

**MULTIMODAL TRANSPORTATION ANALYSIS**

# **APS EDUCATION CENTER**

**ARLINGTON, VA**

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## EXECUTIVE SUMMARY

The following report is a Multimodal Transportation Analysis (MMTA) for the renovation of the APS Education Center, located in Arlington, Virginia adjacent to Washington-Lee High School. The project consists of renovating the existing Education Center building, adding 500 to 600 high school seats, and converting it from its current use as an office facility to a high school instructional facility.

The purpose of this report is to review existing and future transportation facilities in the area surrounding the project site, project transportation demand needs of the project, determine if the new transportation demand generated by the project would have negative impacts on the surrounding transportation network, and present recommendations to minimize the negative impact from the proposed project.

This report concludes that the APS Education Center site will not have a negative impact to the surrounding transportation and roadway network given the recommendations from this report are implemented, including the Transportation Management Plan.

This MMTA reached the following major findings and recommendations:

### Project Summary

The Washington-Lee High School campus site is currently home to:

- The APS Education Center, previously used for APS offices
- Washington-Lee High School
- The David M. Brown Planetarium
- A recreational area with several athletic fields

This project consists of renovating the existing Education Center building by adding 500 to 600 high school seats and converting it from its current configuration as an office building to a school instructional facility. The plan to repurpose the Education Center as an instructional facility involves the closure of the Education Center and the David M. Brown Planetarium during construction, both to reopen after construction. Washington-Lee High School and the athletic fields will remain open during construction.

### Overall Transportation Strategy

Establishing an instructional facility at the Education Center presents an opportunity to optimize transportation operations at the site it shares with Washington-Lee High School. One of the general goals of this project is to provide flexibility in the type of educational program that can be housed in the Education Center building. When the Educational Center building reopens it will host an expansion of the Washington-Lee high school but in the future, it may be used for other programs like a separate school facility. Thus, although this MMTA makes recommendations primarily on how the building will function as an extension of Washington-Lee High School, it also considers how it may function in the future.

Specifically, this report proposes the following transportation strategy:

- Use existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand resulting from the project.
- Create a secondary set of school arrival/dismissal facilities near the Education Center, that can be used to supplement the entire campus or stand-alone is needed, including:
  - Add two (2) dispersed student drop-off/pick-up locations on 15<sup>th</sup> Street N and Washington Boulevard that relieve queueing at the existing N Stafford Street location and provides more convenient access to the Education Center building, and also serve the Washington-Lee campus as a whole.
  - Add a second bus loading/unloading location in the Education Center parking lot that relieves queueing at the existing Generals' Way location and provides more convenient access to the Education Center building.

The recommendation to implement secondary pick-up/drop-off and bus loading/unloading areas provides flexibility to act as both an extension of the Washington-Lee High School transportation system, and as an independent system in case that need arises.

The recommendations contained within this MMTA, and detailed in the following sections, are all based around this overall strategy.

### Parking

This MMTA reached the following major findings on parking:



- During a typical weekday, the existing parking demand for staff and students of Washington-Lee High School is accommodated by the surrounding parking supply, mainly in the parking garage and in unrestricted parking spaces within walking distance.
- Visitor parking peaks outside of school hours due to parking demand for the pool, but there is availability during school hours. There have been some concerns expressed about the location of visitor parking relative to the school's front door (that visitors are required to use).
- After-school parking on weeknights fills up some areas within the parking garage and nearby street parking, while some areas within the parking garage remain empty.

- Increase wayfinding and marketing of the parking garage for after-school activities and events to lessen the impact on nearby on-street parking.

### **Traffic Operations**

A detailed traffic capacity analysis performed for this MMTA led to the following findings:

- The existing study area intersections all operate at acceptable levels of service and delay, with a few exceptions. These are mainly at side streets approaching N Quincy Street, where vehicles are having difficulty finding gaps in traffic to make turns (onto N Quincy St). A similar lack of gaps for pedestrians trying to cross the street was observed in the pedestrian analyses performed in this MMTA.
- The future scenarios show similar results, the areas with poor Levels of Service on side streets get slightly worse.
- This report reviewed several ways to lower delays for drivers at these locations but does not recommend any traffic mitigation measures for the project because there would be negative impacts to other modes (mainly walking), and the benefit would not impact enough drivers to offset negative impacts to other modes.

This report recommends the following strategy for accommodating the increase in parking demand:

- Use the existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand.
- Reopen parking spaces in the closed off Education Center lot based on a comparison of supply and demand without a reduction in parking rates. Based on this strategy this MMTA recommends that 82 spaces in the Education Center parking lot be reopened to serve the Washington-Lee High School campus, and up to 46 spaces can be repurposed.
- Continue the current APS Go! Transportation Demand Management (TDM) programs to encourage use of alternative travel modes, thus reducing parking demand and providing more parking availability.
- Explore high school student parking policies systematically and consider additional demand management measures such as limiting availability of student parking passes and/or charging higher fees for student passes. These would be APS-wide policy changes that would impact all high schools in the County.
- Depending on future visitor entry points on the campus, explore switching how some spaces are designated to increase visitor parking near the school's main entrance.

### **Bicycle Parking**

Because bicycle parking demand is projected to grow, this MMTA is recommending more bicycle parking be added, including 30 bicycle spaces in the Education Center parking lot, 30 spaces in the I-66 parking garage, and six (6) spaces for staff in a storage room near the Education Center.

### **Arrival/Dismissal – Student Drop-off/Pick-up**

This report recommends creating additional drop-off/pick-up areas on eastbound 15<sup>th</sup> Street N between N Randolph Street and N Quincy Street, and westbound Washington Boulevard between N Randolph Street and N Quincy Street. Under existing conditions, student drop-off and pick-up operations occur in the driveway at the Washington-Lee High School front entrance off N Stafford Street and along other streets near the front door.

The proposed 15<sup>th</sup> Street N area has room to accommodate up to 19 vehicles loading or unloading at the same time, depending on how much curbside is used. The proposed



Washington Boulevard area has room to accommodate 12 vehicles loading or unloading at the same time.

Establishing additional drop-off/pick-up areas also allows flexibility for future uses of the Education Center building. Whether the building is incorporated into Washington-Lee High School or established as a separate facility, the drop-off/pick-up areas can serve either function.

**Arrival/Dismissal – School Buses**

Under existing conditions, bus loading and unloading operations occur along Generals’ Way, with some buses using N Stafford Street at dismissal. While the APS Education Center project is unlikely to produce substantially greater bus demand, more buses can be accommodated by creating an additional bus loading/unloading area in the eastern drive aisle of the Education Center parking lot, parallel to N Quincy Street. This area has room to accommodate five buses loading or unloading at the same time.

**N Quincy St Recommendations**

The addition of more students to the Washington-Lee High School campus in the Education Center building has potential impacts on the N Quincy St side of the campus. As such, this MMTA is recommending several mitigation measures to minimize the impact these new and expanded transportation facilities will have.

Detailed descriptions of these recommendations are contained in the body of the MMTA, but are summarized here:

- To help minimize conflicts in general on N Quincy Street, this report is recommending Washington-Lee High School enhance its arrival and dismissal plans with specific instructions to not use N Quincy Street, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford St side of campus today).
- The increased student population in the Education Center building will lead to more student crossings of N Quincy Street. This MMTA recommends enhancing the crosswalk at this location with a treatment that will alert drivers to pedestrian crossings. Industry research has shown that a Rectangular Rapid Flash Beacon (RRFB) is likely the optimal solution, but there

is a chance it may not accomplish its objective. Thus, this MMTA also recommends that the RRFB’s performance be monitored after the school is open for around 6 months to a year to ensure its effectiveness. (A review of alternatives and why the MMTA recommendation is provided in the Pedestrian Facilities section of the MMTA.)

**Transportation Management Plan**

This MMTA is recommending establishment of the standard management plans for County schools, including:

- A use permit required Transportation Demand Management (TDM) plan, with the standard elements for APS high school facilities, based on the APS Go! Program
- A Parking Management Plan (PMP). In addition to standard PMP elements, this MMTA is recommending that the PMP include a section reviewing visitor parking for the school and approved visitor entry points, making sure there is proximity between the two. Additionally, the PMP should review wayfinding and marketing for after-school activities and events held on campus to increase the amount of parking demand using the parking garage in lieu of on-street parking.
- Arrival and dismissal plans updated for the Washington-Lee High School campus with the addition of the Education Center. In addition to standard elements, this report is recommending the arrival and dismissal plans include specific instructions on how to use N Quincy Street safely, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford Street side of campus today).
- APS will incorporate the Ed Center into its ongoing monitoring of school transportation through maintaining records of W-L staff participation in APS TDM benefit programs and conducting triennial surveys of students, visitors, staff, and parents, regarding their travel to and from the school site.

This MMTA is recommending one item specific to this project have its own specific and separate performance and monitoring



plan: An evaluation of driver compliance at the RRFB and associated pedestrian crossings at N Quincy Street and 14<sup>th</sup> Street. If this review finds that the RRFB installation has not increased driver compliance sufficiently, then additional mitigations should be considered.

This item should be monitored at a time around 6 months to one year after the Ed Center opened.





## INTRODUCTION

This report is a Multimodal Transportation Analysis (MMTA) for the renovation of the APS Education Center, located in Arlington, Virginia adjacent to Washington-Lee High School. The project consists of renovating the existing Education Center building, adding 500 to 600 high school seats, and converting it from its current use as an office facility to a high school instructional facility. The project is currently in the schematic design phase. This MMTA is based on the conceptual plans for the facility.

Figure 1 shows the location of the APS Education Center site.

### PURPOSE OF STUDY

The purpose of this report is to:

1. Review existing and future transportation facilities in the area surrounding the project site.
2. Project the transportation demand needs of the proposed project.
3. Determine if the new transportation demand generated by the project would have negative impacts on the surrounding transportation network.
4. Present recommendations to minimize the negative impact from the proposed project, including providing recommendations for the design team to incorporate into the schematic design.

### STUDY TASKS

The following tasks were completed as part of this study:

- A scoping meeting was held with Arlington County Department of Environmental Services (DES) staff on August 28, 2018. This meeting reviewed assumptions and methodologies for this MMTA.
- A scoping form based on the meeting with County staff was submitted to the County and subsequently approved.
- Field reconnaissance was performed at the Washington-Lee High School campus and the study area review lane configurations and traffic controls, and current arrival and dismissal patterns at Washington-Lee High School.

- Traffic counts were conducted at 12 locations on Tuesday, May 8, 2018 and Thursday, September 20, 2018.
- APS Go! data for comparable APS facilities was reviewed to help establish mode split assumptions.
- Parking counts (inventory and occupancy) were conducted in the area surrounding the site on Tuesday September 20, 2018.
- Capacity analyses for the existing conditions were performed.
- Future capacity analyses were performed based on the approved scope.
- Multimodal analyses were performed reviewing pedestrian and bicycle travel to and from the project.
- The analysis findings and recommendations were documented in this report.

### CONTENTS OF STUDY

This report contains nine sections as follows:

- *Study Area Overview*  
This section reviews the area near and adjacent to the proposed project and includes an overview of the site location, and local initiatives within the study area.
- *Project Design*  
This section reviews the transportation components of the project, including the site plan and access. Included is a review of vehicle parking, student pick-up/drop-off operations, bus loading/unloading operations, and bicycle parking.
- *Travel Demand Assumptions*  
This section outlines the travel demand of the proposed project. It contains projections on the mode splits of site users and summarizes the proposed trip generation of the project.
- *Traffic Operations*  
This section provides a summary of the existing roadway facilities and an analysis of the existing and future roadway capacity in the study area. This section highlights the vehicular impacts of the project, including presenting mitigation measures for minimizing impacts as needed.



- *Parking*  
This section reviews the available parking surrounding the APS Education Center site and presents parking recommendations.
- *Pedestrian Facilities*  
This section summarizes existing and future pedestrian access to the site, reviews walking routes to and from the project site, outlines impacts, and presents recommendations as needed.
- *Bicycle Facilities*  
This section summarizes existing and future bicycle access to the site, reviews the quality of cycling routes to and from the project site, outlines impacts, and presents recommendations as needed.
- *Transportation Management Plan*  
This section outlines the various components of the project's Transportation Management Plan (TMP), including Transportation Demand Management (TDM) and Safe Routes to School (SRTS) plans.
- *Summary and Conclusions*  
This section presents a summary of the recommended mitigation measures by mode and presents overall report findings and conclusions.

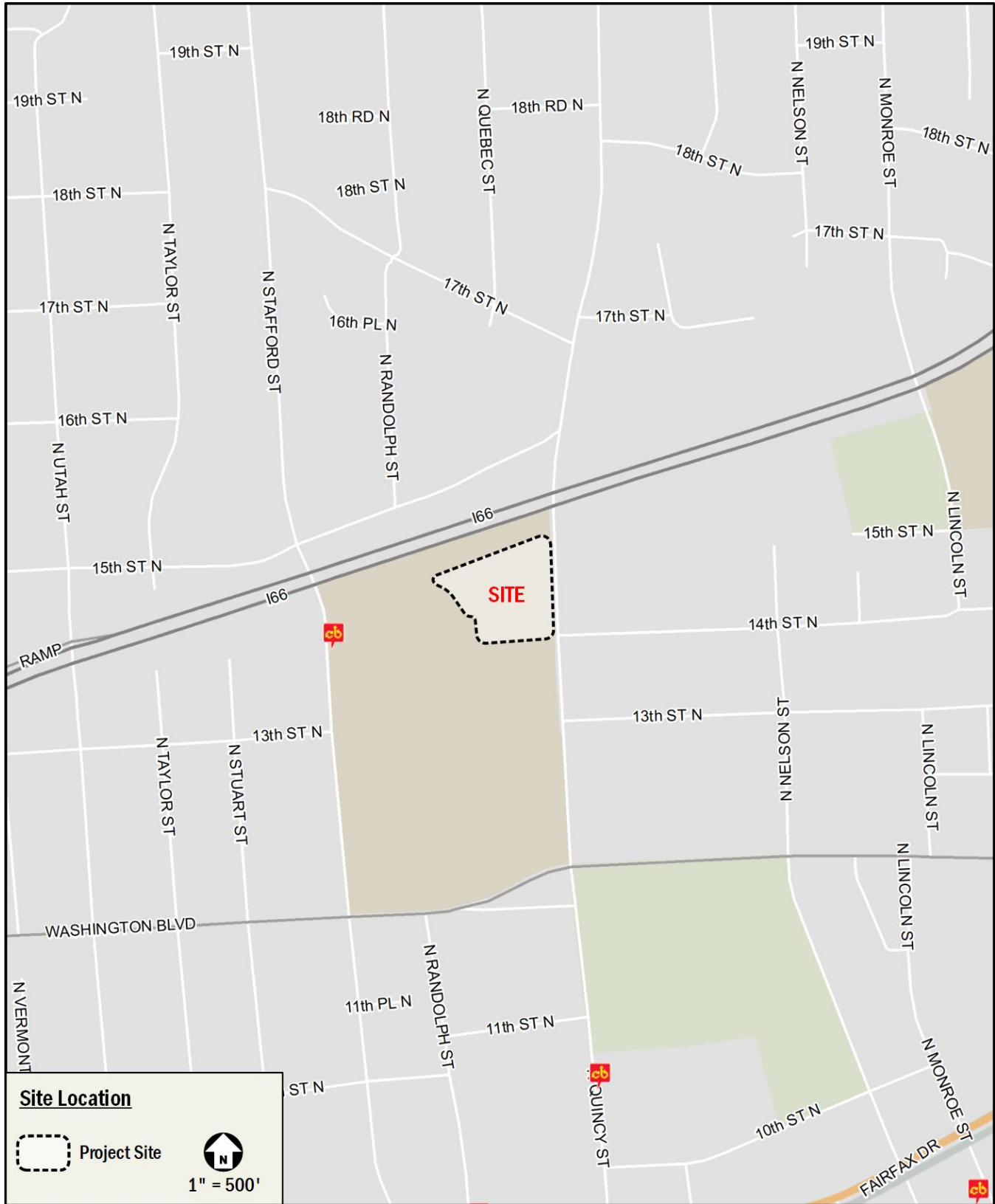


Figure 1: Site Location



## STUDY AREA OVERVIEW

This section reviews the study area and includes an overview of the site location, including a summary of the major transportation characteristics of the area and of future regional projects.

The following conclusions are reached within this chapter:

- The site is surrounded by an extensive regional and local transportation system that will connect students, staff, and visitors of the project to the rest of Arlington County and surrounding areas.
- The site is served by public transportation with access to two Metrorail lines and several local and regional bus routes.
- There is existing bicycle infrastructure including the Custis Trail and several bicycle lanes and signed routes in the vicinity of the site.
- Pedestrian conditions are generally adequate, particularly along anticipated major walking routes.
- Several local initiatives will positively impact the study area, including the Lee Highway and Washington Boulevard Bus Consolidation and Accessibility Improvements, the Washington Boulevard and N Nelson Street Intersection Safety Improvement, and the 13<sup>th</sup> Street North Neighborhood Conservation project.

### MAJOR TRANSPORTATION FEATURES

#### Overview of Regional Access

The APS Education Center site has ample access to regional vehicular, transit, and bicycle transportation options, as shown in Figure 3, that connect the site to destination within Virginia, the District, and Maryland.

The site is accessible from Interstate 66, US Highway 29 (Lee Highway), and State Routes such as SR-237 (Washington Boulevard) and SR-120 (N Glebe Road). These roadways bring vehicular traffic within one (1) mile of the site, at which point arterials and local roads can be used to access the site directly. The main arterials in the vicinity of the site are Washington Boulevard, N Quincy Street, and Fairfax Drive.

The site is located 0.6 miles from both the Ballston-MU and the Virginia Square-GMU Metrorail stations, which are serviced by the Orange and Silver lines and provide connection to areas in Virginia, the District, and Maryland. The site is also serviced by

one major regional bus route which connects to multiple Metrorail stations in Arlington County and Falls Church, Virginia.

The site is located 0.2 miles from the Custis Trail segment of the Arlington Loop, a major off-street bicycle trail network connecting Arlington with other areas of Northern Virginia, as well as several Potomac River crossings into the District of Columbia. A detailed review of existing and bicycle access and infrastructure is provided in a later section of this report.

Overall, the site has access to several regional roadways, transit, and bicycle options, making it convenient to travel between the site and destinations in the Virginia, the District, and Maryland.

#### Overview of Local Access

There are several local transportation options near the site that serve vehicular, transit, walking, and cycling trips, as shown on Figure 3.

In addition to arterials, the site is served by a local vehicular network of low volume neighborhood streets that provide connections from regional roads to the site.

Arlington Transit (ART) is a local bus system provided by Arlington County. ART supplements Metrobus with cross-county routes as well as neighborhood connections to Metrorail. As shown in Figure 4, there are multiple bus routes that serve the site along Washington Boulevard and N Quincy Street.

There are existing bicycle facilities that connect the site to neighborhoods within Arlington County, most notably the Custis Trail, the bike lanes on N Quincy Street, and the signed bicycle routes on N Stafford Street and 13<sup>th</sup> Street N.

As shown in Figure 2, the site is situated in a neighborhood featuring high Walk Scores and Bike Scores. The site is in an area that provides a better walking environment than areas to the north and west which either lack sidewalk coverage or have physical barriers limiting connectivity such as I-66. A detailed review of existing and proposed pedestrian access and infrastructure is provided in a later section of this report.

#### Car-sharing

Two car-sharing companies provide service in Arlington County: Zipcar and Car2Go. Both are private companies that provide

registered users access to a variety of automobiles. Of these, Zipcar has designated spaces for their vehicles. There are no car-share locations within a quarter-mile of the site, although there are some at Ballston Metrorail station.

Car-sharing is also provided by Car2Go, which provides point-to-point car-sharing. Car2Go currently has a fleet of vehicles located throughout the District and Arlington. Car2Go vehicles may park in any non-restricted metered curbside parking space or Residential Permit Parking (RPP) location in any zone throughout the defined “Home Area”. Members do not have to pay the meters or pay stations. Car2Go does not have permanent designated spaces for their vehicles; however, availability is tracked through their website and mobile phone application, which provides an additional option for car-sharing patrons.

### Walkscore

Walkscore.com is a website that provides scores and rankings for the walking, biking, and transit conditions within neighborhoods of Arlington County. Based on this website the planned development is in the Ballston – Virginia Square neighborhood. The site location has a walk score of 93 (or “Walker’s Paradise”), a transit score of 74 (or “Excellent Transit”), and a bike score of 84 (or “Very Bikeable”). Figure 2 shows the neighborhood borders in relation to the site location and displays a heat map for walkability and bikeability.

The site is situated in an area with good walk scores because of the abundance of neighborhood serving retail locations close by, where most errands can be completed by walking.

The transit score was based on the proximity to multiple bus lines, and distance to the nearest Metrorail stop which is located 0.6 miles from the site.

The site is situated in an area with good bike scores due to its proximity to low volume residential roadways, number of bike lanes and trails, and flat topography.

Overall, the Ballston – Virginia Square neighborhood has high walk, transit, and bike scores. Additionally, planned roadway improvements will help increase the walk, bike, and transit scores in the Ballston – Virginia Square neighborhood.

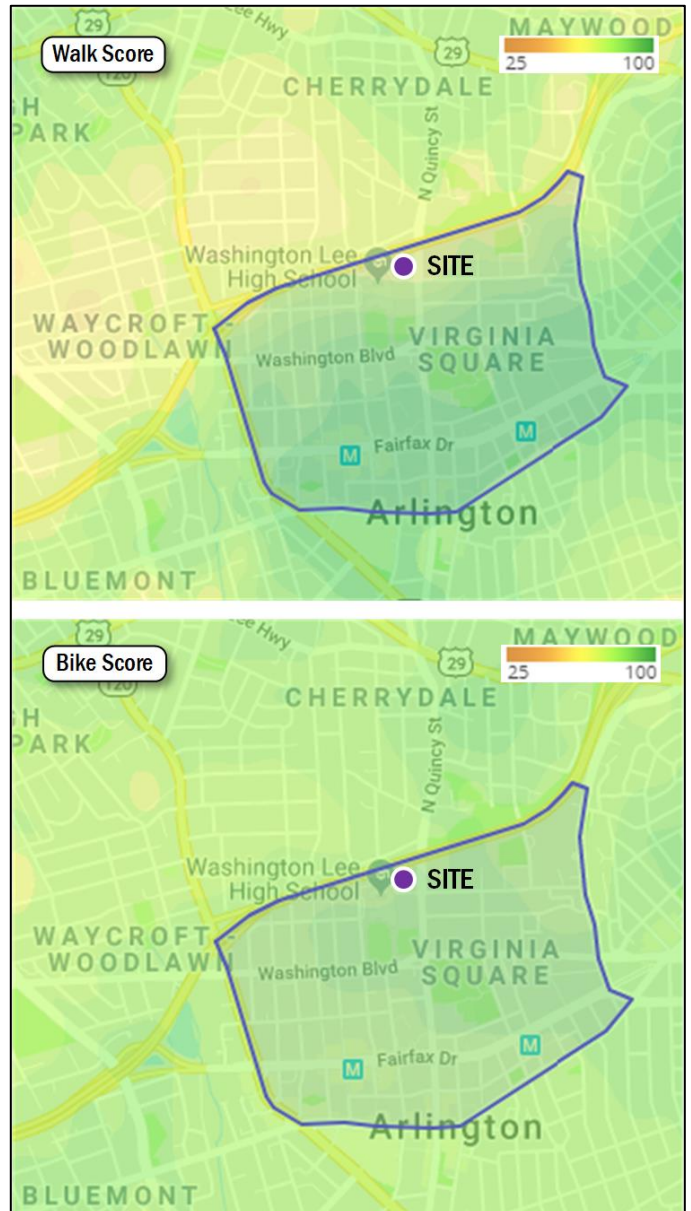


Figure 2: Walk Score & Bike Score





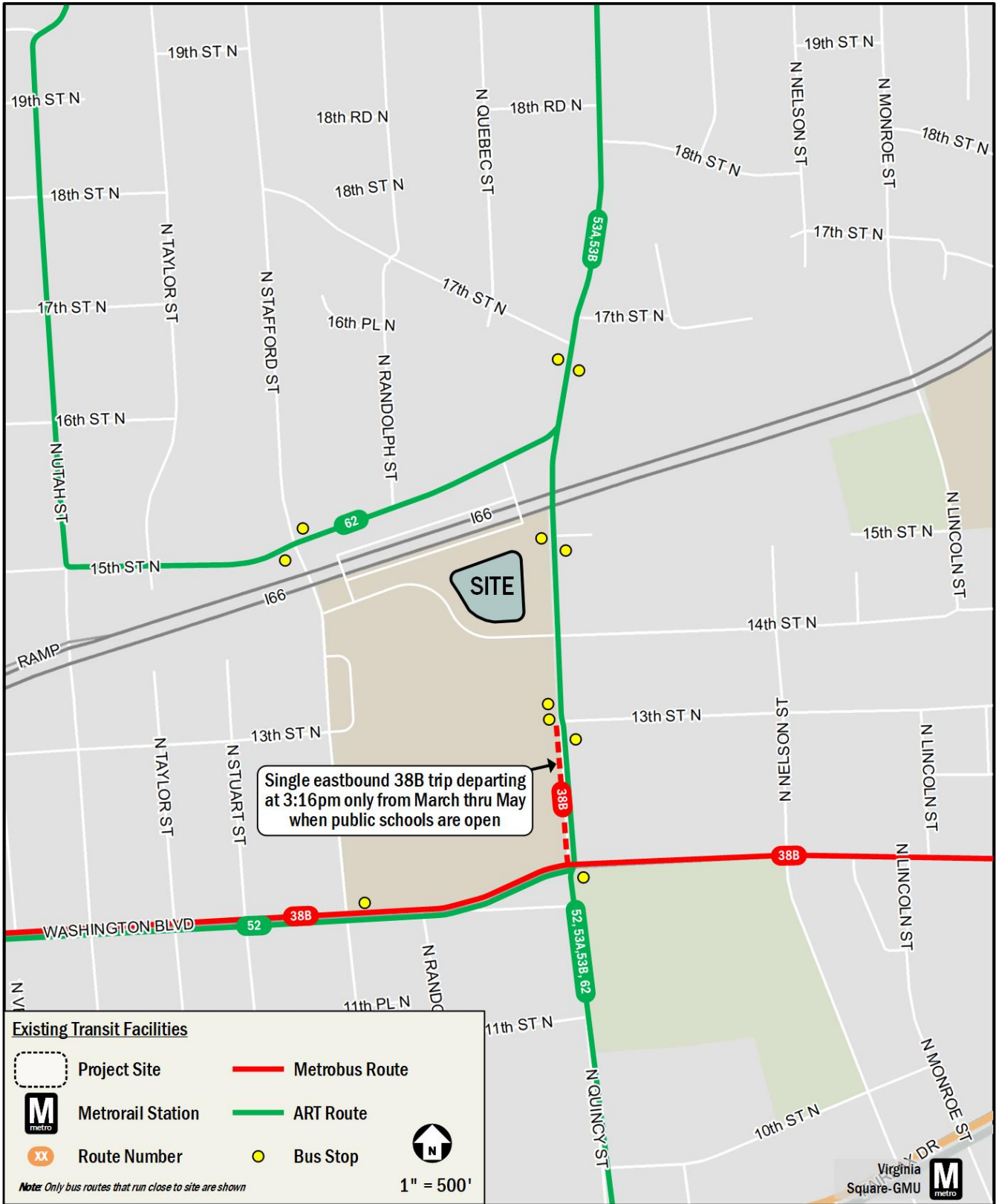


Figure 4: Existing Transit Facilities



## FUTURE PROJECTS

There are several local initiatives and approved developments in the vicinity of the site. These planned and proposed projects are summarized below.

### Local Initiatives

#### *Lee Highway and Washington Boulevard Bus Stop Consolidation and Accessibility Improvements*

This project's goal is to increase bus efficiency and improve bus stop quality, including bringing all bus stops into ADA compliance. Specific project elements include:

- Adding benches, shelters, lean bars, and scheduling information to bus stops
- Adding bus stop pads, ramps, curb extensions, and crosswalks near bus stops
- Consolidating bus stops to improve bus travel times
- Adding/enhancing pedestrian infrastructure to improve pedestrian and traffic safety

Construction began in 2018 and is scheduled to complete in summer 2019.

#### *I-66 Multimodal Improvements Inside the Beltway*

This project's goal is to move more people, enhance connectivity, and provide new travel choices along the I-66 corridor inside the Capital Beltway. Specific project elements include:

- Widening the eastbound lanes of I-66 between the Dulles Connector Road and Fairfax Drive
- Implementing peak period dynamic tolling on I-66 inside the Beltway

Construction of the new eastbound lane began in 2018 and is scheduled to complete in fall 2020. Peak period dynamic tolling is already in place.

#### *Washington Boulevard and N Nelson Street Intersection Safety Improvement*

This project's goal is to enhance pedestrian safety by installing a rectangular rapid flashing beacon (RRFB) at the Washington Boulevard crosswalk, as well as other crossing and curb improvements.

Construction is expected to occur in spring/summer 2019.

### Neighborhood Conservation (NC) Projects

The Neighborhood Conservation (NC) Program helps improve and enhance Arlington neighborhoods. When the program was created in 1964, the goal was to empower residents by having them come together to discuss and share ideas for improving their neighborhoods. Today, the program provides funding for a variety of improvements including: installation of sidewalks, curbs and gutters, streetlights, signs, park improvements, neighborhood art and beautification. This program empowers citizens to identify and plan projects in their own neighborhoods.

#### *13<sup>th</sup> Street North*

This project's goal is to improve pedestrian safety along 13<sup>th</sup> Street N between Kirkwood Road and N Johnson Street.

Specific project elements include:

- Adding a curb, gutter, and 4-foot wide sidewalk on the south side of 13<sup>th</sup> Street N
- Adding a curb and gutter on the north side of 13<sup>th</sup> Street N
- ADA compliant pedestrian ramps and driveway apron upgrades
- Adding a median pedestrian refuge at the intersection of Kirkwood Road and 13<sup>th</sup> Street N
- Adding "Narrow Street Ahead" signs to warn of limited right of way on 13<sup>th</sup> Street N
- No parking on either side of 13<sup>th</sup> Street N

Construction is expected to begin in late 2019.

### Planned Developments

There are several potential development projects in the vicinity of the Site. Of the background developments considered, five (5) were ultimately included and are described below. For the purpose of the capacity analysis and consistent with Arlington County and industry standards, only approved developments expected to be completed prior to the planned development with an origin/destination within the study area were included. Figure 6 shows the location of these developments in relation to the proposed development.

#### *4201 Fairfax Drive (Ballston Central United Methodist Church)*

This project consists of a redevelopment of the existing Ballston Central United Methodist Church structure into a new mixed-used building containing a 23,499 SF church and preschool space, 119 residential units, and 131 parking spaces. It is scheduled to open in 2020.





#### *4000 & 4040 Fairfax Drive (Carpool and Webb Building)*

This project consists of a new multi-use building containing 330 residential units, 8,400 SF of ground floor retail, and 264 parking spaces. It is currently under construction and scheduled to open in 2020.

#### *Clarendon West (Red Top Cab Properties)*

This project consists of three (3) new multi-use buildings containing 584 residential units and 1,295 SF of retail. The buildings are expected to open in 2021.

#### *Washington & Kirkwood (11<sup>th</sup> Street Properties)*

This project consists of a new residential building containing approximately 247 residential units and a two-level underground parking garage. Its opening year has not been determined yet, but for purposes of this analysis it was assumed to be completed and opened before the Education Center project.

#### *3445 Washington Boulevard (American Legion/APAH)*

This project consists of a new residential building containing approximately 161 residential units and 96 underground parking spaces. Its opening year has not been determined yet, but for purposes of this analysis it was assumed to be completed and opened before the Education Center project.

#### *JFAC/Buck Property*

In addition to these five developments that were included in the capacity analyses for this MMTA, another nearby development that does not meet these criteria was also reviewed and incorporated into other aspects of the MMTA. This project is the Joint Facility Advisory Committee's (JFAC) review of the North Quincy Street Development (formerly the Buck Property). The County completed the acquisition of the North Quincy Street Development (formerly known as the Buck Property) on Nov. 20, 2017. Located across the street from Washington-Lee High School, the 6.1 acre site, zoned for light industrial and commercial uses, contains two warehouses and two buildings used as offices.

The County has placed near-term uses on the Buck property, including storing equipment and vehicles. This activity was captured in the existing traffic counts. The JFAC is currently reviewing long-term uses for the site, but the timeline for long-term changes has them opening long after the Education Center project is completed and open. Thus, traffic from long-term uses at the Buck property were not included in the capacity analyses. The Buck property project itself will be performing a transportation study (MMTA), which will include various long-term scenarios and the traffic projections for the Education Center project included in this MMTA.

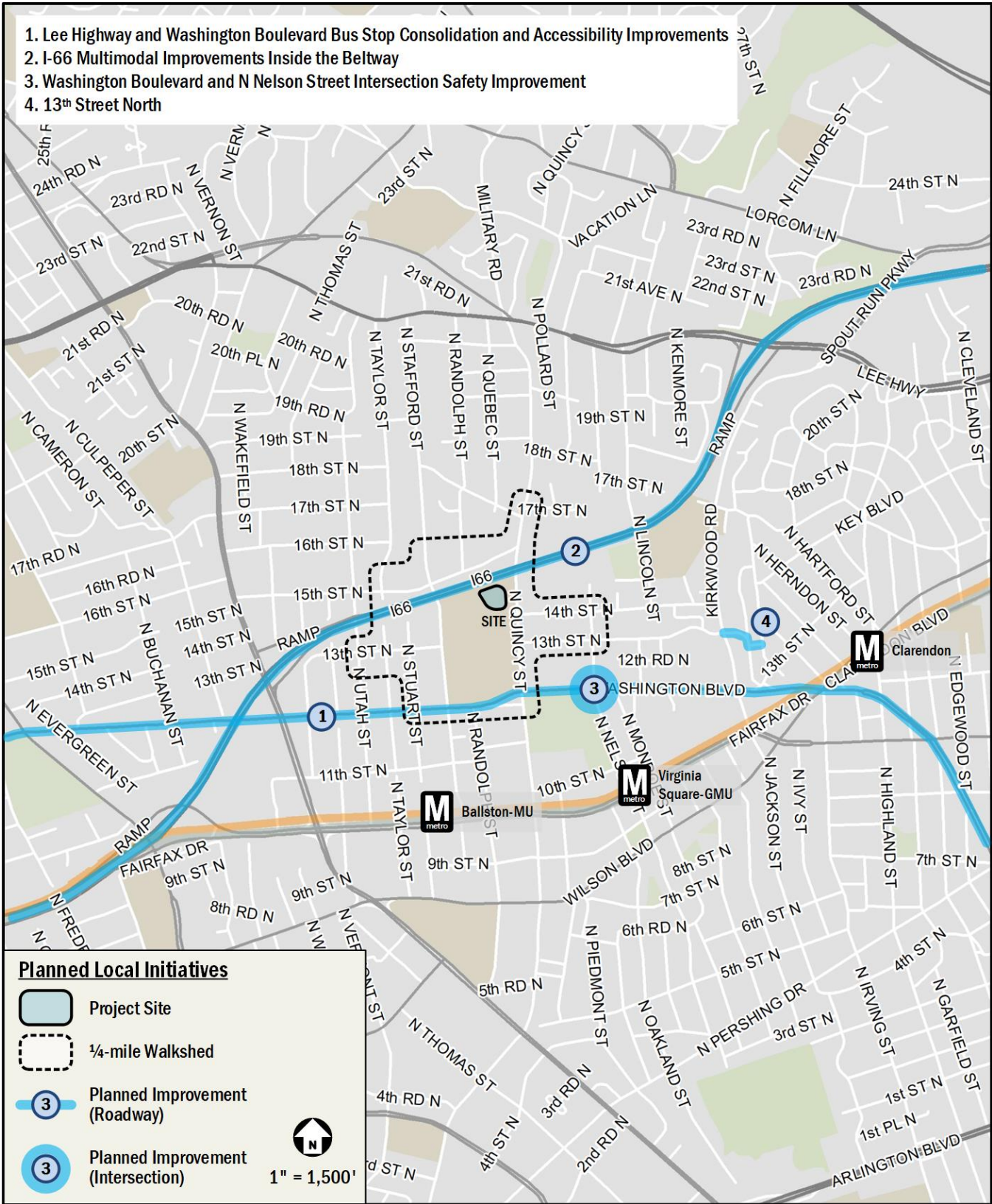


Figure 5: Map of Local Initiatives



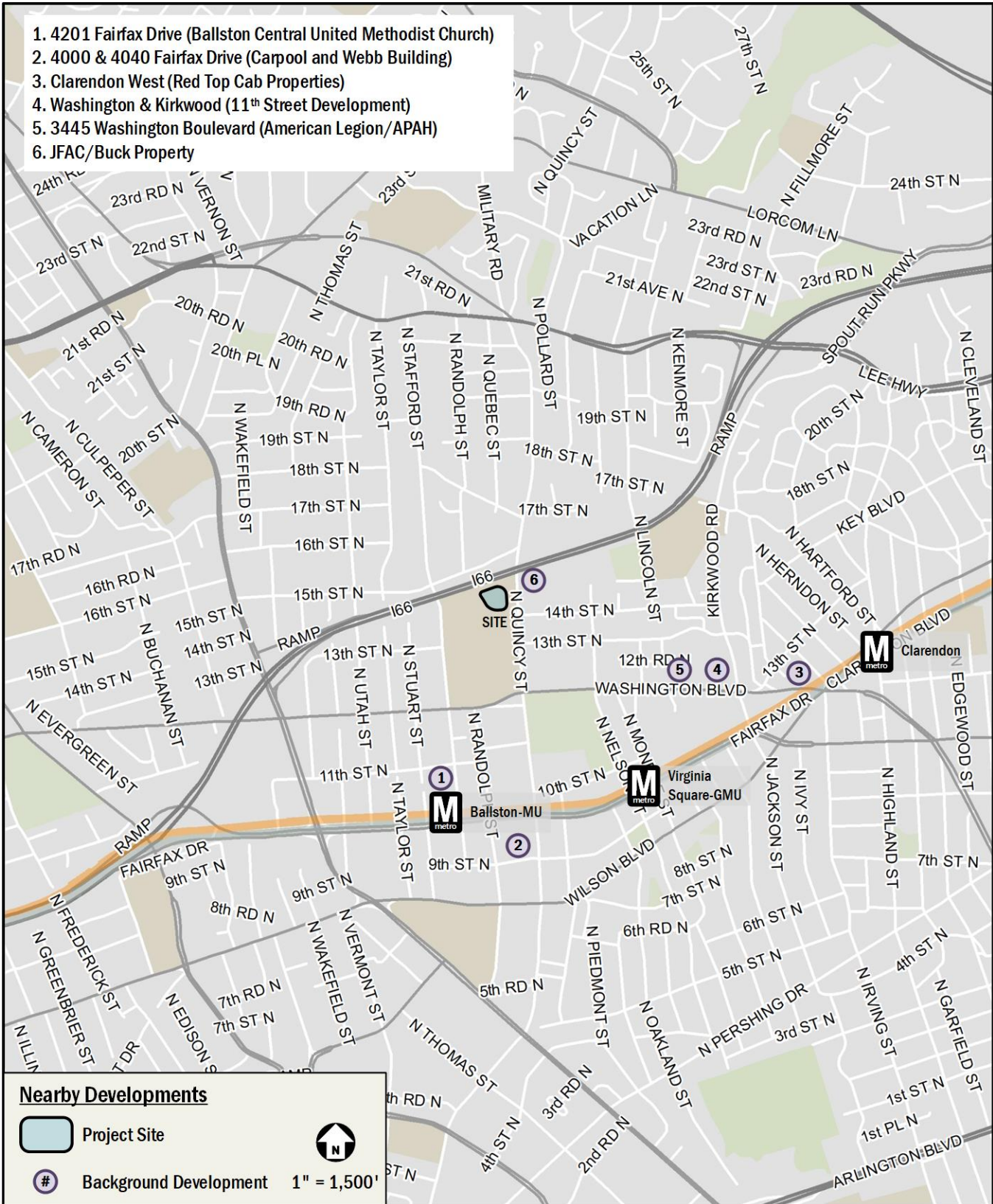


Figure 6: Map of Nearby Developments

## PROJECT DESIGN

This section reviews the transportation components of the APS Education Center project. This includes an overview of how the site will be accessed by various users and how each mode is accommodated.

The project consists of renovating the existing Education Center building by adding 500 to 600 high school seats and converting it from its current configuration as an office building to a school instructional facility. The APS Education Center conversion is included in the APS Strategic Plan. This report is based on a conceptual design approved by the School Board and developed by APS, the design team, and the BLPC (Building Level Planning Committee) and PRFC (Public Facilities Review Committee).

### PROJECT OVERVIEW

The Washington-Lee High School campus site is currently home to:

- The APS Education Center, previously used for APS offices
- Washington-Lee High School
- The David M. Brown Planetarium
- A recreational area with several athletic fields

The plan to repurpose the Education Center as an instructional facility involves the closure of the Education Center and the David M. Brown Planetarium during construction, both to reopen after construction. Washington-Lee High School and the athletic fields will remain open during construction.

### TRANSPORTATION STRATEGY

Establishing an instructional facility at the Education Center presents an opportunity to optimize transportation operations at the site it shares with Washington-Lee High School. One of the general goals of this project is to provide flexibility in the type of educational program that can be housed in the Education Center building. When the Educational Center building reopens it will host an expansion of the Washington-Lee high school but in the future, it may be used for other programs like a separate school facility. Thus, although this MMTA makes recommendations primarily on how the building will function as an extension of Washington-Lee High School, it also considers how it may function in the future.

Specifically, this report proposes the following transportation strategy:

- Use existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand resulting from the project.
- Create a secondary set of school arrival/dismissal facilities near the Education Center, that can be used to supplement the entire campus or stand-alone is needed, including:
  - Add two (2) dispersed student drop-off/pick-up locations on 15<sup>th</sup> Street N and Washington Boulevard that relieve queueing at the existing N Stafford Street location and provides more convenient access to the Education Center building.
  - Add a second bus loading/unloading location in the Education Center parking lot that relieves queueing at the existing Generals' Way location and provides more convenient access to the Education Center building.

The recommendation to implement secondary pick-up/drop-off and bus loading/unloading areas provides flexibility to act as both an extension of the Washington-Lee High School transportation system, and as an independent system in case that need arises.

The recommendations contained within this MMTA are all based around this overall strategy.

### SITE ACCESS AND PARKING

This section reviews site access and parking concerns related to the project.

#### Visitor Parking

Under existing conditions, 50 spaces are reserved for visitor parking on the Washington-Lee High School campus, including 15 in the driveway at the school's front entrance off N Stafford Street, and 35 in the visitor lot south of the Education Center. Many of the spaces in the visitor lot south of the Education Center are reserved for pool visitors.

The peak existing visitor demand was 33 cars during the school day, much lower than the supply of 50 spaces (see the *Parking* section of this report for details on visitor demand). Thus, even after accommodating for an increase in demand based on the increase in population (up to 41 cars), no change to the amount of visitor parking is needed. Although an increase is not



needed, this MMTA is recommending an increase in school visitor parking close to the school's front door. During this project, concerns were expressed about how during the school day the only visitor access is on N Stafford Street at the school's front door, and as such using the visitor parking lot south of the Education Center building is not desirable for school visitors, leading them to fill up the lot near the front door and then proceed to park on N Stafford Street. Thus, this report recommends that either: (1) school visitors gain an additional entry point near the visitor parking lot south of the Education Center (and visitor parking can remain as it is today), or (2) more visitor parking spaces are designated on the N Quincy Street side of the campus closer to the school's front door. Potential spaces can be designated in area A of the parking deck. A final plan when more operational details on the school are known can be developed when the Parking Management Plan (PMP) for the school is established.

#### **Staff/Student Parking**

Staff/student parking demand under existing conditions is 381 spaces, including 189 for staff and 192 for students. As a result of the newly converted Education Center, staff/student parking demand is projected to increase to 236 spaces for staff and 240 for students, totaling a net increase of 95 parking spaces (see the *Travel Demand Assumptions* section of this report for details on these assumptions).

These future parking projections are based on linear growth of the existing parking demand for the school. The future parking demand may be lower, either through having fewer than 600 students, or through additional Transportation Demand Management (TDM) programs and policies. Thus, they represent worst-case projections of demand. If parking demand decreases due to TDM programs or other factors, all or a portion of the Education Center lot can be converted into recreational, educational, or other non-parking uses. See the *Parking* section of this report for more details on this recommendation.

This report recommends accommodating the new parking demand with existing parking facilities on site which are not fully utilized currently. According to peak period parking observations, there are approximately 178 unused parking spaces on or adjacent to the site, including:

- Approximately 30 parking spaces in the garage over Interstate 66

- Approximately 15 on-street parking spaces
- Approximately 128 parking spaces in the Education Center lot

#### **STUDENT DROP-OFF/PICK-UP**

Under existing conditions, student drop-off and pick-up operations occur in the driveway at the Washington-Lee High School front entrance off N Stafford Street, and along other streets near the front door. This report recommends creating additional drop-off/pick-up areas on eastbound 15<sup>th</sup> Street N between N Randolph Street and N Quincy Street, and westbound Washington Boulevard between N Randolph Street and N Quincy Street.

The proposed 15<sup>th</sup> Street N area has room to accommodate 12 to 19 vehicles loading or unloading at the same time, depending on how much curbside is used. The proposed Washington Boulevard area has room to accommodate 12 vehicles loading or unloading at the same time. The proposed drop-off/pick-up areas are shown in Figure 7. It is anticipated that when the school opens both areas will reserve 12 spaces for vehicles each, which can be modified if needed.

Establishing additional drop-off/pick-up areas also allows flexibility for future uses of the Education Center building. Whether the building is incorporated into Washington-Lee High School or established as a separate facility, the drop-off/pick-up areas can serve either function.

#### **BUS LOADING/UNLOADING**

Under existing conditions, bus loading and unloading operations occur along Generals' Way, with some buses at dismissal using N Stafford Street. While the APS Education Center project is unlikely to produce substantially greater bus demand, more buses can be accommodated by creating an additional bus loading/unloading area in the eastern drive aisle of the Education Center parking lot, parallel to N Quincy Street. This area has room to accommodate five buses loading or unloading at the same time. The proposed bus loading/unloading area is shown in Figure 7.

Establishing a bus loading/unloading area in the Education Center parking lot also allows flexibility for future uses of the Education Center building. Whether the building is incorporated into Washington-Lee High School or established





as a separate facility, the bus loading/unloading area can serve either function.

### GENERALS' WAY

Generals' way is the internal roadway through the campus connecting N Stafford Street and N Quincy Street north of the existing high school. It currently serves as access to the Interstate 66 parking garage from N Stafford Street and the visitor parking lot from N Quincy Street, and is one-way eastbound between those two parking facilities. During arrival and dismissal times it also serves as the primary school bus loading and unloading zone.

With addition of students at the Education Center building, there will be a significant increase in students crossing Generals' Way during the day. This report recommends closing Generals' Way to all non-school bus related traffic during school days to eliminate conflicts. The signs and markings at either end of Generals' Way between the parking access points should be reviewed and upgraded as necessary to enforce this restriction.

### LOADING

Freight loading operations will remain unchanged as a result of the APS Education Center project. Large delivery vehicles bringing goods to the Education Center building will use the loading facilities at the existing Washington-Lee building.

### BICYCLE FACILITIES

Currently, there are approximately 76 bicycle racks providing 152 short-term bicycle parking spaces across the Washington-Lee High School campus, including a large rack facility along N Stafford Street near the school's front entrance, and a smaller facility along Generals' Way.

Because bicycle parking demand is projected to grow to 158 spaces, it is recommended that more bicycle parking be added, including 30 bicycle spaces in the Education Center parking lot, 30 spaces in the I-66 parking garage, and six (6) spaces for staff in a storage room near the Education Center. Proposed bicycle parking areas are shown in Figure 7.

This MMTA recommends that the schematic design for the Education Center building explore ways to (1) cover some bicycle parking for students, (2) provide enhanced parking options for school staff (e.g. secured indoor parking), and (3)

provide shower/locker access for staff, possibly by utilizing existing facilities within the W-L High School.

### CONFLICTS AND MITIGATION

The addition of more students to the Washington-Lee High School campus in the Education Center building has potential impacts on the N Quincy St side of the campus. As such, this MMTA recommends several mitigation measures to minimize the impact these new and expanded transportation facilities will have.

Detailed descriptions of these recommendations are contained in the following chapters, but are summarized here:

- To help minimize conflicts in general on N Quincy Street, this report recommends Washington-Lee High School enhance its arrival and dismissal plans with specific instructions to not use N Quincy Street, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford Street side of campus today).
- The increased student population in the Education Center building will lead to more student crossings of N Quincy Street. This MMTA recommends enhancing the crosswalk at this location with a treatment that will alert drivers to pedestrian crossings. Industry research has shown that a Rectangular Rapid Flash Beacon (RRFB) is likely the optimal solution, but there is a chance it may not accomplish its objective. Thus, this MMTA also recommends that the RRFB's performance be monitored after the school is open for around 6 months to a year to ensure its effectiveness. This recommendation is detailed further in the *Pedestrian Facilities* section of this MMTA.



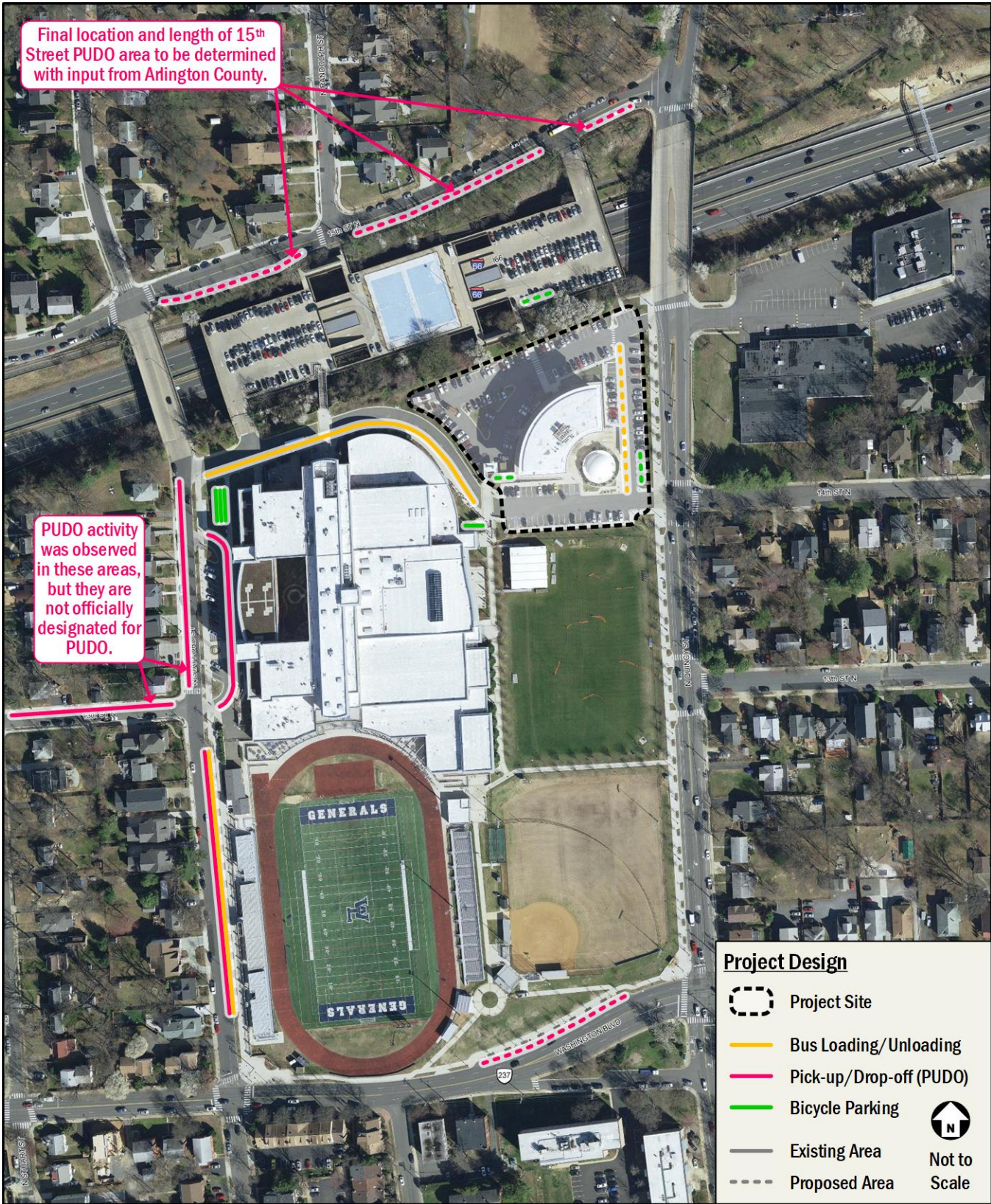


Figure 7: Project Design



## TRAVEL DEMAND ASSUMPTIONS

This section outlines the transportation demand of the proposed APS Education Center. This includes a review of APS Go! survey information, expected mode splits for staff and students, vehicular trip generation, and parking demand.

### MODE SPLIT

The main source of mode split information for this report was APS Go! survey data collected in 2016. These surveys included all APS schools and consisted of multiple surveys including student tallies, parent surveys, and staff surveys.

Table 1 summarizes the morning mode split data from these surveys, and Table 2 contains the afternoon mode split survey results. The surveys were summarized in two categories: (1) all APS schools and (2) Washington-Lee High School.

A similar summary was performed for staff using the APS Go! data, comparing all APS staff and Washington-Lee staff. This information is summarized in Table 3.

**Table 1: Student Morning Mode Split Survey Results**

Population	Morning Mode Split							
	PU/DO	Drive	Carpool	School Bus	Walk	Bike	Transit	Other
<b>All APS Students</b>								
9-10 Grade	28%	-	4%	41%	4%	20%	2%	1%
11-12 Grade	21%	17%	11%	32%	2%	15%	1%	1%
<b>Washington-Lee HS Students</b>								
9-10 Grade	24%	-	3%	42%	6%	23%	1%	1%
11-12 Grade	19%	15%	9%	34%	3%	17%	1%	2%

**Table 2: Student Afternoon Mode Split Survey Results**

Population	Afternoon Mode Split							
	PU/DO	Drive	Carpool	School Bus	Walk	Bike	Transit	Other
<b>All APS Students</b>								
9-10 Grade	22%	-	3%	42%	4%	26%	2%	1%
11-12 Grade	14%	18%	9%	34%	2%	20%	1%	2%
<b>Washington-Lee HS Students</b>								
9-10 Grade	19%	-	3%	40%	7%	29%	2%	-
11-12 Grade	13%	16%	7%	33%	3%	24%	1%	3%

The review of student mode splits shows that the Washington-Lee high school population has slightly lower rates of being dropped-off/picked-up and driving to school as other APS high school facilities, with slightly higher rates of using the school bus and cycling.

**Table 3: Staff Mode Split Survey Results**

Population	Mode					
	Auto	Carpool	Walk	Bike	Transit	Other
<b>All APS Staff</b>	85%	3%	4%	3%	5%	-
<b>Washington-Lee HS Staff</b>	73%	3%	8%	8%	7%	1%

The staff mode splits show that Washington-Lee staff drive to school at lower rates than the average APS employee, with an increased percentage of walkers, cyclists and transit riders.

This MMTA assumes that the expanded student and staff population at the Education Center will have the same mode splits at the existing Washington-Lee staff and student populations. It is likely that the APS Go! program will continue to be a success and reduce the percentage of people that drive to campus, but this MMTA assumes this percentage will remain the same in order to make a more conservative assumption and ensure that all potential impacts from the project are considered.

### PARKING DEMAND

The impact of the Education Center project will increase parking demand on the Washington-Lee campus, increasing student, staff, and visitor parking demand. This MMTA assumes that each category of demand will increase linearly by 25%, due to the 25% increase in student population. Table 4 provides a summary of existing and future parking demand.

**Table 4: Parking Demand Summary**

Population	Population/Parking Demand	
	Existing	Future
<b>Students</b>		
Population	2,400 Students	3,000 Students
Parking Demand	192 spaces	240 spaces
<b>Staff</b>		
Population	220 Employees	275 Employees
Parking Demand	189 spaces	236 spaces
<b>Visitor Parking (during school hours)</b>	<b>33 spaces</b>	<b>41 spaces</b>

(see Parking section of this MMTA for more details)



As stated above, these future parking projections are based on linear growth of the existing parking demand for the school. The future parking demand may be lower, either through having fewer than 600 students, or through additional Transportation Demand Management (TDM) programs and policies. Thus, they represent worst-case projections of demand.

### TRIP GENERATION

The vehicular trip generation for this project considers the land use change of the existing APS building from office space to high school instructional space. This includes the addition of 600 students to Washington-Lee High School, increasing the total number of students from 2,400 to 3,000, or a 25% increase.

The following steps were taken to establish the trip generation for the proposed development:

- 1) Existing school driveway counts were taken in May and June 2017 as part of the Washington-Lee Performance Monitoring Report. These 24-hour counts were taken over eight school days and included all school pickup/drop/off points, parking areas, and driveways. These counts include APS Education Center

related traffic, as it was occupied as an office building at the time.

- 2) To isolate the existing Washington-Lee High School trips, the APS Education Center related trips were removed from the driveway counts. These trips were calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 9<sup>th</sup> Edition, using ITE Land Uses 210 (General Office), using a 40% non-auto reduction derived from American Community Survey (ACS) 5-year estimates of the site census tract.
- 3) The now-isolated existing high school auto trips were grown by 25% to account for the 25% increase in student and staff populations.

Using a 25% linear growth in trip generation provides a worst-case scenario and a conservative analysis. The future trip generation may be lower, either through having fewer than 600 students, or through additional Transportation Demand Management (TDM) programs and policies.

Table 5 contains a summary of the project's trip generation.

**Table 5: Trip Generation Summary**

Land Use	ITE Code	Size	Weekday										
			AM Peak Hour			PM School Dismissal Peak Hour			PM Commuter Peak Hour			Daily	
			In	Out	Tot.	In	Out	Tot.	In	Out	Tot.	Total	
<b>Existing High School/Office Counts, May/June 2017</b>													
High School, APS Office		2400 Students	532	267	799	152	331	483	170	146	316	4,343	
<b>Existing Office</b>													
General Office	710	53 kSF	101	14	115	40	66	106	23	115	138	812	
Non-Auto Reduction (Office) - 40%		-0.4	-40	-6	-46	-16	-26	-42	-9	-46	-55	-325	
<i>Subtotal (Existing Office Vehicle Trips)</i>			<i>61</i>	<i>8</i>	<i>69</i>	<i>24</i>	<i>40</i>	<i>63</i>	<i>14</i>	<i>69</i>	<i>83</i>	<i>487</i>	
Existing Counts Minus ITE Office Trips			-61	-8	-69	-24	-40	-63	-14	-69	-83	-487	
<i>Subtotal (Existing High School Vehicle Trips)</i>			<i>471</i>	<i>259</i>	<i>730</i>	<i>128</i>	<i>291</i>	<i>420</i>	<i>156</i>	<i>77</i>	<i>233</i>	<i>3,856</i>	
<b>Proposed High School</b>													
High School		600 Students	589	323	912	160	364	524	195	96	292	4,820	
<b>Net Site Trips (Proposed High School Vehicle Trips minus Existing High School Vehicle Trips)</b>			<b>118</b>	<b>64</b>	<b>182</b>	<b>32</b>	<b>73</b>	<b>104</b>	<b>39</b>	<b>19</b>	<b>58</b>	<b>964</b>	

Non-Auto Reductions were derived from Census Tract data provided by ACS 5-year estimates for office use and survey responses of staff at Washington Lee High School. The proposed High School Trip Generation rates utilized a growth factor calculated as a ratio between existing and future staff numbers.



## TRAFFIC OPERATIONS

This section summarizes an analysis of the existing and future roadway capacity in the study area. Included is an analysis of potential vehicular impacts of the project and a discussion of potential improvements.

The purpose of the capacity analysis is to:

- Determine the existing capacity of the study area roadways;
- Determine the overall impact of the proposed project on the study area roadways; and
- Discuss potential improvements and mitigation measures to accommodate the additional vehicular trips

The following conclusions are reached within this chapter:

- The existing study area intersections all operate at acceptable levels of service and delay, with a few exceptions. These are at side streets approaching N Quincy Street, where vehicles have difficulty finding gaps in traffic to make turns.
- The future scenarios show similar results, with the areas with poor Levels of Service on side streets getting slightly worse.
- This report reviewed several ways to lower delays for drivers at these locations but does not recommend any traffic mitigation measures for the project because there would be negative impacts to other modes (mainly walking), and the benefit would not impact enough drivers to be worth these impacts.

### STUDY AREA, SCOPE, & METHODOLOGY

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

#### Capacity Analysis Scenarios

The vehicular analyses were performed to determine if the proposed development will lead to adverse impacts on traffic

operations. (A review of impacts to each of other modes is provided later in this report.) This was accomplished by comparing future scenarios: (1) without the proposed project (referred to as the Background condition), and (2) with volumes generated by the project (referred to as the Total Future condition).

As per this report's scoping agreement, the roadway capacity analysis examined the following scenarios:

1. 2018 Existing Conditions
2. 2021 Background Conditions without project traffic
3. 2021 Total Future Conditions with project traffic

Each scenario contains three distinct hours of analysis:

1. The AM commuter/school peak hour
2. The PM school dismissal peak hour,
3. The PM commuter peak hour

#### Study Area

The study area is a list of intersections where detailed capacity analyses were performed for the scenarios listed above. They represent the intersections most likely to have potential impacts or require changes to traffic operations to accommodate the proposed project. Although it is possible that impacts will occur outside of the study area, those impacts are not significant enough to be considered a negative impact nor worthy of mitigation measures.

The study area intersections are based on the projected future trip generation and the location of site access points. As agreed to in this report's scoping agreement, the following intersections were included:

1. N Quincy Street/15th Street N
2. N Quincy Street/Parking Lot Entrance
3. N Quincy Street/14th Street N/Site Driveway
4. N Quincy Street/13th Street N
5. N Quincy Street/Washington Boulevard
6. N Randolph Street/Washington Boulevard
7. N Stafford Street/Washington Boulevard
8. N Stafford Street/13th Street N/PU-DO Entrance
9. N Stafford Street/PU-DO Exit
10. N Stafford Street/Generals' Way
11. N Stafford Street/15th Street N
12. 15th Street N/Parking Garage Entrance



Figure 8 shows a map of the study area intersections.

### 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, which was collected on Tuesday, May 8, 2018 and Thursday, September 20, 2018. The results of the traffic counts are included in the Technical Appendix.

For the AM commuter/school and PM commuter peak hours, the system peak of the study area intersections was used. This was 7:30 AM to 8:30 AM for the AM peak, and 5:15 PM to 6:15 PM in the PM peak. For the PM school dismissal peak hour, the counts from 3:00 PM to 4:00 PM were used based on the school’s afternoon bell time of 3:01 PM. The existing peak hour traffic volumes are shown on Figure 12.

#### 2021 Background Volumes (without the Project)

The traffic projections for the 2021 Background conditions consist of the existing volumes with two additions:

- Traffic generated by developments expected to be completed prior to the project (known as background developments); and
- Inherent growth on the roadway (representing regional traffic growth).

Following national and local methodologies, a background development must meet the following criteria to be incorporated into the analysis:

- Be located in the study area, defined as having an origin or destination point within the cluster of study area intersections;
- Have entitlements; and
- Have a construction completion date prior or close to the proposed development.

Based on these criteria, and as discussed previously, five (5) developments were included in the 2021 Background scenario. These projects are:

1. 4201 Fairfax Drive (Ballston Central United Methodist Church)

2. 4000 & 4040 Fairfax Drive (Carpool and Webb Building)
3. Clarendon West (Red Top Cap Properties)
4. Washington & Kirkwood (11th Street Development)
5. 3445 Washington Boulevard (American Legion/APAH)

There are existing studies available for each of these developments. Trip distribution assumptions for each background development was based on their respective study and altered where necessary based on anticipated travel patterns. A trip generation summary for these developments is shown in Table 7.

While the background developments represent local traffic changes, regional traffic growth is typically accounted for using growth rates. The growth rates used in this analysis are derived using trends in historical counts. Table 6 shows a summary of the growth in traffic volumes on roadways adjacent to the study area. Based on this analysis an annual growth rate of 0.1% was assumed.

The traffic volumes generated by the inherent growth along the network were added to the existing traffic volumes in order to establish the 2021 Background traffic volumes. The Background peak hour traffic volumes are shown on Figure 13.

**Table 6: AADT Volume Trends**

Roadway	AADT					Annual % Change (2012 - 2016)
	2012	2013	2014	2015	2016	
<b>N Quincy St from SR 237 Fairfax Dr to Washington Blvd</b>	8,600	11,000	10,000	10,000	11,000	6.3%
<b>N Quincy St from Washington Blvd to 15<sup>th</sup> St N</b>	11,000	12,000	12,000	11,000	12,000	2.2%
<b>N Quincy St from 15<sup>th</sup> St N to Old Dominion Dr</b>	9,700	8,700	8,500	8,400	8,700	-2.7%
<b>Washington Blvd from Kirkwood Rd to N Glebe Rd</b>	20,000	18,000	18,000	18,000	18,000	-2.6%
<b>15<sup>th</sup> St N from Utah St to N Stafford St</b>	2,400	2,400	2,400	2,400	2,600	2.0%
<b>N Stafford St from 15<sup>th</sup> St N to Arlington Blvd</b>	3,800	3,600	3,600	3,500	3,500	-2.0%
<b>Average</b>						<b>0.1%</b>

\*Adjacent to proposed study area

Source: VDOT Traffic Data 2012 to 2016  
<http://www.virginiadot.org/info/ct-trafficcounts.asp>



**Table 7: Background Development Trip Generation**

Proposed Development	Trip Generation Methodology	Quantity	AM Peak Hour			PM School Dismissal Peak Hour			PM Commuter Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
<b>4201 Fairfax Drive (Ballston Central United Methodist Church)</b>	Based on Approved TIA	138 Dwelling Units	14	57	71	61	33	94	61	33	94
		<i>Minus Reductions</i>	-8	-30	-38	-33	-17	-50	-33	-17	-50
		Residential Total	6	27	33	28	16	44	28	16	44
		23,499 SF Church/Preschool	18	3	21	16	8	24	16	8	24
		Church/Preschool Total	18	3	21	16	8	24	16	8	24
<b>Total Trips</b>	<b>24</b>	<b>30</b>	<b>54</b>	<b>44</b>	<b>24</b>	<b>68</b>	<b>44</b>	<b>24</b>	<b>68</b>		
<b>4000 &amp; 4040 Fairfax Drive (Carpool and Webb Building)</b>	Based on Approved TIA	330 Dwelling Units	33	132	165	129	70	199	129	70	199
		<i>Minus Reductions</i>	-17	-67	-84	-66	-36	-102	-66	-36	-102
		Residential Total	16	65	81	63	34	97	63	34	97
		8,000 SF Retail	20	13	33	22	18	40	22	18	40
		<i>Minus Reductions</i>	-13	-8	-21	-15	-12	-27	-15	-12	-27
		Retail Total	7	5	12	7	6	13	7	6	13
<i>Removal of existing trips</i>	0	0	0	-15	-18	-33	-15	-18	-33		
<b>Total Trips</b>	<b>23</b>	<b>70</b>	<b>93</b>	<b>55</b>	<b>22</b>	<b>77</b>	<b>55</b>	<b>22</b>	<b>77</b>		
<b>Clarendon West (Red Top Cab)</b>	Based on Approved TIA	584 Dwelling Units	60	237	297	236	138	374	236	138	374
		<i>Minus Reductions</i>	-39	-154	-193	-153	-90	-243	-153	-90	-243
		Residential Total	21	83	104	83	48	131	83	48	131
		1,295 SF Retail	6	7	13	11	14	25	11	14	25
		<i>Minus Reductions</i>	-5	-5	-10	-8	-11	-19	-8	-11	-19
Retail Total	1	2	3	3	3	6	3	3	6		
<b>Total Trips</b>	<b>22</b>	<b>85</b>	<b>107</b>	<b>86</b>	<b>51</b>	<b>137</b>	<b>86</b>	<b>51</b>	<b>137</b>		
<b>Washington and Kirkwood (11th Street Devel.)</b>	Based on Approved MMTA	254 Dwelling Units	26	102	128	102	55	157	102	55	157
		<i>Minus Reductions</i>	-11	145	-56	-45	-24	-69	-45	-24	-69
		Residential Total	15	57	72	57	31	88	57	31	88
		<i>Removal of existing trips</i>	-21	-14	-35	-43	-38	-81	-43	-38	-81
<b>Total Trips</b>	<b>-6</b>	<b>43</b>	<b>37</b>	<b>14</b>	<b>-7</b>	<b>7</b>	<b>14</b>	<b>-7</b>	<b>7</b>		
<b>3445 Washington Boulevard (American Legion/APAH)</b>	Based on Submitted MMTA	160 Dwelling Units	15	43	58	43	27	70	43	27	70
		<i>Minus Reductions</i>	-8	-24	-32	-24	-15	-39	-24	-15	-39
		Residential Total	7	19	26	19	12	31	19	12	31
		6,000 SF Legion Space	10	2	12	3	12	15	3	12	15
		<i>Minus Reductions</i>	0	0	0	0	0	0	0	0	0
Legion Total	10	2	12	3	12	15	3	12	15		
<b>Total Trips</b>	<b>17</b>	<b>21</b>	<b>38</b>	<b>22</b>	<b>24</b>	<b>46</b>	<b>22</b>	<b>24</b>	<b>46</b>		
<b>Net Background Site Trips</b>			<b>80</b>	<b>249</b>	<b>329</b>	<b>221</b>	<b>114</b>	<b>335</b>	<b>221</b>	<b>114</b>	<b>335</b>

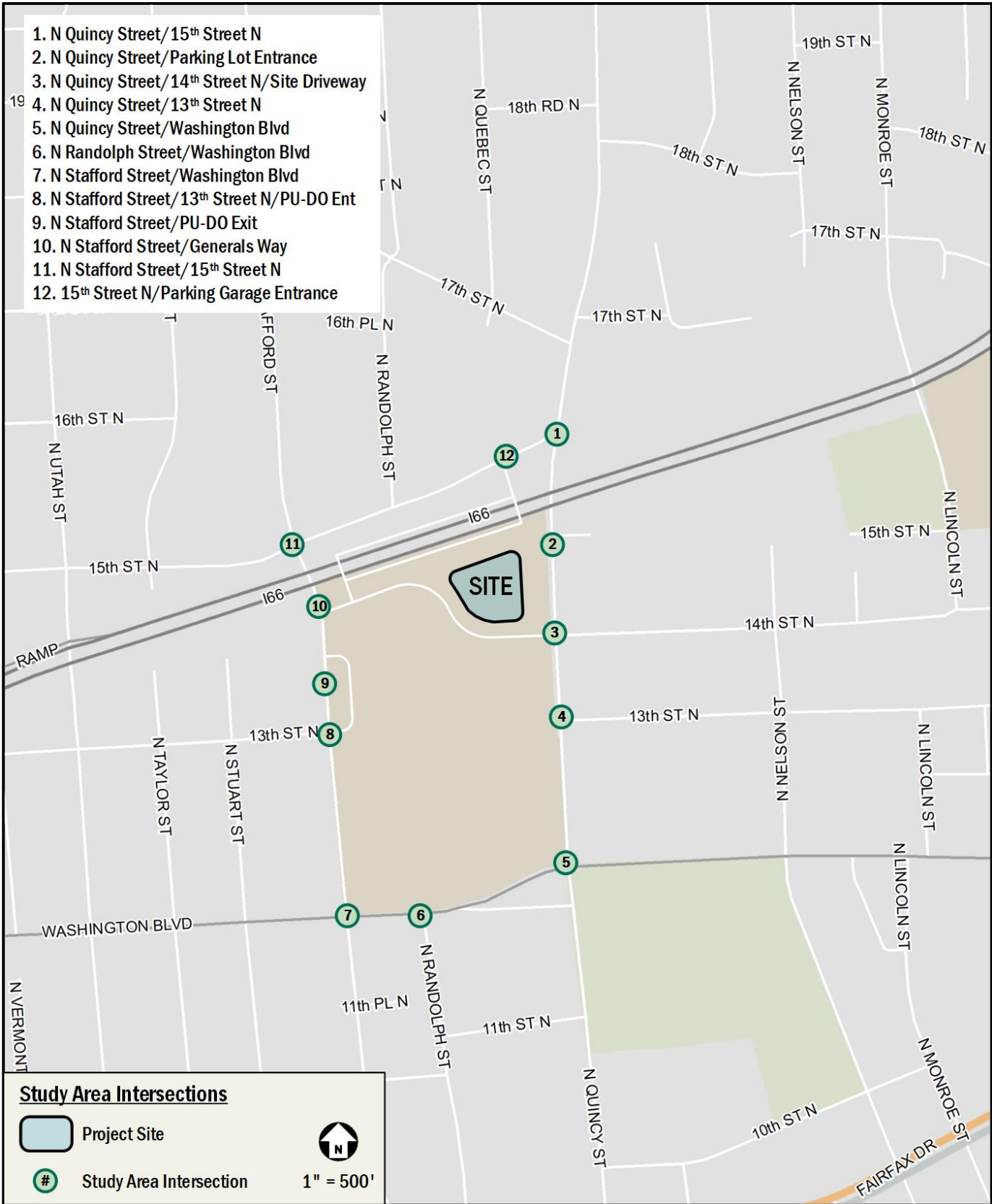


Figure 8: Study Area Intersections





### *2021 Total Future Volumes (with Project)*

The 2021 Total Future Volumes consist of the 2021 Background volumes with the addition of the traffic volumes generated by the project.

The proposed project's trip generation methodology was presented in the Travel Demand Assumptions chapter of this MMTA. First, trips associated with the previously occupied APS Education Center office building were removed from the 2017 driveway counts taken at Washington-Lee High School using ITE trip generation methodology to establish the "existing" trip generation of the site. Second, the "existing" trip generation of the site was grown by 25% to account for the 25% increase in the overall population of the student and staff population, representing net new traffic. Finally, the net new traffic generated by the proposed project was added to the network.

As detailed in the Project Design and Travel Demand Assumptions sections of this report, proposed changes to staff and students parking, and student drop-off and pickup will slightly alter the destination of inbound and origin of outbound vehicular trips as compared to existing conditions:

- The destination of inbound and origin of outbound vehicular trips attributable to the new staff that will drive to the site was the existing Education Center parking lot that will be made available for staff parking;
- The destinations of inbound and origins of outbound vehicular trips attributable to the new students that drive to the site were the available on-street unrestricted parking on 15<sup>th</sup> Street and available parking spaces within the garage;
- The destination of inbound and origin of outbound vehicle trips attributable to new students being dropped-off or picked-up at the site was the two areas along 15<sup>th</sup> Street N and Washington Boulevard that will be designated as dispersed drop-off/pick-up areas. In addition, some existing vehicle trips attributable to student drop-off and pickup currently occurring on N Stafford Street were rerouted to the two dispersed drop-off/pick-up areas to account for the "shifting of student density" that will occur with the addition of 600 students in the APS Education Building; and
- The destinations of inbound and origins of outbound new vehicular trips attributable to after-school activities (new vehicular trips generated during the PM

commuter peak hour) were the surface lots, garage, and on-street parking proximate to the site.

Distribution and routing assumptions were based on the Washington-Lee High School catchment area, traffic counts and existing volume patterns, and the Existing Conditions vehicular capacity analysis. Separate distributions for staff and students were developed: Figure 9 shows the inbound and outbound trip distribution for staff; Figure 10 shows the trip distribution for local traffic, representing all trips that have origins or destinations in the local neighborhood; and Figure 11 shows the trip distribution for the drop-off or pickup of students where parents continue to work or return from work.

### **Geometry and Operations Assumptions**

The following section reviews the roadway geometry and operations assumptions made and the methodologies used in the roadway capacity analyses.

#### *Existing Geometry and Operations*

Study area intersection geometry, lane configuration and additional infrastructure details were confirmed via field reconnaissance by Gorove/Slade.

For some intersections where wide travel lanes exist, observations were made on how traffic flowed through the intersection and the lane configuration was adjusted. For example, on the eastbound approach of 15<sup>th</sup> Street N and N Quincy Street there is technically only one lane, but high enough volumes and pavement width that in reality, right-turning vehicles squeeze by left-turning vehicles. Based on field observations this was coded in the traffic model as separate right- and left-turning lanes to better reflect actual conditions.

Traffic signal timings were provided by County staff and double-checked in the field. Figure 16 shows the lane configurations.

#### *2021 Background Geometry and Operations Assumptions*

Following industry standard methodologies, a background geometry improvement must be funded and have a construction completion date prior or close to the proposed development. Based on these criteria, no roadway geometry or operations changes are anticipated within the study area.

#### *2021 Total Future Geometry and Operations Assumptions*

No roadway geometry or operations changes are anticipated within the study area.

**Notes**

Distribution and routing assumptions are based on the survey results of WL HS Staff, including residential zip code information.

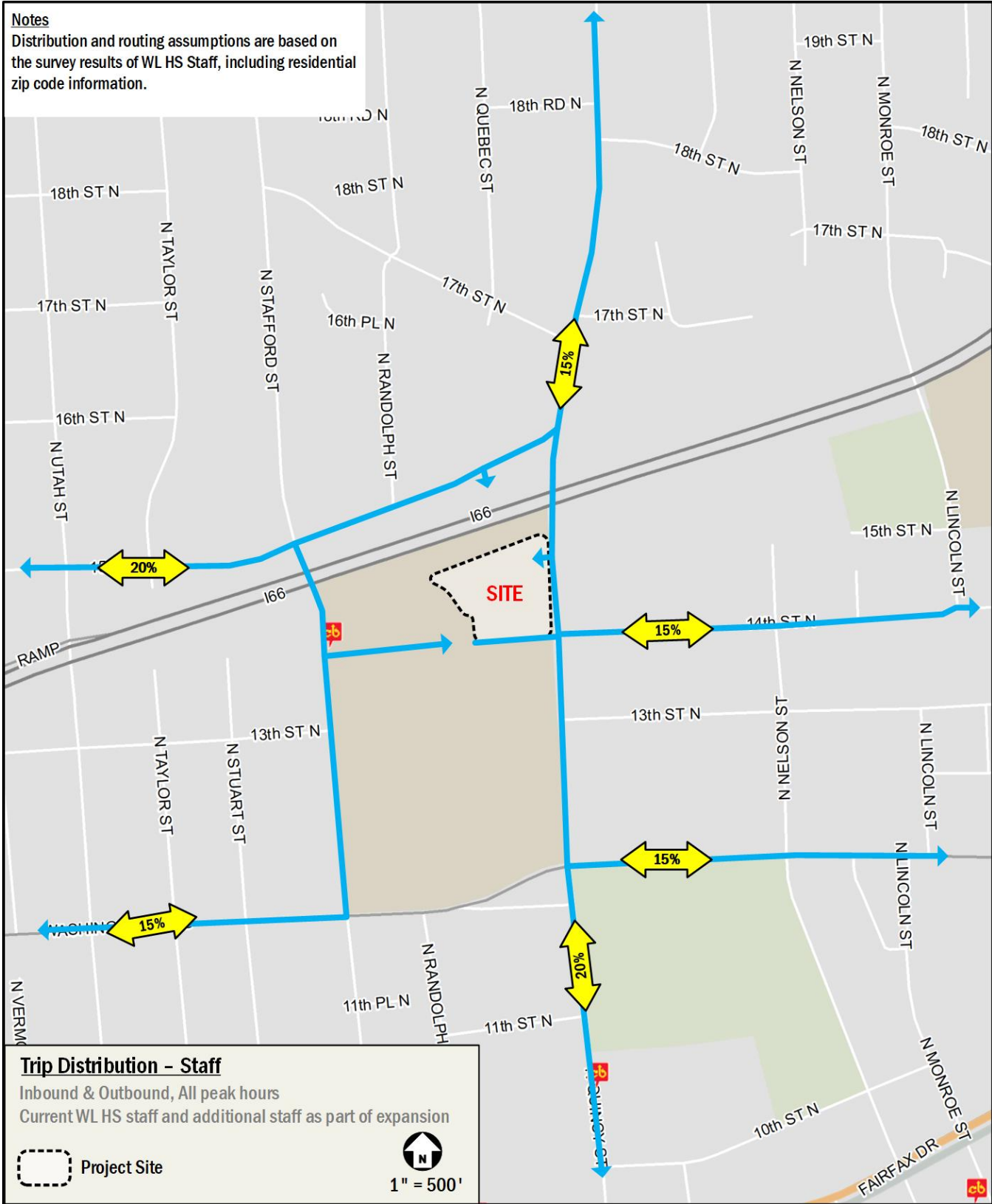


Figure 9: Staff Distribution

**Notes**

This local distribution is used for all trips expected to have origins/destinations in the local neighborhood (the HS catchment boundary).

**Trip Distribution - Local Traffic**

- Student Drop-off AM Peak Hour - Inbound
- Student Drop-off and Pickup PM School Peak Hour - Inbound & Outbound
- Student Pickup PM Peak Hour - Outbound
- Student Driver Inbound and Outbound
- School Visitor Inbound and Outbound

Project Site



1" = 500'

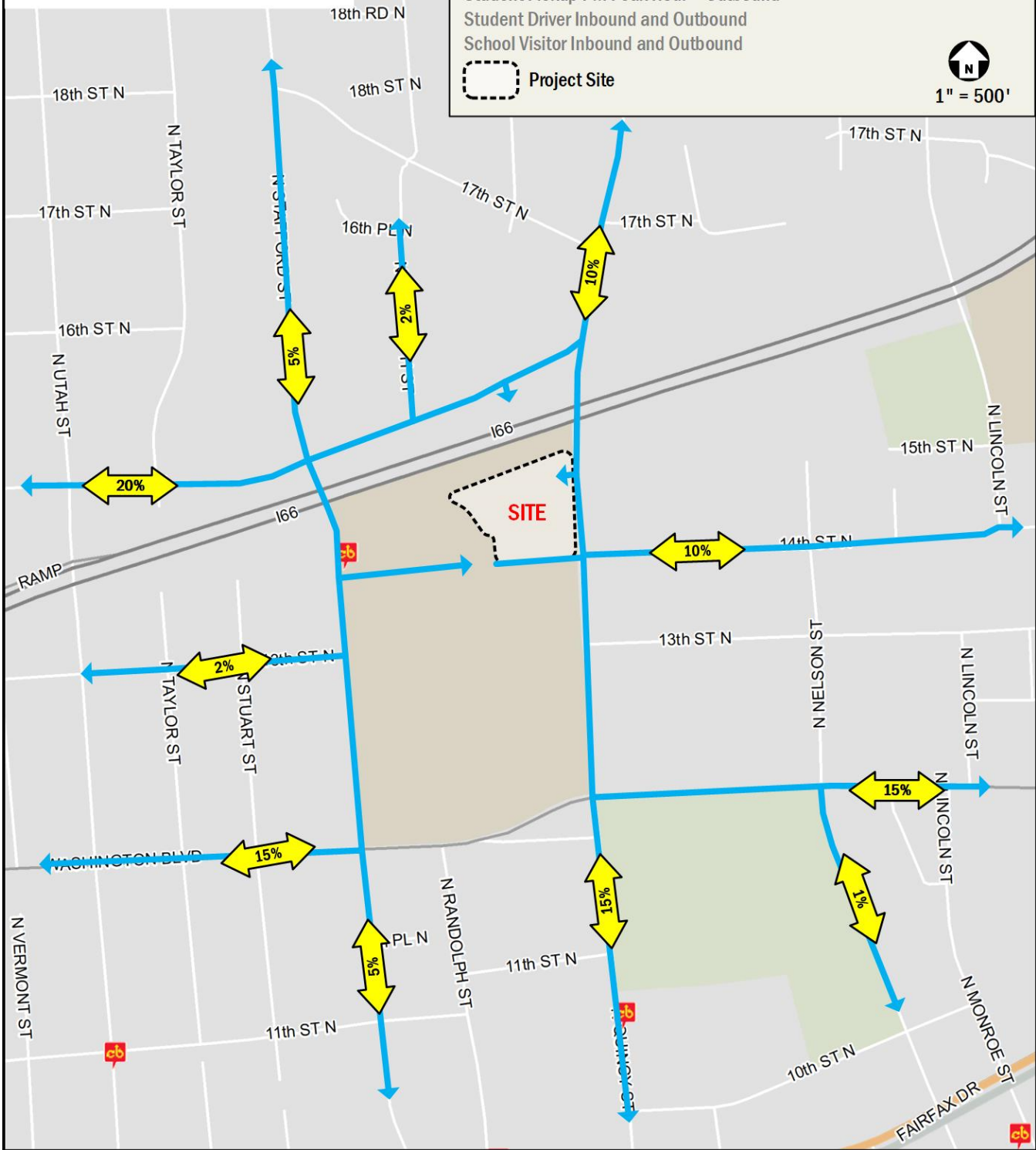


Figure 10: Local Traffic Distribution



**Notes**

Distribution and routing assumptions are based on the location of major employment centers in the region. This distribution is used for all trips expected to have origins/destinations both in the local neighborhood and at employment centers (i.e. it takes into account that some parents will head towards work after dropping-off their child at school, and the reverse in the evening).

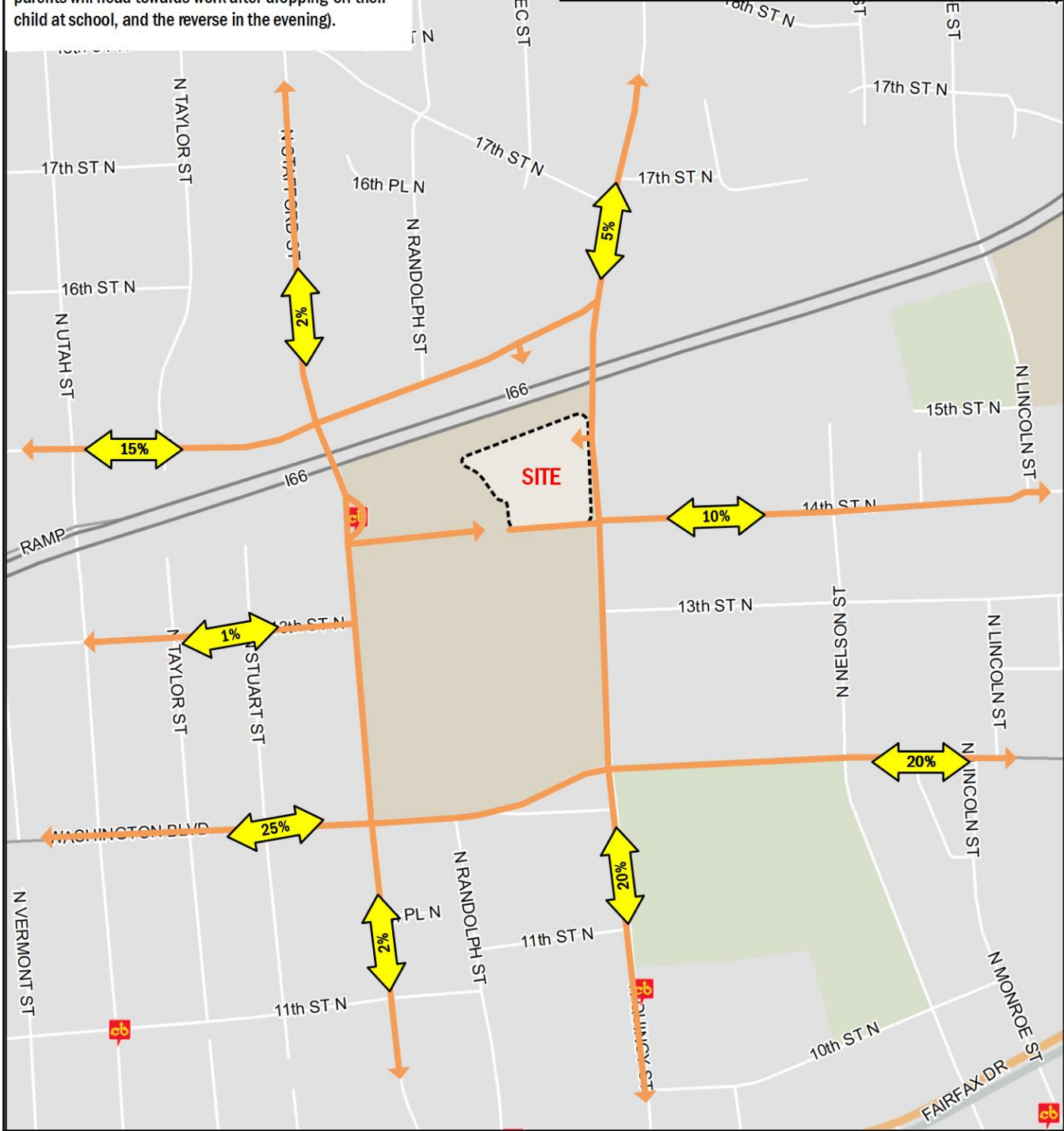
**Trip Distribution - Student Drop-Off/Pick-up**

Outbound, AM Peak Hour  
Inbound, PM Peak Hour

Project Site



1" = 500'



**Figure 11: Student Drop-Off/Pick-Up Distribution**



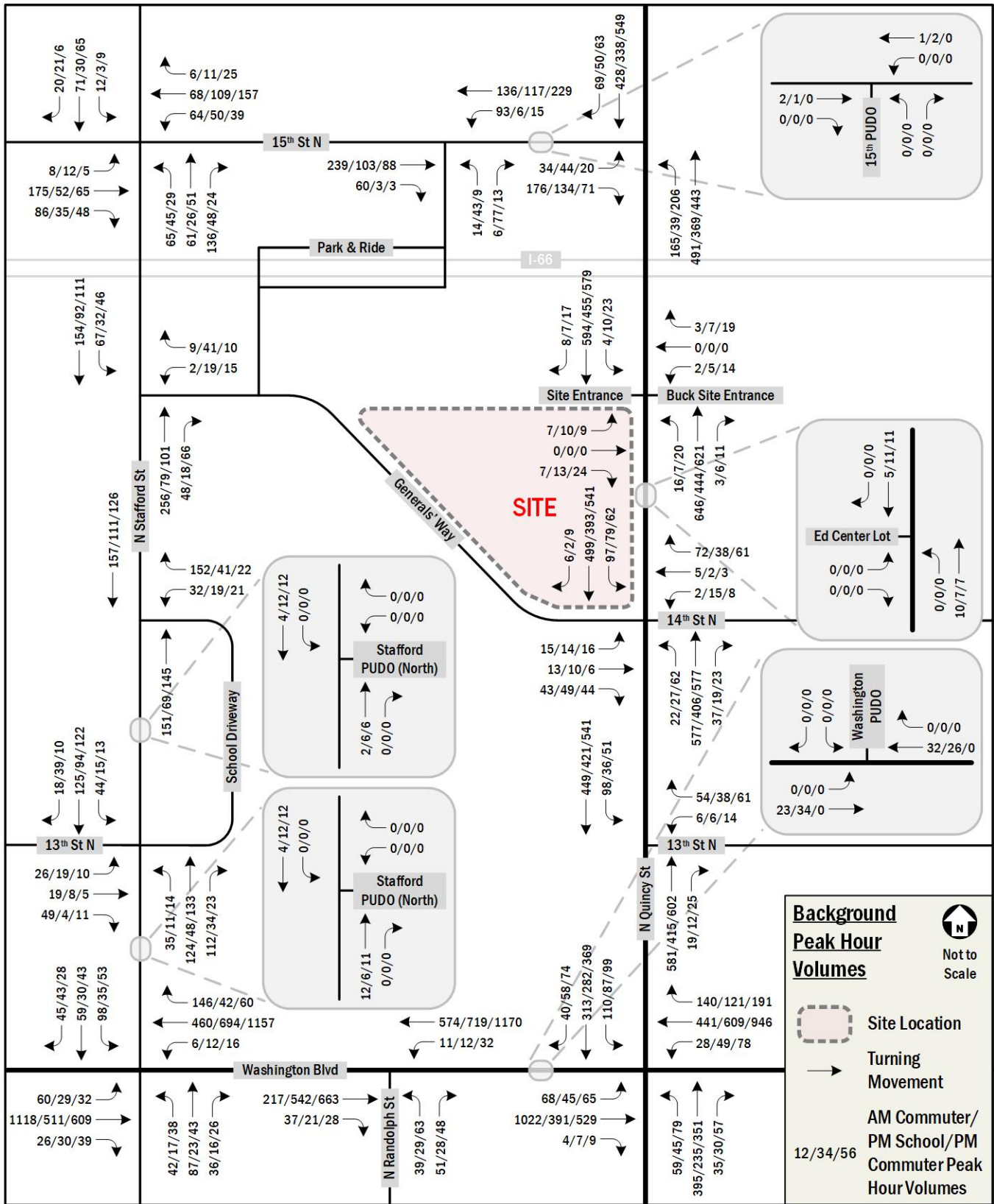


Figure 13: Background Peak Hour Volumes



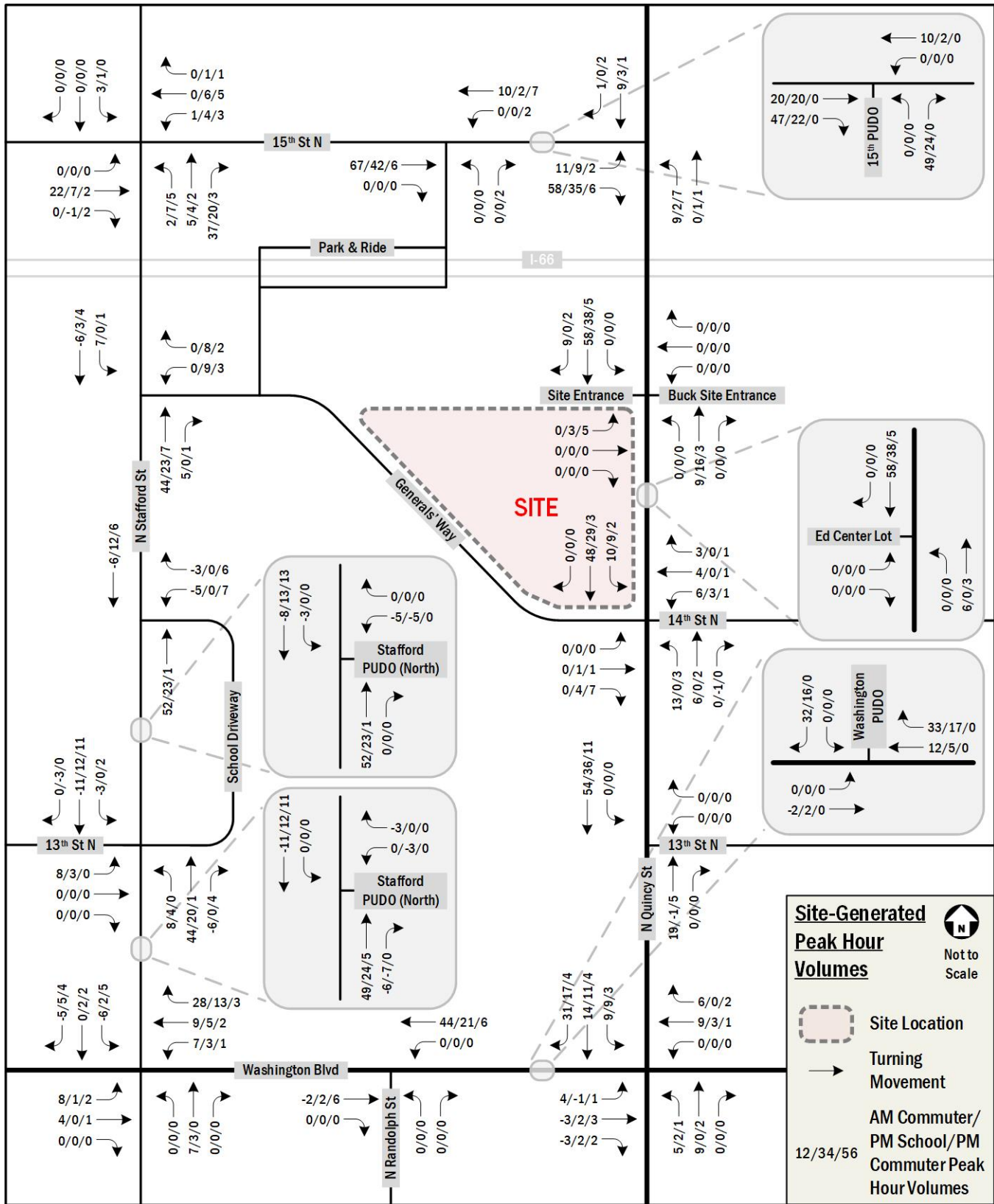


Figure 14: Site Generated Peak Hour Volumes



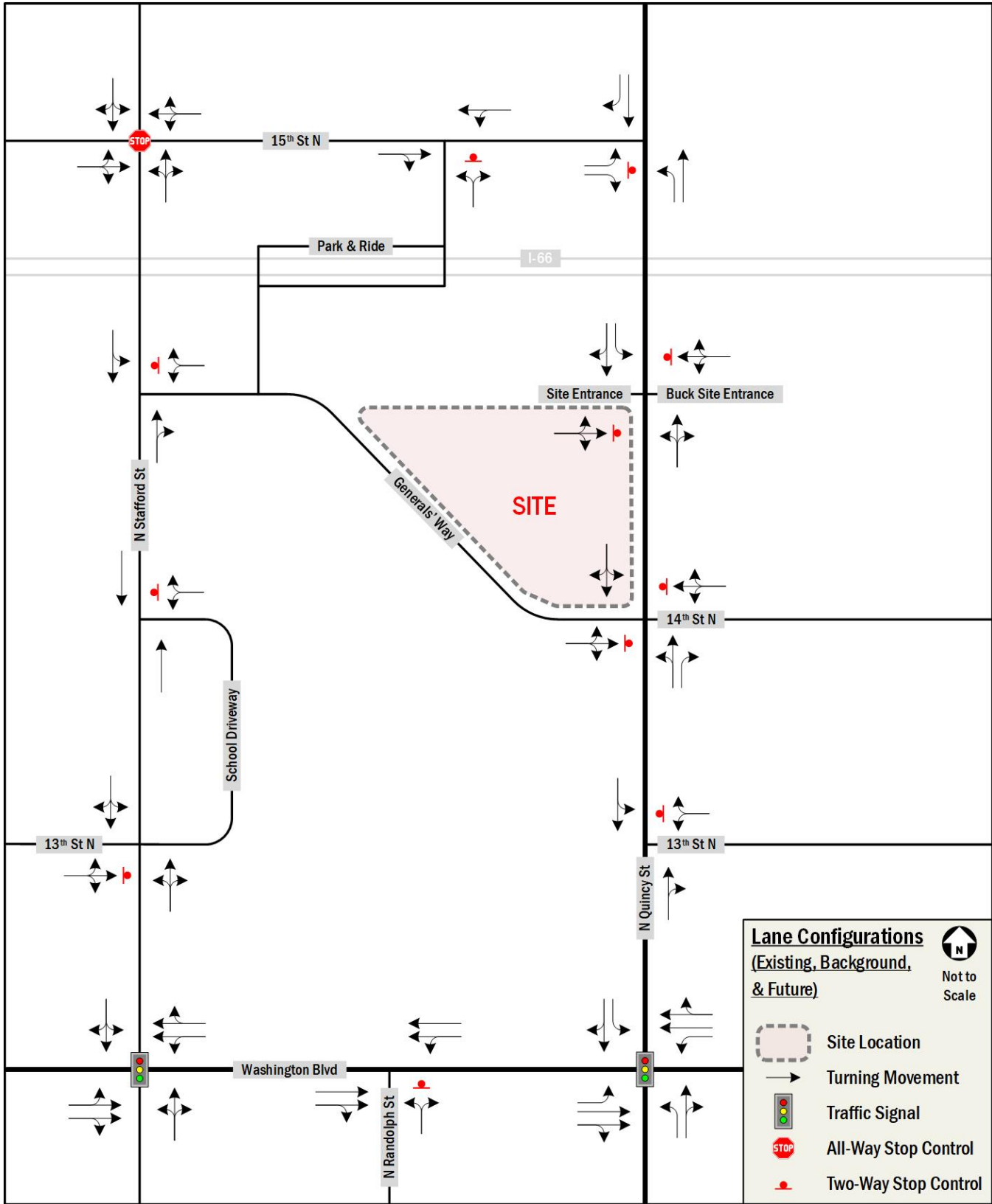


Figure 16: Lane Configurations



## VEHICULAR ANALYSIS RESULTS

### Intersection Capacity Analysis

Intersection capacity analyses were performed for the three scenarios outlined previously at the intersections within the study area during the morning and afternoon peak hours. *Synchro* version 9.1 was used to analyze the study intersections based on the *Highway Capacity Manual* (HCM) 2000 methodology.

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 D is typically used as the acceptable LOS threshold in the County; although LOS E or F is sometimes accepted in urbanized areas if vehicular improvements would be a detriment to safety or non-auto modes of transportation.

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 *Synchro* software). The average delay of each approach 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.

Table 8 shows the results of the capacity analyses. Detailed LOS descriptions and the analysis worksheets are contained in the Technical Appendix.

The results show that most study area intersections operate at acceptable conditions, with several exceptions which are highlighted in red on Table 8.

At several locations within the study area, there are slight improvements between existing and future conditions. This is due to two reasons. First, the methodology used in the analysis assumes a minimum peak hour factor of 0.92 in the future analysis years. At some locations, this caused slight improvements in delay and LOS. Secondly, the rerouting of some trips to account for school activities shifting from the N Stafford Street side of the site to the N Quincy Street side caused slight improvements in delay and LOS.

### Queuing Analysis

In addition to the capacity analyses presented above, a queuing analysis was performed at the study intersections. The queuing analysis was performed using *Synchro* software. The 50<sup>th</sup> percentile and 95<sup>th</sup> percentile queue lengths are shown for each lane group at the study area signalized intersections. The 50<sup>th</sup> percentile queue is the maximum back of queue on a median cycle. The 95<sup>th</sup> percentile queue is the maximum back of queue that is exceeded 5% of the time. For unsignalized intersections, only the 95<sup>th</sup> percentile queue is reported for each lane group (including free-flowing left turns and stop-controlled movements) based on the HCM 2000 calculations. HCM 2000 does not calculate queuing for all-way stops.

Table 11 shows the results of the queuing analysis. The queuing analyses show that all study intersections have acceptable queuing results, with all queues shorter than available storage lengths, with one exception at eastbound Washington Boulevard approaching N Stafford Drive.

### Mitigations

Based on County standards, the proposed project is determined to have an impact if any intersection or movement experiences a degradation to LOS E or F in the future scenario where one does not exist in the background scenario.

There are two (2) locations in the study area that meet this criterion:

- *N Quincy Street and School Driveway/Buck Property Driveway*

Under the 2021 Total Future Conditions, the delay for the eastbound movement increases to a LOS E in the AM peak hour scenario, as compared to LOS D in the Background Conditions.

Several mitigation measures including adding lanes or eliminating turns in or out of the driveway were explored at this location but are ultimately not recommended. The LOS at this intersection is typical of relatively low-volume driveways on arterials and any potential improvements that would widen this approach to accommodate additional turn lanes could improve the LOS for this approach, but those improvements would have negative impacts to other modes (especially given the low number of vehicular volumes on the side streets).



- *N Quincy Street and School Driveway/14<sup>th</sup> Street N*  
Under the 2021 Total Future Conditions, the delay for the westbound movement increases to a LOS E in the AM peak hour scenario, as compared to LOS C in the Background Conditions.

Several mitigation measures including adding lanes or eliminating turns in or out of the driveway were explored at this location but are ultimately not

recommended. The LOS at this intersection is typical of relatively low-volume driveways on arterials and any potential improvements that would widen this approach to accommodate additional turn lanes could improve the LOS for this approach, but those improvements would have negative impacts to other modes (especially given the low number of vehicular volumes on the side streets).





**Table 8: AM Peak Analysis Results**

Intersection/ Movement	AM Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Quincy Street &amp; 15th Street, N</b>						
Eastbound Left/Right	19.4	C	20.2	C	24.0	C
Northbound Left	9.5	A	9.5	A	2.5	A
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/Buck Site Driveway</b>						
Eastbound Left/Thru/Right	38.4	E	33.8	D	38.7	E
Westbound Left/Thru/Right	27.5	D	27.1	D	29.9	D
Northbound Left/Thru/Right	0.6	A	0.5	A	0.6	A
Southbound Left	9.6	A	9.4	A	9.5	A
Southbound Thru/Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/14th Street N</b>						
Eastbound Left/Thru/Right	83.1	F	63.9	F	109.7	F
Westbound Left/Thru/Right	21.0	C	19.7	C	45.0	E
Northbound Left/Thru	0.7	A	0.6	A	1.1	A
Northbound Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru/Right	3.2	A	3.0	A	3.3	A
<b>N Quincy Street &amp; 13th Street N</b>						
Westbound Left/Right	17.3	C	17.4	C	18.5	C
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	3.1	A	3.1	A	3.2	A
<b>N Quincy Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>21.2</b>	<b>C</b>	<b>20.8</b>	<b>C</b>	<b>21.7</b>	<b>C</b>
Eastbound Left	8.2	A	8.1	B	8.3	A
Eastbound Thru/Right	13.0	B	13.0	C	12.9	B
Westbound Left	16.0	B	17.2	B	17.1	B
Westbound Thru/Right	16.2	B	16.4	B	16.6	B
Northbound Left	26.1	C	25.6	C	27.7	C
Northbound Thru/Right	33.6	C	33.9	C	34.4	C
Southbound Left	42.8	D	40.4	D	46.1	D
Southbound Thru/Right	31.3	C	30.2	C	35.7	C
<b>N Randolph Street &amp; Washington Blvd</b>						
Eastbound Thru	0.0	A	0.0	A	0.0	A
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	1.0	A	1.1	A	0.9	A
Westbound Thru	0.0	A	0.0	A	0.0	A
Northbound Left/Right	26.1	D	23.2	C	23.6	C
<b>N Stafford Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>17.4</b>	<b>B</b>	<b>16.9</b>	<b>B</b>	<b>16.3</b>	<b>B</b>
Eastbound Left/Thru/Right	13.3	B	13.3	B	13.4	B
Westbound Left/Thru/Right	7.0	A	6.8	A	6.3	A
Northbound Left/Thru/Right	36.7	D	37.2	D	38.2	D
Southbound Left/Thru/Right	55.3	E	52.8	D	50.5	D
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Left/Thru/Right	14.3	B	13.8	B	14.8	B
Northbound Left/Thru/Right	1.3	A	1.2	A	1.3	A
Southbound Left/Thru/Right	2.2	A	2.1	A	2.2	A
<b>N Stafford Street &amp; PU-DO Exit</b>						
Westbound Left/Right	10.8	B	10.7	B	11.1	B
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A
<b>N Stafford Street &amp; Generals Way</b>						
Westbound Left/Right	12.1	B	12.0	B	12.6	B
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	3.2	A	3.1	A	3.5	A
<b>N Stafford Street &amp; 15th Street N</b>						
<b>Overall</b>	<b>11.5</b>	<b>B</b>	<b>11.0</b>	<b>B</b>	<b>12.0</b>	<b>B</b>
Eastbound Left/Thru/Right	12.3	B	11.6	B	12.7	B
Westbound Left/Thru/Right	10.5	B	10.2	B	10.6	B
Northbound Left/Thru/Right	11.9	B	11.4	B	12.7	B
Southbound Left/Thru/Right	9.9	A	9.6	A	10.0	A

Intersection/ Movement	AM Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	3.9	A	3.8	A	3.8	A
Northbound Left/Right	14.2	B	13.5	B	14.7	B

**Table 9: PM School Peak Hour Analysis Results**

Intersection/ Movement	PM School Dismissal Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Quincy Street &amp; 15th Street, N</b>						
Eastbound Left/Right	17.2	C	15.2	C	17.3	C
Northbound Left	8.7	A	8.4	A	8.7	A
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/Buck Site Driveway</b>						
Eastbound Left/Thru/Right	19.0	C	18.8	C	21.1	C
Westbound Left/Thru/Right	17.8	C	17.0	C	17.6	C
Northbound Left/Thru/Right	0.2	A	0.2	A	0.2	A
Southbound Left	8.5	A	8.5	A	8.5	A
Southbound Thru/Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/14th Street N</b>						
Eastbound Left/Thru/Right	24.0	C	22.8	C	24.9	C
Westbound Left/Thru/Right	23.6	C	21.7	C	26.2	D
Northbound Left/Thru	0.8	A	0.8	A	0.8	A
Northbound Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru/Right	2.2	A	2.2	A	2.4	A
<b>N Quincy Street &amp; 13th Street N</b>						
Westbound Left/Right	13.2	B	13.0	B	13.1	B
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	1.0	A	1.0	A	1.0	A
<b>N Quincy Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>20.2</b>	<b>C</b>	<b>20.0</b>	<b>B</b>	<b>21.4</b>	<b>C</b>
Eastbound Left	4.8	A	5.0	A	5.0	A
Eastbound Thru/Right	4.2	A	4.3	A	4.4	A
Westbound Left	8.5	A	8.6	A	8.7	A
Westbound Thru/Right	10.7	B	10.7	B	10.8	B
Northbound Left	34.6	C	34.2	C	38.2	D
Northbound Thru/Right	34.7	C	35.4	D	35.4	D
Southbound Left	35.5	D	36.1	D	37.4	D
Southbound Thru/Right	43.8	D	43.3	D	48.2	D
<b>N Randolph Street &amp; Washington Blvd</b>						
Eastbound Thru	0.0	A	0.0	A	0.0	A
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	0.6	A	0.5	A	0.5	A
Westbound Thru	0.0	A	0.0	A	0.0	A
Northbound Left/Right	13.3	B	13.2	B	13.4	B
<b>N Stafford Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>9.8</b>	<b>A</b>	<b>10.1</b>	<b>B</b>	<b>10.2</b>	<b>B</b>
Eastbound Left/Thru/Right	8.3	A	8.3	A	8.3	A
Westbound Left/Thru/Right	6.9	A	7.0	A	6.9	A
Northbound Left/Thru/Right	30.6	C	30.7	C	30.8	C
Southbound Left/Thru/Right	31.3	C	31.7	C	32.0	C
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Left/Thru/Right	11.0	B	11.1	B	11.5	B
Northbound Left/Thru/Right	1.0	A	1.0	A	1.0	A
Southbound Left/Thru/Right	0.9	A	0.8	A	0.8	A
<b>N Stafford Street &amp; PU-DO Exit</b>						
Westbound Left/Right	10.0	B	10.0	B	10.3	B
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A

Intersection/ Movement	PM School Dismissal Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Stafford Street &amp; Generals Way</b>						
Westbound Left/Right	10.8	B	10.8	B	11.3	B
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	2.5	A	2.2	A	2.2	A
<b>N Stafford Street &amp; 15th Street N</b>						
<b>Overall</b>	<b>8.6</b>	<b>A</b>	<b>8.5</b>	<b>A</b>	<b>8.7</b>	<b>A</b>
Eastbound Left/Thru/Right	8.1	A	8.1	A	8.3	A
Westbound Left/Thru/Right	9.0	A	8.9	A	9.2	A
Northbound Left/Thru/Right	8.5	A	8.4	A	8.7	A
Southbound Left/Thru/Right	7.9	A	7.9	A	8.1	A
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	0.4	A	0.4	A	0.4	A
Northbound Left/Right	10.4	B	10.2	B	10.6	B

**Table 10: PM Commuter Peak Analysis Results**

Intersection/ Movement	PM Commuter Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Quincy Street &amp; 15th Street, N</b>						
Eastbound Left/Right	21.9	C	23.2	C	24.2	C
Northbound Left	10.2	B	10.3	B	10.4	B
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/Buck Site Driveway</b>						
Eastbound Left/Thru/Right	27.5	D	27.2	D	33.7	D
Westbound Left/Thru/Right	36.5	E	35.6	E	36.1	E
Northbound Left/Thru/Right	0.7	A	0.7	A	0.7	A
Southbound Left	9.6	A	9.6	A	9.6	A
Southbound Thru/Right	0.0	A	0.0	A	0.0	A
<b>N Quincy Street &amp; School Driveway/14th Street N</b>						
Eastbound Left/Thru/Right	69.1	F	58.8	F	63.3	F
Westbound Left/Thru/Right	32.3	D	29.7	D	34.5	D
Northbound Left/Thru	1.9	A	1.8	A	1.9	A
Northbound Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru/Right	1.9	A	2.0	A	2.0	A
<b>N Quincy Street &amp; 13th Street N</b>						
Westbound Left/Right	24.1	C	22.6	C	23.1	C
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	1.8	A	1.8	A	1.8	A
<b>N Quincy Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>23.0</b>	<b>C</b>	<b>23.4</b>	<b>C</b>	<b>23.7</b>	<b>C</b>
Eastbound Left	21.9	C	24.3	C	25.0	C
Eastbound Thru/Right	11.8	B	11.8	B	11.8	B
Westbound Left	13.7	B	14.1	B	14.2	B
Westbound Thru/Right	18.8	B	19.3	B	19.4	B
Northbound Left	33.6	C	34.4	C	36.0	D
Northbound Thru/Right	33.0	C	33.6	C	33.8	C
Southbound Left	34.3	C	36.3	D	37.5	D
Southbound Thru/Right	34.7	C	35.2	D	35.9	D
<b>N Randolph Street &amp; Washington Blvd</b>						
Eastbound Thru	0.0	A	0.0	A	0.0	A
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	1.2	A	1.1	A	1.1	A
Westbound Thru	0.0	A	0.0	A	0.0	A
Northbound Left/Right	19.0	C	17.8	C	18.0	C
<b>N Stafford Street &amp; Washington Blvd</b>						
<b>Overall</b>	<b>8.0</b>	<b>A</b>	<b>8.0</b>	<b>A</b>	<b>8.3</b>	<b>A</b>
Eastbound Left/Thru/Right	6.0	A	6.1	A	6.3	A
Westbound Left/Thru/Right	3.2	A	3.2	A	3.2	A
Northbound Left/Thru/Right	38.1	D	38.0	D	37.8	D
Southbound Left/Thru/Right	38.7	D	39.1	D	40.2	D



Intersection/ Movement	PM Commuter Peak Hour					
	Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Left/Thru/Right	11.0	B	11.0	B	11.2	B
Northbound Left/Thru/Right	0.7	A	0.7	A	0.7	A
Southbound Left/Thru/Right	0.9	A	0.8	A	0.8	A
<b>N Stafford Street &amp; PU-DO Exit</b>						
Westbound Left/Right	9.9	A	9.9	A	10.0	B
Northbound Thru	0.0	A	0.0	A	0.0	A
Southbound Thru	0.0	A	0.0	A	0.0	A
<b>N Stafford Street &amp; Generals Way</b>						
Westbound Left/Right	11.0	B	11.0	A	11.2	B
Northbound Thru/Right	0.0	A	0.0	A	0.0	A
Southbound Left/Thru	2.8	A	2.6	A	2.6	A
<b>N Stafford Street &amp; 15th Street N</b>						
<b>Overall</b>	<b>8.9</b>	<b>A</b>	<b>9.0</b>	<b>A</b>	<b>9.1</b>	<b>A</b>
Eastbound Left/Thru/Right	8.3	A	8.4	A	8.5	A
Westbound Left/Thru/Right	9.5	A	6.9	A	9.8	A
Northbound Left/Thru/Right	8.7	A	8.7	A	8.9	A
Southbound Left/Thru/Right	8.5	A	8.6	A	8.7	A
<b>N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>						
Eastbound Thru/Right	0.0	A	0.0	A	0.0	A
Westbound Left/Thru	0.5	A	0.5	A	0.6	A
Northbound Left/Right	10.0	A	9.9	A	9.9	A



**Table 11: Queuing Analysis Results**

Intersection & Lane Group	Storage Length (Feet)	AM Peak Hour						PM School Dismissal Peak						PM Commuter Peak Hour					
		Existing		Background		Total Future		Existing		Background		Total Future		Existing		Background		Total Future	
		50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%
<b>1. N Quincy Street &amp; 15th Street N</b>																			
Eastbound Left/Right	500	--	68	--	40	--	106	--	30	--	27	--	37	--	21	--	22	--	26
Northbound Left	120	--	18	--	17	--	18	--	8	--	3	--	8	--	24	--	25	--	26
Northbound Thru	315	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Thru	285	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Right	85	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
<b>2. N Quincy Street &amp; School Driveway/Buck Site Driveway</b>																			
Eastbound Left/Thru/Right	50	--	11	--	9	--	11	--	8	--	7	--	9	--	18	--	16	--	23
Westbound Left/Thru/Right	65	--	3	--	2	--	3	--	4	--	3	--	3	--	23	--	22	--	22
Northbound Left/Thru/Right	250	--	2	--	2	--	2	--	1	--	1	--	1	--	2	--	2	--	2
Southbound Left	75	--	0	--	0	--	0	--	1	--	1	--	1	--	2	--	2	--	2
Southbound Thru/Right	315	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
<b>3. N Quincy Street &amp; School Driveway/14th Street N</b>																			
Eastbound Left/Thru/Right	265	--	96	--	73	--	102	--	32	--	28	--	33	--	78	--	65	--	75
Westbound Left/Thru/Right	725	--	28	--	25	--	70	--	23	--	20	--	27	--	43	--	37	--	45
Northbound Left/Thru	200	--	2	--	2	--	3	--	2	--	2	--	2	--	6	--	6	--	6
Northbound Right	35	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Left/Thru/Right	250	--	11	--	10	--	12	--	7	--	7	--	7	--	6	--	6	--	6
<b>4. N Quincy Street &amp; 13th Street N</b>																			
Westbound Left/Right	725	--	18	--	17	--	18	--	8	--	8	--	8	--	31	--	28	--	29
Northbound Thru/Right	410	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Left/Thru	200	--	10	--	11	--	11	--	3	--	3	--	3	--	6	--	5	--	5
<b>5. N Quincy Street &amp; Washington Blvd</b>																			
Eastbound Left	115	25	m20	24	m20	25	m23	5	11	5	12	5	11	22	45	22	#89	22	#96
Eastbound Thru/Right	750	296	201	305	219	302	226	18	27	22	31	22	32	81	101	87	105	87	106
Westbound Left	85	9	26	11	32	11	32	12	28	13	30	13	30	25	54	27	58	27	58
Westbound Thru/Right	700	112	152	121	162	125	167	116	152	120	157	120	158	260	331	274	348	275	349
Northbound Left	120	29	65	31	66	34	75	24	60	24	60	25	64	43	95	42	96	43	98
Northbound Thru/Right	450	270	387	272	390	280	402	143	224	150	234	150	234	232	344	239	354	241	355
Southbound Left	195	74	140	68	#144	75	#171	50	100	50	102	55	110	50	108	52	114	54	117
Southbound Thru/Right	410	230	309	210	307	246	357	218	#333	215	#344	238	#390	250	367	255	376	262	385
<b>6. N Randolph Street &amp; Washington Blvd</b>																			
Eastbound Thru	200	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Eastbound Thru/Right	200	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Westbound Left/Thru	750	--	2	--	2	--	2	--	1	--	1	--	1	--	3	--	4	--	3
Westbound Thru	750	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Northbound Left/Right	365	--	44	--	35	--	36	--	11	--	11	--	11	--	36	--	31	--	31
<b>7. N Stafford Street &amp; Washington Blvd</b>																			
Eastbound Left/Thru/Right	300	235	404	246	408	255	411	83	103	82	110	82	111	97	131	105	140	106	142
Westbound Left/Thru/Right	200	64	98	63	100	63	94	78	97	80	100	80	100	81	92	81	92	83	93
Northbound Left/Thru/Right	525	105	145	107	161	112	171	19	48	22	56	23	59	52	97	52	104	53	104
Southbound Left/Thru/Right	575	153	206	144	215	131	202	30	76	41	90	46	99	61	109	65	122	71	132
<b>8. N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>																			
Eastbound Left/Thru/Right	275	--	21	--	18	--	22	--	4	--	4	--	5	--	4	--	3	--	4
Northbound Left/Thru/Right	575	--	2	--	2	--	3	--	1	--	1	--	1	--	1	--	1	--	1
Southbound Left/Thru/Right	325	--	3	--	3	--	3	--	1	--	1	--	1	--	1	--	1	--	1
<b>9. N Stafford Street &amp; PU-DO Exit</b>																			
Westbound Left/Right	185	--	26	--	23	--	24	--	8	--	7	--	7	--	5	--	5	--	6
Northbound Thru	225	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Thru	75	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
<b>10. N Stafford Street &amp; Generals Way</b>																			
Westbound Left/Right	75	--	2	--	2	--	2	--	8	--	8	--	11	--	4	--	3	--	4
Northbound Thru/Right	75	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Southbound Left/Thru	235	--	6	--	6	--	7	--	2	--	2	--	2	--	3	--	3	--	3
<b>11. N Stafford Street &amp; 15th Street N</b>																			
Eastbound Left/Thru/Right		<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>					
Westbound Left/Thru/Right		<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>					
Northbound Left/Thru/Right		<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>					
Southbound Left/Thru/Right		<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>						<i>HCM Does not report queues for all-way stop-controlled (AWSC) intersections.</i>					
<b>12. N Stafford Street &amp; 13th Street N/PU-DO Entrance</b>																			
Eastbound Thru/Right	350	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0	--	0
Westbound Left/Thru	125	--	8	--	7	--	7	--	0	--	0	--	0	--	1	--	1	--	1
Northbound Left/Right	75	--	4	--	4	--	4	--	16	--	14	--	15	--	3	--	2	--	3



## PARKING

This section reviews the available parking within and surrounding the Washington-Lee campus, including:

- A summary of parking data collected in the area surrounding the campus site on a typical weekday
- A review of existing peak parking demand by source of parking supply
- Recommendations on how to accommodate the increased population of students on the campus using the existing supply

The following conclusions are reached within this chapter:

- During a typical weekday, the existing parking demand for staff and students of Washington-Lee High School is accommodated by the surrounding parking supply, mainly in the parking garage and in unrestricted parking spaces in walking distance.
- Visitor parking peaks outside of school hours, due to parking demand for the pool, but has high availability during the school hours. There have been some concerns expressed about the location of visitor parking relative to the school's front door (that visitors are required to use).
- After-school parking on weeknights fills up some area of the parking garage and nearby street parking, while some areas of the parking garage remain empty.

This report recommends the following strategy for accommodating the increase in demand:

- Use the existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand.
- Reopen parking spaces in the closed off Education Center lot based on a comparison of supply and demand without a reduction in parking rates. Based on this strategy this MMTA recommends that 82 spaces in the Education Center parking lot be reopened to serve the Washington-Lee campus, and up to 46 spaces can be repurposed.
- Continue the current APS Go! Transportation Demand Management (TDM) programs, to encourage use of alternative travel modes, thus reducing parking demand and providing more parking availability.

- Depending on future visitor entry points on the campus, explore switching how some spaces are designated to increase visitor parking near the school's visitor entrance.
- Increase wayfinding and marketing of the parking garage for after-school activities and events to lessen the impact on nearby on-street parking.

### EXISTING PARKING DEMAND

As part of this MMTA, detailed counts of parking supply and demand were conducted surrounding the Washington-Lee High School campus. These counts were used to determine the amount of parking supply and demand on streets within walking distance of the site and parking supplies off-street on-site, and to identify trends or patterns associated with parking demand.

The area surveyed during this study, shown in Figure 17, represents an approximate 0.25-mile walk from the Washington-Lee High School main entrance. Each block-face in the study area was surveyed to determine whether parking is allowed and the approximate number of spaces on the block-face. The off-street parking lots on campus also included in the study area, including the Interstate 66 parking garage.

For the purposes of this study, the parking lots surrounding the Education Center (excluding the visitor lot south of the Education Center), were considered empty. They are currently fenced off and being used temporarily for storage.

The time and date of the parking data collection were selected based on the purpose of the counts. Since the information will be used to help determine parking supply needs for the new Elementary School, the date of the count was selected to represent a "typical weekday", as school parking demand is highest during a school day when staff is parked on site. As such, parking data was collected in the study area on Thursday September 20, 2018 from 6:00 AM to 10:00 PM. The parking demand sweeps were conducted every 30 minutes.

The parking data found a total of 975 parking spaces in the study area, 419 on-street spaces and 556 on-site spaces in surface parking lots and the Interstate 66 parking garage. The parking data found that the peak parking occupancy for the entire area occurred at 9:30 AM to 10:00 AM with an overall parking utilization of 59.3%.





Figure 17: Parking Study Area & Type



The following is a breakdown of the different types of parking in the study area, and major trends observed in the data. Figure 18, Figure 19, and Figure 20 provide graphics summarizing parking occupancy at various times of the day. Figure 21 and Figure 22 contain charts of parking occupancy by type over the course of a day.

- **Parking Garage:** The Interstate 66 parking garage is used primarily by Washington-Lee High School students and staff. It previously also accommodated APS employees and visitors of the Education Center. Some parking is still unrestricted and available for the general public to use as a commuting parking lot.

The parking garage contains a total of 378 spaces divided into six areas over two levels as follows:

- Area A: 72 spaces, W-L Student Parking, 7:30 AM to 3:00 PM M-F
- Area B: 76 spaces, School Staff Parking
- Area C: Not in use
- Area D: 74 spaces APS Center Staff
- Area E: 76 spaces Public use
- Area F: 80 spaces APS Center Staff

The occupancy data showed that the garage gets mostly occupied during a typical school day; it peaked at 92.1% occupancy at 9:30 to 10:00 AM on the day of the parking counts.

The trends observed on when the parking garage fills up in the morning and empties in the evening indicate that most of its users are school related. The parking garage is under 50% occupied by 4:00 PM, more in line with school dismissal than traditional commuting hours.

The parking garage also is used in the evening for after school activities, although mostly just Areas A and B, which are those closest to the Washington-Lee High School front door.

- **Pool/Visitor parking lot:** This lot refers to the parking lot south of the Education Center building. The southern spaces are signed for two-hour parking for the pool, the northern spaces are signed for general two-hour visitor parking.

This lot has a total of 36 spaces and its parking demand peaks before and after school, when the

parking demand at the pool peaks. During the school day, its parking demand peaks at 24 cars (between 3:00 and 3:30 PM).

- **Front Door lot:** This refers to the small parking lot in front of Washington-Lee High School's front door on N Stafford Street. It has 14 parking spaces and peaks during the school day at 12 spaces occupied (at 9:30 AM).
- **Education Center lot:** This refers to the parking lots surrounding the Education Center (excluding the visitor lot south of the Education Center), that are currently fenced off and being used temporarily for storage.

At the time traffic and parking counts were conducted for this study, some of the storage at this lot was for school buses. In the morning, bus drivers show up to the site, park in the parking garage, and run school bus routes after retrieving buses from the Education Center lot. For purposes of this analysis this parking lot was considered empty and available to accommodate future parking demand as needed.

- **On-Street Residential Permit Parking:** Within the study area, there were 248 residential permit parking spaces. These spaces peaked at 61.3% occupancy from 8:00 to 8:30 PM. Generally during the school day they were approximately 40% occupied.
- **On-Street Time-Restricted Parking:** Time restricted parking refers to curbside parking with time limits (e.g. two-hour parking) and includes both metered and non-metered parking. There were 70 time restricted parking spaces that peaked at 68.6% occupancy between 7:00 and 7:30 PM. These spaces were more heavily used in the morning and night, when the time restrictions weren't in place. During the school day, there was ample supply available on these blocks, notably on N Quincy Street where there are time-restricted metered parking spaces.
- **On-Street Unrestricted Parking:** There were 101 unrestricted parking spaces in the study area, which peaked at 92.1% between 10:00 and 10:30 AM. The use of unrestricted parking spaces was very similar to the usage pattern of parking spaces in the parking garage, indicating they are used mostly by the Washington-Lee High School population.



### Parking Occupancy

- █ 0 to 20% occupied
- █ 20% to 40% occupied

- █ 40% to 60% occupied
- █ 60% to 80% occupied
- █ 80% to 100% occupied

*Parking on each block face depicted from corner to corner to make diagram easier to read. It is not meant to indicate parking exists for the entire block face.*

#### 6:00 AM

Overall: 27.8% occupied

Campus parking facilities mostly empty except for parking adjacent to pool.

Residential blocks west of campus also highly occupied.



#### 8:00 AM

Overall: 56.9% occupied

Parking garage gets full quickly in the morning, with significant parking also in the unrestricted on-street parking spaces north of I-66

Residential on-street spaces become available as people leave for work

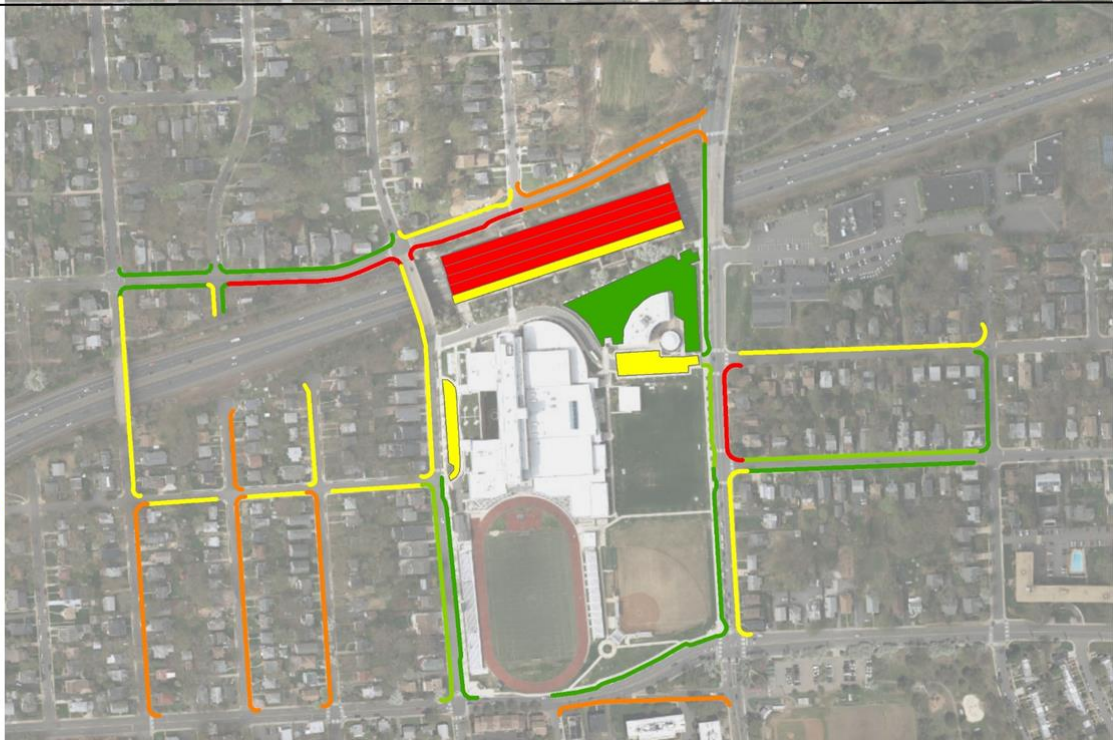


Figure 18: Parking Occupancy - 6:00 AM, 8:00 AM



**Parking Occupancy**

- █ 0 to 20% occupied
- █ 20% to 40% occupied

- █ 40% to 60% occupied
- █ 60% to 80% occupied
- █ 80% to 100% occupied

*Parking on each block face depicted from corner to corner to make diagram easier to read. It is not meant to indicate parking exists for the entire block face.*

**10:30 AM**

Overall: 58.1% occupied

Peak occupancy for combined supply of parking garage and unrestricted on-street parking.



**2:30 PM**

Overall: 55.0% occupied

Before Washington-Lee dismissal. Slightly lower occupancy than at peak.



Figure 19: Parking Occupancy, 10:30 AM, 2:30 PM



### Parking Occupancy

- █ 0 to 20% occupied
- █ 20% to 40% occupied

- █ 40% to 60% occupied
- █ 60% to 80% occupied
- █ 80% to 100% occupied

*Parking on each block face depicted from corner to corner to make diagram easier to read. It is not meant to indicate parking exists for the entire block face.*

#### 4:30 PM

Overall: 33.0% occupied

Parking garage and unrestricted parking occupancy greatly reduces, indicating mostly school use of these supplies.

Pool begins to generate more parking demand after school dismissal.



#### 7:30 PM

Overall: 44.0% occupied

Residential streets get more occupied as people get home from work.

Pool and after school activities fill up Areas A and B in the garage and nearby on-street parking. Areas D, E and F of parking garage mostly empty.



Figure 20: Parking Occupancy, 4:30 PM, 7:30 PM



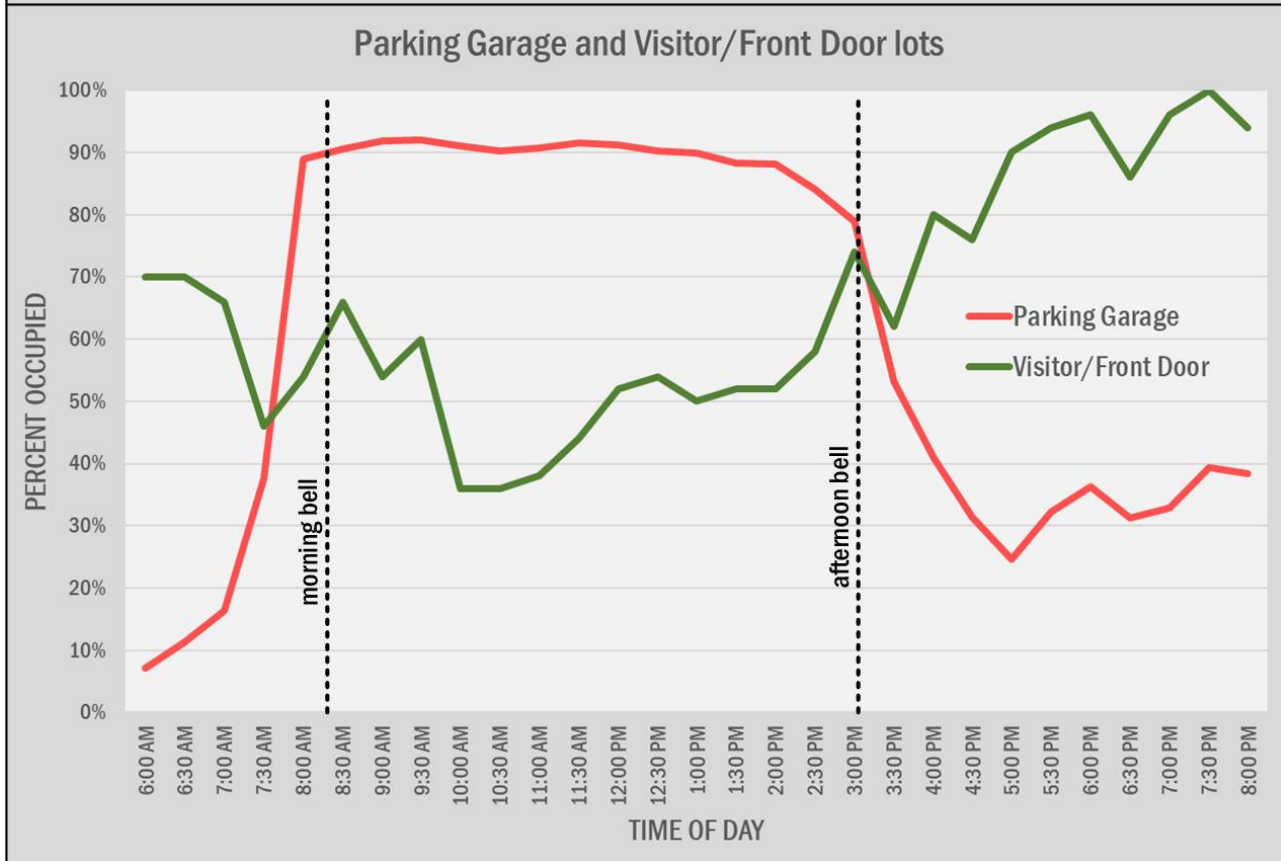
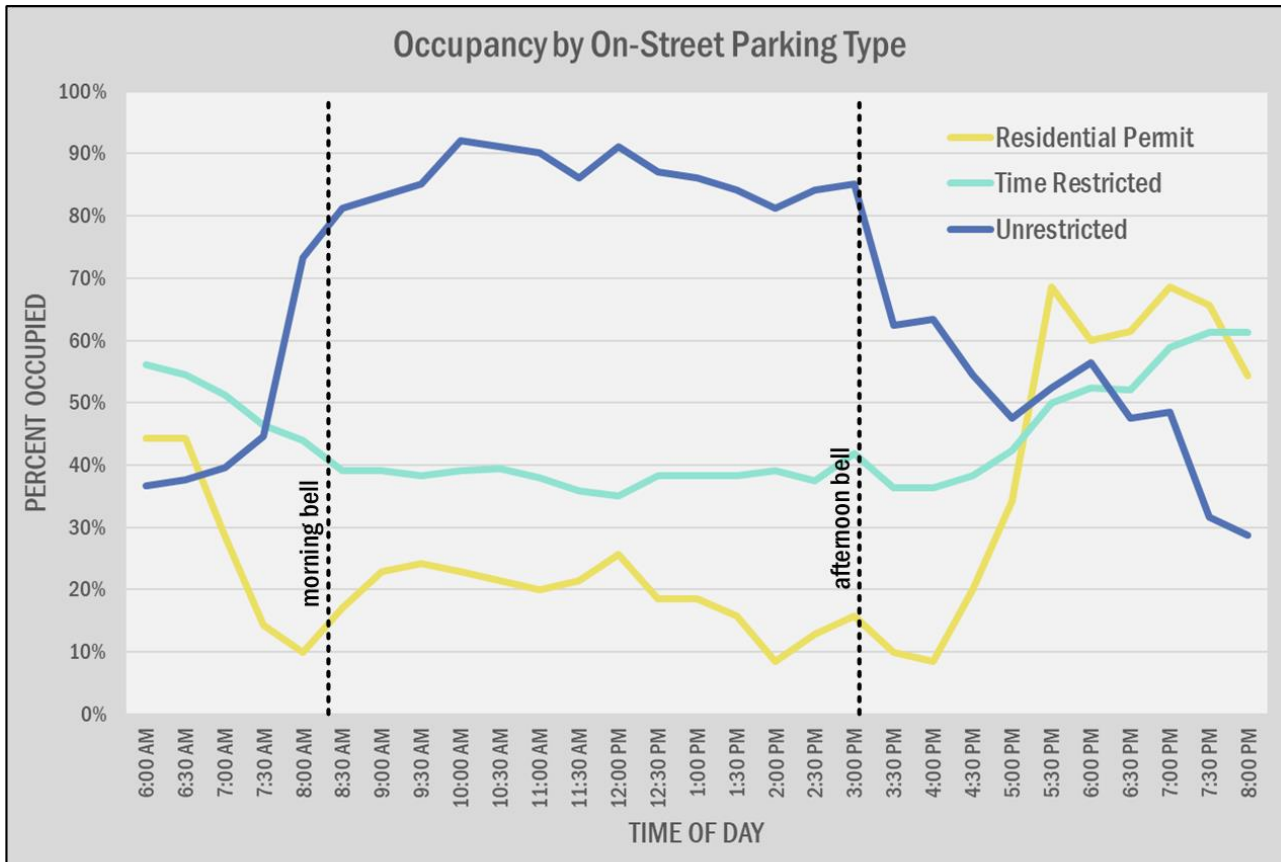


Figure 21: Parking Occupancy by Type (1)

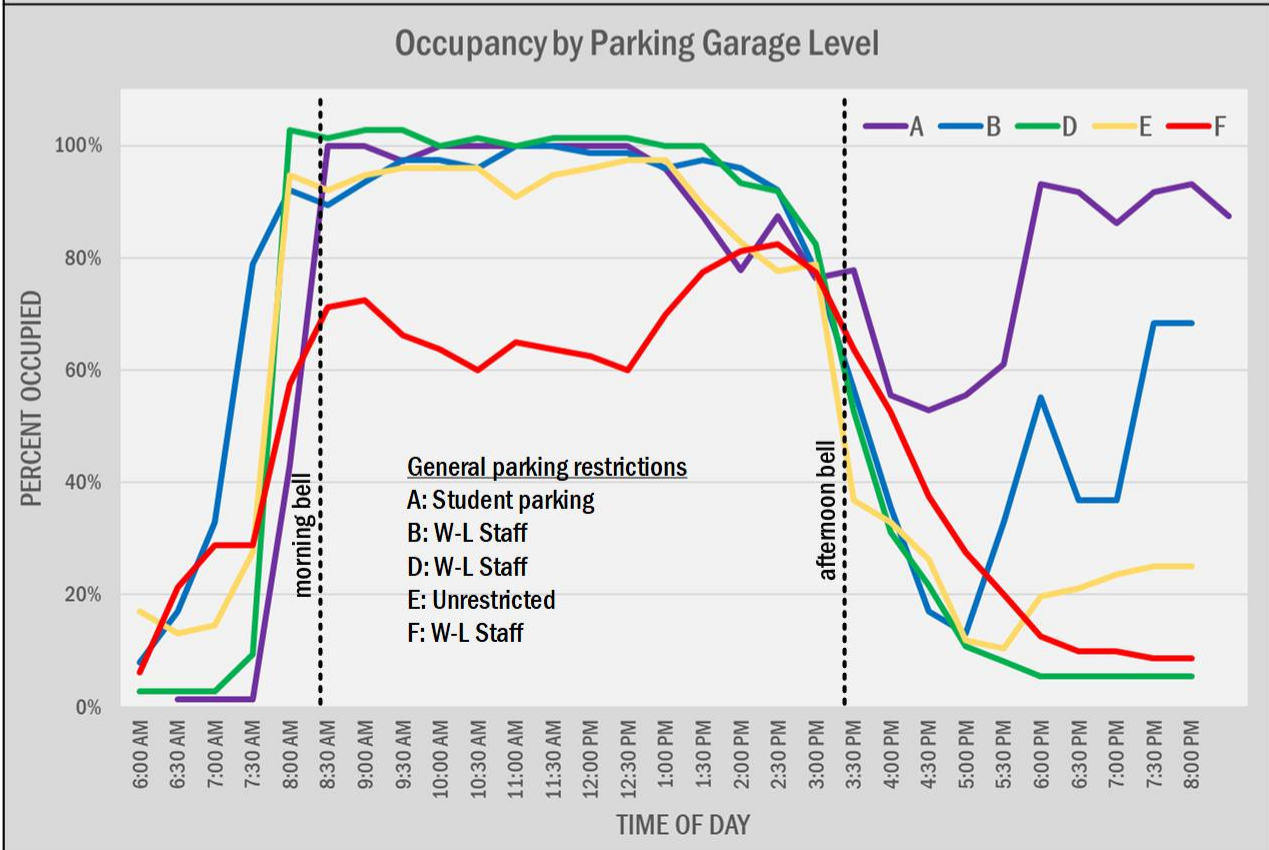
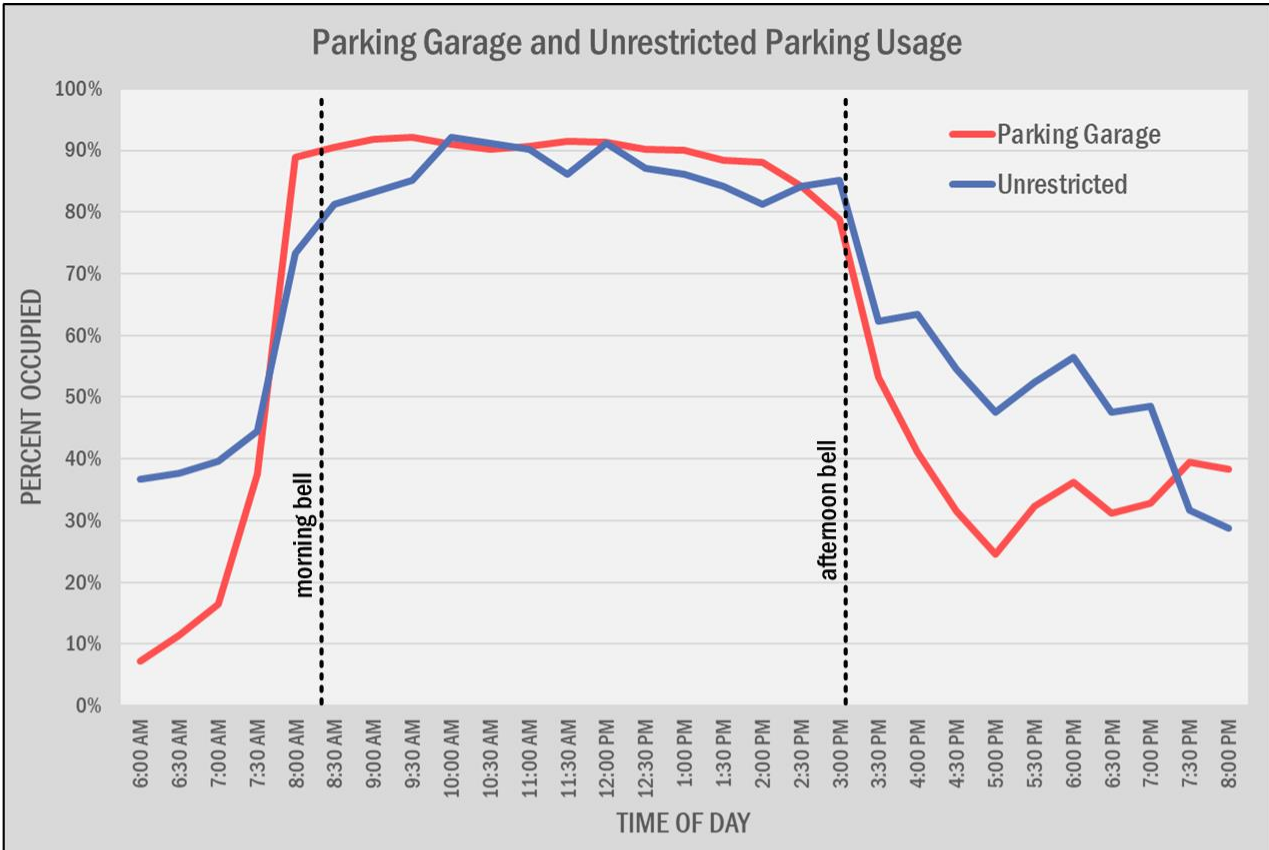


Figure 22: Parking Occupancy by Type (2)



## PARKING RECOMMENDATIONS

Based on the parking data and counts, the potential impacts of adding up to 600 more high school students to the Washington-Lee High School campus were reviewed and recommendations developed. This was done by comparing the anticipated peak demand including the expanded student population the demands observed from the parking data for the existing uses on site.

### Visitor Parking

Under existing conditions, 50 spaces are reserved for visitor parking on the Washington-Lee High School campus, including 15 in the driveway at the Washington-Lee High School front entrance off N Stafford Street, and 35 in the visitor lot south of the Education Center. Many of the spaces in the visitor lot south of the Education Center are reserved for pool visitors.

The peak existing visitor demand was 33 cars during the school day, much lower than the supply of 50 spaces. Thus, even after accommodating for an increase in demand based on the increase in population (up to 41 cars), no change to the amount of visitor parking is needed. Although an increase is not needed, this MMTA recommends an increase in Washington-Lee High School visitor parking close to the school's front door. During this project, concerns were expressed about how during the school day the only visitor access is on N Stafford Street at the school's front door, and as such using the visitor parking lot south of the Education Center building is not desirable for school visitors, leading them to fill up the lot near the front door and then proceed to park on N Stafford Street. Thus, this report recommends that either: (1) school visitors gain an additional entry point near the visitor parking lot south of the Education Center (and visitor parking can remain as it is today), or (2) more visitor parking spaces are designated on the N Quincy Street side of the campus closer to the school's front door. Potential spaces can be designated in area A of the parking deck. A final plan when more operational details on the school are known can be developed when the Parking Management Plan (PMP) for the school is established.

### Staff & Student Parking

Based on the parking data and observations from field visitors, staff and students park in the parking garage and the unrestricted parking, along with a smaller amount of non Washington-Lee High School based parking demand. In order to help determine how the Washington-Lee High School parking demand was using these supplies, this MMTA compared trends

in the parking demand data, observations, and student and staff responses to APS Go! surveys to determine the following supply and demand profile.

**Table 12: Existing Parking Supply & Demand**

Location	Supply	Peak Parking Demand			Empty Spaces
		Students	Staff	Non W-L	
Area A	72	72	0	0	0
Area B	76	0	76	0	0
Area D	76	0	72	4	0
Area E	76	51	7	15	3
Area F	80	0	34	19	27
Unrestricted	101	69	0	17	15
Ed Center	128	0	0	0	128
<b>Total</b>	<b>609</b>	<b>192</b>	<b>189</b>	<b>55</b>	<b>173</b>

Table 12 shows the peak parking demand at the site based on the parking counts, which occurs between 9:30 AM and 10:00 AM, split up between the types of demand and sources of parking supply. This includes where the existing parking demand of 193 student cars and 189 staff cars park during the peak.

The parking demand will grow to 240 student cars and 236 staff cars assuming the rate of parked cars per student and staff population stays the same. These future parking projections are based on linear growth of the existing parking demand for the school. The future parking demand may be lower, either through having fewer than 600 students, or through additional Transportation Demand Management (TDM) programs and policies. Thus, they represent worst-case projections of demand.

This increase of 94 cars of parking demand is much lower than the 173 available spaces during existing peak demand. Since the supply is higher than the project demand, this report recommends the following strategy for accommodating the increase in demand:

- Use the existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand.
- Reopen parking spaces in the closed off Education Center lot based on a comparison of supply and demand without a reduction in parking rates.
- Continue the current APS Go! Transportation Demand Management (TDM) programs to encourage use of



alternative travel modes, thus reducing parking demand and providing more parking availability.

Table 13 summarizes how this could work. In this scenario, the APS staff only parking signs in Area F are taken down, allowing student parking demand to be accommodated there. At the same time, some spaces are reopened in the Education Center lot for staff parking. The amount of supply provided is slightly higher than the projected demand. The continued use of TDM from the APS Go! Program, including the exploration of ways to reduce student parking demand, provides the ability to reduce demand further. Thus, the parking supply is designed to just fit the parking demand in the worst-case scenario but can fit the demand comfortably with a reasonable gain in demand management.

In order to reduce impacts to the on-street parking, this MMTA is recommending that the school work on a signing plan to encourage the use of the parking garage in the evenings for after school activities. This can include a combination of directions on website and information disseminated regarding events and physical signs near the parking lots. The exact recommendations can be developed when the project compiles its Parking Management Plan (PMP).

**Table 13: Proposed Parking Supply & Demand**

Location	Supply	Peak Parking Demand			Empty Spaces
		Students	Staff	Non W-L	
Area A	72	72	0	0	0
Area B	76	0	76	0	0
Area D	76	0	72	4	0
Area E	76	56	6	15	3
Area F	80	59	0	19	2
Unrestricted <sup>1</sup>	89	57	0	17	15
Ed Center	128	0	82	0	0 <sup>2</sup>
<b>Total</b>	<b>597</b>	<b>240</b>	<b>236</b>	<b>55</b>	<b>20</b>

<sup>1</sup>- Reduced to account for conversion of some unrestricted parking spaces on 15<sup>th</sup> Street to pick-up/drop-off area

<sup>2</sup>- Assuming all extra spaces repurposed

Based on this strategy, this MMTA recommends that 82 spaces in the Education Center parking lot be reopened to serve the Washington-Lee High School campus, and up to 46 spaces can be repurposed. Future monitoring of campus parking demand can be used to justify even further reductions of the parking supply, if TDM programs are demonstrated to be successful.

**After School Hours Parking**

The parking occupancy data collected showed some interesting findings for after school hours. The parking garage increased in occupancy in the evening, but only in Areas A and B (and some od D), with Areas E and F mostly empty. At the same time on-street parking on the N Stafford/13<sup>th</sup> Street side of campus near the Washington-Lee High School front door increased, to a point when it was higher than the early morning (at 6:00 AM). This indicates that instead of using the entirety of the parking garage, visitors to the school in the evening are using a combination of on-street parking and the parking garage.



## PEDESTRIAN FACILITIES

This section presents a review of pedestrian walking routes to and from the APS Education Center site. The purpose of this review is to develop a set of recommendations for infrastructure and operational improvements to raise the potential walking mode split of students and staff at the APS Education Center site. The steps performed in this review included:

- A detailed review of infrastructure within a 0.25-mile distance of the site
- A detailed review of additional walking routes beyond 0.25 miles, based on potential walk zone boundaries for the APS Education Center site
- A review of crossing quality along walking routes across arterial roadways
- An examination of impacts that planned County projects would have on walking route quality

The following conclusions are reached within this chapter:

- Walking routes adjacent to the APS Education Center site generally meet County standards, with some exceptions to the east of the site in residential neighborhoods.
- The presence of multiple signalized intersections along Washington Boulevard in the vicinity of the site provide safe crossing locations for pedestrians across an arterial. Each traffic signal provides adequate walk time for pedestrians crossing Washington Boulevard.
- Already planned infrastructure enhancements by the County on Washington Boulevard and 13<sup>th</sup> Street N will improve pedestrian access to the site.
- This MMTA recommends upgrading the pedestrian crossings of N Quincy Street at its intersection with 14<sup>th</sup> Street with a treatment that will alert drivers to pedestrian crossings. Industry research has shown that a Rectangular Rapid Flash Beacon (RRFB) is likely the optimal solution, but there is a chance it may not accomplish its objective. Thus, this MMTA also recommends that the RRFB's performance be monitored after the school is open for around 6 months to a year to ensure its effectiveness.

### SIDEWALK REVIEW

The sidewalk review is an examination of sidewalks along expected walking routes to and from the APS Education Center,

comparing their sidewalk widths, buffer widths, and curb ramps to County standards. This review was performed for:

- All facilities within a quarter-mile of the APS Education Center site entrance and Washington-Lee High School entrance
- Facilities along six (6) primary walking routes in the preliminary walk zone that APS developed for the APS Education Site

Figure 24 shows the pedestrian study area that was evaluated as part of this MMTA. The sidewalks, crosswalks, and curb ramps within the study area were evaluated based on guidelines established by Arlington County. Table 14 summarizes the County width requirements for sidewalks and buffers by street type.

**Table 14: Arlington County Sidewalk Requirements**

Street Type	Minimum Sidewalk Width	Minimum Buffer Width
Neighborhood (Low Density)	4 ft	2 ft
Primarily Single-Family Residential Neighborhoods	5 ft	4 ft
Primarily Garden Apartments & Townhouse Neighborhoods	6 ft	5 ft
Primarily Retail Oriented Mixed-Use Arterial	10 ft	6 ft

Comparisons of the pedestrian facilities within the study area to Arlington County standards are shown on Figure 24, Figure 25, and Figure 26.

Most roadways within one-quarter mile of the site are non-arterials and classified as Neighborhood (low density). Nearby arterial roadways include Washington Boulevard, N Quincy Street, and Fairfax Drive. Washington Boulevard is classified as Primary Single-Family Residential Neighborhoods west of N Quincy Street and Primarily Garden Apartments & Townhouse Neighborhoods east of N Quincy Street. N Quincy Street is classified as Primary Single-Family Residential Neighborhoods north of Washington Boulevard and Primarily Garden Apartments & Townhouse Neighborhoods south of Washington Boulevard. Fairfax Drive is classified as Primarily Retail Oriented Mixed-Use.

### Sidewalks

Some sidewalks surrounding the site meet County standards for sidewalk width and buffer, especially west of the





Washington-Lee High School entrance, but some do not. The residential neighborhood east of the APS Education Center site has roads with sidewalks on only one side, and whose existing sidewalks lack buffers.

Most other roads surrounding the site have a standards-compliant sidewalk on one side and a noncompliant sidewalk on the other. One location within the quarter-mile walkshed and extended walking routes lacks sidewalks altogether: 13<sup>th</sup> Street N between N Vermont Street and N Taylor Street.

Outside of the quarter-mile walk area, the six (6) extended routes show a similar level of quality. Most have a standards-compliant sidewalk on one side of the road, but rarely on both.

### Curb Ramps

ADA standards require that all curb ramps be provided wherever an accessible route crosses a curb, that curb ramps have a detectable warning, and that curb ramps are not shared between two crosswalks. Under existing conditions within the site’s quarter-mile walkshed, there are curb ramps present at most intersections. However, many intersections have curb ramps that are shared by multiple crosswalks or that lack a detectable warning. The six (6) extended walking routes have few intersections with ADA-compliant curb ramps.

### Summary

In general, there are no major gaps in the pedestrian network surrounding the site, though the pedestrian experience could be improved by bringing sidewalks and curb ramps up to County and ADA standards wherever feasible. Pedestrian facilities within the school site are generally of good quality.

## CROSSING REVIEW

This section reviews the quality of crosswalks along walking routes that cross arterials near the APS Education Center site. The purpose of this review is to determine if students would be conformable crossing arterials and what measures could be implemented to improve walking routes.

### Washington Boulevard

Washington Boulevard has several locations where pedestrians can cross at signalized locations with a ‘walk/don’t walk’

pedestrian signal. The crossing review at these locations is based on ensuring pedestrians have enough time to cross when they get a ‘walk’ sign, by comparing the amount of walk time presented during the signal phases compared to the length of the crosswalk.

The main sources of data for this review were (1) crosswalk measurements taken using Arlington County’s AC Maps, and (2) signal timing sheets provided by Arlington County (which show pedestrian walk and don’t walk times). The required pedestrian crossing time was calculated by dividing the distance by an average walking speed of three (3) feet per second. Please note that the Virginia Department of Transportation (VDOT) and the *Manual on Uniform Traffic Control Devices* (MUTCD) assume an average pedestrian walking speed of 3.5 feet per second. The three (3) feet per second assumption was used instead to be more conservative, accounting for the age of students walking to and from the school.

Table 15 shows the results of the pedestrian crossing distance analysis.

**Table 15: Crossing Distance Analysis**

Intersection Leg	Crossing Distance (ft)	Required Crossing Time (sec)*	Minimum Provided Crossing Time (sec)	
			AM	PM
<b>Washington Boulevard and N Stafford Street</b>				
North Leg	38	13	23	23
South Leg	30	10	23	23
East Leg	50	17	18	18
West Leg	44	15	18	18
<b>Washington Boulevard and N Quincy Street</b>				
North Leg	42	14	27	27
South Leg	52	17	27	27
East Leg	58	19	24	24
West Leg	68	23	24	24

\*assuming a pedestrian walking speed of 3 ft/sec

Based on the results of the analysis, the closest signalized intersections to the site allow enough time for pedestrians to cross, even when accounting for the walking speed of children. Although Washington Boulevard carries a relatively high level of vehicular volumes, this report does not recommend infrastructure upgrades to its crosswalks.

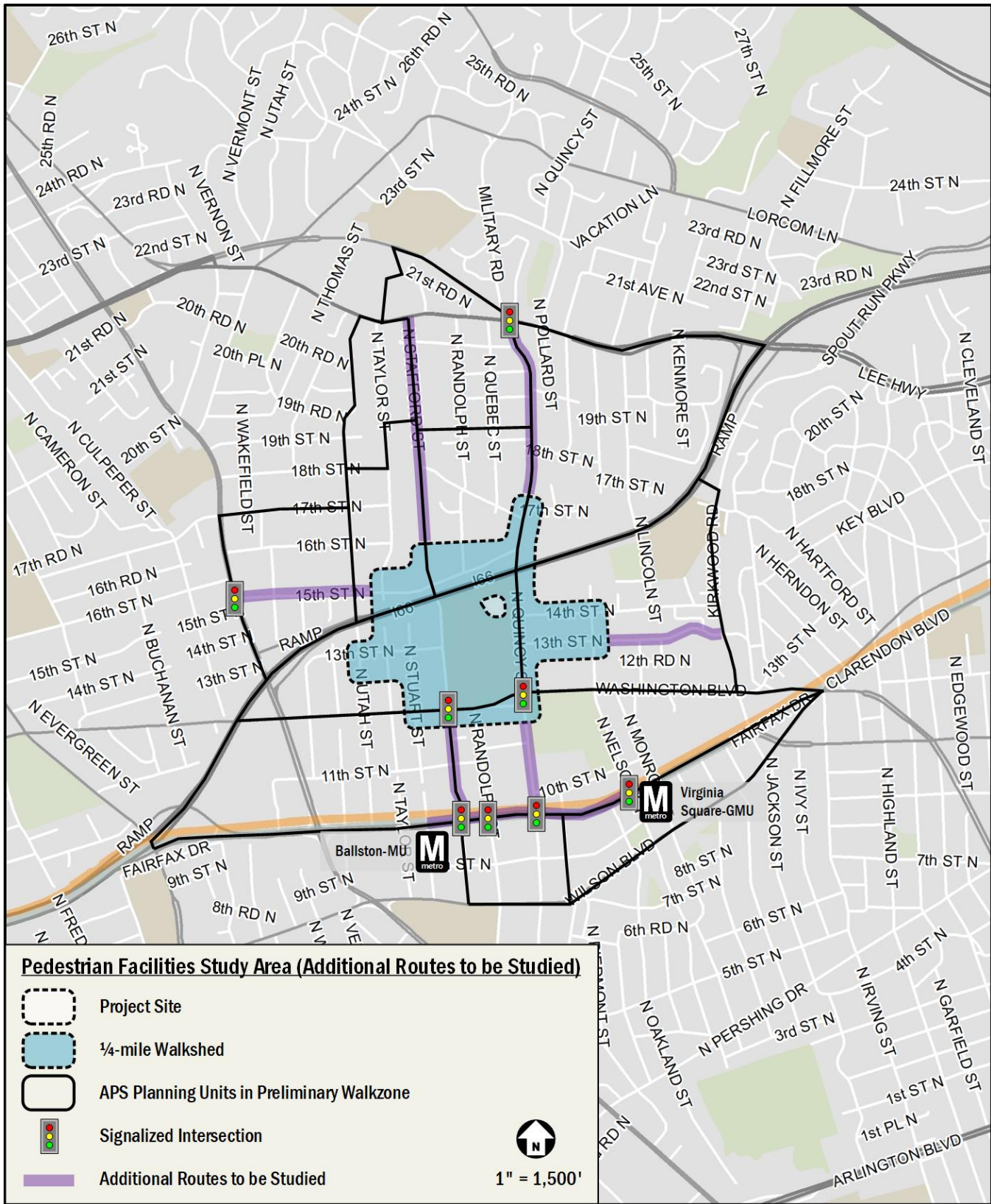


Figure 23: Pedestrian Study Area

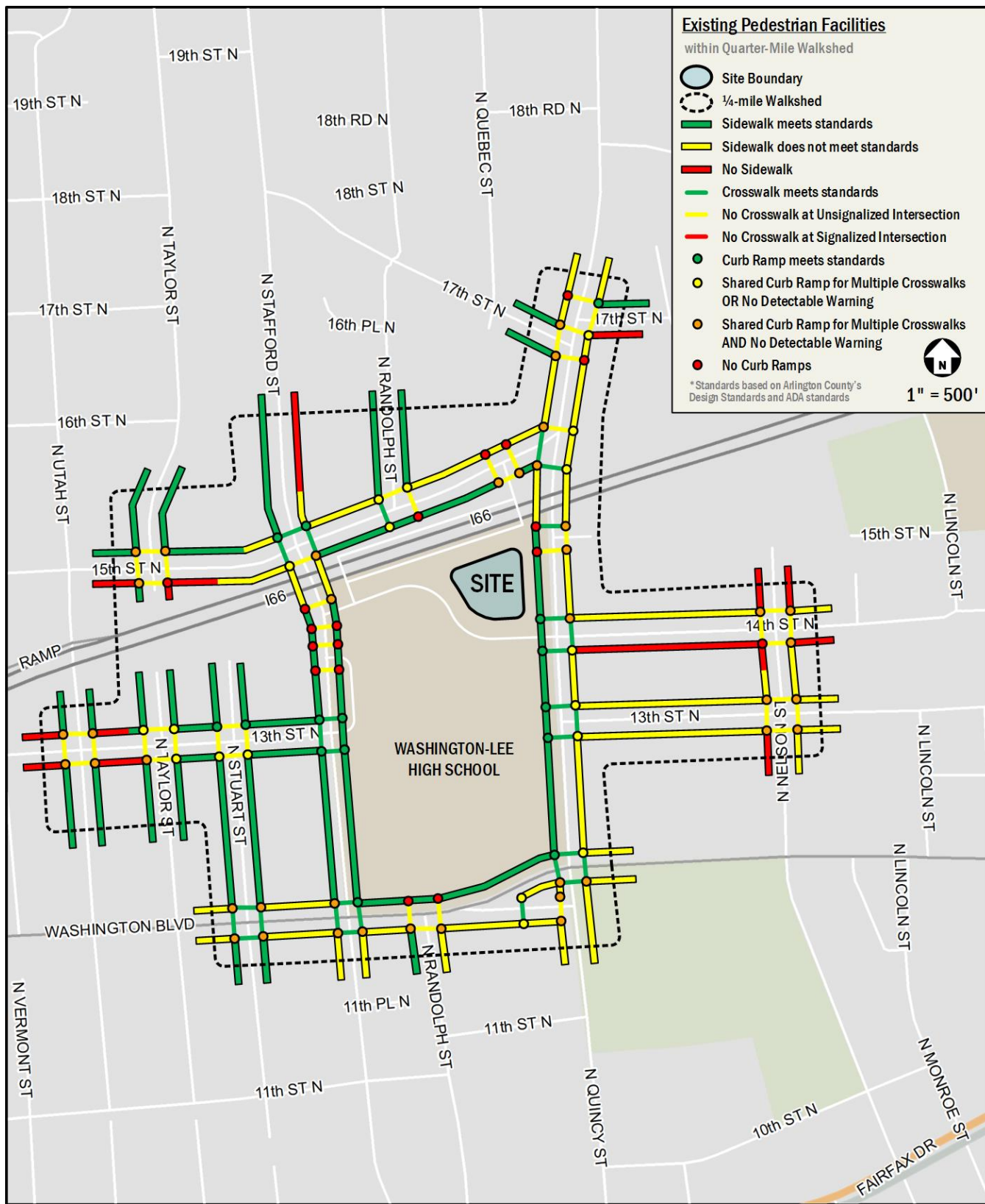


Figure 24: Existing Pedestrian Facilities (quarter mile)



### Existing Pedestrian Facilities

Extended Routes North and West of Site

- Site Boundary
- 1/4-mile Walkshed
- Sidewalk meets standards
- Sidewalk does not meet standards
- No Sidewalk
- Crosswalk meets standards
- No Crosswalk at Unsignalized Intersection
- No Crosswalk at Signalized Intersection
- Curb Ramp meets standards
- Shared Curb Ramp for Multiple Crosswalks OR No Detectable Warning
- Shared Curb Ramp for Multiple Crosswalks AND No Detectable Warning
- No Curb Ramps

\*Standards based on Arlington County's Design Standards and ADA standards

1" = 500'



Figure 25: Existing Pedestrian Facilities (north and west)



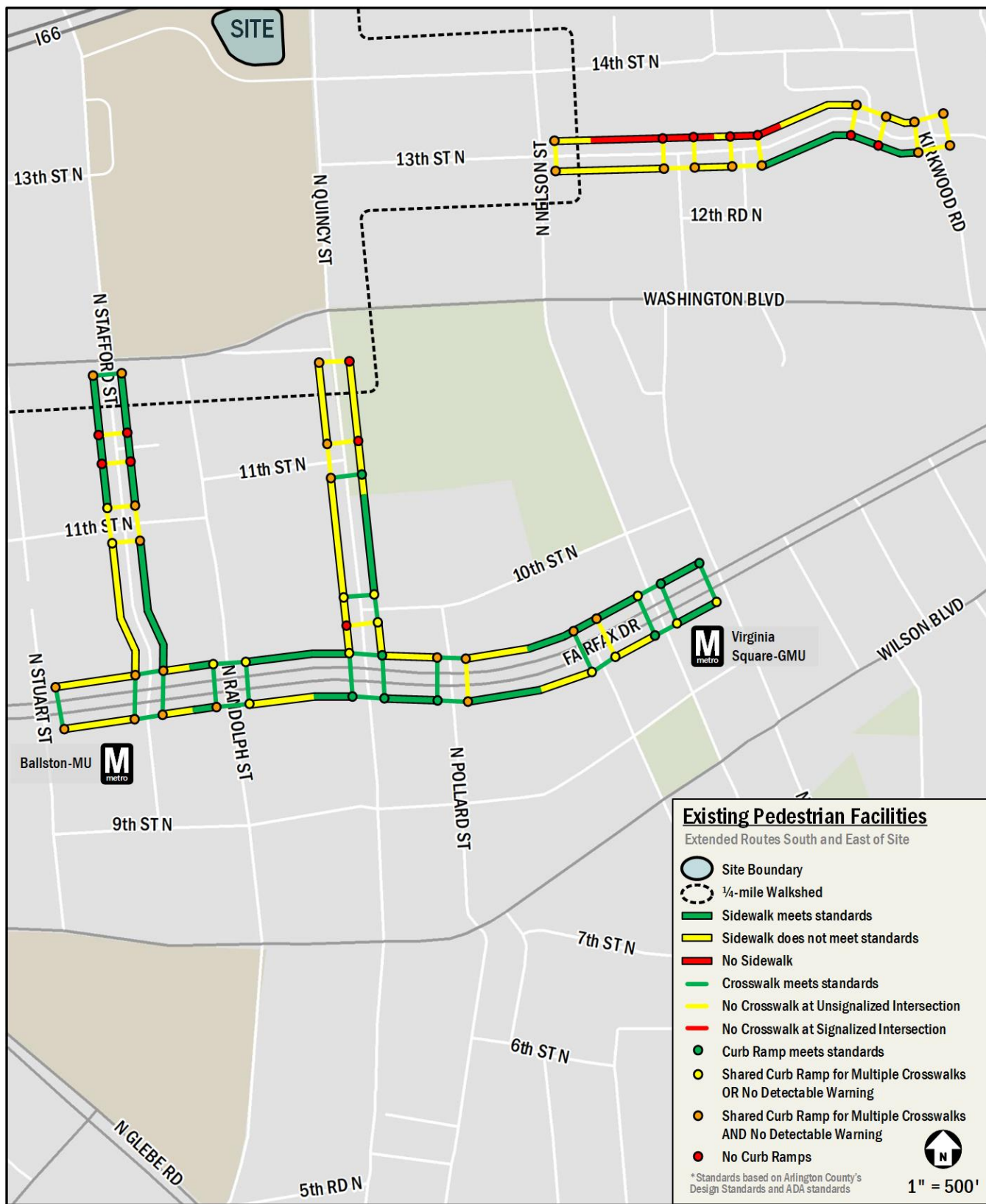


Figure 26: Existing Pedestrian Facilities (south and east)



## PLANNED PEDESTRIAN INFRASTRUCTURE

This section reviews planned infrastructure improvements near the APS Education Center site that could potentially alleviate some of the concerns noted above.

### Local Initiatives

#### *Lee Highway and Washington Boulevard Bus Stop Consolidation and Accessibility Improvements*

This project's goal is to increase bus efficiency and improve bus stop quality, including bringing all bus stops into ADA compliance. The project will improve pedestrian safety by adding bus stop pads, ramps, curb extensions, and crosswalks near bus stops. Construction began in 2018 and is scheduled to complete in summer 2019.

#### *Washington Boulevard and N Nelson Street Intersection Safety Improvement*

This project's goal is to enhance pedestrian safety by installing a rectangular rapid flashing beacon (RRFB) at the Washington Boulevard crosswalk, as well as other crossing and curb improvements. Construction is expected to occur in spring/summer 2019.

### Neighborhood Conservation (NC) Projects

The following projects include pedestrian related improvements as part of Arlington County's Neighborhood Conservation (NC) Program. Infrastructure improvements made through the County's NC Program generally include the installation of sidewalks, curbs and gutters, streetlights, park improvements and renovations, neighborhood art, beautification, traffic management, and pedestrian safety improvements.

#### *13<sup>th</sup> Street North*

This project's goal is to improve pedestrian safety along 13<sup>th</sup> Street N between Kirkwood Road and N Johnson Street.

Specific project elements include:

- Adding a curb, gutter, and 4-foot wide sidewalk on the south side of 13<sup>th</sup> Street N
- Adding a curb and gutter on the north side of 13<sup>th</sup> Street N
- ADA compliant pedestrian ramps and driveway apron upgrades
- Adding a median pedestrian refuge at the intersection of Kirkwood Road and 13<sup>th</sup> Street N

- Adding "Narrow Street Ahead" signs to warn of limited right of way on 13<sup>th</sup> Street N
- No parking on either side of 13<sup>th</sup> Street N

Construction is expected to begin in late 2019.

## IMPACT OF EDUCATION CENTER PROJECT

The addition of more students to the Washington-Lee High School campus in the Education Center building has potential impacts on the N Quincy St side of the campus. The increased student population in the Education Center building will lead to more student crossings of N Quincy Street.

Although this crossing currently meets County standards for treatments, this MMTA is recommending upgrading the pedestrian crossings of N Quincy Street at its intersection with 14<sup>th</sup> Street with a Rectangular Rapid Flash Beacon (RRFB). This recommendation is made based on concerns expressed by project stakeholders, observations of pedestrian facilities in the field, and the review of potential solutions described below.

## POTENTIAL RECOMMENDATIONS FOR N. QUINCY STREET

In response to the concerns observed and heard regarding pedestrians crossing N. Quincy Street at 13th and 14th Streets, this report explored potential improvements at the intersection of N. Quincy Street and 14th Street, at the crosswalk closest to the front door of the Education Center building.

### Industry Guidance

The transportation engineering industry has several sources for guidance when evaluating potential treatments for school pedestrian crossings. The main one is the *Manual of Uniform Traffic Control Devices* (MUTCD), which is published by the Federal Highway Administration (FHWA) and contains details on pavement marking and traffic sign specifications and implementation. Another significant resource is the *Traffic Control Devices Handbook* (2nd Ed.), published by the Institute of Transportation Engineers (ITE), which contains less information on specifications and implementation details but rather provides guidance on how to select appropriate traffic control devices. These two resources present a significant amount of guidance on how to select appropriate crosswalk treatments at school locations based on constantly updated research across the Country.

### Warrants

The *MUTCD* and *Traffic Control Devices Handbook* outline several analytical methodologies to help identify proper traffic



controls. The transportation engineering industry generally refers to these methodologies as *warrants*. Warrants are analytical tests that need to be met to justify the installation of a specific traffic control device (although simply meeting a warrant does not mean a device had to be installed, guidance is provide in the manuals on additional factors to consider). The most common and well-known set of warrants are those for traditional traffic signals.

There is significant guidance in the *MUTCD* and *Traffic Control Devices Handbook* warning against installing unwarranted traffic control devices. Unwarranted traffic devices tend to create more safety and traffic delay problems than they were invented to solve. The analytical thresholds needed to meet a warrant are based on research demonstrating that the conditions are met where the installation would lead to an overall benefit, and would not simply replace one problem with another, or lead to an overall net decrease in safety.

#### Factors

Transportation engineers use several inputs in various warrants, and for this case the following data was used:

- Volumes. This analysis used turning movement counts collected in the Fall of 2018 for the intersection of N Quincy Street and 14<sup>th</sup> Street, as described earlier in this report. These counts included not only vehicles, but bicycles and pedestrians, including the number of pedestrians crossing N Quincy Street.
- Speeds. Arlington County provided speed data for N Quincy Street from 2014. Since this data was collected prior to the recent changes to N Quincy Street, including an improved pedestrian crossing treatment at the intersection of N Quincy Street and 15<sup>th</sup> Street, this report took additional speed data in December 2018.
- Geometries. The intersection geometry also is a factor in warrant analysis, mainly the number of vehicular travel lanes on N Quincy Street and the length of the crosswalk across N Quincy Street.
- Observations. In addition to field observations of traffic and pedestrian activity at the intersection, this report used video recordings done at the same time as the turning movement counts. These recordings were used for studying gaps in traffic and driver compliance for stopping for waiting pedestrians.

- Crash data. Arlington County provided crash data for N Quincy St between Washington Boulevard and 15<sup>th</sup> Street, including all reported crashes between 2010 and 2018 (to date).

#### Traffic Signal Warrants at N Quincy & 14<sup>th</sup> Street

The first warrant tested for this intersection were the traditional traffic signal warrants. There are nine (9) warrants for traffic signals, as follows:

- Warrants 1 through 3 are all various warrants based on vehicular volumes passing through an intersection. Based on the vehicular volumes collected for this report, none of these warrants are met.
- Warrant 4 is based primarily on the volumes of pedestrians crossing the street. Based on the pedestrian volumes collected for this report, this warrant is not met.
- Warrant 5 is a school crossing warrant, which is met. More discussion on this is below.
- Warrant 6 is a coordinated signal system warrant that does not apply for N Quincy Street.
- Warrant 7 is based on crash experience and based on the crash data supplied by the County it is not met.
- Warrant 8 is a roadway network warrant and is used for designating traffic signals in an area of significant future traffic growth, which does not apply to N Quincy Street.
- Warrant 9 is for intersections near railroad crossings, which does not apply to N Quincy Street.

Warrant 5, the *School Crossing* signal warrant, is intended for application where the fact that schoolchildren cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students.

Three criteria must be met to satisfy Warrant 5, School Crossing:

1. A minimum of 20 schoolchildren use cross the major street during the highest crossing hour;
2. The number of adequate gaps in the traffic stream during the period when the schoolchildren are using the crossing is less than the number of minutes in the same period; and



- 3. The distance to the nearest traffic control signal along the major street is more than 300 feet.

Based on these criteria Warrant 5 is met since more than 20 schoolchildren crossed N Quincy Street during the highest crossing hour (31 pedestrians in the AM peak hour) and the number of adequate gaps in the traffic stream (2 adequate gaps) was less than the number of minutes in the same period (30 minutes), and the closest traffic signal on N Quincy Street is approximately 750 feet away (N Quincy Street and Washington Blvd).

The study used to determine the number of adequate gaps during was performed using the video recordings from the turning movement counts. The 30-minute period selected, 8:00 AM to 8:30 AM, is the peak 30 minutes of pedestrian volume crossing N Quincy Street, closest to the morning bell time at Washington-Lee. The video recording from the same time was also used to determine driver compliance at the crosswalks at N Quincy Street and 14<sup>th</sup> Street. During this 30-minute period, 49% of drivers stopped for a pedestrian waiting at the crosswalk.

It should be noted that meeting Warrant 5 by itself does not mean that a traffic signal should be installed at the location. Rather, that the crossing warrants some level of enhanced pedestrian treatment up to and including a traffic signal, and that consideration be given to the implementation of other measures, such as warning sign, flashing beacons, school speed zones, and/or school crossing guards.

#### Enhanced Pedestrian Crossing Options

The following are types of enhanced pedestrian crossing treatments that this report considered for the intersection, in order from least to most intensive.

- Crossing guards/supervision  
Crossing guards are used to increase the amount of gaps in traffic at school crossings. They MUTCD specifically states that crossing guards should not be used to direct traffic in the typical law enforcement sense, but rather help stop cars and create gaps for safe crossings. Some school jurisdictions use police officers in addition to crossing guards when needed to help direct traffic and create gaps as needed.

A main drawback of the use of crossing guards is that they only help alleviate the crossing concerns when present, usually just arrival and dismissal times. Thus, they may not be appropriate for a high school with significant after school activities. Additionally, Arlington Public Schools does not control the placement of crossing guards (or police officers) to create gaps in traffic to aid school crossings. Thus, this report does not recommend crossing supervision as a solution.

- Traffic Calming and/or Signing/Marking Improvements  
In many cases, adding traffic calming measures to a roadway in combination with signings and markings works for two-lane roadways with crosswalks the length at this location (the crosswalk over N Quincy street is 42' long). In this instance, there are several of these measures already in place, such as curb extensions at the intersection of N Quincy St and 14<sup>th</sup> St, bike lanes, a center running median, school zone signage, and in-street yield to pedestrian signage. Although these could be enhanced (e.g. an additional curb extension could be added to the intersections southeast corner), since these elements already exist and there are still concerns and issues with pedestrian crossings means that a more intensive solution is warranted.
- Rectangular Rapid Flashing Beacons (RRFB)  
Rectangular Rapid Flashing Beacons are a new version of a lighted sign warning drivers to yield to pedestrians at crosswalks. The difference between RRFBs and other lighted crosswalk is that the RRFB uses rectangular-shaped high-intensity LED-based indications, that flash back and forth and create a highly visible warning for drivers. These beacons have been shown to increase driver compliance at crosswalks to 70-85%, which is a significant increase compared to similar options (and would represent a significant improvement on the current 49% compliance rate observed during the morning arrival time). The FHWA will be adding RRFB guidance and full approval in the next edition of the MUTCD, and Arlington County has already begun installing them in several locations.

Industry guidance on RRFBs shows they would be a good candidate for installation at the intersection of N Quincy Street and 14<sup>th</sup> St, because the existing traffic calming and signing/markings isn't working as well as desired, and other options aren't warranted.





- High-intensity Activated Crosswalk (HAWK)  
HAWK signals, introduced in the most recent version of the MUTCD, are considered 'hybrid' signals that are a combination of flashing beacons and traditional traffic signals. The MUTCD has warrants for their use, similar to full traffic signals. HAWK signals have been shown to increase driver compliance at stopping for pedestrians to over 90%.

The N Quincy St crosswalk does not meet MUTCD warrants for a HAWK signal. This does not mean it may not be an appropriate location for a HAWK, but rather that based on research done on HAWK signals to date it may not be the best solution given the context. Additionally, the MUTCD does not recommend installation of HAWK signals at intersections, preferring them at mid-block locations. Although the HAWK signal isn't warranted, it is close to meeting warrants, and the *Traffic Control Devices Handbook* states that unwarranted HAWK signals do not have the traditional safety issues as unwarranted full traffic signals. Thus, it may be an acceptable solution if other ones are not successful.

### **Recommendation**

Based on the review of potential enhances crosswalk treatments above, the two treatments that are the best fit are the RRFB and HAWK signal. This report is recommending the installation of RRFB, with the option to upgrade to a HAWK if the RRFB isn't effective.

General transportation engineering practice is to use the least intensive solution that fits the area context and quantitative analysis. In this case, since the existing traffic calming and signing/marking elements are not working as well as desired, upgrading to a RRFB would be the next course of action. Based on research into the effectiveness of RRFB installations, driver compliance at stopping for pedestrians waiting to cross should increase to at least 70%. The only concern with this recommendation is the uncertainty that this will occur.

Since there is a chance that the RRFB will not succeed in increasing driver compliance to this extent, this report also recommends studying the success of the RRFB in the first year the Ed Center is open with the increased student population on campus. If the driver compliance rate is not increased to a satisfactory level (i.e. 70% or more), then this report recommends the County revisit the intersection for additional mitigation measures.



## BICYCLE FACILITIES

This section presents a review of bicycle routes to and from the APS Education Center site. The purpose of this review is to develop a set of recommendations for infrastructure and operational improvements to raise the potential bicycle mode split of students and staff at the site. The steps performed in this review included:

- A detailed review of existing bicycle infrastructure in the vicinity of the site
- An examination of impacts that planned County projects would have on bicycle comfort levels to and from the site

The following conclusions are reached within this chapter:

- The site has good connectivity to existing on- and off-street bicycle facilities. The site is surrounded by local neighborhood streets, bicycle lanes on N Quincy Street, and the Custis Trails.
- While there are no bicycle lanes on Washington Boulevard adjacent to the site, planned improvements will add an enhanced bicycle facility on the roadway, improving bicycle comfort levels.
- There is one (1) Capital Bikeshare station adjacent to the site.
- This MMTA is recommending that more bicycle parking be located closer to the Education Center buildings front door, either the Generals' Way bicycle parking facility can be expanded, or a third facility be added adjacent to the Education Center. A minimum of 16 racks (32 spaces) should be added in proximity to the Education Center in this manner.
- Additionally, this MMTA is recommending that the schematic design for the Education Center building explore ways to (1) cover some bicycle parking for students, (2) provide enhanced parking options for school staff (e.g. secured indoor parking), and (3) provide shower/locker access for staff, possibly by utilizing existing facilities within the W-L High School. Because this project is not building any new structures as part of its design this report recognizes that it may be difficult to incorporate covered or secure bicycle parking or other upgraded facilities, and as such does not consider this recommendation to be a requirement.

- This report recommends using green paint to enhance the visibility of the bike lanes on N Quincy St between 13<sup>th</sup> Street and the northern Ed Center parking lot driveway.

### EXISTING BICYCLE FACILITIES REVIEW

The site has good connectivity to existing on- and off-street bicycle facilities and the site is surrounded by neighborhood streets that are relatively low in vehicular traffic and speed. North-south connectivity is provided via bicycle lanes on N Quincy Street and a signed route on N Stafford Street. East-west connectivity is provided the Custis Trail and a signed route on 13<sup>th</sup> Street N.

#### Bicycle Parking

There are approximately 140 short-term bicycle parking spaces across the Washington-Lee High School campus.

#### Capital Bikeshare

The Capital Bikeshare program provides an additional cycling option for staff and visitors. Capital Bikeshare has placed over 500 bikeshare stations across Washington, DC, Arlington County, the City of Alexandria, and Fairfax County in Virginia, and Montgomery County and Prince George's County in Maryland, with 4,300 bicycles provided. There is a 15-dock Capital Bikeshare station in the northwest corner of the Washington-Lee High School campus, about 0.1 miles from the APS Education Center site.

### PLANNED BICYCLE FACILITIES

This section reviews planned infrastructure improvements near the APS Education Center site that would improve bicycle comfort levels to and from the site.

#### Draft Master Transportation Plan – Bicycle Element

The following bicycle facilities are proposed in the Bicycle Element of Arlington County's 2018 Draft Master Transportation Plan:

- Washington Boulevard Bicycle Facility: An enhanced bicycle facility on Washington Boulevard between Arlington Boulevard and Lee Highway.
- Virginia Square – Cherrydale Bicycle Boulevard: A bicycle boulevard connecting Lee Highway with the Virginia Square-GMU Metrorail station via Lincoln, Monroe, 13<sup>th</sup>, 14<sup>th</sup>, and Nelson Streets.



## PROJECT BICYCLE FACILITIES

Currently, there are approximately 76 bicycle racks providing 152 short-term bicycle parking spaces across the Washington-Lee High School campus, including a large rack facility along N Stafford Street near the school's front entrance, and a smaller facility along Generals' Way. The existing bicycle parking demand peaks at around 94 bicycles.

Future bicycle parking demand would then be estimated at 118 spaces (a 25% increase). The survey results from APS Go! indicate that the observed bicycle parking demand may not represent the highest possible demand. Simply based on the mode split surveys, the potential bicycle demand is 126 bicycles not 94. This may indicate that people are not parking their bicycles on the indicated racks (e.g. staff may take them inside the school to store, and/or cyclists may be locking their bikes

on unofficial racks, such as street signs). Using the survey estimates of parking demand as a base, bicycle parking demand is projected to grow to 135 student bicycles, and 23 staff bicycles.

Because bicycle parking demand is projected to grow to 158 spaces, it is recommended that more bicycle parking be added, including 30 bicycle spaces in the Education Center parking lot, 30 spaces in the I-66 parking garage, and six (6) spaces for staff in a storage room near the Education Center. Proposed bicycle parking areas are shown in Figure 7.



Figure 27: Existing Bicycle Facilities





## TRANSPORTATION MANAGEMENT PLAN

A Transportation Management Plan (TMP) has many components that are tailored to accommodate a given facility with the goal of reducing of automobile trips by encouraging alternative forms of transportation.

A few typical TMP components for high schools are the establishment of a Transportation Demand Management (TDM) plan, the establishment of a Parking Management Plan, the establishment of Arrival and Dismissal Plans, and the establishment of a Performance and Monitoring Plan.

The TMP will include a schedule and details of implementation and continued operation of the elements in the plan. The TMP for the APS Education Center may include, but not be limited to, the following:

### TRANSPORTATION DEMAND MANAGEMENT

The TDM Plan addresses the use permit conditions and includes additional strategies for reducing single-occupancy vehicle (SOV) and single-family travel to the APS Education Center consistent with the Arlington County TDM program and the APS Go! Master Plan.

The goals of the TDM plan are to:

1. Reduce staff drive rates from the existing rate in support of APS's division-wide goal of 75% by 2021 (as an average of all sites).
2. Increase the student walk/bike rate from the existing rate in support of APS's division-wide goal of 30% by 2021 (as an average of all schools).
3. Increase the number of school bus eligible students who ride the school bus.
4. Mitigate potential adverse impacts of parking on APS sites and in surrounding communities.
5. Support and grow a culture around walking, biking, carpooling and public transit use among students and staff.

A number of TDM strategies are outlined in the APS Go! Master Plan, which can be used to increase school bus utilization, public transit utilization, vanpool and carpool utilization, and active transportation modes – e.g., walking and biking, strategies for managing motor vehicle parking and student drop-off/pickup, and evaluation. This report recommends focusing on the following TDM strategies:

### General TDM Strategies

1. Appoint a School Transportation Coordinator (STC);
2. Promote the APS pre-tax transportation benefit;
3. Invite Arlington Transportation Partners (ATP) and Safe Routes to School staff to Open House nights;

### Strategies to Increase School Bus Utilization

4. Establish frequent bus rider incentive program;
5. Establish "walking school bus" program to bus stops;
6. Promote school bus use in communications with parents;

### Strategies to Increase Public Transit Use

7. Offer transit benefit subsidy for those who commute by public transportation;
8. Offer transit training for students;
9. Promote student iRide card, which provides rides on ART buses for half price to students;

### Strategies to Increase Vanpool and Carpool Utilization

10. Inform staff members about the "Guaranteed Ride Home" program;
11. Offer TDM benefit to staff who participate in carpool or vanpools for travel to and from work;

### Strategies to Increase Active Transportation Mode Utilization

12. Continue partnering with the County to make physical improvements to the pedestrian and bicycle environment near the school, as necessary
13. Provide secure bicycle parking/storage facilities for students and staff;
14. Provide shower/changing facilities on site for staff who bike or walk to work;
15. Maintain trained crossing guards at appropriate intersections near school;
16. Establish a walking club;
17. Establish and provide parents with information on walking school buses and bike trains;

Additional TDM strategies will be included in the final use permit. These TDM strategies will target specific community concerns regarding traffic, while complementing the site's location and proximity to transit and bicycle facilities.

In addition to the strategies outlined in the APS Go!, this MMTA is recommending that APS explore additional policy changes to student parking. This would include exploring high school student parking policies systematically and considering additional demand management measures such as limiting



availability of student parking passes and/or charging higher fees for student passes. These would be APS-wide policy changes that would impact all high schools in the County.

### SAFE ROUTES TO SCHOOL

Safe Routes to School (SRTS) is a national program that works to make it safer and easier for students to walk or bike to school. SRTS programs examine conditions around schools and conduct projects and activities that work to improve safety and accessibility, and reduce traffic and air pollution in the vicinity of schools. The core elements of SRTS include:

- Enabling and encouraging children, including those with disabilities, to walk and bicycle to school
- Making bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age.
- Facilitating the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution near schools.

APS has a SRTS Coordinator on staff whose position is funded through VDOT's SRTS Program whose work focuses on these core elements. The following additional strategies can be used to complement the TDM plan, and encourage and enable students to walk and bicycle to the new Ed Center annex while fulfilling SRTS objectives:

1. Participate in Walk to School Day and Bike to School Day;
2. Consider establishing a regular (i.e. weekly or monthly) walk and bike to school day;
3. Hold pedestrian safety classes or assemblies;
4. Partner with the County's Active Transportation team to offer safe cycling classes/training; and
5. Create a frequent walker, biker, and bus rider program with associated travel training opportunities.

### PARKING MANAGEMENT PLAN

A Parking Management Plan (PMP) will address the use permit conditions and be consistent with Arlington Public Schools Policy 50-1.1.

The PMP will show how curbside space adjacent to the site will be designated for parking by the various users of the project. In addition, the PMP will provide effective directional signage to direct staff and visitors to appropriate location on the property.

Per previous discussion in this report, this MMTA is recommending that the PMP include a section reviewing visitor parking for the school and approved visitor entry points, making sure there is proximity between the two. Additionally, the PMP should review wayfinding and marketing for after-school activities and events held on campus to increase the amount of parking demand using the parking garage in lieu of on-street parking.

### ARRIVAL AND DISMISSAL PLANS

Arrival and dismissal plans will be reviewed and updated for the Washington-Lee High School campus with the addition of the Education Center building and population. Their purpose of these plans is to ensure that school arrival and dismissal occurs safely and efficiently for users of all modes.

These plans will include details on parent drop-off and pick-up procedures, including how the queuing space will be managed, where school staff will be placed and their roles, and the marketing/messaging for parents and students.

As per discussions earlier in this MMTA, this report is recommending Washington-Lee High School enhance its arrival and dismissal plans with specific instructions on how to use N Quincy Street safely, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford St side of campus today).

### PERFORMANCE AND MONITORING

APS will continue to maintain records of W-L staff participation in APS TDM benefit programs and conduct triennial surveys of students, visitors, staff, and parents, regarding their travel to and from the school. APS will provide a triennial update to the School Board and APS leadership and the County Manager describing the results of the survey and TDM related activities.

This MMTA is recommending one item specific to this project have its own specific and separate performance and monitoring plan: An evaluation of driver compliance at the RRFB and associated pedestrian crossings at N Quincy Street and 14<sup>th</sup> Street. If this review finds that the RRFB installation has not increased driver compliance sufficiently, then additional mitigations should be considered.

These items should be monitored at a time around 6 months to one year after the Ed Center opened.



## SUMMARY AND RECOMMENDATIONS

This MMTA reached the following major findings and recommendations:

### Project Summary

The Washington-Lee High School campus site is currently home to:

- The APS Education Center, previously used for APS offices
- Washington-Lee High School
- The David M. Brown Planetarium
- A recreational area with several athletic fields

This project consists of renovating the existing Education Center building by adding 500 to 600 high school seats and converting it from its current configuration as an office building to a school instructional facility. The plan to repurpose the Education Center as an instructional facility involves the closure of the Education Center and the David M. Brown Planetarium during construction, both to reopen after construction. Washington-Lee High School and the athletic fields will remain open during construction.

### Overall Transportation Strategy

Establishing an instructional facility at the Education Center presents an opportunity to optimize transportation operations at the site it shares with Washington-Lee High School. One of the general goals of this project is to provide flexibility in the type of educational program that can be housed in the Education Center building. When the Educational Center building reopens it will host an expansion of the Washington-Lee high school but in the future, it may be used for other programs like a separate school facility. Thus, although this MMTA makes recommendations primarily on how the building will function as an extension of Washington-Lee High School, it also considers how it may function in the future.

Specifically, this report proposes the following strategy:

- Use existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand resulting from the project.
- Create a secondary set of school arrival/dismissal facilities near the Education Center, that can be used to supplement the entire campus or stand-alone is needed, including:

- Add two (2) dispersed student drop-off/pick-up locations on 15<sup>th</sup> Street N and Washington Boulevard that relieve queuing at the existing N Stafford Street location and provides more convenient access to the Education Center building.
- Add a second bus loading/unloading location in the Education Center parking lot that relieves queuing at the existing Generals' Way location and provides more convenient access to the Education Center building.

The recommendation to implement secondary pick-up/drop-off and bus loading/unloading areas provides flexibility to act as both an extension of the Washington-Lee High School transportation system, and as an independent system in case that need arises.

The recommendations contained within this MMTA, and detailed in the following sections, are all based around this overall strategy.

### Parking

This MMTA reached the following major findings on parking:

- During a typical weekday, the existing parking demand for staff and students of Washington-Lee High School is accommodated by the surrounding parking supply, mainly in the parking garage and in unrestricted parking spaces within walking distance.
- Visitor parking peaks outside of school hours due to parking demand for the pool, but there is availability during school hours. There have been some concerns expressed about the location of visitor parking relative to the school's front door (that visitors are required to use).
- After-school parking on weeknights fills up some areas within the parking garage and nearby street parking, while some areas within the garage remain empty.

This report recommends the following strategy for accommodating the increase in parking demand:

- Use the existing underutilized parking facilities (e.g. mainly the currently closed Educational Center parking lot) to absorb new parking demand.
- Reopen parking spaces in the closed off Education Center lot based on a comparison of supply and demand without a reduction in parking rates. Based on this strategy this MMTA recommends that 82



spaces in the Education Center parking lot be reopened to serve the Washington-Lee High School campus, and up to 46 spaces can be repurposed.

- Continue the current APS Go! Transportation Demand Management (TDM) programs to encourage use of alternative travel modes, thus reducing parking demand and providing more parking availability.
- Explore student parking policies systematically and consider additional demand management measures such as limiting availability of student parking passes and/or charging higher fees for student passes. These would be APS-wide policy changes that would impact all high schools in the County.
- Depending on future visitor entry points on the campus, explore switching how some spaces are designated to increase visitor parking near the school's main entrance.
- Increase wayfinding and marketing of the parking garage for after-school activities and events to lessen the impact on nearby on-street parking.

### **Traffic Operations**

A detailed traffic capacity analysis performed for this MMTA led to the following findings:

- The existing study area intersections all operate at acceptable levels of service and delay, with a few exceptions. These are mainly at side streets approaching N Quincy Street, where vehicles are having difficulty finding gaps in traffic to make turns (onto N Quincy St). A similar lack of gaps for pedestrians trying to cross the street was observed in the pedestrian analyses performed in this MMTA.
- The future scenarios show similar results, areas with poor Levels of Service on side streets get slightly worse.
- This report reviewed several ways to lower delays for drivers at these locations but does not recommend any traffic mitigation measures for the project because there would be negative impacts to other modes (mainly walking), and the benefit would not impact enough drivers to offset negative impacts to other modes.

### **Bicycle Parking**

Because bicycle parking demand is projected to grow, this MMTA is recommending more bicycle parking be added,

including 30 bicycle spaces in the Education Center parking lot, 30 spaces in the I-66 parking garage, and six (6) spaces for staff in a storage room near the Education Center.

### **Arrival/Dismissal – Student Drop-off/Pick-up**

This report recommends creating additional drop-off/pick-up areas on eastbound 15<sup>th</sup> Street N between N Randolph Street and N Quincy Street, and westbound Washington Boulevard between N Randolph Street and N Quincy Street. Under existing conditions, student drop-off and pick-up operations occur in the driveway at the Washington-Lee High School front entrance off N Stafford Street and along other streets near the front door.

The proposed 15<sup>th</sup> Street N area has room to accommodate up to 19 vehicles loading or unloading at the same time, depending on how much curbside is used. The proposed Washington Boulevard area has room to accommodate 12 vehicles loading or unloading at the same time.

Establishing additional drop-off/pick-up areas also allows flexibility for future uses of the Education Center building. Whether the building is incorporated into Washington-Lee High School or established as a separate facility, the drop-off/pick-up areas can serve either function.

### **Arrival/Dismissal – School Buses**

Under existing conditions, bus loading and unloading operations occur along Generals' Way, with some buses using N Stafford Street at dismissal. While the APS Education Center project is unlikely to produce substantially greater bus demand, more buses can be accommodated by creating an additional bus loading/unloading area in the eastern drive aisle of the Education Center parking lot, parallel to N Quincy Street. This area has room to accommodate five buses loading or unloading at the same time.

### **N Quincy St Recommendations**

The addition of more students to the Washington-Lee High School campus in the Education Center building has potential impacts on the N Quincy St side of the campus. As such, this MMTA is recommending several mitigation measures to minimize the impact these new and expanded transportation facilities will have.

Detailed descriptions of these recommendations are contained in the body of the MMTA, but are summarized here:





- To help minimize conflicts in general on N Quincy Street, this report is recommending Washington-Lee High School enhance its arrival and dismissal plans with specific instructions to not use N Quincy Street, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford St side of campus today).
- The increased student population in the Education Center building will lead to more student crossings of N Quincy Street. This MMTA recommends enhancing the crosswalk at this location with a treatment that will alert drivers to pedestrian crossings. Industry research has shown that a Rectangular Rapid Flash Beacon (RRFB) is likely the optimal solution, but there is a chance it may not accomplish its objective. Thus, this MMTA also recommends that the RRFB's performance be monitored after the school is open for around 6 months to a year to ensure its effectiveness. (A review of alternatives and why the MMTA recommendation is provided in the Pedestrian Facilities section of the MMTA.)
- Arrival and dismissal plans updated for the Washington-Lee High School campus with the addition of the Education Center. In addition to standard elements, this report is recommending the arrival and dismissal plans include specific instructions on how to use N Quincy Street safely, incorporate those plans into the parent/student handbooks, and use APS staff on the sidewalk outside the school to help enforce the plans (similar to how they are used on the N Stafford St side of campus today).
- APS will incorporate the Ed Center into its ongoing monitoring of school transportation through maintaining records of W-L staff participation in APS TDM benefit programs and conducting triennial surveys of students, visitors, staff, and parents, regarding their travel to and from the school site.

This MMTA is recommending one item specific to this project have its own specific and separate performance and monitoring plan: An evaluation of driver compliance at the RRFB and associated pedestrian crossings at N Quincy Street and 14<sup>th</sup> Street. If this review finds that the RRFB installation has not increased driver compliance sufficiently, then additional mitigations should be considered.

These items should be monitored at a time around 6 months to one year after the Ed Center opened.

These recommendations are summarized on the following Figures.

### **Transportation Management Plan**

This MMTA is recommending establishment of the standard management plans for County schools, including:

- A use permit required Transportation Demand Management (TDM) plan, with the standard elements for APS high school facilities, based on the APS Go! Program
- A Parking Management Plan (PMP). In addition to standard PMP elements, this MMTA is recommending that the PMP include a section reviewing visitor parking for the school and approved visitor entry points, making sure there is proximity between the two. Additionally, the PMP should review wayfinding and marketing for after-school activities and events held on campus to increase the amount of parking demand using the parking garage in lieu of on-street parking.