

3. A Review of Campus Travel Patterns - An assessment of how, and how frequently, faculty/staff and students are getting to and around the Central Campus, and where they are coming from.
4. An Evaluation of Current Transportation Demand Management (TDM) Efforts and Investments - An assessment of what the University is currently doing to manage current and future travel patterns.
5. Strategy Development - Identification and evaluation of recommended TDM strategies.

Projected Campus Growth



The Central Campus encompasses 118 acres of land and over 5.5 million gross square feet of University building space. As of fall 2011, Central Campus populations include roughly 11,000 students and 3,300 faculty and staff members. The HUCMP represents no physical expansion of the campus footprint, and does not propose significant campus population growth. The following table presents approximate current and projected campus growth measures.

Figure 1 Existing and Projected Campus Measures

Campus Measure	Existing	Planned	% Change
Students	11,000	12,000	9%
Undergraduate	7,400	8,400	14%
Graduate	3,600	3,600	0%
On-campus beds	3,800	5,000	32%
Faculty/Staff (non-hospital)	3,300	3,300	0%
Campus Area Acres	118	118	0%
Building Area (GSF)	5,709,995	6,952,293	22%

The Central Campus encompasses 118 acres of land and over 5.5 million gross square feet of University building space. As of Fall 2011, Central Campus populations include roughly 11,000 students and 3,300 faculty and staff members. The HUCMP represents no physical expansion of the campus footprint, and does not propose significant campus population growth — no growth in non-hospital faculty or staff, no growth in graduate student enrollment, and 14% growth in undergraduate enrollment. It does, however identify growth in total campus building area of nearly 22% including new graduate and working housing as well as commercial uses.

The HUCMP includes 17 development (new construction or major renovation) sites. Several of the proposed developments will bring non-University related populations to campus, including the Howard University Town Center, a mixed-use residential and retail development. Additionally, the buildings along Georgia Avenue will include new ground floor retail, which over the course of the HUCMP will add a net increase of 153,300 square feet of retail space to campus. The new recreation center will be open to the community, which will bring more people to campus. At the same time, plans to expand on-campus housing capacity by nearly one-third should significantly reduce driving commute rates among students. Because of this, and a commitment to developing a robust TDM program, the HUCMP anticipates future parking supply levels, and thus campus-based traffic levels, to be lower than they are today.

MULTIMODAL NETWORKS ASSESSMENT

The following assessment provides an overview of existing conditions among primary, alternative-modes serving the Central Campus. For each mode, an overview of existing conditions is followed by a summary of changes and improvements recommended in the Campus Plan, an outline of industry best practices, and a gap assessment to identify key areas of potential improvement.

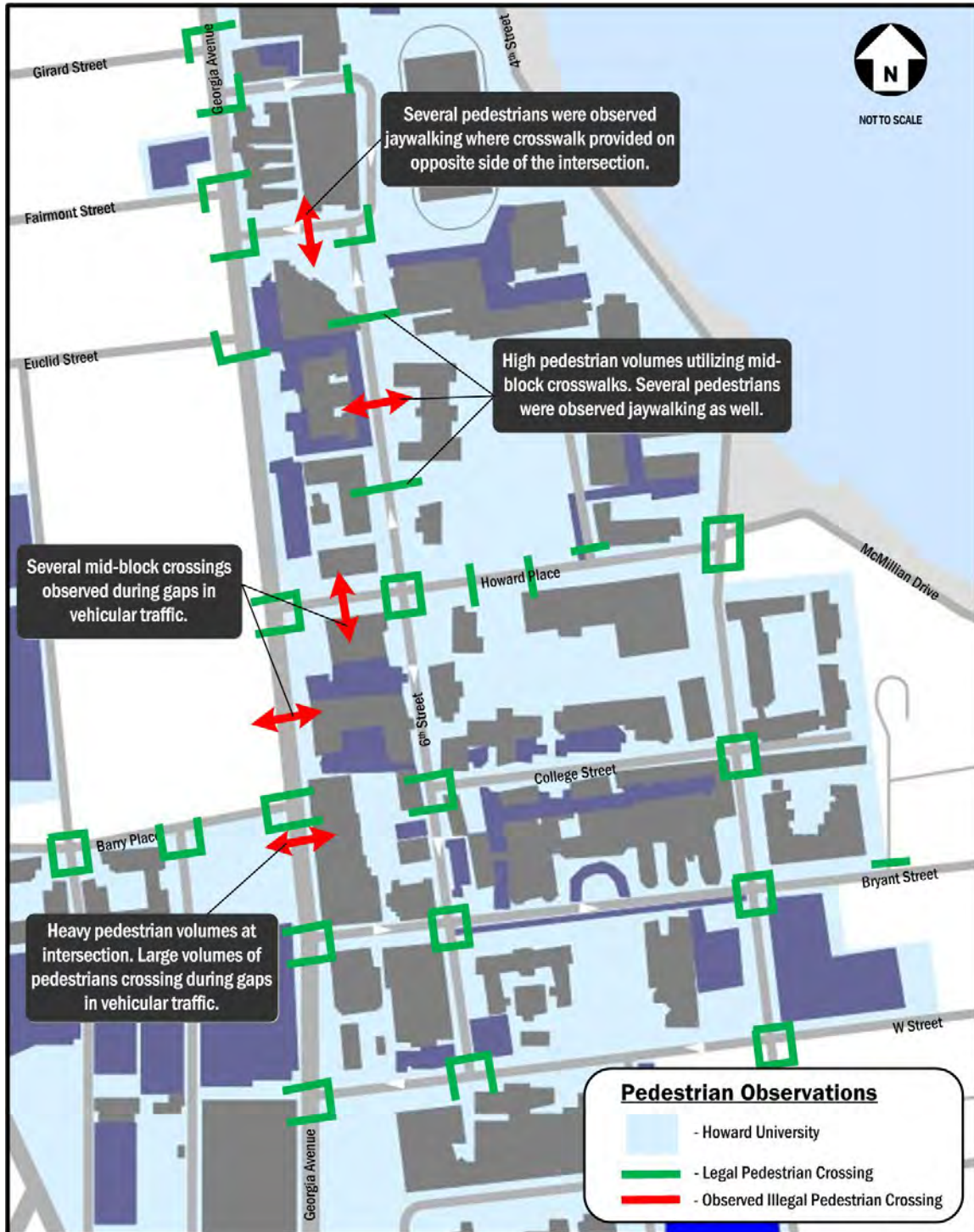
Pedestrian Facilities



Conditions

The Howard University Central Campus is a compact, highly-walkable campus. The size of the campus (generally less than half of a mile across and about three-quarters of a mile from Drew Hall to Howard University Hospital), existing pedestrian amenities (wide sidewalks and crosswalks), and the location of transit stations and parking results in high levels of pedestrian traffic throughout campus.

Figure 2 Observed Pedestrian Crossings



Map and Analysis: Gorove/ Slade

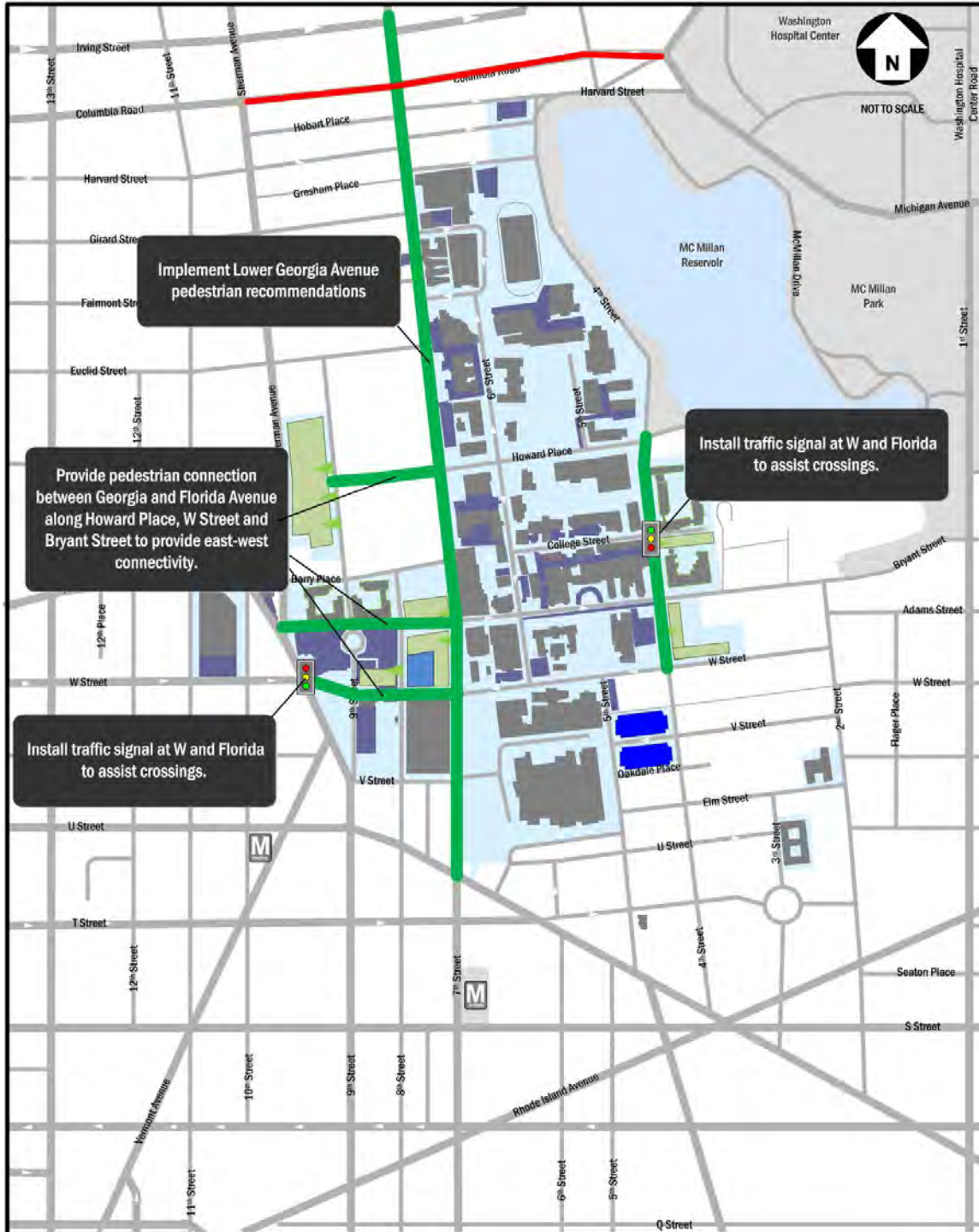
Planned Changes

Campus Plan recommendations were developed to address existing issues and mitigate future impacts:

- Improve conditions along east-west and north-south routes — expanded sidewalk widths, removed obstructions, crosswalk upgrades, and traffic calming (speed tables, decorative pavers, intersection bulb-outs, mid-block crossings, etc.).
- Minimize on-street parking impacts by implementing performance parking (increase space availability to reduce "search" traffic).
- Minimize visitor parking traffic by locating dedicated spaces on the periphery.
- Calm traffic on 4th Street between Howard Place and W Street.
- Add a traffic signal at 4th Street and College Street to accommodate increased pedestrian activity anticipated between the campus quad and planned campus housing east of 4th Street.
- Work with DDOT to implement Lower Georgia Avenue recommendations that improve pedestrian conditions along the Georgia Avenue corridor — bulb-outs on Georgia Avenue at Howard Place, general sidewalk improvements, wider planted buffers, and enhanced crossing facilities.
- Install Leading Pedestrian Intervals (LPIs) at signalized crossings along Georgia Avenue and 4th Street to assist east-west pedestrian crossings.
- Add east-west pedestrian connections between Georgia Avenue and Florida Avenue along W Street and Bryant Street in the form of new streets.
- Improve intersection facilities for pedestrian along Florida Avenue at W Street, Vermont Avenue, and V Street to accommodate increased activity through this area — traffic controls, marked crosswalks, and traffic calming features where warranted.
- Improve sidewalk conditions on Florida Avenue between Sherman Avenue and V Street to accommodate increased demand along this route — widening sidewalks, installing or increasing buffers, and removing obstructions.

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 3 Pedestrian Network Improvements in the HUCMP



Best Practices

Americans with Disabilities Act Design Guidelines

Bring all walkways into compliance with ADA design guidelines. Compliance will not only make more of the campus accessible to all users, but create more comfortable, safe, and accommodating conditions for pedestrians in general.

Pedestrian Zones

The pedestrian is the defining transportation modal element of any campus. To create a protected campus core where pedestrians dominate, while still providing access for automobiles and delivery trucks, many university campuses have created a ring road for vehicles, along with a campus core where through-vehicle traffic is limited.

Space Control and Assignment

Design and materials should support the safety of pedestrians as they access and traverse the campus. Bollards can be used to prevent vehicles from entering the pedestrian realm. Unified pathway treatments can help to define a space as pedestrian-dominant. Signage can be used to control speed and access by other modes, and to lead pedestrians down specific pathways. Regardless of specifics, the pedestrian should be given the most direct routes possible between their origins and destinations.

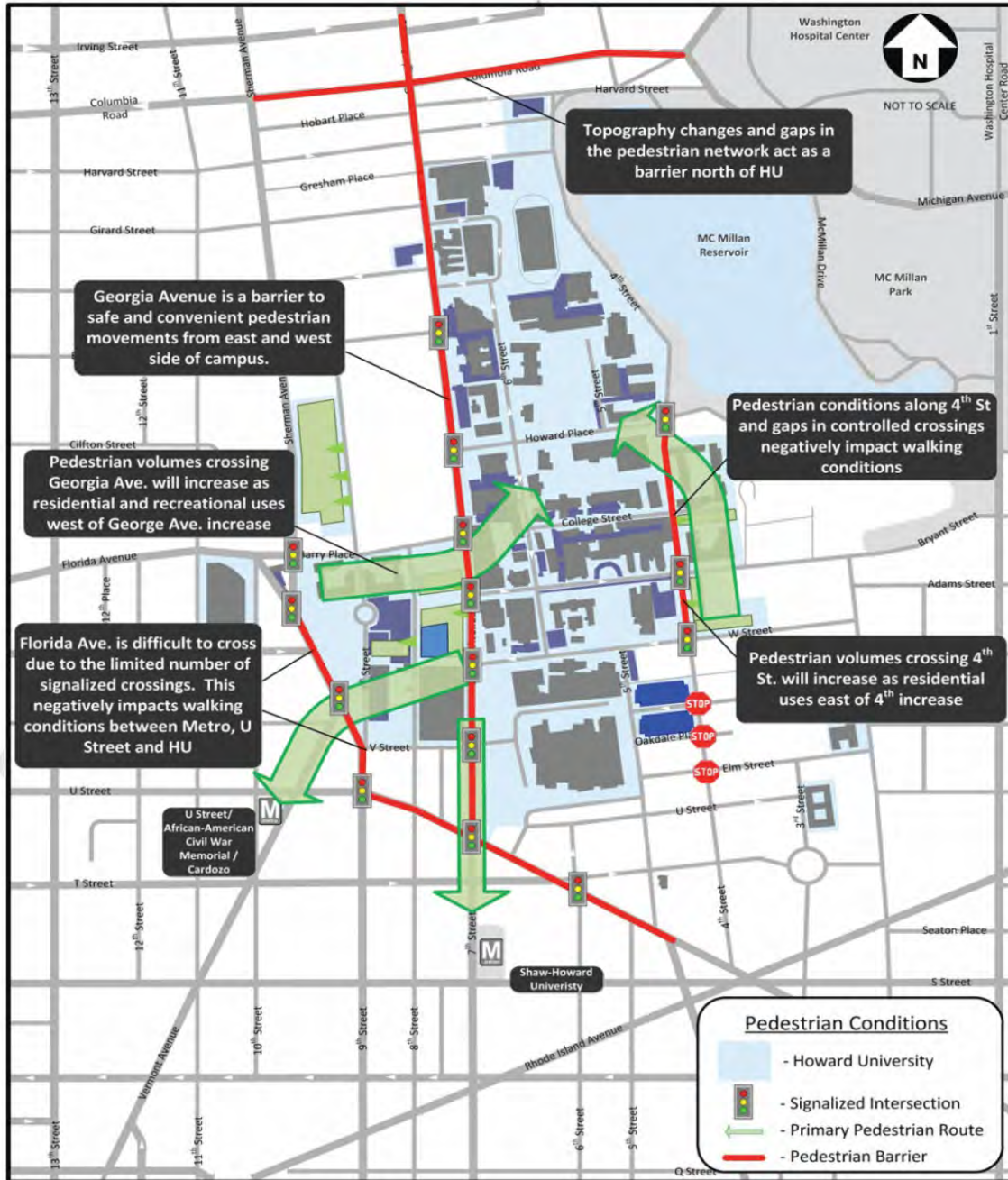
Leading Pedestrian Intervals

Intersections characterized by heavy vehicle and pedestrian traffic often present crossing hazards that impinge upon pedestrian mobility. Incorporating Leading Pedestrian Intervals (LPI) within traffic signal sequencing at these locations can dramatically improve the safety and comfort level of crossing pedestrians. By beginning the WALK phase of the signal cycle a few seconds before the companion GREEN phase, LPI allows pedestrians to establish themselves within the crosswalk before potentially-conflicting vehicle turns can begin. This also discourages drivers from attempting to turn at the beginning of the GREEN phase, ahead of the opposing through traffic, and thus helps improve overall safety at the intersection.

Gap Assessment

Overall, Howard University's existing pedestrian network is of high quality, and walking is the primary mode for moving around campus and between campus and nearby destinations. However, there are physical, technological, and qualitative gaps in the network.

Figure 4 Primary Pedestrian Routes, Barriers, and Expected Impacts



Map and Analysis: Gorove/ Slade

Recent sidewalk installations and improvements appear to be in ADA compliance. Many older facilities, however, including crosswalks in particular, could use compliance-level upgrades. Driveway-sidewalk interfaces present an example where improvements to both new and older network segments could greatly improve both the accessibility and walkability of the central campus - see Figure 5 and Figure 6. Many improvements identified in the HUCMP will help bring a greater share of the campus pedestrian network into ADA compliance and improve general, campus walkability.

Figure 5 Driveways Can Quickly Degrade Pedestrian Networks and ADA Accessibility



Image: Google Maps; Bryant Street NW at Georgia Avenue NW

Figure 6 Driveway-Sidewalk Interface Design Can Help Maintain Flows and Access



Central Business District, New Orleans, Image: Nelson\Nygaard

Within the heart of the Central Campus, there are significant areas (quads) in which pedestrians are essentially the only form of traffic. Formalizing these as pedestrian zones may be less important than ensuring high-quality, appealing pedestrian links between these areas and ensuring that all other traffic expects to yield to pedestrians in and around these areas.

LPI implementation at key intersections along Georgia Avenue and 4th Street — as identified in the HUCMP — could provide significant improvements for east-west, cross-campus pedestrian mobility.

Bicycle

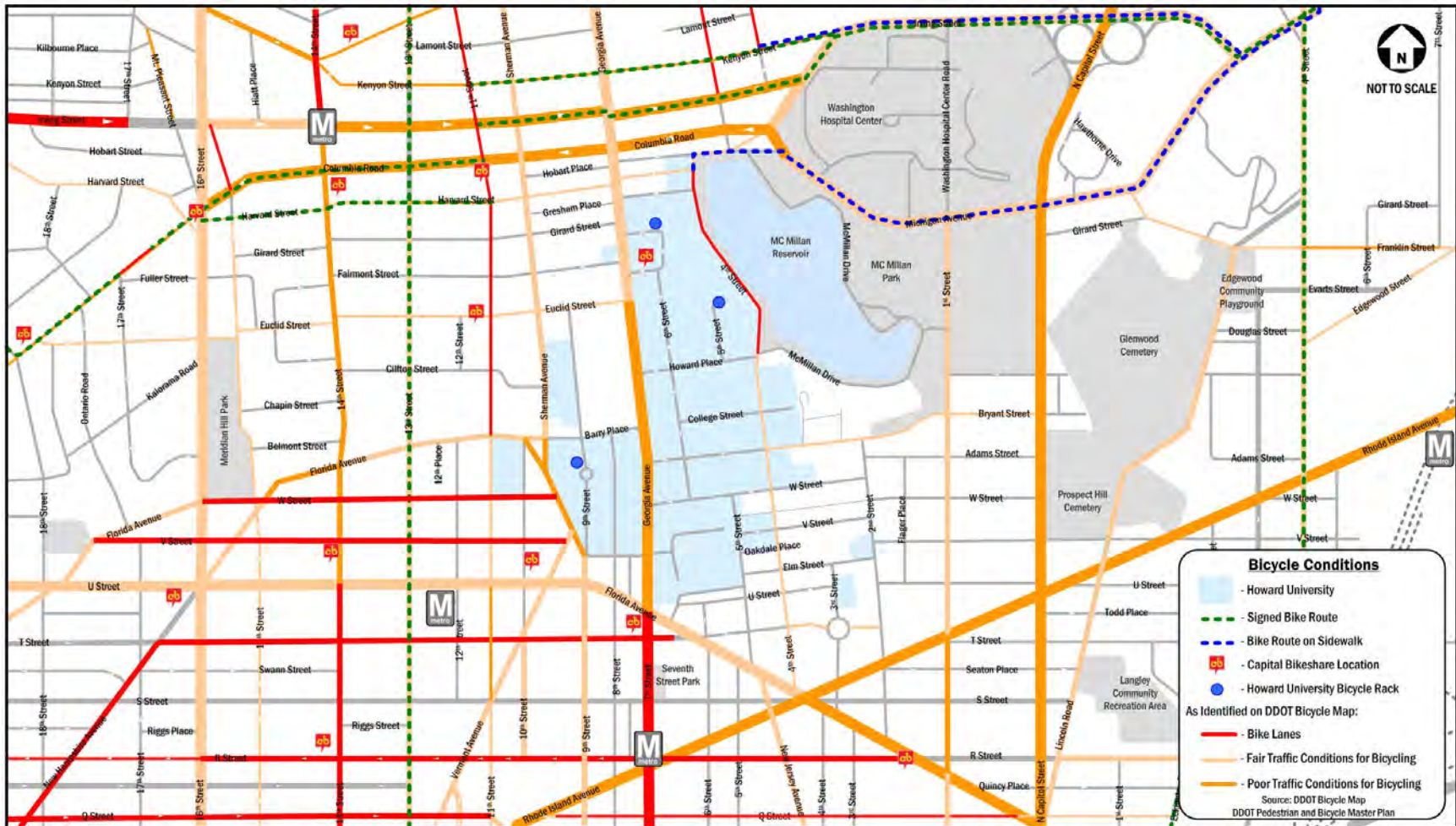


Conditions

There are several cycling facilities surrounding the Central Campus, including on-street bike lanes, signed bike routes, and three Capital Bikeshare stations (see Figure 7). However, gaps between these bicycle facilities and the Central Campus, as well as limited or missing amenities on-campus (particularly secure, sheltered parking opportunities) limit the potential of this network to serve Central Campus access needs.

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 7 Area Bicycle Infrastructure



Map: Grove/ Slade

Increasing use of the on-campus Capital Bikeshare station indicates significant, latent demand for bike access to and from campus. Capital Bikeshare, which premiered in September 2010, has three campus-area stations — one on campus, at Georgia Avenue and Fairmont Street; one adjacent to the Metrorail station portal located at 10th Street and U Street; and another at 7th and T Streets NW. Access to the Capital Bikeshare system is available on a yearly, monthly, three-day, or daily membership basis for a \$75, \$25, \$15, or \$7 fee, respectively. Members can access any bike within the system, and ride for free for up to 30 minutes. After 30 minutes, an escalating fee is charged. Usage data for the on-campus station is summarized below.

Figure 8 On-Campus Bike-Share Performance

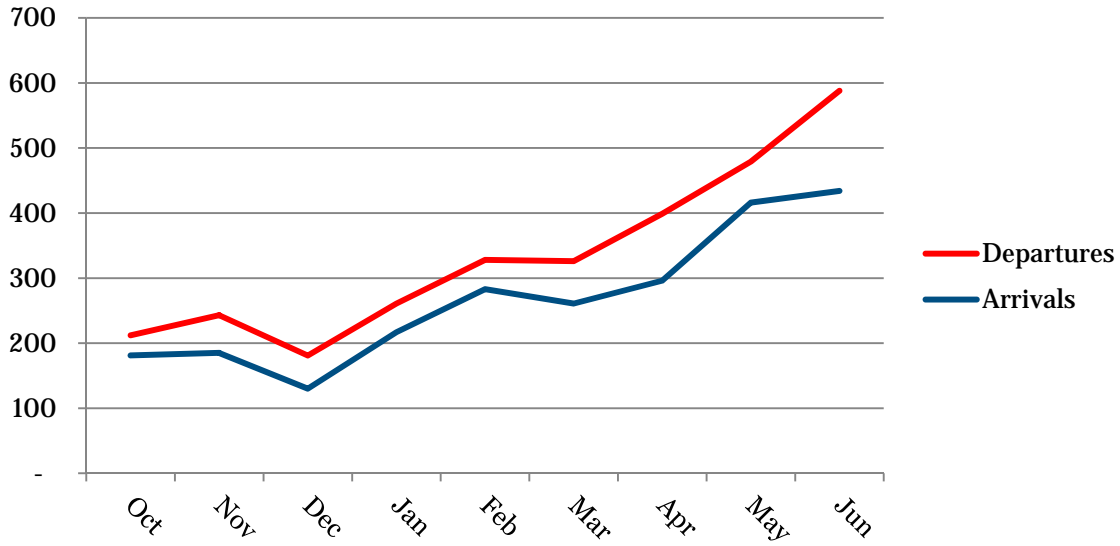
Year	Month	Departures	Arrivals
2010	Oct	212	181
2010	Nov	243	185
2010	Dec	181	130
2011	Jan	261	217
2011	Feb	328	283
2011	Mar	326	261
2011	Apr	399	296
2011	May	479	416
2011	Jun	588	434

Data Source: DDOT, accessed via: <http://www.capitalbikeshare.com/dashboard>

As shown in

Figure 8, usage has grown steadily since the stations were installed. Also apparent is the modest, but consistent gap between departure and arrival volumes, which is likely an impact of the higher relative elevation of the Central Campus compared to surrounding bike-share stations.

Figure 9 On-Campus Bike-Share Performance

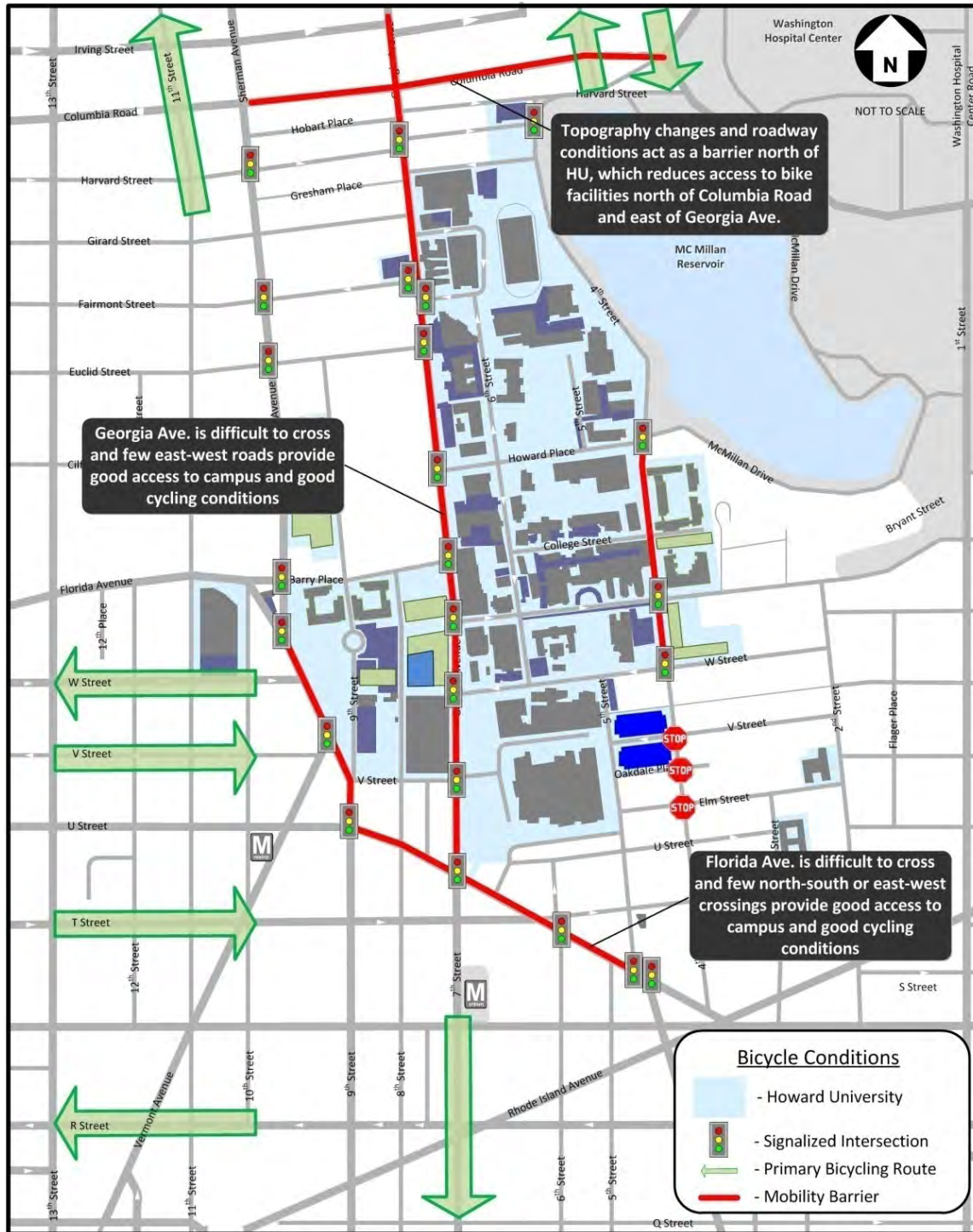


Data Source: DDOT, accessed via: <http://www.capitalbikeshare.com/dashboard>

Aside from the Capital Bikeshare station, there are three traditional bicycle racks located on campus; one at Blackburn Center, one near the athletic stadium, and one at the Howard Plaza Towers.

Planned Changes

Figure 10 Bicycle Conditions and Concerns

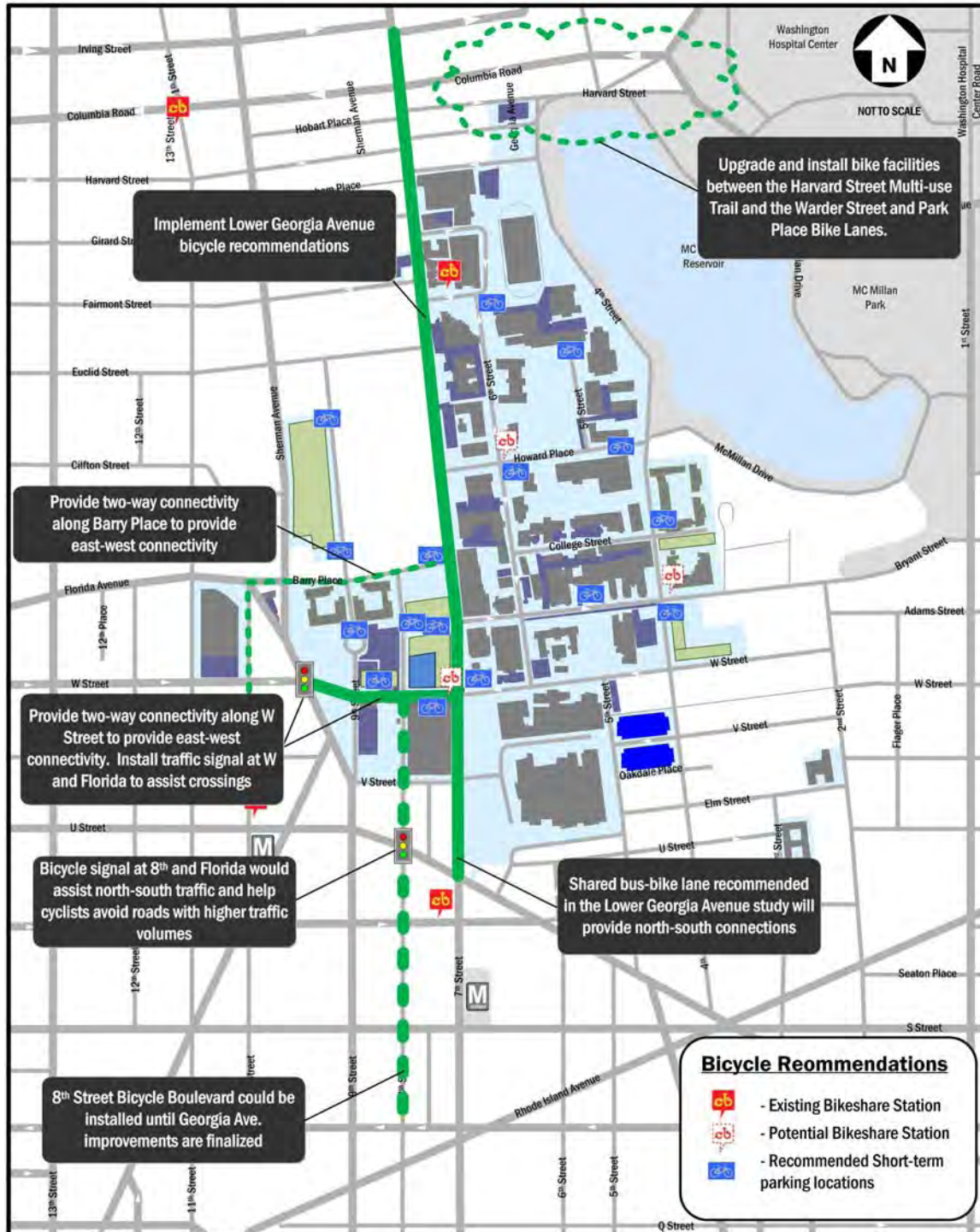


Map and Analysis: Gorove/ Slade

Bicycle network improvements recommended in the HUCMP include:

- Use 10th Street & Barry Place to connect bike lanes on W and V Streets with campus — an all-way stop, this is an ideal location for cyclists to cross Georgia Avenue.
- Create a bicycle facility on 8th Street between R Street and Barry Place, which would require a bicycle-actuated traffic signal to cross Florida Avenue.
- Alternatively, re-construct Georgia Avenue to include bicycle facilities by implementing the Georgia Avenue Great Streets plan — which includes a shared bus and bike lane.
- Locate an enclosed and secure bicycle parking facility on campus (possibly in a parking garage in the first phase), targeted to commuters (faculty/staff and off-campus student) and make shower facilities available to users.
- The proposed Recreation Center building will have shower facilities, and is a potential location for an underground parking facility. If a parking facility were constructed at this parcel, it would provide an excellent opportunity to create a centralized long-term, commuter-based bicycle parking facility on campus that can accommodate most commuters with direct access to shower facilities.
- Consider installing a cycle track along 6th Street to provide for north-south connection within campus if demand warrants additional facilities.
- Add DDOT-compliant bike racks outside of major campus buildings, focusing on those closest to bike routes and residence halls.
- Provide bicycle commuter benefits to faculty/staff.
- Residence halls should incorporate a significant amount of long-term storage for students who wish to bring bicycles to campus.

Figure 11 Bicycle Network Improvements in the HUCMP



Map and Analysis: Gorove/ Slade

Best Practices

Continuous, Dedicated Bikeways

Excellent bicycle facilities take many forms, from dedicated paths fully separated from the surrounding roadway system to bicycle lanes to traffic-calmed lanes where bicycles comfortably share the road with low-speed motor vehicles. Bikeways, however, are only as good as the worst links in the network. If a bike lane suddenly disappears as it approaches a challenging intersection, or if a path ends before it reaches a major destination, it is of little use in encouraging cycling as an alternative to driving. As the bikeway system becomes a more densely interconnected network, the rate of bicycling increases on a sharply upward curve.¹

Bicycle Parking

After continuous bikeways, the design and placement of bicycle parking is the next most important factor for the encouragement of bicycling. The placement of racks on the “desire line” between the approach path and the front door is important. Bicycle racks should be designed to support the frame and allow the use of a variety of locks, including using a U-lock to secure both the frame and the front wheel to the rack. At residential and office areas, protection from weather and theft is important.

Bicycle Safety Education

While extensive coursework and testing is necessary to secure a license to drive a car, anyone can ride a bicycle without special training. Basic education in the safe operation of a bicycle, however, can reduce crash and injury rates — and increase the confidence of novice cyclists to take on the challenge of urban cycling environments.

Summer Bicycle Storage

Many students with bicycles but no car lack the means to take their bicycles with them over the summer. A simple way to encourage bicycling throughout the year is to offer low-cost summer bike storage, taking advantage of underutilized spaces, such as resident hall basements.

Wayfinding

Major bikeways, like major roadways, should be signed. In addition, special destination signage is also helpful, particularly at major bikeway intersections.

Maps and Information

Maps of campus bike networks, parking facilities, retailers, and service providers can help elevate awareness of bicycling as a viable and supported campus travel mode. Maps are frequently provided on university websites, in orientation packages, and posted on information kiosks.

Gap Assessment

The presence of a rich and expanding bicycle facility network surrounding the Central Campus presents an opportunity for the University to tap into the demand for bicycle mobility that such conditions generate. Many such opportunities are identified in the HUCMP, including identifying the proposed

¹ Guidebook on Methods to Estimate Non-Motorized Travel: Overview of Methods. Publication No. FHWA-RD-98-165, July 1999, Federal Highway Administration.

recreational facility as an ideal location for significant, long-term bicycle parking working in coordination with DDOT. This location would combine state of the art parking with facilities for showering and changing before class or work, the absence of which is a common barrier to bicycle commuting, particularly among professionals.

Vehicle Parking



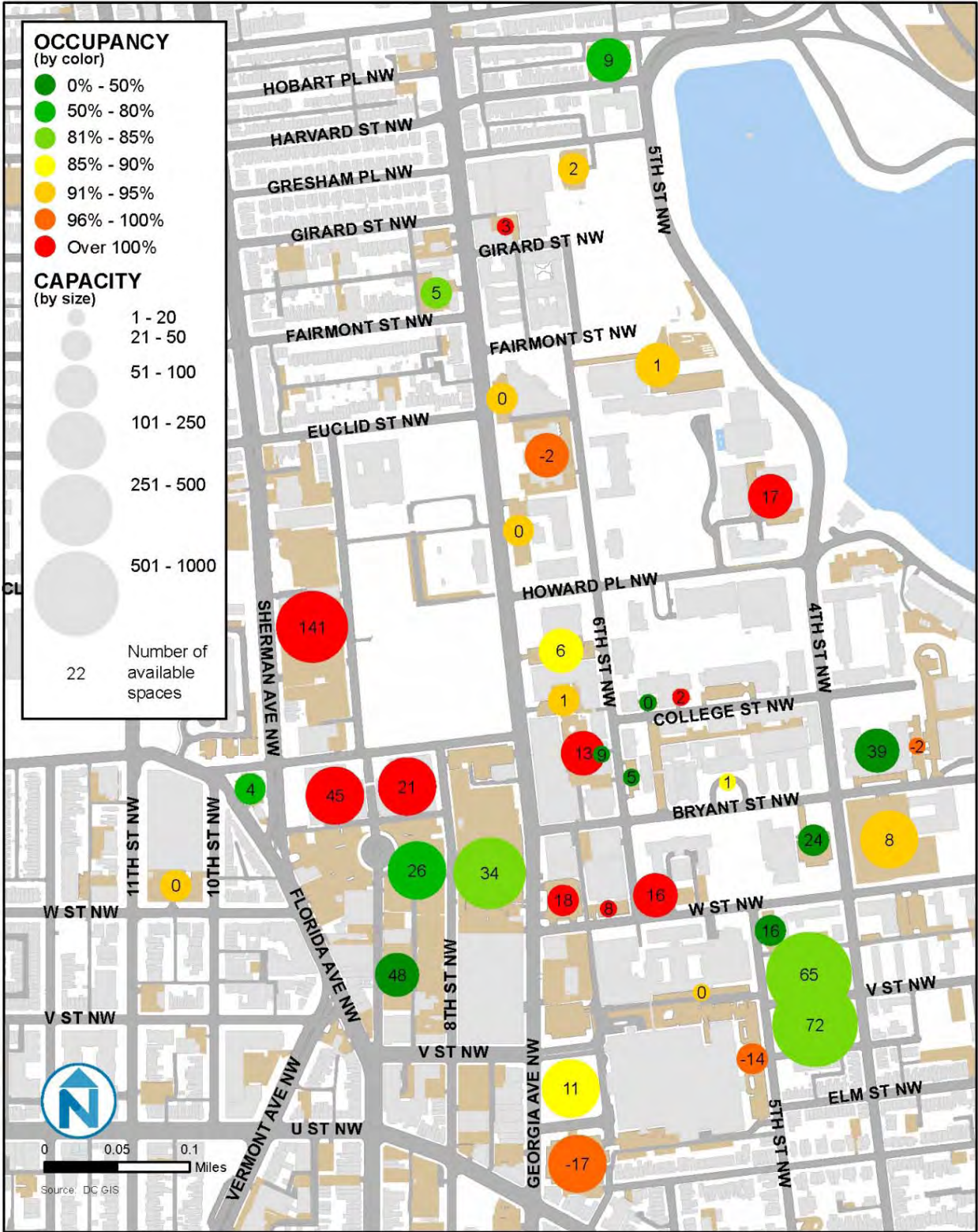
Conditions

Supply and Demand

Parking at the HU Central Campus is provided by the University through surface lots. A total of approximately 2,295 spaces are available within these lots. Among these spaces, 916 are reserved for student parking (about 0.083 spaces per enrolled student) and 1,300 are reserved for faculty/staff parking (about 0.4 spaces per faculty/staff member). There are no significant commercial providers of public parking in the area.

Occupancy surveys were conducted as part of the HUCMP to determine peak-hour demand at each parking facility. Surveys were conducted at several times during a typical weekday when classes were in session during the Spring 2011 semester. Findings are summarized in the table and maps below.

Figure 12 University Parking Facilities - Supply and Peak Occupancy by Location



TDM Plan for the Howard University Campus Master Plan
Howard University

The following table presents these occupancy measures along with quantities of permits sold at each facility, as provided by the Office of Parking and Shuttle Operations (OPSO).

Figure 13 Permit Sales and Occupancy by Location

Lot Name	Number of Spaces	Number of Staff Permits Sold	Number of Student Permits Sold	Total Permits Sold	Peak Occupancy
Childers	76	90	0	90	99%
Florida Ave	23	23	0	23	83%
Founders	54	48	0	48	70%
HUSC	62	60	0	60	100%
Business	36	49	0	49	100%
Medical Arts Bldg	30	11	0	11	*
Miner	53	55	0	55	104%
East	2	2	0	2	*
Johnson	41	37	0	37	100%
Bryant St	11	9	0	9	*
Mackey	56	51	0	51	90%
9th & V St	70	7	35	42	29%
Downing	31	30	0	30	97%
LSHSL	43	33	0	33	44%
Drew	53	5	54	59	83%
A1-Rear	23	22	0	22	92%
Greene	46	42	0	42	96%
Burr	12	10	0	10	75%
Georgia	34	27	0	27	85%
Wonder Plaza	50	51	0	51	75%
Just	22	22	0	22	70%
West	247	109	189	298	56%
Chemistry	4	4	0	4	75%
C.B.P.	55	58	0	58	79%
6th St	10	8	0	8	50%
Bunche	5	3	0	3	25%
Bethune	216	172	117	289	85%
Annex 1	86	103	0	103	117%

TDM Plan for the Howard University Campus Master Plan
Howard University

Lot Name	Number of Spaces	Number of Staff Permits Sold	Number of Student Permits Sold	Total Permits Sold	Peak Occupancy
5th & W	23	17	0	17	38%
6th & W	15	15	0	15	56%
Howard Center	321	266	99	365	89%
Howard Center II	48	47	0	47	62%
East Towers	127	24	124	148	81%
9th St	34	0	45	45	67%
Banneker North	100	49	111	160	55%
Banneker South	275	136	116	252	55%
East Towers Underground	100	16	75	91	80%
West Towers Underground	90	5	75	80	56%
Bethune Annex Underground	62	45	10	55	38%
Bethune Annex Rear	14	11	3	14	117%
Meridian	7	7	0	7	*
Total	2,667	1,779	1,053	2,832	76%

* Data not available.

Off-street parking facilities are commonly considered "at-capacity" when 90% of spaces are full. About half of all HU lots appear to be at- or over-capacity, while the other half have excess capacity (and sometimes significant excess capacity), even during peak times. Thus there appears to be a significant opportunity to improve overall parking conditions by redistributing demand more evenly across the Central Campus lots.

Other noteworthy conditions evident from available demand data include an estimated absentee rate among permit holders of roughly 30%.

In addition to University facilities, several streets on and near campus provide parking opportunities — primarily metered parking and residential-permit parking which allows non-residents two hours of free parking. Many of these on-street spaces are utilized by both faculty/staff and students that do not obtain parking permits, as well as visitors that cannot find parking within the University or do not wish to pay for a daily permit.

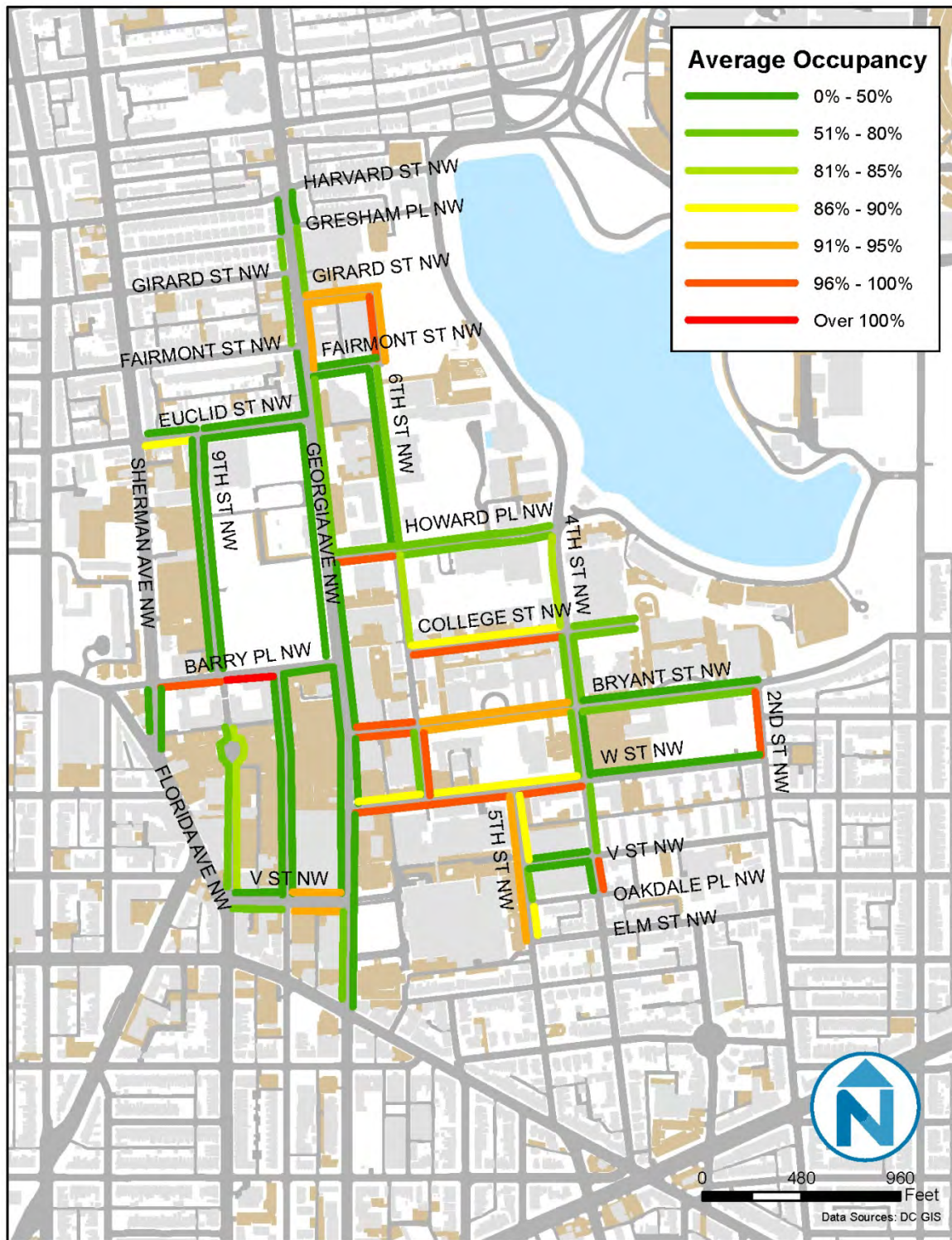
On-Street Parking

With few exceptions, the management of on-street parking within and surrounding the Central Campus is not intended to accommodate typical commuter parking demand patterns. Even for students, time-limits create a barrier to using on-street spaces while attending classes. Many spaces do, however, provide four-hours of parking, significantly reducing this barrier for students attending one or two classes at a time. Such spaces, however, can be of limited benefit if they attract much more demand than they can accommodate. To assess the capacities and availability of these resources for Central Campus commuters, a series of inventory and occupancy surveys of all on-street spaces within the Central Campus were conducted during peak-demand times.

The following maps provide a summary of weekday occupancy conditions on metered, Central Campus streets, as observed during surveys conducted at 11:00 AM, 1:00 PM, and 3:00 PM — hours when weekday parking demand tends to be at its highest.

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 14 Campus Street Weekday Occupancy - 11:00 AM



TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 15 Campus Street Weekday Occupancy - 1:00 PM

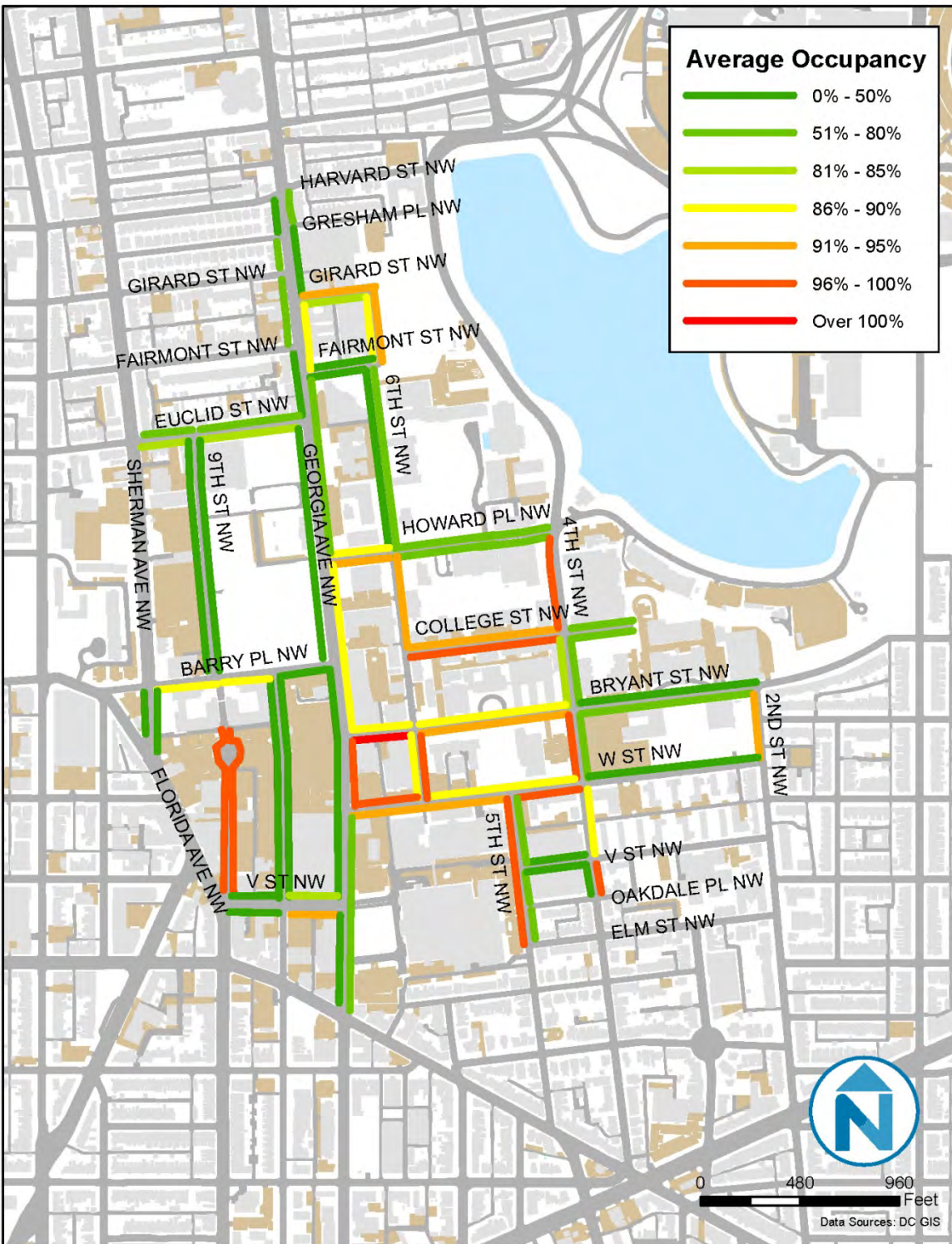
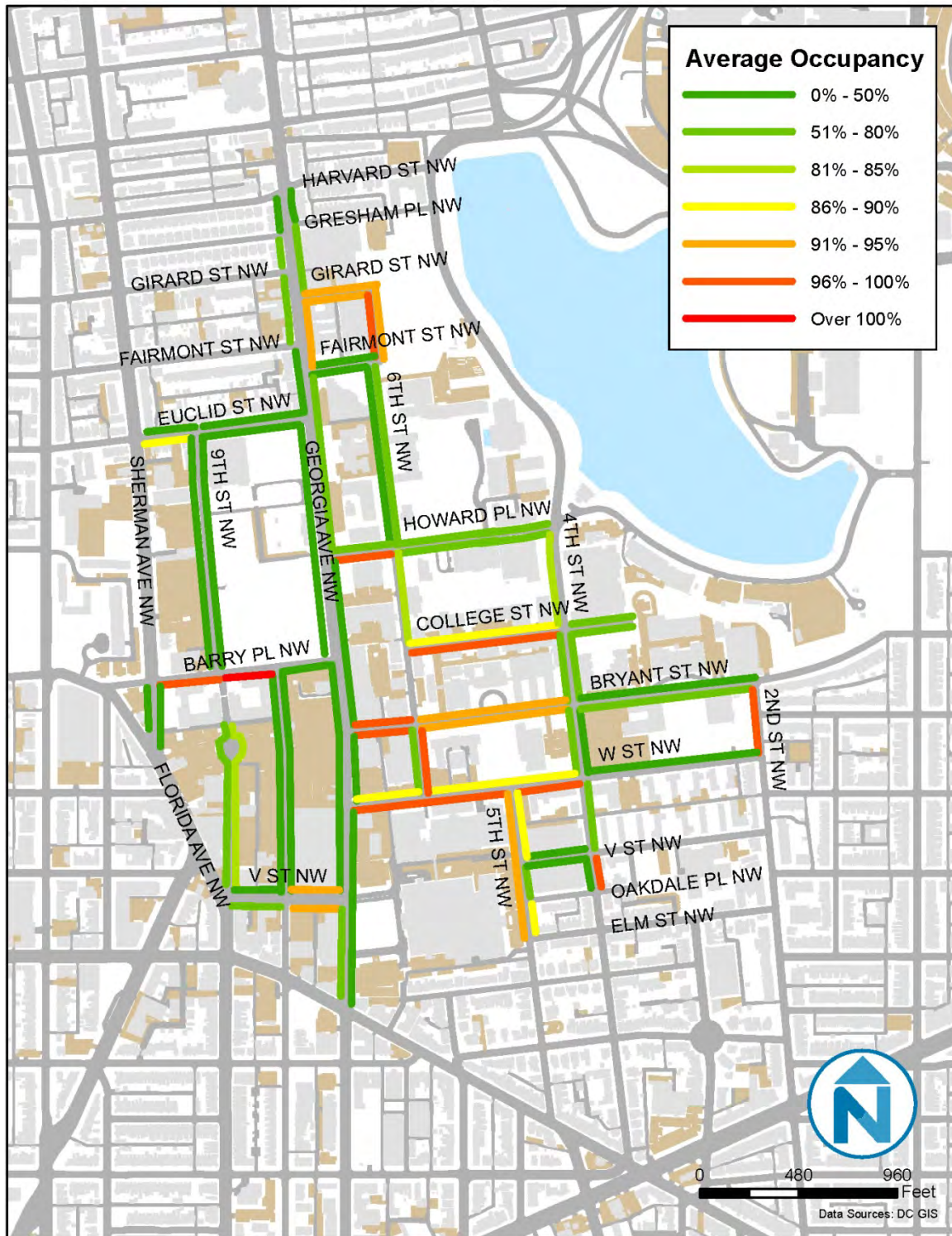


Figure 16 Campus Street Weekday Occupancy - 3:00 PM



As shown, survey findings indicate that on-street parking is a fairly constricted resource, offering limited availability on many blocks within core areas of the Central Campus. However, for those willing to pay the \$2-per-hour rate, adhere to the time limits, and walk a few blocks, most of the surveyed streets appear to provide ample parking options.

This survey effort also provided an opportunity to assess any campus-based impacts on parking availability within surrounding neighborhoods. Most of the blocks in these areas are managed through the District's Residential Parking Permit program, which provides permits to local residents and restricts parking by non-permit-holders to one or two hours (two, in the case of Howard-area neighborhoods). To assess the impact of campus parking demand on these streets, occupancy surveys were conducted on most blocks within campus-adjacent neighborhoods. These surveys distinguished overall occupancy, as well as occupancy by non-residents (vehicles without a displayed Zone 1 Permit).

The following maps provide a summary of weekday occupancy conditions on Campus-adjacent, residential streets, as observed during surveys conducted at 11:00 AM, 1:00 PM, and 3:00 PM.

Figure 17 Neighborhood Street Weekday Occupancy - 11:00 AM

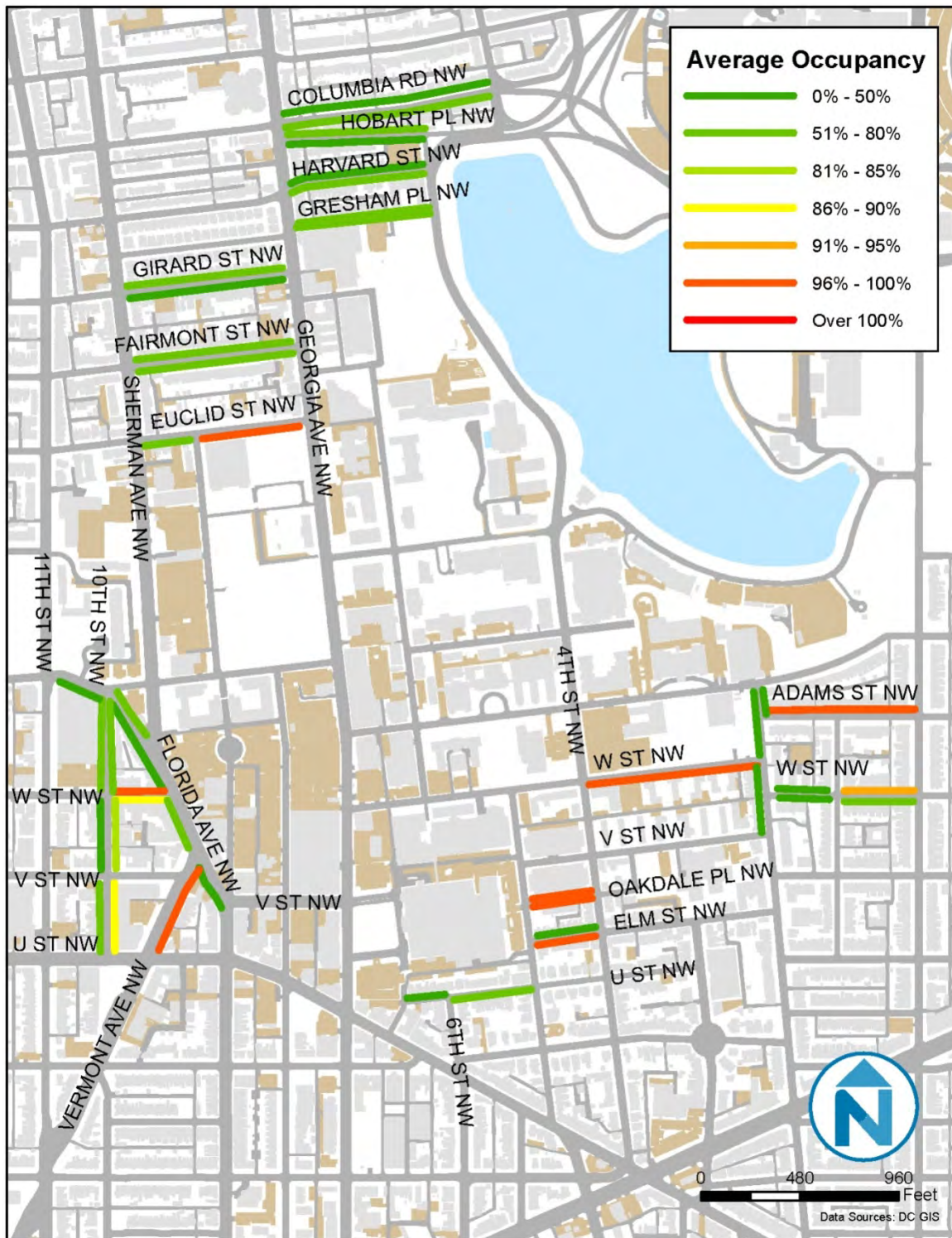


Figure 18 Neighborhood Street Weekday Occupancy - 1:00 PM

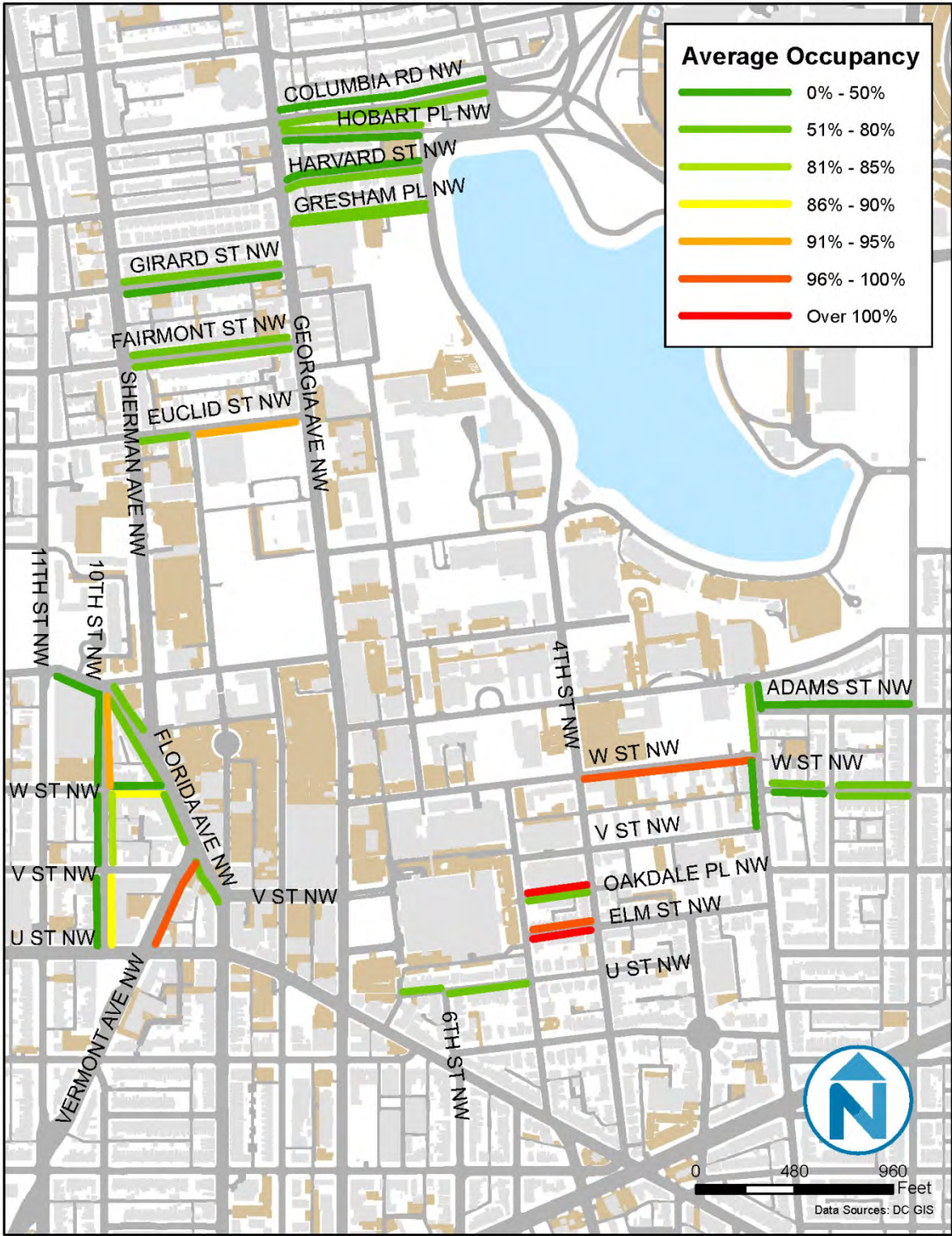


Figure 19 Neighborhood Street Weekday Occupancy - 3:00 PM

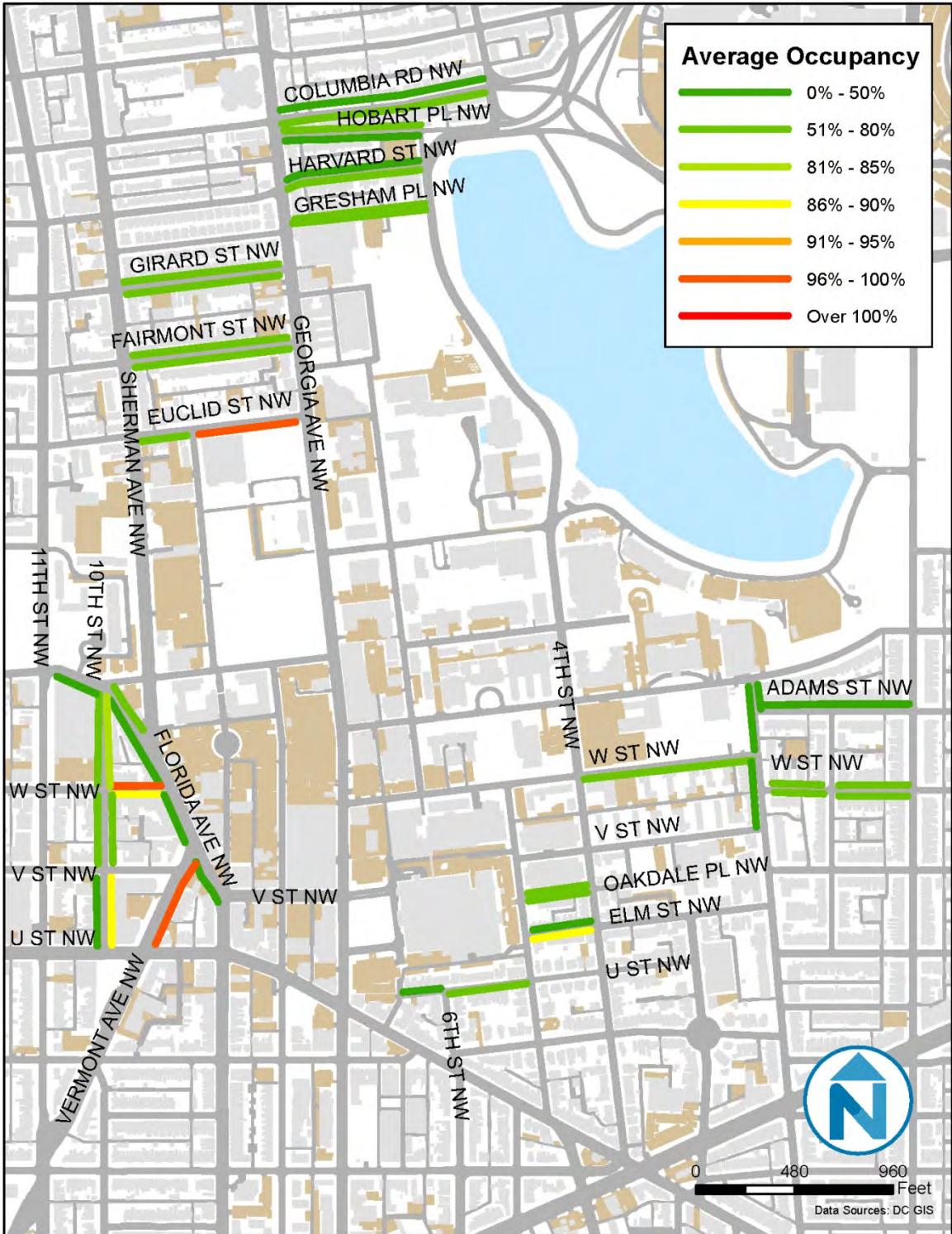
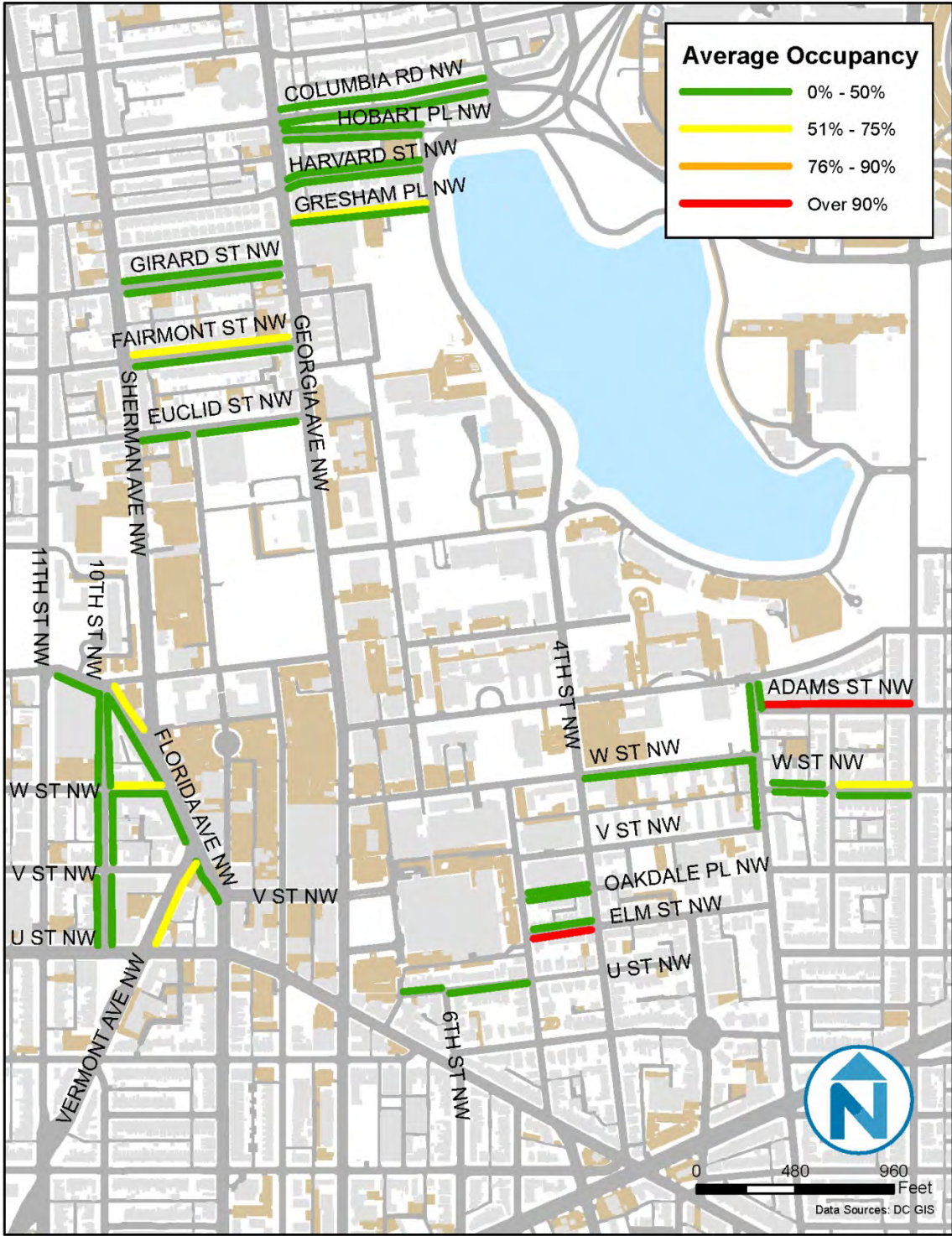
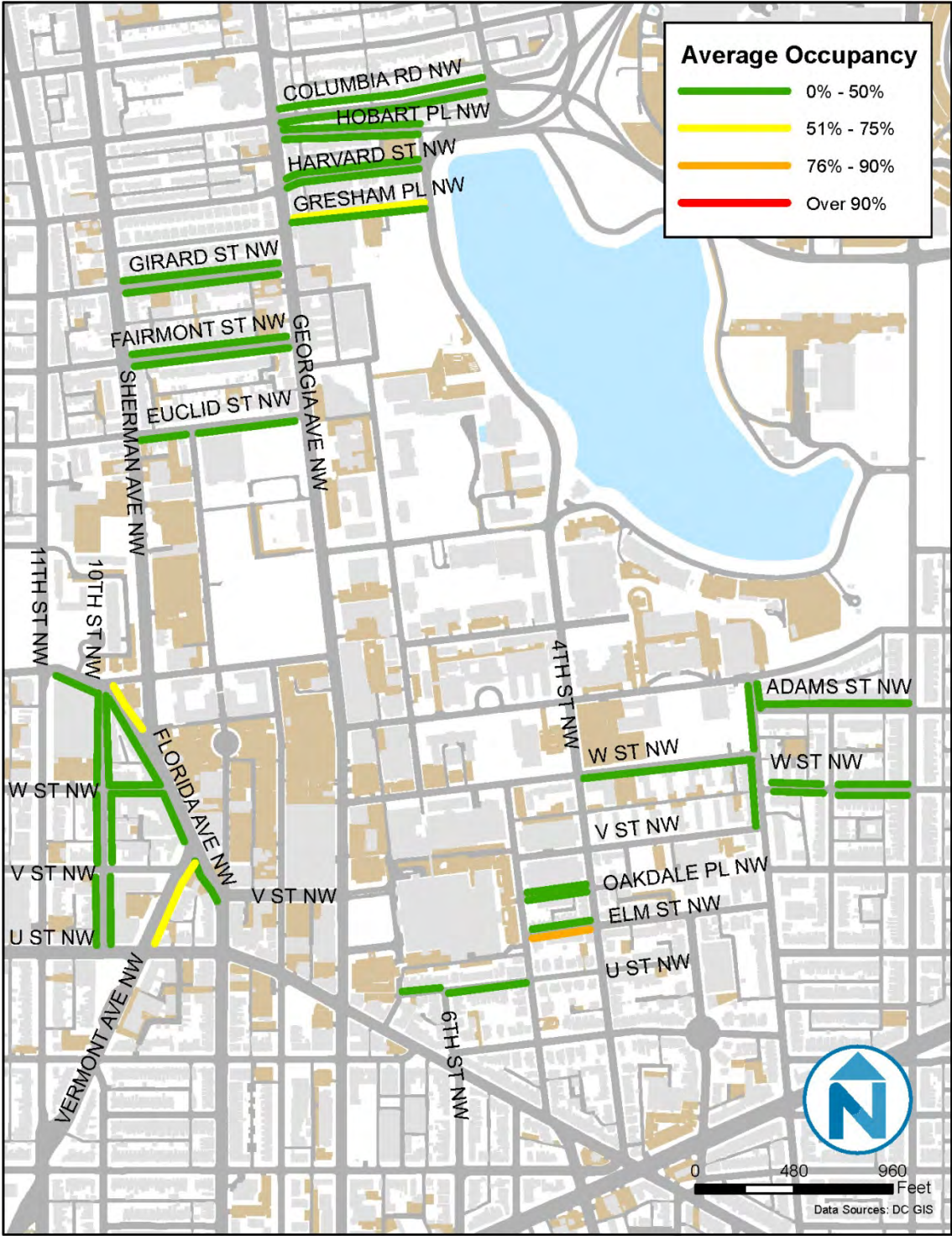


Figure 20 Neighborhood Non-Resident Occupancy - 11:00 AM



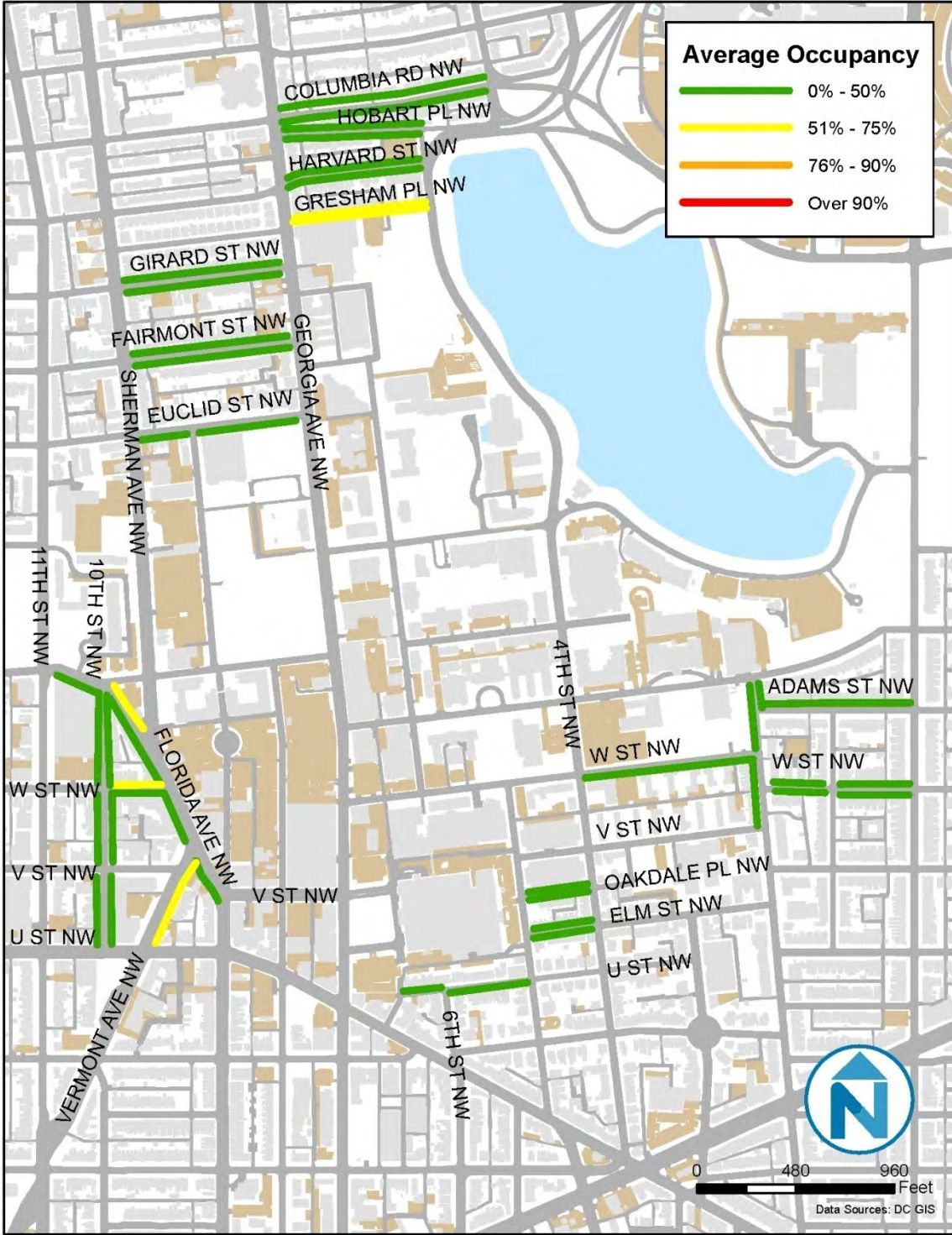
TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 21 Neighborhood Non-Resident Occupancy - 1:00 PM



TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 22 Neighborhood Non-Resident Occupancy - 3:00 PM



The District's resident parking permit regulations on these blocks allow for parking by non-residents for up to two-hours during the times of the surveys. The program objective is not to prevent any non-residential parking on these streets, but to manage non-residential demand enough to preserve parking access for residents. The assessment of campus-based parking impacts on these streets, therefore, begins with identifying blocks where access to parking is being constrained in general. As shown in Figure 17 through Figure 19, between six and eleven such blocks indicated constrained availability conditions (over 85% occupancy) at different times during the surveys.

As shown in Figure 20 through Figure 22, non-residential demand appears to be the primary cause of constrained parking availability on just a small proportion of surveyed blocks. In fact, the only blocks on which this was consistently evident during surveys were: the north side of W Street, between 2nd Street and 1st Street; the south side of Elm Street, between 5th Street and 4th Street; the east side of Vermont Avenue, between U Street and Florida Avenue; and the north side of W Street, between 10th Street and Florida Avenue. This is a fairly good indication that the existing resident permit regulations are working. For those blocks currently experiencing problematic levels of non-resident demand, reduced time limits for non-permitted vehicles could improve conditions for residents.

In either case, residential-block surveys indicate little reason for campus-parking spillover concerns to limit implementation of pricing or other demand-management actions related to Central Campus off-street facilities.

Management

On-campus parking management is provided by OPSO, with the exception of dormitory parking, which is managed by the Department of Residence Life. All vehicles parked on University property must 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. Enforcement is conducted by the Campus Police, Parking Enforcement Division. A total of four officers from the division (three for Central Campus and one for Hospital facilities) are dedicated to monitoring parking compliance full-time, from 8:30 AM to 3:30 PM.

551 reserved spaces are distributed to departments for allocation to individual faculty and staff. All other parking spaces are non-reserved. Access to all spaces is controlled via "hang tag" permits. Annual permit costs are \$400 for a reserved space and \$300 for a non-reserved space — about \$44 and \$33 per month, respectively, based on the nine-month academic year. Student parking permits are allocated on a first-come, first-serve basis. Permit registration is held following the spring semester of each year. Freshmen are not eligible for parking privileges. Annual student permits cost \$240, which amounts to roughly \$27 per month over the course of a nine-month academic year.

The University has sufficient supply to offer a permit to every faculty/staff member and eligible student who requests one, although not always at the lot of their preference. In all, 1,779 faculty/staff permits were sold last year — just over half of all Central Campus faculty/staff members. That same year, 1,053 student permits were sold — less than one for every ten Central Campus students.

During summer sessions, monthly parking permits are available for faculty/staff and students. The monthly rate for summer-registered students is \$24. Summer month permits for faculty and staff are \$30.

Visitors may park in non-reserved spaces within designated lots with a \$4 daily parking permit. Daily permits are sold directly at the University's OPSO office. The number of permits available is limited, and varies based on available spaces within University lots. However, most visitors are not aware of this option, and are left, then, to try to find on-street parking.

Parking Enforcement personnel monitor lots and inform OPSO staff throughout the day regarding availability for daily parking.

Hospital Parking

Hospital parking is also managed by OPSO. Howard University Hospital parking facilities contain approximately 1,495 spaces for accommodating hospital staff, patients, and visitors. Two-year staff parking permits sell for \$552. A limited amount of free parking is provided to Community Physicians, who perform pro-bono work at the hospital. These doctors are at the hospital only a few times a month, and are given parking permits as a courtesy for the days they are on-site. The hospital also has two visitor parking lots for patients and visitors. The lots are managed by a private operator, and offer public parking from 6:30 AM to 11:30 PM at the following rates:

- 1 hr or less: \$2.00
- 1 hr to 1½ hrs: \$2.75
- 1½ hrs to 2 hrs: \$3.50
- 2 hrs to 3 hrs: \$4.50
- 3 hrs to 4 hrs: \$5.50
- Max. to 24 hrs: \$ 6.50

Planned Changes

Over the course of the HUCMP, many existing surface parking will be removed and replaced by new underground parking facilities. An explicit goal of the HUCMP is to build the minimal amount of parking needed to accommodate the plan. A strong TDM Plan will be critical to achieving this goal.

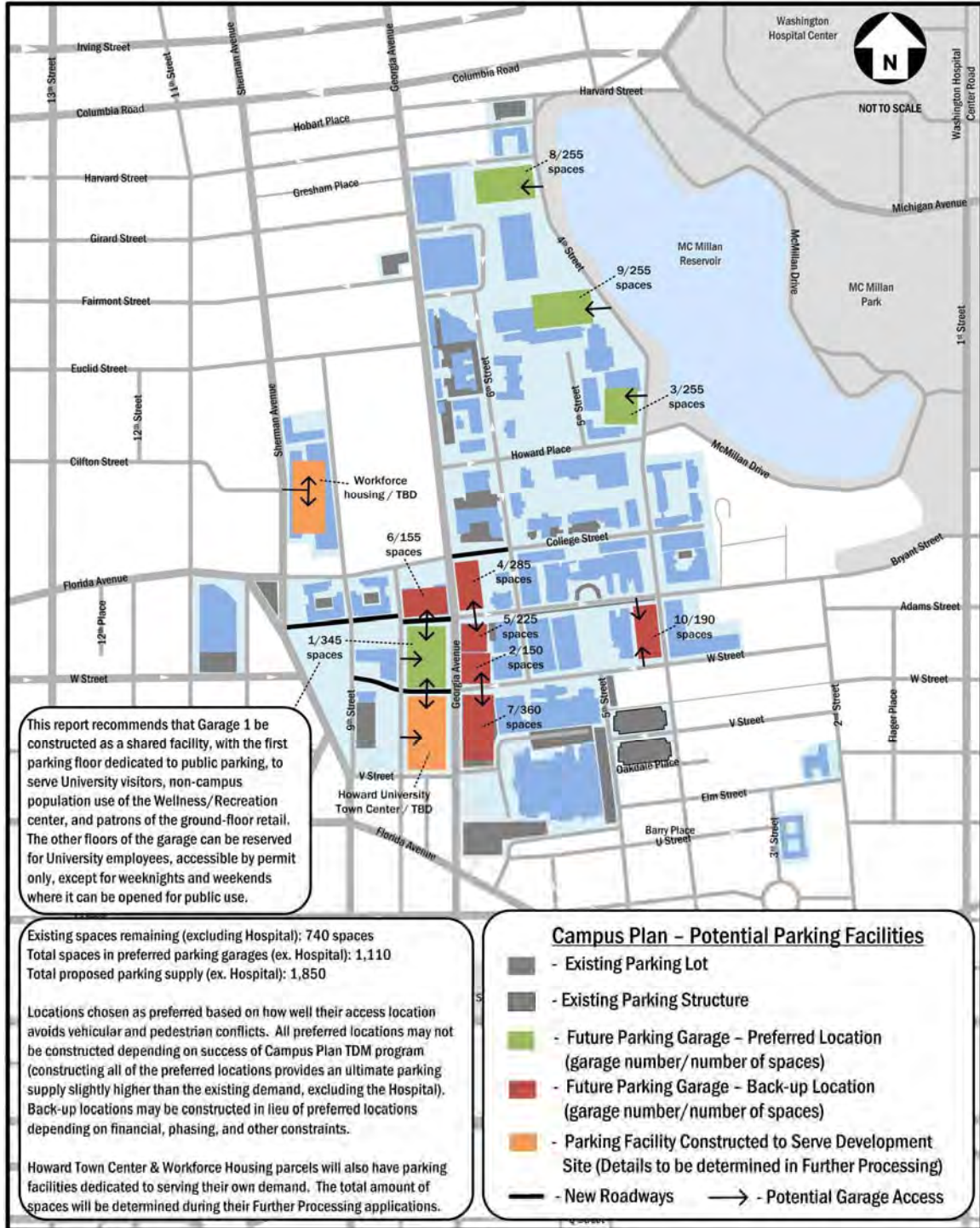
The Campus Master Plan does not propose significantly increasing campus population levels, and, from a parking demand standpoint, the proposed increase in students is off-set by the increase in students living on-campus with excellent walking, cycling, and shuttle access to all Central Campus destinations. Beyond University uses, however, additional parking demand is expected from several changes anticipated or planned for in the HUCMP, including:

- The Howard University Town Center;
- Non-campus population use of the Recreation Center and ground floor retail; and
- The workforce housing parcel.

The HUCMP identifies ten locations for potential new parking facilities to replace existing surface lots. It is recommended that the University's options for the use of these sites remain flexible, however, allowing it to respond to evolving levels of observed parking demand.

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 23 HUCMP Proposed Future Parking Locations



Specific parking recommendations made in the Transportation Report include:

- Establish a goal of reducing demand by 25-30% over the next ten years;
- Implement significant TDM measures immediately to meet this goal;
- Monitor parking demand regularly, by year or semester, to track progress of reducing demand;
- Use results to determine if and when parking facilities identified in the HUCMP should be constructed;
- Of the potential parking facilities identified in the HUCMP, lots 1, 3, 8, and 9 are recommended to 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 assume that these lots are constructed; and
- Locate a primary visitor parking facility somewhere on campus, perhaps under the proposed recreation center.

Best Practices

Pricing

Best practice approaches for managing campus parking demand include two primary pricing strategies:

- Pricing parking to ensure that all parking costs are covered by user fees; and
- Pricing parking based on demand, setting rates relative to levels of demand, typically with a goal of keeping demand in line with the capacity at each facility.

Since 1960, all California State University parking programs are required to be fully self-funding. To construct new parking facilities, schools typically must raise their parking rates to pay for new construction. In such a scenario, existing parking customers have a vested interest in supporting increased TDM investments that can forestall new parking construction/ increased parking fees.

An alternative pricing best practice is to simply adjust parking rates when and where demand begins to constrain capacities. Not only does this represent a time-tested market approach to managing demand for a limited resource, it can provide increased revenue for TDM investments, which in turn can be used to ease demand (and thus pressure for parking rate increases).

Optimize Resources

Parking construction, particularly within dense, urban environments, is very expensive - up to \$60,000 for structured parking and even more for subsurface parking. The best run campus parking systems, therefore, ensure that existing parking resources are optimized before building new capacity. On all college campuses, some parking spaces are always more desirable than others, leading to isolated parking constraints that can skew perceptions of overall availability. To more evenly distribute demand across all campus facilities, schools use a wide variety of strategies, including assigning premium-facility access based on seniority and creating waiting lists. The most effective approach, however, has proven to be price — simply charging a higher rate at the most sought-after locations, and discounting access to the least popular, until utilization is sufficiently even across the combined inventories.

Freshman Parking Restrictions

Many schools have adopted the practice of preventing some underclassmen — freshmen and sometimes sophomores — from access to on-campus parking. This not only directly reduces

campus-parking demand, but also increases exposure to alternative mobility options among those newest to campus. This sort of temporary exposure has proven an effective strategy for increasing long-term interest in alternative modes.

Shared Parking

Opening up University facilities as public parking during off-peak hours can both support local commercial businesses and reduce the amount of parking that new businesses build near campus. Specific benefits of these arrangements can include:

- Generating more pedestrian activity — thus increasing perceptions of personal safety — on weekends and evenings by promoting a "park-once" environment in which more patrons leave their car in one place while walking between local destinations;
- Reducing excess parking supplies; and
- Fostering a more lively, pedestrian-oriented, and destination-rich campus environment by reducing the cost of making local commercial investments.

Campus Shuttles

Bus shuttles connecting parking lots and primary campus destinations can reduce the need for intra-campus driving and promote a park-once environment. This reduces the need for redundant parking supplies, reducing overall supply and allowing spaces to be concentrated in fewer, less prominent campus locations.

Gap Assessment

Howard provides no free parking to any non-hospital faculty/staff or students. Pricing has also been preliminarily identified as a primary means of managing demand while the HUCMP is implemented. Bringing the cost of campus parking closer to parity with the costs of relying on transit service will be a critical step toward optimizing the value of existing and future facilities, and reducing the amount of new parking required to support the redevelopment outlined in the HUCMP.

Howard freshmen are not permitted to purchase annual parking permits, conforming to a best practice.

The University currently shares a 70-space facility with an evening-oriented events venue — the 9:30 Club. The club currently leases the facility from 6:00 PM to 8:00 AM. Other past and present sharing arrangements include the use of the current use of Banneker Lots for a weekend Flea Market and the past practice of permitting local churches to use lots under a formalized agreement. This is a strategy that will be expanded with the opening of Howard Theater, which will be allowed to use roughly 200 spaces in two Central Campus facilities during most evenings and weekends.²

Central Campus shuttles provide frequent service connecting campus destinations with campus parking and nearby Metrorail transit services. Recent investments in this service include providing a "next-bus" texting service; real-time, bus-tracking maps online and through smart

² Theater patrons will pay for the parking, and the Howard Theater will pay a monthly leasing fee.

phone applications; improvements to the Divinity and Law school routes; and an entirely new route connecting Central Campus with a major, regional student-housing development.

Transit



Conditions

Howard University Shuttle Services

Operations

Howard University Shuttle Bus Service (HUBS) is provided for the University's faculty, staff, students, and visitors to and from the Central Campus, various parking lots, dormitories, the School of Divinity, the School of Law, and other University based locations. Service to and from the Shaw/Howard University and Brookland/CUA Metro stations is also provided by HUBS. In addition, HUBS provides service to University Town Center (UTC) in Hyattsville, Maryland. This privately managed residential tower houses Howard University students, among other area university students. HUBS routes are organized as North Campus, North Express, South Campus, South Express, Divinity/East Campus, Law/West Campus, and University Town Center. Hybrid routes are operated on weekends and during the summer. The shuttles are free, but all patrons must present a valid ID card (for HU faculty, staff, and students, validated Capstone ID cards; for visitors, passes are available from the Office of Parking & Shuttle Operations).

The North and South routes operate every 15-20 minutes from 7AM to 12:20AM on weekdays and until 3:00AM on Friday nights. The Divinity/East Campus route operates every 35 minutes weekdays from 8:00AM to 1:00PM and 4:00PM to 10:30PM. On Saturdays, the Divinity/East Campus route operates every 35 minutes from 10:00AM to 2:30PM. The Law/West Campus route operates every 50 minutes weekdays from 8:00AM to 6:00PM and 8:00PM to 11:30PM. The University Town Center route operates every 30 minutes weekdays from 7:00AM to 11:00AM and 7:30PM to 11:30PM. The Weekend route operates every 20 minutes from 8:50AM to 12:30AM (Sunday night) and 8:50AM to 3:00AM (Saturday night).

TDM Plan for the Howard University Campus Master Plan
Howard University

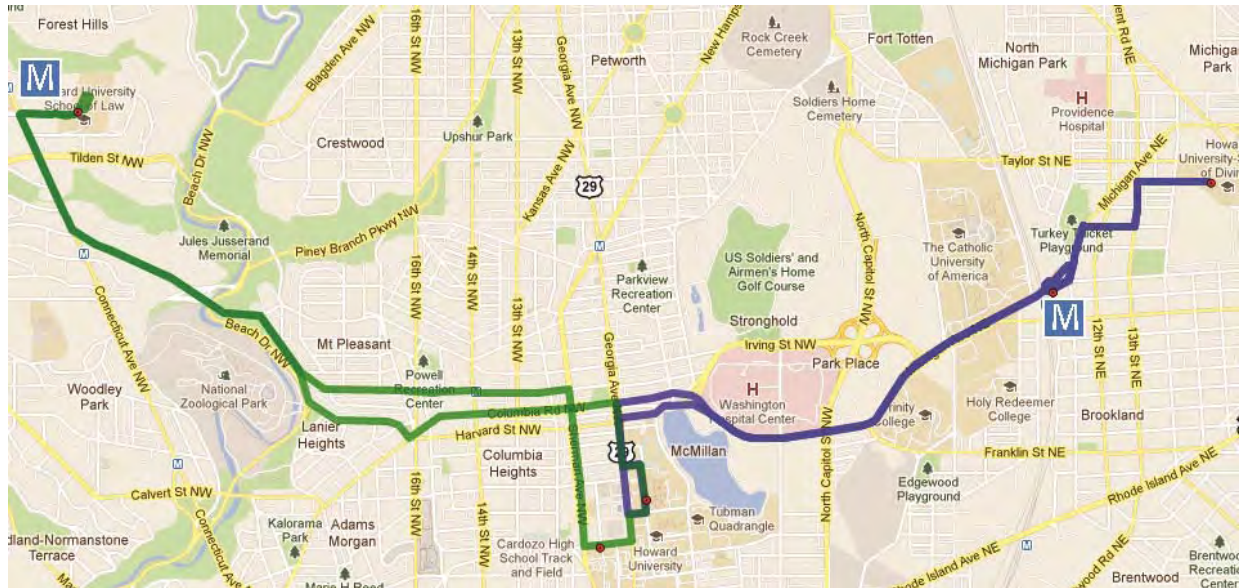
Figure 24 Central Campus Shuttles



<http://www.howardshuttle.com/>

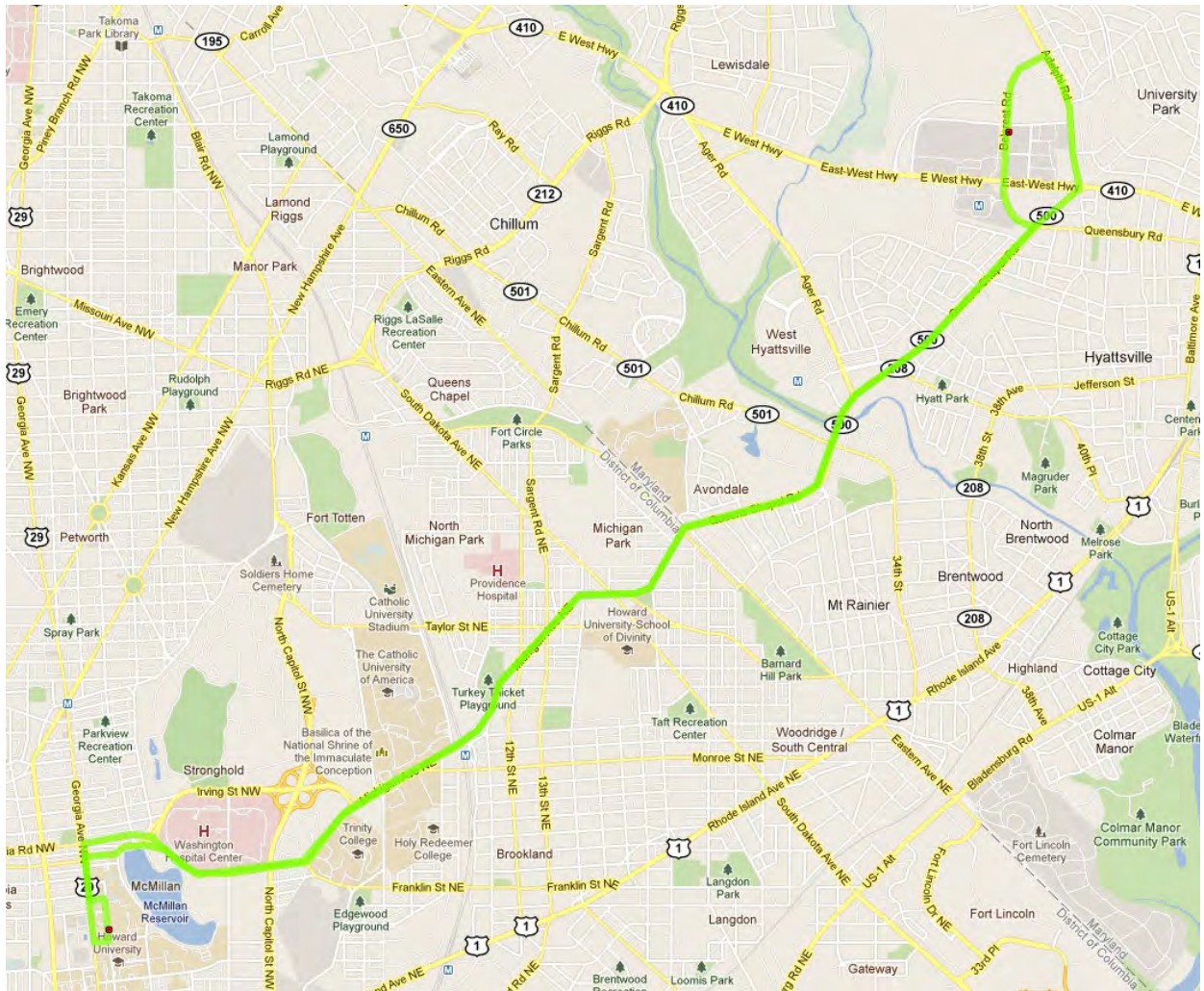
TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 25 Law (Green) and Divinity School (Blue) Connectors



<http://www.howardshuttle.com/>

Figure 26 UTC Connector Route



<http://www.howardshuttle.com/>

Ridership

Shuttle utilization over the past year has varied from a high of almost 5,000 riders per day in September 2010 to approximately 800 riders per day in May 2011 (not including summer-only service months); see Figure 27 and Figure 28³. As is common at many universities, ridership starts high at the beginning of each semester, then generally decreases each month. This pattern is attributable to new students, faculty, and staff who are interested in using the transit system but find other more convenient options as the semester progresses. This indicates an opportunity to improve the shuttle system to retain more of the riders served at the beginning of the school year.

³ Average daily ridership is based on calendar days, however not every route operates every day.

Figure 27 Average Daily Shuttle Ridership per Month

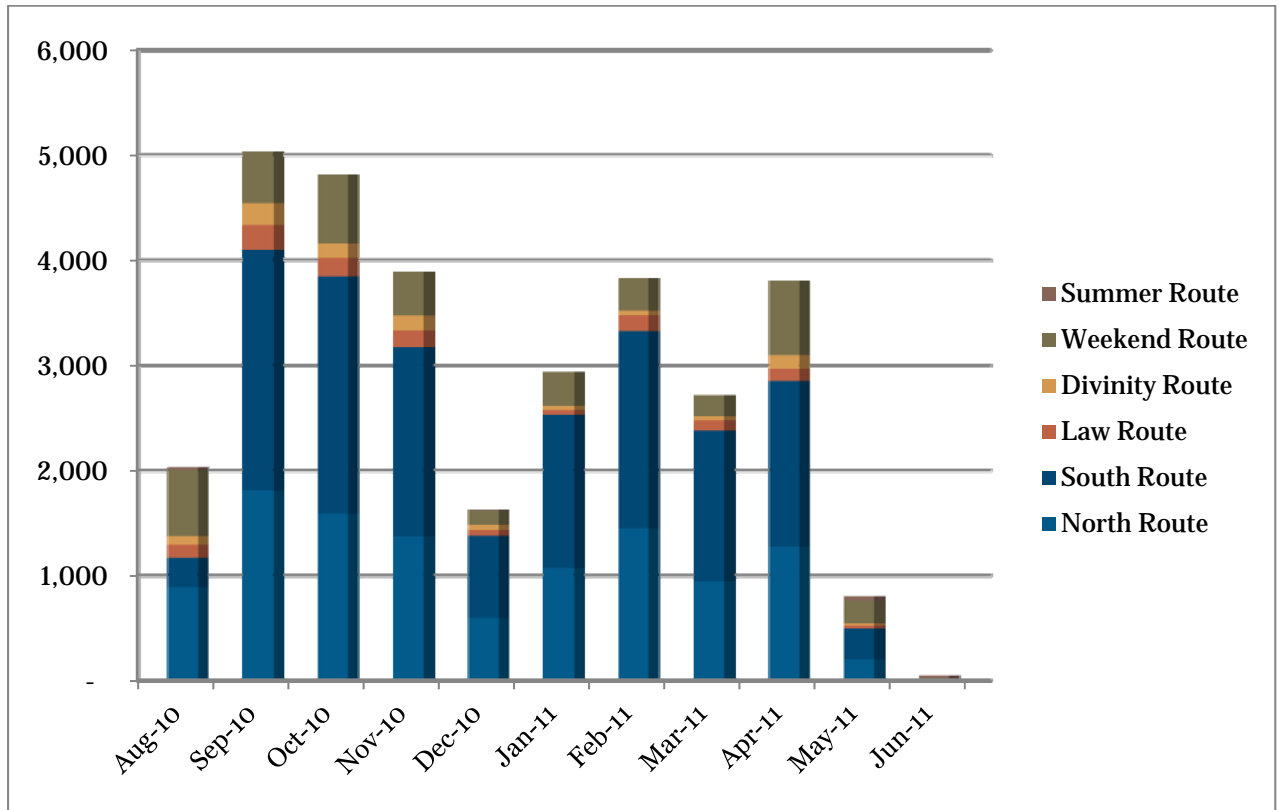


Figure 28 Average Daily Shuttle Ridership per Month

	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11
North Route	883	1,800	1,580	1,363	591	1,065	1,444	937	1,266	194	-
South Route	280	2,288	2,261	1,801	780	1,457	1,875	1,433	1,578	298	-
Law Route	123	241	173	165	56	44	148	99	117	27	-
Divinity Route	84	208	137	138	51	45	47	44	127	21	-
Weekend Route	629	490	657	421	136	319	309	198	709	213	-
Summer Route	28	-	-	-	8	2	-	-	-	45	44
Total Passengers/Day	2,027	5,027	4,808	3,887	1,621	2,931	3,823	2,711	3,797	798	44

Bus Stops

Bus stop infrastructure supporting the Howard University shuttle system generally consists of a post and sign. All stops include a text number to receive real time bus arrival information, while some locations also include printed schedule information.

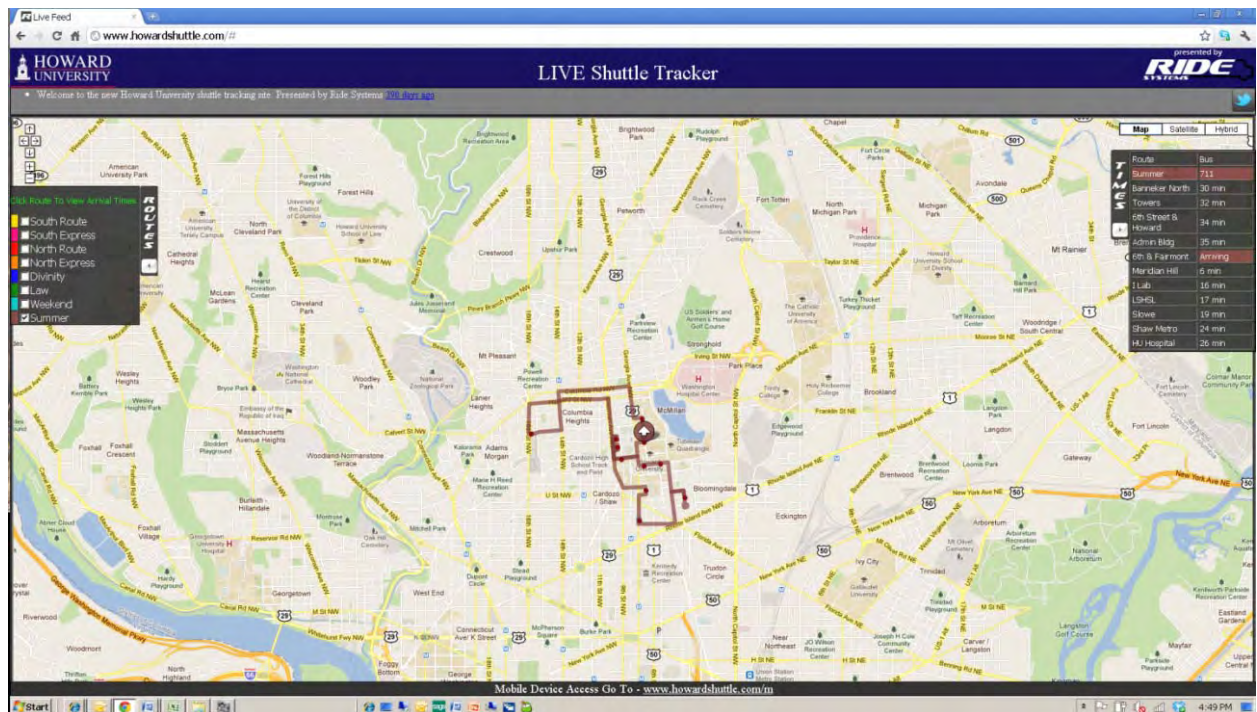
Marketing and Information

Howard University implemented a GPS-based Live Shuttle Tracker System provided by Ride Systems. The system tracks the location of vehicles on a map that can be accessed on the web or

TDM Plan for the Howard University Campus Master Plan Howard University

by mobile phone; vehicles report their location through a GPS transponder, and the feed is updated regularly. Figure 29 displays what users saw on a typical summer weekday; the arrows move around the map in almost real-time (with a few seconds of delay possible). In addition to the Live Shuttle Tracker, Howard University's website provides complete schedule information.

Figure 29 Live Shuttle Tracker



Shuttle Cost

Total HUBS costs for the 2010-11 school year were \$1,328,000. Including the costs of adding the UTC shuttle in the fall of 2011, total 2011-12 HUBS costs are forecasted to roughly \$1.5 million.

WMATA and Other Providers

Howard University is directly served by Metrobus and linked with Metrorail Stations located on the Green and Yellow Lines by HU Shuttles and Metrobus.

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 30 Campus-Proximate Metrorail Stations



Map: Gorove/ Slade Associates

Figure 31 Metrobus Routes



Map: Gorove/ Slade Associates

Planned Additions

WMATA and Other Providers

Investments in significant new transit services are planned for the Central Campus area over the course of the next ten years, including new WMATA streetcar and express Metrobus service — see maps below — and new DDOT DC Circulator bus routes (see Figure 34).

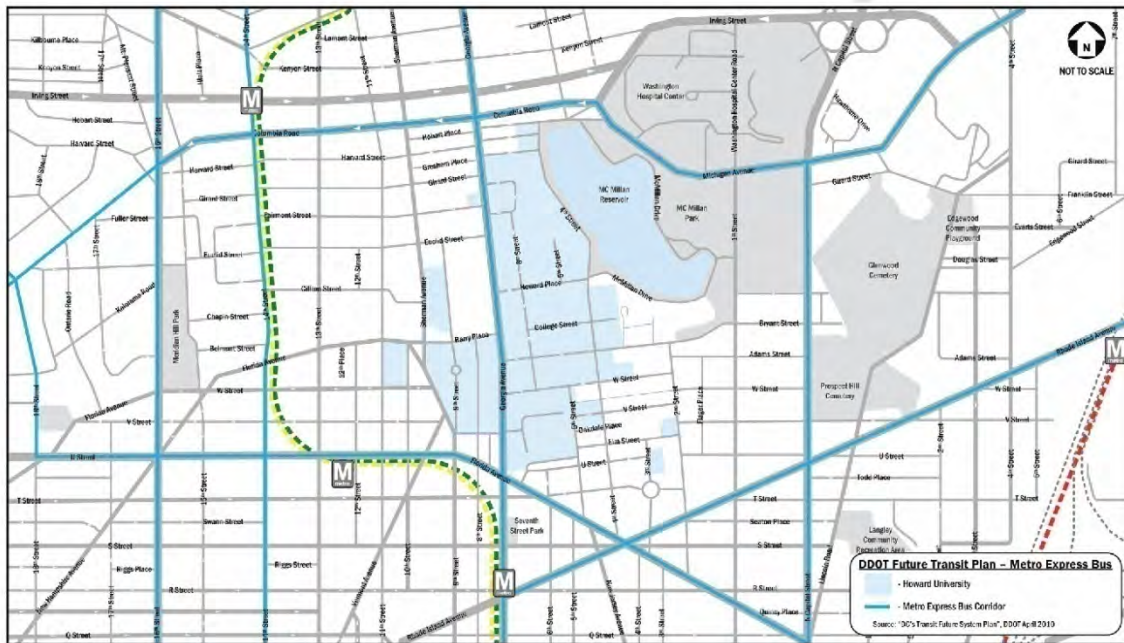
Figure 32 Planned Streetcar Routes



Map: Gorove/ Slade Associates

TDM Plan for the Howard University Campus Master Plan
Howard University

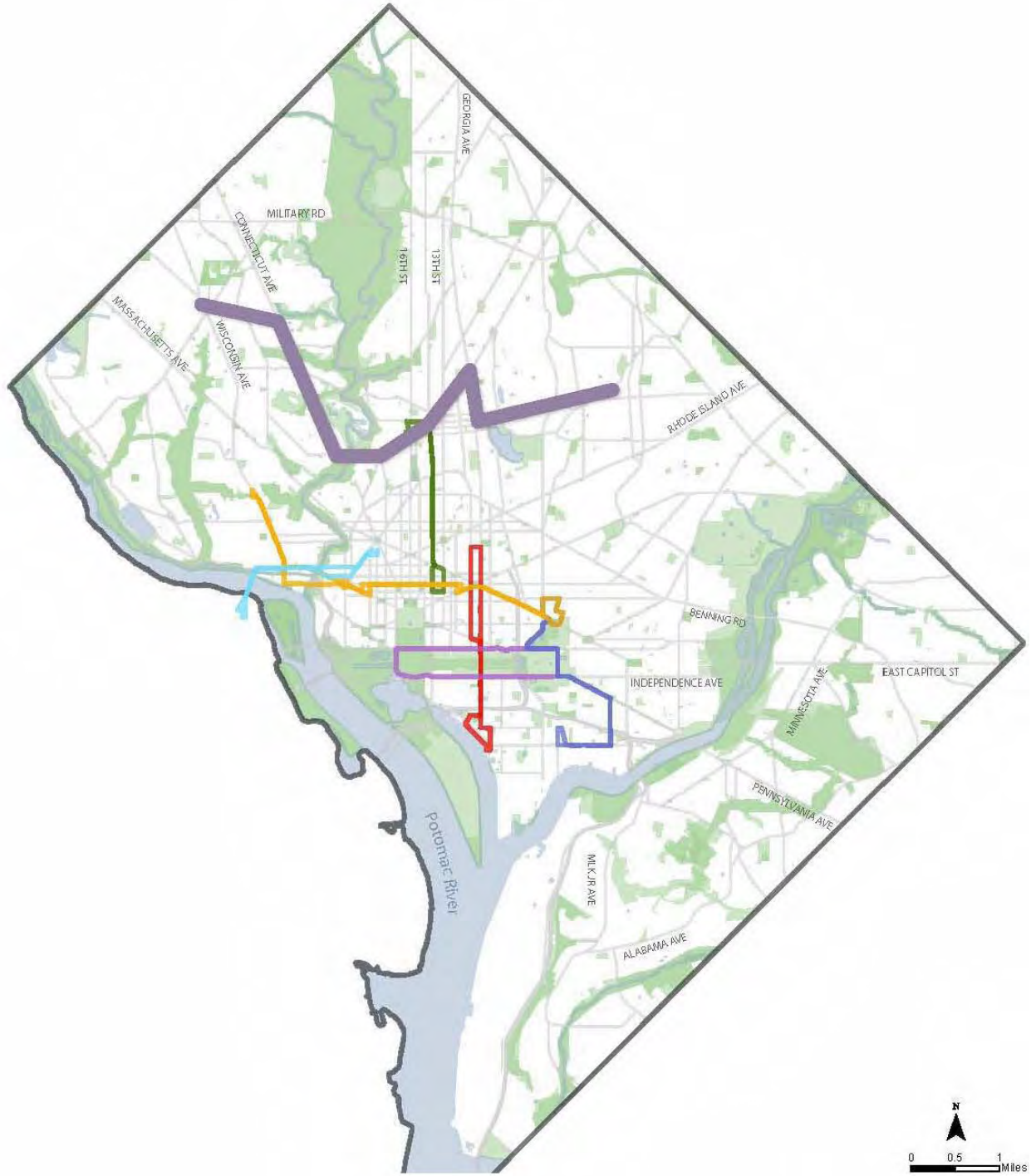
Figure 33 Planned Express Metrobus Routes



Map: Grove/ Slade Associates

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 34 Planned DC Circulator Routes



Map: DDOT

Best Practices

Frequency, Speed, Reliability, and Span

Because most commuters place a high value on their time, they will generally choose whichever mode or route is the fastest – with price becoming a significant factor only when the price differential is great. In order for transit to be attractive to those who have a choice of modes, therefore, it must do well in four key areas:

- **Frequency.** As frequency increases, ridership increases on an upward curve. To be useful for a significant number of people, transit must run at least every 15 minutes.
- **Speed.** To be attractive, transit must also be reasonably fast. Systems that provide priority treatments for buses, allowing them to bypass congestion or hold green lights, tend to be the most attractive to riders.
- **Reliability.** From a customer's standpoint, frequency is only as good as the worst gap in service, particularly unexpected gaps.
- **Span.** A 16 hour service span per day is a typical minimum to not leave riders stranded who need to travel during the middle of the day or stay late at campus.

Passenger Information

Providing easy-to-read maps and schedules and easy-to-identify bus stops is important, particularly in attracting new riders unfamiliar with the system or transit in general.

Passenger Comfort and Safety

A comfortable, safe place to sit and shelter from the extremes of weather is also important, both at bus stops and within the vehicle.

Gap Assessment

HUBS routes operate with high frequency and full day service spans, offering the Howard University population a viable on-campus transit option. Speed and reliability may have opportunities for improvement, especially if DDOT's proposed transit lanes on Georgia Avenue are implemented.

Shuttle information is readily available via electronic systems, providing younger populations with ready access to this information. Providing hard copies of schedule and route information may also encourage less technological savvy populations to ride the shuttles.

Providing complete bus stop infrastructure, including shelters, signage, lighting, and information, at key locations is an effective way to increase the utilization and customer satisfaction with the shuttle system. This is an opportunity to transform simple bus stops where riders are vulnerable to the elements into places where waiting is comfortable.

TRANSPORTATION DEMAND MANAGEMENT



Existing Conditions

In addition to the campus shuttle services outlined above, which are direct TDM investments designed to facilitate campus access, Howard University is committed to a series of investments and services that have proven successful in reducing vehicle travel and parking demand in campus settings, including:

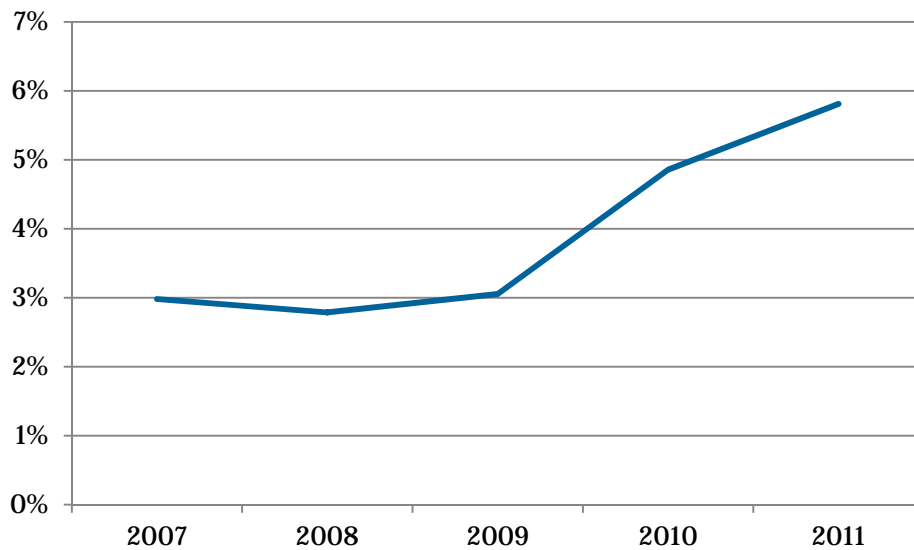
- On-campus housing – Howard’s Residence Life system is currently capable of housing 45% of the total University enrollment.
- Bicycle parking – discussed previously.
- Parking restriction – Freshman students are ineligible to purchase annual parking permits.
- Parking charges – while most forms of parking are subsidized (user rates are kept below market value), none are free — discussed previously.
- Car-share parking – Car-sharing (membership-based, short-term car rentals) has been shown to significantly reduce parking demand among participating members by allowing households to reduce their level of car ownership and encouraging transit use among commuters who occasionally need to use a car during the work day. On-campus opportunities to access car-share vehicles can, therefore, be expected to reduce parking demand among campus residents as well as University faculty and staff. ZipCar, the nation’s largest car-share organization, currently has nine vehicles located within the boundaries of the HUCMP, including seven within a short walk of the Lower Quadrangle. This is three times the number originally located on campus in 2007, and Zipcar is currently discussing placing up to three more vehicles in University facilities. Howard faculty/staff and students can join Zipcar for a discounted rate of \$15.⁴ Access to these

⁴ <http://www.zipcar.com/howard/>

cars is promoted to new students via student orientation materials and the University's Parking and Shuttle webpage.⁵

- WMATA SmartBenefits – The Washington Metropolitan Area Transit Authority's SmartBenefits program is a Web-based program that allows employers to provide transit-commuting benefits by directly adding value to employees' SmarTrip® cards or into other transit or vanpool operator accounts via the Internet. The University's initiated its participation in the program in 2007. Since then, enrollment among eligible Howard University staff (all full-time University and Hospital employees) has nearly doubled, from 109 participants in 2007 to 191 in 2011. The participation rate among eligible employees nonetheless remains just below 6%.

Figure 35 Level of SmartBenefits Participation



Planned Changes

The HUCMP recommends an emphasis on TDM to mitigate any future increase in parking demand. Presented as a means to reduce the HUCMP's exposure to the extremely high cost of structured and underground parking (the form of all Central Campus parking as envisioned in the HUCMP), an effective TDM plan can more than pay for itself by reducing the amount of new parking supply required to support Central Campus uses.

Best Practices

College campuses present unique opportunities to manage local travel demand; with a single entity having significant, direct control over local land use patterns and transportation systems and services. Colleges and universities across the country have used this opportunity to employ TDM toward a number of objectives, including:

- Reducing costs associated with providing parking on campus;
- Reducing the physical impact of parking facilities on campus design;

⁵ <http://auxiliary.howard.edu/parking--shuttle.html>

- Providing opportunities to utilize campus space to support the school's primary mission (education or research) instead of vehicle storage;
- Creating more active campuses - less driving/more walking and bicycling;
- Reducing community resistance to campus expansion plans;
- Meeting school sustainability goals;
- Increasing the school's appeal to students looking to walk and bicycle more often or wishing not to need a car while on campus; and
- Enhance the school's environmental credentials/"green" image.

Whether to avoid building a new parking garage or to enhance their "green" image, more and more schools have been making significant investments in TDM. The documentation of their relative effectiveness has produced an extensive list of TDM investment options with proven success records that can be employed to meet Howard University's particular TDM objectives. The following represents a list of some of the most commonly employed and effective campus TDM strategies, which will inform the Howard University TDM plan.

- One Department for Transit, Parking, and TDM - Making these components of campus transportation the responsibility of one department helps to emphasize the connections, and potential synergies and conflicts, between transit, parking, and TDM investments.
- Campus Bike Paths or In-Road Facilities - Making cycling safer and more comfortable can promote bicycle commuting, while supporting lower rates of car ownership among campus residents.
- Transit Subsidies - Below-market campus parking rates can put transit-commuting at a cost disadvantage. Means by which schools have addressed this disparity include direct cost-sharing as well as programs that allow commuters to purchase transit with pre-tax income.
- Rideshare Matching Service - Without third-party assistance, it is difficult for most commuters to find other commuters who live near them and work similar schedules. Online rideshare-matching programs provide an easy way to make these connections for those interested in sharing rides to reduce fuel and parking costs, or just interested in a more social commute.
- Preferential Rideshare Parking - Reserving the "best" parking spaces for the most efficient auto-commuters has proven effective in encouraging rideshare commuting, particularly where parking demand increases the chances of non-rideshare commuters having to park far from their destination.
- Reserved Rideshare Parking - If ridesharing is the only way to get a reserved parking space, the appeal of rideshare commutes will increase.
- Guaranteed/Emergency Ride Home - Concerns about occasionally having to work late or leave campus early can be a significant barrier to transit and rideshare commuting. Programs that reimburse non-driving commuters for occasional cab rides in such circumstances have proven effective in overcoming these concerns.
- Flextime - Formal policies that provide options for working non-conventional work schedules can reduce peak parking and traffic loads among campus facilities.
- Telecommuting - Formal policies that support regularly working from remote locations can reduce daily parking and traffic demand.
- TDM Promotional Campaigns - Programs that "nobody knows about" are destined to fail. Common promotional elements include a dedicated TDM/Commuter Benefits webpage and social media outreach, commuter clubs, and commute competitions.
- Sheltered Bike Parking - Personal bicycles can represent major financial investments. As such, even a small chance of rain can reduce bicycle commuting when all parking options

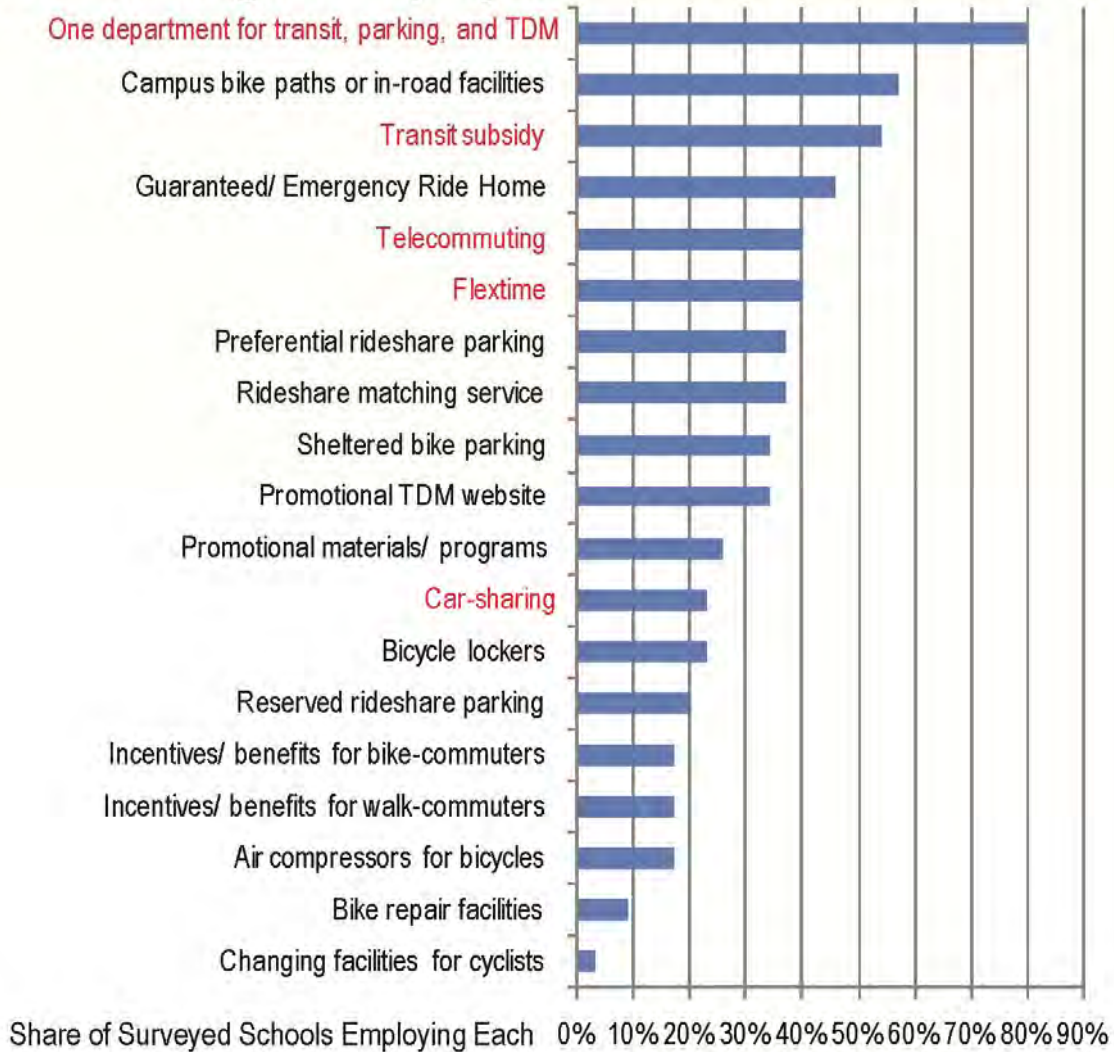
- leave bikes exposed to the elements. Sheltered parking and bicycle lockers also commonly offer more protection from theft compared to standard bicycle racks.
- **Car-sharing** - Accommodating car-share vehicles within university facilities and/or subsidizing or paying membership dues can encourage car-share use among faculty/staff and students. Ready access to car-share vehicles can encourage non-driving commutes among those who may occasionally need to make car trips during the day. Car-share access can also encourage campus residents to not keep a car on campus.
 - **Bike Repair Facilities and Provision of Air Compressors for Bicycles** - Minimal investments in support infrastructure can keep bicycles in circulation, reducing parking demand that might otherwise be created by frustrated former bike commuters.
 - **Incentives/Benefits for Walk- or Bike-Commuters** - Free or subsidized parking is such a common employment benefit, that it is often not even considered a benefit. Offering a comparable level of benefit to those who do not drive, particularly when offered in the form of cash, has proven very effective in reducing driving demand. This strategy can easily pay for itself where reducing parking demand can minimize or avoid new parking construction.
 - **Changing Facilities for Cyclists** - For many commuters arriving on campus covered in sweat is a bike-commuting deal breaker. An increasingly popular means for avoiding this green-commute barrier is to provide campus facilities for showering and changing into fresh clothes.
 - **Charging for Parking** - Increasing the cost of parking is one of the most effective ways to reduce parking demand. Particularly when complemented by viable alternatives to driving.
 - **Increase Campus Housing** - Increasing campus housing reduces aggregate miles travelled to campus destinations and brings more campus commuters within range of walking, cycling, and use of campus shuttle systems.
 - **Streetscape and Pedestrian Network Enhancements** - Investments that make walking safer and more pleasurable can extend the distances that faculty/staff and students are willing to walk to campus destinations. This can reduce parking demand among on-campus residents and reduce vehicle trips between campus destinations.
 - **Underclassmen Parking Restrictions** - Preventing freshmen (and sometimes sophomores) from parking on campus, not only directly reduces parking demand, but exposes new students to other travel modes. Where these modes prove pleasant, reliable, cost-effective, and convenient, many students are likely to continue to rely on them well after driving and parking on campus becomes an option.
 - **Live Where You Work Programs** – These programs offer low-interest mortgage loans or refunds on closing costs to homebuyers working in and looking to buy a home within a certain proximity of the institution. This program results in an increase in residents who work close enough to home to allow for commutes by transit, walking, and biking. This program also doubles as a community reinvestment tool.
 - **Commuter Counseling** - Employees complete a simple form, providing home and work locations, planned travel time, and modes each employee is willing to use. University representatives use standard trip matching software to provide commute options personalized to the employee, including comparisons of travel time and cost. Employees who are aware of their travel options are more likely to travel by alternate modes.
 - **Departmental Bicycle Share** – Departmental bicycle sharing programs provide participating university departments with free commuter bicycles for campus use. The bicycles come fully-equipped with fenders, lights, bell, rack, rear basket(s), odometer, combination U-lock, and helmet. Different than Capital BikeShare, departments who sign up for their own bicycle tend to feel ownership of their specific bicycle and special pride when riding it.

Gap Assessment

A recent study documented in *TDM Review* conducted a survey of 35 university TDM programs, in part to identify which strategies were most common.⁶ Figure 36 provides a summary of its findings, providing a list of TDM strategies and the percent of surveyed schools that have implemented them — TDM strategies currently in place at Howard University are in red.

Figure 36 Survey of Common University TDM Practices

TDM Strategies Employed



⁶ Winters, Philip L. and Zhou, Liren. Benchmarking University Transit and TDM Programs, *TDM Review*, Association for Commuter Transportation, Issue 2, 2008.

Many of the above best practices are anticipated to be incorporated within the new TDM Plan. The details of those practices to be adopted will be identified following subsequent study tasks, including a review of best practice campus TDM case studies and an assessment of DDOT's TDM expectations for new development.

MARKET SURVEY

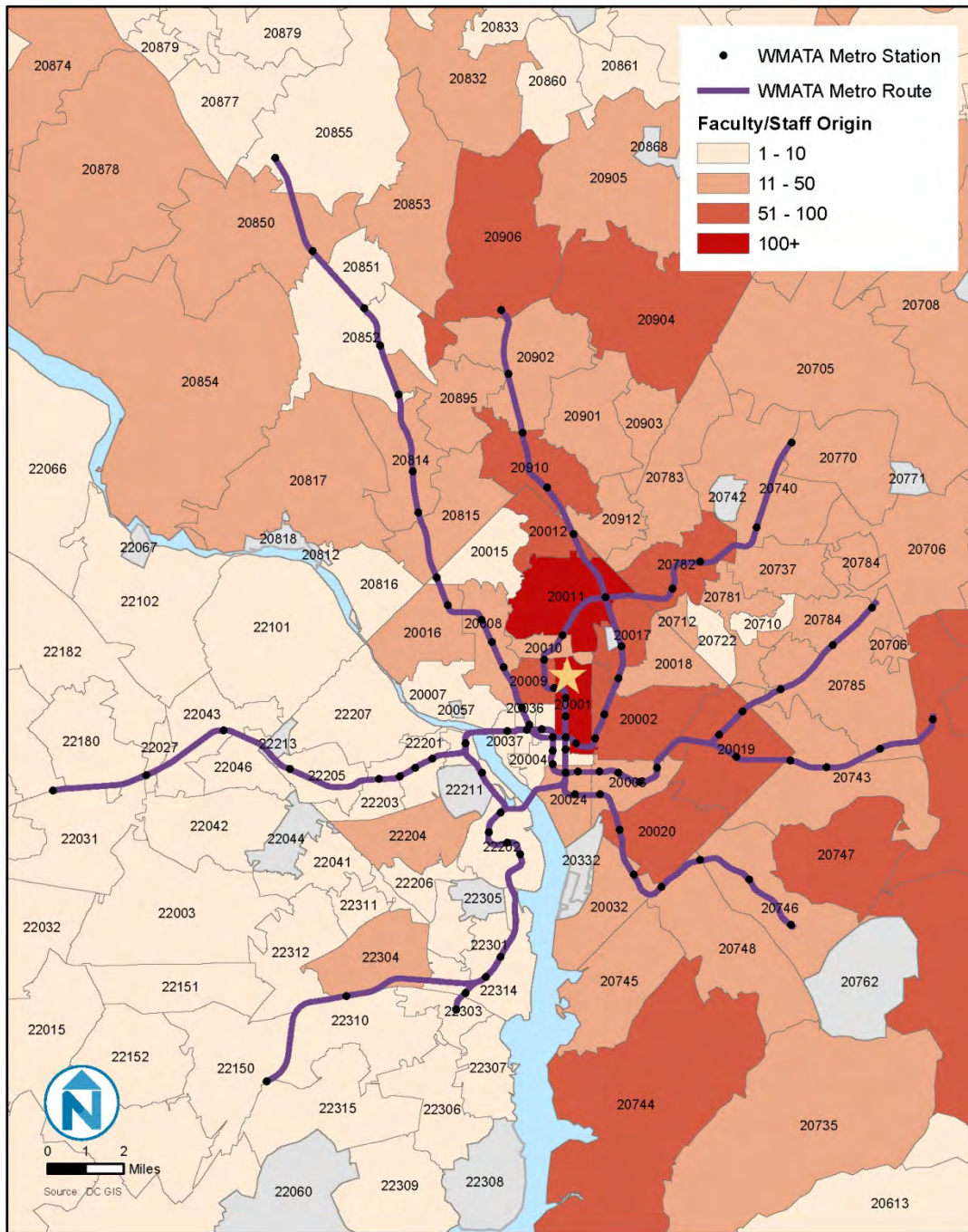
Travel Patterns

Mapping Campus Trip Originations

The following maps depict quantities of faculty/staff and student commute originations, by zip code, within the DC region. WMATA Metrorail routes are depicted to provide a context for the densities residing within areas of rapid transit access.

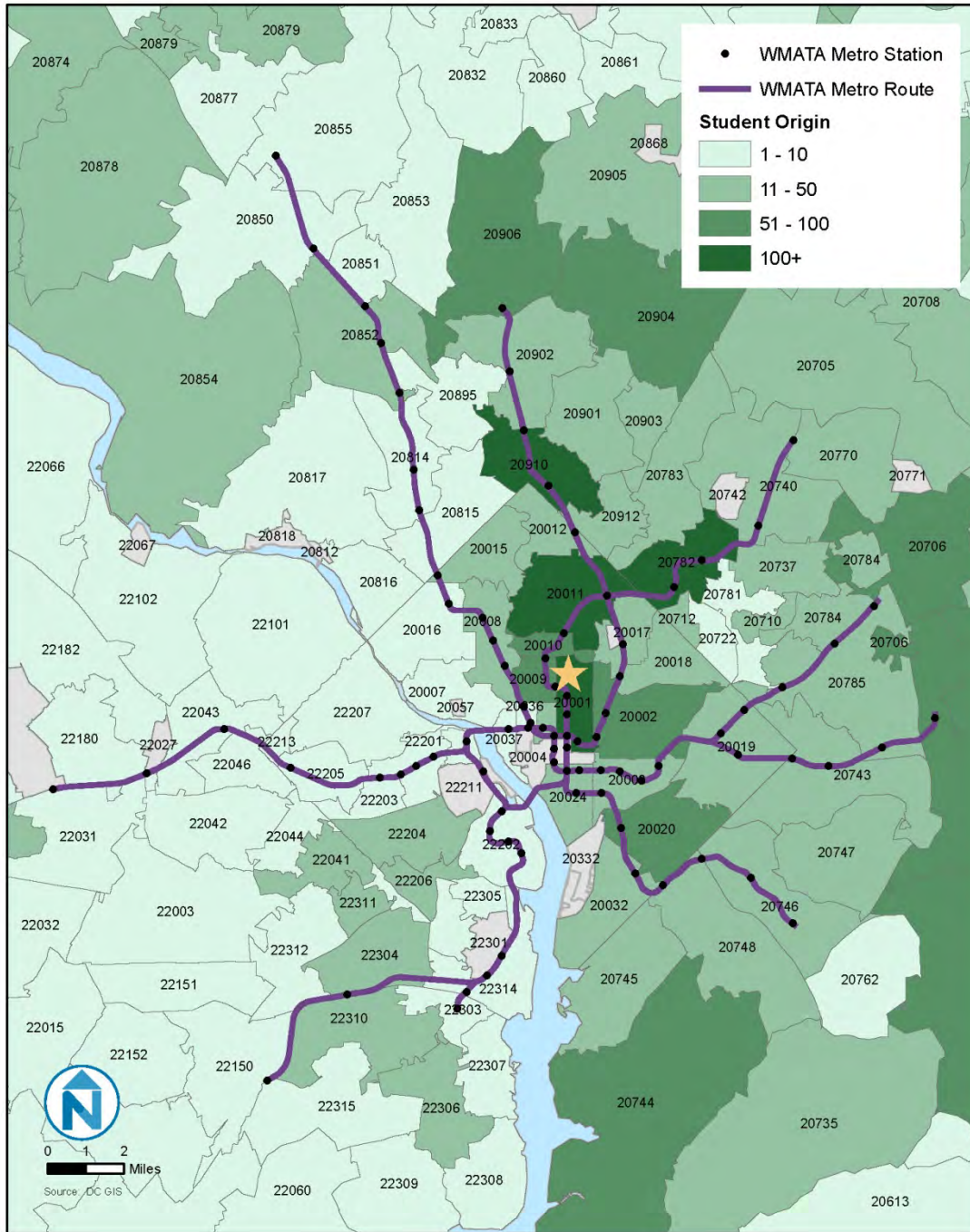
TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 37 Faculty/Staff Commute Originations



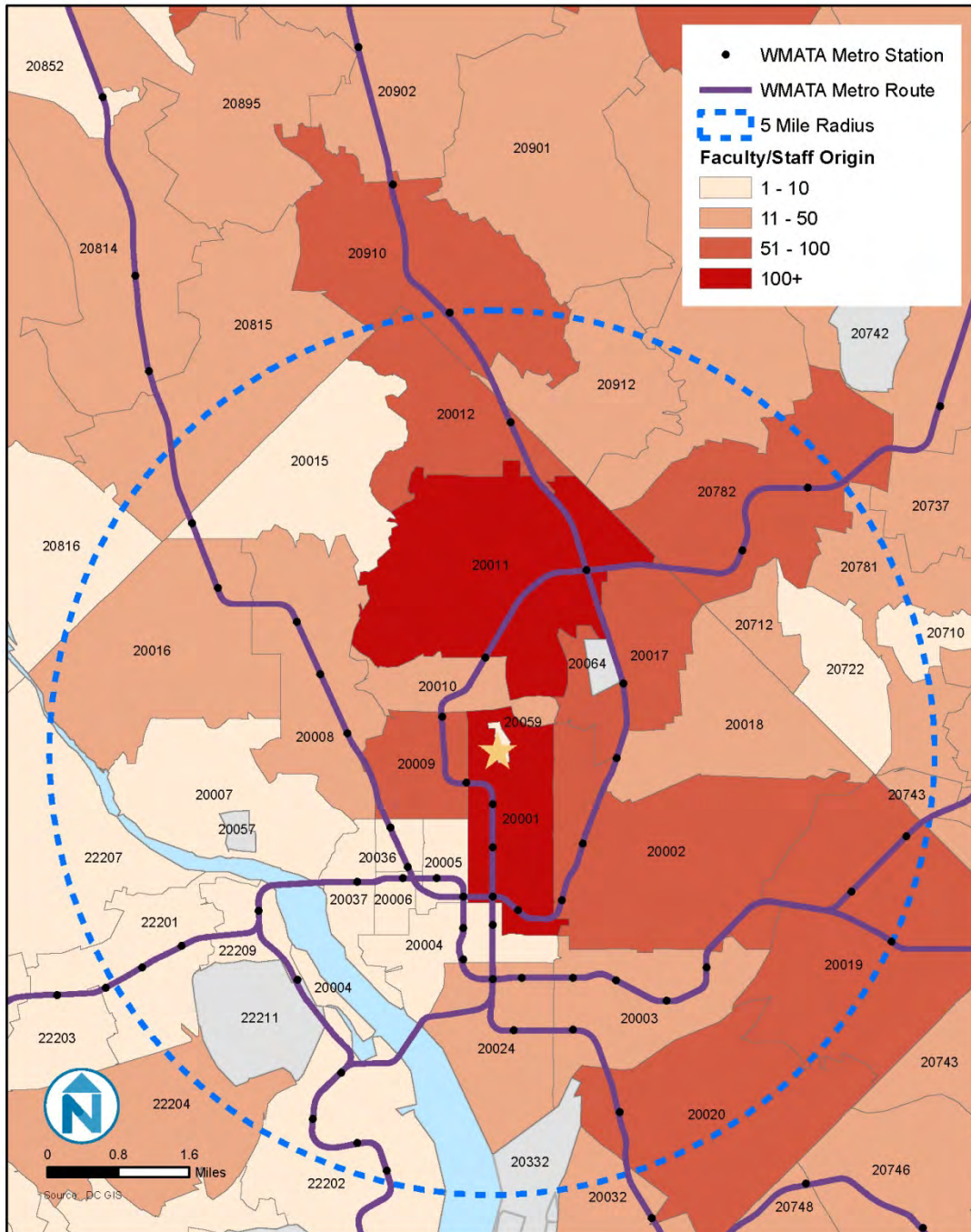
TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 38 Student Commute Originations



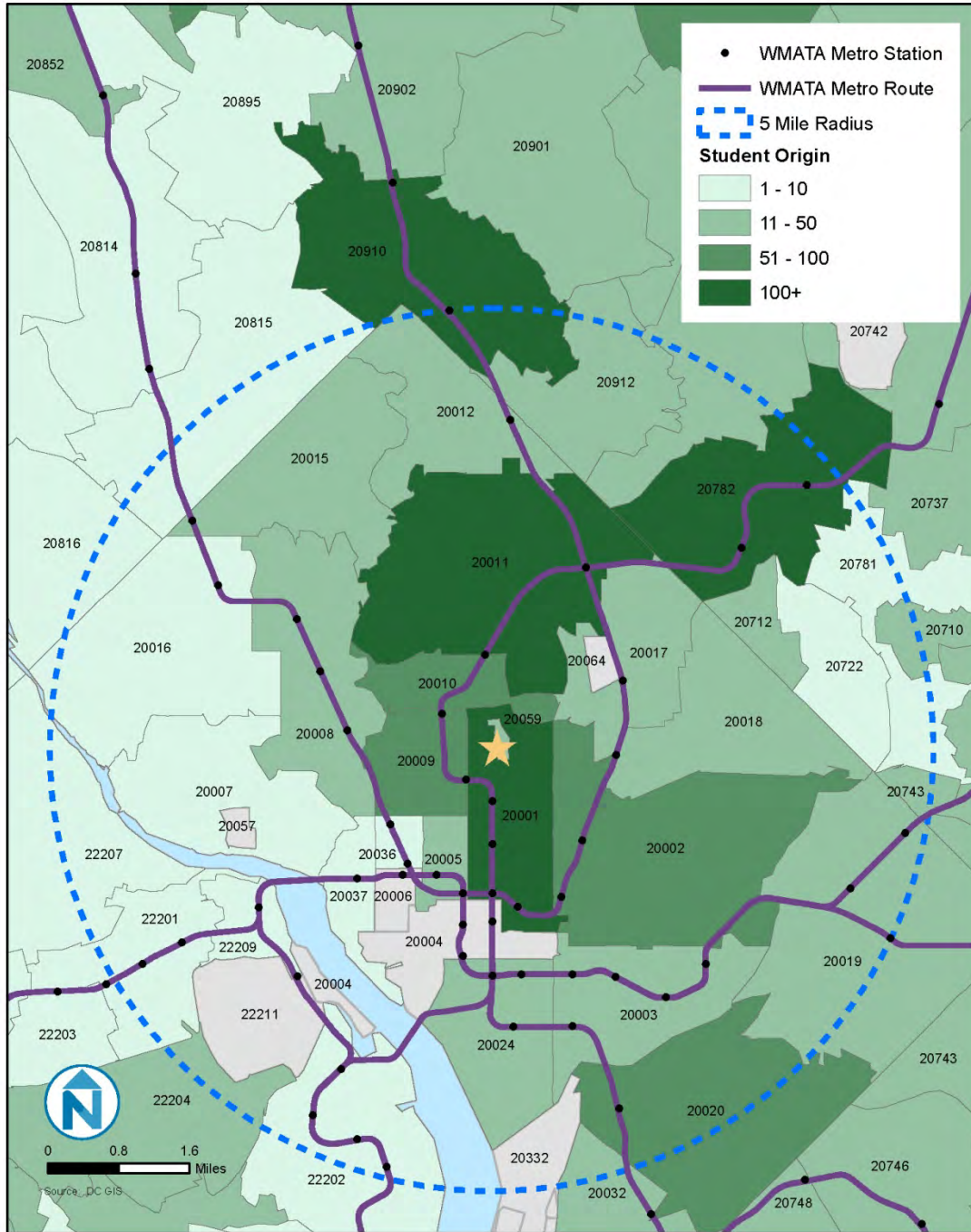
The following maps depict quantities of faculty/staff and student commute originations generally considered within reasonable cycling distance of the Central Campus — 5 miles.

Figure 39 Faculty/Staff Commute Originations vs. Traditional Cycling Commute Catchment



TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 40 Student Commute Originations vs. Traditional Cycling Commute Catchment



Mode Splits

To assess current mode split conditions among those commuting to the Central Campus, an online survey of student, faculty, and staff members was conducted. This survey was designed to develop a comprehensive understanding of the current mode choices being made and the preferences and perspectives underlying those choices.

Figure 41 provides rough population estimates for these three groups, along with the number of surveys completed by members of each.

Figure 41 Population and Online-Survey Sample

Population Category	Population	Number Surveyed	Proportion of Population Surveyed
Students	11,000	343	3%
Faculty	1,000	109	11%
Staff	2,300	236	10%
All	14,300	688	5%

To estimate the current mode split conditions within these groups, the survey contained the following question:

How do you most frequently travel to the Howard University Central Campus? (Please tell us the mode you use for the longest part of your trip. For example, if you walk to Metrorail and drive to Campus, please respond that you use Metrorail.)

The table and graphs below provide a summary of responses received from each group.

Figure 42 Mode Split Findings

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%

TDM Plan for the Howard University Campus Master Plan
Howard University

Figure 43 Faculty Mode Splits

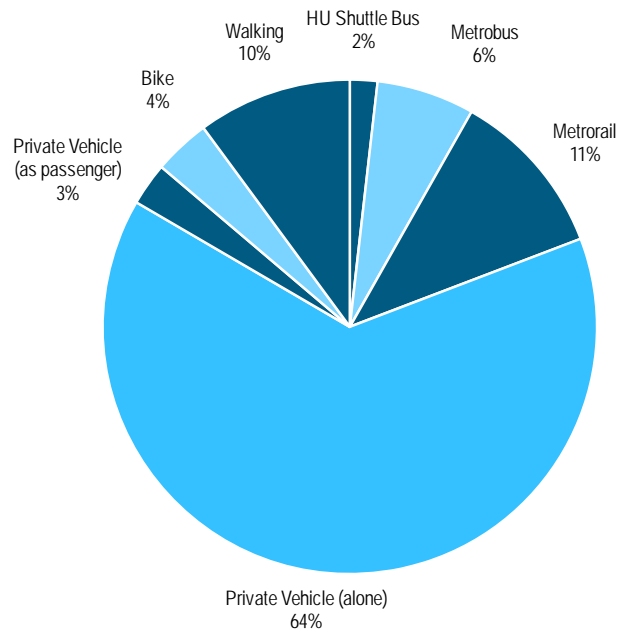


Figure 44 Staff Mode Splits

