC shall be trained, to the satisfaction of ACCS, to provide multimodal and other travel information provided by the County intended to assist with transportation to and from the site.

3. Contribute annually to ACCS, or successor, to sustain direct and indirect on-site and off-site services in support of TMP activities, at a rate defined in the adopted Site Plan Conditions. Payment on this commitment shall begin as a condition of issuance of the first CO for each respective building or phase of construction. Subsequent payments shall be made annually.

B. Facilities and Improvements

1. Provide, in the lobby or lobbies, transportation information display(s), the number/content/design/location of which will be approved by ACCS. The Developer agrees that the required transportation information displays shall meet the Arlington County Neighborhood Transportation Information Display Standards in effect on the date of the site plan approval, or equivalent as approved by the County Manager.
2. Ensure the PMP, bicycle parking and storage facilities, and any other bicycle facilities on-site comply with requirements of adopted Site Plan conditions.

C. Carpool and Vanpool Parking

1. Operate a carpool/vanpool program with required elements including convenient, reserved spaces, and reduced rates of at least 50% and 100% for IRS-recognized vanpools.

D. Promotions, Services, and Policies

1. Prepare, reproduce, and distribute materials provided by Arlington County, including multimodal travel and related information, to each new residential lessee or purchaser and each new office, retail, property management, or maintenance employee, from initial occupancy through the life of the Site Plan. These materials shall be distributed as a part of prospective tenant marketing materials, as well as communications associated with lease signing, on-boarding, or similar activities.
2. Provide one time, per person, to each new residential lessee or purchaser, and each new office, retail, hotel, property management, or maintenance employee, whether employed part-time or full-time, directly employed or contracted, who moves into or begins employment in the building throughout initial occupancy, the choice of one of the following:
 - a. Metro fare on a SmarTrip card or successor fare medium, in an amount stated in the adopted Site Plan conditions
 - b. A one year bikeshare membership
 - c. A one year carshare membership

- The County Manager may approve additions to, or substitution of, one or more of these choices with a comparable transportation program incentive, as technology and service options change, if he/she finds that an incentive shall be designed to provide the individual with an option other than driving alone in a personal vehicle, either by removing a barrier to program entry, such as a membership cost, or by providing a similar level of subsidized access to a public or shared transportation system, program or service.
3. Provide, administer, or cause the provision of a sustainable commute benefit program for each on-site property management, maintenance, and hotel employee, whether employed part-time or full-time, directly employed or contracted. This commute benefit program shall offer, at a minimum, a monthly pre-tax transit and vanpool benefit, as defined by the IRS, or a monthly subsidized/direct transit and vanpool benefit, as defined by the IRS.
 4. Provide, under a "transportation information" heading on the Developer and property manager's websites regarding this development:
 - a. Links to the most appropriate ACCS and/or external transportation-related web pages. Obtain confirmation of most appropriate links from ACCS.
 - b. A description of key transportation benefits and services provided at the building, pursuant to the TMP.

E. Performance and Monitoring

1. During the first year of start-up of the TMP and on an annual basis thereafter, the Developer shall submit an annual report, to the County Manager, which may be provided online or via e-mail, describing completely and correctly, all TMP-related activities at the site and changes in commercial tenants during each year.
2. The Developer agrees to actively participate in a transportation and parking performance monitoring study at two years, five years, and each subsequent five years (at the County's option), after issuance of the first CO, for the life of the site plan. The County may conduct the study or ask the owner to conduct the study (in the latter case, no reimbursement payment shall be required).
3. As part of the study, a report shall be produced as specified by the County. The study may include:
 - a. Building occupancy rates, by use
 - b. A seven-day count of vehicle trips to and from the site
 - c. Average vehicle occupancy for driving trips
 - d. Average garage occupancy at various days of the week and times of day

- e. Average parking availability at various days of the week and times of day
- f. Average duration of stay for short term parkers on various days of the week and times of day
- g. Hourly, monthly, and special event parking fee rates
- h. The share of parking permits/visits subject to each type of fee
- i. Drop-off/pickup and delivery trips at loading docks and site-adjacent curbs, on various days of the week and times of day
- j. Walking trips (pedestrian traffic), on various days of the week and times of day
- k. Biking trips, on various days of the week and times of day
- l. A voluntary mode-split survey including trips arriving by walking, biking, driving/parking, and drop-off/pickup. The building owner/operator/management shall notify, assist, and encourage building occupants and visitors on site to participate in mode-split surveys which may be of an on-line or email variety.

SUMMARY AND CONCLUSIONS

This report concludes that the proposed development will have a minimal impact on the surrounding transportation and roadway network assuming that all planned site design elements and recommended mitigation measures are implemented.

The proposed PDSP would preserve the existing residential towers and add 1,984 new residential units and approximately 52,000 square feet (sf) of new retail and amenity commercial space. Landbays S, C, and N, would add 1,668 units with 27,759 sf of retail. Landbay F would add the remaining residential units and amenity space. These new developments are largely concentrated on the existing surface parking lots. As a result, the PDSP provides nearly 2,000 new homes and 52,000 sf of retail and amenity space with fewer than 350 net new parking spaces.

The PDSP proposes significant changes to S. Joyce St., in both the arterial segment between Army Navy Dr. and 15th St. S., and in the local segment between 15th St. S. and 16th St. S. The arterial segment is proposed for a road diet.

The proposed road diet for S. Joyce St. keeps the east curb as currently located, with the cross-section including (from east to west) the current parking lane (periodically replaced by curb extensions), painted bike lane, one (1) northbound vehicle travel lane, one (1) center turn lane (or median), one (1) southbound vehicle travel lane, a parking lane, a buffer area, a two-way protected cycle track, the curb, a buffer area, and a more ample sidewalk.

A capacity analysis was developed to compare the future roadway network with and without the proposed development. Traffic projections for 2023, 2032, and 2037 are based on existing volumes, plus traffic generated by approved nearby background developments, regional growth on the roadway, and traffic generated by the proposed RiverHouse development.

In addition to the improvements outlined above, mitigation measures were identified based on Arlington County standards. Mitigation measures were explored at these intersections, and included the following recommendations:

Future (2032) Conditions

- Adjustments to signal timing at the S. Hayes Street at 15th Street S. intersection.

With these mitigations in place, the analysis shows that traffic operations with the proposed development will improve or are consistent with the background scenarios at the study area intersections.

The development has many positive elements contained within its design that minimize potential transportation impacts, including:

- The proposed development's close proximity to the Pentagon City Metro Station, and multiple bus routes.
- The implementation of a two-way cycle track along S. Joyce incorporated into the realignment of S. Joyce Street.
- Improvements to the pedestrian facilities adjacent to the site that meet or exceed Arlington County and ADA requirements.
- Limited on-site parking, which will promote the use of non-auto modes of travel to and from the proposed development.
- The inclusion of publicly accessible plazas and parks that improve pedestrian circulation.
- The inclusion of secure-long-term bicycle parking significantly exceeding zoning requirements.
- The installation of short-term bicycle parking spaces around the perimeter of the site that meet zoning requirements.
- The inclusion of shower and locker facilities within each building that meet or exceed zoning requirements.
- A Transportation Management Plan (TMP) that aims to reduce the demand of single-occupancy, private vehicles to/from the proposed development during peak period travel times or shifts single-occupancy vehicular demand to off-peak periods.

As noted above, this report concludes that the proposed development will have a minimal impact on the surrounding transportation and roadway network assuming that all planned site design elements and recommended mitigation measures are implemented.