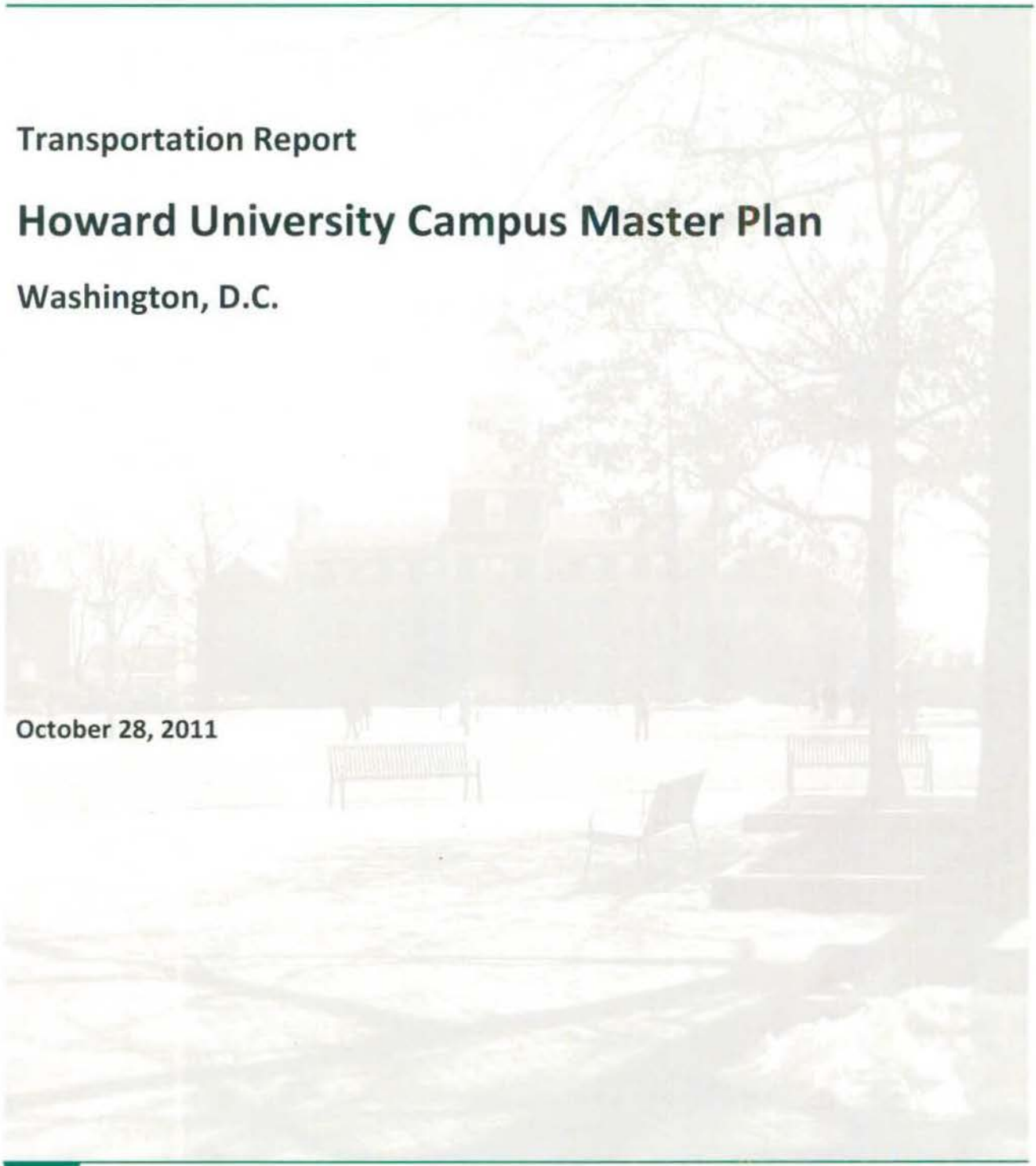
Transportation Report

Howard University Campus Master Plan

Washington, D.C.



October 28, 2011

GOROVE / SLADE

Transportation Planners and Engineers

Prepared by:

GOROVE / SLADE

Transportation Planners and Engineers

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

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

7001 Heritage Village Plaza
Suite 220
Gainesville, VA 20155
Tel: 703.787.9595
Fax: 703.787.9905

www.goroveslade.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF PHOTOS

EXECUTIVE SUMMARY

The following report presents the findings of a Transportation Impact Study (TIS) performed for the Howard University Campus Master Plan (HUCMP). A TIS was produced for the HUCMP earlier this year dated June 23, 2011. This report is an update of the earlier version based on continued interaction with DDOT over the course of the summer. The goal of the proposed HUCMP is to create a physical environment that is supportive of and inspirational to the fulfillment of the University's mission and that enriches the lives of all who live, study, teach, and work at and around Howard University.

Overview of Campus Plan

The population changes expected over the course of the HUCMP are modest. The amount of students is projected to increase, and notably the amount of students living within the campus boundaries is expected to increase significantly. The number of faculty and staff employed by the University (in non-Hospital roles) is expected to remain constant.

Although the planned student population change is modest, the HUCMP includes a significant number of development sites for new buildings or major renovations. The development sites will be the location primarily of University facilities, including academic, research, library, student services, and administrative spaces intended to elevate Howard University's position in the academic marketplace fostering the recruitment and retention of top students, faculty and staff. Four of the development sites are residence hall buildings. The other two buildings are a proposed recreation center and a workforce housing building. Another development to be located on adjacent property owned by Howard University is the Howard University Town Center, a mixed-use residential and retail development. A number of existing buildings and surface parking lots will be removed to make room for these future developments.

The transportation strategy of the HUCMP is driven by how the development sites are built on existing surface parking lots. Complete build-out of the plan would eliminate 68% of the existing surface parking supply. The main transportation question the plan needs to answer is whether it should replace all of the surface parking spaces lost with new, much more expensive underground structured parking facilities. The financial and other constraints behind building new parking facilities underground mean that for the HUCMP to be successful the existing parking cannot be replaced entirely. Rather, the ability to construct all of the buildings included in the Campus Plan hinges on keeping parking demand from rising. Because of this, the plan has the stated goal of reducing existing parking demand and building only the amount of parking necessary to successfully support campus activity.

The major elements of the HUCMP transportation component fall directly from this strategy. HU has already hired a Transportation Demand Management (TDM) consultant, Nelson\Nygaard Consulting Associates, to help develop and implement programs to reduce parking demand and single occupancy vehicle trips. The HUCMP has a flexible parking plan, which includes the identification of many more parking sites than will be needed and selecting which sites to build based on annual monitoring of demand.

The HUCMP also contains additions to east-west circulation on the roadways near campus as follows:

- Howard Place: The plan proposes extending Howard Place between Georgia Avenue and Sherman Avenue as a pedestrian-oriented east-west connection.
- Barry Place/College Street: The plan proposes constructing a section of College Street between Georgia Avenue and 6th Street when the current building occupying the potential street right-of-way is demolished as part of the Campus Plan.

- Bryant Street: The plan proposes that Bryant Street be extended to connect between Florida Avenue and Georgia Avenue. This proposed connection would be a two-way street.
- W Street: The plan proposes that W Street be extended to connect between Florida Avenue and Georgia Avenue. This proposed connection would be a two-way street.

Impact of Campus Plan

The following report includes a detailed section on technical analysis of the impacts of the HUCMP to the surrounding roadway network, including analyses of roadway capacity, non-auto modes of travel and crash data. In summary, the main impact the HUCMP will have is due to three shifts/additions to travel demand:

1. New vehicular traffic will be generated by the modest changes to campus population, the addition of new ground floor retail to Georgia Avenue, the new recreation center, the proposed workforce housing, and the Howard University Town Center;
2. The removal of existing surface parking lots and replacement of parking supply with underground facilities in different locations will lead to a shift in commuting patterns for existing traffic; and
3. The new development sites will changes existing pedestrian patterns and create new pedestrian demand, notable on crosswalks over major streets near campus including Georgia Avenue and 4th Street.

It should be noted that although the University plans to strengthen its TDM plan and implement programs to reduce parking demand and single occupancy vehicle trips, the technical analysis contained in the report do not consider the potential impacts of significant reductions to traffic and parking demand to present a conservative analysis.

The roadway capacity analyses found that many intersections within the study area would operate with unacceptable levels of delay in the future. Examining the capacity analysis results further showed that in most locations non-HUCMP traffic and the implementation of the Lower Georgia Avenue Great Streets preferred alternative had a greater impact than the traffic generated by the HUCMP. For all intersections with unacceptable levels of delay, the report provides recommendations for DDOT to consider that will alleviate delay. The recommendations mostly consist of changes to signal timings and restriction of on-street parking at intersections to allow for turn lanes.

The roadway capacity analysis shows the potential for a new traffic signal at the intersection of College Street and 4th Street. The main impetus for the signal would be new pedestrians crossings of 4th Street generated by the residence halls planned on that side of campus. During the Further Processing of these residence halls, this report recommends that a signal warrant analysis be performed and if necessary, a traffic signal constructed.

For some intersections along Georgia Avenue, slight changes to signal timings or parking regulations cannot alleviate delays. In all future scenarios studied in the roadway capacity analyses, this report found significant delays at the intersections where the Great Streets Plan recommends transit-only lanes, mostly associated with left turning traffic especially at the intersection of Georgia Avenue and Florida Avenue.

Additional analyses contained in this report show that removing the transit-only lanes from the preferred alternative, or adding in left turn lanes (which would necessitate 9 to 10 foot wide lanes) could alleviate delays. An operational solution would be to not permit left turns at these intersections, but that would come at the cost of limiting local access and making drivers go around blocks searching for a path to their destination.

The ultimate decision on the configuration of Georgia Avenue will be made by DDOT. The benefits of transit-only lanes could outweigh delays to traffic, although severe traffic delays will generate illegal use of the transit lanes and could lead to safety concerns. The analysis and comparisons of different configurations of Georgia Avenue are presented for DDOT's review. A potential ultimate solution could entail using a combination of the potential configurations.

Recommendations

In addition to the roadway capacity recommendations listed above, the report contains recommendations on parking, transit, pedestrian accommodations and bicycling including:

- Setting a goal of not increasing parking supply by the end of the HUCMP, and ideally reducing demand to approximately 1,400 spaces in 2021, not including the demand associated with the Howard University Town Center, residents of the workforce housing, and non-campus use of the recreation center and ground floor retail spaces.
- Implementing a robust TDM to reduce parking demand to accomplish this goal.
- Designing the new garages should have access points that minimize conflicts with vehicles and pedestrians.
- Locating a primary visitor parking facility somewhere on campus such as potential garage #1, underneath the proposed wellness and recreation center.
- Bringing bicycle facilities closer to campus
- Improving bicycle parking on campus
- Adding a Capital Bikeshare station to the southern side of campus aligned with the new bicycle routes.
- Exploring a traffic signal at the intersection of W Street and Florida Avenue if and when W Street is extended through to Florida Avenue

A list of the major recommendations made in this report is contained in its final chapter, 'Summary of Recommendations'.

1: INTRODUCTION & SITE REVIEW

This report presents the findings of a Transportation Impact Study (TIS) performed for the Howard University Campus Master Plan (HUCMP). The University's Central Campus has approximately 11,037 students, 1,276 faculty members, and 2,000 staff members. Howard University Hospital is located on the south side of campus, with a population of approximately 2,050 staff.

The goal of the proposed HUCMP is to create a physical environment that is supportive of and inspirational to the fulfillment of the University's mission and that enriches the lives of all who live, study, teach, and work at and around Howard University. The following nine planning principles represent the key characteristics of the campus:

1. Support Howard University's academic mission;
2. Improve the University community's quality of life;
3. Implement good and smart urban design;
4. Improve the public realm,
5. Enhance connectivity and walkability;
6. Develop the campus edge;
7. Embrace sustainability;
8. Preserve and protect historic legacy; and
9. Foster community engagement.

This report presents the transportation planning and engineering analyses of the Howard University Campus Master Plan (HUCMP). The purpose of the transportation analyses is to evaluate the HUCMP and present recommendations to ensure that the development outlined in the plan does not lead to adverse impacts on the surrounding community.

This report contains three sections as follows:

- *Introduction & Site Review*
  This section provides a summary of major transportation features near and adjacent to Howard University. This includes reviewing roadways, transit facilities, bicycle facilities, and pedestrian facilities. This section contains information on the site to help establish a reference for the following sections.

- *Design Review*
  This section provides a summary of the transportation components of the Howard University Campus Master Plan. This section is meant to supplement the details provided in the Campus Plan application.

- *Technical Analysis*
  This section provides a review of the potential impacts of the development of the HUCMP on the surrounding transportation network. Included is an analysis of future roadway capacity with and without the proposed HUCMP.

1.1 Site Location and Major Transportation Features

Howard University is located in the northwest portion of Washington, DC, in Ward 1. The University is located in an area of the District that is primarily residential, with areas of concentrated street-level retail located nearby. The location of the University Central Campus, as shown in Figure 1, is primarily bounded by Sherman Avenue to the west, 4th Street/5th Street to the east, Hobart Place to the north, and W Street to the south. Georgia Avenue, a principal arterial, also travels through the campus boundaries, separating the academic and residential portions of the Central Campus on the west side. 4th Street/5th Street also separates the eastern residential parcels from the academic campus.

The Central Campus is served by several arterials including Georgia Avenue, Florida Avenue, 4th Street, 5th Street, Sherman Avenue, and Harvard Street. Major collector roadways include Bryant Street and Euclid Street. The University is also served by several public transportation sources, including Metrorail and Metrobus. Additionally, the University also provides a free shuttle for students and faculty/staff that connects the Central Campus, the West Campus/School of Law, the East Campus/School of Divinity, residence halls located off-campus, and the Metrorail station. The Central Campus is also served by a pedestrian network consisting of sidewalks and crosswalks along the local streets surrounding the University. In addition to pedestrian accommodations, the site is also served by the on- and off-street bicycle network, which consists of bike lanes and signed bicycle routes along local roadways.

1.2 Roadway Conditions

Regional access for the Howard University Central Campus is provided primarily by Georgia Avenue and Florida Avenue. Local access is also provided by Harvard Street, Gresham Place, Girard Street, Fairmont Street, Euclid Street, Howard Place, College Street, Barry Place, Bryant Street, W Street, V Street, Sherman Avenue, 6th Street, and 4th Street. Figure 2 shows the street network hierarchy for the study area, as well as the average annual weekday traffic volumes for the heavily travelled roadways.

Gorove/Slade conducted field reconnaissance to obtain the existing lane usage and traffic controls at the intersections within the Central Campus study area. Figure 3 presents the number of travel lanes on the roadways surrounding the HU Central Campus, including lanes that sometimes become parking lanes. The physical and service characteristics of the key roadways providing local site access are as follows:

- *Georgia Avenue*
  Georgia Avenue is a four-lane arterial which runs along the west side of the Howard University Central Campus. The roadway is classified by DDOT as a principal arterial with an average annual weekday traffic volume of 19,200 vehicles. Within the limits of the study area, Georgia Avenue runs from Gresham Place to Florida Avenue.

- *Florida Avenue*
  Florida Avenue is a four-lane arterial which runs to the south of the Howard University Hospital campus. The roadway is classified by DDOT as a principal arterial with an average annual weekday traffic volume of 28,500 vehicles and 20,200 vehicles west and east of Georgia Avenue, respectively. Within the limits of the study area, Florida Avenue intersects Georgia Avenue near the southwest corner of the Hospital.

- *Harvard Street*
  Harvard Street is a two-lane roadway which runs to the north of the HU Central Campus. The roadway is classified by DDOT as a minor arterial with an average annual weekday traffic volume of 7,900 vehicles. Within the limits of the study area, Harvard Street runs between Georgia Avenue and 4th Street.

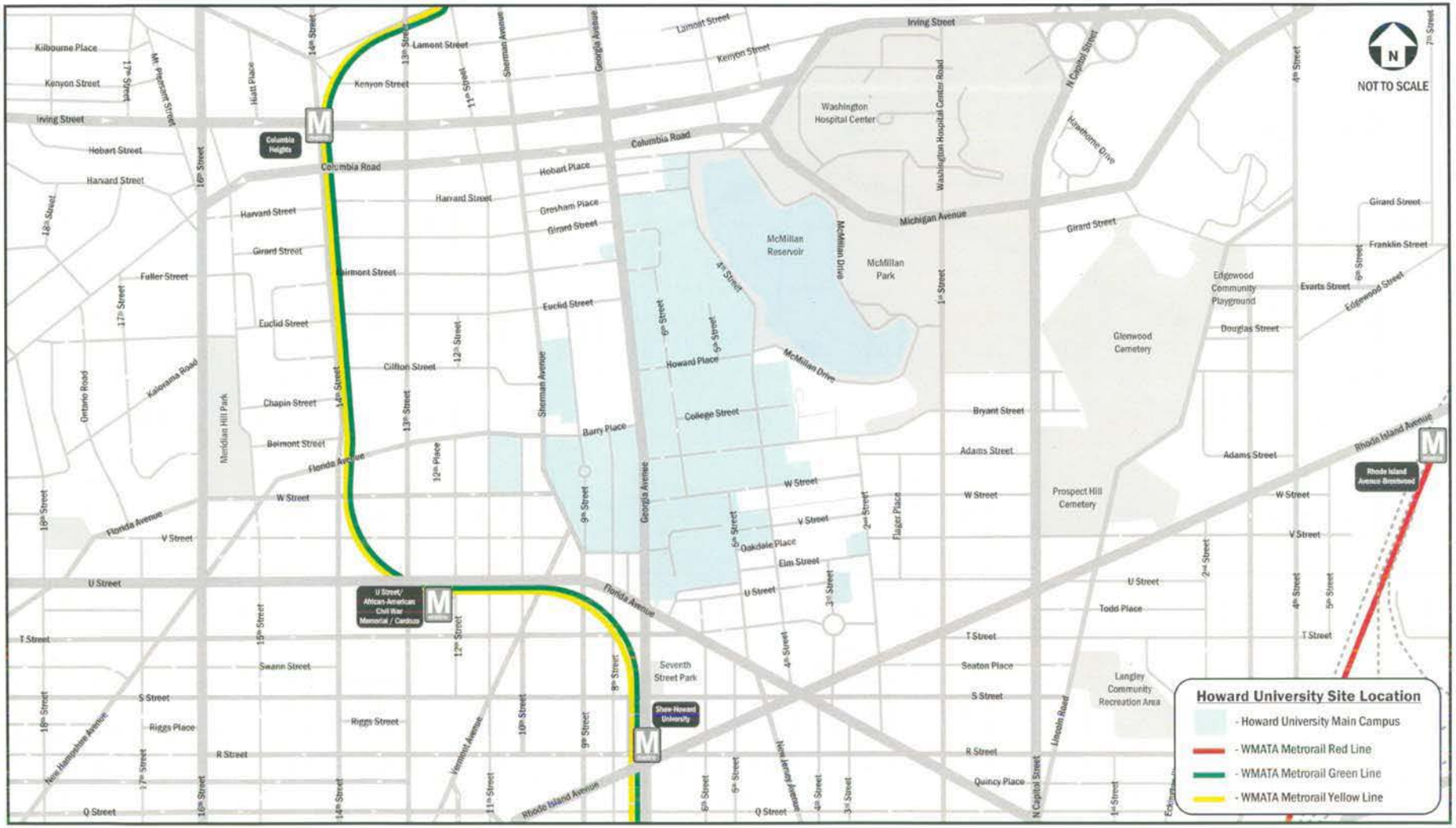


Figure 1: Howard University Central Campus Location

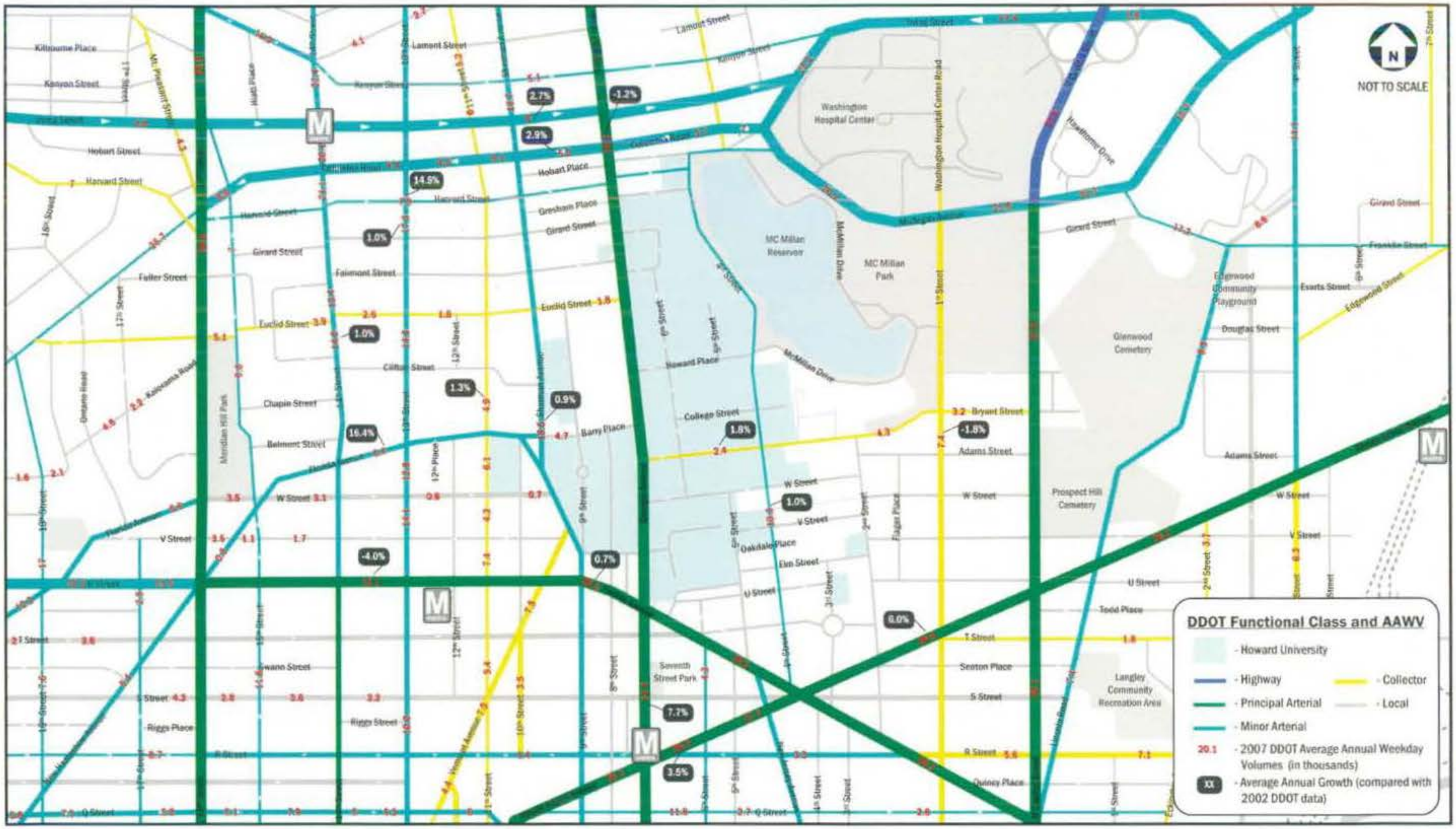


Figure 2: Functional Class and Average Annual Weekday Volumes

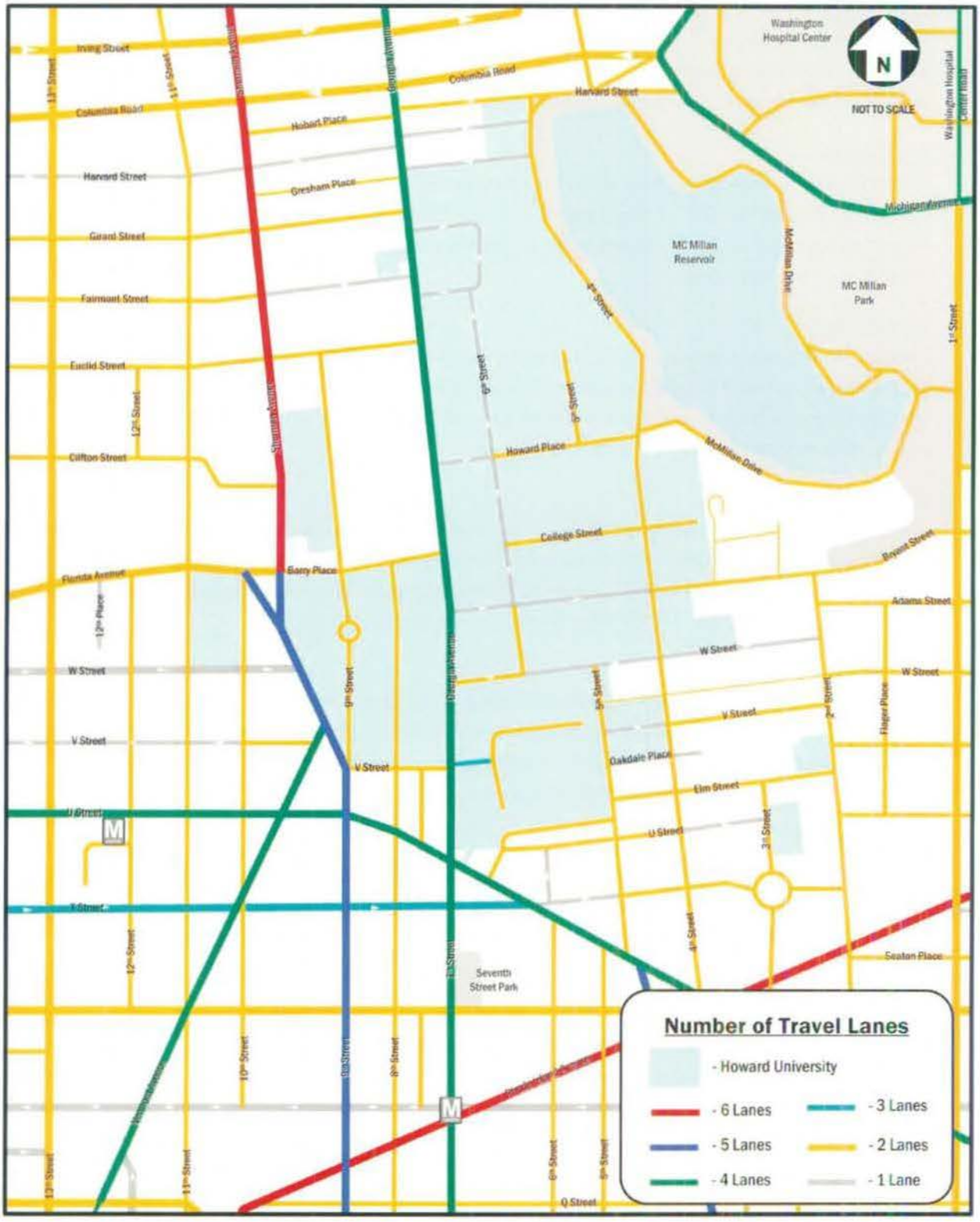


Figure 3: Existing Number of Travel Lanes for the HU Central Campus

- *Gresham Place*

  Gresham Place is a one-lane roadway which runs along the north side of the HU Central Campus. The roadway is classified by DDOT as a local road. Within the limits of the study area, Gresham Place runs between Georgia Avenue and 4th Street. It is a one-way westbound street.

- *Girard Street*

  Girard Street is a two-lane roadway which runs through the northern portion of the HU Central Campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, Girard Street runs between Georgia Avenue and 6th Street. Girard Street is one-way eastbound east of Georgia Avenue. West of Georgia Avenue, it is a two-way street.

- *Fairmont Street*

  Fairmont Street is a one- to two-lane roadway which runs through the northern portion of the HU Central Campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, Fairmont Street runs between Georgia Avenue and 6th Street. Fairmont Street is one-way westbound between Sherman Avenue and 6th Street. West of Sherman Avenue, it is a two-way street.

- *Euclid Street*

  Euclid Street is a one-lane roadway which runs to the west of the HU Central Campus. The roadway is classified by DDOT as a collector roadway with an average annual weekday traffic volume of 1,800 vehicles. Within the limits of the study area, Euclid Street runs west of Georgia Avenue. Euclid Street is one-way eastbound between Sherman Avenue and Georgia Avenue. West of Sherman Avenue, it is a two-way street.

- *Howard Place*

  Howard Place is a one-lane roadway which runs through the central portion of the HU Central Campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, Howard Place runs between Georgia Avenue and 4th Street. Howard Place is one-way eastbound between Georgia Avenue and 6th Street. Between 6th Street and 4th Street, it is a two-way street.

- *College Street*

  College Street is a two-lane roadway which runs through the central portion of the HU Central Campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, Howard Place runs between 6th Street and 4th Street.

- *Barry Place*

  Barry Place is a two-lane roadway which runs to the west of the HU Central Campus. The roadway is classified by DDOT as a local roadway with an average annual weekday traffic volume of 4,700 vehicles. Within the limits of the study area, Barry Place runs between Sherman Avenue and Georgia Avenue.

- *Bryant Street*

  Bryant Street is a one- to two-lane roadway which runs through the southern portion of the HU Central Campus. The roadway is classified by DDOT as a collector roadway with an average annual weekday volume of 2,400 vehicles. Within the limits of the study area, Bryant Street runs between Georgia Avenue and 2nd Street. Bryant Street is one-way eastbound between Georgia Avenue and 4th Street. East of 4th Street, it is a two-way street.

- *W Street*

  W Street is a one-lane roadway which runs along the southern side of the HU Central Campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, W Street runs between Georgia Avenue and 2nd Street. W Street is one-way westbound between Georgia Avenue and 4th Street. Between 4th and 2nd Streets, it is one-way eastbound.

- *V Street*

  V Street is a one- to two-lane roadway which runs along the west side of the Howard University Hospital campus. The roadway is classified by DDOT as a local roadway. Within the limits of the study area, V Street runs west from Georgia Avenue at the Hospital exit and between 5th Street and 2nd Street. V Street is a two-way roadway, with the exception of the portion between 5th Street and 4th Street where it is one-way westbound.

- *Sherman Avenue*

  Sherman Avenue is a six-lane arterial which runs to the west of the Howard University Central Campus. The roadway is classified by DDOT as a minor arterial with an average annual weekday traffic volume of 18,500 vehicles. Within the limits of the study area, Sherman Avenue intersects Barry Place to the west of campus.

- *6th Street*

  Within the limits of the study area, 6th Street runs between Girard Street and W Street. 6th Street is a one-lane roadway, which runs through the west portion of the Howard University Central Campus. The roadway is classified by DDOT as a local roadway. 6th Street is one-way southbound between Girard Street and Fairmont Street, one-way northbound between Fairmont Street and Howard Place, one-way southbound between Howard Place and Bryant Street, and two-way between Bryant Street and W Street.

- *5th Street*

  Within the limits of the study area, 5th Street runs between W Street and U Street. 5th Street is a two-lane roadway, which runs south through the center of the Howard University Hospital campus. The roadway is classified by DDOT as a local roadway.

- *4th Street*

  Within the limits of the study area, 4th Street runs between Harvard Street and U Street. 4th Street is a two-lane roadway, which runs along the east side and through the east portion of the Howard University Central Campus. The roadway is classified by DDOT as a minor arterial with an average annual weekday traffic volume of 10,300 vehicles.

1.3 Site Access

Site access for the Central Campus is provided by multiple access points around the campus. The primary campus entrance is ornamentally designated at the intersection of Georgia Avenue and Fairmont Street. This is not the primary vehicular access point to campus due to the one-way configuration of Fairmont Street. Secondary access points are provided along Georgia Avenue at Girard Street, Howard Place, and Bryant Street. Several parking lot accesses are also provided along Georgia Avenue. Vehicles primarily exit the campus along Georgia Avenue at Fairmont Street and W Street. Gated entrances/exits for the central portion of campus are provided along Howard Place at 6th Street and 4th Street in order to regulate traffic entering the Central Campus. The gate at 4th Street and Howard Place is closed in order to decrease traffic

cutting through the central campus. Access along 4th Street into campus is provided at College Street and W Street and out of campus is provided at College Street and Bryant Street. Access to the residential portions of campus is also provided along Barry Place and Bryant Street.

Access for the Howard University Hospital is provided at multiple points surrounding the campus. The primary Hospital entrance is located along Georgia Avenue north of the intersection with Florida Avenue, with the primary exit located along Georgia Avenue at the intersection with V Street. Secondary access points are also provided along W Street and 5th Street.

1.4 Field Observations

Observations of the study intersections were performed by Gorove/Slade in order to confirm the lane configurations and signal timings obtained from DDOT. During these observation periods, remarks were noted in regards to roadway operations. The study area was observed on Thursday, April 2, 2009 and on Tuesday, April 26, 2011 between 7:30 and 9:30 AM and between 4:30 and 6:30 PM. These days represent "typical" weekdays when classes are in session for the University and the public school system in also in session. These observations were also used to confirm the existing conditions capacity analysis results.

1.4.1 Morning Peak Hour

All intersections within the study area operated with an acceptable amount of delay during the morning peak hour.

The unsignalized intersection of Georgia Avenue and Girard Street experienced very little queue development on the stop-controlled approach due to adequate gaps in traffic along Georgia Avenue. The intersections of Georgia Avenue with Fairmont Street, Howard Place, Barry Place, Bryant Street, and W Street had short queues of approximately 4-6 vehicles developing on the minor approaches. Vehicular traffic along Georgia Avenue was very well coordinated along the arterial. Due to the heavy commuter traffic, most vehicles were traveling southbound along the corridor past the University. Signals along the corridor were well timed to allow for vehicles to travel the corridor quickly without stopping. The only congestion issues observed were the result of vehicles turning at intersections and vehicles stopping for on-street parking. Some congestion was also observed due to buses stopping along the corridor, frequently at or near intersections. Most vehicles were speeding through the corridor and weaving around stopped vehicles and buses when necessary. Multiple buses were observed along Georgia Avenue. In addition to the congestion issues observed due to buses and turning vehicles, unacceptable delay was observed on the westbound approach of Florida Avenue at Georgia Avenue, with queues of at least 8 vehicles developing on the approach.

The intersection of Sherman Avenue and Barry Place experienced little delay. Heavy traffic volumes were observed along the Sherman Avenue corridor, which appeared to be equal to or greater than the traffic volumes on Georgia Avenue. Queues of approximately 4-6 vehicles developed on each approach during the opposing green time. Congestion observed on Sherman Avenue was due to turning vehicles or stopped buses. A few buses were observed along Sherman Avenue.

The intersections of 4th Street with Howard Place/McMillan Drive, College Street, Bryant Street, and W Street experienced little delay. The majority of traffic was traveling towards campus or moving along the 4th Street corridor. Queues of approximately 3-4 vehicles developed on each approach during the opposing green time. A few buses were observed traveling through both intersections.

The intersections of 6th Street with Fairmont Street, Howard Place, College Street, Bryant Street, and W Street experienced very little delay. Vehicular traffic on these roadways was minor, and queues of approximately 2-3 vehicles were observed on the stop-controlled approaches due to conflicting vehicles and pedestrians.

Heavy pedestrian traffic was observed crossing Georgia Avenue at Howard Place and Barry Place moving towards campus. Pedestrians were also observed traveling northbound on Georgia, along 4th Street and 6th Street, and along Barry Place crossing Sherman Avenue traveling towards campus. Most pedestrians appeared to obey pedestrian signals along Georgia Avenue and Sherman Avenue due to heavy traffic volumes moving quickly down the corridors. Pedestrians on 4th Street mostly crossed during gaps in traffic, frequently jaywalking across the intersection. Several pedestrians were also observed jaywalking across 6th Street between parked vehicles.

1.4.2 Afternoon Peak Hour

All intersections within the study area operated with an acceptable amount of delay during the afternoon peak hour.

The unsignalized intersection of Georgia Avenue and Girard Street experienced occasional queue development of 3-4 vehicles on the stop-controlled approach. Adequate gaps in traffic along Georgia Avenue allowed these vehicles to turn with little incurred delay. The intersections of Georgia Avenue with Fairmont Street, Howard Place, Barry Place, Bryant Street, and W Street had short queues of approximately 4-6 vehicles developing on the minor approaches. Vehicular traffic on Georgia Avenue was very well coordinated along the arterial. Due to the heavy commuter traffic, most vehicles were traveling northbound along the corridor past the University. Signals along the corridor were well timed to allow for vehicles to travel the corridor quickly without stopping. The only congestion issues observed were the result of vehicles turning at intersections and vehicles stopping for on-street parking. Some congestion was also observed due to buses stopping along the corridor, frequently at or near intersections. Most vehicles were speeding through the corridor and weaving around stopped vehicles and buses when necessary. Multiple buses were observed along Georgia Avenue. In addition to the congestion issues observed due to buses and turning vehicles, unacceptable delay was observed on the westbound approach of Florida Avenue at Georgia Avenue, with queues of at least 8 vehicles developing on the approach.

The intersection of Sherman Avenue and Barry Place experienced an acceptable amount delay. Heavy traffic volumes were observed along the Sherman Avenue corridor traveling northbound. Queues of approximately 4-6 vehicles developed on each approach during the opposing green time. The eastbound approach experienced the most delay, with queues of approximately 6-8 vehicles developing. Congestion observed on Sherman Avenue appeared to be due to turning vehicles or stopped buses. A few buses were observed along Sherman Avenue.

The intersections of 4th Street with Howard Place/McMillan Drive, College Street, Bryant Street, and W Street experienced an acceptable amount of delay. The majority of traffic was traveling away from campus or moving along the 4th Street corridor. Queues of approximately 4-6 vehicles developed on each approach during the opposing green time. Congestion observed appeared to be due to turning vehicles and vehicles exiting on-street parking spaces. A few buses were observed traveling through both intersections.

The intersections of 6th Street with Fairmont Street, Howard Place, College Street, Bryant Street, and W Street experienced very little delay. Vehicular traffic on these roadways was minor, and queues of approximately 2-3 vehicles were observed on the stop-controlled approaches due to conflicting vehicles and pedestrians.

Heavy pedestrian traffic was observed crossing Georgia Avenue at Howard Place and Barry Place moving away from campus. Some additional pedestrians were observed traveling towards campus. Pedestrians were also observed traveling northbound on Georgia, along 4th Street and 6th Street, and along Barry Place crossing Sherman Avenue traveling away from campus. Most pedestrians appeared to obey pedestrian signals due to heavy traffic volumes moving quickly along the corridors leaving few gaps for crossing. Pedestrians on 4th Street mostly crossed during gaps in traffic, frequently jaywalking across the intersection. Several pedestrians were also observed jaywalking across 6th Street between parked vehicles.

1.5 Car-Sharing

At Howard University, car sharing is provided by Zipcar. Zipcar is a private company that allows registered users to reserve cars for a minimum of 30 minutes or for longer periods up to several days. Car-sharing provides individual access to automobiles for trips made easier by car. Many universities have car-sharing programs because they reduce the number of students that bring cars to campus, which reduces the number of parking spaces that are needed.

Within the study area, 20 Zipcar vehicles are available. Table 1 lists the car-sharing locations in the study area and the number of vehicles available.

Table 1: Car-share Location and Vehicles

Car-share Location	Number of Vehicles
Howard University – 2704 Georgia Avenue NW	1 vehicle
Howard University/8th Street NW – Howard Plaza Towers	2 vehicles
Howard University at Howard Center	1 vehicle
Howard University – 515 W Street NW	2 vehicles
Howard University – 8th Street & Florida Avenue NW	14 vehicles
Total Number of Car-share Vehicles in Study Area	**20 vehicles**

1.6 Parking

Howard University requires all students, faculty, staff, visitors and guests to park on-campus. To accommodate demand for parking, the University has multiple surface parking lots and on-street parking spaces located throughout the campus. HU has a total of 2,295 parking spaces on the central campus, with an additional 1,495 parking spaces for the HU Hospital. HU requires that all vehicles parked on University property display a valid hangtag or parking permit for the appropriate parking lot or area. Vehicles parking without a valid permit are subject to ticketing, towing, and/or immobilization. Personnel from Parking Enforcement, Campus Police, and Hospital Security enforce University parking regulations. Parking management is provided by the Office of Parking and Shuttle Operations (OPSO), which is managed by Auxiliary Services. Parking spaces provided under Bethune and the East and West Towers are managed by Residence Life.

Faculty and staff parking assignments are made through departmental allocations. The department head, dean, or vice president makes all parking assignments for each department. Employees must fill out forms from their departmental parking coordinator, which are processed by OPSO. 400 reserved parking spaces are distributed to departments for allocation as they believe best fit their needs. All other parking spaces are non-reserved. Parking permits and expiration stickers are provided for an annual parking fee of $400 for a reserved space or $300 for a non-reserved space. Faculty and staff may pay their parking fees by payroll deduction or by advance payment. Employees who are unable to obtain a parking assignment must find alternatives to driving to campus.

Student parking is determined through a Parking Registration system at HU that operates on a first-come, first-serve basis. The registration is held following the spring semester of each year. Students must register for a parking permit by the deadline and pick up their parking permits the following fall semester. Unclaimed parking assignments are sold via an automated random selection process. Student permits are provided for an annual fee of $240. Howard Plaza Towers and Bethune Annex residents apply through the residence manager's office if they wish to park in the underground parking facilities. Parking is very limited and students are encouraged to rideshare or use alternatives to driving to campus. To effectively manage this limited resource, freshmen (First Time In College) students are not eligible for parking privileges on University lots. Freshmen are discouraged from bringing a car to campus as street parking is limited and aggressively enforced by District of Columbia authorities.

Visitor parking is very limited, and daily parking permits are available from OPSO for $4. Visitors are allowed to park in any open lot with a daily parking permit. On-street parking spaces are also available throughout the campus. Hospital parking is managed by OPSO. There are a total of 1,495 parking spaces provided for hospital staff, patients, and visitors. During summer sessions, monthly parking permits are available for faculty/staff and students. Parking for students is $24 per month, and students must be registered for summer school in order to qualify for parking. Parking for faculty/staff is $30 per month during the summer session.

Contracted security officers are stationed at select University parking lots in order to enforce parking policies. These officers are managed by the Campus Police. Parking enforcement is also provided by the Campus Police. There are currently four parking enforcement officers who are responsible for ticketing vehicles without valid permits. Collection of parking fines is handled by OPSO. HU relies on ticketing and towing to keep parking spaces open on campus, though the current program still results in an unacceptable amount of illegal parking on campus.

Table 2 presents observations of the existing parking supply and demand. The data was collected by inventorying the existing lots and performing observations on their occupancy over several times during a typical weekday when classes were in session. Figure 4 shows a key to the parking lot locations.

Generally, a parking supply is considered at capacity when demand reaches 90% of the supply. Thus, the existing campus parking situation is under capacity. This is contrary to some of the comments from University staff, who have consistently referred to on-campus parking as insufficient. This is likely due to the location of the lots with available spaces relative to where people want to be on campus. Figure 5 summarizes the amount of parking and percent occupied at peak times by zones within campus. The figure shows how the lots in the middle of campus are over-capacity (occupancy higher than 90%), and that the further a zone is from the center of campus, the lower the peak occupancy. The existing demand of approximately 1,750 spaces requires a supply of 1,925 spaces to meet it, given a proper distribution of demand to the lots on campus.

Table 2 also contains data on the parking facilities for the Hospital. The observed demand at the Hospital parking facilities is over 90%, indicating a parking supply operating over capacity. The Hospital parking data is presented for informational purposes only, as it is separate from the Campus Master Plan process.

In addition to the parking provided on campus, several of the streets on and near campus provide parking. This includes metered parking and free time-limited parking with residential parking permit exceptions. The majority of the streets located outside the campus have time-restricted on-street parking, mainly consisting of two-hour limits, with no time-limit in place for vehicles with residential parking permits. Several of the streets located within the campus, including Georgia Avenue, 6th Street, 4th Street, Fairmont Street, and W Street have metered parking spaces provided on-street. Several of these on-street spaces (time-restricted and metered) are utilized by both faculty/staff and students that do not obtain parking permits. Available spaces may also be used by HU visitors that cannot find parking within the University or do not wish to pay for a visitor permit.

Table 2: Existing Parking Supply & Demand

Lot Code	Lot Name	Existing Parking Supply (Number of Spaces by Designation)				Peak Occupancy on Typical Weekday*	
		Student	*Faculty& Staff*	*H/C*	*Total*	**Percentage**	**Parked Cars**
A	Childers	0	66	6	72	99%	71
AA	Florida Avenue	0	22	1	23	83%	19
B	Founders	0	48	8	56	70%	39
BB	HUSC	0	37	0	37	100%	37
C	Business	0	34	2	36	100%	36
D	Miner	0	50	2	52	104%	54
E	Johnson	0	42	1	43	100%	43
EE	LSHSL	0	41	2	43	44%	19
F	Mackey	0	63	0	63	90%	57
G	Downing	0	33	2	35	97%	34
H	Drew	47	4	3	54	83%	45
I	Greene	0	44	2	46	96%	44
J	Burr	0	11	1	12	75%	9
K	Georgia	0	33	1	34	85%	29
L	Just	0	22	1	23	70%	16
M	Chem	0	8	0	8	75%	6
N	Early Learning Center	0	0	0	0	N/A	N/A
O	C.B.P.	0	49	4	53	79%	42
P	6th Street	0	10	0	10	50%	5
Q	Power/Bunche	0	11	1	12	25%	3
R	Bethune	100	111	7	218	96%	210
RR	Bethune Underground	57	4	2	63	38%	24
RR	Bethune Annex	0	10	2	12	117%^	14^
S	Nursing	0	58	3	61	74%	45
T	5th & W	0	26	0	26	38%	10
U	6th & W	0	17	1	18	56%	10
V	Howard Center	100	209	6	315	89%	281
W	East Tower	100	34	4	138	81%	112
WW	East Tower Underground	100	2	1	103	80%	82
X	9th Street	33	0	0	33	67%	22
YY	West Tower Underground	99	3	1	103	56%	58
Z	Banneker	240	71	3	314	55%	173
1	Howard Center II	0	44	3	47	62%	29
2	9th & V Street Lot	40	25	3	68	29%	20
3	Annex I Rear	0	10	2	12	92%	11
4	Wonder Plaza	0	48	4	52	75%	39
Total Academic		**916**	**1,300**	**79**	**2,295**	**76%**	**1,748**
HUH-A	Hospital Lot A	0	124	0	124	91%	113
HUH-B	Hospital Lot B	0	120	4	124	114%~	141~
HUH-C	Hospital Lot C	0	11	0	11	100%	11
HUH-D	Hospital Lot D	0	42	5	47	130%^	61^
HUH-E	Hospital Garage E	0	593	16	609	89%	544
HUH-F	Hospital Garage F	0	552	28	580	88%	508
Total Hospital		**0**	**1,442**	**53**	**1,495**	**92%**	**1,378**

** - Observations performed on a weekday when classes were in session, at several times in the morning and afternoon. Peak occupancy listed is the highest observed occupancy at each lot among all times*

^ - Illegal parking observed, leading to occupancy greater than 100%.

~ - Lot is stacked parking by valet, leading to occupancy greater than 100%

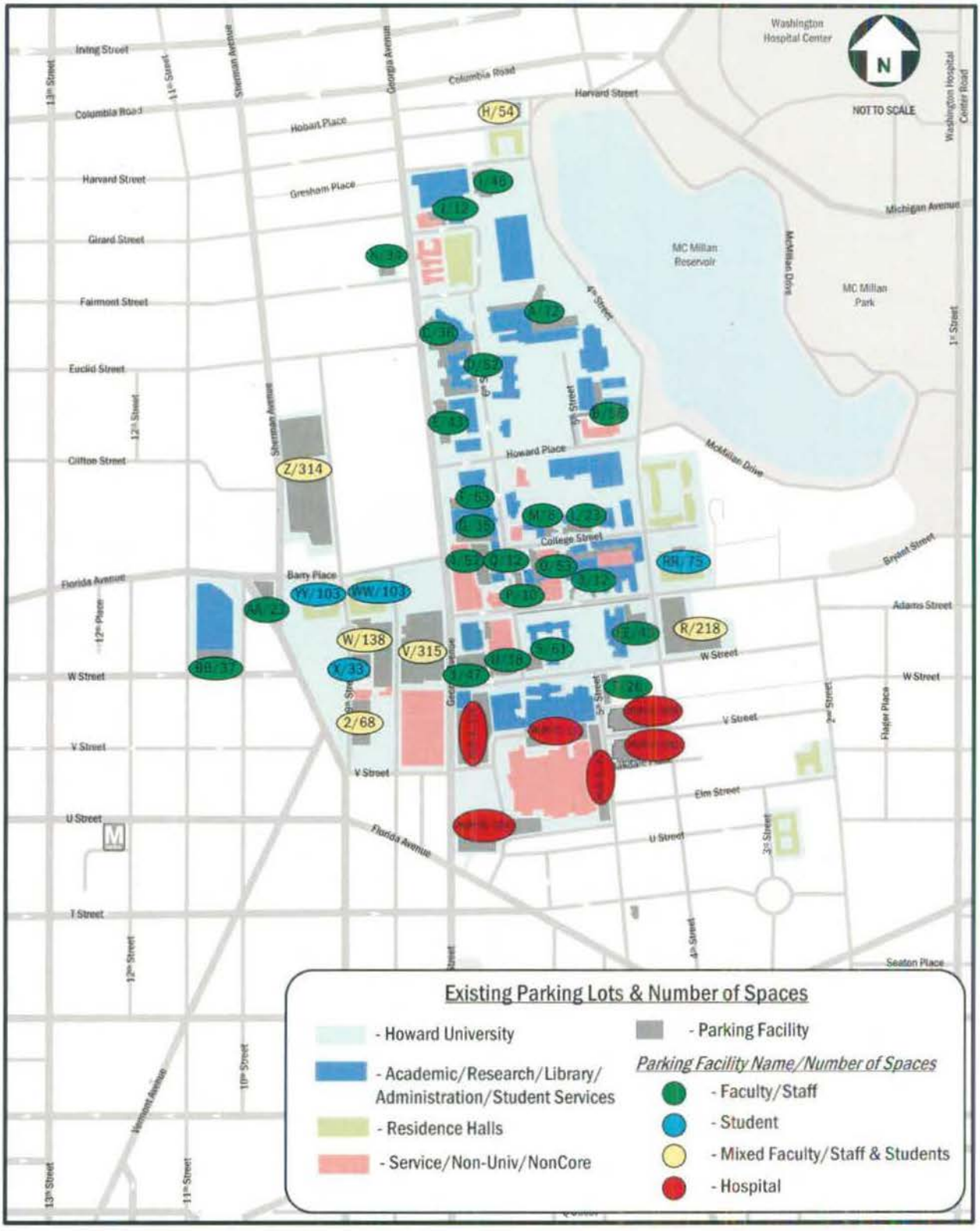


Figure 4: Campus Parking Lots

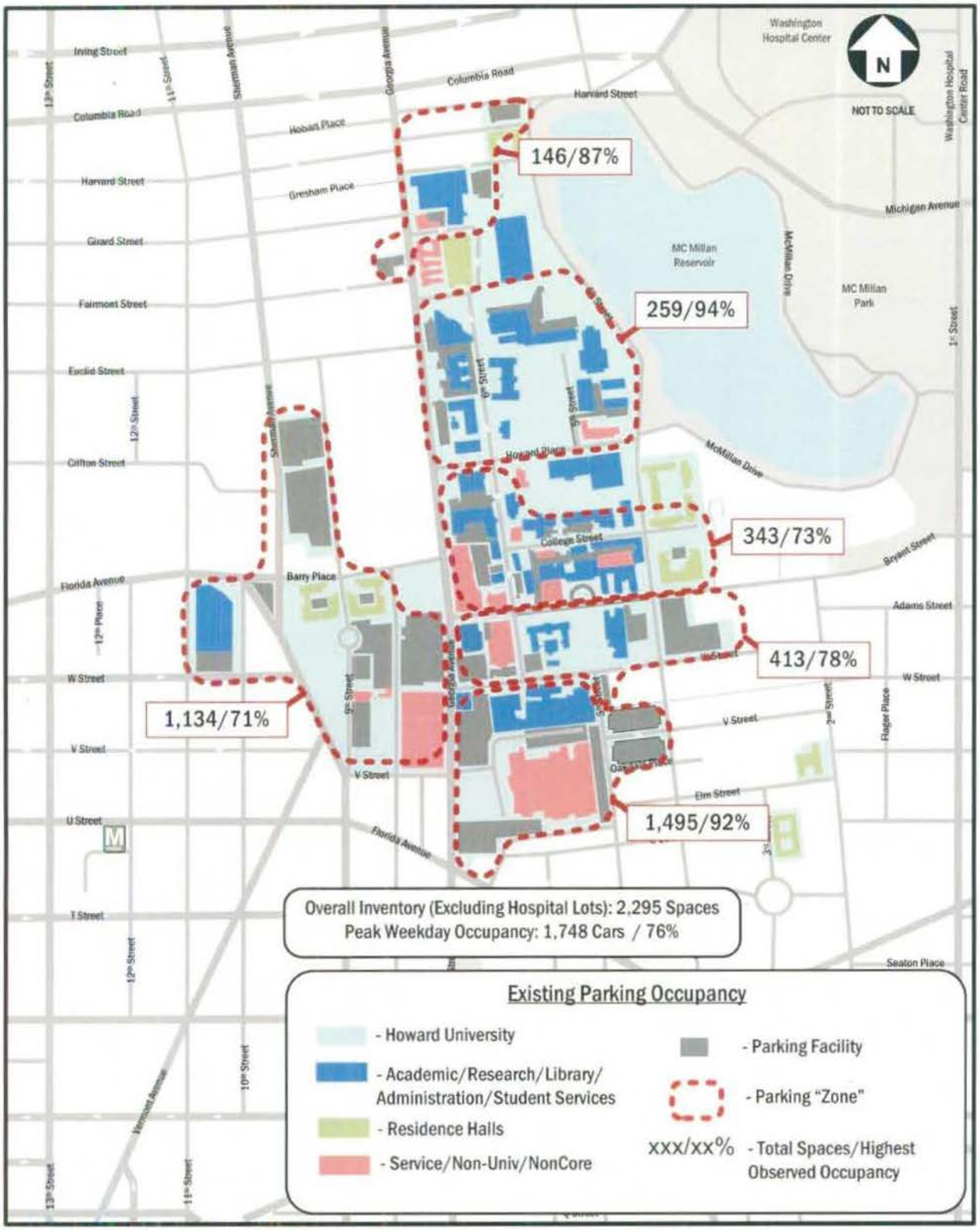


Figure 5: Parking Demand Summary

1.7 Transit Service

Howard University is directly served by Metrobus and linked with Metrorail Stations located on the Green and Yellow Lines by HU Shuttles and Metrobus. Figure 6 identifies Metrobus routes and stops and the nearest Metrorail station locations that serve HU. This includes service along Georgia Avenue and 4th Street adjacent to campus with multiple stops provided along each transit corridor. Transit connects the campus to destinations throughout the District, Maryland, and Virginia.

WMATA's Shaw Metrorail Green and Yellow Lines station is located at 7th Street and S Street NW. The station is located 0.6 miles from the intersection of 4th Street and Bryant Street, which is approximately an 11 minute walk. The University is connected to the Shaw and U Street Metrorail stations by shuttle service, as outlined in Section 1.6. The University is also served by WMATA's local bus service and express bus service, which operates along Georgia Avenue.

There are some bus stops with shelters in the study area that provide rider amenities, such as shelter, benches, route maps, and schedules, while those without shelters are designated by a WMATA sign and do not have additional amenities. Some bus stops near the site are equipped with Next Bus technology, which allows customers to determine bus arrival times. Next Bus technology uses global positioning satellites and advanced computer modeling to track buses on their routes every 120 seconds. Customers can obtain bus information using desktop computers, wireless devices, phones calls to Metro Customer Service, and electronic message signs, though no electronic signs are located in the study area.

1.7.1 DC's Transit Future System Plan

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 that growth and further strengthen neighborhoods. In order to meet these challenges and capitalize on future opportunities, the District Department of Transportation (DDOT) has developed a plan to identify transit challenges and opportunities and to recommend investments. This is outlined in the *DC's Transit Future System Plan* report published by DDOT in April 2010. This plan includes the reestablishment of streetcar service in the District and the implementation of limited-stop bus service along major corridors in the vicinity of the Howard University Central Campus.

The proposed streetcar system element of the plan, as shown on Figure 7, includes four routes that travel near the University. The streetcar system will consist of modern low-floor vehicles that operate on surface tracks embedded in the roadways, which will mostly operate in travel lanes that are shared with automobiles. Stops will generally be located every ¼- to ½-mile along the routes. The future planned routes serving the study area will connect the University to several areas in the District including Rhode Island Avenue, Washington Circle, Buzzard Point, Woodley Park/Adams Morgan, Congress Heights, Brookland, and Takoma.

The Metro Express limited-stop bus service element of the plan, as shown on Figure 8, includes several routes that travel near the University. The new limited-stop bus service will consist of high-frequency buses using specially marked vehicles, operated by WMATA, which will supplement the four existing Metro Express routes that operate along Georgia Avenue, 16th Street, Wisconsin Avenue, and Pennsylvania Avenue. Stops will generally be located every ¼- to ½-mile along the routes. The Metro Express bus services will also include traffic signal priority and real-time Next Bus arrival displays. The future planned corridors near the University include 16th Street, 14th Street, Georgia Avenue, North Capitol Street, Columbia Road/Michigan Avenue, U Street/Florida Avenue, and Rhode Island Avenue.

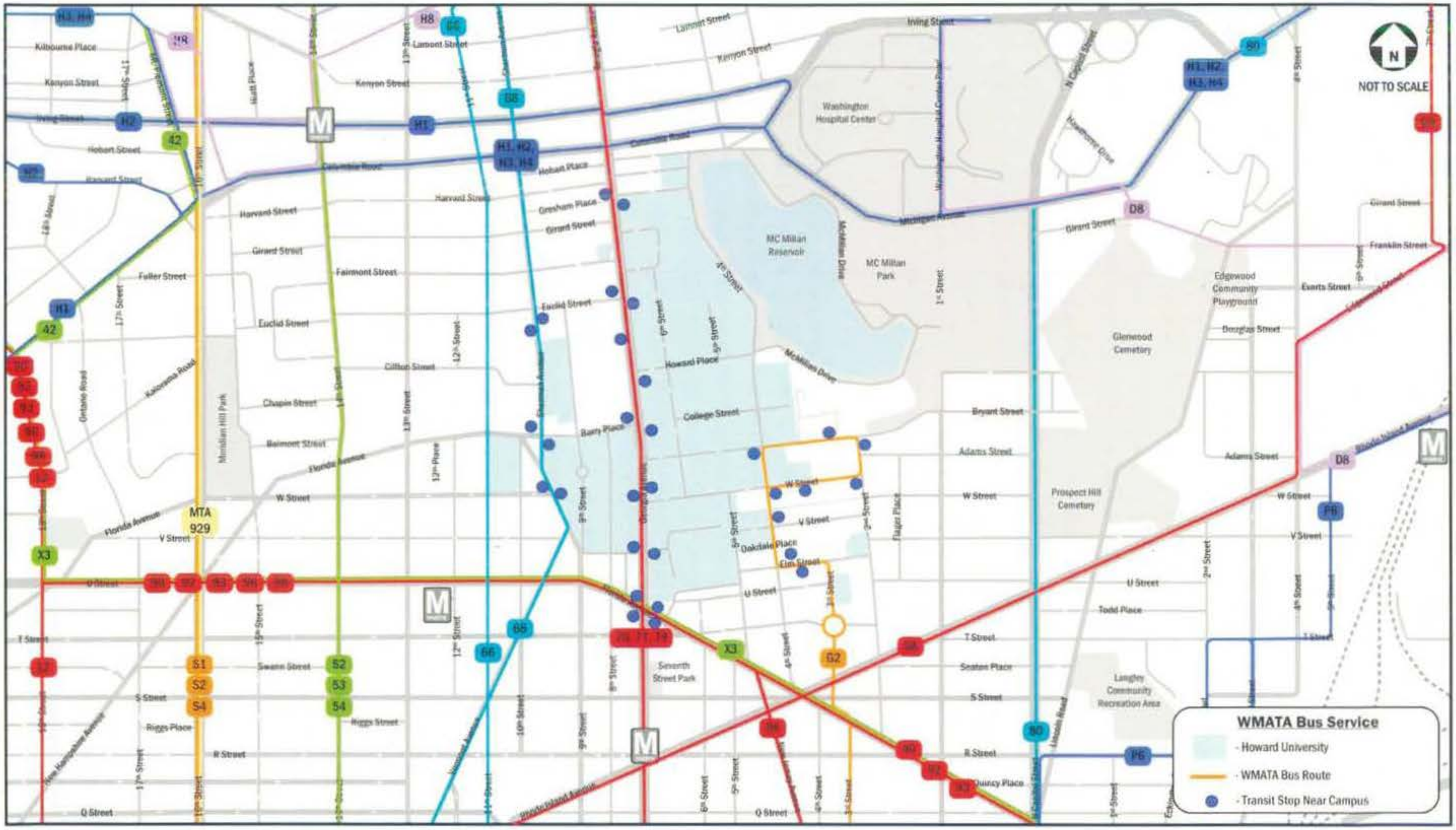


Figure 6: Area Transit Services

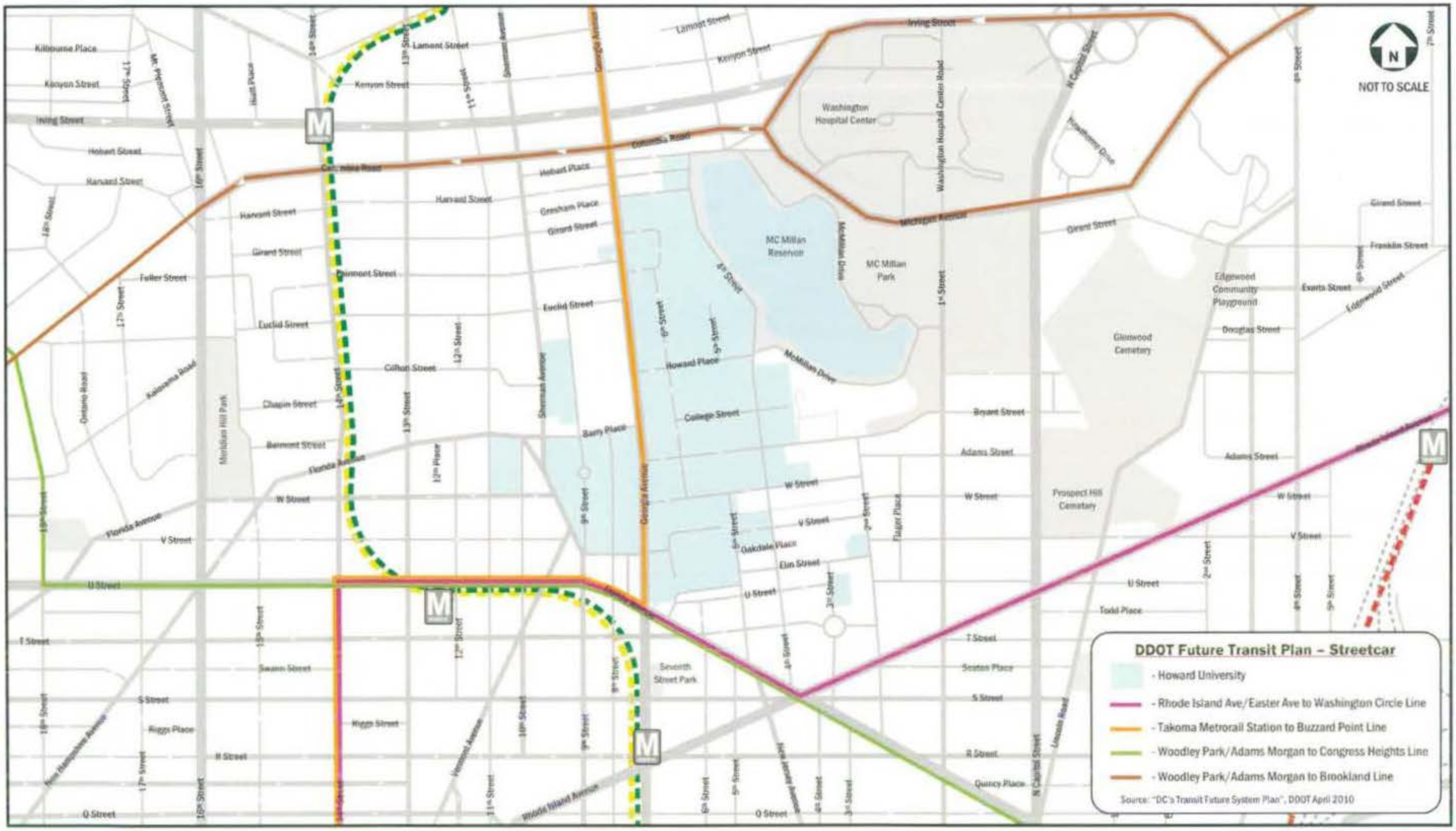


Figure 7: Future Transit Plan – Streetcar Element

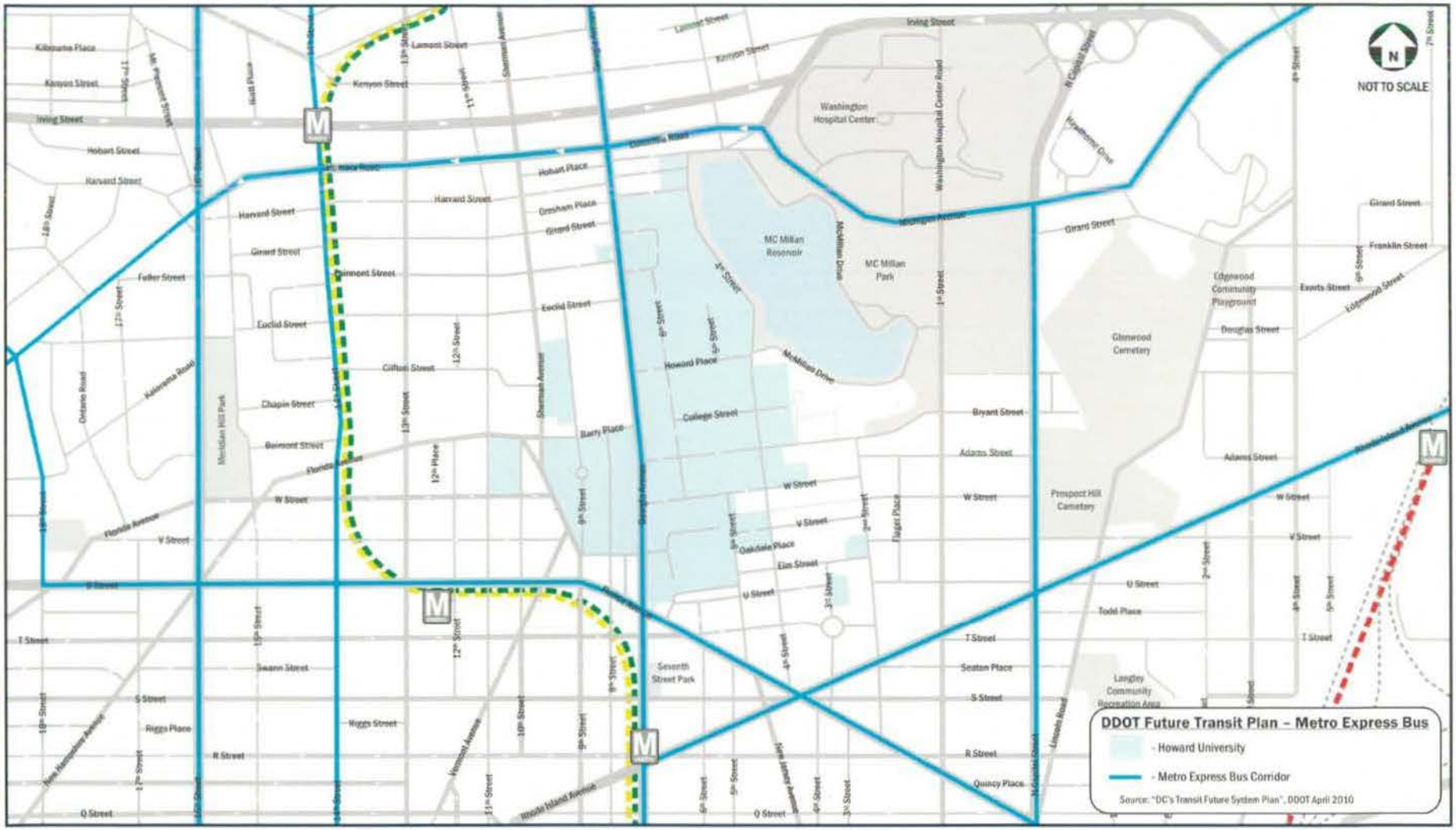


Figure 8: Future Transit Plan – Metro Express Bus Element

1.8 Howard University Shuttle Service

Howard University provides a free shuttle service with five routes running throughout the day and an additional route running on the weekends. HU shuttle service is an essential transportation service provided by the campus. The weekday shuttle service provides access around the Central Campus, to the Meridian Hill Residence Hall, to the Shaw/Howard University Metro station, to the Law School/West Campus, and to the Divinity School/East Campus. The weekend route provides daytime and Saturday late night service around the Central Campus, to the Meridian Hill Residence Hall, and to the Shaw/Howard University Metro station. Figure 9, Figure 10, Figure 11, and Figure 12 identify shuttle routes and stops.

The HU shuttle service is managed by Auxiliary Services. It was established to reduce campus vehicle trips and parking demand. The North, South, Law School/West Campus, and Divinity School/East Campus routes operate on weekdays during the fall and spring semesters. The weekend route operates on Saturday and Sunday during the fall and spring semesters and on weekdays during the summer semester.

Shuttle routes travel through campus with multiple stops located near campus buildings. The convergence point and most heavily used shuttle stop is provided at 6th Street and Fairmont Street near the School of Business and the Cramton Auditorium. This stop is a major source of pedestrian traffic and high volumes of passengers waiting, boarding and alighting. Photo 1 shows the HU shuttles and the conditions at the 6th & Fairmont shuttle stop.

The review of HU shuttle operations shows that several improvements to the shuttle service could be further investigated. The shuttle routes provided around the University have many loops and turns and no direct service between specific origins and destinations on campus (i.e. between the Shaw/Howard University Metro Station and the Quad). The North and South routes could be further studied in order to provide more efficient service to students and faculty/staff.

Photo 1: Howard University Shuttle Service and Stop

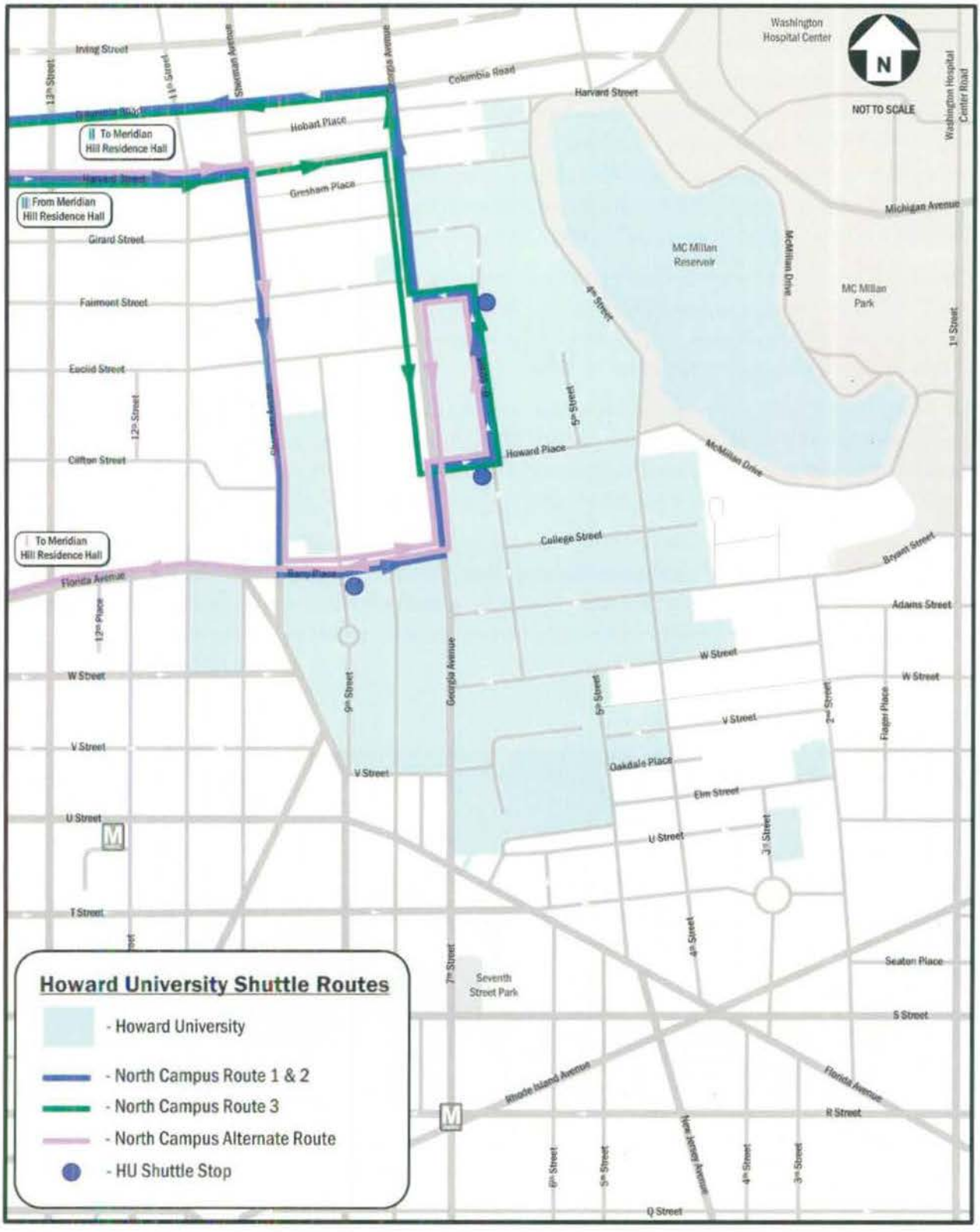


Figure 9: HU North Campus Shuttle Routes and Stops

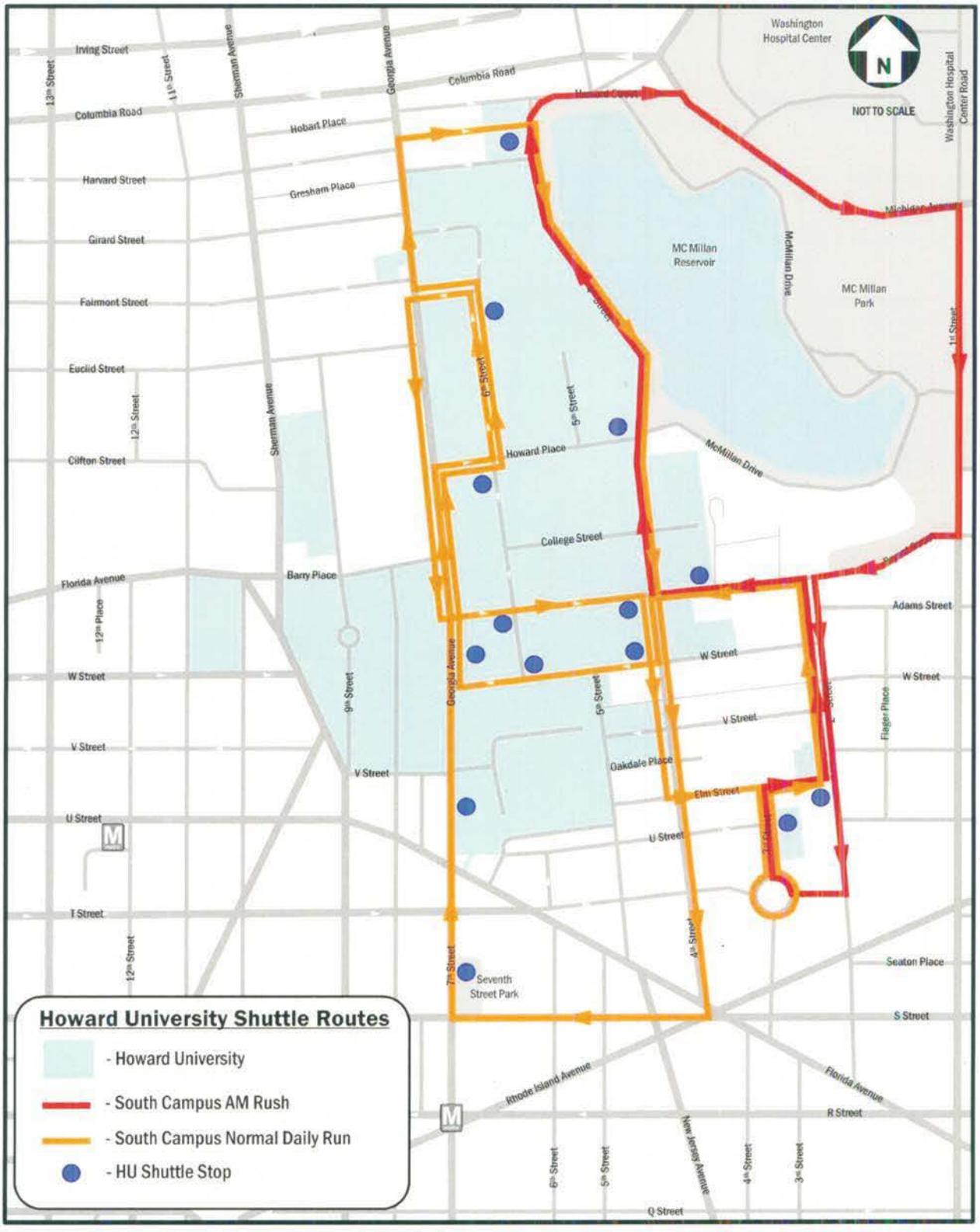


Figure 10: HU South Campus Shuttle Routes and Stops

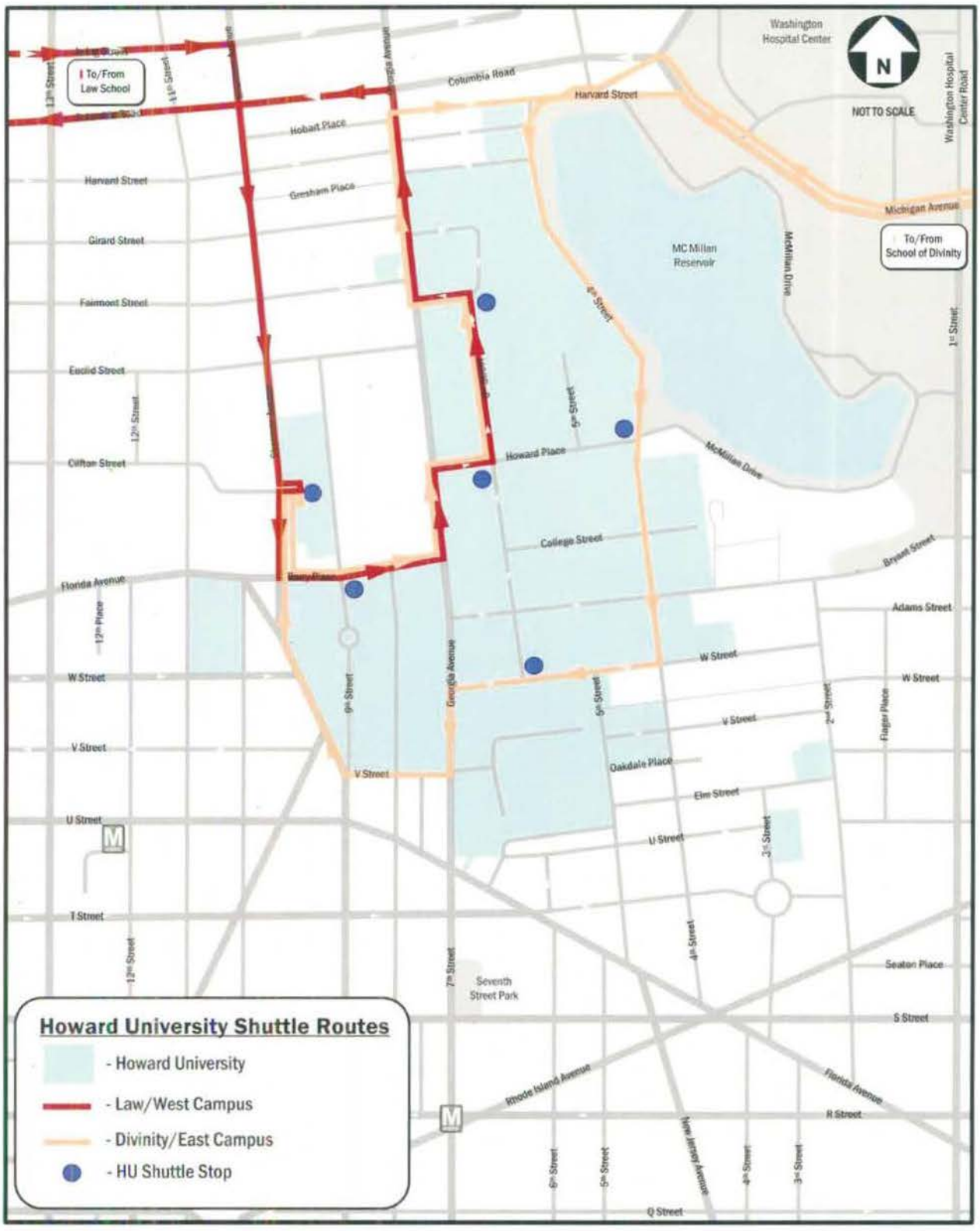


Figure 11: HU East and West Campus Shuttle Routes and Stops

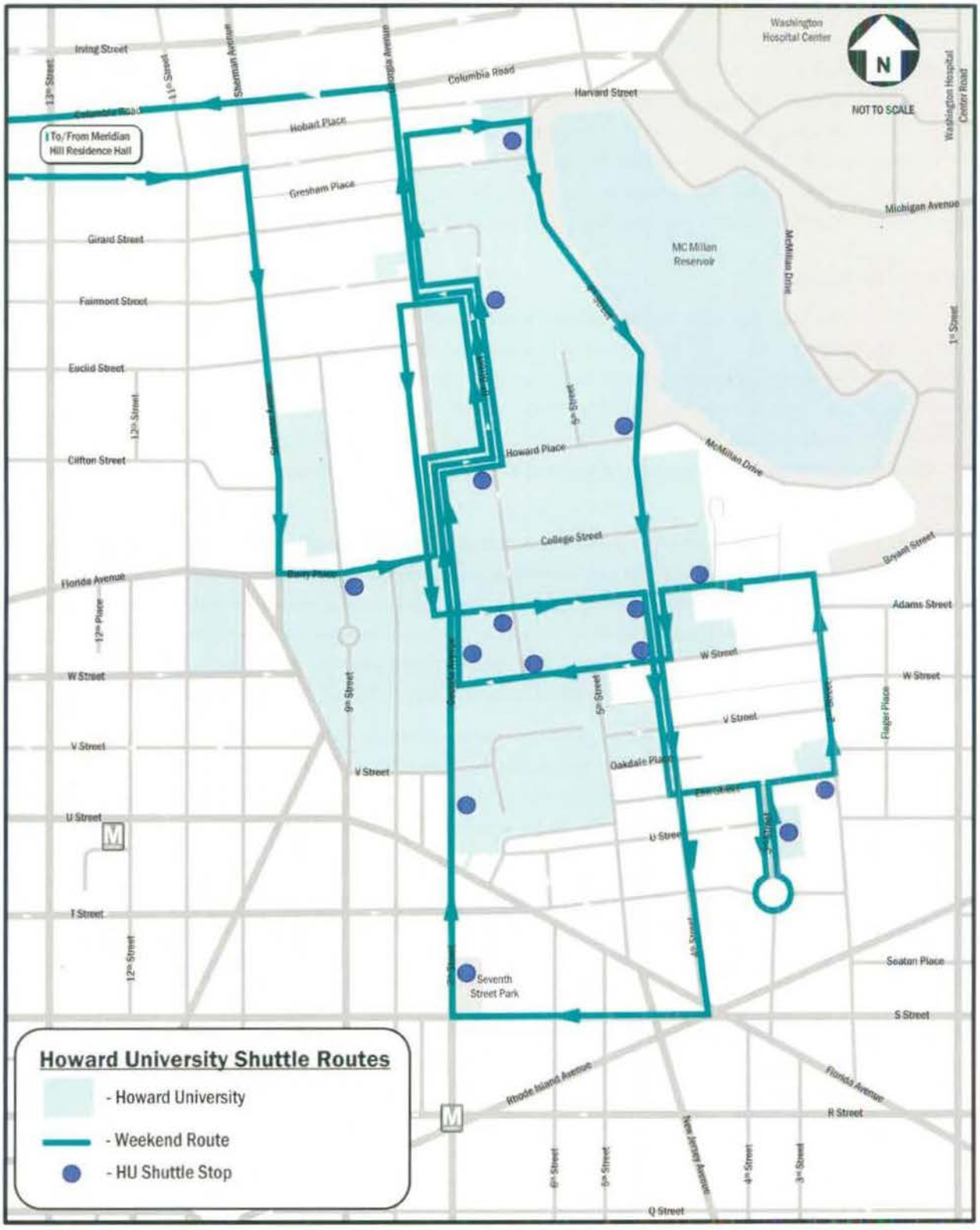


Figure 12: HU Weekend Shuttle Route and Stops

In addition to improving shuttle routes, shuttle stops may be enhanced by adding amenities such as shelter, seating, and route information. NextBus technology currently exists on campus, which has improved shuttle service. In addition, Intelligent Transportation Systems (ITS) technology could be installed at shuttle stops, which could provide information on the time remaining until the next bus arrives. This information could also be synchronized with or replace existing technology and made available on the internet to help passengers plan their trip before departing for the shuttle stop. More comprehensive information can be provided online for access by students and faculty/staff, including shuttle maps and timetables. Further study of the number and routing of HU shuttle routes are areas of operation that will help determine the most efficient routing and stop location given ridership trends and available resources.

1.8 Bicycle Facilities

Bicycle use for commuting, short trips, and recreation is increasing in the District. Increased bicycle traffic can be observed throughout the study area and the limited amount of bicycle parking is frequently occupied during peak periods. On-street bike lanes and signed bike routes have increased in the study area as well. Bike lanes extend to the periphery of campus to the north, west, south and, to a lesser extent, east. These facilities provide good conditions for cycling in the area around the campus, but connections to campus and facilities within campus are incomplete or missing. Reduced cycling conditions are primarily due to changes in topography and roadway conditions. Figure 13 shows the existing bicycle facilities in the study area.

To the north, there are topography changes and roadway configurations that reduce traffic between campus and the bike lanes on Warder Street and Park Place. To the northwest, topography changes and conditions along Georgia Avenue reduce routing options between campus and signed bike routes along Kenyon Street and Irving Street. To the west, conditions on Georgia Avenue and lack of roadway connections between campus and W Street and V Street reduce the ease of using the bike lanes located along these streets. To the south, there are limited options for crossing Florida Avenue to access bike lanes to the south, including those located along 7th Street, 5th Street, T Street, R Street, and Q Street.

Several streets adjacent to campus also act as barriers between the campus and the surrounding area. In particular, Georgia Avenue and Florida Avenue have narrow lane widths and high traffic volumes that discourage cycling. The District Department of Transportation (DDOT) indicates that Georgia Avenue has poor traffic conditions for bicycling between Florida Avenue and Euclid Street, the portion of Georgia Avenue that borders the Central Campus. This is also true of Florida Avenue between Barry Place and V Street.

On campus one-ways impede circulation within campus and require cyclists to uses off-campus roads for circulation that do not provide good cycling conditions, including 4th Street and Georgia Avenue. For example, it is not possible to enter campus at Girard Street and travel south down 6th Street without riding on the sidewalk or cycling in the wrong direction down a one-way street.

The newly created DC bike-sharing system, Capital Bikeshare, which premiered in September 2010, has three stations located near the Central Campus. The station located on Fairmont Street between 6th Street and Georgia Avenue is located on Howard University property. Other stations are located adjacent to the Metrorail station portal located at 10th Street and U Street and at 7th and T Streets NW. These stations provide connections between the University and adjacent transit stations and commercial uses to the south and west, as well as connections throughout the District. The existing Bikeshare stations experience high usage rates and demand for bikes and docks exceed supply during peak periods. Memberships to the Capital Bikeshare system are available on a yearly, monthly, weekly, or daily basis for a $75, $25, $15, or $5 fee,

respectively. Additionally, the first 30 minutes of each trip on Capital Bikeshare is free, with an additional fee paid for each 30 minute period thereafter.

Bicycle parking is not provided on campus at most campus buildings. As shown on Figure 13, the nearest bicycle rack is in the central quad on the Central Campus. During site visits and observations, some bicyclists were noted near the development sites and on campus. The Campus Police use bicycle patrolmen on campus, which seems to be the majority of bicycle users currently on campus. Based on interviews with students and faculty, there is a desire for bicycle racks to be provided on campus. The limited amount of bicycle parking in the study area acts as an additional barrier to cycling.

1.8.1 Bicycle Master Plan

As shown in the *DC Bicycle Master Plan* from April 2005, DDOT's proposed bicycle infrastructure for the roadways in the vicinity of the proposed development includes several multi-use trails, on-street bike lanes, and signed bicycle routes. The facilities will significantly improve bicycling conditions in the study area and may lead to higher rates of cycling. They also provide additional links between the University and major residential and commercial destination in northwest, DC and beyond. Figure 14 illustrates future and proposed bicycle conditions from the Bicycle Master Plan.

1.9 Pedestrian Facilities

Howard University is a compact campus with good pedestrian conditions throughout. The size of the campus, pedestrian amenities, and the location of transit stations and parking results in high pedestrian traffic throughout campus. Campus housing, transit services, and student amenities located on the periphery of the central campus are the primary sources of pedestrian traffic. Campus shuttle stops and parking lots located within campus also generate high volumes of pedestrian traffic.

The primary destination on campus is the quad, or "living room". The quad is located north of Howard Place between 5th and 6th Streets, buffered from adjacent roads by buildings and landscaping. The "living room" of campus attracts and concentrates academic and social activities, and it is the primary location for numerous formal and informal outdoor gatherings. Students and staff are frequently seen throughout the quad socializing. Vehicular access to the central core of campus and the quad is limited by gate access located at 6th Street and Howard Place. However, vehicular traffic throughout this area is still present, with multiple vehicles parked along the periphery of the quad and occasional truck deliveries to the student union. This vehicular access results in pedestrian-vehicle conflicts along access routes to the quad and within the quad along 5th Street and Howard Place. Photo 2, on the following page, shows the conditions of the quadrangle.

Between the core and campus housing, transit stops, and parking lots all streets have sidewalks and most crossings are signal or stopped controlled with crosswalks, curbramps, detectable warning strips and pedestrian countdown signals. Pedestrian conditions and crossings are fair in most locations. Along some key walking routes, the quality of walking conditions is negatively impacted by the narrow width of sidewalks, obstructions on sidewalks that reduce effective sidewalk widths, such as light poles and parking meters, missing crosswalks and curbramps, and narrow or missing buffers between sidewalks and the vehicle cartway. These issues are present along 4th Street, 6th Street and Georgia Avenue and to a lesser extent along W Street, Bryant Street, and Barry Place. These are the primary north-south and east-west pedestrian routes between campus housing, transit stops, and the quad. Within campus, pedestrian-vehicle conflicts occur at several mid-block locations where pedestrian desire lines are not aligned with intersections or designated mid-block crossing locations. This is most common where building entrances or pedestrian pathways do not align with crossing facilities.

There are east-west walking routes between off-campus housing, parking facilities, student amenities, commercial uses, and transit stops and stations that result in heavy pedestrian volumes at crossings along Georgia Avenue and to a lesser extent 4th Street on the eastside of campus and Florida Avenue on the west side of campus. Most of these crossings have good pedestrian amenities, including crosswalks, curbramps, and pedestrian signals. Photo 3 shows two of the most heavily trafficked pedestrian crossings along Georgia Avenue. The left portion shows the crossing at Bryant Street and the right shows Howard Place. Jaywalking on Georgia Avenue in the vicinity of Barry Place is an existing issue that results from access routes to and from the east being offset to the north and south of the intersection rather than routing directly to the intersection and the crosswalks.

Photo 2: Howard University Quad (The "Living Room")

Photo 3: Pedestrian Crossings on Georgia Avenue

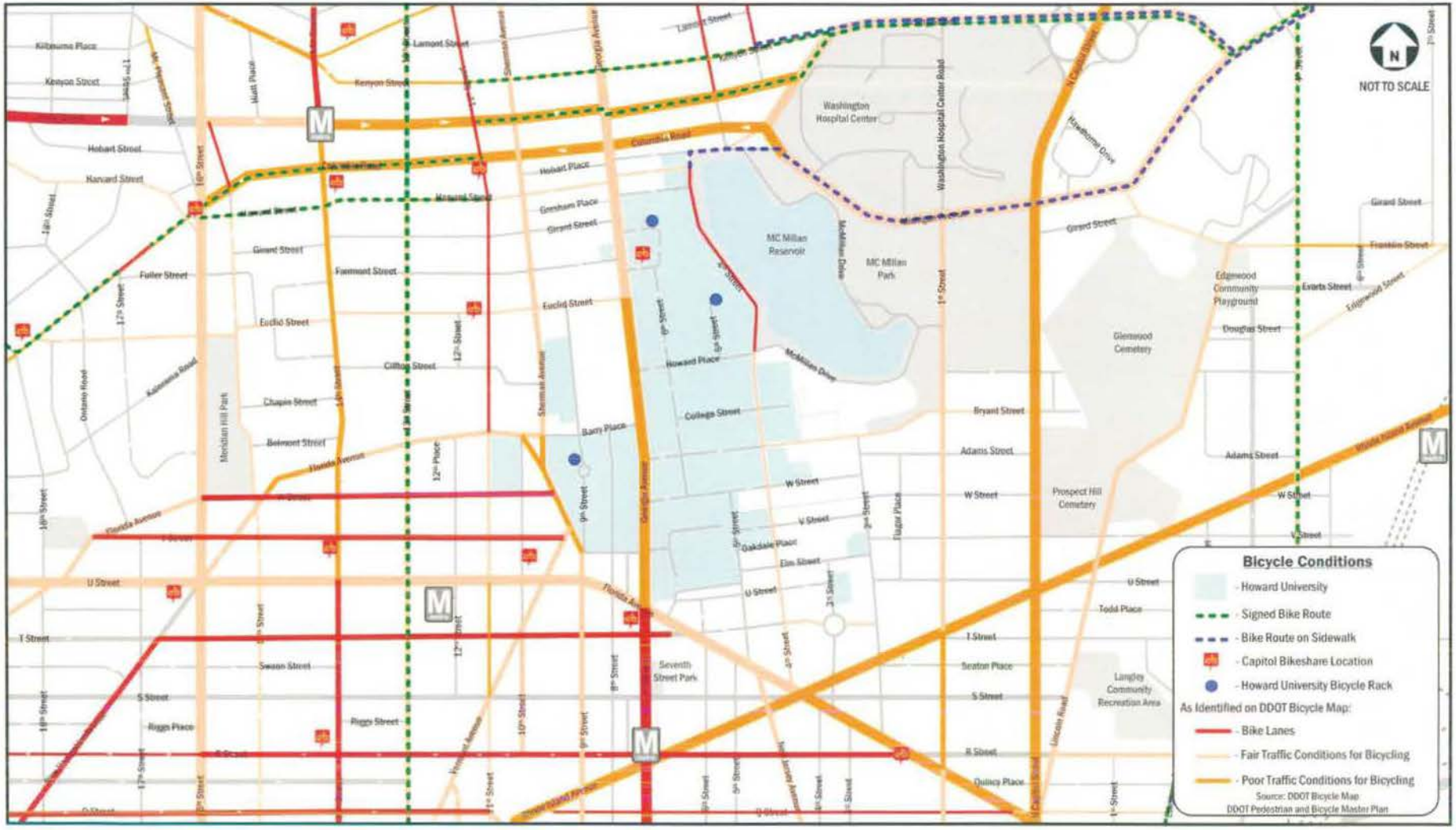


Figure 13: Existing Bicycle Facilities

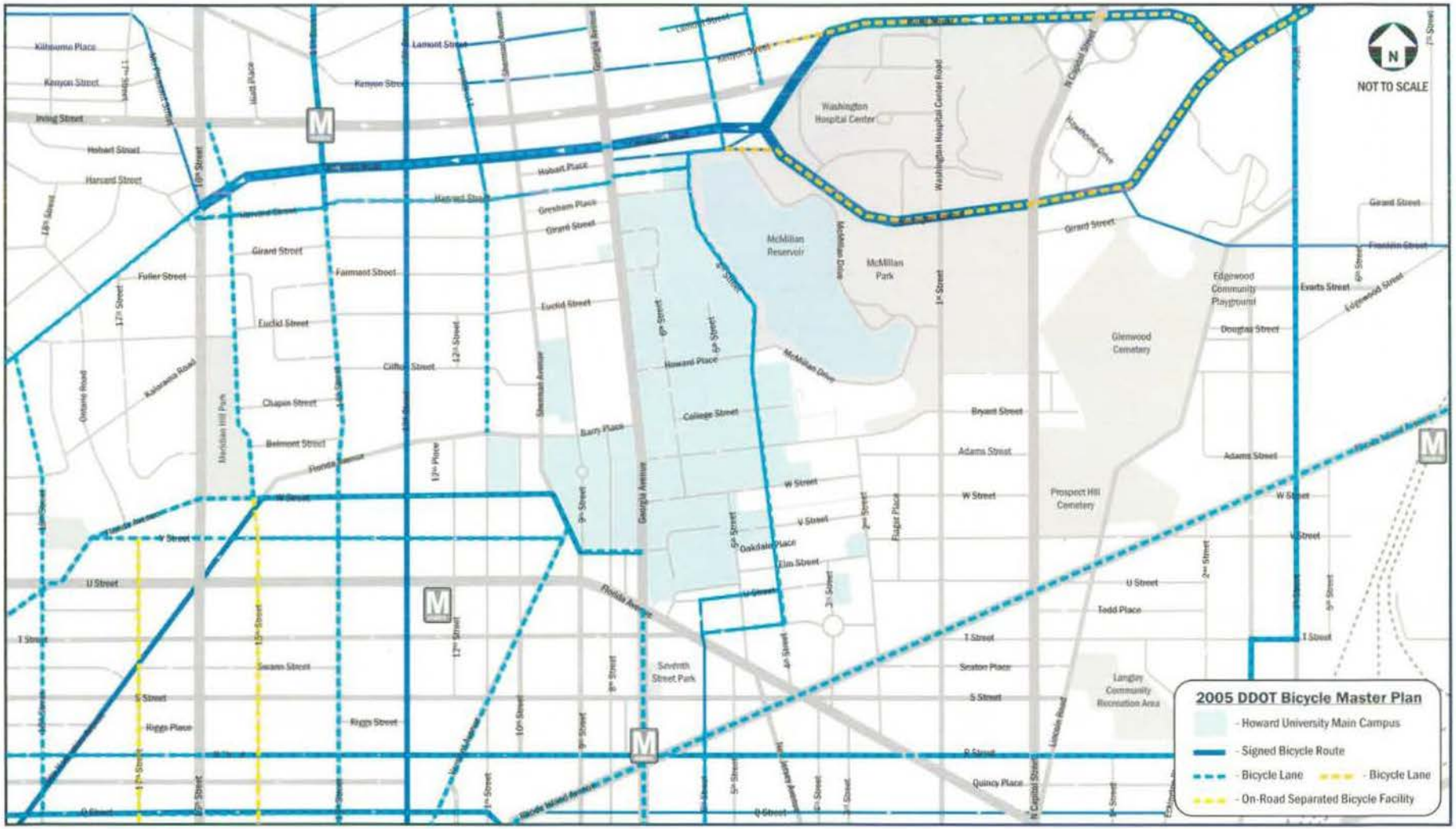


Figure 14: Bicycle Master Plan

Figure 15 identifies the number of lanes of the roadways surrounding the University and the locations of controlled and uncontrolled crosswalks. Figure 15 distinguishes roadways with 1- or 2-lane streets from those with greater than 2-lane cross-sections. This is because a roadway wider than 2-lanes is seen as a mobility barrier for pedestrians, so controlled crosswalks are frequently provided at the intersections.

There are gaps in the pedestrian network and intersections without controlled crosswalks along primary pedestrian routes that increase walk distances or otherwise reduce the quality and attractiveness of walking. The main area where these issues are common is between Georgia Avenue, Barry Place, Florida Avenue, and U Street. In this area, there are large city blocks without through connections that significantly increase walk distances and locations along Florida Avenue that lack adequate crossing facilities or have large gaps between controlled crossing locations. This is primarily an issue along Florida Avenue between Sherman Avenue and U Street where W Street does not connect through from Georgia Avenue to Florida Avenue and where there are connections, such as V Street, that do not have adequate crossing facilities to accommodate through pedestrian traffic.

Overall, the quality of the pedestrian network is good and walking is the primary mode for moving around while on campus or between campus and destinations nearby. Addressing deficiencies could result in better walking conditions and encourage more trips to be made by transit, bike and walking by increasing the ease and attractiveness of walking on and adjacent to campus.

1.10 District Projects and Initiatives

Several background studies have been undertaken in the study area to help improve the quality of life in the neighborhoods surrounding the University. These studies include the *7th Street/Georgia Avenue Great Streets Framework Plan*; the *Lower Georgia Avenue Transportation and Streetscape Study*; the *DUKE Draft Development Framework for a Cultural Destination District within Washington, DC's Greater Shaw/U Street*; and the Mid-City Element of the *DC Comprehensive Plan*.

The Great Streets initiative is the largest District background improvement in the study area and is included in this study. Recommendations for the Georgia Avenue corridor were obtained from the *Lower Georgia Avenue Transportation and Streetscape Improvements Final Report* from December 2007. This study focuses on transportation improvements for pedestrians/bicycles, transit, and vehicles in order to improve multimodal mobility along the Georgia Avenue and Sherman Avenue corridors between Florida Avenue and New Hampshire Avenue. Right-of-way options are defined in the Plan to improve bus service along the corridor and prepare for the Streetcar. Additionally, pedestrian facilities, including bulb-outs, high visibility crosswalks, and sidewalk extensions, are included in the Plan, as well as bicycle facilities, including signed bicycle routes and bike lanes. In order to improve vehicular travel, signal coordination and transit signal prioritization are suggested, as well as left-turn pockets at intersections where pedestrian bulb-outs are not planned. Specific recommendations from the Preferred Alternative to the cross-sections of Georgia Avenue and Sherman Avenue within the study area are included in Section 3.2.3.

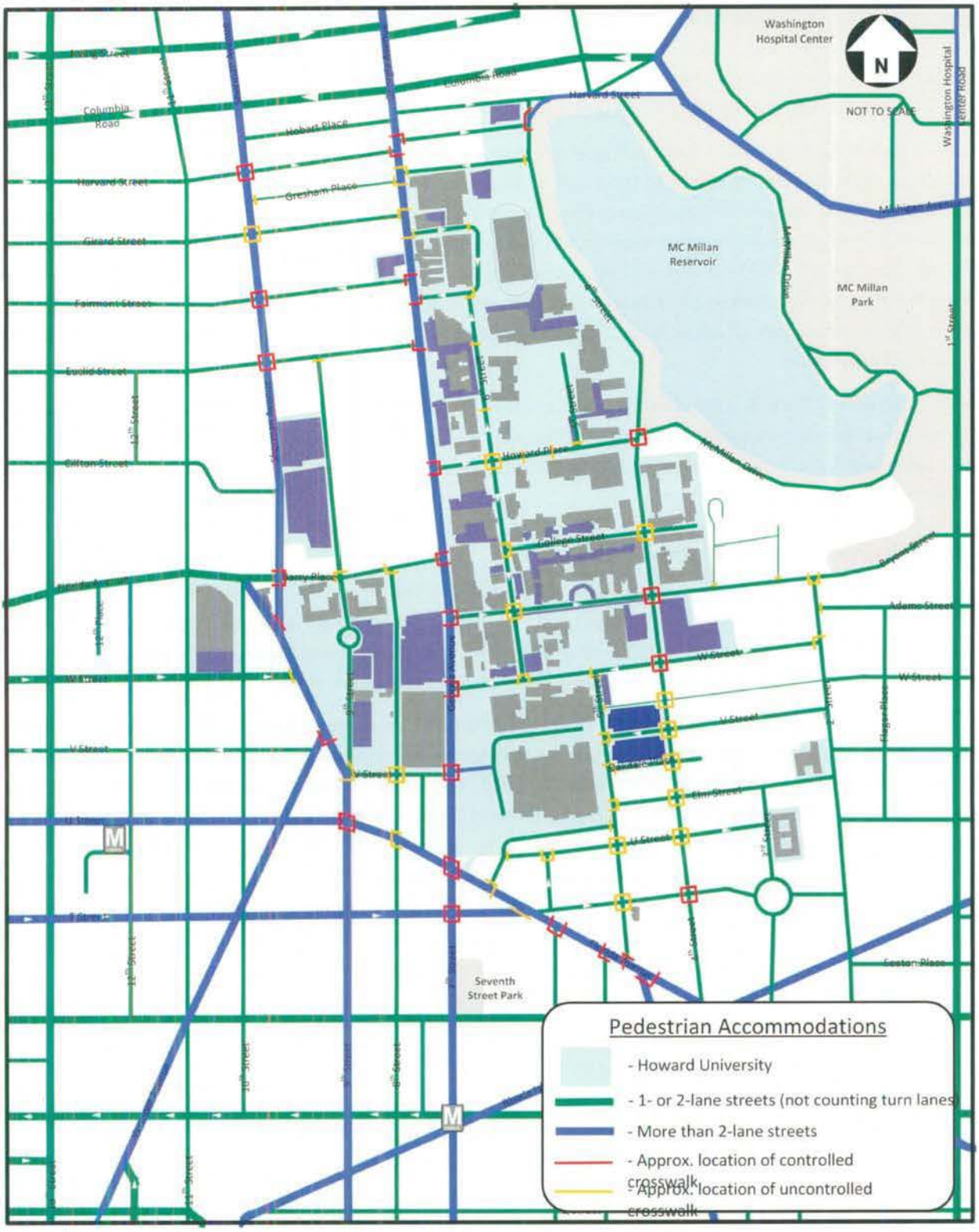


Figure 15: Pedestrian Accommodations

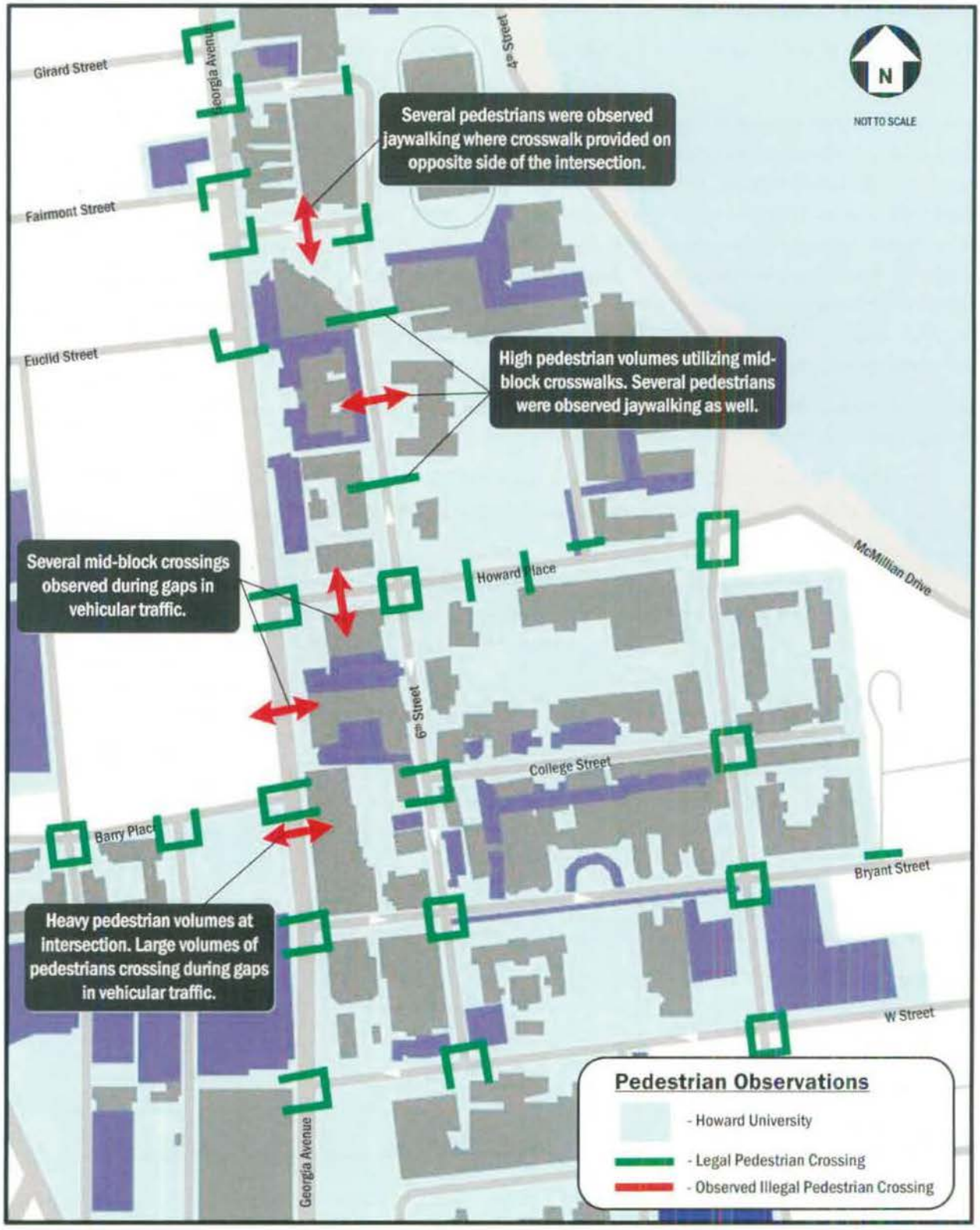


Figure 16: Observed Pedestrian Patterns

2: SUMMARY OF CAMPUS PLAN

This section of the report summarizes the transportation elements included in the HUCMP including changes in land uses and population.

Relative to other District university campus plans, the HUCMP has more development sites, new buildings, and changes to parking supply. The transportation strategy of the plan is driven by how the development sites are built on existing surface parking lots. Complete build-out of the plan would eliminate 68% of the existing surface parking supply. The main transportation question the plan needs to answer is whether it should replace all of the surface parking spaces lost with new, much more expensive underground structured parking facilities. The financial and other constraints behind building new parking facilities underground mean that for the HUCMP to be successful the existing parking cannot be replaced entirely. Rather, the ability to construct all of the buildings included in the Campus Plan hinges on keeping parking demand from rising. Because of this, the plan has the stated goal of reducing existing parking demand and building the only the amount of parking necessary to successfully support campus activity.

The major elements of the HUCMP transportation component fall directly from this strategy. Described in detail below, the major elements of the HUCMP transportation plan are as follows:

- HU has already hired a Transportation Demand Management (TDM) consultant, Nelson\Nygaard Consulting Associates, to help develop and implement programs to reduce parking demand and single occupancy vehicle trips; and
- The HUCMP has a flexible parking plan, described in detail later in this chapter. This includes the identification of many more parking sites than will be needed and selecting which sites to build based on annual monitoring of demand. The goal of the University is to build the minimum amount of parking in the future.

2.1 Population Changes

Table 3 summarizes the major population changes occurring over the course of the HUCMP. By the end of the Campus Master Plan, the total amount of people on campus is not expected to change significantly. The amount of students is projected to increase, and notably the amount of students living within the campus boundaries is expected to increase significantly. The number of faculty and staff employed by the University (in non-Hospital roles) is expected to remain constant.

Table 3: Campus Plan Population Changes

Campus Population	Existing	With Campus Plan
Students	11,000	12,000
Undergraduate	7,400	8,400
Graduate *(approximate, details in HUCMP submittal)*	3,600	3,600
Number of on-campus residence hall beds *(within campus plan boundaries)*	3,800	5,000
Faculty/Staff (non-Hospital)	3,300	3,300

The transportation impact of these changes should not be significant. The main component of commuter traffic is employees, and thus as the faculty and staff levels are remaining constant, the main travel demand generated by the campus population during peak hours should also remain constant. The shift of student population from off-campus to on-

campus locations will increase the amount of students within the campus' walkshed, which can offset the vehicular and parking demand increase from the total student increase.

2.2 Infrastructure Changes

The HUCMP includes several changes to the campus infrastructure that will affect transportation within and adjacent to campus. The existing buildings on campus are outlined on Figure 17, while the HUCMP documentation contains much more detail on campus buildings and infrastructure.

2.2.1 Buildings

The HUCMP includes a significant number of development sites for new buildings or major renovations, as is summarized in Figure 18. A number of existing buildings and surface parking lots will be removed to make room for these future developments, as shown on Figure 19. The development sites will be the location primarily of University facilities, including academic, research, library, student services, and administrative spaces. Four of the development sites are residence hall buildings. The other two buildings are a proposed recreation center and a workforce housing building. Another development to be located on adjacent property owned by Howard University is the Howard University Town Center, a mixed-use residential and retail development.

Several of the proposed new developments will bring non-University related populations to campus, as follows:

- New buildings and renovations along Georgia Avenue will include ground floor retail, which over the course of the HUCMP will add a net increase of 153,500 square feet of retail space to campus;
- The new recreation center will be open to the community, which will bring more people to campus;
- The proposed workforce housing will consist of market-rate units will bring some transportation demand currently located off-campus to campus; and
- The Howard University Town Center will bring retail patrons and new residents not associated with the campus population.

Some transportation demand will be generated by these new facilities. The new academic, research, library, student services, and administrative spaces will not directly generate new transportation demand not already generated by the campus population (i.e. building a library does not increase travel demand, accepting new students or hiring new faculty does). There will be some non-campus population travel demand generated by the recreation center, which will allow non-University memberships. The ground floor retail will serve the campus and the surrounding community, so there will be some additional transportation demand. The workforce housing constructed on campus and the Howard University Town Center will also generate some non-University related traffic. For these sites, the parking demand is separated out from the rest of the general campus demand and as such will be explored further during the individual developments' Further Processing applications. The roadway capacity analyses contained in the next chapter of this report generate traffic demand for these sites individually, separate from the general campus plan population.

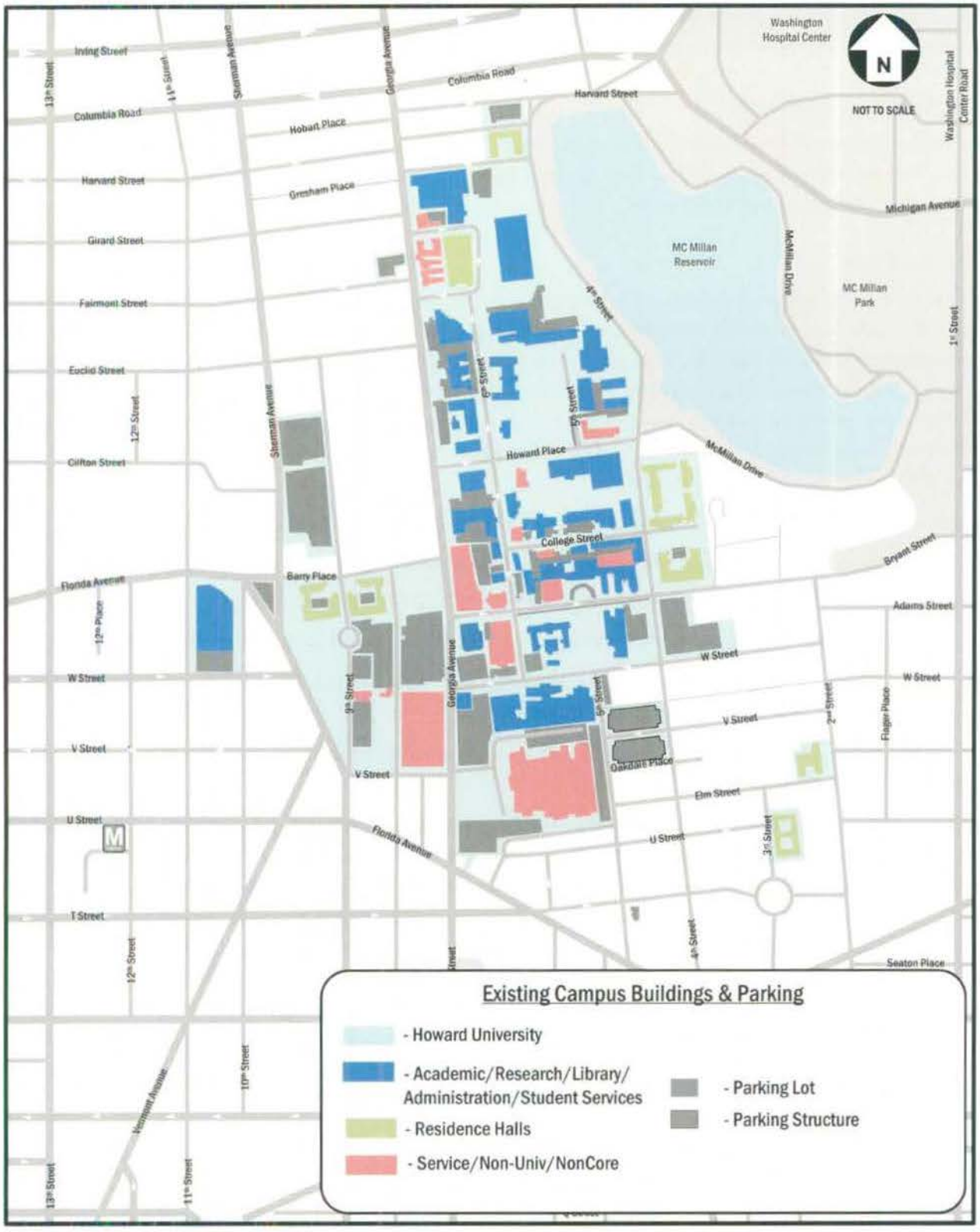


Figure 17: Howard University Existing Campus Buildings and Parking

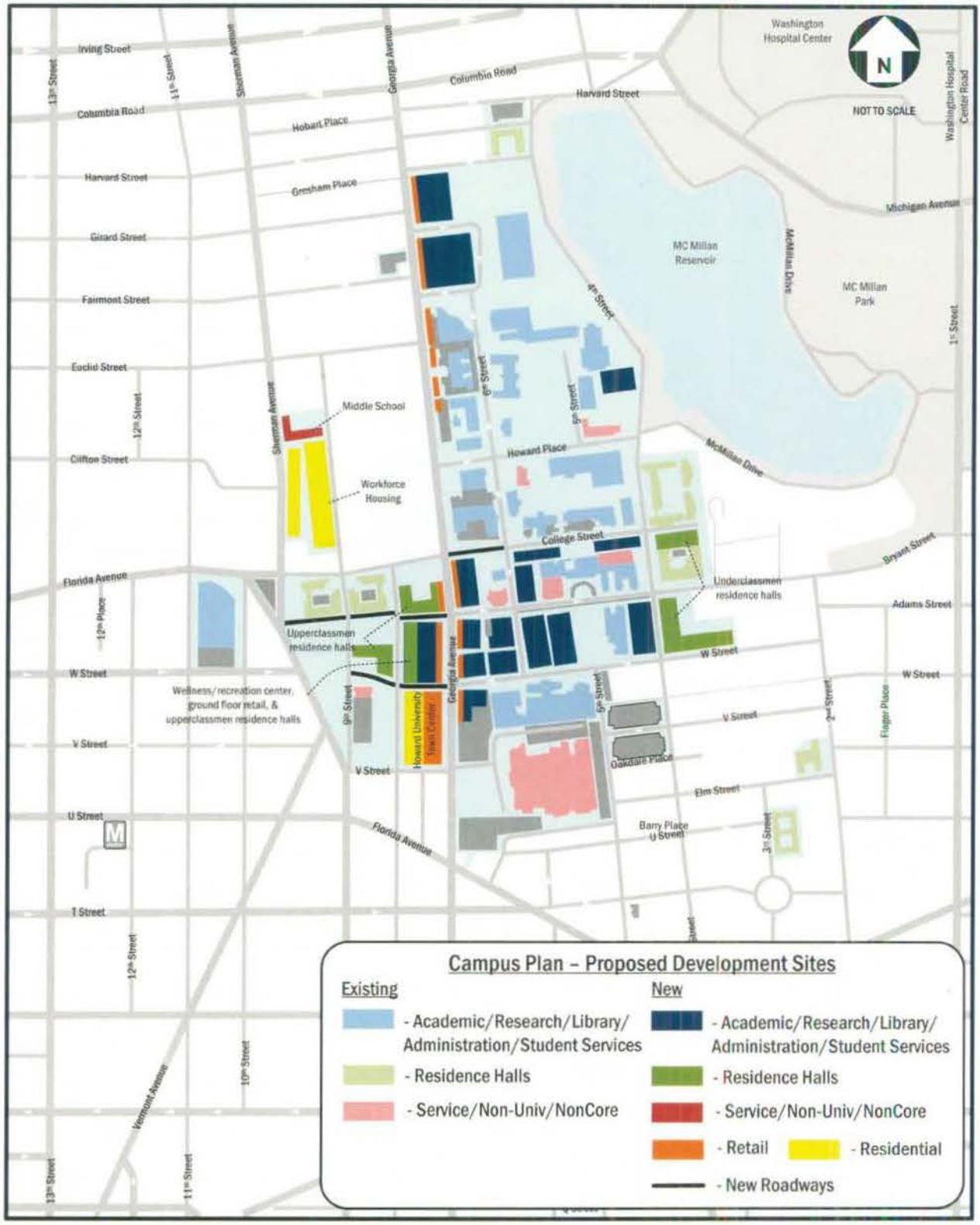


Figure 18: HUCMP Proposed Development Sites

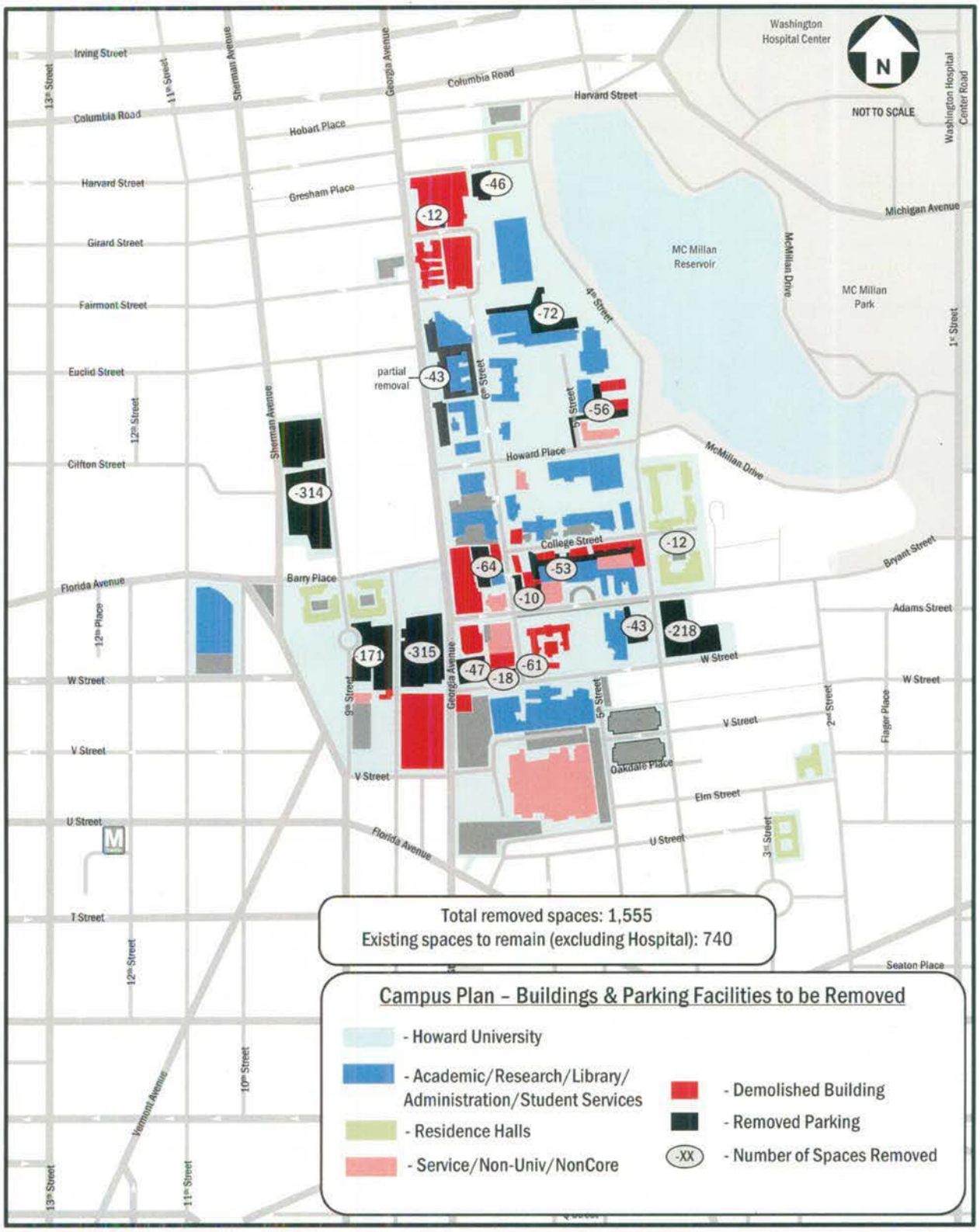


Figure 19: Howard University Buildings and Parking to be Removed under HUCMP

2.2.2 Parking

The Howard University campus currently has approximately 2,300 parking spaces, not counting spaces at the Hospital. The majority of these spaces are located on surface parking lots, which are future development sites. Over the course of the HUCMP, the surface parking spaces will be removed and their supply replaced in new underground parking facilities.

The current supply of approximately 2,300 spaces is several hundred more spaces than the measured parking demand of 1,750 spaces. The Transportation Report recommends that the Campus Master Plan should not incorporate a net increase in parking supply. Based on comments and observations, it appears that common perception of a campus parking problem is due to lots not being in immediate proximity of the desired campus destinations. The Campus Master Plan should explore methods to improve the perception of the several block walk from parking lot locations to central campus.

The goal of the HUCMP is to build the minimal amount of parking needed to accommodate the plan. In order to achieve this goal, the University intends to implement a robust Transportation Demand Management (TDM) to reduce the overall campus parking demand. The changes in parking demand on campus will be measured and decisions on which parking facilities to construct will be based on the on-going monitoring of supply and demand.

An extensive TDM program can reduce parking supply significantly, this report recommends that the University begin reviewing policies and operations to implement new TDM programs which it has done by engaging Nelson\Nygaard as mentioned earlier. It is not necessary to wait until the campus plan is approved before beginning TDM implementation. Instead, it is beneficial to reduce parking demand and monitor progress well before the first surface parking lots are removed for future building sites.

Other District Universities have significantly reduced demand through TDM programs. Between 1999 and 2010, American University has reduced parking demand on campus by 30%, a decrease of a little over 3% per year. Table 4 shows the demand and resulting supply needed to serve that demand for Howard University, assuming a similar 3% per year reduction in demand can be achieved and if there is no significant population change on campus.

Table 4: Recommended Parking Supply with 3% per year Reduction in Demand due to TDM Measures

Year	Demand	Recommended Supply*
2011	1,750	1,925
2012	1,698	1,868
2013	1,647	1,812
2014	1,597	1,757
2015	1,549	1,704
2016	1,503	1,653
2017	1,458	1,604
2018	1,414	1,555
2019	1,372	1,509
2020	1,330	1,463
2021	1,291	1,420

** A supply of 10% over demand is recommended for circulation purposes*

Specific parking recommendations made by this Transportation Report include:

- The HUCMP should have the goal of reducing demand to approximately 1,400 spaces in 2021, not including the demand associated with the Howard University Town Center, residents of the workforce housing, and non-campus use of the recreation center and ground floor retail spaces. The demand associated with these developments can be analyzed in detail during the Further Processing applications for their individual parcels.

- In order to meet this demand, HU should implement parking demand related TDM measures immediately, including:
  - Significantly increasing the price of parking. Currently, faculty/staff parking at Howard University costs 28%, 25%, and 15% of the faculty/staff parking at American University, Georgetown University, and George Washington University, respectively. Combining an increase in parking pricing with providing benefits for other modes can help reduce demand significantly.
  - Marketing the Guaranteed Ride Home Program to all alternate mode users.
  - Expand car-sharing on campus though adding more ZipCar spaces.
  - Start a car-pooling program including web-based ride matching services, parking discounts and preferred parking locations on campus
- The parking demand should be monitored regularly, by year or semester to track progress of reducing demand.
- When individual parcels are up for development on campus, during the Further Processing design and approval process, the monitoring of parking demand should be used to determine if the potential parking facilities identified in the HUCMP should be constructed.
  - The HUCMP team has identified ten potential parking garages totaling 2,475 parking spaces. Not all of these lots will be constructed. This report has split these potential garages into two groups: (1) preferred garages, which if built would result in an eventual parking supply less than the existing supply, but slightly greater than existing demand, and (2) back-up garages, which should only be constructed if it is infeasible to build the preferred garages. The distinction between the two was based on the quality of site access, and the potential vehicular and pedestrian conflicts created. Figure 20 shows the location of these lots.
  - Of the potential parking facilities identified in the HUCMP, this report recommends that lots 1, 3, 8 and 9 be given preference due to their location at the periphery of campus and at different points within the campus. The technical analysis performed of the HUCMP assumes that garage numbers 1, 3, 8 and 9 are constructed. The total parking supply with these lots (added to the remaining surface parking lots) would be 1,850 spaces, slightly higher than the existing demand of 1,750. Thus, if general parking demand on campus remains the same or reduces slightly, the construction of these four garages would be appropriate to handle demand. If the TDM plans are successful and measured parking demand decreases, then fewer garages will be needed. This report recommends that out of the preferred locations, garage #8 be removed before the other locations as its site access is closest to the surrounding residential community.
  - Garage numbers 2, 4, 5, 6 and 7, located mainly along the eastern side of Georgia Avenue, should only be constructed if the other potential lot locations are infeasible for construction. Due to their location within the roadway network they do not have access locations of the same quality as the other lots. Additionally, they are located more centrally within campus which has the potential to create unnecessary pedestrian/vehicle conflicts. Among these locations, garage #6 should be given preference because its potential vehicular access point will produce fewer conflicts. The technical analysis performed of the HUCMP does not assume that these lots are constructed.
- Locate a primary visitor parking facility somewhere on campus
  - This report recommends garage #1, underneath the proposed wellness and recreation center. A public, cash parking facility could be constructed on one of the parking levels of the garage to serve visitors, retail patrons, and community recreation center users. If such a facility were constructed, this report recommends that prices be set to market rate or higher to not induce parking and traffic demand within campus.

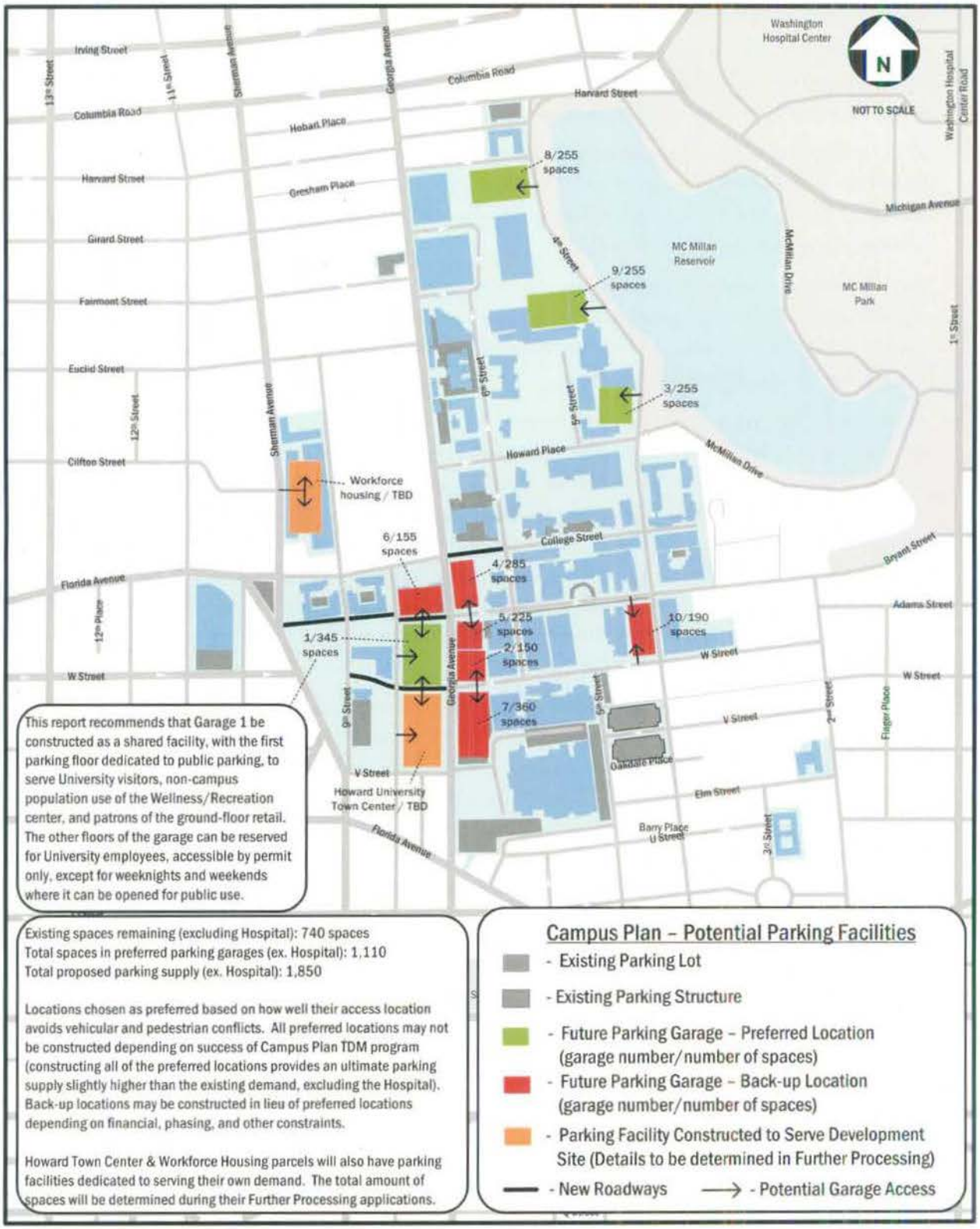


Figure 20: Potential Parking Facilities of the HUCMP

2.2.3 East-West Connectivity

During conversations with District agencies over the course of developing the plan, the HUCMP team was tasked with incorporating east-west connections within the plan (following the precedents set by the Duke Plan and the Lower Georgia Avenue Great Streets Plan). The following summarizes the connections made within the HUCMP:

- Howard Place: The plan proposes extending Howard Place between Georgia Avenue and Sherman Avenue as a pedestrian-oriented east-west connection. This connection is not envisioned as a vehicular connection because it traverses a public park. It is expected to create a stronger pedestrian linkage between the campus and the future workforce housing site on Sherman Avenue.
- Barry Place/College Street: The plan proposes constructing a section of College Street between Georgia Avenue and 6th Street when the current building occupying the potential street right-of-way is demolished as part of the Campus Plan. This would allow for the Barry Place/College Street corridor to connect as a two-way street though campus, from Sherman Avenue to 4th Street.
- Bryant Street: The plan proposes that Bryant Street be extended to connect between Florida Avenue and Georgia Avenue with a 50' right-of-way. This proposed connection is assumed to be a two-way street with a character that is in keeping with the residential character identified by the campus plan. As it passes adjacent to residence halls and a proposed residential quad, this report recommends that Bryant Street have minimal access to parking garages and loading facilities between 8th Street and Sherman Avenue. Figure 21 shows a concept of the Bryant Street extension. It is important to note that HU does not control the portion between 9th Street and Sherman Avenue. Additionally, the intersection of Bryant Street extended with Sherman Avenue was assumed to operate as a right in/right out. The ultimate configuration of this intersection will need to be considered in DDOT's current planning for improvements to the corridor.
- W Street: The plan proposes that W Street be extended to connect between Florida Avenue and Georgia Avenue. This proposed connection would be a two-way street, with a potential traffic signal at its intersection with Florida Avenue to facilitate turns and pedestrian/bicycle crossings. Since Howard University does not control all of the parcels needed to complete this extension, this report and its technical analyses assume that W Street is constructed between Georgia Avenue and 9th Street. W Street is envisioned as a street that can handle site access traffic for potential garage location #1 and parking and loading access for the Howard Town Center with a minimum right-of-way of 50'. Figure 21 shows a concept of the W Street extension.

Figure 21: Conceptual Plan for Extending Bryant and W Streets

2.3 Transportation Demand Management

As stated earlier in this section of the report, a greatly enhanced TDM plan for Howard University is an essential component of the transportation strategy of the HUCMP, and as such HU has hired Nelson\Nygaard to assist them with TDM planning and implementation. Specific details on the existing and future TDM plans for the University will be submitted to DDOT under a separate cover. This section of the report describes those submittals and presents existing information provided to Gorove/Slade by Nelson\Nygaard from their memorandum dated September 28, 2011, which is included in the Appendix.

2.3.1 TDM Submittals

The TDM element of the Transportation Report will be submitted to DDOT in phases. The first component summarizes the key existing conditions of the University's TDM and alternative mode efforts. An on-line survey was conducted to collect existing travel mode share information, interviews with key staff were used to collect transit operations data, and on-site field visits were conductec to confirm pedestrian, bicycle, and parking data. To ensure a complete set of information was collected and analyzed, these efforts occurred in mid-September 2011, when classes were in session and after the drop/add period was completed.

The second submittal to DDOT will include a complete TDM Plan tailored to the travel patterns of Howard University's Central Campus. The TDM plan is anticipated to include a package of informational and communications efforts, parking management, financial incentives/disincentives, and recommendations for the pedestrian, bicycle, shuttle, and carpooling systems. The proposed TDM Plan is being developed with stakeholder input including a series of focus groups and technical reviews, to provide a plan that will be technically sound and embraced by the HU community.

2.3.2 Existing Mode Split

As part of their efforts on the campus TDM submittals, Nelson\Nygaard has provided Gorove/Slade with some information on the existing mode split, shown in Table 5.

Table 5: Existing Primary Mode Choice from Survey

Primary Central Campus Commute Mode	Faculty	Staff	Students
HU Shuttle Bus	2%	7%	35%
Metrobus	6%	6%	7%
Metrorail	11%	12%	17%
Private Vehicle (alone)	64%	57%	9%
Private Vehicle (as passenger)	3%	8%	1%
Bike	4%	1%	1%
Walking	10%	9%	31%

Note: Percentages may not total to 100% due to rounding

The mode split survey results show that over half of faculty and staff currently drive alone to campus. Of those who do not drive, Metrorail and walking are the two major alternate modes. The majority of the students either take the HU Shuttle Bus or walk to campus, with only 9% driving.

3: IMPACTS REVIEW

This section of the report focuses on the influence and impact site generated traffic will have on the local transportation network, with the following purpose:

- To provide information to DDOT and other agencies on how the development of the site will influence the local transportation network. The final transportation 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.
- To determine if development of the site will lead to adverse impacts on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analysis of crosswalk and intersection delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. The report describes what improvements to the transportation network are needed to mitigate adverse impacts.

3.1 Site Transportation Generation

Analysis of the Howard University Campus Master Plan development conditions includes an assessment of the future transportation conditions for the year 2020. The HUCMP focuses on improving the University through the addition of:

- New academic and research facilities;
- New residential housing;
- A new Wellness and Recreation Center;
- Updated athletics facilities; and
- New street-level retail along Georgia Avenue.

The proposed transportation-related changes assumed in this analysis lead to an overall reduction in approximately 213 parking spaces. Based on the information available at the time of this study, it was assumed that these changes are accounted for by the following vehicular trip generation sources:

- Remove approximately 1,478 parking spaces from the Central Campus due to construction on development sites;
- Add approximately 1,265 new parking spaces in parking garages located along the southern portion of Georgia Avenue and along 4th Street/5th Street on the northern side of the campus;
- Construct the Howard Town Center, which consists of approximately 445 residential dwelling units, a 35,000 square-foot grocery store, and 40,000 square feet of additional street-level retail;
- Construct approximately 234 workforce housing units;
- Construct approximately 153,500 square feet of street-level retail along Georgia Avenue; and
- Construct a new 136,500 square-foot Recreation Center.

Pedestrian trip generation sources include:

- Remove existing pedestrians due to the removal of approximately 1,100 beds on the Central Campus;
- Addition of pedestrian due to four new residence halls;

- Construct the Howard Town Center, which consists of approximately 445 residential dwelling units, a 35,000 square-foot grocery store, and 40,000 square feet of additional street-level retail;
- Construct approximately 234 workforce housing units; and
- Construct approximately 153,500 square feet of street-level retail along Georgia Avenue; and
- Construct a new 136,500 square-foot Recreation Center.

Section 2.2 identifies the locations of development areas in the HUCMP. The *Howard University Central Campus Master Plan* provides a more detailed description of the proposed development.

In order to determine the impact of the proposed changes to the HUCMP, vehicular trips were generated based on changes in parking inventory at the University and on growth of population. Although multiple development changes are proposed in the HUCMP, including new residence halls and academic buildings, these sources are not expected to generate any additional vehicular trips. Instead, any change in vehicular trip generation will be due to the proposed parking modifications; the construction of the Howard Town Center, Workforce Housing, Georgia Avenue street-level retail, and the Recreation Center; and the proposed increase in student population.

Trips generated by the proposed parking changes were estimated based on existing (2011) driveway counts at two parking lots located on the Central Campus on Tuesday, April 26, 2011. The resulting trip generation rate calculated to be 0.35 trips per space during the morning peak hour (0.30 inbound and 0.05 outbound) and 0.40 trips per space during the afternoon peak hour (0.05 inbound and 0.35 outbound). The existing parking lot trips were estimated based on the driveway counts outlined previously. Table 6 shows the trips displaced due to the removal of several parking lots on the Central Campus.

Table 6: Existing Vehicular Trips Displaced by Removed Parking Lots

Existing Trips Displaced by Removed Parking Lots					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Lot R	218 Spaces	65	11	11	76
Lot V	315 Spaces	95	16	16	110
Lot 1 and Lot U	65 Spaces	20	3	3	23
Lot O	53 Spaces	16	3	3	19
Lots L, M, and N	31 Spaces	9	2	2	11
Lot B	56 Spaces	17	3	3	20
Lot Q	12 Spaces	4	1	1	4
Lot S	61 Spaces	18	3	3	21
Lot X	33 Spaces	10	2	2	12
Lot 4	52 Spaces	16	3	3	18
Lot A	72 Spaces	22	4	4	25
Lot I	46 Spaces	14	2	2	16
Lot J	12 Spaces	4	1	1	4
Lot W	138 Spaces	41	7	7	48
Lot Z	314 Spaces	94	16	16	110
Total	**1,478 Spaces**	**445**	**77**	**77**	**517**

Instead of completely removing the existing trips from the study area, it is assumed that these trips will be reassigned to the newly constructed parking garages outlined in the HUCMP. This analysis assumes that, of the potential garages listed in the HUCMP, Garages 1, 3, 8, and 9 would be constructed. It was also assumed that approximately two-thirds of spaces provided in Garage 1 would be dedicated for academic uses, yielding approximately 230 spaces for the University. The remainder of the garage (approximately 115 spaces) would be reserved for visitors to the University, the Georgia Avenue on-street retail, and the Recreation Center. Table 7 shows the existing trips reassigned to Garages 1, 3, 8, and 9.

Table 7: Existing Vehicular Trips Reassigned to Parking Garages

Existing Trips Reassigned to Parking Garages					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Garage 1	230 Spaces	103	17	17	121
Garage 3	255 Spaces	114	20	20	132
Garage 8	255 Spaces	114	20	20	132
Garage 9	255 Spaces	114	20	20	132
Total	**995 Spaces**	**445**	**77**	**77**	**517**

Trips generated by the Howard Town Center, Workforce Housing, Georgia Avenue on-street retail, and Recreation Center were estimated using the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. Vehicular trips were determined by examining the WMATA *2005 Development-Related Ridership Survey Final Report*. Automobile mode splits were estimated based on the distance of the proposed developments from the Howard University/Shaw Metrorail Station. Table 8 shows the estimated automobile mode splits for the background developments.

Table 8: HUCMP Development Mode Split Assumptions

HUCMP Development Mode Split Assumptions			
Source	**Land Use**	**Distance from Metro (Feet)**	**Automobile Mode Split**
Howard Town Center	Residential	1620	32%
	Retail	1620	40%
Workforce Housing	Residential	2300	38%
Georgia Avenue On-Street Retail	Retail	2500	51%
Recreation Center	Retail	2000	38%

Based on the mode splits shown in Table 8, Table 9 shows the resulting number of trips added to the study area due to other development in the HUCMP.

Table 9: Vehicular Trips Added by HUCMP Development

Trips Added by HUCMP Development					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Howard Town Center	445 Dwelling Units	34	100	101	54
	35,000 SF Grocery Store	77	49	232	222
	40,000 SF Retail	55	35	51	66
Subtotal		*166*	*184*	*384*	*342*
Vehicular Subtotal		**64**	**65**	**145**	**133**

Trips Added by HUCMP Development					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Workforce Housing	234 Dwelling Units	18	53	57	30
Vehicular Subtotal		**7**	**20**	**22**	**11**
Georgia Avenue On-Street Retail	153,500 Square Feet	121	77	172	218
Vehicular Subtotal		**62**	**39**	**88**	**111**
Recreation Center	136,500 Square Feet	247	158	546	335
Community Subtotal	*16% Community Memberships*	*40*	*25*	*87*	*54*
Community Vehicular Subtotal		**18**	**11**	**39**	**24**
Total		**151**	**135**	**293**	**280**

In addition to the trips generated by the HUCMP development, it is assumed that trips will be generated by the proposed increase in the student population. These trips were estimated using the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. The student mode split for vehicular trips was determined from survey data provided by Nelson/Nygaard.

Table 10: Trips Added by Increase in Student Population

Trips Added by Increase in Student Population					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Future Population	12,000 Students	1,961	490	720	1,679
Existing Population	11,000 Students	1,793	448	663	1,546
Gross New Trips		*168*	*42*	*57*	*133*
Total	**9% Mode Split**	**15**	**4**	**5**	**12**

Similar to the changes to vehicular trip generation, pedestrian trips were generated for the proposed HUCMP. For pedestrian trips, it was assumed that the major trip generation changes would be due to the removal and construction of new residence halls on the Central Campus and other HUCMP developments. Any change in pedestrian trip generation will be due to the proposed residence hall modifications and the construction of the Howard Town Center, Workforce Housing, Georgia Avenue street-level retail, and the Recreation Center. Of note, proposed residence hall modifications not located on the Central Campus are not included in the analysis.

Pedestrian trips were estimated based on existing (2011) residence hall counts at the East Towers on Wednesday, April 27, 2011. The resulting trip generation rate was calculated to be 0.20 trips per bed during the morning peak hour (0.05 inbound and 0.15 outbound) and 0.35 trips per space during the afternoon peak hour (0.20 inbound and 0.15 outbound). The existing pedestrian trips were removed based on the likely routes to and from the Central Campus. Table 11 shows the pedestrian trips removed from the study area.

Table 11: Pedestrian Trips Removed due to Residence Hall Modifications

Trips Removed					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Carver and Slowe Halls	472 Beds	24	71	94	71
Cook Hall	200 Beds	10	30	40	30
Drew Hall	332 Beds	17	50	66	50
Tubman Hall	100 Beds	5	15	20	15
Total	**1,104 Beds**	**56**	**166**	**220**	**166**

Trips generated by the proposed residence halls were also estimated based on the trip generation rates outlined above, as shown in Table 12. These trips were distributed through the study area intersections based on the likely routes to and from the Central Campus.

Table 12: Pedestrian Trips Added due to Residence Hall Modifications

Trips Added					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Underclassmen Hall 1	470 Beds	24	71	97	71
Underclassmen Hall 2	903 Beds	45	135	181	135
Upperclassmen Hall 1	810 Beds	41	122	162	122
Upperclassmen Hall 2	790 Beds	40	119	158	119
Total	**2,973 Beds**	**150**	**447**	**598**	**447**

Similar to the vehicular trip, pedestrian trips generated by the Howard Town Center, Workforce Housing, Georgia Avenue on-street retail, and Recreation Center were estimated using the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. It was assumed that approximately 25% of the trips generated by the Howard Town Center and the Georgia Avenue on-street retail would be walking trips. For the workforce housing, it was assumed that approximately 20% of the trips generated would be walking trips. For the recreation center, it was assumed that approximately 25% of the trips generated by the community member would be walking trips and approximately 50% of the trips generated by University students and faculty/staff would be walking trips. Table 13 shows the pedestrian trips added to the study area by the proposed HUCMP development.

Table 13: Pedestrian Trips Added due to HUCMP Development

Trips Added by HUCMP Development					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Howard Town Center	445 Dwelling Units	34	100	101	54
	35,000 SF Grocery Store	77	49	232	222
	40,000 SF Retail	55	35	51	66
Subtotal		*166*	*184*	*384*	*342*
Pedestrian Subtotal		**33**	**21**	**71**	**72**
Workforce Housing	234 Dwelling Units	18	53	57	30
Pedestrian Subtotal		**4**	**11**	**11**	**6**
Georgia Avenue On-Street Retail	153,500 Square Feet	121	77	172	218
Pedestrian Subtotal		**30**	**19**	**43**	**55**

Trips Added by HUCMP Development					
Source	Size	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Recreation Center	136,500 Square Feet	247	158	546	335
Community Subtotal	*16% Community Memberships*	*40*	*25*	*87*	*54*
University Subtotal	*84% University Memberships*	*207*	*133*	*459*	*281*
Pedestrian Subtotal		**114**	**72**	**252**	**153**
Total		**181**	**123**	**377**	**286**

3.2 Roadway Capacity and Operations

This section details the vehicular trips generated in the study area along the vehicular access routes, defines the analysis assumptions, analyses the vehicular impacts of the proposed Further Processing application, and makes recommendations for improvements where needed.

3.2.1 Scope of Analysis

The purpose of the vehicular capacity analysis is to determine the existing conditions of the intersections located in the immediate vicinity of Howard University. The set of intersections was chosen to help determine the impacts to the nearest intersections along Georgia Avenue, Sherman Avenue, 6th Street, and 4th Street/5th Street. Based on prior studies, and confirmed in discussions with DDOT, 21 total intersections were chosen for analysis. The following intersections were selected:

1. Georgia Avenue & Harvard Street
2. Harvard Street & 5th Street
3. Georgia Avenue & Girard Street
4. Georgia Avenue & Fairmont Street
5. Georgia Avenue & Euclid Street
6. Georgia Avenue & Howard Place
7. 6th Street & Howard Place
8. 5th Street/4th Street & Howard Place
9. Sherman Avenue & Barry Place
10. Georgia Avenue & Barry Place
11. 6th Street & College Street
12. 4th Street & College Street
13. Georgia Avenue & Bryant Street
14. 6th Street & Bryant Street
15. 4th Street & Bryant Street
16. Georgia Avenue & W Street
17. 6th Street & W Street
18. 4th Street & W Street
19. Georgia Avenue & V Street/Howard University Hospital
20. Georgia Avenue & Howard University Hospital
21. Georgia Avenue/7th Street & Florida Avenue

Intersection capacity analyses were performed for the existing conditions at each intersection within the study area during the morning and afternoon peak hours, as well as for future conditions with and without the proposed HUCMP. The study scenarios are as follows:

- Existing Conditions (2009/2011)
- Future Conditions (2021) without HUCMP
- Future Conditions (2021) with HUCMP

The *Synchro, Version 7.0* software package was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology. The *Synchro* model was compiled using signal timings provided by DDOT and with lane configurations and traffic volumes collected by Gorove/Slade. The scope of analysis and proposed methodology was agreed to by DDOT over the course of several meetings leading up to the assembly of this report. The following sections review the assumptions made for the technical analyses, as summarized in Table 16.

3.2.2 Traffic Volume Assumptions

The following section reviews the traffic volume assumptions made and methodologies used in the roadway capacity analyses, summarized in Table 16.

Existing Conditions (2009/2011)

The overall purpose of this study is to show what affect the HUCMP will have on the transportation system in the study area. The existing conditions in and around the University are characterized in order to provide a foundation for assessing the transportation implications of the HUCMP. This is determined by examining the peak traffic hours, which are directly associated with the peaking characteristics of the University and the area transportation system. The peaking characteristics of the adjacent transportation system are determined through analysis of existing count data.

DDOT and National standards require that traffic counts be conducted on a weekday, not including Monday or Friday, when traffic conditions can be described as "typical". This includes the consideration for adjacent uses, such as retail, special events, and recreation facilities and for major traffic generators, such as the area public school system or any large public or private institutions. Weekend and other off-peak periods are also often reviewed if the study area includes other uses that may be relatively inactive during the "typical" weekday.

The traffic counts conducted on "typical" day are used to determine the morning and afternoon "peak hour" of traffic within the study area. According to the Highway Capacity Manual (HCM) methodologies, a one-hour analysis period is preferred. Analysis periods that exceed one hour are not usually used because traffic conditions are typically not steady for long time periods and because the adverse impact of short peaks in traffic demand may not be detected in a long time period. The "peak hour" represents the worst-case scenario, when the system traffic volumes are the highest. The use of a "typical" weekday morning and afternoon peak hours are used to ensure that conclusions regarding adverse impacts and their respective mitigation measures would apply to the vast majority of time roadways are used in the study area. Although there may be times when volume flows exceed these conditions, such as during special events, holiday weekends, or other times depending on the study area and site location, it is the industry standard to design transportation infrastructure for the peak times during "typical" weekdays.

In order to ensure that the data collected contains the peak hour, traffic counts are taken for a period of several hours during the morning and afternoon peak periods. From these peak periods, a peak hour is derived for both the morning and

the afternoon time periods. According to the Transportation Impact Analyses for Site Development Manual published by the Institute of Transportation Engineers (ITE), data is generally collected during the weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak hours. Although this is the standard, Gorove/Slade usually collects data for a three-hour (or longer) period to ensure that the peak hour is contained within the data collection timeframe.

The peak period counts are analyzed to determine the one hour during the morning and afternoon periods that contains the highest cumulative directional traffic demands. From each peak period count, the morning and afternoon "peak hours" are determined by summing up the four fifteen-minute consecutive time periods in the study area that experience the highest cumulative traffic volumes. These morning and afternoon "peak hours" are analyzed for the system of intersections investigated, choosing the "peak hour" of the entire system instead of each individual intersection.

Following the above guidelines, traffic counts, including vehicular and pedestrian volumes, were conducted by Gorove/Slade at the key study intersections between the hours of 6:30 to 9:30 AM and 4:00 to 7:00 PM on Tuesday, March 31, 2009; Thursday, April 2, 2009; and Tuesday April 7, 2009. Additional counts were performed on Tuesday, April 26, 2011. These count dates represent "typical" weekdays when classes are in session for the University and the public school system is also in session. These "typical" weekdays also represent time periods that include normal operation for other major traffic generators in the study area. The results of the traffic counts are included in the Technical Attachments. The morning and afternoon peak hours for the system of intersections being studied occurred between 8:00 to 9:00 AM and 5:00 to 6:00 PM, respectively. Peak hour traffic volumes are shown on Figure 22, Figure 23, and Figure 24.

Future Conditions (2021) without HUCMP

The future conditions without the proposed HUCMP include the traffic generated by background developments located near the University and inherent growth on the roadways. Growth from these two sources is added to the existing traffic volumes in order to determine the traffic projections for the future without the HUCMP.

The background developments included are the Howard Theater located near the intersection of 7th and T Streets NW, Progression Place located next to the Howard Theater, and the Logic Project located near the corner of 10th and V Streets NW. Trips generated by the background developments were estimated using the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. Vehicular trips were determined by examining the WMATA *2005 Development-Related Ridership Survey Final Report*. Automobile mode splits were estimated based on the distance of the proposed developments from the Howard University/Shaw Metrorail Station. Table 14 shows the estimated automobile mode splits for the background developments.

Table 14: Background Development Mode Split Assumptions

Background Development Mode Split Assumptions			
Source	**Land Use**	**Distance from Metro (Feet)**	**Automobile Mode Split**
Howard Theater	Entertainment	825	68%
	Retail	825	30%
Progression Place	Office	170	23%
	Residential	170	19%
	Retail	170	21%
Logic Project	Residential	530	23%

Based on the mode splits outlined in Table 14, Table 15 shows the trips generated by the background developments.

Table 15: Vehicular Trips Added by Background Developments

Trips Added by Background Developments					
Source	**Size**	*AM Peak Hour*		*PM Peak Hour*	
		In	Out	In	Out
Howard Theater	700-Seat Live Theater	0	0	7	7
	600 SF Gift Shop	4	2	10	13
Subtotal		*4*	*2*	*17*	*20*
Vehicular Subtotal		**1**	**1**	**8**	**9**
Progression Place	100,000 SF Office	36	5	32	159
	205 Dwelling Units	16	46	51	27
	20,000 SF Retail	37	23	30	39
Subtotal		*89*	*74*	*107*	*207*
Vehicular Subtotal		**19**	**15**	**23**	**50**
Logic Project	37 Dwelling Units	4	19	21	10
Vehicular Subtotal		**1**	**4**	**5**	**2**
Total		**21**	**20**	**36**	**61**

In addition to the background developments, other traffic increased due to inherent growth on the study area roadways were accounted for with a 1.6% per year growth rate compounded annually over the study period (2009/2011-2020). This rate was estimated based on a comparison between existing and past average annual weekday traffic volumes obtained from DDOT, as shown in Figure 2. This growth rate was applied to all study area roadways and intersections, with the exception of turning movements attributable to the University.

The traffic volumes generated by the background developments and the inherent growth were added to the existing (2009/2011) traffic volumes in order to establish the future (2021) traffic volumes without the proposed HUCMP. The traffic volumes for the future conditions without the HUCMP are shown on Figure 25, Figure 26, and Figure 27.

Future Conditions (2021) with HUCMP

Existing travel patterns in the study area and trip distribution percentages from employee zip codes were analyzed in order to determine the trip distribution for the trips added and removed from the HUCMP study area, as shown in Figure 28. Based on this review, the site-generated trips were distributed through the study area intersections, as shown on Figure 29, Figure 30, and Figure 31. It was assumed that the parking garages located along Georgia Avenue would be accessed from 8th Street, and the garages located on the northern portion of the Central Campus would be accessed from 5th Street.

Trip distribution for the pedestrian trips was estimated based on existing travel patterns in the study area and the locations of pedestrian origins and destinations. Based on this trip distribution, the site-generated pedestrian trips were distributed through the study area intersections.

The traffic volumes for the future (2021) conditions with the HUCMP were calculated by adding the HUCMP-generated traffic volumes to the future (2021) without the HUCMP traffic volumes. Thus the future condition with HUCMP scenario includes traffic generated by: existing volumes, the growth percentage, background development, the campus population increase, the new parking garages. It also accounts for changes in traffic patterns due to the new east-west streets, and the elimination of traffic going to the parking lots that have been removed. The future (2021) traffic volumes with the HUCMP are shown on Figure 32, Figure 33, and Figure 34.

3.2.3 Geometry and Operations Assumptions

The following section reviews the roadway geometry and operations assumptions made and methodologies used in the roadway capacity analyses, summarized in Table 16.

Existing Conditions (2009/2011)

Gorove/Slade conducted field reconnaissance to confirm the existing lane configurations and traffic controls at the intersections within the study area, shown on Figure 22, Figure 23, and Figure 24. Existing signal timings and offsets were obtained from DDOT and confirmed during field reconnaissance.

Future Conditions (2020) without HUCMP

The lane configurations for the future conditions without the proposed HUCMP were determined based on the existing lane configurations and the improvements outlined in the *Lower Georgia Avenue Transportation and Streetscape Improvements Final Report*, published by DDOT in December 2007. The improvements included are based on the preferred alternative outlined in the report, which reduces the cross-section of Georgia Avenue and Sherman Avenue.

The following improvements were included in the future scenario without the HUCMP from the Preferred Alternative presented in the *Final Report*:

- Maintain four general-purpose travel lanes on Georgia Avenue between New Hampshire Avenue and Barry Place, with parking located on both sides of the street;
- Convert the far right travel lane on Georgia Avenue between Barry Place and Florida Avenue into a bus-only lane and remove the on-street parking located on both sides of the street;
- Convert the former parking lane on southbound Georgia Avenue at Barry Place to a dedicated right-turn lane;
- Reduce the cross-section of Sherman Avenue from three lanes in each direction to one lane with widened sidewalks and a median;
- Provide southbound left-turn lane on Sherman Avenue at Barry Place; and
- Retime signals along Georgia Avenue and Sherman Avenue, optimizing them for progressive traffic movement through the corridors.

The lane configurations and traffic controls for the future conditions without the proposed HUCMP are shown on Figure 25, Figure 26, and Figure 27.

Future Conditions (2021) with HUCMP

The lane configurations for the future conditions with the proposed HUCMP were determined based on those assumed in the future conditions without the proposed HUCMP. A few transportation improvements are included in the Howard University Campus Master Plan. The following improvements were included in the future scenario with the HUCMP:

- Construction of the College Street extension between Georgia Avenue and 6th Street, connecting to the existing intersection of Georgia Avenue and Barry Place;
- Construction of Bryant Street between Georgia Avenue and Florida Avenue, connecting to the existing intersections at either end of the roadway; and

- Construction of W Street between Georgia Avenue and 9th Street, connecting to the existing intersection at Georgia Avenue.

The lane configurations and traffic controls for the future conditions with the proposed HUCMP are shown on Figure 32, Figure 33, and Figure 34.

3.2.4 Vehicular Analysis Results

Intersection capacity analyses were performed for the three scenarios outlined in Section 3.2.1 at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7.0* was used to analyze the study intersections based on the Highway Capacity Manual (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 E is typically used as the acceptable LOS threshold in the District; although LOS F is sometimes accepted in urbanized areas.

The LOS capacity analyses were based on: (1) the peak hour traffic volumes outlined in Section 3.2.2; (2) the lane use and traffic controls outlined in Section 3.2.3; and (3) the Highway Capacity Manual (HCM) methodologies (using *Synchro 7* software). An average delay (of each approach) and LOS is shown for the signalized intersections, as well as an 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 Appendix.

Table 17 shows the results of the capacity analyses, including LOS and average delay per vehicle (in seconds). The capacity analysis results for the morning peak hour are shown on Figure 35, Figure 36, and Figure 37 and for the afternoon peak hour are shown on Figure 38, Figure 39, and Figure 40.

3.2.5 Summary of Analysis Results and Mitigation Measures

Generally, speaking, the proposed HUCMP is considered to have an impact at an intersection within the study area if the capacity analyses show an LOS F condition in the future with the HUCMP scenario where one does not exist in the future without the HUCMP scenario. Table 18 summarizes the results of the capacity analyses, and Table 19 shows the capacity analysis results with the improvements proposed in Table 18.

3.2.6 Analysis of Great Streets Recommendations

During the planning process for the HUCMP, DDOT has expressed concern with the ability of the preferred alternative presented in the Lower Georgia Avenue Great Streets Plan for the stretch of Georgia Avenue between Barry Place and Florida Avenue. The Great Streets Plan recommended that transit-only lanes be installed on Georgia Avenue, essentially converting a four-lane roadway to a two-lane roadway.

The main concern is how left turning vehicles would cause lengthy delays as the lack of the second through lane would mean vehicles going straight through an intersection would not have the ability to go around left turning vehicles. As seen in the capacity analysis results, all future scenarios studied in the roadway capacity analyses, this report found significant delays at these intersections, mostly associated with left turning traffic especially at the intersection of Georgia Avenue and Florida Avenue.

DDOT's request that the HUCMP add east-west connectivity across this section of Georgia Avenue is at odds with the reduced capacity that is caused by the transit-only lanes identified by the Great Streets Plan. The additional roadway connections at College Street, Bryant Street and W Street would create more opportunities for left turns and thus could exacerbate the capacity constraints generated by the transit-only lanes.

In order to examine this further, this report evaluated two possible alternatives to the transit-only lane configuration presented in the Great Streets Plan:

1. Removing the transit only restriction on the lanes, essentially keeping the existing conditions of Georgia Avenue between Barry Place and Florida Avenue.
2. Adding left turns lanes to the transit only configuration. Georgia Avenue between Barry Place and Florida Avenue is approximately 45 to 50 feet wide, and could support a five lane cross-section with 9 to 10 foot lanes. The cross-section would have two transit only lanes, two general travel lanes, and one left turn lane/median.

An additional alternative that would alleviate capacity concerns would be to prohibit left turns either through 'no left turn' signs or a median physically blocking turns. These measures, although they would create better capacity analysis results, would lead to a roadway network with less connectivity and would lessen the quality of local access, negating the positive benefits of the new east-west connections. Thus, this report does not recommend these measures.

Table 20 shows the results of the capacity analyses with the three configurations studied (the two described above in addition to the preferred alternative from the Great Streets plan). The capacity analyses show that either alternative to the Great Streets preferred plan provides a significant capacity benefit to Georgia Avenue, although not all failing LOS grades can be alleviated.

This analysis and comparisons of different configurations of Georgia Avenue is presented for DDOT's review. The ultimate decision on the configuration of Georgia Avenue will be made by DDOT. The benefits of transit-only lanes could outweigh delays to traffic, although severe traffic delays will generate illegal use of the transit lanes and could lead to safety concerns.

Table 16: Summary of Vehicular Capacity Analysis Assumptions

2009/2011 Existing Conditions

- Dates of data collection:
  - Tuesday, March 31, 2009
  - Thursday, April 2, 2009
  - Tuesday, April 7, 2009
  - Tuesday, April 26, 2011
  - Counts taken from 6:00 – 9:00 AM and 4:00 – 7:00 PM
  - Count sheets in Appendix
- System Peak: 8:00 – 9:00 AM, 5:00 – 6:00 PM
- Geometries and lane configurations based on existing conditions
- Peak hour factors based on existing count data
- Percent heavy vehicles estimated from count data provided by DDOT from June 2009
- Signal timings/phasings/offsets provided by DDOT

2021 Future without HUCMP (Future Background Conditions)

- Background developments
  - Howard Theater
    - Located near intersection of 6th & T Streets
    - Redevelopment of 700-seat live theater with 600-square foot museum/gift shop
  - Progression Place
    - Located near the intersection of 7th & S Streets
    - Consists of new, mixed-use development with 100,000 square feet of office use, 20,000 square feet of retail use, and 205 dwelling units
  - The Logic Project
    - Located near intersection of 10th & V Streets
    - Redevelopment of vacant lot and historic church into 37 condominium units
- Background growth percentage of 1.6% applied to all turning movements except those entering and exiting the University
- *Improvements from Lower Georgia Avenue Transportation and Streetscape Improvements Final Report:*
  - Retime signals and optimize offsets along Georgia Avenue and Sherman Avenue;
  - Convert the far right travel lane on Georgia Avenue between Barry Place and Florida Avenue into a bus-only lane and remove the on-street parking located on both sides of the street;
  - Convert the former parking lane on southbound Georgia Avenue at Barry Place to a dedicated right-turn lane;
  - Reduce the cross-section of Sherman Avenue from three lanes in each direction to one lane with widened sidewalks and a median; and
  - Provide southbound left-turn lane on Sherman Avenue at Barry Place.

2021 Future with HUCMP (Total Future Conditions)

- Site trip generation and mode split assumptions are detailed in Section 3.1 of report
- Trip distribution for vehicles based on existing zip code data, as shown on Figure 28
- No signal timing changes assumed
- Following improvements included:
  - Construction of the College Street extension between Georgia Avenue and 6th Street, connecting to the existing intersection of Georgia Avenue and Barry Place;
  - Construction of Bryant Street between Georgia Avenue and Florida Avenue, connecting to the existing intersections at either end of the roadway; and
  - Construction of W Street between Georgia Avenue and 9th Street, connecting to the existing intersection at Georgia Avenue.