COMPREHENSIVE TRANSPORTATION REVIEW

THE LADYBIRD

WASHINGTON, DC

November 22, 2017

GOROVE / SLADE
Transportation Planners and Engineers

Prepared by:

1140 Connecticut Avenue NW
Suite 600
Washington, DC 20036
Tel: 202.296.8625
Fax: 202.785.1276

3914 Centreville Road
Suite 330
Chantilly, VA 20151
Tel: 703.787.9595
Fax: 703.787.9905

15125 Washington Street
Suite 136
Haymarket, VA 20169
Tel: 703.787.9595
Fax: 703.787.9905

www.goroveslade.com

This document, together with the concepts and designs presented herein, as an instrument of services, is intended for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization by Gorove/Slade Associates, Inc., shall be without liability to Gorove/Slade Associates, Inc.

Contents

Executive Summary 1

Introduction 3

- Purpose of Study 3
- Project Summary 3
- Contents of Study 3

Study Area Overview 6

- Major Transportation Features 6
- Future Projects 7

Project Design 12

- Site Access and Circulation 12
- Loading 13
- Parking 14
- Curbside Management 14
- Bicycle and Pedestrian Facilities 15
- Transportation Demand Management (TDM) 15

Trip Generation 24

Traffic Operations 26

- Study Area, Scope, & Methodology 26
- Vehicular Analysis Results 28
- Mitigations 29

Transit 52

- Existing Transit Service 52
- Planned Transit Service 52
- Site-Generated Transit Impacts 54

Pedestrian Facilities 56

- Pedestrian Study Area 56
- Pedestrian Infrastructure 56
- Site Impacts 57

Bicycle Facilities 61

- Existing Bicycle Facilities 61
- Planned Bicycle Facilities 61
- Site Impacts 62

Crash Data Analysis 64

- Summary of Available Crash Data 64
- Potential Impacts 64

Summary and Conclusions 66

Figures

Figure 1: Site Location 4

Figure 2: Site Aerial 5

Figure 3: Summary of Walkscore and Bikescore 7

Figure 4: Major Regional Transportation Facilities 9

Figure 5: Major Local Transportation Facilities 10

Figure 6: Planned Development Map 11

Figure 7: Site Plan – G2 Floor Plan 17

Figure 8: Site Plan – G1 Floor Plan 18

Figure 9: Site Plan – First Floor Plan 19

Figure 10: Proposed Alley Improvements 20

Figure 11: Circulation Plan 21

Figure 12: Existing Curbside Management 22

Figure 13: Proposed Curbside Management Plan 23

Figure 14: Study Area Intersections 31

Figure 15: Existing Peak Hour Traffic Volumes (1 of 2) 32

Figure 16: Existing Peak Hour Traffic Volumes (2 of 2) 33

Figure 17: 2021 Background Peak Hour Traffic Volumes (1 of 2) 34

Figure 18: 2021 Background Peak Hour Traffic Volumes (2 of 2) 35

Figure 19: Outbound Trip Distribution and Routing 36

Figure 20: Inbound Trip Distribution and Routing 37

Figure 21: Lane Configuration and Traffic Control (1 of 2) 38

Figure 22: Lane Configuration and Traffic Control (2 of 2) 39

Figure 23: Site-Generated Peak Hour Traffic Volumes (1 of 2) 40

Figure 24: Site-Generated Peak Hour Traffic Volumes (2 of 2) 41

Figure 25: 2021 Future Peak Hour Traffic Volumes (1 of 2) 42

Figure 26: 2021 Future Peak Hour Traffic Volumes (2 of 2) 43

Figure 27: Morning Peak Hour Capacity Analysis Results (1 of 2) 48

Figure 28: Morning Peak Hour Capacity Analysis Results (2 of 2) 49

Figure 29: Afternoon Peak Hour Capacity Analysis Results (1 of 2) 50

Figure 30: Afternoon Peak Hour Capacity Analysis Results (2 of 2) 51

Figure 31: Existing Transit Service 55

Figure 32: Pedestrian Pathways 58

Figure 33: Existing Pedestrian Infrastructure 59

Figure 34: Proposed Landscape Site Plan 60

Figure 35: Existing Bicycle Facilities 63

Tables

Table 1: Summary of Mode Split Assumptions 24
Table 2: Multi-Modal Trip Generation Summary 25
Table 3: Summary of Background Development Trip Generation 30
Table 4: Applied Annual and Total Growth Rates 30
Table 5: LOS Results 44
Table 6: Queueing Results (in feet) 46
Table 7: Metrobus Route Information 52
Table 8: Transit Stop Requirements 53
Table 9: Sidewalk Requirements 56
Table 10: Intersection Crash Rates 64
Table 11: Crash Type Breakdown 65

EXECUTIVE SUMMARY

The following report is a Comprehensive Transportation Review (CTR) for the Ladybird development. The report reviews the transportation aspects of the project's voluntary design review application. The Zoning Commission Case Number is 16-23.

The purpose of this study is to evaluate whether the project will generate a detrimental impact on the surrounding transportation network. This evaluation is based on a technical comparison of the existing conditions, background conditions, and future conditions. This report concludes that **the project will not have a detrimental impact** on the surrounding transportation network assuming that all planned site design elements and Transportation Demand Management (TDM) plan are implemented.

Proposed Project

The Ladybird site is currently occupied by a surface parking lot, a vacant grocery store, and additional retail uses that are currently in operation. The site is generally bound by Yuma Street to the north, 48th Street to the east, the American University Admin Building to the south, and a public alley to the west. The resulting development will be a mixed-use development consisting of two buildings with a total of 219 residential dwelling units and 16,000 square feet of grocery/retail space.

As part of the development, sections of the roadway network surrounding the site will be improved. Pedestrian facilities along the perimeter of the project on Yuma Street, 48th Street, and along the public and private alleys to the west and south of the site will be improved so that they meet or exceed DDOT and ADA standards. This includes sidewalks that meet or exceed width requirements, crosswalks at all necessary locations, and curb ramps with detectable warnings. Additional design elements such as Windom Walk, a publicly accessible linear park between Buildings 1 and 2 that will provide a new pedestrian extension of Windom Place through the site between 48th Street and the public alley along the west of the site. In addition, existing curb cuts along Yuma Street and 48th Street will be closed, providing more continuity to sidewalks along the site's perimeter that does not exist under current conditions.

Vehicular and loading access for the project will be provided primarily via Yuma Street, 48th Street, and Massachusetts Avenue, which provide access to the public alley that connects to the loading facilities, the service and delivery space, and the below-grade parking garage.

The development will provide approximately 370 below-grade parking spaces in three levels of below-grade parking. The first level of parking will contain approximately 85 parking spaces that are intended to be for residential use. The second level of parking will contain approximately 106 parking spaces, of which approximately 49 parking spaces will be devoted to the grocery/retail uses on site. As required by an agreement with American University, approximately 57 parking spaces on the second level will be shared by the grocery/retail uses on site and the American University Admin Building to the south of the site and approximately 179 parking spaces on the third level will be shared between the residential uses on site and the American University Admin Building. Parking is planned to be priced at the market-rate.

The development will supply long-term bicycle parking within the below-grade garage and short-term bicycle parking around the perimeter of the site. The amount of short-term and long-term bicycle parking being provided exceeds what is required by zoning.

Multi-Modal Impacts and Recommendations

Transit

The site is served by regional and local transit services via Metrobus and Metrorail. The site is 0.8 miles from the Tenleytown – AU Metrorail Station entrance at Albemarle Street and Wisconsin Avenue, and four Metrobus stops are located within a block of the site along Massachusetts Avenue.

Although the development will be generating new transit trips, existing transit facilities have enough capacity to handle the new trips.

Pedestrian

The site is surrounded by a well-connected pedestrian network. Most roadways within a quarter-mile radius provide sidewalks and acceptable crosswalks and curb ramps, particularly along the primary walking routes. There are residential streets to the north and east of the site which lack sidewalks, curb ramps, or crosswalks that meet DDOT and ADA standards.

As a result of the development, pedestrian facilities along the perimeter of the site will be improved by the removal of two curb cuts. One wide curb cut (that includes a pedestrian refuge)

will be abandoned on Yuma Street, and one curb cut will be abandoned on 48th Street. The development will improve sidewalks adjacent to the site such that they meet or exceed DDOT requirements and provide an improved pedestrian environment.

The Applicant will fund the installation of a new HAWK (High-Intensity Activated crosswalk) signal on Massachusetts Avenue between 48th Street and 49th Street. This is designed to help pedestrians safely cross Massachusetts Avenue, and to help accommodate the additional pedestrian demand that the development will generate.

Bicycle

Bicycle infrastructure in the vicinity of the site is limited. The site is 0.6 miles from the nearest designated bicycle facility, which are shared-lanes along 43rd Street. However, low volume residential streets surrounding the site provide bicycle connectivity where official facilities are lacking.

The proposed development will provide short-term bicycle parking along the perimeter of the site and on-site secure long-term bicycle parking within the below-grade garage for residents and employees of the development.

Vehicular

The site is well-connected to regional roadways such as Massachusetts Avenue and Western Avenue, principal and minor arterials such as Nebraska Avenue and Wisconsin Avenue, and an existing network of collector and local roadways.

In order to determine the potential impacts of the proposed development on the transportation network, this report projects future conditions with and without development of the site and performs analyses of intersection delays and queues. These are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. The analysis concluded that no intersections would require mitigation as a result of the development.

Summary and Recommendations

This report concludes that **the proposed development will not have a detrimental impact on the surrounding transportation network assuming that all planned site design and TDM elements are implemented.**

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

- The inclusion of secure long-term bicycle parking spaces within the development that meet or exceed zoning requirements.
- The installation of short-term bicycle parking spaces around the perimeter of the site that meet or exceed zoning requirements.
- The creation of wide pedestrian sidewalks that meet or exceed DDOT and ADA requirements.
- The installation of a HAWK (High-Intensity Activated crossWalk) signal on Massachusetts Avenue between 48th Street and 49th Street.
- The inclusion of publicly accessible plazas and parks, that improve pedestrian porosity and circulation.
- The inclusion of two (2) electric vehicle charging and four (4) car-share parking spaces.
- A robust Transportation Demand Management (TDM) plan that reduces the demand of single-occupancy, private vehicles during peak period travel times or shifts single-occupancy vehicular demand to off-peak periods.
- The installation of a highly visible stop sign at the intersection of the east-west and north-south alleys.

INTRODUCTION

PURPOSE OF STUDY

This report reviews the transportation elements of the Ladybird development. The site, shown in Figure 1 and Figure 2, is located in the American University Park neighborhood and is adjacent to the Spring Valley neighborhood in Northwest DC.

The purpose of this report is to:

1. Review the transportation elements of the development site plan and demonstrate that the site conforms to DDOT's general policies of promoting non-automobile modes of travel and sustainability.
2. Provide information to DDOT and other agencies on how the development of the site will influence the local transportation network. This report accomplishes this by identifying the potential trips generated by the site on all major modes of travel and where these trips will be distributed on the network.
3. Determine if development of the site will lead to adverse impacts on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analyses of vehicular delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. In those areas where adverse impacts are identified and require mitigation, the report provides recommendations for improvements to the transportation network to mitigate the adverse impacts.

PROJECT SUMMARY

The Ladybird development will be a mixed-use development consisting of two buildings with a total of 219 residential dwelling units and 16,000 square feet of grocery/retail space.

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.
- *Project Design*
  This section reviews the transportation components of the project, including the site plan and access. This chapter also contains the proposed Transportation Demand Management (TDM) plan for the site.
- *Trip Generation*
  This section outlines the travel demand of the proposed project. It 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.
- *Transit*
  This section summarizes the existing and future transit service adjacent to the site, reviews how the project's transit demand will be accommodated, outlines impacts, and presents recommendations as needed.
- *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.
- *Safety/Crash Analysis*
  This section reviews the potential safety impacts of the project. This includes a review of crash data at intersections in the study area and a qualitative discussion on how the development will influence safety.
- *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

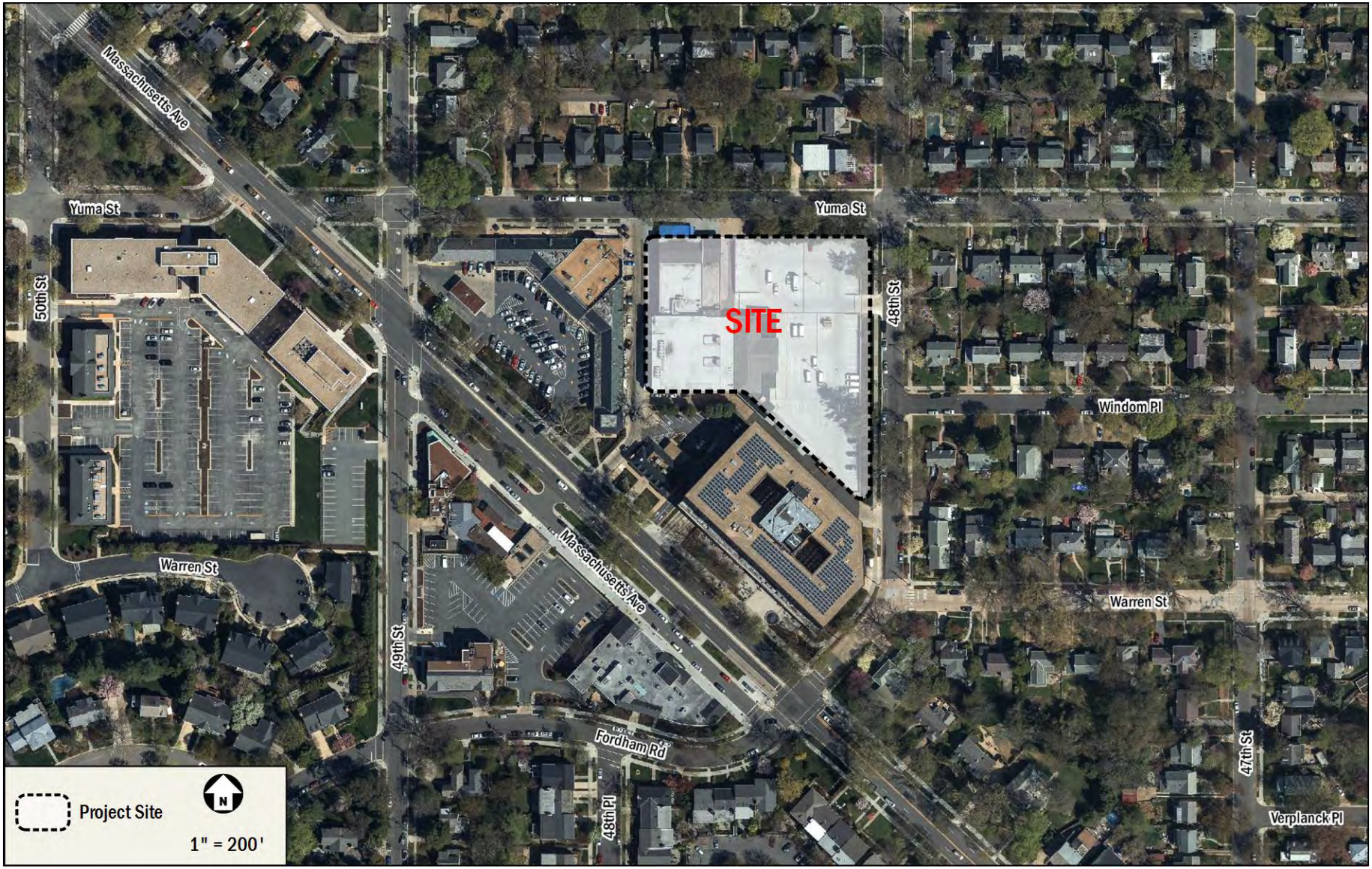

Figure 2: Site Aerial

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 the residents, employees, and patrons of the proposed development to the rest of the District and surrounding areas.
- The site is served by public transportation with access to two local Metrobus lines.
- There is limited bicycle infrastructure in the vicinity of the site, although low volume residential streets surrounding the site provide connectivity
- Pedestrian conditions are generally good, particularly along anticipated major walking routes.

MAJOR TRANSPORTATION FEATURES

Overview of Regional Access

The Ladybird site has ample access to regional vehicular- and transit-based transportation options, as shown in Figure 4, that connect the site to destinations within the District, Virginia, and Maryland.

The site is accessible from several principal and minor arterials such as Massachusetts Avenue, Nebraska Avenue and Western Avenue. The roadways create connectivity to the Capital Beltway (I-495) that surrounds Washington, DC and its inner suburbs, as well as providing connectivity to the District core.

There are several local bus routes near the site that connect the site with various areas in Washington, DC. The multiple bus route options allow for more frequent bus pickups and specified travel destination options, as shown in Figure 5.

The site is located 0.8 miles from the Tenleytown-AU Metrorail station, which is serviced by the Red line which provides connections to areas in the District and Maryland. The Red Line connects Prince George's County and Montgomery County, Maryland while providing access to the District core. In addition, the Red Line provides connections to all additional Metrorail lines allowing for access to much of the DC Metropolitan area.

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

Overview of Local Access

The site is served by a local vehicular network that includes several local streets Yuma Street and 48th Street, and collectors such as 49th Street, 46th Street and Van Ness Street, all of which provide vehicular access to the site.

The Metrobus system provides local transit service in the vicinity of the site, including connections to several neighborhoods within the District and additional Metrorail stations. As shown in Figure 5, there are two bus routes that service the site. In the vicinity of the site, the majority of Metrobus routes travel along Massachusetts Avenue. These bus routes connect the site to many areas of the District. A detailed review of transit stops within a quarter-mile walk of the site is provided in a later section of this report.

Limited bicycle facilities connect the site to areas within the District. However, low-volume residential streets surrounding the site provide connectivity to shared-lane facilities on 43rd Street and River Road to the east of the site. A detailed review of existing and proposed bicycle facilities and connectivity is provided in a later section of the report.

Anticipated pedestrian routes, such as those to public transportation stops, retail zones, and community amenities, provide adequate pedestrian facilities; however, there are some sidewalks and curb cuts that do not meet DDOT standards. A detailed review of existing and proposed pedestrian access and infrastructure is provided in a later section of this report.

Overall, the Ladybird site is surrounded by a good local transportation network that allows for efficient transportation options via transit, bicycle, walking, or vehicular modes.

Car-sharing

Three car-sharing companies provide service in the District: Zipcar, Maven, and Car2Go. All three services are private companies that provide registered users access to a variety of automobiles. Of these, Zipcar and Maven have designated

spaces for their vehicles. There are no car-share locations within a quarter-mile of the site.

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 Parking Permit (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 the District. Based on this website the planned development is located in the AU Park – Friendship Heights – Tenley neighborhood. The site location has a walk score of 78 (or "Very Walkable"), a transit score of 42 (or "Some Transit"), and a bike score of 65 (or "Bikeable"). Figure 3 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 that are in close proximity, where most errands can be completed by walking.

The modest transit score was based on the proximity to multiple bus lines, and distance to the nearest Metrorail stop which is located 0.8 miles from the site.

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

Overall, the AU Park – Friendship Heights – Tenley neighborhood has high walk, good transit, and good bike scores. Additionally, other planned developments and roadway improvements will help increase the walk and bike scores in the AU Park – Friendship Heights – Tenley neighborhood.

Future Projects

There are a few District initiatives and approved developments located in the vicinity of the site. These planned and proposed projects are summarized below.

Local Initiatives

MoveDC: Multimodal Long-Range Transportation Plan

MoveDC is a long-range plan that provides a vision for the future of DC's transportation system. As the District grows, so must the transportation system, specifically in a way that expands transportation choices while improving the reliability of all transportation modes.

The MoveDC report outlines recommendations by mode with the goal of having them completed by 2040. The plan hopes to achieve a transportation system for the District that includes:

- 70 miles of high-capacity transit (streetcar or bus)
- 200 miles of on-street bicycle facilities or trails

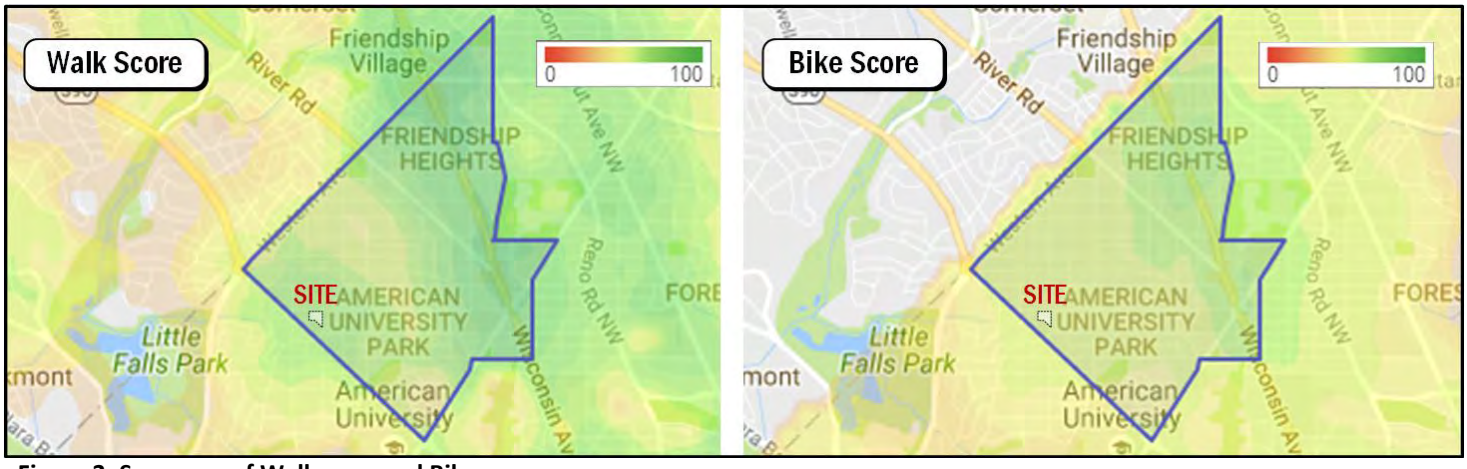

Figure 3: Summary of Walkscore and Bikescore

- Sidewalks on at least one side of every street
- New street connections
- Road management/pricing in key corridors and the Central Employment Area
- A new downtown Metrorail loop
- Expanded commuter rail
- Water taxis

In direct relation to the proposed development, the MoveDC plan outlines recommended pedestrian and bicycle improvements such as new sidewalks, and new bicycle trails and bicycle lanes. These recommendations would create additional multi-modal capacity and connectivity to the proposed development and are discussed further down in the report.

SustainableDC: Sustainable DC Plan

SustainableDC is planning effort initiated by the Department of Energy & Environment and the Office of Planning that provides the District with a framework for leading Washington DC to become the most sustainable city in the nation. The 2012 report proposes a 20-year timeframe to answer challenges in areas of: (1) Jobs & the economy; (2) Health & Wellness; (3) Equity & Diversity; (4) Climate & Environment; (5) Built Environment; (5) Energy; (6) Food; (7) Nature; (8) Transportation; (9) Waste; and (10) Water. With respect to transportation, the sustainability goals targeted in 20 years include:

- Improving connectivity and accessibility through efficient, integrated, and affordable transit systems
- Expanding provision of safe, secure infrastructure for cyclists and pedestrians
- Reducing traffic congestion to improve mobility
- Improving air quality along major transportation routes

In direct relation to the development, a combination of increasing public transit and decreasing vehicular mode shares through Transportation Demand Management has been suggested to meet the transportation targets.

Rock Creek West II Livability Study

Published in 2011, the purpose of this DDOT study was to examine the street network and identify concrete actions to increase transportation and safety options in Ward 3. The study area includes the community-oriented neighborhoods of American University Park, Chevy Chase, Forest Hills, Friendship Heights, and Tenleytown.

A number of transportation issues in the study area were identified by DDOT and residents, including: aggressive driving such as speeding and blocking crosswalks, insufficient pedestrian crossing times at intersections, unsignalized crosswalks, cut-through traffic on residential streets, missing sidewalks, and wide streets and intersections. These conditions cause pedestrians and bicycle safety issues, particularly for the elderly and children.

The Study identifies the following recommendations:

- Installing curb extensions along local streets to reduce crossing distances and slow turning vehicles
- Traffic calming measures such as mini-roundabouts, chicanes, speed humps, distinctive paving and streetscape material, and lane narrowing
- Adding bicycle facilities such as shared-lane (“Sharrow”) facilities, bike lanes, or cycle tracks
- Installing HAWK signals and medians at pedestrian crosswalks along high volume street

In direct relation to the Ladybird development, the Rock Creek West II Livability Study identifies Yuma Street as a roadway in need of a bicycle boulevard.

Planned Developments

There is one potential development project in the vicinity of the Ladybird site. For the purpose of this analysis and consistent with DDOT and industry standards, only approved developments expected to be complete prior to the planned development with an origin/destination within the study area were included. Figure 6 shows the location of the background development in relations to the Ladybird development.

The Spring Valley Shopping Center Expansion

The expansion of the Spring Valley Shopping Center will add approximately 15,000 sf of retail to the existing site. The Spring Valley Shopping Center Expansion lies within the study area, is expected to open before the completion of the Ladybird development, and will thus be included in the analysis.

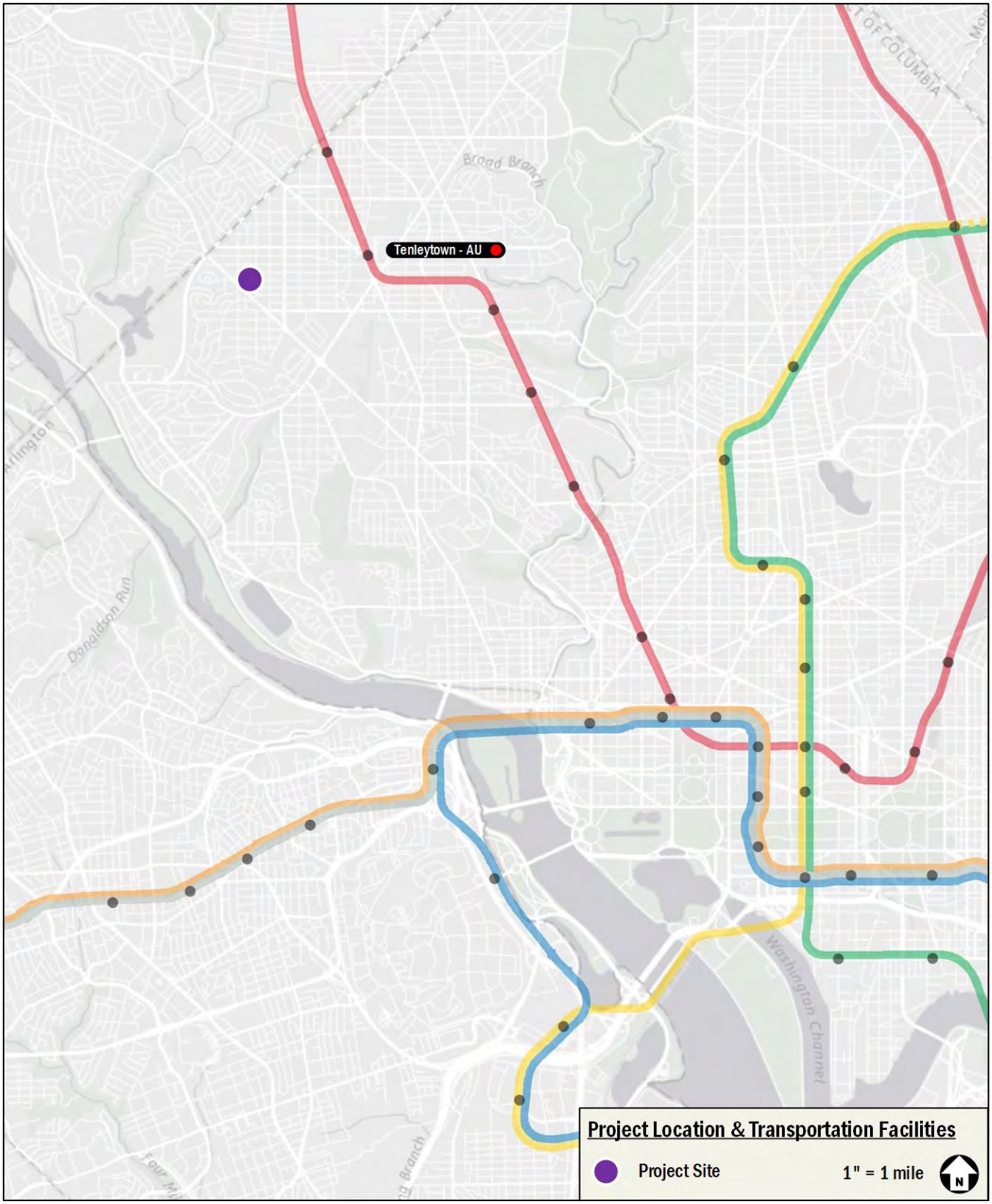

Figure 4: Major Regional Transportation Facilities

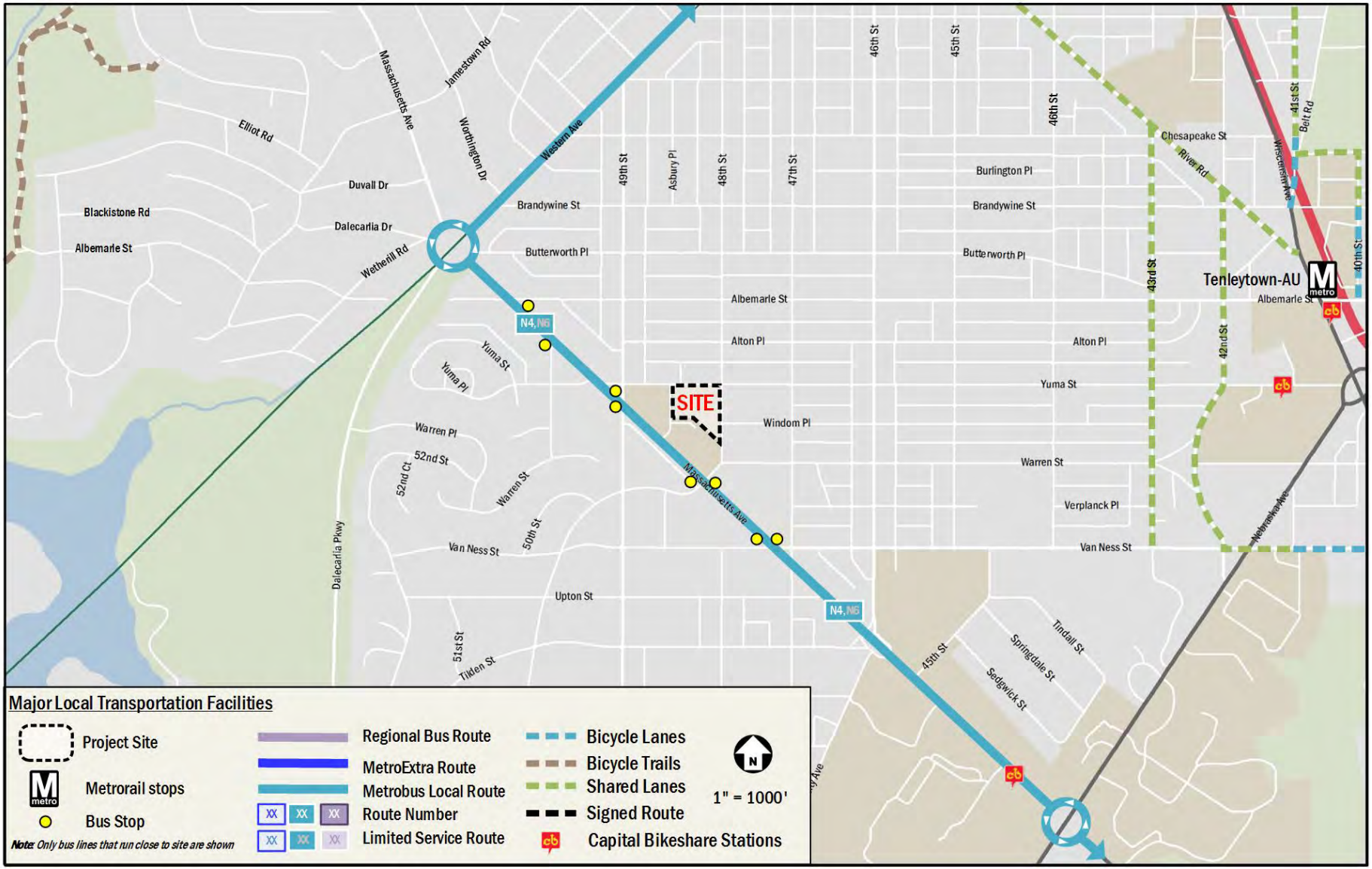

Figure 5: Major Local Transportation Facilities

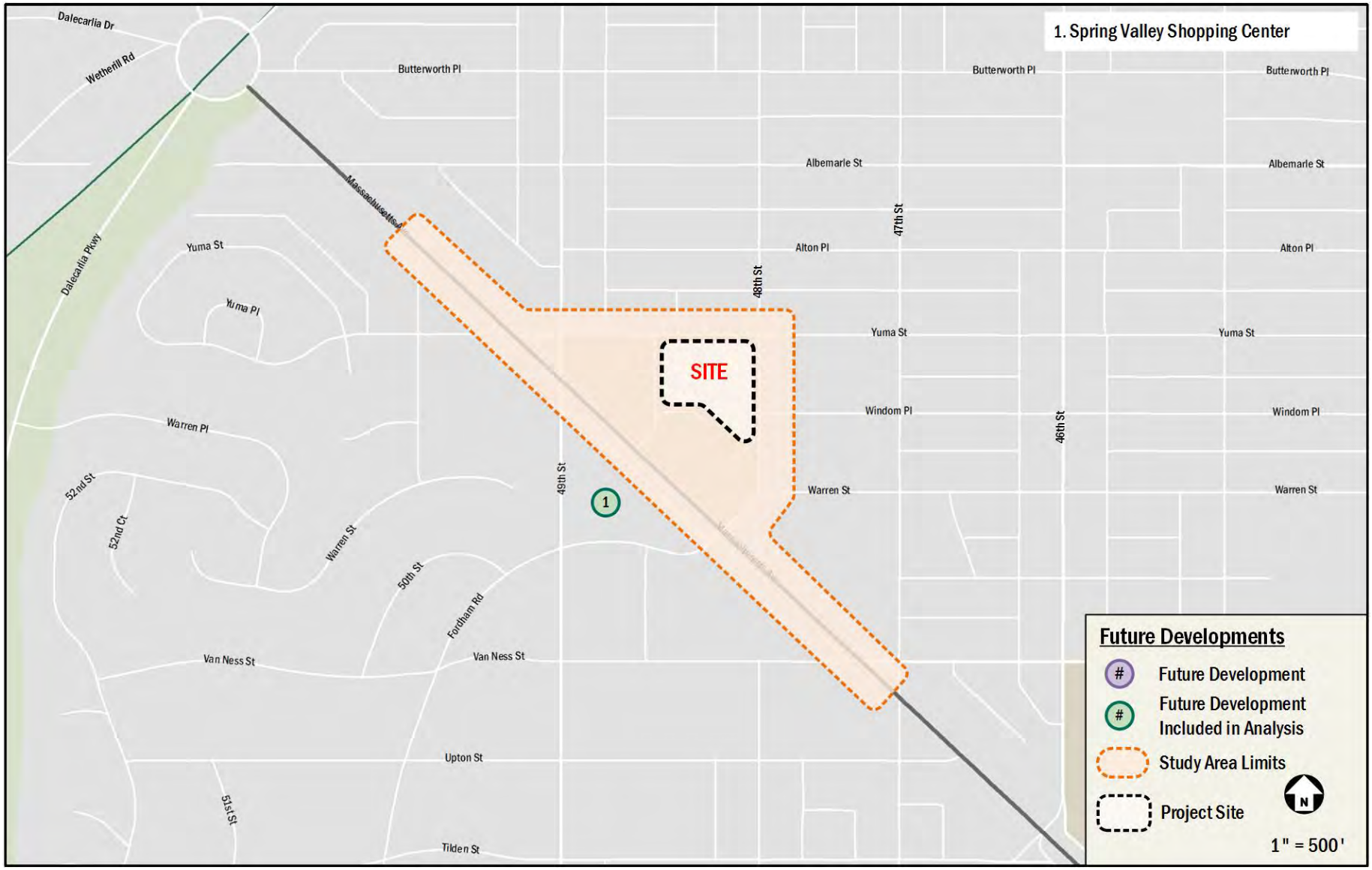

Figure 6: Planned Development Map

PROJECT DESIGN

This section reviews the transportation components of the Ladybird development, including the proposed site plan and access points. It includes descriptions of the site's vehicular access, loading, parking, bicycle and pedestrian facilities, and Transportation Demand Management (TDM) plan. It supplements the information provided in the site's plan package that accompanied the Zoning Application, which includes several illustrations of site circulation and layout.

The site is currently occupied by a surface parking lot, a vacant grocery store, and additional retail uses that are currently in operation. The site is generally bound by Yuma Street to the north, 48th Street to the east, the American University Admin Building to the south, and a public alley to the west. The proposed development will be a mixed-use development consisting of two buildings with a total of 219 residential dwelling units and 16,000 square feet of grocery/retail space. The development will provide 370 below-grade parking spaces.

Figure 7, 8, and 9 show an overview of the development program and site plan elements.

SITE ACCESS AND CIRCULATION

Pedestrian Access

Primary pedestrian access to the residential component of the development is expected to occur along Yuma Street. Auxiliary pedestrian access to the residential component of the development is expected to occur along 48th Street. For the grocery component, primary pedestrian access is expected to occur along Yuma Street. Pedestrian access to the retail component of the development is expected to occur via the public alley along the western edge of the site.

Bicycle Access

Bicycle access to the secure long-term bicycle parking will be from the alley abutting the western portion of the site. Short-term bicycle parking will be located around the perimeter of the site, along Yuma Street, 48th Street, and the public alleys along the western and southern portions of the site. Bicycle access to the site is primarily expected to occur via Yuma Street and 48th Street, and along the alleys to the south and west of the site.

Vehicular Access

All of the vehicular access to the site will be via 48th Street, Yuma Street, and Massachusetts Avenue, all of which provide access to the public alley that connects to the below-grade parking garage.

Two 40-foot pick-up and drop-off areas ("entrance zones" along Yuma Street and 48th Street in front of the Building 1 and Building 2 entrances will facilitate pick-up/drop-off and food delivery operations, subject to DDOT approval. The Applicant will coordinate with DDOT in regard to the pick-up and drop-off areas.

A circulation plan with vehicular, bicycle, pedestrian, and loading routes is shown on Figure 11.

Alley Operations

The property is bounded by alleys on its west and south sides. The north-south alley on the property's western edge, connects Massachusetts Avenue to Yuma Street, and the east-west alley on the property's southern edge connects the north-south alley with 48th Street. Approximately 200 feet of the east-west alley on the property's southern edge is private property. Trucks, cars, bicycles, and pedestrians were observed using these alleys.

As part of the proposed development, trash enclosures for the Spring Valley Shopping Center to the west of the Ladybird development, which shares the north-south alley, will be added, which will improve alley operations and minimize the number of objects protruding into the alley. To maintain a 20-foot width through this part of the alley, the proposed development will expand the north-south alley that abuts the site by four feet from the existing 20 feet to a total width of 24 feet, as well as provide a three (3) foot delineated pedestrian path where none exists today. Figure 10 shows the improvements to the north-south alley that are proposed as part of the development.

Additionally, along the east-west alley that abuts the site, the Applicant will add a five (5) foot delineated pedestrian path with a five (5) foot buffer where none exists now, while maintaining the 20-foot alley which will create a safer interaction between pedestrians and vehicles using this space.

At the T-intersection of the two public alleys, the Applicant proposes installing a highly visible stop sign on the eastern leg

of the intersection, which will further improve safety and operations in the alley.

LOADING

The proposed loading facilities in the development should accommodate all delivery demand without detrimental impacts. Figure 7 shows the locations of the loading berths and service/delivery spaces.

Truck routing to and from the site will be focused on designated primary truck routes, such as Massachusetts Avenue. The majority of truck restricted routes are to the east of the site on Yuma Street east of 48th Street, on 48th Street north of Yuma Street, on Windom Place, and on Warren Street. Of note, the segment of 49th Street to the west of the site that lies between Massachusetts Avenue and Yuma Street is restricted to trucks. As such, any outbound trucks from the development will exit onto 48th Street or Massachusetts Avenue via the alley. Turning maneuvers into and out of the site for are included in the Technical Attachments.

The proposed development is expected to generate approximately 21 truck trips per day. This includes daily trash removal services, mail and parcel delivery, produce delivery, retail delivery, and residential move-in and move-out trips. One (1) trash removal truck, two (2) mail and parcel delivery trucks, 16 grocery delivery trucks, one (1) general retail pick-up and delivery trucks, and approximately one (1) residential move-in or -out trucks (conservatively calculated using an average of 18 months average turnover per unit) will service the development on a daily basis. The loading facilities provided by the development will be sufficient to accommodate this demand.

Building 1 will contain separate dedicated residential and grocer/retail loading facilities that are located to the west of the garage access ramp along the southern side of the development. In compliance with the minimum loading requirements of 11-C DCMR § 901.1, the Building 1 residential loading facilities will consist of a 30-foot loading berth and a 20-foot service/delivery space, and the grocer/retail loading facilities will consist of a 55-foot loading berths, a 30-foot loading berth, and a 20-foot service/delivery space. Building 2 does not have a minimum loading requirement because it will have less than 50 dwelling units. However, to minimize the potential for impact to the existing alleys, the street network, and the surrounding neighborhood, Building 2 will contain space on the ground floor for service and loading activities located adjacent to the 20-foot private alley along the north side of the American University Admin Building.

Loading Management Plan (LMP)

The Applicant has proposed the following measures to offset any potential impacts that the loading activities of the proposed development might have on the surrounding intersections and neighborhood:

- A loading dock manager will be designated by the building management. The dock manager will coordinate with vendors and tenants to schedule deliveries and will be on duty during delivery hours.
- All tenants will be required to schedule deliveries that utilize the loading docks – defined here as any loading operation conducted using a truck 20' in length or larger.
- Commercial deliveries will be scheduled between 7 AM – 7 PM (7 days a week), and discouraged from making deliveries after 4PM on weekdays
- Waste collection (both commercial & residential) allowed 7 AM – 4 PM (7 days a week)
- Residential move-ins/outs allowed 9 AM – 4 PM (7 days a week)
- The dock manager(s) will schedule deliveries such that the dock's capacity is not exceeded. In the event that an unscheduled delivery vehicle arrives while the dock is full, that driver will be directed to return at a later time when a berth will be available so as to not impede the drive aisle that passes in front of the loading dock.
- The dock manager(s) will monitor inbound and outbound truck maneuvers and will ensure that trucks accessing the loading dock do not block vehicular traffic except during those times when a truck is actively entering or exiting the alley.
- The loading manager(s) will monitor the alley to keep the designated loading areas clear for deliveries, keep the alley from being blocked due to vehicle loading/unloading activity, and enforce the no parking restrictions.
- Trucks using the loading dock will not be allowed to idle and must follow all District guidelines for heavy vehicle operation including but not limited to DCMR 20 – Chapter 9, Section 900 (Engine Idling), the regulations set forth in DDOT's Freight Management

and Commercial Vehicle Operations document, and the primary access routes listed in the DDOT Truck and Bus Route System.

PARKING

Based on current District zoning laws, the following outlines the parking requirements for all land uses of the development, based on the proposed map amendments:

- *Residential*
  1 space per 3 dwelling units in excess of 4 dwelling units, amounting to a minimum requirement of 72 spaces

- *Grocer/Retail*
  1.33 spaces per 1,000 square feet in excess of 3,000 square feet, amounting to a minimum requirement of 17 spaces

Three levels of below-grade parking will contain 370 total parking spaces. The first level of parking will contain approximately 85 parking spaces that are intended to be devoted to residential use. The second level of parking will contain approximately 106 parking spaces, of which approximately 49 parking spaces will be devoted to the grocery/retail uses on site. As required by an agreement with American University, approximately 57 parking spaces on the second level will be shared by the grocery/retail uses on site and the American University Admin Building to the south of the site and approximately 179 parking spaces on the third level will be shared between the residential uses on site and the American University Admin Building. Parking is planned to be priced at the market-rate.

Parking Management Plan (PMP)

A Parking Management Plan (PMP) was prepared by the Applicant in order to provide greater detail regarding layout of the garage, parking access and controls, car-share parking, the American University Administrative Building overflow parking agreement considerations, parking rates, bicycle parking, and enforcement. The Applicant is working with DDOT to finalize the PMP. A draft of the PMP is included in the Technical Attachments.

CURBSIDE MANAGEMENT

The Applicant has proposed a number of improvements to the curbside management along the perimeter of the site to be coordinated with DDOT. A review of the existing curbside management was conducted, and is shown on Figure 12.

Under existing conditions, there are approximately 26 parking spaces along the northern blockface on Yuma Street, all of which are restricted by the Residential Permit Parking (RPP) Program (2hr max, M-F 7:00AM-8:30PM). The southern blockface on Yuma Street has no parking. Along the eastern blockface of 48th Street there are approximately five (5) parking spaces which are RPP restricted (2hr max, M-F 7:00AM-8:30PM). Along the western blockface of 48th Street there are eight (8) metered parking spaces (2hr max, 7:00AM-6:30PM), and a 40-foot commercial loading zone.

Subject to DDOT approval, the Applicant has proposed to make the following improvements to the curbside management along the perimeter of the site as shown on Figure 13. Along the southern blockface of Yuma Street between the public alley and 48th Street the 60-foot curb cut is planned to be removed, and the stretch of no parking is planned to be replaced metered parking, totaling an increase of approximately 13 parking spaces. Along 48th Street, the eastern blockface between Yuma Street and Windom Place will be changed to RPP, replacing the no parking under existing conditions, adding approximately six (6) RPP parking spaces. Along the western blockface of 48th Street between Yuma Street and the private alley, the 40-foot commercial loading zone, the no parking, and the 40-foot curb cut are planned to be removed, and metered parking added, totaling an increase of approximately nine (9) parking spaces. Overall, approximately 28 new on-street parking along Yuma Street and 48th Street are planned to be added with the redevelopment of the site.

The two (2) proposed 40-foot no parking sections ("entrance zones") on Yuma Street and 48th Street will serve as areas for general pick-up/drop-off and food deliveries, subject to DDOT approval.

The proposed changes will remove parking restrictions that are no longer needed along the perimeter of the site, such as the existing commercial loading zone on 48th Street, while adding additional on-street parking spaces. The need for additional on-street parking has been raised as a concern by the community. Furthermore, the additional parking will act as a traffic calming measure by narrowing the drive lanes and reducing driving speeds along those segments of the roadway.

Bicycle and Pedestrian Facilities

Bicycle Facilities

Based on current District zoning laws, the following outlines the parking requirements for all land uses of the development, based on the proposed map amendments:

- *Residential*
  1 short-term space per 20 dwelling units, amounting to a minimum requirement of 11 short-term spaces; and 1 long-term space per 3 dwelling units, amounting to a minimum requirement of 62 long-term spaces. Please note that after the first 50 bicycle parking spaces are provided for a use, additional spaces are required at one-half (0.5) the ratio specified.

- *Grocer/Retail*
  1 short-term space per 3,500 square feet, amounting to a minimum requirement of 5 short-term spaces; and 1 long-term space per 10,000 square feet, amounting to a minimum requirement of 2 long-term spaces.

The project will include 27 short-term bicycle spaces at street level along the perimeter of the site on 48th Street, Yuma Street, and along the segment of public alley to the south of the site. These short-term spaces will include inverted U-racks placed in high-visibility areas. The Applicant is working in conjunction with DDOT to select locations for the racks in public space.

The project will also include secure long-term bicycle parking. The plans identify a total of 83 long-term spaces in two separate areas located in the first level of the below-grade parking garage. The first storage and maintenance space will house 77 long-term bicycle spaces for residents of the proposed development. The second storage space will house six (6) long-term bicycle spaces for use of the grocery/retail employees so that they may store their bicycles securely.

The 83 secure long-term bicycle parking spaces will exceed the amount of bicycle parking that is required by Zoning Regulations.

Pedestrian Facilities

As discussed previously, pedestrian facilities will be improved greatly around the site. Under existing conditions, pedestrian facilities, specifically curb ramps around the site do not meet DDOT and ADA standards. As part of the development, pedestrian facilities around the perimeter of the site will be improved to meet DDOT and ADA standards. This includes sidewalks that meet or exceed the width requirements, crosswalks at all necessary locations, and curb ramps with detectable warnings. Additional design elements such as Windom Walk, a publicly accessible linear park between Buildings 1 and 2 that will provide a new pedestrian extension of Windom Place through the site between 48th Street and the public alley along the west of the site. The inclusion of outdoor seating, planting beds, and additional streetlights will be a great improvement over existing conditions. Figure 34 shows the planned streetscape and pedestrian improvements to the area surrounding the project.

As part of the development, the Applicant will fund the installation of a new HAWK (High-Intensity Activated crossWalk) signal on Massachusetts Avenue between 48th Street and 49th Street. This is designed to help pedestrians safely cross Massachusetts Avenue, and to help accommodate the additional pedestrian demand that the development will generate.

Transportation Demand Management (TDM)

TDM is the application of policies and strategies used to reduce travel demand or to redistribute demand to other times or spaces. TDM typically focuses on reducing the demand of single-occupancy, private vehicles during peak period travel times or on shifting single-occupancy vehicular demand to off-peak periods.

The Transportation Demand Management (TDM) plan for the Ladybird development is based on the DDOT expectations for TDM programs. The Applicant proposes the following TDM measures:

- The Applicant will fund a new HAWK (High-Intensity Activated crosswalk) signal on Massachusetts Avenue between 48th Street and 49th Street. This is designed to help pedestrians safely cross Massachusetts Avenue.
- The Applicant will exceed Zoning requirements to provide bicycle parking/storage facilities at the proposed development. This includes secure parking located on-site and short-term bicycle parking around the perimeter of the site.

- The Applicant will unbundle the cost of residential parking from the cost of lease or purchase of each unit.
- The Applicant will identify TDM Leaders (for planning, construction, and operations). The TDM Leaders will work with residents and employees in the development to distribute and market various transportation alternatives and options.
- The Applicant will provide TDM materials to new residents in the Residential Welcome Package materials.
- The Applicant will provide residents and grocery/retail employees who wish to carpool with detailed carpooling information and will be referred to other carpool matching services sponsored by the Metropolitan Washington Council of Governments (MWCOG).
- The Applicant will install a Transportation Information Center Display (electronic screen) within the residential lobbies containing information related to local transportation alternatives.
- The Applicant will offer either a one-year membership to Capital Bikeshare or a one-year membership to a car-sharing service to each residential unit for the initial lease up of each unit.
- The Applicant will provide a bicycle repair station within the residential long-term bicycle storage room.
- The Applicant will dedicate four (4) parking spaces in the below-grade parking garage for car- sharing services to use with right of first refusal.
- The Applicant will restrict residents of the building from obtaining a Residential Parking Permit ("RPP"), with penalty of lease termination.

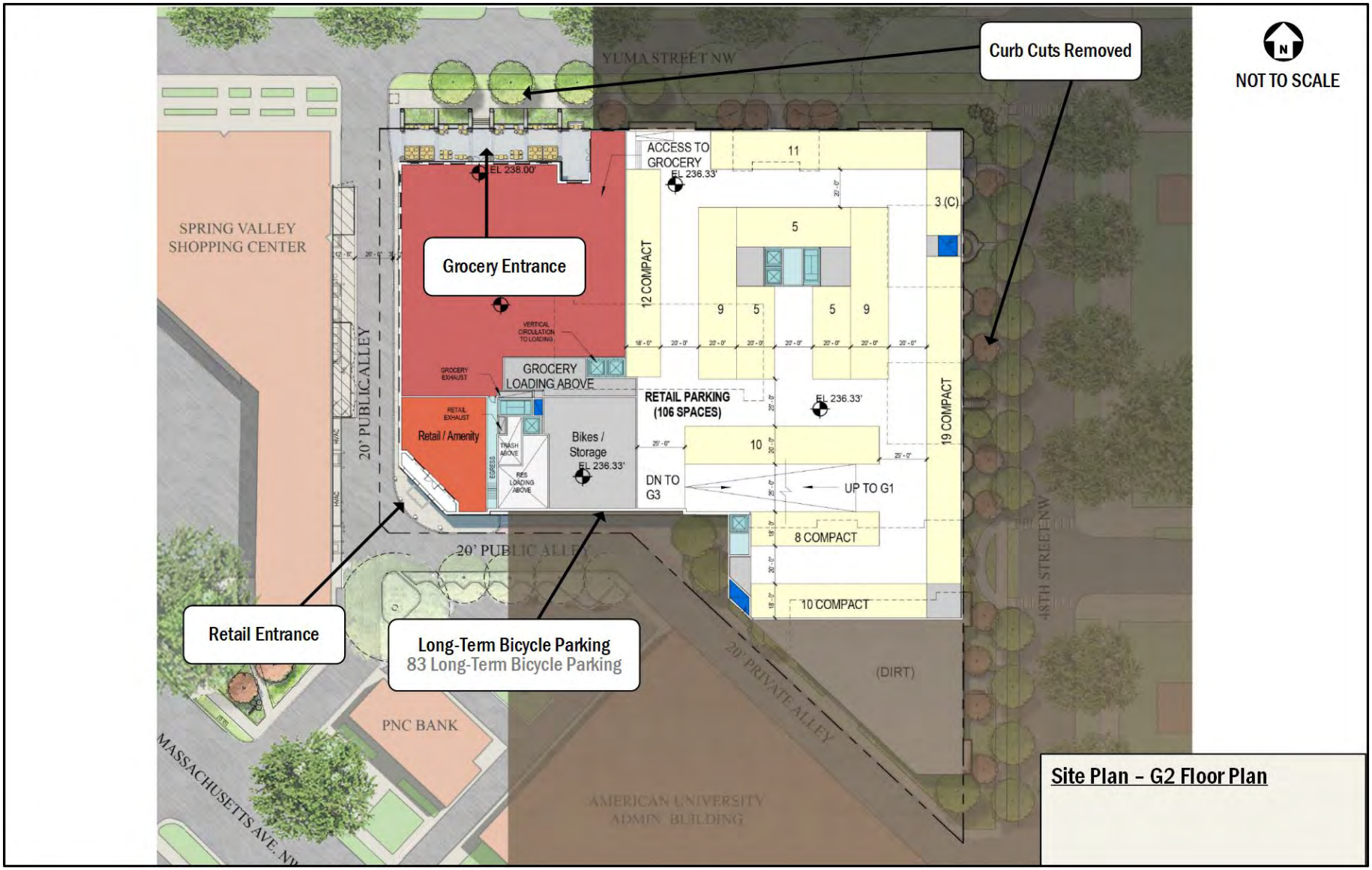

Figure 7: Site Plan – G2 Floor Plan

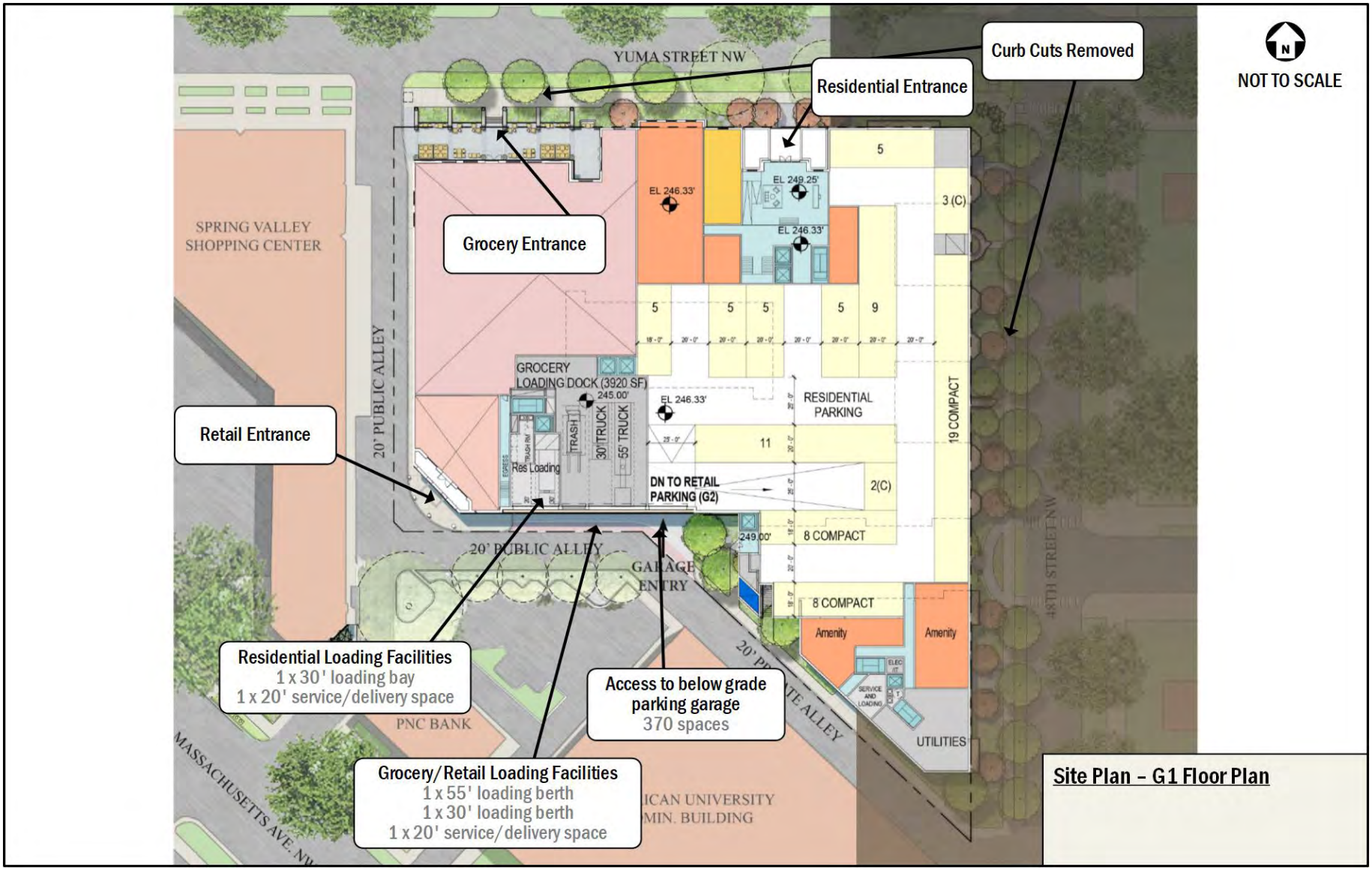

Figure 8: Site Plan – G1 Floor Plan

Figure 9: Site Plan – First Floor Plan

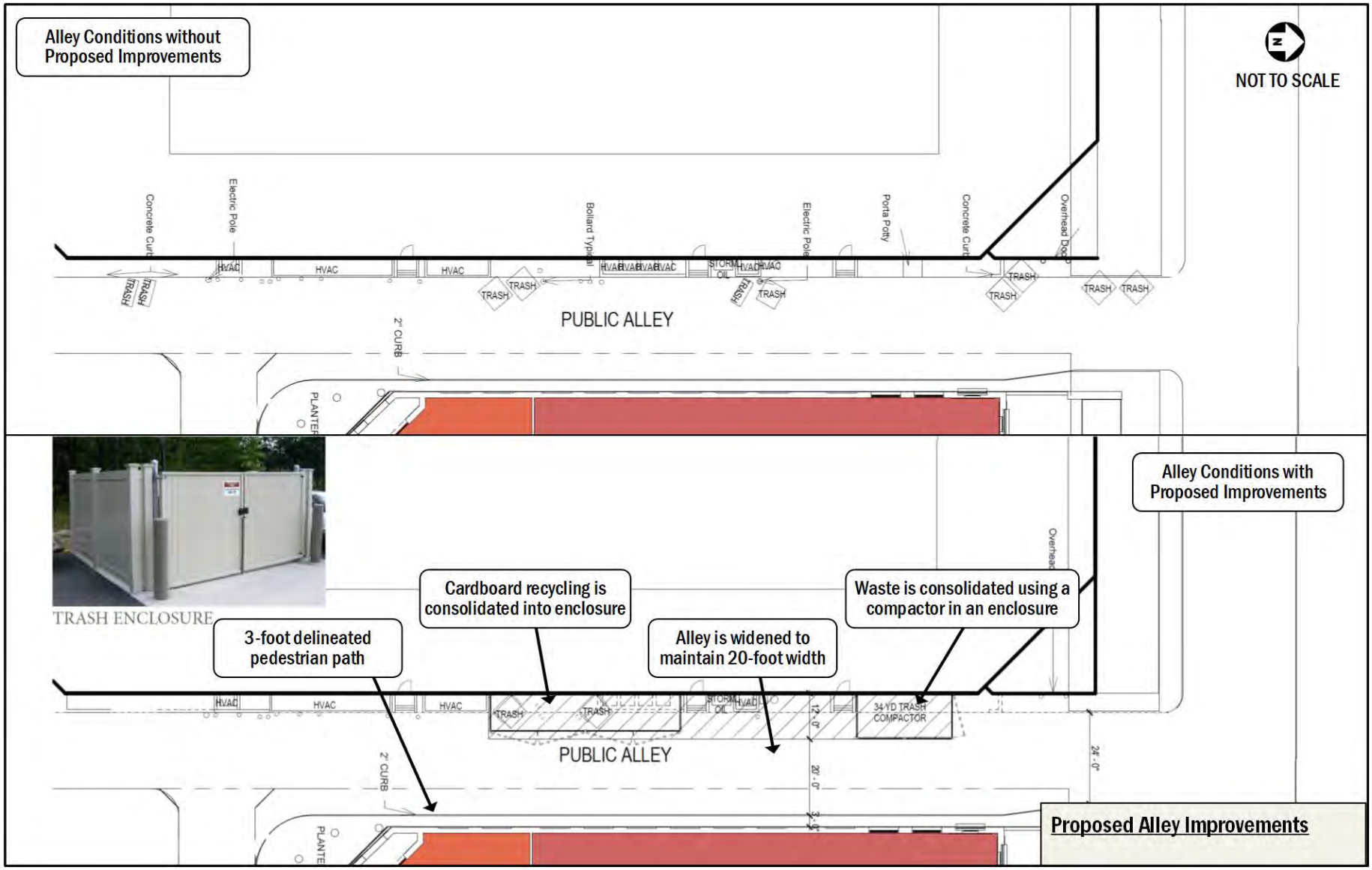

Figure 10: Proposed Alley Improvements

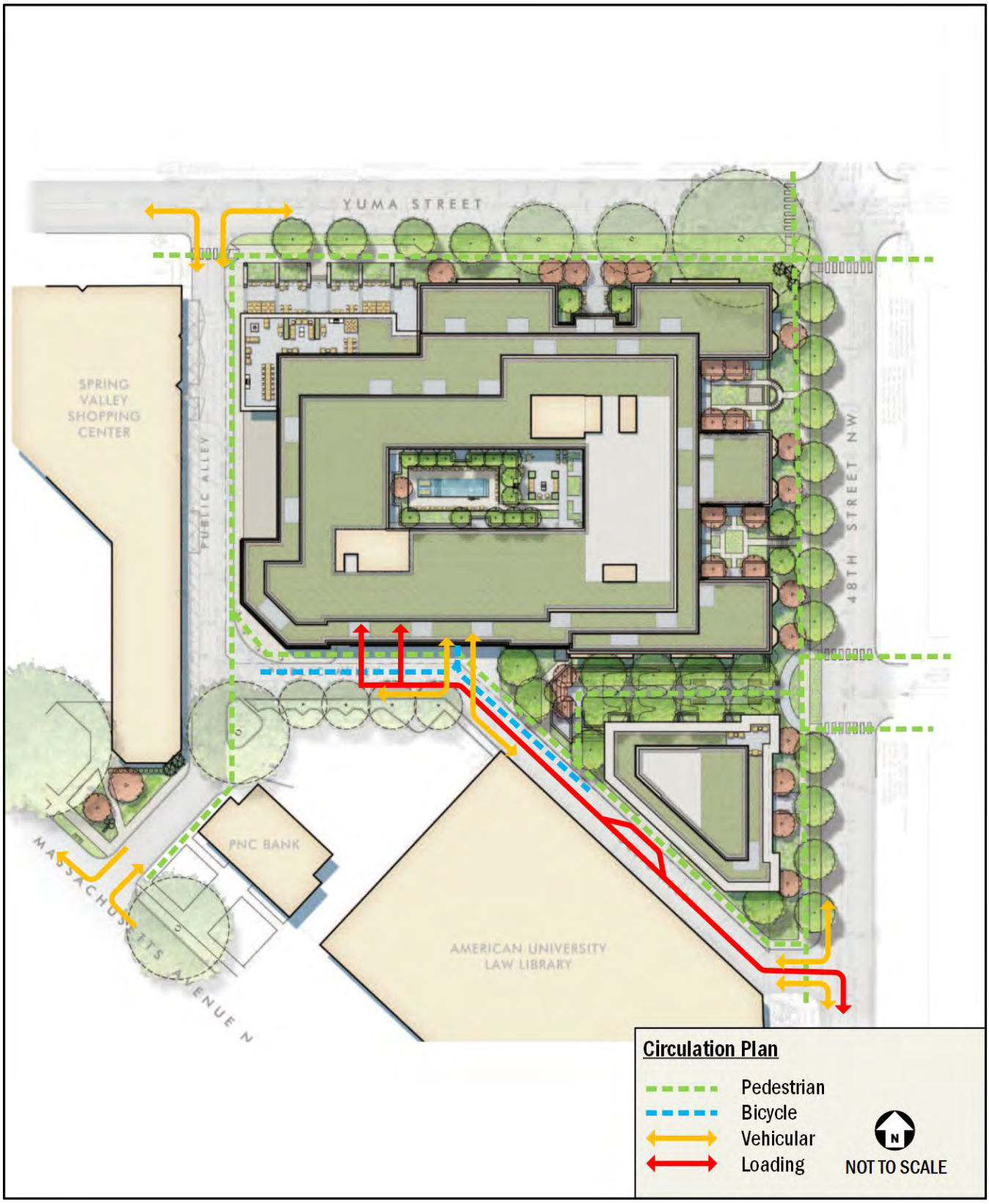

Figure 11: Circulation Plan

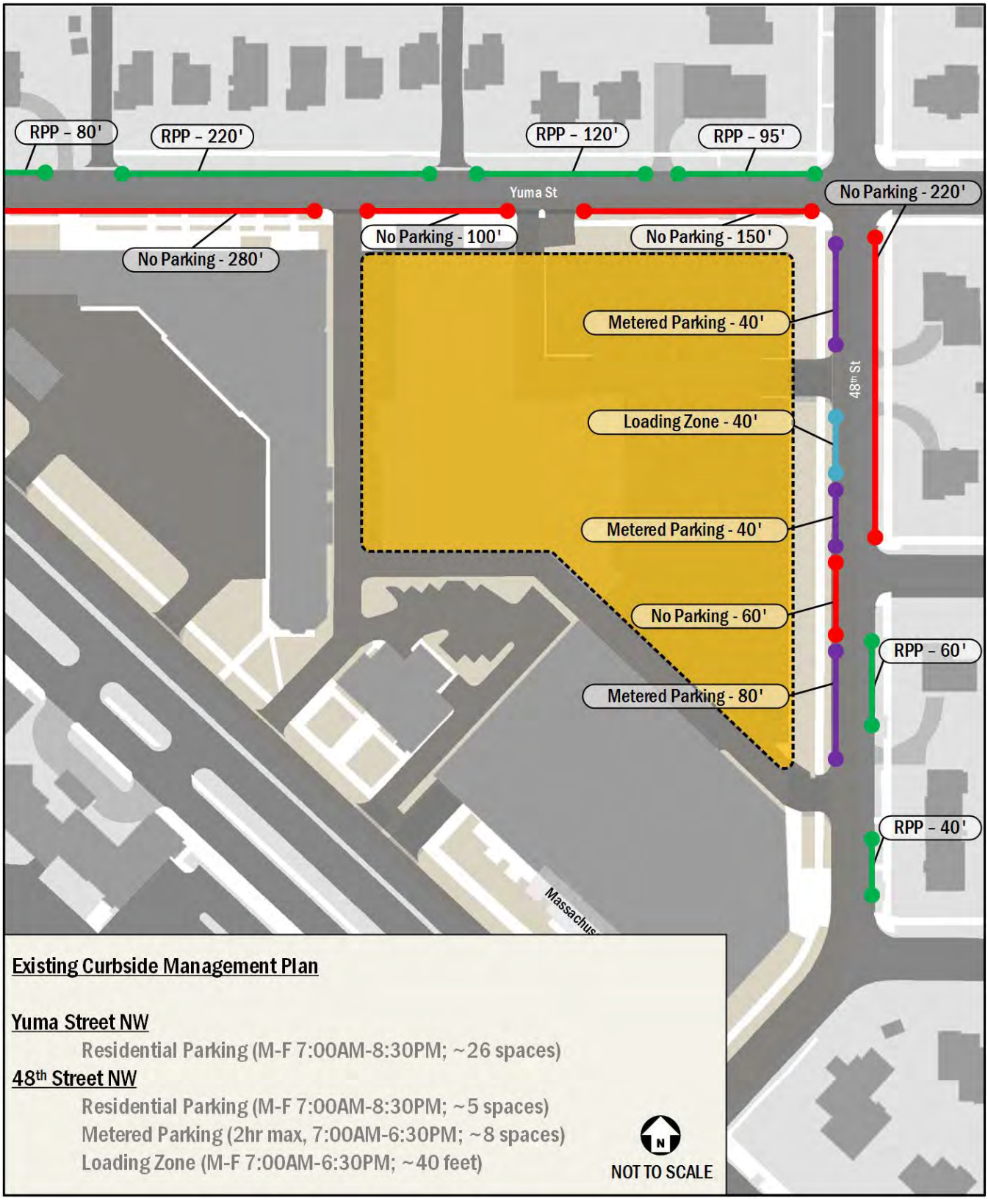

Figure 12: Existing Curbside Management

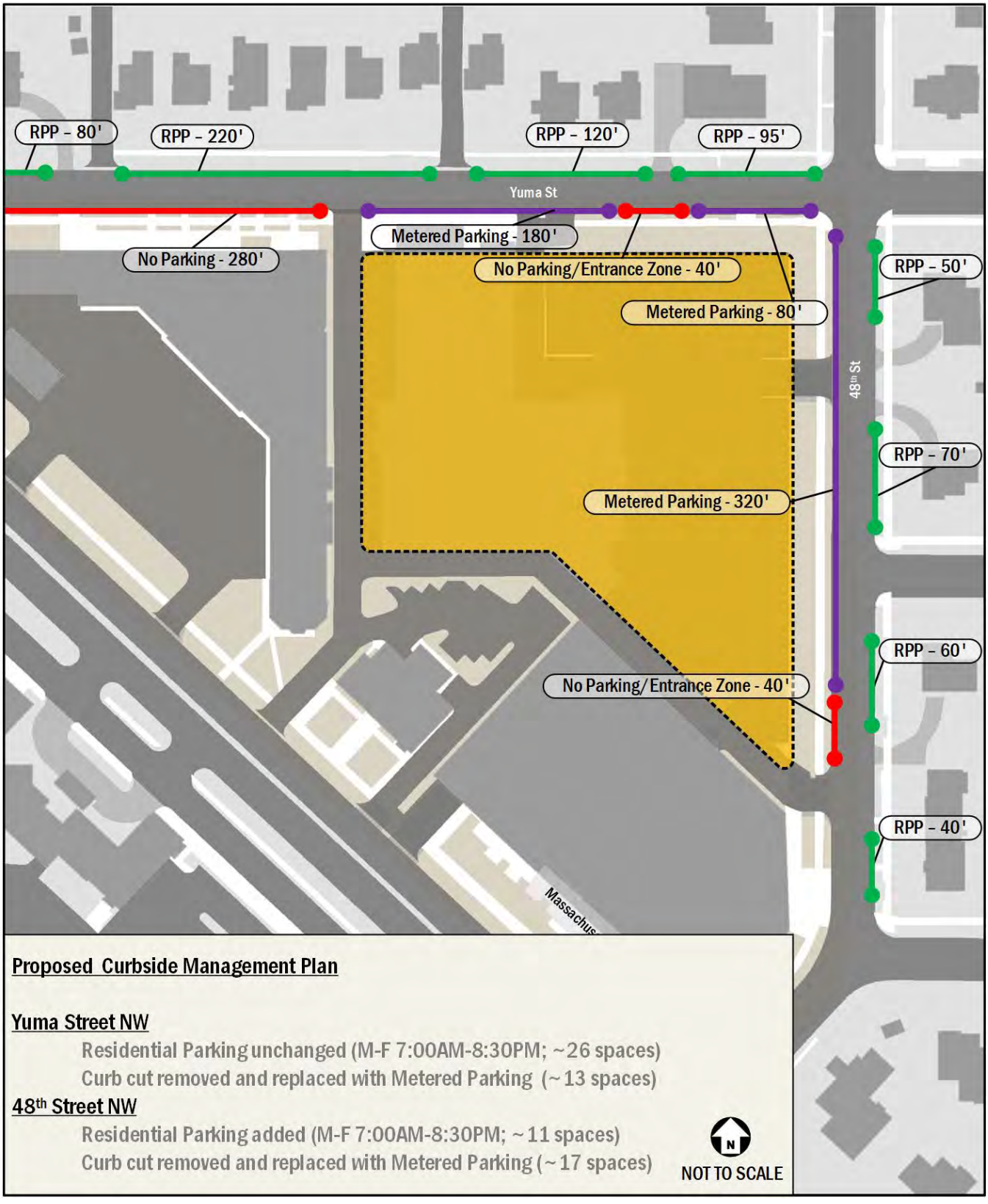

Figure 13: Proposed Curbside Management Plan

TRIP GENERATION

This section outlines the transportation demand of the proposed Ladybird project. It summarizes the projected trip generation of the site by mode, which forms the basis for the chapters that follow. These assumptions were vetted and approved by DDOT as a part of the scoping process for the study.

Traditionally, weekday peak hour trip generation is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 9th Edition. This methodology was supplemented to account for the urban nature of the site (the *Trip Generation Manual* provides data for non-urban, low transit use sites) and to generate trips for multiple modes, as vetted and approved by DDOT.

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the site. The vehicular mode split was then adjusted to reflect the amount of parking provided by the development and other developments with similar proximity to Metrorail.

Grocery trip generation was calculated based on ITE land use 850, Supermarket. Mode splits for the grocery portion of the site were based on information contained in WMATA's 2005 *Development-Related Ridership Survey*, the amount of parking provided by the development, and mode splits used for grocery uses of nearby developments that have recently been studied.

Trip generation for the retail component of the site was calculated using the same trip generation rate as the grocery component, which results in a higher more conservative trip generation than using the traditional retail trip generation rate.

The mode split assumptions for all land uses within the development is summarized in Table 1. A summary of the multimodal trip generation for the overall development is provided in Table 2 for both peak hours. Detailed calculations are included in the Technical Attachments.

Table 1: Summary of Mode Split Assumptions

Land Use	Mode			
	Auto	Transit	Bike	Walk
Residential	90%	5%	2%	3%
Grocer/Retail	90%	0%	2%	8%

Table 2: Multi-Modal Trip Generation Summary

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Residential	20 veh/hr	80 veh/hr	100 veh/hr	81 veh/hr	43 veh/hr	124 veh/hr
	Grocer/Retail	30 veh/hr	18 veh/hr	48 veh/hr	93 veh/hr	88 veh/hr	181 veh/hr
	Total	**50 veh/hr**	**98 veh/hr**	**148 veh/hr**	**174 veh/hr**	**131 veh/hr**	**305 veh/hr**
Transit	Residential	1 ppl/hr	5 ppl/hr	6 ppl/hr	5 ppl/hr	3 ppl/hr	8 ppl/hr
	Grocer/Retail	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr
	Total	**1 ppl/hr**	**5 ppl/hr**	**6 ppl/hr**	**5 ppl/hr**	**3 ppl/hr**	**8 ppl/hr**
Bike	Residential	1 ppl/hr	2 ppl/hr	3 ppl/hr	2 ppl/hr	1 ppl/hr	3 ppl/hr
	Grocer/Retail	1 ppl/hr	1 ppl/hr	2 ppl/hr	4 ppl/hr	3 ppl/hr	7 ppl/hr
	Total	**2 ppl/hr**	**3 ppl/hr**	**5 ppl/hr**	**6 ppl/hr**	**4 ppl/hr**	**10 ppl/hr**
Walk	Residential	1 ppl/hr	3 ppl/hr	4 ppl/hr	3 ppl/hr	2 ppl/hr	5 ppl/hr
	Grocer/Retail	5 ppl/hr	3 ppl/hr	8 ppl/hr	15 ppl/hr	15 ppl/hr	30 ppl/hr
	Total	**6 ppl/hr**	**6 ppl/hr**	**12 ppl/hr**	**18 ppl/hr**	**17 ppl/hr**	**35 ppl/hr**

TRAFFIC OPERATIONS

This section provides a summary of an analysis of the existing and future roadway capacity in the study area. Included is an analysis of potential vehicular impacts of the Ladybird development 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 development on the study area roadways; and
- Discuss potential improvements and mitigation measures to accommodate the additional vehicular trips

The capacity analysis focuses on the morning and afternoon commuter peak hours, as determined by the existing traffic volumes in the study area. The scope of the capacity analysis was developed based on DDOT guidelines and agreed to by DDOT staff.

The following conclusions are reached within this chapter:

- The existing study area intersections operate at an acceptable level of service during all analysis scenarios for both the morning and afternoon peak hours.
- Existing areas of concern for roadway capacity are primarily focused along the heavily trafficked commuter routes such as Massachusetts Avenue.
- The addition of trips generated by background developments and inherent growth on the study area roadways slightly increase the levels of delay and queuing, but not to unacceptable levels.
- There are no study intersections that operate at an unacceptable level of service as a result of the proposed development.
- Overall, this report concludes that the project will not have a detrimental impact to the surrounding vehicular network.

STUDY AREA, SCOPE, & METHODOLOGY

This section outlines the vehicular trips generated in the study area along the vehicular access routes and defines the analysis assumptions.

The scope of the analysis contained within this report was extensively discussed with and agreed to with DDOT. The general methodology of the analysis follows national and DDOT guidelines on the preparation of transportation impact evaluations of site development.

Capacity Analysis Scenarios

The vehicular analyses are performed to determine if the proposed development will lead to adverse impacts on traffic operations. A review of impacts to each of the other modes is outlined later in this report. This is accomplished by comparing future scenarios: (1) without the proposed development (referred to as the Background condition) and (2) with the development approved and constructed (referred to as the Future condition).

Specifically, the roadway capacity analysis examined the following scenarios:

1. 2016 Existing Conditions
2. 2021 Future Conditions without the development (2021 Background)
3. 2021 Future Conditions with the development (2021 Future)

Study Area

The study area of the analysis is a set of intersections where detailed capacity analyses were performed for the scenarios listed above. The set of intersections decided upon during the study scoping process with DDOT are those intersections most likely to have potential impacts or require changes to traffic operations to accommodate the proposed development. Although it is possible that impacts will occur outside of the study area, those impacts are not significant enough to be considered a detrimental impact nor worthy of mitigation measures.

Based on the projected future trip generation and the location of the site access points, the following intersections were chosen and agreed upon by DDOT for analysis:

1. Massachusetts Avenue/50th Street NW
2. Massachusetts Avenue/Yuma Street NW (western side of Massachusetts Avenue)
3. Massachusetts Avenue/Yuma Street NW (eastern side of Massachusetts Avenue)
4. Massachusetts Avenue/49th Street NW
5. Massachusetts Avenue NW/Alley

6. Massachusetts Avenue/48th Street/Fordham Road NW
7. Massachusetts Avenue/Van Ness Street NW
8. Yuma Street/49th Street NW
9. Yuma Street NW/Alley
10. Yuma Street/48th Street NW
11. Windom Place/48th Street NW
12. 48th Street NW/Alley
13. Warren Street/48th Street NW
14. Fordham Road/49th Street NW
15. Albemarle Street/49th Street NW
16. Albemarle Street/48th Street NW
17. Yuma Street/46th Street NW

Figure 14 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, October 18, 2016 and Thursday, October 20, 2016. The results of the traffic counts are included in the Technical Attachments. The existing peak hour traffic volumes are shown on Figure 15 and Figure 16. For all intersections, the individual morning and afternoon peak hours were used.

2021 Background Traffic 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 DDOT 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, one development was included in the 2021 Background scenario. This development is the Spring Valley Shopping Center Expansion.

Trip generation for the Spring Valley Shopping Center Expansion was calculated based on the Institute of Transportation Engineers' *Trip Generation Manual*, 9th Edition, with mode splits based on information contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used for nearby developments that have recently been studied. Trip distribution assumptions was based on those determined for the Ladybird development and altered where necessary based on anticipated travel patterns. Mode split and trip generation assumptions for the Spring Valley Shopping Center Expansion are shown Table 3.

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 the Metropolitan Washington Council of Government's (MWCOG) currently adopted regional transportation model, comparing the difference between the year 2015 and 2020 model scenarios as vetted and agreed to by DDOT. The growth rates observed in this model served as a basis for analysis assumptions, and where negative growth was observed, a conservative 0.10 percent annual growth rate was applied to the roadway. The applied growth rates are shown in Table 4. Figures showing the traffic volumes generated by the inherent regional traffic growth are included in the Technical Attachments.

The traffic volumes generated by background developments and by the inherent growth along the network were added to the existing traffic volumes in order to establish the 2021 Background traffic volumes. The traffic volumes for the 2021 Background conditions are shown on Figure **17** and Figure 18.

2021 Total Future Traffic Volumes (with the project)

The 2021 Total Future traffic volumes consist of the 2021 Background volumes with the addition of the traffic volumes generated by the proposed development (site-generated trips). Thus, the 2021 Total Future traffic volumes include traffic generated by: the existing volumes, background developments, the inherent growth on the study area roadways, and the proposed project.

Trip distribution for the site-generated trips was determined based on: (1) CTPP TAZ data, (2) existing and future travel patterns in the study area, and (3) the location of the underground parking garage of the development. Trip distributions were extensively vetted and agreed to by DDOT.

The residential trip distribution was significantly influenced by the CTPP TAZ flow data for drivers commuting from the site's TAZ, and adjusted based on traffic volumes and patterns. The origin of outbound and destination of inbound residential vehicular trips was the below-grade parking garage of the Ladybird development.

The grocery and retail trip distribution was primarily based on the locations and proximity of other full-service grocers. Thus, the grocery and retail trip distribution is weighted more towards nearby residential areas than regional origins. The origin of outbound and destination of inbound grocery and retail vehicular trips was the below-grade parking garage of the Ladybird development.

Based on this review and the site access locations, the site-generated trips were distributed through the study area intersections. A summary of trip distribution assumptions and specific routing is provided on Figure 19 for outbound trips and on Figure 20 for inbound trips.

Existing site trips, representing traffic generated by parking demand of the American University Admin building to the south of the site, were rerouted to account for the change in the location of the access to the below-grade parking. Figures showing the rerouted traffic volumes are included in the Technical Attachments.

The traffic volumes for the 2021 Total Future conditions were calculated by adding the development-generated traffic volumes to the 2021 Background traffic volumes, and rerouting the existing American University trips. Thus, the future condition with the proposed development scenario includes traffic generated by: existing volumes, background developments through the year 2021, inherent growth on the network, and the proposed development. The site-generated traffic volumes are shown on Figure 23 and Figure 24 and the 2021 Total Future traffic volumes are shown on Figure 25 and Figure 26.

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 Assumptions

The geometry and operations assumed in the existing conditions scenario are those present when the main data collection occurred. Gorove/Slade made observations and confirmed the existing lane configurations and traffic controls at the intersections within the study area. Existing signal timings and offsets were obtained from DDOT and confirmed during field reconnaissance.

The lane configurations and traffic controls for the Existing conditions are shown on Figure 21 and Figure 22.

Future Geometry and Operations Assumptions

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

- Be funded; and
- Have a construction completion date prior or close to the proposed development.

Based on these criteria, no background improvements were included in the future scenario.

VEHICULAR ANALYSIS RESULTS

Intersection Capacity Analysis

Intersection capacity analyses were performed for the three scenarios outlined previously at the intersections contained 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 District; 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. Detailed LOS descriptions and the analysis worksheets are contained in the Technical Attachments.

Table 5 shows the results of the capacity analyses, including LOS and average delay per vehicle (in seconds) for the Existing, 2021 Background, and 2021 Future scenarios. The capacity analysis results are shown on Figure 27 and Figure 28 for the morning peak hour, and Figure 29 and Figure 30 for the afternoon peak hour.

All of the study intersections operate at acceptable conditions during the morning and afternoon peak hours for the Existing, 2021 Background, and 2021 Future scenarios.

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 50th percentile and 95th percentile queue lengths are shown for each lane group at the study area signalized intersections. The 50th percentile queue is the maximum back of queue on a median cycle. The 95th percentile queue is the maximum back of queue that is exceeded 5% of the time. For unsignalized intersection, only the 95th 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 6 shows the queuing results for the study area intersections. Two of the study intersections have a lane group that exceeds its storage length during at least one peak hour in all of the study scenarios. These intersections are as follows:

- Massachusetts Avenue & 50th Street NW (Existing AM, Background AM, Future AM)
- Massachusetts Avenue & 49th Street NW (Existing PM, Background PM, Future PM)

With the addition of the site-generated traffic, queues are slightly increased at all of the study intersections, but no major impacts are seen as a result of the development.

MITIGATIONS

Based on DDOT standards, the proposed development is considered to have an impact at an intersection within the study area if the capacity analyses show an LOS E or LOS F where one does not exist in the background condition, or if there is an increase in delay at any approach or the overall intersection operating under LOS E or F of greater than 5 seconds, when compared to the background condition. The development is also considered to have an impact if the 95th percentile queues increase by more than 150 feet at an intersection or along an approach in the future condition, when compared to background condition. Following these guidelines, no intersections require mitigation as a result of the planned development.

Recommendations

Although no intersections require mitigation as a result of the development, field observations noted that existing operations at the intersection of Massachusetts Avenue and 49th Street were being impacted as a result of vehicles attempting to turn left out of the driveway that is to the north of the intersection, which serves the Spring Valley Shopping Center and Exxon Station, in order to then turn left onto Massachusetts Avenue. Observations noted that these vehicles oftentimes block the northbound lane, resulting in operational issues. This report recommends that DDOT study whether channelizing or limiting left turns out of the driveway would be a feasible solution to this problem.

Table 3: Summary of Background Development Trip Generation

Background Development	ITE Land Use Code Trip Generation, 9th Ed.	Quantity	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Spring Valley Expansion	820 Shopping Center (Rate)	15,000 sf	9	5	14	27	29	56
	Non-Auto Reduction: 30%		-3	-1	-4	-8	-9	-17
		Total Trips	**6**	**4**	**10**	**19**	**20**	**39**
		Net Background Site Trips	**6**	**4**	**10**	**19**	**20**	**39**

Table 4: Applied Annual and Total Growth Rates

Road & Direction	Annual Growth Rate		Total Growth between 2016 and 2021	
	AM Peak	PM Peak	AM Peak	PM Peak
Massachusetts Avenue NW – Northbound	2.00%	0.10%	10.41%	0.50%
Massachusetts Avenue NW – Southbound	0.10%	2.00%	0.50%	10.41%
49th St NW – Northbound	0.10%	0.25%	0.50%	1.26%
49th St NW – Southbound	0.50%	0.10%	2.53%	0.50%
46th St NW – Northbound	1.00%	1.00%	5.10%	5.10%
46th St NW – Southbound	1.75%	1.00%	9.06%	5.10%
All Other	0.10%	0.10%	0.50%	0.50%

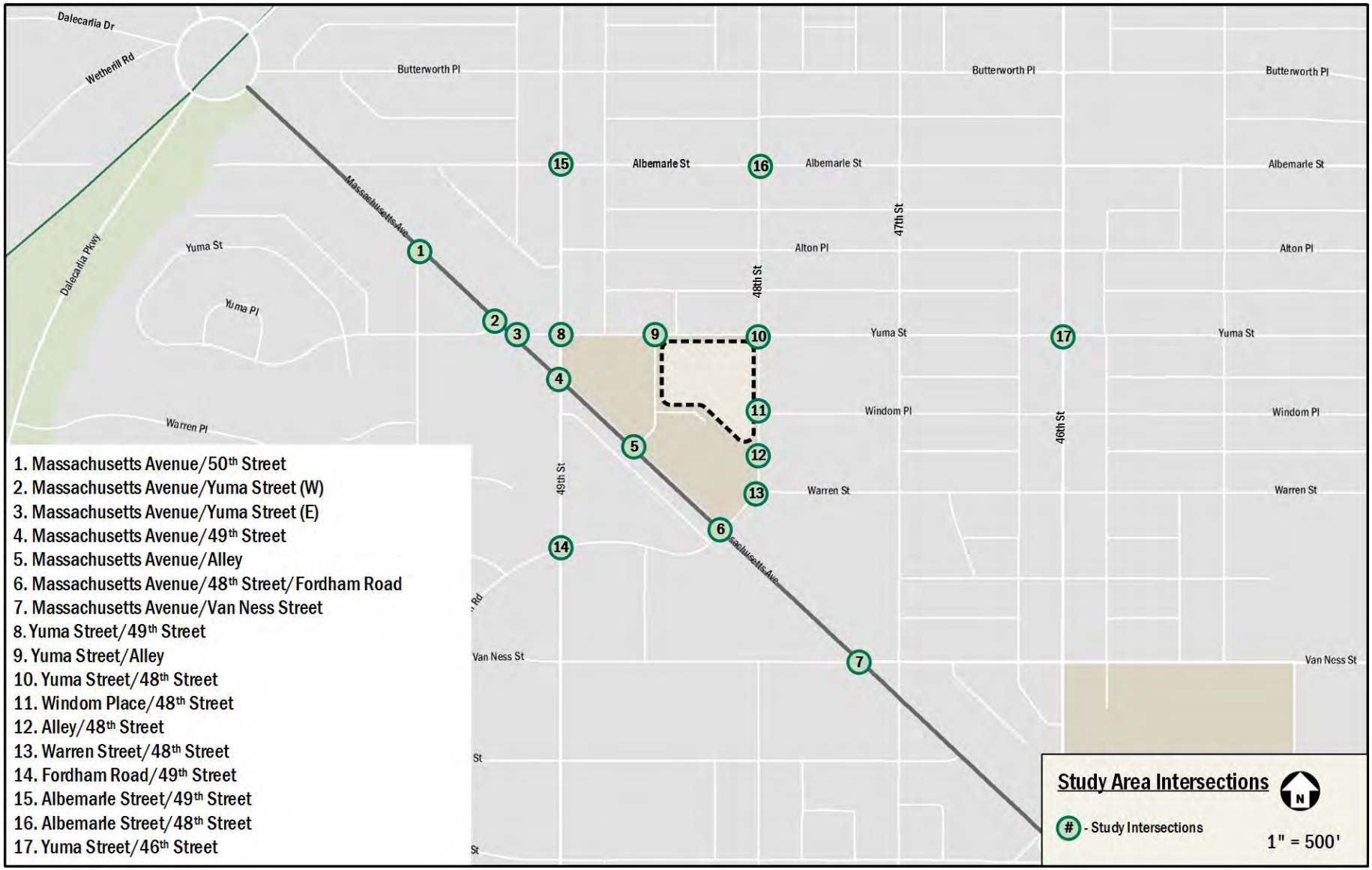

Figure 14: Study Area Intersections

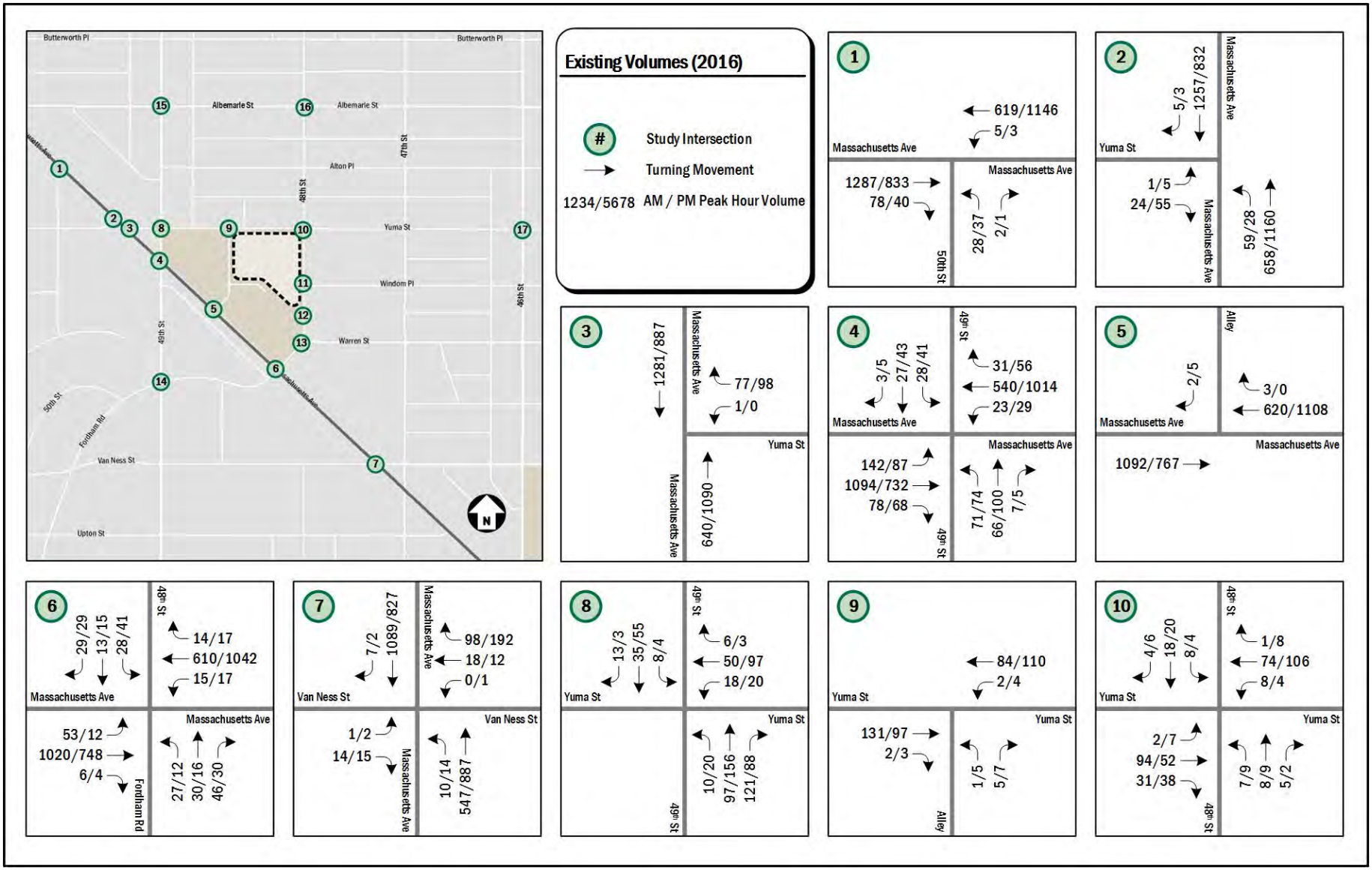

Figure 15: Existing Peak Hour Traffic Volumes (1 of 2)

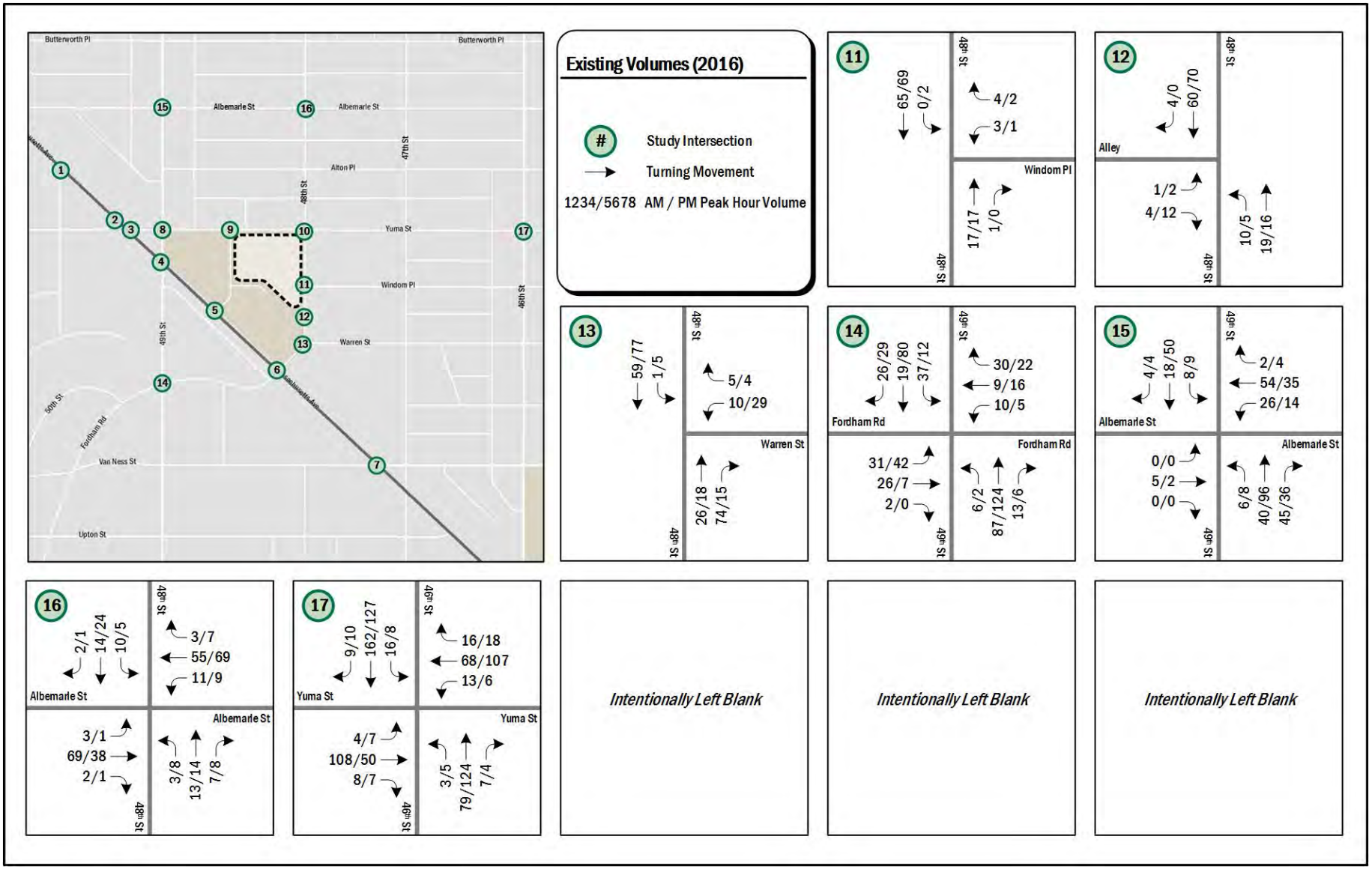

Figure 16: Existing Peak Hour Traffic Volumes (2 of 2)

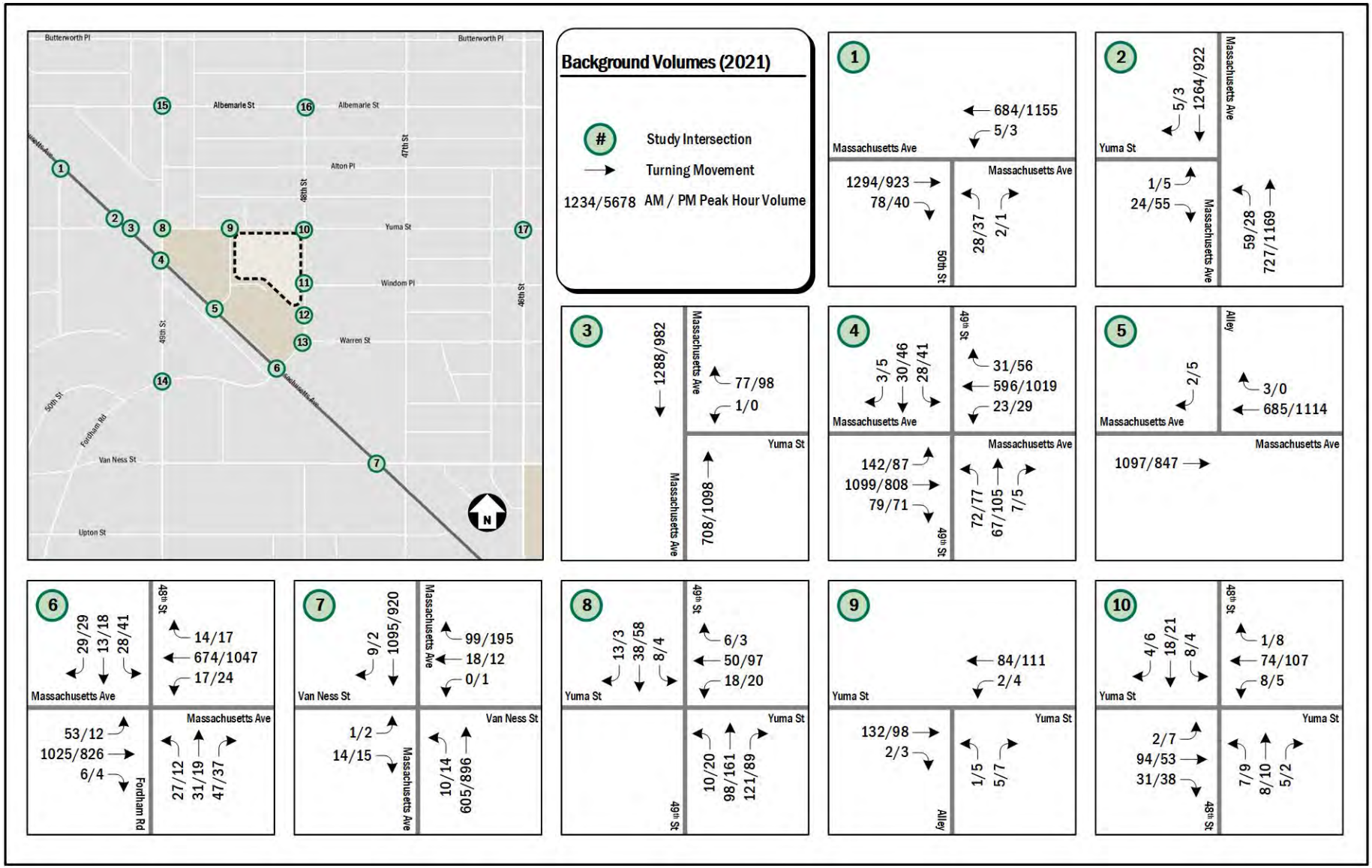

Figure 17**: 2021 Background Peak Hour Traffic Volumes (1 of 2)**

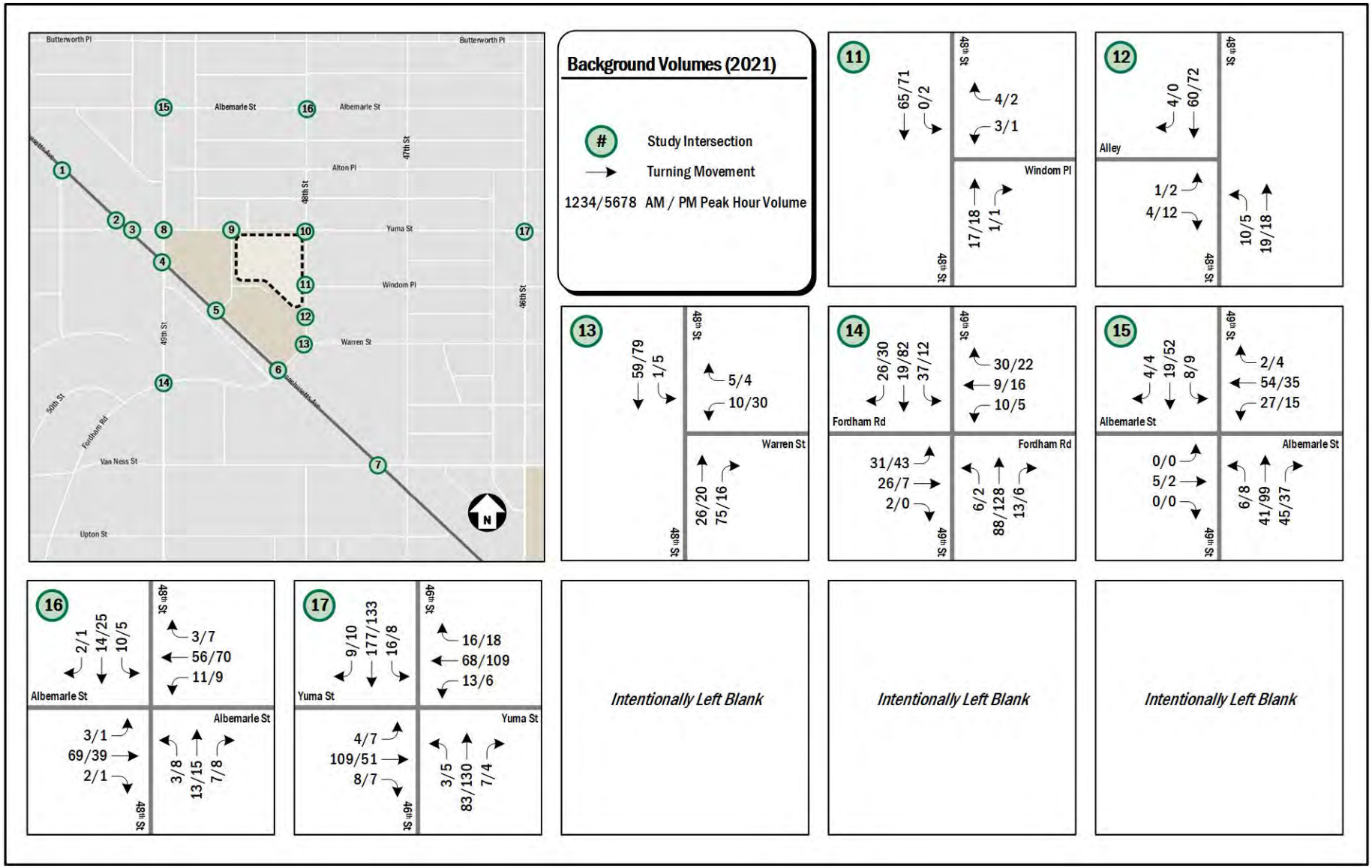

Figure 18: 2021 Background Peak Hour Traffic Volumes (2 of 2)

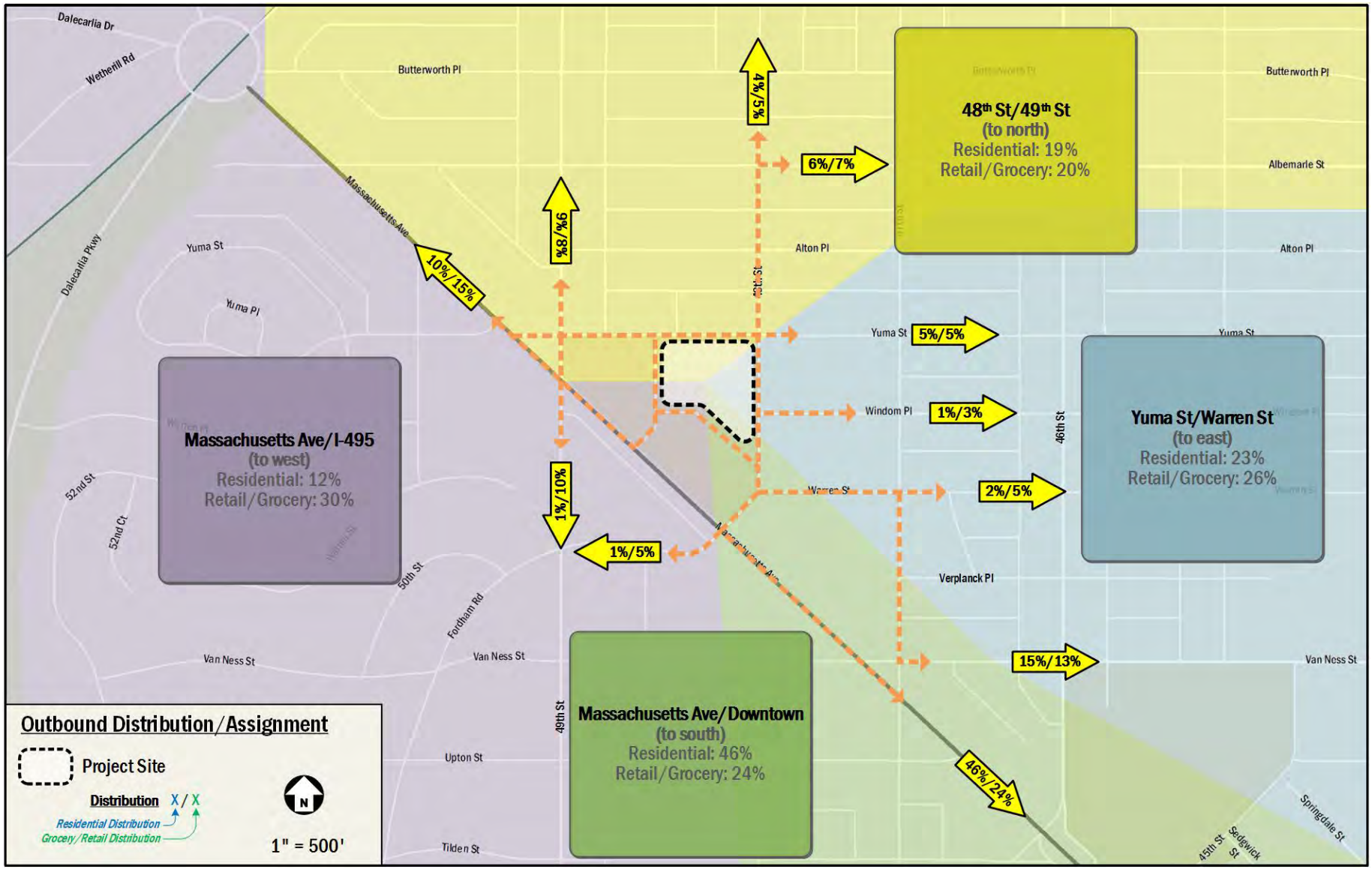

Figure 19: Outbound Trip Distribution and Routing

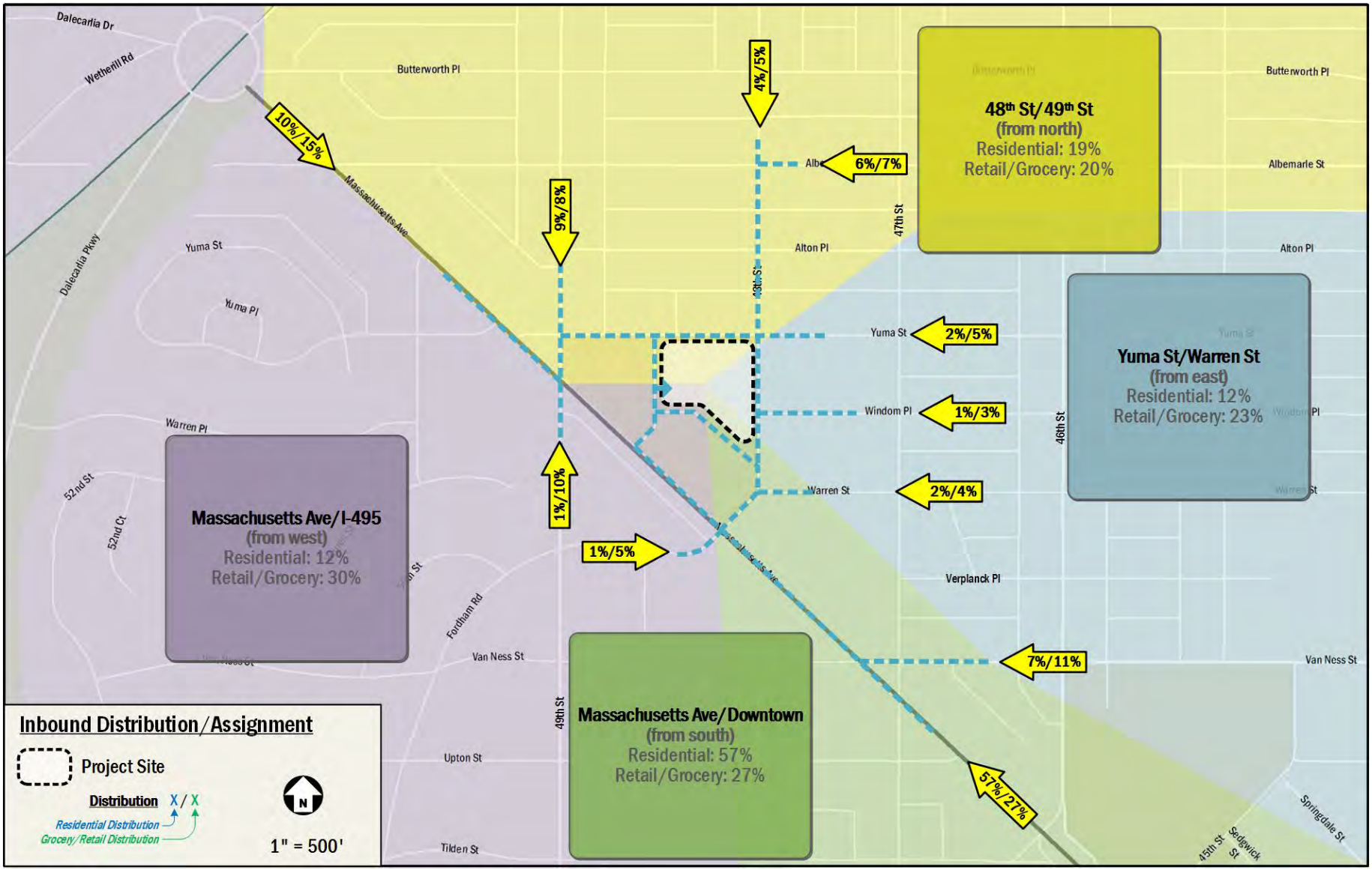

Figure 20: Inbound Trip Distribution and Routing

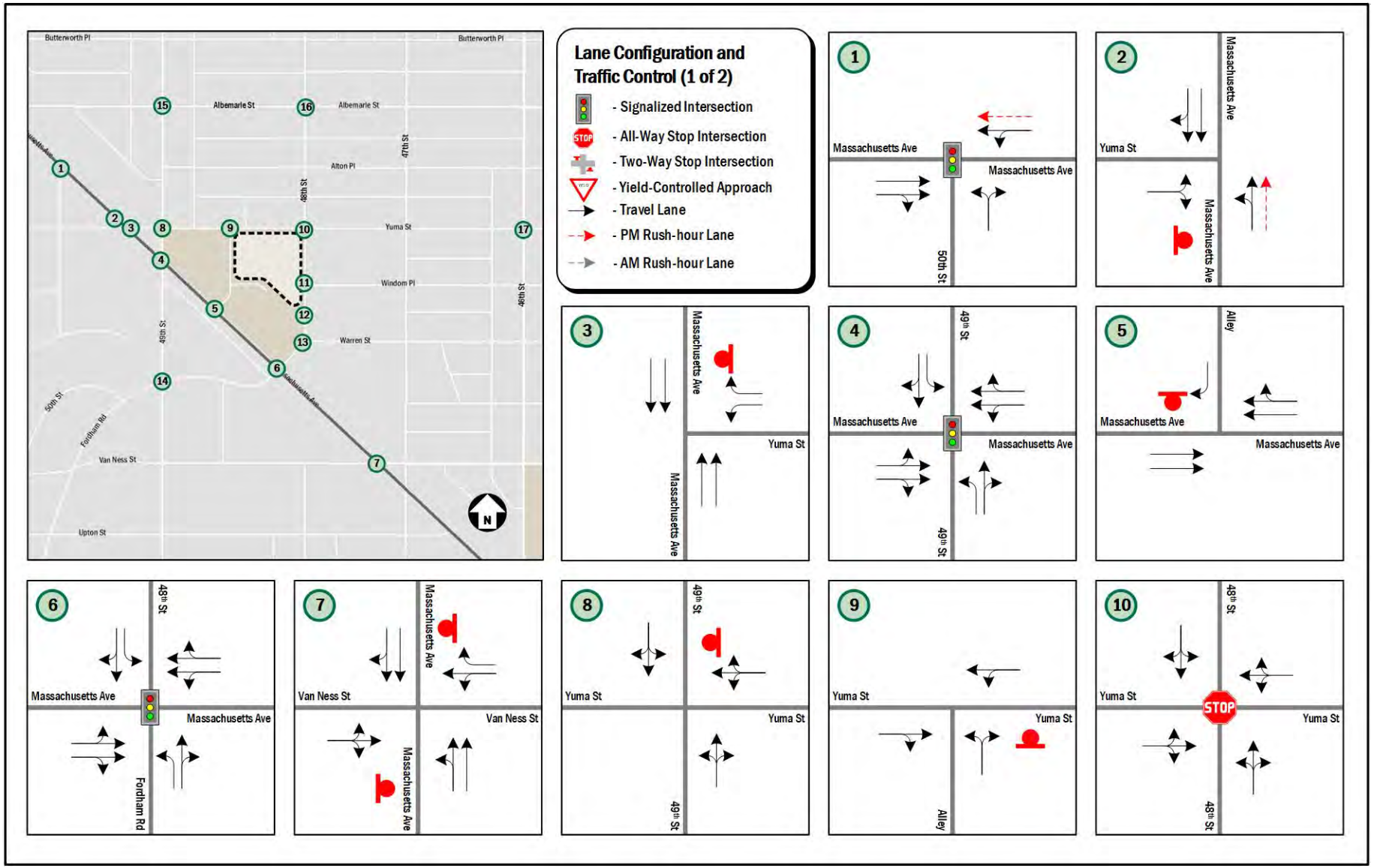

Figure 21: Lane Configuration and Traffic Control (1 of 2)

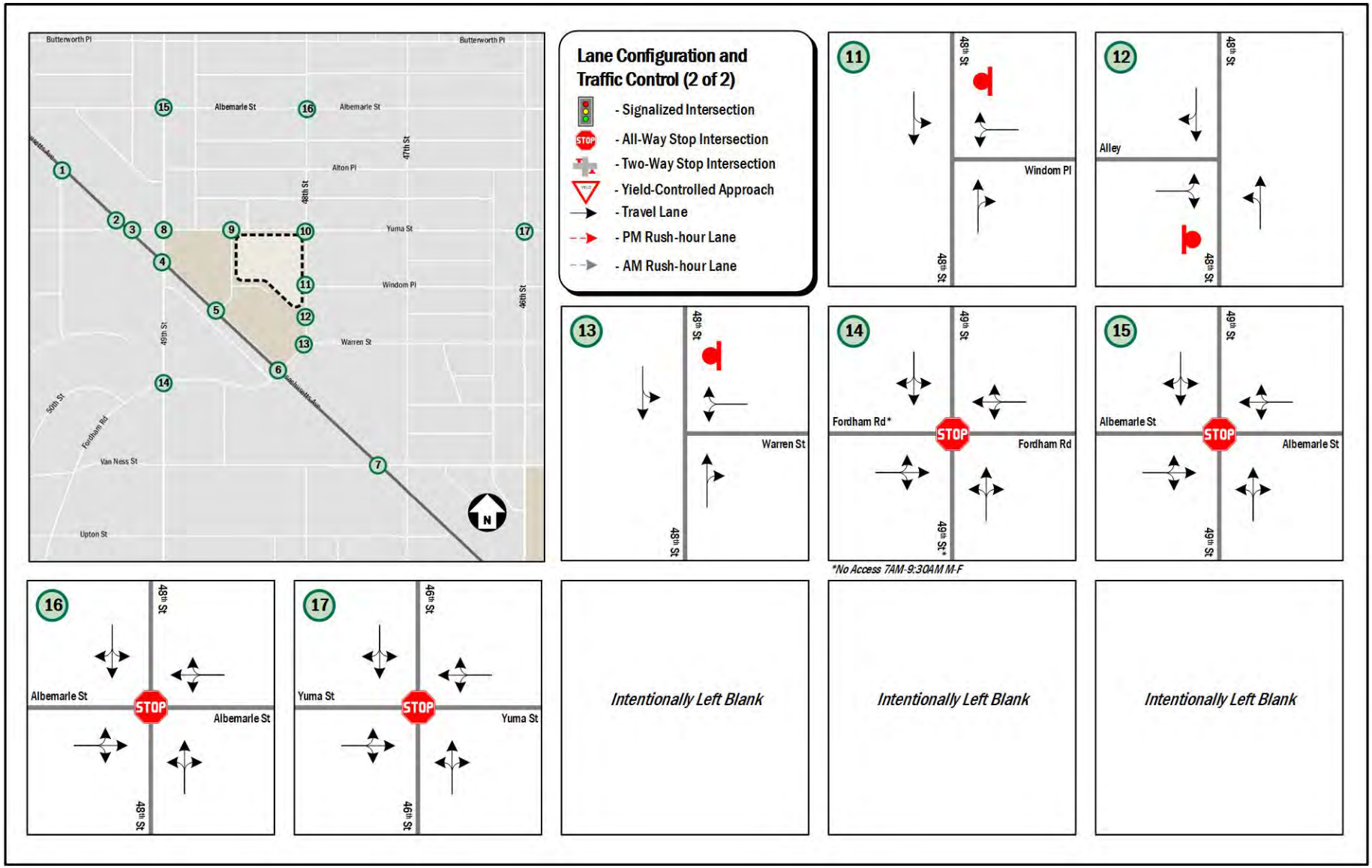

Figure 22: Lane Configuration and Traffic Control (2 of 2)

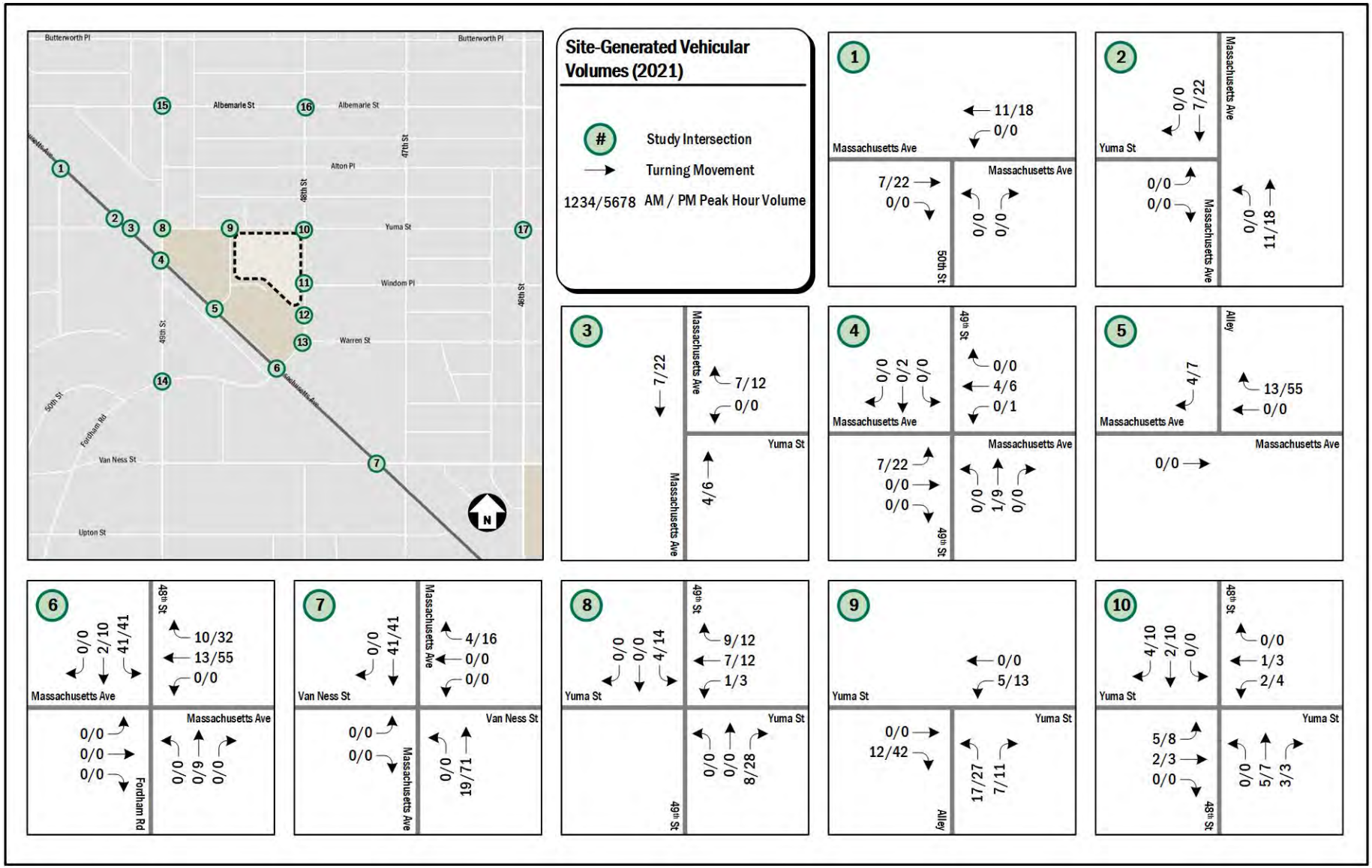

Figure 23: Site-Generated Peak Hour Traffic Volumes (1 of 2)

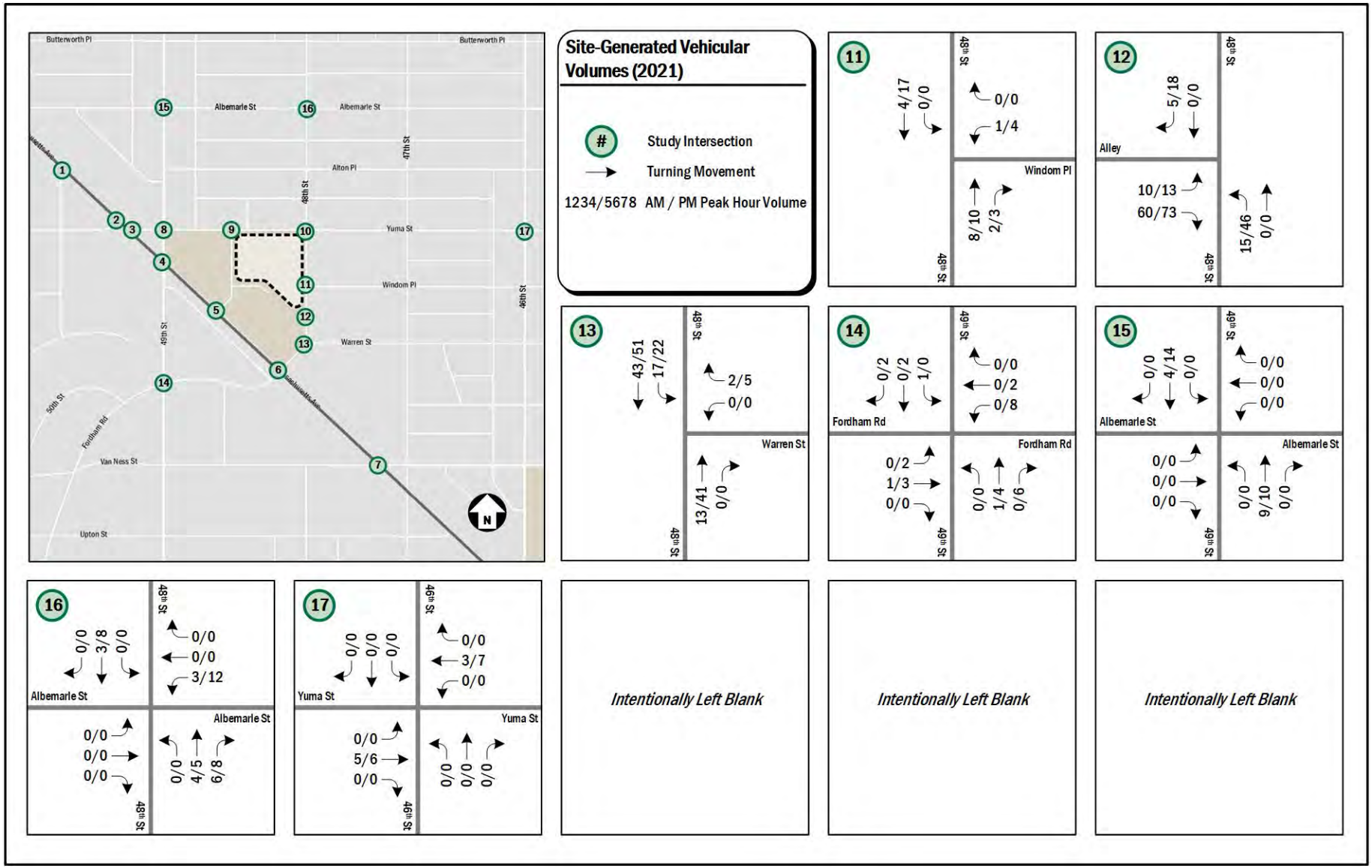

Figure 24: Site-Generated Peak Hour Traffic Volumes (2 of 2)

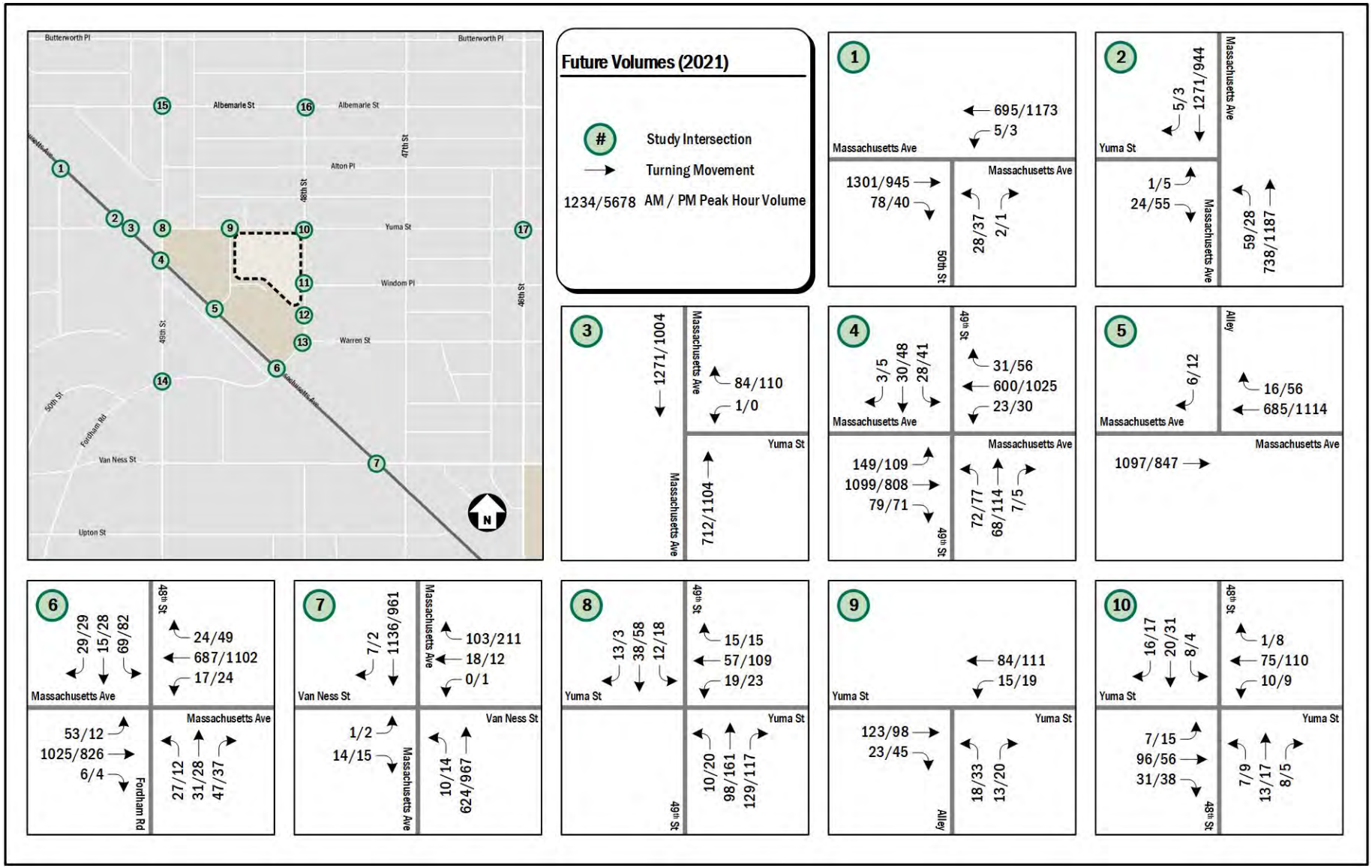

Figure 25: 2021 Future Peak Hour Traffic Volumes (1 of 2)

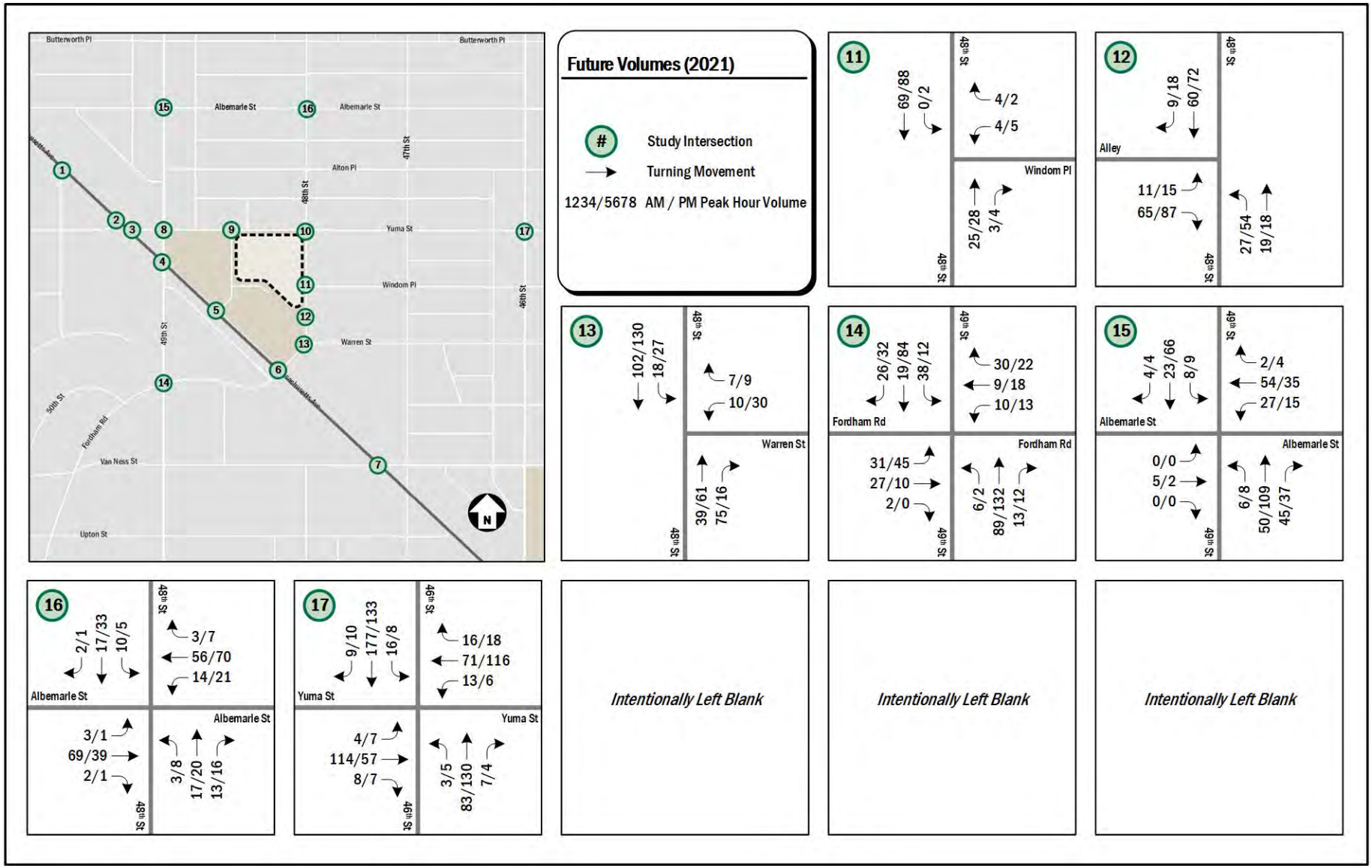

Figure 26: 2021 Future Peak Hour Traffic Volumes (2 of 2)

Table 5: LOS Results

Intersection	Approach	Existing Conditions (2016)				Background Conditions (2021)				Future Conditions (2021)			
		AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Massachusetts Avenue & 50th Street NW	**Overall**	**16.9**	**B**	**7.5**	**A**	**17.0**	**B**	**7.9**	**A**	**17.0**	**B**	**8.0**	**A**
	Northbound	34.1	C	35.3	D	34.1	C	35.4	D	34.1	C	35.4	D
	Southeastbound	18.8	B	11.5	B	18.9	B	12.0	B	19.0	B	12.2	B
	Northwestbound	11.8	B	3.5	A	12.1	B	3.5	A	12.2	B	3.6	A
Massachusetts Avenue & Yuma Street (W) NW	Eastbound	11.0	B	10.1	B	11.1	B	10.1	B	11.1	B	10.1	B
	Southeastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Northwestbound	2.3	A	0.4	A	2.4	A	0.4	A	2.4	A	0.4	A
Massachusetts Avenue & Yuma Street (E) NW	Westbound	9.3	A	10.1	B	9.3	A	10.1	B	9.3	A	10.2	B
	Southeastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Northwestbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
Massachusetts Avenue & 49th Street NW	**Overall**	**18.9**	**B**	**14.5**	**B**	**20.9**	**C**	**15.0**	**B**	**21.6**	**C**	**16.5**	**B**
	Northbound	35.0	D	35.4	D	35.1	D	35.7	D	35.1	D	35.9	D
	Southbound	32.6	C	33.3	C	32.6	C	33.3	C	32.6	C	33.4	C
	Southeastbound	15.8	B	10.9	B	17.9	B	12.1	B	18.8	B	15.8	B
	Northwestbound	20.0	C	12.2	B	22.1	C	12.3	B	22.7	C	12.2	B
Massachusetts Avenue NW & Alley	Southeastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Northwestbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Southwestbound	9.7	A	10.0	B	9.7	A	10.0	B	9.7	A	10.0	B
Massachusetts Avenue & 48th Street & Fordham Road NW	**Overall**	**10.8**	**B**	**9.7**	**A**	**11.3**	**B**	**10.1**	**B**	**12.1**	**B**	**11.1**	**B**
	Southeastbound	8.9	A	8.4	A	9.7	A	8.9	A	10.1	B	8.9	A
	Northwestbound	8.9	A	7.2	A	9.2	A	7.3	A	9.3	A	7.8	A
	Northeastbound	29.1	C	34.3	C	29.2	C	34.4	C	29.2	C	34.8	C
	Southwestbound	28.9	C	35.3	D	28.9	C	35.3	D	31.3	C	38.6	D
Massachusetts Avenue & Van Ness Street NW	Eastbound	13.7	B	22.7	C	14.2	B	26.1	D	15.4	C	34.1	D
	Westbound	20.2	C	20.6	C	22.2	C	21.6	C	24.0	C	24.8	C
	Southeastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Northwestbound	0.3	A	0.2	A	0.2	A	0.2	A	0.2	A	0.2	A
49th Street & Yuma Street NW	Westbound	11.6	B	13.1	B	11.6	B	13.2	B	11.8	B	14.4	B
	Northbound	0.4	A	0.7	A	0.4	A	0.7	A	0.4	A	0.6	A
	Southbound	1.1	A	0.5	A	1.1	A	0.5	A	1.6	A	2.0	A
Yuma Street NW & Alley	Eastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Westbound	0.2	A	0.3	A	0.2	A	0.3	A	1.2	A	1.2	A
	Northbound	9.3	A	9.5	A	9.3	A	9.5	A	10.0	B	10.5	B

Intersection	Approach	Existing Conditions (2016)				Background Conditions (2021)				Future Conditions (2021)			
		AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Yuma Street & 48th Street NW	**Overall**	**7.8**	**A**	**7.8**	**A**	**7.8**	**A**	**7.8**	**A**	**7.9**	**A**	**8.0**	**A**
	Eastbound	7.9	A	7.7	A	7.9	A	7.7	A	8.1	A	8.0	A
	Westbound	7.8	A	8.0	A	7.8	A	8.0	A	7.9	A	8.2	A
	Northbound	7.6	A	7.7	A	7.6	A	7.7	A	7.6	A	7.8	A
	Southbound	7.7	A	7.6	A	7.7	A	7.6	A	7.7	A	7.8	A
Windom Place & 48th Street NW	Westbound	8.8	A	8.6	A	8.8	A	8.6	A	8.9	A	9.1	A
	Northbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Southbound	0.0	A	0.2	A	0.0	A	0.2	A	0.0	A	0.2	A
48th Street NW & Alley	Eastbound	8.7	A	8.9	A	8.7	A	8.9	A	9.2	A	9.7	A
	Northbound	2.6	A	1.8	A	2.6	A	1.7	A	4.5	A	5.8	A
	Southbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
Warren Street & 48th Street NW	Westbound	9.3	A	9.5	A	9.3	A	9.5	A	9.7	A	10.5	B
	Southbound	0.1	A	0.5	A	0.1	A	0.5	A	1.2	A	1.4	A
	Northeastbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0	A
Fordham Road & 49th Street NW	**Overall**	**7.9**	**A**	**8.1**	**A**	**7.9**	**A**	**8.2**	**A**	**7.9**	**A**	**8.3**	**A**
	Eastbound	8.0	A	8.2	A	8.0	A	8.3	A	8.0	A	8.4	A
	Westbound	7.5	A	7.7	A	7.5	A	7.7	A	7.5	A	7.9	A
	Northbound	8.0	A	8.2	A	8.0	A	8.3	A	8.0	A	8.4	A
	Southbound	7.9	A	8.1	A	7.9	A	8.1	A	8.0	A	8.2	A
Albemarle Street & 49th Street NW	**Overall**	**7.6**	**A**	**7.8**	**A**	**7.6**	**A**	**7.8**	**A**	**7.7**	**A**	**7.9**	**A**
	Eastbound	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.6	A
	Westbound	7.8	A	7.8	A	7.9	A	7.9	A	7.9	A	7.9	A
	Northbound	7.4	A	7.9	A	7.5	A	7.9	A	7.6	A	8.0	A
	Southbound	7.4	A	7.6	A	7.5	A	7.7	A	7.5	A	7.8	A
Albemarle Street & 48th Street NW	**Overall**	**7.5**	**A**	**7.5**	**A**	**7.6**	**A**	**7.5**	**A**	**7.6**	**A**	**7.7**	**A**
	Eastbound	7.6	A	7.4	A	7.6	A	7.4	A	7.6	A	7.5	A
	Westbound	7.6	A	7.6	A	7.6	A	7.7	A	7.7	A	7.9	A
	Northbound	7.3	A	7.4	A	7.3	A	7.4	A	7.3	A	7.5	A
	Southbound	7.5	A	7.5	A	7.5	A	7.5	A	7.6	A	7.6	A
Yuma Street & 46th Street NW	**Overall**	**9.0**	**A**	**8.7**	**A**	**9.2**	**A**	**8.8**	**A**	**9.2**	**A**	**8.9**	**A**
	Eastbound	8.9	A	8.4	A	9.0	A	8.4	A	9.1	A	8.5	A
	Westbound	8.7	A	8.8	A	8.8	A	8.8	A	8.8	A	8.9	A
	Northbound	8.6	A	8.8	A	8.7	A	8.9	A	8.7	A	9.0	A
	Southbound	9.4	A	8.8	A	9.6	A	8.9	A	9.7	A	9.0	A

Table 6: Queueing Results (in feet)

Intersection	Lane Group	Storage Length (ft)	Existing Conditions (2016)				Background Conditions (2021)				Future Conditions (2021)			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
			50th %	95th %	50th %	95th %	50th %	95th %	50th %	95th %	50th %	95th %	50th %	95th %
Massachusetts Avenue & 50th Street NW	Northbound LR	240	18	42	23	52	18	42	23	52	18	42	23	52
	Southeastbound TR	330	348	437	151	194	351	441	173	222	354	444	179	228
	Northwestbound LT	265	221	236	61	71	227	241	63	72	225	240	64	74
Massachusetts Avenue & Yuma Street (W) NW	Eastbound LR	235	--	4	--	7	--	4	--	7	--	4	--	7
	Northbound LT	30	--	7	--	3	--	7	--	3	--	7	--	3
	Southbound TR	265	--	0	--	0	--	0	--	0	--	0	--	0
Massachusetts Avenue & Yuma Street (E) NW	Westbound Left	80	--	0	--	0	--	0	--	0	--	0	--	0
	Westbound Right	80	--	8	--	12	--	8	--	12	--	9	--	14
	Northbound Thru	160	--	0	--	0	--	0	--	0	--	0	--	0
	Southbound Thru	30	--	0	--	0	--	0	--	0	--	0	--	0
Massachusetts Avenue & 49th Street NW	Northbound Left	475	45	84	43	87	46	86	45	90	46	86	45	90
	Northbound TR	475	43	81	60	110	44	81	63	115	44	82	69	123
	Southbound Left	75	17	42	24	55	17	42	24	55	17	42	24	55
	Southbound TR	75	17	41	24	57	18	44	26	59	18	44	28	62
	Southeastbound LTR	230	106	177	83	98	120	191	88	125	128	200	91	157
	Northwestbound LTR	300	115	186	269	345	147	210	273	349	151	214	276	354
Massachusetts Avenue NW & Alley	Southeastbound Thru	300	--	0	--	0	--	0	--	0	--	0	--	0
	Northwestbound TR	375	--	0	--	0	--	0	--	0	--	0	--	0
	Southwestbound Right	110	--	0	--	1	--	0	--	1	--	1	--	1
Massachusetts Avenue & 48th Street & Fordham Road NW	Southeastbound LTR	670	147	355	105	144	182	376	124	147	197	385	135	135
	Northwestbound LTR	585	101	131	146	187	115	148	151	192	120	154	170	216
	Northeastbound Left	215	16	38	7	23	16	38	7	23	16	38	7	23
	Northeastbound TR	215	17	51	10	40	18	52	12	44	18	52	18	53
	Southwestbound Left	135	16	40	23	56	16	40	23	56	42	80	48	96
	Southwestbound TR	135	7	33	8	40	7	33	10	42	9	35	16	51
Massachusetts Avenue & Van Ness Street NW	Eastbound LTR	280	--	3	--	7	--	3	--	8	--	4	--	11
	Westbound Left	76	--	25	--	18	--	28	--	21	--	32	--	25
	Westbound Right	76	--	15	--	56	--	16	--	58	--	18	--	72
	Southeastbound TR	100	--	1	--	0	--	1	--	0	--	1	--	0
	Northwestbound TL	585	--	0	--	1	--	0	--	2	--	0	--	2

49th Street & Yuma Street NW	Westbound LTR	75	--	11	--	21	--	11	--	21	--	14	--	30
	Northbound LTR	260	--	1	--	1	--	1	--	1	--	1	--	1
	Southbound LTR	315	--	1	--	0	--	1	--	0	--	1	--	1
Yuma Street NW & Alley	Eastbound TR	320	--	0	--	0	--	0	--	0	--	0	--	0
	Westbound LT	260	--	0	--	0	--	0	--	0	--	1	--	1
	Northbound LR	240	--	1	--	1	--	1	--	1	--	4	--	7
Yuma Street & 48th Street NW*	Eastbound LTR	335	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound LTR	440	--	--	--	--	--	--	--	--	--	--	--	--
	Northbound LTR	255	--	--	--	--	--	--	--	--	--	--	--	--
	Southbound LTR	265	--	--	--	--	--	--	--	--	--	--	--	--
Windom Place & 48th Street NW	Westbound LR	460	--	1	--	0	--	1	--	0	--	1	--	1
	Northbound TR	155	--	0	--	0	--	0	--	0	--	0	--	0
	Southbound LT	245	--	0	--	0	--	0	--	0	--	0	--	0
48th Street NW & Alley	Eastbound LR	385	--	0	--	1	--	0	--	1	--	8	--	12
	Northbound LT	105	--	1	--	0	--	1	--	0	--	2	--	3
	Southbound TR	155	--	0	--	0	--	0	--	0	--	0	--	0
Warren Street & 48th Street NW	Westbound LR	460	--	2	--	4	--	2	--	4	--	2	--	5
	Southbound LR	95	--	0	--	0	--	0	--	0	--	1	--	2
	Northeastbound LR	135	--	0	--	0	--	0	--	0	--	0	--	0
Fordham Road & 49th Street NW*	Eastbound LTR	195	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound LTR	260	--	--	--	--	--	--	--	--	--	--	--	--
	Northbound LTR	345	--	--	--	--	--	--	--	--	--	--	--	--
	Southbound LTR	480	--	--	--	--	--	--	--	--	--	--	--	--
Albemarle Street & 49th Street NW*	Eastbound LTR	730	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound LTR	650	--	--	--	--	--	--	--	--	--	--	--	--
	Northbound LTR	275	--	--	--	--	--	--	--	--	--	--	--	--
	Southbound LTR	300	--	--	--	--	--	--	--	--	--	--	--	--
Albemarle Street & 48th Street NW*	Eastbound LTR	630	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound LTR	420	--	--	--	--	--	--	--	--	--	--	--	--
	Northbound LTR	265	--	--	--	--	--	--	--	--	--	--	--	--
	Southbound LTR	300	--	--	--	--	--	--	--	--	--	--	--	--
Yuma Street & 46th Street NW*	Eastbound LTR	545	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound LTR	500	--	--	--	--	--	--	--	--	--	--	--	--
	Northbound LTR	215	--	--	--	--	--	--	--	--	--	--	--	--
	Southbound LTR	235	--	--	--	--	--	--	--	--	--	--	--	--

**HCM 2000 does not report queuing for all-way stops*

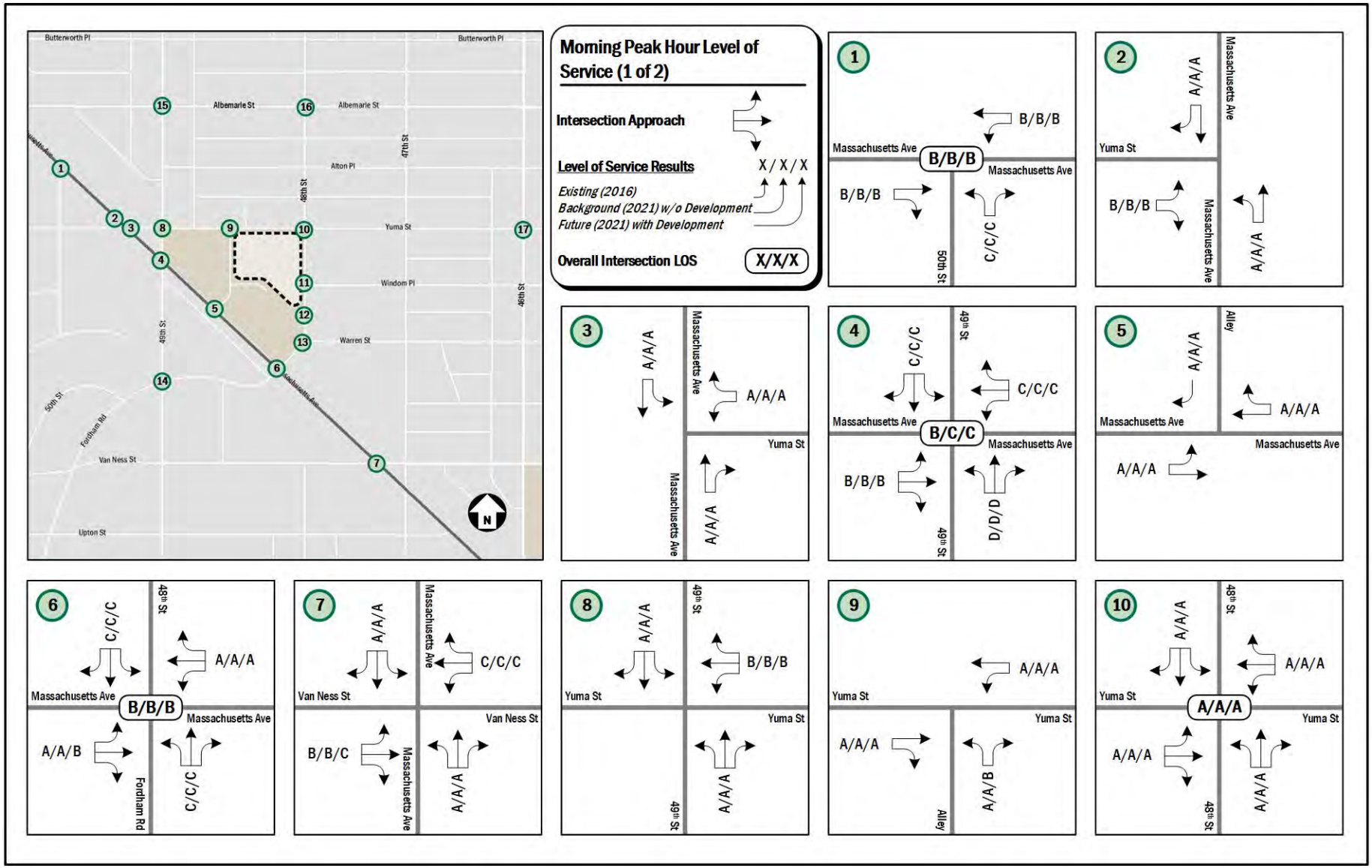

Figure 27: Morning Peak Hour Capacity Analysis Results (1 of 2)

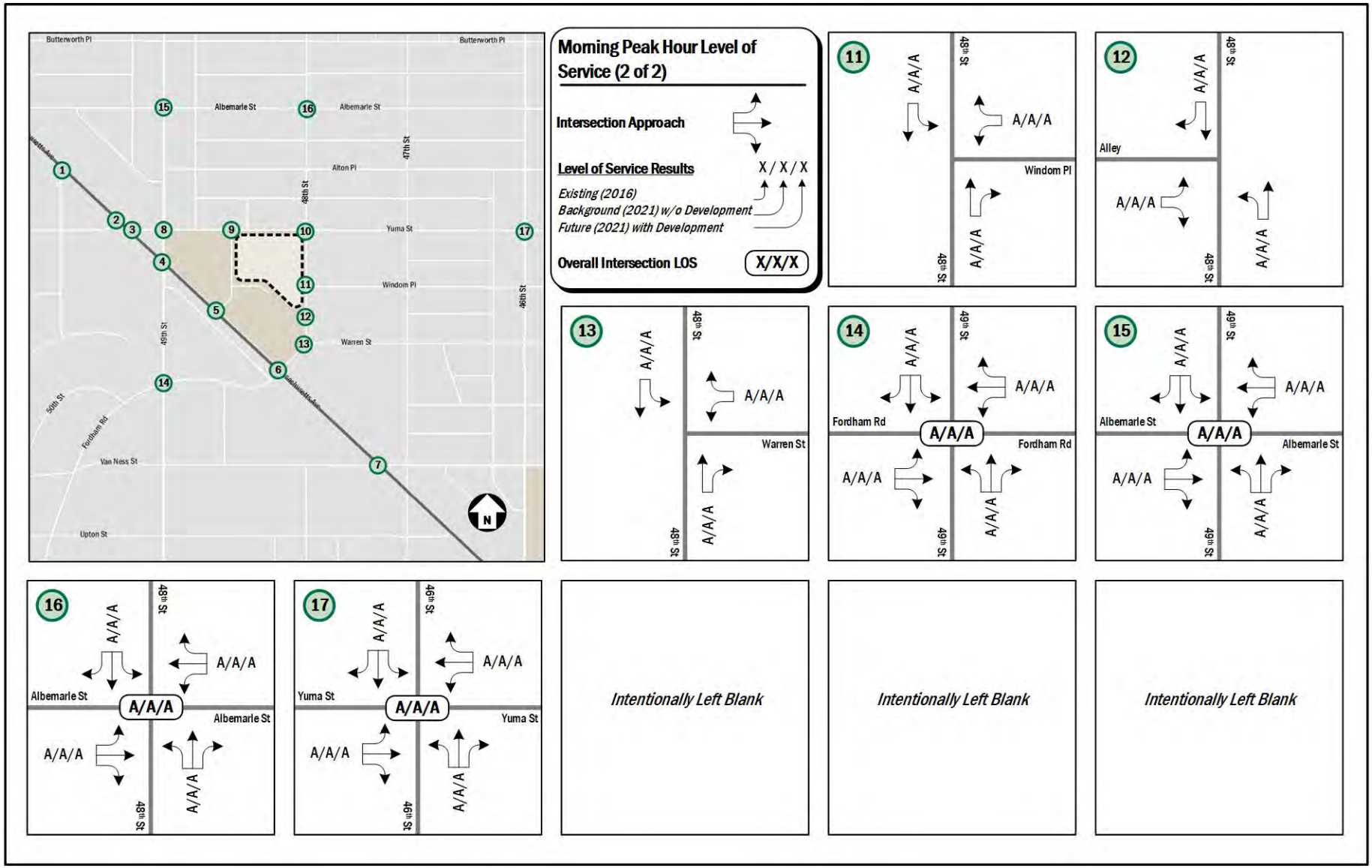

Figure 28: Morning Peak Hour Capacity Analysis Results (2 of 2)

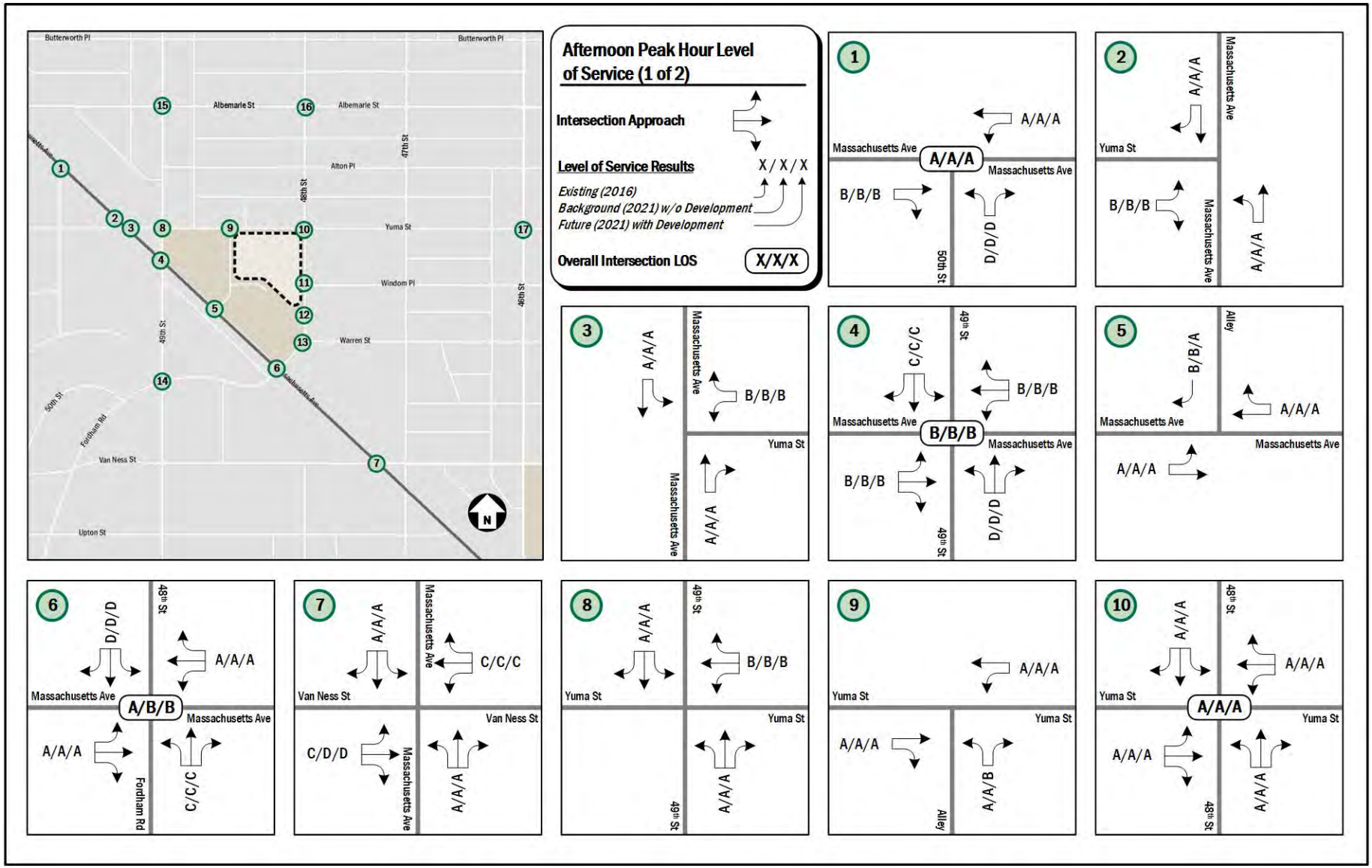

Figure 29: Afternoon Peak Hour Capacity Analysis Results (1 of 2)

Figure 30: Afternoon Peak Hour Capacity Analysis Results (2 of 2)

TRANSIT

This section discusses the existing and proposed transit facilities in the vicinity of the site, accessibility to transit, and evaluates the overall transit impacts of the Ladybird project.

The following conclusions are reached within this chapter:

- The development has adequate access to transit
- The development is located 0.8 miles from the Tenleytown-AU Metrorail station
- The development site is surrounded by two Metrobus routes that travel along multiple primary corridors
- The site is expected to generate a manageable number of transit trips, and the existing service is capable of handling these new trips

EXISTING TRANSIT SERVICE

The study area is well served by Metrobus and has access to Metrorail. Combined, these transit services provide local, city wide, and regional transit connections and link the site with major cultural, residential, employment, and commercial destinations throughout the region. Figure 31 identifies the major transit routes, stations, and stops in the study area.

The Tenleytown-AU Metrorail station is located 0.8 miles from the development site and is served by the Red Line, which provides direct connections to areas in the District and Maryland along with access to Virginia via connecting lines. The Red Line connects Shady Grove with Glenmont while providing access to the District core in a "U" shape. Red Line trains run approximately every three to six minutes during the morning and afternoon peak hours. The Red Line runs about every 12 minutes during weekday non-peak hours, every 15 to 18 minutes on weekday evenings after 9:30 pm and 12 to 15 minutes on the weekends.

The site is also serviced by Metrobus along multiple primary corridors. These bus routes connect the site to the downtown core of the District, including Metrorail stations which provide further connections to Virginia and Maryland. Table 7 shows a summary of the bus route information for the routes that serve the site, including service hours, headway, and distance to the nearest bus stop.

Figure 31 shows a detailed inventory of the existing Metrobus stops within a quarter-mile walkshed of the site. Each stop is evaluated based on the guidelines set forth by WMATA's *Guidelines for the Design and Placement of Transit Stops*, as detailed in Table 8. A detailed breakdown of individual bus stop amenities and conditions is included in the Technical Attachments.

PLANNED TRANSIT SERVICE

MoveDC

Due to growth of population, jobs, and retail in several neighborhoods in the District and the potential for growth in other neighborhoods, the District's infrastructure is challenged with the need for transportation investments to support the recent growth and to further strengthen neighborhoods. In order to meet these challenges and capitalize on future opportunities, DDOT has developed a plan to identify transit challenges and opportunities and to recommend investments. *MoveDC* is a long-range plan that provides a vision for the future of DC's transportations system, specifically in a way that expands transportation choices while improving the reliability of all transportation modes.

The MoveDC report outlines recommendations by mode with the goal of having them complete by 2040. The plan hopes to achieve a transportation system for the District that includes:

- 70 miles of high-capacity transit (streetcar or bus)
- 200 miles of on-street bicycle facilities or trails
- Sidewalks on at least one side of every street
- New street connections
- Road management/pricing in key corridors and the Central Employment Area

Table 7: Metrobus Route Information

Route Number	Route Name	Service Hours	Headway	Walking Distance to Nearest Bus Stop
N4, N6	Massachusetts Avenue Line	Weekdays: 5:36AM – 12:44 AM Weekends: 5:45AM – 12:45 AM	5-30 min	<0.1 miles, 1 minute

Table 8: Transit Stop Requirements

Feature	Basic Stop	Enhanced Service Bus Stop	Transit Center
Bus Stop Sign	Yes	Yes	Yes
ADA 5'x8' Landing Pad - at a minimum, a clear, unobstructed, paved boarding area that is 8 feet deep (perpendicular to the curb) by 5 feet wide (parallel to the curb) and compliant with the ADA Accessibility Guidelines (ADAAG)	Yes	Yes	Yes
Sidewalk - connected by a paved sidewalk that is at least 4 feet wide	Yes	Yes	Yes
Lighting - adequate lighting either from street lights, lights from an adjacent business, or shelter lighting (particularly stops that are served in the evenings)	Evening Service	Yes	Yes
Seating	Trip Generator Based	Yes	Yes
Information Case - detailed schedule information on services	Yes	Yes	Yes
Trash Receptacle - trash receptacle (particularly at locations that are close to fast food establishments and convenient stores)	Site Specific	Yes	Yes
Shelter(s) - shelter with interior seating if there are 50 or more boardings per day (including transfers)	1 (50+ boardings/day)	1	2+
System Map	Contingent on Shelter	Yes	Yes
Real-time Display (LED + Audio)	Optional	Yes	Yes
Interactive Phone System On-Site - real time bus arrival information through an interactive phone and push button audio system	No	No	Yes
Expanded Boarding & Alighting Area (Rear-door Access)	No	Site Specific	Yes
Bus Bay (Pull Off)	No	Site Specific	Yes

- A new downtown Metrorail loop
- Expanded commuter rail
- Water taxis

No transit related improvements were outlined in the MoveDC plan that directly affect the proposed development.

WMATA and DDOT Transit Studies

WMATA studied capacity of Metrorail stations in its *Station Access & Capacity Study (2008).* The study analyzed the capacity of Metrorail stations for their vertical transportation, for example the capacity of the station at elevators, stairs, and escalators to shuttle patrons between the street, mezzanine, and platforms. The study also analyzed stations capacity to process riders at fare card gates. For both analyses, vertical transportation and fare card gates, volume-to-capacity ratios were calculated for existing data (from 2005) and projections for the year 2030. According to the study, the Tenleytown-AU station can currently accommodate future growth at all access points.

In 2014, WMATA and DDOT initiated the Tenleytown-AU Metrorail Station Access Study to identify station access improvements and to redesign WMATA owned property to better accommodate all modes of access to the station. The study specifically examined WMATA and DDOT owned property on Fort Drive and 40th Street, the adjacent street grid to the eastern station entrance, in order to provide a higher level of service for all modes of access to the station. The study found that: (1) Public realm enhancements and pedestrian safety improvements are needed at locations surrounding the Tenleytown-AU Metrorail Station; (2) Provisions of benches, covered areas, and other transit amenities are needed to accommodate the large numbers of bus transit users; (3) Provisions of bicycle parking are needed to accommodate existing and planned bicycle mode share to the Tenleytown-AU Station; and (4) Improvements are needed to eliminate

awkward vehicular movements and reduce automobile-pedestrian conflicts.

In 2016, Phase II of the Tenleytown-AU Metrorail Station Access Study was initiated, which presented three draft station area concepts for consideration. All three concepts provide: (1) Better crosswalk design at 40th Street, Fort Drive, and Albemarle Street; (2) Better disability access with curb cuts at crosswalks; (3) Angled bus parking spots for easier vehicle entry and exit from the station; (4) Bus shelters with improved customer information and weather protection; (5) Better sidewalk designs for easier pedestrian, ADA, and cyclist access; (6) More green space and tree box landscaping; (7) More bicycle racks as well as secure bike storage; (8) High visibility pedestrian and bicycle crossing at intersections; and (8) Expanded sidewalk space in front of 40th St NW retail to provide pedestrian plaza opportunity. As of this report, no alternative has been selected.

WMATA has also studied capacity along Metrobus routes. DC's *Transit Future System Plan* (2010) lists the bus routes with the highest load factor (a ratio of passenger volume to bus capacity). A load factor is considered unacceptable if it is over 1.2 during peak periods or over 1.0 during off-peak or weekend periods. According to this study Metrobus routes that travel near the site operate at a load factor that is at or below its capacity during peak periods of the day. As it is expected that the majority of new trips will be made via the Metrorail, site-generated transit trips will not cause detrimental impacts to Metrobus or Metrorail service.

Site-Generated Transit Impacts

Transit Trip Generation

The proposed development is projected to generate 6 transit trips (1 inbound, 5 outbound) during the morning peak hour and 8 transit trips (5 inbound, 3 outbound) during the afternoon peak hour.

US Census data was used to determine the distribution of those taking Metrorail and those taking Metrobus. The site lies in TAZ 10096 and data shows that approximately 78 percent of transit riders used Metrorail and the remainder use Metrobus. That said, approximately 5 people will use Metrorail and 1 person will use Metrobus during the morning peak hour; approximately 6 people will use Metrorail and 2 people will use Metrobus during the afternoon peak hour.

Figure 31: Existing Transit Service

PEDESTRIAN FACILITIES

This section summarizes the existing and future pedestrian access to the site and reviews walking routes to and from the site.

The following conclusions are reached within this chapter:

- The existing pedestrian infrastructure surrounding the site provides an adequate walking environment. There are some gaps in the system, but there are sidewalks along all primary routes to pedestrian destinations.
- The site is expected to generate a manageable number of pedestrian trips.

PEDESTRIAN STUDY AREA

Facilities within a quarter-mile of the site were evaluated as well as routes to nearby transit facilities and prominent retail and neighborhood destinations. The site is easily accessible to bus stops along Massachusetts Avenue. There are some areas of concern within the study area that negatively impact the quality of and attractiveness of the walking environment. This includes roadway conditions that reduce the quality of walking conditions, narrow or nonexistent sidewalks, and incomplete or insufficient crossings at busy intersections. Figure 32 shows suggested pedestrian pathways, walking time and distances, and barriers and areas of concern.

PEDESTRIAN INFRASTRUCTURE

This section outlines the existing and proposed pedestrian infrastructure within the pedestrian study area.

Existing Conditions

A review of pedestrian facilities surrounding the proposed development shows that most facilities meet DDOT standards and provide a quality walking environment. Figure 33 shows a detailed inventory of the existing pedestrian infrastructure surrounding the site. Sidewalks, crosswalks, and curb ramps are evaluated based on the guidelines set forth by DDOT's *Public Realm Design Manual* in addition to ADA standards. Sidewalk widths and requirements for the District are shown below in Table 9.

Within the area shown, the majority of roadways are considered residential with a low to moderate density. Most of the sidewalks surrounding the site to the south comply with DDOT standards; however, to the north and east there are areas which have inadequate sidewalks or no sidewalks at all, with insufficient or no buffer. All primary pedestrian destinations are accessible via routes with sidewalks, most of which meet DDOT standards.

ADA standards require that curb ramps be provided wherever an accessible route crosses a curb and must have a detectable warning. Additionally, curb ramps shared between two crosswalks are not desired. As shown in Figure 33, under existing conditions crosswalks and curb ramps are mostly present near the site.

Pedestrian Infrastructure Improvements

As a result of the development, pedestrian facilities around the perimeter of the site will be improved to meet DDOT and ADA standards. This includes sidewalks that meet or exceed the width requirements, crosswalks at all necessary locations, and curb ramps with detectable warnings. Additional design elements such as Windom Walk, a publicly accessible linear park between Buildings 1 and 2 that will provide a new pedestrian extension of Windom Place through the site between 48th Street and the public alley along the west of the site. The inclusion of outdoor seating, planting beds, and additional streetlights will be a great improvement over existing conditions. A landscape and open space plan as included in the submission is shown on Figure 34.

As part of the development, the Applicant will fund the installation of a new HAWK (High-Intensity Activated crossWalk) signal on Massachusetts Avenue between 48th Street and 49th Street. This is designed to help pedestrians

Table 9: Sidewalk Requirements

Street Type	Minimum Sidewalk Width	Minimum Buffer Width
Residential (Low to Moderate Density)	6 ft	4 ft (6 ft preferred for tree space)
Residential (High Density)	8 ft	4 ft (6 ft preferred for tree space)
Commercial (Non-downtown)	10 ft	4 ft
Downtown	16 ft	6 ft

safely cross Massachusetts Avenue, and to help accommodate the additional pedestrian demand that the development will generate.

SITE IMPACTS

Pedestrian Trip Generation

The Ladybird development is expected to generate 12 walking trips (6 inbound, 6 outbound) during the morning peak hour and 35 walking trips (18 inbound, 17 outbound) during the afternoon peak hour. The origins and destinations of these trips are likely to be:

- Employment opportunities where residents can walk to work;
- Employees and patrons of the development;
- Retail locations outside of the site; and
- Neighborhood destinations such as schools, libraries, and parks in the vicinity of the site.

In addition to these trips, the transit trips generated by the site will also generate pedestrian demand between the site and nearby transit stops.

Currently the existing pedestrian network has the capacity to absorb the newly generated trips from the site. The planned sidewalk and pedestrian landscape improvements along the site frontage on 48th Street, Yuma Street, and the alley will further improve and expand the pedestrian network in the vicinity of the site.

Figure 32: Pedestrian Pathways

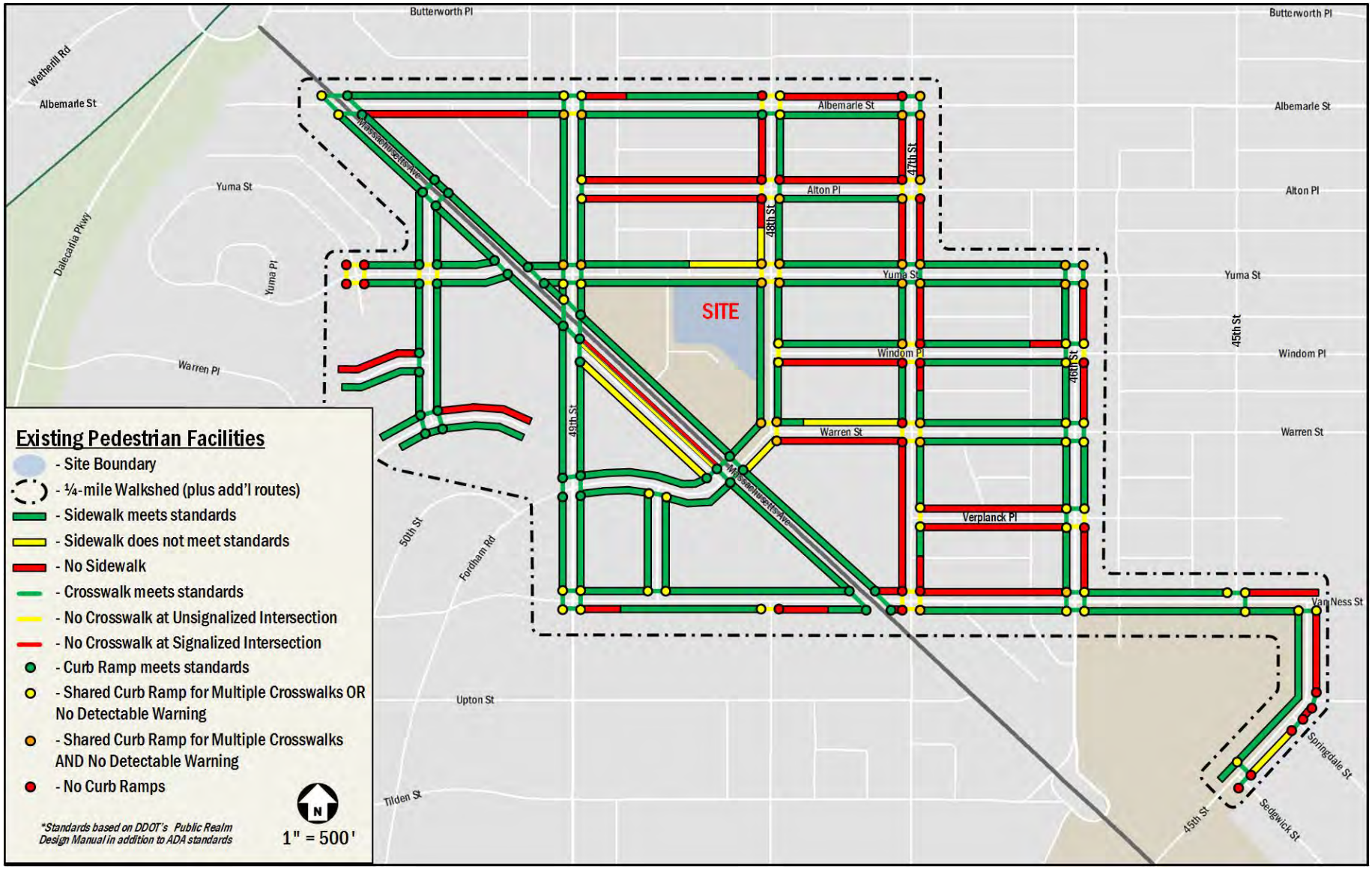

Figure 33: Existing Pedestrian Infrastructure

Figure 34: Proposed Landscape Site Plan

BICYCLE FACILITIES

This section summarizes existing and future bicycle access, reviews the quality of cycling routes to and from the site, and presents recommendations.

The following conclusions are reached within this chapter:

- Limited existing bicycle infrastructure surrounds the site.
- The site is not expected to generate a significant amount of bicycle trips; therefore, all site-generated bike trips can be accommodated on the residential low-volume streets surrounding the site.
- The development will include secure bicycle parking on site for residents and employees of the development.
- The development will include short-term bicycle racks along the perimeter of the site.

EXISTING BICYCLE FACILITIES

Limited bicycle infrastructure exists surrounding the site. The site is 0.6 miles from the nearest designated bicycle facility, which are shared-lanes along 43rd Street. However, low volume residential streets surrounding the site provide bicycle connectivity where designated facilities are lacking. Figure 35 illustrates the existing bicycle facilities in the area.

Under existing conditions there is no short-term bicycle parking located around the perimeter of the site.

PLANNED BICYCLE FACILITIES

MoveDC

The MoveDC plan outlines several bicycle improvements in the vicinity of the site. These improvements are broken up into four tiers that rank the priority for implementation. Due to the timeline of the proposed development, this report will focus on the Tier 1 and Tier 2 recommendations within the vicinity of the site. The four tiers are broken down as follows:

- *Tier 1*
  Investments should be considered as part of DDOT's 6-year Transportation Improvement Program (TIP) and annual work program development, if they are not already included. Some projects may be able to move directly into construction, while others become high priorities for advancement through the Project Development Process.

  There are two tier 1 additions that will positively affect bicycle connectivity to and from the site. A bicycle trail from Western Avenue to R Street NW along Massachusetts Avenue NW, and a trail from Rockwood Parkway NW to Wisconsin Avenue NW along Nebraska Avenue NW are planned. These facilities will greatly improve the bicycle connectivity near the site.

- *Tier 2*
  Investments within this tier are not high priorities in the early years of MoveDC implementation. These investments could begin moving through the Project Development Process if there are compelling reasons for their advancement.

  There is one tier 2 addition that will positively affect bicycle connectivity to and from the site. A bicycle lane extending from Linnean Avenue NW to 49th Street NW along Albemarle Street NW is planned. This facility will greatly improve the bicycle connectivity near the site.

- *Tier 3*
  Investments within this tier are not priorities for DDOT-led advancement in the early years of MoveDC's implementation. They could move forward earlier under circumstances, such as real estate development initiatives and non-DDOT partnerships providing the opportunity for non-District-led completion of specific funding.

- *Tier 4*
  Generally, investments within this tier are not priorities for DDOT-led advancement and are lower priority for project development in the early years of implementation.

Although these projects are discussed in the MoveDC plan, they are not currently funded nor included in DDOT's Transportation Improvement Plan thus they will not be assumed as complete for this analysis.

Capital Bikeshare

The Capital Bikeshare program provides additional cycling options for residents, employees, and patrons of the planned development. The Bikeshare program has placed over 400 Bikeshare stations across Washington, DC, Arlington, and Alexandria, VA, Montgomery County, MD, and most recently Fairfax, VA, with over 3,500 bicycles provided. Within a quarter-mile of the site, there are no existing Capital Bikeshare

stations. Although one station is planned within DDOT's Capital Bikeshare Development Plan to be installed by 2018 in the vicinity of the site.

Figure 35 illustrates the existing Capital Bikeshare facilities in the area.

On-Site Bicycle Elements

The project will include 27 short-term bicycle spaces at street level along the perimeter of the site on 48th Street, Yuma Street, and along the segment of public alley to the south of the site. These short-term spaces will include inverted U-racks placed in high-visibility areas. The Applicant is coordinating with DDOT to select locations for these racks in public space.

The project will also include secure long-term bicycle parking. The plans identify a total of 83 long-term spaces in two separate areas located in the first level of the below-grade parking garage. The first storage and maintenance space will house 77 long-term bicycle spaces for residents of the proposed development. The second storage space will house six (6) long-term bicycle spaces for use of the grocery/retail employees so that they may store their bicycles securely.

The 83-secure long-term bicycle parking spaces will exceed the amount of bicycle parking that is required by Zoning Regulations.

SITE IMPACTS

Bicycle Trip Generation

The Ladybird development is expected to generate 5 bicycle trips (2 inbound, 3 outbound) during the morning peak hour and 10 bicycle trips (6 inbound, 4 outbound) during the afternoon peak hour. Although the proposed development will be generating a relatively small number of peak hour bicycle trips, bicycling will be an important mode for getting to and from the site, with significant facilities located on site and existing and planned routes to and from the site.

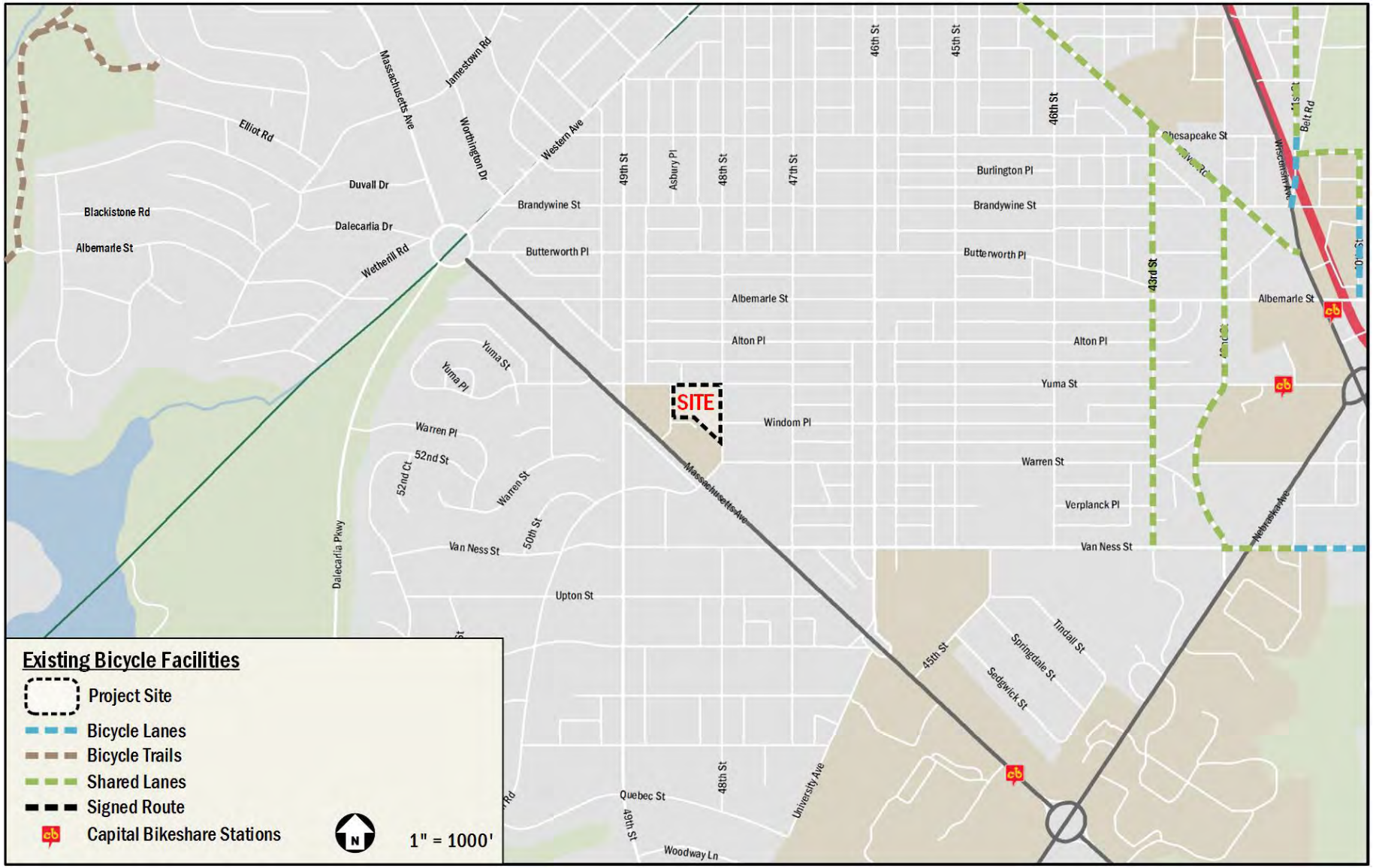

Figure 35: Existing Bicycle Facilities

CRASH DATA ANALYSIS

This section of the report reviews available crash data within the study area, reviews potential impacts of proposed development on crash rates, and makes recommendations for mitigation measures where needed.

SUMMARY OF AVAILABLE CRASH DATA

A crash analysis was performed to determine if there was an abnormally high crash rate at any study area intersection. DDOT provided the last three years of intersection crash data, from 2013 to 2015 for the study area. This data was reviewed and analyzed to determine the crash rate at each location. For intersections, the crash rate is measured in crash per million-entering vehicles (MEV). The crash rates per intersections are shown in Table 10.

According to the Institute of Transportation Engineers' *Transportation Impact Analysis for Site Development*, a crash rate of 1.0 or higher is an indication that further study is required. One intersection in this study area meets this criterion (as shown in red in Table 10 and detailed in Table 11). The Ladybird development should be developed in a manner to help alleviate, or at minimum not add to, the conflicts at this intersection.

A rate over 1.0 does not necessarily mean there is a significant problem at an intersection, but rather it is a threshold used to identify which intersections may have higher crash rates due to operational, geometric, or other deficiencies. Additionally, the crash data does not provide detailed location information. In some cases, the crashes were located near the intersections and not necessarily within the intersection.

For that intersection, the crash type information from the DDOT crash data was reviewed to see if there is a high percentage of certain crash types. Generally, the reasons for why an intersection has a high crash rate cannot be derived from crash data, as the exact details of each crash are not represented. However, some summaries of crash data can be used to develop general trends or eliminate possible causes. Table 11 contains a breakdown of crash types reported for the one intersection with a crash rate over 1.0 per MEV.

POTENTIAL IMPACTS

This section reviews the one location with existing crash rates over 1.0 MEV and reviews potential impacts of the proposed development.

- *Fordham Road NW & 49th Street NW*
  This intersection is over the threshold of 1.0 crashes per MEV, with a rate of approximately 1.32 crashes per MEV.

Table 10: Intersection Crash Rates

Intersection	Total Crashes	Ped Crashes	Bike Crashes	Rate per MEV*
Massachusetts Avenue NW & 50th Street NW	1	0	0	0.03
Massachusetts Avenue NW & Yuma Street NW (W)	0	0	0	0.00
Massachusetts Avenue NW & Yuma Street NW (E)	0	0	0	0.00
Massachusetts Avenue NW & 49th Street NW	15	0	0	0.48
Massachusetts Avenue NW & Alley^				
Massachusetts Avenue NW & 48th Street NW & Fordham Road NW	17	2	0	0.62
Massachusetts Avenue NW & Van Ness Street NW	0	0	0	0.00
49th Street NW & Yuma Street NW	0	0	0	0.00
Yuma Street NW & Alley^				
Yuma Street NW & 48th Street NW	2	0	0	0.54
Windom Place NW & 48th Street NW	0	0	0	0.00
Alley & 48th Street NW^				
Warren Street NW & 48th Street NW	1	0	0	0.43
Fordham Road NW & 49th Street NW	6	0	0	**1.32**
Albemarle Street NW & 49th Street NW	0	0	0	0.00
Albemarle Street NW & 48th Street NW	1	0	0	0.37
Yuma Street NW & 46th Street NW	0	0	0	0.00

** - Million Entering Vehicles; Volumes estimated based on turning movement count data*

^ - Crash Data unavailable

The majority of crashes at this intersection side-swiped vehicles and backing crashes.

Elevated side-swiped crashes could be the result of on-street parking on both sides of the eastern, western, and southern legs of the intersection. Side-swipe crashes can often occur when a parked vehicle attempts to merge into the travel lane. Elevated backing crashes are most likely the result of the abundant amount of on-street parking at the intersection.

The safety concerns at this intersection are primarily due to the existing lane configurations and operations. The site-generated traffic at this intersection is minimal and not expected to degrade the safety; thus, no improvements are recommended as part of the proposed development.

Table 11: Crash Type Breakdown

Intersection	Rate per MEV	Right Angle	Left Turn	Right Turn	Rear End	Side Swiped	Head On	Parked	Fixed Object	Ran Off Road	Ped. Involved	Backing	Non-Collision	Under/Over Ride	Unspecified	Total
Fordham Road & 49th Street	**1.32**	0	0	0	0	3	0	1	0	0	0	2	0	0	0	**6**
		0%	*0%*	*0%*	*0%*	*50%*	*0%*	*17%*	*0%*	*0%*	*0%*	*33%*	*0%*	*0%*	*0%*	

SUMMARY AND CONCLUSIONS

This report presents the findings of a Comprehensive Transportation Review (CTR) for the Ladybird development. The purpose of this study is to evaluate whether the project will generate a detrimental impact to the surrounding transportation network. This evaluation is based on a technical comparison of the existing conditions, background conditions, and future conditions. This report concludes that **the project will not have a detrimental impact** to the surrounding transportation network assuming that all planned site design and Transportation Demand Management (TDM) elements are implemented.

The Ladybird site is currently occupied by a surface parking lot, a vacant grocery store, and additional retail uses that are currently in operation. The site is generally bound by Yuma Street to the north, 48th Street to the east, the American University Admin Building to the south, and a public alley to the west. The resulting development will be a mixed-use development consisting of two buildings with a total of 219 residential dwelling units and 16,000 square feet of grocery/retail space.

As part of the development, sections of the roadway network surrounding the site will be improved. Pedestrian facilities along the perimeter of the project on Yuma Street, 48th Street, and along the public and private alleys to the west and south of the site will be improved so that they meet or exceed DDOT and ADA standards. This includes sidewalks that meet or exceed width requirements, crosswalks at all necessary locations, and curb ramps with detectable warnings. Additional design elements such as Windom Walk, a publicly accessible linear park between Buildings 1 and 2 that will provide a new pedestrian extension of Windom Place through the site between 48th Street and the public alley along the west of the site. In addition, existing curb cuts along Yuma Street and 48th Street will be closed, providing more continuity to sidewalks along the site's perimeter that does not exist under current conditions.

Vehicular and loading access for the project will be provided primarily via Yuma Street, 48th Street, and Massachusetts Avenue, which provide access to the public alley that connects to the loading facilities, the service and delivery space, and the below-grade parking garage.

The development will provide approximately 370 below-grade parking spaces in three levels of below-grade parking. The first level of parking will contain approximately 85 parking spaces that are intended to be for residential use. The second level of parking will contain approximately 106 parking spaces, of which approximately 49 parking spaces will be devoted to the grocery/retail uses on site. As required by an agreement with American University, approximately 57 parking spaces on the second level will be shared by the grocery/retail uses on site and the American University Admin Building to the south of the site and approximately 179 parking spaces on the third level will be shared between the residential uses on site and the American University Admin Building. Parking is planned to be priced at the market-rate.

The development will supply long-term bicycle parking within the below-grade garage and short-term bicycle parking around the perimeter of the site. The amount of short-term and long-term bicycle parking being provided exceeds what is required by zoning.

Multi-Modal Impacts and Recommendations

Transit

The site is served by regional and local transit services via Metrobus and Metrorail. The site is 0.8 miles from the Tenleytown – AU Metrorail Station entrance at Albemarle Street and Wisconsin Avenue, and four Metrobus stops are located within a block of the site along Massachusetts Avenue.

Although the development will be generating new transit trips, existing transit facilities have enough capacity to handle the new trips.

Pedestrian

The site is surrounded by a well-connected pedestrian network. Most roadways within a quarter-mile radius provide sidewalks and acceptable crosswalks and curb ramps, particularly along the primary walking routes. There are residential streets to the north and east of the site which lack sidewalks, curb ramps, or crosswalks that meet DDOT and ADA standards.

As a result of the development, pedestrian facilities along the perimeter of the site will be improved by the removal of two curb cuts. One wide curb cut (that includes a pedestrian refuge) will be abandoned on Yuma Street, and one curb cut will be abandoned on 48th Street. The development will improve sidewalks adjacent to the site such that they meet or exceed

DDOT requirements and provide an improved pedestrian environment.

The Applicant will fund the installation of a new HAWK (High-Intensity Activated crosswalk) signal on Massachusetts Avenue between 48th Street and 49th Street. This is designed to help pedestrians safely cross Massachusetts Avenue, and to help accommodate the additional pedestrian demand that the development will generate.

Bicycle

Bicycle infrastructure in the vicinity of the site is limited. The site is 0.6 miles from the nearest designated bicycle facility, which are shared-lanes along 43rd Street. However, low volume residential streets surrounding the site provide bicycle connectivity where official facilities are lacking.

The proposed development will provide short-term bicycle parking along the perimeter of the site and on-site secure long-term bicycle parking within the below-grade garage for residents and employees of the development.

Vehicular

The site is well-connected to regional roadways such as Massachusetts Avenue and Western Avenue, principal and minor arterials such as Nebraska Avenue and Wisconsin Avenue, and an existing network of collector and local roadways.

In order to determine the potential impacts of the proposed development on the transportation network, this report projects future conditions with and without development of the site and performs analyses of intersection delays and queues. These are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. The analysis concluded that no intersections would require mitigation as a result of the development.

Summary and Recommendations

This report concludes that **the proposed development will not have a detrimental impact on the surrounding transportation network assuming that all planned site design and TDM elements are implemented.**

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

- The inclusion of secure long-term bicycle parking spaces within the development that meet or exceed zoning requirements.
- The installation of short-term bicycle parking spaces around the perimeter of the site that meet or exceed zoning requirements.
- The creation of wide pedestrian sidewalks that meet or exceed DDOT and ADA requirements.
- The installation of a HAWK (High-Intensity Activated crossWalk) signal on Massachusetts Avenue between 48th Street and 49th Street.
- The inclusion of publicly accessible plazas and parks, that improve pedestrian porosity and circulation.
- The inclusion of two (2) electric vehicle charging and four (4) car-share parking spaces.
- A robust Transportation Demand Management (TDM) plan that reduces the demand of single-occupancy, private vehicles during peak period travel times or shifts single-occupancy vehicular demand to off-peak periods.
- The installation of a highly visible stop sign at the intersection of the east-west and north-south alleys.