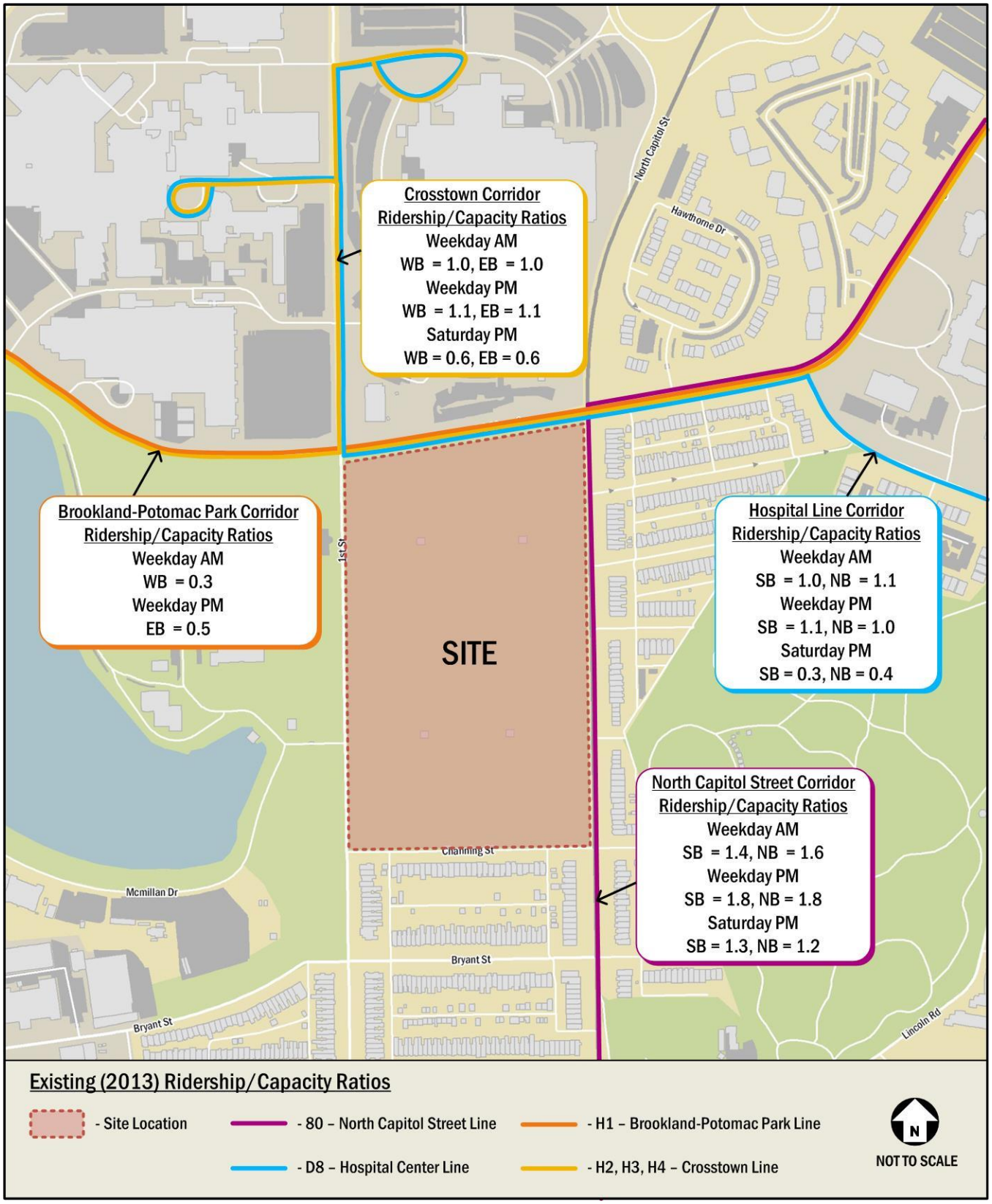

Figure 37: Existing (2013) Ridership/Capacity Ratios

Rail System

The most likely utilized Metrorail stations are the U Street Station and Columbia Heights Station on the Green/Yellow Line and Brookland Station on the Red Line due to either their distance to the site and/or their connectivity with the Metrobus system. Table 44 shows the passenger boardings at each station for the three study periods based on daily records from WMATA. According to the *Metrorail Station Access & Capacity Study*[1] performed by WMATA in April of 2008, 60% of boardings occur during the peak periods, thus it was assumed that the individual morning and afternoon peak hours would generate approximately 20% of daily boardings. It is expected that Saturday boardings are more equally spread out during the day thus only 10% of daily boardings were assumed for the Saturday peak hour.

At maximum, Metrorail trains are expected to hold 120 passengers/car, which yields a total capacity of 720 passengers for six-car trains and 960 passengers for eight-car trains. On both Lines, trains run at an approximate headway of five minutes during the morning and afternoon peak hours resulting in 12 trains per hour traveling in both directions. Assuming that half of the trains have six cars and half have eight cars, each Line should be able to accommodate 19,680 passengers during the morning and afternoon peak hours. Assuming a maximum headway of ten minutes during the Saturday peak hour, each Line should accommodate 9,850 passengers during this time. Therefore, the amount of boardings at the stations nearest the McMillan development should not experience capacity issues under typical conditions.

Additionally, the *Metrorail System Access & Capacity Study* examines the existing and future transit capacity through the year 2030. The study analyzed vertical flow between the surface and mezzanine, mezzanine and platform, and platforms at transfer station, in addition to passenger flow through horizontal elements such as faregate arrays and farecard vendors. According to this study, the vertical and faregate capacity at all nearby Metrorail stations is currently acceptable and will continue to be acceptable through the year 2030.

Table 44: Existing Metrorail Ridership

Metrorail Station	Peak Hour Boardings		
	AM Peak	PM Peak	Saturday Peak
Brookland	1335	1335	668
U Street	1500	1500	475
Columbia Heights	2578	2578	1289

Future Background Conditions (<u>without</u> McMillan PUD)

Background transit conditions were evaluated for the Metrobus and Metrorail study areas in 2025 taking into account a nominal growth in overall ridership and an increase in capacity due to future improvements.

Metrobus

In order to determine the Metrobus future background conditions, the following steps were taken:

1. Determine a background growth rate for Metrobus ridership.
2. Analyze all potential transit improvements in the vicinity of the site.
3. Determine the capacity of each corridor with improvements.
4. Determine the background R/C ratio with the updated ridership and capacity values.

<u>Background Growth</u>

A growth rate was determined to project the inherent growth of Metrobus ridership independent of the McMillan development. Based on the *Metrobus Fleet Management Plan*, Metrobus ridership has increased at a rate of 0.6% on weekdays and 1.7% on Saturdays between the years of 2005 and 2009. This amounts to a 7.2% weekday growth and 20.4% Saturday growth for the study period. These growth rates were applied to the existing ridership determined in the previous section.

<u>Proposed Improvements</u>

Due to existing and anticipated transit capacity issues, many improvements have been proposed along the transit corridors near the site. These improvements were compiled from sources including the *DC Circulator Transit Development Plan, DC's Transit Future System Plan,* and the *North Capitol Street Line Study*[2]. The improvements are outlined below.

[1] *Metrorail System Access & Capacity Study Final Report*, April 2008, Washington Metropolitan Area Transit Authority

[2] *North Capitol Street Line Study*, January 2013, District of Columbia Department of Transportation

- *MetroExtra Route 80x*
  An additional express route is being considered for the 80 Line. This route would likely have 15 minute headways, which would add four new buses per hour to the North Capitol Street Corridor. Currently it is only expected to operate during peak periods on weekdays, but there is potential for adding mid-day, late night, and weekend service in the future. The final route has not yet been determined, but it will likely continue to connect the site to the same major destinations as the existing 80 Line.

- *Brookland-CUA Metro-Union Station Neighborhood Connector*
  This additional bus line is expected to run every 15 minutes thus adding 4 new buses per hour. This route extends from Union Station to Brookland-CUA Metro Station with connections in NoMA and the Washington Hospital Center. The route has been explicitly designed to connect the McMillan site with two Metrorail stations, including Union Station. Because this line differs slightly from the 80 Line and also has some similar attributes to the D8 Line, added capacity from the connector was split between the North Capitol Street and the Hospital Center Corridors.

- *Tenleytown to Brookland Circulator Route*
  The Tenleytown to Brookland Circulator Route is expected to be added in 2018 based on the most up to date study. Although this may change, it is safe to assume that this new circulator route will be in affect by the time the McMillan development is complete in 2025. Assuming this route will provide the same service as all other circulator routes, it will increase capacity along the Crosstown Corridor by six buses per hour during all three analysis periods. Although it is not specified, for the purpose of this analysis it is assumed that the number of seats on a Circulator bus will be the same as the average number of seats per bus on a Metrobus.

- *Woodley Park/Adams Morgan to Brookland Streetcar Line*
  A streetcar line is also expected to travel along the Crosstown Corridor. Streetcars can accommodate up to 168 seated and standing passengers per car. Although the DC Streetcar service is still primarily in the planning process, a conservative service estimate would be four streetcars per hour during the weekday and three streetcars per hour during the weekends. At this time, the Woodley Park/Adams Morgan to Brookland Streetcar Line is anticipated to be part of Streetcar's Phase 3 construction, which is scheduled to be complete by 2020[1]. However, in order to maintain a conservative analysis, it is assumed that the McMillan PUD will be completed prior to the completion of the streetcar line.

All of the proposed transit improvements are displayed graphically in Figure 38 to show the anticipated alignment in the vicinity of the site.

Results

The projected background capacity was calculated for each corridor based on the proposed transit improvements discussed above. The background ridership was determined from the growth rates and the updated R/C ratio was then calculated. These values are summarized in Table 45 and graphically represented in Figure 39.

As can be seen, all corridors operate well below the R/C threshold of 1.2 under background conditions. However, it should be noted that many, if not all, of the proposed improvements discuss the McMillan development as being an important catalyst for added DDOT and WMATA transit service enhancements in the area. It is understood that this development will generate an abundance of traffic (from all modes); in order to maintain a transit-oriented design model, it will be necessary to heighten transit availability in the area.

Metrorail

According to the *Metrorail Station Access & Capacity Study*, Metrorail ridership is expected to increase at a rate of 1.7% per year until 2030 (20.4% for the study period). This growth rate was applied to passenger boardings at each station resulting in the ridership values shown on Table 46.

Although there will be an increase in Metrorail ridership, the capacity of the Metrorail system is also expected to increase. New train cars will slowly replace the old train cars over the next five years that have a larger standing capacity and will allow for more eight-car trains, particularly during peak hours. Although the new standing capacity is not currently known, it is safe to assume that weekday peak hour capacity will increase by approximately 3,000 passengers, and Saturday peak hour capacity will increase by 1,500 passengers. Therefore, the added ridership due to nominal growth along the system will be accounted for by the added capacity of the new train cars.

[1] *DC's Transit Future Plan Final Report*, DDOT, April 2010

Table 45: Background Metrobus Conditions

Bus Route	Time	Direction	Background Capacity (passengers/hour)	Background Ridership (passengers/hour)	Background R/C Ratio
North Capitol Street Corridor	Weekday AM	*Southbound*	492	371	0.8
		Northbound	410	283	0.7
	Weekday PM	*Southbound*	410	313	0.8
		Northbound	451	392	0.9
	Saturday PM	*Southbound*	328	131	0.4
		Northbound	328	118	0.4
Hospital Center Corridor	Weekday AM	*Southbound*	246	174	0.7
		Northbound	246	197	0.8
	Weekday PM	*Southbound*	205	149	0.7
		Northbound	328	251	0.8
	Saturday PM	*Southbound*	328	90	0.3
		Northbound	205	63	0.3
Brookland-Potomac Park Corridor	Weekday AM	*Southbound*	164	60	0.4
	Weekday PM	*Northbound*	123	65	0.5
Crosstown Corridor	Weekday AM	*Westbound*	574	334	0.6
		Eastbound	492	251	0.5
	Weekday PM	*Westbound*	492	293	0.6
		Eastbound	533	341	0.6
	Saturday PM	*Westbound*	346	120	0.3
		Eastbound	347	121	0.3

Total Future Conditions (<u>with</u> McMillan PUD)

Total future transit conditions were evaluated for the Metrobus and Metrorail study areas in 2025 by adding site-generated transit trips to the transit background conditions.

Transit Mode Split

According to recent census data at the site location approximately 50 percent of transit riders use Metrobus and 50 percent use Metrorail. In 2025 it is likely that this split will shift towards a slightly higher bus percentage due to the amount of improvements and added service in the area. Additionally, census data does not take into account trips that use both bus and rail services. Due to the distance between the site and the nearest Metrorail stations it is expected that approximately 20% of those traveling by rail will utilize bus service to complete their trip. Therefore a mode split of 60% bus, 20% rail, and 20% combination of both is assumed, as shown in Table 47. That being said, future bus ridership will be determined by taking 80% of the transit trip generation and future Metrorail ridership will be determined by taking 40% of the transit trip generation to account for the overlapping uses.

Table 46: Background Metrorail Ridership

Metrorail Station	Peak Hour Boardings		
	AM Peak	PM Peak	Saturday Peak
Brookland	1607	1607	804
U Street	1804	1804	903
Columbia Heights	3104	3104	1552

Table 47: Transit Mode Split

Transit Use	Mode Split	Resulting % of Total Trips
Bus	60%	80%
Rail	20%	40%
Both	20%	

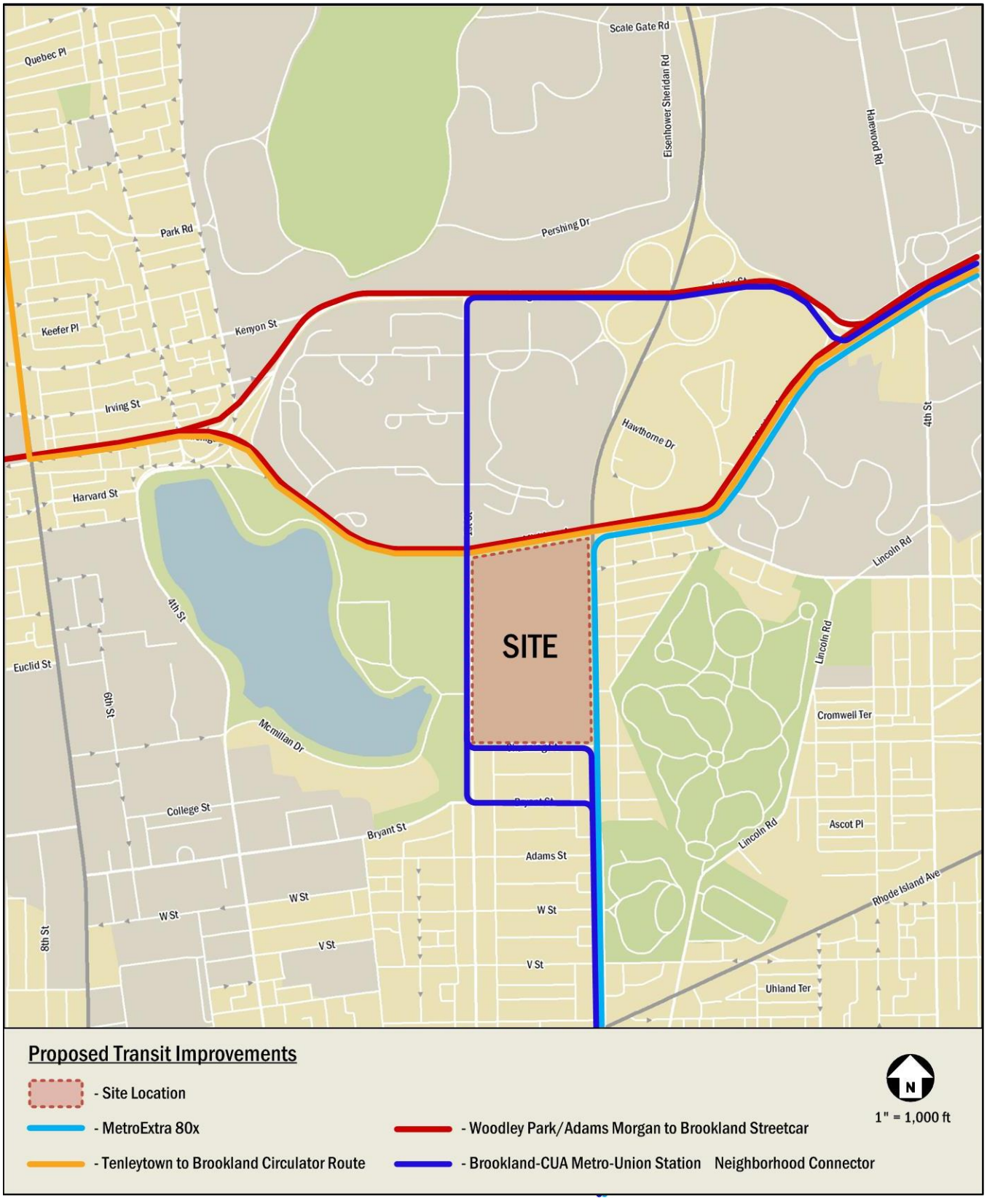

Figure 38: Proposed Transit Improvements

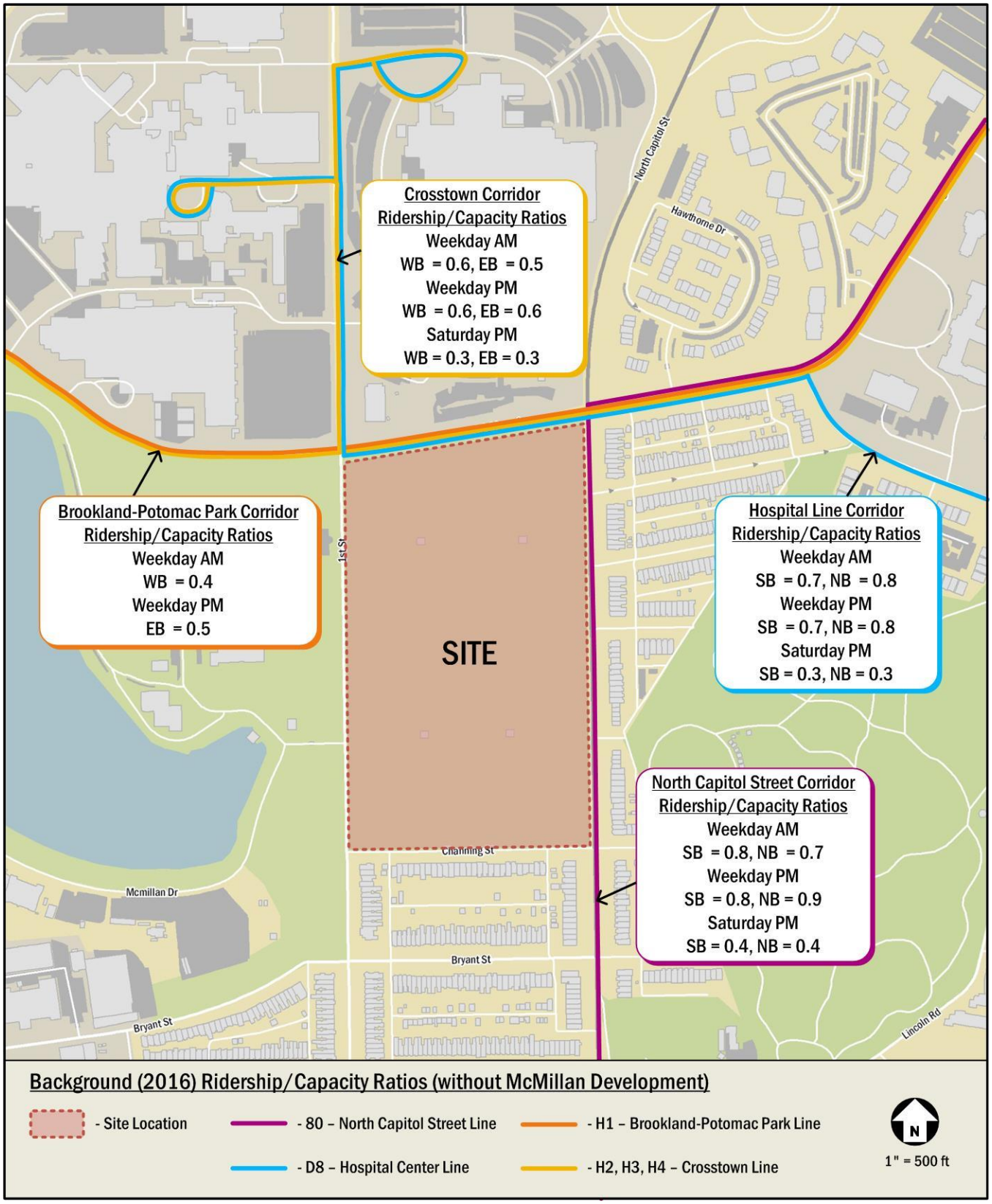

Figure 39: Future Background (2025) Ridership/Capacity Ratios (without McMillan PUD)

Metrobus

In order to determine the total future conditions, the following steps were taken for each bus route:

1. Determine the projected total future ridership for all corridors.
2. Determine the projected total future ridership/capacity ratios for all corridors.
3. Evaluate potential improvements/additional transit options.

Projected Total Future Ridership

As stated above and shown in Table 48, 80% of the transit trips generated by the McMillan PUD (including the 20% of trips that will use both bus and rail) were attributed towards bus trips to determine the total future bus ridership. These additional transit trips were distributed amongst the existing corridors and added to the background ridership values. The distribution of site-generated transit trips was based on the projected transit route choice of local and regional populations, as well as the current ridership of each Corridor.

Projected Future Ridership/Capacity Ratio

The future R/C ratio was determined by dividing the future ridership by the future capacity. Although the future capacity involves the addition of a circulator route, which may abide by different standards, the *2000 Metrobus Service Guidelines* will continue to be used for this analysis. Therefore an R/C ratio of 1.1 is acceptable for the Crosstown Corridor and 1.2 for all other Corridors.

Results

The capacity was compared to the total future ridership to determine the R/C ratio with the addition of the McMillan PUD. These values are summarized in Table 49 and graphically represented in Figure 40.

As can be seen in Table 49, the Hospital Center Corridor and the Brookland-Potomac Park Corridor operate at an acceptable level under the future conditions. The North Capitol Street Corridor and the Crosstown Corridor each have at least one scenario in which the R/C ratio meets or exceeds 1.2 or 1.1, respectively. It is important to note that the increase in capacity exceeds the increase in ridership along both corridors.

Based on these results, the transit improvements incorporated into this analysis will be essential in maintaining acceptable transit service. In addition, the implementation of streetcar service will help alleviate any transit concerns seen as a result of this analysis. Thus, this report recommends that the Applicant McMillan coordinate with DDOT, WMATA, and nearby institutions to help bring these transit improvements to the area.

Overall, the R/C ratios tend to decrease or stay the same along corridors with potential capacity issues. Therefore, the proposed corridor improvements are successful in mitigating any degradation to the transit system as a result of projected ridership increases.

Metrorail

As stated above and shown in Table 48, 40% of the transit trips generated by the McMillan PUD (including the 20% of trips that will use both bus and rail) were attributed to Metrorail ridership. Based on proximity to the site and connectivity with transit, the Metrorail trips were distributed to each station as follows: 50% at Brookland Station, 30% at U Street Station, and 20% at Columbia Heights Station. This resulted in the total number of future boardings shown in Table 51.

Again, these stations currently operate at an acceptable level and are expected to operate at an acceptable level well into the future. Although ridership numbers are expected to increase by 2025, the capacity of the Metrorail system will also increase by that time and compensate for most, if not all, of the growth in ridership.

Table 48: Transit Trip Generation

Time Period	Transit Total				Bus				Rail		
	IB	OB	Total	% of Total Trips	IB	OB	Total	% of Total Trips	IB	OB	Total
Weekday AM	1083	417	1500	80%	866	334	1200	40%	433	167	600
Weekday PM	591	1080	1671		473	864	1337		236	432	668
Saturday PM	313	386	699		250	309	559		125	154	279

Table 49: Total Future Metrobus Conditions

Bus Route	Time	Direction	Future Capacity (passengers/hour)	Future Ridership (passengers/hour)	Future R/C Ratio
North Capitol Street Corridor	Weekday AM	*Southbound*	492	678	1.4
		Northbound	410	660	1.6
	Weekday PM	*Southbound*	410	719	1.8
		Northbound	451	748	1.7
	Saturday PM	*Southbound*	328	283	0.9
		Northbound	328	253	0.8
Hospital Center Corridor	Weekday AM	*Southbound*	246	204	0.8
		Northbound	246	275	1.1
	Weekday PM	*Southbound*	205	227	1.1
		Northbound	328	294	0.9
	Saturday PM	*Southbound*	328	139	0.4
		Northbound	205	103	0.5
Brookland-Potomac Park Corridor	Weekday AM	*Southbound*	164	94	0.6
	Weekday PM	*Northbound*	123	106	0.9
Crosstown Corridor	Weekday AM	*Westbound*	574	463	0.8
		Eastbound	492	496	1.0
	Weekday PM	*Westbound*	492	546	1.1
		Eastbound	533	502	0.9
	Saturday PM	*Westbound*	346	207	0.6
		Eastbound	347	196	0.6

Transit Mitigation Options

As previously noted, the North Capitol Street and Crosstown Corridors operate at an unacceptable level in at least one study scenario. Although issues along these Corridors cannot be directly attributed to the PUD, improvements and additional transit options are suggested for DDOT and WMATA to implement in both corridors to accommodate demand.

North Capitol Street Corridor

It is recommended that the 80 Line incorporate the use of articulated buses into its regular service. A significant improvement would be made if three standard buses were replaced with articulated buses during the morning and afternoon peak hours, with the potential of utilizing them throughout the entire weekday and on weekends if necessary. These buses may be distributed as seen fit between the 80 and 80x routes, as both routes stop at the same significant locations. Table 50 shows the updated capacity and R/C ratio with the suggested improvements. Although the R/C ratio does not fall below 1.2 for all study scenarios, it is still an improvement over the total future and existing conditions. It would take replacing ten standard buses with articulated buses to keep all study scenarios under an R/C ratio of 1.2.

Table 51: Total Future Metrorail Ridership

Metrorail Station	Peak Hour Boardings		
	AM Peak	PM Peak	Saturday Peak
Brookland	1907	1941	944
U Street	1984	2004	987
Columbia Heights	3224	3238	1281

Table 50: North Capitol Corridor with Improvements

Time Period	Direction	Future Capacity (passengers /hour)	Future Ridership (passengers /hour)	Future R/C Ratio
Weekday AM	*Southbound*	558	678	1.2
	Northbound	476	660	1.4
Weekday PM	*Southbound*	476	719	1.5
	Northbound	517	748	1.4
Saturday PM	*Southbound*	328	283	0.9
	Northbound	328	253	0.8

Crosstown Corridor

For the most part, the Crosstown Corridor operates at acceptable levels; however, there are times when the R/C ratio approaches 1.1, making conditions less than ideal. When the Woodley Park/Adams Morgan to Brookland Streetcar Line is completed and running full service, the capacity along this corridor will greatly increase, resulting in acceptable R/C values for all study periods. Thus, progress of the Streetcar service should be monitored in conjunction with construction of the McMillan PUD.

At completion of Phase 1 of the PUD, it is likely that existing and background transit service will be sufficient to serve site-generated transit trips. However, at full build-out, and assuming the Streetcar Line is not complete, it would be advantageous to implement a shuttle service that runs from the Brookland-CUA Metro station to the site. Assuming that buses along this corridor travel at an average of 7.5 mph, and given a round trip shuttle trip of approximately 2.5 miles, a shuttle bus would be able to make the trip in approximately 20 minutes. Taking into account a few minutes of wait time at each end of the route, a fleet of two buses would be sufficient to provide shuttle service five times an hour, or every 12 minutes.

Additionally, a shuttle service would likely be more attractive to those traveling to and from the McMillan site than the existing facilities. Due to the short distance of the shuttle route, the shuttle buses are more likely to arrive in a timely fashion with little-to-no delays as compared to some of the surrounding Metrobus routes. This shuttle route would have a great impact on those that utilize the Crosstown Corridor transit options to travel between the Brookland-CUA Metro Station and the site. It may also have an impact on riders of the 80 Line as some people who use the 80 Line to travel to and from the site are transferring at Metrorail stations. If there is a reliable shuttle service from the Brookland-CUA Metro Station, riders may transfer to the Red Line in order to access the shuttle service instead of utilizing the 80 Line bus service.

Shuttle buses are generally smaller than standard buses; for the purpose of this analysis, it was assumed that they will have a capacity of 25 seated passengers per bus. This adds an additional capacity of 250 passengers (125 eastbound and 125 westbound) per hour between the Brookland-CUA Metro Station and the site. This added capacity will be primarily utilized by riders along the Crosstown Corridor; however, if the shuttle proves to be a reliable travel method it is likely that people who would otherwise use the 80 Line would also take advantage of the shuttle service.

A shuttle service is likely to take a significant amount of stress off the Metrobus and Circulator routes that travel near the site. However, transit capacity may be monitored near completion of the McMillan project to determine if a shuttle is necessary. If shuttle service is utilized at the site, the ridership of the service should be monitored to determine if the right amount of service is being implemented as shuttle service may become unnecessary as more transit improvements are realized.

Additionally, many of the surrounding institutional facilities provide their own shuttle services to and from the nearby Metrorail stations, including Howard University, Trinity University, the Children's National Medical Center, the Veteran Affairs Medical Center, and the Washington Hospital Center. These shuttle routes are shown on Figure 41. This report suggests that the McMillan development work with some of these institutions to determine if a shared shuttle service is feasible. A combined shuttle service with the Children's National Medical Center, the Veteran Affairs Medical Center, or the Washington Hospital Center would be particularly advantageous due to their proximity to the McMillan PUD. Through a combined shuttle service, all parties involved would be able to split the cost of the service; thus, improving efficiency while minimizing cost.

On-Site Transit Facilities

In addition to determining the capacity and ridership of the nearby transit network, a more refined plan for the transit facilities (i.e. bus stops, bus shelters) along the perimeter of, and potentially within the site, was developed. The McMillan PUD provides an opportunity to evaluate the existing conditions and make changes that provide a larger overall benefit to the site and the surrounding neighborhood.

Existing Facilities

There are currently bus stops located along the east and west sides of North Capitol Street and along the north and south sides of Michigan Avenue in the vicinity of the site, as shown in Figure 42.

Under existing conditions, there are three stops on the north side of the site that serve eastbound transit trips and two stops that serve westbound trips. Of these five bus stops, only one,

located on northeast corner of Michigan Avenue and North Capitol Street, provides a shelter. On the east side of the site, there are three stops that serve southbound trips and two stops that serve northbound trips. Of these, only the stop, located on the west side of North Capitol Street just north of Girard Street, provides a shelter.

Future Facilities

By full build-out, the McMillan site will require consolidation and relocation of existing bus stops, integration of future transit services, and an on-site transit hub to facilitate localized bus and van trips.

Bus Stop Relocation/Consolidation

Based on the future layout of the McMillan PUD and the addition of new signalized intersections around the perimeter of the site, it is suggested that the adjacent bus stops be relocated and consolidated, as shown in Figure 43; however, this report realizes that changes to bus stop locations are done outside of the PUD approval process, and final decisions on relocations cannot be made at this time. Thus, these recommendations are provided as a starting point for discussion between the Applicant, DDOT, WMATA, and the community to review stop locations and develop a finalized plan to use new pedestrian crossings to improve service.

This report suggests consolidating the two bus stops on the south side of Michigan Avenue into one bus stop located just east of the new signalized intersection at Michigan Avenue NW and Half Street NW. It is also suggested that the bus stop located at the northeast corner of Michigan Avenue and North Capitol Street be relocated to the Half Street intersection. The signalized intersection provides safe and effective pedestrian access to the site, which allows for the consolidation of stops to a more centrally located area within the site. Additionally, as part of the overall site improvements, these stops would provide a shelter that would benefit not only the site but the surrounding area as well.

New signalized intersections would also be added along North Capitol Street at the North Service Court and Evarts Street NW, as shown previously in Figure 34. Thus, some existing pedestrian crosswalks would be abandoned and relocated to the signalized intersections, which provide safer pedestrian access. By changing the primary pedestrian access locations, it becomes essential to relocate existing bus stops to these locations to better serve the site and the surrounding neighborhood.

Along the west side of North Capitol Street, the existing bus stop at Douglas Street should be shifted north so that it lies south of the new Evarts Street NW signalized intersection. This relocated bus stop is more centrally located along the perimeter of the site. Additionally, the bus stop north of Channing Street and north of Girard Street would be abandoned.

Along the east side of North Capitol Street, there is only one existing bus stop located south of Evarts Street. Due to the offset intersection resulting from the extended Evarts Street NW through the site, this bus stop should be relocated north of Evarts Street such that it is not situated within the intersection. Similar to Michigan Avenue, all relocated bus stops would be provided with a shelter to better serve the site and the surrounding neighborhood. All relocated bus stops along North Capitol Street should be designed to accommodate articulated buses. Along Michigan Avenue relocated bus stops should be designed to accommodate two buses at a time due to the large amount of bus service along Michigan Avenue NE/NW.

In addition, this report suggests keeping all other bus stops east of North Capitol Street and west of First Street NW along Michigan Avenue in their existing locations as well as stops south of Channing Street on North Capital Street. These bus stops will not be provided with shelters as part of the development as they are not directly impacted by the site.

Future Transit Service Integration

As discussed earlier, many transit improvements are expected to be implemented by completion of the McMillan development. Therefore, it is important to ensure that the necessary facilities for these transit services are incorporated into or planned for within the site. Integration suggestions for each potential transit improvement are discussed below and shown on Figure 43:

- *MetroExtra Route 80x*
  The MetroExtra Route 80x will utilize the previously discussed relocated bus stops. No additional transit facilities will be necessary for this transit improvement.

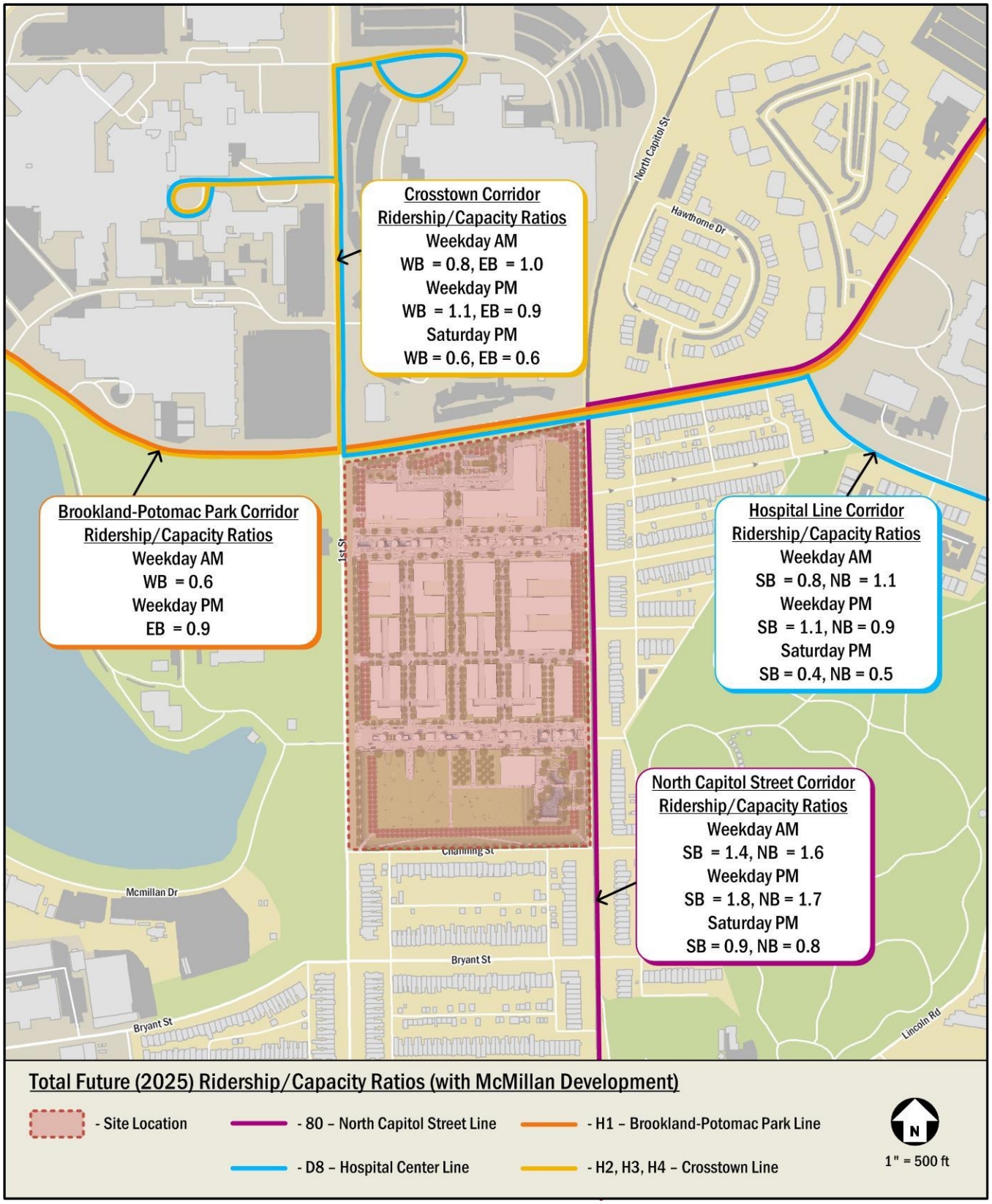

Figure 40: Total Future (2025) Ridership/Capacity Ratios (with McMillan PUD)

Figure 41: Shuttle Routes for Nearby Institutional Facilities

Figure 42: Existing On-Site Transit Facilities

Figure 43: Future On-Site Transit Facilities

- *Brookland-CUA Metro-Union Station Neighborhood Connector*
  The Neighborhood Connector Route would require additional bus stops as the route does not coincide with existing routes in the vicinity of the site (as presented earlier in Figure 38). Throughout the planning and construction phases of this development, coordination with DDOT will be necessary to determine the final alignment of the route and locations of bus stops. At this time, it is suggested that the route provide two bus stops on First Street NW in both directions. The placement of these stops would be most desirable at the South Service Court and the North Service Court. It is recommended that these stop locations provide shelters.

- *Tenleytown to Brookland Circulator Route*
  The Circulator route will travel along the Crosstown Corridor, utilizing bus stops along Michigan Avenue NE/NW. Because this will increase the frequency of transit service along the corridor, it is imperative that the bus stop along Michigan Avenue be designed to accommodate at least two buses. The proposed location for the bus stop is nearly 100 feet between curb cuts; therefore, two buses would be able to pick up/drop off passengers without queues backing up into the adjacent intersection.

- *Woodley Park/Adams Morgan to Brookland Streetcar Line*
  The McMillan PUD must coordinate with DDOT on the alignment and ultimate completion of the proposed Streetcar line. If Streetcar service is positioned along Michigan Avenue NE/NW, it would be advantageous to locate stops along the north and south sides of Michigan Avenue, adjacent to the site. It would also be beneficial to install the raised platform associated with Streetcar stops in conjunction with the streetscape improvements along the perimeter of the site (assuming the alignment is finalized at the time of construction).

Transit Hub

As shown in Figure 43, the development is proposing a transit hub on the north side of the site near Parcel 1. This transit hub will be accessible from Michigan Avenue NW and located internally as to not create any stoppages or queuing along the primary roadway grid. The transit hub will be used for bus and van activity localized to the McMillan PUD, as opposed to the bus stops along the perimeter of the site, which will be used for District-wide and regional transportation options.

If a shuttle service is utilized at the site, this transit hub would be an ideal location for pick-up and drop-off activity. This area allows for the localized shuttle service to take place within the boundaries of the site and also serves as a quick turnaround point for the shuttle. This area also serves as a good pick-up/drop-off location for wheelchair accessible vans which may require frequent service at the medical office.

Summary of Improvements and Recommendations

This report developed several improvements and recommendations for the McMillan development site in regards to transit. The following provides a summary of all the planned and recommended transit improvements:

- Based on existing capacity and ridership, the 80 Metrobus route, which primarily runs along North Capitol Street, exceeds the acceptable ridership vs. capacity threshold. Under future conditions there are some transit improvements that will increase capacity; however, due to inherent growth on the Metrobus system and transit trips generated by the McMillan PUD, the increased capacity will not be enough to serve the new ridership levels. Therefore, this TIS suggests that WAMATA consider the use of articulated buses to the 80 route. This report suggests replacing three standard buses with articulated buses. Although the ridership/capacity (R/C) ratio does not decrease to an acceptable level as a result, this is an attainable goal that brings the R/C ratio below that of existing conditions.
- A shuttle between the McMillan site and the Brookland Metrorail Station is suggested to offset any deficit in transit capacity, particularly along the Crosstown Corridor and the North Capitol Street Corridor. This shuttle will not be necessary after the completion of Phase 1, but should be regarded as a probable option at full build-out to provide residents and employees of the McMillan PUD an additional option for traveling to the site. It would be advantageous for the PUD to discuss the possibility of a shared shuttle service with nearby institutions such as the Children's National Medical Center, the Washington Hospital Center, or the Veteran Affairs Medical Center. As further transit improvements are made, it may be beneficial to monitor the necessity of this shuttle and make changes as seen fit.
- Due to an updated street grid as part of the McMillan development, new signalized intersections are proposed along Michigan Avenue NW and North Capitol Street. It is

recommended that bus stops along the perimeter of the site be consolidated and relocated adjacent to the new signalized intersections to allow for improved pedestrian access.

- Because there will be multiple transit improvements implemented by full build-out of the development, it is recommended that the overall site design integrate the facilities necessary for future transit service. This will include new bus stops along First Street NW for the Brookland-CUA Metro-Union Station Neighborhood Connector, elongated bus bays along Michigan Avenue to accommodate the Tenleytown to Brookland Circulator Route, and raised platforms along Michigan Avenue to accommodate the Woodley Park/Adams Morgan to Brookland Streetcar Line.
- A transit hub is proposed to be located within the northern portion of the site, adjacent to the medical office. This transit hub will accommodate all bus and van traffic for the McMillan site including but not limited to shuttle service and wheelchair accessible vans.

PEDESTRIAN FACILITIES

This section summarizes the existing and future pedestrian access to the site, reviews walking routes to and from the site, outlines impacts due to site-generated pedestrian trips, and presents recommendations for the site.

EXISTING CONDITIONS

The existing pedestrian conditions were evaluated qualitatively based on DDOT and ADA standards, and quantitatively based on the *Highway Capacity Manual 2010* (HCM 2010) methodology for pedestrian link analyses.

Existing Pedestrian Facilities

Pedestrian facilities within the study area primarily provide a good walking environment. Within the pedestrian study area, which includes all pedestrian facilities within a quarter-mile of the site and additional walking routes to major destinations, most roadways have sidewalks, crosswalks, and curb ramps with detectable warnings.

The site currently has acceptable access to nearby transit service. Michigan Avenue and North Capitol Street, which directly border the site, are major Metrobus corridors and provide access to six different Metrobus routes. Although there are no Metrorail stations within a half-mile of the site, Michigan Avenue provides a direct pedestrian link to the Brookland Metrorail station, and many of the Metrobus routes that serve the site connect with the Brookland Metrorail station on the Red Line and the Columbia Heights station on the Green/Yellow Line.

There are some barriers and areas of concern within the study area that negatively impact the quality and attractiveness of the walking environment. This includes walking distances between the site and some major destinations, manmade and natural barriers that increase walking distances, and roadway conditions that reduce the quality of walking conditions, including narrow or nonexistent sidewalks along several streets, lengthy crossings at some intersections, and high-speed, high-volume roadways that constrict pedestrian access. Figure 44 shows suggested pedestrian pathways, walking time and distances, and barriers and areas of concern. As discussed in "Study Area Overview" section, and as part of the 2009 *North Capitol Street Cloverleaf Feasibility Study*, the highway-like section of North Capitol Street north of the site is in the planning stages to undergo massive changes that will greatly improve the pedestrian environment.

A review of pedestrian facilities near the site shows that many facilities meet DDOT standards and provide a quality walking environment. Figure 45 shows a detailed inventory of the existing pedestrian infrastructure within the study area.

Sidewalks, crosswalks, and curb ramps are evaluated based on the guidelines set forth by DDOT's *Public Realm Design Manual,* in addition to ADA standards. Sidewalk width and buffer requirements for the District are shown below in Table 52. Within the area shown, most roads are considered residential with a moderate density; thus, a six-foot sidewalk with a four-foot buffer is required. As can be seen in Figure 45, many sidewalks in the vicinity of the site comply with these standards; however, there are a few areas that do not meet the minimum width or have no sidewalks at all. For the most part, these issues are not detrimental to the overall pedestrian experience as many roadways without sidewalks are not expected to be high volume pedestrian pathways. Additionally, some of the areas without sidewalks are part of the site itself, and sidewalks will be constructed in compliance with DDOT standards as part of the streetscape improvements.

ADA standards require that all curb ramps be provided wherever an accessible route crosses a curb and must have a detectable warning. Curb ramps shared between two crosswalks are not desired. As shown in Figure 45, under existing conditions, there are some issues with crosswalks and curb ramps near the site. Some of these issues, particularly along North Capitol Street between Michigan Avenue NW and Channing Street NW, will be improved as part of the PUD.

Table 52: Sidewalk Requirements

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

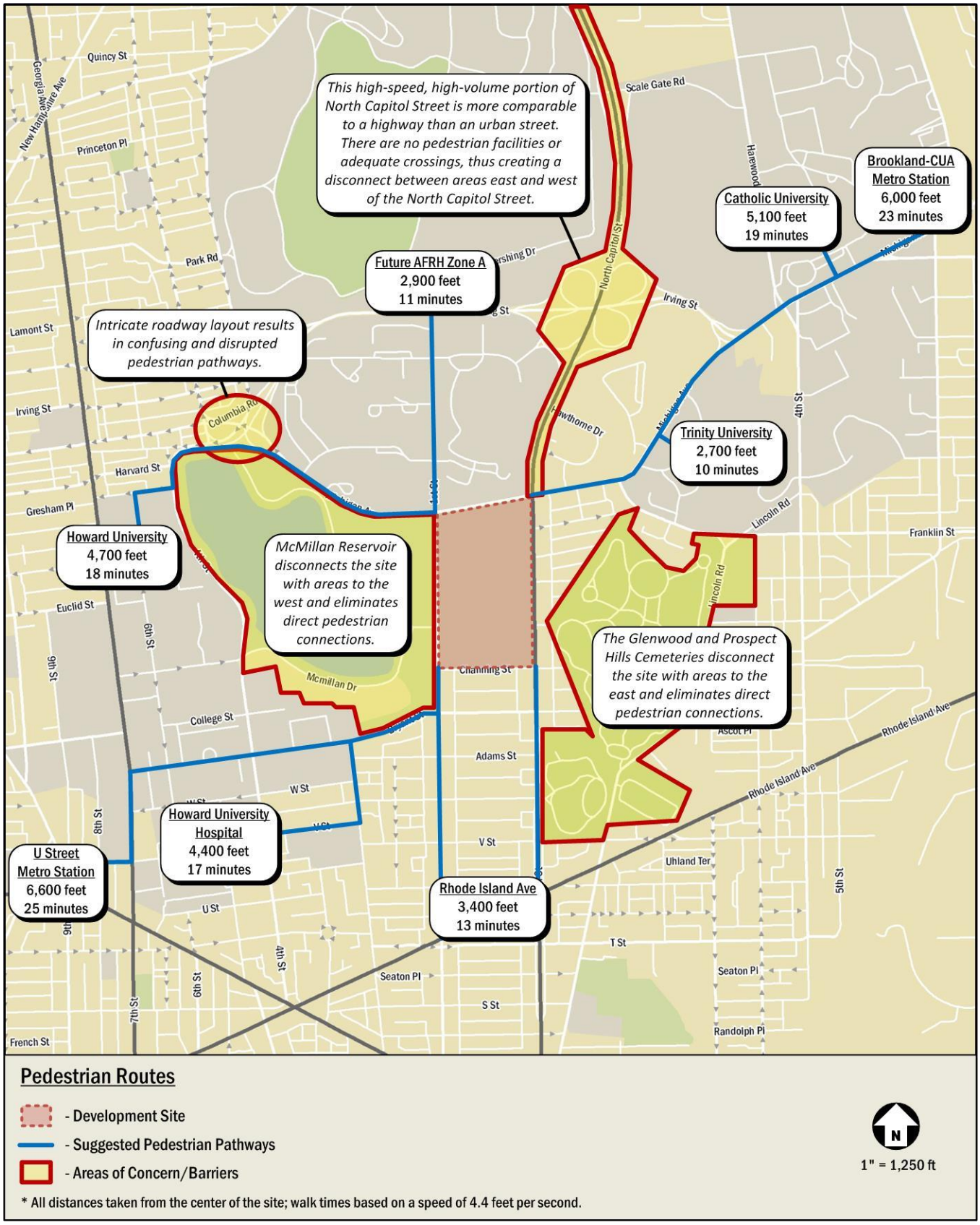

Figure 44: Pedestrian Routes

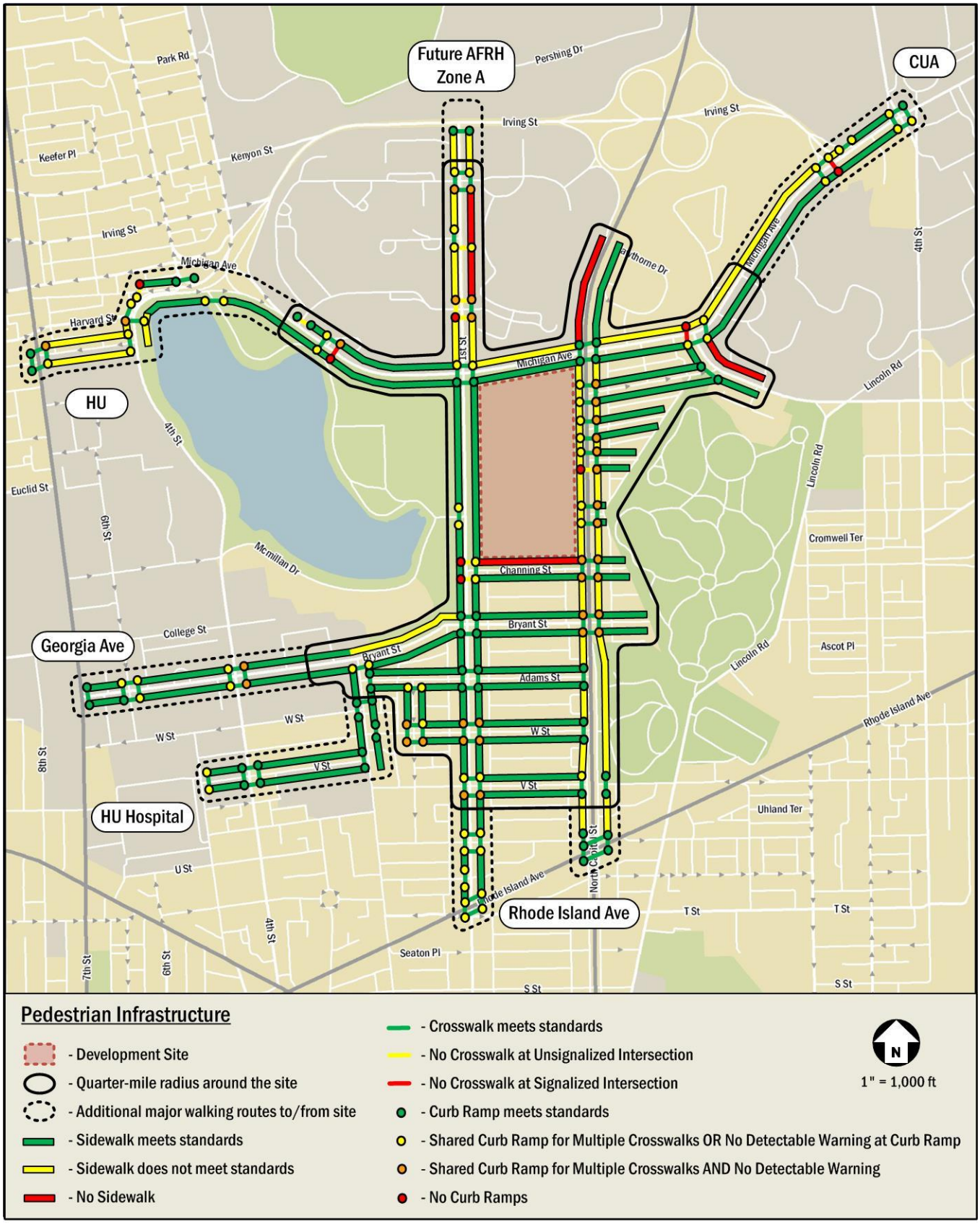

Figure 45: Pedestrian Infrastructure

Pedestrian Link Analysis

"Chapter 17: Urban Street Segments" of the Highway Capacity Manual 2010 (HCM 2010) outlines a methodology for evaluating the performance of an urban street segment in terms of its service to pedestrians. In contrast with the qualitative analysis discussed above, the HCM 2010 link analysis provides an evaluation of the pedestrian perception of service along a roadway as opposed to the sidewalks compliance with standards.

Methodology

Due to data collection constraints, the overall methodology outlined in HCM 2010 was simplified slightly. The modified step-by-step methodology is outlined below:

Step 1: Determine Free-Flow Walking Speed

The average free-flow speed reflects conditions in which there are negligible pedestrian-to-pedestrian conflicts and primarily takes into account pedestrian age and sidewalk grade. For the purpose of this analysis, a free-flow walking speed of 4.4 feet/second was used. This value is used for a pedestrian population that is less than 20% elderly (i.e. 65 years of age or older), which is consistent with US Census age distribution data for the census tract of the site. It was assumed that sidewalks in the area do not have a significant enough upgrade (10% or greater) to reduce the average free-flow speed.

Step 2: Determine Average Pedestrian Space

Average pedestrian space indicates if a pedestrian has an adequate amount of space to maneuver along the sidewalk and avoid fellow pedestrians and obstacles. The average pedestrian space is determined based on the effective sidewalk width, pedestrian flow rate, and walking speed.

The pedestrian flow rate was not available for all study area links; however, based on the pedestrian intersection counts, it is not likely that any link reaches a flow rate greater than 100 pedestrians/hour under existing conditions. Based on the HCM 2010 methodology, an average pedestrian space of 60 square feet/person is adequate to provide pedestrians with the ability to move in the desired path without altering movements. In order for the average pedestrian space to fall below 60 square feet/person, the pedestrian flow rate would need to exceed 1,000 pedestrians/hour. This pedestrian flow rate is not reached under existing conditions, nor will it increase to this level due to the future development based on an overall pedestrian trip generation of 261 trips during the morning peak hour, 331 trips during the afternoon peak hour, and 184 trips during the Saturday peak hour. Therefore, it was assumed that all pedestrian links in the study area provide an adequate pedestrian space of 60 square feet/person or greater.

Step 3: Determine Pedestrian Level of Service (LOS) Score

The pedestrian LOS score takes into account the overall cross section of the roadway and sidewalk, including the width of travel lanes, parking lanes, bike lanes, sidewalk buffers, and sidewalks. The link score has high sensitivity to the separation between pedestrians and moving vehicles in addition to the speed and volume of vehicles along the adjacent roadway. Collected traffic counts were used to determine the volumes along many roadways. For roadways without available data, a volume was assumed based on the functional classification of the roadway. AADT volumes provided by the district were inventoried by functional classification and used to determine an appropriate average volume based on functional class.

Step 4: Determine Link LOS

The link LOS is determined based on the LOS score and the average pedestrian space. As discussed above, the average pedestrian space was assumed to be above 60 square feet per person; thus, the pedestrian LOS is determined based on the pedestrian LOS score shown in Table 53. LOS results range from "A" being the best to "F" being the worst, based on the pedestrian traveling experience and perception of service quality along the sidewalk segment.

Results

To perform the pedestrian link analysis, extensive data was collected at every sidewalk segment in the pedestrian study area. This data was collected on Tuesday, November 12, 2013, Thursday, November 14, 2013, and Wednesday, December 4, 2013. A full inventory of data collection and analysis results is included in the Technical Attachments. Figure 46, Figure 47, and Figure 48 summarize the pedestrian link LOS results.

Table 53: Pedestrian LOS Criteria

Pedestrian LOS Score	Pedestrian LOS
< 2.00	A
> 2.00 - 2.75	B
> 2.75 - 3.50	C
> 3.50 - 4.25	D
> 4.25 - 5.00	E
> 5.00	F

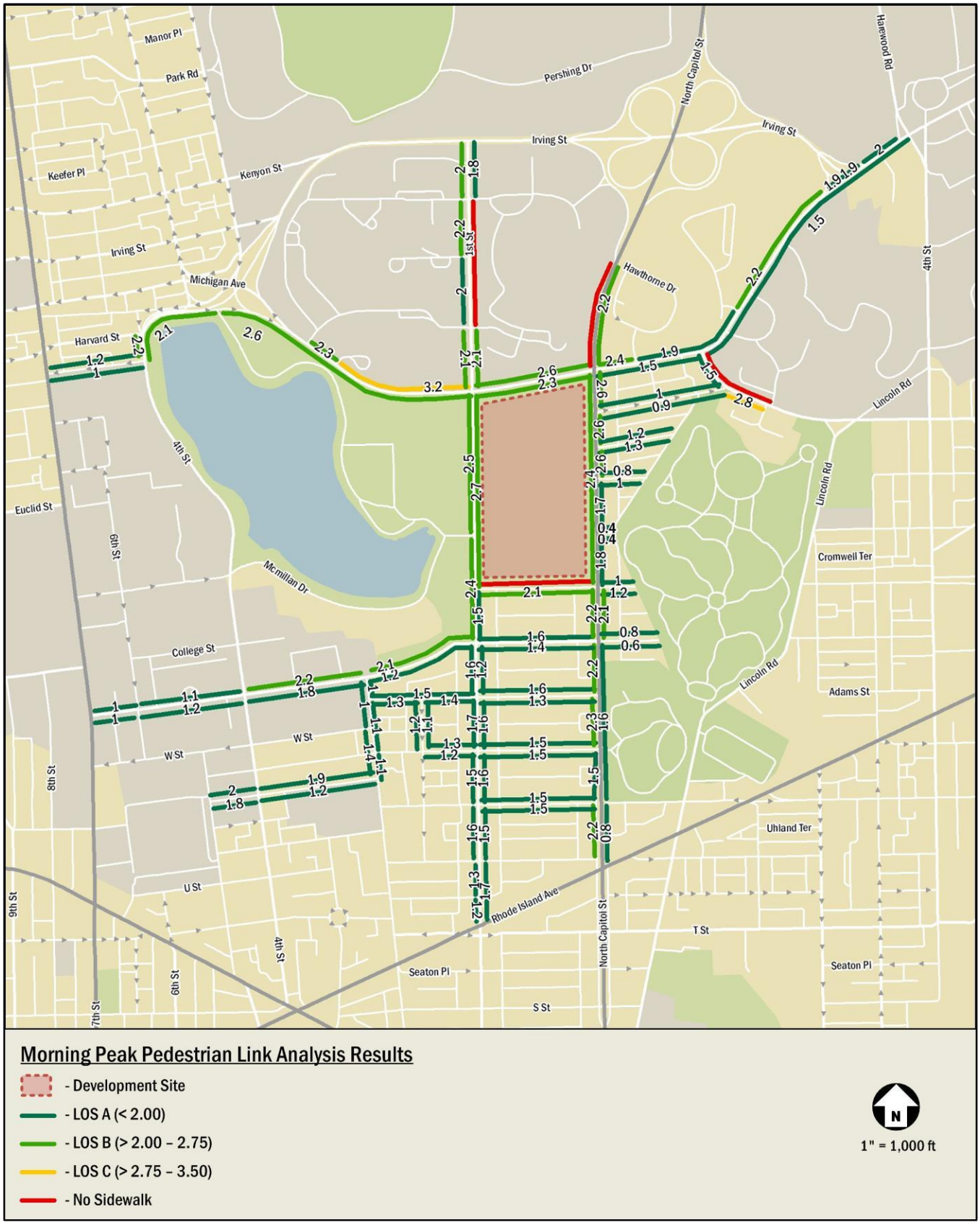

Figure 46: Morning Peak Pedestrian Link Analysis Results

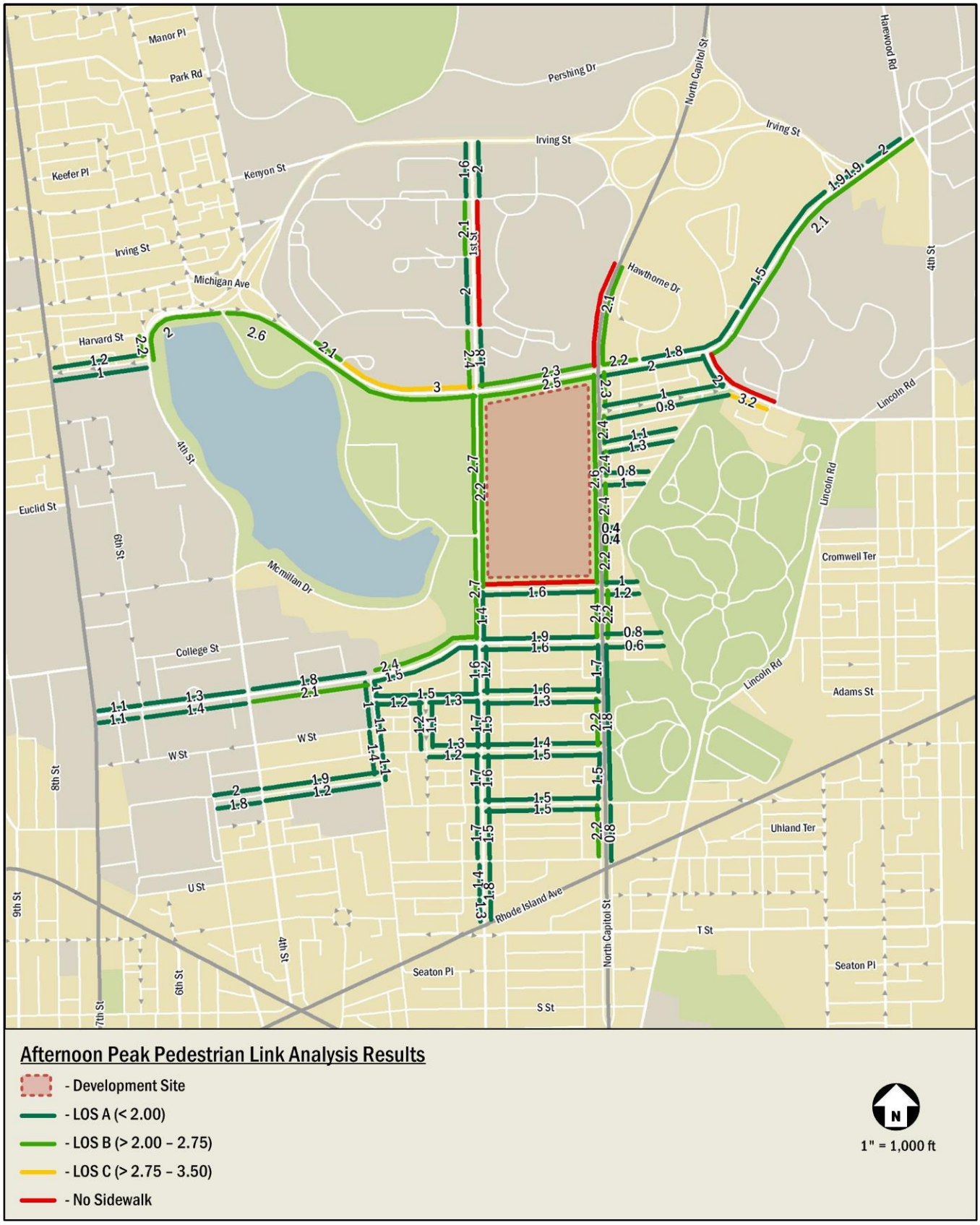

Figure 47: Afternoon Peak Pedestrian Link Analysis Results

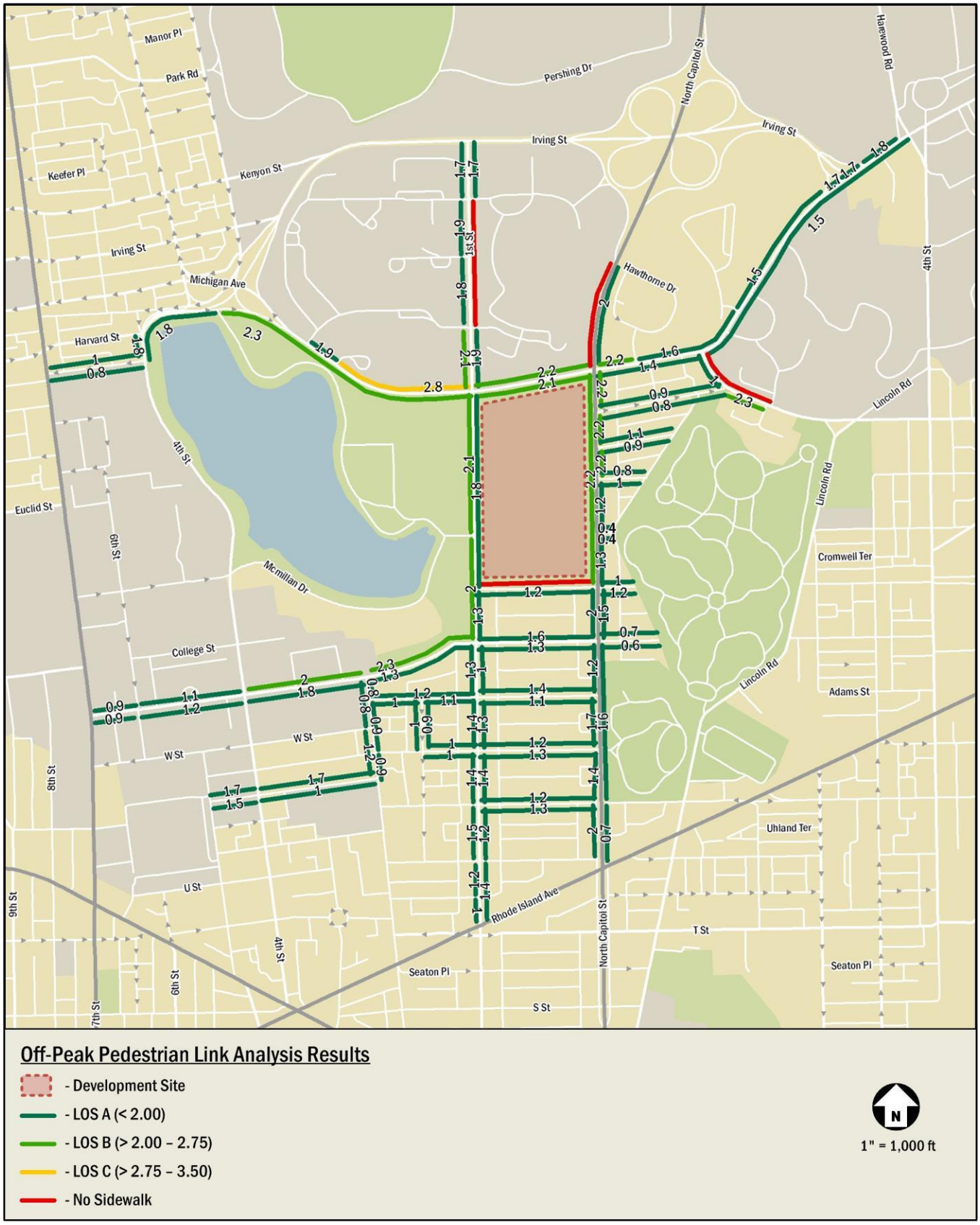

Figure 48: Off-Peak Pedestrian Link Analysis Results

The analysis concludes that all study segments in the study area, with the exception of those that do not have sidewalks, are perceived as acceptable based on an LOS of C or better. The sidewalks with slightly lower LOS ratings are situated on portions of Michigan Avenue NE/NW, North Capitol Street, First Street NW, and Bryant Street NW, which is consistent with roadways that have higher volumes and speeds. The existing layout of the site and surrounding area also results in long stretches of sidewalk where there are no crossings and/or no signal- or stop-controlled intersections. The long roadway segments also contribute to a worsened perception of pedestrian facilities. The PUD will be adding some signal-controlled intersections around the perimeter of the site along Michigan Avenue NW, North Capitol Street, and First Street NW. By breaking up the flow of vehicular traffic along these roadways, the overall pedestrian perception will likely improve.

This analysis reinforces the qualitative conclusions made previously that most sidewalks offer conditions that are conducive to adequate pedestrian movement throughout the system. Based on these conclusions, it is assumed that the external pedestrian network is suitable to serve pedestrian traffic to and from the development. All sidewalks along the site boundary will be further improved as part of the streetscape improvements.

Pedestrian Crosswalk Level of Service

Crosswalk analyses were performed for the existing and total future conditions at the intersections contained within the study area during the morning, afternoon, and Saturday peak hours. The analysis was based on the methodology outlined in "Chapter 18: Pedestrians" of the Highway Capacity Manual (HCM).

The methodology for signalized intersections was used in order to estimate the average delay experienced by a pedestrian at a signalized crosswalk (the amount of time waiting for a walk sign). As stated in the HCM, pedestrian delay is not constrained by capacity, even when pedestrian flow rates reach 5,000 pedestrians per hour (pph). This calculation is based on the effective green time programmed for pedestrians and the cycle length, and it is rated by the amount of delay experienced. Therefore the pedestrian volumes were not taken into account for this analysis; however, pedestrian counts were collected in conjunction with vehicular counts. The results of these counts are included in the Technical Attachments.

The results of the signalized intersection analyses are expressed in Level of Service (LOS) and delay (seconds) for each crosswalk. LOS results range from "A" being the best to "F" being the worst. The delay and LOS show the likelihood that a pedestrian will not comply with a traffic-control device (i.e. jaywalking). According to the HCM, when pedestrians experience more than a 30-second delay, they become impatient and may engage in risk-taking behavior. The likelihood of non-compliance reflects low to moderate conflicting volumes. At intersections with high conflicting volumes, pedestrians have little choice but to wait for the walk signal. Therefore, observed non-compliance is reduced at these locations.

The methodology for unsignalized intersections was used in order to estimate the average delay experienced by a pedestrian at an uncontrolled crosswalk. This methodology applies to unsignalized intersections with a pedestrian crossing against a free-flowing traffic stream or an approach not controlled by a stop sign. The unsignalized intersection methodology does not apply to zebra-striped crossings at unsignalized intersections or at crossings against a stream of traffic controlled by a stop sign because pedestrians have the right-of-way and therefore experience no delay. It should be noted that in the District, pedestrians have the right-of-way at al crosswalks, including those against a free-flowing traffic stream, and theoretically, experience no delay. However, the analysis was performed at pedestrian crossings against free-flowing traffic streams and yield-controlled approaches in order to evaluate the theoretical delay experienced by pedestrians. The calculation for average pedestrian delay at an unsignalized crossing is based on the average pedestrian walking speed, crosswalk length, assumed pedestrian lost time (start-up and end clearance time), and conflicting vehicular flow rate.

The results of the unsignalized intersections analyses are expressed in level of service (LOS) and delay (seconds) for each crosswalk. LOS results range from "A" being the best to "F" being the worst. The delay and LOS show the likelihood that a pedestrian will engage in risk-taking behavior (i.e. accepting a short gap between vehicles). Pedestrians generally tolerate smaller delays at unsignalized intersections than at signalized intersections.

Results of the capacity analyses, including LOS and average delay (in seconds), for the existing and total future pedestrian conditions are included in the Technical Attachments and draw

many conclusions about the existing and future conditions at the study area intersections. The future analysis is based on the suggested intersection improvements discussed in the "Vehicular" section.

The analysis results indicate that the majority of signalized crosswalks in the study area operate at a level of service D or better during both morning, afternoon, and Saturday peak hours for the existing and total future conditions. This finding indicates a low (LOS A and LOS B) to moderate (LOS C and LOS D) likelihood of non-compliance by pedestrians, which is reflected by pedestrians jaywalking across the intersection. The study intersections with crosswalks operating at LOS E will experience a moderate to high likelihood of non-compliance. These intersections include North Capitol Street & Channing Street NE/NW, Georgia Avenue NW & Columbia Road NW, and Georgia Avenue NW & Bryant Street NW.

The analysis results also indicate that the majority of unsignalized crosswalks in the study area operate at a level of service of F during the morning, afternoon, and Saturday peak hours for the existing and total future conditions. This finding indicates an unfriendly and intimidating environment for pedestrians. However, as stated previously, pedestrians have the right-of-way in all crosswalks in the District, so vehicles must yield to pedestrians in the crosswalk at the study intersections.

The proposed development will not have detrimental impacts to pedestrian level of service at the study intersections but will likely improve the overall pedestrian environment. The unsignalized crosswalks along North Capitol Street result in a high amount of delay, primarily due to the lengthy crossings and high volumes along North Capitol Street. This stretch of North Capitol Street is approximately 1,500 feet long and does not have any signalized crosswalks to help facilitate pedestrian traffic. These conditions result in a pedestrian environment that is intimidating and may provide unsafe conditions. As part of the McMillan development, two new signalized intersections will be added along this portion of North Capitol Street. The signalized crosswalks will provide a much improved level of service over the unsignalized crosswalks.

Additionally, one signalized intersection will be added along First Street NW at the North Service Court. Under existing conditions, there are no crosswalks along First Street between Channing Street and Michigan Avenue. Although the new intersection is not located mid-block, it still provides pedestrians with a safe connection to the site from the west side of First Street NW.

Pedestrian Site Design

The overall pedestrian circulation within the PUD will greatly change from existing to total future conditions. This section describes the existing and future pedestrian circulation of the site and discusses the overall improvements the PUD will have on the pedestrian environment.

Existing Pedestrian Circulation

The McMillan site is currently not conducive to pedestrian connectivity. Fencing around the site and topography resulting in steep inclines isolate the site from the surrounding area. As shown in Figure 49, under existing conditions there are no sidewalks available on the north side of Channing Street. The sidewalk along North Capitol Street does not meet DDOT standards for sidewalk and buffer width and may present as an intimidating environment for some pedestrians. There is no buffer between the sidewalk and the roadway on either side of the street. At most times the curb lane acts as a parking lane; however during the morning and afternoon peak hours, the curb lane is used as a travel lane for southbound and northbound traffic, respectively. Therefore, when volumes along North Capitol Street are highest, the sidewalk and travel lane are adjacent to each other.

Additionally, there are few direct pedestrian connections that provide an exclusive pedestrian phase to facilitate safe crossing. Vehicular traffic along North Capitol Street is free-flowing between Michigan Avenue and Channing Street, so pedestrian crosswalks have been placed at multiple locations. Vehicles are expected to yield to pedestrians at these crosswalks; however, due to the high volumes along this segment of North Capitol Street, crossing may still prove to be difficult. Along First Street NW there are no pedestrian crossings between Channing Street NW and Michigan Avenue NW.

Future Pedestrian Circulation

The site plan for the McMillan PUD includes a network of roadways and pedestrian facilities that create an enhanced pedestrian network with ample circulation and connection points, as shown in Figure 50.

The sidewalk network surrounding the site is greatly improved over the existing conditions. In addition to providing sidewalks with buffers along the entire perimeter of the site, the development will reintroduce the historic “Olmsted Walk”, which was used as the perimeter pathway while the McMillan Sand Filtration Site was in service.

New east/west pedestrian connections are provided along the repurposed North and South Service Courts and along Evarts Street NW. New north/south roadways (Quarter Street, Half Street, and Three Quarters Street) do not provide through connections between Michigan Avenue NW and Channing Street NW; however, they provide additional pedestrian connections within the site itself. This extensive network of pedestrian facilities allows for direct access to all building entrances, as shown in Figure 50.

New signalized intersections along Michigan Avenue NW, North Capitol Street, and First Street NW also result in an improved pedestrian environment for the site. Existing access to the site via signal-controlled crosswalks is limited, which can encourage jaywalking. The addition of signal-controlled crosswalks around the perimeter of the site, particularly along the higher volume roadways, will result in safer pedestrian access to the site. Although some of the new site roadways result in minimal offsets between intersections along North Capitol Street, all pedestrian crosswalks will be placed to provide the most safe and effective pedestrian crossings. All new intersections, and those within the site streetscape, will comply with DDOT and ADA standards. Crosswalks will be located at all intersections and will provide curb ramps with detectable warning strips.

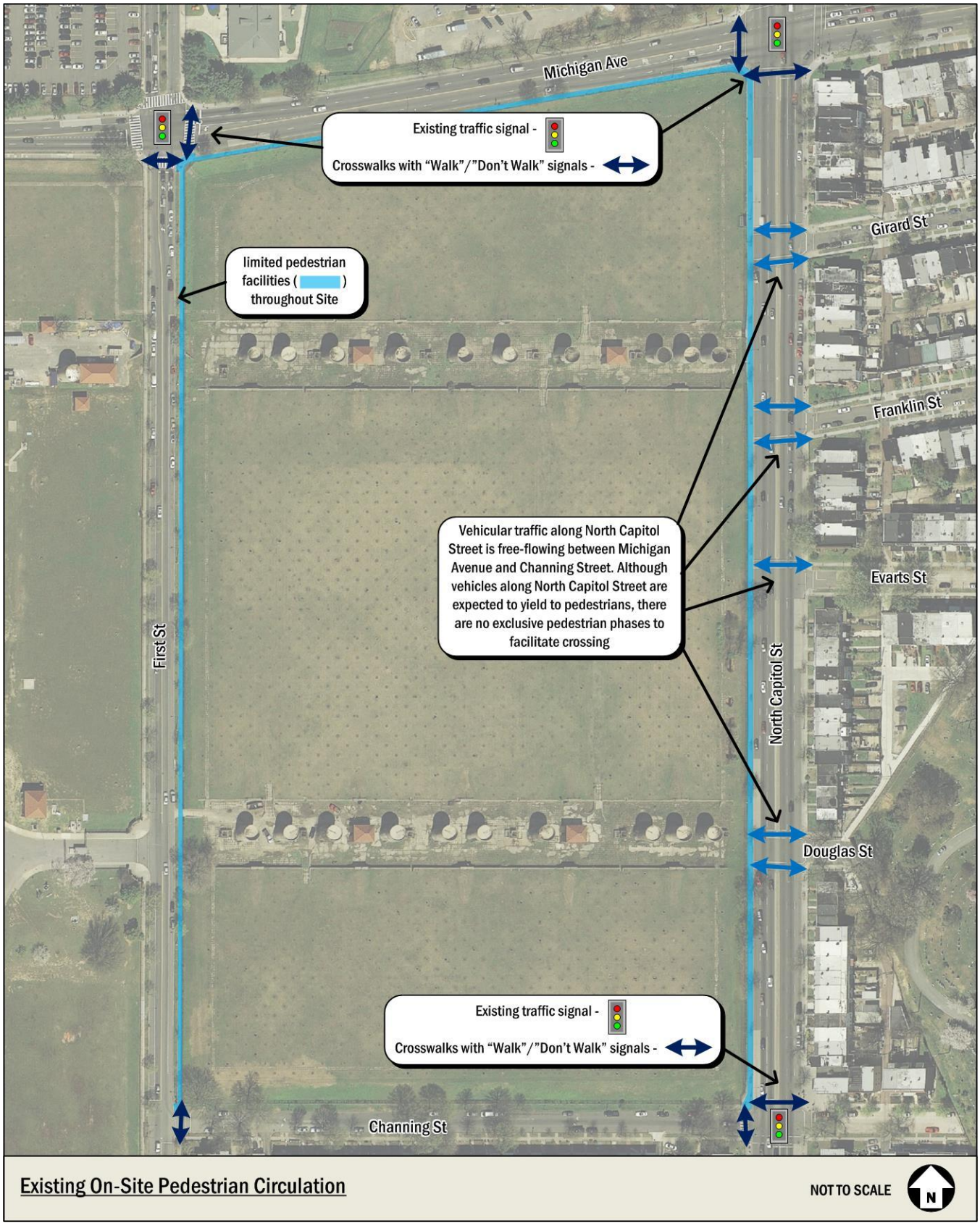

Figure 49: Existing On-Site Pedestrian Circulation

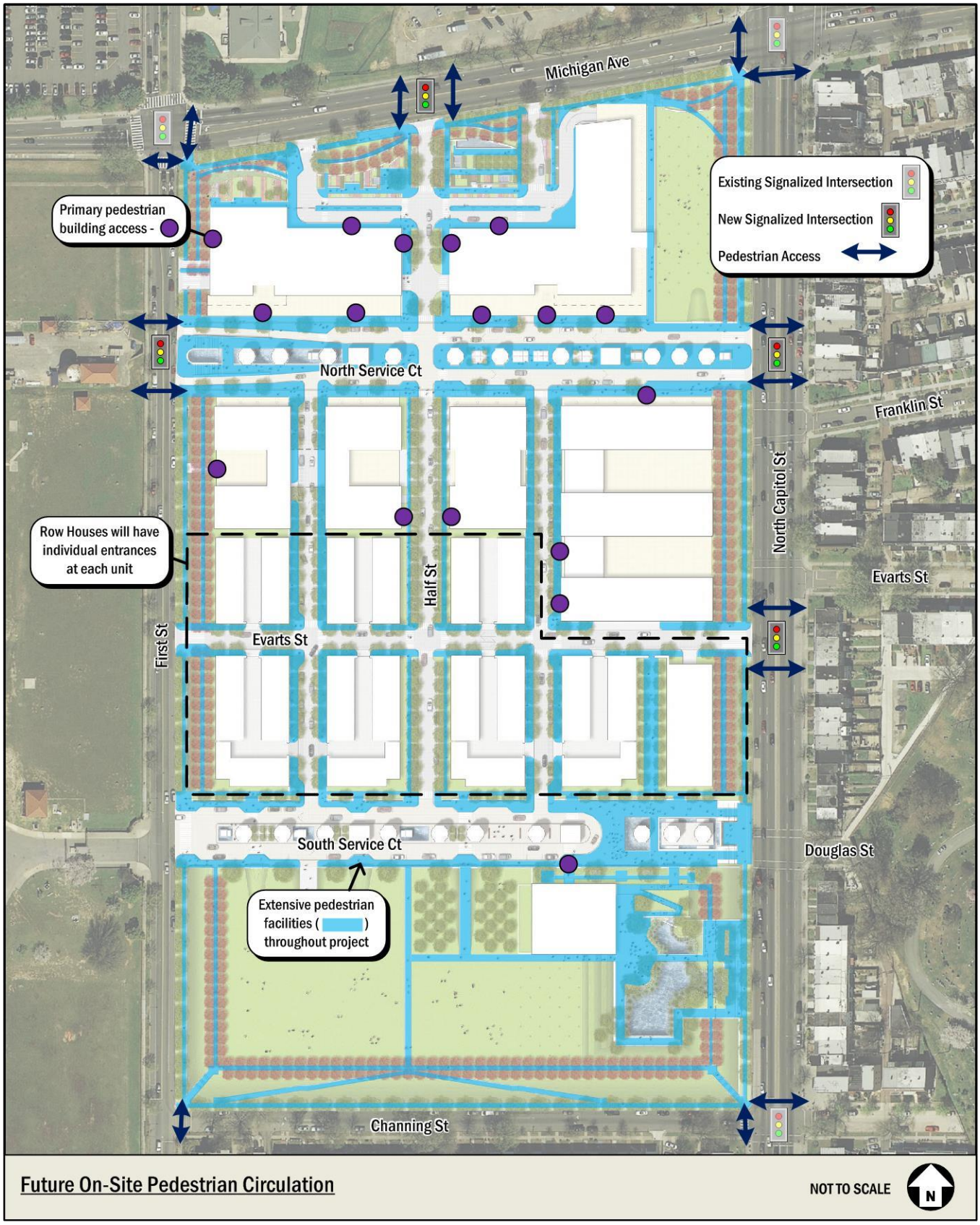

Figure 50: Future On-Site Pedestrian Circulation

BICYCLE FACILITIES

This section summarizes existing and future bicycle access, reviews the quality of cycling routes to and from the site, outlines impacts due to site-generated bicycle trips, and presents recommendations.

EXISTING AND PROPOSED BICYCLE FACILITIES

Within the study area, bicyclists have access to on-street bike lanes, signed bicycle routes, and local and residential streets that facilitate cycling. The bicycle network provides good conditions for local trips and there are several different routes that provide access to many areas within the District.

West of the site is a pair of one-way bike lanes along Warder Street NW and Park Place NW that continue along 4th/5th Street NW, and east of the site is a bike lane along 4th Street NE. The Metropolitan Branch Trail is also located further east of the site and consists of off-street trails and on-street signed bicycle routes that run parallel to the Metrorail Red Line.

The 2005 *Bicycle Master Plan*[1] outlines plans for future bicycle facilities within the District. Many improvements near the site increase overall bicycle connectivity. These consist of new bike lanes that function as connectors between bike lanes in the system as well as bike lanes along new corridors such as Rhode Island Avenue, Columbia Road, and Harvard Street. New additions and connections will also be added along the Metropolitan Branch Trail that connect the site with more areas of the District and Maryland.

There are some routes with cycling barriers and entire roadway corridors with poor conditions that reduce the overall quality of cycling conditions. Figure 51 illustrates existing and proposed facilities in the study area and identifies corridors with poor conditions and specific locations where there are barriers. Figure 51 also depicts routes to likely destinations within the area in addition to the distance and time it takes to get to these destinations assuming a speed of 11 miles per hour.

Although on-street bicycle facilities are near the site, very little bicycle parking is provided. This results in many cyclists using street signs, parking meters, or similar objects to secure their bicycles. This finding indicates that there is a demand for additional bicycle parking facilities in the study area.

[1] *District of Columbia Bicycle Master Plan*, April 2005, District of Columbia Department of Transportation

In addition to personal bike use, the Capital Bikeshare program has placed 300 bicycle share stations across Washington, DC, Arlington and Alexandria, VA, and most recently Montgomery County, MD with over 2,500 bicycles provided. There is only one Bikeshare station near the site located near the Hospital Center; however, this Bikeshare station is just over a quarter mile from the site, which makes it a less attractive amenity.

BICYCLE LINK ANALYSIS

"Chapter 17: Urban Street Segments" of the *Highway Capacity Manual 2010* (HCM 2010) outlines a methodology for evaluating the performance of an urban street segment in terms of its service to bicyclists.

Methodology

The methodology for bike link analyses involves a six step process; however, two of these steps can be used as a stand-alone method requiring less-intensive data collection. This approach is often taken by local, regional, and state transportation agencies. Thus, the two-stop process was used in lieu of the six-step process and continued to provide the desired quantitative level of service (LOS) results.

Step 1: Determine Bicycle LOS Score for Link

The bicycle link LOS score is determined through several inputs that primarily consist of the vehicular profile of the roadway, cross-section of the roadway (including if an exclusive bicycle facility is provided), and the pavement condition.

Similar to the methodology used for the pedestrian link analysis, collected traffic counts were used to determine the vehicular volumes along many roadways. For roadways without available data, a volume was assumed based on the functional classification of the roadway. AADT volumes provided by the District were inventoried by functional classification and used to determine an appropriate average volume based on functional class. A similar method was used to determine the heavy vehicle percentage along each roadway. AADT volumes categorize the type of vehicles counted; thus, an average heavy vehicle percentage was determined for each functional classification and applied to the study area links.

Pavement condition rating is expressed on a scale of 0 to 5, 0 being the worst and 5 being the best. For the purpose of this analysis, and to eliminate subjectivity within the data collection process, a pavement condition of 3 was assumed for all roadways, consistent with a roadway that has some rutting and patching and provides an acceptable ride for low-speed traffic.

Step 2: Determine Link LOS

The bicycle link LOS is determined exclusively from the bicycle link LOS score determined in Step 1. This score is compared to the thresholds shown in Table 54 to determine the bicycle link LOS. LOS results range from "A" being the best to "F" being the worst on the basis of the cyclists traveling experience and perception of service quality along the roadway segment.

Results

Data collected for the bicycle link analysis was collected in conjunction with data collected for the pedestrian link analysis. This data was collected on Tuesday, November 12, 2013, Thursday, November 14, 2013, and Wednesday, December 4, 2013. Although bicycle volumes are not a factor in the bicycle link analysis, volumes were collected at areas thought to be high volume bicycle routes to provide a baseline for future bicycle trips. Volume counts and a full inventory of the bicycle link data collection and analysis results are included in the Technical Attachments. Figure 52, Figure 53, and Figure 54 show a graphical representation of the bicycle link LOS results.

The analysis concludes that most roadways in the study area are perceived as an LOS C or better; thus, most cyclists feel comfortable riding on the roadways surrounding the site. Exceptions to this finding are segments of Michigan Avenue and North Capitol Street, primarily during the morning and afternoon weekday peak hours. This exception is likely due to high volumes on these roadways (which tend to decrease on the weekends) and, in some cases, high speeds.

Based on this analysis, it can be concluded that the best way for cyclists to access the site is from First Street NW which provides an LOS of C or better from Rhode Island Avenue to Irving Street for all study scenarios. There are also several local and residential roadways in the Bloomingdale neighborhood to the south that result in comfortable cycling conditions.

Table 54: Bicycle LOS Criteria

Bicycle LOS Score	Bicycle LOS
< 2.00	A
> 2.00 - 2.75	B
> 2.75 - 3.50	C
> 3.50 - 4.25	D
> 4.25 - 5.00	E
> 5.00	F

Future On-Site Bicycle Facilities

Of all the modes analyzed in this TIS, the trip generation estimates for cycling are the lowest. The site is projected to generate 82 trips during the weekday morning peak hour, 62 trips during the weekday afternoon peak hour, and 78 trips during the Saturday afternoon peak hour. Bicycling has the potential to be an important mode for the McMillan development, especially between the site and Metrorail stations. Therefore, it is essential that the site incorporates bicycle-specific infrastructure into the design. Locations of proposed bicycle facilities are shown in Figure 55.

As discussed previously in the "Project Design" section, long- and short-term bicycle parking will be located throughout the site. The amount of long-term bicycle parking will exceed the minimum required by the Zoning Regulations and the *DC Zoning Regulations and Bicycle Commuter and Parking Expansion Act of 2007*.

Under existing conditions, there is only one Capital Bikeshare station located within the area, and it is just over a quarter-mile walk from the site. Therefore, space for three new Capital Bikeshare stations will be located within the PUD: one along the north side of the site near the medical office, one along the South Service Court near the community center, and one near the grocery store on Parcel 4. These stations will create a denser supply of Capital Bikeshare stations in the neighborhood making it a more attractive non-auto transportation mode for those that do not own personal bicycles.

The development will result in an increase of bicycle facilities in the area and the new roadway grid within the site will create broadened bicycle connectivity for the site and surrounding area. Within the site, it is expected that Evarts Street NW and Half Street NW will be the main vehicular thoroughfares. Although it is assumed that some bicycle trips will also use these, the grid is arranged such that the North and South Service Courts, Quarter Street NW, and Three Quarter Street NW will have lower speeds and lower volumes. Therefore, these streets will act as the primary bicycle routes within the site and allow for safe and efficient access to each parcel and the proposed Capital Bikeshare stations.

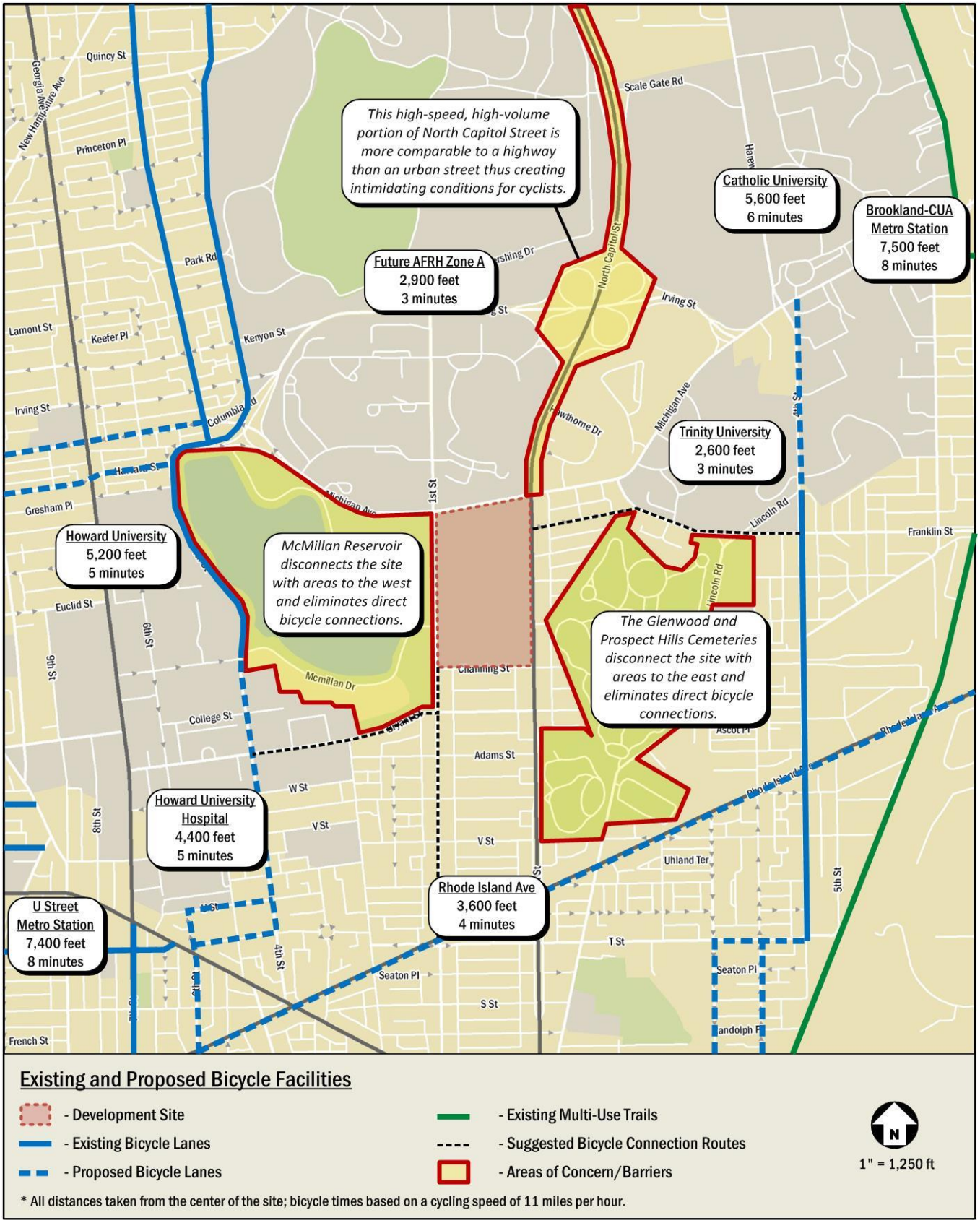

Figure 51: Existing and Proposed Bicycle Facilities

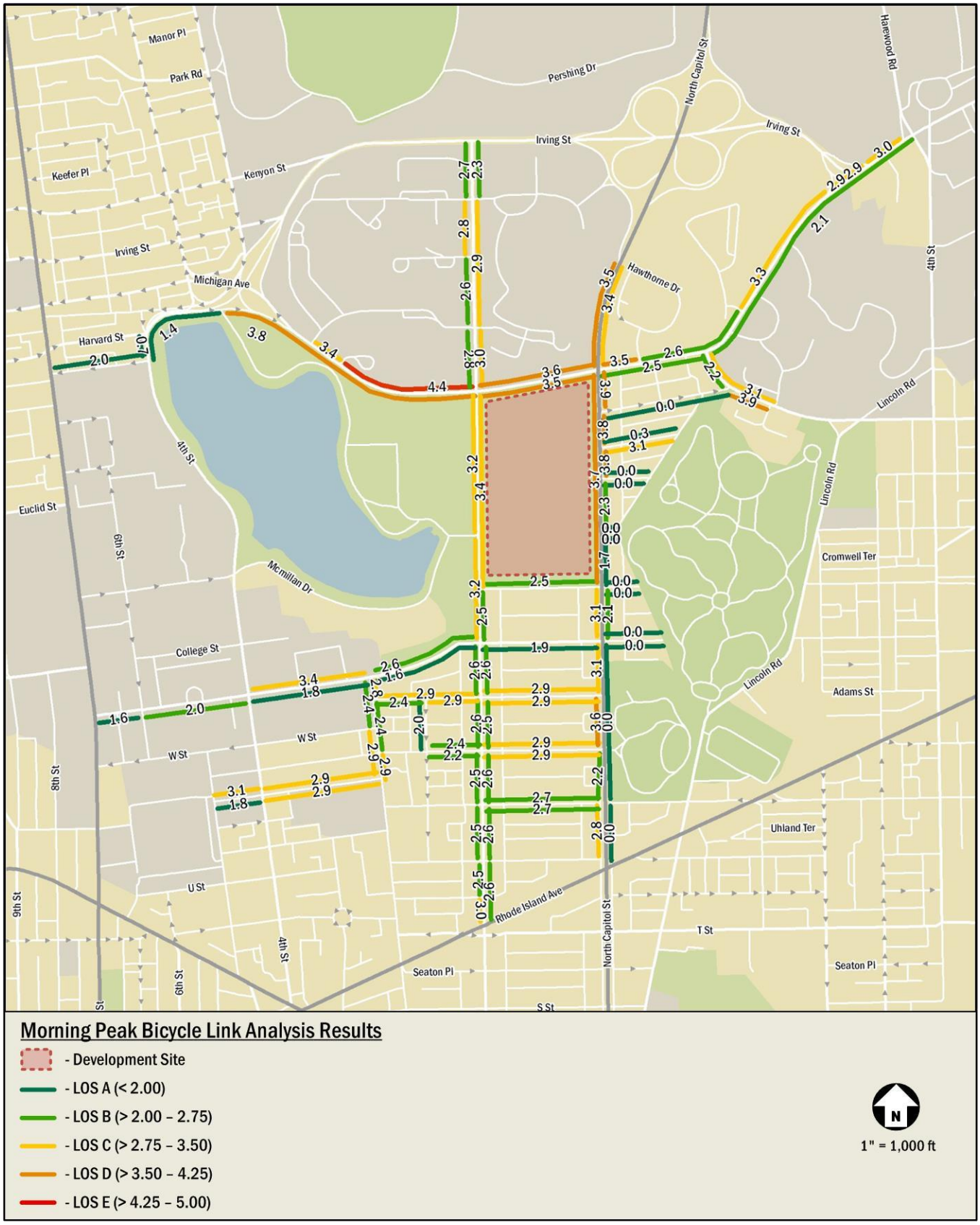

Figure 52: Morning Peak Bicycle Link Analysis Results

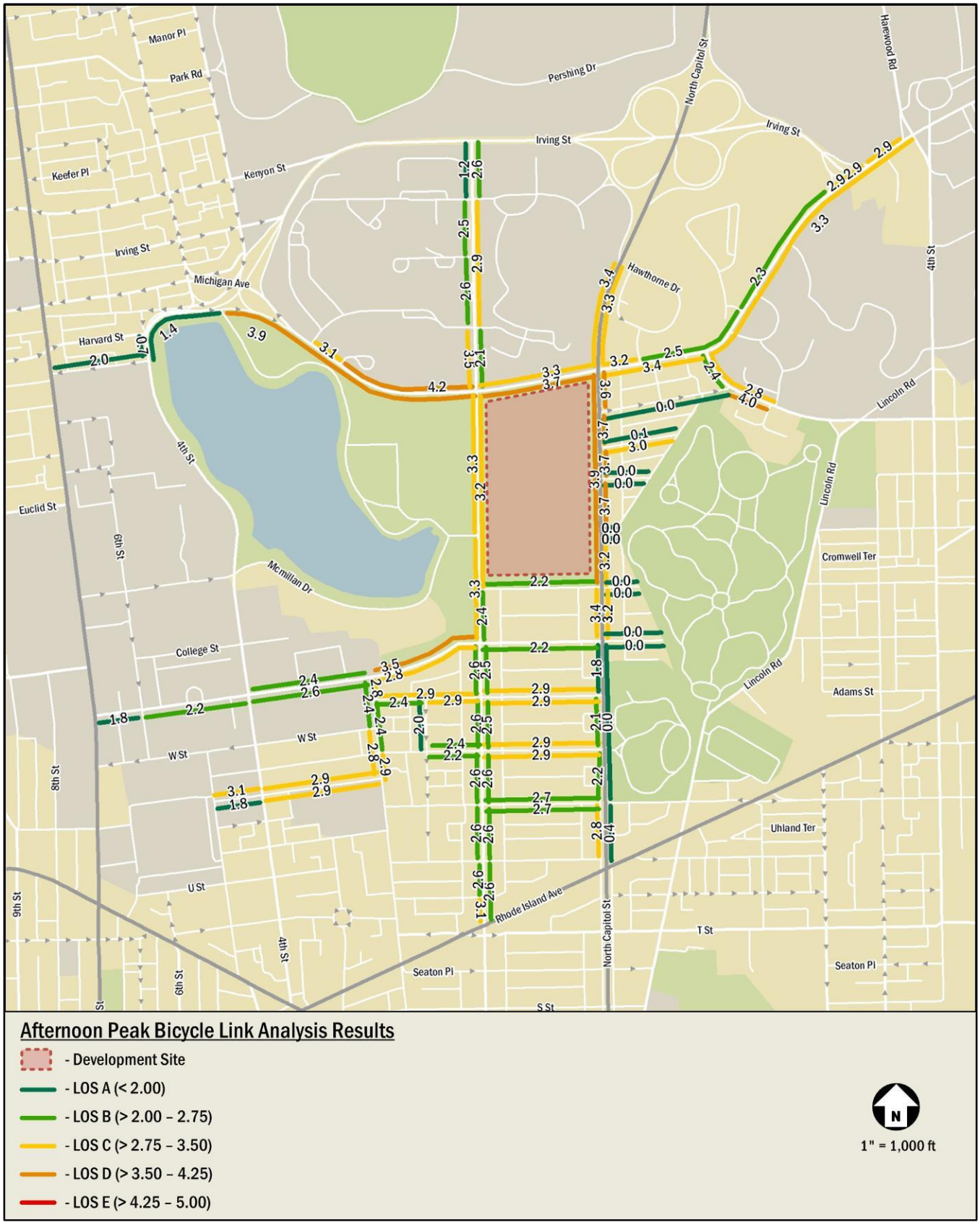

Figure 53: Afternoon Peak Bicycle Link Analysis Results

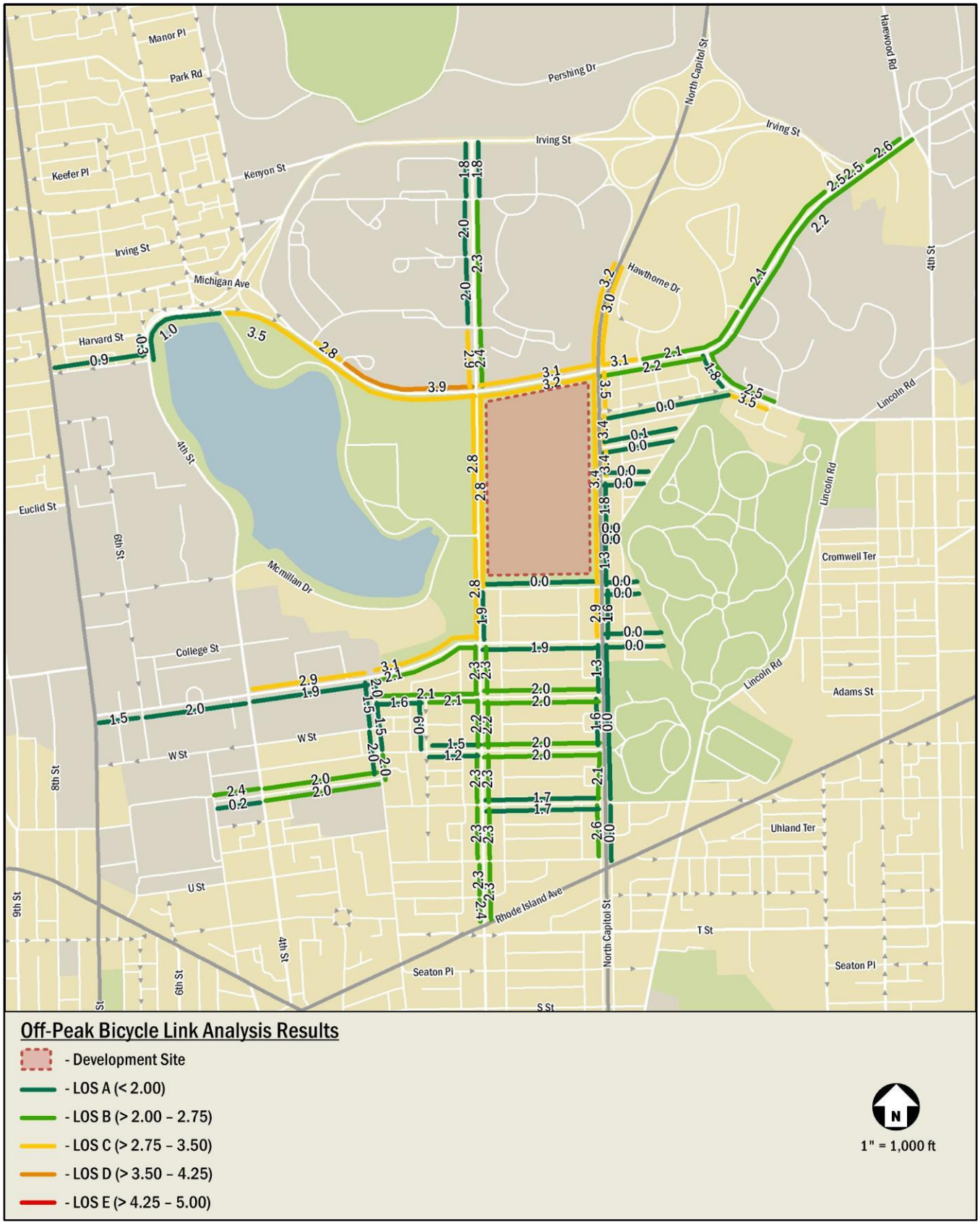

Figure 54: Off-Peak Bicycle Link Analysis Results

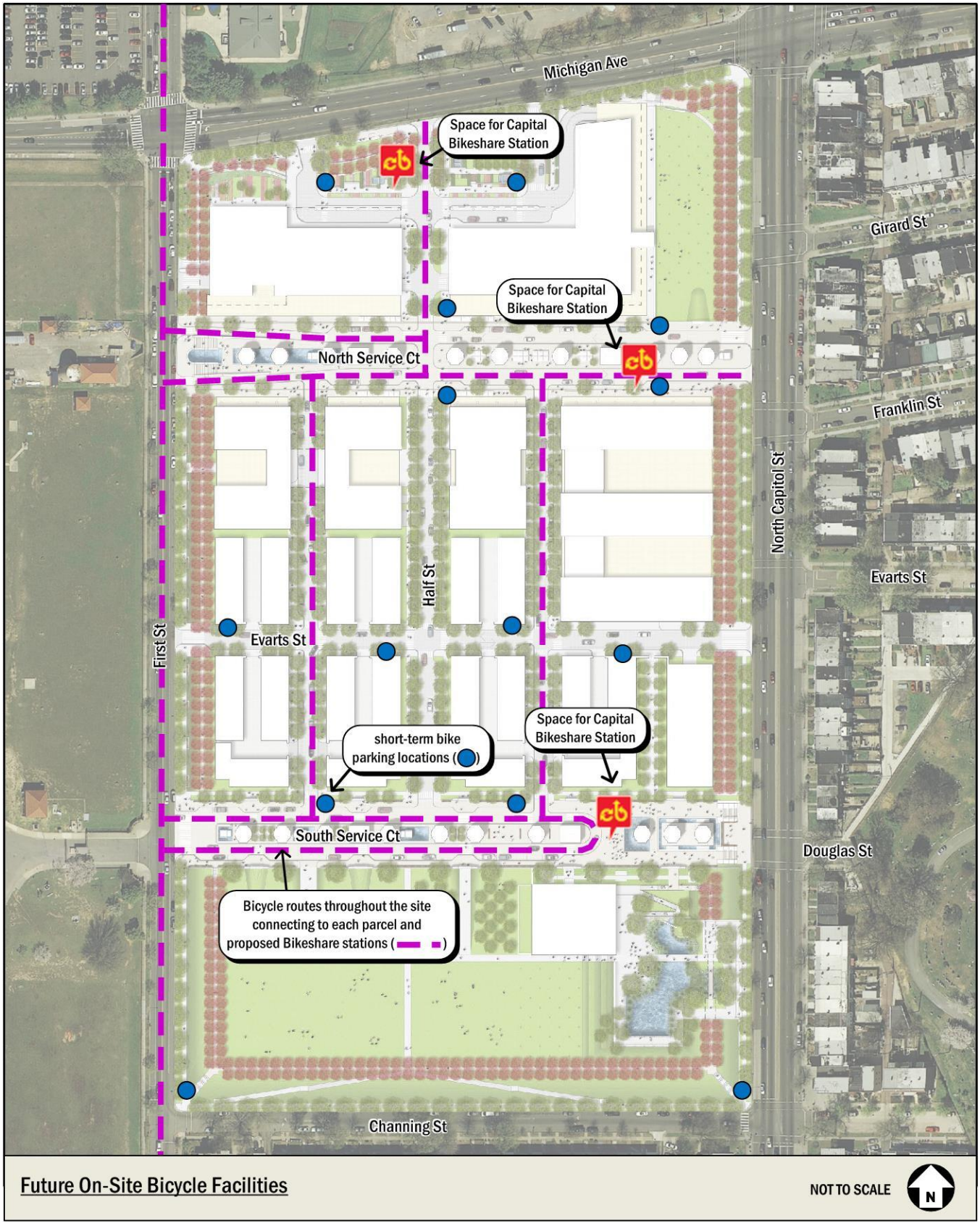

Figure 55: Future On-Site Bicycle Facilities

CRASH DATA ANALYSIS

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

SUMMARY OF AVAILABLE CRASH DATA

A crash analysis was performed to determine if there was an abnormally high crash rate at study area intersections. DDOT provided the last three years of intersection crash data, from 2010 to 2012 for the study area (with the exception of North Capitol Street and First Street as data was not received prior to submitting this report). This data was reviewed and analyzed to determine the crash rate at each location. For intersections, the crash rate is measure in crash per million-entering vehicles (MEV). The crash rates per intersections are shown in Table 55.

According to the Institute of Transportation Engineer's *Transportation Impact Analysis for Site Development*, a crash rate of 1.0 or higher is an indication that further study is required. Seven intersections in this study area meet this criterion (as shown in red in Table 55 and detailed in Table 56). The McMillan PUD should be developed in a manner to help alleviate, or at minimum not add to, the conflicts at these intersections.

The crash summary data in Table 55 shows seven intersections with a crash rate over 1.0 crashes per million entering vehicles – the rate which is considered a threshold for further analysis. A rate over 1.0 does not necessarily mean there is a significant problem at an intersection, but rather it is a threshold used to identify which intersections may have higher crash rates due to operational, geometric, or other issues.

For these seven intersections, the crash type information from the DDOT crash data was reviewed to see if there is a high percentage of certain crash types. Generally, the reasons for why an intersection has a high crash rate cannot be derived from crash data, as the exact details of each crash are not represented. However, some summaries of crash data can be used to develop general trends or eliminate some possible causes. Table 56 contains a breakdown of crash types reported for the seven intersections with a crash rate over 1.0 per MEV.

POTENTIAL IMPACTS

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

- *First Street & Michigan Avenue NW*
  This intersection was found to have a considerably high crash rate, with 2.76 crashes per MEV over the course of the 3-year study period. The majority of the crashes at this intersection were rear end and side swiped vehicles.

- *North Capitol Street & Michigan Avenue NE*
  This intersection was found to have a high crash rate, with

Table 55: Intersection Crash Rates

Intersection	Total Crashes	Ped Crashes	Bike Crashes	Rate per MEV*
First Street & Irving Street NW	20	3	1	0.83
First Street & Michigan Avenue NW	67	1	3	**2.76**
North Capitol Street & Michigan Avenue	65	3	2	**1.44**
Michigan Avenue & Franklin Street NE	42	3	0	**2.17**
North Capitol Street & Girard Street	17	0	0	0.51
North Capitol Street & Franklin Street	14	0	0	0.42
North Capitol Street & Evarts Street	6	0	2	0.18
North Capitol Street & Douglas Street	3	0	0	0.09
First Street & Channing Street NW	10	0	0	**1.08**
North Capitol Street & Channing Street	17	0	1	0.46
First Street & Bryant Street NW	6	0	0	0.65
First Street & Rhode Island Avenue NW	19	2	1	0.56
Georgia Avenue & Columbia Road NW	32	2	0	**1.16**
Georgia Avenue & Harvard Road NW	34	2	2	**1.33**
Georgia Avenue & Bryant Street NW	42	4	1	**2.26**
Georgia Avenue & W Street NW	17	1	1	0.89

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

1.44 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were rear end and side swiped vehicles.

- *Michigan Avenue & Franklin Street NE*
  This intersection was found to have a considerably high crash rate, with 2.17 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were rear end and side swiped vehicles.

- *First Street & Channing Street NW*
  This intersection was found to have a crash rate just over the threshold, with 1.08 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were rear end crashes.

- *Georgia Avenue & Columbia Street NW*
  This intersection was found to have a high crash rate, with 1.16 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were rear end and side swiped vehicles.

- *Georgia Avenue & Harvard Road NW*
  This intersection was found to have a high crash rate, with 1.33 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were right angle, rear end, and side swiped vehicles.

- *Georgia Avenue & Bryant Street NW*
  This intersection was found to have a considerably high crash rate, with 2.26 crashes per MEV over the course of the 3-year study period. The majority of crashes at this intersection were side swiped vehicles.

The PUD and background developments will significantly alter seven intersections, most likely in favor of a safer environment. Between improvements made for background developments, and those recommended within this report for the PUD, six of the seven intersections are expected to change in the future, with the intersection of Michigan Avenue and Franklin Street being the exception. As the improvements at these intersections will likely bring signing and marking enhancement or upgrades, and retimed traffic signals were applicable, it is likely they will experience a reduction in crash rates.

As for the final intersection, Michigan Avenue and Franklin Street has a high amount of observed rear end and side swipe crashes, which could be for a variety of reasons and further study beyond the scope of a TIS would be necessary to properly understand the source of the elevated crash rate. Thus, this TIS recommends that DDOT investigate the source of the elevated crash rate and explore whether enhanced signing and marking, changes to signal timing, and/or improving sight lines would generate an improvement.

Table 56: High Crash Rate Intersections by Crash Type

Intersection	Rate per MEV	Right Angle	Left Turn	Right Turn	Rear End	Side Swiped	Head On	Parked	Fixed Object	Ran Off Road	Ped. Involved	Backing	Non-Collision	Under/Over Ride	Unspecified	Total
First Street & Michigan Avenue NW	2.76	7 *10%*	5 *7%*	1 *1%*	15 *22%*	20 *30%*	1 *1%*	2 *3%*	4 *6%*	3 *4%*	3 *4%*	2 *3%*	0 *0%*	0 *0%*	4 *6%*	**67**
North Capitol Street & Michigan Avenue	1.44	3 *5%*	8 *12%*	2 *3%*	24 *37%*	13 *20%*	4 *6%*	1 *2%*	2 *3%*	1 *2%*	4 *6%*	1 *2%*	1 *2%*	0 *0%*	1 *2%*	**65**
Michigan Avenue & Franklin Street NE	2.17	2 *5%*	2 *5%*	2 *5%*	10 *24%*	10 *24%*	3 *7%*	1 *2%*	2 *5%*	0 *0%*	2 *5%*	5 *12%*	0 *0%*	0 *0%*	3 *7%*	**42**
First Street & Channing Street NW	1.08	1 *10%*	0 *0%*	1 *10%*	4 *40%*	1 *10%*	0 *0%*	1 *10%*	1 *10%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*	1 *10%*	**10**
Georgia Avenue & Columbia Road NW	1.16	4 *13%*	3 *9%*	2 *6%*	5 *16%*	9 *28%*	1 *3%*	1 *3%*	1 *3%*	0 *0%*	2 *6%*	1 *3%*	1 *3%*	0 *0%*	2 *6%*	**32**
Georgia Avenue & Harvard Road NW	1.33	7 *21%*	2 *6%*	0 *0%*	8 *24%*	8 *24%*	0 *0%*	1 *3%*	0 *0%*	0 *0%*	4 *12%*	2 *6%*	0 *0%*	0 *0%*	2 *6%*	**34**
Georgia Avenue & Bryant Street NW	2.26	2 *5%*	4 *10%*	0 *0%*	5 *12%*	20 *48%*	0 *0%*	2 *5%*	1 *2%*	0 *0%*	2 *5%*	2 *5%*	0 *0%*	0 *0%*	4 *10%*	**42**

TRANSPORTATION DEMAND MANAGEMENT

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

TDM's importance within the District is highlighted within section T-3.1 of the DC Comprehensive Plan, where it has its own dedicated section including TDM policies and actions. As stated in the Plan, the Washington DC, metropolitan region is a leader in developing and implementing TDM strategies. Typical TDM programs include:

- Carpooling/vanpooling, employee shuttles, and benefits that encourage bicycling and walking.
- Financial incentives, such as preferential parking for ride-sharers and transit subsidies.
- Congestion avoidance strategies, such as compressed work weeks, flexible work schedules and telecommuting.

The McMillan PUD will include a TDM plan in order to help minimize its potential traffic impacts to the surrounding neighborhood. The following TDM plan is based on the DDOT expectations for TDM programs, modified to fit the specific needs of the PUD and transportation network. The Applicant proposes that upon construction, the project incorporate several TDM measures, including the following:

- The Applicant shall designate a TDM coordinator, who is responsible for organizing and marketing the TDM plan and who will act as a point of contact with DDOT.
- All parking on site will be priced at market rates at minimum, defined as the average cost for parking in a 0.25 mile radius from the site (potential exceptions may be necessary for the Health Care Office building based on employee/tenant agreements, and tenant specific requirements). All residential parking (other than the row houses) will be unbundled from the costs of leasing apartments or purchasing condos.
- All office employers and the grocery store will provide SmartBenefits for their employees.
- Bicycle parking and shower accommodations will be provided meeting per the minimums listed earlier in this report.
- On-street parking spaces will be reserved for car-sharing services, as needed throughout the development.
- Office and residential building lobbies will display transit and other alternate mode information, using electronic messaging boards.
- The Applicant will work with nearby institutions to promote transit improvements in the area and explore the concept of a shared shuttle service.

SUMMARY AND CONCLUSIONS

This TIS for the Redevelopment of the McMillan Sand Filtration Site, Zoning Case 13-14, reviewed the transportation aspects of PUD application. This report concluded that **the PUD will not have a detrimental impact** to the surrounding transportation network as long as the report's recommendations and mitigation measures are incorporated into the PUD application or made a condition of approval.

Following a detailed review of the study area, project design, transportation demand, impacts by mode, crash data, and proposed TDM plan, this TIS developed a set of suggestion and recommendations detailed in the report, and summarized as follows:

- Prior to the hearing, submit additional details on the loading and bicycle parking plans as described in the Project Design chapter of the report
- Construct the following roadway improvements
    - Install new traffic signals at the following locations:
        - Michigan Avenue NW and Half Street NW
        - North Capitol Street and the North Service Court
        - North Capitol Street and Evarts Street NW
        - First Street and the North Service Court
    - Extend peak hour parking restrictions to both sides of North Capitol Street between Michigan Avenue and Bryant Street.
    - Construct an eastbound right turn at the intersection of Michigan Avenue and North Capitol Street.
    - Construct a northbound left turn lane at the intersection of North Capitol Street with the North Service Court.
    - Construct a northbound left turn lane at the intersection of North Capitol Street with Evarts Street NW.
    - Construct a northbound through lane at the intersection of Michigan Avenue NW and First Street NW.
    - Construct a southbound left turn lane at the intersection of First Street NW and the North Service Court.
    - Construct a southbound left turn lane at the intersection of First Street NW and Evarts Street NW.
    - Convert the intersection of Channing Street NW and First Street NW to one-way stop controlled intersection.
- That the Applicant coordinate with DDOT, nearby institutions, and the community to help bring significant increases in transit capacity to the area. Preferably, these are WMATA and DDOT's already planned improvements to the bus and streetcar systems. If these improvements do not come to fruition by full build-out of Phase 1 of the PUD, the Applicant will implement a private shuttle service to serve site generated transit demand in the interim.
- That the Applicant will coordinate with DDOT and the community to review bus stop locations and develop a plan to use the new pedestrian crossings to improve transit accessibility.
- A commitment to a TDM plan per the outline above.
- A commitment to the grocery store having a loading dock manager.