

**THE GEORGE WASHINGTON UNIVERSITY  
SCIENCE AND ENGINEERING COMPLEX  
TRANSPORTATION IMPACT STUDY  
WASHINGTON, D.C.**

Submitted on behalf of:  
The George Washington University

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## Section I INTRODUCTION

### OVERVIEW

This report presents a Transportation Impact Study (TIS) of the proposed redevelopment of Square 55 on the Foggy Bottom Campus of The George Washington University (GW or the University), in Washington, D.C. The study was conducted in support of a Second-Stage Planned Unit Development (PUD) application for the proposed redevelopment.

### Site Location

Square 55 is located in Ward 2 and is bounded by I Street on the north, H Street on the south, 22<sup>nd</sup> Street on the east, and 23<sup>rd</sup> Street on the west, as shown on Figure I-1.

### Proposed Redevelopment

On February 5, 2007, the Zoning Commission of the District of Columbia approved two applications by The George Washington University: (1) a special exception for a new Campus Plan and (2) first-stage approval of a PUD and related amendments to the Zoning Map of the District of Columbia. The order was adopted on March 12, 2007 and became final and effective on October 26, 2007.

The approved Campus Plan identified Square 55 as one of the potential redevelopment sites on campus. The University is moving forward now with the Second-Stage PUD application for the Square 55 redevelopment.

GW proposes to raze the existing 1,252-space (1,482-space with valet capacity) University Parking Garage (UPG), the existing 20-space Lot 2 surface parking lot, and the adjacent Physical Sciences Building (Building K) and construct a new Science and Engineering Complex (SEC) in its place, as shown on Figure I-2. The existing Fulbright, Jacqueline Bouvier Kennedy Onassis (JBKO), and Munson Residence Halls will be retained.

Construction is anticipated to begin in the spring of 2011 and be completed by the end of 2014. Occupancy of the new building is anticipated in January 2015.

The new SEC will include 376,471 square feet (S.F.) of gross floor area (G.F.A.) on eight levels above-grade. Two below-grade programmed levels plus 327 parking spaces (379 spaces including valet capacity) on four levels below-grade also are proposed.

The departments that will occupy the SEC currently are located in 12 buildings throughout GW's Foggy Bottom Campus and leased space.

The number of curb cuts around the perimeter of Square 55 will be reduced from seven to two. Five curb cuts (two on H Street, two on 22<sup>nd</sup> Street, and one on I Street) that currently provide access to the UPG will be consolidated at a single, new curb cut on H Street, immediately west of the existing curb cuts, as shown on Figure I-2. The new H Street curb cut will provide both access to and egress from the new 327-space (379-space including valet capacity) parking garage. A sixth curb cut on 23<sup>rd</sup> Street that provides access to a single Zipcar space also will be closed.

A single driveway on I Street will provide access to a new loading area within the existing service court defined by the Munson Residence Hall on the east, the JBKO Residence Hall on the west, and the new SEC on the south, as shown on Figure I-3. The existing driveway will be widened.

Pedestrian access to the SEC is proposed at the corner of 22<sup>nd</sup> and H Streets, on 23<sup>rd</sup> Street, and two locations on 22<sup>nd</sup> Street. Pedestrian access to the retail component located at the northeast corner of the site will be provided via a door on I Street and internally through the SEC, as shown on Figure I-4.

## STUDY SCOPE

### Overview

The University retained Wells + Associates to evaluate the multi-modal transportation impacts of redeveloping Square 55. The scope of the study and proposed methodologies were discussed with the District Department of Transportation (DDOT).

### Study Area

The study area was selected based on those intersections that potentially could be affected by the proposed redevelopment. The following intersections were selected for detailed analysis:

1. 23<sup>rd</sup> Street/I Street,
2. 22<sup>nd</sup> Street/I Street,
3. 23<sup>rd</sup> Street/H Street,
4. 22<sup>nd</sup> Street/H Street, and
5. H Street/Proposed Driveway.

## Study Objectives

The objectives of this study were to:

1. Evaluate existing traffic conditions,
2. Identify off-street parking impacts,
3. Identify on-street parking impacts on the blocks immediately surrounding Square 55,
4. Identify existing mode choices,
5. Project future traffic volumes without and with the proposed SEC,
6. Evaluate the effectiveness of the existing Transportation Management Plan and recommend changes, as necessary,
7. Analyze and recommend improvements to manage truck service and delivery activity, and
8. Recommend transportation improvements to promote the safe and efficient flow of vehicular and pedestrian traffic on campus.



## CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

1. Square 55 is well served by a high-quality multi-modal transportation system that includes: a connected network of arterial, collector, and local streets; a connected network of sidewalks, paths, and open spaces; the adjacent Foggy Bottom-GWU Metrorail station; multiple regional bus lines; shuttle buses; and bicycle facilities.
2. The number of parking spaces on Square 55 will be reduced by 945 spaces (1,123 including valet capacity), from 1,272 parking spaces in the UPG and Lot 2 (1,502 including valet capacity) to 327 spaces (379 including valet capacity) in the SEC garage.
3. Parking will be more widely distributed throughout GW's Foggy Bottom Campus by redeveloping Squares 54, 55, and 103. Traffic will be more widely dispersed throughout the Campus rather than concentrated at relatively few large parking facilities (such as the UPG).
4. GW will maintain a minimum of 2,800 parking spaces through the year 2020 in compliance with the Campus Plan Order.
5. The number of curb cuts around the perimeter of Square 55 will be reduced from seven to two, which will reduce pedestrian/vehicle conflicts.
6. The number of curb parking spaces around the perimeter of Square 55 will be increased by an estimated eight spaces, from approximately 25 to approximately 33 spaces because of the reduced number of curb cuts and the relocation of the Vern Express bus stop from H Street to G Street. Six parking spaces will be displaced on G Street due to this bus stop relocation, resulting in a net gain of two curb parking spaces on the Campus.
7. The proposed modification of the I Street driveway will safely and adequately accommodate single-unit trucks and tractor-trailer trucks up to 45 feet in length (WB-40) turning into and out of the driveway to and from the east and west on I Street.
8. One 55-foot tractor-trailer truck (WB-50) is expected to use the high-bay loading berth approximately once a quarter during off-peak times. The entire width of I Street will be required for these trucks to turn into and out of the I Street driveway, which will require temporary prohibition of curb parking on both sides of the street and manual street traffic control. These deliveries will be pre-scheduled all will occur on weekends.
9. An extensive truck management plan has been developed to accommodate the anticipated loading operations of the SEC and to minimize the impact of the building's truck operations.
10. The proposed development plan will provide approximately 80 bicycle parking spaces outside of the facility and 30 bicycle parking spaces in the SEC garage. The University currently is in the process of conducting a campus-wide inventory of bicycle parking. The University should continue to work with DDOT throughout the PUD process to ensure that adequate bicycle parking is provided.
11. The existing Vern Express shuttle bus stop will be relocated from the north side of H Street, east of 23<sup>rd</sup> Street, to the north side of G Street, west of 22<sup>nd</sup> Street in front of Fungler Hall.
12. GW currently has an extensive Transportation Management Plan that promotes safe and efficient traffic operations within the Campus, encourages alternate modes of transportation, and maximizes the use of the on- and off-street parking facilities to efficiently serve the campus parking demands. The TMP also prohibits freshmen and sophomores from bringing vehicles to campus except in special circumstances.

13. As a result of GW's aggressive Transportation Management Plan, the GW community widely uses alternative modes of transportation. Specifically, 67 percent of faculty and staff at the Foggy Bottom Campus commute via a carpool or non-auto mode of transportation. Of the students who commute to campus, 79 percent do so via a carpool or non-auto mode of transportation.
14. In accordance with GW's TMP, the proposed SEC will encourage alternate modes of transportation by providing parking on-site for car sharing vehicles and electric cars, bicycle accommodations, and by providing shower and changing facilities on-site for those who choose to walk, bike, or jog to the facility.
15. Currently, the signalized intersections in the immediate vicinity of Square 55 operate at an overall acceptable LOS "D" or better during weekday AM and PM peak hours. Select lane groups operate near or at capacity at the 23<sup>rd</sup> Street/I Street intersection.
16. Currently, side street movements from the Square 55 driveways on H and I Streets operate near or at capacity.
17. Under future conditions without the proposed redevelopment, the 23<sup>rd</sup> Street/I Street intersection is projected to operate at overall capacity during the PM peak hour. The remaining signalized intersections in the study area will operate at acceptable overall levels of service.
18. The UPG currently generates 259 AM peak hour trips and 338 PM peak hour trips. The proposed SEC will generate 65 AM peak hour trips and 85 PM peak hour trips. Thus, the proposed SEC will generate 194 (or 75 percent) fewer AM peak hour trips and 253 (or 75 percent) fewer PM peak hour trips than the existing UPG. The remaining trips currently generated by the UPG will be dispersed to other locations, including Squares 54 and 103.
19. The proposed redevelopment will result in a reduction in trips at each of the off-site study intersections during the peak hours, with the exception of the 22<sup>nd</sup> Street/I Street intersection. During the AM peak hour, traffic at this intersection is projected to increase by approximately five percent.
20. The volume of traffic entering and exiting the site via the H Street driveway is expected to decrease with the proposed redevelopment.
21. When installed, traffic signal timings at the 22<sup>nd</sup> Street/I Street intersection should be based on future traffic projections in order to adequately accommodate traffic associated with the redevelopment of Square 55. GW and Boston Properties made the required contribution toward the signal in conjunction with the Square 54 development; it is not proposed in conjunction with the SEC development.
22. The proposed redevelopment will not have a significant impact on the traffic operations in the study area.

## Section 2 BACKGROUND INFORMATION

### EXISTING LAND USE

The subject site was zoned C-3-C as part of the First-Stage PUD that applies to the Foggy Bottom Campus. The site currently is zoned C-3-C (Major Business and Employment Centers) and is occupied by the 1,482 space UPG, 20 space Lot 2, and GW's Physical Sciences Building. The C-3-C district is designed to accommodate major business and employment centers supplementary to the Central Business (C-4) District. The C-3-C District permits medium-high density development, including office, retail, housing, and mixed-use development.<sup>1</sup> The remainder of the Square is occupied by three residence halls, which will remain.

The area surrounding the site is comprised of educational, retail, and residential uses. Redevelopment of Square 54, located one block to the north, is underway. This mixed-use development, consisting of office, residential, and retail uses, will be completed next year.

The Foggy Bottom-GWU Metro Station is located at the northwest corner of the 23<sup>rd</sup> Street/I Street intersection.

### PUBLIC ROADWAY NETWORK

Square 55 is located within a connected network of arterial, collector, and local streets. Existing intersection lane use and traffic control at the study intersections are shown on Figure 2-1.

The north-south streets through campus (21<sup>st</sup>, 22<sup>nd</sup>, and 23<sup>rd</sup> Streets) and Pennsylvania Avenue/Washington Circle primarily serve through commuter traffic. The east-west streets through campus (F, G, H, and I Streets) are more diverse and primarily serve local traffic.

**23<sup>rd</sup> Street** is classified by DDOT as a principal arterial, as shown on Figure 2-2. Automobiles, public buses, private shuttle buses, pedestrians, bicyclists, and cars parked along the curb share this two-way, five-lane street. The Foggy Bottom-GWU Metrorail station, the University, the GW Hospital, the adjacent Golden Triangle/K Street business corridor, and local organizations such as the Red Cross and World Bank generate large numbers of pedestrians that use the sidewalks and crosswalks on 23<sup>rd</sup> Street, particularly at I Street.

Within the study area, three lanes operate in the northbound direction and two lanes operate in the southbound direction along 23<sup>rd</sup> Street, however, due to construction on Square 54, the third northbound through lane currently is closed between I Street and Washington Circle.

The average daily traffic (ADT) on 23<sup>rd</sup> Street in the site vicinity is 18,500 vehicles per day (vpd).<sup>2</sup> The posted speed limit is 25 miles per hour (mph). The intersections of 23<sup>rd</sup> Street with I and H Streets are controlled by traffic signals.

**22<sup>nd</sup> Street** is a one-way collector, with two northbound travel lanes south of I Street. Typically, 22<sup>nd</sup> Street carries three northbound travel lanes north of I Street; however, the western curb lane currently is closed due to the construction activities on Square 54. The posted speed limit is 35 mph.

The 22<sup>nd</sup> Street/I Street and 22<sup>nd</sup> Street/H Street intersections are controlled by all-way stop signs. The ADT on 22<sup>nd</sup> Street is 5,800 vpd within the study area.<sup>3</sup>

**I Street** is a two-way, two-lane street in the vicinity of the site. Further east, between 21<sup>st</sup> Street and Pennsylvania Avenue, I Street is one-way eastbound. The posted speed limit is 25 mph. The ADT is 3,700 vpd on the two-way portion in the vicinity of the site.<sup>4</sup>

Due to the construction taking place on Square 54, the I Street cartway currently is narrowed between 22<sup>nd</sup> and 23<sup>rd</sup> Streets. Currently, no on-street parking is permitted on this block as a result of the construction.

The I Street/23<sup>rd</sup> Street intersection is controlled by a traffic signal. The I Street/22<sup>nd</sup> Street intersection is all-way stop controlled. I Street, between 23<sup>rd</sup> and 24<sup>th</sup> Streets, is a pedestrian mall, closed to vehicular traffic.

**H Street** is a two-lane, east-west collector that provides one travel lane in each direction in the site vicinity. The intersection of H Street and 23<sup>rd</sup> Street is controlled by a traffic signal. The H Street/22<sup>nd</sup> Street intersection is controlled by stop signs on each approach. The ADT of the roadway varies from 3,400 to 3,800 vpd in the site vicinity.<sup>5</sup>

**PUBLIC TRANSPORTATION FACILITIES AND SERVICES**

GW is served by both Metrobus and Metrorail, as shown on Figure 2-3.

**Metrorail**

The Foggy Bottom-GWU Metrorail Station is located on the northwest quadrant of the 23<sup>rd</sup> Street/I Street intersection. This is the eighth busiest station in the Metrorail system with an average weekday ridership of nearly 41,000 passengers (based on 2006 data).<sup>6</sup> The peak hour boardings and alightings at the Foggy Bottom-GWU Metrorail station are summarized in Table 2-1.

Table 2-1  
 Foggy Bottom-GW Metrorail Station Passenger Boardings and Alightings

Time of Day	Boardings	Alightings	Total
AM Peak Hour	910	4,220	5,130
PM Peak Hour	3,666	1,307	4,973

The majority of passengers (74 to 89 percent) walk to and from the station; less than 10 percent drive or are driven to the station, as shown in Table 2-2.<sup>7</sup>

Table 2-2  
 Foggy Bottom-GW Metrorail Station  
 Passenger Access Modes

Mode	Percent	
	AM Peak	PM Peak
Metrobus	13.3	2.8
Other Bus	1.7	6.7
Park & Ride	3.3	1.0
Carpool	1.0	0.0
Kiss & Ride	6.6	0.9
Bike	0.0	0.0
Walk	74.1	88.6
Taxi	0.0	0.0
Total	100.0	100.0

**Bus Service**

Washington Metropolitan Area Transit Authority (WMATA), the Maryland Transit Administration (MTA), and the Kennedy Center Shuttle currently provide public bus service near Square 55.

WMATA's Wisconsin Avenue (Route 31), Pennsylvania Avenue (Routes 32 and 36), Ballston - Farragut Square (Route 38B), Pennsylvania Avenue Express (Route 39), Brookland - Potomac Park (Route H1), Connecticut Avenue (Route L1), and Massachusetts Avenue (Route N3) each provide service at bus stops located on the southeast and southwest corners of the 23<sup>rd</sup> Street/I Street intersection immediately adjacent to the Foggy Bottom-GWU Metrorail station. Additionally, WMATA's North Capitol Street (Route 80) provides service at a bus stop located on the southwest corner of the 23<sup>rd</sup> Street/H Street intersection. A total of 446 bus-trips are operated on these lines on a typical weekday, 238 bus-trips on a typical Saturday, and 197 bus-trips on a typical Sunday, as shown in Table 2-3.

MTA's Routes 901, 909, and 950 each provide service at bus stops located on the southeast and southwest corners of the 23<sup>rd</sup> Street/I Street intersection immediately adjacent to the Foggy Bottom-GWU Metrorail station. As shown on Table 2-4, a total of 107 bus-trips are operated on these lines on a typical weekday. No weekend service is provided on these MTA lines.

Table 2-3  
 Metrobus Service – Number of Bus Trips

LINE			WEEKDAY SERVICE			SATURDAY SERVICE			SUNDAY SERVICE		
NAME	NUMBER	DIRECTION	AM Service	PM Service	After Midnight	AM Service	PM Service	After Midnight	AM Service	PM Service	After Midnight
			Wisconsin Avenue	31	NB	18	31	-	11	24	1
SB	19	32			-	12	24	-	10	16	-
Pennsylvania Avenue	32	EB	-	8	-	-	-	-	-	-	-
		WB	9	-	-	-	-	-	-	-	-
	36	EB	-	6	-	-	-	-	-	-	-
		WB	4	-	-	-	-	-	-	-	-
Ballston - Farragut Square	38B	EB	24	35	3	12	24	3	13	24	1
		WB	22	35	3	13	23	3	12	25	-
Pennsylvania Avenue Express	39	EB	-	9	-	-	-	-	-	-	-
		WB	9	-	-	-	-	-	-	-	-
North Capitol Street	80	NB	26	38	4	14	26	4	11	23	1
		SB	32	37	3	14	27	3	12	23	-
Brookland - Potomac Park	H1	NB	-	6	-	-	-	-	-	-	-
		SB	9	-	-	-	-	-	-	-	-
Connecticut Avenue	L1	NB	-	7	-	-	-	-	-	-	-
		SB	8	-	-	-	-	-	-	-	-
Massachusetts Avenue	N3	EB	5	-	-	-	-	-	-	-	-
		WB	-	4	-	-	-	-	-	-	-
<b>TOTALS</b>			<b>185</b>	<b>248</b>	<b>13</b>	<b>76</b>	<b>148</b>	<b>14</b>	<b>67</b>	<b>128</b>	<b>2</b>
			<b>446</b>			<b>238</b>			<b>197</b>		

Table 2-4  
 Maryland Transit Administration Bus Service – Number of Bus Trips

LINE			WEEKDAY SERVICE		
NAME	NUMBER	DIRECTION	AM Service	PM Service	After Midnight
			La Plata, Charles County, Maryland Waldorf, Charles County, Maryland Washington, D.C.	901	NB
		SB	-	31	-
California, St. Mary's County, Maryland Charlotte Hall, St. Mary's County, Maryland Washington, D.C.	909	NB	5	-	-
		SB	-	5	-
Kent Island, Queen Anne's County, Maryland Annapolis, Anne Arundel County, Maryland Washington, D.C.	950	EB	-	19	-
		WB	17	-	-
<b>TOTALS</b>			52	55	-
			107		

The Kennedy Center Shuttle provides service from the Kennedy Center to the Foggy Bottom-GWU Metrorail station. The shuttle is free and departs every 15 minutes from 9:45 AM to midnight on Monday through Friday, from 10:00 AM to midnight on Saturdays, and from noon to midnight on Sundays. On federal holidays the shuttle operates from 4:00 PM to midnight.

**GW CAMPUS TRANSPORTATION**

The University provides four forms of inter-campus transportation: the Colonial Express, the Vern Express, the Virginia Science and Technology Campus Shuttle, and the University Police Department (UPD) Escort Service.

**The Vern Express** is a free bus service that provides transportation for students, faculty/staff, and visitors between the Foggy Bottom and Mount Vernon campuses. The three-mile trip between the two campuses takes between 10 and 13 minutes during non-rush hours. During the academic year, the Vern Express runs 24 hours a day, seven days a week, providing an easy and efficient link between the campuses. During the summer and semester breaks, the Vern Express provides more limited service.

On weekdays during the academic year, the Vern Express operates at headways of five to ten minutes between 7:00 AM and 9:00 PM, and at 15 to 30 minute headways at all other times of day. On weekends during the academic year, the Vern Express operates with headways ranging from 15 to 30 minutes.

During the 2008-2009 academic year, ridership on the Vern Express was 650,137 passengers, which is an increase in ridership of approximately two percent when compared to the 2007-2008 academic year.

The Vern Express routes are shown on Figures 2-4A and 2-4B. Stops are located on the Foggy Bottom Campus at the following locations:

1. 2025 E Street, NW (Red Cross Building);
2. 22<sup>nd</sup> Street and G Street;
3. H Street east of 23<sup>rd</sup> Street and in front of Fulbright Hall (primary location);<sup>†</sup> and
4. 2601 Virginia Avenue in front of the Hall on Virginia Avenue (across from the Watergate), except on weekdays between 6:00 AM and 10:00 AM.

The existing H Street stop consists of a concrete pad, a passenger waiting shelter, an electronic information sign, a static route/schedule display, benches, and trash receptacles, as shown on Figure 2-4A.

This stop must be relocated since it will be displaced by the proposed driveway for the SEC. As such, the Vern Express route is proposed to be shifted from H Street to G Street, as shown on Figure 2-5. The primary stop is proposed to be relocated to the north side of G Street, west of 22<sup>nd</sup> Street. Passengers will wait in the lobby of Funger Hall when the building is open from approximately 7:00 AM to 10:00 PM. From 10:00 PM to 7:00 AM, passengers will wait in the Fishbowl, which is located on the northeast corner of the 22<sup>nd</sup> Street/G Street intersection. The relocated bus stop will be visible from both the Funger Hall lobby and the Fishbowl.

Along with posting bus stop signs, this proposal will require the removal of six parking meters on the north side of G Street, west of 22<sup>nd</sup> Street. The loss of six curb parking spaces on G Street to accommodate the bus stop will be offset by a gain of seven curb parking spaces on the north side of H Street resulting from the removal of the existing bus stop and the closing of one curb cut.

<sup>†</sup> Except on weekdays between 6:00 AM and 10:00 AM, during which time the primary location is at 21<sup>st</sup> Street and H Street adjacent to Marvin Center.

**Colonial Express** is a shuttle bus service that operates on two routes shown on Figure 2-6. The northern route operates as a clockwise loop with stops at Marvin Center, The Aston residence hall, 19<sup>th</sup> Street at L Street, Connecticut Avenue at L Street, and 20<sup>th</sup> Street at I Street.

The southern route also serves five stops at the following locations: Marvin Center, Thurston Hall, Health and Wellness Center, the HOVA residence hall, and Columbia Plaza.

Both routes operate between 7:00 PM and approximately 3:00 AM. The northern route generally has headways of 23 minutes while the southern route has headways ranging from 19 minutes to 49 minutes.

**GW Virginia Science and Technology Campus Shuttle** runs between the Virginia Science and Technology Campus and the Foggy Bottom Campus. A second shuttle provided by Virginia Regional Transit also is available between the Virginia Science and Technology Campus and the West Falls Church Metro Station. Both shuttle services are free for GW faculty, staff, and students.

Service between the Virginia Science and Technology Campus and the Foggy Bottom Campus is provided between 8:35 AM and 11:00 PM, Monday through Thursday. Friday service is provided between 8:35 AM and 10:00 PM. The shuttle makes five stops daily (Monday through Friday) at the Foggy Bottom Campus. The stop is located at the intersection of 21<sup>st</sup> and I Streets in front of the Marvin Center.

Saturday service is limited to three trips between the campuses.

The **University Police Department (UPD) Escort Service** is offered by the UPD to enhance safety and peace of mind for members of the GW community after dark. UPD Escort vans are in operation between 7:00 PM and 6:00 AM. During all other hours, escorts are provided by UPD officers on foot or in patrol cars. Escorts are provided from on-campus to on-campus, on-campus to select off-campus locations, and select off-campus locations to on-campus locations.

## PEDESTRIAN ACCOMMODATIONS

Sidewalks are present along both sides of 22<sup>nd</sup>, 23<sup>rd</sup>, and H Streets within the study area. A sidewalk also is present along the south side of I Street. A temporary walkway has been constructed on the north side of I Street between 22<sup>nd</sup> and 23<sup>rd</sup> Streets due to construction activities on Square 54. Upon completion of the Square 54 construction, a new sidewalk on the north side of I Street will be available to pedestrians. The Square 54 redevelopment also will feature a generous 60-foot wide setback on private property along the north side of I Street for the majority of the block between 22<sup>nd</sup> and 23<sup>rd</sup> Streets. This setback will create a pedestrian-oriented retail plaza.

### Pedestrian Accommodations at Signalized Intersections

At the 23<sup>rd</sup> Street/H Street intersection, pedestrian signals with countdown heads are present for all crossings. Marked crosswalks are present on each approach of the intersection. A single accessible ramp is located on each corner of the intersection to aid disabled persons at each crossing. Photographs of the pedestrian crossings at the 23<sup>rd</sup> Street/H Street intersection are shown in Figure 2-7.

At the 23<sup>rd</sup> Street/I Street intersection, pedestrian signals with countdown heads are present for all crossings. Marked crosswalks are present on each approach of the intersection. A single accessible ramp is located on the southeast corner of the intersection serving persons crossing I Street. Two large depressed curbs are located on 23<sup>rd</sup> Street nearly aligned with the two crosswalks crossing 23<sup>rd</sup> Street, though they are not accessible ramps, per se. Photographs of the pedestrian crossings at the 23<sup>rd</sup> Street/I Street intersection are shown in Figure 2-8.

### Pedestrian Accommodations at Unsignalized Intersections

At the 22<sup>nd</sup> Street/H Street intersection, crosswalks are present on all four approaches. Two accessible ramps are located on each corner serving all pedestrian crossing maneuvers. Photographs of the pedestrian crossings at the 22<sup>nd</sup> Street/H Street intersection are shown in Figure 2-9.

At the 22<sup>nd</sup> Street/I Street intersection, crosswalks are present on all four approaches. Two accessible ramps are located on each the northwest and southwest corners of the intersection, serving persons crossing both I and 22<sup>nd</sup> Streets. One accessible ramp is located on each the northeast and southeast corners of the intersection, serving persons crossing 22<sup>nd</sup> Street. No ramps are present for persons crossing the east leg of I Street. Photographs of the pedestrian crossings at the 22<sup>nd</sup> Street/I Street intersection are shown in Figure 2-10.

### Pedestrian Master Plan

The District of Columbia Pedestrian Master Plan strives to make Washington, D.C. safer and more walkable by improving sidewalks, roadway crossings, and the quality of the pedestrian environment and ensuring that the District's policies and procedures support walking.<sup>8</sup> The plan provides an overview of existing pedestrian conditions, recommends new pedestrian projects and programs, establishes performance measures, and provides a plan for implementation through 2018.

The Plan estimates areas of pedestrian activity and deficiency. Within the site vicinity, H and 22<sup>nd</sup> Streets contain moderate pedestrian activity and pedestrian deficiency. I and 23<sup>rd</sup> Streets contain moderate to high moderate pedestrian activity and pedestrian deficiency.

The Plan provides pedestrian crash data for the years 2000 through 2006. Within the site vicinity, one pedestrian crash has occurred at each the I Street/23<sup>rd</sup> Street and I Street/22<sup>nd</sup> Street intersections. Two to four pedestrian crashes have occurred at each the H Street/23<sup>rd</sup> Street and H Street/22<sup>nd</sup> Street intersections. Figure 2-11 summarizes the pedestrian activity and crashes in the study area.

As part of the Plan, eight priority corridors (one in each ward) were identified based on areas of heavy pedestrian traffic and deficient walking conditions. The priority corridor in Ward 2 is New York Avenue, from 15<sup>th</sup> Street, N.W. to Penn Street, N.E.



## BICYCLES ACCOMMODATIONS

### Bicycle Master Plan

The District of Columbia Bicycle Master Plan<sup>9</sup> seeks to create a more bicycle-friendly city by establishing high quality bicycle facilities and programs that are safe and convenient.

Existing bicycle levels of service (BLOS) in the site vicinity that are presented in the Plan are shown in Table 2-4 and on Figure 2-12.

Table 2-5  
 Existing Bicycle Levels of Service

Roadway	Bicycle LOS
H Street	E
I Street	D
22 <sup>nd</sup> Street, north of I Street	D
22 <sup>nd</sup> Street, south of I Street	E
23 <sup>rd</sup> Street	D

The plan also reports the number of bicycle crashes that occurred between 2000 and 2002. No bicycle crashes occurred at any of the study intersections during the three-year period.<sup>10</sup>

Within the study area, a bicycle lane is proposed on 22<sup>nd</sup> Street from Virginia Avenue to R Street.<sup>11</sup> The lane will be constructed on the east side of the roadway, between the center travel lane and curb parking lane.<sup>12</sup>

### Campus Bicycle Inventory

GW is in the process of conducting a campus-wide inventory of all University-owned bicycle racks. Details on the number and locations of bike racks will be provided upon completion of the inventory.

### Bike Sharing

Capital Bikeshare is an automated bicycle rental or bicycle sharing system in the Washington, D.C. area. The District and Arlington County teamed up to launch a new bike share program that includes over 110 stations with 1,100 bicycles.

Membership is required to use Capital Bikeshare. Daily, monthly, and annual memberships are available for fees of \$5, \$25, and \$75, respectively. The first 30-minutes of use are free; users are then charged a usage fee for each additional 30-minute period. Bicycles can be returned to any station with an available dock.

The closest bikeshare station to the proposed SEC is located approximately one block to the east, at the 21<sup>st</sup> Street/I Street intersection, as shown on Figure 2-13. This station has 27 docks. Other stations within an approximate six block radius of the proposed SEC include:

- 19<sup>th</sup> Street/Pennsylvania Avenue (15 docks),
- 20<sup>th</sup> Street/E Street (15 docks),
- 19<sup>th</sup> Street/E Street (11 docks), and
- 21<sup>st</sup> Street/Virginia Avenue (11 docks).

A SmartBike station currently is located at the Foggy Bottom-GWU Metro Station. This station is expected to soon transition to the Capital Bikeshare program.

### ZIPCAR

Zipcar is an automated car rental or car sharing system in the Washington, D.C. area. Zipcar users must fill out an application online and then will receive a Zipcard, which enables them to reserve Zipcars at any of the locations. Users pay either an hourly or daily rental fee to use the car for their reserved time slot. Cars must be returned to the same designated parking space at which it was picked up.

Eleven Zipcars are located within approximately one block of the subject site, including three cars on Square 55 itself (two in the UPG and one on the east side of 23<sup>rd</sup> Street between Building K and Fulbright Residence Hall), as shown on Figure 2-14. Another seven Zipcars are located within approximately three blocks of the subject site.

## PARKING

### Off-Street Parking Inventory

Currently, 21 parking lots and garages are located on the Foggy Bottom Campus. These parking facilities house 3,104 self-parked (striped) spaces (3,751 spaces including valet capacity), as shown in Table 2-6. In accordance with the Campus Plan, the University is required to maintain a minimum of 2,800 off-street parking spaces.

### On-Street Parking Inventory

Curb parking is permitted on both sides of H, 22<sup>nd</sup>, and 23<sup>rd</sup> Streets on the blocks that border Square 55; however, peak period restrictions apply on many streets. Currently curb parking on I Street is restricted due to construction activities on Square 54.

A total of 50 on-street parking spaces are located on both sides of the four blocks that border Square 55, as shown in Table 2-7 and on Figure 2-15. Table 2-8 summarizes the number of on-street spaces available by peak period.

On the east side of the street, a "No Standing or Parking ←" sign is located immediately adjacent to a meter, within the parking zone. As such, a car parked in the metered space will be in violation of the sign. The sign should be shifted a few feet to the north, out of the parking zone, to eliminate this contradiction.

Table 2-6  
 Existing Off-Street Parking Inventory

Lot #	Name	Number of Spaces		
		Self	Valet	Total
2	JBKO <sup>†</sup>	20	0	20
3	Lot 3	13	36	49
4	Academic Center	226	60	286
5	Elliot School	198	59	257
6	New Hall	59	0	59
7	Ambulatory Care Center	110	0	110
9	Media/Public Affairs	64	0	64
10	Warwick Lot	24	0	24
12	Lot 12	23	0	23
14	Ross Hall	139	48	187
15	Old Main	63	0	63
16	Funger Hall	218	46	264
17	Ivory Tower	90	0	90
18	South Hall	180	0	180
20	Dakota	60	0	60
21	Health & Wellness	112	0	112
UPG	University Parking Garage	1,252	230	1,482
MC	Marvin Center	170	144	314
A	Support Building	49	44	93
	Rear of Westend	9	0	9
	Riverside Towers	5	0	5
<b>TOTAL</b>		<b>3,104</b>	<b>647</b>	<b>3,751</b>

<sup>†</sup> Though attendant-parked, these 20 spaces are counted as self-parked spaces since they are not tandem spaces.

Table 2-7  
 On-Street Parking Inventory  
 By Type of Parking

Location	On-Street Parking Spaces			
	Meter	RPP	Other	Total
H Street (between 22 <sup>nd</sup> and 23 <sup>rd</sup> Streets)				
North	0	0	2	2
South	9	0	0	9
I Street (between 22 <sup>nd</sup> and 23 <sup>rd</sup> Streets) <sup>†</sup>				
North	0	0	0	0
South	0	0	0	0
22 <sup>nd</sup> Street (between H and I Streets)				
East	10	4	0	14
West	10	0	0	10
23 <sup>rd</sup> Street (between H and I Streets)				
East	5	0	2	7
West	8	0	0	8
<b>TOTAL</b>	<b>42</b>	<b>4</b>	<b>4</b>	<b>50</b>
<sup>†</sup> No parking currently exists on this block due to construction activities on Square 54.				

Table 2-8  
 On-Street Parking Inventory  
 By Time of Day

Location	On-Street Parking Spaces		
	AM Peak	PM Peak	Off Peak
H Street (between 22 <sup>nd</sup> and 23 <sup>rd</sup> Streets)			
North	0	0	2
South	0	0	9
I Street (between 22 <sup>nd</sup> and 23 <sup>rd</sup> Streets) <sup>†</sup>			
North	0	0	0
South	0	0	0
22 <sup>nd</sup> Street (between H and I Streets)			
East	4	4	14
West	0	0	10
23 <sup>rd</sup> Street (between H and I Streets)			
East	0	7	7
West	8	0	8
<b>TOTAL</b>	<b>12</b>	<b>11</b>	<b>50</b>
<sup>†</sup> No parking currently exists on this block due to construction activities on Square 54.			

## Section 3 EXISTING CONDITIONS ANALYSIS

### EXISTING TRANSPORTATION DEMAND MEASURES (TDM)

The GW Transportation Management Plan (TMP) was created as a comprehensive plan that promotes safe and efficient traffic operations within the campus, encourages alternate modes of transportation, and maximizes the use of the on- and off-street parking facilities to efficiently serve the campus parking demands. The campus-wide plan consists of the following measures:

1. Transportation Management Coordinator,
2. Public Transportation Pass,
3. GW Parking Facility Permits,
4. On-Campus Parking Pre-Tax Deductions,
5. Off-Campus Parking Pre-Tax Deductions,
6. Attendant Parking,
7. Carpool Programs,
8. Shuttle Bus Service Plan,
9. Car Sharing,
10. Technology Initiatives,
11. Web-based Transit Purchases,
12. Parking Management During On-Site Construction, and
13. Truck Management Program.

#### Transportation Management Coordinator

In accordance with the approved Campus Plan, the University designated a Transportation Management Coordinator in the fall of 2006. The Transportation Management Coordinator is responsible for implementing and monitoring the TMP, including:

- Advising undergraduate students, faculty, and staff of the various TMP initiatives through student and faculty/staff orientation programs;

- Marketing and promoting TMP initiatives through printed materials and online resources;
- Working with students, faculty, and staff to evaluate appropriate locations for bike racks and lockers (including evaluation of bike storage facilities in connection with future University development projects) to encourage more members of the GW community to bike to campus; and
- Working with appropriate University offices to promote public transportation for special events on campus.

In the spring of 2010, the University combined the responsibilities for transportation and parking initiatives to allow for a comprehensive approach to campus transportation matters.

#### Public Transportation Pass

The Foggy Bottom Campus is served by the Foggy Bottom – GWU Metrorail station, conveniently located within the Campus, and numerous Metrobus lines. GW offers a pre-tax transportation benefits program to University employees (regular full-time and part-time) to promote the use of public transportation. This program (SmartBenefits) allows employees to purchase a SmartTrip Card, which can be used on Metrorail, Metrobus, and on MARC or VRE commuter trains.

GW also introduces all new students to the WMATA public transportation program during their orientation.

#### GW Parking Facility Permits

Parking permits are issued to students, faculty, staff, residents, and physicians who drive and park on-campus. The permits are sold with monthly contracts or on an occasional/daily parking basis and are assigned to a specific parking facility. Freshmen and sophomores are not permitted to bring cars to campus.

Visitors are required to pay hourly rate fees, but do not need to purchase a permit.

Discounted daily parking rates are offered to encourage faculty, staff, and students who do drive to park in University garages. Parking fees can be paid conveniently by payroll deduction or via funds deposited to the GWorld card.

### **On-Campus Parking Pre-Tax Deduction Program**

A pre-tax deduction for on-campus parking fees is offered to all regular GW employees.

### **Off-Campus Parking Pre-Tax Deduction Program**

This program allows employees who pay for parking at a Metro station or at a commercial parking facility to participate in a pre-tax parking program.

### **Attendant/Valet Parking**

When class attendance is high or when special events occur on campus, attendant/valet parking is available at specific parking facilities to provide additional parking spaces.

### **Carpool Programs**

Carpooling is encouraged at GW through the Carpool Program, which allows employees to park any car registered in their carpool group in one group-shared parking space in any parking facility. The University is enrolled in "NuRide," a ride sharing program that encourages and rewards carpooling. Registered riders earn reward points that can be redeemed for gift cards, discounts, and event tickets.

### **Car Sharing**

The University actively promotes Zipcar at University fairs and events. Since 2007, GW affiliated Zipcar memberships have increased by more than 50 percent (including students, faculty, staff, and alumni). Since then, the University has worked closely with Zipcar to increase the number of Zipcars on campus. Currently, 19 Zipcars are located on the Foggy Bottom Campus.

### **Shuttle Bus Service Plan**

To alleviate the need for private automobile use on-campus and between campuses, GW provides four forms of campus transportation: the Colonial Express Shuttle, the Vern Express Shuttle, the Virginia Science and Technology Campus Shuttle, and the University Police Department (UPD) Escort Service.

### **Technology Initiatives**

The University promotes the use of video conferencing, podcasts, online library resources, the Bb@GW on-line course management system (based on the Blackboard Learning System™), and administrative document management systems to reduce the need for physical movement to and between the Foggy Bottom and other GW campuses.

The University's website provides links to Commuter Connections and other transportation resources.

### **Web-based Transit Purchases**

In accordance with the Campus Plan approval, GW now provides a link from its website to Metro pass sales information where members of the University community can purchase transit fare media, including SmarTrip fare cards online.

### **Parking Management During On-Site Construction**

The University has a parking management plan in place to ensure that campus parking demands are adequately met during construction. Specifically, 362 (462 including valet capacity) GW designated spaces in the Square 54 garage will come on-line prior to demolishing the UPG. Additionally, the University plans to lease interim spaces at the Kennedy Center and additional spaces in the Square 54 garage during construction of the SEC and other redevelopment projects.

While leased parking at the Kennedy Center is in place, users who chose not to walk can ride the Kennedy Center shuttle during its hours of operation. GW is exploring the possibility of providing a shuttle to transport people from the Kennedy Center to the Foggy Bottom Campus. When the Kennedy Center shuttle is not in operation.

### Truck Management Plan

The University currently has a truck management plan in place with the goal of reducing the impact of GW delivery trucks on the campus roadways. Preferred truck routes were developed in conjunction with DDOT to identify the main roadways that delivery vehicles should use to access the GW loading facilities, while discouraging the use of smaller and narrower neighborhood streets. GW is committed to developing specific truck management plans for new developments on campus.

## GW TRANSPORTATION CHARACTERISTICS

A University-wide transportation survey was conducted during the spring semester of 2010 in order to identify the existing travel behaviors of the GW community and to assess the effectiveness of its Transportation Management Plan. The survey was distributed electronically to 800 faculty, 1,300 staff, and 6,000 students at the Foggy Bottom, Mount Vernon, and Virginia Science and Technology Campuses. The number of respondents from the Foggy Bottom Campus is presented in Table 3-1.

Table 3-1  
 Summary of Respondents  
 Foggy Bottom Campus

Type of Response	Number of Responses
Faculty	294
Staff	536
Students	854
Total	1,684
Numerous respondents provided only partially complete surveys. The numbers reflected in this table include both complete and partially complete surveys.	

### Mode Choice

Based on the survey data, an estimated 51 percent of Foggy Bottom students live on campus. The remaining 49 percent commute to campus. Faculty, staff, and students who commute to campus were asked about their mode of transportation to campus. These data are summarized in Table 3-2.

As shown in Table 3-2, 29 percent of the faculty and staff drive alone. Eight percent carpool and 12 percent walk, jog, or bike to campus. The majority of the faculty and staff, 47 percent, commute via some form of public transportation.

The mode split of students commuting to the Foggy Bottom Campus is summarized in Table 3-2. Just 17 percent of all students who commute drive alone to campus while three percent carpool. The majority of commuter students, 76 percent, commute to campus via a non-auto mode of transportation (i.e., rail, bus, walk/jog, or bike).

### Carpooling Characteristics

The average vehicle occupancy for those who travel by automobile was determined based on the number of persons in each respondent's carpool. The carpooling data for faculty/staff and students also are summarized in Table 3-2.

Based on the data, the average vehicle occupancy for faculty and staff is 1.25 persons per vehicle. Based on the student commuter data, the average vehicle occupancy for commuter students is 1.17 persons per vehicle.

Table 3-2  
 Mode Split Summary  
 Foggy Bottom Campus

Mode	Faculty/Staff		Student Commuters	
	Number	Percent	Number	Percent
<b>Auto</b>				
Drove Alone	242	29%	139	17%
Motorcycle	1	0%	2	0%
2 person Carpool	56	7%	18	2%
3 person Carpool	7	1%	5	1%
4-6 person Carpool	2	0%	0	0%
7+ person Carpool	0	0%	0	0%
Sub-total	308	37%	164	20%
<b>Non-auto</b>				
Commuter Rail	309	37%	431	53%
Light Rail	21	3%	8	1%
Public Bus	53	6%	65	8%
Private Bus	8	1%	4	1%
Walk/Jog	84	10%	63	8%
Bicycle	17	2%	39	5%
Other	26	3%	28	3%
Sub-total	518	62%	638	79%
No Response	4	1%	9	1%
Total	830	100%	811	100%

## TRAFFIC VOLUMES

Turning movement counts and pedestrian counts were conducted at the following intersections on Wednesday, September 15, 2010 from 7:00 to 10:00 AM and from 4:00 to 7:00 PM:

- 22<sup>nd</sup> Street/H Street,
- 23<sup>rd</sup> Street/H Street, and
- H Street/UPG Driveway.

Turning movement counts and pedestrian counts were conducted at the following intersections on Wednesday, September 29, 2010 from 7:00 AM to 10:00 AM and from 4:00 PM to 7:00 PM:

- 22<sup>nd</sup> Street/I Street,
- 23<sup>rd</sup> Street/I Street,
- 22<sup>nd</sup> Street/UPG Driveway, and
- I Street/UPG Driveway.

Turning movement counts and pedestrian counts were conducted at the I Street/Lot 2 Driveway on Wednesday, September 29, 2010 from 7:00 AM to 7:00 PM.

Based on the data collected, a common AM peak hour and a common PM peak hour were selected for the study area. The common AM peak hour occurred from 7:45 to 8:45 AM and the common PM peak hour occurred from 5:00 to 6:00 PM.

Existing peak hour vehicular traffic volumes are summarized on Figure 3-1. Existing peak hour pedestrian volumes are summarized on Figure 3-2. Traffic count data are included in Appendix A.

### Existing Site Trips

Counts at the UPG driveways and the Lot 2 driveway were utilized to determine the number of trips currently generated by the facilities during the AM and PM peak hours.

As shown in Table 3-3, the UPG and Lot 2 currently generate 259 trips during the AM peak hour (7:45 to 8:45 AM) or 0.172 trips per space. During the PM peak hour (5:00 to 6:00 PM), the UPG generates 338 trips or 0.225 trips per space.

Table 3-3  
 Existing Site Trip Generation

Time Period	Enter	Exit	Total
AM Peak Hour (veh)	222	37	259
AM Peak Hour (veh/space <sup>†</sup> )	0.148	0.025	0.172
PM Peak Hour (veh)	79	259	338
PM Peak Hour (veh/space <sup>†</sup> )	0.053	0.172	0.225

<sup>†</sup> Based on 1,502 spaces; 1,482 spaces in UPG (including valet spaces) and 20 valet spaces in Lot 2.

### OPERATIONAL ANALYSIS

Capacity/level of service (LOS) analyses were conducted based on the existing lane use and traffic control shown on Figure 2-1, existing vehicular traffic volumes shown on Figure 3-1, the existing pedestrian volumes shown on Figure 3-2, and existing DDOT traffic signal timings, which are included in Appendix B.

Synchro software (Version 7, Build 773) was used to evaluate levels of service at each of the study intersections during the AM and PM peak hours. Synchro is a macroscopic model used to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings and to optimize traffic signal timings. The levels of service reported were taken from the Highway Capacity Manual 2000<sup>13</sup> (HCM) reports generated by Synchro. Levels of service descriptions are included in Appendix C.

The Synchro results are presented in Appendix D and summarized in Table 3-4.

Table 3-4  
 Existing Levels of Service

Approach	AM Peak	PM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>		
WBLR	C (30.5)	F (93.4)
NBT	A (9.2)	A (5.4)
NBR	E (55.9)	A (2.1)
SBLT	B (10.6)	B (13.9)
<b>Overall</b>	<b>B (20.0)</b>	<b>B (17.6)</b>
<b>2. 22<sup>nd</sup> Street/I Street</b>		
EBLT	B (12.5)	A (8.3)
WBTR	A (8.8)	A (8.7)
NBLTR	A (9.4)	A (8.0)
<b>Overall</b>	<b>B (10.6)</b>	<b>A (8.3)</b>
<b>3. 22<sup>nd</sup> Street/H Street</b>		
EBLT	B (13.9)	A (9.3)
WBTR	A (9.0)	A (8.3)
NBLTR	B (10.3)	A (8.0)
<b>Overall</b>	<b>B (11.7)</b>	<b>A (8.6)</b>
<b>4. 23<sup>rd</sup> Street/H Street</b>		
EBLTR	C (34.5)	D (35.8)
WBLTR	C (26.2)	D (47.5)
NBLTR	B (11.4)	A (8.6)
SBLTR	A (9.2)	A (3.6)
<b>Overall</b>	<b>B (14.4)</b>	<b>B (12.4)</b>
<b>5. I Street/Lot 2 Driveway</b>		
WBL	A (0.0)	A (1.3)
NBLR	F (116.3)	F (435.6)
<b>6. I Street/UPG Driveway</b>		
WBL	A (3.1)	A (0.8)
<b>7. 22<sup>nd</sup> Street/UPG Driveway</b>		
EBL	C (15.7)	C (17.7)
EBR	A (4.4)	A (3.4)
<b>8. H Street/UPG Driveway</b>		
EBLTR	A (1.6)	A (1.4)
WBLTR	A (1.6)	A (0.5)
NBLTR	E (36.7)	F (*)
SBL	C (24.5)	F (865.3)
SBTR	B (10.6)	F (175.2)

[x.x] = unsignalized intersection control delay in sec/veh  
 (x.x) = signalized intersection control delay in sec/veh



As shown in Table 3-4, the following intersections currently have one or more lane groups that operate at capacity:

- 23<sup>rd</sup> Street/I Street,
- I Street/Lot 2 Driveway, and
- H Street/Existing UPG Driveway.

The remaining intersections currently operate with acceptable levels of service (i.e., LOS “D” or better).

## Section 4 FUTURE BACKGROUND CONDITIONS

### TRAFFIC VOLUMES

In order to forecast 2020 background traffic volumes in the study area without the proposed redevelopment, several factors were taken into consideration:

- The impact of the current construction activities in the study area on existing traffic counts,
- Increases in traffic associated with growth outside the immediate site vicinity (regional growth), and
- Increases in traffic associated with planned or approved but not yet constructed developments in the study area (pipeline developments).

### Post Construction Conditions

Roadways within the study area currently are impacted by the construction activities of Square 54, as follows:

- The western curb lane on 22<sup>nd</sup> Street is closed between I Street and Pennsylvania Avenue,
- The eastern curb lane on 23<sup>rd</sup> Street is closed between I Street and Washington Circle,
- The lane widths on I Street, between 22<sup>nd</sup> and 23<sup>rd</sup> Streets, have been narrowed and curb parking removed, and
- The sidewalk on the north side of I Street currently is closed; a temporary walkway has been erected in its place.

The existing volumes were compared to historical counts conducted in the area to determine whether the construction activities have impacted local traffic patterns. The current counts are significantly lower than the 2005 counts; therefore, the 2005 counts were assumed to reflect post construction conditions.

The 2005 counts (taken from the previously approved Transportation Impact Study for the Foggy Bottom Campus Plan) are shown on Figure 4-1.

Likewise, the pedestrian counts along I Street were compared to previous counts conducted in the area. Currently, the number of pedestrians along the south side of I Street is substantially higher than along the north side of I Street. During the AM peak hour, approximately 60 percent of the pedestrians on I Street currently use the sidewalk on the south side of the street. During the PM peak hour, approximately 67 percent of the pedestrians on I Street currently use the sidewalk on the south side of the street.

A review of 2005 pedestrian counts indicate that previously, more pedestrians used the sidewalk on the north side of I Street than the sidewalk on the south side of I Street. Specifically, counts from 2005 indicate that approximately 43 percent of the pedestrians on I Street used the sidewalk on the south side of I Street during the AM peak hour, and approximately 48 percent used the southern sidewalk during the PM peak hour. To account for post-construction conditions, an adjustment was made to the pedestrian volumes to reflect the proportions observed prior to construction on Square 54. The adjusted pedestrian volumes are depicted on Figure 4-2.

### Regional Growth

In order to account for regional traffic growth outside the immediate site vicinity, a growth rate of ½ percent per year, compounded annually over 15 years (2005 to 2020), was applied to the post construction traffic volumes shown on Figure 4-1. The Square 55 site trip volumes (i.e., turning movements in and out of UPG and Lot 2 driveways) were not grown at any of the study intersections. The resulting volumes are shown on Figure 4-3.

## Pipeline Developments

In addition to the proposed development, several other developments planned in and around the study area were considered as part of the background traffic growth.

### Square 54

On May 14, 2007, the District of Columbia Zoning Commission approved a PUD and Zoning Map amendment for Square 54, located one block north of the proposed SEC site. The approval rezoned the Square from R-D-5 to C-3-C, which allowed construction of a mixed-use development which will consist of approximately 335 residential units, approximately 436,000 S.F. of office space, and approximately 84,000 S.F. of retail space (including a 37,000 S.F. grocery store). The proposed development will include approximately 1,026 parking spaces, of which 362 (462 including valet capacity) will be designated for use by GW. Access to the garage is proposed via a new driveway on 22<sup>nd</sup> Street.

The project is under construction and will be complete in the spring of 2011.

Traffic associated with the redevelopment of Square 54 was taken from the Square 54 Transportation Impact Study.<sup>14</sup> The Square 54 site assignments are included in Appendix E.

### Square 39

Like Square 55, Square 39 also was identified as a potential area of redevelopment under the approved Campus Plan. In the near future, GW intends to move forward with the Second-Stage PUD application for redevelopment of Square 39.

Square 39, located west of The George Washington University Hospital, currently is occupied by the three-story Warwick building, which houses the GW Universal Health Services Radiation Oncology Center and a 24-space faculty/staff surface parking lot. Both of these facilities are proposed to be razed to accommodate the new School of Public Health and Health Services (SPHHS). The SPHHS site was approved for a maximum of 115,549 S.F. of gross floor area per the First-Stage PUD. No parking is proposed in conjunction with the SPHHS.

The uses currently housed in the Warwick building will be relocated to nearby Ross Hall, The George Washington University Hospital, or leased space in the nearby Golden Triangle/K Street business corridor.

The new SPHHS will partially consolidate educational departments and administrative functions currently housed in Ross Hall; Building K; 2021, 2121, and 2175 K Street; 2100 Pennsylvania Avenue; and 2100 M Street.

Construction of the new facility is anticipated to begin in January 2012 with anticipated completion by the end of 2013. The new facility is expected to be occupied by late 2013 or early 2014.

Traffic associated with the increase in faculty, staff, and students for the new SPHHS was estimated based on traffic projections from The George Washington University Foggy Bottom Campus Plan: 2006-2025 Transportation Impact Study.<sup>15</sup> Specifically, the Campus Plan contemplated an increase of 1,198 students and 1,000 faculty and staff. Corresponding increases in vehicular traffic associated with these increases were estimated across the Campus. In order to estimate the vehicular traffic increases associated with additional faculty, staff, and students related to the new SPHHS, a portion of the Campus Plan forecasts were used based on the ratio of SPHHS faculty, staff, and students to the faculty, staff, and students used in the Campus Plan. The site assignments for the SPHHS are included in Appendix E.

The traffic associated with all of the pipeline developments is shown on Figure 4-4.

Background 2020 traffic forecasts were developed by combining the post construction volumes grown to the year 2020 (shown on Figure 4-3) with the pipeline traffic volumes shown on Figure 4-4. The resulting 2020 background traffic forecasts are shown on Figure 4-5.

## PLANNED IMPROVEMENTS

A review of the Transportation Improvement Program (TIP) for the Washington Metropolitan Region prepared by the National Capitol Region Transportation Research Board indicates the following transportation improvements in the area by 2020:

- K Street, N.W. Priority Busway – Reconstruction of K Street, N.W. between Mount Vernon Triangle and Washington Circle to provide an exclusive transit way in the median with anticipated completion in 2017;
- District-wide Bicycle and Pedestrian Management Program – Improvements to increase the safety and convenience of bicycle and pedestrian travel, such as installing bicycle racks, installing bicycle lanes on existing streets, upgrading signage and lighting, and improving the pedestrian experience in the City;
- Roadway Construction City-wide – Reconstruction of streets with poor pavement condition, including New Hampshire Avenue from Dupont Circle to H Street, N.W.; and
- East Entrance Foggy Bottom – Undertake a study to evaluate the feasibility of constructing an additional entrance on the east side of the Foggy Bottom-GWU Metrorail station. The study is slated to be complete in 2012.

Although these improvements do not directly affect the analysis in the study area, the Square 54 redevelopment does include transportation related improvements in the immediate study area. Specifically, the traffic impact study for the site recommended signalization of the 22<sup>nd</sup> Street/I Street intersection and restriping of I Street to provide separate left and through lanes on the eastbound approach to 22<sup>nd</sup> Street. GW and Boston Properties made the required contribution toward the traffic signal in conjunction with the Square 54 redevelopment. Accordingly, these improvements have been assumed in the future conditions analysis.

The future lane use and traffic control in the study area are shown on Figure 4-6.

## OPERATIONAL ANALYSIS

Capacity/level of service analyses were conducted at the study intersections based on the future background traffic forecasts shown on Figure 4-5, the future lane use and traffic control shown on Figure 4-6, and existing DDOT traffic signal timings provided in Appendix B. The proposed traffic signal at the 22<sup>nd</sup> Street/I Street intersection was modeled as a three-phase operation with an eastbound advance phase, consistent with the [Square 54 Transportation Impact Study](#). The signal also was modeled with a 100-second cycle consistent with DDOT's AM and PM peak hour timing plans.

The Synchro level of service results for the 2020 background conditions without the proposed Square 55 redevelopment are presented in Appendix F and summarized in Table 4-1.

As shown in Table 4-1, the following intersections are projected to have one or more lane groups operating at capacity under the 2020 background conditions:

- 23<sup>rd</sup> Street/I Street,
- 23<sup>rd</sup> Street/H Street,
- I Street/Lot 2 Driveway, and
- H Street/Existing UPG Driveway.

The remaining intersections are projected to operate with acceptable levels of service (i.e., LOS "D" or better).

Table 4-1  
 2020 Background Levels of Service

Approach	AM Peak	PM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>		
WBLR	E (56.5)	F (762.9)
NBT	B (12.5)	A (6.7)
NBR		A (2.5)
SBLT	F (83.3)	E (67.9)
<b>Overall</b>	<b>D (41.0)</b>	<b>F (148.4)</b>
<b>2. 22<sup>nd</sup> Street/I Street</b>		
EBL	D (37.8)	B (16.2)
EBT	B (18.7)	A (7.0)
WBTR	D (49.1)	C (28.9)
NBLTR	D (54.3)	D (40.6)
<b>Overall</b>	<b>D (44.1)</b>	<b>C (29.0)</b>
<b>3. 22<sup>nd</sup> Street/H Street</b>		
EBLT	C (21.2)	B (10.1)
WBTR	B (10.2)	B (10.2)
NBLTR	B (13.5)	A (9.3)
<b>Overall</b>	<b>C (16.2)</b>	<b>A (9.8)</b>
<b>4. 23<sup>rd</sup> Street/H Street</b>		
EBLTR	D (38.8)	D (47.6)
WBLTR	C (26.9)	E (78.9)
NBLTR	B (12.9)	A (8.5)
SBLTR	B (11.7)	A (5.9)
<b>Overall</b>	<b>B (16.1)</b>	<b>B (17.8)</b>
<b>5. I Street/Lot 2 Driveway</b>		
WBL	A (0.0)	A (1.0)
NBLR	F (54.7)	F (280.4)
<b>6. I Street/UPG Driveway</b>		
WBL	A (2.1)	A (0.5)
<b>7. 22<sup>nd</sup> Street/UPG Driveway</b>		
EBL	C (17.2)	C (19.4)
EBR	A (3.6)	A (2.5)
<b>8. H Street/UPG Driveway</b>		
EBLTR	A (1.4)	A (1.7)
WBLTR	A (2.2)	A (0.3)
NBLTR	E (41.2)	F (*)
SBL	D (27.4)	F (991.7)
SBTR	B (10.5)	F (229.4)
[x.x] = unsignalized intersection control delay in sec/veh (x.x) = signalized intersection control delay in sec/veh		

## QUEUE ANALYSIS

A queuing analysis was conducted for 2020 conditions without the proposed Square 55 redevelopment. Synchro was used to conduct the analyses; specifically, the 95<sup>th</sup> percentile queue lengths were examined. The results are summarized in Table 4-2. Queue reports are provided in Appendix G.

As shown in Table 4-2, queues at a few lane groups at the following intersections are projected to extend to the adjacent intersection during the peak hours:

- 23<sup>rd</sup> Street/I Street (Westbound and Southbound),
- 22<sup>nd</sup> Street/I Street (Eastbound), and
- 23<sup>rd</sup> Street/H Street (Westbound).

Queues that extend to adjacent intersections are typical in urban environments where intersections (signalized intersections in particular) are closely spaced.

Table 4-2  
 95<sup>th</sup> Percentile Queue Summary<sup>†</sup>  
 Background Conditions

Approach	Available Storage	AM Peak	PM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>			
WBLR	265	98	534
NBT	330	226	65
NBR	380/50 <sup>‡</sup>		3
SBLT	380	251	660
<b>2. 22<sup>nd</sup> Street/I Street</b>			
EBL	100	350	61
EBT	260	116	21
WBTR	530	87	275
NBLTR	320	316	177
<b>4. 23<sup>rd</sup> Street/H Street</b>			
EBLTR	300	197	189
WBLTR	295	66	328
NBLTR	375	205	94
SBLTR	330	117	103
<b>5. I Street/Lot 2 Driveway</b>			
WBL	165	0	1
NBLR	NA	1	32
<b>6. I Street/UPG Driveway</b>			
WBL	40	2	1
<b>7. 22<sup>nd</sup> Street/UPG Driveway</b>			
EBL	NA	1	12
NBLT	NA	7	3
<b>8. 22<sup>nd</sup> Street/UPG Driveway</b>			
EBLTR	165	4	2
WBLTR	115	2	1
NBLTR	NA	4	*
SBL	NA	7	198
SBTR	NA	3	245
<sup>†</sup> All distances in feet, measured to nearest intersection or end of turn lane, as appropriate. <sup>‡</sup> 330 feet of storage available during AM peak hour; only 50' available during PM peak hour, due to on-street parking.			

## Section 5 SITE ANALYSIS

### OVERVIEW

Currently, GW's science and engineering departments occupy space in 12 buildings throughout the Foggy Bottom Campus. The proposed SEC will allow for the consolidation of these departments at one location, the proposed Science and Engineering Complex (SEC).

The proposed SEC will include 376,471 S.F. of G.F.A. on eight levels above-grade. Two below-grade programmed levels plus 327 parking spaces (379 including valet capacity) on four levels below-grade also are proposed. The existing UPG and adjacent Physical Sciences Building (Building K) will be razed to accommodate the new SEC. The existing Fulbright, JBKO, and Munson Residence Halls will be retained.

Construction is anticipated to begin in the spring of 2011 with anticipated completion by the end of 2014. Occupancy of the new building is anticipated in January 2015.

The programming of the proposed SEC contemplates an additional 69 faculty and staff for the various science and engineering departments.

### SITE ACCESS

Vehicular access to the garage will be provided via a new curb cut on H Street that will be located immediately west of the existing UPG curb cuts on H Street. The five existing UPG curb cuts (two on H Street, two on 22<sup>nd</sup> Street, and one on I Street) will be eliminated.

The proposed garage driveway will be configured with one inbound lane and one outbound lane.

Pedestrian access to the SEC is proposed at the corner of 22<sup>nd</sup> Street and H Street, on 23<sup>rd</sup> Street, and two locations on 22<sup>nd</sup> Street. Pedestrian access to the retail component located at the northeast corner of the site will be provided via a door on I Street and internally through the SEC.

### LOADING

The existing service court located between the Munson and JBKO Residence Halls will be modified to incorporate loading functions for the SEC. The existing driveway to the service court will be widened to accommodate trucks.

A 30-foot loading berth and a 55-foot loading berth will accommodate the consolidated needs of the existing Munson and JBKO Residence Halls and the proposed SEC.

A 20-foot service space also will be provided.

Trucks 45 feet in length or shorter (i.e., WB-40 or smaller) will enter and exit the loading area front first. Larger trucks (i.e., WB-50) will back in and exit front first. A crane will be installed in a high bay loading dock to load and off-load heavy cargo transported by these larger trucks.

Diagrams showing truck maneuvers in and out of the proposed service court are included in Appendix H.

### PROPOSED PARKING SUPPLY

#### Off-Street Parking Inventory

In accordance with the approved Campus Plan, GW is required to maintain a minimum of 2,800 off-street parking spaces on its Foggy Bottom Campus.

Approximately 945 parking spaces (1,123 including valet capacity) will be displaced permanently as a result of the redevelopment of Square 55 (i.e., 1,252 self-parked spaces in the UPG plus 20 spaces in Lot 2 minus 327 self-parked spaces in new SEC garage or, including valet spaces, 1,482 spaces in the UPG plus 20 spaces in Lot 2 minus 349 spaces in the new SEC garage). Another 24 spaces will be lost permanently with the redevelopment of Square 39. The majority of those spaces will be relocated to other parking facilities on campus. Specifically, 362 new parking spaces (462 including valet capacity) will be designated for GW use in the Square 54 garage in the spring of 2011.

Additionally, a net increase of 357 spaces in the new Law Learning Center (LLC) garage (392 self-garage spaces plus 58 interim valet spaces minus 93 spaces currently on Square 103) will come on-line in the spring of 2012. Upon completion of LLC and SEC, the University will have approximately 3,400 total spaces (including valet), more than exceeding the required minimum of 2,800 off-street parking spaces.

### On-Street Parking Inventory

An increase in the curb parking supply is anticipated upon completion of the proposed redevelopment of Square 55. The number of curb cuts for the square will be reduced from seven to two. Additionally, the existing Vern Express bus stop on H Street will be relocated.

The closure of five curb cuts coupled with the removal of the Vern Express stop will allow for an additional eight curb parking spaces on the four faces of the square. Six spaces will be lost on G Street with the Vern Express bus stop relocation.

Figure 5-1 depicts the curb parking inventory along the four faces of the square under existing conditions and under post-redevelopment conditions.

### BICYCLE REQUIREMENTS

According to the District of Columbia Municipal Regulations (DCMR),<sup>16</sup> the number of bicycle parking spaces provided shall be at least equal to five percent of the number of automobile parking spaces provided. Therefore, a total of 19 bicycle parking spaces will be required for the proposed SEC.

Bicycle parking in the SEC will be provided on the first level of the garage and in several locations outside, surrounding the building. Approximately 30 spaces will be provided in the garage. Approximately 80 spaces will be provided outside, conveniently located near the building entrances. The ground level bicycle parking is shown on Figure 5-2.

## TRIP GENERATION ANALYSIS

### Overview

Vehicular traffic generated by the proposed redevelopment will be comprised of four components:

2. The portion of the traffic currently parking in the UPG that will continue to park in the SEC garage,
3. The portion of the traffic currently parking in the UPG that will be displaced to park on Square 54,
4. The portion of the traffic currently parking in the UPG that will be displaced to park on Square 103 (LLC), and
5. The additional trips that will be generated by approximately 69 additional faculty members.

### Traffic Associated with the SEC Garage

The proposed parking provided in conjunction with the SEC will accommodate visitor parking and permit parking for faculty and staff. This parking will not be limited to just those going to the SEC. As such, it will be similar in nature to the parking currently permitted at the UPG, although fewer spaces will be provided.

The number of vehicle trips that will be generated by the redeveloped site was based on the site-specific trip generation rates developed for the existing UPG (including Lot 2), as shown in Table 5-1A.

Table 5-1A  
 Vehicular Site Trip Generation  
 Proposed SEC Garage

Time Period	Enter	Exit	Total
AM Peak (veh)	56	9	65
PM Peak (veh)	20	65	85
† Based on 379 spaces (including valet spaces).			



### Reassigned Traffic to Square 54 Garage

The new GW spaces in Square 54 also will be similar in nature to those spaces currently located in the UPG. Therefore, the number of vehicle trips that will be rerouted from the existing UPG to the new Square 54 garage was based on the site-specific trip generation rates developed for the existing UPG (including Lot 2). Table 5-1B summarizes the number of trips that are projected to be rerouted to the Square 54 garage.

Table 5-1B  
 Vehicular Site Trip Generation  
 Square 54 Garage

Time Period	Enter	Exit	Total
AM Peak (veh)	68	11	79
PM Peak (veh)	25	79	104
† Based on 462 spaces (including valet spaces).			

### Reassigned Traffic to Square 103 (Law Learning Center) Garage

Square 103 was identified as a potential redevelopment area in the approved Campus Plan. The University ultimately plans to redevelop a portion of the Square for a new, six-story Law Learning Center. The site currently is occupied by student residences, Law School facilities, academic uses, and 93-surface parking spaces (Lot A).

The first phase of the redevelopment will raze the existing uses to make way for a 23,281 S.F. below-grade seminar/teaching facility, five levels of below grade parking, and a surface level of parking. A total of 450 parking spaces (including 58 interim surface spaces) will be provided upon completion of the first phase.<sup>17</sup> These spaces will be used to replace a portion of the spaces lost with the razing of the UPG. Upon completion of the SEC, 58 interim surface spaces will be removed.

### Traffic Associated with Increase in Faculty/Staff

Traffic associated with the increase in faculty and staff for the new SEC was estimated based on traffic projections from The George Washington University Foggy Bottom Campus Plan: 2006-2025 Transportation Impact Study.<sup>18</sup>

Specifically, the Campus Plan contemplated an increase of 1,000 faculty and staff. Corresponding increases in vehicular traffic associated with these increases were estimated across the Campus. In order to estimate the vehicular traffic increases associated with new faculty and staff related to the new SEC, a portion of the Campus Plan forecasts were used based on the ratio of SEC faculty and staff to the faculty and staff used in the Campus Plan.

### SITE TRIP DISTRIBUTION AND ASSIGNMENT

The distribution and assignment of peak hour trips generated by the proposed redevelopment was based on existing traffic patterns in the study area.

First, existing trips currently generated by the UPG and Lot 2 were removed from the roadway network based on the existing traffic volumes entering and exiting each of the driveways during the peak hours. These trips were removed from the remaining study intersections based on the traffic patterns from the 2005 counts in the Campus Plan. The removal of the existing trips associated with the UPG and Lot 2 are shown on Figure 5-3A.

The portion of the trips that will park in the SEC garage then was added back to the roadway network based on the location of the proposed driveway on H Street, as shown on Figure 5-3B.

Likewise, the portion of the trips that will park in the Square 54 garage was added back to the roadway network based the location of the Square 54 driveway on 22<sup>nd</sup> Street, as shown on Figure 5-3C.

The trips that will be rerouted to the new LLC garage on Square 103 were taken from the Draft Transportation Impact Study for Stage 2 PUD Application - George Washington University Law Learning Center (LLC).<sup>19</sup> The site trips presented in the study were carried through the Square 55 study area based on existing traffic patterns, as shown on Figure 5-3D.

Traffic associated with the increase in faculty and staff is shown on Figure 5-3E. The combined site trips for all components are summarized in Figure 5-3F.

## PROPOSED TDM MEASURES FOR THE SEC

As part of the campus-wide TMP, the SEC will employ several specific TDMs to encourage alternate modes of transportation, manage loading and delivery operations, and to generally promote safe and efficient traffic operations in and around the site.

### Car Sharing

A minimum of three parking spaces within the SEC garage will be designated as car sharing spaces. These spaces will replace the current Zip Car spaces in the UPG and the Zip Car space currently located off of 23<sup>rd</sup> Street between Fulbright Hall and Building K. The University will continue to work with Zip Car to identify future demand for additional car sharing spaces.

### Parking for Electric Cars

Six parking spaces in the SEC garage will be designated as parking for electric cars. These spaces will provide access to recharging stations.

### Bicycle Accommodations

As previously mentioned, approximately 30 bicycle spaces will be provided on the first level of the SEC garage. Additionally, 80 spaces will be conveniently located outside of the SEC proximate to the building entrances.

Shower and changing facilities will be provided in the SEC for those who chose to bicycle, walk, or jog.

### Truck Management Plan

GW is committed to operating in a manner that is sensitive to the surrounding community. The purpose of the truck management plan is to promote safe and efficient travel for all users (e.g., cars, trucks, and pedestrians) by conducting its loading and delivery operations to avoid adverse impacts on campus and the surrounding community.

Dock Manager - GW will designate an employee to serve as an on-site dock manager who will be responsible for coordinating and scheduling deliveries for both the academic departments and the retail tenant within the building.

The dock manager also will be responsible for disseminating information to tenants, vendors, suppliers, and service providers regarding truck routes, rules and regulations, and hours of operation. Dock management duties may be part of other duties assigned to the individual.

Truck Route Designation – The preferred truck routes shown on Figure 8-1 have been identified for trucks coming to and from the SEC. The dock manager will direct all deliveries and trash disposal services to use the preferred truck routes, and will require all retail tenants to forward this route to those responsible for regular deliveries.

Operation of Trucks - Trucks must obey all traffic control devices including signs, markings, and signals. Trucks must yield to pedestrians upon entering and exiting the loading area. Truck idling will not be permitted on the premises.

Scheduling of Trucks - Deliveries for trucks greater than an overall length of 45 feet must be pre-scheduled. The dock manager or his/her designee will be on-site to assist in coordinating these deliveries.

Deliveries on trucks greater than an overall length of 45 feet will be scheduled on Saturdays or Sundays.

Hours of operation - The dock manager will instruct all tenants, vendors, suppliers, and service providers that deliveries and trash disposal services will not be permitted between 7:00 and 9:00 AM and between 5:00 and 7:00 PM, Monday through Friday. Certain deliveries cannot be controlled, however (including but not limited to FedEx and UPS).

Enforcement - The dock manager shall be the primary point of contact responsible for ensuring compliance with this truck management plan.

GW shall require its retail tenant to conform to the provisions of this truck management plan through a lease provision or similar mechanism.

GW shall require its vendors and service providers (not including commercial delivery services such as FedEx, UPS, etc.) to conform to the provisions of this truck management plan through a contract provision or similar mechanism.

## Section 6 TOTAL FUTURE CONDITIONS

### TOTAL FUTURE TRAFFIC FORECASTS

Total future traffic forecasts with the proposed development were determined by combining the 2020 background traffic forecasts shown in Figure 4-5 with the site traffic volumes shown on Figure 5-3F to yield the 2020 total future traffic forecasts shown on Figure 6-1.

#### Proportional Impact Analysis

In order to determine the amount of traffic on the surrounding roadways that will be attributable to the proposed redevelopment, a proportional impact assessment was conducted. That is, the total future traffic volumes were compared to the background traffic volumes to determine the impact of adding the site trips to the study intersections. Table 6-1 displays the results of the proportional impact analysis.

Table 6-1  
 Proportional Impact Analysis

Intersection	AM Peak	PM Peak
1. 23 <sup>rd</sup> Street/I Street	0%	-3%
2. 22 <sup>nd</sup> Street/I Street	5%	-5%
3. 22 <sup>nd</sup> Street/H Street	-3%	-3%
4. 23 <sup>rd</sup> Street/H Street	-1%	-2%

As shown in Table 6-1, the traffic at each of the study intersections is expected to decrease during the PM peak hour as a result of the dispersion of trips associated with the proposed redevelopment. During the AM peak hour, traffic at most of the study intersections is expected to decrease as a result of the proposed redevelopment. Only the 22<sup>nd</sup> Street/I Street intersection is projected to see a small increase in traffic.

Site impacts of five percent or less are low and generally reflect negligible effects on traffic operations and delays. Site impacts between five and 15 percent generally are considered moderate and minor effects on traffic operations and delays could be expected. Site impacts of more than 15 percent generally are considered significant.<sup>20</sup>

#### OPERATIONAL ANALYSIS

A future conditions capacity analysis, with the SEC, was performed at the study intersections utilizing 2020 projected total future traffic volumes shown on Figure 6-1, the lane use and traffic controls shown on Figure 6-2, and existing DDOT traffic signal timings included in Appendix B. At the 22<sup>nd</sup> Street/I Street intersection, the signal timings were consistent with those used under background conditions.

The analysis is summarized in Table 6-2 and the results are included in Appendix I.

As shown in Table 6-2, levels of service and delays with the proposed SEC generally will be consistent with background conditions. One notable exception is the northbound approach at the 22<sup>nd</sup> Street/I Street intersection. During the AM peak hour, the northbound approach is anticipated to drop from LOS “D” to LOS “E” with the proposed SEC.

The westbound approach at the 23<sup>rd</sup> Street/H Street intersection is expected to improve from LOS “E” to LOS “D” with the proposed SEC. The proposed driveway on H Street will operate with better levels of service and lower delays than the existing UPG driveway on H Street.

Levels of service were not reported for the I Street loading access since the SEC’s truck management plan will not permit deliveries during the AM and PM peak periods; therefore, no vehicles should be using this driveway during the AM and PM peak hours.

Table 6-2  
 Total Future Levels of Service

Approach	AM Peak	PM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>		
WBLR	E (56.8)	F (739.1)
NBT	B (12.2)	A (5.6)
NBR		A (1.9)
SBLT	F (84.7)	E (62.5)
<b>Overall</b>	<b>D (42.1)</b>	<b>F (143.3)</b>
<b>2. 22<sup>nd</sup> Street/I Street</b>		
EBL	D (38.3)	B (16.6)
EBT	B (19.0)	A (7.1)
WBTR	D (48.1)	C (28.7)
NBLTR	E (71.3)	D (37.8)
<b>Overall</b>	<b>D (52.7)</b>	<b>C (27.5)</b>
<b>3. 22<sup>nd</sup> Street/H Street</b>		
EBLT	C (22.3)	A (9.8)
WBTR	B (10.0)	B (10.1)
NBLTR	B (12.6)	A (9.2)
<b>Overall</b>	<b>C (16.5)</b>	<b>A (9.6)</b>
<b>4. 23<sup>rd</sup> Street/H Street</b>		
EBLTR	D (38.5)	D (47.7)
WBLTR	C (25.9)	D (41.5)
NBLTR	B (12.8)	A (8.5)
SBLTR	B (11.9)	A (5.8)
<b>Overall</b>	<b>B (15.9)</b>	<b>B (12.2)</b>
<b>9. H Street/Proposed SEC Driveway</b>		
EBLTR	A (0.8)	A (2.0)
WBLTR	A (1.7)	A (0.4)
NBLTR	D (34.8)	F (104.0)
SBLTR	C (16.5)	F (450.2)
[x.x] = unsignalized intersection control delay in sec/veh (x.x) = signalized intersection control delay in sec/veh		

### QUEUE ANALYSIS

A queuing analysis was conducted to determine the impact that the proposed SEC will have on queue lengths in the study area. Synchro was used to conduct the analyses; specifically, the 95<sup>th</sup> percentile queue lengths were examined. The results are summarized in Table 6-3. Queue reports are provided in Appendix J.

Table 6-3  
 95<sup>th</sup> Percentile Queue Summary<sup>†</sup>  
 Total Future Conditions

Approach	Available Storage	AM Peak	PM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>			
WBLR	265	101	526
NBT	330	220	41
NBR	380/50 <sup>‡</sup>		3
SBLT	380	257	668
<b>2. 22<sup>nd</sup> Street/I Street</b>			
EBL	100	348	60
EBT	260	118	21
WBTR	530	81	271
NBLTR	320	365	153
<b>4. 23<sup>rd</sup> Street/H Street</b>			
EBLTR	300	195	191
WBLTR	295	51	182
NBLTR	375	201	93
SBLTR	330	122	104
<b>9. H Street/Proposed SEC Driveway</b>			
EBLTR	165	2	2
WBLTR	115	2	1
NBLTR	NA	3	54
SBLTR	NA	3	185
<sup>†</sup> All distances in feet, measured to nearest intersection or end of turn lane, as appropriate. <sup>‡</sup> 330 feet of storage available during AM peak hour; only 50' available during PM peak hour, due to on-street parking.			

Where queue lengths are projected to increase with the proposed redevelopment, the increase is projected to be one car length or less, with one exception. During the AM peak hour, the northbound queue at the 22<sup>nd</sup> Street/I Street intersection is projected to increase by approximately two car lengths.

## Section 7 IMPROVEMENT ANALYSIS

### OVERVIEW

Due to the dispersion of traffic from one large garage to several smaller garages, traffic will decrease at some locations and increase in others. In most cases, traffic operations will remain unchanged or will be slightly better with the proposed SEC. One exception is at the 22<sup>nd</sup> Street/I Street intersection where the northbound approach is projected to drop from a LOS “D” to a LOS “E” during the AM peak hour.

In order to mitigate the impact at this intersection, traffic signal timings were optimized to more efficiently accommodate projected traffic volumes. This traffic signal was proposed in conjunction with the redevelopment of Square 54, but has not yet been installed. Therefore, when installed, traffic signal timings should be based on projected future traffic conditions.

Table 7-1 summarizes the results of the analysis. Level of service reports for total future conditions with improvements are provided in Appendix K.

### QUEUE ANALYSIS

A queuing analysis was conducted to determine the effect of the proposed timing adjustment on the queues in the stud area. The results are summarized in Table 7-2. Queue reports are provided in Appendix L.

As before (i.e., prior to the timing adjustments at the 22<sup>nd</sup> Street/I Street intersection), many of the queue lengths are projected to decrease with the proposed redevelopment. At locations where the queue is projected to increase, the increase is projected to be one car length or less, which is insignificant

Table 7-1  
 Total Future Levels of Service with Improvements

Approach	AM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>	
WBLR	E (56.3)
NBTR	B (12.2)
SBLT	F (84.7)
<b>Overall</b>	<b>D (42.0)</b>
<b>2. 22<sup>nd</sup> Street/I Street</b>	
EBL	D (45.4)
EBT	C (21.5)
WBTR	D (50.9)
NBLTR	D (49.5)
<b>Overall</b>	<b>D (45.0)</b>
<b>3. 22<sup>nd</sup> Street/H Street</b>	
EBLT	C (22.3)
WBTR	A (10.0)
NBLTR	B (12.6)
<b>Overall</b>	<b>C (16.5)</b>
<b>4. 23<sup>rd</sup> Street/H Street</b>	
EBLTR	D (38.5)
WBLTR	C (25.9)
NBLTR	B (12.8)
SBLTR	B (11.9)
<b>Overall</b>	<b>B (15.9)</b>
<b>9. H Street/Proposed SEC Driveway</b>	
EBLTR	A (0.8)
WBLTR	A (1.7)
NBLTR	D (34.8)
SBLTR	C (16.5)
[x.x] = unsignalized intersection control delay in sec/veh (x.x) = signalized intersection control delay in sec/veh	

Table 7-2  
 95<sup>th</sup> Percentile Queue Summary<sup>†</sup>  
 Total Future Conditions with Improvements

Approach	Available Storage	AM Peak
<b>1. 23<sup>rd</sup> Street/I Street</b>		
WBLR	265	103
NBT	330	220
NBR	380/50 <sup>‡</sup>	
SBLT	380	257
<b>2. 22<sup>nd</sup> Street/I Street</b>		
EBL	100	349
EBT	260	123
WBTR	530	83
NBLTR	320	337
<b>4. 23<sup>rd</sup> Street/H Street</b>		
EBLTR	300	195
WBLTR	295	51
NBLTR	375	201
SBLTR	330	121
<b>9. H Street/Proposed SEC Driveway</b>		
EBLTR	165	2
WBLTR	115	2
NBLTR	NA	3
SBLTR	NA	3
<sup>†</sup> All distances in feet, measured to nearest intersection or end of turn lane, as appropriate. <sup>‡</sup> 330 feet of storage available during AM peak hour; only 50' available during PM peak hour, due to on-street parking.		

## Section 8 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

1. Square 55 is well served by a high-quality multi-modal transportation system that includes: a connected network of arterial, collector, and local streets; a connected network of sidewalks, paths, and open spaces; the adjacent Foggy Bottom-GWU Metrorail station; multiple regional bus lines; shuttle buses; and bicycle facilities.
2. The number of parking spaces on Square 55 will be reduced by 945 spaces (1,123 including valet capacity), from 1,272 parking spaces in the UPG and Lot 2 (1,502 including valet capacity) to 327 spaces (379 including valet capacity) in the SEC garage.
3. Parking will be more widely distributed throughout the GW's Foggy Bottom campus by redeveloping Squares 54, 55, and 103. Traffic will be more widely dispersed throughout the campus rather than concentrated at relatively few large parking facilities (such as the UPG).
4. GW will maintain a minimum of 2,800 parking spaces through the year 2020 in compliance with the Campus Plan Order.
5. The number of curb cuts around the perimeter of Square 55 will be reduced from seven to two, which will reduce pedestrian/vehicle conflicts.
6. The number of curb parking spaces around the perimeter of Square 55 will be increased by an estimated eight spaces, from approximately 25 to approximately 33 spaces because of the reduced number of curb cuts and the relocation of the Vern Express bus stop from H Street to G Street. Six parking spaces will be displaced on G Street due to this bus stop relocation, resulting in a net gain of two curb parking spaces on the Campus.
7. The proposed modification of the I Street driveway will safely and adequately accommodate single-unit trucks and tractor-trailer trucks up to 45 feet in length (WB-40) turning into and out of the driveway to and from the east and west on I Street.
8. One 55-foot tractor-trailer truck (WB-50) is expected to use the high-bay loading berth approximately once a quarter during off-peak times. The entire width of I Street will be required for these trucks to turn into and out of the I Street driveway, which will require temporary prohibition of curb parking on both sides of the street and manual street traffic control. These deliveries will be scheduled on weekends.
9. An extensive truck management plan has been developed to accommodate the anticipated loading operations of the SEC and to minimize the impact of the building's truck operations.
10. The proposed development plan will provide approximately 80 bicycle parking spaces outside of the facility and 30 bicycle parking spaces in the SEC garage. The University currently is in the process of conducting a campus-wide inventory of bicycle parking. The University should continue to work with DDOT throughout the PUD process to ensure that adequate bicycle parking is provided.
11. The existing Vern Express shuttle bus stop will be relocated from the north side of H Street, east of 23<sup>rd</sup> Street, to the north side of G Street, west of 22<sup>nd</sup> Street in front of Fungler Hall.

12. GW currently has an extensive Transportation Management Plan that promotes safe and efficient traffic operations within the Campus, encourages alternate modes of transportation, and maximizes the use of the on- and off-street parking facilities to efficiently serve the Campus parking demands. The TMP also prohibits freshmen and sophomores from bringing vehicles to the Campus except in special circumstances.
13. As a result of GW's aggressive Transportation Management Plan, the GW community widely uses alternative modes of transportation. Specifically, 67 percent of faculty and staff at the Foggy Bottom Campus commute via a carpool or non-auto mode of transportation. Of the students who commute to campus, 79 percent do so via a carpool or non-auto mode of transportation.
14. In accordance with GW's TMP, the proposed SEC will encourage alternate modes of transportation by providing parking on-site for car sharing vehicles and electric cars, bicycle accommodations, and by providing shower and changing facilities on-site for those who choose to walk, bike, or jog to the facility.
15. Currently, the signalized intersections in the immediate vicinity of Square 55 operate at an overall acceptable LOS "D" or better during weekday AM and PM peak hours. Select lane groups operate near or at capacity at the 23<sup>rd</sup> Street/I Street intersection.
16. Currently, side street movements from the Square 55 driveways on H and I Streets operate near or at capacity.
17. Under future conditions without the proposed redevelopment, the 23<sup>rd</sup> Street/I Street intersection is projected to operate at overall capacity during the PM peak hour. The remaining signalized intersections in the study area will operate at acceptable overall levels of service.
18. The UPG currently generates 259 AM peak hour trips and 338 PM peak hour trips. The proposed SEC will generate 65 AM peak hour trips and 85 PM peak hour trips. Thus, the proposed SEC will generate 194 (or 75 percent) fewer AM peak hour trips and 253 (or 75 percent) fewer PM peak hour trips than the existing UPG. The remaining trips currently generated by the UPG will be dispersed to other locations, including Squares 54 and 103.
19. The proposed redevelopment will result in a reduction in trips at each of the off-site study intersections during the peak hours, with the exception of the 22<sup>nd</sup> Street/I Street intersection. During the AM peak hour, traffic at this intersection is projected to increase by approximately five percent.
20. The volume of traffic entering and exiting the site via the H Street driveway is expected to decrease with the proposed redevelopment.
21. When installed, traffic signal timings at the 22<sup>nd</sup> Street/I Street intersection should be based on future traffic projections in order to adequately accommodate traffic associated with the redevelopment of Square 55. GW and Boston Properties made the required contribution toward the signal in conjunction with the Square 54 development; it is not proposed in conjunction with the SEC development.
22. The proposed redevelopment will not have a significant impact on the traffic operations in the study area.



## REFERENCES

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- <sup>1</sup> District of Columbia Municipal Regulations, Title 11-Zoning, Section 350, September 14, 2007.
- <sup>2</sup> Traffic Volume Map, District Department of Transportation, 2008, [<http://mocrs.dc.gov/DC/DDOT/About+DDOT/Maps/Traffic+Volume+Map+2008>]
- <sup>3</sup> Ibid.
- <sup>4</sup> Ibid.
- <sup>5</sup> Ibid.
- <sup>6</sup> Foggy Bottom-GWU Station Second Entrance Demand Analysis, Final Report, Washington Metropolitan Area Transit Authority, March 1, 2007.
- <sup>7</sup> Ibid.
- <sup>8</sup> District Department of Transportation, District of Columbia Pedestrian Master Plan, May 2008, [[http:// www.dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians/Pedestrians/Pedestrian+Master+Plan](http://www.dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians/Pedestrians/Pedestrian+Master+Plan)].
- <sup>9</sup> District Department of Transportation, District of Columbia Bicycle Master Plan, April 2005.
- <sup>10</sup> Ibid.
- <sup>11</sup> Ibid.
- <sup>12</sup> Memo from Jim Sebastian, DDOT Bicycle and Program Manager, to Sherry Rutherford, Washington, DC, July 28, 2006.
- <sup>13</sup> Highway Capacity Manual, Transportation Research Board, Washington DC, 2000.
- <sup>14</sup> Square 54 Transportation Impact Study, Wells + Associates, LLC, Revised October 2006.
- <sup>15</sup> The George Washington University Foggy Bottom Campus Plan: 2006-2025 Transportation Impact Study, Wells + Associates, LLC, Second Revision November 2006.
- <sup>16</sup> District of Columbia Municipal Regulations, Title 11-Zoning, Section 2119.2, 2001 Edition.
- <sup>17</sup> Draft Transportation Impact Study for Stage 2 PUD Application - George Washington University Law Learning Center (LLC), Gorove/Slade, May 13, 2010.
- <sup>18</sup> The George Washington University Foggy Bottom Campus Plan: 2006-2025 Transportation Impact Study, Wells + Associates, LLC, Second Revision November 2006.
- <sup>19</sup> Draft Transportation Impact Study for Stage 2 PUD Application - George Washington University Law Learning Center (LLC), Gorove/Slade, May 13, 2010.
- <sup>20</sup> Connecticut Avenue Transportation Study – Draft Final Report, DMJM+Harris, Inc., June 2003.

# FIGURES

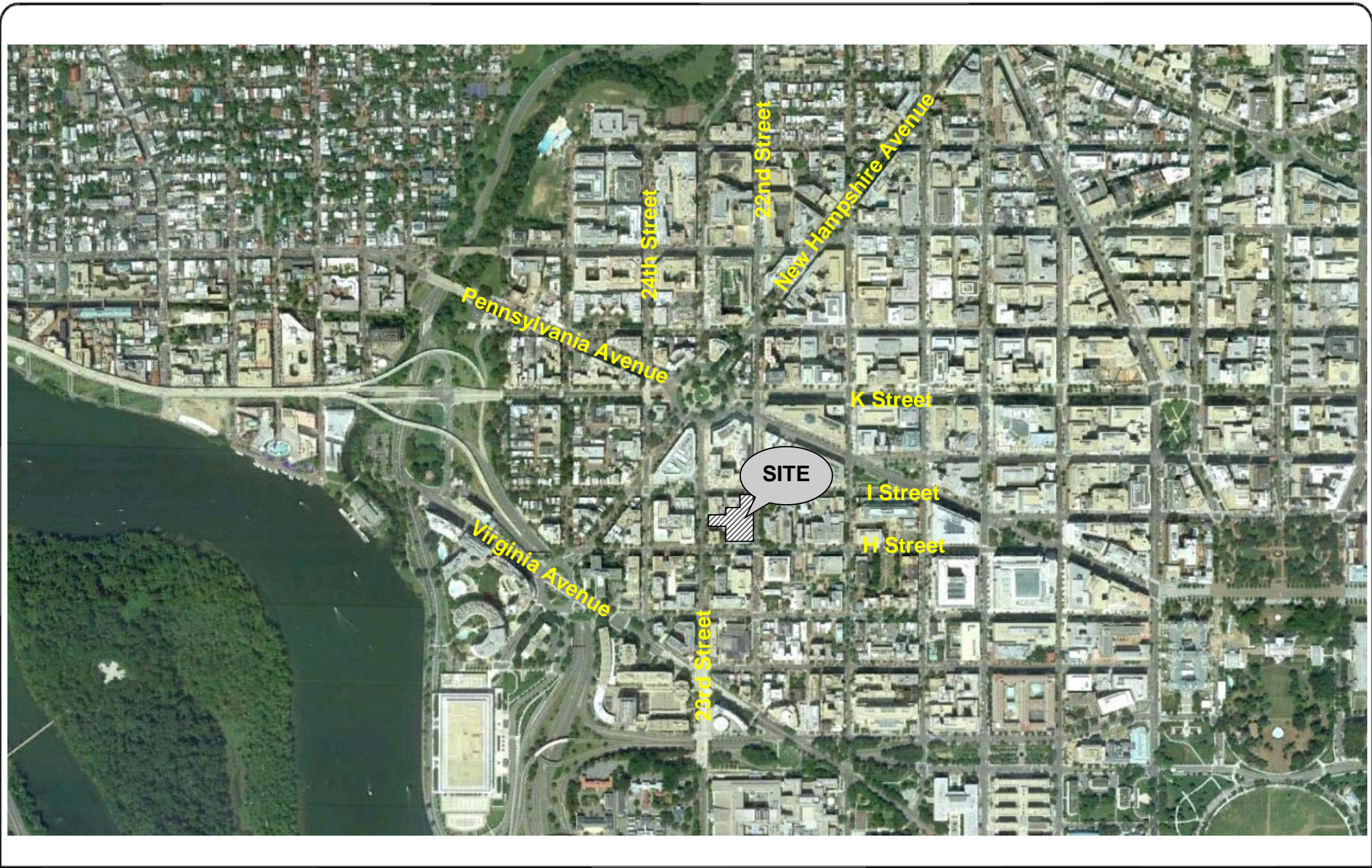
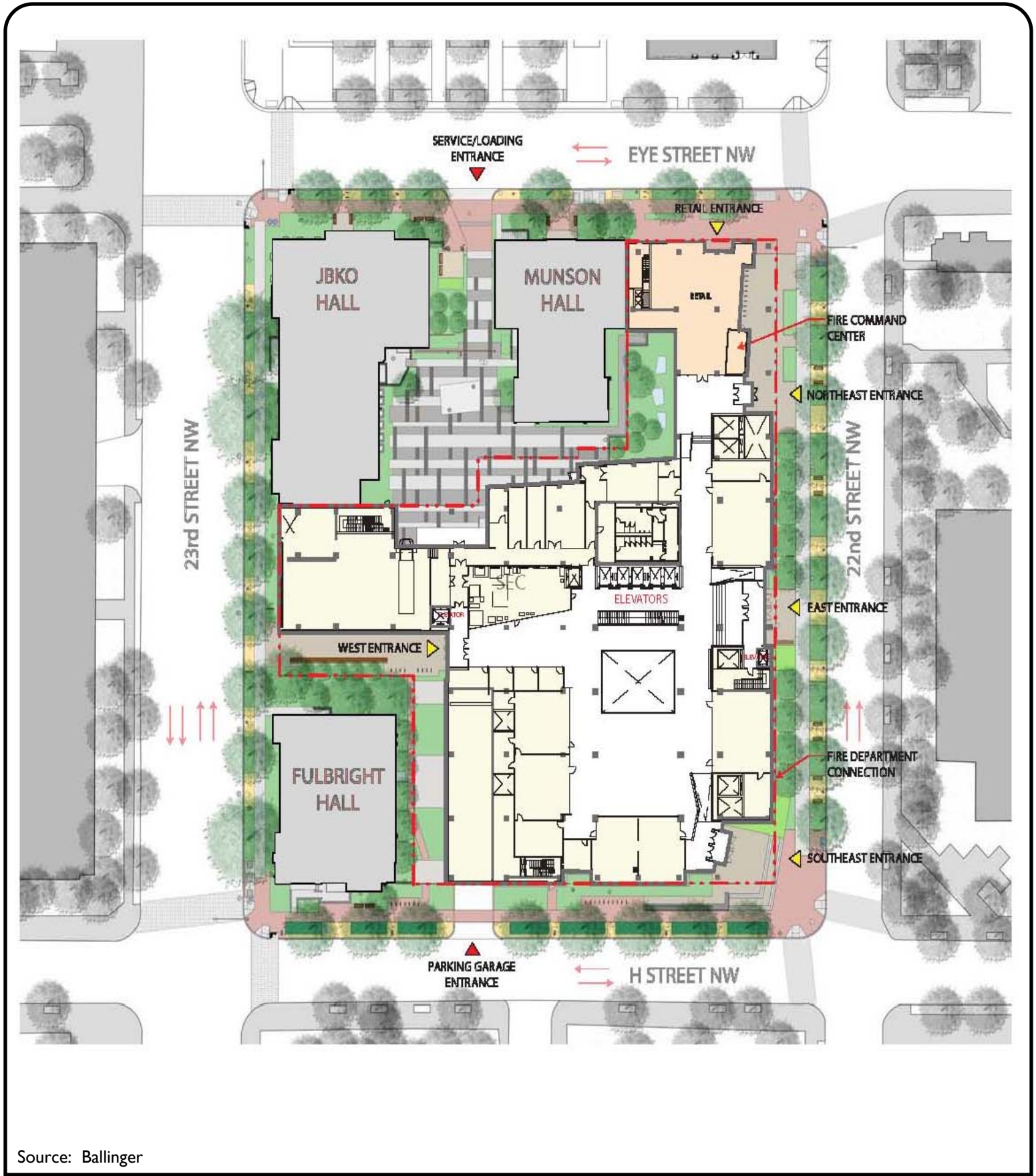


Figure I-1  
Site Location



North



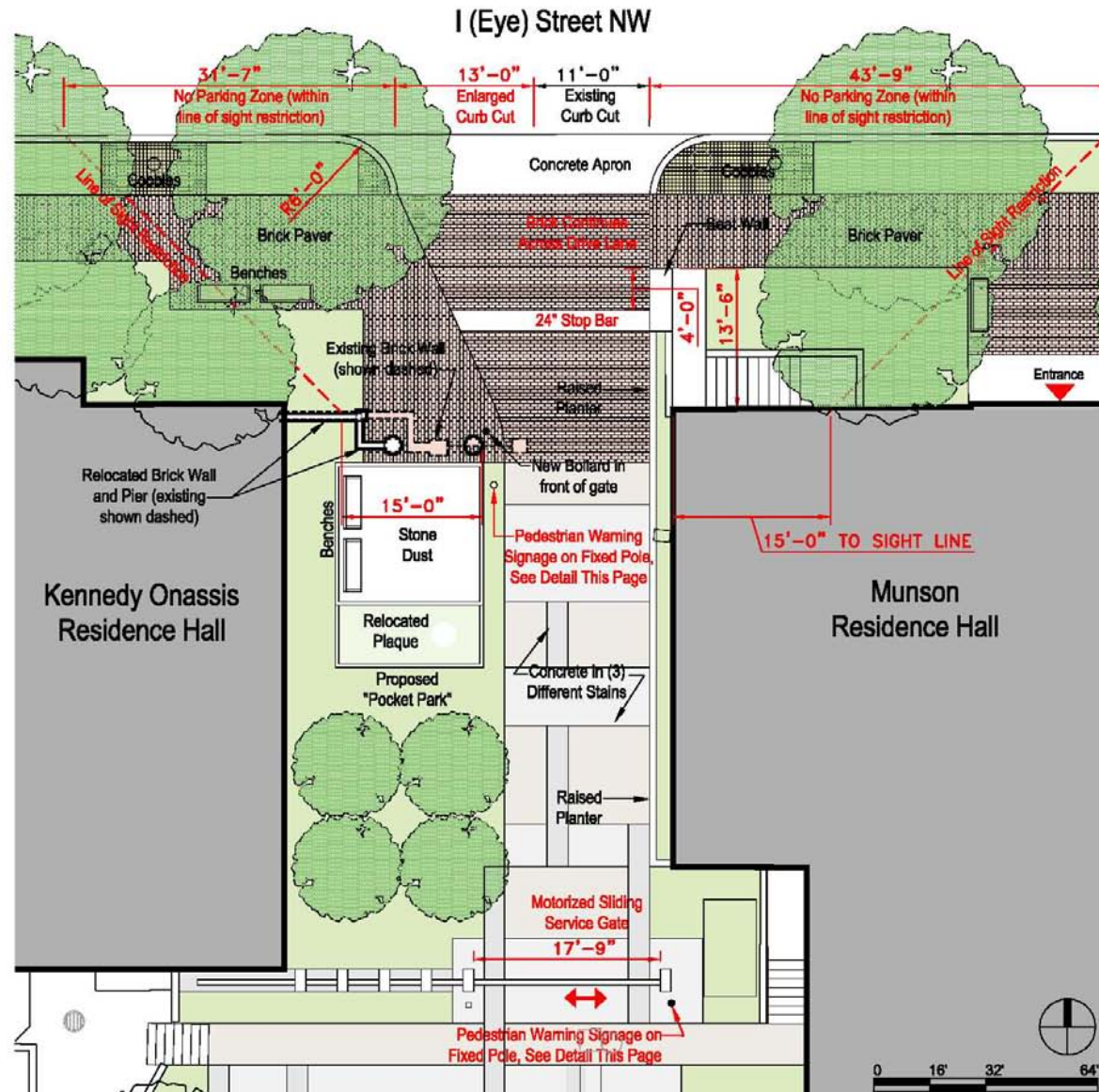
Source: Ballinger

Figure I-2  
Site Plan



**Proposed Pedestrian Safety Measures:**

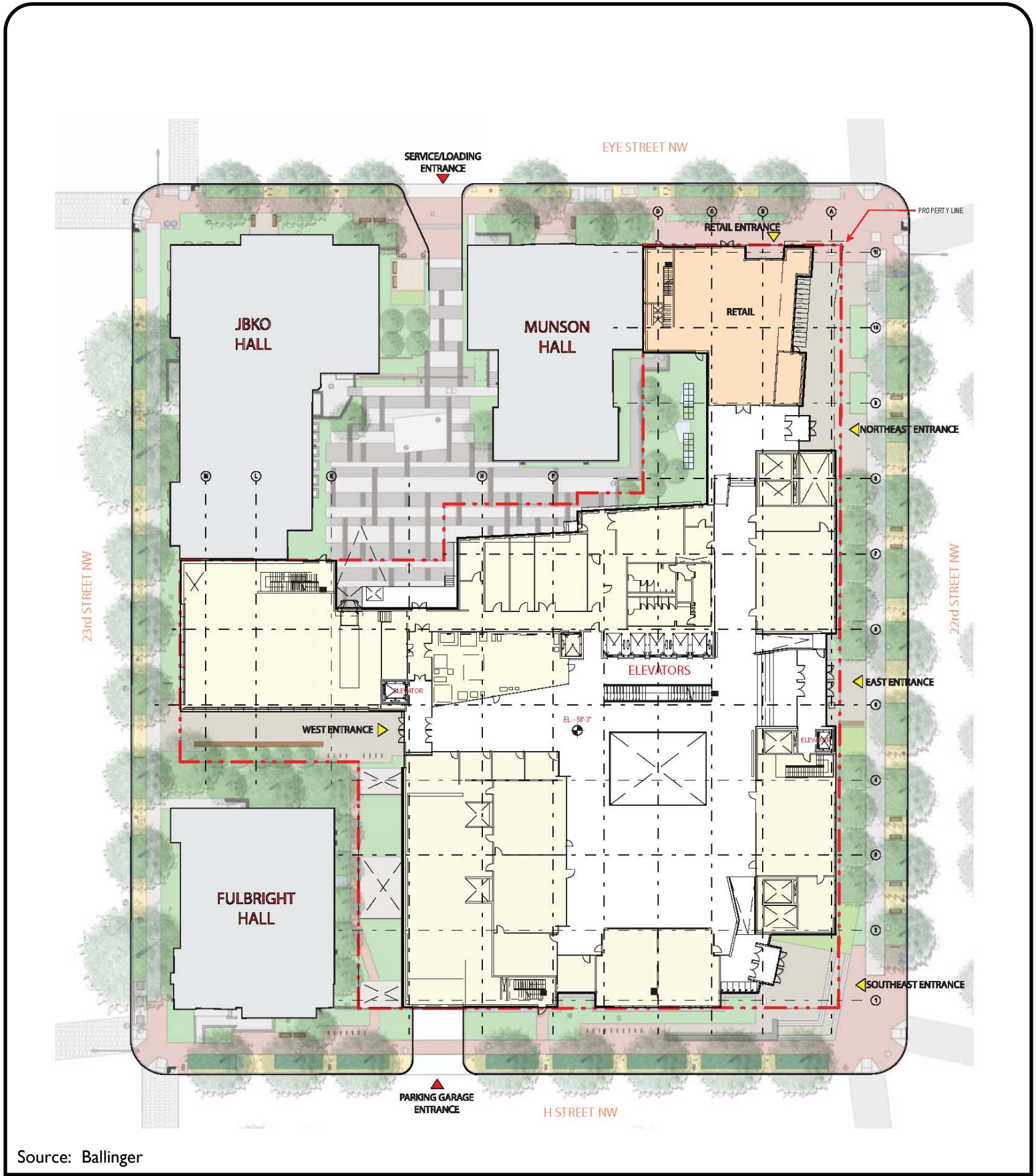
1. Pedestrian **Sidewalk Material Continues** across drive lane.
2. **Adequate Sight Lines**, allowed by the distance between the edge of the buildings and the beginning of the pedestrian pathway, approximately 13'-6".
3. **On Site Dock Manager**, who schedules and receives large truck deliveries.
4. Motorized **Automatic Sliding Gate**.
5. **Extended No Parking Zone** at service court entrance.
6. (2) Pedestrian **Warning Signs**, mounted to the left and right of the drive lane. See below:



Source: Ballinger

Figure I-3  
Loading Area Plan





Source: Ballinger

Figure I-4  
Pedestrian Entrance Locations

◀ Pedestrian Entrance



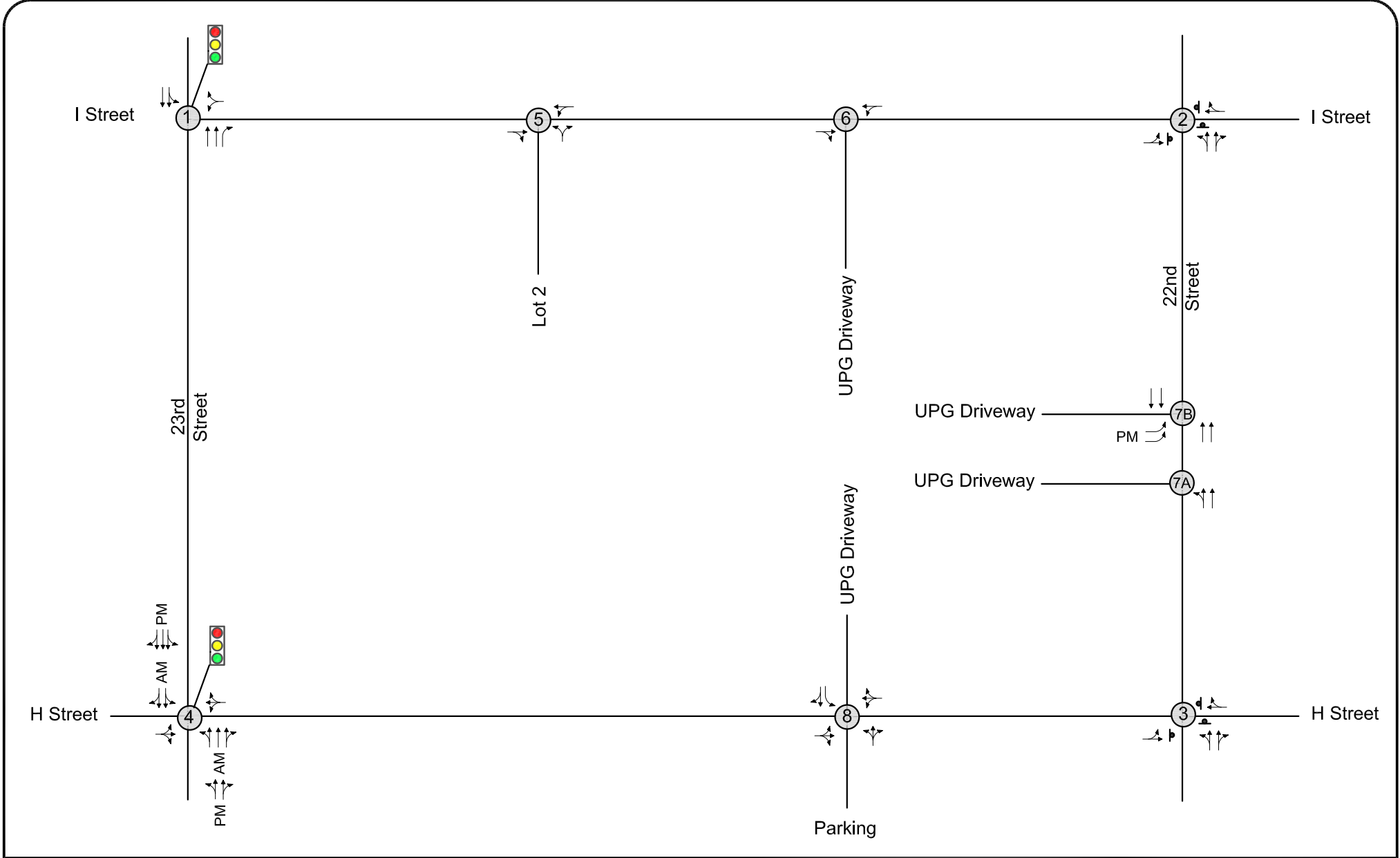


Figure 2-1  
Existing Lane Use and Traffic Control

- ← Represents One Travel Lane
- 🚦 Signalized Intersection
- 🛑 Stop Sign



North

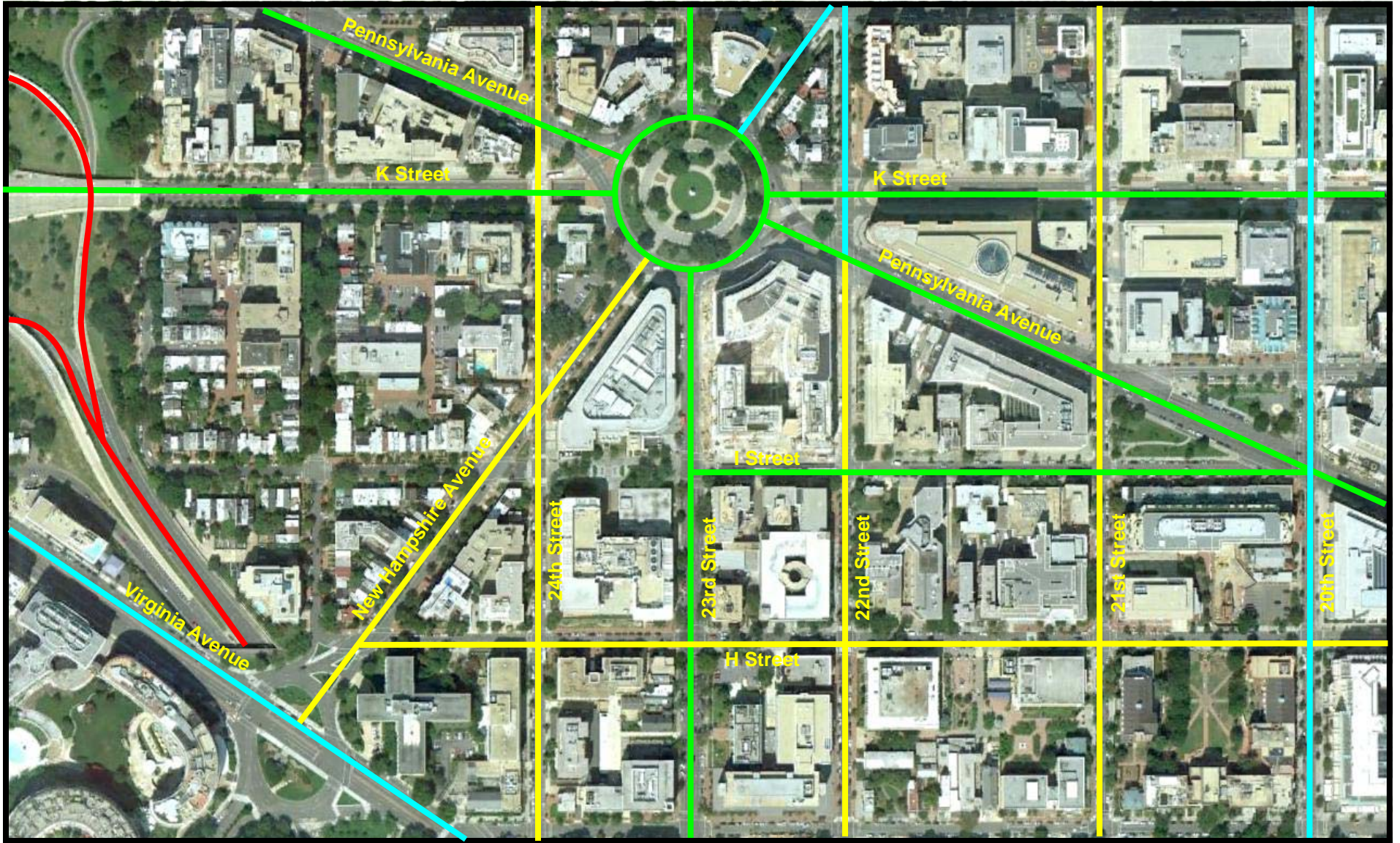


Figure 2-2  
Functional Classification Map

- Interstate
- Other Freeway/Expressway
- Principal Arterial
- Minor Arterial
- Collector
- Local Roadway







Source: <http://www.wmata.com>

Figure 2-3  
Public Transportation Services



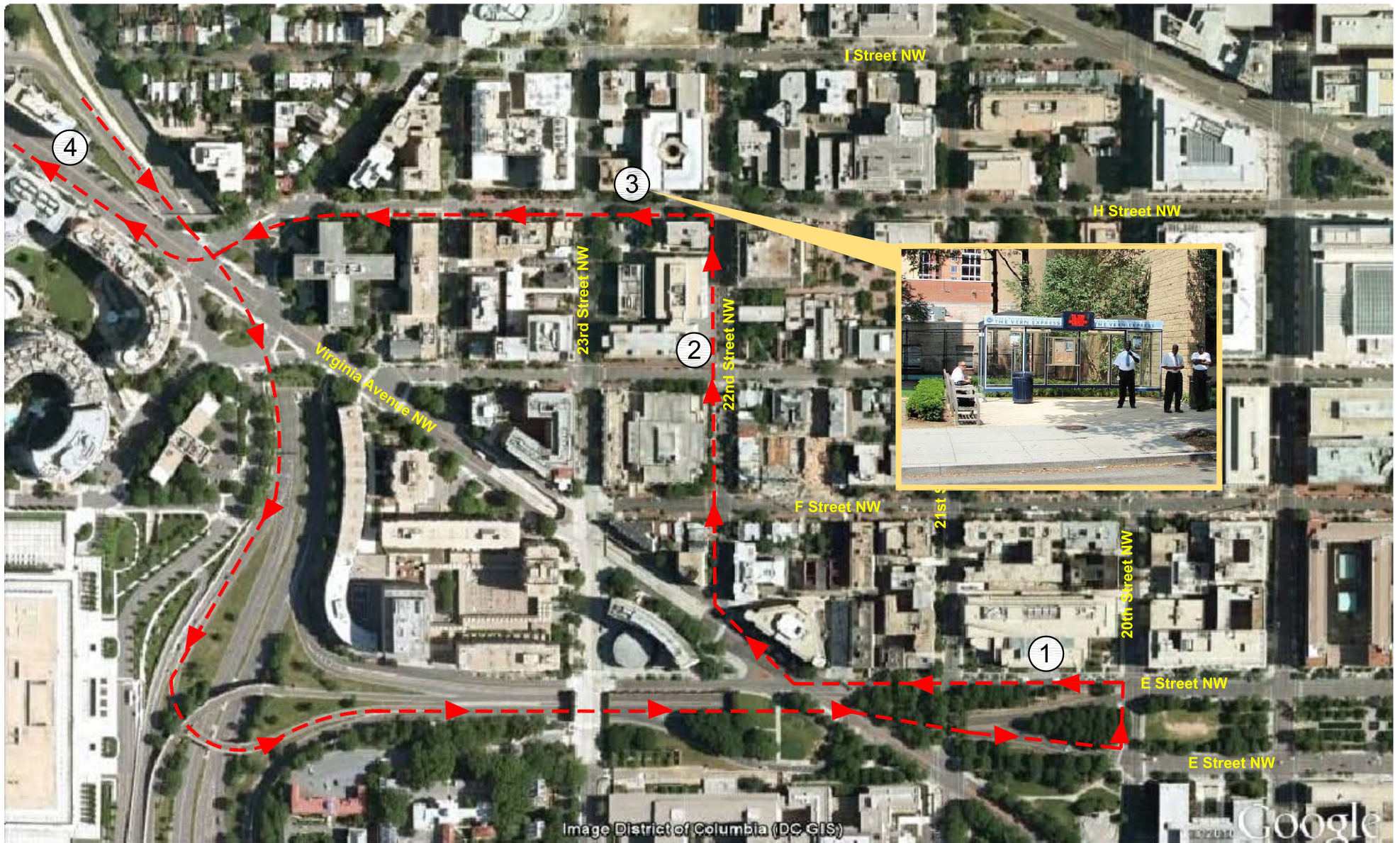


Figure 2-4A  
 Existing Vern Express Route  
 Monday Through Friday (All Times Except 6 AM to 10 AM)

**Bus Stops**

1. 2025 E Street (In Front of Red Cross Building)
2. 22nd and G Streets
3. 23rd and H Streets (In Front of Fulbright Hall)
4. 2601 Virginia Avenue (Hall on Virginia Avenue)



North

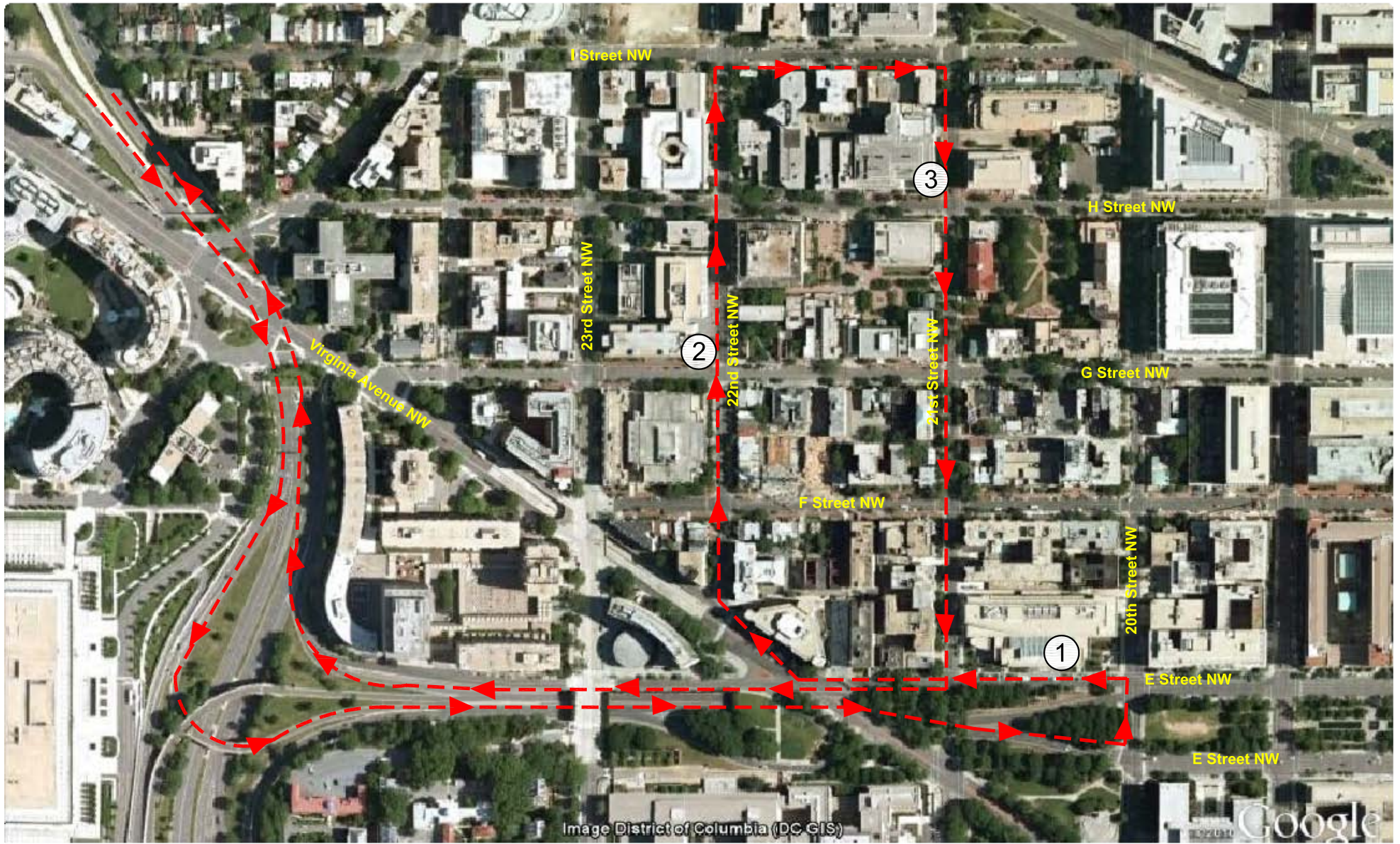


Figure 2-4B  
 Existing Vern Express Route  
 Monday Through Friday (6 AM to 10 AM)

- Bus Stops
- 1. 2025 E Street (In Front of Red Cross Building)
  - 2. 22nd and G Streets
  - 3. 21st and H Streets (At Marvin Center)



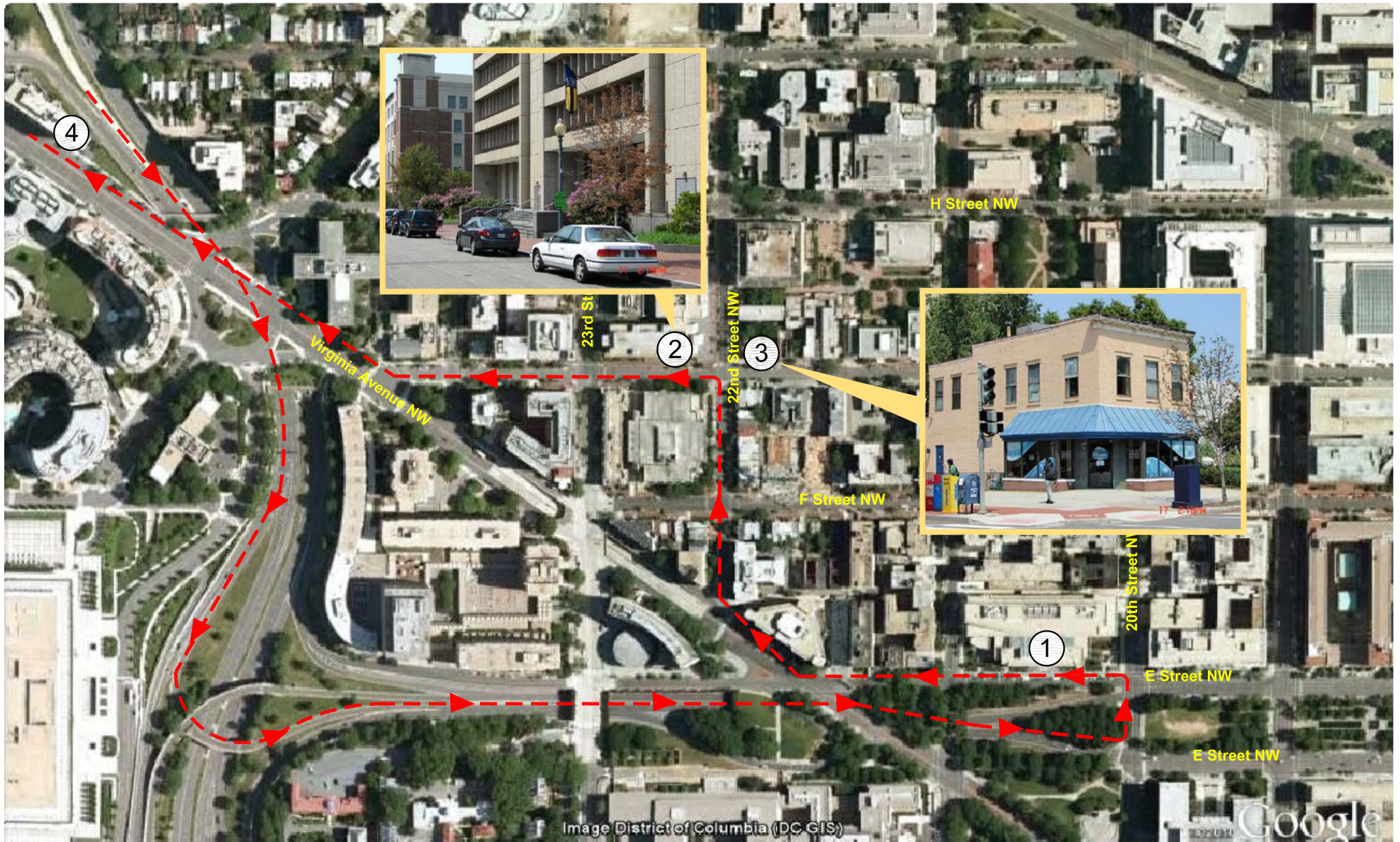


Figure 2-5  
 Proposed Vern Express Route  
 Monday Through Friday (All Times Except 6 AM to 10 AM)

**Bus Stops**

1. 2025 E Street (In Front of Red Cross Building)
2. 22nd and G Streets
3. 23rd and H Streets (In Front of Fulbright Hall)
4. 2601 Virginia Avenue (Hall on Virginia Avenue)



# COLONIAL EXPRESS SHUTTLE BUS SERVICE ROUTES

## Northern Route

- 1 MARVIN CENTER/GELMAN @ MC H ST
- 2 ASTON
- 3 CORNER OF 19TH & L ST
- 4 CORNER OF CONNECTICUT & L ST
- 5 CORNER OF 20TH & EYE ST



## Southern Route

- 1 MARVIN CENTER/GELMAN @ MC H ST
- 2 THURSTON HALL
- 3 HEALTH AND WELLNESS
- 4 HOVA
- 5 COLUMBIA PLAZA @ CENTER DRIVEWAY

BLUE LIGHT EMERGENCY PHONE

### NORTHERN ROUTE

- 1) MARVIN CENTER/GELMAN @ MC H ST.
- 2) ASTON
- 3) CORNER OF 19TH & L ST
- 4) CORNER OF CONNECTICUT & L ST
- 5) CORNER OF 20TH & EYE ST

### SOUTHERN ROUTE

- 1) MARVIN CENTER/GELMAN @ MC H ST.
- 2) THURSTON HALL
- 3) HEALTH AND WELLNESS CENTER
- 4) HOVA
- 5) COLUMBIA PLAZA @ CENTER DRIVEWAY

Source: <http://gwired.gwu.edu/upd/>

Figure 2-6  
Existing Colonial Express Routes





23<sup>rd</sup> & H Streets  
North Leg



23<sup>rd</sup> & H Streets  
South Leg



23<sup>rd</sup> & H Streets  
East Leg



23<sup>rd</sup> & H Streets  
West Leg

Source: <http://maps.google.com>

Figure 2-7  
Pedestrian Crossing at the 23<sup>rd</sup> Street/H Street Intersection



23<sup>rd</sup> & I Streets  
North Leg



23<sup>rd</sup> & I Streets  
South Leg



23<sup>rd</sup> & I Streets  
East Leg



23<sup>rd</sup> & I Streets  
West Leg

Source: <http://maps.google.com>

Figure 2-8  
Pedestrian Crossing at the 23<sup>rd</sup> Street/I Street Intersection



22<sup>nd</sup> & H Streets  
North Leg



22<sup>nd</sup> & H Streets  
South Leg



22<sup>nd</sup> & H Streets  
East Leg



22<sup>nd</sup> & H Streets  
West Leg

Source: <http://maps.google.com>

Figure 2-9  
Pedestrian Crossing at the 22<sup>nd</sup> Street/H Street Intersection





22<sup>nd</sup> & I Streets  
North Leg



22<sup>rd</sup> & I Streets South Leg



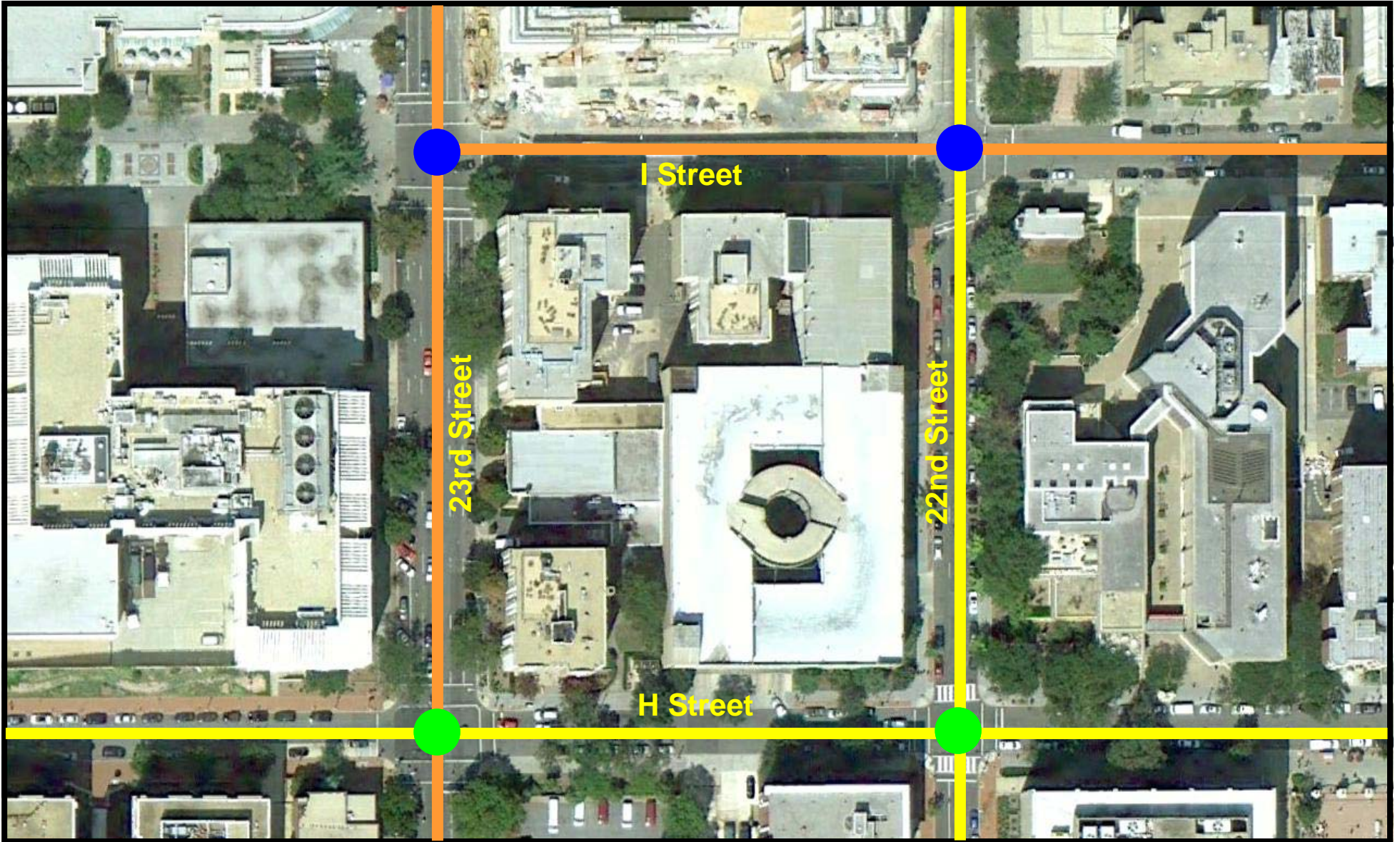
22<sup>nd</sup> & I Streets  
East Leg



22<sup>nd</sup> & I Streets  
West Leg

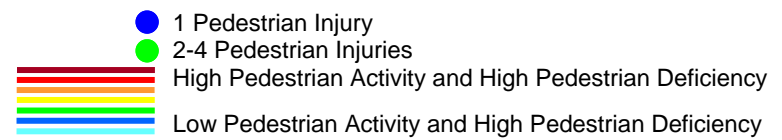
Source: <http://maps.google.com>

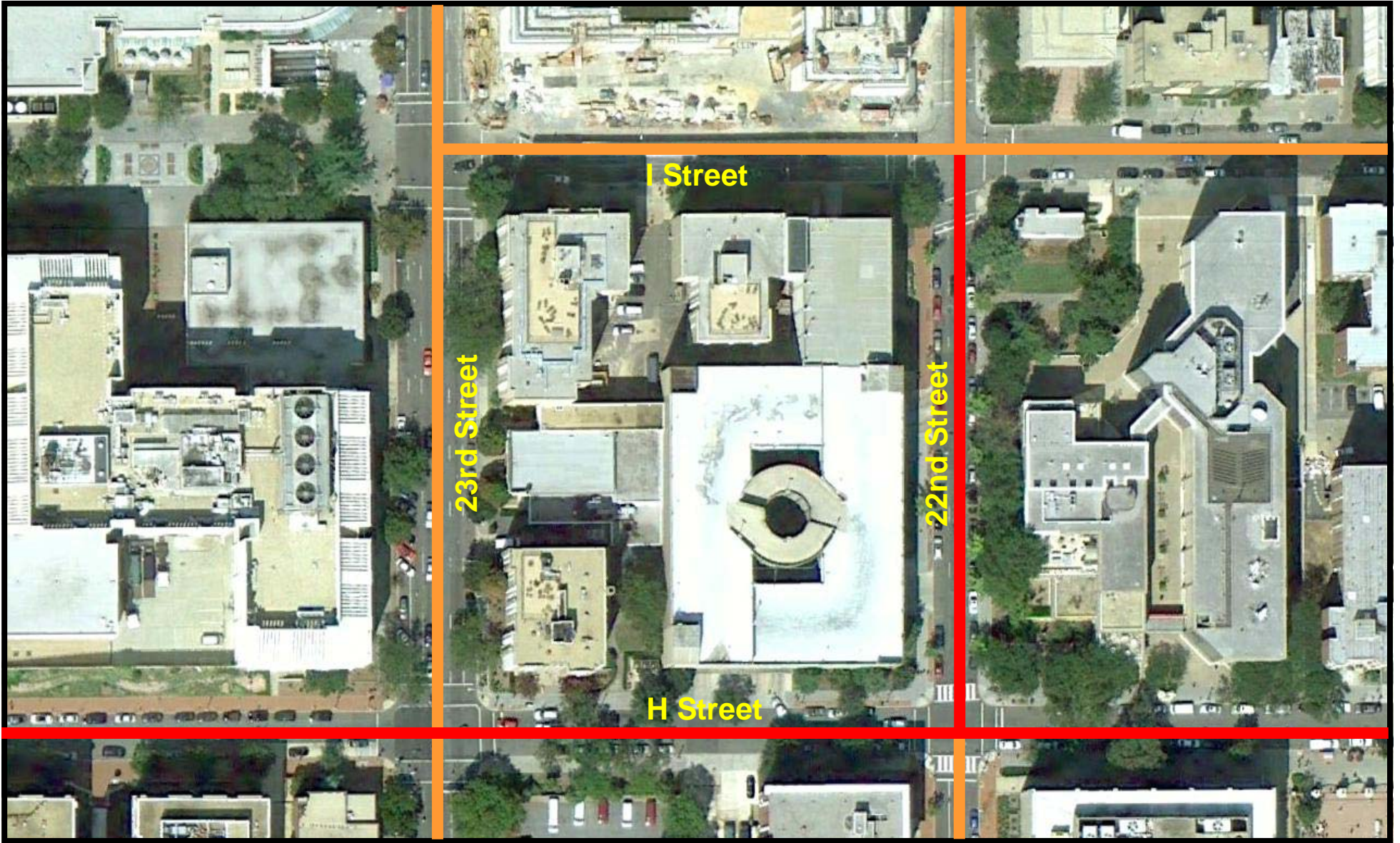
Figure 2-10  
Pedestrian Crossing at the 22<sup>nd</sup> Street/I Street Intersection



Source: DC Pedestrian Master Plan







Figure 2-11  
Pedestrian Activity



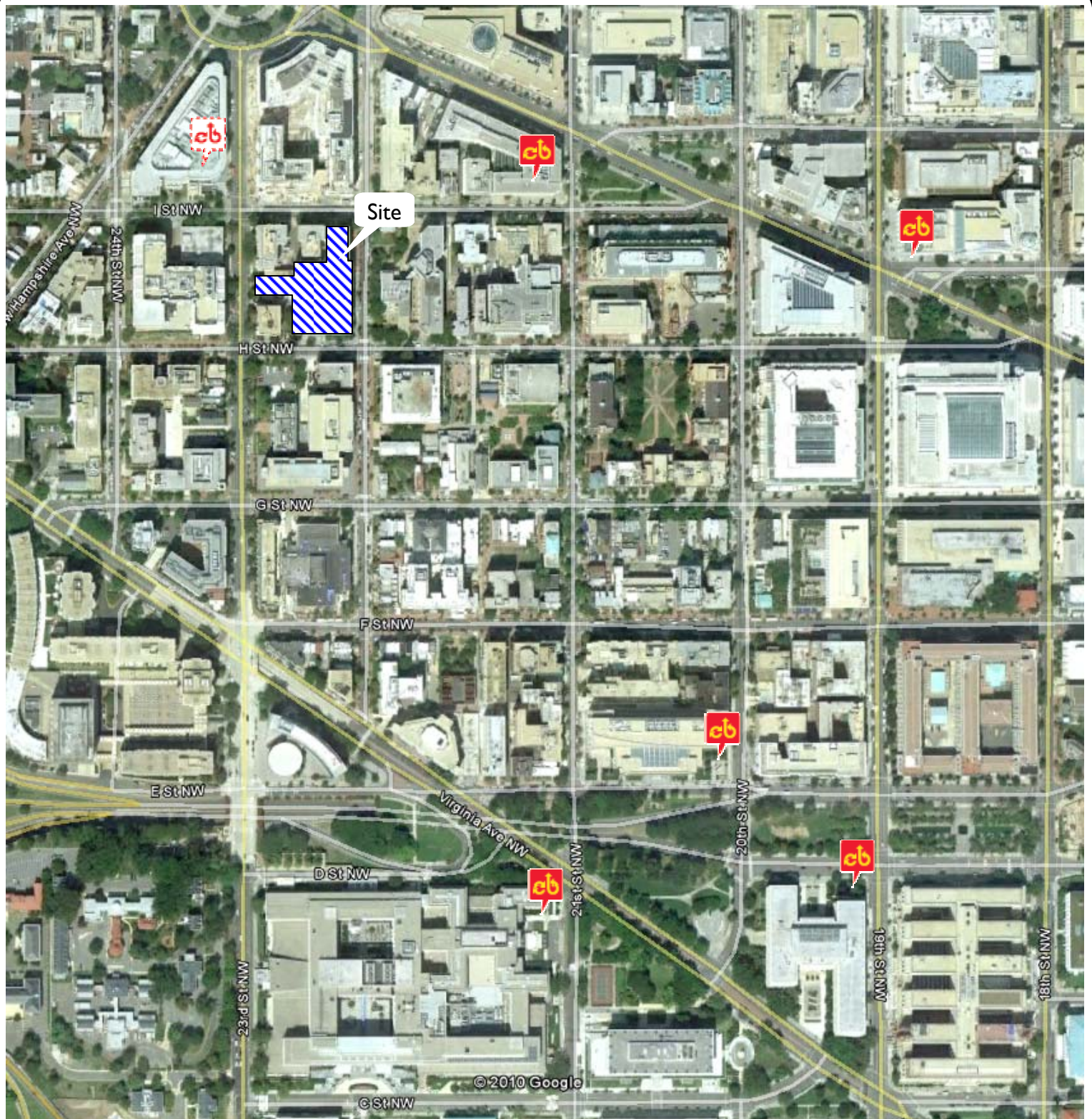


Source: DC Bicycle Master Plan

Figure 2-12  
Bicycle Levels of Service

-  Bicycle LOS A
-  Bicycle LOS B
-  Bicycle LOS C
-  Bicycle LOS D
-  Bicycle LOS E
-  Bicycle LOS F





Source: <http://www.capitalbikeshare.com>

Figure 2-13  
Capital Bikeshare Locations



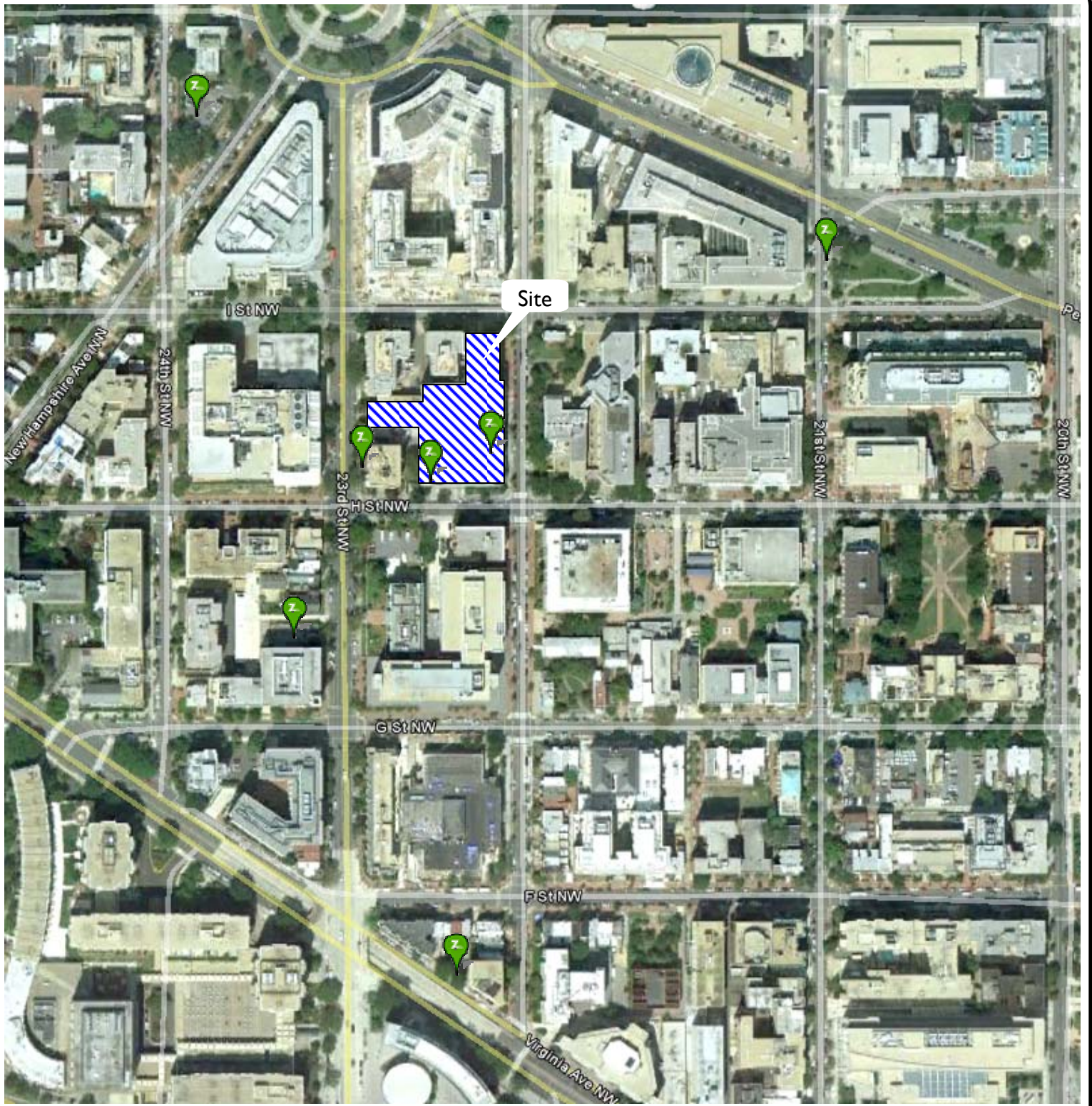
Current Capital Bikeshare Locations



Planned Capital Bikeshare Locations



North



Source: <http://www.zipcar.com>

Figure 2-14  
Zipcar Locations



Zipcar Locations



North

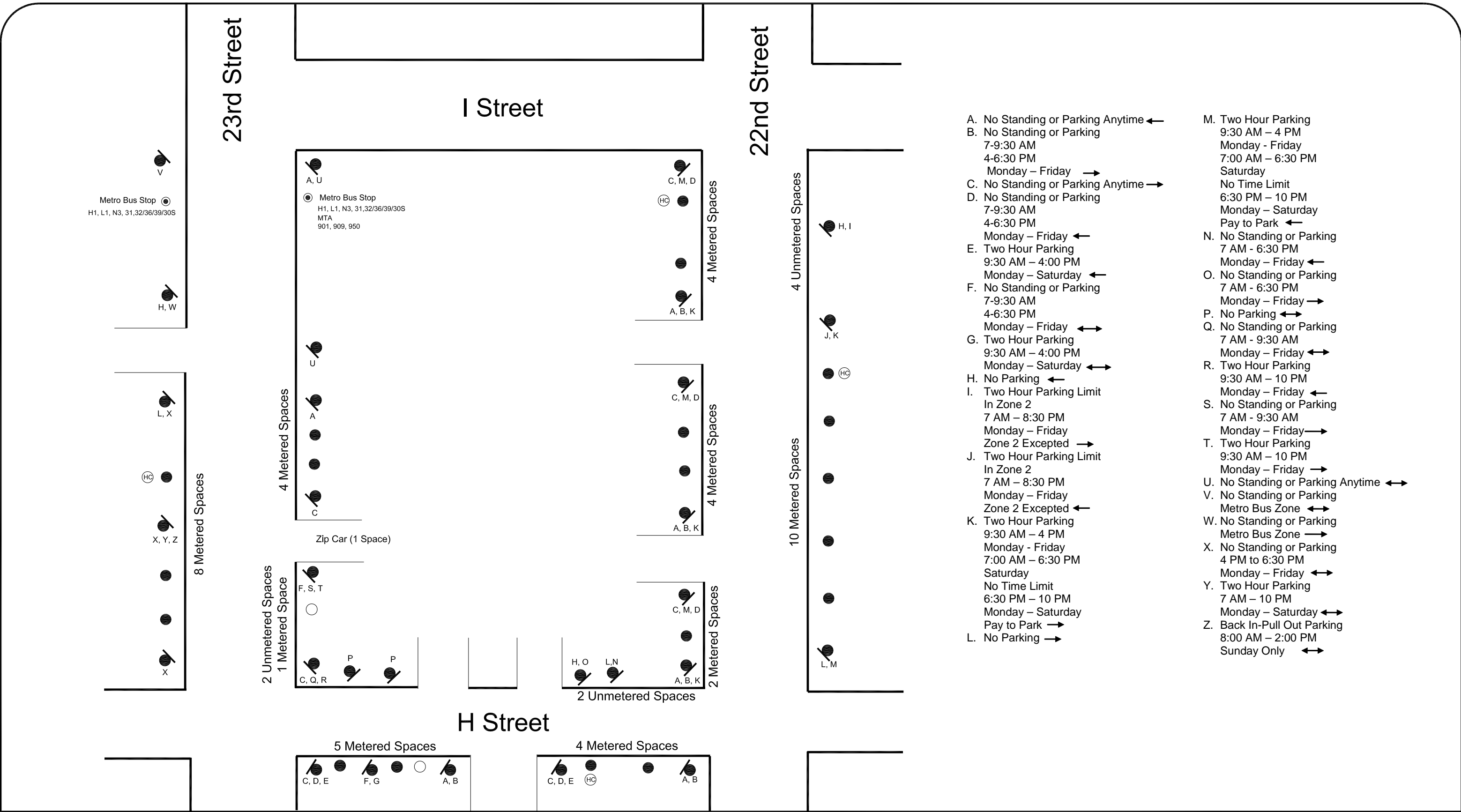


Figure 2-15 Existing On-Street Parking Restrictions

Sign/Legend  
 Double Meter  
 Single Meter  
 Handicap Meter

North

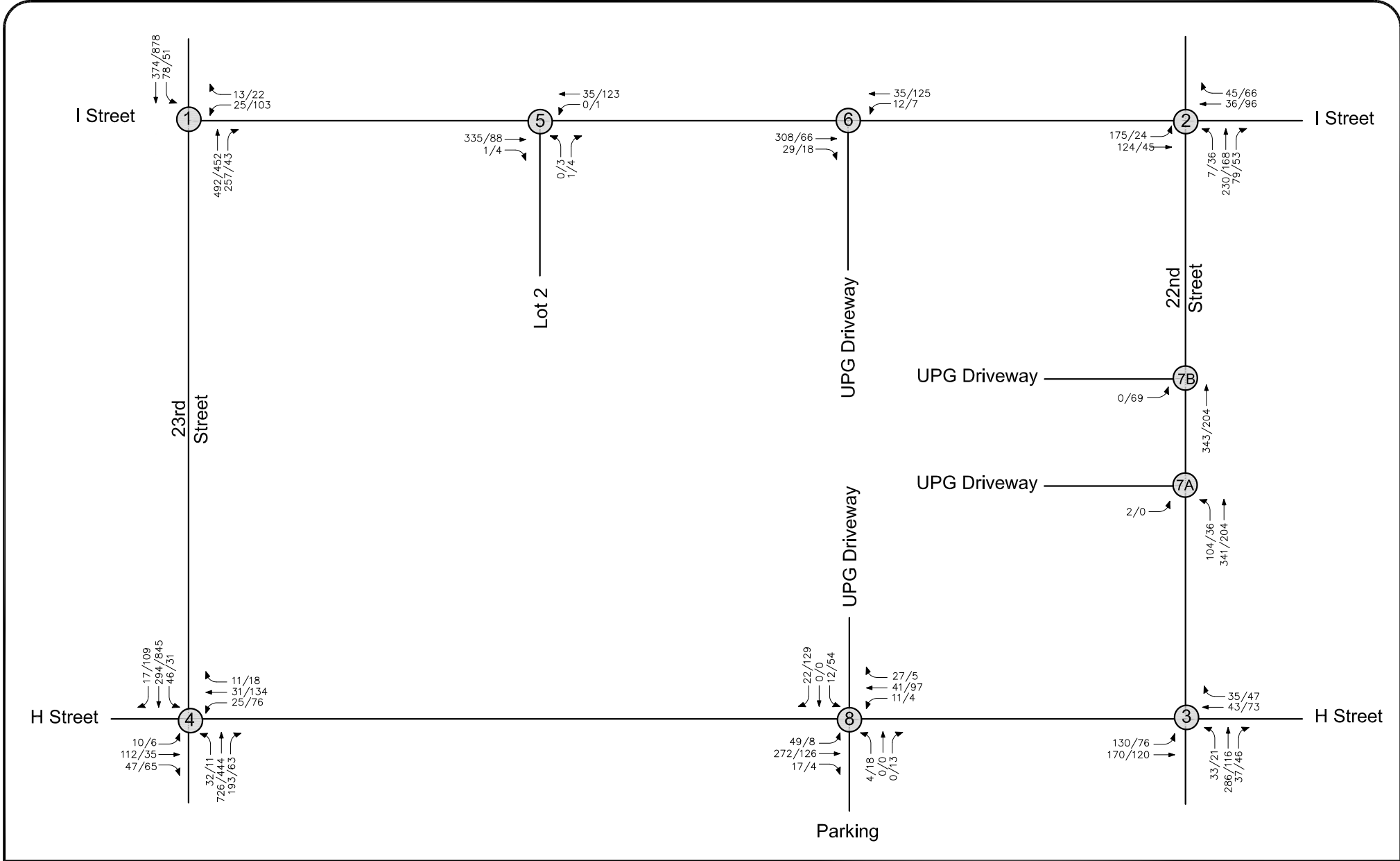


Figure 3-1  
Existing Peak Hour Vehicular Traffic Volumes

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North

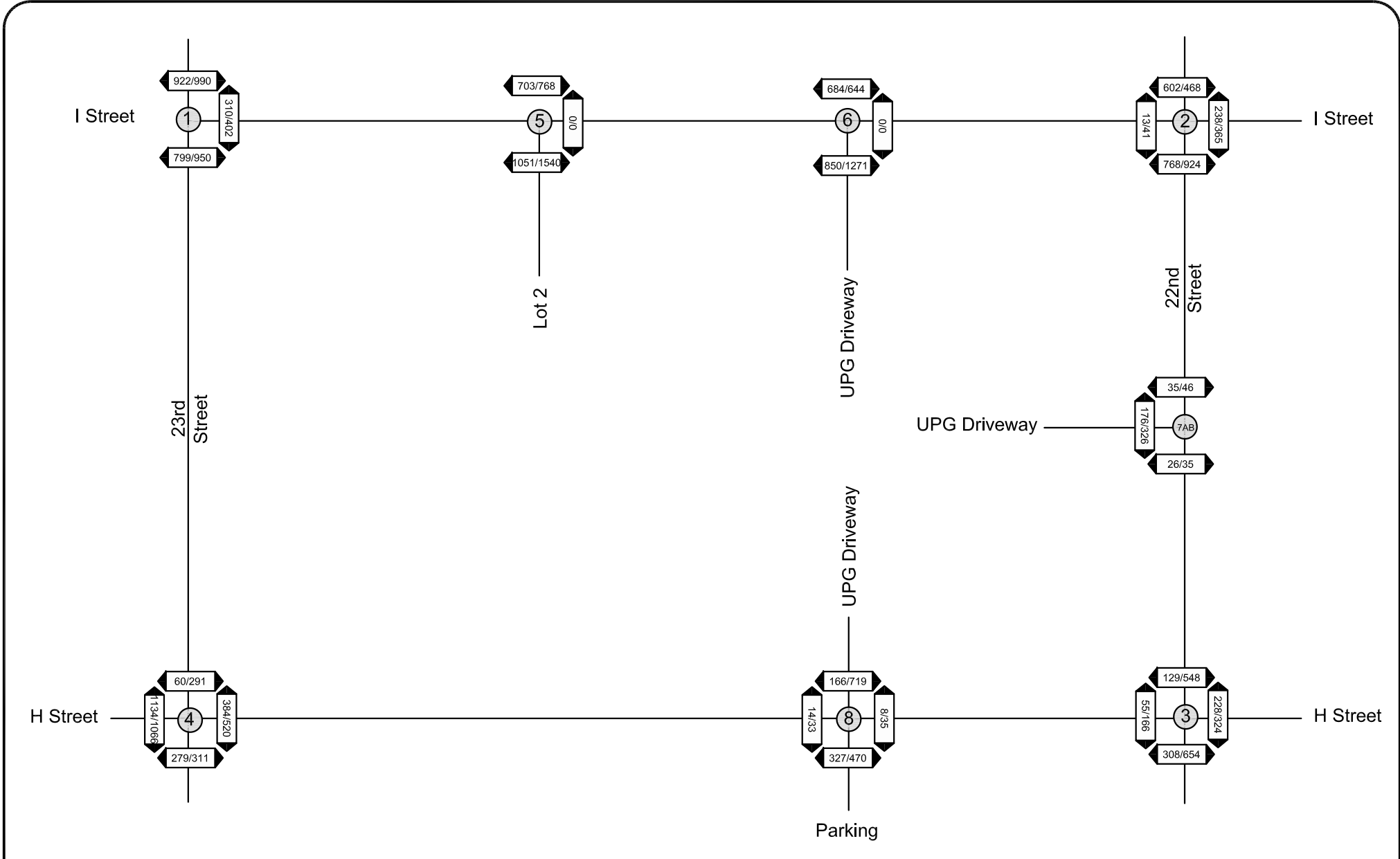


Figure 3-2  
Existing Peak Hour Pedestrian Volumes

AM/PM Peak Hour Pedestrian Volume



North



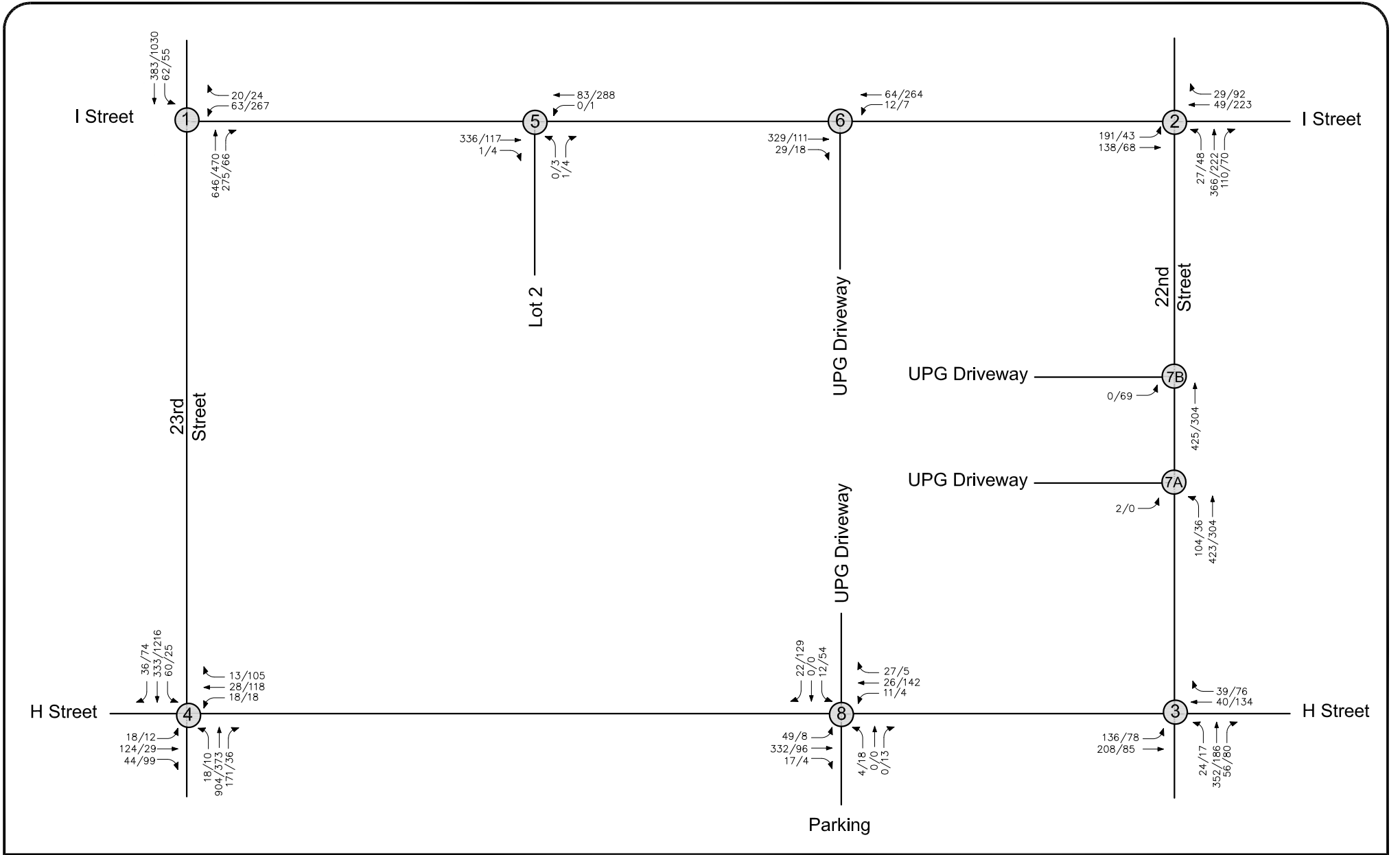


Figure 4-1  
Post Construction Peak Hour Vehicular Traffic Volumes

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North

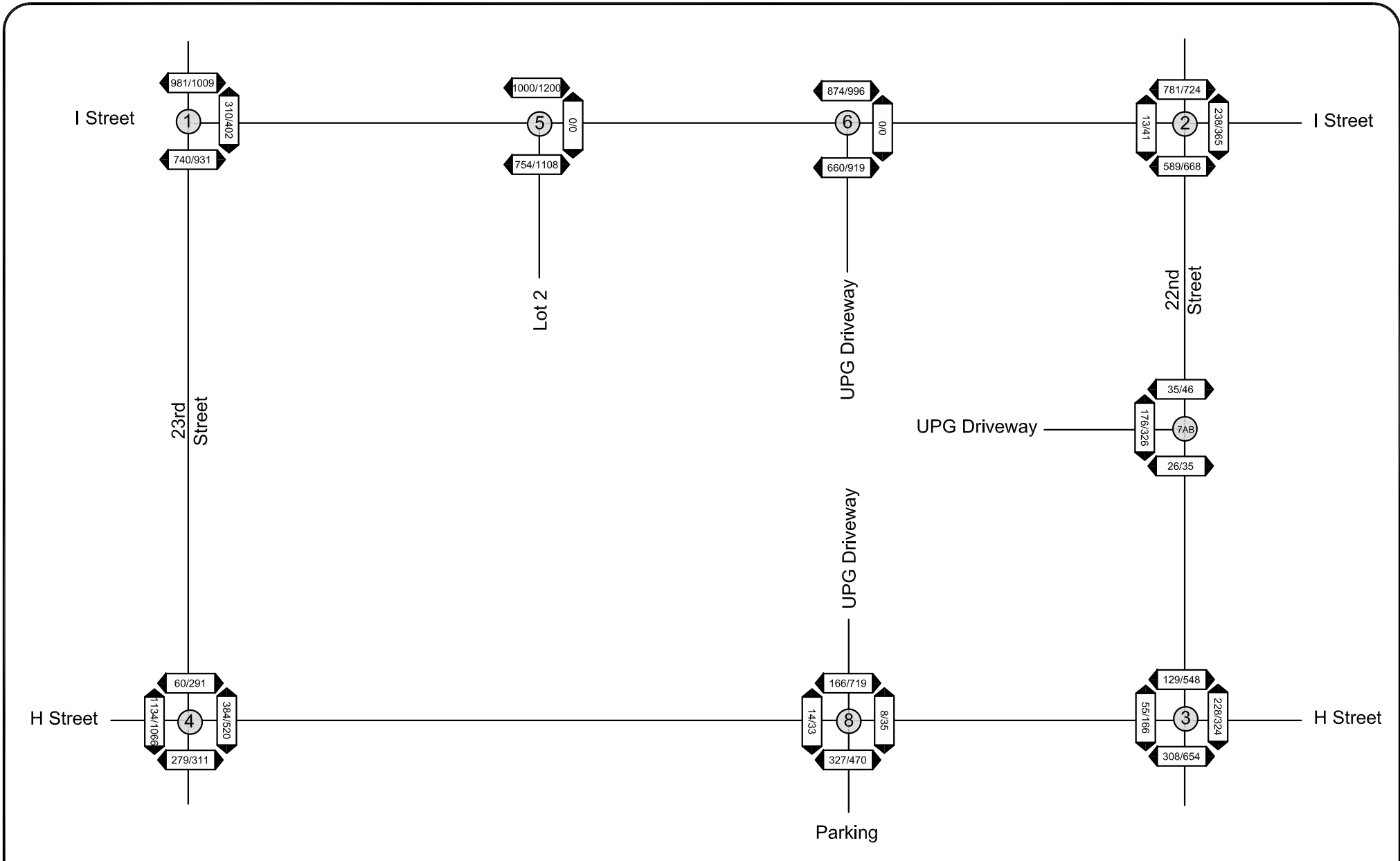


Figure 4-2  
Peak Hour Pedestrian Volumes Adjusted for  
Post Construction Conditions

AM/PM Peak Hour Pedestrian Volume



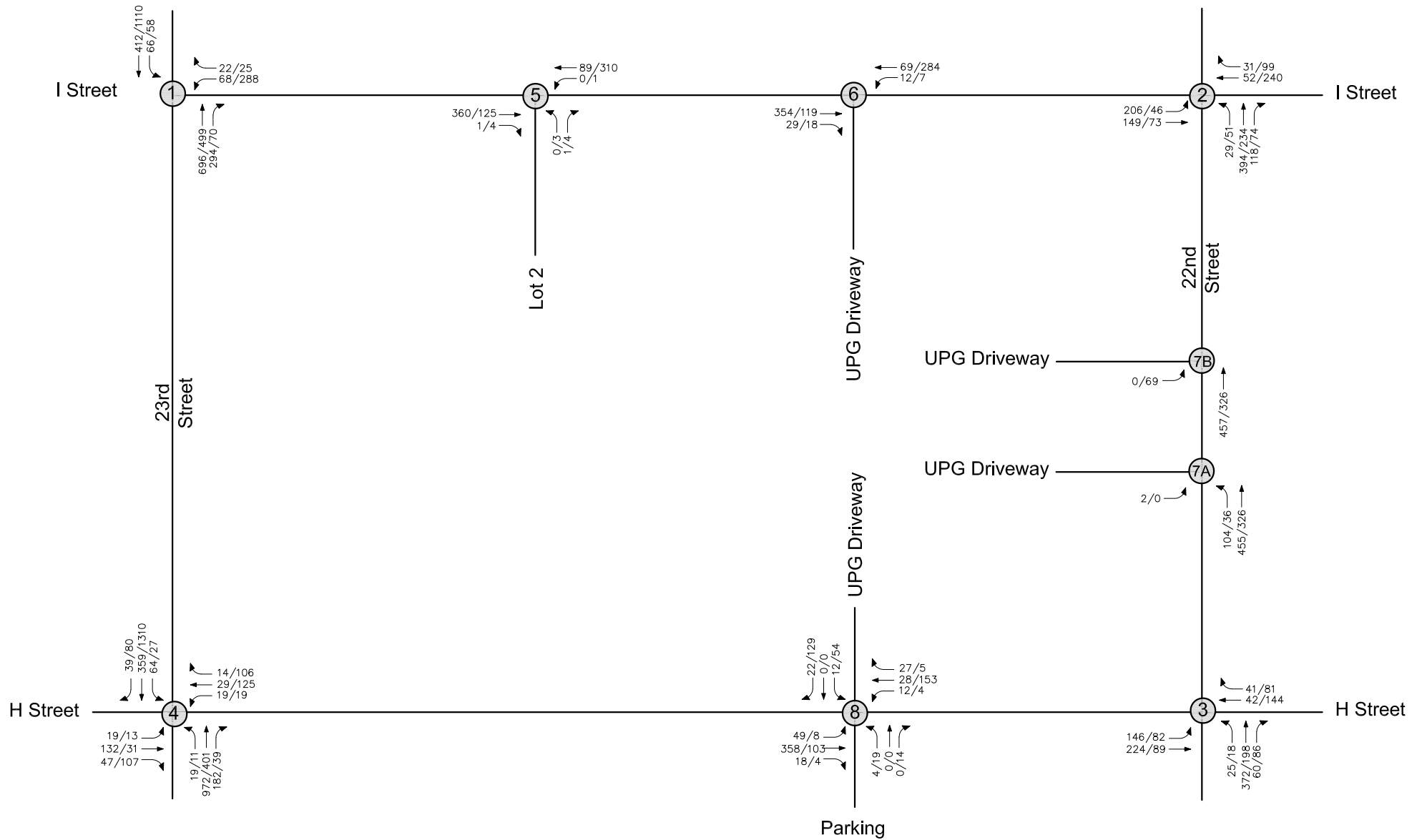


Figure 4-3  
Post Construction Peak Hour Vehicular Traffic Volumes  
plus Regional Growth (2020)

AM PEAK HOUR  
PM PEAK HOUR  
000/000



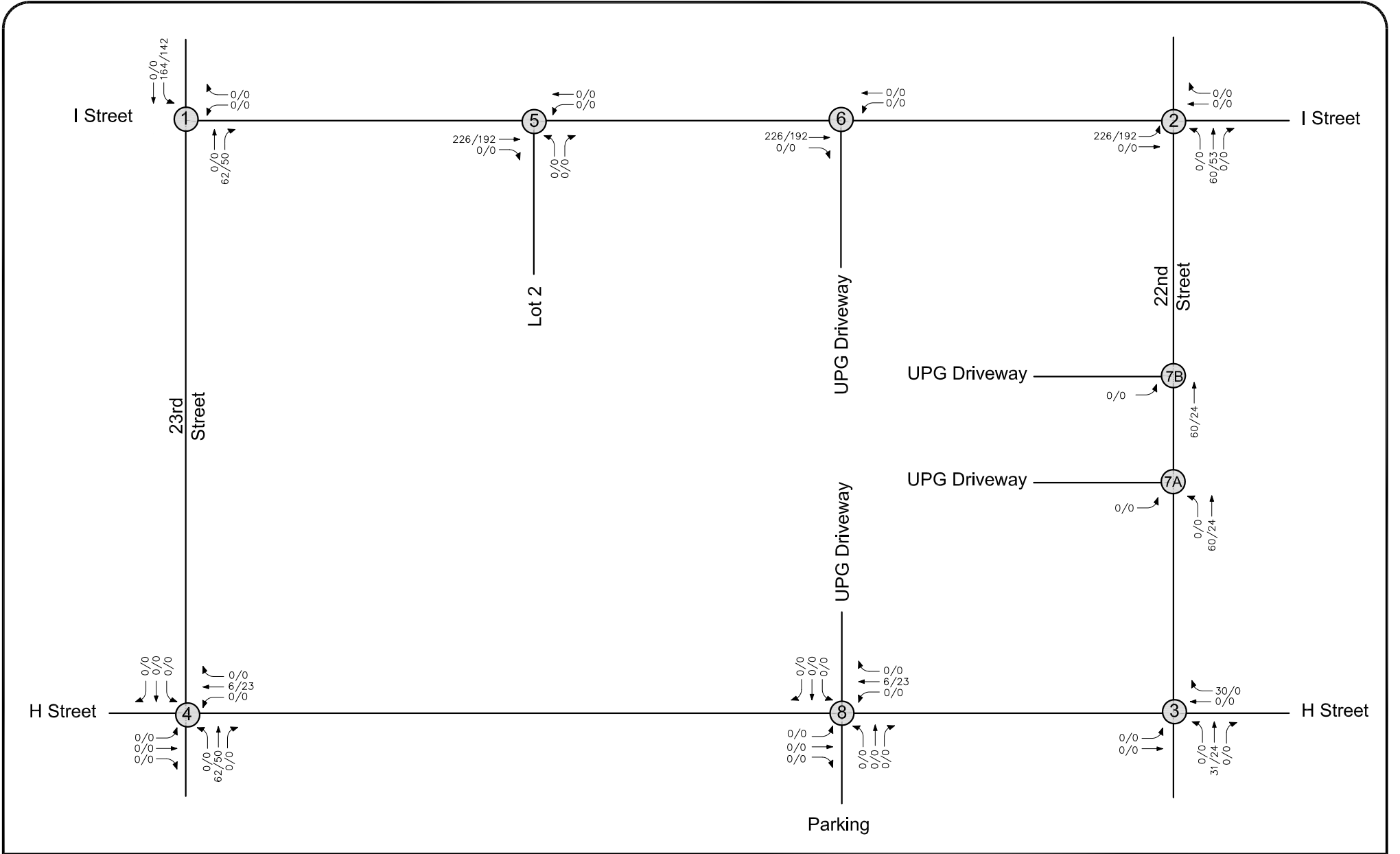


Figure 4-4  
Pipeline Development Traffic Assignments

AM PEAK HOUR  
000/000  
PM PEAK HOUR



North

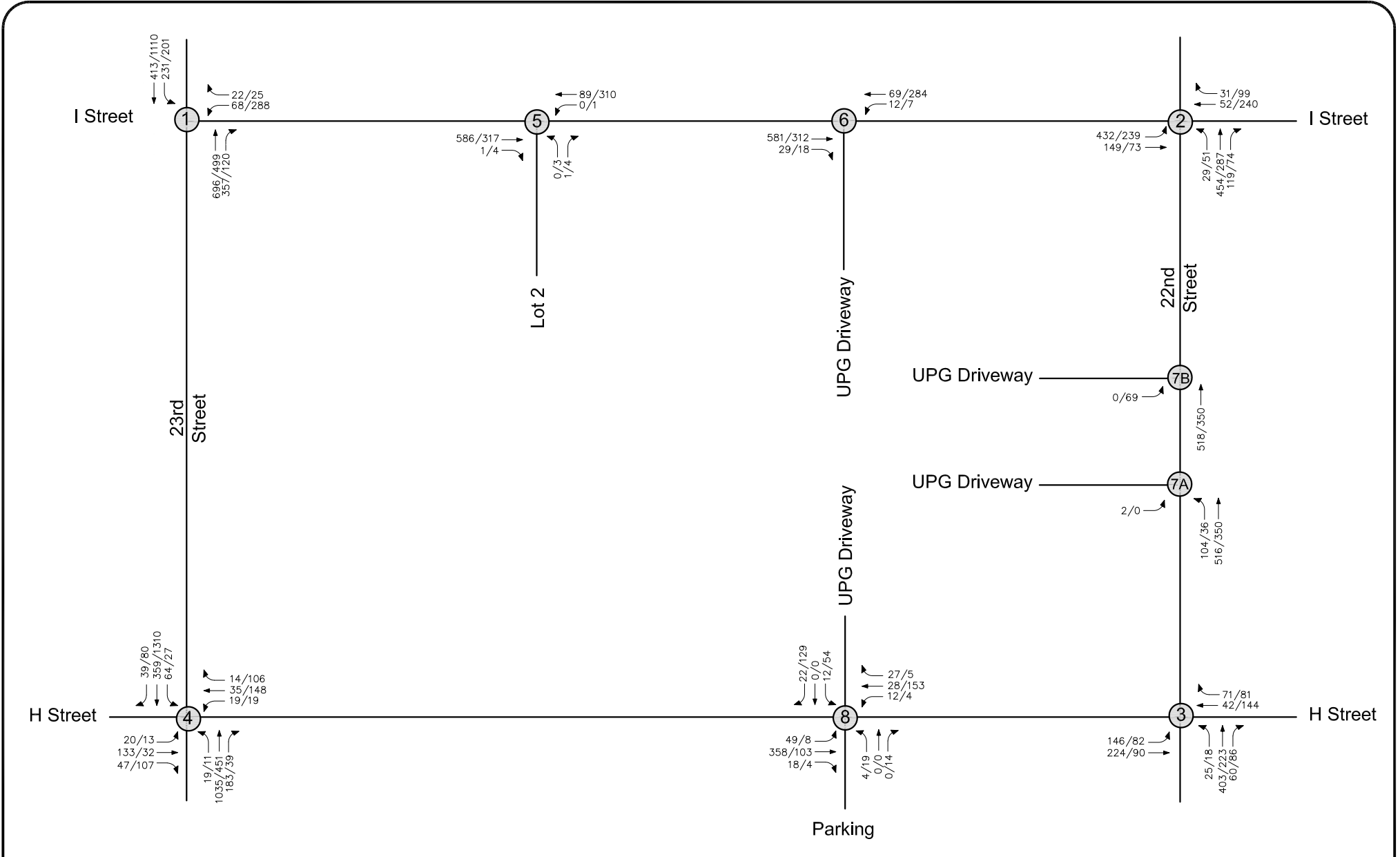


Figure 4-5  
2020 Future Background Peak Hour Traffic Forecasts

AM PEAK HOUR  
PM PEAK HOUR  
000/000



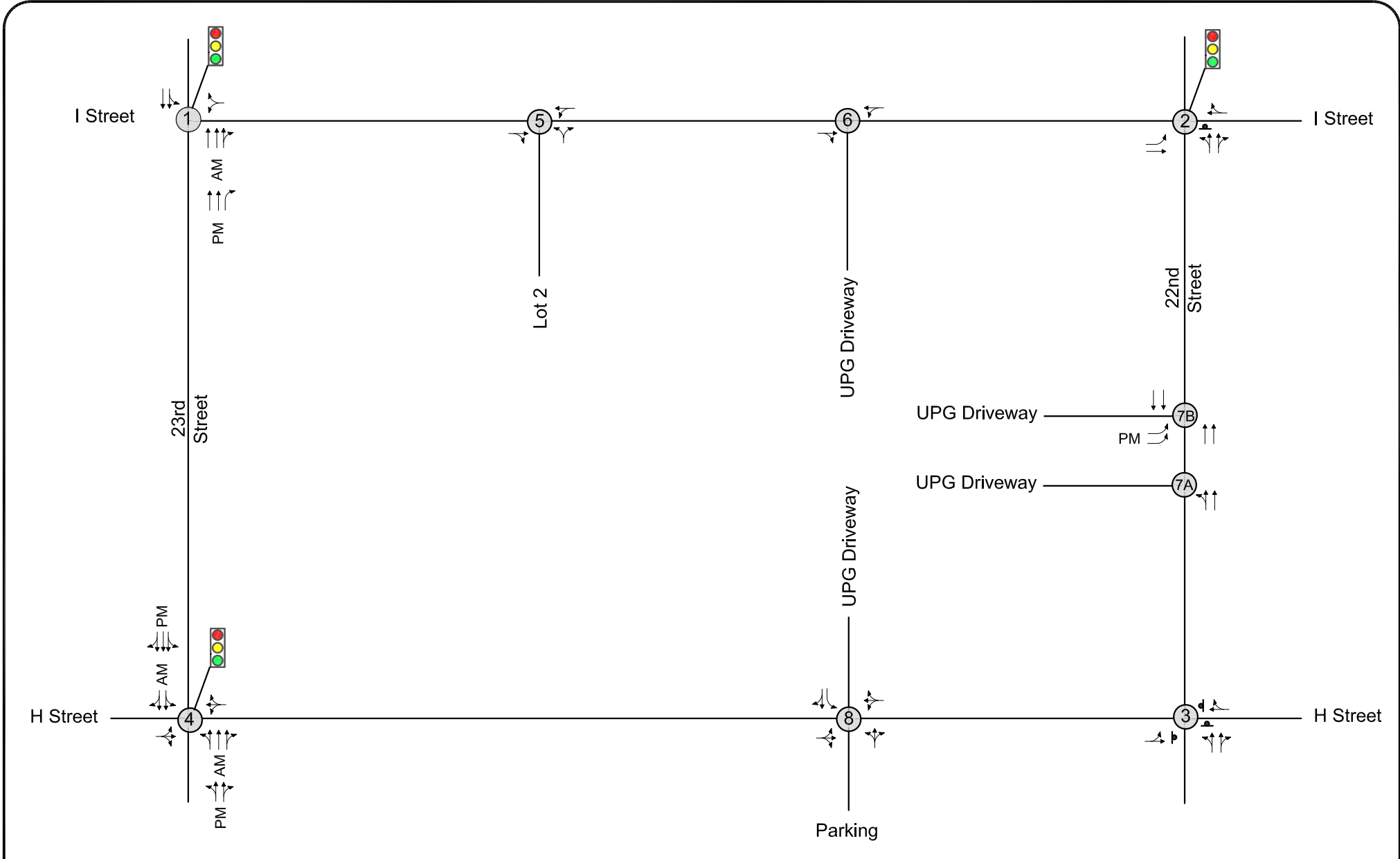
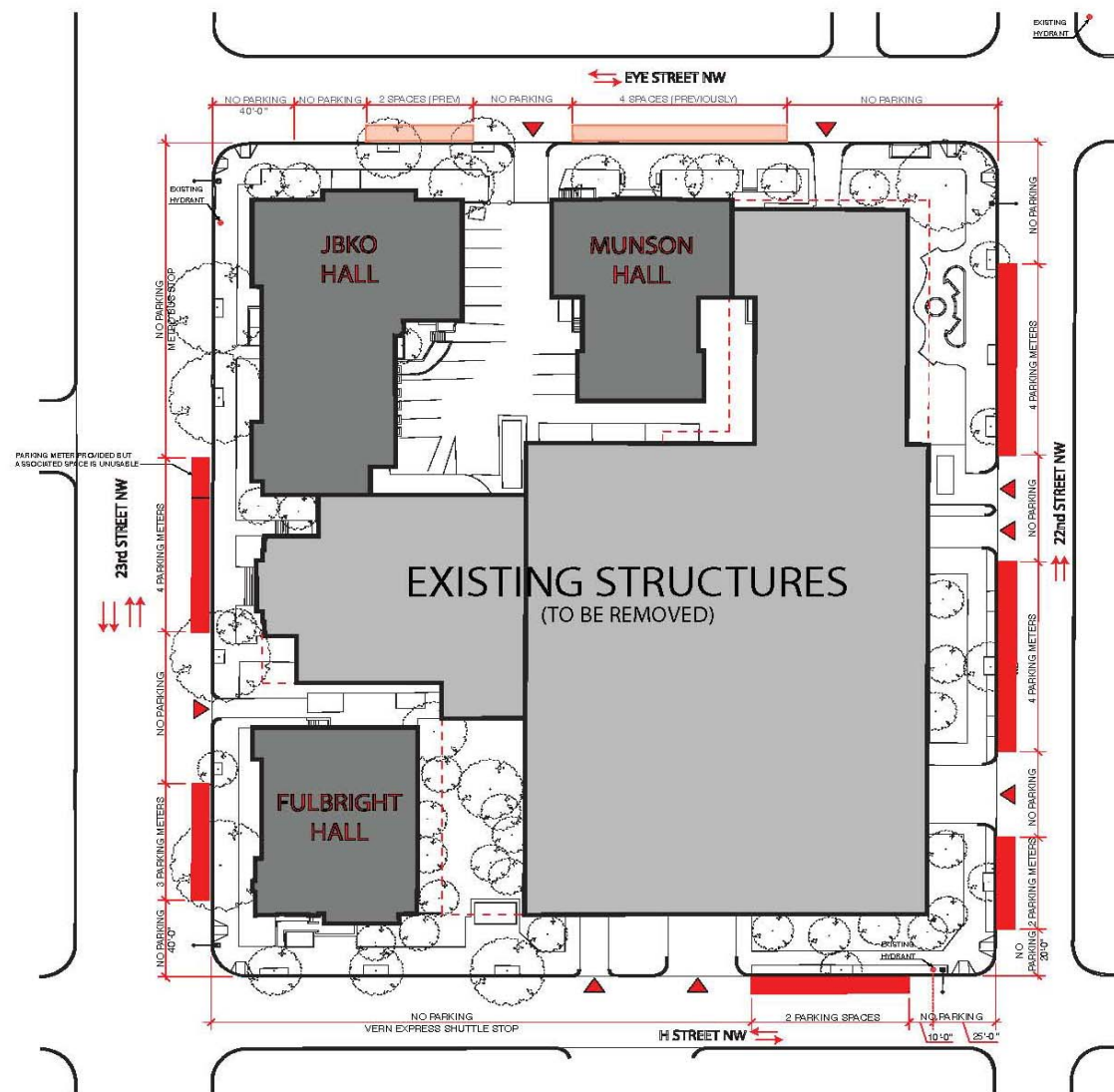


Figure 4-6  
2020 Background Lane Use and Traffic Control

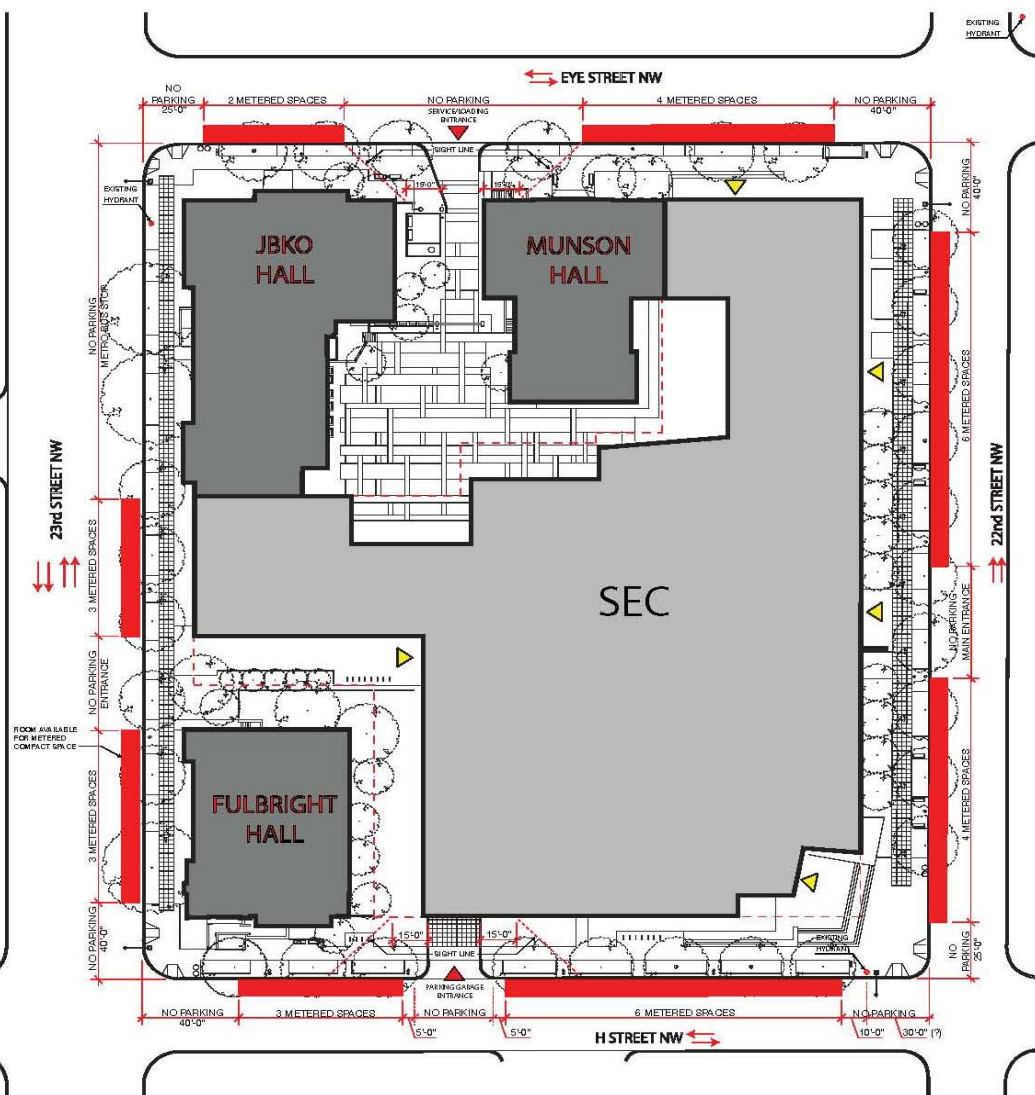
- ← Represents One Travel Lane
- 🚦 Signalized Intersection
- 🛑 Stop Sign
- 🏠 North



NOTES:

- (1): NO PARKING CURRENTLY ON BOTH SIDES OF EYE STREET NW DUE TO CONSTRUCTION
- (2): PARKING PRIOR TO EYE STREET CONSTRUCTION SHOWN AS

EXISTING STREET PARKING	
22nd St	10
I St	0/6
23rd St	7
H St	2
Total	19/25



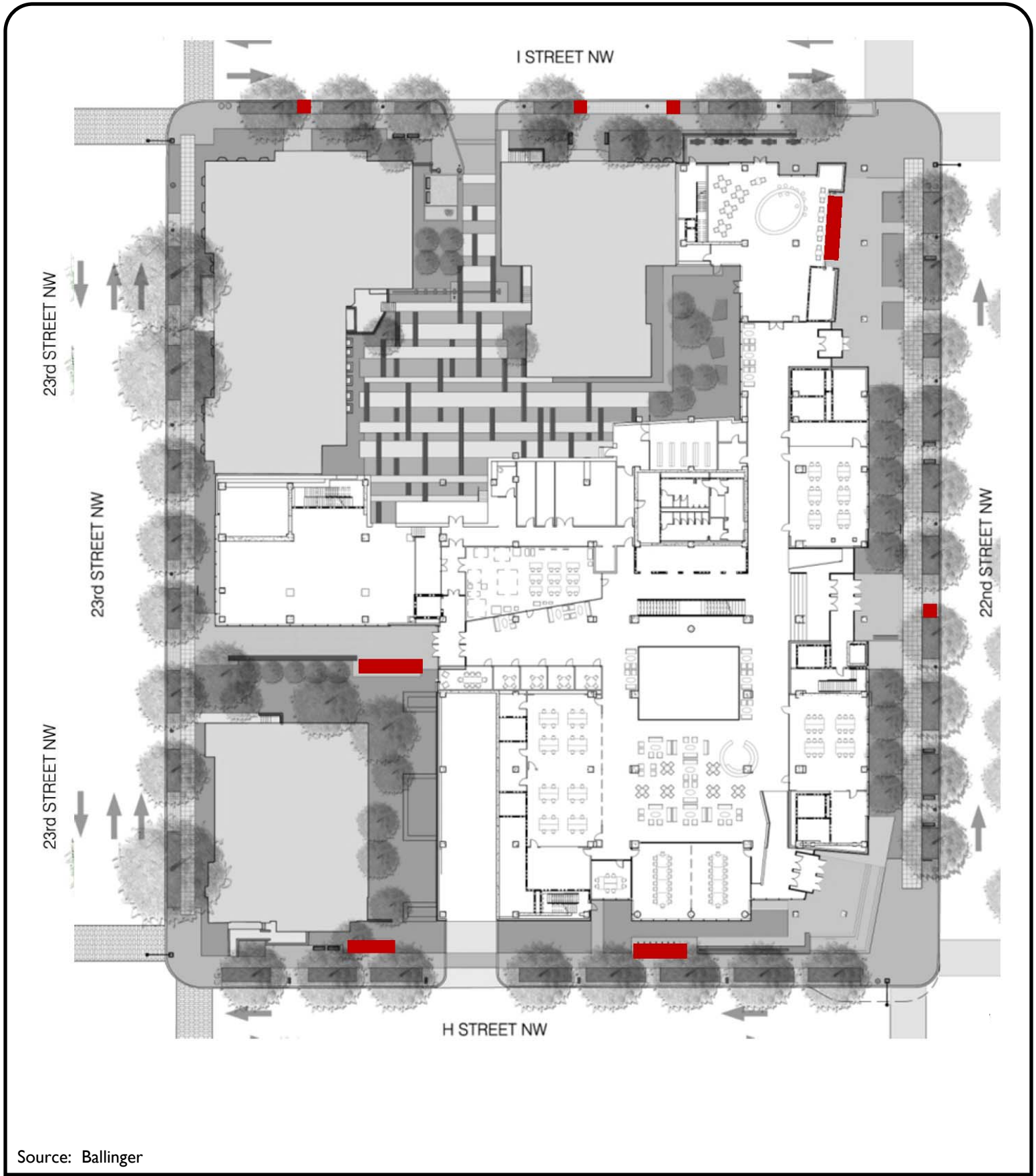
- (3): 7 SPACES GAINED ON H STREET AS A RESULT OF RELOCATING VERN EXPRESS SHUTTLE STOP ONE BLOCK SOUTH TO G STREET, WHERE 6 SPACES ARE PROPOSED TO BE REMOVED TO ACCOMMODATE THE NEW BUS STOP.
- (4): PARKING CALCULATIONS ARE BASED ON A 21'-0" TYPICAL PARKING SPACE
- (5): 5 CURB CUTS TO BE REMOVED

STREET PARKING AFTER SEC	
22nd St	10
I St	6
23rd St	6
H St	9
Total	31

Source: Ballinger

Figure 5-1  
Existing versus Proposed Curb Parking Inventory





Source: Ballinger

Figure 5-2  
Proposed Bicycle Parking

 Bicycle Parking





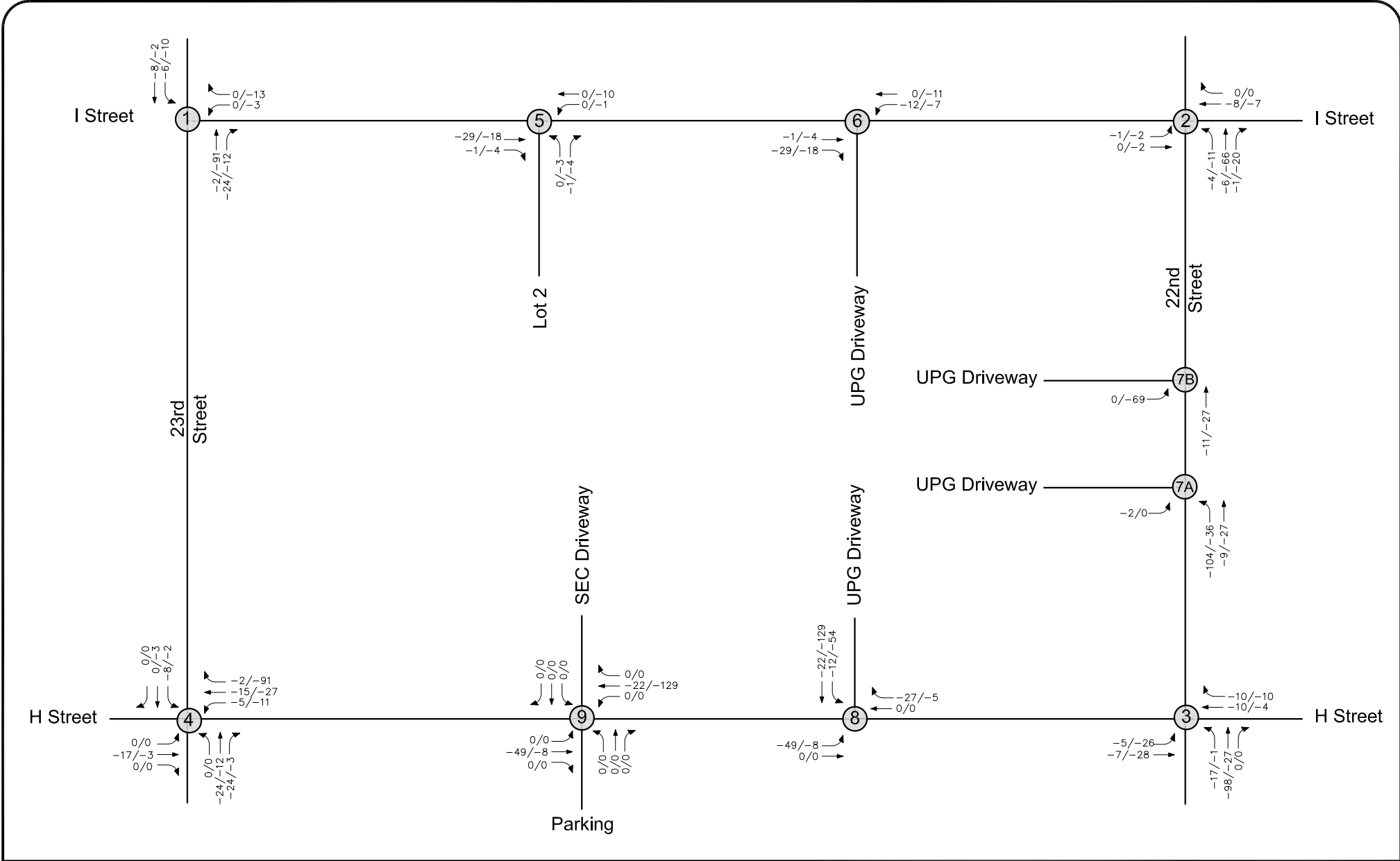


Figure 5-3A  
Removal of Existing UPG Site Trips

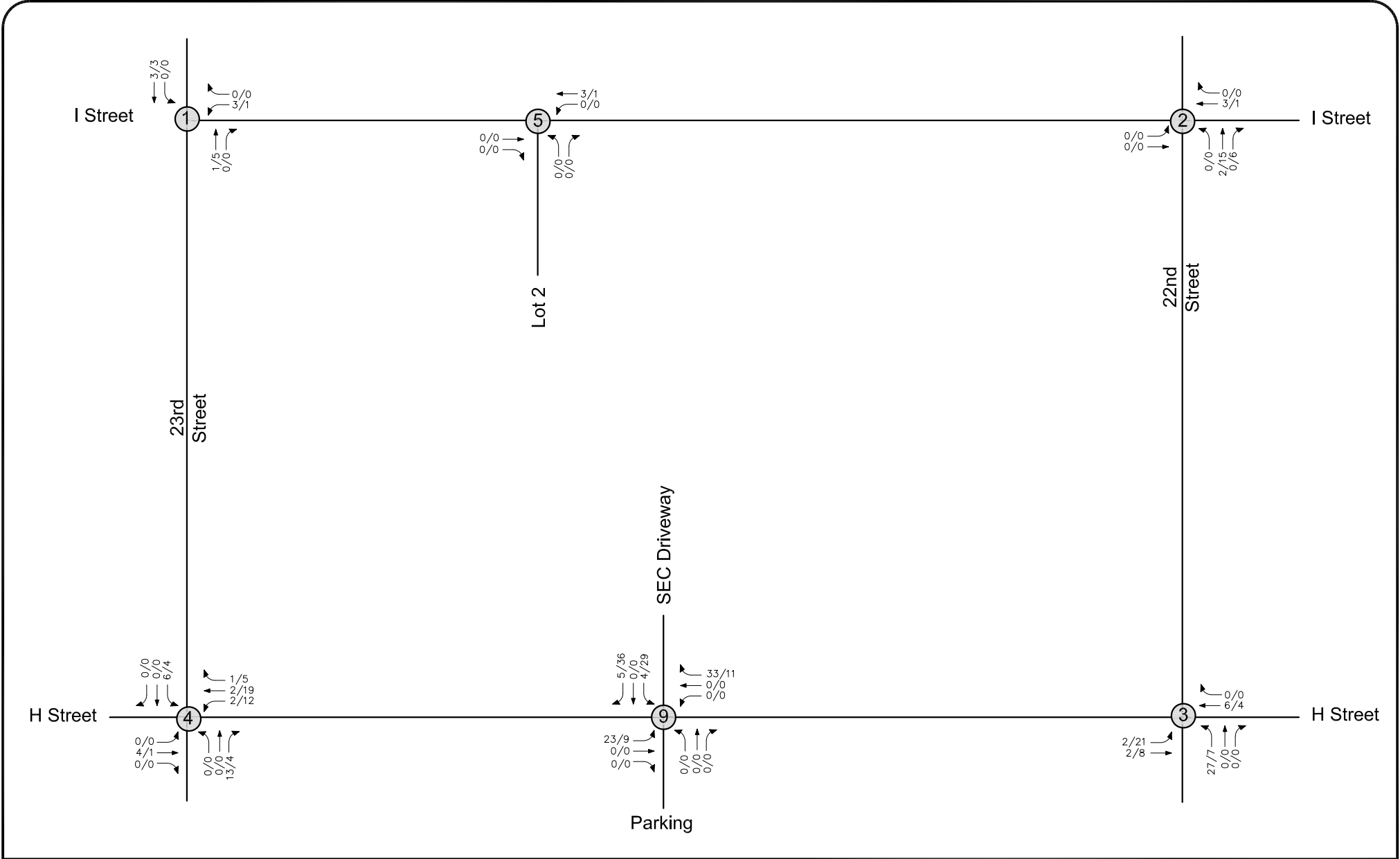


Figure 5-3B  
Site Trip Assignment - SEC Garage

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North

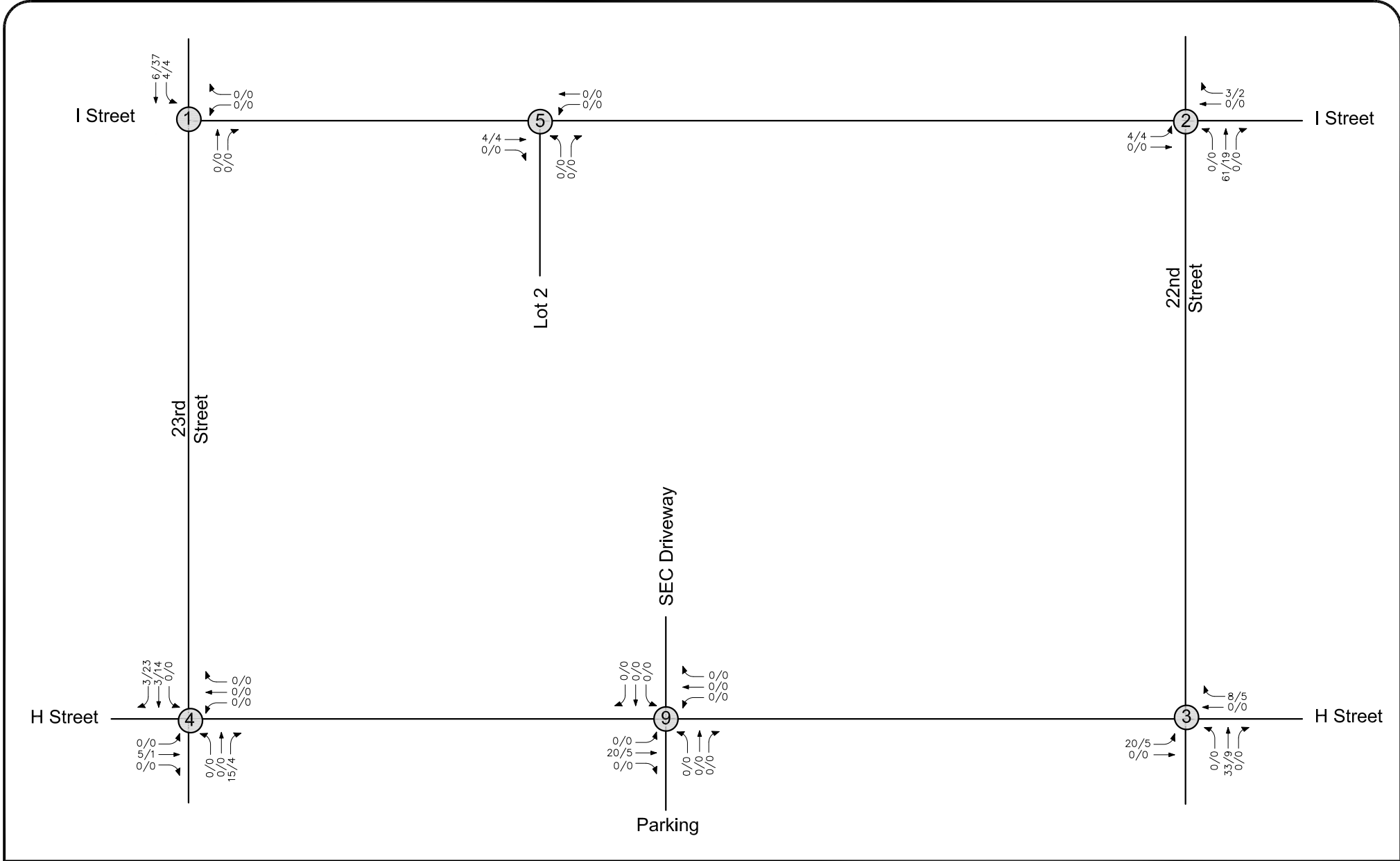


Figure 5-3C  
Site Trip Assignment – Square 54 Garage

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North



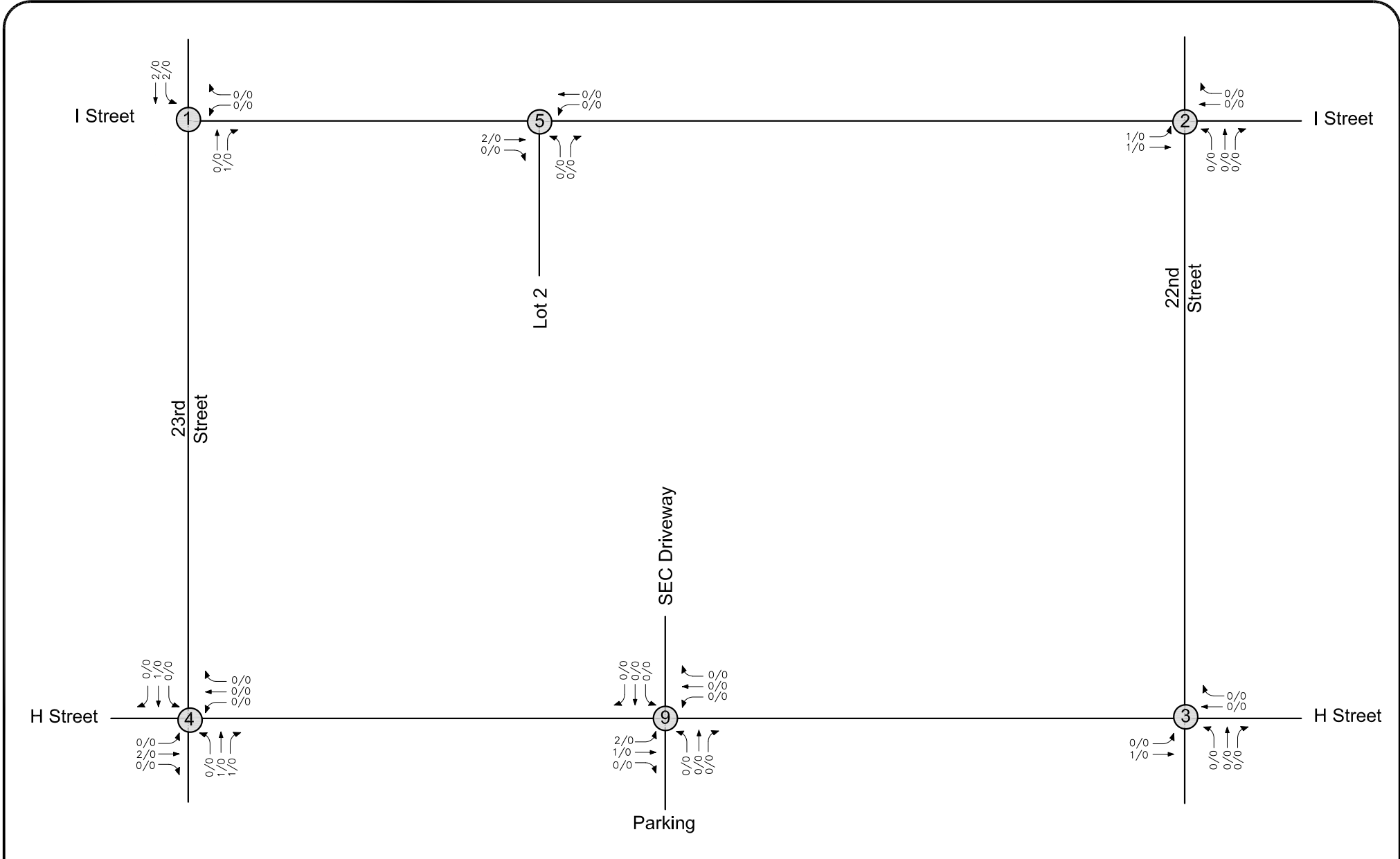
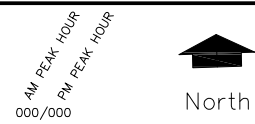


Figure 5-3E  
Site Trip Assignment – Increase in Faculty and Staff



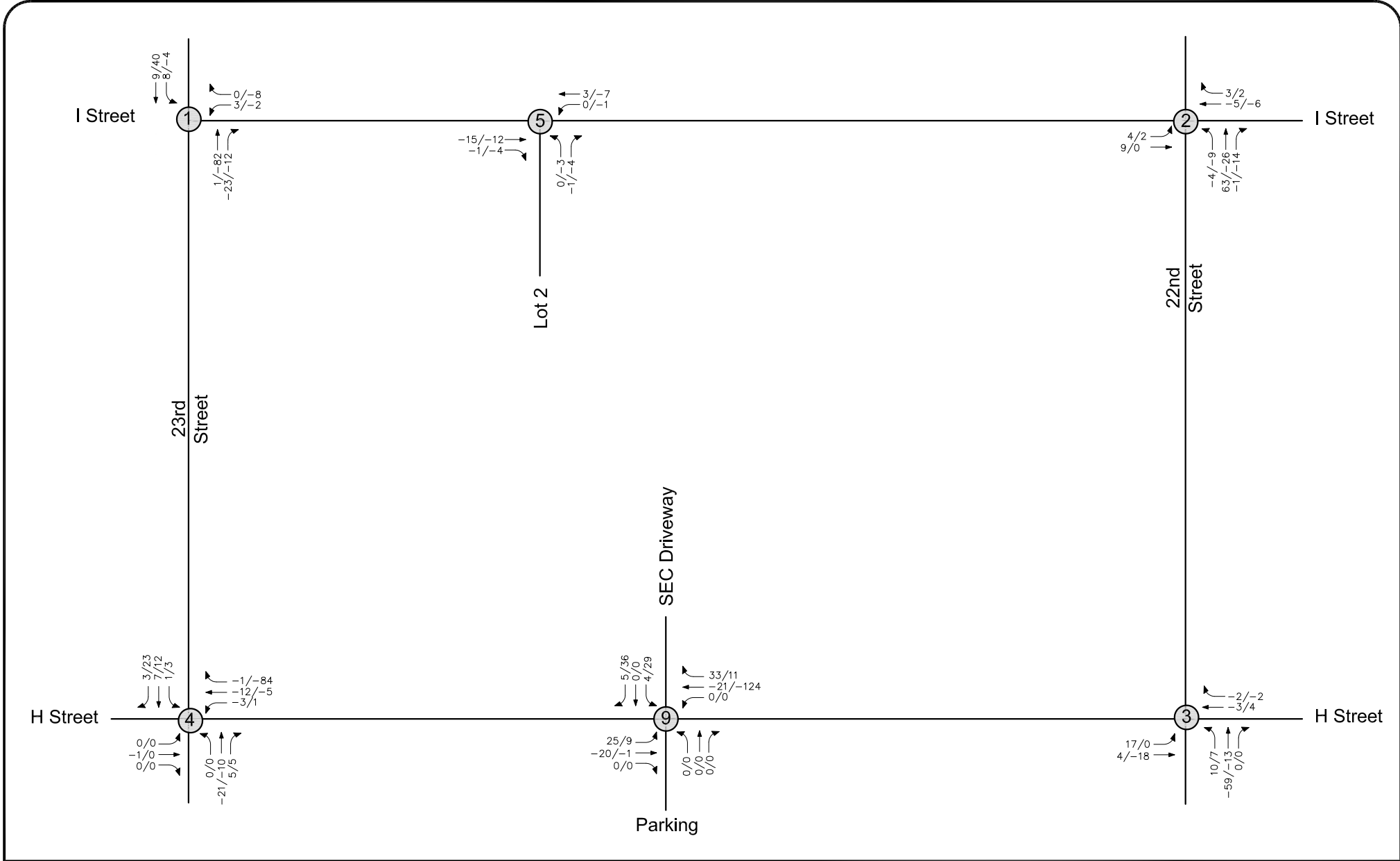


Figure 5-3F  
Combined Site Trip Assignment – All Components

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North

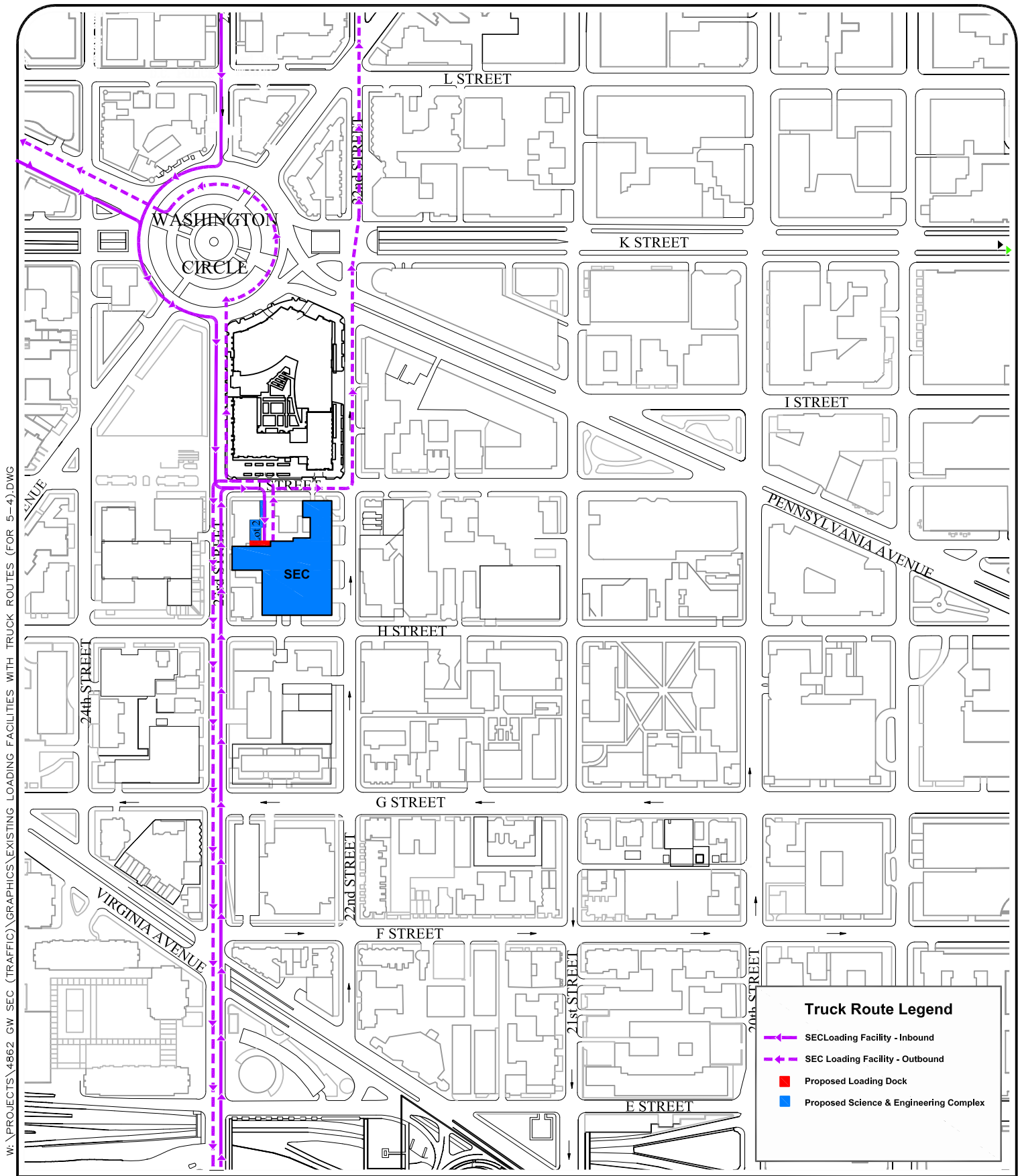


Figure 5-4  
Preferred Truck Routes

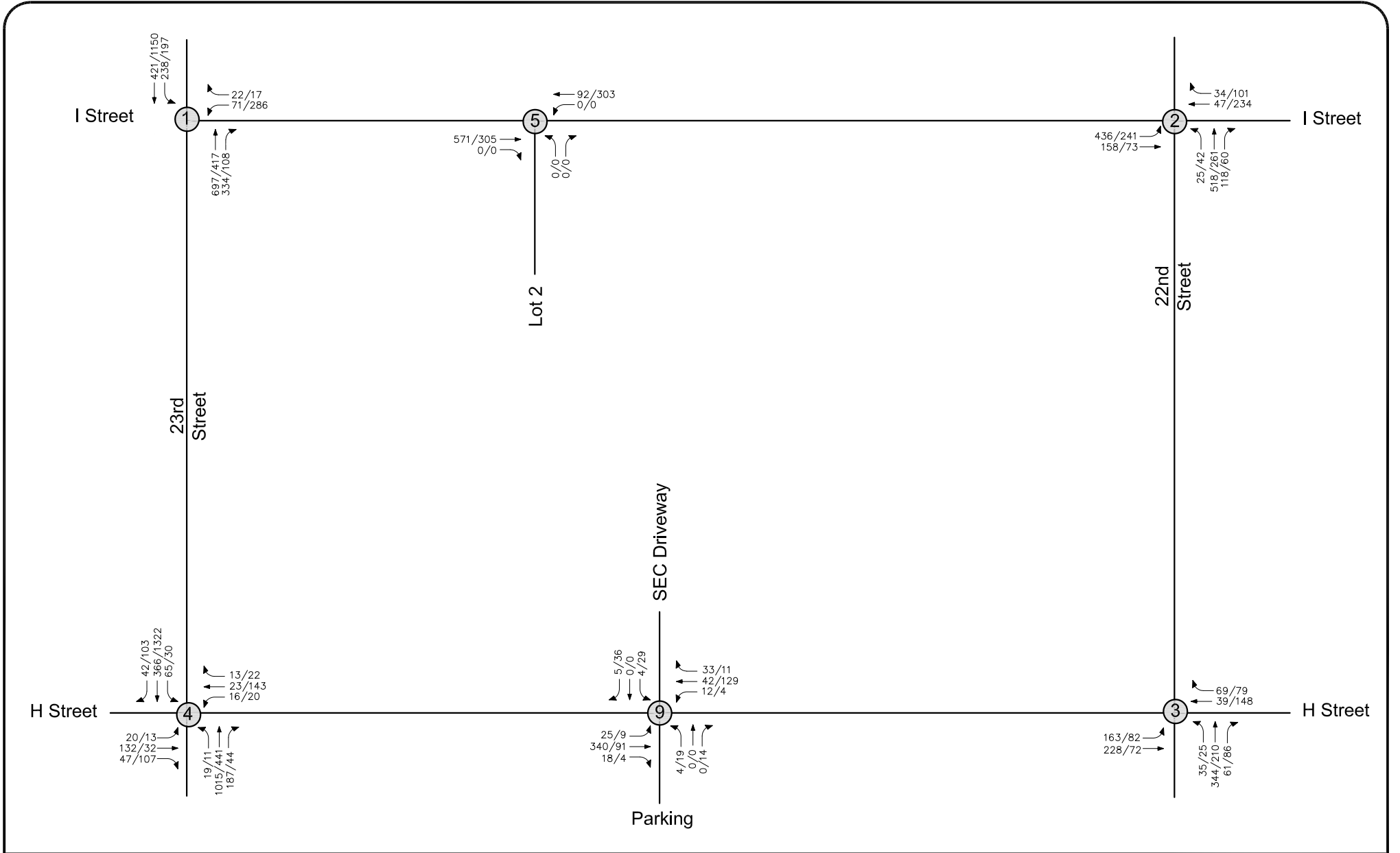


Figure 6-1  
2020 Total Future Peak Hour Traffic Forecasts

AM PEAK HOUR  
PM PEAK HOUR  
000/000



North



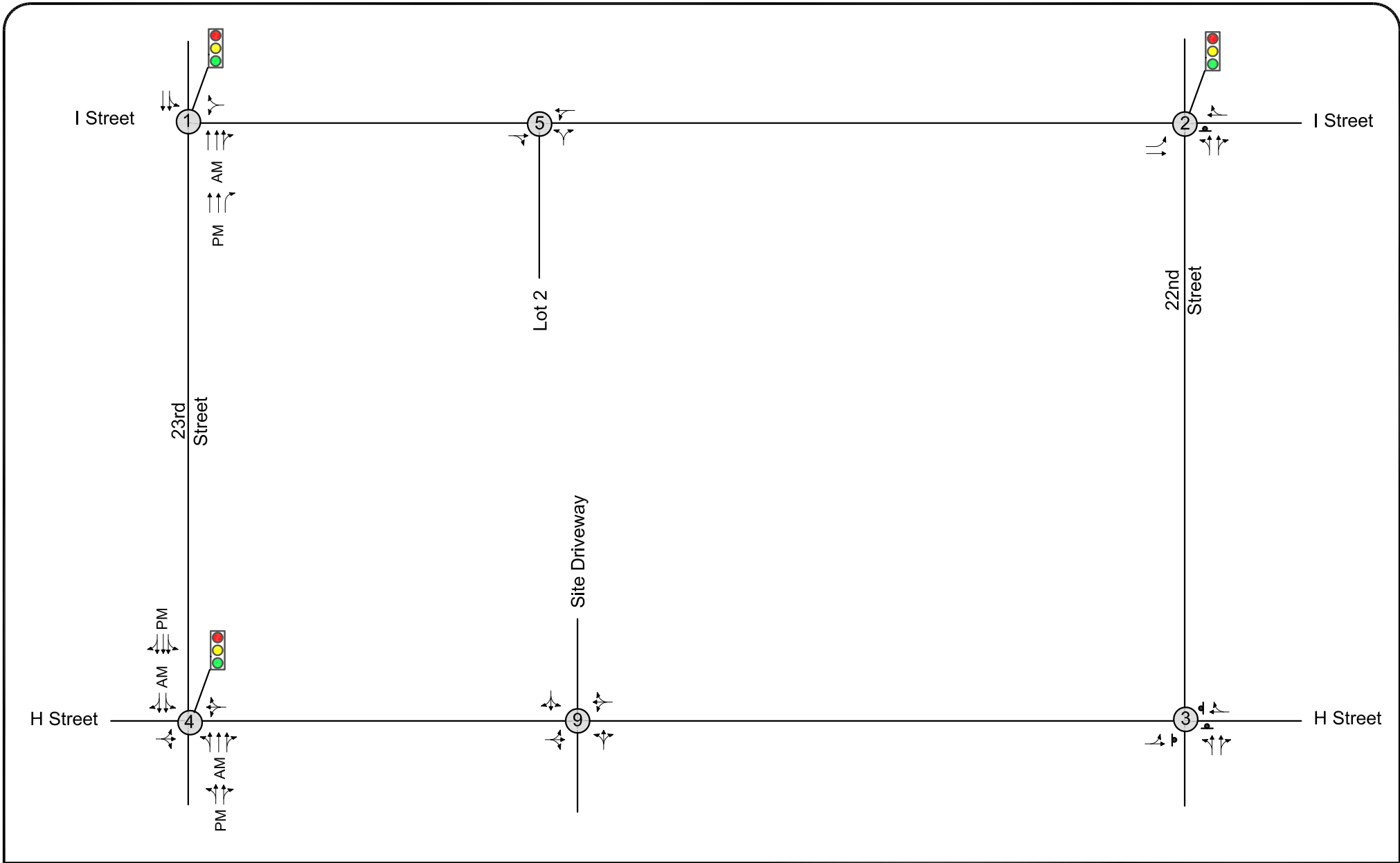
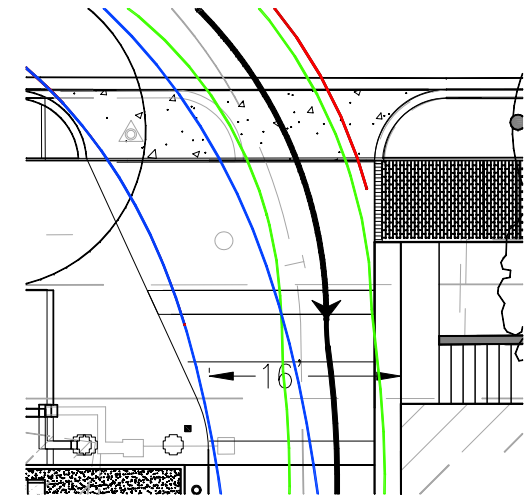
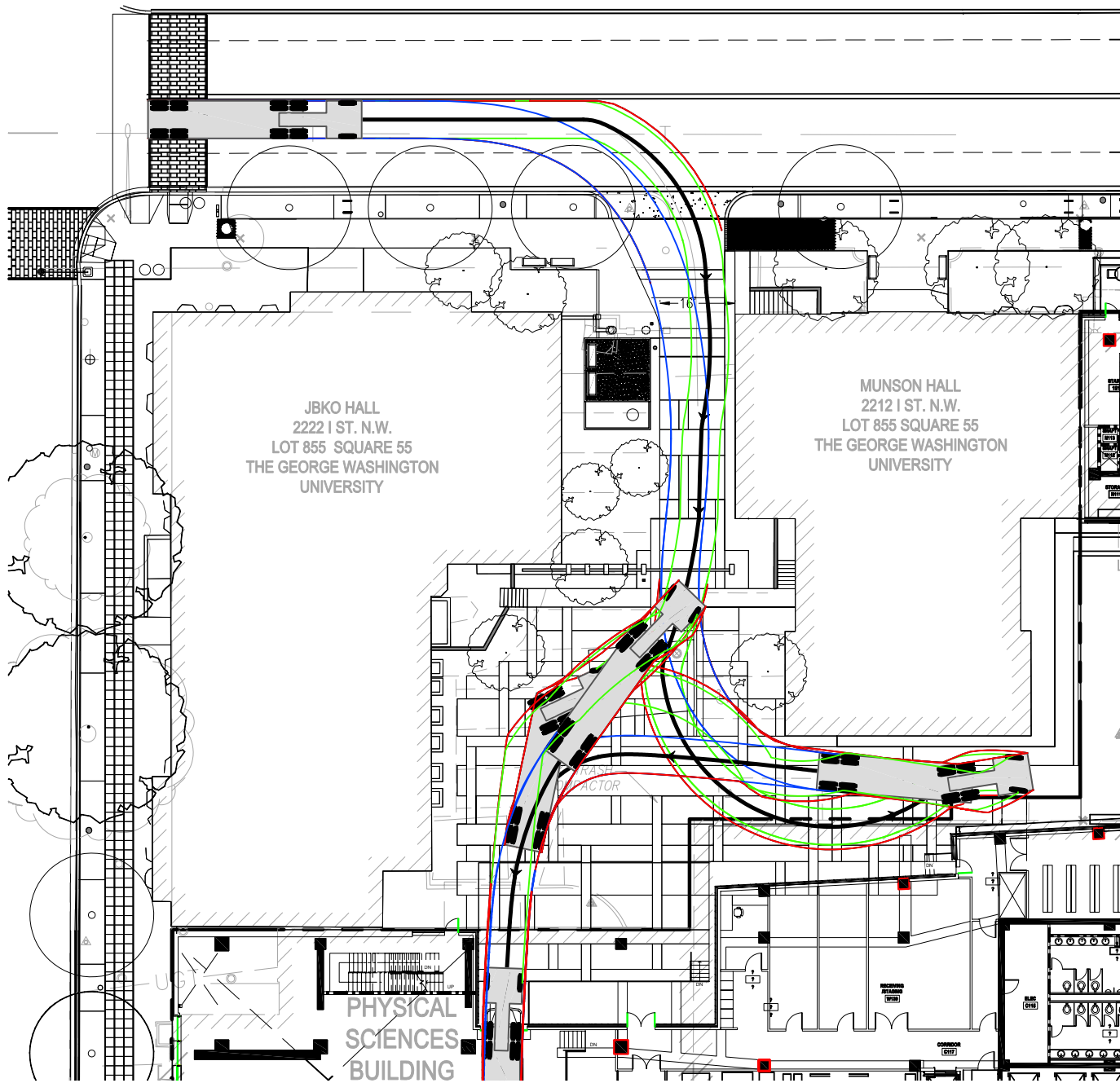


Figure 6-2  
2020 Total Future Lane Use and Traffic Control

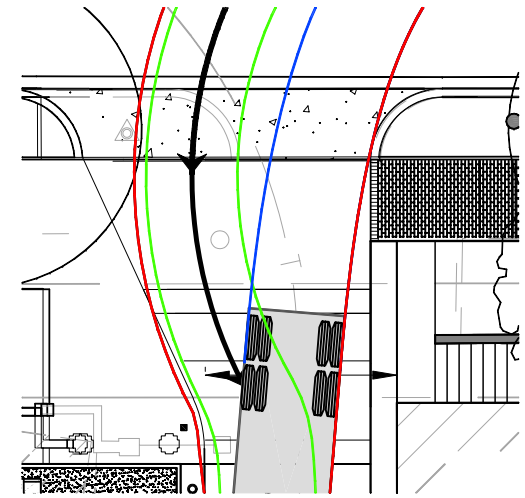
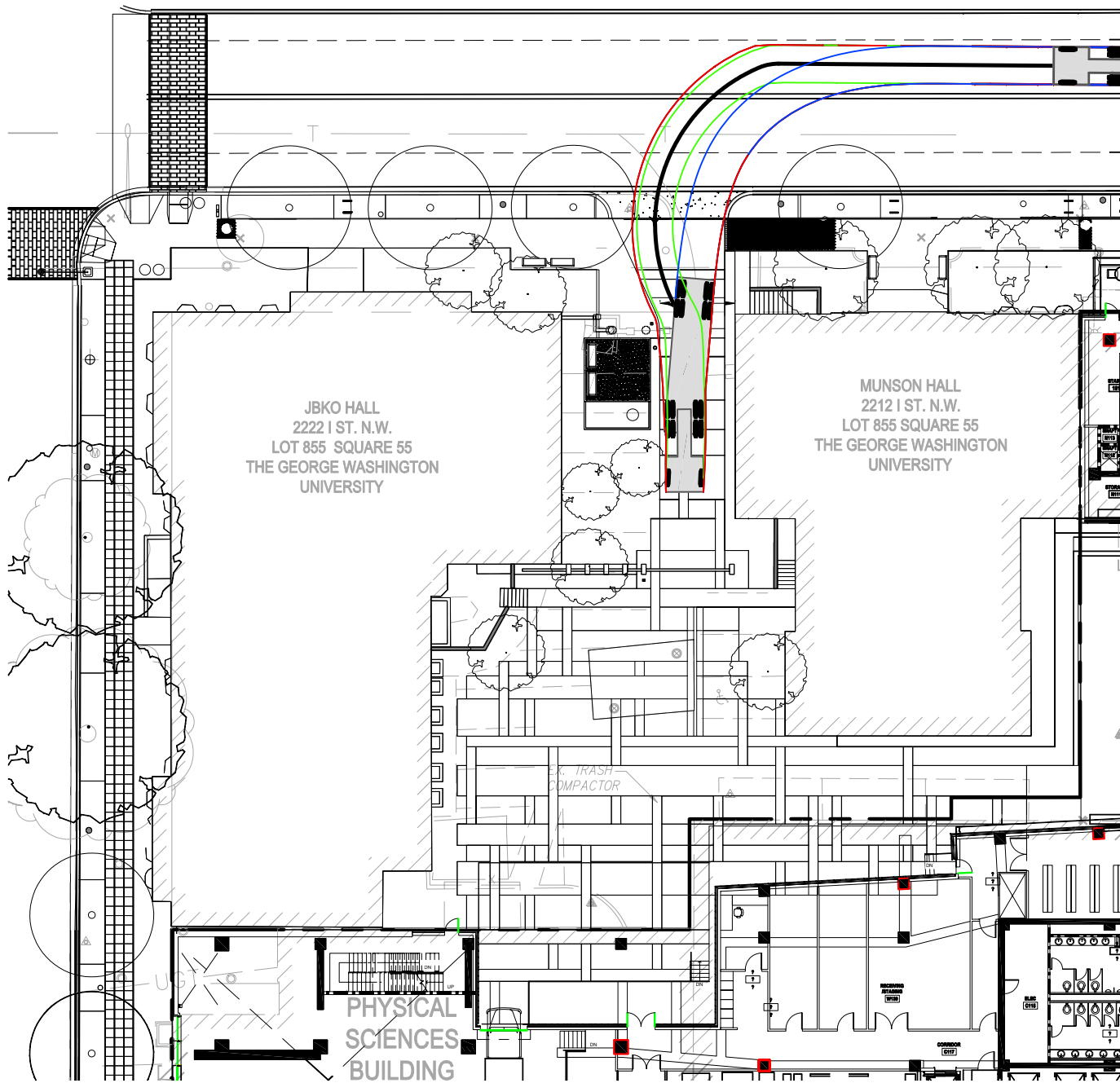
# **TRUCK DIAGRAMS**



Scale: 1/16" = 1'

- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

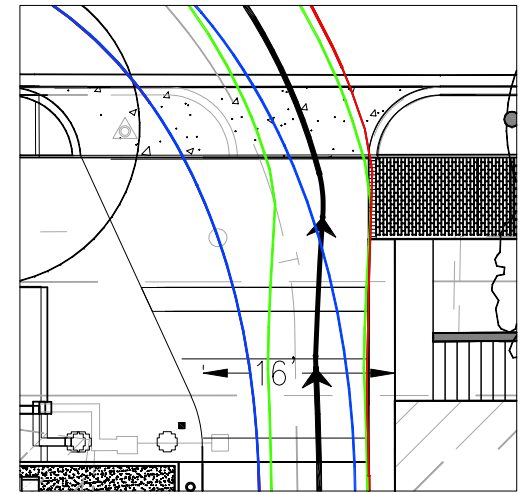
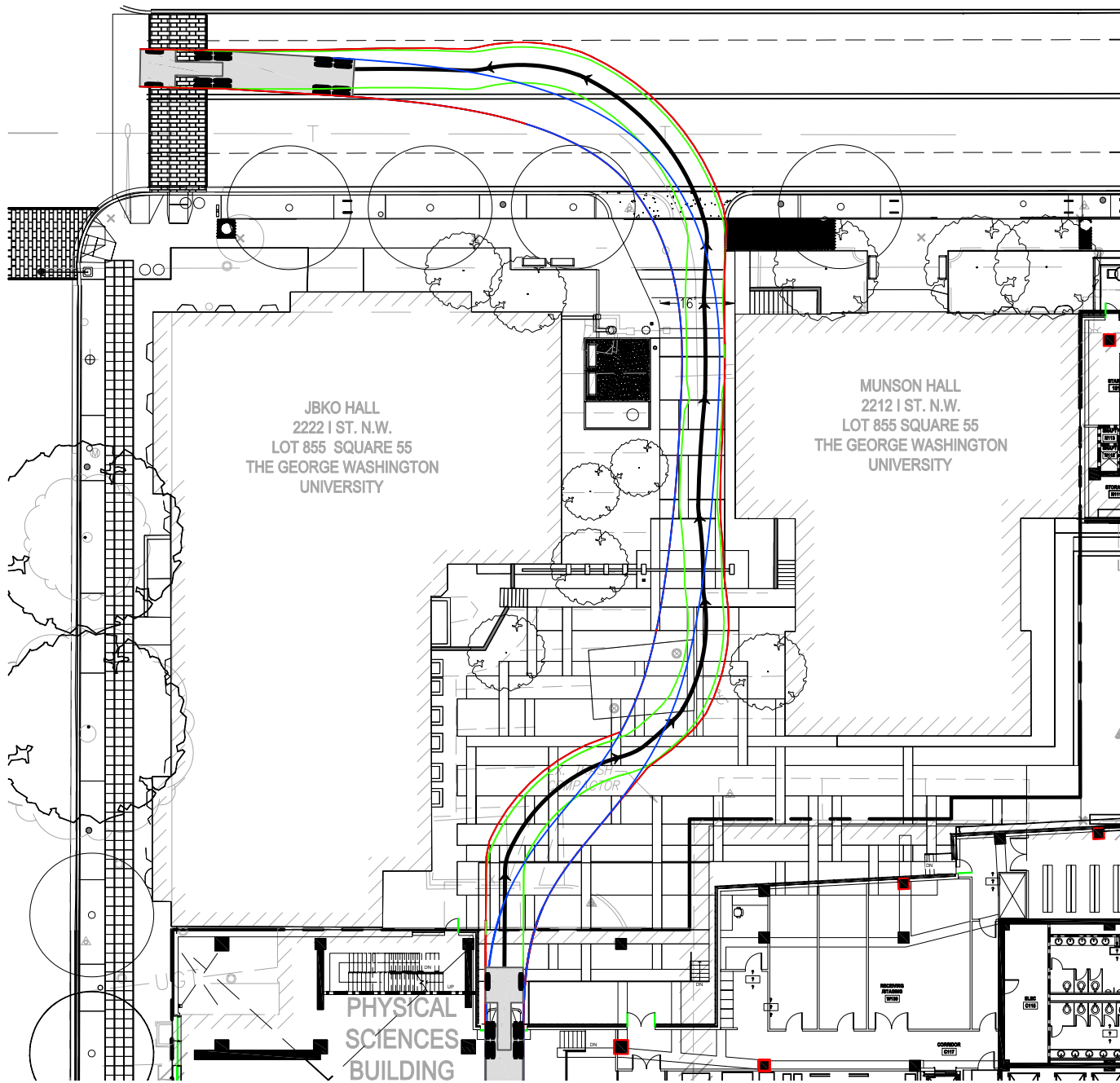
**Figure H-1**  
**I Street Loading Entrance (WB-40) Inbound from West**



Scale: 1/16" = 1'

- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

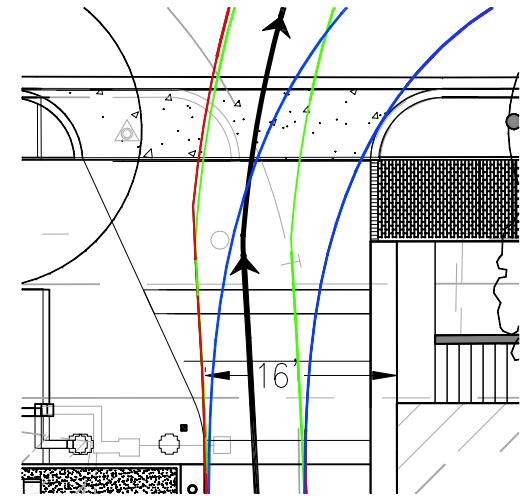
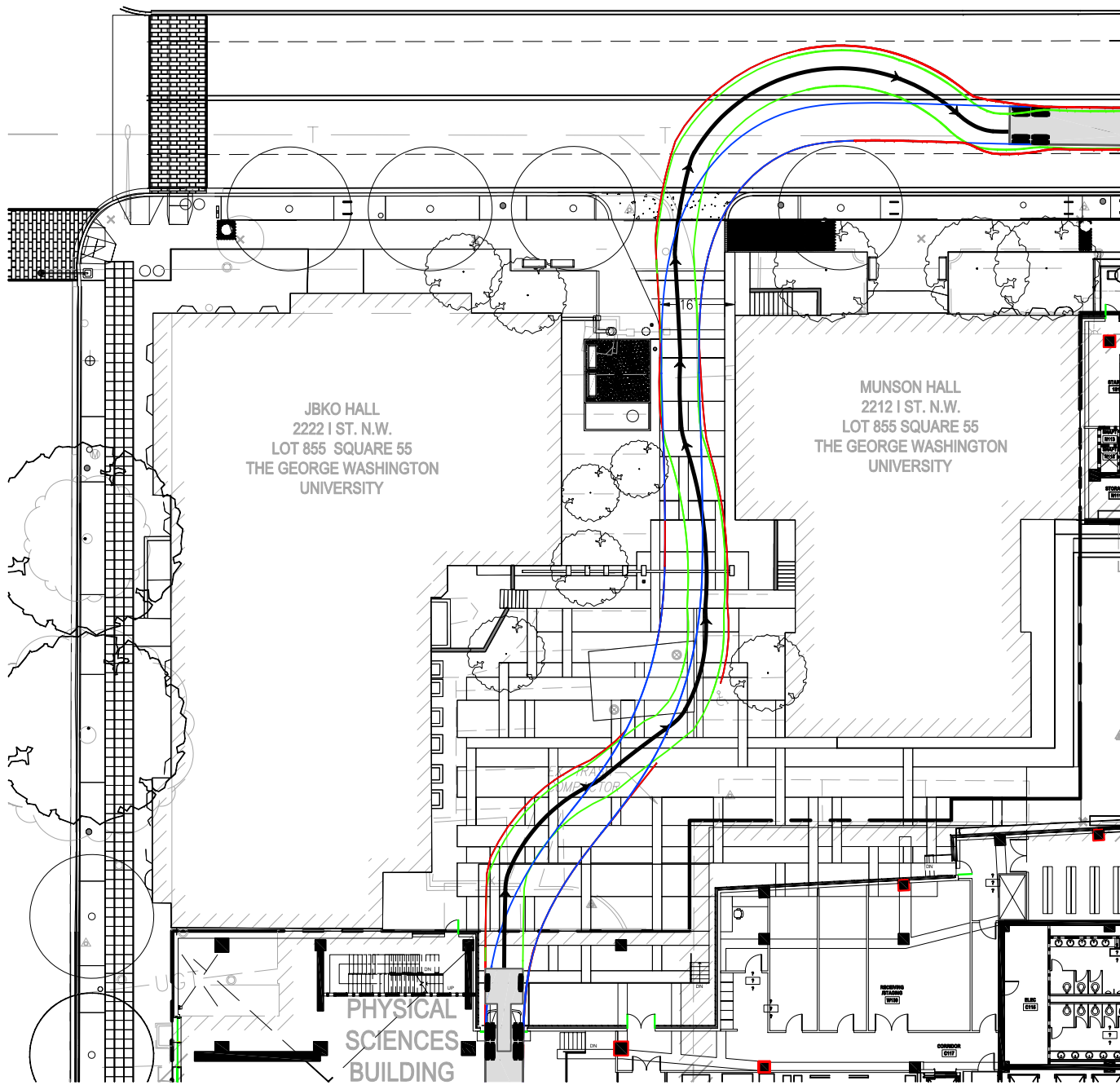
**Figure H-2**  
**I Street Loading Entrance (WB-40) Inbound from East**



Scale: 1/16" = 1'

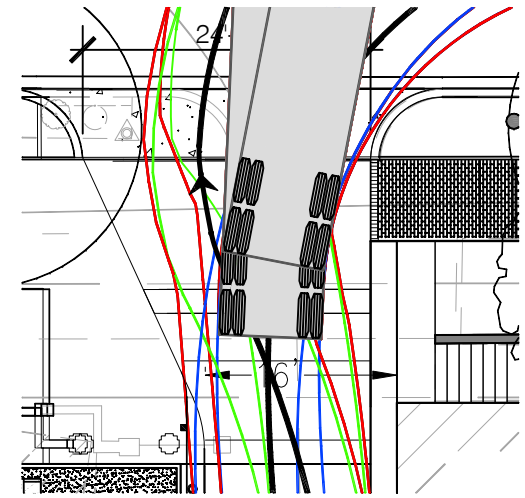
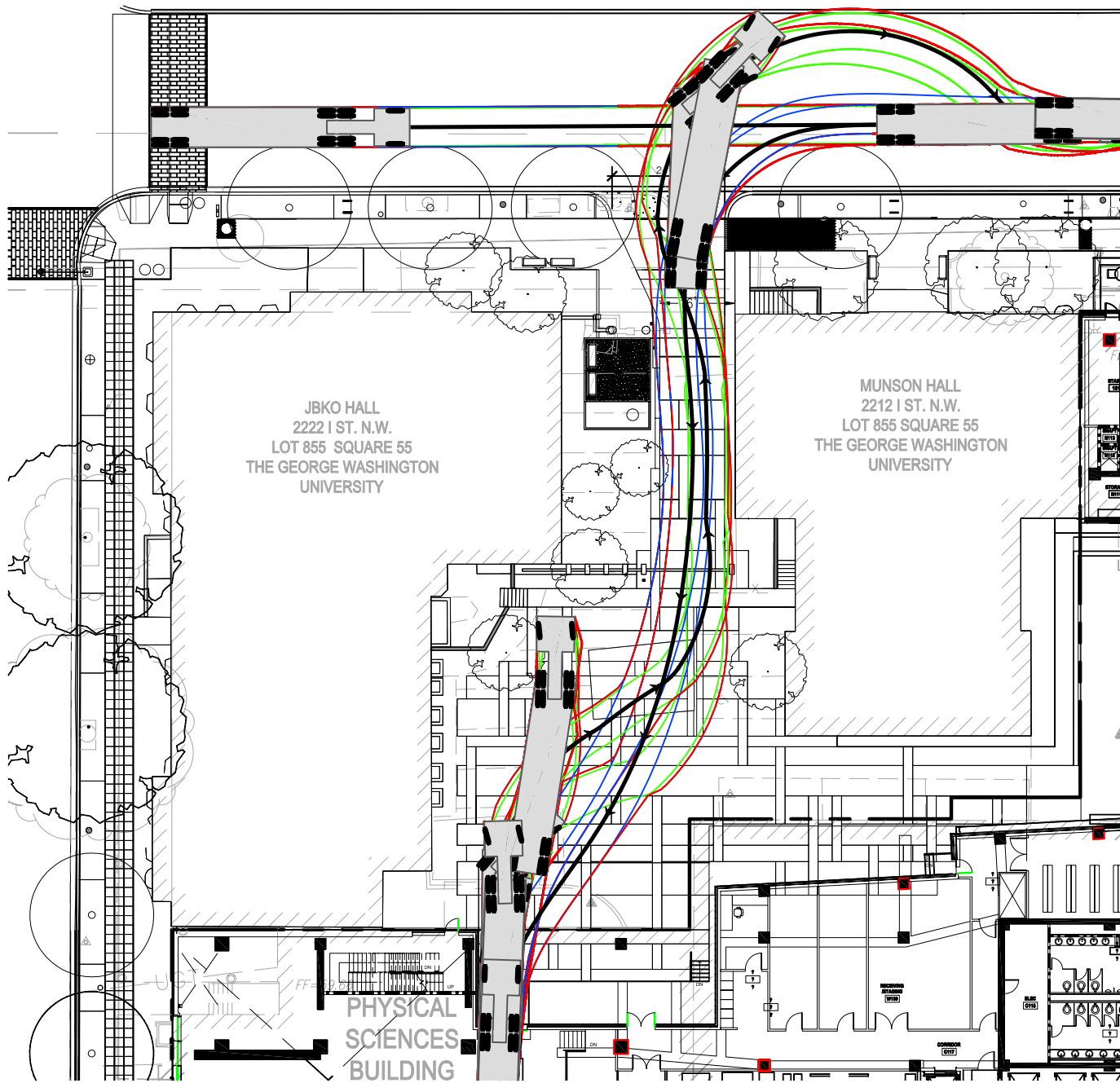
- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

**Figure H-3**  
**I Street Loading Entrance (WB-40) Outbound to West**



- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

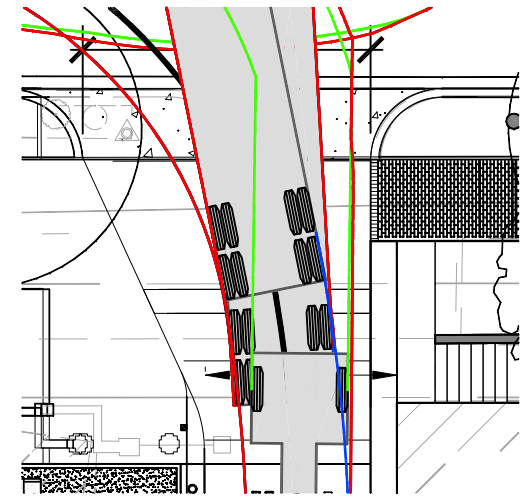
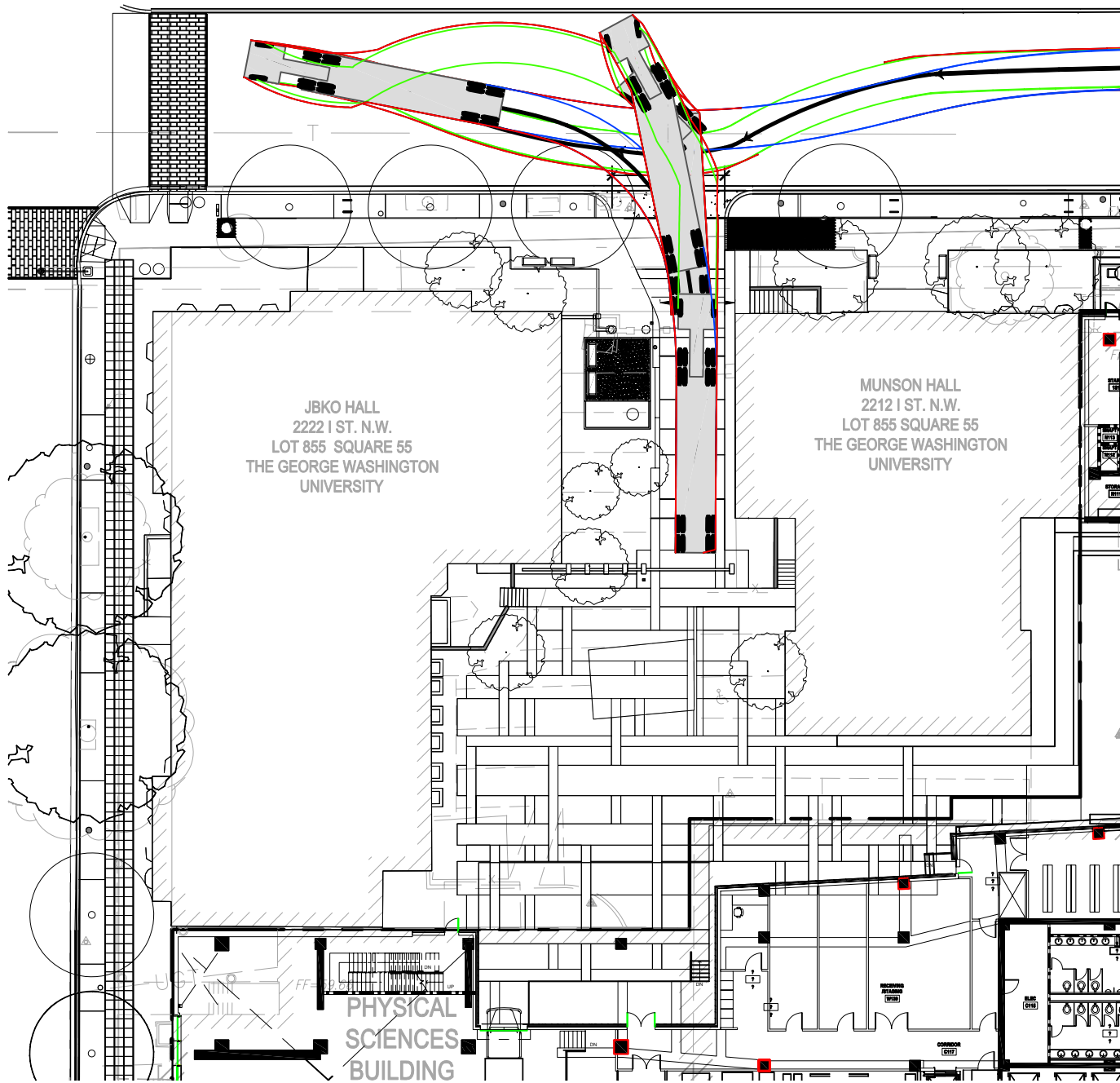
**Figure H-4**  
**I Street Loading Entrance (WB-40) Outbound to East**



Scale: 1/16" = 1'

- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

**Figure H-5**  
**I Street Loading Entrance (WB-50) Inbound from West**

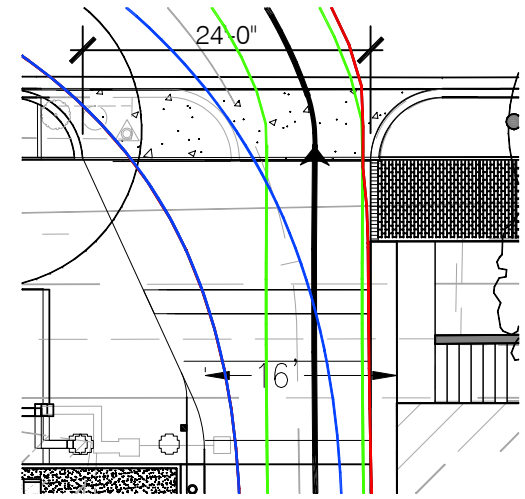
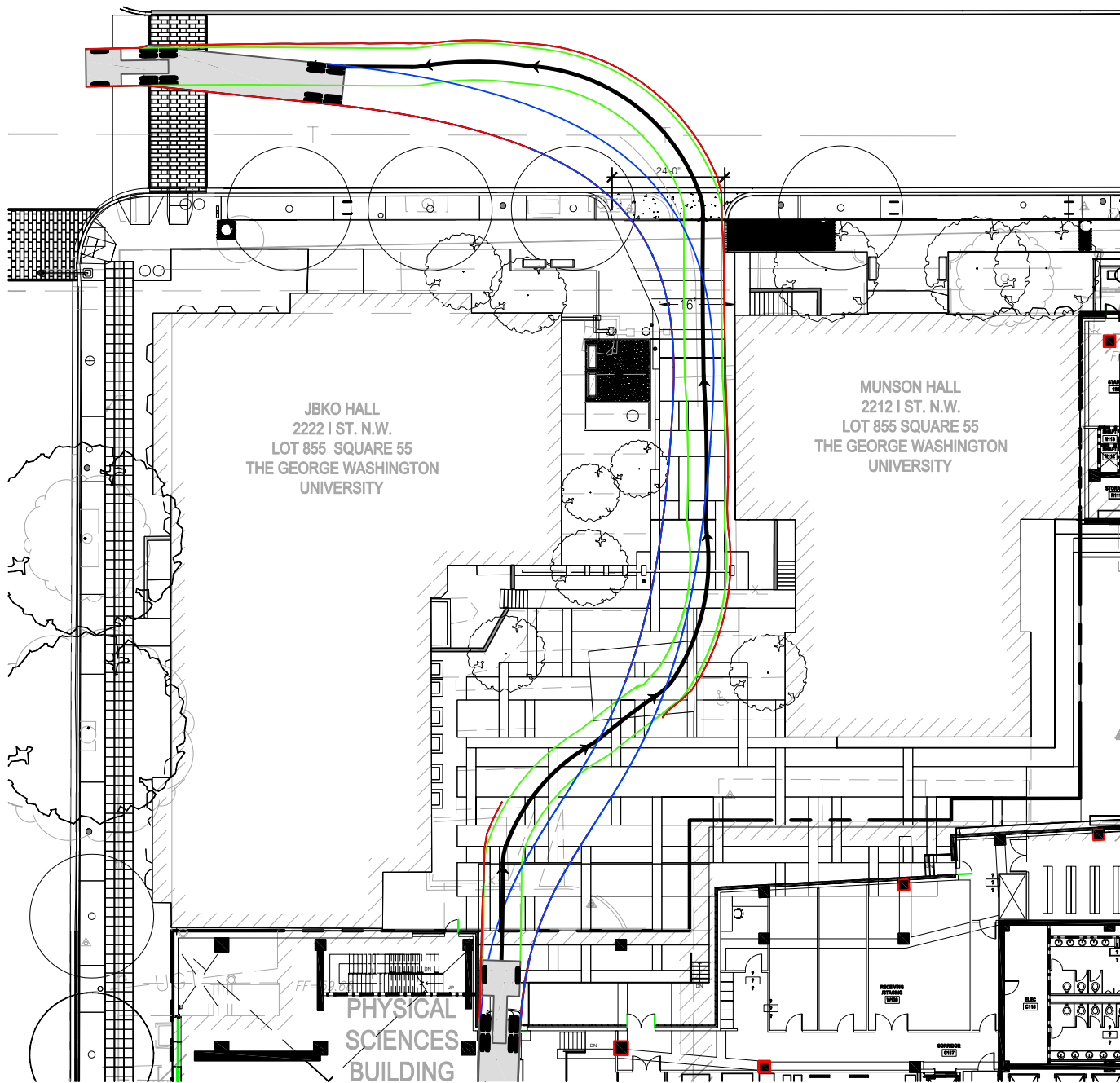


Scale: 1/16" = 1'

- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

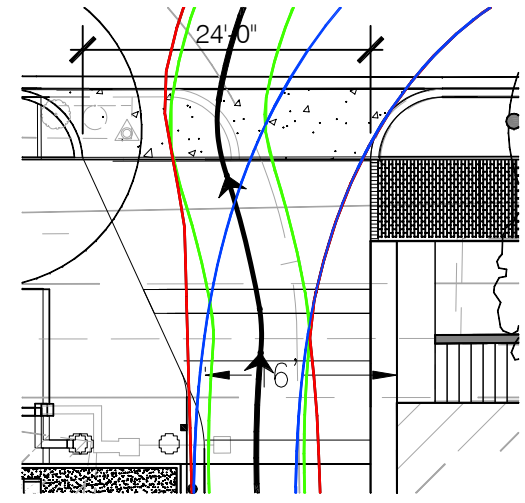
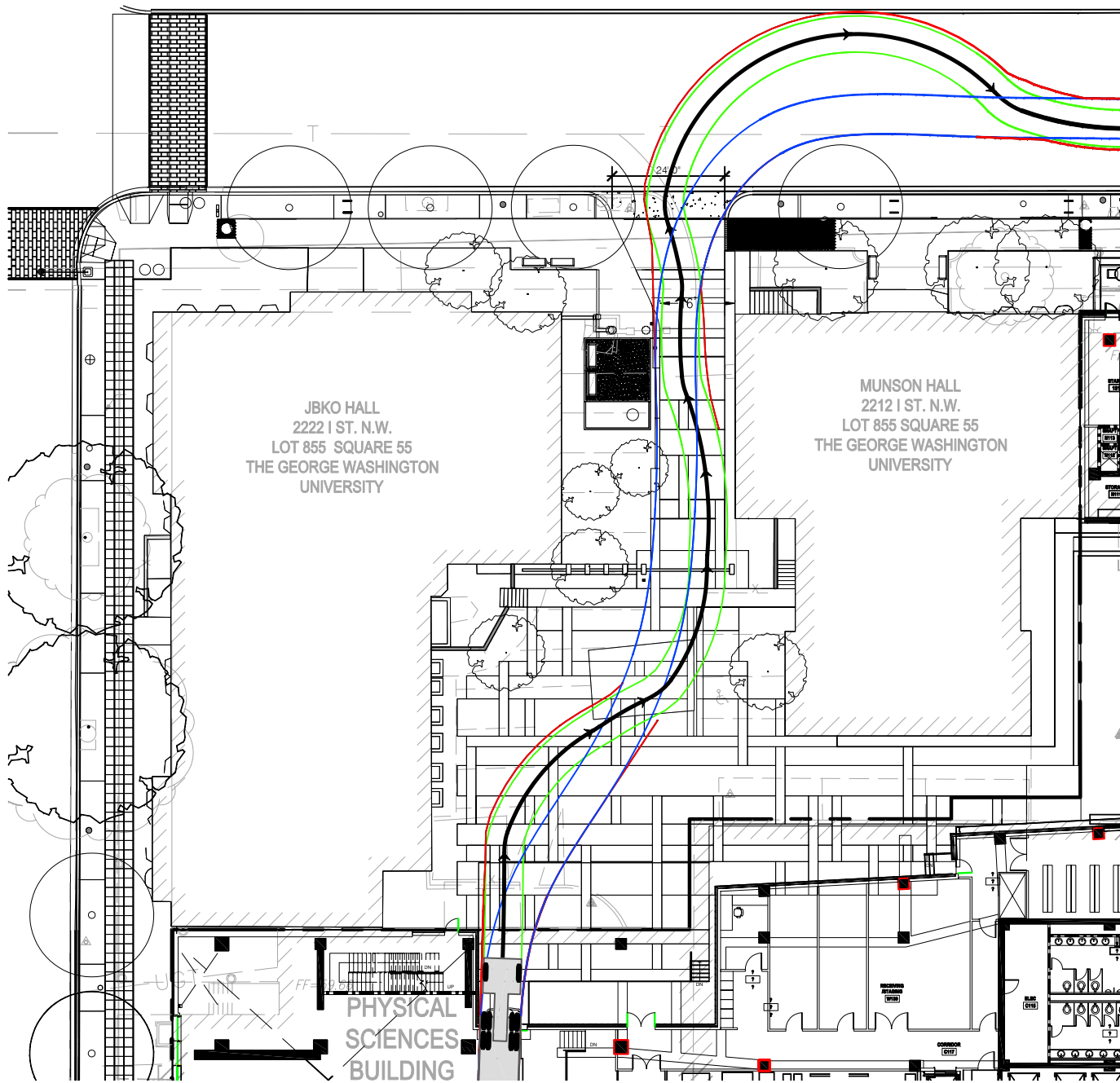
**Figure H-6**  
**I Street Loading Entrance (WB-50) Inbound from East**





- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

**Figure H-7**  
**I Street Loading Entrance (WB-50) Outbound to West**



- Vehicle Body
- Front Tire Tread
- Rear Tire Tread
- Directional Path

**Figure H-8**  
**I Street Loading Entrance (WB-50) Outbound to East**