

COMPREHENSIVE TRANSPORTATION REVIEW

**ST. PAUL'S COLLEGE
BZA CASE No. 19377**

WASHINGTON, DC

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EXECUTIVE SUMMARY

The following report is a Comprehensive Transportation Review (CTR) for the St. Paul's College development. This report reviews the transportation aspects of the project's Board of Zoning Adjustment (BZA) Case Number 19377.

The purpose of this study is to evaluate whether the project will generate a detrimental impact to the surrounding transportation network, particularly as it relates to the operations along 4th Street. This evaluation is based on a technical comparison of the existing conditions, background conditions, and total 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 elements and mitigation measures are implemented.

Proposed Project

The development site is generally bounded by an existing driveway to the south, private streets and townhomes to the east, an existing driveway to the north, and 4th Street to the west. The site consists of open space and a surface parking lot under existing conditions and will be developed to include approximately 60 townhomes with a large portion of green space maintained to preserve trees and historic view sheds of the existing St. Paul's College buildings. Each townhome will have a private garage with 1 to 2 parking spaces. Additionally, an approximately 26,000 square foot Paulist Fathers Seminary will be constructed that will primarily consist of residential space and religious use/support space.

As part of the development, a new private roadway and its associated curb cut will be constructed connecting the development to 4th Street. An additional network of private alleys will be constructed to access the garages of the townhomes. Loading activity associated with move-ins and move-outs is expected to take place within the network of private alleys.

In addition to the new private roadway, the existing driveway and its associated curb cut on the southern end of the site will be realigned and slightly widened in conjunction with the new Paulist Fathers Seminary building. Under existing conditions, this driveway is located less than 100 feet from the adjacent signalized intersection and is barely wide enough to accommodate two-way traffic. The realignment will be

beneficial to the overall roadway operations along 4th Street as the driveway will be located further from the adjacent signalized intersection at Lincoln Road and will be widened to better accommodate two-way traffic. The driveway currently serves as the primary access to the two (2) schools that recently occupied the historic St. Paul's College building as a matter-of-right, and this realignment is also expected to improve operations for the schools. All vehicular access to the Paulist Fathers Seminary will be from this realigned driveway, in addition to the school-related traffic.

Pedestrian and bicycle access to the development will occur predominantly via 4th Street. The new private roadway will provide sidewalks that access the front doors of all townhomes and connect with the existing pedestrian network.

Multi-Modal Impacts and Recommendations

Transit

The site is well-served by regional and local transit services such as Metrorail and Metrobus. The site is approximately 0.6 miles from the Brookland-CUA Metrorail Station. Metrobus stops are located near the site along Michigan Avenue, Franklin Street, and Lincoln Road.

Although the St. Paul's College development will be generating new transit trips on the network, the existing facilities have enough capacity to handle the new trips. The Brookland-CUA Metrorail station does not have existing capacity concerns and is not expected to as a result of the planned development. Some nearby Metrobus lines do have existing capacity concerns, but the small amount of transit trips added to the network as a result of the planned development will not exacerbate existing conditions.

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 some pedestrian barriers surrounding the site such as limited connectivity due to the railroad tracks to the east.

The development will construct internal sidewalks along the new private roadways as well as leading up to the front doors of each townhome.



Bicycle

The site is well served by existing bicycle facilities. Many trails, bike lanes, and signed bike routes exist near the site such as the Metropolitan Branch Trail to the east, north-south bike lanes along 4th Street NE, and east-west bike routes along Irving Street. There are future plans to add a two-way cycle track along 4th Street between Lincoln Road and Michigan Avenue. The site is also served by the Capital Bikeshare and new dockless bikeshare programs which provide an additional cycling option for residents of the St. Paul's development.

Long-term bicycle parking is expected to take place in individual townhouse units.

Vehicular

The St. Paul's College site is well-connected to regional roadways such as US Route 1, US Route 29, US Route 50, and Interstate 395, as well as primary and minor arterials such as Michigan Avenue and an existing network of collector and local roadways.

The development is not expected to result in detrimental impacts to the surrounding vehicular network due to the minimal trip generation associated with the proposed development program. DDOT's CTR guidelines state that a comprehensive vehicular analysis is required if a development is expected to generate a minimum of 25 vehicular trips in the peak direction during either peak hour. The proposed development is expected to generate 22 vehicular trips in the peak direction during the peak hour. As such, the development does not trigger the need for a comprehensive vehicular analysis.

However, during the DDOT scoping process, it was determined that a vehicular capacity analysis should be performed to evaluate the operations of the proposed 4th Street curb cut, as well as the realignment of the existing school driveway, in relation to the overall 4th Street corridor. As such, this CTR studied six intersections along the 4th Street corridor, in addition to the two driveways, to properly analyze the flow of vehicular traffic along 4th Street.

The vehicular capacity analyses concluded the following:

- The projected vehicular trip generation is negligible with a peak vehicular trip generation of 22 trips in the peak direction during the peak hour, or one new trip every two to three minutes.

- The realignment and widening of the existing school driveway results in more optimal operations and improved maneuverability for vehicles entering and exiting the driveway.
- The proposed private roadway is not projected to have any detrimental impacts to the 4th Street corridor and results in minimal queuing along the private roadway approach.
- Multiple study intersections operate at LOS E or LOS F under Existing conditions or as a result of background trips. These intersections observed increased delay as a result of the proposed development, but the 95th percentile queues were shown to increase by less than one vehicle length along all lane groups for all intersections. This report explored potential improvements at these intersections and determined that signal timing adjustments can adequately mitigate the majority of issues.
- Overall, the proposed development is not expected to result in detrimental impacts to the surrounding roadway network due to the minimal amount of trips generated by the project and the proposed design of the site.



INTRODUCTION

This report reviews the transportation elements of the St. Paul's College development, BZA Case Number 19377. The development will contain 60 residential townhomes and an approximately 26,000 square foot Paulist Fathers Seminary. The site, shown in Figure 1, is located in the Edgewood neighborhood of Northeast 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 the District Department of Transportation (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. Evaluate the operations of the proposed 4th Street curb cut, as well as the realignment of the existing school driveway, in relation to the overall 4th Street corridor. This report accomplishes this by projecting future conditions with and without development of the site and performing analyses of vehicular delays.

PROJECT SUMMARY

The development site is generally bounded by an existing driveway to the south, private streets and townhomes to the east, an existing driveway to the north, and 4th Street to the west. The site consists of open space and a surface parking lot under existing conditions and will be developed to include approximately 60 townhomes with a large portion of green space maintained to preserve existing trees and historic view sheds of the existing St. Paul's College building. Each townhome will have a private garage with 1 to 2 parking spaces. Additionally, an approximately 26,000 square foot Paulist Fathers Seminary will be constructed that will primarily consist of residential space and religious use/support space.

As part of the development, a new private roadway and its associated curb cut will be constructed connecting the development to 4th Street and the existing school driveway and its associated curb cut will be shifted north to increase the

distance to the adjacent intersection. An additional network of private alleys will be constructed to access the garages of the townhomes. Loading activity associated with move-ins and move-outs is expected to take place within the network of private alleys.

In addition to the new private roadway, the existing driveway and its associated curb cut on the southern end of the site will be realigned and slightly widened in conjunction with the new Paulist Fathers Seminary building. Under existing conditions, this driveway is located less than 100 feet from the adjacent signalized intersection and is barely wide enough to accommodate two-way traffic. The realignment will be beneficial to the overall roadway operations along 4th Street as the driveway will be located further from the adjacent signalized intersection at Lincoln Road and will be widened to better accommodate two-way traffic. The driveway currently serves as the primary access to the two (2) schools that recently occupied the historic St. Paul's College building as a matter-of-right, and this realignment is also expected to improve operations for the schools. All vehicular access to the Paulist Fathers Seminary will be from this realigned driveway, in addition to the school-related traffic.

Pedestrian and bicycle access to the development will occur predominantly via 4th Street. The new private roadway will provide sidewalks that access the front doors of all townhomes and connect with the existing pedestrian network.

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 operations of the proposed curb cut.

- *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.



Site Location



Figure 1: Site Location



STUDY AREA OVERVIEW

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

The following conclusions are reached within this chapter:

- The site is surrounded by an extensive regional and local transportation system that will accommodate the residents of the proposed development
- The site is well-served by public transportation with access to the Metrorail Red Line and several Metrobus lines.
- There is some existing bicycle infrastructure including the bike trails along the Metropolitan Branch Trail and several bike lanes and signed routes in the vicinity of the site.
- Pedestrian conditions are generally good, particularly along anticipated major walking routes.

MAJOR TRANSPORTATION FEATURES

Overview of Regional Access

The St. Paul's College site has ample access to regional vehicular- and transit-based transportation options, as shown in Figure 3, that connect the site to destinations within the District, Virginia, and Maryland.

The site is accessible via several US highways such as US Route 50 (New York Avenue), US Route 29 (Georgia Avenue) and US Route 1 (Rhode Island Avenue). These connect to interstates such as I-395, I-695, and I-295. The highways and interstates create connectivity to the Capital Beltway (I-495) that surrounds Washington, DC and its inner suburbs as well as regional access to I-95. All of these roadways bring vehicular traffic within half-mile of the site, at which point arterials and local roads can be used to access the site directly.

The site has access to the Metrorail Red Line which provides connections to areas in the District and Maryland. This line connects stations in Prince George's County and Montgomery County, Maryland while providing access to the District core. In addition, the Red Line provides connections to 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

There are several local transportation options near the site that serve vehicular, transit, walking, and cycling trips, as shown on Figure 4.

The site is served by a local vehicular network that includes several primary and minor arterials such as Franklin Street, Michigan Avenue, Lincoln Road, and 4th Street. In addition, there is an existing network of connector and local roadways that provide access to the site.

The Metrobus system provides local transit service in the vicinity of the site, including a connection to Union Station which acts as a primary hub for Amtrak, VRE, and MARC rail services. As shown in Figure 4, there are seven bus routes that service the site. In the vicinity of the site the majority of routes travel along Michigan Avenue, Franklin Street, and Lincoln Road. These bus lines connect the site to many areas of the District and Maryland, including several Metrorail stations.

There are existing bicycle facilities that connect the site to areas within the District, most notably the Metropolitan Branch Trail and bike lanes on 4th Street and Monroe Street which provide connections to downtown DC and other bicycle facilities. Other facilities include bicycle-friendly roads along 12th Street NE and Newton Street NE.

In the vicinity of the site, most roadways provide sidewalks with crosswalks present at most intersections. Anticipated pedestrian routes, such as those to public transportation stops, retail zones, and community amenities, provide acceptable pedestrian facilities; however there are some pedestrian barriers in the area that limit the overall connectivity to and from the site. A detailed review of existing and proposed pedestrian access and infrastructure is provided in a later section of this report.

Overall, the site is surrounded by an extensive 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 has designated spaces for their vehicles within the vicinity of the development. These locations are listed in Table 1.

Car-sharing is also provided by Car2Go, which provides point-to-point car sharing. Unlike Zipcar or Maven, which require two-way trips, Car2Go can be used for one-way rentals. Car2Go currently has a fleet of vehicles located throughout the District. 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 meters or pay stations. Car2Go does not have permanent designated spaces for their vehicles; however availability is tracked through their website, 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 Edgewood Neighborhood. This project location itself has a walk score of 75 (or “Very Walkable”), transit score of 69 (or “Good Transit”), and a bike score of 67 (or “Bikeable”). Figure 2 shows the neighborhood borders in relation to the site location and displays a heat map for walkability and bikeability.

As shown in Figure 2, the site is situated in a neighborhood that encompasses some good and some average walk scores. The site is situated in an area with good bike scores due to its proximity to bike facilities and flat topography. Overall, the Edgewood neighborhood has good walk, transit, and bike scores. Additionally, other planned developments and roadway improvements will help increase the walk and bike scores in the Edgewood neighborhood.

FUTURE REGIONAL PROJECTS

There are several District initiatives and background developments located in the vicinity of the site. These planned and proposed projects are summarized below.

Table 1: Summary of Carshare Locations

Carshare Location	Number of Vehicles
Zipcar	
University Hall Condos	1 vehicle
2800 8th Street NE	1 vehicle
9th Street NE and Monroe Street NE	4 vehicles
Monroe Street Market (625 Monroe Street NE)	2 vehicles
Pangborn Parking Lot (Catholic University)	1 vehicle
Total	9 vehicles

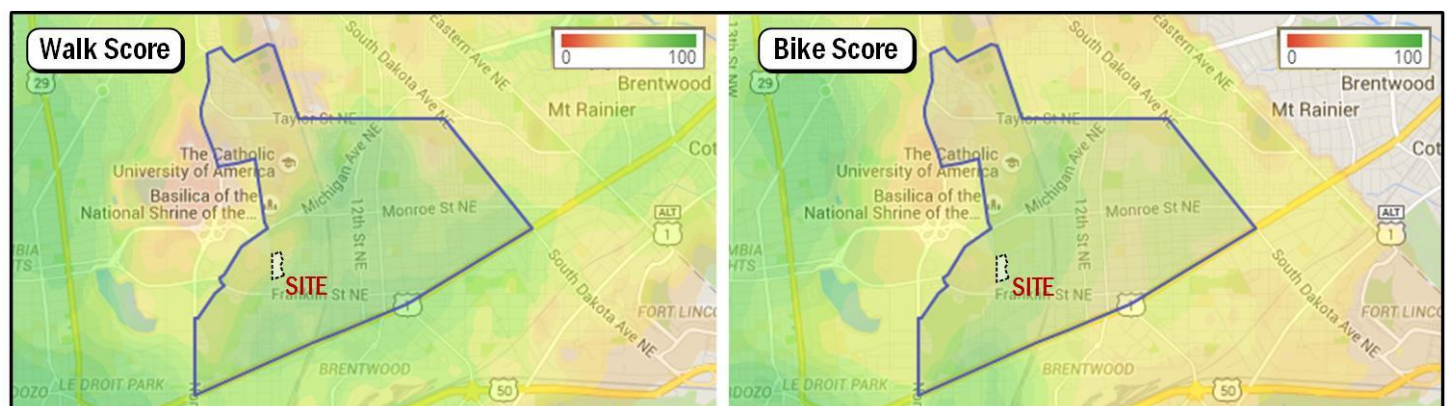


Figure 2: Summary of Walkscore and Bikescore



Local Initiatives

MoveDC: Multimodal Long-Range Transportation Plan

MoveDC is an implementation-based 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 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
- A new downtown Metrorail loop
- Expanded commuter rail
- Water taxis

In direct relation to the proposed development, the MoveDC plan outlines recommended transit and bicycle improvements such as a Streetcar route and new bicycle trails and cycle tracks. These recommendations would create additional multi-modal capacity and connectivity to the proposed development.

Brookland Multi-Modal Transportation and Streetscape Study

The purpose of the Brookland project is to improve safety, mobility, and accessibility and to support economic development in the vicinity of the project. The project will: (1) reduce traffic congestion and travel speeds; (2) improve parking supply; (3) promote pedestrian safety; and (4) enhance transit, bicycle, and pedestrian access and connectivity. Ultimately, the goal of the Brookland project is to address the problems of the corridor in a way that both addresses the transportation issues, while also revitalizing the surrounding neighborhoods around 12th Street NE.

Through short-term and long-term goals, the study aims to correct design deficiencies, improve safety issues for all users, including drivers, transit riders, pedestrians, and bicyclists, as well as providing key connections in the local, regional, and national transportation network.

The study recommends several potential short-term goals such as improved maintenance of pavement markings, the installation of rumble strips for traffic calming measures, improved street level lighting, and the replacement of absent or deteriorated sidewalks and curbs.

The potential long-term recommendations outlined in the study are the updating of signal phasing at all traffic lights along the corridor, add truck routing signs to reduce the number of heavy-vehicles on residential streets, improve intersections along the corridor to coincide with DDOT's Public Realm Design Manual, improve the pedestrian environment on bridges, and install multi-space parking meters along major streets.

Planned Developments

There are several potential development projects in the vicinity of the St. Paul's College site as described below. Figure 5 shows the location of these developments in relation to the proposed development and the corresponding study area.

Lee Montessori School and Washington Leadership Academy

Adjacent to the site, the old Seminary building has been recently occupied by an elementary school (Lee Montessori School), a high school (Washington Leadership Academy), and related accessory uses. This development was matter-or-right. The schools began operations at the beginning of the 2016-2017 school year, with full enrollment expected in 2020.

Brookland Townhomes

The site will include ~22 townhomes and up to ~23 new residential units in the renovated Redemptorists' Building with its associated surface parking lot. The project is expected to be complete in 2018.

3350 9th Street

The development includes 16,600 square feet of office space. The development was completed in 2015.

The Arcadia at Brookland Station

The development includes 212 residential units, 30,000 square feet of retail, 150 parking spaces, and 66 bicycle parking spaces. The development is currently under construction.

Monroe Street Market

Phase 2 of the Monroe Street Market development is underway. Block A-2 includes 45 townhomes with construction recently completed. Block E will include 156 residential units



and 35,000 square feet of retail. Block E is expected to be complete prior to 2020.

McMillan Sand Filtration Site

The development will redevelop the twenty-five acre vacant parcel, which was previously home to a water treatment plant. The development will include approximately 682 residential units, 1,030,000 square feet of office (including medical office), 94,000 square feet of retail (including a 53,000 square foot grocery store), a community center, a park, and approximately 3,000 parking spaces. The development is expected to be complete in 2025.

818 Michigan Avenue Garage

This development includes a 1,441 space parking garage to be primarily utilized by employees of Children's National Hospital. The garage is expected to be complete in 2017.

For the purpose of this analysis, only approved developments expected to be complete prior to the proposed development with an origin/destination within the study area are to be included. Of the background developments described above, only the Lee Montessori School and Washington Leadership Academy meet this criteria as they were not open prior to data collection for this analysis.

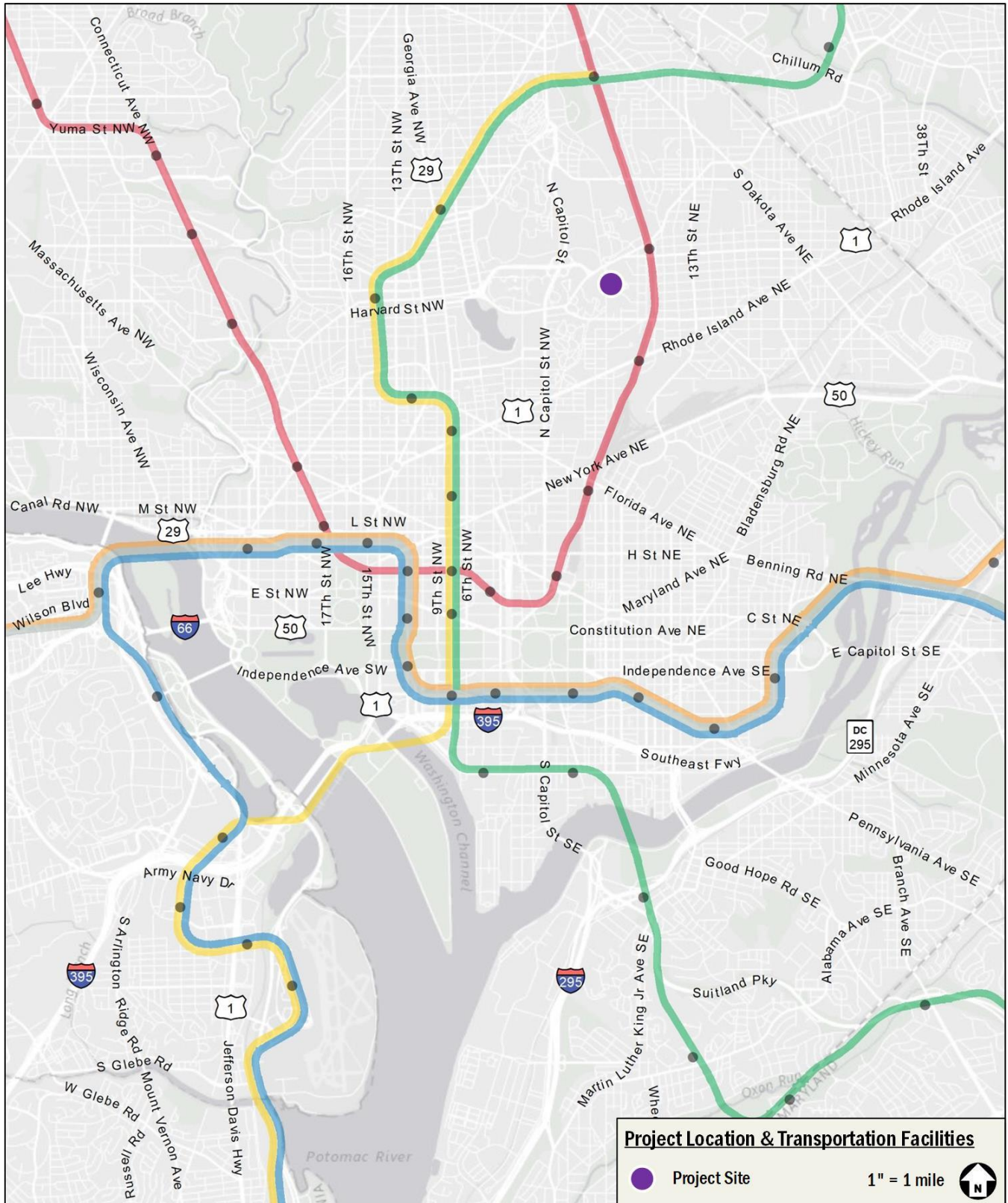


Figure 3: Major Regional Transportation Facilities

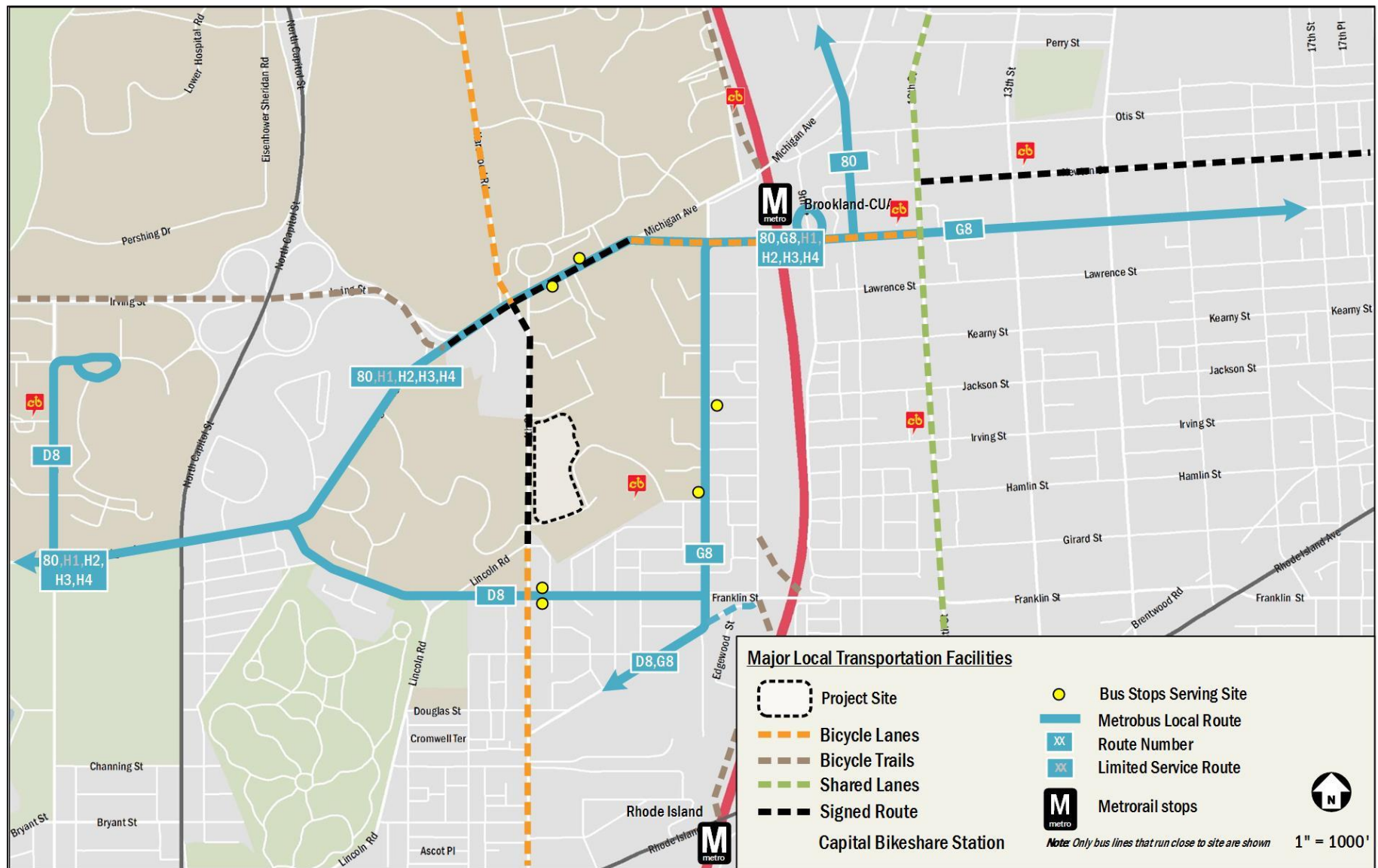
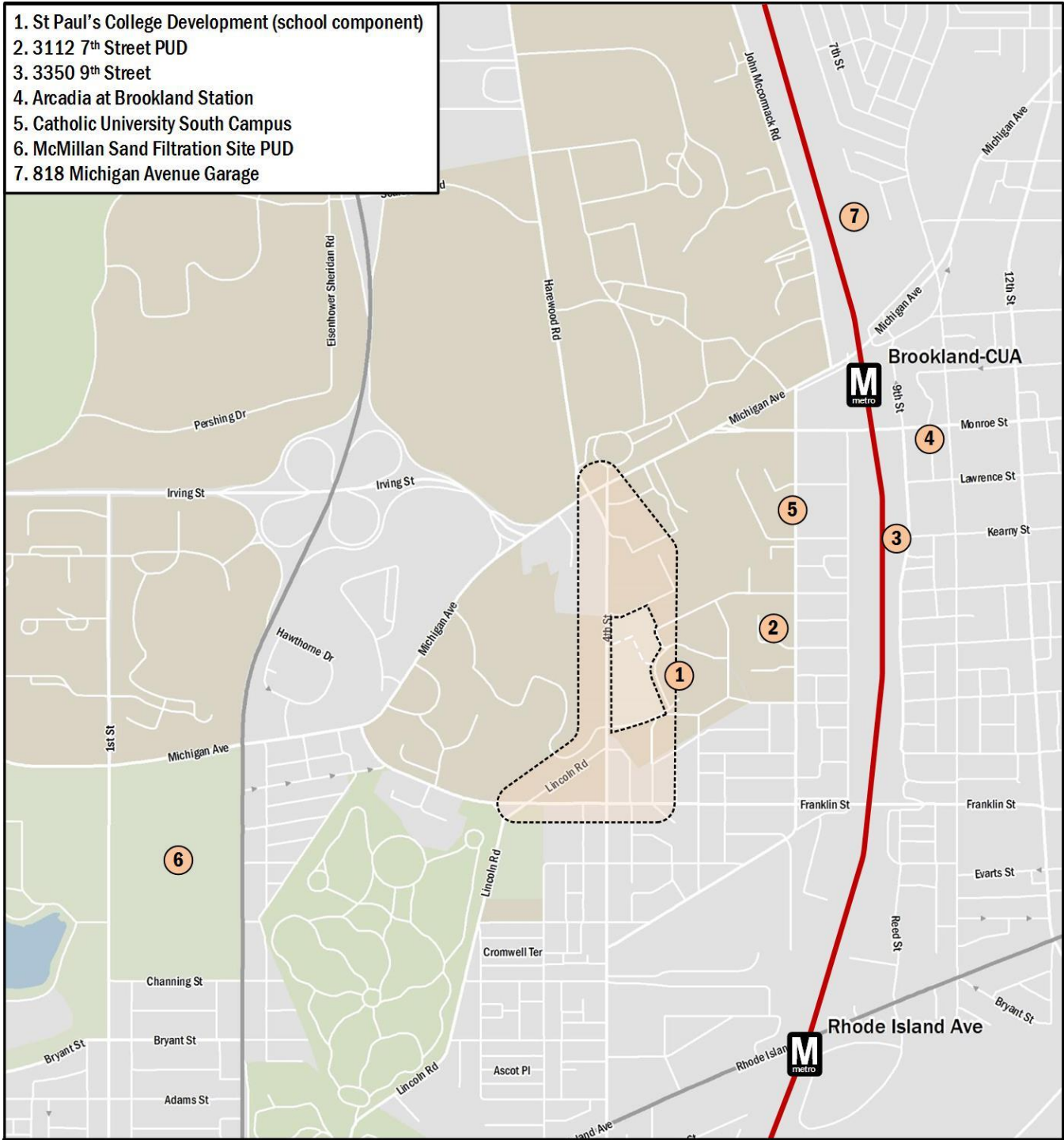


Figure 4: Major Local Transportation Facilities



- 1. St Paul's College Development (school component)
- 2. 3112 7th Street PUD
- 3. 3350 9th Street
- 4. Arcadia at Brookland Station
- 5. Catholic University South Campus
- 6. McMillan Sand Filtration Site PUD
- 7. 818 Michigan Avenue Garage



Background Development Map

- Site Location
- Study Area
- Background Development

1" = 1000'

Figure 5: Planned Development Map



PROJECT DESIGN

This section reviews the transportation components of St. Paul's College development, including the proposed site plan and access points. It includes descriptions of the site's vehicular access, loading, parking, and Transportation Demand Management (TDM) plan.

PROJECT SUMMARY

The development site is generally bounded by an existing driveway to the south, private streets and townhomes to the east, an existing driveway to the north, and 4th Street to the west. The site consists of open space and a surface parking lot under existing conditions and will be developed to include approximately 60 townhomes with a large portion of green space maintained to preserve existing trees and historic view sheds of the existing St. Paul's College buildings. Each townhome will have a private garage with 1 to 2 parking spaces. Additionally, an approximately 26,000 square foot Paulist Fathers Seminary will be constructed that will primarily consist of residential space and religious use/support space. Figure 6 shows the proposed site plan.

ACCESS AND CIRCULATION

As part of the development, a new private roadway and its associated curb cut will be constructed connecting the development to 4th Street. An additional network of private alleys will be constructed to access the garages of the townhomes. Loading activity associated with move-ins and move-outs is expected to take place within the network of private alleys.

In addition to the new private roadway, the existing driveway and its associated curb cut on the southern end of the site will be realigned and slightly widened in conjunction with the new Paulist Fathers Seminary building. Under existing conditions, this driveway is located less than 100 feet from the adjacent signalized intersection and is barely wide enough to accommodate two-way traffic. The realignment will be beneficial to the overall roadway operations along 4th Street as the driveway will be located further from the adjacent signalized intersection at Lincoln Road and will be widened to better accommodate two-way traffic. The driveway currently serves as the primary access to the two (2) schools that recently occupied the historic St. Paul's College building as a

matter-of-right, and this realignment is also expected to improve operations for the schools.

Although the new private roadway will have access to the existing driveway, it is expected that townhouse-related traffic will use the new private roadway and that school- and Paulist-related traffic will use the realigned school driveway. It is also expected that there will be a physical barricade between the existing school driveway and the adjacent Chancellors Row roadways. Therefore, the only vehicular access will be off of 4th Street.

Pedestrian and bicycle access to the development will occur predominantly via 4th Street. The new private roadway will provide sidewalks that access the front doors of all townhomes and connect with the existing pedestrian network.

PARKING AND LOADING

Parking will be provided within each individual townhome in the form of 1- and 2-car garages. It is anticipated that all 20' townhomes will be able to accommodate 2-car garages. The Paulist Fathers Seminary building will be served by approximately 15 to 18 parking spaces. This amount of parking will sufficiently serve the needs of both uses.

In addition to garage and parking lot parking on the property, parking will be supplied along the private roadways in order to adequately replace the parking supply of the existing surface parking lot that will be removed as part of the development. These parking spaces will be located in private space, with the final locations to be determined in coordination with the new Paulist Fathers Seminary.

Loading activity for the townhomes is expected to take place within the proposed network of private alleys and loading activity for the Paulist Fathers Seminary will take place on-site, such that it does not impede traffic flow along the school driveway.

BICYCLE AND PEDESTRIAN FACILITIES

Due to the nature of the townhomes, it is expected that secure long-term bicycle parking will be satisfied in each individual unit, either in the garage or within the home.

Pedestrian facilities will be provided along the new private roadway with additional sidewalks constructed to provide access to the front doors of each townhome. These sidewalks



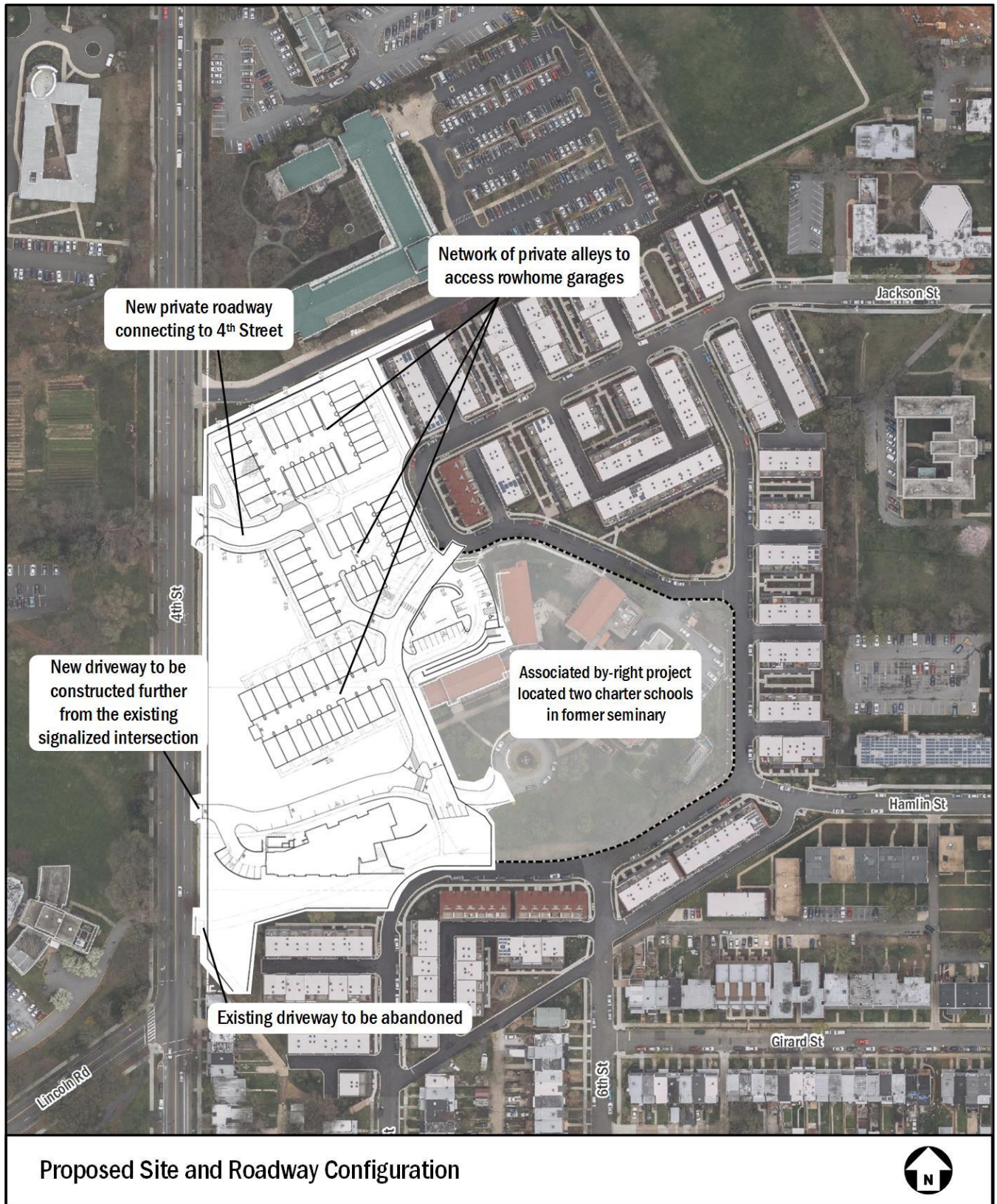
will connect to the existing network of sidewalks surrounding the site.

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 proposed development is based on the DDOT expectations for TDM programs. The Applicant proposes the following TDM measures:

- The Applicant will identify a TDM Leader (for planning, construction, and operations). The TDM Leader will work with residents to distribute and market various transportation alternatives and options.
- The Applicant will provide updated contact information for the TDM Leader and report TDM efforts and amenities to goDCgo staff once per year.
- The Applicant will establish a TDM marketing program that provides detailed transportation information and promotes walking, cycling, and transit. This information will be compiled in a brochure for distribution to residents. The marketing program will also utilize and provide website links to CommuterConnections.com and goDCgo.com, which provide transportation information and options for getting around the District.



Proposed Site and Roadway Configuration



Figure 6: Site Plan



TRIP GENERATION

This section outlines the transportation demand of the proposed St. Paul’s College development. It summarizes the projected trip generation of the site by land use and by mode, which forms the basis for the chapters that follow.

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.

Residential trip generation was calculated based on ITE land use 230, Townhomes, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the site and adjusted up to reflect the nature of the development and the distance to Metrorail. The townhome mode split is shown in Table 2.

Table 2: Mode Split Summary

Travel Mode	Mode Split Percentage
Auto	70%
Transit	25%
Bicycle	2%
Walk	3%

Alternatively, trip generation for the Paulist Fathers Seminary was based on information provided by the Fathers due to the unconventional land use, which is not included in the *Trip Generation Manual*. The Paulist Fathers Seminary is expected to have ~15 sleeping rooms and support space for the use of the residents. The sleeping rooms will generally be occupied by Paulist Students who take classes at Catholic University and travel by foot or bike, resident priests who have offices on site or within walking distance, and Paulist Novices who typically leave the building for ministry assignments during the midday two to three times per week. Additionally, up to 6 administrative personnel are expected to travel to and from the site during normal business hours, of which half are expected to travel via public transit. As such, it was conservatively estimated that the Paulist Fathers Seminary would generate 7 vehicular trips in the morning peak hour (5 inbound, 2 outbound) and 7 vehicular trips in the afternoon peak hour (2 inbound, 5 outbound)

A summary of the multimodal trip generation for the development is provided in Table 3 for the morning and afternoon peak hours. Of note, only vehicular trips are shown for the Paulist Fathers Building. Detailed calculations are included in the Technical Appendix. Although this amount of vehicular trips does not trigger the need for a comprehensive vehicular analysis based on the CTR guidelines, a vehicular analysis was performed to evaluate the proposed private roadway access as it relates to the overall operations along the 4th Street corridor.

Table 3: Summary of Trip Generation by Mode

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Residential	4 veh/hr	20 veh/hr	24 veh/hr	19 veh/hr	9 veh/hr	28 veh/hr
	Paulist Bldg	5 veh/hr	2 veh/hr	7 veh/hr	2 veh/hr	5 veh/hr	7 veh/hr
	Total	9 veh/hr	22 veh/hr	31 veh/hr	21 veh/hr	14 veh/hr	35 veh/hr
Transit	Residential	2 ppl/hr	8 ppl/hr	10 ppl/hr	8 ppl/hr	3 ppl/hr	11 ppl/hr
Bike	Residential	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr
Walk	Residential	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr



TRAFFIC OPERATIONS

This section provides a summary of an analysis of the existing and future roadway capacity in the study area. The purpose of the capacity analysis is to evaluate the operations of the proposed 4th Street curb cut, as well as the realignment of the existing school driveway, in relation to the overall 4th Street corridor.

This analysis was accomplished by determining the traffic volumes and roadway capacity for the existing, background, and future scenarios. The capacity analysis focuses on the morning and afternoon commuter peak hours, as determined by the existing traffic volumes in the study area.

The following conclusions are reached within this chapter:

- The projected vehicular trip generation is negligible with a peak vehicular trip generation of 22 trips in the peak direction during the peak hour, or one new trip every two to three minutes.
- The realignment and widening of the existing school driveway results in more optimal operations and improved maneuverability for vehicles entering and exiting the driveway.
- The proposed private roadway is not projected to have any detrimental impacts to the 4th Street corridor and results in minimal queuing along the private roadway approach.
- Multiple study intersections operate at LOS E or LOS F under Existing conditions or as a result of background trips. These intersections observed increased delay as a result of the proposed development, but the 95th percentile queues were shown to increase by less than one vehicle length along all lane groups for all intersections. This report explored potential improvements at these intersections and determined that signal timing adjustments can adequately mitigate the majority of issues.
- Overall, the proposed development is not expected to result in detrimental impacts to the surrounding roadway network due to the minimal amount of trips generated by the project and the proposed design of the site.

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 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 of the St. Paul's College project 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. 2015/2016 Existing Conditions
2. 2020 Background Conditions without the development (2020 Background)
3. 2020 Future Conditions with the development (2020 Future)

Study Area

The study area of the analysis is a set of intersections where detailed capacity analyses are performed for the scenarios listed above. The set of intersections decided upon during the study scoping process with DDOT consisted of the proposed private roadway access and surrounding intersections along the 4th Street corridor in order to evaluate the impacts of the proposed curb cut.

Based on the projected future trip generation and the location of the proposed private roadway curb cut, the following intersections were chosen for analysis:

1. Michigan Avenue & Harewood Road, NE
2. Harewood Road & 4th Street, NE
3. Michigan Avenue & 4th Street, NE
4. 4th Street & Existing School Driveway, NE
5. 4th Street & Lincoln Road, NE



6. 4th Street & Franklin Street, NE
7. Lincoln Road & Franklin Street, NE
8. 4th Street & Future Private Roadway, NE

Figure 7 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, September 15, 2015, Tuesday, September 29, 2015, Thursday, October 1, 2015, and Tuesday, April 26, 2016. The results of the traffic counts are included in the Technical Attachments. The existing peak hour traffic volumes are shown on Figure 8. For all intersections the individual morning and afternoon peak hours were used and volumes were balanced due to the close proximity of many study area intersections and the varying data collection dates.

2020 Background Traffic Volumes (without the project)

The traffic projections for the 2020 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 industry, 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, only the Lee Montessori School and Washington Leadership Academy schools, which began operations in the Fall of 2016, were included as background developments. These schools currently occupy the historic St. Paul's College building, which is located directly adjacent to the proposed development.

Although the schools are currently open, they were not open during the time of the existing data collection. In order to accurately evaluate the impacts of the schools, 15-minute counts were collected during the AM and PM commuter peak hours at the school driveway. Conversations with school administrators helped determine the 15-minute periods that experience the highest pick-up/drop-off activity and occur during the peak hours of the adjacent street traffic. The morning count was performed from 8:45 to 9:00 AM and the afternoon count was performed from 5:30 to 5:45 PM. Only inbound and outbound vehicular trips were collected in order to determine an accurate trip generation for the schools during the peak 15-minute periods.

The 15-minute counts were then multiplied by a factor of four to estimate the trip generation during the peak hours. Given that the counts were collected during peak pick-up/drop-off activity, it is expected that the projected trip generation will be conservatively high and represent a peak vehicular flow rate at the driveway.

Table 5: Existing and Future School Populations

School Name	2016-2017 School Year Enrollment		Anticipated Full Enrollment	
	Students	Faculty	Students	Faculty
Lee Montessori School	144	25	295	42
Washington Leadership Academy	100	13	400	37

Table 4: Background Development Trip Generation

Mode	School Trip Generation					
	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	385 veh/hr	309 veh/hr	694 veh/hr	94 veh/hr	119 veh/hr	213 veh/hr



The existing school populations are expected to grow over the next three years as shown in Table 5. As such, the peak hour trip generation was factored upwards based on the student and faculty population expected in 2020. Table 4 shows the total number of trips generated by the schools in 2020. Because the trip generation is based on existing driveway counts, non-auto projections are not included in the table.

These trips were then distributed and assigned to the study area intersections. Trip distribution assumptions for the student and faculty populations were based on discussions with school administrators and adjusted based on directional observations and counts at the school driveway.

While background developments represent local traffic changes, regional traffic growth is typically accounted for using percentage growth rates. The growth rates used in this analysis are derived using the Metropolitan Washington Council of Governments (MWCOC) regional transportation models. Growth rates were based on the differences between the year 2015 and 2020 MWCOC model scenarios. Where the COG model showed negative or minimal growth, we assumed a conservative 0.5 percent per year minimum growth. Table 6 summarizes the annual growth rates used in the study.

The traffic volumes generated by the background development and the inherent growth along the network were added to the existing traffic volumes in order to establish the 2020 Background traffic volumes. The traffic volumes for the 2020 Background conditions are shown on Figure 9.

Table 6: Summary of Background Growth

Road & Direction	Annual Growth Rate		Total Growth between 2015 and 2020		Total Growth between 2016 and 2020	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Michigan Avenue (EB)	0.80%	0.50%	4.1%	2.5%	3.2%	2.0%
Michigan Avenue (WB)	0.50%	0.50%	2.5%	2.5%	2.0%	2.0%
Harewood Road (NB)	0.50%	0.90%	2.5%	4.6%	2.0%	3.7%
Harewood Road (SB)	1.20%	0.90%	6.2%	4.6%	4.9%	3.7%
4th Street (NB)	0.70%	0.50%	3.6%	2.5%	2.8%	2.0%
4th Street (SB)	0.90%	0.50%	4.6%	2.5%	3.7%	2.0%
Franklin Street (EB)	0.50%	0.50%	2.5%	2.5%	2.0%	2.0%
Franklin Street (WB)	0.50%	0.50%	2.5%	2.5%	2.0%	2.0%
Lincoln Street (NB)	0.50%	0.50%	2.5%	2.5%	2.0%	2.0%
Lincoln Street (SB)	0.50%	0.50%	2.5%	2.5%	2.0%	2.0%

2020 Total Future Traffic Volumes (with the project)

The 2020 Total Future traffic volumes consist of the 2020 Background volumes with the addition of the traffic volumes generated by the proposed development (site-generated trips). Thus, the 2020 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.

The trip distribution for site-generated trips was assembled based on a review of existing traffic patterns and flow data from CTPP (Census Transportation Planning Products). For both the residential and Paulist Fathers Seminary, trip distribution was influenced significantly by the CTPP TAZ flow data for drivers commuting from the site’s TAZ, and adjusted based on traffic volumes and patterns.

Based on this review and the site access locations, the site-generated trips were distributed through the study area intersections. As was discussed previously, the residential trips are generally expected to use the new private roadway connecting to 4th Street and the Paulist Fathers Seminary trips are expected to use the realigned school driveway. A summary of trip distribution assumptions is provided on Figure 10.

The site-generated traffic volumes are shown on Figure 11 and the 2020 Total Future traffic volumes are shown on Figure 12.

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.

The lane configurations and traffic controls for the Existing conditions are shown on Figure 13.

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, one (1) background improvement met this criteria and was included in the analysis. A cycle track along 4th Street is expected to be constructed by the 2020 build out year, affecting lane configuration and signal timings at four (4) of the seven (7) study intersections. The lane configuration and traffic controls assumed for the 2020 Background conditions are shown on Figure 14. The lane configuration and traffic controls assumed for the 2020 Future conditions are based on the 2020 Background conditions, with the addition of the new private roadway at 4th Street and the realigned school driveway, as shown on Figure 15.

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 2000 (HCM) 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 the *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 7 shows the results of the capacity analyses, including LOS and average delay per vehicle (in seconds) for the Existing, 2020 Background, and 2020 Total Future scenarios. The capacity analysis results are shown on Figure 16 for the morning peak hour and Figure 17 for the afternoon peak hour.

Six (6) of the study area intersections operate at unacceptable conditions or have an approach that operates at unacceptable conditions during at least one of the study scenarios. These intersections are as follows:

- Michigan Avenue & Harewood Road, NE
 - Northbound approach operates at LOS F during the AM peak hour under Background and Total Future conditions
- Michigan Avenue & 4th Street, NE
 - Overall intersection operates at LOS E and the westbound and northbound approaches operate at LOS F during the PM peak hour under Existing conditions
 - Northbound approach operates at LOS F during the PM peak hour under Background and Total Future conditions.
- 4th Street & School Driveway, NE
 - Westbound approach operates at LOS F during the PM peak hour under Existing conditions
 - Westbound approach operates at LOS F during the AM and PM peak hours under Background and Total Future conditions
- 4th Street & Lincoln Road, NE



- Northeastbound approach operates at LOS E during the AM peak hour and LOS F during the PM peak hour under Background and Total Future conditions
- 4th Street & Franklin Street, NE
 - Overall intersection and southbound approach operate at LOS F during the AM peak hour and southbound approach operates at LOS F during the PM peak hour under the Background and Total Future conditions
- 4th Street & Private Roadway
 - Westbound approach operates at LOS E during the AM and PM peak hours under the Total Future conditions

- There is an increase in the 95th percentile queue length of greater than 150 feet, when compared to the background scenario.

Following these guidelines there are impacts to four (4) intersections as a result of the St. Paul's development:

1. Michigan Avenue & Harewood Road, NE
2. 4th Street & School Driveway, NE
3. 4th Street & Private Roadway, NE
4. 4th Street & Franklin Street, NE

Queuing Analysis

In addition to the capacity analysis presented above, a queuing analysis was performed at the study area 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 of a median cycle. The 95th percentile queue is the maximum back of queue that is exceeded 5 percent of the time. For two-way stop-controlled intersections, only the 95th percentile queue is reported for each lane group (including free-flowing left turns and stop-controlled movements) based on HCM methodologies.

Table 8 shows the queuing results for the study area intersections. Results of the queuing analysis show that queue lengths are minimally impacted by the proposed development, with the 95th percentile queues increasing by less than one vehicle length along all approaches at all intersections as a result of site-generated traffic.

Improvements

Typically, the proposed development is considered to have an impact at an intersection within the study area if any of the following conditions are met:

- The capacity analyses show a LOS E or F at an intersection or along an approach where one does not exist in the Background conditions;
- There is an increase in delay at any approach or overall intersection operating under LOS E or F of greater than 5 percent when compared to the Background condition; or

However, these capacity issues primarily result from existing capacity issues and the addition of background trips, with very few trips being generated by the St. Paul's development. The majority of intersections and approaches operate at acceptable levels of service under Existing conditions, but delay is observed to increase significantly as a result of the background development. As such, many intersections and approaches operate with unacceptable levels of delay in the Background conditions, with delays increasing by more than 5 percent in the Future conditions as a result of a minimal number of site-generated trips.

To illustrate this point, Figure 18 and Figure 19 show the percent of trips attributable to existing trips, background trips, and site-generated trips at all study area intersections and individual approaches, for the morning and afternoon peak hours, respectively. As shown, site-generated trips account for less than 2 percent of trips at all study area intersections and less than 1 percent of trips at the majority of study area intersections. Background trips represent 2 to 14 percent of trips at each of the study area intersections.

Additionally, the amount of vehicular trips generated by the development does not trigger the CTR thresholds for performing a comprehensive vehicular analysis. DDOT's CTR guidelines state that a comprehensive vehicular analysis is required if a development is expected to generate a minimum of 25 vehicular trips in the peak direction during either peak hour. The proposed development is expected to generate 22 vehicular trips in the peak direction during the peak hour.

However, during the DDOT scoping process, it was determined that a vehicular capacity analysis should be performed to evaluate the operations of the overall 4th Street corridor. As shown in Table 7 and Table 8, the proposed private roadway has minimal impact to operations at the adjacent intersections



along 4th Street. The proposed private roadway itself operates at LOS E for both the morning and the afternoon peak hours; however, this is primarily due to the amount of existing traffic along 4th Street. Additionally, as shown on Table 8, queues are expected to be less than one cars length during both peak hours.

As such, this report does not propose mitigation measures to be implemented by the Applicant, but instead offers potential improvements to be considered by DDOT at the intersections that operate at unacceptable levels. A comparison between the 2020 Future conditions and 2020 Future conditions with improvements is included in the Technical Attachments.

- Michigan Avenue & Harewood Road, NE
Under the 2020 Background conditions, the northbound approach of Harewood Road degrades to a LOS F during the AM peak hour. Under the 2020 Future conditions, delay along the northbound approach increases by more than 5 percent (as a result of 10 site-generated trips).

Adjustments to the signal timings at this intersection result in acceptable levels of service along all approaches, without degrading operations at the adjacent intersections which are controlled under the same signal controller.

- 4th Street & School Driveway, NE
Under Existing conditions, the westbound driveway approach operates at a LOS F during the PM peak hour. Under Background conditions, the significant increase in school-related trips results in delay that exceeds the limitations of the HCM methodology for both the AM and PM peak hours. Under the 2020 Future conditions, delay along the driveway increases as a result of 4 trips in the AM peak hour and 6 trips in the PM peak hour. However, it is expected that the overall operations of the intersection will improve as a result of the proposed development in conjunction with the driveway realignment, which places the intersection significantly further from the adjacent signalized intersection, and the driveway widening.

Although the schools are not yet at full capacity, field observations during the school morning and afternoon peak hours revealed little to no queuing or delays when vehicles were exiting the driveway onto 4th Street. Some queuing occurred when vehicles turned into the school from 4th Street, due to the intersection spacing and narrow driveway width that made turns into the driveway difficult.

The realignment and widening of the driveway along 4th Street results in better sight lines for exiting vehicles and has the potential to reduce queuing along northbound 4th Street when turning into the driveway.

Several potential improvements were tested at this intersection, including restricting left turns, adding separate left- and right-turn lanes, and signaling the intersection. Neither restricting left turns nor adding separate left- and right-turn lanes adequately mitigated the capacity concerns at this intersection. Although a signal may be warranted in the morning peak hour as a result of school-related traffic, capacity concerns at this location are likely to be adequately mitigated by the use of traffic control officers in conjunction with the driveway realignment and widening.

Given that the majority of capacity concerns at this location result from trips generated by the matter-of-right schools occupying the historic St. Paul’s College building, this report does not propose any improvements as part of this Application. Alternatively, this intersection should be evaluated as part of DDOT’s Safe Routes to School Program, particularly in conjunction with the proposed changes along the 4th Street corridor.

- 4th Street & Private Roadway, NE
Under 2020 Future conditions, the westbound approach of the private roadway operates at a LOS E during the AM and PM peak hours. In both instances, the level of delay observed at the approach is just above the minimum LOS E threshold of 35 seconds. A minimal amount of trips leaves the private driveway (18 trips in the AM peak hour and 8 in trips in the PM peak hour) using a single turn lane for left and right turns onto 4th Street, NE.

Given the minimal amount of traffic along the private roadway, the delay is primarily a result of the existing and background traffic along 4th Street which restricts acceptable gaps. That said, the 95th percentile queues along the approach are shown to be less than one car in length for both peak hours. Additionally, the trips are shown to have a negligible impact on the through traffic along 4th Street. As such, no improvements are proposed at the private roadway.

- 4th Street & Franklin Street, NE

Under 2020 Background conditions, the southbound approach of 4th Street operates at a LOS F during the AM and PM peak hours. The overall intersection operates at a LOS F during the AM peak hour. Under the 2020 Future conditions, background issues are exacerbated such that delay along the southbound approach increases by more than 5 percent during the PM peak hour (as a result of 5 trips during the PM peak hour).

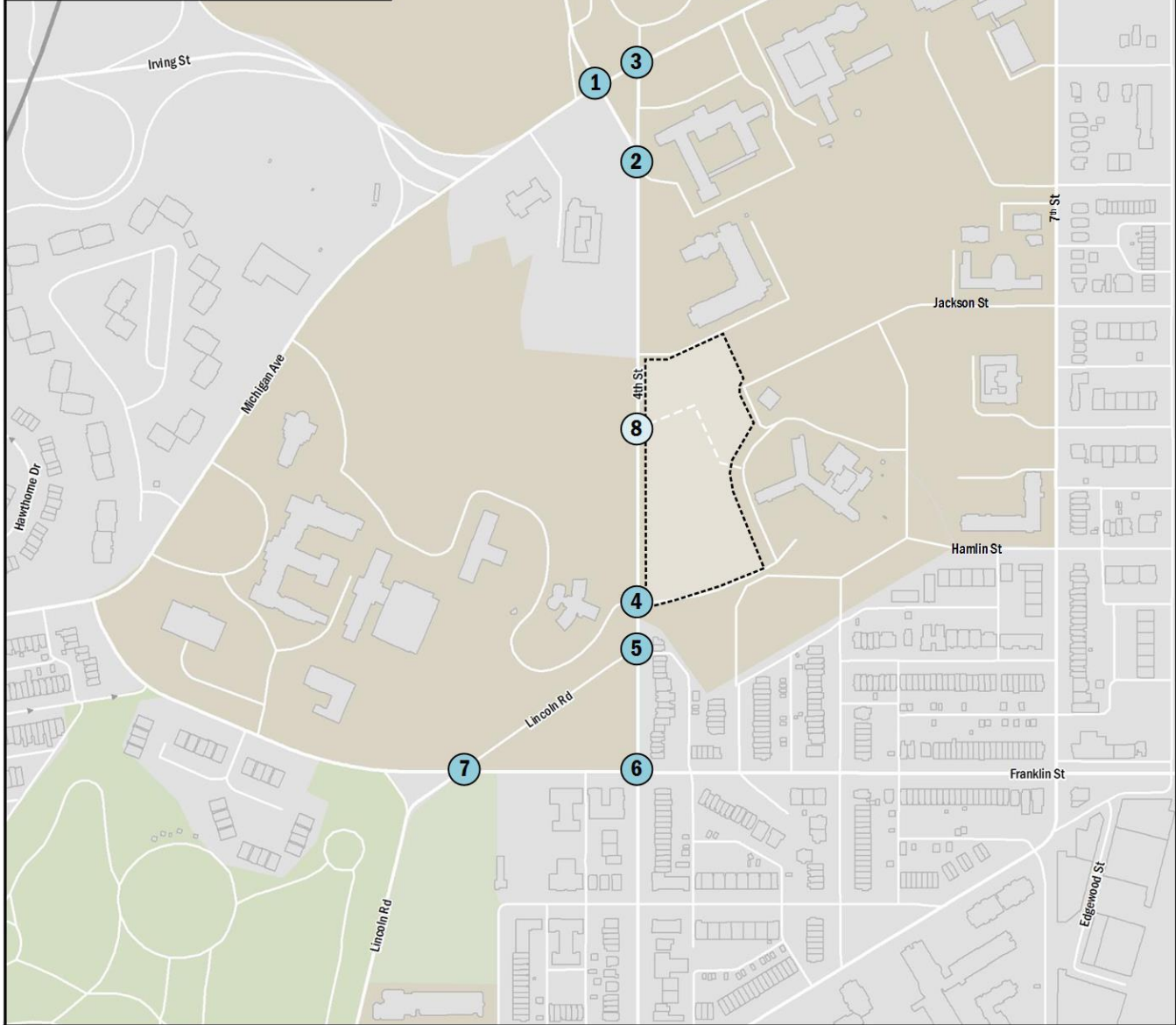
Adjustments to the signal timings at this intersection result in acceptable levels of service along the southbound approach and lessened delay along the southbound approach and overall intersection during the PM peak hour. These adjustments include recalibrating the offsets during both peak hours and assigning five seconds of additional green time to the north-south phase along 4th Street.

In addition to improvements analyzed at these four (4) intersections, three (3) additional intersections were improved as a result of signal timing changes and offset optimization, as they are controlled by the same signal controllers as the above improved intersections:

- Michigan Avenue & 4th Street, NE
- 4th Street & Lincoln Road, NE
- Lincoln Road & Franklin Street, NE



1. Michigan Avenue & Harewood Road, NE
2. Harewood Road & 4th Street, NE
3. Michigan Avenue & 4th Street, NE
4. 4th Street & School Driveway, NE
5. 4th Street & Lincoln Road, NE
6. 4th Street & Franklin Street, NE
7. Lincoln Road & Franklin Street, NE
8. 4th Street & Private Roadway, NE



Study Area

- Site Location
- Study Intersection (existing)
- Study Intersection (future)

N
1" = 500'

Figure 7: Study Area Intersections

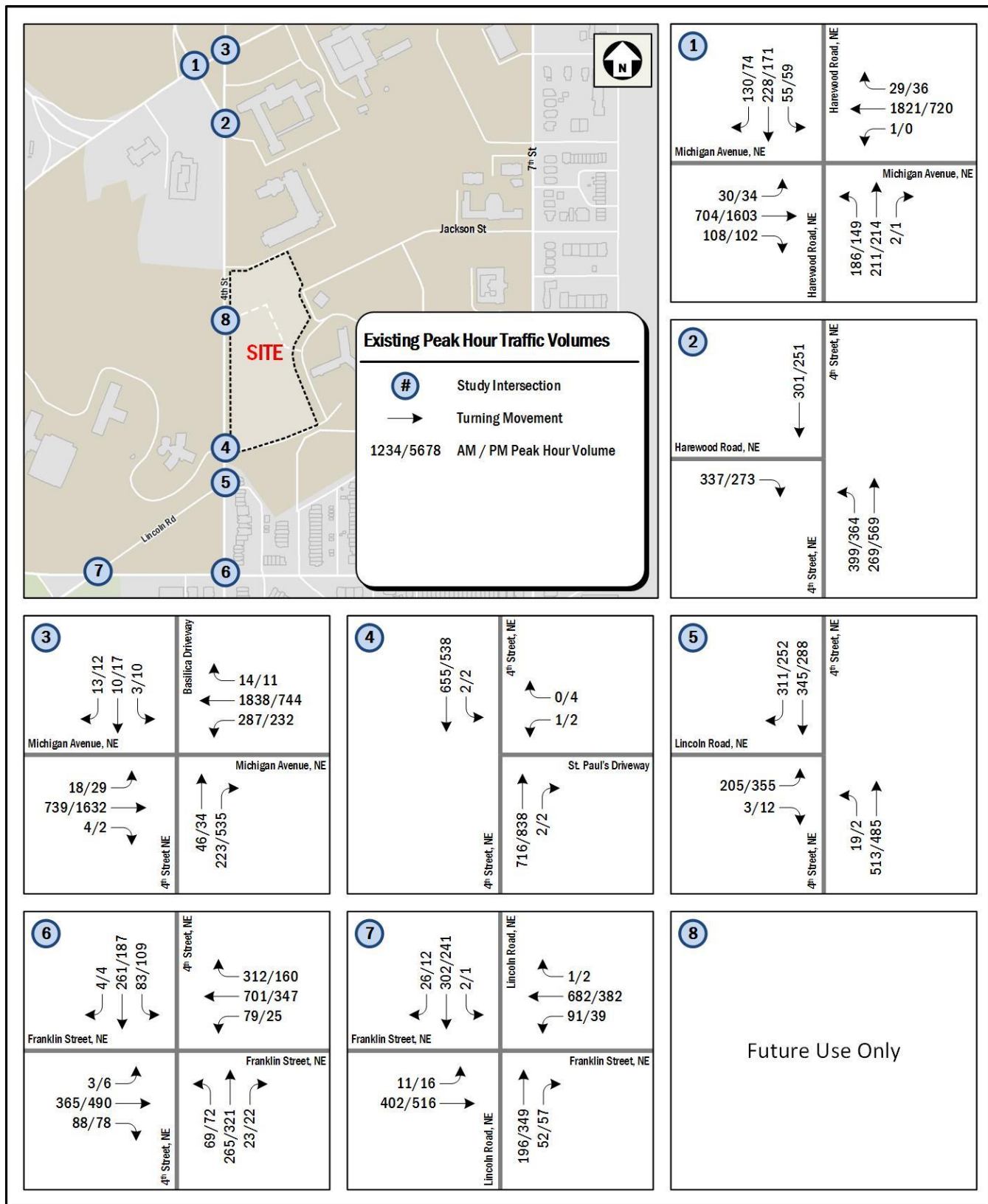


Figure 8: Existing Peak Hour Traffic Volumes

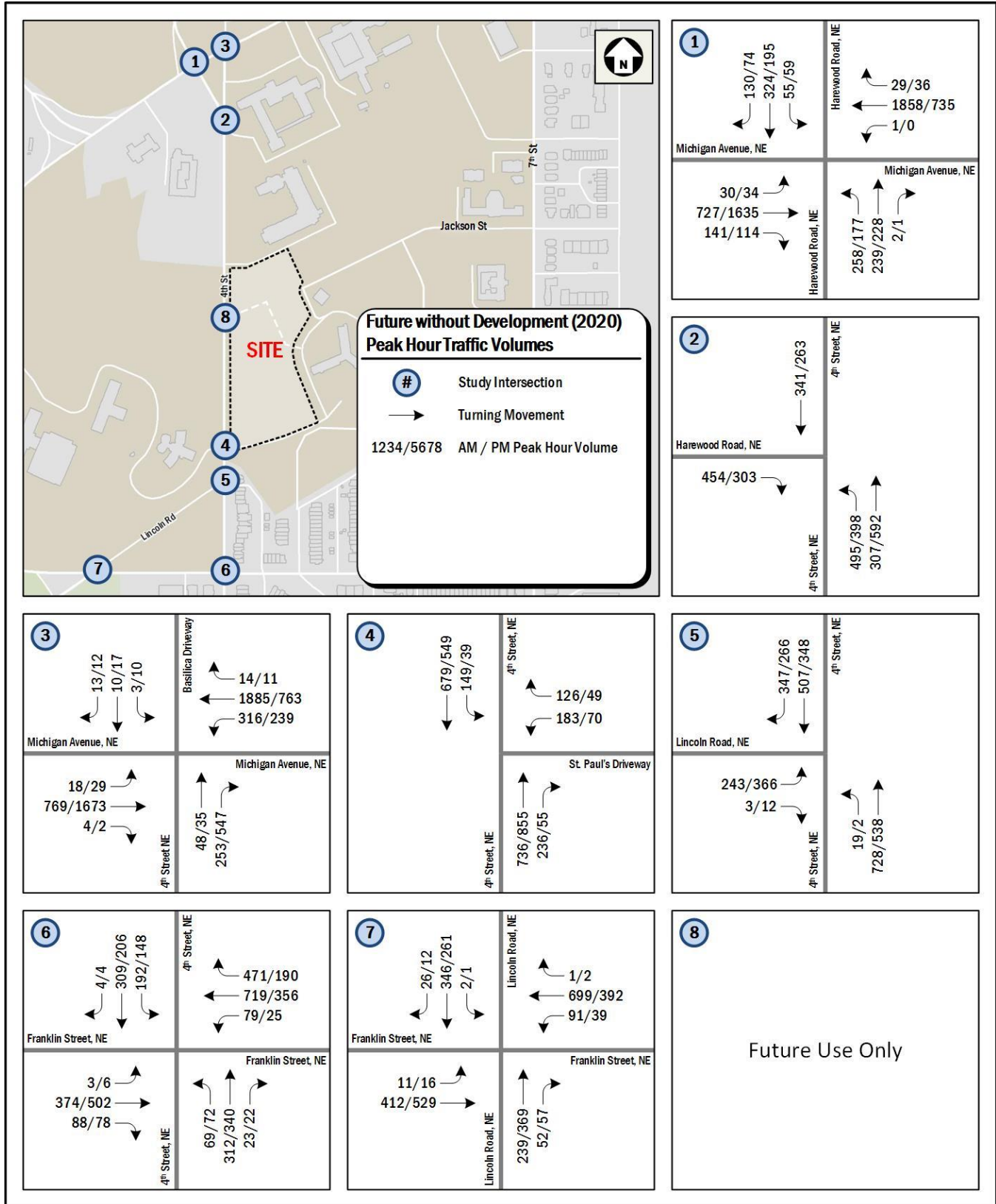


Figure 9: Background Peak Hour Traffic Volumes



Trip Distribution and Routing

- Site Location
- Inbound Route
- Outbound Route

N

1" = 1000'

Figure 10: Trip Distribution and Routing

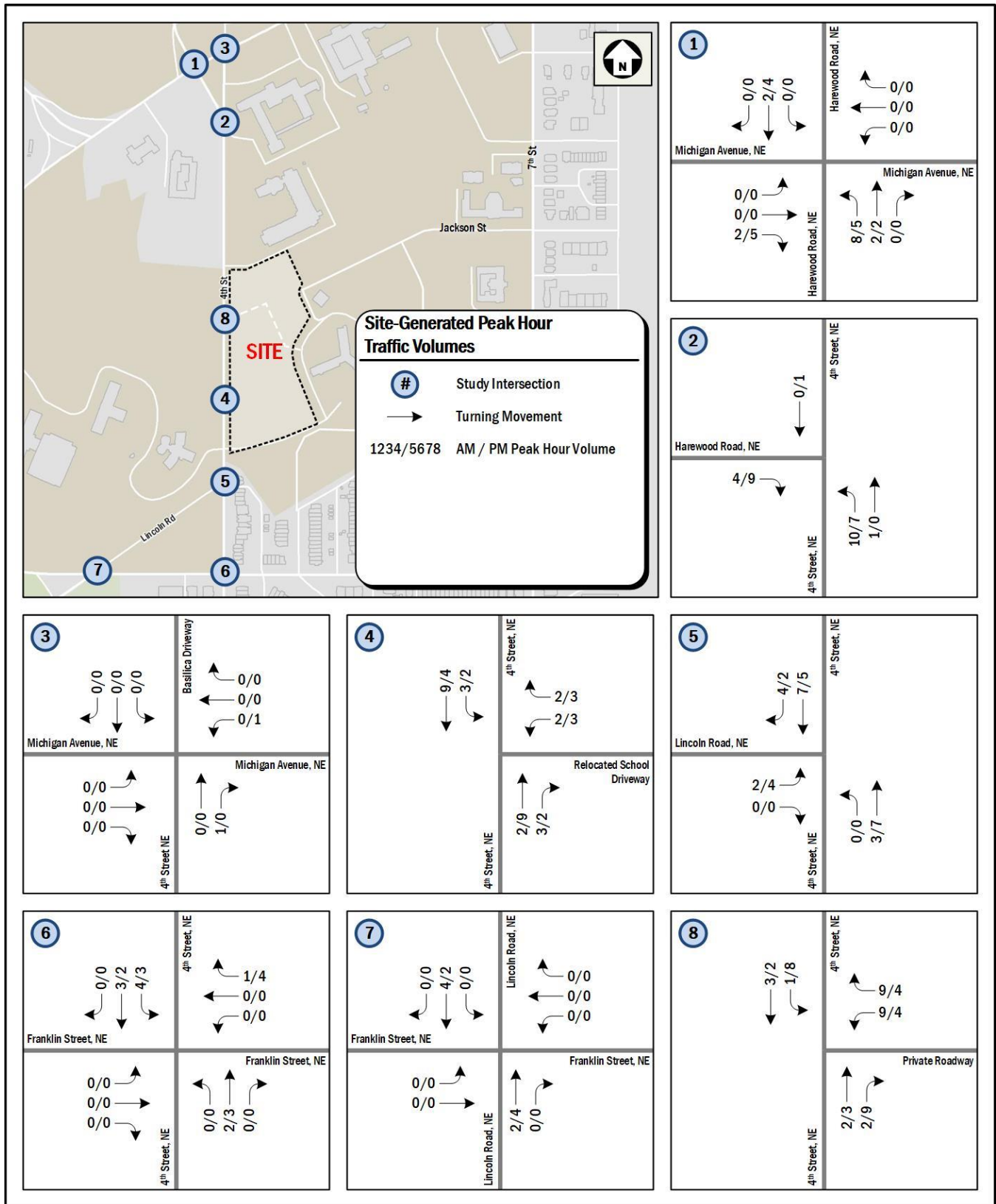


Figure 11: Site-Generated Peak Hour Traffic Volumes

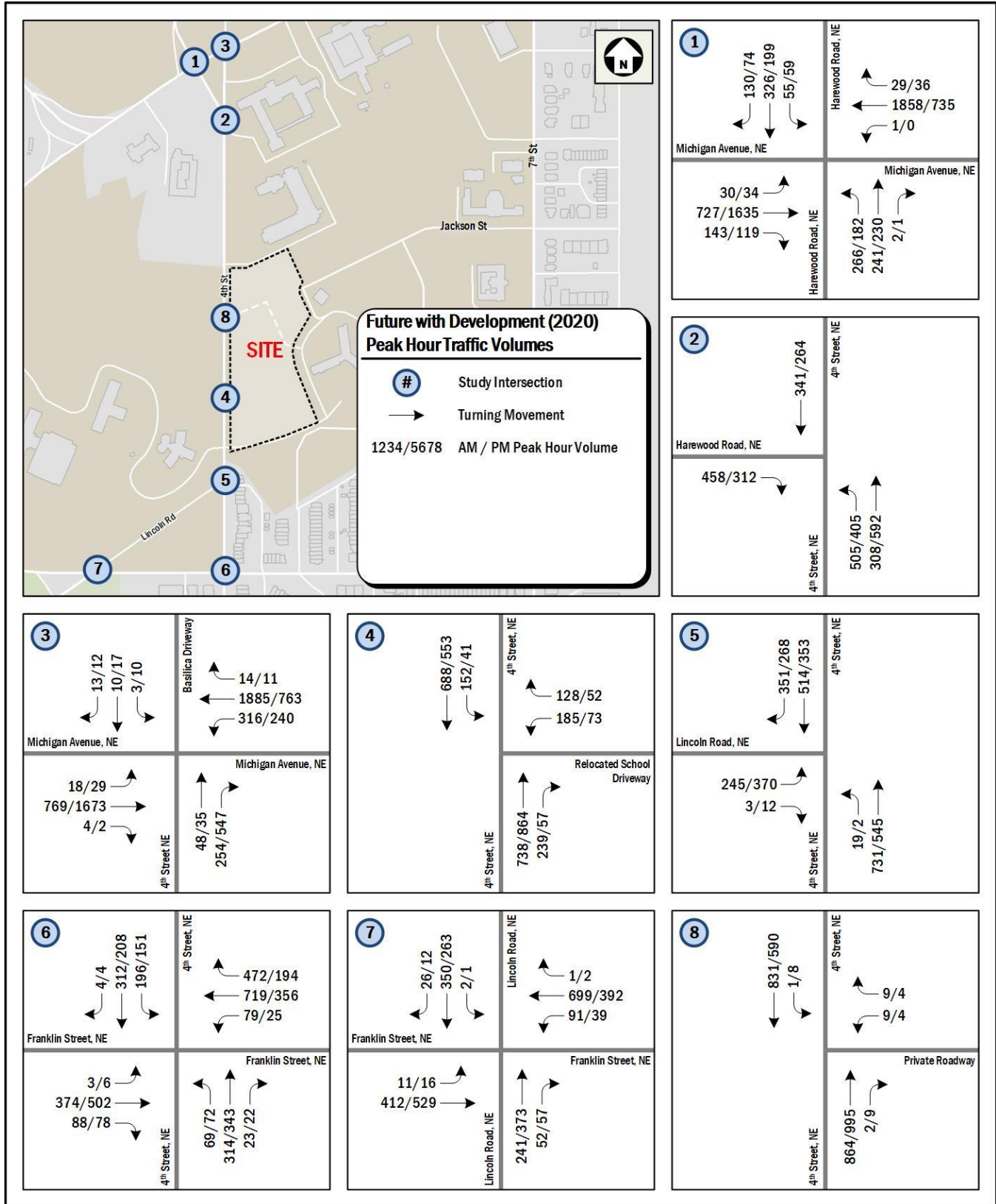


Figure 12: Future with Development (2020) Peak Hour Traffic Volumes

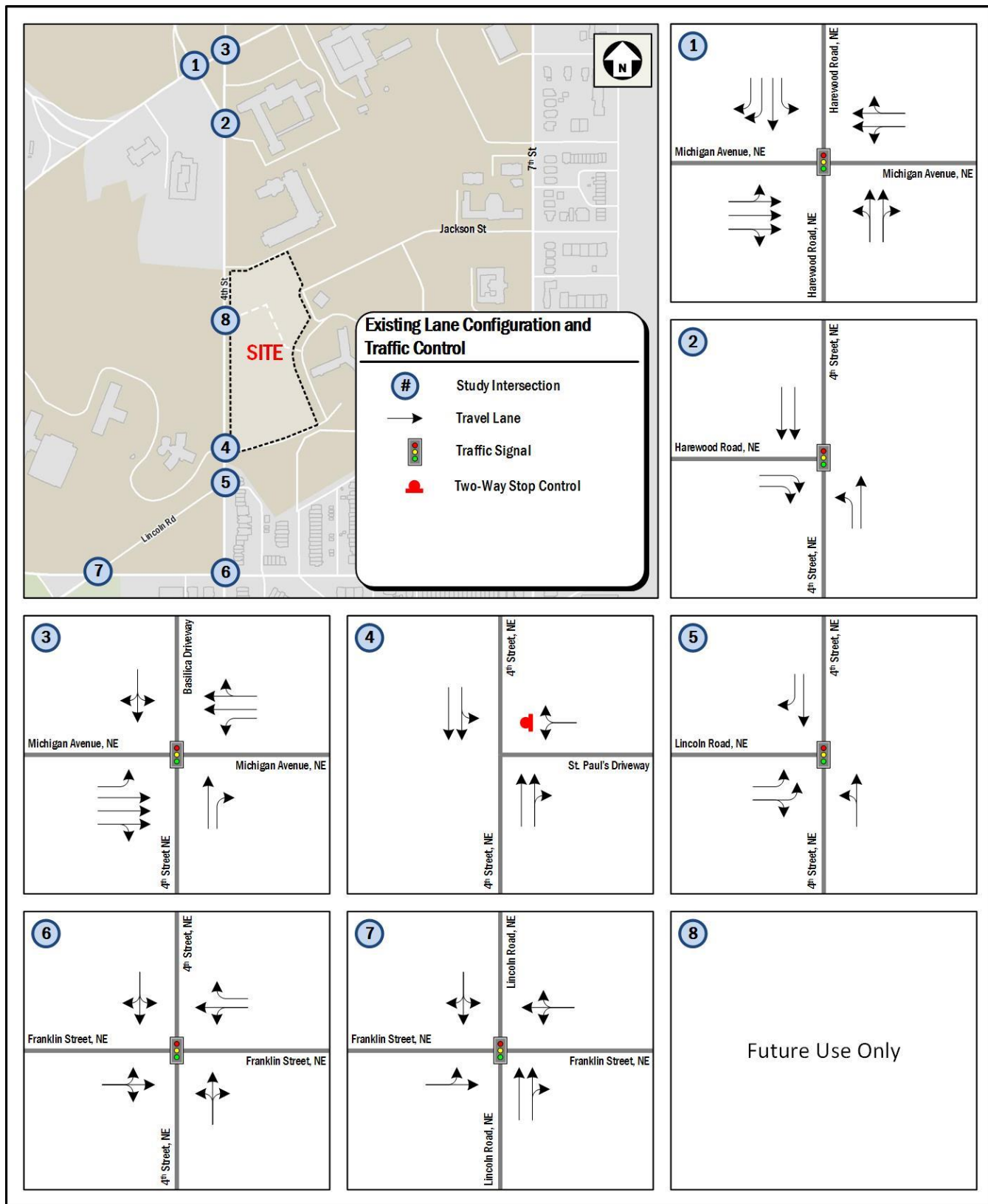


Figure 13: Existing Lane Configuration and Traffic Control

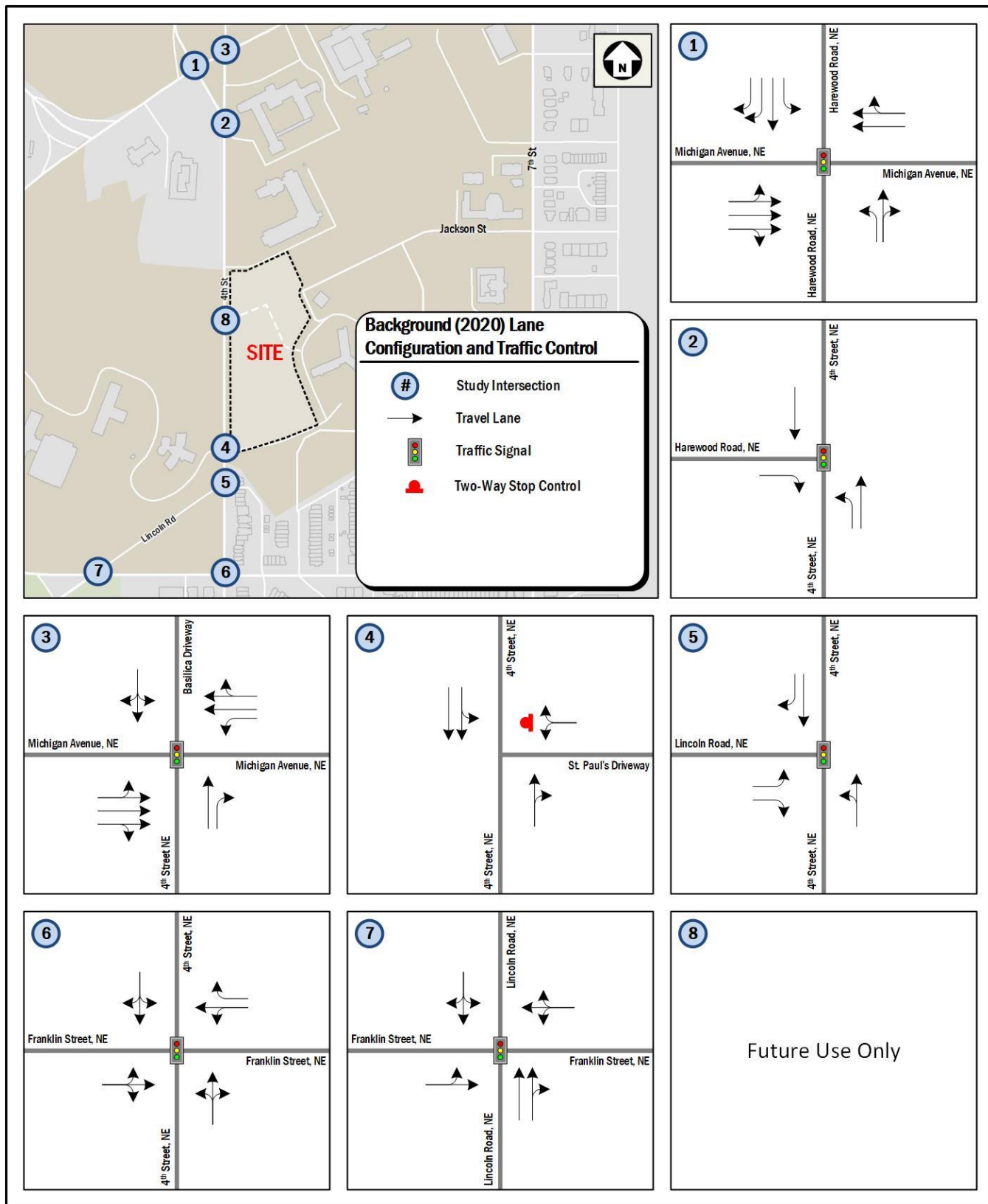


Figure 14: Background (2020) Lane Configuration and Traffic Control

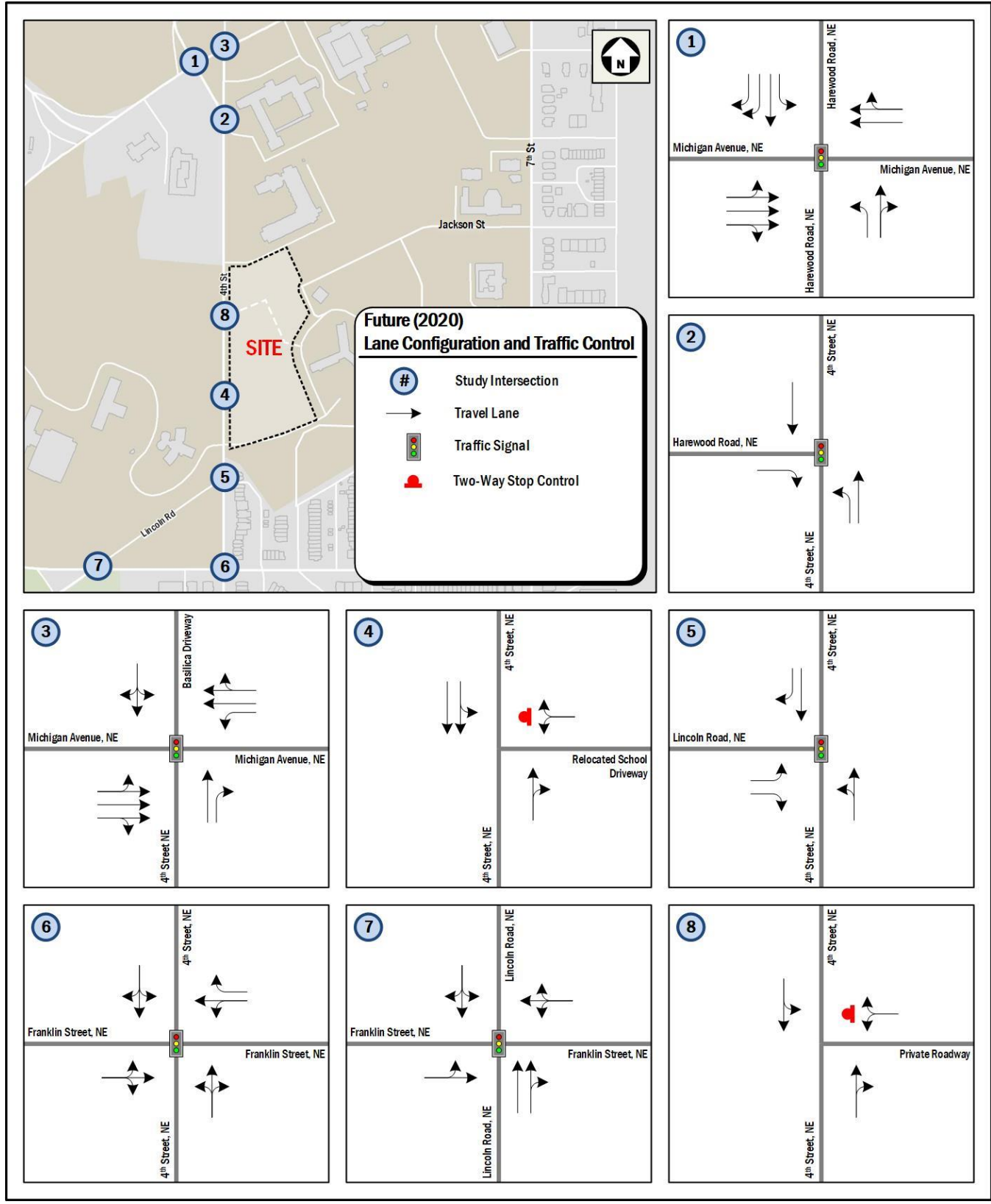


Figure 15: Future (2020) Lane Configuration and Traffic Control

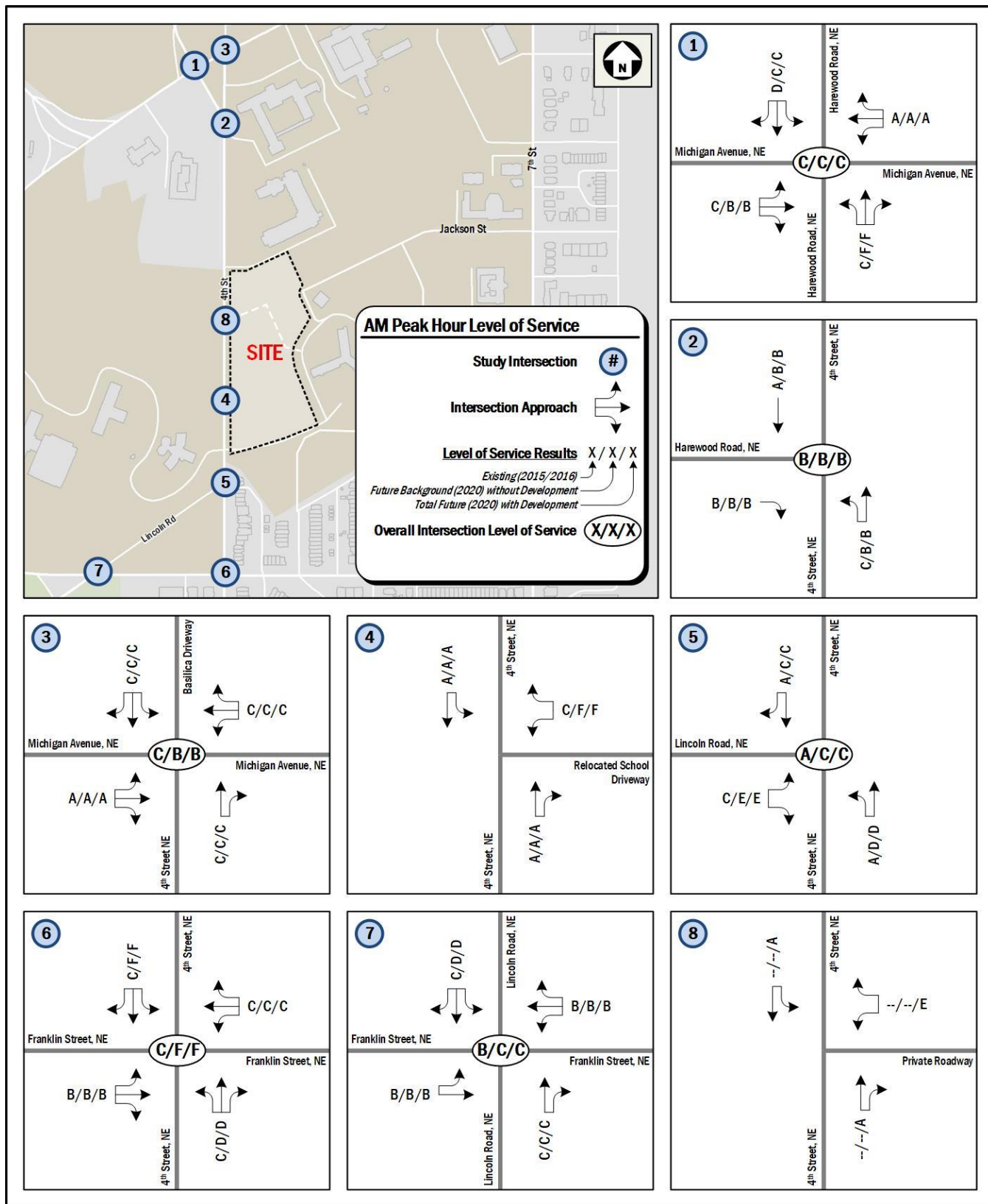


Figure 16: AM Peak Hour Level of Service

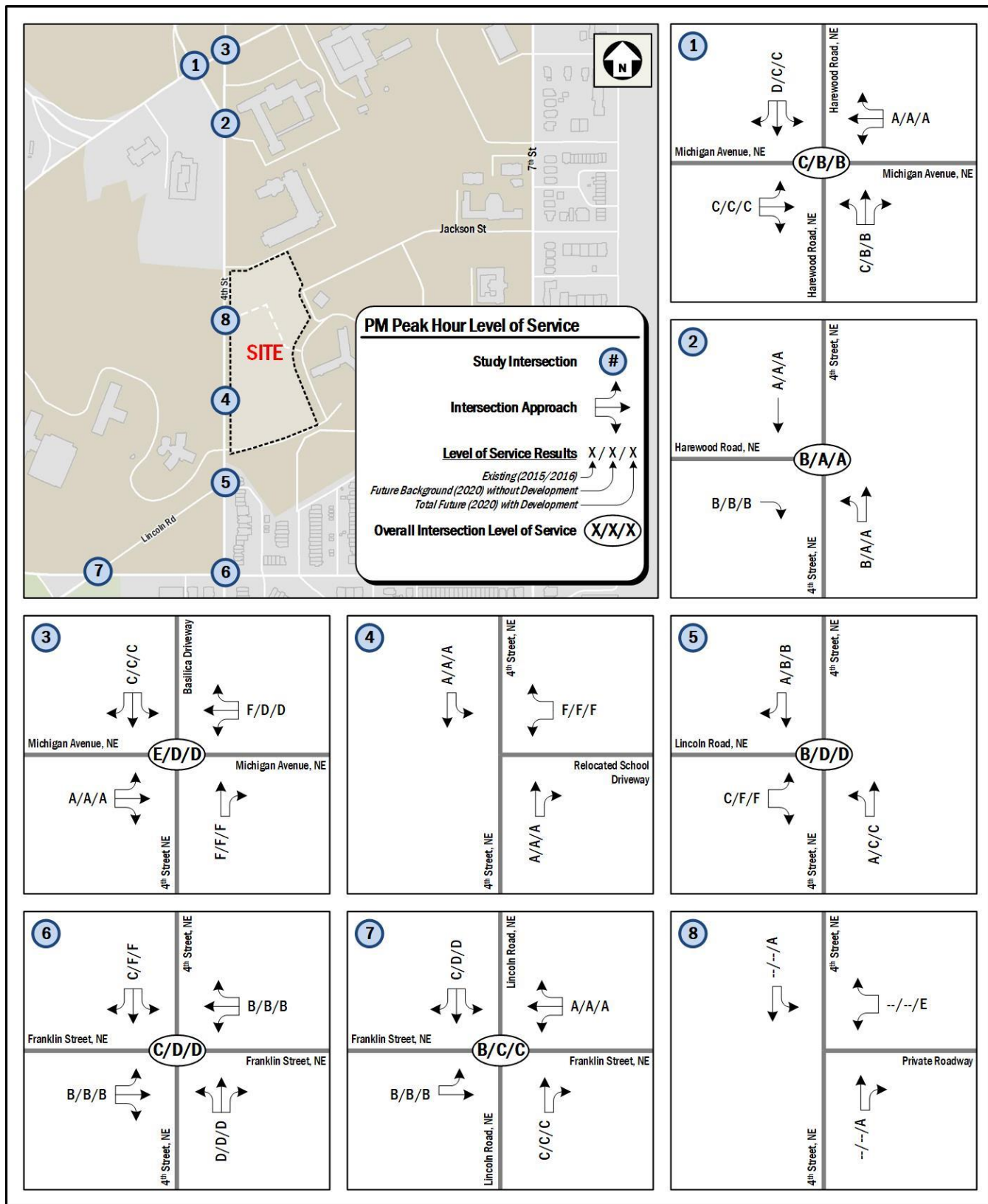


Figure 17: PM Peak Hour Level of Service

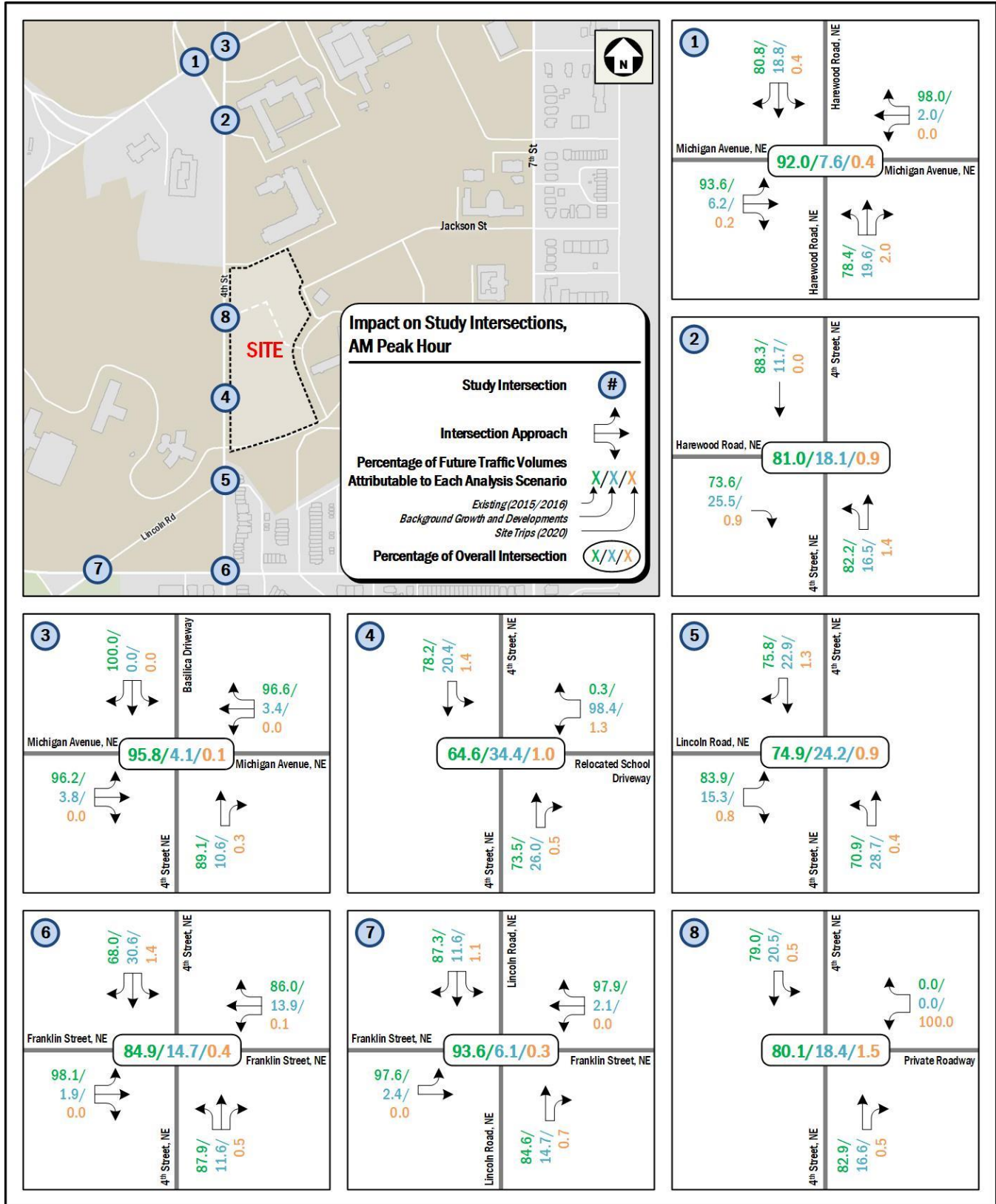


Figure 18: Impact on Study Intersection - AM Peak Hour

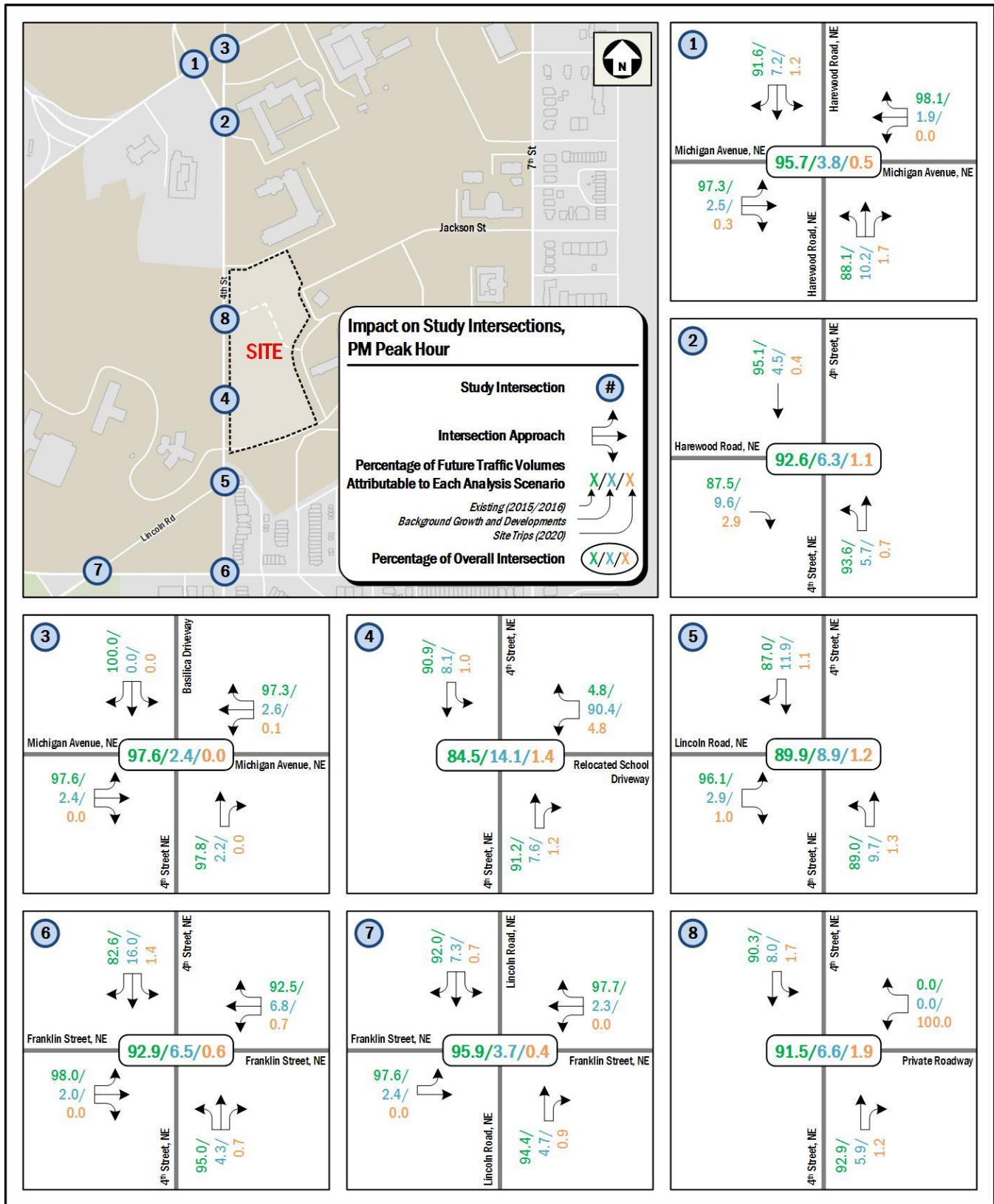


Figure 19: Impact on Study Intersection - PM Peak Hour



Table 7: Vehicular Capacity Analysis Results

Intersection	Approach	Existing Conditions (2015/2016)				Background Conditions (2020)				Total Future Conditions (2020)			
		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
Michigan Avenue and Harewood Road, NE	Overall	16.5	C	25.0	C	24.0	C	16.8	B	25.8	C	17.0	B
	Eastbound	27.6	C	34.9	C	18.0	B	20.9	C	18.9	B	21.0	C
	Westbound	3.2	A	0.6	A	6.8	A	2.0	A	6.8	A	2.0	A
	Northbound	30.7	C	21.1	C	92.9	F	17.8	B	104.3	F	18.9	B
	Southbound	38.9	D	36.6	D	27.6	C	28.7	C	27.6	C	28.8	C
Harewood Road and 4th Street, NE	Overall	18.2	B	13.6	B	13.3	B	9.1	A	13.6	B	9.4	A
	Eastbound Right	12.6	B	12.5	B	16.9	B	13.9	B	17.3	B	14.3	B
	Northbound	29.6	C	17.4	B	12.5	B	8.4	A	12.8	B	8.7	A
	Southbound	1.7	A	1.3	A	10.4	B	5.4	A	10.4	B	5.4	A
Michigan Avenue and 4th Street, NE	Overall	23.8	C	59.4	E	19.9	B	37.5	D	19.9	B	37.7	D
	Eastbound	5.4	A	2.5	A	5.6	A	4.6	A	5.6	A	4.6	A
	Westbound	30.5	C	94.5	F	24.3	C	46.6	D	24.3	C	47.1	D
	Northbound	22.0	C	158.7	F	23.9	C	114.7	F	24.0	C	114.9	F
	Southbound	32.7	C	32.3	C	25.7	C	29.0	C	25.7	C	29.0	C
4th Street and St. Paul's Driveway	Overall	--	--	--	--	--	--	--	--	--	--	--	--
	Westbound	24.9	C	52.8	F	ERR	F	ERR	F	ERR	F	ERR	F
	Northbound	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Southbound	0.0	A	0.1	A	4.9	A	4.9	A	5.1	A	5.5	A
4th Street and Lincoln Road, NE	Overall	9.9	A	12.9	B	33.4	C	39.9	D	33.6	C	40.3	D
	Eastbound	31.7	C	32.2	C	55.7	E	89.4	F	56.0	E	90.5	F
	Northbound	6.4	A	6.2	A	39.9	D	31.5	C	40.3	D	31.8	C
	Southbound	6.1	A	5.3	A	21.9	C	15.1	B	22.1	C	15.0	B
4th Street and Franklin Street, NE	Overall	26.7	C	22.4	C	80.7	F	47.2	D	83.7	F	49.6	D
	Eastbound	13.8	B	12.5	B	13.8	B	12.7	B	13.8	B	12.7	B
	Westbound	29.7	C	13.6	B	30.8	C	13.7	B	30.8	C	13.7	B



Intersection	Approach	Existing Conditions (2015/2016)				Background Conditions (2020)				Total Future Conditions (2020)			
		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
Lincoln Road and Franklin Street, NE	Northbound	34.5	C	39.9	D	39.3	D	43.0	D	39.5	D	43.4	D
	Southbound	27.9	C	33.9	C	287.8	F	158.2	F	299.8	F	168.9	F
	Overall	18.3	B	18.4	B	23.0	C	21.8	C	23.2	C	21.9	C
	Eastbound	12.7	B	12.9	B	12.9	B	13.1	B	12.9	B	13.1	B
	Westbound	12.7	B	6.4	A	13.0	B	6.3	A	13.0	B	6.3	A
	Southbound	29.0	C	24.5	C	47.7	D	41.9	D	48.6	D	42.1	D
4th Street and New Site Driveway	Westbound	--	--	--	--	--	--	--	--	36.9	E	36.0	E
	Northbound	--	--	--	--	--	--	--	--	0.0	A	0.0	A
	Southbound	--	--	--	--	--	--	--	--	0.1	A	0.5	A



Table 8: Vehicular Queuing Results

Intersection	Lane Group	Storage Length (ft)	Existing Conditions (2015/2016)				Background Conditions (2020)				Total Future Conditions (2020)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%
Michigan Avenue and Harewood Road, NE	Eastbound LTR	475	161	208	377	#512	138	176	319	382	138	177	320	383
	Westbound LTR	50	17	20	2	4	31	#73	15	19	31	#73	15	19
	Northbound LTR	100	25	#208	22	73	--	--	--	--	--	--	--	--
	Northbound Left	100	--	--	--	--	~175	#270	32	#84	~184	#281	38	#91
	Northbound TR	100	--	--	--	--	26	42	24	32	26	43	24	32
	Southbound LT	1800	91	137	76	117	--	--	--	--	--	--	--	--
	Southbound Left	1800	--	--	--	--	26	59	32	70	26	59	32	70
	Southbound Right	1800	--	--	--	--	174	263	109	176	175	264	112	179
	Southbound Right	85	0	26	0	3	17	40	0	18	17	40	0	18
4th Street and Harewood Road, NE	Eastbound Right	100	53	68	42	m51	124	189	91	121	127	159	95	127
	Northbound Left	85	263	370	185	304	166	m204	192	m260	171	m213	199	m267
	Northbound Thru	1400	0	0	7	1	0	m0	0	m0	0	m0	0	m0
	Southbound Thru	100	7	11	5	m3	66	m87	27	m24	66	m87	28	m24
4th Street and Michigan Avenue, NE	Eastbound Left	30	1	m2	1	m1	--	--	--	--	--	--	--	--
	Eastbound TR	30	19	22	21	m25	--	--	--	--	--	--	--	--
	Eastbound LTR	30	--	--	--	--	27	32	39	43	28	32	39	43
	Westbound Left	85	175	270	~242	#393	98	#210	~167	#324	98	#210	~168	#324
	Westbound TR	800	521	655	140	178	526	662	117	149	526	662	117	149
	Northbound Thru	100	20	51	19	48	24	52	21	45	24	52	21	45
	Northbound Right	100	100	148	~339	#555	80	124	~333	#546	81	125	~333	#546
	Southbound LTR	50	8	31	14	43	9	29	14	41	9	29	14	41
4th Street NE and St. Paul's Driveway	Westbound LR	425	--	0	--	7	--	err	--	err	--	err	--	err
	Northbound TR	800	--	0	--	0	--	0	--	0	--	0	--	0
	Southbound LT	550	--	0	--	1	--	38	--	22	--	40	--	25
4th Street and Lincoln Road, NE	Eastbound LR	100	76	117	143	m178	--	--	--	--	--	--	--	--
	Eastbound Left	100	--	--	--	--	185	268	287	#427	186	270	290	#435



Intersection	Lane Group	Storage Length (ft)	Existing Conditions (2015/2016)				Background Conditions (2020)				Total Future Conditions (2020)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%	50th%	95th%
	Eastbound Right	100	--	--	--	--	1	m5	3	m14	1	m5	3	m14
	Northbound LT	275	85	109	60	m108	539	#754	379	m485	542	#760	385	m489
	Southbound Thru	1400	146	187	109	158	346	427	148	208	352	434	151	212
	Southbound Right	100	1	0	0	3	12	25	1	1	12	25	1	1
4th Street and Franklin Street, NE	Eastbound LTR	425	147	182	127	151	150	185	129	153	150	185	129	153
	Westbound LT	200	447	#719	136	205	468	#746	141	212	468	#746	141	212
	Westbound Right	85	0	39	0	29	61	143	0	31	62	145	0	31
	Northbound LTR	325	200	309	246	#402	237	#391	262	#433	239	#396	265	#438
	Southbound LTR	250	74	#121	145	#369	~535	#718	~328	#494	~548	#732	~338	#507
Lincoln Road and Franklin Street, NE	Eastbound LT	100	149	220	188	273	154	226	195	282	154	226	195	282
	Westbound LTR	425	437	m577	74	m89	454	m578	74	m89	454	m578	74	m89
	Northbound TR	100	63	98	125	172	78	117	133	182	79	118	134	183
	Southbound LTR	525	111	188	132	200	245	m#359	207	281	247	m#367	209	282
4th Street NE and New Site Driveway	Westbound LR	100	--	--	--	--	--	--	--	--	--	13	--	5
	Northbound TR	300	--	--	--	--	--	--	--	--	--	0	--	0
	Southbound LT	700	--	--	--	--	--	--	--	--	--	0	--	1



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 due to the St. Paul’s College development.

The following conclusions are reached within this chapter:

- The development site is located 0.6 miles from the Brookland-CUA Metrorail station and surrounded by several Metrobus routes that travel along multiple primary corridors.
- The site is expected to generate a minimal amount of transit trips, and the existing service is capable of handling these new trips.

EXISTING TRANSIT SERVICE

The study area is well served by Metrorail and Metrobus. 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 20 identifies the major transit routes, stations, and stops in the study area.

The Brookland-CUA station is located approximately 0.6 miles from the development site and is served by the Red Line, which travels south from Glenmont, through downtown DC, and then continues north through the District core to Shady Grove. Trains run approximately every four to eight minutes during the morning and afternoon peak hours. They run about every 12 minutes during weekday non-peak hours, every 15-18 minutes

Table 9: Metrobus Route Information

Route Number	Route Name	Service Hours	Headway	Walking Distance to Nearest Bus Stop
80	North Capitol Street Line	Weekdays: 4:29 AM-2:10 AM Weekends: 4:40 AM – 2:45 AM	4-45 min	0.3 miles, 5 minutes
D8	Hospital Center Line	Weekdays: 5:37 AM – 12:58 AM Weekends: 6:16 AM – 1:00 AM	12-35 min	0.3 miles, 6 minutes
G8	Rhode Island Avenue Line	Weekdays: 4:52 AM-12:32 AM Weekends: 5:31 AM – 1:21 AM	5-45 min	<0.1 miles, 1 minute
H1	Brookland-Potomac Park Line	Weekdays: Northbound 5:17 PM-7:04 PM Southbound 6:28 AM-8:50 AM	15-30 min	0.3 miles, 5 minutes
H2, H3, H4	Crosstown Line	Weekdays: 4:40 AM-1:59 AM Weekends: 4:50 AM – 2:40 PM	3-40 min	0.3 miles, 5 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 lines connect the site to many areas of the District, Maryland, and Virginia, including several Metrorail stations serving five of the six lines. Table 9 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.

PROPOSED TRANSIT SERVICE

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. This is outlined in DC’s *Transit Future System Plan* report published by DDOT in April 2010, which includes the reestablishment of streetcar service in the District.

One streetcar route is expected to travel near the site. This route would run along Michigan Avenue and connect the site with the Woodley Park and Brookland-CUA Metrorail stations.

SITE-GENERATED TRANSIT IMPACTS

The proposed development is projected to generate 10 transit trips (2 inbound, 8 outbound) during the morning peak hour and 11 transit trips (8 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 20220 which shows that approximately 45 percent of transit riders used Metrorail and the remainder use Metrobus or Circulator. Based on this data, it is expected that approximately 5 people will use Metrorail and 5 will use Metrobus during the morning peak hour; approximately 5 people will use Metrorail and 6 will use Metrobus during the afternoon peak hour.

WMATA studied capacity of Metrorail stations in its *Station Access & Capacity Study*. 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 Brookland-CUA station will require additional sidewalks to accommodate the 14.4% growth in ridership at the station, and can currently accommodate future growth at all access points.

WMATA 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 the two of the five Metrobus lines that travel near the site exceed the acceptable load factor during all periods of the day, while the remaining three have ample capacity.

Based on this information, and the minimal number of transit trips expected to be generated by the site, it is not expected that site-generated transit trips will cause detrimental impacts to Metrorail or Metrobus service.

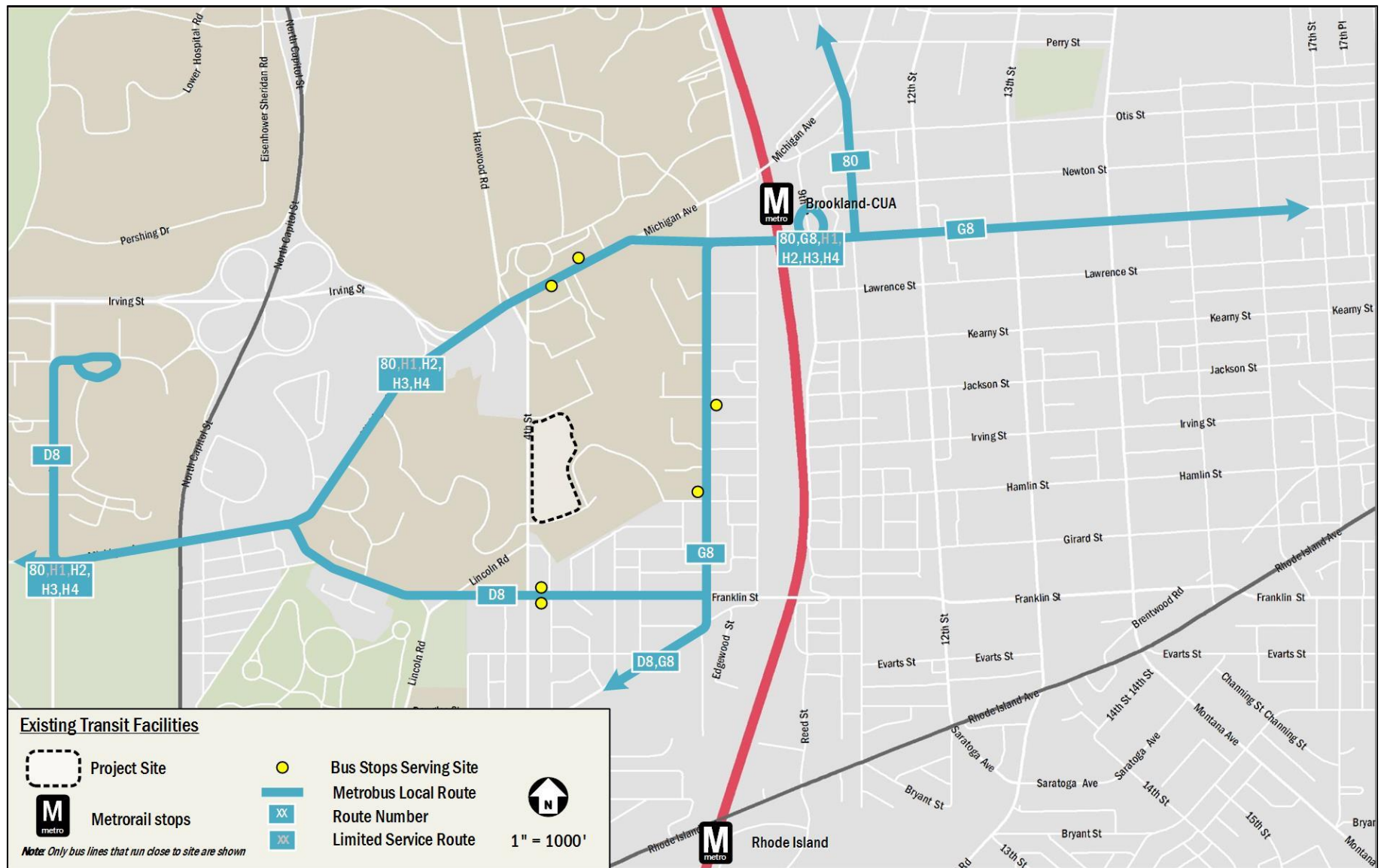


Figure 20: Existing Transit Service



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 a quality walking environment. There are some gaps in the system, but there are sidewalks along all primary routes to pedestrian destinations, particularly those routes that connect to transit.
- The site is not expected to generate a significant amount of pedestrian trips.
- Sidewalks will be located along the new private roadway and leading up to the front door of each townhouse.

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 accessible to transit options such as bus stops along 7th Street, Michigan Avenue, and the Brookland-CUA Station. The site is also within walking distance of many destinations such as the Catholic University of America and Trinity University. There are some barriers and 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, incomplete or insufficient crossings at busy intersections, and the railroad tracks that limit connectivity to the east. Figure 21 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 planned development shows that many facilities meet DDOT standards and provide a quality walking environment. Figure 22 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 10.

Within the area shown, most roadways are considered residential with a low to moderate density. Some areas along Monroe Street NE are considered commercial and thus require wider sidewalks. Most of the sidewalks surrounding the site comply with DDOT standards; however there are some areas which have inadequate sidewalks or no sidewalks at all, primarily located along the private streets of the Chancellor’s Row townhouse community. All primary pedestrian destinations are accessible via routes with sidewalks, most of which meeting DDOT standards. The sidewalks that do not meet DDOT standards are typically along routes that do not provide an acceptable buffer width, but do maintain the minimum sidewalk width. Some of these issues will be remedied as part of background developments.

ADA standards require that all curb ramps be provided wherever an accessible route crosses a curb and must have a detectable warning. Additionally, curb ramps shared between two crosswalks is not desired. As shown in the figure, under existing conditions there are some issues with crosswalks and curb ramps near the site.

SITE IMPACTS

This section summarizes the impacts of the development on the overall pedestrian operations in the vicinity of the site.

Pedestrian Trip Generation

The planned development is expected to generate 1 walking trip (0 inbound, 1 outbound) during the morning peak hour and

Table 10: 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



1 walking trip (1 inbound, 0 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
- Retail locations in the vicinity of the site
- Neighborhood destinations such as CUA, Metropolitan Branch Trail, etc.

In addition to these trips, the transit trips generated by the site will also generate pedestrian demand between the site and nearby transit stops. About 45 percent of these will be walking to the Brookland-CUA Metrorail Station located approximately 0.6 miles from the site and the rest will be walking to Metrobus stops, which are primarily located along 7th Street, Franklin Street, and Michigan Avenue.

On-Site Pedestrian Infrastructure

Sidewalks will be constructed throughout the development to provide access between the existing roadway network and the front doors of each townhome. Due to steep grades throughout the site, sidewalks will only connect to 4th Street along the new private roadway. The sidewalk network will also connect to the existing Chancellor's Row sidewalks which lead to additional street and sidewalks such as those along 7th Street and Franklin Street.

The development will construct internal sidewalks along the new private roadways as well as leading up to the front doors of each townhome.

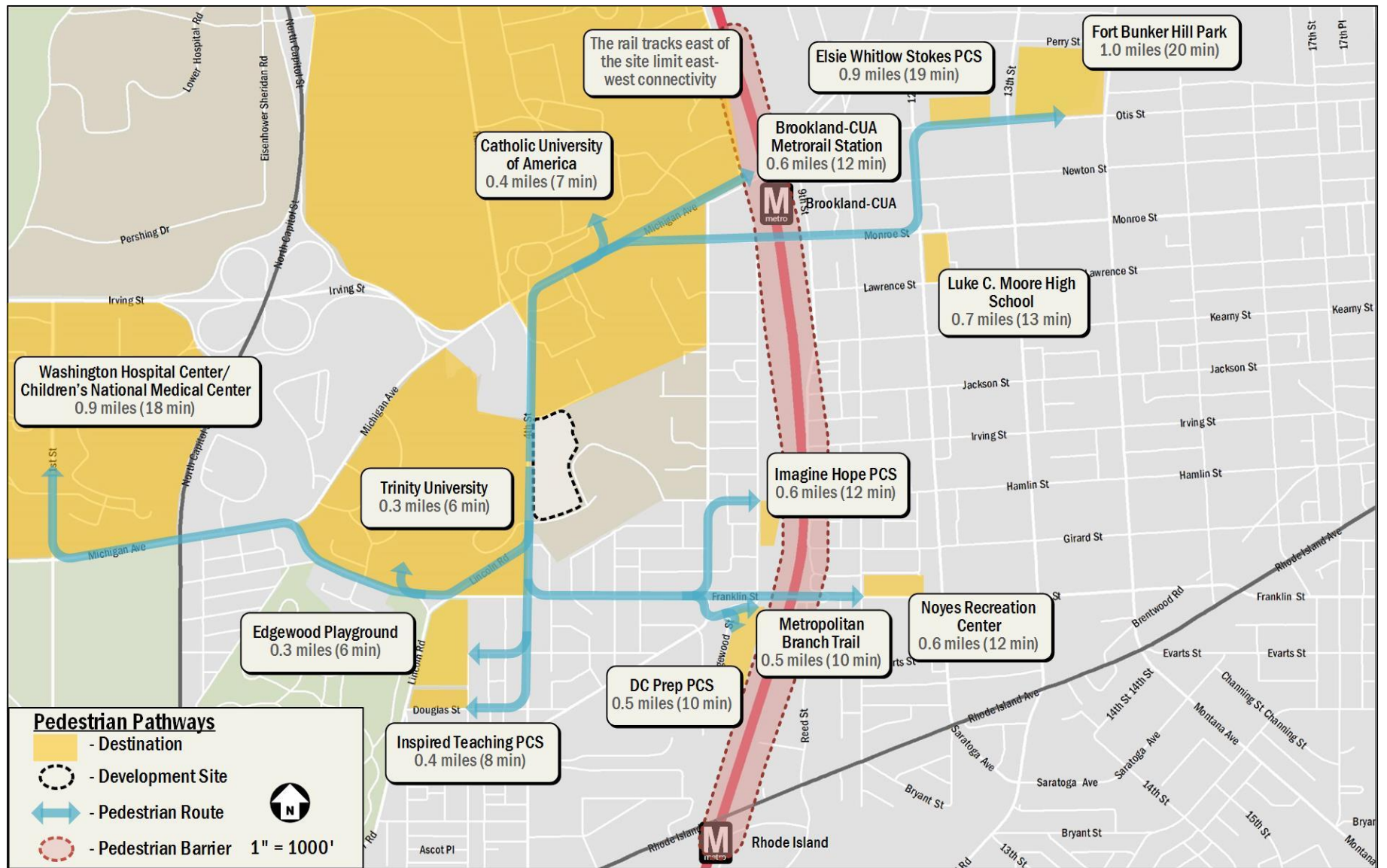


Figure 21: Pedestrian Pathways

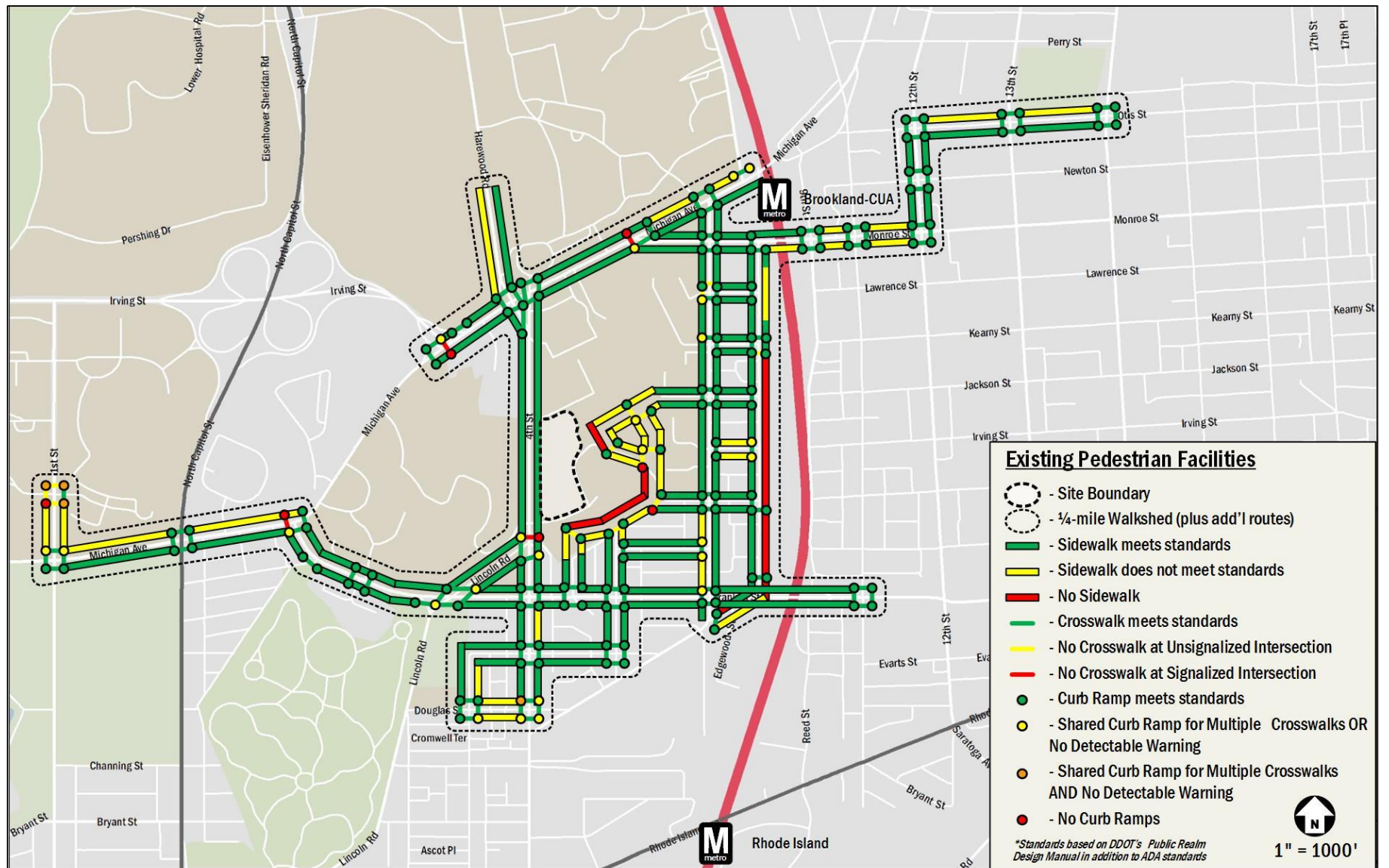


Figure 22: Existing Pedestrian Infrastructure



BICYCLE FACILITIES

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

The following conclusions are reached within this chapter:

- The site has access to several bike trails, bike lanes, and signed bike routes in addition to a nearby Capital Bikeshare station.
- The site is not expected to generate a significant amount of bicycle trips, therefore all site-generated bike trips can be accommodated on existing infrastructure.
- Long-term bicycle parking is expected to take place in each individual unit.

EXISTING BICYCLE FACILITIES

The site is well-connected to existing on- and off-street bicycle facilities. North-south connectivity is primarily provided along the bike lanes on 4th Street NE and along the Metropolitan Branch Trail. Additional roadways such as 12th Street NE and 11th Street NE also provide shared lanes or signed bicycle routes. East-west connectivity is provided along Irving Street NE/NW and Monroe Street/Newton Street NE. Figure 23 illustrates the existing bicycle facilities in the area.

In addition to personal bicycles, the Capital Bikeshare program provides an additional cycling option for residents, employees, and patrons of the planned development. The Bikeshare program has placed over 440 bicycle-share stations across Washington, DC, Arlington, Alexandria, and Fairfax, VA, and Montgomery County, MD with over 3,700 bicycles provided. Within a quarter-mile of the site there is one Capital Bikeshare station located at Hamlin Street & 7th Street NE that houses a total of 15 docks. Figure 23 illustrates the existing Capital Bikeshare facilities in the area.

PROPOSED BICYCLE FACILITIES

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. The four tiers are broken down as follows:

- Tier 1
Investments should be considered as part of DDOT’s 6-year 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.

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

Due to the timeline of the St Paul’s College development, this report focuses on the Tier 1 and Tier 2 recommendations within the vicinity of the site. Tier 1 recommendations include upgrades to the bicycle facilities connecting the Brookland and Columbia Heights neighborhoods, including, but not limited to facilities along Irving Road, Michigan Avenue, and Monroe Street. Tier 2 recommendations include bike lanes along Rhode Island Avenue, which would create a necessary and efficient bicycle connection to areas downtown.

Although these projects are discussed in the MoveDC plan, they are not currently funded or included in DDOT’s Transportation Implementation Plan thus they will not be assumed as complete for this analysis.

Outside of the MoveDC plan, there are future plans to add a two-way cycle track along 4th Street between Lincoln Road and Michigan Avenue.

SITE IMPACTS

This section summarizes the impacts of the development on the overall bicycle operations surrounding the site and develops recommendations for connectivity improvements.



Bicycle Trip Generation

The planned development is expected to generate 1 bicycle trip (0 inbound, 1 outbound) during the morning peak hour and 1 bicycle trip (1 inbound, 0 outbound) during the afternoon peak hour. Although bicycling will be an important mode for getting to and from the site the impacts from bicycling will be relatively less than impacts to other modes.

On-Site Bicycle Elements

Due to the nature of the townhomes, it is expected that secure long-term bicycle parking will be satisfied in each individual unit, either in the garage or within the home.



Figure 23: Existing Bicycle Facilities



CRASH DATA ANALYSIS

This section of the report reviews available crash data within the study area, reviews potential impacts of the 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 elevated crash rate at study area intersections. 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 measure in crash per million-entering vehicles (MEV). The crash rates per intersections are shown in Table 12.

According to the Institute of Transportation Engineer's *Comprehensive Transportation Review for Site Development*, a crash rate of 1.0 or higher is an indication that further study is required. Two intersections in the study area meet this criterion (as shown in red in Table 12 and detailed in Table 11). The project should be developed in a manner to help alleviate, or at minimum not add to, the conflicts at these intersections.

The crash summary data in Table 12 shows two intersections with a crash rate over 1.0 crashes per million entering vehicles – the rate which is considered a threshold for further analysis.

Table 12: Intersection Crash Rates (2013 to 2015)

Intersection	Total Crashes	Ped Crashes	Bike Crashes	Rate per MEV*
Michigan Avenue & Harewood Road, NE	29	0	0	0.64
Harewood Road & 4th Street, NE	9	0	0	0.47
Michigan Avenue & 4th Street, NE	54	5	0	1.21
4th Street & Lincoln Road, NE	6	0	0	0.30
4th Street & Franklin Street, NE	21	3	0	0.75
Lincoln Road & Franklin Street, NE	32	2	0	1.18

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

Table 11: Elevated Crash Rate Intersections by Crash Type

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 Rte	Unspecified	Total
Michigan Avenue & 4th Street, NE	1.21	5 9%	6 11%	2 4%	12 22%	14 26%	2 4%	0 0%	1 2%	0 0%	2 4%	0 0%	0 0%	0 0%	10 19%	54
Lincoln Road & Franklin Street, NE	1.18	1 3%	0 0%	0 0%	13 41%	7 22%	1 3%	0 0%	3 9%	0 0%	1 3%	1 3%	0 0%	0 0%	5 16%	32

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 elevated crash rates due to operational, geometric, or other issues. 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 these two intersections, the crash type information from the DDOT crash data was reviewed to see if there is an elevated percentage of certain crash types. Generally, the reasons for why an intersection has an elevated 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 some possible causes. Table 11 contains a breakdown of crash types reported for the two intersections with a crash rate over 1.0 per MEV.

POTENTIAL IMPACTS

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

- Michigan Avenue & 4th Street, NE**
 This intersection is over the threshold of 1.0 crashes per MEV, with a rate of approximately 1.21 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection are either rear end or side swiped vehicles.

Rear end and side swiped crashes may be elevated at this intersection due to the existing geometry and signal timings. Along both 4th Street and the westbound approach of Michigan Avenue, one through lane is converted to an exclusive turn lane in advance of the intersection to help process the significant amount of turning vehicles. This may result in last minute lane changes or sudden slowing to change lanes, resulting in side swiped or rear end crashes.

The safety concerns at this intersection are primarily due to the existing geometry and operations. Given that this intersection is so close to two other intersections, changes to this intersection may require changes to adjacent intersections and may have negative impacts to vehicular capacity or pedestrian crossings. Additionally, site-generated traffic is minimal and not expected to degrade the safety at this intersection; thus no improvements are recommended as part of the development.

- Lincoln Road & Franklin Street, NE

This intersection is over the threshold of 1.0 crashes per MEV, with a rate of approximately 1.18 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection are either rear end or side swiped vehicles.

Rear end and side swiped crashes may be elevated at this intersection due to the skewed geometry of the intersection, grade changes and obstructed site lines along Lincoln Avenue, the absence of exclusive turn lanes, and the prevalence of on-street parking along Franklin Street. These conditions could result in crashes from last-second maneuvers to get around turning vehicles or parked vehicles pulling out of spaces when there is not enough clearance.

The safety concerns at this intersection are primarily due to the existing geometry and operations. Changes to the geometry could have negative impacts to pedestrian movements by increasing crossing distances. Other changes are infeasible based on space constraints. Site-generated traffic is not expected to degrade the safety at this intersection; thus no improvements are recommended as part of the development.



SUMMARY AND CONCLUSIONS

This report presented a Comprehensive Transportation Review (CTR) for the St. Paul's College development. The purpose of this study was to evaluate whether the project will generate a detrimental impact to the surrounding transportation network, particularly as it relates to operations of the 4th Street corridor.

This evaluation is based on a technical comparison of the existing conditions, background conditions, and total future conditions. This report concluded that **the project will not have a detrimental impact** to the surrounding transportation network assuming that all planned site design elements are implemented, particularly shifting the existing curb cut to the north.

Proposed Project

The development site is generally bounded by an existing driveway to the south, private streets and townhomes to the east, an existing driveway to the north, and 4th Street to the west. The site consists of open space and a surface parking lot under existing conditions and will be developed to include approximately 60 townhomes with a large portion of green space maintained to preserve trees and historic view sheds of the existing St. Paul's College building. Each townhome will have a private garage with 1 to 2 parking spaces. Additionally, an approximately 26,000 square foot Paulist Fathers Seminary will be constructed that will primarily consist of residential space and religious use/support space.

As part of the development, a new private roadway and its associated curb cut will be constructed connecting the development to 4th Street. An additional network of private alleys will be constructed to access the garages of the townhomes. Loading activity associated with move-ins and move-outs is expected to take place within the network of private alleys.

In addition to the new private roadway, the existing driveway and its associated curb cut on the southern end of the site will be realigned and slightly widened in conjunction with the new Paulist Fathers Seminary building. Under existing conditions, this driveway is located less than 100 feet from the adjacent signalized intersection and is barely wide enough to accommodate two-way traffic. The realignment will be beneficial to the overall roadway operations along 4th Street as the driveway will be located further from the adjacent signalized intersection at Lincoln Road and will be widened to

better accommodate two-way traffic. The driveway currently serves as the primary access to the two (2) schools that recently occupied the historic St. Paul's College building as a matter-of-right, and this realignment is also expected to improve operations for the schools. All vehicular access to the Paulist Fathers Seminary will be from this realigned driveway, in addition to the school-related traffic.

Pedestrian and bicycle access to the development will occur predominantly via 4th Street. The new private roadway will provide sidewalks that access the front doors of all townhomes and connect with the existing pedestrian network.

Multi-Modal Impacts and Recommendations

Transit

The site is well-served by regional and local transit services such as Metrorail and Metrobus. The site is approximately 0.6 miles from the Brookland-CUA Metrorail Station. Metrobus stops are located near the site along Michigan Avenue, Franklin Street, and Lincoln Road.

Although the St. Paul's College development will be generating new transit trips on the network, the existing facilities have enough capacity to handle the new trips. The Brookland-CUA Metrorail station does not have existing capacity concerns and is not expected to as a result of the planned development. Some nearby Metrobus lines do have existing capacity concerns, but the small amount of transit trips added to the network as a result of the planned development will not exacerbate existing conditions.

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 some pedestrian barriers surrounding the site such as limited connectivity due to the railroad tracks to the east.

The development will construct internal sidewalks along the new private roadways as well as leading up to the front doors of each townhome.

Bicycle

The site is well served by existing bicycle facilities. Many trails, bike lanes, and signed bike routes exist near the site such as the Metropolitan Branch Trail to the east, north-south bike lanes along 4th Street NE, and east-west bike routes along Irving



Street. There are future plans to add a two-way cycle track along 4th Street between Lincoln Road and Michigan Avenue. The site is also served by the Capital Bikeshare and new dockless bikeshare programs which provide an additional cycling option for residents of the St. Paul's development.

Long-term bicycle parking is expected to take place in individual townhouse units.

Vehicular

The St. Paul's College site is well-connected to regional roadways such as US Route 1, US Route 29, US Route 50, and Interstate 395, as well as primary and minor arterials such as Michigan Avenue and an existing network of collector and local roadways.

The development is not expected to result in detrimental impacts to the surrounding vehicular network due to the minimal trip generation associated with the proposed development program. DDOT's CTR guidelines state that a comprehensive vehicular analysis is required if a development is expected to generate a minimum of 25 vehicular trips in the peak direction during either peak hour. The proposed development is expected to generate 22 vehicular trips in the peak direction during the peak hour. As such, the development does not trigger the need for a comprehensive vehicular analysis.

However, during the DDOT scoping process, it was determined that a vehicular capacity analysis should be performed to evaluate the operations of the proposed 4th Street curb cut, as well as the realignment of the existing school driveway, in relation to the overall 4th Street corridor. As such, this CTR studied six intersections along the 4th Street corridor, in addition to the two driveways, to properly analyze the flow of vehicular traffic along 4th Street.

The vehicular capacity analyses concluded the following:

- The projected vehicular trip generation is negligible with a peak vehicular trip generation of 22 trips in the peak direction during the peak hour, or one new trip every two to three minutes.
- The realignment and widening of the existing school driveway results in more optimal operations and improved maneuverability for vehicles entering and exiting the driveway.

- The proposed private roadway is not projected to have any detrimental impacts to the 4th Street corridor and results in minimal queuing along the private roadway approach.
- Multiple study intersections operate at LOS E or LOS F under Existing conditions or as a result of background trips. These intersections observed increased delay as a result of the proposed development, but the 95th percentile queues were shown to increase by less than one vehicle length along all lane groups for all intersections. This report explored potential improvements at these intersections and determined that signal timing adjustments can adequately mitigate the majority of issues (that exist even without the proposed project).
- Overall, the proposed development is not expected to result in detrimental impacts to the surrounding roadway network due to the minimal amount of trips generated by the project and the proposed design of the site.