The Citadel
Washington, D.C.

Traffic Impact Analysis

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TABLE OF CONTENTS

List of Figures ii

List of Tables ii

EXECUTIVE SUMMARY iii

INTRODUCTION 1
- Scope of Study 2
- Site Area Transportation System Characteristics 2
- Roadway Network within the Vicinity of the Site 4

EXISTING (2004) TRAFFIC CONDITIONS 7
- Existing (2004) Traffic Volumes 7

BUILD YEAR WITH OTHER PENDING DEVELOPMENT (2006) CONDITIONS 9
- Planned Roadway Improvements 9
- Future Background (2006) Traffic Volumes 9

BUILD YEAR WITH PROPOSED CITADEL DEVELOPMENT (2006) CONDITIONS 12
- Site Access 12
- Public Transit and Pedestrian Access 12
- Site Generated Traffic Volumes 12
- Directional Distribution and Trip Assignment 13

SITE TRANSPORTATION CHARACTERISTICS 16
- Parking 16
- Truck Access and Loading 18
- Comparable Sites 21

CAPACITY ANALYSES 23
- Existing (2004) Capacity Analysis 24
- Future Background (2006) Capacity Analysis 24
- Total Future (2006) Capacity Analysis 24

CONCLUSIONS 28

TECHNICAL APPENDIX 29

List of Figures

Figure 1 - Site Location Map 3
Figure 2 - Neighborhood Location Map 5
Figure 3 - Local Roadway Network 6
Figure 4 - Existing (2004) Peak Hour Volumes 8
Figure 5 - Future Background (2006) Peak Hour Volumes 11
Figure 6 - Site Generated Peak Hour Volume and Direction of Approach 14
Figure 7 - Total Future (2006) Peak Hour Volumes 15
Figure 8 - Existing On-Street Parking Configuration 17
Figure 9 - Loading Dock Truck Access 19
Figure 10 - Proposed On-Street Parking Configuration 20
Figure 11 - Existing (2004) Levels of Service 25
Figure 12 - Future Background (2006) Levels of Service 26
Figure 13 - Total Future (2006) Levels of Service 27

List of Tables

Table 1 - Background Development Trip Generation 10
Table 2 - Trip Generation 13
Table 3 - Design Vehicle Dimensions 18
Table 4a - Comparable Site Observations 21
Table 4b - Comparable Site Observations 22
Table 5 - Capacity Analysis Results 23

EXECUTIVE SUMMARY

This report presents the findings of a traffic impact analysis for the planned redevelopment of the Citadel site located in the Kalorama neighborhood of Washington, DC, including an analysis of the following intersections, only one of which is currently signalized:

Unsignalized Intersections
- 17th Street NW and Columbia Road
- 17th Street NW and Euclid Street
- 17th Street NW and Kalorama Road
- 16th Street NW and Kalorama Road

Signalized Intersection
- 16th Street NW and Euclid Street

The maximum sizes and uses of the major components of the redevelopment include the following:

- 42,299 square foot Harris Teeter grocery store;
- 7,215 square feet of other retail; and
- 33,379 square feet of office space

The proposed development is scheduled to be complete by the year 2006 through which future conditions were analyzed in this report.

Based on analysis, the following major conclusions were determined:

Existing Conditions (2004)

The capacity analyses show that the intersections currently operate at acceptable levels of service of D or better in the AM and PM peak hours with the exceptions of side street approaches to intersections of both Euclid Street and Kalorama Road at 16th Street. The volume of traffic that experiences extended delay is a small portion of the total traffic that passes through these intersections such that the vast majority of traffic experiences very little delay; the delays now experienced are concentrated where Euclid Street and Kalorama Road cross or meet 16th Street.

Build Year (2006) without Proposed Site Development (Future Background) Conditions

The future background capacity analyses show that the intersections are expected to operate at acceptable levels of service of D or better in the AM and PM peak hours with the exceptions of the side street approaches to intersections on 16th Street. With only the addition of background development traffic, the expected delay on the eastbound approach to the intersection of Kalorama Road and 16th Street increases well beyond acceptable conditions. Acceptable operation levels can be achieved with the installation of a traffic signal at this intersection, but it would need to be coordinated with the traffic signal at the nearby intersection of 16th Street and Euclid Street.

Build Year (2006) with Proposed Citadel Development (Total Future) Conditions

The total future capacity analyses with the mitigation signal measure discussed in the future background condition show that the intersections are expected to operate at acceptable levels of service of D or better in the AM and PM peak hours with the exceptions of Euclid Street's approaches to its intersection with 16th Street. Assuming the mitigation improvements described above at the intersection of Kalorama Road and 16th Street, the addition of future Citadel site traffic does not degrade the level of service at this intersection below acceptable levels. While the proposed development at the Citadel would increase the number of vehicles heading along Kalorama Road toward 16th Street, the total increase would not produce unacceptable levels of service at that intersection if it was signalized as discussed above to solve problems that would become acute from the combination of current traffic and attributed to future conditions without development of The Citadel. The timing of the signal at 16th and Euclid Streets could be adjusted to reduce the delay on Euclid's approaches. Doing so would likely disrupt the traffic progression on the major north-south corridor of 16th Street. The vast majority of traffic traveling through this intersection is expected to experience very little delay in the total future condition with overall levels of service within acceptable limits.

Parking

The Citadel will provide over 130 parking spaces including ADA compliant handicap accessible spaces. Ninety of these spaces will be dedicated to the grocery store use with the remainder used as supply for the office and other retail use during business hours on weekdays. All parking in the garage will be available to grocery store/retail patrons in the evenings and on weekends. This parking supply exceeds by nearly double the zoning requirement and is expected to be sufficient for accommodating the needs of the Citadel's patrons and tenants based on Harris Teeter understanding of market needs and when compared to similar grocery uses. Given the urban nature of the surrounding neighborhood, it is expected that a number of patrons and tenants will arrive to the site by means that will not require them to park in the garage (walking, bicycle, taxi, and/or drop-off/pick-up).

Loading

The proposed grocery store will be provided with the two required loading berths, which are expected to be sufficient for accommodating the store's loading needs. One of these berths is shorter than that required by zoning regulations. The Applicant will operate the loading dock with vehicles of an appropriate length and on a schedule to reduce the possibility of the queuing of delivery trucks. The remaining retail and office uses will be sufficiently served by curbside loading zones.

INTRODUCTION

This report presents the findings of a traffic impact analysis for the redevelopment of the Citadel building in Washington, DC. The regional roadway network and site location are given in Figure 1. The Citadel building is located in the Kalorama neighborhood in the northeast quadrant of the intersection of 17th Street NW and Kalorama Road NW and is proposed to include 49,514 square feet of retail to include a Harris Teeter grocery store and other tenants as well as 33,379 square feet of office space. The project is scheduled to be complete by the year 2006. The maximum sizes and uses of the major components of the development include the following:

- 42,299 square foot Harris Teeter grocery store;
- 7,215 square feet of other retail; and
- 33,379 square feet of office space
- approximately 130 below grade parking spaces
- enclosed on-site loading dock with 2 delivery-truck berths and 1 trash container

The following tasks were undertaken as part of this study:

- Field reconnaissance in the vicinity of the site was performed to collect information related to existing on-street parking, traffic controls, roadway geometry, and traffic flow characteristics;

- Manual vehicle traffic turning movement counts were conducted at five intersections within the vicinity of the site, during morning and evening peak hours;

- Future traffic conditions were projected based on the development's square footage and proposed uses; and

- Intersection capacity analyses were performed for existing, build year without development (2006) and build year with development (2006) peak hour traffic conditions at the intersections contained within the study area.

- Parking and loading characteristics of comparably sized and located grocery stores in the area were observed and compared to the program proposed at the Citadel.

Sources of data for this study include the District Department of Transportation, the Citadel project team and the office files and field reconnaissance efforts of Gorove/Slade Associates.

Scope of Study

The following intersections were identified for their inclusion in this study:

Unsignalized Intersections
- 17th Street NW and Columbia Road
- 17th Street NW and Euclid Street
- 17th Street NW and Kalorama Road
- 16th Street NW and Kalorama Road

Signalized Intersection
- 16th Street NW and Euclid Street

These intersections were chosen because they are the intersections through which delivery trucks are expected to travel to gain access to and from the site. Given the existing roadway network, it was assumed that trucks would approach the site from the either the north or south on 16th Street and use Kalorama Road to access the on-site loading dock from 17th Street. Trucks would then exit the site and head either north on 17th Street and east on Columbia Road or south on 17th Street and East on Kalorama Road to return to 16th Street.

This report presents a discussion and the findings of analyses performed for the following conditions:

- ***Existing Conditions (2004):***
  Considers existing traffic volumes and existing roadway configurations during the A.M. and P.M. peak hours;

- ***Build Year (2006) without Proposed Development (Future Background) Conditions:***
  Considers existing traffic volumes during the A.M. and P.M. peak hours after adding traffic associated with other known developments in the area and applying a growth rate of 1% per year for 2 years to account for an increase in background traffic;

- ***Build Year (2006) with Proposed Citadel Development (Total Future) Conditions:***
  Considers the total future condition 2006 during the A.M. and P.M. peak hours, which consists of traffic volumes associated with other known developments in the area and future site volumes generated from a 42,299 square foot Harris Teeter grocery store, 7,215 square feet of other retail, and 33,379 square feet of office space.

Site Area Transportation System Characteristics

The site is located in a densely populated residential neighborhood bounded by 17th Street to the west and Kalorama Road to the south and is several blocks from main business corridors on Columbia Road and 18th Street. It is one block west of a major north-south corridor – 16th Street. The site is also well served by Metrobus within 1 to 2 blocks of the site including routes 42, 90, 92, 93, 96, 98, S1, S2, S4 and others.

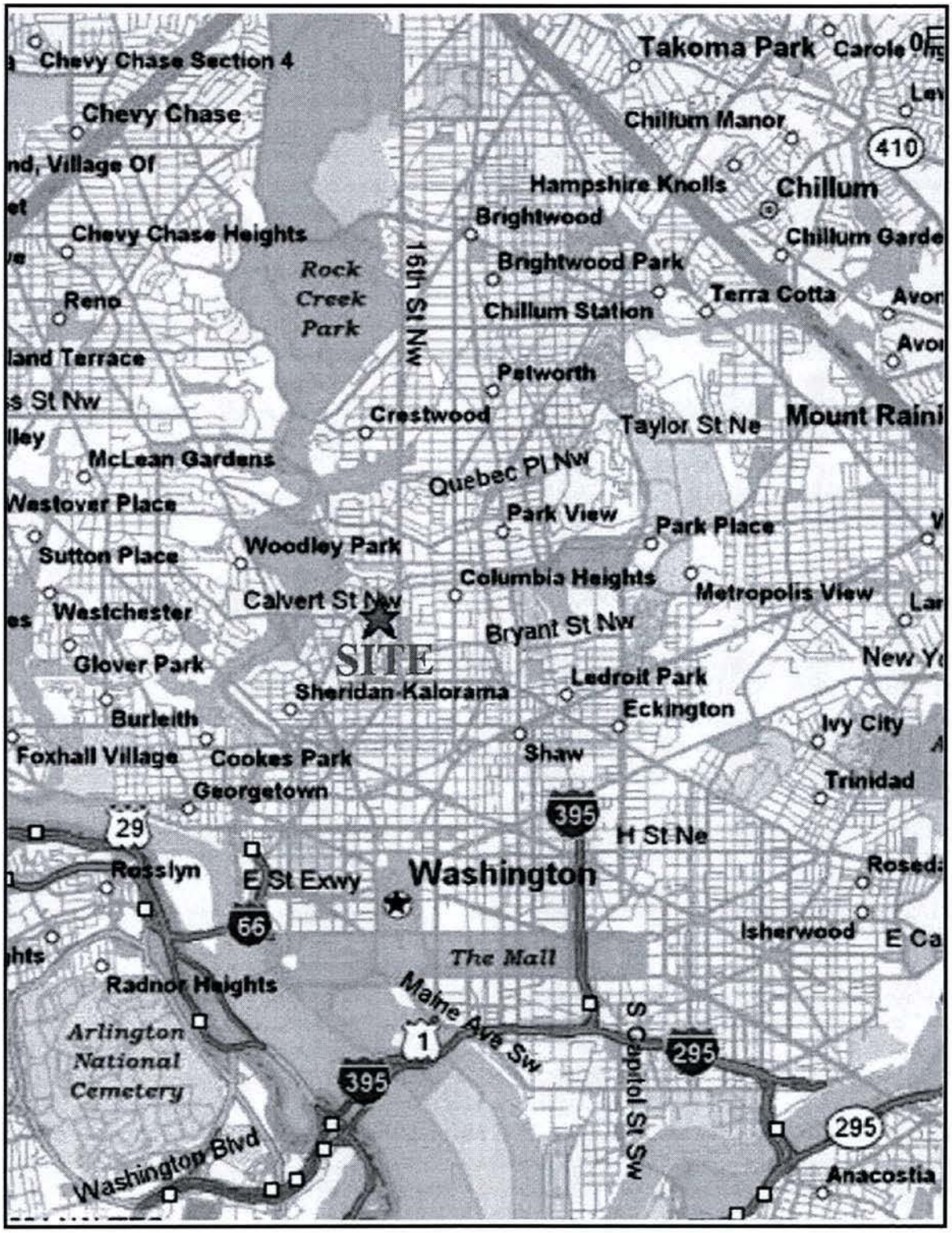


Figure 1 - Site Location Map

Roadway Network within the Vicinity of the Site

Figure 2 illustrates the neighborhood location of the site and the immediate roadway network surrounding it. As can be seen in this figure, the existing roadway network is such that the site is somewhat isolated in this portion of the Kalorama neighborhood. Characteristics of this neighborhood include Meridian Hill/Malcolm X Park and the jog in Euclid Street at 15th Street to the east, a jog in Kalorama Road at Champlain Street and to the west, the bend in 17th Street into Belmont Street to the south and several one-way streets. All of these characteristics along with the size of neighborhood streets (general pavement widths of 30' with parking on either side) result in "calming" traffic and discouraging motorists from using the neighborhood roadways as throughways to other neighborhoods or as routes between arterials. The vast majority of the traffic on these roadways is destined to or originating from locations within this immediate neighborhood.

Descriptions of the major roadways linked to the site are given below; note the roadways described below refer to the existing intersections within the scope of this study.

16th Street NW is a major north-south corridor in NW Washington, DC. In the vicinity of the site, this street consists of two northbound and three southbound travel lanes. This street provides access to the Capital Beltway to the north and Massachusetts Avenue to the south and is served by Metrobus routes S1, S2, and S4. Sixteenth Street is classified as a "Major Arterial" in the District of Columbia's Functional Classification map.

Kalorama Road is a neighborhood roadway with a 30' pavement width that serves traffic in both directions and parking on both sides of the street. This roadway intersects 17th Street with an all-way stop-controlled intersection and 16th Street with a "T" intersection with stop control on Kalorama. Kalorama Road is functionally classified as a "Local" street.

17th Street is also a 30' roadway with parking on both sides of the street. North of Kalorama Road, this neighborhood roadway operates in both directions and intersects Euclid Street with an all-way stop-controlled intersection and with Columbia Road with a "T" intersection with stop control on 17th. South of Kalorama Road, 17th Street operates one-way northbound. Seventeenth Street is functionally classified as a "Local" street.

Euclid Street to the north of the site is a two-way east-west neighborhood street that intersects Columbia Road to the west and 16th Street to the east of the site. Its intersection with 16th is controlled by a traffic signal. Euclid Street is functionally classified as a "Collector" street, meaning it is intended to carry somewhat more traffic than those classified as "Local" ones.

Columbia Road is a major business corridor in this area of NW Washington with traffic operating in both the northeast and southwest directions. This road consists of one travel lane in each direction with a central, bi-directional left turn lane and metered parking on either side of the street. Columbia Road is functionally classified as a "Minor Arterial," meaning it carries more traffic volume than either "Local" or "Collector" streets, but less than "Major Arterials."

Figure 3 provides an illustration of the existing lane configuration of the roadway network.

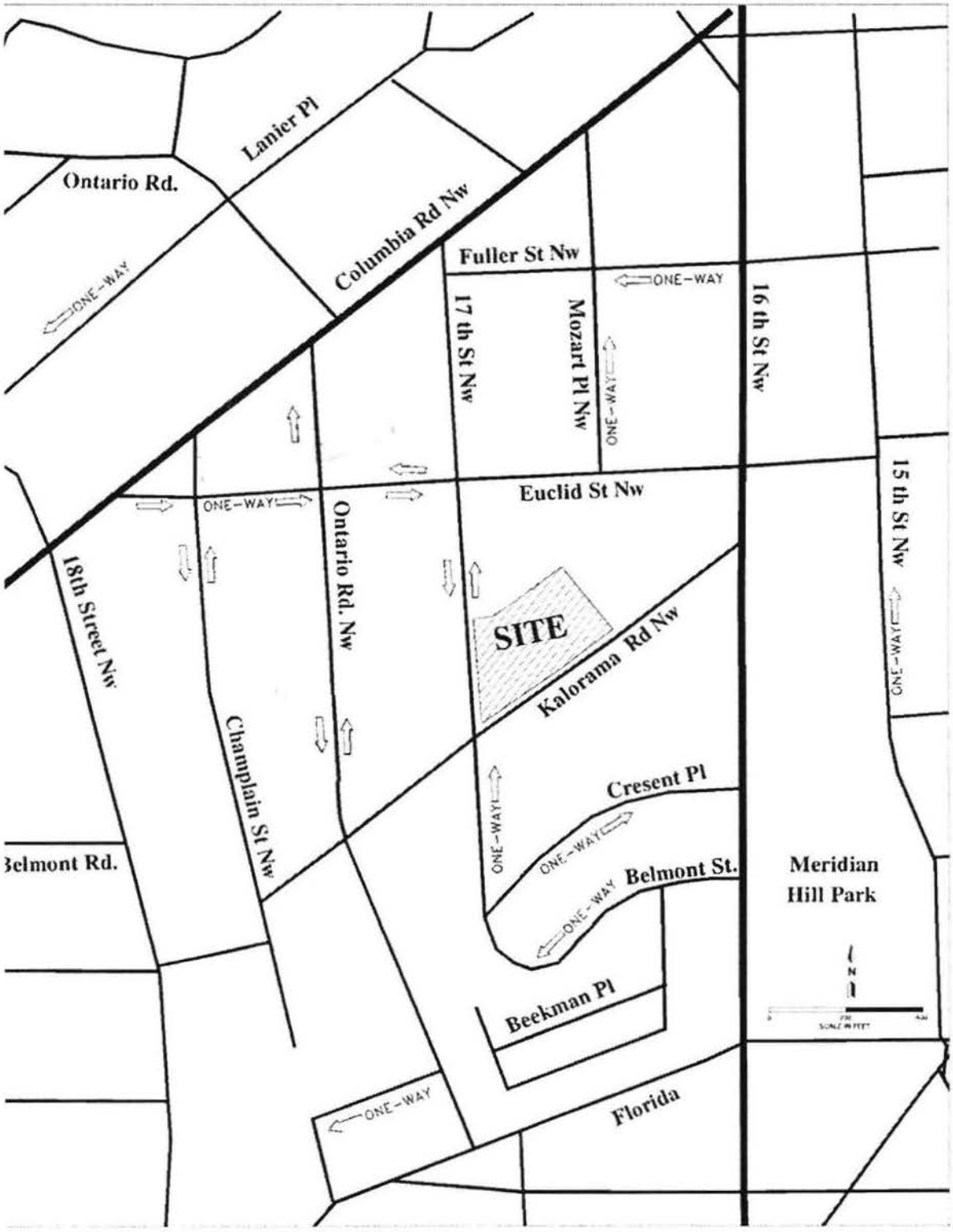


Figure 2 - Neighborhood Location Map

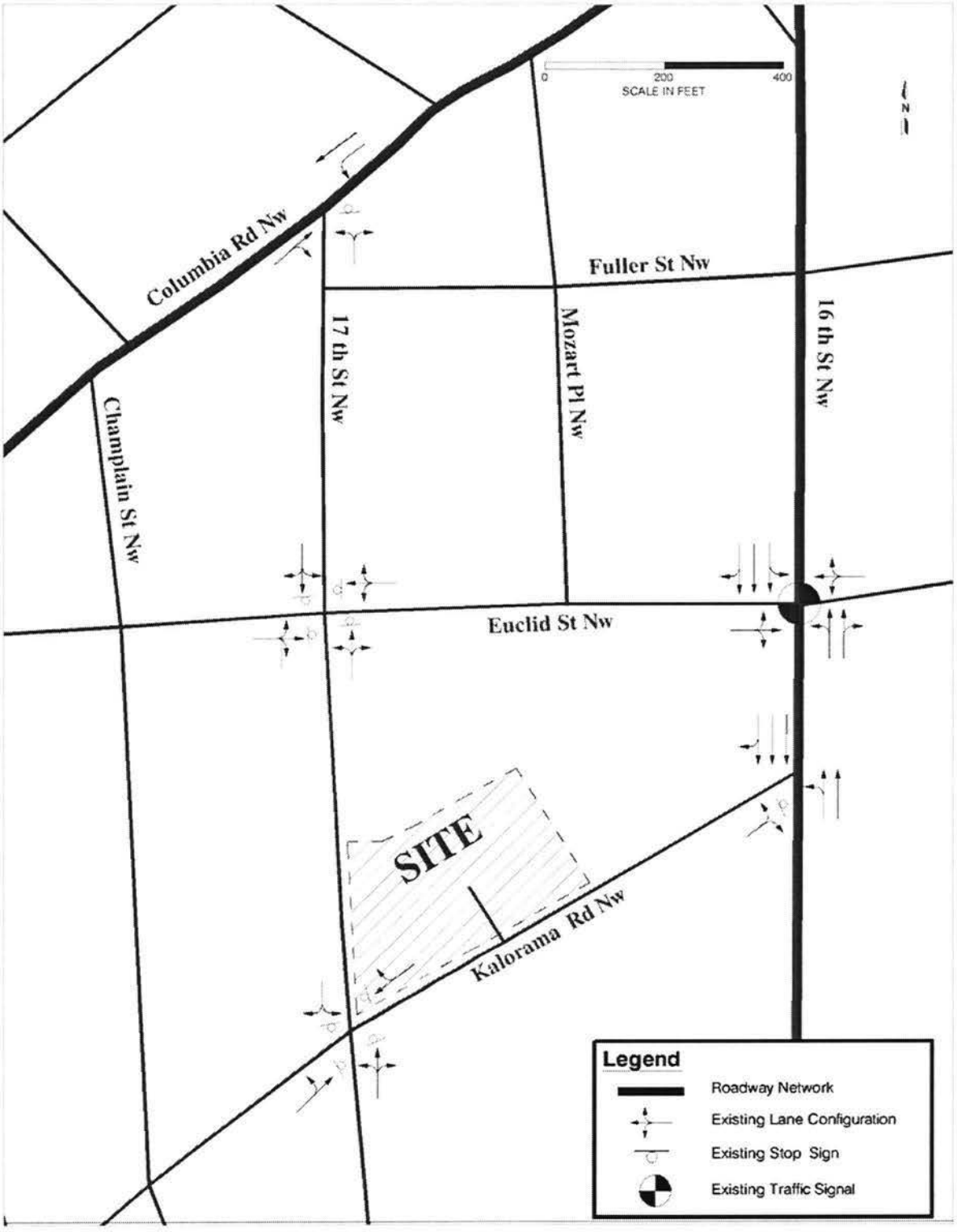


Figure 3 - Local Roadway Network

EXISTING (2004) TRAFFIC CONDITIONS

Existing (2004) Traffic Volumes

Existing weekday peak hour traffic counts were conducted at the intersections of 16th Street with Euclid and Kalorama Roads and the intersections of 17th Street with Columbia, Euclid and Kalorama Roads on Tuesday September 14, 2004. The A.M. commuter peak hour occurs from 8:15 A.M. to 9:15 A.M. and the P.M. commuter peak hour occurs from 5:15 P.M. to 6:15 P.M. The volumes during these commuter peak hours considered in this study are shown in Figure 4.

The traffic volumes that exist at this time at the selected intersections are consistent with the uses and densities within the area and, particularly for Euclid Street, the volume of traffic using it as east-west traffic. Given the other streets' geometries and the isolated nature of the surrounding network within the perimeter of the neighborhood, namely 18th Street on the west, 16th Street on the east, Columbia Road on the north, and Florida Avenue on the south, their traffic is believed to consist mostly of trips that originate within or are destined to the nearby neighborhood.



Figure 4 - Existing (2004) Peak Hour Volumes

BUILD YEAR WITH OTHER PENDING DEVELOPMENT (2006) CONDITIONS

Planned Roadway Improvements

There are no known roadway improvements planned in the vicinity of the site.

Future Background (2006) Traffic Volumes

The construction of the proposed development is anticipated to be complete in 2006. This neighborhood is currently experiencing a high level of development activity, which may be having an impact on traffic volumes in the neighborhood. In the past decade, a number of buildings on 17th Street have been converted to condominiums or renovated as rental units. Other large apartment buildings are contributing to existing traffic in the neighborhood, such as Park Tower and The Envoy. This traffic is included in the existing traffic volumes discussed in the Existing (2004) Traffic Conditions section of this report.

Four other developments were identified in the vicinity of the site that do not currently exist but which are expected to be occupied by 2006. The traffic associated with these background developments was determined using the Institute of Transportation Engineers (ITE) *Trip Generation, 7th Edition* for land uses #220 (Apartment) and #230 (Residential Condominium/Townhouse). A reduction in the trips obtained from the Trip Generation Manual was taken to reflect the use of public transportation according to the *Columbia Heights/Mount Pleasant Transportation Study* prepared for DDOT by Cambridge Systematics, Inc. dated July 2003. This study found that within the study area, 44% of residents used public transportation to commute to and from work while the average use of public transit in the District is 33%. The background developments are located outside of the report's study area by one block to the south and one block to the west. While the proximity of the developments to the study area of the Cambridge report may warrant a transit reduction of 44%, the District average of 33% was used as a conservative assumption. The trip generation for the background developments is shown in Table 1. The locations of these developments are illustrated in Figure 5.

The applicant is also aware that the density that could be forthcoming at the Dorchester could be about double what is shown in the table above. (The projected values are those estimated to reflect matter of right development under its present split R-5-B/R-5-D zoning.)

An inherent traffic growth of 1% per year was also assumed to account for other developments in the area that may be completed by the anticipated build year of 2006. The inherent traffic growth and background development trips were added to the existing volumes in order to establish future background 2006 traffic volumes without the Citadel site trips. The future background traffic volumes are shown in Figure 5.

The trip generation and associated trip reduction for the proposed Citadel redevelopment will be discussed in the Build Year with Proposed Development (2006) Conditions section of this report.

Table 1 - Background Development Trip Generation

	Land Use	Quantity	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
A	**Dorchester Apartments**	75 units	8	32	40	38	21	59
	Transit Reduction (33%)		*-3*	*-11*	*-14*	*-13*	*-7*	*-19*
	Subtotal		**5**	**21**	**26**	**25**	**14**	**40**
B	**1700 Kalorama Lofts**	36 units	4	19	23	17	9	26
	Transit Reduction (33%)		*-1*	*-6-*	*-7*	*-6*	*-3*	*-9*
	Subtotal		**3**	**13**	**16**	**11**	**6**	**17**
C	**Adams Alley**	22 units	3	12	15	11	6	17
	Transit Reduction (33%)		*-1*	*-4*	*-5*	*-4*	*-2*	*-6*
	Subtotal		**2**	**8**	**10**	**7**	**4**	**11**
D	**Jemal's Wheel 1701 Kalorama**	48 units	5	24	29	22	11	33
	Transit Reduction (33%)		*-2*	*-8*	*-10*	*-7*	*-4*	*-11*
	Subtotal		**3**	**16**	**19**	**15**	**7**	**22**
Total Proposed Trips			**13**	**58**	**71**	**59**	**31**	**90**

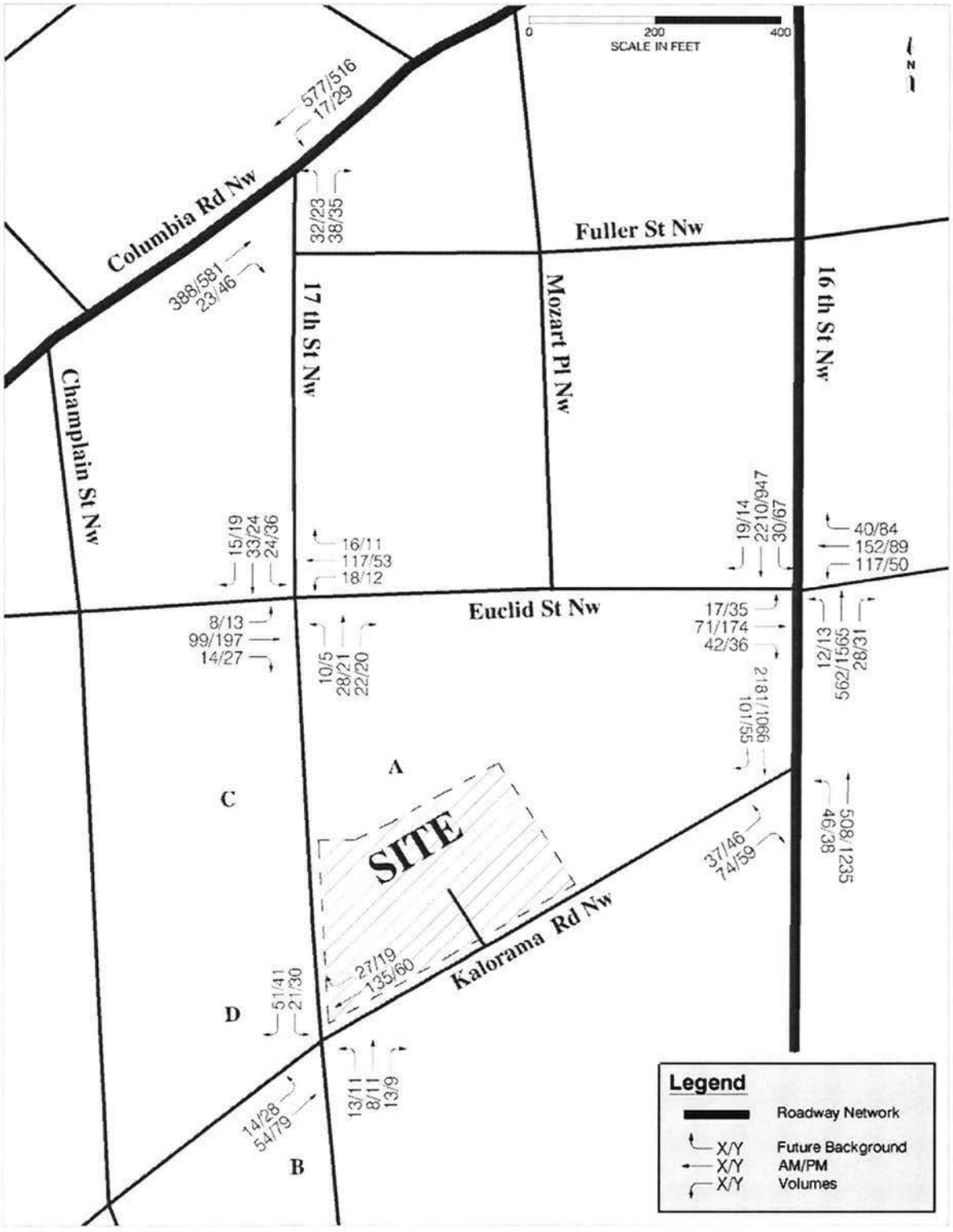


Figure 5 - Future Background (2006) Peak Hour Volumes

BUILD YEAR WITH PROPOSED CITADEL DEVELOPMENT (2006) CONDITIONS

Site Access

This office & retail development will maintain the one driveway to serve the patrons of the property. The driveway access point is located on Kalorama Road approximately 180 feet east of 17th Street and provides access to a two level parking garage. This garage is planned to accommodate both retail patrons and office employees.

Public Transit and Pedestrian Access

The site is located one block from major Metrobus corridors on 16th Street, 18th Street and Columbia Road. A Metrorail station serving Green Line trains is located approximately three blocks to the northeast at Harvard and 14th Streets. In addition, the location of the site within a residential neighborhood means that a large number of area residents will be within walking distance of the site. It is expected that a portion of patrons of the major component of the development, the grocery store, will arrive on foot, rather than by personal vehicle.

Observations were conducted at a similarly located grocery store – Whole Foods Market at 1450 P Street NW – on Wednesday September 15, 2004 from 12:00 PM to 7:00 PM to determine an appropriate ratio of vehicle arrivals to pedestrian arrivals. These observations found that on a typical weekday, the percentage of patrons that arrive either on foot or by public transit ranged between 60% and 67%. The remaining patrons arrived by either taxi or by personal vehicle. To avoid overestimating the proportion of non-automobile arrivals to the Citadel site, the lower end of the range, 60%, was used in calculating the trip generation for the proposed site.

Site Generated Traffic Volumes

In order to determine the appropriate trip generation for this development the Institute of Transportation Engineers (ITE) *Trip Generation, 7th Edition* was used to determine the trips into and out of the proposed site. When using ITE's trip generation manual, the land uses used in calculations were #850 (Supermarket), #814 (Specialty Retail Center) and #710 (General Office Building). A reduction in trips, based on the results of the observations made at the P Street Whole Foods Market, was taken for the retail use. A reduction in trips was also taken for the office portion of the development according to the findings of the Cambridge Systematics, Inc. transportation study discussed previously in this report. The summary of the trips generated and reductions taken for the weekday peak hours is presented in Table 2.

Table 2 - Trip Generation

Land Use	Quantity	AM Peak Hour			PM Peak Hour			Average Daily Traffic		
		In	Out	Total	In	Out	Total	In	Out	Total
Harris Teeter	42,299 SF	86	55	141	241	232	473	2,112	2,112	4,224
Transit Reduction (60%)		*-52*	*-33*	*-85*	*-145*	*-139*	*-284*	*-1,267*	*-1,267*	*-2,534*
Subtotal		**34**	**22**	**56**	**96**	**93**	**189**	**845**	**845**	**1,690**
Other Retail	7,215 SF	3	3	6	17	22	39	174	174	348
Transit Reduction (60%)		*-2*	*-2*	*-4*	*-10*	*-13*	*-23*	*-104*	*-104*	*-208*
Subtotal		**1**	**1**	**2**	**7**	**9**	**16**	**70**	**70**	**140**
Office	33,379 SF	69	9	78	20	96	116	287	287	574
Transit Reduction (33%)		*-23*	*-3*	*-26*	*-7*	*-32*	*-39*	*-96*	*-96*	*-192*
Subtotal		**46**	**6**	**52**	**13**	**64**	**77**	**191**	**191**	**382**
Total Proposed Trips		**81**	**29**	**110**	**117**	**166**	**282**	**1,106**	**1,106**	**2,212**

The sizes of each of the land uses included in the trip generation calculations are the maximum that are possible at the site. Several factors may reduce the ultimate size of which each use when it is constructed. Currently a mezzanine level is proposed to house office space. This level would include approximately 7,000 square feet but may not be included in the development program. This would reduce the office are from 33,379 square feet to 26,379 square feet, thus reducing vehicle trips associated with this use. The planned 7,215 square feet of retail consists of two levels of relative equal size. One of these levels is below grade and may not be deemed suitable as functional, occupied space for the future tenant. If this were the case, these retail trips could be cut in half. The traffic volumes used in the capacity analysis, therefore, lean toward conservative projections.

It is noted that the above table contains projected vehicle trips over the course of the peak AM and PM hours of a typical weekday. These numbers do not directly correlate to parking demand and are not indicative of parking supply needs. Parking needs associated with the proposed redevelopment program at the Citadel will be discussed in the Parking section of this report.

Directional Distribution and Trip Assignment

Census data was reviewed using GIS software to establish the population densities within the likely market area of the store given the location of other grocery food stores in the area. This likely market area was divided up based on the most convenient access routes to the site. The resulting populations in each sub-area were used to determine the Direction of Approach (DOA) percentages shown in Figure 6. The inbound and outbound site traffic assignments for the weekday A.M. and P.M. peak hours are also illustrated in Figure 6.

The site trips were then combined with the future background volumes to arrive at total future peak hour traffic volumes. The resulting total future volumes are illustrated in Figure 7.



Figure 6 - Site Generated Peak Hour Volume and Direction of Approach



Figure 7 - Total Future (2006) Peak Hour Volumes

SITE TRANSPORTATION CHARACTERISTICS

Parking

The Citadel building was originally built with two parking garage levels. These levels are planned to be renovated to continue to serve the parking demands of the proposed site uses. The final parking layout will include more than 130 parking spaces. Forty of these spaces are planned to be restricted for use by office employees during business hours; a few of the 40 spaces may be set aside for the use by the other retail/commercial tenant. The remaining 90 spaces will be dedicated to the retail portions of the development. In the evening and on the weekends, all 130 parking spaces within the garage will be available to retail patrons. On-street parking is available on the streets surrounding the site and is heavily utilized by residents. The majority of these spaces have a 2-hour time limit without a Zone 1 parking permit as seen in Figure 8 – an illustration of the existing on-street parking and loading zones adjacent to the site.

The proposed number of parking spaces exceeds that required by zoning regulations. It is expected to be a sufficient supply for serving the office and retail uses proposed for the site. While the trip generation calculations shown in Table 2 of this report show that the expected trips, at times, exceed the proposed parking supply, these trips are to occur over the course of just one hour in the AM and one hour in the PM. Given that the average length of stay of a grocery store patron is typically less than one hour, it is reasonable to expect that each parking space in the grocery store section of the garage will turn over 2 to 3 times in that hour. Also, some of the vehicle trips are expected to be taxis or pick-up or drop-off trips that will not utilize garage parking.

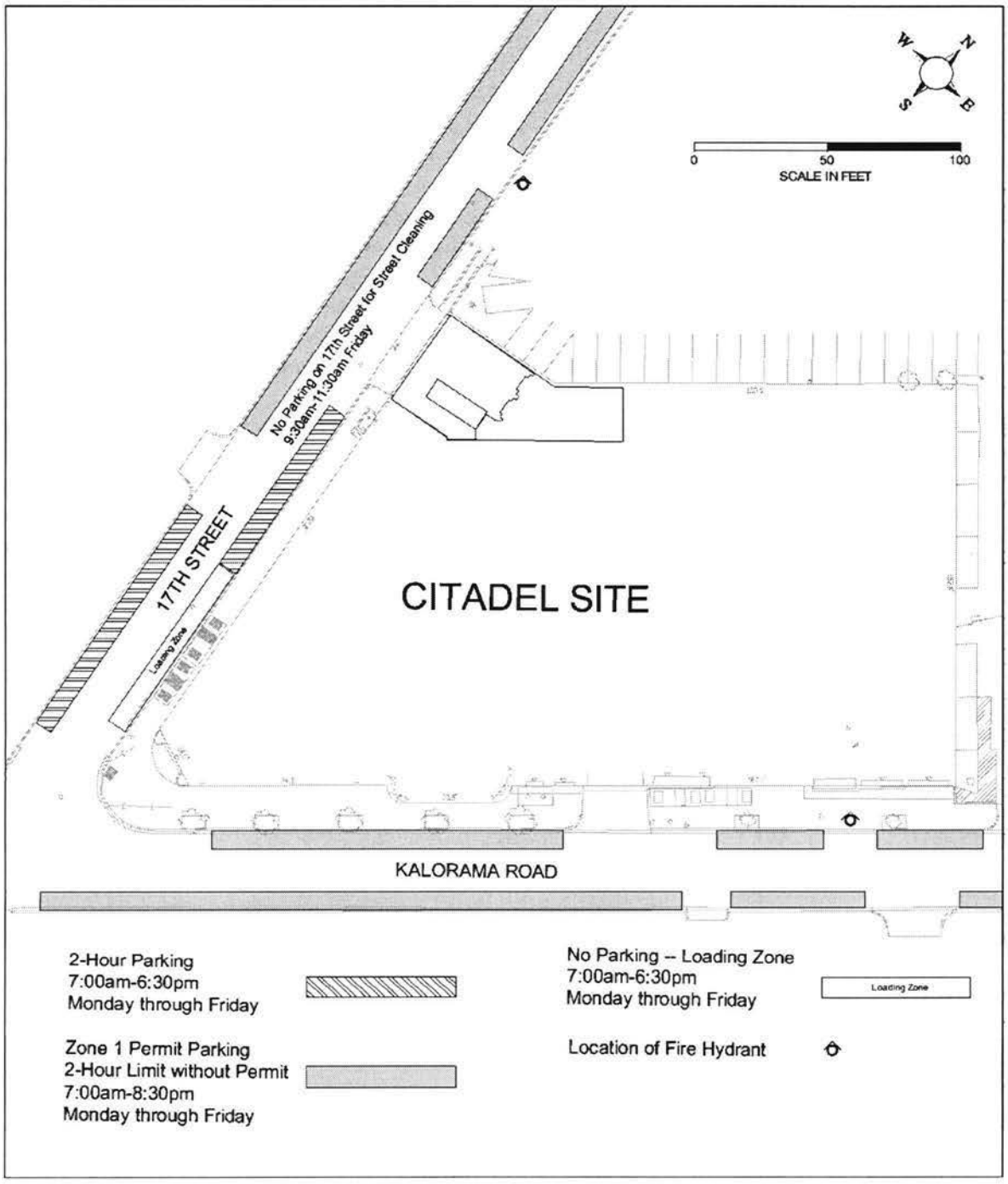


Figure 8 - Existing On-Street Parking Configuration

Truck Access and Loading

This site is proposed to include an on-site loading dock to accommodate a Single Unit Truck (SU) AASHTO design vehicle. This vehicle is designated with the following dimensions (shown in feet) and is intended to represent a wide range of single unit trucks that vary in length from 15' to as much as 35'.

Table 3 - Design Vehicle Dimensions

Design Vehicle Type	Symbol	Height	Width	Length	Front Overhang	Rear Overhang	Wheelbase
Single Unit Truck	SU	11-13.5	8.0	30	4	6	20

As discussed previously in this report, delivery trucks will arrive via 16th Street. Given geometrics and existing/projected traffic conditions, trucks arriving from both north and south are expected to use Kalorama to access the loading dock on 17th Street, though some arriving from the north might use Columbia Road to reach 17th Street. When leaving the loading docks, most trucks that are to head north on 16th Street would be expected to exit heading north on 17th Street and return to 16th Street by turning east on Columbia Road. Most trucks that are to head south on 16th Street would head south on 17th Street and east on Kalorama Road to return to 16th Street. Trucks unloading along the curbside loading face are facing north and would continue north on 17th Street to Columbia Road to return to 16th Street, where they would turn north or south. As a practical matter, Euclid Street's congestion at 16th Street and geometry at 17th Street will discourage trucks delivering at the Citadel site from using Euclid Street to any significant extent.

It is recommended that 40' of parking, approximately two parking spaces, be eliminated directly across from the loading dock to allow for truck maneuvering in this area. Figure 9 illustrates the necessary truck maneuvers for accessing the two proposed on-site loading berths and roll-off trash container. Trucks will also be able to load and unload within the proposed on-street loading zones on 17th Street and Kalorama Road. A number of loading zones exist on Kalorama Road and on 17th Street. One such loading zone currently exists on 17th near the intersection with Kalorama Road with on street parking between it and the loading dock. It is proposed that the existing loading zone be reduced to 40' in length and relocated to the north just south of the dock entrance, measuring 50' in length. Also, the north curb frontage on Kalorama Road should be reviewed for a possible change in status to provide the needed curb loading space for the new office and retail uses. Any change to parking on the north side of Kalorama could be done as a daytime provision so that residents may use the parking over night. A reconfiguration of on street loading and parking zones could be achieved with minimal loss of on street parking.

Figure 10 shows the proposed on-street parking and loading zone configuration and areas where consultation with the District of Columbia would be appropriate and essential.

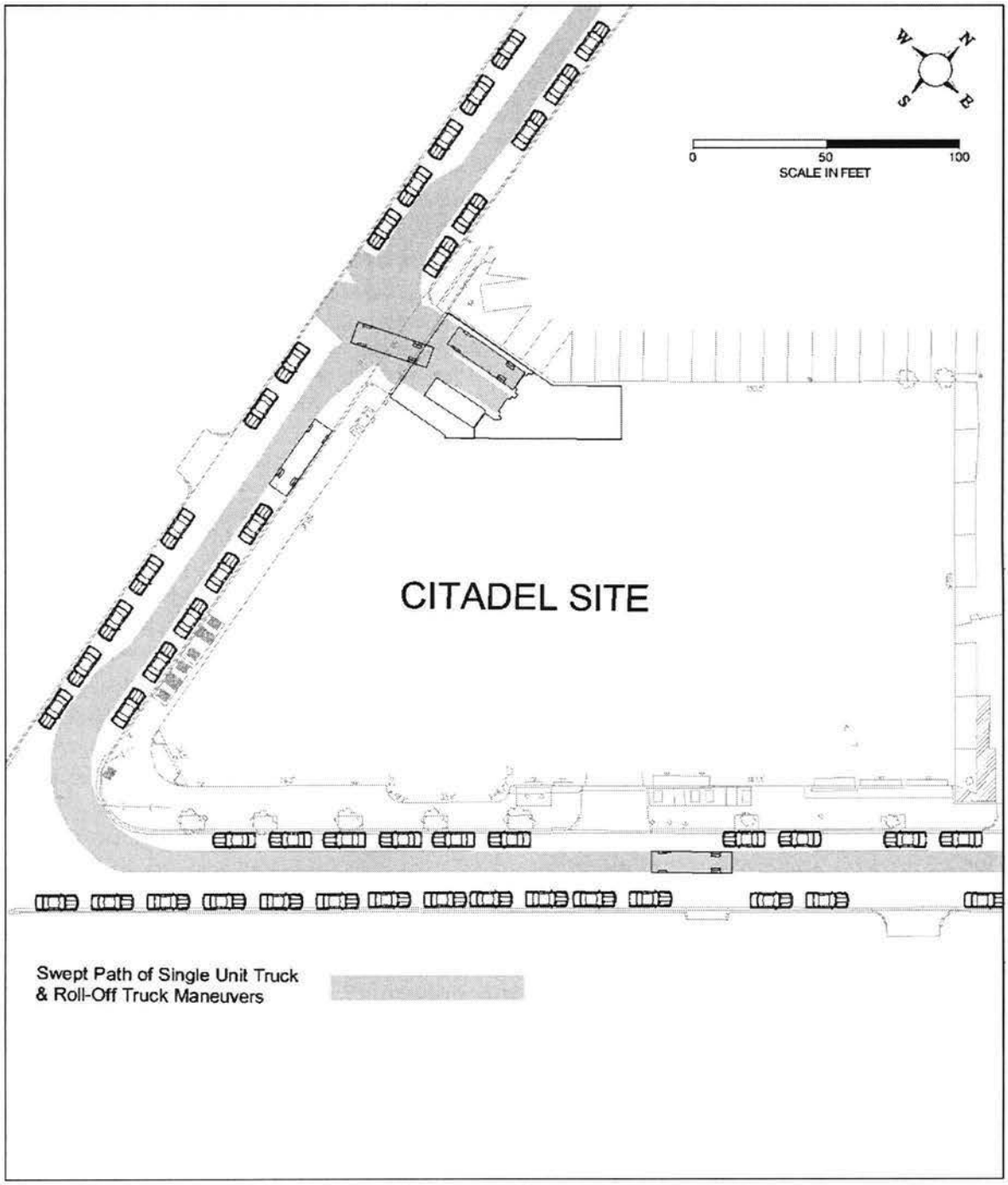


Figure 9 - Loading Dock Truck Access

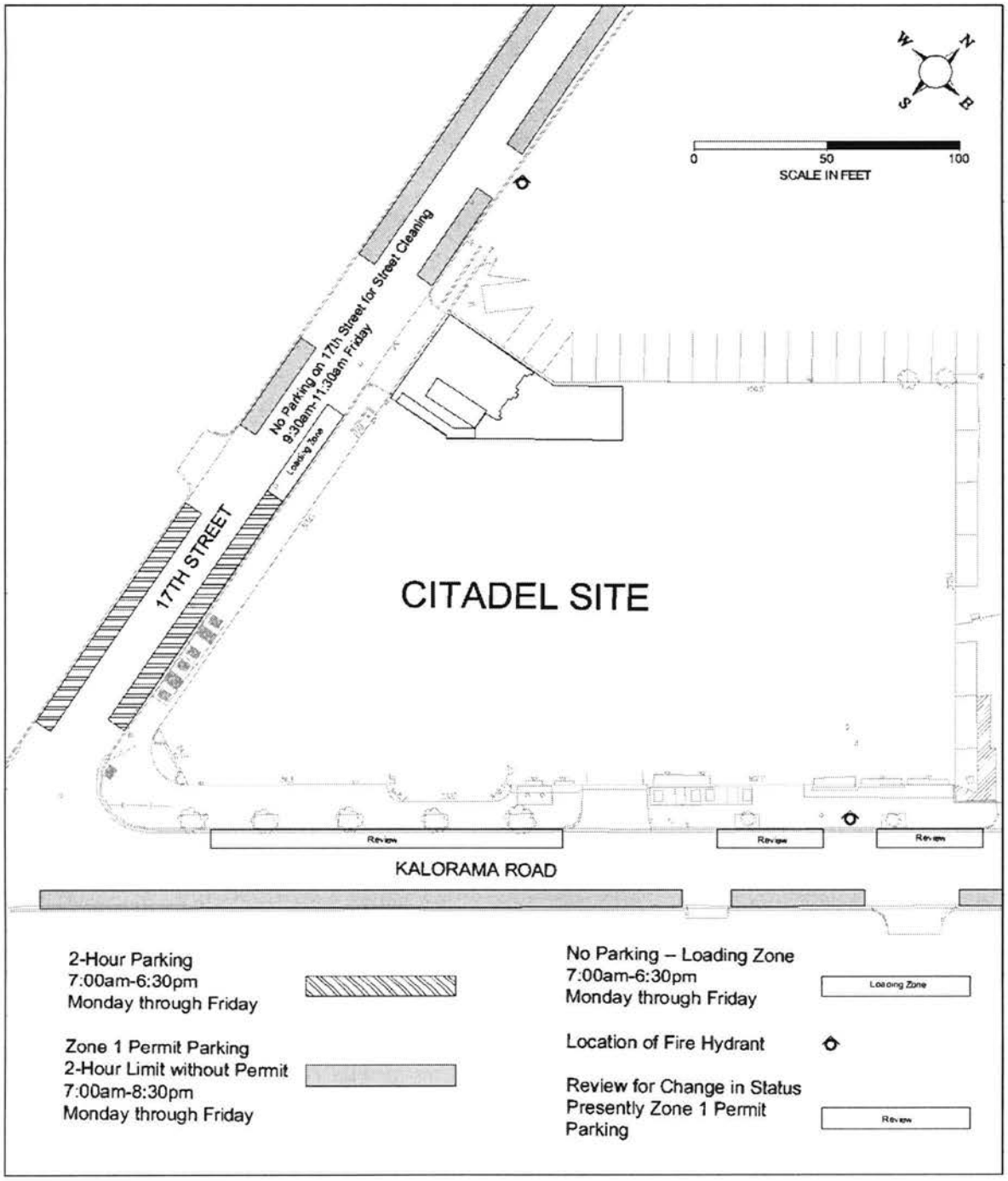


Figure 10 - Proposed On-Street Parking Configuration

Comparable Sites

Transportation elements at comparable supermarkets were studied and compared to the proposed parking and loading program at the Citadel. The following supermarkets were identified as being comparable to the proposed Harris Teeter store at the Citadel in their size and location:

- Safeway – Dupont Circle
- Safeway – Adams Morgan
- Whole Foods – Logan Circle
- Whole Foods – Glover Park
- Giant – Columbia Heights

Observations regarding the transportation characteristics of each of the comparables were made including the number of parking spaces, width of adjacent roadways, and size and location of loading docks/zones serving the site. Table 4 below summarizes these observations.

Table 4a - Comparable Site Observations

Store	Square Feet	# Parking Spaces	Parking Ratio (spaces per 1,000 SF)	Parking Management	# Loading Bays
Proposed Harris Teeter (Kalorama) 17th Street and Kalorama Road Washington, DC	42,299	90 weekdays 130 evenings and weekends	2.1 weekdays 3.1 evenings and weekends		2
Safeway (Dupont) 1701 Corcoran Street Northwest Washington, DC	13,572	0	0	N/A	1
Safeway (Adams Morgan) 1747 Columbia Road Northwest Washington, DC	26,153	32	1.2	60 min. free customer only parking in garage and alley behind store	1
Whole Foods (Logan Circle) 1440 P Street NW Logan Circle Washington, DC	40,200	185	4.6	Two-hour free customer only parking in basement and on roof; pay-on-foot machines by elevator	2
Whole Foods (Glover Park) 2323 Wisconsin Avenue Northwest Washington, DC	35,237	192	5.4	60 min. free parking for customers only on three garage levels	3
Giant (Columbia Hts.) 3460 14th Street Northwest Washington, DC	21,851	77	3.5	Two hour free parking for customers only in surface lot in front of store	1

Table 4b - Comparable Site Observations

Store	On-Street Parking Restriction Dimensions	Street Width Adjacent to Store	On-Street Parking Designations
Harris Teeter (Kalorama)	Parking restricted loading zone on 17th Street immediately south of the loading docks (40 feet)	Both 17th Street and Kalorama Road are 30 feet with two travel/parking lanes	See Figures 8 and 10
Safeway (Dupont)	Parking restricted loading zone on entire blockfront of 17th Street adjacent to store (200 feet)	17th Street is 40 feet with two travel and two parking lanes in the southbound direction; Corcoran Street has one 20-foot lanes eastbound	One hour metered parking on 17th Street; 2 hour metered parking on Corcoran Street
Safeway (Adams Morgan)	No parking on Columbia Road from alley immediately north of store to Ontario Road (50 feet)	Columbia Road is 40 feet wide with two 15-foot travel/parking lanes and one center turn lane	One hour metered parking on both sides of Columbia Road adjacent to storefront
Whole Foods (Logan Circle)	Parking restricted loading zone on opposite P Street blockfront to store (130 feet); small loading zone on SE corner of P and 15th Streets	P Street is 40 feet with two 20-foot travel/parking lanes	One-hour metered parking on store-side blockfront; loading zone on opposite blockfront to store
Whole Foods (Glover Park)	No parking immediately in front of store's main entrance on Wisconsin Ave. (70 feet)	Wisconsin Ave. is 52 feet two 15 foot outside travel lanes and two 11 foot inside travel lanes	Two-hour meter parking
Giant (Columbia Hts.)	No on-street loading zone	14th Street is 46 feet with two 11-foot travel lanes, two 5-foot bike lanes, and two 7-foot parking lanes	One-hour parking

CAPACITY ANALYSES

Capacity analyses for the intersections within the study area were performed for the critical A.M. and P.M. commuter peak hours in the Existing **(EX)**, Future Background **(FB)** and Total Future **(TF)** conditions. They were analyzed with Highway Capacity Manual methodology using the Highway Capacity Software 2000 (HCS 4.1d). The results of the capacity analyses can be found in Table 5, and are expressed in levels of service (LOS) and delay (in seconds).

Table 5 - Capacity Analysis Results

Intersection / Movement	EX	FB	TF	EX	FB	TF
	LOS (Delay)			LOS (Delay)		
	AM			PM		
17th Street and Columbia Road *Unsignalized*						
Westbound Left	A (8.1)	A (8.2)	A (8.2)	A (8.8)	A (8.8)	A (8.9)
Northbound Approach	C (15.2)	C (16.2)	C (16.8)	C (17.6)	C (18.7)	C (23.5)
17th Street and Euclid Street *Unsignalized*						
Eastbound Approach	A (8.0)	A (8.5)	A (8.1)	A (8.7)	A (8.9)	A (9.1)
Westbound Approach	A (8.2)	A (8.3)	A (8.3)	A (7.8)	A (7.9)	A (8.0)
Northbound Approach	A (7.6)	A (7.8)	A (7.9)	A (7.6)	A (7.7)	A (8.1)
Southbound Approach	A (7.9)	A (8.0)	A (8.1)	A (8.0)	A (8.1)	A (8.4)
17th Street and Kalorama Road *Unsignalized*						
Eastbound Approach	A (7.6)	A (7.7)	A (7.9)	A (7.7)	A (7.9)	A (8.2)
Westbound Approach	A (7.9)	A (8.0)	A (8.2)	A (7.3)	A (7.5)	A (7.9)
Northbound Approach	A (7.4)	A (7.5)	A (7.6)	A (7.4)	A (7.5)	A (7.7)
Southbound Approach	A (7.3)	A (7.4)	A (7.7)	A (7.3)	A (7.4)	A (7.9)
16th Street and Euclid Street *Signalized*						
Eastbound Approach	D (40.8)	D (41.2)	D (41.2)	E (73.2)	E (80.0)	E (80.0)
Westbound Approach	F (213.9)	F (228.4)	F (231.7)	F (108.2)	F (126.6)	F (134.8)
Northbound Approach	A (6.3)	A (6.4)	A (6.5)	B (14.2)	B (15.0)	C (20.4)
Southbound Approach	B (13.1)	B (13.7)	B (14.0)	A (7.5)	A (7.7)	A (7.9)
Overall	C (31.9)	*C (33.6)*	*C (34.0)*	C (23.4)	*C (25.7)*	*C (29.0)*
16th Street and Kalorama Road *Unsignalized*						
Eastbound Approach	F (107.4)	F (295.4)	n/a	E (44.0)	E (58.8)	n/a
Northbound Left	C (16.7)	C (18.9)	n/a	B (10.2)	B (10.5)	n/a
16th Street and Kalorama Road *Signalized*						
(Mitigated with a Signal in the Future Background Condition) Eastbound Approach		D (38.7)	D (40.5)	n/a	D (38.1)	D (53.1)
Northbound Approach		A (7.4)	A (9.0)	n/a	B (11.5)	C (21.5)
Southbound Approach	n/a	B (11.9)	B (12.0)	n/a	A (6.5)	A (6.6)
Overall	n/a	*B (12.0)*	*B (12.7)*	n/a	*B (10.4)*	*B (17.6)*
Kalorama Road and Site's Driveway *Unsignalized*						
Eastbound Left	n/a	n/a	A (7.3)	n/a	n/a	A (7.4)
Southbound Approach	n/a	n/a	A (8.9)	n/a	n/a	A (9.9)

Existing (2004) Capacity Analysis

In the District of Columbia, a level of service D or better is considered acceptable during peak traffic times. The results of the existing capacity analysis indicate that all of the intersections operate at an acceptable level of service during the A.M. and P.M. commuter peak hours with the exception of side street approaches at the intersections on 16th Street. These approaches operate with very high delay, particularly westbound Euclid at 16th, however the volume of traffic that experiences extended delay is a small portion of the total traffic that passes through these intersections. The vast majority of the traffic experiences very little delay. The signal timing at this intersection could be modified to decrease the delay on the side street approaches. This, however, would result in increased delay for traffic on 16th Street. Since 16th street is a major north-south corridor, the District Department of Transportation has timed the signal to give priority to the traffic on 16th Street. The results of the existing conditions capacity analysis are displayed graphically in Figure 11.

Future Background (2006) Capacity Analysis

The results of the future background capacity analysis indicate that all of the intersections operate at an acceptable level of service D or better during commuter peak hours with the exceptions for the side street approaches to the 16th Street intersections. The intersection approaches to 16th Street that experience excessive delay presently will be exacerbated by background traffic growth. Traffic on the eastbound approach to the unsignalized intersection of Kalorama Road and 16th Street will be especially impacted by this background growth. Eastbound Kalorama traffic is expected to experience unacceptable delays and maximum vehicle queues of 9 vehicles during the AM peak hour that would extend half way to 17th Street. These impacts could be mitigated with a traffic signal at the intersection. The results of the capacity analysis of this intersection with a traffic signal are included in Table 3 and show that a signal would improve the level of service of this intersection to within acceptable levels of D or better. This signal would need to be timed and coordinated with the existing signal at the intersection of 16th and Euclid Streets. Proper timing and coordination will ensure that these two signals work together to maintain the current traffic progression that motorists experience today on this major corridor. The results of the future background capacity analysis is illustrated in Figure 12.

Total Future (2006) Capacity Analysis

The results of the total future (2006) capacity analysis indicate that all of the intersections operate at an acceptable level of service D or better in the A.M. and P.M. peak hours with the exceptions of the side street approaches to the intersection of 16th and Euclid Streets. The above table shows the capacity analysis results of the intersection of Kalorama Road and 16th Street with the traffic signal introduced as mitigation for future background traffic conditions. The results of the total future capacity analyses with mitigation are shown in Figure 13.

The detailed HCS analysis worksheets are contained in the Technical Appendix.

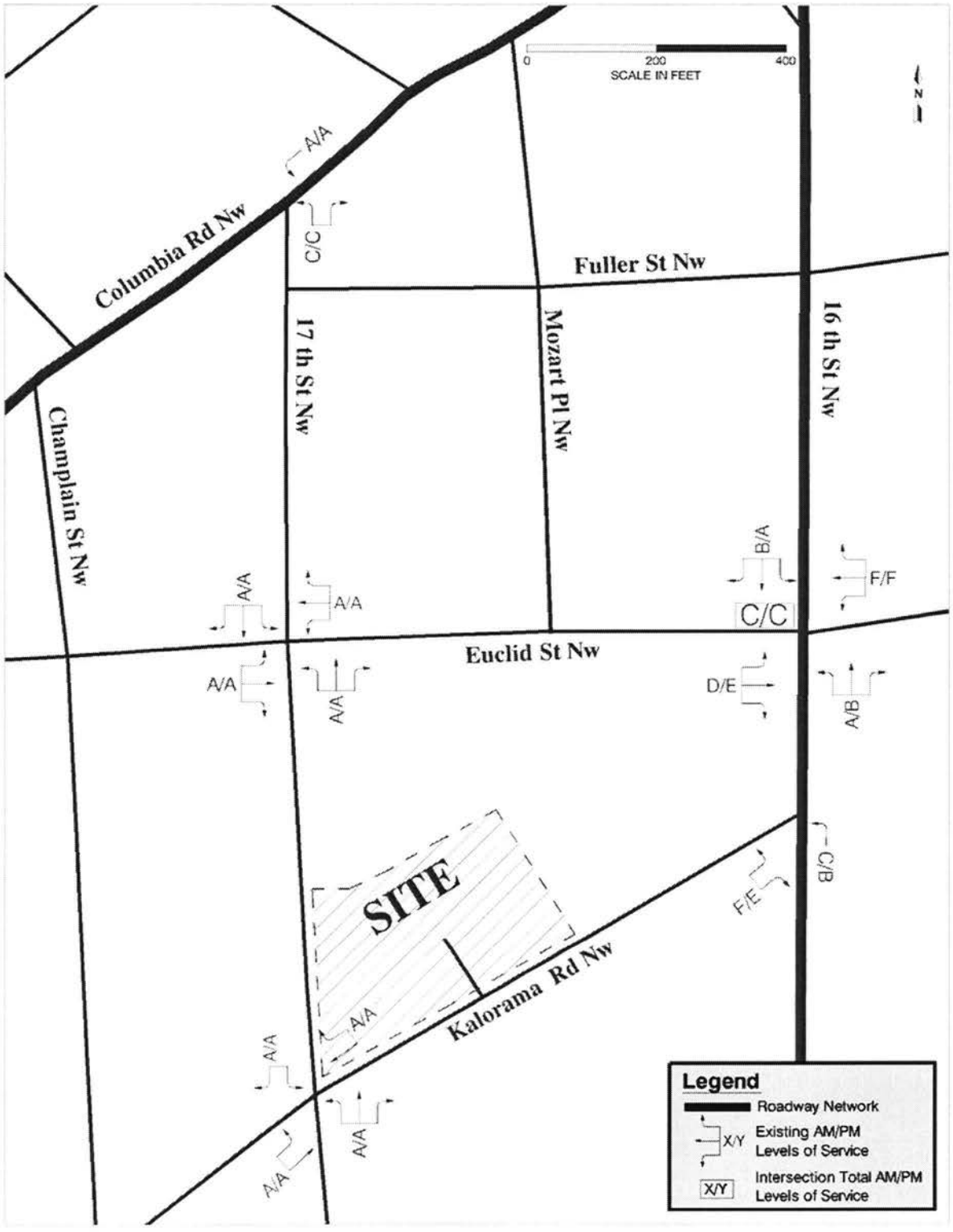


Figure 11 - Existing (2004) Levels of Service

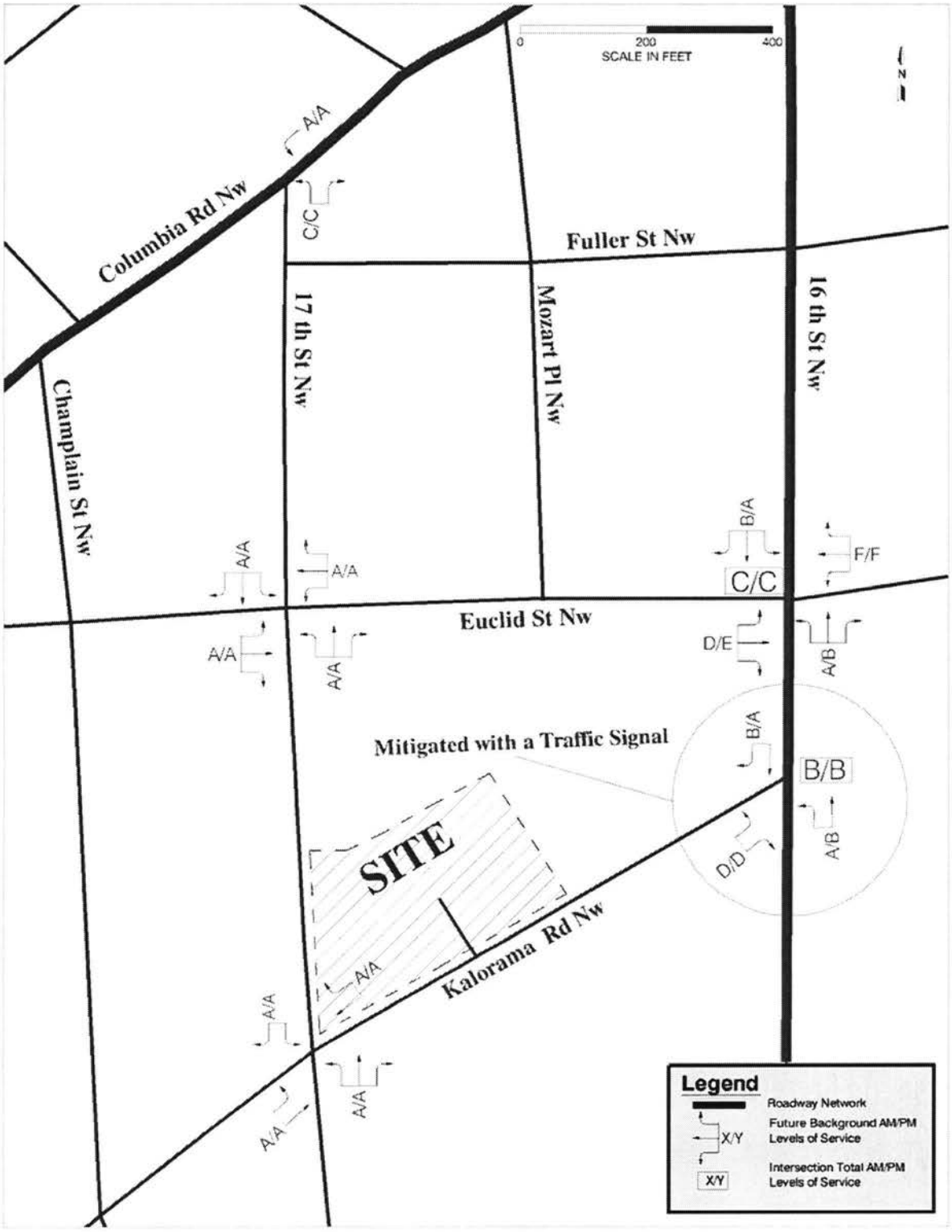


Figure 12 - Future Background (2006) Levels of Service

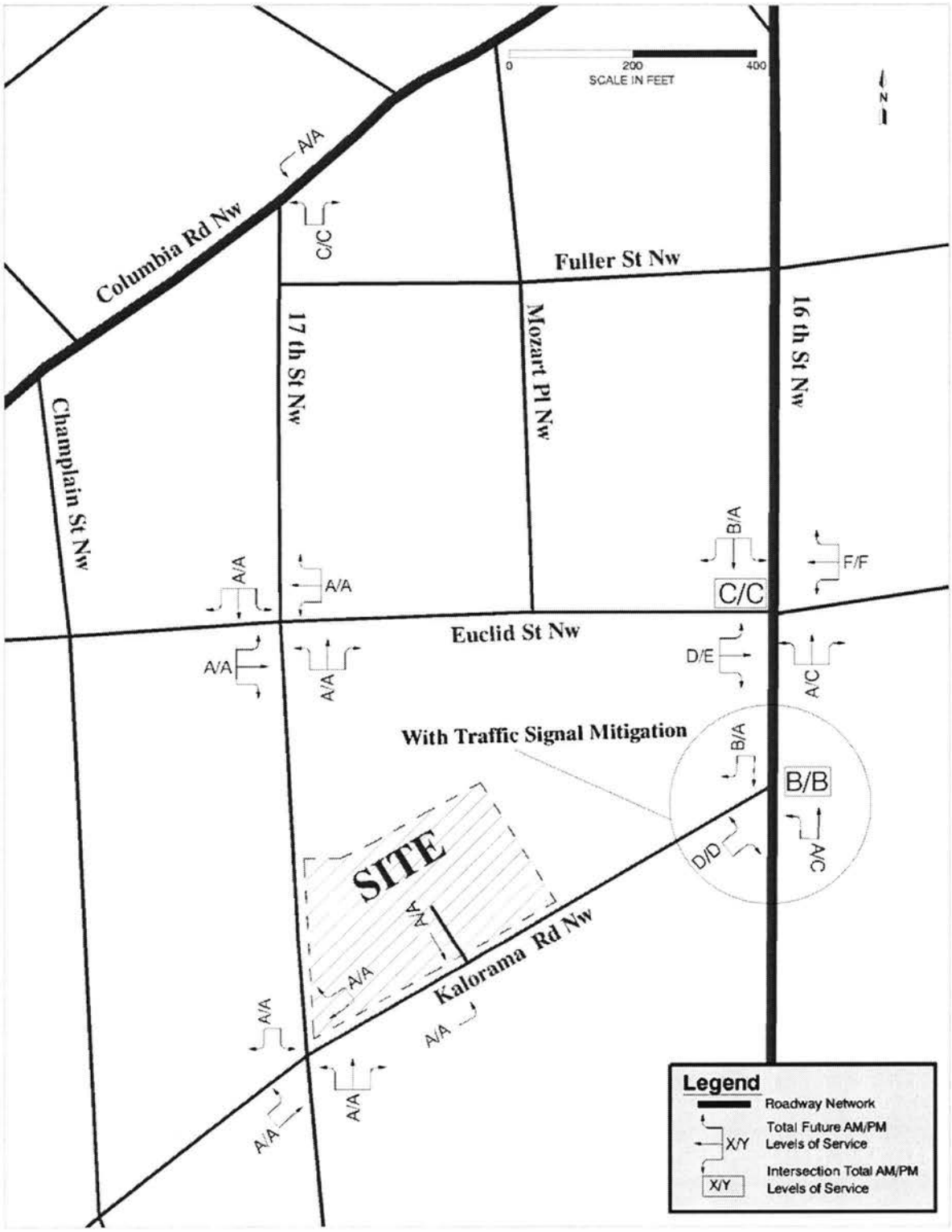


Figure 13 - Total Future (2006) Levels of Service

CONCLUSIONS

The analysis presented in this report resulted in the following conclusions:

Existing Conditions (2004)

- All of the study intersections operate at acceptable levels with the exception of side street approaches to the two intersections on 16th Street, one of which is signalized.
- These side street approaches endure higher delays for the greater benefit of preserving the progression of traffic on the major north south corridor of 16th Street.

Build Year (2006) without Proposed Development (Future Background) Conditions

- All of the study intersections operate at acceptable levels with the exception of side street approaches to the two intersections on 16th Street, one of which is signalized.
- The expected future traffic without the redevelopment of the Citadel is expected to increase delays on the Kalorama approach to 16th Street beyond acceptable conditions.
- Conditions at this intersection could be improved to within acceptable parameters with the installation of a traffic signal at this intersection.

Build Year (2006) with Proposed Citadel Development (Total Future) Conditions

- All of the study intersections operate at acceptable levels with the exception of the Euclid Street approaches to the signalized intersection at 16th Street.
- Assuming the installation of a traffic signal at the intersection of Kalorama Road and 16th Street, the level of service at this intersection with the addition of site traffic remains above acceptable levels.

Parking

- The proposed parking supply is expected to be sufficient for serving the needs of the uses in the proposed redevelopment program.

Loading

- The loading dock and curbside loading zones proposed for the site are expected to be sufficient for the delivery needs of the proposed land uses at the Citadel site.