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**PLANNING . ENGINEERING . INFORMATION TECHNOLOGY**

REPORT OF JOE MEHRA, P.E. PTOE, CONCERNING TRAFFIC STUDY  
SUBMITTED BY VISION McMILLAN PARTNERS FOR THE McMILLAN SAND  
FILTRATION SITE PUD RELATED TO THE MASTER PLAN

The following comments are based on the Traffic Study dated March 17, 2014 and the supplemental information dated April 17 prepared by Gorove/Slade, DDOT Report, industry practices and published transportation engineering manuals and WMATA publications.

The proposal for the McMillan Sand Filtration Site includes 860,000 square feet of health care related office building with ground floor retail of 15,000 square feet. In addition, the development will include the following:

1. 258 residential units
2. 23,250 square feet retail
3. 170,000 square feet general office
4. 3,000 square feet retail
5. 52,920 square feet grocery store
6. 278 residential units
7. 146 row houses
8. Community Center and Park

The traffic impact study, in brief, consists of the following steps:

1. Existing conditions analysis
2. Background conditions without the site
3. Total conditions with the site developed

There are errors and omissions by Gorove/Slade in each of the three steps listed above.

**Existing Conditions** – The existing traffic volumes were utilized to estimate the existing capacity and levels of service. There are either missing data items or errors in traffic data. Some of these include:

1. The truck/bus vehicle counts are not shown and the analysis utilized a default value of 2 percent for the entire network. This is important because of the heavy transit use forecasted in the future, the truck/bus volumes should have been counted for existing conditions and adjusted for future conditions. The greater the number of trucks/buses in the vehicle stream, the lower the levels of service.
2. A few of the roadways had the incorrect lane widths coded
3. The Right Turn on Red was checked “Yes” for all intersections, which is not the case as there are some restrictions.
4. There are a few approaches where the bus blockages were not entered for capacity/levels of service computations.
5. No conflicting bicycle volumes were utilized in the capacity/levels of service computations.
6. The adjacent parking lane box wasn’t checked for streets with on street parking. Synchro model requires that a “Yes” be coded if on-street parking impedes traffic flow.
7. There are discrepancies in the existing traffic counts utilized in the capacity/levels of service analysis. The AM and PM peak hour volumes on North Capitol Street between Douglas Street and Channing Street do not balance. Similarly, the volumes on Douglas Street and Evarts Street are totally balanced even though the counts were taken on different days.
8. The Armed Forces Retirement Home traffic study estimated level of service (LOS) E for the intersection of North Capitol Street and Michigan Avenue during the AM and PM peak hours. The Gorove/Slade traffic study estimated that this intersection is currently operating at LOS D during the AM and PM peak hour.

**Background Conditions** – The background conditions consist of existing traffic, traffic from developments outside the study area and traffic from developments inside the study area. Gorove/Slade used a regional level model to estimate background growth due to developments outside the study area, but “capped” the total growth to the regional model projections. The regional model projections are at a macro level whereas the traffic impact study is at a micro level. Therefore, Gorove/Slade is underestimating the growth of traffic from developments outside the study area. As noted in the Gorove/Slade report, there are several approved developments in the vicinity of the McMillan Sand Filtration site (The Catholic University Master Plan, The Catholic University South Campus Redevelopment, Trinity University Master Plan, Michigan at Irving PUD, etc.) and their traffic will use the study area roadways such as, North Capitol Street and Michigan Avenue. Further, the Washington Hospital Center,

projected to generate approximately 2,000 trips during each of the AM and PM peak hours was excluded from the background developments.

The background developments that were included in Gorove/Slade traffic study, according to Gorove/Slade, are projected to generate approximately 4,300 vehicle trips and 2,500 transit trips during the peak hour.

**Total Conditions** - The total conditions with the site developed consists of the site traffic added to the background traffic.

Trip Generation - Gorove/Slade estimates the following AM peak hour, PM peak hour, weekday daily and Saturday trips for the various modes:

Site Trip Generation				
Time Period	Auto	Transit	Bicycle	walk
AM Peak Hour	1884	1465	79	255
PM Peak Hour	2294	1710	115	336
<b>Weekday Daily</b>	<b>31560</b>	<b>24414</b>	<b>1462</b>	<b>4470</b>
Saturday Peak Hour	559	291	53	117
Saturday Daily	8133	4211	737	1631

As noted above, according to Gorove/Slade the proposed development is estimated to generate a total of 31,560 vehicle trips on a weekday. Gorove/Slade estimate of 31,560 daily vehicle trips are more than the current traffic volumes on North Capitol Street between Michigan Avenue and Irving Street (daily traffic volume of 30,900 vehicles). Gorove/Slade estimated the vehicle trip generation using the ITE Trip Generation Report and developed mode of travel using a methodology that is based on assumptions rather than substantiated facts and data. Gorove/Slade assumed that 30 percent of the persons traveling to and from the medical office building and the general office building will be using transit, 4% would walk, 1% would bike and the remainder 65% would use the automobile. Gorove/Slade assumed a 35 percent mode share by transit for the residential uses.

I have researched the use of 30 percent for transit use at the site and find that it is extremely high given the site location. All metro rail stations are located more than one mile from the McMillan site. WMATA's 2005 Development Related Ridership Survey showed the following results for office buildings and residential developments located in close proximity to the metro station.

Summary for Office Commute and Residential Trips By Distance from Station				
Distance	All Transit Mode Share (1)		Auto Mode Share	
Miles	Office Commute	Residential	Office Commute	Residential
0	46%	55%	48%	29%
1/4	30%	45%	66%	41%
1/2	13%	36%	83%	54%

(1) includes Metrorail, Metrobus, Commuter rail and other transit options

This table shows that the transit share for office buildings are as high as 46% near the Metro station and drop to 13% for office buildings located one half mile from the metro station. The McMillan Sand Filtration Site is located more than one mile from the Metro stations and the transit share, based on the WMATA survey, would be expected to be less than 13 percent. However, Gorove/Slade has assumed 30 percent transit which is obviously extremely difficult to achieve given its location with respect to the Metro stations. Similarly, the table shows that the transit share for residential use is as high as 55% near the Metro station and drop to 36% for residences located one half mile from the metro station. The McMillan Sand Filtration Site is located more than one mile from the Metro stations and the transit share, based on the WMATA survey, would be expected to be less than 36 percent. However, Gorove/Slade has assumed 35 percent transit which is obviously extremely difficult to achieve given its location with respect to the Metro stations. Further, Gorove/Slade estimates that more than 1,700 persons would be using transit to the site and this would require 43 additional buses to be run during peak hour at full capacity (40 passenger bus) and a minimum of 610 bus trips on a daily basis to accommodate just the site traffic.

Gorove/Slade has estimated that the other background developments in the immediate vicinity of the McMillan Sand Filtration site would generate approximately 2,500 transit trips during the peak hour. This would require 60 additional buses to be run during peak hour at full capacity, just to accommodate the background developments. The total number of buses needed to serve the McMillan Sand Filtration and the three background developments in one hour would be over 100 buses.

I have assumed that with an aggressive travel demand management program, a transit mode share of at the most 20 percent may be achieved at the site for the medical office building and the general office use. A transit mode share of at the most 25 percent may be achieved at the site for the residential uses. This would show that Gorove/Slade have underestimated the vehicle trips by 15 percent during the AM and PM peak hours. These additional trips during the one hour period will have a significant impact on the traffic flows and levels of service at the study intersections.

Saturday Peak Hour Analysis - Gorove/Slade collected traffic data at several sites on a Saturday to determine the "combined Saturday peak hour". The process is described in the report and I am in agreement with the process. The Gorove/Slade study states that the peak hour on Saturday is between 3 PM and 4 PM (Figure 16, Page 28 of the March 17, 2014 traffic study report). However, Gorove/Slade did not conduct any traffic counts during the computed Saturday peak hour. All counts on Saturday were conducted between 4 PM and 7 PM (see Page 34 of the March 17, 2014 traffic study report). Therefore, all the traffic analysis conducted by Gorove/Slade for Saturday is meaningless, since it did not include the peak hour. Gorove/Slade should count the traffic during the Saturday peak hour and conduct the analysis to determine the traffic impacts.

Levels of Service (LOS) Analysis – Many of the errors and omissions listed in the existing conditions are also valid for the total conditions with the site developed. Furthermore, Gorove/Slade has omitted the additional bus trips, pedestrian trips and bicycle trips from the levels of service analysis. I have estimated that a minimum of 100 additional bus trips per hour would be needed to accommodate the site traffic and the background developments, based on Gorove/Slade estimates of transit use. These bus trips should be added to the vehicle stream and the levels of service computed. It should be noted that a bus stopped at a bus stop impedes traffic flow and its impact should be accounted for. Many of the 1,710 transit passengers during the peak hour may be crossing the adjacent streets. These transit passengers are also like pedestrians and should be included as pedestrian crossings, as appropriate. Pedestrians and bicycle crossings also impact levels of service. An additional 336 walk trips and 115 bicycle trips during one hour should be included in the levels of service. The inclusion of buses, pedestrian and bicycle crossings in the levels of service analysis will impact the levels of service significantly. DDOT states in their report, "Analysis provided by the Applicant shows that vehicle traffic impacts from the action will worsen the operations of several intersections in the study area as measured by Level of Service (LOS) even with the changes included in the PUD application. Most notably, the intersection of North Capitol Street/Michigan Avenue and Michigan Avenue/First Street experience a significant degradation of LOS. Additionally, several locations along North Capitol Street in the vicinity of the site are expected to operate at failing LOS."

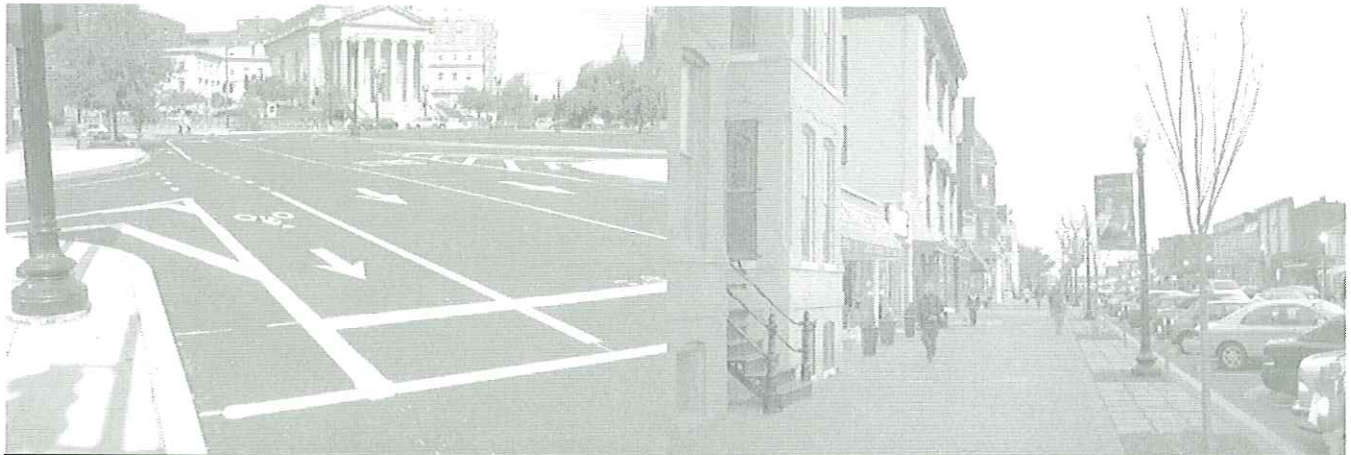
Other than the failing levels of service, many of the intersections have queue lengths that exceed the available storage. This means that the through traffic will be blocked by the turning vehicles.

In order to visually show the impacts, I have utilized the Synchro model developed by Gorove/Slade and provided to me to run the simulation using the SimTraffic model. I will show the simulation for the AM peak hour for the existing conditions followed by the

simulation of the future conditions for the same time period and includes all improvements recommended by Gorove/Slade.

## **CONCLUSIONS**

The Gorove/Slade analysis of existing conditions have several errors and omissions that lead to erroneous levels of service results. Gorove/Slade estimates that the site will generate in excess of 31,500 weekday trips and they exceed the existing daily traffic volume on North Capitol Street. Further, the site is estimated by Gorove/Slade to generate in excess of 24,000 daily transit trips that would require more than 610 bus trips to serve only the site traffic. More than 100 bus trips would be needed to serve exclusively the site and the background developments in the study area during the peak one hour. These transit use commitments have not been obtained from WMATA, DDOT or other private operators. Gorove/Slade analysis shows that the peak hour on Saturday occurs between 3 PM and 4 PM. However, Gorove/Slade does not analyze this hour at all. All Saturday analysis is meaningless since it did not include the peak hour. Gorove/Slade should redo the Saturday analysis and present to DDOT for review. DDOT has stated that the Applicants analysis shows that several intersections experience a significant degradation of levels of service even with the changes included in the PUD application. The levels of service computations do not include the additional transit buses, transit passenger crossing streets, pedestrians and bicycle trips. Their inclusion would worsen the levels of service than presented in the report. The Synchro/SimTraffic model simulation shows excessive delays and congestion in the study area roadways. Based on this review the Applicant should be denied until a revised traffic study is submitted and reviewed by DDOT.



TRANSPORTATION IMPACT STUDY

**McMILLAN SAND FILTRATION SITE PUD**

WASHINGTON, DC



March 17, 2014

 **GROVE / SLADE**  
Transportation Planners and Engineers



TRANSPORTATION TECHNICAL ATTACHMENTS

# McMILLAN SAND FILTRATION SITE PUD

WASHINGTON, DC



March 17, 2014

 **GOROVE / SLADE**  
Transportation Planners and Engineers

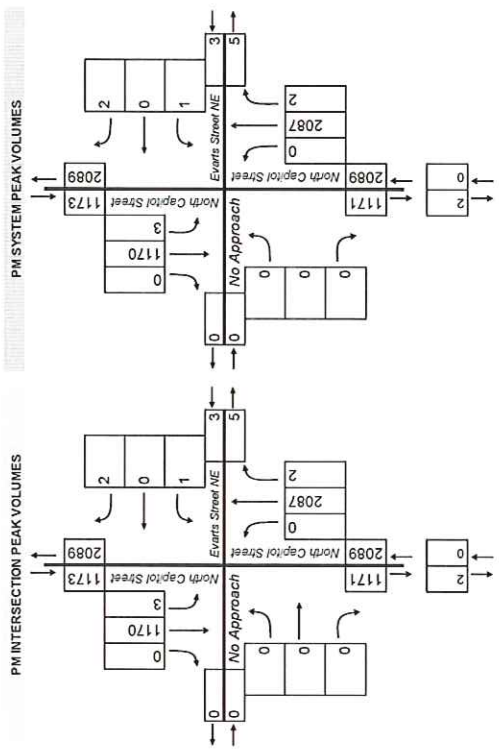
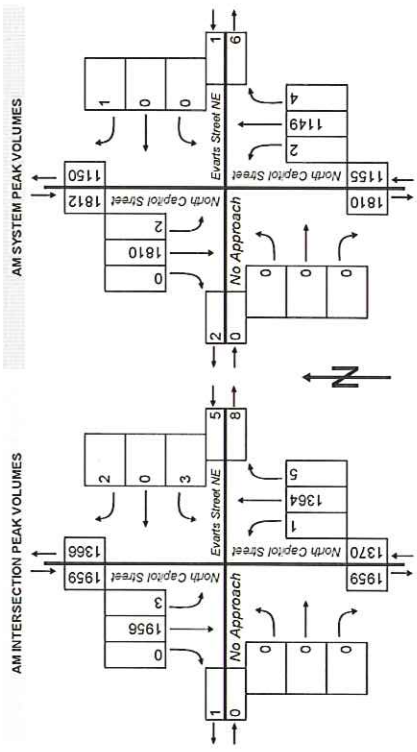




Governor/Slade Associates  
 Project Name :  
 Project # : 243D-001  
 Location : NWDC  
 Data Source : Symetra

Date of Counts: Wednesday, February 15, 2012  
 AM Weather Conditions:  
 PM Weather Conditions:

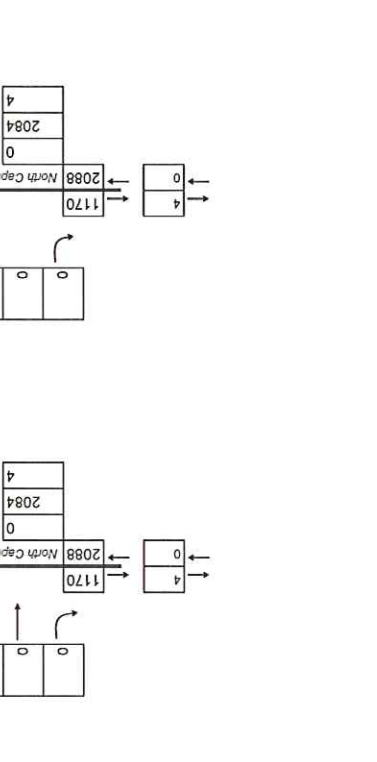
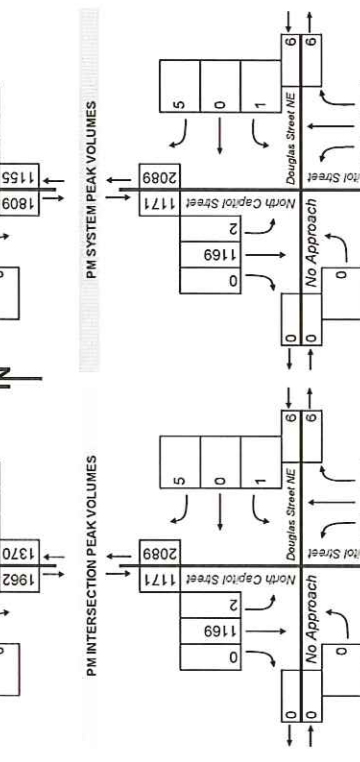
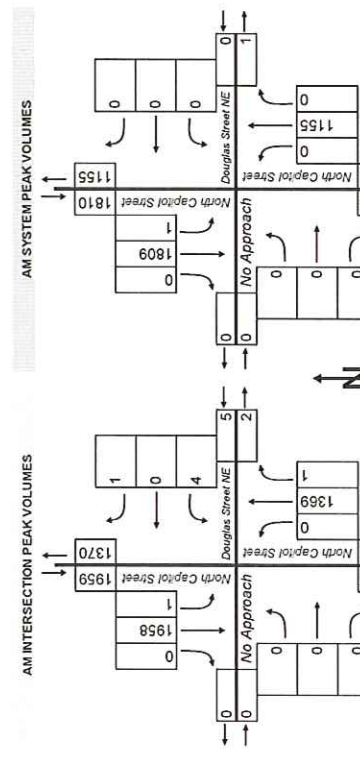
Direction: Roadway: Movement:	7 - Evars Street & North Capitol Street											
	Southbound			Westbound			Northbound			Eastbound		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
6:30 AM to 6:45 AM	0	402	0	1	0	1	0	2	295	0	2	0
6:45 AM to 7:00 AM	0	302	0	1	0	1	0	3	365	1	2	0
7:00 AM to 7:15 AM	0	494	0	2	0	0	0	1	351	0	6	0
7:15 AM to 7:30 AM	0	504	1	0	0	2	0	2	350	0	1	0
7:30 AM to 7:45 AM	0	485	0	7	0	0	1	0	341	0	4	0
7:45 AM to 8:00 AM	0	473	2	2	0	0	0	2	322	1	1	0
8:00 AM to 8:15 AM	0	515	1	0	0	0	0	1	299	0	5	0
8:15 AM to 8:30 AM	0	402	0	3	0	0	0	1	288	1	3	0
8:30 AM to 8:45 AM	0	420	0	3	1	0	0	0	240	0	2	0
8:45 AM to 9:00 AM	0	276	3	1	1	0	0	0	235	1	1	0
9:00 AM to 9:15 AM	0	310	0	1	0	0	0	0	269	0	0	0
9:15 AM to 9:30 AM	0	243	1	3	1	0	0	2	260	0	8	0
4:00 PM to 4:15 PM	0	270	0	2	1	0	0	0	407	0	3	0
4:15 PM to 4:30 PM	0	276	0	2	1	0	0	3	448	0	2	0
4:30 PM to 4:45 PM	0	298	0	1	0	0	0	1	483	1	5	0
4:45 PM to 5:00 PM	0	300	2	0	0	0	0	0	526	0	3	0
5:00 PM to 5:15 PM	0	297	0	2	1	0	1	0	542	0	10	0
5:15 PM to 5:30 PM	0	284	1	0	0	0	0	0	482	0	7	0
5:30 PM to 5:45 PM	0	289	1	2	1	0	0	1	537	0	8	0
5:45 PM to 6:00 PM	0	240	2	1	0	0	0	1	428	0	4	0
6:00 PM to 6:15 PM	0	231	0	1	2	0	0	3	454	0	10	0
6:15 PM to 6:30 PM	0	281	0	1	1	0	0	0	399	0	1	0
6:30 PM to 6:45 PM	0	281	0	1	1	0	0	0	399	0	1	0
6:45 PM to 7:00 PM	0	281	0	1	1	0	0	0	399	0	1	0
7:00 AM to 8:00 AM	0	1656	3	11	2	0	3	5	1364	1	12	0
8:00 AM to 8:45 AM	0	1170	3	4	2	0	1	2	2087	0	44	0
8:45 PM to 5:45 PM	0	1810	2	9	1	0	0	4	1149	2	11	0
5:45 PM to 5:45 PM	0	1170	3	4	2	0	1	2	2087	0	44	0
7:30 AM to 8:30 AM	0	1875	2	13	0	0	1	4	1250	2	13	0
4:45 PM to 5:45 PM	0	1170	3	4	2	0	1	2	2087	0	28	0
Overall AM PEAK HOUR FACTOR	= 0.91											
Overall PM PEAK HOUR FACTOR	= 0.97											
Overall Intersection Volume:	8477											
PM Period Intersection Volume:	7466											
Overall PM PEAK HOUR FACTOR	= 0.97											





**Gorove/Slade Associates**  
 Project Name : McMillan Redevelopment  
 Project # : 243D-001  
 Location : NW/DC  
 Data Source : Symmetra

**Intersection:** 9 - Douglas Street & North Capitol Street  
**Date of Counts:** Thursday, February 23, 2012  
**AM Weather Conditions:**   
**PM Weather Conditions:**



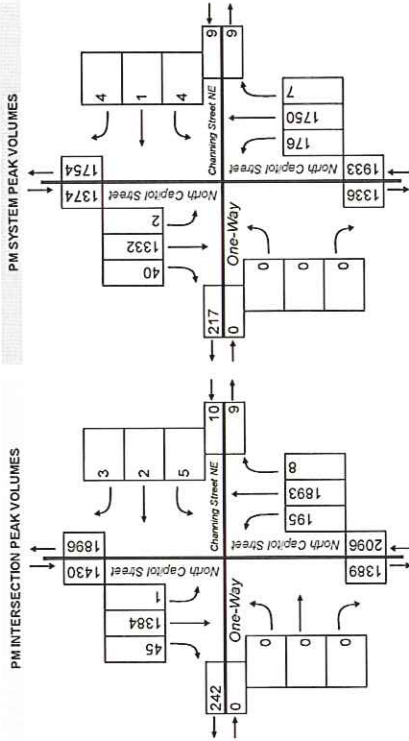
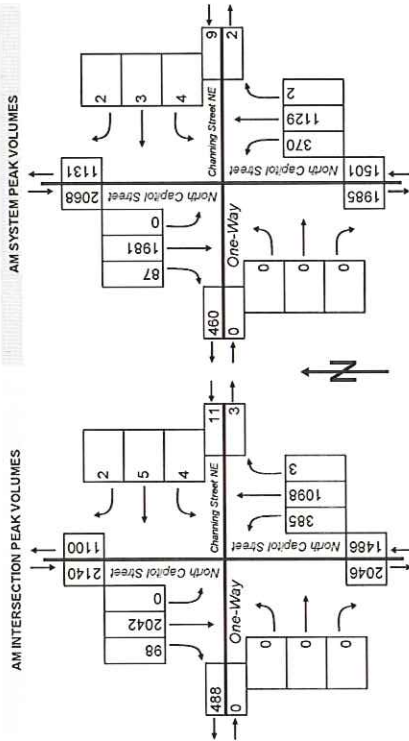
Direction: Roadway: Movement:	Southbound North Capitol Street			Westbound Douglas Street NE			Northbound North Capitol Street			Eastbound No Approach		
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
6:30 AM to 6:45 AM	0	403	0	0	0	0	0	297	0	0	0	0
6:45 AM to 7:00 AM	0	303	0	0	0	0	0	369	0	0	0	0
7:00 AM to 7:15 AM	0	494	0	0	2	4	0	352	0	1	0	0
7:15 AM to 7:30 AM	0	506	0	0	0	1	0	352	0	1	0	0
7:30 AM to 7:45 AM	0	486	0	1	0	2	3	340	0	3	0	0
7:45 AM to 8:00 AM	0	472	1	0	0	0	0	325	0	0	0	0
8:00 AM to 8:15 AM	0	515	0	0	0	0	0	300	0	0	0	0
8:15 AM to 8:30 AM	0	402	0	0	0	0	0	290	0	0	0	0
8:30 AM to 8:45 AM	0	420	0	0	0	0	0	240	0	0	0	0
8:45 AM to 9:00 AM	0	276	0	0	0	0	0	236	0	0	0	0
9:00 AM to 9:15 AM	0	310	0	0	0	0	0	269	0	0	0	0
9:15 AM to 9:30 AM	0	243	0	0	0	0	0	262	0	0	0	0
<b>PM PEAK</b>												
Direction: Roadway: Movement:	Southbound North Capitol Street			Westbound Douglas Street NE			Northbound North Capitol Street			Eastbound No Approach		
4:00 PM to 4:15 PM	0	270	0	1	0	0	0	406	0	0	0	0
4:15 PM to 4:30 PM	0	276	0	3	0	0	0	448	0	0	0	0
4:30 PM to 4:45 PM	0	298	0	1	0	0	0	484	0	0	0	0
4:45 PM to 5:00 PM	0	299	1	0	0	1	0	526	0	0	0	0
5:00 PM to 5:15 PM	0	298	0	0	1	0	0	542	0	0	0	0
5:15 PM to 5:30 PM	0	284	0	2	0	0	2	480	0	0	0	0
5:30 PM to 5:45 PM	0	288	1	0	2	0	0	536	0	0	0	0
5:45 PM to 6:00 PM	0	240	0	0	0	0	0	429	0	0	0	0
6:00 PM to 6:15 PM	0	231	0	0	0	0	0	457	0	0	0	0
6:15 PM to 6:30 PM	0	281	0	0	0	0	0	399	0	0	0	0
6:30 PM to 6:45 PM	0	281	0	0	0	0	0	399	0	0	0	0
6:45 PM to 7:00 PM	0	281	0	0	0	0	0	399	0	0	0	0
<b>PEAK HOURS</b>												
Direction: Roadway: Movement:	Southbound North Capitol Street			Westbound Douglas Street NE			Northbound North Capitol Street			Eastbound No Approach		
7:00 AM to 8:00 AM	0	1958	1	0	4	8	1	1369	0	5	0	0
8:00 AM to 9:00 AM	0	1169	2	0	5	0	4	2094	0	5	0	0
9:00 AM to 10:00 AM	0	1809	1	0	0	0	0	1165	0	0	0	0
10:00 AM to 11:00 AM	0	1169	2	0	5	0	4	2094	0	5	0	0
11:00 AM to 12:00 PM	0	1875	1	0	1	0	2	1255	0	3	0	0
12:00 PM to 1:00 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
1:00 PM to 2:00 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
2:00 PM to 3:00 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
3:00 PM to 4:00 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
4:00 PM to 4:45 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
4:45 PM to 5:45 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
5:45 PM to 6:45 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
6:45 PM to 7:00 PM	0	1169	2	0	5	0	4	2094	0	5	0	0
<b>PEAK HOUR FACOTRS</b>												
AM PEAK HOUR	0.00	0.88	0.25	0.88	0.00	0.00	0.89	0.00	0.89	0.00	0.00	0.00
PM PEAK HOUR	0.00	0.98	0.50	0.98	0.63	0.00	0.25	0.75	0.50	0.96	0.00	0.00
Overall AM PEAK HOUR FACTOR	= 0.91											
Overall PM PEAK HOUR FACTOR	= 0.97											
AM Period Intersection Volume:	8469											
PM Period Intersection Volume:	7500											
Overall PM PEAK HOUR FACTOR	= 0.97											



GorvenStede Associates  
 Project Name: Milliken Road/Assignment  
 Project #: 2430-001  
 Location: ANJUDC  
 Data Source: WASA Clean Rooms Project

Date of Counts: Tuesday, February 05, 2013  
 AM Weather Conditions: [ ]  
 PM Weather Conditions: [ ]

Direction: Roadway: Movement:	11 - Channing Street & North Capitol Street																																																																																																																																																																																			
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*Future Background Conditions (without McMillan PUD)*

The McMillan PUD is anticipated to be fully constructed in 2025. The traffic projections for the future background conditions consist of the traffic generated by background developments with planned completion by 2025 and the inherent growth on the roadway added to the existing traffic volumes.

As outlined previously, there are several background developments located in the vicinity of the site. However, only those studies that are located within the study area, are fully funded, and are planned to be completed by the study year (2025) are included in the future background scenario. Table 9 shows a review of the background developments. Additional details are contained in the Technical Attachments.

Based on these criteria, the following developments are included in capacity analysis:

- VAMC Master Plan;
- Armed Forces Retirement Home – Zone A; and
- Howard University Campus Master Plan.

For the VA Medical Center Master Plan (VAMC), new growth from the VAMC is incorporated based on the existing Master Plan and associated traffic study, as well as comments made by the VAMC staff. According to the VAMC staff, the hospital plans to expand employment from the current number of

approximately 2,400 to 3,000 employees, and the amount of patient activity is expected to grow by approximately 20% over the next 10 years.

Therefore, the trip generation and assignment assumptions are based on those contained in the DC VAMC Master Plan *Transportation Management Program* assembled by AMT in April of 2010. The trip generation was calculated based on the methodology outlined in the ITE *Trip Generation Manual*, 9<sup>th</sup> Edition, with an alternate mode reduction of 25%, as outlined in the *Transportation Management Program*.

Table 10 shows the total number of trips generated by the VAMC development for the weekday morning and afternoon peak hours. The trip generation projections were also extrapolated to determine the Saturday peak hour trip generation, as shown in Table 11.

For the Armed Forces Retirement Home – Zone A (AFRH) development, traffic projections from the Master Plan and associated traffic study and transportation management program are incorporated in to the future background volumes. The Master Plan shows completion of Phases 1 through 4 by the year 2021, so it is assumed that these phases would be complete by the background study year of 2025.

Therefore, the trip generation and assignment assumptions are based on those contained in the AFRH Master Plan *Transportation Management Program* assembled by Michael Baker Jr., Inc. in July 2008.

**Table 9: Review of Background Developments**

Development	Expected Completion Date	Approved?	Origin or Destination in Study Area?	Included in Capacity Analysis?
The Catholic University of America Master Plan	2027 (full build out)	Yes	No	No
The Catholic University of America South Campus Redevelopment	2015 (from TIS)	Yes	No	No
VAMC Master Plan	2029 (full build-out)	n/a	Yes	Yes
Armed Forces Retirement Home – Zone A	2022 (all phases)	n/a	Yes	Yes
Trinity University Campus Plan	2016	Yes	No	No
Michigan at Irving PUD	2016	Yes	No	No
Washington Hospital Center	2015 (TIS from 2000)	Yes, but expired	Yes	No
Howard University Campus Master Plan	2021	Yes	Yes	Yes



Figure 1: Map of Potential Background Improvements & Developments

**Table 7: Base Weekday Vehicle- and Person-Trip Generation**

Land Use	Size	Trip Generation						
		AM Peak Hour			PM Peak Hour			Weekday Total
		In	Out	Total	In	Out	Total	
Ground Floor Retail	59,000 Square Feet	36	21	57	105	114	219	2,524
Grocery Store	50,000 Square Feet	105	65	170	242	232	474	5,112
Office	194,000 Square Feet	286	39	325	50	246	294	2,174
Medical Office	860,000 Square Feet	1,624	432	2,056	606	1,560	2,166	34,736
Residential	555 Dwelling Units	54	223	277	225	118	343	3,614
Recreational	6,6 Acres 17,000 Square Feet	40	25	65	36	34	70	806
<b>Total Vehicle-Trips</b>		<b>1,859</b>	<b>766</b>	<b>2,625</b>	<b>1,214</b>	<b>2,058</b>	<b>3,272</b>	<b>46,792</b>

**Table 8: Weekday Trip Generation for Proposed Development by Mode**

Land Use	Size	Trip Generation						
		AM Peak Hour			PM Peak Hour			Weekday Total
		In	Out	Total	In	Out	Total	
<b>Vehicle Trips</b>								
Retail		24	13	37	48	51	99	1,148
Retail Pass-By		--	--	--	21	22	43	492
Grocery		74	45	119	119	113	232	2,505
Grocery Pass-By		--	--	--	51	49	100	1,073
Office		186	25	211	33	160	193	1,413
Medical Office		1,055	281	1,336	393	1,015	1,408	22,578
Residential		30	122	152	123	65	188	1,988
Recreational		18	11	29	16	15	31	363
<b>Total New Vehicle Trips</b>		<b>1,387</b>	<b>497</b>	<b>1,884</b>	<b>804</b>	<b>1,490</b>	<b>2,294</b>	<b>31,560</b>
<b>Transit Person-Trips</b>								
Retail		13	7	20	37	41	78	899
Grocery		37	24	61	86	83	169	1,820
Office		97	13	110	17	83	100	737
Medical Office		896	239	1,135	335	861	1,196	19,174
Residential		21	89	110	89	47	136	1,429
Recreational		18	11	29	16	15	31	355
<b>Total New Transit Person-Trips</b>		<b>1,082</b>	<b>383</b>	<b>1,465</b>	<b>580</b>	<b>1,130</b>	<b>1,710</b>	<b>24,414</b>
<b>Walking Person-Trips</b>								
Retail		6	4	10	19	20	39	449
Grocery		13	8	21	30	29	59	637
Office		13	2	15	2	11	13	98
Medical Office		120	31	151	45	114	159	2,557
Residential		4	18	22	18	9	27	286
Recreational		22	14	36	20	19	39	443





**Step 5:**

The Saturday hourly trip distribution assumptions were compiled using (1) daily Saturday traffic volume counts on roadways leading in and out of developments of similar land uses from the libraries of Gorove/Slade and (2) hourly distribution data from the ITE *Trip Generation Manual*, 9<sup>th</sup> Edition.

**Step 6:**

To determine the hourly travel demand (inbound and outbound), the daily trips were distributed over the course of a day between the hours of 6:00 AM and 9:00 PM.

The daily trips were distributed by land use, and the total trips were summed to determine the highest Saturday hourly demand, which was 3:00 PM to 4:00 PM.

**Step 7:**

The Saturday peak hour trips were broken down by mode and summarized.

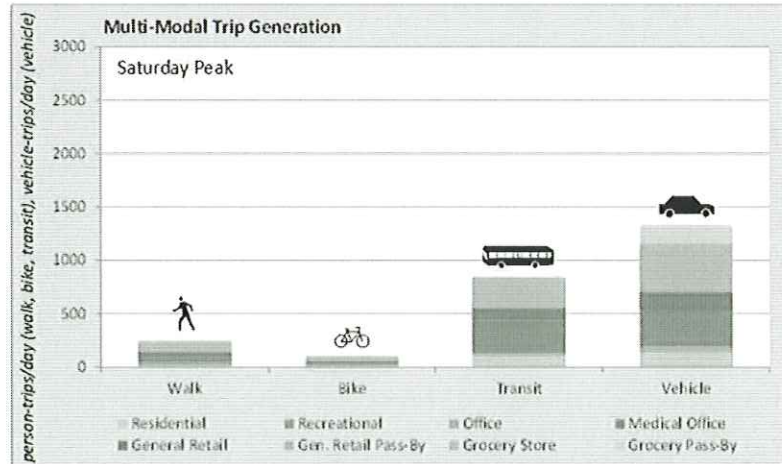
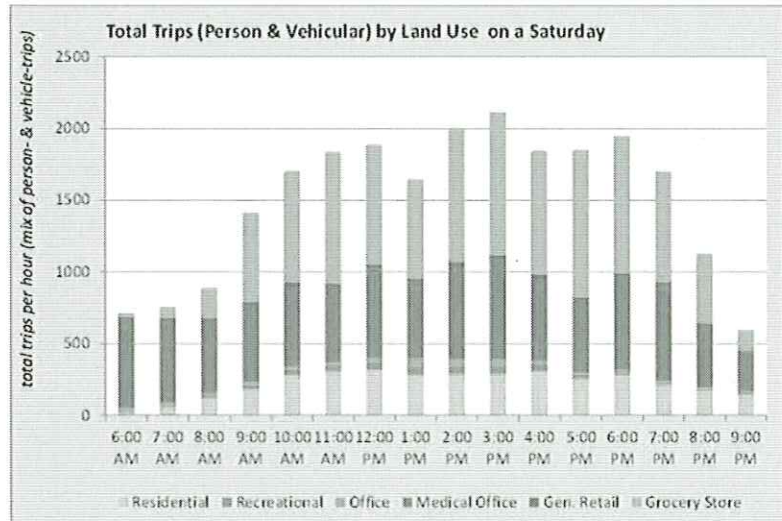
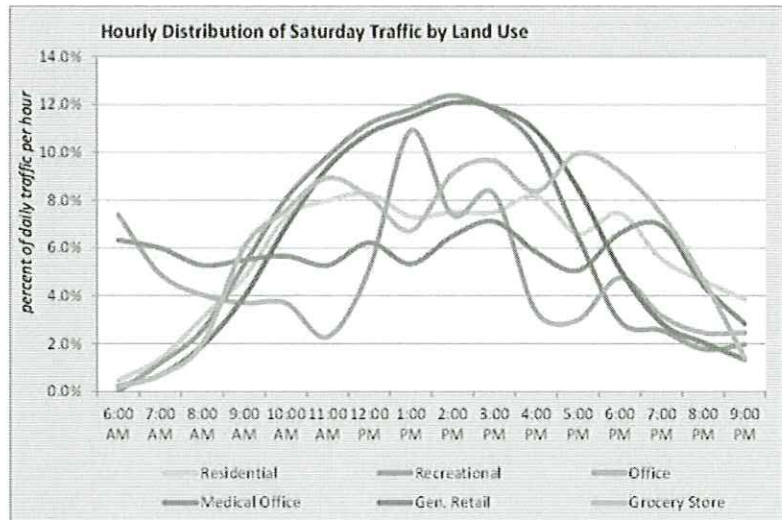


Figure 16: Saturday Trip Generation Summary, Page 3 of 3



Based on the Driveshed Analysis, the following intersections were selected for the weekday morning and afternoon peak hour analyses, as shown in Figure 20:

1. First Street NW & Irving Street NW
2. First Street NW & Michigan Avenue NW
3. North Capitol Street & Michigan Avenue NE/NW
4. Michigan Avenue NE & Franklin Street NE
5. North Capitol Street & Girard Street NE
6. North Capitol Street & Franklin Street NE
7. North Capitol Street & Evarts Street NE
8. First Street NW & McMillan Street NW
9. North Capitol Street & Douglas Street NE
10. First Street NW & Channing Street NW
11. North Capitol Street & Channing Street NE/NW
12. First Street NW & Bryant Street NW
13. First Street NW & Rhode Island Avenue NW
14. North Capitol Street & Rhode Island Avenue NE/NW
15. Georgia Avenue NW & Columbia Road NW
16. Georgia Avenue NW & Harvard Street NW
17. Georgia Avenue NW & Bryant Street NW
18. Georgia Avenue NW & W Street NW
19. All site access points

In addition, the following intersections were selected for the Saturday afternoon peak hour analysis (based on the retail driveshed), as shown in Figure 21:

1. First Street NW & Michigan Avenue NW
2. North Capitol Street & Michigan Avenue NE/NW
3. Michigan Avenue NE & Franklin Street NE
4. North Capitol Street & Girard Street NE
5. North Capitol Street & Franklin Street NE
6. North Capitol Street & Evarts Street NE
7. First Street NW & McMillan Street NW
8. North Capitol Street & Douglas Street NE
9. First Street NW & Channing Street NW
10. North Capitol Street & Channing Street NE/NW
11. First Street NW & Bryant Street NW
12. All site access points

#### CAPACITY ANALYSIS

The following section outlines the capacity analyses performed for the McMillan PUD. This includes a review of the traffic volume assumptions, geometry and operations assumptions, analysis methodology, and analysis results, as summarized in Table 8.

#### Traffic Volume Assumptions

The following section reviews the traffic volume assumptions and methodologies used in the roadway capacity analyses, summarized in Table 8. A summary of the traffic volumes is shown on Figure 23 and Figure 24 for the morning peak hour, Figure 25 and Figure 26 for the afternoon peak hour, and Figure 27 for the Saturday peak hour. Detailed traffic volume graphics are included in the Technical Attachments.

#### Existing Conditions

The overall purpose of this study is to determine the impact the proposed McMillan PUD will have on the transportation system in the study area. The existing conditions in and around the site are characterized in order to provide a foundation for assessing the transportation implications of the proposed PUD. This is determined by examining the peak traffic hours, which are directly associated with the peaking characteristics of the site and the adjacent transportation system. These peaking characteristics are found through analysis of existing count data.

Existing traffic counts were collected by Gorove/Slade at the weekday study intersections between the hours of 6:30 AM and 9:30 AM for the morning peak period and between 4:00 PM and 7:00 PM for the afternoon peak period. Additional counts were obtained from the WASA Clean Rivers Project for several study area intersections. The results of the traffic counts are included in the Technical Attachments.

The morning and afternoon peak hours for the system of intersections being studied occurred from 7:45 AM to 8:45 AM and from 4:45 PM to 5:45 PM, respectively. However, for this analysis, the corridor peak hours along North Capitol Street (7:30 AM to 8:30 AM and 4:45 PM to 5:45 PM) were used. For other intersections in the study area, the individual intersections peaks were used to provide a conservative analysis.

In addition to the weekday morning and afternoon peak hours, this report includes an analysis of the Saturday afternoon peak hour. Traffic counts were collected by Gorove/Slade at the Saturday study intersections between the hours of 4:00 PM and 7:00 PM.

The Saturday peak hour of the system of intersections being studied occurred from 4:00 PM to 5:00 PM. However, in order to be conservative, the analysis focuses on the individual intersection peaks at the study area intersections.