
Transportation Impact Study for Second-Stage PUD Application

**The George Washington University
Square 103 Development Site – Phase 1**

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EXECUTIVE SUMMARY

This report presents the findings of a Transportation Impact Study (TIS) conducted for second-stage approval of a Planned Unit Development (PUD) for The George Washington University Square 103 Development Site – Phase I (the “Project”) located on the property known as Square 103 in Northwest Washington, DC. The property is owned by The George Washington University and is located within the boundaries of the *2007 Foggy Bottom Campus Plan*. The proposed site plan consists of the construction of a below-grade seminar/teaching facility, a below-grade parking structure, and a temporary surface parking lot. A second phase of development will be constructed on the temporary surface lot at a later date. The site is currently utilized by The George Washington University for several uses, including student residences, surface parking, and academic departmental uses.

The first phase of the Project will consist of a below-grade seminar/teaching facility with 23,281 SF of space, five stories of below-grade parking with 392 spaces, and a surface level with an additional 58 temporary parking spaces and ancillary support space. The 450 parking spaces will be occupied by existing users relocated from the University Parking Garage, located on Square 55, which is being redeveloped, and other University parking facilities based on the future parking supply and demand. Access for the parking garage and surface parking lot will be from a single access drive located in the public alley. The second phase of the Project would construct academic space for the Law School, but this phase is not currently scheduled and is therefore not analyzed in this report.

A review of the proposed redevelopment plan found the second-stage PUD application consistent with the goals outlined in the Campus Plan and compliant with the conditions outlined in the First-Stage PUD approval. These include:

- The relocated parking will help to meet the goal of the Campus Plan to disperse University trips throughout the campus, rather than concentrating them at central locations.
- The proposed project will satisfy the requirements outlined in the Transportation Management Plan (TMP), including GW parking facility passes and the on-campus pre-tax deduction program for employees. Covered, secured bicycle parking will also be provided.
- The construction of the below-grade parking facility will assist the University in maintaining the minimum parking supply of 2,800 spaces, while allowing for future above-grade development.

A review of the proposed redevelopment site found the following:

- Traffic in the study area is heavily commuter-based, especially on 20th Street during the morning peak hour. Vehicular volumes are high northbound in the morning and southbound in the evening. Traffic controls in the area are oriented in order to aid in the progression of traffic through the study area, as well as to provide controlled crossings for pedestrians.
- Other roadways in the study area had limited activity, including vehicles, pedestrians and cyclists.
- The commuter-based traffic on 20th Street during the morning peak hours travels at relatively high observed speeds.
- Bicycling conditions in the study area are fair to poor and few cyclists were observed during site visits. There are few existing on or off-street bicycle facilities, but DDOT’s proposed bicycle facilities map includes new on-street bike lanes and multi-use trails that would link the site with local and regional destinations, which could significantly increase the number of trips made by bicycle.

- The site is well-served by public transit. It is located four blocks from the Foggy Bottom-GWU Metrorail station. Multiple Metrobus routes serve the site, with stops adjacent to or near the site. GW shuttles also serve the study area.

Based on these findings and the nature of the proposed Project, it appears that most regional trips to and from the site will be made by private automobile, traveling to the below-grade garage. The majority of visitors to the seminar and teaching facility will be faculty and students walking from adjacent academic spaces on campus.

The proposed development will have a limited impact to pedestrian and bicycle conditions. Pedestrian traffic will be generated by people travelling to and from the parking garage and seminar/teaching facility, but the amount of pedestrians will not be at a sufficient level to negatively impact pedestrian conditions in the study area. The parking garage will include bicycle parking, which can increase the bicycle activity to the site over existing conditions without a negative impact to the study area.

A capacity analysis was performed within a study area of six intersections; the results were as follows.

- All study area intersections operate at acceptable levels of service in the future with the proposed development. Neither the commuter-based traffic nor the local neighborhood based traffic will be negatively affected by vehicle trips generated by the Project.
- The site access drive will operate at acceptable levels of service.
- The approach of the intersection of 21st Street and the Alley will operate at a LOS F during the afternoon peak hour. This is due to the high volumes of pedestrians combined with heavy commuter traffic volumes.

No mitigation measures are necessary to alleviate this delay, because the negative impact of this condition is limited to drivers leaving the redevelopment site. There are no negative impacts to the study area and surrounding land uses. Thus, no traffic management measures are needed to mitigate impacts of site-generated traffic.

INTRODUCTION

This report presents the findings of a Transportation Impact Study (TIS) conducted for second-stage approval of a Planned Unit Development (PUD) for The George Washington University Square 103 Development Site – Phase I located on the property known as Square 103 in Northwest Washington, DC. The property is owned by The George Washington University and is located within the boundaries of the *2007 Foggy Bottom Campus Plan*.

The site will be developed in two phases. The first phase consists of the construction of a below-grade seminar/teaching facility, five stories of below-grade parking, and a surface level with temporary parking spaces and ancillary support space. The parking spaces will be occupied by existing users relocated from the University Parking Garage and other University parking facilities based on future parking supply and demand. Access for the parking garage will be from a single access drive located in the public alley. The second phase of the project would construct academic space for the Law School, but this phase is not currently scheduled, and is therefore not analyzed in this report. Figure 1 shows a map of the site location.

The site is currently utilized by the University for several uses, including student residences, parking for the University Police department and other University vehicles, and academic departmental uses. Existing vehicular uses are being relocated to other sites on campus. Residential uses are being relocated to a recently renovated space on campus, and academic uses are moving to a temporary lease space. All of the existing site vehicular uses are accessed from the public alley that bisects the block, east to west.

The primary objectives of this study are to evaluate the transportation conditions near the proposed Project, to confirm the development's consistency with the Campus Plan (first-stage PUD approval), and to identify the impacts to the transportation network due to the development. This report focuses on the existing transportation network within the vicinity of the site, the transportation elements of the proposed development, and the possible impacts to the transportation network.

Gorove/Slade performed the following steps while preparing the study:

- Performed field reconnaissance of existing roadway and intersection geometrics, traffic controls, speed limits, and operations;
- Observed traffic conditions during the morning and afternoon peak periods on a typical weekday;
- Conducted peak hour turning movement counts at study intersections;
- Analyzed the existing transportation network;
- Described and quantified the impacts of other (non-Project) development and infrastructure changes on the future transportation network;
- Calculated the trip generation for the proposed development based on trip generation rates estimated from the *George Washington University Foggy Bottom Campus Plan: Years 2006-2025 (later known as the 2007 Foggy Bottom Campus Plan)*;
- Detailed the transportation elements of the proposed Project, including pedestrian and vehicular access;
- Forecasted future traffic volumes with and without the proposed Project;
- Estimated the difference in peak hour traffic with and without the proposed Project;
- Calculated future levels of service at the study intersections with and without the proposed Project; and

- Recommended mitigation measures, if necessary, based on the future transportation analysis.

Sources of data for this study include traffic counts and observations conducted by Gorove/Slade; The *George Washington University Foggy Bottom Campus Plan: Years 2006-2025*; the Transportation Impact Study prepared by Wells & Associates, the Project for the Campus Plan; schematic design plans prepared Perkins + Will/Shalom Baranes Associates Architects; studies by WMATA and ITE; and the files/library of Gorove/Slade.

Scope of Traffic Study

This traffic impact analysis was conducted in accordance with Section 2406.12 of Title 11 of the DC Municipal Regulations for a second-stage PUD approval. This TIS, combined with the site plan package part of the submittal, contains the elements required for a second-stage PUD application. This study provides information on the transportation elements of the proposed Project to help understand the final design of the proposal, as well as shows how the second-stage PUD plans are in accordance with the intent and purposes of this title, the PUD process, and the first-stage approval.

Section 2406.12 does not list a detailed capacity analysis as a requirement of a second-stage PUD approval, as traditionally, the analyses performed for the first-stage PUD application are sufficient. However, for this development, due to the wide scope of the Campus Plan (first-stage PUD), a smaller-scale capacity analysis of the intersections in the immediate vicinity of the site is included in this application. This analysis was performed in order to identify any capacity concerns not previously identified in the Campus Plan, including examining the two intersections of 20th and 21st Streets with the Public Alley, which were not previously identified for study. This TIS identifies the scope of the study intersections located in the immediate vicinity of the Project and narrows the horizon year of the analysis in comparison with the Campus Plan.

Six study intersections were chosen for the capacity analyses based on their proximity to the proposed Project. As shown on Figure 2, the following intersections were identified:

- 21st Street NW and G Street NW (signalized)
- 20th Street NW and G Street NW (signalized)
- 21st Street NW and Public Alley (unsignalized)
- 20th Street NW and Public Alley (unsignalized)
- 21st Street NW and F Street NW (signalized)
- 20th Street NW and F Street NW (signalized)

Levels of service (LOS) were calculated for the intersections in the study area using the Highway Capacity Manual (HCM) methodology using the *Synchro, Version 7* software.

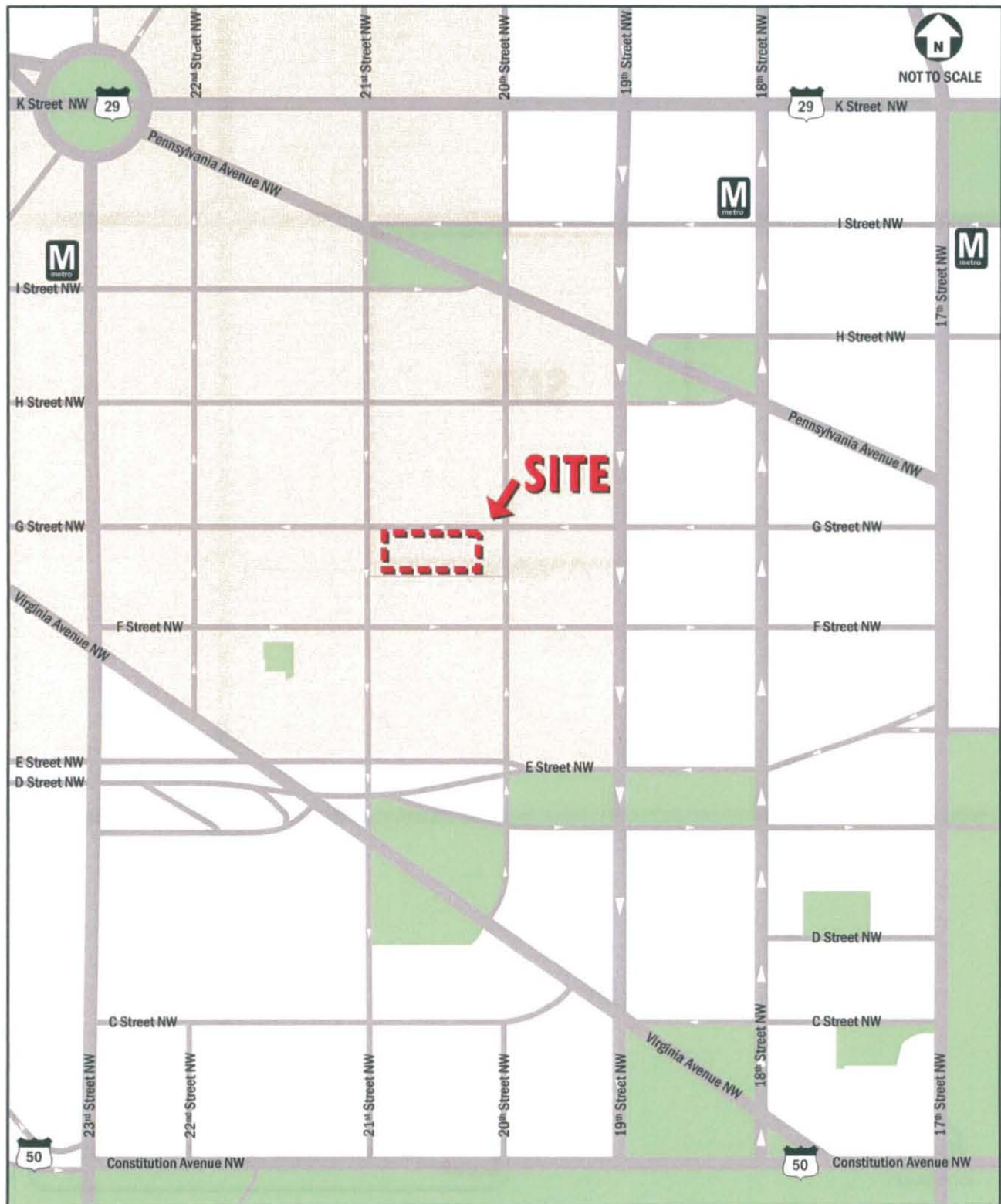


Figure 1: Location Map

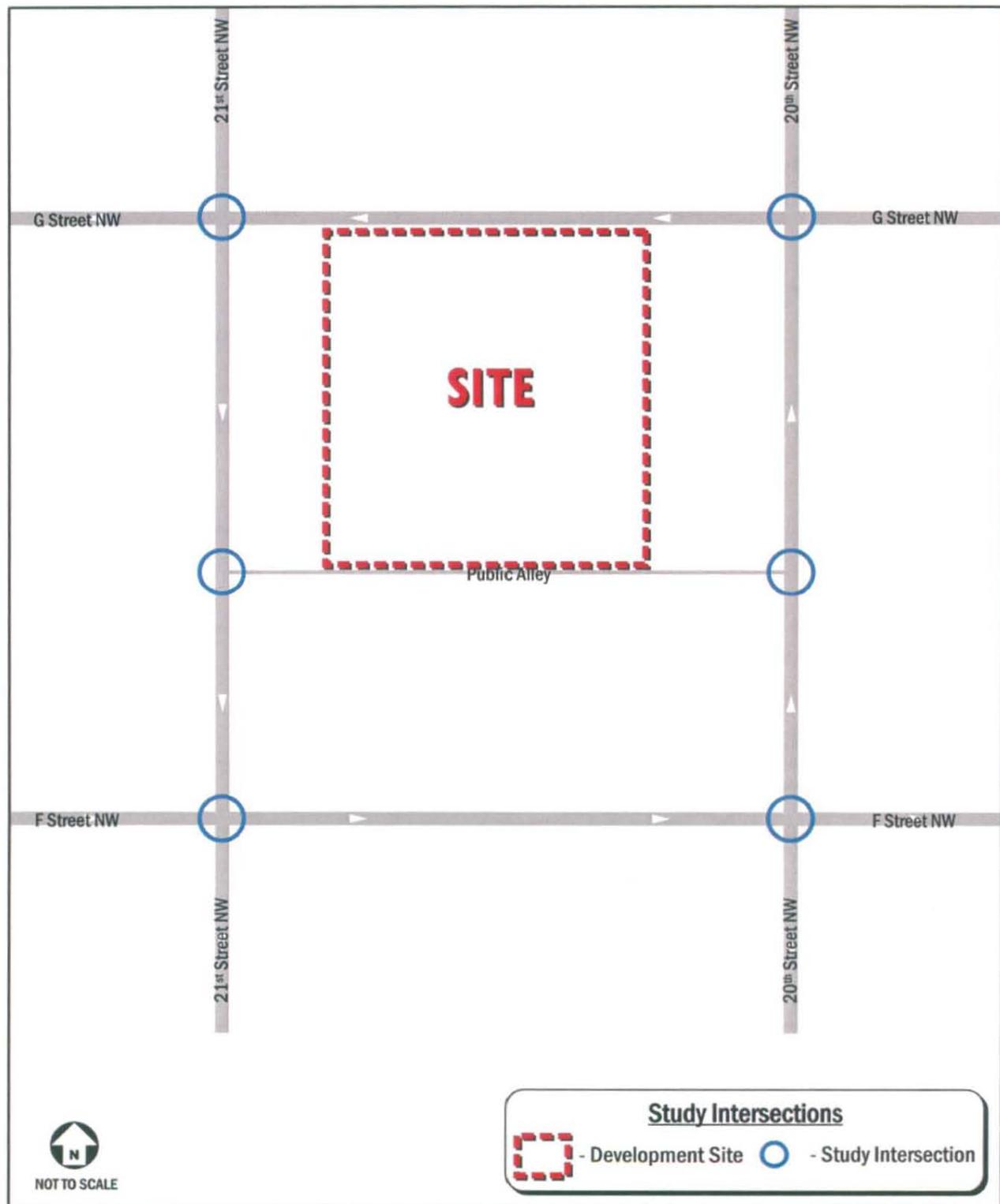


Figure 2: Study Intersections

CONSISTENCY WITH FIRST-STAGE PUD APPROVAL

Development of The George Washington University Foggy Bottom campus is currently governed by the *2007 Foggy Bottom Campus Plan*, which was approved by the Zoning Commission in conjunction with a First-Stage PUD with relating Zoning Map amendments in March 2007. The Campus Plan included a Traffic Impact Study (TIS), prepared by Wells & Associates, the Project that evaluated traffic and parking for the Foggy Bottom campus. The study area was bound by 19th Street on the east, 24th Street on the west, Washington Circle and Pennsylvania Avenue on the north, and F Street on the south and included all intersections that could potentially be affected by the Campus Plan. The Campus Plan TIS identified the following recommendations:

Proposed Future Parking Supply

The proposed future parking supply was identified to remain at the existing 2,800-space minimum requirement (established in prior Campus Plans). Instead of building a few large parking structures, the study recommended parking structures be located throughout the campus in order to minimize impact on the surrounding neighborhoods and to provide convenient access to major roadways. This application fits within this recommendation, as the underground parking on the site will replace, in part, the parking removed from Square 55 upon redevelopment on that block and removal of the University Parking Garage.

Capacity Analysis and Recommended Improvements

The Campus Plan TIS calculated a modest increase in traffic volumes for the Foggy Bottom Campus. The main impact would develop from a dispersal of existing and new University trips throughout the campus, rather than concentrating them at specific locations. Several improvements were identified to mitigate the increase in traffic at some intersections in the study area, including signal timing improvements, new traffic signals, and eliminating on-street parking at a few locations. No improvements were recommended at the six study intersections included in this report.

Pedestrian Plan

The Campus Plan included a network of informal pedestrian-oriented pathways throughout the Foggy Bottom campus, which would complement the existing sidewalks and provide more direct pedestrian linkages. Special treatments were identified as being potentially appropriate at the mid-block crossings on G and H Streets. The proposed Project site plan is consistent with this recommendation.

Transportation Management Plan (TMP)

The TMP was created in order to promote safe and efficient traffic operation within the campus, maximize the use of off-street parking facilities, and implement effective shuttle service on- and off-campus. The TMP included a public transportation pass to offer pre-tax benefits to employees to promote the use of public transportation, GW parking facility passes to be sold to students and employees that drive and park on-campus, a carpool program, pre-tax deduction programs for on-campus parking fees for employees, an attendant parking program for special events, and when class attendance is high, and a shuttle bus service plan. Recommended improvements to the TMP included an enhanced public transportation program for special events, a pedestrian and bicycle program, a parking management plan to meet campus parking demands during construction, a truck management program to reduce the impact of delivery trucks on campus roadways, and a special events management program to encourage careful scheduling of large on-campus events. The proposed Project site plan is consistent with this recommendation.

As stated previously, the *2007 Foggy Bottom Campus Plan* was approved for Special Exemption and as a First-Stage PUD with relating Zoning Map amendments in March 2007 by Zoning Commission Order No. 06-11/06-12. This approval identified several conditions for approval. The following conditions were set forth in regards to parking and traffic¹:

Condition C-13

The University shall implement several measures to minimize the adverse impacts associated with parking and traffic, including support of mass transit, continued supply of at least 2,800 off-street parking spaces, recording all student vehicles kept in University parking facilities, and prohibiting freshman and sophomore students from bringing a vehicle to the University.

Condition C-14

The University shall maintain and periodically update its Transportation Management Plan addressing traffic and parking. In addition to the measures described in the Campus Plan TIS, the TMP shall also include measures to encourage travel by public transportation, to encourage persons who drive to park in University facilities, to designate a Transportation Management Coordinator, and to promote various technology initiatives to reduce the need to travel to the University.

Condition C-15

The University shall file a Foggy Bottom Campus Plan Compliance Report on November 20 of each year including the current inventory of University-owned parking spaces and other evidence of compliance with Condition C-13 and information evidencing compliance with Condition C-14.

The proposed Project is consistent with the first-stage PUD approval of the Campus Plan. The first phase of development identified in this report and application specifically follows the parking structure recommendations outlined in the Campus Plan TIS. In total, the Project will provide approximately 392 new spaces in the underground garage as well as 58 additional interim surface parking spaces, for a total of approximately 450 parking spaces. This additional parking will help meet the goal of the Campus Plan capacity analysis to disperse University trips throughout the campus, rather than concentrated at specific locations.

Additionally, the proposed Project is consistent with the conditions (C-13, C-14, and C-15) identified by the Special Exemption and as a First-Stage PUD Approval. The first phase of development identified in this report and application follows Condition C-13 and Condition C-14 by providing University-owned parking spaces to employees, which will be relocated from the University Parking Garage. The construction of the below-grade parking facility will allow the University to maintain the minimum parking supply, while allowing for future above-grade development. The parking facility will also provide a new location for employees to park in University-owned facilities. The University has also followed Condition C-15 by publishing the 2009 Foggy Bottom Campus Plan Compliance Report, which records the total number of University-provided off-street parking spaces located in the areas covered under this condition as 3,769².

¹ Zoning Commission Order No. 06-11/06-12 for Z.C Cases No. 06-11 and 06-11: Applications of George Washington University for Special Exemption Approval of a Campus Plan and for Approval of a First-Stage Planned Unit Development and Related Zoning Map Amendments for the Foggy Bottom Campus; March 12, 2007

² Foggy Bottom Campus Plan Compliance Report, Foggy Bottom Campus Plan (2007), Zoning Commission Case Nos. 06-11 and 06-12 as directed by Condition C-15; November 20, 2009

EXISTING CONDITIONS

A review of existing conditions determines if any areas of concern or opportunity exist within the transportation network. Analysis of the existing conditions also establishes a point of reference for the analysis of the future traffic conditions.

Roadway Network

The proposed site is bordered by G Street on the north, a public alley on the south, 21st Street on the west and 20th Street on the east. The four heavily trafficked streets surrounding the development include G Street, F Street, 21st Street, and 20th Street. Figure 3 shows the street network hierarchy and annual daily traffic volumes for the roadways in the study area.

The immediate study area of the Project has several key local access roads. These include:

G Street

G Street is a three-lane arterial that runs westbound in the vicinity of the site. On-street parking is provided at all times on both sides of the roadway, reducing it to one travel lane. Parking restrictions near intersections allow for short turn lanes. DDOT classifies G Street as a collector with an average daily traffic of 2,200 vehicles between 20th and 21st Streets and 1,600 vehicles east of 20th Street. Within the limits of the study area, G Street runs from 20th Street to 21st Street.

F Street

F Street is a three-lane arterial that runs eastbound in the vicinity of the site. On-street parking is provided at all times on both sides of the roadway, reducing it to one travel lane. Parking restrictions near intersections allow for short turn lanes. DDOT classifies F Street as a collector with an average daily traffic of 2,600 vehicles west of 21st Street and 1,800 vehicles between 20th and 21st Streets. Within the limits of the study area, F Street runs from 20th Street to 21st Street.

21st Street

21st Street is a three-lane arterial that runs southbound in the vicinity of the site. On-street parking is provided at all times on both sides of the roadway, reducing it to one travel lane. Parking restrictions near intersections allow for short turn lanes. DDOT classifies 21st Street as a collector with an average daily traffic of 6,400 vehicles north of G Street and 7,100 vehicles south of G Street. Within the limits of the study area, 21st Street runs from G Street to F Street.

20th Street

20th Street is a three-lane arterial that runs northbound in the vicinity of the site. On-street parking on both sides of the roadway reduces the roadway to one travel lane, except during the morning peak period, when parking is prohibited and the arterial provides three travel lanes. Parking restrictions near intersections allow for short turn lanes during times when parking is allowed on-street. DDOT classifies 20th Street as a minor arterial with an average daily traffic of 15,000 vehicles north of F Street and 10,400 vehicles south of F Street. Within the limits of the study area, 20th Street runs from G Street to F Street.

Public Alley

The public alley is a sixteen (16) foot wide two-lane roadway that runs east-west along the southern border of the site. Within the limits of the study area, the public alley runs between 21st Street and 20th Street.

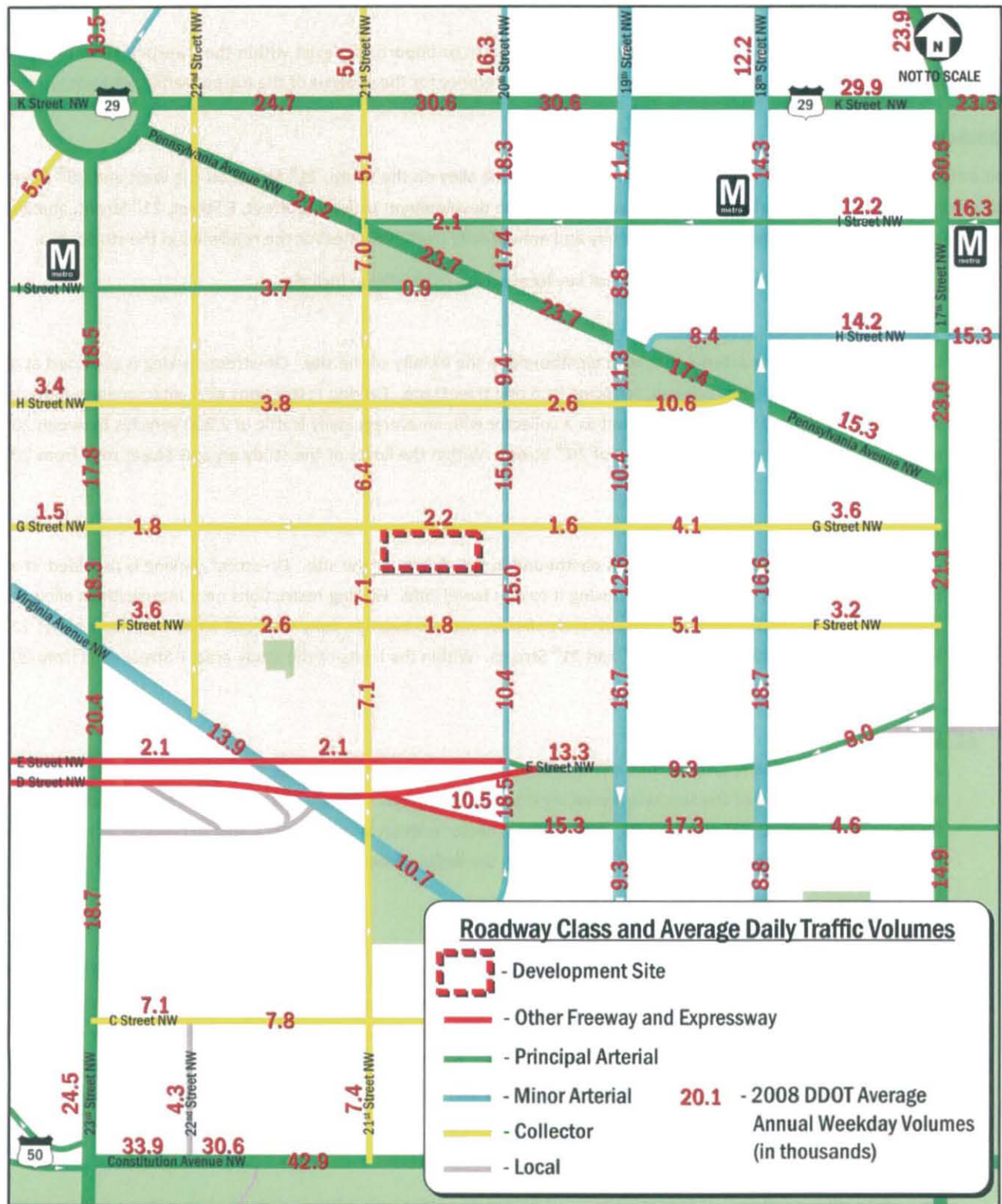


Figure 3: Roadway Classification and Average Daily Traffic

Gorove/Slade conducted field reconnaissance to obtain the existing lane configurations and traffic controls at the intersections within the study area, shown on Figure 4.

Traffic Observations

Observations of the study intersections were performed by Gorove/Slade in order to assess the existing operations of the roadway network. During these observation periods, remarks were noted in regards to signal operation, vehicular queuing, and pedestrian activity. The study area was observed on Tuesday, January 19, 2010 between 5:30 and 6:30 PM and on Thursday, January 28, 2010 between 8:00 and 9:00 AM. During these observation periods, the University was in full operation with classes in session and no inclement weather occurred.

Morning Peak Hour

During the morning peak hour observations, all study intersections appeared to operate at acceptable conditions. The majority of vehicles were observed traveling on or towards northbound 20th Street. Moderate queues were observed for the northbound approaches along 20th Street, but these queues appeared to be served by the green time provided by the traffic signal. Vehicles traveling on F, G, and 21st Streets did not appear to incur significant delay or queue development. The majority of vehicles traveling along F Street appeared to be driving in excess of the speed limit (25 mph). Very few vehicles were observed accessing the Public Alley. A few vehicles observed travelling through the alley appeared to be using it as a short-cut to change direction (because of the one-way street pattern). Other vehicles appeared to be delivery or University vehicles.

Afternoon Peak Hour

During the after peak hour observations, all study intersections appeared to operate at acceptable conditions. The majority of vehicles were observed traveling on or towards southbound 21st Street and westbound G Street. Moderate queues were observed for the southbound approaches along 21st Street and at the westbound approaches along G Street, but these queues appeared to be served by the green time provided by the traffic signal. Vehicles traveling on F and 21st Streets did not appear to incur significant delay or queue development. Very few vehicles were observed accessing the Public Alley. A few vehicles observed travelling through the alley appeared to be using it as a short-cut to change direction (because of the one-way street pattern). Other vehicles appeared to be delivery or University vehicles.

Pedestrian Facilities

The existing site for the proposed Project provides satisfactory pedestrian facilities and connectivity throughout the study area. Sidewalks are located on all block faces along the roadway network with crosswalks linking segments at the intersections located within the study area. Adequate crosswalks are provided at each of the study intersections. Controlled crosswalks are provided along all approaches at the signalized intersections in the study area. No sidewalks or other pedestrian facilities are provided within the alley.

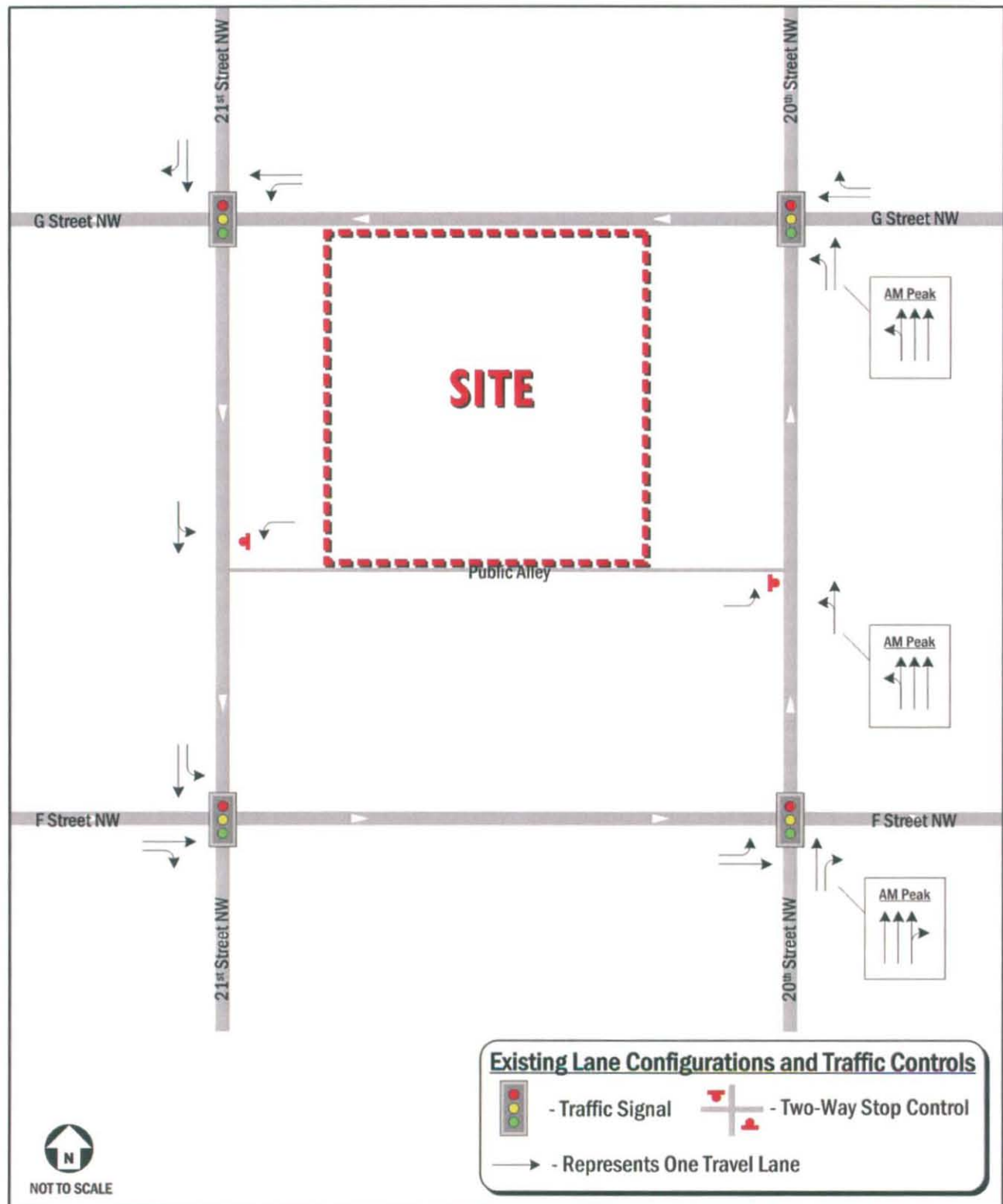


Figure 4: Existing Traffic Controls and Lane Configurations

The signalized intersections located within the study area have well-striped crosswalks with illuminated pedestrian signals at each approach. Due to the short cycle lengths provided at the signalized intersections (50 and 100 seconds) and the effective green time provided to pedestrians in the study area, the pedestrian level of service (LOS) at all signalized intersections is C or better, corresponding to less than 30 seconds of delay³.

During the observation periods, high pedestrian volumes were observed on the sidewalks within the study area. The majority of the pedestrians observed appeared to be students of the University. The pedestrians generally obeyed the controlled crosswalks at the study intersections. However, some pedestrian were observed crossing at the end of a flashing “Do Not Walk” signal, slightly delaying oncoming vehicles. A few pedestrians were observed jaywalking, mostly mid-block along F, G, 20th, and 21st Streets during gaps in traffic or between stopped vehicles queued at an intersection.

Bicycle Facilities

According to DDOT’s March 2009 Bicycle Map, bicycle conditions in the study area vary between good, fair, and poor, as shown in Figure 5. Some local streets provide adequate cycling conditions and there is a multi-use trail along Constitution Avenue south of the study area, but there are few attractive routes for trips between the proposed site and major destinations, including the National Mall and downtown DC. The study area has several major roads with high traffic volumes and speeds, man-made and natural barriers, and a lack of bicycle facilities. Bicyclists share the roadway with traveling and parked vehicles in the majority of the study area.

During the site observations, very little bicycle activity was observed. Although only a few cyclists were observed on local streets surrounding the study area, these streets have lower vehicular volumes and could be conducive to bicycling to and from the site. DDOT’s proposed bicycle infrastructure for the study area includes several on-street bike lanes, several signed bicycle routes, an on-road separated bicycle facility, and an extension to the existing multi-use trail on Constitution Avenue. The facilities will significantly improve bicycling conditions in the study area and may lead to higher rates of cycling. They also link the site with major residential and commercial destination in downtown DC and beyond. Figure 6 illustrates proposed bicycle conditions. The Project will provide bicycle facilities to meet this need.

Transit Network

The Metrobus and Metrorail systems provide public transportation access to the Project. The nearest Metrorail station is Foggy Bottom, located approximately 0.4 miles from the proposed development. The blue and orange lines serve the Foggy Bottom Metrorail station, running approximately every three minutes during the morning and afternoon peak periods and every six to ten minutes during the weekday off-peak periods and on weekends.

Metrobus service is also accessible to the site, with stops near to the site on F and 21st Streets. The routes serving the sites mostly connect to other downtown locations. A few Metrobus routes provide service to the Foggy Bottom Metrorail station, as well as locations in Virginia, Maryland, and DC. Figure 7 shows the existing corridors served by Metrobus and Metro Extra/Express service. Shuttles operated by GW that circulate around the campus also serve the site. Additional service is provided by the DC Circulator and commuter busses from Maryland and Virginia.

During site observations, a limited number of transit riders were seen using the stops adjacent to the site. Buses appeared regularly and had adequate room to accommodate all riders waiting to board.

³ As calculated by equation 18-5 of the Highway Capacity Manual (HCM)

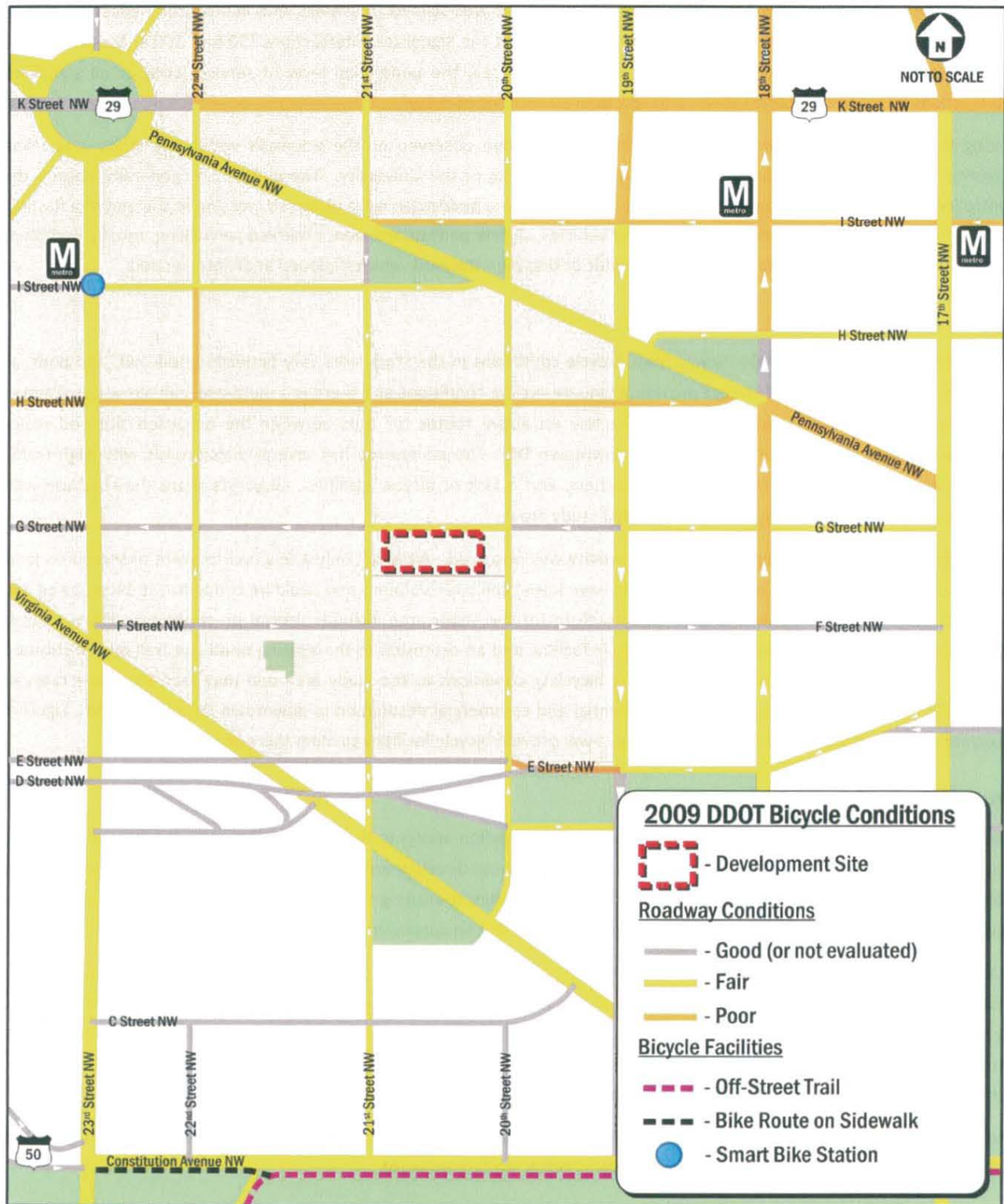


Figure 5: Existing Bicycle Conditions (DDOT Bike Map March 2009)

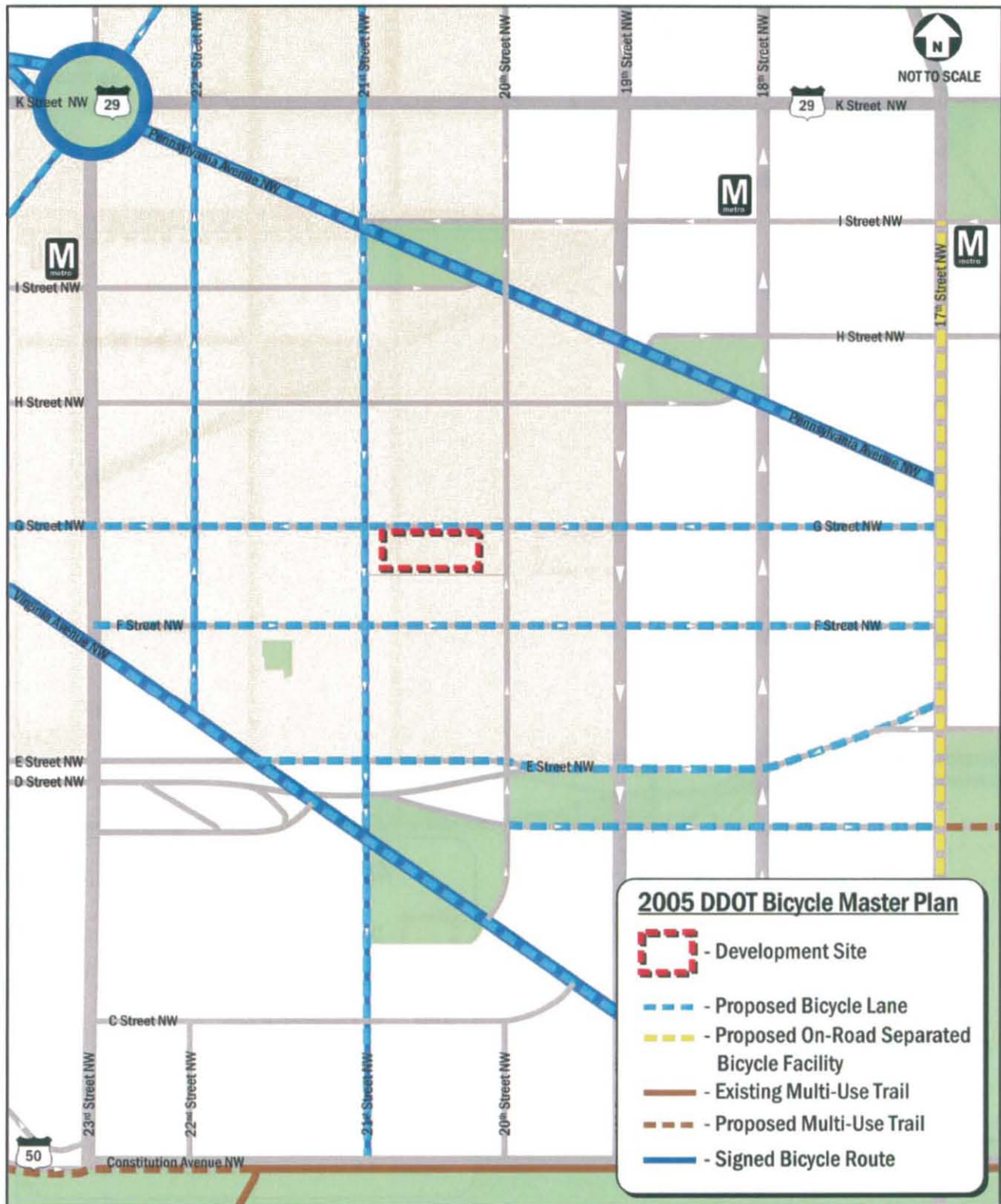


Figure 6: Proposed Bicycle Conditions (DDOT Bicycle Master Plan April 2005)

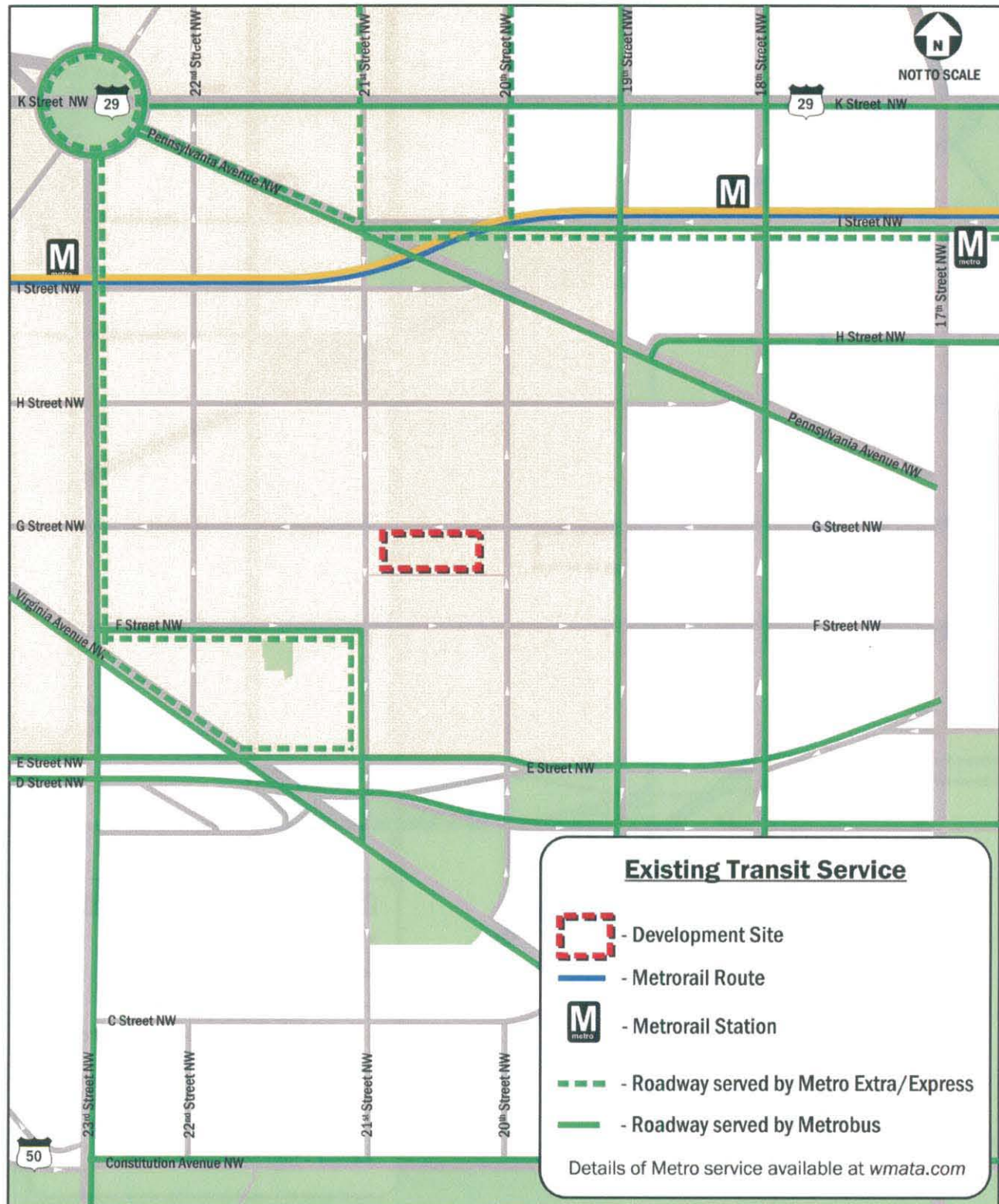


Figure 7: Existing Transit Service

Summary

A review of the proposed redevelopment site found the following:

- Traffic in the study area is heavily commuter-based, especially on 20th Street during the morning peak hour. Vehicular volumes are high northbound in the morning and southbound in the evening. Traffic controls in the area are oriented in order to aid in the progression of traffic through the study area, as well as to provide controlled crossings for pedestrians.
- Other roadways in the study area had limited activity, including vehicles, pedestrians and cyclists.
- The commuter-based traffic on 20th Street during the morning peak hours travels at relatively high observed speeds.
- Bicycling conditions in the study area are fair to poor and few cyclists were observed during site visits. There are few existing on or off-street bicycle facilities, but DDOT's proposed bicycle facilities map includes new on-street bike lanes and multi-use trails that would link the site with local and regional destinations, which could significantly increase the number of trips made by bicycle.
- The site is located near the Foggy Bottom-GWU Metrorail station.
- Multiple Metrobus routes serve the site, with stops adjacent to or near the site.

Based on these findings and the nature of the second-stage PUD, it appears that most regional trips to and from the site will be made by private automobile, traveling to the below-grade garage. It is expected that users of the academic and administrative portion of the project, however, will be traveling to the facility via Metrorail/Metrobus, walking, and bicycle.

DESCRIPTION OF PROPOSED DEVELOPMENT

Site Access and Circulation

Site access for the proposed Project will be provided from the public alley located between 20th and 21st Streets. The proposed driveway will be located along the public alley, which will provide access for vehicles to the below-ground parking deck. The public alley will also provide access for pedestrians. Additional pedestrian access will be provided along G Street.

A diagram of the site access and circulation is included in the Site Plan package. This submittal contains details and dimensions of the transportation design elements, including locations and dimensions of sidewalks, walkways, and driveways on-site.

Parking

The site will be served by approximately 450 parking spaces. The majority of the spaces (392) will be provided by five stories of below-grade parking. An additional 58 temporary parking spaces will be located on the surface level. The 450 parking spaces will likely be occupied by existing users relocated from the University Parking Garage, located on Square 55, which will be redeveloped as part of the Campus Plan. Additional uses may be relocated from other University garages according to future supply and demand. Access for the parking garage will be from a single access drive located in the public alley. Bicycle parking will be provided in the underground garage, and on the site streetscape. Refer to the Site Plan package that accompanies the Stage 2 application for details on these design elements.

Pedestrian and Bicycle Impacts

The proposed development will have a limited impact to pedestrian and bicycle conditions. Pedestrian traffic will be generated by people travelling to and from the parking garage and seminar/teaching facility, but the amount of pedestrians will not be at a sufficient level to negatively impact pedestrian conditions in the study area. The parking garage will include bicycle parking, which can increase the bicycle activity to the site over existing conditions without a negative impact to the study area. Additional interim Bicycle parking will also be provided at grade until Phase II is developed.

Trip Generation and Mode Split

Trips for the proposed Project were generated using data from the *2007 Foggy Bottom Campus Plan*. Counts for faculty/staff parking facilities were used to develop a trip generation rate for the proposed parking garage for the Project, which would serve as the primary traffic generator on site. Specifically, the parking facilities chosen for comparison were Warwick Lot, Ross Hall, and New Hall. These were selected because they are faculty/staff commuting facilities, which represent the highest possible trip generation rate among the type of users that could populate the Project's garage, and do not have a mix of users. Although the parking garage on site is projected to serve users relocated from the University Parking Garage, which accommodates visitors as well as faculty/staff, these lots were selected because they only have faculty/staff parking, which has the highest trip generation rate of all users. The possibility exists that all of the future users of the Project's garage will be faculty/staff, and thus a specific rate for faculty/staff was generated to estimate future traffic. The future traffic estimate with only faculty/staff parking, being the highest possible trip generation rate, also provides the most conservative calculation of the Project's impact.

Based on data provided in the *Campus Plan* documents, the trip generation per space rate developed for these faculty/staff lots was 0.65 trips per space in the morning peak hour (0.45 in and 0.20 out) and 0.55 trips per space in the afternoon peak hour (0.15 in and 0.40 out). Based on these rates, the parking spaces at the Project would generate a total of

approximately 295 trips in the morning peak hour (204 in and 91 out) and 250 trips in the afternoon peak hour (68 in and 182 out)⁴.

It should be noted that the drivers expected to park at the Project lots will be existing users relocated from the University Parking Garage and other University parking facilities. Thus, the overall number of cars driving to and from campus should remain the same. In order to be conservative, and to gain a better idea on the potential of impact to the intersections nearest the site, existing trips were not removed from the study area intersections.

Trip Distribution

The peak hour trips described previously were distributed through the study area based on the nature of the proposed development and regional traffic patterns. In addition, an assessment of the future roadway conditions was used to determine the routes that provide the most convenient access to the proposed development. Based on this review, the distribution for the site traffic and the resulting trip assignments are shown on Figure 8.

⁴ The parking count was 454 at the time of analysis.



CAPACITY ANALYSIS

Intersection capacity analyses were performed for the existing conditions, future conditions without development, and future conditions with development at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7.0* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay (of each approach) and LOS for the signalized intersections is also shown for an overall intersection LOS grade. The HCM does not give guidelines for calculating the average delay for a two-way stop-controlled intersection, as the approaches without stop signs would technically have no delay. The detailed analysis worksheets are contained in the Technical Appendix.

Existing Conditions Capacity Analysis

Traffic Volumes

In order to determine the peak hour turning movement traffic volumes, counts were performed for the study area intersections on Wednesday, January 21, 2010 between the hours of 6:00 to 9:00 AM and 4:00 to 7:00 PM. During these data collection periods, the University was in full operation with classes in session and no inclement weather occurred. The existing traffic volumes for the intersections contained within the study area are shown on Figure 9. Analysis of the existing traffic data determined that morning peak hour is from 8:00 to 9:00 AM, and the afternoon peak hour is from 5:30 to 6:30 PM. The count summaries are included in the Technical Appendix.

Capacity Analysis Results

The existing capacity analysis is based on the roadway network as shown in Figure 4 and the traffic volumes described above and shown previously on Figure 9. The results of the intersection capacity analyses are presented in Table 1.

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better on each approach. The capacity analysis of the existing conditions shows that the study area intersections operate at acceptable levels of service. All study intersections operate at a LOS of C or better during both the morning and afternoon peak hours, which confirms what was observed in the field.

Future Conditions without Development Capacity Analysis

Traffic Volumes

Future non-site traffic will be generated by increases in commuting traffic traversing the study area and traffic generated by nearby developments. A percentage growth of existing traffic volumes was employed to account for these volumes. The growth rate used was 0.5% compounded annually over a four-year period, equating to an overall growth of around 2%, and was applied to all study intersections.

The traffic volumes generated by the growth rate were added to the existing traffic volumes in order to establish the future traffic volumes without the proposed developments. The traffic volumes for the future conditions without development are shown on Figure 10.

Capacity Analysis Results

The capacity analysis for the future conditions without development is based on the existing roadway network and the traffic volumes shown previously on Figure 10. The results of the intersection capacity analyses are presented in Table 1.

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better on each approach. The capacity analysis of the future background conditions shows that the study area intersections would operate at acceptable levels of service. All study intersections operate at a LOS of C or better during both the morning and afternoon peak hours.

Future Conditions with Development Capacity Analysis

Traffic Volumes

The total future traffic volumes were calculated by: (1) removing the trips generated by the existing site uses and (2) adding the trips generated by the proposed redevelopment. The existing site use trips were determined based on the turning movement counts performed at either end of the alley. The traffic volumes for the total future scenario were generated by adding the site generated traffic volumes (as shown on Figure 8) to the 2014 future background traffic volumes (as shown on Figure 10) and subtracting the existing trips described above (as shown on Figure 11). The traffic volumes for the total future scenario are shown on Figure 12.

Capacity Analysis Results

The future roadway network is based on the existing configuration of the roadways in the study area with the addition of the site access point previously described. The capacity analysis for the future conditions without development is based on the roadway network outlined above and the traffic volumes shown previously on Figure 12. The results of the intersection capacity analyses are presented in Table 1.

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better for the overall intersection and individual approach grades. The capacity analysis of the total future conditions shows that the study area intersections would operate at acceptable levels of service. All study intersections operate at a LOS of C or better during both the morning and afternoon peak hours.

During the afternoon peak hour, the westbound approach of the intersection of 21st Street and the Alley will operate at a LOS F due to the high volumes of pedestrians combined with heavy commuter traffic volumes. Drivers exiting these locations will not be able to find gaps in traffic often enough to avoid undue delays, as the high levels of commuting traffic block gaps from forming, or the high levels of pedestrian traffic block exiting vehicles from exiting when a gap appears.

Capacity Analysis Findings

The capacity analysis results were as follows:

- All study area intersections operate at acceptable levels of service in the future with the proposed development. Neither the commuter-based traffic nor the local neighborhood based traffic will be negatively affected by vehicle trips generated by the Project.
- The site access drive will operate at acceptable levels of service.
- The approach of the intersection of 21st Street and the Alley will operate at a LOS F during the afternoon peak hour. This is due to the high volumes of pedestrians combined with heavy commuter traffic volumes.

No mitigation measures are necessary to alleviate this delay, because the negative impact of this condition is limited to drivers leaving the redevelopment site. There are no negative impacts to the study area and surrounding land uses. Thus, no traffic management measures are needed to mitigate impacts of site-generated traffic.

Table 1: Results of Capacity Analyses

Intersection (Approach)	Capacity Analysis Results											
	AM Peak Hour						PM Peak Hour					
	Existing		Background		Total Future		Existing		Background		Total Future	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
21st Street & G Street	10.1	B	10.2	B	10.4	B	21.3	C	22.4	C	24.3	C
Westbound	3.9	A	3.9	A	3.5	A	21.8	C	22.2	C	24.2	C
Southbound	12.0	B	12.0	B	12.9	B	21.0	C	22.4	C	24.4	C
21st Street & Alley	--	--	--	--	--	--	--	--	--	--	--	--
Westbound Left	11.7	B	11.7	B	14.9	B	33.9	D	35.7	E	112.2	F
Southbound Left	0.2	A	0.2	A	2.2	A	0.1	A	0.1	A	0.8	A
21st Street & F Street	7.8	A	7.8	A	8.3	A	17.2	B	18.2	B	24.6	C
Eastbound	11.9	B	12.0	B	12.2	B	13.4	B	13.4	B	13.5	B
Southbound	4.7	A	4.8	A	5.5	A	18.2	B	19.4	B	27.2	C
20th Street & F Street	11.9	B	12.0	B	12.7	B	21.1	C	21.3	C	22.0	C
Eastbound	25.6	C	25.6	C	27.1	C	12.3	B	12.4	B	13.2	B
Northbound	10.1	B	10.2	B	10.7	B	23.5	C	23.8	C	24.7	C
20th Street & Alley	--	--	--	--	--	--	--	--	--	--	--	--
Eastbound Left	9.6	A	9.7	A	10.7	B	16.8	C	17.0	C	30.2	D
Northbound Left	0.1	A	0.1	A	2.8	A	0.1	A	0.1	A	1.1	A
20th Street & G Street	7.7	A	7.8	A	8.3	A	13.2	B	13.3	B	14.5	B
Westbound	28.2	C	28.3	C	28.6	C	19.8	B	20.0	B	20.1	C
Northbound	5.4	A	5.5	A	5.7	A	6.6	A	6.7	A	9.8	A
Alley & Garage Driveway	--	--	--	--	--	--	--	--	--	--	--	--
Eastbound Left	--	--	--	--	7.6	A	--	--	--	--	7.3	A
Southbound	--	--	--	--	10.2	B	--	--	--	--	9.7	A

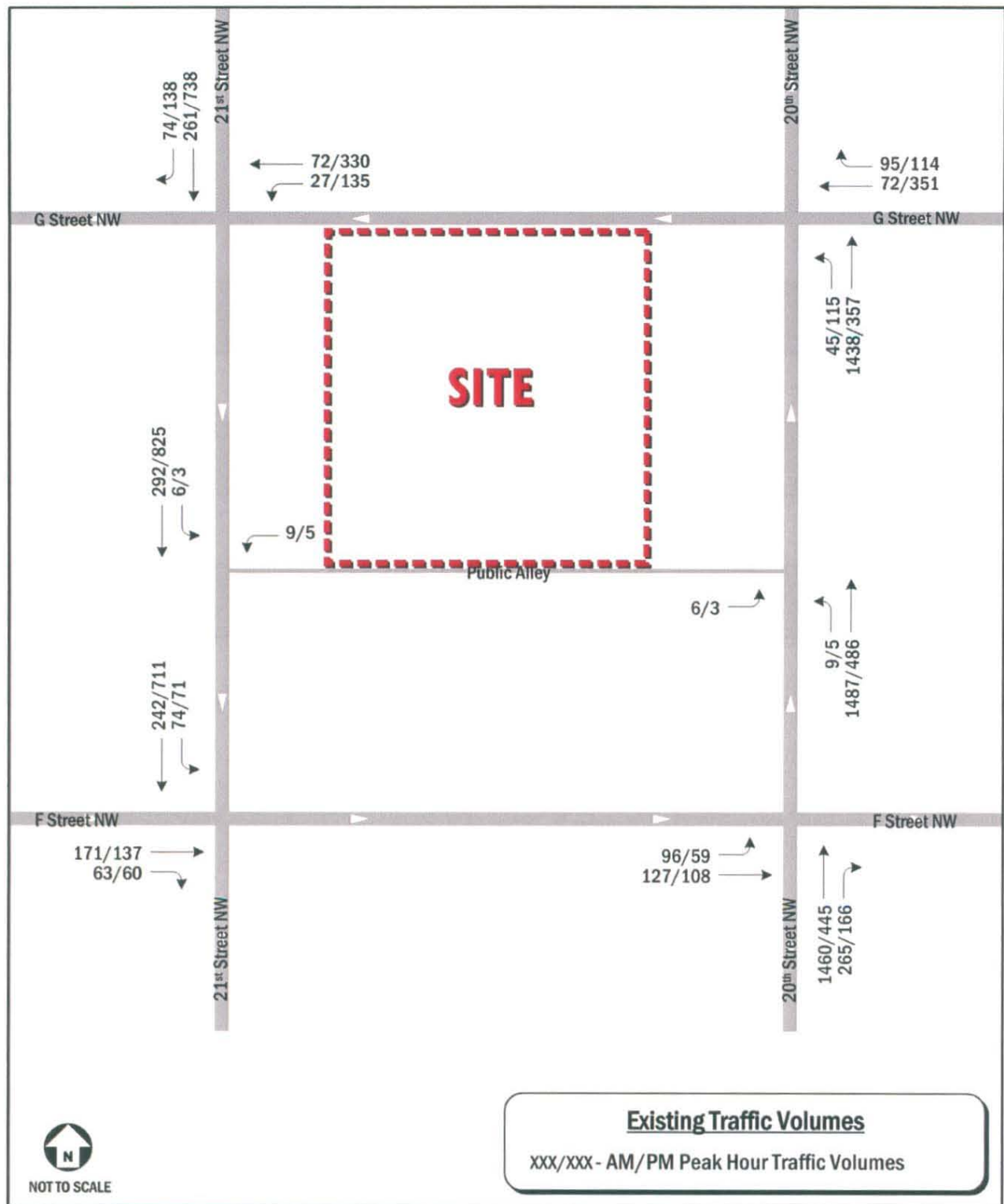


Figure 9: Existing Traffic Volumes

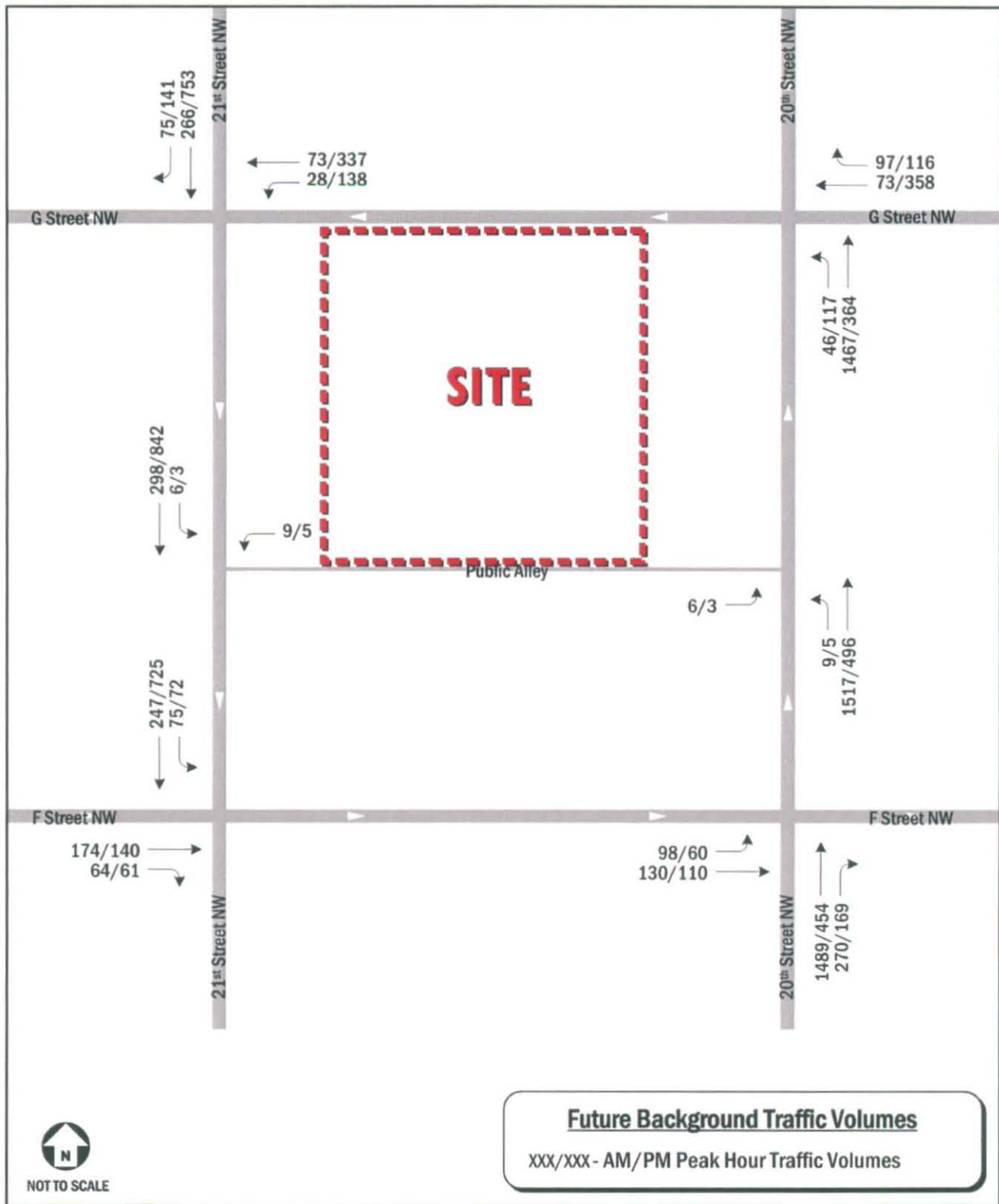


Figure 10: Future without Development Traffic Volumes

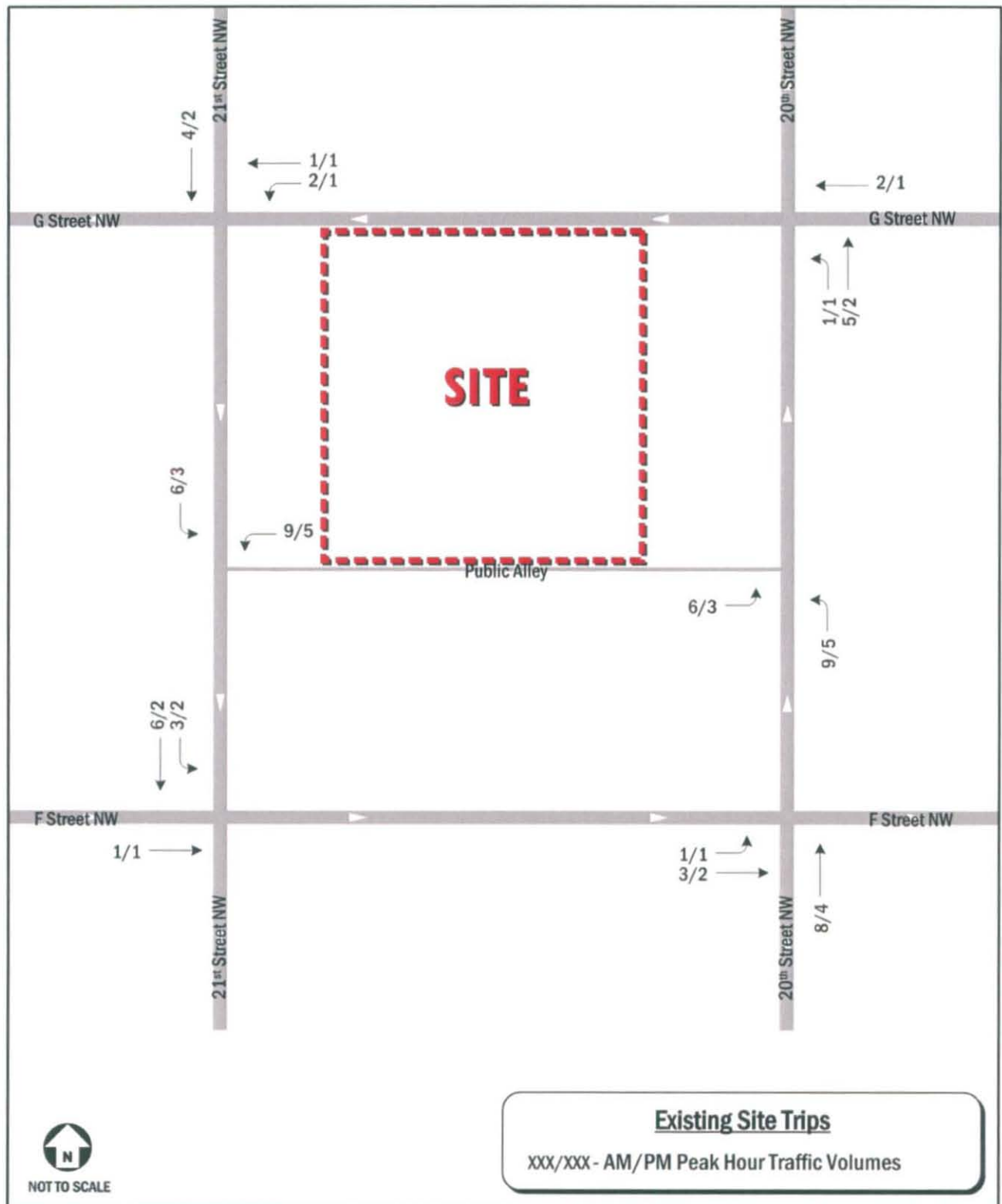


Figure 11: Trips Generated by Existing Site

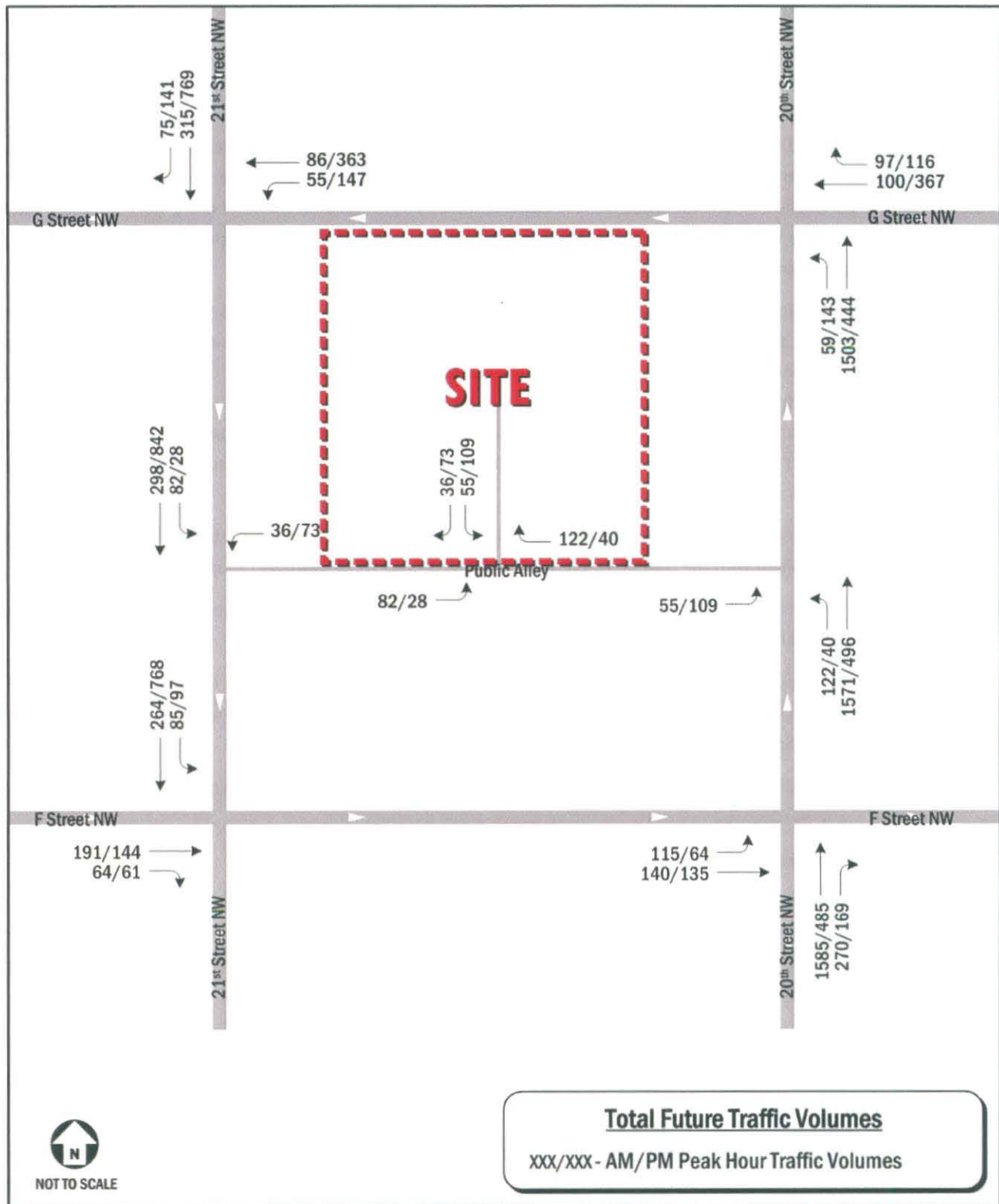


Figure 12: Future with Development Traffic Volumes

SUMMARY AND CONCLUSIONS

This report presents the findings of a Transportation Impact Study (TIS) conducted for second-stage approval of a Planned Unit Development (PUD) for The George Washington University Square 103 Development Site – Phase I (the “Project”) located on the property known as Square 103 in Northwest Washington, DC. The property is owned by the George Washington University and is located within the boundaries of the *2007 Foggy Bottom Campus Plan*. The proposed site plan consists of the construction of a below-grade seminar/teaching facility, a below-grade parking structure, and a temporary surface parking lot. A second phase of development will be constructed on the temporary surface lot at a later date. The site is currently utilized by The George Washington University for several uses, including student residences, parking facilities, and academic departmental uses.

The first phase of the Project will consist of a below-grade seminar/teaching facility with 23,000 SF of space, five stories of below-grade parking with 392 spaces, and a surface level with an additional 58 temporary parking spaces and ancillary support space. The 450 parking spaces will be occupied by existing users relocated from the University Parking Garage, located on Square 55, which is being redeveloped, and other University parking facilities based on future parking supply and demand. Access for the parking garage will be from a single access drive located in the public alley. The second phase of the project would construct academic space for the Law School, but this phase is not currently scheduled, and is therefore not analyzed in this report..

A review of the proposed redevelopment plan found the second-stage PUD application consistent with the goals outlined in the Campus Plan and compliant with the conditions outlined in the First-Stage PUD approval. These include:

- The relocated parking will help to meet the goal of the Campus Plan to disperse University trips throughout the campus, rather than concentrating them at centralized locations.
- The proposed project will satisfy the requirements outlined in the Transportation Management Plan (TMP), including GW parking facility passes and the on-campus pre-tax deduction program for employees. Covered, secured bicycle storage will also be provided.
- The construction of the below-grade parking facility will assist the University in maintaining the minimum parking supply of 2,800 spaces, while allowing for future above-grade development.

A review of the proposed redevelopment site found the following:

- Traffic in the study area is heavily commuter-based, especially on 20th Street during the morning peak hour. Vehicular volumes are high northbound in the morning and southbound in the evening. Traffic controls in the area are oriented in order to aid in the progression of traffic through the study area, as well as to provide controlled crossings for pedestrians.
- Other roadways in the study area had limited activity, including vehicles, pedestrians and cyclists.
- The commuter-based traffic on 20th Street during the morning peak hours travels at relatively high observed speeds.
- Bicycling conditions in the study area are fair to poor and few cyclists were observed during site visits. There are few existing on or off-street bicycle facilities, but DDOT’s proposed bicycle facilities map includes new on-street bike lanes and multi-use trails that would link the site with local and regional destinations, which could significantly increase the number of trips made by bicycle.

- The site is well-served by public transit. It is located four blocks from the Foggy Bottom-GW Metrorail station. Multiple Metrobus routes serve the site, with stops adjacent to or near the site. GW shuttles also serve the study area.

Based on these findings and the nature of the proposed second-stage PUD, it appears that most regional trips to and from the site will be made by private automobile, traveling to the below-grade garage. It is expected that users of the academic and administrative portion of the project will be traveling to the seminar/teaching facility via Metrorail/Metrobus, walking, and bicycle.

The proposed development will have a limited impact to pedestrian and bicycle conditions. Pedestrian traffic will be generated by people travelling to and from the parking garage and seminar/teaching facility, but the amount of pedestrians will not be at a sufficient level to negatively impact pedestrian conditions in the study area. The parking garage and surface improvements will include bicycle parking, which can increase the bicycle activity to the site over existing conditions without a negative impact to the study area.

A capacity analysis was performed within a study area of six intersections; the results were as follows.

- All study area intersections operate at acceptable levels of service in the future with the proposed development. Neither the commuter-based traffic nor the local neighborhood based traffic will be negatively affected by vehicle trips generated by the Project.
- The site access drive will operate at acceptable levels of service.
- The westbound approach of the intersection of 21st Street and the Alley will operate at a LOS F during the afternoon peak hour. This delay is due to the high volumes of pedestrians combined with heavy commuter traffic volumes. However, this will only affect vehicles leaving the site via the Alley to turn left onto 21st Street.

No mitigation measures are necessary to alleviate this delay, because the negative impact of this condition is limited to drivers leaving the redevelopment site. There are no negative impacts to the study area and surrounding land uses. Thus, no traffic management measures are needed to mitigate impacts of site-generated traffic.