during the afternoon peak hour. Again, please note that 30 percent of the STC trips will be to off-site garages and not the site. Furthermore, of the remaining STC trips, some of those trips will be pick-up/drop-off only. Detailed calculations are included in the Technical Appendix.

Table 7: STC Mode Split - Survey Results

User Group	Mode Split				
	Auto	Transit	Walk	Bike	Housed On-Site
Office User Groups					
Full-Time Staff	30%	45%	4%	4%	17%
Part-time staff	50%	50%	0%	0%	0%
Volunteers	60%	40%	0%	0%	0%
Education User Groups					
Summer Camp	67%	25%	8%	0%	0%
MAC	70%	20%	10%	0%	0%
Home School	80%	20%	0%	0%	0%
After School Class	0%	100%	0%	0%	0%
Workshops & Training	25%	50%	10%	15%	0%
Rehearsal User Groups					
STC Actors	10%	20%	0%	20%	50%
ACA Rehearsals	10%	80%	5%	5%	0%
Ford Theater Rehearsals	20%	60%	8%	12%	0%

Table 8: Trip Generation Summary

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	*Out*	*Total*	*In*	*Out*	*Total*
Auto	Residential	4 veh/hr	13 veh/hr	17 veh/hr	16 veh/hr	9 veh/hr	25 veh/hr
	STC (on-site)	22 veh/hr	4 veh/hr	26 veh/hr	20 veh/hr	7 veh/hr	27 veh/hr
	STC (off-site)	9 veh/hr	2 veh/hr	11 veh/hr	8 veh/hr	3 veh/hr	11 veh/hr
	Total	**35 veh/hr**	**19 veh/hr**	**54 veh/hr**	**44 veh/hr**	**19 veh/hr**	**63 veh/hr**
Transit	Residential	4 ppl/hr	13 ppl/hr	17 ppl/hr	16 ppl/hr	9 ppl/hr	25 ppl/hr
	STC	43 ppl/hr	2 ppl/hr	45 ppl/hr	8 ppl/hr	13 ppl/hr	21 ppl/hr
	Total	**47 ppl/hr**	**15 ppl/hr**	**62 ppl/hr**	**24 ppl/hr**	**22 ppl/hr**	**46 ppl/hr**
Bike	Residential	0 ppl/hr	2 ppl/hr	2 ppl/hr	2 ppl/hr	1 ppl/hr	3 ppl/hr
	STC	3 ppl/hr	0 ppl/hr	3 ppl/hr	0 ppl/hr	1 ppl/hr	1 ppl/hr
	Total	**3 ppl/hr**	**2 ppl/hr**	**5 ppl/hr**	**2 ppl/hr**	**2 ppl/hr**	**4 ppl/hr**
Walk	Residential	1 ppl/hr	3 ppl/hr	4 ppl/hr	4 ppl/hr	2 ppl/hr	6 ppl/hr
	STC	3 ppl/hr	0 ppl/hr	3 ppl/hr	4 ppl/hr	1 ppl/hr	5 ppl/hr
	Total	**4 ppl/hr**	**3 ppl/hr**	**7 ppl/hr**	**8 ppl/hr**	**3 ppl/hr**	**11 ppl/hr**

TRIP GENERATION

This section outlines the transportation demand of the proposed Wharf Phase 2 project. It summarizes the projected trip generation of the site by mode, which forms the basis for the chapters that follow. These assumptions were vetted and approved by DDOT as a part of the scoping process for the study.

First-Stage vs Second-Stage Development Program

The overall development for Phase 2 has been slightly modified from the development program analyzed as part of the First-Stage PUD. Apart from the addition of the hotel uses to Parcel 8, the change in Phase 2's development program from the First-Stage PUD is consistent with flexibility that was approved as part of the First-Stage PUD and subsequent approvals.

Methodology

Traditionally, weekday peak hour trip generation is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 9th Edition. This methodology was supplemented to account for the urban nature of the site (the *Trip Generation Manual* provides data for non-urban, low transit use sites) and to generate trips for multiple modes, as vetted and approved by DDOT.

Residential trip generation was calculated based on ITE land use 220, Apartment, and on ITE land use 230, Condo/Townhome, splitting trips into different modes using assumptions derived from 2015 census data for the residents that currently live near the site. The vehicular mode split was then adjusted to reflect the parking supply and other developments with similar proximity to Metrorail. The condo component was adjusted upwards based on assumed increased auto usage.

Retail trip generation was calculated based on ITE land use 820, Shopping Center. Mode splits for the retail portion of the site were based on information about similar sites with retail contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used in the Wharf Phase 1 Second-Stage CTR.

Office trip generation was calculated based on ITE land use 710, General Office Building, splitting trips into different modes using assumptions derived from census data for the employees that currently work near the site. The mode splits were then adjusted to reflect the parking supply, the proximity to Metrorail, and the improved bicycle facilities in the area. The office mode split was primarily based on the mode split used in the Wharf Phase 1 Second-Stage CTR.

Hotel trip generation was calculated based on ITE land use 310, Hotel. Mode splits for the hotel portion of the site were based on information about similar hotels contained in WMATA's 2005 *Development-Related Ridership Survey*. The proximity of the site to Metrorail was also a determinant factor for assigning hotel mode split.

Trip associated with the Wharf Marina were accounted for in two ways: (1) the 94 boat slips used by live-aboard slip license holders were calculated using the same methodology as the non-ownership residential uses of Phase 2; and (2) the trip generation for the 156 recreational boat slips was calculated based on ITE land use 420, Marina. Mode splits for the Marina portion of the site were based on information provided by the Applicant, which estimated that about 50% of recreational boat slip users drive to the site.

The mode split assumptions for all land uses within the development is summarized in Table 7. A summary of the multimodal trip generation for Phase 2 of the Wharf is provided in Table 8 for both peak hours. Detailed calculations are included in the Technical Appendix.

Table 7: Summary of Mode Split Assumptions

Land Use	Mode			
	Auto	Transit	Bike	Walk
Residential (Apartment)	25%	50%	10%	15%
Residential (Condo)	40%	40%	5%	15%
Retail	19%	56%	15%	10%
Office	42%	47%	8%	3%
Hotel	40%	40%	5%	15%
Marina	50%	25%	10%	15%

Table 8: Phase 2 Multi-Modal Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	379 veh/hr	108 veh/hr	487 veh/hr	176 veh/hr	396 veh/hr	570 veh/hr
Transit	578 ppl/hr	217 ppl/hr	793 ppl/hr	500 ppl/hr	789 ppl/hr	1291 ppl/hr
Bike	108 ppl/hr	43 ppl/hr	150 ppl/hr	116 ppl/hr	168 ppl/hr	284 ppl/hr
Walk	63 ppl/hr	46 ppl/hr	109 ppl/hr	96 ppl/hr	109 ppl/hr	206 ppl/hr

Mode Split Assumptions - DDOT HQ

Office Component

Description of project:

The development will contain 190,000 S.F. of office and 13,000 S.F. of retail

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Workplace TAZ Data (20367)	67%		30%	3%		---	
WMATA Ridership Survey (Office Sites in CBD)	21%		74%	5%		---	
DC Water Headquarters	45%		45%	10%		---	

Mode Split assumed in TIS:

Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Office Mode Split	40%	40%	5%	15%	---

Notes: - Proximity to Metrorail influenced mode splits

- Mode Split compared to DC Water Headquarters

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey Table 12 (U Street Main Street Retail)	19%		57%	25%		---	
WMATA Ridership Survey Table 12 (Crystal City - Crystal Plaza Shops)	24%		41%	36%		---	
WMATA Ridership Survey Table 12 (Retail Sites)	36%		37%	27%		---	

Mode Split assumed in TIS:

Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	25%	35%	20%	20%	---

From 45 Q Street SW CTR

Mode Split Assumptions

Hotel Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Workplace Census Data - TAZ (10369)	43%	15%	19%	0%	3%	15%	6%
Adjacent Workplace Census Data - TAZ (20388)	63%	16%	17%	2%	2%	0%	0%
WMATA Ridership Survey (Average for Hotel Sites)	38%		31%	31%		---	

Mode Split assumed in CTR:

Information Source	Mode				
	Drive		Transit	Bike	Walk	Telecommute/Other
Hotel Mode Split	45%		45%	2%	8%	---

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Workplace Census Data - TAZ (10369)	43%	15%	19%	0%	3%	15%	6%
Adjacent Workplace Census Data - TAZ (20388)	63%	16%	17%	2%	2%	0%	0%
WMATA Ridership Survey (Average for Retail Sites)	36%		37%	27%		---	

Mode Split assumed in CTR:

Information Source	Mode				
	Drive		Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	15%		40%	5%	40%	---

Residential Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Residential Census Data - TAZ (10369)	35%	3%	32%	5%	18%	6%	1%
Adjacent Residential Census Data - TAZ (20388)	6%	0%	6%	0%	82%	6%	0%
Residential Census Data - Census Tract 64	35%	1%	22%	15%		13%	14%

Mode Split assumed in CTR:

Information Source	Mode				
	Drive		Transit	Bike	Walk	Telecommute/Other
Residential Mode Split	25%		40%	5%	30%	---

From 45 Q Street SW CTR

Trip Generation - Hotel

190 hotel rooms

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Hotel	310	190 rooms	53 veh/hr	37 veh/hr	90 veh/hr	59 veh/hr	57 veh/hr	116 veh/hr	1,718 veh
		Calculation Details:	*59%*	*41%*	*=0.5X/1000-5.34*	*51%*	*49%*	*=0.75X/1000-26.02*	*=11.29X/1000-426.97*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Hotel	1.67 ppl/veh	89 ppl/hr	61 ppl/hr	150 ppl/hr	99 ppl/hr	95 ppl/hr	194 ppl/hr	2,869 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Hotel	Auto	45%	40 ppl/hr	28 ppl/hr	68 ppl/hr	45 ppl/hr	42 ppl/hr	87 ppl/hr	1,291 ppl
Hotel	Transit	45%	40 ppl/hr	28 ppl/hr	68 ppl/hr	45 ppl/hr	42 ppl/hr	87 ppl/hr	1,291 ppl
Hotel	Bike	2%	2 ppl/hr	1 ppl/hr	3 ppl/hr	2 ppl/hr	2 ppl/hr	4 ppl/hr	57 ppl
Hotel	Walk	8%	7 ppl/hr	4 ppl/hr	11 ppl/hr	7 ppl/hr	9 ppl/hr	16 ppl/hr	230 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Hotel	1.67 ppl/veh	24 veh/hr	17 veh/hr	41 veh/hr	27 veh/hr	25 veh/hr	52 veh/hr	773 veh

Trip Gen Summary for Hotel

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	24 veh/hr	17 veh/hr	41 veh/hr	27 veh/hr	25 veh/hr	52 veh/hr	773 veh
Transit	40 ppl/hr	28 ppl/hr	68 ppl/hr	45 ppl/hr	42 ppl/hr	87 ppl/hr	1,291 ppl
Bike	2 ppl/hr	1 ppl/hr	3 ppl/hr	2 ppl/hr	2 ppl/hr	4 ppl/hr	57 ppl
Walk	7 ppl/hr	4 ppl/hr	11 ppl/hr	7 ppl/hr	9 ppl/hr	16 ppl/hr	230 ppl

From 45 Q Street SW CTR

Trip Generation - Retail

9,414 SF of neighborhood serving retail space

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	820	9.414 sf	6 veh/hr	3 veh/hr	9 veh/hr	17 veh/hr	19 veh/hr	36 veh/hr	1,206 veh
Calculation Details:			*62%*	*38%*	*=0.94(X/1000)*	*48%*	*52%*	*=3.81(X/1000)*	*Ln(T)=0.68Ln(X/1000)+5.57*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	11 ppl/hr	5 ppl/hr	16 ppl/hr	31 ppl/hr	35 ppl/hr	66 ppl/hr	2,195 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	Auto	15%	2 ppl/hr	0 ppl/hr	2 ppl/hr	5 ppl/hr	5 ppl/hr	10 ppl/hr	329 ppl
Shopping Center	Transit	40%	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	14 ppl/hr	26 ppl/hr	878 ppl
Shopping Center	Bike	5%	1 ppl/hr	0 ppl/hr	1 ppl/hr	2 ppl/hr	1 ppl/hr	3 ppl/hr	110 ppl
Shopping Center	Walk	40%	4 ppl/hr	3 ppl/hr	7 ppl/hr	12 ppl/hr	15 ppl/hr	27 ppl/hr	878 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	1 veh/hr	0 veh/hr	1 veh/hr	3 veh/hr	2 veh/hr	5 veh/hr	181 veh

Trip Gen Summary for Retail

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	1 veh/hr	0 veh/hr	1 veh/hr	3 veh/hr	2 veh/hr	5 veh/hr	181 veh
Transit	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	14 ppl/hr	26 ppl/hr	878 ppl
Bike	1 ppl/hr	0 ppl/hr	1 ppl/hr	2 ppl/hr	1 ppl/hr	3 ppl/hr	110 ppl
Walk	4 ppl/hr	3 ppl/hr	7 ppl/hr	12 ppl/hr	15 ppl/hr	27 ppl/hr	878 ppl

From 45 Q Street SW CTR

Trip Generation - Residential

60 dwelling units

Step 1: Base trip generation using ITE's *Trip Generation*, 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	221	60 du	5 veh/hr	16 veh/hr	21 veh/hr	16 veh/hr	11 veh/hr	27 veh/hr	325 veh
		Calculation Details	*26%*	*74%*	*Ln(T)=0.98Ln(X)-0.98*	*61%*	*39%*	*Ln(T)=0.96Ln(X)-0.63*	*=5.45X/1000-1.79*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	6 ppl/hr	19 ppl/hr	25 ppl/hr	19 ppl/hr	13 ppl/hr	32 ppl/hr	384 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	Auto	25%	2 ppl/hr	4 ppl/hr	6 ppl/hr	5 ppl/hr	3 ppl/hr	8 ppl/hr	96 ppl
Apartment	Transit	40%	2 ppl/hr	8 ppl/hr	10 ppl/hr	8 ppl/hr	5 ppl/hr	13 ppl/hr	154 ppl
Apartment	Bike	5%	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	2 ppl/hr	19 ppl
Apartment	Walk	30%	2 ppl/hr	6 ppl/hr	8 ppl/hr	5 ppl/hr	4 ppl/hr	9 ppl/hr	115 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	2 veh/hr	3 veh/hr	5 veh/hr	4 veh/hr	3 veh/hr	7 veh/hr	81 veh

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	2 veh/hr	3 veh/hr	5 veh/hr	4 veh/hr	3 veh/hr	7 veh/hr	81 veh
Transit	2 ppl/hr	8 ppl/hr	10 ppl/hr	8 ppl/hr	5 ppl/hr	13 ppl/hr	154 ppl
Bike	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	2 ppl/hr	19 ppl
Walk	2 ppl/hr	6 ppl/hr	8 ppl/hr	5 ppl/hr	4 ppl/hr	9 ppl/hr	115 ppl

Travel Demand Assumptions

This chapter outlines the 1319 South Capitol Street SW development's transportation demand. It summarizes the projected trip generation of the proposed project by mode, which forms the basis for the chapters that follow. These assumptions were vetted and approved by DDOT as a part of the scoping process for the study.

Traditionally, weekday peak hour trip generation is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 10th Edition. This methodology was supplemented to account for the urban nature of the project (*Trip Generation* provides data for non-urban, low transit use sites) and to generate trips for multiple modes, as vetted and approved by DDOT.

Existing Trip Generation

The site is currently occupied by eight (8) rowhouses and a 50-space surface parking lot.

Residential trip generation is based on the existing eight (8) rowhouses and was calculated based on ITE land use 210, *Single-Family Detached Housing*. Trips were split into auto and non-auto modes using assumptions derived from census data for the residents that currently live near the site, census data for the commuters that currently work near the site, and WMATA ridership survey data. As such, a 35% auto/65% non-auto mode split was assumed for the rowhouses. Detailed calculations are included in the Technical Attachments.

The existing 50-space surface parking lot is used primarily for sporting events and is assumed to have a peak occupancy outside of the typical weekday morning and afternoon peak hours. Therefore, it is conservatively assumed that the existing trips for the surface parking lot will not be included as a credit for the trip generation.

Proposed Trip Generation

Proposed residential and retail trip generation was calculated based on ITE land use 221, *Multifamily Housing (Mid-Rise)* and ITE land use 820, *Shopping Center*, respectively. To provide a more conservative approach, the trip generation assumes a 10% flexibility in the number of units. As such, the trip generation was assumed with a development program of 341 residential units and 3,479 SF of retail use.

Trips were split into different modes using assumptions derived from census data for the residents that currently live near the site, census data for the commuters that currently work near the site, WMATA ridership survey data, and the proposed parking supply. A summary of the mode split assumptions is provided in Table 3.

A summary of the multimodal trip generation for the proposed development based on ITE is provided in Table 4 for the morning, afternoon, and Saturday peak hours. Detailed calculations are included in the Technical Attachments.

Table 3: Mode Split Assumptions

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential	35%	45%	10%	10%
Retail	10%	5%	10%	75%

As shown on Table 4, the 1319 South Capitol Street SW development is expected to generate trips on the surrounding transportation network across all modes. The AM peak hour trip generation is projected to include 44 vehicles/hour, 65 transit riders/hour, 15 bicycle trips/hour, and 18 walking trips/hour. The PM peak hour trip generation is projected to include 54 vehicles/hour, 81 transit riders/hour, 20 bicycle trips/hour, and 36 walking trips/hour. The Saturday peak hour trip generation is projected to include 38 vehicles/hour, 58 transit riders/hour, 15 bicycle trips/hour, and 31 walking trips/hour.

A comparison of the vehicle trip generation between the existing site and the proposed development is presented in Table 5. As shown on Table 5, the 1319 South Capitol Street SW development results in a net increase in vehicular trip generation during the morning peak hour, with 41 additional vehicle trips (10 additional inbound and 31 additional outbound), and a net increase in vehicular trip generation during the afternoon peak hour, with 51 additional trips (31 additional inbound and 20 additional outbound).

Table 4: ITE Multi-Modal Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour			Saturday Peak Hour			Daily
	In	Out	Total	In	Out	Total	In	Out	Total	Total
Residential (341 Units)										
Auto (veh/hr)	11	32	43	32	21	53	19	18	37	650
Transit (ppl/hr)	17	48	65	49	31	80	28	29	57	986
Bike (ppl/hr)	4	11	15	11	7	18	6	7	13	219
Walk (ppl/hr)	4	10	14	11	6	17	6	7	13	219
Neighborhood-Serving Retail (3,479 SF)										
Auto (veh/hr)	0	1	1	1	0	1	1	0	1	13
Transit (ppl/hr)	0	0	0	1	0	1	1	0	1	12
Bike (ppl/hr)	0	0	0	1	1	2	1	1	2	24
Walk (ppl/hr)	4	0	4	8	11	19	10	8	18	178
Total										
Auto (veh/hr)	11	33	44	33	21	54	20	18	38	663
Transit (ppl/hr)	17	48	65	50	31	81	29	29	58	998
Bike (ppl/hr)	4	11	15	12	8	20	7	8	15	243
Walk (ppl/hr)	8	10	18	19	17	36	16	15	31	397

Table 5: Net Vehicular Trip Generation

Mode		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Existing Auto Trips (veh/hr)							
	Rowhouses	*1*	*2*	*3*	*2*	*1*	*3*
Proposed Auto Trips (veh/hr)							
	Residential	11	32	43	32	21	53
	Retail	0	1	1	1	0	1
	Total	11	33	44	33	21	54
Net Auto Trips (veh/hr)		**+10**	**+31**	**+41**	**+31**	**+20**	**+51**

As shown on Table 6, the Mixed-Use development scheme of the 5 M Street SW development is expected to generate trips on the surrounding transportation network across all modes. The AM peak hour trip generation is projected to include 192 vehicles/hour, 172 transit riders/hour, 41 bicycle trips/hour, and 93 walking trips/hour. The PM peak hour trip generation is projected to include 225 vehicles/hour, 214 transit riders/hour, 62 bicycle trips/hour, and 202 walking trips/hour. The Saturday peak hour trip generation is projected to include 99 vehicles/hour, 107 transit riders/hour, 29 bicycle trips/hour, and 78 walking trips/hour.

A comparison of the vehicle trip generation between the existing site and the proposed Mixed-Use development scheme is presented in Table 7. As shown on Table 7, the 5 M Street SW development results in an overall net increase in vehicular trip generation, with 78 additional vehicle trips (55 inbound and 23 outbound) during the morning peak hour and 127 additional vehicle trips (44 inbound and 83 outbound) during the afternoon peak hour.

Residential Scheme

Residential trip generation was calculated based on ITE land use 221, *Multifamily Housing (Mid-Rise)*. Trip generation for the neighborhood-serving retail components of the site was calculated based on ITE land use 820, *Shopping Center*. Trip generation for the potential grocer component of the site was calculated based on ITE land use 850, *Supermarket*.

Trips were split into different modes using assumptions derived from census data for the residents that currently live near the site, census data for the commuters that currently work near the site, WMATA ridership survey data, and the proposed parking supply. A summary of the mode split assumptions is provided in Table 5.

Pass-by trips are vehicular trips that are already present on the road network that now deviate from their existing route due to the addition of the proposed development. A pass-by reduction of 25 percent has been applied to the weekday AM and PM peak hours, as vetted and approved by DDOT. These pass-by rates are available on the ITE Trip Generation Handbook, 3rd Edition, for the potential grocer (ITE Land Use 850). A pass-by rate of 25 percent is applied to the Saturday peak hour to be consistent with the weekday AM and PM peak hours. The net site-generated vehicular trip results after pass-by reduction is summarized in Table 8.

A summary of the multimodal trip generation for the proposed Residential development scheme of the 5 M Street SW development based on ITE is provided in Table 9 for the morning, afternoon, and Saturday peak hours. Detailed calculations are included in the Technical Attachments.

Table 5: Mode Split Assumptions – Residential Scheme

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential	35%	45%	10%	10%
Retail	5%	5%	10%	80%
Grocer*	30%	20%	10%	40%

* Assumes 25% Pass-By trips

As shown on Table 8, the Residential development scheme of the 5 M Street SW development is expected to generate trips on the surrounding transportation network across all modes. The AM peak hour trip generation is projected to include 103 vehicles/hour, 151 transit riders/hour, 40 bicycle trips/hour, and 79 walking trips/hour. The PM peak hour trip generation is projected to include 144 vehicles/hour, 209 transit riders/hour, 66 bicycle trips/hour, and 183 walking trips/hour. The Saturday peak hour trip generation is projected to include 89 vehicles/hour, 132 transit riders/hour, 36 bicycle trips/hour, and 77 walking trips/hour.

A comparison of the vehicle trip generation between the existing site and the proposed Residential development scheme is presented in Table 9. As shown on Table 9, the 5 M Street SW development results in a net increase in vehicular trip generation during the morning peak hour, with 11 fewer vehicle trips (47 fewer inbound and 36 additional outbound), and a net increase in vehicular trip generation during the afternoon peak hour, with 46 additional trips (55 inbound and 9 fewer outbound).

Table 8: ITE Multi-Modal Trip Generation Summary – Residential Scheme

Mode	AM Peak Hour			PM Peak Hour			Saturday Peak Hour			Daily
	In	Out	Total	In	Out	Total	In	Out	Total	Total
Residential (688 Units)										
Auto (veh/hr)	23	35	47	35	22	57	37	39	76	707
Transit (ppl/hr)	34	98	132	98	63	161	56	60	116	1,990
Bike (ppl/hr)	8	21	29	22	14	36	13	13	26	442
Walk (ppl/hr)	7	22	29	22	14	36	13	13	26	443
Neighborhood-Serving Retail (10,755 SF)										
Auto (veh/hr)	1	0	1	1	1	2	1	0	1	20
Transit (ppl/hr)	1	0	1	2	2	4	1	0	1	37
Bike (ppl/hr)	1	1	2	4	4	8	1	2	3	74
Walk (ppl/hr)	8	6	14	28	31	59	11	10	21	591
Grocer (13,095 SF)										
Auto (veh/hr)	7	4	11	14	13	27	5	4	9	314
Auto (25% Pass-by) (veh/hr)	2	2	4	5	4	9	1	2	3	105
Transit (ppl/hr)	11	7	18	23	21	44	8	7	15	509
Bike (ppl/hr)	6	3	9	11	11	22	4	3	7	254
Walk (ppl/hr)	22	14	36	45	43	88	15	15	30	1,018
Total										
Auto (veh/hr)	31	68	99	79	56	135	43	43	86	1,646
Auto (25% Pass-by) (veh/hr)	2	2	4	5	4	9	1	2	3	105
Transit (ppl/hr)	46	105	151	123	86	209	65	67	132	2,536
Bike (ppl/hr)	15	25	40	37	29	66	18	18	36	770
Walk (ppl/hr)	37	42	79	95	88	183	39	38	77	2,052

Table 9: Net Vehicular Trip Generation – Residential Scheme

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Existing Auto Trips (veh/hr)						
Convenience Market	*25*	*25*	*50*	*20*	*19*	*39*
Parking Lot	*55*	*9*	*64*	*9*	*50*	*59*
Existing Total	80	34	114	29	69	98
Proposed Auto Trips (veh/hr)*						
Residential Scheme Total	33	70	103	84	60	144
Net Auto Trips (veh/hr)	**-47**	**+36**	**-11**	**+55**	**-9**	**+46**

* Includes auto and pass-by trips

Table 9
Site Trip Generation Summary

Land Use		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Proposed Development							
485 DU Apartment (LUC 230)	Total Trips	48	193	241	185	99	284
	Non-auto Trips	*24*	*97*	*121*	*93*	*50*	*143*
	Transit	*18*	*72*	*90*	*69*	*37*	*106*
	Bicycle	*2*	*8*	*10*	*7*	*4*	*11*
	Pedestrian	*4*	*17*	*21*	*17*	*9*	*26*
	Vehicle Trips	24	96	120	92	49	141
38,087 SF Quality Restaurant* (LUC 931)	Total Trips	25	6	31	191	94	285
	Non-auto Trips	*5*	*1*	*6*	*38*	*19*	*57*
	Transit	*2*	*-*	*4*	*15*	*8*	*23*
	Bicycle	*-*	*-*	*-*	*4*	*2*	*6*
	Pedestrian	*3*	*1*	*2*	*19*	*9*	*28*
	Vehicle Trips	20	5	25	153	75	228
33,368 SF Retail* (LUC 820)	Total Trips	49	31	80	138	149	287
	Non-auto Trips	*29*	*18*	*47*	*83*	*90*	*173*
	Transit	*7*	*4*	*11*	*21*	*23*	*43*
	Bicycle	*5*	*3*	*8*	*14*	*15*	*29*
	Pedestrian	*17*	*11*	*28*	*48*	*52*	*101*
	Vehicle Trips	20	13	33	55	59	114
Total Proposed Development	Total Trips	122	230	352	514	342	856
	Non-auto Trips	*58*	*116*	*174*	*214*	*159*	*373*
	Transit	*27*	*76*	*105*	*105*	*68*	*172*
	Bicycle	*7*	*11*	*18*	*25*	*21*	*46*
	Pedestrian	*24*	*29*	*51*	*84*	*70*	*155*
	Vehicle Trips	64	114	178	300	183	483

* The square footage for the retail and restaurant uses do not include areas devoted to parking or loading.

Non-auto Mode Split

A portion of the trips generated by the proposed development would be made via non-auto modes of transportation. The percentage of site-generated trips that would use public transportation is dependent on the proximity of the site to transit stops, the walkability of the surrounding area, and the degree to which the use of public transit is encouraged, such as by implementation of a transportation demand management (TDM) program.

From Peninsula 88 CTR

Table 9
Site Trip Generation Summary

Land Use		AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	*Total*
Proposed Development							
110 DU Condominium (LUC 230)	Total Trips	10	46	56	44	21	65
	Non-auto Trips	*3*	*14*	*17*	*13*	*6*	*19*
	Transit	*2*	*10*	*12*	*10*	*5*	*14*
	Bicycle	-	*1*	*1*	*1*	-	*1*
	Pedestrian	*1*	*3*	*4*	*2*	*1*	*4*
	Vehicle Trips	7	32	39	31	15	46
1,700 SF Retail (LUC 820)	Total Trips	8	5	13	19	20	39
	Non-auto Trips	*5*	*3*	*8*	*11*	*12*	*23*
	Transit	*1*	*1*	*2*	*3*	*3*	*6*
	Bicycle	*1*	-	*1*	*1*	*2*	*4*
	Pedestrian	*3*	*2*	*5*	*7*	*7*	*13*
	Vehicle Trips	3	2	5	8	8	16
Total Proposed Development	Total Trips	18	51	69	63	41	104
	Non-auto Trips	*8*	*17*	*25*	*24*	*18*	*42*
	Transit	*3*	*11*	*14*	*13*	*8*	*20*
	Bicycle	*1*	*1*	*2*	*2*	*2*	*5*
	Pedestrian	*4*	*5*	*9*	*9*	*8*	*17*
	Vehicle Trips	10	34	44	39	23	62

Non-auto Mode Split

A portion of the trips generated by the proposed development would be made via non-auto modes of transportation. The percentage of site-generated trips that would use public transportation is dependent on the proximity of the site to transit stops, the walkability of the surrounding area, and the degree to which the use of public transit is encouraged, such as by implementation of a transportation demand management (TDM) program.

According to US Census data, approximately 40 percent of residents in the vicinity of the site take public transportation, walk, or bike to work. Another four percent carpool and another seven percent stay home. However, as requested by DDOT, a non-auto mode split of 30 percent was used for the residential component based on the proposed parking supply and the fact that the subject site is situated further from the Metro station than other locations within the same Census Tract. As agreed by DDOT, the non-auto mode split

Mode Split Assumptions 1900 Half Street (Watermark)

Existing Office

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Employees (20388)	50.0%	19.0%	23.0%	2.0%	1.0%	3.0%	2.0%
WMATA DRRS Office Avg. Suburban-Inside the Beltway	66%		30%	6%			

Mode Split assumed in TIS:

Land Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Office Mode Split	75%	15%	5%	5%	0.0%

Residential Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Census Tract 64	34.0%	3.0%	41.0%	0.0%	20.0%	2.0%	1.0%
CTPP - TAZ Residents (20388)	27.0%	0.0%	0.0%	0.0%	13.0%	61.0%	0.0%
WMATA DRRS Residential Avg. Suburban-Inside the Beltway	39.0%		49.0%	14.0%			
State of the Commute (of District residents)	41%	7%	41%	11%		---	

Mode Split assumed in TIS:

Land Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Residential Mode Split	60%	30%	5%	5%	0.0%

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Employees (20388)	50.0%	19.0%	23.0%	2.0%	1.0%	3.0%	2.0%
WMATA DRRS Avg. Retail Sites	36%		37%	27%			

Mode Split assumed in TIS:

Land Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	50%	30%	10%	10%	0.0%

Verge/The Stacks

Mode Split Assumptions

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Workplace Census Data - TAZ (20388)	63%	16%	17%	2%	2%	0%	0%
45 Q CTR Retail	15%		40%	5%	40%	---	
WMATA Ridership Survey (Average for Retail Sites)	36%		37%	27%		---	

Mode Split assumed in CTR:

Information Source	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	20%	35%	5%	40%	---

Residential Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
Residential Census Data - TAZ (20388)	6%	0%	6%	0%	82%	6%	0%
Adjacent Residential Census Data - TAZ (10369)	35%	3%	32%	5%	18%	6%	1%
Residential Census Data - Census Tract 64	27%	1%	28%	13%	18%	13%	--
45 Q CTR Residential	25%		40%	5%	30%	---	

Mode Split assumed in CTR:

Information Source	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Residential Mode Split	40%	30%	10%	20%	---

Trip Generation - Verge Retail

10,200 square feet of ground floor retail

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	820	10,200 sf	6 veh/hr	4 veh/hr	10 veh/hr	19 veh/hr	20 veh/hr	39 veh/hr	1,273 veh
		Calculation Details:	*62%*	*38%*	*=0.94(X/1000)*	*48%*	*52%*	*=3.81(X/1000)*	*Ln(T)=0.68Ln(X/1000)+5.57*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	11 ppl/hr	7 ppl/hr	18 ppl/hr	35 ppl/hr	36 ppl/hr	71 ppl/hr	2,317 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	Auto	20%	2 ppl/hr	2 ppl/hr	4 ppl/hr	7 ppl/hr	7 ppl/hr	14 ppl/hr	463 ppl
Shopping Center	Transit	35%	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	13 ppl/hr	25 ppl/hr	811 ppl
Shopping Center	Bike	5%	1 ppl/hr	0 ppl/hr	1 ppl/hr	2 ppl/hr	2 ppl/hr	4 ppl/hr	116 ppl
Shopping Center	Walk	40%	4 ppl/hr	3 ppl/hr	7 ppl/hr	14 ppl/hr	14 ppl/hr	28 ppl/hr	927 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	1 veh/hr	1 veh/hr	2 veh/hr	4 veh/hr	4 veh/hr	8 veh/hr	254 veh

Trip Gen Summary for Retail

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	1 veh/hr	1 veh/hr	2 veh/hr	4 veh/hr	4 veh/hr	8 veh/hr	254 veh
Transit	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	13 ppl/hr	25 ppl/hr	811 ppl
Bike	1 ppl/hr	0 ppl/hr	1 ppl/hr	2 ppl/hr	2 ppl/hr	4 ppl/hr	116 ppl
Walk	4 ppl/hr	3 ppl/hr	7 ppl/hr	14 ppl/hr	14 ppl/hr	28 ppl/hr	927 ppl

Trip Generation - Verge Residential

344 dwelling units

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	222	344 du	26 veh/hr	83 veh/hr	109 veh/hr	77 veh/hr	49 veh/hr	126 veh/hr	1,567 veh
		Calculation Details:	*24%*	*76%*	*=0.28X+12.86*	*61%*	*39%*	*=0.34X+8.56*	*=3.94X+211.81*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	31 ppl/hr	98 ppl/hr	129 ppl/hr	91 ppl/hr	58 ppl/hr	149 ppl/hr	1,849 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	Auto	40%	12 ppl/hr	40 ppl/hr	52 ppl/hr	36 ppl/hr	24 ppl/hr	60 ppl/hr	740 ppl
Apartment	Transit	30%	9 ppl/hr	30 ppl/hr	39 ppl/hr	27 ppl/hr	18 ppl/hr	45 ppl/hr	555 ppl
Apartment	Bike	10%	3 ppl/hr	10 ppl/hr	13 ppl/hr	9 ppl/hr	6 ppl/hr	15 ppl/hr	185 ppl
Apartment	Walk	20%	7 ppl/hr	18 ppl/hr	25 ppl/hr	19 ppl/hr	10 ppl/hr	29 ppl/hr	369 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	10 veh/hr	34 veh/hr	44 veh/hr	31 veh/hr	20 veh/hr	51 veh/hr	627 veh

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	10 veh/hr	34 veh/hr	44 veh/hr	31 veh/hr	20 veh/hr	51 veh/hr	627 veh
Transit	9 ppl/hr	30 ppl/hr	39 ppl/hr	27 ppl/hr	18 ppl/hr	45 ppl/hr	555 ppl
Bike	3 ppl/hr	10 ppl/hr	13 ppl/hr	9 ppl/hr	6 ppl/hr	15 ppl/hr	185 ppl
Walk	7 ppl/hr	18 ppl/hr	25 ppl/hr	19 ppl/hr	10 ppl/hr	29 ppl/hr	369 ppl

Trip Generation - Stacks Retail

80,000 square feet of ground floor retail

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	820	80,000 sf	47 veh/hr	28 veh/hr	75 veh/hr	146 veh/hr	159 veh/hr	305 veh/hr	5,166 veh
		Calculation Details:	*62%*	*38%*	*=0.94(X/1000)*	*48%*	*52%*	*=3.81(X/1000)*	*Ln(T)=0.68Ln(X/1000)+5.57*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	86 ppl/hr	51 ppl/hr	137 ppl/hr	266 ppl/hr	289 ppl/hr	555 ppl/hr	9,402 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Shopping Center	Auto	20%	17 ppl/hr	10 ppl/hr	27 ppl/hr	53 ppl/hr	58 ppl/hr	111 ppl/hr	1,880 ppl
Shopping Center	Transit	35%	30 ppl/hr	18 ppl/hr	48 ppl/hr	93 ppl/hr	101 ppl/hr	194 ppl/hr	3,291 ppl
Shopping Center	Bike	5%	4 ppl/hr	3 ppl/hr	7 ppl/hr	13 ppl/hr	15 ppl/hr	28 ppl/hr	470 ppl
Shopping Center	Walk	40%	35 ppl/hr	20 ppl/hr	55 ppl/hr	107 ppl/hr	115 ppl/hr	222 ppl/hr	3,761 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Shopping Center	1.82 ppl/veh	9 veh/hr	6 veh/hr	15 veh/hr	29 veh/hr	32 veh/hr	61 veh/hr	1,033 veh

Trip Gen Summary for Retail

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	9 veh/hr	6 veh/hr	15 veh/hr	29 veh/hr	32 veh/hr	61 veh/hr	1,033 veh
Transit	30 ppl/hr	18 ppl/hr	48 ppl/hr	93 ppl/hr	101 ppl/hr	194 ppl/hr	3,291 ppl
Bike	4 ppl/hr	3 ppl/hr	7 ppl/hr	13 ppl/hr	15 ppl/hr	28 ppl/hr	470 ppl
Walk	35 ppl/hr	20 ppl/hr	55 ppl/hr	107 ppl/hr	115 ppl/hr	222 ppl/hr	3,761 ppl

Trip Generation - Stacks Residential

2000 dwelling units

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	222	2,000 du	138 veh/hr	435 veh/hr	573 veh/hr	420 veh/hr	269 veh/hr	689 veh/hr	8,092 veh
		Calculation Details:	*24%*	*76%*	*=0.28X+12.86*	*61%*	*39%*	*=0.34X+8.56*	*=3.94X+211.81*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	163 ppl/hr	513 ppl/hr	676 ppl/hr	496 ppl/hr	317 ppl/hr	813 ppl/hr	9,549 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Apartment	Auto	40%	65 ppl/hr	205 ppl/hr	270 ppl/hr	198 ppl/hr	127 ppl/hr	325 ppl/hr	3,820 ppl
Apartment	Transit	30%	49 ppl/hr	154 ppl/hr	203 ppl/hr	149 ppl/hr	95 ppl/hr	244 ppl/hr	2,865 ppl
Apartment	Bike	10%	16 ppl/hr	52 ppl/hr	68 ppl/hr	50 ppl/hr	31 ppl/hr	81 ppl/hr	955 ppl
Apartment	Walk	20%	33 ppl/hr	102 ppl/hr	135 ppl/hr	99 ppl/hr	64 ppl/hr	163 ppl/hr	1,909 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	55 veh/hr	174 veh/hr	229 veh/hr	168 veh/hr	107 veh/hr	275 veh/hr	3,237 veh

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	55 veh/hr	174 veh/hr	229 veh/hr	168 veh/hr	107 veh/hr	275 veh/hr	3,237 veh
Transit	49 ppl/hr	154 ppl/hr	203 ppl/hr	149 ppl/hr	95 ppl/hr	244 ppl/hr	2,865 ppl
Bike	16 ppl/hr	52 ppl/hr	68 ppl/hr	50 ppl/hr	31 ppl/hr	81 ppl/hr	955 ppl
Walk	33 ppl/hr	102 ppl/hr	135 ppl/hr	99 ppl/hr	64 ppl/hr	163 ppl/hr	1,909 ppl

Trip Generation - Stacks Office

250,000 square feet of office

Step 1: Base trip generation using ITEs' *Trip Generation* 10th Edition

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Office	710	250,000 sf	224 veh/hr	37 veh/hr	261 veh/hr	44 veh/hr	228 veh/hr	272 veh/hr	2,581 veh
		Calculation Details:	*86%*	*14%*	*=0.94X*	*16%*	*84%*	*=0.95Ln(X/1000)*	*=(T)=0.97Ln(X/1000)+2.5*

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Office	1.18 ppl/veh	264 ppl/hr	44 ppl/hr	308 ppl/hr	52 ppl/hr	269 ppl/hr	321 ppl/hr	3,046 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Weekday
			In	Out	Total	In	Out	Total	Total
Office	Auto	40%	106 ppl/hr	17 ppl/hr	123 ppl/hr	21 ppl/hr	107 ppl/hr	128 ppl/hr	1,218 ppl
Office	Transit	40%	106 ppl/hr	17 ppl/hr	123 ppl/hr	21 ppl/hr	107 ppl/hr	128 ppl/hr	1,218 ppl
Office	Bike	5%	13 ppl/hr	2 ppl/hr	15 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr	152 ppl
Office	Walk	15%	39 ppl/hr	8 ppl/hr	47 ppl/hr	7 ppl/hr	42 ppl/hr	49 ppl/hr	458 ppl

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2017 NHTS, Table 16)	AM Peak Hour			PM Peak Hour			Weekday
		In	Out	Total	In	Out	Total	Total
Apartment	1.18 ppl/veh	90 veh/hr	14 veh/hr	104 veh/hr	18 veh/hr	90 veh/hr	108 veh/hr	1,032 veh

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	90 veh/hr	14 veh/hr	104 veh/hr	18 veh/hr	90 veh/hr	108 veh/hr	1,032 veh
Transit	106 ppl/hr	17 ppl/hr	123 ppl/hr	21 ppl/hr	107 ppl/hr	128 ppl/hr	1,218 ppl
Bike	13 ppl/hr	2 ppl/hr	15 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr	152 ppl
Walk	39 ppl/hr	8 ppl/hr	47 ppl/hr	7 ppl/hr	42 ppl/hr	49 ppl/hr	458 ppl

Trip Generation - Maximum Existing Office
665,928sf of office

Step 1: Base trip generation using ITEs' *Trip Generation*

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	710	665,928 du	767 veh/hr	105 veh/hr	872 veh/hr	140 veh/hr	684 veh/hr	824 veh/hr

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	867 ppl/hr	118 ppl/hr	985 ppl/hr	158 ppl/hr	773 ppl/hr	931 ppl/hr

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	Auto	75%	650 ppl/hr	89 ppl/hr	739 ppl/hr	119 ppl/hr	579 ppl/hr	698 ppl/hr
Office	Transit	15%	130 ppl/hr	18 ppl/hr	148 ppl/hr	24 ppl/hr	116 ppl/hr	140 ppl/hr
Office	Bike	5%	43 ppl/hr	6 ppl/hr	49 ppl/hr	8 ppl/hr	39 ppl/hr	47 ppl/hr
Office	Walk	5%	43 ppl/hr	6 ppl/hr	49 ppl/hr	8 ppl/hr	39 ppl/hr	47 ppl/hr

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	575 veh/hr	79 veh/hr	654 veh/hr	105 veh/hr	513 veh/hr	618 veh/hr

Trip Gen Summary for Existing Office

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	575 veh/hr	79 veh/hr	654 veh/hr	105 veh/hr	513 veh/hr	618 veh/hr
Transit	130 ppl/hr	18 ppl/hr	148 ppl/hr	24 ppl/hr	116 ppl/hr	140 ppl/hr
Bike	43 ppl/hr	6 ppl/hr	49 ppl/hr	8 ppl/hr	39 ppl/hr	47 ppl/hr
Walk	43 ppl/hr	6 ppl/hr	49 ppl/hr	8 ppl/hr	39 ppl/hr	47 ppl/hr

Trip Generation - Existing Occupied Office
70,297sf of office

Step 1: Base trip generation using ITEs' *Trip Generation*

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	710	70,297 du	127 veh/hr	17 veh/hr	144 veh/hr	27 veh/hr	130 veh/hr	157 veh/hr

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	144 ppl/hr	19 ppl/hr	163 ppl/hr	31 ppl/hr	146 ppl/hr	177 ppl/hr

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	Auto	75%	108 ppl/hr	14 ppl/hr	122 ppl/hr	23 ppl/hr	110 ppl/hr	133 ppl/hr
Office	Transit	15%	22 ppl/hr	2 ppl/hr	24 ppl/hr	5 ppl/hr	22 ppl/hr	27 ppl/hr
Office	Bike	5%	7 ppl/hr	1 ppl/hr	8 ppl/hr	2 ppl/hr	7 ppl/hr	9 ppl/hr
Office	Walk	5%	7 ppl/hr	1 ppl/hr	8 ppl/hr	2 ppl/hr	7 ppl/hr	9 ppl/hr

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	96 veh/hr	12 veh/hr	108 veh/hr	20 veh/hr	98 veh/hr	118 veh/hr

Trip Gen Summary for Existing Office

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	96 veh/hr	12 veh/hr	108 veh/hr	20 veh/hr	98 veh/hr	118 veh/hr
Transit	22 ppl/hr	2 ppl/hr	24 ppl/hr	5 ppl/hr	22 ppl/hr	27 ppl/hr
Bike	7 ppl/hr	1 ppl/hr	8 ppl/hr	2 ppl/hr	7 ppl/hr	9 ppl/hr
Walk	7 ppl/hr	1 ppl/hr	8 ppl/hr	2 ppl/hr	7 ppl/hr	9 ppl/hr

Trip Generation - Residential
-approximately 462 units

Step 1: Base trip generation using ITEs' *Trip Generation*

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Apartments	220	462 du	46 veh/hr	184 veh/hr	230 veh/hr	177 veh/hr	95 veh/hr	272 veh/hr

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Apartments	1.13 ppl/veh	52 ppl/hr	208 ppl/hr	260 ppl/hr	200 ppl/hr	107 ppl/hr	307 ppl/hr

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Apartments	Auto	60%	31 ppl/hr	125 ppl/hr	156 ppl/hr	120 ppl/hr	64 ppl/hr	184 ppl/hr
Apartments	Transit	30%	16 ppl/hr	62 ppl/hr	78 ppl/hr	60 ppl/hr	32 ppl/hr	92 ppl/hr
Apartments	Bike	5%	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
Apartments	Walk	5%	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Apartments	1.13 ppl/veh	27 veh/hr	111 veh/hr	138 veh/hr	106 veh/hr	57 veh/hr	163 veh/hr

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	27 veh/hr	111 veh/hr	138 veh/hr	106 veh/hr	57 veh/hr	163 veh/hr
Transit	16 ppl/hr	62 ppl/hr	78 ppl/hr	60 ppl/hr	32 ppl/hr	92 ppl/hr
Bike	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
Walk	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr

Trip Generation - Retail

-approximately 24,032 sf

Step 1: Base trip generation using ITEs' *Trip Generation*

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Retail	820	24,032 sf	14 veh/hr	9 veh/hr	23 veh/hr	43 veh/hr	46 veh/hr	89 veh/hr

Step 2: Convert to people per hour, before applying mode splits

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Retail	1.78 ppl/veh	25 ppl/hr	16 ppl/hr	41 ppl/hr	77 ppl/hr	81 ppl/hr	158 ppl/hr

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Retail	Auto	50%	13 ppl/hr	8 ppl/hr	21 ppl/hr	39 ppl/hr	40 ppl/hr	79 ppl/hr
Retail	Transit	30%	8 ppl/hr	4 ppl/hr	12 ppl/hr	23 ppl/hr	24 ppl/hr	47 ppl/hr
Retail	Bike	10%	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr
Retail	Walk	10%	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr

Step 4: Convert auto trips back to vehicles/hour

Land Use	People/Car (from 2009 NHTS, Table 16)	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Retail	1.78 ppl/veh	7 veh/hr	5 veh/hr	12 veh/hr	22 veh/hr	22 veh/hr	44 veh/hr

Trip Gen Summary for Retail

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	7 veh/hr	5 veh/hr	12 veh/hr	22 veh/hr	22 veh/hr	44 veh/hr
Transit	8 ppl/hr	4 ppl/hr	12 ppl/hr	23 ppl/hr	24 ppl/hr	47 ppl/hr
Bike	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr
Walk	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr

Trip Gen Summary by Land Use/Mode

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Apartments	27 veh/hr	111 veh/hr	138 veh/hr	106 veh/hr	57 veh/hr	163 veh/hr
Auto	Retail	7 veh/hr	5 veh/hr	12 veh/hr	22 veh/hr	22 veh/hr	44 veh/hr
Auto	**Total**	**34 veh/hr**	**116 veh/hr**	**150 veh/hr**	**128 veh/hr**	**79 veh/hr**	**207 veh/hr**
Transit	Apartments	16 ppl/hr	62 ppl/hr	78 ppl/hr	60 ppl/hr	32 ppl/hr	92 ppl/hr
Transit	Retail	8 ppl/hr	4 ppl/hr	12 ppl/hr	23 ppl/hr	24 ppl/hr	47 ppl/hr
Transit	**Total**	**24 ppl/hr**	**66 ppl/hr**	**90 ppl/hr**	**83 ppl/hr**	**56 ppl/hr**	**139 ppl/hr**
Bike	Apartments	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
Bike	Retail	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr
Bike	**Total**	**6 ppl/hr**	**11 ppl/hr**	**17 ppl/hr**	**18 ppl/hr**	**13 ppl/hr**	**31 ppl/hr**
Walk	Apartments	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
Walk	Retail	3 ppl/hr	1 ppl/hr	4 ppl/hr	8 ppl/hr	8 ppl/hr	16 ppl/hr
Walk	**Total**	**6 ppl/hr**	**11 ppl/hr**	**17 ppl/hr**	**18 ppl/hr**	**13 ppl/hr**	**31 ppl/hr**

D. Existing Turning Movement Counts

Gorove/Slade Associates - Multimodal Turning Movement Count Report

Project Name : Yards Parcel G
Project # : 1977-029
Location Washington, DC
Data Source: Gorove/Slade Associates, Inc.

Analysis Period: STUDY_PERIOD 04:00 PM to 07:00 PM
Date of Counts: Thursday, February 7, 2019
Weather: Cloudy

Volumes Displayed as: 1. Intersection Peak (vehicle)
Intersection Peak Hour (all vehicles): 04:30 PM to 05:30 PM
System Peak Hour (all vehicles): 04:00 PM to 05:00 PM
User-Defined Peak Hour: 05:00 PM to 06:00 PM

Intersection: 1. S Capital Street SE & Potomac Avenue SE

ALL VEHICLES

Direction:	Southbound					Westbound					Northbound					Eastbound				
Roadway:	S Capital Street SE					Potomac Avenue SE					S Capital Street SE					Potomac Avenue SE				
Movement:	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds
04:00 PM to 04:15 PM	0	0	439	2	0	0	134	10	2	0	0	0	285	45	0	0	9	3	79	1
04:15 PM to 04:30 PM	0	0	442	0	0	0	128	8	2	1	0	0	291	42	0	0	10	4	98	2
04:30 PM to 04:45 PM	0	0	462	0	0	0	126	7	1	1	0	0	295	41	2	0	12	5	118	2
04:45 PM to 05:00 PM	0	0	477	1	0	0	127	6	3	1	0	0	294	43	0	0	8	8	116	1
05:00 PM to 05:15 PM	0	0	469	1	0	0	125	4	4	2	0	0	255	39	0	0	8	5	114	2
05:15 PM to 05:30 PM	0	0	465	0	1	0	133	1	5	0	0	0	273	40	0	0	5	2	115	1
05:30 PM to 05:45 PM	0	0	459	1	0	0	137	4	5	2	0	0	289	35	0	0	4	2	112	1
05:45 PM to 06:00 PM	0	0	459	1	1	0	140	11	7	4	0	0	301	42	0	0	3	3	107	1
06:00 PM to 06:15 PM	0	0	473	2	0	0	129	6	6	3	0	0	299	30	1	0	5	4	78	1
06:15 PM to 06:30 PM	0	0	481	2	2	0	117	3	5	1	0	0	265	20	0	0	4	4	55	1
06:30 PM to 06:45 PM	0	1	470	3	1	0	81	2	8	0	0	0	244	26	1	0	5	3	29	0
06:45 PM to 07:00 PM	0	0	420	4	1	0	54	5	10	1	0	0	241	13	4	0	2	5	16	1
07:00 PM to 07:15 PM																				
07:15 PM to 07:30 PM																				
07:30 PM to 07:45 PM																				
07:45 PM to 08:00 PM																				
08:00 PM to 08:15 PM																				
08:15 PM to 08:30 PM																				
08:30 PM to 08:45 PM																				
08:45 PM to 09:00 PM																				
INT. PEAK HR (ALL VEH)	1875				1	542				4	1280				2	516				6
04:30 PM to 05:30 PM	0	0	1873	2		0	511	18	13		0	0	1117	163		0	33	20	463	
Peak Hour Overall	U	Left	Thru	Right	**SB**	U	Left	Thru	Right	**WB**	U	Left	Thru	Right	**NB**	U	Left	Thru	Right	**EB**
Factor (PHF) 0.97	n/a	n/a	0.98	0.50	**0.98**	n/a	0.96	0.64	0.65	**0.97**	n/a	n/a	0.95	0.95	**0.95**	n/a	0.69	0.63	0.98	**0.96**

HEAVY VEHICLES (FHWA 4+)

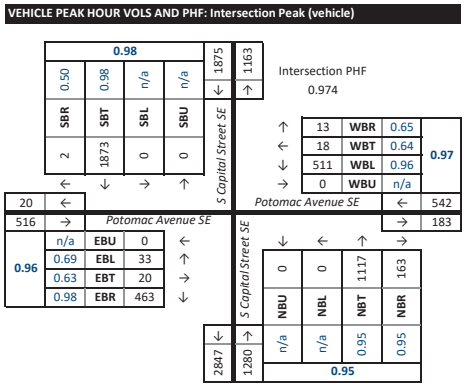
Direction:	Southbound					Westbound					Northbound					Eastbound				
Roadway:	S Capital Street SE					Potomac Avenue SE					S Capital Street SE					Potomac Avenue SE				
Movement:	U	Left	Thru	Right		U	Left	Thru	Right		U	Left	Thru	Right		U	Left	Thru	Right	
04:00 PM to 04:15 PM	0	0	11	0		0	2	3	0		0	0	11	0		0	3	0	1	
04:15 PM to 04:30 PM	0	0	12	0		0	2	3	0		0	0	9	1		0	2	1	0	
04:30 PM to 04:45 PM	0	0	11	0		0	2	2	0		0	0	9	1		0	1	2	0	
04:45 PM to 05:00 PM	0	0	13	1		0	3	2	0		0	0	8	0		0	0	0	0	
05:00 PM to 05:15 PM	0	0	10	0		0	1	1	0		0	0	6	0		0	0	1	1	
05:15 PM to 05:30 PM	0	0	14	0		0	2	0	0		0	0	11	0		0	0	0	0	
05:30 PM to 05:45 PM	0	0	6	0		0	2	1	0		0	0	5	0		0	1	0	0	
05:45 PM to 06:00 PM	0	0	10	0		0	1	2	0		0	0	12	0		0	0	1	2	
06:00 PM to 06:15 PM	0	0	8	0		0	0	0	0		0	0	5	0		0	0	0	1	
06:15 PM to 06:30 PM	0	0	8	0		0	1	1	0		0	0	10	0		0	0	0	2	
06:30 PM to 06:45 PM	0	0	3	0		0	0	0	0		0	0	9	0		0	0	0	1	
06:45 PM to 07:00 PM	0	0	8	1		0	0	0	0		0	0	10	0		0	0	1	0	
07:00 PM to 07:15 PM																				
07:15 PM to 07:30 PM																				
07:30 PM to 07:45 PM																				
07:45 PM to 08:00 PM																				
08:00 PM to 08:15 PM																				
08:15 PM to 08:30 PM																				
08:30 PM to 08:45 PM																				
08:45 PM to 09:00 PM																				
INT. PEAK HR (ALL VEH)	49					13					35					5				
04:30 PM to 05:30 PM	0	0	48	1		0	8	5	0		0	0	34	1		0	1	3	1	
Heavy Vehicle % (PHV):	0.0%	0.0%	2.6%	50.0%	**2.6%**	0.0%	1.6%	27.8%	0.0%	**2.4%**	0.0%	0.0%	3.0%	0.6%	**2.7%**	0.0%	3.0%	15.0%	0.2%	**1.0%**
INT. PEAK HR (HV ONLY)	48					19					39					10				
04:00 PM to 05:00 PM	0	0	47	1		0	9	10	0		0	0	37	2		0	6	3	1	
Heavy Vehicle % (PHV):	0.0%	0.0%	2.6%	33.3%	**2.6%**	0.0%	1.7%	32.3%	0.0%	**3.4%**	0.0%	0.0%	3.2%	1.2%	**2.9%**	0.0%	15.4%	15.0%	0.2%	**2.1%**

BICYCLES

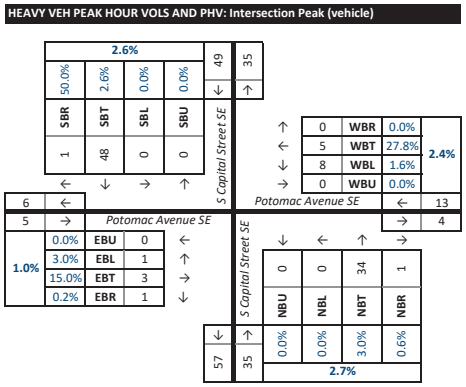
Direction:	Southbound				Westbound				Northbound				Eastbound			
Roadway:	S Capital Street SE				Potomac Avenue SE				S Capital Street SE				Potomac Avenue SE			
Movement:	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right
04:00 PM to 04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM to 04:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
04:30 PM to 04:45 PM	0	0	1	0	0	0	0	0	0	0	5	0	0	0	1	1
04:45 PM to 05:00 PM	0	0	1	0	0	0	1	0	0	0	5	0	0	0	0	0
05:00 PM to 05:15 PM	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0
05:15 PM to 05:30 PM	0	0	1	0	0	0	1	0	0	1	1	1	0	0	1	0
05:30 PM to 05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM to 06:00 PM	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0
06:00 PM to 06:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
06:15 PM to 06:30 PM	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0	0
06:30 PM to 06:45 PM	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0
06:45 PM to 07:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
07:00 PM to 07:15 PM																
07:15 PM to 07:30 PM																
07:30 PM to 07:45 PM																
07:45 PM to 08:00 PM																
08:00 PM to 08:15 PM																
08:15 PM to 08:30 PM																
08:30 PM to 08:45 PM																
08:45 PM to 09:00 PM																
INT. PEAK HR (ALL VEH)	5				2				15				3			
04:30 PM to 05:30 PM	0	0	5	0	0	0	2	0	0	1	13	1	0	0	2	1
INT. PEAK HR (BIKES)	5				2				15				3			
04:30 PM to 05:30 PM	0	0	5	0	0	0	2	0	0	1	13	1	0	0	2	1

DATA COLLECTION NOTES :

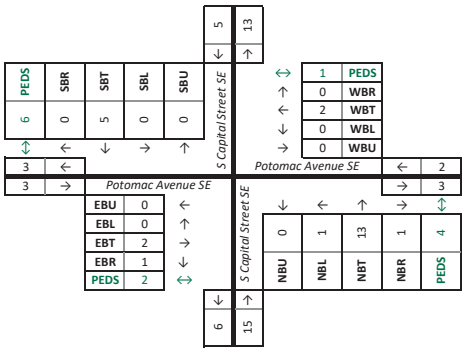
VEHICLE PEAK HOUR VOLS AND PHF: Intersection Peak (vehicle)



HEAVY VEH PEAK HOUR VOLS AND PHV: Intersection Peak (vehicle)



PED AND BIKE PEAK HOUR VOLUMES: Intersection Peak (vehicle)



Gorove/Slade Associates - Multimodal Turning Movement Count Report

Project Name : Yards Parcel G
Project # : 1977-029
Location Washington, DC
Data Source: Gorove/Slade Associates, Inc.

Analysis Period: STUDY_PERIOD 06:30 AM to 09:30 AM
Date of Counts: Thursday, February 7, 2019
Weather: Cloudy

Volumes Displayed as: 1. Intersection Peak (vehicle)
Intersection Peak Hour (all vehicles): 06:45 AM to 07:45 AM
System Peak Hour (all vehicles): 08:00 AM to 09:00 AM
User-Defined Peak Hour: 07:30 AM to 08:30 AM

Intersection: 1. S Capital Street SE & Potomac Avenue SE

ALL VEHICLES

Direction:	Southbound					Westbound					Northbound					Eastbound				
Roadway:	S Capital Street SE					Potomac Avenue SE					S Capital Street SE					Potomac Avenue SE				
Movement:	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds	U	Left	Thru	Right	Peds
06:30 AM to 06:45 AM	0	0	222	26	1	0	23	25	4	3	0	2	665	87	4	0	6	10	4	0
06:45 AM to 07:00 AM	0	0	269	12	1	0	24	37	4	5	0	2	641	118	4	0	4	5	10	1
07:00 AM to 07:15 AM	0	0	291	13	0	0	29	33	7	4	0	3	635	105	4	0	4	7	9	2
07:15 AM to 07:30 AM	0	0	293	14	1	0	30	35	8	2	0	3	594	106	2	1	4	8	8	3
07:30 AM to 07:45 AM	0	0	266	11	0	0	35	32	6	3	0	2	675	97	2	0	6	7	7	2
07:45 AM to 08:00 AM	0	0	273	7	0	0	41	33	7	2	0	2	658	85	4	0	5	7	6	1
08:00 AM to 08:15 AM	0	0	279	8	0	0	35	28	6	4	0	1	627	89	3	1	7	5	5	0
08:15 AM to 08:30 AM	0	0	253	8	0	0	38	25	6	3	0	1	662	93	1	0	9	6	12	0
08:30 AM to 08:45 AM	1	0	231	11	1	0	43	25	6	1	0	1	695	113	0	0	5	6	11	0
08:45 AM to 09:00 AM	0	0	207	12	0	0	38	27	7	1	0	2	690	105	1	0	6	7	10	1
09:00 AM to 09:15 AM	0	0	231	14	1	0	36	28	8	1	0	2	621	101	2	1	8	8	9	0
09:15 AM to 09:30 AM	0	0	269	6	2	0	26	36	6	0	0	0	675	105	0	0	11	6	8	0
09:30 AM to 09:45 AM																				
09:45 AM to 10:00 AM																				
10:00 AM to 10:15 AM																				
10:15 AM to 10:30 AM																				
10:30 AM to 10:45 AM																				
10:45 AM to 11:00 AM																				
11:00 AM to 11:15 AM																				
11:15 AM to 11:30 AM																				
INT. PEAK HR (ALL VEH)	1169				2	280				14	2981				12	80				8
06:45 AM to 07:45 AM	0	0	1119	50		0	118	137	25		0	10	2545	426		1	18	27	34	
Peak Hour Overall	U	Left	Thru	Right	**SB**	U	Left	Thru	Right	**WB**	U	Left	Thru	Right	**NB**	U	Left	Thru	Right	**EB**
Factor (PHF) 0.99	n/a	n/a	0.95	0.89	**0.95**	n/a	0.84	0.93	0.78	**0.96**	n/a	0.83	0.94	0.90	**0.96**	0.25	0.75	0.84	0.85	**0.95**

HEAVY VEHICLES (FHWA 4+)

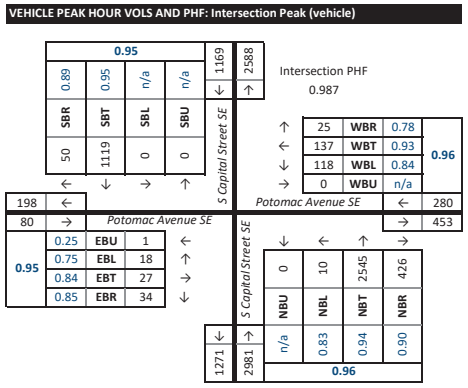
Direction:	Southbound					Westbound					Northbound					Eastbound				
Roadway:	S Capital Street SE					Potomac Avenue SE					S Capital Street SE					Potomac Avenue SE				
Movement:	U	Left	Thru	Right		U	Left	Thru	Right		U	Left	Thru	Right		U	Left	Thru	Right	
06:30 AM to 06:45 AM	0	0	11	2		0	0	2	0		0	0	12	4		0	2	2	0	
06:45 AM to 07:00 AM	0	0	14	2		0	0	9	0		0	1	13	2		0	2	1	1	
07:00 AM to 07:15 AM	0	0	13	2		0	0	10	1		0	1	20	2		0	3	2	1	
07:15 AM to 07:30 AM	0	0	15	3		0	1	7	1		0	1	15	4		0	3	2	2	
07:30 AM to 07:45 AM	0	0	23	2		0	1	6	1		0	0	16	5		0	4	3	2	
07:45 AM to 08:00 AM	0	0	11	1		0	0	7	0		0	0	16	4		0	3	4	5	
08:00 AM to 08:15 AM	0	0	23	2		0	1	5	1		0	1	25	3		0	5	5	4	
08:15 AM to 08:30 AM	0	0	10	1		0	1	6	1		0	0	16	1		0	8	4	3	
08:30 AM to 08:45 AM	0	0	8	4		0	1	8	0		0	0	23	3		0	1	3	3	
08:45 AM to 09:00 AM	0	0	10	4		0	2	9	1		0	1	24	3		0	3	2	3	
09:00 AM to 09:15 AM	0	0	5	5		0	1	10	1		0	1	17	4		0	3	6	2	
09:15 AM to 09:30 AM	0	0	11	4		0	5	9	1		0	0	19	5		0	5	4	3	
09:30 AM to 09:45 AM																				
09:45 AM to 10:00 AM																				
10:00 AM to 10:15 AM																				
10:15 AM to 10:30 AM																				
10:30 AM to 10:45 AM																				
10:45 AM to 11:00 AM																				
11:00 AM to 11:15 AM																				
11:15 AM to 11:30 AM																				
INT. PEAK HR (ALL VEH)	74					37					80					26				
06:45 AM to 07:45 AM	0	0	65	9		0	2	32	3		0	3	64	13		0	12	8	6	
Heavy Vehicle % (PHV):	0.0%	0.0%	5.8%	18.0%	**6.3%**	0.0%	1.7%	23.4%	12.0%	**13.2%**	0.0%	30.0%	2.5%	3.1%	**2.7%**	0.0%	66.7%	29.6%	17.6%	**32.5%**
INT. PEAK HR (HV ONLY)	80					31					90					42				
07:15 AM to 08:15 AM	0	0	72	8		0	3	25	3		0	2	72	16		0	15	14	13	
Heavy Vehicle % (PHV):	0.0%	0.0%	6.5%	20.0%	**7.0%**	0.0%	2.1%	19.5%	11.1%	**10.5%**	0.0%	25.0%	2.8%	4.2%	**3.1%**	0.0%	68.2%	51.9%	50.0%	**54.5%**

BICYCLES

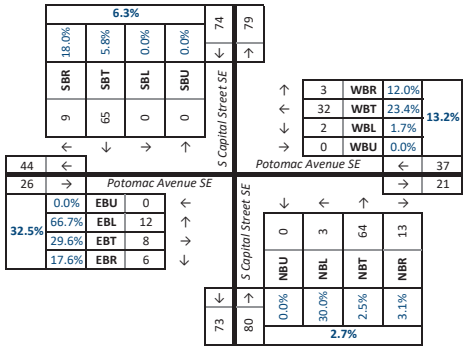
Direction:	Southbound				Westbound				Northbound				Eastbound			
Roadway:	S Capital Street SE				Potomac Avenue SE				S Capital Street SE				Potomac Avenue SE			
Movement:	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right
06:30 AM to 06:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM to 07:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
07:00 AM to 07:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
07:15 AM to 07:30 AM	0	0	1	0	0	2	0	0	0	0	0	0	1	0	0	0
07:30 AM to 07:45 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0
07:45 AM to 08:00 AM	0	0	3	0	0	1	0	0	0	0	0	1	0	0	0	0
08:00 AM to 08:15 AM	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0
08:15 AM to 08:30 AM	0	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0
08:30 AM to 08:45 AM	1	0	2	0	0	1	1	0	0	0	0	0	0	0	1	0
08:45 AM to 09:00 AM	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
09:00 AM to 09:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
09:15 AM to 09:30 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
09:30 AM to 09:45 AM																
09:45 AM to 10:00 AM																
10:00 AM to 10:15 AM																
10:15 AM to 10:30 AM																
10:30 AM to 10:45 AM																
10:45 AM to 11:00 AM																
11:00 AM to 11:15 AM																
11:15 AM to 11:30 AM																
INT. PEAK HR (ALL VEH)	2				3				2				2			
06:45 AM to 07:45 AM	0	0	2	0	0	3	0	0	0	0	1	1	1	0	1	0
INT. PEAK HR (BIKES)	8				5				4				3			
07:45 AM to 08:45 AM	1	0	7	0	0	3	2	0	0	0	1	3	1	0	2	0

DATA COLLECTION NOTES :

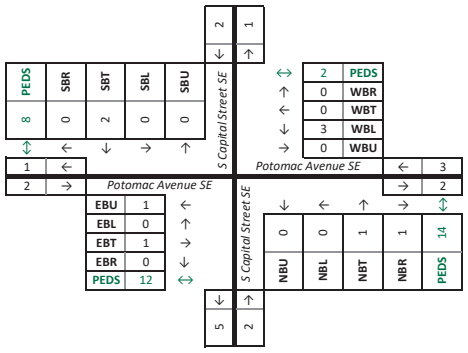
VEHICLE PEAK HOUR VOLS AND PHF: Intersection Peak (vehicle)



HEAVY VEH PEAK HOUR VOLS AND PHV: Intersection Peak (vehicle)



PED AND BIKE PEAK HOUR VOLUMES: Intersection Peak (vehicle)



Attachment D - Existing Turning Movement Counts

Project Name :	1900 Half Street SW
Project # :	2112-019
Location	Buzzard Point
Data Source:	Gorove/Slade Associates, Inc.

Intersection:	Half Street at Potomac Avenue Southwest

	Date of Counts:	Tuesday, April 26, 2016		PM Weather Conditions:	
	AM Weather Conditions:	Clear			Clear

AM PEAK

			Southbound				Westbound				Northbound				Eastbound			
Direction:			Southbound				Westbound				Northbound				Eastbound			
Roadway:			Half St.				Potomac Ave.				Half St.				Potomac Ave.			
Movement:			Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
6:30 AM	to	6:45 AM	3	3	10	0	3	23	11	1	8	0	2	0	0	10	0	0
6:45 AM	to	7:00 AM	0	0	7	0	9	29	21	1	8	1	2	0	1	6	0	0
7:00 AM	to	7:15 AM	1	1	10	0	5	22	15	1	9	2	2	0	0	4	0	0
7:15 AM	to	7:30 AM	1	0	8	0	8	21	12	0	9	3	0	0	0	12	0	1
7:30 AM	to	7:45 AM	0	0	8	0	5	18	14	0	6	1	3	0	0	20	0	1
7:45 AM	to	8:00 AM	0	1	7	0	1	14	8	0	6	1	1	0	0	14	0	0
8:00 AM	to	8:15 AM	1	3	6	0	3	15	23	0	14	2	2	0	0	8	1	0
8:15 AM	to	8:30 AM	2	0	10	0	6	11	17	0	22	2	1	0	0	13	0	0
8:30 AM	to	8:45 AM	0	1	2	0	1	8	13	0	8	1	2	0	0	7	0	0
8:45 AM	to	9:00 AM	0	0	11	0	2	10	17	0	4	1	1	0	2	10	0	0
9:00 AM	to	9:15 AM	2	0	3	0	5	10	21	1	9	2	3	0	0	8	0	0
9:15 AM	to	9:30 AM	1	2	16	0	5	16	32	0	29	4	2	0	1	7	0	0

PM PEAK

			Southbound				Westbound				Northbound				Eastbound			
Direction:			Southbound				Westbound				Northbound				Eastbound			
Roadway:			Half St.				Potomac Ave.				Half St.				Potomac Ave.			
Movement:			Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
4:00 PM	to	4:15 PM	1	6	29	1	8	4	16	2	24	1	2	0	1	135	0	0
4:15 PM	to	4:30 PM	10	2	23	0	3	47	17	0	6	5	20	0	0	75	4	0
4:30 PM	to	4:45 PM	2	5	38	0	0	6	23	0	21	9	3	1	5	113	0	0
4:45 PM	to	5:00 PM	1	5	32	0	3	4	9	8	8	2	3	3	3	137	1	0
5:00 PM	to	5:15 PM	0	5	38	0	2	6	8	6	5	2	1	0	4	75	0	1
5:15 PM	to	5:30 PM	0	6	49	1	8	19	28	9	10	2	3	1	7	103	0	0
5:30 PM	to	5:45 PM	0	10	38	0	9	11	23	29	12	2	3	0	8	124	0	1
5:45 PM	to	6:00 PM	0	5	32	1	1	12	37	6	18	0	3	7	6	63	1	0
6:00 PM	to	6:15 PM	2	6	40	0	3	9	40	11	7	0	4	2	9	87	1	0
6:15 PM	to	6:30 PM	4	8	49	0	0	9	43	29	9	3	5	0	7	58	0	1
6:30 PM	to	6:45 PM	1	16	33	4	7	12	33	28	11	0	8	7	10	61	0	7
6:45 PM	to	7:00 PM	2	4	12	0	7	26	27	12	6	5	3	5	3	35	1	2

PEAK HOURS

			Southbound				Westbound				Northbound				Eastbound			
Direction:			Southbound				Westbound				Northbound				Eastbound			
Roadway:			Half St.				Potomac Ave.				Half St.				Potomac Ave.			
Movement:			Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds
AM INTERSECTION PEAK HOUR																		
6:45 AM	to	7:45 AM	2	1	33	0	27	90	62	2	32	7	7	0	1	42	0	2
PM INTERSECTION PEAK HOUR																		
4:00 PM	to	5:00 PM	14	18	122	1	14	61	65	10	59	17	28	4	9	460	5	0
AM SYSTEM PEAK HOUR																		
7:30 AM	to	8:30 AM	3	4	31	0	15	58	62	0	48	6	7	0	0	55	1	1
PM SYSTEM PEAK HOUR																		
4:00 PM	to	5:00 PM	14	18	122	1	14	61	65	10	59	17	28	4	9	460	5	0

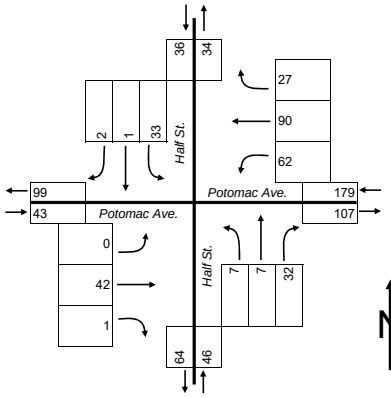
PEAK HOUR FACTORS

	Southbound				Westbound				Northbound				Eastbound			
	Half St.				Potomac Ave.				Half St.				Potomac Ave.			
AM Peak Hour	Right	Thru	Left	Approach	Right	Thru	Left	Approach	Right	Thru	Left	Approach	Right	Thru	Left	Approach
AM PEAK HOUR	0.38	0.33	0.78	**0.79**	0.63	0.81	0.67	**0.82**	0.55	0.75	0.58	**0.61**	0.00	0.69	0.25	**0.70**
	Right	Thru	Left	Approach	Right	Thru	Left	Approach	Right	Thru	Left	Approach	Right	Thru	Left	Approach
PM PEAK HOUR	0.35	0.75	0.80	**0.86**	0.44	0.32	0.71	**0.52**	0.61	0.47	0.35	**0.79**	0.45	0.84	0.31	**0.84**

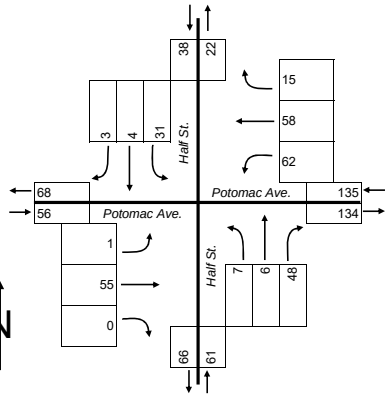
Overall AM PEAK HOUR FACTOR = **0.86** **Overall PM PEAK HOUR FACTOR** = **0.96**

AM Period Intersection Volume: 871 **PM Period Intersection Volume:** 2397

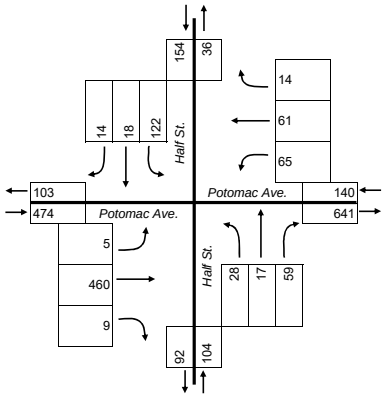
AM INTERSECTION PEAK VOLUMES



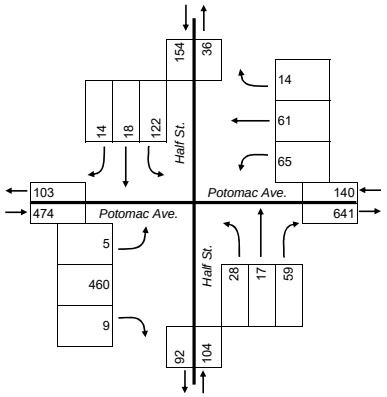
AM SYSTEM PEAK VOLUMES



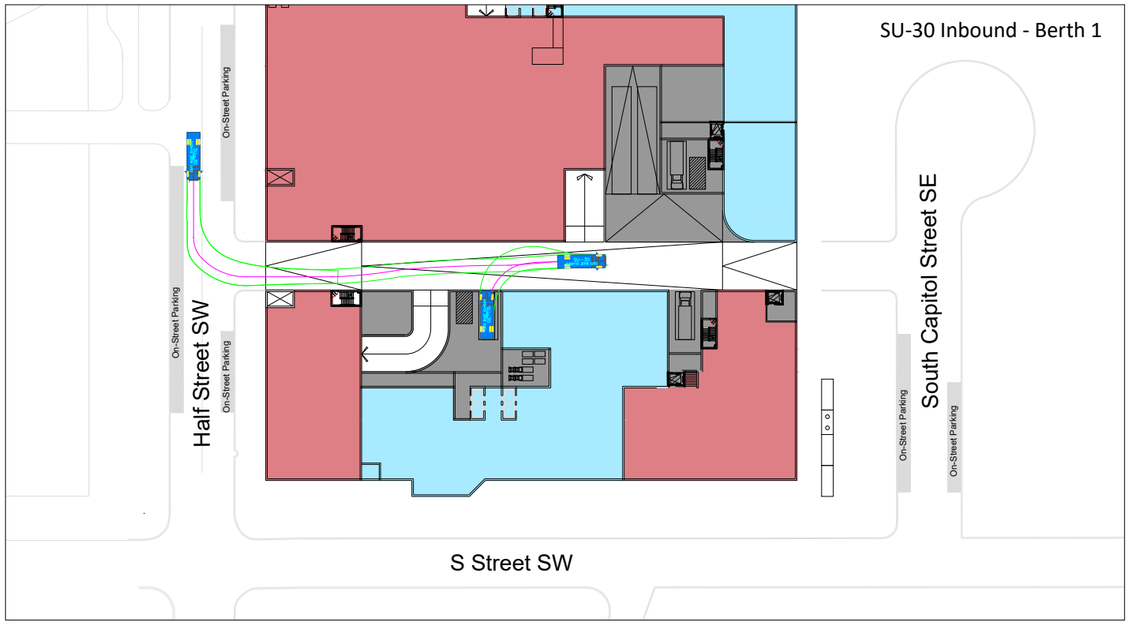
PM INTERSECTION PEAK VOLUMES

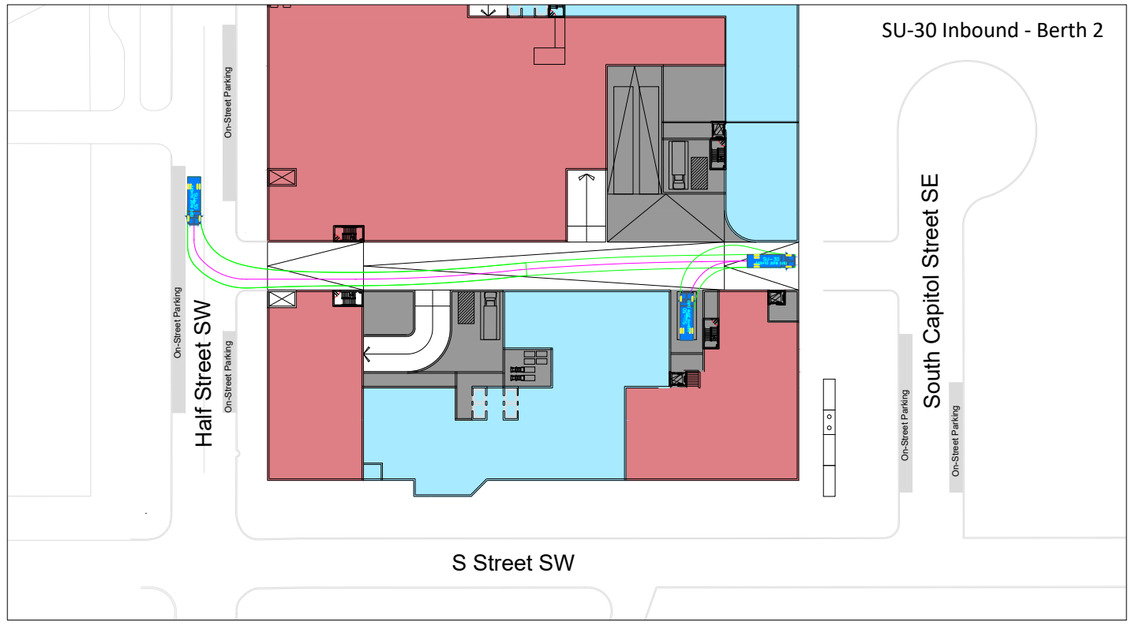


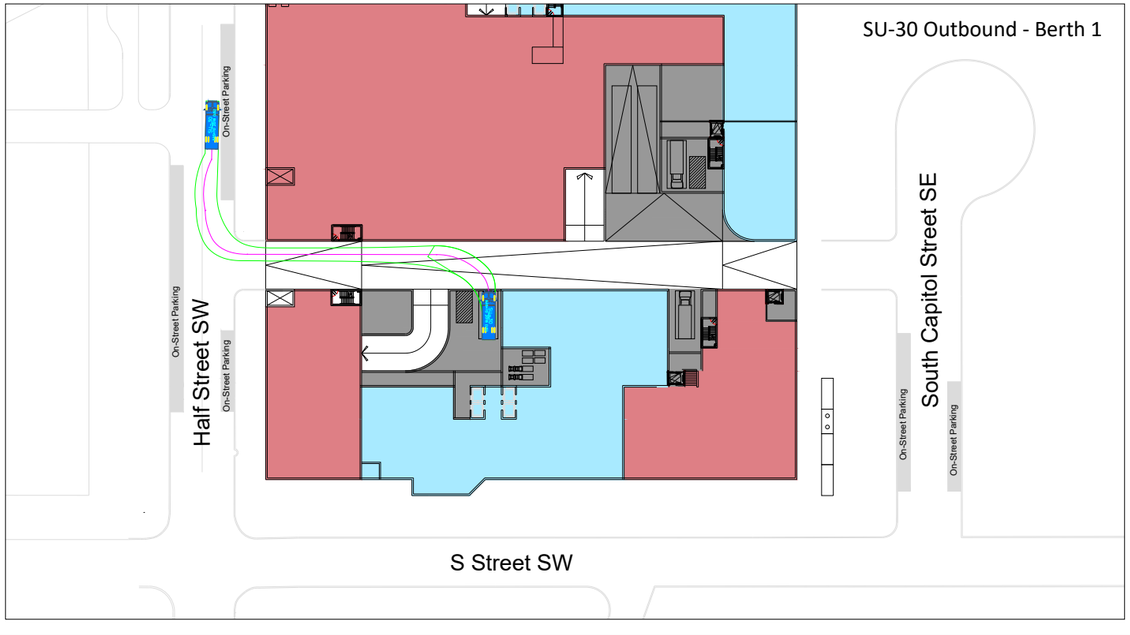
PM SYSTEM PEAK VOLUMES

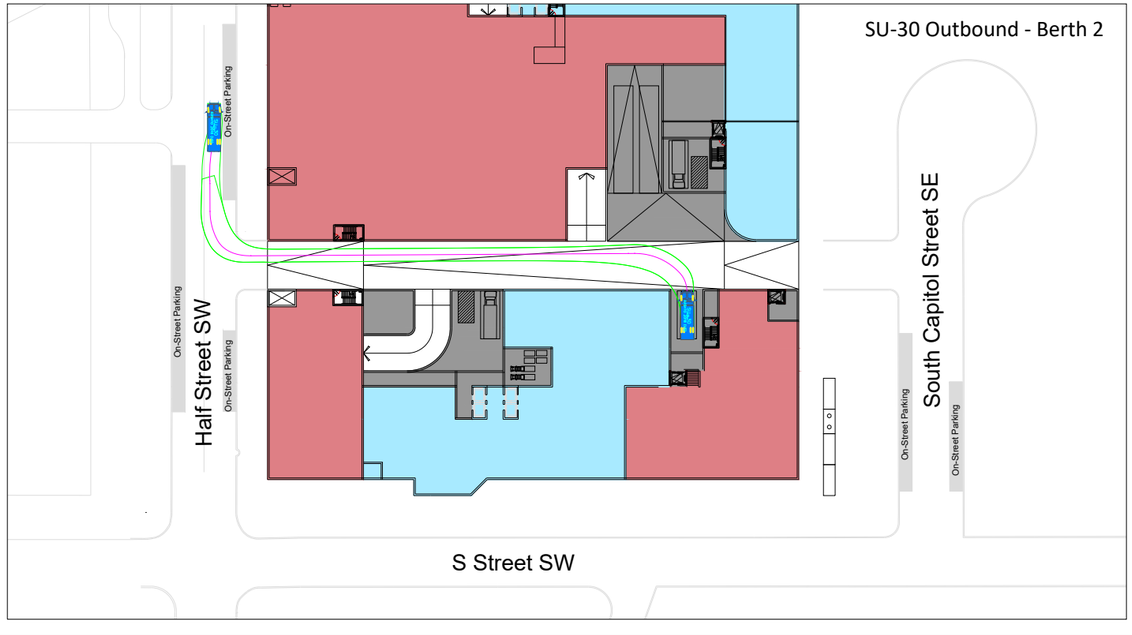


E. Truck Maneuvering Diagrams









GOROVE SLADE
Transportation Planners and Engineers

Steuart Buzzard Point Phase 1: Vehicle Turning Movements

Steuart Investment Company
August 27, 2021
1 of 3

DRAFT

1700 Half Street SW
Washington, DC 20024

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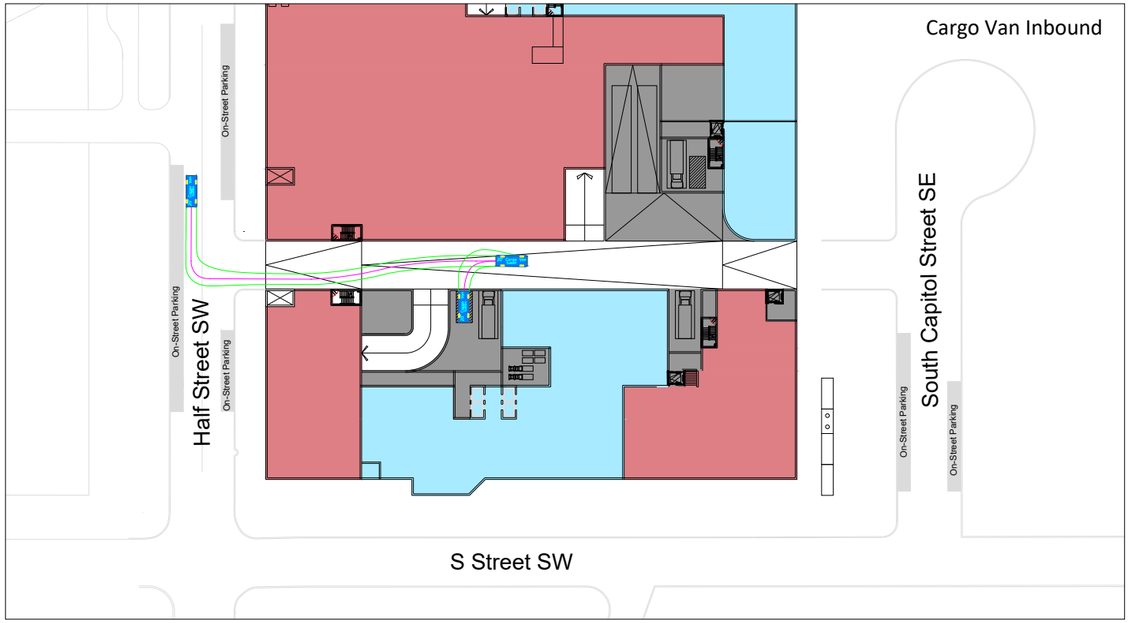
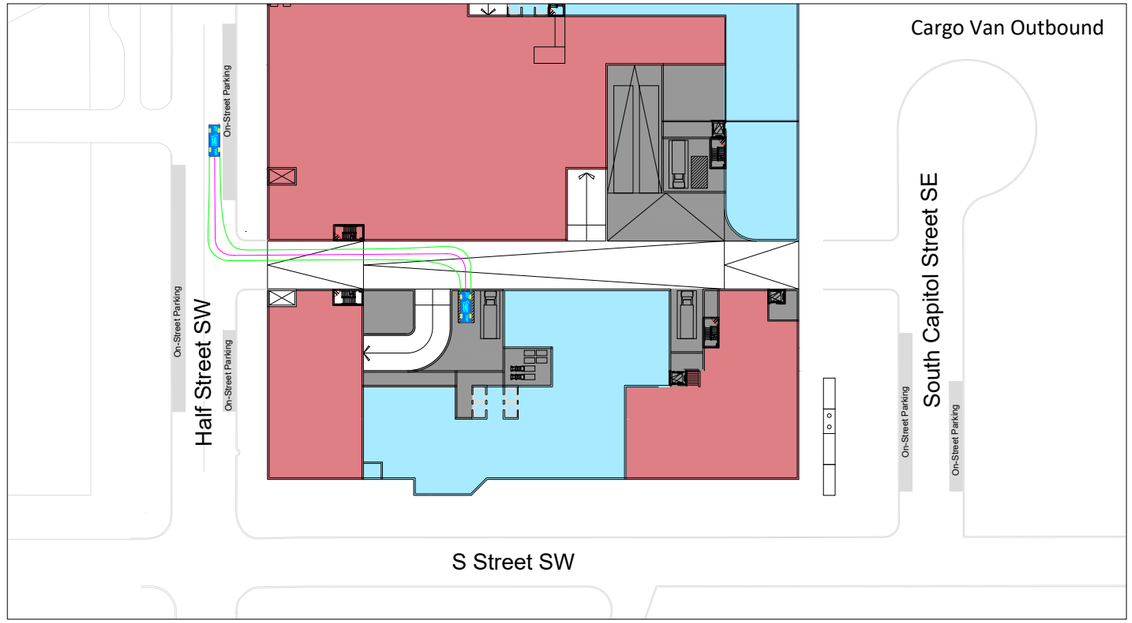
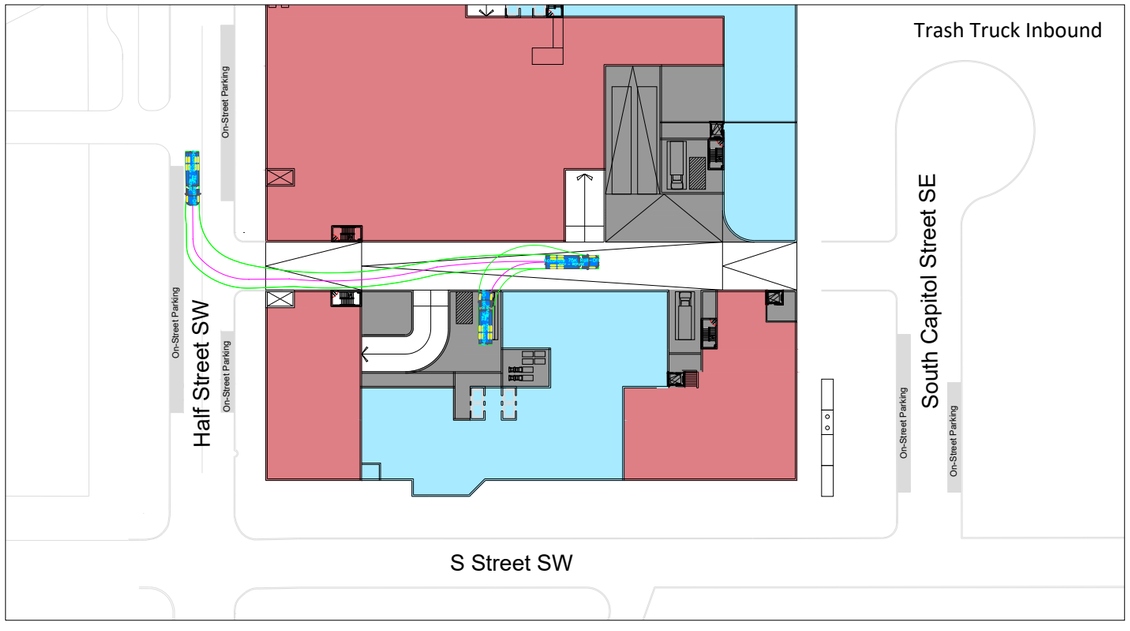
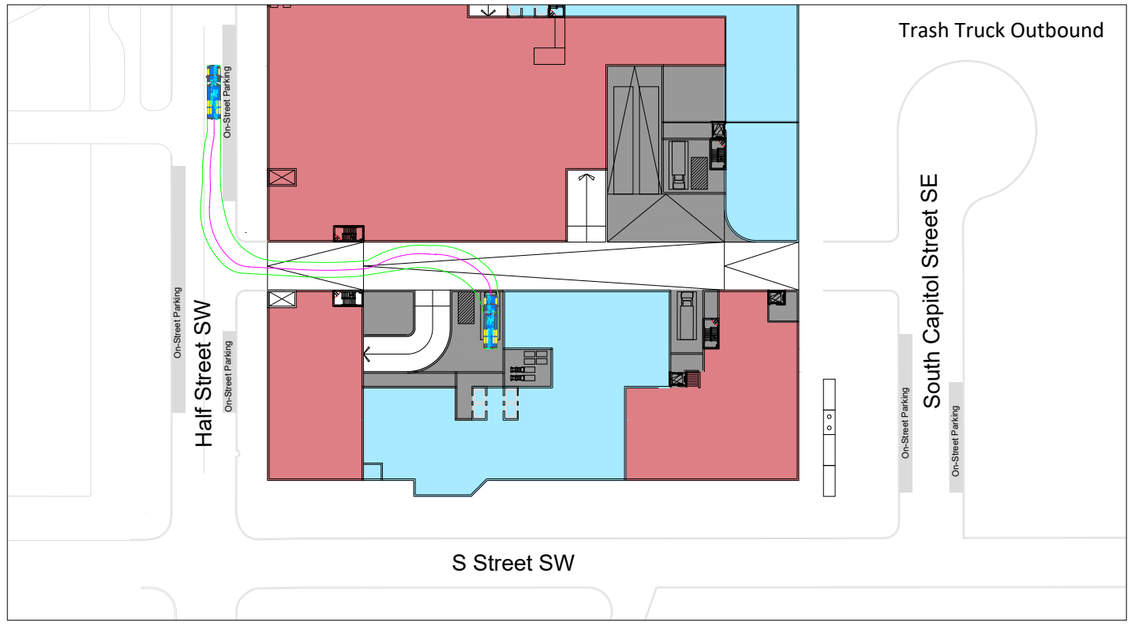
N
1"=90'









GOROVE SLADE
Transportation Planners and Engineers

Steuart Buzzard Point Phase 1: Vehicle Turning Movements

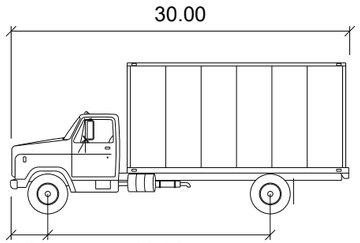
Steuart Investment Company
August 27, 2021
2 of 3

DRAFT

1700 Half Street SW
Washington, DC 20024

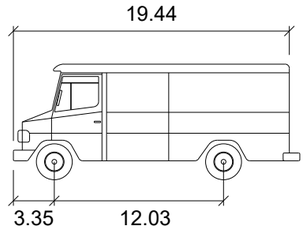
P:\2104-022 Steuart Buzzard Point Phase 1\CAD\8.26.21 Steuart Buzzard Point AutoTurn.dwg - 8/26/2021 6:03 PM

N
1"=90'



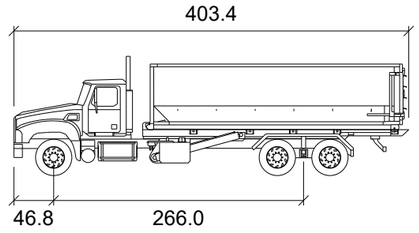
SU-30

	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8



20' Cargo Van

	feet
Width	: 6.54
Track	: 6.54
Lock to Lock Time	: 6.0
Steering Angle	: 47.4



Accurate 75K Roll-Off

	inches
Width	: 98.0
Track	: 96.2
Lock to Lock Time	: 6.0
Steering Angle	: 32.7

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Steuart Buzzard Point Phase 1: Vehicle Profiles

DRAFT

Steuart Investment Company
August 27, 2021
3 of 3

1700 Half Street SW
Washington, DC 20024

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F. Vehicular Level of Service Definitions

A. Level of Service Definitions

All capacity analyses are based on the procedures specified by the Transportation Research Board, Special Report 209: Highway Capacity Manual (HCM), 2000. Levels of service (LOS) range from A to F. A brief description of each level of service for signalized and unsignalized intersections is provided below.

Signalized Intersections

Level of service is based upon the traffic volume present in each lane on the roadway, the capacity of each lane at the intersection and the delay associated with each directional movement. The levels of service for signalized intersections are defined below:

- **LOS A** describes operations with very low average delay per vehicle, i.e., less than 10.0 seconds. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop. Short signal cycle lengths may also contribute to low delay.

- **LOS B** describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

- **LOS C** describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level although many still pass through the intersection without stopping. This is generally considered the lower end of the range of the acceptable level of service in rural areas.

- **LOS D** describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and/or high traffic volumes as compared to the roadway capacity. Many vehicles are required to stop and the number of vehicles that do not have to stop declines. Individual signal cycle failures, where all waiting vehicles do not clear the intersection during a single green time, are noticeable. This is generally considered the lower end of the range of the acceptable level of service in urban areas.

- **LOS E** describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delay values generally indicate poor progression, long cycle lengths, and high traffic volumes. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions.

- **LOS F** describes operations with average delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when traffic arrives at a flow rate that exceeds the capacity of the intersection. It may also occur at high volumes with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delays.

Unsignalized Intersections

At an unsignalized intersection, the major street through traffic and right turns are assumed to operate unimpeded and therefore receive no level of service rating. The level of service for the minor street and the major street left turn traffic is dependent on the volume and capacity of the available lanes, and, the number and frequency of acceptable gaps in the major street traffic to make a conflicting turn.

The level of service grade is provided for each conflicting movement at an unsignalized intersection and is based on the total average delay experienced by each vehicle. The delay includes the time it takes a vehicle to move from the back of a queue through the intersection.

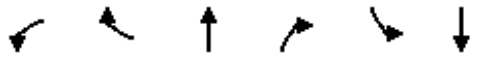
The unsignalized intersection level of service analysis does not account for variations in driver behavior or the effects of nearby traffic signals. Therefore, the results from this analysis usually indicate worse levels of service than may be experienced in the field. The unsignalized intersection level of service descriptions are provided below:

- **LOS A** describes operations where there is very little to no conflicting traffic for a minor side street movement, i.e., an average total delay of less than 10.0 seconds per vehicle.
- **LOS B** describes operations with average total delay in the range of 10.1 to 15.0 seconds per vehicle.
- **LOS C** describes operations with average total delay in the range of 15.1 to 25.0 second per vehicle.
- **LOS D** describes operations with average total delay in the range of 25.1 to 35.0 seconds per vehicle.
- **LOS E** describes operations with average total delay in the range of 35.1 to 50.0 seconds per vehicle.
- **LOS F** describes operations with average total delay of 50 seconds per vehicle. LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through or enter a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queuing on the minor approaches. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal driver behavior.

G. Existing (2021) Vehicular Capacity Analysis and Queuing Worksheets

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	40	0	0	81
Future Volume (Veh/h)	0	0	40	0	0	81
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	44	0	0	90
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						240
pX, platoon unblocked						
vC, conflicting volume	134	44			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	134	44			44	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	860	1026			1564	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	44	90
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.03	0.05
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	7.6%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

2: Half Street SW/Half Street & R Street SW

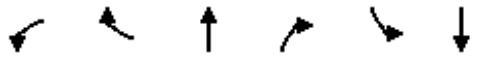
08/24/2021

Lane Group	NBT	SBT
Lane Group Flow (vph)	44	90
v/c Ratio	0.03	0.05
Control Delay	0.0	0.2
Queue Delay	0.0	0.0
Total Delay	0.0	0.2
Queue Length 50th (ft)	0	0
Queue Length 95th (ft)	0	0
Internal Link Dist (ft)	160	160
Turn Bay Length (ft)		
Base Capacity (vph)	1676	1676
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.03	0.05

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Half Street SW/Half Street & R Street SW

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	40	0	0	81
Future Volume (vph)	0	0	40	0	0	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1676			1676
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1676			1676
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	44	0	0	90
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	44	0	0	90
Turn Type			NA			NA
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			75.0			75.0
Effective Green, g (s)			75.0			75.0
Actuated g/C Ratio			1.00			1.00
Clearance Time (s)			6.0			6.0
Vehicle Extension (s)			1.0			1.0
Lane Grp Cap (vph)			1676			1676
v/s Ratio Prot			0.03			c0.05
v/s Ratio Perm						
v/c Ratio			0.03			0.05
Uniform Delay, d1			0.0			0.0
Progression Factor			1.00			1.00
Incremental Delay, d2			0.0			0.1
Delay (s)			0.0			0.1
Level of Service			A			A
Approach Delay (s)	0.0		0.0			0.1
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.06		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	8.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street & Potomac Ave SW

08/24/2021

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	50	1	89	134	45
v/c Ratio	0.24	0.01	0.35	0.51	0.12
Control Delay	32.7	23.0	28.8	33.0	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	23.0	28.8	33.0	22.7
Queue Length 50th (ft)	22	0	25	38	16
Queue Length 95th (ft)	52	4	m43	m61	41
Internal Link Dist (ft)	379			485	160
Turn Bay Length (ft)					
Base Capacity (vph)	335	285	467	491	372
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.00	0.19	0.27	0.12

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Half Street & Potomac Ave SW

08/24/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	45	1	80	121	5	35
Future Volume (vph)	45	1	80	121	5	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.88	
Flt Protected	1.00	1.00	0.95	1.00	0.99	
Satd. Flow (prot)	1676	1425	1593	1676	1471	
Flt Permitted	1.00	1.00	0.95	1.00	0.99	
Satd. Flow (perm)	1676	1425	1593	1676	1471	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	50	1	89	134	6	39
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	50	0	89	134	45	0
Turn Type	NA	Perm	Split	NA	Prot	
Protected Phases	4		3	3	2	
Permitted Phases		4				
Actuated Green, G (s)	4.5	4.5	9.9	9.9	14.6	
Effective Green, g (s)	6.5	6.5	11.9	11.9	16.6	
Actuated g/C Ratio	0.09	0.09	0.16	0.16	0.22	
Clearance Time (s)	6.0	6.0	7.0	7.0	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)	145	123	252	265	325	
v/s Ratio Prot	c0.03		0.06	c0.08	c0.03	
v/s Ratio Perm		0.00				
v/c Ratio	0.34	0.00	0.35	0.51	0.14	
Uniform Delay, d1	32.2	31.3	28.1	28.9	23.5	
Progression Factor	1.00	1.00	0.92	0.95	1.00	
Incremental Delay, d2	0.5	0.0	0.3	0.5	0.9	
Delay (s)	32.8	31.3	26.2	27.9	24.3	
Level of Service	C	C	C	C	C	
Approach Delay (s)	32.7			27.2	24.3	
Approach LOS	C			C	C	

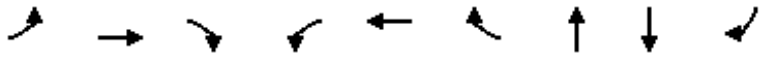
Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

4: South Capitol St & Potomac Ave SW/Potomac Ave SE

08/24/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	19	27	34	107	154	25	3036	1151	51
v/c Ratio	0.26	0.27	0.37	0.49	0.79	0.10	1.10	0.54	0.06
Control Delay	66.9	64.8	69.5	65.0	88.5	0.8	74.4	13.1	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.9	64.8	69.5	65.0	88.5	0.8	74.4	13.1	0.8
Queue Length 50th (ft)	20	28	35	102	154	0	~1253	274	0
Queue Length 95th (ft)	51	65	76	164	234	0	#1413	404	6
Internal Link Dist (ft)		485			900		1278	151	
Turn Bay Length (ft)	100					210			
Base Capacity (vph)	149	202	189	278	245	294	2760	2121	850
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.13	0.18	0.38	0.63	0.09	1.10	0.54	0.06

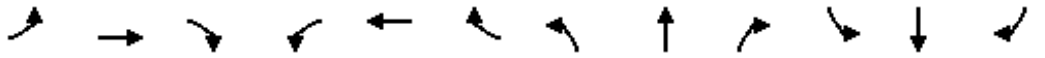
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
4: South Capitol St & Potomac Ave SW/Potomac Ave SE

08/24/2021

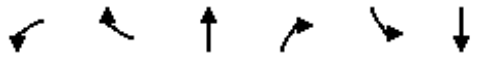


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	27	34	118	141	25	10	2570	426	0	1139	50
Future Volume (vph)	19	27	34	118	141	25	10	2570	426	0	1139	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	15	15	12	12	12	12	11	12	12	11	11
Grade (%)		0%			3%			5%			-2%	
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00		0.91			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98		0.99			1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			1.00	1.00
Satd. Flow (prot)	1070	1447	1355	1490	1313	1259		4152			2993	1168
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93			1.00	1.00
Satd. Flow (perm)	1070	1447	1355	1490	1313	1259		3878			2993	1168
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	19	27	34	119	142	25	10	2596	430	0	1151	51
RTOR Reduction (vph)	0	0	0	0	0	21	0	11	0	0	0	15
Lane Group Flow (vph)	19	27	34	107	154	4	0	3025	0	0	1151	36
Confl. Peds. (#/hr)	2		12	12		2	8		14	14		8
Confl. Bikes (#/hr)			4	4			2		1	1		2
Heavy Vehicles (%)	67%	30%	18%	2%	23%	12%	30%	3%	3%	0%	6%	18%
Turn Type	Split	NA	Prot	Split	NA	Perm	Perm	NA			NA	Perm
Protected Phases	4	4	4	3	3			6			2	
Permitted Phases						3	6					2
Actuated Green, G (s)	6.9	6.9	6.9	20.2	20.2	20.2		102.9			102.9	102.9
Effective Green, g (s)	8.9	8.9	8.9	22.2	22.2	22.2		104.9			104.9	104.9
Actuated g/C Ratio	0.06	0.06	0.06	0.15	0.15	0.15		0.70			0.70	0.70
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		6.0			6.0	6.0
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0		1.0			1.0	1.0
Lane Grp Cap (vph)	63	85	80	220	194	186		2712			2093	816
v/s Ratio Prot	0.02	0.02	c0.03	0.07	c0.12						0.38	
v/s Ratio Perm						0.00		c0.78				0.03
v/c Ratio	0.30	0.32	0.42	0.49	0.79	0.02		1.12			0.55	0.04
Uniform Delay, d1	67.6	67.6	68.1	58.7	61.7	54.6		22.5			11.0	7.0
Progression Factor	0.89	0.88	0.88	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	1.0	0.8	1.3	0.6	18.5	0.0		57.7			1.0	0.1
Delay (s)	60.9	60.3	61.3	59.3	80.2	54.6		80.3			12.1	7.1
Level of Service	E	E	E	E	F	D		F			B	A
Approach Delay (s)		60.9			70.1			80.3			11.9	
Approach LOS		E			E			F			B	

Intersection Summary			
HCM 2000 Control Delay	61.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	78	0	0	19
Future Volume (Veh/h)	0	0	78	0	0	19
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	87	0	0	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						260
pX, platoon unblocked						
vC, conflicting volume	108	87			87	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	108	87			87	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	889	971			1509	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	87	21
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1700
Volume to Capacity	0.00	0.05	0.01
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	7.4%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

2: Half Street SW & R Street SW

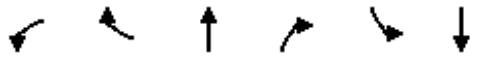
08/24/2021

Lane Group	NBT	SBT
Lane Group Flow (vph)	87	21
v/c Ratio	0.05	0.01
Control Delay	0.1	0.0
Queue Delay	0.0	0.0
Total Delay	0.1	0.0
Queue Length 50th (ft)	0	0
Queue Length 95th (ft)	0	0
Internal Link Dist (ft)	180	160
Turn Bay Length (ft)		
Base Capacity (vph)	1676	1676
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.05	0.01

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Half Street SW & R Street SW

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	78	0	0	19
Future Volume (vph)	0	0	78	0	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1676			1676
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1676			1676
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	87	0	0	21
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	87	0	0	21
Turn Type			NA			NA
Protected Phases			2			6
Permitted Phases						
Actuated Green, G (s)			75.0			75.0
Effective Green, g (s)			75.0			75.0
Actuated g/C Ratio			1.00			1.00
Clearance Time (s)			6.0			6.0
Vehicle Extension (s)			1.0			1.0
Lane Grp Cap (vph)			1676			1676
v/s Ratio Prot			c0.05			0.01
v/s Ratio Perm						
v/c Ratio			0.05			0.01
Uniform Delay, d1			0.0			0.0
Progression Factor			1.00			1.00
Incremental Delay, d2			0.1			0.0
Delay (s)			0.1			0.0
Level of Service			A			A
Approach Delay (s)	0.0		0.1			0.0
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.06		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	11.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street SW & Potomac Ave SW/Potomac Avenue SW

08/24/2021

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	509	10	11	11	87
v/c Ratio	1.27	0.03	0.05	0.05	0.11
Control Delay	166.7	12.8	31.5	31.4	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	166.7	12.8	31.5	31.4	13.9
Queue Length 50th (ft)	~304	0	11	11	15
Queue Length 95th (ft)	#481	11	m14	m14	63
Internal Link Dist (ft)	379			485	160
Turn Bay Length (ft)					
Base Capacity (vph)	402	349	382	402	765
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.27	0.03	0.03	0.03	0.11

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Half Street SW & Potomac Ave SW/Potomac Avenue SW

08/24/2021

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	458	9	10	10	19	59
Future Volume (vph)	458	9	10	10	19	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	5.0	5.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.90	
Flt Protected	1.00	1.00	0.95	1.00	0.99	
Satd. Flow (prot)	1676	1425	1593	1676	1487	
Flt Permitted	1.00	1.00	0.95	1.00	0.99	
Satd. Flow (perm)	1676	1425	1593	1676	1487	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	509	10	11	11	21	66
RTOR Reduction (vph)	0	8	0	0	0	0
Lane Group Flow (vph)	509	2	11	11	87	0
Turn Type	NA	Perm	Split	NA	Prot	
Protected Phases	4		3	3	2	
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0	4.6	4.6	32.4	
Effective Green, g (s)	18.0	18.0	6.6	6.6	34.4	
Actuated g/C Ratio	0.24	0.24	0.09	0.09	0.46	
Clearance Time (s)	6.0	6.0	7.0	7.0	6.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	
Lane Grp Cap (vph)	402	342	140	147	682	
v/s Ratio Prot	c0.30		c0.01	0.01	c0.06	
v/s Ratio Perm		0.00				
v/c Ratio	1.27	0.01	0.08	0.07	0.13	
Uniform Delay, d1	28.5	21.7	31.4	31.4	11.7	
Progression Factor	1.00	1.00	1.21	1.21	1.00	
Incremental Delay, d2	138.2	0.0	0.0	0.0	0.4	
Delay (s)	166.7	21.7	38.2	38.1	12.1	
Level of Service	F	C	D	D	B	
Approach Delay (s)	163.9			38.2	12.1	
Approach LOS	F			D	B	

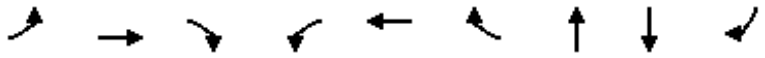
Intersection Summary			
HCM 2000 Control Delay	138.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

4: South Capitol St & Potomac Avenue SW/Potomac Ave SE

08/24/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	34	21	477	274	272	13	1330	1951	2
v/c Ratio	0.09	0.06	1.45	0.99	0.99	0.04	0.61	1.23	0.00
Control Delay	45.5	45.5	239.0	110.3	112.4	0.2	26.9	144.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	45.5	239.0	110.3	112.4	0.2	26.9	144.2	0.0
Queue Length 50th (ft)	25	15	~603	285	283	0	324	~1238	0
Queue Length 95th (ft)	m23	m15	m#454	#484	#486	0	375	#1372	0
Internal Link Dist (ft)		485			900		1278	151	
Turn Bay Length (ft)	100					210			
Base Capacity (vph)	358	338	330	278	274	321	2164	1581	511
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.06	1.45	0.99	0.99	0.04	0.61	1.23	0.00

Intersection Summary

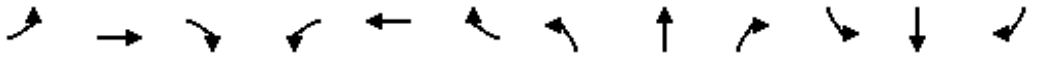
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
4: South Capitol St & Potomac Avenue SW/Potomac Ave SE

08/24/2021



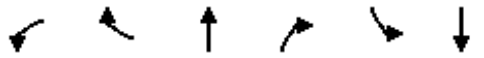
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	20	463	511	18	13	0	1127	163	0	1892	2
Future Volume (vph)	33	20	463	511	18	13	0	1127	163	0	1892	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	15	15	15	12	12	12	12	11	12	12	11	11
Grade (%)		0%			3%			5%			-2%	
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00		0.91			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98		1.00			1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	0.96	1.00		1.00			1.00	1.00
Satd. Flow (prot)	1735	1636	1599	1490	1473	1405		4192			3080	921
Flt Permitted	0.95	1.00	1.00	0.95	0.96	1.00		1.00			1.00	1.00
Satd. Flow (perm)	1735	1636	1599	1490	1473	1405		4192			3080	921
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	34	21	477	527	19	13	0	1162	168	0	1951	2
RTOR Reduction (vph)	0	0	0	0	0	11	0	13	0	0	0	1
Lane Group Flow (vph)	34	21	477	274	272	2	0	1317	0	0	1951	1
Confl. Peds. (#/hr)	1		2	2		1	6		4	4		6
Confl. Bikes (#/hr)	5					4	5		14	15		5
Heavy Vehicles (%)	3%	15%	0%	2%	28%	0%	0%	3%	0%	0%	3%	50%
Turn Type	Split	NA	Prot	Split	NA	Perm		NA			NA	Perm
Protected Phases	4	4	4	3	3			6			2	
Permitted Phases						3						2
Actuated Green, G (s)	29.0	29.0	29.0	26.0	26.0	26.0		75.0			75.0	75.0
Effective Green, g (s)	31.0	31.0	31.0	28.0	28.0	28.0		77.0			77.0	77.0
Actuated g/C Ratio	0.21	0.21	0.21	0.19	0.19	0.19		0.51			0.51	0.51
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		6.0			6.0	6.0
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0		1.0			1.0	1.0
Lane Grp Cap (vph)	358	338	330	278	274	262		2151			1581	472
v/s Ratio Prot	0.02	0.01	c0.30	0.18	c0.18			0.31			c0.63	
v/s Ratio Perm						0.00						0.00
v/c Ratio	0.09	0.06	1.45	0.99	0.99	0.01		0.61			1.23	0.00
Uniform Delay, d1	48.1	47.8	59.5	60.8	60.9	49.7		25.9			36.5	17.8
Progression Factor	0.93	0.94	0.85	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	0.0	0.0	202.0	49.5	52.1	0.0		1.3			111.0	0.0
Delay (s)	45.0	45.1	252.5	110.3	113.0	49.7		27.2			147.5	17.8
Level of Service	D	D	F	F	F	D		C			F	B
Approach Delay (s)		231.0			110.2			27.2			147.4	
Approach LOS		F			F			C			F	

Intersection Summary			
HCM 2000 Control Delay	116.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	118.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

H. Background (2024) Vehicular Capacity Analysis and Queuing Worksheets

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	458	0	0	310
Future Volume (Veh/h)	0	0	458	0	0	310
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	482	0	0	326
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						156
pX, platoon unblocked						
vC, conflicting volume	808	482			482	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	808	482			482	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	350	584			1081	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	482	326
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1081
Volume to Capacity	0.00	0.28	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

2: Half Street SW & R Street SW

08/24/2021

Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	45	437	89	326
v/c Ratio	0.03	1.00	0.07	0.17
Control Delay	2.0	50.2	0.1	0.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	2.0	50.2	0.1	0.2
Queue Length 50th (ft)	4	0	1	0
Queue Length 95th (ft)	9	#169	m1	0
Internal Link Dist (ft)	76			132
Turn Bay Length (ft)				
Base Capacity (vph)	1525	437	1275	1863
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.03	1.00	0.07	0.17

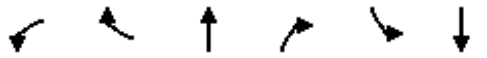
Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Half Street SW & R Street SW

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑	↑	↑	↑
Traffic Volume (vph)	0	0	43	415	85	310
Future Volume (vph)	0	0	43	415	85	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0	4.0	6.0	6.0
Lane Util. Factor			1.00	1.00	1.00	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			1863	1583	1770	1863
Flt Permitted			1.00	1.00	0.73	1.00
Satd. Flow (perm)			1863	1583	1356	1863
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	45	437	89	326
RTOR Reduction (vph)	0	0	0	437	0	0
Lane Group Flow (vph)	0	0	45	0	89	326
Turn Type			NA	NA	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases					6	
Actuated Green, G (s)			59.0	0.0	69.0	75.0
Effective Green, g (s)			59.0	0.0	69.0	75.0
Actuated g/C Ratio			0.79	0.00	0.92	1.00
Clearance Time (s)			6.0		6.0	6.0
Vehicle Extension (s)			1.0		1.0	1.0
Lane Grp Cap (vph)			1465	0	1269	1863
v/s Ratio Prot			0.02		0.00	c0.18
v/s Ratio Perm					0.06	
v/c Ratio			0.03	0.00	0.07	0.17
Uniform Delay, d1			1.7	37.5	0.3	0.0
Progression Factor			1.00	1.00	0.19	1.00
Incremental Delay, d2			0.0	0.0	0.0	0.2
Delay (s)			1.8	37.5	0.1	0.2
Level of Service			A	D	A	A
Approach Delay (s)	0.0		34.2			0.2
Approach LOS	A		C			A

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street SW & Potomac Avenue SW

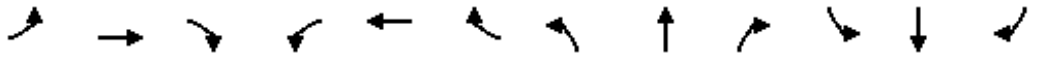
08/24/2021

Lane Group	EBL	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	2	47	317	91	45	52
v/c Ratio	0.01	0.17	0.80	0.22	0.05	0.06
Control Delay	31.0	1.3	49.6	17.8	15.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.0	1.3	49.6	17.8	15.0	14.4
Queue Length 50th (ft)	1	0	268	55	13	14
Queue Length 95th (ft)	7	0	356	84	38	39
Internal Link Dist (ft)				275	132	151
Turn Bay Length (ft)						
Base Capacity (vph)	377	451	486	510	914	930
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.65	0.18	0.05	0.06

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Half Street SW & Potomac Avenue SW

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	45	301	86	0	5	38	0	0	49	0
Future Volume (vph)	2	0	45	301	86	0	5	38	0	0	49	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00			1.00			1.00	
Frt	1.00		0.85	1.00	1.00			1.00			1.00	
Flt Protected	0.95		1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1770		1583	1770	1863			1852			1863	
Flt Permitted	0.95		1.00	0.95	1.00			0.98			1.00	
Satd. Flow (perm)	1770		1583	1770	1863			1831			1863	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	0	47	317	91	0	5	40	0	0	52	0
RTOR Reduction (vph)	0	0	44	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	0	3	317	91	0	0	45	0	0	52	0
Turn Type	Prot		Prot	Split	NA		Perm	NA			NA	
Protected Phases	4		4	3	3			2			2	
Permitted Phases							2					
Actuated Green, G (s)	4.2		4.2	16.7	16.7			35.1			35.1	
Effective Green, g (s)	4.2		4.2	16.7	16.7			35.1			35.1	
Actuated g/C Ratio	0.06		0.06	0.22	0.22			0.47			0.47	
Clearance Time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Vehicle Extension (s)	1.0		1.0	1.0	1.0			1.0			1.0	
Lane Grp Cap (vph)	99		88	394	414			856			871	
v/s Ratio Prot	0.00		c0.00	c0.18	0.05						c0.03	
v/s Ratio Perm								0.02				
v/c Ratio	0.02		0.03	0.80	0.22			0.05			0.06	
Uniform Delay, d1	33.5		33.5	27.6	23.8			10.9			10.9	
Progression Factor	1.00		1.00	1.31	0.75			1.04			1.00	
Incremental Delay, d2	0.0		0.1	9.8	0.1			0.1			0.1	
Delay (s)	33.5		33.5	45.8	17.9			11.4			11.0	
Level of Service	C		C	D	B			B			B	
Approach Delay (s)		33.5			39.6			11.4			11.0	
Approach LOS		C			D			B			B	

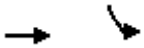
Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: R Street SW & West Oval

08/24/2021

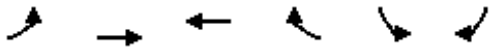


Lane Group	EBT	SBL
Lane Group Flow (vph)	526	1571
v/c Ratio	0.65	0.43
Control Delay	64.6	8.5
Queue Delay	0.0	2.1
Total Delay	64.6	10.6
Queue Length 50th (ft)	183	200
Queue Length 95th (ft)	224	237
Internal Link Dist (ft)	313	281
Turn Bay Length (ft)		
Base Capacity (vph)	918	3658
Starvation Cap Reductn	0	1883
Spillback Cap Reductn	0	30
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.57	0.89

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: R Street SW & West Oval

08/24/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	500	0	0	1492	0
Future Volume (vph)	0	500	0	0	1492	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0			8.0	
Lane Util. Factor		0.91			0.94	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		5085			4990	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		5085			4990	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	526	0	0	1571	0
RTOR Reduction (vph)	0	0	0	0	18	0
Lane Group Flow (vph)	0	526	0	0	1553	0
Turn Type		NA			Prot	
Protected Phases		4			6	
Permitted Phases						
Actuated Green, G (s)		30.2			107.8	
Effective Green, g (s)		30.2			107.8	
Actuated g/C Ratio		0.19			0.70	
Clearance Time (s)		9.0			8.0	
Vehicle Extension (s)		3.0			1.0	
Lane Grp Cap (vph)		990			3470	
v/s Ratio Prot		c0.10			c0.31	
v/s Ratio Perm						
v/c Ratio		0.53			0.45	
Uniform Delay, d1		56.0			10.4	
Progression Factor		1.00			1.00	
Incremental Delay, d2		0.6			0.4	
Delay (s)		56.6			10.9	
Level of Service		E			B	
Approach Delay (s)		56.6	0.0		10.9	
Approach LOS		E	A		B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

6: West Oval & Frederick Douglass Bridge

08/24/2021

Lane Group	WBR	NEL
Lane Group Flow (vph)	3593	387
v/c Ratio	1.34	0.70
Control Delay	177.8	66.4
Queue Delay	0.0	0.0
Total Delay	177.8	66.4
Queue Length 50th (ft)	~2081	168
Queue Length 95th (ft)	m#2116	227
Internal Link Dist (ft)		22
Turn Bay Length (ft)		
Base Capacity (vph)	2673	621
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.34	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
6: West Oval & Frederick Douglass Bridge

08/24/2021

Movement	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	3413	0	0	368	0
Future Volume (vph)	0	3413	0	0	368	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0			9.0	
Lane Util. Factor		0.76			0.97	
Frt		0.85			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3610			3433	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3610			3433	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	3593	0	0	387	0
RTOR Reduction (vph)	0	43	0	0	2	0
Lane Group Flow (vph)	0	3550	0	0	385	0
Turn Type		Prot			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		107.8			30.2	
Effective Green, g (s)		107.8			30.2	
Actuated g/C Ratio		0.70			0.19	
Clearance Time (s)		8.0			9.0	
Vehicle Extension (s)		1.0			3.0	
Lane Grp Cap (vph)		2510			668	
v/s Ratio Prot		c0.98			c0.11	
v/s Ratio Perm						
v/c Ratio		1.41			0.58	
Uniform Delay, d1		23.6			56.6	
Progression Factor		1.00			0.98	
Incremental Delay, d2		187.0			1.1	
Delay (s)		210.6			56.6	
Level of Service		F			E	
Approach Delay (s)	210.6		0.0		56.6	
Approach LOS	F		A		E	

Intersection Summary			
HCM 2000 Control Delay	195.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	155.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	128.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
7: West Oval & Potomac Avenue SE

08/24/2021

Lane Group	WBT	NBL2	NBL
Lane Group Flow (vph)	515	61	3919
v/c Ratio	0.63	0.18	2.24dr
Control Delay	54.8	1.1	538.1
Queue Delay	0.0	0.0	1.2
Total Delay	54.8	1.1	539.3
Queue Length 50th (ft)	236	0	~2355
Queue Length 95th (ft)	301	0	#2404
Internal Link Dist (ft)	366		322
Turn Bay Length (ft)			
Base Capacity (vph)	817	344	1830
Starvation Cap Reductn	0	0	66
Spillback Cap Reductn	0	0	538
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.63	0.18	3.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

HCM Signalized Intersection Capacity Analysis
7: West Oval & Potomac Avenue SE

08/24/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	435	54	65	2937	779	0	0
Future Volume (vph)	0	0	0	0	435	54	65	2937	779	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0		11.0	11.0			
Lane Util. Factor					0.95		0.86	0.86			
Frt					0.98		1.00	0.97			
Flt Protected					1.00		0.95	0.96			
Satd. Flow (prot)					3480		1522	4478			
Flt Permitted					1.00		0.95	0.96			
Satd. Flow (perm)					3480		1522	4478			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	458	57	68	3092	820	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	52	71	0	0	0
Lane Group Flow (vph)	0	0	0	0	509	0	9	3848	0	0	0
Turn Type					NA		Prot	Prot			
Protected Phases					4		5	2			
Permitted Phases											
Actuated Green, G (s)					35.0		23.0	83.0			
Effective Green, g (s)					35.0		23.0	83.0			
Actuated g/C Ratio					0.23		0.15	0.55			
Clearance Time (s)					11.0		11.0	11.0			
Vehicle Extension (s)					3.0		1.0	1.0			
Lane Grp Cap (vph)					812		233	2477			
v/s Ratio Prot					c0.15		0.01	c0.24			
v/s Ratio Perm								0.62			
v/c Ratio					0.63		0.04	2.24dr			
Uniform Delay, d1					51.6		54.1	33.5			
Progression Factor					1.00		1.00	1.00			
Incremental Delay, d2					1.5		0.3	251.0			
Delay (s)					53.2		54.4	284.5			
Level of Service					D		D	F			
Approach Delay (s)		0.0			53.2			281.0		0.0	
Approach LOS		A			D			F		A	

Intersection Summary			
HCM 2000 Control Delay	254.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	111.7%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Queues

8: West Oval & South Capitol Street

08/24/2021

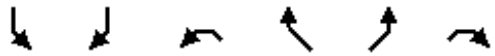
Lane Group	SBR	NWR
Lane Group Flow (vph)	1509	3148
v/c Ratio	0.42	0.91
Control Delay	0.4	18.4
Queue Delay	1.2	46.4
Total Delay	1.5	64.8
Queue Length 50th (ft)	0	752
Queue Length 95th (ft)	0	m0
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)	3610	3452
Starvation Cap Reductn	0	1569
Spillback Cap Reductn	1765	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.82	1.67

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: West Oval & South Capitol Street

08/24/2021



Movement	SBL	SBR	NWL	NWR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	1434	0	2991	0	0
Future Volume (vph)	0	1434	0	2991	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		11.0		
Lane Util. Factor		0.76		0.76		
Frt		0.85		0.85		
Flt Protected		1.00		1.00		
Satd. Flow (prot)		3610		3610		
Flt Permitted		1.00		1.00		
Satd. Flow (perm)		3610		3610		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1509	0	3148	0	0
RTOR Reduction (vph)	0	0	0	348	0	0
Lane Group Flow (vph)	0	1509	0	2800	0	0
Turn Type		custom		custom		
Protected Phases		Free		2 4		
Permitted Phases						
Actuated Green, G (s)		150.0		129.0		
Effective Green, g (s)		150.0		129.0		
Actuated g/C Ratio		1.00		0.86		
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		3610		3104		
v/s Ratio Prot		0.42		c0.78		
v/s Ratio Perm						
v/c Ratio		0.42		0.90		
Uniform Delay, d1		0.0		6.6		
Progression Factor		1.00		14.99		
Incremental Delay, d2		0.4		0.4		
Delay (s)		0.4		98.7		
Level of Service		A		F		
Approach Delay (s)	0.4		98.7		0.0	
Approach LOS	A		F		A	

Intersection Summary			
HCM 2000 Control Delay	66.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Queues
9: West Oval & Q Street SW

08/24/2021

Lane Group	WBL	WBT	SBT
Lane Group Flow (vph)	261	266	1509
v/c Ratio	0.26	0.27	0.84
Control Delay	1.1	1.2	49.5
Queue Delay	0.6	0.6	47.9
Total Delay	1.7	1.8	97.4
Queue Length 50th (ft)	4	5	496
Queue Length 95th (ft)	m9	m9	560
Internal Link Dist (ft)		159	126
Turn Bay Length (ft)			
Base Capacity (vph)	987	995	1794
Starvation Cap Reductn	428	429	581
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.47	0.47	1.24

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: West Oval & Q Street SW

08/24/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	467	33	0	0	0	0	0	1412	22
Future Volume (vph)	0	0	0	467	33	0	0	0	0	0	1412	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						7.0	
Lane Util. Factor				0.95	0.95						0.91	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.96						1.00	
Satd. Flow (prot)				1681	1696						5074	
Flt Permitted				0.95	0.96						1.00	
Satd. Flow (perm)				1681	1696						5074	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	492	35	0	0	0	0	0	1486	23
RTOR Reduction (vph)	0	0	0	16	16	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	245	250	0	0	0	0	0	1508	0
Turn Type				Split	NA						NA	
Protected Phases				3 4 5	3 4 5						6	
Permitted Phases												
Actuated Green, G (s)				79.0	79.0						53.0	
Effective Green, g (s)				68.0	68.0						53.0	
Actuated g/C Ratio				0.45	0.45						0.35	
Clearance Time (s)											7.0	
Vehicle Extension (s)											1.0	
Lane Grp Cap (vph)				762	768						1792	
v/s Ratio Prot				0.15	c0.15						c0.30	
v/s Ratio Perm												
v/c Ratio				0.32	0.33						0.84	
Uniform Delay, d1				26.2	26.3						44.6	
Progression Factor				0.04	0.05						1.00	
Incremental Delay, d2				0.1	0.1						4.6	
Delay (s)				1.1	1.3						49.3	
Level of Service				A	A						D	
Approach Delay (s)		0.0			1.2			0.0			49.3	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	120.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

10: West Oval & Potomac Avenue SW

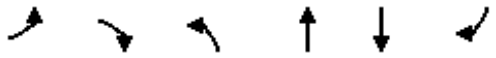
08/24/2021

Lane Group	SBT
Lane Group Flow (vph)	1978
v/c Ratio	0.46
Control Delay	0.6
Queue Delay	0.6
Total Delay	1.2
Queue Length 50th (ft)	12
Queue Length 95th (ft)	0
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	4258
Starvation Cap Reductn	1701
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.77

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: West Oval & Potomac Avenue SW

08/24/2021



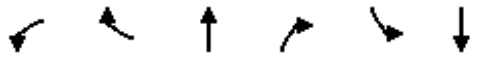
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	1492	387
Future Volume (vph)	0	0	0	0	1492	387
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0	
Lane Util. Factor					0.91	
Frt					0.97	
Flt Protected					1.00	
Satd. Flow (prot)					4928	
Flt Permitted					1.00	
Satd. Flow (perm)					4928	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	1571	407
RTOR Reduction (vph)	0	0	0	0	27	0
Lane Group Flow (vph)	0	0	0	0	1951	0
Turn Type					NA	
Protected Phases					4 5 6	
Permitted Phases						
Actuated Green, G (s)					129.0	
Effective Green, g (s)					122.0	
Actuated g/C Ratio					0.81	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)					4008	
v/s Ratio Prot					c0.40	
v/s Ratio Perm						
v/c Ratio					0.49	
Uniform Delay, d1					4.3	
Progression Factor					0.16	
Incremental Delay, d2					0.1	
Delay (s)					0.7	
Level of Service					A	
Approach Delay (s)	0.0			0.0	0.7	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	0.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

08/24/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	532	0	0	600
Future Volume (Veh/h)	0	0	532	0	0	600
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	560	0	0	632
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						184
pX, platoon unblocked						
vC, conflicting volume	1192	560			560	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1192	560			560	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	207	528			1011	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	560	632
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1011
Volume to Capacity	0.00	0.33	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		

Queues

2: Half Street SW & R Street SW

08/24/2021

Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	63	497	531	632
v/c Ratio	0.04	0.37	0.42	0.34
Control Delay	2.1	1.1	1.1	0.4
Queue Delay	0.0	0.2	2.3	0.0
Total Delay	2.1	1.2	3.4	0.4
Queue Length 50th (ft)	5	0	0	0
Queue Length 95th (ft)	11	16	m12	m0
Internal Link Dist (ft)	104			132
Turn Bay Length (ft)				
Base Capacity (vph)	1440	1336	1256	1863
Starvation Cap Reductn	0	0	567	0
Spillback Cap Reductn	0	241	203	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.04	0.45	0.77	0.34

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Half Street SW & R Street SW

08/24/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	60	472	504	600
Future Volume (vph)	0	0	60	472	504	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0	6.0	6.0	6.0
Lane Util. Factor			1.00	1.00	1.00	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			1863	1583	1770	1863
Flt Permitted			1.00	1.00	0.72	1.00
Satd. Flow (perm)			1863	1583	1334	1863
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	63	497	531	632
RTOR Reduction (vph)	0	0	0	113	0	0
Lane Group Flow (vph)	0	0	63	384	531	632
Turn Type			NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases				2	6	
Actuated Green, G (s)			58.0	58.0	69.0	75.0
Effective Green, g (s)			58.0	58.0	69.0	75.0
Actuated g/C Ratio			0.77	0.77	0.92	1.00
Clearance Time (s)			6.0	6.0	6.0	6.0
Vehicle Extension (s)			1.0	1.0	1.0	1.0
Lane Grp Cap (vph)			1440	1224	1256	1863
v/s Ratio Prot			0.03		0.03	c0.34
v/s Ratio Perm				0.24	c0.36	
v/c Ratio			0.04	0.31	0.42	0.34
Uniform Delay, d1			2.0	2.5	0.4	0.0
Progression Factor			1.00	1.00	1.46	1.00
Incremental Delay, d2			0.1	0.7	0.0	0.2
Delay (s)			2.1	3.2	0.6	0.2
Level of Service			A	A	A	A
Approach Delay (s)	0.0		3.1			0.4
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	1.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street SW & Potomac Avenue SW

08/24/2021

Lane Group	EBL	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	24	468	588	6	63	105
v/c Ratio	0.11	0.80	1.11	0.01	0.12	0.18
Control Delay	27.9	15.4	94.0	19.3	16.7	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	15.4	94.0	19.3	16.7	19.4
Queue Length 50th (ft)	11	12	436	2	20	35
Queue Length 95th (ft)	28	95	m#867	m3	47	70
Internal Link Dist (ft)				275	132	151
Turn Bay Length (ft)						
Base Capacity (vph)	377	684	531	559	536	596
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.68	1.11	0.01	0.12	0.18

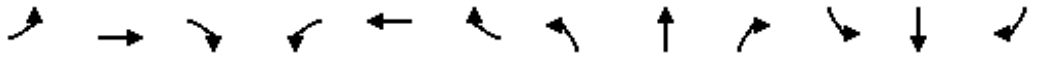
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Half Street SW & Potomac Avenue SW

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	445	559	6	0	20	40	0	0	100	0
Future Volume (vph)	23	0	445	559	6	0	20	40	0	0	100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00			1.00			1.00	
Frt	1.00		0.85	1.00	1.00			1.00			1.00	
Flt Protected	0.95		1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770		1583	1770	1863			1832			1863	
Flt Permitted	0.95		1.00	0.95	1.00			0.90			1.00	
Satd. Flow (perm)	1770		1583	1770	1863			1679			1863	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	24	0	468	588	6	0	21	42	0	0	105	0
RTOR Reduction (vph)	0	0	385	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	24	0	83	588	6	0	0	63	0	0	105	0
Turn Type	Prot		Prot	Split	NA		Perm	NA			NA	
Protected Phases	4		4	3	3			2			2	
Permitted Phases							2					
Actuated Green, G (s)	9.5		9.5	22.5	22.5			24.0			24.0	
Effective Green, g (s)	9.5		9.5	22.5	22.5			24.0			24.0	
Actuated g/C Ratio	0.13		0.13	0.30	0.30			0.32			0.32	
Clearance Time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Vehicle Extension (s)	1.0		1.0	1.0	1.0			1.0			1.0	
Lane Grp Cap (vph)	224		200	531	558			537			596	
v/s Ratio Prot	0.01		c0.05	c0.33	0.00						c0.06	
v/s Ratio Perm								0.04				
v/c Ratio	0.11		0.41	1.11	0.01			0.12			0.18	
Uniform Delay, d1	29.0		30.2	26.2	18.4			18.0			18.4	
Progression Factor	1.00		1.00	1.24	0.92			0.88			1.00	
Incremental Delay, d2	0.1		0.5	61.4	0.0			0.4			0.6	
Delay (s)	29.1		30.7	94.0	17.0			16.3			19.0	
Level of Service	C		C	F	B			B			B	
Approach Delay (s)		30.6			93.2			16.3			19.0	
Approach LOS		C			F			B			B	

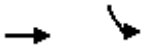
Intersection Summary			
HCM 2000 Control Delay	58.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: R Street SW & West Oval

08/24/2021



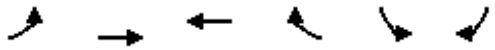
Lane Group	EBT	SBL
Lane Group Flow (vph)	1027	2923
v/c Ratio	0.98	0.86
Control Delay	77.2	9.7
Queue Delay	33.4	6.4
Total Delay	110.6	16.1
Queue Length 50th (ft)	378	340
Queue Length 95th (ft)	#475	443
Internal Link Dist (ft)	313	281
Turn Bay Length (ft)		
Base Capacity (vph)	1050	3394
Starvation Cap Reductn	103	447
Spillback Cap Reductn	31	199
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.08	0.99

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: R Street SW & West Oval

08/24/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑			↑↑↑	
Traffic Volume (vph)	0	976	0	0	2777	0
Future Volume (vph)	0	976	0	0	2777	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0			8.0	
Lane Util. Factor		0.91			0.94	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		5085			4990	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		5085			4990	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1027	0	0	2923	0
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	0	1027	0	0	2922	0
Turn Type		NA			Prot	
Protected Phases		4			6	
Permitted Phases						
Actuated Green, G (s)		36.4			96.6	
Effective Green, g (s)		36.4			96.6	
Actuated g/C Ratio		0.24			0.64	
Clearance Time (s)		9.0			8.0	
Vehicle Extension (s)		3.0			1.0	
Lane Grp Cap (vph)		1233			3213	
v/s Ratio Prot		c0.20			c0.59	
v/s Ratio Perm						
v/c Ratio		0.83			0.91	
Uniform Delay, d1		53.9			22.9	
Progression Factor		0.94			0.43	
Incremental Delay, d2		4.7			2.5	
Delay (s)		55.2			12.4	
Level of Service		E			B	
Approach Delay (s)		55.2	0.0		12.4	
Approach LOS		E	A		B	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

6: West Oval & Frederick Douglass Bridge

08/24/2021

Lane Group	WBR	NEL
Lane Group Flow (vph)	1795	392
v/c Ratio	0.71	0.52
Control Delay	14.6	43.1
Queue Delay	1.1	0.0
Total Delay	15.8	43.1
Queue Length 50th (ft)	398	139
Queue Length 95th (ft)	463	m160
Internal Link Dist (ft)		34
Turn Bay Length (ft)		
Base Capacity (vph)	2518	757
Starvation Cap Reductn	11	0
Spillback Cap Reductn	450	7
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.87	0.52

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
6: West Oval & Frederick Douglass Bridge

08/24/2021

Movement	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	1705	0	0	372	0
Future Volume (vph)	0	1705	0	0	372	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0			9.0	
Lane Util. Factor		0.76			0.97	
Frt		0.85			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3610			3433	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3610			3433	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1795	0	0	392	0
RTOR Reduction (vph)	0	71	0	0	45	0
Lane Group Flow (vph)	0	1724	0	0	347	0
Turn Type		Prot			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		96.6			36.4	
Effective Green, g (s)		96.6			36.4	
Actuated g/C Ratio		0.64			0.24	
Clearance Time (s)		8.0			9.0	
Vehicle Extension (s)		1.0			3.0	
Lane Grp Cap (vph)		2324			833	
v/s Ratio Prot		c0.48			c0.10	
v/s Ratio Perm						
v/c Ratio		0.74			0.42	
Uniform Delay, d1		18.2			47.8	
Progression Factor		1.00			0.94	
Incremental Delay, d2		1.9			0.1	
Delay (s)		20.1			45.1	
Level of Service		C			D	
Approach Delay (s)	20.1		0.0		45.1	
Approach LOS	C		A		D	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	122.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
7: West Oval & Potomac Avenue SE

08/24/2021

Lane Group	WBT	NBL2	NBL
Lane Group Flow (vph)	1025	102	2085
v/c Ratio	1.52	0.38	1.36dr
Control Delay	282.2	11.9	124.9
Queue Delay	0.7	0.9	0.3
Total Delay	282.9	12.8	125.3
Queue Length 50th (ft)	~756	11	~875
Queue Length 95th (ft)	#938	m37	#1032
Internal Link Dist (ft)	366		322
Turn Bay Length (ft)			
Base Capacity (vph)	673	270	1737
Starvation Cap Reductn	0	0	100
Spillback Cap Reductn	66	50	176
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.69	0.46	1.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

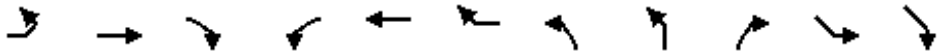
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

HCM Signalized Intersection Capacity Analysis
7: West Oval & Potomac Avenue SE

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	898	76	107	1590	380	0	0
Future Volume (vph)	0	0	0	0	898	76	107	1590	380	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0		11.0	11.0			
Lane Util. Factor					0.95		0.86	0.86			
Frt					0.99		1.00	0.97			
Flt Protected					1.00		0.95	0.96			
Satd. Flow (prot)					3498		1522	4486			
Flt Permitted					1.00		0.95	0.96			
Satd. Flow (perm)					3498		1522	4486			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	945	80	113	1674	400	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	92	71	0	0	0
Lane Group Flow (vph)	0	0	0	0	1021	0	10	2014	0	0	0
Turn Type					NA		Prot	Prot			
Protected Phases					4		5	2			
Permitted Phases											
Actuated Green, G (s)					28.7		15.0	83.0			
Effective Green, g (s)					28.7		15.0	83.0			
Actuated g/C Ratio					0.19		0.10	0.55			
Clearance Time (s)					11.0		11.0	11.0			
Vehicle Extension (s)					3.0		1.0	1.0			
Lane Grp Cap (vph)					669		152	2482			
v/s Ratio Prot					c0.29		0.01	c0.08			
v/s Ratio Perm								0.37			
v/c Ratio					1.53		0.07	1.36dr			
Uniform Delay, d1					60.6		61.2	27.2			
Progression Factor					1.00		2.17	0.94			
Incremental Delay, d2					244.3		0.6	2.2			
Delay (s)					305.0		133.1	27.7			
Level of Service					F		F	C			
Approach Delay (s)		0.0			305.0			32.6		0.0	
Approach LOS		A			F			C		A	

Intersection Summary			
HCM 2000 Control Delay	119.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	117.9%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Queues

8: West Oval & South Capitol Street

08/24/2021

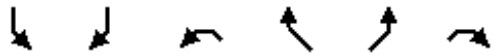
Lane Group	SBR	NWR
Lane Group Flow (vph)	2469	1754
v/c Ratio	0.68	0.52
Control Delay	1.1	0.7
Queue Delay	47.9	5.8
Total Delay	49.0	6.4
Queue Length 50th (ft)	0	9
Queue Length 95th (ft)	0	m0
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)	3610	3405
Starvation Cap Reductn	0	1587
Spillback Cap Reductn	1889	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.43	0.96

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: West Oval & South Capitol Street

08/24/2021



Movement	SBL	SBR	NWL	NWR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	2346	0	1666	0	0
Future Volume (vph)	0	2346	0	1666	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		11.0		
Lane Util. Factor		0.76		0.76		
Frt		0.85		0.85		
Flt Protected		1.00		1.00		
Satd. Flow (prot)		3610		3610		
Flt Permitted		1.00		1.00		
Satd. Flow (perm)		3610		3610		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	2469	0	1754	0	0
RTOR Reduction (vph)	0	0	0	319	0	0
Lane Group Flow (vph)	0	2469	0	1435	0	0
Turn Type		custom		custom		
Protected Phases		Free		2 4		
Permitted Phases						
Actuated Green, G (s)		150.0		122.7		
Effective Green, g (s)		150.0		122.7		
Actuated g/C Ratio		1.00		0.82		
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		3610		2952		
v/s Ratio Prot		0.68		0.40		
v/s Ratio Perm						
v/c Ratio		0.68		0.49		
Uniform Delay, d1		0.0		4.1		
Progression Factor		1.00		1.00		
Incremental Delay, d2		1.1		0.0		
Delay (s)		1.1		4.1		
Level of Service		A		A		
Approach Delay (s)	1.1		4.1		0.0	
Approach LOS	A		A		A	

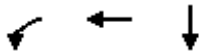
Intersection Summary			
HCM 2000 Control Delay	2.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

9: West Oval & Q Street SW

08/24/2021



Lane Group	WBL	WBT	SBT
Lane Group Flow (vph)	524	533	2469
v/c Ratio	0.58	0.59	1.19
Control Delay	28.1	28.8	130.6
Queue Delay	47.6	51.1	0.8
Total Delay	75.6	79.9	131.4
Queue Length 50th (ft)	381	390	~1066
Queue Length 95th (ft)	m46	m234	#1150
Internal Link Dist (ft)		159	126
Turn Bay Length (ft)			
Base Capacity (vph)	899	901	2067
Starvation Cap Reductn	415	413	496
Spillback Cap Reductn	63	63	332
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.08	1.09	1.57

Intersection Summary

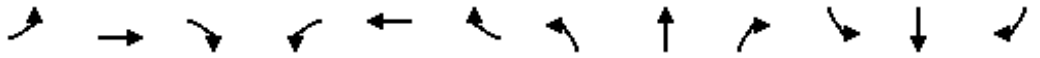
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: West Oval & Q Street SW

08/24/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	997	8	0	0	0	0	0	2345	1
Future Volume (vph)	0	0	0	997	8	0	0	0	0	0	2345	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						7.0	
Lane Util. Factor				0.95	0.95						0.91	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.95						1.00	
Satd. Flow (prot)				1681	1687						5085	
Flt Permitted				0.95	0.95						1.00	
Satd. Flow (perm)				1681	1687						5085	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	1049	8	0	0	0	0	0	2468	1
RTOR Reduction (vph)	0	0	0	17	17	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	507	516	0	0	0	0	0	2469	0
Turn Type				Split	NA						NA	
Protected Phases				3 4 5	3 4 5						6	
Permitted Phases												
Actuated Green, G (s)				71.0	71.0						61.0	
Effective Green, g (s)				60.0	60.0						61.0	
Actuated g/C Ratio				0.40	0.40						0.41	
Clearance Time (s)											7.0	
Vehicle Extension (s)											1.0	
Lane Grp Cap (vph)				672	674						2067	
v/s Ratio Prot				0.30	c0.31						c0.49	
v/s Ratio Perm												
v/c Ratio				0.75	0.76						1.19	
Uniform Delay, d1				38.7	38.9						44.5	
Progression Factor				1.20	1.22						1.00	
Incremental Delay, d2				0.4	0.4						91.2	
Delay (s)				46.7	48.0						135.7	
Level of Service				D	D						F	
Approach Delay (s)		0.0			47.4			0.0			135.7	
Approach LOS		A			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	109.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	126.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
10: West Oval & Potomac Avenue SW

08/24/2021

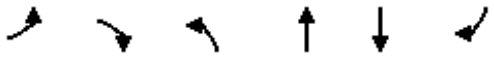
Lane Group	SBT
Lane Group Flow (vph)	3518
v/c Ratio	0.86
Control Delay	8.8
Queue Delay	42.3
Total Delay	51.1
Queue Length 50th (ft)	223
Queue Length 95th (ft)	m113
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	4073
Starvation Cap Reductn	850
Spillback Cap Reductn	330
Storage Cap Reductn	0
Reduced v/c Ratio	1.09

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
10: West Oval & Potomac Avenue SW

08/24/2021

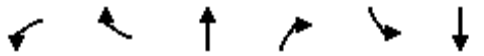


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	2777	565
Future Volume (vph)	0	0	0	0	2777	565
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0	
Lane Util. Factor					0.91	
Frt					0.97	
Flt Protected					1.00	
Satd. Flow (prot)					4956	
Flt Permitted					1.00	
Satd. Flow (perm)					4956	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	2923	595
RTOR Reduction (vph)	0	0	0	0	22	0
Lane Group Flow (vph)	0	0	0	0	3496	0
Turn Type					NA	
Protected Phases					4 5 6	
Permitted Phases						
Actuated Green, G (s)					122.7	
Effective Green, g (s)					115.7	
Actuated g/C Ratio					0.77	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)					3822	
v/s Ratio Prot					c0.71	
v/s Ratio Perm						
v/c Ratio					0.91	
Uniform Delay, d1					13.3	
Progression Factor					0.91	
Incremental Delay, d2					0.4	
Delay (s)					12.5	
Level of Service					B	
Approach Delay (s)	0.0			0.0	12.5	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

I. Future (2024) Vehicular Capacity Analysis and Queuing Worksheets



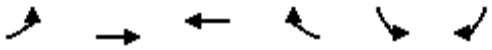
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	430	2463	144	0	1477
Future Volume (Veh/h)	0	430	2463	144	0	1477
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	453	2593	152	0	1555
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			938			271
pX, platoon unblocked						
vC, conflicting volume	3111	864			2745	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3111	864			2745	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	0			100	
cM capacity (veh/h)	9	297			143	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3
Volume Total	453	864	864	864	152	518	518	518
Volume Left	0	0	0	0	0	0	0	0
Volume Right	453	0	0	0	152	0	0	0
cSH	297	1700	1700	1700	1700	1700	1700	1700
Volume to Capacity	1.52	0.51	0.51	0.51	0.09	0.30	0.30	0.30
Queue Length 95th (ft)	650	0	0	0	0	0	0	0
Control Delay (s)	283.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	F							
Approach Delay (s)	283.9	0.0				0.0		
Approach LOS	F							

Intersection Summary			
Average Delay	27.1		
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBT	WBT	SBL
Lane Group Flow (vph)	194	642	42
v/c Ratio	0.08	0.26	0.17
Control Delay	1.5	1.5	22.2
Queue Delay	0.0	0.0	0.0
Total Delay	1.5	1.5	22.2
Queue Length 50th (ft)	0	0	12
Queue Length 95th (ft)	14	38	36
Internal Link Dist (ft)	57	144	25
Turn Bay Length (ft)			
Base Capacity (vph)	2303	2493	687
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.08	0.26	0.06

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	157	433	170	35	5
Future Volume (vph)	25	157	433	170	35	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		3.0	
Lane Util. Factor		0.95	0.95		1.00	
Frt		1.00	0.96		0.98	
Flt Protected		0.99	1.00		0.96	
Satd. Flow (prot)		2960	2778		1580	
Flt Permitted		0.87	1.00		0.96	
Satd. Flow (perm)		2581	2778		1580	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	167	461	181	37	5
RTOR Reduction (vph)	0	0	25	0	5	0
Lane Group Flow (vph)	0	194	617	0	37	0
Heavy Vehicles (%)	9%	9%	12%	12%	2%	2%
Turn Type	Perm	NA	NA		Prot	
Protected Phases		2	6		4	
Permitted Phases	2					
Actuated Green, G (s)		46.1	46.1		2.9	
Effective Green, g (s)		48.1	48.1		4.9	
Actuated g/C Ratio		0.80	0.80		0.08	
Clearance Time (s)		6.0	6.0		5.0	
Vehicle Extension (s)		1.0	1.0		1.0	
Lane Grp Cap (vph)		2069	2227		129	
v/s Ratio Prot			c0.22		c0.02	
v/s Ratio Perm		0.08				
v/c Ratio		0.09	0.28		0.29	
Uniform Delay, d1		1.3	1.5		25.9	
Progression Factor		1.00	1.00		1.00	
Incremental Delay, d2		0.1	0.3		0.5	
Delay (s)		1.4	1.8		26.4	
Level of Service		A	A		C	
Approach Delay (s)		1.4	1.8		26.4	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	2.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	101	103	295	196	446	202
v/c Ratio	0.12	0.22	0.78	0.23	0.81	0.38
Control Delay	12.0	3.8	35.3	13.1	35.8	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.0	3.8	35.3	13.1	35.8	14.7
Queue Length 50th (ft)	28	0	130	59	389	106
Queue Length 95th (ft)	55	25	#285	100	m329	m104
Internal Link Dist (ft)	270			264	478	
Turn Bay Length (ft)						
Base Capacity (vph)	824	465	377	840	550	534
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.22	0.78	0.23	0.81	0.38

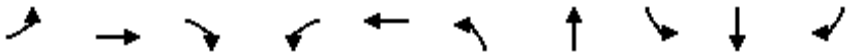
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	95	97	277	184	419	190
Future Volume (vph)	95	97	277	184	419	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.59	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	0.65	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1613	813	1014	1644	1377	1232
Flt Permitted	1.00	1.00	0.69	1.00	0.95	1.00
Satd. Flow (perm)	1613	813	739	1644	1377	1232
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	101	103	295	196	446	202
RTOR Reduction (vph)	0	50	0	0	0	42
Lane Group Flow (vph)	101	53	295	196	446	160
Confl. Peds. (#/hr)		454	454			
Heavy Vehicles (%)	6%	6%	4%	4%	18%	18%
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	6			2	8	
Permitted Phases		6	2			8
Actuated Green, G (s)	44.0	44.0	44.0	44.0	34.0	34.0
Effective Green, g (s)	46.0	46.0	46.0	46.0	36.0	36.0
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.40	0.40
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lane Grp Cap (vph)	824	415	377	840	550	492
v/s Ratio Prot	0.06			0.12	c0.32	
v/s Ratio Perm		0.06	c0.40			0.13
v/c Ratio	0.12	0.13	0.78	0.23	0.81	0.33
Uniform Delay, d1	11.5	11.5	17.9	12.2	24.0	18.6
Progression Factor	1.00	1.00	1.00	1.00	1.41	1.18
Incremental Delay, d2	0.3	0.6	14.9	0.7	1.2	0.2
Delay (s)	11.8	12.1	32.8	12.9	35.1	22.2
Level of Service	B	B	C	B	D	C
Approach Delay (s)	12.0			24.9	31.0	
Approach LOS	B			C	C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



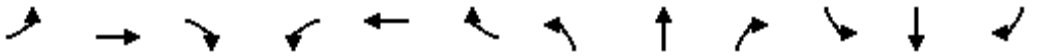
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	272	1753	424	224	3750	153	172	267	31	100
v/c Ratio	0.87	1.16	0.46	1.19	1.72	0.55	0.64	1.41	0.10	0.47
Control Delay	79.9	103.7	7.5	189.0	356.3	62.7	75.5	257.1	67.8	9.1
Queue Delay	9.7	0.0	2.3	0.0	0.2	5.5	0.0	0.0	0.0	1.2
Total Delay	89.5	103.7	9.8	189.0	356.6	68.1	75.5	257.1	67.8	10.3
Queue Length 50th (ft)	166	~1285	256	~317	~2397	149	182	~424	36	0
Queue Length 95th (ft)	m#235	#1419	362	#505	#2425	227	275	m#624	m53	m12
Internal Link Dist (ft)		198			308		259		478	
Turn Bay Length (ft)				250				200		
Base Capacity (vph)	313	1515	931	188	2177	279	267	189	299	212
Starvation Cap Reductn	27	0	366	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	195	77	0	0	0	29
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.95	1.16	0.75	1.19	1.89	0.76	0.64	1.41	0.10	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

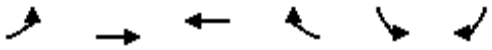
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	256	1648	399	211	3303	222	144	131	31	251	29	94
Future Volume (vph)	256	1648	399	211	3303	222	144	131	31	251	29	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	10.0	10.0	4.0	4.0	4.0		4.0	6.0		4.0	6.0	2.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.91		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	0.94		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.89	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	2973	3065	1371	1477	4204		1332	1280		1337	1583	1346
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.68	1.00		0.53	1.00	1.00
Satd. Flow (perm)	2973	3065	1371	1477	4204		949	1280		749	1583	1346
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	272	1753	424	224	3514	236	153	139	33	267	31	100
RTOR Reduction (vph)	0	0	115	0	4	0	0	5	0	0	0	100
Lane Group Flow (vph)	272	1753	309	224	3746	0	153	167	0	267	31	0
Confl. Peds. (#/hr)									212	212		
Heavy Vehicles (%)	6%	6%	6%	10%	10%	10%	22%	22%	22%	8%	8%	8%
Turn Type	Prot	NA	pt+ov	Prot	NA		pm+pt	NA		pm+pt	NA	NA
Protected Phases	1	6	3 6	5	2		3	8		7	4	
Permitted Phases							8			4		
Actuated Green, G (s)	17.0	87.0	107.0	21.0	91.0		43.0	35.0		37.0	32.0	0.0
Effective Green, g (s)	19.0	89.0	99.0	23.0	93.0		47.0	37.0		41.0	34.0	0.0
Actuated g/C Ratio	0.11	0.49	0.55	0.13	0.52		0.26	0.21		0.23	0.19	0.00
Clearance Time (s)	12.0	12.0		6.0	6.0		6.0	8.0		6.0	8.0	
Vehicle Extension (s)	3.0	1.0		3.0	1.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	313	1515	754	188	2172		269	263		193	299	0
v/s Ratio Prot	0.09	c0.57	0.23	0.15	c0.89		c0.03	0.13		c0.05	0.02	
v/s Ratio Perm							0.12			c0.26		
v/c Ratio	0.87	1.16	0.41	1.19	1.72		0.57	0.64		1.38	0.10	0.00
Uniform Delay, d1	79.3	45.5	23.5	78.5	43.5		57.0	65.3		69.7	60.4	90.0
Progression Factor	0.78	0.61	0.95	1.00	1.00		1.00	1.00		1.17	1.10	1.00
Incremental Delay, d2	14.8	75.8	0.2	126.7	328.0		2.7	5.0		195.4	0.1	0.0
Delay (s)	76.5	103.8	22.5	205.2	371.5		59.8	70.3		276.8	66.8	90.0
Level of Service	E	F	C	F	F		E	E		F	E	F
Approach Delay (s)		86.7			362.1			65.3			213.5	
Approach LOS		F			F			E			F	

Intersection Summary			
HCM 2000 Control Delay	245.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.56		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	149.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	121	393	45	61	37
Future Volume (Veh/h)	23	121	393	45	61	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	24	127	414	47	64	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			716			
pX, platoon unblocked	0.98				0.98	0.98
vC, conflicting volume	461				612	438
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442				597	418
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				86	94
cM capacity (veh/h)	1098				448	623

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	151	461	103
Volume Left	24	0	64
Volume Right	0	47	39
cSH	1098	1700	501
Volume to Capacity	0.02	0.27	0.21
Queue Length 95th (ft)	2	0	19
Control Delay (s)	1.5	0.0	14.0
Lane LOS	A		B
Approach Delay (s)	1.5	0.0	14.0
Approach LOS			B

Intersection Summary			
Average Delay		2.3	
Intersection Capacity Utilization		41.8%	ICU Level of Service A
Analysis Period (min)		15	

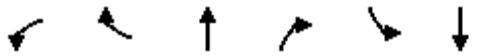
Lane Group	EBT	NBR
Lane Group Flow (vph)	1369	3045
v/c Ratio	1.06	1.51
Control Delay	39.8	252.8
Queue Delay	8.6	0.2
Total Delay	48.4	253.0
Queue Length 50th (ft)	~611	~2184
Queue Length 95th (ft)	m47	m#1287
Internal Link Dist (ft)	106	
Turn Bay Length (ft)		
Base Capacity (vph)	1296	2022
Starvation Cap Reductn	26	0
Spillback Cap Reductn	0	136
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.08	1.61

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1301	0	0	0	0	2893
Future Volume (vph)	1301	0	0	0	0	2893
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	11.0					6.0
Lane Util. Factor	0.91					0.76
Frt	1.00					0.85
Flt Protected	1.00					1.00
Satd. Flow (prot)	4577					3249
Flt Permitted	1.00					1.00
Satd. Flow (perm)	4577					3249
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1369	0	0	0	0	3045
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	1369	0	0	0	0	3044
Turn Type	NA					Prot
Protected Phases	3					2
Permitted Phases						
Actuated Green, G (s)	51.4					107.6
Effective Green, g (s)	53.4					109.6
Actuated g/C Ratio	0.30					0.61
Clearance Time (s)	13.0					8.0
Vehicle Extension (s)	3.0					1.0
Lane Grp Cap (vph)	1357					1978
v/s Ratio Prot	c0.30					c0.94
v/s Ratio Perm						
v/c Ratio	1.01					1.54
Uniform Delay, d1	63.3					35.2
Progression Factor	0.14					0.77
Incremental Delay, d2	9.6					242.7
Delay (s)	18.7					269.8
Level of Service	B					F
Approach Delay (s)	18.7			0.0	269.8	
Approach LOS	B			A	F	

Intersection Summary			
HCM 2000 Control Delay	191.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	117.1%	ICU Level of Service	H
Analysis Period (min)	15		

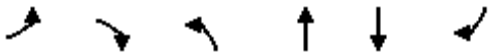
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	20	4174	20	0	0
Future Volume (Veh/h)	0	20	4174	20	0	0
Sign Control	Yield		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	21	4394	21	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			301			440
pX, platoon unblocked	0.73	0.73			0.73	
vC, conflicting volume	4404	1109			4415	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3806	0			3821	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	2	789			38	

Direction, Lane #	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	21	1255	1255	1255	649
Volume Left	0	0	0	0	0
Volume Right	21	0	0	0	21
cSH	789	1700	1700	1700	1700
Volume to Capacity	0.03	0.74	0.74	0.74	0.38
Queue Length 95th (ft)	2	0	0	0	0
Control Delay (s)	9.7	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	9.7	0.0			
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	61	4133	0	0
Future Volume (Veh/h)	0	0	61	4133	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	64	4351	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				471	270	
pX, platoon unblocked	0.72					
vC, conflicting volume	1578	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	416	0	0			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	96			
cM capacity (veh/h)	388	1084	1622			

Direction, Lane #	NB 1	NB 2	NB 3	NB 4
Volume Total	43	892	1740	1740
Volume Left	43	21	0	0
Volume Right	0	0	0	0
cSH	1622	1622	1700	1700
Volume to Capacity	0.04	0.04	1.02	1.02
Queue Length 95th (ft)	3	3	0	0
Control Delay (s)	7.3	0.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	0.2			
Approach LOS				

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	124.3%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	NBT	SBR
Lane Group Flow (vph)	4351	2412
v/c Ratio	1.01	0.74
Control Delay	14.7	1.6
Queue Delay	18.7	0.5
Total Delay	33.5	2.1
Queue Length 50th (ft)	69	0
Queue Length 95th (ft)	m400	0
Internal Link Dist (ft)	190	
Turn Bay Length (ft)		
Base Capacity (vph)	4312	3249
Starvation Cap Reductn	202	0
Spillback Cap Reductn	0	381
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.06	0.84

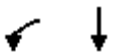
Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑↑		↱↱↱		
Traffic Volume (vph)	0	4133	0	2291	0	0
Future Volume (vph)	0	4133	0	2291	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0		2.0		
Lane Util. Factor		0.91		0.76		
Frt		1.00		0.85		
Flt Protected		1.00		1.00		
Satd. Flow (prot)		4577		3249		
Flt Permitted		1.00		1.00		
Satd. Flow (perm)		4577		3249		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	4351	0	2412	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	4351	0	2412	0	0
Turn Type		NA		custom		
Protected Phases		2		Free		
Permitted Phases						
Actuated Green, G (s)		162.2		180.0		
Effective Green, g (s)		164.2		180.0		
Actuated g/C Ratio		0.91		1.00		
Clearance Time (s)		8.0				
Vehicle Extension (s)		1.0				
Lane Grp Cap (vph)		4175		3249		
v/s Ratio Prot		c0.95		0.74		
v/s Ratio Perm						
v/c Ratio		1.04		0.74		
Uniform Delay, d1		7.9		0.0		
Progression Factor		0.92		1.00		
Incremental Delay, d2		19.9		1.6		
Delay (s)		27.2		1.6		
Level of Service		C		A		
Approach Delay (s)		27.2	1.6		0.0	
Approach LOS		C	A		A	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

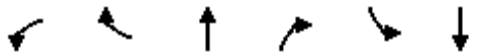
c Critical Lane Group



Lane Group	WBL	SBT
Lane Group Flow (vph)	64	2412
v/c Ratio	0.16	0.65
Control Delay	31.5	7.1
Queue Delay	0.0	1.1
Total Delay	31.5	8.1
Queue Length 50th (ft)	12	350
Queue Length 95th (ft)	m6	377
Internal Link Dist (ft)	125	153
Turn Bay Length (ft)		
Base Capacity (vph)	411	3737
Starvation Cap Reductn	0	979
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.16	0.87

Intersection Summary

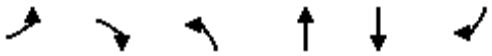
m Volume for 95th percentile queue is metered by upstream signal.



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	61	0	0	0	0	2291
Future Volume (vph)	61	0	0	0	0	2291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0					5.0
Lane Util. Factor	0.97					0.91
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	3090					4577
Flt Permitted	0.95					1.00
Satd. Flow (perm)	3090					4577
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	64	0	0	0	0	2412
RTOR Reduction (vph)	33	0	0	0	0	0
Lane Group Flow (vph)	31	0	0	0	0	2412
Turn Type	Prot					NA
Protected Phases	5					6
Permitted Phases						
Actuated Green, G (s)	21.8					143.2
Effective Green, g (s)	23.8					145.2
Actuated g/C Ratio	0.13					0.81
Clearance Time (s)	8.0					7.0
Vehicle Extension (s)	3.0					1.0
Lane Grp Cap (vph)	408					3692
v/s Ratio Prot	c0.01					c0.53
v/s Ratio Perm						
v/c Ratio	0.08					0.65
Uniform Delay, d1	68.5					7.1
Progression Factor	0.95					1.00
Incremental Delay, d2	0.0					0.6
Delay (s)	65.1					7.7
Level of Service	E					A
Approach Delay (s)	65.1		0.0			7.7
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	1447	905
Future Volume (Veh/h)	0	0	0	0	1447	905
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	0	1523	953
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				96	461	
pX, platoon unblocked	0.79	0.79	0.79			
vC, conflicting volume	1523	762	2476			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1130	166	2337			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	156	671	165			

Direction, Lane #	SB 1	SB 2	SB 3	SB 4
Volume Total	762	762	476	476
Volume Left	0	0	0	0
Volume Right	0	0	476	476
cSH	1700	1700	1700	1700
Volume to Capacity	0.45	0.45	0.28	0.28
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				
Approach Delay (s)	0.0			
Approach LOS				

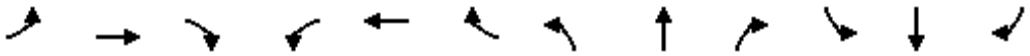
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBT	SBT
Lane Group Flow (vph)	1401	1523
v/c Ratio	1.08	0.53
Control Delay	109.4	14.6
Queue Delay	7.1	0.3
Total Delay	116.4	14.9
Queue Length 50th (ft)	~675	184
Queue Length 95th (ft)	#772	209
Internal Link Dist (ft)	225	16
Turn Bay Length (ft)		
Base Capacity (vph)	1294	2847
Starvation Cap Reductn	0	645
Spillback Cap Reductn	20	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.10	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1301	30	0	0	0	0	0	0	0	1447	0
Future Volume (vph)	0	1301	30	0	0	0	0	0	0	0	1447	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		11.0									6.0	
Lane Util. Factor		0.91									0.91	
Frt		1.00									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		4561									4577	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		4561									4577	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1369	32	0	0	0	0	0	0	0	1523	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1400	0	0	0	0	0	0	0	0	1523	0
Turn Type		NA									NA	
Protected Phases		3									6	
Permitted Phases										6		
Actuated Green, G (s)		51.4									107.6	
Effective Green, g (s)		53.4									109.6	
Actuated g/C Ratio		0.30									0.61	
Clearance Time (s)		13.0									8.0	
Vehicle Extension (s)		3.0									1.0	
Lane Grp Cap (vph)		1353									2786	
v/s Ratio Prot		c0.31									c0.33	
v/s Ratio Perm												
v/c Ratio		1.03									0.55	
Uniform Delay, d1		63.3									20.6	
Progression Factor		1.00									0.73	
Incremental Delay, d2		33.8									0.6	
Delay (s)		97.1									15.6	
Level of Service		F									B	
Approach Delay (s)		97.1			0.0			0.0			15.6	
Approach LOS		F			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	54.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

12/21/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	32	532	0	47	600
Future Volume (Veh/h)	0	32	532	0	47	600
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	34	560	0	49	632
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						184
pX, platoon unblocked						
vC, conflicting volume	1290	560			560	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1290	560			560	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			95	
cM capacity (veh/h)	172	528			1011	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	34	560	681
Volume Left	0	0	49
Volume Right	34	0	0
cSH	528	1700	1011
Volume to Capacity	0.06	0.33	0.05
Queue Length 95th (ft)	5	0	4
Control Delay (s)	12.3	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	12.3	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

Queues

2: Half Street SW & R Street SW

12/21/2021

Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	66	527	531	681
v/c Ratio	0.05	0.39	0.42	0.37
Control Delay	2.1	1.1	1.1	0.5
Queue Delay	0.0	0.2	2.6	0.0
Total Delay	2.1	1.3	3.7	0.5
Queue Length 50th (ft)	5	0	0	0
Queue Length 95th (ft)	12	16	m10	m0
Internal Link Dist (ft)	104			132
Turn Bay Length (ft)				
Base Capacity (vph)	1440	1343	1252	1863
Starvation Cap Reductn	0	0	581	0
Spillback Cap Reductn	0	276	231	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.49	0.79	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Half Street SW & R Street SW

12/21/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	63	501	504	647
Future Volume (vph)	0	0	63	501	504	647
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0	6.0	6.0	6.0
Lane Util. Factor			1.00	1.00	1.00	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			1863	1583	1770	1863
Flt Permitted			1.00	1.00	0.71	1.00
Satd. Flow (perm)			1863	1583	1330	1863
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	527	531	681
RTOR Reduction (vph)	0	0	0	119	0	0
Lane Group Flow (vph)	0	0	66	408	531	681
Turn Type			NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases				2	6	
Actuated Green, G (s)			58.0	58.0	69.0	75.0
Effective Green, g (s)			58.0	58.0	69.0	75.0
Actuated g/C Ratio			0.77	0.77	0.92	1.00
Clearance Time (s)			6.0	6.0	6.0	6.0
Vehicle Extension (s)			1.0	1.0	1.0	1.0
Lane Grp Cap (vph)			1440	1224	1252	1863
v/s Ratio Prot			0.04		0.03	c0.37
v/s Ratio Perm				0.26	c0.36	
v/c Ratio			0.05	0.33	0.42	0.37
Uniform Delay, d1			2.0	2.6	0.4	0.0
Progression Factor			1.00	1.00	1.55	1.00
Incremental Delay, d2			0.1	0.7	0.0	0.2
Delay (s)			2.1	3.3	0.7	0.2
Level of Service			A	A	A	A
Approach Delay (s)	0.0		3.2			0.4
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	1.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street SW & Potomac Avenue SW

12/21/2021

Lane Group	EBL	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	24	468	633	6	66	111
v/c Ratio	0.11	0.81	1.20	0.01	0.12	0.19
Control Delay	27.7	16.9	129.8	19.8	16.8	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.7	16.9	129.8	19.8	16.8	19.5
Queue Length 50th (ft)	11	18	~542	2	22	37
Queue Length 95th (ft)	28	104	m#1027	m3	49	73
Internal Link Dist (ft)				275	132	151
Turn Bay Length (ft)						
Base Capacity (vph)	377	674	528	556	538	596
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.69	1.20	0.01	0.12	0.19

Intersection Summary

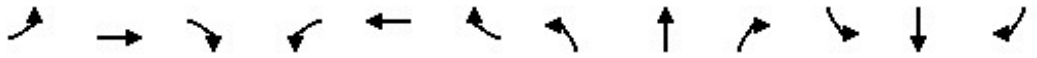
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Half Street SW & Potomac Avenue SW

12/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	445	601	6	0	20	43	0	0	105	0
Future Volume (vph)	23	0	445	601	6	0	20	43	0	0	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00			1.00			1.00	
Frt	1.00		0.85	1.00	1.00			1.00			1.00	
Flt Protected	0.95		1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770		1583	1770	1863			1834			1863	
Flt Permitted	0.95		1.00	0.95	1.00			0.90			1.00	
Satd. Flow (perm)	1770		1583	1770	1863			1683			1863	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	24	0	468	633	6	0	21	45	0	0	111	0
RTOR Reduction (vph)	0	0	373	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	24	0	95	633	6	0	0	66	0	0	111	0
Turn Type	Prot		Prot	Split	NA		Perm	NA			NA	
Protected Phases	4		4	3	3			2			2	
Permitted Phases							2					
Actuated Green, G (s)	9.6		9.6	22.4	22.4			24.0			24.0	
Effective Green, g (s)	9.6		9.6	22.4	22.4			24.0			24.0	
Actuated g/C Ratio	0.13		0.13	0.30	0.30			0.32			0.32	
Clearance Time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Vehicle Extension (s)	1.0		1.0	1.0	1.0			1.0			1.0	
Lane Grp Cap (vph)	226		202	528	556			538			596	
v/s Ratio Prot	0.01		c0.06	c0.36	0.00						c0.06	
v/s Ratio Perm								0.04				
v/c Ratio	0.11		0.47	1.20	0.01			0.12			0.19	
Uniform Delay, d1	28.9		30.3	26.3	18.5			18.0			18.4	
Progression Factor	1.00		1.00	1.27	0.93			0.88			1.00	
Incremental Delay, d2	0.1		0.6	98.0	0.0			0.5			0.7	
Delay (s)	29.0		31.0	131.4	17.2			16.4			19.1	
Level of Service	C		C	F	B			B			B	
Approach Delay (s)		30.9			130.3			16.4			19.1	
Approach LOS		C			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	77.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: R Street SW & West Oval

12/21/2021

Lane Group	EBT	SBL
Lane Group Flow (vph)	1058	2923
v/c Ratio	1.01	0.86
Control Delay	83.7	10.0
Queue Delay	33.5	8.8
Total Delay	117.2	18.8
Queue Length 50th (ft)	~394	364
Queue Length 95th (ft)	#498	430
Internal Link Dist (ft)	313	279
Turn Bay Length (ft)		
Base Capacity (vph)	1050	3393
Starvation Cap Reductn	101	478
Spillback Cap Reductn	37	199
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.11	1.00

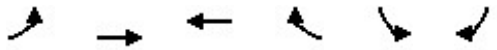
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: R Street SW & West Oval

12/21/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1005	0	0	2777	0
Future Volume (vph)	0	1005	0	0	2777	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0			8.0	
Lane Util. Factor		0.91			0.94	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		5085			4990	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		5085			4990	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1058	0	0	2923	0
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	0	1058	0	0	2922	0
Turn Type		NA			Prot	
Protected Phases		4			6	
Permitted Phases						
Actuated Green, G (s)		36.4			96.6	
Effective Green, g (s)		36.4			96.6	
Actuated g/C Ratio		0.24			0.64	
Clearance Time (s)		9.0			8.0	
Vehicle Extension (s)		3.0			1.0	
Lane Grp Cap (vph)		1233			3213	
v/s Ratio Prot		c0.21			c0.59	
v/s Ratio Perm						
v/c Ratio		0.86			0.91	
Uniform Delay, d1		54.3			22.9	
Progression Factor		0.94			0.45	
Incremental Delay, d2		5.7			2.4	
Delay (s)		56.8			12.7	
Level of Service		E			B	
Approach Delay (s)		56.8	0.0		12.7	
Approach LOS		E	A		B	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

6: West Oval & Frederick Douglass Bridge

12/21/2021

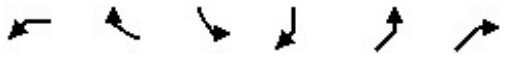
Lane Group	WBR	NEL
Lane Group Flow (vph)	1802	417
v/c Ratio	0.72	0.55
Control Delay	15.1	44.3
Queue Delay	1.3	0.0
Total Delay	16.4	44.3
Queue Length 50th (ft)	411	150
Queue Length 95th (ft)	477	m170
Internal Link Dist (ft)		34
Turn Bay Length (ft)		
Base Capacity (vph)	2508	756
Starvation Cap Reductn	3	0
Spillback Cap Reductn	461	7
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.88	0.56

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
6: West Oval & Frederick Douglass Bridge

12/21/2021



Movement	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	1712	0	0	396	0
Future Volume (vph)	0	1712	0	0	396	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0			9.0	
Lane Util. Factor		0.76			0.97	
Frt		0.85			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3610			3433	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3610			3433	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1802	0	0	417	0
RTOR Reduction (vph)	0	60	0	0	45	0
Lane Group Flow (vph)	0	1742	0	0	372	0
Turn Type		Prot			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		96.6			36.4	
Effective Green, g (s)		96.6			36.4	
Actuated g/C Ratio		0.64			0.24	
Clearance Time (s)		8.0			9.0	
Vehicle Extension (s)		1.0			3.0	
Lane Grp Cap (vph)		2324			833	
v/s Ratio Prot		c0.48			c0.11	
v/s Ratio Perm						
v/c Ratio		0.75			0.45	
Uniform Delay, d1		18.4			48.2	
Progression Factor		1.00			0.94	
Incremental Delay, d2		2.0			0.2	
Delay (s)		20.4			45.6	
Level of Service		C			D	
Approach Delay (s)	20.4		0.0		45.6	
Approach LOS	C		A		D	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	123.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues
7: West Oval & Potomac Avenue SE

12/21/2021

Lane Group	WBT	NBL2	NBL
Lane Group Flow (vph)	1031	108	2111
v/c Ratio	1.54	0.40	1.37dr
Control Delay	290.4	13.1	131.4
Queue Delay	0.7	1.0	0.4
Total Delay	291.1	14.2	131.8
Queue Length 50th (ft)	~771	15	~909
Queue Length 95th (ft)	#944	m41	#1053
Internal Link Dist (ft)	366		322
Turn Bay Length (ft)			
Base Capacity (vph)	668	270	1737
Starvation Cap Reductn	0	0	100
Spillback Cap Reductn	61	50	187
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.70	0.49	1.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

HCM Signalized Intersection Capacity Analysis
7: West Oval & Potomac Avenue SE

12/21/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	903	76	114	1611	383	0	0
Future Volume (vph)	0	0	0	0	903	76	114	1611	383	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0		11.0	11.0			
Lane Util. Factor					0.95		0.86	0.86			
Frt					0.99		1.00	0.97			
Flt Protected					1.00		0.95	0.96			
Satd. Flow (prot)					3498		1522	4487			
Flt Permitted					1.00		0.95	0.96			
Satd. Flow (perm)					3498		1522	4487			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	951	80	120	1696	403	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	97	71	0	0	0
Lane Group Flow (vph)	0	0	0	0	1027	0	11	2040	0	0	0
Turn Type					NA		Prot	Prot			
Protected Phases					4		5	2			
Permitted Phases											
Actuated Green, G (s)					28.5		15.0	83.0			
Effective Green, g (s)					28.5		15.0	83.0			
Actuated g/C Ratio					0.19		0.10	0.55			
Clearance Time (s)					11.0		11.0	11.0			
Vehicle Extension (s)					3.0		1.0	1.0			
Lane Grp Cap (vph)					664		152	2482			
v/s Ratio Prot					c0.29		0.01	c0.08			
v/s Ratio Perm								0.37			
v/c Ratio					1.55		0.07	1.37dr			
Uniform Delay, d1					60.8		61.2	27.4			
Progression Factor					1.00		1.88	0.95			
Incremental Delay, d2					253.4		0.6	2.3			
Delay (s)					314.2		115.4	28.3			
Level of Service					F		F	C			
Approach Delay (s)		0.0			314.2			32.6		0.0	
Approach LOS		A			F			C		A	

Intersection Summary			
HCM 2000 Control Delay	121.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Queues
8: West Oval & South Capitol Street

12/21/2021

Lane Group	SBR	NWR
Lane Group Flow (vph)	2501	1776
v/c Ratio	0.69	0.52
Control Delay	1.1	0.7
Queue Delay	47.9	7.0
Total Delay	49.0	7.7
Queue Length 50th (ft)	0	10
Queue Length 95th (ft)	0	m0
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)	3610	3404
Starvation Cap Reductn	0	1583
Spillback Cap Reductn	1896	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.46	0.98

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: West Oval & South Capitol Street

12/21/2021

Movement	SBL	SBR	NWL	NWR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	2376	0	1687	0	0
Future Volume (vph)	0	2376	0	1687	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		11.0		
Lane Util. Factor		0.76		0.76		
Frt		0.85		0.85		
Flt Protected		1.00		1.00		
Satd. Flow (prot)		3610		3610		
Flt Permitted		1.00		1.00		
Satd. Flow (perm)		3610		3610		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	2501	0	1776	0	0
RTOR Reduction (vph)	0	0	0	326	0	0
Lane Group Flow (vph)	0	2501	0	1450	0	0
Turn Type		custom		custom		
Protected Phases		Free		2 4		
Permitted Phases						
Actuated Green, G (s)		150.0		122.5		
Effective Green, g (s)		150.0		122.5		
Actuated g/C Ratio		1.00		0.82		
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		3610		2948		
v/s Ratio Prot		0.69		0.40		
v/s Ratio Perm						
v/c Ratio		0.69		0.49		
Uniform Delay, d1		0.0		4.2		
Progression Factor		1.00		1.00		
Incremental Delay, d2		1.1		0.0		
Delay (s)		1.1		4.2		
Level of Service		A		A		
Approach Delay (s)	1.1		4.2		0.0	
Approach LOS	A		A		A	

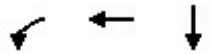
Intersection Summary			
HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

9: West Oval & Q Street SW

12/21/2021



Lane Group	WBL	WBT	SBT
Lane Group Flow (vph)	531	539	2501
v/c Ratio	0.59	0.60	1.21
Control Delay	29.0	29.6	136.9
Queue Delay	54.2	54.1	0.8
Total Delay	83.2	83.8	137.7
Queue Length 50th (ft)	392	401	~1090
Queue Length 95th (ft)	m190	m195	#1173
Internal Link Dist (ft)		161	126
Turn Bay Length (ft)			
Base Capacity (vph)	898	900	2067
Starvation Cap Reductn	416	414	496
Spillback Cap Reductn	76	77	356
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.10	1.11	1.59

Intersection Summary

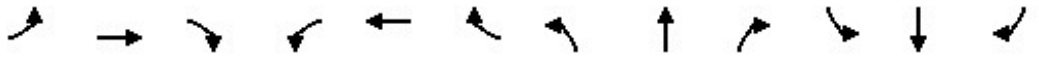
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: West Oval & Q Street SW

12/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1009	8	0	0	0	0	0	2375	1
Future Volume (vph)	0	0	0	1009	8	0	0	0	0	0	2375	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						7.0	
Lane Util. Factor				0.95	0.95						0.91	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.95						1.00	
Satd. Flow (prot)				1681	1687						5085	
Flt Permitted				0.95	0.95						1.00	
Satd. Flow (perm)				1681	1687						5085	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	1062	8	0	0	0	0	0	2500	1
RTOR Reduction (vph)	0	0	0	17	17	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	514	522	0	0	0	0	0	2501	0
Turn Type				Split	NA						NA	
Protected Phases				3 4 5	3 4 5						6	
Permitted Phases												
Actuated Green, G (s)				71.0	71.0						61.0	
Effective Green, g (s)				60.0	60.0						61.0	
Actuated g/C Ratio				0.40	0.40						0.41	
Clearance Time (s)											7.0	
Vehicle Extension (s)											1.0	
Lane Grp Cap (vph)				672	674						2067	
v/s Ratio Prot				0.31	c0.31						c0.49	
v/s Ratio Perm												
v/c Ratio				0.76	0.77						1.21	
Uniform Delay, d1				38.9	39.1						44.5	
Progression Factor				1.23	1.25						1.00	
Incremental Delay, d2				0.4	0.5						97.9	
Delay (s)				48.3	49.3						142.4	
Level of Service				D	D						F	
Approach Delay (s)		0.0			48.8			0.0			142.4	
Approach LOS		A			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	114.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	128.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

10: West Oval & Potomac Avenue SW

12/21/2021

Lane Group	SBT
Lane Group Flow (vph)	3562
v/c Ratio	0.88
Control Delay	9.6
Queue Delay	45.8
Total Delay	55.5
Queue Length 50th (ft)	266
Queue Length 95th (ft)	m116
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	4061
Starvation Cap Reductn	842
Spillback Cap Reductn	365
Storage Cap Reductn	0
Reduced v/c Ratio	1.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
10: West Oval & Potomac Avenue SW

12/21/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	2777	607
Future Volume (vph)	0	0	0	0	2777	607
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0	
Lane Util. Factor					0.91	
Frt					0.97	
Flt Protected					1.00	
Satd. Flow (prot)					4948	
Flt Permitted					1.00	
Satd. Flow (perm)					4948	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	2923	639
RTOR Reduction (vph)	0	0	0	0	25	0
Lane Group Flow (vph)	0	0	0	0	3537	0
Turn Type					NA	
Protected Phases					4 5 6	
Permitted Phases						
Actuated Green, G (s)					122.5	
Effective Green, g (s)					115.5	
Actuated g/C Ratio					0.77	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)					3809	
v/s Ratio Prot					c0.71	
v/s Ratio Perm						
v/c Ratio					0.93	
Uniform Delay, d1					13.9	
Progression Factor					0.94	
Incremental Delay, d2					0.5	
Delay (s)					13.6	
Level of Service					B	
Approach Delay (s)	0.0			0.0	13.6	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

J. Future with Mitigation (2024) Vehicular Capacity Analysis and Queuing Worksheets

HCM Unsignalized Intersection Capacity Analysis
1: Half Street SW & Site Alley

12/21/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	32	532	0	47	600
Future Volume (Veh/h)	0	32	532	0	47	600
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	34	560	0	49	632
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						184
pX, platoon unblocked						
vC, conflicting volume	1290	560			560	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1290	560			560	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			95	
cM capacity (veh/h)	172	528			1011	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	34	560	681
Volume Left	0	0	49
Volume Right	34	0	0
cSH	528	1700	1011
Volume to Capacity	0.06	0.33	0.05
Queue Length 95th (ft)	5	0	4
Control Delay (s)	12.3	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	12.3	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

Queues

2: Half Street SW & R Street SW

12/21/2021

Lane Group	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	66	527	531	681
v/c Ratio	0.05	0.39	0.42	0.37
Control Delay	2.1	1.1	0.8	0.2
Queue Delay	0.0	0.2	2.5	0.0
Total Delay	2.1	1.3	3.3	0.2
Queue Length 50th (ft)	5	0	0	0
Queue Length 95th (ft)	12	16	m0	m0
Internal Link Dist (ft)	104			132
Turn Bay Length (ft)				
Base Capacity (vph)	1440	1343	1252	1863
Starvation Cap Reductn	0	0	576	0
Spillback Cap Reductn	0	264	222	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.05	0.49	0.79	0.37

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
2: Half Street SW & R Street SW

12/21/2021

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	63	501	504	647
Future Volume (vph)	0	0	63	501	504	647
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			6.0	6.0	6.0	6.0
Lane Util. Factor			1.00	1.00	1.00	1.00
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			1863	1583	1770	1863
Flt Permitted			1.00	1.00	0.71	1.00
Satd. Flow (perm)			1863	1583	1330	1863
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	66	527	531	681
RTOR Reduction (vph)	0	0	0	119	0	0
Lane Group Flow (vph)	0	0	66	408	531	681
Turn Type			NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases				2	6	
Actuated Green, G (s)			58.0	58.0	69.0	75.0
Effective Green, g (s)			58.0	58.0	69.0	75.0
Actuated g/C Ratio			0.77	0.77	0.92	1.00
Clearance Time (s)			6.0	6.0	6.0	6.0
Vehicle Extension (s)			1.0	1.0	1.0	1.0
Lane Grp Cap (vph)			1440	1224	1252	1863
v/s Ratio Prot			0.04		0.03	c0.37
v/s Ratio Perm				0.26	c0.36	
v/c Ratio			0.05	0.33	0.42	0.37
Uniform Delay, d1			2.0	2.6	0.4	0.0
Progression Factor			1.00	1.00	0.79	1.00
Incremental Delay, d2			0.1	0.7	0.0	0.2
Delay (s)			2.1	3.3	0.4	0.2
Level of Service			A	A	A	A
Approach Delay (s)	0.0		3.2			0.3
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	1.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Half Street SW & Potomac Avenue SW

12/21/2021

Lane Group	EBL	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	24	468	633	6	66	111
v/c Ratio	0.09	0.89	1.09	0.01	0.15	0.22
Control Delay	26.0	29.4	85.9	17.2	20.0	23.0
Queue Delay	0.0	0.0	4.2	0.0	0.0	0.0
Total Delay	26.0	29.4	90.1	17.2	20.0	23.0
Queue Length 50th (ft)	10	55	~565	2	23	40
Queue Length 95th (ft)	28	#206	m#707	m3	53	80
Internal Link Dist (ft)				275	132	151
Turn Bay Length (ft)						
Base Capacity (vph)	354	587	581	611	445	496
Starvation Cap Reductn	0	0	10	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.80	1.11	0.01	0.15	0.22

Intersection Summary

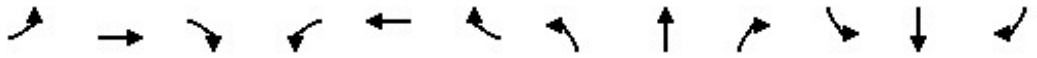
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
3: Half Street SW & Potomac Avenue SW

12/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	0	445	601	6	0	20	43	0	0	105	0
Future Volume (vph)	23	0	445	601	6	0	20	43	0	0	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Lane Util. Factor	1.00		1.00	1.00	1.00			1.00			1.00	
Frt	1.00		0.85	1.00	1.00			1.00			1.00	
Flt Protected	0.95		1.00	0.95	1.00			0.98			1.00	
Satd. Flow (prot)	1770		1583	1770	1863			1834			1863	
Flt Permitted	0.95		1.00	0.95	1.00			0.90			1.00	
Satd. Flow (perm)	1770		1583	1770	1863			1669			1863	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	24	0	468	633	6	0	21	45	0	0	111	0
RTOR Reduction (vph)	0	0	287	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	24	0	181	633	6	0	0	66	0	0	111	0
Turn Type	Prot		Prot	Split	NA		Perm	NA			NA	
Protected Phases	4		4	3	3			2			2	
Permitted Phases							2					
Actuated Green, G (s)	11.4		11.4	24.6	24.6			20.0			20.0	
Effective Green, g (s)	11.4		11.4	24.6	24.6			20.0			20.0	
Actuated g/C Ratio	0.15		0.15	0.33	0.33			0.27			0.27	
Clearance Time (s)	6.0		6.0	7.0	7.0			6.0			6.0	
Vehicle Extension (s)	1.0		1.0	1.0	1.0			1.0			1.0	
Lane Grp Cap (vph)	269		240	580	611			445			496	
v/s Ratio Prot	0.01		c0.11	c0.36	0.00						c0.06	
v/s Ratio Perm								0.04				
v/c Ratio	0.09		0.75	1.09	0.01			0.15			0.22	
Uniform Delay, d1	27.3		30.4	25.2	17.0			21.0			21.4	
Progression Factor	1.00		1.00	1.26	0.89			0.90			1.00	
Incremental Delay, d2	0.1		11.2	53.9	0.0			0.7			1.0	
Delay (s)	27.4		41.6	85.7	15.1			19.6			22.5	
Level of Service	C		D	F	B			B			C	
Approach Delay (s)		40.9			85.0			19.6			22.5	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	59.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

5: R Street SW & West Oval

12/21/2021

Lane Group	EBT	SBL
Lane Group Flow (vph)	1058	2923
v/c Ratio	1.01	0.86
Control Delay	83.0	10.0
Queue Delay	33.5	8.8
Total Delay	116.5	18.8
Queue Length 50th (ft)	~390	364
Queue Length 95th (ft)	#495	430
Internal Link Dist (ft)	313	279
Turn Bay Length (ft)		
Base Capacity (vph)	1050	3393
Starvation Cap Reductn	101	478
Spillback Cap Reductn	37	199
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.11	1.00

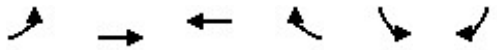
Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
5: R Street SW & West Oval

12/21/2021



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	1005	0	0	2777	0
Future Volume (vph)	0	1005	0	0	2777	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		9.0			8.0	
Lane Util. Factor		0.91			0.94	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		5085			4990	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		5085			4990	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1058	0	0	2923	0
RTOR Reduction (vph)	0	0	0	0	1	0
Lane Group Flow (vph)	0	1058	0	0	2922	0
Turn Type		NA			Prot	
Protected Phases		4			6	
Permitted Phases						
Actuated Green, G (s)		36.4			96.6	
Effective Green, g (s)		36.4			96.6	
Actuated g/C Ratio		0.24			0.64	
Clearance Time (s)		9.0			8.0	
Vehicle Extension (s)		3.0			1.0	
Lane Grp Cap (vph)		1233			3213	
v/s Ratio Prot		c0.21			c0.59	
v/s Ratio Perm						
v/c Ratio		0.86			0.91	
Uniform Delay, d1		54.3			22.9	
Progression Factor		0.93			0.45	
Incremental Delay, d2		5.7			2.4	
Delay (s)		56.0			12.7	
Level of Service		E			B	
Approach Delay (s)		56.0	0.0		12.7	
Approach LOS		E	A		B	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

6: West Oval & Frederick Douglass Bridge

12/21/2021

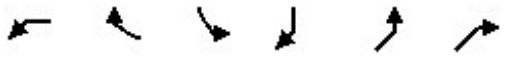
Lane Group	WBR	NEL
Lane Group Flow (vph)	1802	417
v/c Ratio	0.72	0.55
Control Delay	15.1	44.3
Queue Delay	1.3	0.0
Total Delay	16.4	44.4
Queue Length 50th (ft)	411	150
Queue Length 95th (ft)	477	m170
Internal Link Dist (ft)		34
Turn Bay Length (ft)		
Base Capacity (vph)	2508	756
Starvation Cap Reductn	3	0
Spillback Cap Reductn	461	7
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.88	0.56

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
6: West Oval & Frederick Douglass Bridge

12/21/2021



Movement	WBL	WBR	SBL	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	1712	0	0	396	0
Future Volume (vph)	0	1712	0	0	396	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.0			9.0	
Lane Util. Factor		0.76			0.97	
Frt		0.85			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3610			3433	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3610			3433	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1802	0	0	417	0
RTOR Reduction (vph)	0	60	0	0	45	0
Lane Group Flow (vph)	0	1742	0	0	372	0
Turn Type		Prot			Prot	
Protected Phases		2			4	
Permitted Phases						
Actuated Green, G (s)		96.6			36.4	
Effective Green, g (s)		96.6			36.4	
Actuated g/C Ratio		0.64			0.24	
Clearance Time (s)		8.0			9.0	
Vehicle Extension (s)		1.0			3.0	
Lane Grp Cap (vph)		2324			833	
v/s Ratio Prot		c0.48			c0.11	
v/s Ratio Perm						
v/c Ratio		0.75			0.45	
Uniform Delay, d1		18.4			48.2	
Progression Factor		1.00			0.94	
Incremental Delay, d2		2.0			0.2	
Delay (s)		20.4			45.7	
Level of Service		C			D	
Approach Delay (s)	20.4		0.0		45.7	
Approach LOS	C		A		D	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	123.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

7: West Oval & Potomac Avenue SE

12/21/2021

Lane Group	WBT	NBL2	NBL
Lane Group Flow (vph)	1031	108	2111
v/c Ratio	1.54	0.40	1.37dr
Control Delay	290.4	13.1	131.4
Queue Delay	0.7	1.0	0.4
Total Delay	291.1	14.1	131.8
Queue Length 50th (ft)	~771	15	~909
Queue Length 95th (ft)	#944	m41	#1053
Internal Link Dist (ft)	366		322
Turn Bay Length (ft)			
Base Capacity (vph)	668	270	1737
Starvation Cap Reductn	0	0	100
Spillback Cap Reductn	61	50	187
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.70	0.49	1.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

HCM Signalized Intersection Capacity Analysis
7: West Oval & Potomac Avenue SE

12/21/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	903	76	114	1611	383	0	0
Future Volume (vph)	0	0	0	0	903	76	114	1611	383	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0		11.0	11.0			
Lane Util. Factor					0.95		0.86	0.86			
Frt					0.99		1.00	0.97			
Flt Protected					1.00		0.95	0.96			
Satd. Flow (prot)					3498		1522	4487			
Flt Permitted					1.00		0.95	0.96			
Satd. Flow (perm)					3498		1522	4487			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	951	80	120	1696	403	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	97	71	0	0	0
Lane Group Flow (vph)	0	0	0	0	1027	0	11	2040	0	0	0
Turn Type					NA		Prot	Prot			
Protected Phases					4		5	2			
Permitted Phases											
Actuated Green, G (s)					28.5		15.0	83.0			
Effective Green, g (s)					28.5		15.0	83.0			
Actuated g/C Ratio					0.19		0.10	0.55			
Clearance Time (s)					11.0		11.0	11.0			
Vehicle Extension (s)					3.0		1.0	1.0			
Lane Grp Cap (vph)					664		152	2482			
v/s Ratio Prot					c0.29		0.01	c0.08			
v/s Ratio Perm								0.37			
v/c Ratio					1.55		0.07	1.37dr			
Uniform Delay, d1					60.8		61.2	27.4			
Progression Factor					1.00		1.88	0.95			
Incremental Delay, d2					253.4		0.6	2.3			
Delay (s)					314.2		115.4	28.3			
Level of Service					F		F	C			
Approach Delay (s)		0.0			314.2			32.6		0.0	
Approach LOS		A			F			C		A	

Intersection Summary			
HCM 2000 Control Delay	121.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Queues
8: West Oval & South Capitol Street

12/21/2021

Lane Group	SBR	NWR
Lane Group Flow (vph)	2501	1776
v/c Ratio	0.69	0.52
Control Delay	1.1	0.7
Queue Delay	47.9	7.0
Total Delay	49.0	7.7
Queue Length 50th (ft)	0	10
Queue Length 95th (ft)	0	m0
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)	3610	3404
Starvation Cap Reductn	0	1583
Spillback Cap Reductn	1896	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.46	0.98

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
8: West Oval & South Capitol Street

12/21/2021

Movement	SBL	SBR	NWL	NWR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	0	2376	0	1687	0	0
Future Volume (vph)	0	2376	0	1687	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		11.0		
Lane Util. Factor		0.76		0.76		
Frt		0.85		0.85		
Flt Protected		1.00		1.00		
Satd. Flow (prot)		3610		3610		
Flt Permitted		1.00		1.00		
Satd. Flow (perm)		3610		3610		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	2501	0	1776	0	0
RTOR Reduction (vph)	0	0	0	326	0	0
Lane Group Flow (vph)	0	2501	0	1450	0	0
Turn Type		custom		custom		
Protected Phases		Free		2 4		
Permitted Phases						
Actuated Green, G (s)		150.0		122.5		
Effective Green, g (s)		150.0		122.5		
Actuated g/C Ratio		1.00		0.82		
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)		3610		2948		
v/s Ratio Prot		0.69		0.40		
v/s Ratio Perm						
v/c Ratio		0.69		0.49		
Uniform Delay, d1		0.0		4.2		
Progression Factor		1.00		1.00		
Incremental Delay, d2		1.1		0.0		
Delay (s)		1.1		4.2		
Level of Service		A		A		
Approach Delay (s)	1.1		4.2		0.0	
Approach LOS	A		A		A	

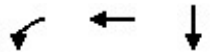
Intersection Summary			
HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Queues

9: West Oval & Q Street SW

12/21/2021



Lane Group	WBL	WBT	SBT
Lane Group Flow (vph)	531	539	2501
v/c Ratio	0.59	0.60	1.21
Control Delay	29.0	29.6	136.9
Queue Delay	54.2	54.1	0.8
Total Delay	83.2	83.8	137.7
Queue Length 50th (ft)	392	401	~1090
Queue Length 95th (ft)	m190	m195	#1173
Internal Link Dist (ft)		161	126
Turn Bay Length (ft)			
Base Capacity (vph)	898	900	2067
Starvation Cap Reductn	416	414	496
Spillback Cap Reductn	76	77	356
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.10	1.11	1.59

Intersection Summary

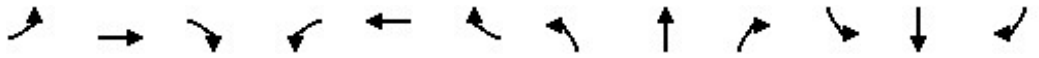
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
9: West Oval & Q Street SW

12/21/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1009	8	0	0	0	0	0	2375	1
Future Volume (vph)	0	0	0	1009	8	0	0	0	0	0	2375	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						7.0	
Lane Util. Factor				0.95	0.95						0.91	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.95						1.00	
Satd. Flow (prot)				1681	1687						5085	
Flt Permitted				0.95	0.95						1.00	
Satd. Flow (perm)				1681	1687						5085	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	1062	8	0	0	0	0	0	2500	1
RTOR Reduction (vph)	0	0	0	17	17	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	514	522	0	0	0	0	0	2501	0
Turn Type				Split	NA						NA	
Protected Phases				3 4 5	3 4 5						6	
Permitted Phases												
Actuated Green, G (s)				71.0	71.0						61.0	
Effective Green, g (s)				60.0	60.0						61.0	
Actuated g/C Ratio				0.40	0.40						0.41	
Clearance Time (s)											7.0	
Vehicle Extension (s)											1.0	
Lane Grp Cap (vph)				672	674						2067	
v/s Ratio Prot				0.31	c0.31						c0.49	
v/s Ratio Perm												
v/c Ratio				0.76	0.77						1.21	
Uniform Delay, d1				38.9	39.1						44.5	
Progression Factor				1.23	1.25						1.00	
Incremental Delay, d2				0.4	0.5						97.9	
Delay (s)				48.3	49.3						142.4	
Level of Service				D	D						F	
Approach Delay (s)		0.0			48.8			0.0			142.4	
Approach LOS		A			D			A			F	

Intersection Summary			
HCM 2000 Control Delay	114.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	128.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Queues

10: West Oval & Potomac Avenue SW

12/21/2021

Lane Group	SBT
Lane Group Flow (vph)	3562
v/c Ratio	0.88
Control Delay	9.6
Queue Delay	45.8
Total Delay	55.5
Queue Length 50th (ft)	266
Queue Length 95th (ft)	m116
Internal Link Dist (ft)	1
Turn Bay Length (ft)	
Base Capacity (vph)	4061
Starvation Cap Reductn	842
Spillback Cap Reductn	536
Storage Cap Reductn	0
Reduced v/c Ratio	1.11

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
10: West Oval & Potomac Avenue SW

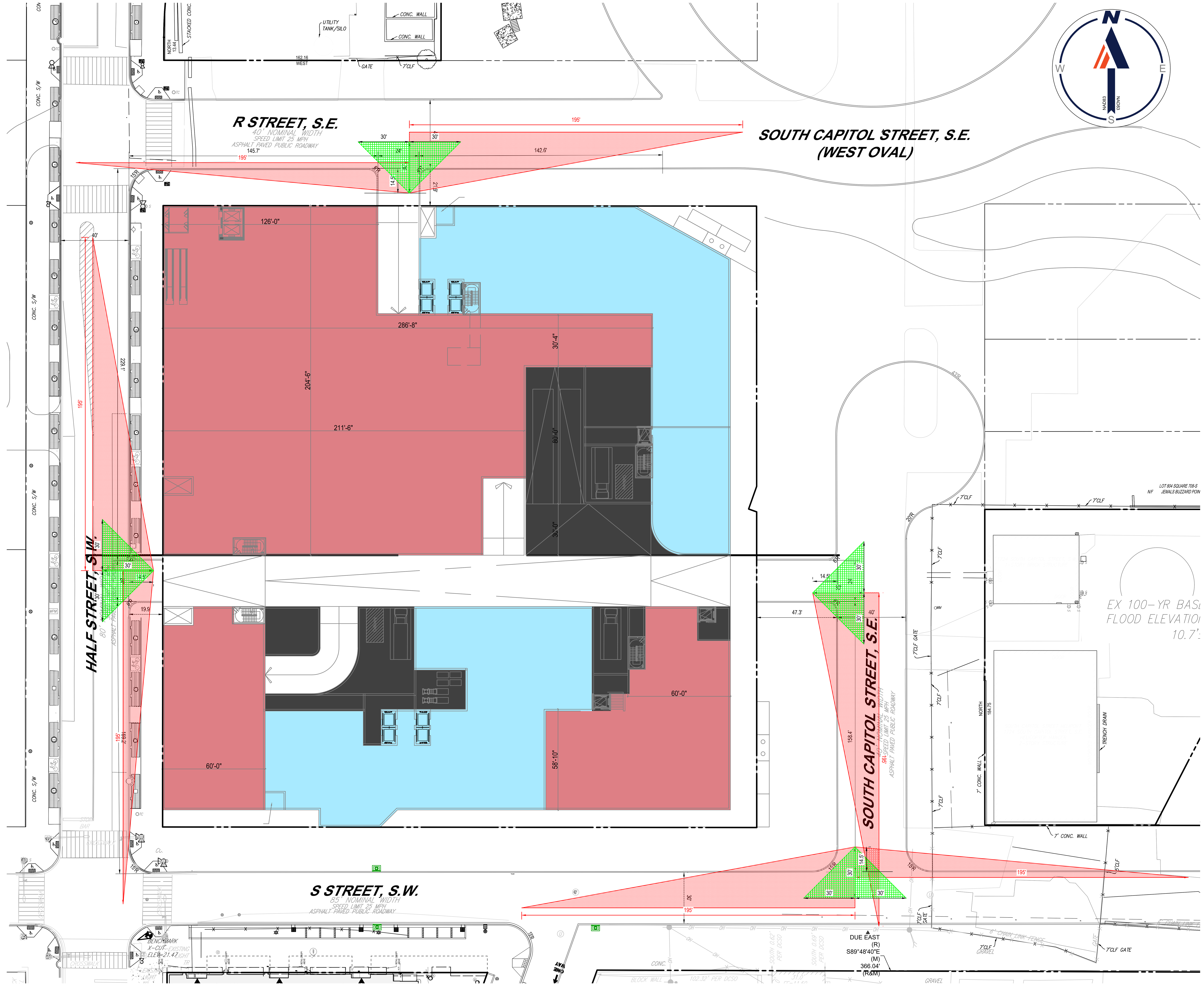
12/21/2021

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	2777	607
Future Volume (vph)	0	0	0	0	2777	607
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)					11.0	
Lane Util. Factor					0.91	
Frt					0.97	
Flt Protected					1.00	
Satd. Flow (prot)					4948	
Flt Permitted					1.00	
Satd. Flow (perm)					4948	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	2923	639
RTOR Reduction (vph)	0	0	0	0	25	0
Lane Group Flow (vph)	0	0	0	0	3537	0
Turn Type					NA	
Protected Phases					4 5 6	
Permitted Phases						
Actuated Green, G (s)					122.5	
Effective Green, g (s)					115.5	
Actuated g/C Ratio					0.77	
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)					3809	
v/s Ratio Prot					c0.71	
v/s Ratio Perm						
v/c Ratio					0.93	
Uniform Delay, d1					13.9	
Progression Factor					0.94	
Incremental Delay, d2					0.5	
Delay (s)					13.6	
Level of Service					B	
Approach Delay (s)	0.0			0.0	13.6	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	32.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

K. Sight Distance Analysis



LEGEND

- SIGHT DISTANCE TRIANGLES PER AASHTO
- SIGHT DISTANCE TRIANGLES PER DDOT DESIGN AND ENGINEERING MANUAL - SECTION 32.12

NOTES

A DESIGN SPEED OF 30 MPH WAS USED FOR THIS INTERSECTION SIGHT DISTANCE ANALYSIS. BASED ON THE 2011 AASHTO "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" MANUAL, THE INSTESECTION SIGHT DISTANCE FOR THIS DESIGN SPEED IS 195' AND A DECISION POINT OF 14.5' WAS UTILIZED FROM THE EDGE OF PAVEMENT.

PER THE DDOT DESIGN AND ENGINEERING MANUAL - SECTION 32.12, THE SIGHT TRIANGLES ARE TO BE 30' X 30' FOR MINOR ROADS.

ALL PROPOSED CURB CUTS ARE PER DDOT STANDARDS STATED IN THE DDOT DESIGN AND ENGINEERING MANUAL DATED JANUARY 2019.

1" = 30'

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PROJECT No.:	DC2020661
DRAWN BY:	SL
CHECKED BY:	CM
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CAD I.D.:	SPP-0

PROJECT:

CONCEPTUAL CURB CUT PLAN

FOR

STEUART BUZZARD POINT

LOT 0801 SQUARE 0662
BOOK 3595 PAGE K
WASHINGTON, DC 20003

BOHLER DC
1331 PENNSYLVANIA AVE., NW,
STE. 1250 NORTH
WASHINGTON, DC 20004
Phone: (202) 524-5700

SHEET TITLE:

SIGHT DISTANCE EXHIBIT

SHEET NUMBER:

C-301

ORG. DATE - 5/12/2021