The George Washington University
Site 75A
Transportation Impact Study
Washington, DC

Submitted on behalf of:
The George Washington University

Prepared by:
Wells + Associates, Inc.

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

PAGE

LIST OF FIGURES

LIST OF APPENDICES

Section 1
INTRODUCTION

OVERVIEW

This report presents a Transportation Impact Study conducted for the proposed redevelopment of Site 75A on The George Washington University's (GW or the University) Foggy Bottom Campus, in Washington, DC. The study was conducted in support of a Second-Stage Planned Unit Development (PUD) application for the proposed redevelopment. In conjunction with the proposed redevelopment, a portion of the existing public alley on the square will be relocated consistent with the approved Campus Plan.

Site Location

The site is located in Ward 2 and generally is bounded by I Street on the south, Pennsylvania Avenue on the north, 22nd Street on the west, and 21st Street on the east. The subject redevelopment is comprised of Lots 23, 33, 34, 41, 42, 47, and 863, as shown on Figure 1-1. The existing alley located between Rice Hall and the John Quincy Adams (JQA) House will be relocated approximately 55 feet to west and will be widened from 15 feet to 24 feet.

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 Site 75A, which includes Lots 23, 33, 34, 41, 42, and 47, as one of the potential redevelopment sites on campus. The Campus Plan also contemplated the relocation of the alley on Square 75. The University is moving forward now with the Second-Stage PUD application for the Site 75A redevelopment. The University also is seeking a modification to the First-Stage PUD and related Zoning Map Amendment to include Lot 863 as part of the redevelopment site.

As proposed, redevelopment of Site 75A will consist of demolishing the existing office building at 2100W Pennsylvania Avenue and the adjacent townhouses along Pennsylvania Avenue and constructing a new commercial building in their place, as shown on Figure 1-2.

The proposed, 11-story building will include 255,550 square feet (SF) of commercial space. The ground floor is approximately 23,190 SF and will be flexible space to be used as office space or community/building serving retail space. The remaining 232,360 SF will be office space.

Vehicular access to the below-grade parking garage and loading facilities will be provided via the public alley on the south side of the site. Approximately 147 striped parking spaces (approximately 183 spaces with tandem spaces) will be provided in the below-grade garage. The main pedestrian access to the building is proposed via Pennsylvania Avenue.

Construction is anticipated to begin no earlier than 2014. For purposes of this study, occupancy of the new building was assumed to occur in 2016.

STUDY SCOPE

Overview

In order to assess the impacts of the proposed redevelopment and alley relocation on the surrounding roadway network, the Applicant commissioned this transportation impact study.

Study Area

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

1. Washington Circle/23rd Street,
2. Washington Circle/Eastbound Pennsylvania Avenue,
3. Washington Circle/Westbound Pennsylvania Avenue,
4. Washington Circle/Westbound K Street,
5. Westbound Pennsylvania Avenue/Eastbound K Street,
6. Pennsylvania Avenue/22nd Street,
7. 22nd Street/Eastbound K Street,
8. 22nd Street/Westbound K Street,
9. 23rd Street/I Street,
10. 22nd Street/I Street,
11. I Street/Public Alley,
12. 21st Street/I Street, and
13. Pennsylvania Avenue/21st Street/I Street.

Study Objectives

The objectives of this study were to:

1. Evaluate existing traffic conditions,
2. Evaluate future traffic conditions without the proposed redevelopment,
3. Evaluate future traffic conditions with the proposed redevelopment,
4. Identify existing mode choice alternatives,
5. Identify any traffic operational impacts associated with the proposed redevelopment,
6. Identify on-street parking impacts associated with the redevelopment of Site 75A on the blocks immediately surrounding the site,
7. Evaluate effectiveness of the proposed loading facilities,
8. Recommend transportation improvements to promote the safe and efficient flow of vehicular and pedestrian traffic associated with the proposed redevelopment.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

1. The redevelopment of Site 75A would demolish existing buildings on the site to allow for the construction of 255,550 SF of commercial space.
2. As part of the proposed redevelopment, the public alley on I Street will be relocated approximately 55 feet to the west of its existing location and will be widened to 24 feet. This relocation and widening will better accommodate existing loading operations, which will remain on the square, future loading operations of the proposed redevelopment, and vehicular access to/from the proposed development, thereby minimizing impacts to the public space.
3. Eight additional metered on-street parking spaces and seven fewer unmetered on-street parking spaces would be provided with the proposed redevelopment, thereby resulting in a net gain of one on-street parking space surrounding Square 75.
4. The proposed redevelopment will provide approximately 52 enclosed bicycle parking spaces in the parking garage and approximately 12 additional bicycle parking spaces in the public space on Pennsylvania Avenue.
5. The subject site 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; and bicycle facilities.
6. The Applicant has agreed to various transportation demand management strategies that encourage alternate modes of transportation and further enhance the transportation options available at the site.
7. Under the existing conditions, several study intersections have one or more lane groups that operate near or at capacity during the AM and PM peak hours.
8. Under future conditions without the proposed redevelopment, several additional lane groups at the study intersections would operate near or at capacity compared to existing conditions due to increases in traffic from growth outside the immediate site vicinity and increases in traffic associated with planned or approved but not yet constructed developments in the study area.
9. In conjunction with the redevelopment of Square 54, Boston Properties and GW provided the required contribution for future signalization of the 22nd Street/I Street intersection. Therefore, this improvement was assumed to be in place prior to build out and occupancy of the proposed redevelopment.
10. The proposed redevelopment is anticipated to generate an estimated 90 net new AM peak hour vehicular trips and 68 net new PM peak hour vehicular trips.
11. The proposed redevelopment will have some impact on the traffic operations in the study area, specifically, at the Pennsylvania Avenue/22nd Street, 23rd Street/I Street, 22nd Street/I Street, and I Street/Public Alley intersections. These impacts can be mitigated with the following improvements:

    - Optimization of signal timings at the Pennsylvania Avenue/22nd Street intersection,
    - Optimization of signal timings at the 23rd Street/I Street intersection,
    - Optimization of signal timings at the 22nd Street/I Street intersection,
    - Restriping the westbound approach at the 22nd Street/I Street intersection to provide an exclusive westbound right turn lane.

Section 2
BACKGROUND INFORMATION

EXISTING LAND USE

Lots 23, 33, 34, 41, 42, and 47 were rezoned from the C-3-C district to the C-4 district in conjunction with the First-Stage PUD. The balance of the subject site (Lot 863) will be rezoned from the C-3-C district to the C-4 district through the modification of the First-Stage PUD.

The subject redevelopment site is occupied by an 87,554 SF office building at 2100W Pennsylvania Avenue and six townhouses along Pennsylvania Avenue that currently house 13,280 SF of retail uses and 8,560 SF of University uses. The alley relocation also would demolish the JQA House and Facilities Support Building, which house 18,631 SF of University uses.

The remainder of the square is occupied by the Ambulatory Care Center, the Burns Building, the President Condominium (the only building on the square not owned by the University), Rice Hall, and 2100 Pennsylvania Avenue, which houses commercial uses. These buildings will remain.

The area surrounding the site is comprised of commercial office, educational, retail, and residential uses. Redevelopment of Square 54, located one block to the west, was recently completed.

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

PUBLIC ROADWAY NETWORK

Site 75A is located within a connected network of arterial, collector, and local streets. Existing lane use and traffic control at the study intersections are shown on Figure 2-1.

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

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

Within the study area, three lanes are provided in each direction; however, the southbound curb lane is used for parking and a shuttle bus stop and, therefore, is not a travel lane. Additionally, parking is permitted in the northbound curb lane with the exception of 7:00 AM to 9:30 AM.

The average daily traffic (ADT) on 23rd Street in the vicinity of the site was 18,600 vehicles per day (vpd)[1] in 2009 (the most recent data available). The posted speed limit is 25 miles per hour (mph). The intersections of 23rd Street with I Street and H Street are controlled by traffic signals.

22nd Street is a one-way collector, with two northbound travel lanes during peak hours. The speed limit is not posted in the vicinity of the site.

The 22nd Street/I Street intersection is controlled by an all-way stop and the 22nd Street/Pennsylvania Avenue intersection is controlled by a traffic signal. The ADT on 22nd Street was 5,800 vpd within the study area[2] in 2009.

21st Street is a one-way collector, with two southbound travel lanes during the peak hours north of Pennsylvania Avenue. Between Pennsylvania and I Street, only one lane is used for travel at all times except during the PM peak hours when two lanes are used for travel. South of I Street, 21st Street is two lanes between 7:00 AM and 6:30 PM. The speed limit is not posted in the vicinity of the site.

At 21st Street, I Street is controlled by a stop sign. The 21st Street/Pennsylvania Avenue intersection is controlled by a traffic signal. The ADT on 22nd Street was 6,400 vpd[3] in the vicinity of the site in 2009.

I Street is classified as a principal arterial and is a two-way, two-lane street, in the vicinity of the site. Further east, between 21st Street and Pennsylvania Avenue, I Street is one-way eastbound. The posted speed limit is 25 mph. The ADT was 3,700 vpd on the two-way portion in the vicinity of the site[4] in 2009.

The I Street/23rd Street intersection is controlled by a traffic signal. The I Street/22nd Street is controlled by an all-way stop and at 21st Street, I Street is controlled by a stop sign. I Street, between 23rd and 24th Streets, is a pedestrian mall, closed to vehicular traffic.

Pennsylvania Avenue is classified as a principal arterial and is a two-way, six-lane street, in the vicinity of the site. The ADT was 21,300 vpd in the vicinity of the site[5] in 2009.

Within the study area, traffic signals are present along Pennsylvania Avenue with its intersections with Washington Circle, 22nd Street, and 21st Street.

PUBLIC TRANSPORTATION FACILITIES AND SERVICES

The subject site is served by both bus and Metrorail, as shown on Figure 2-3.

Metrorail

The Foggy Bottom-GWU Metrorail Station is located on the northwest quadrant of the 23rd Street/I Street intersection. This station is the eighth busiest station in the Metrorail system with an average weekday ridership of nearly 41,000 passengers (based on 2006 data).[6] The peak hour boardings and alightings at the Foggy Bottom-GWU Metro 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.[7]

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

In November 2011, WMATA completed the installation of three new escalators at the Foggy Bottom – GWU Metro Station. Early this year, WMATA will complete the construction of a new staircase. A canopy also will be installed over the escalators and staircase.

Bus Service

Washington Metropolitan Area Transit Authority (WMATA), the Maryland Transit Administration (MTA) and the Kennedy Center Shuttle currently provide public bus service near Site 75A.

WMATA's Pennsylvania Avenue (Routes 32 and 36), Balston - Farragut Square (Route 38B), Wisconsin Avenue Express (Route 37), and Pennsylvania Avenue Express (Route 39) Lines each provide service to a bus stop located at the Pennsylvania Avenue/21st Street intersection[†]. Additionally, the Wisconsin Avenue (Route 31), Brookland - Potomac Park (Route H1), Connecticut Avenue (Route L1), and Massachusetts Avenue (Route N3) Lines each provide service to bus stops located on the southeast and southwest corners of the 23rd Street/I Street intersection immediately adjacent to the Foggy Bottom Metrorail station.

On these lines, a total of 500 bus-trips occur on a typical weekday, 150 bus-trips on a typical Saturday, and 126 bus-trips on a typical Sunday are operated, as shown in Table 2-3.

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

Additionally, the DC Circulator Georgetown –Union Station Line provides service in the study area with stops at the 21st Street/K Street, Pennsylvania Avenue/22nd Street, and Pennsylvania Avenue/21st Street intersections. The Circulator provides service daily from 7:00 AM to 9:00 PM with 10 minute headways for a total of 85 trips for both the eastbound and westbound routes.

[†] The Wisconsin Avenue Express Line (Route 37) stops in the study area at the Pennsylvania Avenue/21st Street intersection in the morning. In the afternoon, the stop is at the I Street/19th Street intersection.

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	9	17	-
		SB	21	31	-	13	23	-	11	14	-
Pennsylvania Avenue	32	EB	24	28	2	-	-	-	-	-	-
		WB	33	30	3	-	-	-	-	-	-
	36	EB	19	25	2	-	-	-	-	-	-
		WB	21	11	3	-	-	-	-	-	-
Wisconsin Avenue Express Line	37	NB	10	-	-	-	-	-	-	-	-
		SB	-	9	-	-	-	-	-	-	-
Ballston - Farragut Square	38B	EB	25	35	2	13	24	2	13	24	1
		WB	23	34	3	13	23	3	13	24	-
Pennsylvania Avenue Express	39	EB	-	9	-	-	-	-	-	-	-
		WB	9	-	-	-	-	-	-	-	-
Brookland - Potomac Park	H1	NB	-	6	-	-	-	-	-	-	-
		SB	9	-	-	-	-	-	-	-	-
Connecticut Avenue	L1	NB	-	7	-	-	-	-	-	-	-
		SB	8	-	-	-	-	-	-	-	-
Massachusetts Avenue	N3	EB	5	-	-	-	-	-	-	-	-
		WB	-	4	-	-	-	-	-	-	-
Totals			**225**	**260**	**15**	**50**	**94**	**6**	**46**	**79**	**1**
			500			**150**			**126**		

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, DC	901	NB	30	-	-
		SB	-	31	-
California, St. Mary's County, Maryland Charlotte Hall, St. Mary's County, Maryland Washington, DC	909	NB	5	-	-
		SB	-	5	-
Kent Island, Queen Anne's County, Maryland Annapolis, Anne Arundel County, Maryland Washington, DC	950	EB	-	19	-
		WB	17	-	-
TOTALS			52	55	-
			107		

PEDESTRIAN MASTER PLAN

The District of Columbia Pedestrian Master Plan (DCPMP) strives to make Washington, DC safer and more walkable by improving sidewalks, roadway crossings, and the quality of the pedestrian environment as well as by ensuring that the District's policies and procedures support walking.[8] 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 DCPMP estimates areas of pedestrian activity and deficiency. Within the site vicinity, 22nd Street contains moderate pedestrian activity and pedestrian deficiency. Pennsylvania Avenue, 23rd Street, 21st Street, I Street, and Washington Circle contain moderately high pedestrian activity and pedestrian deficiency. Finally, K Street contains high pedestrian activity and pedestrian deficiency.

The DCPMP provides pedestrian crash data for the years 2000 through 2006. Within the site vicinity, one pedestrian injury has occurred at each the 23rd Street/I Street and 22nd Street/I Street intersections. Five to eight pedestrian injuries have occurred at each the Washington Circle/23rd Street and Pennsylvania Avenue/21st Street/I Street intersections. Figure 2-4 summarizes the pedestrian activity and crashes in the study area.

As part of the DCPMP, 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 15th Street, NW to Penn Street, NE.

BICYCLE MASTER PLAN

The District of Columbia Bicycle Master Plan (DCBMP) seeks to create a more bicycle-friendly city by establishing high quality bicycle facilities and programs that are safe and convenient. [9]

Under existing conditions where bicyclists share the road with vehicles, the bicycle levels of service (BLOS) in the site vicinity are presented in the DCBMP and have been replicated in Table 2-5 and on Figure 2-5.

Table 2-5
Existing Bicycle Levels of Service

Roadway	Bicycle LOS
Washington Circle	D
K Street	E
Pennsylvania Avenue	D
I Street, between 23rd Street and Pennsylvania Avenue	D
I Street, east of Pennsylvania Avenue	E
21st Street	D
22nd Street, north of K Street	E
22nd Street, between I Street and K Street	D
22nd Street, south of I Street	E
23rd Street	D

The DCBMP also reports the number of bicycle crashes that occurred between 2000 and 2002. One bicycle crash occurred at each the Washington Circle/Pennsylvania Avenue and 22nd Street/K Street intersections. Two to three bicycle crashes occurred at the Pennsylvania Avenue/21st Street/I Street intersection. The remaining study intersection did not experience any bicycle crashes in that two year time period.[10]

According to the DCBMP, several on-street bicycle lanes are proposed within the study area. Specifically, on-street bicycle lanes are proposed on 22nd Street from Virginia Avenue to Massachusetts Avenue, on 21st Street from Constitution Avenue to R Street, and on Pennsylvania Avenue from 17th Street to M Street.[11]

The planned 22nd Street bicycle lane will be constructed on the east side of the roadway, between the center, travel lane and the curb parking lane on the east side of the street.[12]

The planned 21st Street bicycle lane will be constructed on the west side of the roadway, between the center, travel lane and the curb parking lane on the west side of the street.[13]

No specific details are available for the planned bicycle lane on Pennsylvania Avenue.

CAPITAL BIKESHARE

Capital Bikeshare is an automated bicycle rental or bicycle sharing system that provides over 1,200 bicycles at 140 stations across Washington, DC and Arlington, VA.

Membership, which is required to use Capital Bikeshare, includes four options for joining: 24 hours ($7), three days ($15), 30 days ($25), or one year ($75). The first 30-minutes of use are free; users then are charged a usage fee for each additional 30-minute period. Bicycles can be returned to any station with an available dock.

The site's closest Bikeshare station actually is located on Square 75, on the northwest corner of the 21st Street/I Street intersection. This station recently was expanded to include 35 docks. A Bikeshare station also is planned at the Foggy Bottom-GWU Metro Station. Additionally, several other Bikeshare stations are located nearby, as shown on Figure 2-6.

ZIPCAR

Zipcar is an automated car rental or car sharing system in the Washington, DC 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 utilize the car for their reserved time slot. Cars must be returned to the same designated parking space at which it was picked up.

The nearest Zipcar location is 2200 Pennsylvania Avenue, which is one block from the site. Two vehicles are stationed at this location. As shown on Figure 2-7, several other Zipcars are located within approximately four blocks of the site.

Section 3
EXISTING CONDITIONS ANALYSIS

TRAFFIC VOLUMES

Turning movement counts, bicycle counts, and pedestrian counts were conducted at the study intersections on Wednesday, November 16, 2011 from 7:00 AM to 10:00 AM and from 4:00 PM to 7:00 PM; on Thursday December 1, 2011 from 7:00 AM to 10:00 AM and from 4:00 PM to 7:00 PM; and on Wednesday, January 25, 2012 from 7:00 AM to 9:00 AM and from 5:00 PM 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 7:30 AM to 8:30 AM and the common PM peak hour occurred from 5:30 PM to 6:30 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.

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[14] (HCM) reports generated by Synchro. Levels of service descriptions are included in Appendix C.

The level of service results for existing conditions are presented in Appendix D and summarized in Table 3-1.

As shown in Table 3-1, several of the study intersections currently operate at capacity during the AM and PM peak hours. Specifically, the westbound right turn onto Washington Circle from K Street operates at a failing LOS during the PM peak hour. The westbound approach at the signalized 23rd Street/I Street intersection operates at a failing LOS during the PM peak hour.

At the intersection of the public alley and I Street, both the northbound and southbound stop controlled approaches operate at failing LOS during the PM peak hour. The stop controlled eastbound approach at the 21st Street/I Street intersection operates at a LOS E during the AM peak hour and a LOS F during the PM peak hour.

Finally, at the Pennsylvania Avenue/21st Street/I Street intersection, the westbound, I Street lane groups operate at failing LOS during the AM and PM peak hour and the intersection operates at an overall LOS F during the PM peak hour.

Table 3-1
Existing Levels of Service

Approach	AM Peak	PM Peak
1. Washington Circle/23rd Street		
EBTR	A (0.3)	A (0.3)
EBR	A (1.8)	A (3.2)
NBR	C (27.3)	B (14.7)
Overall	**A (8.2)**	**A (4.2)**
4. Washington Circle/WB K Street		
WBR	C [16.8]	F [63.0]
5. WB Pennsylvania Avenue/EB K Street		
EBT	B (19.1)	C (28.9)
NWT	D (42.0)	A (3.3)
Overall	**C (30.0)**	**A (7.8)**
6. Pennsylvania Avenue/22nd Street		
EBLT	B (13.8)	B (11.9)
WBTR	C (28.2)	D (46.9)
NBLTR	D (44.3)	D (53.2)
Overall	**C (23.5)**	**D (37.6)**
7. 22nd Street/EB K Street		
EBLT	C (26.7)	C (22.9)
NBTR	A (5.5)	A (6.7)
Overall	**B (14.6)**	**B (12.6)**
8. 22nd Street/WB K Street		
WBT	D (44.3)	D (41.1)
WBR	D (35.4)	C (27.3)
NBLT	A (1.1)	A (1.9)
Overall	**B (15.1)**	**C (22.1)**
9. 23rd Street/I Street		
WBLR	D (37.0)	F (256.6)
NBT	B (10.5)	A (5.8)
NBR	D (38.1)	
SBLT	B (12.4)	C (17.9)
Overall	**B (16.9)**	**D (40.7)**
10. 22nd Street/I Street		
EBLT	C [16.1]	A [9.4]
WBTR	A [9.6]	B [10.1]
NBLTR	B [10.3]	A [8.4]
11. I Street/Public Alley		
EBLTR	A [0.5]	A [1.3]
WBLTR	A [0.2]	A [0.9]
NBLTR	C [15.7]	F [225.7]
SBLTR	C [21.7]	F [81.3]

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

Table 3-1 (continued)
Existing Levels of Service

Approach	AM Peak	PM Peak
12. 21st Street/I Street		
EBTR	E [43.0]	F [615.5]
SBLTR	A [0.3]	A [0.5]
13. Pennsylvania Avenue/21st Street/I Street		
SBL	C (26.4)	C (29.6)
SBTR	C (25.4)	C (28.2)
SETR	B (19.4)	D (37.9)
WBLR	F (140.8)	F (260.6)
WBR	F (166.2)	F (282.7)
NWLT	A (4.4)	C (22.2)
Overall	**D (44.0)**	**F (109.1)**

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

Section 4
FUTURE BACKGROUND CONDITIONS

TRAFFIC VOLUMES

Overview

In order to forecast year 2020 background traffic volumes in the study area without the proposed redevelopment, 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) were considered.

Regional Growth

In order to account for regional traffic growth outside the immediate site vicinity, a growth rate of one percent per year, compounded annually over eight years (2012 to 2020), was applied to the existing vehicular volumes shown on Figure 3-1. Note that the growth rate was not applied to the turning movement volumes in and out of the alley and the Academic Center driveway on I Street. The resulting 2020 volumes with regional growth are shown on Figure 4-1.

Pipeline Developments

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

Marriott Courtyard Hotel

A Marriott Courtyard Hotel is planned at 515 20th Street, NW. The planned hotel will replace a parking structure that was demolished prior to the traffic counts performed for the Site 75A redevelopment. Therefore, to account for trips associated with the planned 150-room hotel, a trip generation analysis was undertaken based on trip generation rates developed for DC hotels.[15] These rates, which are dependent on a hotel's distance to the nearest Metro station, have been accepted by DDOT as part of other rezoning cases for hotels.

Based a walking distance of approximately 3,060 feet to the nearest Metro station, the planned Marriott Courtyard Hotel would generate 51 AM peak hour vehicular trips and 50 PM peak hour vehicular trips. These trips were added to the roadway network based the distributions utilized for Site 75A (see Section 5) and the location of the planned hotel.

General Services Administration Headquarters

The General Services Administration (GSA) headquarters at 1800 F Street, NW currently is undergoing a renovation of the existing 700,000 SF building and construction of 105,000 SF of new infill office space. In the spring of 2011, GSA employees were relocated to One Constitution Square at 1275 1st Street, NE. Since One Constitution Square is located over two miles from the existing GSA building, the number of trips that would be generated by the entire 805,000 SF renovated building was estimated to provide a conservative analysis.

Based on the Institute of Transportation Engineers' (ITE) Trip Generation[16] Land Use Code (LUC) 710 (General Office) and a non-auto mode split of 15 percent, the renovated and expanded GSA headquarters would 846 AM peak hour vehicular trips and 833 PM peak hour vehicular trips. These trips were added to the roadway network based on the distributions utilized for the Site 75A site (see Section 5) and the location of the GSA headquarters.

GW Campus Plan[†]

Finally, traffic associated with the approved GW Campus Plan was estimated based on The George Washington University Foggy Bottom Campus Plan: 2006-2025 Transportation Impact Study (GW Campus Plan TIS).[17] First, trips associated with the reallocation of parking spaces throughout the campus were taken into account. Specifically, as part of the GW Campus Plan TIS, certain parking areas on campus were assumed to remain and others were assumed to be relocated or eliminated. Therefore, this reshuffling of existing trips to/from GW was taken into account for the 2020 conditions. In addition to the trips associated with the reallocation of parking, the GW Campus Plan TIS also accounted for trips that would be generated by future increases in the number of students, faculty, and staff on the Campus. Specifically, the GW Campus Plan TIS accounted for an increase in the student population to the cap of 20,000 students on a headcount basis, which was an increase of 1,198 students from the Fall 2005 baseline conditions utilized in the GW Campus Plan TIS. Similarly, the GW Campus Plan TIS accounted for an increase in the faculty/staff headcount to the cap of 12,529 faculty/staff, which was an increase of 6,475 faculty/staff from the Fall 2005 baseline conditions utilized in the GW Campus Plan TIS.

According to GW representatives, the Fall 2011 populations on a headcount basis (i.e., when the traffic counts for this study were performed) were 17,862 students and 6,699 faculty/staff.

To determine the proportion of trips that should be added to the roadway network to account for increases in students, faculty, and staff by the 2020 study year, a linear interpolation was performed between the Fall 2011 populations and the future populations analyzed in the GW Campus Plan TIS. Based on the 2027 expiration year for the Campus Plan, this linear interpolation estimates a population of 19,065 students for the 2020 study year, which would be an increase of 263 students compared to the Fall 2005 baseline conditions utilized in the GW Campus Plan TIS.

Similarly, the linear interpolation estimates a population of 9,978 faculty/staff for the 2020 study year, which would be an increase of 3,924 faculty/staff compared to the Fall 2005 baseline conditions utilized in the GWU Campus Plan TIS.

Note that these predicted populations for the 2020 study year should be considered extremely conservative. As demonstrated by the limited changes in faculty/staff and student counts since 2005, the University's population is not growing notably. However, to provide a conservative analysis and to be consistent with the GW Campus Plan TIS, the predicted increases in student, faculty, and staff populations per the linear interpolation were utilized for the 2020 study year.

Based on this methodology, a portion of the site trips associated with the student population increase at each intersection and a portion of the site trips associated with the faculty/staff population increase at each intersection were estimated based on the GW Campus Plan TIS and then added to the roadway network for the 2020 conditions.

Combined Pipeline Developments

Details for each of the pipeline developments are included in Appendix E. The traffic associated with the pipeline developments combined is shown at each of the study intersections on Figure 4-2.

Background Forecasts

Background 2020 traffic forecasts were developed by combining the existing traffic volumes grown to the year 2020 (shown on Figure 4-1) with the pipeline traffic volumes shown on Figure 4-2. The resulting 2020 background traffic forecasts are shown on Figure 4-3.

[†] The GW Campus Plan included the redevelopment of Squares 39, 55, and 103 (among others); therefore, the traffic associated with these approved redevelopments is accounted for in the traffic associated with the Campus Plan.

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, NW Priority Busway – Reconstruction of K Street, NW 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, NW; 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. According to the TIP, the study is slated to be complete in 2012; however, a study was completed by WMATA in 2007.

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 22nd Street/I Street intersection and restriping of I Street to provide separate left and through lanes on the eastbound approach to 22nd 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 analyses.

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

Additionally, preliminary plans prepared by the Infrastructure Project Management Administration within the District Department of Transportation call for pedestrian improvements to Washington Circle and New Hampshire Avenue. The improvements call for: (1) widening various crosswalks around the Circle, (2) upgrading pavement markings to use a striped crosswalk to increase visibility, (3) placing new crosswalks or relocating crosswalks, (4) upgrading traffic signals as necessary to accommodate new or relocated crossings, and (5) upgrading accessible ramps at the crossings.

At this time, the schedule for implementation of the proposed improvements is unknown.

OPERATIONAL ANALYSIS

Capacity/level of service analyses were conducted at the study intersections based on the future background traffic forecasts shown on Figure 4-3, the future lane use and traffic control shown on Figure 4-4, and existing DDOT traffic signal timings provided in Appendix B. Note that the proposed traffic signal at the 22nd Street/I Street intersection was modeled as a three-phase operation with an eastbound advance phase, consistent with the Square 55 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 Site 75A redevelopment are presented in Appendix F and summarized in Table 4-1.

Table 4-1
2020 Background Levels of Service

Approach	AM Peak	PM Peak
1. Washington Circle/23rd Street		
EBTR	A (0.5)	A (0.4)
EBR	A (3.2)	A (4.2)
NBR	C (29.5)	B (14.8)
Overall	**A (8.3)**	**A (4.5)**
4. Washington Circle/WB K Street		
WBR	C [18.6]	F [152.6]
5. WB Pennsylvania Avenue/EB K Street		
EBT	B (18.9)	C (28.7)
NWT	D (40.6)	A (5.6)
Overall	**C (29.8)**	**A (8.7)**
6. Pennsylvania Avenue/22nd Street		
EBLT	B (14.8)	B (12.3)
WBTR	C (30.9)	E (63.6)
NBLTR	D (49.6)	F (267.9)
Overall	**C (25.5)**	**F (112.7)**
7. 22nd Street/EB K Street		
EBLT	C (29.2)	C (22.8)
NBTR	A (4.9)	A (4.9)
Overall	**B (15.1)**	**B (10.4)**
8. 22nd Street/WB K Street		
WBT	D (45.8)	D (44.2)
WBR	D (35.6)	C (27.4)
NBLT	A (1.0)	A (1.9)
Overall	**B (15.1)**	**C (22.0)**
9. 23rd Street/I Street		
WBLR	D (35.1)	F (473.0)
NBT	B (11.0)	A (6.0)
NBR	D (38.5)	
SBLT	C (23.3)	C (22.6)
Overall	**C (21.3)**	**E (79.6)**
10. 22nd Street/I Street		
EBL	D (48.9)	B (14.8)
EBT	A (9.1)	B (10.7)
WBTR	D (38.7)	F (98.3)
NBLTR	D (54.1)	D (48.5)
Overall	**D (40.3)**	**E (60.1)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[err*] = Delay theoretically greater than 999.9 Seconds

Table 4-1 (continued)
2020 Background Levels of Service

Approach	AM Peak	PM Peak
11. I Street/Public Alley		
EBLTR	A [0.5]	A [1.1]
WBLTR	A [2.3]	A [1.1]
NBLTR	C [18.8]	F [971.1]
SBLTR	D [27.4]	F [109.3]
12. 21st Street/I Street		
EBTR	F [79.1]	F [*]
SBLTR	A [0.3]	A [0.5]
13. Pennsylvania Avenue/21st Street/I Street		
SBL	C (26.9)	C (31.3)
SBTR	C (28.9)	C (30.5)
SETR	C (32.6)	D (42.1)
WBLR	F (173.3)	F (310.7)
WBR	F (203.4)	F (334.1)
NWT	C (27.0)	D (38.0)
Overall	**D (50.3)**	**F (120.9)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[*] = Delay theoretically greater than 999.9 Seconds

As shown in Table 4-1, lane groups that were operating at capacity under existing conditions would continue to operate at capacity under the 2020 background conditions. Several additional lane groups at various study intersections would operate at capacity under the 2020 background conditions, as follows:

- During the PM peak hour, the westbound approach, northbound approach, and overall intersection LOS would drop to LOS F at the Pennsylvania Avenue/22nd Street intersection;
- During the PM peak hour, the overall LOS at the 23rd Street/I Street intersection would drop to a LOS E;
- At the 22nd Street/I Street intersection, the westbound approach would drop to a LOS F and the overall intersection LOS would drop to a LOS E during the PM peak hour; and
- During the AM peak hour, the eastbound approach at the 21st Street/I Street intersection would drop to a LOS F.

QUEUE ANALYSIS

A queuing analysis was conducted for 2020 conditions without the proposed Site 75A redevelopment. Synchro was used to conduct the analyses; specifically, the 95th percentile queue lengths were examined. The results are summarized in Table 4-2. Queue reports for the signalized intersections are provided in Appendix G and the queues for the stop controlled intersections can be found in the LOS reports in Appendix F.

As shown in Table 4-2, the following intersections have at least one lane group with a 95th percentile queue that would exceed the available storage under the 2020 background conditions:

- Washington Circle/Westbound K Street,
- Westbound Pennsylvania Avenue/Eastbound K Street,
- Pennsylvania Avenue/22nd Street,
- 22nd Street/Eastbound K Street,
- 23rd Street/I Street,
- 22nd Street/I Street, and
- Pennsylvania Avenue/21st Street/I Street.

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

Table 4-2
95th Percentile Queue Summary (in feet)
2020 Background Conditions

Approach	Available Storage†	AM Peak	PM Peak
1. Washington Circle/23rd Street			
EBTR	60	0	0
EBR	60	0	0
NBR	380	370	159m
4. Washington Circle/WB K Street			
WBR	105	39	393
5. WB Pennsylvania Avenue/EB K Street			
EBT	80	111m	78
NWT	80	109m	45m
6. Pennsylvania Avenue/22nd Street			
EBLT	180	190	86
WBTR	610	170	378#
NBLTR	380	178m#	398m#
7. 22nd Street/EB K Street			
EBLT	65	186	190
NBTR	15	42	16m
8. 22nd Street/WB K Street			
WBT	540	129	294#
WBR	540	38	40
NBLT	50	8	9
9. 23rd Street/I Street			
WBLR	265	36m	257m#
NBT	330	212	45
NBR	330	127	
SBLT	380	344#	465#
10.22nd Street/I Street			
EBL	100	200m#	40m
EBT	265	49m	61m
WBTR	230	20m	350m#
NBLTR	325	181#	172#

† All distances measured to nearest intersection or end of turn lane, as appropriate.

m Volume for 95th percentile queue is metered by upstream signal.

95th percentile volume exceeds capacity; queue may be longer.

~ Volume exceeds capacity; queue is theoretically infinite.

* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Table 4-2 (continued)
95th Percentile Queue Summary (in feet)
2020 Background Conditions

Approach	Available Storage†	AM Peak	PM Peak
12. 21st Street/I Street			
EBT	280	141	*
EBR	50	2	*
SBLT	160	0	3
13. Pennsylvania Avenue/21st Street			
SBL	305	107	234
SBTR	295	184	305
SETR	600	173#	220m
WBLR	290	286#	486#
WBR	290	308#	506#
NWT	330	180m#	282~

† All distances measured to nearest intersection or end of turn lane, as appropriate.

m Volume for 95th percentile queue is metered by upstream signal.

95th percentile volume exceeds capacity; queue may be longer.

~ Volume exceeds capacity; queue is theoretically infinite.

* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Section 5
SITE ANALYSIS

OVERVIEW

Currently, Square 75 houses two commercial buildings at 2100W Pennsylvania Avenue and 2100 Pennsylvania Avenue, the Ambulatory Care Center, six townhouses, Rice Hall, the President Condominium, and the JQA House. The proposed redevelopment of Site 75A would include demolishing 2100W Pennsylvania Avenue and the six townhouses to construct an 11-story commercial building. The redevelopment also would demolish the JQA House and the University Facility Support Building to allow for the relocation of the public alley approximately 55 feet west of its current location (adjacent to the President Condominium).

The redevelopment of Site 75A would include approximately 255,550 SF of commercial space on 11 above-grade floors and approximately 147 striped parking spaces (approximately 183 with tandem spaces) on three levels below-grade. The 23,190 square foot ground floor of the proposed building would include a variety of flexible space, which could be used as office, retail or building support space. The remaining ten floors would include 232,360 square feet of office space.

Construction is anticipated to begin no earlier than 2014. For purposes of this study, occupancy of the new building was assumed to occur in 2016.

RELOCATED ALLEY

Currently, Square 75 is serviced by a public alley system, as shown on Figure 5-1. The portion of the alley that intersects I Street is 15-feet wide, runs perpendicular to I Street, and is located approximately 266 feet east of 22nd Street. The alley currently serves trash and loading operations for all uses on the square. Additionally, certain vehicles, including University vehicles and the President Condominium staff vehicles, use the alley to access parking spaces behind the buildings on the square.

In conjunction with the proposed redevelopment and in accordance with the approved Campus Plan, the alley will be relocated approximately 55 feet to the west, as shown on Figure 5-2. They alley also will be widened from 15 feet to 24 feet. This relocation and widening of the alley will better accommodate existing loading operations, which will remain on the square, future loading operations of the proposed redevelopment, and vehicular access to/from the proposed development, thereby minimizing impacts to the public space. Specifically, the increased width of the alley will better facilitate the turning radii of trucks providing trash service and making deliveries to 2100 Pennsylvania Avenue, the Ambulatory Care Center, and the Burns Building. Additionally, the increased width will better facilitate two-way traffic. The additional width is especially important to ensure that vehicles coming into the alley to the proposed garage will not be inhibited by trucks using the alley.

EXISTING SITE ACCESS

Currently, there is a shared parking structure under both 2100W and 2100 Pennsylvania Avenue. Access to this parking garage is provided via an existing curb cut on I Street located between the existing public alley and 21st Street.

EXISTING LOADING

Loading for the existing office building at 2100W Pennsylvania Avenue currently occurs via the public alley. A single loading berth is present at the rear of the 2100W building. However, field observations indicate that numerous small trucks and vans stop in the alley parallel to the face of the building to make deliveries.

A curbside loading zone is present on Pennsylvania Avenue in front of the six townhouses that are located on Site 75A. The loading zone restricts parking from 6:30 PM to 7:00 AM, Monday through Saturday.

PROPOSED SITE ACCESS

Vehicular access to the below-grade garage would be provided via the relocated public alley on I Street.

The proposed garage driveway adheres to DDOT's policy on driveways. Specifically, DDOT's Design and Engineering Manual states, "A new curb cut or driveway shall not be permitted from any property with alley access or with potential access through an alley widened onto private property or with potential access to an expanded alley network on private property unless the applicant provides documentation that demonstrates that alley access is not possible due to topography or that alley access would be in conflict with existing land uses and not supported by guidelines in the Comprehensive Plan."[18]

The proposed driveway to the garage would have one inbound lane and one outbound lane.

The main pedestrian access to the site is proposed to be from Pennsylvania Avenue.

PROPOSED LOADING

According to the District of Columbia Municipal Regulations (DCMR), in the C-4 district, an office greater than 200,000 SF in size would require three 30-foot loading berths and one 20-foot service/delivery space.[19]

As proposed, the proposed redevelopment would include three 30-foot loading berths and one 20-foot service/delivery space to accommodate the consolidated needs of the site.

Trucks accessing the loading berths and service/ delivery space would enter the relocated alley front-first from I Street and would then back into one of the loading berths or the loading space from the alley. Trucks exiting the loading area would exit the loading area front-first and then exit the relocated alley front-first onto I Street.

Diagrams showing the truck maneuvers in and out of the relocated alley and loading area are included in Appendix H.

PROPOSED PARKING SUPPLY

Off-Street Parking Inventory

According to the DCMR, in the C-4 district, one automobile parking space is required for every 1,800 SF of office space in excess of 2,000 SF, provided the lot area is greater than 10,000 SF.[20] Therefore, a total of 141 automobile parking spaces would be required for the redeveloped Site 75A site.

A total of approximately 147 striped automobile parking spaces would be provided in the below-grade parking garage. Additionally, approximately 36 tandem spaces would be provided in the below-grade parking garage. Therefore, a total of approximately 183 off-street parking spaces are proposed in conjunction with the proposed redevelopment. Table 5-1 provides a detailed inventory of the proposed parking supply for the redeveloped Site 75A site.

Table 5-1
Off-Street Parking Inventory Summary

Type of Space		Level 1	Level 2	Level 3/4	Total
Striped	ADA†	2	2	2	6
	SV‡	10	0	0	10
	Standard	13	28	33	74
	Compact	14	24	19	57
	Total	**39**	**54**	**54**	**147**
Tandem	Tandem	5	9	11	25
	Tandem/Compact	2	7	2	11
	Total	**7**	**16**	**13**	**36**
Total (Striped and Tandem)		**46**	**70**	**67**	**183**

† Americans with Disabilities Act compliant spaces

‡ Sustainable vehicle spaces

On-Street Parking Inventory

Due to the relocation of the I Street alley and the elimination of the loading zone for the existing restaurants on the property, an increase in the curb parking supply is anticipated upon completion of the proposed redevelopment of Site 75A.

As shown in Table 5-2, eight additional metered spaces and seven fewer unmetered spaces (including the removal of one space for a westbound right turn lane on I Street at 22nd Street, as discussed in Section 7) would be provided with the redevelopment, thereby resulting in a net gain of one on-street parking space surrounding Square 75.

Table 5-2
On-Street Parking Inventory Summary

Street	Existing Supply		Proposed Supply	
	Metered	Unmetered	Metered	Unmetered
I Street	9	7	12	4†
22nd Street	13	0	13	0
Pennsylvania Avenue	10	11	15	7
21st Street	0	4	0	4
Total	**32**	**22**	**40**	**15**
	54		**55**	

† Number of spaces reflects the loss of one space to accommodate a westbound right turn lane, as described in Section 7.

Figures 5-2A and 5-2B depict the curb parking inventory along the four faces of the square under existing conditions and post-redevelopment conditions, respectively.

Bicycle Parking

According to the DCMR, the number of bicycle parking spaces provided shall be at least equal to five percent of the number of automobile parking spaces required per the DCMR.[21] Considering 141 automobile parking spaces would be required for the site, a total of seven bicycle parking spaces would be required for the proposed redevelopment.

The proposed building would provide approximately 52 bicycle parking spaces in an enclosed area on the first level of the below-grade parking garage, as shown on Figure 5-3A, thereby exceeding the requirement per the DCMR.

As shown on Figure 5-3B, approximately six inverted U-racks also are proposed along Pennsylvania Avenue in the public space, which will provide approximately 12 convenient bicycle parking spaces for visitors to the proposed redevelopment.

TRIP GENERATION ANALYSIS

Trip Generation for Proposed Development

The total number of trips generated by the proposed redevelopment would be comprised of vehicular trips to/from the site and non-auto trips to/from the site.

The total number of trips anticipated to be generated by the proposed redevelopment was estimated based on ITE's Trip Generation.[22] LUC 710 (General Office) was used to estimate the total number of trips to/from the redeveloped site. The total square footage of the proposed building was selected as the independent variable.

Note that the trips associated with the flexible space were generated as office, rather than retail, since ITE specifically allows for this assumption in situations where there is a retail component in the ground level of an office building.

The trip generation for the proposed redevelopment is summarized in Table 5-3 and, as shown, the proposed development would generate 397 AM peak hour trips and 365 PM peak hour based on standard ITE rates/equations.

A portion of the trips generated by the proposed redevelopment would be made via non-auto modes of transportation. The percentage of site-generated trips that would use public transportation is dependent on the proximity of the site to transit stops, the walkability of the surrounding area, and the degree to which the use of public transit is encouraged, such as by implementation of a transportation demand management (TDM) program.

Based on these factors, the non-auto mode split for the site was estimated to be 50 percent Therefore, as shown in Table 5-3, 199 AM peak hour trips and 183 PM peak hour trips are projected to be made by non-auto modes of transportation.

Taking into account the non-auto mode share, the proposed development would generate an estimated 198 AM peak hour external vehicular trips and 182 PM peak hour external vehicular trips, as shown on Table 5-3.

Trip Generation for Existing Buildings

In order to account for the existing buildings that will be demolished as part of the redevelopment, the total number of trips, the number of non-auto trips, and the resulting number of external vehicular trips were estimated for the existing uses on the site.

The total number of trips anticipated to be generated by the proposed redevelopment was estimated based on ITE's Trip Generation.[23] LUC 710 (General Office) was used to estimate the total number of trips for the existing office building. Square footage was selected as the independent variable. Because the retail uses to be demolished are largely community-serving retail uses, the vehicle trip generation for those uses is minimal. In order to provide a conservative analysis, the vehicle trips associated with the retail uses were not deducted.

The trip generation for the existing buildings is summarized in Table 5-3 and, as shown, it is estimated that the existing buildings generate 218 AM peak hour trips and 230 PM peak hour based on standard ITE rates/equations.

In order to estimate the number of internal trips that occur between the existing office and existing retail uses, the internal capture rates outlined in the ITE Trip Generation Handbook[24] were used. Since internal capture rates are not provided for the AM peak hour, the AM internal capture rates were assumed to be half of the PM rates.

Based on this methodology, it is estimated that two AM peak hour trips and two PM peak hour trips occur internally between the existing office and retail uses.

After subtracting the internal trips from the total trip generation for the existing buildings, a 50 percent non-auto mode split was applied to the external trips. Taking into account the non-auto mode share, the existing buildings generate an estimated 108 AM peak hour external vehicular trips and 114 PM peak hour external vehicular trips, as shown on Table 5-3.

Taking into account the internal trips and non-auto mode share, the existing buildings generate an estimated 108 AM peak hour external vehicular trips and 114 PM peak hour external vehicular trips, as shown on Table 5-3.

Net Additional Trip Generation with Proposed Development

To determine the net number of trips that would be added to the surrounding roadway network with the proposed redevelopment, the trip generation for the existing buildings that would be demolished was subtracted from the trip generation for the proposed development. As shown in Table 5-3, the proposed redevelopment would result in an estimated 90 additional AM peak hour vehicular trips and 68 additional PM peak hour vehicular trips.

Appendix I provides additional details on the trip generation calculations for the proposed development and the existing buildings.

Table 5-3
Site Trip Generation Summary

LAND USE		AM PEAK HOUR			PM PEAK HOUR			ADT
		In	Out	Total	In	Out	Total	
PROPOSED DEVELOPMENT								
255,550 SF Office (LUC 710)	Total Trips	349	48	397	62	303	365	2,747
	Internal Trips	--	--	--	--	--	--	--
	External Trips	349	48	397	62	303	365	2,747
	Non-auto Trips	*175*	*24*	*199*	*31*	*152*	*183*	*1,374*
	Vehicle Trips	**174**	**24**	**198**	**31**	**151**	**182**	**1,373**
EXISTING BUILDINGS TO BE DEMOLISHED								
87,554 SF Office (LUC 710)	Total Trips	149	20	169	30	147	177	1,204
	Internal Trips	--	--	--	--	--	--	--
	External Trips	149	20	169	30	147	177	1,204
	Non-auto Trips	*74*	*10*	*84*	*15*	*73*	*88*	*602*
	Vehicle Trips	**75**	**10**	**85**	**15**	**74**	**89**	**602**
NET ADDITIONAL SITE TRIPS								
Total Trips		200	28	228	32	156	188	1,543
Internal Trips		--	--	--	--	--	--	--
External Trips		200	28	228	32	156	188	1,543
Non-auto Trips		*101*	*14*	*115*	*16*	*79*	*95*	*772*
Vehicle Trips		**99**	**14**	**113**	**16**	**77**	**93**	**771**

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 and general knowledge of commuter routes to/from the site.

The trip distributions shown in Table 5-4 were applied to the total vehicle trips generated by the redevelopment and also were applied to the trips estimated to be generated by the existing buildings that would be demolished with the redevelopment.

Table 5-4
Site Trip Distributions

ROADWAY	DIRECTION	INBOUND DISTRIBUTION	OUTBOUND DISTRIBUTION
Washington Circle	Northwest	45%	45%
23rd Street	South	15%	15%
22nd Street	North	--	10%
	South	5%	--
21st Street	North	10%	--
	South	--	5%
Pennsylvania Avenue	Southeast	15%	15%
K Street	East	10%	10%

For the total proposed development site trips, the external vehicle trips shown in Table 5-3 were assigned to the public roadway network according to the directional distributions in Table 5-4 and the location of the relocated alley on I Street. The resulting site assignments for the total trips generated by the proposed development are shown on Figure 5-4A.

Similarly, the external vehicle trips shown in Table 5-3 for the existing buildings were assigned to the public roadway network according to the directional distributions in Table 5-4 and assuming all existing site trips utilize the parking garage below 2100E Pennsylvania Avenue, which accesses I Street immediately east of the existing alley. The resulting site assignments for the trips associated with the existing buildings are shown on Figure 5-4B.

To determine the net number of site trips at each intersection that would be added with the proposed redevelopment, the site assignments on Figure 5-4B for the existing buildings were subtracted from the site assignments shown on Figure 5-4A for the proposed development. Figure 5-4C displays the resulting net additional site assignments for the proposed redevelopment.

Section 6
TOTAL FUTURE CONDITIONS

TOTAL FUTURE TRAFFIC FORECASTS

Total future traffic forecasts with the proposed redevelopment were determined by combining the 2020 background traffic forecasts shown in Figure 4-5 with the site traffic volumes shown on Figure 5-3A 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. 23rd Street/ Washington Circle	1.5%	<1.0%
2. EB Pennsylvania Avenue/ Washington Circle	0%	0%
3. WB Pennsylvania Avenue/ Washington Circle	<1.0%	2.0%
4. WB K Street/ Washington Circle	<1.0%	1.7%
5. EB K Street/ WB Pennsylvania Avenue	<1.0%	2.8%
6. 22nd Street/ Pennsylvania Avenue	<1.0%	2.3%
7. 22nd Street/EB K Street	<1.0%	2.7%
8. 22nd Street/WB K Street	1.5%	1.2%
9. 23rd Street/I Street	3.6%	1.1%
10. 22nd Street/I Street	7.3%	8.2%
11. I Street/Public Alley	23.4%	17.6%
12. 21st Street/I Street	3.6%	1.4%
13. Pennsylvania Avenue/ 21st Street/I Street	1.5%	<1.0%

As shown in Table 6-1, the traffic associated with the proposed redevelopment would account for less than four percent of the total future traffic volumes at each of the study intersections, with two exceptions. At the I Street/22nd Street intersection, traffic associated with the proposed redevelopment would account for approximately seven percent of the total future traffic volumes during the AM peak hour and approximately eight percent of the total future traffic volumes during the PM peak hour. At the I Street/Public Alley intersection, the proposed redevelopment would account for proportionally more traffic since the alley would provide direct access to the parking garage for the proposed development.

Generally speaking, 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.[25]

OPERATIONAL ANALYSIS

A future conditions capacity analysis, with the proposed redevelopment, was performed at the study intersections using the 2020 total future traffic forecasts shown on Figure 6-1, the lane use and traffic controls shown on Figure 4-4, and existing DDOT traffic signal timings included in Appendix B. At the 22nd 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 J.

As shown in Table 6-2, levels of service and delays with the proposed redevelopment generally are projected to be consistent with background conditions. The following exceptions are noted:

- Pennsylvania Avenue/22nd Street – During the PM peak hour, the northbound approach is projected to operate at a LOS F, which is consistent with background conditions; however, the delay is projected to increase by more than 10 percent.
- 23rd Street/I Street – During the PM peak hour, the overall intersection level of service is projected to drop from a LOS E under background conditions to a LOS F under total future conditions.
- 22nd Street/I Street – During the AM peak hour, the northbound approach is projected to drop from a LOS D under background conditions to a LOS E under total future conditions. During the PM peak hour, the westbound approach is projected to operate at a LOS F under total future conditions, which is consistent with background conditions; however, the delay is projected to increase by more than 10 percent. Also during the PM peak hour, the overall intersection level of service is projected to drop from a LOS E under background conditions to a LOS F under total future conditions.
- I Street/Public Alley – During the PM peak hour, the side street alley and driveway approaches are projected to operate at a LOS F under both background and total future conditions. However, under total future conditions, the delay is projected to increase substantially.

Table 6-2
2020 Total Future Levels of Service

Approach	AM Peak	PM Peak
1. Washington Circle/23rd Street		
EBTR	A (0.5)	A (0.4)
EBR	A (3.5)	A (4.3)
NBR	C (29.5)	B (14.7)
Overall	**A (8.2)**	**A (4.5)**
4. Washington Circle/WB K Street		
WBR	C [18.7]	F [162.0]
5. WB Pennsylvania Avenue/EB K Street		
EBT	B (18.9)	C (28.7)
NWT	D (40.1)	A (6.3)
Overall	**C (29.6)**	**A (9.1)**
6. Pennsylvania Avenue/22nd Street		
EBLT	B (14.8)	B (12.3)
WBTR	C (30.7)	E (63.5)
NBLTR	D (52.0)	F (325.6)
Overall	**C (26.1)**	**F (135.4)**
7. 22nd Street/EB K Street		
EBLT	C (29.2)	C (22.8)
NBTR	A (4.8)	A (4.6)
Overall	**B (15.0)**	**B (10.0)**
8. 22nd Street/WB K Street		
WBT	D (45.8)	D (44.2)
WBR	D (35.6)	C (27.4)
NBLT	A (1.0)	A (1.9)
Overall	**B (15.1)**	**C (21.8)**
9. 23rd Street/I Street		
WBLR	D (35.2)	F (510.2)
NBT	B (11.0)	A (6.0)
NBR	D (40.2)	
SBLT	C (30.8)	C (24.1)
Overall	**C (25.1)**	**F (87.7)**
10. 22nd Street/I Street		
EBL	D (49.4)	B (17.3)
EBT	B (13.3)	B (11.0)
WBTR	D (44.0)	F (203.8)
NBLTR	E (56.8)	D (48.7)
Overall	**D (41.6)**	**F (106.7)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[*] = Delay theoretically greater than 999.9 Seconds

Table 6-2 (continued)
2020 Total Future Levels of Service

Approach	AM Peak	PM Peak
11. I Street/Public Alley		
EBLTR	A [5.4]	A [3.1]
WBLTR	A [1.8]	A [1.3]
NBLTR	D [26.7]	F [*]
SBLTR	E [35.7]	F [831.4]
12. 21st Street/I Street		
EBTR	F [101.4]	F [*]
SBLTR	A [0.3]	A [0.5]
13. Pennsylvania Avenue/21st Street/I Street		
SBL	C (26.9)	C (31.3)
SBTR	C (29.4)	C (30.6)
SETR	C (32.6)	D (42.0)
WBLR	F (173.3)	F (310.7)
WBR	F (203.4)	F (334.1)
NWT	D (35.6)	D (39.6)
Overall	**D (50.1)**	**F (120.8)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[*] = Delay theoretically greater than 999.9 Seconds

QUEUE ANALYSIS

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

Where queue lengths are projected to increase with the proposed redevelopment, the increase is projected to be one car length or less, with two exceptions. During the AM peak hour, the southbound queue at the 23rd Street/I Street intersection is projected to increase by approximately two car lengths but would remain contained within the available storage. During the PM peak hour, the westbound queue is projected to increase by approximately 100 feet with the proposed redevelopment. Under both background and total future conditions, the westbound queue would extend along I Street past the public alley; however, in both cases, the queues would not extend to the I Street/21st Street intersection.

Table 6-3
95th Percentile Queue Summary (in feet)
2020 Total Future Conditions

Approach	Available Storage†	AM Peak	PM Peak
1. Washington Circle/23rd Street			
EBTR	60	0	0
EBR	60	0	0
NBR	380	370	158m
4. Washington Circle/WB K Street			
WBR	105	39	404
5. WB Pennsylvania Avenue/EB K Street			
EBT	80	111m	78
NWT	80	110m	50m
6. Pennsylvania Avenue/22nd Street			
EBLT	180	190	86
WBTR	610	170	378#
NBLTR	380	187m#	413m#
7. 22nd Street/EB K Street			
EBLT	65	186	191
NBTR	15	42	22
8. 22nd Street/WB K Street			
WBT	540	129	294#
WBR	540	38	40
NBLT	50	8	10
9. 23rd Street/I Street			
WBLR	265	37m	216m#
NBT	330	210	45
NBR	330	134	
SBLT	380	383#	524#
10.22nd Street/I Street			
EBL	100	187m#	39m
EBT	265	60m	67m
WBTR	175	22m	461m#
NBLTR	325	192#	172#

† All distances measured to nearest intersection or end of turn lane, as appropriate.
m Volume for 95th percentile queue is metered by upstream signal.
95th percentile volume exceeds capacity; queue may be longer.
~ Volume exceeds capacity; queue is theoretically infinite.
* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Table 6-3 (continued)
95th Percentile Queue Summary (in feet)
2020 Total Future Conditions

Approach	Available Storage†	AM Peak	PM Peak
12. 21st Street/I Street			
EBT	335	164	*
EBR	50	2	*
SBLT	160	0	3
13. Pennsylvania Avenue/21st Street			
SBL	305	107	234
SBTR	295	193	306
SETR	600	173m#	217m
WBLR	290	286#	486#
WBR	290	308#	506#
NWT	330	207m#	288~

† All distances measured to nearest intersection or end of turn lane, as appropriate.

m Volume for 95th percentile queue is metered by upstream signal.

95th percentile volume exceeds capacity; queue may be longer.

~ Volume exceeds capacity; queue is theoretically infinite.

* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Section 7
IMPROVEMENT ANALYSIS

OVERVIEW

As outlined in the previous section, the proposed redevelopment would have some impact on traffic operations in the study area. In order to mitigate the impact, associated with the additional traffic generated by the redevelopment, an incremental series of improvements were evaluated as summarized below.

Pennsylvania Avenue/22nd Street

In order to mitigate the impact of the proposed redevelopment, signal timings at the Pennsylvania Avenue/22nd Street intersection were optimized during the PM peak hour. The signal timing optimizations involved shifting two seconds of green time from the eastbound phase to the northbound phase. No changes were made to the cycle length or offset at the intersection.

23rd Street/I Street

In order to mitigate the impact to queues during the AM peak hour, traffic signal timings at the 23rd Street/I Street intersection were optimized. The proposed timing changes include shifting one second of green time from the westbound phase to the northbound and southbound phase.

During the PM peak hour, the traffic signal timings were optimized to mitigate the impact to levels of service at the intersection. The timing recommendations involve shifting eight seconds of green time from northbound and southbound phase to the westbound phase.

No changes were made to the cycle length or offset at the intersection during either the AM or PM peak hours.

22nd Street/I Street

Traffic signal timings were optimized during both the AM and PM peak hours to offset the impact of the proposed redevelopment. Additionally, in order to fully mitigate the impact of the proposed redevelopment, a separate westbound right turn lane was analyzed. Implementation of a westbound right turn lane would require the removal of one on-street parking space on the north side of I Street during the peak hours.

The traffic signal timings involved shifting three seconds of green time from the northbound phase and seven seconds of green time from the eastbound left turn phase to the eastbound and westbound mainline phase during the AM peak hour. No changes were made to the cycle length or offset at the intersection.

No changes were made to the PM traffic signal timings at this intersection.

The design of the traffic signal at the 22nd Street/I Street intersection should consider signage for "No Turn on Red," especially on the westbound approach, due to the high volume of pedestrians at the intersection.

CAPACITY ANALYSIS

To document the impact of the improvements, capacity analyses were performed with the lane use and traffic control shown on Figure 7-1, the 2020 total future traffic forecasts shown on Figure 6-1, and the adjusted signal timings.

The capacity analyses worksheets showing these improvements are provided in Appendix L. The levels of service are summarized in Table 7-1.

Table 7-1
2020 Total Future Levels of Service
with Improvements

Approach	AM Peak	PM Peak
1. Washington Circle/23rd Street		
EBTR	A (0.5)	A (0.4)
EBR	A (3.5)	A (4.3)
NBR	C (29.4)	B (15.5)
Overall	**A (8.2)**	**A (4.6)**
4. Washington Circle/WB K Street		
WBR	C [18.7]	F [162.0]
5. WB Pennsylvania Avenue/EB K Street		
EBT	B (18.9)	C (28.2)
NWT	D (40.1)	A (6.3)
Overall	**C (29.6)**	**A (9.1)**
6. Pennsylvania Avenue/22nd Street		
EBLT	B (14.8)	B (13.6)
WBTR	C (30.7)	E (63.5)
NBLTR	D (54.6)	F (286.3)
Overall	**C (26.6)**	**F (123.0)**
7. 22nd Street/EB K Street		
EBLT	C (29.2)	C (24.9)
NBTR	A (4.8)	A (4.6)
Overall	**B (15.0)**	**B (10.7)**
8. 22nd Street/WB K Street		
WBT	D (45.8)	D (44.2)
WBR	D (35.6)	C (27.4)
NBLT	A (1.0)	A (2.2)
Overall	**B (15.1)**	**C (21.9)**
9. 23rd Street/I Street		
WBLR	C (32.9)	F (299.9)
NBT	B (10.8)	A (9.9)
NBR	D (40.3)	
SBLT	C (28.1)	D (54.5)
Overall	**C (23.7)**	**E (77.7)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[*] = Delay theoretically greater than 999.9 Seconds

Table 7-1 (continued)
2020 Total Future Levels of Service
with Improvements

Approach	AM Peak	PM Peak
10. 22nd Street/I Street		
EBL	D (51.4)	B (13.8)
EBT	B (17.0)	B (12.2)
WBT	C (33.5)	C (28.4)
WBR	D (53.3)	E (63.5)
NBLTR	D (44.4)	D (48.7)
Overall	**D (39.2)**	**D (39.6)**
11. I Street/Public Alley		
EBLTR	A [5.4]	A [3.1]
WBLTR	A [1.8]	A [1.3]
NBLTR	D [26.7]	F [*]
SBLTR	E [35.7]	F [831.4]
12. 21st Street/I Street		
EBTR	F [101.4]	F [*]
SBLTR	A [0.3]	A [0.5]
13. Pennsylvania Avenue/21st Street/I Street		
SBL	C (26.9)	C (31.3)
SBTR	C (29.4)	C (30.6)
SETR	C (32.6)	D (41.5)
WBLR	F (173.3)	F (310.7)
WBR	F (203.4)	F (334.1)
NWT	D (35.6)	D (39.6)
Overall	**D (50.1)**	**F (120.7)**

[x.x] = unsignalized intersection control delay in sec/veh
(x.x) = signalized intersection control delay in sec/veh
[*] = Delay theoretically greater than 999.9 Seconds

QUEUE ANALYSIS

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

Table 7-2
95th Percentile Queue Summary (in feet)
2020 Total Future Conditions with Improvements

Approach	Available Storage†	AM Peak	PM Peak
1. Washington Circle/23rd Street			
EBTR	60	0	0
EBR	60	0	0
NBR	380	369	156m
4. Washington Circle/WB K Street			
WBR	105	39	404
5. WB Pennsylvania Avenue/EB K Street			
EBT	80	110m	78
NWT	80	110m	57
6. Pennsylvania Avenue/22nd Street			
EBLT	180	177	90
WBTR	610	170	378#
NBLTR	380	216m#	445#
7. 22nd Street/EB K Street			
EBLT	65	186	194
NBTR	15	42	22
8. 22nd Street/WB K Street			
WBT	540	129	294#
WBR	540	38	40
NBLT	50	9	11
9. 23rd Street/I Street			
WBLR	265	65m	299m#
NBT	330	209	65
NBR	330	134	
SBLT	380	383#	589#

† All distances measured to nearest intersection or end of turn lane, as appropriate.

m Volume for 95th percentile queue is metered by upstream signal.

95th percentile volume exceeds capacity; queue may be longer.

~ Volume exceeds capacity; queue is theoretically infinite.

* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Table 7-2 (continued)
95th Percentile Queue Summary (in feet)
2020 Total Future Conditions with Improvements

Approach	Available Storage†	AM Peak	PM Peak
10. 22nd Street/I Street			
EBL	100	198m#	42m
EBT	265	199m	72m
WBT	175	29m	164m
WBR	100	10	199m#
NBLTR	325	171	172#
12. 21st Street/I Street			
EBT	335	164	*
EBR	50	2	*
SBLT	160	0	3
13. Pennsylvania Avenue/21st Street			
SBL	305	107	234
SBTR	295	193	306
SETR	600	173m#	219m
WBLR	290	286#	486#
WBR	290	308#	506#
NWT	330	207m#	288~

† All distances measured to nearest intersection or end of turn lane, as appropriate.

m Volume for 95th percentile queue is metered by upstream signal.

95th percentile volume exceeds capacity; queue may be longer.

~ Volume exceeds capacity; queue is theoretically infinite.

* Delay theoretically greater than 999.9 seconds; queue cannot be calculated.

Section 8
TRANSPORTATION DEMAND MANAGEMENT

OVERVIEW

As documented herein, the proposed redevelopment will be well served by various transit services. The subject site is considered to be a "walker's paradise" and a transit "rider's paradise" according to the Walk Score website (www.walkscore.com). In fact, the site scores a 98 out of a possible 100 on the walk score scale and a 92 out of a possible 100 on the transit score scale. The walk score considers how close various amenities, such as coffee shops, grocery stores, schools, parks, and banks, are to the site. The transit score considers how close rail and bus services are to the site. The scales utilized by Walk Score are shown in Table 8-1.

TRANSPORTATION DEMAND MANAGEMENT PLAN

While the location of the proposed development is expected to naturally encourage the use of transit, the Applicant also has identified several other strategies to encourage the use of non-auto modes of transportation. Specifically:

1. A member of the on-site property management team will be designated as the Transportation Management Coordinator (TMC). The TMC will be responsible for ensuring that information is disseminated to tenants of the building. The position may be part of other duties assigned to the individual.
2. The TMC will prepare a package of information identifying programs and incentives for encouraging employees to use alternative modes of transportation. Packages will include information regarding the following:
   a. SmartBenefits,
   b. Corporate car sharing memberships,
   c. Capital Bikeshare,
   d. Commuter Connections Rideshare Program,
   e. Commuter Connections Guaranteed Ride Home,
   f. Commuter Connections Pools Program,
   g. VanStart, and
   h. NuRide.
3. Links to CommuterConnections.com and goDCgo.com will be provided on developer and/or property management websites.
4. Parking spaces will be provided on site for a car sharing service subject to agreement with a car sharing vendor.
5. Convenient, attractive, and covered secure bike parking facilities will be provided. Approximately 52 bicycle spaces will be provided on the first level of the garage. Additionally, approximately 12 bicycle spaces will be provided along Pennsylvania Avenue.
6. Shower and changing facilities will be provided on site for employees who wish to walk, jog, or bike to work.

Table 8-1
Walk and Transit Score Scales

WALK SCORE	DESCRIPTION
90–100	Walker's Paradise — Daily errands do not require a car.
70–89	Very Walkable — Most errands can be accomplished on foot.
50–69	Somewhat Walkable — Some amenities within walking distance.
25–49	Car-Dependent — A few amenities within walking distance.
0–24	Car-Dependent — Almost all errands require a car.
TRANSIT SCORE	**DESCRIPTION**
90–100	Rider's Paradise — World-class public transportation.
70–89	Excellent Transit — Transit is convenient for most trips.
50–69	Good Transit — Many nearby public transportation options.
25–49	Some Transit — A few nearby public transportation options.
0–24	Minimal Transit — It is possible to get on a bus.

Section 9

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

1. The redevelopment of Site 75A would include demolishing the existing uses on the site to allow for the construction of 255,550 SF of commercial space.
2. As part of the proposed redevelopment, the public alley on I Street will be relocated approximately 55 feet to the west of its existing location and will be widened to 24 feet. This relocation will better accommodate existing loading operations, which will remain on the square, future loading operations of the proposed redevelopment, and vehicular access to/from the proposed development, thereby minimizing impacts to the public space.
3. Eight additional metered on-street parking spaces and seven fewer unmetered on-street parking spaces would be provided with the proposed redevelopment, thereby resulting in a net gain of one on-street parking space surrounding Square 75.
4. The proposed redevelopment will provide approximately 52 covered bicycle parking spaces in the parking garage and approximately 12 additional bicycle parking spaces in the public space on Pennsylvania Avenue.
5. The subject site 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; and bicycle facilities.
6. The Applicant has agreed to various transportation demand management strategies that encourage alternate modes of transportation and further enhance the transportation options available at the site.
7. Under the existing conditions, several study intersections have one or more lane groups that operate near or at capacity during the AM and PM peak hours.
8. Under future conditions without the proposed redevelopment, several additional lane groups at the study intersections would operate near or at capacity compared to existing conditions due to increases in traffic from growth outside the immediate site vicinity and increases in traffic associated with planned or approved but not yet constructed developments in the study area.
9. In conjunction with the redevelopment of Square 54, Boston Properties and GW provided the required contribution for future signalization of the 22nd Street/I Street intersection. Therefore, this improvement was assumed to be in place prior to build out and occupancy of the proposed redevelopment.
10. The proposed redevelopment is anticipated to generate an estimated 90 net new AM peak hour vehicular trips and 68 net new PM peak hour vehicular trips.

11. The proposed redevelopment will have some impact on the traffic operations in the study area, specifically, at the Pennsylvania Avenue/22nd Street, 23rd Street/I Street, 22nd Street/I Street, and I Street/Public Alley intersections. These impacts can be mitigated with the following improvements:

- Optimization of signal timings at the Pennsylvania Avenue/22nd Street intersection,
- Optimization of signal timings at the 23rd Street/I Street intersection,
- Optimization of signal timings at the 22nd Street/I Street intersection,
- Restriping the westbound approach at the 22nd Street/I Street intersection to provide an exclusive westbound right turn lane.

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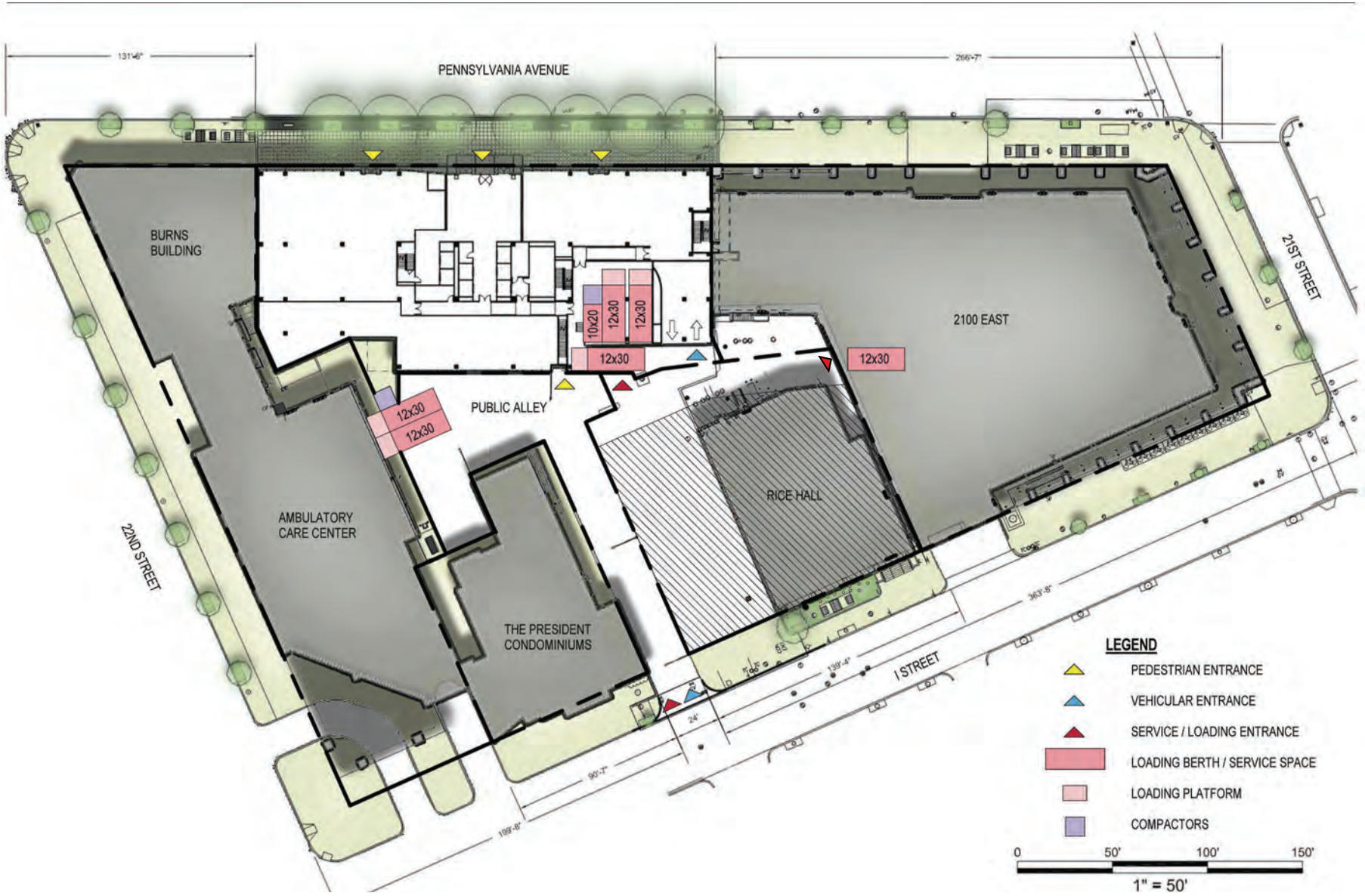
FIGURES

Figure 1-1
Site Location

North

The George Washington University—Square 75
Washington, DC

WELLS + ASSOCIATES



Source: Gensler

Figure 1-2
Site Plan

North

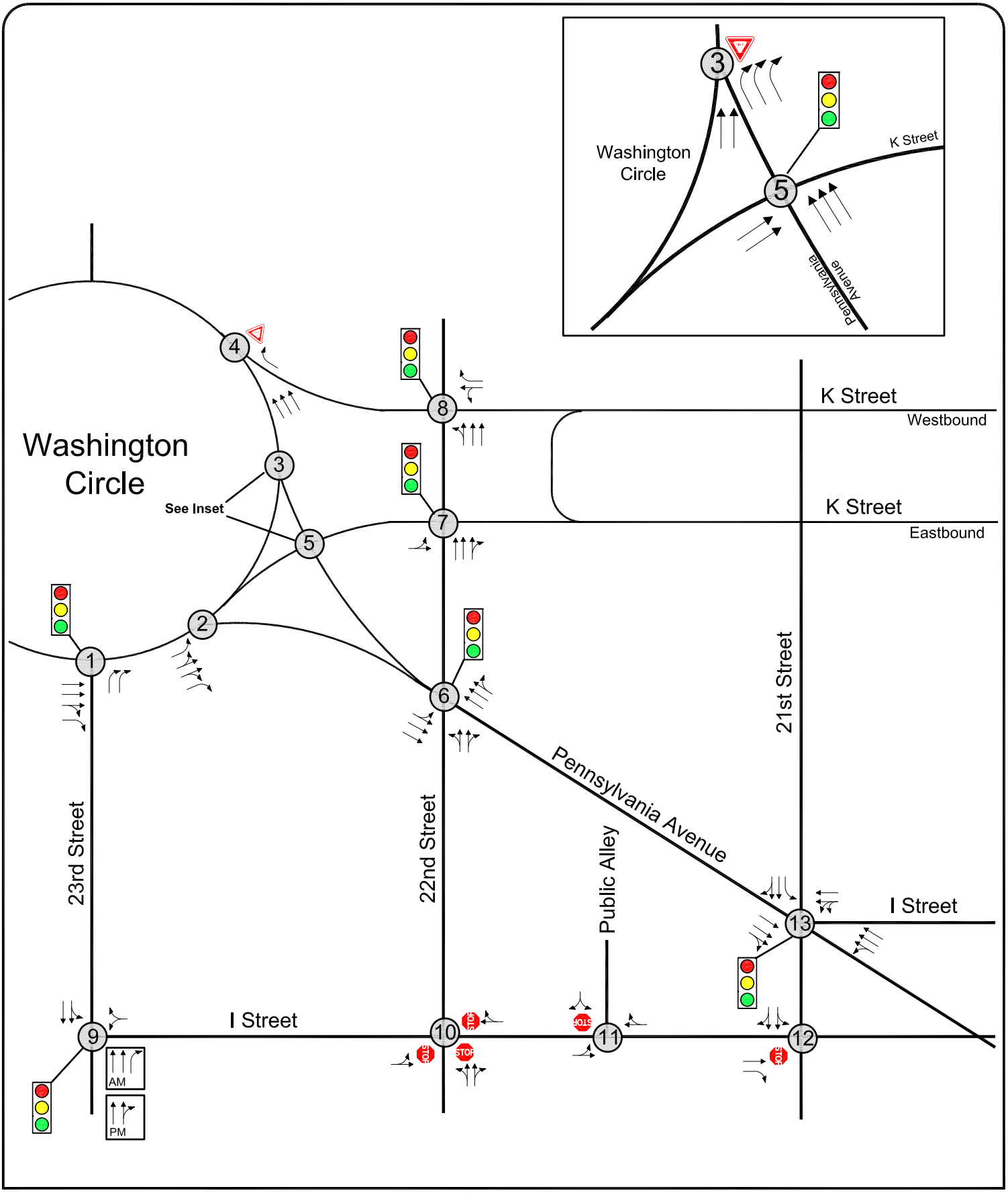


Figure 2-1
Existing Lane Use and Traffic Control

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The George Washington University - Square 75
Washington, DC

Wells + Associates, Inc.

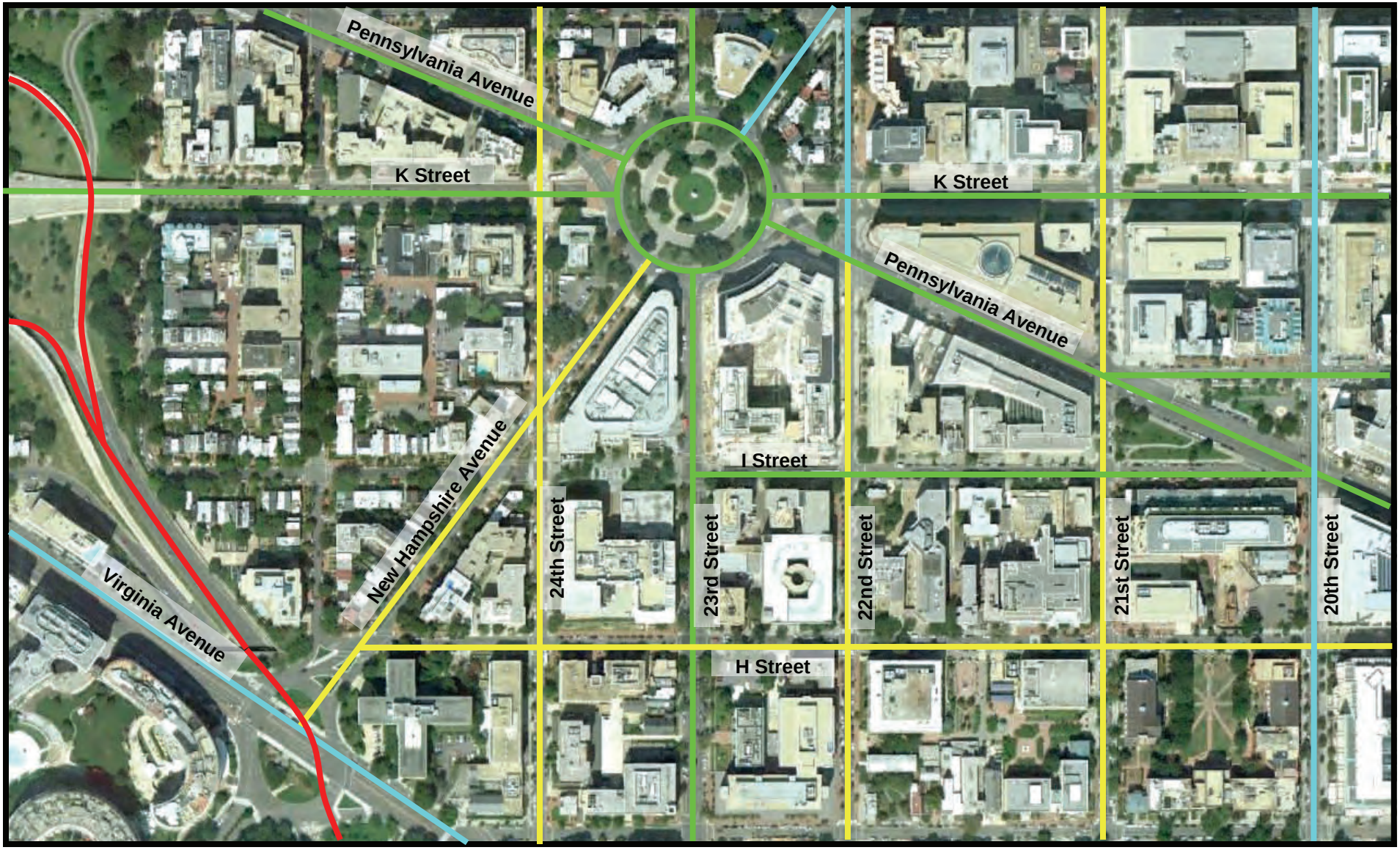


Figure 2-2
Functional Classification Map

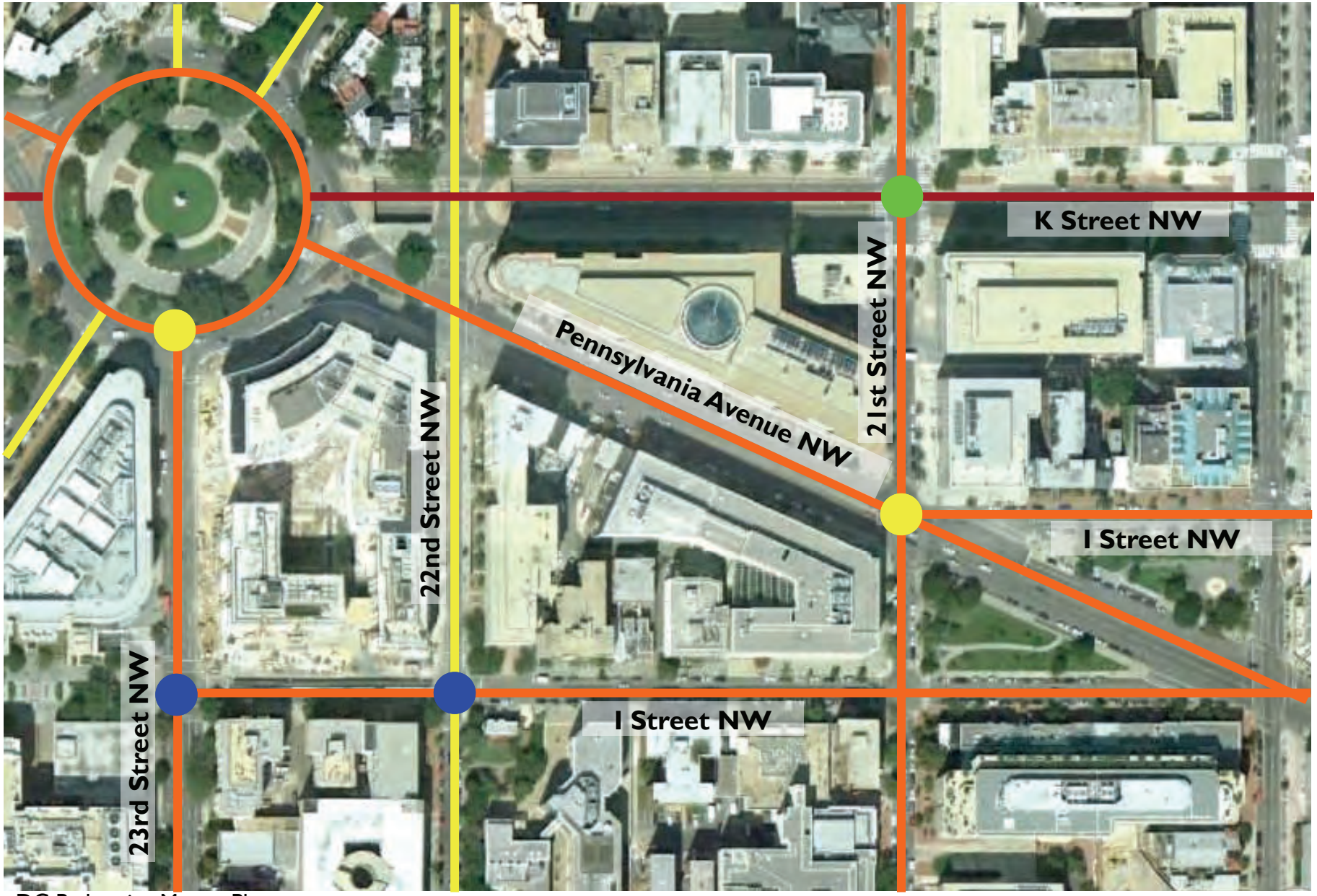
Interstate
Other Freeway/Expressway
Principal Arterial
Minor Arterial
Collector
Local Roadway

North

Source: http://www.wmata.com

Figure 2-3
Public Transportation Services

North



Source: DC Pedestrian Master Plan

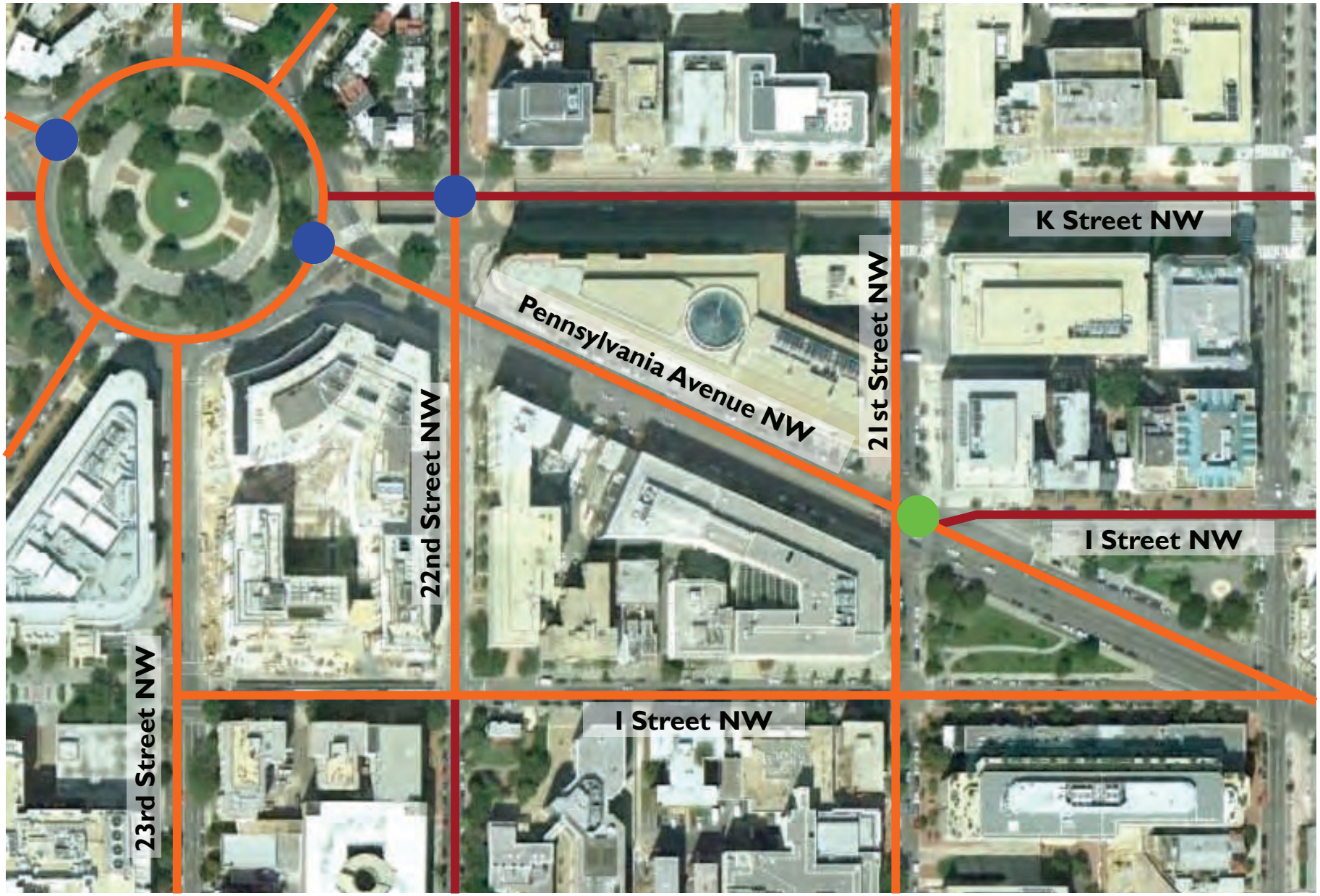
Figure 2-4
Pedestrian Activity

1 Pedestrian Injury
2-4 Pedestrian Injuries
5-8 Pedestrian Injuries
High Pedestrian Activity and High Pedestrian Deficiency
Low Pedestrian Activity and High Pedestrian Deficiency

North

The George Washington University—Square 75
Washington, DC

WELLS + ASSOCIATES



Source: DC Bicycle Master Plan

Figure 2-5
Bicycle Levels of Service

1 Bicycle Crash
2-3 Bicycle Crashes

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

North

The George Washington University—Square 75
Washington, DC

WELLS + ASSOCIATES

Source: http://www.capitalbikeshare.com

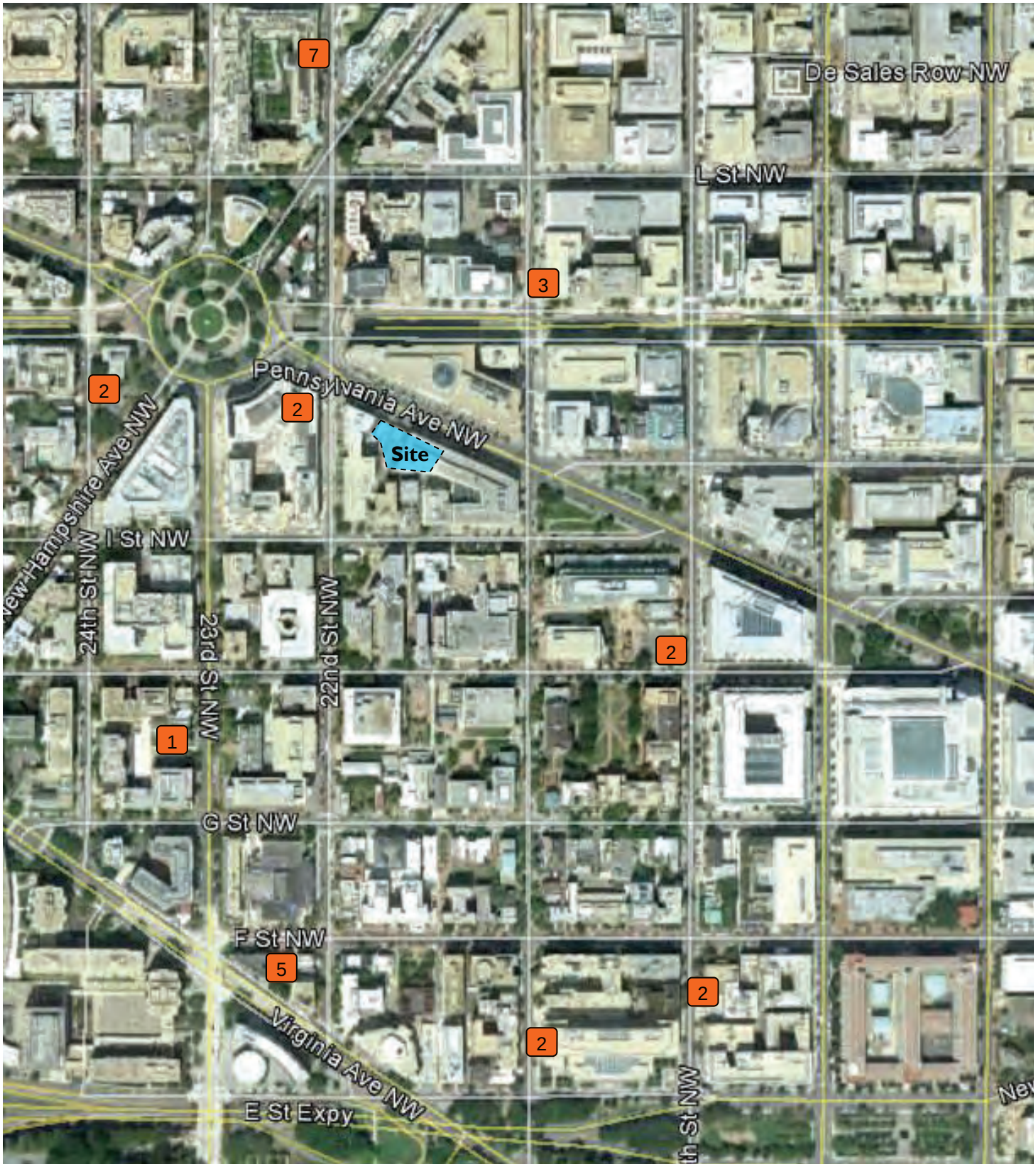
Figure 2-6
Capital Bikeshare Locations

Current Capital Bikeshare Locations

Planned Capital Bikeshare Locations

North

The George Washington University—Square 75
Washington, DC



Source: http://www.zipcar.com

Figure 2-7
Zipcar Locations

Zipcar Locations (Number of Zipcars)

North

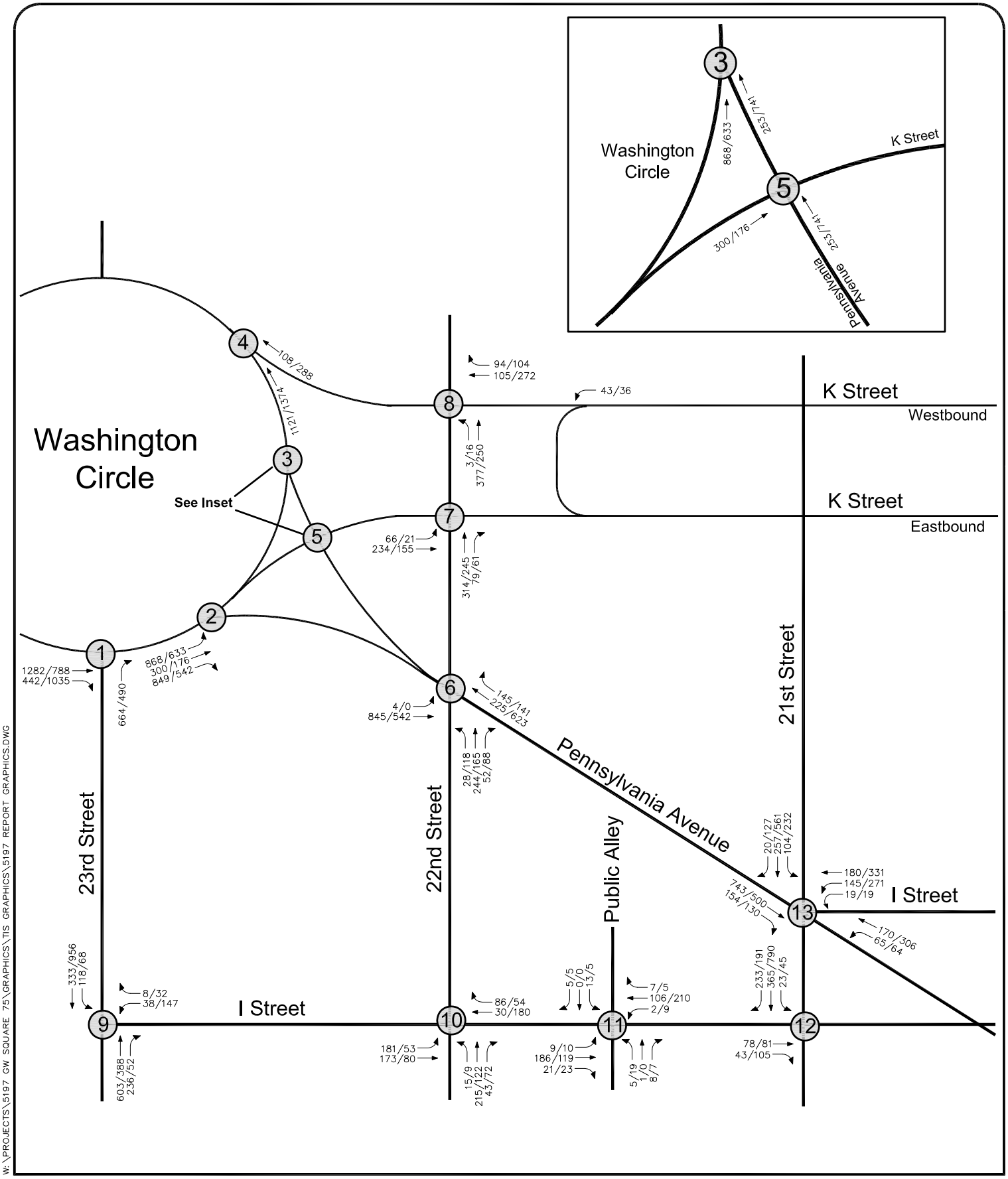


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Figure 3-1
Existing Peak Hour Vehicular Traffic Volumes

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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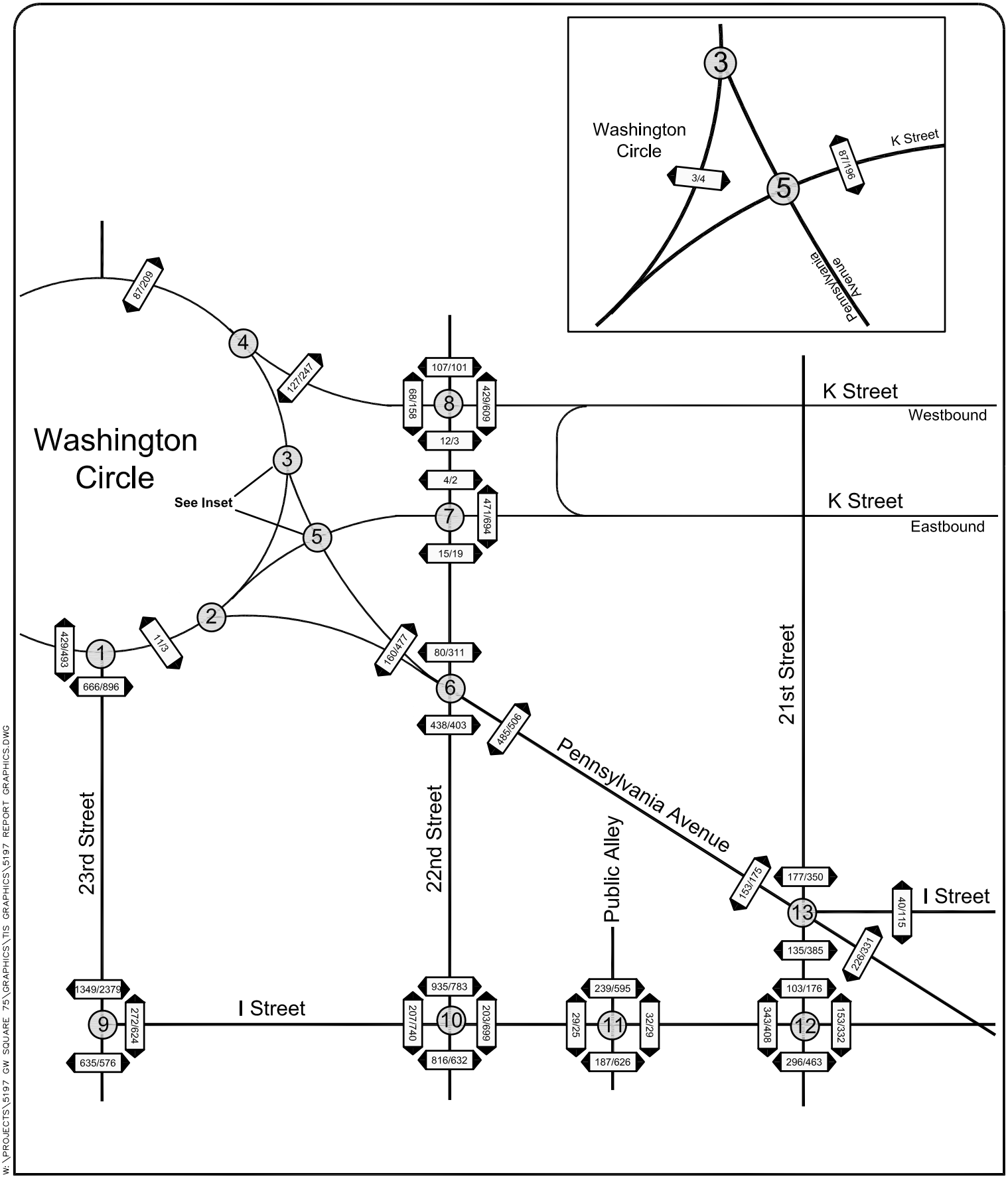

Figure 3-2
Existing Peak Hour Pedestrian Volumes

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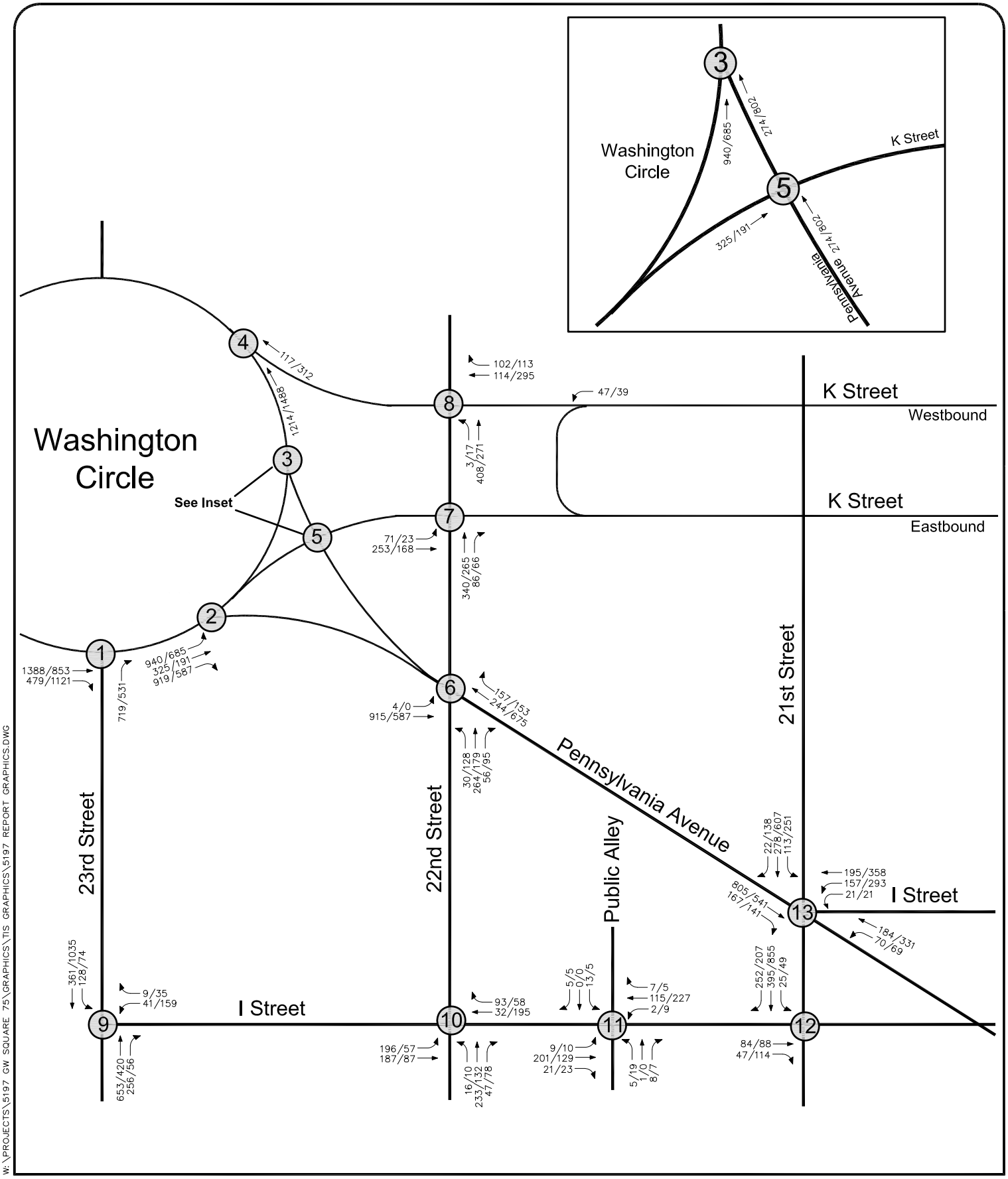

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Figure 4-1
Existing Peak Hour Vehicular Traffic Volumes plus Regional Growth (2020)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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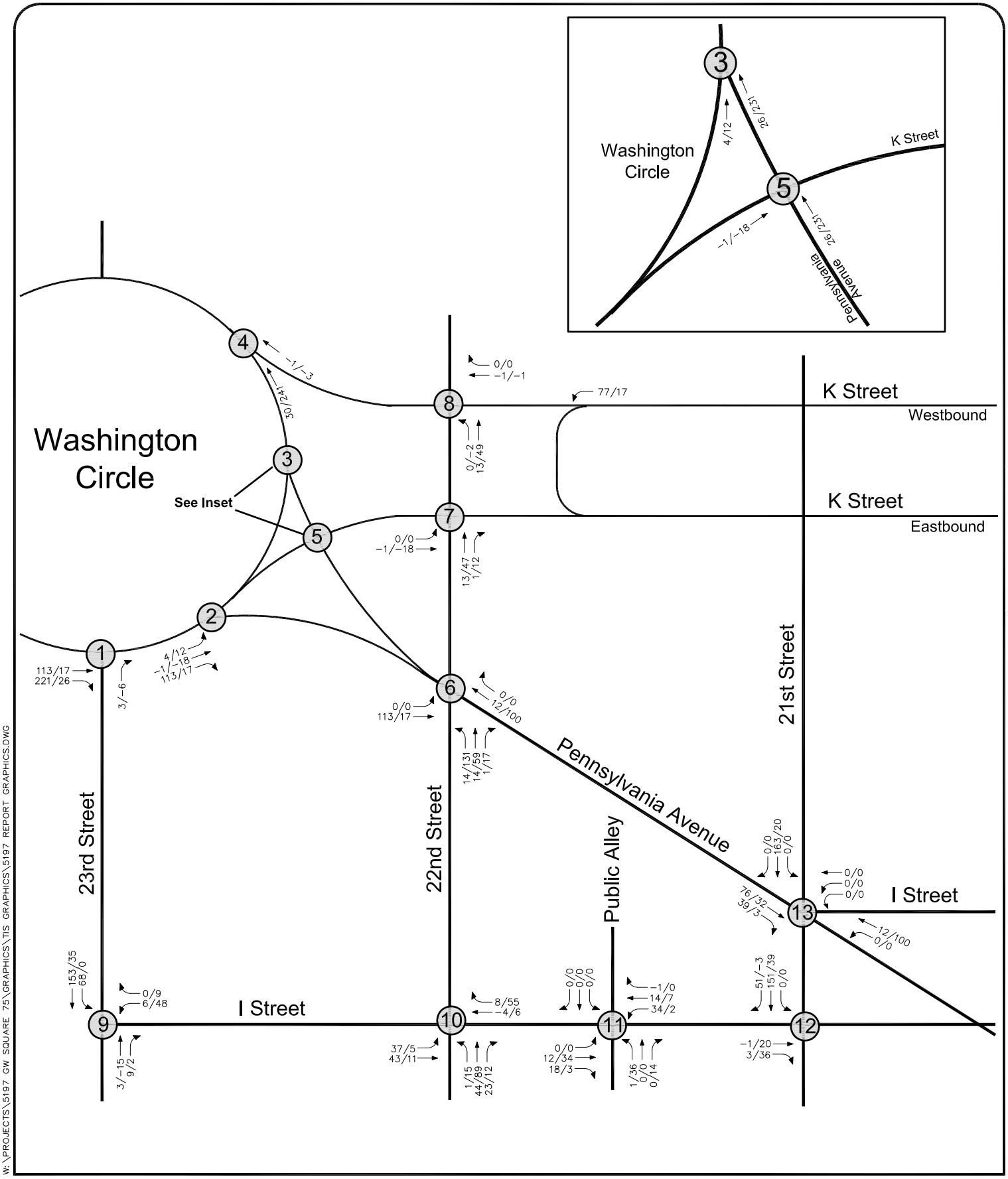

Figure 4-2
Pipeline Development Traffic Assignments

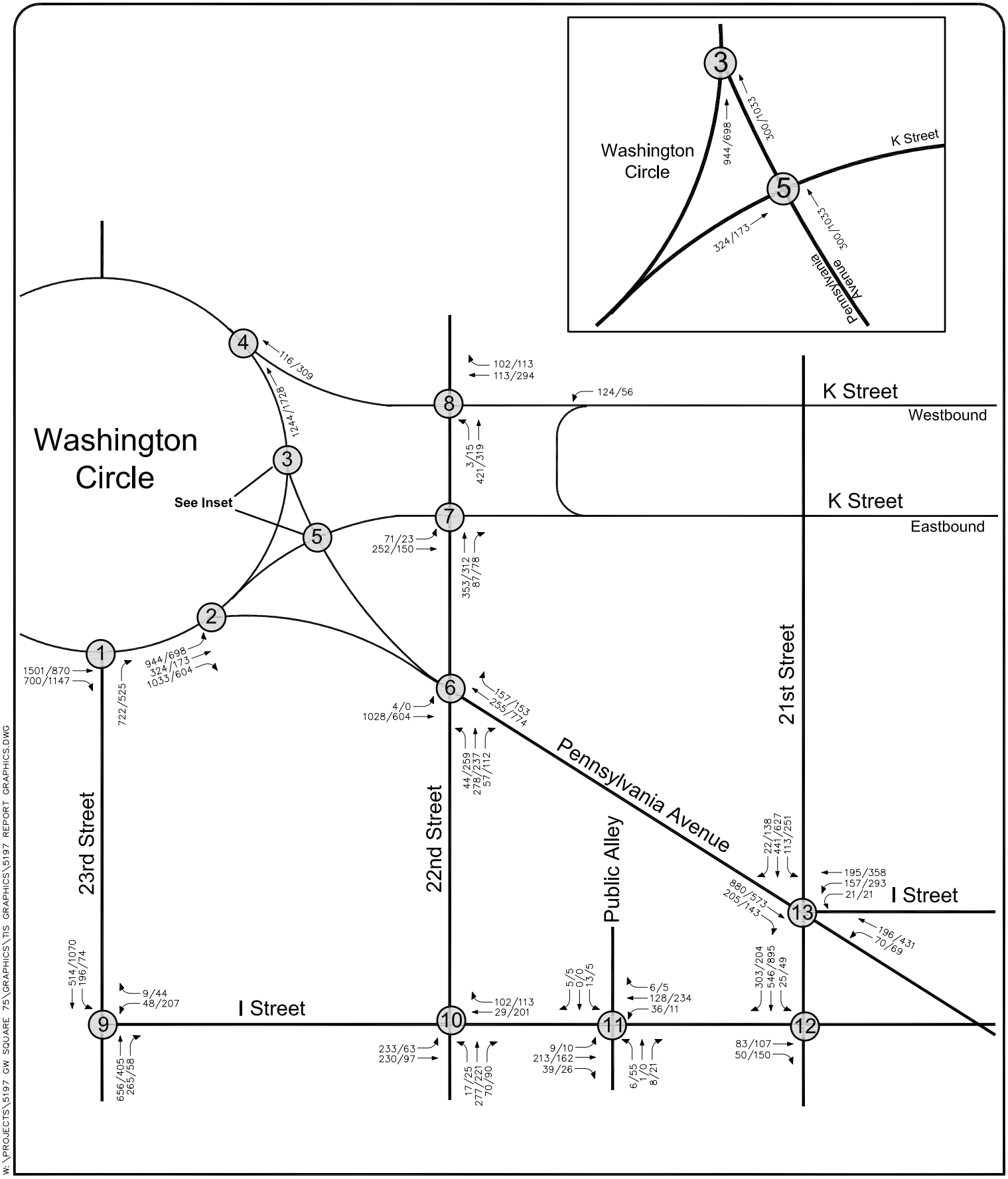

Figure 4-3
2020 Future Background Peak Hour Traffic Forecasts

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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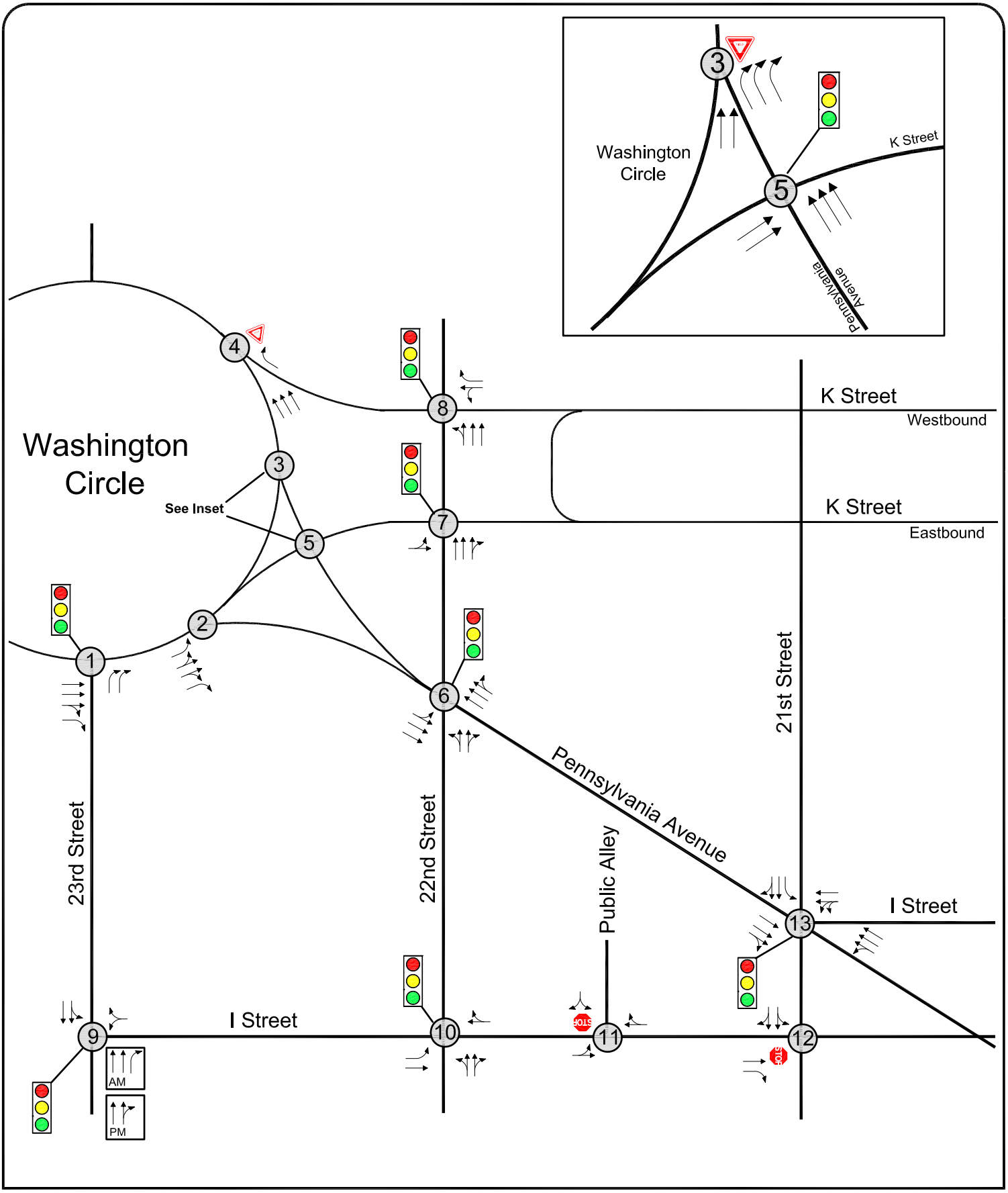

Figure 4-4
2020 Background Lane Use and Traffic Control

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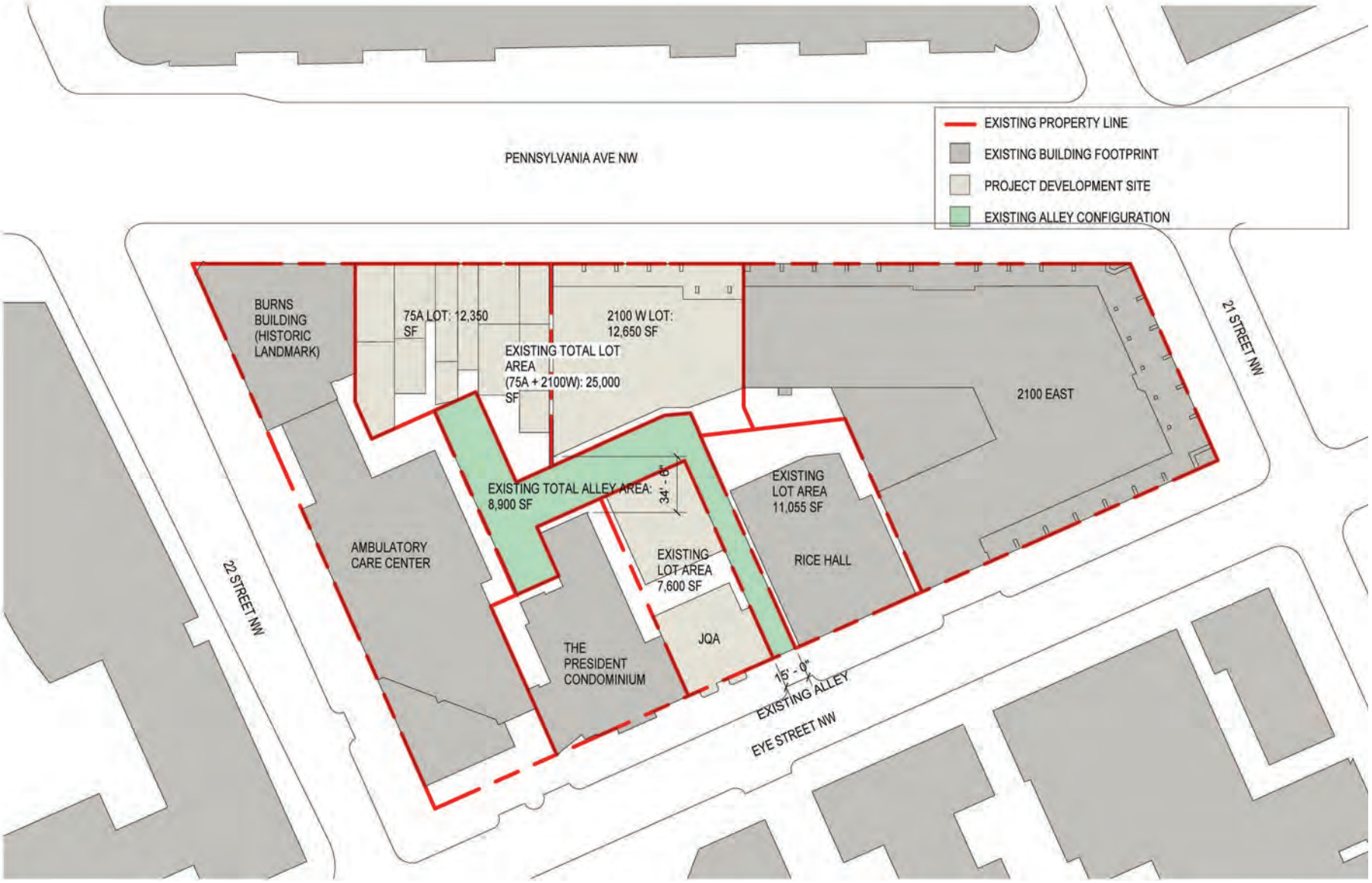
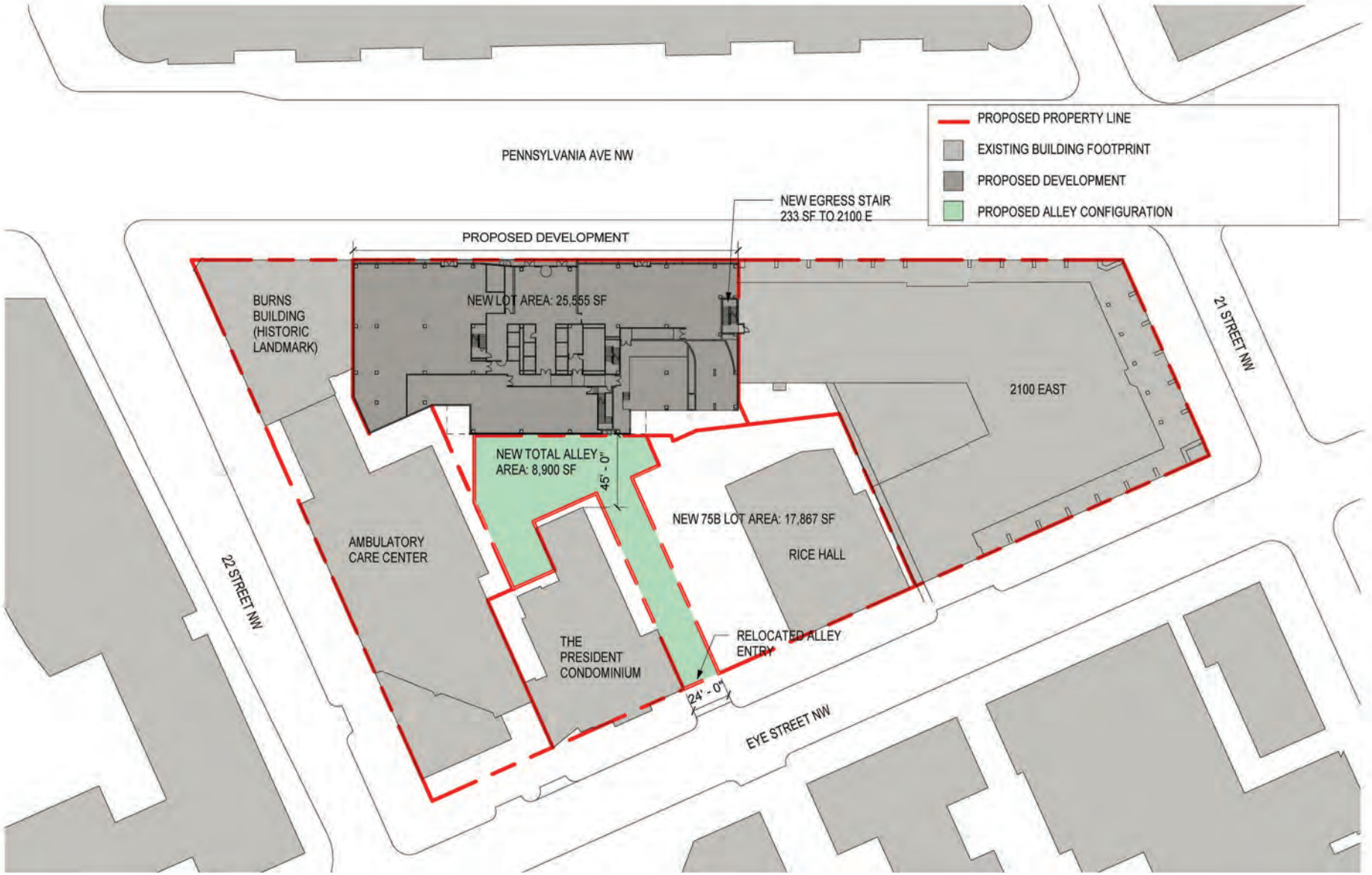


Source: Gensler

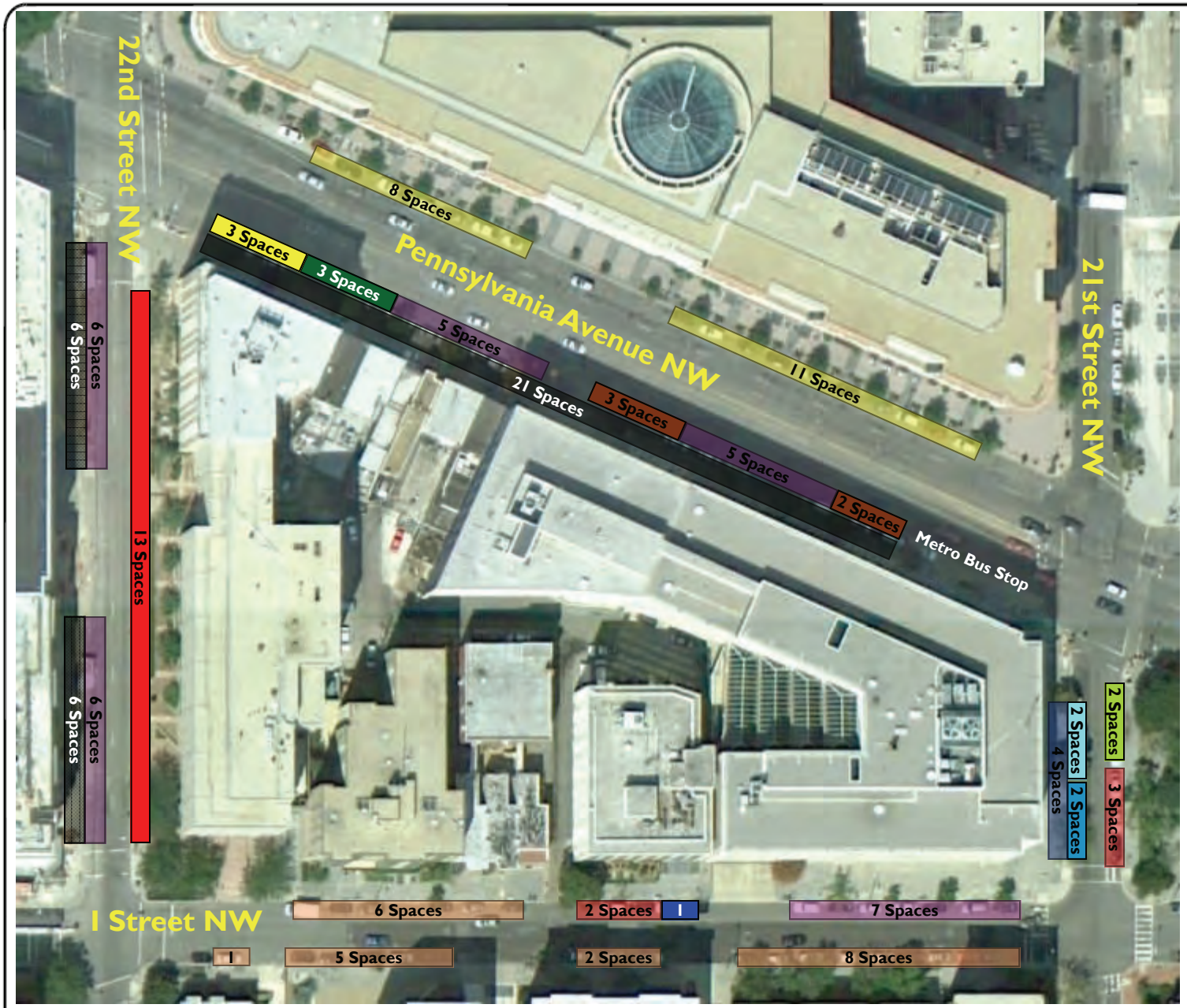
Figure 5-1
Existing Alley Location

North



Source: Gensler

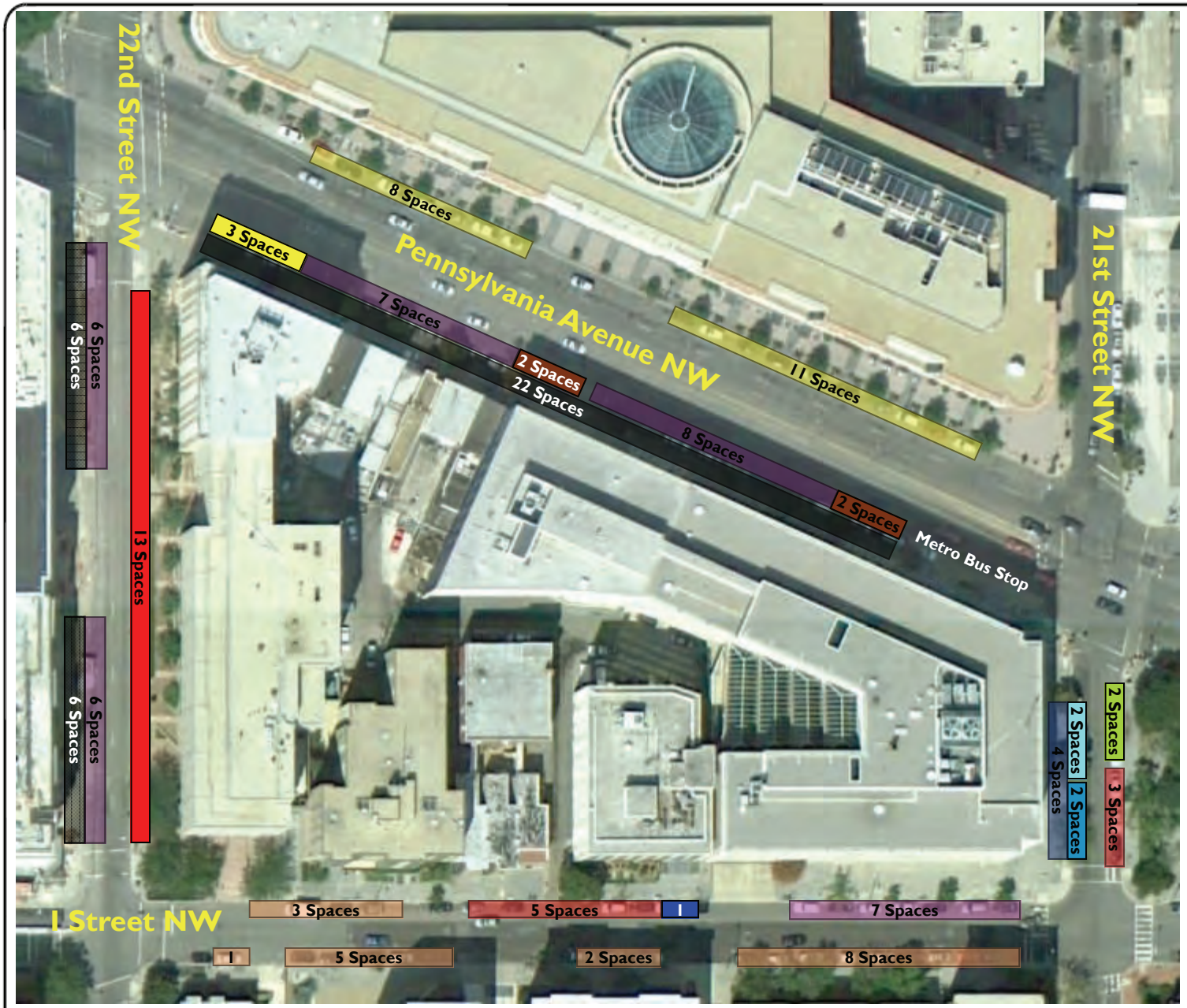
Figure 5-2
Proposed Alley Location



- 2 Hour Metered Parking
- 2 Hour Metered Parking
  7:00 AM - 8:30 PM
- 2 Hour Parking
  7:00 AM - 8:30 PM
- 2 Hour Metered Parking
  7:00 AM - 4:00 PM
- 2 Hour Metered Parking
  9:30 AM - 4:00 PM
- 2 Hour Metered Parking
  7:00 AM - 6:30 PM Monday - Friday
  7:00 AM - 10:00 PM Saturday
- ZipCar Parking
- No Parking 7:00 AM - 6:30 PM
- No Parking 7:00 AM - 4:00 PM
  Monday - Friday
- Shuttle Bus Parking Only
  7:00 AM - 4:00 PM Monday - Friday
- No Standing or Parking
  4:00 PM - 6:30 PM Monday - Friday
- No Standing or Parking
  7:00 AM - 9:30 AM, 4:00 PM - 6:30 PM
  Monday - Friday
- No Parking 8:30 AM - 4:00 PM
  Monday - Friday
- No Parking 9:30 AM - 4:00 PM
  Monday - Saturday
- Loading Zone No Parking
  6:30 PM - 7:00 AM Monday - Saturday

Figure 5-3A
Existing On-Street Parking Restrictions

North



- 2 Hour Metered Parking
- 2 Hour Metered Parking 7:00 AM - 8:30 PM
- 2 Hour Parking 7:00 AM - 8:30 PM
- 2 Hour Metered Parking 7:00 AM - 4:00 PM
- 2 Hour Metered Parking 9:30 AM - 4:00 PM
- 2 Hour Metered Parking 7:00 AM - 6:30 PM Monday - Friday 7:00 AM - 10:00 PM Saturday
- ZipCar Parking
- No Parking 7:00 AM - 6:30 PM
- No Parking 7:00 AM - 4:00 PM Monday - Friday
- Shuttle Bus Parking Only 7:00 AM - 4:00 PM Monday - Friday
- No Standing or Parking 4:00 PM - 6:30 PM Monday - Friday
- No Standing or Parking 7:00 AM - 9:30 AM, 4:00 PM - 6:30 PM Monday - Friday
- No Parking 8:30 AM - 4:00 PM Monday - Friday
- No Parking 9:30 AM - 4:00 PM Monday - Saturday
- Loading Zone No Parking 6:30 PM - 7:00 AM Monday - Saturday

Figure 5-3B
On-Street Parking Inventory
Post-Redevelopment Conditions

North

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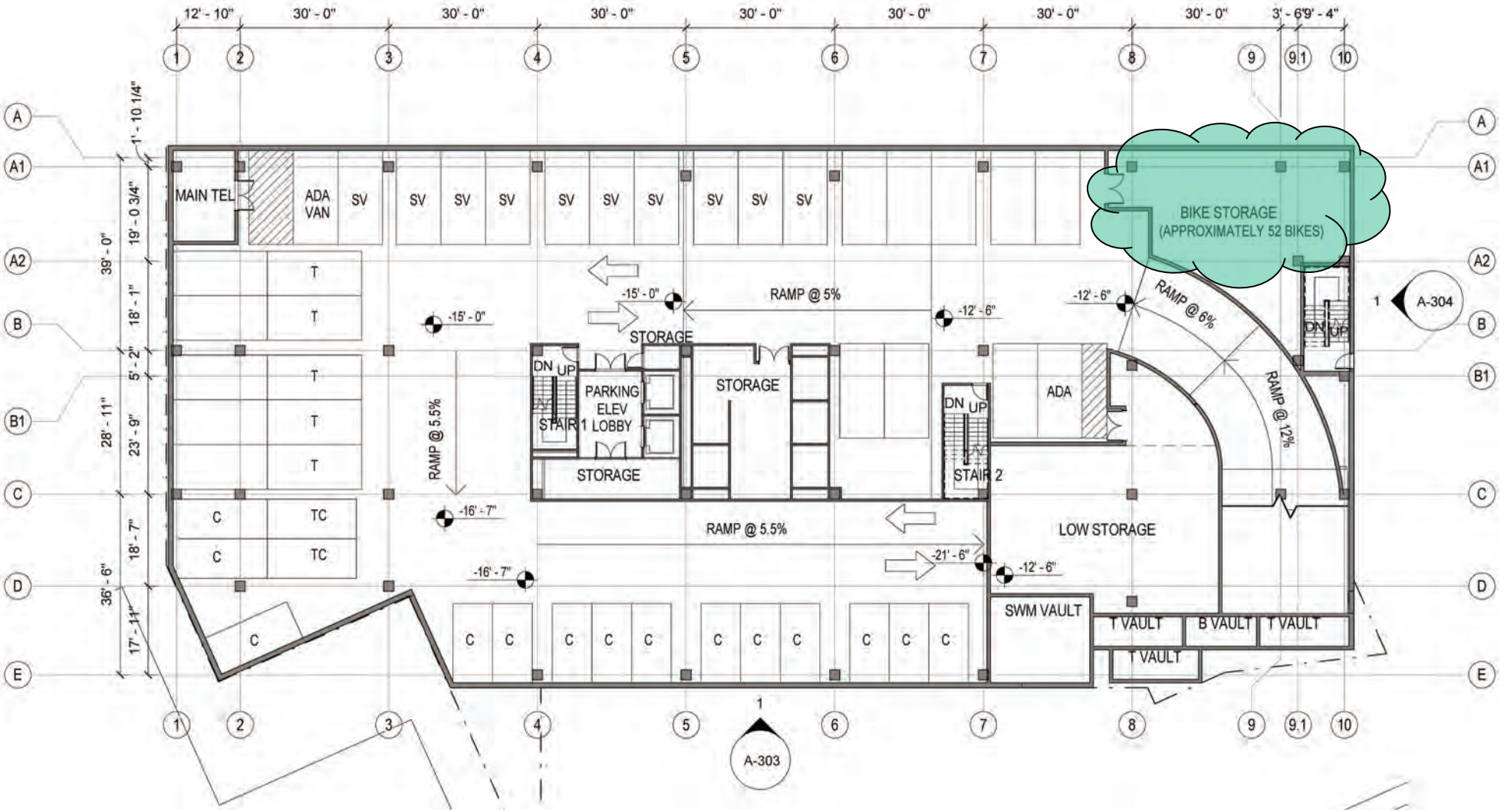
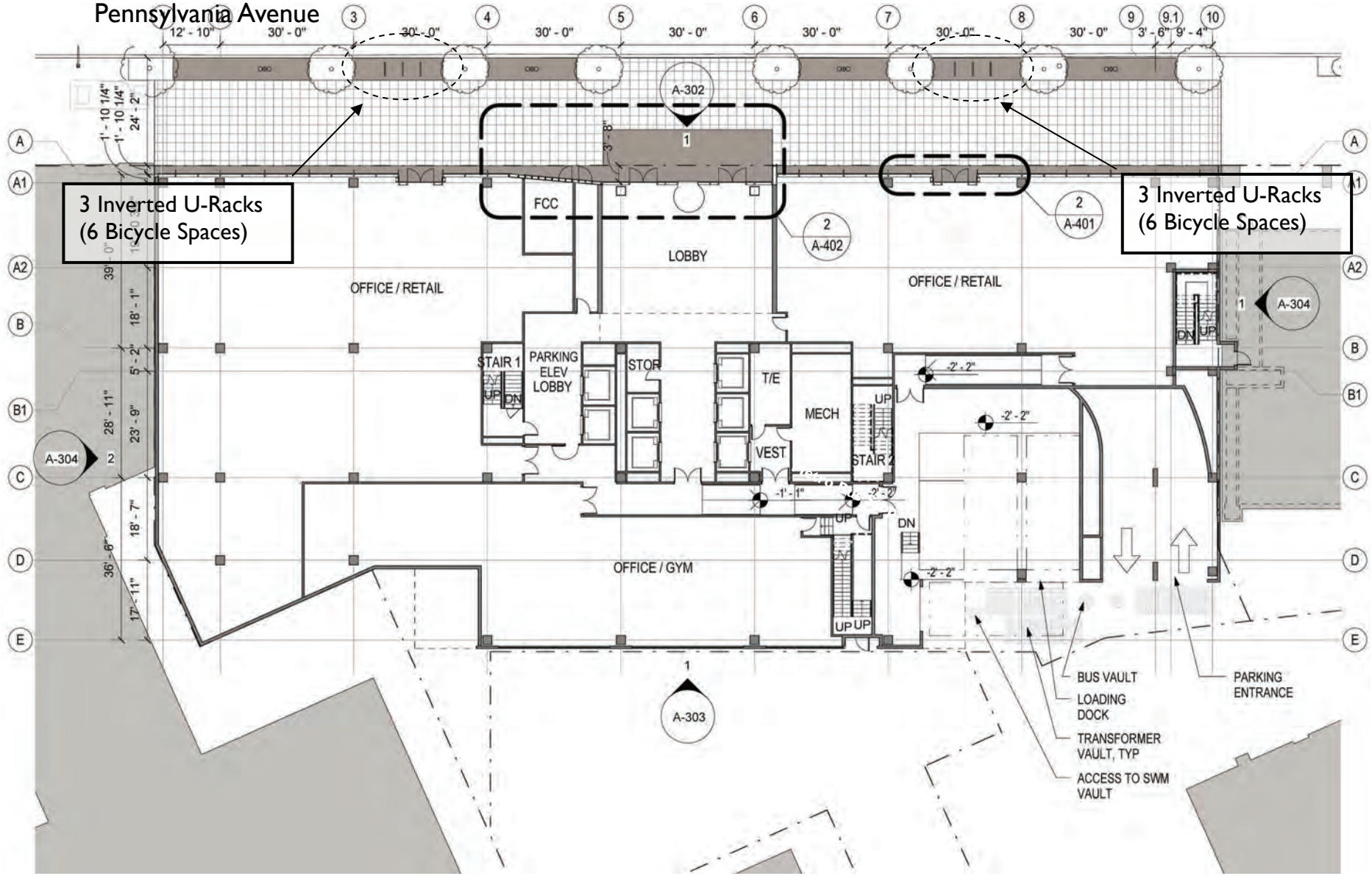


Source: Gensler

Figure 5-4A
Proposed Bicycle Parking in P1 Garage Level

North



Source: Gensler

Figure 5-4B
Proposed Bicycle Parking in Public Space

North

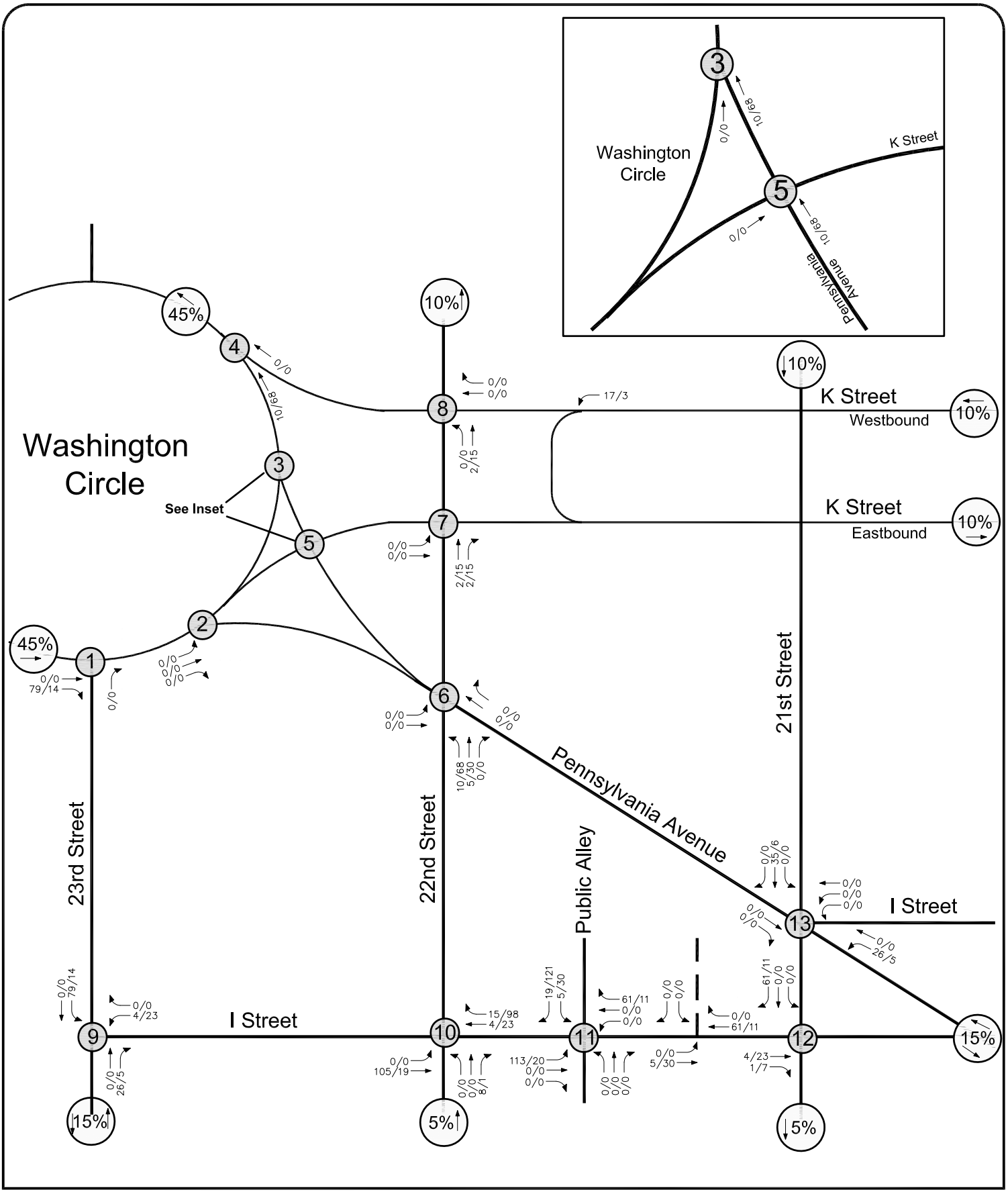


Figure 5-5A
Site Distribution and Assignment
for Proposed Development

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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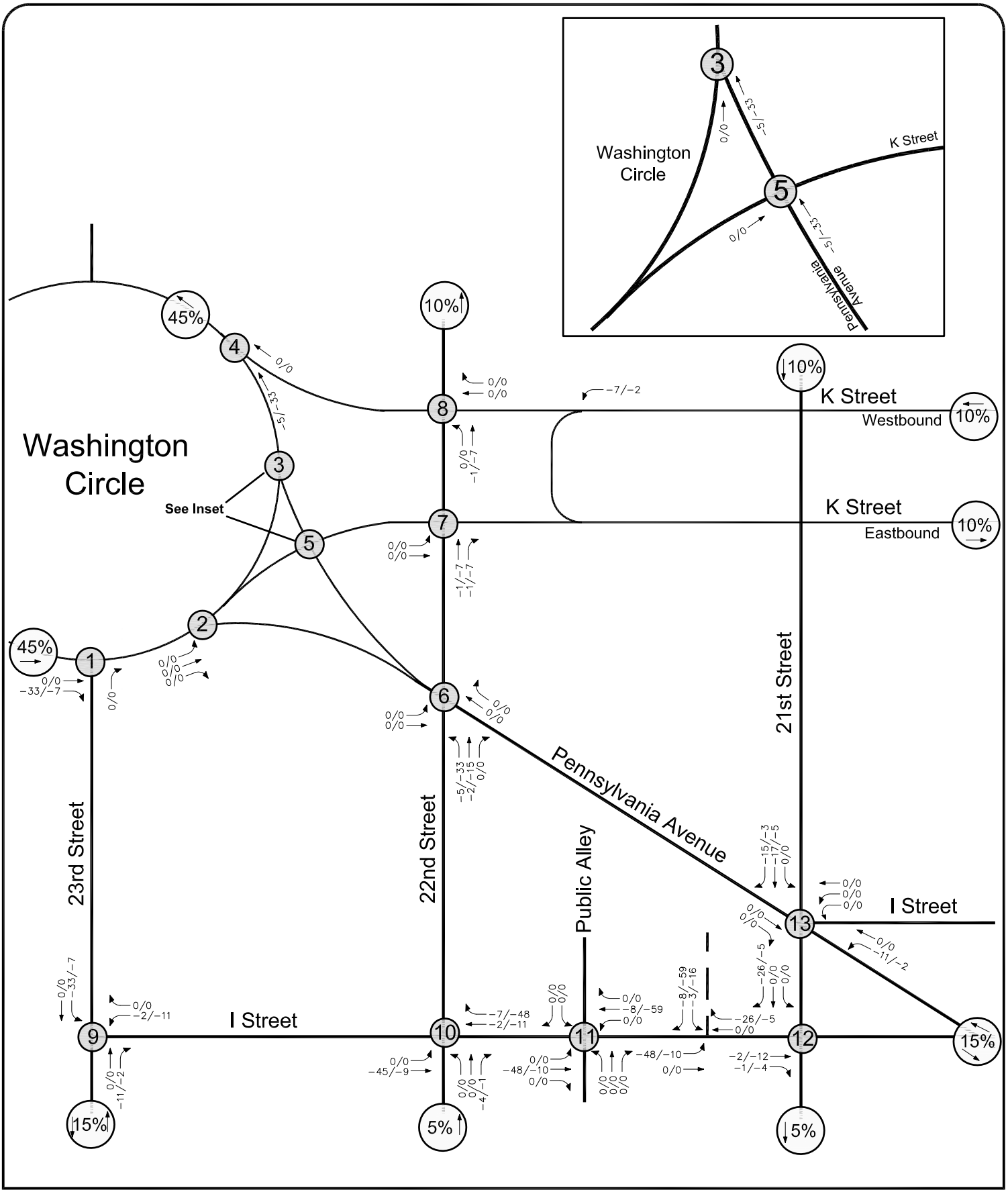

Figure 5-5B
Trip Distribution and Assignment
for Existing Buildings to be Demolished

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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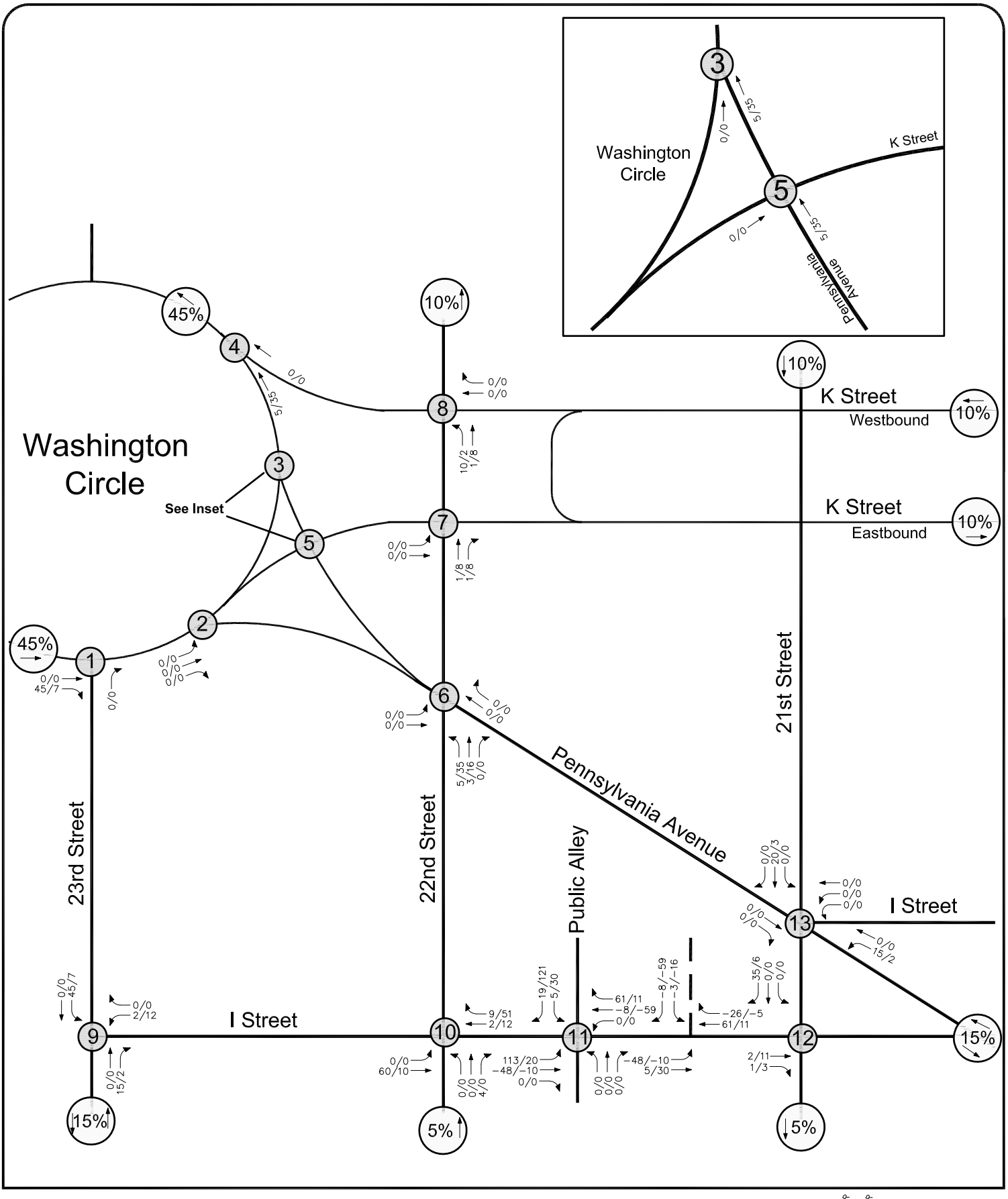

Figure 5-5C
Net Site Trip Distribution and Assignment

AM PEAK HOUR
PM PEAK HOUR
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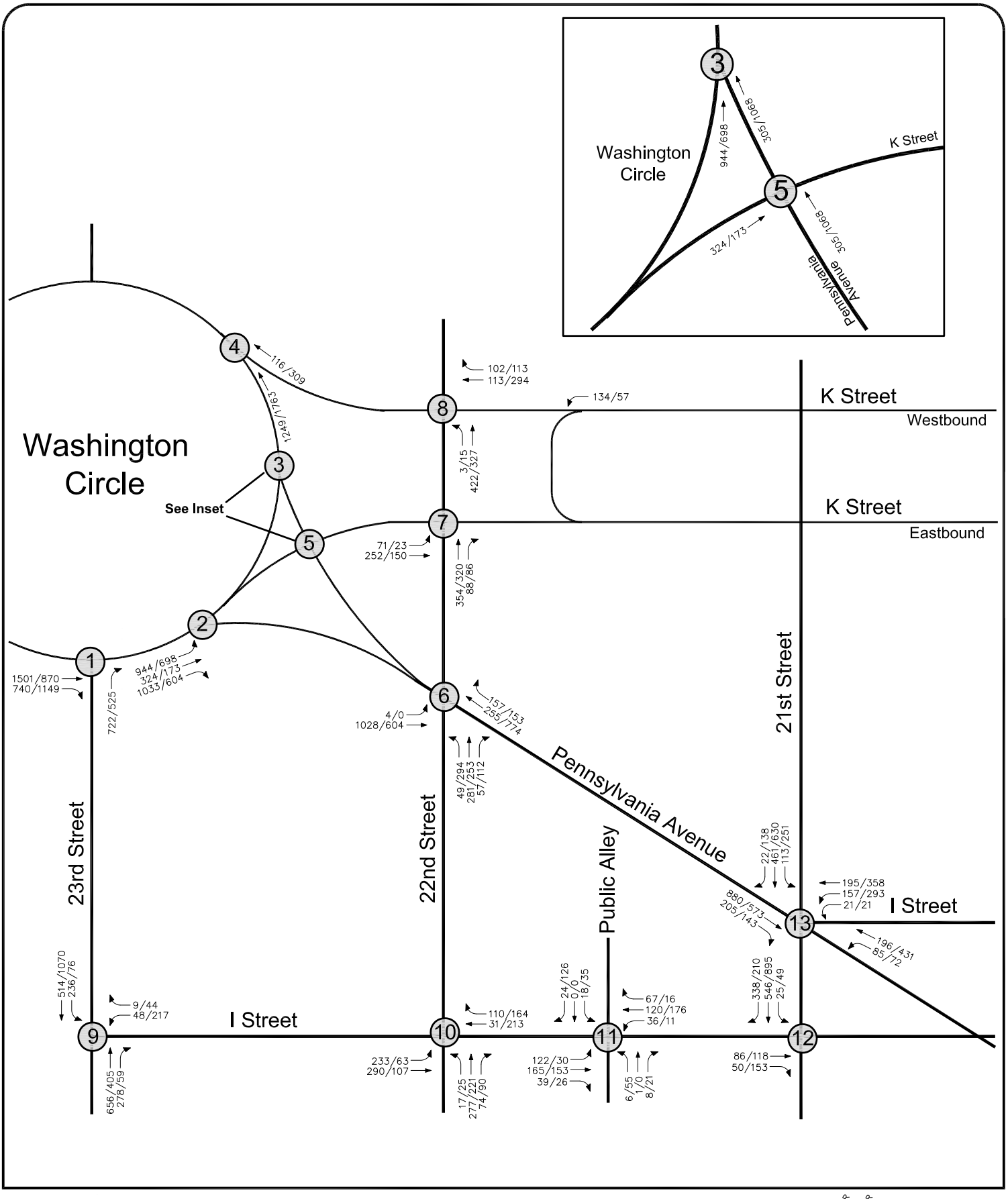

Figure 6-1
2020 Total Future Peak Hour Traffic Forecasts

AM PEAK HOUR
PM PEAK HOUR
000/000

North

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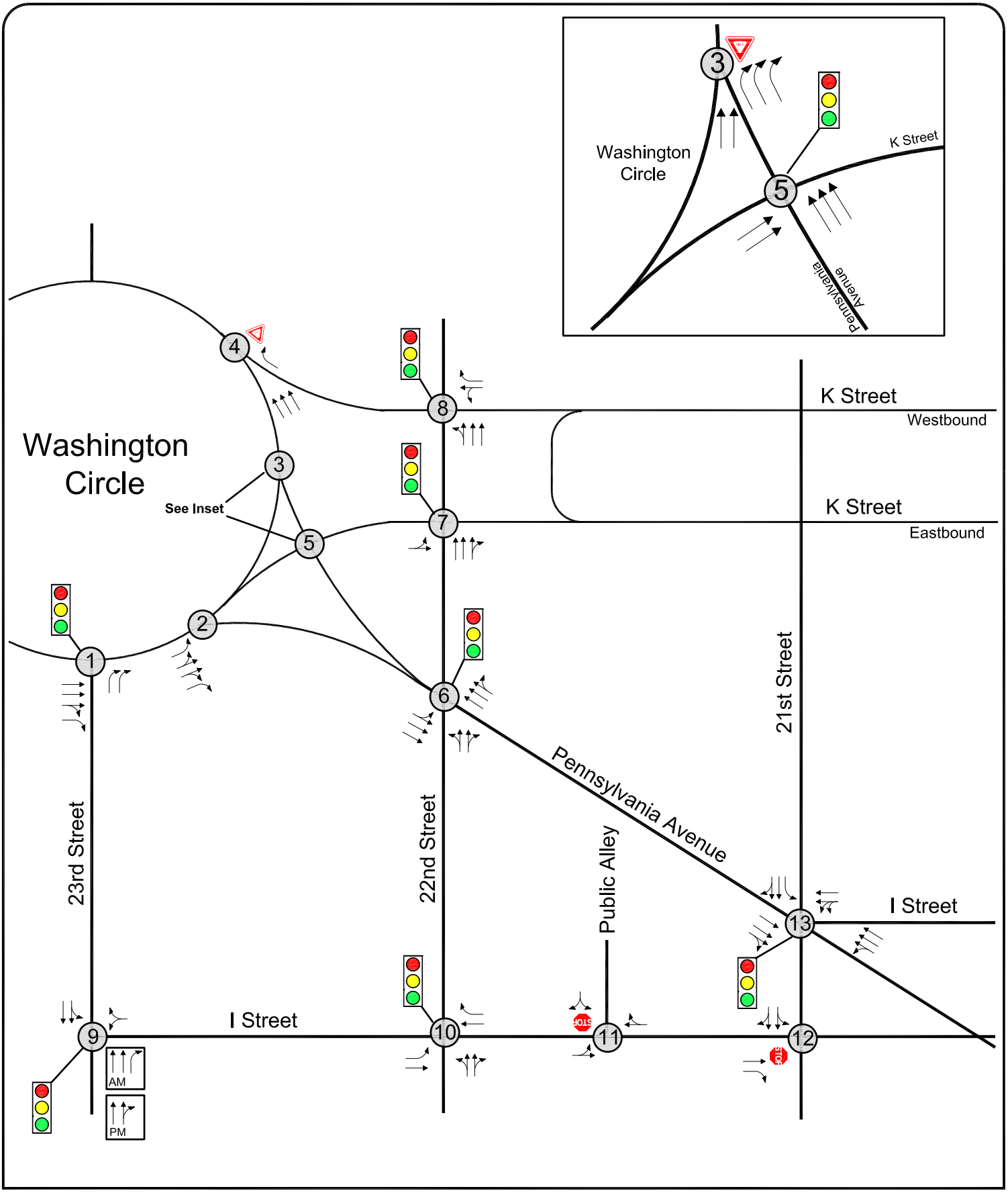

Figure 7-1
2020 Total Future Lane Use and Traffic Control
with Recommended Improvements

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