

Traffic Impact Assessment

Square 700 Development 25 M Street, SE

Washington, D.C.

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TABLE OF CONTENTS

List of Figures-----	iii
List of Tables -----	iv

Part 1: Transportation Elements of the Site Plan

Curb Cuts-----	1
Parking -----	1
Vehicular -----	1
Bicycle -----	2
Car-Sharing-----	2
Loading Docks-----	2
Frequency of Truck Traffic -----	3
Traffic Controls -----	4

Part 2: Traffic Impact Assessment

Introduction -----	1
Scope of Traffic Study -----	2
Existing Conditions -----	5
Existing Roadway Network-----	5
Existing Transit Network-----	10
Existing Pedestrian Facilities -----	12
Existing Traffic Volumes-----	12
Field Observations-----	12
Morning Peak Hour -----	12
Afternoon Peak Hour -----	14
Existing Conditions Capacity Analysis -----	16
Summary of Existing Analysis Results -----	20
Future Conditions without Development-----	21
Future Roadway Network -----	21

Future without Development Traffic Volumes	21
Future without Development Capacity Analysis	23
Summary of Future Background Analysis Results	25
Description of Development	30
Site Access and Circulation	30
Trip Generation	30
Site Traffic Distribution and Assignment	31
Future Conditions with Development	34
Future Traffic Volumes with Development	34
Future with Development Capacity Analysis	34
Summary of Future Background Analysis Results	36
Ballpark Game-Day Traffic Capacity Analysis	40
Existing Game-Day Conditions	40
Existing Game-Day Traffic Volumes	40
Existing Game-Day Capacity Analysis	42
Future Game-Day Conditions without Development	44
Future Game-Day without Development Traffic Volumes	44
Future Game-Day without Development Capacity Analysis	44
Future Game-Day Conditions with Development	49
Site Traffic Distribution and Assignment	49
Future Game-Day with Development Traffic Volumes	49
Future with Development Capacity Analysis	49
Summary and Conclusions	55



LIST OF FIGURES

Figure 1 - Location Map	3
Figure 2 - Study Intersections	4
Figure 3 - Roadway Classification	6
Figure 4 - Average Daily Traffic	7
Figure 5 - Existing Traffic Controls and Lane Configurations	9
Figure 6 - Existing Transit Service	11
Figure 7 - Existing Traffic Volumes	18
Figure 8 - Existing Levels of Service	19
Figure 9 - Background Developments	22
Figure 10 - Future Background Site-Generated Trips	27
Figure 11 - Future Background Traffic Volumes	28
Figure 12 - Future Background Levels of Service	29
Figure 13 - Site Generated Trip Distribution	32
Figure 14 - Site Generated Traffic Volumes	33
Figure 15 - Total Future Traffic Volumes	38
Figure 16 - Total Future Levels of Service	39
Figure 17 - Existing Game-Day Traffic Volumes	41
Figure 18 - Existing Game-Day Levels of Service	43
Figure 19 - Future Background Game-Day Site-Generated Trips	45
Figure 20 - Future Game-Day without Development Traffic Volumes	46
Figure 21 - Future Game-Day without Development Levels of Service	48
Figure 22 - Site Generated Game-Day Traffic Distribution	50
Figure 23 - Future Game-Day Site Generated Traffic Volumes	51
Figure 24 - Future with Development Game-Day Traffic Volumes	52
Figure 25 - Future with Development Game-Day Levels of Service	54

LIST OF TABLES

Table 1 - Existing LOS Results	17
Table 2 - Background Site Trip Generation	23
Table 3 - Future Background LOS Results	23
Table 4 - Site Trip Generation	30
Table 5 - Site Trip Distribution.....	31
Table 6 - Total Future LOS Results.....	34
Table 7 - Existing Game-Day LOS Results	42
Table 8 - Future Background Game-Day LOS Results	47
Table 9 - Site Trip Distribution.....	49
Table 10 - Total Future Game-Day LOS Results.....	53



PART 1: TRANSPORTATION ELEMENTS OF THE SITE PLAN

The following is a summary of the transportation elements of the proposed Square 700 (25 M Street) Development in support of its application for Zoning Commission Design Review. The proposed site plan consists of a mixed-use development (office, retail, and residential uses) located near the Washington Nationals Ballpark between N Street and M Street, SE along the west side of Half Street, SE. Following this summary is a Traffic Impact Assessment (TIA) of site impacts, including existing and future capacity analyses. Site location maps and details of the area transportation network are contained within that section of this document.

CURB CUTS

The site is served by five curb cuts, all along the eastern edge of the site on Van Street. No curb cuts are proposed along Half Street SE to reflect the long term plans for this neighborhood, which include Half Street being a pedestrian friendly street that can be closed to vehicular during events at the Ballpark.

Along Van Street, two curbs cuts are located north of the pedestrian-only Via, one for a loading area, and one accessing the parking garage. Three curb cuts are located south of the Via, one for parking garage access, and two for a shared loading dock. Two curb cuts are needed for the southern loading area to maintain a maximum curb cut of 25'. Although two curb cuts are used, the loading space is shared with a service corridor connecting the three loading berths. Thus, any use in the building south of the Via can get loading access from any of the southern loading berths.

PARKING

Vehicular

The site will be served by three levels of underground parking totaling 607 spaces. The parking is planned to serve the land uses as follows:

- Residential: approximately 280 Units
 - Proposed parking ratio: 0.75 spaces per Unit
 - Proposed number of spaces: 210 spaces
- Office: approximately 364,000 square feet
 - Proposed parking ratio: 0.84 spaces per thousand square feet
 - Proposed number of spaces: 304 spaces
- Retail: approximately 57,000 square feet
 - Proposed parking ratio: 1.58 spaces per thousand square feet
 - Proposed number of spaces: 90 spaces



- Car-Sharing: 3 reserved spaces

The proposed development includes the flexibility of replacing some of the parking on the first level for additional retail space (the retail portion at the southern end of the building fronting N Street would become two levels). The switch from parking to additional retail space is dependent on attracting a tenant for this use, and having retail tenants that would accept a reduction in dedicated retail parking. This may occur upon initial occupancy or after the development is completed and open for several years depending on the retail market demand for leasable space in the submarket. This change would reduce the overall parking count by 40 or more spaces (which would result in a retail parking ratio of less than 1 space per thousand square feet).

Bicycle

The proposed development includes 157 bicycle parking spaces in the garage, all on the first parking level. Access to shower facilities is provided in a fitness center, also located on the first parking level.

Car-Sharing

The Square 700 development proposes reserving three spaces for car-sharing use within the underground garage.

LOADING DOCKS

As stated above there are two loading docks serving the proposed development, one on either side of the Via. There are multiple ways to calculate the loading required by zoning for this development, since it is a singular building that operates as if it were at least two separate buildings. The loading docks were designed as if the building was two separate buildings divided by the Via, as follows:

Northern dock:

- Provided:
 - 3 12' x 30' berths
 - 1 10' x 20' loading space
 - 300 SF platform
- The amount provided is based on the single highest use of the northern portion of the site (north of the Via). The amount provided matches the zoning requirement for the office portions of the northern half, if it was considered a single building.

Southern dock:



- Provided:
 - 3 12' x 30' berths
 - More than 300 SF of platform space
- The amount provided is based on the single highest use of the southern portion of the site (south of the Via). The amount provided matches the zoning requirement for each land use of the southern half of the development (taken individually), if it was considered a single building, assuming that one 1 10' x 20' space can be replaced with a 12' x 30' berth, and that 55' long berths can be substituted with 30' berths.

The location and design of the loading berths will require trucks to back in from Van Street. This design element, along with the reduction of the 55' berth to a 30' berth is intended to maximize the pedestrian experience along Van Street. Accommodating head-in maneuvers and larger trucks would necessitate larger curb radii & curb cut spacing and reductions to sidewalk width.

Frequency of Truck Traffic

The following is an estimate of the frequency of truck traffic expected along Van Street generated by the proposed development. The following assumptions are based on expected delivery times between 10am and 3pm on weekdays.

- Residential
 - Assume one delivery truck each weekday.
 - Assume residential turnover of 20% each year, which equates to one move per week.
 - Total: approximately 6 trucks per week
- Office
 - Assume one delivery truck each weekday per office 'building'
 - Total: approximately 10 trucks per week
- Retail
 - Assume 5 goods & services based stores, with one delivery truck per weekday
 - Assume 2 restaurants, with two delivery trucks per weekday
 - Total: approximately 45 trucks per week
- Trash
 - Assume three trash trucks per weekday, or 15 trucks per week
- Total
 - Approximately 76 trucks per week



Assuming deliveries happen between 10am and 3pm on weekdays, this equates to approximately 3 trucks per hour, or one truck every 20 minutes. Based on these estimates, the loading facilities proposed can accommodate the projected amount of truck activity. In addition, the amount of truck activity is not significant enough to negatively impact through traffic on Van Street.

TRAFFIC CONTROLS

The second section of this document contains a detailed Traffic Impact Assessment of the proposed development including a capacity analysis of area roadways. Based on the results of this study, no changes or new traffic controls are recommended as part of this development. No traffic signals are recommended along Van Street at the parking garage curb cuts or at either end of Van Street at its intersections with M Street SE and N Street SE.



PART 2: TRAFFIC IMPACT ASSESSMENT

INTRODUCTION

This report presents the findings of a traffic impact assessment conducted for the Square 700 Development in support of its application for Zoning Commission Design Review. The proposed site plan consists of a mixed-use development (office, retail, and residential uses) located near the Washington Nationals Ballpark between N Street and M Street, SE along the west side of Half Street, SE. Figure 1 shows a map of the site location.

The primary objectives of this study are to evaluate the transportation conditions near the Square 700 Development and to identify impacts to the transportation network due to the proposed development. The study area encompasses 12 intersections near the site. This report focuses on the existing transportation network within the vicinity of the site, the transportation elements of the proposed development, and the possible impacts to the transportation network.

Gorove/Slade Associates, Inc. (G/SA) undertook the following steps while preparing the study:

- Performed field reconnaissance of existing roadway and intersection geometrics, traffic controls, speed limits, and operations.
- Observed traffic conditions during the morning and afternoon peak periods on a typical weekday;
- Observed traffic conditions before, during, and after a typical event at the Washington Nationals Baseball Stadium located south of the proposed development;
- Conducted peak hour turning movement counts at study intersections;
- Described and quantified impacts of other (non-Square 700 Development) development and infrastructure changes nearby on the future transportation network;
- Calculated the trip generation based on the Institute of Transportation Engineers' (ITE) Trip Generation, 7th Edition.
- Detailed the transportation elements of the proposed Square 700 Development, including pedestrian and vehicular access, truck loading/unloading activity, and bicycle and vehicular parking;
- Estimated the difference in peak hour traffic with and without the proposed Square 700 Development;
- Forecasted future traffic volumes with and without the proposed development;
- Calculated future levels of service at the study intersections with and without the proposed development; and
- Recommended mitigation measures, if necessary, based on the future transportation analysis.



Sources of data for this study include traffic counts and observations conducted by G/SA, plans from HOK, the Monument Ballpark – Square 700 & 701 Transportation Impact Study prepared by Wells and Associates, LLC and the files/library of G/SA.

Scope of Traffic Study

This traffic impact study was conducted in accordance with national and DDOT standards. The scope of this traffic impact analysis was based on the scope of the adjacent Monument Ballpark Site Traffic Study performed by Wells & Associates. The study intersections were based on those selected for the Monument Ballpark Site with the addition of South Capitol Street and Potomac Avenue.

The following intersections were identified for this study, shown on Figure 2:

- South Capitol Street and Eye Street, SE
- South Capitol Street Southbound Local Lanes and M Street, SE
- South Capitol Street Northbound Local Lanes and M Street, SE
- M Street and Van Street, SE
- M Street and Half Street, SE
- M Street and Cushing Place, SE
- M Street and 1st Street, SE
- South Capitol Street and N Street, SE
- N Street and Van Street, SE
- N Street and Half Street, SE
- N Street and 1st Street, SE
- South Capitol Street and Potomac Avenue, SE

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

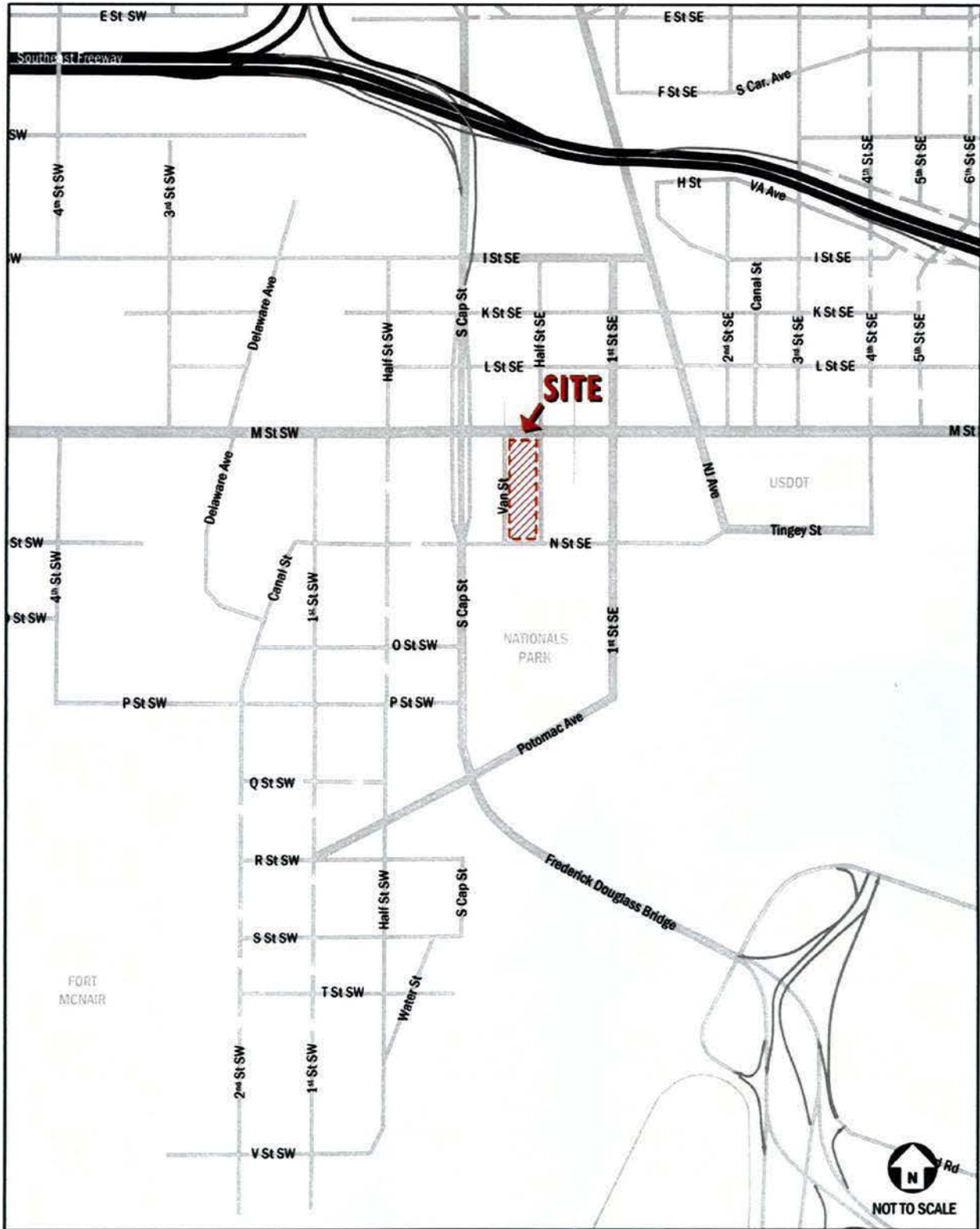


Figure 1 - Location Map



Figure 2 - Study Intersections



EXISTING CONDITIONS

The existing conditions of the study are analyzed to determine if any existing areas of concern or opportunity exist within the transportation network and to establish a point of reference for the analysis of future traffic conditions.

Existing Roadway Network

The proposed site is bordered by M Street on the north, N Street on the south, Van Street on the west, and Half Street on the east. Heavily trafficked streets in the area include South Capitol Street, M Street, Potomac Avenue, and 1st Street. Figure 3 shows the street network hierarchy for the study area. Figure 4 shows the annual daily traffic volumes for the heavily travelled roadways.

The immediate study area of the Square 700 Development has several key local access roads. These include:

- *South Capitol Street*

South Capitol Street is a 4-lane arterial with two local lanes provided at the intersection with M Street that runs north-south in the vicinity of the site. The roadway is classified by DDOT as a major arterial north of M Street, with an average daily traffic of 53,300 vehicles. South of M Street, South Capitol Street is classified as a freeway/expressway, with an average daily traffic of 54,600 vehicles¹. Within the limits of the study area, South Capitol Street runs from Eye Street to Potomac Avenue.

- *Eye Street*

Eye Street is a 2-lane roadway that runs east-west in the vicinity of the site. The roadway is classified by DDOT as a minor arterial west of South Capitol Street, with an average daily traffic of 4,700 vehicles. East of South Capitol Street, Eye Street is classified as a collector, with an average daily traffic of 5,300 vehicles. Within the limits of the study area, Eye Street intersects South Capitol Street north of the site.

- *M Street*

M Street is a 6-lane roadway that runs east-west in the vicinity of the site. The roadway is classified by DDOT as a minor arterial with an average daily traffic of 20,000 vehicles west of and 12,700 vehicles east of South Capitol Street. Within the limits of the study area, M Street runs from South Capitol Street to 1st Street.

¹ The DDOT classifications have not been updated to reflect recent infrastructure and construction changes to South Capitol Street

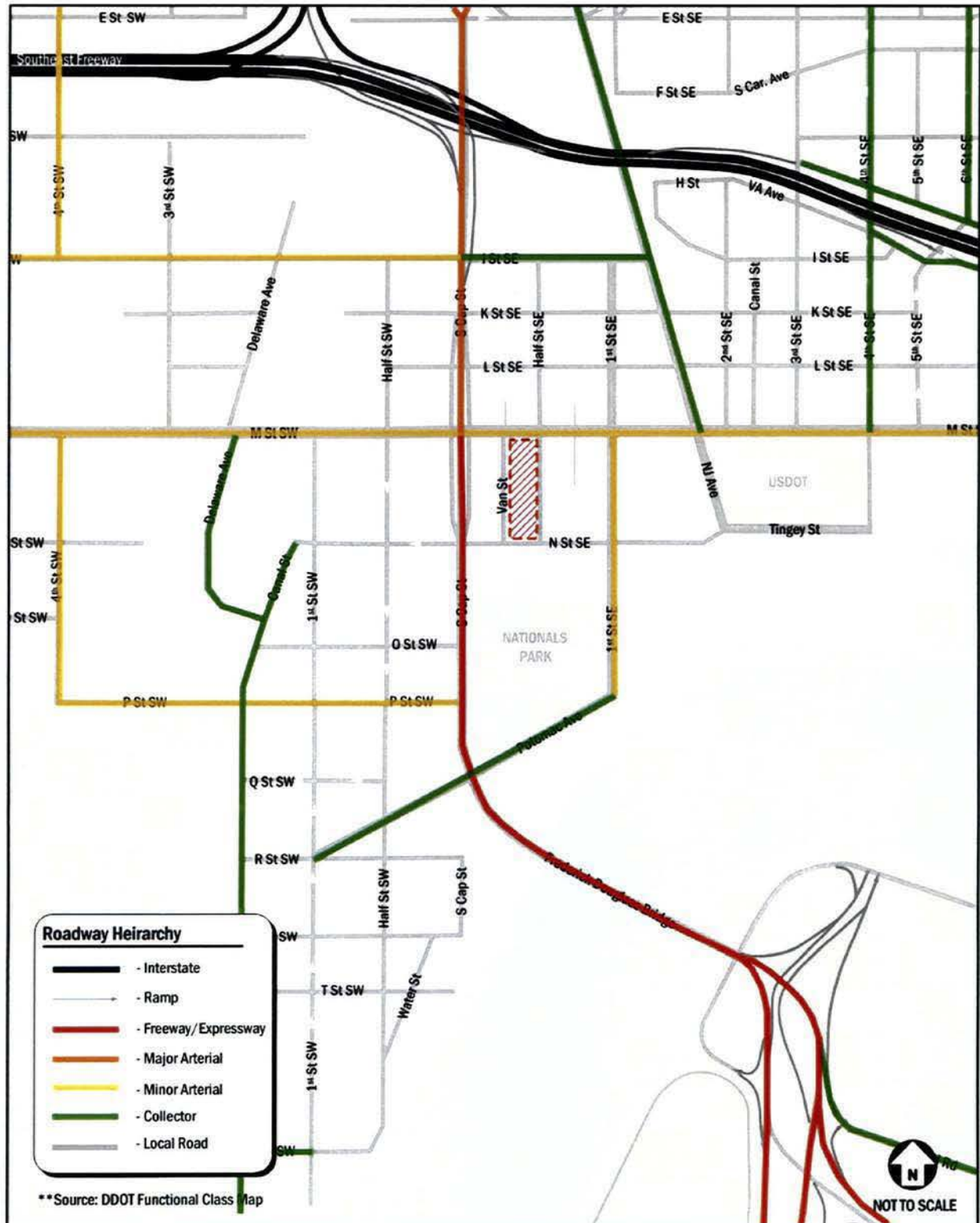


Figure 3 - Roadway Classification





- *N Street*

N Street is a 4-lane roadway that runs east-west in the vicinity of the site. The roadway is classified by DDOT as a local road. Within the limits of the study area, N Street runs from South Capitol Street to 1st Street.

- *Potomac Avenue*

Potomac Avenue is a 4-lane roadway that runs northeast-southwest in the vicinity of the site. The roadway is classified by DDOT as a collector. Within the limits of the study area, Potomac Avenue intersects South Capitol Street south of the site.

- *Van Street*

Van Street is a 2-lane roadway that runs north-south in the vicinity of the site. The roadway is classified by DDOT as local road. Within the limits of the study area, Van Street runs from M Street to N Street.

- *Half Street*

Half Street is a 2-lane roadway that runs north-south in the vicinity of the site. The roadway is classified by DDOT as local road. Within the limits of the study area, Half Street runs from M Street to N Street. The construction of the Washington Nationals Ballpark closed Half Street south of N Street, where it terminates at a T-intersection.

- *Cushing Place*

Cushing Place is a 2-lane alley that runs north-south in the vicinity of the site. Within the limits of the study area, Cushing Place intersects M Street northeast of the site.

- *1st Street*

In the vicinity of the site, 1st Street is a 4-lane roadway that runs north-south. The roadway is classified by DDOT as a minor arterial. Within the limits of the study area, 1st Street runs from M Street to Potomac Avenue.

G/SA conducted field reconnaissance to obtain the existing lane configuration and traffic controls at the intersections within the study area, which are shown on Figure 5.

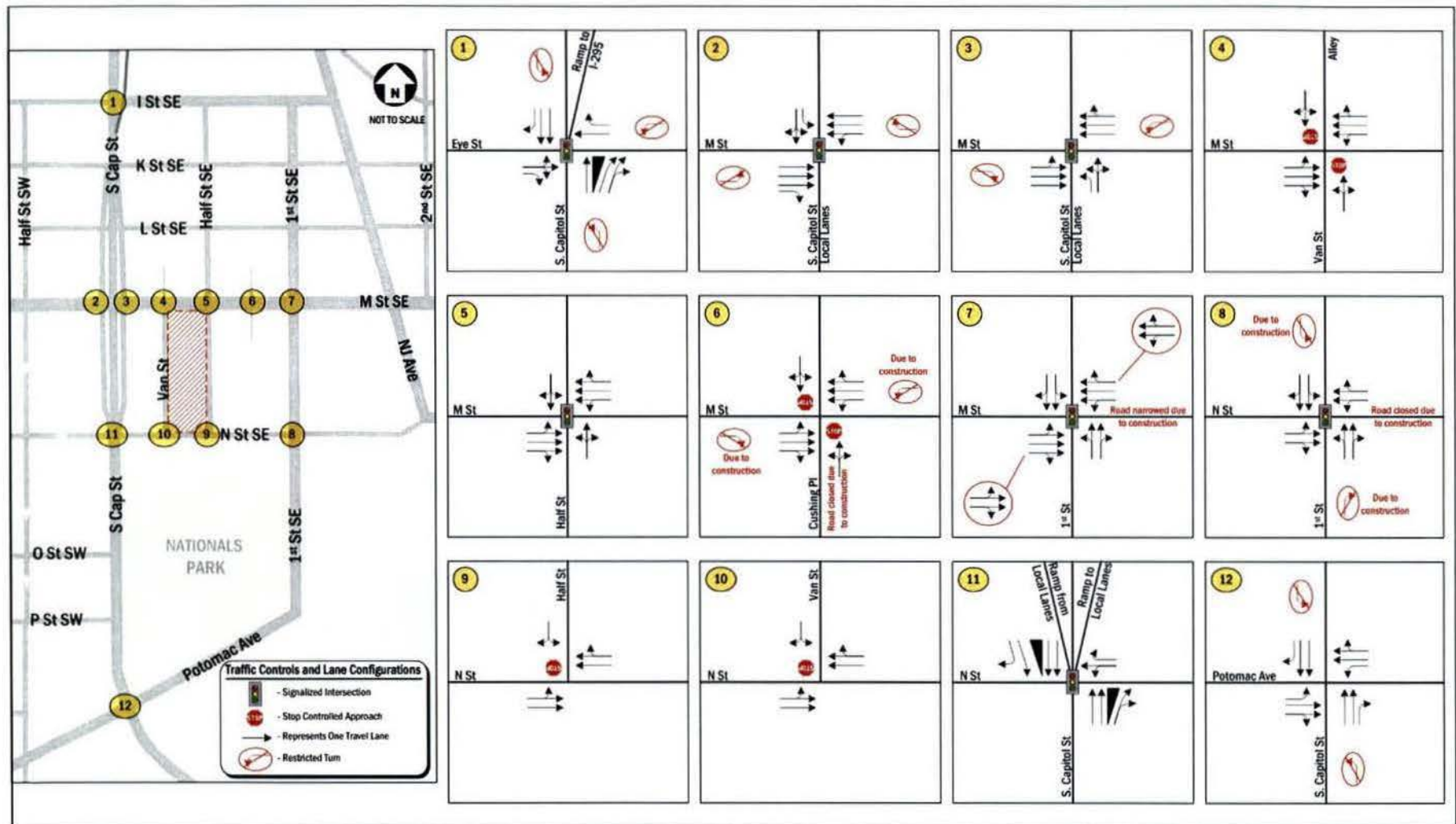


Figure 5 - Existing Traffic Controls and Lane Configurations

During the field reconnaissance, the following roadway disruptions due to construction in the vicinity of the proposed development were recorded.

- *M Street*

Due to the construction of the Monument Ballpark site adjacent to the proposed development, M Street between Half Street and New Jersey Avenue is decreased to a 4-lane arterial. It is assumed that the roadway will return to a 6-lane cross-section with the completion of the construction.

- *Cushing Place*

Due to the construction of the Monument Ballpark site adjacent to the proposed development, Cushing Place south of M Street is closed. It is assumed that the roadway will reopen with the completion of the construction.

- *N Street*

Due to the construction of The Yards development south of the site, N Street east of 1st Street is closed. It is assumed that the roadway will reopen with the completion of the construction.

Existing Transit Network

Existing public transportation access to the Square 700 Development is provided via Metrorail and Metrobus systems. The nearest Metrorail station is Navy Yard, which is located adjacent to the site at the corner of M Street and Half Street, served by the green line. The site is approximately 0.9 miles from the Capitol South Metrorail Station, which is served by the orange and blue lines. The L'Enfant Plaza Station is located approximately 1.3 miles away, which provides connection to the yellow, orange, and blue lines from the green line. Each line runs approximately every 6 minutes during the morning and afternoon weekday peak periods and approximately every 15 to 20 minutes during the weekday off-peak periods and on weekends.

Metrobus service is also accessible from the Square 700 Development. Metrobus service travels along M Street, South Capitol Street, and New Jersey Avenue near the Navy Yard station. These various Metrobus lines provide service to other Metrorail stations, as well as to locations in Virginia, Maryland, and downtown Washington, D.C.

The DC Circulator also provides service near the proposed development. The Convention Center/SW Waterfront Route can be accessed from the intersection of M Street and 6th Street, SW, which is approximately 0.6 miles from the site. The Smithsonian/National Gallery of Art Loop can be accessed from the intersection of Independence Avenue and 4th Street, SW, which is approximately 1.3 miles from the site.

Figure 6 shows the existing bus and rail service available for the site.



Figure 6 - Existing Transit Service



Existing Pedestrian Facilities

The Square 700 Development study area provides satisfactory pedestrian facilities and connectivity. Sidewalks are located along the roadway network with crosswalks linking segments at intersections within the study area. Adequate crosswalks are provided at the study intersections, although pedestrian activity is limited to specific approaches at intersections with protected turns. Due to the proximity of the site to the Washington Nationals Ballpark, wide sidewalks are constructed throughout the study area.

Existing Traffic Volumes

In order to determine the peak hour turning movement traffic volumes, traffic counts were performed on Tuesday, December 2, 2008 from 6:00 am to 9:00 am and from 4:00 pm to 7:00 pm. The existing traffic volumes for the intersections contained within the study area are shown in Figure 7. Analysis of the existing traffic data determined that the morning peak hour is from 7:00 am to 8:00 am, and the afternoon peak hour is from 4:30 pm to 5:30 pm. The existing turning movement counts are included in the Technical Appendix.

Field Observations

Observations of the study intersections were performed by G/SA in order to determine the lane configurations and signal timings. During these observation periods, remarks were noted in regards to signal operation. The study area was observed on Thursday, December 4th between 7:30 am and 9:00 am between 4:30 pm and 6:00 pm.

Morning Peak Hour

The intersection of South Capitol Street and Eye Street appeared to operate at acceptable conditions during the morning peak hour. A long northbound queue developed due to heavy traffic flow from the M Street local lanes. However, the traffic appeared to be moving quickly through the intersection, with a majority of the queue dispelling during the green time. No southbound queue was observed. For the east- and westbound movements, short queues of approximately 4 – 6 vehicles were observed. These vehicles appeared to experience acceptable wait times during the north- and southbound green time. Minor pedestrian activity was observed, with the majority of pedestrians crossing east- and westbound across the intersection. Of note, the eastbound approach was signed as a through/right-turn lane and a right-turn lane. This caused confusion to drivers who used the right-turn only lane as a through lane due to the 2 through lanes on the opposite approach, which also caused conflict with drivers turning right from the far lane. Although no left-turn restrictions are shown, the signage implies that eastbound left-turns are restricted.

The intersection of South Capitol Street (local lanes only) and M Street appeared to operate at acceptable conditions during the morning peak hour. The operation of the intersection as a diamond



interchange (2 closely spaced intersections with 1-way approaches operated as a single intersection) appeared to improve the overall condition of the intersection. The northbound approach was heavily trafficked, with a long queue of at least 10 vehicles per lane that developed. The majority of traffic was observed turning left. A small amount of traffic was observed on the other approaches, with short queues of approximate 3 – 4 vehicles per lane that developed. Very little pedestrian activity was observed.

The intersection of Van Street and M Street appeared to operate at acceptable conditions during the morning peak hour. Very little north- and southbound traffic was observed, generating occasional queues of 1 – 2 vehicles. The east- and westbound traffic appeared to be moving through the intersection with very little delay. Some east- and westbound pedestrian activity was observed. No crosswalk is provided for the north- and southbound approaches, which is appropriate because it is not signalized and near to Half Street.

The intersection of Half Street and M Street appeared to operate at acceptable conditions during the morning peak hour. A small amount of north-, south-, and westbound traffic was observed. The majority of traffic observed was eastbound, with short queues of approximately 3 – 4 vehicles developing. A significant amount of pedestrian activity was observed. The majority of pedestrians were observed traveling north- and southbound. Most pedestrians observed did not use the actuation buttons or wait for the phase but instead crossed the intersection during gaps in traffic.

The intersection of Cushing Place and M Street appeared to operate at acceptable conditions during the morning peak hour. Very little southbound traffic was observed. The east- and westbound traffic appeared to be moving through the intersection with very little delay. Some east- and westbound pedestrian activity was observed. No crosswalk is provided for the north- and southbound approaches, which is appropriate because it is not signalized and near to 1st Street.

The intersection of 1st Street and M Street appeared to operate at acceptable conditions during the morning peak hour. During the observation period, the east- and westbound approaches were narrowed to a 4-lane cross-section due to construction. The construction appeared to cause some queuing in the eastbound direction, but the queues were short (approximately 4 – 6 vehicles). Occasional northbound queues developed of approximately 3 – 4 vehicles. A small amount of traffic was observed in the south- and westbound directions. A significant amount of pedestrian activity was observed, mostly crossing east- and westbound.

The intersection of 1st Street and N Street appeared to operate at acceptable conditions during the morning peak hour. During the observation period, the westbound approach was closed due to construction. Very little eastbound traffic was observed, with occasional queues of 1 – 2 vehicles developing. North- and southbound queues of 4 – 6 vehicles developed. Although the majority of traffic was north- and southbound, the majority of the green time was provided to the east- and



westbound movements. A significant amount of pedestrian activity was observed crossing north- and southbound. Since there was green time allocated to the mostly unused east- and westbound movements, the pedestrians frequently crossed the intersection during the red phase.

The intersection of Half Street and N Street appeared to operate at acceptable conditions during the morning peak hour. Very little traffic was observed for all approaches, with no queue development. No pedestrian activity was observed.

The intersection of Van Street and N Street appeared to operate at acceptable conditions during the morning peak hour. Very little traffic was observed for all approaches, with no queue development. No pedestrian activity was observed.

The intersection of South Capitol Street and N Street appeared to operate at unacceptable conditions during the morning peak hour. Short southbound queues developed on the ramp from the M Street local lanes (approximately 4 – 6 vehicles per lane). A small amount of traffic was observed on the south- and westbound approaches. The majority of traffic was travelling northbound, with queues extending past the upstream intersection with Potomac Avenue due to a heavy traffic flow from the Frederick Douglass Bridge. Very little pedestrian activity was observed, with pedestrians mainly crossing east- and westbound.

The intersection of South Capitol Street and Potomac Avenue appeared to operate at unacceptable conditions during the morning peak hour. Short queues developed (approximately 4 – 6 vehicles per lane) for the south-, east-, and westbound movements. The majority of traffic was travelling northbound, with queues extending onto the upstream Frederick Douglass Bridge. Due to the northbound left-turn restriction, a significant amount of traffic made the northbound right-turn followed by a mid-block U-turn in order to execute the restricted movement. No pedestrian activity was observed.

Afternoon Peak Hour

The intersection of South Capitol Street and Eye Street appeared to operate at acceptable conditions during the afternoon peak hour. A long southbound queue developed due to the upstream ramp from the Southwest Freeway. The majority of the delay appeared to occur at the upstream intersection at the end of the ramp, allowing for acceptable southbound traffic flow through the study intersection. Little traffic was observed for the west- and northbound movements. Short queues of approximately 2 – 3 vehicles developed during the red phases. A significant amount of eastbound traffic was observed, which caused a long queue to develop (at least 10 vehicles per lane). The majority of eastbound traffic appeared to be turning. Minor pedestrian activity was observed, with the majority of pedestrians crossing in the east and westbound crosswalks. As noted above, the eastbound approach signage caused conflict between vehicles.



The intersection of South Capitol Street (local lanes only) and M Street appeared to operate at acceptable conditions during the afternoon peak hour. The diamond configuration of the intersection appeared to work well, although some westbound vehicles got stuck in the center of the intersection trying to turn left to enter the southbound ramp. Southbound queues from the downstream intersection extended to M Street, causing significant delay for vehicles attempting to enter the southbound ramp. The northbound approach had variable queue development, though usually minimal (approximately 3 – 4 vehicles per lane). The east- and westbound approaches had minor queue development of approximately 4 – 6 vehicles. The majority of queued vehicles appeared to be turning onto the southbound ramp. Very little pedestrian activity was observed.

The intersection of Van Street and M Street appeared to operate at acceptable conditions during the afternoon peak hour. Very little north- and southbound traffic was observed, generating occasional queues of 1 – 2 vehicles. The eastbound traffic appeared to be moving through the intersection with very little delay. The westbound approach occasionally blocked the intersection due to queues extended for the intersection of M Street with South Capitol Street. Some east- and westbound pedestrian activity was observed. No crosswalk is provided for the north- and southbound approaches, which is appropriate because it is not signalized and near to Half Street.

The intersection of Half Street and M Street appeared to operate at acceptable conditions during the afternoon peak hour. A small amount of north- and southbound traffic was observed. The majority of traffic observed was westbound, with short queues of approximately 3 – 4 vehicles developing. Short queues of approximately 1 – 2 vehicles were observed on the eastbound approach. A significant amount of pedestrian activity was observed. The majority of pedestrians were observed traveling north- and southbound. Due to the actuated pedestrian phase, most of the pedestrians observed did not wait for the phase (or actuate it) but instead crossed the intersection during gaps in traffic. Most pedestrians observed did not use the actuation buttons or wait for the phase but instead crossed the intersection during gaps in traffic.

The intersection of Cushing Place and M Street appeared to operate at acceptable conditions during the afternoon peak hour. Very little southbound traffic was observed. The east- and westbound traffic appeared to be moving through the intersection with very little delay. Some east- and westbound pedestrian activity was observed. No crosswalk is provided for the north- and southbound approaches, which is appropriate because it is not signalized and near to 1st Street.

The intersection of 1st Street and M Street appeared to operate at acceptable conditions during the afternoon peak hour. The construction noted above appeared to cause some queuing in the east- and westbound direction, but the queues were short (approximately 4 – 6 vehicles). Occasional north- and southbound queues developed of approximately 3 – 4 vehicles. A significant amount of pedestrian activity was observed, mostly crossing east- and westbound.



The intersection of 1st Street and N Street appeared to operate at acceptable conditions during the afternoon peak hour. Very little eastbound traffic was observed (due to construction noted above), with occasional queues of 1 – 2 vehicles developing. North- and southbound queues of 4 – 6 vehicles developed. Although the majority of traffic was north- and southbound, the majority of the green time was provided to the east- and westbound movements. Little pedestrian activity was observed.

The intersection of Half Street and N Street appeared to operate at acceptable conditions during the afternoon peak hour. Very little traffic was observed for all approaches, with no queue development. No pedestrian activity was observed.

The intersection of Van Street and N Street appeared to operate at acceptable conditions during the afternoon peak hour. Very little traffic was observed for all approaches, with no queue development. No pedestrian activity was observed.

The intersection of South Capitol Street and N Street appeared to operate at unacceptable conditions during the afternoon peak hour. Short northbound queues developed (approximately 2 – 3 vehicles per lane). A small amount of traffic was observed on the westbound approach. The majority of traffic was travelling southbound, with queues extending from the downstream intersection with Potomac Avenue to the upstream intersection with M Street. Very little pedestrian activity was observed, with pedestrians mainly crossing east- and westbound.

The intersection of South Capitol Street and Potomac Avenue appeared to operate at unacceptable conditions during the morning peak hour. Short queues developed (approximately 4 – 6 vehicles per lane) for the north- and westbound movements. Long eastbound queues were observed (at least 10 vehicles per lane), with the bulk of traffic turning right. The majority of traffic was travelling southbound, with queues extending from the intersection with N Street. No pedestrian activity was observed.

Existing Conditions Capacity Analysis

Intersection capacity analyses were performed for the existing conditions at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

The results of the intersection capacity analyses are presented in Table 1 and shown on Figure 8. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay and LOS for the signalized and all-way stop controlled intersections is also shown. For two-way stop controlled intersections, an average delay is not defined in the HCM. The detailed analysis worksheets are contained in the Technical Appendix.

**Table 1 - Existing LOS Results**

Intersection (Approach)	Existing Level of Service			
	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
South Capitol St & Eye Street	B	19.2	C	33.3
Eastbound	D	44.3	D	54.6
Westbound	D	39.7	D	41.9
Northbound	B	17.2	B	15.4
Southbound	B	15.7	D	38.9
South Capitol St (Southbound Lanes) & M Street	C	21.0	D	37.9
Eastbound	D	45.4	E	60.0
Westbound	A	1.5	A	0.8
Southbound	D	54.8	D	43.6
South Capitol St (Northbound Lanes) & M Street	D	40.3	D	35.6
Eastbound	A	1.7	C	21.4
Westbound	D	46.0	E	55.7
Northbound	E	62.2	C	27.0
Van Street & M Street				
Westbound Left	A	0.1	A	0.3
Northbound	A	9.4	A	9.7
Southbound	A	9.7	A	0.0
Half Street & M Street	A	6.8	A	7.3
Eastbound	A	5.7	A	5.6
Westbound	A	5.0	A	5.4
Northbound	D	38.1	D	38.1
Southbound	D	37.9	D	39.0
Cushing Place & M Street				
Eastbound Left	A	1.5	A	0.5
Southbound	A	9.2	A	9.8
1 st Street & M Street	B	14.3	B	15.3
Eastbound	B	15.7	B	15.7
Westbound	A	8.0	A	7.0
Northbound	C	22.6	C	27.0
Southbound	C	31.4	C	31.2
1 st Street & N Street	C	22.7	C	21.2
Eastbound	B	13.9	B	13.8
Northbound	B	18.6	B	18.7
Southbound	C	29.5	C	26.5
Half Street & N Street	A	6.5	A	6.8
Eastbound	A	6.6	A	6.7
Westbound	A	6.3	A	6.8
Southbound	A	7.0	A	7.0
Half Street & Van Street				
Eastbound Left	A	2.6	A	2.4
Southbound	A	8.9	A	8.8
South Capitol Street & N Street	F	131.5	F	101.2
Westbound	D	39.3	D	43.5
Northbound	F	160.2	A	7.1
Southbound	D	40.3	F	133.4
South Capitol St & Potomac Avenue	F	112.8	F	148.4
Eastbound	D	41.9	F	316.9
Westbound	D	45.2	D	44.9
Northbound	F	166.0	A	9.5
Southbound	A	3.8	F	183.7

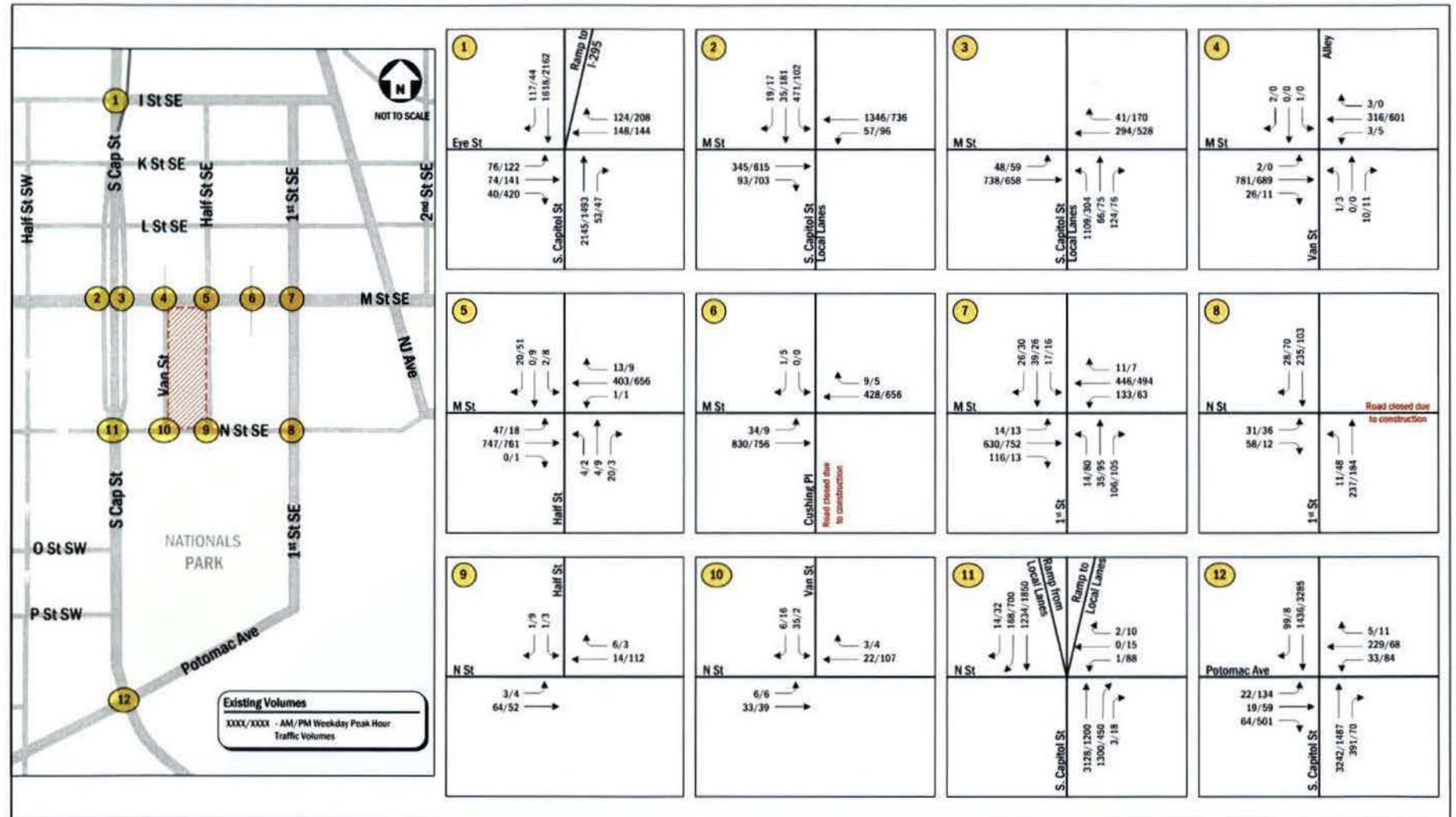


Figure 7 - Existing Traffic Volumes

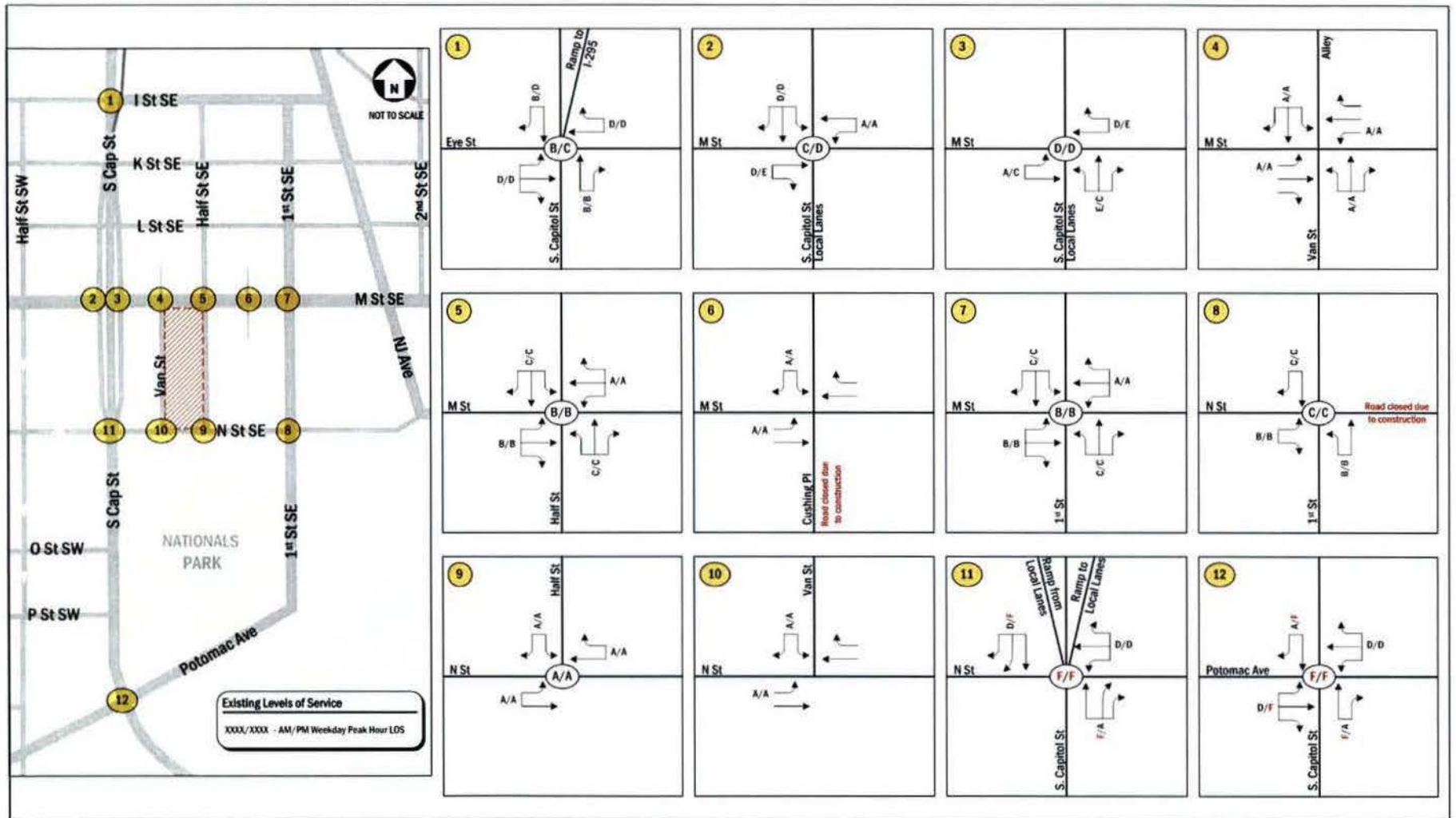


Figure 8 - Existing Levels of Service

Summary of Existing Analysis Results

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better on each approach. The following intersections operate at unacceptable LOS during both peak periods:

- 1) South Capitol Street & N Street
- 2) South Capitol Street & Potomac Avenue

The results from the capacity analyses confirm what was observed in the field.

- Most of the study intersections operate at acceptable conditions during both the morning and afternoon peak hours.
- The intersection of South Capitol Street southbound local lanes and M Street operates at an acceptable LOS during the morning and afternoon peak period. As observed, the eastbound approach has an acceptable amount of delay but operates at capacity (LOS E).
- The intersection of South Capitol Street northbound local lanes and M Street operates at an acceptable LOS during the morning and afternoon peak period. As observed, the northbound approach in the morning and the westbound approach in the afternoon have an acceptable amount of delay but operate at capacity (LOS E).
- The intersection of South Capitol Street and N Street operates at an unacceptable LOS during the morning and afternoon peak periods. The northbound approach operates at unacceptable conditions during the morning and the southbound approach during the afternoon.
- The intersection of South Capitol Street and Potomac Avenue operates at an unacceptable LOS during both the morning and afternoon peak period. As observed, the northbound approach operates as unacceptable conditions during the morning peak period and the east- and southbound approaches during the afternoon peak period.

Based on the observations and analysis results, it appears that most congestion in the study area is due to commuter traffic. The major commuter traffic patterns in the study area include the following: (1) the regional connection between South Capitol Street/Anacostia Freeway and I-395, which leads to a significant amount of northbound South Capitol Street traffic in the morning and southbound in the evening, and (2) the connection between South Capitol Street/Anacostia Freeway and downtown DC via M Street, which leads to a northbound left turns from northbound South Capitol Street to M Street in the morning and a right turns from eastbound M Street to southbound South Capitol Street in the evening. The failing LOS on South Capitol Street are located where these two movements coincide.

It is recommended that the District revisit the roadway signing and marking on the eastbound approach of Eye Street to South Capitol Street in order to eliminate the driver confusion observed at this intersection.



FUTURE CONDITIONS WITHOUT DEVELOPMENT

Future Roadway Network

The future roadway network is based on the existing configuration of the roadways in the study area. It is assumed that roadway closures included in the existing capacity analysis would be completed by 2012. This includes the following roadways:

- M Street will be restored to a 6-lane cross-section at 1st Street.
- N Street will re-opened east of 1st Street, post construction, per development plans of The Yards.
- Cushing Place will re-open south of M Street and be constructed south to a new intersection with N Street.

Future without Development Traffic Volumes

The construction of the proposed development is anticipated to be complete in 2012. The traffic generated by nearby proposed developments and inherent growth on the roadways within the study area were accounted for in the traffic projections. The following developments were included in the background scenario:

- Velocity Development (Cohen Site) – Phase 1 and 2
- 100 M Street SE
- Florida Rock
- Arthur Capper Carrollsburg
- The Yards (Southeast Federal Center) – Phase 1a
- Jefferson at 100 Eye Street
- Monument Ballpark (Square 701)

Trip generation for the background developments was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation, 7th Edition and from the reports for these developments. Other traffic increases were accounted for with a 2 percent growth rate compounded annually over the 4-year period for all study intersections. This growth rate represents commuting traffic traversing the study area and developments not included in the above list.

The background developments are shown on Figure 9. Table 2 presents the trips generated by the background developments, as shown on Figure 10. The future background inherent traffic growth was added to the existing (2008) volumes in order to establish the future (2012) traffic volumes without the proposed development. The future background traffic volumes are shown on Figure 11.



**Table 2 - Background Site Trip Generation**

Development	Land Use	Weekday Trip Generation					
		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Velocity (Cohen Site) – Phase 1	Residential	17	83	100	80	39	119
Velocity (Cohen Site) – Phase 2	Residential	13	65	78	63	31	94
	Office/Retail	268	57	325	72	226	298
100 M Street SE	Office/Retail	129	26	155	69	150	219
Florida Rock	Residential	7	26	33	27	15	42
	Office/Retail	191	30	221	56	185	241
Arthur Capper Carollsburg	Residential	55	231	286	223	115	338
	Office/Retail	414	60	474	93	395	488
SEFC – Phase 1a	Residential	22	90	112	92	45	137
	Office/Retail	284	43	327	77	273	350
Jefferson at 100 Eye Street	Residential	10	46	56	46	23	69
Monument Ballpark Site	Residential/Hotel	53	78	131	71	59	130
	Office/Retail	278	67	345	200	424	624
Total		1,741	902	2,643	1,169	1,980	3,149

Future without Development Capacity Analysis

Intersection capacity analyses were performed for the future background conditions at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

The results of the intersection capacity analysis are shown on Figure 12 and presented in Table 3. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay and LOS for the signalized and all-way stop controlled intersections is also shown. For two-way stop controlled intersections, an average delay is not defined in the HCM. The detailed analysis worksheets are contained in the Technical Appendix.

Table 3 - Future Background LOS Results

Intersection (Approach)	Future Background Level of Service			
	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
South Capitol St & Eye Street	D	37.9	F	118.5
Eastbound	E	61.9	F	229.2
Westbound	D	47.8	F	193.0
Northbound	B	17.9	B	15.4
Southbound	D	54.5	F	139.7
South Capitol St (Southbound Lanes) & M Street	E	59.7	F	104.9
Eastbound	D	49.2	F	209.6
Westbound	A	2.3	A	9.1
Southbound	F	159.7	D	53.3
South Capitol St (Northbound Lanes) & M Street	F	123.4	F	142.6
Eastbound	A	2.8	C	21.5



Intersection (Approach)	Future Background Level of Service			
	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
Westbound	E	60.6	F	320.8
Northbound	F	247.4	D	37.2
Van Street & M Street				
Eastbound Left	A	0.1	A	0.0
Westbound Left	A	0.4	A	0.2
Northbound	B	13.0	B	11.1
Southbound	B	10.6	A	0.0
Half Street & M Street	B	10.1	A	9.8
Eastbound	B	10.2	A	9.0
Westbound	A	5.6	A	6.6
Northbound	D	40.5	D	42.0
Southbound	D	38.1	D	39.4
Cushing Place & M Street				
Eastbound Left	A	1.3	A	0.6
Westbound Left	A	2.8	A	1.3
Northbound	D	34.3	D	27.7
Southbound	F	195.1	F	123.3
1 st Street & M Street	C	24.8	D	50.4
Eastbound	C	30.4	D	41.6
Westbound	A	8.0	A	7.8
Northbound	D	45.8	F	153.4
Southbound	C	33.8	D	51.5
1 st Street & N Street	C	23.7	C	21.5
Eastbound	B	14.4	B	14.8
Westbound	B	14.0	B	14.2
Northbound	C	20.9	C	24.0
Southbound	C	30.3	C	24.2
Half Street & N Street	A	7.0	A	7.0
Eastbound	A	7.2	A	7.1
Westbound	A	6.8	A	6.8
Southbound	A	7.6	A	7.9
Van Street & N Street				
Eastbound Left	A	0.8	A	1.0
Southbound	A	10.0	A	9.7
South Capitol Street & N Street	F	206.9	F	244.3
Westbound	D	42.7	D	51.4
Northbound	F	262.8	A	8.9
Southbound	D	41.8	E	77.1
South Capitol St & Potomac Avenue	F	184.1	F	236.6
Eastbound	D	42.5	F	493.2
Westbound	D	48.2	F	194.4
Northbound	F	269.2	B	12.6
Southbound	A	6.7	F	307.9



Summary of Future Background Analysis Results

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better on each approach. The following intersections are projected to operate at unacceptable LOS during both peak periods under future background conditions:

- 1) South Capitol Street & Eye Street
- 2) South Capitol Street Southbound & M Street
- 3) South Capitol Street Northbound & M Street
- 4) First Street & M Street
- 5) South Capitol Street & N Street
- 6) South Capitol Street & Potomac Avenue

The results from the capacity analyses are summarized below.

- Most of the study intersections operate at acceptable conditions during both the morning and afternoon peak hours.
- The intersection of South Capitol Street and Eye Street operates at an unacceptable LOS of F during the afternoon peak hour due to the east-, west-, and southbound movements.
- The intersection of South Capitol Street southbound local lanes and M Street operates at an acceptable LOS during the morning peak period but, the southbound approach has an unacceptable LOS of E. The intersection operates at an unacceptable LOS during the afternoon peak period due to the eastbound approach.
- The intersection of South Capitol Street northbound local lanes and M Street operates at an unacceptable LOS during the morning and afternoon peak period. The northbound approach in the morning and the westbound approach in the afternoon have an unacceptable amount of delay.
- The intersection of Cushing Place and M Street operates at an acceptable LOS during both peak periods, but the southbound approach operates at an unacceptable LOS of F. This is due to the site trips from the Monument Ballpark Development on Cushing Place, as stated in the report by Wells & Associates. Although the approach has an unacceptable LOS, the number of vehicles experiencing the delay is relatively small. The delay is due to the lack of acceptable gaps in traffic due to heavy through traffic along M Street.
- The intersection of 1st Street and M Street operates at an acceptable LOS during both peak periods, but the northbound approach operates at an unacceptable LOS of F during the afternoon peak period. The intersection operation could be improved with the addition of a leading protected left-turn for the northbound movement.



- The intersection of South Capitol Street and N Street operates at an unacceptable LOS during both the morning and afternoon peak period. The northbound approach operates at unacceptable conditions during the morning peak period and the southbound approach during the afternoon peak period.
- The intersection of South Capitol Street and Potomac Avenue operates at an unacceptable LOS during both the morning and afternoon peak period. The northbound approach operates at unacceptable conditions during the morning peak period and the east-, west- and southbound approaches during the afternoon peak period.

The increase in congestion shown in the background capacity analyses is primarily limited to South Capitol Street. The additional traffic generated by the background developments is overlapping the commuter patterns that are creating the existing congestion along South Capitol Street. It is likely that commuter traffic may shift from these regional routes when locally generated traffic rises to the levels shown in the background analyses. As the roadways within the study area become congested, it will be less attractive for regional traffic to use these streets and they will shift to other times of day or routes. A new route for regional traffic is planned to be included in the new 11th Street Bridges project to assist in regional connections between the Anacostia Freeway and I-395, which will provide an alternate route for a significant amount of commuter traffic traveling through the study area.

The analysis results for intersections outside of the South Capitol Street corridor show generally acceptable conditions except for the evening rush hour levels of service southbound Cushing Place and M Street, and northbound 1st Street at M Street. The poor level of service calculated for Cushing Place and M Street affects a small amount of vehicles, all of which have alternate routes to take, and was also projected and discussed in the traffic study for the adjacent Monument Ballpark Development site. The unacceptable level of service for northbound traffic at the intersection of 1st Street and M Street is due to the expected increase in northbound left turns. This intersection does not have a northbound left turn lane, which combined with the expected number of vehicles travelling south on 1st Street leads to a large delay as vehicles making left turns do not receive enough gaps in traffic. As stated above, operations could be improved with the addition of a leading protected left-turn phase for the northbound movement. This improvement would involve retiming the intersection and installing a new signal-head for the northbound approach.

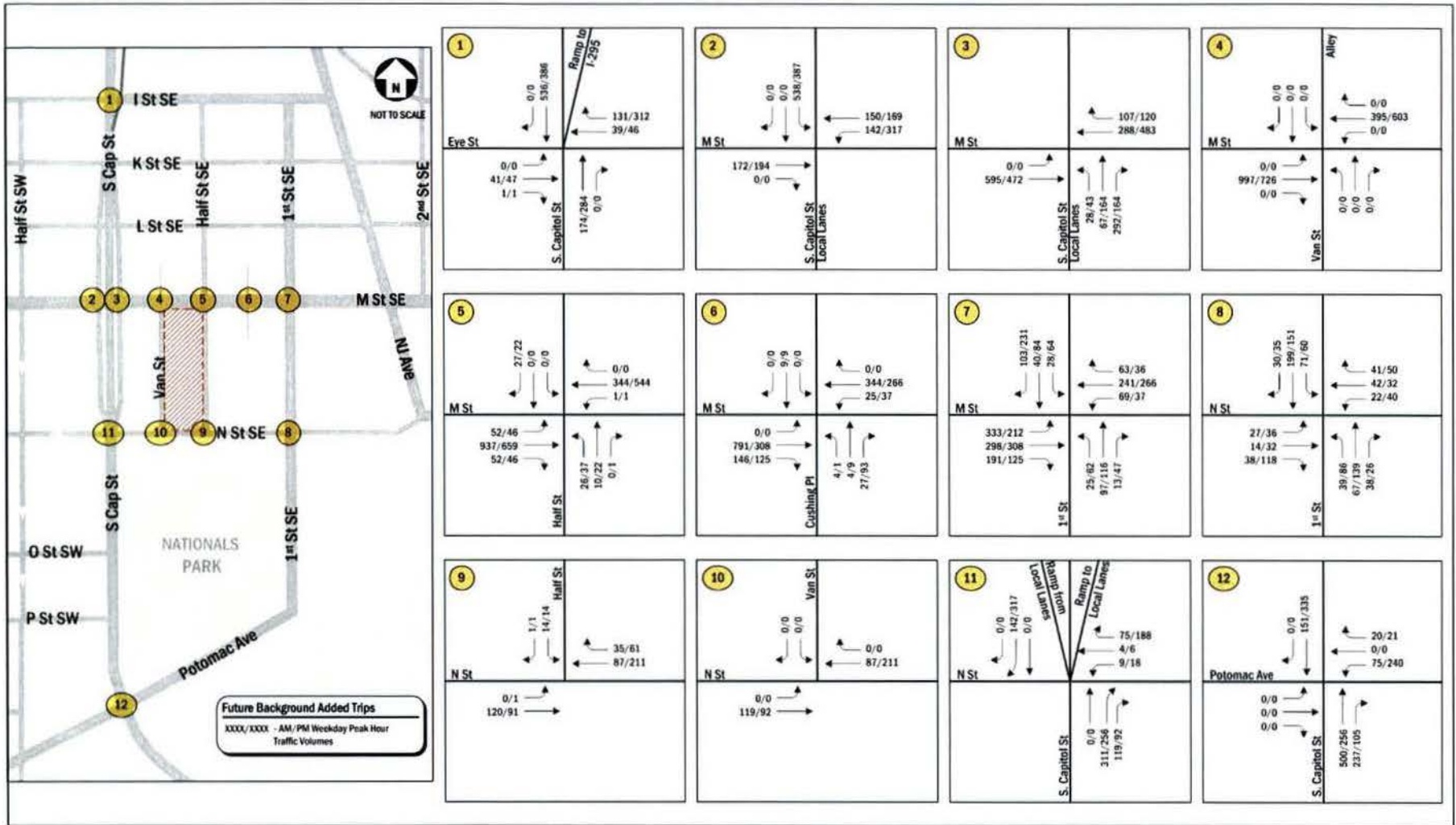


Figure 10 - Future Background Site-Generated Trips

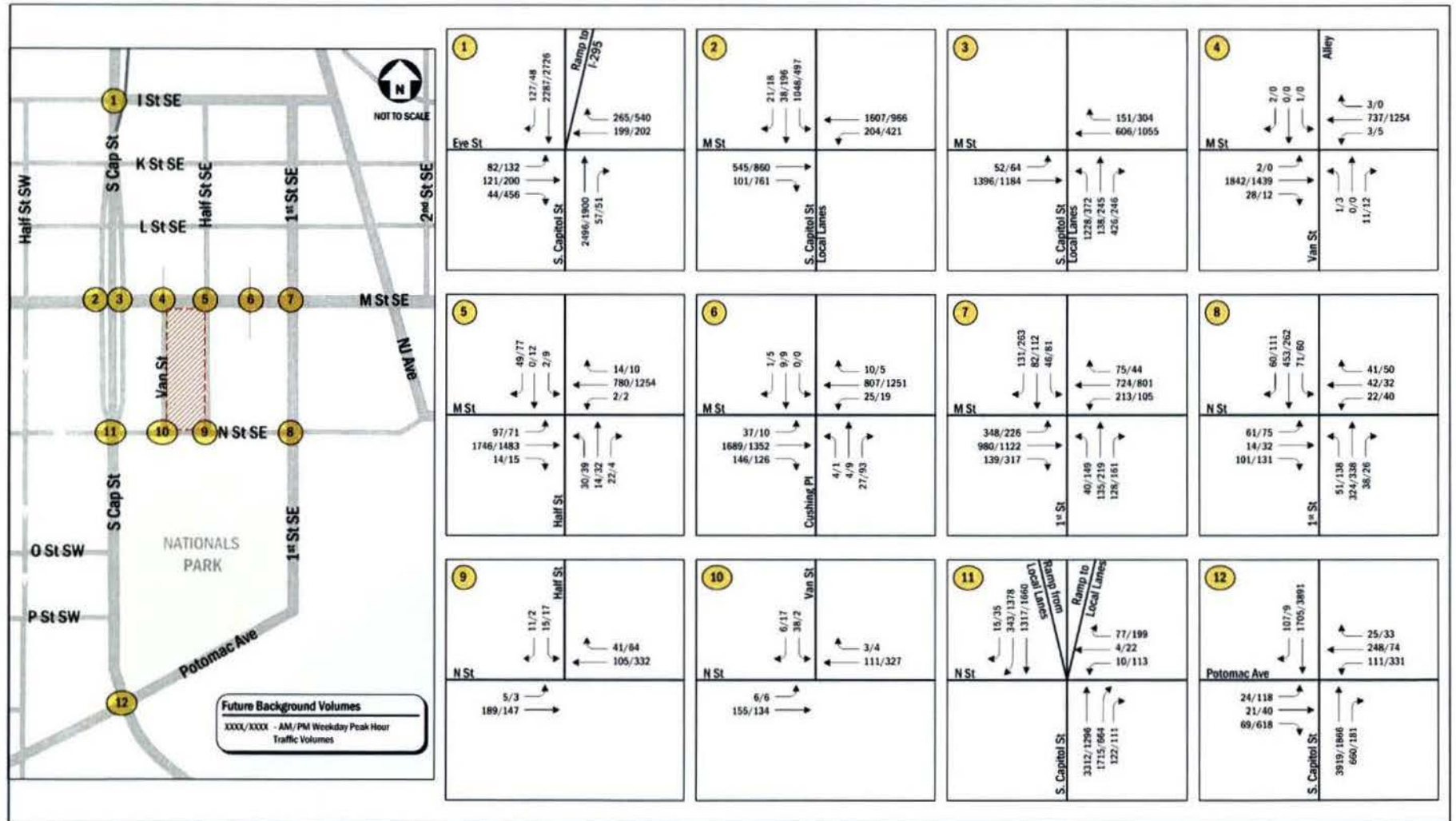


Figure 11 - Future Background Traffic Volumes

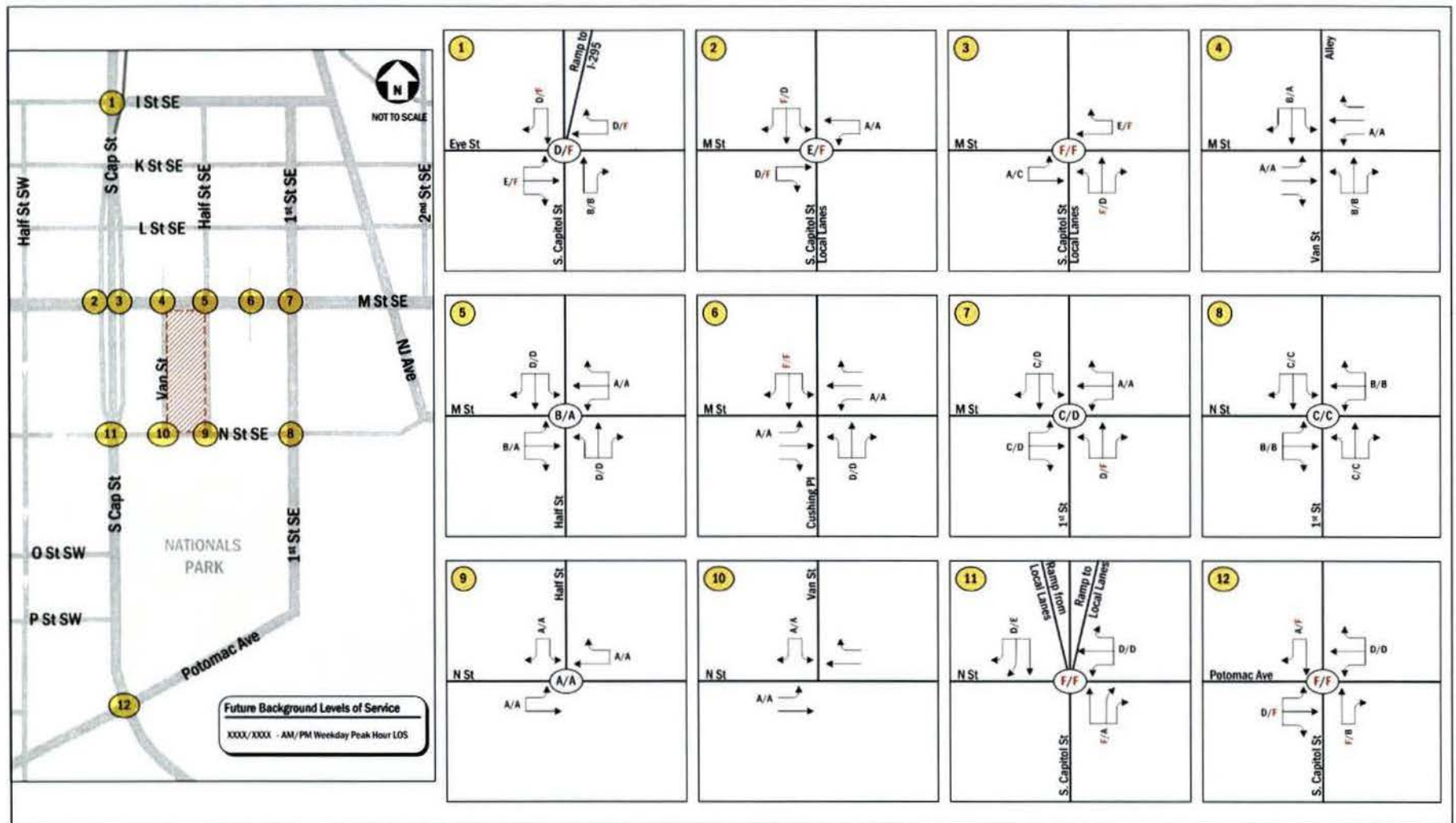


Figure 12 - Future Background Levels of Service



DESCRIPTION OF DEVELOPMENT

Site Access and Circulation

Site access for the proposed development will be provided from Van Street. This includes all access to parking and loading facilities. Major roadways used to access the site are M Street, N Street, South Capitol Street, and 1st Street. Adjacent to the site, Half Street is planned as a pedestrian friendly street with no access to parking or loading.

Pedestrian access will be provided from Half Street, Van Street, M Street, and N Street. The proposed development includes the construction of an east-west pedestrian alley between Half Street and Van Street to provide additional pedestrian connectivity within the site.

Trip Generation

The proposed development consists of a mix of office, retail, and residential uses. The development will contain approximately 280 residential units, as well as office uses, with street-level retail. There are approximately 580 parking spaces proposed. Trip generation for the proposed development was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation, 7th Edition. This was used to determine the trips into and out of the proposed development during the morning and afternoon peak hours. Table 4 shows the trips generated by the proposed development.

Table 4 - Site Trip Generation

Land Use	ITE Code	Size	Units	Weekday Trip Generation						Daily	
				AM Peak Hour			PM Peak Hour				Total
				In	Out	Total	In	Out	Total		
Office Building	710	371	kSF	471	64	535	84	410	494	3,662	
Transit Reduction				236	32	268	42	205	247	1,831	
Shopping Center	820	54	kSF	66	42	108	200	217	417	4,550	
Internal Capture				..	..	..	40	43	83	910	
Transit Reduction				46	30	76	112	122	234	2,548	
Residential Apartments	220	280	Units	28	113	141	112	60	172	1,833	
Transit Reduction				17	68	85	67	36	103	1,100	
Total Primary Trips				266	89	355	135	281	416	3,656	

Due to the combination of street-level retail with both office and residential land uses, a 20% internal capture reduction was applied for trips originating from within the proposed development. The WMATA Ridership Survey was used to determine transit reduction rates. Due to the close proximity of the Navy Yard Metrorail Station, a transit reduction (50% for office, 70% for retail, and 60% for residential) was applied in order to account for the high amount of non-auto trips. This reduction is based on the regression equation summaries for office commute, residential, and retail commutes.



These include Tables S-2, 3, 7, 9, 11, and 15 from the WMATA Ridership Survey.

Site Traffic Distribution and Assignment

The nature of the proposed development and regional traffic patterns were analyzed in order to determine the trip distribution for vehicles accessing the site. In addition, an assessment of future roadway conditions was used to determine the routes that provide the most convenient access to the development. Based on this review, the distribution for site traffic is shown in Table 5 and presented on Figure 13. The resulting trip assignment is shown on Figure 14.

Table 5 - Site Trip Distribution

Roadway Link	Trip Distribution	
	Office/Retail Uses	Residential/Hotel Uses
South Capitol Street north of Eye Street	30%	35%
Eye Street west of South Capitol Street	2%	6%
M Street west of South Capitol Street	8%	24%
M Street east of 1 st Street	15%	8%
N Street east of 1 st Street	5%	2%
Frederick Douglass Bridge (South Capitol Street south of Potomac Avenue)	40%	25%
Total	100%	100%

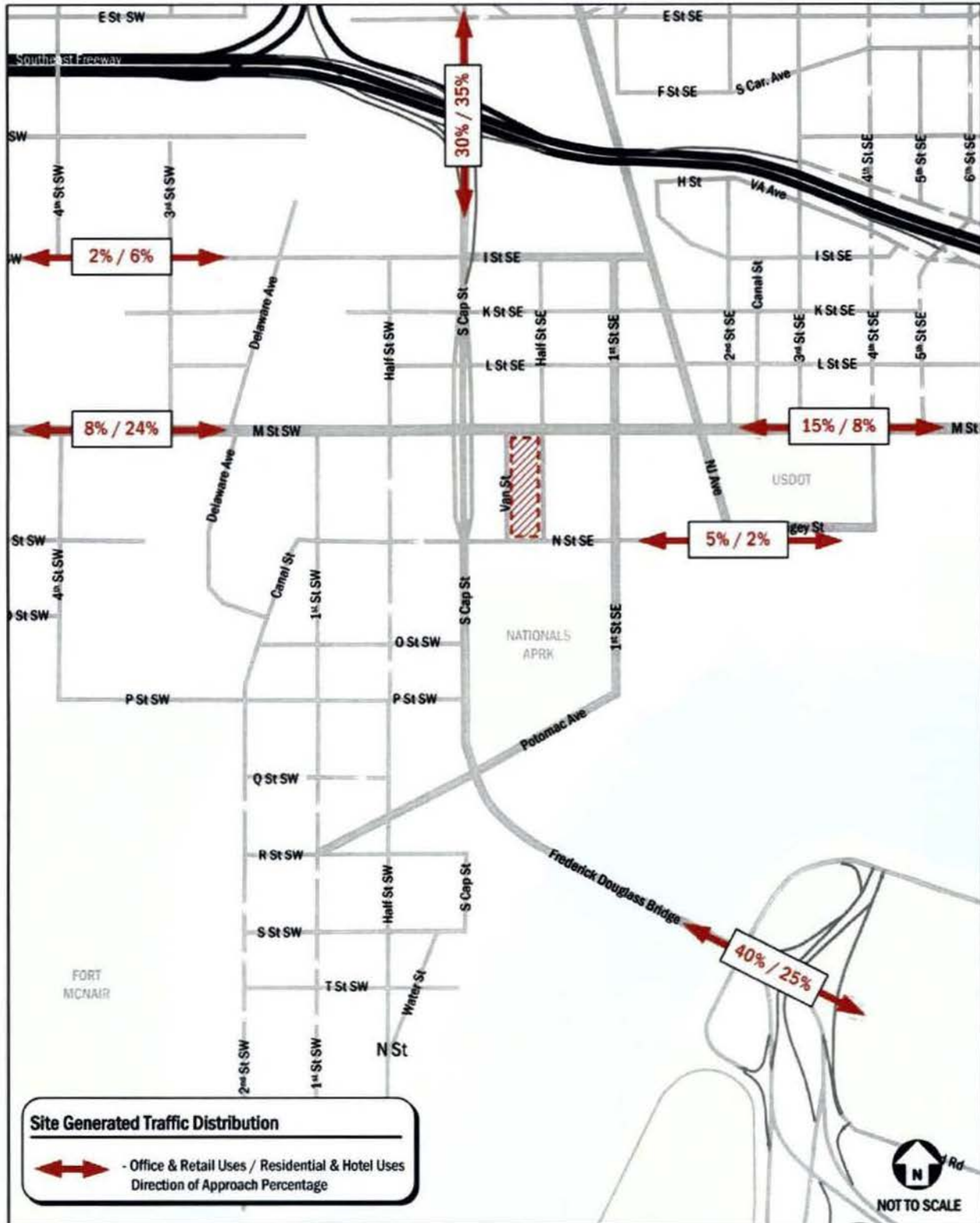


Figure 13 - Site Generated Trip Distribution

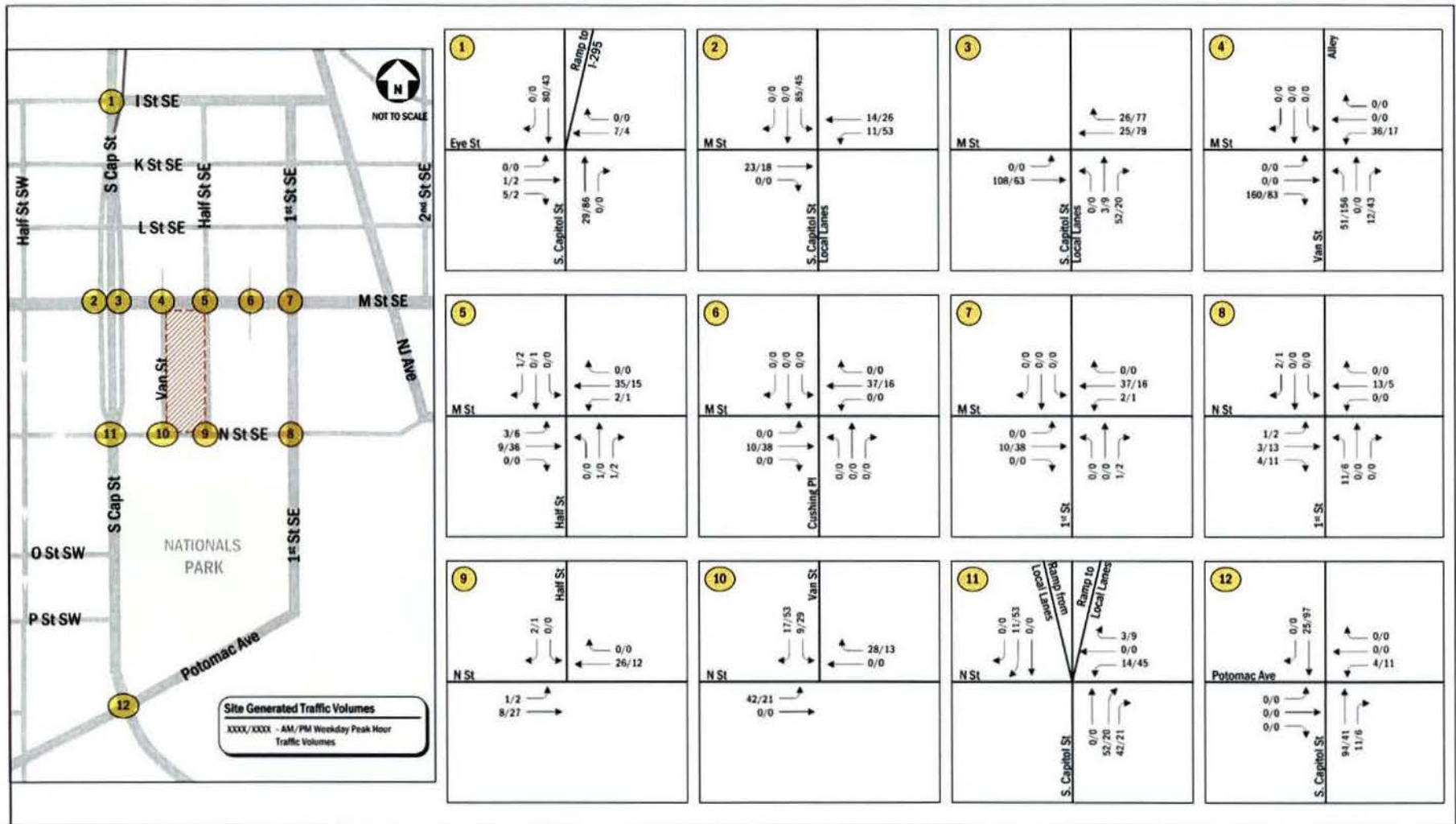


Figure 14 - Site Generated Traffic Volumes



FUTURE CONDITIONS WITH DEVELOPMENT

Future Traffic Volumes with Development

In order to determine the traffic volumes present on the roadways in the vicinity of the development under the 2012 build condition, the proposed development traffic volumes were added to the 2012 future background traffic volumes. The traffic volumes for the total future scenario are shown on Figure 15.

Future with Development Capacity Analysis

Intersection capacity analyses were performed for the future background conditions at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

The results of the intersection capacity analysis are shown on Figure 16 and presented in Table 6. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay and LOS for the signalized and all-way stop controlled intersections is also shown. For two-way stop controlled intersections, an average delay is not defined in the HCM. The detailed analysis worksheets are contained in the Technical Appendix.

Table 6 - Total Future LOS Results

Intersection (Approach)	Future Background Level of Service				Total Future Level of Service			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
South Capitol St & Eye Street	D	37.9	F	118.5	D	44.0	F	122.8
Eastbound	E	61.9	F	229.2	E	63.0	F	240.5
Westbound	D	47.8	F	193.0	D	47.9	F	193.7
Northbound	B	17.9	B	15.4	B	18.1	B	15.6
Southbound	D	54.5	F	139.7	E	68.1	F	148.3
South Capitol St (Southbound Lanes) & M Street	E	59.7	F	104.9	E	74.2	F	111.5
Eastbound	D	49.2	F	209.6	D	49.8	F	227.0
Westbound	A	2.3	A	9.1	A	2.7	B	10.7
Southbound	F	159.7	D	53.3	F	198.1	E	56.6
South Capitol St (Northbound Lanes) & M Street	F	123.4	F	142.6	F	133.1	F	182.4
Eastbound	A	2.8	C	21.5	A	4.8	C	21.7
Westbound	E	60.6	F	320.8	E	66.9	F	404.9
Northbound	F	247.4	D	37.2	F	270.1	D	40.6
Van Street & M Street								
Eastbound Left	A	0.1	A	0.0	A	0.1	A	0.0
Westbound Left	A	0.4	A	0.2	A	5.0	A	1.1
Northbound	B	13.0	B	11.1	D	30.3	D	32.3
Southbound	B	10.6	A	0.0	B	13.7	A	0.0
Half Street & M Street	B	10.1	A	9.8	B	10.3	A	10.0
Eastbound	B	10.2	A	9.0	B	10.5	A	9.2
Westbound	A	5.6	A	6.6	A	5.7	A	6.6
Northbound	D	40.5	D	42.0	D	40.6	D	42.1
Southbound	D	38.1	D	39.4	D	38.1	D	39.4



Intersection (Approach)	Future Background Level of Service				Total Future Level of Service			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Cushing Place & M Street								
Eastbound Left	A	1.3	A	0.6	A	1.4	A	0.6
Westbound Left	A	2.8	A	1.3	A	2.7	A	1.3
Northbound	D	34.3	D	27.7	D	32.2	D	31.5
Southbound	F	195.1	F	123.3	F	196.6	F	134.3
1 st Street & M Street	C	24.8	D	50.4	D	36.3	D	45.9
Eastbound	C	30.4	D	41.6	D	53.2	C	30.0
Westbound	A	8.0	A	7.8	A	8.2	A	7.8
Northbound	D	45.8	F	153.4	D	43.9	F	154.7
Southbound	C	33.8	D	51.5	C	33.8	D	53.0
Improvement: Add northbound leading protected left turn	C	24.9	D	44.5	C	49.2	C	34.9
Eastbound	C	29.9	E	59.8	E	76.2	D	39.4
Westbound	B	12.4	B	13.1	B	13.7	B	13.2
Northbound	C	31.2	D	54.3	D	38.0	D	54.5
Southbound	D	38.5	D	42.8	C	33.7	D	43.1
1 st Street & N Street	C	23.7	C	21.5	B	19.7	C	21.3
Eastbound	B	14.4	B	14.8	B	14.4	B	14.9
Westbound	B	14.0	B	14.2	B	14.1	B	14.2
Northbound	C	20.9	C	24.0	C	20.5	C	24.2
Southbound	C	30.3	C	24.2	C	26.7	C	23.7
Half Street & N Street	A	7.0	A	7.0	A	7.3	A	8.2
Eastbound	A	7.2	A	7.1	A	7.4	A	7.7
Westbound	A	6.8	A	6.8	A	7.0	A	8.4
Southbound	A	7.6	A	7.9	A	8.0	A	8.3
Half Street & Van Street								
Eastbound Left	A	0.8	A	1.0	A	3.8	A	3.2
Southbound	A	10.0	A	9.7	B	10.7	B	11.3
South Capitol Street & N Street	F	206.9	F	244.3	F	222.3	F	258.5
Westbound	D	42.7	D	51.4	D	42.6	D	53.2
Northbound	F	262.8	A	8.9	F	282.9	A	9.3
Southbound	D	41.8	E	77.1	D	41.3	E	77.2
South Capitol St & Potomac Ave	F	184.1	F	236.6	F	195.1	F	247.7
Eastbound	D	42.5	F	493.2	D	42.6	F	493.2
Westbound	D	48.2	F	194.4	D	48.4	F	210.4
Northbound	F	269.2	B	12.6	F	284.7	B	13.2
Southbound	A	6.7	F	307.9	A	6.9	F	327.0



Summary of Future Background Analysis Results

For the purpose of this analysis, it is desirable to achieve a level of service (LOS) of “E” or better on each approach. The following intersections operate at unacceptable LOS during both peak periods:

- 1) South Capitol Street & Eye Street
- 2) South Capitol Street Southbound & M Street
- 3) South Capitol Street Northbound & M Street
- 4) First Street & M Street
- 5) South Capitol Street & N Street
- 6) South Capitol Street & Potomac Avenue

The results from the capacity analyses are summarized below.

- Most of the study intersections operate at acceptable conditions during both the morning and afternoon peak hours.
- The intersection of South Capitol Street and Eye Street operates at an unacceptable LOS of F during the afternoon peak hour due to the east-, west-, and southbound movements.
- The intersection of South Capitol Street southbound local lanes and M Street operates at an acceptable LOS during the morning peak period but, the southbound approach has an unacceptable LOS of E. The intersection operates at an unacceptable LOS during the afternoon peak period due to the eastbound approach.
- The intersection of South Capitol Street northbound local lanes and M Street operates at an unacceptable LOS during the morning and afternoon peak period. The northbound approach in the morning and the westbound approach in the afternoon have an unacceptable amount of delay.
- The intersection of Cushing Place and M Street operates at an acceptable LOS during both peak periods, but the southbound approach operates at an unacceptable LOS of F. This is due to the site trips from the Monument Ballpark Development, as stated in the report by Wells & Associates. Although the approach has an unacceptable LOS, the number of vehicles is relatively small.
- The intersection of 1st Street and M Street operates at an acceptable LOS during both peak periods, but the northbound approach operates at an unacceptable LOS of F during the afternoon peak period. The intersection operation could be improved with the addition of a leading protected left-turn phase for the northbound movement. This improvement would involve retiming the intersection and installing a new signal-head for the northbound approach. It should be noted that in the results table above, the overall LOS for this intersection improves from background to total future conditions. This is because the LOS represents a weighted



average of delay for each approach, and site traffic is added to approaches that have a relatively lower delay, which creates a situation where delay and LOS improve even though additional volume passes through an intersection.

- The intersection of South Capitol Street and N Street operates at an unacceptable LOS during both the morning and afternoon peak period. The northbound approach operates at unacceptable conditions during the morning peak period and the southbound approach during the afternoon peak period.
- The intersection of South Capitol Street and Potomac Avenue operates at an unacceptable LOS during both the morning and afternoon peak period. The northbound approach operates at unacceptable conditions during the morning peak period and the east-, west- and southbound approaches during the afternoon peak period.

The total future capacity analyses results are very similar to the background conditions results. The same intersections and approaches that fail under background conditions fail under total future conditions, with no additional failures in overall or approach LOS.

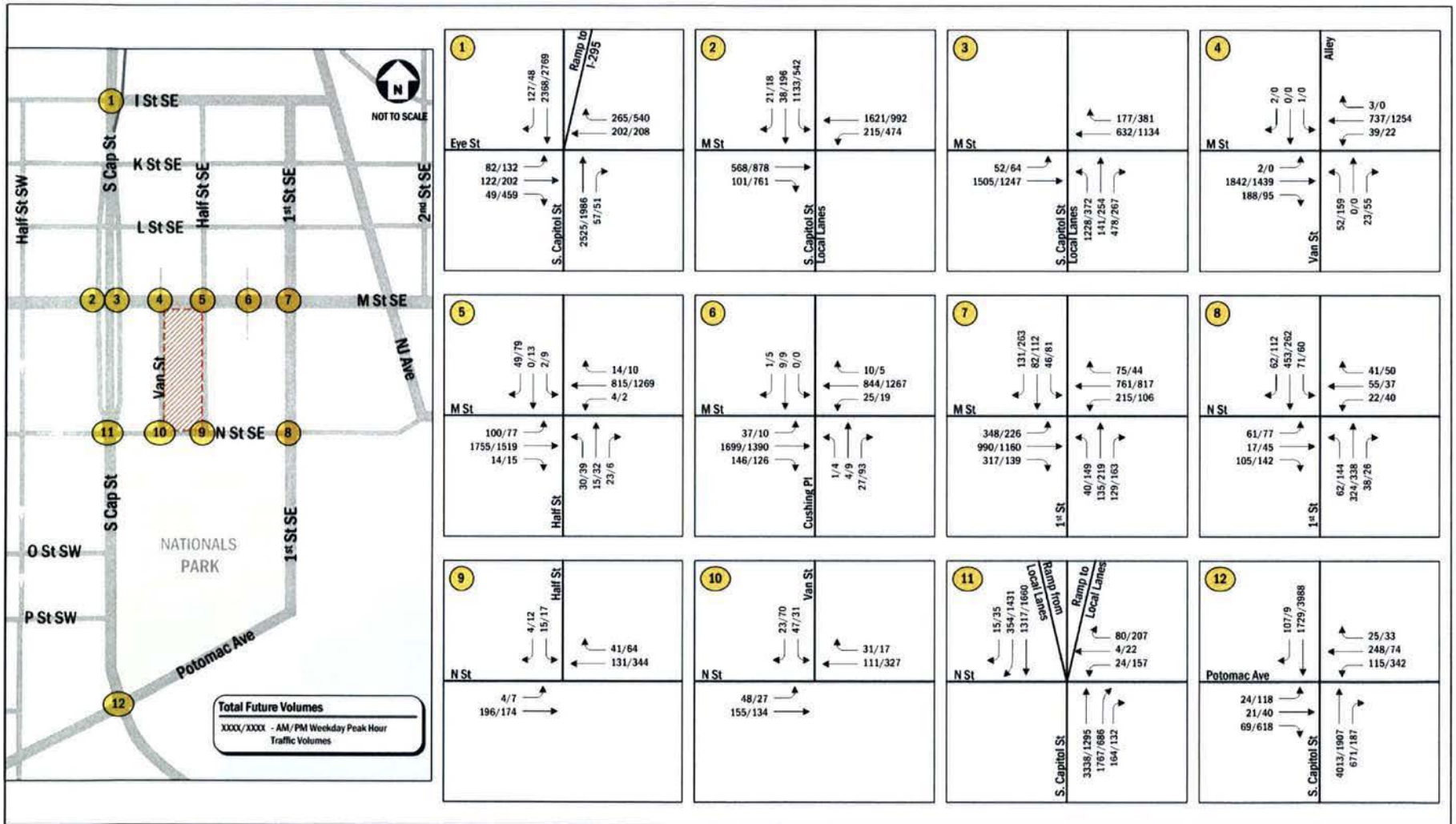


Figure 15 - Total Future Traffic Volumes

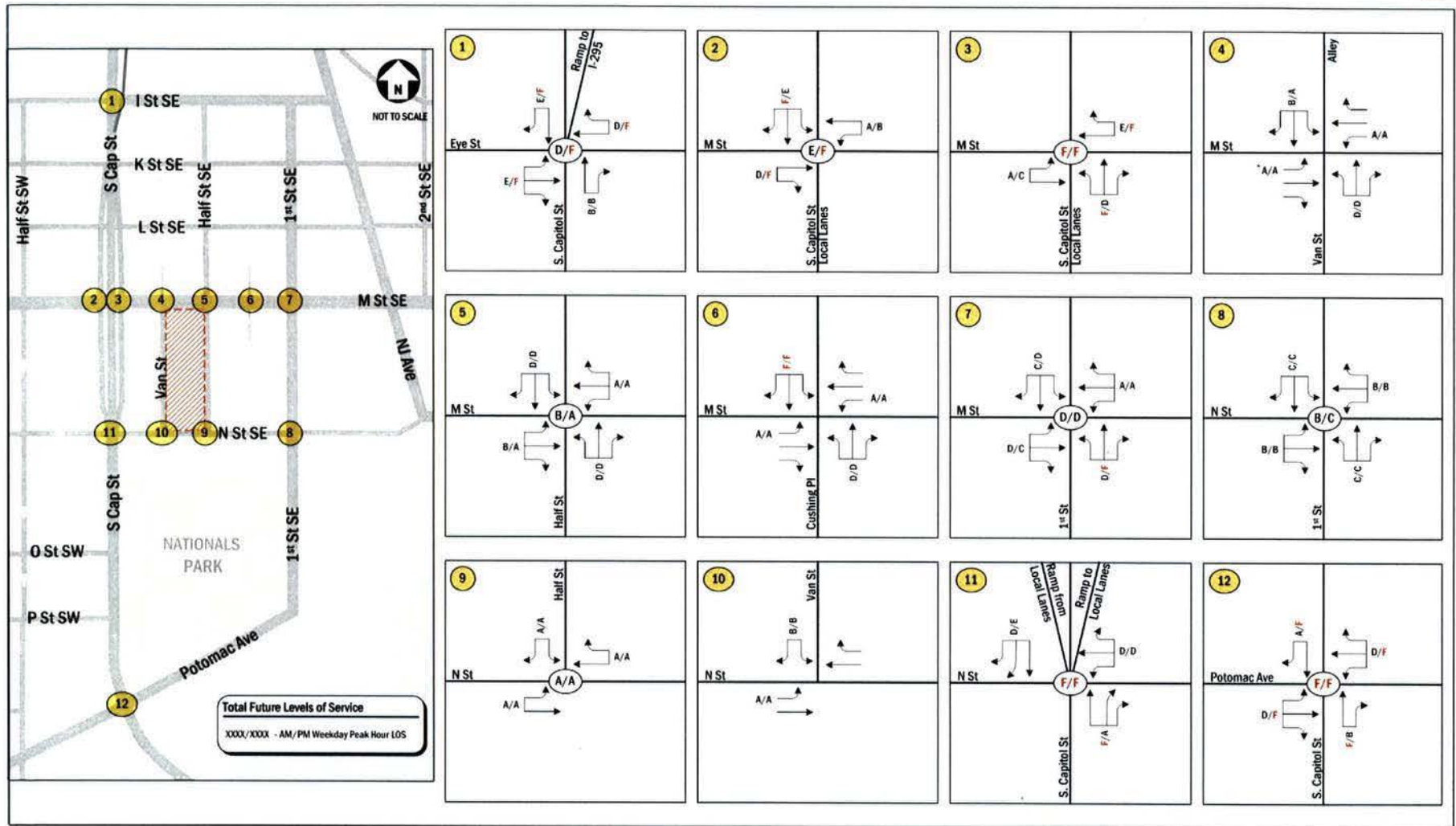


Figure 16 - Total Future Levels of Service



BALLPARK GAME-DAY TRAFFIC CAPACITY ANALYSIS

Due to the proximity of the Washington Nationals Ballpark south of the proposed Square 700, an additional traffic analysis was performed in order to account for the additional traffic generated by a typical weekday evening event. The analysis contained in this section assumes that the evening peak occurs before a 7:05 pm game between 6:00 pm and 7:00 pm.

The Traffic Operations and Parking Plan (TOPP) was developed by G/SA for the D.C. Sports and Entertainment Commission. The following traffic restrictions are in place during a Ballpark event:

- Half Street is closed between M Street and N Street
- N Street is closed between Van Street and 1st Street
- It is assumed that, when constructed, Cushing Place will be closed at N Street.
- It is assumed that all site traffic from the proposed development will be directed east on M Street, restricting left turns at the intersection of Van Street and M Street.

Due to street closures and traffic controls, the following 5 study intersections were included in the analysis:

- 1) South Capitol Street Southbound Local Lanes and M Street, SE
- 2) South Capitol Street Northbound Local Lanes and M Street, SE
- 3) Half Street and M Street
- 4) 1st Street and M Street
- 5) South Capitol Street and Potomac Avenue

Existing Game-Day Conditions

Existing Game-Day Traffic Volumes

In order to determine the turning movement traffic volumes for the two scenarios analyzed, traffic counts were performed on Tuesday, September 23, 2008 from 4:00 pm to 8:00 pm, when the Washington Nationals hosted the Los Angeles Dodgers. The existing traffic volumes for the intersections contained within the study area are shown in Figure 17. Volumes for the intersections of the South Capitol Street Local Lanes and M Street are low compared to existing counts performed during non-event traffic. This is due to the shift of commuter traffic to alternate routes and travel times to avoid event traffic. The existing turning movement counts are included in the Technical Appendix.

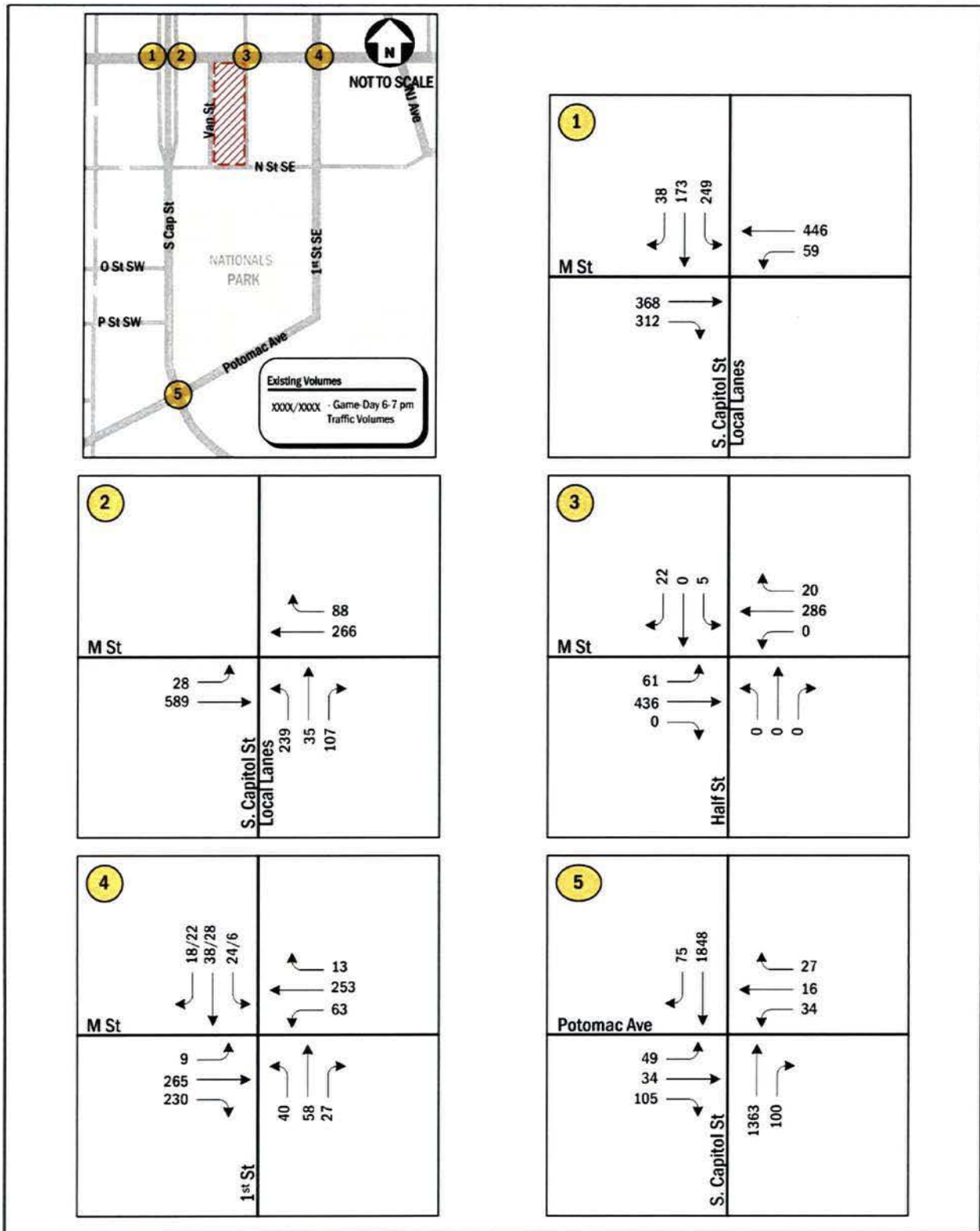


Figure 17 - Existing Game-Day Traffic Volumes



Existing Game-Day Capacity Analysis

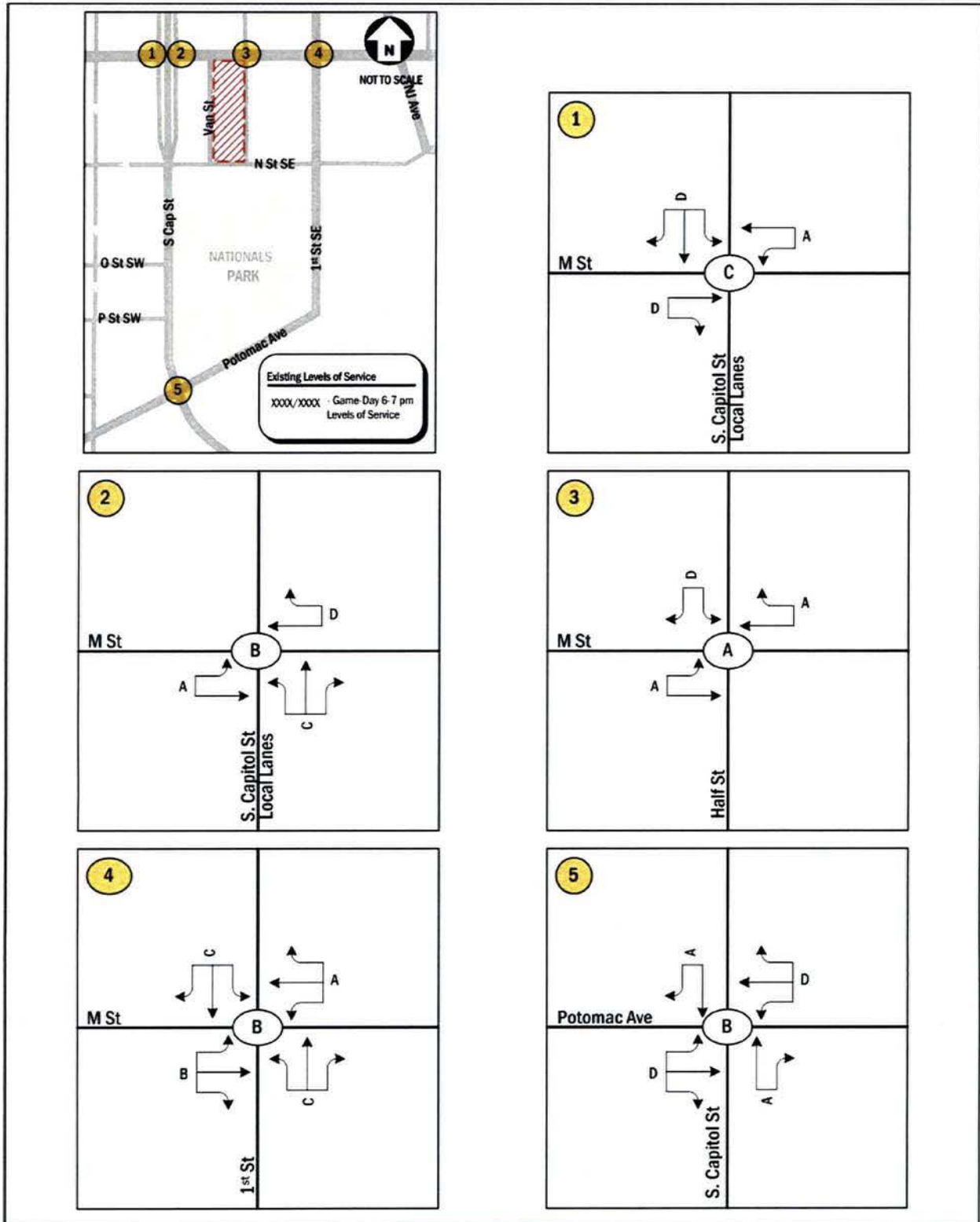
Intersection capacity analyses were performed for the existing conditions at the intersections contained within the study area during the morning and afternoon peak hours. Synchro, Version 7 was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

The results of the intersection capacity analyses are presented in Table 7 and shown on Figure 18. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay and LOS for the signalized and all-way stop controlled intersections is also shown. For two-way stop controlled intersections, an average delay is not defined in the HCM. The detailed analysis worksheets are contained in the Technical Appendix.

Table 7 - Existing Game-Day LOS Results

Intersection (Approach)	Existing Game-Day Level of Service	
	6:00 – 7:00 PM	
	LOS	Delay
South Capitol St (Southbound Lanes) & M Street	C	34.3
Eastbound	D	45.9
Westbound	A	1.0
Southbound	D	53.9
South Capitol St (Northbound Lanes) & M Street	B	18.8
Eastbound	A	1.8
Westbound	D	45.9
Northbound	C	21.5
Half Street & M Street	A	6.1
Eastbound	A	5.2
Westbound	A	4.8
Southbound	D	38.0
1 st Street & M Street	B	13.4
Eastbound	B	13.2
Westbound	A	6.0
Northbound	C	25.4
Southbound	C	31.0
South Capitol St & Potomac Avenue	B	10.8
Eastbound	D	43.6
Westbound	D	42.2
Northbound	A	8.6
Southbound	A	8.0

For the purpose of this analysis, an acceptable level of service is E. During the game-day analysis periods, all study intersections operate at acceptable conditions. Of note, these results are significantly better than the existing conditions results for the non game-day scenario presented earlier. This indicates that commuter traffic may be adjusting to the influence of the Ballpark, especially as it gets closer to the start of a game.



Future Game-Day Conditions without Development

Future Game-Day without Development Traffic Volumes

The construction of the proposed development is anticipated to be complete in 2012. The traffic generated by nearby developments and inherent growth on the roadways within the study area were accounted for in the traffic projections. The following developments were included in the background scenario.

- Velocity Development (Cohen Site) – Phase 1 and 2
- 100 M Street SE
- Florida Rock
- Arthur Capper Carrollsburg
- Southeast Federal Center – Phase 1a
- Jefferson at 100 Eye Street
- Monument Ballpark (Square 701)

Trip generation for the background developments was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) Trip Generation, 7th Edition. Other traffic increases were accounted for with a 2 percent growth rate compounded annually over the 4-year period for all study intersections.

The background developments are shown on Figure 9. Table 2 presents the trips generated by the background developments, as shown on Figure 19. The future background inherent traffic growth was added to the existing (2008) volumes in order to establish the future (2012) traffic volumes without the proposed development. The future background traffic volumes are shown on Figure 20.

Future Game-Day without Development Capacity Analysis

Intersection capacity analyses were performed for the future background conditions at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

In order to account for traffic signals operated by traffic control officers, signal timings at the study intersections were optimized for the future background traffic volumes.

The results of the intersection capacity analysis are shown on Figure 21 and presented in Table 8. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. The detailed analysis worksheets are contained in the Technical Appendix.

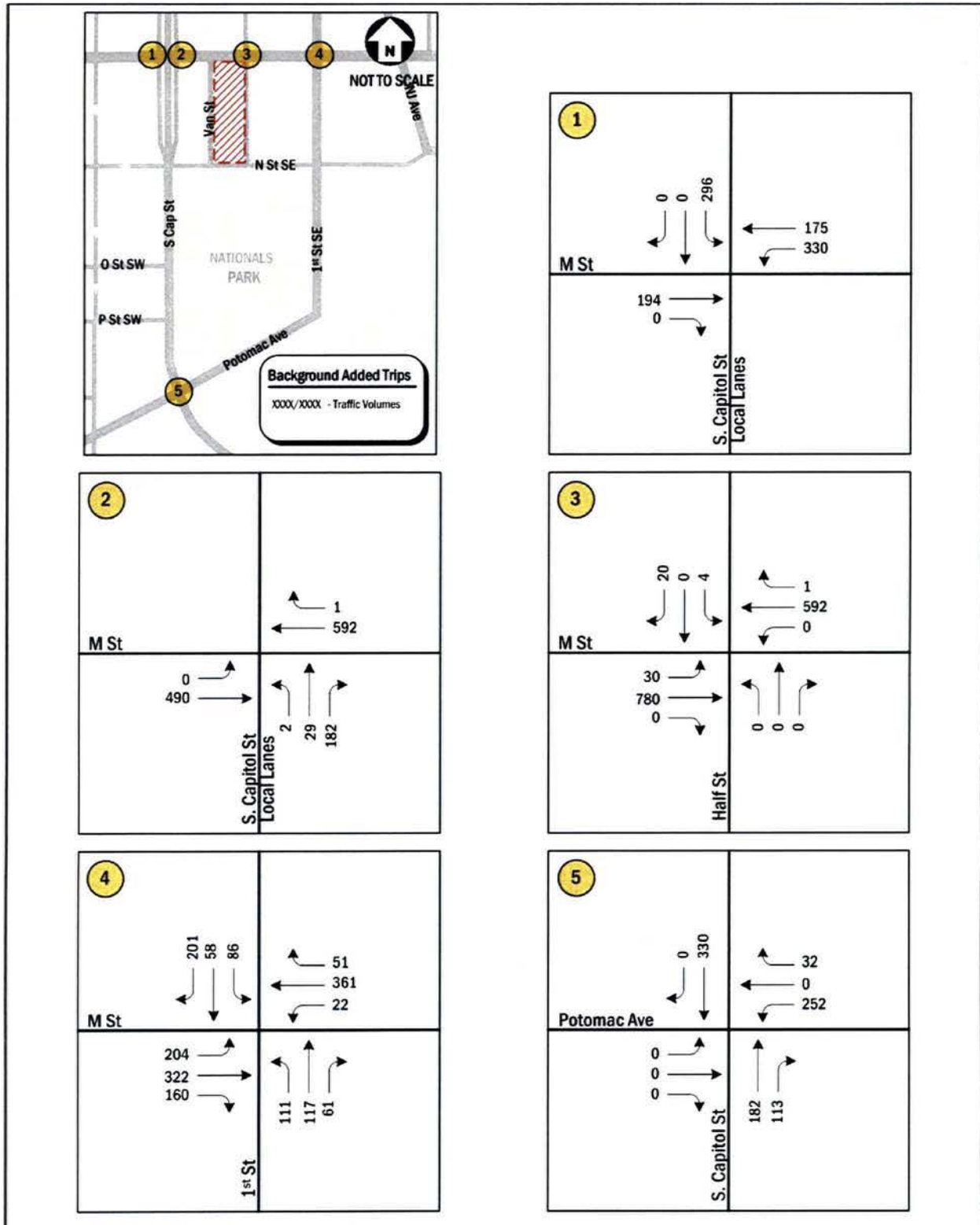


Figure 19 - Future Background Game-Day Site-Generated Trips

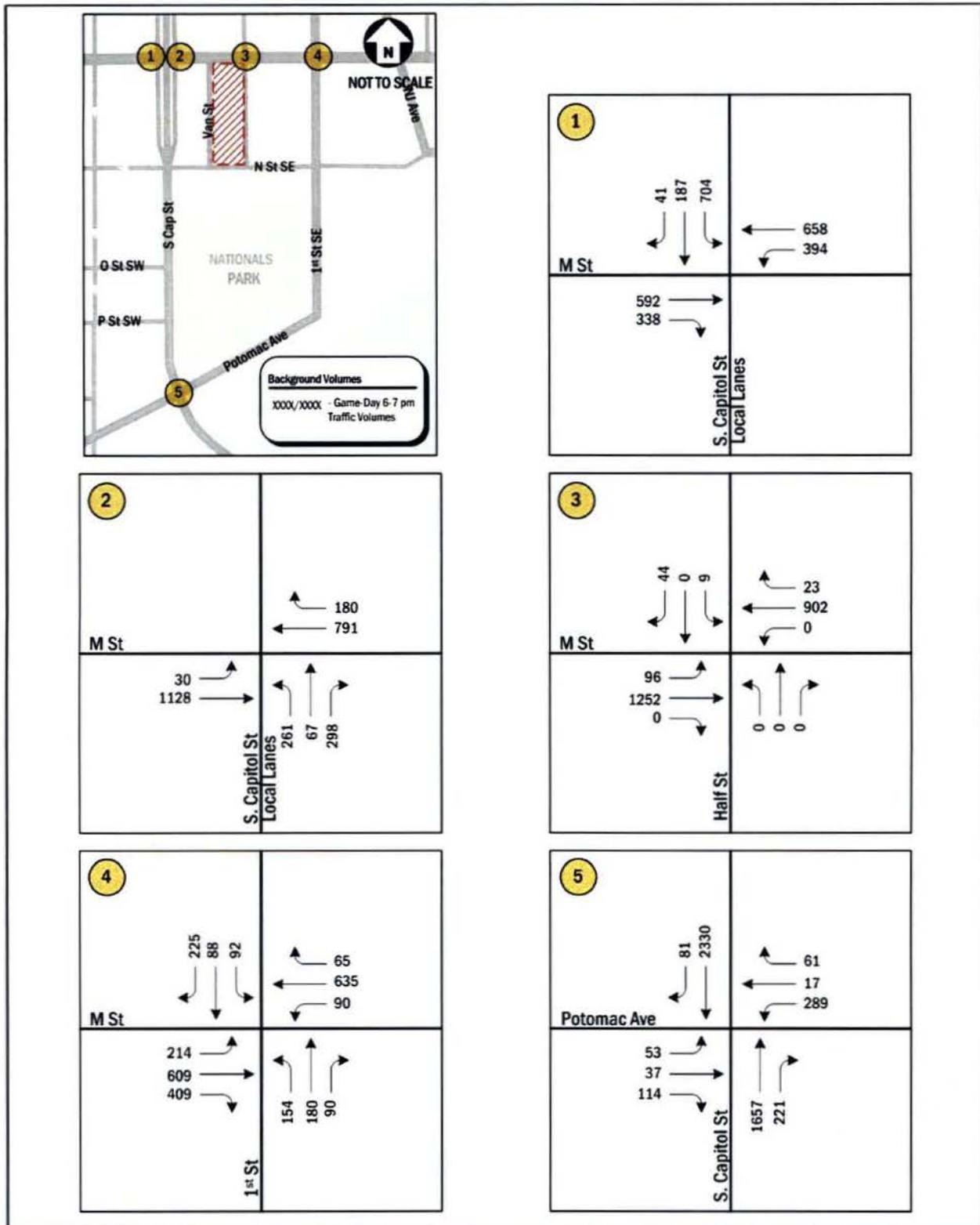


Figure 20 - Future Game-Day without Development Traffic Volumes

**Table 8 - Future Background Game-Day LOS Results**

Intersection (Approach)	Future Background Game-Day Level of Service	
	6:00 – 7:00 PM	
	LOS	Delay
South Capitol St (Southbound Lanes) & M Street	D	47.3
Eastbound	D	50.2
Westbound	A	4.1
Southbound	F	93.0
South Capitol St (Northbound Lanes) & M Street	D	50.4
Eastbound	A	3.2
Westbound	F	122.7
Northbound	C	25.4
Half Street & M Street	A	7.8
Eastbound	A	8.0
Westbound	A	5.7
Southbound	D	38.5
1 st Street & M Street	C	21.2
Eastbound	C	23.0
Westbound	B	11.7
Northbound	C	25.9
Southbound	C	29.1
South Capitol St & Potomac Avenue	D	35.9
Eastbound	D	39.6
Westbound	F	117.2
Northbound	B	13.6
Southbound	D	40.5

For the purpose of this analysis, an acceptable level of service is E. During the game-day analysis periods, all study intersections operate at acceptable conditions. The following movements operate at unacceptable conditions:

- Southbound approach at South Capitol Street (Southbound Lanes) and M Street
- Westbound approach at South Capitol Street (Northbound Lanes) and M Street
- Westbound approach at South Capitol Street and Potomac Avenue

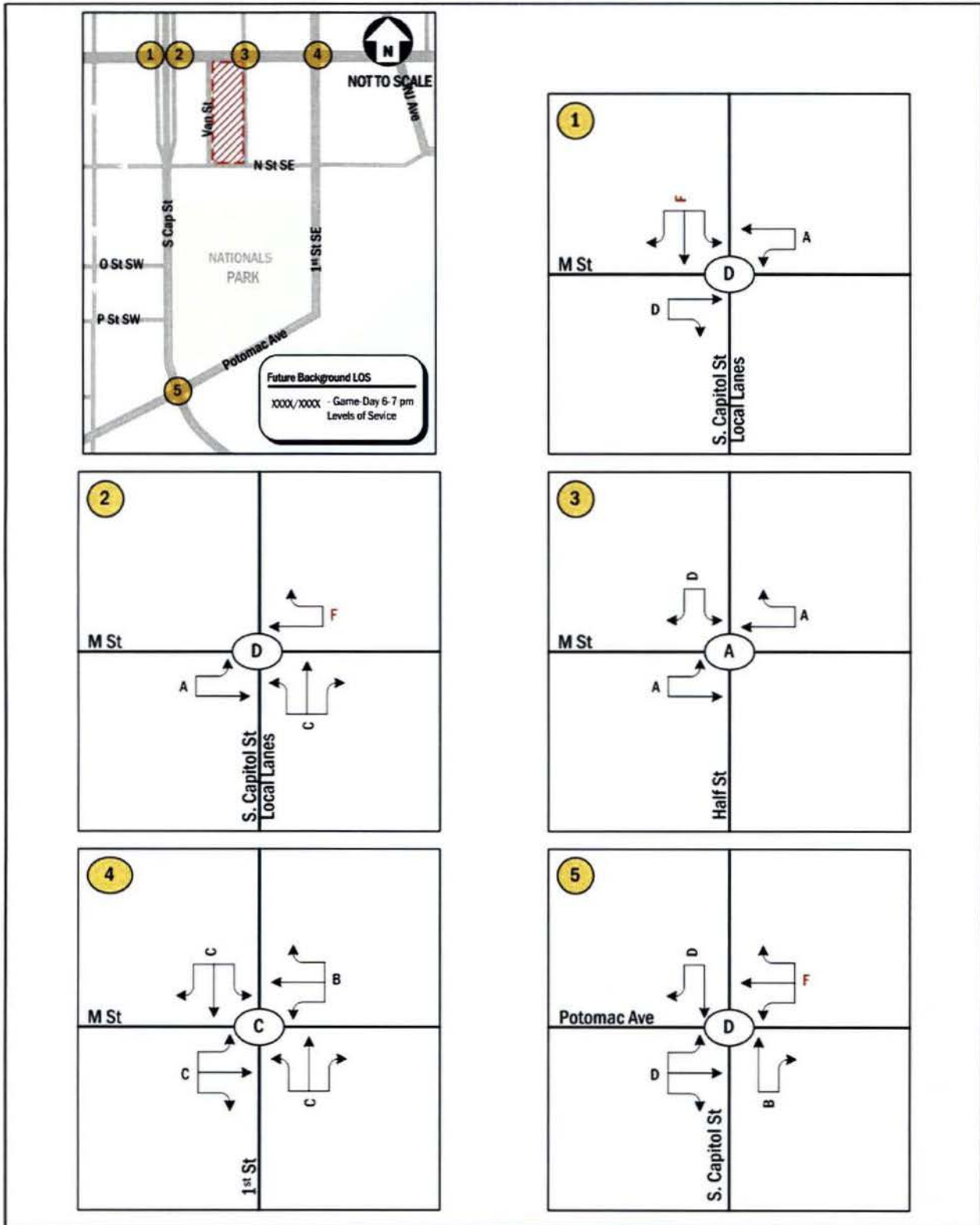


Figure 21 - Future Game-Day without Development Levels of Service



Future Game-Day Conditions with Development

Site Traffic Distribution and Assignment

The nature of the proposed development and regional traffic patterns were analyzed in order to determine the trip distribution for vehicles accessing the site. In addition, an assessment of future roadway conditions was used to determine the routes that provide the most convenient access to the development. Based on this review, the distribution for site traffic is shown in Table 9 and presented on Figure 22. The resulting trip assignment is shown on Figure 23.

Table 9 - Site Trip Distribution

Roadway Link	Trip Distribution	
	Office/Retail Uses	Residential/Hotel Uses
South Capitol Street north of Eye Street	30%	35%
Eye Street west of South Capitol Street	2%	6%
M Street west of South Capitol Street	8%	24%
M Street east of 1 st Street	15%	8%
N Street east of 1 st Street	5%	2%
Frederick Douglass Bridge (South Capitol Street south of Potomac Avenue)	40%	25%
Total	100%	100%

Future Game-Day with Development Traffic Volumes

In order to determine the traffic volumes present on the roadways in the vicinity of the development under the 2012 build condition, the proposed development traffic volumes were added to the 2012 future background traffic volumes. The traffic volumes for the total future scenario are shown on Figure 24.

Future with Development Capacity Analysis

Intersection capacity analyses were performed for the future background conditions at the intersections contained within the study area during the morning and afternoon peak hours. *Synchro, Version 7* was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology.

In order to account for traffic signals operated by traffic control officers, signal timings at the study intersections were optimized for the future background traffic volumes.

The results of the intersection capacity analysis are shown on Figure 25 and presented in Table 10. They are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. Detailed analysis worksheets are contained in the Technical Appendix.

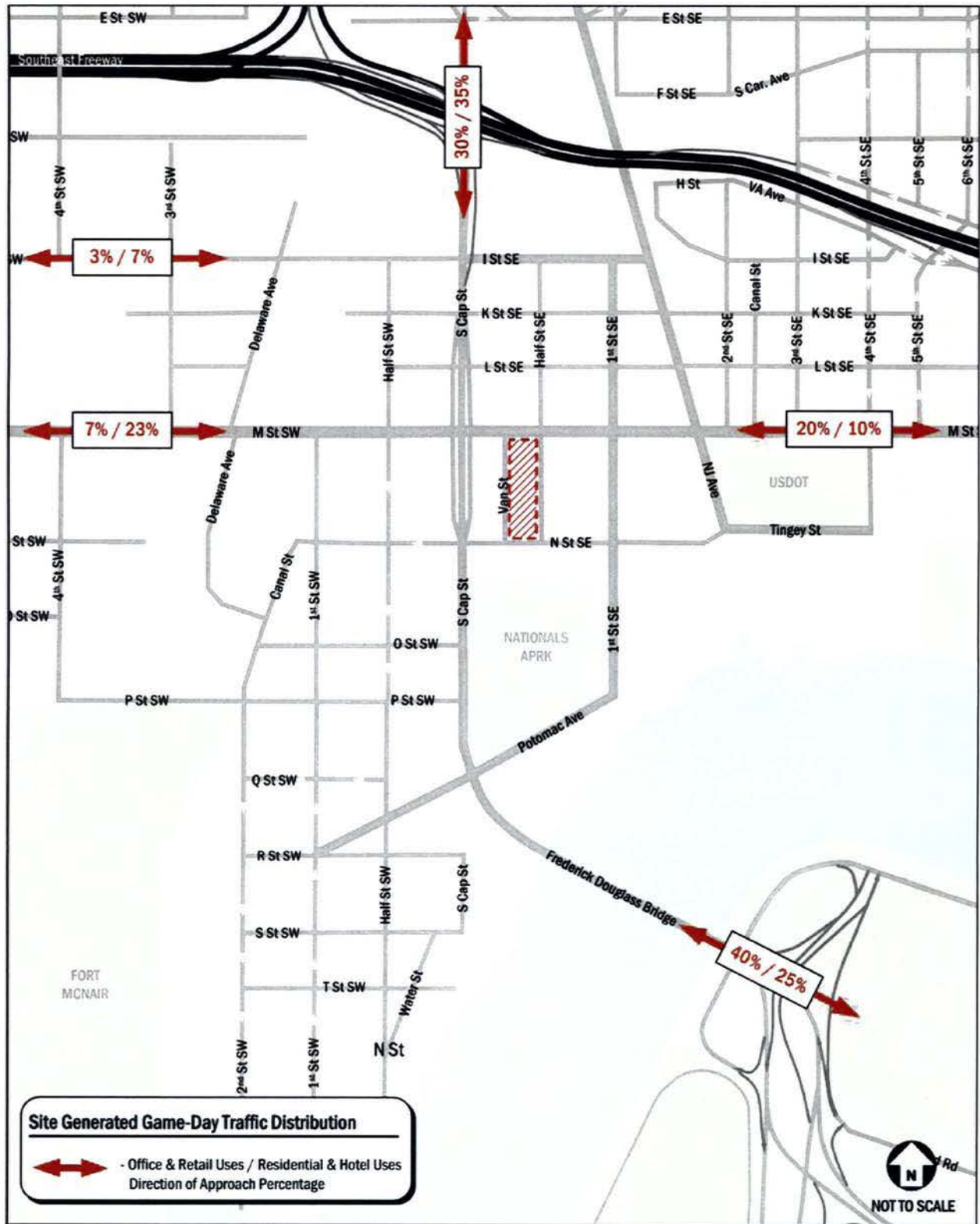


Figure 22 - Site Generated Game-Day Traffic Distribution

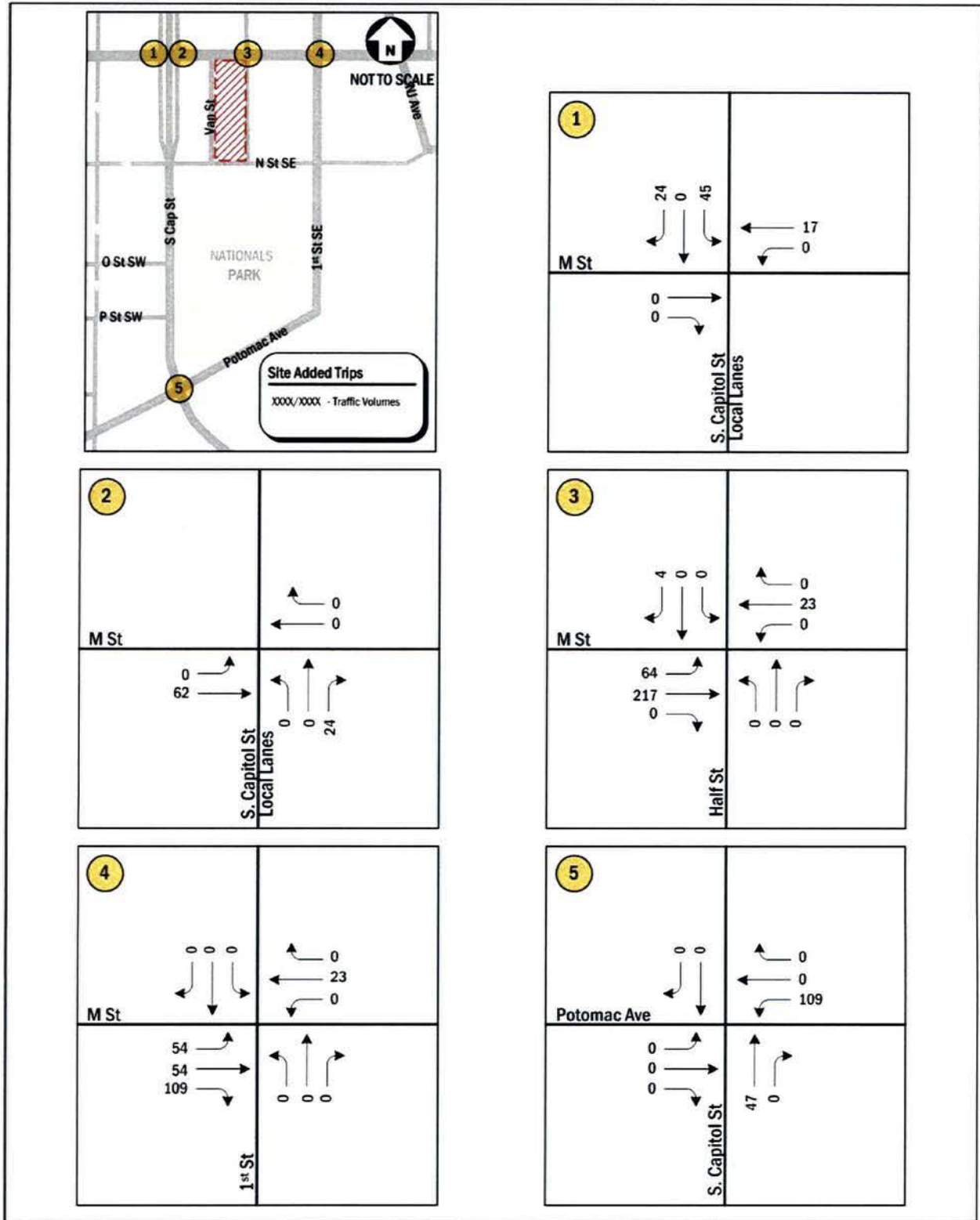


Figure 23 - Future Game-Day Site Generated Traffic Volumes

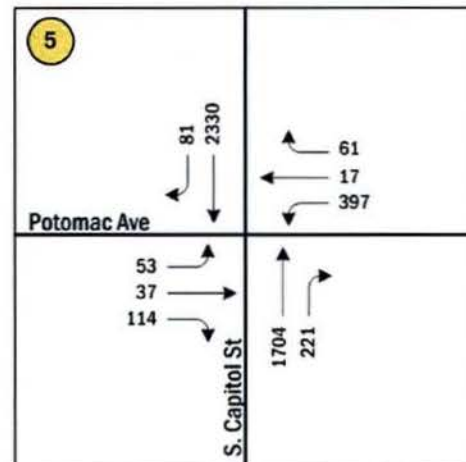
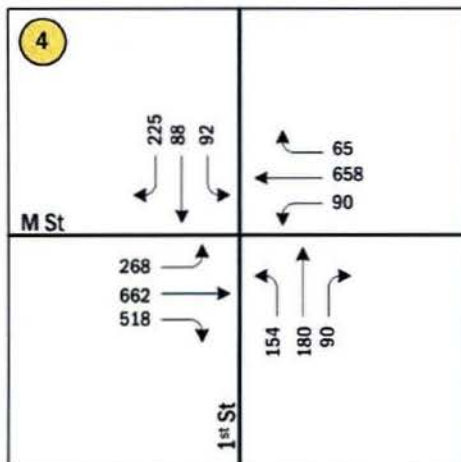
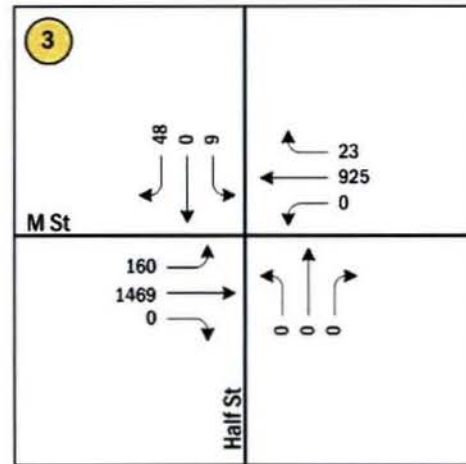
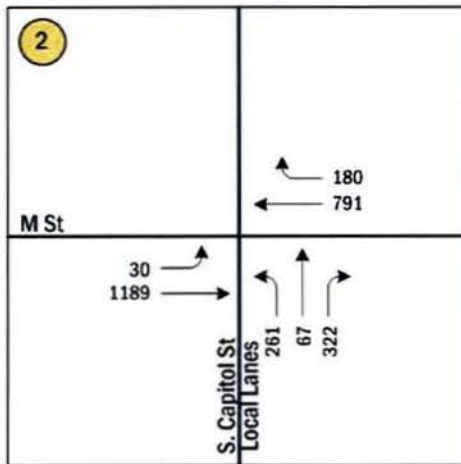
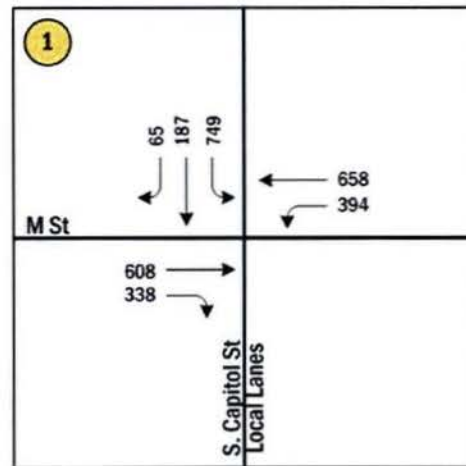


Figure 24 - Future with Development Game-Day Traffic Volumes

**Table 10 - Total Future Game-Day LOS Results**

Intersection (Approach)	Future Background Game-Day Level of Service		Total Future Game-Day Level of Service	
	6:00 – 7:00 PM		6:00 – 7:00 PM	
	LOS	Delay	LOS	Delay
South Capitol St (Southbound Lanes) & M Street	D	47.3	E	56.1
Eastbound	D	50.2	D	50.8
Westbound	A	4.1	A	4.2
Southbound	F	93.0	F	115.6
South Capitol St (Northbound Lanes) & M Street	D	50.4	D	49.4
Eastbound	A	3.2	A	3.5
Westbound	F	122.7	F	122.7
Northbound	C	25.4	C	26.1
Half Street & M Street	A	7.8	A	9.4
Eastbound	A	8.0	B	10.5
Westbound	A	5.7	A	5.8
Southbound	D	38.5	D	38.5
1 st Street & M Street	C	21.2	C	23.0
Eastbound	C	23.0	C	25.1
Westbound	B	11.7	B	10.3
Northbound	C	25.9	C	31.5
Southbound	C	29.1	C	31.9
South Capitol St & Potomac Avenue	D	35.9	E	67.0
Eastbound	D	39.6	C	32.3
Westbound	F	117.2	F	129.0
Northbound	B	13.6	C	22.2
Southbound	D	40.5	F	93.4

For the purpose of this analysis, an acceptable level of service is E. During the game-day analysis periods, all study intersections are projected to operate at acceptable conditions. The following movements are projected to operate at unacceptable conditions:

- Southbound approach at South Capitol Street (Southbound Lanes) and M Street
- Westbound approach at South Capitol Street (Northbound Lanes) and M Street
- Westbound approach at South Capitol Street and Potomac Avenue
- Southbound approach at South Capitol Street and Potomac Avenue

The results the background and total future capacity analyses show that future growth in the area surrounding the Ballpark will contribute to additional delay in study area intersections, but not to the same levels shown in similar non game-day scenarios. This is due to the drop in general traffic on M Street and South Capitol Street observed on game-days. If the background traffic generated by local development also followed this pattern, of shifting to earlier commuting times during the evening or alternate routes, these capacity analyses results would show only acceptable conditions.

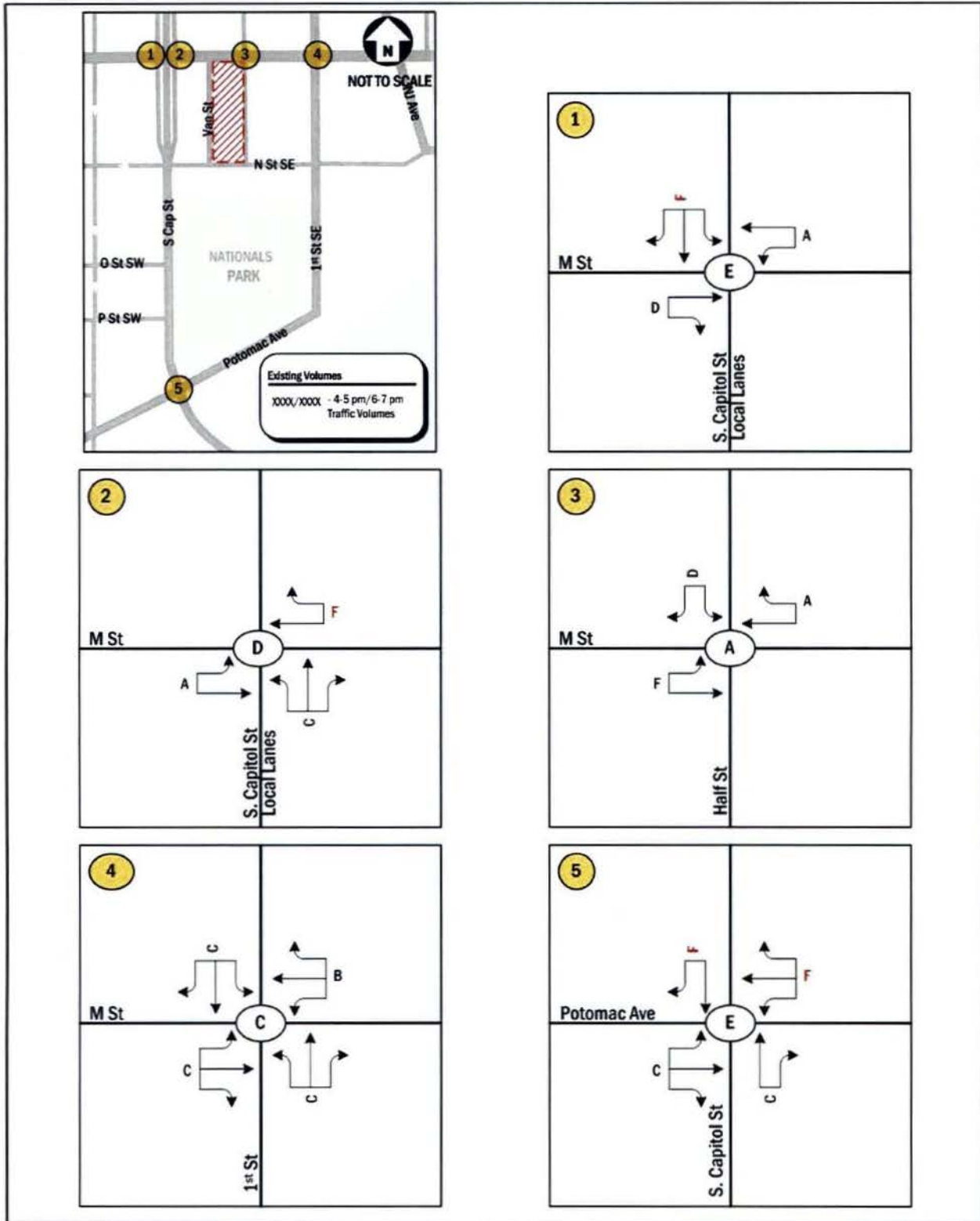


Figure 25 - Future with Development Game-Day Levels of Service



SUMMARY AND CONCLUSIONS

This report presents the findings of a traffic impact study conducted for the Square 700 Development in support of its application for Zoning Commission Design Review. The proposed site plan consists of a mixed-use development (office, retail, and residential uses) located near the Washington Nationals Ballpark between N Street and M Street, SE along the west side of Half Street, SE.

An analysis of existing conditions reached the following conclusions:

- Most intersections within the study area operated at acceptable levels of service, with the exception of intersections on South Capitol Street south of M Street.
- Congestion at these locations is primarily due to commuter traffic. The major commuter traffic patterns in the study area include the following: (1) the regional connection between South Capitol Street/Anacostia Freeway and I-395, which leads to a significant amount of northbound South Capitol Street traffic in the morning and southbound in the evening, and (2) the connection between South Capitol Street/Anacostia Freeway and downtown DC via M Street, which leads to a northbound left turns from northbound South Capitol Street to M Street in the morning and a right turns from eastbound M Street to southbound South Capitol Street in the evening. The failing levels of service on South Capitol Street are located where these two movements coincide.
- It is recommended that the District revisit the roadway signing and marking on the eastbound approach of Eye Street to South Capitol Street in order to eliminate the driver confusion observed at this intersection.

An analysis of background conditions, future conditions without site development, reached the following conclusions:

- All intersections along the South Capitol Street corridor are expected to operate at unacceptable conditions.
- The additional traffic generated by the background developments is overlapping the commuter patterns that are creating the existing congestion along South Capitol Street. It is likely that commuter traffic may shift from these regional routes when locally generated traffic rises to the levels shown in the background analyses. As the roadways within the study area become congested, it will be less attractive for regional traffic to use these streets and they will shift to other times of day or routes.
- A new route for regional traffic is planned to be included in the new 11th Street Bridges project to assist in regional connections between the Anacostia Freeway and I-395, which will provide an alternate route for a significant amount of commuter traffic traveling through the study area.
- The analysis results for intersections outside of the South Capitol Street corridor show generally



acceptable conditions except for the evening rush hour levels of service southbound Cushing Place and M Street, and northbound 1st Street at M Street.

- The poor level of service calculated for Cushing Place and M Street affects a small amount of vehicles, all of which have alternate routes to take, and was also projected and discussed in the traffic study for the adjacent Monument Ballpark Development site.
- The unacceptable level of service for northbound traffic at the intersection of 1st Street and M Street is due to the expected increase in northbound left turns. This intersection does not have a northbound left turn lane, which combined with the expected number of vehicles travelling south on 1st Street leads to a large delay as vehicles making left turns do not receive enough gaps in traffic.

An analysis of total future conditions, including site development, reached the following conclusions:

- Site access for the proposed development will be provided from Van Street. This includes all access to parking and loading facilities.
- Adjacent to the site, Half Street is planned as a pedestrian friendly street with no access to parking or loading.
- Pedestrian access will be provided from Half Street, Van Street, M Street, and N Street. The proposed development includes the construction of an east-west pedestrian alley between Half Street and Van Street to provide additional pedestrian connectivity within the site.
- The total future capacity analyses results are very similar to the background conditions results. The same intersections and approaches that fail under background conditions fail under total future conditions, with not additional failures in overall or approach LOS. Operation at this intersection could be improved with the addition of a leading protected left-turn for the northbound movement. This improvement would involve retiming the intersection and installing a new signal-head for the northbound approach. This eliminates the projected failing northbound LOS at that intersection.

A 'game-day' analysis was also performed, substituting the traffic counts during a typical weekday with counts taken during a Washington Nationals home game. This analysis reached the following conclusions:

- During the existing game-day, all study intersections operated at acceptable conditions, significantly better than the existing conditions results for the non game-day scenario. This indicates that commuter traffic may be adjusting to the influence of the Ballpark, especially as it gets closer to the start of a game.
- Capacity analyses after adding background and site development traffic showed that future growth in the area surrounding the Ballpark will contribute to additional delay in study area



intersections, but not to the same levels shown in similar non game-day scenarios. This is due to the drop in general traffic on M Street and South Capitol Street observed on game-days.

- If the background traffic generated by local development also followed this pattern, of shifting to earlier commuting times during the evening or alternate routes, these capacity analyses results would show only acceptable conditions.
- Thus, it is not expected that development of the Square 700 site will negatively impact Ballpark game-day operations or add significantly to delay at study area intersections on game-days.