TRANSPORTATION AND PARKING ASSESSMENT REPORT- PLANNED UNIT DEVELOPMENT APPLICATION FOR 4600 WISCONSIN AVE., TENLEYTOWN, NORTHWEST, WASHINGTON, DC

(Case No. 10-23)

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B. Turning Movement Count Data

C. Synchro Analysis Worksheets – Existing Traffic Situation

D. DDOT Crash Data

E. Parking Availability Survey – Memorandum

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I. Supporting Material and Reference for Research on Reduction in Vehicle Miles of Travel

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1.0 INTRODUCTION

1.1 Project Background

The subject property is situated on the northwest quadrant of the Wisconsin Avenue/Brandywine Street intersection in the Tenleytown area of Northwest, Washington, D.C. at the address 4600 and 4614 Wisconsin Avenue, N.W. (within Square 1732). The property is zoned C-2-A, and it is improved with a 10,000+/- SF commercial/office/retail building, which is currently vacant. The existing improvements will be partially demolished and expanded to consist of 60 apartment units and approximately 14,000 SF of commercial uses. The Applicant is seeking approval of the project under the City's Planned Unit Development (PUD) guidelines; and the application will include the request to re-zone the property from the C-2-A to the C-3-A District. It is also noted that the existing improvements does not provide zoning-compliant parking and no new parking will be provided to the site.

The PUD process requires the Applicant to demonstrate that the City's affected transportation system will be adequate to accommodate the proposed development, as well as identify potential public benefits that will accrue through the development process. In addition, the Applicant is expected to demonstrate that the proposal complies with the City's current policies regarding mobility and sustainability. The Consultant has reviewed various aspects of the Applicant's proposal, including the demographics of the proposed building, the type of commercial retail tenants, as well as parking supply and usage characteristics within the immediate area.

The Consultant has determined that the proposed development can be accommodated by the City's existing transportation system. This is primarily due to the location of the property within a Transit Oriented Development (TOD) zone (just two blocks from the Tenleytown-AU Metrostation), with excellent pedestrian connectivity and convenient access to Metrobus routes serving the local area. In addition, the proposed development is projected to generate a very low level of vehicular trips. The Applicant also proposes to implement a Transportation Demand Management (TDM) plan that will further reduce vehicular trip generation by the site.

1.2 Report Organization and Summary

This report is organized into six (6) sections. The current section, **Section 1** presents the background and context for the study. **Section 2** evaluates the existing traffic condition, pedestrian and bicycle safety and existing parking conditions. **Section 3** addresses projected growth in through traffic, as well as growth due to the impact of approved but un-built developments within the study area. Vehicular and pedestrian trip generation of the proposed PUD site is also discussed in this section. **Section 4** discusses parking as an essential PUD element. **Section 5** outlines elements of Transportation Demand Management (TDM) plan proposed for the PUD site. Section 6 summarizes the key findings and recommendations.

The remainder of this memorandum presents the basis for the conclusion, and fully documents the study approach and analysis process. In order to facilitate the discussion which follows, the location of the property is shown in Exhibit 1. In keeping with the City's current guidelines, scoping discussions were also held with the District Department of Transportation (DDOT), and relevant correspondence documenting our study approach is included in Attachment A. The City's Comprehensive Transportation Review (CTR) form is included as Attachment A (A-2 to A-10), with DDOT's comments and specific requirements highlighted.

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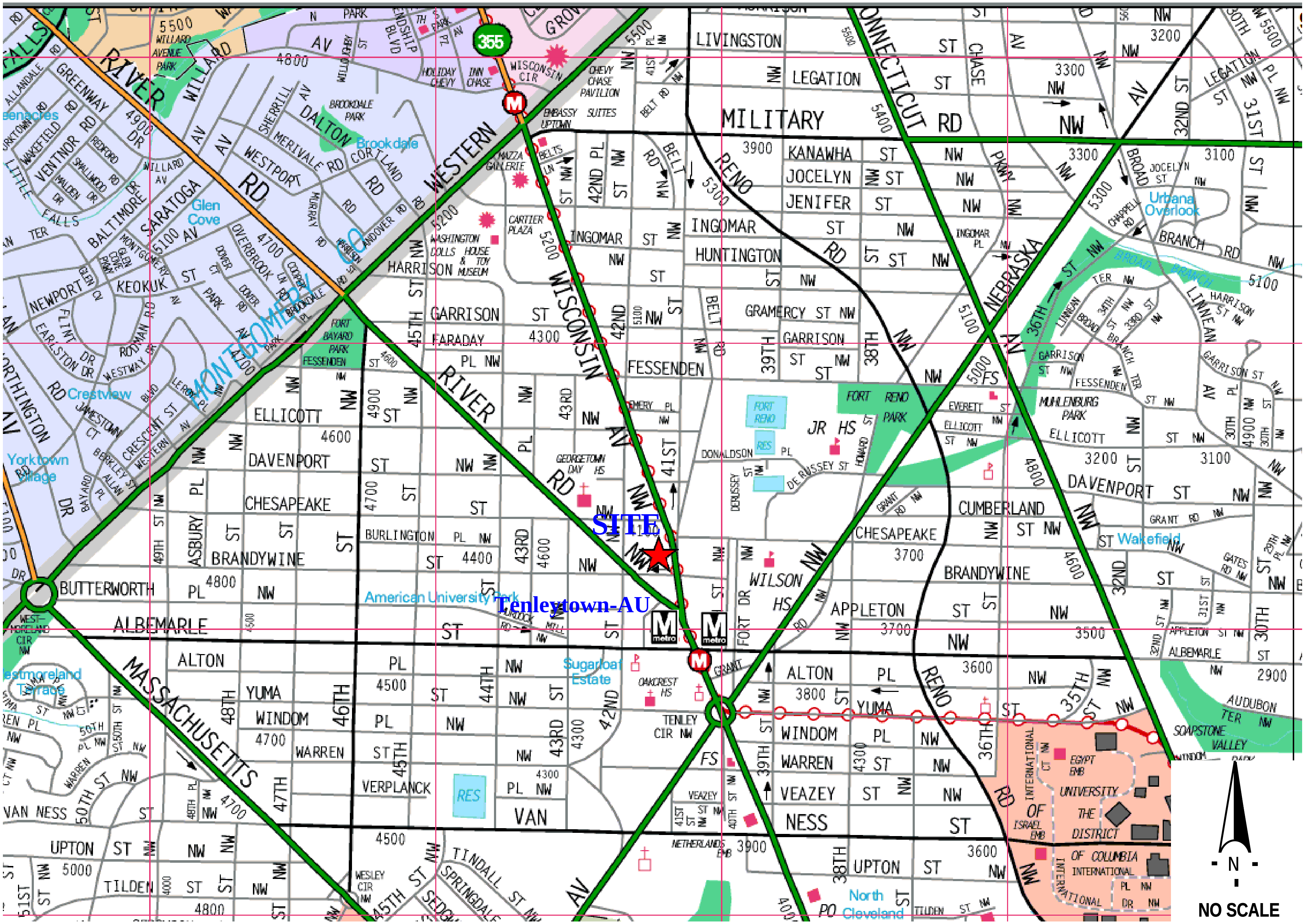


O. R. GEORGE & ASSOCIATES, INC.

Traffic Engineers - Transportation Planners

Exhibit 1: Site Location Map

4600 Wisconsin Avenue Northwest, Washington, D.C.

Planned Unit Development Application (No. ZC 10-23)

2.0 EXISTING ROADWAY AND TRAFFIC CONDITIONS

2.1 Zoning and Land Use Context

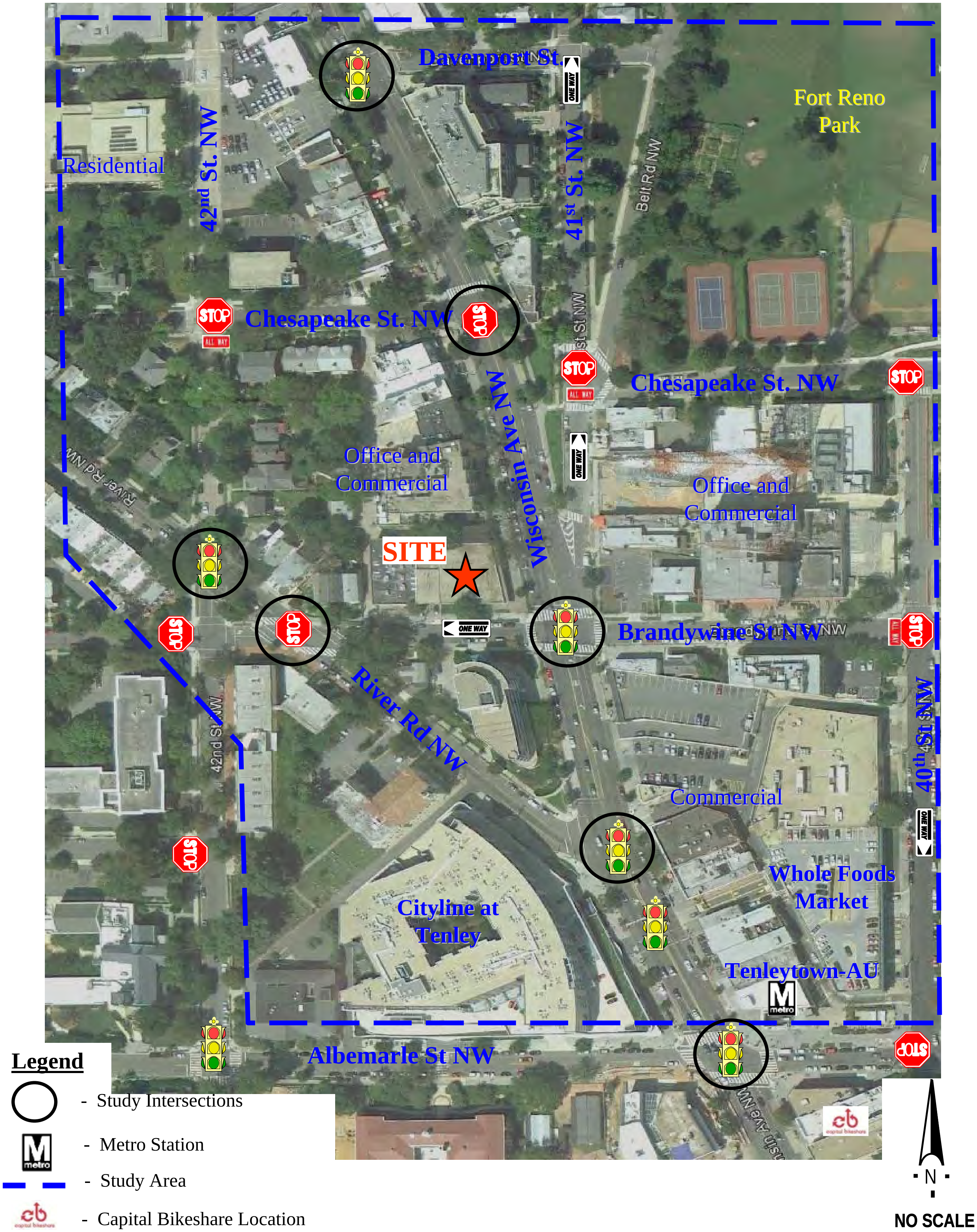
The property is within Square 1732, with Lots to the east of the property zoned C-2-A and those to the west zoned R-2 (semi-detached residential). To the south along the Wisconsin Avenue corridor, the properties are of medium density, i.e., zoning category C-3-A, which permits a mix of business, employment and housing uses. The area is substantially built-out according to these zoning categories. With respect to the abutting uses along Brandywine Street, it is noted that the properties within Square 1731 immediately to the south, consists f a mix of mainly commercial and retail uses, many of which are accessed via River Road. As further context to the land use and access situation, it is noted that the one-way directional approach along the 4100 block of Brandywine Street is westbound as opposed to the adjacent block to the east, which serves two-way traffic flow.

The property is located within the "Rock Creek West Planning Area" as defined in the City's Comprehensive Plan[1]. The Plan notes that "any re-development along the corridor should, among other objectives, promote walk ability and create a more attractive street environment". Furthermore, the Plan requires that the "impact of new development on traffic, parking and infrastructure and public services must be mitigated to the greatest extent feasible". These aspects of the City's policies are addressed in relevant sections of this report following. Exhibit 2 shows key study area land uses that provide further context to the transportation analysis which follows.

2.2 Study Area Roadway Network

The subject property is well-connected to the City's roadway, bicycle and pedestrian networks, as well as the area's transit facilities and services. Regional access to the proposed development site is served by several major arterial corridors, including Wisconsin Avenue, River Road and Nebraska Avenue. The local and collector roadways are typical of the City's grid system. Based on field reconnaissance of the site and its environs, and discussions with the DDOT staff, the study area road network selected for evaluation is defined as shown in Exhibit 2. It includes the area delimited by Davenport Street to the North, Albemarle Street in the South, 42nd Street to the west, and 40th Street to the east. The physical characteristics and service functions of the key study area roadways are described on page 6.

[1] *Comprehensive Plan for the National Capital: District Elements (Chapter 3, Section LU 1.3), October 2007.*



O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**EXHIBIT 2: Study Area and Land Use Context**
	4600 Wisconsin Avenue, Northwest, Washington D.C.
	Planned Unit Development Application (No. ZC 10-23)

Study Area Roadway Network (Continued)

- Wisconsin Avenue: This is an undivided north-south Principal Arterial on the City's roadway network. This roadway has a six-lane cross section. Parking is restricted along the west side during the morning peak period and along the east side during the afternoon peak period. This allows for three (3) lanes to serve the dominant direction of flow during both morning and afternoon peak periods. Meters restricting parking to two-hour limits are provided along both sides of the roadway and allow for parking outside of the periods between 7:00 AM and 10:00 PM. Within the area of the subject site, this roadway serves approximately 29,900 vehicles per day[2].

- Brandywine Street: This is a two-lane, east-west Local Roadway on the City's roadway network. The section of this roadway between Wisconsin Avenue and River Road is one-way in the westbound direction. Metered parking is also provided along both sides of the roadway. The 4100 block of Brandywine Street serves approximately 6,600 vehicles on an average weekday.

- River Road: This is a two-lane Minor Arterial on the City's roadway network with on-street Residential Parking Permit (RPP) parking permitted along both sides of the roadway. Within the area of the subject site, this roadway serves approximately 9,600 vehicles on an average weekday.

- Albemarle Street: This is a two-lane east-west Collector Road on the City's roadway network with metered parking along both sides of the road. Albemarle Street serves approximately 7,700 vehicles on an average weekday within the area of the subject site.

The Average Annual Daily Traffic (AADT) volumes cited above are from the City's most recent traffic volume maps. The existing roadway network and traffic control devices at these intersections, including the lane configurations during weekday peak period restrictions, are presented in Exhibit 3. Based on the scoping discussions with DDOT, the study analyzed the following seven (7) local intersections:

1) Wisconsin Ave. and Davenport St.
2) Wisconsin Ave. and Chesapeake St.
3) Wisconsin Ave. and Brandywine St.
4) Wisconsin Ave. and River Rd.
5) Wisconsin Ave. and Albemarle St.
6) River Rd. and Brandywine St.
7) River Rd. and 42nd St.

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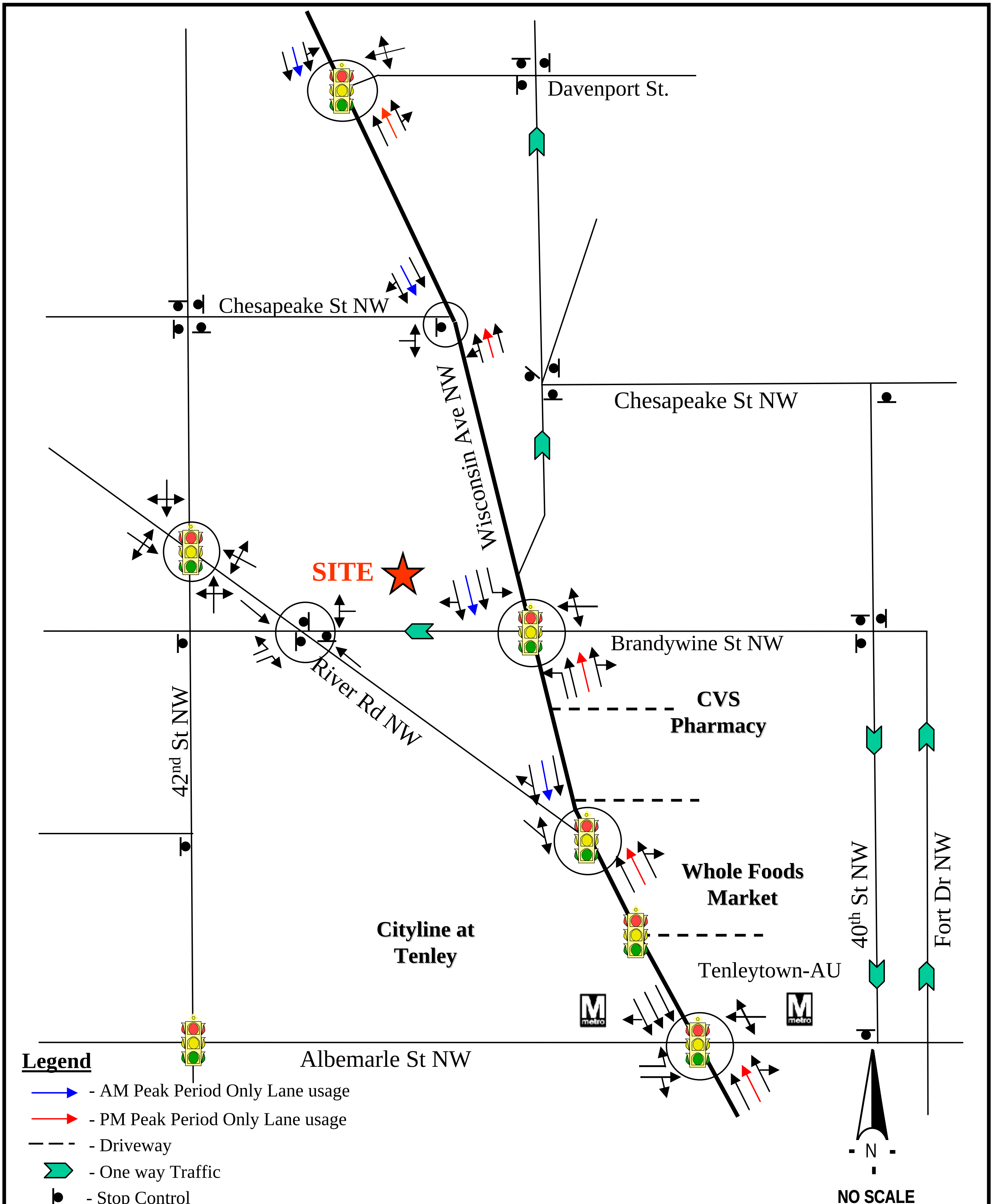
[2] *DDOT "2009 Traffic Volumes" map factored by annual increase of 2% to reflect 2012 conditions.*



Legend

- AM Peak Period Only Lane usage
- PM Peak Period Only Lane usage
- Driveway
- One way Traffic
- Stop Control

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EXHIBIT 3: Roadway Configuration and Traffic Control Devices

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

2.3 Existing Traffic Situation

In order to assess current traffic flow conditions, field observations were made of the study area roadway network during the morning and afternoon peak periods. Turning movement counts were also conducted at the seven (7) study area intersections on a typical weekday, during the periods between 7:00 – 10:00 AM, and 4:00 – 7:00 PM. Exhibit 4 shows the morning and afternoon peak hour traffic volumes; and the turning movement count data is included as Attachment B. The Consultant also considered the traffic accessing the commercial/retail uses along the east side of Wisconsin Avenue (between River Road and Brandywine Street) in order to reflect actual operational conditions.

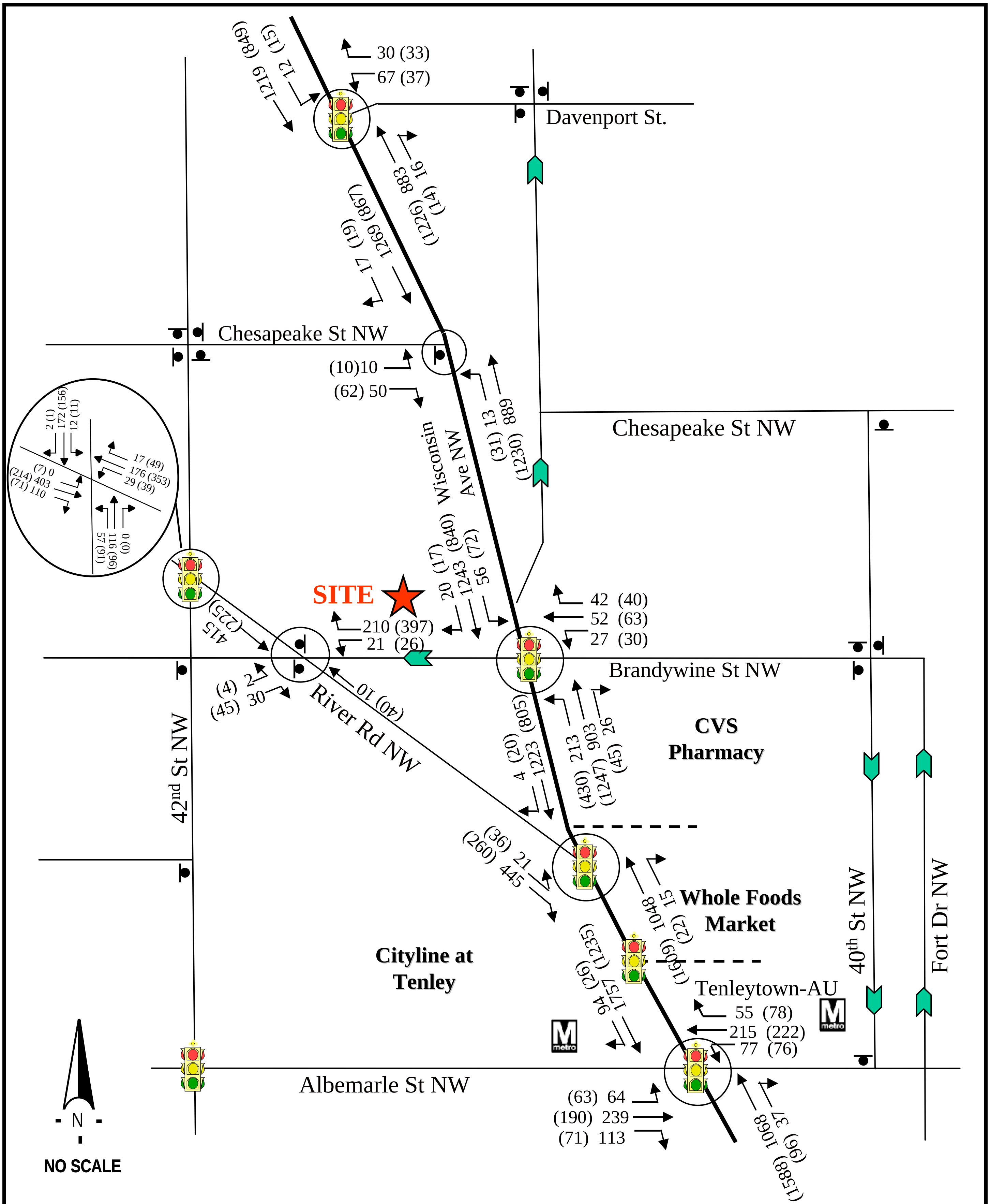
As per DDOT's requirements, the Consultant performed operational analysis for the study area intersections using the Synchro software, and the results are reported as per the Highway Capacity Manual (HCM 2000) methodology. The computed Levels of service[3] (LOS) and the average control delay are summarized in Table 1 (on page 10). The analysis worksheets are included as Attachment C.

The levels of service shown in Table 1 are quite acceptable and well within the City's planning standards. The control delays shown are nominal, and would typically be experienced by the minor street approaches, which carry much less traffic. The favorable levels of services are due primarily to the following factors:

- The signals along the Wisconsin Avenue corridor are coordinated in order to enhance the progression of traffic flow along the corridor.
- There are fulltime left-turn restrictions from Wisconsin Avenue onto River Road and there are part-time and peak period left-turn restrictions from Wisconsin Avenue onto Albemarle Street, reducing conflicting vehicular movements.
- Exclusive left-turn phases are provided for turning traffic from Wisconsin Avenue (in both directions) onto Brandywine Street.

In addition to the above factors, countdown pedestrian signals are provided at all signalized intersections. This facilitates non conflicting pedestrian and vehicular movements. In this connection, it is important to note that the turning movement counts undertaken included pedestrians using each crosswalk at the location. The pedestrian volumes recorded during the peak hours are presented in Table 2 on page 10.

3 "Level of Service" is a qualitative measure describing operational conditions within a traffic stream or at an intersection, and reflects their perception by drivers and other roadway users. Principal considerations are factors such as speed and travel time, delay, and freedom of maneuver, traffic interruptions, comfort, convenience and safety. Current engineering practice defines six (6) Levels of service (A-F), with "A" representing best operation conditions, and Level of Service "F" representing the worst conditions. Level of Service "D" is generally considered by the District of Columbia as the minimum acceptable conditions for planning purposes.



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Traffic Engineers - Transportation Planners

EXHIBIT 4: Existing Peak Hour Traffic Volumes

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

Table 1:
Summary of Capacity Analysis Results – Existing Traffic Situation

Intersection	AM Peak Hour		PM Peak Hour	
	Level of Service	Avg. Delay (Secs/Veh)*	Level of Service	Avg. Delay (Secs/Veh)*
1) Wisconsin Ave. @ Davenport St. (Signalized)	A	5.3	A	4.9
2) Wisconsin Ave. @ Chesapeake St. (Stop Sign Controlled)	C	20.8	C	19.0
3) Wisconsin Ave. @ Brandywine St. (Signalized)	B	18.5	C	27.3
4) Wisconsin Ave. @ River Rd. (Signalized)	A	5.3	A	4.9
5) Wisconsin Ave. @ Albemarle St. (Signalized)	C	30.9	C	30.7
6) River Rd. @ Brandywine St. (Stop Sign Controlled)	C	15.2	C	24.9
7) River Rd. @ 42nd St. (Signalized)	C	31.6	C	22.7

* Secs/Veh. = Average Control Delay (in Seconds per Vehicle)
Source: O. R. George & Associates

TABLE 2:
Existing Peak Hour Pedestrian Volumes

Intersection	North Crosswalk		South Crosswalk		East Crosswalk		West Crosswalk	
	AM	PM	AM	PM	AM	PM	AM	PM
1) Wisconsin Ave @ Davenport St.	13	26	N/A	N/A	18	23	N/A	N/A
2) Wisconsin Ave @ Chesapeake St	25	15	N/A	N/A	N/A	N/A	13	26
3) Wisconsin Ave. @ Brandywine St.	61	67	31	69	71	161	59	125
4) Wisconsin Ave. @ River Rd.	19	36	N/A	N/A	N/A	N/A	107	155
5) Wisconsin Ave. @ Albemarle St.	128	199	61	146	242	315	235	282
6) Brandywine St. @ River Rd.	24	29	17	32	18	27	14	21
7) River Rd. @ 42nd St.	34	18	N/A	N/A	9	3	12	9

Source: O. R. George & Associates

It is also noted that the heaviest volumes recorded occurred at the intersection of Wisconsin Avenue at Albemarle Street, which is adjacent to the Tenleytown-AU Metrorail station. This intersection is signalized and operates on a 100-second cycle length, which computes to 36 cycles per hour. This shows that pedestrian volumes at this location would be in the range of 4-6 crossing Wisconsin Avenue, and 7-10 crossing Albemarle Street during a typical cycle. Given the fact that these are recently installed crosswalks in the range from 15-20 Ft. wide, and considering that DDOT times its signals with specific emphasis on ensuring pedestrian accommodation, the data indicates no deficiencies in terms of the quality of service provided to pedestrians.

DDOT's current policy requires Consultants to document pedestrian facilities within the immediate area of the site; this matter is further addressed in Section 2.8.

2.4 Existing Operations and Safety Considerations

Traffic operations and efficiency of vehicular flow within roadway networks are closely linked to safety, and there is also an accepted correlation with crash (accident) occurrence. The PUD site is located in a high density built-up area (in terms of land use activity), and pedestrian and bicycle activities are significant. In order to address safety within the defined study area, the Consultant obtained the most recent 3-year (period for which this data is available) crash data from the City for the seven (7) study intersections. The data is summarized in Table 3, and the reports are presented in Attachment D.

<u>TABLE 3</u>:
Summary of Crash Data

Intersection	Total Crashes				Average Accidents Per Year	MEV**	Crash Rate*
	2008	2009	2010	2011			
1) Wisconsin Ave. @ Davenport St.	***	4	8	6	6	9.2	0.65
2) Wisconsin Ave. @ Chesapeake St	***	3	7	1	4	8.5	0.47
3) Wisconsin Ave. @ Brandywine St	7	13	9	***	10	10.2	0.98
4) Wisconsin Ave. @ River Rd.	8	5	6	***	6	8.9	0.67
5) Wisconsin Ave. @ Albemarle St	9	11	14	***	11	13.1	0.84
6) River Rd. @ Brandywine St.	0	4	2	***	2	4.5	0.5
7) River Rd. @ 42nd St.	-	3	1	***	2	4.6	0.436

** Crash Rate = computed as Average Crashes per year divided by MEV*
*** MEV = Million Entering Vehicles (i.e. estimated number of millions of vehicles using the location over a typical year)*
**** None reported/available.*
***<u>Source</u>:** DDOT, and O. R. George & Associates, 2012.*

Table 3 shows that the computed crash rates are all less than 1.0. DDOT's guidelines do not provide specific criteria for evaluating crash rates. However, it is noted that a crash rate of 2.00 is generally considered as the upper limit of acceptability. The computed rates are well below this value, and do not indicate safety deficiencies.

2.5 Transit and Bicycle Facilities

The subject property is favorably situated relative to public transportation services. It is approximately 600 ft north of the Tenleytown-AU Metro station, which is accessible within **3-5 minutes** by walk and **1-3 minutes** by bicycle. The site is also served by fourteen (14) Metrobus routes running along Wisconsin Avenue and Nebraska Avenue, with local connectivity via Chesapeake, Brandywine and 40th Streets. Access to these bus routes is as follows:

- Wisconsin Avenue: Service along this major arterial includes Routes 31, 32, 36, 37 and N-2, with bus stops located on either side of Wisconsin Avenue just, south of Brandywine Street. These bus routes connect the site to outlying areas of the City to the north and west.

- Nebraska Avenue: Routes D-31, D-32, D-33, D-34, W-45 and W-47 provide service along this arterial, with neighborhood access along Chesapeake Street and Albemarle Street (also connected with the Tenleytown-AU Metrostation). The routes connect the site with the outlying areas in the east.

In addition, bus routes H-2, H-3 and H-4 connect the immediate area of the subject property to the central parts of the City. These Metrobus routes generally operate with headways in the range of eight (8) to ten (10) minutes during the peak commuting hours, and twelve (12) to fifteen (15) minutes during the off-peak hours on weekdays. For convenience, a copy of the WMATA bus route map is included as Exhibit 5.

The City Bicycle Map identifies bicycle travel routes within the area along Wisconsin Avenue, Nebraska Avenue, and 42nd Street. The Bicycle Master Plan calls for significant new facilities, including along Nebraska Avenue, River Road, and Albemarle Street. The City's current policies on multi-modal facilities are also applicable within the general study area. In this regard, it is noted that there are Capital Bikeshare stations located within the local area of the PUD site, one station being on the east side of Wisconsin Avenue and immediately south of the Albemarle Street intersection.

Source: Washington Metropolitan Area Transit Authority

O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**Exhibit 5: WMATA Bus Map** **4600 Wisconsin Avenue Northwest, Washington, D.C.** **Planned Unit Development Application (No. ZC 10-23)**

2.6 Existing Parking Situation

As a part of the Applicant's community outreach process, several presentations were made to the local Advisory Neighborhood Commission. The Consultant undertook an inventory of parking spaces, which are conveniently located relative to the PUD site. One of the requests made to the Applicant was to determine the potential availability of parking spaces on a long-term lease basis. The Consultant inventoried the parking supply in the vicinity of the PUD site on behalf of the Applicant and these results are summarized in a memorandum dated August 1, 2012, a copy of which is included as Attachment E. Further details are provided as a part of Section 4.0 Other PUD Elements and Considerations.

As noted earlier, the retail use proposed by the Applicant is expected to attract principally none-destination trips, and should not generate significant parking demand. However, the Consultant conducted a parking inventory and usage survey of spaces within convenient walking distance to the site, and the results are summarized in Table 4.

TABLE 4:
Summary of Parking Usage Survey

Parking Location	Average Observed Availability (Spaces)							
	AM			PM				
	6:00 - 8:00	8:00 - 10:00*	10:00 - 12:00	12:00 - 2:00	2:00 - 4:00	4:00 - 6:00*	6:00 - 8:00	8:00 - 10:00
1) Brandywine St. (between Wisconsin Ave. and 42nd St.) (12 spaces)	8	10	4	6	5	1	4	7
2) Brandywine St. (between Wisconsin Ave. and 40th Ave.) (26 spaces)	17	7	5	8	9	4	1	3
3) Wisconsin Ave. (between River Rd. and Chesapeake St.) (31 spaces)	31	12	22	16	18	11	18	17
4) River Rd. (between Wisconsin Ave. and Brandywine St.) (17 spaces)	16	15	11	8	4	6	6	7
5) 42nd St. (between River Rd. and Chesapeake St.) (24 spaces**)	9	4	3	2	2	4	8	11

*AM and PM peak hours occurred during these 2-hour time periods. **Residential Parking Permit restricted

Source: O. R. George & Associates

The information presented in Table 4 shows the following:

- 10:00 AM – 12:00 PM: 45 out of 110 spaces available (41%)
- 4:00 PM – 6:00 PM: 26 out of 110 spaces available (24%)
- 6:00 PM – 8:00 PM: 37 out of 110 spaces available (34%)

From the survey results it cab be concluded that there are adequate parking spaces that can be used by retail vehicles, should there be a need.

2.7 Existing Signage and Pavement Markings

In keeping with DDOT's current CTR standards, the agency has requested that the Consultant document existing signage and pavement markings within the study area. More specifically, the requirement is that, the Consultant inventory and makes general observations of the regulatory and warning signs and the pavement markings in order to assess observable conditions and general compliance with the Manual of Uniform Traffic Control Devices (MUTCD) standards.

With respect to the signage, the results of the inventory are shown in Exhibit 6. The signs appeared to be properly positioned, in terms of their lateral clearance from the edge of the roadway, and their vertical heights, which allowed them to be visible to motorists. There was no evidence of deterioration within the message board or the sign supports. (Measurement of retroreflectivity associated with nighttime was not required.)

With respect to pavement markings, the main features were the double centerline, yellow pavement markings, and lane separation lines. These all appear to be in keeping with character of Wisconsin Avenue as a major arterial, and with minor roadway approaches. Photographs of representative sections of roadway are included as Attachment F.

2.8 Pedestrian Facilities (Sidewalks, Crosswalks and Pedestrian Ramps)

As per DDOT's requirements, the Consultant performed a survey of crosswalks and ADA[4] ramps at intersections within the study area. As is typical for locations within built-up areas of the city, crosswalks and sidewalks are provided at all intersections, in keeping with pedestrian flow and adjacent land use and access situations. These are linked to the City's network of sidewalks, which is continuous along both sides of Wisconsin Avenue and along all minor roadway approaches. The DDOT Design and Engineering Manual requires ADA ramps to be provided at all crosswalk locations (with separate ramps connecting to individual crosswalks).

The ramps at all locations appear to be in compliance with this requirement, except for the two (2) intersections of River Road @ Brandywine Street, and at 42nd Street. A total of four (4) ramps locations are involved. Recommendations regarding this deficiency are included in Section 5 dealing with Transportation Management Plan provisions and mitigation measures. Photographs showing typical facilities are included as Attachment F. It is noted that there are several schools within the area (notably Jenny Elementary School along Albemarle west of

[4] *Americans with Disability Act (generally referred to as handicap.)*

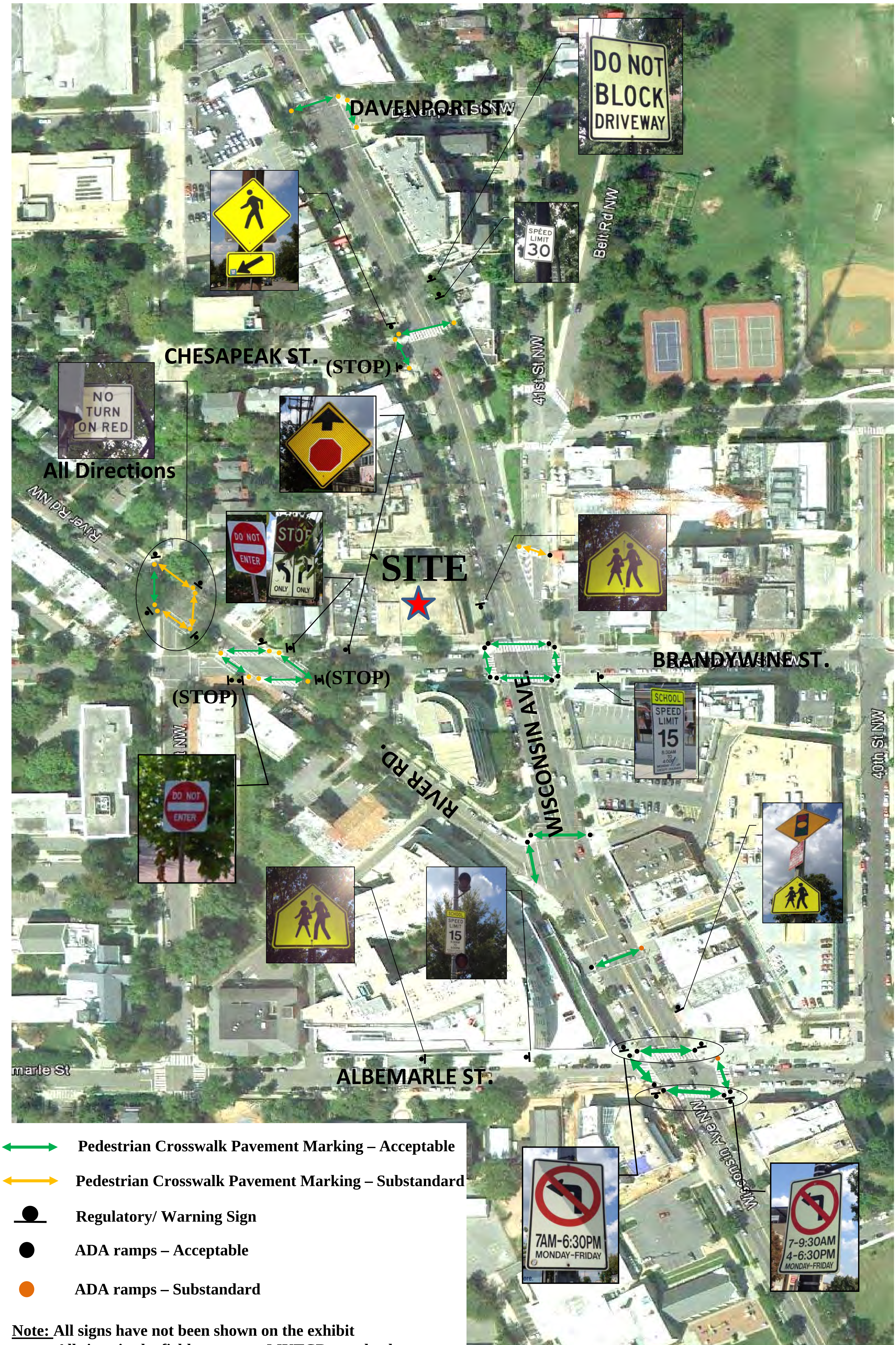
Wisconsin, and Woodrow Wilson High School along Brandywine Street east of Wisconsin), and school crossing signs are shown at the affected intersections. It appears that the following

pedestrian signs would be needed:

The following potential deficiencies, in terms of signage were observed:

- A school crossing sign could be provided for northbound traffic along Wisconsin Avenue at Brandywine Street. (This would compliment the existing sign provided for southbound traffic.)
- A school crossing sign could be provided for southbound traffic along Wisconsin Avenue at Albemarle Street. (This would compliment the existing sign provided for northbound traffic.)
- A pedestrian crossing sign could be provided for traffic traveling in the northbound direction at Chesapeake Street. (This would compliment the existing sign provided for southbound traffic.)
- A speed limit sign (30 MPH) is provided along the east side of Wisconsin Avenue at Chesapeake Street. Visibility of the sign is obscured by vegetation and the situation could be considered for mitigation.

It is noted that all signage would be located within the public space, and any changes would require an evaluation and approval by DDOT for their implementation. This would include consideration of factors, such as "clutter" within the public space.

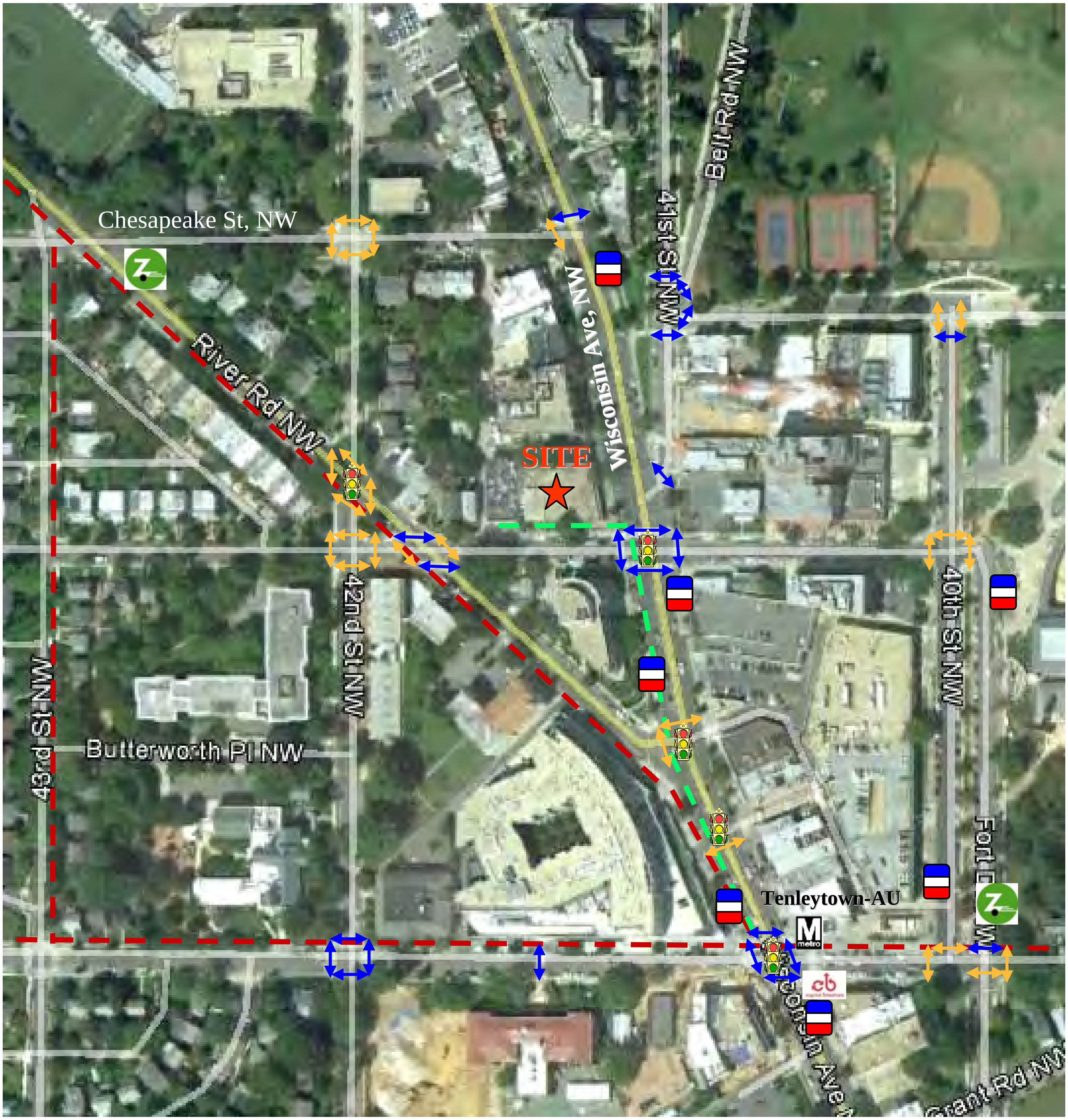


O. R. GEORGE & ASSOCIATES, INC.
Traffic Engineers - Transportation Planners

EXHIBIT 6: SIGNS AND ADA RAMPS LOCATION

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)



Legend

cb	- Capital Bikeshare Station	↔ (blue)	- Highlighted Crosswalk
Z	- Zipcar Location	↔ (orange)	- Regular Crosswalks
		green dashes	- Primary Pedestrian Pathway
Metrobus symbol	- Metrobus Stop	red dashes	- Signed Bicycle Route

O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**Exhibit 7: Pedestrian/Multimodal Provisions** **4600 Wisconsin Avenue, Northwest, Washington D.C.** **Planned Unit Development Application (No. ZC 10-23)**

3.0 FUTURE TRAFFIC CONDITIONS

3.1 Proposed Development Plan

As noted earlier, the development will consist of 60 multi-family residential units and 14,000 square feet of ground-floor retail space. The residential use will consist of a mix of unit types, ranging from studios to one-bedroom units. The Applicant anticipates that the ground-floor retail would serve between three (3) and five (5) retail establishments, catering primarily to local area residents and workers, and passer-by traffic. As such, the retail uses would not be a destination attraction. There will also be a considerable level of trips that will be linked with other destination retail uses within the immediate area. In terms of the parking and loading facilities, Table 5 shows the City's requirements, as compared with the Applicant's proposal.

Table 5:
Parking and Loading Situation

Site Elements	Required	Proposed
Parking		
- Residential	30 Spaces	None
- Retail	38 Spaces	None
Loading		
- Residential	1 Berth @ 12' X 55' (with 100 SF platform)	1 Berth @ 12' X 30' (with 100 SF platform)*
- Retail	1 Berth @ 12' X 30' (with 100 SF platform)	None

* Shared usage with the residential component

The issues pertaining to the access needs of the development, the vehicle trip generation, and potential impacts on the local area roadway network are discussed in Section 3.2 and 3.3. The matter of the site parking and loading needs, operations, and management are addressed in Section 4. As noted in the Applicant Statement and in the drawings provided, vehicular access to the future development will be via a curb-cut along the north side of Brandywine Street, which will provide access to the 30-Ft. loading berth and one parking space that would be used for car sharing purposes. Pedestrian access to the building would be as follows:

- The main entrance to the residential section would be off the west side of Wisconsin Avenue; and this entrance would serve residents, visitors, and other pedestrian trips.
- Entrance to the commercial/retail establishments, all of which would be accessed off Brandywine Street.

The physical arrangement of the access point to the facility will impact both vehicular and pedestrian movements into and out of the site, and their use of the adjacent facilities within the public space. These issues are addressed in the respective sections dealing with projected vehicle trips and projected pedestrian trips.

3.2 Vehicle Trip Generation and Site Access Considerations

In keeping with DDOT's requirements, the Consultant utilized the Institute of Transportation Engineers (ITE) Trip Generation Manual (8th Ed., 2008) to develop preliminary trip generation estimates for the site. It is important to note that the ITE rates are reflective of stand-alone suburban sites, which typically have little or no access to public transportation services, bicycle facilities, and a continuous and comprehensive pedestrian network that promote non-auto use. Accordingly, adjustment factors were applied to reflect the location of the property within a Transit Oriented Development zone, and its close proximity to the Tenleytown-AU Metrostation, as well as having easy access to a number of bus routes serving the local area.

In order to develop appropriate trip reduction and mode split factors, the Consultant conducted a trip generation survey for the Cityline at Tenley mixed-use complex located one block south of the subject PUD site. That development consists of 200± multi-family residential units and 88,000 square feet of retail space, with each of these uses having separate entry and exit. The retail uses are anchored by a national electronics retailer, a major home furnishing and storage equipment dealer, and a hardware store. These uses attract primarily destination shoppers, with limited local area and passer-by patronage as well. The hours of operation are collectively between 8:00 AM and 10:00 PM.

The results of the survey are summarized in Table 6. (For comparison, the corresponding ITE trip rates are also included in the table.)

Table 6:
Vehicle Trip Generation Survey for
The Cityline at Tenley Development

Site Elements	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
200 Residential Units						
- Observed Trips	1	2	3	18	5	23
- Computed Trip Rates*	0.01	0.01	0.02	0.09	0.03	0.12
Corresponding ITE Trip Rates/Unit [1]	0.09	0.21	0.30	0.23	0.16	0.39
88,000 GSF Retail						
- Observed Trips	20	7	27	94	125	219
- Computed Trip Rates**	0.23	0.08	0.31	1.07	1.42	2.48
Corresponding ITE Trip Rates/1,000 sq. ft. [2]	0.61	0.39	1.00	1.83	1.90	3.73

*Trips per residential unit **Trips per 1,000 GSF retail

[1] ITE Land Use Code 223 (Mid-rise Apartment) [2] ITE Land Use Code 820 (Shopping Center)

Source: ITE Trip Generation Manual (2003), and O. R. George & Associates

The data presented in Table 6 shows that the "observed" trip generation rates are considerably lower than those recommended by ITE. In the residential component case, the computed rates are 7% of the ITE recommended rate during the AM peak hour, and 30% of the ITE recommendation rate during the afternoon peak hour. For the retail use, the computed rate was 30% of the ITE recommended rate during the AM peak hour, and 66% of the ITE recommended rate during the PM peak hour. For convenience, the comparisons are shown in the table following:

Land Use	% Recommended ITE Rate	
	AM Peak Hour	PM Peak Hour
Residential	7%	30%
Retail	30%	66%

As noted earlier, the PUD site will have 14,000 sq. ft. of retail space, consisting of three (3) to five (5) retail service establishments. The Applicant has advised that these establishments will be local-serving, catering mainly to passer-by traffic, pedestrians, and local residents, including those from the subject development. This study therefore assumes that the retail would have no appreciable vehicle trip generation. *[Note: This assumption is supported by a site survey conducted for the Triangle Development located near the Columbia Heights Metrorail Station, as part of BZA Case No. 18269.]*

Based on the above, and considering adjustments applied in other residential development uses approved by DDOT, this study finds that a 60% non-auto modal split would be a reasonable and conservative assumption for a site having typical parking supply that complies with the City's current Regulations. When coupled with the fact that the Applicant proposes <u>no</u> on-site parking, a reduction factor of 80% was applied. The 20% vehicle trip factor (which this assumption implies) would allow for miscellaneous other trips (i.e., deliveries, drop-offs/pick-up trips, etc.). Some adjustment in the directional split was made to account for the assumptions noted. Table 7 below presents the trip generation estimates of the PUD site. Table 3 also includes trips for the retail component of the site, and reflects similar assumptions made for the retail trips. (See paragraph following below.)

<u>Table 7:</u>
Vehicle Trip Generation (Subject PUD Site)

	AM Peak Hour			PM Peak Hour		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Trip Rates						
Trips per Mid-Rise Apt. Unit *[ITE Land Use Code 223]*	0.09	0.21	0.30	0.23	0.16	0.39
Trip Generation						
Trip/60 Mid-Rise Apt. Units	5	13	18	14	10	24
Net New Residential Trips (With 75% non-auto factor)	**4**	**5**	**9**	**4**	**4**	**8**
Retail Trips	**6**	**6**	**12**	**15**	**15**	**30**
Total Site Trips	**10**	**11**	**21**	**19**	**19**	**38**

<u>Source:</u> ITE Trip Generation Manual (2003), and O. R. George & Associates, Inc.

The assumptions referenced above are closely linked to the proposed access arrangement for the site. The access consists of the following:

- Residential Access: With the lobby and main access to the residential apartment being off the west side of Wisconsin Avenue, it is assumed that virtually all of the vehicle trips will be oriented north-south along Wisconsin Avenue, with minor percentages oriented to/from the adjacent minor roadways.
- Retail Access: The development proposal calls for three (3) to five (5) retail establishments to be located along the north side of Brandywine Street. Vehicle trips accessing these businesses would be predominantly oriented to/from Wisconsin Avenue (both directions), and some minor roadway approaches. This assumes that all patronage trips would (conservatively) use the metered parking along the block, while the delivery and other service vehicle trips would have a similar orientation to Wisconsin Avenue, access the site loading facilities, as well as the loading zone (implemented by DDOT) along the south of the block.

These assumptions are reflected in the vehicle trip assignment; see Exhibit 7 for the site trip assignment. Pedestrian generation and impacts are discussed in the subsequent of the report.

Pedestrian Trip Generation: In order to develop a generalized estimate of pedestrian trips that would be generated by the site, the Consultant made the following assumptions:

- Occupancy would be in the range of 1.5 residents per unit, and considering the 60 units, the building population would be approximately 90 residents.
- The pedestrian peak hour would be concurrent with the vehicular peak hour.
- Average day non trip-making activity to be approximately 10% and 40% of the trips would occur during the peak hour.
- Pedestrian/bicycle mode split of 92%/8 %[5].

Based on the above mentioned assumptions, the site would generate approximately 30 pedestrian trips and 5 bicycle trips during the AM peak hour. For the purpose of this analysis, the study assumed the corresponding trips for the PM peak hour to be 30% higher (this assumption is consistent with the ITE vehicular trip percentage change between the AM and PM peak hours). Therefore, the site would generate 39 pedestrian trips and 7 bicycle trips during the PM peak hour.

With respect to the retail use, it is noted that the beginning hours of operation would typically occur between 9:00 and 10:00 AM. However, without additional information of the specific type of retail uses, it would be impractical to estimate the pedestrian/bicycle trips generated by the retail site to any degree of specificity. Furthermore, it was noted that much of the pedestrians accessing the retail will be attracted from those already using the adjacent roadway network. As a conservative approach, the Consultant utilized a survey conducted for the 1375 Kenyon Street project, which is a mixed-use development in The Columbia Heights area of Northwest. The development consists of 141 residential units and 18,044 SF of retail space, involving nine (9) retailers.

[5] *United States Census Bureau (2010) – Washington D.C.*

The Columbia Heights survey was conducted between 10:00 AM and 2:00 PM, and the result was noted as an average of 38 trips per hour[6]. Prorating the trips based on the difference in square footage of the retail space, the subjected PUD site will generate approximately 30 trips per hour during 10:00 AM to 2:00 PM. As a worst case scenario, the study assumed 50% of these trips would be generated during AM peak hour, and 100% during the PM peak hour. Based on the assumed percentages, the site would generate approximately 15 pedestrian trips during AM peak hour and 30 pedestrian trips during PM peak hour. These non-auto trip generations are summarized in the table below.

Land Use/Mode	AM Peak	PM Peak
Residential		
- Pedestrian	30 trips	40 trips
- Bicycle	5 trips	7 trips
Retail		
- Pedestrian	15 trips	30 trips
- Bicycle	1 trip	3 trip

Source: O. R. George & Associates, Inc.

While the above estimates of pedestrian/bicycle generated are conservative (i.e., on the higher side), the Consultant added these trips to the pedestrian volumes in the analysis of 2015 build conditions. These are addressed in Section 3.3 following.

3.3 Projected 2015 Traffic Situation

The Applicant anticipates build-out of the project by 2014. Therefore, in accordance with DDOT guidelines for traffic studies, a planning horizon year of 2015 was used (reflecting build-out plus one year). The projected 2015 traffic situation was derived by combining 1) growth in through traffic; 2) projected traffic from approved (but un-built) developments impacting the area; and 3) trip generation from the proposed PUD development. *(The latter was discussed earlier in this section in conjunction with the proposed development and site access provision of the PUD plan.)*

Growth In Through Traffic

In order to assess potential growth in through traffic within the area, this study considered traffic volume data obtained from DDOT for the period 2007 through 2009 inclusive, the most recent data 3-year period for which data is available. The data shows a relatively stable (or decreasing) pattern, particularly along Wisconsin Avenue (which showed over 6.0% decrease over the referenced periods). See table following on Page 24.

[6] *Traffic Impact Study by O. R. George and Associates, Inc. (BZA Case No. 18264)*

Recent Traffic Growth Trends

Roadway Segment/Section	ADT Volumes			Average Growth rate (2007-2009)
	2007	2008	2009	
1) Wisconsin Avenue NW (South of River Road)	34.2	34.0	29.9	-6.0%
2) Wisconsin Avenue NW (South of Western Avenue)	28.7	28.5	24.1	-8.1%
3) Nebraska Avenue NW (East of Wisconsin Avenue NW)	16.7	16.7	16.7	0.0%
4) Nebraska Avenue NW (West of Wisconsin Avenue NW)	11.8	11.8	11.8	0.0%

* Secs/Veh. = Average Control Delay Seconds per Vehicle

Source: DDOT and O. R. George & Associates

The Consultant used a conservative annual growth rate of 1.0% compounded annually for the 2015 base year, as required by DDOT. *(This is in accordance with DDOT's comments reflected in the CTR scoping process).* Attachment G-1 shows the 2015 base year traffic situation.

Background Development

As part of the study scoping process with DDOT, three (3) "background" developments were identified for inclusion in this analysis. These developments are as follows:

1) The Commons: Located west of Wisconsin Avenue between Newark Street and Idaho Avenue, this development consists of 118,804 GSF retail, 146 residential units, and 17,320 GSF commercial office space. Based on the traffic study approved by the City[7], the net trip generation and vehicle trip assignment was used as the basis for determining the trips to be assigned to the study area roadway network for the current study. Attachments G-2 to G-5 are extracts of relevant pages from the Wells & Associates study, and the trip assignment to the current study are included as Attachment G-6.

2) 5220 Wisconsin Avenue, NW: This approved Planned Unit Development is located within the Friendship Heights Transit Oriented Development Zone. The project proposed 70 residential condominium units and 13,200 SF retail. Based on the approved traffic impact study[8], background trips from this site were used and assigned to the current study area roadway network. Attachments G-7 to G-9 are extracts of relevant pages from the study; and the trips are assigned to the study area network as shown in H-10. [Note: It is understood that this PUD approval may now effectively be void since no development has occurred on this site to date. Moreover, communications with DDOT also suggest that they are aware that ownership of the site has been transferred to a public utility.]

3) Friendship Hospital for Animals (4501 Brandywine Street, NW): The property is located west of the proposed PUD site and this property has been at this location since

[7] *Traffic Impact Study by Wells & Associates, May, 2008*

[8] *Traffic Impact Study by O. R. George & Associates, Inc, June, 2006*

1958. Through the BZA application process the project proposes to modify the existing 9,000 GSF building and construct an additional floor of approximately 8,200 GSF. The Applicant projects that the expansion will not generate additional trips. This has been mentioned in the accompanying statement of the applicant, as the expansion is to modernize the facility and allow decompression from the current cramped operation conditions. However, trip generation from the draft Traffic Impact Study[9] was considered as part of the background traffic situation. Attachments G-11 to G-13 are extracts of relevant pages from the report, and the trip assignment to the current study are included as Attachment G-14.

It is to be noted that DDOT included four (4) other developments for consideration in this study. These developments are: the Davenport Safeway site (mixed residential and retail), located west of 42nd Street and north of Davenport Street; the Martin's Volvo mixed-use site located west of Wisconsin Avenue between Chesapeake Street; Davenport Street and American University Washington College of Law located near Tenley Circle and DHS Nebraska Avenue Master Plan- BRAC Consolidation. Efforts were made to obtain information regarding land use mix, TMP provisions, and ultimate vehicle trip distribution and assignment from these developments. Several of these are in the planning stages, and information was not available. The Consultant is seeking information from DDOT regarding these developments, with the intent of providing a supplementary memorandum on receiving the information.

The projected 2015 "base" traffic situation (Attachment G-1) was combined with the background development trip assignments (Attachments G-6, G-10 and G-14) to generate the 2015 "background" traffic situation shown in Attachment G-15. In order to develop the 2015 total (build) traffic situation, the background traffic situation (Attachment G-15) was combined with Exhibit 8 (page 26) which shows the trip assignment for the subject PUD site. Exhibit 9 (page 27) shows the projected 2015 total traffic situation.

In accordance to DDOT's requirements, capacity analysis was performed for the key study intersections and the results are summarized in Table 8 (page 28). For completeness, Table 8 shows a comparison of the existing and 2015 capacity analysis results. Given the location of the PUD site the intersection of Wisconsin Avenue at Brandywine Street would be the location significantly impacted. Table 8 shows that the average control delay at the location increases by an average of approximately 1.5 seconds during the peak hours. The 2015 total traffic situation analysis worksheets are included as Attachment H.

The draft DDOT Traffic Impact Study guidelines require 95th percentile queues to be reported for locations with an overall Level of Service D or worse. However, as shown in the Table 8, all intersections are projected to operate at a Level of Service C or better. As noted earlier, the projected pedestrian trips generated by the subject PUD site are accounted for in the analysis. The results presented in Table 8 are therefore a sufficient basis to conclude that the study intersections will continue to operate at acceptable levels of service upon build-out of the project in 2015.

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[9] *Traffic Impact Study (Draft) – July, 2012 by O. R. George and Associates, Inc.*

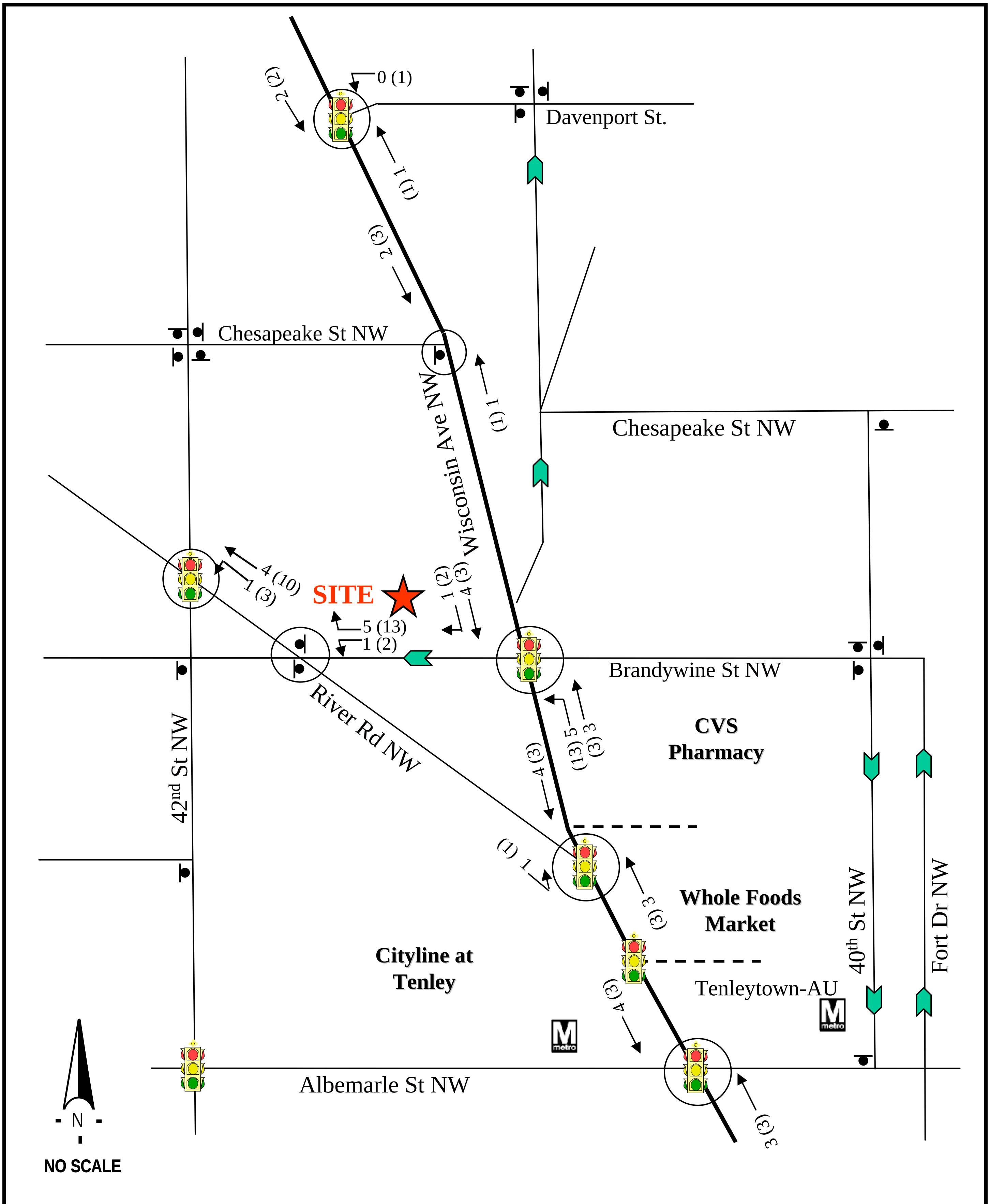

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EXHIBIT 8: 2015 Site Trip Assignment

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

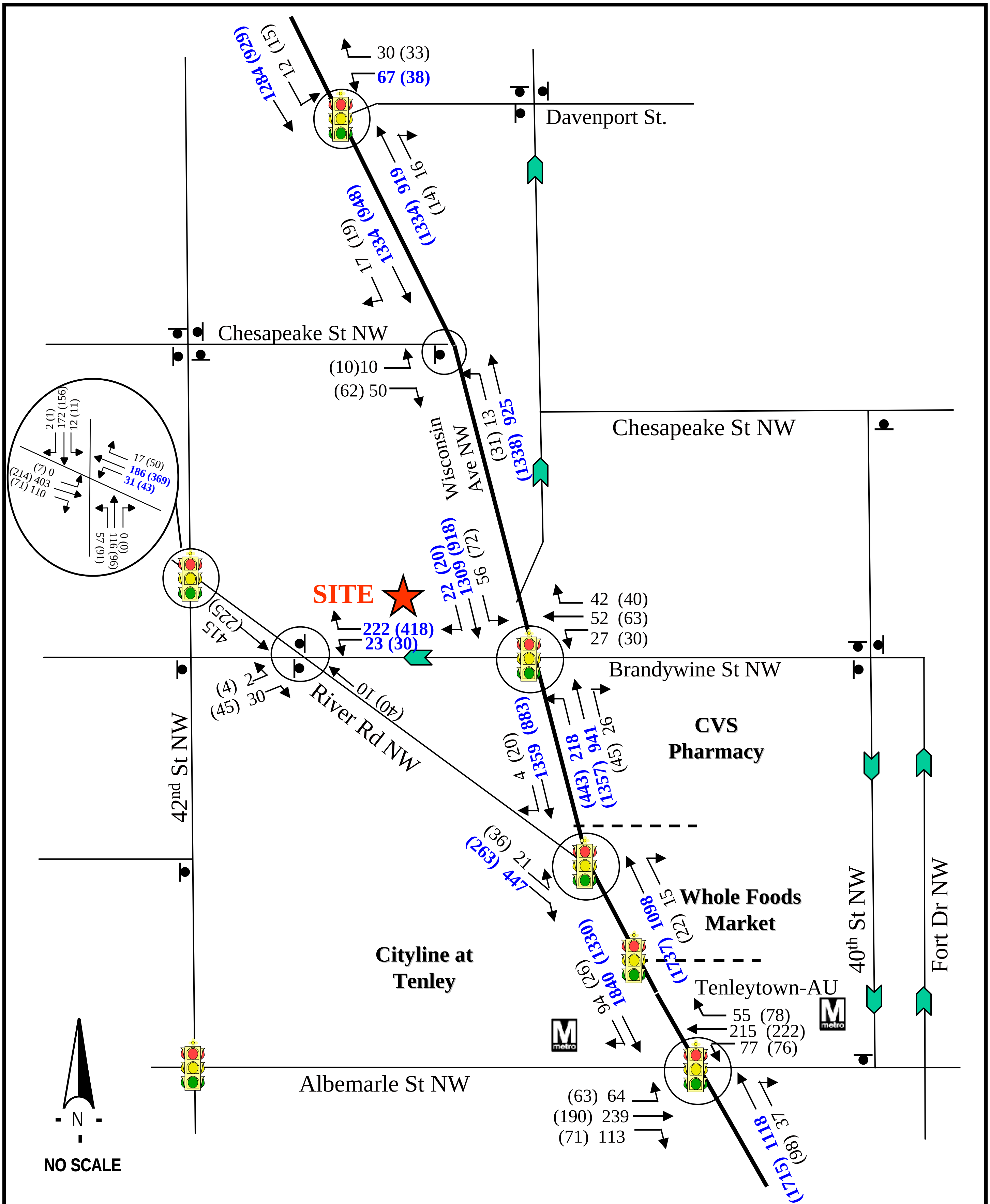

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EXHIBIT 9: 2015 Total Traffic Situation

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

TABLE 8:
Summary and Comparison of Capacity Analysis Results
(Existing 2012 and 2015 Total Traffic Situation)

Intersection	Evaluation Criteria	Existing (2012)		Future (2015)	
		AM Peak	PM Peak	AM Peak	PM Peak
1) Wisconsin Ave. @ Davenport St.	LOS	B	B	B	B
	Avg. Control Delay (sec)	14.1	15.4	14.2	15.7
2) Wisconsin Ave. @ Chesapeake St.	LOS	C	B	C	B
	Avg. Control Delay (sec)	15.5	12.9	21.3	13.4
3) Wisconsin Ave. @ Brandywine St.	LOS	B	B	B	C
	Avg. Control Delay (sec)	14.5	19.2	15.9	21.3
4) Wisconsin Ave. @ River Rd.	LOS	A	A	B	A
	Avg. Control Delay (sec)	9.7	5.2	11.1	5.2
5) Wisconsin Ave. @ Albemarle St.	LOS	C	C	C	C
	Avg. Control Delay (sec)	23.8	26.4	23.7	29.3
6) River Rd. @ Brandywine St.**	LOS	A	A	B	A
	Avg. Control Delay (sec)	12.2	11.6	12.4	12.2
7) River Rd. @ 42nd St.	LOS	C	C	C	C
	Avg. Control Delay (sec)	27.3	27.1	27.9	26.9

Source: O. R. George & Associates, Inc.
** For analysis purpose this intersection is considered as all way stop controlled.

4.0 OTHER PUD CONSIDERATIONS AND RELATED RESEARCH

In addition to the specific factors addressed in the preceding section covering vehicular trip generation and modal splits, it is the Consultant's view that the subject application must be considered in the context of emerging policies and changes in the City's Regulations. Also, there has been significant research on changing demographics within urban areas particularly with respect to vehicle ownership and travel patterns. These two subjects are discussed below. It is felt that these are directly relevant to the basis under which the parking relief is sought.

4.1 Changes in City Policies for Off-street Parking Requirements

The most significant is the "Zoning Regulations Review," which the City is conducting.[10] Phase I of this review was undertaken over a two-year period, involving a 24-member Task Force, with support from Nelson Nygaard Associates, a major consulting firm. Part of the focus was to identify changes that were needed to be better in sync with the goals and objectives established in the 2006 Comprehensive Plan. The following are highlights of the principal background, perspectives and recommended changes from the review:

a) The current parking regulations are based on land use and travel demand characteristics of 1958. One of the driving factors for the 1958 parking ratios (for off-street parking requirement) was that public streets had been heavily used for the storage of vehicles, and this was considered undesirable. The current staff report notes that current urban planning principles stipulated that on-street parking is acceptable (and desirable) as a part of urban life, including as an element of traffic calming.

b) The 1956 studies, which drove the provisions of the 1958 Regulations, assumed personal vehicles as the preferred mode of transportation. The District Office of Planning and the Department of Transportation have underscored that this principle runs contrary to its current policies of urban design, mobility and sustainability.

c) The 2006 Comprehensive Plan cites the City's Capital Investment in the Regional Metrorail System, noting the City's fifteen Metrorail Stations and requirement for new policies in the management of land in the vicinity of these stations (particularly to de-emphasize auto-oriented uses and surface parking).

In order to further address the matter of parking, the Consultant conducted parking inventories and usage surveys for a four-block area bordering the PUD site. The inventory is illustrated in Exhibit 10. The available parking within the defined study area is summarized as follows:

- There are a total of one hundred eighty-three (183) on-street metered parking spaces within the area, forty-nine (49) of which are located within a block of the PUD site.

[7] *"Zoning Regulations Review" of General Parking Chapter, General Bicycle Parking Review Chapter, and General Loading Chapter. (Set-Down Hearing Report for Zoning Commission Case No. 08-06), September 3, 2010.*

Legend

- Metro Station
- Capital Bikeshare Location
- Meter Parking
- RPP Parking
- Parking Garage
- Block Boundary
- B-X - Block Number
- (XX) - Available Number of Spaces

N

NO SCALE

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EXHIBIT 10: Parking Inventory

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

- There are five (5) off-street parking facilities within the area; including approximately five hundred sixty (560) commercial spaces that are accessible to the public for use on an hourly basis, as well as for short term lease.

Usage surveys were conducted for the on-street metered parking spaces within the defined study area, and the observations are summarized in Table 9.

Table 9
On-street Metered Parking Usage Survey

Block	Available Spaces	Observed Occupancy (%)		
		10:00 AM - Noon	Noon - 2:00 PM	2:00 - 4:00 PM
B-1 (PUD Block)	49	34 (69%)	32 (65%)	25 (51%)
B-2 (Eastern Block)	67	26 (39%)	28 (42%)	29 (43%)
B-3 (Southern Block)	11	5 (45%)	4 (36%)	4 (36%)
B-4 (Southeastern Block)	56	16 (29%)	13 (23%)	13 (23%)

Source: O. R. George & Associates

As it can be seen from the table above, there is a considerable amount of metered parking within the study area, particularly within the Block of the PUD site. The critical findings are summarized below.

- There are fifteen (15) metered parking spaces (2-hour limit) along Wisconsin Avenue and adjacent to the PUD site. Survey of these spaces on a typical weekday showed an average occupancy of 33% and a maximum occupancy of 60%.
- There are thirteen (13) metered parking spaces along Brandywine Street abutting the property, and additional seventeen (17) spaces along River Road to the south. These spaces do not have any peak hour restrictions. Survey of these spaces on a typical weekday showed an average occupancy in the range of 40%, and a maximum occupancy of 65%.

Moreover, as discussed in Section 3.2, the trip generation and mode split survey of the Cityline development indicated that only 35% of retail patrons use personal vehicles to access the development. Since the Cityline Development would attract a significant number of destination trips, it is the Consultant's view that the retail uses within the subject PUD site would attract no more than 10 to 15 percent of patrons using personal vehicles, considering the local-serving types of retail uses, which the Applicant envisions. Based on these considerations, the Consultant finds that the parking needs of the retail component of the proposed development can easily be accommodated by the metered parking and other parking spaces within the vicinity of the site. The availability of parking spaces within walking distance from the PUD site has been discussed under Section 2.6, which includes the parking usage survey data. It is important to note that the parking survey was conducted during the period of mid-October to mid-December, 2011.

In addition to the above, it was noted that there are a number commercial parking facilities within the immediate vicinity of the PUD site. As shown in Exhibit 10, there are five parking facilities with a total capacity of 765 spaces within the local area (560 commercial and 205 private parking spaces). These uses cater principally to commercial/retail patron demand during daytime hours, but are generally vacant during night-time when residential parking demand would be predominant. As part of the study effort, the Consultant investigated the potential use of the following two parking sites.

a) Cityline Retail/Atlantic Parking: This site consists of 150 parking spaces. Our discussion with the site management indicated that there is a minimum of 50 spaces available during daytime and 110 to 120 spaces available during night-time hours. The site management team has confirmed that these spaces are available for short term lease.

b) Whole Foods/Circle Parking: This four-story parking garage has a capacity of 380 spaces and discussions with the management staff indicated that a minimum of 130 spaces are available during peak demand periods. It was also noted that spaces are available for short term lease.

As noted in Section 2.6 (page 14) the applicant has engaged in extensive discussion with the Advisory Neighborhood Commission regarding potential measures that can be taken to ensure that the project doesn't result in adverse impacts on the community. One of the measures included having in place arrangements for lease of parking spaces by tenants as a contingency. The Consultant understands the applicants Pre-hearing statement will include further information regarding this issue.

4.2 Changing Urban Trends – Demographics and Travel Characteristics

With respect to the residential component of the site it is noted that the provision of 30 off-street parking spaces would be required to satisfy the criteria of the Zoning Regulations. The Applicant's Statement has identified practical difficulties and constraints to providing the required parking. In relation to this issue, the Consultant conducted considerable research pertaining to recent change in demographics, auto ownership and travel demand characteristics within the Nation's Capital, urban areas elsewhere in the country as well as internationally. The results of the research are summarized below, under five (5) key headings:

- ***Trends in Vehicle Ownership Within Urban Areas:*** The United States Census Bureau reports that the urban population of the United States increased significantly from 79.0% to approximately 81.0% between 2000 and 2010[11]. While, this increase may seem relatively small, the remarkable statistics is that over 80% of the population of the United States lives in urban areas. During the same period, the population of Washington D.C. increased from 572,059 to 601,723 persons, an increase of over 5.0%. Most of this increase has been with the age group 21-35. The Federal Highway Administration reports that over the 10-year period auto ownership in the District of Columbia fell by approximately 40,200 registrations; and vehicles per person fell from

[11] *U.S. Department of Commerce, Bureau of Census – "2010 Urban Area Facts".*

0.42 to 0.35 a drop of approximately 17.0%[12]. Along with these basic demographic changes, market surveys have shown that the purchase of new vehicles by adults within the age group of 21-34 has dropped to 27.0% (a 30.0% reduction from the corresponding figure from the peak year of 1985). Current trends dealing with demographic shifts and auto ownership can perhaps be capsulized by reference to a survey cited in the Wall Street Journal publication of January 2011, which sites surveys sighing that approximately 90.0% of younger population choosing to "live in an urban environment … which feature plenty of walking distance restaurants, retail and public transportation to Washington D.C", even when they may be forced to settle in outlying suburban communities such as Bethesda, Maryland or Arlington, Virginia[13].

- ***Reduction in Vehicle Miles of Travel (VMT):*** The transportation profession recognizes that the concept of Vehicle Miles of Travel (VMT) has a strong link with attitudes of significant segments of population towards ownership of personal vehicles, and travel mode choices. The National Household Travel Survey[14] database reports the VMT for age group 16-34 has dropped from 10,300 to 7,900 miles per capita between 2001 and 2009, a decrease by 23%. While the level of reduction is less for the overall population, a similar downward trend is also evident for all age groups. With respect to the District of Columbia, statistics published by Federal Highway Administration shows that while the City's population increased by 5.0% between 2000 and 2010, per capita Vehicle Miles of Travel fell by estimated 8.0% to 10.0% over the same period. The impact and implication for transportation policy is perhaps best summarized in an April 2012 article titled "*Transportation and the New Generation… What it Means for Transportation Policy*"[15] which notes the following:

  - As the demand for transportation overall stagnates, there is emerging consumer preference for walkable, less auto-dependent forms of developments.

  - Decline in Vehicle Miles of Travel improves the competitive positions of transportation alternatives on measures of quality, convenience and cost.

  In Support of the above extracts from the above referenced article are included as Attachment I.

- ***Trends in Transit Oriented Development in Urban Areas***: The Applicants Statement makes reference to several existing developments within historic districts with in Washington D.C., which provide no off-street parking. It is important to note that several of the sites noted are not located within Transit Oriented Districts. As part of the study effort, the Consultant performed an internet search of urban areas where there has been significant residential development in recent years without off-street parking. The Consultant selected the City of Portland, Oregon for reference and comparison. That city is designated as an urban center is situated within a metropolitan area, and has a

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[12] *U.S. Department of Transportation, Federal Highway Administration – Public Data for Highway Statistics.*

[13] *The Wall Street Journal- Real Estate New and Analysis*, January 13, 2011

[14] *U.S. Department of Transportation, Federal Highway Administration - National Household Survey Historical Monthly VMT Report*, 3 May 2011.

[15] *Frontier Group – U.S. Public Interest Research Group – Education Fund: "Transportation and the New Generation, Why Young People are Driving Less and What it Means for Transportation Policy" April, 2012*

population of 583,776, which is quite comparable to Washington D.C's population of approximately 600,000. The City also has a highly reputed public transportation system, consisting of Trimet Rapid Transit and Bus System network. As in Washington D.C. high density development is general concentrated within the downtown areas.

In an August, 2012 article entitled "No Room for Parking at Many New-Apartment Complexes" by Oregon Public Broadcasting News[16], it is reported that, of 40 apartment building projects for which permits were filed within an approximate one-year period, 25 offered no off-street parking. The number of units ranged from 10 to 282, and averaged 50 units. For convenience, a link to the article is provided and the extract from the article are included in Attachment J. (http://www.opb.org/news/article/no-room-parking-many-new-apartment-projects/).

- ***Proliferation of Car-share Organizations:*** Car-sharing is an emerging trend and serves the primary purposes of providing choice and bridging the gap for households and individuals who elect not to own a car, but may need one occasionally. Currently there are three (3) car-sharing companies operating with the Washington D.C area, namely Zipcar, Hertz On-Demand and Car2go. Zipcar being the pioneer of the concept, other companies are venturing in car-share to address the growing demand. A survey conducted by Flexcar[17] within the Washington D.C. area has shown that 42.0% of car-share members have forgone purchase of a car, and 25.0% of members who own a car have shown willingness to sell their car. In this connection it is noted that the Applicant proposes to provide a car-share space on-site as part of the TDM plan.

- ***Increase in Bicycle and Pedestrian Travel Mode Share***: As noted on page 33 dealing with reduced Vehicle Miles of Travel in urban areas, the Public Interest Research Group sites statistics that point to significant increase in bicycle and pedestrian travel within urban areas. The Organization notes that a 24.0% increase has occurred over the period 2001 to 2009. (See footnote #15 on page 33). Moreover, a study conducted for DDOT by LDA Consulting[18] regarding the impacts of Capital Bikeshare reported that four in ten survey respondents drove a car less often, and 94.0% of respondents indicated that Capital Bikeshare had been a factor contributing to their reduced driving. Thirty-eight percent (38.0%) of respondents who had access to a personal vehicle reduced annual driving by an average 523 miles. This resulted in a reduction of about 5 million Vehicle Miles of Travel per year for the 18,000 Capital Bikeshare members (as of November 2011). It is noted that there are two Bikeshare stations in close proximity to the subject PUD site, and the applicant plans to provide 25 bicycle spaces on-site.

As noted earlier, this study also gave significant consideration to the fact that the City is currently undergoing a review and update of regulations governing off-street parking provisions. As part of public hearing before the Zoning Commission, testimony was provided citing specific examples of residential developments implemented within TOD zones in the City, and which showed significant imbalance between parking supply and demand. For convenience, extract from the testimony by the Smart Growth Organization is included in Attachment K.

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[16] *Oregon Public Broadcasting News – No Room For Parking At Many Apartment Complexes, August 15, 2012*
[17] *Car-Sharing: Where and How It Succeeds– TCRP Report 108.*

[18] *Capital Bikeshare 2011 Member Survey Report (June 14, 2012) -LDA Consulting Washington, DC 20015*

The Consultant wishes to note that there is a considerable additional on-going research, pertaining to the subject discussed in this section. In particular, the Consultant wishes to cite the following recent studies, both of which were found to be quite germane to the current discussion and related policy decisions by the City.

1. "Residential Off- Street Parking: Car Ownership, VMT and Related Carbon Impacts (Case Study New York City)" - Transportation Research Board (TRB)[19].
2. "Guaranteed Parking – Guaranteed Driving: Comparing Jackson Heights, Queens and Park Slope, Brooklyn shows that a guaranteed parking spot at home leads to more driving to work." [20]

For convenience and ease of reference, copies of the two studies are included as Attachment L.

[19] *Transportation Research Board (TRB) – National Academy of Sciences, Washington D.C.*
[20] *Prepared for Transportation Alternatives, October, 2008*

5.0 TRANSPORTATION MANAGEMENT PLAN

The City's current policies emphasize vehicle trip reduction as one of its objectives for enhancing the quality of life within the urban environment. In support of this objective, developers/applicants are encouraged to incorporate Transportation Demand Management (TDM) measures, with the goal of reducing vehicle trip generation, particularly during the weekday peak hours. Earlier sections of this report have shown that the subject PUD site is quite favorably situated relative to the City's public transportation system, with the Tenleytown-AU Metrostation just two (2) blocks from the site and 14 Metrobus route running along Wisconsin Avenue and along Nebraska Avenue. As such, vehicular trip generation from the site would be very low, and will not appreciably impact the levels of service at the intersections in the immediate vicinity. The City's Comprehensive Plan also encourages mixed-use developments (of the type proposed) within the Tenleytown/Friendship Heights area.

In keeping with the City's policy, the Applicant proposes the following as the principal elements of its Transportation Demand Management Plan:

a) <u>Resident Transportation Coordinator (RTC):</u> The Applicant's site management will designate one employee as the Resident Transportation Coordinator. This person's duties would principally be to provide information to residents (particularly those incoming) regarding transit opportunities and schedules, as well as the location of Bike Share stations within the area, and bicycle parking provisions within the building. The RTC will generally encourage non-private auto usage and will have related information prominently displayed in the offices, community rooms, and other appropriate common space.

b) <u>Digital Multimodal Display:</u> This refers to a real-time display screen that provides schedule information of Metrobus and Metrorail, and locations of Bike Share and Zip-Car stations, among other transportation related information. This display is being developed by DDOT, and is referred to as "NextBus Display." The installation at the subject site will be dependent on the progress made by the City, its cost and its availability for installation.

c) <u>Bicycle Usage Program:</u> The Applicant proposes to provide 25 bicycle parking spaces in a secure, convenient location that would be accessible to residents at all times. Moreover, a one-time Capital Bikeshare annual membership fee will be paid by the Applicant for initial tenants.

d) <u>Car-Share/Handicap Parking:</u> The Applicant proposes one (1) personal vehicle parking space to be located within the area of the loading facilities, which will be used as a car sharing space. A one-time Zipcar membership and application fees (totaling $85.00) will be paid by the Applicant for initial tenants. The applicant is also prepared to work with the City to designate one of the existing on-street parking spaces near the building entrance as a handicap/ADA space.

e) <u>Transit Subsidies:</u> The Applicant proposes to provide a one-time $50.00 transit fare card to initial tenants and employees in order to encourage non-auto mode usage.

f) Residential Parking Permit Program Exclusion: The Applicant agrees to exclude building residents from RPP eligibility, and will pursue the process of this exclusion with the responsible City agencies [including DDOT, and the Department of Motor Vehicles].The Applicant's Land Use Counsel is also tracking pending legislature on this matter.

g) Loading Facility Management: The applicant proposes to provide a 30 feet loading berth with platform to serve both the residential and retail uses. (This is in lieu of the 55 feet loading berth and platform required.) It is important to note that the Applicant plans to put in place a management arrangement through which move-in/move-out would be scheduled and would generally occur during weekend and other hours, so as not to conflict with the usage of retail component of the site.

h) Monitoring, Feedback and Audits: The Applicant proposes to work with the City's Policy, Planning and Sustainability administration staff to put in place specific program and schedule for monitoring the site to quantify the Measures of Effectiveness embodied in the Consultant's analysis and assumptions. This would include audits to confirm levels of vehicle trip generation, parking demand, pedestrian and bicycle usage and similar factors.

In addition to the above specific items, the Applicant's management will maintain liaison with DDOT staff and the Advisory Neighborhood Commission as needed in order to ensure the continued effectiveness of the TDM measures. It is envisioned that this would apply particularly within the first two years after the issuance of Use and Occupancy permits for the development.

6.0 SUMMARY OF FINDINGS AND CONCLUSION

Based on the foregoing data, analyses and discussion, this study has shown that the proposed development can be accommodated by the local area transportation system and would not create any adverse traffic impacts on the immediate area. Principal findings supporting this conclusion are as follows:

a) Existing overall levels of service at the key intersections within the area of the site are quite acceptable (at Level of Service C or better) during weekday morning and afternoon peak hours. The site is projected to generate 21 vehicle trips during the morning and 38 vehicle trips during the afternoon peak hours on typical weekdays. This level of trip generation will not impact the future levels of service.

b) A survey performed at the Cityline residential development show a very favorable modal split *(64% using transit, walk, bicycle, etc., and 36% using auto)*. Survey of the destination retail uses within the same development also showed relatively low level of vehicle use, and corresponding low demand for parking spaces within that development. *[Details of the survey are presented in Section 3.2 on page 20.]*

c) The City's requirements for parking at retail uses assume personal vehicles as the primary means of access. However, this applies to destination retail uses, which are typically stand-alone sites, similar to suburban settings. The subject site will consist of between three (3) to five (5) retail/service establishments within the 14,000 SF of retail space. The Applicant projects that these retail uses will largely be local-serving, catering to residential and other uses within the area, and pedestrian traffic accessing the Metrorail station and uses within the TOD area in general.

d) The small number vehicle trips noted in Item a) will have access to 45 on-street metered parking spaces virtually bordering the subject property. The majority of these spaces would be accessible during the typical hours of retail activity (generally 9:00 AM – 8:00 PM). *[See Section 4.1 beginning on page 31.]*

e) The study has documented the emerging trends of low vehicle ownership, decrease in Vehicle Miles of Travel, and increase in pedestrians/bicycle mode shares in Washington, D.C. and other urban areas within the United States. Section 4 discusses significant research, which the Consultant has done to address this subject; and includes references to the City's ongoing review and pending update of its off-street parking provisions in the Zoning Regulations.

f) The study also makes reference to the Applicant's Statement, which documents the practical difficulties to providing parking within the PUD site. In addition, the study has identified several off-street parking facilities that would provide opportunities for use by residents of the proposed building. This would be consistent with principle of "shared parking usage" that supports the City's objective of sustainability. *[See Section 4.1 beginning on page 31.]*

g) The study shows that, with the intended management of the loading facilities, the loading and service access needs of the site would be adequately met. This is addressed in the Transportation Demand Management Plan presented in Section 5 beginning on page 36.

h) The Applicant plans to implement an effective Transportation Demand Management Plan to further reduce vehicular trip generation, manage the site loading facilities and ensure no adverse impact on existing Residential Parking Permit provisions of the local area. *[See Section 5.0 beginning on page 36.]*

The Consultant finds that the existing transportation facilities within the area of the PUD site are quite capable of accommodating the development proposal. Additionally, several aspects of the proposal would support the City's policies and goals for sustainability of its urban environment. While the proposal to provide no parking for the site is technically not a TDM measure, the research presented in the report demonstrates that it is likely to have a supporting effect. In this connection, the Consultant wishes to quote the title of one of the research papers cited in this report: "Guaranteed Parking – Guaranteed Driving". The proposal would, therefore, satisfy the City's requirements for adequate public transportation facilities, and should otherwise comply with the City's criteria for approval of Planned Unit Developments.

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ATTACHMENT

A

Correspondence with
District Department of Transportation

Sandy Lawrence

From: ORGASSOC@aol.com
Sent: Friday, April 27, 2012 11:00 AM
To: eliot.kriviski@dc.gov
Cc: splawrence@orgengineering.com; ogeorge@orgengineering.com
Subject: CTR Form for 4600 Wisconsin Ave. NW; Request for Scoping Meeting
Attachments: 120427_DDOT CTR Scoping Form_4600 Wiscondon Ave NW.docx; O.R. George Authorization Letter.pdf; Scoping Letter 1-24-12.pdf

Greetings Eliot,

You'll notice that this is not my typical email address. Our regular email server is currently experiencing some difficulties, so until it is fixed, please reply all to this email address. Thanks.

Douglas Developments Corporation (the "Applicant") has filed its case for 4600 Wisconsin Avenue, NW. We would like to arrange for a scoping meeting at the earliest opportunity. If you could provide me with a few optional meeting dates and times, it would be helpful in arranging for the presence of the Applicant.

As this is another project which was started prior our receipt of the City's new CTR scoping process, we had submitted a scoping letter to Martin Parker. We have also moved forward with a preliminary analysis, which we would be prepared to share with you at our meeting.

Please find the following attached:

1. CTR Scoping Form
2. Traffic Consultant Authorization Letter
3. Scoping Letter to Martin Parker (dated 1/24/2012)

If you have any questions or comments, please do not hesitate to contact me.

Best,
Sandy

Sandy P. Lawrence, M.U.P.
Senior Transportation Planner

O. R. GEORGE & ASSOCIATES, INC.
Transportation Planning & Engineering
10210 Greenbelt Road, Suite 310
Lanham, MD 20706-2218
(301) 794-7700 (phone)
(301) 794-4400 (fax)

Project Name & Applicant Team:	4600 Wisconsin Avenue, NW Applicant: Douglas Developments Corporation, 702 H Street NW (Ward 3), Washington, D.C., Sq. No. 1732 (Paul Millstein, Vice President) Land Use Counsel: Holland & Knight, LLP, 2099 Pennsylvania Avenue NW, Suite 100, Washington, D.C. (Norman N. Glasgow, Jr., Esquire; Carolyn Brown, Esquire) Architect: Shalom Baranes Associates, PC, 3299 K Street NW, Suite 400, Washington, D.C. (Patrick Burkhart, AIA) Transportation Consultants: O. R. George & Associates, Inc., 10210 Greenbelt Road, Suite 310, Lanham, MD 20706 (Osborne R. George, P.E., PTOE)
Case Type & No. (PUD, LTR, etc...)	Map Amendment and PUD (Case No. 10-23)
Street Address:	4600 & 4614 Wisconsin Avenue NW, Washington, DC 20016.
Estimated Date of Hearing:	June/July, 2012.
Meeting Type/Date (Concept Meeting, Scoping Meeting, etc.):	Scoping Meeting requested
Description of Project:	a) *Existing Improvements:* A commercial/office building, currently not in use; b) *Proposed Improvements:* A mixed-use building of 60 apartment units and 14,000± SF ground-floor retail; c) *Parking supply:* None proposed; and d) *Relief sought:* No off-street parking proposed, and reduced loading facilities. (See Items on Site Access & Loading, and Parking on page 7.)
Meeting Summary:	To be completed by DDOT after scoping meeting

A-2

Meeting Attendees

Name	Representing:	Phone:	Email:
TO BE PROVIDED.			

Guidelines & Proposed Scope/Discussion Items	DDOT Comments/Action Items
Planning Documents	
Guidelines: The study should address how the proposed development considers the primary planning documents of the District, as well as localized studies. It is important that the applicant references any planning documents relating to both city-wide initiatives as well as more localized issues. Documents that reference these specific areas include but are not limited to The Comprehensive Plan, District of Columbia Small Area Plans, the DDOT Design and Engineering Manual, the Public Realm Manual, and Green Streets literature. Proposed Documents: • **Zoning Regulation, Section 2101 and 2201; Comprehensive Plan; Bicycle Master Plan; Pedestrian Master Plan; and DDOT TIS Study Guidelines and Comprehensive Transportation Review Process.**	
Roadway Capacity & Operations	
Guidelines: <u>Study Area</u> The study area should include intersections where site impacts are most likely to occur, including: • All site access points • Adjacent streets/intersections at the boundary of the site • The nearest potentially affected streets Additional intersections may be appropriate given the projected trip generation of the project. Proposed Scope: Intersections • **Wisconsin Avenue @ Brandywine Street NW (TMC/LOS/Crash Data);** • **Wisconsin Avenue @ River Road NW (TMC/LOS/Crash Data); and** • **Wisconsin Avenue @ Albemarle Street NW (TMC/LOS/Crash Data).**	Please add the following intersections to the study area: 1. River Road and 42nd Street, NW (*first signalized intersection to the west of the site*) 2. Brandywine Street and River Road, NW (proximity (approx.. 160 ft.) to the *first signalized intersection to the west of the site*) 3. Wisconsin Avenue and Davenport Street, NW (*first signalized intersection to the north of the site*) 4. Wisconsin Avenue and Chesapeake Street, NW (*first major intersection (unsignolized) to the north of the site*)
<u>Development Scenarios</u> Typically, all studies should include the following scenarios: • Existing conditions • Future conditions, at the anticipated build-out year of the development, <u>without</u> the construction of the development (Background Conditions) • Future conditions, at the anticipated build-out year of the development, <u>with</u> the construction of the development (Total Future Conditions) • Forecast year If the proposed development will be in stages, with significant trip generation for each stage, individual phases will need to be examined individually. Proposed Scope: • **Study will address existing, background, and total future conditions (parking; LOS; safety; etc.)**	• The same quantitative operational and safety analyses performed for the existing conditions should be performed for the 2014 future scenarios (i.e., background and build-out).

A-4

• **For future conditions – study will include a qualitative assessment only, considering the Transit Oriented Development characteristics and low level of trip generation projected. (Forecast year: 2014, plus one.)**	
Hours of Analysis Typically, the peak hour of commuter traffic should be used, for both AM and PM rush hours. Other hours of analysis may be appropriate given the overall trip generation of the proposed development, and the expected hours of vehicular demand to and from the site. Land use may also determine the appropriate hours of analysis as some uses experience their peak demand on weekends and off-peak from the typical uses. For instance, proposed developments that may include commercial or retail use should include weekend hours in the analysis. **Proposed Scope:** **Study will analyze peak hours of roadway network (between 7-10 AM and 4-7PM) on a typical weekday when Congress and public schools are in session.**	
Data Collection Turning Movement Counts (TMCs) of study area intersections are usually conducted from 7-10am and 4-7pm on a typical weekday (Tues/Wed/Thurs), when Congress and public schools are in session. If the site generates existing traffic, all current site access driveways should be included in the TMCs. Other data collection may be necessary depending on the project (such as weekly ATR counts, counts of comparable site trip generation, parking occupancy counts, etc…) **Proposed Scope:** **TMC's will be conducted between 7 – 10 AM and 4 – 7 PM on a typical weekday at the following intersections:** • **Wisconsin Avenue @ Brandywine Street NW; Wisconsin Avenue @ River Road NW; and Wisconsin Avenue @ Albemarle Street NW. (See also Item Roadway and Capacity Operations on page 3.)**	• Vehicular and pedestrian traffic data at the study area intersections should be collected between 7:00 AM and 10:00 AM, and 4:00 PM and 7:00 PM on a typical weekday when Congress and public schools are in session, with data aggregated into 15 minute intervals at the following intersections: 1. River Road and 42nd Street, NW 2. Brandywine Street and River Road, NW 3. Wisconsin Avenue and Davenport Street, NW 4. Wisconsin Avenue and Chesapeake Street, NW
Area Roadway Improvements The study should account for approved and funded transportation improvement projects within the study area. Other planned, but not approved improvements may be appropriate to include. **Proposed Scope:** **Study will consider recent improvements made within the area of the Tenleytown-AU Metrostation. Consultant will also seek information from DDOT regarding pending roadway improvements.**	• Consultant should contact DDOT and request for all ongoing, pending projects and future transportation improvement projects (infrastructure or safety) in order incorporate relevant changes to the roadway network.

A-5

<u>Background Developments</u> The study should account for traffic generated by developments in the study area that have an origin/destination within the study area. Typically, only approved/entitled developments are included in the list of background developments. **Proposed Scope:** **Study will consult DDOT for any background developments, including bicycle and transit facility improvements, within the immediate area.**	The following is a list of background developments to be used by all three proposed Wisconsin Avenue Development traffic impact studies in the vicinity: 1. Tenleytown Safeway 2. 4800 Wisconsin Avenue 3. Cathedral Commons (3400-3430 Wisconsin Avenue) 4. 5220 Wisconsin Avenue 5. American University Washington College of Law 6. DHS Nebraska Avenue Master Plan – BRAC Consolidation 7. Friendship Hospital for Animals
<u>Background Growth</u> The study should account for through traffic within the study area from future developments that do not have origins or destinations within the study area. **Proposed Scope:** **Study will assume a growth factor of 1.5% per year to 2015 for through traffic based on historic trends and discussions with DDOT.**	• A growth in through traffic is not expected along Wisconsin Avenue; however, in order to be conservative, use 1% annually compounded growth rate for through traffic.
<u>Site Trip Generation</u> Typically, site trip generation is performed using ITE's *Trip Generation*. However, recent academic literature may suggest other appropriate site trip generation rates. ITE also provides methodologies for calculating internal capture/synergy for mixed-use developments and pass-by percentages for retail establishments. Mode splits are typically estimated using WMATA's *Ridership Survey*. Alternatives include using data from comparable sites, or published in other sources. All assumptions should be detailed in the study. All data source choices must also be justified within the study. **Proposed Scope:** **Study will reference ITE trip rates (Land Use Code 223), but will reflect the fact that no parking is provided, and that travel will be overwhelmingly by transit and other non-personal auto modes. The study proposes a local trip generation rate survey (the Cityline at Tenley residential development). The fact that the retail will be local-serving in nature will also be factored in to the analysis.**	• Please provide tabulated trip generation data for estimated trips (vehicular, transit, and non-motorized) to be generated by the proposed development in order for DDOT to determine the level of analyses that would be required. Also, provide the proposed mode split and internally-captured trips to be used in preparation of the TIS.

A-6

<table>
<tr><td><u>Site Trip Distribution & Assignment</u>
Trips generated by the site should be distributed throughout the study area network, based on one or a combination of the following:
Existing count patterns
Prior studies of similar land uses near the site
Market studies
Regional models
Market studies and regional models are generally used for larger developments.

Proposed Scope:
The Consultant projects that the vehicle trip generations by the site would be very low. The study will qualitatively analyze vehicular trip distribution and assignment. It will also consider the property's TOD characteristic, and pedestrian orientation towards the transit services within the area. Study will emphasize pedestrian accessibility and safety.</td><td>Provide diagrams showing the proposed directional distribution percentages and assignment of site-generated trips onto the existing roadway network and all site access points.
Provide all supporting documentation and justification for the site trip distribution and assignment assumptions.</td></tr>
<tr><td><u>Analysis Methodology</u>
Capacity analyses are typically performed using Highway Capacity Manual (HCM) methodologies using an industry recognized software package. Any overall intersection approach LOS that is shown at grade "F" should be highlighted in the study.
Proposed Methodology:
HCM analysis, along with signal timing and phasing, considering the need for pedestrian access and safety (for existing conditions and excluding future conditions because of expected low level of trip generation due to TOD characteristics and no parking provided.)</td><td>Use Synchro software tool to analyze the study intersections to provide LOS for existing and future analysis years/scenarios.
Include 95th-percentile queuing analyses for the existing and future traffic conditions at the approaches of the study area intersections.</td></tr>
<tr><td>Safety</td><td></td></tr>
<tr><td>Guidelines: The study should present the results of the safety analysis that demonstrates that the site will not create or exacerbate existing safety issues for all modes of travel. The analysis shall include applicable elements of the Highway Safety Manual and consider at least typical geometry, traffic composition, traffic control, user demographics, and other local conditions. The analysis should also include three years of crash data for all intersections within the roadway operations study area.

Proposed CTR Scope:
Study will analyze available crash data (including bicycle and pedestrian crashes if available) for the three study area intersections listed under "Data Collection" on page 4. General assessments will consider the area's pedestrian network of sidewalks, crosswalks, pedestrian signals, and other facilities, particularly considering the orientation to transit facilities within the local area.</td><td>Request crash data from DDOT at the study area intersections and perform a safety analysis from vehicular and pedestrian/bicycle safety perspectives.
Evaluate the exiting signage and pavement markings within the study area and consider implementing replacement of the existing signs and pavement markings that are not compliant with the current standards (2009 Manual of Uniform Traffic Control Devices (MUTCD) with Revisions 1 and 2 incorporated May 2012).</td></tr>
</table>

A-7

Bicycle & Pedestrian Facilities	
Guidelines: The study should identify existing and proposed pedestrian & bicycle service to the site. The study should highlight both the bicycle and pedestrian study areas (block radii, etc.). The site plan's accommodation of pedestrians and bicycles should be discussed, including identifying widths of sidewalks, any on-site bicycle pathways, and short and long-term bicycle parking. For larger developments or campus plans, the study should take the multi-modal trip generation estimates (described above) and distribute them onto the network to identify the potential major and minor routes that people will use to and from the proposed development. Proposed CTR Scope: **Study will document as per DDOT's guidelines, including walk/bike time and path to the Metro, and will also address ADA compliance and necessary repairs/replacements due to gaps in connectivity/continuity.**	• Provide (in the TIS) a diagram (preferably an aerial image) showing the locations of the sidewalks, crosswalks, and ADA-compliant ramps, along with the physical condition/functionality of the facilities within the study area, especially for the connections to transit. This can be accomplished by color coding the facilities and their connections, say red for missing links, yellow for substandard or distressed facilities, and green for acceptable facilities. • Consider including upgrade to all ramps within the pedestrian capture area of the development in accordance with current ADA requirements and DDOT standards.
Transit Service	
Guidelines: The study should identify existing and proposed transit facilities that serve the site. Any plans for new facilities should be included, such as bus stops and shelters. The routes associated with any new or existing facilities should be addressed, including frequency of trips and destination points. The site plan's accommodation of transit service, including any changes to bus stops or other transit infrastructure necessary due to development should be discussed. For larger developments or campus plans, the study should take the multi-modal trip generation estimates (described above) and distribute them onto the network to identify the potential amount of new transit riders per route that people will use to and from the proposed development. Proposed CTR Scope: **Study will document location of bus/metro routes, and condition of bus/metro stops.**	• Coordinate with DDOT/PTSA and WMATA to include a qualitative analysis of the capacity of transit (i.e., bus and Metro) that the residents of the proposed development are expected to use. The qualitative analysis can be achieved by mention of the frequency of service, consist information, ridership (***based on the attached table***) and estimated capacity during peaks, additional person trips the site is expected to generate, etc.
Site Access & Loading	
DDOT requires that loading take place in private space and that no back-up maneuvers take place in the public realm, whether in public space of in areas of private spaces accessible to the general public unless the Applicant can demonstrate a legitimate reason why this must occur. Any plans for new curb cuts need to demonstrate that they meet District standards, including sight distance. When it is determined that a new curb cut is necessary, the applicant should first consider an alley. If an alley is not available, access from a side street is the next preferable option. Proposed CTR Scope: **Study will provide data and discussion regarding service and loading access needs, and management strategies to support the adequacy of the facilities proposed.**	• Provide an AutoTurn analysis of truck turning radii into the loading area(s) using WB-50 design vehicle.

A-8

Parking	
Guidelines: The parking study should include parking demand estimates and comparisons with the proposed parking supply, using data from comparable sites where possible. The Applicant, through DDOT, must conduct an analysis of impacts to residential parking and as necessary; propose a scheme to manage curbsides in light of future conditions. The analysis should take into account the parking spill-over area, including both on and off-street parking supply, and on and off-street parking utilization. Proposed CTR Scope: **Study will place considerable emphasis on on-street, off-street (private), and off-street (public) parking within the area, and will consider data provided by the Applicant on the profiles of prospective residents. A literature review will also be performed related to trends in vehicle ownership and usage, particularly within urban areas.**	• Provide information regarding the proposed number of vehicular parking spaces and ratio, along with the number of on- and off-site bicycle parking. In addition, based on the large number of commercial properties along Wisconsin Ave. and its proximity to the proposed development, consider determining the most effective measurements to coordinate parking access since supply and off-street parking will not be proposed.
Streetscape/Public Realm	
Guidelines: DDOT expects new developments to rehabilitate streetscape infrastructure between the curb and property lines. The applicant must work closely with DDOT and OP to ensure that design of the public realm meets current standards. Discussion Items: **This will be documented in the site/building plans, with traffic-related elements to be appropriately discussed in TIS.**	
Transportation Demand Management	
Guidelines: DDOT requires the applicant in all major development review cases to produce a TDM plan. The *Incorporation of Transportation Demand Management into the Development Review Process* document located on DDOT's website provides guidance. The proposed TDM plan should demonstrate how it will facilitate a greater split between transportation modes. Proposed Scope: **The Consultant will develop a TDM plan that reflects the property's TOD location and proposed land use, and is consistent with DDOT's sustainability and mobility policies. The measures will also reflect the "relief" sought with respect to the parking.**	• Provide quantitative estimates regarding the effect of the proposed TDM measures, along with supporting information.

A-9

Performance Monitoring & Measurement	
Guidelines: To complement a TDM plan, DDOT requires that an Applicant compose a performance monitoring plan for any large scale development. This should consist of the establishment of benchmark goals with regard to TDM measures, along with a commitment to increase TDM efforts should the Applicant fail to reach these goals. The monitoring methodology should at least include quantifiable site performance measures and suggest regular testing intervals. **Proposed Scope:** **This will be a specific measure of TDM plan.**	

Information/Data Requests:
Crash data (including pedestrian & bike crashes, if available) for 2007, 2008, 2009 for the following intersections:

- **Wisconsin Ave @ Brandywine St NW; Wisconsin Ave @ River Rd NW; and Wisconsin Ave @ Albemarle St NW.**
- **(Synchro files may be requested for safety evaluation)**

Information from DDOT regarding roadway improvements and background developments in the study area.

Proposed Schedule:

- DDOT comments on Scoping Document: **TBD**
- Transportation Consultant/Applicant responses to comments: **TBD**
- Phase I Completion: **TBD**
- Phase II Completion: **TBD**
- Submission of Report to DDOT: **45 days before hearing**
- Zoning Commission Hearing: **TBD**

O. R. GEORGE & ASSOCIATES, INC.

Traffic Engineers – Transportation Planners

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January 24, 2012

Mr. Martin Parker, Deputy Associate Director
Transportation Policy, Planning and Sustainability Administration
District Department of Transportation (DDOT)
55 M Street, S.E. (5th Floor)
Washington, D.C. 20003

DRAFT

Attn: Ms. Janet Thomas

Re: Phase 1 Evaluation and Traffic Impact Study Scoping Proposal - Planned Unit Development Application for 4600 Wisconsin Avenue, Northwest, Washington D.C

Dear Mr. Parker:

We have been retained by the Applicant to prepare a Traffic Impact Analysis in support of the referenced matter. The subject property is located within the northwest quadrant of the Wisconsin Avenue/Brandywine Street intersection in the Friendship Heights area of Northwest, Washington D.C., at the address 4600 and 4614 Wisconsin Avenue NW (within square 1732). As shown on the attached exhibit, the site is also located approximately 600 Ft. from the Tenleytown-AU Metrostation.

The property is zoned C-2-A (Community Business Center - Low Moderate Density), and it is improved with a 10,000± SF commercial/retail/office building, which is currently vacant. The Applicant proposes to demolish the existing building at 4614 Wisconsin Avenue (Lot 817) in order to accommodate the new construction. The new development will consist of 60 residential units on the upper five floors, with approximately 14,000 square feet of gross floor area devoted to retail and services uses on the ground floor and lower level. The existing building is not provided with zoning-compliant parking, and none is proposed.

In keeping with the City's guidelines for performing Traffic Impact Studies, we submit the following as our initial assessment data and the technical approach we propose to use for the study.

1) **Trip Generation:** We propose to use the Institution of Transportation Engineers (ITE) "Trip Generation Manual," 8th Edition (2008). We also plan to conduct trip generation surveys at existing residential buildings within the local area or other comparable sites elsewhere in the City in order to estimate non-auto mode usage, along with adjustment factors accepted by DDOT for recent comparable sites. Our preliminary estimate is that 60% non-auto mode split would apply to the residential use. Furthermore, the retail component will be local-serving and would not generate significant destination (vehicle) trips. Based on these assumptions, the estimated vehicle trip generation is as follows:

AM			PM		
IN	OUT	TOTAL	IN	OUT	TOTAL
2	5	7	6	4	10

2) **Modal Splits:** The subject property is well-served by public transportation. As noted, the Tenleytown-AU Metrorail station is located 600 Ft. south of the property, and several bus stops are conveniently located from the site providing access to fourteen (14) Metrobus routes. This supports the trip generation assumptions and estimates presented on page 1.

3) **Trip Distribution and Assignment:** Based upon Items 1 and 2, we project that the vehicle trip generation by the site would be very low. We therefore request the City's concurrence in addressing the trip distribution and assignment in a qualitative/descriptive manner in our report.

4) **Study Area Definition:** We propose to define the study area network as shown in the attached exhibit, which includes the roadways abutting the subject property. Our approach would deemphasize level of service analyses that are usually performed for projects generating significant vehicle trips. However, the Consultant plans to perform turning movement and pedestrian counts on three (3) intersections in the immediate area of the site. We will also consider potential impacts on on-street parking within the local area having residential parking Permit restrictions.

5) **Parking Inventory and Usage:** In keeping with the requirements of the Zoning Regulations, we propose to identify any off-street public parking spaces conveniently accessible to individuals using the property. The Consultant also proposes to perform inventories and usage of on-street and any off-street public parking within the study area on typical weekdays.

6) **Transportation Demand Management:** In keeping with the City's guidelines, we propose to develop a Transportation Demand Management Plan that reflects the property's TOD location and proposed land use.

7) **Data Collection Plan:** Our data collection plan will be consistent with the discussions and approaches outlined under the items above, and otherwise consistent with the City's policies and guidelines for Transit Oriented Development, sustainability and walkable communities.

If DDOT accepts the above approach, we will follow-up promptly on the Phase II Analysis and documentation. We look forward to your response, and we are available to meet with you if required. Thank you.

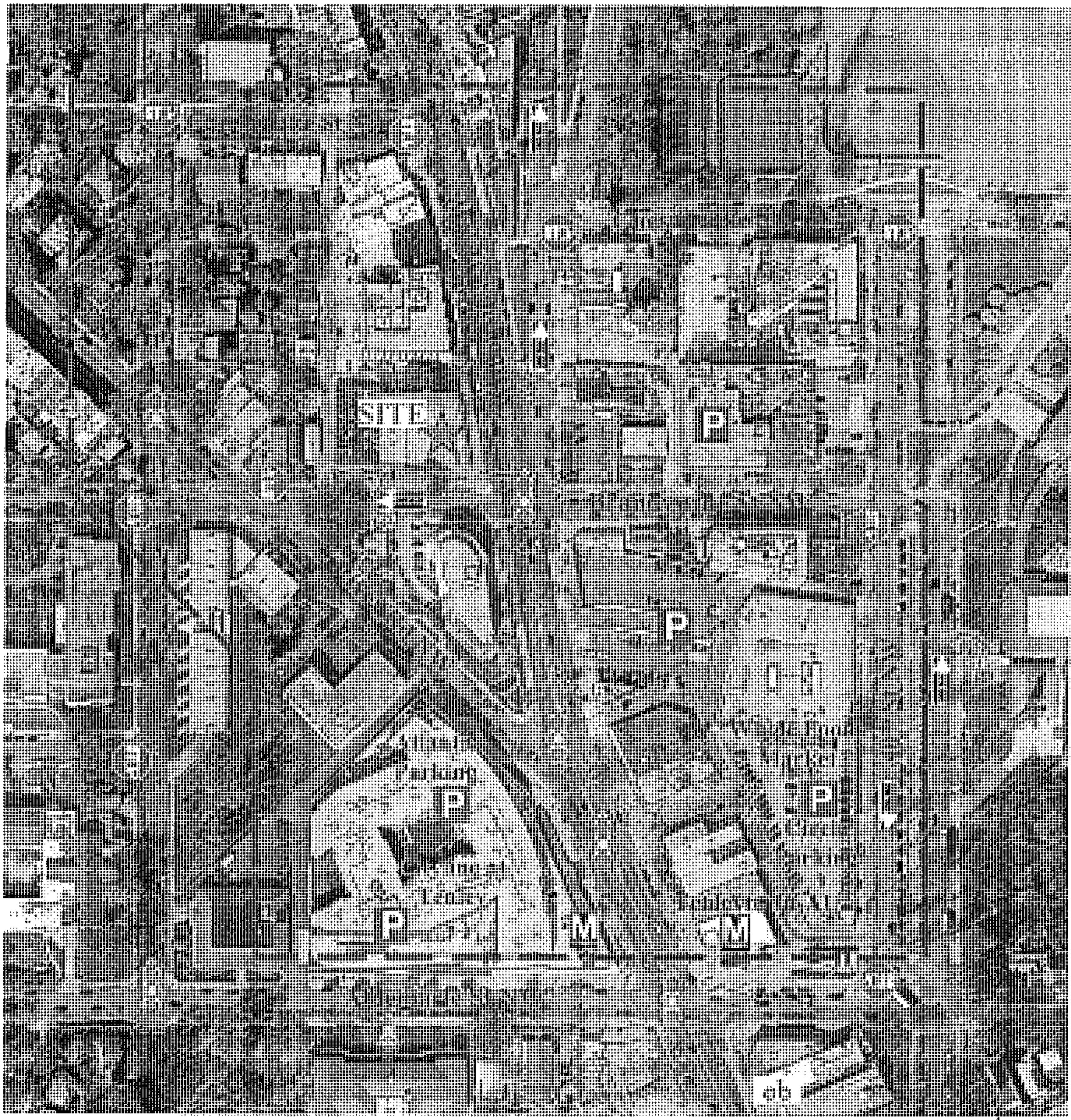
Sincerely,
O. R. GEORGE & ASSOCIATES, INC.

Osborne R. George, P.E., PTOE
President

ORG/AMB

Attachments: As Noted

cc: Mr. Christopher Delfs, AICP (DDOT)
Mr. Paul Millstein, Vice President (Douglas Development)
Chip Glasgow, Esquire (Holland & Knight)
Caroline Brown, Esquire (Holland & knight)



Legend

- M - Metro Station
- Study Area
- cb - Capital Bikeshare Location
- P - Parking Garage

O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**EXHIBIT : Site Location and Preliminary Findings**
	4600 Wisconsin Avenue, Northwest, Washington D.C.
	PUD Application

A-13

ATTACHMENT

B

Turning Movement Count Summaries

O. R. George and Associates, Inc.
10210 Greenbelt Road, Suite 310
Lanham, MD 20706
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Counted by:ORGA-AB
Board :D4-2236
City/County:Washington, O.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@BRA
Site Code : 12345678
Start Date : 10/18/2011
Page No : 1

Groups Printed- Passenger Vehicles - Trucks - Buses

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Brandywine Street, N.W. From East					Brandywine Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
07:15 AM	14	240	1	0	255	24	96	7	0	127	1	12	2	0	15	0	0	0	0	0	397
07:30 AM	17	254	2	0	273	27	134	8	0	169	1	7	8	0	16	0	0	0	0	0	458
07:45 AM	16	289	4	0	309	32	155	4	0	191	5	8	3	0	16	0	0	0	0	0	516
08:00 AM	10	309	3	0	322	43	214	6	0	263	8	11	9	0	28	0	0	0	0	0	613
Total	57	1092	10	0	1159	126	599	25	0	750	15	38	22	0	75	0	0	0	0	0	1984
08:15 AM	13	331	5	0	349	48	232	5	0	285	4	12	9	0	25	0	0	0	0	0	659
08:30 AM	16	311	7	0	334	64	254	9	0	327	6	16	13	0	35	0	0	0	0	0	696
08:45 AM	17	292	5	0	314	58	203	6	0	267	9	13	11	0	33	0	0	0	0	0	614
09:00 AM	15	285	4	0	304	44	208	7	0	259	11	4	5	0	20	0	0	0	0	0	583
Total	61	1219	21	0	1301	214	897	27	0	1138	30	45	38	0	113	0	0	0	0	0	2552
09:15 AM	12	255	3	0	270	40	204	3	0	247	2	6	8	0	16	0	0	0	0	0	533
09:30 AM	11	224	4	0	239	32	191	4	0	227	3	7	1	0	11	0	0	0	0	0	477
Total	23	479	7	0	509	72	395	7	0	474	5	13	9	0	27	0	0	0	0	0	1010
04:15 PM	16	147	3	0	166	79	228	12	0	319	1	6	7	0	14	0	0	0	0	0	499
04:30 PM	15	152	4	0	171	90	239	14	0	343	5	8	6	0	19	0	0	0	0	0	533
04:45 PM	14	143	4	0	161	94	247	13	0	354	4	8	3	0	15	0	0	0	0	0	530
05:00 PM	17	187	5	0	209	82	252	10	0	344	9	10	5	0	24	0	0	0	0	0	577
Total	62	629	16	0	707	345	966	49	0	1360	19	32	21	0	72	0	0	0	0	0	2139
05:15 PM	16	209	3	0	228	96	264	14	0	374	6	12	7	0	25	0	0	0	0	0	627
05:30 PM	20	232	4	0	256	101	270	13	0	384	9	9	7	0	25	0	0	0	0	0	665
05:45 PM	19	201	3	0	223	117	322	14	0	453	7	23	11	0	41	0	0	0	0	0	717
06:00 PM	16	208	5	0	229	107	335	8	0	450	5	15	11	0	31	0	0	0	0	0	710
Total	71	850	15	0	936	421	1191	49	0	1661	27	59	36	0	122	0	0	0	0	0	2719
06:15 PM	17	199	5	0	221	105	320	10	0	435	9	16	11	0	36	0	0	0	0	0	692
06:30 PM	13	178	4	0	195	92	286	14	0	392	7	21	18	0	46	0	0	0	0	0	633
Grand Total	304	4646	78	0	5028	1375	4654	181	0	6210	112	224	155	0	491	0	0	0	0	0	11729
Apprch %	6.0	92.4	1.6	0.0		22.1	74.9	2.9	0.0		22.8	45.6	31.6	0.0		0.0	0.0	0.0	0.0		
Total %	2.6	39.6	0.7	0.0	42.9	11.7	39.7	1.5	0.0	52.9	1.0	1.9	1.3	0.0	4.2	0.0	0.0	0.0	0.0	0.0	

O. R. George and Associates, Inc.
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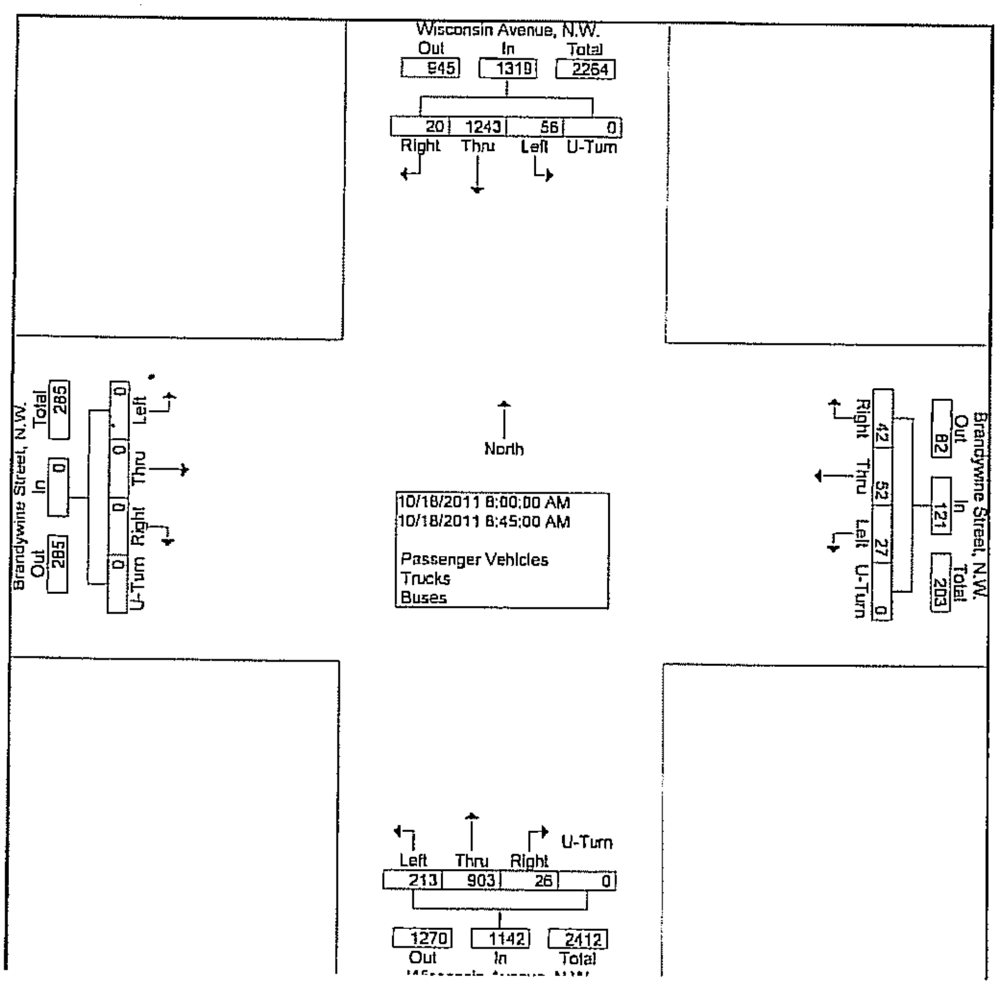
Counted by:ORGA-AB
Board :D4-2236
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@BRA
Site Code : 12345678
Start Date : 10/18/2011

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Brandywine Street, N.W. From East					Brandywine Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 07:15 AM to 11:45 AM - Peak 1 of 1																					
Intersection	08:00 AM																				
Volume	56	1243	20	0	1319	213	903	26	0	1142	27	52	42	0	121	0	0	0	0	0	2582
Percent	4.2	94.2	1.5	0.0		18.7	79.1	2.3	0.0		22.3	43.0	34.7	0.0		0.0	0.0	0.0	0.0		
08:30 Volume	16	311	7	0	334	64	254	9	0	327	6	16	13	0	35	0	0	0	0	0	696
Peak Factor																					0.927
High Int.	08:15 AM					08:30 AM					08:30 AM					7:00:00 AM					
Volume	13	331	5	0	349	64	254	9	0	327	6	16	13	0	35						
Peak Factor					0.945					0.873					0.864						



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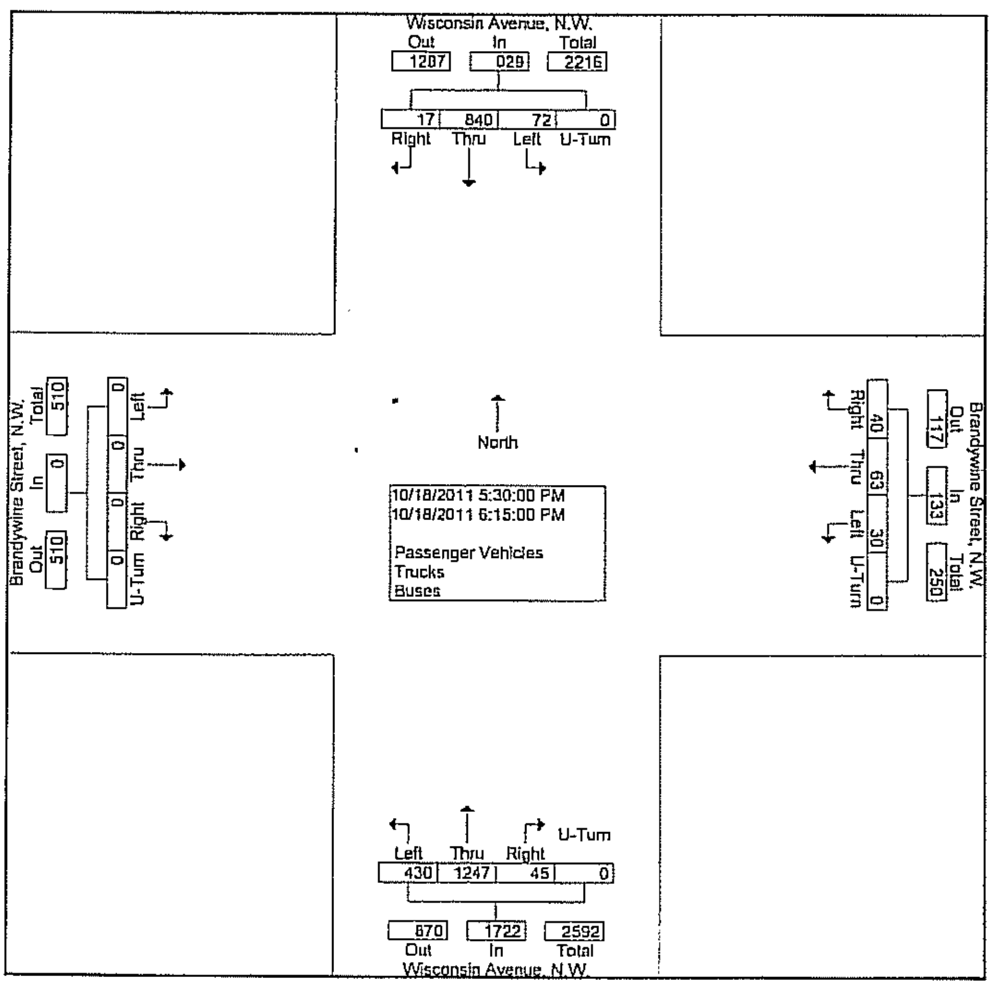
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@BRA
Site Code : 12345678
Start Date : 10/18/2011

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Brandywine Street, N.W. From East					Brandywine Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 12:00 PM to 06:30 PM - Peak 1 of 1																					
Intersection	05:30 PM																				
Volume	72	840	17	0	929	430	1247	45	0	1722	30	63	40	0	133	0	0	0	0	0	2784
Percent	7.8	90.4	1.8	0.0		25.0	72.4	2.6	0.0		22.6	47.4	30.1	0.0		0.0	0.0	0.0	0.0		
05:45 Volume	19	201	3	0	223	117	322	14	0	453	7	23	11	0	41	0	0	0	0	0	717
Peak Factor																					0.971
High Int.	05:30 PM					05:45 PM					05:45 PM										
Volume	20	232	4	0	256	117	322	14	0	453	7	23	11	0	41						
Peak Factor					0.907					0.950					0.811						



B-3

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Counted by:ORGA-SD
Board :D1-0932
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@RIV
Site Code : 10190932
Start Date : 10/19/2011
Page No : 1

Groups Printed- Passenger Vehicles - Trucks - Buses

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Private Driveway From East					River Road, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
07:15 AM	0	220	0	0	220	0	135	0	0	135	0	0	0	0	0	2	0	81	0	83	438
07:30 AM	0	242	2	0	244	1	152	0	0	153	0	0	0	0	0	2	0	92	0	94	491
07:45 AM	0	281	1	0	282	0	167	0	0	167	0	0	0	0	0	6	0	100	0	106	555
08:00 AM	0	310	2	0	312	1	223	0	0	224	0	0	0	0	0	3	0	97	0	100	636
Total	0	1053	5	0	1058	2	677	0	0	679	0	0	0	0	0	13	0	370	0	383	2120
08:15 AM	0	320	1	0	321	0	258	0	0	258	0	0	0	0	0	4	0	87	0	91	670
08:30 AM	0	305	2	0	307	2	275	0	0	277	0	0	0	0	0	6	0	107	0	113	697
08:45 AM	0	301	0	0	301	0	257	0	0	257	0	0	0	0	0	6	0	109	0	115	673
09:00 AM	0	297	1	0	298	0	241	0	0	241	0	0	0	0	0	5	0	115	0	120	659
Total	0	1223	4	0	1227	2	1031	0	0	1033	0	0	0	0	0	21	0	418	0	439	2699
09:15 AM	0	268	0	0	268	2	223	0	0	225	0	0	0	0	0	4	0	112	0	116	609
09:30 AM	0	230	1	0	231	0	208	0	0	208	0	0	0	0	0	7	0	113	0	120	559
Total	0	498	1	0	499	2	431	0	0	433	0	0	0	0	0	11	0	225	0	236	1168
04:15 PM	0	171	2	0	173	2	292	0	0	294	0	0	0	0	0	10	0	56	0	66	533
04:30 PM	0	182	5	0	187	3	328	0	0	331	0	0	0	0	0	10	0	58	0	68	586
04:45 PM	0	187	3	0	190	0	344	0	0	344	0	0	0	0	0	11	0	61	0	72	606
05:00 PM	3	192	5	0	200	1	365	0	0	366	0	0	0	0	0	7	0	53	0	60	626
Total	3	732	15	0	750	6	1329	0	0	1335	0	0	0	0	0	38	0	228	0	266	2351
05:15 PM	0	200	2	0	202	1	279	0	0	280	0	0	0	0	0	9	0	66	0	75	557
05:30 PM	0	205	3	0	208	2	306	0	0	308	0	0	0	0	0	9	0	67	0	76	592
05:45 PM	0	210	2	0	212	2	315	0	0	317	0	0	0	0	0	7	0	59	0	66	595
06:00 PM	0	204	2	0	206	1	331	0	0	332	0	0	0	0	0	9	0	65	0	74	612
Total	0	819	9	0	828	6	1231	0	0	1237	0	0	0	0	0	34	0	257	0	291	2356
06:15 PM	0	186	4	0	190	3	348	1	0	352	0	0	0	0	0	11	0	69	0	80	622
06:30 PM	0	176	3	0	179	1	323	0	0	324	0	0	0	0	0	14	0	63	0	77	580
Grand Total	3	4687	41	0	4731	22	5370	1	0	5393	0	0	0	0	0	142	0	1630	0	1772	11896
Apprch %	0.1	99.1	0.9	0.0		0.4	99.6	0.0	0.0		0.0	0.0	0.0	0.0		8.0	0.0	92.0	0.0		
Total %	0.0	39.4	0.3	0.0	39.8	0.2	45.1	0.0	0.0	45.3	0.0	0.0	0.0	0.0	0.0	1.2	0.0	13.7	0.0	14.9	

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O. R. George and Associates, Inc.
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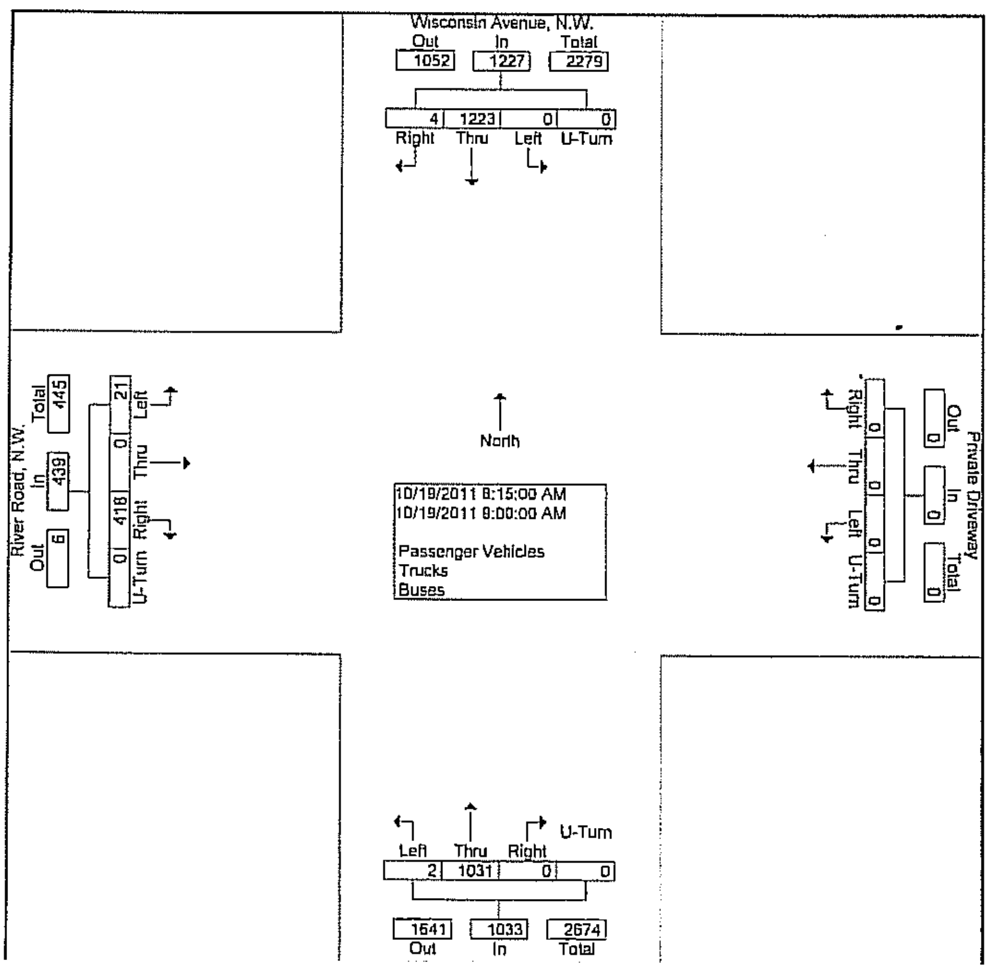
Board :D1-0932
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@RIV
Site Code : 10190932
Start Date : 10/19/2011

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Private Driveway From East					River Road, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 07:15 AM to 11:45 AM - Peak 1 of 1																					
Intersection	08:15 AM																				
Volume	0	1223	4	0	1227	2	1031	0	0	1033	0	0	0	0	0	21	0	418	0	439	2699
Percent	0.0	99.7	0.3	0.0		0.2	99.8	0.0	0.0		0.0	0.0	0.0	0.0		4.8	0.0	95.2	0.0		
08:30 Volume	0	305	2	0	307	2	275	0	0	277	0	0	0	0	0	6	0	107	0	113	697
Peak Factor																					0.968
High Int.	08:15 AM					08:30 AM					7:00:00 AM					09:00 AM					
Volume	0	320	1	0	321	2	275	0	0	277	0	0	0	0	0	5	0	115	0	120	
Peak Factor					0.956					0.932										0.915	



B-5

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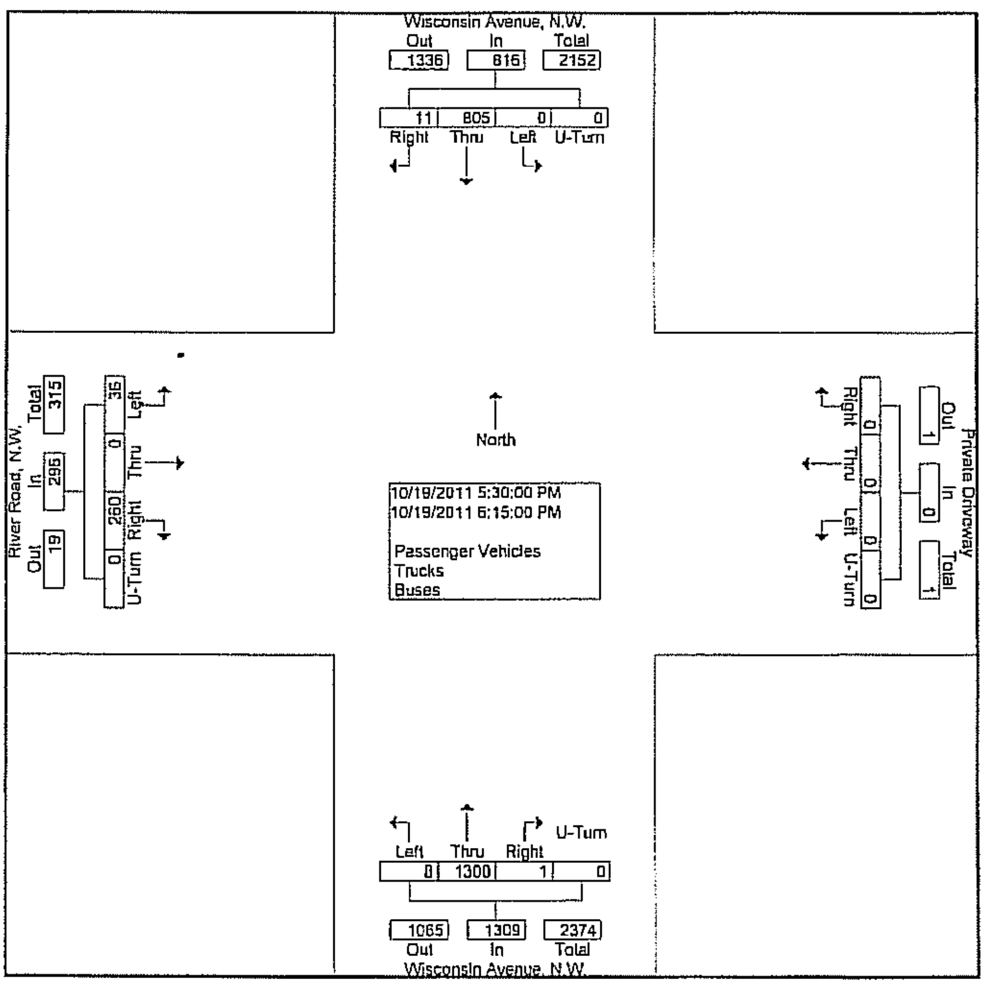
Board :D1-0932
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@RIV
Site Code : 10190932
Start Date : 10/19/2011
Page No : 3

	Wisconsin Avenue, N.W. From North					Wisconsin Avenue, N.W. From South					Private Driveway From East					River Road, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 12:00 PM to 06:30 PM - Peak 1 of 1																					
Intersection	05:30 PM																				
Volume	0	805	11	0	816	8	1300	1	0	1309	0	0	0	0	0	36	0	260	0	296	2421
Percent	0.0	98.7	1.3	0.0		0.6	99.3	0.1	0.0		0.0	0.0	0.0	0.0		12.2	0.0	87.8	0.0		
06:15 Volume	0	186	4	0	190	3	348	1	0	352	0	0	0	0	0	11	0	69	0	80	622
Peak Factor																					0.973
High Int.	05:45 PM					06:15 PM										06:15 PM					
Volume	0	210	2	0	212	3	348	1	0	352	0	0	0	0	0	11	0	69	0	80	
Peak Factor					0.962					0.930										0.925	



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Counted by:ORGA-AB
Board :D4-2236
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@ALB
Site Code : 22345678
Start Date : 10/19/2011

Groups Printed- Passenger Vehicles - Trucks - Buses

	Wisconsin Avenue, N.W. From North					Albemarle Street, N.W. From East					Wisconsin Avenue, N.W. From South					Albemarle Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
07:15 AM	5	255	3	0	263	7	22	10	0	39	1	163	8	0	172	2	21	7	0	30	504
07:30 AM	7	387	5	0	399	9	26	11	0	46	1	179	9	0	189	4	38	19	0	61	695
07:45 AM	1	468	6	0	475	20	32	9	0	61	2	244	11	0	257	6	42	27	0	75	868
08:00 AM	3	492	0	0	495	23	35	7	0	65	0	268	7	0	275	9	55	24	0	88	923
Total	16	1602	14	0	1632	59	115	37	0	211	4	854	35	0	893	21	156	77	0	254	2990
08:15 AM	1	385	47	0	433	29	48	15	0	92	2	274	10	0	286	14	66	15	0	95	906
08:30 AM	2	423	30	0	455	8	60	17	0	85	0	259	11	0	270	19	76	33	0	128	938
08:45 AM	1	450	17	0	468	17	72	16	0	105	1	264	9	0	274	22	42	41	0	105	952
09:00 AM	3	425	14	0	442	11	30	13	0	54	1	253	6	0	260	18	47	35	0	100	856
Total	7	1683	108	0	1798	65	210	61	0	336	4	1050	36	0	1090	73	231	124	0	428	3652
09:15 AM	0	407	8	0	415	15	48	21	0	84	2	273	8	0	283	9	49	16	0	74	856
09:30 AM	2	391	12	0	405	12	44	28	0	84	0	265	5	0	270	12	51	22	0	85	844
Total	2	798	20	0	820	27	92	49	0	168	2	538	13	0	553	21	100	38	0	159	1700
04:15 PM	2	242	12	0	256	8	20	17	0	45	0	338	12	0	350	4	27	6	0	37	688
04:30 PM	0	251	14	0	265	10	22	15	0	47	1	356	19	0	376	12	33	11	0	56	744
04:45 PM	1	250	12	0	263	12	38	21	0	71	2	368	21	0	391	17	36	14	0	67	792
05:00 PM	0	256	6	0	262	11	51	24	0	86	1	382	26	0	409	23	41	13	0	77	834
Total	3	999	44	0	1046	41	131	77	0	249	4	1444	78	0	1526	56	137	44	0	237	3058
05:15 PM	1	276	8	0	285	17	73	37	0	127	1	344	14	0	359	9	44	8	0	61	832
05:30 PM	0	296	5	0	301	21	48	19	0	88	1	378	18	0	397	14	56	15	0	85	871
05:45 PM	1	312	7	0	320	26	58	21	0	105	1	395	17	0	413	12	44	16	0	72	910
06:00 PM	0	308	5	0	313	12	54	17	0	83	1	415	34	0	450	18	52	21	0	91	937
Total	2	1192	25	0	1219	76	233	94	0	403	4	1532	83	0	1619	53	196	60	0	309	3550
06:15 PM	1	317	9	0	327	17	62	21	0	100	0	397	27	0	424	19	38	19	0	76	927
06:30 PM	2	283	12	0	297	13	50	20	0	83	2	385	26	0	413	16	34	17	0	67	860
Grand Total	33	6874	232	0	7139	298	893	359	0	1550	20	6200	298	0	6518	259	892	379	0	1530	16737
Apprch %	0.5	96.3	3.2	0.0		19.2	57.6	23.2	0.0		0.3	95.1	4.6	0.0		16.9	58.3	24.8	0.0		
Total %	0.2	41.1	1.4	0.0	42.7	1.8	5.3	2.1	0.0	9.3	0.1	37.0	1.8	0.0	38.9	1.5	5.3	2.3	0.0	9.1	

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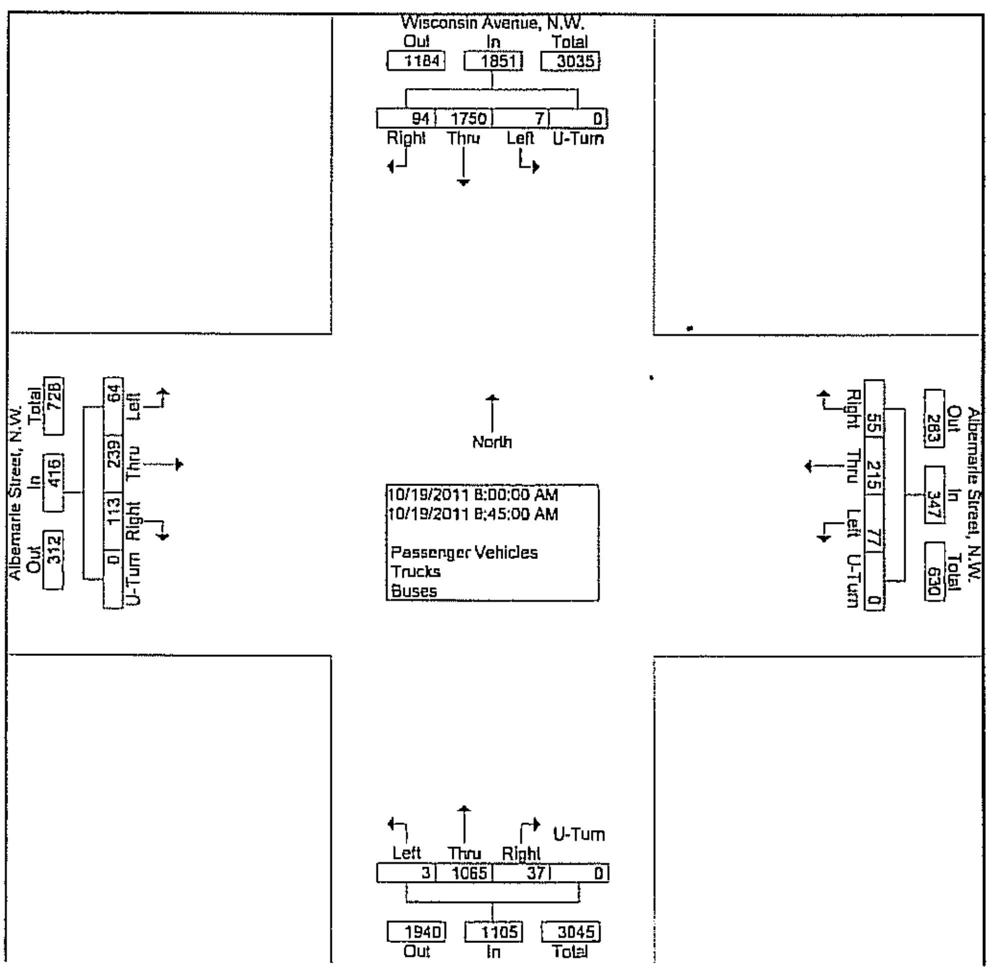
Counted by:ORGA-AB
Board :D4-2236
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@ALB
Site Code : 22345678
Start Date : 10/19/2011

	Wisconsin Avenue, N.W. From North					Albemarle Street, N.W. From East					Wisconsin Avenue, N.W. From South					Albemarle Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 07:15 AM to 11:45 AM - Peak 1 of 1																					
Intersection	08:00 AM																				
Volume	7	1750	94	0	1851	77	215	55	0	347	3	1065	37	0	1105	64	239	113	0	416	3719
Percent	0.4	94.5	5.1	0.0		22.2	62.0	15.9	0.0		0.3	96.4	3.3	0.0		15.4	57.5	27.2	0.0		
08:45 Volume	1	450	17	0	468	17	72	16	0	105	1	264	9	0	274	22	42	41	0	105	952
Peak Factor																					0.977
High Int.	08:00 AM					08:45 AM					08:15 AM					08:30 AM					
Volume	3	492	0	0	495	17	72	16	0	105	2	274	10	0	286	19	76	33	0	128	
Peak Factor					0.935					0.826					0.966					0.813	



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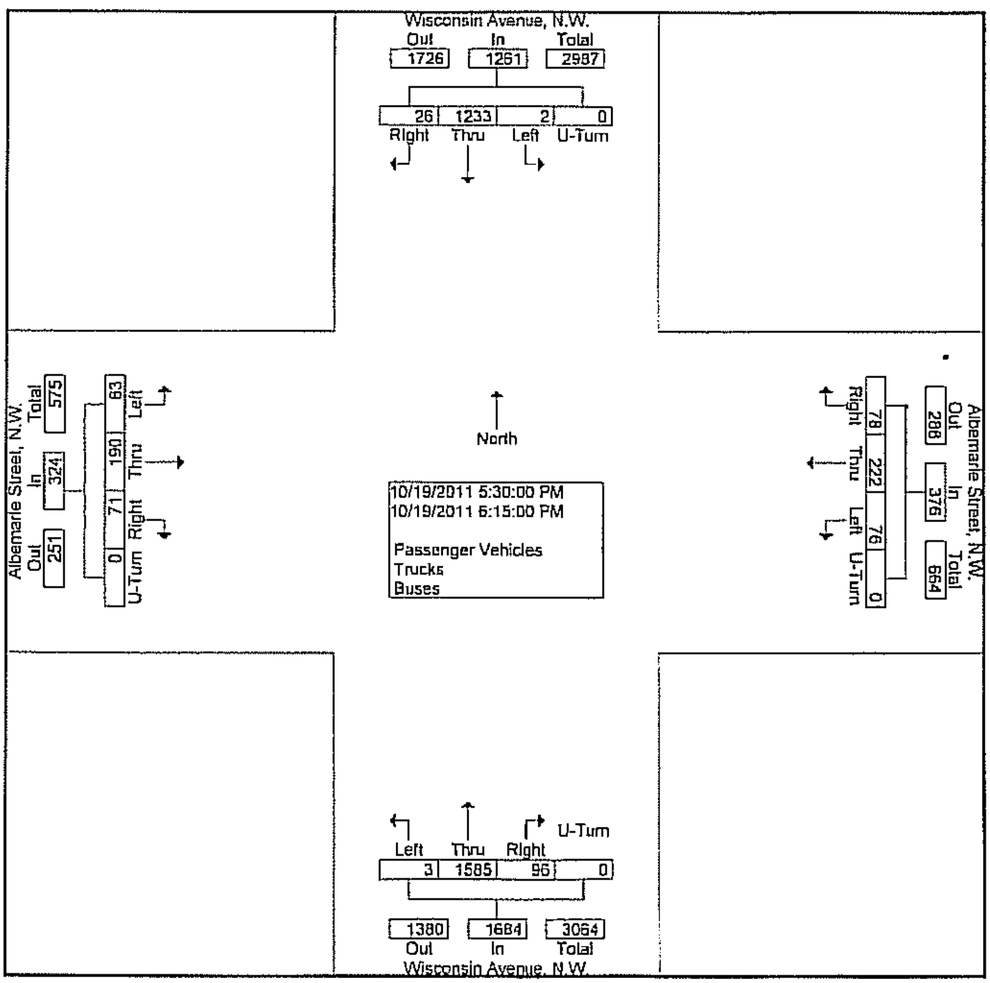
Counted by:ORGA-AB
Board :D4-2236
City/County:Washington, D.C.
Weather :Warm/Cloudy/Wet

File Name : WIS@ALB
Site Code : 22345678
Start Date : 10/19/2011

	Wisconsin Avenue, N.W. From North					Albemarle Street, N.W. From East					Wisconsin Avenue, N.W. From South					Albemarle Street, N.W. From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour From 12:00 PM to 06:30 PM - Peak 1 of 1																					
Intersection	05:30 PM																				
Volume	2	1233	26	0	1261	76	222	78	0	376	3	1585	96	0	1684	63	190	71	0	324	3645
Percent	0.2	97.8	2.1	0.0		20.2	59.0	20.7	0.0		0.2	94.1	5.7	0.0		19.4	58.6	21.9	0.0		
06:00 Volume	0	308	5	0	313	12	54	17	0	83	1	415	34	0	450	18	52	21	0	91	937
Peak Factor																					0.973
High Int.	06:15 PM					05:45 PM					06:00 PM					06:00 PM					
Volume	1	317	9	0	327	26	58	21	0	105	1	415	34	0	450	18	52	21	0	91	
Peak Factor					0.964					0.895					0.936					0.890	



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Counted by:
Board :
City/County:
Weather :

File Name : BRA@42nd
Site Code : 12345678
Start Date : 9/6/2012
Page No : 1

Groups Printed- Passenger Vehicles - Trucks - Buses

	Brandywine Street. NW From North					42nd St, NW From East					Brandywine St, NW From South					42nd St, NW From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
08:15 AM	0	2	0	0	2	0	82	5	0	87	0	0	0	0	0	0	65	0	0	65	154
08:30 AM	0	4	1	0	5	0	80	3	0	83	0	0	0	0	0	3	30	4	0	37	125
08:45 AM	1	1	3	0	5	0	75	5	0	80	0	0	0	0	0	4	37	10	0	51	136
09:00 AM	1	5	3	0	9	0	53	3	0	56	0	0	0	0	0	2	39	6	0	47	112
Total	2	12	7	0	21	0	290	16	0	306	0	0	0	0	0	9	171	20	0	200	527
05:00 PM	1	2	2	0	5	0	56	4	0	60	0	0	0	0	0	4	42	4	0	50	115
Total	1	2	2	0	5	0	56	4	0	60	0	0	0	0	0	4	42	4	0	50	115
05:15 PM	0	3	2	0	5	0	58	4	0	62	0	0	0	0	0	1	47	11	0	59	126
05:30 PM	0	4	3	0	7	0	62	4	0	66	0	0	0	0	0	2	50	15	0	67	140
05:45 PM	0	2	2	0	4	0	67	4	0	71	0	0	0	0	0	1	37	5	0	43	118
06:00 PM	2	1	2	0	5	0	63	4	0	67	0	0	0	0	0	4	51	7	0	62	134
Total	2	10	9	0	21	0	250	16	0	266	0	0	0	0	0	8	185	38	0	231	518
06:15 PM	1	1	0	0	2	0	69	6	0	75	0	0	0	0	0	0	53	5	0	58	135
Grand Total	6	25	18	0	49	0	665	42	0	707	0	0	0	0	0	21	451	67	0	539	1295
Apprch %	12.2	51.0	36.7	0.0		0.0	94.1	5.9	0.0		0.0	0.0	0.0	0.0		3.9	83.7	12.4	0.0		
Total %	0.5	1.9	1.4	0.0	3.8	0.0	51.4	3.2	0.0	54.6	0.0	0.0	0.0	0.0	0.0	1.6	34.8	5.2	0.0	41.6	

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Counted by:
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City/County:
Weather :

File Name : RIV@42nd
Site Code : 12345678
Start Date : 9/6/2012
Page No : 1

Groups Printed- Passenger Vehicles - Trucks - Buses

	River Road, NW From North					42nd Street, NW From East					River Road, NW From South					42nd Street, NW From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
08:15 AM	0	107	19	0	126	4	64	1	0	69	4	39	5	0	48	14	51	0	0	65	308
08:30 AM	0	108	29	0	137	2	46	0	0	48	8	35	4	0	47	12	18	0	0	30	262
08:45 AM	0	92	37	0	129	3	35	1	0	39	8	46	4	0	58	16	22	0	0	38	264
09:00 AM	0	96	25	0	121	3	27	0	0	30	4	34	4	0	42	15	25	0	0	40	233
Total	0	403	110	0	513	12	172	2	0	186	24	154	17	0	195	57	116	0	0	173	1067
05:00 PM	0	55	23	0	78	1	27	0	0	28	10	62	6	0	78	21	22	0	0	43	227
Total	0	55	23	0	78	1	27	0	0	28	10	62	6	0	78	21	22	0	0	43	227
05:15 PM	0	56	15	0	71	2	33	0	0	35	14	65	15	0	94	25	22	0	0	47	247
05:30 PM	2	52	19	0	73	1	40	0	0	41	7	89	9	0	105	27	23	0	0	50	269
05:45 PM	2	39	22	0	63	2	40	0	0	42	9	90	15	0	114	18	19	0	0	37	256
06:00 PM	3	58	15	0	76	6	43	1	0	50	9	105	10	0	124	21	32	0	0	53	303
Total	7	205	71	0	283	11	156	1	0	168	39	349	49	0	437	91	96	0	0	187	1075
06:15 PM	0	37	27	0	64	4	37	0	0	41	11	91	6	0	108	30	22	1	1	54	267
Grand Total	7	700	231	0	938	28	392	3	0	423	84	656	78	0	818	199	256	1	1	457	2636
Apprch %	0.7	74.6	24.6	0.0		6.6	92.7	0.7	0.0		10.3	80.2	9.5	0.0		43.5	56.0	0.2	0.2		
Total %	0.3	26.6	8.8	0.0	35.6	1.1	14.9	0.1	0.0	16.0	3.2	24.9	3.0	0.0	31.0	7.5	9.7	0.0	0.0	17.3	

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City/County:
Weather :

File Name : RIV@BRA
Site Code : 12345678
Start Date : 9/6/2012
Page No : 1

Groups Printed- Passenger Vehicles - Trucks - Buses

	River Road, NW From North					Brandywine Street, NW From East					River Road, NW From South					Brandywine Street, NW From West					
End Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
08:15 AM	0	111	0	0	111	1	0	46	0	47	0	2	0	0	2	0	0	5	0	5	165
08:30 AM	0	110	0	0	110	1	0	44	0	45	0	3	0	0	3	1	0	5	0	6	164
08:45 AM	0	95	0	0	95	0	0	56	0	56	0	2	0	0	2	0	0	12	0	12	165
09:00 AM	0	99	0	0	99	9	0	39	0	48	0	3	0	0	3	1	0	8	0	9	159
Total	0	415	0	0	415	11	0	185	0	196	0	10	0	0	10	2	0	30	0	32	653
05:00 PM	0	56	0	0	56	12	0	61	0	73	0	17	0	0	17	1	0	8	0	9	155
Total	0	56	0	0	56	12	0	61	0	73	0	17	0	0	17	1	0	8	0	9	155
05:15 PM	0	58	0	0	58	6	0	83	0	89	0	11	0	0	11	2	0	12	0	14	172
05:30 PM	0	53	0	0	53	9	0	95	0	104	0	10	0	0	10	1	0	18	0	19	186
05:45 PM	0	41	0	0	41	6	0	104	0	110	0	10	0	0	10	0	0	7	0	7	168
06:00 PM	0	64	0	0	64	5	0	115	0	120	0	9	0	0	9	1	0	8	0	9	202
Total	0	216	0	0	216	26	0	397	0	423	0	40	0	0	40	4	0	45	0	49	728
06:15 PM	0	41	0	0	41	3	0	99	0	102	0	9	0	0	9	1	0	5	0	6	158
Grand Total	0	728	0	0	728	52	0	742	0	794	0	76	0	0	76	8	0	88	0	96	1694
Apprch %	0.0	100.0	0.0	0.0		6.5	0.0	93.5	0.0		0.0	100.0	0.0	0.0		8.3	0.0	91.7	0.0		
Total %	0.0	43.0	0.0	0.0	43.0	3.1	0.0	43.8	0.0	46.9	0.0	4.5	0.0	0.0	4.5	0.5	0.0	5.2	0.0	5.7	

ATTACHMENT

C

**Synchro Analysis Worksheets–
Existing Condition**

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.95			0.91
Frt	0.96		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1725		3530			5083
Flt Permitted	0.97		1.00			0.93
Satd. Flow (perm)	1725		3530			4712
Volume (vph)	67	30	883	16	12	1219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	33	960	17	13	1325
RTOR Reduction (vph)	16	0	1	0	0	0
Lane Group Flow (vph)	90	0	976	0	0	1338
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	23.0		63.0			63.0
Effective Green, g (s)	26.0		66.0			66.0
Actuated g/C Ratio	0.26		0.66			0.66
Clearance Time (s)	7.0		7.0			7.0
Lane Grp Cap (vph)	449		2330			3110
v/s Ratio Prot	c0.05		0.28			
v/s Ratio Perm						c0.28
v/c Ratio	0.20		0.42			0.43
Uniform Delay, d1	28.9		8.0			8.1
Progression Factor	1.00		2.44			1.00
Incremental Delay, d2	1.0		0.5			0.4
Delay (s)	29.9		20.0			8.5
Level of Service	C		B			A
Approach Delay (s)	29.9		20.0			8.5
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	50	13	889	1269	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	54	14	966	1379	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				490	393	
pX, platoon unblocked	0.89	0.88	0.88			
vC, conflicting volume	1900	469	1398			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1368	136	1187			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	93	97			
cM capacity (veh/h)	120	784	516			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	65	336	644	552	552	294
Volume Left	11	14	0	0	0	0
Volume Right	54	0	0	0	0	18
cSH	407	516	1700	1700	1700	1700
Volume to Capacity	0.16	0.03	0.38	0.32	0.32	0.17
Queue Length 95th (ft)	14	2	0	0	0	0
Control Delay (s)	15.5	0.9	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	15.5	0.3		0.0		
Approach LOS	C					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	44.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱		↰	↑↑↱		↰	↑↑↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor					1.00		1.00	0.95		1.00	0.91	
Frt					0.95		1.00	1.00		1.00	1.00	
Flt Protected					0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)					1756		1770	3524		1770	5073	
Flt Permitted					0.99		0.12	1.00		0.25	1.00	
Satd. Flow (perm)					1756		215	3524		467	5073	
Volume (vph)	0	0	0	27	52	42	213	903	26	56	1243	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	29	57	46	232	982	28	61	1351	22
RTOR Reduction (vph)	0	0	0	0	19	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	113	0	232	1008	0	61	1371	0
Turn Type				Split			pm+pt			pm+pt		
Protected Phases				6	6		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)					19.6		66.4	54.0		51.0	45.6	
Effective Green, g (s)					22.6		69.4	57.0		57.0	48.6	
Actuated g/C Ratio					0.23		0.69	0.57		0.57	0.49	
Clearance Time (s)					7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)					3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)					397		410	2009		376	2465	
v/s Ratio Prot					c0.06		c0.09	0.29		0.01	0.27	
v/s Ratio Perm							c0.30			0.08		
v/c Ratio					0.28		0.57	0.50		0.16	0.56	
Uniform Delay, d1					32.0		12.7	12.9		9.8	18.1	
Progression Factor					1.00		2.30	0.22		0.43	0.97	
Incremental Delay, d2					1.8		1.5	0.8		0.2	0.8	
Delay (s)					33.8		30.7	3.6		4.4	18.5	
Level of Service					C		C	A		A	B	
Approach Delay (s)		0.0			33.8			8.6			17.9	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.91	
Frt	0.87			1.00	1.00	
Flt Protected	1.00			1.00	1.00	
Satd. Flow (prot)	1619			3539	5079	
Flt Permitted	1.00			1.00	1.00	
Satd. Flow (perm)	1619			3539	5079	
Volume (vph)	21	445	0	1048	1223	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	484	0	1139	1329	11
RTOR Reduction (vph)	31	0	0	0	1	0
Lane Group Flow (vph)	476	0	0	1139	1339	0
Turn Type						
Protected Phases	2			8	4	
Permitted Phases						
Actuated Green, G (s)	32.0			55.0	55.0	
Effective Green, g (s)	35.0			57.0	57.0	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	7.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	567			2017	2895	
v/s Ratio Prot	c0.29			c0.32	0.26	
v/s Ratio Perm						
v/c Ratio	0.84			0.56	0.46	
Uniform Delay, d1	29.9			13.6	12.6	
Progression Factor	1.00			0.20	0.13	
Incremental Delay, d2	13.9			0.8	0.4	
Delay (s)	43.8			3.5	2.1	
Level of Service	D			A	A	
Approach Delay (s)	43.8			3.5	2.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.91	
Frt	1.00	0.95			0.98			1.00			0.99	
Flt Protected	0.95	1.00			0.99			1.00			1.00	
Satd. Flow (prot)	1770	1773			1803			3522			5047	
Flt Permitted	0.40	1.00			0.83			1.00			1.00	
Satd. Flow (perm)	748	1773			1516			3522			5047	
Volume (vph)	64	239	113	77	215	55	0	1068	37	0	1757	94
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	260	123	84	234	60	0	1161	40	0	1910	102
RTOR Reduction (vph)	0	2	0	0	6	0	0	3	0	0	6	0
Lane Group Flow (vph)	70	381	0	0	372	0	0	1198	0	0	2006	0
Turn Type	pm+pt			Perm								
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2								
Actuated Green, G (s)	43.0	43.0			33.8			45.0			45.0	
Effective Green, g (s)	45.0	45.0			35.8			47.0			47.0	
Actuated g/C Ratio	0.45	0.45			0.36			0.47			0.47	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	390	798			543			1655			2372	
v/s Ratio Prot	0.01	c0.21						0.34			c0.40	
v/s Ratio Perm	0.07				c0.25							
v/c Ratio	0.18	0.48			0.68			0.72			0.85	
Uniform Delay, d1	17.6	19.3			27.3			21.3			23.3	
Progression Factor	1.00	1.00			1.00			1.00			0.81	
Incremental Delay, d2	0.2	2.0			6.9			2.8			3.5	
Delay (s)	17.8	21.3			34.1			24.1			22.3	
Level of Service	B	C			C			C			C	
Approach Delay (s)		20.8			34.1			24.1			22.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.99	
Flt Protected		0.98			1.00			1.00			0.99	
Satd. Flow (prot)		1833			1854			1809			1832	
Flt Permitted		0.85			0.98			1.00			0.57	
Satd. Flow (perm)		1586			1824			1809			1056	
Volume (vph)	57	116	0	12	172	2	0	403	110	29	176	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	126	0	13	187	2	0	438	120	32	191	18
RTOR Reduction (vph)	0	0	0	0	0	0	0	13	0	0	4	0
Lane Group Flow (vph)	0	188	0	0	202	0	0	545	0	0	237	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		52.7			52.7			33.3			33.3	
Effective Green, g (s)		55.7			55.7			36.3			36.3	
Actuated g/C Ratio		0.56			0.56			0.36			0.36	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		883			1016			657			383	
v/s Ratio Prot								c0.30				
v/s Ratio Perm		c0.12			0.11						0.22	
v/c Ratio		0.21			0.20			0.83			0.62	
Uniform Delay, d1		11.1			11.0			29.0			26.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			0.4			8.5			3.0	
Delay (s)		11.7			11.5			37.5			29.1	
Level of Service		B			B			D			C	
Approach Delay (s)		11.7			11.5			37.5			29.1	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	27.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.91			0.95
Frt	0.94		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1699		5077			3536
Flt Permitted	0.97		1.00			0.91
Satd. Flow (perm)	1699		5077			3234
Volume (vph)	37	33	1226	14	15	849
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	36	1333	15	16	923
RTOR Reduction (vph)	27	0	1	0	0	0
Lane Group Flow (vph)	49	0	1347	0	0	939
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	23.0		63.0			63.0
Effective Green, g (s)	26.0		66.0			66.0
Actuated g/C Ratio	0.26		0.66			0.66
Clearance Time (s)	7.0		7.0			7.0
Lane Grp Cap (vph)	442		3351			2134
v/s Ratio Prot	c0.03		0.27			
v/s Ratio Perm						c0.29
v/c Ratio	0.11		0.40			0.44
Uniform Delay, d1	28.2		7.9			8.1
Progression Factor	1.00		2.40			1.00
Incremental Delay, d2	0.5		0.3			0.7
Delay (s)	28.7		19.2			8.8
Level of Service	C		B			A
Approach Delay (s)	28.7		19.2			8.8
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	62	31	1230	867	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	67	34	1337	942	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				490	393	
pX, platoon unblocked	0.91	0.88	0.88			
vC, conflicting volume	1466	482	963			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	837	271	819			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	89	95			
cM capacity (veh/h)	264	638	707			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	78	301	535	535	628	335
Volume Left	11	34	0	0	0	0
Volume Right	67	0	0	0	0	21
cSH	533	707	1700	1700	1700	1700
Volume to Capacity	0.15	0.05	0.31	0.31	0.37	0.20
Queue Length 95th (ft)	13	4	0	0	0	0
Control Delay (s)	12.9	1.7	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.9	0.4			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					✥		↰	↑↑↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor					1.00		1.00	0.91		1.00	0.95	
Frt					0.96		1.00	0.99		1.00	1.00	
Flt Protected					0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)					1767		1770	5059		1770	3529	
Flt Permitted					0.99		0.16	1.00		0.18	1.00	
Satd. Flow (perm)					1767		306	5059		334	3529	
Volume (vph)	0	0	0	30	63	40	430	1247	45	72	840	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	68	43	467	1355	49	78	913	18
RTOR Reduction (vph)	0	0	0	0	15	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	0	0	0	129	0	467	1401	0	78	930	0
Turn Type				Split			pm+pt			pm+pt		
Protected Phases				6	6		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)					19.6		66.4	53.7		45.1	39.4	
Effective Green, g (s)					22.6		69.4	56.7		51.1	42.4	
Actuated g/C Ratio					0.23		0.69	0.57		0.51	0.42	
Clearance Time (s)					7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)					3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)					399		549	2868		296	1496	
v/s Ratio Prot					c0.07		c0.20	0.28		0.02	0.26	
v/s Ratio Perm							c0.39			0.11		
v/c Ratio					0.32		0.85	0.49		0.26	0.62	
Uniform Delay, d1					32.3		20.4	13.0		12.5	22.5	
Progression Factor					1.00		2.15	0.21		0.52	1.00	
Incremental Delay, d2					2.1		10.2	0.5		0.4	1.8	
Delay (s)					34.4		54.1	3.2		6.9	24.4	
Level of Service					C		D	A		A	C	
Approach Delay (s)		0.0			34.4			15.9			23.0	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.91	0.95	
Frt	0.88			1.00	1.00	
Flt Protected	0.99			1.00	1.00	
Satd. Flow (prot)	1632			5085	3526	
Flt Permitted	0.99			1.00	1.00	
Satd. Flow (perm)	1632			5085	3526	
Volume (vph)	36	260	0	1609	805	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	283	0	1749	875	22
RTOR Reduction (vph)	94	0	0	0	2	0
Lane Group Flow (vph)	228	0	0	1749	895	0
Turn Type						
Protected Phases	2			8	4	
Permitted Phases						
Actuated Green, G (s)	32.0			55.0	55.0	
Effective Green, g (s)	35.0			57.0	57.0	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	7.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	571			2898	2010	
v/s Ratio Prot	c0.14			c0.34	0.25	
v/s Ratio Perm						
v/c Ratio	0.40			0.60	0.45	
Uniform Delay, d1	24.6			14.1	12.4	
Progression Factor	1.00			0.15	0.14	
Incremental Delay, d2	2.1			0.6	0.6	
Delay (s)	26.6			2.7	2.3	
Level of Service	C			A	A	
Approach Delay (s)	26.6			2.7	2.3	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↶↑↱			↑↑↱			↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.95	
Frt	1.00	0.96			0.97			0.99			1.00	
Flt Protected	0.95	1.00			0.99			1.00			1.00	
Satd. Flow (prot)	1770	1787			1792			5042			3528	
Flt Permitted	0.38	1.00			0.87			1.00			1.00	
Satd. Flow (perm)	701	1787			1573			5042			3528	
Volume (vph)	63	190	71	76	222	78	0	1588	96	0	1235	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	207	77	83	241	85	0	1726	104	0	1342	28
RTOR Reduction (vph)	0	13	0	0	10	0	0	6	0	0	2	0
Lane Group Flow (vph)	68	271	0	0	399	0	0	1824	0	0	1368	0
Turn Type	pm+pt			Perm								
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2								
Actuated Green, G (s)	43.0	43.0			33.8			45.0			45.0	
Effective Green, g (s)	45.0	45.0			35.8			47.0			47.0	
Actuated g/C Ratio	0.45	0.45			0.36			0.47			0.47	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	371	804			563			2370			1658	
v/s Ratio Prot	0.01	c0.15						0.36			c0.39	
v/s Ratio Perm	0.07				c0.25							
v/c Ratio	0.18	0.34			0.71			0.77			0.83	
Uniform Delay, d1	17.8	17.8			27.6			22.0			22.9	
Progression Factor	1.00	1.00			1.00			1.00			1.04	
Incremental Delay, d2	0.2	1.1			7.4			2.5			4.6	
Delay (s)	18.0	19.0			35.0			24.5			28.5	
Level of Service	B	B			D			C			C	
Approach Delay (s)		18.8			35.0			24.5			28.5	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.99	
Flt Protected		0.98			1.00			1.00			1.00	
Satd. Flow (prot)		1818			1855			1800			1827	
Flt Permitted		0.78			0.98			0.99			0.94	
Satd. Flow (perm)		1459			1824			1779			1717	
Volume (vph)	91	96	0	11	156	1	7	214	71	39	353	49
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	104	0	12	170	1	8	233	77	42	384	53
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	6	0
Lane Group Flow (vph)	0	203	0	0	183	0	0	302	0	0	473	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		55.8			55.8			30.2			30.2	
Effective Green, g (s)		58.8			58.8			33.2			33.2	
Actuated g/C Ratio		0.59			0.59			0.33			0.33	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		858			1073			591			570	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.10			0.17			c0.28	
v/c Ratio		0.24			0.17			0.51			0.83	
Uniform Delay, d1		9.9			9.4			26.9			30.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			0.3			0.7			9.7	
Delay (s)		10.5			9.8			27.6			40.5	
Level of Service		B			A			C			D	
Approach Delay (s)		10.5			9.8			27.6			40.5	
Approach LOS		B			A			C			D	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

ATTACHMENT

D

Crash Data

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: WISCONSIN AVE and DAVENPORT ST, NW

Time Period Covered: From 01/01/2009 To 12/31/2011 **Prepared By:** Victorine Gwei **Prepared Date:** 8/30/2012

Total Number of Accident:	18
Total Number of Fatalities:	0
Total Number of Injuries:	8
Total Number of Disabling Injuries:	1
Total Number of NonDisabling Injuries:	1
Total Number of Pedestrians Involved:	1
Total Number of Bicycles Involved:	0
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	0	0.0%	Fixed Object:	0	0.0%
Left Turn:	1	5.6%	Ran Off Road:	0	0.0%
Right Turn:	1	5.6%	Ped. Involved:	1	5.6%
Rear End:	10	55.6%	Backing:	1	5.6%
Side Swiped:	1	5.6%	Non Collision:	0	0.0%
Head On:	1	5.6%	Under/Over Ride:	0	0.0%
Parked:	0	0.0%	Unspecified:	2	11.1%

Time of Day	#ACC	%
07:30 ~ 09:30:	1	5.6%
09:30 ~ 11:30:	4	22.2%
11:30 ~ 13:30:	0	0.0%
13:30 ~ 16:00:	5	27.8%
16:00 ~18:30:	3	16.7%
18:30 ~ 07:30:	5	27.8%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	5	27.8%
Monday:	2	11.1%
Tuesday:	1	5.6%
Wednesday:	4	22.2%
Thursday:	1	5.6%
Friday:	1	5.6%
Saturday:	4	22.2%

Weather Condition	#ACC	%
Clear:	15	83.3%
Rain:	2	11.1%
Snow:	0	0.0%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	1	5.6%

Surface Condition	#ACC	%
Dry:	16	88.9%
Wet:	2	11.1%
Snow/Ice:	0	0.0%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	0	0.0%

Type of Vehicle	#VEH	%
Passenger Car:	24	68.6%
Bus:	1	2.9%
Truck:	5	14.3%
Taxi:	4	11.4%
Minivan:	0	0.0%
Police/Emergency Vehicle:	1	2.9%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	0	0.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	8	44.4%
PDO Collision:	10	55.6%

Light Condition	#ACC	%
Daylight:	13	72.2%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	5	27.8%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	0	0.0%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	1	2.9%
Driver: Electronic Device:	0	0.0%
Driver: Others:	9	25.7%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	25	71.4%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	0	0.0%
In Crosswalk no Signal:	0	0.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	1	100.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2009	4	0	3	0	1	0	0
2010	8	0	3	1	0	0	0
2011	6	0	2	0	0	0	0

12 Records are not approved as of 8/30/2012 11:29:22 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: WISCONSIN AVE and CHESAPEAKE ST, NW

Time Period Covered: From 01/01/2009 To 12/31/2011 **Prepared By:** Victorine Gwei **Prepared Date:** 8/30/2012

Total Number of Accident:	11
Total Number of Fatalities:	0
Total Number of Injuries:	9
Total Number of Disabling Injuries:	0
Total Number of NonDisabling Injuries:	4
Total Number of Pedestrians Involved:	1
Total Number of Bicycles Involved:	1
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	0	0.0%	Fixed Object:	0	0.0%
Left Turn:	2	18.2%	Ran Off Road:	0	0.0%
Right Turn:	0	0.0%	Ped. Involved:	2	18.2%
Rear End:	3	27.3%	Backing:	1	9.1%
Side Swiped:	1	9.1%	Non Collision:	0	0.0%
Head On:	0	0.0%	Under/Over Ride:	0	0.0%
Parked:	1	9.1%	Unspecified:	1	9.1%

Time of Day	#ACC	%
07:30 ~ 09:30:	2	18.2%
09:30 ~ 11:30:	1	9.1%
11:30 ~ 13:30:	0	0.0%
13:30 ~ 16:00:	4	36.4%
16:00 ~18:30:	0	0.0%
18:30 ~ 07:30:	4	36.4%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	1	9.1%
Monday:	2	18.2%
Tuesday:	1	9.1%
Wednesday:	4	36.4%
Thursday:	2	18.2%
Friday:	0	0.0%
Saturday:	1	9.1%

Weather Condition	#ACC	%
Clear:	8	72.7%
Rain:	3	27.3%
Snow:	0	0.0%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	0	0.0%

Surface Condition	#ACC	%
Dry:	8	72.7%
Wet:	3	27.3%
Snow/Ice:	0	0.0%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	0	0.0%

Type of Vehicle	#VEH	%
Passenger Car:	16	76.2%
Bus:	1	4.8%
Truck:	1	4.8%
Taxi:	1	4.8%
Minivan:	0	0.0%
Police/Emergency Vehicle:	1	4.8%
Motorcycle/Moped:	0	0.0%
Bicycle:	1	4.8%
Fixed Object:	0	0.0%
Unspecified:	0	0.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	7	63.6%
PDO Collision:	4	36.4%

Light Condition	#ACC	%
Daylight:	8	72.7%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	3	27.3%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	0	0.0%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	1	4.8%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	6	28.6%
Vehicle:	0	0.0%
Roadway:	1	4.8%
Unspecified:	13	61.9%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	0	0.0%
In Crosswalk no Signal:	1	100.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	0	0.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2009	3	0	2	2	0	1	0
2010	7	0	7	2	1	0	0
2011	1	0	0	0	0	0	0

9 Records are not approved as of 8/30/2012 11:31:21 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: WISCONSIN AVE and BRANDYWINE ST, NW

Time Period Covered: From 01/01/2008 To 12/31/2010 **Prepared By:** Victorine Gwei **Prepared Date:** 5/9/2012

Total Number of Accident:	29
Total Number of Fatalities:	0
Total Number of Injuries:	6
Total Number of Disabling Injuries:	1
Total Number of NonDisabling Injuries:	3
Total Number of Pedestrians Involved:	1
Total Number of Bicycles Involved:	0
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	6	20.7%	Fixed Object:	1	3.4%
Left Turn:	4	13.8%	Ran Off Road:	0	0.0%
Right Turn:	0	0.0%	Ped. Involved:	1	3.4%
Rear End:	5	17.2%	Backing:	0	0.0%
Side Swiped:	9	31.0%	Non Collision:	0	0.0%
Head On:	2	6.9%	Under/Over Ride:	0	0.0%
Parked:	0	0.0%	Unspecified:	1	3.4%

Time of Day	#ACC	%
07:30 ~ 09:30:	13	44.8%
09:30 ~ 11:30:	1	3.4%
11:30 ~ 13:30:	3	10.3%
13:30 ~ 16:00:	2	6.9%
16:00 ~18:30:	4	13.8%
18:30 ~ 07:30:	6	20.7%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	3	10.3%
Monday:	5	17.2%
Tuesday:	6	20.7%
Wednesday:	7	24.1%
Thursday:	5	17.2%
Friday:	2	6.9%
Saturday:	1	3.4%

Weather Condition	#ACC	%
Clear:	24	82.8%
Rain:	5	17.2%
Snow:	0	0.0%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	0	0.0%

Surface Condition	#ACC	%
Dry:	24	82.8%
Wet:	5	17.2%
Snow/Ice:	0	0.0%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	0	0.0%

Type of Vehicle	#VEH	%
Passenger Car:	0	0.0%
Bus:	0	0.0%
Truck:	0	0.0%
Taxi:	0	0.0%
Minivan:	0	0.0%
Police/Emergency Vehicle:	0	0.0%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	61	100.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	4	13.8%
PDO Collision:	25	86.2%

Light Condition	#ACC	%
Daylight:	22	75.9%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	6	0.0%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	1	3.4%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	0	0.0%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	61	100.0%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	1	100.0%
In Crosswalk no Signal:	0	0.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	0	0.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2008	7	0	0	0	0	0	0
2009	13	0	4	2	0	0	0
2010	9	0	2	1	1	0	0

3 Records are not approved as of 5/9/2012 7:44:55 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: WISCONSIN AVE and RIVER RD, NW

Time Period Covered: From 01/01/2008 To 12/31/2010 **Prepared By:** Victorine Gwei **Prepared Date:** 5/9/2012

Total Number of Accident:	19
Total Number of Fatalities:	0
Total Number of Injuries:	4
Total Number of Disabling Injuries:	0
Total Number of NonDisabling Injuries:	2
Total Number of Pedestrians Involved:	2
Total Number of Bicycles Involved:	0
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	0	0.0%	Fixed Object:	0	0.0%
Left Turn:	0	0.0%	Ran Off Road:	0	0.0%
Right Turn:	0	0.0%	Ped. Involved:	3	15.8%
Rear End:	5	26.3%	Backing:	1	5.3%
Side Swiped:	7	36.8%	Non Collision:	0	0.0%
Head On:	0	0.0%	Under/Over Ride:	0	0.0%
Parked:	3	15.8%	Unspecified:	0	0.0%

Time of Day	#ACC	%
07:30 ~ 09:30:	2	10.5%
09:30 ~ 11:30:	3	15.8%
11:30 ~ 13:30:	3	15.8%
13:30 ~ 16:00:	6	31.6%
16:00 ~18:30:	1	5.3%
18:30 ~ 07:30:	4	21.1%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	2	10.5%
Monday:	3	15.8%
Tuesday:	3	15.8%
Wednesday:	2	10.5%
Thursday:	5	26.3%
Friday:	4	21.1%
Saturday:	0	0.0%

Weather Condition	#ACC	%
Clear:	15	78.9%
Rain:	1	5.3%
Snow:	1	5.3%
Sleet/Hail:	0	0.0%
Fog/Mist:	1	5.3%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	1	5.3%

Surface Condition	#ACC	%
Dry:	15	78.9%
Wet:	2	10.5%
Snow/Ice:	0	0.0%
Slush:	1	5.3%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	1	5.3%

Type of Vehicle	#VEH	%
Passenger Car:	0	0.0%
Bus:	0	0.0%
Truck:	0	0.0%
Taxi:	0	0.0%
Minivan:	0	0.0%
Police/Emergency Vehicle:	0	0.0%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	35	100.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	3	15.8%
PDO Collision:	16	84.2%

Light Condition	#ACC	%
Daylight:	16	84.2%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	3	0.0%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	0	0.0%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	0	0.0%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	35	100.0%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	0	0.0%
In Crosswalk no Signal:	0	0.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	1	50.0%
From Between Parked Cars:	0	0.0%
Unspecified:	1	50.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2008	8	0	4	2	2	0	0
2009	5	0	0	0	0	0	0
2010	6	0	0	0	0	0	0

4 Records are not approved as of 5/9/2012 8:32:32 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: WISCONSIN AVE and ALBEMARLE ST, NW

Time Period Covered: From 01/01/2008 To 12/31/2010 **Prepared By:** Victorine Gwei **Prepared Date:** 5/9/2012

Total Number of Accident:	34
Total Number of Fatalities:	0
Total Number of Injuries:	12
Total Number of Disabling Injuries:	3
Total Number of NonDisabling Injuries:	2
Total Number of Pedestrians Involved:	2
Total Number of Bicycles Involved:	2
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	1	2.9%	Fixed Object:	0	0.0%
Left Turn:	3	8.8%	Ran Off Road:	0	0.0%
Right Turn:	1	2.9%	Ped. Involved:	3	8.8%
Rear End:	6	17.6%	Backing:	2	5.9%
Side Swiped:	8	23.5%	Non Collision:	1	2.9%
Head On:	2	5.9%	Under/Over Ride:	0	0.0%
Parked:	3	8.8%	Unspecified:	4	11.8%

Time of Day	#ACC	%
07:30 ~ 09:30:	4	11.8%
09:30 ~ 11:30:	5	14.7%
11:30 ~ 13:30:	4	11.8%
13:30 ~ 16:00:	1	2.9%
16:00 ~18:30:	6	17.6%
18:30 ~ 07:30:	14	41.2%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	6	17.6%
Monday:	4	11.8%
Tuesday:	6	17.6%
Wednesday:	6	17.6%
Thursday:	3	8.8%
Friday:	4	11.8%
Saturday:	5	14.7%

Weather Condition	#ACC	%
Clear:	27	79.4%
Rain:	4	11.8%
Snow:	1	2.9%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	2	5.9%

Surface Condition	#ACC	%
Dry:	27	79.4%
Wet:	4	11.8%
Snow/Ice:	1	2.9%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	2	5.9%

Type of Vehicle	#VEH	%
Passenger Car:	0	0.0%
Bus:	0	0.0%
Truck:	0	0.0%
Taxi:	0	0.0%
Minivan:	0	0.0%
Police/Emergency Vehicle:	0	0.0%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	64	100.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	10	29.4%
PDO Collision:	24	70.6%

Light Condition	#ACC	%
Daylight:	18	52.9%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	12	0.0%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	2	5.9%
Unspecified:	2	5.9%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	0	0.0%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	64	100.0%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	1	50.0%
In Crosswalk no Signal:	0	0.0%
In Unmarked Crosswalk:	1	50.0%
Not in Crosswalk:	0	0.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2008	9	0	2	0	1	0	0
2009	11	0	2	0	0	0	0
2010	14	0	8	2	1	2	0

3 Records are not approved as of 5/9/2012 9:22:37 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: RIVER RD and BRANDYWINE ST, NW

Time Period Covered: From 01/01/2008 To 12/31/2010 **Prepared By:** Victorine Gwei **Prepared Date:** 5/9/2012

Total Number of Accident:	6
Total Number of Fatalities:	0
Total Number of Injuries:	3
Total Number of Disabling Injuries:	0
Total Number of NonDisabling Injuries:	1
Total Number of Pedestrians Involved:	2
Total Number of Bicycles Involved:	0
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	0	0.0%	Fixed Object:	0	0.0%
Left Turn:	1	16.7%	Ran Off Road:	0	0.0%
Right Turn:	0	0.0%	Ped. Involved:	2	33.3%
Rear End:	1	16.7%	Backing:	0	0.0%
Side Swiped:	0	0.0%	Non Collision:	0	0.0%
Head On:	1	16.7%	Under/Over Ride:	0	0.0%
Parked:	1	16.7%	Unspecified:	0	0.0%

Time of Day	#ACC	%
07:30 ~ 09:30:	2	33.3%
09:30 ~ 11:30:	2	33.3%
11:30 ~ 13:30:	1	16.7%
13:30 ~ 16:00:	0	0.0%
16:00 ~18:30:	1	16.7%
18:30 ~ 07:30:	0	0.0%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	0	0.0%
Monday:	0	0.0%
Tuesday:	0	0.0%
Wednesday:	1	16.7%
Thursday:	3	50.0%
Friday:	1	16.7%
Saturday:	1	16.7%

Weather Condition	#ACC	%
Clear:	6	100.0%
Rain:	0	0.0%
Snow:	0	0.0%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	0	0.0%

Surface Condition	#ACC	%
Dry:	6	100.0%
Wet:	0	0.0%
Snow/Ice:	0	0.0%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	0	0.0%

Type of Vehicle	#VEH	%
Passenger Car:	0	0.0%
Bus:	0	0.0%
Truck:	0	0.0%
Taxi:	0	0.0%
Minivan:	0	0.0%
Police/Emergency Vehicle:	0	0.0%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	9	100.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	3	50.0%
PDO Collision:	3	50.0%

Light Condition	#ACC	%
Daylight:	6	100.0%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	0	0.0%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	0	0.0%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	0	0.0%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	9	100.0%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	0	0.0%
In Crosswalk no Signal:	2	100.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	0	0.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2009	4	0	1	0	0	0	0
2010	2	0	2	1	2	0	0

2 Records are not approved as of 5/9/2012 7:48:58 AM

DC Department of Transportation - Traffic Accident Reporting and Analysis System

Accident Summary Report (R-7)

Intersection: 42ND ST and RIVER RD, NW

Time Period Covered: From 01/01/2008 To 12/31/2010 **Prepared By:** Victorine Gwei **Prepared Date:** 5/9/2012

Total Number of Accident:	5
Total Number of Fatalities:	0
Total Number of Injuries:	3
Total Number of Disabling Injuries:	0
Total Number of NonDisabling Injuries:	0
Total Number of Pedestrians Involved:	0
Total Number of Bicycles Involved:	0
Total Number of Motorcycles Involved:	0

Collision Type	#ACC	%	Collision Type	#ACC	%
Right Angle:	0	0.0%	Fixed Object:	0	0.0%
Left Turn:	1	20.0%	Ran Off Road:	0	0.0%
Right Turn:	0	0.0%	Ped. Involved:	0	0.0%
Rear End:	3	60.0%	Backing:	0	0.0%
Side Swiped:	1	20.0%	Non Collision:	0	0.0%
Head On:	0	0.0%	Under/Over Ride:	0	0.0%
Parked:	0	0.0%	Unspecified:	0	0.0%

Time of Day	#ACC	%
07:30 ~ 09:30:	1	20.0%
09:30 ~ 11:30:	0	0.0%
11:30 ~ 13:30:	2	40.0%
13:30 ~ 16:00:	1	20.0%
16:00 ~18:30:	0	0.0%
18:30 ~ 07:30:	1	20.0%
Unspecified:	0	0.0%

Day o fweek	#ACC	%
Sunday:	0	0.0%
Monday:	1	20.0%
Tuesday:	0	0.0%
Wednesday:	3	60.0%
Thursday:	0	0.0%
Friday:	1	20.0%
Saturday:	0	0.0%

Weather Condition	#ACC	%
Clear:	4	80.0%
Rain:	1	20.0%
Snow:	0	0.0%
Sleet/Hail:	0	0.0%
Fog/Mist:	0	0.0%
Crosswind/Blowing Sand:	0	0.0%
Unspecified:	0	0.0%

Surface Condition	#ACC	%
Dry:	4	80.0%
Wet:	1	20.0%
Snow/Ice:	0	0.0%
Slush:	0	0.0%
Water/Sand:	0	0.0%
Repairing:	0	0.0%
Unspecified:	0	0.0%

Type of Vehicle	#VEH	%
Passenger Car:	0	0.0%
Bus:	0	0.0%
Truck:	0	0.0%
Taxi:	0	0.0%
Minivan:	0	0.0%
Police/Emergency Vehicle:	0	0.0%
Motorcycle/Moped:	0	0.0%
Bicycle:	0	0.0%
Fixed Object:	0	0.0%
Unspecified:	10	100.0%

Accident Severity Type	#ACC	%
Fatal Collision:	0	0.0%
Injury Collision:	2	40.0%
PDO Collision:	3	60.0%

Light Condition	#ACC	%
Daylight:	5	100.0%
Dawn/Dusk:	0	0.0%
Dark(Lighted):	0	0.0%
Dark(Not Lighted):	0	0.0%
Dark(Unknown Lighting):	0	0.0%
Unspecified:	0	0.0%

Contributing Factor	#VEH	%
Driver: Speed:	0	0.0%
Driver: Alcohol/Drug:	0	0.0%
Driver: Electronic Device:	0	0.0%
Driver: Others:	0	0.0%
Vehicle:	0	0.0%
Roadway:	0	0.0%
Unspecified:	10	100.0%

Pedestrian Actions	#ACC	%
In Crosswalk with Signal:	0	0.0%
In Crosswalk against Signal:	0	0.0%
In Crosswalk no Signal:	0	0.0%
In Unmarked Crosswalk:	0	0.0%
Not in Crosswalk:	0	0.0%
From Between Parked Cars:	0	0.0%
Unspecified:	0	0.0%

Year	Accidents	Fatalities	Injuries	Disabling Injuries	Pedestrians	Bicycles	Motorcycles
2008	1	0	2	0	0	0	0
2009	3	0	1	0	0	0	0
2010	1	0	0	0	0	0	0

1 Records are not approved as of 5/9/2012 9:24:52 AM

D-7

ATTACHMENT

E

Parking Survey

O. R. GEORGE & ASSOCIATES, INC.

Traffic Engineers – Transportation Planners

10210 Greenbelt Road, Suite 310 • Lanham, MD 20706-2218
Tel: (301) 794-7700 • Fax: (301) 794-4400
E-mail: ogeorge@orgengineering.com

MEMORANDUM

DATE: August 1, 2012

TO: Paul Millstein, Vice President (Douglas Development Corp.)

FROM: Osborne R. George, P.E., PTOE /Sandra P. Lawrence, MUP

RE: Parking Availability Survey – Tenley/Friendship Heights Area, NW, Washington, DC

Further to your recent request, our company conducted a survey of parking facilities within the general vicinity of your proposed residential project at 4600 Wisconsin Avenue, Northwest. The purpose was to determine the likely availability of parking spaces for potential long-term lease (10 years or greater), within a half-mile radius of your proposed project. The area extends between Upton Street to the south, and Harrison Street to the north.

The attached map shows the location of your property, and the zoning categories within the project limits noted. The map shows that commercial zoning represents essentially a "strip" area along the Wisconsin Avenue corridor. To the east and west of the corridor, properties are residentially-zoned and are built-out, primarily with single-family residential and institutional uses. Our survey consisted of the following tasks:

a) Map reviews and site visits to all businesses and institutions within the area, which showed significant on-site parking.

b) Every effort was made to speak with a representative. Where no responsible person was available, our staff left a letter detailing the objective of our inquiry. (See attached.)

c) Where no personnel could be contacted at the site, we obtained information and followed-up via telephone and e-mail.

d) The field observations and responses are detailed on the attached survey form.

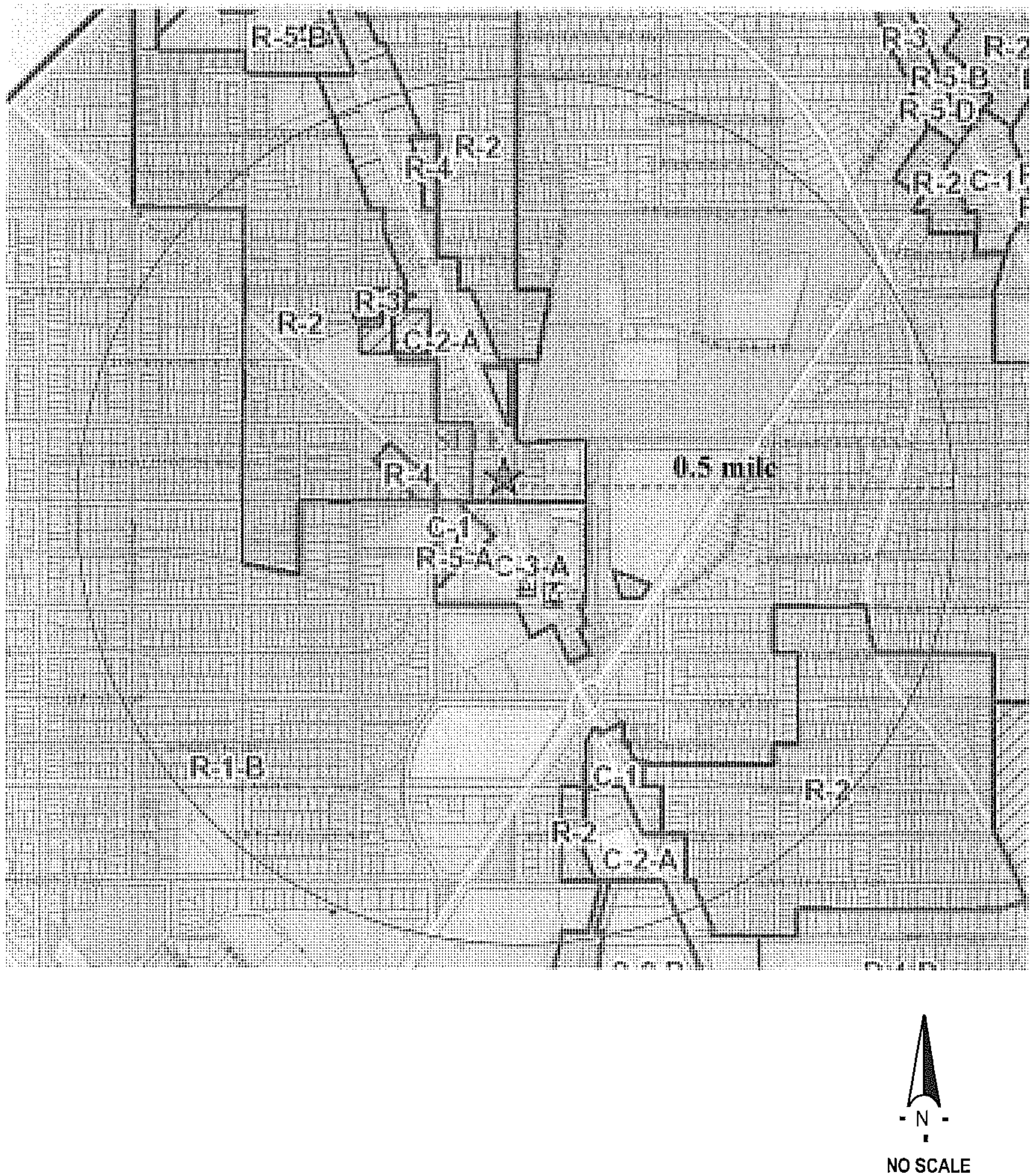
Of the 46 locations identified, in-person or telephone contact was made with 40 of them; and letters were left behind and e-mail contact was made with the remaining 4 locations. We will again try to make contact with the latter 4 businesses.

Our survey found that there were 4 businesses, which indicated a readiness to consider leasing spaces on a <u>monthly</u> basis. However, we found no indication of businesses that were prepared to lease spaces on a long-term basis. Further details of the responses are provided on the attached form. Please also be advised that business representatives may be contacting you directly.

Please let us know if you require further assistance in this matter. Thanks.

ORG/sd

Attachments: As noted



O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**Parking Availability Survey Study Area** **4600 Wisconsin Avenue, Northwest, Washington D.C.** **PUD Application (Case No. 10-23)**

E-2

O. R. GEORGE & ASSOCIATES, INC.

Traffic Engineers – Transportation Planners

10210 Greenbelt Road, Suite 310 • Lanham MD 20706
Tel: (301) 794-7700 • Fax: (301) 794-4400
E-mail: ogeorge@orgengineering.com

July 24, 2012

To Whom It May Concern:

Our company is providing consulting services to Douglas Development Corporation, which is developing an apartment building at the corner of Wisconsin Avenue and Brandywine Street, Northwest. Douglas Development desires to lease up to 20 parking spaces within the immediate area, for a period of ten (10) years or longer. If your company is interested or requires further information, please contact the company representative, as per below.

Mr. Paul Millstein, Vice President
Douglas Development Corporation
702 H Street, NW, Suite 400
Washington, DC 20001
Tel: (202) 638-6300

Please also feel free to contact Ms. Sandy Lawrence (at 301-794-7700) if we may be of further assistance in this matter. Thank you.

Sincerely,
O. R. GEORGE & ASSOCIATES, INC.

Osborne R. George, P.E., PTOE
President

ORG/sl/sd

Parking Availability Survey
Tenleytown/Friendship Heights Area
(In support of 4600 Wisconsin Avenue, NW/PUD Application, Case No. 10-23)

Date: 7/24, 7/25
Technician: SANDY LAWRENCE

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity) Public	Private	Person Contacted	Response/Comments
1	JOSEPH GAWLER'S SON INC., FUNERAL DIRECTORS	5130 WISCONSIN AVE. 202.966.6400		lot (56±)	JOANNE (RECEPTION)	NONE AVAILABLE/NOT INTERESTED
2	COLONIAL PARKING	5100 WISCONSIN AVE. 202-407-2670	LOT (190±)		WUDASSIE (ATTENDANT)	CAN LEASE MONTHLY SPACES. NO INDICATION THAT CAN LEASE ON LONG-TERM (i.e. 10 YRS) BASIS. TOLD TO SPEAK WITH MANAGER - MR. FIKRU. (LEFT LETTER)
3	WEICHERT REALTY + KNIGHTS OF COLUMBUS	5034 WISCONSIN AVE. 202-326-1300 (WEICHERT)		LOT (20)	MARIE (BY PHONE)	ALL SPACES RESERVED FOR WEICHERT/KNIGHTS OF COLUMBUS (NONE AVAILABLE)
4	FOX NEWS PARKING LOT	5100 BLOCK WISCONSIN AVE		LOT (171)	DARRYL HOLMES (SECURITY)	NONE PRESENTLY AVAILABLE (LEFT LETTER)
5	AMALGAMATED TRANSIT UNION	5025 WISCONSIN AVE. 202-537-1645		GARAGE (NUMBER OF SPACES UNKNOWN)	CHRISTY (RECEPTION) VON DYKES (MANAGER)	NONE AVAILABLE (LEFT LETTER, POTENTIAL FOR FOLLOW-UP?)

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity) Public	Private	Person Contacted	Response/Comments
6	CITIBANK	5001 WISCONSIN AVE.		LOT (28)	KAREN BIGGS (RECEPTION)	NONE AVAILABLE
7	TAIPEI ECONOMIC + CULTURAL REPRESENTATIVE OFFICE IN THE US + DEFENSE MISSION	5010 WISCONSIN AVE.		LOT (50±)	NO ONE AVAILABLE	EMBASSY TYPE OF BUILDING (NONE AVAILABLE)
8	BERNSTEIN MANAGEMENT COMPANY	5028 WISCONSIN AVE 202-537-0787		LOT (70±)	CLAUDIA (BY PHONE)	NONE AVAILABLE TO NON-TENANTS
9	DEOUDES-MAGAFAN REALTY	4900 BLOCK WISCONSIN AVE 301-986-9500		LOT (25)	ANGELO MAGAFAN (MANAGER, BY PHONE)	NONE AVAILABLE PRESENTLY. COMPANY POLICY - CAN LEASE ON A YEARLY BASIS. NO LONGER TERMS.
10	SAFEWAY	4203 DAVENPORT ST. 202.364.0290		LOT (125±)	MARIA (BY PHONE)	NONE AVAILABLE PRESENTLY (LEFT LETTER)
11	CENTRAL PENSION FUND	4115 CHESAPEAKE ST. 202.362.1000		LOT (35±)	MICHELLE (BY PHONE)	PARKING RESERVED FOR TENANTS + PERMIT HOLDERS (NONE AVAILABLE)
12	TD BANK	4849 WISCONSIN AVE. 202-537-8470		LOT 15	NINA (BANK TELLER)	NOT DEFINITIVE/NONE APPARENTLY AVAILABLE (LEFT LETTER)

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity)		Person Contacted	Response/Comments
			Public	Private		
13	TENLEY HILL BUILDING - PN HOFFMAN (MANAGEMENT)	4725 WISCONSIN AVE 202.686.0010 ext. 246		GARAGE (No. OF SPACES UNKNOWN)	LINDSAY (RECEPTION)	UNSURE OF LEASABILITY TO NON-TENANTS. (LEFT LETTER)
14	CENTER FOR APPLIED LINGUISTICS BUILDING	4646 40th ST. 202.362.0700		LOT (28±)	DEBORAH (SITE EMPLOYEE)	NONE AVAILABLE, SPACES AVAILABLE ONLY TO TENANTS
15	SPORT + HEALTH CLUB/ WASHINGTON KARATE ACADEMY / WAMU AMERICAN UNIV. RADIO	4001 BRANDYWINE ST.		LOT (20±)	DEVON (BUILDING SECURITY GUARD)	NONE AVAILABLE PRESENTLY (LEFT LETTER)
16	LEGALUSA REALTY	4025 BRANDYWINE ST. SUITE 200		LOT (16)	NO ONE AVAILABLE	OFFICE @ 4025 BRANDYWINE CLOSED. (LEFT LETTER)
17	ATLANTIC PARKING	4620 WISCONSIN AVE. 202-466-5050		GARAGE (120±)	DOUG QUANDER (ATTENDANT)	NONE AVAILABLE. CONTRACTED BY AMERICAN UNIVERSITY + MURASAKI RESTAURANT
18	APT/OFFICE BUILDING UNDER CONSTRUCTION	4600 BLOCK 41st ST.		LOT (10±)	NO ONE AVAILABLE	BUILDING UNDER CONSTRUCTION
19	REALTY PROS	4624 WISCONSIN AVE 202-537-3800		LOT (11±)	SUSAN (BY PHONE)	ALL RESERVED FOR BUSINESSES ADJACENT TO LOT WITH FRONTAGE ON WISCONSIN. (NONE AVAILABLE)

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity)		Person Contacted	Response/Comments
			Public	Private		
20	DEVONSHIRE APTS (LANDMARK COMPANIES)	4105 WISCONSIN AVE 301-652-7077		LOT (10)	JENNIFER (BY PHONE)	LEASABLE TO NON-TENANTS, BUT NONE PRESENTLY AVAILABLE
21	REUTER'S INC	4115 WISCONSIN AVE 202-244-8200		LOT (4±)	JOHN (MANAGER)	NONE AVAILABLE. RESERVED FOR BUILDING USE (DECLINED LETTER)
22	TAIWANESE EMBASSY	4201 WISCONSIN AVE 202-237-0437		LOT (6±) AND GARAGE (NO. SPACES UNKNOWN)	ATTENDANT (NAME NOT GIVEN)	NOT LEASABLE/NONE AVAILABLE
23	PNC BANK	4249 WISCONSIN AVE 202-835-5648		LOT (16±)	REGGIE (RECEPTION)	NOT LEASABLE/NOT AVAILABLE
24	CHIPOTLE	4301 B WISCONSIN AVE 202-237-0602		LOT (9±)	VALERIE (COUNTER)	NONE AVAILABLE/NOT LEASABLE
25	WISCONSIN AVE BAPTIST CHURCH + AGAPE BAPTIST CHURCH	3920 ALTON PL 202-966-2259		LOT (27±)	NO ONE AVAILABLE	NO ANSWER @ DOOR. (EMAILED LETTER)
26	CIRCLE PARKING CORPORATION (WHOLE FOODS ASSOCIATED PARKING)	4530 WISCONSIN AVE 202-331-0980	GARAGE (380±)		GEZAHGN	NO SPACES AVAILABLE RIGHT NOW. TYPICALLY HAS MONTHLY PARKING FOR LEASE. (LEFT LETTER)

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity)		Person Contacted	Response/Comments
			Public	Private		
27	AMERICAN UNIV.	4000 WISCONSIN AVE.		LOT (30±) GARAGE (NO. SPACES UNKNOWN)	ANNA (PARKING + TRAFFIC, PHONE)	NONE AVAILABLE / NOT LEASABLE TO NON-STUDENTS, NON-EMPLOYEES
28	CVS, STORE 2174	4555 WISCONSIN AVE. 202.537.1459		LOT (40±)	LUBNA (STORE MANAGER) + SIMON (PHOTO TECHNICIAN)	UNSURE OF LEASABILITY/APPEARS NOT AVAILABLE. DIRECTED TO SPEAK WITH DISTRICT MANAGER - SCOTT STASO - 301-776-4013 (LEFT LETTER)
29	DOMINOES PIZZA	4539 WISCONSIN AVE. 202-362-7500		LOT (15±)	MARK (EMPLOYEE)	NOT LEASABLE/NONE AVAILABLE
30	TENLEY POINT BUILDING DONAHOE REAL ESTATE SERVICES	4530 WISCONSIN AVE 202-333-0880		Lot (10±) GARAGE (NO SPACES UNKNOWN)	LEFT VOICEMAIL FOR JOANNE COBB	LEFT VOICEMAIL WITH MR. PAUL MILLSTEIN'S REQUEST FOR SPACES ON 10-YR. LEASE; GAVE DOUGLAS DEV. PHONE NUMBER, IN CASE INTERESTED
31	THE CITY CHURCH	4100 RIVER RD. 202-546-2489		LOT (23)	ALYSSA VASQUEZ (RECEPTION, BY PHONE)	DIRECTED TO EMAIL HER, AND SHE WOULD FORWARD IT TO THE ADMINISTRATOR (EMAILED LETTER)
32	SAINT COLUMBA'S EPISCOPAL CHURCH + NURSERY SCHOOL	4201 ALBEMARLE ST. 202-363-4119		LOT (24±)	LAURA (RECEPTION)	NOT LEASABLE/NONE AVAILABLE
33	IONA SENIOR SERVICES	4125 ALBEMARLE ST. 202-966-1055		GARAGE (NO. SPACES UNKNOWN)	JOSEPHINE (RECEPTION)	NOT LEASABLE/NONE AVAILABLE

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity)		Person Contacted	Response/Comments
			Public	Private		
34	CITYLINE @ TENLEY - ATLANTIC PARKING	4500 WISCONSIN AVE 202-466-5050	GARAGE (150±)		RAY (BY PHONE)	MIGHT HAVE AVAILABILITY. LETTER EMAILED, Exec. Dir. of Parking, Yohannes Kifle, will be in touch with Paul Millstein.
35	- CONDO BUILDING	4101 ALBEMARLE ST. 202-679-1020		GARAGE (NO. SPACES UNKNOWN)	SIMON (CONCIERGE)	SPACES LEASED THROUGH INDIVIDUAL HOMEOWNERS. (LEFT LETTER)
36	JOHN W MARTIN III, DDS + J. BOYLAN DDS DENTAL OFFICE	4341 WISCONSIN AVE 202-966-1900		LOT (7)	JANET (RECEPTION)	NOT LEASABLE/NONE AVAILABLE
37	TENLEY MINI MART	4326 WISCONSIN AVE 202-363-3683		LOT (10)	ALODIA (COUNTER CLERK)	NOT LEASABLE/NONE AVAILABLE
38	PSYCHIATRIC INSTITUTE OF WASHINGTON	4228 WISCONSIN AVE 202-743-7772		LOTS (NO. OF SPACES UNKNOWN)	LORI (RECEPTION)	NOT LEASABLE / NONE AVAILABLE
39	ATLANTIC SERVICE GROUP, LOCATION 76	4200 WISCONSIN AVE 202-466-5050		GARAGE (NO. SPACES UNKNOWN)	JUVENAL (ATTENDANT)	MONTHLY SPACES AVAILABLE. POTENTIAL FOR LONGER BASIS (LEFT LETTER)
40	COLONIAL PARKING STATION 367	4000 WISCONSIN AVE 202-295-8100		GARAGE (NO. SPACES UNKNOWN)	ERMIAS (ATTENDANT)	NONE PRESENTLY AVAILABLE. MAY EVENTUALLY HAVE AVAILABILITY. (LEFT LETTER)
41	WUSA 9 BUILDING	4100 BLOCK WISCONSIN 202-895-5999		GARAGE (NO. SPACES UNKNOWN)	JOE (BUSINESS OFFICE, PHONE)	NOT LEASABLE TO NON-TENANTS NONE AVAILABLE
42	TENLEY-FRIENDSHIP NEIGHBORHOOD LIBRARY	4450 WISCONSIN 202-727-1488		LOT (7)	NO ONE AVAILABLE	NONE APPARENTLY AVAILABLE (LEFT LETTER)

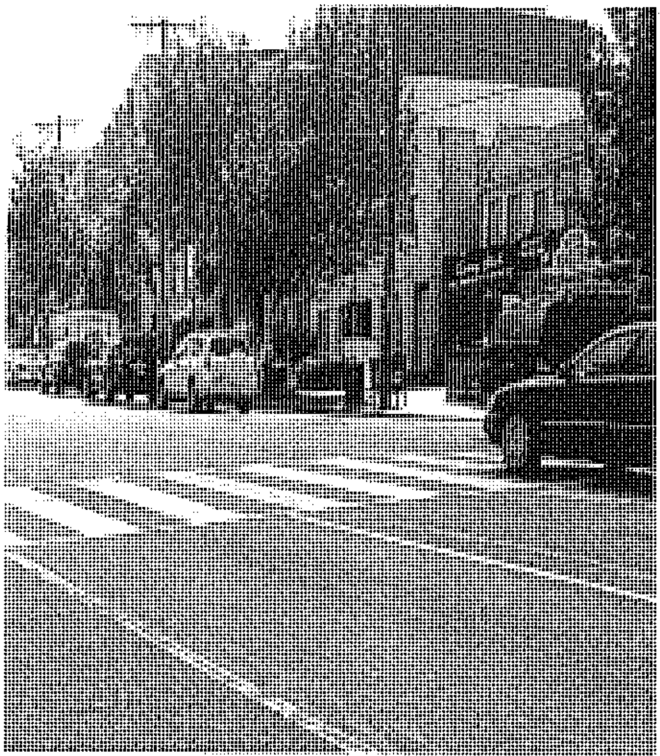
E-9

#	Property/Business Name	Address & Telephone Number	Type of Parking (Capacity)		Person Contacted	Response/Comments
			Public	Private		
43	ST ANN'S CATHOLIC CHURCH	4001 YUMA ST 202-966-6288		LOT (50 ±)	LEFT GENERAL MAILBOX VOICEMAIL	LEFT PAUL MILLSTEIN CONTACT INFO + PURPOSE OF CALL (ALSO EMAILED LETTER)
44	NATIONAL PRESBYTERIAN CHURCH	4101 NEBRASKA AVE 202-537-0800		LOT (300±)	JIM WALKER (FACILITIES MANAGER) 202-537-7565 (BY PHONE)	POTENTIALLY AVAILABLE. DOUGLAS DEV. CORP + EACH PERSON PARKING WOULD REQUIRE SCREENING (EMAILED LETTER)
45	SAINT PAULS LUTHERAN CHURCH	4900 CONNECTICUT AVE 202-966-5489		LOT (30±)	BENTE (OFFICE ADMIN, BY PHONE)	NONE AVAILABLE
46	ST MARY ARMENIAN APOSTOLIC CHURCH	4125 FESSENDEN ST 202-363-1923		LOT (25±)	HASMIK (BY PHONE)	AVAILABLE ON YEARLY BASIS (EMAILED LETTER)
47						
48						
49						
50						

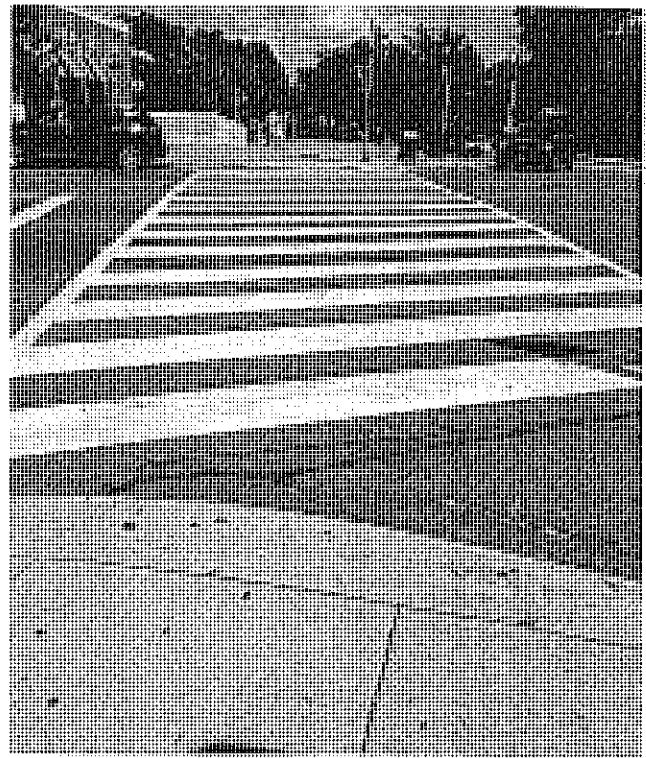
ATTACHMENT

F

Photographs – Study Area Roadways and ADA Facilities



WISCONSIN AVE. @ CHESAPEAK ST.

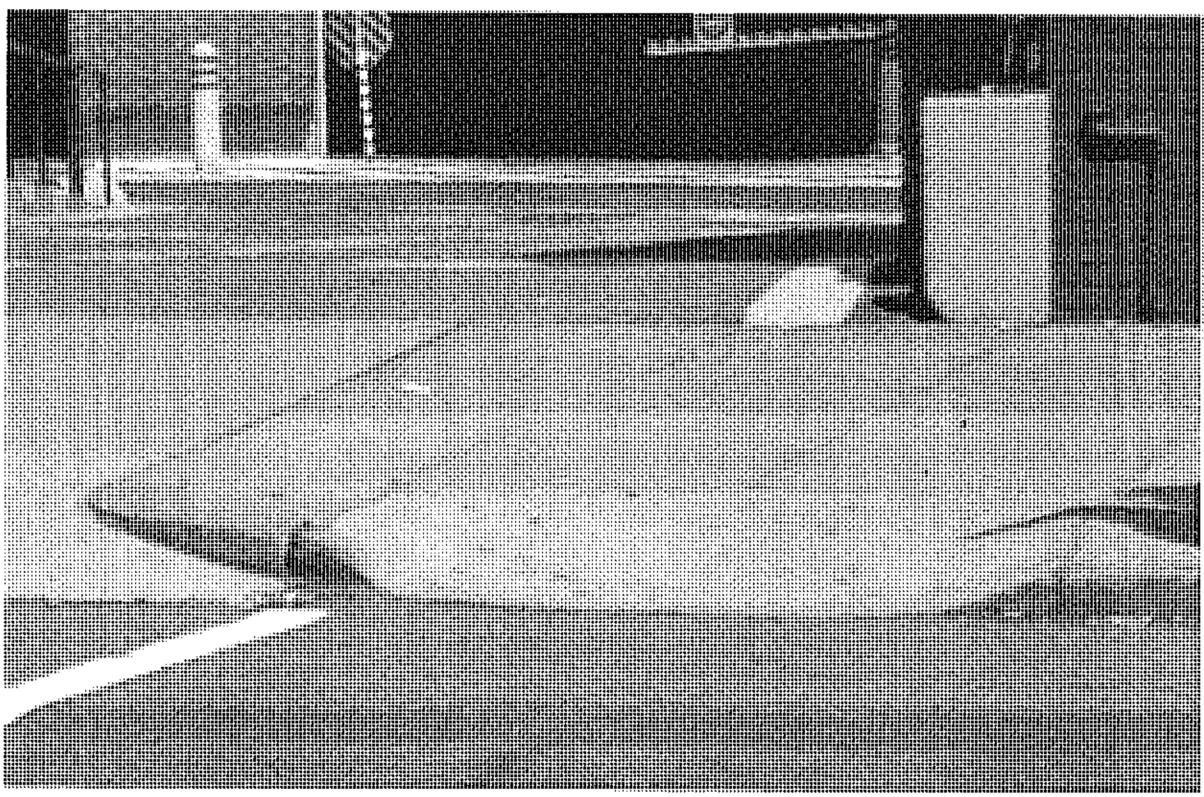


WISCONSIN AVE. @ ALBEMARLE ST.

CHESAPEAK ST. @ RIVER RD.

WISCONSIN AVE. @ BRANDYWINE ST.

ADA Ramps at Chesapeake St. @ Wisconsin Ave. Intersection Crosswalk

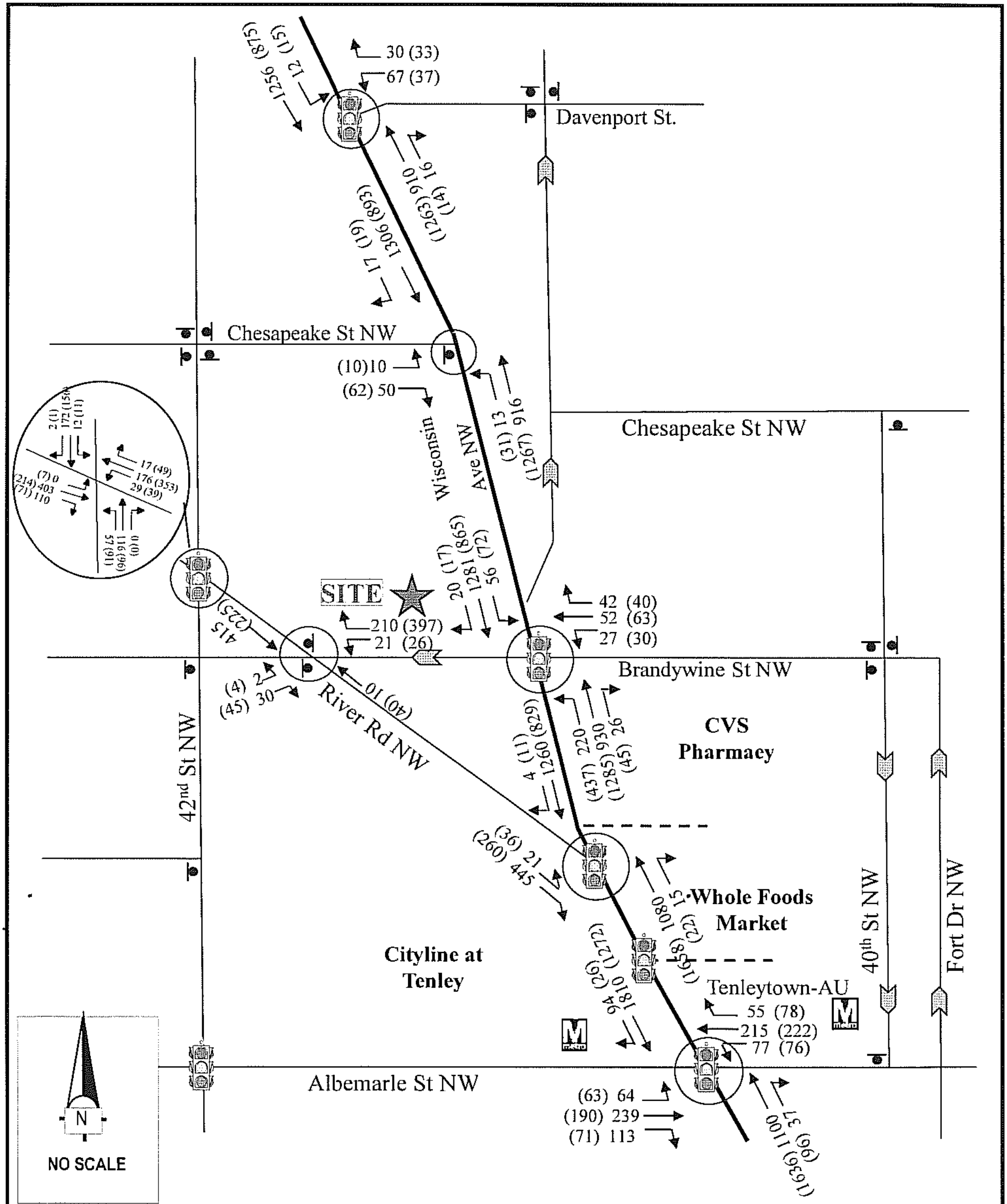


ADA Ramps at Wisconsin Ave. @ Whole Foods Crosswalk

ATTACHMENT

G

Supporting Material for Background Traffic Analysis



O. R. GEORGE & ASSOCIATES, INC.

Traffic Engineers - Transportation Planners

2015 Base Traffic Situation

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

G-1

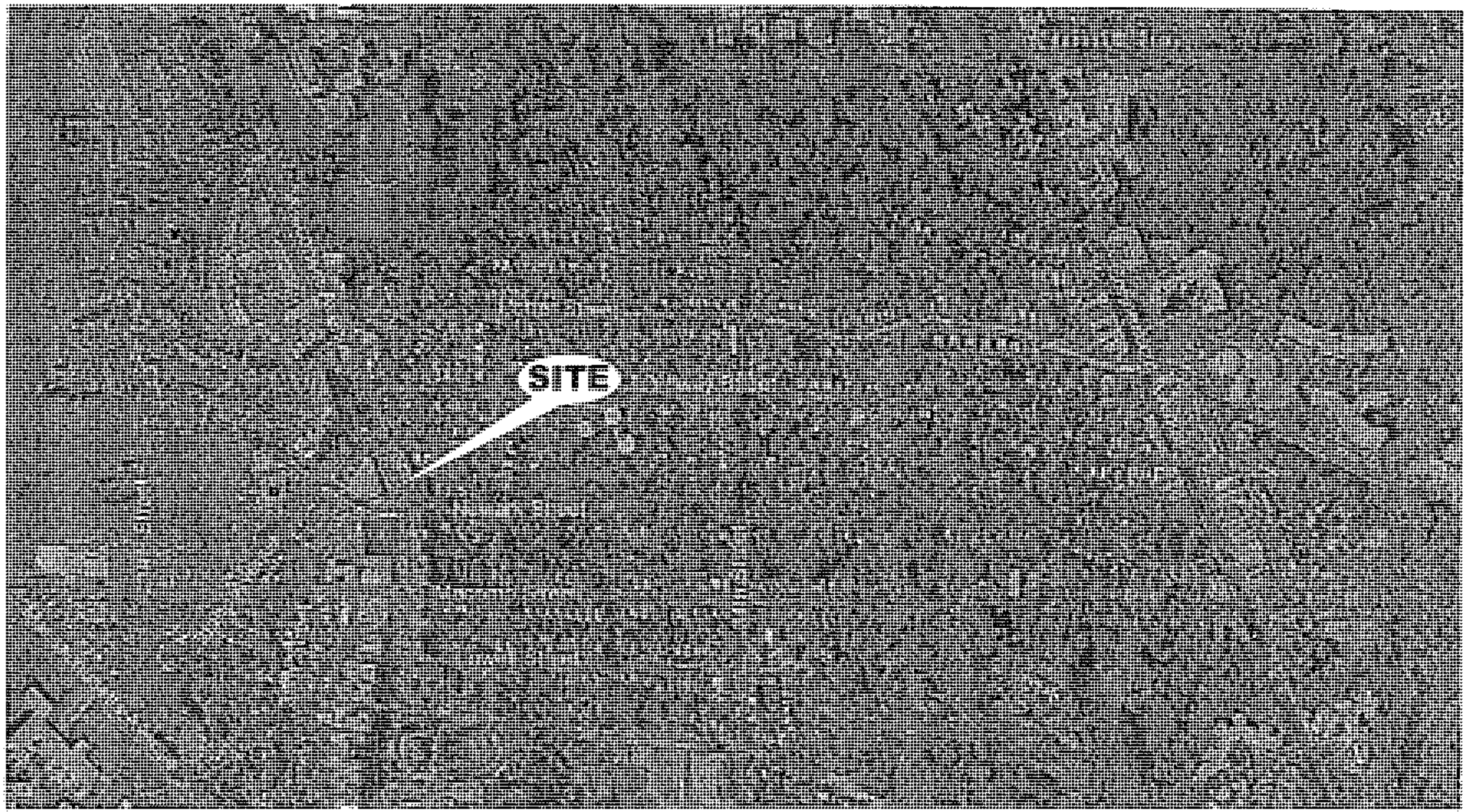
WISCONSIN AVENUE GIANT
TRANSPORTATION IMPACT STUDY
WASHINGTON, D.C.

Prepared for:
Giant of Maryland, LLC

Prepared by:
Wells + Associates, Inc.

May 14, 2008 PUD Submission

G-2



O:\PROJECTS\3501-4000\3992 CLEVELAND PARK GIANT (2008)\GRAPHICS\3992 RPT GRAPHICS.DWG

Figure 1–1
Site Location

North

G-3

Directional Distribution

The following directional distribution of site-generated trips was derived from counts of existing traffic, previous traffic study, local knowledge, and engineering judgment:

Residential Site Traffic

Direction	Route	Percent
From the North	Wisconsin Avenue	38%
From the South	Idaho Avenue	7%
From the South	38th Street	2%
From the South	Wisconsin Avenue	30%
From the West	Massachusetts Avenue	7%
From the West	Newark Street	1%
From the East	Porter Street	2%
From the East	Newark Street	10%
From the East	Macomb Street	3%
Total		100%

Commercial Site Traffic

Direction	Route	Percent
From the North	Wisconsin Avenue	36%
From the South	Idaho Avenue	5%
From the South	38th Street	4%
From the South	Wisconsin Avenue	30%
From the West	Massachusetts Avenue	7%
From the West	Newark Street	3%
From the East	Porter Street	2%
From the East	Newark Street	6%
From the East	Macomb Street	7%
Total		100%

Site Traffic Assignments

These site-generated trips were assigned to the public road network according to this directional distribution. The resulting weekday and Saturday site traffic assignments are shown on Figures 3-3 and 3-4, respectively.

G-4

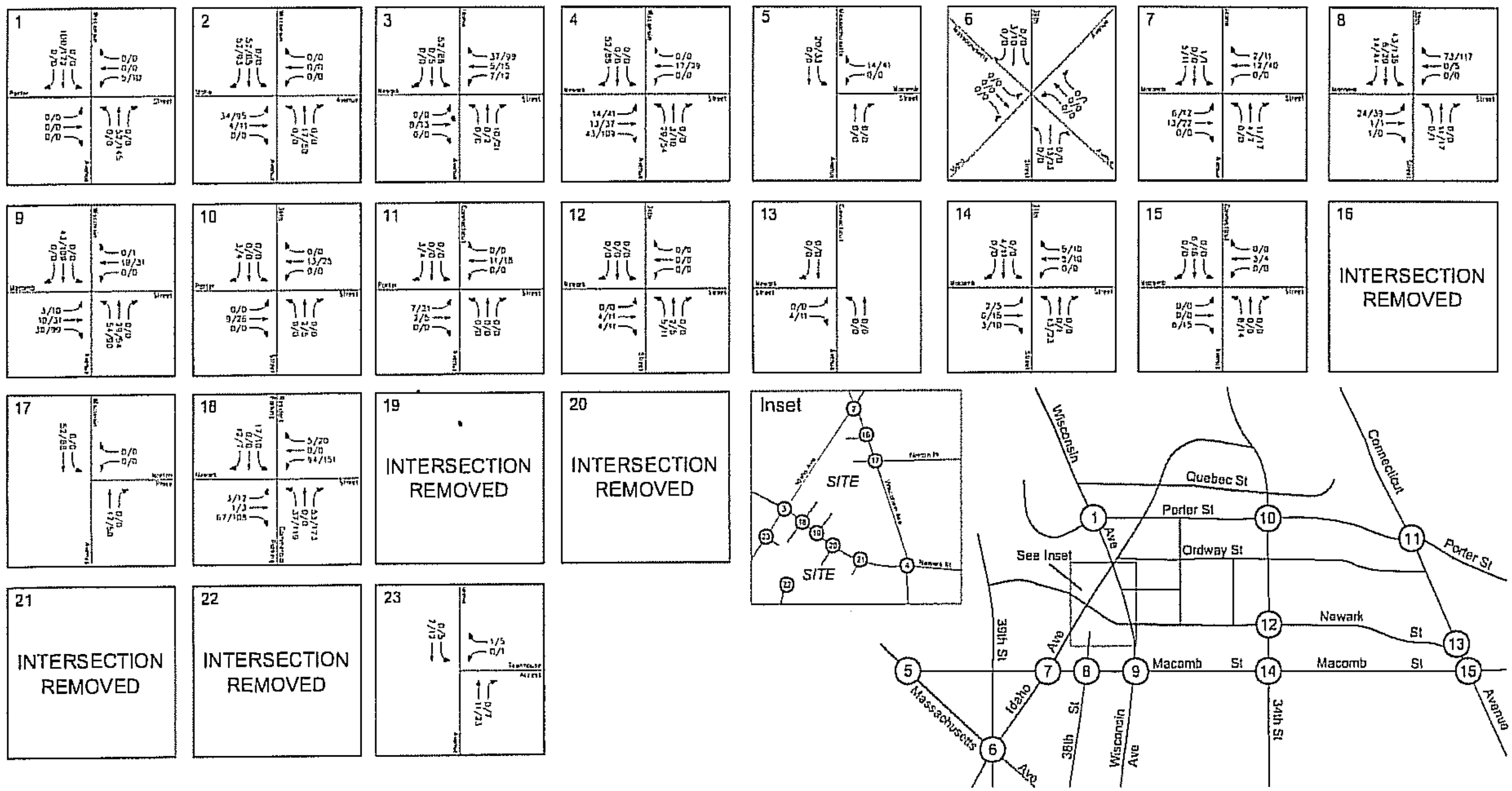
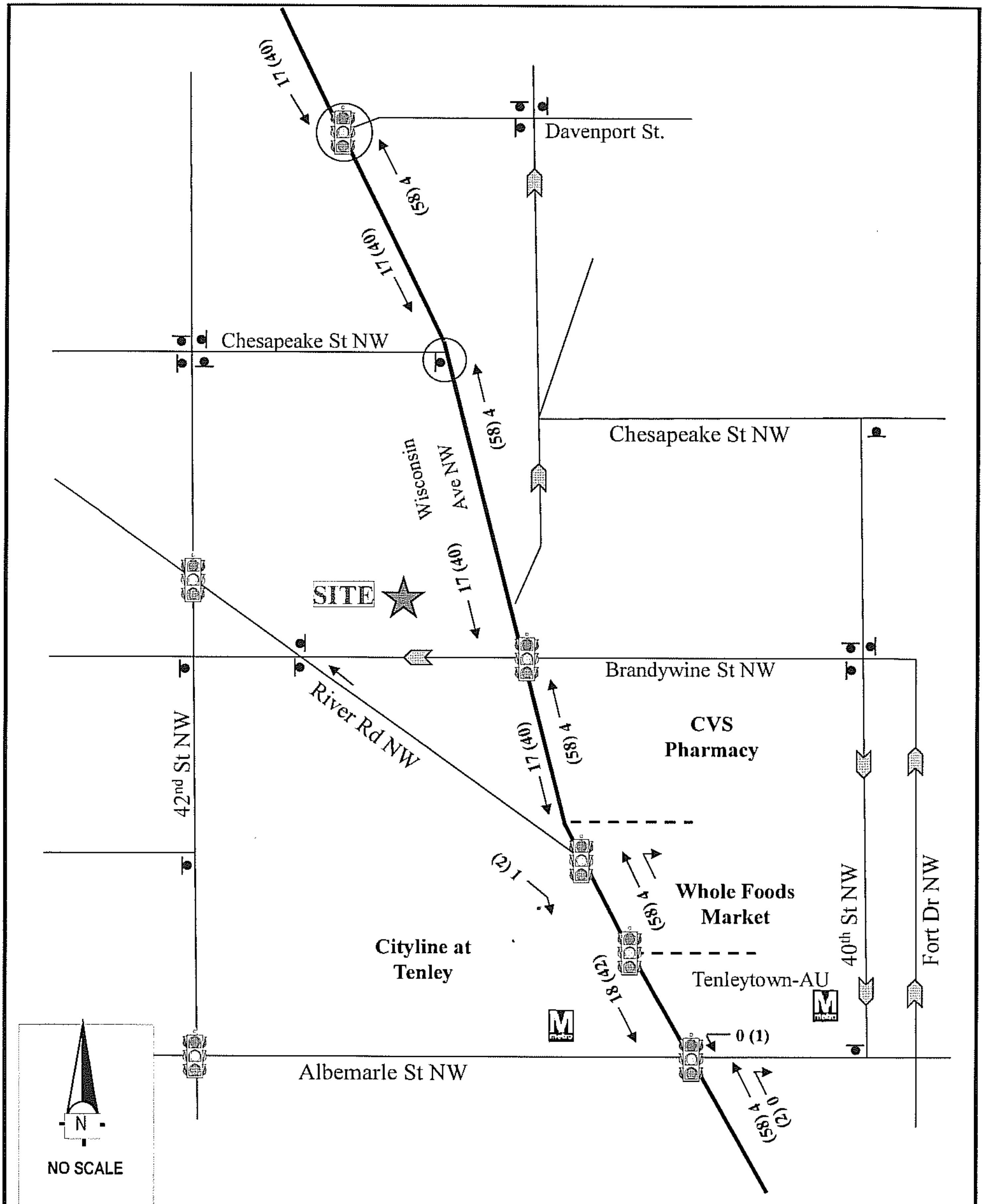


Figure 3–3
Site–Generated Traffic Assignments: Weekday

G-5



O. R. GEORGE & ASSOCIATES, INC.
Traffic Engineers - Transportation Planners

Site Trip Generation and Assignment

The Commons

G-6

TRAFFIC IMPACT ANALYSIS - 5220 WISCONSIN AVENUE, PLANNED UNIT DEVELOPMENT AND MAP AMENDMENT APPLICATIONS, NORTHWEST, WASHINGTON, DC

Prepared for:
AKRIDGE
601 Thirteenth Street, NW Suite 300 North
Washington D.C. 20005
- David Tuchmann, Assistant Development Manager

Land Use Counsel:
HOLLAND & KNIGHT, LLP
2099 Pennsylvania Avenue, NW, Suite 100
Washington, D.C. 20006
- Christopher H. Collins, Esquire
- Christy Moseley Shiker, Esquire-

Prepared by:
O. R. GEORGE & ASSOCIATES, INC.
Transportation Planning & Engineering Consultants
10210 Greenbelt Road, Suite 310
Lanham, MD 20706-2218
Tel: (301) 794-7700

June 15, 2006

G-7

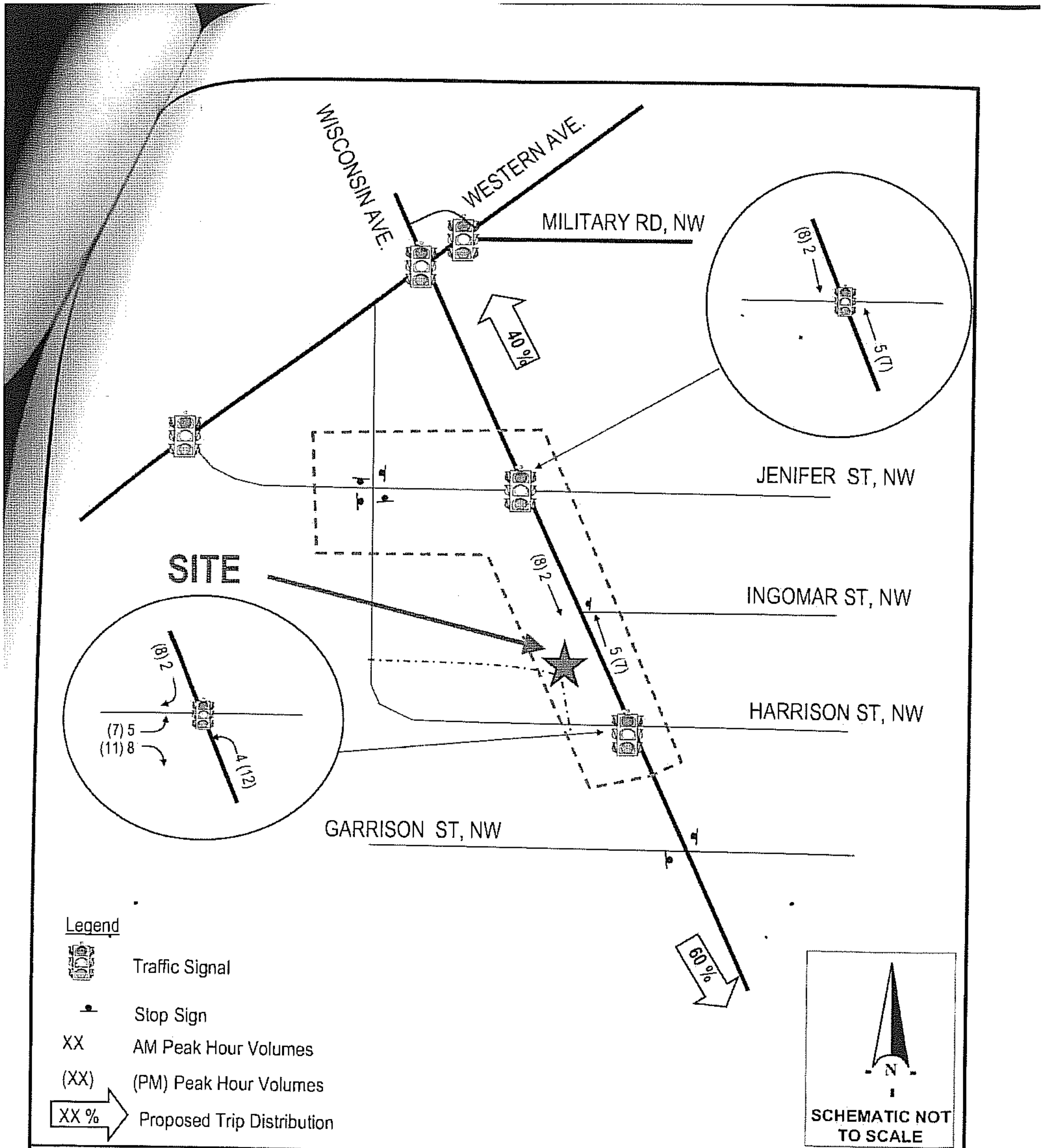
TABLE 6

PROJECTED PEAK HOUR TRIP GENERATION – PROPOSED 5220 WISCONSIN AVENUE DEVELOPMENT

Trip Rates	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
• Trips Per Condominium Unit	0.09	0.21	0.30	0.23	0.16	0.39
(With 50% Transit Usage*)	0.05	0.10	0.15	0.12	0.08	0.20
• Trips Per 1,000 GSF Retail Space	0.63	0.40	1.03	1.80	1.95	3.75
(With 65% Walk/Non Auto Trips*)	0.22	0.14	0.36	0.63	0.68	1.31
Trip Generation						
• Trips/70 Condominium Units	3	7	10	8	6	14
• Trips/13,200 GSF Retail Space	3	2	5	9	9	18
Total (Proposed Development)	**6**	**9**	**15**	**17**	**15**	**32**
Existing Site Trips	**4**	**2**	**6**	**5**	**7**	**12**

* Based on WMATA 1989 Development Ridership Survey Report (Figure 36, p. 103, Figure 38, p.106 for residential and retail uses, respectively) and agency confirmation in 2005/2006.

Source: ITE Trip Generation Manual (2003), WMATA and O. R. George & Associates.



O. R. GEORGE & ASSOCIATES, INC.
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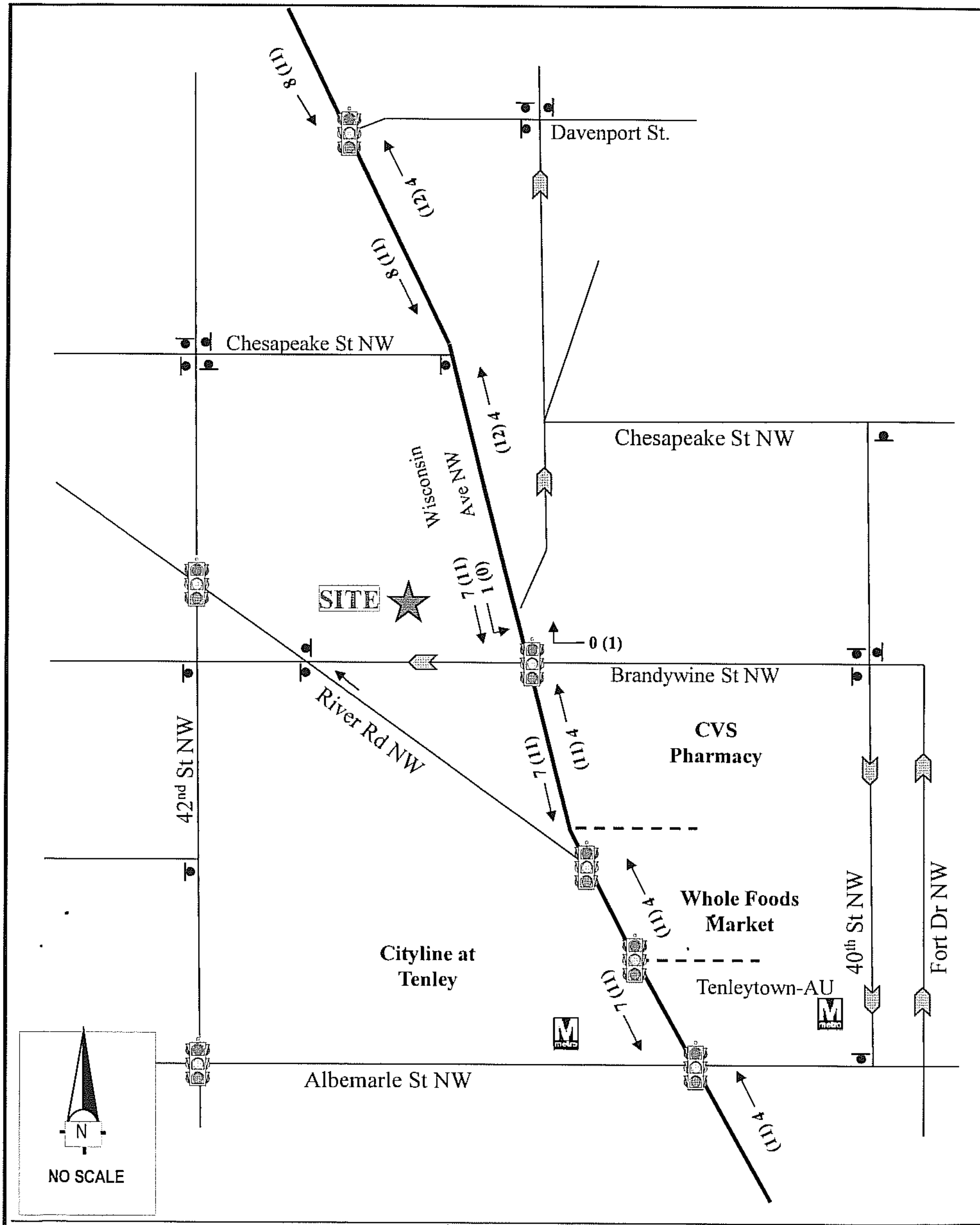
EXHIBIT 2

PROJECTED SITE TRIP ASSIGNMENT
5220 Wisconsin Avenue, NW



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Site Trip Generation and Assignment
5220 Wisconsin Ave

G-10

TRAFFIC IMPACT AND PARKING ASSESSMENT – BOARD OF ZONING ADJUSTMENT APPLICATION FOR FRIENDSHIP HOSPITAL FOR ANIMALS, NORTHWEST, WASHINGTON, D.C.

(Case No. 18435)

Prepared for:
FRIENDSHIP HOSPITAL FOR ANIMALS, INC.
4105 Brandywine Street, NW
Washington, DC 20016

- Peter Glassman, DVM, Director

Land Use Counsel:
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Prepared by:
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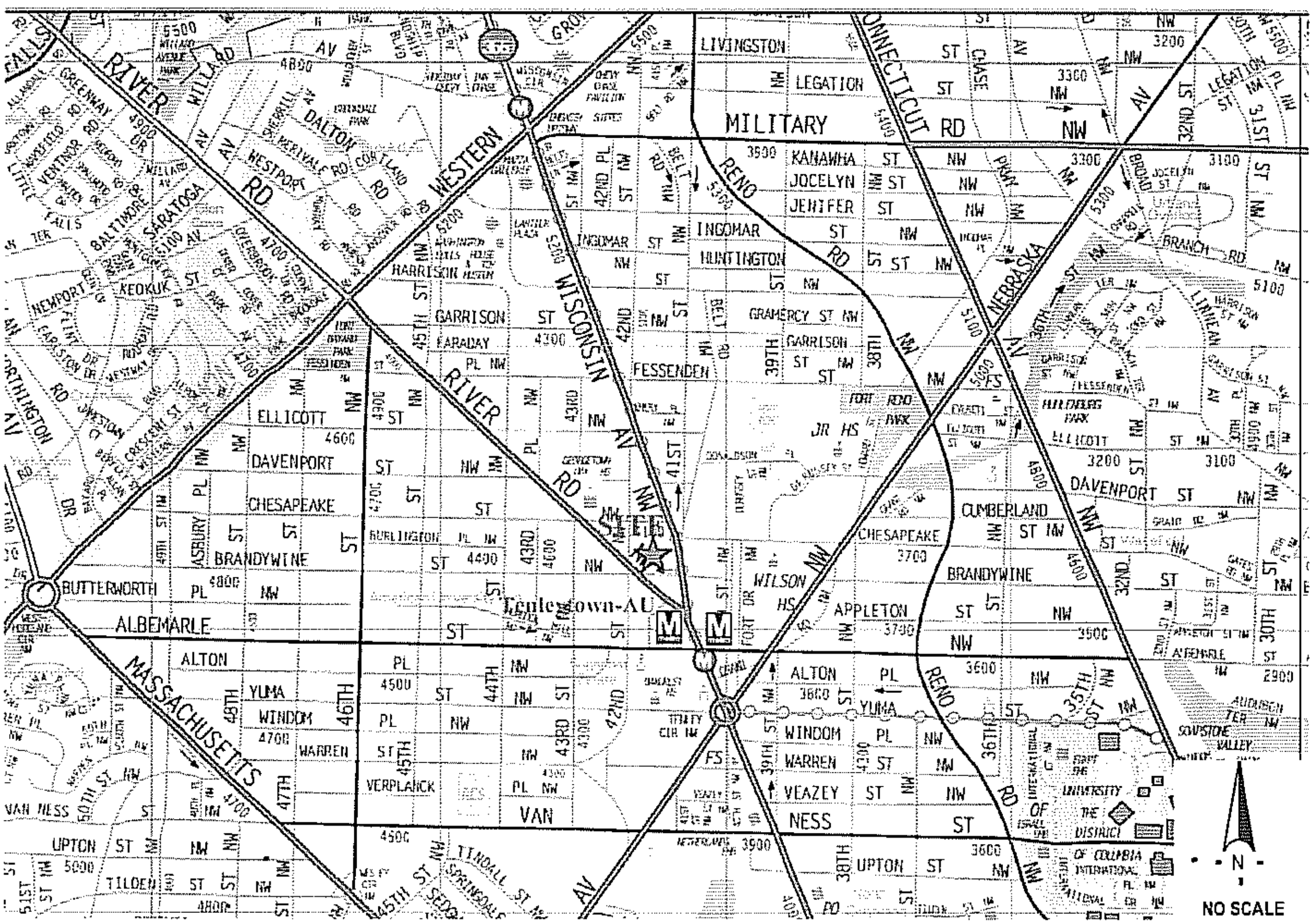
DRAFT

July 9, 2012

G-11



O. R. GEORGE & ASSOCIATES, INC. *Traffic Engineers - Transportation Planners*	**Exhibit 1: Site Location Map** **4105 Brandywine Street, Norhtwest, Washington, D.C.** **Board of Zoning Adjustment Application (Case No. 18435)**

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TABLE 8:
Summary of Client Travel Modes
(by Peak Period)

	Street System Peak		Hospital Peak	
	7:45 – 8:45 AM	5:15 – 6:15 PM	10:00 – 11:00 AM	4:00 – 5:00 PM
Personal Vehicle	15	24	20	21
Walk	0	2	4	6
TOTAL	*15*	*26*	*24*	*27*

Source: O. R. George & Associates

It is noted that during the adjacent street morning and afternoon peak hours, that nearly 100% of clients use vehicles to access the Hospital. One interesting factor of the above data is that the Hospital peaks occur at different times from the peak hours of the adjacent roadway network. This also has significant implications for parking demand. In this connection, the survey included a count of client arrivals and departures over the period of 7:00 AM to 7:00 PM. The data is presented graphically in Exhibit 8, and is discussed further in Section 4.3, dealing with this subject.

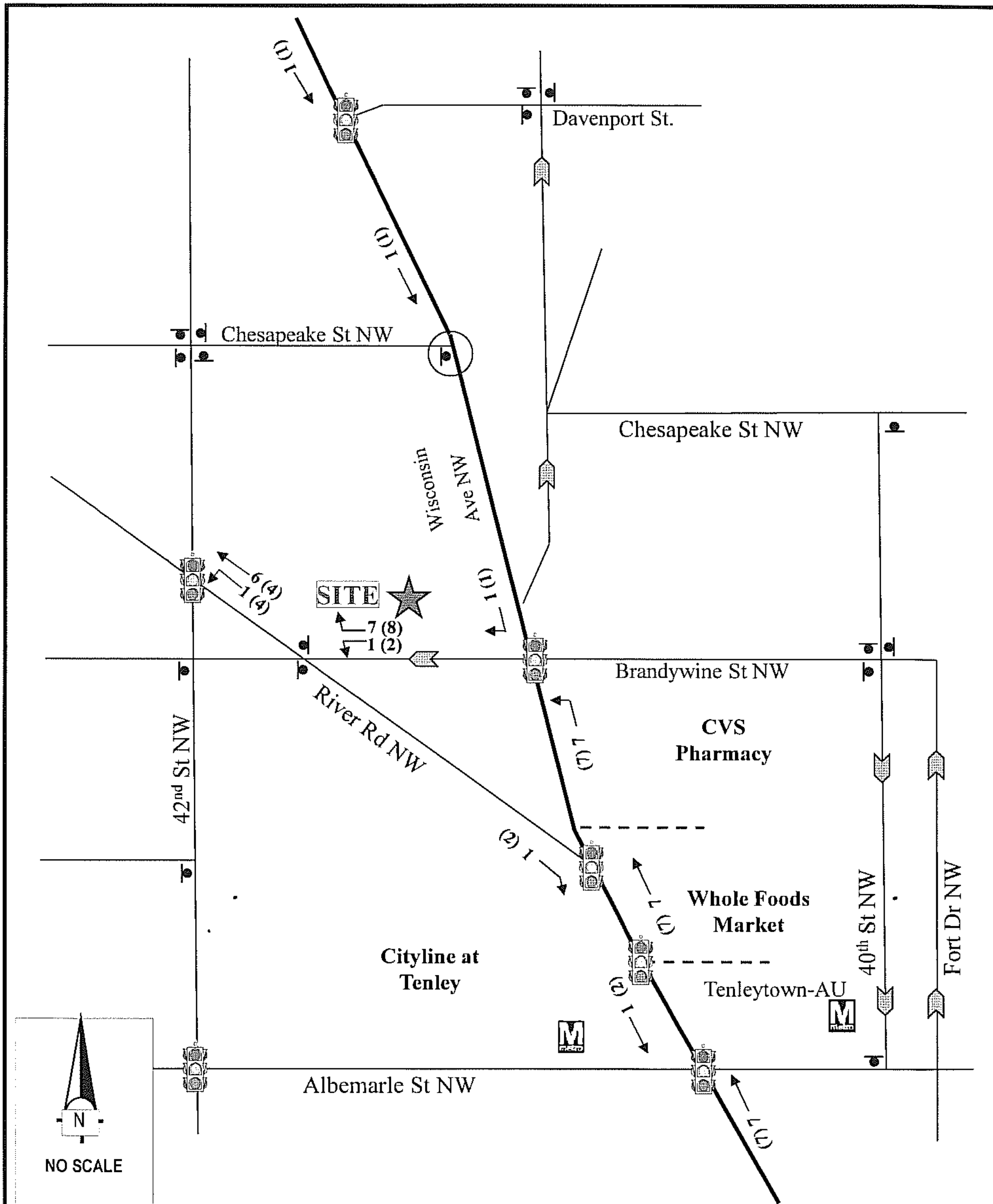
Trip Generation Considerations

As discussed earlier in this report, the Applicant's proposal does not call for any appreciable increase in staffing or client activity. Furthermore, the Applicant is amenable to conditions of approval stipulating to this effect. However, for completeness, the Applicant considered the following aspects of potential vehicle trip generation from the site.

Trip Generation Survey: The survey conducted at the site shows a vehicle trip generation of approximately ten (10) vehicles (inbound and outbound) generated during both the morning and afternoon peak hours. Considering the current 9,000 SF of the site improvements and the 60% vehicle mode split observed, this computes to the following potential vehicle trip generation:

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total
9	6	15	9	10	19

ITE Trip Generation Rates: In keeping with DDOT's requirements, the Consultant also considered trip generation rates recommended by the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (8th Ed., 2008). Veterinary hospitals are included as Land Use Code 640 (Animal Hospital/Veterinary Clinic). It is important to note that these rates are more applicable to stand-alone suburban sites, which have little or no access to public transportation services, and other non-auto travel opportunities. In addition, the ITE manual notes that the data and the derived trip rates are based on two (2) sites, one of which was in a rural location. ITE cautions that the trip rates may be unreliable and should be used with caution. Applying the ITE rates was therefore discarded as an option.



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Site Trip Generation and Assignment

Friendship Hospital for Animals

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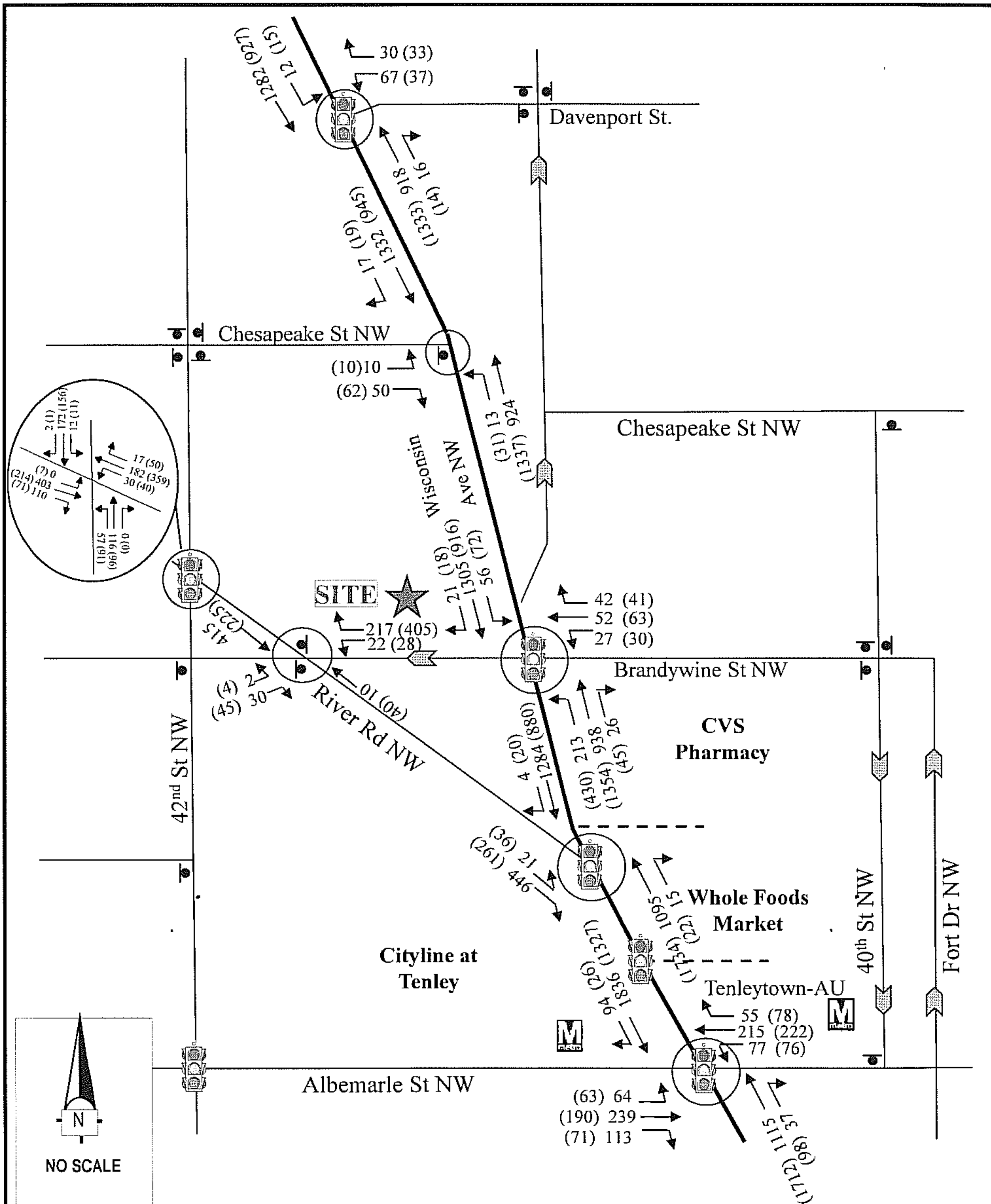


O. R. GEORGE & ASSOCIATES, INC.
Traffic Engineers - Transportation Planners

2015 Background Traffic Situation

4600 Wisconsin Avenue, Northwest, Washington D.C.

Planned Unit Development Application (No. ZC 10-23)

G-15

ATTACHMENT

H

Synchro Analysis Worksheets–
2015 Total Traffic Situation

Movement	WBL	WBR	NBT	NBR	SBL	SBT
	↙	↖	↑	↗	↘	↓
Lane Configurations	↰↱		↑↱			↰↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.95			0.91
Frt	0.96		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1725		3530			5083
Flt Permitted	0.97		1.00			0.93
Satd. Flow (perm)	1725		3530			4711
Volume (vph)	67	30	919	16	12	1284
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	73	33	999	17	13	1396
RTOR Reduction (vph)	16	0	1	0	0	0
Lane Group Flow (vph)	90	0	1015	0	0	1409
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	23.0		63.0			63.0
Effective Green, g (s)	26.0		66.0			66.0
Actuated g/C Ratio	0.26		0.66			0.66
Clearance Time (s)	7.0		7.0			7.0
Lane Grp Cap (vph)	449		2330			3109
v/s Ratio Prot	c0.05		0.29			
v/s Ratio Perm						c0.30
v/c Ratio	0.20		0.44			0.45
Uniform Delay, d1	28.9		8.1			8.2
Progression Factor	1.00		2.41			1.00
Incremental Delay, d2	1.0		0.5			0.5
Delay (s)	29.9		20.1			8.7
Level of Service	C		C			A
Approach Delay (s)	29.9		20.1			8.7
Approach LOS	C		C			A

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	50	13	925	1334	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	54	14	1005	1450	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				490	393	
pX, platoon unblocked	0.86	0.93	0.93			
vC, conflicting volume	1990	493	1468			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1647	294	1347			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	92	97			
cM capacity (veh/h)	75	651	470			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	65	349	670	580	580	308
Volume Left	11	14	0	0	0	0
Volume Right	54	0	0	0	0	18
cSH	286	470	1700	1700	1700	1700
Volume to Capacity	0.23	0.03	0.39	0.34	0.34	0.18
Queue Length 95th (ft)	22	2	0	0	0	0
Control Delay (s)	21.3	1.0	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	21.3	0.3		0.0		
Approach LOS	C					

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

H-2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱		↰	↑↱		↰	↑↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor					1.00		1.00	0.95		1.00	0.91	
Frt					0.95		1.00	1.00		1.00	1.00	
Flt Protected					0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)					1756		1770	3525		1770	5074	
Flt Permitted					0.99		0.10	1.00		0.24	1.00	
Satd. Flow (perm)					1756		188	3525		439	5074	
Volume (vph)	0	0	0	27	52	42	218	941	26	56	1309	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	29	57	46	237	1023	28	61	1423	22
RTOR Reduction (vph)	0	0	0	0	19	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	113	0	237	1049	0	61	1443	0
Turn Type				Split			pm+pt			pm+pt		
Protected Phases				6	6		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)					19.6		66.4	53.9		50.8	45.3	
Effective Green, g (s)					22.6		69.4	56.9		56.8	48.3	
Actuated g/C Ratio					0.23		0.69	0.57		0.57	0.48	
Clearance Time (s)					7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)					3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)					397		401	2006		362	2451	
v/s Ratio Prot					c0.06		c0.10	0.30		0.01	0.28	
v/s Ratio Perm							c0.31			0.08		
v/c Ratio					0.28		0.59	0.52		0.17	0.59	
Uniform Delay, d1					32.0		16.6	13.2		9.9	18.7	
Progression Factor					1.00		2.26	0.21		1.00	1.00	
Incremental Delay, d2					1.8		1.9	0.8		0.2	1.0	
Delay (s)					33.8		39.4	3.5		10.1	19.7	
Level of Service					C		D	A		B	B	
Approach Delay (s)		0.0			33.8			10.1			19.3	
Approach LOS		A			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			↑↑	↑↑↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.91	
Frt	0.87			1.00	1.00	
Flt Protected	1.00			1.00	1.00	
Satd. Flow (prot)	1619			3539	5080	
Flt Permitted	1.00			1.00	1.00	
Satd. Flow (perm)	1619			3539	5080	
Volume (vph)	21	447	0	1098	1359	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	486	0	1193	1477	11
RTOR Reduction (vph)	21	0	0	0	1	0
Lane Group Flow (vph)	488	0	0	1193	1487	0
Turn Type						
Protected Phases	2			8	4	
Permitted Phases						
Actuated Green, G (s)	32.0			55.0	55.0	
Effective Green, g (s)	35.0			57.0	57.0	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	7.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	567			2017	2896	
v/s Ratio Prot	c0.30			c0.34	0.29	
v/s Ratio Perm						
v/c Ratio	0.86			0.59	0.51	
Uniform Delay, d1	30.2			13.9	13.1	
Progression Factor	1.24			0.18	0.30	
Incremental Delay, d2	11.2			0.9	0.5	
Delay (s)	48.7			3.4	4.4	
Level of Service	D			A	A	
Approach Delay (s)	48.7			3.4	4.4	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱			↰↑↱			↑↑↱			↑↑↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.91	
Frt	1.00	0.95			0.98			1.00			0.99	
Flt Protected	0.95	1.00			0.99			1.00			1.00	
Satd. Flow (prot)	1770	1773			1803			3522			5046	
Flt Permitted	0.40	1.00			0.83			1.00			1.00	
Satd. Flow (perm)	748	1773			1516			3522			5046	
Volume (vph)	64	239	113	77	215	55	0	1118	37	0	1737	94
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	260	123	84	234	60	0	1215	40	0	1888	102
RTOR Reduction (vph)	0	2	0	0	6	0	0	2	0	0	6	0
Lane Group Flow (vph)	70	381	0	0	372	0	0	1253	0	0	1984	0
Turn Type	pm+pt			Perm								
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2								
Actuated Green, G (s)	43.0	43.0			33.8			45.0			45.0	
Effective Green, g (s)	45.0	45.0			35.8			47.0			47.0	
Actuated g/C Ratio	0.45	0.45			0.36			0.47			0.47	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	390	798			543			1655			2372	
v/s Ratio Prot	0.01	c0.21						0.36			c0.39	
v/s Ratio Perm	0.07				c0.25							
v/c Ratio	0.18	0.48			0.68			0.76			0.84	
Uniform Delay, d1	17.6	19.3			27.3			21.8			23.1	
Progression Factor	1.00	1.00			1.00			1.00			0.80	
Incremental Delay, d2	0.2	2.0			6.9			3.3			3.0	
Delay (s)	17.8	21.3			34.1			25.1			21.5	
Level of Service	B	C			C			C			C	
Approach Delay (s)		20.8			34.1			25.1			21.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	0	30	23	0	222	0	415	0	0	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	0	33	25	0	241	0	451	0	0	11	0

Direction, Lane #	EB 1	EB 2	WB 1	SE 1	NW 1
Volume Total (vph)	2	33	266	451	11
Volume Left (vph)	2	0	25	0	0
Volume Right (vph)	0	33	241	0	0
Hadj (s)	0.53	-0.67	-0.49	0.03	0.03
Departure Headway (s)	6.5	5.3	4.7	4.7	5.3
Degree Utilization, x	0.00	0.05	0.35	0.59	0.02
Capacity (veh/h)	497	601	707	739	617
Control Delay (s)	8.4	7.4	10.2	14.1	8.4
Approach Delay (s)	7.4		10.2	14.1	8.4
Approach LOS	A		B	B	A

Intersection Summary			
Delay	12.4		
HCM Level of Service	B		
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.99	
Flt Protected		0.98			1.00			1.00			0.99	
Satd. Flow (prot)		1833			1854			1809			1833	
Flt Permitted		0.85			0.98			1.00			0.56	
Satd. Flow (perm)		1586			1824			1809			1033	
Volume (vph)	57	116	0	12	172	2	0	403	110	31	186	17
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	126	0	13	187	2	0	438	120	34	202	18
RTOR Reduction (vph)	0	0	0	0	0	0	0	13	0	0	4	0
Lane Group Flow (vph)	0	188	0	0	202	0	0	545	0	0	250	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		52.7			52.7			33.3			33.3	
Effective Green, g (s)		55.7			55.7			36.3			36.3	
Actuated g/C Ratio		0.56			0.56			0.36			0.36	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		883			1016			657			375	
v/s Ratio Prot								c0.30				
v/s Ratio Perm		c0.12			0.11						0.24	
v/c Ratio		0.21			0.20			0.83			0.67	
Uniform Delay, d1		11.1			11.0			29.0			26.8	
Progression Factor		1.00			1.00			1.00			1.03	
Incremental Delay, d2		0.6			0.4			8.5			4.4	
Delay (s)		11.7			11.5			37.5			31.9	
Level of Service		B			B			D			C	
Approach Delay (s)		11.7			11.5			37.5			31.9	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	27.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0			4.0
Lane Util. Factor	1.00		0.91			0.95
Frt	0.94		1.00			1.00
Flt Protected	0.97		1.00			1.00
Satd. Flow (prot)	1700		5077			3536
Flt Permitted	0.97		1.00			0.91
Satd. Flow (perm)	1700		5077			3226
Volume (vph)	38	33	1334	14	15	929
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	36	1450	15	16	1010
RTOR Reduction (vph)	27	0	1	0	0	0
Lane Group Flow (vph)	50	0	1464	0	0	1026
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	23.0		63.0			63.0
Effective Green, g (s)	26.0		66.0			66.0
Actuated g/C Ratio	0.26		0.66			0.66
Clearance Time (s)	7.0		7.0			7.0
Lane Grp Cap (vph)	442		3351			2129
v/s Ratio Prot	c0.03		0.29			
v/s Ratio Perm						c0.32
v/c Ratio	0.11		0.44			0.48
Uniform Delay, d1	28.2		8.1			8.5
Progression Factor	1.00		2.36			1.00
Incremental Delay, d2	0.5		0.4			0.8
Delay (s)	28.7		19.5			9.3
Level of Service	C		B			A
Approach Delay (s)	28.7		19.5			9.3
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	62	31	1338	948	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	67	34	1454	1030	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				490	393	
pX, platoon unblocked	0.89	0.86	0.86			
vC, conflicting volume	1593	526	1051			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	877	285	896			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	89	95			
cM capacity (veh/h)	244	612	647			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	78	325	582	582	687	364
Volume Left	11	34	0	0	0	0
Volume Right	67	0	0	0	0	21
cSH	506	647	1700	1700	1700	1700
Volume to Capacity	0.15	0.05	0.34	0.34	0.40	0.21
Queue Length 95th (ft)	14	4	0	0	0	0
Control Delay (s)	13.4	1.7	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	13.4	0.4			0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↱		↰	↑↑↱		↰	↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor					1.00		1.00	0.91		1.00	0.95	
Frt					0.96		1.00	1.00		1.00	1.00	
Flt Protected					0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)					1767		1770	5061		1770	3528	
Flt Permitted					0.99		0.13	1.00		0.16	1.00	
Satd. Flow (perm)					1767		237	5061		294	3528	
Volume (vph)	0	0	0	30	63	40	443	1357	45	72	918	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	68	43	482	1475	49	78	998	22
RTOR Reduction (vph)	0	0	0	0	15	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	129	0	482	1521	0	78	1018	0
Turn Type				Split			pm+pt			pm+pt		
Protected Phases				6	6		7	4		3	8	
Permitted Phases							4			8		
Actuated Green, G (s)					19.6		66.4	53.9		44.0	38.5	
Effective Green, g (s)					22.6		69.4	56.9		50.0	41.5	
Actuated g/C Ratio					0.23		0.69	0.57		0.50	0.42	
Clearance Time (s)					7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)					3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)					399		531	2880		272	1464	
v/s Ratio Prot					c0.07		c0.22	0.30		0.02	0.29	
v/s Ratio Perm							c0.41			0.12		
v/c Ratio					0.32		0.91	0.53		0.29	0.70	
Uniform Delay, d1					32.3		25.2	13.3		13.1	24.1	
Progression Factor					1.00		1.91	0.23		0.60	1.00	
Incremental Delay, d2					2.1		15.8	0.5		0.5	2.5	
Delay (s)					34.4		64.1	3.6		8.4	26.6	
Level of Service					C		E	A		A	C	
Approach Delay (s)		0.0			34.4			18.1			25.3	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.91	0.95	
Frt	0.88			1.00	1.00	
Flt Protected	0.99			1.00	1.00	
Satd. Flow (prot)	1632			5085	3527	
Flt Permitted	0.99			1.00	1.00	
Satd. Flow (perm)	1632			5085	3527	
Volume (vph)	36	263	0	1737	883	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	286	0	1888	960	22
RTOR Reduction (vph)	77	0	0	0	2	0
Lane Group Flow (vph)	248	0	0	1888	980	0
Turn Type						
Protected Phases	2			8	4	
Permitted Phases						
Actuated Green, G (s)	32.0			55.0	55.0	
Effective Green, g (s)	35.0			57.0	57.0	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	7.0			6.0	6.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	571			2898	2010	
v/s Ratio Prot	c0.15			c0.37	0.28	
v/s Ratio Perm						
v/c Ratio	0.43			0.65	0.49	
Uniform Delay, d1	24.9			14.7	12.8	
Progression Factor	1.00			0.13	0.19	
Incremental Delay, d2	2.4			0.7	0.6	
Delay (s)	27.3			2.6	3.0	
Level of Service	C			A	A	
Approach Delay (s)	27.3			2.6	3.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			↔			↑↑↱			↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			0.91			0.95	
Frt	1.00	0.96			0.97			0.99			1.00	
Flt Protected	0.95	1.00			0.99			1.00			1.00	
Satd. Flow (prot)	1770	1787			1792			5045			3529	
Flt Permitted	0.38	1.00			0.87			1.00			1.00	
Satd. Flow (perm)	701	1787			1573			5045			3529	
Volume (vph)	63	190	71	76	222	78	0	1715	96	0	1330	26
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	207	77	83	241	85	0	1864	104	0	1446	28
RTOR Reduction (vph)	0	9	0	0	10	0	0	6	0	0	2	0
Lane Group Flow (vph)	68	275	0	0	399	0	0	1962	0	0	1472	0
Turn Type	pm+pt			Perm								
Protected Phases	1	6			2			4			8	
Permitted Phases	6			2								
Actuated Green, G (s)	43.0	43.0			33.8			45.0			45.0	
Effective Green, g (s)	45.0	45.0			35.8			47.0			47.0	
Actuated g/C Ratio	0.45	0.45			0.36			0.47			0.47	
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	371	804			563			2371			1659	
v/s Ratio Prot	0.01	c0.15						0.39			c0.42	
v/s Ratio Perm	0.07				c0.25							
v/c Ratio	0.18	0.34			0.71			0.83			0.89	
Uniform Delay, d1	17.8	17.9			27.6			23.0			24.1	
Progression Factor	1.00	1.00			1.00			1.00			1.12	
Incremental Delay, d2	0.2	1.2			7.4			3.5			7.0	
Delay (s)	18.0	19.0			35.0			26.5			33.9	
Level of Service	B	B			D			C			C	
Approach Delay (s)		18.8			35.0			26.5			33.9	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	0	45	30	0	418	0	225	0	0	40	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	49	33	0	454	0	245	0	0	43	0

Direction, Lane #	EB 1	EB 2	WB 1	SE 1	NW 1
Volume Total (vph)	4	49	487	245	43
Volume Left (vph)	4	0	33	0	0
Volume Right (vph)	0	49	454	0	0
Hadj (s)	0.53	-0.67	-0.51	0.03	0.03
Departure Headway (s)	6.3	5.1	4.4	5.2	5.6
Degree Utilization, x	0.01	0.07	0.59	0.36	0.07
Capacity (veh/h)	518	635	792	635	560
Control Delay (s)	8.2	7.3	13.5	11.1	9.0
Approach Delay (s)	7.4		13.5	11.1	9.0
Approach LOS	A		B	B	A

Intersection Summary			
Delay	12.2		
HCM Level of Service	B		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

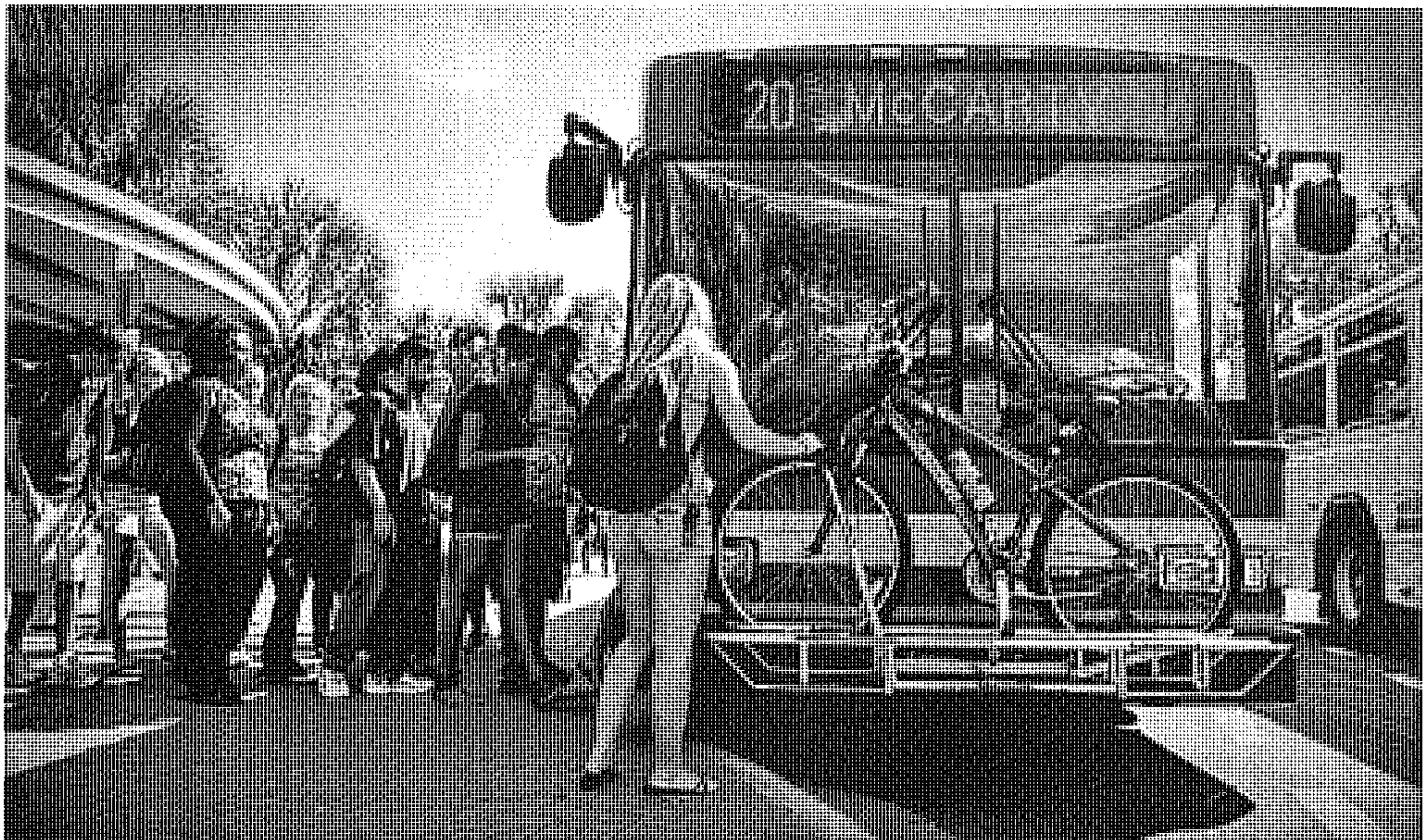
Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↰↑↱			↰↑↱			↰↑↱			↰↑↱	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.97			0.99	
Flt Protected		0.98			1.00			1.00			1.00	
Satd. Flow (prot)		1818			1855			1800			1828	
Flt Permitted		0.78			0.98			0.99			0.93	
Satd. Flow (perm)		1458			1824			1777			1711	
Volume (vph)	91	96	0	11	156	1	7	214	71	43	369	49
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	104	0	12	170	1	8	233	77	47	401	53
RTOR Reduction (vph)	0	0	0	0	0	0	0	16	0	0	6	0
Lane Group Flow (vph)	0	203	0	0	183	0	0	302	0	0	495	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)		54.2			54.2			31.8			31.8	
Effective Green, g (s)		57.2			57.2			34.8			34.8	
Actuated g/C Ratio		0.57			0.57			0.35			0.35	
Clearance Time (s)		7.0			7.0			7.0			7.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		834			1043			618			595	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.10			0.17			c0.29	
v/c Ratio		0.24			0.18			0.49			0.83	
Uniform Delay, d1		10.6			10.2			25.6			29.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.4			0.6			9.7	
Delay (s)		11.3			10.5			26.2			39.6	
Level of Service		B			B			C			D	
Approach Delay (s)		11.3			10.5			26.2			39.6	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

ATTACHMENT

I

Supporting Material and Reference for Research on Reduction in Vehicle Miles of Travel



Transportation and the New Generation

Why Young People Are Driving Less and What It Means for Transportation Policy

FRONTIER GROUP U.S. PIRG

I-1

Transportation and the New Generation

Why Young People Are Driving Less and What It Means for Transportation Policy

Frontier Group

U.S. PIRG Education Fund

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Implications for Transportation Policy

America's transportation policies have long been predicated on the assumption that driving will continue to increase. The changing transportation preferences of young people—and Americans overall—throw that assumption into doubt. Transportation decision-makers at all levels—federal, state and local—need to understand the trends that are leading to the reduction in driving among young people and engage in a thorough reconsideration of America's transportation policy-making to ensure that it serves both the needs of today's and tomorrow's young Americans and moves the nation toward a cleaner, more sustainable and economically vibrant future.

Transportation infrastructure decisions have long-lasting implications. Highways, transit lines and sidewalks have useful lives measured in decades—and sometimes centuries. To make the best of limited resources, transportation planners must anticipate trends 10, 20 or 40 years into the future.

Since World War II, the vision the U.S. government has had of the future has been one of consistent increases in driving. In 2000, for example, the U.S. Energy Information Administration projected that by 2010, the total number of vehicle-miles traveled on America's roads would reach 3.4 trillion.[80] However, in 2010, decreased driving rates caused the vehicle-miles traveled to total just less than 3 trillion miles—a difference of 11 percent.[81]

The shift away from six decades of increasing vehicle travel to a new reality of slow-growing or even declining vehicle travel has potentially seismic implications for transportation policy. It calls into question the wisdom of our current transportation investment priorities as well as the sources of revenue used to pay for those priorities. It creates both a multitude of new opportunities as well as difficult challenges.

The data in this report suggest a possible future in which:

- The demand for transportation overall stagnates due to the substitution of mobile technologies for some transportation services and the emerging consumer preference for walkable, less auto-dependent forms of development.

I-3

- The demand for automobile transportation—both absolutely and as a share of overall transportation demand—stagnates or declines due to the improved competitive position of transportation alternatives on measures of quality, convenience and cost.

- The demand for transportation alternatives increases for the same reasons.

It is much too early to conclude that this vision of the future will become reality. But it is at least as plausible a vision of the future as one based on an expectation that the trend toward ever-increasing amounts of driving that has characterized the last 60 years will resume.

Such a shift in future transportation trends would shake the foundations of transportation policy-making. For example, to meet the demand for alternative transportation, federal, state and local governments would need to prioritize investment in public transportation, bike lanes, sidewalks and other transportation alternatives. To meet the demand for walkable neighborhoods in close proximity to transit, government officials would need to ensure that land-use and transportation policies were aligned to support the development of these communities. To compensate for the declines in gas-tax revenues, decision-makers would need to find alternative sources of funding for road and bridge maintenance or boost the gasoline tax to levels that may further discourage driving.

Again, it is far too early to say that this vision will become reality. As the old saying goes, it's difficult to make predictions, especially about the future.

But policy-makers and the public need to be aware that America's current transportation policy-making and financing structure is fundamentally out-of-step with both the nation's current needs and the expressed preferences of growing numbers of Americans. It is well beyond the scope of this report to address the policy implications of shifting youth transportation trends in detail—though we hope to return to this issue in future work. It is clear, however, that we urgently need to consider a new vision for transportation policy that reflects the needs of 21st century America.

I-4

The Trends: Today's Youth Drive Less and Use Transportation Alternatives More

During the second half of the 20th century, the total number of miles driven in America steadily increased. Then, at the turn of the century, the trend changed. Americans now drive less than we did in the mid-2000s—both in absolute and per-capita terms.

Today's youth are leading this decline in vehicle-miles traveled. Some young people do not drive at all hecause they either do not own a car or do not have a license. Those who do drive are taking fewer trips and driving shorter distances. At the same time, more young people are instead choosing to walk, bike or take public transportation, or to stay connected using mobile technologies instead of traveling.

Today's Youth Drive Less

Between 1970 and 2004, the number of vehicle-miles traveled per capita increased by an average of 1.8 percent annually, and the total number of vehicle-miles traveled increased by an average of 2.9 percent annually.[3]

Since the mid-2000s however, the number of miles driven in America—both total and per capita—has fallen. Since 2004, the average number of vehicle-miles driven per capita has decreased by 6 percent. (See Figure 1.) And since 2007, when Americans' total vehicle travel peaked, the total number of miles driven in America has fallen 2.3 percent. (See Figure 2.) Americans as a whole drove fewer miles in 2011 than they drove in 2004.[4]

Today's youth lead the decline in vehicle-miles traveled. While Generation X (age 35-49) and the Baby Boomers (age 50-65) have seen modest drops in the distance they travel in cars, Generation Y (age 16-34) is now driving significantly less than young generations have in prior decades. According to the National Household Travel Survey (NHTS), between 2001 and 2009, the average number of vehicle-miles traveled by young people (16 to 34-year-olds) decreased from 10,300 miles to 7,900 miles per capita—a drop of 23 percent.[7] The National Household Transportation Survey shows that this is the result of:

I-5

Figure 1: Vehicle-Miles Traveled Per Capita Peaked in 2004[5]

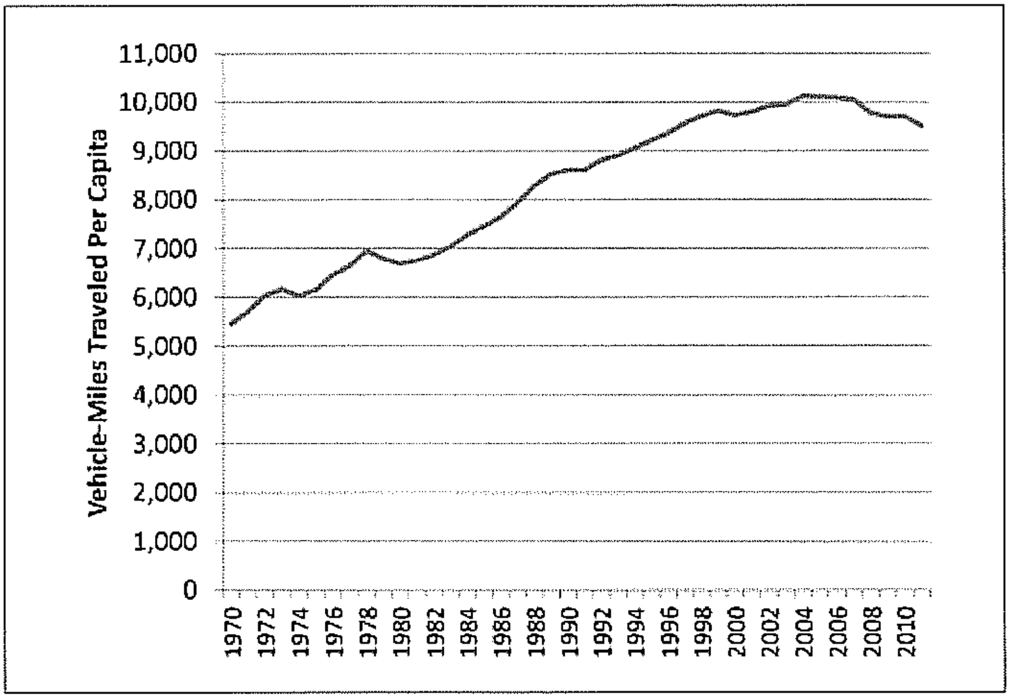
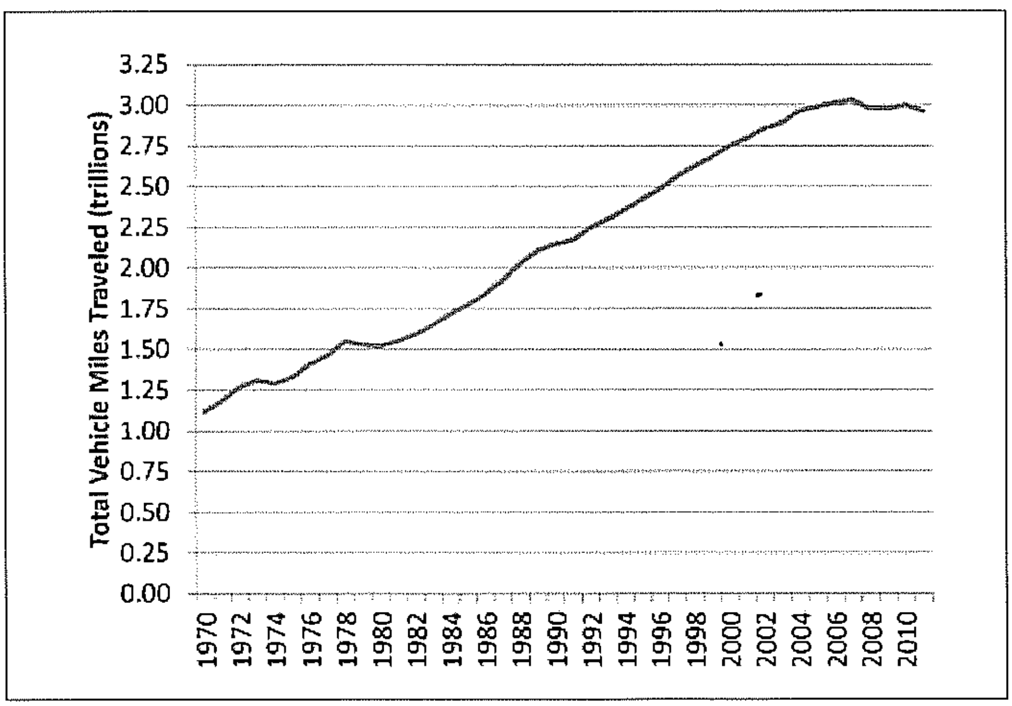


Figure 2: Total Vehicle-Miles Traveled Peaked in 2007[6]



I-6

- *Fewer car trips per driver*: In 2009, young drivers took 15 percent fewer trips than young drivers took in 2001.[8]

- *Shorter car trips:* In 2009, the average trip length traveled by young drivers was 9.5 miles—a 6 percent drop from 10.1 miles, the average trip length in 2001.[9]

In addition, fewer young people are on the road in the first place because fewer hold licenses. According to the Federal Highway Administration, from 2000 to 2010, the percentage of 14 to 34-year-olds without licenses increased from 21 percent to 26 percent.[10] For more information on licensing rates for young people, see page 11.

Today's Youth Increasingly Use Transportation Alternatives

Young people are traveling less in cars, but they are increasingly using alternative forms of transportation. According to the NHTS, the average young person took 25 more trips and traveled 117 more miles on alternative transportation (including biking, transit, and walking) in 2009 than the average young person traveled in 2001.[14]

Biking: In 2009, 16 to 34-year-olds as a whole took 24 percent more bike trips than they took in 2001, despite the age group actually shrinking in size by 2 percent.[15]

Walking: In 2009, 16 to 34-year-olds walked to destinations 16 percent more frequently than did 16 to 34-year-olds in 2001.[16]

Young People in Other Countries Have Also Reduced Their Driving

Decreased driving among young people is not unique to America, but rather a phenomeuou becoming characteristic of developed countries. In a 2011 study by the University of Michigan Trausportation Research Institute, researchers found that of the 14 countries studied other than the United States, seven developed countries—Sweden, Norway, Great Britain, Canada, Japan, South Korea and Germany—showed a recent decrease in the percentage of young people with driver's licenses. The other seven countries—Finland, Israel, The Netherlands, Switzerland, Spain, Latvia and Poland—many of them less developed, showed an increase in the percentage of young people with licenses.[11]

In addition to licensing rates, driving rates have also fallen in many developed countries. Vehicle-miles traveled have either leveled off or fallen in Western European countries including Belgium, Denmark, France, Germany, Italy, The Netherlands and Spain.[12] Although data on driving rates for young people are not easily available, the German Income and Expenditure survey shows that the share of young households without cars in Germany increased from 20 percent to 28 perceut from 1998 to 2008.[13]

ATTACHMENTS

A. DDOT CTR and Correspondence

B. Turning Movement Count Data

C. Synchro Analysis Worksheets – Existing Traffic Situation

D. DDOT Crash Data

E. Parking Availability Survey – Memorandum

F. PUD Site Pavement Markings and ADA Ramps

G. Background Traffic Conditions

H. Synchro Analysis Worksheets – Total Traffic Situation (2015)

I. Reference - Reduction in Vehicle Miles of Travel

J. Reference - Trends in Transit Oriented development in Urban Areas

K. Extracts from Testimony by the Smart Growth Organization

L. Case Study - Relationship between Off-Street Parking and Car Ownership

I-8

Public transit: Between 2001 and 2009 the annual number of passenger miles per capita traveled by 16 to 34-year-olds on public transit increased by 40 percent.[17] Young people have played a significant role in driving up the total number of passenger miles traveled on transit. From 2001 to 2009, the annual number of passenger miles traveled increased by 10 billion, more than 60 percent of which came from 16 to 34-year-olds.[18]

According to the Bureau of Transportation Statistics, heavy rail (subway) and light rail ridership across the country has been steadily increasing over the last decade, even as automobile travel has stagnated.[19] (See Figure 3.)

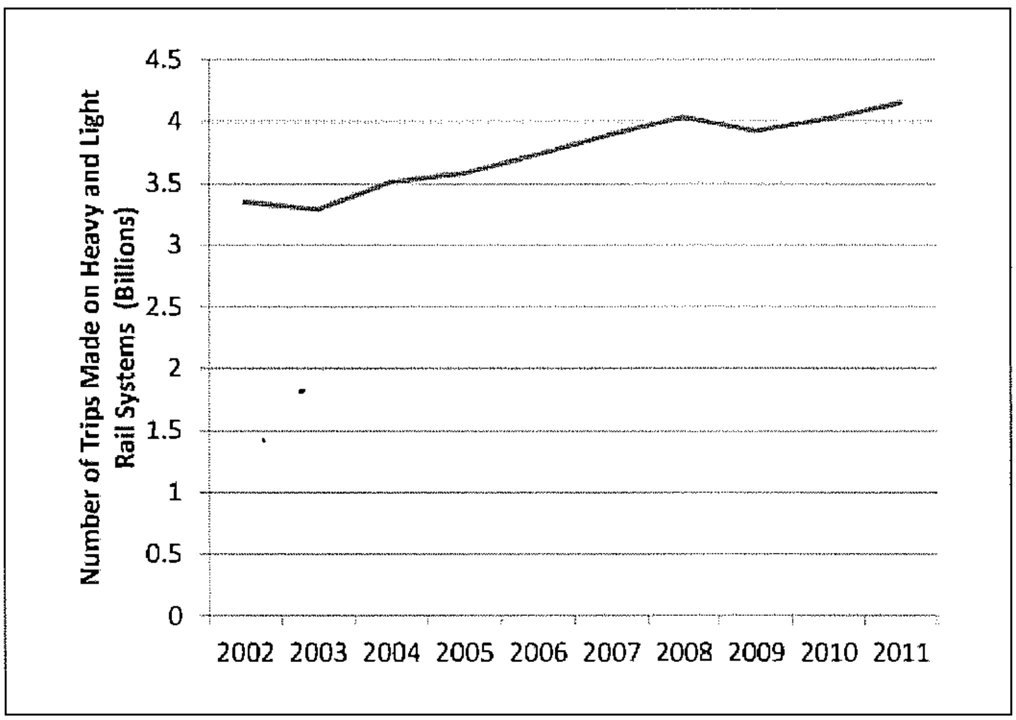
Today's Youth Avoid or Postpone Buying Cars and Acquiring Driver's Licenses

Not only are many Americans—including young Americans—making fewer and shorter trips in their cars, but an increasing number are not driving at all—either because they do not have a car or do not have a license.

The Number of Vehicles on the Road Has Stagnated

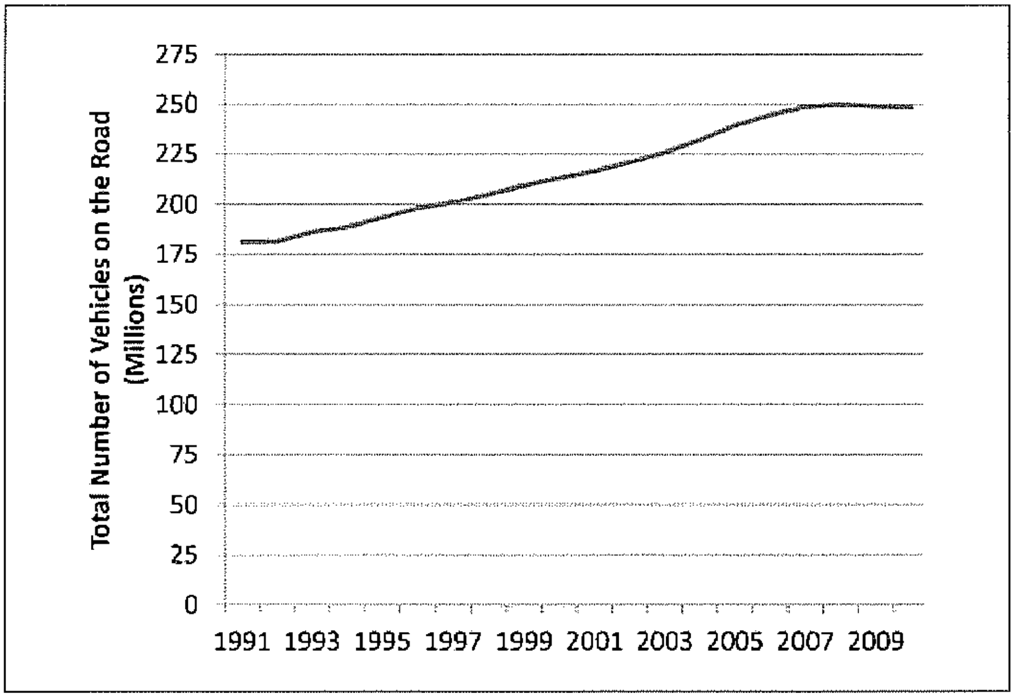
People are putting fewer cars on American roads. Every year, several million Americans buy and register new automobiles

Figure 3: Heavy and Light Rail Ridership Increases Across the US[20]



I-9

Figure 4: The Total Number of Vehicles On the Road Has Plateaued Since 2006[22]



while several million simultaneously retire old ones. Historically, the number of automobiles on the road has steadily increased because newly registered automobiles outnumbered retired automobiles. Since 2006, the number of vehicles on America's roads has hit a plateau after decades of growth.[21] (See Figure 4.)

The Number of Young Licensed Drivers Has Decreased

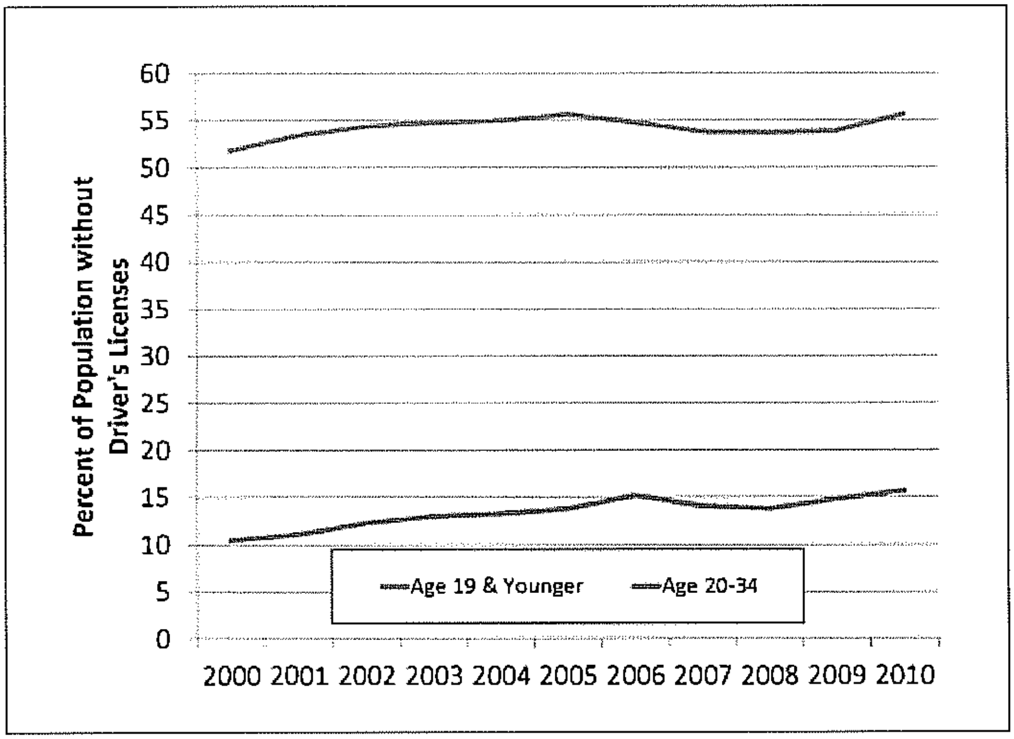
A growing number of young Americans do not have driver's licenses. According to the Federal Highway Administration, from 2000 to 2010, the share of 14 to 34-year-olds without a license increased from 21 percent to 26 percent.[23] (See Figure 5.)

The increase in young people without driver's licenses is not limited to age groups affected by Graduated Drivers Licensing (GDL) laws (age 14-19). (For more information on GDL laws, see page 22.) The percentage of people between the ages of 20 and 34 without licenses has also increased. The number of 20 to 34-year-olds without a driver's license increased from 10.4 percent to 15.7 percent between 2000 and 2010. (See Figure 5.)

Americans Move to More Urban Areas with More Transportation Alternatives

Many Americans, including young people, are seeking to move to places that have alternative transportation options. For decades, people migrated from central cities to distant suburbs and exurbs where transportation was dependent on automobiles. Recently, however, there has been an increase in movement back to densely-

Figure 5: The Share of Young People Without Driver's Licenses Has Increased[24]



populated urban cores where people can walk, bike and take public transit instead of driving. There has also been an increase of interest in walkable, mixed-use developments in suburban communities. Some people living in these communities, especially those in Generation Y, do not own cars. According to the Bureau of Transportation Statistics, households in urban areas are 2.5 times more likely not to possess a car than households in rural areas.[25]

The rising demand for homes in centrally-located locations is being met through the revitalization of aging urban areas in major cities as well as the reconstruction of downtown and single-use (e.g. retail) areas into mixed-use walkable and transit-oriented developments in smaller cities. This transformation has already taken place in several cities. Arlington County in Virginia, Bellevue in Washington, and Pasadena in California have all replaced strip malls with mixed-use developments that have access to public transit.[26]

This increase in downtown construction is clearly demonstrated by trends in building permits. In the decades before this shift back to downtown areas, the number of building permits in exurbs and far-lying suburbs dramatically outnumbered the number of permits in inner cities. However, a recent study by the U.S. Environmental Protection Agency of 50 metropolitan areas shows that the proportion of building permits in central city neighborhoods has significantly increased in recent years. In nearly half of the metropolitan areas, the share of new residential building permits in urban core communities dramatically increased. For example, in the New York City metropolitan area, the central city's share of residential building permits increased from 15 percent in the early 1990s to 48 percent in the mid-

I-11

2000s.[27] Over the same time period, the central city's share of building permits in Chicago increased from 7 percent to 27 percent and the central city's share in Portland, Oregon, increased from 9 percent to 26 percent.[28]

The increased demand for property in inner cities and mixed-use suburban areas is also evident in housing prices. Whereas in the late 1990s, the most expensive housing was in the outer-lying suburbs, today's most expensive housing has shifted to walkable inner cities and inner suburbs. According to a real estate analysis by Christopher Leinberger, professor at the Graduate Real Estate Development Program at the University of Michigan, some of today's most expensive neighborhoods in metropolitan areas are walkable multi-use communities, such as Capitol Hill in Seattle, Virginia Highland in Atlanta, and German Village in Columbus (OH)—communities that were all dilapidated 30 years ago.[29]

The age groups leading this migration to inner-cities and mixed-use suburbs are those nearing retirement (Baby Boomers) and young adults (Generation Y). Many baby boomers, who no longer need multi-room houses and backyards (because their children have moved out), have begun moving to homes that are smaller and in locations that have easily-accessible societal amenities.[30] Young adults have begun leaving their parents' homes to move into "vibrant, compact, and walkable communities full of economic, social, and recreational activities," according to the Brookings Institution.[31] An estimated 77 percent of young people (age 18-35) plan to live in urban centers.[32]

ATTACHMENT

J

Supporting Material for Research on Transit Oriented Developments in Urban Areas

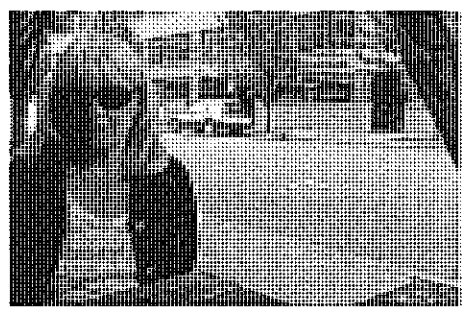
No Room For Parking At Many New Apartment Complexes

OPB | Aug. 15, 2012 1:12 a.m. | Updated: Aug. 15, 2012 6:17 a.m. | Portland, Oregon

Apartment buildings are going up all over Portland, this summer. The construction is a positive trend in the sluggish economy. But nearly two-thirds of the recent projects are going up without any parking places.

This isn't a reflection of a big change in policy – it reflects a change in demand.

Patricia Cates lives in downtown Portland. She's single, and works for a local non-profit. Evan Burton is married and lives on Portland's east side. He teaches college classes and works weatherizing homes.



Patricia Cates

They live in apartments, and neither of them owns a car.

"Many of the people here don't drive, and least our immediate neighbors that we know of, do not drive. And we do not drive, no," Burton says.

"I love my lifestyle. I don't like to get pushy, but when people ask me about it, I explain how much less expensive it is, and less stressful it is, and how I lost 20 pounds the first year, because I was walking everywhere," Cates says.

Burton and Cates have one other thing in common: the buildings they live in don't have parking places.

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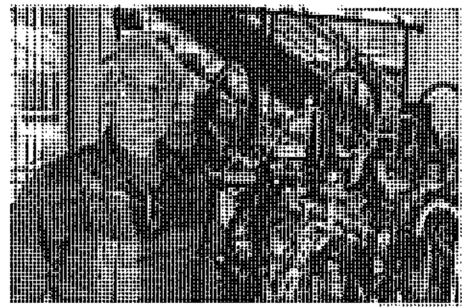
Developers are betting that many more Portlanders like them are looking to rent new apartments.

One of those developers is Dave Mullens with the Urban Development Group. He opened the Irvington Garden in a close-in Northeast Portland neighborhood last year. It's 50 units with no parking places.

"The cost of parking would make building tbis type of project on this location unaffordable," Mullens says.



Mullens calls the difference "tremendous."

"Parking a site is the difference between a $750 apartment and a $1,200 apartment. Or, the difference between apartments and condos," he says.

Mullens says the current market is friendlier for affordable rental apartments than for condominiums.

He says the Irvington Garden filled within weeks of opening, and has remained that way. He says the majority of renters don't have cars – though some do, and park on the street.

When builders want a project approved, they come to this city permit center run by the Portland Bureau of Development Services.

Planner Tim Heron says the new push to build without parking fits within current zoning – and is consistent with the city's planning goals.

"Portland wants to grow up in terms of its density – and parking cars, meaning making the space and creating the space for them to park on a site can eat up a lot of space. So we've seen an increase in developers wanting to exercise a no-parking option, and use that space for units or for retail."

Of 40 apartment building projects to be filed in the last year and a half, 25 offer no parking.

Heron says the projects have to fit the places they're in. Just a few blocks from the permit center is a 282-unit building for Portland State University students.

"This is downtown. This is where the highest intensity of the zoning is for the city – and it's there for a reason, because it's well-served by transit," Heron says.

Heron says 16 stories with no parking wouldn't fly anywhere else.

And in several parts of the city, neighborhood activists are hoping to stop projects that are even a quarter that size.

J-2

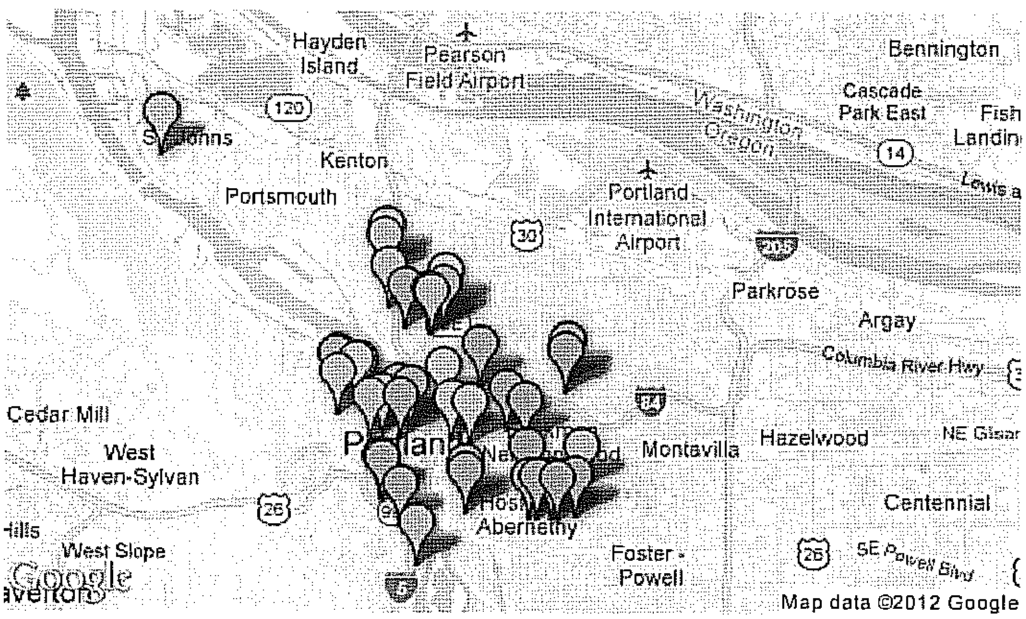
Al Ellis, president of the Beaumont-Wilshire Neighborhood Association, cites a proposed four-story apartment complex on Fremont Street.

Ellis says the building would be out of character with the neighborhood. And residents worry that without parking provided, tenants would jam the side streets with parked cars.

Planners and developers say successful, no-parking projects have two things in common: frequent transit service, and a nice, walkable neighborhood.

Ellis agrees that his is a fun neighborhood. But he doubts the bus service is good enough to attract people without cars to rent the 50-or-more units.

Ellis says he invited the project's developers to meet the neighbors. He warned them the proposal wouldn't be popular.



"And they came to the community meeting, and there were hundreds of people there. It was standing room only, and it was a real hornet's nest. They learned that the community really – it pushed a button in our neighborhood."

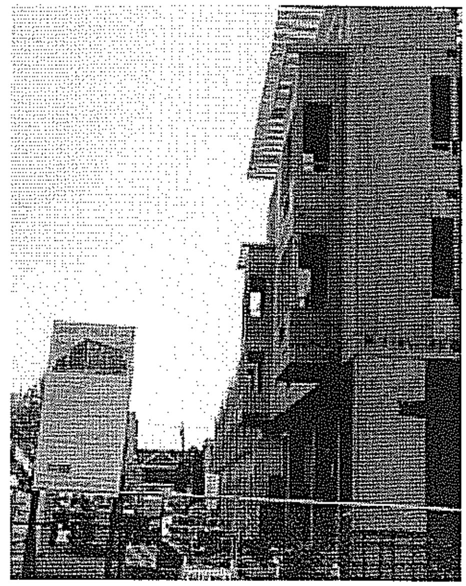
The Fremont Street proposal is not one of the 40 projects to come before the city recently. There's no formal application yet. Ellis says it's a work-in-progress.

"They came into the meeting saying we've already made some concessions. We decided that we will include retail. We decided we will have less units, and some of them will be larger than 400 square feet. Still, the parking issue was still unresolved."

Ellis says he's meeting with the developers this week to talk about further changes.

J-3

Conflicts between developers and neighbors are flaring up all over Portland. A project on North Williams is facing an appeal hearing this week. People in the Richmond neighborhood are worried about multiple projects along Southeast Division.



And Evan Burton – the apartment dweller who doesn't have a car – says recent construction has split his Northeast neighborhood: renters of apartments vs. owners of houses.

"Younger apartment dwellers, it's really a non-issue – many of whom do prefer to commute by bicycle or by public transit. Homeowners who live in the neighborhood are concerned."

Burton says he's heard some specifics from neighbors.

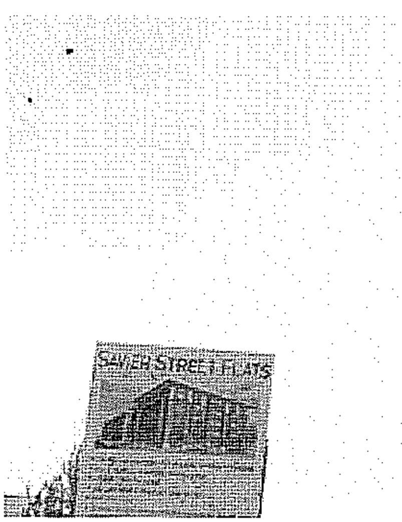
"The personal anecdotes I've heard have to do with elderly relatives coming to visit, or driving into the neighborhood, and having to park a block or two away, and/or fears about that."

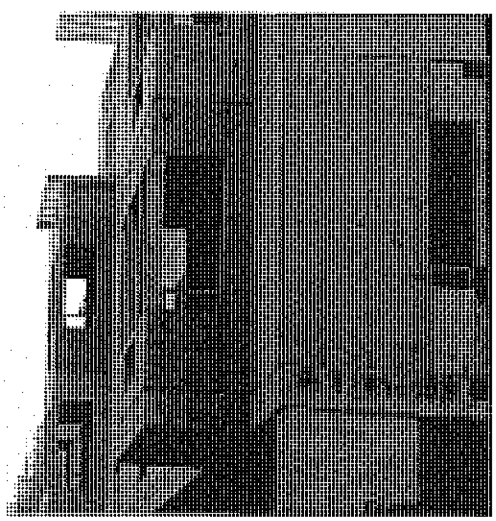
Ellis with the Beaumont Neighborhood says homeowners aren't the only ones worried about where visitors will park. He says businesses along Fremont are already suffering a parking crunch approaching that of the city's poster child for the problem: Northwest 23rd Avenue.

Portland's Planning and Sustainability Bureau recently announced it's begun a parking study. Ellis hopes that will lead to changes in the zoning code.

But developer Dave Mullens doubts Portland will do anything to back away from its goal of establishing dense, urban neighborhoods.

APARTMENT PARKING ISSUES





View Slideshow »

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Sources for this story came from OPB's Public Insight Network.

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ATTACHMENT

K

Extracts from
Testimony by the Smart Growth Organization

COALITION FOR SMARTER GROWTH

Testimony before
the D.C. Zoning Commission regarding:

SUPPORT for Case No. 08-06-2 (Comprehensive Zoning Regulations Rewrite: Parking)
By Cheryl Cort, Policy Director
July 31, 2008

Please accept these comments on behalf of the Coalition for Smarter Growth, a regional organization based in the District of Columbia focused on ensuring transportation and development decisions are made with genuine community involvement and accommodate growth while revitalizing communities, providing more housing and travel choices, and conserving our natural and historic areas. In addition to serving on the 2006 Comprehensive Plan task force, I fully participated in the Office of Planning work group that helped shape the proposed parking regulations. I am pleased to testify in full support of these proposed parking amendments. These revisions affirm what is best about our neighborhoods and city and help chart a course for a more environmentally sustainable and economically vibrant and inclusive city.

1958 Future vision of D.C.: Expressways, universal car ownership, the demise of transit

At the time that our city instituted its zoning code in 1958, urban planners of the era, including Harold Lewis, who wrote the new zoning plan for the city, envisioned a very different future. The Lewis plan cited the need to require off-street parking for all new development hoping for "...the eventual removal of curb parking and the subsequent freeing of the traffic arteries."

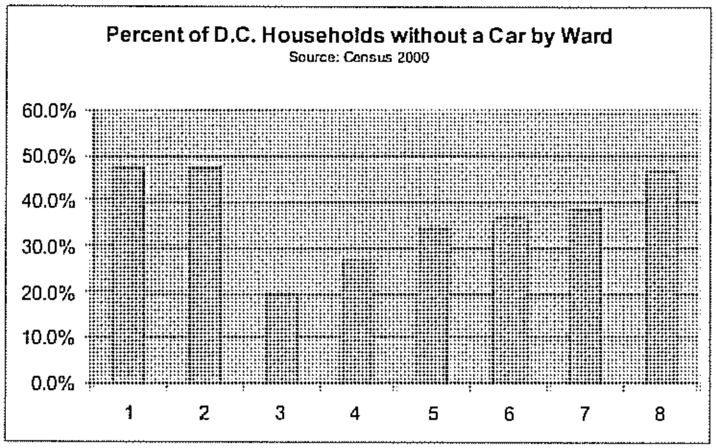
Lewis anticipated:

- the demise of public transit as a major mode of travel;
- universal car ownership;
- a network of expressways ringing downtown and crisscrossing neighborhoods;
- razing of old buildings to make way for needed parking lots and garages.

Given these trends, or perceived trends, Lewis called for the: "adaptation of the physical structure of the city to new forms of living...Inability to adapt to new forms will almost inevitably lead to its economic decay....Life in a metropolitan city had come to be dominated by the ownership of the automobile."

Today's reality – D.C. is a transit-oriented city where 20 – 50% of households do not own cars.

The future vision of the 1950s did not come to pass. Cities that relied on walking, transit and bicycling did not grow obsolete. In fact, D.C.'s vitality might best be credited to its many compact historic walkable neighborhoods and the rebirth of its transit system. Metrorail was built with the money allocated for the planned freeway system. Today, transit ridership is a major form of access for D.C. residents and workers. One third of D.C. workers ride transit, 11% walk, and 1.2% bicycle to work. D.C. has the second highest non-driving commute rate in the county; and the second highest walk to work rate. Automobile ownership is far from universal – 37 percent of D.C. households don't own a car. According to the 2000 Census, Wards 2, 1 and 8 have the most households who do not own a car at 47 percent (see chart). In Logan Circle, 38 percent of residents walk all the way to their jobs. Far from universal, car ownership is one of many transportation options for D.C. households.



The 2006 Comprehensive Plan is a major departure from the 1958 vision of our city. Rather than viewing rowhouse neighborhoods as obsolete, the 2006 Comprehensive Plans affirms the qualities of these historic neighborhoods as something to preserve and enhance.

The 2006 Comprehensive Plan promotes alternatives to single passenger automobiles and recognizes that the city's planning efforts around Metro stations have focused on responding to our region's growth by guiding "growth of the city in a way that minimizes the number and length of auto trips generated," and affirms working to "reduce household expenses on transportation by providing options for "car-free" (or one car) living." Unlike the 1950s vision, the Comprehensive Plan sees a vision of investing in new transit service, improving walking and bicycling, and better balancing the use of our public rights of way.

The Comprehensive Plan also puts a premium on growing an inclusive city. The plan lays out an ambitious set of policies and practices to make housing more affordable to the large share of moderate and low income families in our city who face steep cost burdens for housing. Statistics about our city demonstrate that we remain transit-oriented and that a large share of households save money by not owning a car and relying on transit. Parking requirements burden housing with extra costs that many households cannot afford to pay. Parking requirements also displace space that might have been used for homes or living space. Sadly, building required parking often means that those who do not own cars are subsidizing the rent for those who do – which is likely to mean those with less income are subsidizing those with higher incomes.

The damage done by parking minimums and lack of maximums

Parking requirements have been a major culprit in undermining historic building and street forms. If a hurricane knocked down my U Street rowhouse block tomorrow, it would be illegal to rebuild because few of the rowhouses on my block have off-street parking. The 1958 minimum parking requirements often disrupt continuous sidewalks in rowhouse neighborhoods with curb cuts, driveways and garages. The removal of parking requirements will legalize our historic sidewalk-oriented rowhouse neighborhoods. (see attached photos)

Urban design problems caused by parking requirements:

- Force curb cuts that take away parking as a shared on-street resource and privatize it;
- Curb cuts and driveways across sidewalks prioritize the public space for the use of private vehicles, degrading pedestrian safety and comfort;
- Added curb cuts add conflicts for pedestrians on the sidewalk and bicyclists and vehicles traveling in the streets as new points of entering vehicles need to be watched;
- Curb cuts remove on-street parking which exposes the sidewalk directly to moving traffic – and

K-2

reduces the buffer for pedestrians on the sidewalk;

- Removed on-street parking can increase vehicle speeds;
- Space for parking often consumes space that could have been living space or more productive uses.

Parking minimums and the absence of parking maximums have led to many lost opportunities for more affordable housing or commercial space in redeveloping neighborhoods. I have witnessed the revision to a development plan that eliminated affordable housing for families in order to add more parking for cars to meet minimum parking requirements. This planned housing was steps away from the U Street Metro station. Two blocks away, a new residential building on the 1300 block of U Street – the Ellington – can't rent the parking spaces that it built at a 1:1 ratio and is advertising to the public to rent spaces.

On-street parking management is the main concern of D.C. car owners – this is the purview of DDOT

Off-street parking is often underutilized because its costs are reflected in the prices charged to users ($40,000 purchase price, $200 per monthly rental). The substantial inventory of vacant off-street parking supply in new buildings in Columbia Heights and U Street appear to have little effect on the demand for free on-street parking. Requiring off-street parking will not resolve the conflict over the expectation about the availability of free street parking for residents. To address concerns about the availability of street parking, DDOT needs to better manage the curbside. DDOT is piloting some programs to do this. The pilots seek to ensure better availability of parking for residents while discouraging outsiders from hunting for free parking in residential neighborhoods. We will work with DDOT to expand these programs to other neighborhoods facing similar conflicts over how on-street parking is managed.

Other key provisions of the parking regulations:

Maximums: While eliminating parking minimums is the most important change in regulations, instituting maximums where appropriate protects and enhances the city's competitive advantage as a transit-accessible, walkable, bikable place. Metro stations and other high density high transit corridors are places where maximums would be appropriate. The lightly used $47 million Tax Increment Financed DC USA parking garage at the Columbia Heights Metro station is an example of the need to both eliminate minimums and institute maximums. The 1,000-space garage received a variance from the minimum required, yet the amount built was far above what was appropriate for the high density site in a transit-rich neighborhood where 70% of households don't own cars.

Car sharing: We support these requirements. Car sharing is an important new tool that bridges the gap for households which only sometimes need a car. It is cheaper than owning a car for the occasional user. Car sharing makes efficient use of costly space in compact neighborhoods. Studies on car sharing show that 40% of members give up their cars or decide not to purchase one. One shared car replaces 15 privately owned cars on average. I can personally attest to selling my seldom-used car when car sharing came to my neighborhood.

Bicycle parking: We support these requirements but ask that the commission consider the refinements proposed by the Washington Area Bicyclist Association.

Prohibition of curb cuts: We support relief from any parking requirement where a curb cut is prohibited.

Flexibility in parking requirements: We support these provisions because often zoning relief is given through the BZA but nothing is required in return. This is a more systematic way to provide flexibility while also generating significant public resources to provide transportation benefits to the neighborhood.

We expect these funds will be used to improve transit, walking and bicycling facilities and will work with DDOT ensure this. We also support the guidance to the BZA in the case of a variance.

Shared parking: Allowing for shared parking is a critically important provision because costly parking spaces are often built even if underutilized parking exists nearby. This provision makes efficient use of expensive off-street parking resources.

Landscaping requirements for parking lots: D.C. has long needed improvements to parking lot landscaping requirements. We believe the proposed requirements were carefully developed and represent national best practices. They will be a significant improvement to existing standards and the poor conditions of existing parking lots in the city.

In conclusion, we urge you to adopt these proposed regulations. We believe this proposal fulfills the intention of the 2006 Comprehensive Plan and builds on the strength of our city as we prepare for a future of rising demand to live and work in efficient, convenient, walkable, transit-accessible communities.

Thank you for your consideration.

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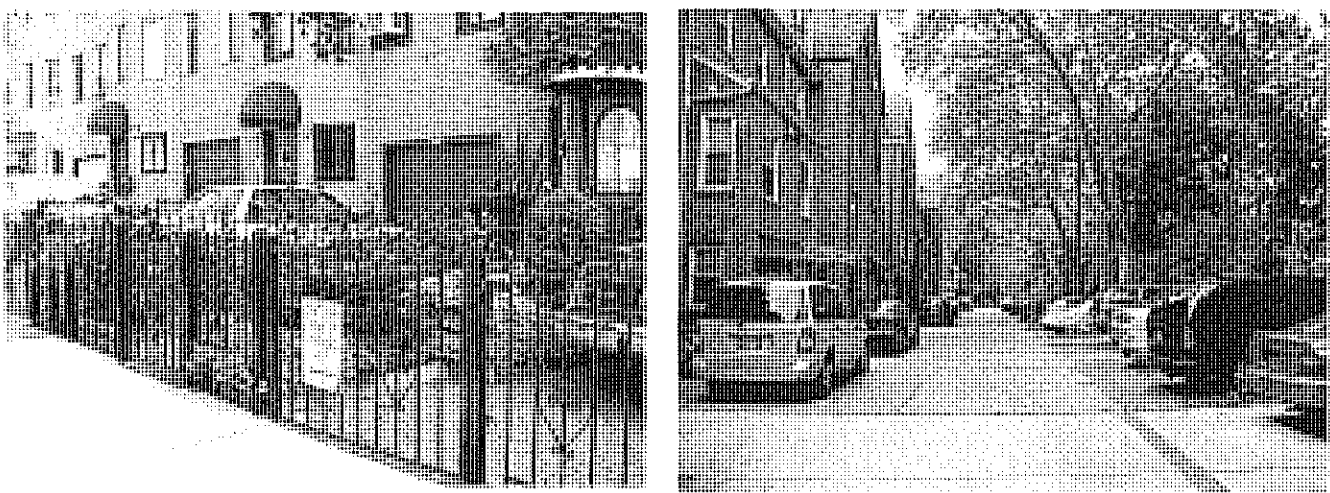
ATTACHMENT

L

Supporting Material and Research on Relationship between Off-Street Parking and Car Ownership

Guaranteed Parking – Guaranteed Driving:

Comparing Jackson Heights, Queens and Park Slope, Brooklyn shows that a guaranteed parking spot at home leads to more driving to work.



Prepared for Transportation Alternatives

October 2008

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John Kaehny
Sustainable Transportation Consultant

L-1

Does a guaranteed private parking spot induce more driving?

Introduction

Suburbanizing the City[1] showed that New York City zoning regulations encourage car ownership, and increase overall driving by New York City residents. In this report we compare the neighborhoods of Jackson Heights, Queens with Park Slope in Brooklyn. We show that the presence of guaranteed, off-street, parking at home results in a larger share of car owners choosing to drive to work. New York City zoning regulations require new residential buildings to include off-street parking for some or all residents thus contributing to increases in driving to work. **The findings in this report strongly suggest that New York City zoning regulations promote driving to work, even when a viable transit option exists.**

Indicators such as income, car ownership, density, government employment, and the difference between drive and transit times to the central business district (CBD) predict a higher share of auto commuting by Park Slope residents. **Yet Jackson Heights residents are 45% more likely to drive to work in the Manhattan CBD and 28% more likely to commute by car in general.** Notably, Jackson Heights sends 23% fewer commuters to the Manhattan CBD than Park Slope, but 13% more auto commuters. In this report we show why Jackson Heights residents are more likely to drive.

The report is organized into the following sections: *Demographics, Car Ownership, Government Employment* and *Commute Behavior* in which we use census data to compare the two neighborhoods; *Transit Access* and *CBD Travel Times* in which we look at differences in access to the Manhattan CBD; Parking in which we document the differences in off-street parking for the two neighborhoods; and finally, we present our conclusion explaining the difference in likelihood of driving to work.

We show that there is significantly more off-street parking in Jackson Heights and that this difference likely accounts for a higher share of car owners driving to work from there. We also find evidence that contradicts the premise that middle class families will not move to New York City if accessory parking is not required in new housing. Both Jackson Heights and Park Slope are considered solidly middle class yet, because most buildings pre-date City parking requirements, they contain far less parking than required in new buildings by the City Planning commission. In 2007, Park Slope was named one of America's "Ten Great Neighborhoods" by the American Planning Association[2] despite an **off-street parking/dwelling unit ratio eight times lower** than that required for new housing there by City Planning. Similarly, Jackson Heights attracts many middle class families with an **off-street parking/dwelling unit ratio four and a half times lower** than that required by the zoning code.

The analysis presented here is compelling but also specific to the two neighborhoods studied. It would have to be supplemented with additional fieldwork and analysis before drawing citywide conclusions.

[1] Weinberger et al. 2008. Suburbanizing the City, New York, NY http://www.transalt.org/files/newsroom/reports/suburbanizing_the_city.pdf (accessed October 1, 2008)

[2] American Planning Association. 2007. Great Places in America: Neighborhoods http://www.planning.org/greatplaces/neighborhoods/2007/parkslope.htm (accessed October 1, 2008)

Study Area

We selected Jackson Heights, which was identified by the City as a high auto-use "hot spot"[3], and Park Slope a roughly comparable neighborhood with respect to auto ownership, number of households and employed residents, and access to the Manhattan central business district (CBD). The study area boundaries are illustrated below in Figure 1.

Demographics, Car Ownership, Government Employment and Commute Behavior

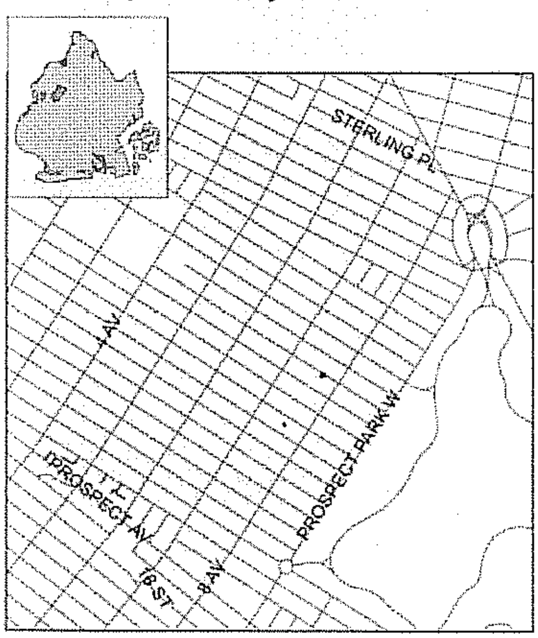
Jackson Heights' population is larger than Park Slope's, but the two neighborhoods have almost the same number of households and employed residents. Park Slope households are more likely to own at least one car, 42% of them do compared with 39% in Jackson Heights. But Jackson Heights car owners are more likely to own multiple vehicles, 13% of them do as opposed to only 11% in Park Slope. These and other differences are shown in Table 1.

As the table shows, Jackson Heights residents are 28% more likely to commute by auto (23% versus 18%) and Jackson Heights accounts for more auto commuters to the CBD than Park Slope, despite having a smaller number of residents who work in the CBD. Jackson Heights sends 23% fewer workers to the Manhattan CBD but 13% more drivers. Thus, **Jackson Heights residents are 45% more likely to drive to work in the CBD than Park Slope residents.** The percentage of Jackson Heights CBD commuters who drive is relatively low, compared with Queens as a whole, but significantly higher than Park Slope.

The primary predictors of mode choice are income, auto ownership, density[4] and travel time differences between competing modes. Higher income and higher levels of auto ownership are associated with higher auto use while higher density is typically associated with better transit alternatives and therefore lower auto use. These relationships suggest that Park Slope, with higher income, higher rates of auto ownership and lower density would have a greater share of auto commuters. Travel time differences are discussed in the next section.

In New York City another critical factor is government employment. A 2006 study[5] showed that government workers,

Park Slope, Brooklyn



Jackson Heights, Queens

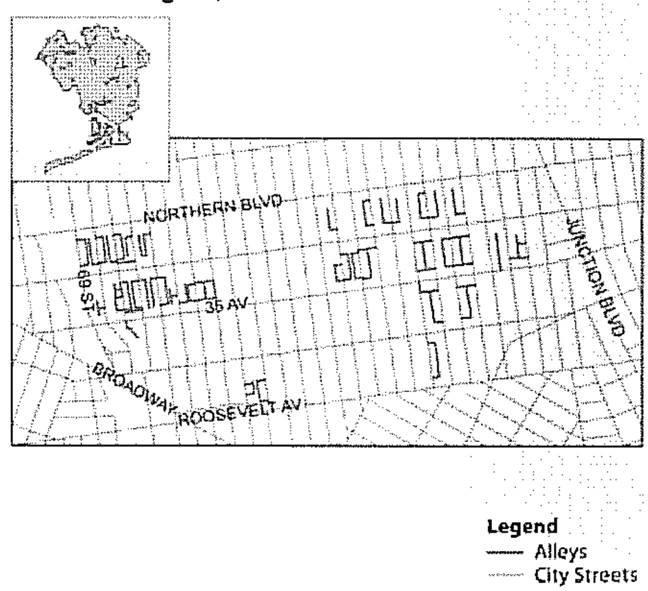


Figure 1. Study Area Boundaries

[3] The Jackson Heights neighborhood boundary identified as a driving hotspot included additional area to the north. For this analysis we restrict the area to the census tracts bounded by the Brooklyn-Queens Expressway, Northern Boulevard, Junction Boulevard, and Roosevelt Avenue.

[4] Density and auto ownership, though, are also highly correlated with each other.

[5] Schaller, Bruce. 2006. *Necessity or Choice? Why People Drive in Manhattan.* New York, NY http://www.transalt.org/files/newsroom/reports/schaller_Feb2006.pdf (accessed October 1, 2008)

L-3

Table 1. Neighborhood Characteristics

	Jackson Heights[1]	Park Slope[1]
Demographics		
Population	71,186	53,078
Occupied housing units	24,900	24,360
Average household size	2.9	2.2
Area (square miles)	0.73	0.93
Population per square mile	97,515	57,073
Household per square mile	34,110	26,194
Median household income[2]	$39,566	$60,711
Home ownership (% of households)	27%	34%
Vehicle ownership		
Vehicles owned	11,625	11,875
Vehicles per employed resident	0.37	0.38
Households with at least one vehicle	39%	42%
Households with multiple vehicles	13%	11%
Commuting behavior		
Employed residents	31,190	31,619
Drive or carpool to work	7,029	5,300
Percent auto share	23%	18%
Residents employed in CBD	12,824	16,481
Drive or carpool to CBD	1,004	885
Percent auto share to CBD	7.8%	5.4%

Source: US Census Bureau, Census 2000. Tables P1, P51 H6, H7, H44

[1] Jackson Heights is defined as the census tracts bounded by the Brooklyn-Queens Expressway, Northern Boulevard, Junction Boulevard, and Roosevelt Avenue. Park Slope is defined as the whole census tracts bounded by Fourth Avenue, Sterling Place, Prospect Park (or 8th Avenue south of 16th Street), and the Prospect Expressway. While Flatbush Avenue is the more traditional boundary of Park Slope, census tracts north of Sterling cross Flatbush into Prospect Heights.

[2] Median household income is estimated by using the weighted average of the median incomes of the census tracts in each neighborhood. Median household income for New York City was $38,293 in 1999. Source US Census Bureau, Census 2000.

due to their parking privilege, are twice as likely as other city residents to commute to the Central Business District by auto. If Jackson Heights had more government employees, that could explain higher auto commuting. But in comparing the two neighborhoods, we found Park Slope residents are half again more likely to work for the government than are Jackson Heights residents. This suggests that more Park Slope residents would have government parking privileges and they would thus be more likely to commute by car.

CBD bound commuters are more likely than commuters to other parts of the city to use transit, Thus, a higher percentage of CBD bound commuters would result in lower auto use and the higher rate of commuting to the Manhattan CBD by Park Slope residents could result in the lower rate of auto commuting overall.

To test the relative effects of these factors we developed a mode choice probability model. See Appendix A for a technical description. The model estimates tell us that for every $1,000 increase in income commuters are 1% more likely to commute by car; people who own their own homes are 44% more likely to commute by car[6]; but people who work in Manhattan are 85% less likely to commute by car and if you work for the government your odds of commuting by car increase by 25%. As noted above, the study *Necessity or*

Table 2. Percent of Neighborhood Residents Employed in Local, State and Federal Government

	New York City	New York State	Federal	Total
Jackson Heights	6.3%	1.2%	2.4%	9.9%
Park Slope	10.3%	3.2%	1.8%	15.3%

Source: US Census Bureau, Census 2000. Table P51

[6] We include homeownership to improve the explanatory value of the model.

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Table 3. Travel Time in Minutes: Jackson Heights and Park Slope to Midtown and Downtown Manhattan

	Park Avenue @ 42nd Street			Wall Street @Broadway		
	Automobile	Transit	Ratio	Automobile	Transit	Ratio
Jackson Heights[1]	23	40	1.7	35	57	1.6
Park Slope[2]	25	42	1.7	17	35	2.1

Source: Google Maps; Hopstop.com
[1]Measured from 37th Avenue and 79th Street
[2] Measured from 7th Avenue and 3rd Street

Choice? Why People Drive in Manhattan estimates government employees are twice as likely to commute by car[7].

Based on income, auto and home ownership, government employment and percentage of commuters to Manhattan[8], and assuming other things equal, the model predicts that Park Slope residents would be 5%[9] more likely to commute to work by car. Yet in practice Jackson Heights residents are 28% more likely to commute to work by car.
ployment centers are shown in Table 3.

The travel times to midtown are about the same from each neighborhood and by each mode. Most important for mode choice analysis, though, the ratio of transit to drive times are also the same. This suggests no additional benefit to either neighborhood of using one of the modes disproportionately. On the other hand, while travel time to Wall Street is higher for Jackson Heights residents, the ratio of transit to driving travel time for Park Slope residents is higher. This difference in ratios would suggests that, other things being equal, there is a greater advantage to Park Slope residents in driving to Wall Street than there would be for Jackson Heights residents. With the higher relative advantage to driving from Park Slope we would expect a higher rate of driving from Park Slope.

Based on these ratios we conclude that travel time is not a factor in explaining the CBD mode choice differences. Because we use a sketch model based on census data, rather than a travel demand model based on household travel survey data, we exclude further treatment of travel time.

Having ruled out several possible explanations we turned our study to the built environment and, in particular, to the availability of parking.

Parking

After considering the effects of income, auto ownership, government employment, transit access, and CBD travel time, we looked to other supply characteristics of the auto/

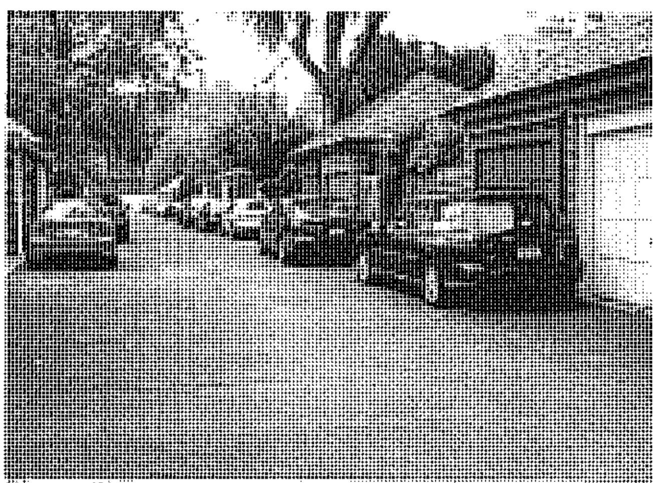

Figure 2. Typical Alley in Jackson Heights

[7] Schaller, Bruce 2006. Op. Cit.
[8] Due to data restrictions we use all Manhattan, not just CBD, commuters.
[9] The result is based on 25 simulations.

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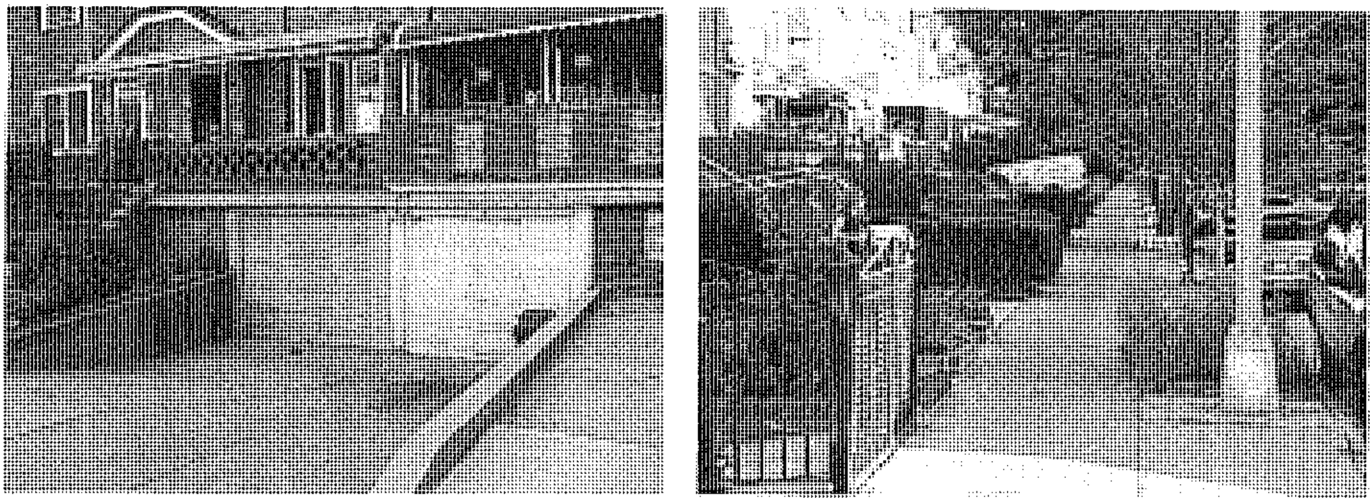


Photos: Kyle Sundin

Figure 3. Typical block front for 1, 2 or 3 family streets in Jackson Heights

highway/street system to explain why, despite our expectation that Park Slope residents would be 5% more likely than their Jackson Heights counterparts to commute by car, it is the case that Jackson Heights residents are 28% more likely to commute by car and 45% more likely to commute to the CBD by car. To understand both curbside and off-street parking we surveyed the two areas. Our survey efforts and their results are described below in the respective sections on curbside and off-street parking. Surveying the neighborhoods brought us to a powerful explanation. With alleyways and a newer housing stock, Jackson Heights has more than twice as much off-street residential parking per residence, it has more than 2.5 times as much off-street parking per car-owning household and over six times as much "on-site" off-street parking, i.e. in driveways or on-site garages.

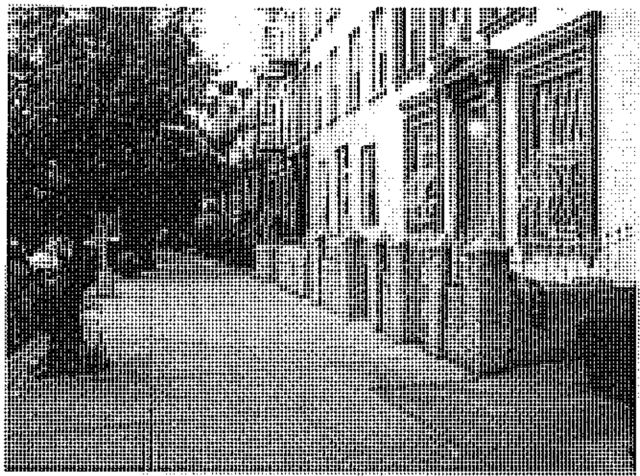
Curbside Parking

To estimate the on-street parking we selected a systematic, stratified random sample of streets in each of the neighborhoods. Appendix B provides details of the analysis. From our survey we estimated slightly more than 17 spaces per short, or avenue, block and 47 and 64 spaces per long, or street, block in Jackson Heights and Park Slope respectively.

Park Slope, the larger of the two areas has approximately 10,200 curbside spaces. Jackson Heights has about 6,900. On a per area basis that is 11,000 and 9,400 curbside spaces per square mile for Park Slope and Jackson Heights respectively. The limited number of driveways in Park Slope yields more curbside parking, amounting to an average of 36% more cars parked per street.

Photos: Rachel Weinberger

Figure 4. Typical block front for 1, 2, or 3 family streets in Park Slope




Photos: Rachel Weinberger

Figure 5. Typical block front for 1, 2, or 3 family streets in Park Slope (left image) and more recent construction in Park Slope with driveways and garages (right image).

Off-Street

As shown in Table 4 and illustrated in Figures 2 and 3, Jackson Heights also has close to six times as much convenient, "on-site" residential parking per car owning family — much of it in local alleyways or front driveways. Jackson Heights has 22 times more alleyways than Park Slope. Figure 1, on page 2, illustrates the extent of alleys in each neighborhood. Figures 2, 3, 4 and 5 show typical streetscapes in each neighborhood.

In Jackson Heights, 62% of the housing units were constructed in 1940[10] or more recently. Arguably this is since the onset of the auto-age, as marked by the 1939 World's Fair. By comparison only 21% of the housing units in Park Slope have been built since 1940. **More important, though, 16% of the housing units in Jackson Heights, as opposed to 8% of the units in Park Slope, have been constructed since the 1961 zoning revision, thus they have been built with driveways and garages.** Subsequent zoning revisions require parking be provided at the rear or side of a residence, instead of in-front.

To estimate off-street parking, we used the Department of City Planning's Primary Land Use Tax Lot Output (PLUTO) database for 2007 and the Department of Consumer Affairs (DCA) list of licensed garages. We supplemented these data with field work and information from the commercial website BestParking.com.

PLUTO lists the garage area in square feet for every lot in the city, except for small buildings. Importantly, the database does not include garage or driveway area for one, two or three family buildings. For these small buildings we estimated off-street parking. The sampling strategy is outlined below and detailed in Appendix C. There are some discrepancies between the PLUTO data and actual conditions. To correct for that, we sampled garages in the neighborhoods. We found that in Park Slope about 10%, and Jackson Heights 2%, of the square footage reported as garages or surface lots have been converted to construction sites. Records for a few lots indicated errors in recording. Where our field survey confirmed the actual condition, we adjusted these figures accordingly. We matched PLUTO data against the DCA database to distinguish between residential and commercial lots. We found discrepancies in the DCA database as well. For example, addresses were given for parking lots but did not have any parking space associated with them. The most egregious example we encountered was a listing for a 530-space lot in Park Slope; our field survey found no lots at or near the indicated address.

Having established the square footage allocated to garage space for buildings of four units or greater we converted that square footage to parking spaces by assuming that one space requires 300 square feet. We excluded commercial accessory parking, for example hospital parking lots, which are used by customers and employees.

To account for garages and driveways, associated with small buildings we conducted a field survey of approximately 10% of the small (one-, two- and three-family) residential buildings in each neighborhood. A systematic sample of groups of blocks in each neighborhood was chosen. Surveyors then counted the number of parking spaces in garages and driveways of the small buildings in those blocks. Conservatively we assumed there was no tandem parking, i.e. driveways leading to one car garages were counted as just one space. If there was any doubt as to the use of a space we did not include it in our count. These data were used to estimate

[10] 1940 is the first year the Census began collecting data on the age of the country's housing stock

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Table 4. Off-street parking spaces in Jackson Heights and Park Slope

Type of parking	Jackson Heights	Park Slope
Parking lots	605	885
Driveways, garages and alleyways	3,030	535
Total off-street	3,635	1,420
Curbside	6,855	10,200
Total parking	10,490	11,620
Dwelling Units (from Table 1)	24,900	24,360
Off-street parking space per Dwelling Unit	14%	6%
Off-street space per car owning HH	37%	14%
"On-site" off-street per car owning household*	31%	5%
Total parking per car owning household	1.08	1.13

*"on site" refers to garage or driveway parking space on the same property or adjacent alleyway parking spaces "off-site" which refers to nearby garage parking.

garage and driveway parking for all small buildings in the two neighborhoods.

When all types of off-street parking are considered, Jackson Heights has 3,635 off-street parking spaces and Park Slope has 1,415 – a difference of 156%. Table 4, summarizes off-street parking by category in these neighborhoods.

As Table 4 shows there are 1.08 and 1.13 parking spaces per car owning household in Jackson Heights and Park Slope respectively. With more overall spaces in Park Slope we would expect Park Slope residents to find parking more easily which would ease the time cost or burden associated with auto use. Again we would expect this to contribute to more auto use by Park Slope residents.

But it is private parking that tips the scales. Jackson Heights has more than six times as many off-street parking spaces in attached garages and driveways or in back alleys. Our survey of 160 one- two- and three-family buildings in Jackson Heights found 275 off-street parking spaces, or 1.09 spaces per unit in small buildings. In Park Slope, our survey of 559 small buildings found 64 off-street parking spaces, or .05 spaces per unit in small buildings. Applying these factors to the neighborhoods we estimate 0.14 off-street spaces per dwelling unit in Jackson Heights and 0.06 spaces per dwelling unit in Park Slope. Given the rates of auto ownership listed in Table 1 and vacancy rates for the neighborhoods we estimate that **37% of Jackson Heights residents who own cars have access to off-street parking as compared to only 14% of Park Slope residents, and 31% have access to on-site, private spaces compared with 5% in Park Slope.**

These results indicate that off-street parking could well account for Jackson Heights' higher auto share for CBD commutes and could very likely explain the higher auto mode share to other destinations. Furthermore, because the level of auto ownership is similar in the two neighborhoods, these results suggest that ease of access is critical in determining whether a car will be used for commuting. With few attached garages and driveways, car owners in Park Slope generally have to search for curbside parking or pick up and drop off their car at a nearby, or distant, lot. Parking is much easier and, therefore less costly in time in Jackson Heights.

With on-site space available to 31% of car owning residents of Jackson Heights compared to 5% of car owning Park Slope residents, Jackson Height residents are six times more likely to park their cars in attached garages and driveways. For them there is no search time, no valet notification, and no additional time to walk home.

Conclusion

Suburbanizing the City showed how the economics of required off-street parking shifted the decision of whether or not to own a car. Here we show how the economics of off-street parking effect the decision of when people use their cars.

Jackson Heights, is a relatively dense neighborhood that is well served by transit. We compare it with Park Slope, a slightly lower density area with higher auto ownership, higher income, a higher incidence of government employees and a worse transit to drive time ratio for access to lower Manhattan. These indicators all have a positive effect on auto mode share, meaning as income, percent government employees and car ownership increase more people will drive to work; as density decreases, auto mode share will also increase. At the same time, Park Slope has a greater share of its employed residents commuting to Manhattan which is negatively associated with auto mode shares meaning that auto mode share decreases with increased commuters to the CBD, thus offsetting the higher expectation of auto commuters. Controlling for these factors, our model predicts Jackson Heights and Park Slope commuters will drive at roughly equal rates with Park Slope commuters about 5% more likely to drive. But Jackson Heights residents, with over two times more off-street parking and six times more driveway parking, are 28% more likely to drive in general and 45% more likely to commute by auto to the CBD.

The mode a commuter selects is a function of the relative advantages of each option[11]. When parking is scare or hard to find at either or both ends of the trip the relative advantage of transit exceeds the advantages of automobile use. The use of parking placards is an example of how easing parking at the destination end of a trip changes the relative advantages of driving versus using transit[12]. The presence of a guaranteed off-street parking spot –particularly if it is on site—eases parking at the origin end of a trip and greatly increases the likelihood that people in New York City will use cars even for trips that are well served by transit.

Finally, it is worth noting that the additional off-street parking found in Jackson Heights comes most frequently at the expense of green space as front and rear yards are converted to alleys or driveways in order to accommodate cars.

[11] Ben-Akiva Moshe and Steven Lerman. 1985. Discrete Choice Analysis: Theory and its Application to Travel Demand, The MIT Press, Cambridge Massachusetts; London, England.
[12] Schaller, Bruce 2006 op. cit.

Appendix A: Mode Choice Sketch Model

Introduction:

The most frequently used model specification for binary choices –i.e. an individual's choice between two possible outcomes—is the binary logit model. In this example we use the binary logit model to study the choice that employed New York City residents make with respect to what mode they use for their journey to work. We divide the choices between those who drive and those who do not drive. The former category includes carpoolers and people who drive alone; the latter category includes all others, hence, people who walk to work, take transit, bicycle or even work at home. The model predicts a probability that a household will select one option/outcome over the other, when aggregated over a neighborhood those probabilities yield the percentage of the population who choose each option.

For this research our objective was to both explain and predict mode choices at a sketch planning level. A mode choice model used in travel demand forecasting or facilities planning would include additional variables that were not available for this study. Given the limited data, we do not expect a level of accuracy required for travel forecasting but we expect the model to yield insight into the factors affecting mode choice and the direction (either amplifying or depressing) of that effect.

Data and Model Specification

Estimation

We estimated several models using the Public Use Micro Sample (PUMS) of the United States Census. The PUMS data is a 5% sample of the Census Bureau's long form responses. We are interested in how people who live outside of Manhattan travel to work whether they work in the Manhattan CBD or elsewhere in the city or region. We used only records pertaining to employed, New York City, non-Manhattan residents. We further limited the data to exclude the wealthiest 9% of the sample–i.e. those earning higher than $200,000 per year; the exclusion improved the model's explanatory power by almost 5%. The data consist of 91,130[1] disaggregated full responses to the census long form questionnaire. Hence, rather than having data aggregated to the block or tract level, data are available at the household level; income levels, car ownership levels and other socio-economic details of people by their different commute modes are known.

The shortcomings of the PUMS data for travel demand forecasting are that place of residence is known only at a fairly high level of aggregation and place of work is known only at the county level. For detailed studies these locations must be known with greater specificity which is why forecasting is typically done using a household travel survey rather than census data.

[1] When weighted by the census weight factors these records represent over 2.2 million New Yorkers.

Model specification:

The model is a binary logit choice model that predicts the probability that a person will drive which we denote as *P(drive)*:

$$P(drive) = \frac{e^{\alpha+\beta i \cdot Xi}}{1+e^{\alpha+\beta i \cdot Xi}}$$

α and β are estimated parameters with α an estimated intercept and β a vector of *i* parameter estimates. To avoid potential colinearity conflicts and over specification we use the most parsimonious variable set we can to both explain and predict mode choice at the sketch level. Variables included in the model are:

- Household income
- Car ownership
- Housing tenure (whether or not the resident owned their home)
- Employment by the government
- Employment in Manhattan

These variables give a reasonable model fit with pseudo R-square statistics of .256 (Cox & Snell) and .345 (Nagelkerke) respectively, these indicate that our selected set of variables explains between 25% and 35% of the variation in mode choice among residents of the Bronx, Queens, Brooklyn and Staten Island. Additional factors to explain mode choice in a forecasting model would include travel time and cost by all the possible modes for the actual origin and destination. For the sketch model we rely on implied average values for travel time and cost based on the experience of all non-Manhattan resident New Yorkers. Other acknowledged but seldom tested factors in mode choice include parking availability at the destination of a trip and other built environment elements such as walking environment and street connectivity.

The parameter values are given in the table below:

Table A-1. Parameter Estimates

Variable	B	S.E.	Wald	Sig.	Exp(B)
Income (000)	0.01	0.00	956.94	0.00	1.01
Home ownership	0.36	0.02	475.10	0.00	1.44
Auto ownership	1.68	0.02	7092.26	0.00	5.37
Manhattan employment	-1.87	0.00	10495.73	0.00	0.15
Government employment	0.22	0.02	125.50	0.00	1.25
Constant	-1.55	0.02	6595.87	0.00	0.21

Application

Following a standard modeling approach, such as that used by New York Metropolitan Transportation Council with the Best Practices Model, we simulated several thousand households that matched key neighborhood characteristics of Jackson Heights and Park Slope.

Using a normal (μ,σ^2) probability distribution we simulated household income. The mean and variance were derived from the census tract data. Using binomial distributions with parameter p we simulated home ownership, auto ownership, Manhattan employment and government employment. The parameters for p were also derived from tract data. The table below shows the census data and our simulated set of households.

Table A-2. Simulated Households and Census Estimates

	Park Slope		Jackson Heights	
Variable	Census	Simulation	Census	Simulation
Home ownership	34.0%	34.0%	26.6%	27.4%
Auto ownership	42.4%	41.8%	38.9%	38.7%
Manhattan employment	52.1%	51.8%	41.1%	42.5%
Government employment	15.3%	15.6%	9.9%	9.8%
Income	$60,700	$59,200	$39,500	$39,700

Applying the estimated model parameters to the synthetic households yields a prediction, *ceteris paribus*, of roughly 30% auto commuters from Jackson Heights and 32% from Park Slope. Thus it over predicts auto mode share for both neighborhoods. The value in the model, however, is not as a travel demand forecasting tool but a sketch level model that yields insight into the relative behaviors of residents of the two neighborhoods.

Appendix B: Curbside Parking Estimates

	Curbside Parking	
	Jackson Heights	Park Slope
Number of street blocks	96	119
Number of avenue blocks	135	150
Streets surveyed	28	25
Avenues surveyed	23	23
Average space/street	47.10	64.04
Average space/avenue	17.30	17.43
St. dev. street	17.10	6.70
St. dev. avenue	6.20	2.97
Finite population correction (streets)	0.29	0.21
Finite population correction (avenues)	0.17	0.15
S.E.E. streets	2.29	1.06
S.E.E. avenue	1.07	0.52
90% C.I lower bound (streets)	43	62
90% C.I upper bound (streets)	51	66
90% C.I lower bound (avenues)	15	17
90% C.I upper bound (avenues)	19	18
Estimated parking on streets	4,522	7,589
Estimated parking on avenues	2,336	2,615
Total estimated spots	6,858	10,203
Lower Bound streets	4,148	7,374
Upper Bound	4,896	7,803
Lower Bound avenues	1,484	1,959
Upper Bound	2,584	2,749
Lower Bound total	5,632	9,333
Upper Bound	7,480	10,553
Off-street spaces	3,633	1,416
car accommodation	10,491	11,619
Number of vehicles (per U.S. census)	11,625	11,875
Saturation	1.11	1.02
Area	0.73	0.93
Curbside space / area	9,394	10,971
Total parking spaces / area	14,371	12,494

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Appendix C: Off-Street Parking Estimates

To estimate the provision of off-street parking in Jackson Heights and Park Slope, we relied on official data sources and a field survey.

The Department of City Planning's PLUTO database provides detailed information on every tax lot in the city. For this study, we looked at the building class (BldgClass), lot area (LotArea), and garage area (GarageArea). In estimating the number of parking spaces provided by a lot, we assumed that spaces consume an average of 300 square feet.

We also looked at a database of parking garages and lots maintained by the Department of Consumer Affairs (DCA). The data include the number of spaces in each commercial garage or lot.

Through a field survey, as well as scans with Google Earth to verify data on specific lots, we found a number of errors in the DCA and PLUTO databases:

- Nine percent of the square footage in Park Slope that was identified as garage space – and two percent in Jackson Heights – was found to be under construction or converted to other uses. One lot in the DCA database could not be found.
- Several Park Slope lots that PLUTO identified as garages or parking lots had a garage area of zero. Where a scan with Google Earth or field work suggested that the lot was open for residential parking, we used the lot area field as an estimate of the garage area. This increased the estimated inventory of residential parking by ten percent.
- The DCA database lists a few lots that PLUTO does not identify as garages. Where a scan with Google Earth or field work confirmed the existence of lots that are open for residential parking, these were added to the parking inventory. This increased the parking estimate for Jackson Heights by 48% and for Park Slope by 25%.

The field survey also identified garages that appeared to be dedicated to employee or customer parking; these lots were excluded from the total. Table C-1 summarizes these adjustments.

Table C-1. Adjustments to PLUTO and DCA Data

Neighborhood	Jackson Heights	Park Slope
Garage Area from PLUTO[1]	145,374	244,309
Less non-existent parking (from field survey)	(3,180)	(22,138)
Less dedicated customer/employee parking (field survey)	(19,219)	(34,033)
Plus lot area for parking lots with Garage Area = 0	0	23,496
Net residential parking	122,975	211,634
Convert to spaces	410	705
Plus DCA lots not in PLUTO	195	178
Total PLUTO+DCA parking	605	883

[1] Three PLUTO records for Jackson Heights listed garage areas of 1 square foot. These were assumed to be errors and the garage area was set at 300 square feet, or one parking space.

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The most significant weakness of the PLUTO dataset is that it does not tabulate parking in residential buildings with three or fewer units. In Jackson Heights, driveways and garages at the front of such buildings and in back alleys provide a significant amount of residential parking.

To correct for this omission, we conducted a systematic sample of approximately 10% of the small (1-3 units) buildings in both neighborhoods. Four groups of three adjacent blocks were sampled in Park Slope and two such block groups were sampled in Jackson Height. Surveyors counted driveways and garages on the street and in alleys on these blocks. We did not count driveways that led to a garage, as we conservatively assumed that residents would park in either the garage or the driveway but not both.

Table C-2 summarizes the results of this survey

Table C-2. Driveways and Garages in Sampled Neighborhoods

	Jackson Heights	Park Slope
Sampled buildings	160	559
Sampled dwelling units	253	1179
Driveway and garage spaces counted	275	63.5
Spaces per building (sample)	1.72	0.11
Spaces per unit (sample)	1.09	0.05
Number of buildings with 1-3 units in neighborhood	1,762	4,688
Number of units in small buildings	3,229	10,299
Estimated driveway and garage spaces in neighborhood	3,028	533

Residential Off-Street Parking: Car Ownership, VMT and Related Carbon Impacts (Case Study New York City)

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Word count: 4,676 + 6 tables =6,176

ABSTRACT:

Parking is a key element of the street and highway system. Parking supply affects driving demand by changing the underlying cost structure associated with mode choice decisions. It also affects levels of auto ownership by changing the cost of auto ownership. These two facts combine to make parking management an important and powerful tool for both traffic and air quality management. A pilot analysis of demographics, highway and transit access and of off-street parking in two New York City neighborhoods strongly suggests that the provision of residential off-street parking affects commuting behavior. Moreover, it appears that the *type* of parking provision plays a strong role in determining mode share. Accessory parking that is adjacent to a home, in a garage or driveway, seems more likely to generate auto commutes than parking in commercial centralized lots. We follow this analysis by testing plausible development scenarios and show that the City's residential off-street parking regulations will undermine its own vision for a sustainable future.

INTRODUCTION:

Much has been written on the relationship between growth in road capacity and growth in vehicle travel. This research has shown that road expansion temporarily alleviates congestion but induces long term growth in vehicle travel demand (*1*,*2*). Parking capacity at the destination end of a trip is also reasonably well studied, research shows that expensive or constrained parking in downtowns leads to lower auto commuting and higher transit shares (*cf. 3*). Less well understood is the connection between parking capacity on the residential end of a trip and vehicle ownership and use. In fact, our literature search found no studies covering this topic and our research in New York City found that official data sources inhibit a real understanding of this relationship and prevent the City from evaluating the impacts of its zoning and development policies.

This study analyzes the link between off-street residential parking in New York and vehicle use and it estimates the expected growth in vehicle travel under current zoning and development policies. The first section of the study sets the stage for our analysis by introducing the concepts of latent and induced demand and the economics of vehicle ownership. It explores the application of these principles to residential parking supply. The second section looks in detail at Jackson Heights, Queens, a neighborhood identified in PlaNYC, New York City's sustainability plan, as a driving "hotspot," (*4*)– i.e. a neighborhood that sends a large number of its residents to work in Manhattan by automobile. We match Jackson Heights with Park Slope, Brooklyn, an area that is similar both in terms of demographics and access to transit, but that is not considered a driving hotspot. Compared to Park Slope, Jackson Heights is home to 23% fewer Manhattan central business district (CBD) commuters but sends 13% more auto commuters to the CBD. We show that there is a significant difference in the provision of off-street parking between the two neighborhoods and that this likely accounts for the different commuting patterns.

Having established a relationship between off-street parking and auto use, in the third section, we look at the city's current zoning requirements with respect to both land use and off-street parking, and we examine the impact of four development scenarios that are consistent with the City's growth projections. Our analysis shows that the zoning and development plans invite an expansion in driving hotspots that is contrary to the intent of the City's sustainability plan and that would overwhelm the vehicle travel reductions promised by central elements of that plan.

INFRASTRUCTURE, VEHICLE OWNERSHIP AND VEHICLE USE

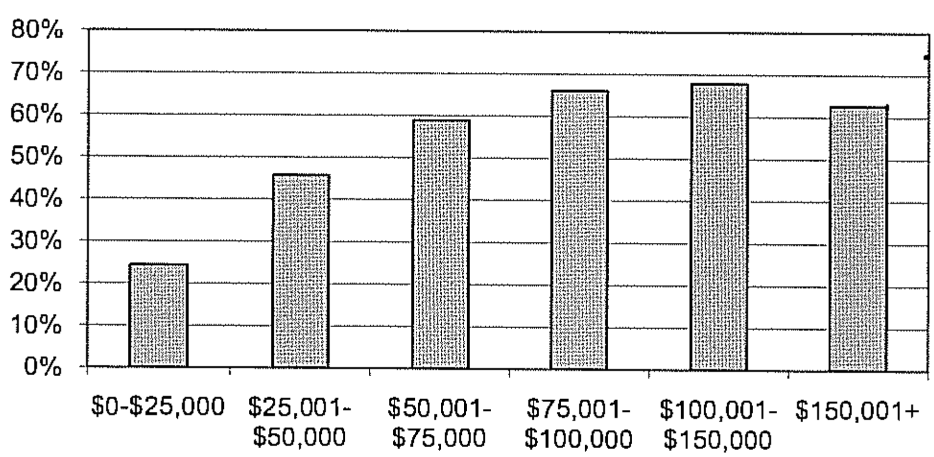
Infrastructure

Traffic congestion occurs when the demand for a facility exceeds its capacity. Though intuition suggests that ameliorating congestion is accomplished by adding infrastructure, research has repeatedly proven the fallacy of that intuition. In his books *Stuck in Traffic* and *Still Stuck in Traffic*, Downs argues and demonstrates that the building of more transportation infrastructure results in greater congestion (*5*, *6*). Likewise, Mogridge, in his article "The Self Defeating Nature of Urban Road Capacity Policy," describes road capacity policy and how it has not only failed to achieve the expected ends, it has brought about results opposite of those intended (*2*). The principal reason for this phenomenon is explained in the economic concepts of latent and induced demand. When the monetary cost of a commodity is hidden, as in the case of most of our roads, people enjoy it for "free" until so many users are enjoying it that it becomes congested and no longer "free." It still has no direct monetary cost but users begin to pay for it with their time. In this way the time cost and the system capacity become the limiting factors. When infrastructure is added it has two important effects, the direct effect of adding more capacity which serves the latent demand, i.e. the existing demand at the same price point (time and money), and the secondary effect of reducing the time cost – hence making use cheaper – and attracting more users, i.e. inducing demand. When parking supply is constrained, the search costs associated with finding a spot add to the costs of using the vehicle. This acts as a deterrent to both ownership and use. In cities like New York, Philadelphia, San Francisco, Chicago and Boston, where there are relatively robust alternatives, this deterrent may well be an important advantage in reducing auto use and thereby achieving air pollution and greenhouse gas emission reductions.

Vehicle Ownership and Use

Beyond the provision of automobile infrastructure, the most commonly cited predictors of vehicle ownership and use are income and density. Rising income tends to correlate with higher levels of auto ownership, while higher density correlates with lower auto ownership and use (*7,8,9*). The interplay between these factors can be seen in New York City, where auto ownership rises monotonically with income for most of the income spectrum, with 68% of households in the second-highest income bracket owning a car (Figure 1). But in the highest income bracket (above $150,000), the percentage of households owning a car drops to 63%. The drop is because a disproportionate percentage of the wealthiest households (57%) are in Manhattan, where development density is highest and auto ownership is most expensive and inconvenient, indeed the median income of Manhattan carless households is roughly equivalent to the median income of car owning households in Brooklyn and the Bronx; the 80th Percentile income for Manhattan carless households is well above, the 80th percentile for car owning households in the other boroughs. Among all households in Manhattan, the wealthiest and densest borough, only 23% own a car, well below the citywide average of 45%. Even in the highest income bracket ($150k+), only 47% of Manhattan households own a car. This reveals that a majority of wealthy households are willing to forgo auto ownership in exchange for the benefits of density.

Figure 1 Percent of New York City households owning a car, by income (2000).



Source: US Census Bureau, Census 2000 Public Use Micro Sample

Parking complicates transportation planning because demand for parking and demand for road use are complementary, yet off-street parking is typically privately owned and roads are publicly provided common goods. Ideally, policies regarding road capacity and parking provision should be aligned. However, as planning entities throughout the country increasingly recognize the importance of integrating land use and transportation, nowhere is the lack of integration more apparent than at the interface of the public street system and publicly regulated but privately owned off-street parking. Off-street parking regulation and supply, an important component of the transportation infrastructure system, is typically under the exclusive domain of the locally developed zoning code. Zoning regulations that require accessory parking as part of new residential developments affect travel demand by increasing transportation supply; they essentially make car use cheaper by eliminating the time-cost associated with searching for a spot and retrieving your vehicle when it is not parked in your own driveway. Indeed, determinations with respect to local parking supply are usually made without reference to the rest of the auto/highway system.

The evidence on the relationship between off-street parking and vehicle usage is primarily focused on the provision and pricing of downtown parking on mode choice. In that case the evidence is clear, where parking is relatively scarce, and therefore costly, cities enjoy higher transit mode share for downtown oriented trips (*2, 10, 11*). We have found no research on the relationship between residential parking requirements and vehicle usage.

Bundling parking with housing increases the cost of housing by shifting part of the cost of car ownership to the house. The additional cost to housing of required parking is well documented (*11,12,13,14*). A much less considered effect of the shift is that it reduces the marginal cost of car ownership. Anyone who purchases or rents a home that includes an off-street parking space *de facto* makes a pre-payment toward car ownership. The payment is not toward the car directly but toward the cost of owning and operating a car which includes the cost of storage. Thus both markets are distorted likely resulting in lower rates of homeownership and higher rates of car ownership than would be seen if the uses and costs were unbundled.

NEIGHBORHOOD COMPARISON

Demographics, car ownership and commute behavior

Because there is little research relating the provision of parking to motor vehicle use, we developed a pilot study to explore this issue in New York City. Our goal was to understand the contributing factors to driver "hot spots" as identified in PlaNYC, the City's sustainability plan. To that end we selected Jackson Heights, an identified hot spot, and a roughly comparable neighborhood with respect to access to the Manhattan Central Business District (CBD). The comparison neighborhood, Park Slope, has a similar number of households, a similar number of employed residents, a slightly higher auto ownership rate, a higher median income, and lower population density. These differences are shown in Table 1.

Table 1 Neighborhood Indicators

	Jackson Heights[1]	Park Slope[1]
Demographics		
Population	71,186	53,079
Occupied households	24,900	24,360
Average household size	2.9	2.2
Area (square miles)	0.73	0.93
Population per square mile	98,031	57,304
Household per square mile	34,273	26,363
Median household income[2]	$40,399	$63,561
Home ownership (% of households)	27%	34%
Vehicle ownership		
Vehicles owned	11,711	11,951
Vehicles per employed resident	0.38	0.40
Commuting behavior		
Employed residents	30,497	29,636
Drive or carpool to work	7,029	5,300
Percent auto share	23%	18%
Residents employed in CBD	12,824	16,481
Drive or carpool to CBD	1,004	885
Percent auto share to CBD	7.8%	5.4%

Source: US Census Bureau, Census 2000.
[1] Jackson Heights is defined as the census tracts bounded by the Brooklyn-Queens Expressway, Northern Boulevard, Junction Boulevard, and Roosevelt Avenue. Park Slope is defined as the whole census tracts bounded by Fourth Avenue, Sterling Place, Prospect Park (or 8th Avenue south of 16th Street), and the Prospect Expressway.
[2] Median household income is estimated by using the weighted average of the median incomes of the census tracts in each neighborhood.

As the table shows, Jackson Heights accounts for more auto commuters to the CBD than Park Slope, despite having a smaller number of residents who work in the CBD. Jackson Heights sends 23% fewer workers to the Manhattan CBD but 13% more drivers, making Jackson Heights residents 45% more likely to drive to work in the CBD than Park Slope residents. The percentage of Jackson Heights CBD commuters who drive is still relatively low – 7.8%, compared with 17.5% for Queens as a whole – but significantly higher (99.5% CI) than Park Slope's 5.4%.

The primary predictors of mode choice, i.e. higher income and lower density, suggest that Park Slope would have the greater number of auto commuters. Other factors that would affect mode choice include transit and highway access. We look at those next.

Transit and Highway (street) Access

Differences in transit access could account for the difference in travel behavior; if one neighborhood were poorly served by transit a greater auto share would be predicted. It appears, however, that transit access is approximately equal for the two neighborhoods. During rush hour, Jackson Heights is served by 3 express lines (E, F, 7 express) and 3 local lines (R, V, 7 local).

Park Slope is served by 3 express lines (B, D, Q) and 5 local lines (F, M, R, 2, 3) to Manhattan. Park Slope has shorter travel times to Lower Manhattan but longer travel times to the larger employment center in Midtown. Jackson Heights residents can have a longer walk to the nearest station, with a maximum distance of 0.6 miles compared with 0.4 miles in Park Slope. On the other hand, some Park Slope residents are more than a mile from the nearest express station, while all of Jackson Heights' residents are within 0.8 miles of an express stop. Auto and transit travel times between the two neighborhoods and the two main employment centers are shown in Table 2. While there are some differences it is most interesting to note that the ratio of transit to auto travel time is equivalent for the journey to midtown and much higher for Park Slope residents to the Downtown destination. The higher relative transit time would, once again favor driving from Park Slope.

Table 2 Travel Time in Minutes: Jackson Heights and Park Slope to Midtown and Downtown Manhattan (distance given in parenthesis)

	Car		*Transit*		*Ratio*	
	Park Avenue @ 42nd Street	Wall Street @Broadway	Park Avenue @ 42nd Street	Wall Street @Broadway	Park Avenue @ 42nd Street	Wall Street @Broadway
Jackson Heights	(dist) 23	(dist) 35	40	57	1.7	1.6
Park Slope	(dist) 25	(dist) 17	42	35	1.7	2.1

Source: Google Maps; Hopstop.com

Parking

After considering the effects of income, auto ownership, density, transit access, and travel time we looked to other supply characteristics of the auto-highway system to explain the disparity in commuting behavior. Two principal differences between the neighborhoods lie in the amount of off-street parking available to the respective residents, and alley space which is prevalent in Jackson Heights but virtually non-existent in Park Slope. Alleyways in Jackson Heights are frequently used to supply additional off-street parking to the residents.

To estimate off-street parking, we used the Department of City Planning's Primary Land Use Tax Lot Output (PLUTO) database for 2007 and the Department of Consumer Affairs (DCA) list of licensed garages. We supplemented these data with field work and information from the commercial web-site BestParking.com.

PLUTO lists the garage area in square feet for every lot in the city with the important exception of small buildings. The database does not include garage or driveway area for one, two or three family buildings. There are also some discrepancies between the PLUTO data and actual conditions. We sampled garages in the neighborhoods to develop corrections for these data. We matched PLUTO data against the DCA database to distinguish residential versus commercial lots. We found discrepancies in that database as well and made appropriate corrections based on our field work.

Once we had established the square footage devoted to parking we estimated parking spaces using the assumption that one space requires 300 square feet. We excluded commercial accessory parking, for example hospital parking lots, which are used only by customers and employees.

To account for garages and driveways, associated with small buildings we conducted a field survey of approximately 10% of the small (one-, two- and three-family) residential buildings in each neighborhood. A systematic sample of groups of blocks in each neighborhood was chosen. Surveyors then counted the number of parking spaces in garages and driveways of the small buildings in those blocks. Conservatively we assumed there was no tandem parking, i.e. driveways leading to one car garages were counted as just one space. If there was any doubt as to the use of a space we did not include it in our count. These data were used to estimate garage and driveway parking for all such buildings in the two neighborhoods.

Analysis

When all types of off-street parking are considered, Jackson Heights has 3,633 parking spaces and Park Slope has 1,416 – a difference of 156%. Table 3 below, summarizes parking by category in these neighborhoods.

Table 3 Off-street parking spaces in Jackson Heights and Park Slope

Type of parking	Jackson Heights	Park Slope
Parking lots	605	883
Driveways and garages	3,028	533
Total	3,633	1,416
Dwelling Units (from Table 1)	25,817	25,276
Parking space per D.U.	0.14	0.06
Off-street per car owning HH	31%	12%
"on-site" off-street per car owning household*	26%	4.5%

*"on site" refers to a garage or driveway parking space attached to the building as opposed to "off-site" which refers to nearby garage parking.

While Park Slope has 46% more parking in lots and garages, Jackson Heights has more than four times as many parking spaces in attached garages and driveways or in back alleys. Our survey of 160 one- two- and three-family buildings in Jackson Heights found 275 parking spaces, or 1.09 spaces per unit in small buildings. In Park Slope, our survey of 559 small buildings found 64 parking spaces, or .05 spaces per unit in small buildings. Applying these factors to the neighborhoods we estimate 0.14 off-street spaces per DU in Jackson Heights and 0.06 spaces per DU in Park Slope. Given the rates of auto ownership listed in Table 1 and vacancy rates for the neighborhoods we estimate that 31% of Jackson Heights residents who own cars have access to off-street parking and 12% of Park Slope residents who own cars have access to off-street parking.

These results indicate that off-street parking could well account for Jackson Heights' higher auto share for CBD commutes; other explanations could include more shift-work by Jackson Heights residents or more employer provided parking at the destination of these commute trips. However, there is no evidence in the available data to support either of these hypotheses.

Furthermore, because the level of auto ownership is similar in the two neighborhoods, these results suggest that ease of access is critical in determining whether a car will be used for commuting. With few attached garages and driveways, car owners in Park Slope generally have to search for on-street parking or pick up and drop off their car at a remote site. Parking is much easier, therefore less costly in time, for Jackson Heights residents who are 5.7 times more likely to park their cars in attached garages and driveways. For them there is no search time, no valet notification, and no additional time to walk home.

While the finding of the pilot study cannot be generalized to larger geographic areas, a citywide field effort would have to be conducted to estimate off-street parking in other areas, it strongly points to off-street parking as tipping utility in favor of driving when other viable alternatives exist. Indeed, the preferred choice of Jackson Heights residents (92% of those who work in the CBD) is to take public transit to their jobs.

In the next section we augment our analysis of the travel behavior consequences of the City's parking policy by coupling behavioral correlates of vehicle ownership with ownership decisions driven by parking supply –as discussed earlier. We then look at four development scenarios that could accommodate the City's projection of 265,000 additional housing units over the next 22 years. Finally, we estimate a range of VMT and resultant carbon outcomes.

FUTURE CAR OWNERSHIP AND VEHICLE MILES TRAVELED

Vehicle Miles Traveled

To estimate the VMT impact of these vehicles we use the New York Metropolitan Transportation Council's (NYMTC) Regional Travel Household Interview Survey (RT-HIS) and the National Household Travel Survey – New York Supplement (NHTS-NYS). NYMTC is the region's metropolitan planning organization (MPO) and collects this data in order to estimate their travel demand models. The RT-HIS is the most comprehensive information the city currently has on individual and household travel behavior. Two shortcomings of the survey lead to a conservative estimate of travel impacts. The first is that no interviews were done with New York City residents on weekend days. To estimate weekend travel we used the NHTS-NYS. The second short-coming of the RT-HIS is that it is a one day diary which decreases the likelihood of representing households who may be on longer, multi-day car trips.

Aware of these shortcomings we estimate, conservatively, that New Yorkers who own vehicles use them an average of 6,480 miles per year.

Table 4 shows auto trip rates and trip lengths for households that own cars and those who do not own cars. Non-car owning households make, on average 0.04 auto trips per day most likely these trips are made in borrowed vehicles or include rides from friends or family members. Carless households are not further considered in the analysis. Car owning households in New York City make approximately 2.44 auto trips per day. The average trip length is 6.71 miles resulting in average weekday VMT of 16.38. From the NHTS we calculated that New York City households log approximately 130% of their average weekday mileage on weekend days. The total weekly mileage is thus approximately 125 miles per car owning household.

Table 4 Daily Trip Rates and Average Trip Lengths for New York Households Surveyed in RT-HIS

Household auto ownership	*Daily trips*	*House-holds in Survey*	*Trips per HH*	*Average trip length*	*Average weekday VMT/HH**	*Average weekly VMT/HH***
0 cars	71	2024	0.04	6.07	0.21	
1 or more cars	5407	2213	2.44	6.71	16.38	124.6

*RT-HIS;
**RT-HIS weekday estimate modified by NHTS weekend/weekday ratio

New York City residents have the lowest rate of auto ownership in the United States. In part this is due to the fact that the inconvenience of car ownership outweighs the benefits. And the benefits of density outweigh the inconvenience of foregoing a car. In part it is due to the fact that some people prefer a car-free lifestyle (self-selection), for them there is no inconvenience, and New York is one of the few cities in the country where the density of land use and the robustness of the transit system make living car-free a feasible option. Indeed, it would be impossible, given the street capacity, for New York City to accommodate levels of auto ownership typical of the rest of the country (*4*).

Because they own fewer cars, New Yorkers have a much lower per capita carbon footprint than other cities. New York Metro area residents emitted 0.66 tons of carbon per person from cars compared with 1 full ton per person from cars in major metro areas throughout the country (*15*). In spite of the low footprint the City has set an important goal to reduce carbon even further; a goal that takes on greater importance in light of evidence that shows capita carbon emissions grew 3.5 to 7 times faster in the New York region than it did in major metro areas throughout the country (*15*). This analysis demonstrates that the expected carbon reductions from the transportation elements of PlaNYC, most particularly what would have been accomplished with the Mayor's congestion pricing plan, will be more than erased by projected increases in VMT due to increased car ownership that will accompany new development under the existing zoning code.

Future Car Ownership

The City is projecting a need for 265,000 additional housing units by 2030 to accommodate a projected 1 million new residents (*4*). Ten to twenty percent of this housing will be provided in high density developments such as those summarized in Table 5.

The average ratio of 0.32 parking spaces to dwelling unit (DU) estimated for these projects is quite low by national standards. It is lower than even the New York City zoning, which requires between 0.4 and 1 parking space per new unit (*16*), but it is much higher than many New York City neighborhoods. As noted earlier, Park Slope, Brooklyn, which has recently been named one of "the ten great neighborhoods in America,"(*17*) has approximately 0.06 off street spaces per DU and Jackson Heights, Queens has 0.14.

Table 5 Summary of Five Recent Rezoning/Redevelopment Plans*

	Dwelling Units (increase)	*Commercial, Retail, Other (1,000 sq ft)*	*Residential Parking Spaces increase*	*Public and Commercial Parking Spaces*
Greenpoint-Williamsburg	8,257 (7,391)	337	3,245	250
Jamaica	5,380 (3,565)	3,100	1210	6,490
Atlantic Yards (Average of residential and commercial variations)	5878	2,150	880	3,670
Willets Point	5,500	3,440	2,500	4,200
Flushing Commons**	517	566	708	1,295
Total	22,851	9,593	7,333	15,905

*Based on environmental impact statements

**We were unable to locate the environmental impact statement associated with the Flushing Commons project but a description of the project was laid out in a Draft Scope of Analysis for an Environmental Impact Statement. Accessory parking is set at a rate of 1.36 for this project, far in excess of other requirements in the city. Among the five specific goals for the site is the unqualified "maintenance of below market rate parking for the site."

It is highly unlikely that all of New York City's expected development will occur in large scale developments or rezoning. Indeed, the remaining 80% to 90% is most likely to occur at lower densities with higher associated residential off-street requirements. This development will likely be infill, and small projects. With a few exceptions each new parking space will host an additional car, adding to the number of vehicles owned by residents of the city. We assume the City would not require parking in excess of demand, hence each required space is expected to be utilized. Table 6 illustrates four possible development scenarios to accommodate the city's projected housing. It includes the estimated increases in off-street parking and car ownership. The estimated car ownership is only that due to the off-street parking requirement; we do not estimate car ownership increases associated with growth alone.

Table 6 Possible Development Scenarios and Their Off-street Parking Impacts

	Spaces Per DU	*Extreme High Density*	*High Density*	*Moderate Density*	*Medium Density*
Highest density[1]	0.32	75%	50%	20%	15%
Medium density[2]	0.5	12.5%	25%	45%	45%
Low density[3]	1	12.5%	25%	35%	40%
Increase in off-street parking and related car ownership[4]		113,288	141,775	169,335	178,345
Annual VMT[5]		734,103,000	918,702,000	1,097,290,800	1,155,675,600
CO2 Tons per year[6]		339,086	424,353	506,844	500,449

[1]As estimated from the EISs

[2] examples of zones at this level of parking requirement include R6QH-R7X

[3] examples of zones at this level of parking requirement include R1-R4B

[4]These estimates only include induced car ownership due to the off-street parking requirements.

[5]Based on current average annual driving of 6,480 miles per year source: RT-HIS and NHTS New York Supplement.

[6]Assumes 22.4 miles/gallon source http://www.eia.doe.gov/aer/txt/ptb0208.html United States Department of Energy Annual Energy Review accessed 7/20/2008 and 19.4lbs of carbon/gallon http://www.epa.gov/otaq/climate/420f05001.htm United States Environmental Protection Agency Emission Facts 2005 accessed 7/15/2008.

The first scenarios are unlikely given the time frame for large scale project development, they are included here for comparison. Focusing on the moderate and medium density scenarios we calculate, based on off-street parking alone, residents of the new development are 42% to 49% more likely to own cars than today's New Yorkers. Based on that ownership rate and the rate of driving described in Table 4 we estimate an additional 1.09 to 1.15 billion VMT. Using United States Departments of Energy and Environmental Protection guidelines (*18, 19*) we estimate between 430 and 454 thousand annual metric tons of GHG. While we cannot estimate the likely increase in overall auto ownership, the new developments would include off-street parking for 63% to 67% of dwelling units. If only 20% of the residents of these units were to park on street, these households would be 86% to 94% more likely to own cars than today's New Yorkers.

Based on our neighborhood comparison the evidence suggests that households with on-site off-street parking are inclined to drive more than their neighbors. For this analysis we make the more conservative assumption that residents of developments with off-street parking accommodations will drive at the same rate as current New Yorkers. We combine the estimate of VMT per new household and the number of new households with off-street parking and estimate 2 million average daily VMT in the most conservative scenario. This is about twice the expected offset for VMT within the city's borders estimated from the recently proposed congestion charge (*4*). Thus the City's policy of carbon reduction is undermined and profoundly reversed by the City's policy on off-street parking requirements for residential development.

CONCLUSION

Parking is a key element of the street and highway system. Parking supply affects driving demand by changing the underlying cost structure associated with mode choice decisions. It also affects levels of auto ownership by changing the cost of auto ownership. These two facts combine to make parking management an important and powerful tool for both traffic and air quality management.

Absent any other evidence we are inclined to conclude that, like many cities in the United States, New York City has developed a residential off-street parking policy based largely on what is perceived as convenient for car owners at their home locations. It may seem to be a sensible policy for the City to try and accommodate the desires of some households to own cars but this is a poor approach from the perspective of public stewardship of the city. First, the policy erodes sidewalk integrity and therefore the public realm. Second, adding to the cost of housing development further burdens low income households and households who prefer to live car-free. But most importantly the policy is at odds with other city policy to reduce both congestion and, more critically, GHG emissions. Adding automobile infrastructure, including in the form of off-street parking, will inevitably lead to additional demand for auto travel throughout the city and region.

Adding more terminal space without reference to the right-of-way capacity will bring the system out of balance. Adding capacity in a codified but apparently ad-hoc way undermines the rational planning process. It is at odds with the carbon reduction strategies set forth by City Hall and the guiding principles of sustainable development set forth by the Department of City Planning itself (*20*). By increasing the cost of housing construction it also undermines the department's mission of facilitating housing development.

We have discussed principles of transportation planning as they relate to parking. Our analysis of demographics, highway and transit access and of off-street parking in the two neighborhoods is provisional pending more exhaustive fieldwork and statistical analysis, yet it strongly suggests that the provision of off-street residential parking affects commuting behavior. We believe that more field work and analysis will corroborate this finding. Moreover, it appears that the *type* of parking provision plays a strong role in determining mode share. Accessory parking that is adjacent to a home, in a garage or driveway, seems more likely to generate auto commutes than parking in commercial pay lots. Our analysis of possible development scenarios has shown that the City's residential off-street parking regulations will undermine its own vision for a sustainable future.

Population growth will very likely lead to increased auto ownership, the City, rather than striving to accommodate more auto ownership should focus on strategies that accommodate population growth without embracing auto growth; indeed, to support rather than undermine several worthwhile objectives the City claims to pursue, the City should strive to reduce growth in auto ownership.

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