Traffic Impact Study

Randall School Redevelopment

Washington, DC

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EXECUTIVE SUMMARY

The following presents the findings of a Traffic Impact Study (TIS) conducted for the Randall School development located at 65 I Street in the southwest quadrant of Washington, DC in support of its application for a meditation to an approved Planned Unit Development (PUD). The development program includes approximately 544 residential dwelling units, 26,818 SF of retail space, and 45,893 SF of cultural space that will be used as an art museum. Below grade parking will be constructed to provide 370 parking spaces. There will be no new curb cuts in public space; all vehicular and loading access will be located on private property. Significantly, the main loading facilities for the building are located below-grade. The overall density of the project is 4.32 FAR, or approximately 499,843 square feet of gross floor area.

In March of 2008, the Zoning Commission approved a PUD for the site and rezoned the property to the C-3-C District. At that time, the building was expected to consist of approximately 100,000 square feet of space devoted to exhibition, studio, and classroom space for the Corcoran College of Art and Design, with an additional 423,800 square feet of residential space amounting to approximately 440-490 residential units. The project also proposed a below grade parking structure providing a minimum of 393 parking spaces. Both the approved PUD and the current proposal have the same density of 4.32 FAR, or approximately 499, 843 square feet of gross floor area. The modified PUD will provide approximately 10,000 square feet more residential space than the previously approved PUD.

The main purpose of this report is to determine if the proposed PUD modification will generate a detrimental impact to traffic or parking in the surrounding neighborhood. This report concludes that the PUD modification will not generate a detrimental impact for the following reasons:

- *Overall Impacts are Minimized*

  The modified Randall School PUD will impact the surrounding transportation network, as it will generate vehicular, pedestrian and bicycle traffic. Proper transportation planning for new developments in DC works towards minimizing this impact to ensure it's non-detrimental. The District Department of Transportation (DDOT) realizes that many District roadways are at capacity, are not going to get wider, and that only small tweaks to the roadway system are possible. With that in mind, the development team and DDOT worked together to create a plan that minimizes impacts and keeps them non-detrimental. The Randall School PUD accomplishes this through a combination of design elements worked into the site plans and Transportation Demand Management (TDM) strategies. These TDM strategies are based on those required under the previous PUD in Condition No. 10 in Z.C. Order No. 07-13, but adjusted to reflect changes in the revised PUD and the surrounding transportation system

  - **Design Elements**: The following report contains details on the transportation design elements of the Randall School PUD's site plans. In summary, the site plans were developed to take advantage of the PUD's proximity to the District Core and the high quality multi-modal surrounding transportation network. The amount of vehicular parking proposed is much lower than a comparable suburban development, which reflects how residents, employees, and visitors are expected to take advantage of non-vehicular modes to access the site. The amount of parking was designed to accommodate all demand generated by the site without encouraging driving as a mode. The amount of bicycle parking in the parking garage exceeds the amount of vehicular parking, as the Applicant expects the PUD to have a high use of cycling as a transportation mode. The Applicant has also proposed to help fund a Capital Bikeshare station near the site to encourage cycling to and from the PUD.

    The modified PUD has no curb cuts in public space, and the design takes advantage of private street access on its west and north sides. Access to the below-grade parking garage and loading dock will occur from the

private H Street SW, at the north side of the building. Truck maneuvers into and out of the site will be head-in/head-out from H Street SW. The proposed loading facilities on site are adequate to handle expected loading activity.

The modified PUD also proposes an alternative scheme that includes a turnaround feature at I Street SW that is essentially an extension of Half Street SW. This turnaround will service the PUD and adjacent public recreation center, swimming pool, and ball fields. It will act as one of the primary vehicular and taxi pick-up /drop-off areas for residents (in the eastern residential lobby) and patrons of the restaurant and commercial uses. It reduces impacts to the general public by shifting this passenger activity off of I Street SW (which is where it would occur if the turnaround cannot be constructed). The Applicant is also proposing to include pedestrian improvements in combination with the turn-around, including curb extensions on the northern side of I Street SW and pedestrian warning signs. The curb extensions contribute to traffic calming by narrowing the travel way and enhance pedestrian visibility for crossing I Street.

- **TDM**: Beyond a site design that minimizes impacts, the PUD includes management and operational strategies to reduce vehicular traffic and impacts. These are detailed in the report and include reserving parking spaces for car-sharing services, providing electronic message boards with transportation information in building lobbies, unbundling the price of parking from leases or purchase prices, and charging market-rate prices for vehicular parking.

- *Traffic Impacts will not be Detrimental*

  The following report includes a detailed analysis of vehicular congestion at surrounding intersections, to ensure that the impacts that are generated do not reach detrimental levels. The scope and methodologies employed in the analysis were vetted and agreed to with DDOT. The analysis concluded that the modified PUD itself will not generate a detrimental impact to surrounding intersection vehicular capacity. One intersection within the study area operates at unacceptable levels of congestion, but that condition exists today and is not the result of future PUD traffic added to the network.

- *Parking Impacts will not be Detrimental*

  The modified PUD parking supply matches a projected parking demand analysis for the PUD's development program. The report contains details on the supply and demand analysis, including a breakdown by land use. The report also contains a summary of on-street parking available in a short walking distance from the PUD. Most parking spaces surrounding the PUD are restricted to Residential Parking Permits (RPP). Residents of the PUD will not be eligible to obtain RPP permits, so impact to the RPP on-street parking zones should be minimal. In addition, a significant amount of metered parking exists near the site. The meters allow two to three hour parking, which could be utilized by museum and restaurant patrons, as it may be more convenient than using the parking garage. This supply of parking should also help ensure that these patrons avoid the RPP zoned areas.

1: INTRODUCTION & SITE REVIEW

This report presents the findings of a Traffic Impact Study (TIS) conducted for the Randall School development located at 65 I Street in the southwest quadrant of Washington, DC in support of its application for a meditation to an approved Planned Unit Development (PUD). Figure 1 identifies the site location within the District.

The development program includes approximately 544 residential dwelling units, 26,818 SF of retail space, and 45,893 SF of cultural space that will be used as an art museum. Below grade parking will be constructed to provide 370 parking spaces. There will be no new curb cuts in public space; all vehicular and loading access will be located on private property. Significantly, the main loading facilities for the building are located below-grade. The overall density of the project is 4.32 FAR, or approximately 499,843 square feet of gross floor area.

In March of 2008, the Zoning Commission approved a PUD for the site and rezoned the property to the C-3-C District. At that time, the building was expected to consist of approximately 100,000 square feet of space devoted to exhibition, studio, and classroom space for the Corcoran College of Art and Design, with an additional 423,800 square feet of residential space amounting to approximately 440-490 residential units. The project also proposed a below grade parking structure providing a minimum of 393 parking spaces. Both the approved PUD and the current proposal have the same density of 4.32 FAR, or approximately 499,843 square feet of gross floor area. The modified PUD will provide approximately 10,000 square feet more residential space than the previously approved PUD.

The purpose of this report is to:

1. Review the transportation elements of the development site plan, supplementing the material provided in the site plans that accompany the development application, and demonstrate that the site promotes non-automobile modes of travel and sustainability. The Design Review section (Chapter 2) of the report covers this topic.
2. Provide information to the District Department of Transportation (DDOT) and other agencies on how the development of the site will influence the local transportation network. This report accomplishes this by identifying the potential trips generated by the site and where these trips will be distributed on the network. The Impacts Review section (Chapter 3) of the report contains this analysis.
3. Determine if development of the site will lead to adverse impacts on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analyses of vehicular delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. The Impacts Review section (Chapter 3) of the report contains this analysis.

This report contains the following three sections as follows:

- *Introduction & Site Review (Chapter 1)*
  This section provides a summary of major transportation features near and adjacent to the site, to help establish a reference for the following sections. This includes reviewing roadways, transit facilities, bicycle facilities, pedestrian facilities, and future development and District initiatives.

- *Design Review (Chapter 2)*
  This section provides a summary of the internal transportation features of the proposed development. This section is meant to supplement the details provided in the site plan package contained in the development application and

reviews such items as the general parking strategy of the site, bicycle accommodations, and transportation demand management (TDM).

- *Impacts Review (Chapter 3)*
  This section provides a review of the impacts the proposed development could have to each mode within the transportation network. For each mode, and where necessary, a list of recommendations and mitigation measures are compiled.

1.1 Site Location & Major Transportation Features

The Randall School development is located in Southwest Washington, DC, in Ward 6. The project site is bounded by 1st Street SW to the west, H Street SW to the north, and I Street SW to the south, with existing buildings on the east.

The site is served by many regional and arterial roadways including I-395, I-695, South Capitol Street, M Street SW/SE, Maine Avenue SW, and 7th Street SW. The site is accessible via these roadways along with a network of collector and local streets. Figure 2 shows the roadway network hierarchy and the average daily traffic volumes for the roadways in the vicinity of the proposed development.

The site is served by several public transportation services, including Metrorail and Metrobus. The site is also served by a pedestrian network consisting of sidewalks and crosswalks around local streets surrounding the project site. In addition to pedestrian accommodations, the site has access to many on- and off-street bike facilities.

1.2 Car-Sharing

Three car-sharing companies serve the District: Zipcar, Hertz 24/7, and Daimler's Car2Go. All three services are private companies that provide registered users access to a variety of automobiles. Both Zipcar and Hertz 24/7 have a few locations adjacent to the project site. Table 1 lists the car-sharing locations in the study area and the number of vehicles available with stations closest to the site listed first.

Table 1: Carshare Location and Vehicles

Carshare Location	Number of Vehicles
Zipcar	
1101 S Capitol Street SW	2 vehicles
1100 S Capitol Street SE	3 vehicles
Greenleaf Senior Center	1 vehicle
Hertz on Demand	
4th Street SW/E St SW Lot	1 vehicle
Total Number of Carshare Vehicles in Study Area	**7 vehicles**

Car-sharing is also provided by Car2Go, which is relatively new to the District and provides point-to-point car sharing. Unlike Zipcar, which requires two-way trips, Car2Go can be used for one-way rentals. Car2Go currently has a small fleet of vehicles located throughout the District. Car2Go vehicles may park in any non-restricted Metered curbside parking space or Residential Parking Permit location in any zone throughout the defined "Home Area". Members do not have to pay the meters or pay stations. Car2Go does not have permanent designated spaces for their vehicles; however availability is tracked through their website, which provides an additional option for car-sharing patrons.

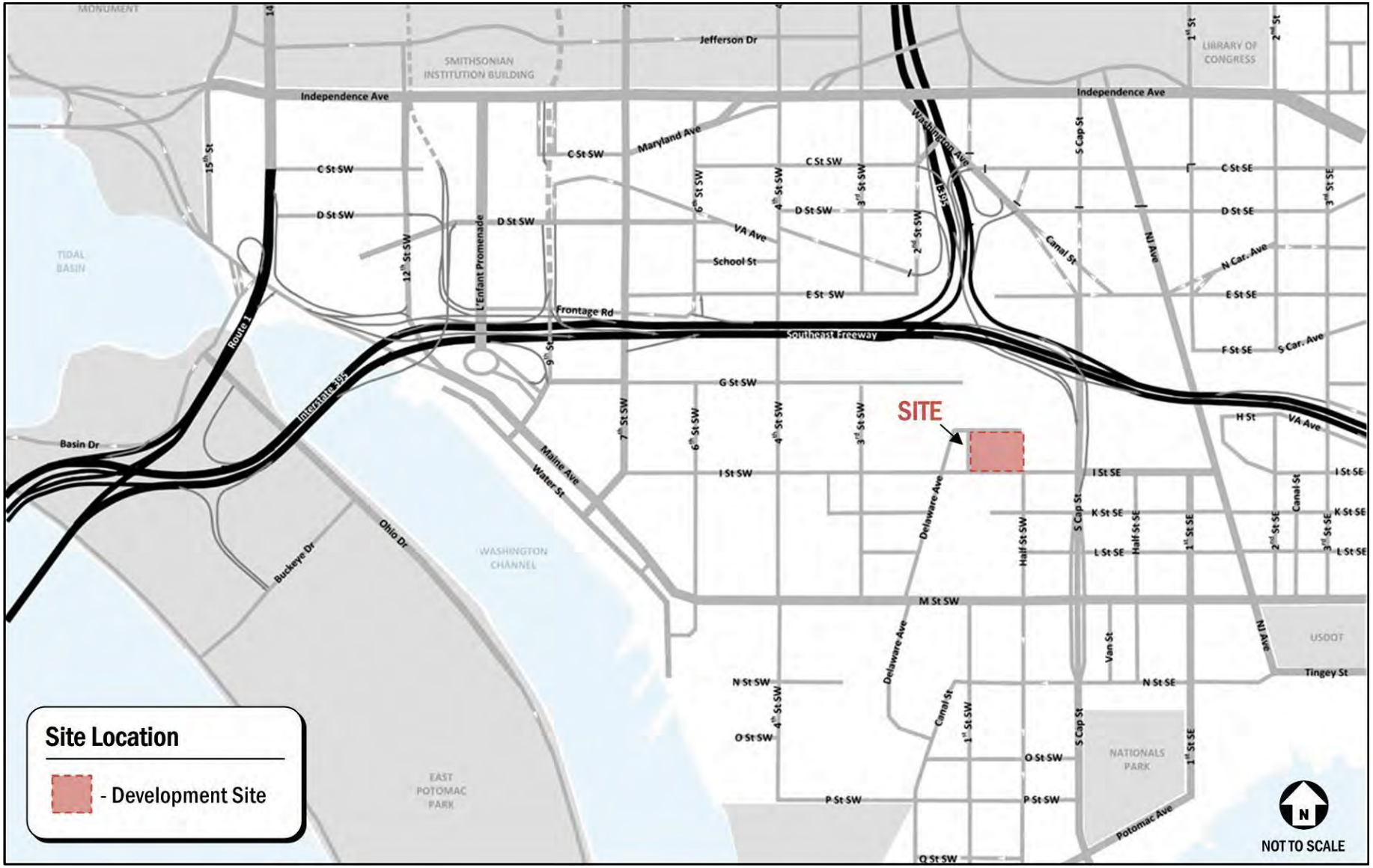

Figure 1: Site Location

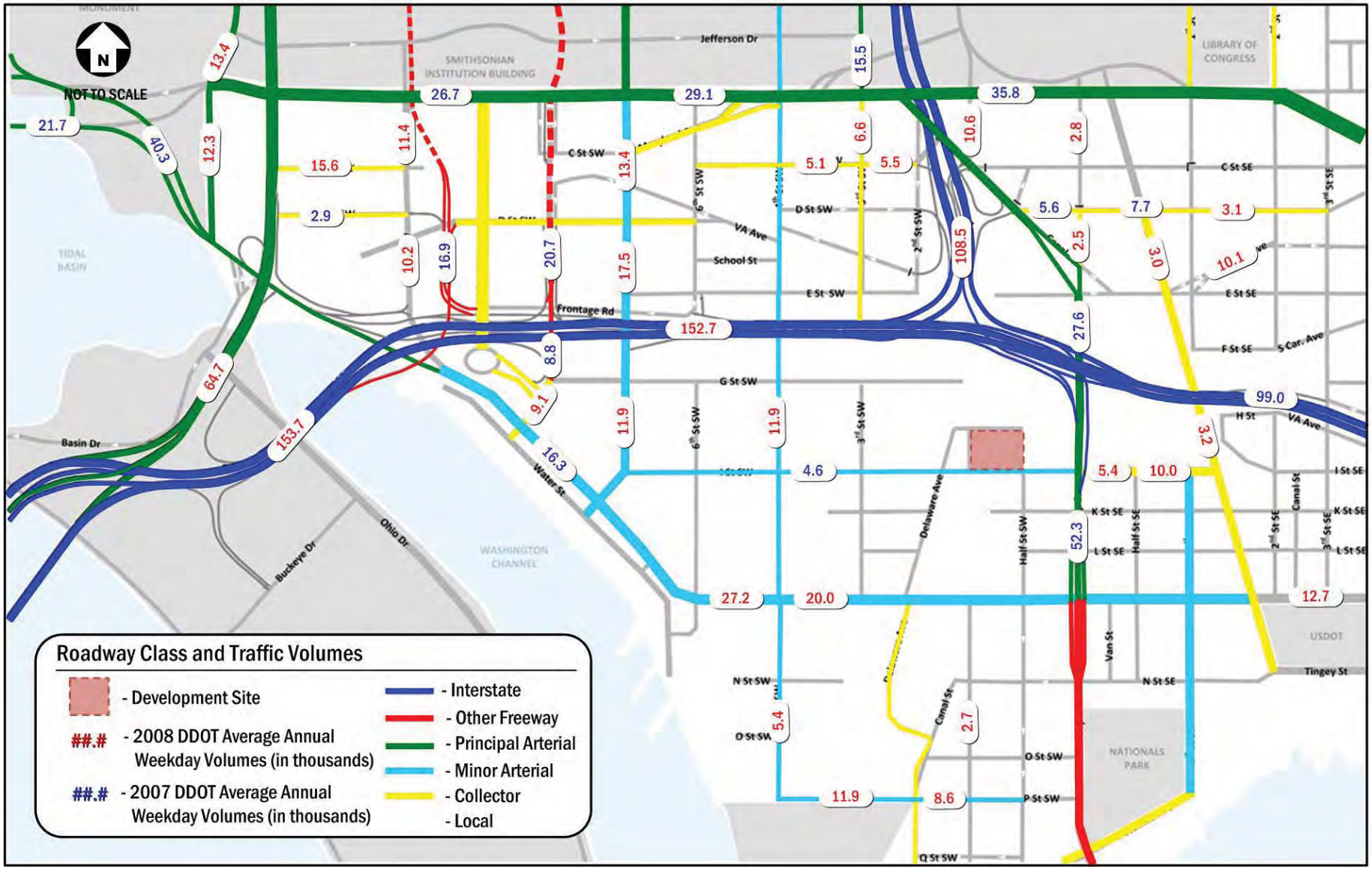

Figure 2: Roadway Classification and Average Daily Traffic Volumes

1.3 Transit

The study area is well served by Metrorail and Metrobus. Combined, these transit services provide local, city wide, and regional transit connections and link the site with major cultural, residential, employment, and commercial destinations throughout the region. Figure 3 identifies the major transit routes, stations, and stops in the study area.

The Southwest Waterfront – SEU and Navy Yard Metrorail stations are located within a half mile of the development site and serve the Green Line. Additionally the L'Enfant Plaza, Federal Center, and Capitol South Metrorail stations are all located within a mile of the site and serve the Orange, Blue, Yellow, and Green Lines. The Green Line connects the study area with Fort Totten and Greenbelt, Maryland to the north, major downtown connections such as Chinatown/Gallery Place, and Branch Avenue Station in Maryland to the south. The Blue and Orange Lines travel through downtown DC linking Virginia with Maryland. The Blue Line connecting Largo Town Center with Franconia-Springfield and the Orange Line connecting New Carrolton with Vienna. The Yellow Line connects the study area with Fort Totten and Huntington with additional service to Greenbelt and Franconia-Springfield during rush hour. Trains run frequently during the morning and afternoon peak hours. Trains run approximately every 5-6 minutes during weekday non-peak hours, every 10-15 minutes on weekday evenings after 7:00 pm, and 6-15 minutes on the weekends.

The site is primarily serviced by the Metrobus service along M Street, I Street, and South Capitol Street, which are all within walking distance of the site. Metrobus service is equally as accessible as there are several routes located around the perimeter of the development site. The routes serving this area connect the site to the Metrorail system and with various locations throughout the downtown business core. Table 2 shows a summary of the bus route information for the Lines that serve the site vicinity, including service hours and headway.

Table 2: Bus Route Information

Route Number	Route Name	Service Hours[1]	Headway[1]
74	Convention Center-Southwest Waterfront Line	5:00 am – 1:00 am	15-25 min
A9	South Capitol Street Line	Weekdays NB: 6:00 – 9:30 am Weekdays SB: 3:00 – 7:00 pm	15-20 min
A42, 46, 48	Anacostia-Congress Heights Line	Late night extension of A2, 6, 8 line Weekdays: 12:00 am – 6:00 am Weekends: 12:00 am – 8:00 am	30 min
P6	Anacostia-Eckington Line	Weekdays: 5:00 am – 2:00 am Saturdays: 5:30 am – 2:00 am Sundays: 6:30 am – 12:30 am	15-30 min
P17, 19	Oxon Hill-Fort Washington Line	Weekdays NB: 5:00 am – 10:00 am Weekdays SB: 3:00 pm – 8:00 pm	10 – 30 min
V7, 8, 9	Minnesota Ave-M Street Line	4:30 am – 1:30 am	30 min
W13	Bock Road Line	Monday – Saturday NB: 5:00 am – 9:00 am Monday – Saturday SB: 3:30 pm – 8:00 pm	20 – 30 min

There are several methodologies for calculating bus Level of Service (LOS). One such method is based on peak period service frequencies, or how many times per hour a user can catch a bus. Higher frequencies contribute to more convenient

[1] WMATA route schedules, http://wmata.com/bus/timetables/

service and lower overall travel time for riders because wait time is reduced. This method is described in the Transit Cooperative Research Program (TCRP) Transit Capacity and Quality of Service Manual, 2nd Edition, 200. LOS A is defined by an average headway of less than 10 minutes (more than 6 buses per hour), which is a service level that is frequent enough that passengers generally do not need to consult route schedules. LOS F is defined by an average headway of more than 60 minutes (less than one bus per hour). Peak hour LOS for each route within the study area is presented in Table 3. As shown, all routes operate at an LOS of C or better. Therefore, improvements based on service frequencies are unnecessary.

Table 3: Transit Level of Service

Route Number	Route Name	Peak Hour Headway[2]	Transit LOS[3]
74	Convention Center-Southwest Waterfront Line	15-20 min	C
A9	South Capitol Street Line	15-20 min	C
A42, 46, 48	Anacostia-Congress Heights Line	n/a (late-night service only)	n/a
P6	Anacostia-Eckington Line	15-20 min	C
P17, 19	Oxon Hill-Fort Washington Line	5-20 min	B
V7, 8, 9	Minnesota Ave-M Street Line	10-15 min	B
W13	Bock Road Line	20 min	C

A major initiative for the District of Columbia is the addition of the DC Streetcar. The streetcar will make traveling through the District of Columbia significantly easier for all persons, including those residing within the residential component of the site and those visiting the retail and cultural areas. Two routes are projected to travel within the vicinity of the site. These include the Takoma Metrorail Station to Buzzard Point Line as well as the Congress Heights to Buzzard Point Line. Both Lines include proposed stops within walking distance of the development site, as depicted in Figure 4.

[2] WMATA route schedules, http://wmata.com/bus/timetables/
[3] Transit Cooperative Research Program (TCRP) Transit Capacity and Quality of Service Manual, 2nd Edition, 2003. Exhibit 3-12.

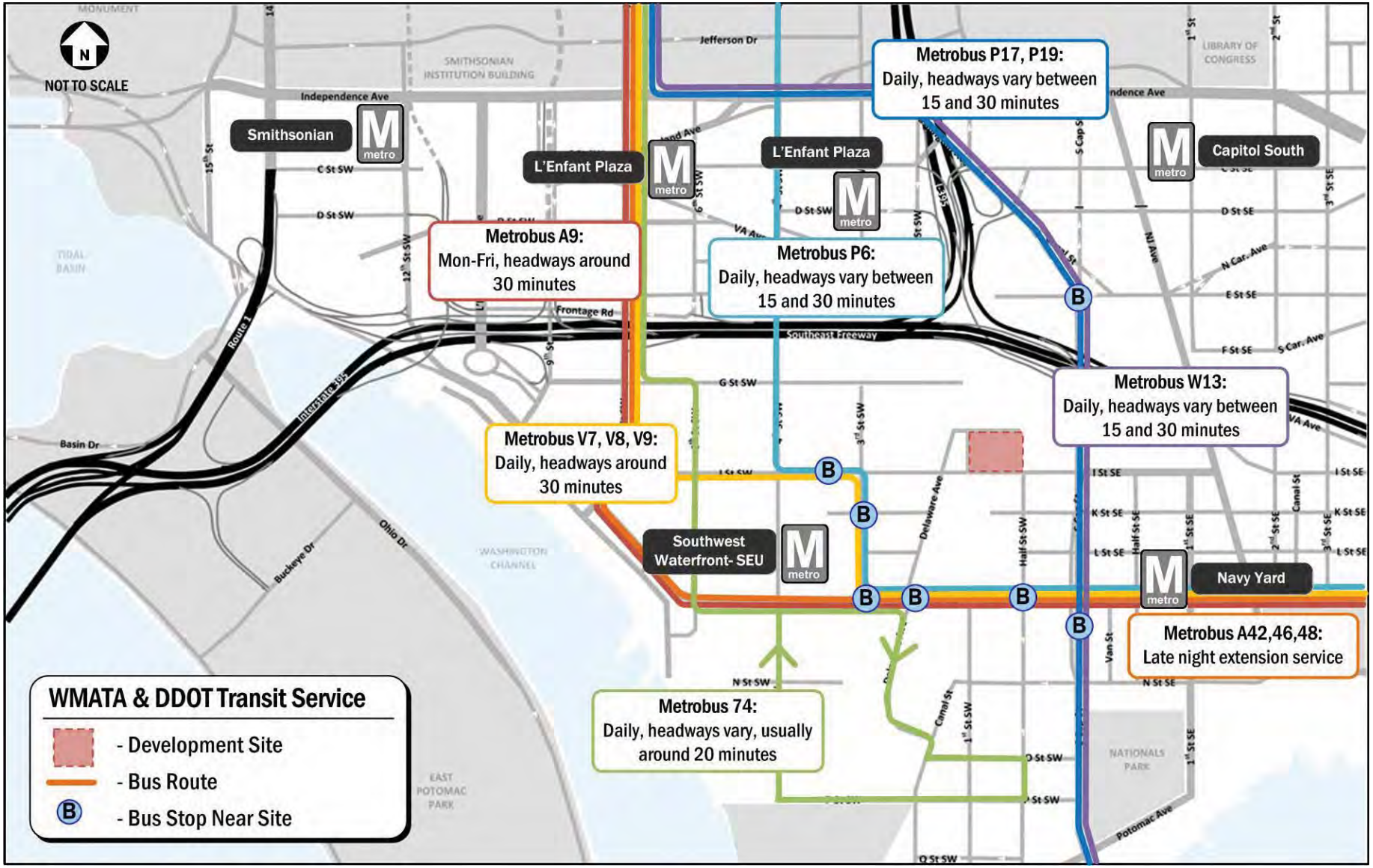

Figure 3: Existing Transit Service

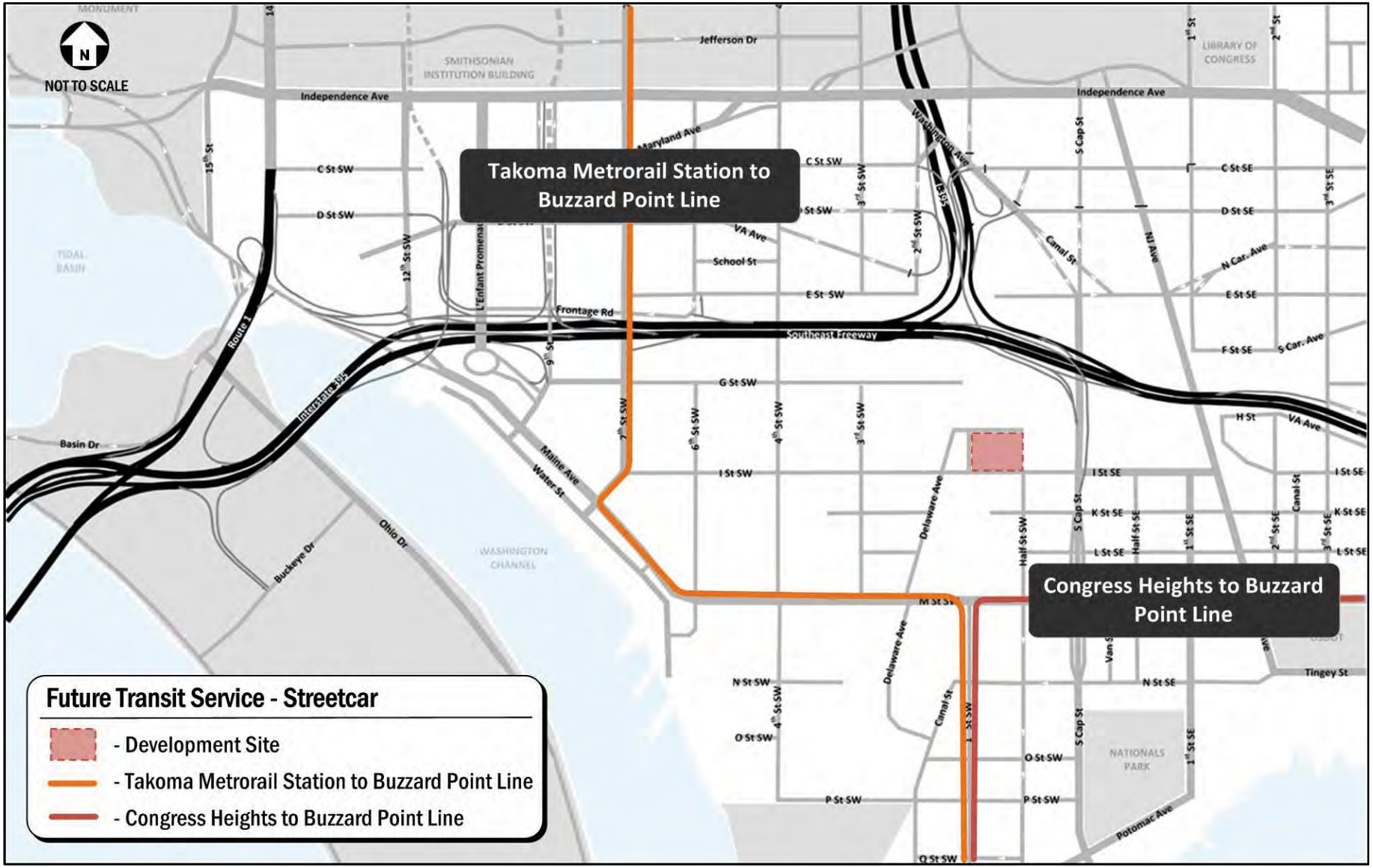

Figure 4: Future Streetcar Service

1.4 Bicycle Facilities

Within the study area, bicyclists have access to multi-use trails, on-street bike lanes, signed bike routes, and local and residential streets that facilitate cycling. The bicycle network provides good conditions for local trips, and there are several routes for trips between the study area and Northern Virginia, Northwest Washington, DC, and destinations south of the Anacostia River.

Near the site, 4th Street provides the safest north-south connectivity. 4th Street is a signed bike route with portions of the roadway containing on-street bike lanes. It also leads to bike trails and additional bike lanes to continue safe travel conditions. I (Eye) Street and M Street/Water Street provide east-west connectivity near the site. I (Eye) Street contains an on-street bike lane from 7th Street SW to New Jersey Avenue NE. I (Eye) Street generally provides good conditions for cycling, but there are some locations along the route that may prove challenging for novice cyclists, including the intersection of I (Eye) Street and South Capitol Street. M Street is a signed bicycle route and cycling conditions along it are fair according to DDOT. However, traffic volumes and speeds along M Street may discourage novice cyclists from using this route for east-west trips.

There are some routes with barriers to cycling and entire roadway corridors that have poor cycling conditions. These barriers reduce the overall quality of cycling conditions and limit the number of routes that directly link the site with destinations throughout the District and region. Figure 5 illustrates bicycle facilities in the study area and identifies street corridors with poor cycling conditions and the specific locations where there are barriers to cycling.

Some bicycle parking was observed in the study area though most cyclists typically use street signs, parking meters, or similar objects to secure their bicycles. This indicates that there is demand for additional bicycle parking facilities in the study area.

In addition, the Capital Bikeshare program has placed over 200 bicycle-share stations across Washington, DC, Arlington and Alexandria, VA, and most recently Montgomery County, MD with over 1,800 bicycles provided. Capitol Bikeshare has plans to expand the system and potential new station locations have been identified throughout the study area. Figure 5 identifies existing and potential station locations in the study area.

1.5 Pedestrian Facilities

Overall, the pedestrian facilities within the study area provide a good walking environment. This section provides an inventory of the existing site access facilities and deficiencies. Pedestrian access to the site is provided along all adjacent streets, including I (Eye) Street, 1st Street, Delaware Avenue, and H Street.

The site has good pedestrian access to nearby transit service. The bus stops located along M Street, I (Eye) Street, and South Capitol Street serve routes that provide local and commuter service between the study area and destinations to the north, east, and south. In addition, pedestrians can safely and conveniently access the Southwest Waterfront Metro Station, which is located less than a half mile from the site. Additional Metrorail stations are also accessible from the site; however the routes are generally not as pedestrian friendly.

There are some barriers and areas of concern within the study area that negatively impact the quality and attractiveness of walking, including 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 routes. This includes narrow sidewalks along several streets, lengthy freeway underpasses, and lengthy crossings at some intersections. Walking distances between the site and major transit and commercial destinations in the area will not have significant impact on the

pedestrian activity. Access routes generally provide good walking conditions, and walking is a convenient and quick option as compared to other modes. Figure 6 shows suggested pedestrian pathways, walking time and distances, and barriers and areas of concern.

A detailed review of pedestrian facilities near the site shows that most facilities meet DDOT standards and provide a quality walking environment. Figure 7 shows a detailed illustration of the existing pedestrian infrastructure within a quarter-mile walkshed of the development site. Sidewalks, crosswalks, and curb ramps are evaluated based on the guidelines set forth by DDOT's *Public Realm Design Manual,* in addition to ADA standards. Sidewalk width and buffer requirements for the District are shown below in Table 4. Within the quarter-mile walkshed, most roads are considered residential with a low to moderate density. Exceptions include M Street and South Capitol Street, which require a greater minimum sidewalk width. As can be seen in the figure, some of the higher density roadways do not comply with the greater minimum. ADA standards require that all curb ramps be provided wherever an accessible route crosses a curb and must have a detectable warning. Additionally, curb ramps shared between two crosswalks are not desired. As shown in the figure, there are some existing issues with crosswalks and curb ramps near the site.

Table 4: Sidewalk Requirements

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

1.6 Future Developments

There are several other projects approved or under construction located in the vicinity of the proposed development. The majority of these projects are mixed-use, consisting of office, residential, and retail development, as outlined below. Of the developments in the area, the following meet the criteria of having an origin/destination within the study area and being completed prior to 2016, the anticipated completion year for the Randall School. A map of the locations of the background developments is included as Figure 8.

- *The Plaza on K*
  The Place on K development consists of a mix of office and retail uses located north of K Street SE between Half Street SE and 1st Street SE. The first phase of the development is expected to be completed by 2015, with a second phase to be completed in 2018.

- *Square 699/Velocity*
  The Square 699N/Velocity development is a hotel building located north of L Street SE between Half Street SE and 1st Street SE. The development is anticipated to be completed by 2014. A second phase of development, which consists of office and retail uses, is expected to be completed by 2019.

- *Southwest Waterfront PUD*
  The Southwest Waterfront Development is located southwest of Maine Avenue SW between the I-395 Freeway and 6th Street SW. The proposed development contains a mix of retail, residential, office, hotel, church, cultural,

and marina uses. The first phase of the development is anticipated to be completed in 2015/2016. The full development is projected to be completed by 2018 at the earliest.

- *Waterfront Station*
  The Waterfront Station development is currently under construction and partially completed, located north of M Street SW between 3rd Street SW and 5th Street SW. The remaining development consists of a residential building from Phase I, which is projected to be completed in 2013. The future phases of Waterfront Station, consisting of office and residential uses, are projected to be completed in 2020.

- *The View at Waterfront*
  The View at Waterfront (Fairfield at Marina View) development is located on the northeast corner of 6th and M Streets SW. The development, which consists of residential and retail uses, is projected to be completed in 2014.

- *Parcel 69*
  The Parcel 69 development is an office building located at the southwest intersection of 4th and E Streets, SW. The development is anticipated to be completed by 2013.

- *20 K Street*
  The 20 K Street SE development consists of residential uses and is located north of K Street, between South Capitol Street and Half Street SE. The development is anticipated to be completed by 2016.

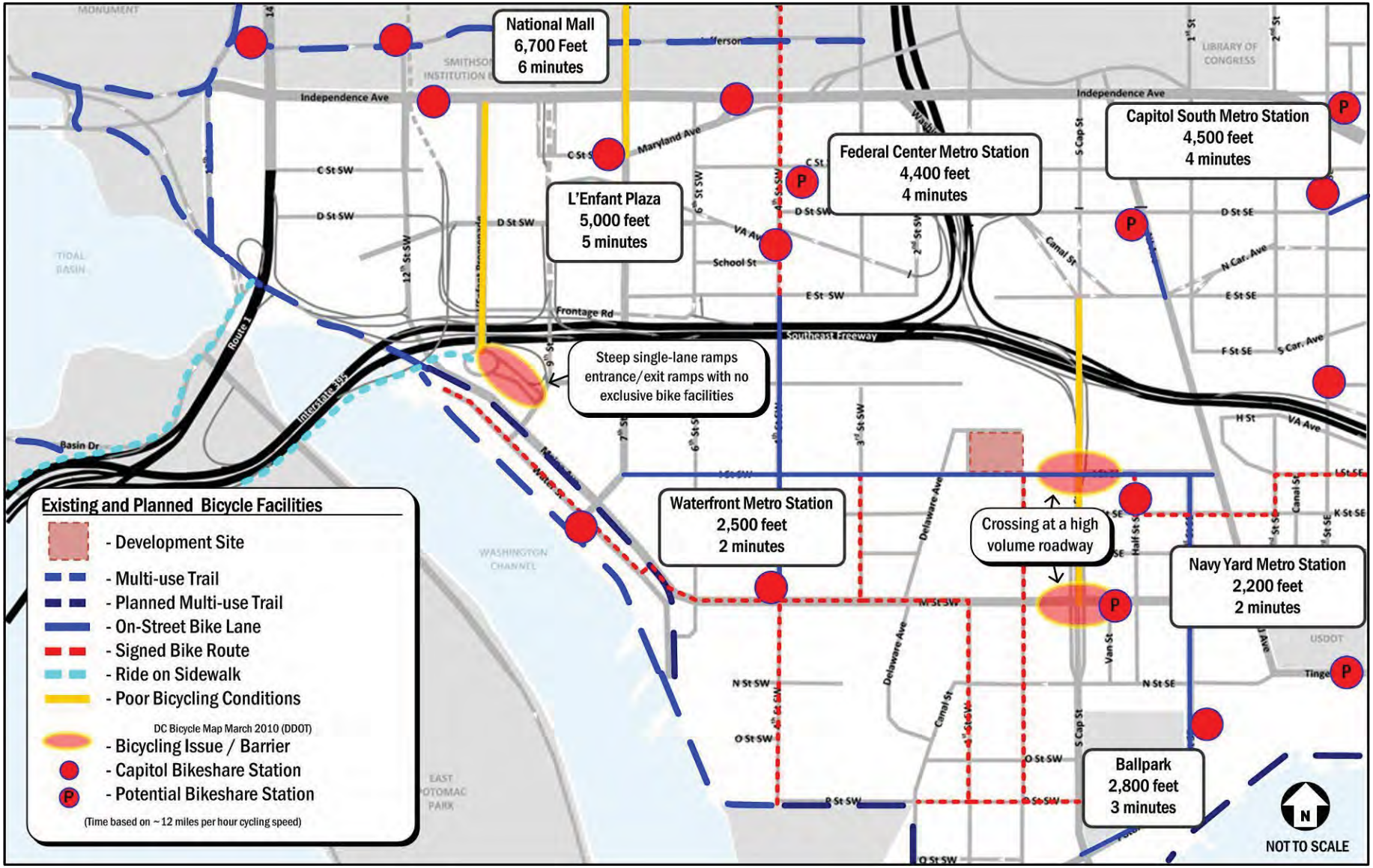

Figure 5: Existing and Proposed Bicycle Facilities

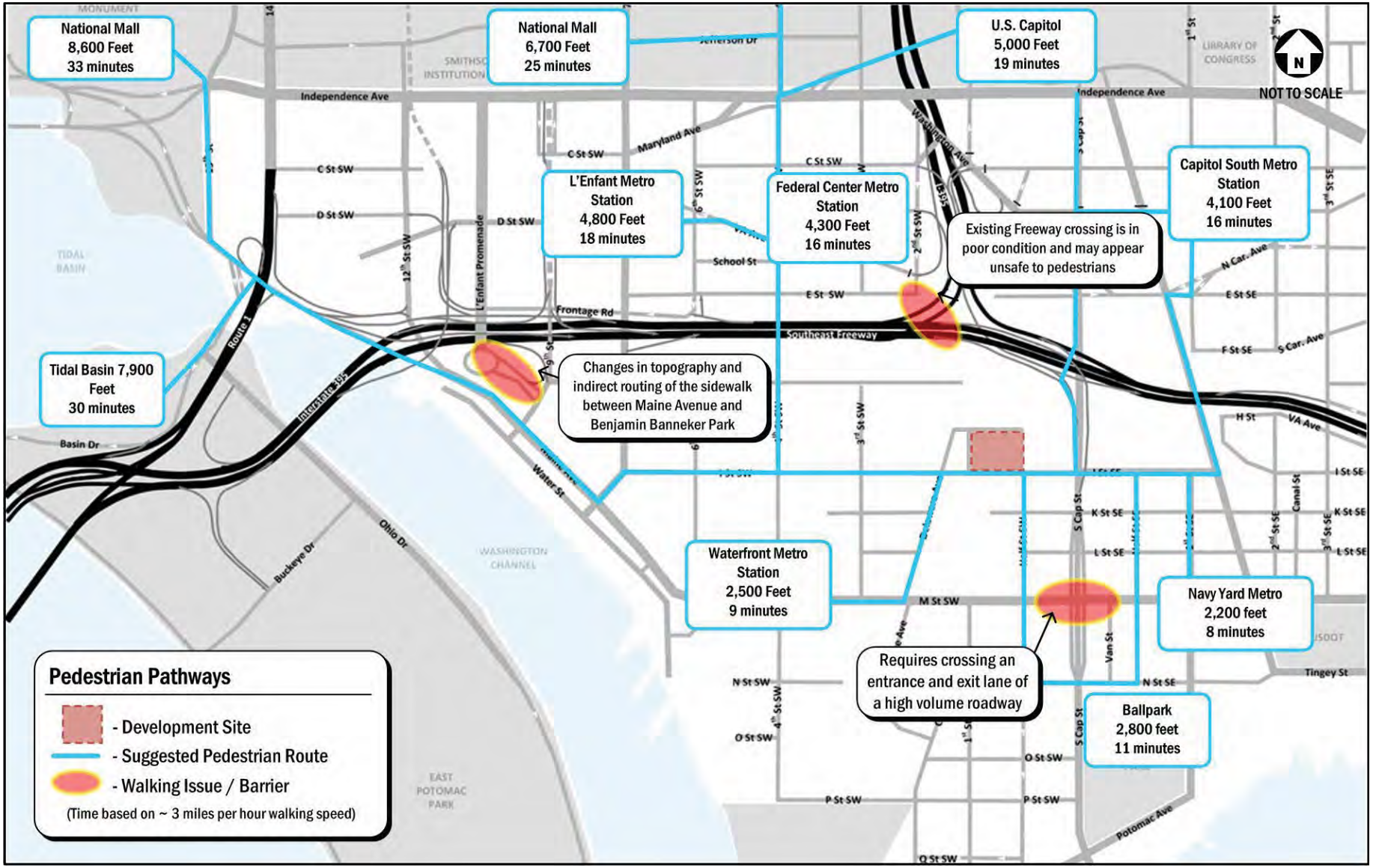

Figure 6: Existing Pedestrian Network

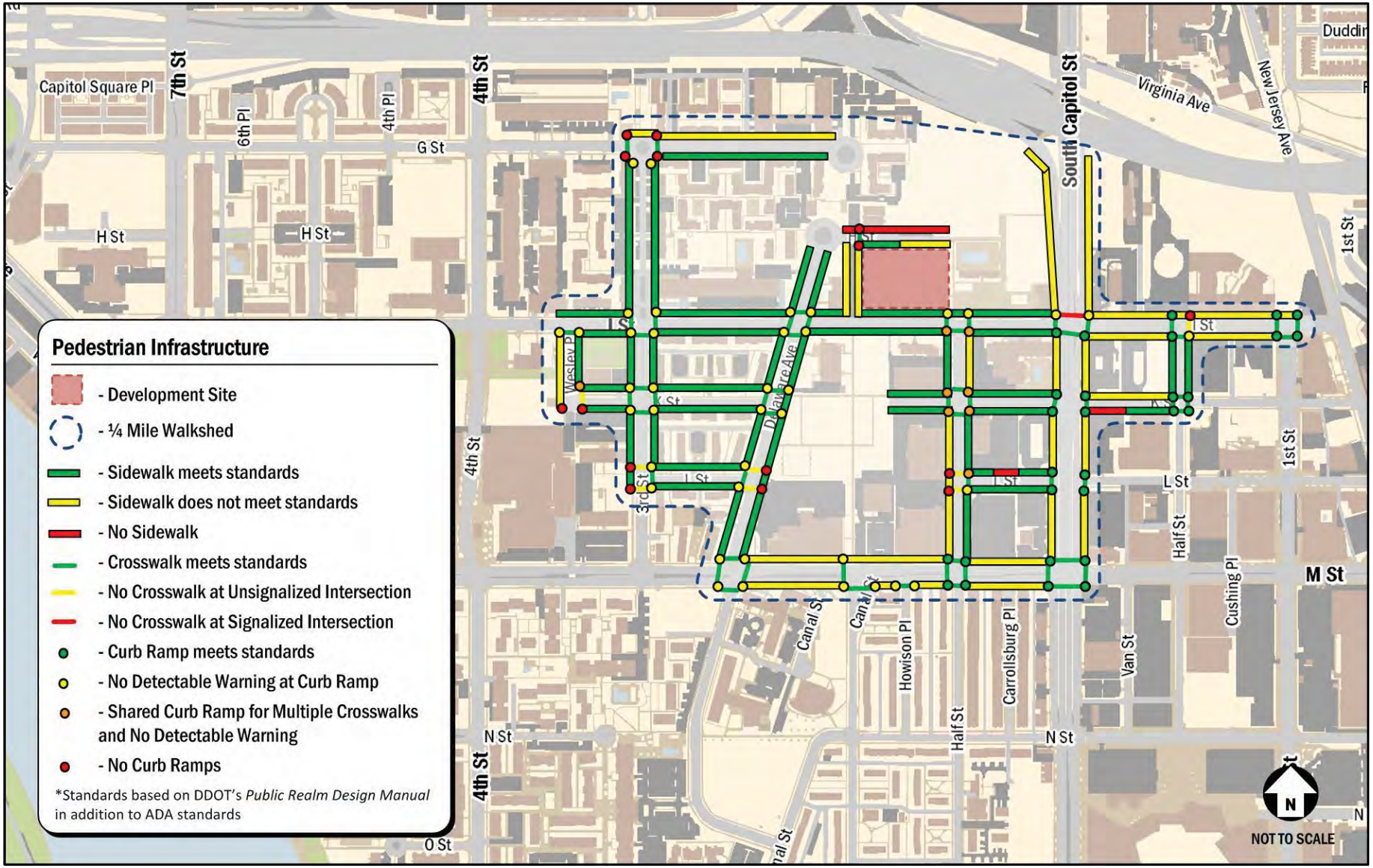

Figure 7: Existing Pedestrian Infrastructure

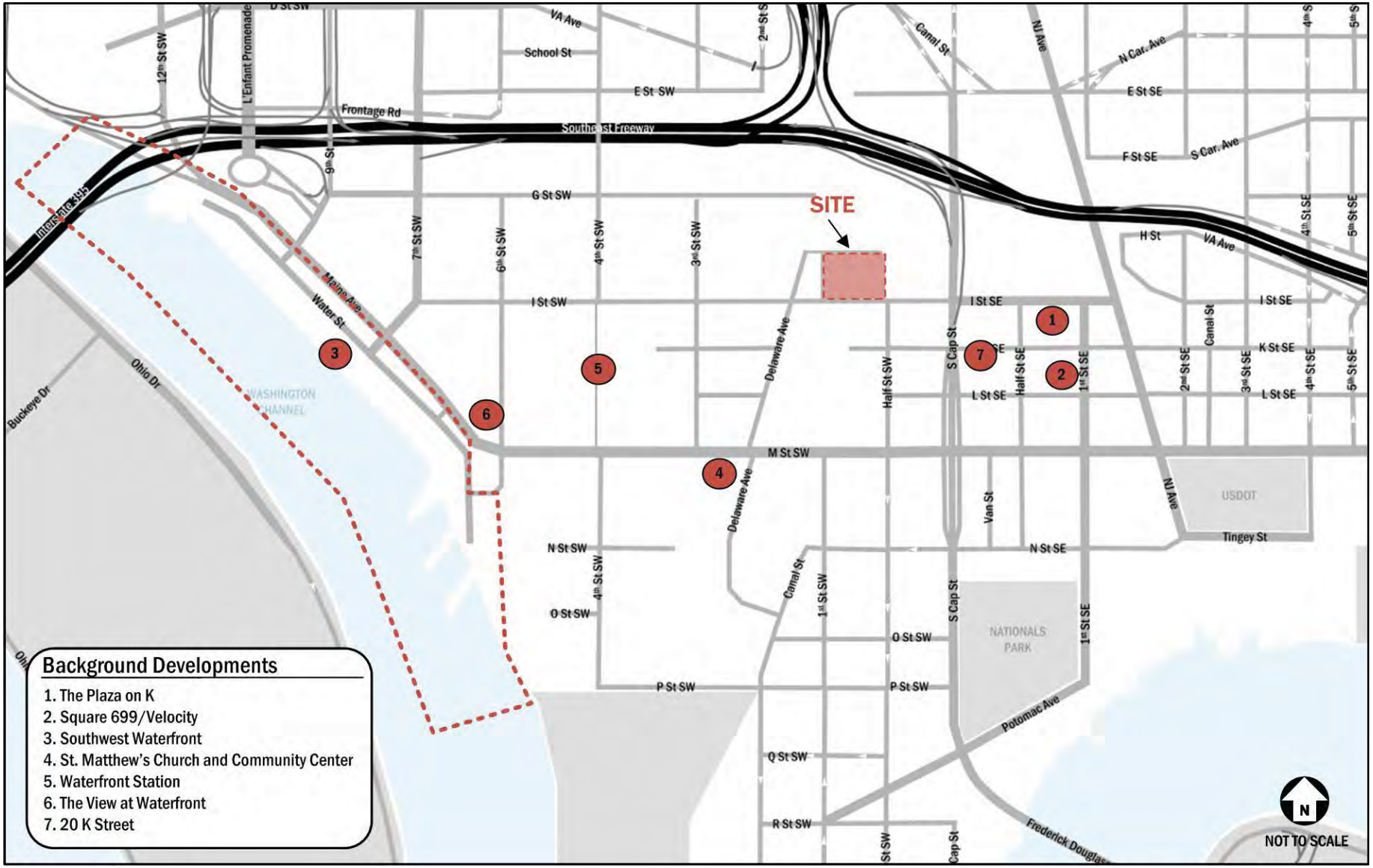

Figure 8: Background Development Map

2: DESIGN REVIEW

This section provides an overview of how each land use within the Randall School modified PUD will access the site in addition to providing an overview of the transportation features associated with the development. The site is currently vacant and will be developed as a mixed-use development containing cultural, commercial, and residential uses. The overall development program includes approximately 544 residential dwelling units, 26,818 square feet of retail space, and 45,893 square feet of cultural space to be used as an art museum. The development is proposed to provide 370 parking spaces to serve all land uses. A site plan showing all site access and circulation for the proposed development is shown in Figure 9.

For comparison purposes, the following is a breakdown of the development program of the proposed Randall PUD and the existing approved PUD:

- Proposed PUD:
  - Residential: 544 dwelling units
  - Retail: 26,818 square feet
  - Cultural:45,893 square feet
  - Vehicular Parking: 370 spaces
- Approved PUD:
  - Residential: 440-490 Condominiums
  - Cultural: Approximately 100,000 square feet of exhibition, studio, and classroom space for the Corcoran College of Art and Design
  - Vehicular Parking: Minimum of 393 spaces

2.1 Site Access

The section provides an overview of how each land use within the modified PUD will access the site. Detailed sections on loading, parking, and Transportation Demand Management follow this overview.

2.1.1 Residential

Residents and their guests are expected to take advantage of the excellent transportation alternatives available near the Randall School site, including Metrorail, Metrobus, and ample bicycling routes. The proximity of the site to the District's CBD, in addition to the varied employment and commercial sources in the adjacent neighborhood, makes non-automobile modes such as walking and cycling especially attractive.

The Transportation Demand Management (TDM) plan for the Randall School PUD was assembled to take advantage of the high quality transportation system, through the inclusion of measures such as bicycle parking, funding a Capital Bikeshare station, and providing spaces for carsharing vehicles (more details on the TDM are presented later in this section). Notable in the TDM plan for the PUD is a relatively low vehicular parking supply, which reflects the expected high use of non-automobile modes of travel. For example, the parking garage contains more bicycle parking spaces than vehicular parking spaces.

As the residential component of the Randall School modified PUD will act like two separate residential buildings, there will be two lobbies: one adjacent to the proposed vehicle turn-around/extension of Half Street on the east edge of the site and

one on 1st Street SW, a private street on the west side of the project. These lobbies will be the primary pedestrian entrances for residents and their guests. In addition, passenger car pick-up and drop-off activity will occur in front of both lobbies: in the turn-around for the eastern lobby and curbside on 1st Street SW for the western one. If the proposed turnaround is not constructed as part of the modified PUD, a loading/unloading zone will be requested on I Street SW.

Loading and trash service for the residential component will take place in the underground service area. A shared loading dock and trash area is located on the first level below grade (a more detailed discussion on the loading docks is presented later in this section). Residents will be required to schedule moves with property management to help alleviate disruptions to other residents or uses in the building. In addition, residents will be restricted to using 40' trucks or smaller for move-in/move-out and staging their moves in the underground service area. The proposed unit size of the modified PUD is not expected to generate a need for larger moving vehicles. In the event a resident move requires a tractor-trailer larger than 40', it will be accommodated curbside on 1st Street SW, a private street adjacent to the western residential lobby.

2.1.2 Museum

Museum employees and patrons are also expected to take advantage of non-automobile modes of travel. The museum is planned as a small art museum, similar to other District museums such as the Corcoran Gallery of Art, the National Museum of Women in the Arts, and The Phillips Collection. It is not expected to generate significant tour group activity but rather individual or small groups of patrons.

Patron travel patterns for smaller museums are not heavily studied, although Gorove/Slade did perform a survey of visitors to The Phillips Collection in the year 2000. This survey confirms that employees and patrons of art museums are not expected to arrive and depart by automobile in significant numbers. The automobile mode split of employees was 23 percent on weekdays and 37 percent on weekends. For visitors, the automobile mode split was 20 percent on weekdays and 18 percent on weekends. The Phillips Collection has a small parking lot that employees can use. No parking is provided for visitors, although a number of public parking garages surround the museum for visitor parking. Most small art museums in the District heavily advertise the use of alternate modes for visitors, and the proposed museum in the Randall School modified PUD will do the same.

Although the majority of employees and visitors are not expected to drive, the museum will have access to the parking garage for employee and patron use. This will be different from many other small art museums in the District that do not have dedicated visitor parking. This portion of the garage parking supply expected to serve museum parking demand will be adequate to handle all typical activity generated by the museum.

The museum will include a small event space that accommodates fewer than 100 people. For these events, the museum plans to supplement its parking supply with valet parking. Other than providing the ability to fit more cars in the same amount of space in the garage, the valet parking is also intended to help deter event patrons from looking for parking in the surrounding neighborhood. The museum will advertise the availability of valet parking to event patrons to help direct them away from other parking sources, as well as advertise all other non-auto modes of transportation.

The valet parking stand will be located in the turnaround on Half Street or along the private portion of 1st Street such that any valet queuing will have no adverse effects on I Street SW. For smaller events, valet parking will be accommodated on site and utilize no more than the number of parking garage spaces available to the site. For larger events, valet parking will be extended to off-site parking lots and garages. The following parking garages have been identified as potential overflow valet parking areas:

- The Capitol Skyline Hotel across the street from the modified PUD;

- The Central Parking System Garage on 4th Street SW between M and I Streets; and
- The 24 M Street Parking Lot on Half Street SW between M and L Streets

The museum's front door will be the historic entrance of the property on I Street SW. The majority of pedestrians are expected to use this entry for access. Although there will be a vehicle curbside pick-up/drop-off area on I Street in front of the museum, passenger car and taxi pick-up/drop-off activity will also be directed towards the Half Street SW extension/turn around and the drop-off area on the private portion of 1st Street, such that no one pick-up/drop-off area is overwhelmed. By implementing dedicated pick-up/drop-off areas in front of all the major pedestrian accesses of the development, illegal stopping and standing is deterred.

The museum will use the shared underground service area for all deliveries, except for special deliveries of art exhibits. These travelling exhibits typically arrive in a 55' tractor-trailer, which is larger than what the underground service area can accommodate. Additionally, due to the sensitive nature of the cargo, the museum would prefer to load/unload the art directly into the museum at the ground level. Thus, the modified PUD contains a special loading facility at the ground level, accessed via the private portion of 1st Street SW, to accommodate these deliveries. The museum does not expect these deliveries to occur often (at most once a month).

The museum operators have indicated that they do not expect patrons to arrive in tour buses, or accommodate class field trips in school buses. The modified PUD contains a back-up plan in case this activity occurs once constructed. Any bus activity will be directed to use the curb space on 1st Street SW for loading/unloading. All buses will be required to abide District laws for idling.

2.1.3 Restaurant/Commercial Space

The remaining space in the modified PUD is restaurant and commercial space. These land uses are grouped not only because they have similar access but because the current plan is for the commercial space to be a food-related education service connected to the restaurant. Thus, it is possible that these uses will function as a single entity.

Restaurant and commercial employees and patrons are expected to use a majority of non-automobile modes, similar to the residential and museum uses on site. Although they will be encouraged to use non-auto modes, they will have access to the parking garage and a portion of the garage supply is intended for restaurant and commercial use.

The main entry for the restaurant is on the eastern side of the modified PUD, adjacent to the proposed Half Street SW turn-around. The main entry for the commercial space is on I Street close to 1st Street SW. The majority of pedestrians accessing these uses are expected to use these access points. Passenger car and taxi pick-up and drop-off activity for the restaurant will use the proposed turn-around that is an extension of Half Street SW and 1st Street SW. A restaurant operator has not been selected yet, but it is likely that the restaurant will operate a valet parking service. Valet parking for the restaurant would occur in the proposed turn-around and go to and from the site parking garage. It should be noted that if the turn-around extension of Half Street SW is not constructed, then the Applicant will request additional loading/unloading space on I Street SW to accommodate this activity. Pick-up/drop-off activity for the commercial space in the western portion of the historic structure will be located on I Street SW.

All loading for the restaurant and commercial space would occur in the shared underground service area. The amount of loading space provided can easily accommodate the needs of these uses.

2.2 Loading Management

The modified PUD plans include a below grade loading area accessible from the private portion of H Street SW just north of the site. Based on DDOT's Truck and Bus Route map, appropriate routing was determined in order to avoid unnecessary neighborhood impacts. A map of suggested inbound and outbound truck routes is shown in Figure 10. As can be seen, trucks have quick access to truck routes such as South Capitol Street and M St SW. Additionally, both of these roadways allow for easy access to major regional highways in the area.

Zoning regulations require one (1) 55' berth and one (1) 20' service space for the residential component, one (1) 30' berth and one (1) 20' service space for the retail component, and one (1) 30' berth and one (1) 20' service space for the museum. The applicant is proposing to supply two (2) 40' berths, one (1) 30' berth, and no separate service spaces. Additionally, there will be a loading area off of the private section of 1st Street SW to serve the museum exclusively. As described above, it is planned to be used by tractor trailers infrequently (approximately 6 to 12 times per year) when exhibits are being switched out. The area will be disguised as a courtyard with landscaping in order to minimize its impact on the overall site.

Although a loading variance is being requested, the proposed amount of loading facilities provided is adequate to handle the expected amount of truck traffic to and from the site, as zoning regulations do not account for shared loading bays that are often utilized in mixed-use developments. Based on Gorove/Slade's work on other District projects, the amount of weekly deliveries was determined. Typically, rented residential units in the District have a turnover of 18 months with two moving trucks per turnover. With the apartment complex of 544 dwelling units, this amounts to approximately 7 moving trucks per week. Although the retail tenant is not finalized, it is currently expected that a full restaurant will occupy the space. This would likely require two (2) van-sized and four (4) 30' truck deliveries per week. As stated above, the museum is expected to generate one 50' truck when exhibits are switched out every one to two months. This amount of loading activity can easily be accommodated by the amount of loading facilities provided.

2.3 Parking

Parking will be provided by means of a below-grade parking garage with approximately 370 parking spaces. The parking garage will be accessible from the private portion of H Street SW on the north side of the site. This portion of H Street is exclusively accessible from Delaware Avenue and 1st Street SW. Due to the access location along a private, low volume roadway, it is not expected that the parking access will cause excessive delay to vehicles entering and exiting the site.

Based on the zoning regulations for a C-3-C zone, the site would require 1 space per 4 residential units, 1 space per 750 square feet of retail space greater than 3,000 square feet, and 1 space per 600 square feet of ground floor area and cellar area for the museum. This amounts to 136 residential spaces, 32 retail spaces, and 77 museum spaces, or a total of 245 required parking spaces. The development is proposing a total of 370 parking spaces; therefore, it will provide a sufficient amount of parking. The existing PUD was approved for a parking garage with a minimum of 393 parking spaces; therefore the updated development reduces the overall amount of parking. The decrease in parking will result in greater benefit to the community as it is likely to encourage the use of non-auto travel modes without causing parking spillover to on-street parking in the surrounding neighborhood.

The parking supply provided in the modified PUD was based on an estimate of parking demand. For the residential uses in the project, the Applicant conducted a market study of comparable sites. The market research showed that residential demand in the surrounding neighborhood is currently around 0.55 parking spaces per unit for the unit types contained in the modified PUD. This market study matches information in Gorove/Slade's library on comparable projects.

For the museum and commercial uses, parking demand was estimated using national standards with a non-auto mode use reduction. While working on various projects in the District, Gorove/Slade has observed that commercial uses have a parking demand of around 25% standard rates when located in the District core (standard parking rates assume no significant use of non-automobile modes). Thus, to calculate the parking demand of the museum and commercial uses in the modified PUD, Gorove/Slade used rates for those land uses from the *Institute of Transportation Engineers'* Parking Generation, 4th Edition, reduced by 75%. The following summarizes the parking demand calculations:

- Residential: 544 units @ 0.55 spaces/unit = 299 spaces
- Commercial:
  - Restaurant: 10,336 square feet @ 4.1 spaces/thousand square feet = 42 spaces
  - Retail: 16,482 square feet @ 0.72 spaces/thousand square feet = 12 spaces
  - Museum: 45,893 square feet @ 0.33 spaces/thousand square feet = 15 spaces
- Total: 368 spaces

Thus, the proposed supply of 370 spaces meets the projected demand. The current plan calls for the residential parking spaces to be nested within the garage; outside of the nest parking is shared between the other uses. Therefore, there is no exact breakdown for the amount of spaces assigned to each use. In general, around 299 spaces will be nested for the residential uses; the remaining 71 spaces will be shared by the general public (for museum, commercial, and restaurant use). As described above, valet parking may be employed during events at the restaurant, which could increase the supply slightly.

The Applicant has requested flexibility to reduce the amount of parking in the modified PUD. An alternate parking scheme, with fewer spaces is included in the modified PUD, to be constructed if the market for parking demand shifts in the future and the project's demand can be accommodated in a smaller supply. As stated above, the parking supply proposed in the modified PUD matches existing parking demand. The Applicant is concerned that the market for parking demand is in decline, and basing the proposed supply on current demand could lead to overbuilding parking. Gorove/Slade concurs that parking demand has been in decline in the District and that the trend is likely to continue. The Applicant has thus incorporated an alternate parking scheme with fewer spaces in case demand decreases, and will only employ this scheme if market shifts in parking demand show that the supply will be sufficient to not create a detrimental impact to the surrounding community.

2.4 Bicycle Facilities

The development is planning to supply short- and long-term bicycle parking. Due to varying elevations on the south side of the building along I Street SW, no short-term bike parking will be located along I Street; however six short-term bike racks will be placed on the west side of the building along 1st Street SW, which can accommodate a total of 12 bikes at one time.

The modified PUD plans contain 550 long-term bike parking spaces located in the parking garage. According to the Bicycle Commuter and Parking Expansion Act of 2007, a residential building owner shall provide at least one secure parking space for each 3 residential units. Additionally, for other land uses, the number of bicycle parking spaces provided shall be at least equal to 5 percent of the number of automobile parking spaces required. Therefore, according to regulations, the development should provide approximately 187 long-term bicycle parking spaces, which the development will greatly

exceed. The number of long-term bicycle spaces included in the modified PUD was based on the proposed new zoning regulations, which call for 1 space for each residential unit and 1 space for each 10,000 square feet of commercial space.

In addition to bicycle parking, the applicant has agreed to fund the installation of a Capital Bikeshare station in the vicinity of the site if one is not installed prior to the completion of the development. The exact location for the station will be decided at a later point by DDOT; however, the Applicant requests that the station be located within two blocks of the modified PUD. After reviewing the overall site and taking into account existing Bikeshare facilities, this report suggests that DDOT consider the northeast corner of I Street and Delaware Avenue SW for the station. At this location, cyclists using Bikeshare would be able to take advantage of the existing traffic signal at the intersection to cross the roadway, in addition to the east and westbound bike lanes along I Street. This location also serves as an approximate midway point between existing Capital Bikeshare stations shown on Figure 5. Therefore, distribution of stations and overall user benefit would have the greatest positive impact at this location.

2.5 Half Street SW Turnaround

As discussed previously, the Applicant has proposed construction of a turnaround facility at the eastern edge of the property that will essentially be an extension of Half Street SW, as shown in Figure 9. This turnaround will service the modified PUD and adjacent public recreation center, swimming pool, and ball fields. It will act as one of the primary vehicular pick-up/drop-off areas for residents (in the eastern residential lobby) and patrons of the restaurant and commercial uses. It will also be the location of the restaurant valet stand, should the restaurant decide to implement valet services. The turnaround is designed such that vehicles idling at the curb can be passed by those further back in the queue. This greatly improves the overall functionality of the turnaround, as vehicles waiting to for valet services may be bypassed by quick pick-up/drop-off activity.

2.5.1 Pedestrian Amenities

The Applicant is proposing to include pedestrian improvements at the intersection of I Street and Half Street SW, constructed in combination with the turn-around. These improvements include curb extensions on the northern side of I Street SW and pedestrian warning signs. The curb extensions contribute to traffic calming by narrowing the travel way and enhance pedestrian visibility for crossing I Street. High-visibility markings and additional signage helps warn drivers that pedestrians may be entering the intersection, thus improving the overall pedestrian environment.

2.5.2 Queuing Analysis

A queuing analysis was performed to determine the adequacy of the turn-around and ensure that traffic will not back up onto I Street SW. This analysis used the highest expected vehicular trip generation for the turn-around, anticipated to occur during potential restaurant valet operations. Based on the Institute of Transportation Engineers' (ITE) *Trip Generation,* 9th Edition, the amount of trips generated by the restaurant during its peak period was calculated. For the purpose of this analysis, the highest trip generation rate for a Quality Restaurant (Land Use 931) occurs during the Saturday peak hour of the generator. Utilizing the retail mode split of 40 percent vehicular trips (discussed in Chapter 3), the restaurant is expected to generate 45 total trips (27 inbound, 18 outbound) during its peak hour.

When restaurant patrons arrive and depart the valet stand, the service time at the valet stand will be determined by the amount of time it takes to interact with the valet attendant. The service time for residents, patrons of the modified PUD, and users of the adjacent recreation center will be much shorter as these are more likely to be quick pick-up/drop-off activities. Therefore, on average, it is likely that the service time at the turnaround will be between 1 and 2 minutes per

vehicle. Both values are used in the analysis to determine the sensitivity of this time variance. Additionally, valet operations are extremely flexible dependent on staffing. The average processing time per vehicle can easily be improved through additional staff, essentially creating more processing lanes.

Using industry-standard stochastic queuing analysis, the expected queuing characteristics for the system of vehicles utilizing the turnaround was calculated based on the assumptions outlined above. Assuming a service time of 1 minute, the average queue of the system is expected to be 0.87 vehicles, with an average waiting time of 9.8 seconds. Assuming a service time of 2 minutes, the average queue of the system is expected to be 3.43 vehicles, with an average waiting time of 2 minutes and 34 seconds. Based on the current design of the turnaround, all queuing from the valet services is expected to remain within the turnaround area and there will be no spillover onto I Street SW. Thus, there will be no detrimental impacts to the surrounding neighborhoods.

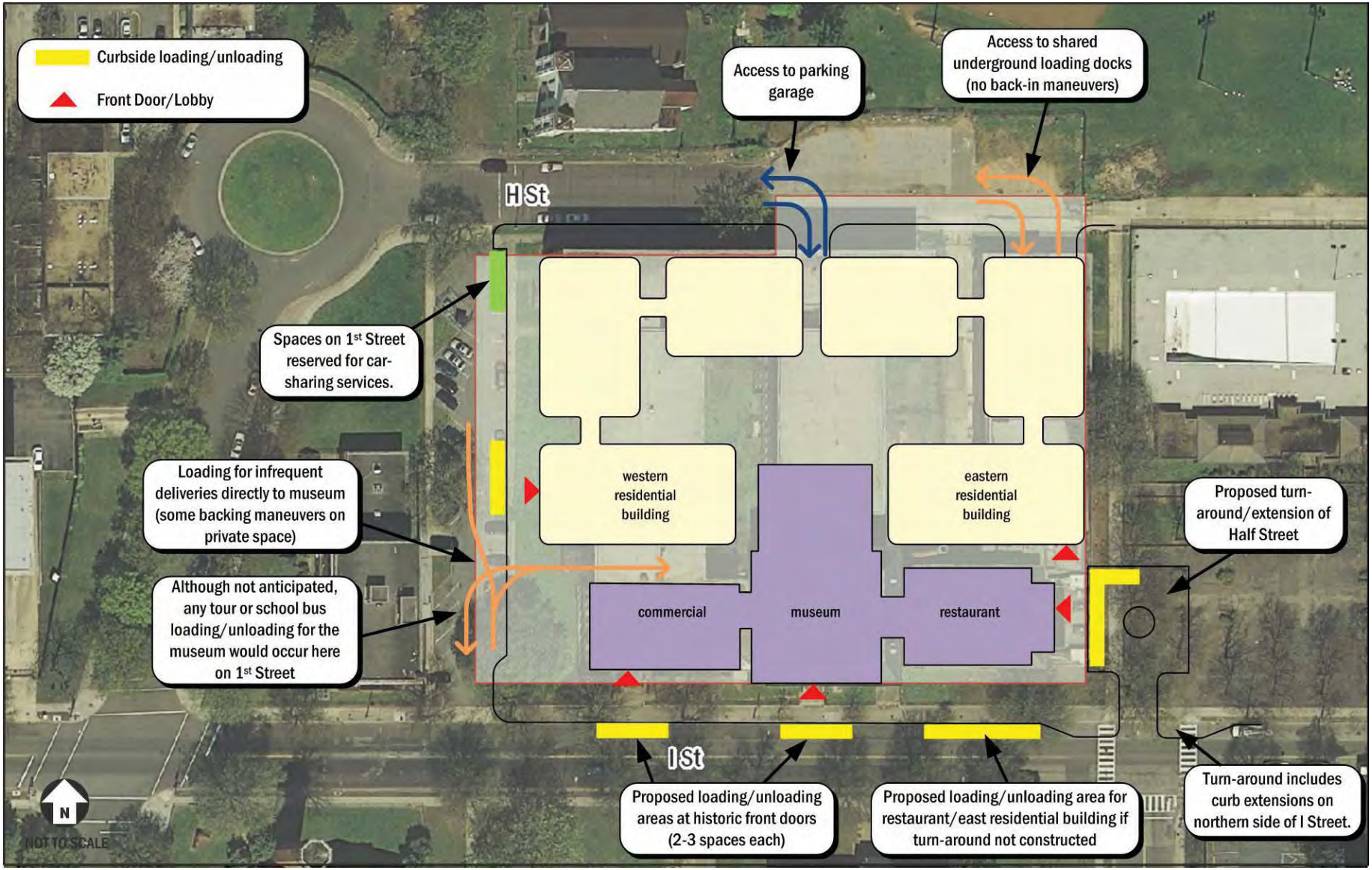

Figure 9: Site Access

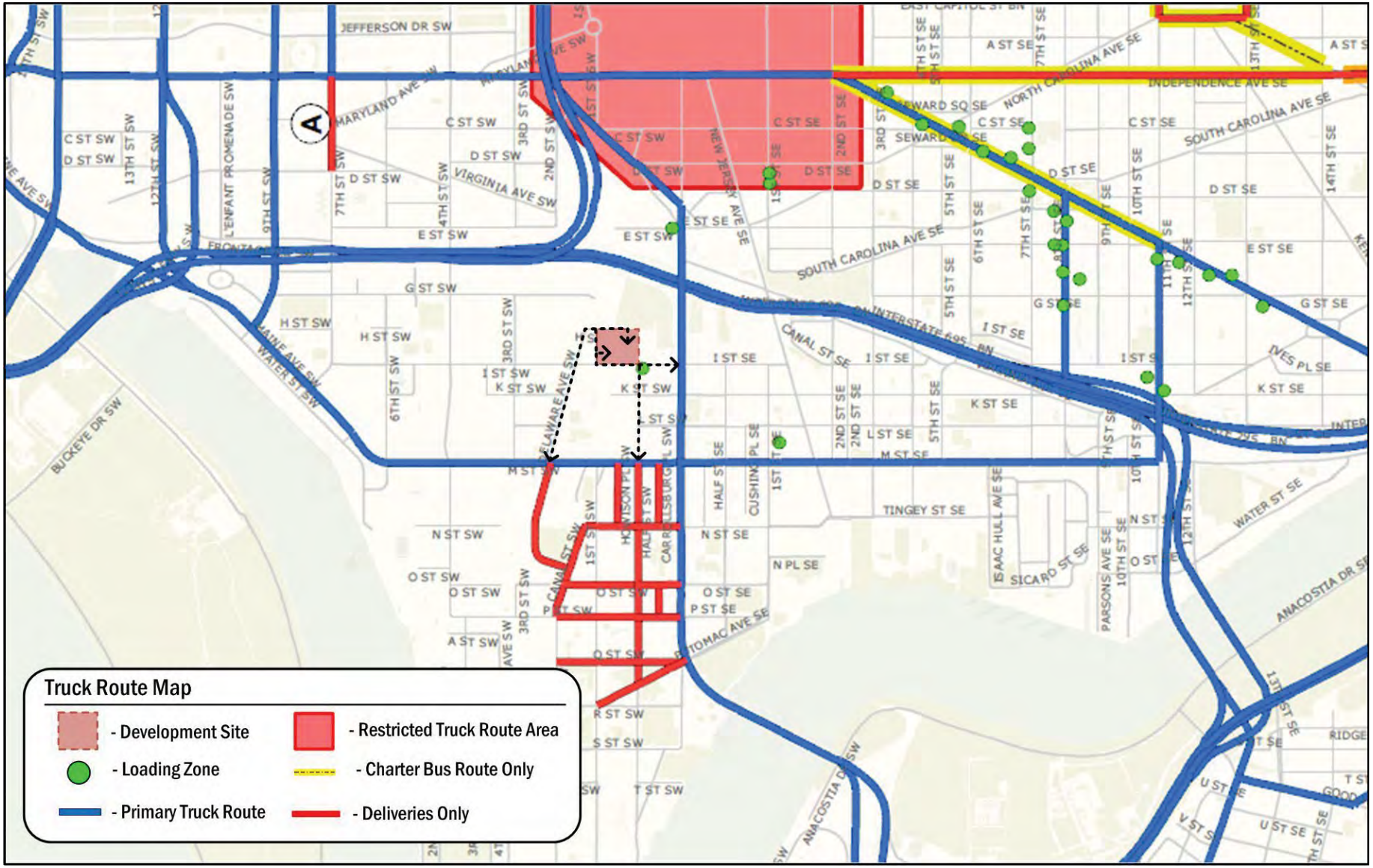

Figure 10: Suggested Truck Route Map

2.6 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 improvements that encourage bicycling and walking;
- Financial incentives, such as preferential parking for ride-sharers and transit subsidies; and
- Congestion avoidance strategies, such as compressed work weeks, flexible work schedules and telecommuting

The District of Columbia is quickly growing and attracting new residential, commercial, and retail development and redevelopment, which are generating significant additional vehicular traffic to, from, and within the District. In order to meet the District's goals of reducing automobile trips and accommodation of travel through a complete transportation network, DDOT initiated an analysis of TDM in the development review process conducted by Michael Baker Jr., Inc. with the assistance of Nelson/Nygaard Consulting Associates; Strategic Transportation Initiatives, Inc.; and Patton Harris Rust & Associates, which is documented in *Incorporation of Transportation Demand Management (TDM) into the Development Review Process, Final Report and Recommendations* from July 2010. The following TDM recommendations were developed based on the contents of this report, discussions with DDOT, and the TDM plans developed for recently approved projects.

2.6.1 Proposed TDM Plan

As part of the existing PUD, DDOT requested the Applicant produce a TDM plan, which outlined the following TDM commitments:

- Bicycle Parking;
- Shuttle service for Corcoran students and faculty and the general public;
- Two (2) car-sharing spaces;
- An on-site business center;
- Distribution of transit information ;
- SmarTrip cards for residents; and
- Transportation Coordinators for both the Corcoran and property manager.

Several of these measures are outdated or not relevant for the new PUD program. Thus, the TDM plan for the Randall School development is based on the DDOT expectations for TDM programs, modified to fit the specific needs of the updated plan. The Applicant proposes that the project incorporate several TDM measures, including the following:

- The Applicant will designate a Transportation Coordinator for the residential, museum and restaurant components of the site who will act as a point-of-contact for DDOT.

- The Applicant will provide a transportation information center located in each residential lobby and the museum lobbies, maintained by the Transportation Coordinator.
- Each residential lobby will contain an electronic message board displaying relevant transportation information, such as transit estimated arrival times at nearby stops/stations and Capital Bikeshare availability at nearby stations.
- The museum's website will provide links to godcgo.com, information on alternative modes of travel, instructions for event patrons, and will discourage parking on-street in residential permit parking zones.
- New residents will be provided with transportation information upon move-in.
- The Applicant will unbundle all residential parking costs from the cost of lease or purchase. Residential parking will be priced to limit demand in a way to help achieve the parking ratios described above.
- Restaurant, commercial, and museum parking will be priced at market-cost, defined as no less than the charges of the lowest fee garage located within a ¼ mile.
- The Applicant will provide ride-matching services for residents, in addition to reserving parking spaces in the garage for employee carpool vehicles.
- The Applicant will reserve two (2) parking spaces for car sharing vehicles. As much as possible, the space reserved will be in a highly visible area with public access. The PUD plans currently identify two spaces on the curbside of 1st Street SW.
- The Applicant will exceed existing DC Zoning and law requirements for bicycle parking. The PUD includes 550 long-term bicycle parking spaces in the parking garage.
- The Applicant shall pay the cost of installation and one year of operating costs for a 40 foot Capital Bikeshare station in the immediate vicinity of the Property at a location to be selected by DDOT. This commitment will be required no later than issuance of the building's certificate of occupancy, and will be eliminated if a station gets constructed within a two-block radius of the site beforehand.

3: IMPACTS REVIEW

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

- To provide information to the District Department of Transportation (DDOT) and other agencies on how the development of the site will influence the local transportation network. This report accomplishes this by identifying the potential trips generated by the site and where these trips are expected to travel to and from.
- To determine if development of the site will lead to adverse impact on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analysis of intersection delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area.

3.1 Site Transportation Demand

3.1.1 Base Trip Generation

Traditionally, trip generation for a development is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 9th Edition. For this report, the methodology was supplemented to account for the urban nature of the site (*Trip Generation* provides data for non-urban, low transit use sites) and to generate trips for multiple modes. The following summarizes the methodology that was used in this study.

First, ITE Trip Generation was used to develop base vehicular-trip rates, not accounting for reductions due to mode split. Following the base vehicular-trip rate calculations, the vehicle-trips were converted to person-trips by assuming an average vehicle occupancy of 1.1 persons per vehicle for residential use and 1.8 persons per vehicle for the retail and cultural uses, based on the Census Data Transportation Planning Package (CTPP) 2000. Table 5 shows the base number of trips generated by the proposed development. As shown, the trip generation analysis is based on a previous version of the development plan that assumed 550 dwelling units, 16,000 square feet of retail space, and 40,000 square feet of cultural space.

Table 5: Base Vehicle- and Person-Trip Generation

Proposed Development	Quantity		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Residential Component	550	DU	55	218	273	208	112	320
Converted Person Trips at 1.1 persons/vehicle			**61**	**240**	**300**	**229**	**123**	**352**
Retail/Commercial Component	16,000	sf	9	6	15	28	31	59
Cultural Component	40,000	sf	9	2	11	1	6	7
Converted Person Trips at 1.8 persons/vehicle			**32**	**14**	**47**	**52**	**67**	**119**
Net Vehicle-Trips before Non-Auto Reduction			73	226	299	237	149	386
Net Person-Trips			**93**	**254**	**347**	**281**	**190**	**471**

3.1.2 Mode Split

Following base trip generation, the trips were split into each mode: public transportation, walking, bicycle, and vehicle. Each land use was analyzed by mode separately in order to account for varying mode splits. The residential mode split was determined based on the 2011 U.S. Census data for Tract 105, in which the development is located. For this tract, a mode split of 47% vehicle, 45% public transit, 5% walking, and 3% biking was determined.

The mode split estimates for the retail component was based on survey information contained in WMATA's *2005 Development-Related Ridership Survey*. The retail component was based on the average mode split among all retail sites analyzed with a slight increase in vehicular mode split to account for a longer distance to the nearest Metro station and to maintain a conservative analysis. Thus, the retail mode split is assumed to be 40% vehicle, 35% public transit, 20% walking, and 5% biking.

The museum mode split was also based on information contained in the *Ridership Survey*. During the weekday AM and PM peak hours, it is anticipated that people traveling to and from the museum will primarily consist of museum employees with some visitors. Although there is no mode split data available specific to museum uses, it was assumed that the mode split for the museum during these times would consist of a split between office and retail mode split. The average of office mode split for suburban areas inside the beltway and all retail sites analyzed was calculated giving a museum mode split of 50% vehicle, 35% public transit, 10% walking, and 5% biking.

The weekday peak hour mode split is summarized below in Table 6 for all land uses.

Table 6: Mode Split Summary

Land Use	Mode Split			
	Public Transit	*Walk*	*Bicycle*	*Automobile*
Residential	45%	5%	3%	47%
Retail	35%	20%	5%	40%
Cultural	35%	10%	5%	50%

As discussed previously in the parking sections, Gorove/Slade concludes that the retail and cultural uses will not have a 50% automobile mode split but somewhere closer to 25%. This report recognizes this disconnect, which is due to the limited nature of quality mode split data in addition to the above sources and the desire to keep the vehicular capacity analyses conservative. In essence, traffic impacts are exaggerated in order to help identify potential impacts to the network.

3.1.3 Multi-Modal Trip Generation

Based on the trip generation calculations and mode split assumptions shown previously, Table 7 shows the resulting calculations by mode. The proposed development will generate approximately 140 vehicular trips, 152 transit trips, 22 walking trips, and 11 bike trips during the morning peak hour; and 176 vehicular trips, 201 transit trips, 40 walking trips, and 17 bike trips during the afternoon peak hour.

Table 7: Multi-Modal Trip Generation

Trip Generation by Land Use & Mode		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Residential							
Transit Person-Trips	45%	28	108	135	103	55	158
Walking Person-Trips	5%	3	12	15	11	6	18
Bicycling Person-Trips	3%	2	7	9	7	4	11
Vehicular Person-Trips	47%	28	113	141	108	58	165
Vehicle-Trips		***25***	***103***	***128***	***98***	***52***	***150***
Retail							
Transit Person-Trips	35%	6	4	10	17	20	38
Walking Person-Trips	20%	3	2	5	10	11	21
Bicycling Person-Trips	5%	1	1	1	3	3	5
Vehicular Person-Trips	40%	6	4	11	20	22	42
Vehicle-Trips		***3***	***2***	***6***	***11***	***12***	***23***
Cultural							
Transit Person-Trips	35%	5	2	7	1	4	5
Walking Person-Trips	10%	2	0	2	0	1	1
Bicycling Person-Trips	5%	1	0	1	0	1	1
Vehicular Person-Trips	50%	8	2	10	1	5	6
Vehicle-Trips		***4***	***1***	***6***	***1***	***3***	***3***
Overall Trip Generation							
Transit Person-Trips		39	113	152	121	79	201
Walking Person-Trips		8	14	22	21	18	40
Bicycling Person-Trips		4	8	11	10	8	17
Vehicular Person-Trips		42	119	162	129	85	213
Total Person-Trips		**93**	**254**	**347**	**281**	**190**	**471**
Total Vehicle-Trips		***32***	***106***	***140***	***110***	***67***	***176***

3.2 Vehicular Impacts

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

3.2.1 Scope of Analysis

The purpose of the vehicular capacity analysis is to determine the existing conditions of the intersections located in the immediate vicinity of the proposed development. The following intersections were selected, as shown in Figure 11:

1. I Street SW & South Capitol Street
2. I Street SW & Half Street SW
3. I Street SW & Delaware Avenue SW
4. I Street SW & 4th Street SW
5. I Street SW & 7th Street SW
6. Maine Avenue SW & 7th Street SW
7. H Street SW & 1st Street SW
8. I Street SW & 1st Street SW
9. Site Driveway at H Street SW

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

- 2013 Existing Conditions
- 2016 Future Conditions without Development (2016 Background)
- 2016 Future Conditions with Development (2016 Future)

The *Synchro, Version 7.0* software package was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology. The *Synchro* model was compiled using signal timings provided by DDOT and with lane configurations and traffic volumes collected by Gorove/Slade. The following sections review the assumptions made for the technical analyses, as summarized in Table 10.

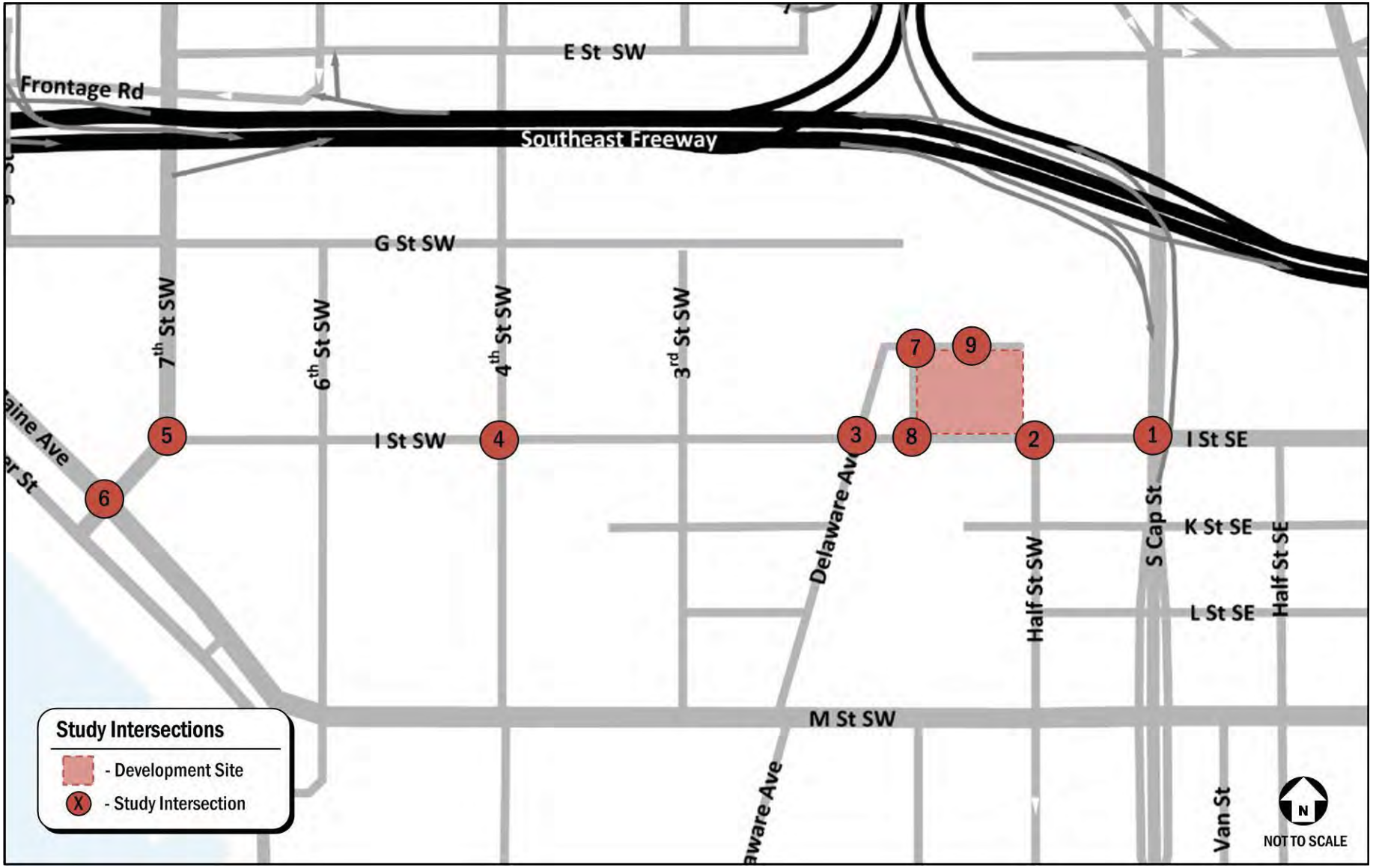

Figure 11: Study Intersections

3.2.2 Traffic Volume Assumptions

The following section reviews the traffic volume assumptions and methodologies used in the roadway capacity analyses, as summarized in Table 10.

2013 Existing Conditions

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

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

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

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

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

Following the above guidelines, traffic counts, including vehicular and pedestrian volumes, were conducted by Gorove/Slade at the key study intersections between the hours of 6:30 and 9:30 AM and between 4:00 and 7:00 PM on Wednesday, June 5, 2013. For some of these intersections, traffic count data collected previously on Thursday, March 21, 2013 and Tuesday, September 14, 2010 were used. These count dates represent "typical" weekdays when the DC public

school systems were in session, as well as the surrounding counties in Maryland and Virginia. These "typical" weekdays also represent time periods that include normal operation for other major traffic generators in the study area. The results of the traffic counts are included in the Technical Attachments. The morning and afternoon peak hours for the system of intersections being studied occurred between 7:45 – 8:45 AM and 4:30 – 5:30 PM, respectively. Peak hour traffic volumes for the existing conditions are shown on Figure 12 for the morning and afternoon peak hours.

2016 Future Conditions without Development (2016 Background)

The Randall School development is anticipated to be complete in 2016. The traffic projections for the future condition without the development consist of the traffic generated by background developments with planned completion by 2016 as outlined earlier in Section 1.6. Only developments that meet the criteria of being approved and having an origin/destination within the study area are included in the 2016 Background scenario. The following developments fit the criteria for inclusion in the 2016 Background scenario:

- The Plaza on K (Phase 1)
- Square 699/Velocity
- Southwest Waterfront (Phase 1)
- St. Matthew's Church and Community Center
- Waterfront Station
- The View at Waterfront
- 20 K Street

Available background development traffic studies were used to determine the number of trips added for the background developments. This includes the "Waterfront Development Traffic Impact Study" performed by Gorove/Slade in May 2007, the "Southwest Waterfront Stage 1 PUD Transportation Impact Study" performed by Gorove/Slade in June 2011, the "St. Matthew's Church and Community Center Planned Unit Development Traffic Impact Study" performed by Gorove/Slade in February 2012, and the "The Wharf Phase 1 Transportation Impact Study" performed by Gorove/Slade in May 2012. These documents were used to determine the number of trips generated by the aforementioned background developments, the mode split percentages, and the trip routing.

Trip generation for the other background developments was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 9th Edition. For developments consisting of a mix of retail uses with office, residential, or hotel uses, a 20% internal capture reduction was applied for retail trips originating from within the proposed development. The Shopping Center trip rate was applied in lieu of individual trip rates, such as bank, pharmacy and supermarket, for the retail uses because applying individual rates would not account for interaction between the retail uses (shoppers visiting more than one store), and the Shopping Center trip rate does account for these uses and interactions. Additionally, the General Office Building, Residential Apartments, and Residential Condominiums/Townhomes rates were applied for office and residential uses to estimate trips generated by the background developments.

For this report, the methodology was supplemented to account for the urban nature of the site (Trip Generation provides data for non-urban, low transit use sites). The WMATA Ridership Survey was used to determine transit reduction rates in order to account for trips taken by walking, bicycling, and transit. The mode split assumptions were based on the patterns and general findings from that document, observations of existing traffic, and the type and density of surrounding land

uses. It was assumed that retail uses would generate a lot of local demand and therefore, have the highest assumed percentage of walking and biking trips. Residential based trips would be the most likely to use public transit, since they will be regular users that will be able to figure out and take advantage of the various routes and schedules. Although the location of the site near several major highways could lead to driving mode splits, the Metrorail, Metrobus, and DC Circulator service will be utilized to reach destinations in downtown areas of the District and to surrounding areas.

Table 8, shown below, summarizes the mode split assumptions for the background developments with no available approved study. The mode splits were averaged for all of the background developments, as presented in several other approved studies performed by Gorove/Slade, including the "St. Matthew's Church and Community Center Planned Unit Development Traffic Impact Study" and the "Southwest Waterfront Stage 1 PUD Transportation Impact Study". The mode split assumptions were applied to the base trip generation for the background developments as a reduction to the vehicular trips estimated by *Trip Generation.*

Table 8: Mode Split Assumptions for Background Developments

Land Use	Mode Split			
	Vehicle	*Transit*	*Walk*	*Bike*
Office	50%	35%	10%	5%
Retail/Restaurant	25%	35%	30%	10%
Residential	35%	45%	15%	5%
Hotel	35%	45%	15%	5%
Church	50%	35%	10%	5%
Marina	35%	45%	15%	5%
Theater	39%	44%	12%	5%

Based on the available background studies and the trips estimated following the methodology outlined above, Table 9 shows the total number of trips generated by the background developments. The trips generated for each background development are shown in the Technical Appendix.

Table 9: Year 2016 Background Trip Generation

Land Use	Trip Generation					
	AM Peak Hour			PM Peak Hour		
	In	*Out*	*Total*	*In*	*Out*	*Total*
Vehicle Trips						
Retail	28	18	46	80	80	160
Residential	73	285	358	274	151	425
Office	307	41	348	53	262	315
Hotel	70	47	117	67	59	126
Church	4	3	7	3	4	7
Marina	3	2	5	7	5	12
Theater	10	2	12	23	24	47
Total Vehicle-Trips	**495**	**398**	**893**	**507**	**585**	**1,092**

These trips were then distributed and assigned to the network. Where a background study was not available, trips generated by the background developments were distributed using an analysis based on Metropolitan Washington Council

of Governments (MWCOG) transportation planning models. Data from Traffic Analysis Zones (TAZs), including home-based and non-home-based trips, was used to determine the inbound and outbound vehicular trip distribution. The data used encompassed trips to and from the Southwest Waterfront development in 2010 and 2030. The data obtained from the MWCOG model was used in order to estimate the directions of approach for the study area. The major routes originate from the Francis Case Memorial Bridge/Southwest Freeway (I-395) and the George Mason Memorial Bridge/14th Street Bridge (Route 1) from the west, Maine Avenue SW from the west, 9th Street/12th Street from the north, 7th Street from the north, I-395 from the north, the Southeast Freeway/John Philip Sousa Bridge from the south and east, the 11th Street Bridges (I-295) from the south and east, and the Frederick Douglas Bridge/South Capitol Street from the south. Some trips will also originate from the local area roadways as well. One trip distribution was assumed for all land uses because the MWCOG data for Southwest Waterfront aggregated all land uses for each TAZ. Figure 13 shows the direction of approach for the background developments.

Of note, the Scoping Document approved by DDOT and provided in the Technical Attachments specified that the background growth rate would be obtained from the M Street SE/SW traffic study. However, a background growth rate is not available from this study due to the analysis methodology employed. The traffic volumes projected in the M Street study were calculated based on a macroscopic development model for 2035, based on the future land use in the study area. The analysis methodology used estimated the future traffic volumes based on an estimation of origins and destinations in the study area. The methodology employed in this analysis is based on a microscopic development model, which projects future traffic volumes based on approved background developments and inherent growth on the roadways. However, after comparing traffic volumes from 2006 when the original PUD study was completed to traffic volumes collected in 2013 for the updated analysis, it was found that there has been a negative growth rate along I Street and South Capitol Street over the past several years. Therefore, no growth rate was applied to the study area roadways as part of the analysis.

The traffic volumes generated by the background development were added to the existing traffic volumes in order to establish the future traffic volumes without the proposed development. The traffic volumes for the 2016 Background Conditions are shown on Figure 14 for the morning and afternoon peak hours.

2016 Future Conditions with Development (2016 Total Future)

The future conditions with development scenario adds trips generated by the proposed development to the 2016 future conditions without development scenario. Similar to how a trip distribution was prepared for background developments, data obtained from the MWCOG for Southwest Waterfront was used for the proposed development in order to determine the inbound and outbound distribution of the added trips, as shown in Figure 15. Based on this review and the proposed site access locations, the site-generated trips were distributed through the study area intersections as shown in Figure 16.

The traffic volumes for the 2016 Total Future conditions were calculated by adding the site-generated traffic volumes to the 2016 background traffic volumes. Thus the future conditions with the proposed development include traffic generated by the existing volumes, background development through the year 2016, and the proposed Randall School development. The 2016 Total Future traffic volumes are shown on Figure 17 for the morning and afternoon peak hours.

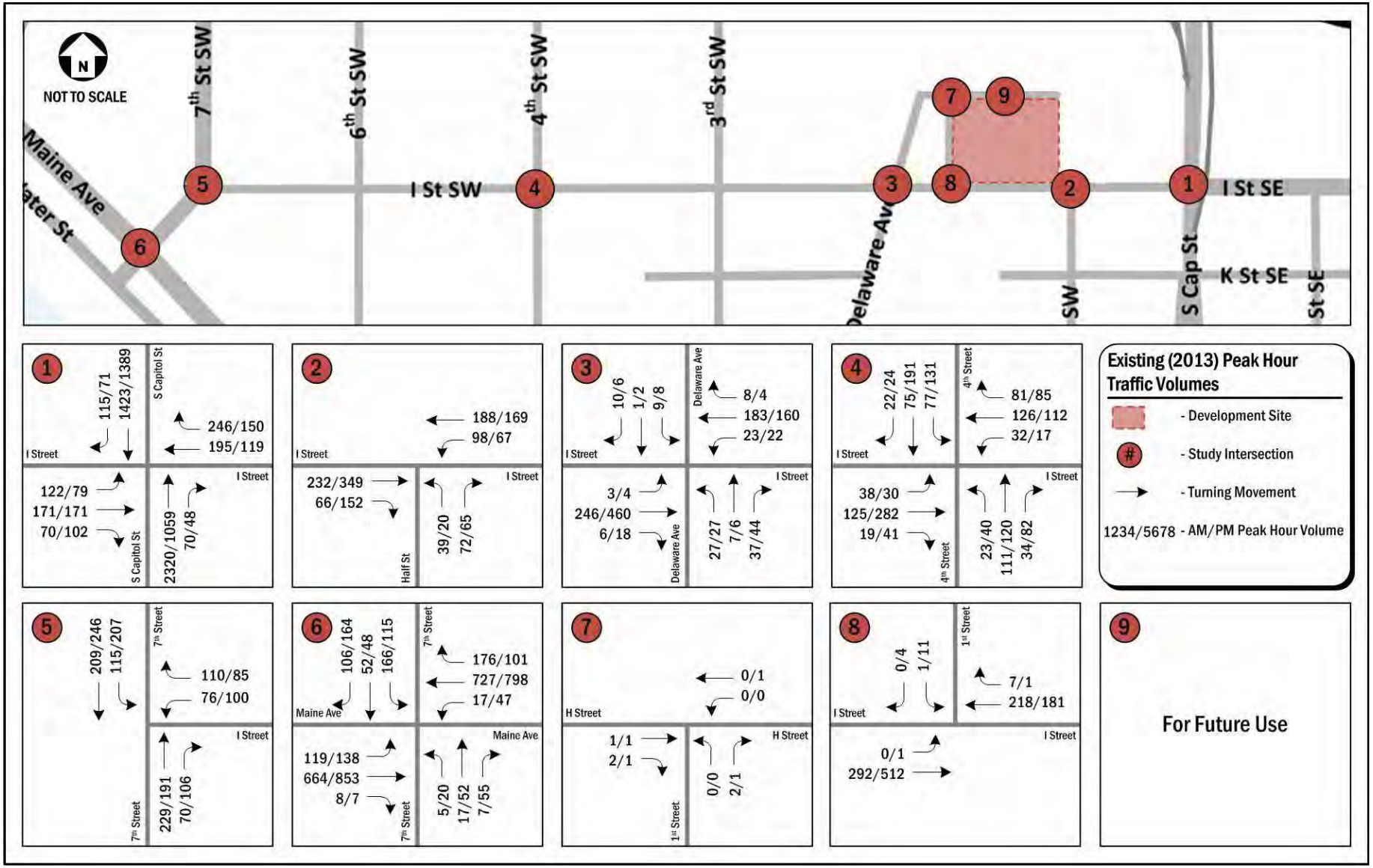

Figure 12: Existing (2013) Peak Hour Traffic Volumes

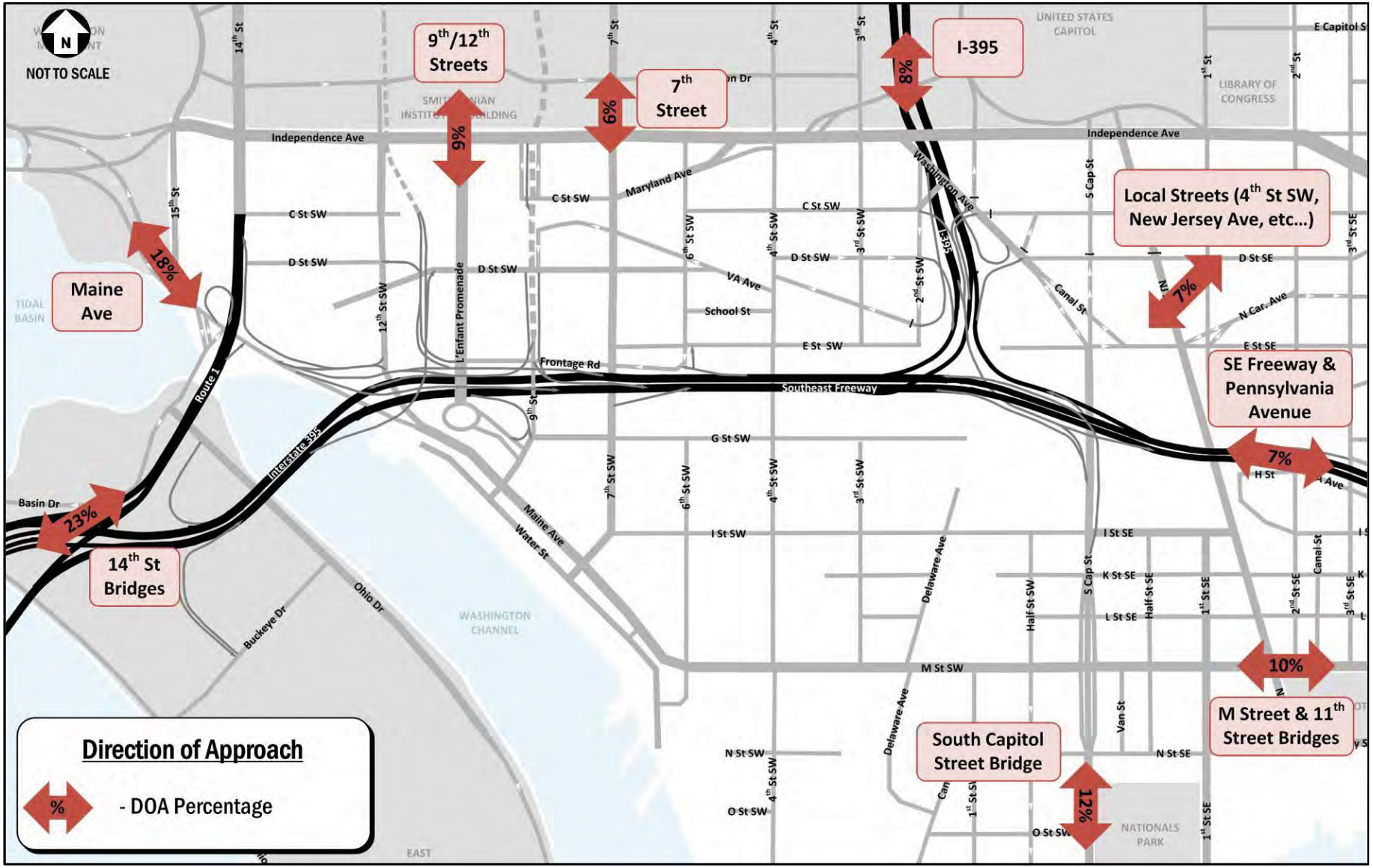

Figure 13: Direction of Approach for Background Developments

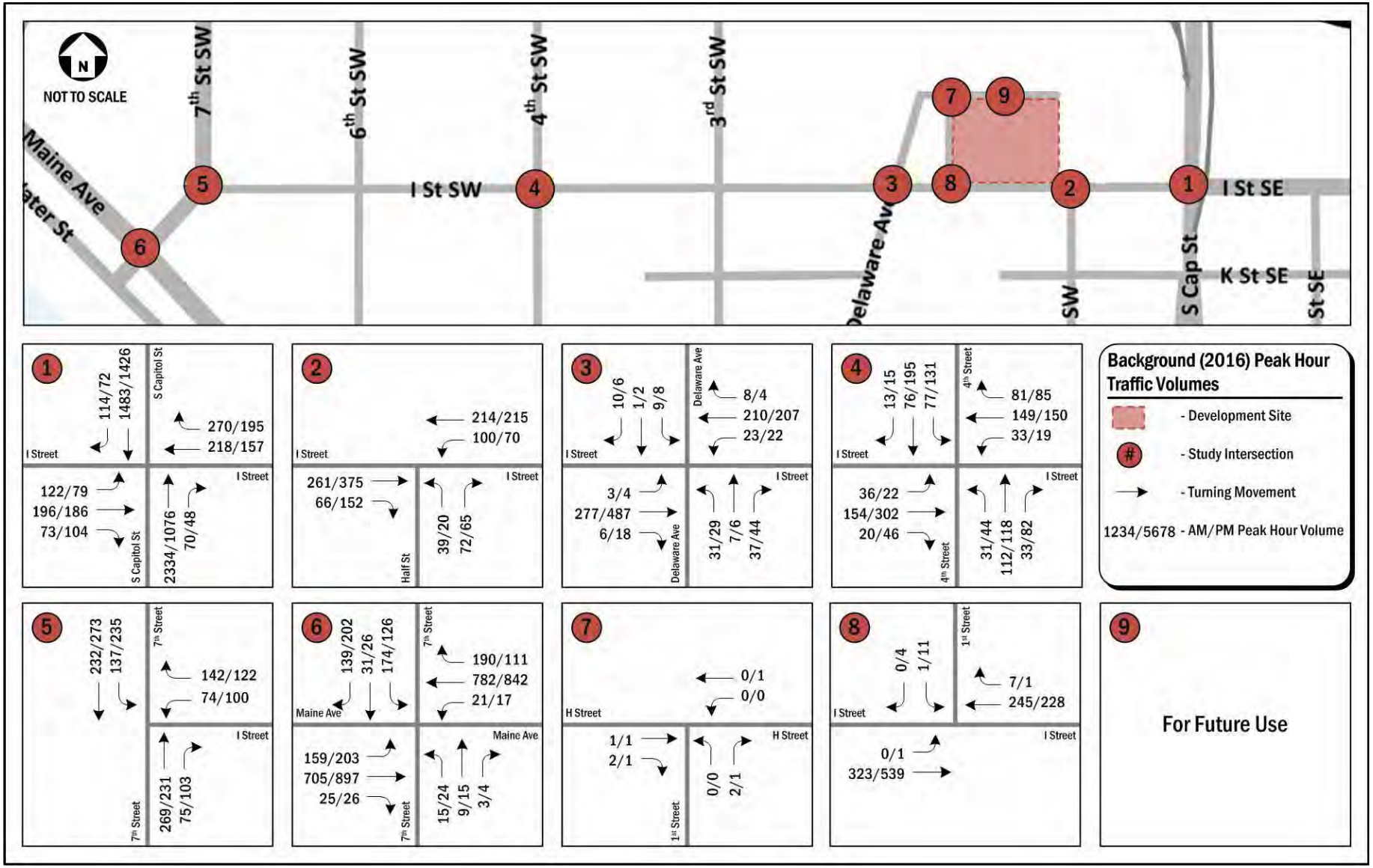

Figure 14: Background (2016) Peak Hour Traffic Volumes

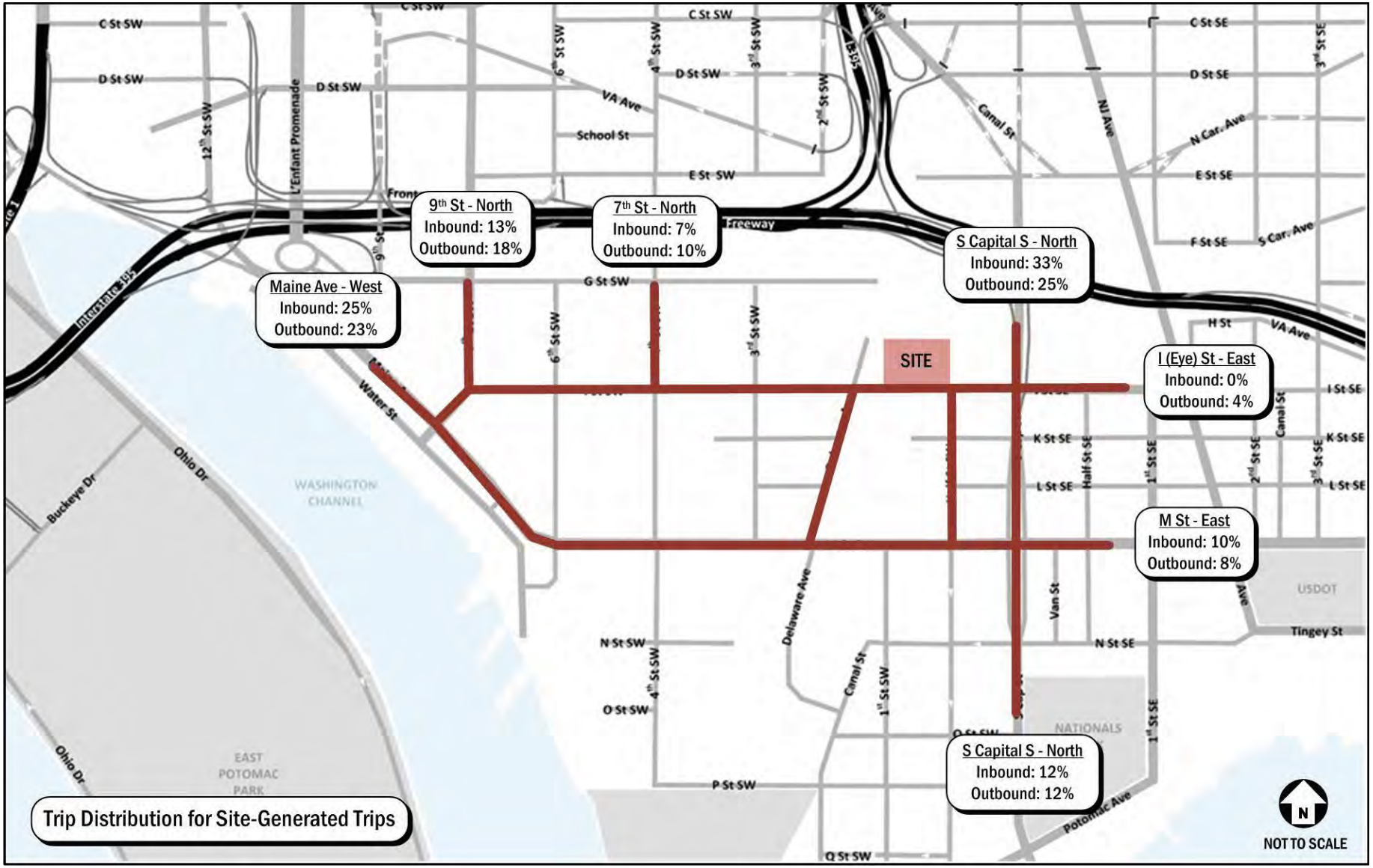

Figure 15: Trip Distribution for Site-Generated Trips

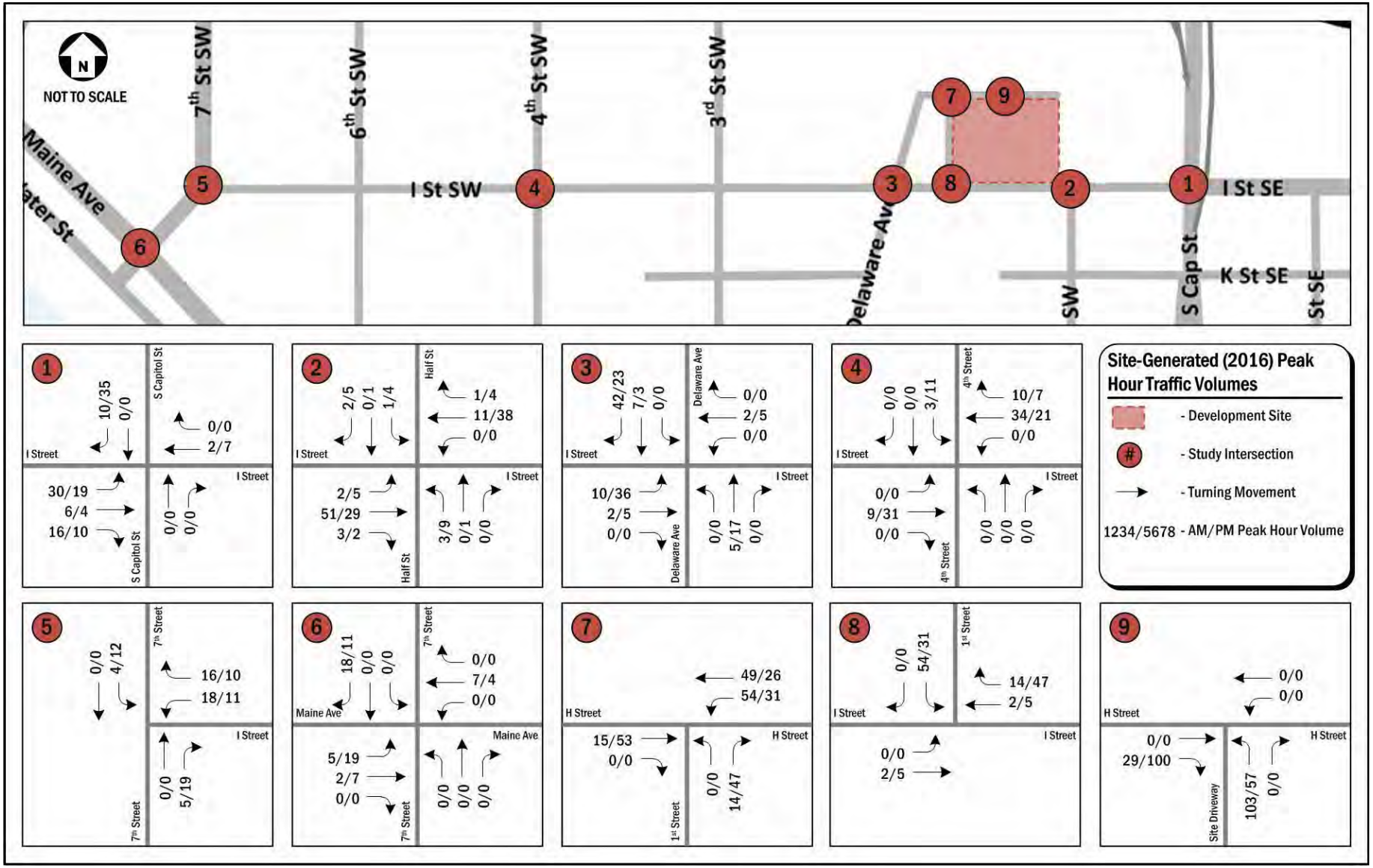

Figure 16: Site-Generated (2016) Peak Hour Traffic Volumes

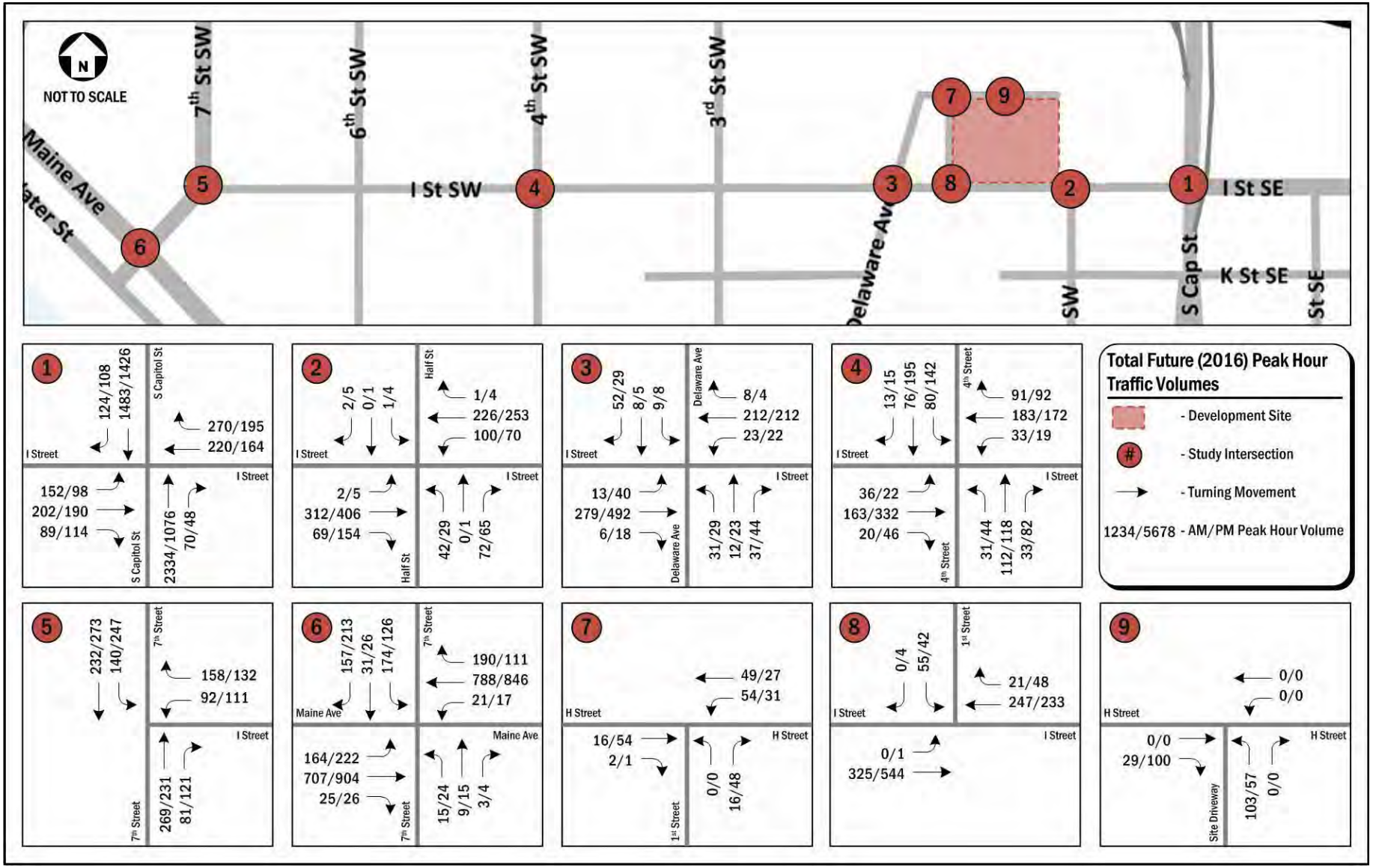

Figure 17: Total Future (2016) Peak Hour Traffic Volumes

3.2.3 Geometry and Operations Assumptions

The following section reviews the roadway geometry and operations assumptions made and the methodologies used in the roadway capacity analyses, as summarized in Table 10.

2013 Existing Conditions

Gorove/Slade conducted field reconnaissance to confirm the existing lane configurations and traffic controls at the intersections within the study area, as shown on Figure 18. Existing signal timings and offsets were obtained from DDOT and confirmed during field reconnaissance.

2016 Future Conditions without Development (2016 Background)

The lane configurations and traffic controls for the 2016 future conditions without the proposed development are based on the 2013 existing conditions. No roadway infrastructure changes were assumed for the future conditions without development for 2016.

2016 Future Conditions with Development (2016 Total Future)

The lane configurations for the 2016 future conditions with the proposed development are based on the lane configurations for the 2016 conditions without the proposed development. In the future conditions, however, it is assumed that Half Street will extend north of I Street to accommodate a pick-up/drop-off area for the development. Additionally, a new site driveway will be added along the private portion of H Street, north of the site. The lane configurations and traffic controls for the 2016 Total Future conditions are shown in Figure 19.

3.2.4 Vehicular Analysis Results

Intersection capacity analyses were performed for the three scenarios at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7.0* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology. The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. A LOS grade is a letter grade based on the average delay (in seconds) experienced by motorists traveling through an intersection. LOS results range from "A" being the best to "F" being the worst. LOS E is typically used as the acceptable LOS threshold in the District; however, LOS F is sometimes accepted in urbanized areas.

The LOS capacity analyses were based on: (1) the peak hour traffic volumes; (2) the lane use and traffic controls; and (3) the Highway Capacity Manual (HCM) methodologies (using *Synchro 7* software). The average delay of each approach and LOS is shown for the signalized intersections, in addition to the overall average delay and intersection LOS grade. The HCM does not give guidelines for calculating the average delay for a two-way stop-controlled intersection, as the approaches without stop signs would technically have no delay. Detailed LOS descriptions and the analysis worksheets are contained in the Appendix.

Table 11 shows the results of the capacity analyses, including LOS and average delay per vehicle (in seconds) for the 2013 Existing and 2016 Background and Total Future scenarios. The capacity analysis results for the morning and afternoon peak hours are shown on Figure 20 and Figure 21, respectively.

Overall, the study area intersections primarily operate under acceptable conditions during the AM and PM peak hours. The only exception is the eastbound approach of I Street SW at the intersection of I Street and South Capitol Street. This approach operates at an LOS F under existing conditions, which is exacerbated in the 2016 Background and 2016 Total

Future conditions. Restriping of the eastbound approach from the existing condition of separate left/through and right-turn lanes to separate left-turn and through/right lanes could alleviate some of the delays experienced at this intersection. This report recommends that this intersection be studied by DDOT outside the scope of this study in order to determine if future improvements are necessary as the area is developed.

Of note, further analysis of the intersection of Half Street and I Street SW is previously discussed in Section 2.5. By studying the peak hour of the generator at the restaurant and assuming that valet services operate from the turnaround, it was determined that there will be no detrimental queuing issues at the turnaround due to trips associated with the site.

Table 10: Summary of Vehicular Capacity Analysis Assumptions

2013 Existing Conditions

• Dates of data collection:
  ○ Wednesday, June 5, 2013
  ○ Thursday, March 21, 2013
  ○ Tuesday, September 14, 2010
  ○ Counts taken from 6:30 – 9:30 AM and 4:00 – 7:00 PM
  ○ Count sheets in Technical Appendix
• System Peak: 7:45 – 8:45 AM, 4:30 – 5:30 PM
• Geometries and lane configurations based on existing conditions
• Signal timings/phasings/offsets provided by DDOT

2016 Future Conditions without Development (2016 Background)

• Background developments:
  ○ Developments assumed completed by 2016 and with origins/destinations within the study area
  ○ Mode split & assignment assumptions taken from individual transportation studies for each development, where possible. If no study was on record, mode split assumptions shown in Table 8and assignment methodologies were similar to those used for the site, based on trip distribution shown in Figure 13.
  ○ Total AM peak hour trips assigned: 893; Total PM peak hour trips assigned: 1,092
• Background growth percentage:
  ○ None assumed due to an overall decrease in traffic volumes along I Street and South Capitol Street over the past several years
• No roadway infrastructure or signal timing improvements assumed.

2016 Future Conditions with Development (2016 Total Future)

• Site trip generation based on ITE *Trip Generation*, 9th Edition
  ○ Total AM peak hour trips assigned: 140; Total PM peak hour trips assigned: 176
• Mode split determined based on:
  ○ US Census data for the residential component;
  ○ The average of all retail sites from WMATA's *Ridership Survey* for the retail component; and
  ○ And average of retail sites and office sites within the beltway from WMATA's *Ridership Survey* for the museum component
• Trip distribution for vehicles based on existing traffic volumes and travel patterns in the study area, along with MWCOG model origin/destination data, as shown in Figure 15
• Under future conditions with development it was assumed that a pick-up/drop-off area would exist as an extension of Half Street SW.

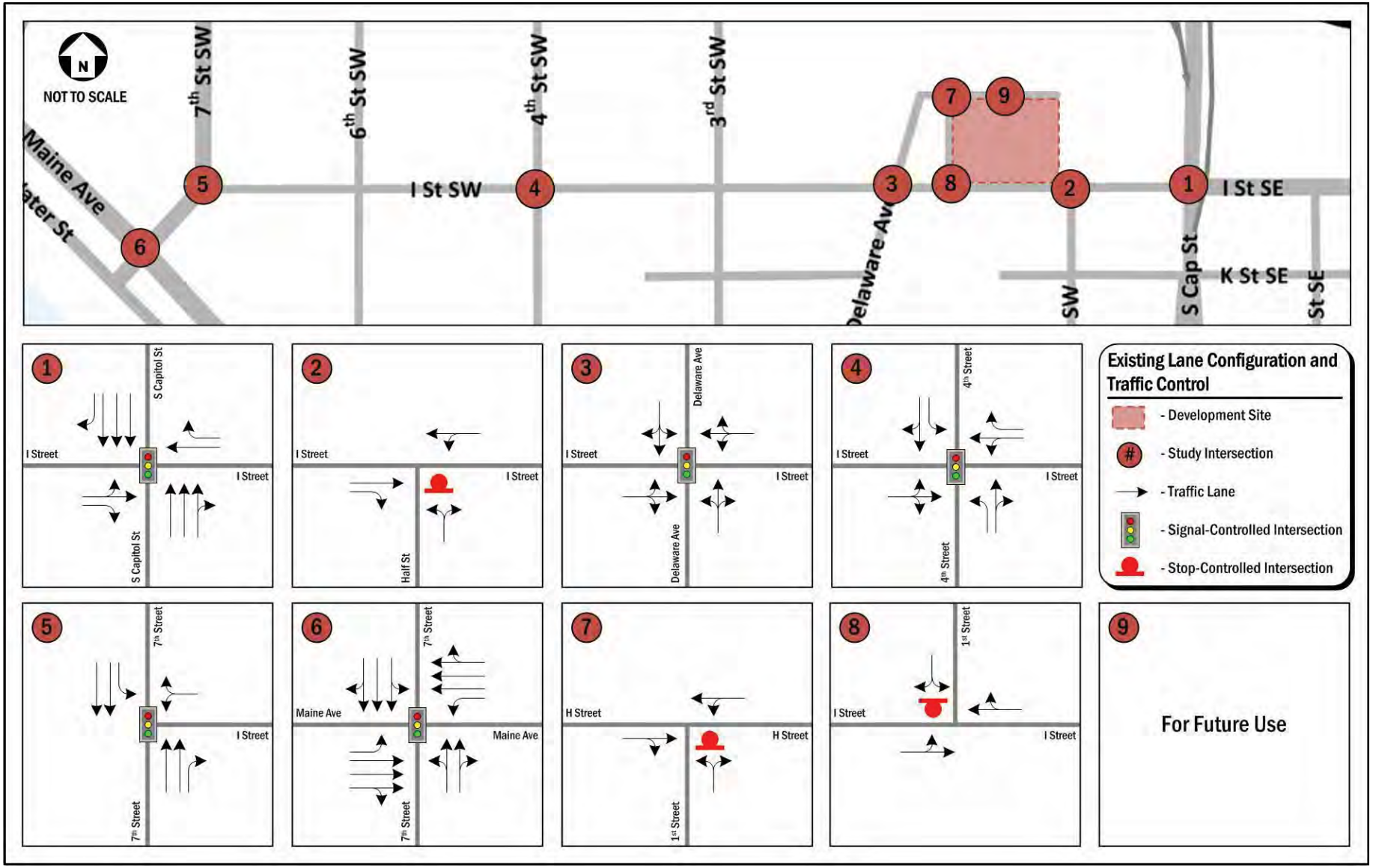

Figure 18: Existing Lane Configuration and Traffic Control

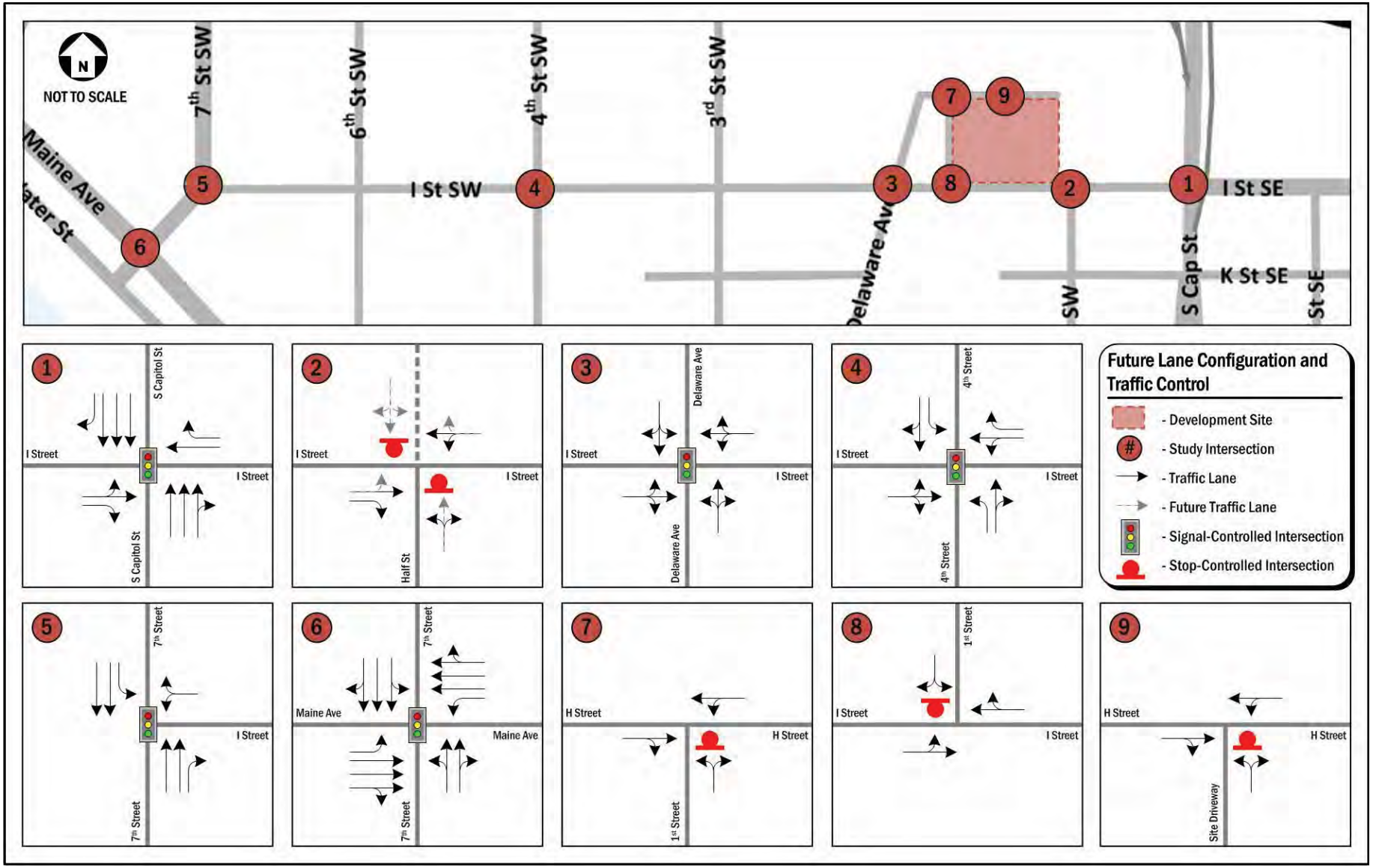

Figure 19: Future Lane Configuration and Traffic Control

Table 11: Vehicular Level of Service Results for 2013 Existing and 2016 Background/Future

Intersection	Approach	Existing Conditions (2013)				Background Conditions (2016)				Total Future Conditions (2016)			
		AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
I Street and S Capitol Street	**Overall**	**29.4**	**C**	**18.3**	**B**	**36.1**	**D**	**19.9**	**B**	**43.6**	**D**	**22.1**	**C**
	Eastbound	125.4	F	53.7	D	187.4	F	58.2	E	252.1	F	72.4	E
	Westbound	62.6	E	42.9	D	71.8	E	46.0	D	71.8	E	46.3	D
	Northbound	17.3	B	9.6	A	17.5	B	9.6	A	17.5	B	9.6	A
	Southbound	16.1	B	11.8	B	16.3	B	12.0	B	16.5	B	12.3	B
I Street and Half Street	Eastbound Left	--	--	--	--	--	--	--	--	0.1	A	0.1	A
	Westbound Left	3.6	A	3.3	A	3.5	A	3.1	A	3.5	A	3.0	A
	Northbound	15.4	C	15.6	C	16.7	C	16.7	C	21.9	C	24.6	C
	Southbound	--	--	--	--	--	--	--	--	15.6	C	20.9	C
I Street and Delaware Avenue	**Overall**	**11.0**	**B**	**11.2**	**B**	**11.2**	**B**	**10.9**	**B**	**13.7**	**B**	**12.6**	**B**
	Eastbound	4.7	A	8.8	A	5.5	A	8.8	A	5.5	A	9.5	A
	Westbound	5.8	A	5.5	A	6.0	A	5.8	A	6.0	A	5.8	A
	Northbound	36.3	D	35.7	D	37.1	D	35.8	D	38.0	D	37.5	D
	Southbound	34.2	C	34.0	C	34.2	C	34.0	C	35.4	D	34.5	C
I Street and 4th Street	**Overall**	**27.1**	**C**	**37.4**	**D**	**26.4**	**C**	**36.3**	**D**	**26.0**	**C**	**38.3**	**D**
	Eastbound	16.5	B	16.8	B	17.4	B	17.4	B	17.9	B	18.5	C
	Westbound	10.1	B	9.4	A	10.2	B	11.5	B	10.4	B	10.8	B
	Northbound	43.0	D	48.5	D	42.7	D	48.0	D	42.7	D	48.0	D
	Southbound	41.6	D	70.2	E	41.4	D	69.3	E	42.3	D	78.5	E
I Street and 7th Street	**Overall**	**14.8**	**B**	**14.7**	**B**	**16.2**	**B**	**18.8**	**B**	**19.3**	**B**	**20.5**	**C**
	Westbound	50.2	D	42.3	D	56.1	E	57.6	E	63.1	E	62.2	E
	Northbound	2.2	A	10.1	B	1.8	A	11.5	B	1.8	A	12.1	B
	Southbound	5.9	A	6.4	A	9.1	A	6.6	A	6.1	A	6.6	A
Maine Avenue and 7th Street	**Overall**	**22.0**	**C**	**32.3**	**C**	**23.0**	**C**	**37.0**	**D**	**22.9**	**C**	**38.8**	**D**
	Eastbound	21.1	C	44.8	D	23.6	C	53.5	D	24.0	C	57.1	E
	Westbound	19.1	B	21.6	C	19.6	B	21.9	C	19.6	B	22.0	C
	Northbound	27.4	C	23.8	C	27.6	C	23.6	C	27.6	C	23.6	C

Intersection	Approach	Existing Conditions (2013)				Background Conditions (2016)				Total Future Conditions (2016)			
		AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
	Southbound	31.6	C	27.4	C	31.2	C	26.2	C	28.7	C	27.1	C
H Street and 1st Street	Westbound Left	0.0	A	0.0	A	0.0	A	0.0	A	4.3	A	4.6	A
	Northbound	8.4	A	8.4	A	8.4	A	8.4	A	8.9	A	10.8	B
I Street and 1st Street	Eastbound Left	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
	Southbound	12.0	B	12.5	B	12.5	B	13.3	B	19.0	C	16.2	C
H Street and Site Driveway	Westbound Left	--	--	--	--	--	--	--	--	0.0	A	0.0	A
	Northbound	--	--	--	--	--	--	--	--	9.1	A	9.1	A

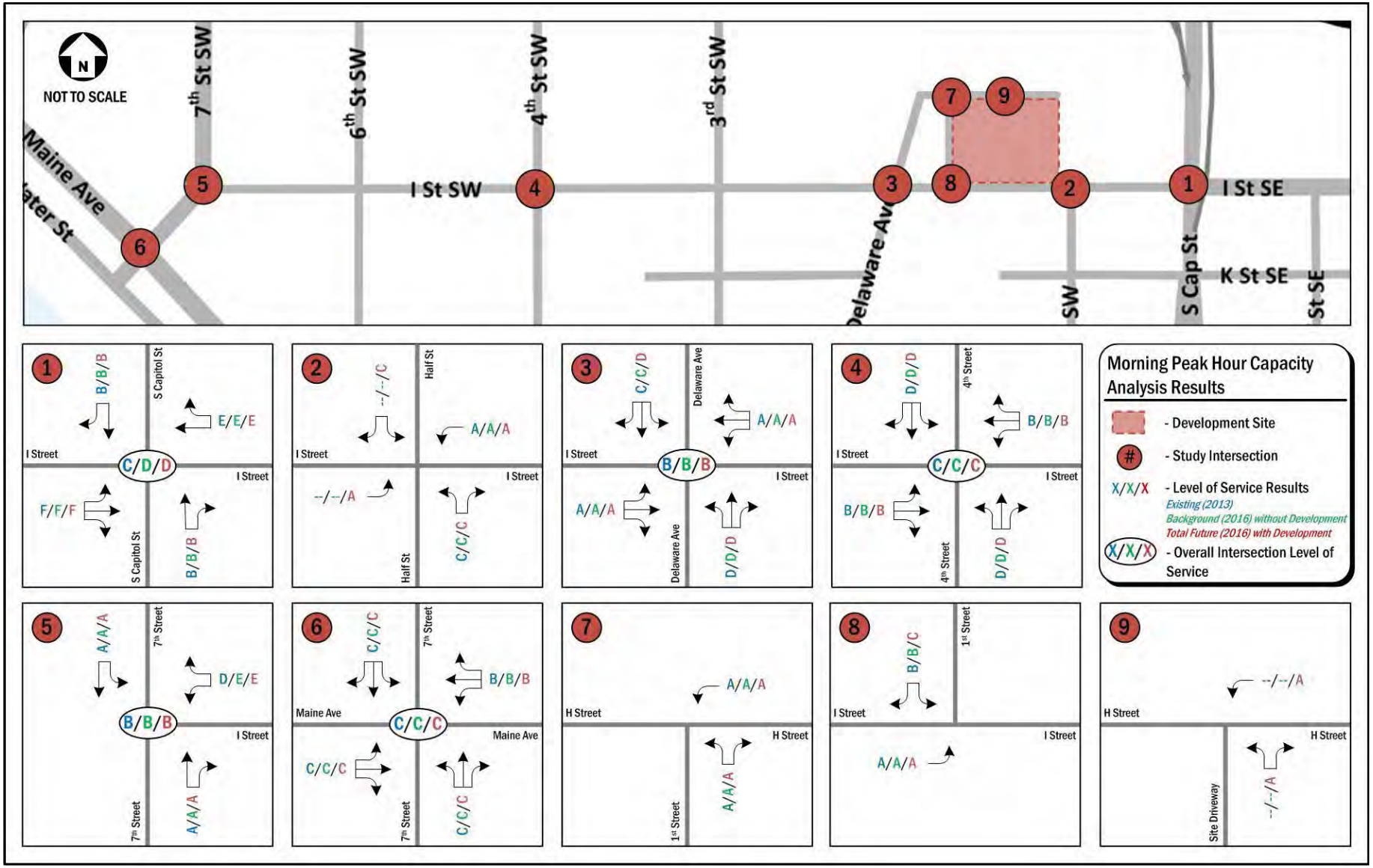

Figure 20: Morning Peak Hour Capacity Analysis Results

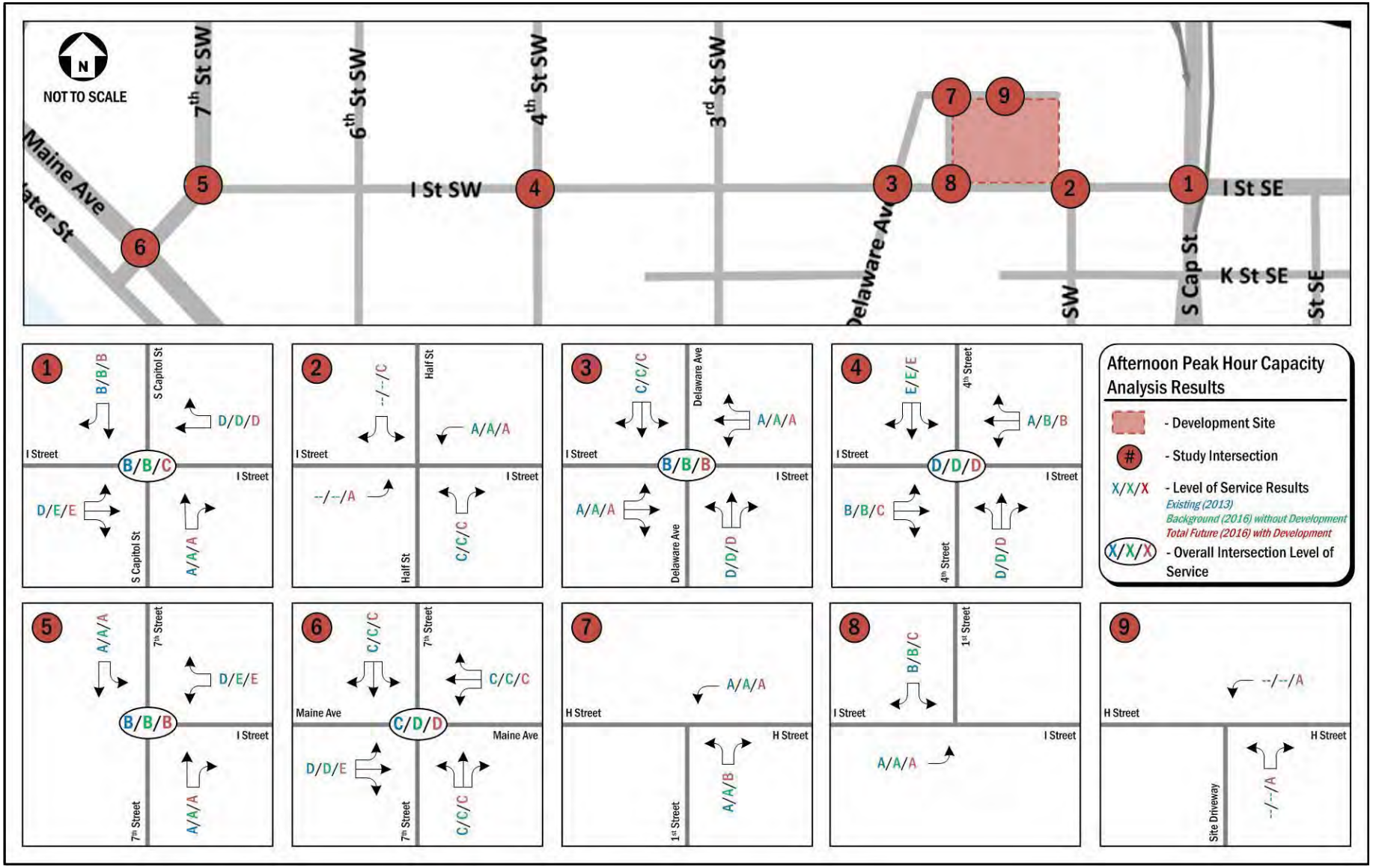

Figure 21: Afternoon Peak Hour Capacity Results

3.3 Crash Data

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.

3.3.1 Summary of Available Crash Data

A safety analysis was performed to determine if there was an abnormally high accident rate at any study area intersection. The District Department of Transportation (DDOT) provided the last three years of intersection accident data, from 2010 to 2012. This data set included all intersections adjacent to the site. This data was reviewed and analyzed to determine the accident rate at each location. For intersections, the accident rate is measure in accidents per million-entering vehicles (MEV). The accident rates per intersections are shown in Table 12.

According to the Institute of Transportation Engineer's Transportation Impact Analysis for Site Development, an accident rate of 1.0 or higher is an indication that further study is required. Three intersections in this study area meet this criterion (as shown in red in Table 12 and detailed in Table 13). The proposed site needs to be developed in a manner to help alleviate, or at minimum not add to, the conflicts at these intersections.

Table 12: Intersection Crash Rates

Intersection	Total Crashes	Pedestrian Crashes	Bike Crashes	Rate per MEV*
I Street SW and S Capitol Street	99	2	3	**2.28**
I Street SW and Half Street SW	17	1	0	**1.78**
I Street SW and Delaware Avenue SW	14	0	0	**1.84**
I Street SW and 4th Street SW	11	0	0	0.99
I Street SW and 7th Street SW	10	1	0	0.93
Maine Avenue SW and 7th Street SW	17	0	0	0.64

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

The crash summary data in Table 12 shows three 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 three 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 13 contains a breakdown of crash types reported for the three intersections with a crash rate over 1.0 per MEV.

Table 13: 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
I Street SW & S Capitol Street	**2.28**	17 *17%*	7 *7%*	3 *3%*	33 *33%*	18 *18%*	1 *1%*	1 *1%*	2 *2%*	1 *1%*	3 *3%*	3 *3%*	1 *1%*	0 *0%*	9 *9%*	**99**
I Street SW & Half Street SW	**1.78**	6 *35%*	3 *18%*	1 *6%*	1 *6%*	1 *6%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*	1 *6%*	2 *12%*	0 *0%*	0 *0%*	2 *12%*	**17**
I Street SW & Delaware Avenue SW	**1.84**	0 *0%*	1 *7%*	0 *0%*	5 *36%*	3 *21%*	2 *14%*	1 *7%*	1 *7%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*	0 *0%*	1 *7%*	**14**

3.3.2 Potential Impacts

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

- *I Street SW & S Capitol Street*

  This intersection was found to have a high crash rate of 2.28 crashes per MEV over the course of the 3-year study period. The majority of the crashes at this intersection were rear end crashes, with a large amount of right angle crashes and side swiped vehicles as well. Elevated rear-end collision rates are typical at intersections controlled by a traffic signal such as this, potentially intensified due to the relatively high speeds and geometry changes along South Capitol Street. Right-angle crashes are typically the result of a driver who failed to either stop or yield right-of-way, ran a red light, or was not cleared from the intersection upon the onset of the conflicting movement's green signal. Side swipe crashes can often occur when a vehicle makes a last-second lane change around a turning vehicle or fails to leave adequate space when passing another vehicle.

- *I Street SW & Half Street SW*

  This intersection was found to have a high crash rate of 1.78 crashes per MEV over the course of the 3-year study period. The majority of the crashes at this intersection were right angle crashes, in addition to a large amount of left turn crashes. This intersection is a stop-controlled T-intersection in which northbound traffic must yield to east and westbound traffic. Therefore, crashes can occur due to northbound vehicles not allowing for a large enough gap to enter the intersection. Additionally, some left turn crashes may be caused by westbound left turns where the driver does not see a conflicting vehicle or the opposing vehicle makes a last minute decision to go through the intersection instead of turning right.

  As discussed in Chapter 2, a turnaround will be added as an extension of Half Street at this intersection. As part of construction of the turnaround, changes will be made to the intersection such as curb extensions on the north side and added pedestrian signage/warnings. These improvements will act as traffic calming mechanisms and may help reduce the crash rate at this intersection.

- *I Street SW & Delaware Avenue SW*
  This intersection was found to have a high crash rate of 1.84 crashes per MEV over the course of the 3-year study period. The majority of the crashes at this intersection were rear end collisions and side swiped vehicles. Elevated rear-end collision rates are typical at intersections controlled by a traffic signal. Side swipe crashes can often occur when a vehicle going straight though an intersection makes a last-second lane change to get around a vehicle waiting for a gap to make a left turn when exclusive turn lanes are not available, which is the case for approaches at this intersection.

3.4 Non-Auto Impacts

In addition to the local vehicular network, the Randall School development is served by public transit, bicycle, and pedestrian transportation networks, as described in Chapter 1. This section of the report presents the expected volume of trips traveling to and from the Randall School site and reviews the ability of each non-auto transportation network to handle the expected trips.

3.4.1 Transit

The proposed development will generate transit trips from residents of the apartment complex as well as patrons of the museum and retail components of the site. As stated in Section 1, there is a wide variety of transit service nearby, including Metrorail and Metrobus. Both the Southwest Waterfront – SEU and Navy Yard Metrorail stations, which serve the green line, are located within a half mile of the development site, with the L'Enfant Plaza, Federal Center, and Capitol South Metrorail stations, serving the Yellow, Green, Orange, and Blue lines, located within a mile of the site.

Additionally there are several bus lines that pass near the site, including the Anacostia-Eckington Line and the Minnesota Ave-M Street Line. These lines run nearest the site along I Street, 3rd Street, and M Street SW. The Randall School development is located in Tract 105, and based on US Census data, of those that use public transportation to get to work, approximately 32 percent take Metrobus and 68 percent take Metrorail. The multi-modal trip generation determined in Section 3.1.3 determined that the site will generate approximately 152 AM peak hour transit trips (39 inbound, 113 outbound), 201 PM peak hour transit trips (121 inbound, 79 outbound), and 2,199 new transit trips in a single weekday. Therefore the development is likely to generate 49 Metrobus trips and 103 Metrorail trips during the AM peak hour; 64 Metrobus trips and 137 Metrorail trips during the PM peak hour; and 704 Metrobus trips and 1,495 Metrorail trips during a full weekday.

In 2008 WMATA studied the capacity of Metrorail stations in its *Station Access & Capacity Study.* The study analyzed the capacity of Metrorail stations for their vertical transportation, including the capacity of the station at elevators, stairs, and escalators to shuttle patrons between the street, mezzanine, and platforms. The study also analyzed station capacity to process riders at farecard gates. For both analyses (vertical transportation and farecard gates) volume to capacity ratios were calculated for existing data (from 2005) and projections for the year 2030. Based on the findings, the Southwest Waterfront – SEU station, the Federal Center station, and the Capitol South station can all accommodate the additional riders generated by the proposed development. The L'Enfant Plaza station currently warrants a study for vertical transportation at the east mezzanine as the volume to capacity ratio is between 0.5 and 0.75. The ridership is also expected to increase above 0.75 in the future, and improvements are likely to be necessary at the east and west mezzanines by 2030. However, as this station is the furthest of the five Metrorail stations from the site, it is likely that the development will only generate a couple hundred trips during an average weekday. Therefore, it is not expected to create a detrimental impact to the station's capacity. It should also be noted that this study was completed before the opening of

the Washington Nationals Ballpark in 2008; therefore, data from the Navy Yard station has drastically changed and has been studied separately to address its unique needs.

WMATA has also studied capacity for bus routes in *DC's Transit Future System Plan*, which lists the bus routes with the highest load factor (a ratio of passenger volume to bus capacity). None of the Metrobus routes that travel near the Randall School development are cited for having unacceptable load factors. Thus, it is expected that the local bus service can accommodate the future riders generated by the proposed development.

3.4.2 Bicycle

Bicycling will be an important mode for getting to and from the Randall School development, with significant bicycle facilities located on site and quality routes provided to and from the site. The impacts from bicycling will be relatively low when compared to other modes, due to the lower amount of cycling trips generated.

Cyclists traveling to and from the site are expected to take advantage of existing and planned routes in the study area. Particularly, cyclists are expected to greatly utilize the I Street bike lanes directly adjacent to the site that travel eastbound and westbound. From there, cyclists are likely to use the 4th Street SW bike lanes to the west of the site and New Jersey Avenue SW bike lanes to the east of the site. A future multi-use trail along Maine Avenue and along the Anacostia River, as identified in the *DC Bicycle Master Plan*, will also provide additional east-west connections.

Another important factor in the bicycle infrastructure is the availability of Capital Bikeshare. As discussed previously, the Applicant has agreed to fund the installation of a Bikeshare station on site, given that one is not installed prior to the completion of the development. The suggested location of this station is on the northeast corner of I Street and Delaware Avenue SW. This location is ideal as cyclists would be able to utilize the existing signalized intersection to access the station, and the station would be positioned along a roadway with eastbound and westbound bicycle lanes. The location also results in the most optimal distribution of Bikeshare stations as it is located approximately halfway between two existing Bikeshare stations.

Based on the quality of the routes near the project's location, the proposed development will not have a negative impact to bicycle facilities in the study area.

3.4.3 Pedestrian

The Randall School development is located in a walkable area, with connections to major existing and future retail locations, employment sites, residential neighborhoods, and transit connections.

The origins and destinations of site-generated pedestrian trips are likely to be:

- Employment opportunities where residents can walk to work, such as the USDOT headquarters, Navy Yard, and other office buildings on the M Street SW/SE corridor.
- Retail locations, such the planned restaurants and shops along Southwest Waterfront and other retail sites along the M Street corridor.
- Nationals' Park, where many residents can walk.

Based on these origins/destinations, most pedestrian trips generated by the proposed development will walk along the I Street corridor for at least part of their trip. Delaware Avenue and Half Street SW will likely be used to access M Street, and Half Street SW and Half Street SE may be used south of the site to avoid walking along South Capitol Street where

complicated lane configurations make pedestrian facilities lass desirable. North of the site however, the best ways to cross the freeway are along South Capitol Street and New Jersey Avenue to the east and 4th Street SW to the west.

In addition to these trips, the transit trips generated by the site will also generate pedestrian demand between the site and nearby transit stops. Because there are two Metrorail stations within a half-mile of the site, and three additional Metrorail stations within a mile of the site, there may be pedestrian traffic generated by all of these stations. However, it is likely that most people will utilize the Waterfront Metrorail Station or the Navy Yard Metro Station which requires pedestrians to walk to M Street east or west of the site.

Most of the sidewalks surrounding the site are of high quality, although there are some gaps in the network. A summary of sidewalk availability and quality is shown previously on Figure 7. On the direct perimeter of the site, the sidewalks along 1st Street and Half Street SW do not meet DDOT standards. As part of the overall development, these sidewalks will be improved to meet standards.

The capacity of sidewalks to handle the projected number of pedestrians will not be negatively impacted by this project, as long as future redevelopments build sidewalks to DDOT standards. DDOT requires that all sidewalks are a minimum of 6 feet wide, with sidewalks on arterial streets 8 to 10 feet wide depending on the location. The proposed widths along I Street SW near the site meet standards and those substandard sidewalks along 1st Street and H Street SW will be improved as part of the construction process. The *Highway Capacity Manual* (HCM) outlines methodologies for calculating capacity of sidewalks based on the sidewalk widths. According to methodologies contained in the HCM, the LOS grade on a 6 foot wide sidewalk does not reach LOS D until the sidewalk volumes reach 2,000 pedestrians per hour. Similarly, LOS E is not reached until volumes reach 3,000 pedestrians per hour. The existing pedestrian counts adjacent to the site combined with the projected pedestrian trips associated with the site will not approach these thresholds. Thus, the sidewalk capacity will not be exceeded, and there will be no detrimental impacts.

As discussed in Chapter 2, pedestrian improvements will be made at the intersection of I Street and Half Street SW as part of the turnaround construction. These improvements include curb extensions on the northern side of I Street SW that contribute to traffic calming by narrowing the travel way, in addition to high-visibility crosswalk markings and additional signage to help enhance overall pedestrian safety at the intersection.

3.5 On-Street Parking

An on-street parking inventory was collected to determine the number of parking spaces and their corresponding parking curbside restrictions within a quarter-mile walkshed. Figure 22 shows the specific parking curbside restrictions at each block face within the quarter-mile walkshed, and Table 14 gives a quantitative breakdown of parking spaces.

Table 14: Breakdown of Parking Spaces by Curbside Restriction

Parking Restriction	Parking Spaces
Residential Parking Permit	
Zone 6 permit only 7a-midnight, M-Sun	183
2 hr parking 7a-midnight, M-Sun, except Zone 6	93
Metered	
3 hr parking 7a-6:30p, M-Sat	76
2 hr parking 7a-9:30p, M-Sat	7
2 hr parking 7a-6:30p, M-Sat	45
Unrestricted	

Parking Restriction	Parking Spaces
Unrestricted at all times	53
No Standing/Parking 7a-7p, M-F	23
No Standing/Parking 7a-9p, M-Sun	2
No Standing/Parking 7-9:30a, 4-6:30p, M-F	20
Permit Parking only 7a-6:30p, M-F	34
20 minute parking 6a-9p, M-Sun	8
Other	
Bus Loading 6a-8:30p, No parking all other times	1
Police Parking Only	34
Total	579

As shown, the majority of the parking in the vicinity of the site is Residential Parking Permit (RPP) and, of these, the majority of spaces are enhanced RPP spaces. The enhance RPP means only vehicles with Zone 6 permits may park in those spaces during the specified times. All other RPP spaces have a two hour time limit for those without Zone 6 permits. Therefore, the majority of the RPP spaces in the vicinity of the site may only be utilized by Zone 6 permit holders during the times when trips to and from the site are expected to peak. As the Randall School's address is located on a commercial street, its residents will not be eligible for RPP passes, and thus are not expected to park in RPP zones.

There are also a substantial amount of metered parking spaces near the site, including the portion of I Street SW directly adjacent to the site. All of the metered parking in the area has a time limit of two to three hours, running from 7:00 AM to 6:30 or 9:30 PM. These spaces may be utilized by those visiting the museum or the restaurant as their duration of stay falls within two to three hours. There is also a significant amount of unrestricted parking near the site. Some of these spaces are unrestricted at all times, and some have certain time constraints as discussed in the table above. The presence of the metered and unrestricted spaces allows drivers that prefer on-street parking to park on-street without spilling over into RPP zones.

Based on this review of on-street parking, the Randall School PUD will not have a detrimental impact to the surrounding network's on-street parking supply.

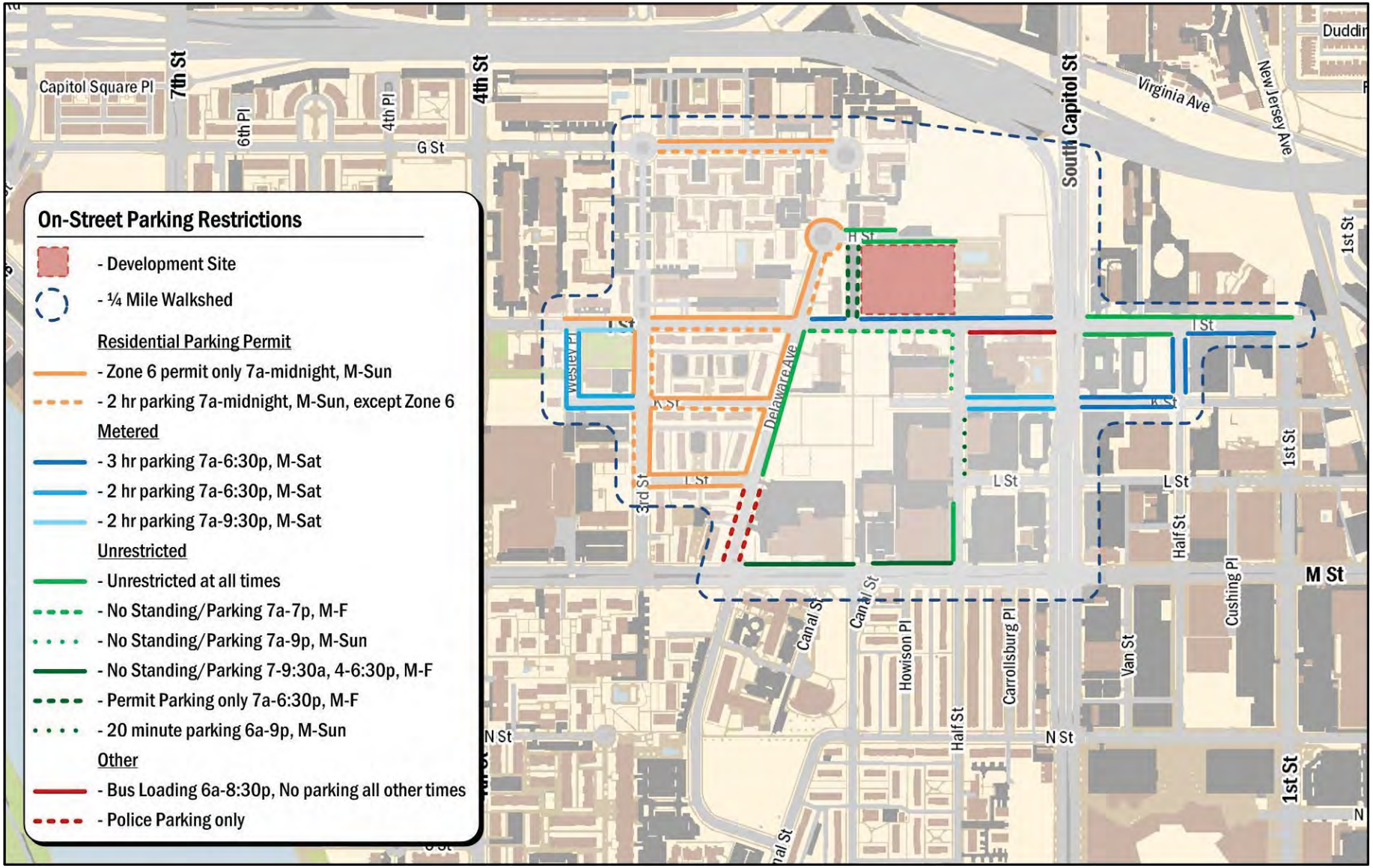

Figure 22: On-Street Parking Restrictions