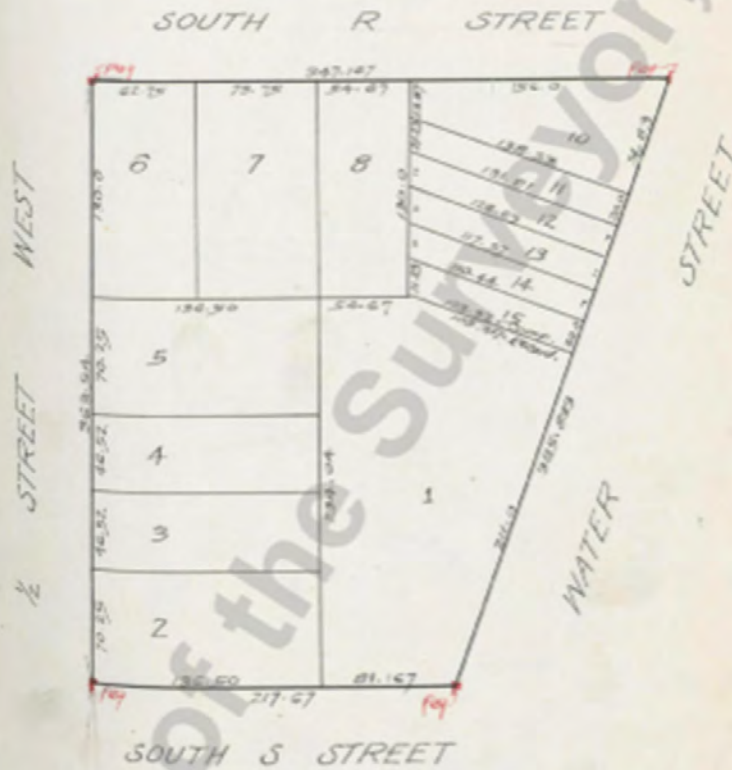


Surveyor's Office
DISTRICT OF COLUMBIA

Washington, D.C. Dec. 11, 1900

Plat of Survey of Lots 1 to 8 and 12 to 15 (also space), outlines

Square 667
(30.65033)



Scale: 1 inch = 60 feet

Surveyor's Office
 I, John S. [Signature], Surveyor, do hereby certify, That the foregoing plat is correct in accordance with law and record. Actual survey made this
5th day of DEC. 1900 for Gulf Refining Co.
 (Handwritten)

NOTE.—Bevel squares shown in black, but do not necessarily agree with actual survey.
 Surveyor, District of Columbia
John S. [Signature]

1152

At the request of the Commissioners, appointed under the Act of Congress for establishing the temporary and permanent seat of the Government of the United States, the following Square was recorded this 2nd day of February 1802.



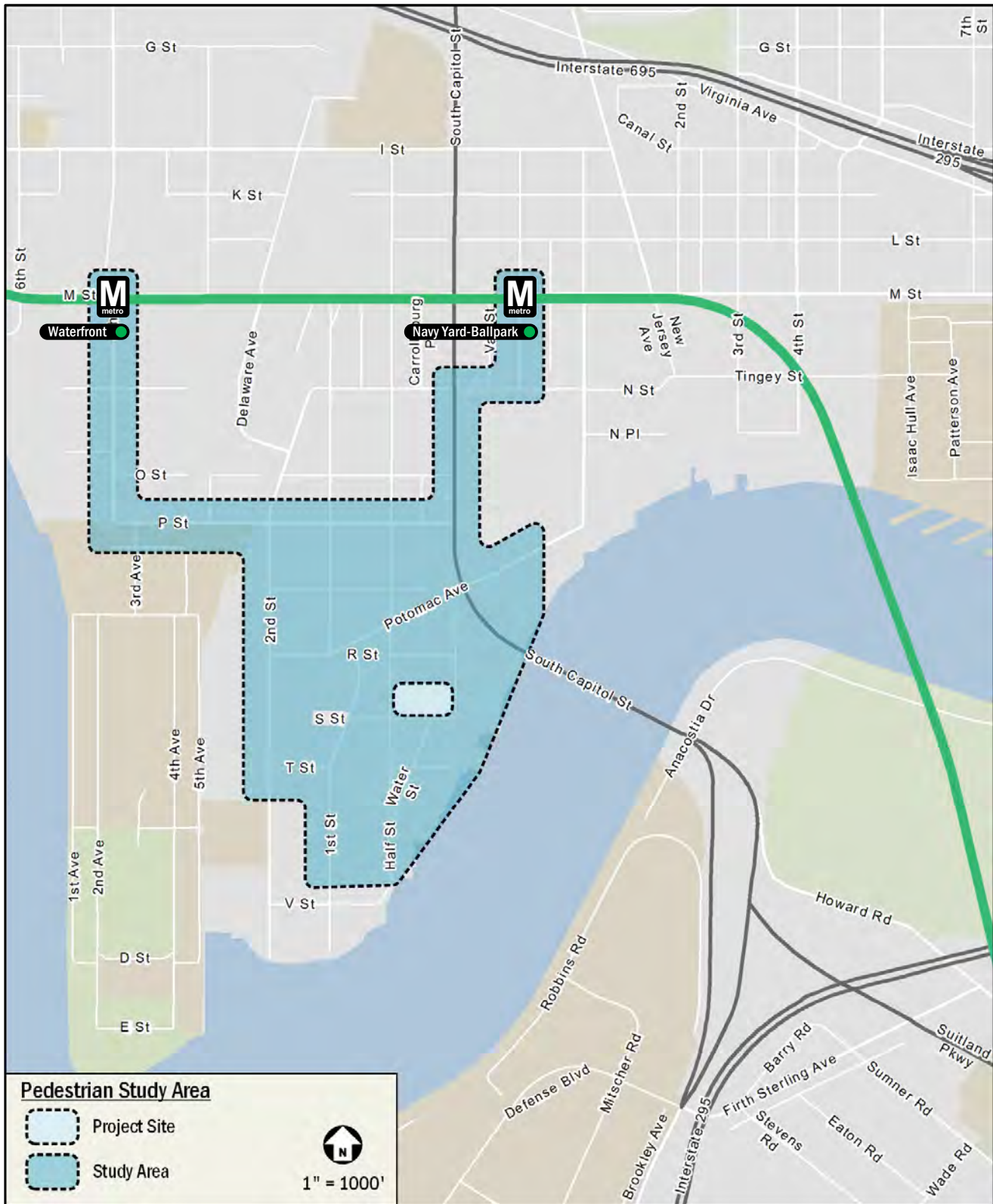
Square East of Square 662 City of Washington.

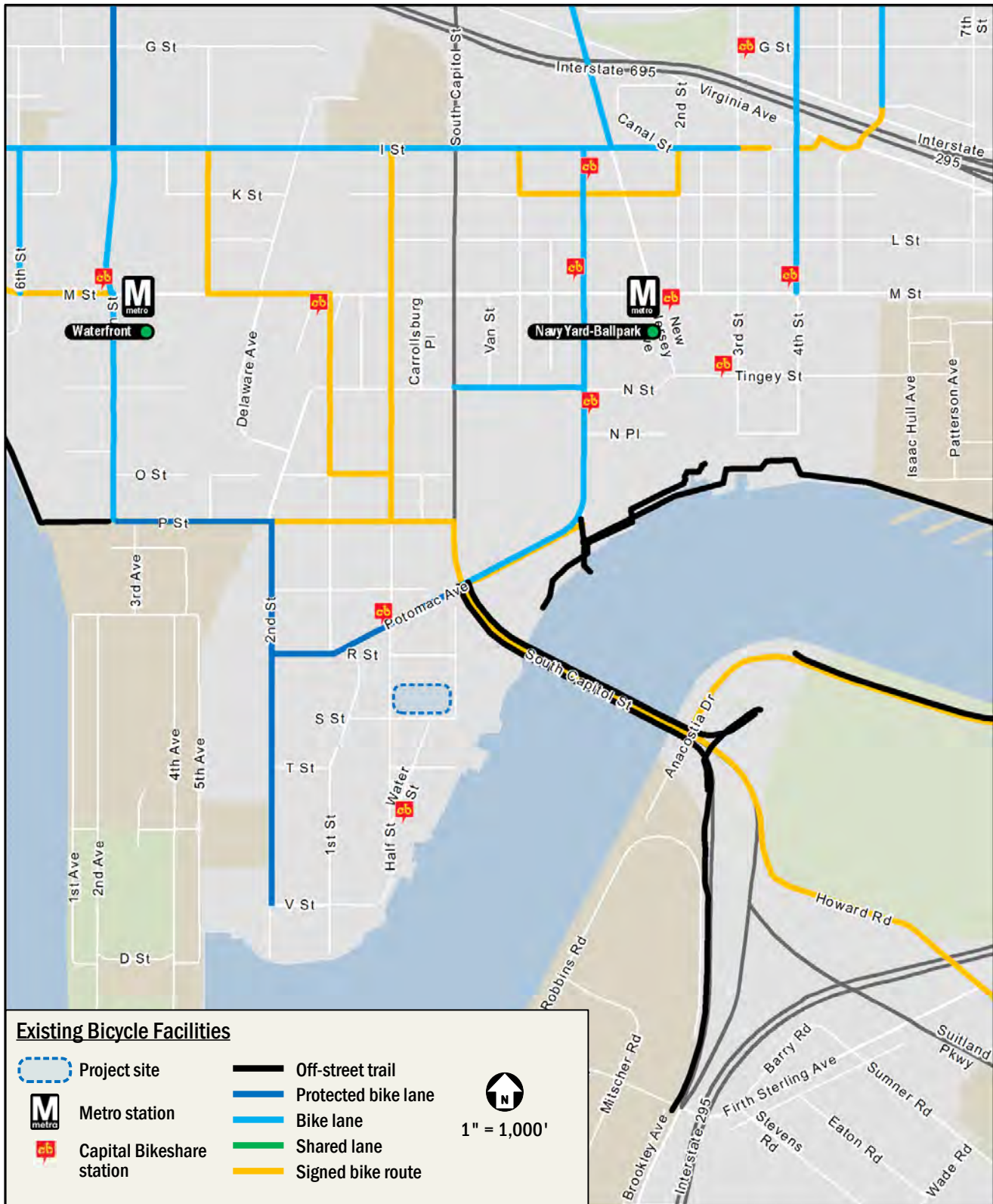
Bounded {
 On the East by South Capitol Street one hundred and eighty four feet, eight inches.
 On the North west by Water Street one hundred and ninety six feet, five inches.
 On the South by S Street North sixty five feet, nine inches and three quarters.

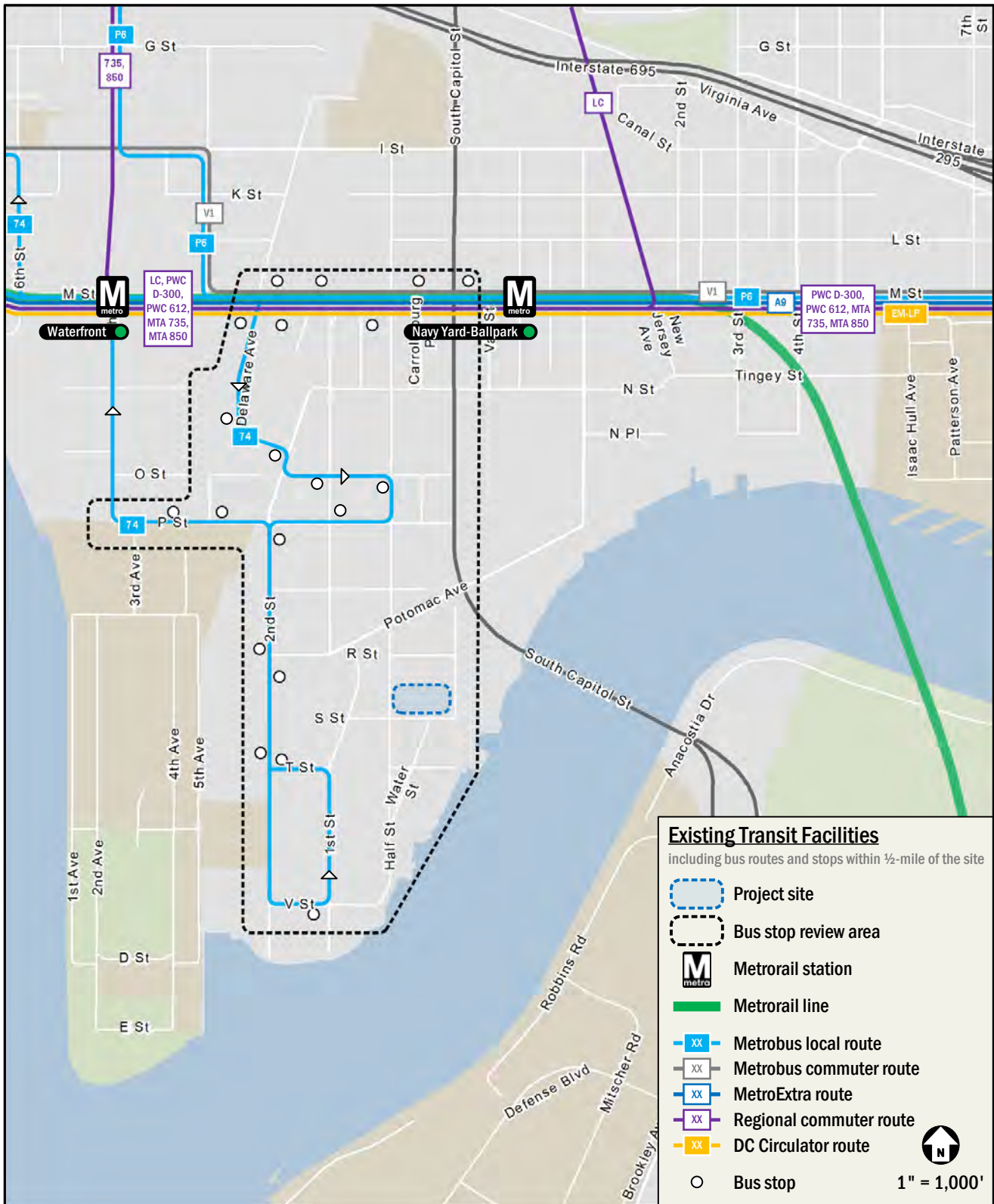
Thomas Johnson, David Stuart, Daniel Carroll, Commissioners having set out and assigned to the several proprietors of Lots in Maryland the respective compensations for their several Lots in Maryland aforesaid, the whole of this Square East of Square numbered six hundred and sixty two in the City of Washington remain to the public Subject to be sold equally to the Debtors of Trust concerning Lands in the said City as appears by the original plans and proceedings in the Commissioners Office, dated the twenty sixth day of June One thousand seven hundred and ninety four.
 Jan 26. 1802.

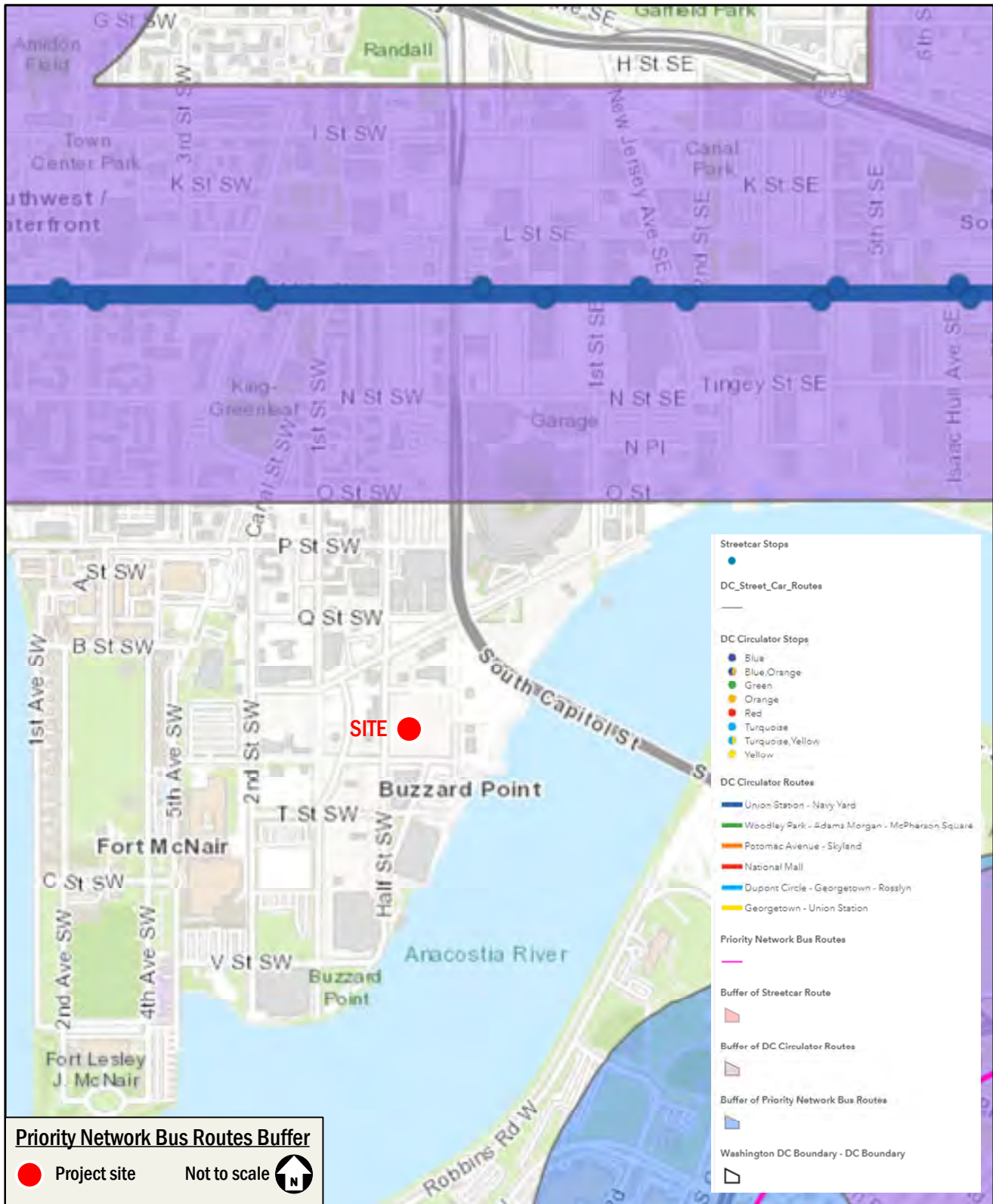
NOW
 H.T.

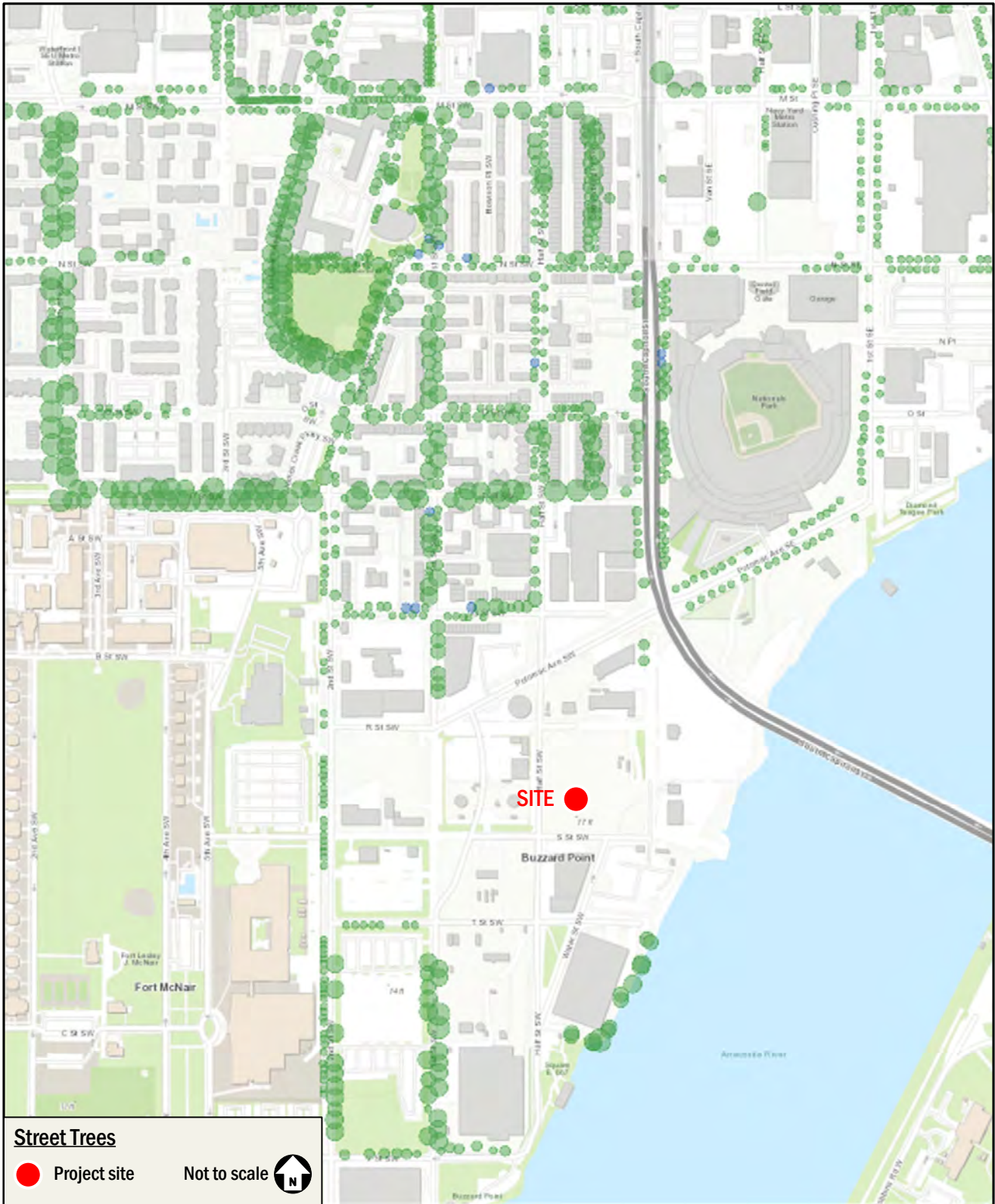
Office of the Surveyor, D.C.



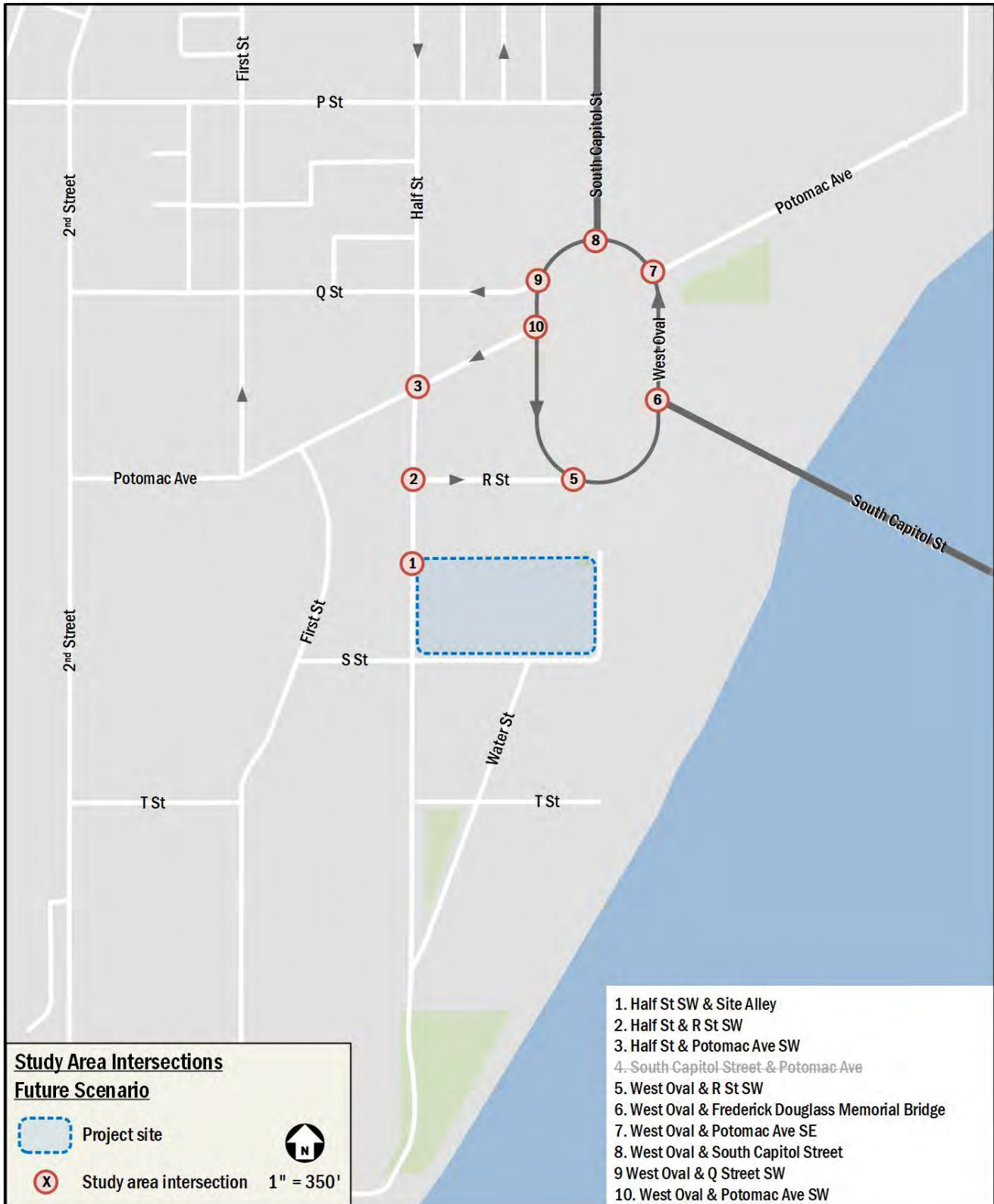


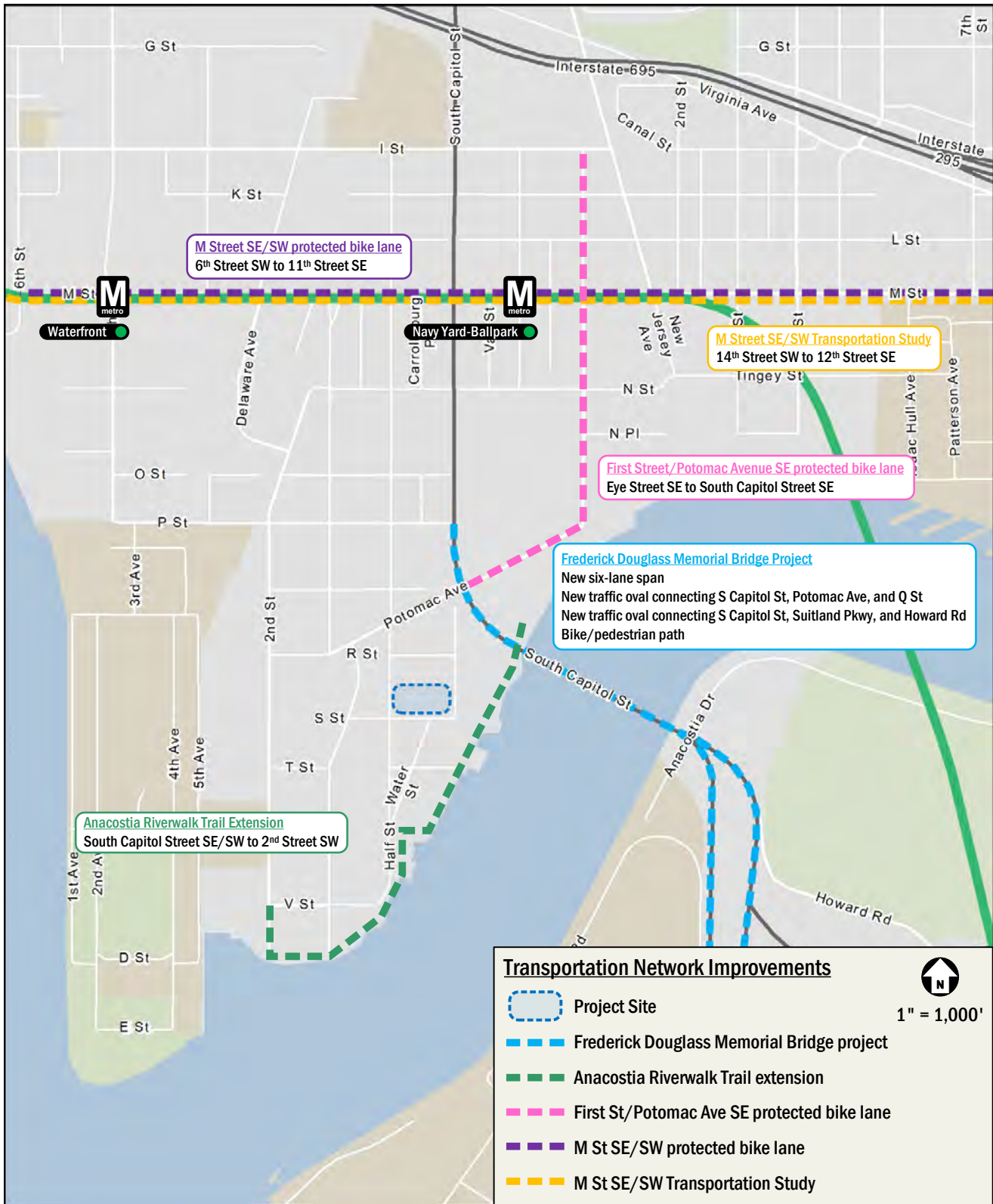


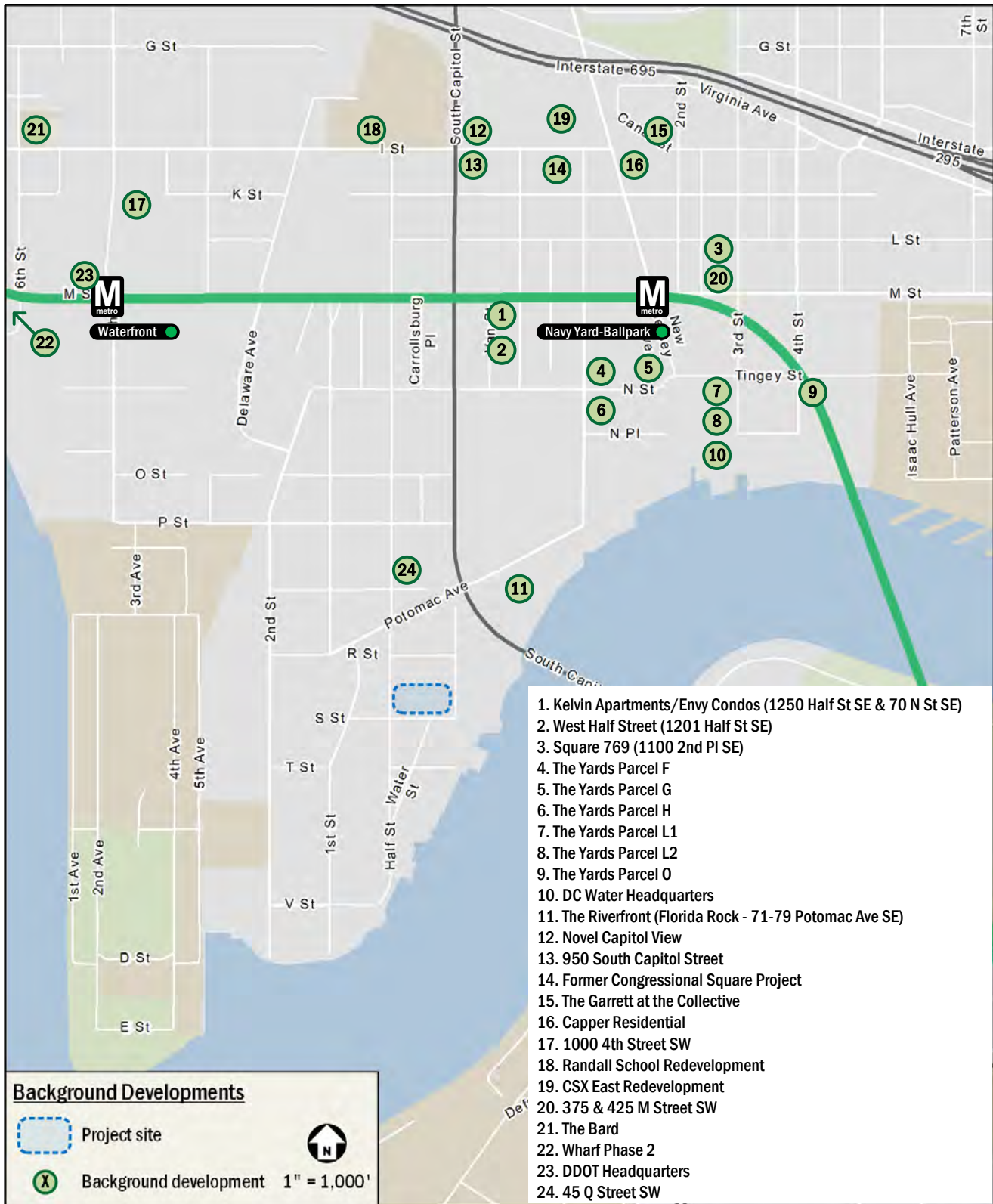


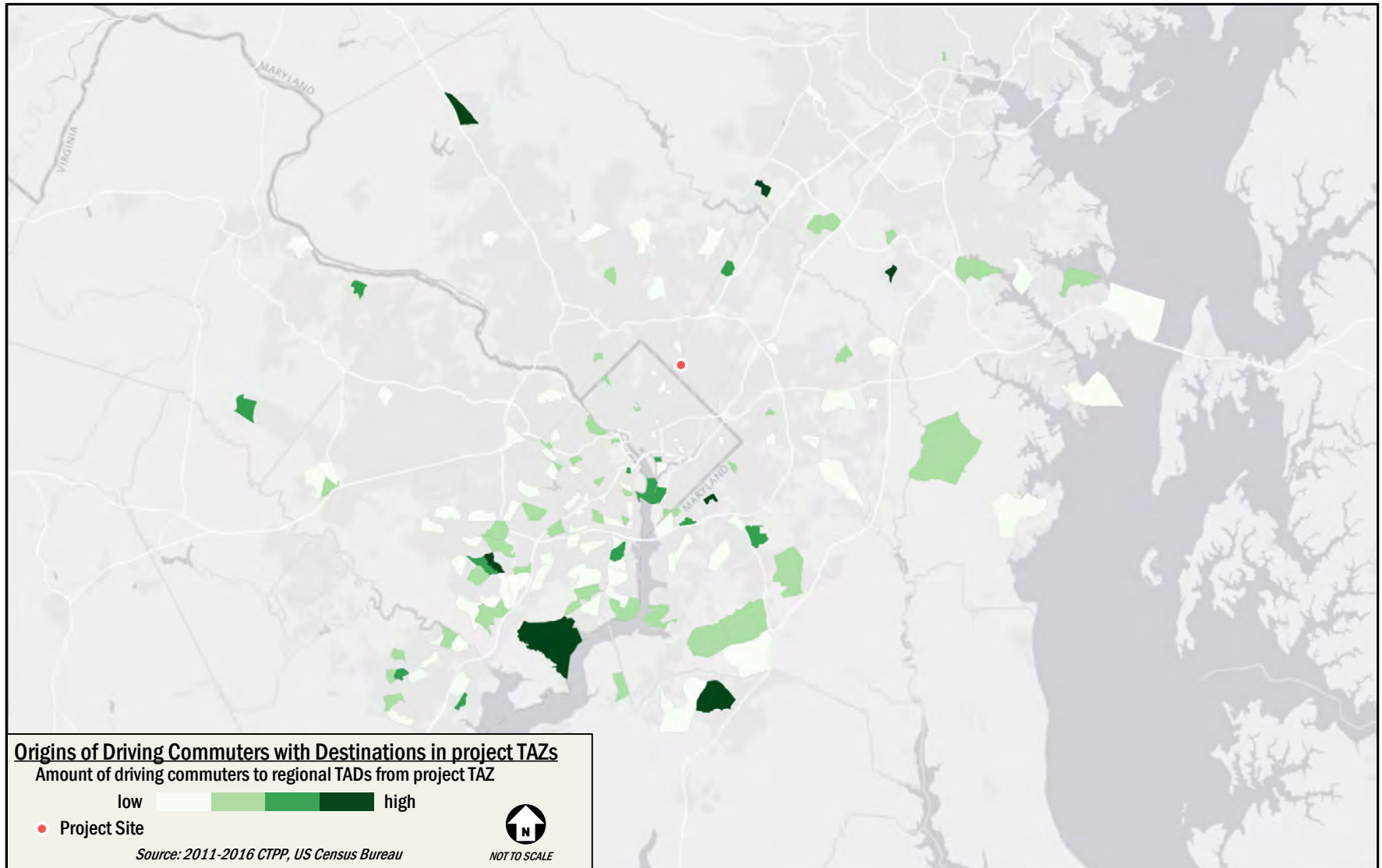


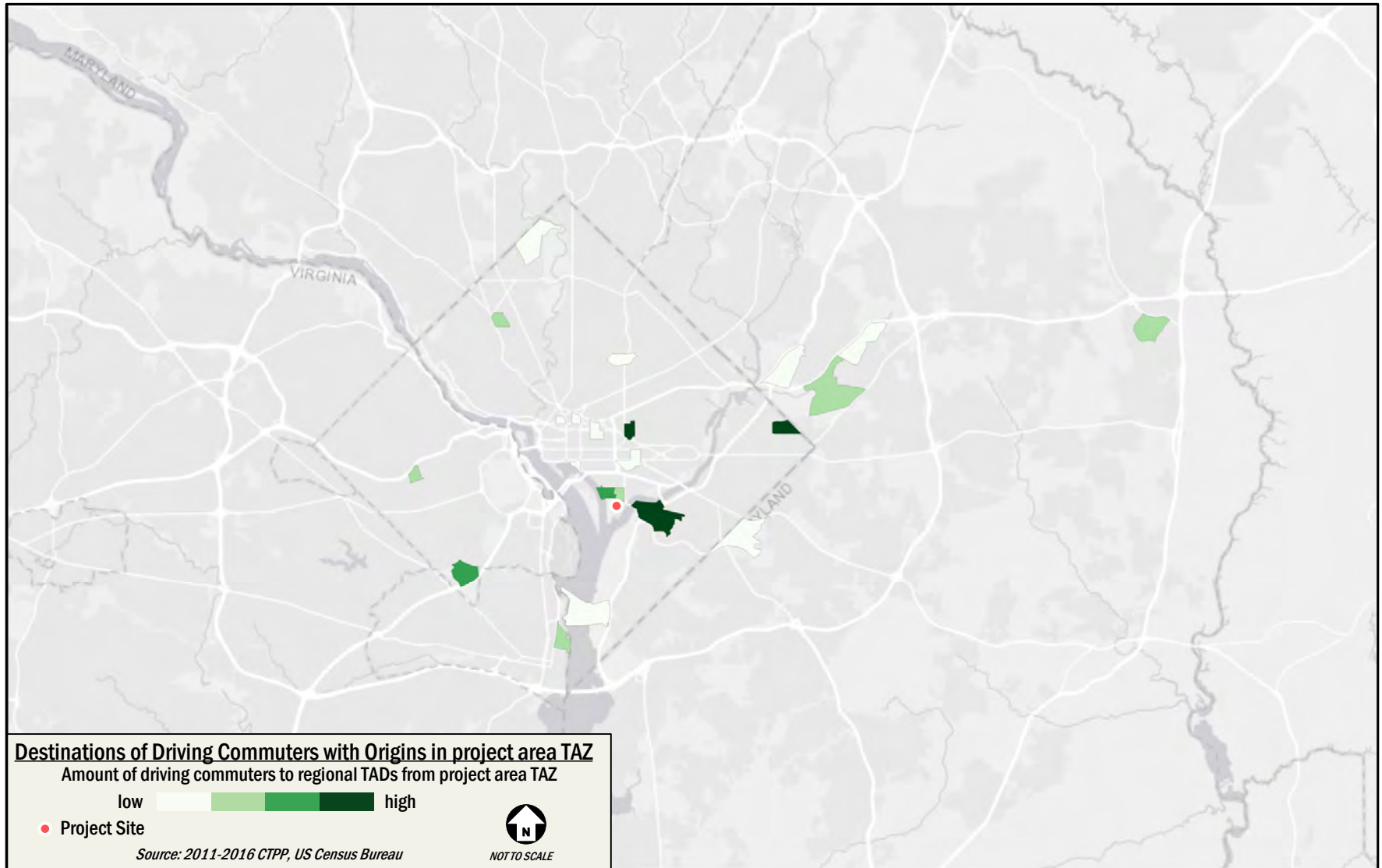


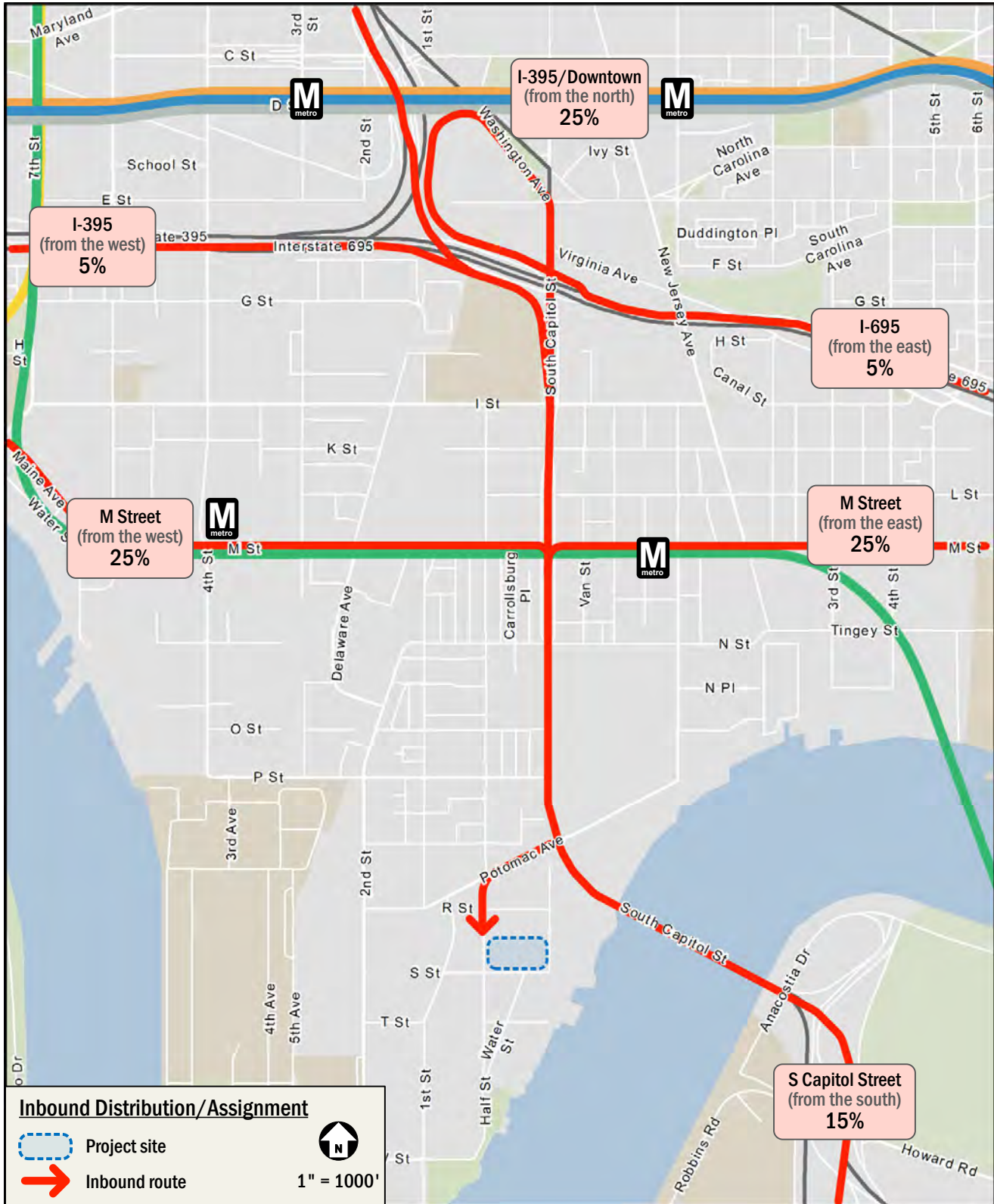


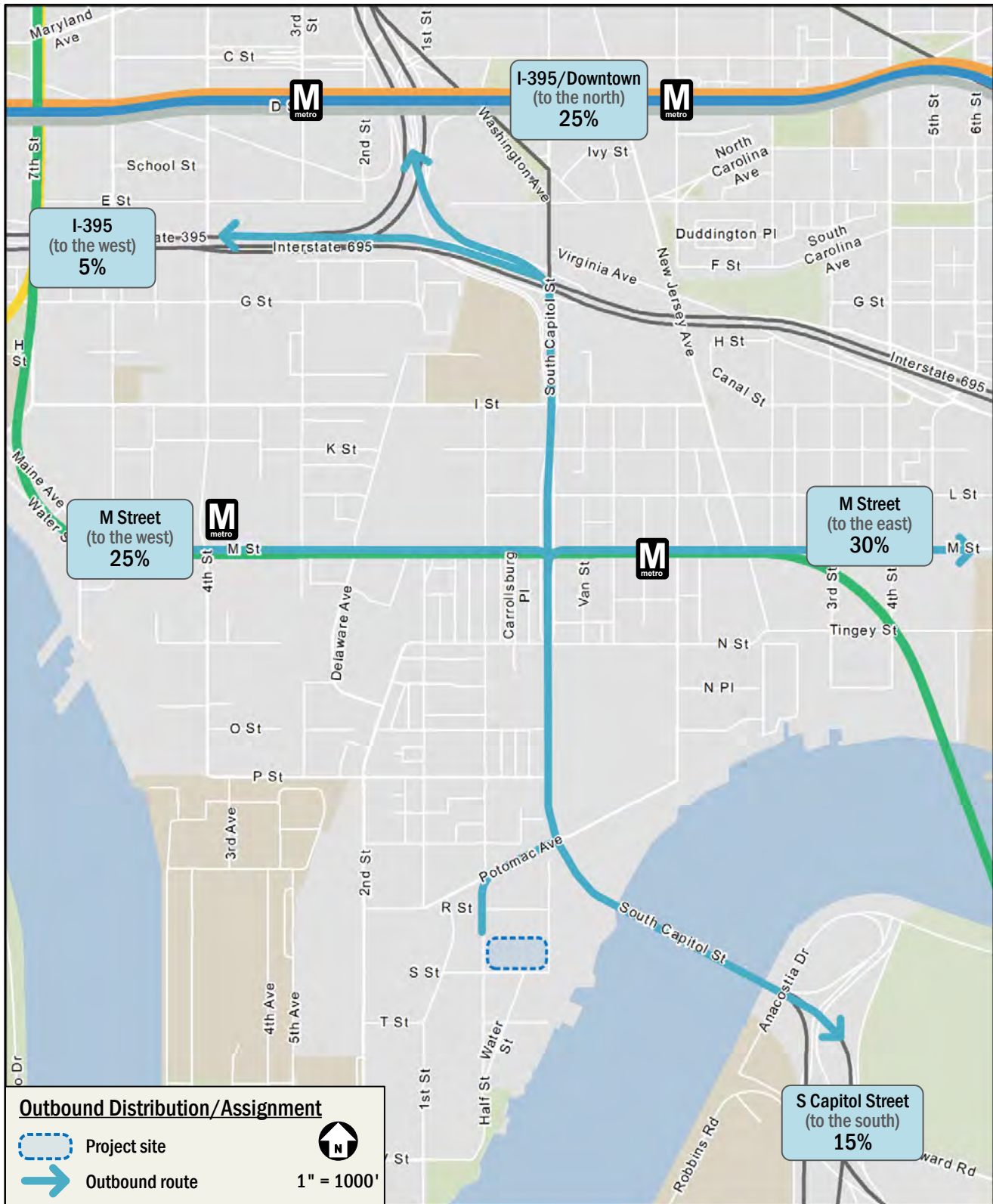


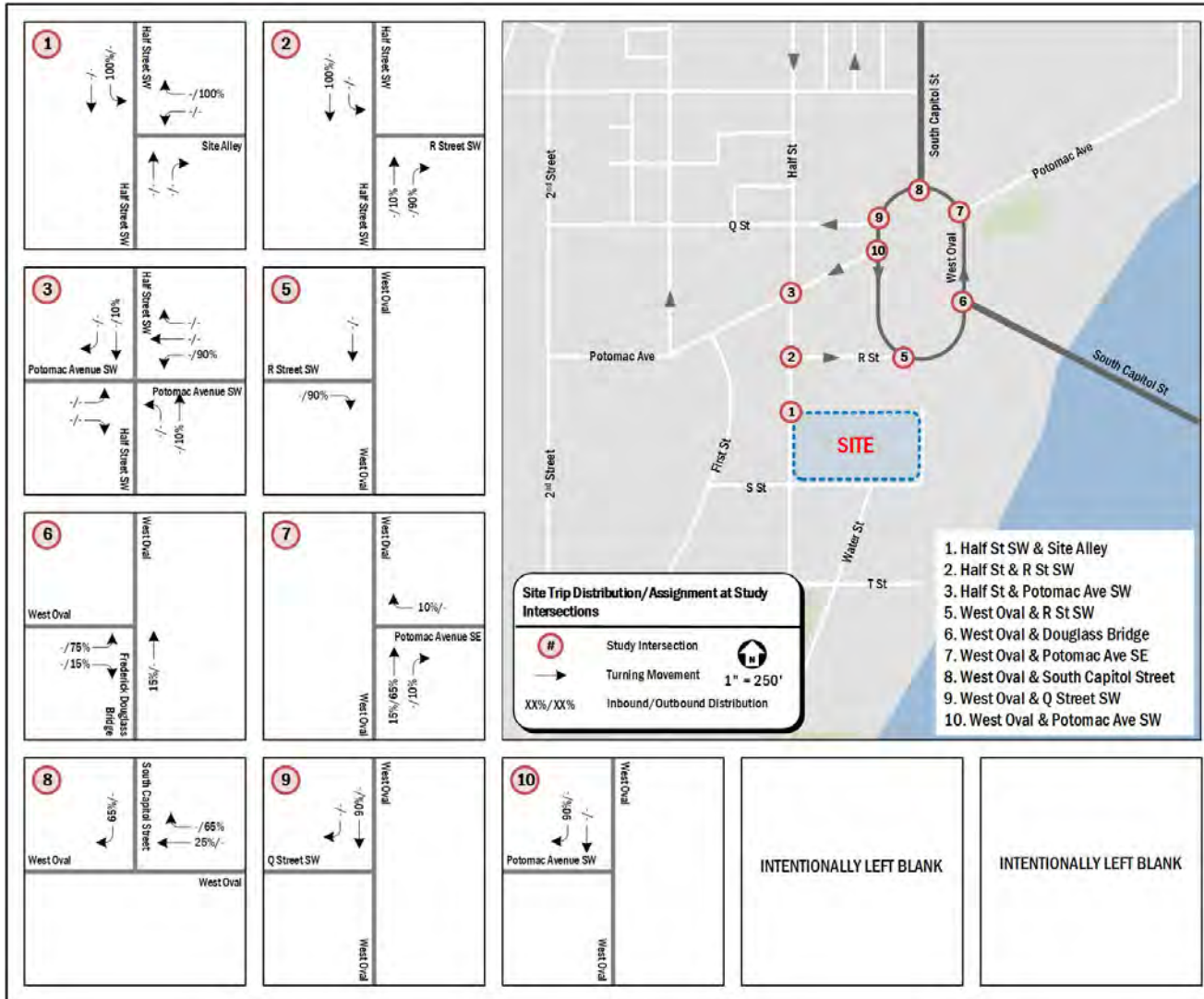










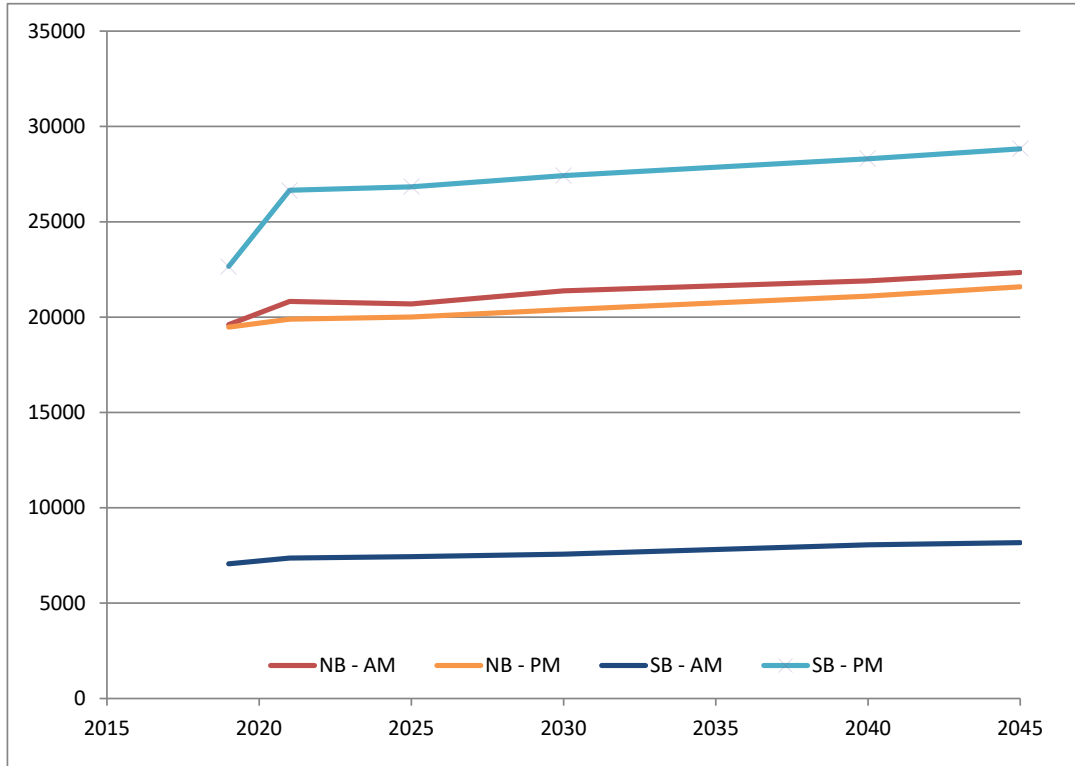


Growth Rate Information & Assumptions

South Capitol St SW/SE Aggregate

MWCOG Model Volumes (v2.3.78)

Direction/Period	2019	2021	2025	2030	2040	2045
NB - AM	19608	20824	20696	21380	21905	22344
NB - PM	19474	19895	20007	20394	21105	21591
SB - AM	7058	7363	7438	7570	8061	8175
SB - PM	22661	26653	26831	27426	28307	28824

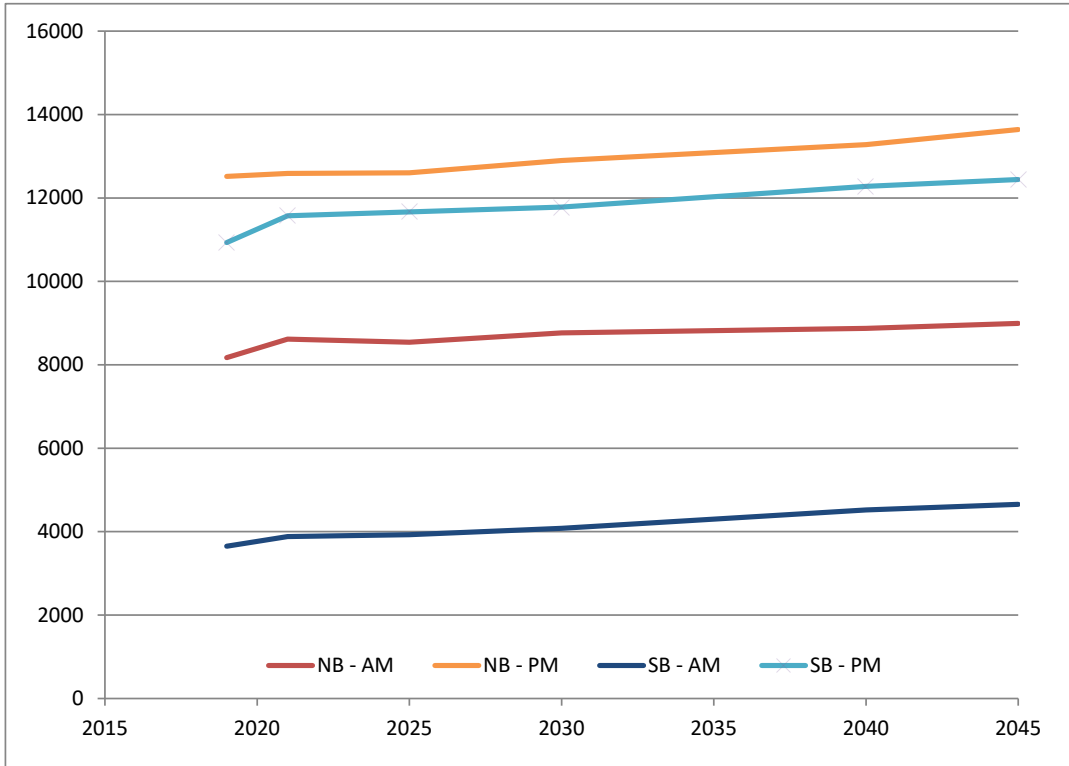


Direction/Period	Growth per year between 2019 & 2025
NB - AM	0.90%
NB - PM	0.45%
SB - AM	0.88%
SB - PM	2.86%

Growth Rate Information & Assumptions
South Capitol St SW/SE btwn P St and Potomac Ave

MWCOG Model Volumes (v2.3.78)

Direction/Period	2019	2021	2025	2030	2040	2045
NB - AM	8171	8614	8541	8765	8875	8991
NB - PM	12518	12588	12602	12897	13281	13640
SB - AM	3652	3882	3925	4081	4519	4656
SB - PM	10931	11572	11665	11781	12277	12444



Year of data collection: 2021
 Project completion date: 2025

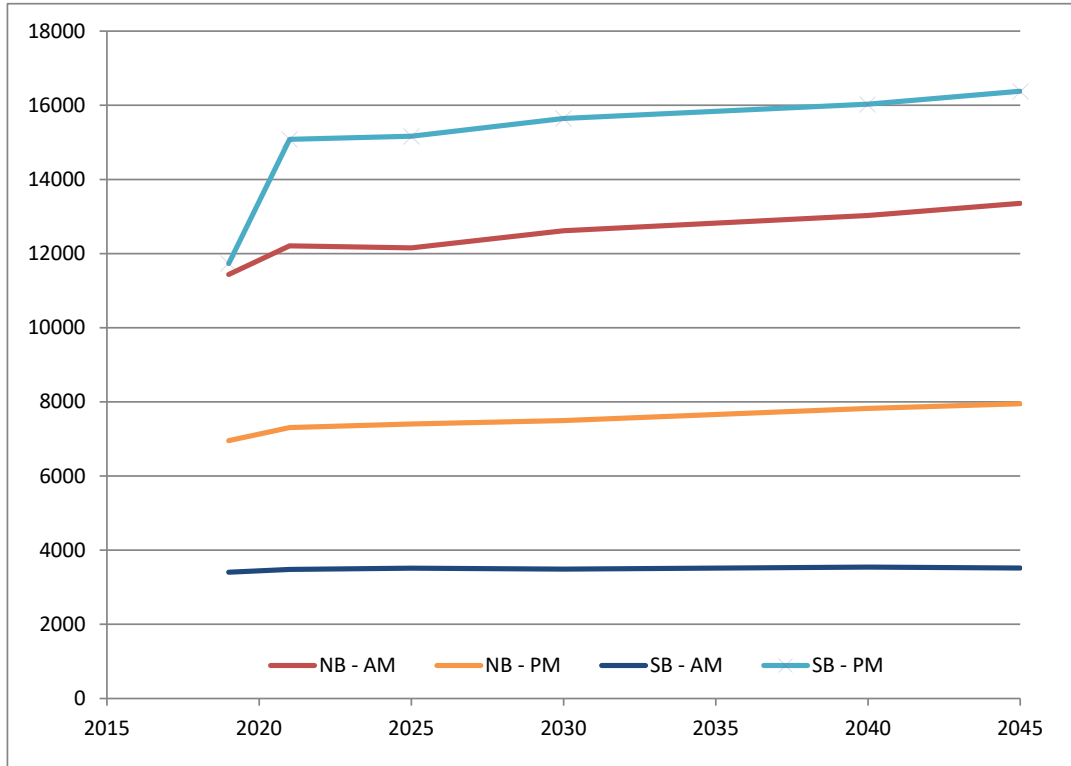
Direction/Period	Growth per year between 2019 & 2025
NB - AM	0.74%
NB - PM	0.11%
SB - AM	1.21%
SB - PM	1.09%

Growth Rate Information & Assumptions

South Capitol St SW/SE btwn Potomac Ave and Anacostia Fwy

MWCOG Model Volumes (v2.3.78)

Direction/Period	2019	2021	2025	2030	2040	2045
NB - AM	11437	12210	12155	12615	13030	13353
NB - PM	6956	7307	7405	7497	7824	7951
SB - AM	3406	3481	3513	3489	3542	3519
SB - PM	11730	15081	15166	15645	16030	16380



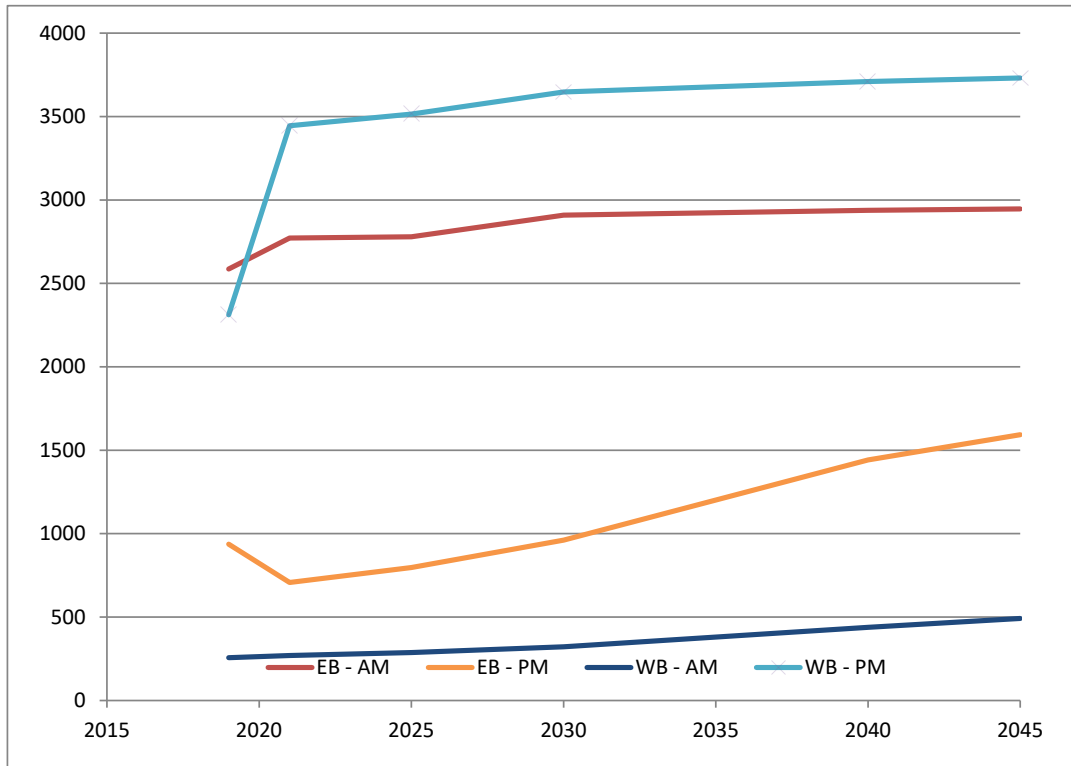
Year of data collection: 2021
 Project completion date: 2025

Direction/Period	Growth per year between 2019 & 2025
NB - AM	1.02%
NB - PM	1.05%
SB - AM	0.52%
SB - PM	4.37%

Growth Rate Information & Assumptions
Potomac Ave SE btwn South Capitol St and N St

MWCOG Model Volumes (v2.3.78)

Direction/Period	2019	2021	2025	2030	2040	2045
EB - AM	2586	2772	2779	2909	2938	2946
EB - PM	937	707	797	961	1442	1593
WB - AM	256	269	287	322	438	492
WB - PM	2312	3445	3515	3647	3710	3731



Direction/Period	Growth per year between 2019 & 2025
EB - AM	1.21%
EB - PM	-2.66%
WB - AM	1.92%
WB - PM	7.23%

Attachment A - Scoping Information

Location	DDOT AADT Volumes										Annual Growth								Average Growth Between 2010-2019		
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019	2011-2019	2012-2019	2013-2019	2014-2019	2015-2019	2016-2019	2017-2019		2018-2019	
S Capitol St (Bridge)	46.3	46.5	61.4	61.6	62.8	51.5	53.0	53.0	47.0	47.0	0.2%	0.1%	-3.7%	-4.4%	-5.6%	-2.3%	-3.9%	-5.8%	0.0%	-2.8%	
Potomac Ave SW (between Half St SW & S. Capitol St)	5.8	5.8	5.8	5.8	5.9	6.1	6.0	6.0	6.0	6.0	0.4%	0.4%	0.5%	0.6%	0.3%	-0.4%	0.0%	0.0%	0.0%	0.0%	0.2%

Location	DDOT AADT Volumes					Annual Growth				Average Growth Between 2015-2019
	2015	2016	2017	2018	2019	2015-2019	2016-2019	2017-2019	2018-2019	
S Capitol St (between M St & Potomac Ave)	45.5	45.1	43.5	43.4	43.5	-1.1%	-1.2%	0.0%	0.2%	-0.5%
Potomac Ave SE (between M St SE & S. Capitol St)	4.5	5.0	5.0	5.0	5.0	2.7%	0.0%	0.0%	0.0%	0.7%

B. Detailed Trip Generation and Mode Split Information

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%	---

Attachment B - Detailed Trip Generation and Mode Split Information

Trip Generation - Phase 1 Retail

17,342 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	17,342 sf	10 veh/hr	6 veh/hr	16 veh/hr	32 veh/hr	34 veh/hr	66 veh/hr	1,826 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	18 ppl/hr	11 ppl/hr	29 ppl/hr	58 ppl/hr	62 ppl/hr	120 ppl/hr	3,323 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%	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	12 ppl/hr	24 ppl/hr	665 ppl
Shopping Center	Transit	35%	6 ppl/hr	4 ppl/hr	10 ppl/hr	20 ppl/hr	22 ppl/hr	42 ppl/hr	1,163 ppl
Shopping Center	Bike	5%	1 ppl/hr	0 ppl/hr	1 ppl/hr	3 ppl/hr	3 ppl/hr	6 ppl/hr	166 ppl
Shopping Center	Walk	40%	7 ppl/hr	5 ppl/hr	12 ppl/hr	23 ppl/hr	25 ppl/hr	48 ppl/hr	1,329 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	2 veh/hr	1 veh/hr	3 veh/hr	7 veh/hr	6 veh/hr	13 veh/hr	365 veh

Trip Gen Summary for Retail

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	2 veh/hr	1 veh/hr	3 veh/hr	7 veh/hr	6 veh/hr	13 veh/hr	365 veh
Transit	6 ppl/hr	4 ppl/hr	10 ppl/hr	20 ppl/hr	22 ppl/hr	42 ppl/hr	1,163 ppl
Bike	1 ppl/hr	0 ppl/hr	1 ppl/hr	3 ppl/hr	3 ppl/hr	6 ppl/hr	166 ppl
Walk	7 ppl/hr	5 ppl/hr	12 ppl/hr	23 ppl/hr	25 ppl/hr	48 ppl/hr	1,329 ppl

Attachment B - Detailed Trip Generation and Mode Split Information

Trip Generation - Phase 1 Residential

457 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	457 du	34 veh/hr	107 veh/hr	141 veh/hr	100 veh/hr	64 veh/hr	164 veh/hr	2,012 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	40 ppl/hr	126 ppl/hr	166 ppl/hr	118 ppl/hr	76 ppl/hr	194 ppl/hr	2,374 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%	16 ppl/hr	50 ppl/hr	66 ppl/hr	47 ppl/hr	31 ppl/hr	78 ppl/hr	950 ppl
Apartment	Transit	30%	12 ppl/hr	38 ppl/hr	50 ppl/hr	35 ppl/hr	23 ppl/hr	58 ppl/hr	712 ppl
Apartment	Bike	10%	4 ppl/hr	13 ppl/hr	17 ppl/hr	12 ppl/hr	7 ppl/hr	19 ppl/hr	237 ppl
Apartment	Walk	20%	8 ppl/hr	25 ppl/hr	33 ppl/hr	24 ppl/hr	15 ppl/hr	39 ppl/hr	475 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	14 veh/hr	42 veh/hr	56 veh/hr	40 veh/hr	26 veh/hr	66 veh/hr	805 veh

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Peak Hour			Weekday
	In	Out	Total	In	Out	Total	Total
Auto	14 veh/hr	42 veh/hr	56 veh/hr	40 veh/hr	26 veh/hr	66 veh/hr	805 veh
Transit	12 ppl/hr	38 ppl/hr	50 ppl/hr	35 ppl/hr	23 ppl/hr	58 ppl/hr	712 ppl
Bike	4 ppl/hr	13 ppl/hr	17 ppl/hr	12 ppl/hr	7 ppl/hr	19 ppl/hr	237 ppl
Walk	8 ppl/hr	25 ppl/hr	33 ppl/hr	24 ppl/hr	15 ppl/hr	39 ppl/hr	475 ppl

C. Background Development Trip Generation

Attachment C - Background Development Trip Generation

Background Development	Trip Generation Source	AM Peak Hour (veh/hr)			PM Peak Hour (veh/hr)		
		In	Out	Total	In	Out	Total
Kelvin Apartments/Envy Condos	ITE Trip Gen. 10th Ed.	33	56	89	97	84	181
W Half St	Gorove Slade Study	35	85	120	119	91	210
Square 769	ITE Trip Gen. 10th Ed.	8	19	27	22	16	38
Yards Parcel F	Gorove Slade Study	103	17	120	29	113	142
Yards Parcel G	Gorove Slade Study	109	18	127	27	116	143
Yards Parcel H	Gorove Slade Study	22	54	76	63	46	109
Yards Parcel L1	Gorove Slade Study	36	25	61	42	42	84
Yards Parcel L2	Gorove Slade Study	10	40	50	39	21	60
Yards Parcel O	ITE Trip Gen. 10th Ed.	16	35	51	45	31	76
DC Water HQ	Gorove Slade Study	112	13	125	19	102	121
Riverfront	Gorove Slade Study	297		428	163	285	448
950 S Capitol S	ITE Trip Gen. 10th Ed.	15	61	76	59	33	92
Former Congressional Square Project	ITE Trip Gen. 10th Ed.	43	91	134	122	95	217
The Garrett at the Collective	ITE Trip Gen. 10th Ed.	18	42	60	53	39	92
Capper	ITE Trip Gen. 10th Ed.	15	36	51	43	30	73
1000/1001 4th St	Gorove Slade Study	58	115	173	122	82	204
Randall School Redevelopment	Gorove Slade Study	32	106	138	110	67	177
CSX East Redevelopment	Gorove Slade Study	132	232	364	176	144	320
375 & 425 M Street SW	Gorove Slade Study	60	119	179	136	104	240
The Bard	Gorove Slade Study	35	19	54	44	19	63
Wharf Phase 2	Gorove Slade Study	384	122	506	196	408	602
DDOT HQ	ITE Trip Gen. 10th Ed.	72	13	85	19	78	97
45 Q Street SW	Gorove Slade Study	27	20	47	34	30	64
1319 South Capitol Street	Gorove Slade Study	11	33	44	33	21	54
5 M Street SW	Gorove Slade Study	29	64	93	78	55	133
Riverpoint	DDOT Approved Study	64	114	178	300	183	483
Peninsula 88	DDOT Approved Study	10	34	44	39	23	62
Verge	ITE Trip Gen. 10th Ed.	11	35	46	35	24	59
Watermark	Gorove Slade Study	34	116	150	128	79	207
The Stacks	ITE Trip Gen. 10th Ed.	154	194	348	215	229	444
Total		1,985	1,928	4,044	2,607	2,690	5,295

Mode Split Assumptions - Monument Valley

Residential Component

Description of residential component of project:

The development will contain approximately 445 residential dwelling units, 60,000 S.F. of retail

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for U-Street Station Area)	22%		51%	27%		---	
WMATA Ridership Survey (average for Suburban-Inside the Beltway)	39%		49%	12%		---	

Mode Split assumed in TIS:

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

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Silver Spring Neighbourhood Center)	67%		19%	14%		---	
WMATA Ridership Survey (Ballston Common)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	45%		10%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Trip Generation - Monument Valley

Residential (800 du), Retail (44,000 S.F.)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	221	445 du	42 veh/hr	118 veh/hr	160 veh/hr	120 veh/hr	76 veh/hr	196 veh/hr	1211 veh	1210 veh	2421 veh
<i>Calculation Details:</i>			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	60,000 sf	35 veh/hr	21 veh/hr	56 veh/hr	110 veh/hr	119 veh/hr	229 veh/hr	1133 veh	1132 veh	2265 veh
<i>Calculation Details:</i>			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	50 ppl/hr	139 ppl/hr	189 ppl/hr	142 ppl/hr	90 ppl/hr	231 ppl/hr	1429 ppl	1428 ppl	2857 ppl
Retail	1.82 ppl/veh	64 ppl/hr	38 ppl/hr	102 ppl/hr	200 ppl/hr	217 ppl/hr	417 ppl/hr	2062 ppl	2060 ppl	4122 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	20 ppl/hr	56 ppl/hr	76 ppl/hr	57 ppl/hr	35 ppl/hr	92 ppl/hr	572 ppl	571 ppl	1143 ppl
Apartments	Transit	40%	20 ppl/hr	56 ppl/hr	76 ppl/hr	57 ppl/hr	35 ppl/hr	92 ppl/hr	572 ppl	571 ppl	1143 ppl
Apartments	Bike	5%	3 ppl/hr	6 ppl/hr	9 ppl/hr	7 ppl/hr	5 ppl/hr	12 ppl/hr	71 ppl	72 ppl	143 ppl
Apartments	Walk	15%	8 ppl/hr	20 ppl/hr	28 ppl/hr	21 ppl/hr	14 ppl/hr	35 ppl/hr	214 ppl	215 ppl	429 ppl
Retail	Auto	45%	29 ppl/hr	17 ppl/hr	46 ppl/hr	90 ppl/hr	98 ppl/hr	188 ppl/hr	928 ppl	927 ppl	1855 ppl
Retail	Transit	10%	6 ppl/hr	4 ppl/hr	10 ppl/hr	20 ppl/hr	22 ppl/hr	42 ppl/hr	206 ppl	206 ppl	412 ppl
Retail	Bike	10%	6 ppl/hr	4 ppl/hr	10 ppl/hr	20 ppl/hr	22 ppl/hr	42 ppl/hr	206 ppl	206 ppl	412 ppl
Retail	Walk	35%	22 ppl/hr	14 ppl/hr	36 ppl/hr	70 ppl/hr	76 ppl/hr	146 ppl/hr	722 ppl	721 ppl	1443 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	17 veh/hr	47 veh/hr	64 veh/hr	48 veh/hr	30 veh/hr	78 veh/hr	485 veh	484 veh	969 veh
Retail	1.82 ppl/veh	16 veh/hr	9 veh/hr	25 veh/hr	49 veh/hr	54 veh/hr	103 veh/hr	510 veh	509 veh	1019 veh

Trip Gen Summary for Monument Valley

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	33 veh/hr	56 veh/hr	89 veh/hr	97 veh/hr	84 veh/hr	181 veh/hr	995 veh	993 veh	1988 veh
Transit	26 ppl/hr	60 ppl/hr	86 ppl/hr	77 ppl/hr	57 ppl/hr	134 ppl/hr	778 ppl/hr	777 ppl/hr	1555 ppl/hr
Bike	9 ppl/hr	10 ppl/hr	19 ppl/hr	27 ppl/hr	27 ppl/hr	54 ppl/hr	277 ppl/hr	278 ppl/hr	555 ppl/hr
Walk	30 ppl/hr	34 ppl/hr	64 ppl/hr	91 ppl/hr	90 ppl/hr	181 ppl/hr	936 ppl/hr	936 ppl/hr	1872 ppl/hr



TRIP GENERATION

This section outlines the transportation demand of the proposed West Half Street project. It summarizes the projected trip generation of the site by land use (residential and retail) and by mode, which forms the basis for the chapters that follow.

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

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the site and mode splits used for residential developments that have recently been studied. Mode splits were adjusted based on the anticipated parking supply.

Retail trip generation was calculated based on ITE land use 820, Shopping Center. Rates based on average vehicle trip ends per 1,000 square feet of gross leasable area were used. Mode splits for the retail portion of the site were based on information contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used for retail uses of nearby developments that have recently been studied. A summary of

mode splits for all land uses within the development is shown on Table 5.

Table 5: Mode Split Summary

Land Use	Mode Split			
	Auto	Transit	Bike	Walk
Residential	45%	43%	4%	8%
Retail	40%	40%	5%	15%

It should be noted that due to the changes to the development program from the approved development to the proposed development, particularly the transition from office space to residential space, the overall trip generation for the development has decreased for both vehicular and non-auto modes. A summary of the multimodal trip generation for the proposed development, the approved development, and the difference between the two is provided in Table 4, Table 7, and Table 6, respectively, for the morning and afternoon peak hours. As shown, the vehicular trip generation decreases by 70 trips in the morning peak hour and 43 trips in the afternoon peak hour due to the updated development program. The non-auto trip generation decreases by 55 trips in the morning peak hour and 42 trips in the afternoon peak hour due to the updated development program. Detailed calculations are included in the Technical Appendix.

Table 4: Multi-Modal Trip Generation Summary (Proposed Development)

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Apartments	19 veh/hr	76 veh/hr	95 veh/hr	73 veh/hr	40 veh/hr	113 veh/hr
	Retail	16 veh/hr	9 veh/hr	25 veh/hr	46 veh/hr	51 veh/hr	97 veh/hr
	Total	35 veh/hr	85 veh/hr	120 veh/hr	119 veh/hr	91 veh/hr	210 veh/hr
Transit	Apartments	20 ppl/hr	82 ppl/hr	102 ppl/hr	79 ppl/hr	43 ppl/hr	122 ppl/hr
	Retail	28 ppl/hr	17 ppl/hr	45 ppl/hr	82 ppl/hr	90 ppl/hr	172 ppl/hr
	Total	48 ppl/hr	99 ppl/hr	147 ppl/hr	161 ppl/hr	133 ppl/hr	294 ppl/hr
Bike	Apartments	2 ppl/hr	8 ppl/hr	10 ppl/hr	7 ppl/hr	4 ppl/hr	11 ppl/hr
	Retail	3 ppl/hr	3 ppl/hr	6 ppl/hr	10 ppl/hr	12 ppl/hr	22 ppl/hr
	Total	5 ppl/hr	11 ppl/hr	16 ppl/hr	17 ppl/hr	16 ppl/hr	33 ppl/hr
Walk	Apartments	4 ppl/hr	15 ppl/hr	19 ppl/hr	15 ppl/hr	8 ppl/hr	23 ppl/hr
	Retail	10 ppl/hr	7 ppl/hr	17 ppl/hr	31 ppl/hr	34 ppl/hr	65 ppl/hr
	Total	14 ppl/hr	22 ppl/hr	36 ppl/hr	46 ppl/hr	42 ppl/hr	88 ppl/hr

Mode Split Assumptions - Square 769

Residential Component

Description of residential component of project:

The development will contain approximately 171 residential dwelling units, 4,000 S.F. of retail

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for U-Street Station Area)	22%		51%	27%		---	
WMATA Ridership Survey (average for Suburban-Inside the Beltway)	39%		49%	12%		---	

Mode Split assumed in TIS:

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

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Silver Spring Neighbourhood Center)	67%		19%	14%		---	
WMATA Ridership Survey (Ballston Common)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	45%		10%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Trip Generation - Square 769

Residential (171 du), Retail (4,000 S.F.)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	221	171 du	16 veh/hr	46 veh/hr	62 veh/hr	46 veh/hr	29 veh/hr	75 veh/hr	465 veh	465 veh	930 veh
<i>Calculation Details:</i>			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	4,000 sf	2 veh/hr	2 veh/hr	4 veh/hr	7 veh/hr	8 veh/hr	15 veh/hr	76 veh	75 veh	151 veh
<i>Calculation Details:</i>			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	19 ppl/hr	54 ppl/hr	73 ppl/hr	54 ppl/hr	34 ppl/hr	89 ppl/hr	549 ppl	549 ppl	1097 ppl
Retail	1.82 ppl/veh	4 ppl/hr	4 ppl/hr	7 ppl/hr	13 ppl/hr	15 ppl/hr	27 ppl/hr	138 ppl	137 ppl	275 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	8 ppl/hr	21 ppl/hr	29 ppl/hr	22 ppl/hr	14 ppl/hr	36 ppl/hr	220 ppl	219 ppl	439 ppl
Apartments	Transit	40%	8 ppl/hr	21 ppl/hr	29 ppl/hr	22 ppl/hr	14 ppl/hr	36 ppl/hr	220 ppl	219 ppl	439 ppl
Apartments	Bike	5%	1 ppl/hr	3 ppl/hr	4 ppl/hr	3 ppl/hr	1 ppl/hr	4 ppl/hr	27 ppl	28 ppl	55 ppl
Apartments	Walk	15%	3 ppl/hr	8 ppl/hr	11 ppl/hr	8 ppl/hr	5 ppl/hr	13 ppl/hr	82 ppl	83 ppl	165 ppl
Retail	Auto	45%	2 ppl/hr	1 ppl/hr	3 ppl/hr	6 ppl/hr	6 ppl/hr	12 ppl/hr	62 ppl	62 ppl	124 ppl
Retail	Transit	10%	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	14 ppl	14 ppl	28 ppl
Retail	Bike	10%	0 ppl/hr	1 ppl/hr	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	14 ppl	14 ppl	28 ppl
Retail	Walk	35%	1 ppl/hr	1 ppl/hr	2 ppl/hr	5 ppl/hr	4 ppl/hr	9 ppl/hr	48 ppl	48 ppl	96 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	7 veh/hr	18 veh/hr	25 veh/hr	19 veh/hr	12 veh/hr	31 veh/hr	186 veh	186 veh	372 veh
Retail	1.82 ppl/veh	1 veh/hr	1 veh/hr	2 veh/hr	3 veh/hr	4 veh/hr	7 veh/hr	34 veh	34 veh	68 veh

Trip Gen Summary for Monument Valley

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	8 veh/hr	19 veh/hr	27 veh/hr	22 veh/hr	16 veh/hr	38 veh/hr	220 veh	220 veh	440 veh
Transit	8 ppl/hr	22 ppl/hr	30 ppl/hr	23 ppl/hr	16 ppl/hr	39 ppl/hr	234 ppl/hr	233 ppl/hr	467 ppl/hr
Bike	1 ppl/hr	4 ppl/hr	5 ppl/hr	4 ppl/hr	3 ppl/hr	7 ppl/hr	41 ppl/hr	42 ppl/hr	83 ppl/hr
Walk	4 ppl/hr	9 ppl/hr	13 ppl/hr	13 ppl/hr	9 ppl/hr	22 ppl/hr	130 ppl/hr	131 ppl/hr	261 ppl/hr

Travel Demand Assumptions

This chapter outlines the Project’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

Parcel F is currently occupied by an 85-space surface parking lot which is used primarily for sporting events. The surface parking lot is assumed to have a peak occupancy outside of the typical weekday morning and afternoon peak hours. Therefore, conservatively, 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 710, *General Office Building* and ITE land use 820, *Shopping Center*, respectively.

Trips were split into different modes using assumptions derived from 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
Office	40%	40%	5%	15%
Retail	25%	35%	20%	20%

As shown on Table 4, the Yards West – Parcel F Project is expected to generate trips on the surrounding transportation network across all modes. The AM peak hour trip generation is projected to include 120 vehicles/hour, 149 transit riders/hour, 25 bicycle trips/hour, and 59 walking trips/hour. The PM peak hour trip generation is projected to include 142 vehicles/hour, 197 transit riders/hour, 50 bicycle trips/hour, and 85 walking trips/hour. The Saturday peak hour trip generation is projected to include 107 vehicles/hour, 192 transit riders/hour, 79 bicycle trips/hour, and 96 walking trips/hour.

It is conservatively assumed that the current use of the site does not contribute existing peak hour trip generation. Therefore, the net increase in vehicular trip generation is equal to the proposed Project-related trip generation. As shown in Table 4, the Project results in an increase in vehicular trip generation during the morning peak hour, with 120 additional vehicle trips (103 additional inbound and 17 additional outbound), and an increase in vehicular trip generation during the afternoon peak hour, with 142 additional trips (29 additional inbound and 113 additional outbound).

Table 4: ITE Multi-Modal Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour			Daily	Saturday Peak Hour		
	In	Out	Total	In	Out	Total	Total	In	Out	Total
Office (279,295 sf)										
<i>Auto (veh/hr)</i>	100	15	115	19	101	120	1,149	32	27	59
<i>Transit (ppl/hr)</i>	118	18	136	23	119	142	1,356	38	32	70
<i>Bike (ppl/hr)</i>	15	2	17	3	15	18	170	5	4	9
<i>Walk (ppl/hr)</i>	43	9	52	8	46	54	509	13	13	26
Retail (22,776 sf)										
<i>Auto (veh/hr)</i>	3	2	5	10	12	22	215	25	23	48
<i>Transit (ppl/hr)</i>	8	5	13	27	28	55	548	64	58	122
<i>Bike (ppl/hr)</i>	5	3	8	15	17	32	313	36	34	70
<i>Walk (ppl/hr)</i>	5	2	7	15	16	31	313	36	34	70
Total										
<i>Auto (veh/hr)</i>	103	17	120	29	113	142	1,364	57	50	107
<i>Transit (ppl/hr)</i>	126	23	149	50	147	197	1,904	102	90	192
<i>Bike (ppl/hr)</i>	20	5	25	18	32	50	483	41	38	79
<i>Walk (ppl/hr)</i>	48	11	59	23	62	85	822	49	47	96



From The Yards Parcel G CTR

TRIP GENERATION

This section outlines the forecasted transportation demand of the project. It summarizes the projected trip generation of the project by mode and forms the basis for the chapters that follow. Traditionally, weekday peak hour trip generation is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition. In accordance with DDOT's guidelines this report's methodology is 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.

Office trip generation was calculated based on ITE land use 710, General Office and retail trip generation was calculated based on ITE land use 820, Retail. Trips were split into different modes using assumptions derived from census data for employees that currently travel near the site.

A summary of the multimodal trip generation for the project is provided in Table 3 for the morning and afternoon peak hours. The mode split assumptions for all land uses within the project is summarized in Table 2. The mode split for the office use is higher than desirable, thus providing a conservative estimate for the purposes of this CTR. Detailed calculations are included in the Technical Appendix.

Table 2: Summary of Mode Split Assumptions

Land Use	Mode			
	Drive	Transit	Bike	Walk
Retail	25%	35%	20%	20%
Office	40%	40%	5%	15%

Table 3: Multi-Modal Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	109 veh/hr	18 veh/hr	127 veh/hr	27 veh/hr	116 veh/hr	143 veh/hr
Transit	131 ppl/hr	23 ppl/hr	154 ppl/hr	40 ppl/hr	146 ppl/hr	186 ppl/hr
Bike	19 ppl/hr	4 ppl/hr	23 ppl/hr	12 ppl/hr	26 ppl/hr	38 ppl/hr
Walk	50 ppl/hr	10 ppl/hr	60 ppl/hr	18 ppl/hr	58 ppl/hr	76 ppl/hr

Travel Demand Assumptions

This chapter outlines the Project's transportation demand. It summarizes the projected trip generation of the 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

Parcel H is currently occupied by a 188-space surface parking lot. This 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, conservatively, 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, *Mid-rise Multifamily Housing*, and

ITE land use 820, *Shopping Center*, respectively. Trips were split into different modes using assumptions derived from census data for the residents that currently live near Parcel H, census data for the commuters that currently work near Parcel H, 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	40%	40%	10%	10%
Retail	25%	35%	20%	20%

As shown on Table 4, the Project is expected to generate trips on the surrounding transportation network across all modes. The AM peak hour trip generation is projected to include 76 vehicles/hour, 97 transit riders/hour, 29 bicycle trips/hour, and 30 walking trips/hour. The PM peak hour trip generation is projected to include 109 vehicles/hour, 163 transit riders/hour, 62 bicycle trips/hour, and 62 walking trips/hour. The Saturday peak hour trip generation is projected to include 137 vehicles/hour, 236 transit riders/hour, 103 bicycle trips/hour, and 103 walking trips/hour.

Table 4: ITE Multi-Modal Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour			Daily Total	Saturday Peak Hour		
	In	Out	Total	In	Out	Total		In	Out	Total
Residential (478 Units)										
Auto (veh/hr)	18	51	69	51	33	84	1,042	41	42	83
Transit (ppl/hr)	21	60	81	60	39	99	1,229	48	50	98
Bike (ppl/hr)	5	15	20	15	10	25	307	12	12	24
Walk (ppl/hr)	6	15	21	16	9	25	307	11	13	24
Retail (26,570 sf)										
Auto (veh/hr)	4	3	7	12	13	25	251	29	25	54
Transit (ppl/hr)	10	6	16	30	34	64	639	72	66	138
Bike (ppl/hr)	6	3	9	17	20	37	365	41	38	79
Walk (ppl/hr)	6	3	9	18	19	37	365	41	38	79
Total										
Auto (veh/hr)	22	54	76	63	46	109	1,293	70	67	137
Transit (ppl/hr)	31	66	97	90	73	163	1,868	120	116	236
Bike (ppl/hr)	11	18	29	32	30	62	672	53	50	103
Walk (ppl/hr)	12	18	30	34	28	62	672	52	51	103



TRIP GENERATION

This section outlines the transportation demand of the proposed Yards Parcel L1 project. It summarizes the projected trip generation of the site by mode, which forms the basis for the chapters that follow. 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.

Hotel trip generation was calculated based on ITE land use 310, Hotel. Mode splits for the retail portion of the site were based on information contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used for hotel uses of nearby developments that have recently been studied.

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 contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used for retail uses of nearby developments that have recently been studied.

The below-grade parking garage will contain 85 parking spaces that will be shared by the retail components of Parcel L1 and L2, as well as open to the public for general shared use parking or hotel guests if demand dictates. In order to account for the public parking portion of the development, the analysis will include the trips generated by the site's existing use (a surface parking lot with 202 public parking spaces).

For purposes of determining the impact of the overall site, trips generated by the residential and retail components of Parcel L2 were included at the request of DDOT. Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the site. The vehicular mode split was then

Table 2: Multi-Modal Trip Generation Summary

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Hotel (Parcel L1)	35 veh/hr	25 veh/hr	60 veh/hr	35 veh/hr	33 veh/hr	68 veh/hr
	Retail (Parcel L1)	2 veh/hr	1 veh/hr	3 veh/hr	5 veh/hr	6 veh/hr	11 veh/hr
	Residential (Parcel L2)	15 veh/hr	57 veh/hr	72 veh/hr	57 veh/hr	31 veh/hr	88 veh/hr
	Retail (Parcel L2)	2 veh/hr	1 veh/hr	3 veh/hr	7 veh/hr	6 veh/hr	13 veh/hr
	Public Parking*	47 veh/hr	1 veh/hr	48 veh/hr	70 veh/hr	33 veh/hr	103 veh/hr
	Total		101 veh/hr	85 veh/hr	186 veh/hr	174 veh/hr	109 veh/hr
Transit	Hotel (Parcel L1)	47 ppl/hr	32 ppl/hr	79 ppl/hr	46 ppl/hr	44 ppl/hr	90 ppl/hr
	Retail (Parcel L1)	4 ppl/hr	3 ppl/hr	7 ppl/hr	13 ppl/hr	13 ppl/hr	26 ppl/hr
	Residential (Parcel L2)	10 ppl/hr	39 ppl/hr	49 ppl/hr	38 ppl/hr	21 ppl/hr	59 ppl/hr
	Retail (Parcel L2)	6 ppl/hr	3 ppl/hr	9 ppl/hr	16 ppl/hr	18 ppl/hr	34 ppl/hr
	Total		67 ppl/hr	77 ppl/hr	144 ppl/hr	113 ppl/hr	96 ppl/hr
Bike	Hotel (Parcel L1)	8 ppl/hr	5 ppl/hr	13 ppl/hr	8 ppl/hr	7 ppl/hr	15 ppl/hr
	Retail (Parcel L1)	2 ppl/hr	2 ppl/hr	4 ppl/hr	7 ppl/hr	8 ppl/hr	15 ppl/hr
	Residential (Parcel L2)	5 ppl/hr	19 ppl/hr	24 ppl/hr	19 ppl/hr	11 ppl/hr	30 ppl/hr
	Retail (Parcel L2)	3 ppl/hr	2 ppl/hr	5 ppl/hr	9 ppl/hr	10 ppl/hr	19 ppl/hr
	Total		18 ppl/hr	28 ppl/hr	46 ppl/hr	43 ppl/hr	36 ppl/hr
Walk	Hotel (Parcel L1)	23 ppl/hr	17 ppl/hr	40 ppl/hr	23 ppl/hr	22 ppl/hr	45 ppl/hr
	Retail (Parcel L1)	2 ppl/hr	2 ppl/hr	4 ppl/hr	7 ppl/hr	8 ppl/hr	15 ppl/hr
	Residential (Parcel L2)	2 ppl/hr	6 ppl/hr	8 ppl/hr	6 ppl/hr	4 ppl/hr	10 ppl/hr
	Retail (Parcel L2)	3 ppl/hr	2 ppl/hr	5 ppl/hr	9 ppl/hr	10 ppl/hr	19 ppl/hr
	Total		30 ppl/hr	27 ppl/hr	57 ppl/hr	45 ppl/hr	44 ppl/hr

*based on existing counts



adjusted to reflect the parking supply and other developments with similar proximity to Metrorail. Retail trip generation for Parcel L2 was calculated using the same methodology outlined for Parcel L1.

A summary of the multimodal trip generation for the development is provided in Table 2 for the morning and afternoon peak hours. The mode split assumptions for all land uses within the development is summarized in Table 3. A comparison of the trip generation and amount of planned parking is shown in Table 4. Detailed calculations are included in the Technical Appendix.

Table 3: Summary of Mode Split Assumptions

Land Use	Mode			
	Auto	Transit	Bike	Walk
Residential	50%	30%	15%	5%
Retail	25%	35%	20%	20%
Hotel	50%	35%	5%	10%

Table 4: Comparison of Parking and Auto Trip Generation

Land Use	Parking Provided	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Hotel (Parcel L1)	50 spaces	35 veh/hr	25 veh/hr	60 veh/hr	35 veh/hr	33 veh/hr	68 veh/hr
Retail (Parcel L1)	85 spaces*	2 veh/hr	1 veh/hr	3 veh/hr	5 veh/hr	6 veh/hr	11 veh/hr
Residential (Parcel L2)	135 spaces	15 veh/hr	57 veh/hr	72 veh/hr	57 veh/hr	31 veh/hr	88 veh/hr
Retail (Parcel L2)	shared*	2 veh/hr	1 veh/hr	3 veh/hr	7 veh/hr	6 veh/hr	13 veh/hr
Public Parking (Parcel L1/L2)	shared*	47 veh/hr	1 veh/hr	48 veh/hr	70 veh/hr	33 veh/hr	103 veh/hr
Total	270 spaces	101 veh/hr	85 veh/hr	186 veh/hr	174 veh/hr	109 veh/hr	283 veh/hr

*shared between Parcel L1/L2 Retail and Public Parking



TRIP GENERATION

This section outlines the transportation demand of the proposed Yards Parcel L2 project. It summarizes the projected trip generation of the site by mode, which forms the basis for the chapters that follow.

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.

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from 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.

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 contained in WMATA's 2005 *Development-Related Ridership Survey* and mode splits used for retail uses of nearby developments that have recently been studied.

A summary of the multimodal trip generation for the development is provided in Table 2 for the morning and afternoon peak hours. The mode split assumptions for all land uses within the development is summarized in Table 3. Detailed calculations are included in the Technical Appendix.

Table 2: Multi-Modal Trip Generation Summary

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Residential	10 veh/hr	40 veh/hr	50 veh/hr	39 veh/hr	21 veh/hr	60 veh/hr
	Retail	3 veh/hr	3 veh/hr	6 veh/hr	10 veh/hr	11 veh/hr	21 veh/hr
	Total	13 veh/hr	43 veh/hr	56 veh/hr	49 veh/hr	32 veh/hr	81 veh/hr
Transit	Residential	14 ppl/hr	58 ppl/hr	72 ppl/hr	57 ppl/hr	30 ppl/hr	87 ppl/hr
	Retail	9 ppl/hr	5 ppl/hr	14 ppl/hr	26 ppl/hr	27 ppl/hr	53 ppl/hr
	Total	23 ppl/hr	63 ppl/hr	86 ppl/hr	83 ppl/hr	57 ppl/hr	140 ppl/hr
Bike	Residential	5 ppl/hr	19 ppl/hr	24 ppl/hr	19 ppl/hr	10 ppl/hr	29 ppl/hr
	Retail	5 ppl/hr	3 ppl/hr	8 ppl/hr	15 ppl/hr	15 ppl/hr	30 ppl/hr
	Total	10 ppl/hr	22 ppl/hr	32 ppl/hr	34 ppl/hr	25 ppl/hr	59 ppl/hr
Walk	Residential	2 ppl/hr	6 ppl/hr	8 ppl/hr	6 ppl/hr	4 ppl/hr	10 ppl/hr
	Retail	5 ppl/hr	3 ppl/hr	8 ppl/hr	15 ppl/hr	15 ppl/hr	30 ppl/hr
	Total	7 ppl/hr	9 ppl/hr	16 ppl/hr	21 ppl/hr	19 ppl/hr	40 ppl/hr

Table 3: Summary of Mode Split Assumptions

Land Use	Mode			
	Auto	Transit	Bike	Walk
Residential	35%	45%	15%	5%
Retail	25%	35%	20%	20%

Mode Split Assumptions - Parcel O**Residential Component****Description of residential component of project:**

The development will contain approximately 171 residential dwelling units, 4,000 S.F. of retail

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for <i>U-Street Station Area</i>)	22%		51%	27%		---	
WMATA Ridership Survey (average for <i>Suburban-Inside the Beltway</i>)	39%		49%	12%		---	

Mode Split assumed in TIS:

Land Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Residential Mode Split	35%	45%	5%	15%	---

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component**Pertinent Mode Split data from other sources:**

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (<i>Silver Spring Neighbourhood Center</i>)	67%		19%	14%		---	
WMATA Ridership Survey (<i>Ballston Common</i>)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Retail Mode Split	25%		30%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Trip Generation - Parcel O

Residential (171 du), Retail (4,000 S.F.)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	221	328 du	31 veh/hr	87 veh/hr	118 veh/hr	88 veh/hr	56 veh/hr	144 veh/hr	892 veh	892 veh	1784 veh
<i>Calculation Details:</i>			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	19,200 sf	11 veh/hr	7 veh/hr	18 veh/hr	35 veh/hr	38 veh/hr	73 veh/hr	363 veh	362 veh	725 veh
<i>Calculation Details:</i>			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	37 ppl/hr	103 ppl/hr	139 ppl/hr	104 ppl/hr	66 ppl/hr	170 ppl/hr	1053 ppl	1053 ppl	2105 ppl
Retail	1.82 ppl/veh	20 ppl/hr	13 ppl/hr	33 ppl/hr	64 ppl/hr	69 ppl/hr	133 ppl/hr	661 ppl	659 ppl	1320 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	15 ppl/hr	41 ppl/hr	56 ppl/hr	42 ppl/hr	26 ppl/hr	68 ppl/hr	421 ppl	421 ppl	842 ppl
Apartments	Transit	40%	15 ppl/hr	41 ppl/hr	56 ppl/hr	42 ppl/hr	26 ppl/hr	68 ppl/hr	421 ppl	421 ppl	842 ppl
Apartments	Bike	5%	2 ppl/hr	5 ppl/hr	7 ppl/hr	5 ppl/hr	4 ppl/hr	9 ppl/hr	53 ppl	52 ppl	105 ppl
Apartments	Walk	15%	6 ppl/hr	15 ppl/hr	21 ppl/hr	16 ppl/hr	10 ppl/hr	26 ppl/hr	158 ppl	158 ppl	316 ppl
Retail	Auto	25%	5 ppl/hr	3 ppl/hr	8 ppl/hr	16 ppl/hr	17 ppl/hr	33 ppl/hr	165 ppl	165 ppl	330 ppl
Retail	Transit	30%	6 ppl/hr	4 ppl/hr	10 ppl/hr	19 ppl/hr	21 ppl/hr	40 ppl/hr	198 ppl	198 ppl	396 ppl
Retail	Bike	10%	2 ppl/hr	1 ppl/hr	3 ppl/hr	6 ppl/hr	7 ppl/hr	13 ppl/hr	66 ppl	66 ppl	132 ppl
Retail	Walk	35%	7 ppl/hr	5 ppl/hr	12 ppl/hr	22 ppl/hr	25 ppl/hr	47 ppl/hr	231 ppl	231 ppl	462 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	13 veh/hr	34 veh/hr	47 veh/hr	36 veh/hr	22 veh/hr	58 veh/hr	357 veh	357 veh	714 veh
Retail	1.82 ppl/veh	3 veh/hr	1 veh/hr	4 veh/hr	9 veh/hr	9 veh/hr	18 veh/hr	91 veh	91 veh	181 veh

Trip Gen Summary for Monument Valley

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	16 veh/hr	35 veh/hr	51 veh/hr	45 veh/hr	31 veh/hr	76 veh/hr	448 veh	448 veh	895 veh
Transit	21 ppl/hr	45 ppl/hr	66 ppl/hr	61 ppl/hr	47 ppl/hr	108 ppl/hr	619 ppl/hr	619 ppl/hr	1238 ppl/hr
Bike	4 ppl/hr	6 ppl/hr	10 ppl/hr	11 ppl/hr	11 ppl/hr	22 ppl/hr	119 ppl/hr	118 ppl/hr	237 ppl/hr
Walk	13 ppl/hr	20 ppl/hr	33 ppl/hr	38 ppl/hr	35 ppl/hr	73 ppl/hr	389 ppl/hr	389 ppl/hr	778 ppl/hr

3.1 SITE TRANSPORTATION DEMAND

3.1.1 Base Trip Generation

Traditionally, trip generation for a proposed development is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 9th Edition. For this report, the methodology was supplemented to account for the urban nature of the site (*Trip Generation* provides data for non-urban, low transit use sites) and to generate trips for multiple modes. The following summarizes the methodology that was used in this study, which was approved by DDOT per the Scoping Form contained in the Technical Attachments.

First, ITE *Trip Generation* was used to develop base vehicular-trip rates, not accounting for reductions due to mode split. The *Trip Generation Handbook*, 2nd Edition was also consulted for guidelines for estimating trip generation. The following summarizes the trip generation projections:

- The office trips were projected based on Land Use (LU) 715 for Single Tenant Office Building. The total weekday trips, as well as the morning and afternoon weekday peak hour trips, were generated using the regression equations provided based on average vehicle trip ends per square foot of office space. The regression equations were chosen for the Office projections, due to the high (over 0.75) coefficient of determinations (R^2) for each time period. The weekday morning and afternoon peak hours generally correspond to the peak hours of the adjacent roadway network – one hour between 7:00 and 9:00 AM and between 4:00 and 6:00 PM, respectively. Based on this, the peak hour of the adjacent roadway network was used for the trip generation projection instead of the peak hours of the Generator.

Following the base vehicular- trip rate calculations, the vehicle-trips were converted to person-trips based on the estimated average vehicle occupancy (AVO). AVO rates were obtained from the *Summary of Travel Trends – 2009 National Household Travel Survey* performed by the U.S. Department of Transportation Federal Highway Administration⁴.

3.1.2 Mode Split

Following the base trip generation discussed in Section 3.1.1, the trips were split into each mode: transit (consisting of both Metrorail and Metrobus), walking, biking, and vehicle. The mode split estimates for the DC Water PUD were developed using survey information contained in several sources: WMATA's *2005 Development-Related Ridership Survey*, U.S. Department of Transportation's *2009 National Household Travel Survey (NHTS) Summary of Travel Trends*, Commuter Connections' *2010 State of the Commute Survey Report*, estimates from studies for nearby approved developments, and files from Gorove/Slade's library. These assumptions were approved by DDOT per the Scoping Form contained in the Technical Attachments.

Several sources provide mode split information that can be used to develop estimates for future residents of the DC Water Site PUD, including results from the 2007-2011 American Community Survey, WMATA's *Ridership Survey* of office sites within the District, and studies for other nearby developments, as shown below on Table 5. WMATA Ridership Survey data for Office sites within the CBD noted office auto modal splits of 21 percent while studies for other nearby developments noted auto modal splits of 40 to 50 percent (with higher auto modal splits for developments further from Metro, such as the Riverfront on the Anacostia development). The modal splits assumed for the DC Water PUD office space is noted on

⁴ AVO rates obtained from "Table 16: Average Vehicle Occupancy for Selected Trip Purpose 1977, 1983, 1990, and 1995 NPTS, and 2001 and 2009 NHTS (Person Miles per Vehicle Mile" for 2009 data. AVO for Retail uses based on "Shopping" Trip Purpose. AVO for Office and Residential uses based on "To or From Work" Trip Purpose.

Table 5 below is noted to be similar to that assumed for other nearby developments. Therefore, the office mode splits assumed for the DC Water Site will provide a conservative analysis.

Table 5: Modal Split Assumptions

Pertinent Mode Split data from other sources:					
Information Source	Mode				
	SOV	Carpool	Transit	Bike	Walk
WMATA Ridership Survey (average for <i>Suburban-Inside the Beltway</i>)	66%		30%	6%	
WMATA Ridership Survey (average for <i>CBD</i>)	21%		75%	4%	
Square 701 (Ballpark Square) PUD	40%		50%	7%	3%
Riverfront on the Anacostia (Florida Rock) PUD	50%		40%	7%	3%
Other Studies (Background Development Assumptions)	50%		35%	10%	5%

Mode Split assumed in TIS:					
Information Source	Mode				
	Drive	Transit	Bike	Walk	
Office Mode Split	45%	45%	5%	5%	

3.1.3 Multi-Modal Trip Generation

Based on the trip generation calculations outlined in Section 3.1.1 and the mode split assumptions shown in Section 3.1.2 (and summarized in Table 5) Table 6 shows the resulting calculations by mode.

Table 6: Trip Generation

Step 1: Base trip generation using ITEs' Trip Generation								
Land Use	Land Use Code	Quantity	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Single Ten. Office	715	152,789 sf	247 veh/hr	30 veh/hr	277 veh/hr	40 veh/hr	227 veh/hr	267 veh/hr

Step 2: Convert to people per hour, before applying mode splits								
Land Use	People/Car (from 2009 NHTS, Table 16)	Quantity	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	152,789 sf	279 ppl/hr	34 ppl/hr	313 ppl/hr	45 ppl/hr	257 ppl/hr	302 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	45%	126 ppl/hr	15 ppl/hr	141 ppl/hr	21 ppl/hr	115 ppl/hr	136 ppl/hr
Office	Transit	45%	126 ppl/hr	15 ppl/hr	141 ppl/hr	21 ppl/hr	115 ppl/hr	136 ppl/hr
Office	Bike	5%	14 ppl/hr	2 ppl/hr	16 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr
Office	Walk	5%	14 ppl/hr	2 ppl/hr	16 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr

Step 4: Convert auto trips back to vehicles/hour								
Land Use	People/Car (from 2009 NHTS, Table 16)	Quantity	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Office	1.13 ppl/veh	152,789 sf	112 veh/hr	13 veh/hr	125 veh/hr	19 veh/hr	102 veh/hr	120 veh/hr

Trip Gen Summary for Office								
Mode	AM Peak Hour			PM Peak Hour				
	In	Out	Total	In	Out	Total		
Auto	112 veh/hr	13 veh/hr	125 veh/hr	19 veh/hr	102 veh/hr	120 veh/hr		
Transit	126 ppl/hr	15 ppl/hr	141 ppl/hr	21 ppl/hr	115 ppl/hr	136 ppl/hr		
Bike	14 ppl/hr	2 ppl/hr	16 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr		
Walk	14 ppl/hr	2 ppl/hr	16 ppl/hr	3 ppl/hr	13 ppl/hr	16 ppl/hr		

3: IMPACTS REVIEW

This section of the report focuses on the influence and impact site generated traffic will have on the local transportation network, with the following purpose:

- To provide information to the District Department of Transportation (DDOT) and other agencies on how the development of the site will influence the local transportation network. This report accomplishes this by identifying the potential trips generated by the site on all major modes of travel and where these trips are expected to travel to and from.
- To determine if development of the site will lead to adverse impacts on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analysis of intersection delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the project will negatively impact the study area. The report describes what improvements to the transportation network are needed to mitigate adverse impacts.

3.1 Site Transportation Demand

3.1.1 Base Trip Generation

Traditionally, trip generation for a proposed development is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. For this report, the methodology was supplemented to account for the urban nature of the site (*Trip Generation* provides data for non-urban, low transit use sites) and to generate trips for multiple modes. The following summarizes the methodology that was used in this study.

First, ITE *Trip Generation* was used to develop base vehicular-trip rates, not accounting for reductions due to mode split. The Shopping Center trip rate was applied in lieu of individual trip rates, such as bank, pharmacy, and supermarket, for the retail uses because applying individual rates would not account for interaction between the retail uses (shoppers visiting more than one store). The Shopping Center trip rate accounts for these uses and interactions.

Second, the vehicle-trips were converted to person-trips by assuming an average vehicle occupancy of 1.1 persons per vehicle, based on the Census Data Transportation Planning Package (CTPP) 2000. Table 6 and Table 7 show the base number of trips generated by the proposed development for Phase 1 and for Phases 2-4, respectively.

Table 6: Base Vehicle- and Person-Trip Generation (Phase 1 Only)

Land Use	Size*		Trip Generation for Phase 1						Weekday Total
			AM Peak Hour			PM Peak Hour			
			In	Out	Total	In	Out	Total	
Vehicle Trips									
Retail	12,520	Square Feet	8	5	13	23	24	47	538
Residential	324	Dwelling Units	32	130	162	127	69	196	2,088
Total Vehicle-Trips			40	135	175	150	93	243	2,626
Person-Trips									
Retail	1.1	Persons/Vehicle	9	5	14	25	27	52	592
Residential	1.1	Persons/Vehicle	35	143	178	140	76	216	2,297
Total Person-Trips			44	148	192	165	103	268	2,889

Table 7: Base Vehicle- and Person-Trip Generation (Phases 2, 3, and 4)

Land Use	Size*		Trip Generation for Phases 2, 3, and 4						Weekday Total
			AM Peak Hour			PM Peak Hour			
			In	Out	Total	In	Out	Total	
Vehicle Trips									
Retail (Phase 2)	5,850	Square Feet	4	2	6	11	11	22	252
Retail (Phase 4)	5,000	Square Feet	3	2	5	9	10	19	216
Office (Phase 3)	326,675	Square Feet	426	58	484	76	369	445	3,320
Hotel (Phase 4)	400	Rooms	164	118	282	138	143	281	3,568
Residential (Phase 2)	282	Dwelling Units	28	114	142	112	61	173	1,834
Total Vehicle-Trips			625	294	919	346	594	940	9,190
Person-Trips									
Retail	1,1	Persons/Vehicle	8	4	12	22	23	45	515
Office	1,1	Persons/Vehicle	469	63	532	84	406	490	3,652
Hotel	1,1	Persons/Vehicle	180	130	310	152	157	309	3,925
Residential	1,1	Persons/Vehicle	31	125	156	123	67	190	2,017
Total Person-Trips			688	322	1,010	381	653	1,034	10,109

3.1.2 Mode Split

Following the base trip generation shown in Section 3.1.1, the trips were split into each mode: transit (consisting of both Metrorail and Metrobus/DC Circulator), walking, biking, and vehicle. Each land use was analyzed by mode separately in order to account for varying mode splits. The mode split estimates for the RiverFront PUD were developed using survey information contained in several sources, WMATA's *2005 Development-Related Ridership Survey*, WMATA's *Station Site and Access Planning Manual*, *Commuter Connections' 2010 State of the Commute Survey Report*, results from the 2000 U.S. Census, and files from Gorove/Slade's library. The following describes in detail how the mode split assumptions were assembled based on information from these sources.

Retail Uses

The main source of mode split information for retail sites is WMATA's *Ridership Survey*. Contained within the report are summaries of mode splits for five retail sites within the Metropolitan area, and one within the District. The one site within the District was the U Street area, which of all of the sites surveyed is the closest in characteristics to the RiverFront, as it is a 'main street' retail area with ground floor retail mixed in with other land uses. Table 8 summarizes the mode split information for the U Street site, and all of the retail sites surveyed.

Table 8: WMATA Ridership Survey Mode Split for Retail Sites

Retail Location	Mode			
	Metrorail	Metrobus & Other Transit	Auto	Walk & Other
Central Business District	44%	13%	19%	25%
All sites surveyed	29%	8%	36%	27%

Although the U Street site is closest in characteristics to the RiverFront PUD, in order to maintain a conservative assumption, this report uses the mode splits for the all retail sites surveyed as a basis for assumptions. This report uses the following mode split assumptions for retail:

- Vehicle: 35%
- Transit: 40%
- Walk: 20%
- Bike: 5%

Office Uses

WMATA's 2005 *Development-Relates Ridership Survey* has generally been used as the standard source for developing mode split estimates. Information provided within the report shows that office sites in the central business district and all office sites surveyed had the following mode splits, shown in Table 9.

Table 9: WMATA Ridership Survey Mode Split for Office Sites

Office Location	Mode			
	Metrorail	Metrobus & Other Transit	Auto	Walk & Other
Central Business District	63%	12%	21%	5%
All sites surveyed	25%	9%	62%	6%

The central business district mode split is an average of several sites surveyed. Applying it to the RiverFront PUD may not be appropriate because the sites surveyed do not have similar characteristics, such as the amount of parking per square foot of space, walking distance to Metrorail and employee benefits for non-auto commuters. Notably, the walking distance from RiverFront to the Navy Yard station is longer than all of the central business district sites surveyed. *The Ridership Survey* includes an analysis that concludes that the percentage ridership via Metrorail decreases 0.96% for every 100 feet the site is located from a Metrorail station. Applying this to RiverFront, using a starting assumption of 63% and an average walking distance of 2200 feet, the expected Metrorail mode split for RiverFront would be 42%.

Using data from other office sites surveyed in WMATA's report would also not be appropriate, because they also differ greatly. Each site has significantly more parking spaces per square foot of office space. Even more notable is that the *Ridership Survey* notes that 72% of the office commuters that responded to the survey were offered subsidized or free parking by their employers. The Transportation Demand Management (TDM) plan for the RiverFront PUD contains measures that will ensure that the parking garage will be priced at market rate for the majority of users, including office workers.

Information contained within the 2010 *State of the Commute* report shows why only offering market rate pricing will have a large influence on the office mode split. Table 10 shows the mode split difference between all commuters surveyed in the State of the Commute surveys split between whether the commuter was offered free parking.

Table 10: Mode Split Difference Based on Free Parking (Entire DC Area)

Parking Benefit	Mode				
	Drive Alone	Carpool	Bus	Train	Walk/Bike
Free Parking	82%	6%	3%	5%	4%
No Free Parking	42%	10%	11%	32%	6%

The *State of the Commute* report also contains responses of mode splits for all commuters employed in the District, as follows:

- Drive alone: 42%
- Carpool: 11%
- Bus: 10%
- Metrorail: 31%
- Commuter Rail: 2%
- Bike: 1%
- Walk: 3%

Because these surveys are from sites averaged across the entire District, and not just sites from the CBD like the WMATA *Ridership Survey*, this study uses these mode splits as a starting point for building assumptions for the RiverFront.

The following steps were taken to assemble the mode split estimates, starting with the *State of Commute's* average for all office sites within the District. The amount of transit use was assumed to be 40%, because it is expected that the RiverFront PUD will have similar transit use to both all employment sites in the District (43%) and of all sites surveyed that charge for parking (42%) per the *State of the Commute* survey. The amount of cycling was set to 3%, to reflect the site's location near the Anacostia Riverfront Trail and the amount of residents located within a 10-15 minute bicycle ride from the site. Similarly, the walk mode split was increased to reflect the number of existing and future residents living within in walking distance of the site, compared to the District average as a whole.

Thus, the assumptions on office mode split for the RiverFront are as follows:

- Vehicle: 50%
- Transit: 40%
- Walk: 7%
- Bike: 3%

Residential Uses

Several sources provide mode split information that can be used to develop mode split estimates for future residents of the RiverFront, including results from the 2000 census, WMATA's *Ridership Survey* of residential sites within the District, and the *State of the Commute* report that contains the average mode split of commuters who live in the District. The mode splits from these three sources are shown in Table 11.

Table 11: Mode Split Information for Residential Uses

Information Source	Mode			
	<i>Train</i>	<i>Metrobus & Other Transit</i>	<i>Auto</i>	<i>Walk & Other</i>
2000 Census ¹	20%	25%	33%	22%
State of the Commute ²	27%	14%	48%	11%
WMATA Ridership Survey ³	50%	6%	18%	26%

Of these three sources of information, the one that most closely contains the transportation characteristics of the RiverFront PUD would be the census information from the tracts where it is located. The sites that comprise the *Ridership Survey's* average mode splits do not compare well based on location and distance from the Metrorail station. The *State of the Commute* is an average for the entire District, and the difference between its mode splits and the census data make sense, given that the census tracts adjacent to the RiverFront site have high quality bus service.

Thus, this report uses the census information as a starting point for assembling residential mode split assumptions. The following steps were taken to assemble the mode split estimates, using this data as a starting point.

- The amount of transit use was assumed to be 40%, slightly less than the census tracts surrounding it (45%).
- The amount of cycling was set to 5%, to reflect the site's location near the Anacostia Riverfront Trail and the amount of residents located within a 10-15 minute bicycle ride from the site.
- Similarly, the walk mode split was set to 15% to reflect the amount of existing and future resident in walking distance of the site, compared to the District average as a whole. The total amount of bicycling and walking totals 20%, which is close to the 'Walk & Other' percentages observed in the census data.

Thus, the assumptions for residential mode split at the RiverFront are as follows:

- Vehicle: 40%
- Transit: 40%
- Walk: 15%
- Bike: 5%

Hotel Uses

The main source of mode split information for hotel sites is WMATA's *Ridership Survey*. Contained within the report are summaries of mode splits for four retail sites within the Metropolitan area. Table 12 summarizes the mode split information of the hotel sites surveyed.

Table 12: WMATA Ridership Survey Mode Split for Hotel Sites

Office Location	Mode			
	<i>Metrorail</i>	<i>Metrobus & Other Transit</i>	<i>Auto</i>	<i>Walk & Other</i>
All sites surveyed	27%	4%	38%	31%

¹ Weighted average for responses from census tracts 64 and 72

² Survey respondents that live within the District

³ For 'CBD' locations, which includes all residential sites surveyed within the District

This report uses the mode splits for the all retail sites surveyed as a basis for assumptions, stating with assuming that transit use of hotel traffic will be 30%, similar to the WMATA survey results.

- Drive: 45%
- Transit: 30%
- Walk: 20%
- Bike: 5%

Summary

Table 13 summarizes the mode split assumptions.

Table 13: Mode Split Assumptions

Land Use	Mode Split			
	Vehicle	Transit	Walk	Bike
Retail	35%	40%	20%	5%
Office	50%	40%	7%	3%
Residential	40%	40%	15%	5%
Hotel	45%	30%	20%	5%

3.1.3 Multi-Modal Trip Generation

Based on the trip generation calculations outlined in Section 3.1.1 and the mode split assumptions shown in Section 3.1.2 (and summarized in Table 13), Table 14 shows the resulting calculations by mode for Phase 1. Phase 1 of the proposed PUD will generate approximately 69 vehicular trips, 77 transit trips, 30 walking trips, and 10 bicycle trips during the morning peak hour; 95 vehicular trips, 107 transit trips, 42 walking trips, and 14 bicycle trips during the afternoon peak hour; and 1,023 vehicular trips, 1,156 transit trips, 463 walking trips, and 145 bicycle trips during a typical weekday.

Table 15 shows the resulting calculations by mode for Phases 2, 3, and 4. The remaining phases of the proposed PUD will generate approximately 429 vehicular trips, 373 transit trips, 124 walking trips, and 41 bicycle trips during the morning peak hour; 432 vehicular trips, 383 transit trips, 134 walking trips, and 42 bicycle trips during the afternoon peak hour; and 4,161 vehicular trips, 3,652 transit trips, 1,447 walking trips, and 433 bicycle trips during a typical weekday.

Table 14: Trip Generation for Proposed Development by Mode (Phase 1 Only)

Land-Use/Mode	Trip Generation by Mode for Phase 1						Daily Total
	AM Peak Hour			PM Peak Hour			
	In	Out	Total	In	Out	Total	
Vehicle Trips							
Retail	3	1	4	8	8	16	188
Residential	13	52	65	51	28	79	835
<i>Total New Vehicle Trips</i>	16	53	69	59	36	95	1,023
Transit Person-Trips							
Retail	4	2	6	10	11	21	237
Residential	14	57	71	56	30	86	919
<i>Total New Transit Person-Trips</i>	18	59	77	66	41	107	1,156

Land-Use/Mode	Trip Generation by Mode for Phase 1						Daily Total
	AM Peak Hour			PM Peak Hour			
	In	Out	Total	In	Out	Total	
Walking Person-Trips							
Retail	2	1	3	5	5	10	118
Residential	5	22	27	21	11	32	345
<i>Total New Walking Person-Trips</i>	7	23	30	26	16	42	463
Bicycling Person-Trips							
Retail	0	1	1	1	2	3	30
Residential	2	7	9	7	4	11	115
<i>Total New Bicycling Person-Trips</i>	2	8	10	8	6	14	145
Total Trips*	43	143	186	159	99	258	2,787

* - Combination of person-trips and vehicle-trips

Table 15: Trip Generation for Proposed Development by Mode (Phases 2, 3, and 4)

Land-Use/Mode	Trip Generation by Mode for Phases 2, 3, and 4						Daily Total
	AM Peak Hour			PM Peak Hour			
	In	Out	Total	In	Out	Total	
Vehicle Trips							
Retail	3	1	4	7	8	15	164
Office	213	29	242	37	186	223	1,659
Residential	74	52	126	62	64	126	1,605
Hotel	11	46	57	45	23	68	733
<i>Total New Vehicle Trips</i>	301	128	429	151	281	432	4,161
Transit Person-Trips							
Retail	3	2	5	9	9	18	206
Office	188	25	213	34	162	196	1,461
Residential	54	39	93	46	47	93	1,178
Hotel	12	50	62	49	27	76	807
<i>Total New Transit Person-Trips</i>	257	116	373	138	245	383	2,652
Walking Person-Trips							
Retail	2	0	2	4	5	9	103
Office	33	4	37	6	28	34	256
Residential	36	26	62	30	32	62	785
Hotel	5	18	23	18	11	29	303
<i>Total New Walking Person-Trips</i>	76	48	124	58	76	134	1,447
Bicycling Person-Trips							
Retail	0	1	1	1	1	2	26
Office	14	2	16	3	12	15	110
Residential	9	7	16	8	7	15	196
Hotel	2	6	8	6	4	10	101
<i>Total New Bicycling Person-Trips</i>	25	16	41	18	24	42	433
Total Trips*	659	308	967	365	626	991	9,693

* - Combination of person-trips and vehicle-trips

Trip Generation - 950 South Cap (300 du)

300 high-rise residential dwelling 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	300 du	30 veh/hr	121 veh/hr	151 veh/hr	119 veh/hr	64 veh/hr	183 veh/hr
<i>Calculation Details:</i>			20%	80%	=0.49(x)+3.73	65%	35%	=0.55(x)+17.65

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	34 ppl/hr	137 ppl/hr	171 ppl/hr	134 ppl/hr	73 ppl/hr	207 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	50%	17 ppl/hr	69 ppl/hr	86 ppl/hr	67 ppl/hr	37 ppl/hr	104 ppl/hr
Apartments	Transit	40%	14 ppl/hr	54 ppl/hr	68 ppl/hr	54 ppl/hr	29 ppl/hr	83 ppl/hr
Apartments	Bike	3%	1 ppl/hr	4 ppl/hr	5 ppl/hr	4 ppl/hr	2 ppl/hr	6 ppl/hr
Apartments	Walk	7%	2 ppl/hr	10 ppl/hr	12 ppl/hr	9 ppl/hr	5 ppl/hr	14 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
High-rise Apartments	1.13 ppl/veh	15 veh/hr	61 veh/hr	76 veh/hr	59 veh/hr	33 veh/hr	92 veh/hr

Trip Gen Summary for Residential

Mode	AM Peak Hour			PM Commuter Peak Hour		
	In	Out	Total	In	Out	Total
Auto	15 veh/hr	61 veh/hr	76 veh/hr	59 veh/hr	33 veh/hr	92 veh/hr
Transit	14 ppl/hr	54 ppl/hr	68 ppl/hr	54 ppl/hr	29 ppl/hr	83 ppl/hr
Bike	1 ppl/hr	4 ppl/hr	5 ppl/hr	4 ppl/hr	2 ppl/hr	6 ppl/hr
Walk	2 ppl/hr	10 ppl/hr	12 ppl/hr	9 ppl/hr	5 ppl/hr	14 ppl/hr

Mode Split Assumptions - Former Congressional**Residential Component****Description of residential component of project:**

The development will contain approximately 690 residential dwelling units, 13,393 S.F. of retail and 196 hotel rooms.

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for <i>U-Street Station Area</i>)	22%		51%	27%		---	
WMATA Ridership Survey (average for <i>Suburban-Inside the Beltway</i>)	39%		49%	12%		---	

Mode Split assumed in TIS:

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

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component**Pertinent Mode Split data from other sources:**

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Silver Spring Neighbourhood Center)	67%		19%	14%		---	
WMATA Ridership Survey (Ballston Common)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Neighborhood Retail Mode Split	45%		10%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Hotel Component**Pertinent Mode Split data from other sources:**

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Holiday Inn Arlington)	67%		17%	17%		---	
WMATA Ridership Survey (Crystal City - Hyatt Regency)	24%		34%	42%		---	
WMATA Ridership Survey (Goliday Inn - Silver Spring)	54%		12%	33%		---	

Mode Split assumed in TIS:

Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Hotel Mode Split	55%	25%	0%	20%	---

Notes: -Three WMATA survey sites listed are applicable to the hotel component of the project

Trip Generation - Former Congressional
Residential (800 du), Retail (44,000 S.F.)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	220	800 du	75 veh/hr	213 veh/hr	288 veh/hr	215 veh/hr	137 veh/hr	352 veh/hr	2176 veh	2176 veh	4352 veh
<i>Calculation Details:</i>			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	44,000 sf	25 veh/hr	16 veh/hr	41 veh/hr	81 veh/hr	87 veh/hr	168 veh/hr	831 veh	830 veh	1661 veh
<i>Calculation Details:</i>			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	89 ppl/hr	251 ppl/hr	340 ppl/hr	254 ppl/hr	162 ppl/hr	415 ppl/hr	2568 ppl	2568 ppl	5135 ppl
Retail	1.82 ppl/veh	46 ppl/hr	29 ppl/hr	75 ppl/hr	147 ppl/hr	158 ppl/hr	306 ppl/hr	1512 ppl	1511 ppl	3023 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	36 ppl/hr	100 ppl/hr	136 ppl/hr	102 ppl/hr	64 ppl/hr	166 ppl/hr	1027 ppl	1027 ppl	2054 ppl
Apartments	Transit	40%	36 ppl/hr	100 ppl/hr	136 ppl/hr	102 ppl/hr	64 ppl/hr	166 ppl/hr	1027 ppl	1027 ppl	2054 ppl
Apartments	Bike	5%	4 ppl/hr	13 ppl/hr	17 ppl/hr	13 ppl/hr	8 ppl/hr	21 ppl/hr	128 ppl	129 ppl	257 ppl
Apartments	Walk	15%	13 ppl/hr	38 ppl/hr	51 ppl/hr	38 ppl/hr	24 ppl/hr	62 ppl/hr	385 ppl	385 ppl	770 ppl
Retail	Auto	45%	21 ppl/hr	13 ppl/hr	34 ppl/hr	66 ppl/hr	72 ppl/hr	138 ppl/hr	680 ppl	680 ppl	1360 ppl
Retail	Transit	10%	5 ppl/hr	3 ppl/hr	8 ppl/hr	15 ppl/hr	16 ppl/hr	31 ppl/hr	151 ppl	151 ppl	302 ppl
Retail	Bike	10%	5 ppl/hr	3 ppl/hr	8 ppl/hr	15 ppl/hr	16 ppl/hr	31 ppl/hr	151 ppl	151 ppl	302 ppl
Retail	Walk	35%	16 ppl/hr	10 ppl/hr	26 ppl/hr	51 ppl/hr	56 ppl/hr	107 ppl/hr	529 ppl	529 ppl	1058 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	31 veh/hr	84 veh/hr	115 veh/hr	86 veh/hr	55 veh/hr	141 veh/hr	870 veh	871 veh	1741 veh
Retail	1.82 ppl/veh	12 veh/hr	7 veh/hr	19 veh/hr	36 veh/hr	40 veh/hr	76 veh/hr	374 veh	374 veh	747 veh

Trip Gen Summary for CSX Parcel East

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	43 veh/hr	91 veh/hr	134 veh/hr	122 veh/hr	95 veh/hr	217 veh/hr	1244 veh	1245 veh	2488 veh
Transit	41 ppl/hr	103 ppl/hr	144 ppl/hr	117 ppl/hr	80 ppl/hr	197 ppl/hr	1178 ppl/hr	1178 ppl/hr	2356 ppl/hr
Bike	9 ppl/hr	16 ppl/hr	25 ppl/hr	28 ppl/hr	24 ppl/hr	52 ppl/hr	279 ppl/hr	280 ppl/hr	559 ppl/hr
Walk	29 ppl/hr	48 ppl/hr	77 ppl/hr	89 ppl/hr	80 ppl/hr	169 ppl/hr	914 ppl/hr	914 ppl/hr	1828 ppl/hr

Mode Split Assumptions - The Garrett**Residential Component****Description of residential component of project:**

The development will contain approximately 690 residential dwelling units, 13,393 S.F. of retail and 196 hotel rooms.

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for U-Street Station Area)	22%		51%	27%		---	
WMATA Ridership Survey (average for Suburban-Inside the Beltway)	39%		49%	12%		---	

Mode Split assumed in TIS:

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

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component**Pertinent Mode Split data from other sources:**

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Silver Spring Neighbourhood Center)	67%		19%	14%		---	
WMATA Ridership Survey (Ballston Common)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Neighborhood Retail Mode Split	45%		10%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Hotel Component**Pertinent Mode Split data from other sources:**

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Holiday Inn Arlington)	67%		17%	17%		---	
WMATA Ridership Survey (Crystal City - Hyatt Regency)	24%		34%	42%		---	
WMATA Ridership Survey (Goliday Inn - Silver Spring)	54%		12%	33%		---	

Mode Split assumed in TIS:

Use	Mode				
	Drive	Transit	Bike	Walk	Telecommute/Other
Hotel Mode Split	55%	25%	0%	20%	---

Notes: -Three WMATA survey sites listed are applicable to the hotel component of the project

Trip Generation - The Garrett

Use (375 du), Use (1500S.F.) Use (196 rooms)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	220	375 du	35 veh/hr	100 veh/hr	135 veh/hr	101 veh/hr	64 veh/hr	165 veh/hr	1020 veh	1020 veh	2040 veh
Calculation Details:			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	15,000 sf	9 veh/hr	5 veh/hr	14 veh/hr	27 veh/hr	30 veh/hr	57 veh/hr	283 veh	283 veh	566 veh
Calculation Details:			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	41 ppl/hr	118 ppl/hr	159 ppl/hr	119 ppl/hr	76 ppl/hr	195 ppl/hr	1204 ppl	1204 ppl	2407 ppl
Retail	1.82 ppl/veh	16 ppl/hr	9 ppl/hr	25 ppl/hr	49 ppl/hr	55 ppl/hr	104 ppl/hr	515 ppl	515 ppl	1030 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	16 ppl/hr	48 ppl/hr	64 ppl/hr	48 ppl/hr	30 ppl/hr	78 ppl/hr	482 ppl	481 ppl	963 ppl
Apartments	Transit	40%	16 ppl/hr	48 ppl/hr	64 ppl/hr	48 ppl/hr	30 ppl/hr	78 ppl/hr	482 ppl	481 ppl	963 ppl
Apartments	Bike	5%	2 ppl/hr	6 ppl/hr	8 ppl/hr	6 ppl/hr	4 ppl/hr	10 ppl/hr	60 ppl	60 ppl	120 ppl
Apartments	Walk	15%	6 ppl/hr	18 ppl/hr	24 ppl/hr	18 ppl/hr	11 ppl/hr	29 ppl/hr	181 ppl	180 ppl	361 ppl
Retail	Auto	45%	7 ppl/hr	4 ppl/hr	11 ppl/hr	22 ppl/hr	25 ppl/hr	47 ppl/hr	232 ppl	232 ppl	464 ppl
Retail	Transit	10%	2 ppl/hr	1 ppl/hr	3 ppl/hr	5 ppl/hr	5 ppl/hr	10 ppl/hr	52 ppl	51 ppl	103 ppl
Retail	Bike	10%	2 ppl/hr	1 ppl/hr	3 ppl/hr	5 ppl/hr	5 ppl/hr	10 ppl/hr	52 ppl	51 ppl	103 ppl
Retail	Walk	35%	6 ppl/hr	3 ppl/hr	9 ppl/hr	17 ppl/hr	19 ppl/hr	36 ppl/hr	180 ppl	181 ppl	361 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	14 veh/hr	40 veh/hr	54 veh/hr	41 veh/hr	25 veh/hr	66 veh/hr	408 veh	408 veh	816 veh
Retail	1.82 ppl/veh	4 veh/hr	2 veh/hr	6 veh/hr	12 veh/hr	14 veh/hr	26 veh/hr	127 veh	127 veh	255 veh

Trip Gen Summary for CSX Parcel East

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	18 veh/hr	42 veh/hr	60 veh/hr	53 veh/hr	39 veh/hr	92 veh/hr	535 veh	535 veh	1071 veh
Transit	18 ppl/hr	49 ppl/hr	67 ppl/hr	53 ppl/hr	35 ppl/hr	88 ppl/hr	534 ppl/hr	532 ppl/hr	1066 ppl/hr
Bike	4 ppl/hr	7 ppl/hr	11 ppl/hr	11 ppl/hr	9 ppl/hr	20 ppl/hr	112 ppl/hr	111 ppl/hr	223 ppl/hr
Walk	12 ppl/hr	21 ppl/hr	33 ppl/hr	35 ppl/hr	30 ppl/hr	65 ppl/hr	361 ppl/hr	361 ppl/hr	722 ppl/hr

Mode Split Assumptions - Capper Residential

Residential Component

Description of residential component of project:

The development will contain approximately 690 residential dwelling units, 13,393 S.F. of retail and 196 hotel rooms.

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
CTPP - TAZ Residents (TAZ 20372)	34%	0%	40%	3%	24%	0%	0%
Census Tract - Residents (CT 72)	32%	4%	32%	3%	23%	3%	2%
State of the Commute 2016 (of District residents)	35%	4%	42%	16%		3%	
WMATA Ridership Survey (average for U-Street Station Area)	22%		51%	27%		---	
WMATA Ridership Survey (average for Suburban-Inside the Beltway)	39%		49%	12%		---	

Mode Split assumed in TIS:

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

Notes: -Census data (CTPP) used as basis for assumptions
 '-Census data adjusted based on parking supply

Retail Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Silver Spring Neighbourhood Center)	67%		19%	14%		---	
WMATA Ridership Survey (Ballston Common)	43%		30%	27%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Pass-by	Transit	Bike	Walk	Telecommute/Other
Neighborhood Retail Mode Split	45%		10%	10%	35%	---

Notes: -Two WMATA survey sites listed are more applicable to the ground-floor neighborhood retail

Hotel Component

Pertinent Mode Split data from other sources:

Information Source	Mode						
	SOV	Carpool	Transit	Bike	Walk	Telecommute	Other
WMATA Ridership Survey (Holiday Inn Arlington)	67%		17%	17%		---	
WMATA Ridership Survey (Crystal City - Hyatt Regency)	24%		34%	42%		---	
WMATA Ridership Survey (Goliday Inn - Silver Spring)	54%		12%	33%		---	

Mode Split assumed in TIS:

Use	Mode					
	Drive	Transit	Bike	Walk	Telecommute/Other	
Hotel Mode Split	55%		25%	0%	20%	---

Notes: -Three WMATA survey sites listed are applicable to the hotel component of the project

Trip Generation - Capper Residential

Residential (322 du), Retail (9,250 S.F.)

Step 1: Base trip generation using ITEs' Trip Generation

Land Use	Land Use Code	Quantity (x)	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	220	322 du	30 veh/hr	86 veh/hr	116 veh/hr	87 veh/hr	55 veh/hr	142 veh/hr	876 veh	876 veh	1752 veh
Calculation Details:			26%	74%	=0.36X	61%	39%	=0.44X	50%	50%	=5.44X
Retail	820	9,250 sf	6 veh/hr	3 veh/hr	9 veh/hr	17 veh/hr	18 veh/hr	35 veh/hr	175 veh	174 veh	349 veh
Calculation Details:			62%	38%	=0.94(X/1000)	48%	52%	=3.81(X/1000)	50%	50%	=37.75(X/1000)
Calculation Details:			#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!

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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	35 ppl/hr	101 ppl/hr	137 ppl/hr	103 ppl/hr	65 ppl/hr	168 ppl/hr	1034 ppl	1034 ppl	2067 ppl
Retail	1.82 ppl/veh	11 ppl/hr	5 ppl/hr	16 ppl/hr	31 ppl/hr	33 ppl/hr	64 ppl/hr	319 ppl	317 ppl	635 ppl

Step 3: Split between modes, per assumed Mode Splits

Land Use	Mode	Split	AM Peak Hour			PM Peak Hour			Daily		
			In	Out	Total	In	Out	Total	In	Out	Total
Apartments	Auto	40%	14 ppl/hr	41 ppl/hr	55 ppl/hr	41 ppl/hr	26 ppl/hr	67 ppl/hr	414 ppl	413 ppl	827 ppl
Apartments	Transit	40%	14 ppl/hr	41 ppl/hr	55 ppl/hr	41 ppl/hr	26 ppl/hr	67 ppl/hr	414 ppl	413 ppl	827 ppl
Apartments	Bike	5%	2 ppl/hr	5 ppl/hr	7 ppl/hr	5 ppl/hr	3 ppl/hr	8 ppl/hr	52 ppl	51 ppl	103 ppl
Apartments	Walk	15%	5 ppl/hr	16 ppl/hr	21 ppl/hr	15 ppl/hr	10 ppl/hr	25 ppl/hr	155 ppl	155 ppl	310 ppl
Retail	Auto	45%	5 ppl/hr	2 ppl/hr	7 ppl/hr	14 ppl/hr	15 ppl/hr	29 ppl/hr	144 ppl	142 ppl	286 ppl
Retail	Transit	10%	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	3 ppl/hr	6 ppl/hr	32 ppl	32 ppl	64 ppl
Retail	Bike	10%	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	3 ppl/hr	6 ppl/hr	32 ppl	32 ppl	64 ppl
Retail	Walk	35%	4 ppl/hr	2 ppl/hr	6 ppl/hr	11 ppl/hr	11 ppl/hr	22 ppl/hr	112 ppl	110 ppl	222 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			Daily		
		In	Out	Total	In	Out	Total	In	Out	Total
Apartments	1.18 ppl/veh	12 veh/hr	35 veh/hr	47 veh/hr	35 veh/hr	22 veh/hr	57 veh/hr	351 veh	350 veh	701 veh
Retail	1.82 ppl/veh	3 veh/hr	1 veh/hr	4 veh/hr	8 veh/hr	8 veh/hr	16 veh/hr	79 veh	78 veh	157 veh

Trip Gen Summary for CSX Parcel East

Mode	AM Peak Hour			PM Peak Hour			Daily		
	In	Out	Total	In	Out	Total	In	Out	Total
Auto	15 veh/hr	36 veh/hr	51 veh/hr	43 veh/hr	30 veh/hr	73 veh/hr	430 veh	428 veh	858 veh
Transit	15 ppl/hr	42 ppl/hr	57 ppl/hr	44 ppl/hr	29 ppl/hr	73 ppl/hr	446 ppl/hr	445 ppl/hr	891 ppl/hr
Bike	3 ppl/hr	6 ppl/hr	9 ppl/hr	8 ppl/hr	6 ppl/hr	14 ppl/hr	84 ppl/hr	83 ppl/hr	167 ppl/hr
Walk	9 ppl/hr	18 ppl/hr	27 ppl/hr	26 ppl/hr	21 ppl/hr	47 ppl/hr	267 ppl/hr	265 ppl/hr	532 ppl/hr



TRIP GENERATION

This section outlines the transportation demand of the Project. It summarizes the projected trip generation of the site by mode and land use, 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.

The proposed trip generation for the Project assumed 456 residential units, 11,000 square feet of retail and/or restaurant space, 9,000 square feet of arts/cultural space, and a 176-student education/daycare facility.

Given that the most recent analysis for this building was completed in 2007, updated methodology was used to determine the projected trip generation. As an update to the 2007 trip generation analysis, a multi-modal trip generation methodology was applied using ITE 9th Edition rates for all land uses. Mode split assumptions were based on census data and other resources.

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from 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.

Although the specific use of the Arts/Cultural space is not known at this time, the trip generation was conservatively calculated based on ITE land use 444, Theatre, splitting trips into different modes using assumptions derived ridership data. The vehicular mode split was then adjusted to reflect the

parking supply and other developments with similar proximity to Metrorail.

Trip generation for retail was broken out into two different types of retail: general retail that could draw regional trips and neighborhood retail that is intended to serve the immediate neighborhood. Trip generation for both types of retail was calculated based on ITE land use 820, Shopping Center, with neighborhood retail generating a significantly higher percentage of walking trips as compared to general retail.

Education/Daycare trip generation was calculated based on ITE land use 565, Daycare, splitting trips into different modes based on information provided by the school and comparable education sites in the District.

A summary of the sites mode splits assumptions are shown in Table 2. A summary of the multimodal trip generation is provided in Table 3 for both peak hours. The Project is expected to generate 173 trips in the morning peak hour (58 inbound, 115 outbound) and 204 trips in the afternoon peak hour (122 inbound, 82 outbound). Detailed calculations are included in the Technical Attachments.

Table 2: Proposed Mode Split – 1000 4th Street, SW

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential	45%	35%	5%	15%
General Retail	30%	35%	5%	30%
Neighborhood Retail	15%	15%	10%	60%
Arts/Cultural	45%	25%	5%	25%
Education	50%	15%	0%	35%

Table 3: 2018 Trip Generation Summary – 1000 4th Street, SW

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	<i>Apartments</i>	20 veh/hr	83 veh/hr	103 veh/hr	79 veh/hr	41 veh/hr	120 veh/hr
	<i>General Retail</i>	1 veh/hr	0 veh/hr	1 veh/hr	2 veh/hr	2 veh/hr	4 veh/hr
	<i>Neighborhood Retail</i>	1 veh/hr	0 veh/hr	1 veh/hr	2 veh/hr	1 veh/hr	3 veh/hr
	<i>Arts/Cultural</i>	1 veh/hr	0 veh/hr	1 veh/hr	10 veh/hr	5 veh/hr	15 veh/hr
	<i>Education</i>	35 veh/hr	32 veh/hr	67 veh/hr	29 veh/hr	33 veh/hr	62 veh/hr
	Total		58 veh/hr	115 veh/hr	173 veh/hr	122 veh/hr	82 veh/hr
Transit	<i>Apartments</i>	18 ppl/hr	72 ppl/hr	90 ppl/hr	69 ppl/hr	37 ppl/hr	106 ppl/hr
	<i>General Retail</i>	1 ppl/hr	1 ppl/hr	2 ppl/hr	5 ppl/hr	5 ppl/hr	10 ppl/hr
	<i>Neighborhood Retail</i>	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	3 ppl/hr	6 ppl/hr
	<i>Arts/Cultural</i>	1 ppl/hr	0 ppl/hr	1 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
	<i>Education</i>	22 ppl/hr	20 ppl/hr	42 ppl/hr	18 ppl/hr	21 ppl/hr	39 ppl/hr
	Total		43 ppl/hr	94 ppl/hr	137 ppl/hr	105 ppl/hr	71 ppl/hr
Bike	<i>Apartments</i>	3 ppl/hr	10 ppl/hr	13 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
	<i>General Retail</i>	0 ppl/hr	0 ppl/hr	0 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr
	<i>Neighborhood Retail</i>	1 ppl/hr	0 ppl/hr	1 ppl/hr	2 ppl/hr	2 ppl/hr	4 ppl/hr
	<i>Arts/Cultural</i>	0 ppl/hr	0 ppl/hr	0 ppl/hr	2 ppl/hr	1 ppl/hr	3 ppl/hr
	<i>Education</i>	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr	0 ppl/hr
	Total		4 ppl/hr	10 ppl/hr	14 ppl/hr	15 ppl/hr	8 ppl/hr
Walk	<i>Apartments</i>	8 ppl/hr	31 ppl/hr	39 ppl/hr	30 ppl/hr	15 ppl/hr	45 ppl/hr
	<i>General Retail</i>	1 ppl/hr	1 ppl/hr	2 ppl/hr	4 ppl/hr	4 ppl/hr	8 ppl/hr
	<i>Neighborhood Retail</i>	4 ppl/hr	3 ppl/hr	7 ppl/hr	12 ppl/hr	11 ppl/hr	23 ppl/hr
	<i>Arts/Cultural</i>	1 ppl/hr	0 ppl/hr	1 ppl/hr	10 ppl/hr	5 ppl/hr	15 ppl/hr
	<i>Education</i>	51 ppl/hr	47 ppl/hr	98 ppl/hr	43 ppl/hr	48 ppl/hr	91 ppl/hr
	Total		65 ppl/hr	82 ppl/hr	147 ppl/hr	99 ppl/hr	83 ppl/hr

3: IMPACTS REVIEW

This section of the report focuses on the influence and impact site generated traffic will have on the local transportation network, with the following purpose:

- To provide information to the District Department of Transportation (DDOT) and other agencies on how the development of the site will influence the local transportation network. This report accomplishes this by identifying the potential trips generated by the site and where these trips are expected to travel to and from.
- To determine if development of the site will lead to adverse impact on the local transportation network. This report accomplishes this by projecting future conditions with and without development of the site and performing analysis of intersection delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area.

3.1 Site Transportation Demand

3.1.1 Base Trip Generation

Traditionally, trip generation for a development is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 9th Edition. For this report, the methodology was supplemented to account for the urban nature of the site (*Trip Generation* provides data for non-urban, low transit use sites) and to generate trips for multiple modes. The following summarizes the methodology that was used in this study.

First, ITE Trip Generation was used to develop base vehicular-trip rates, not accounting for reductions due to mode split. Following the base vehicular-trip rate calculations, the vehicle-trips were converted to person-trips by assuming an average vehicle occupancy of 1.1 persons per vehicle for residential use and 1.8 persons per vehicle for the retail and cultural uses, based on the Census Data Transportation Planning Package (CTPP) 2000. Table 5 shows the base number of trips generated by the proposed development. As shown, the trip generation analysis is based on a previous version of the development plan that assumed 550 dwelling units, 16,000 square feet of retail space, and 40,000 square feet of cultural space.

Table 5: Base Vehicle- and Person-Trip Generation

Proposed Development	Quantity	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Residential Component	550 DU	55	218	273	208	112	320
Converted Person Trips at 1.1 persons/vehicle		61	240	300	229	123	352
Retail/Commercial Component	16,000 sf	9	6	15	28	31	59
Cultural Component	40,000 sf	9	2	11	1	6	7
Converted Person Trips at 1.8 persons/vehicle		32	14	47	52	67	119
Net Vehicle-Trips before Non-Auto Reduction		73	226	299	237	149	386
Net Person-Trips		93	254	347	281	190	471

3.1.2 Mode Split

Following base trip generation, the trips were split into each mode: public transportation, walking, bicycle, and vehicle. Each land use was analyzed by mode separately in order to account for varying mode splits. The residential mode split was determined based on the 2011 U.S. Census data for Tract 105, in which the development is located. For this tract, a mode split of 47% vehicle, 45% public transit, 5% walking, and 3% biking was determined.

The mode split estimates for the retail component was based on survey information contained in WMATA's 2005 *Development-Related Ridership Survey*. The retail component was based on the average mode split among all retail sites analyzed with a slight increase in vehicular mode split to account for a longer distance to the nearest Metro station and to maintain a conservative analysis. Thus, the retail mode split is assumed to be 40% vehicle, 35% public transit, 20% walking, and 5% biking.

The museum mode split was also based on information contained in the *Ridership Survey*. During the weekday AM and PM peak hours, it is anticipated that people traveling to and from the museum will primarily consist of museum employees with some visitors. Although there is no mode split data available specific to museum uses, it was assumed that the mode split for the museum during these times would consist of a split between office and retail mode split. The average of office mode split for suburban areas inside the beltway and all retail sites analyzed was calculated giving a museum mode split of 50% vehicle, 35% public transit, 10% walking, and 5% biking.

The weekday peak hour mode split is summarized below in Table 6 for all land uses.

Table 6: Mode Split Summary

Land Use	Mode Split			
	Public Transit	Walk	Bicycle	Automobile
Residential	45%	5%	3%	47%
Retail	35%	20%	5%	40%
Cultural	35%	10%	5%	50%

As discussed previously in the parking sections, Gorove/Slade concludes that the retail and cultural uses will not have a 50% automobile mode split but somewhere closer to 25%. This report recognizes this disconnect, which is due to the limited nature of quality mode split data in addition to the above sources and the desire to keep the vehicular capacity analyses conservative. In essence, traffic impacts are exaggerated in order to help identify potential impacts to the network.

3.1.3 Multi-Modal Trip Generation

Based on the trip generation calculations and mode split assumptions shown previously, Table 7 shows the resulting calculations by mode. The proposed development will generate approximately 140 vehicular trips, 152 transit trips, 22 walking trips, and 11 bike trips during the morning peak hour; and 176 vehicular trips, 201 transit trips, 40 walking trips, and 17 bike trips during the afternoon peak hour.

Table 7: Multi-Modal Trip Generation

Trip Generation by Land Use & Mode	AM Peak Hour			PM Peak Hour			
	In	Out	Total	In	Out	Total	
Residential							
Transit Person-Trips	45%	28	108	135	103	55	158
Walking Person-Trips	5%	3	12	15	11	6	18
Bicycling Person-Trips	3%	2	7	9	7	4	11
Vehicular Person-Trips	47%	28	113	141	108	58	165
Vehicle-Trips		25	103	128	98	52	150
Retail							
Transit Person-Trips	35%	6	4	10	17	20	38
Walking Person-Trips	20%	3	2	5	10	11	21
Bicycling Person-Trips	5%	1	1	1	3	3	5
Vehicular Person-Trips	40%	6	4	11	20	22	42
Vehicle-Trips		3	2	6	11	12	23
Cultural							
Transit Person-Trips	35%	5	2	7	1	4	5
Walking Person-Trips	10%	2	0	2	0	1	1
Bicycling Person-Trips	5%	1	0	1	0	1	1
Vehicular Person-Trips	50%	8	2	10	1	5	6
Vehicle-Trips		4	1	6	1	3	3
Overall Trip Generation							
Transit Person-Trips		39	113	152	121	79	201
Walking Person-Trips		8	14	22	21	18	40
Bicycling Person-Trips		4	8	11	10	8	17
Vehicular Person-Trips		42	119	162	129	85	213
Total Person-Trips		93	254	347	281	190	471
Total Vehicle-Trips		32	106	140	110	67	176

3.2 Vehicular Impacts

This section details the vehicular trips generated in the study area along the vehicular access routes, defines the analysis assumptions, analyzes the vehicular impacts of the impacts of the proposed development, and makes recommendations for improvements where needed.

3.2.1 Scope of Analysis

The purpose of the vehicular capacity analysis is to determine the existing conditions of the intersections located in the immediate vicinity of the proposed development. The following intersections were selected, as shown in Figure 11:

1. I Street SW & South Capitol Street
2. I Street SW & Half Street SW
3. I Street SW & Delaware Avenue SW
4. I Street SW & 4th Street SW
5. I Street SW & 7th Street SW
6. Maine Avenue SW & 7th Street SW
7. H Street SW & 1st Street SW
8. I Street SW & 1st Street SW
9. Site Driveway at H Street SW



TRIP GENERATION

This section outlines the transportation demand of the project. It summarizes the projected trip generation of the project by mode and forms the basis for the chapters that follow.

Traditionally, weekday peak hour trip generation is calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 10th Edition. Additionally, DDOT has recently adopted use of the TripsDC tool for trip generation projections. The TripsDC tool is a locally calibrated and validated trip generation tool based on more than 50 residential over retail developments within the District. The TripsDC tool directly estimates the total person trips and is sensitive to the number of parking spaces provided at the site as well as proximity to Metrorail stations and nearby employment. The nature of the project, which includes residential, hotel, office and retail uses, requires that both ITE Trip Generation Manual and Trip DC methodologies be employed.

For Building 1 (hotel over retail) and Building 2 (residential over office) a multi-modal trip generation is projected based on ITE methodology. ITE Land Use Code 310 was used for hotel, Land Use Code 820 was used for retail, and Land Use Code 710 was used for office. The mode split assumptions proposed for Building 1 and 2 take into consideration Census Data to/from the site TAZ, State of the Commute of District Residents, and WMATA Ridership Survey.

The trip generation projections for Building 3 (residential only) are calculated based on the TripsDC tool. The TripsDC tool calculates multimodal splits for both the AM and PM peak hours individually.

A summary of the multimodal trip generation for Building 1 and 2 is provided in Table 2. The mode split assumptions for Building 3 is summarized in Table 3. A trip generation summary for all three (3) buildings is outlined in Table 4. Detailed calculations are included in the Technical Appendix.

Table 2: Building 1 Mode Split

Land Use	Mode Split			
	Drive	Transit	Bike	Walk
Building 1: Hotel	55%	25%	5%	15%
Building 1: Retail	45%	10%	10%	35%
Building 2: Residential	40%	40%	5%	15%
Building 2: Office	60%	30%	3%	7%

Table 3: Building 2/3 Mode Split

Land Use	Time Period	Mode Split			
		Drive	Transit	Bike	Walk
Building 3: Residential	AM Peak Hour	34%	21%	5%	40%
	PM Peak Hour	24%	12%	4%	59%



Table 4: Trip Generation Summary

Mode	Building	Land Use	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Auto	Building 1	Hotel	31 veh/hr	20 veh/hr	51 veh/hr	34 veh/hr	32 veh/hr	66 veh/hr
		Retail	3 veh/hr	1 veh/hr	4 veh/hr	8 veh/hr	8 veh/hr	16 veh/hr
	Building 2	Residential	19 veh/hr	53 veh/hr	72 veh/hr	55 veh/hr	35 veh/hr	90 veh/hr
		Office	33 veh/hr	6 veh/hr	39 veh/hr	4 veh/hr	25 veh/hr	29 veh/hr
	Building 3	Residential	46 veh/hr	152 veh/hr	198 veh/hr	75 veh/hr	44 veh/hr	119 veh/hr
	Total			132 veh/hr	232 veh/hr	364 veh/hr	176 veh/hr	144 veh/hr
Transit	Building 1	Hotel	23 ppl/hr	16 ppl/hr	39 ppl/hr	26 ppl/hr	25 ppl/hr	51 ppl/hr
		Retail	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	4 ppl/hr	7 ppl/hr
	Building 2	Residential	22 ppl/hr	63 ppl/hr	85 ppl/hr	65 ppl/hr	41 ppl/hr	106 ppl/hr
		Office	20 ppl/hr	3 ppl/hr	23 ppl/hr	3 ppl/hr	14 ppl/hr	17 ppl/hr
	Building 3	Residential	28 ppl/hr	94 ppl/hr	122 ppl/hr	75 ppl/hr	44 ppl/hr	119 ppl/hr
	Total			94 ppl/hr	177 ppl/hr	271 ppl/hr	172 ppl/hr	128 ppl/hr
Bike	Building 1	Hotel	5 ppl/hr	3 ppl/hr	8 ppl/hr	5 ppl/hr	5 ppl/hr	10 ppl/hr
		Retail	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	4 ppl/hr	7 ppl/hr
	Building 2	Residential	3 ppl/hr	8 ppl/hr	11 ppl/hr	8 ppl/hr	5 ppl/hr	13 ppl/hr
		Office	2 ppl/hr	0 ppl/hr	2 ppl/hr	0 ppl/hr	2 ppl/hr	2 ppl/hr
	Building 3	Residential	7 ppl/hr	22 ppl/hr	29 ppl/hr	18 ppl/hr	10 ppl/hr	28 ppl/hr
	Total			18 ppl/hr	34 ppl/hr	52 ppl/hr	34 ppl/hr	26 ppl/hr
Walk	Building 1	Hotel	14 ppl/hr	9 ppl/hr	23 ppl/hr	16 ppl/hr	14 ppl/hr	30 ppl/hr
		Retail	4 ppl/hr	2 ppl/hr	6 ppl/hr	12 ppl/hr	11 ppl/hr	23 ppl/hr
	Building 2	Residential	8 ppl/hr	24 ppl/hr	32 ppl/hr	24 ppl/hr	16 ppl/hr	40 ppl/hr
		Office	5 ppl/hr	0 ppl/hr	5 ppl/hr	1 ppl/hr	3 ppl/hr	4 ppl/hr
	Building 3	Residential	54 ppl/hr	179 ppl/hr	232 ppl/hr	142 ppl/hr	84 ppl/hr	226 ppl/hr
	Total			85 ppl/hr	214 ppl/hr	298 ppl/hr	195 ppl/hr	128 ppl/hr



TRIP GENERATION

This section outlines the transportation demand of the M Street Sites. It summarizes the projected trip generation of the sites by mode and land use, 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.

Given that the most recent analysis for the M Street Buildings was completed in 2007, we used updated methodology to determine the projected trip generation. The original analysis assumed that the retail space would generate local pedestrian or transit traffic only and was not included in the vehicular trip generation calculations. Additionally, an 80% non-auto reduction was used for the office use, which would be considered too high under today's standards. The 2007 trip generation is summarized in Table 2 below and an excerpt from the 2007 TIS is included in the Technical Attachments. For comparison purposes, the difference in trip generation between the 2007 development program and the 2017 development program is shown using the updated trip generation/mode split methodology.

As an update to the 2007 trip generation analysis, a multi-modal trip generation methodology was applied using ITE rates for all land uses. Mode split assumptions were based on census data and other resources.

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the sites. The vehicular mode split was then adjusted to reflect the parking supply and other developments with similar proximity to Metrorail.

Office trip generation was calculated based on ITE land use 710, General office, splitting trips into different modes using assumptions derived from census data for the employees in the region that travel to the sites. The vehicular mode split was then adjusted to reflect the parking supply and other developments with similar proximity to Metrorail.

Retail trip generation for the 2017 development program was calculated based on ITE land use 820, Shopping Center, splitting trips into different modes using assumptions based on ridership data.

Proposed trip generation for the East Building assumed 309 apartments, 18,660 square feet of office space, and 21,930 square feet of retail space. Of note, this differs slightly from what was ultimately proposed for the East Building, which includes 308 apartments and 18,640 square feet of office space. The proposed trip generation for the West Building assumed 296 apartments, 19,450 square feet of office space, and 19,940 square feet of retail space. Mode split assumptions are shown in Table 3 and Table 4 for East Building and West Building, respectively. A summary of the multimodal trip generation for the East Building is provided in Table 5 for both peak hours and a summary of the multimodal trip generation for the West Building is provided in Table 6 for both peak hours. A summary of the combined trip generation for both buildings is shown in Table 7. Detailed calculations are included in the Technical Appendix. A summary of the multi-modal trip generation for the 2007 development program using current trip generation methodology is shown on Table 8. A comparison of 2007 vs. 2017 Trip generation Projections using current trip gen methodology is shown in Table 9.

The change in land use results in a shift in the inbound/outbound trip generation. This is expected given the change from primarily office use to primarily residential use (i.e. there are more people leaving the sites in the morning than coming to the sites). However, the overall vehicular trip generation significantly decreases as a result of the updated development program when compared using consistent mode split methodology. Industry standards show that when all other factors are the same, residential land uses generate fewer vehicular trips than office land uses.



Table 2: 2007 TIS Trip Generation Projections

Building		AM Peak Hour			PM Peak Hour		
		IB trips	OB trips	Total Trips	IB trips	OB trips	Total Trips
East Building	Total Trips	400	54	454	71	346	417
	80% Reduction	-320	-43	-363	-57	-277	-334
	Vehicle Trips	80	11	91	14	69	83
West Building	Total Trips	426	58	484	76	369	445
	80% Reduction	-341	-46	-387	-61	-295	-356
	Vehicle Trips	85	12	97	15	74	89
Total	Total Trips	826	112	938	147	715	862
	80% Reduction	-661	-89	-750	-118	-572	-690
	Vehicle Trips	165	23	188	29	143	172

Table 3: Proposed Mode Split – East Building

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential Mode Split	45%	35%	5%	15%
Retail Mode Split	30%	35%	5%	30%
Office Mode Split	50%	45%	2%	3%

Table 4: Proposed Mode Split – West Building

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential Mode Split	45%	35%	5%	15%
Retail Mode Split	30%	35%	5%	30%
Office Mode Split	50%	45%	2%	3%

Table 5: 2017 Trip Generation Summary – East Building

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Apartments	14 veh/hr	56 veh/hr	70 veh/hr	55 veh/hr	29 veh/hr	84 veh/hr
	Retail	4 veh/hr	2 veh/hr	6 veh/hr	12 veh/hr	12 veh/hr	24 veh/hr
	Office	13 veh/hr	2 veh/hr	15 veh/hr	3 veh/hr	11 veh/hr	14 veh/hr
	Total	31 veh/hr	60 veh/hr	91 veh/hr	70 veh/hr	52 veh/hr	122 veh/hr
Transit	Apartments	12 ppl/hr	49 ppl/hr	61 ppl/hr	48 ppl/hr	26 ppl/hr	74 ppl/hr
	Retail	8 ppl/hr	5 ppl/hr	13 ppl/hr	24 ppl/hr	26 ppl/hr	50 ppl/hr
	Office	13 ppl/hr	2 ppl/hr	15 ppl/hr	3 ppl/hr	11 ppl/hr	14 ppl/hr
	Total	33 veh/hr	56 veh/hr	89 veh/hr	75 veh/hr	63 veh/hr	138 ppl/hr
Bike	Apartments	2 ppl/hr	7 ppl/hr	9 ppl/hr	7 ppl/hr	4 ppl/hr	11 ppl/hr
	Retail	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	4 ppl/hr	7 ppl/hr
	Office	1 ppl/hr	0 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr	1 ppl/hr
	Total	4 veh/hr	8 veh/hr	12 veh/hr	10 veh/hr	9 veh/hr	19 ppl/hr
Walk	Apartments	5 ppl/hr	21 ppl/hr	26 ppl/hr	21 ppl/hr	11 ppl/hr	32 ppl/hr
	Retail	7 ppl/hr	4 ppl/hr	11 ppl/hr	21 ppl/hr	22 ppl/hr	43 ppl/hr
	Office	1 ppl/hr	0 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr	1 ppl/hr
	Total	13 veh/hr	25 veh/hr	38 veh/hr	42 veh/hr	34 veh/hr	76 ppl/hr



Table 6: 2017 Trip Generation Summary – West Building

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	<i>Apartments</i>	13 veh/hr	54 veh/hr	67 veh/hr	52 veh/hr	29 veh/hr	81 veh/hr
	<i>Retail</i>	3 veh/hr	3 veh/hr	6 veh/hr	11 veh/hr	11 veh/hr	22 veh/hr
	<i>Office</i>	13 veh/hr	2 veh/hr	15 veh/hr	3 veh/hr	12 veh/hr	15 veh/hr
	Total	29 veh/hr	59 veh/hr	88 veh/hr	66 veh/hr	52 veh/hr	118 veh/hr
Transit	<i>Apartments</i>	12 ppl/hr	47 ppl/hr	59 ppl/hr	46 ppl/hr	25 ppl/hr	71 ppl/hr
	<i>Retail</i>	7 ppl/hr	5 ppl/hr	12 ppl/hr	22 ppl/hr	24 ppl/hr	46 ppl/hr
	<i>Office</i>	13 ppl/hr	2 ppl/hr	15 ppl/hr	3 ppl/hr	12 ppl/hr	15 ppl/hr
	Total	32 ppl/hr	54 ppl/hr	86 ppl/hr	71 ppl/hr	61 ppl/hr	132 ppl/hr
Bike	<i>Apartments</i>	2 ppl/hr	6 ppl/hr	8 ppl/hr	7 ppl/hr	3 ppl/hr	10 ppl/hr
	<i>Retail</i>	1 ppl/hr	1 ppl/hr	2 ppl/hr	3 ppl/hr	4 ppl/hr	7 ppl/hr
	<i>Office</i>	1 ppl/hr	0 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr	1 ppl/hr
	Total	4 ppl/hr	7 ppl/hr	11 ppl/hr	10 ppl/hr	8 ppl/hr	18 ppl/hr
Walk	<i>Apartments</i>	5 ppl/hr	20 ppl/hr	25 ppl/hr	20 ppl/hr	10 ppl/hr	30 ppl/hr
	<i>Retail</i>	6 ppl/hr	4 ppl/hr	10 ppl/hr	19 ppl/hr	21 ppl/hr	40 ppl/hr
	<i>Office</i>	1 ppl/hr	0 ppl/hr	1 ppl/hr	0 ppl/hr	1 ppl/hr	1 ppl/hr
	Total	12 ppl/hr	24 ppl/hr	36 ppl/hr	39 ppl/hr	32 ppl/hr	71 ppl/hr

Table 7: 2017 Combined Trip Generation Summary

Mode	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
Auto	60 veh/hr	119 veh/hr	179 veh/hr	136 veh/hr	104 veh/hr	240 veh/hr
Transit	65 ppl/hr	110 ppl/hr	175 ppl/hr	146 ppl/hr	124 ppl/hr	270 ppl/hr
Bike	8 ppl/hr	15 ppl/hr	23 ppl/hr	20 ppl/hr	17 ppl/hr	37 ppl/hr
Walk	25 ppl/hr	49 ppl/hr	74 ppl/hr	81 ppl/hr	66 ppl/hr	147 ppl/hr



Table 8: 2007 Trip Generation Summary (using current trip gen methodology)

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Auto	Office	418 veh/hr	56 veh/hr	474 veh/hr	72 veh/hr	356 veh/hr	428 veh/hr
	Retail	6 veh/hr	6 veh/hr	12 veh/hr	22 veh/hr	22 veh/hr	44 veh/hr
	Total	424 veh/hr	62 veh/hr	486 veh/hr	94 veh/hr	378 veh/hr	472 veh/hr
Transit	Office	424 veh/hr	59 veh/hr	483 veh/hr	74 veh/hr	360 veh/hr	434 veh/hr
	Retail	14 veh/hr	10 veh/hr	24 veh/hr	44 veh/hr	48 veh/hr	40 veh/hr
	Total	438 veh/hr	69 veh/hr	507 veh/hr	118 veh/hr	408 veh/hr	474 veh/hr
Bike	Office	19 veh/hr	2 veh/hr	21 veh/hr	4 veh/hr	15 veh/hr	19 veh/hr
	Retail	2 veh/hr	2 veh/hr	4 veh/hr	6 veh/hr	8 veh/hr	14 veh/hr
	Total	21 veh/hr	4 veh/hr	25 veh/hr	10 veh/hr	23 veh/hr	33 veh/hr
Walk	Office	28 veh/hr	4 veh/hr	32 veh/hr	5 veh/hr	24 veh/hr	29 veh/hr
	Retail	12 veh/hr	8 veh/hr	20 veh/hr	38 veh/hr	42 veh/hr	80 veh/hr
	Total	40 veh/hr	12 veh/hr	52 veh/hr	43 veh/hr	66 veh/hr	109 veh/hr

Table 9: Comparison of 2007 vs. 2017 Trip generation Projections (using current trip gen methodology)

Mode	Land Use	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
2017	Auto	60 veh/hr	119 veh/hr	179 veh/hr	136 veh/hr	104 veh/hr	240 veh/hr
	Non-Auto	98 ppl/hr	174 ppl/hr	272 ppl/hr	247 ppl/hr	207 ppl/hr	454 ppl/hr
2007	Auto	424 veh/hr	62 veh/hr	486 veh/hr	94 veh/hr	378 veh/hr	472 veh/hr
	Non-Auto	499 ppl/hr	85 ppl/hr	584 ppl/hr	171 ppl/hr	497 ppl/hr	616 ppl/hr
Difference	Auto	-364 veh/hr	57 veh/hr	-307 veh/hr	42 veh/hr	-274 veh/hr	-232 veh/hr
	Non-Auto	-401 ppl/hr	89 ppl/hr	-312 ppl/hr	76 ppl/hr	-290 ppl/hr	-162 ppl/hr



TRIP GENERATION

This section outlines the transportation demand of the proposed 501 Eye Street SW project. It summarizes the projected trip generation of the site by mode, which forms the basis for the chapters that follow.

Because there is no comparable ITE land use for the proposed STC use, trip generation projections for the STC use were based on survey results and discussions with STC, while residential trip generation was based on ITE methodology.

RESIDENTIAL TRIP GENERATION

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.

Residential trip generation was calculated based on ITE land use 220, Apartment, splitting trips into different modes using assumptions derived from census data for the residents that currently live near the site. The residential mode split is shown on Table 6. The residential component of the site is expected to generate 17 vehicular trips (4 in, 13 out) during the morning peak hour, and 25 vehicular trips (16 in, 9 out) during the afternoon peak hour.

Of note, apartments allocated to STC actors/fellows are not expected to generate any vehicle trips as actors are not expected to have a car on site. Additionally, the majority of STC actors/fellows are expected to be on-site during weekday peak hours.

Table 6: Proposed Residential Mode Split

Land Use	Mode			
	Drive	Transit	Bike	Walk
Residential	45%	40%	5%	10%

STC TRIP GENERATION

The overall transportation demand for STC is a combination of multiple user groups. Each user group's demand was assembled using survey information compiled from existing employees and information provided by STC. The general schedule of employees and events, the number of people expected for each user group, and expected mode splits are

summarized previously in Table 4 and Table 5. A summary of mode splits by user group is shown on Table 7.

From the information provided in Table 4 and Table 5 and additional information from STC, the morning and afternoon peak hours were determined and used to determine the peak hour trip generation of STC. It should be noted that although all user groups were used to determine the transportation demand, not all user groups are expected to be traveling to and from the site during the weekday commuter peak hours. Nor is every user group expected to be on site at the same time of year or same time of day. As stated previously in the Project Design section, programming for STC is limited by the amount of space available, such that not all user groups are able to be on site at the same time. For example, some education activities are only possible when rehearsal space is not in use.

As scoped with DDOT, the STC trip generation was based on the highest activity non-summer day, which is expected to occur in May when the most rehearsal and education activities are anticipated. Based on the data provided, the morning peak hour for STC is expected to occur 9 to 10 AM and the afternoon peak hour is expected to occur from 6 to 7 PM. During these times, the STC component of the site is expected to generate 37 vehicular trips (31 in, 6 out) during the morning peak hour, and 38 vehicular trips (28 in, 10 out) during the afternoon peak hour.

Not all vehicular trips are expected to go directly to the garage. For example, some employees will be parking in designated off-site parking spaces and some visitors will be parking in other off-site parking garages. To effectively account for off-site parking, 30 percent of STC trips were routed to an off-site garage, while the remaining trips were routed to the on-site garage.

Furthermore, some on-site vehicular activity will be pick-up/drop-off only. As such, on-site STC trips shown in Table 8 include pick-up/drop-off activity. Pick-up/drop-off activity was conservatively routed to and from the garage, but is expected to remain along Eye Street within the designated pick-up/drop-off area.

TRIP GENERATION SUMMARY

A summary of the multimodal trip generation for the overall site is provided in Table 8. The 501 Eye Street SW project is expected to generate 54 vehicular trips (35 in, 19 out) during the morning peak hour, and 63 vehicular trips (44 in, 19 out)