

Exhibit D

West End Parcel SQUARE 50
Washington, DC

TRANSPORTATION IMPACT STUDY
November 16, 2012

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INTRODUCTION

The following report details the results of a Transportation Impact Study (TIS) for the West End Square 50 project in Northwest Washington, DC. Figure 1 provides an illustration of the site location. This document is supplemental to the Board of Zoning Adjustment application number 18456.

West End Residential Properties, LLC is proposing to redevelop the Square 50 site located in the West End as part of a land disposition agreement (LDA) with the District. Square 50 is located at 2225 M Street, NW and is bounded by the site driveway to the north, M Street to the south, 23rd Street to the west and a portion of the public alley and office building to the east. The site is currently occupied by the Engine Company #1 fire station.

The proposed development program is planned to consist of a mix of uses including a new replacement fire station at ground level, recreational or commercial land uses, and above grade apartment units. There are two proposed options for the development which are summarized below:

Option 1

- 14,886 square foot redeveloped Fire Station
- 51,821 square foot Apartment building containing 52 to 61 Units
- 20,597 square foot Squash Club

Option 2

- 14,886 square foot redeveloped Fire Station
- 51,821 square foot Apartment House containing 52 to 65 Units
- 26,560 square feet of Commercial Space

The project will provide for 24 below-grade parking spaces and will require a variance from providing the required parking spaces (55 for Option 1 and 43 for Option 2). The project will also provide one 30 foot loading berth in the rear of the building. Both Options will require a loading variance as the residential use requires a 55-foot loading berth in addition to the 30-foot loading berth (which would support either the squash court or commercial office use). The project is planned to be complete by 2015.

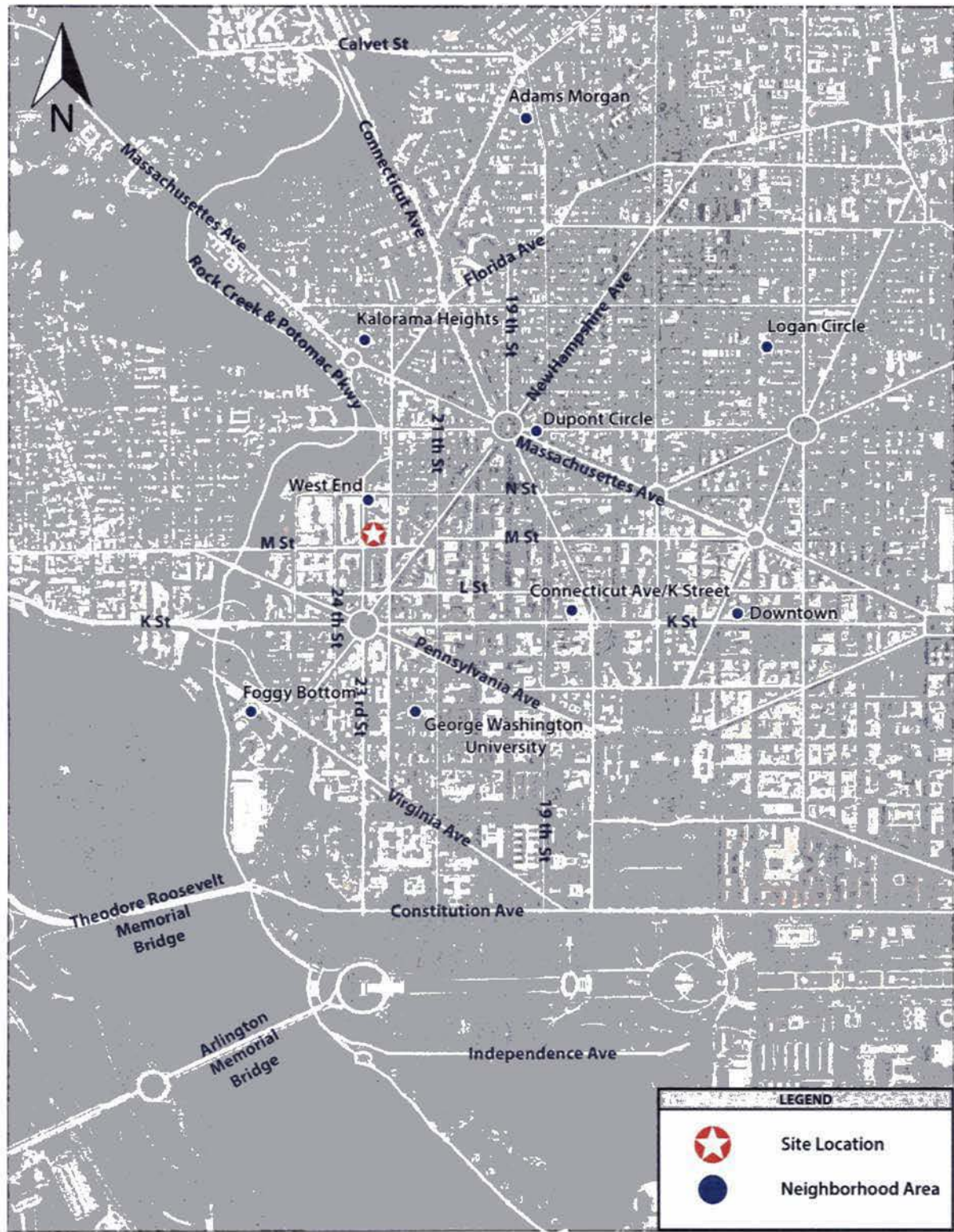


Figure 1: Site Location

Scope of Study

The following TIS provides an assessment of existing and future transportation conditions including site access, pedestrian and bicycle facilities, transit, loading facilities, traffic and parking demand. This TIS also provides a Transportation Demand Management (TDM) Plan that outlines various commitments the developer will employ to encourage use of green travel mode choices.

BACKGROUND

Neighborhood Context

Square 50 is located in the WestEnd section of Washington, DC southwest of Dupont Circle and due north of Foggy Bottom. The site is north of the George Washington University campus and is surrounded by numerous hotels including the Ritz Carlton, the Park Hyatt, the Embassy Suites and the Westin. The Tanzanian Embassy is north of the site located at 1232 22nd Street, NW.

Fire Station Operations and Transportation Characteristics

The Square 50 site is currently occupied by the Engine Company #1 fire station. Parking is provided on site within an un-marked surface lot accessed from 23rd Street and M Street¹. Fire station employees also park along the alley ingress accessed from M Street. During observations² there were 14 vehicles parked on-site (8 vehicles parked within the un-marked surface lot and 6 vehicles parked along the M Street alley ingress).

The existing fire station has 13 employees per shift³. Approximately 99% of employees drive to the location to work 24 hour shifts (7:00 AM to 7:00 AM). Employees are required to drive, as they can be called to fill in shortages at other firehouses at any time, and public transportation is not a feasible option for rapid response.

At the time of shift changes or between the hours of 6:00 AM and 7:00 AM a maximum of 26 employees could potentially be on-site. There are no proposed changes in staffing as a result of the new firehouse construction.

Proposed Squash Court Operations and Transportation Characteristics

With approximately 19,000 existing squash players in the Washington DC area, there is significant demand for squash courts as there are currently only 13 squash courts in the District of Columbia. The proposed squash club will increase the number of accessible courts by 60% and will feature 8 squash courts, locker rooms, a fitness center, study areas, massage therapy, physical therapy, a café⁴, pro-shop

¹ Cars are typically parked on the M Street driveway so primary access/egress is limited to 23rd Street only.

² Friday, November 2, 2012 between 7:00 AM and 9:00 AM.

³ Employees include the Engine, Ladder Truck, Ambulance, Medic Unit and the TAU unit staff

⁴ Primarily used by squash facility patrons

and a rooftop terrace. The squash court will occupy the third level and a portion of the fourth level of the building, and will be accessed through the lobby on 23rd Street. The squash court is planned to be operational Monday through Friday from 6:00 AM to 11:00 PM and Saturday and Sunday from 7:00 AM to 10:00 PM.

Average annual attendance is projected to be about 100,000 patrons per year. The typical peak time of the day for the squash courts are Wednesdays from 6:00 AM to 9:00 AM, 5:00 PM to 8:00 PM and on weekends. Average daily attendance is about 280 per day.⁵ Squash court patrons are expected to travel to/from the facility primarily by way of public transit and/or walk/bike. Parking will be very limited and squash employees will be encouraged to use Metrorail, Metrobus and/or walking/biking to get to the site.

One of the eight squash courts will include bleacher seating with the capacity to accommodate 200 people. During special events this bleacher seating will be utilized. It is projected there would be one special tournament or large event per month with a projected attendance of 50 to 75 attendees. Most special events will take place on Weekends. Participants and spectators will likely stay in surrounding hotels. Staff will recommend preferred hotels locations to limit vehicular traffic to the site.

Competitive use of squash facilities by high school and college students typically occurs between November and March. During those months, there could be competitions two nights per week.

⁵ Estimate based on anecdotal information from other similar facilities

TRANSPORTATION NETWORK AND SITE ACCESS

The proposed Square 50 project is located in the West End community and is served by a broad transportation network including Metrorail, Metrobus, principal and minor arterials, local streets and sidewalks.

Existing Road Network

Key roadways surrounding the site include M Street, L Street, 23rd Street and 22nd Street. Those roadways are described below. Average Daily Traffic (ADT) volume for each roadway is based on DDOT's traffic volume data.

- M Street is a one-way⁶ westbound minor arterial. Within the site vicinity, M Street extends from Thomas Circle, to the east, to the merger with Key Bridge Freeway where the roadway becomes Canal Road to the west. Average Daily Traffic (ADT) volume, between 23rd and 24th Streets, is 13,800 vehicles and the posted speed limit is 25 miles per hour. Within the study area, M Street is three lanes plus two adjacent curbside parking lanes. Two-hour metered parking is permitted on the both sides of M Street west of 22nd Street, excluding the south-side of M Street between 23rd and 24th Streets. Parking along this section of M Street is limited to 15 minute loading for hotel patrons. East of 22nd Street, curbside parking is prohibited on weekdays from 7:00am to 6:30pm.
- L Street is a three-lane one-way eastbound minor arterial that extends from Pennsylvania Avenue, NW to the west to Massachusetts Avenue, NW to the east. L Street functions as a two-way pair with M Street. L Street services 11,600 vehicles per day within the project vicinity. DDOT has implemented a bike lane along the north-side of L Street. Approaching 23rd Street (north-side), daily curb-side parking is limited to Metropolitan Police Department (MPD) permit holders only. The posted speed limit is 25 miles per hour.
- 23rd Street is a one-way southbound principal arterial. Daily traffic adjacent to the project is 15,500 vehicles. Within the study area, 23rd Street has three travel lanes during the peak periods⁷. During off-peak periods, one of

⁶ M Street is one-way westbound between Connecticut Avenue, NW and 29th Street. West of 29th Street, M Street is two-way running west to the intersection with Key Bridge where the roadway transitions to Canal Road.

⁷ 7:00 am to 9:30 am and 4:00 pm to 6:30pm

the travel lanes provides curbside parking. The speed limit is 25 miles per hour.

- 22nd Street is a one-way northbound minor arterial that extends from Virginia Avenue, NW to the south to S Street, NW to the north. Daily traffic adjacent to the project site is 13,900 vehicles. Within proximity to the study area, 22nd Street has three travel lanes during peak periods. During off-peak periods, one of the travel lanes provides curbside parking.
- N Street operates as a two-way westbound and eastbound local road adjacent to the project site. N Street extends from 25th Street, NW to the west to Florida Avenue, NE to the east. Daily traffic adjacent to the project site is 1,800 vehicles. Within proximity to the study area, N Street has two travel lanes with curbside parking provided along both sides.

The roadway network described above is illustrated in Figure 2.

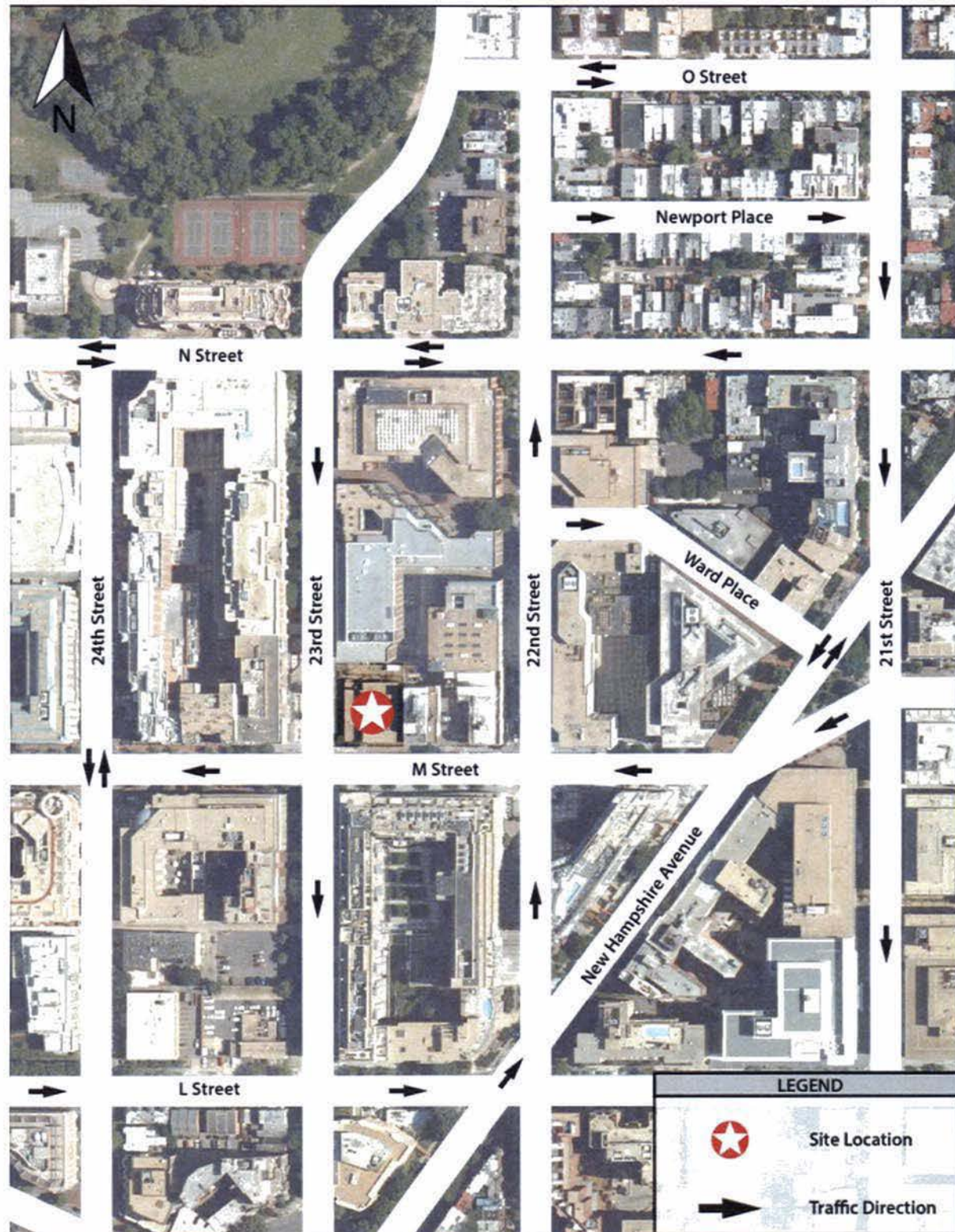


Figure 2: Square 50 and Surrounding Roadway Network

Site Access

Vehicular ingress/egress to Square 50 currently is provided via a 12 foot driveway from 23rd Street and a 12 foot driveway from M Street. The M Street driveway is typically occupied with parked vehicles and is therefore not readily accessible for access/egress. Pedestrian access to the existing fire station is provided via the site entrance at the corner of 23rd and M Street, NW.

The fire station currently has a 12 foot driveway for Emergency Medical Service (EMS) vehicles and a 74 foot driveway for fire trucks. The driveways are separated by a 19 foot refuge area.

Existing site circulation is shown in Figure 3.

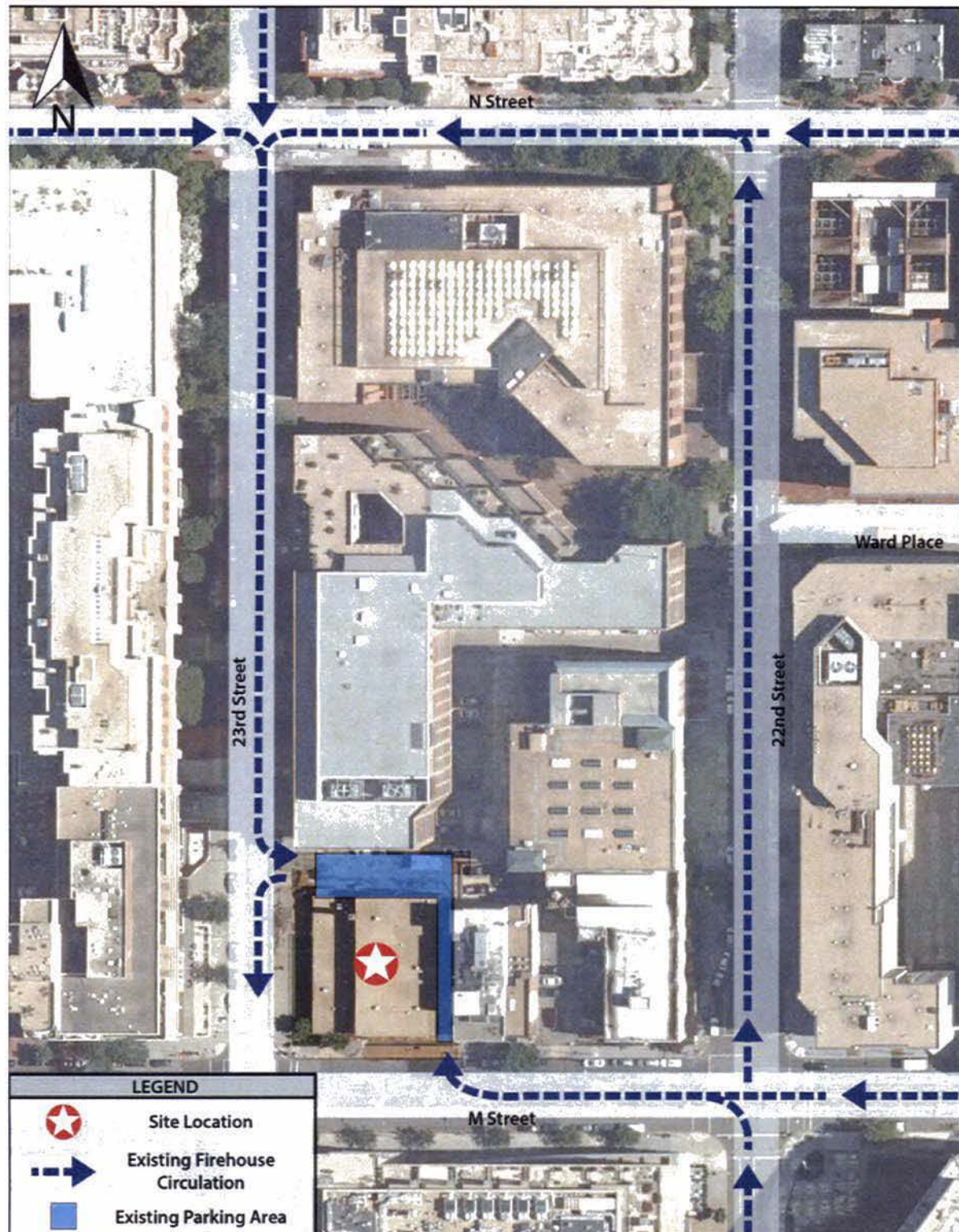


Figure 3: Existing Site Circulation

Existing Alley Network

A portion of the eastern edge of the Square 50 site is located directly adjacent to a north-south alley. The north-south alley is accessed via an east-west alley that is accessed from 22nd Street and 23rd Street. The east-west alley provides access to the public parking garage⁸ at 1255 23rd Street (approximately 240 parking spaces) and also to a private parking lot used by Jefferson Square's building's tenants such as Le Printemps Flower Shop and Jefferson Square Deli. There are a total of 12 reserved parking spaces in the alley with one exclusively reserved for the Flower Shop and one for the Dry Cleaners.

See Figure 4 for an illustration of the alley network and circulation.

The private parking lot is separated from the firehouse parking by a fence located at the southwest corner of the north-south alley. The lot has nine reserved marked spaces, of which one reserved space is exclusively for flower shop deliveries. The lot also has two loading bays, each located on the ends of the marked spaces. Field observations conducted on November 2, 2012 from 7:00 AM to 9:00 AM indicated there were several vehicles parked inside the north-south alley.

⁸ Operated by Central Parking

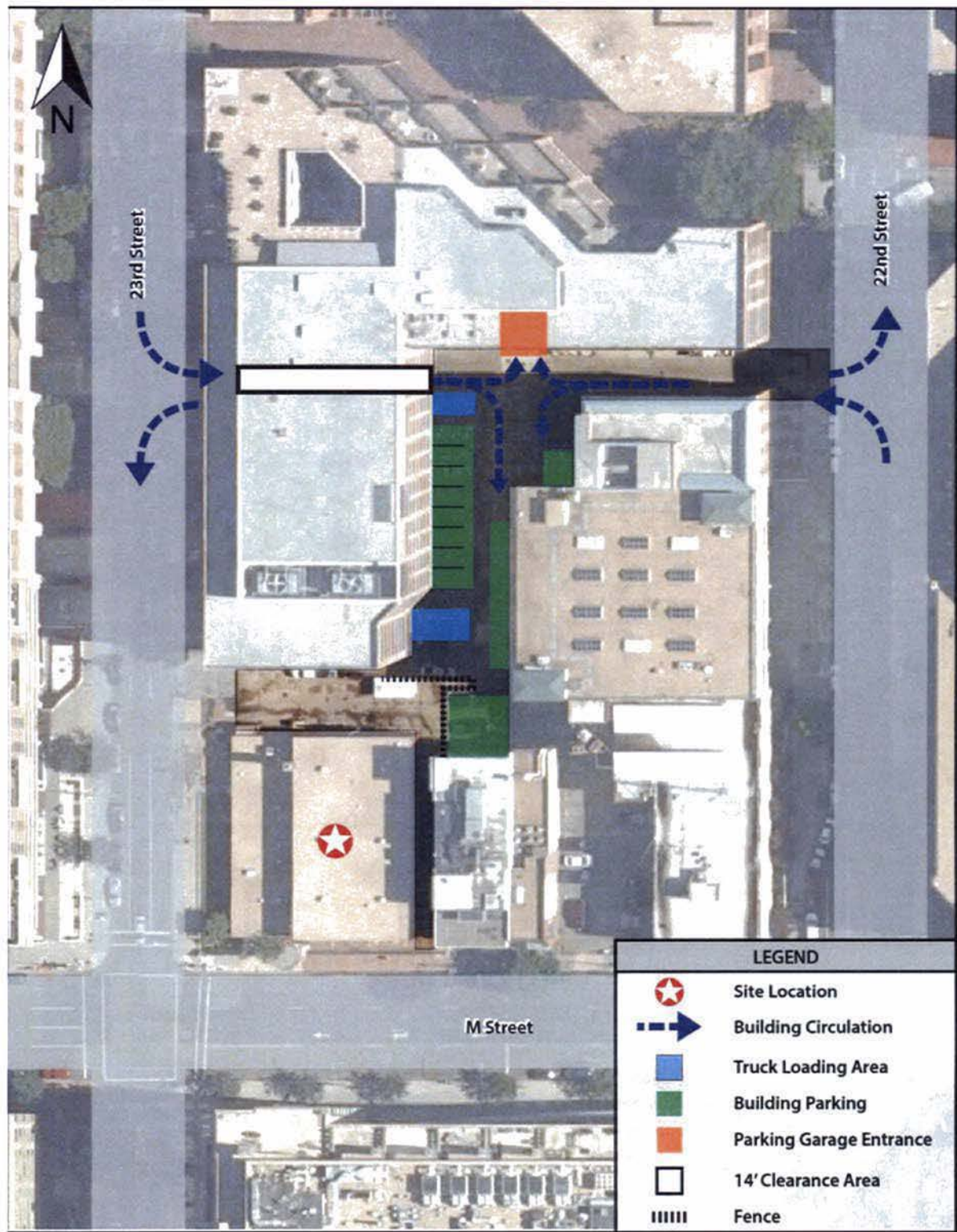


Figure 4: Alley Network and Circulation

Pedestrian Access and Circulation

Sidewalks and crosswalks provide access to the proposed Square 50 project. An inventory of sidewalks and crosswalks at the study area intersections is shown in Figure 5.

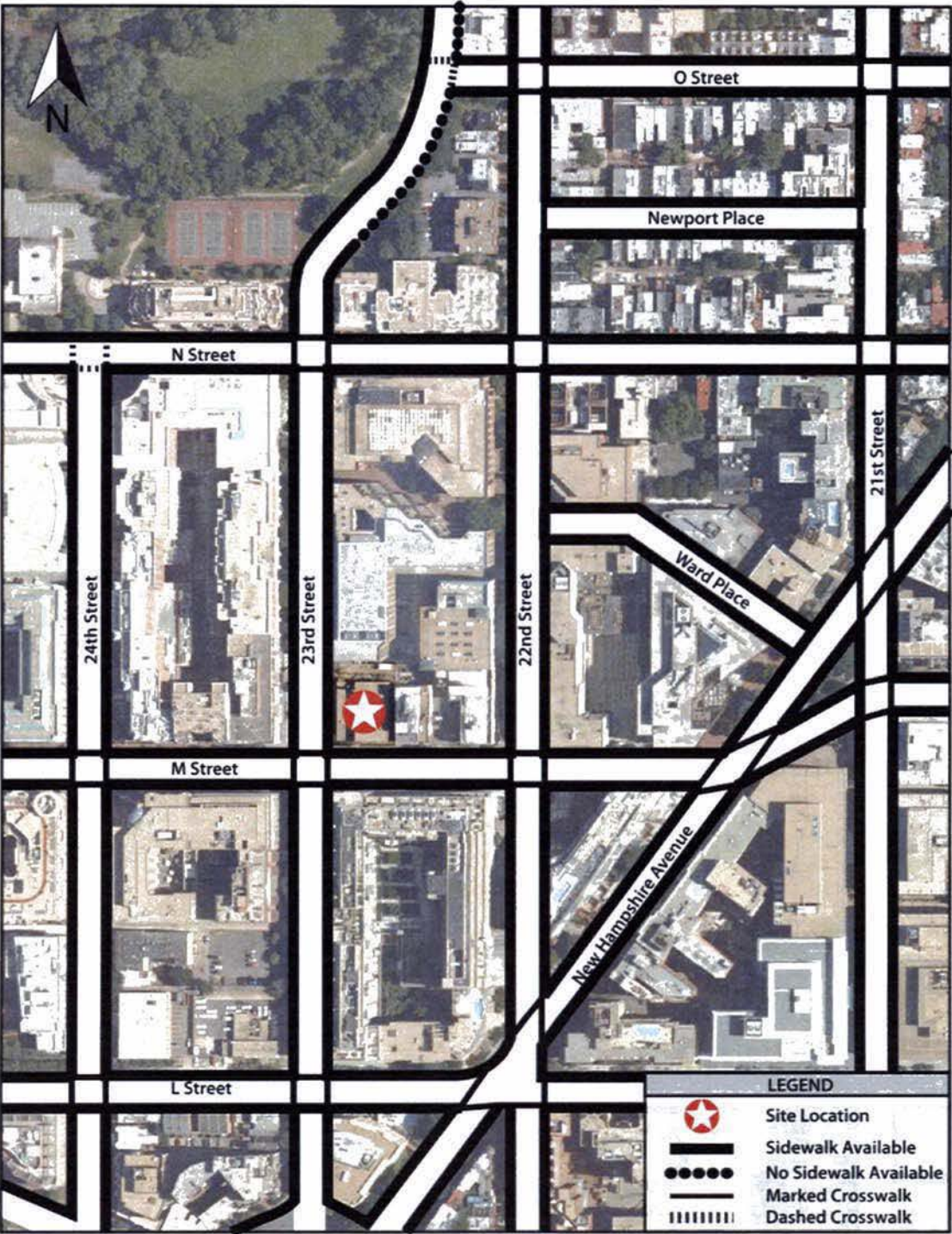


Figure 5: Pedestrian Conditions

Sidewalk widths surrounding the site are typically greater than the minimum six-foot⁹ clear path for the pedestrians to walk. All sidewalks are generally adequate to accommodate pedestrian traffic.

A summary of pedestrian counts collected (at intersections surrounding Square 50) during the morning and afternoon peak hour are as follows:

- L Street – 566 AM and 510 PM
- M Street (at intersection with 23rd Street) – 638 AM and 799 PM
- N Street (at intersection with 23rd Street) – 185 AM and 173 PM
- 22nd Street (at intersection with N Street) – 452 AM and 449 PM
- 23rd Street (at intersection with M Street) – 147 AM and 160 PM

Detailed pedestrian counts for the study area intersections are provided in the Appendix.

There are various pedestrian generators within the vicinity of Square 50 including the following:

- Starbucks
- Exxon gas station¹⁰
- West End Cinema
- West End Library
- WestEnd Bistro
- Sports Club/LA
- Trader Joe's
- Numerous office and apartment buildings

Some pedestrian attractions are illustrated in Figure 6.

⁹ Per specifications in the DDOT Design and Engineering Manual (April 2009)

¹⁰ The Exxon gas station located at the southeast corner 22nd and M Street serves as a gathering and rest spot area for taxi cab drivers. During observations a number of pedestrians were observed catching a taxi at this location.

The Foggy Bottom Metrorail Station and GW University are located further south of Square 50 approximately 0.4 miles away. The Walk Score for the Square 50 site is 97. The Walk Score is a number between 0 and 100 that measures the walkability of any location. A Walk Score between 90 and 100 is considered a Walker's Paradise in which daily errands do not require a car.

Some of the marked crosswalks in the study area are worn out and require restriping to make them more visible to motorists such as 23rd Street and M Street and 23rd and L Street intersections.

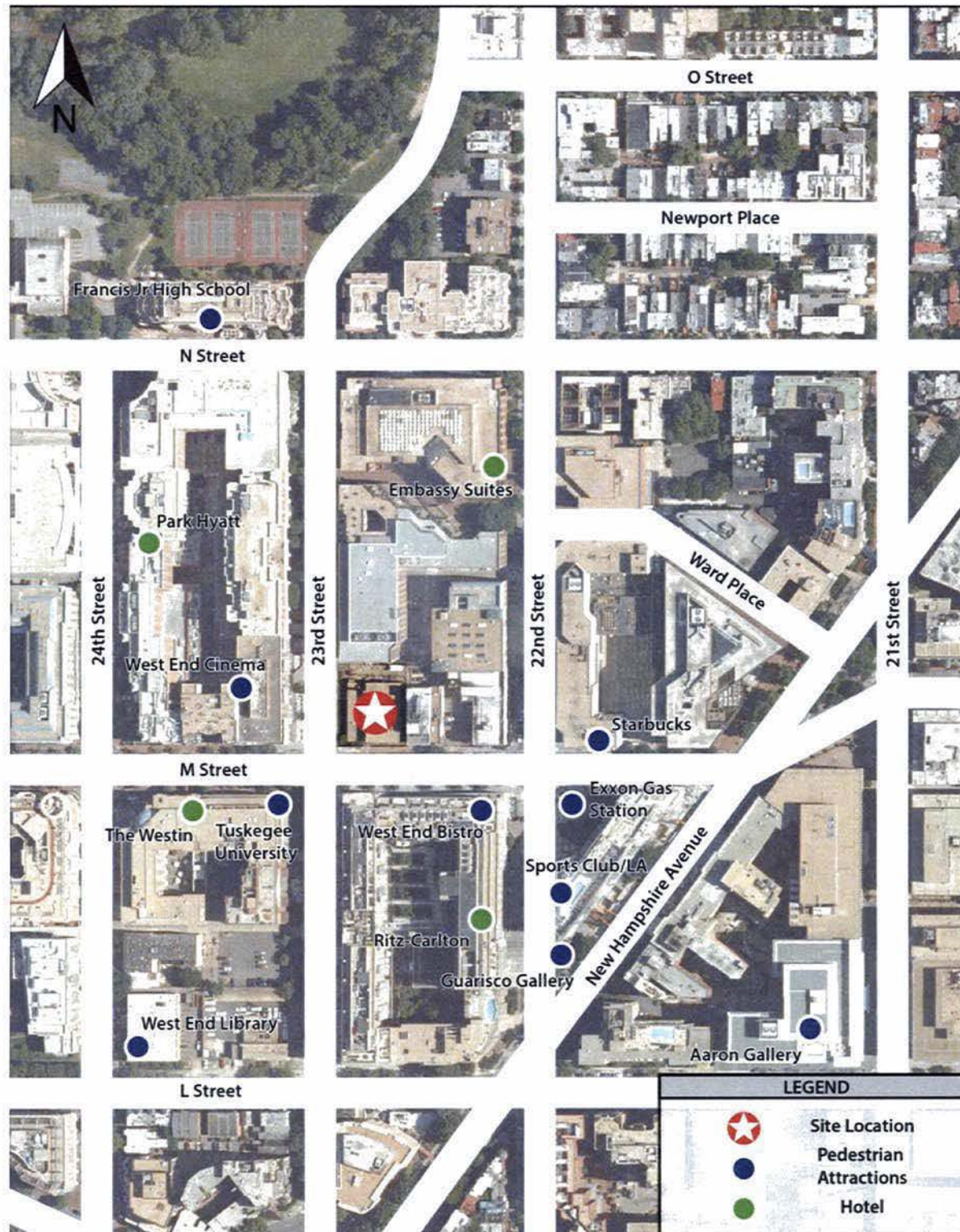


Figure 6: Pedestrian Attractions

Bicycle Access and Circulation

There is a bike lane along the northside of L Street, NW between 12th Street, NW and 25th Street, NW. Photographs of the bike lanes along L Street between 22nd Street and 23rd Street and between 21st Street and 22nd Street are shown in Figures 7 and 8.



Figure 7: L Street Bike Lane (between 22nd and 23rd Streets)



Figure 8: L Street Bike Lane (between 21st and 22nd Streets)

In addition to the L Street bike lanes the following bicycle facilities are within a two mile radius of the Square 50 site:

- Off-Street Trail on Rock Creek and Potomac Parkway
- Off-Street Trail on M Street (west of the Rock Creek and Potomac Parkway)
- Capital Crescent Trail (crosses Canal Road)
- Bike Lanes on New Hampshire Avenue (northeast of DuPont circle), Q Street and R Street
- Bike Lanes on 15th Street
- Signed Bicycle Route on 19th Street

Figure 9 provides an illustration of the above listed bicycle facilities.

On roadways without designated bicycle facilities, bicyclists are expected to either utilize the sidewalk or the vehicular travel lanes, as typically observed throughout areas within the city, to directly access the Square 50 project. Biking on the sidewalk is prohibited along 23rd Street but however is generally unrestricted along other study area roadways.

A summary of bicycle counts¹¹ observed during the morning and afternoon peak hour are as follows:

- L Street – 44 AM and 28 PM
- M Street – 45 AM and 74 PM
- N Street – 91 AM and 99 PM
- 22nd Street – 17 AM and 44 PM
- 23rd Street – 0 AM and 19 PM
- 24th Street – 11 AM and 15 PM

The 2011 District of Columbia Bicycle Map rates traffic conditions for bicycling adjacent to the Square 50 property as poor on M Street and 22nd Street. Traffic conditions for bicycling on N Street are rated as good.

Capital Bike Share has various bike stations near the project site, one station is located at 24th Street and N Street (which furnishes 15 bicycles) and the other on M Street between 21st Street and New Hampshire Avenue (which houses 19 bicycles). Capital Bike Share also has a bike station at the corner of 25th and L Street which furnishes 11 bikes.

Figure 9 illustrates existing and proposed bicycle facilities within the vicinity including a future trail connection proposed along a section of Whitehurst Freeway, west of Rock Creek and Potomac Parkway.

¹¹ Bicycle counts on 24th Street, 23rd Street, M Street and L Street were conducted prior to implementation of the L Street bike lane

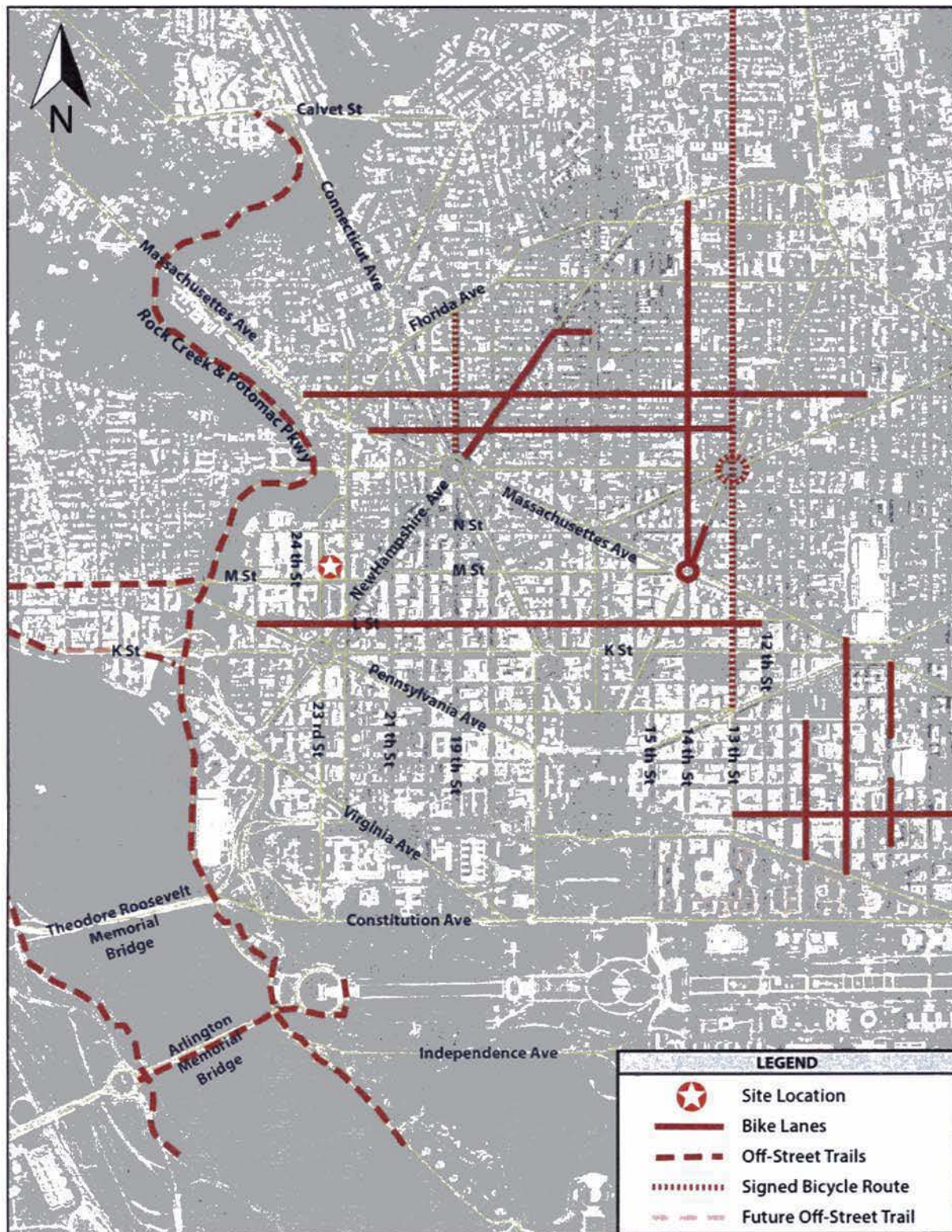


Figure 9: Existing and Proposed Bicycle Facilities

Transit

The Washington Metropolitan Area Transit Authority (WMATA) has three Metrorail stations in close proximity to the Square 50 site. Those stations include the Foggy Bottom-GWU Station on the orange and blue lines and the DuPont Circle Station and Farragut North Station on WMATA's red line. The Foggy Bottom Station is located approximately 0.4 miles (about an eight minute walk) south of the Square 50 project, at the intersection of 23rd Street and I Street. Both the DuPont Circle Metrorail Station and the Farragut North Metrorail Stations are approximately 0.7 miles east of the site (just over a 14 minute walk from the site).

WMATA also has a number of Metrobus routes serving the Square 50 site location. Metrobus routes, key destinations and service headways are shown in Table 1.

The Dupont Circle- Georgetown- Rosslyn Circulator route services M Street, NW and L Street, NW. The circulator route operates Sunday through Thursday from 7:00 AM to Midnight and Friday through Saturday from 7:00 AM to 2:00 AM. There is a circulator bus stop at the corner of 24th Street and M Street, located one block west of Square 50, and a bus stop located at 24th Street and L Street. Figure 7 illustrates WMATA Metrobus routes, Metrorail Stations and the DuPont-Georgetown-Rosslyn Circulator route.

Table 1 WMATA Bus Routes

Route	Route Name	Key Destinations	Service Headways (Weekday Peak)
31	Wisconsin Avenue Line	Friendship Heights Station Tenleytown- AU Station Washington National Cathedral Foggy Bottom-GWU Station	13 to 17 minutes
32,36	Pennsylvania Avenue	Friendship Heights Station Wisconsin Avenue Washington National Cathedral Georgetown White House The National Mall Capitol Hill	5 to 19 minutes
38B	Ballston-Farragut Line	Ballston –MU Station Clarendon Station Rosslyn Station Georgetown Farragut North Station Farragut West Station	12 to 16 minutes
D6	Sibley Hospital- Armory Line	Stadium Sibley Hospital Georgetown University Hospital DuPont Circle Station Metro Center Station Union Station Stadium Armory	10 - 30 minutes
H1	Brookland-Potomac Line	Park Adams Morgan DuPont Circle Foggy Bottom Potomac Park/State Department	16 – 24 minutes
N3	Massachusetts Avenue Line	Friendship Heights Station Spring Valley Foggy Bottom-GWU Station Potomac Park/State Department	15-24 minutes
L1	Connecticut Avenue Line	Federal Triangle Station Foggy Bottom Potomac Park	12-20 minutes

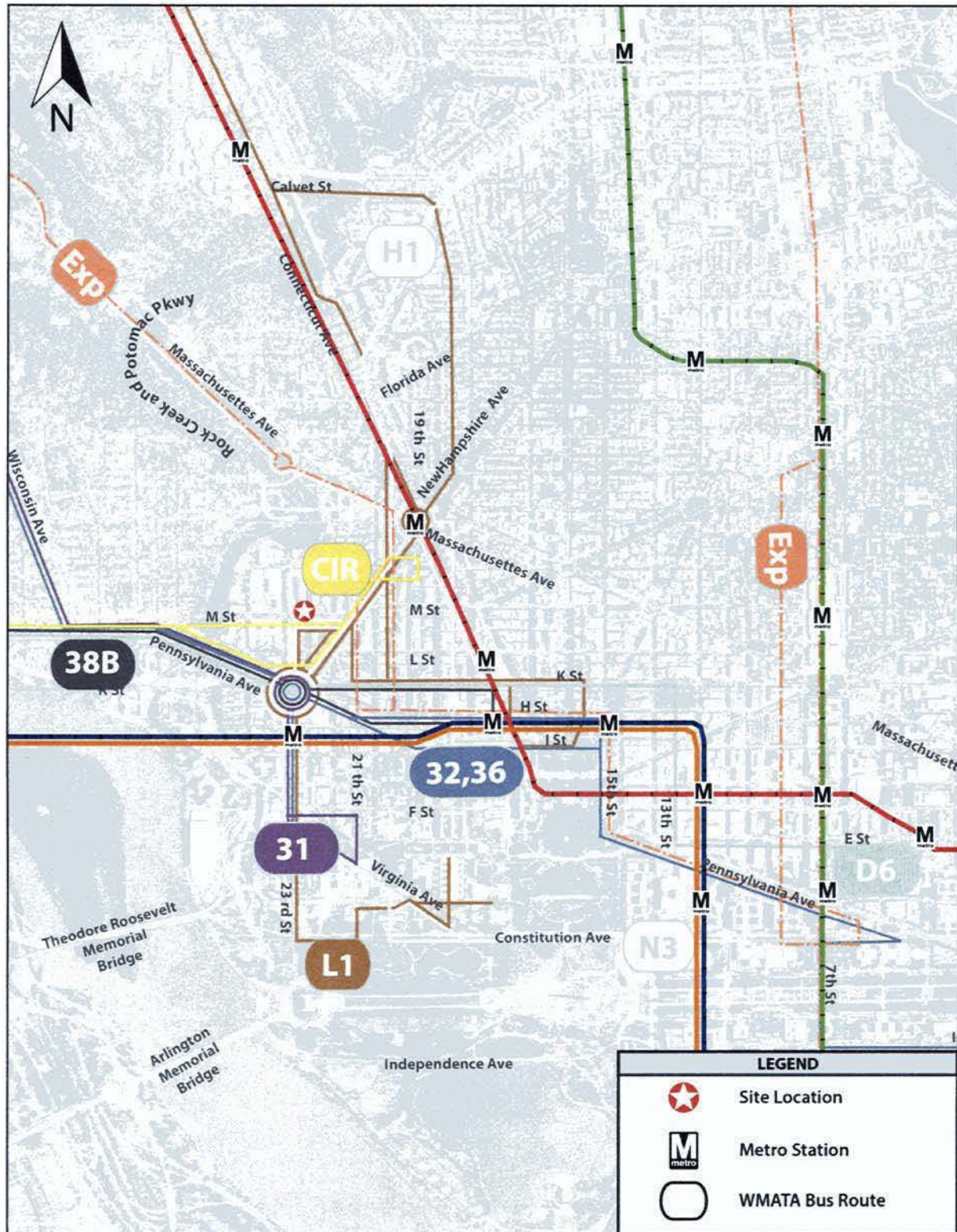
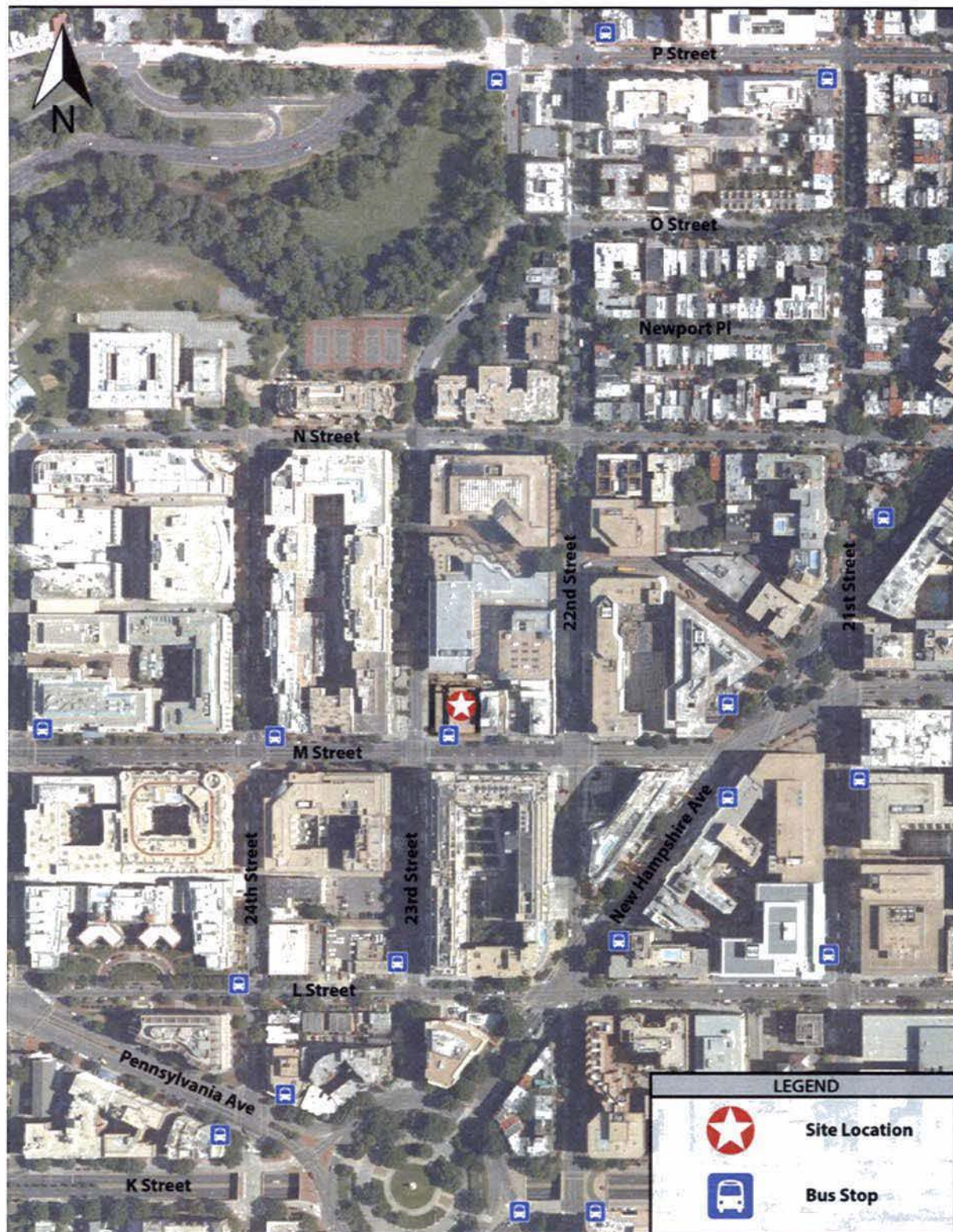


Figure 10: Metrorail Stations and Metrobus Routes

There are numerous Metrobus stops along M Street within the vicinity of Square 50. The bus stops support the WMATA Metrobus routes H1, L1 and N3. The MTA Commuter Bus route 907 services M Street (near the intersection with 23rd Street) in the morning and also stops along L Street (approaching 23 rd. Street) in the evening.

Bus stop locations are illustrated in Figure 11.



Parking

On-site

Parking is provided on site within an un-marked surface lot accessed from 23rd Street and M Street¹². Fire station employees also park along the alley ingress accessed from M Street. The maximum on-site parking capacity is 15 vehicles spaces.

During shift changes (typically between the hours of 6:00 AM and 7:00 AM) it can be expected a maximum of 26 parking spaces are required.

Off-site

There are a number of off-site parking garages near Square 50 as listed in Table 2 and shown on Figure 13. Table 2 also provides hours of operation, types of users, parking supply, monthly parking availability and parking rates.

¹² Cars are typically parked on the M Street driveway so primary access/egress is limited to 23rd Street only.

Table 2: Off-Site Parking Locations

Parking Garage	Hours	Users	Types of Parking	Supply	Monthly Parking Availability	Parking Rates
Ritz Carlton (Central Parking) 1150 22 nd St NW	M-Sun: 24 Hours	Public & Hotel Guests	• Daily • Overnight • Monthly	400	Monthly parking spaces are currently available. The operation manager noted they can allocate public spaces to monthly spaces, as needed.	Hotel Guests: Daily Valet: \$29 Overnight Valet: \$49 Public (Self-Park): Early Bird: \$10 1 Hour: \$14 90 Min: \$21 8 Hours: \$26 Monthly: \$242
Atlantic Parking (Surface Lot) 2125 M St NW	M-F: 6AM-8PM	Public	• Daily • Monthly	44 (Lined Spaces)	25 spaces currently available for monthly parking, 7 taken, 18 for sales as of October 22 nd , 2012	Public: Early Bird: \$9 1 Hour: \$6 Maximum: \$10 Evening: \$6 Monthly: \$200
Colonial Parking 1200 New Hampshire Ave NW	M-TH: 6AM-10PM F: 6AM-12AM Sat: 10AM-12AM Sun: 10AM-10PM	Public	• Daily • Monthly • Overnight	Information Not Available	20 monthly spaces currently available for monthly parking as of October 22 nd , 2012	Public: Early Bird: \$11 Daytime: \$16 Hour: \$9 Evening: \$8 Weekend: \$7 Monthly: \$227.57 (unreserved) \$455.15 (reserved)

Parking Garage	Hours	Users	Types of Parking	Supply	Monthly Parking Availability	Parking Rates
IM-Park 1250 23 rd St NW		Public, Building Tenants	Monthly	Information Not Available	Monthly Non-tenant parking (non-reserved) available starting <i>October 30th, 2012</i>	Monthly non-tenant: \$233.05
PMI 2300 M St NW	M-Sun: 6AM-12AM	Public, Westin Hotel Guests, German Embassy	- Daily - Overnight - Monthly	Information Not Available	Currently at capacity	Public: 1 Hour: \$8 2 Hours: \$10 12 Hours: \$17 Daily Max: \$22 Monthly: \$221.25 (unreserved) \$442.50 (reserved)
IM-Park 2401 Pennsylvania Ave NW	M-F: 7AM-7PM	Public	- Daily - Monthly	107	Currently at capacity	Public: Early Bird: \$11 1 Hour: \$9 Daily Max: \$15 Monthly: \$238(unreserved) \$476 (reserved)
LAZ 2400 M St NW	M-F: 7AM-7PM	Public, Building Tenants	- Daily - Monthly	Information Not Available	Not available to non-building tenants	Public: 1 Hour: \$9 Daily Max: \$16 Monthly: \$220

Parking Garage	Hours	Users	• Types of Parking	Supply	Monthly Parking Availability	Parking Rates
Colonial Parking 2440 M St NW	M-F: 6AM-9PM	Public, Building Tenants	• Daily • Monthly	250	Not available to non-building tenants	Public: 1 Hour: \$11 2 Hours: \$16 Daily Max: \$18 Evenings (After 5PM): \$7 Monthly: \$231.79
Central Parking 1255 23 rd St NW	M-F: 7AM-7PM	Public, Building Tenants	• Daily • Monthly	240	Not available to non-building tenants	Public: 1 Hour: \$11 Daily Max: \$16 Monthly: 231.79

As shown in Table 2, daily parking is available at all of the parking garages. Monthly parking is available at the Ritz Cartlon, the Atlantic Surface Parking lot, the Colonial Parking garage and at IM Park. Based on available data, there are currently a minimum of 38 monthly parking spaces at two of the four locations. The remaining locations also support monthly parking for non-tenants residents¹³.

The parking locations that are likely to serve the Square 50 project are listed below and shown as “convenient or preferred” parking facilities in Figure 13:

- 1) Central Parking (garage), 1255 23rd Street
- 2) Atlantic Parking (surface lot), 2125 M Street
- 3) Colonial Parking (garage), 1200 New Hampshire Avenue

¹³ The number of available monthly parking spaces at those location is not known.

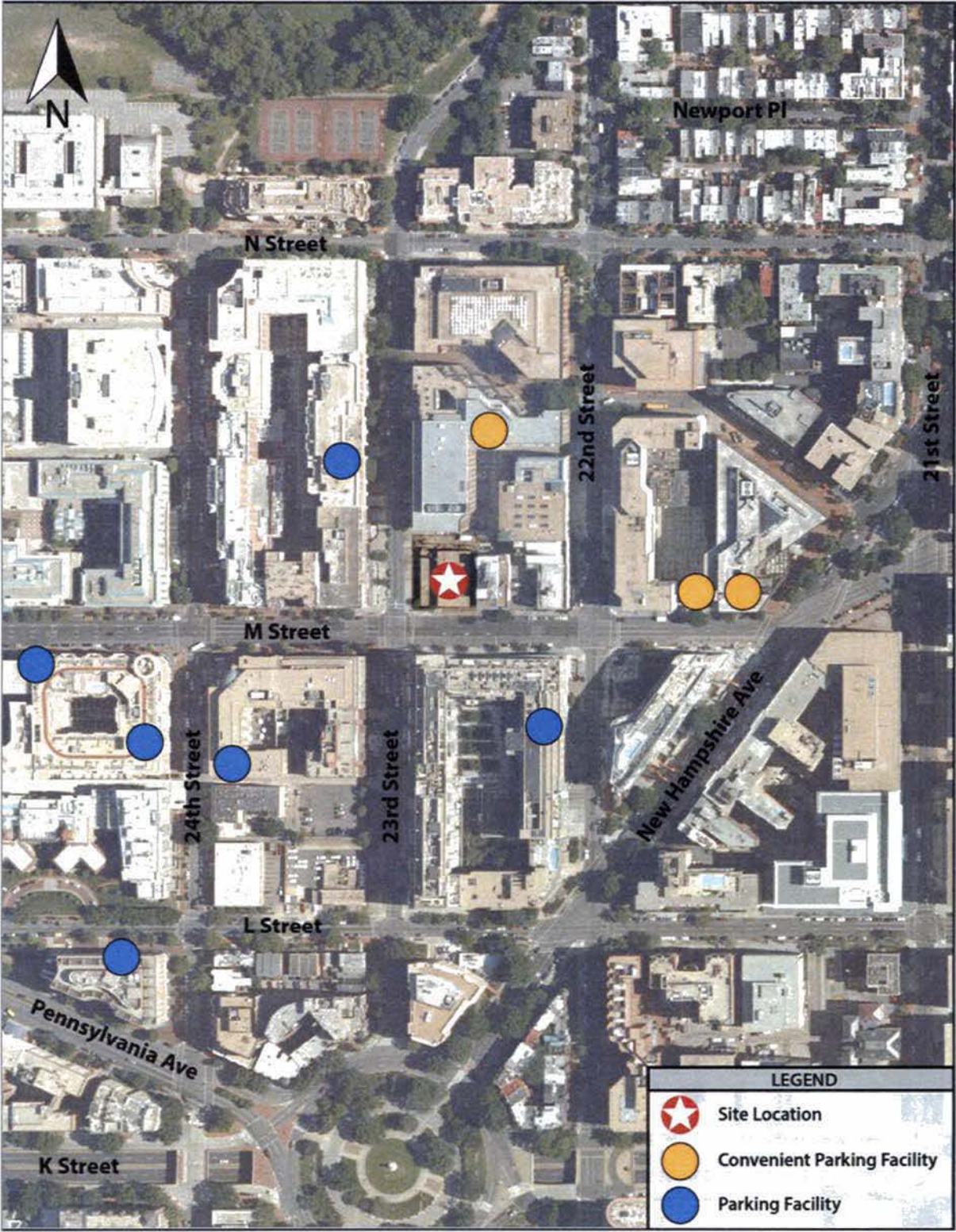


Figure 12: Parking Garages

Adjacent to Square 50, there are twenty metered parking spaces along the west side of 23rd Street, 8 metered spaces along M Street (5 on the north side and 3 on the south side), 17 metered spaces along N Street (8 on the north side and 9 on the south side), and 4 metered spaces on the east side of 22nd Street with an additional 4 spaces reserved for taxi cabs only.

On-street parking is typically utilized by patrons accessing residential and commercial land uses. Roadways where curbside parking would potentially be impacted by the site design or by site trips were included in the parking study area. Figure 13 highlights the parking study area and Figure 14 illustrates on-street parking and restrictions surrounding Square 50. The parking assessment included an inventory of existing parking spaces (metered and unmetered), parking restrictions and parking control.

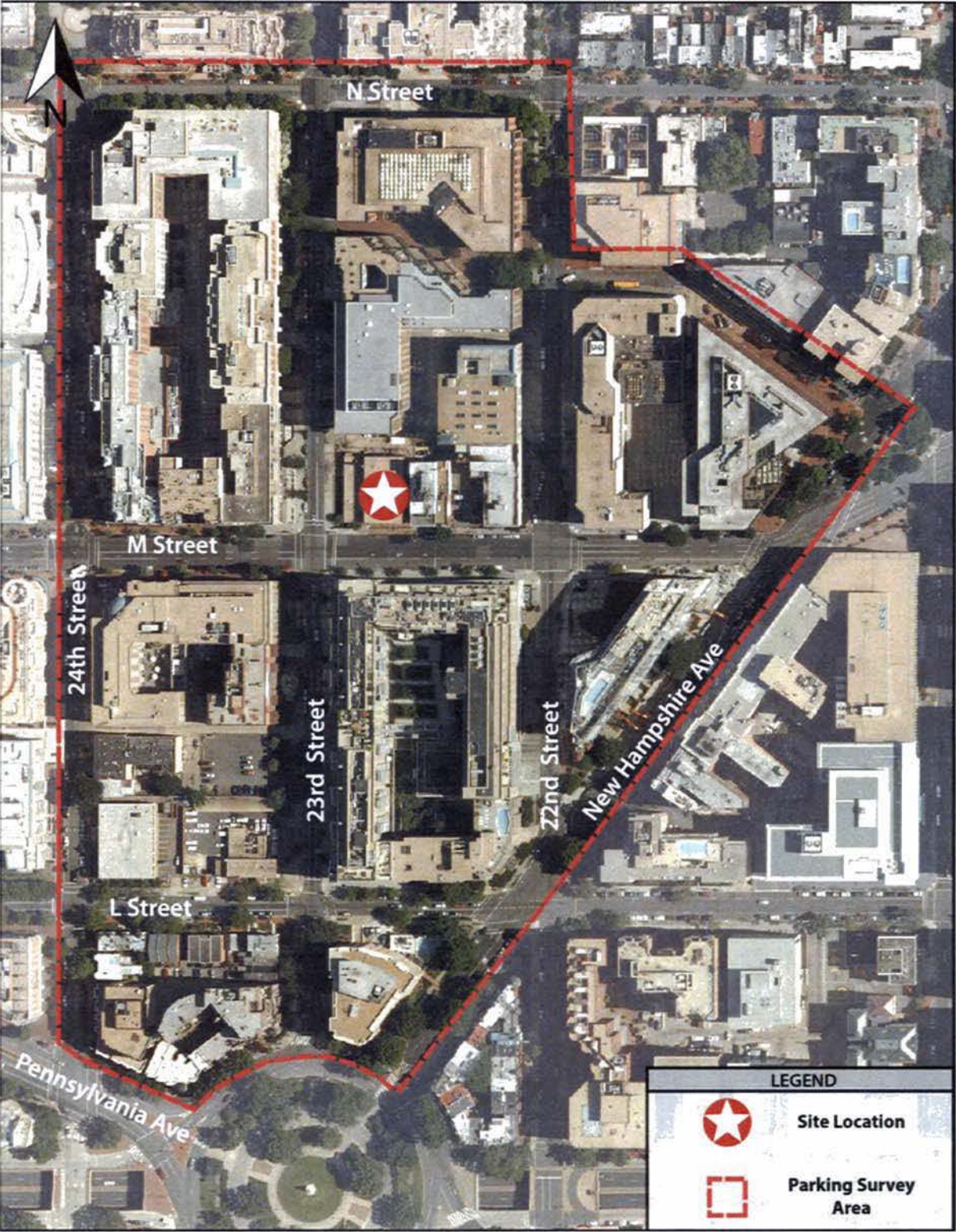


Figure 13: Parking Study Area

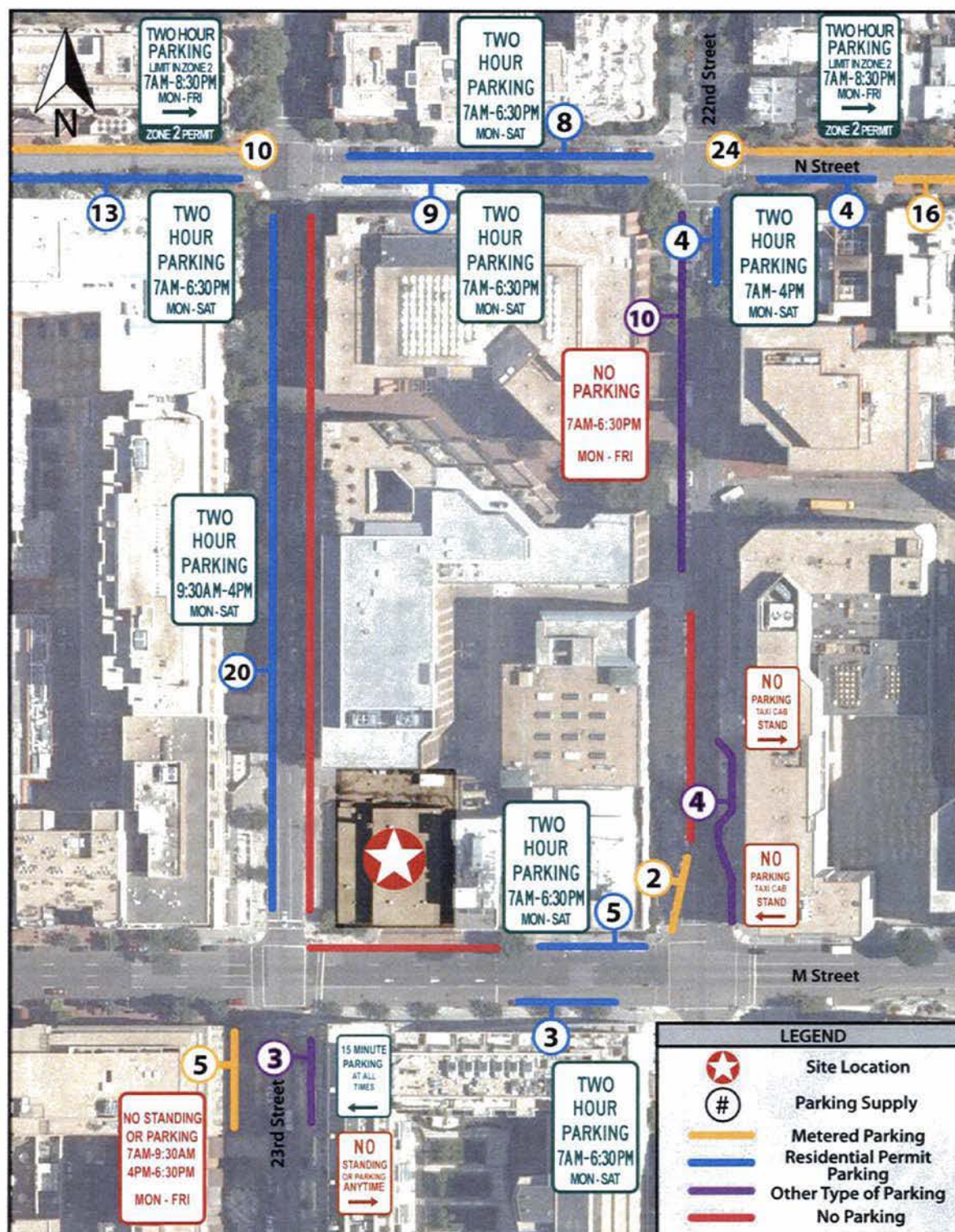


Figure 14: On-Street parking adjacent to Square 50

The existing on-street parking spaces along M Street, NW (between 22nd and 23rd Street) are currently utilized by construction vehicles.¹⁴ This usage is temporary as the spaces are signed reserved for construction use until February 2, 2013. Parking associated with construction was also observed north of M street along the west side of 22nd street directly adjacent to the construction area. Those vehicles were typically in place by 7:00 AM and left around 5:00 PM.

Parking occupancy surveys were conducted on Wednesday, April 14 and Thursday, April 15, 2011 from 2:00 PM to 4:00 PM and from 6:00 PM to 7:00 PM. Survey periods were selected in an effort to capture the peak commercial/office occupancy (afternoon hours) as well as the peak residential occupancy (evening hours). Tables 2 and 3 summarize the results of the afternoon and evening parking assessment.

Table 2 Afternoon Parking Inventory and Occupancy (2:00 pm to 4:00 pm)¹⁵

Street	Inventory*	Occupancy	% Occupied	Parking Control
L Street	33	5	97%	Metered; RPP; Signed
M Street	31	26	92%	Metered
New Hampshire Ave	43	43	105%	RPP; Metered
23rd Street	35	23	66%	Metered; RPP
24th Street	53	49	92%	Metered
22nd Street	10	7	70%	RPP; Signed
Total	205	153	75%	

¹⁴ associated with the planned hotel project at 2213 M Street, SW.

¹⁵ Inventory excludes parking spaces where daily parking is prohibited between the hours of 7:00 AM and 6:30 PM.

Table 3 Evening Parking Inventory and Occupancy (6:00 pm to 7:00 pm)¹⁶

Street	Inventory	Occupancy	% Occupied	Parking Control
L Street	33	19	58%	Metered; RPP; Signed
M Street	31	29	94%	Metered
New Hampshire Ave	43	40	93%	RPP; Metered
23rd Street	35	12	34%	Metered; RPP
24th Street	53	44	83%	Metered
22nd Street	10	3	30%	RPP; Signed
Total	205	147	72%	

As shown in Table 3, there are 205 parking spaces (145 metered parking spaces, 43 signed RPP and 17 with no parking control). Afternoon parking surveys indicate parking spaces within the study area were 75% occupied. During evening observations, 72% of the parking spaces were occupied. Peak parking accumulation observed in urban areas such as Baltimore, Atlanta, Boston, and Buffalo range from 74% to 90%¹⁷. Occupancy levels, during the evening peak hours, are within the functional range of peak accumulation for urban cities.

¹⁶ This represent inventory after 6:30 pm after rush hour parking restrictions have been lifted.

¹⁷ Weant and Levinson Parking manual (1990), CBD Parking Characteristics for Selected Urban Areas. Table 6-1

Safety Assessment

Table 4 provides a summary of accident history (within a three year period)¹⁸ for the study area intersections. This data is based on statistics received from the DC Department of Transportation Traffic Accident Report and Analysis System.

¹⁸ January 1, 2008 to December 31, 2010

Table 4 Summary of Accident History

Intersection	Total Number of Accidents	Total Number of Injuries	Total Number of Pedestrians Involved	Total Number of Bicycle/Motorcycle Involved	Predominant Types of Accidents
22nd and M Street	25	3	4	0	• 7 Rear end • 6 side swipe • 4 backing • 2 right turn • 1 right angle • 1 left turn
23rd and M Street	27	5	2	2	• 12 Side Swipes • 4 Left Turn • 6 Right Angles • 4 Unspecified • 3 Fixed Object • 2 Rear Ends • 2 Backing • 2 Unspecified • 1 Parked
23rd and N Street	10	2	1	0	• 3 Side Swiped • 2 Left Turn • 2 Rear Ends • 1 Right Angle • 1 Backing
23rd and L Street	32	5	3	0	• 10 Side Swipes • 7 Rear End • 3 Right Angle • 2 Left Turn • 2 Unspecified • 1 Right Turn • 1 Head On • 1 Parked • 1 Backing • 1 Non Collision

Intersection	Total Number of Accidents	Total Number of Injuries	Total Number of Pedestrians Involved	Total Number of Bicycle/Motorcycle Involved	Predominant Types of Accidents
22nd and N Street	25	5	0	0	• 10 Side Swiped • 4 Left Turn • 4 Rear End • 3 Unspecified • 1 Parked • 1 Fixed Object • 1 Ran off Road

As shown in Table 4, there were 27 accidents at the 23rd street and M street intersection. Two of these accidents involved a pedestrian. Based on the Crash Report Summary, a majority of the collision types were classified as side-swipes and right angles. According to the Institutes of Transportation Engineer's (ITE's) *Traffic Engineering Handbook*, some potential causal factors for right angles at a signalized intersection are large traffic volume, restricted sight distance, and inadequate traffic control devices.

At the 22nd and M street intersection there were 25 accidents. Of these accidents, four of them involved a pedestrian. Based on the crash report summary, a majority of the collision types were classified as rear-end and side-swipe. Some potential causal factors for rear-end at a signalized intersection are large turn volume, crossing pedestrians, and inadequate signal timing.

Table 17 provides crash rates for the study intersections. The intersection crash rates¹⁹ were calculated based on AADT volumes and Accident Summary Reports (R-7)'s supplied by DDOT. The crash rates shown below are expressed in terms of crashes per million entering vehicles (MEV), for instance if an intersection had a crash rate of 1; for every 1 million vehicles entering the intersection, 1 vehicle will be involved in a collision.

¹⁹ ITE's - *Transportation Engineering Handbook*, 6th Edition - R_{spot} Equation

Table 5 Accident Crash Rate

Intersection	# of Reported Crashes	Time Period of Analysis	Annual Average Daily Traffic Volume	K Factor	Crash Rate for Intersection (R_{spot})
22nd and M Street	25	3	27700	0.09	0.074
23rd and M Street	27	3	29400	0.09	0.075
23rd and N Street	10	3	17300	0.09	0.047
23rd and L Street	32	3	27100	0.09	0.097
22nd and N Street	25	3	15600	0.09	0.131

Ranking locations by crash rates account for exposure to potential crashes and are generally superior to crash frequency rates as a means of identifying high-hazard locations.

Car Sharing

There are two existing ZipCar stations within close proximity to the site including the Ritz Carlton station, located at 1150 22nd Street, which furnishes three vehicles and the 2400 M Street Apartment station at the corner of 24th Street and M Street which has eight vehicles. A ZipCar station will also be installed at the Square 37 development, at the intersection of 23rd Street and L Street.

Car2Go is another carsharing resource available. Members can locate available cars using the Car2Go website and then utilize their member card for access to vehicles. There are five parking locations in the District that have designated Car2Go parking spaces. In all other areas of the District, vehicles can be dropped off at any location (within the Washington, DC boundary) including residential areas however excluding rush hour zones, street cleaning, no parking areas and/or non-sanctioned off-street private parking. A Car2Go space is located within the Central Garage at 2021 K Street, NW.

EXISTING TRAFFIC ASSESSMENT

Data Collection and Field Observations

Traffic data (turning movement counts), pedestrian/bicycle counts, and field observations were conducted on Thursday, October 18, 2012 from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM at the following intersections:

- 22nd and M Street
- 23rd and M Street
- 23rd and N Street

Traffic data (turning movement counts), pedestrian/ bicycle counts included in this study were conducted²⁰ on Tuesday, May 10, 2011²¹ from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM at the following intersections:

- 23rd and L Street
- 23rd and M Street

Based on data collected during these time periods, the system peak hours were determined to be 7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM. Traffic analysis is however based each individual intersection peak hour. Field observations indicated traffic along 23rd Street experienced delay and congestion during the evening peak hours from the intersection with M Street and continuing south to the intersection with Washington Circle.

Existing Capacity Analysis

To assess existing traffic conditions, it is necessary to collect traffic data at the intersections during peak hours of traffic flow and operations (i.e. morning and evening rush hour periods). The data collected is in the form of turning movement counts for through, left and right movement at the intersection. This existing data, along with the number of lanes and information on traffic signal timings are entered into traffic analysis software and evaluated to provide a Level of Service

²⁰ As part of the West End Parcel Square 37 Zoning Commission Submittal and TIS

²¹ Data for these intersections was collected prior to the installation of L Street bike lanes

(LOS) at each intersection. Level of Service is calculated for the morning and evening peak hours of a typical weekday.

Level of Service (LOS) is a measure of the average control (i.e. stop sign or traffic signal) delay experienced by all motorists arriving to an intersection. There are six representative levels of service defined for intersections and they are designated using letters "A" through "F", with LOS "A" representing the best operating conditions and LOS "F" representing the worst. Safety of the intersection is not included in the measures used to calculate LOS. Level of Service is defined differently for signalized intersections and unsignalized intersections. For signalized intersections, delay is evaluated for the overall intersection; while at unsignalized intersections delay is analyzed for each movement separately (i.e. northbound, southbound, eastbound or westbound traffic). The thresholds for the intersection levels of service are shown in the following table:

Table 7 Intersection Level of Service

Level of Service Threshold for Delay (seconds/vehicle)		
LOS	Signalized	Unsignalized
A	0-10 sec	0-10 sec
B	> 10-20 sec	> 10-15 sec
C	> 20-35 sec	> 15-25 sec
D	> 35-55 sec	> 25-35 sec
E	> 55-80 sec	> 35-50 sec
F	> 80 sec	> 50 sec

Existing conditions Level of Service (LOS) capacity analyses were conducted for the study area intersections using SYNCHRO 7 software. Capacity analyses results can range from LOS "A" (best) to LOS "F" (worst) based on the average delay experienced by motorists. LOS "D" is typically accepted by DDOT as the minimum delay threshold limit for intersections. Table 8 shows the LOS results for the study area intersections under existing conditions.

Table 8 Existing Conditions Level of Service (overall and by approach)

Study Area Intersections		Overall				By Approach				
		AM Peak		PM Peak		Approach	AM Peak		PM Peak	
		LOS	Delay (second/vehicle)	LOS	Delay (second/vehicle)		LOS	Delay (second/vehicle)	LOS	Delay (second/vehicle)
1	22nd and M Street	B	17.8	B	18.8	WB	C	20.7	B	19.3
						NB	B	13.9	B	17.7
2	23rd and M Street	C	27.2	B	16	WB	C	28.7	A	8.7
						SB	C	25.3	C	24.4
3	23rd and N Street	B	15.5	B	16.9	EB	D	36.6	C	23.3
						WB	D	42.1	B	13.3
						SB	A	7.6	B	15.2
4	23rd and L Street	B	13.5	E	79.3	EB	B	10.7	C	29.3
						SB	B	16.6	F	103.5
5	22nd and N Street	C	20.5	C	27.6	EB	D	43.8	C	31.9
						WB	D	37.4	E	66.9
						NB	B	11.2	B	15

The LOS "D" or better at intersections is considered acceptable under the DDOT traffic analysis guidelines. As shown in Table 8, all of the study area intersections operate at an acceptable LOS under existing conditions during both the AM and PM peak hours except the 23rd Street/L Street intersection during the PM peak hour. During the PM peak hour, the 23rd Street/ L Street intersection operates at LOS "E" with a delay of 79.3 seconds. In addition, field observations showed extensive delays and queuing along 23rd Street, from the intersection with M Street and continuing south to the intersection with Washington Circle.

FUTURE BACKGROUND ASSESSMENT

The Future Background analysis scenario considers all planned development projects within the vicinity of the project site (expected through the year 2015 and excluding the Square 50 project) and regional traffic growth. The scenario will serve as a baseline for understanding future impacts associated with development of the Square 50 project.

Future Background Projects

GW's Foggy Bottom Campus Plan Summer 2011 Update outlines the following active development sites within close proximity to the Square 50 site:

- Square 39 – School of Public Health and Health Services (SPHHS) building bounded by Washington Circle, New Hampshire Avenue and 24th Street. Construction commencement is slated for January 2012 with anticipated occupancy date of January 2014.
- Square 55 – Bounded by I Street, 22nd Street, H Street, and 23rd Street will include a new science and engineering complex, 4 levels of underground parking with 327 spaces, and 3,000 square feet of ground floor retail at the corner of 22nd Street and I Street. The building is planned to open in January 2015.
- Square 102- GW Museum is proposed at the corner of 21st Street and G Street. Construction is anticipated to begin in summer 2012.
- Square 103 – Law Learning Center Garage will be bounded by G Street, 20th Street, F Street, and 21st Street. The site will include 23,281 square feet of academic and administrative space, 392 underground parking spaces, 58 at-grade parking spaces, and loading and service facilities.

The following projects are also planned with the vicinity of the Square 50 site.

- 2213 M Street– Located at the northwest corner of 22nd Street and M Street and will consist of approximately 122,300 square feet of gross floor area including a 148 to 170 room hotel, ground floor restaurant space and an outdoor landscaped spa. The site will also provide for 42 parking spaces in a

below grade garage with a maximum capacity of 71 vehicles spaces. This project is currently under construction.

- Square 37 – located at the corner of 23rd Street and L Street and will include a ground floor Library and retail spaces with 164 residential units above 270 underground parking spaces.

A 2% annual growth rate was applied to study area roadway to account for GW projects and general regional growth. Site traffic associated with the Square 37 project was included in the future background traffic projections.

Planned Roadway Improvements

Bicycle plans on M Street, described in detail in the Planned Bicycle Improvements Section below, would eliminate a travel lane on M Street.

Outside of the study area, DDOT is planning to convert New Hampshire Avenue between Washington Circle and M Street into a two-way roadway (instead of the existing one-way operation). The status of the project was unknown at the time of this study.

Planned Bicycle Improvements

The District has plans²² to implement cycle tracks along M Street. Proposed plans include the following:

- Implement a bicycle lane along M Street NW, between 15th Street and 26th Street. In the vicinity of the Square 50 project, the bike lane will require the loss of one travel lane on M Street between 23rd and 24th Street. Between 22nd and 23rd Street, no travel lanes will be lost however the existing lane configuration²³ would be modified to include two westbound left turn lanes and two through travel lanes. There will be no impact to existing curb-side parking supply and/or restrictions as a result of the bike lane.

There is a Capital Bikeshare stations planned at the Square 37 project.

²² Plan and information were taken from the 2008 L Street Traffic Analysis Memorandum prepared by Sabra Wang & Associates

²³ The existing lane configuration provides for three through travel lanes and one left-through travel lanes

Planned Pedestrian Improvements

DDOT is currently planning pedestrian improvements for Washington Circle (south of the Square 50 site). Construction was slated to begin in spring 2012. Status of the project was not known at the time of this report. The plan includes implementing pedestrian crosswalks, pedestrian and bicycle signage and pavement markings and minor lane configuration modifications.

Future Signal Improvements

New traffic communication system upgrades, associated with fire Station signal prioritization, were previously planned along M Street for the year 2012. The current status of the signalization improvements were not known at the time of this report.

Background Capacity Analysis

Regional traffic growth, planned developments and pedestrian/bicycle improvement projects were considered in projecting future background traffic conditions. Capacity analyses were conducted for the study area intersection using SYNCHRO 7. Tables 9 and 10 outline a comparison of existing and future background intersection level of service and delay (for the overall intersection and by approach).

Table 9 Future Background Conditions Level of Services (overall)

Study Area Intersections		Overall							
		Existing				Future Background			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	22nd and M Street	B	17.8	B	18.8	B	18.8	B	19.3
2	23rd and M Street	C	27.2	B	16.0	C	29.0	C	20.6
3	23rd and N Street	B	15.5	B	16.9	B	16.0	B	17.6
4	23rd and L Street	B	13.5	E	79.3	C	20.9	F	108.9
5	22nd and N Street	C	20.5	C	27.6	C	21.2	C	30.0

Table 10 Future Background Conditions Level of Services (by approach)

Study Area Intersections		Approach	Existing				Future Background			
			AM Peak		PM Peak		AM Peak		PM Peak	
			LOS	Delay (second/vehicle)	LOS	Delay (second/vehicle)	LOS	Delay (second/vehicle)	LOS	Delay (second/vehicle)
1	22nd and M Street	WB	C	20.7	B	19.3	C	21.9	B	19.8
		NB	B	13.9	B	17.7	B	14.7	B	18.5
2	23rd and M Street	WB	C	28.7	A	8.7	C	31.5	B	11.4
		SB	C	25.3	C	24.4	C	26.2	C	31.3
3	23rd and N Street	EB	D	36.6	C	23.3	D	37.8	C	24.0
		WB	D	42.1	B	13.3	D	44.6	B	16.0
		SB	A	7.6	B	15.2	A	7.8	B	15.5

Study Area Intersections		Approach	Existing				Future Background			
			AM Peak		PM Peak		AM Peak		PM Peak	
4	23rd and L Street	EB	B	10.7	C	29.3	B	19.8	C	31.4
		SB	B	16.6	F	103.5	C	22.1	F	146.2
5	22nd and N Street	EB	D	43.8	C	31.9	D	44.6	C	33.7
		WB	D	37.4	E	66.9	D	37.9	E	77.9
		NB	B	11.2	B	15.0	B	11.9	B	15.2

As shown in Table 9, all of the study area intersections would continue to operate at an acceptable LOS under future background conditions during both the AM and PM peak hours except the 23rd Street/L Street intersection during the PM peak hour. During the PM peak hour, the 23rd Street/ L Street intersection would operate at LOS "F" with a delay of 108.9 seconds.

SQUARE 50 SITE DEVELOPMENT

There are two proposed options for the development which are summarized below:

Option 1

- 14,886 square feet redeveloped Fire Station
- 51,821 square feet Apartment building containing 52 to 61 Units
- 20,597 square foot Squash Club

Option 2

- 14,886 square feet redeveloped Fire Station
- 51,821 square feet Apartment House containing 52 to 65 Units
- 26,560 square feet of Commercial Space

The Square 50 site plan is shown in Figure 15.

Site Access and Circulation

The following is a summary of changes to the existing Square 50 site access system:

- The existing 12 foot driveway on 23rd Street will be eliminated and replaced with a new 20 foot site driveway. The new driveway will be relocated 12 feet further north of the current driveway location. The driveway will provide direct access to the below-grade parking garage (24 parking spaces).
- The existing 12 foot M Street driveway that provides access to the fire station parking lot will be eliminated.
- The fire station currently has a 12 foot driveway for Emergency Medical Services (EMS) vehicles and a 74 foot driveway for fire trucks. The driveways are separated by a 19 foot refuge area. In the future the two driveways (totaling 86 feet) will be consolidated into one 60 foot driveway. Additionally the new driveway will be located 82 feet from the 22nd Street/M Street intersection whereas the current EMS driveway is located 38 feet from the intersection.

- **Truck access to the loading area will be provided from 23rd Street or 22nd Street via the existing alley system. The proposed loading area is located in the rear of the proposed Square 50 building and will provide one 30 foot truck space and one 20 foot service delivery space.**
- **Pedestrian entrance to the site is located on M Street for the fire station and 23rd Street for the residential and squash or commercial components.**

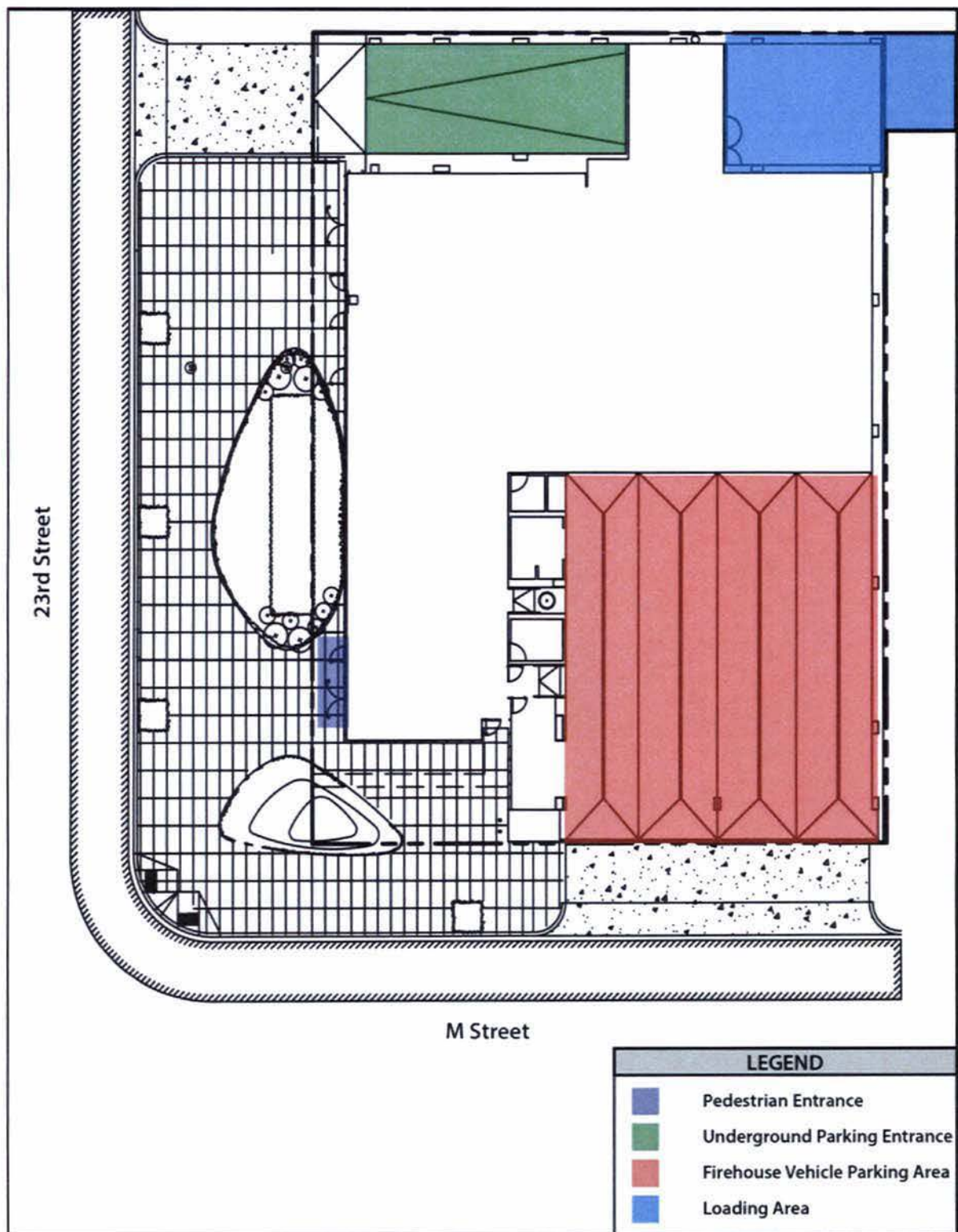


Figure 15: Square 50 Site Plan

Transportation Impacts

Pedestrian Improvements

The project will provide improvements to public spaces on both 23rd and M Streets. There will be new street trees and new sidewalks on 23rd and additional planting in public space. The sidewalk widths will vary with the minimum dimension of eight feet.

Curbside Management

Impacts to on-street parking will depend on the selected school bus loading location. If M Street is selected to support bus loading/unloading, there would be no impacts to on-street parking as a result of the design of the Square 50 project. If 23rd Street is selected to support school bus loading/unloading, there could potential be a loss of up to two RRP parking spaces.

Transit

No impacts to the existing bus stop.

School Bus Circulation and Staging

A number of the high school and college students will use the squash facilities for practices and for competitive matches. Students would likely use transit or walk/bike to the squash facility for weekday practices. During competitive months (November through March), two school related competitions would occur per week. For these events students could potentially arrive/depart via school bus.

The following two Options are being considered for School bus loading/ unloading:

Option 1 M Street - With this scenario school buses would load/ unload on M Street east of the Fire Station driveway. There is 60 feet between the stop bar and the driveway to the fire station. A standard bus is 40 feet long thus there would be adequate spacing for temporary bus loading/unloading. This option would need to be coordinated with the DCFEMS to determine if this is permissible and if there would be any impacts to fire truck ingress/egress.

Option 2 23rd Street- School buses would load/unload on the west-side of 23rd Street at the intersection with M Street. Students would exit the bus and cross the street to gain access to the squash court.

Buses will immediately depart the site and travel to temporary parking locations.

Allowable loading space on M St. - 30 feet (distance from stop bar to driveway is 60 feet)

Future Parking Supply and Demand

The project will provide for 24 parking spaces in a below-grade garage. The project is required to provide 55 parking spaces for development Option 1 and 43 spaces for Option 2. A parking variance is being requested as part of the BZA Application.

Parking spaces will primarily support fire station personnel. About 20 parking spaces are needed to accommodate the parking demand created during the fire station employee shift change. Four spaces will also be provided to support employees of the other non-fire station uses.

No parking spaces will be provided on-site to support the residents of the building. West End Residential Properties, LLC has indicated there is currently a demand for affordable housing units without parking. Additionally, a recent survey of affordable housing units located comparable distance from a Metrorail station indicate a couple of properties that do not provide parking and the average parking demand for the units surveyed was 5% (see Appendix for survey results). As outlined in the Parking section of this report, there are a minimum of 38 monthly parking spaces available in the general vicinity. The spaces cost an average of \$226 per month and may not be affordable to those individuals that meet affordable housing requirements. If 5% of the Square 50 residents have vehicles (based on affordable housing survey results) then there could be an increased on-street parking demand of three to four vehicles. The demand would primarily occur during the evening hours when there is adequate on-street parking available in the area.

Both options 1 and 2 will have a separate component either the Squash court or Commercial Office space which would require parking spaces. Based on survey results on-street parking spaces are available during the afternoon peak and evening to support additional demand. Squash club patrons, office employees and/or visitors that drive would primarily use off-street parking.

During the evening peak the commercial alternative would have minimal impact on on-street and off-street parking. Squash court patrons would use on-street or off-street parking. Survey results indicated there are approximately 58 available on-street parking spaces in the area during the evening.

FUTURE TRAFFIC ASSESSMENT

Future Traffic Projections

Tables 8 and 9 outline projected trip generation for Square 50 Options 1 and Option 2. Site trips in both tables represent additional net trips associated with the redevelopment of the Square 50 property. As shown in Tables 11 and 12, there would be no new net trips associated with the fire station as the existing station would be redesigned and maintained on site in the future.

Trip generation assumptions for development options 1 and 2 are outlined below:

- **Residential** – Residential trip generation was developed based on trip rates calculated for the West End Trip Generation Case Study. The two survey sites for the West End case study were located approximately 0.3 to 0.5 miles or a maximum of 2,640 feet from the Foggy Bottom Metrorail station as compared to the Square 50 project located 0.4 miles or 2,112 feet from the station. Additionally it should be noted that the survey sites are market rate condos and provide an average of 1.77 parking spaces per unit whereas the Square 50 project would not provide any residential parking spaces. As a result, residential trip generation rates used in Tables 8 and 9 are expected to be higher than actually expected for the Square 50 project. The West End Case Study is included in the Appendix.
- **Squash Club** - The Institute of Transportation Engineers' (ITE) Trip Generation Manual, 8th Edition was used to project weekday peak hour trips associated with the Squash Court (Option 1). Land use code 491 Tennis/Racquet Club²⁴ was used to project Squash Club site traffic (based on the number of courts).
- **Commercial** - The Institute of Transportation Engineers' (ITE) Trip Generation Manual, 8th Edition was used to project weekday peak hour trips associated with the commercial Office land use. Land use code 710 General Office Building was used to office site traffic (based on the square footage). Since the proposed site will be located approximately 0.4 miles from the Foggy Bottom – GWU Metrorail Station on the Blue and Orange Lines, trip reduction factors based on percentage calculations presented in the *Washington Metropolitan Area Transit Authority's (WMATA) Development Related*

²⁴ Tennis/Racquet clubs are privately owned facilities that primarily cater to racquet sports (tennis, racquetball, or squash - indoor or outdoor) or squash - indoor or outdoor.

Ridership Survey II for residential and retail land uses was applied to the site trip generation. Trip reduction calculations are provided in the Appendix of this document.

Table 11 Future Trip Generation (Option 1)

Option 1			AM			PM		
	Units		IN	OUT	TOTAL	IN	OUT	TOTAL
Replacement Fire Station ²⁵	N/A		0	0	0	0	0	0
Residential	61	units	1	7	8	8	2	10
Squash Club	8	courts	9	9	18	18	18	36
Total All Site Trips			10	16	26	26	20	46

Table 12 Future Trip Generation (Option 2)

Option 2			AM			PM		
	Units		IN	OUT	TOTAL	IN	OUT	TOTAL
Replacement Fire Station ²⁶	N/A		0	0	0	0	0	0
Residential	65	units	2	8	10	8	2	10
Commercial (Office)	26.56	1,000 SF	57	8	65	18	90	109
All Transit Mode Share Reduction			15	2	17	5	23	28
Walk/Bike Reduction			3	1	4	1	5	6
Commercial w/Reductions			39	5	44	12	62	74
Total All Site Trips			41	13	54	20	64	84

Tables 11 and 12 indicate Square 50 Option 1 would generation 26 AM and 46 PM peak hour trips and Square 50 Option 2 would generate 54 AM and 84 PM peak hour trips.

²⁵ Fire station will not generate any new trips. The existing fire station trips have been included in existing traffic counts.

²⁶ Fire station will not generate any new trips. The existing fire station trips have been included in existing traffic counts.

Future Conditions Intersection Analysis

Table 13 and 14 provides a comparison of Existing, Future Background and Future Conditions intersection Level of Service. The future analysis is based on Option 2 since this option would have the highest trip generation. Directional distribution and methodology is included in the appendix. Residential and Commercial distribution considered the various parking garages/lots that future residents are likely to use since the site will not including parking for commercial and/or residential land uses.

Table 13 Future Conditions Level of Services (overall)

Study Area Intersections		Overall											
		Existing				Future Background				Future			
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	22nd and M Street	B	17.8	B	18.8	B	18.8	B	19.3	B	18.9	B	19.5
2	23rd and M Street	C	27.2	B	16.0	C	29.0	C	20.6	C	28.9	C	21.7
3	23rd and N Street	B	15.5	B	16.9	B	16.0	B	17.6	B	16.1	B	17.6
4	23rd and L Street	B	13.5	E	79.3	C	20.9	F	108.9	C	21.3	F	110.8
5	22nd and N Street	C	20.5	C	27.6	C	21.2	C	30.0	C	21.7	C	30.1

Table 14 Future Conditions Level of Services (approach)

Study Area Intersections		Approach	Existing				Future Background				Future			
			AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
			LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	22nd and M Street	WB	C	20.7	B	19.3	C	21.9	B	19.8	C	22.0	B	19.9
		NB	B	13.9	B	17.7	B	14.7	B	18.5	B	14.7	B	18.5
2	23rd and M Street	WB	C	28.7	A	8.7	C	31.5	B	11.4	C	31.3	B	11.3
		SB	C	25.3	C	24.4	C	26.2	C	31.3	C	26.1	C	33.5
3	23rd and N Street	EB	D	36.6	C	23.3	D	37.8	C	24.0	D	37.8	C	24.0
		WB	D	42.1	B	13.3	D	44.6	B	16.0	D	45.4	B	16.0
		SB	A	7.6	B	15.2	A	7.8	B	15.5	A	7.8	B	15.5
4	23rd and L Street	EB	B	10.7	C	29.3	B	19.8	C	31.4	C	20.5	C	31.8
		SB	B	16.6	F	103.5	C	22.1	F	146.2	C	22.3	F	148.2
5	22nd and N Street	EB	D	43.8	C	31.9	D	44.6	C	33.7	D	45.2	C	33.8
		WB	D	37.4	E	66.9	D	37.9	E	77.9	D	37.9	E	77.9
		NB	B	11.2	B	15.0	B	11.9	B	15.2	B	12.3	B	15.6

As shown in Table 14, all of the study area intersections would continue to operate at an acceptable LOS under future conditions including the proposed Square 50 site during both the AM and PM peak hours except the 23rd Street/L Street intersection during the PM peak hour. During the PM peak hour, the 23rd Street/ L Street intersection would continue to operate at LOS "F" and the delay would increase from 108.9 seconds to 110.8 seconds. The volume to capacity ratio (v/c) would increase from 1.16 under future background conditions to 1.17 under future conditions. The new v/c ratio reflects a 0.9 percent increase from future background to future conditions. DDOT requires that mitigation needs to be addressed if the v/c ratio from the future background to future condition increases by two percent or greater. Since the increase in v/c ratio is less than two percent, no mitigation measures have been proposed.

LOADING MANAGEMENT PLAN

The Loading Management Plan describes regulations the property manager will employ to manage trash pick-up, deliveries and other loading activities within the shared residential/commercial loading areas. The Loading Management Plan includes the following elements:

- **Loading Facilities** – The Square 50 project will provide one 30 foot loading berths for both residential and commercial loading. The loading area will be accessible via the existing east-west/north-south public alley network. The property manager will schedule regular use of the loading berths.
- **Delivery Vehicle Access** - Truck maneuvering diagrams showing ingress and egress for a 30 foot truck are shown in Figures 16 and 19. Approaching the site, commercial vendors, delivery vehicles and/or trash truck drivers would approach the loading area from 22nd Street via the existing east-west public alley proceed south along the north-south alley and reverse into the loading berth. Departing the site trucks would out of the loading berth bear left on the north-south alley, turn right onto the east-west section of the alley and proceed left onto 22nd Street. As shown in the maneuvering diagrams, 30 foot truck can adequately maneuver into and out of the loading area. Maneuvering diagrams showing inbound and outbound access to/from 23rd Street are provided in the Appendix.
- **Delivery Vehicle Size Limits** – Commercial deliveries will be made primarily by single unit trucks (30 foot). Vendors will be instructed that deliveries are not permitted from trucks greater than 30 feet. A 30 foot truck would also be adequate for residential move-in operations and deliveries. The proposed loading area *does not* include the 55 foot loading berth required by zoning. The applicant will seek a variance with the District to forego the zoning requirement to accommodate 55-foot delivery trucks. Building uses do not correlate with the need for a 55 foot truck however a truck of this size should require access; the building management will need to be notified in advance so that a temporary permit could be obtained.
- **Delivery Hours** – Commercial deliveries will be restricted to the timeframe between 8:00 AM and 7:00 PM Monday through Friday.
- **Residential move-ins**– Residents will be required to reserve a space in the loading dock with the property manager. Move-ins would typically be

scheduled Monday through Saturday between the hours of 8:00 AM and 7:00 PM.

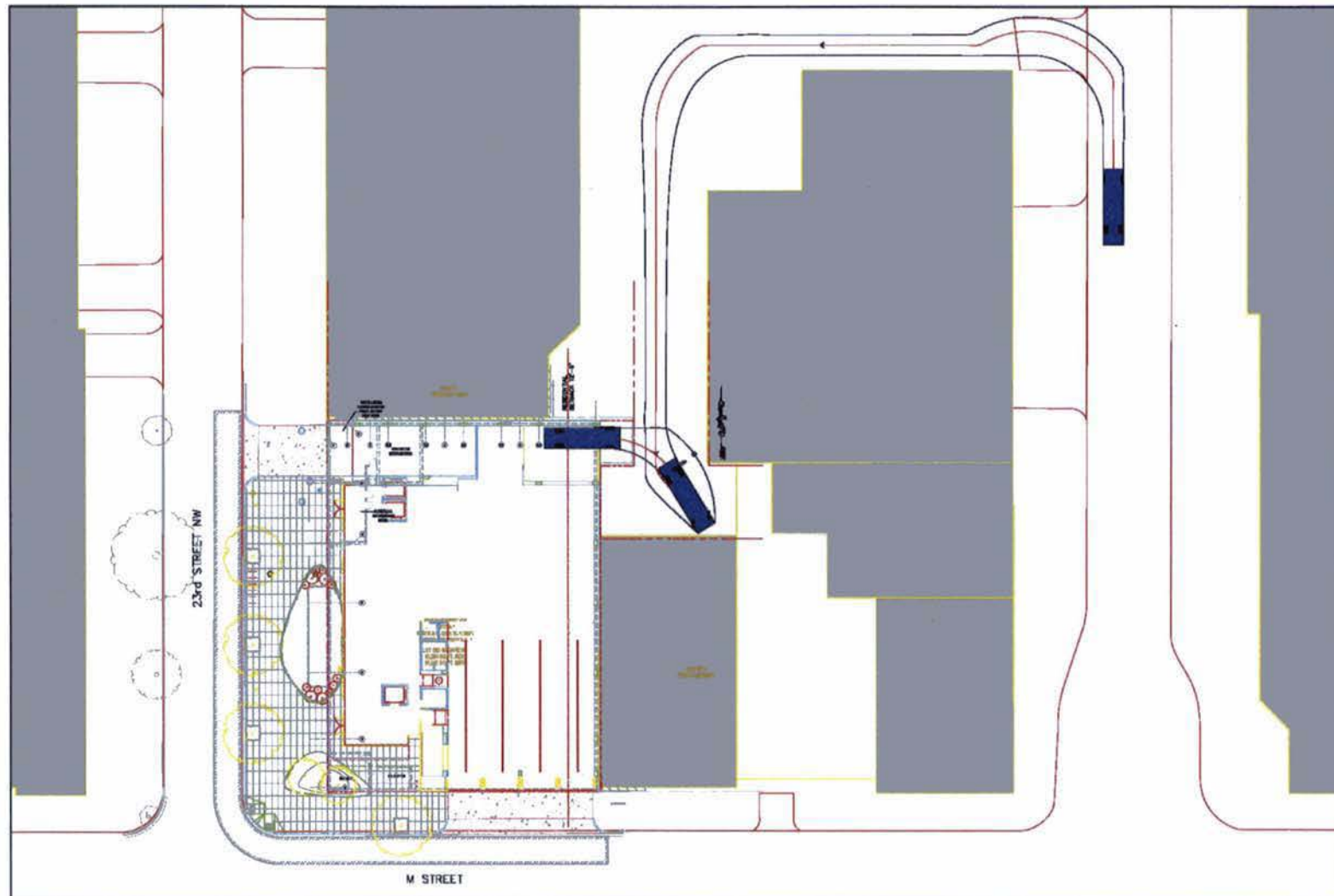


Figure 16: Ingress 30-Foot Truck Maneuver (from 22nd Street)

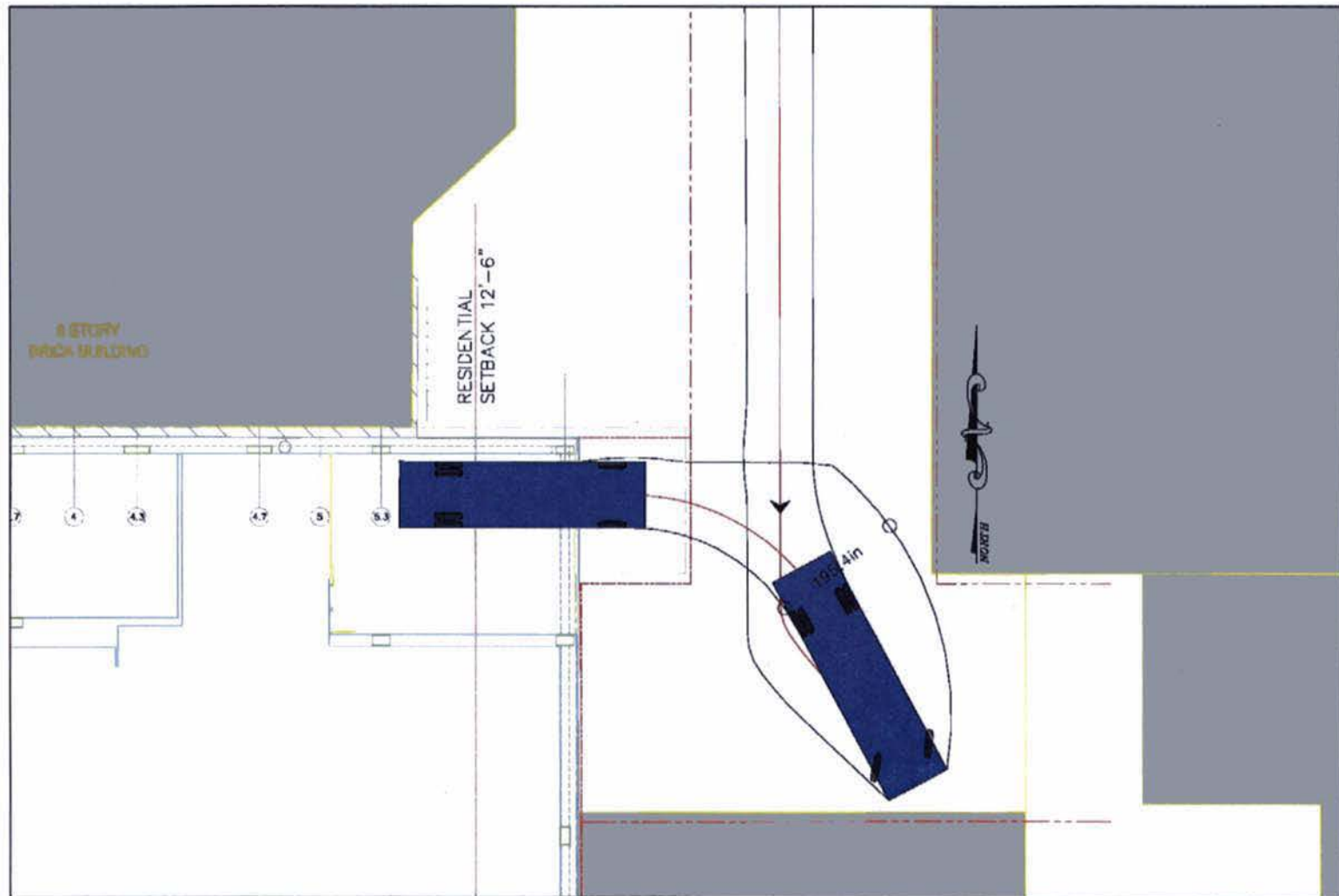


Figure 17: Ingress 30-Foot Truck Maneuver (showing loading area)

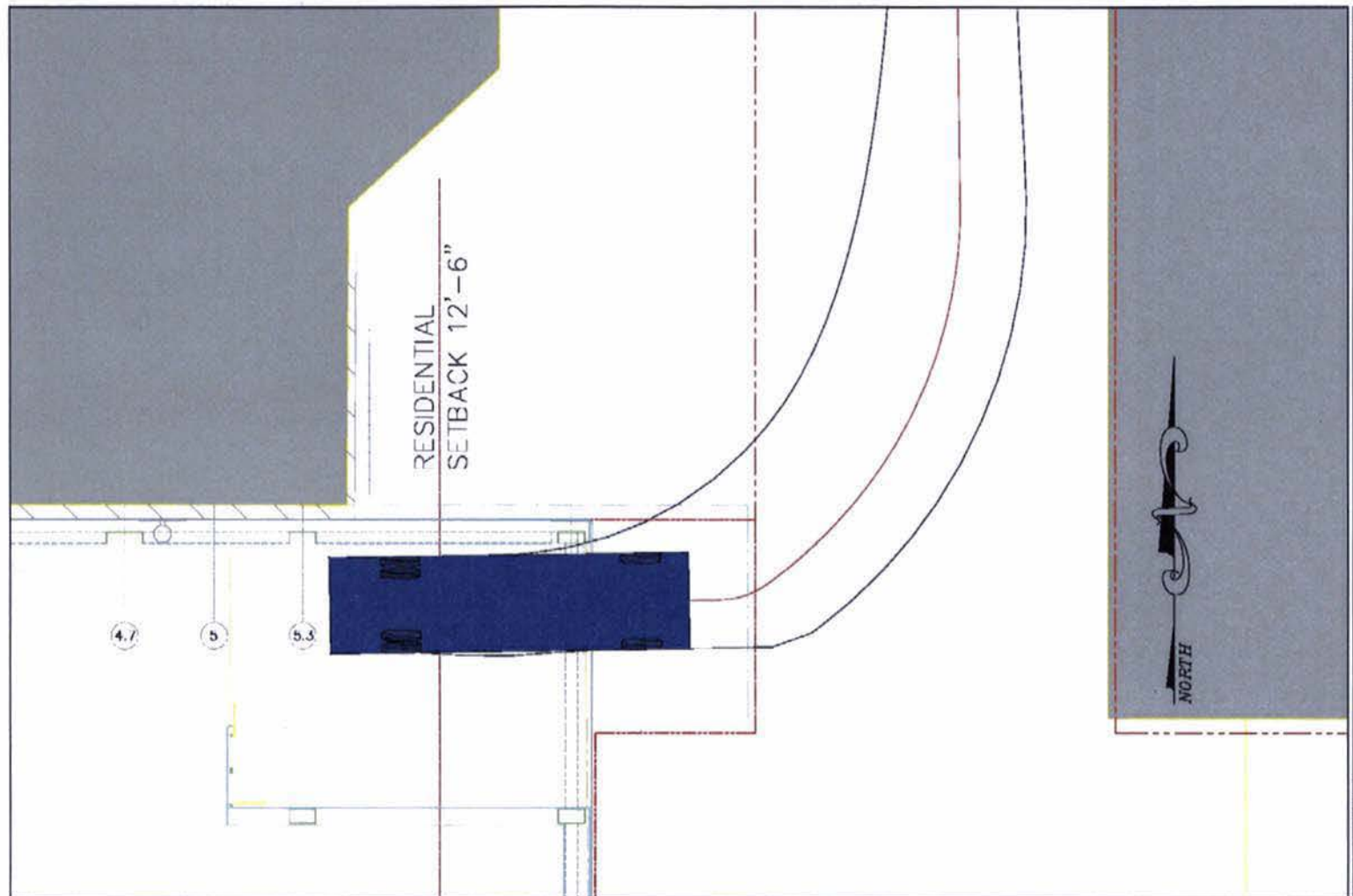


Figure 18: Egress 30-Foot Truck Maneuver (showing loading area)

- **Loading Zone-** The applicant proposes to implement a 40 feet loading zones along the east-side of 23rd Street to support temporary parcel deliveries to Square 50. There is 120 feet between the stop bar and the Square 50 site driveway. With a setback of 25 feet from the stop bar and 5 feet from the driveway, there is ample space (90 feet) available for a temporary loading zone. The loading zone would be in place between the hours of 9:30 AM and 4:00 PM (during off-peak periods) and would have minimal impacts on traffic flow on 23rd Street. The applicant will coordinate with DDOT to determine if it would be feasible to implement a temporary loading zone in this location.
- **Trash Removal Operations** – Trash dumpsters will be provided in the loading area. Residential trash collection will occur twice weekly and commercial trash collection will occur four to five times per week.
- **Loading Berth Scheduling/Management** – The property manager will manage residential and commercial deliveries.

The Loading Management Plan may be updated and improved by the property manager once the project is complete.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Transportation Demand Management (TDM) Plan is an active program used to foster alternative transportation choices that are more environmentally friendly than driving alone. The applicant will actively promote and implement strategies to encourage use of green travel choices (i.e. transit, walking and biking) and thereby reduce traffic and parking demand. A list of the offered TDM measures is as follows:

TDM

DDOT Expected TDM Measures	Applicant Offerings
During construction, maintain or coordinate relocation of any existing bus stop at the developer's expense	A Maintenance of Traffic (MOT) will be required as part of the construction permitting process. The MOT will identify temporary impacts to transportation facilities such as sidewalks and bus stops. The construction manager in conjunction with the applicant will maintain or coordinate the relocation of any existing bus stop.
Comply with Zoning requirement to provide bicycle parking/storage facilities	The Applicant will provide approximately 38 bicycle racks on-site.
Require all parking cost be unbundled from the cost of lease or purchases. Parking cost must be set at no less than the charges of the lowest fee garage, located within a ¼ mile.	No residential parking provided on-site.
Post all TDM commitments on-line publicize availability and allow the public to see what commitments have been promised.	The applicant will post all TDM commitments online.

DDOT Expected TDM Measures	Applicant Offerings
Identify a project's TDM leader (for planning, construction and operations). Provide DDOT/Zoning enforcement with annual TDM Leader contact updates	At this time, Benjamin Sonnet/EastBanc will serve as the projects TDM leader.
Provide website links to CommuterConnections.com and goDCgo.com on developer and property management websites.	As part of each tenant's initial welcome package, a document outlining website links such as CommuterConnections.com and goDCgo.com will be provided. The welcome package with also include WMATA Metrorail/Metrobus and DC bicycle maps.
Provide on-site business center to residents with access to copier, fax and internet services.	

Additional TDM Measures	Applicant Offerings
Provide each new resident with one-year subscription to DC Bikeshare Program	The applicant has committed to providing a one year bikeshare membership for first time move-ins as part of the initial welcome package.
Provide each new resident with a one-time SmarTrip card	Each new resident will be provided with a \$30 smart trip card.
Provide a one-time membership fee subsidy in a car sharing program for each residential unit.	The applicant has committed to providing a one year zip car membership for first time move-ins.

DDOT's TDM in the Development Process Report was used as a reference to guide development of this TDM plan. The applicant will provide all expected TDM measures and a number of supplemental measures as outlined in the TDM Recommendations Matrix.²⁷

The Applicant has committed to the transportation demand management measures listed above.

Monitoring Plan

The applicant has agreed to monitor its potential transportation impacts created by the proposed Square 50 development. The monitoring program will also offer the opportunity to track impacts of site related traffic on the local community and track the success of TDM measures.

The following specific measures will be included in the annual monitoring plan to be conducted for three consecutive years after occupancy of the project:

- Conduct traffic counts at the site driveway
- Monitor transportation modal split of employees and visitors
- Monitor availability of monthly off-street parking for residents

²⁷ Reference Table 2: TDM Recommendation Matrix; Incorporation of Transportation Demand Management into the Development Review Process Final Report and Recommendations (October 2010). It is assumed the Square 37 project applies to a proposal requiring a variance (or is a PUD) and generates less than 100 peak hour auto trips.

CONCLUSIONS

The primary conclusions that were presented in this study are as follows:

- Square 50 is located at 2225 M Street, NW. The site is currently occupied by the Engine Company #1 fire station and is planned to consist of a mix of uses including a new replacement fire station at ground level, recreational or commercial land uses, and above grade apartment units.

Existing Transportation Conditions

- The study area is well served by WMATA Metrorail and Metrobus and other pedestrian/bicycle orientated transportation modes such as Capital Bikeshare.
- All of the study area intersections operate at an acceptable LOS under existing conditions during both the AM and PM peak hours except the 23rd Street/L Street intersection during the PM peak hour. During the PM peak hour, the 23rd Street/ L Street intersection operates at LOS "E" with a delay of 79.3 seconds.

Future Background Conditions

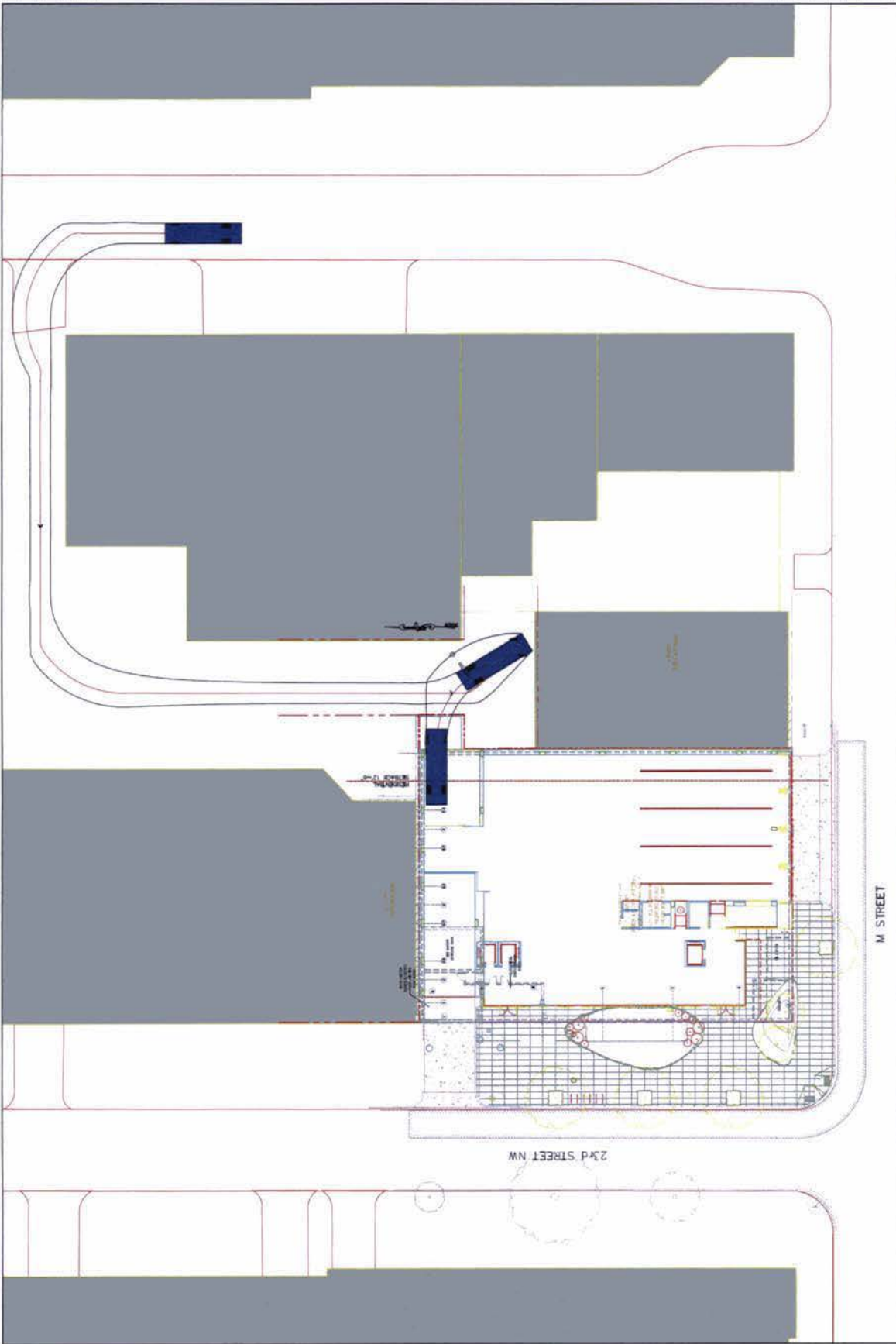
- Future Background projections assume a 2% rate to accounts for regional growth and pproposed plans for GW's Foggy Bottom Campus Plan. The projections also include site traffic associated with other planned development projects.
- Transportation improvements are planned for the areas including bicycle lanes on M Street, converting New Hampshire Avenue between Washington Circle and M Street into a two-way roadway (instead of the existing one-way operation) and planned pedestrian improvements at Washington Circle.
- All study area intersections would continue to operate at an acceptable LOS under future background conditions during both the AM and PM peak hours except the 23rd Street/L Street intersection. Delay at this intersection is projected to increase from 79.3 seconds per vehicle to 108.9 seconds per vehicle with the addition of traffic associated with regional growth and planned projects.

Future Conditions

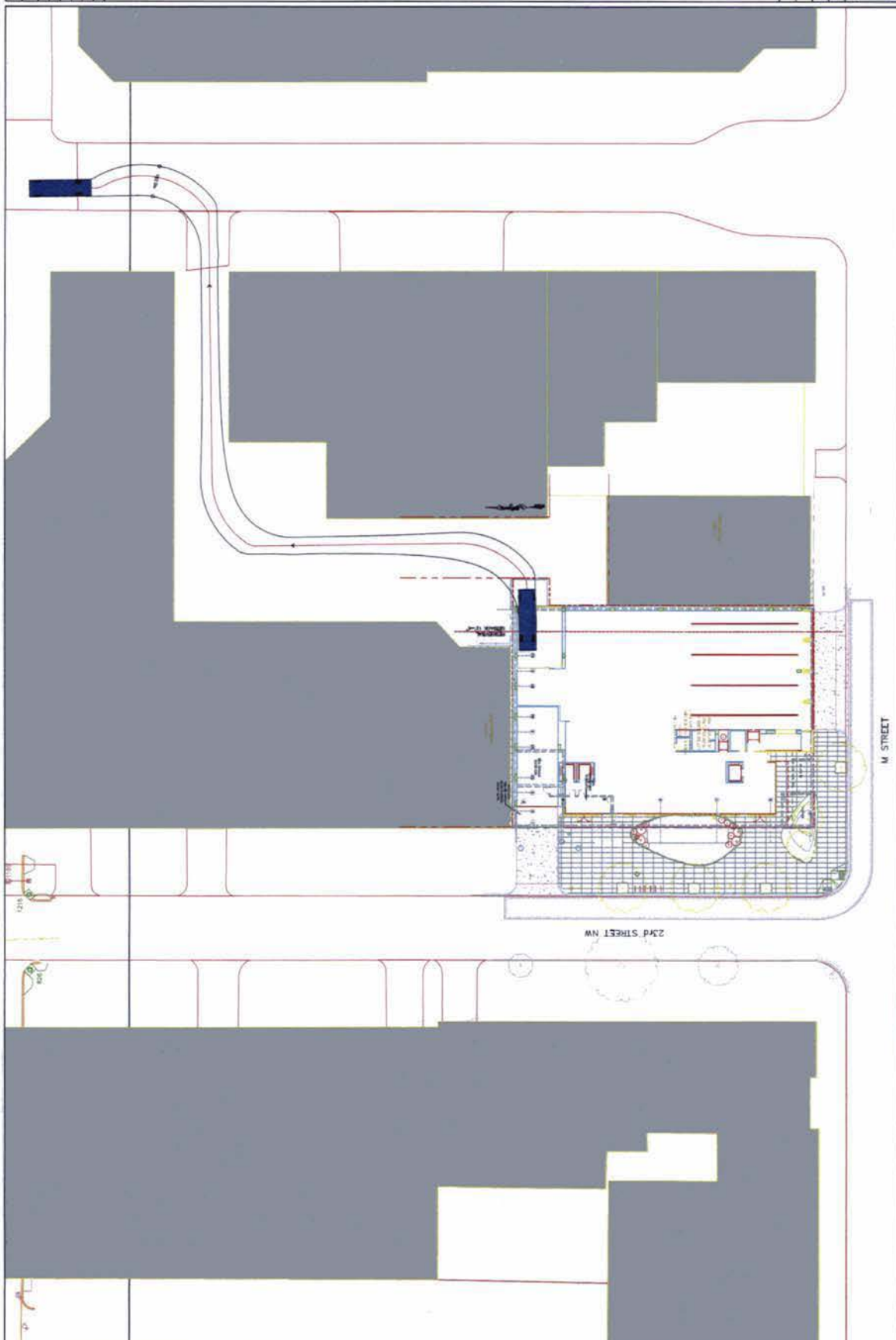
- Vehicular access from M Street will be eliminated and all fire station traffic will be redirected to the proposed site driveway along 23rd Street.
- The project will provide for 24 below-grade parking spaces. Parking spaces will primarily support fire station personnel. Non-fire station users will park in public parking garages surrounding the site.
- Parking inventories indicate there is available on-street parking and a number of parking garages/surface lots provide daily parking. Daily parking demand associated with the squash court and or commercial office component would be accommodated using on-street or off-street parking. Based on available data, there are currently a minimum of 38 monthly parking spaces available in the study area. Based on recent surveys residential parking demand is expected to be about 5% (or three to four vehicles). This demand could be accommodated using off-site parking facilities, if needed.
- The applicant is requesting a variance from providing the required parking spaces (55 for Option 1 and 43 for Option 2). A loading variance will be required to forego the 55-foot truck loading berth and associated platform for the residential use. A 40 feet loading zones is also being proposed along the east-side of 23rd Street to support temporary parcel deliveries. The applicant will coordinate with DDOT on the loading zone.
- A TDM and monitoring plan has been developed to manage future travel and parking demand.
- With the Square 50 project, all of the study area intersections would continue to operate at an acceptable LOS under future conditions and excluding the 23rd Street and L Street intersection (which is a LOS "E" under existing conditions). Intersection delay would increase by no more than 1.9 seconds per vehicle. This increase in delay is negligible. Thus traffic added in accordance with the Square 50 project will not adversely impact the surrounding roadway network.
- The future v/c ratio reflects a 0.9 percent increase from future background to future conditions. Since the increase in v/c ratio is less than two percent, no mitigation measures is required.

Appendix F. Loading Maneuvering Diagrams

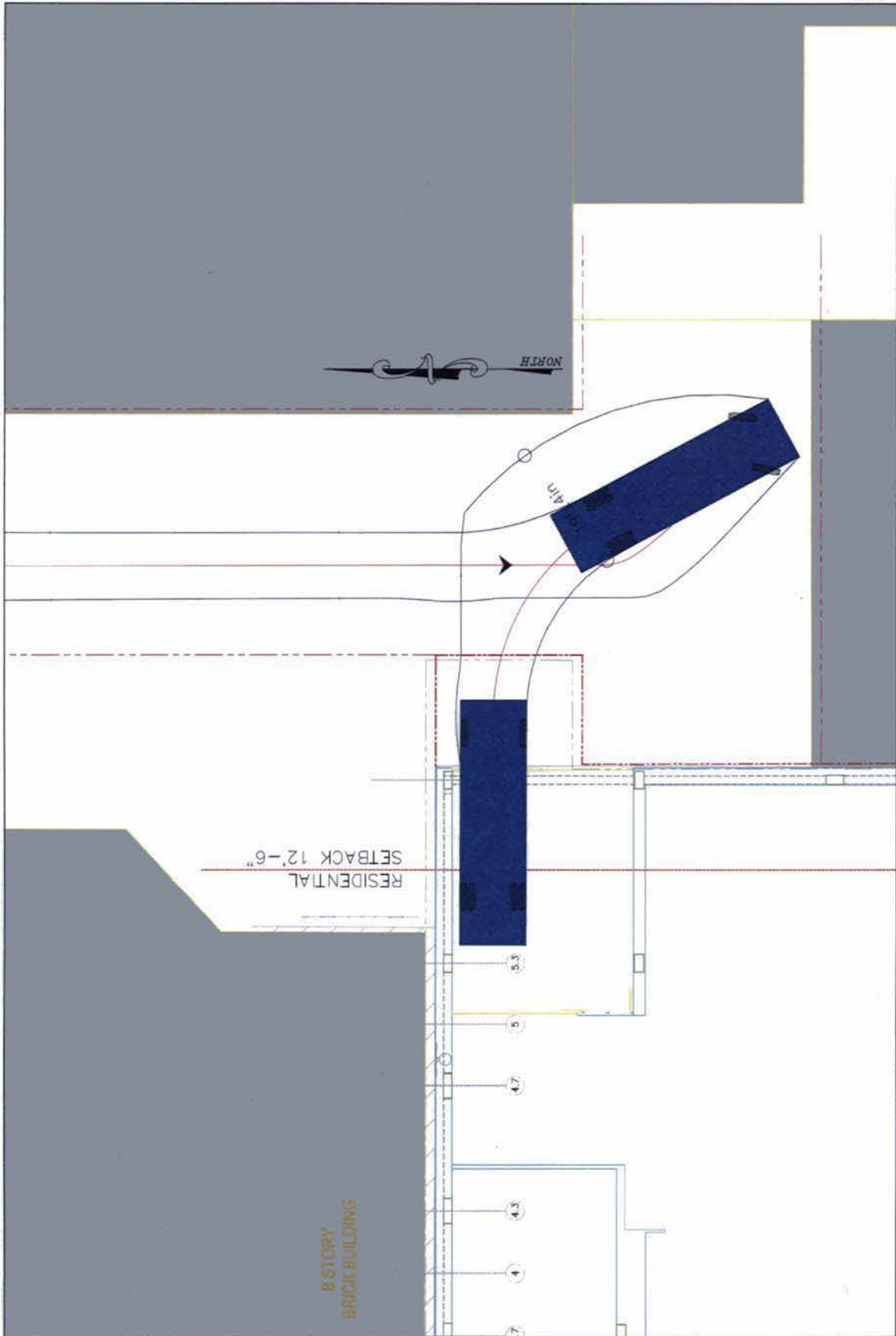
30-FOOT TRUCK INBOUND FROM 22ND STREET



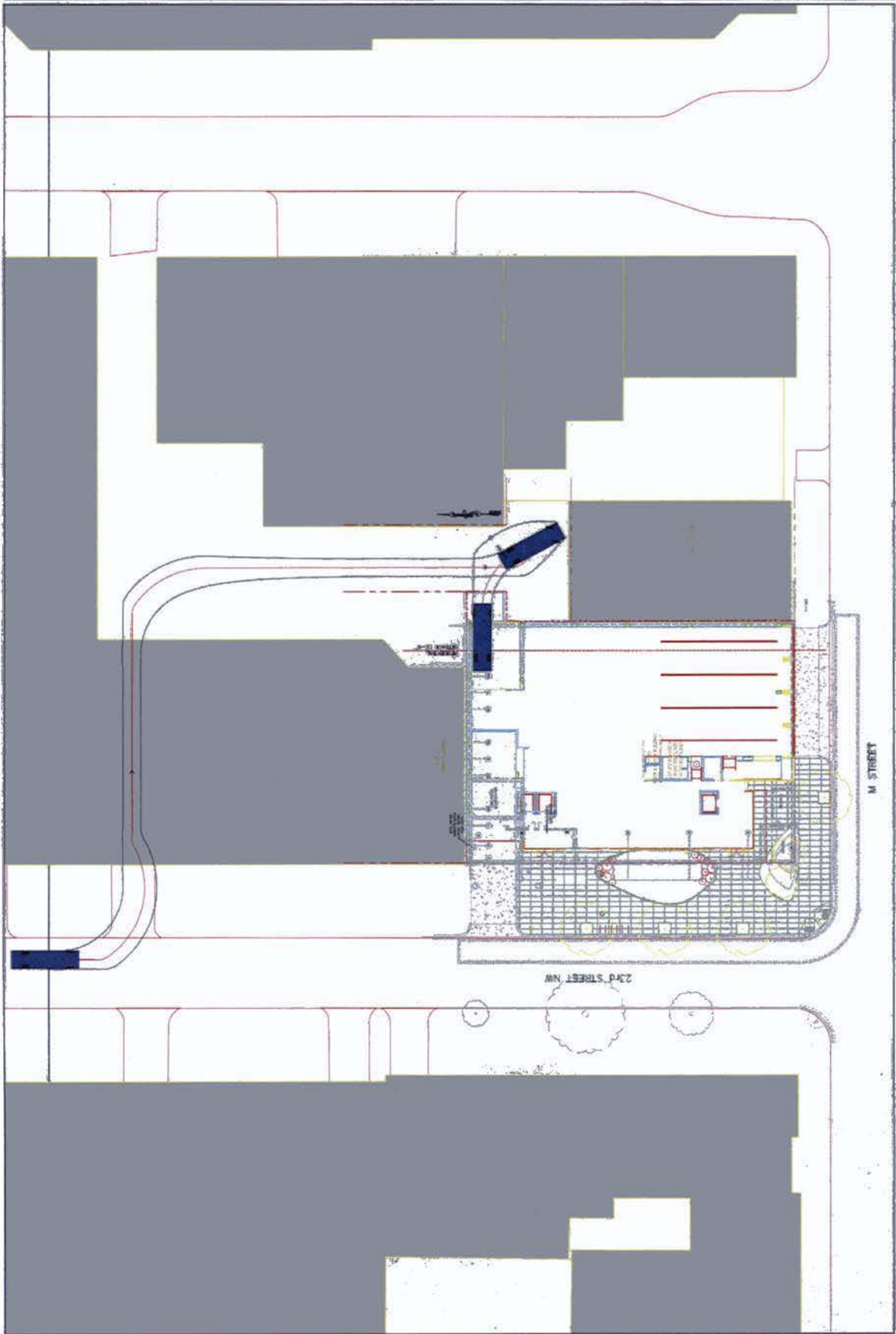
30-FOOT TRUCK OUTBOUND TO 22ND STREET



30-FOOT TRUCK INBOUND LOADING DOCK AREA

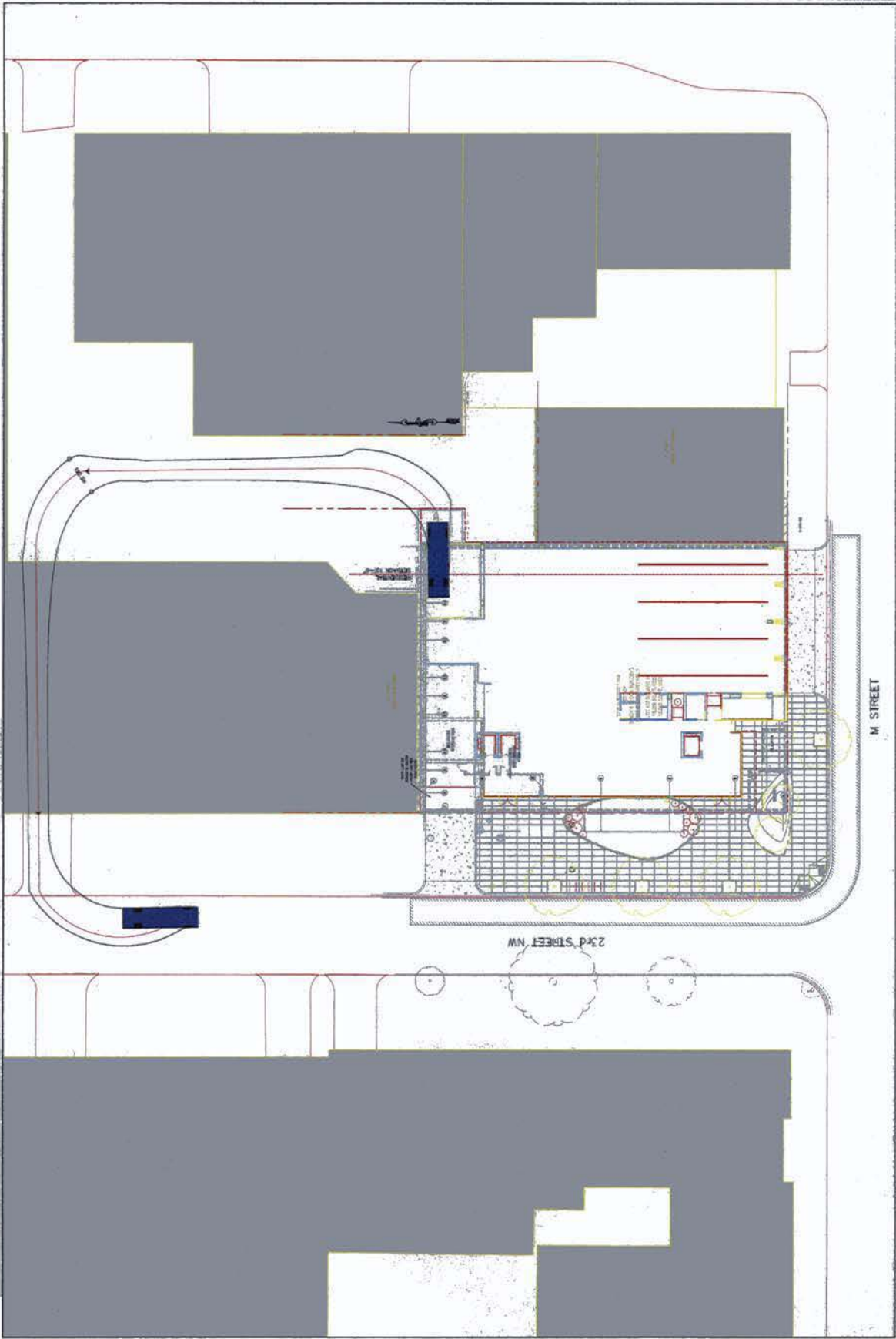


30-FOOT TRUCK INBOUND FROM 23RD STREET



30-FOOT TRUCK OUTBOUND TO 23RD STREET

30-FOOT TRUCK OUTBOUND TO 23RD STREET



30-FOOT TRUCK OUTBOUND LOADING DOCK AREA

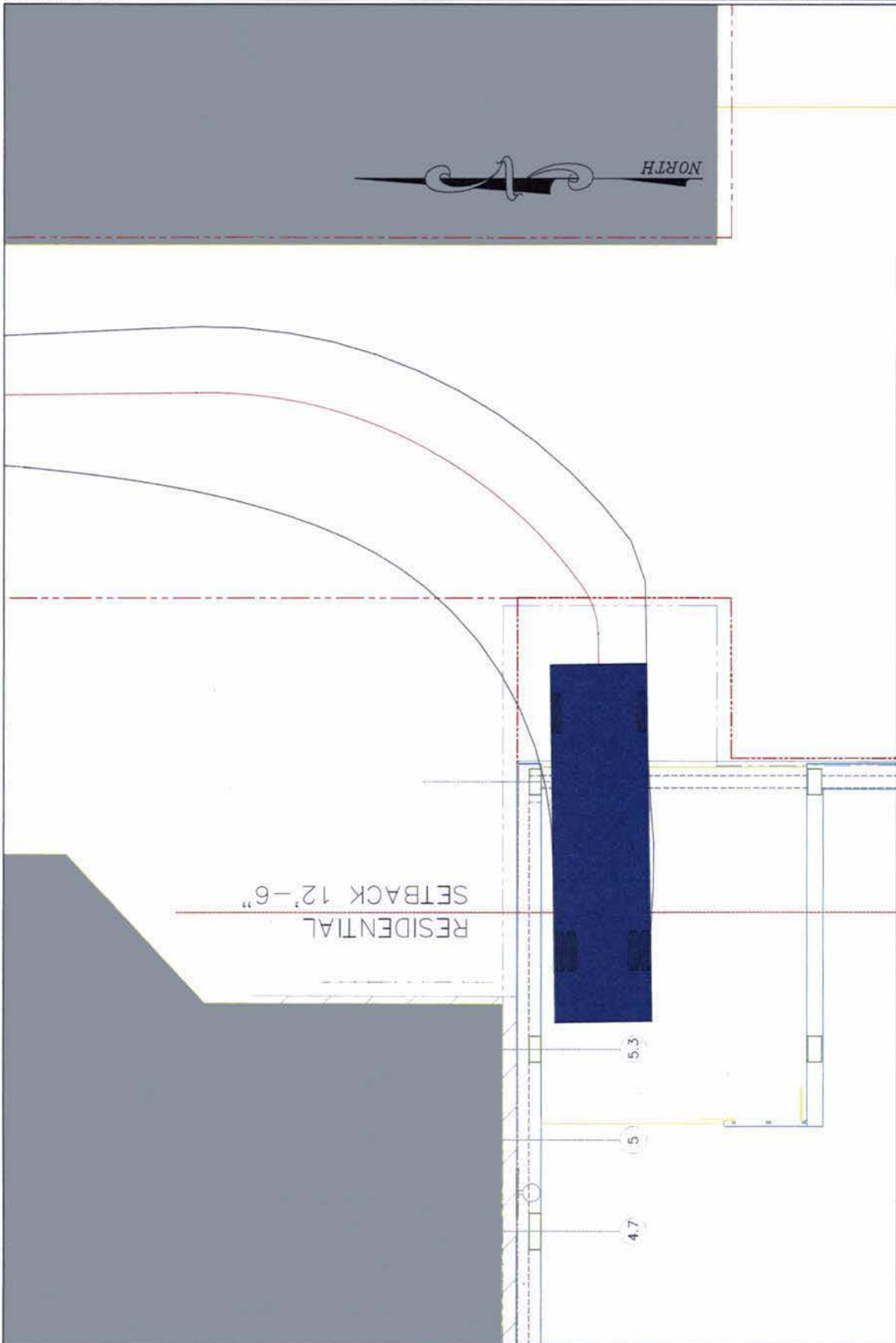
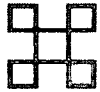


Exhibit E



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Resumes

Nicole A. White, P.E., PTOE

PRINCIPAL

Ms. White leads the organization's strategic direction with over 15 years of experience in transportation planning and traffic engineering projects. She brings extensive management skills and expertise ranging from intersection safety and operational studies to parking studies and Transportation Management Plans. Ms. White specializes in corridor studies and transit analysis, master planning for Federal Campuses and Universities, as well as revitalization and redevelopment studies. Ms. White has significant experience coordinating with project stakeholders and local officials. She is a certified Charrette Planner through the National Charrette Institute. Ms. White has previously been accepted as an expert witness by the Circuit Court of Prince George's County, District of Columbia Zoning Commission, District of Columbia Board of Zoning Adjustment and Montgomery County Hearing Examiner.

PROFESSIONAL REGISTRATIONS

Maryland – Professional Engineer

Institute of Transportation Engineers – Professional Traffic Operations Engineer

EDUCATION

Master of Engineering,

Civil Engineering - Transportation

University of Maryland, 2002

Bachelor of Science,

Civil Engineering

University of Maryland, 1996

PROFESSIONAL AFFILIATIONS

Institute of Transportation Engineers

American Planning Association

TECHNICAL PAPERS & PRESENTATIONS

Comparative Analysis of Transportation Impacts of Three Major Urban Universities



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RELEVANT EXPERIENCE

Redevelopment & Revitalization Studies

Ms. White has directed a number of redevelopment and revitalization studies where she has gained significant experience developing transportation concepts by working with consultant planning teams, local agencies, and community groups. Her experience includes balancing the competing needs of various modes of transportation, including transit and pedestrian facilities. Project experience includes:

- Mount Vernon Square District Transit Study, Washington, DC
- Rhode Island Avenue Great Streets Initiative, Washington, DC
- Bowie MARC Station Sector Plan, Bowie, MD
- Laurel MARC Station, Laurel, MD
- Morgan Boulevard, Largo, MD
- H Street, N.E. Redevelopment Project, Washington, DC
- Georgia Avenue Revitalization, Washington, DC

Universities and Institutions

Ms. White has prepared traffic impact studies for schools and other learning institutions. Project experience includes examining pick-up and drop-off activity as well as queuing analyses. Ms. White has helped to develop transportation management and shared parking opportunities for various institutions. Project experience includes:

- Coppin State University Science and Technology Center
- Frederick Community College Facilities Master Plan
- University of Mary Washington Master Plan
- George Washington University (GWU) Hospital, Washington, DC
- GWU Lerner Health & Wellness Center, Washington, DC
- GWU Pelham Hall Replacement, Washington, DC
- GWU Food Service Facility, Washington, DC
- GWU Housing Project, Washington, DC
- GWU Media & Public Affairs Building, Washington, DC
- GWU University Parking Garage, Washington, DC
- GWU Campus Plan 2000, Washington, DC
- American University Campus Plan 2000, Washington, DC
- Georgetown University Campus Plan 2000, Washington, DC

Master Plans & Transportation Management

Ms. White has managed the transportation component of Master Plans for a number of campuses and large scale development projects. Her work on these studies includes projecting and analyzing future transportation and parking conditions based on population and development growth, and recommending necessary improvements to transportation and parking systems. A key component of these projects includes developing a circulation system within the campus and



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access to adjacent land uses for multiple modes of transportation. Ms. White is experienced in developing Transportation Management Plans with travel demand objectives, goals, strategies, and measures of effectiveness. Ms. White also has significant experience presenting to community groups, planning agencies, and zoning boards as part of the Master Planning and Environmental Impact Statement (EIS) processes. Project experience includes:

- Department of Homeland Security Headquarters Consolidation at St. Elizabeths, Washington, DC
- McMillan Sand Filtration Site Master Plan, Washington, DC
- Suitland Federal Center, Suitland, Maryland

Exhibit F



Steven E. Sher, Director of Zoning and Land Use Services, has more than 30 years' experience as the leading consultant in the Zoning Regulations and development processes in the District of Columbia. For more than 18 years, he has advised developers and property owners on the interpretation and application of development regulations and approval processes in the city. He has appeared as an expert witness in zoning and planning before the District of Columbia Zoning Commission, Board of Zoning Adjustment, Historic Preservation Review Board and the Mayor's Agent for the historic preservation act, before the Zoning Hearing Examiner and the Planning Board in Montgomery County, Maryland, and in local and federal courts. Recent major cases in which he has played a leading role include the MCI Center, the new Washington Convention Center, the residential/retail/hotel complex at 2200 M Street for the Ritz Carlton, and the planned redevelopment of the old Hecht's block at 7th and F Streets, the Station Place office development adjacent to Union Station, to be the new headquarters for the SEC, the International Monetary Fund's Headquarters II office building at 1900 Pennsylvania Avenue, the new headquarters for the U.S. Department of Transportation at the Southeast Federal Center and the redevelopment of the Capper/Carrollburg public housing projects in Southeast using a HOPE VI grant.

For more than 14 years, Mr. Sher was employed in the various zoning and planning offices of the District of Columbia. As one of the chief technical staff persons for the Zoning Commission, he played a significant role in drafting major portions of the present Zoning Regulations, including the waterfront and mixed use (CR) districts, the regulations concerning community based residential facilities, the planned unit development regulations and the regulations governing parking and loading.

For eight years, Mr. Sher served as the Executive Director of the Zoning Secretariat. As such, he was the chief executive/operating/administrative officer for the Zoning Commission and the Board of Zoning Adjustment of the District of Columbia. Mr. Sher supervised the handling of over 1,600 cases before the Board of Zoning Adjustment and numerous rezoning, planned unit development and text amendment cases before the Zoning Commission. Matters which he assisted the Zoning Commission in resolving included the rezoning of the Dupont Circle area, the Hotel-Residential Incentive District, implementation of the Foreign Missions Act and major development cases such as McLean Gardens, Techworld, Lafayette Center and the Sumner-Magruder schools redevelopment. Mr. Sher represented the Zoning Commission and the BZA before Congress, the Council of the District of Columbia, the Mayor and other public agencies.

Mr. Sher is a member of Lambda Alpha, the honorary land economics society, and the American Planning Association. He also served on the Mayor's Commission on Downtown Housing, various task forces of the Greater Washington Board of Trade and the D.C. Building Industry Association and the Metropolitan Washington Council of Government Metropolitan Development Community Advisory Committee. He has also served as guest lecturer at various universities on planning and zoning issues.

Mr. Sher received a Bachelor of Arts in Urban Studies from Brooklyn College of the City University of New York and a Master of Regional Planning from Cornell University.