Traffic Impact Study

Sibley Memorial Hospital
Medical Office Building Expansion
Washington, D.C.

June 8, 2006

Prepared For:
Sibley Memorial Hospital
5255 Loughboro Road, NW
Washington, DC 20016
202.537.4000

GOROVE/SLADE ASSOCIATES, INC.
Transportation, Traffic and Parking

PREPARED BY:

Gorove/Slade Associates, Inc.
1140 Connecticut Avenue
Suite 700
Washington, D.C. 20036

Tel: 202.296.8625
Fax: 202.785.1276

3914 Centreville Road
Suite 330
Chantilly, VA 20151

Tel: 703.787.9595
Fax: 703.787.9905

www.goroveslade.com

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The following report presents the findings of a traffic impact study prepared for the Sibley Memorial Hospital Medical Office Building Expansion plan. The hospital proposes to build a medical office building and parking garage to complement their existing facilities. The proposed medical office building expansion is designed to be approximately 130,700 square feet (gross floor area) and will include space dedicated to medical office use and outpatient services, as well as a 6,900 square foot auditorium to replace the existing auditorium, and a 750-space parking garage. With the garage, a net increase of 421 parking spaces will be added to the campus to serve the needs of the MOB and existing Hospital doctors, staff, and visitors.

The traffic capacity analyses detailed in the study found the following conditions:

- *Existing*

  The study intersections currently operate at acceptable conditions during the AM and PM peak periods. Significant delays do occur on the southbound approach of the MacArthur Boulevard and Loughboro Road intersection and on the STOP-controlled left-turn movement from Dalecarlia Parkway onto Loughboro Road. However, the movement at Dalecarlia Parkway onto Loughboro Road is not related to Sibley as this movement is primarily commuter traffic.

- *Future Background (2008) – without MOB expansion*

  The study intersections under Future Background conditions will continue to operate similarly as in Existing conditions with slight increases in delay. The delay at the intersection of MacArthur Boulevard and Loughboro Road could be mitigated with adjusted signal timings.

- *Total Future (2008) – with MOB expansion*

  The study intersections under Future Background conditions would continue to operate similarly as in Future Background conditions. With the proposed intersection reconfiguration, the STOP-controlled left-turn movement from Dalecarlia Parkway onto Loughboro Road would maintain a LOS F during the AM peak hour, and would slightly decline in LOS in the PM peak. SIMTraffic results reflect acceptable operations for both peaks, although some motorists may experience considerable delays in making left-turns onto Loughboro Road.

Based on these results, the Medical Office Building expansion at Sibley Memorial Hospital will not have a negative impact on the surrounding roadway network. The addition of the Medical Office Building traffic does not have significant impact as these additional trips can be accommodated by the current roadway configuration.

INTRODUCTION

This report presents the findings of a traffic impact study prepared for the proposed Sibley Memorial Hospital Medical Office Building Expansion plan. The hospital is located in the Palisades neighborhood of Ward 3 in Upper Northwest, Washington, D.C. near the Dalecarlia Reservoir as shown in Figure 1. The site is bounded by Loughboro Road to the south, MacArthur Boulevard to the west, Little Falls Road to the north, and Dalecarlia Parkway to the east.

The applicants, Lucy Webb Hayes Training School for Deaconesses and Missionaries under the name Sibley Memorial Hospital (Sibley), are proposing to expand and modernize existing facilities by constructing a new Medical Office Building (MOB) and parking garage. The proposed MOB is designed to be approximately 130,700 square feet (gross floor area) and will include space dedicated to medical office use and outpatient services, as well as a 6,900 square foot auditorium to replace the existing auditorium. The plan also includes an approximately 750-space parking garage, however since there is a loss of surface parking spaces due to the new development, the parking garage will provide a net increase of approximately 421 spaces.

The primary purpose of this report is to evaluate the traffic impacts of the proposed new development at six study intersections located around the site and identify any necessary transportation improvements needed to mitigate impacts.

The following list summarizes the tasks performed by Gorove/Slade Associates as part of this study:

- Field reconnaissance to collect existing roadway and intersection geometrics, traffic controls, and signal operations;
- Vehicle turning movement counts collected at study area intersections;
- Bus ridership activity observed;
- Existing Levels of Service calculated at the study intersections;
- Background traffic forecasts and Levels of Service for project build-out in 2008 based on existing counts, traffic growth, and traffic generated by other pending/future developments;
- AM and PM peak hour and daily trip generation of the new development, including mode split assumptions;
- Total Future traffic volume forecasts for project build-out in 2008 based on Background Future traffic forecasts and site traffic assignments; and
- Total Future Levels of Service of the study intersections based on Total Future traffic forecasts, existing and future traffic controls, and existing and future intersection geometrics.

Figure 1 – Site Location and Study Area Intersections

Sources of data for this study include traffic counts conducted by Gorove/Slade Associates, the Institute of Transportation Engineer's (ITE) *Trip Generation*, 7th Edition, Sibley Memorial Hospital, Wilmot Sanz Architects and Planners, the District Department of Transportation (DDOT), the "Development-Related Ridership Survey II" prepared by WMATA, and the files/library of Gorove/Slade Associates.

Project Scope

This traffic impact study was conducted in general accordance with parameters set by a scoping letter sent to DDOT on December 14, 2005. A copy of the scoping letter is contained in the Appendix. As per the scoping letter, the following study intersections were analyzed (as shown in Figures 1 and 2):

1. Little Falls Road and MacArthur Boulevard
2. Little Falls Road and Dalecarlia Parkway
3. Dalecarlia Parkway and Loughboro Road
4. Loughboro Road and Main Hospital Entrance
5. Loughboro Road and Grand Oaks Entrance
6. Loughboro Road and MacArthur Boulevard

Capacity analyses were performed to determine the existing Levels of Service (LOS) for the AM and PM peak hours for the study intersections. A LOS equates a letter grade to the average delay in seconds experienced by motorists at an intersection. LOS results range from A being the best to F being the worst. A LOS of D or better is typically used as the acceptable LOS threshold in the District; although a LOS E is acceptable in highly urbanized areas. The *Highway Capacity Manual 2000* methodology and Synchro traffic software, version 6.0, was used for analysis.

For purposes of this study, it was assumed that the MOB expansion will be complete and fully occupied by 2008.

Figure 2 – Study Area Intersection Photographs

EXISTING CONDITIONS

Site Access and Existing Road Network

Sibley is well served with regional access via a number of arterial roadways with connection to I-495 (Capital Beltway), as well as several local access roadways. The roadways serving SMH include:

- *Massachusetts Avenue*

  The District Department of Transportation (DDOT) classifies Massachusetts Avenue as a principal arterial with an average annual weekday traffic (AAWT) volume of 24,900 vehicle trips (near the intersection of Massachusetts Avenue and Dalecarlia Parkway). Massachusetts Avenue connects the Northwest quadrant of the District and points in Maryland with downtown Washington D.C.

- *River Road*

  DDOT classifies River Road as a minor arterial with an AAWT volume of 13,000 vehicle trips (near the intersection of River Road and Western Avenue). River Road extends from I-495 to Wisconsin Avenue in Northwest, Washington D.C. and serves as a major connection to Maryland suburbs in the Bethesda/Potomac corridor, as well as the Northwestern quadrant of Washington, D.C.

- *MacArthur Boulevard*

  DDOT classifies MacArthur Boulevard as a minor arterial with an AAWT volume of 12,500 vehicle trips north of the intersection of Loughboro Road and 17,000 vehicle trips south of the intersection of Loughboro Road. MacArthur Boulevard is a four-lane, divided roadway with unrestricted parking lanes along both sides of the roadway.

- *Loughboro Road*

  DDOT classifies Loughboro Road as a minor arterial with an AAWT volume of 11,000 vehicle trips. Loughboro Road is a three-lane roadway with restricted parking (2 hour parking, 7:00 a.m. to 8:30 p.m., except Zone 3) along the south side of the roadway and no parking along the north side. These restrictions protect residential streets from long term parking.

- *Dalecarlia Parkway*

  DDOT classifies Dalecarlia Parkway as a minor arterial with an AAWT volume of 16,000 vehicle trips. Dalecarlia Parkway is a four-lane, divided roadway that serves as a connection from Massachusetts Avenue at Westmoreland Circle to Loughboro Road.

- *Little Falls Road*

  Little Falls Road is a two-lane roadway serving Sibley Memorial Hospital and Dalecarlia

Reservoir. It provides a connection between MacArthur Boulevard and Dalecarlia Parkway. DDOT classifies Little Falls Road as a local collector. The AAWT for Little Falls Road was not reported by DDOT.

Gorove/Slade Associates conducted field reconnaissance to obtain the existing lane usage and traffic controls at the intersections within the study area. Figure 3 presents the local roadway network of the study area, as well as existing lane use configurations.

Existing Transit

Sibley is served by the D3, D6, and M4 Metrobus (WMATA) routes, as well as the Montgomery County Ride-On bus as shown in Figure 4. The D3 Metrobus route is a limited service route operating during the AM in the eastbound direction only, and westbound in the PM. The D3 route connects with the following Metrorail stations: Union Station, Metro Center, Farragut North, Farragut West, and Dupont Circle. The D6 Metrobus route is a full service route that connects with the following Metrorail stations: Stadium Armory, Union Station, Metro Center, Farragut Square and Dupont Circle. The M4 Metrobus operates in a full service loop connecting Sibley with the Tenleytown Metrorail station (the closest Metrorail station to Sibley) and points east. Sibley is also served by the Ride-On Number 23 bus which operates Monday through Saturday and connects Sibley with the Friendship Heights Metrorail station.

Bus Ridership Analysis

On Thursday, November 17, bus stop use patterns along Loughboro Road were observed to determine the number of neighbor and Hospital riders. Observations of the number of riders who were dropped-off outside of Sibley were conducted from 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. The peak bus hour ridership was found to be from 7:00 a.m. to 8:00 a.m. and 6:00 p.m. to 7:00 p.m. The difference between the bus peak hour ridership and the traffic system peak hours (discussed below) around Sibley is because Hospital employee shift changes do not correlate with the peak hours of street traffic.

Table 1 shows the analysis results of the bus stop use patterns. According to the analysis, the majority of riders who use the bus are Hospital employees or patients.

Table 1 – Bus Ridership Analysis Results

Time Period		Ridership			
		Hospital Drop-offs	*Non-Hospital Drop-offs*	*Total Dropped-off*	*Percentage*
AM Ridership Peak	7:00 a.m. to 8:00 a.m.	43	3	46	93%
PM Ridership Peak	6:00 p.m. to 7:00 p.m.	17	4	21	81%

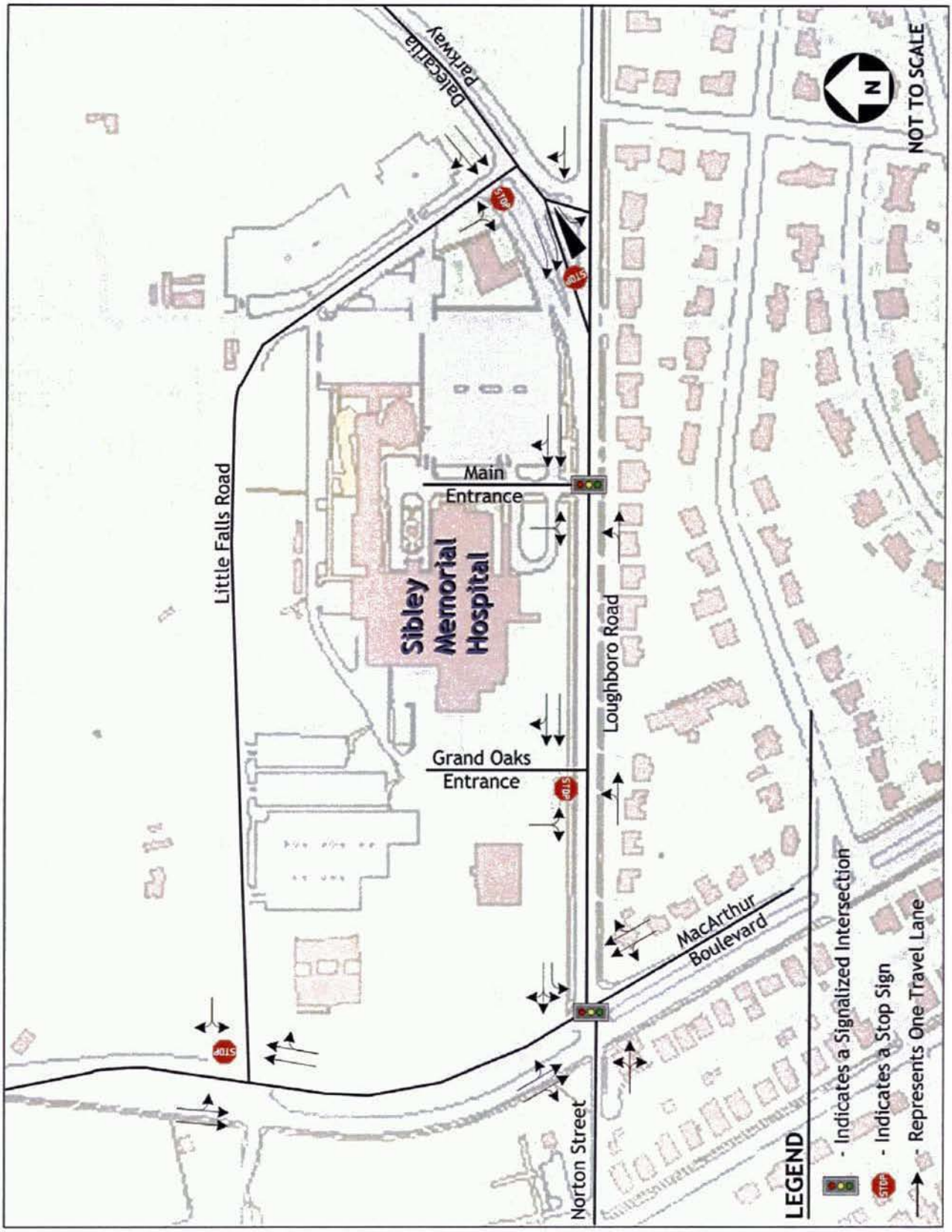

Figure 3 – Existing Lane Use and Traffic Control

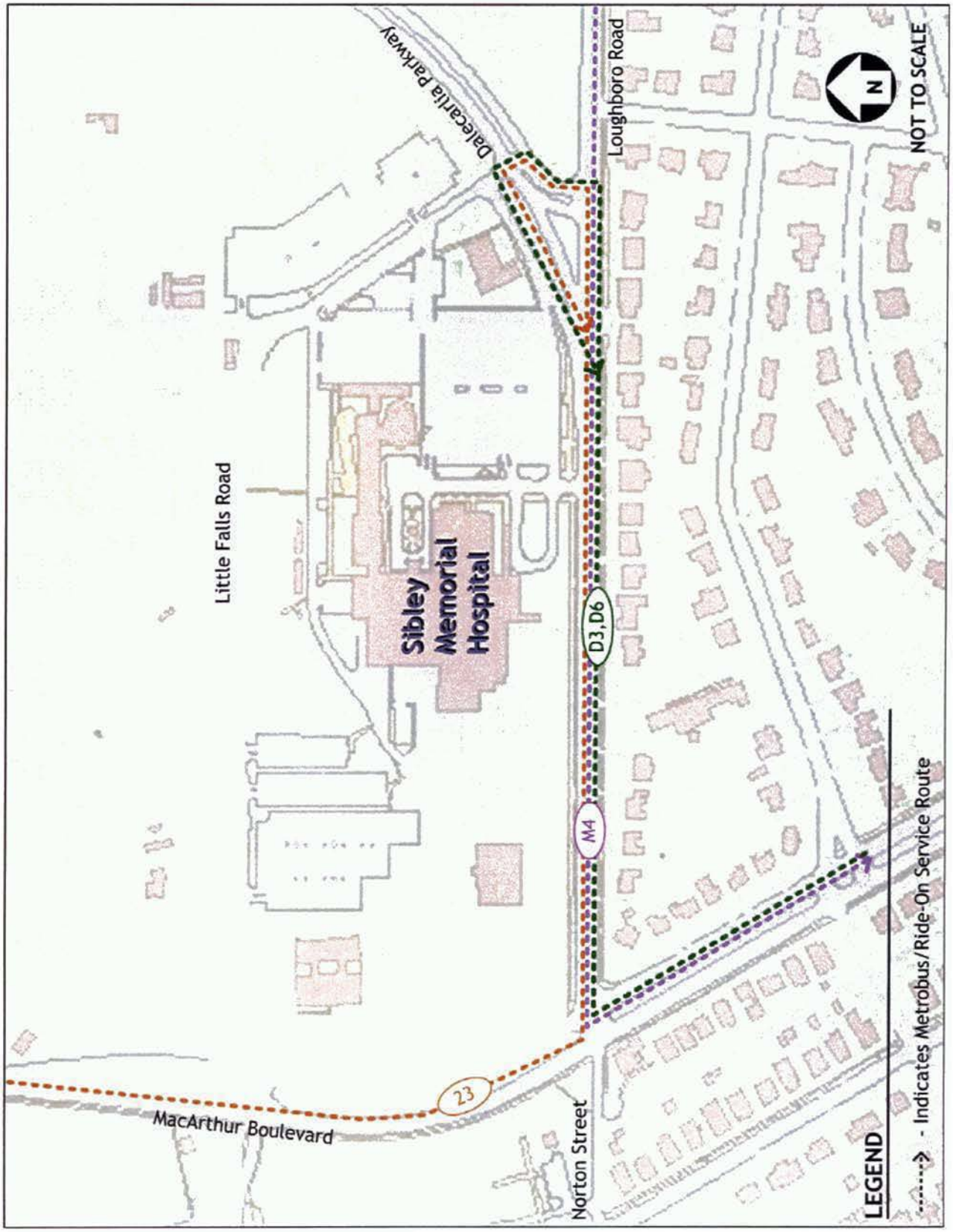

Figure 4 – Existing Transit Service Routes

Existing Traffic Volumes

All turning movement traffic counts were conducted on Thursday, November 10 (an average weekday for area traffic, but a higher than average day for Hospital activity) from 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. Other data collected at these intersections included signal timings, lane configurations, and traffic control. From the data collected, the system peak hours were found to be from 7:30 a.m. to 8:30 a.m. and 5:00 p.m. to 6:00 p.m. and the existing volumes are shown in Figure 5.

The geographic distribution of employee, inpatient, and outpatient places of residence by location were plotted for the Washington, D.C. Metro area and are shown in Figures 6, 7, and 8, respectively. The information was provided by Sibley Memorial Hospital business staff and is current through September 2005. Figure 6 shows that Hospital employees commute from the entire D.C. Metro area. It is important to note that not all of these employees are commuting to the Hospital at the same time. Hospital shift changes occur at 7:00 a.m., 3:00 p.m. and 11:00 p.m. Figures 7 and 8 show that Hospital patients are primarily from the Northwest D.C. and suburban Maryland (Bethesda/Potomac/Rockville) areas.

Existing Capacity Analysis

The average delay and overall LOS for each study intersection was analyzed and the results are presented in Table 2. Signalized intersections have a LOS and delay for each approach, as well as an overall LOS. Unsignalized intersections only have a LOS and delay for the approach that would experience measurable delay. Unsignalized intersections do not have an overall LOS.

The Existing peak hour LOS calculations are included in the Appendix. The calculations are based on: existing lane use and traffic controls; peak hour traffic volumes for the study intersections; peak hour pedestrian volumes; *Highway Capacity Manual 2000* (HCM) methodology; and Synchro version 6 software.

The resulting LOS for the study area intersections are shown in Figure 9. The capacity analysis shows that the intersections in the study area generally operate at overall acceptable conditions. The signalized intersection of Loughboro Road and Sibley's Main Entrance presently operate at LOS A for both the AM and PM peak hours; motorists experience nominal delay.

The Loughboro Road/Norton Road and MacArthur Boulevard signalized intersection operates at LOS D and LOS C during the AM and PM peak hours, respectively. It is important to note that motorists on the southbound approach experience marginally unacceptable delays due to the shared southbound left-turn movements from MacArthur Boulevard onto Loughboro Road.

The HCM calculations indicate that the STOP-controlled left-turn movement from Dalecarlia Parkway onto Loughboro Road presently operates at a LOS F during the AM peak hour. However, actual

observations, as well as SIMTraffic simulations suggest that the movement operation is acceptable, although some motorists may experience considerable delays in making left-turns onto Loughboro Road.

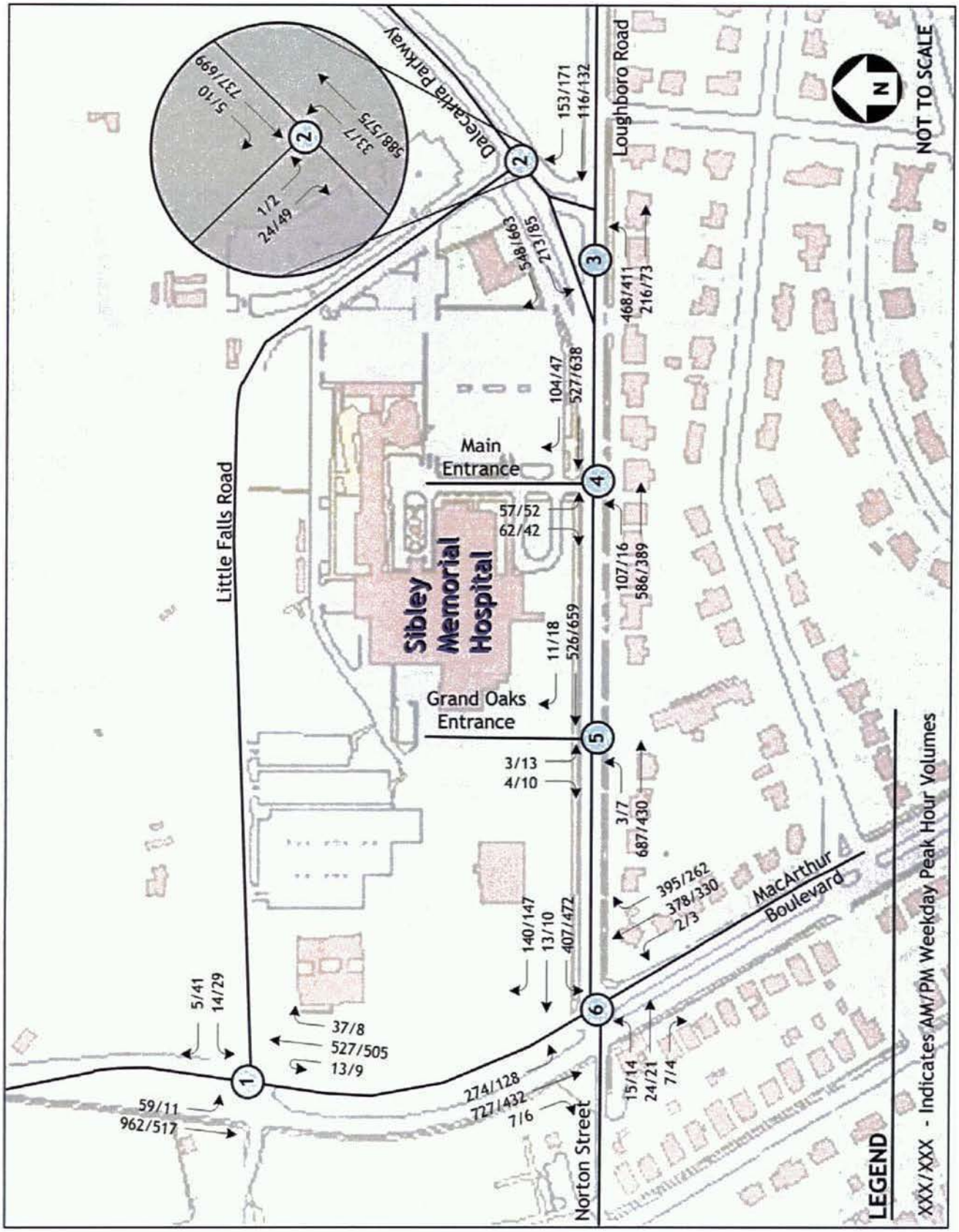

Figure 5 – Existing Peak Hour Traffic Volumes

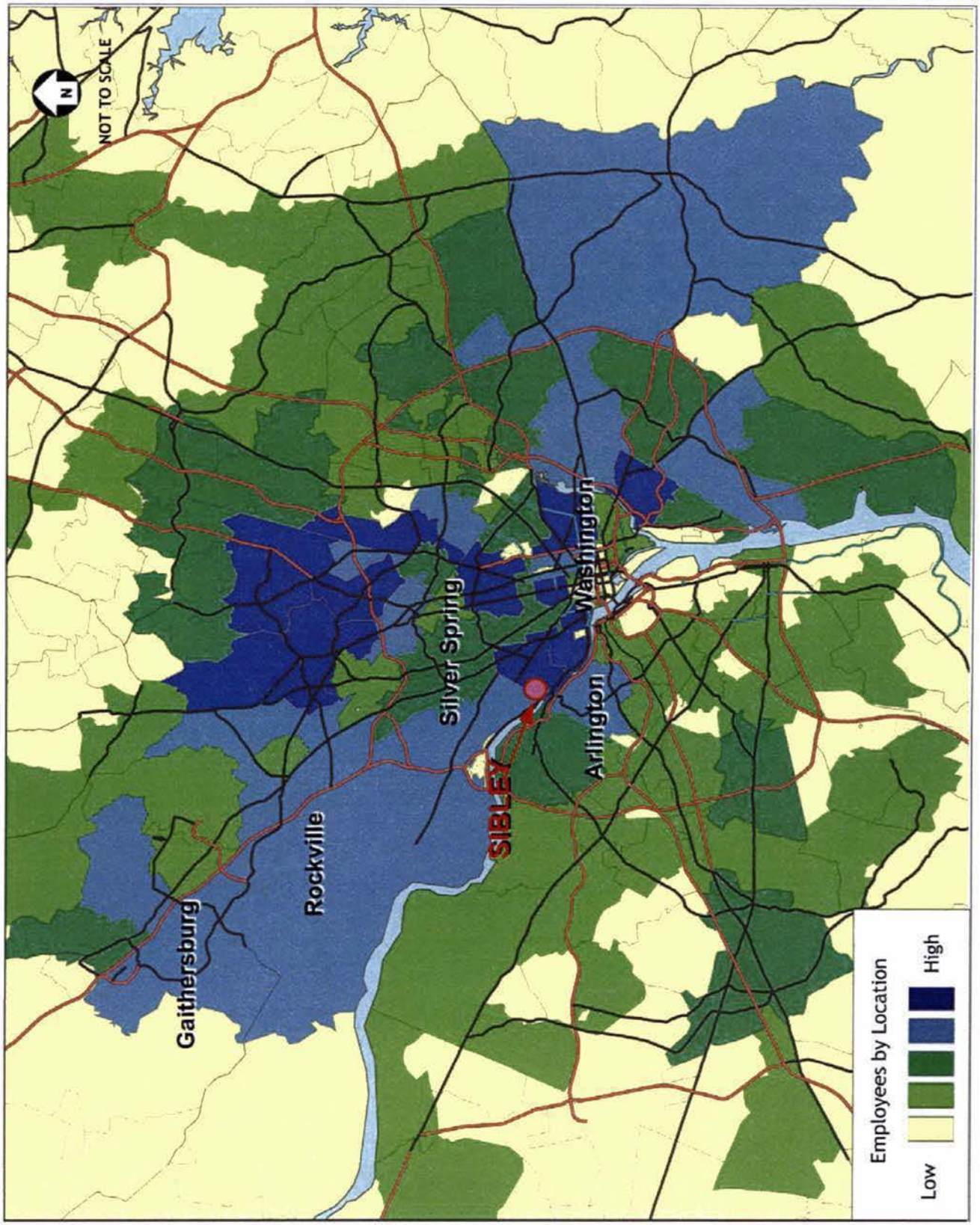

Figure 6 – Sibley Employees by Location

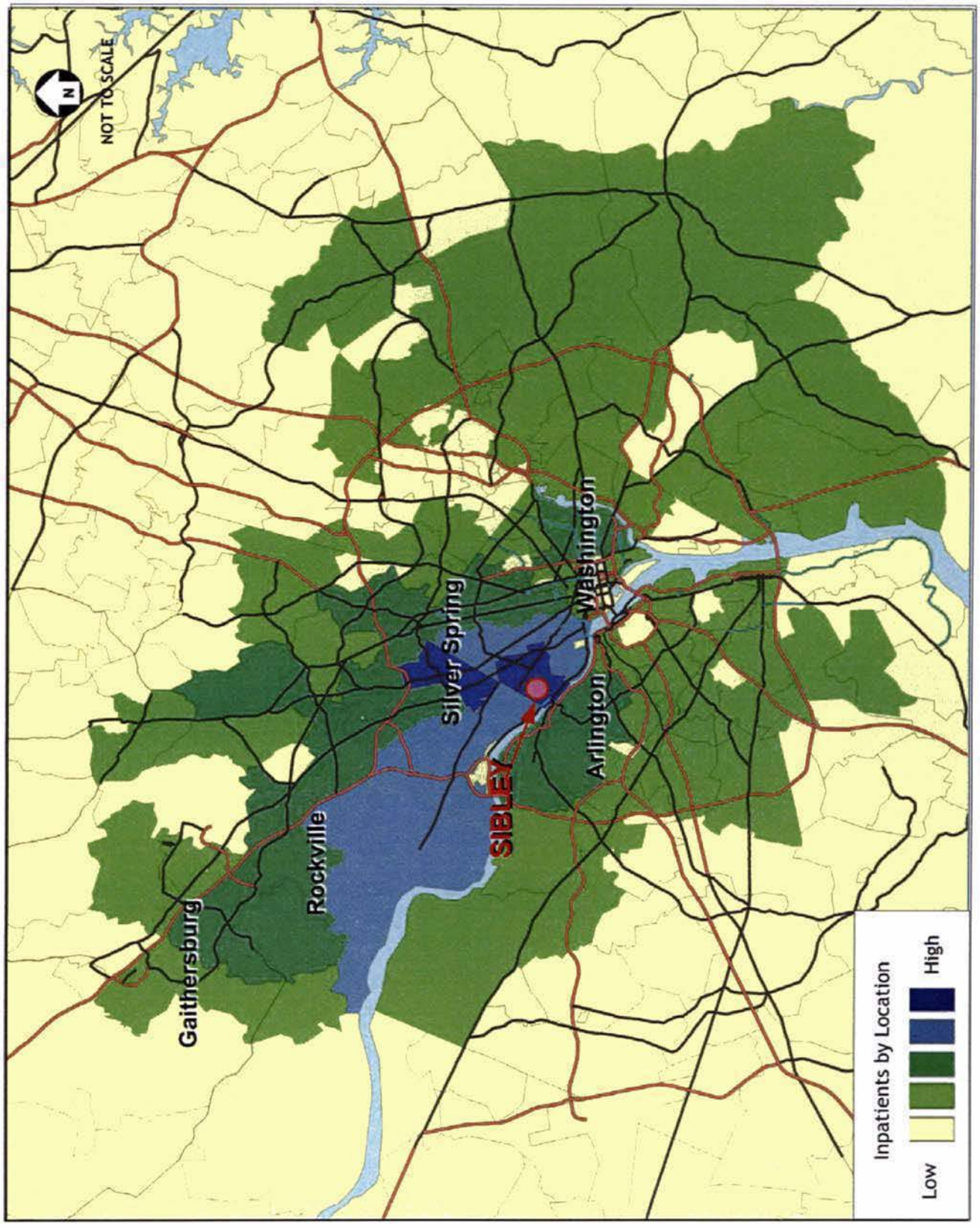

Figure 7 – Sibley Inpatients by Location

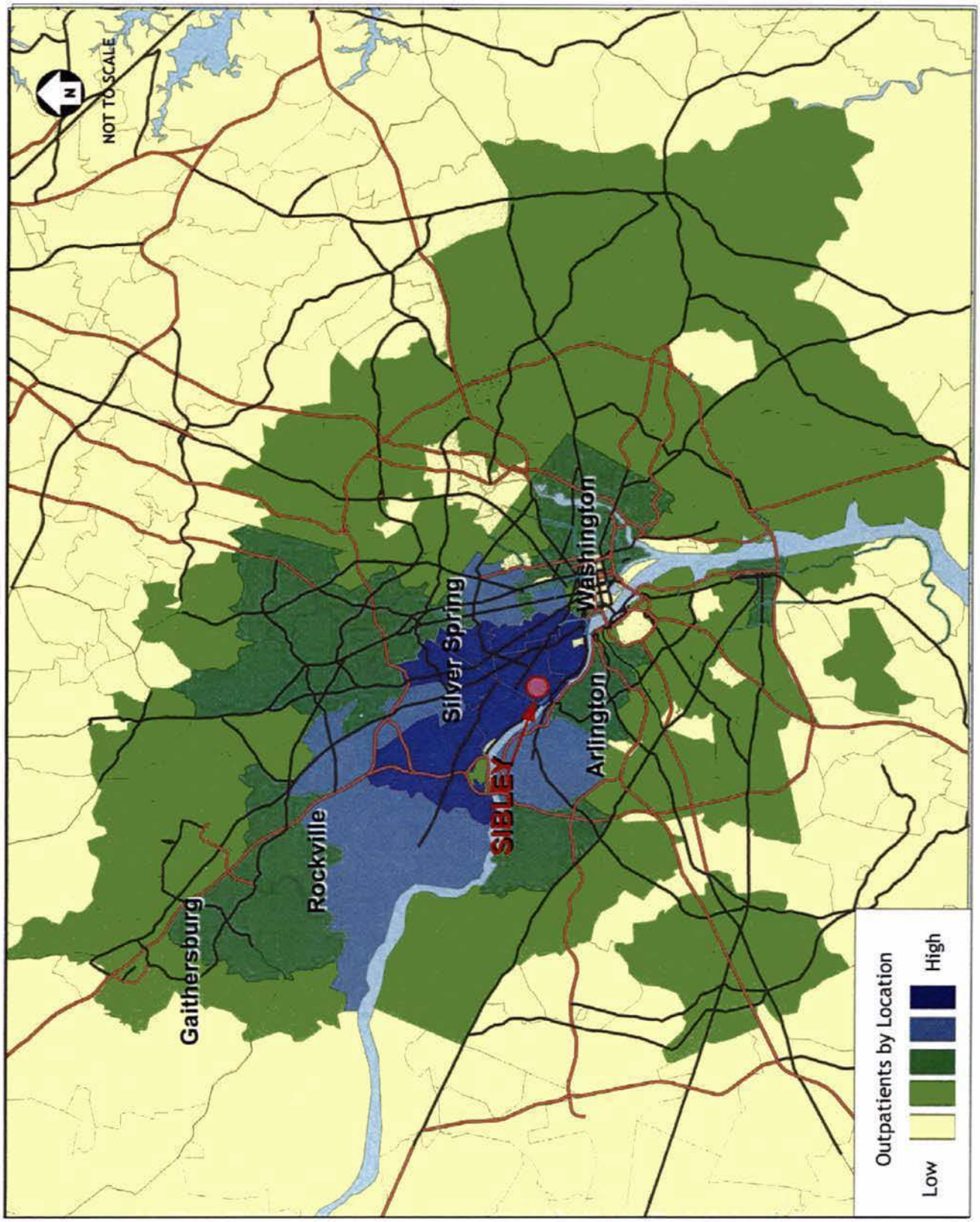

Figure 8 – Sibley Outpatients by Location

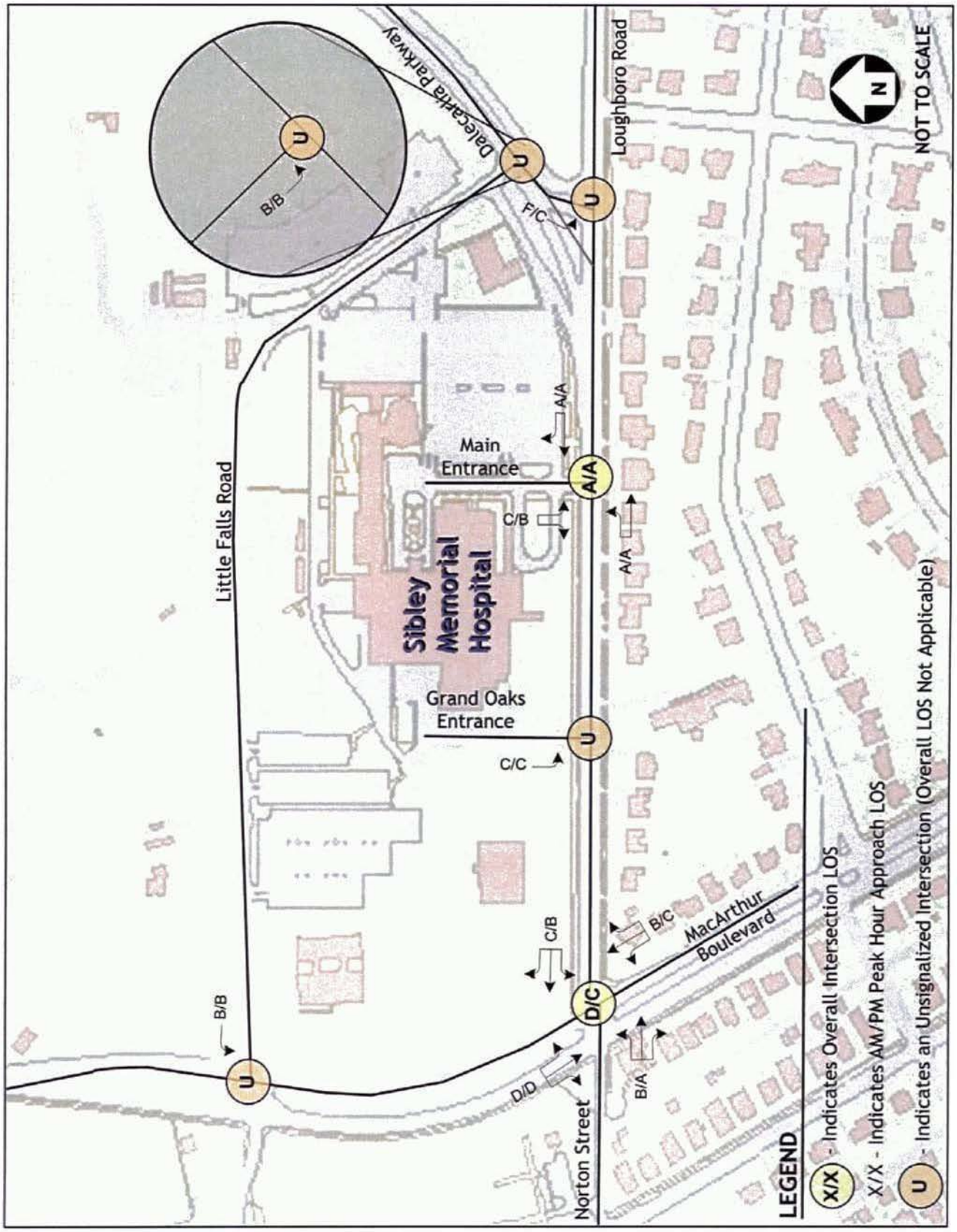

Figure 9 – Existing LOS Capacity Results

Table 2 – Existing Levels of Service

Intersection (Approach)	Existing Conditions			
	AM Peak Hour		*PM Peak Hour*	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
Little Falls Road and MacArthur Boulevard				
Westbound	14.2	B	11.9	B
Little Falls Road and Dalecarlia Parkway				
Eastbound	12.0	B	12.0	B
Dalecarlia Parkway and Loughboro Road				
Southbound	188.5	F	21.1	C
Loughboro Road and Main Hospital Entrance				
Overall	**6.2**	**A**	**3.9**	**A**
Eastbound	6.7	A	3.5	A
Westbound	2.3	A	3.1	A
Southbound	23.7	C	12.1	B
Loughboro Road and Grand Oaks Entrance				
Southbound	18.9	C	20.7	C
Loughboro Rd./Norton St. and MacArthur Blvd.				
Overall	**44.0**	**D**	**27.9**	**C**
Eastbound	17.5	B	8.7	A
Westbound	24.9	C	12.8	B
Northbound	16.5	B	28.1	C
Southbound	77.0	E	45.9	D

SIMTraffic (version 6.0) was used to create a model of the roadway network surrounding the Sibley Hospital site. The information gathered from the data collection efforts, as well general observations, were use to create and calibrate a model which reflects traffic operations.

The simulation results are included in the Appendix and summarized in Table 3. Table 3 shows the 95th percentile queues for the AM and PM peak hour. The 95th percentile queue is a worst-case scenario that is not necessarily ever observed. For instance, the queues will be better than this result 95% of the time. The longest 95th percentile queues occurred on the southbound approach of the Loughboro Road and MacArthur Boulevard intersection during both the AM and PM peak hours. The simulations also show that the Dalecarlia Parkway and Loughboro Road intersection presently experiences queues of 118 feet during the AM peak hour and 70 feet during the PM peak hour.

Table 3 – Simulation Results: Existing Queuing Conditions

Intersection Approach (Directions Served)	Existing Queuing Conditions	
	AM Peak Hour	*PM Peak Hour*
	95th Percentile Queue (feet)	95th Percentile Queue (feet)
Little Falls Road and MacArthur Boulevard		
Westbound	432	57
Southbound (Left-Through)	246	53
Southbound (Through)	262	-
Little Falls Road and Dalecarlia Parkway		
Eastbound	52	52
Northbound (Left)	-	25
Northbound (Through)	41	-
Southbound (Through-Right)	47	-
Southbound (Through)	158	-
Dalecarlia Parkway and Loughboro Road		
Eastbound	148	145
Westbound	9	8
Southbound	118	70
Loughboro Road and Main Hospital Entrance		
Eastbound	249	121
Westbound (Through)	84	78
Westbound (Through-Right)	68	69
Southbound	93	64
Loughboro Road and Grand Oaks Entrance		
Eastbound (Through-Left)	18	-
Southbound	34	39
Loughboro Road/Norton St. and MacArthur Blvd.		
Eastbound	37	36
Westbound (Left)	156	171
Westbound (Left-Through-Right))	176	184
Northbound (Left-Through)	133	174
Northbound (Through-Right)	192	134
Southbound (Left-Through)	675	314
Southbound (Through-Right)	723	282

Note: some approaches do not experience a measurable queue during the AM and/or PM peak hour.

FUTURE BACKGROUND CONDITIONS

Future Background conditions represent future traffic levels in 2008 if the MOB expansion was not built. These conditions are the basis for comparative evaluation to Total Future conditions, which will include traffic generated by the proposed MOB. In order to develop background traffic forecasts, a composite of existing traffic, traffic growth, and traffic from other area developments was used.

Future Background Developments

Background conditions are affected by any approved transit, roadway, or development project within the site study area. According to the District Department of Transportation (DDOT), there are not any approved roadway improvements planned near the project. A Transit improvement project, "Little Falls Road Transportation Study" by DMJM Harris for DDOT, is in our study area; however elements of the transportation study are already proposed in the Architectural plans submitted for Sibley. Another development, the U.S. Army Corps of Engineers' "Proposed Water Treatment Residuals Management Process for the Washington Aqueduct, Washington, D.C." is adjacent to the Sibley property at the Dalecarlia Reservoir. Impacts from this development are expected to be minimal and would include an increase in truck traffic by 6 trucks per day.

On the Sibley Hospital site, construction is underway to add an assisted living building to complement the existing services provided by Grand Oaks. Traffic generated by the new building will be added to Future Background conditions. The new residential building is not expected to generate many vehicle trips. The vast majority of Grand Oaks residents do not own cars, and those who do, rarely drive. Therefore, the trips that would be generated by the addition would predominately be visitors and service vehicles. A dedicated entrance to Grand Oaks is currently closed due to construction, but will be open upon completion of the project. Table 4 shows the anticipated trip generation for the new Grand Oaks building.

Table 4 – Grand Oaks Trip Generation

Land Use	ITE Land Use Code	Size	Trip Generation					
			AM Peak Hour			*PM Peak Hour*		
			In	Out	Total	In	Out	Total
Assisted Living	254	39 beds	3	2	5	4	5	9
Total Site Trip Generation			**3**	**2**	**5**	**4**	**5**	**9**

Traffic Growth

To account for an increase in traffic that may result from developments that were not known to be improved at the time of this study, or any other factor such as roadway improvements around the study area, a half-percent ambient growth rate was applied to the through and significant turning movements

along Loughboro Road, MacArthur Boulevard, and Dalecarlia Parkway. A half-percent ambient growth rate was selected because of historical traffic volume information for these roadways. This area has actually shown a minor decrease in traffic over the years 2000, 2001, and 2002 (latest information available from DDOT).

Future Background Traffic Forecast

Background traffic forecasts were developed based on a composite of existing traffic counts, impacts from Future Background developments, and traffic growth along Loughboro Road, MacArthur Boulevard, and Dalecarlia Parkway. Figure 10 shows the Future Background traffic volumes for the six study area intersections, including the re-opened Grand Oaks entrance.

Future Background Capacity Analysis

Future Background peak hour Levels of Service (without the MOB expansion) were calculated based on the following: existing lane use and traffic controls; the Future Background traffic volumes; and the *Highway Capacity Manual* (HCM) 2000 methodologies using the Synchro version 6 traffic software. Table 5 displays the results of the capacity analysis including the Levels of Service and average delay per vehicle in seconds. The Levels of Service for each intersection and their approaches are also illustrated in Figure 11. Copies of the LOS worksheets can be found in the Appendix.

The capacity analysis shows that all study area intersections will continue to operate similar to existing conditions. There will be no considerable change in the delays experienced by motorists when the growth and the trips from the assisted living dwellings are applied to existing traffic.

The southbound approach of the Loughboro Road/Norton Street and MacArthur Boulevard intersection continues to experience undue delay during the AM peak hour. The signal operations of this intersection could be improved if the southbound movement was given an advanced time with a left-turn arrow (i.e., ahead of, or leading, the northbound movements). This would reduce blockage of the southbound shared lane and improve the overall operation of the intersection. These mitigation measures were implemented in the analysis and are also shown in Table 5. The intersection would operate at an overall LOS C for both the AM and PM Peak and each movement would operate at a LOS C or better.

The southbound STOP-controlled approach at the Dalecarlia Parkway and Loughboro Road intersection would continue to experience long delays as motorists make the left-turn movement from Dalecarlia Parkway onto Loughboro Road.

The Future Background conditions were simulated using the SIMTraffic model developed from Existing conditions. The additional traffic as a result of growth as well as the improvements to the Loughboro Road and MacArthur Boulevard intersection was also included in the simulation to determine the Future Background conditions of 2008 (without Sibley being built). The simulation

revealed that the roadway network surrounding Sibley would operate acceptably.

A copy of the SIMTraffic queuing report for the network is included in the Appendix and the analysis results are summarized in Table 6. Table 6 shows that the southbound movement of the Loughboro Road and MacArthur Boulevard intersection would experience significant reduction in queuing as compared to Existing conditions without improvement in the signal timings; the shared left-turn lane would experience a 95th percentile queue of 358 feet or about 13 to 15 cars. Should the signal timing improvements be implemented, motorists at this movement would experience reduced queue lengths especially during the AM peak hour.

The Dalecarlia Parkway and Loughboro Road intersection would experience queues of approximately 320 feet (120 feet + 200 feet) during the AM peak hour. This implies that traffic from this intersection would block the upstream intersection of Little Falls Road and Dalecarlia Parkway. Sibley plans to work with DDOT to place signs at this intersection notifying motorists not to block the intersection. According to simulation results, blockage may occur over 80% of the time.

Table 5 – Future Background Levels of Service

Intersection (Approach)	Future Background Conditions			
	AM Peak Hour		*PM Peak Hour*	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
Little Falls Road and MacArthur Boulevard				
Westbound	14.3	B	12.0	B
Little Falls Road and Dalecarlia Parkway				
Eastbound	12.1	B	12.7	B
Dalecarlia Parkway and Loughboro Road				
Southbound	215.2	F	22.0	C
Loughboro Road and Main Hospital Entrance				
Overall	**6.3**	**A**	**3.9**	**A**
Eastbound	6.8	A	3.5	A
Westbound	2.3	A	3.1	A
Southbound	24.9	C	12.3	B
Loughboro Road and Renaissance Entrance				
Southbound	19.4	C	21.1	C
Loughboro Rd./Norton St. and MacArthur Blvd.				
Overall	**53.3**	**D**	**30.3**	**C**
Eastbound	17.5	B	8.7	A
Westbound	25.1	C	12.9	B
Northbound	16.7	B	28.5	C
Southbound	98.0	F	52.5	D
Loughboro Rd./Norton St. and MacArthur Blvd.				
Overall (Imp: Leading Southbound Movement)	**28.5**	**C**	**24.0**	**C**
Eastbound	21.3	C	18.0	B
Westbound	32.2	C	28.4	C
Northbound	28.3	C	25.8	C
Southbound	26.9	C	17.9	B
MacArthur Boulevard and Grand Oaks Entrance				
Southbound	10.2	B	10.0	B

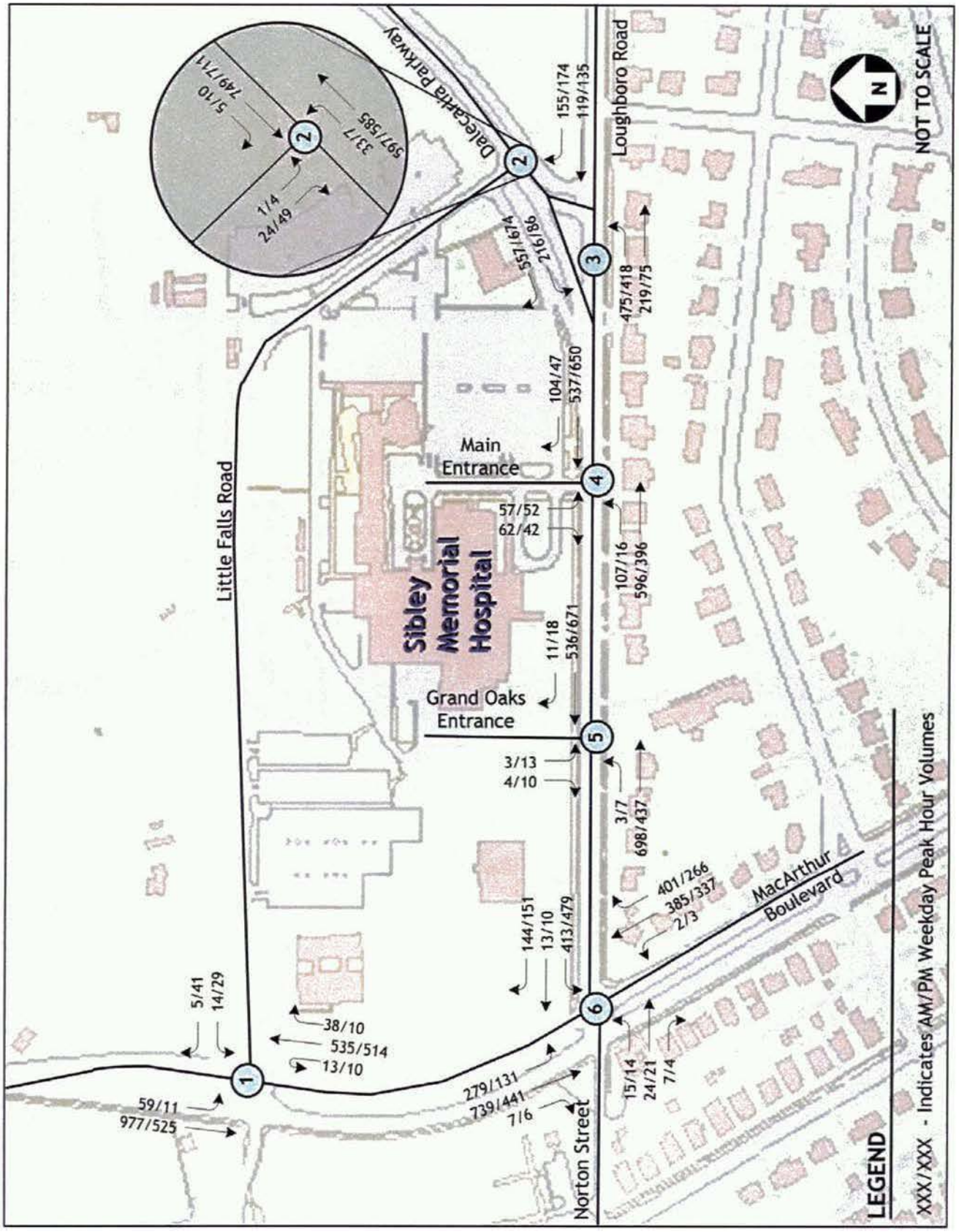

Figure 10 – Future Background Traffic Forecast 2008 (without development)

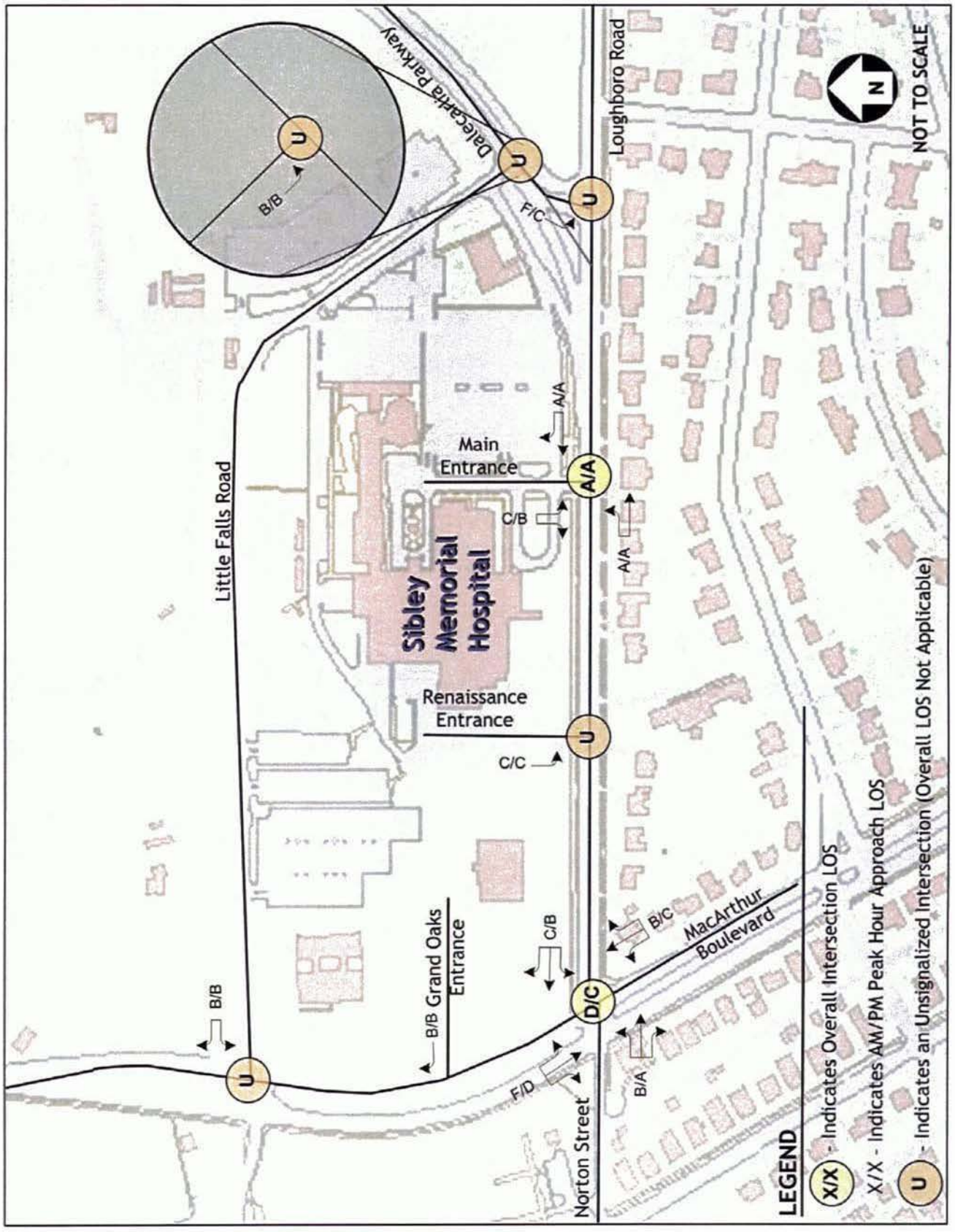

Figure 11 – Future Background LOS Capacity Results

Table 6 – Simulation Results: Background Queuing Conditions

Intersection Approach (Directions Served)	Background Queuing Conditions	
	AM Peak Hour	*PM Peak Hour*
	95th Percentile Queue (feet)	95th Percentile Queue (feet)
Little Falls Road and MacArthur Boulevard		
Westbound	54	53
Northbound (U-turn)	45	32
Northbound (Through-Right)	84	-
Southbound (Left-Through)	88	15
Southbound (Through)	28	-
Little Falls Road and Dalecarlia Parkway		
Eastbound	103	43
Northbound (Left)	30	10
Northbound (Through)	0	-
Southbound (Through-Right)	86	-
Southbound (Through)	200	10
Dalecarlia Parkway and Loughboro Road		
Eastbound	195	109
Westbound	-	20
Southbound	120	79
Loughboro Road and Main Hospital Entrance		
Eastbound	220	34
Westbound (Through)	85	85
Westbound (Through-Right)	63	69
Southbound	96	75
Loughboro Road and Grand Oaks Entrance		
Eastbound (Through-Left)	26	34
Southbound	-	39
Loughboro Road and MacArthur Blvd.		
Eastbound	31	19
Westbound (Left)	192	166
Westbound (Left-Through-Right))	197	151
Northbound (Left-Through)	139	159
Northbound (Through-Right)	206	183
Southbound (Left-Through)	358	259
Southbound (Through-Right)	325	238
Loughboro Road and MacArthur Blvd. (Improve)		
Eastbound	38	19
Westbound (Left)	208	166
Westbound (Left-Through-Right))	221	151
Northbound (Left-Through)	184	159
Northbound (Through-Right)	216	183
Southbound (Left-Through)	291	259
Southbound (Through-Right)	252	238
Loughboro Road and Grand Oaks Entrance		
Westbound (Right-Out)	15	15

Note: some approaches do not experience a measurable queue during the AM and/or PM peak hour.

TOTAL FUTURE TRAFFIC CONDITIONS

The Total Future traffic conditions represent future traffic in the study area including existing traffic, background growth, and traffic generated by the MOB expansion.

Development Program

The Lucy Webb Hayes Training School for Deaconesses and Missionaries on behalf of Sibley Memorial Hospital (Sibley) is planning to upgrade/expand existing Hospital facilities as shown in Figure 12. The proposed plan consists of building a new medical office and outpatient services building (approximately 130,700 square feet gross floor area) and an approximately 750-space parking garage.

Proposed Roadway Re-alignment

The proposed Architectural plan also shows improvements to the existing Hospital entrance off Dalecarlia Parkway and a geometric modification of the intersection at Dalecarlia Parkway and Loughboro Road (pending community and DDOT support). The proposed modification to Dalecarlia Parkway and Loughboro Road would create a safer intersection from a design standpoint, but a safety analysis has not been completed. The improved Hospital entrance at Dalecarlia Parkway will continue to service emergency traffic, but will also provide access for doctors, employees, visitors to the MOB and new parking garage.

Parking Supply

The Sibley Memorial Hospital parking policy is based on the Hospital's mission as a major healthcare service provider and its objective of being a good neighbor. This requires that the hospital always providing adequate parking because patients and their families require the comfort and convenience of driving to the Hospital, healthcare workers' shifts preclude most staff from using public transportation, and doctors require a high level of mobility for emergencies.

The MOB project will increase the parking supply at Sibley from 1,464 spaces (includes 37 spaces at Grand Oaks) to a new total of approximately 1,885 spaces – a net increase of 421 parking spaces as shown in Table 7. This increase includes a new parking garage with approximately 750 spaces and the elimination of approximately 329 existing surface parking spaces due to the construction of the new medical office building and the parking garage.

Sibley Hospital further conducted a survey and internal audit of the present parking on campus. The survey revealed that on a daily basis approximately 360 parking spaces remained unused. The addition of the 421 net parking spaces would result in a total of 781 spaces for the 130,000 S.F medical office building. This would result in a parking ratio of 6 spaces per 1,000 S.F.

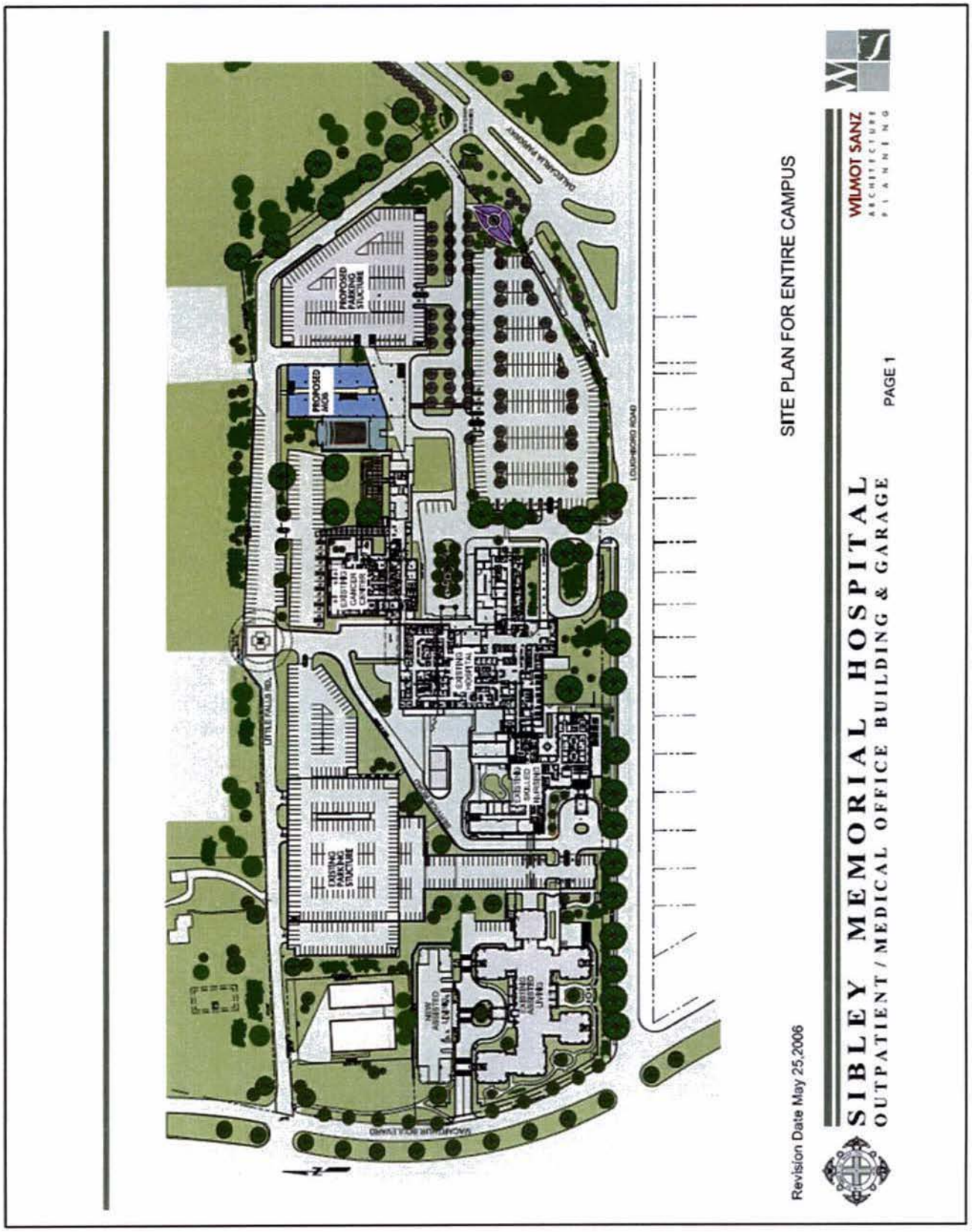

Figure 12 – Architectural Site Plan

Table 7 – Future Parking Supply

Parking Lot	Number of Spaces	Spaces To Be Removed	Spaces To Be Added	Spaces After MOB
Doctor Parking				
Front Lot	62	(62)		0
Rear Lot	46	(46)		0
Visitor Parking				
Visitor's Lot	232	(17)		215
Hayes Oncology (Patient Only)	14	(14)		0
Lot 9 (Grand Oaks)	37			37
Employee Parking				
Lot 1	169	(169)	750[1]	750
Lot 2[2]	80	(21)		59
Lot 3 (Fence line)	47			47
Lot 4 (Old Lot)	72			72
Lot 4 (Deck Garage)	156			156
Lot 5 (Garage)	195			195
Lot 6 (Garage)	178			178
Lot 7 (Garage)	103			103
Renaissance Patient Parking				
Lot 8	73			73
Total for Site	**1464**	**(329)**	**750**	**1885**

Note (1): Lot 1 will become MOB Garage and provide doctor, visitor, and employee parking.
Note (2): Lot 2 will be shared among employees and Hayes Oncology patient parking.

The Hospital planning team developed the new parking plan to be consistent with the Hospital's current parking policy. The new medical office building will generate the need for some additional parking for doctors. Most of the tenants at the new building will be doctors who already park at the hospital, but the new building may attract additional doctors, and there will be less turnover in doctor's parking since they will be able to serve their patients' hospital and office visit needs from this one location. Figure 13 shows the location and designation of the parking areas, as well as the anticipated traffic routing to each.

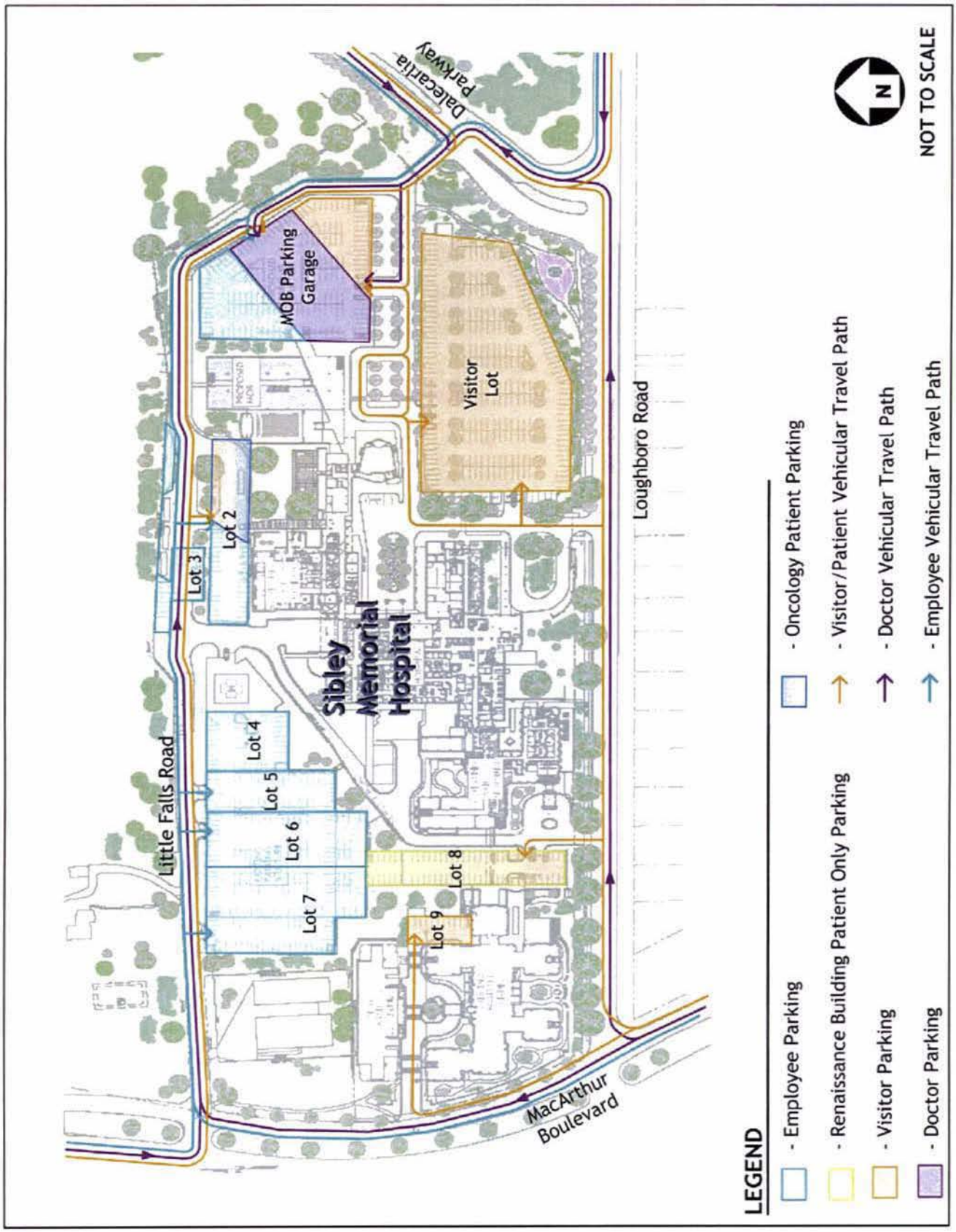

Figure 13 – Sibley Parking Locations and Routing Map

Trip Generation

It is not expected that all of the traffic generated by the new MOB will be new traffic. It is likely that many of the doctors and patients, who currently use Sibley facilities, will continue to do so in this new location. Many of the trips are also expected to have a shared purpose, i.e. a doctor's appointment and a laboratory test conducted on the same visit.

The trip generation shown in Table 8 is a conservatively high estimate of the number of trips that will be generated by the new MOB. The number of trips generated by the proposed development was based on the rates and equations published by the Institute of Transportation Engineers (ITE), *Trip Generation*, 7th edition. A transit reduction rate of 10% was applied to the trips based results found in a commuter survey prepared by Sibley in 2003. With the reduction applied, a total of 292 AM peak hour trips (230 in and 62 out) and 365 PM peak hour trips (99 in and 266 out) are forecasted to be generated by this development. This represents approximately 6% and 9% of the total vehicular traffic on the surrounding roadway network, for the AM and PM peak hours, respectively.

Table 8 – Site Trip Generation

Land Use	ITE Land Use Code	Size	Trip Generation					
			AM Peak Hour			*PM Peak Hour*		
			In	Out	Total	In	Out	Total
Medical Office Building	720	130,700 SF	256	68	324	110	296	406
Transit Reduction		10%	(26)	(7)	(32)	(11)	(30)	(41)
Total Site Trip Generation			**230**	**62**	**292**	**99**	**266**	**365**

Trip Distribution

The site-generated traffic volumes were assigned to the roadway network based on existing travel patterns identified during data collection, GIS mapping, and locations of parking facilities. Figure 14 shows the site-generated traffic volumes, as well as the directions of approach for vehicles accessing the surrounding roadway network and site access entrances.

Total Future Traffic Forecast

The site-generated traffic assignments were combined with the Future Background traffic forecasts to yield the Total Future traffic forecasts associated with the complete build-out of the new MOB expansion on the Sibley campus and are shown in Figure 15.

Total Future Capacity Analysis

Total Future peak hour Levels of Service (including the build-out of the new MOB) were calculated based on the following: existing lane use and traffic controls; the Total Future traffic volumes; and the Highway Capacity Manual (HCM) 2000 methodologies using the Synchro, version 6, traffic software.

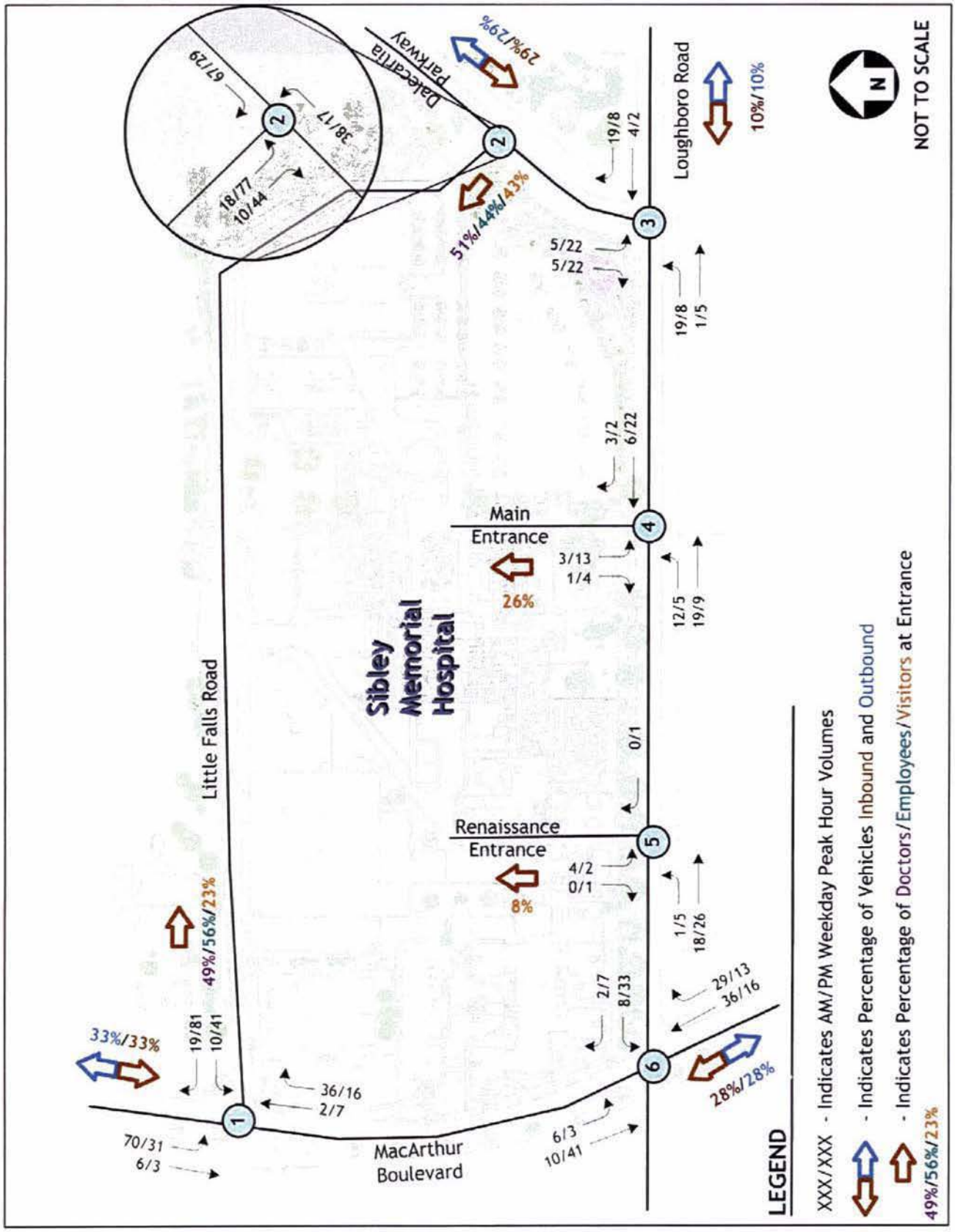

Figure 14 – Site-Generated Traffic Volumes and Directions of Approach

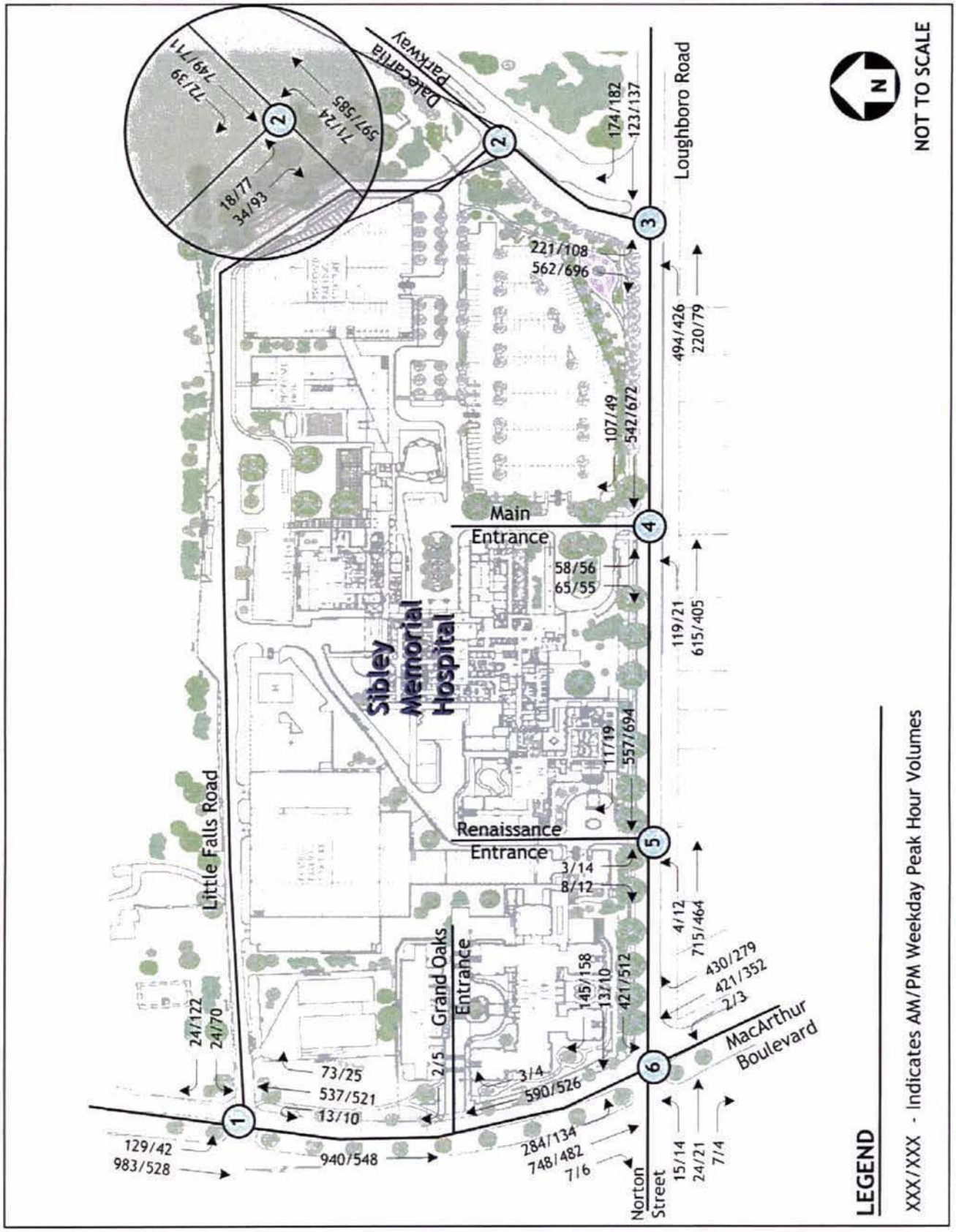

Figure 15 – Total Future Traffic Forecast 2008 (with development)

Table 9 displays the results of the capacity analysis including the Level of Service and average delay per vehicle in seconds. Copies of the LOS calculation worksheets can be found in the Appendix.

The resulting LOS for the study area intersections are shown in Figure 16. The capacity analysis shows that the roadway network and the intersections of the study area will continue to operate at overall acceptable conditions with ambient growth in traffic, as well as with the addition of traffic forecasted for the Sibley improvements.

Table 9 – Total Future Levels of Service

Intersection (Approach)	Future Background Conditions			
	AM Peak Hour		*PM Peak Hour*	
	Delay (sec/veh)	Level of Service	Delay (sec/veh)	Level of Service
Little Falls Road and MacArthur Boulevard				
Westbound	15.3	C	14.6	B
Little Falls Road and Dalecarlia Parkway				
Eastbound	23.0	C	38.4	E
Dalecarlia Parkway and Loughboro Road				
Southbound	143.9	F	41.8	C
Loughboro Road and Main Hospital Entrance				
Overall	**8.0**	**A**	**4.5**	**A**
Eastbound	10.2	B	4.3	A
Westbound	2.7	A	3.7	A
Southbound	23.4	C	11.0	B
Loughboro Road and Renaissance Entrance				
Southbound	16.7	C	22.6	C
Loughboro Rd./Norton St. and MacArthur Blvd.				
Overall	**61.5**	**E**	**36.4**	**D**
Eastbound	17.5	B	8.7	A
Westbound	25.4	C	13.4	B
Northbound	17.4	B	29.0	C
Southbound	119.0	F	70.4	E
Loughboro Rd./Norton St. and MacArthur Blvd.				
Overall (Imp: Leading Southbound Movement)	**29.4**	**C**	**25.0**	**C**
Eastbound	21.3	C	18.0	B
Westbound	32.6	C	29.8	C
Northbound	29.8	C	26.2	C
Southbound	27.7	C	18.9	B
MacArthur Boulevard and Grand Oaks Entrance				
Southbound	10.4	B	10.1	B

Table 10 shows that queuing will be relatively consistent with Future Background conditions for much of the roadway network. There would be slight increases in the queues at the entrances to the Hospital; however these are accommodated throughout the network without significant queuing impacts.

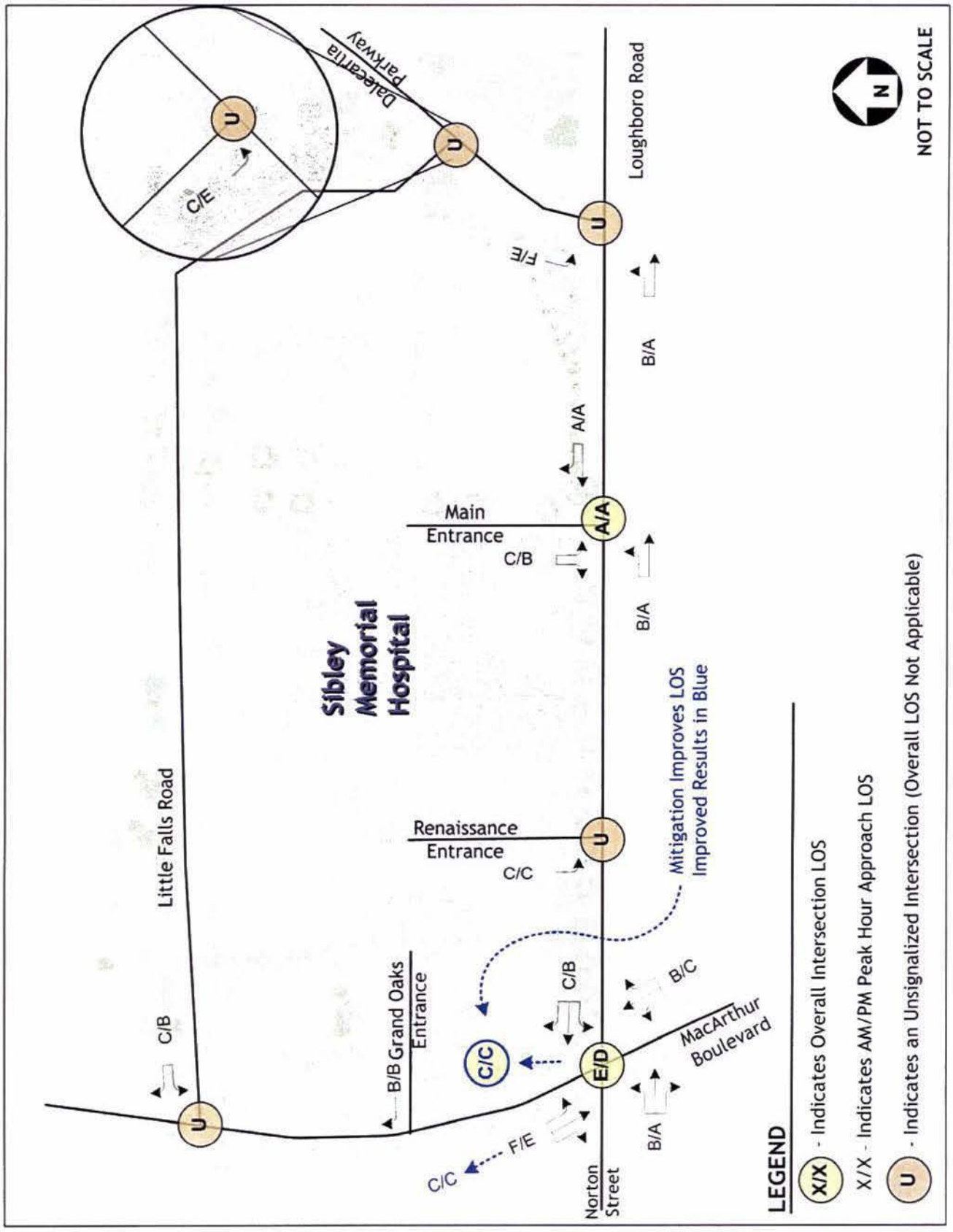

Figure 16 – Total Future LOS Capacity Results

Table 10 – Simulation Results: Total Future Queuing Conditions (with Improvements)

Intersection Approach (Directions Served)	Total Future Queuing Conditions	
	AM Peak Hour	*PM Peak Hour*
	95th Percentile Queue (feet)	95th Percentile Queue (feet)
Little Falls Road and MacArthur Boulevard		
Westbound	89	121
Northbound (U-Turn)	69	15
Northbound (Through-Right)	15	-
Southbound (Left-Through)	160	57
Southbound (Through)	87	-
Little Falls Road and Dalecarlia Parkway		
Eastbound	173	79
Northbound (Left)	73	43
Northbound (Through)	39	-
Southbound (Through-Right)	328	-
Southbound (Through)	347	-
Dalecarlia Parkway and Loughboro Road		
Eastbound	239	154
Westbound	17	32
Southbound (Left)	279	166
Southbound (Right)	300	212
Loughboro Road and Main Hospital Entrance		
Eastbound	396	112
Westbound (Through)	82	71
Westbound (Through-Right)	118	95
Southbound	96	63
Loughboro Road and Grand Oaks Entrance		
Eastbound (Through-Left)	112	47
Southbound	32	43
Loughboro Road and MacArthur Blvd.		
Eastbound	37	30
Westbound (Left)	239	234
Westbound (Left-Through-Right))	249	243
Northbound (Left-Through)	215	172
Northbound (Through-Right)	238	215
Southbound (Left-Through)	343	187
Southbound (Through-Right)	293	171
Loughboro Road and Grand Oaks Entrance		
Westbound (Right-Out)	17	17

Note: some approaches do not experience a measurable queue during the AM and/or PM peak hour.

CONCLUSION

The traffic capacity analyses detailed in the study found the following conditions:

- *Existing*

  Under Existing conditions, the roadway network in the study area generally operates at acceptable conditions during the AM and PM peak periods.

  The southbound approach of the MacArthur Boulevard and Loughboro Road intersection experiences marginally unacceptable delays due to the shared left-turn movement from MacArthur Boulevard onto Loughboro Road.

  The STOP-controlled left-turn movement from Dalecarlia Parkway onto Loughboro Road presently operates at a LOS F during the AM peak hour. However, actual observations, as well as SIMTraffic simulations suggest that the movement operation is acceptable, although some motorists may experience considerable delays in making left-turns onto Loughboro Road.

- *Future Background (2008) – without MOB expansion*

  With ambient growth in traffic up to the build-out year (2008) and the addition of background traffic from Grand Oaks, the study intersections continue to operate similar to Existing conditions, with only slight increases in delay.

  The southbound approach of the MacArthur Boulevard and Loughboro Road intersection would experience further decline in LOS, however with adjustment to the signal timings, operations could be improved to a LOS C or better.

- *Total Future (2008) – with MOB expansion*

  The study intersections, under Total Future conditions (with Sibley Hospital traffic) would continue to operate similar to Future Background conditions.

  Even with the proposed intersection reconfiguration, the STOP-controlled left-turn movement from Dalecarlia Parkway onto Loughboro Road would maintain a LOS F during the AM peak hour, and would be slightly worse in LOS in the PM peak. SIMTraffic results reflect acceptable operations in the both peaks, although some motorists may experience considerable delays in making left-turns onto Loughboro Road.

Based on these results, the Medical Office Building expansion at Sibley Memorial Hospital will not have a negative impact on the surrounding roadway network. The addition of the Medical Office Building traffic does not have significant impact as these additional trips can be accommodated by the current roadway configuration.

COMMUNITY CONCERNS AND RESPONSES

This chapter is an addendum to the traffic study to address questions from the community that were raised in working group meetings. Although these questions were outside the general requirements and the scope of work as agreed to by the District Department of Transportation (DDOT), the items discussed below were addressed to respond to the community in good faith.

1) Estimate of the average daily traffic (ADT) generated by the MOB and how this would affect the ADT on the existing road network.

The network of roads in the study area includes MacArthur Boulevard, Dalecarlia Parkway, Loughboro Road, and Little Falls Road. The number of trips generated by the proposed development was estimated based on the rates and equations published by the Institute of Transportation Engineers (ITE), *Trip Generation*, 7th edition. Estimates of the morning and afternoon peak hour traffic volumes and the average daily traffic (for weekdays) are shown in the trip generation table below. These AM and PM peaks represent the one-hour trip generation of the medical office building (MOB) coinciding with the peak hour of the adjacent street during the morning and afternoon commutes. The daily trips represent trips generated over a 24-hour period; however given the expected hours of operation of a typical medical office building, the traffic represents 6:00 AM to 7:00 PM operations, depending on the individual practices.

By definition, ITE's trip generation rates are derived from data collected at single-use developments where virtually all access to the development is 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.

Under a worst case scenario estimate, a conservatively low transit reduction rate of 10% was applied to the trips based on results found in a commuter survey prepared by Sibley in 2003. This reflects only the alternate mode choice of staff personnel; there is no transit reduction for physicians and visitors to the hospital. With this reduction applied, a total of 292 AM peak hour trips (230 in and 62 out), 365 PM peak hour trips (99 in and 266 out), and 4,616 daily trips are expected to be generated by this development. This represents approximately 6%, 9% and 8% of the total vehicular traffic on the surrounding roadway network, for the AM peak hour, PM peak hour and daily traffic, respectively.

Synergy is expected between Sibley Hospital and the proposed MOB; a high percentage of physicians practicing at the existing Sibley Hospital will have their offices in the new MOB. This will effectively reduce the number of doctors' vehicular trips on the roadways since (depending on the practice) many physicians will not have to make vehicular trips between the hospital and their otherwise remotely located medical offices.

Table 11 – Trip Generation without synergy reductions

Land Use	ITE Code	Size	Trip Generation								
			AM Peak Hour			PM Peak Hour			Weekday		
			In	Out	Total	In	Out	Total	In	Out	Total
Medical Office Building	720	130,700 SF	256	68	324	110	296	406	2565	2565	5129
Transit Reduction		10%	(26)	(7)	(32)	(11)	(30)	(41)	(256)	(256)	(513)
Total Site Trip Generation without synergy			**230**	**62**	**292**	**99**	**266**	**365**	**2308**	**2308**	**4616**

It is also expected that synergy will be realized when patients requiring various tests and treatment (such as x-rays) prescribed by physicians at the MOB use these services offered by the Hospital. In the interest of providing a conservatively high preliminary estimate of the traffic associated with the new MOB and develop a worst case scenario, these synergies were not considered in an earlier ADT memo to the community (dated April 06, 2006). However, since information relating to the services being shifted from the Hospital to the MOB is available, a more accurate estimate is calculated herein.

According to data received from Sibley Memorial Hospital, approximately 80% of physicians who will be working at the MOB are already doing rounds at the existing Sibley Memorial Hospital. These physicians presently do rounds on patients at least once or twice per day, and sometimes three times within the day. At an average 2.5 physician trips per day, 80 physicians would total approximately 240 trips.

Additionally, the services that would be moved from the existing hospital to the new MOB will include: Outpatient's CT (80 trips per day), Outpatient's Ultra Sound (16 trips per day), All Diagnostic Imaging (154 trips per day), and Surgery Center cases (30 trips per day). The Data Center employees (50 trips per day) and the Surgery center employees (20 trips per day) would also be shifted. These synergies combine for a total of 590 trips per day as shown in the following Table 12.

When these synergy trips are deducted from the total daily trips estimated in Table 11, the total daily trips expected to be generated by the MOB will be approximately 4,026 trips per day.

Table 12 – Hospital/MOB Synergy

MOB/Hospital Synergistic Component	Average Daily Trips (ADT)
Physicians	240
Outpatient's CT	80
Outpatient's Ultra Sound	16
All Diagnostic Imaging	154
Surgery Center	30
Data Center Employees	50
Surgery Center Employees	20
Total Synergistic Trips	**590**

The total site-generated ADT (4,026 trips) were assigned to the roadway network based on existing travel patterns identified during data collection, GIS mapping of place of residence of the various user classes, and locations of parking facilities. The resulting trips were compared with the ADT on each major roadway to determine the impact of the new MOB traffic on each roadway. The figure (on page 4) shows that McArthur Boulevard would realize an approximate 7% increase in average daily traffic; Dalecarlia would see approximately 7% increase at the Dalecarlia Parkway/Little Falls Road intersection and north of this point; while the increase on Loughboro Road will be approximately 4% to 5%.

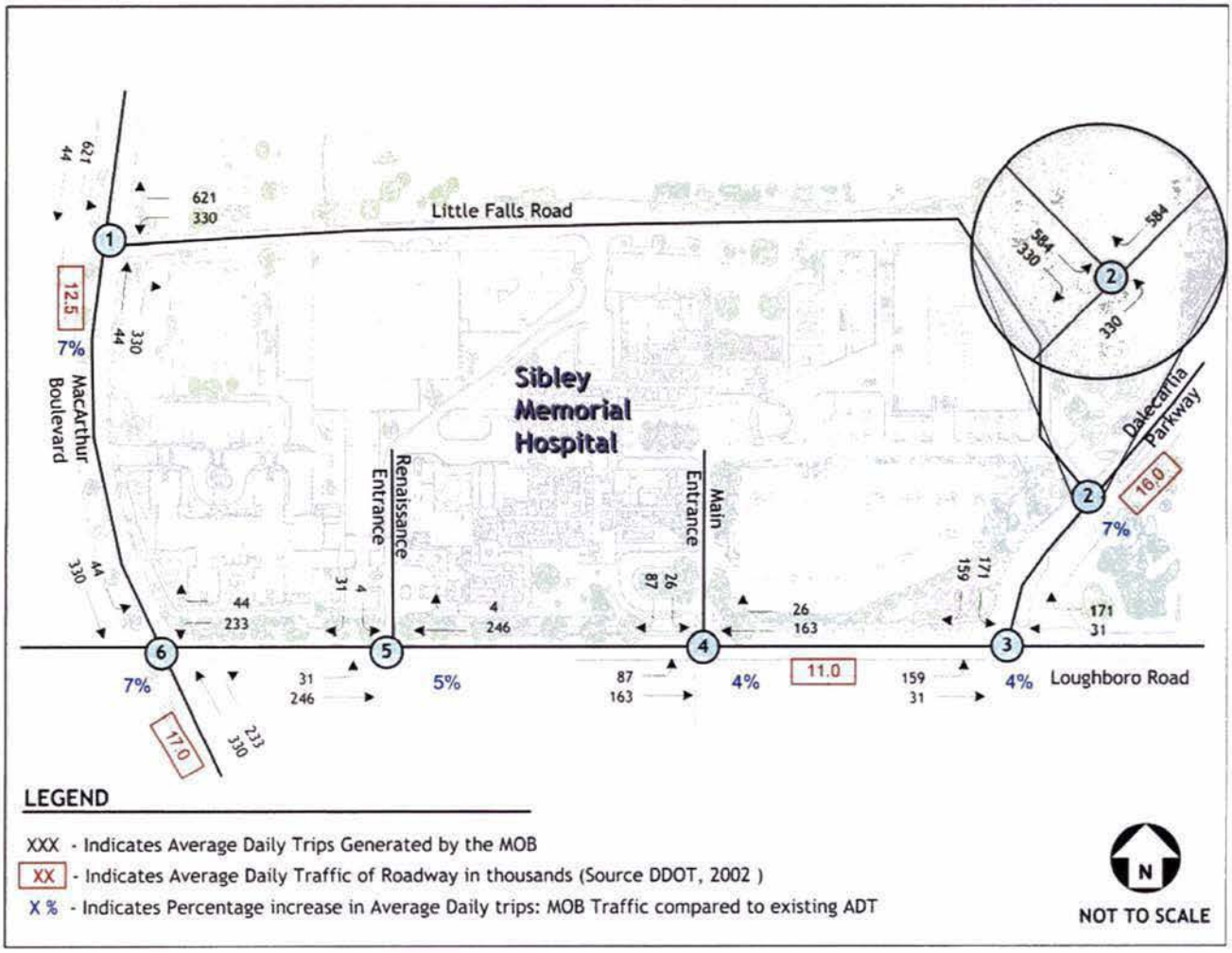

Figure 17 – Existing Average Daily Traffic (ADT) compared to ADT of the MOB

2) Level of Service (LOS) for the eastbound left-turn movement at Loughboro Road and Dalecarlia Parkway.

The eastbound movement at the Loughboro Road/Dalecarlia Parkway intersection is a shared movement (left-thru) and is therefore never normally reported as separate movements. However, since the left-turn from Loughboro Road to Dalecarlia Parkway is significantly heavier than the thru movement, the LOS of the approach is reflective of the LOS for the left-turn movement. This is confirmed in the analysis; the eastbound left-turn movement at Loughboro Road and Dalecarlia Parkway will operate at a LOS C.

3) What are the traffic conditions of the roadway during off peak hours?

Gorove/Slade Associates, Inc. observed traffic in the study area during off-peak hours between 6:30 a.m. and 8:00 a.m., and 2:30 p.m. and 4:00 p.m. to determine the traffic conditions at the time of the 7:00 a.m. and 3:00 p.m. shift changes for the hospital. Our observations revealed that traffic on the roads within the study area is very light during these hours. There was little or no queuing at the study intersections, and traffic moved freely along the roads. This is consistent with the argument that the heaviest traffic in the study area occurs during the commuter morning and afternoon peaks, and is due to vehicles passing through the area to get to other destinations.

4) Address traffic and parking concerns on Palisades Lane.

As it pertains to traffic, the analysis of the ADT and peak hour conditions on Loughboro Road showed that the MOB will increase the traffic by an average of 6% (between 7% and 5% on different roadways) per day in the immediate vicinity of the hospital, and this increase will be less at the intersection of Loughboro Road and Palisades Lane. An estimate of the ADT in the vicinity of Palisades Lane reveals that just over 450 vehicles per day would be added to Loughboro Road with the new MOB. This would be an increase of about three cars along Loughboro Road every five minutes, which would not be enough to adversely impact traffic on either road. Observations were done to evaluate the parking conditions on Palisades Lane. Time stamped photos were taken of Palisades Lane showing the number of parked vehicles over a two week period (See Figures on pages 5 and 6). The observations and photos showed that parking was abundant. Over the period observed, only one vehicle parked along Palisades Lane was found to be associated with Sibley Hospital. All other vehicles were linked to residents of Palisades Lane.

5) Address pavement marking concerns at Loughboro Road and Arizona Avenue.

Although this issue was outside the scope of the traffic study the community's concerns were relayed and discussed in a meeting with DDOT Staff. The Traffic Services Division promised to address the concerns of the community.

Figure 18 – Time elapsed photos of Palisades Lane (03/09/2006 – 03/14/2006)

Date: 3/15/2006 @ 13:30 Hrs

Date: 3/17/2006 @ 13:35 Hrs

Date: 3/22/2006 @ 14:00 Hrs

Date: 3/23/2006 @ 13:45 Hrs

Figure 19 – Time elapsed photos of Palisades Lane (03/15/2006 – 03/23/2006)

6) Field check sight distances at the proposed location for Little Falls Road/Dalecarlia Parkway intersection.

A sight distance analysis was conducted on April 14, 2006, to determine the suitability and safety of the proposed shift in the access to the hospital from Dalecarlia Parkway. As per the 2001 AASHTO Green Book, the minimum recommended sight distance on a 40 mph roadway is 195 ft. Gorove/Slade Associates, Inc. conservatively assumed vehicle speeds of 45 mph. The minimum recommended sight distance on a 45 mph roadway is 220 feet. The expanded 220 ft sight distance was met for the proposed new entrance location (See Figure 20).

Line of Sight from new entrance location spanning the required sight distance

Figure 20 – Line of Sight – Aerial View

Photos show the Line of Sight from the new entrance location (bag).
Vehicles are clearly visible beyond the required sight distance (eye level = 3.5 ft.)

Figure 21 – Line of Sight – Simulated View

7) Impacts of the proposed MOB on DDOT's plans for a bike path along Dalecarlia Parkway.

As part of the wider DC Bicycle Master Plan aimed at creating an even more bicycle friendly city, the District plans to create high-quality bicycle facilities and programs over the next few years. This includes the construction of several bicycle paths, which includes the Dalecarlia Parkway Trail. The Dalecarlia Parkway Trail will run from Westmoreland Circle (Massachusetts Avenue on the DC-Maryland line) to Loughboro Road and could serve as a connection between the Friendship Heights Metro and the Capitol Crescent Trail (see Figure 22). The proposed trail was discussed in a meeting with DDOT Staff and it was agreed that the MOB construction would not affect the trail since the trail would be constructed on the opposite side of Dalecarlia Parkway (the eastern side) and not the same side as the Hospital and MOB.

8) Use of video footage from Hospital camera on Hayes building to capture off-peak traffic conditions on adjacent street.

Gorove/Slade Associates, Inc. reviewed video footage of adjacent streets from the camera on the Hayes building. This footage provided partial glimpses of the traffic on Loughboro Road and Dalecarlia Parkway. The footage reinforced the personal observations of Gorove/Slade Associates, Inc. staff, as noted in Section 3 above, that the adjacent streets have very light traffic during off peak hours.

Figure 22 – The proposed Dalecarlia Parkway Trail

APPENDIX