Traffic Impact Analysis

Florida Rock PUD

Washington, D.C.

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EXECUTIVE SUMMARY

This report presents the findings of a traffic impact study submitted in conjunction with a Second-Stage Planned Unit Development (PUD) and Zoning Map Amendment application for Florida Rock Properties, Inc. in Washington, D.C. The primary purpose of this study is to evaluate the local traffic impacts of the proposed new development, focusing on the proposed site driveways and the intersections and roadways directly serving the site (Potomac Avenue and 1st Street SE).

The Florida Rock site is located on the north side of the Frederick Douglass Bridge in Ward 6 in Washington, D.C., east of South Capitol Street, bounded by the Anacostia River and Potomac Avenue. The proposed development plan consists of slightly over 1,100,000 square feet of mixed-use space, divided among four buildings.

Based on the capacity analysis, prior transportation studies performed near the site, and a review of the site plan, the proposed Florida Rock mixed-use development will have no negative impact on the surrounding local roadway network. The parking provided, circulation within the site, loading operations, and access to Potomac Avenue from site driveways is acceptable for each phase of the project.

The close proximity and quality of access to Metrorail significantly reduces potential traffic impacts. In addition, the connection to the Anacostia Riverwalk Trail provides a significant transportation feature to site residents, visitors and office tenants.

Although the capacity analyses contained in this report show acceptable levels of service at local roadways, all of the regional roadways analyzed operated at or above their capacity. This impacts the proposed development through the encouragement of alternate vehicular routing and alternate mode usage. Although the site is located near South Capitol Street, by using the local roadway system the 11th Street bridges, I-295 and I-395, and downtown DC can easily be reached without the need for South Capitol Street. Thus, even if the regional capacity is not improved through the on-going efforts of DDOT, notably the South Capitol Street EIS project, regional access for the site can still occur through other routes.

INTRODUCTION

This report presents the findings of a traffic impact study submitted in conjunction with a Second-Stage Planned Unit Development (PUD) and Zoning Map Amendment application for Florida Rock Properties, Inc. in Washington, D.C.

The Florida Rock site is located on the north side of the Frederick Douglass Bridge in Ward 6 in Washington, D.C., east of South Capitol Street, bounded by the Anacostia River and Potomac Avenue. Figure 1 shows the location of the site. The proposed development plan consists of slightly over 1,100,000 square feet of mixed-use space, divided among four buildings:

- Phase 1: Office building with ground floor retail (approx. 297,000 square feet)
- Phase 2: Residential building with ground floor retail (approx. 218,000 square feet)
- Phase 3: Office building with ground floor retail (approx. 354,000 square feet)
- Phase 4: Hotel (approx. 248,000 square feet)

Study Overview

The primary purpose of this study is to evaluate the local traffic impacts of the proposed new development, focusing on the proposed site driveways and the intersections and roadways directly serving the site (Potomac Avenue and 1st Street SE). Gorove/Slade Associates undertook the following steps while preparing this study:

- Performed field reconnaissance of existing roadway and intersection geometrics, traffic controls, and speed limits and operations;
- Discussed study scope and methodology with District Department of Transportation (DDOT) staff;
- Conducted peak hour turning movement counts at study intersections;
- Determined existing levels of service at the study intersections;
- Developed background traffic forecasts for project build-out in 2012 and 2017 based on existing counts and traffic generated by other pending/future developments;
- Calculated background levels of service at study intersections based on background traffic forecasts and existing traffic controls;
- Estimated the AM and PM peak hour and daily trips that would be generated by the new development, including mode split assumptions;

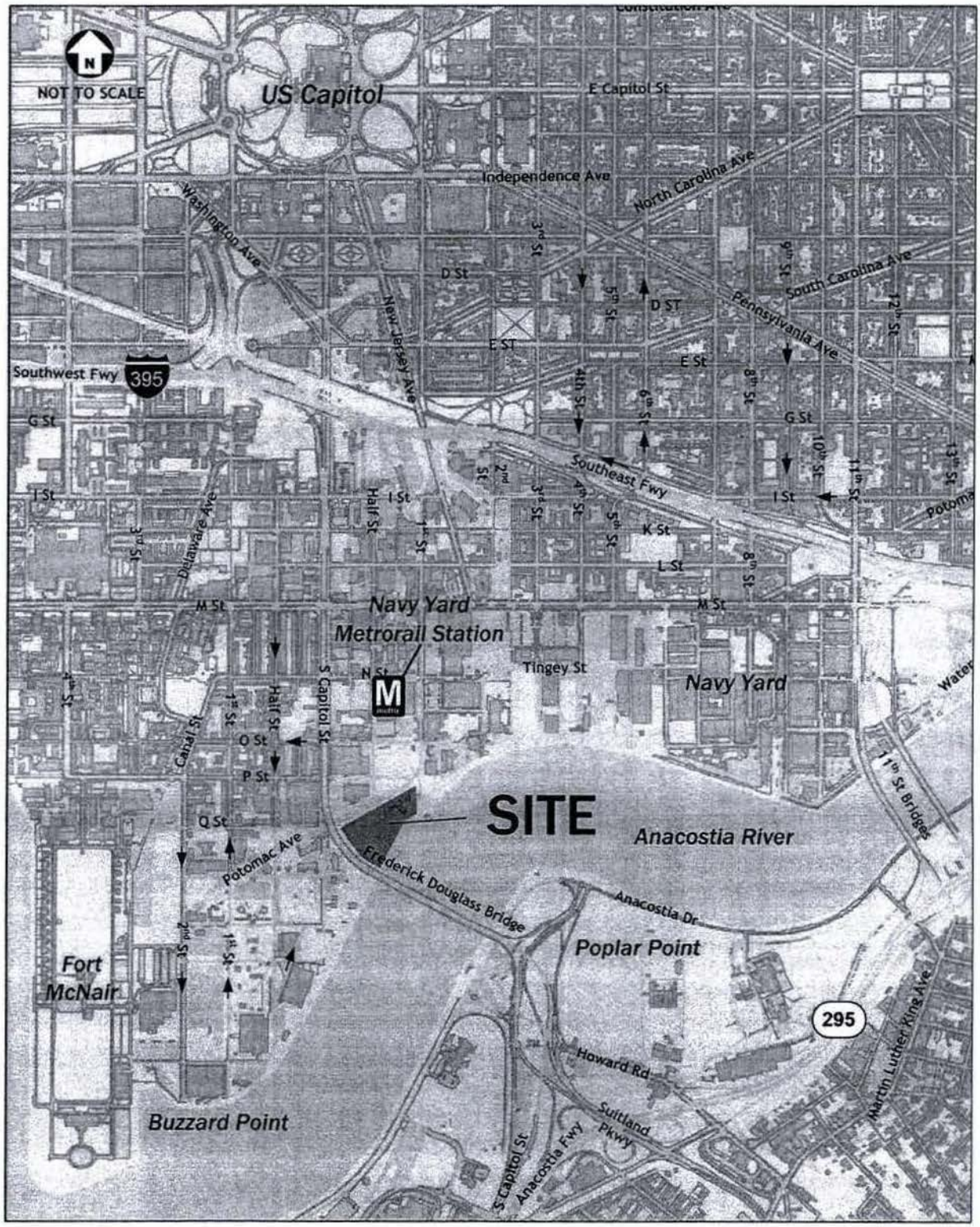


Figure 1 – Site Location

- Forecasted total future traffic volumes for project build-out in both 2012 and 2017 based on background future traffic forecasts and site traffic assignments; and
- Calculated total future levels of service at the study intersections based on total future traffic forecasts, existing and future traffic controls, and existing and future intersection geometrics.

Sources of data for this study include traffic counts conducted by Gorove/Slade, ITE's *Trip Generation*, 7th Edition, site and circulation plans from Davis Buckley Architects and Planners, the District Department of Transportation (DDOT), *Traffic Impact Analysis – 100 Potomac Avenue, Second State Planned Unit Development and Map Amendment Applications* by O.R. George and Associates, Inc., *2005 Development-Related Ridership Survey* prepared by the Washington Metropolitan Area Transit Authority (WMATA), and the files/library of Gorove/Slade.

Study Scope

This traffic impact study was conducted in accordance with discussions held with DDOT staff and a summary scoping document emailed to DDOT on August 3, 2006. A copy of the scoping document is included in the Appendix to this report.

Study Intersections

The scope of this study focused on site access and the signalized intersections closest to the proposed site on Potomac Avenue and 1st Street SE. An analysis of traffic beyond the traffic signals included in the scope was not performed for several reasons, (1) the percentage impact of site traffic to M Street SE and South Capitol Street was not significant enough to warrant their inclusion based on DDOT standards, and (2) studies of South Capitol Street and regional traffic are being performed by DDOT (these studies are discussed in more detail later in this report).

These studies have a greater scope than a traditional impact analysis containing a more refined analysis that takes into account more existing and future impacts and influence on traffic. In discussions with DDOT staff, it was agreed that this study should focus on direct site access and nearby traffic signals, and that all data and analysis files be made available for their incorporation into the on-going regional analysis of the area. Thus, the only regional-traffic based study intersections included in this report are the future intersection of Potomac Avenue and South Capitol Street, due to it's proximity to the site, and the intersection of M Street and South Capitol Street, due to its level of importance in the area. In addition, including the intersection of M Street and South Capitol Street provides a good indication of regional traffic conditions in the near SE/SW area since it serves the two main corridors in the area.

The following study intersections are included in this study:

1) Potomac Avenue and South Capitol Street (future intersection)
2) N Street and 1st Street SE

3) M Street and 1st Street SE
4) M Street and northbound South Capitol Street ramps
5) M Street and southbound South Capitol Street ramps
6) All proposed site driveways

Horizon Years

Previous studies of this site have based the horizon year for future conditions on full build-out of all four phases. Since then, more details on the District's planned improvements to the South Capitol Street corridor are available. Based on conversations with DDOT and the phasing indicated by the Florida Rock project team, this study uses two horizon years: 2012 and 2017. The first horizon year, 2012, represents the end of Phase 2, and incorporates the planned interim improvements at the intersection of South Capitol Street and Potomac Avenue. The second horizon year, 2017, represents full-build out of the site and assumes the completion of the proposed traffic oval and new Frederick Douglass Bridge (due to construction phasing, phases 3 and 4 cannot be built until these improvements are made). This was done so the analysis would determine if site driveways will operate acceptably when the intersection of Potomac Avenue and South Capitol Street exists in both its interim and final conditions.

EXISTING CONDITIONS

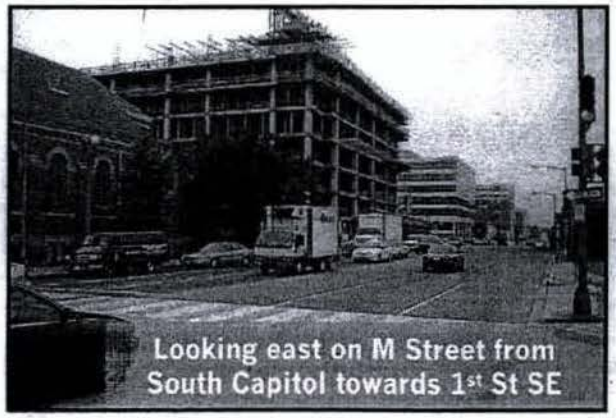
The site is served by many regional roadways including Interstate 395 (I-395), Interstate 295 (I-295), and several interchanges and bridges. Arterials near the site include South Capitol Street and M Street; 1st Street SE, N Street and Potomac Avenue serve as collector roadways. The following is a description of the major and local roadways included as part of the study area:

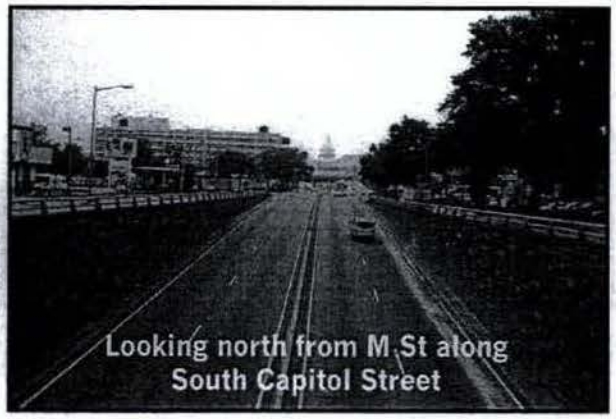
South Capitol Street

South Capitol Street is classified by DDOT as a principal arterial. The ADT volume on the portion of South Capitol Street near the study area is approximately 58,600 vehicle trips. South Capitol Street connects the Frederick Douglass Memorial Bridge to Interstate 395 and the Capitol. North of M Street, South Capitol Street is between 6 and 8 lanes and parking is prohibited. South of M Street, South Capitol Street is a six-lane grade-separated roadway and two lanes serve as access roads for local traffic and entrance/exit ramps. Parking is available south of M Street on the southern leg of southbound South Capitol Street. North of M Street, the right-of-way width for South Capitol Street is 155 feet but narrows to 130 feet from M Street to the Frederick Douglass Memorial Bridge.

M Street

M Street is a six-lane minor arterial divided by a brick median to the west of South Capitol Street and undivided to the east. The roadway extends from Maine Avenue westerly to 11th Street SE. M Street bridges over and has ramp connections to South Capitol Street before terminating at 11th Street SE. The ADT volume on the portion of M Street near the study area is approximately 19,200 vehicle trips. Commuters use M Street during peak periods, offering access between Maryland suburbs (via I-295 and the Whitney Young Memorial Bridge), the Washington Navy Yard, and other destinations in Washington. Generally, parking is not permitted on M Street. The posted speed limit is 30 mph.


Looking east on M Street from South Capitol towards 1st St SE


Looking north from M St along South Capitol Street

N Street

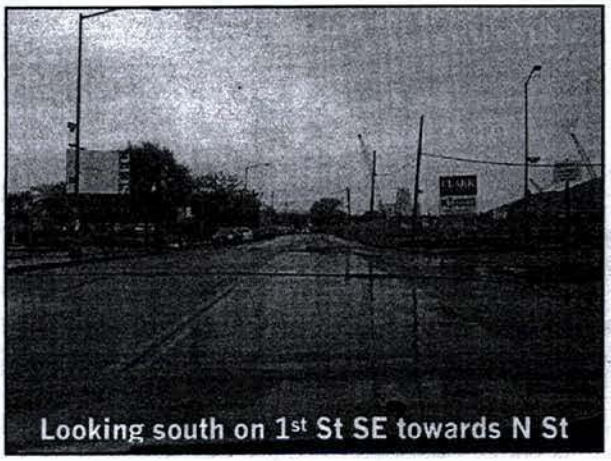
N Street/Tingey Street is a local two-lane roadway with a posted speed limit of 25 mph. East of the intersection with 1st Street, SE, the road name changes from N Street to Tingey Street through the Southeast Federal Center site.

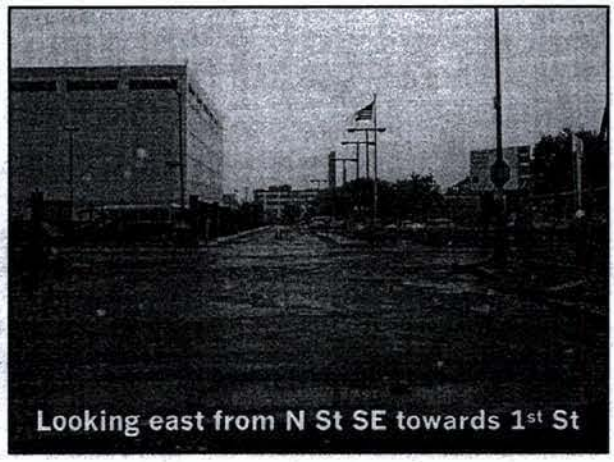
Potomac Avenue

Potomac Avenue is a two-lane local collector street that extends from 1st Street SW and R Street SW just east of Fort McNair to 1st Street SE. The street carries two travel lanes in each direction separated by a median. The ADT volume on the portion of Potomac Avenue near the study area is approximately 2,000 vehicle trips. Potomac Avenue crosses underneath South Capitol Street as a grade-separated intersection. Potomac Avenue has two parking lanes.

1st Street SE

1st Street SE is a two-lane local street that stretches from the Anacostia River waterfront to I Street. The roadway carries commercial and industrial vehicle traffic due to the land uses south of M Street. The intersection of 1st Street SE and M Street is signalized.


Looking south on 1st St SE towards N St


Looking east from N St SE towards 1st St

Gorove/Slade conducted field reconnaissance to obtain the existing lane usage and traffic controls at the intersections within the study area. Figure 2 presents the local roadway network of the study area and existing lane use and configurations.

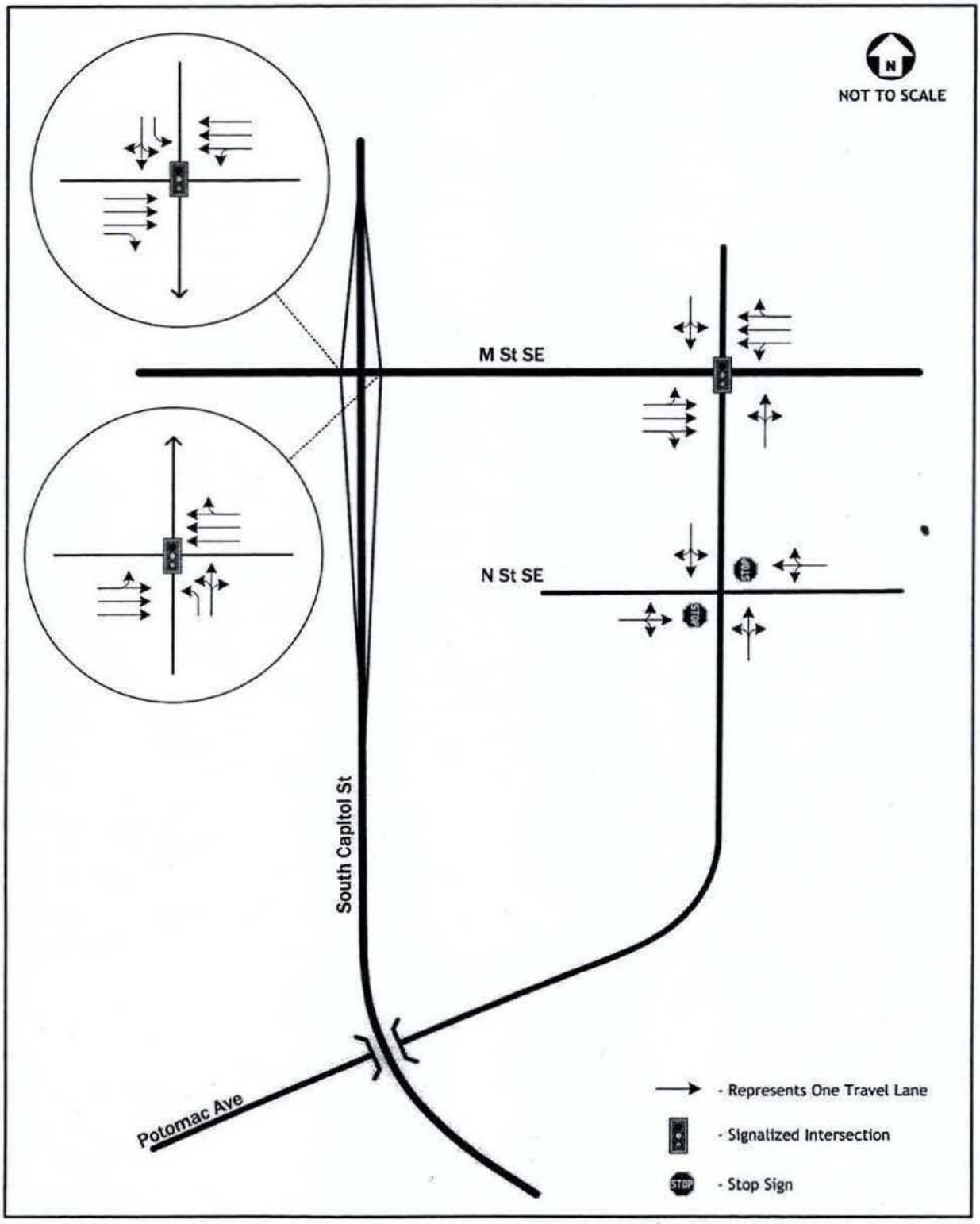


Figure 2 – Existing Lane Use and Configuration

Public Transportation

WMATA Metrorail

The Navy Yard Metrorail Station, served by the Green Line, is located approximately 2,000 feet north of the Florida Rock site. The station has two access portals on M Street SE, one at Half Street and the other at New Jersey Avenue.

WMATA Metrobus

Nine Metrobus routes on four lines operate within the vicinity of the Florida Rock site, mostly on M Street and South Capitol Street. Table 1 summarizes details on theses routes, which include the following:

- *Minnesota Avenue-M Street Line*
  Routes V7, V8, and V9, connect the Smithsonian, L'Enfant plaza, Waterfront-SEU, Navy Yard, Potomac Avenue, Minnesota Avenue, and Deanwood Metrorail Stations via Minnesota Avenue, Pennsylvania Avenue, and M Street. Service hours are from 6:00 a.m. to 2:30 a.m. daily. Weekday headways (time between buses) are approximately 7 minutes during peak periods and 30 minutes during off-peak times. Weekend and holiday headways range from 20 to 40 minutes.

- *Navy Yard Shuttle Line*
  Route N22 connects the Navy Yard Metrorail Station with the Eastern Market Metrorail Station on the Blue and Orange Lines and Union Station on the Red Line, via Pennsylvania Avenue and 8th Street SE. The line operates from 6:00 a.m. to 7:30 p.m. on weekdays, with nine-minute headways during weekday peak periods and 20-minute headways during off-peak periods. No weekend service is provided. The route operates with 20-minute headways on holidays.

- *Anacostia-Eckington Line*
  Routes P1 and P2 connect the Anacostia Metrorail Station with the Navy Yard and Waterfront-SEU Stations (all on the Green Line) and the Federal Center SW and Federal Triangle Metrorail Stations (both on the Blue and Orange Lines) via Martin Luther King, Jr. Avenue, M Street, 4th Street, and Constitution Avenue. Service is offered from 7:00 a.m. to 7:30 p.m. on weekdays, with headways ranging from 20 to 40 minutes. No weekend service is provided.

- *Anacostia-Congress Heights Line*
  Routes A42, A46, and A48, connect the Archives-Navy Memorial Metrorail Station on the Yellow and Green Lines with the Anacostia, Congress Heights, and Southern Avenue Metrorail Stations on the Green Line via 7th Street, M Street, Martin Luther King, Jr. Avenue and South Capitol Street. These routes serve the Southeast Federal Center only when Metrorail is not in

service: midnight to 5:30 a.m. on weekdays and midnight to 8:00 a.m. on weekends. Headways range from seven to 30 minutes.

Table 1 – Metrobus Routes Near Site

Line	Route	Metro Stops	Service
South Capitol Street	A9	L'Enfant, Waterfront-SEU	M to F, limited
Oxon Hill-Ft. Washington	P17, P18, P19	Anacostia	M to F, limited
Navy Yard Shuttle	N22	Navy Yard, Eastern Market, Union Station	M to F, limited
Anacostia-Congress Heights	A42, A46, A48	Archives-Navy Memorial, L'Enfant, Navy Yard, Anacostia	M to Sun, early AM, after midnight
Minnesota Avenue - M Street	V7, V8, V9	Archives-Navy Memorial, L'Enfant, Smithsonian, Waterfront, Navy Yard, Minnesota Ave, Deanwood	M to Sun, service to Archives Metro only on weekends
Anacostia-Eckington Line	P1, P2	Navy Yard, Waterfront, Federal Center, Federal Triangle	M to F, limited

Existing Traffic Volumes

Existing AM and PM peak hour traffic counts were conducted at the existing intersections on July 12 and August 10, 2006. The AM peak hour for the system of intersections being studied occurred between 6:45 a.m. and 7:45 a.m., while the PM peak hour occurred between 5:00 p.m. and 6:00 p.m. A summary of the intersection turning movements is included in the Appendix.

Since these peak hour counts were conducted during the summer, they were increased to reflect the lower traffic volumes observed during the summer months. This was done by comparing peak hour counts at the intersection of M Street and South Capitol Street from 2002 and 2004 with the new summer 2006 counts. Based on the old counts, the expected 2006 intersection traffic was determined and the 2006 summer counts were raised to meet the expected level of traffic. This analysis showed that summer traffic is approximately 10% lower than what would be expected based on historical data. The resulting 2006 traffic volumes are shown on Figure 3.

Existing Capacity Analysis

Existing peak hour levels of service (LOS) were calculated based on: (1) the existing lane use and traffic controls shown on Figure 2; (2) the peak hour traffic volumes of the each key intersections shown on Figure 3; (3) existing signal timings/phasings and (4) the Highway Capacity Manual 2000 (HCM) methodologies (using the Synchro 6 software). Copies of LOS calculation worksheets are included in the Appendix. Table 2 displays the results of the capacity analyses with existing LOS and delay, including LOS and average delay per vehicle (in seconds).

The existing analysis reveals that traffic on 1st Street SE operates above acceptable levels of service,

while the intersection of South Capitol Street and M Street fails during both the AM and PM peak periods. These findings are consistent with previous studies within the near SE/SW neighborhood.

What previous studies have found is that generally, intersections serving local traffic, such as those on 1st Street SE, Potomac Avenue and N Street SE operate at or above acceptable conditions. Regional intersections, such as the intersections of M Street with South Capitol Street or 11th Street SE, and the intersection of South Capitol Street and I Street, operate under failing conditions. These findings lead to the conclusion that the local roads in the study area are under-utilized and limited by several 'choke-points' in the system caused by regional traffic patterns. DDOT has been studying these regional traffic patterns for years and through several studies, notably the Anacostia Access Study and Middle Anacostia River Crossing Study, have identified infrastructure improvements to alleviate and spread out regional traffic.

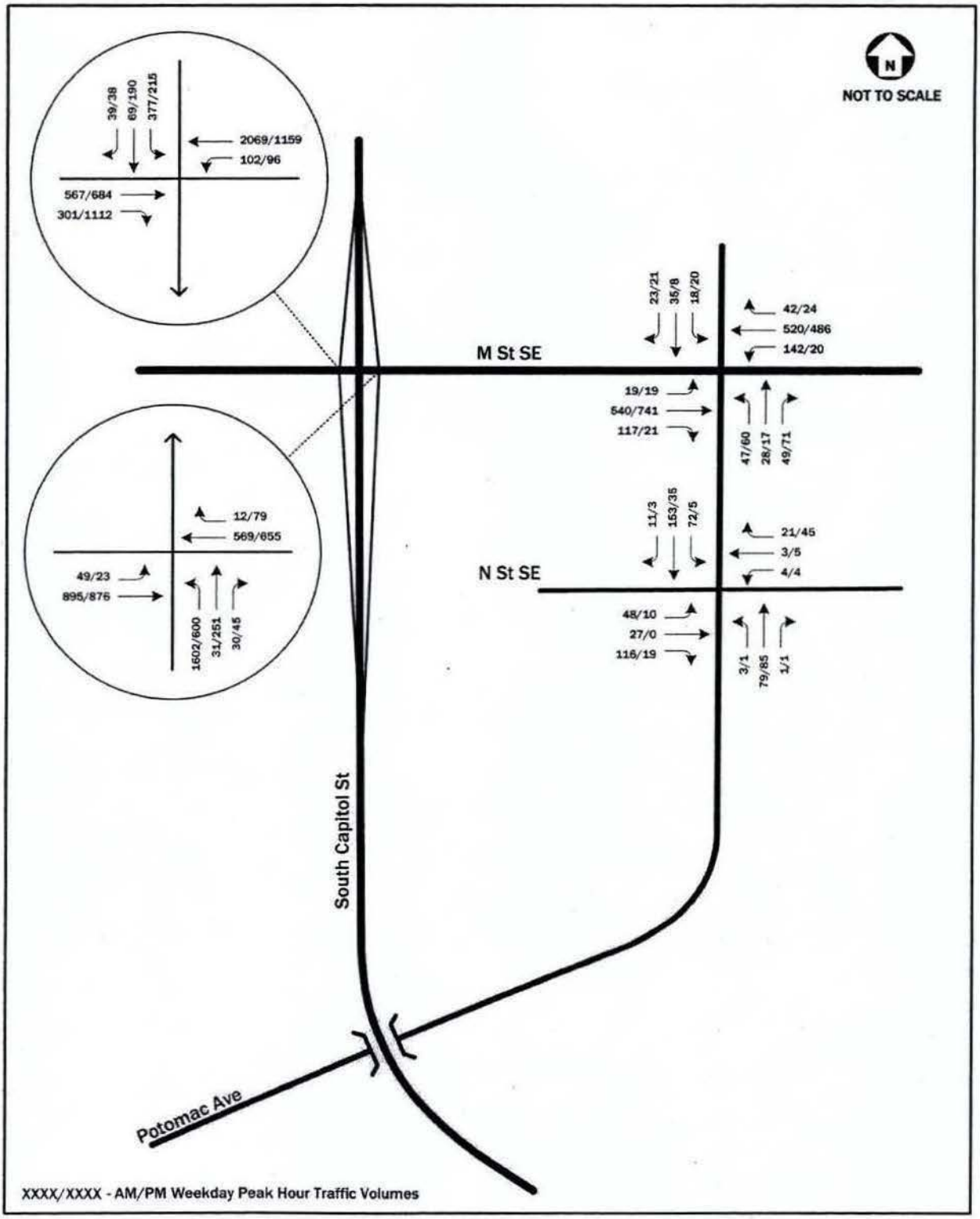


Figure 3 – 2006 Peak Hour Traffic Volumes

Table 2 – Summary of Existing Capacity Analysis

Intersection (Approach)	Existing Conditions			
	AM Peak Hour		*PM Peak Hour*	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
N St & 1st St SE (2-way stop controlled)				
Overall	**6.3**	**A**	**3.5**	**A**
Eastbound	12.8	B	9.4	A
Westbound	10.3	B	9.2	A
Northbound	0.3	A	0.1	A
Southbound	2.6	A	0.9	A
M St & 1st St SE (traffic signal)				
Overall	**12.9**	**B**	**13.0**	**B**
Eastbound	12.6	B	11.8	B
Westbound	7.3	A	8.1	A
Northbound	34.7	C	31.6	C
Southbound	32.3	C	27.5	C
M St & SB South Capitol Ramps (traffic signal)				
Overall	**16.2**	**B**	**122.8**	**F**
Eastbound	39.3	D	230.3	F
Westbound	1.2	A	1.6	A
Southbound	42.3	D	29.9	C
M St & NB South Capitol Ramps (traffic signal)				
Overall	**110.1**	**F**	**83.2**	**F**
Eastbound	1.9	A	0.8	A
Westbound	36.8	D	24.2	C
Northbound	197.0	F	214.1	F

FUTURE BACKGROUND CONDITIONS

Future background conditions were analyzed for each horizon year. The future background analyses, which represent future conditions at the horizon years if the Florida Rock development were not to occur, provide a basis of comparison for the total future analyses, which include traffic generated by the proposed development. In order to develop background traffic forecasts, a composite of existing traffic, ambient growth in traffic and traffic from other future area developments was developed. In addition, planned infrastructure changes to South Capitol Street, Potomac Avenue and 1st Street SE were incorporated.

Future Infrastructure Improvements

This analysis assumed improvements to the study area intersections based on existing traffic studies performed in the area and discussions with DDOT staff. The existing studies performed in the area can be organized into three categories:

- *Regional Access Studies*
  These studies examined regional traffic and major highways and arterials. Those reviewed in preparation of this report included the *4th Street NW Transportation Study*, the *Anacostia Access Study*, the *South Capitol Street EIS*, the *Middle Anacostia River Crossings Study* and the *11th Street Bridges EIS*. Information on these reports can be found on the DDOT website at www.ddot.dc.gov.

  Of particular interest to this analysis are the recommendations arising from the on-going analysis of South Capitol Street, now in the Environmental Impact Study (EIS) phase. The recommendations include interim and permanent improvements to South Capitol Street, notably the intersection of Potomac Avenue and South Capitol Street. Currently, Potomac Avenue travels under South Capitol Street. DDOT plans to alter how the Frederick Douglass Bridges lands on the north side of the Anacostia River so an at-grade intersection of South Capitol Street and Potomac Avenue can be constructed. This interim improvement is expected to be in place by spring 2008. DDOT provided a sketch of the improvement, which is shown in Figure 4. This improvement is assumed to be in place for the 2012 horizon year.

  The long-term improvement recommended by the EIS is a traffic oval centered around the intersection of South Capitol Street and Potomac Avenue. The intersection of South Capitol Street and Potomac Avenue near the proposed Florida Rock development would be incorporated into the traffic oval. DDOT provided Gorove/Slade analysis files of this condition so it could be incorporated into this report. The volume estimates contained in these files for the South Capitol Street and Potomac Avenue intersection formed the basis for the background volumes assumed at this intersection for this study. This improvement is assumed to be in place for the 2017 horizon year.

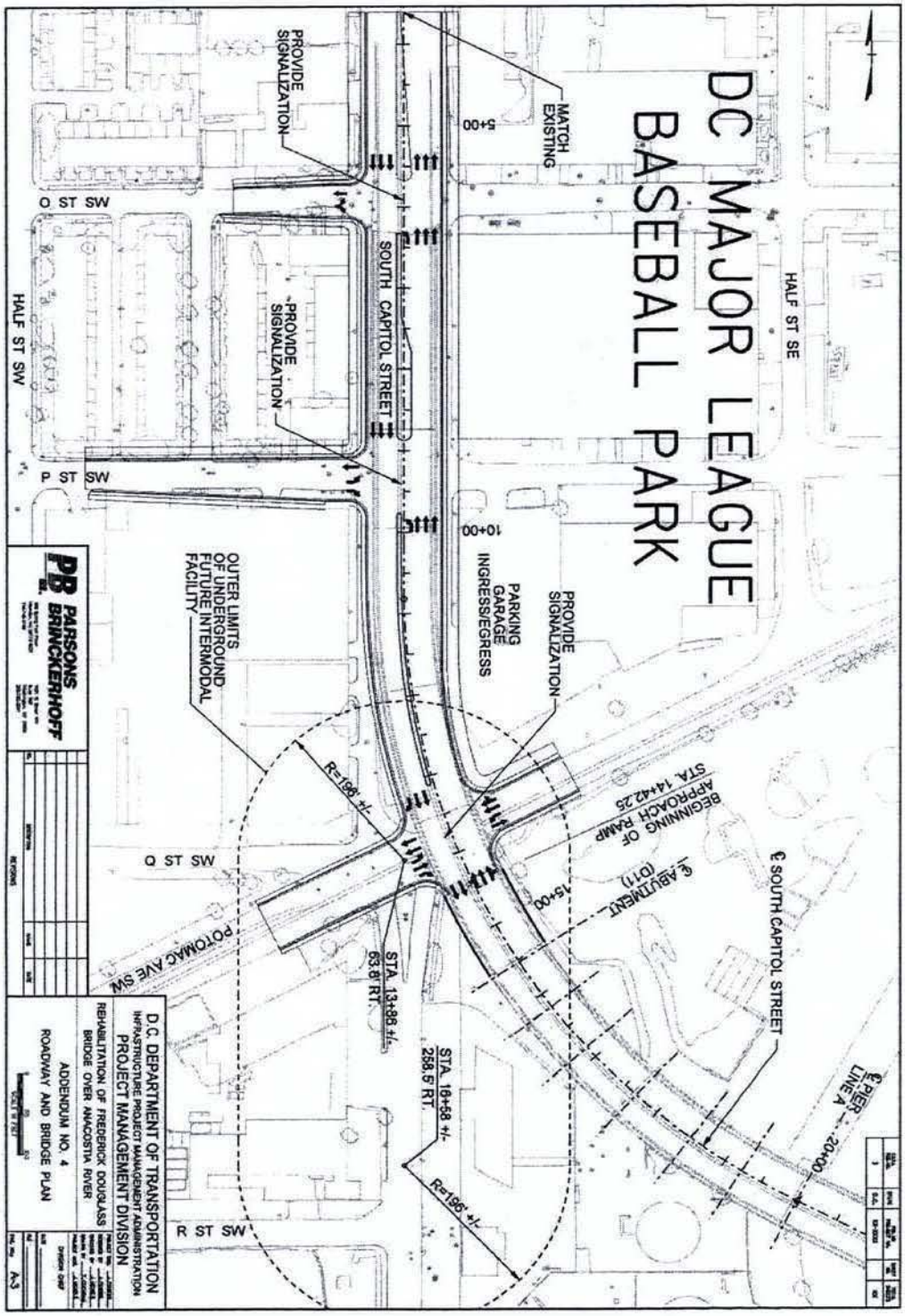


Figure 4 – South Capitol Street Interim Improvements

- *Development Related Studies*
  These studies are related to development near the study area, mostly submitted as part of zoning applications. They include traffic impact analyses for Arthur Capper Carrollsburg, the USDOT Headquarters, the Southeast Federal Center, and the AWI Waterfront. Information from these studies was used to determine growth to traffic for the years 2012 and 2017, including trip generation, distribution and project phasing.

- *Ballpark Related Studies*
  Incorporated into the Ballpark planning process were two transportation studies, the Ballpark Environmental Mitigation Study (EMS), and the Ballpark Transportation Management Plan (TMP). These studies provide insight on what improvements will be in place for the opening of the Ballpark in 2008 and initial concepts for game day operations. Included in the Ballpark construction is the rehabilitation of Potomac Avenue and 1st Street SE near the site. Based on discussions with DDOT it was assumed that by 2008, Potomac Avenue and 1st Street will be resurfaced to four travel lanes (sufficient right-of-way exists to widen the roadways).

In addition, DDOT is currently studying the effects of development in the near SE/SW in detail, incorporating the reports listed above. The purpose of this study is to examine the entire area as a whole and find any projected deficiencies in the system that may not be noticed when looking at individual components of the system or specific time periods. Gorove/Slade is coordinating with DDOT to ensure that the results of this study can be incorporated into this analysis.

Based on these studies and infrastructure assumptions, Figures 5 and 6 show the assumed lane designations and traffic controls for years 2012 and 2017.

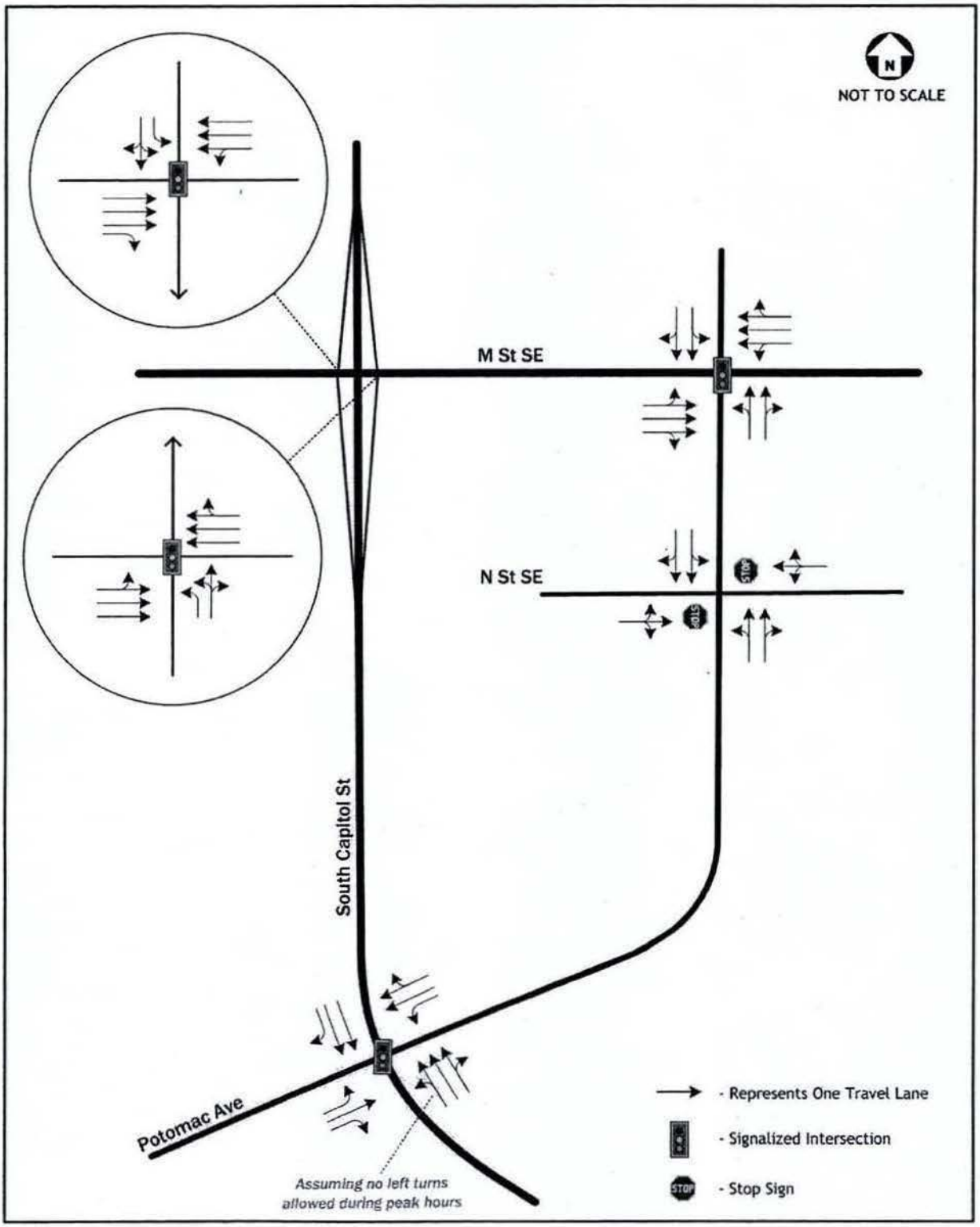


Figure 5 – 2012 Lane Designations and Traffic Controls

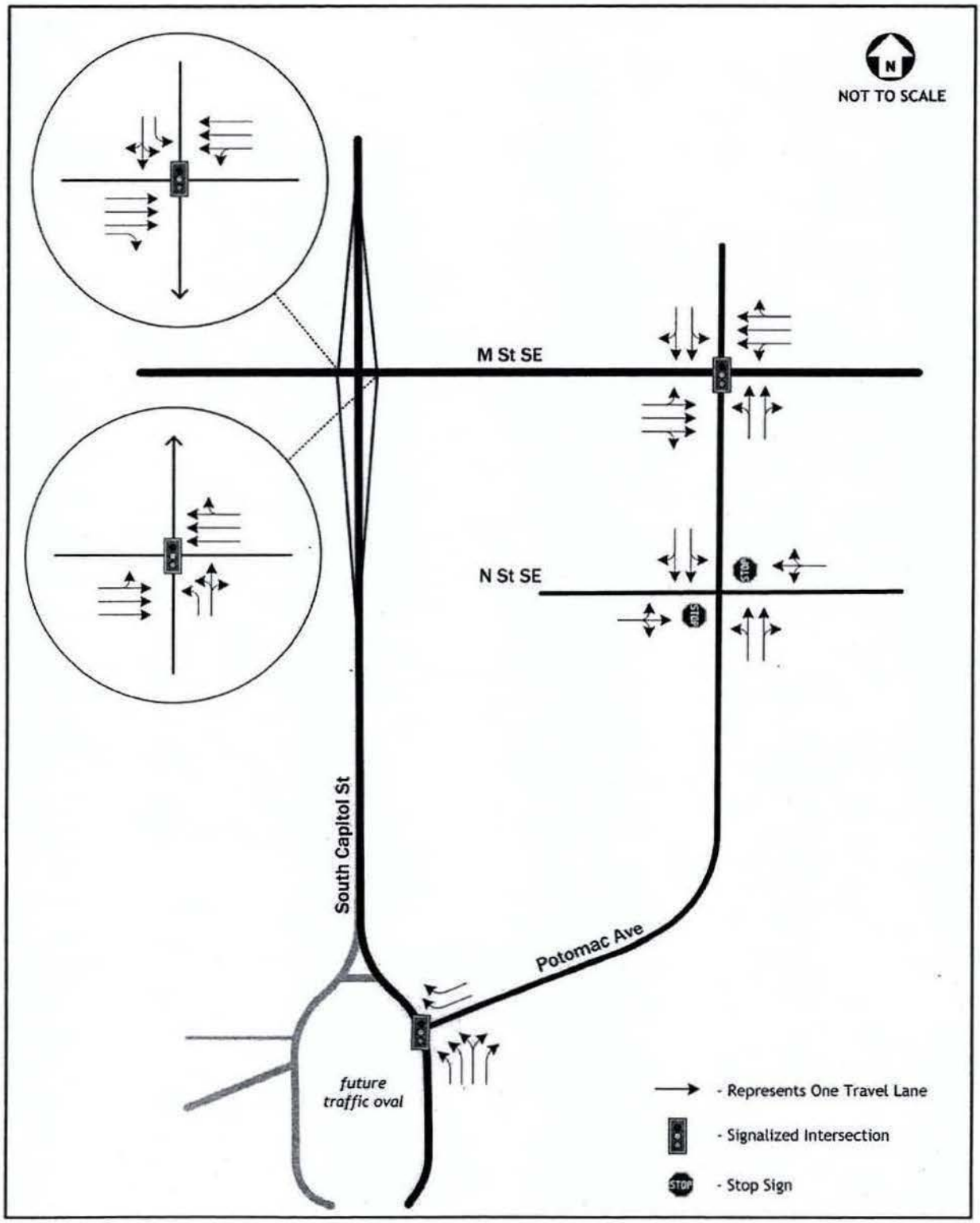


Figure 6 – 2017 Lane Designations and Traffic Controls

Future Background Developments

A traffic impact analysis generally uses two methods to account for growth in traffic on study area roadways for the horizon years; (1) ambient growth of existing traffic and (2) assigning traffic for approved development. The ambient growth is supposed to capture growth in through traffic on streets serving new development located outside of the study area (regional traffic). Generating and assigning traffic for approved developments near the study site accounts for local traffic growth. Ideally, traffic is not double-counted, although it is possible that the ambient growth used may account for both regional and local growth. In some cases, ambient growth rates are skipped entirely, if an extensive list of approved developments exists, to avoid any double-counting of traffic.

Due to the amount of growth on-going and expected in the near SE/SW area of the District, this methodology is difficult to use for this impact analysis. First, the amount of ambient growth is hard to determine, since the majority of growth in local roads has been generated by the new developments in near SE/SW itself. Most areas of the District are not experiencing regional traffic growth, but historical counts of M Street in the last four years show an increase of around 3% per year. Second, the amount and details of proposed and approved developments is rather long and changes almost daily. A list of approved developments can be generated, but that would not include any changes that may occur over time, any planned developments, or by-right developments that would occur prior to the horizon years.

Due to these considerations, this impact analysis used a combined approach. A relatively large percentage growth rate was used in combination with a key list of approved and planned developments. A growth rate of 3% per year was assumed for roadways in the study area between 2006 and 2012, and a 2% per year growth rate was assumed between 2012 and 2017. This growth rate accounts for regional growth plus smaller development sites scattered throughout the entire near SE/SW area. The approved development specifically assigned as background traffic as limited to the major known development sites; the USDOT headquarters, the Southeast Federal Center, Arthur Capper Carrollsburg, the Waterside Mall, and the AWI Waterfront.

For these developments, trips were generated and assigned based on prior traffic impact analyses, including the *Arthur Capper Carrollsburg Traffic Impact Analysis*, the *4th Street SW Transportation Study*, the *USDOT Traffic Impact Study*, and the *Southeast Federal Center Transportation Management Plan*.

Table 3 contains a summary of assumptions used for these studies. Figure 7 shows their location on the study area map.

Table 3 – Summary of Background Developments

Development	Horizon Year	Program	Trip Generation					
			AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Arthur Capper Carrollsburg	2012	40 kSF retail 740 kSF office 800 apartments 260 townhouses 580 condominiums	461	243	706	269	504	773
USDOT Headquarters	2012	5,500 employees	471	41	512	71	448	519
SEFC: Phase 1a	2012	450 kSF 832 residential units 92 kSF retail	299	204	503	233	345	578
SEFC: Phases 1b & 2	2017	1,530 kSF office 2,045 residential units 371 kSF retail	877	467	1,344	597	1,031	1,628
Waterside Mall PUD	2017	2,025 kSF Office 25 kSF retail 400 residential units	731	141	872	207	800	1,009
AWI Waterfront	2017	300 room hotel 750-850 residential units 217kSF retail 160 kSF museum	155	400	555	657	625	1,282

Future Background Traffic Forecast

Using the growth rates and the trip generation and assignments for the background developments contained in the prior studies, the 2012 and 2017 future background traffic volumes were assembled, as shown in Figures 8 and 9.

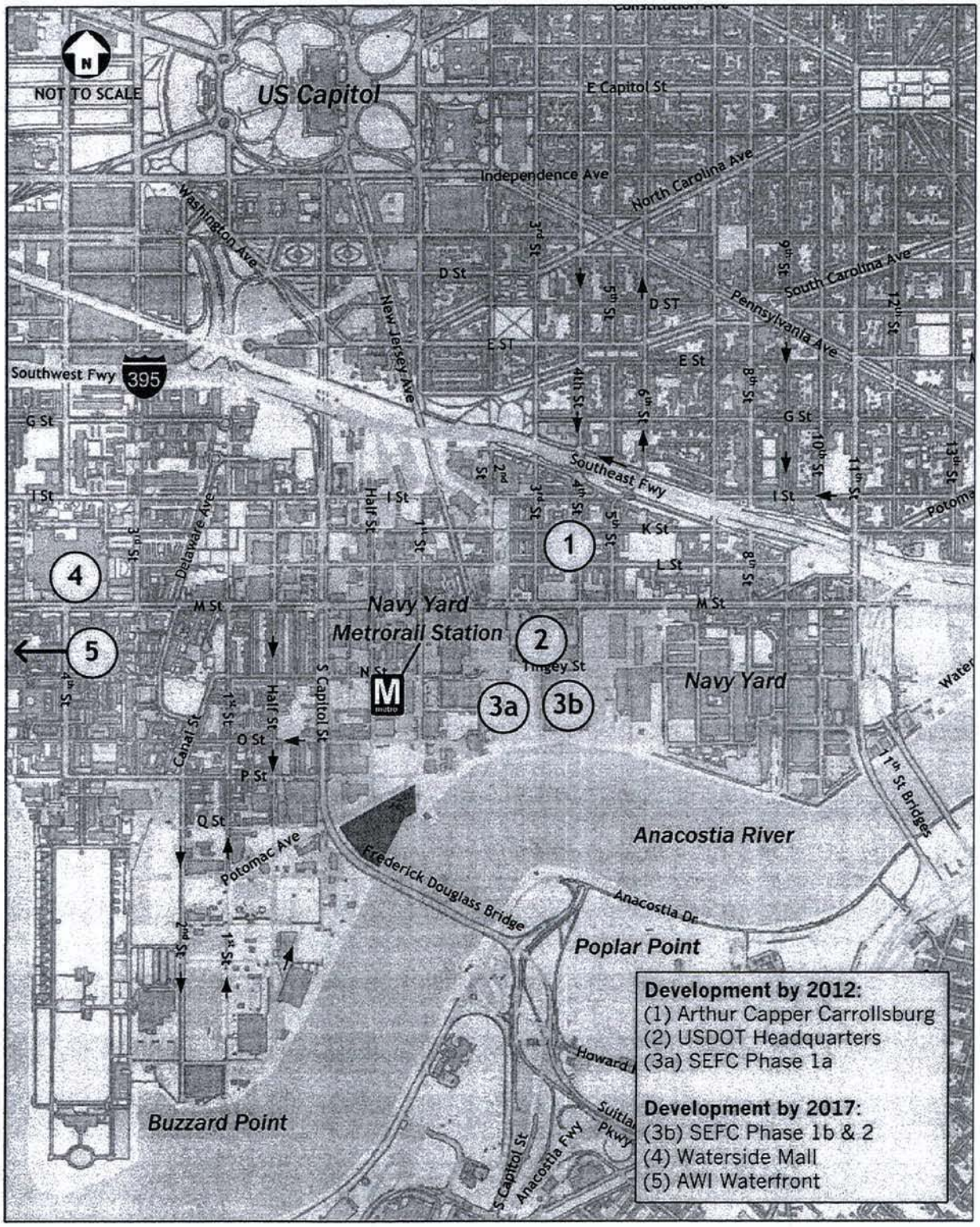


Figure 7 – Location of Approved Background Developments

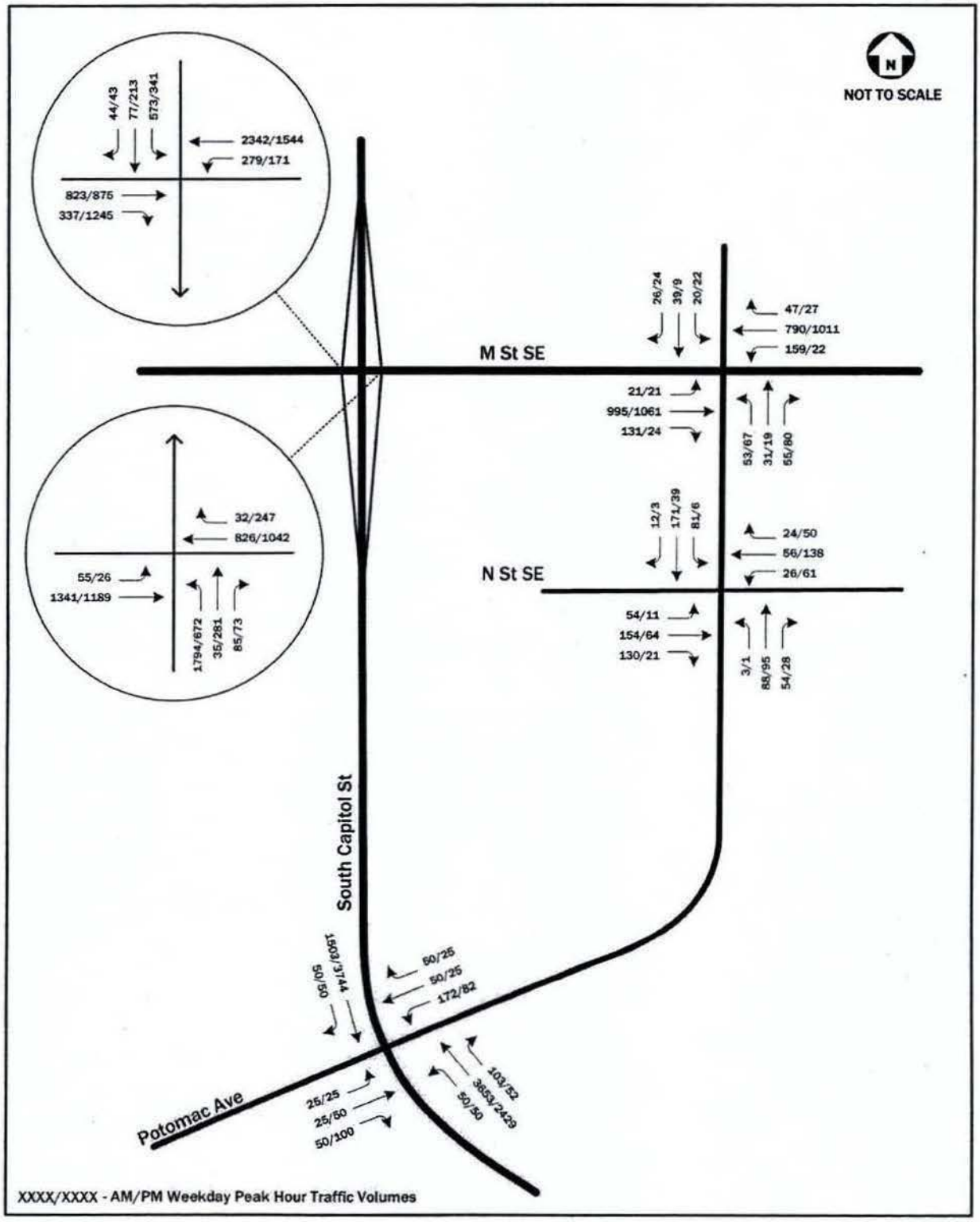


Figure 8 – 2012 Background Peak Hour Traffic Volumes

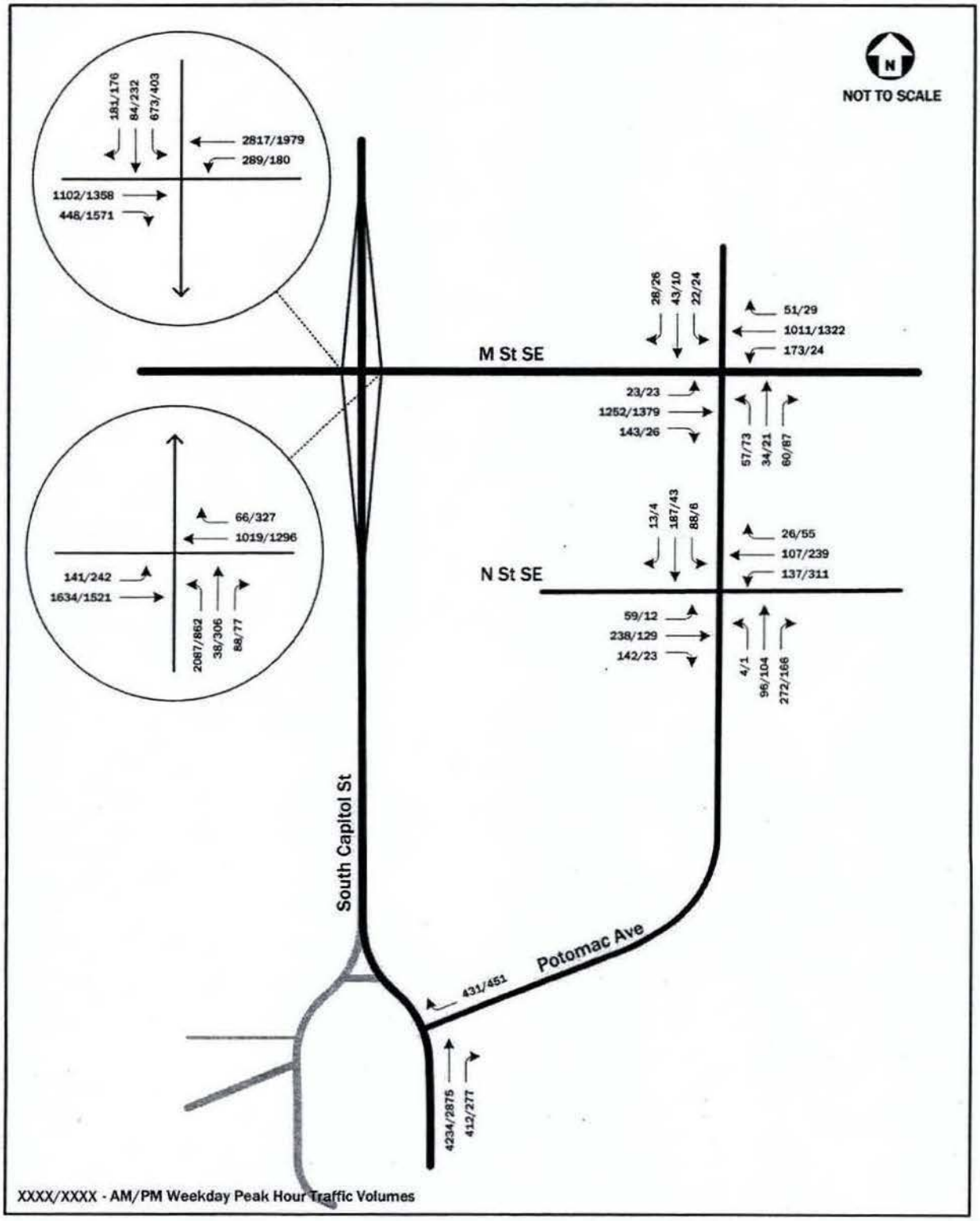


Figure 9 – 2017 Background Peak Hour Traffic Volumes

Future Background Analyses

Background peak hour levels of service (without the Florida Rock mixed-use development) were calculated based on: (1) future lane use and traffic controls shown on Figures 5 and 6; (2) the background traffic volumes shown on Figures 8 and 9; and (3) the *Highway Capacity Manual* 2000 (HCM) methodologies (using Synchro 6 software). The traffic signal timings were optimized using the Synchro software to reflect any changes made by DDOT prior to the horizon years. Copies of LOS calculation worksheets are included in the Appendix. Table 4 displays the results of the capacity analyses, including LOS and average delay per vehicle (in seconds).

The results in table 4 show similar results to the existing conditions capacity analyses. The intersections serving regional traffic patterns on South Capitol Street operate at failing conditions when handling commuter traffic. The intersections on 1st Street SE operate at acceptable conditions, except for the intersection of 1st Street and N Street SE, which experiences enough growth in traffic by the year 2017 that mitigation measures will be needed. Table 4 also shows the analysis results of two mitigation measures; (1) changing the control from two-way stop sign to all-way stop sign, and (2) changing the control to a traffic signal. Changing the control to an all-way stop sign alone is not sufficient. To ensure acceptable levels of service for that mitigation measure, some on-street parking on N Street will need to be removed to add an eastbound right turn lane and a westbound left turn lane. Installing a traffic signal at this location obtains acceptable levels of service without the need for additional lanes. The exact mitigation measure employed will be at the discretion of DDOT, although this study recommends re-examining this intersection closer to the year 2017 before selecting what improvements will be necessary. For the purposes of this analysis, a traffic signal at this location was assumed for the total future traffic capacity analysis presented in the following section.

At the time of writing this report, the South Capitol Street EIS was not issued as a final document. Thus, it is not clear what the final recommendation will be for re-configuring the intersection of South Capitol Street and M Street. The results of this analysis show that improving this connection will be necessary to avoid extremely long commuting delays. It should be noted though, that this analysis does not take into account major shifts in regional commuter traffic patterns, such as the effect that the replacement of the 11th Street Bridges and possibly the John Sousa Bridge will have to South Capitol Street traffic by 2017 (the South Capitol Street EIS does take these factors into account).

Table 4 – 2012 and 2017 Background Capacity Analysis Results

Intersection (Approach)	2012 Background Conditions				2017 Background Conditions			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
South Capitol St and Potomac Avenue (traffic signal)								
Overall	**65.7**	**E**	**184.2**	**F**	**127.1**	**F**	**25.5**	**C**
Eastbound	34.6	C	38.7	D	...	...	...	...
Westbound	51.7	D	37.0	D	137.4	F	54.1	D
Northbound	91.3	F	9.5	A	126.1	F	21.4	C
Southbound	8.0	A	310.2	F	...	...	...	...
N St & 1st St SE (2-way stop controlled)								
Overall	**13.4**	**B**	**8.2**	**A**	*	**F**	**76.1**	**F**
Eastbound	26.0	D	10.8	B	184.4	F	13.9	B
Westbound	18.5	C	12.7	B	*	F	133.5	F
Northbound	0.2	A	0.1	A	0.1	A	0.0	A
Southbound	2.5	A	1.0	A	2.8	A	0.9	A
M St & 1st St SE (traffic signal)								
Overall	**14.8**	**B**	**13.8**	**B**	**13.8**	**B**	**16.3**	**B**
Eastbound	15.2	B	14.5	B	12.9	B	19.8	B
Westbound	11.3	B	10.5	B	11.7	B	10.3	B
Northbound	29.2	C	25.3	C	30.4	C	30.6	C
Southbound	27.0	C	25.9	C	29.5	C	29.0	C
M St & SB South Capitol Ramps (traffic signal)								
Overall	**48.1**	**D**	**146.7**	**F**	**145.8**	**F**	**275.6**	**F**
Eastbound	51.6	D	266.0	F	113.6	F	478.3	F
Westbound	17.4	B	3.6	A	119.7	F	14.8	B
Southbound	157.8	F	134.2	F	285.6	F	238.1	F
M St & NB South Capitol Ramps (traffic signal)								
Overall	**119.3**	**F**	**42.8**	**D**	**220.2**	**F**	**83.9**	**F**
Eastbound	5.5	A	2.2	A	75.2	E	9.5	A
Westbound	58.0	E	24.8	C	133.4	F	93.0	F
Northbound	229.9	F	113.5	F	379.0	F	177.5	F
With Mitigation Measures								
N St & 1st St SE (add eastbound right turn lane, westbound left turn lane, and change to four-way stop sign control)								
Overall	...	...	...	...	**17.1**	**C**	**13.3**	**A**
Eastbound	...	...	...	...	19.2	C	10.3	B
Westbound	...	...	...	...	13.3	B	15.2	C
Northbound	...	...	...	...	19.8	C	11.5	B
Southbound	...	...	...	...	14.1	B	9.3	A
N St & 1st St SE (install traffic signal)								
Overall	...	...	...	...	**19.8**	**B**	**18.0**	**B**
Eastbound	...	...	...	...	14.8	B	4.0	A
Westbound	...	...	...	...	14.7	B	11.0	B
Northbound	...	...	...	...	24.1	C	36.8	D
Southbound	...	...	...	...	26.7	C	44.1	D

* - Error: Delay too high to calculate

TOTAL FUTURE TRAFFIC CONDITIONS

Total future traffic conditions represent future traffic in the study area including existing traffic, background growth, and traffic generated by the proposed Florida Rock development.

Florida Rock Transportation Features

The Florida Rock development will be constructed in four phases, detailed in Table 5.

Table 5 – Florida Rock Program and Phasing

Phase	Land Use	Gross Square Feet	Parking Provided	Estimated Year of Completion
1	Office Retail	259,000 38,000	256	2009
2	Residential Retail	203,000(1) 15,000	400	2011
3	Office Retail	342,000 12,000	433	2014
4	Hotel	248,000(2)	300	2016

1 – Approximately 169 Dwelling Units
2 – 260 Rooms

Figure 10 shows an annotated site plan of the full build-out of the development highlighting its transportation features.

Parking for the project will be provided in a single underground garage to be constructed in conjunction with the phases located above. Portions of the garage will be partitioned, such as the hotel and residential spaces, but drivers will be able to circulate throughout the entire garage to any of its access points.

Site access will be provided through four driveways. The first, the easternmost on Potomac Avenue, will provide direct access into the site parking garage and is planned as a full-access drive with a median break on Potomac Avenue. The westernmost driveway on Potomac Avenue, to be constructed in Phase 3 will also provide access to the parking garage. This driveway is planned to be limited to right turns in and right turns out only. The other site drives will provide access to a center accessway, which will serve the hotel valet garage, hotel pick-up/drop-off and residential building pick-up/drop-off. There will be no commercial parking garage access from the center accessway. The site drive on the future traffic oval will provide entry into the accessway, and the middle site driveway on Potomac Avenue will serve as the exit from the accessway. Prior to the construction of Phases 3 and 4, this middle drive will serve as limited access for loading and pick-up/drop-off for the residential building.

Two loading docks are planned, the first accessed near the easternmost site drive on Potomac Avenue. The second loading dock is accessed by the same garage ramp as the westernmost site drive on Potomac Avenue (the right turn in/right turn out driveway).

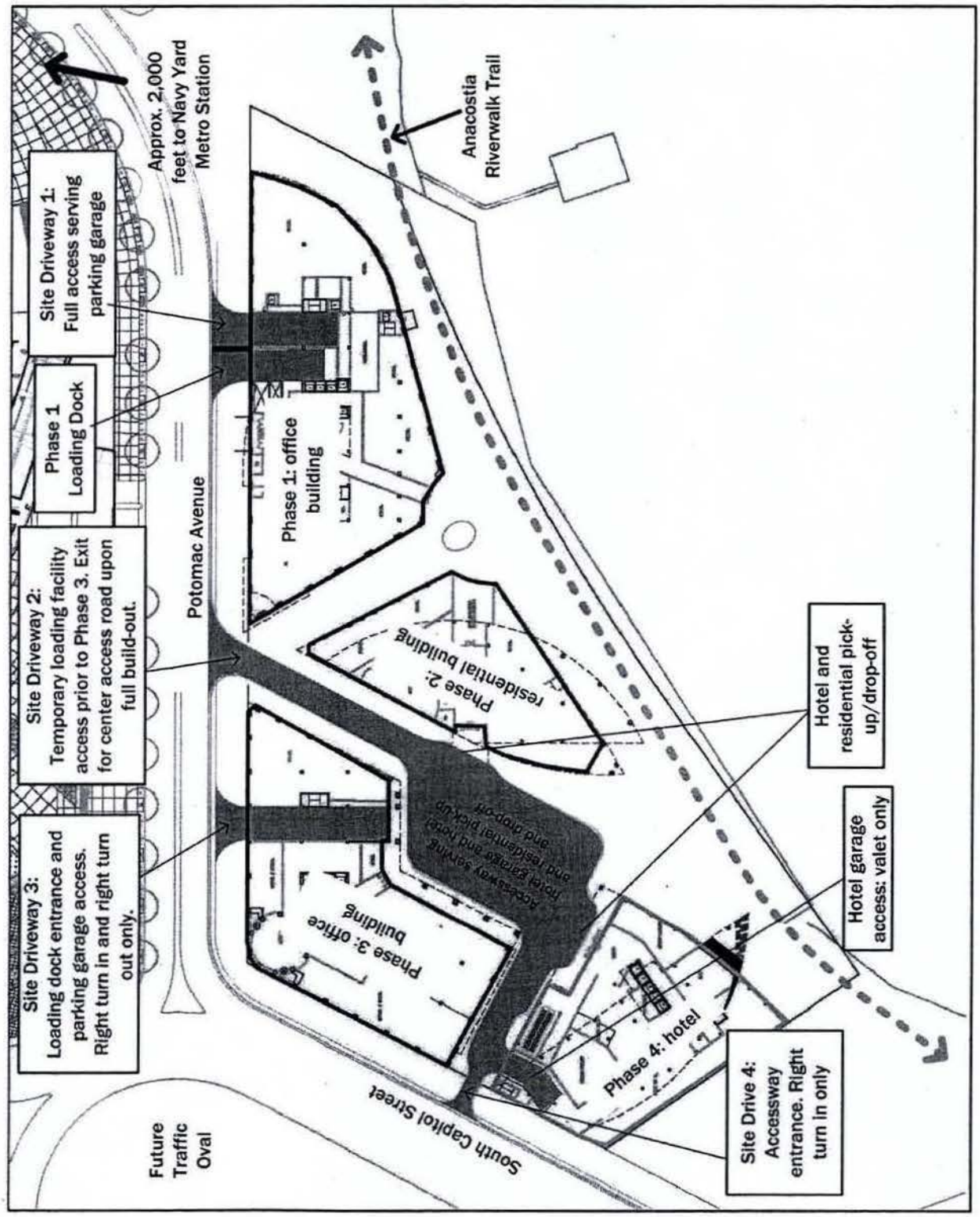


Figure 10 – Florida Rock Transportation Features

The proposed development is located approximately 2,000 feet south from the nearest Metrorail station, the Navy Yard station, which is served by the Green Line. Also, the Anacostia Riverwalk Trail passes through the site, on the Anacostia River waterfront. The Florida Rock site plan shows wide sidewalks and pedestrian connections for its visitors, office-workers and residents providing quality access to local transit and trails.

Table 6 summarizes the parking required based on zoning, as well as the number of spaces provided in the plan. The amount of parking provided will be sufficient to handle the anticipated Florida Rock traffic.

Table 6 – Summary of Florida Rock Parking

Land Use	Number of Spaces	
	Required	*Provided*
Office	330	745
Retail	75	75
Residential	53	259
Hotel	164	279
Total	**612**	**1,389**

Transportation Management Plan

The purpose of a Transportation Management Plan (TMP) for the Florida Rock mixed-use development is to provide services and incentives to increase the efficiency of the roadway network without adding additional capacity. A TMP is most successful for large scale employers, and would be aided significantly, if large tenants were brought to the office buildings on site. Given the congested nature of the regional access to the site, it is recommended that the following measures be employed for the development.

- *Transportation Coordinator*
  A transportation coordinator is a person designated for administering the TMP. They would disseminate information to the residents and office-workers and coordinate with District agencies on activities and related information. They would also help administer a guaranteed ride home program, the parking management on site, and monitor and evaluate the TMP strategies.

- *Carpools and Vanpools*
  The transportation coordinator would implement measures to encourage ridesharing, including ride-matching for residential and office-workers, and helping provide incentives.

- *Flexible Work Hours*
  This program allows for office tenants in the Florida Rock buildings to be encouraged to implement a variable work program, including flextime, a compresses work week and staggered work hours. These measures would serve to reduce the morning and afternoon peak

period vehicular trip generation of the proposed office uses.

- *Parking Management*
  The TMP will include the assignment of a limited number of preferentially-located parking spaces to resident and office-workers participating in the ridesharing activities managed by the transportation coordinator. Other strategies would include pricing of parking and the provision of secure bicycle spaces.

- *Truck Management Plan*
  This project requests zoning flexibility from the loading provisions of the zoning regulations. As a result of the increased retail square footage provided in the east office building, additional loading facilities are required by zoning which cannot be included within the existing loading area. However, this situation will be remedied by sharing loading docks between different land uses and development components of the entire project. This remedy has been used in other mixed-use development projects within the District.

  The applicant will develop a Truck Management Plan to ensure that at all times, the need for trucks to access the property will be met on-site with no impact on public space. Deliveries, trash removal, etc. will be scheduled to ensure that:

  - Trucks entering and leaving the site have minimal impact on traffic flow on the adjacent public streets, by avoiding commuter peak periods, and Ballpark traffic peaks.
  - On rare occasions when a truck needs to wait for access to a loading it will be parked on-site at a location designed for this purpose.

  Based on this commitment to a management plan, Gorove/Slade Associates finds that the provisions for off-street truck loading for this application will be adequate.

- *TMP Coordination*
  The Florida Rock TMP, through the transportation coordinator, should coordinate activities and strategies with other TMPs in the areas, including the USDOT and SEFC TMPs.

Trip Generation

The number of trips anticipated to be generated by the new development was estimated using the Institute of Transportation Engineers (ITE) *Trip Generation* rates/equations, 7th Edition and the *2005 Development-Related Ridership Survey*, by the Washington Metropolitan Area Transit Authority (WMATA).

By definition, ITE's trip generation rates were derived from data collected from single-use developments where virtually all access to the development would be by private automobile (Source-*Trip Generation Handbook*, 2nd Edition, Appendix B). *Trip Generation* does not account for the potential

effects of Transit Demand Management (TDM) programs, transit availability, and interaction between various on-site uses (synergy), particularly when these uses are in walking distance of each other.

A high percentage of trips to and from developments near Metrorail stations use transit; it is therefore expected that some residents, visitors and employees of the Florida Rock development would take advantage of the nearby Metrorail station. Based on the WMATA *2005 Development-Related Ridership Survey* and prior studies performed in the area, the trip generation calculations included alternate mode and synergy reductions of 50% for office and hotel, 60% for residential, and 90% for retail.

Table 7 summarizes the trip generation for the Florida Rock mixed-use development, including trip reductions. A detailed calculation is contained in the Appendix.

It should be noted that upon completion of these analysis, a slight change to the program was made. An updated trip generation calculation showed the program changes altered the trip generation by 1%. Since the trip generation did not change significantly, the total future capacity analyses were not revised. The Appendix contains the detailed calculation for both the program assumed for the analysis, and the most recent program.

Table 7 – Summary of Florida Rock Trip Generation

Phase	Trip Generation						
	AM Peak Hour			*PM Peak Hour*			*Daily*
	In	Out	Total	In	Out	Total	Total
Phase 1: Office	170	24	194	34	151	185	1,466
Phase 2: Residential	8	28	36	31	19	50	527
Phase 3: Office	225	30	255	42	197	239	1,803
Phase 4: Hotel	51	37	88	41	43	84	1,160
Total	**454**	**119**	**573**	**148**	**410**	**558**	**4,956**

Trip Distribution and Assignment

The site-generated traffic volumes for the study area roadways are based on existing travel patterns identified during data collection, knowledge of the area, and distributions contained in previous reports. The percent distributions are shown in Table 8. Figures 11 and 12 show the assignment of these trips through the study area intersections for both horizon years.

Table 8 – Florida Rock Trip Distribution

Phase	Percent to/from Route			
	East on M St	*West on M St*	*North on S. Capitol St*	*South on S. Capitol St*
Office Phases	20%	10%	30%	40%
Residential & Hotel Phases	10%	30%	35%	25%

Total Future Traffic Forecast

The site-generated traffic assignments depicted on Figures 11 and 12 were combined with the background traffic forecasts shown on Figures 8 and 9 to yield the total future traffic forecasts associated with the build-out of Florida Rock, shown on Figures 13 and 14.

Total Future Traffic Analyses

Total future peak hour levels of service were calculated based on: (1) the future lane use and traffic controls shown on Figures 5 and 6; (2) the total future traffic volumes shown on Figures 13 and 14; and (3) the Highway Capacity Manual 2000 (HCM) methodologies (using Synchro 6 software). Copies of LOS calculation worksheets are included in the Appendix. Table 9 displays the results of the capacity analyses, including LOS and average delay per vehicle (in seconds).

The analysis shows that there would be little or no significant change in the levels of service of the study intersections from background conditions to future conditions. The only exception is the westbound approach at the intersection of South Capitol Street and Potomac Avenue in the evening rush hour. The overall LOS at this intersection changes from C to E with the inclusion of site traffic. This condition is considered acceptable in urban areas, and in a regional traffic based intersection such as the proposed traffic oval. A decrease in the amount of westbound delay at this location is possible through changes to signal timings, although none were assumed in this analysis, since most likely preference will be given to through traffic in the oval. More likely, if this intersection operates at or above capacity, more site traffic will use alternate routes, such as N Street, to access South Capitol Street.

In 2012 both site driveways will operate at acceptable conditions. In 2017 all four site driveways will operate at acceptable conditions, with the easternmost driveway (site drive number one) close to capacity in the evening rush hour. This is due to the difficulty found in turning left onto Potomac Avenue to access South Capitol Street. Although this is considered an acceptable condition, it is possible that in the future, motorists exiting the parking garage will decide to turn right instead of left and access South Capitol Street via N Street or at another point.

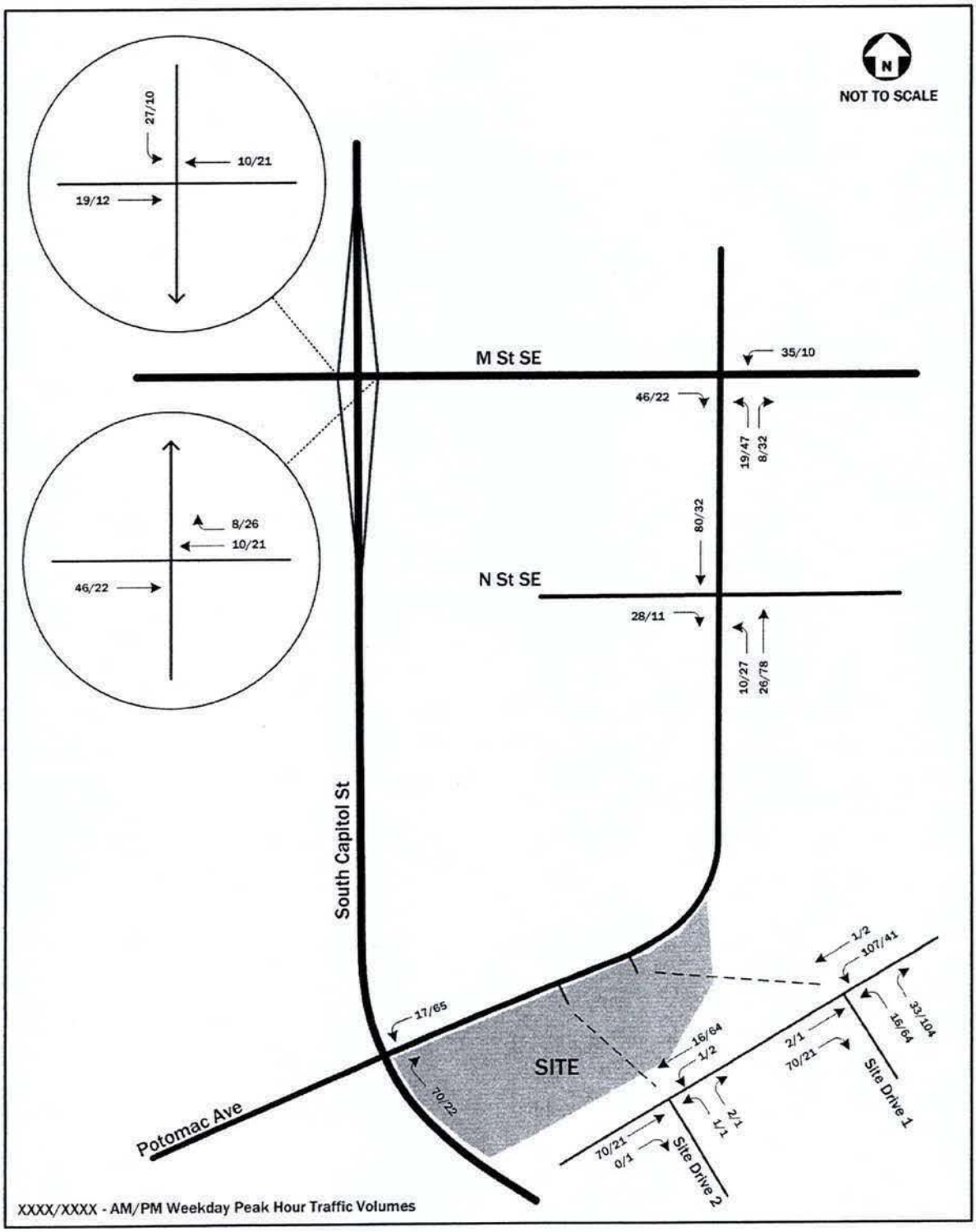


Figure 11 – 2012 Site Generated Peak Hour Traffic Volumes

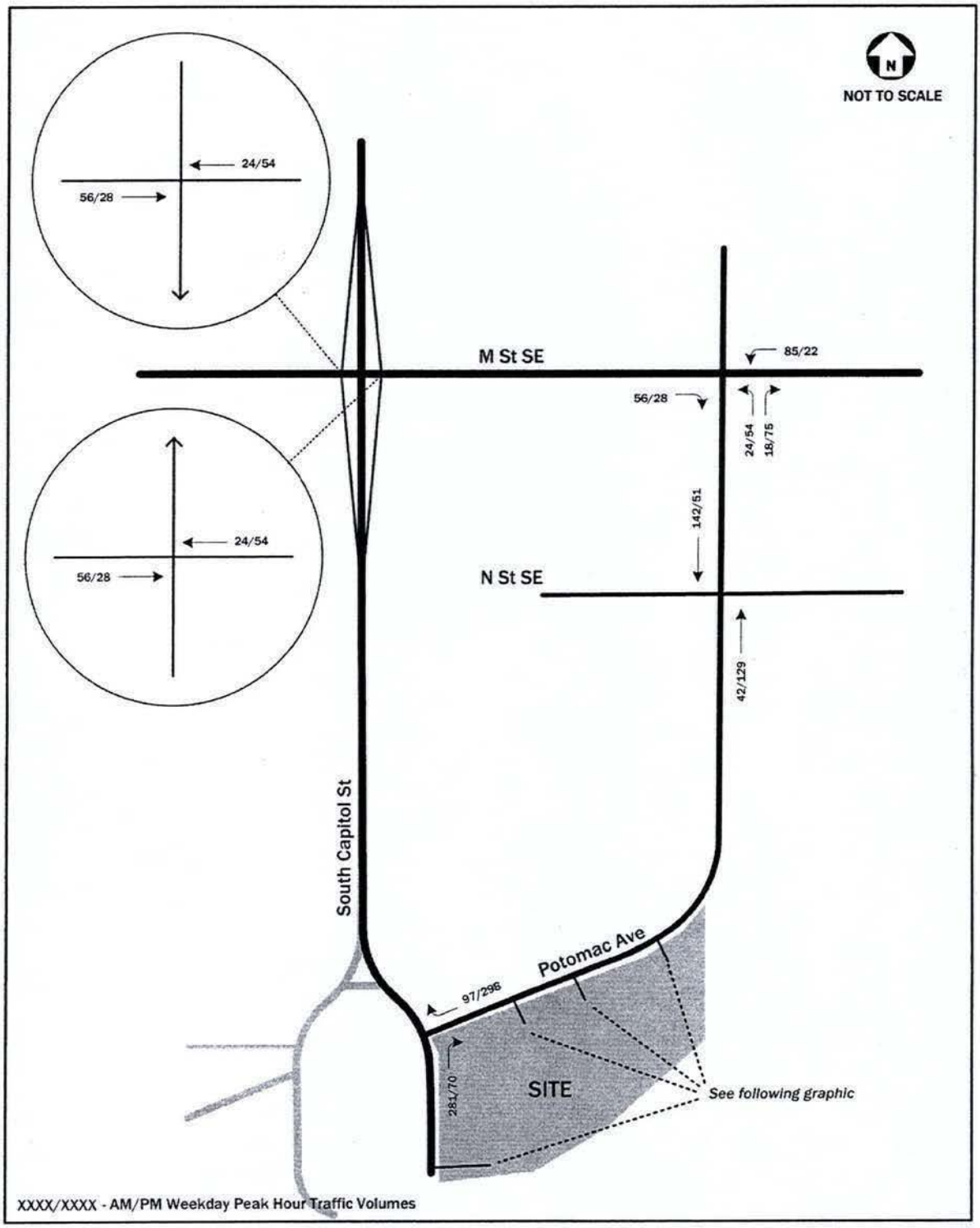


Figure 12a – 2017 Site Generated Peak Hour Traffic Volumes

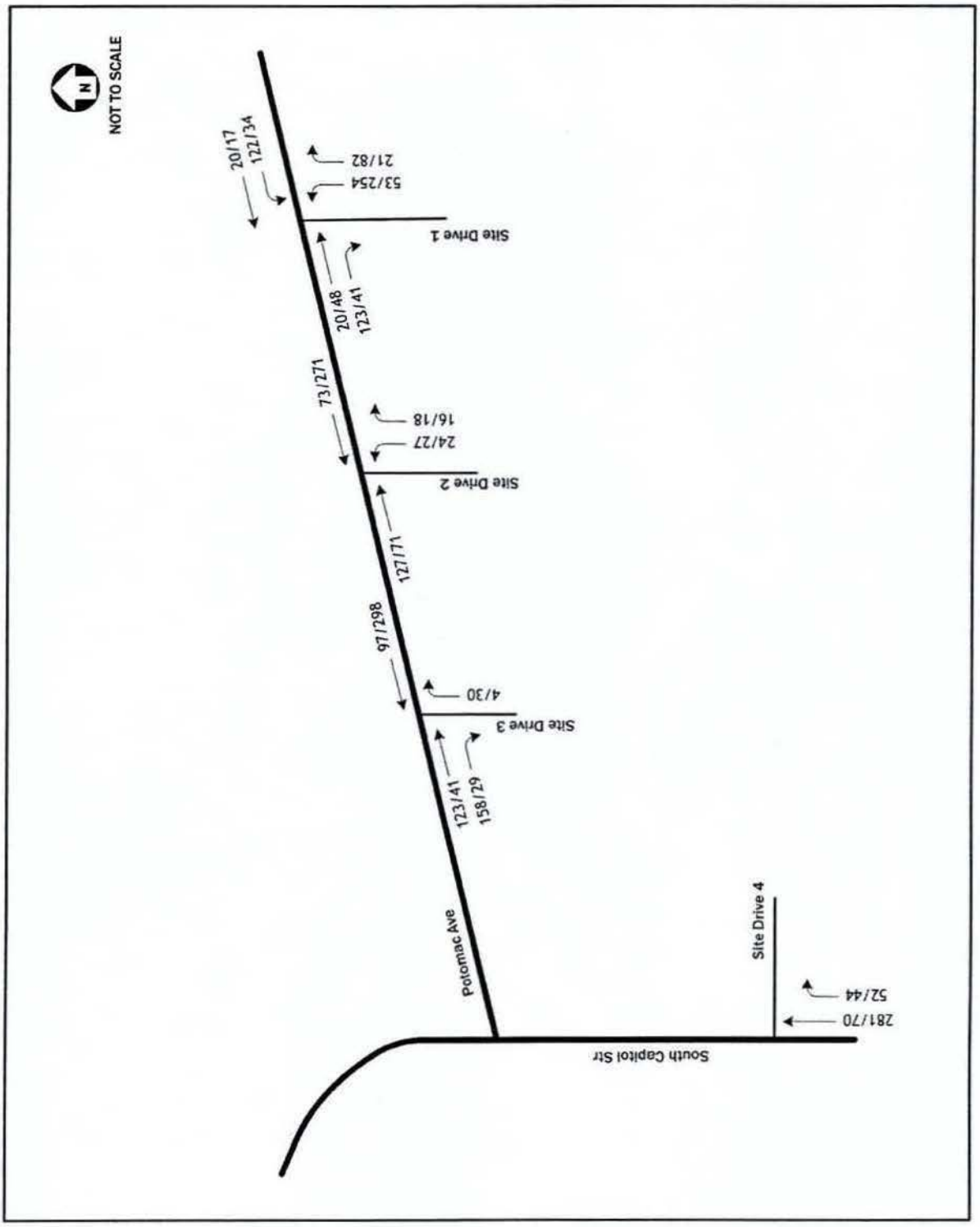


Figure 12b – 2017 Site Generated Peak Hour Traffic Volumes

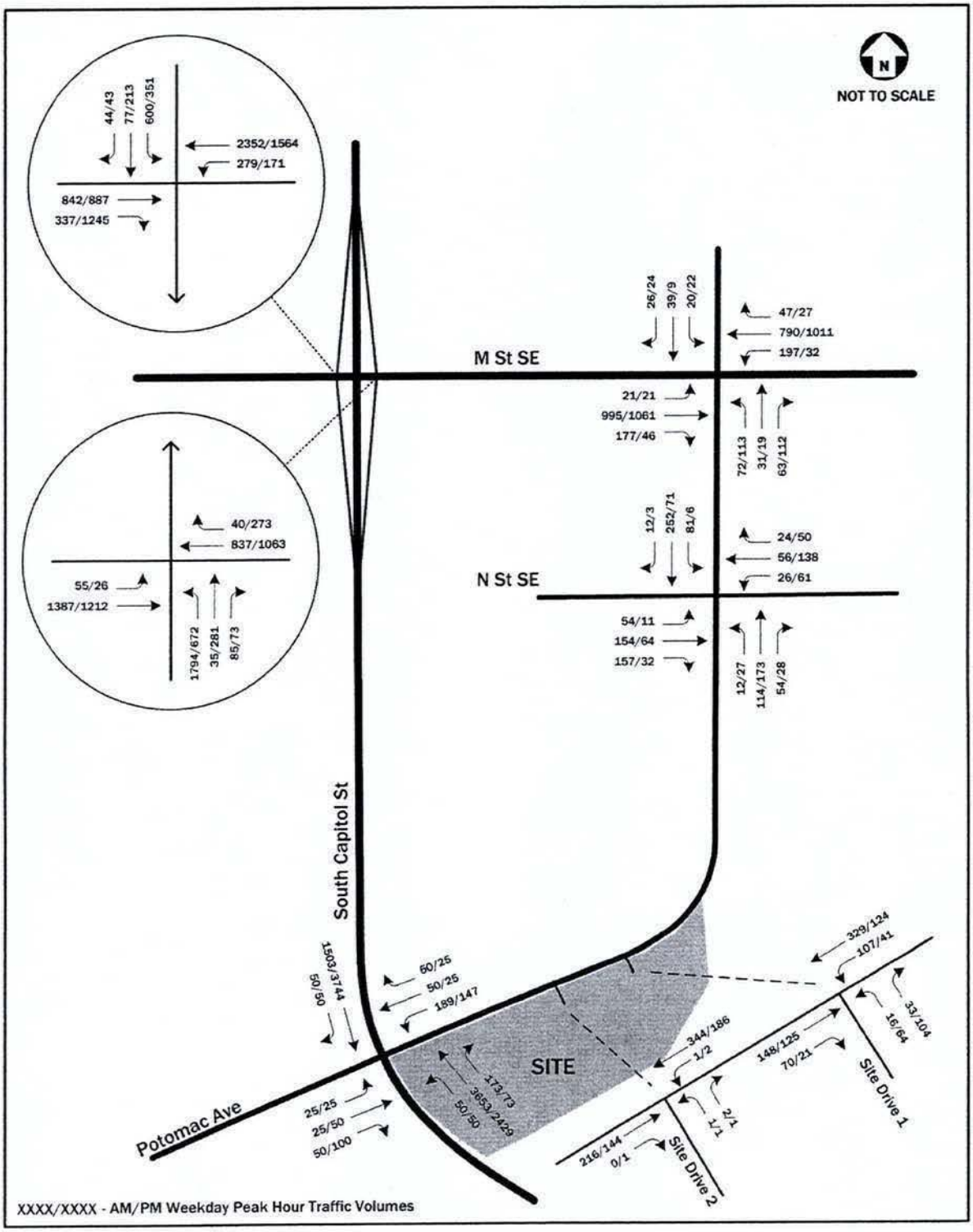


Figure 13 – 2012 Total Future Peak Hour Traffic Volumes

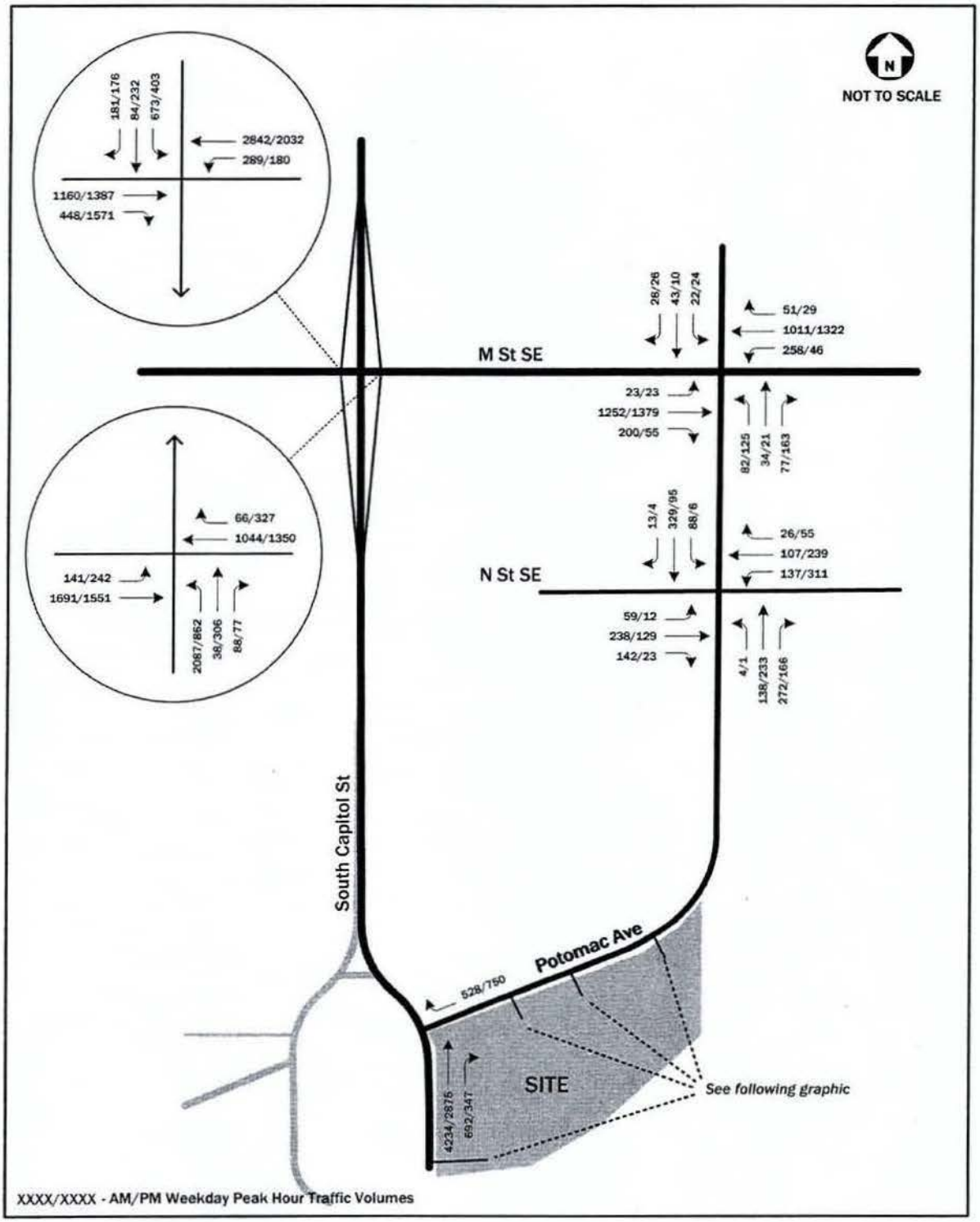


Figure 14a – 2017 Total Future Peak Hour Traffic Volumes

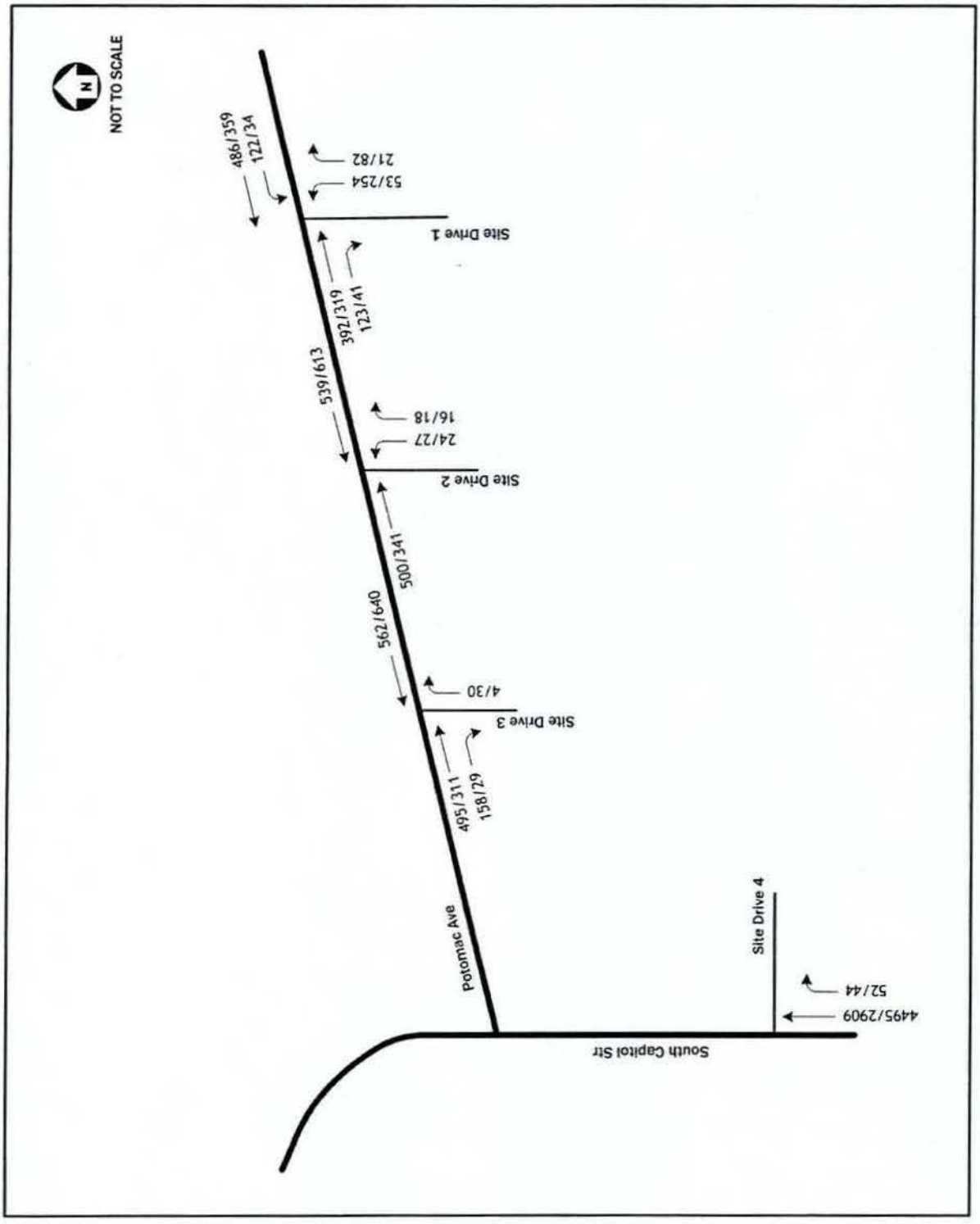


Figure 14b – 2017 Total Future Peak Hour Traffic Volumes

Table 9 – 2012 and 2017 Total Future Traffic Capacity Analysis Results

Intersection (Approach)	2012 Total Future Conditions				2017 Total Future Conditions			
	AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
South Capitol St and Potomac Avenue (traffic signal)								
Overall	**73.4**	**E**	**182.6**	**F**	**132.3**	**F**	**58.0**	**E**
Eastbound	34.6	C	38.7	D	...	...	...	...
Westbound	59.0	E	48.2	D	241.8	F	208.9	F
Northbound	102.0	F	9.7	A	120.5	F	22.9	C
Southbound	8.0	A	310.2	F	...	...	...	...
N St & 1st St SE (2012: 2-way stop controlled, 2017: Traffic signal)								
Overall	**19.9**	**B**	**8.6**	**A**	**21.3**	**C**	**22.8**	**C**
Eastbound	44.9	E	12.8	B	14.8	B	4.0	A
Westbound	24.9	C	16.9	C	14.7	B	11.0	B
Northbound	0.6	A	0.9	A	24.6	C	41.9	D
Southbound	2.0	A	0.6	A	29.0	C	47.6	D
M St & 1st St SE (traffic signal)								
Overall	**14.9**	**B**	**14.5**	**B**	**14.5**	**B**	**18.3**	**B**
Eastbound	14.8	B	14.7	B	13.8	B	20.1	C
Westbound	11.6	B	10.7	B	12.4	B	10.8	B
Northbound	29.9	C	27.3	C	27.2	C	41.7	D
Southbound	27.0	C	25.9	C	29.5	C	29.0	C
M St & SB South Capitol Ramps (traffic signal)								
Overall	**49.7**	**D**	**146.6**	**F**	**154.1**	**F**	**273.7**	**F**
Eastbound	54.8	D	264.7	F	134.6	F	475.2	F
Westbound	18.9	B	3.9	A	124.6	F	17.0	B
Southbound	157.8	F	140.9	F	286.1	F	239.0	F
M St & NB South Capitol Ramps (traffic signal)								
Overall	**123.6**	**F**	**42.9**	**D**	**227.0**	**F**	**90.1**	**F**
Eastbound	19.2	B	2.3	A	92.2	F	10.9	B
Westbound	63.4	E	26.3	C	146.3	F	109.8	F
Northbound	229.9	F	113.5	F	379.0	F	177.5	F
Potomac Avenue & Site Drive 1								
Overall	**2.1**	**A**	**4.4**	**A**	**2.7**	**A**	**12.1**	**B**
Westbound Left Turn	2.1	A	2.0	A	2.2	A	0.8	A
Northbound	11.2	B	10.7	B	25.7	D	38.3	E
Potomac Avenue & Site Drive 2								
Overall	**0.1**	**A**	**0.1**	**A**	**0.6**	**A**	**0.6**	**A**
Westbound Left Turn	0.0	A	0.1	A	...	...	...	...
Northbound	9.8	A	9.4	A	15.2	C	13.4	B
Potomac Avenue & Site Drive 3								
Northbound Right	...	...	...	...	10.7	B	9.5	A

Note: Site Drive 4 has no delay calculation results because it only consists of through movements and right turns

IMPACT OF BALLPARK OPERATIONS

The Florida Rock mixed-use development is located adjacent to the new Ballpark, across Potomac Avenue. Based on the Ballpark EMS and TMP reports, the planned travel demand characteristics of Ballpark patrons and the operations of the Ballpark on game days will not have a significant negative impact on Florida Rock residents or office-workers. This is due to several reasons:

- *Travel demand characteristics*
  The Ballpark TMP shows an average automobile mode split of 36 to 48% depending on the time of game and the relative attendance. Thus, the impacts of the Ballpark on roadways will be reduced significantly by the use of the Navy Yard Metrorail Station and people walking and biking to the Ballpark.

- *Parking facility locations*
  The Ballpark TMP provides an overview of the parking strategy and locations, including the concept of spreading-out parking to disperse the impact at any one location. Thus, many cars will be parking a few blocks away from the Ballpark and not near the Florida Rock site.

- *Operations planning*
  In order to accommodate the additional traffic on area roadways special traffic operations will be in place, including special signal timings, traffic control officers and turning restrictions. These game day measures should alleviate some of the congestion that would otherwise normally occur through the introduction of additional traffic to the roadways system.

It should also be noted that much of the Ballpark regular season schedule occurs during the summer months, when traffic on regional roadways is lighter than normal.

It may be that the main source of congestion that Florida Rock residents and office-workers encounter due to Ballpark traffic will not be on the roadways at all, but at the Navy Yard Metrorail Station and sidewalks. It is expected that the Green Line will operate close to capacity coming from the District on weeknight 7:00 p.m. games. As long as residents and office-workers are knowledgeable of game times and walking routes that do not overlap with as many Ballpark patrons, access to sidewalks and transit should be acceptable during games.

Thus, although it would be advisable that Florida Rock residents and tenants would be knowledgeable of game schedules and time to avoid conflicts, travel in and around the Ballpark area will be possible on game days, with an acceptable amount of delay added to the typical delay experience on local roadways and transit systems.

CONCLUSION

Based on the capacity analysis results contained in this report, prior transportation studies performed near the site, and a review of the site plan, the proposed Florida Rock mixed-use development will have no negative impact on the surrounding local roadway network. The parking provided, circulation within the site, loading operations, and access to Potomac Avenue from site driveways is acceptable for each phase of the project.

The close proximity and quality of access to Metrorail significantly reduces potential traffic impacts. In addition, the connection to the Anacostia Riverwalk Trail provides a significant transportation feature to site residents, visitors and office tenants.

Although the capacity analyses contained in this report show acceptable levels of service at local roadways, all of the regional roadways analyzed operated at or above their capacity. This impacts the proposed development through the encouragement of alternate vehicular routing and alternate mode usage. Although the site is located near South Capitol Street, by using the local roadway system the 11th Street bridges, I-295 and I-395, and downtown DC can easily be reached without the need for South Capitol Street. Thus, even if the regional capacity is not improved through the on-going efforts of DDOT, notably the South Capitol Street EIS project, regional access for the site can still occur through other routes.

Appendix A
Scoping Documents

Robert B. Schiesel

From: Robert B. Schiesel
Sent: Thursday, August 03, 2006 3:48 PM
To: 'abdoulaye.bah@dc.gov'; 'christopher.delfs@dc.gov'
Cc: Louis J. Slade; 'cmshiker@hklaw.com'; Milo L.Meacham
Subject: Scoping for new Florida Rock TIS
Attachments: TIS Scoping - F Rock.doc; FRock TIS Outline.doc; Site Location.jpg

Please find attached a scoping document, site location graphic and preliminary study outline for a traffic impact study for the proposed Florida Rock PUD. We are planning to submit a traffic impact study prior to the end of the month, and thus we do not have time for a formal meeting and would like to confirm the study scope via email.

The site is located south of the Ballpark site, east of South Capitol Street and south of Potomac Avenue. A traffic impact study was completed for the site two years ago, and this study will serve as an update for two main reasons, (1) to include changes to the site plan, and (2) to include details on the South Capitol Street improvements not available two summers ago.

We propose that the study focus on the site access driveways, nearby arterial intersections, and the interaction between the site drives and the future intersection of South Capitol Street and Potomac Avenue, both in it's interim condition (to be completed in 2008) and it's final condition as part of the traffic oval (to be completed a few years afterward). We do not think extensive study of South Capitol Street and M Street are necessary due to the South Capitol Street EIS underway, and studies being performed internally by DDOT (although we have included the intersection of South Capitol Street and M Street due to its importance within the entire near SE/SW area). We have discussed this project and studies/work in the near SW/SE neighborhood with DDOT IPMA staff and Parsons Brinkerhoff. Out list of future development and infrastructure improvements will be based on these discussions.

Due to the short timeframe of this project, and since it is August, it will be difficult to gain existing counts. We have several sets of counts for most of the study intersections from 2002 to 2004, and Parsons Brinkerhoff has forwarded us their data collection from the South Capitol Street EIS. We plan on taking new counts, and growing those counts based on trends and volumes from our count inventory.

Please review the attached documents, and provide any comments and thoughts you have. We are already underway with our analysis, and would appreciate a quick response.

Thanks,
Rob Schiesel

Robert B. Schiesel, P.E. || Project Manager
Gorove/Slade Associates, Inc.
1140 Connecticut Ave || Suite 700 || Washington, DC 20036
P: 202.296.8625 || F: 202.785.1276 || www.goroveslade.com

DDOT - Gorove/Slade Traffic Impact Study Scoping Form

Project Name: Florida Rock PUD **Site Location:** 100 Potomac Avenue, SE

Purpose of Study: PUD Application **Estimated date of Study Completion:** Mid to late August

Brief Description of Project: Mixed-Use over several Phases

Attendee Name:	**Representing:**	**Phone:**	**EMail:**
Sent via Email to:			
Abdoulaye Bah	DDOT	(202) 671-0494	abdoulaye.bah@dc.gov
Chris Delfs	DDOT	(202) 671-1598	christopher.delfs@dc.gov
Milo Meacham	Davis Buckley Architects	(202) 223-1234	mmeacham@davisbuckley.com
Christy Shiker	Holland & Knight LLP	(202) 457-7167	cmshiker@hklaw.com

Summary of Draft Trip Generation:

Daily: 2425 IN 2425 OUT **AM:** 400 IN 125 OUT **PM:** 150 IN 380 OUT

Attachments:
- Site Location Map
- Preliminary Report Outline

DDOT Guideline	Gorove/Slade Comments & Recommendations	Clarifications/Notes
1. Scenarios and Planning Horizons "Each traffic impact study shall present an analysis of the traffic conditions without and with the proposed project at two planning years horizons: short term and long term... ...The short-term horizon year is defined as one year after occupancy of the project. If the project is proposed to occur over multiple phases, each phase shall be evaluated one year after phase occupancy. The second planning horizon shall be based on the 20-year planning horizon. "	We propose two Horizon years. The first will evaluate study area conditions, focusing on the operations of site access drives, when the interim improvements on South Capitol Street are in place. This Horizon Year will include Phases 1 and 2 (of 4 total). The second Horizon Year will be one year after full build out and will include the completed traffic oval and improvements to South Capitol Street. We think it is important to evaluate conditions under both the interim and permanent conditions of the intersection of South Capitol Street and Potomac Avenue. We do not think a 20-year horizon year is necessary due to the South Capitol Street EIS, which is evaluating long-term impacts in the study area.	
2. Peak Hours of Analysis None specified, although AM and PM only is implied.	AM and PM peak weekday peak hours	
3. Capacity Analyses "... peak hour intersection levels of service shall be determined for signalized and un-signalized intersections within the study area based on procedures described in the latest edition of the Highway Capacity Manual (or equivalent approved by DDOT). The existing arterials shall also be analyzed based on a daily volume/capacity ratio analysis where the threshold capacities are defined by arterial designation per the following table. Volume/capacity ratios that exceed 1.00 shall be identified."	We will use Synchro v6 for all capacity analyses, using the HCM methodology. We may use SimTraffic for simulation results, especially regarding queuing at the site access drives. We will evaluate the v/c ratio on Potomac Avenue/1st Street SE, adjacent to the site.	
4. Study Area "At a minimum, the study area shall contain: 1. Adjacent and boundary streets and/or natural barriers 1. Nearest arterial/arterial intersection(s) 2. Access roads 3. Internal roads 4. All major signalized or potentially future signalized intersections, either current or future years, where: - the project contributes a 10 percent impact (during either the a.m. or p.m. peak hour) to any approach leg of the intersection where the intersection is operating at an acceptable level of service, or - the project contributes a 5 percent impact (during either the a.m. or p.m. peak hour) to any approach leg of the intersection where the intersection is operating at an unacceptable level of service."	We propose to follow a similar study scope to the previous traffic study for this site, completed in 2004. We will include: -all site access drives and internal roadways, -the nearest adjacent arterial street intersections (South Capitol Street and Potomac Avenue and M Street and 1st Street). -an adjacent intersection not included above (N Street and 1st SE) -a nearby major arterial intersection (M Street and South Capitol Street) See the attached site location map. We do not believe that any intersections outside of this scope will meat the 10%/5% rule.	

DDOT Guideline	Gorove/Slade Thoughts	Clarifications/Notes
5. Site Description "A brief description of the site shall be provided. This should include, as a minimum, a description of its size, general terrain features, existing zoning and use, and proposed zoning and use. A map shall be included showing build-out conditions of the subject property of the following: the street system, roadway classifications, number of travel lanes, street width, existing and proposed ROW dimensions, and, existing and proposed driveways and accesses (with turning movements)."	We will include site plans illustrating the transportation features of the project.	
6. Trip Generation "Trip generation must be calculated from the latest data contained within ITE Trip Generation or other industry publications.... Data limitations, data age, choice of peak hour of adjacent street traffic, choice of independent variable and choice of average rate versus statistical significant modification shall be presented and discussed. In the event that data is not available for a proposed land use, the applicant must conduct a local trip generation study following procedures prescribed in the ITE Trip Generation manual and provide sufficient justification for the proposed generation rate. This rate must be acceptable to DDOT."	We will use the ITE Trip Generation rates and the latest WMATA development survey. We will also incorporate mixed-use synergy reductions using the methodology suggested by ITE.	
7. Background Forecast – Short Term "The short term traffic forecast shall be the sum of existing traffic volumes plus cumulative development traffic plus ambient growth. The cumulative development traffic shall be based, in part, on the approved project's a.m. and p.m. peak hour and ADT summary sheets. The short term planning horizon year ambient growth rate traffic forecasts shall be based on: · proportion between existing traffic volumes and build-out regional model forecasts · extrapolation from historical traffic counts to current counts, and/or · planning analysis that considers trends in the areas circulation system through either a proportion of extrapolation estimate."	We will base growth rates on volumes from historical counts in the study area. We are coordinating on a agreed list of developments to include in background forecasts, with DDOT, though Natasha Goguts, who is working on an internal DDOT evaluation of development related traffic.	

DDOT Guideline	Gorove/Slade Thoughts	Clarifications/Notes
8. Background Forecast – Long Term "Long term a.m. and p.m. peak hour planning horizon traffic forecasts shall be based on the most recent COG traffic forecasts. Requests for forecast shall comply with current COG protocol. It should be noted that the COG forecasts are based on future year population and employment projections that reflect a regional perspective on growth and development. The applicant and consultant shall investigate those land use assumptions as they apply to their project study area and make forecast adjustments as necessary."	N/A	
9. Background Transportation Improvements "The baseline surface transportation network (without the proposed project improvements) assumed for the first planning horizon should reflect existing facilities plus any firmly committed improvements by the District and other developments within the study area. All planned surface transportation facilities within the study area may be included for the baseline assumptions for the long term planning horizon network analysis."	We will base the background transportation improvements on studies being performed in the area and the input from DDOT IPMA, notable Natasha Goguts and Kathleen Penney. We will definitely include the interim improvements to South Capitol Street for the first Horizon year, and the complete traffic oval for the second Horizon year.	
10. Trip Distribution "Trip distribution may be based on COG traffic forecasts, market analysis, existing traffic flows, applied census data, and professional judgment."	Agreed	
11. Project Impacts "The key elements of the project impact analysis include: 1. generalized daily traffic volume level of service 2. a peak hour intersection level of service *The principal objective of the intersection LOS analysis is to identify whether the traffic from the proposed project when added to the existing plus short and long term planning horizon traffic will result in a significant impact and an unacceptable LOS. Significance is defined as: (a) When the added project traffic causes LOS to exceed the established threshold, (b) When the short term or long term horizon year traffic with the project exceeds the established threshold, and the project traffic causes a 2% increase in the v/c ratio or delay.* 3. the appropriateness of access locations and the need for future traffic signals 4. turn lane storage requirements 5. sight distance 6. appropriateness of acceleration or deceleration lanes"	We will include discussion on all topics listed.	

DDOT Guideline	Gorove/Slade Thoughts	Clarifications/Notes
12. Special Analysis/Issues "This section provides the District with opportunities to request specific focused traffic analyses germane to the proposed development. These could included access control, access spacing, accident/safety concerns, cut through traffic and residential quality of life, truck estimates and pavement design, accident statistics, pedestrian safety, bicycle safety, safe routes to schools, emergency routes, etc."	We will include a discussion on the impacts to site traffic due to the new Ballpark. We will review the preliminary Ballpark analysis and operations plans and comment on the impact to employees, residents and guests of the Florida Rock development.	

Project Scope agreed to by: _____ **Date:** _____

DDOT Project Contact: _____

Gorove/Slade Project Contact: _____

Date of Request: _____ Date Needed by: _____

Request:	**DDOT Contact:**
☐ Existing Turning Movement Counts within 1 Year Intersections: _____	_____
☐ Signal Timings for Intersections within Study Area	_____
☐ CAD Drawing of Study Area (ROW, signing, marking, etc.)	_____
☐ ADTs from last ten years in Study Area	_____
☐ Approved Development Details (preferably TIS) Developments: _____	_____
☐ Funded Transportation Improvement Details Improvements/Studies: _____	_____
☐ Crash/Accident Data within Study Area	_____
☐ Other: _____	_____

Florida Rock TIS
Preliminary Outline

1. Introduction
   1.1. Purpose and Steps
      1.1.1. Purpose of Study
      1.1.2. Site location (map)
      1.1.3. Summary of Zoning issues
      1.1.4. Discussion of Previous Study by OR George
      1.1.5. Steps taken in study
   1.2. Project Scope
      1.2.1. Discussions/Meetings with DDOT
      1.2.2. List of study intersections
         1.2.2.1. South Capitol Street and Potomac Avenue
         1.2.2.2. South Capitol Street and M Street
         1.2.2.3. M Street and 1st Street, SE
         1.2.2.4. N Street and 1st Street, SE
         1.2.2.5. All site driveways
      1.2.3. Phases studied, Horizon years
         1.2.3.1. Horizon Year 1: End of Phase 2, Prior to Completion of Traffic Oval
         1.2.3.2. Horizon Year 2: One Year after final build-out, with Traffic Oval
      1.2.4. Background studies and improvements included
      1.2.5. Background developments included

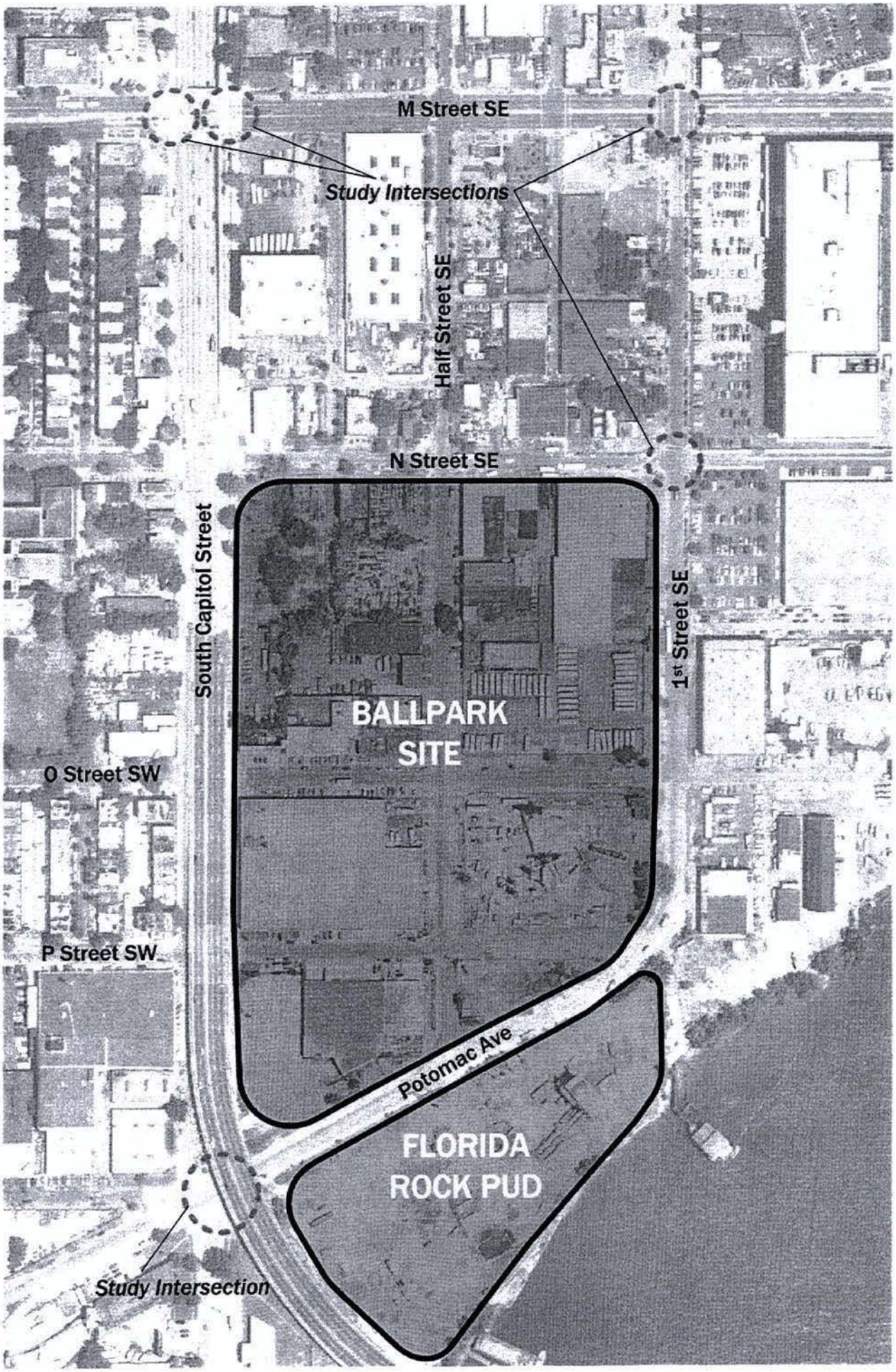
2. Existing Conditions
   2.1. Site access and existing road network (prose describing roadways)
   2.2. Existing lane uses and traffic controls (graphic)
   2.3. Existing transit service (rail and bus)
   2.4. Existing traffic volumes (graphic)
   2.5. Existing Levels of Service (table and graphic)
   2.6. Discussion of capacity analysis results

3. Future Background Conditions
   3.1. Current Traffic Studies (map and table)
      3.1.1. Anacostia Access Study
      3.1.2. South Capitol Street EIS
         3.1.2.1. Interim Improvements
         3.1.2.2. Traffic Oval
      3.1.3. Middle Anacostia River Crossing Study
      3.1.4. 11th Street Bridges EIS
      3.1.5. Entire SE/SW DDOT Capacity Study
      3.1.6. 4th Street Study
      3.1.7. Development related studies
         3.1.7.1. USDOT TIS
         3.1.7.2. SEFC EIS
         3.1.7.3. Southwest Waterfront
         3.1.7.4. Capper-Carrolsburg
      3.1.8. Ballpark Studies
         3.1.8.1. Ballpark EMS
         3.1.8.2. Ballpark TMP
         3.1.8.3. Ballpark TOPP
      3.1.9. Anacostia Riverwalk Study
   3.2. Background Volumes

- 3.2.1. Growth percentages
- 3.2.2. List of background developments (map)
  - 3.2.2.1. Completed by Phase 2
  - 3.2.2.2. Completed by Phase 4 (full build-out)
  - 3.2.2.3. Trip Generation (table)
  - 3.2.2.4. Trip distribution and assignment (graphic)
- 3.3. Background Levels of Service (map and table)
  - 3.3.1. First Horizon Year (end of phase 2)
  - 3.3.2. Second Horizon Year (end of phase 4)
- 3.4. Discussion of capacity analysis results

4. Total Future Conditions
   - 4.1. Florida Rock Transportation Features
     - 4.1.1. Site Plan at End of Phase 2 (Interim South Cap St Improvements)
     - 4.1.2. Site Plan at End of Phase 4 (Traffic Oval)
     - 4.1.3. Site Access
     - 4.1.4. Loading Access
     - 4.1.5. Parking Required and Provided
     - 4.1.6. Transportation Demand Management Measures
   - 4.2. Total Future Traffic Volumes
     - 4.2.1. Trip Generation
       - 4.2.1.1. Mode Choice
       - 4.2.1.2. Mixed-Use Synergy
       - 4.2.1.3. Trip Generation Table
     - 4.2.2. Trip Distribution and Assignment (graphic)
     - 4.2.3. Total Future Volumes (graphic)
   - 4.3. Total Future Levels of Service (map and table)
     - 4.3.1. First Horizon Year (end of phase 2)
     - 4.3.2. Second Horizon Year (end of phase 4)
   - 4.4. Discussion of capacity analysis results
   - 4.5. Mitigation Considerations
   - 4.6. Impact of Ballpark/Special Event Operations to Florida Rock Traffic

5. Summary of Conclusions
   - 5.1. Summary of Transportation Features
   - 5.2. Capacity Analysis Summary
     - 5.2.1. Existing
     - 5.2.2. Background
     - 5.2.3. Total Future
   - 5.3. Summary of recommended mitigation measures


M Street SE
Study Intersections
Half Street SE
N Street SE
South Capitol Street
1st Street SE
BALLPARK SITE
O Street SW
P Street SW
Potomac Ave
FLORIDA ROCK PUD
Study Intersection

Appendix B
Turning Movement Counts

Gorove/Slade Associates

Project Name :	Florida Rock
Project # :	2070.001
Location	DC
Data Source:	Gorove/Slade Associates

Intersection:	N Street SE at First Street SE															
AM PEAK	Southbound				Westbound				Northbound				Eastbound			
Roadway:	1st St.				Office Complex				1st St.				N St.			
Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM to 6:15 AM	2	28	8	0	5	1	0	1	1	8	0	1	21	7	10	0
6:15 AM to 6:30 AM	1	17	12	0	3	0	0	0	0	9	1	2	22	14	7	3
6:30 AM to 6:45 AM	4	25	18	3	7	1	0	3	0	13	2	3	22	3	16	5
6:45 AM to 7:00 AM	2	37	18	0	1	1	1	2	1	20	2	3	30	10	12	0
7:00 AM to 7:15 AM	2	32	18	0	4	0	1	1	0	21	1	4	36	4	12	4
7:15 AM to 7:30 AM	5	41	18	0	9	1	0	1	0	24	0	5	27	5	14	2
7:30 AM to 7:45 AM	2	43	18	2	7	1	2	0	0	14	0	1	23	8	10	3
7:45 AM to 8:00 AM	8	29	20	2	5	0	0	3	0	20	4	5	24	2	22	3
8:00 AM to 8:15 AM	5	38	11	0	14	1	1	3	1	24	2	7	21	5	12	3
8:15 AM to 8:30 AM	3	38	8	0	7	0	0	1	0	30	0	5	14	3	8	4
8:30 AM to 8:45 AM	3	21	9	0	10	2	0	0	0	17	4	2	13	8	7	2
8:45 AM to 9:00 AM	2	31	11	0	4	0	0	0	1	17	2	4	16	2	11	5
PM PEAK	Southbound				Westbound				Northbound				Eastbound			
Roadway:	1st St.				Office Complex				1st St.				N St.			
Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM to 4:15 PM	6	6	7	0	18	1	0	0	0	53	4	2	4	1	4	1
4:15 PM to 4:30 PM	3	7	2	0	13	4	0	0	1	38	3	6	3	0	4	0
4:30 PM to 4:45 PM	3	8	4	1	19	0	0	2	0	30	0	7	5	0	4	2
4:45 PM to 5:00 PM	3	10	1	2	21	4	0	4	0	24	2	2	3	0	2	1
5:00 PM to 5:15 PM	1	11	2	0	11	2	1	1	0	26	1	3	1	0	3	0
5:15 PM to 5:30 PM	2	10	1	0	11	1	3	0	0	24	0	1	4	0	3	1
5:30 PM to 5:45 PM	0	7	2	0	14	1	0	1	1	19	0	0	5	0	3	0
5:45 PM to 6:00 PM	0	7	0	0	9	1	0	0	0	16	0	1	9	0	1	0
6:00 PM to 6:15 PM	2	9	1	0	9	2	0	0	0	9	1	2	3	0	0	0
6:15 PM to 6:30 PM	0	5	0	0	6	1	0	0	0	15	1	0	4	0	3	0
6:30 PM to 6:45 PM	0	5	0	0	6	1	1	0	0	5	2	0	7	0	0	0
6:45 PM to 7:00 PM	2	3	2	0	3	1	0	0	0	7	0	4	1	0	4	0
PEAK HOURS	Southbound				Westbound				Northbound				Eastbound			
Roadway:	1st St.				Office Complex				1st St.				N St.			
Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM INTERSECTION PEAK HOUR																
7:15 AM to 8:15 AM	20	151	67	4	35	3	3	7	1	82	6	18	95	20	58	11
PM INTERSECTION PEAK HOUR																
4:00 PM to 5:00 PM	15	31	14	3	71	9	0	6	1	145	9	17	15	1	14	4
AM SYSTEM PEAK HOUR																
6:45 AM to 7:45 AM	11	153	72	2	21	3	4	4	1	79	3	13	116	27	48	9
PM SYSTEM PEAK HOUR																
5:00 PM to 6:00 PM	3	35	5	0	45	5	4	2	1	85	1	5	19	0	10	1
PEAK HOUR FACTORS	Southbound				Westbound				Northbound				Eastbound			
	1st St.				Office Complex				1st St.				N St.			
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM PEAK HOUR	0.55	0.89	1.00	N/A	0.58	0.75	0.50	N/A	0.25	0.82	0.38	N/A	0.81	0.68	0.86	N/A
PM PEAK HOUR	0.38	0.80	0.63	N/A	0.80	0.63	0.33	N/A	0.25	0.82	0.25	N/A	0.53	0.00	0.83	N/A

Overall AM PEAK HOUR FACTOR = 0.93

AM Period Intersection Volume: 1397

Overall PM PEAK HOUR FACTOR = 0.90

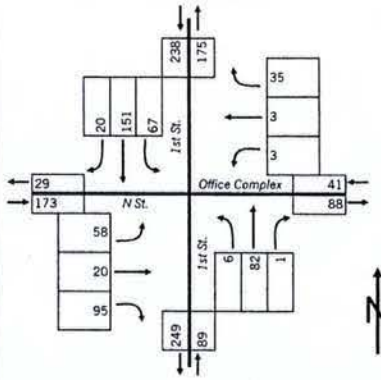
PM Period Intersection Volume: 659

Date of Counts: Thursday, August 10, 2006

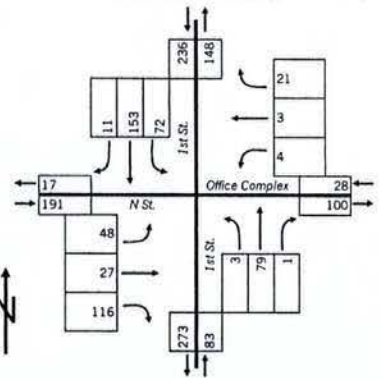
AM Weather Conditions: Warm, Rainy

PM Weather Conditions: Warm, Clear

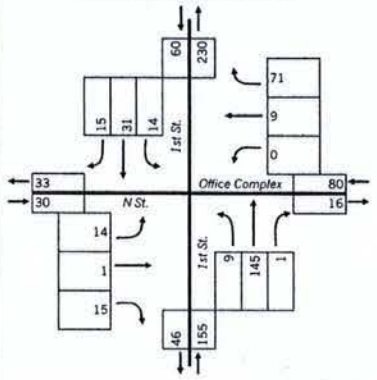
AM INTERSECTION PEAK VOLUMES



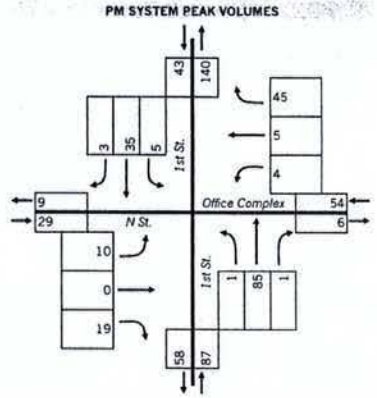
AM SYSTEM PEAK VOLUMES



PM INTERSECTION PEAK VOLUMES



PM SYSTEM PEAK VOLUMES



Gorove/Slade Associates

Project Name :	Florida Rock
Project # :	2070.001
Location :	DC
Data Source	Gorove/Slade Associates

Intersection:	M Street SE at First Street SE

AM PEAK					Southbound				Westbound				Northbound				Eastbound			
Direction:																				
Roadway:					First St.				M St.				First St.				M St.			
Movement:					Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM	to	6:15 AM			1	2	0	1	2	56	22	9	6	3	13	1	38	122	7	3
6:15 AM	to	6:30 AM			1	3	1	2	8	63	17	10	8	1	9	1	23	77	2	9
6:30 AM	to	6:45 AM			0	8	1	8	5	84	25	6	14	6	17	5	35	108	3	14
6:45 AM	to	7:00 AM			6	5	3	2	9	106	31	14	9	4	13	3	26	141	5	12
7:00 AM	to	7:15 AM			2	4	2	2	8	97	29	13	10	4	13	5	36	126	2	10
7:15 AM	to	7:30 AM			9	14	5	0	9	145	46	22	25	11	14	1	32	122	3	5
7:30 AM	to	7:45 AM			6	12	8	0	16	125	36	12	5	9	7	1	23	102	9	10
7:45 AM	to	8:00 AM			6	11	7	1	19	148	32	12	6	8	8	3	21	71	4	7
8:00 AM	to	8:15 AM			8	5	10	5	19	115	33	18	14	13	7	1	14	131	6	7
8:15 AM	to	8:30 AM			7	4	13	3	18	117	32	15	11	14	7	1	17	73	7	3
8:30 AM	to	8:45 AM			7	3	6	4	12	140	21	10	10	6	6	2	13	94	5	8
8:45 AM	to	9:00 AM			1	4	4	4	13	116	20	10	18	5	6	2	20	80	9	8

PM PEAK					Southbound				Westbound				Northbound				Eastbound			
Direction:																				
Roadway:					First St.				M St.				First St.				M St.			
Movement:					Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	to	4:15 PM			10	3	6	5	6	135	7	16	25	10	31	2	9	130	5	6
4:15 PM	to	4:30 PM			5	2	11	1	3	167	6	15	23	6	24	1	3	116	5	6
4:30 PM	to	4:45 PM			7	1	8	1	7	121	7	19	20	12	14	1	7	175	4	5
4:45 PM	to	5:00 PM			6	3	8	0	5	88	5	7	21	7	23	2	2	215	7	1
5:00 PM	to	5:15 PM			3	1	6	0	5	126	7	10	18	6	11	0	7	172	6	0
5:15 PM	to	5:30 PM			2	3	5	1	10	108	4	11	24	2	20	1	7	191	4	4
5:30 PM	to	5:45 PM			4	3	7	1	4	116	5	13	19	3	14	1	4	145	5	2
5:45 PM	to	6:00 PM			12	1	2	0	5	92	4	8	10	6	15	0	3	166	4	4
6:00 PM	to	6:15 PM			4	3	2	0	6	87	4	1	16	0	10	0	3	188	4	4
6:15 PM	to	6:30 PM			8	1	3	0	0	74	3	4	10	3	16	1	1	133	0	1
6:30 PM	to	6:45 PM			1	0	2	0	1	71	2	5	9	0	9	3	1	98	1	6
6:45 PM	to	7:00 PM			5	1	2	0	5	61	5	0	13	2	13	0	4	59	2	2

PEAK HOURS					Southbound				Westbound				Northbound				Eastbound			
Direction:																				
Roadway:					First St.				M St.				First St.				M St.			
Movement:					Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM INTERSECTION PEAK HOUR																				
7:15 AM	to	8:15 AM			29	42	30	6	44	533	147	64	50	41	36	6	90	426	22	29
PM INTERSECTION PEAK HOUR																				
4:00 PM	to	5:00 PM			28	9	33	7	21	511	25	57	89	35	92	6	21	636	21	18
AM SYSTEM PEAK HOUR																				
6:45 AM	to	7:45 AM			23	35	18	4	42	473	142	61	49	28	47	10	117	491	19	37
PM SYSTEM PEAK HOUR																				
5:00 PM	to	6:00 PM			21	8	20	2	24	442	20	42	71	17	60	2	21	674	19	10

PEAK HOUR FACTORS	Southbound First St.				Westbound M St.				Northbound First St.				Eastbound M St.			
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM PEAK HOUR	0.64	0.63	0.56	N/A	0.66	0.82	0.77	N/A	0.49	0.64	0.84	N/A	0.81	0.87	0.53	N/A
PM PEAK HOUR	0.44	0.67	0.71	N/A	0.60	0.88	0.71	N/A	0.74	0.71	0.75	N/A	0.75	0.88	0.79	N/A

Overall AM PEAK HOUR FACTOR = 0.85

Overall PM PEAK HOUR FACTOR = 0.92

AM Period Intersection Volume: 3930

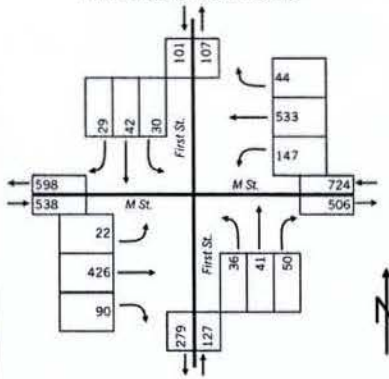
PM Period Intersection Volume: 3864

Date of Counts: Thursday, August 10, 2006

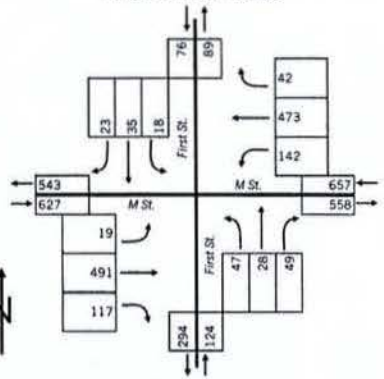
AM Weather Conditions: Warm, Rainy

PM Weather Conditions: Warm, Clear

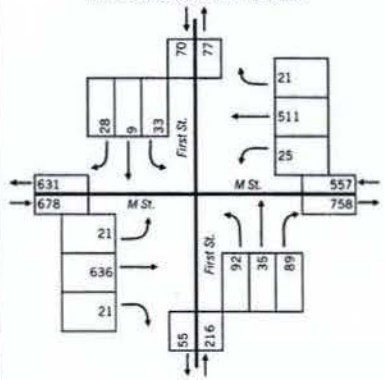
AM INTERSECTION PEAK VOLUMES



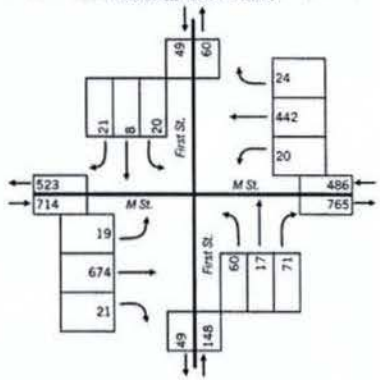
AM SYSTEM PEAK VOLUMES



PM INTERSECTION PEAK VOLUMES



PM SYSTEM PEAK VOLUMES



Gorove/Slade Associates

Project Name:	Florida Rock
Project Number:	2070-001
Location:	DC
Data Source:	Gorove/Slade Associates

Intersection:																		
AM PEAK																		
			Direction:	Southbound				Westbound				Northbound				Eastbound			
			Roadway:	South Capitol St				M St				South Capitol St				M St			
			Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:00 AM	to	6:15 AM		7	11	75	1	6	40	11	2	16	3	229	0	23	36	6	5
6:15 AM	to	6:30 AM		10	11	67	1	1	66	13	5	10	6	332	1	29	63	9	1
6:30 AM	to	6:45 AM		7	19	80	0	4	93	11	5	6	6	276	0	55	74	9	7
6:45 AM	to	7:00 AM		10	19	102	6	5	99	30	5	7	13	345	0	57	143	7	3
7:00 AM	to	7:15 AM		5	10	86	7	2	120	35	1	9	7	426	1	77	149	14	8
7:15 AM	to	7:30 AM		13	19	82	5	1	139	23	1	11	5	333	2	76	113	11	10
7:30 AM	to	7:45 AM		11	21	73	1	4	159	14	7	3	6	352	1	64	111	17	13
7:45 AM	to	8:00 AM		9	8	58	1	4	147	9	9	8	7	372	2	44	108	20	11
8:00 AM	to	8:15 AM		16	7	62	4	3	168	12	12	4	9	323	2	64	91	26	20
8:15 AM	to	8:30 AM		12	14	65	0	7	132	16	11	2	26	340	8	57	93	24	20
8:30 AM	to	8:45 AM		8	21	49	3	7	172	16	11	3	20	345	3	62	69	7	20
8:45 AM	to	9:00 AM		7	11	50	3	11	143	17	9	7	22	300	1	77	96	11	7
PM PEAK																			
			Direction:	Southbound				Westbound				Northbound				Eastbound			
			Roadway:	South Capitol St				M St				South Capitol St				M St			
			Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	to	4:15 PM		8	40	45	1	5	186	57	0	6	23	78	1	183	53	7	8
4:15 PM	to	4:30 PM		6	36	44	1	22	153	37	3	7	15	112	1	275	94	12	4
4:30 PM	to	4:45 PM		15	42	40	0	16	202	41	3	13	48	106	2	216	140	3	9
4:45 PM	to	5:00 PM		7	45	46	0	17	165	36	3	11	19	67	0	268	110	6	2
5:00 PM	to	5:15 PM		10	48	54	0	11	178	22	1	7	50	91	2	263	118	11	18
5:15 PM	to	5:30 PM		8	52	38	0	10	98	39	2	4	43	89	0	217	105	4	10
5:30 PM	to	5:45 PM		13	33	47	0	33	181	21	6	18	67	216	0	293	205	7	6
5:45 PM	to	6:00 PM		7	57	56	0	25	138	14	1	16	91	149	5	238	194	1	7
6:00 PM	to	6:15 PM		11	39	45	0	28	93	21	2	18	39	160	0	201	144	7	10
6:15 PM	to	6:30 PM		11	37	54	0	18	124	23	0	17	45	167	0	211	167	6	6
6:30 PM	to	6:45 PM		12	39	46	0	12	85	18	0	14	55	162	1	190	107	11	7
6:45 PM	to	7:00 PM		7	37	43	0	17	104	32	0	14	51	231	0	178	110	15	4
PEAK HOURS																			
			Direction:	Southbound				Westbound				Northbound				Eastbound			
			Roadway:	South Capitol St				M St				South Capitol St				M St			
			Movement:	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM INTERSECTION PEAK HOUR																			
6:45 AM	to	7:45 AM		39	69	343	19	12	517	102	14	30	31	1456	4	274	516	49	34
PM INTERSECTION PEAK HOUR																			
5:30 PM	to	6:30 PM		42	166	202	0	102	536	79	9	69	242	692	5	943	710	21	29
AM SYSTEM PEAK HOUR																			
6:45 AM	to	7:45 AM		39	69	343	19	12	517	102	14	30	31	1456	4	274	516	49	34
PM SYSTEM PEAK HOUR																			
5:00 PM	to	6:00 PM		38	190	195	0	79	595	96	10	45	251	545	7	1011	622	23	41

PEAK HOUR FACTORS	Southbound				Westbound				Northbound				Eastbound			
	South Capitol St				M St				South Capitol St				M St			
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM PEAK HOUR	0.75	0.82	0.84	N/A	0.60	0.81	0.73	N/A	0.68	0.60	0.85	N/A	0.89	0.87	0.72	N/A
PM PEAK HOUR	0.73	0.83	0.87	N/A	0.60	0.82	0.62	N/A	0.63	0.69	0.63	N/A	0.86	0.76	0.52	N/A

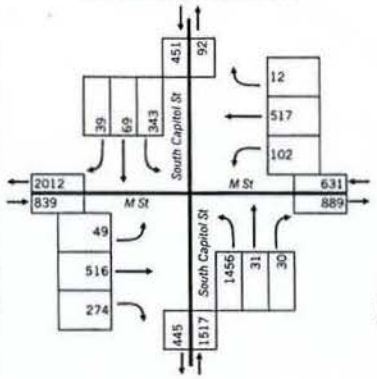
Overall AM PEAK HOUR FACTOR = 0.91 **Overall PM PEAK HOUR FACTOR** = 0.81

AM Period Intersection Volume: 9056 **PM Period Intersection Volume:** 10147

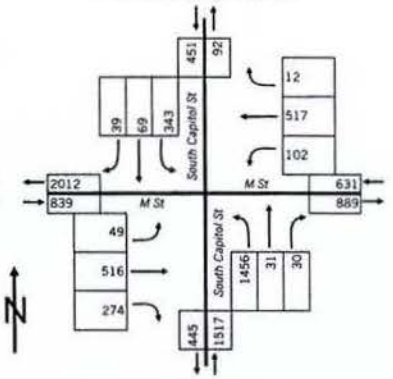
Date of Counts: Wednesday, July 12, 2006

AM Weather Conditions: Hot, Hazy **PM Weather Conditions:** Hot, Hazy

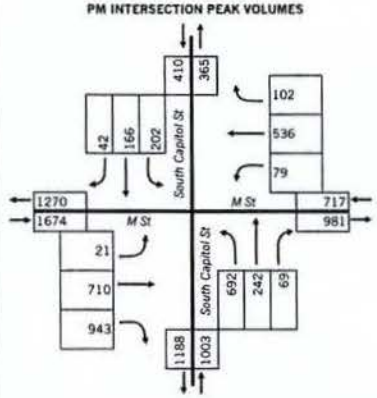
AM INTERSECTION PEAK VOLUMES



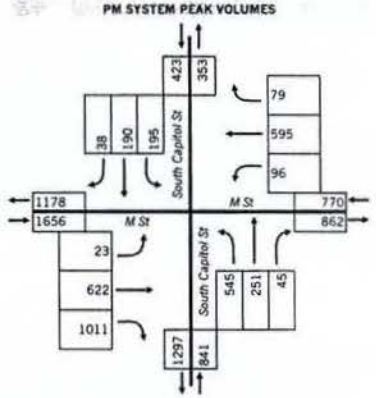
AM SYSTEM PEAK VOLUMES



PM INTERSECTION PEAK VOLUMES



PM SYSTEM PEAK VOLUMES



Appendix C
Trip Generation Calculations

FLORIDA ROCK PUD
TRIP GENERATION (USED FOR ANALYSIS)

	Time Period Weekday	AM Peak Hour	PM Peak Hour
Phase 1			
Office	*Source: ITE Trip Generation 7th Ed, Land Use 710; WMATA 2006 Ridership Survey*		
Rate	ln(t)=0.77ln(x)+3.65	ln(t)=0.80ln(x)+1.55	t=1.12(x)+78.81
Gross Floor Area (in Thousands)	243	243	243
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,321	191	175
Percentage Entering	50%	88%	17%
Percentage Exiting	50%	12%	83%
Total Inbound	661	168	30
Total Outbound	660	23	145
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814 WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37.66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	33	33	33
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	145	3	10
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	73	2	4
Total Outbound	72	1	6
Phase 1 Sub-Total			
Total Inbound	734	170	34
Total Outbound	732	24	151
Total Trips	1,466	194	185
Phase 2			
Residential	*Source: ITE Trip Generation 7th Ed, Land Use 220; WMATA 2006 Ridership Survey*		
Rate	t=6.01(x)+150.35	t=0 49(x)+3.73	t=0.55(x)+17.65
Number of Units	172	172	172
Alternate Mode Use Reduction	60%	60%	60%
Total Trips	474	35	45
Percentage Entering	50%	20%	65%
Percentage Exiting	50%	80%	35%
Total Inbound	237	7	29
Total Outbound	237	28	16
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814; WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37.66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	11.4	11.4	11.4
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	53	1	5
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	27	1	2
Total Outbound	26	0	3
Phase 2 Sub-Total			
Total Inbound	264	8	31
Total Outbound	263	28	19
Total Trips	527	36	50
Phase 3			
Office	*Source: ITE Trip Generation 7th Ed, Land Use 710; WMATA 2006 Ridership Survey*		
Rate	ln(t)=0.77ln(x)+3 65	ln(t)=0.80ln(x)+1.55	t=1.12(x)+78.81
Gross Floor Area (in Thousands)	348	348	348
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,742	254	234
Percentage Entering	50%	88%	17%
Percentage Exiting	50%	12%	83%
Total Inbound	871	224	40
Total Outbound	871	30	194
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814 WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37.66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	13.3	13.3	13.3
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	61	1	5
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	31	1	2
Total Outbound	30	0	3
Phase 3 Sub-Total			
Total Inbound	902	225	42
Total Outbound	901	30	197
Total Trips	1,803	255	239
Phase 4			
Hotel	*Source: ITE Trip Generation 7th Ed, Land Use 310; WMATA 2006 Ridership Survey*		
Rate	t=8 92(x)	t=0.79(x)-29.80	ln(t)=1.2ln(x)-1.55
Number of Rooms	260	260	260
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,160	88	84
Percentage Entering	50%	58%	49%
Percentage Exiting	50%	42%	51%
Total Inbound	580	51	41
Total Outbound	580	37	43
Total PUD Inbound	2,480	454	148
Total PUD Outbound	2,476	119	410
Total PUD	4,956	573	558

FLORIDA ROCK PUD
TRIP GENERATION (MOST RECENT PROGRAM)

	Time Period Weekday	AM Peak Hour	PM Peak Hour
Phase 1			
Office	*Source: ITE Trip Generation 7th Ed, Land Use 710; WMATA 2006 Ridership Survey*		
Rate	ln(t)=0.77ln(x)+3.65	ln(t)=0.80ln(x)+1.55	t=1.12(x)+78.81
Gross Floor Area (in Thousands)	258	258	258
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,384	200	184
Percentage Entering	50%	88%	17%
Percentage Exiting	50%	12%	83%
Total Inbound	692	176	31
Total Outbound	692	24	153
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814 WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37.66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	36.1	36.1	36.1
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	158	3	11
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	79	2	5
Total Outbound	79	1	6
Phase 1 Sub-Total			
Total Inbound	771	178	36
Total Outbound	771	25	159
Total Trips	1,542	203	195
Phase 2			
Residential	*Source: ITE Trip Generation 7th Ed, Land Use 220; WMATA 2006 Ridership Survey*		
Rate	t=6.01(x)+150.35	t=0.49(x)+3.73	t=0.55(x)+17.65
Number of Units	169	169	169
Alternate Mode Use Reduction	60%	60%	60%
Total Trips	466	35	44
Percentage Entering	50%	20%	65%
Percentage Exiting	50%	80%	35%
Total Inbound	233	7	29
Total Outbound	233	28	15
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814; WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37.66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	14.1	14.1	14.1
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	64	2	6
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	32	1	3
Total Outbound	32	1	3
Phase 2 Sub-Total			
Total Inbound	265	8	32
Total Outbound	265	29	18
Total Trips	530	37	50
Phase 3			
Office	*Source: ITE Trip Generation 7th Ed, Land Use 710; WMATA 2006 Ridership Survey*		
Rate	ln(t)=0.77ln(x)+3.65	ln(t)=0.80ln(x)+1.55	t=1 12(x)+78.81
Gross Floor Area (in Thousands)	341.2	341.2	341:2
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,716	250	230
Percentage Entering	50%	88%	17%
Percentage Exiting	50%	12%	83%
Total Inbound	858	220	39
Total Outbound	858	30	191
Retail	*Source: ITE Trip Generation 7th Ed, Land Use 814 WMATA 2006 Ridership Survey*		
Rate	t=42.78(x)+37 66	=25% of PM Rate	t=2.40(x)+21.48
Gross Leasable Area (in Thousands)	11.4	11.4	11 4
Alternate Mode Use Reduction	90%	90%	90%
Total Trips	53	1	5
Percentage Entering	50%	61%	44%
Percentage Exiting	50%	39%	56%
Total Inbound	27	1	2
Total Outbound	26	0	3
Phase 3 Sub-Total			
Total Inbound	885	221	41
Total Outbound	884	30	194
Total Trips	1,769	251	235
Phase 4			
Hotel	*Source: ITE Trip Generation 7th Ed, Land Use 310; WMATA 2006 Ridership Survey*		
Rate	t=8.92(x)	t=0.79(x)-29.80	ln(t)=1.2ln(x)-1.55
Number of Rooms	260	260	260
Alternate Mode Use Reduction	50%	50%	50%
Total Trips	1,160	88	84
Percentage Entering	50%	58%	49%
Percentage Exiting	50%	42%	51%
Total Inbound	580	51	41
Total Outbound	580	37	43
Total PUD Inbound	2,501	458	150
Total PUD Outbound	2,500	121	414
Total PUD	5,001	579	564

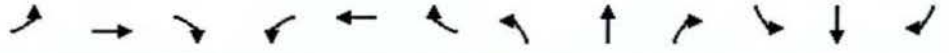
Appendix D
Capacity Analysis Worksheets

HCM Unsignalized Intersection Capacity Analysis
1: N St SE & 1st St SE 8/18/2006

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	48	27	116	4	3	21	3	79	1	72	153	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	29	126	4	3	23	3	86	1	78	166	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											663	
pX, platoon unblocked												
vC, conflicting volume	446	422	172	562	428	86	178			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	446	422	172	562	428	86	178			87		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	94	86	99	99	98	100			95		
cM capacity (veh/h)	487	495	871	342	491	972	1398			1509		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	208	30	90	257
Volume Left	52	4	3	78
Volume Right	126	23	1	12
cSH	667	711	1398	1509
Volume to Capacity	0.31	0.04	0.00	0.05
Queue Length 95th (ft)	33	3	0	4
Control Delay (s)	12.8	10.3	0.3	2.6
Lane LOS	B	B	A	A
Approach Delay (s)	12.8	10.3	0.3	2.6
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↰↑↑↑					↰	✣	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0					3.0	3.0	
Lane Util. Factor		0.91	1.00		0.91					0.95	0.95	
Frt		1.00	0.85		1.00					1.00	0.98	
Flt Protected		1.00	1.00		1.00					0.95	0.97	
Satd. Flow (prot)		4577	1425		4566					1513	1513	
Flt Permitted		1.00	1.00		0.83					0.95	0.97	
Satd. Flow (perm)		4577	1425		3820					1513	1513	
Volume (vph)	0	567	301	102	2069	0	0	0	0	377	69	39
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	630	334	113	2299	0	0	0	0	419	77	43
RTOR Reduction (vph)	0	0	267	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	630	67	0	2412	0	0	0	0	268	264	0
Turn Type			Perm	D.P+P						Split		
Protected Phases		4		3	3 4					6	6	
Permitted Phases			4	4								
Actuated Green, G (s)		19.0	19.0		61.0					23.0	23.0	
Effective Green, g (s)		20.0	20.0		65.0					26.0	26.0	
Actuated g/C Ratio		0.20	0.20		0.65					0.26	0.26	
Clearance Time (s)		4.0	4.0							6.0	6.0	
Lane Grp Cap (vph)		915	285		2819					393	393	
v/s Ratio Prot		0.14			c0.39					c0.18	0.17	
v/s Ratio Perm			0.05		c0.17							
v/c Ratio		0.69	0.23		0.86					0.68	0.67	
Uniform Delay, d1		37.1	33.6		13.8					33.3	33.2	
Progression Factor		1.00	1.00		0.06					1.00	1.00	
Incremental Delay, d2		4.2	1.9		0.3					9.2	8.9	
Delay (s)		41.3	35.5		1.2					42.5	42.1	
Level of Service		D	D		A					D	D	
Approach Delay (s)		39.3			1.2			0.0			42.3	
Approach LOS		D			A			A			D	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0		3.0	3.0				
Lane Util. Factor		0.91			0.91		*0.95	0.95				
Frt		1.00			1.00		1.00	0.99				
Flt Protected		1.00			1.00		0.95	0.96				
Satd. Flow (prot)		4565			4563		1513	1514				
Flt Permitted		0.90			1.00		0.95	0.96				
Satd. Flow (perm)		4122			4563		1513	1514				
Volume (vph)	49	895	0	0	569	12	1602	31	30	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	54	994	0	0	632	13	1780	34	33	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1048	0	0	643	0	934	912	0	0	0	0
Turn Type	D.P+P						Split					
Protected Phases	7	5 7			5		2	2				
Permitted Phases	5											
Actuated Green, G (s)		42.0			19.0		42.0	42.0				
Effective Green, g (s)		46.0			20.0		45.0	45.0				
Actuated g/C Ratio		0.46			0.20		0.45	0.45				
Clearance Time (s)					4.0		6.0	6.0				
Lane Grp Cap (vph)		2011			913		681	681				
v/s Ratio Prot		c0.14			c0.14		c0.62	0.60				
v/s Ratio Perm		0.10										
v/c Ratio		0.52			0.70		1.37	1.34				
Uniform Delay, d1		19.2			37.2		27.5	27.5				
Progression Factor		0.07			0.87		1.00	1.00				
Incremental Delay, d2		0.7			4.4		176.4	162.4				
Delay (s)		1.9			36.8		203.9	189.9				
Level of Service		A			D		F	F				
Approach Delay (s)		1.9			36.8			197.0			0.0	
Approach LOS		A			D			F			A	

Intersection Summary			
HCM Average Control Delay	110.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0			3.0			3.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frt		0.97			0.99			0.95			0.96	
Flt Protected		1.00			0.99			0.98			0.99	
Satd. Flow (prot)		4452			4490			1499			1350	
Flt Permitted		0.90			0.70			0.87			0.92	
Satd. Flow (perm)		4031			3176			1324			1259	
Volume (vph)	19	540	117	142	520	42	47	28	49	18	35	23
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	600	130	158	578	47	52	31	54	20	39	26
RTOR Reduction (vph)	0	32	0	0	7	0	0	24	0	0	16	0
Lane Group Flow (vph)	0	719	0	0	776	0	0	113	0	0	69	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Parking (#/hr)										10	10	10
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	4 3			2			6	
Permitted Phases	4			4 3			2			6		
Actuated Green, G (s)		44.0			63.0			21.0			21.0	
Effective Green, g (s)		47.0			67.0			24.0			24.0	
Actuated g/C Ratio		0.47			0.67			0.24			0.24	
Clearance Time (s)		6.0						6.0			6.0	
Lane Grp Cap (vph)		1895			2391			318			302	
v/s Ratio Prot					c0.06							
v/s Ratio Perm		c0.18			0.15			c0.09			0.05	
v/c Ratio		0.38			0.32			0.36			0.23	
Uniform Delay, d1		17.1			7.0			31.6			30.6	
Progression Factor		0.71			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.4			3.1			1.8	
Delay (s)		12.6			7.3			34.7			32.3	
Level of Service		B			A			C			C	
Approach Delay (s)		12.6			7.3			34.7			32.3	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
1: N St SE & 1st St SE 8/18/2006

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	9	4	5	45	1	85	1	5	35	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	10	4	5	49	1	92	1	5	38	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											663	
pX, platoon unblocked												
vC, conflicting volume	197	146	40	155	147	93	41			93		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197	146	40	155	147	93	41			93		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	99	99	99	95	100			100		
cM capacity (veh/h)	717	742	1032	801	741	964	1568			1501		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	59	95	47
Volume Left	11	4	1	5
Volume Right	10	49	1	3
cSH	838	924	1568	1501
Volume to Capacity	0.02	0.06	0.00	0.00
Queue Length 95th (ft)	2	5	0	0
Control Delay (s)	9.4	9.2	0.1	0.9
Lane LOS	A	A	A	A
Approach Delay (s)	9.4	9.2	0.1	0.9
Approach LOS	A	A		

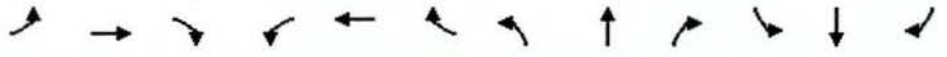
Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	16.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↰↑↑↑					↰	✣	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0					3.0	3.0	
Lane Util. Factor		0.91	1.00		0.91					0.95	0.95	
Frt		1.00	0.85		1.00					1.00	0.98	
Flt Protected		1.00	1.00		1.00					0.95	1.00	
Satd. Flow (prot)		4577	1425		4559					1513	1553	
Flt Permitted		1.00	1.00		0.79					0.95	1.00	
Satd. Flow (perm)		4577	1425		3602					1513	1553	
Volume (vph)	0	684	1112	96	1159	0	0	0	0	215	190	38
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	760	1236	107	1288	0	0	0	0	239	211	42
RTOR Reduction (vph)	0	0	413	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	760	823	0	1395	0	0	0	0	239	246	0
Turn Type			Perm	D.P+P						Split		
Protected Phases		4		3	3 4					6	6	
Permitted Phases			4	4								
Actuated Green, G (s)		33.0	33.0		54.0					30.0	30.0	
Effective Green, g (s)		34.0	34.0		58.0					33.0	33.0	
Actuated g/C Ratio		0.34	0.34		0.58					0.33	0.33	
Clearance Time (s)		4.0	4.0							6.0	6.0	
Lane Grp Cap (vph)		1556	485		2319					499	512	
v/s Ratio Prot		0.17			c0.14					0.16	c0.16	
v/s Ratio Perm			c0.58		0.20							
v/c Ratio		0.49	1.70		0.60					0.48	0.48	
Uniform Delay, d1		26.1	33.0		13.5					26.7	26.7	
Progression Factor		1.00	1.00		0.08					1.00	1.00	
Incremental Delay, d2		1.1	322.3		0.4					3.3	3.2	
Delay (s)		27.2	355.3		1.6					29.9	29.9	
Level of Service		C	F		A					C	C	
Approach Delay (s)		230.3			1.6			0.0			29.9	
Approach LOS		F			A			A			C	

Intersection Summary			
HCM Average Control Delay	122.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	127.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0		3.0	3.0				
Lane Util. Factor		0.91			0.91		*0.95	0.95				
Frt		1.00			0.98		1.00	0.99				
Flt Protected		1.00			1.00		0.95	0.98				
Satd. Flow (prot)		4571			4503		1513	1542				
Flt Permitted		0.93			1.00		0.95	0.98				
Satd. Flow (perm)		4262			4503		1513	1542				
Volume (vph)	23	876	0	0	655	79	600	251	45	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	973	0	0	728	88	667	279	50	0	0	0
RTOR Reduction (vph)	0	0	0	0	15	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	999	0	0	801	0	489	503	0	0	0	0
Turn Type	D.P+P						Split					
Protected Phases	7	5 7			5		2	2				
Permitted Phases	5											
Actuated Green, G (s)		63.0			33.0		21.0	21.0				
Effective Green, g (s)		67.0			34.0		24.0	24.0				
Actuated g/C Ratio		0.67			0.34		0.24	0.24				
Clearance Time (s)					4.0		6.0	6.0				
Lane Grp Cap (vph)		2958			1531		363	370				
v/s Ratio Prot		c0.11			c0.18		0.32	c0.33				
v/s Ratio Perm		0.11										
v/c Ratio		0.34			0.52		1.35	1.36				
Uniform Delay, d1		7.0			26.5		38.0	38.0				
Progression Factor		0.08			0.86		1.00	1.00				
Incremental Delay, d2		0.3			1.3		173.5	178.7				
Delay (s)		0.8			24.2		211.5	216.7				
Level of Service		A			C		F	F				
Approach Delay (s)		0.8			24.2			214.1			0.0	
Approach LOS		A			C			F			A	

Intersection Summary			
HCM Average Control Delay	83.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0			3.0			3.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frt		1.00			0.99			0.94			0.94	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		4553			4537			1479			1316	
Flt Permitted		0.92			0.91			0.87			0.87	
Satd. Flow (perm)		4177			4132			1307			1168	
Volume (vph)	19	741	21	20	486	24	60	17	71	20	8	21
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	823	23	22	540	27	67	19	79	22	9	23
RTOR Reduction (vph)	0	3	0	0	5	0	0	33	0	0	17	0
Lane Group Flow (vph)	0	864	0	0	584	0	0	132	0	0	37	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Parking (#/hr)										10	10	10
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	4 3			2			6	
Permitted Phases	4			4 3			2			6		
Actuated Green, G (s)		43.0			59.0			25.0			25.0	
Effective Green, g (s)		46.0			63.0			28.0			28.0	
Actuated g/C Ratio		0.46			0.63			0.28			0.28	
Clearance Time (s)		6.0						6.0			6.0	
Lane Grp Cap (vph)		1921			2672			366			327	
v/s Ratio Prot					c0.04							
v/s Ratio Perm		c0.21			0.10			c0.10			0.03	
v/c Ratio		0.45			0.22			0.36			0.11	
Uniform Delay, d1		18.4			7.9			28.8			26.8	
Progression Factor		0.60			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.2			2.7			0.7	
Delay (s)		11.8			8.1			31.6			27.5	
Level of Service		B			A			C			C	
Approach Delay (s)		11.8			8.1			31.6			27.5	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

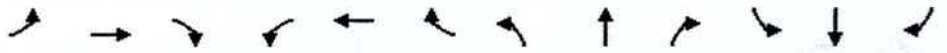
HCM Unsignalized Intersection Capacity Analysis
1: N St SE & 1st Street SE

8/18/2006

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	54	154	130	26	56	24	3	88	54	81	171	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	59	167	141	28	61	26	3	96	59	88	186	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											663	
pX, platoon unblocked												
vC, conflicting volume	479	529	99	626	507	77	199			154		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	479	529	99	626	507	77	199			154		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	85	61	85	86	86	97	100			94		
cM capacity (veh/h)	388	424	937	207	437	968	1371			1424		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	367	115	51	107	181	106
Volume Left	59	28	3	0	88	0
Volume Right	141	26	0	59	0	13
cSH	528	381	1371	1700	1424	1700
Volume to Capacity	0.70	0.30	0.00	0.06	0.06	0.06
Queue Length 95th (ft)	135	31	0	0	5	0
Control Delay (s)	26.0	18.5	0.5	0.0	4.0	0.0
Lane LOS	D	C	A		A	
Approach Delay (s)	26.0	18.5	0.2		2.5	
Approach LOS	D	C				

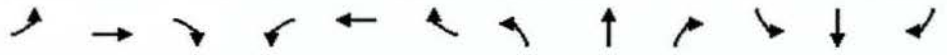
Intersection Summary			
Average Delay	13.4		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95			0.91			0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.92			1.00			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1652	1739	1478	1652	3056			4727			3303	1478
Flt Permitted	0.68	1.00	1.00	0.74	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1189	1739	1478	1286	3056			4727			3303	1478
Volume (vph)	25	25	50	172	50	50	0	3653	103	0	1503	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	27	54	187	54	54	0	3971	112	0	1634	54
RTOR Reduction (vph)	0	0	44	0	1	0	0	3	0	0	0	14
Lane Group Flow (vph)	27	27	10	187	107	0	0	4080	0	0	1634	40
Turn Type	Perm		Perm	Perm								Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)	16.0	16.0	16.0	16.0	16.0			72.0			72.0	72.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0			74.0			74.0	74.0
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.18			0.74			0.74	0.74
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0			6.0	6.0
Lane Grp Cap (vph)	214	313	266	231	550			3498			2444	1094
v/s Ratio Prot		0.02			0.04			c0.86			0.49	
v/s Ratio Perm	0.02		0.01	c0.15								0.03
v/c Ratio	0.13	0.09	0.04	0.81	0.19			1.17			0.67	0.04
Uniform Delay, d1	34.4	34.2	33.8	39.4	34.8			13.0			6.7	3.5
Progression Factor	1.00	1.00	1.00	0.95	0.94			1.00			1.00	1.00
Incremental Delay, d2	1.2	0.5	0.3	25.0	0.8			78.3			1.5	0.1
Delay (s)	35.6	34.7	34.1	62.2	33.5			91.3			8.2	3.5
Level of Service	D	C	C	E	C			F			A	A
Approach Delay (s)		34.6			51.7			91.3			8.0	
Approach LOS		C			D			F			A	

Intersection Summary			
HCM Average Control Delay	65.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↰↑↑↑					↰	✣	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0					3.0	3.0	
Lane Util. Factor		0.91	1.00		0.91					0.95	0.95	
Frt		1.00	0.85		1.00					1.00	0.98	
Flt Protected		1.00	1.00		0.99					0.95	0.97	
Satd. Flow (prot)		4577	1425		4553					1513	1513	
Flt Permitted		1.00	1.00		0.67					0.95	0.97	
Satd. Flow (perm)		4577	1425		3049					1513	1513	
Volume (vph)	0	823	337	279	2342	0	0	0	0	573	77	44
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	914	374	310	2602	0	0	0	0	637	86	49
RTOR Reduction (vph)	0	0	295	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	914	79	0	2912	0	0	0	0	384	382	0
Turn Type			Perm	D.P+P						Split		
Protected Phases		4		3	3 4					6	6	
Permitted Phases			4	4								
Actuated Green, G (s)		20.0	20.0		66.0					18.0	18.0	
Effective Green, g (s)		21.0	21.0		70.0					21.0	21.0	
Actuated g/C Ratio		0.21	0.21		0.70					0.21	0.21	
Clearance Time (s)		4.0	4.0							6.0	6.0	
Lane Grp Cap (vph)		961	299		2871					318	318	
v/s Ratio Prot		0.20			c0.50					c0.25	0.25	
v/s Ratio Perm			0.06		c0.21							
v/c Ratio		0.95	0.26		1.01					1.21	1.20	
Uniform Delay, d1		39.0	33.0		15.0					39.5	39.5	
Progression Factor		1.00	1.00		0.55					1.00	1.00	
Incremental Delay, d2		19.4	2.1		9.2					119.2	117.3	
Delay (s)		58.4	35.2		17.4					158.7	156.8	
Level of Service		E	D		B					F	F	
Approach Delay (s)		51.6			17.4			0.0			157.8	
Approach LOS		D			B			A			F	

Intersection Summary			
HCM Average Control Delay	48.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0		3.0	3.0				
Lane Util. Factor		0.91			0.91		*0.95	0.95				
Frt		1.00			0.99		1.00	0.99				
Flt Protected		1.00			1.00		0.95	0.96				
Satd. Flow (prot)		4568			4551		1513	1505				
Flt Permitted		0.78			1.00		0.95	0.96				
Satd. Flow (perm)		3564			4551		1513	1505				
Volume (vph)	55	1341	0	0	826	32	1794	35	85	0	0	0
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	61	1490	0	0	918	36	1993	39	94	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1551	0	0	950	0	1092	1030	0	0	0	0
Turn Type	D.P+P						Split					
Protected Phases	7	5 7			5		2	2				
Permitted Phases	5											
Actuated Green, G (s)		38.0			20.0		46.0	46.0				
Effective Green, g (s)		42.0			21.0		49.0	49.0				
Actuated g/C Ratio		0.42			0.21		0.49	0.49				
Clearance Time (s)					4.0		6.0	6.0				
Lane Grp Cap (vph)		1708			956		741	737				
v/s Ratio Prot		c0.19			c0.21		c0.72	0.68				
v/s Ratio Perm		0.19										
v/c Ratio		0.91			0.99		1.47	1.40				
Uniform Delay, d1		27.2			39.4		25.5	25.5				
Progression Factor		0.17			0.82		1.00	1.00				
Incremental Delay, d2		0.9			25.8		220.5	187.4				
Delay (s)		5.5			58.0		246.0	212.9				
Level of Service		A			E		F	F				
Approach Delay (s)		5.5			58.0			229.9			0.0	
Approach LOS		A			E			F			A	

Intersection Summary			
HCM Average Control Delay	119.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	117.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0			3.0			3.0			3.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frt		0.98			0.99			0.94			0.95	
Flt Protected		1.00			0.99			0.98			0.99	
Satd. Flow (prot)		4494			4508			2829			2778	
Flt Permitted		0.90			0.64			0.82			0.88	
Satd. Flow (perm)		4050			2915			2378			2475	
Volume (vph)	21	995	131	159	790	47	53	31	55	20	39	26
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	23	1106	146	177	878	52	59	34	61	22	43	29
RTOR Reduction (vph)	0	16	0	0	5	0	0	44	0	0	21	0
Lane Group Flow (vph)	0	1259	0	0	1102	0	0	110	0	0	73	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Parking (#/hr)										10	10	10
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	4 3			2			6	
Permitted Phases	4			4 3			2			6		
Actuated Green, G (s)		46.0			59.0			25.0			25.0	
Effective Green, g (s)		49.0			63.0			28.0			28.0	
Actuated g/C Ratio		0.49			0.63			0.28			0.28	
Clearance Time (s)		6.0						6.0			6.0	
Lane Grp Cap (vph)		1985			2059			666			693	
v/s Ratio Prot					c0.07							
v/s Ratio Perm		c0.31			0.26			c0.05			0.03	
v/c Ratio		0.63			0.54			0.17			0.11	
Uniform Delay, d1		18.9			10.3			27.2			26.7	
Progression Factor		0.77			1.00			1.06			1.00	
Incremental Delay, d2		0.5			1.0			0.5			0.3	
Delay (s)		15.2			11.3			29.2			27.0	
Level of Service		B			B			C			C	
Approach Delay (s)		15.2			11.3			29.2			27.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			