

4605-C Pinecrest Office Park Drive
Alexandria, Virginia 22312-1442
(703) 914-4850
FAX (703) 914-4865
Email - mcv@mcvainc.com
www.mcvainc.com

PLANNING . ENGINEERING . INFORMATION TECHNOLOGY

MEMORANDUM

TO: Government of the District of Columbia Zoning Commission

FROM: Joe Mehra, P.E. PTOE

SUBJECT: Z.C. Case No. 13-14 McMillan Sand Filtration Site

DATE: May 13, 2014 **JOB:** J-841

Commissioner May asked for background information on the daily trip generation for the medical office use at the McMillan Sand Filtration site at the hearing on May 8, 2014. I have prepared this memorandum to provide this information. As I testified, I used the same methodology that Gorove/Slade used to compute the AM and PM peak hour trip generation by mode for the medical office use to estimate daily trips. The daily trips are high relative to the AM and PM peak traffic because the medical facilities with doctors' offices sustain high traffic throughout the day because of high patient turnover. I want to reiterate that both my findings and the findings of the applicant are based on field verified data for similar developments to the current proposed medical office building. Gorove/Slade collected traffic data at a medical office building over a 24-hour period. This data is included in Table 46 of the Technical Attachments to the March 17, 2014 traffic study report. The data collected by Gorove/Slade shows that the daily trips to the medical office building was 1801 and the PM peak hour trips were 105 during the 4 PM to 5 PM hour. This data shows that the daily trips are approximately 17 times the peak hour trips. The data I presented on May 8 also resulted in the daily trips being approximately 17 times the peak hour trips for the medical office building. My estimate of daily vehicle trips to the McMillan medical office building was 22,718 and the peak hour estimate was 1,314. The daily to peak hour ratio is approximately 17, same as the data collected by Gorove/Slade.

The following information has been extracted from the Gorove/Slade traffic study report.

Medical Office trips were projected based on LU 720 for Medical-Dental Office Building, which is a facility that provides diagnoses and outpatient care on a routine basis but is unable to provide prolonged inhouse medical and surgical care. This land use was chosen to represent the Healthcare building on site, as conversations with the development team indicated it was the closest to the planned tenants of the building. The facilities typically include one or more private physicians or dentists. The total weekday trips, as well as the afternoon peak hour trips were generated using the regression equations provided based on average vehicle trip ends per 1,000 square feet of gross floor area. The regression equation was chosen due to the high (over 0.75) coefficient of determination (R²). The weekday morning peak hour trips were generated based on the average rate of trip generation per 1,000 square because no regression equation is provided for this time period. Trip Generation does not provide information on when the Medical Office uses peak during a typical weekday.

Following the base vehicular- trip rate calculations, the vehicle-trips were converted to person-trips based on the estimated average vehicle occupancy (AVO). AVO rates were obtained from the Summary of Travel Trends – 2009 National Household Travel Survey performed by the U.S. Department of Transportation Federal Highway Administration. Based on the information contained in the report, Table 1 shows the AVO assumed for each land use¹ and the base number of trips generated by the proposed development.

Table 1: Base Vehicle- and Person-Trip Generation

Land Use	Average Vehicle Occupancy
Ground Floor Retail	1.78 Persons/Vehicle
Grocery Store	1.84 Persons/Vehicle
Office	1.13 Persons/Vehicle
Medical Office	1.84 Persons/Vehicle
Residential	1.13 Persons/Vehicle
Recreational	2.20 Persons/Vehicle

Mode Split - Following the base trip generation shown above, the trips were split into each mode: transit (consisting of both Metrorail and Metrobus), walking, biking, and vehicle. Each land use was analyzed by mode separately in order to account for varying mode splits. The mode split estimates for the McMillan development were developed using survey information contained in several sources, WMATA's 2005 Development-Related Ridership Survey, WMATA's Station Site and Access Planning Manual, Commuter Connections' 2010 State of the Commute Survey Report, results from the U.S. Census Community Survey, and files from Gorove/Slade's library. The following describes in detail how the mode

split assumptions were assembled based on information from these sources. Thus, the projected mode split for the Office uses is broken down as follows:

- Vehicle: 65%
- Transit: 30%
- Walk: 4%
- Bike: 1%

Gorove/Slade presents the AM, PM and daily trips by mode for the medical office building in Tables 7 and 8 of the Transportation Technical Attachments. As shown in these Tables, they support my computations of the daily vehicle and transit trips to and from the site for the medical office use. My report presented the following mode split estimates for the medical office use on a daily basis:

Daily vehicle trips	22718
Daily transit trips	19292
Daily walk trips	2572
Daily Bicycle trips	643

Table 8 from the Gorove/Slade report shows the following for the medical office building:

Daily vehicle trips	22578
Daily transit trips	19174
Daily walk trips	2557
Daily Bicycle trips	639

My estimates and Gorove/Slade estimates are not significantly different. As a matter of fact, they are almost the same. Gorove/Slade agrees with me that the daily vehicle trips to the medical office buildings is more than 22,000 and the daily transit trips to the medical office building is more than 19,000 trips. Regardless, both analyses corroborate the basic finding that the medical office building at this development would generate a substantial number of vehicle trips per day.

I am attaching the copies of the relevant pages from the ITE Trip Generation Report. I am also attaching copies of Table 7, Table 8 and Table 46 from Gorove/Slade's traffic study reports.

I will be glad to answer any questions that you may have on this memorandum at the hearing on May 13, 2014.

TRIP GENERATION MANUAL

9th Edition • Volume 3: Data



Institute of Transportation Engineers

Medical-Dental Office Building (720)

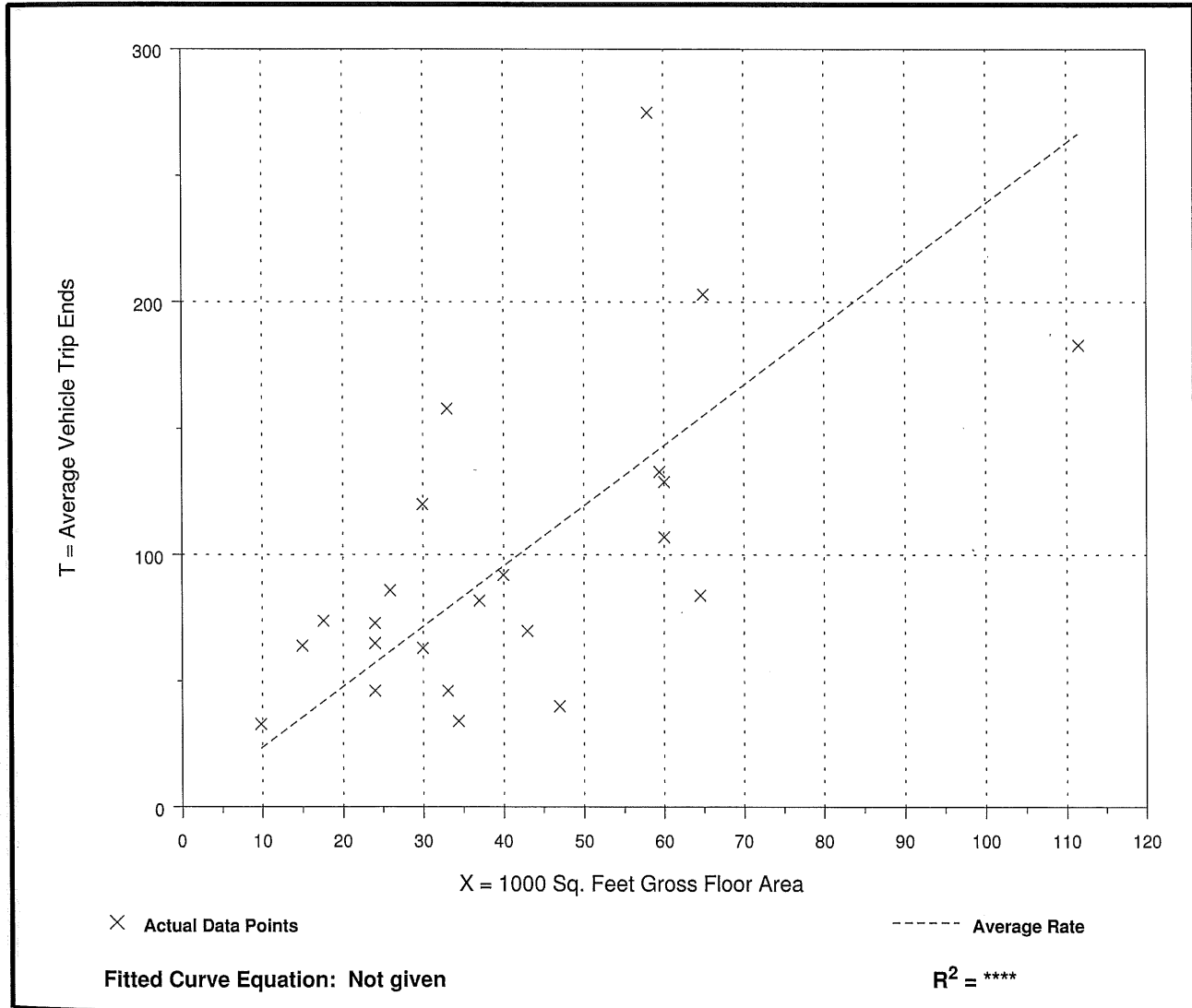
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.

Number of Studies: 23
 Average 1000 Sq. Feet GFA: 41
 Directional Distribution: 79% entering, 21% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
2.39	0.85 - 4.79	1.89

Data Plot and Equation



Medical-Dental Office Building (720)

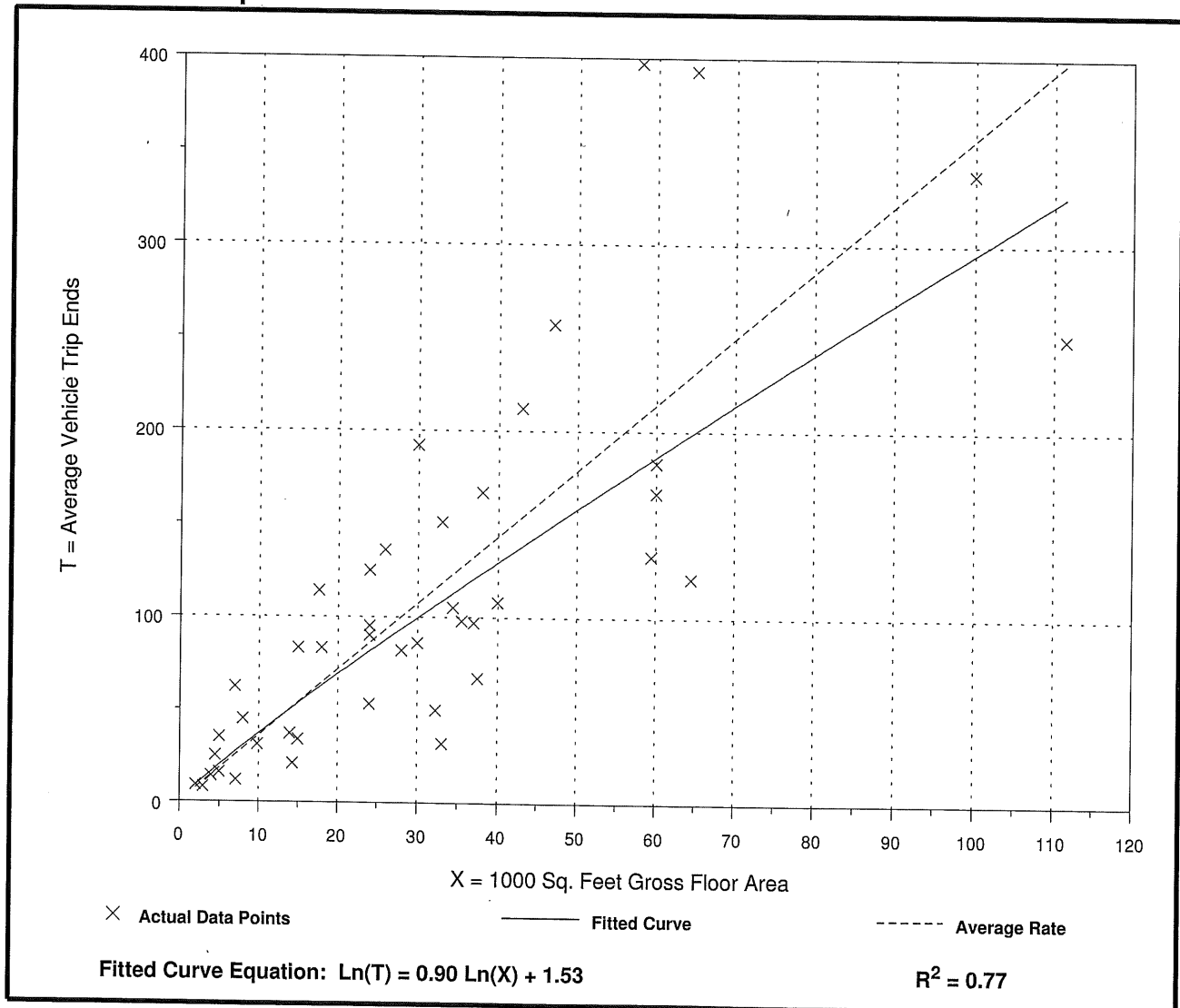
Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 43
Average 1000 Sq. Feet GFA: 31
Directional Distribution: 28% entering, 72% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
3.57	0.97 - 8.86	2.47

Data Plot and Equation



Medical-Dental Office Building (720)

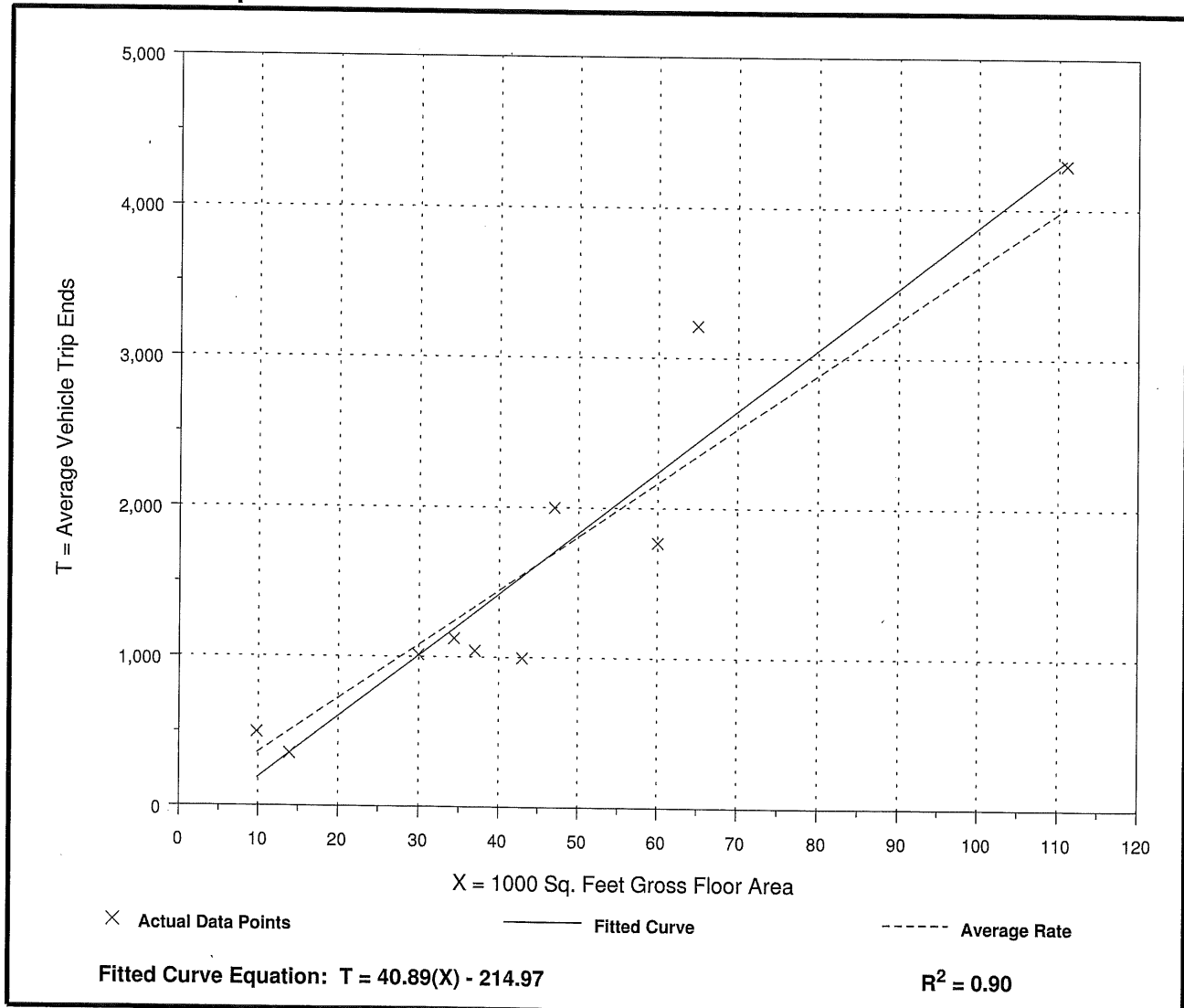
**Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Floor Area
On a: Weekday**

Number of Studies: 10
Average 1000 Sq. Feet GFA: 45
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate ~	Range of Rates	Standard Deviation
36.13	23.16 - 50.51	10.18

Data Plot and Equation





TRANSPORTATION TECHNICAL ATTACHMENTS

MCMILLAN SAND FILTRATION SITE PUD

WASHINGTON, DC



March 17, 2014

 **GOROVE / SLADE**
Transportation Planners and Engineers

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 17,000	Acres Square Feet	40	25	65	36	34	70	806
Total Vehicle-Trips			1,859	766	2,625	1,214	2,058	3,272	46,792

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	
Vehicle Trips									
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
<i>Total New Vehicle Trips</i>			1,387	497	1,884	804	1,490	2,294	31,560
Transit Person-Trips									
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
<i>Total New Transit Person-Trips</i>			1,082	383	1,465	580	1,130	1,710	24,414
Walking Person-Trips									
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



Land Use	Size	Trip Generation						
		AM Peak Hour			PM Peak Hour			Weekday
		<i>In</i>	<i>Out</i>	<i>Total</i>	<i>In</i>	<i>Out</i>	<i>Total</i>	Total
<i>Total New Walking Person-Trips</i>		178	77	255	134	202	336	4,470
Bicycling Person-Trips								
Retail		3	2	5	9	11	20	225
Grocery		6	3	9	13	12	25	273
Office		3	1	4	1	2	3	25
Medical Office		30	8	38	11	29	40	639
Residential		2	7	9	8	4	12	123
Recreational		9	5	14	8	7	15	177
<i>Total New Bicycling Person-Trips</i>		53	26	79	50	65	115	1,462
Total Trips*		2,700	983	3,683	1,568	2,887	4,455	61,906

* - Combination of person-trips and vehicle-trips

Table 9: Base Saturday Vehicle- and Person-Trip Generation

Land Use	Size	Trip Generation			
		Saturday Peak Hour			Saturday
		<i>In</i>	<i>Out</i>	<i>Total</i>	Total
Ground Floor Retail	59,000 Square Feet	146	138	284	2,950
Grocery Store	50,000 Square Feet	272	261	533	8,880
Total Vehicle-Trips		418	399	817	11,830

Table 10: Saturday Trip Generation for Proposed Development by Mode

Land Use	Size	Trip Generation			
		Saturday Peak Hour			Saturday
		<i>In</i>	<i>Out</i>	<i>Total</i>	Total
Vehicle Trips					
Retail		66	63	129	66
Retail Pass-By		29	27	56	29
Grocery		133	129	262	133
Grocery Pass-By		57	55	112	57
<i>Total New Vehicle Trips</i>		285	274	559	8,133
Transit Person-Trips					
Retail		52	49	101	1,050
Grocery		97	93	190	3,161
<i>Total New Transit Person-Trips</i>		149	142	291	4,211
Walking Person-Trips					
Retail		26	25	51	525
Grocery		34	32	66	1,106





Table 46: Hourly Distribution of Medical Office Uses

Hour Beginning	Total Trips			Percent of Total Traffic		
	Inbound	Outbound	Total	Inbound	Outbound	Total
12:00 AM	7	23	30	0.8%	2.5%	1.7%
1:00 AM	3	9	12	0.3%	1.0%	0.7%
2:00 AM	3	5	8	0.3%	0.5%	0.4%
3:00 AM	5	4	9	0.6%	0.4%	0.5%
4:00 AM	6	3	9	0.7%	0.3%	0.5%
5:00 AM	7	5	12	0.8%	0.5%	0.7%
6:00 AM	101	13	114	11.4%	1.4%	6.3%
7:00 AM	53	55	108	6.0%	6.0%	6.0%
8:00 AM	50	45	95	5.6%	4.9%	5.3%
9:00 AM	63	36	99	7.1%	3.9%	5.5%
10:00 AM	60	42	102	6.8%	4.6%	5.7%
11:00 AM	50	45	95	5.6%	4.9%	5.3%
12:00 PM	58	54	112	6.5%	5.9%	6.2%
1:00 PM	37	59	96	4.2%	6.4%	5.3%
2:00 PM	65	52	117	7.3%	5.7%	6.5%
3:00 PM	45	83	128	5.1%	9.1%	7.1%
4:00 PM	37	68	105	4.2%	7.4%	5.8%
5:00 PM	40	51	91	4.5%	5.6%	5.1%
6:00 PM	81	38	119	9.1%	4.2%	6.6%
7:00 PM	37	88	125	4.2%	9.6%	6.9%
8:00 PM	31	49	80	3.5%	5.4%	4.4%
9:00 PM	14	37	51	1.6%	4.0%	2.8%
10:00 PM	17	20	37	1.9%	2.2%	2.1%
11:00 PM	16	31	47	1.8%	3.4%	2.6%
Total	886	915	1,801	100%	100%	100%

Based on the hourly distribution shown in Table 46, the total number of Saturday trips, as shown previously in Table 41, was distributed for each hour of a typical Saturday. The hourly distribution was used to calculate the hourly trips for all modes, as shown in Table 47 and on Figure 10. Of note, only the hours between 6:00 AM and 10:00 PM are shown.