

4 Construction Scenarios

The proposed construction sites were analyzed to determine traffic, transit, pedestrian, and bicycle impacts. DC Water has retained a professional consulting team including civil engineers, traffic engineers, and public outreach professionals to assist in completing this study. At each site, mitigation measures were developed to minimize the anticipated impacts during construction. The analysis took into consideration the estimated construction duration, work hours, projected traffic volumes, and future planned development near each site. The analysis conservatively assumed concurrent construction at all sites.

The study area for each site was defined based on recommendations by the District Department of Transportation (DDOT). The analysis established 2013 levels of service and delays as well as projected conditions for the year 2020 and the anticipated mid-point of NEBT construction. Background traffic volumes for the year 2020 were developed based on projected developments and regional growth that is anticipated to influence the study area intersections. Volumes were then derived for the construction condition based on hauling volumes and the estimated number of workers at each site. Capacity analysis was conducted to determine the impacts to intersection operations and recommendations were developed to assist in mitigating these impacts.

In order to evaluate the preliminary impacts to the roadway, pedestrian and bicycle networks, conceptual maintenance of traffic plans were developed for the proposed construction.

4.1 Study Area

The overall study area encompasses the major roadways and intersections where traffic could potentially be impacted by the NEBT construction. The entire study area is bounded by:

- To the North: Franklin Street NE
- To the South: West Virginia Avenue NE
- To the East: 14th Street NE
- To the West: 7th Street NW

Due to the size of the project and the locations of the sites, the overall project area was split into three smaller areas, which are summarized in Table 4-1 below and shown in Figures 4-1, 4-2, and 4-3.

Table 4-1: Northeast Boundary Tunnel Traffic Study Areas

Study Area	Site	Existing Land Use	Study Area Boundary
1	Mt Olivet Road Site	Commercial, Low-Medium Density Residential	North: New York Avenue NE South: Florida Avenue NE
	W Street Site	Industrial, Transport, Communication, Utilities	East: West Virginia Avenue NE and Trinidad Avenue NE West: Fenwick Avenue NE

Study Area	Site	Existing Land Use	Study Area Boundary
2	Rhode Island Avenue Site	Industrial, Transport, Communication, Utilities, Institutional	North: Franklin Street NE South: Rhode Island Avenue NE East: 14th Street NE West: Lincoln Road NE
	4th Street Site	Low-Medium Density Residential, Commercial, Industrial	
3	T Street Site and Pumping Station	Low-Medium Density Residential	North: T Street NW South: Q Street NW East: North Capitol Street West: 7th Street NW
	Florida Avenue Site	Commercial, Low-Medium Density Residential	
	R Street Diversion Site	Low-Medium Density Residential, Parks and Open Spaces	



Figure 4-1: Study Area 1 – Mt. Olivet Road and W Street Sites

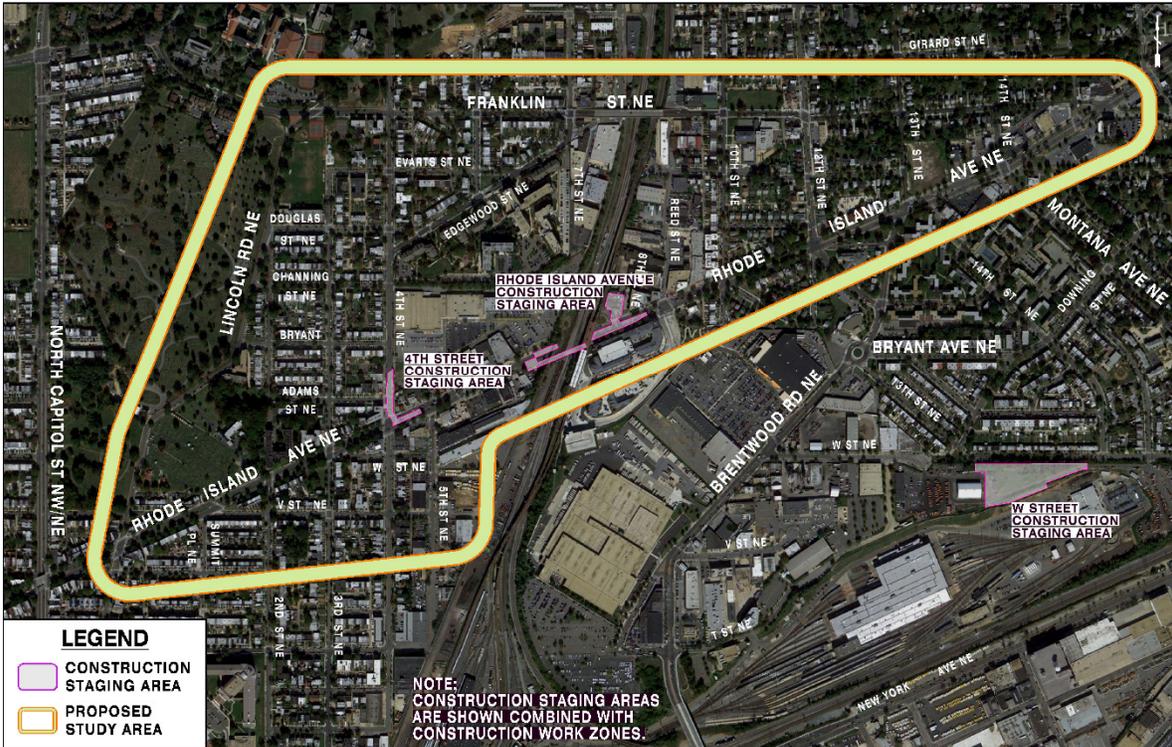


Figure 4-2: Study Area 2 – 4th Street and Rhode Island Avenue Sites

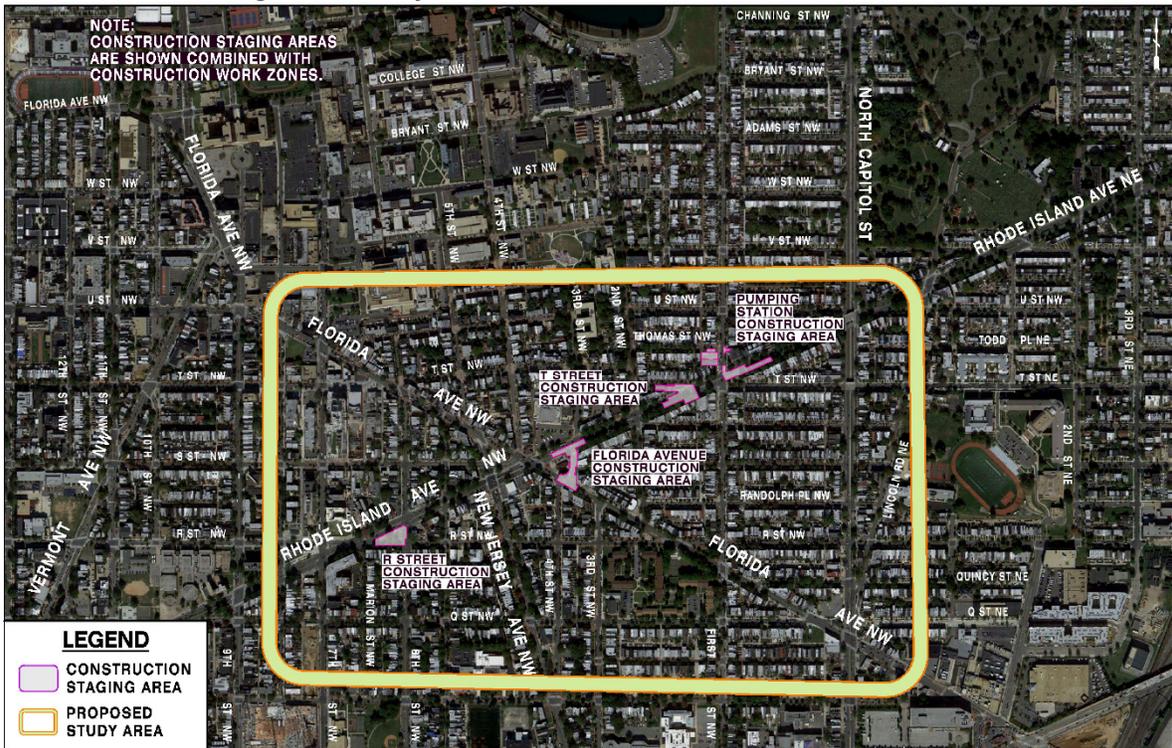


Figure 4-3: Study Area 3 – Florida Avenue, R Street and T Street Sites

Table 4-2 summarizes the major universities/schools, hospitals and roadway facilities within the study areas. Florida Avenue is a major thoroughfare that traverses through all three study areas, while Rhode Island Avenue traverses through Study Area 2 and 3.

Table 4-2: Universities/Schools, Hospitals and Major Roadway Facilities in Study Area

Study Area	Universities/Schools in Proximity	Hospitals in Proximity	Major Roadway Facilities
1	Gallaudet University		<p>Florida Ave NE – four lane undivided facility Mt Olivet Road NE– four lane facility. Two lanes east/west. Parking permitted between West Virginia Ave NE to Trinidad Ave NE. New York Ave NE – six lane divided roadway from the 9th Street Bridge to Fenwick Ave NE. West Virginia Ave NE– two to four travel lanes with parking on both sides west of Mt Olivet Road NE. Some parking is allowed east of Mt Olivet Road NE.</p>
2	Catholic University Calvary Christian Academy		<p>4th St NE– two travel lanes total, a bicycle lane in each direction, and parking on both sides. Franklin St NE– section of Franklin Street NE from 4th St NE to Rhode Island Ave NE has one eastbound lane and one or two westbound lanes. The westbound curb lane allows for some time-limited parking. Parking is restricted in the eastbound lane and in the westbound curb lane during the AM peak hours. Rhode Island Ave NE– six lane divided roadway. The outside curb lanes allow for parking during non-peak times throughout most of the study area</p>
3	Howard University	<p>Med Star Washington Hospital Center Children’s National Hospital MedStar National Rehabilitation Hospital Veterans Affairs Medical Center Howard University Hospital</p>	<p>Florida Ave NW– four lane undivided facility Rhode Island Ave NW – six lane divided roadway. The outside curb lanes allow for parking during non-peak times throughout most of the study area First St NW – one travel lane in each direction with parking on both sides 3rd St NW – one travel lane in each direction between Florida Ave NW and Rhode Island Ave NW 6th St NW – one/two travel lanes in each direction with parking allowed on both sides. R St NW – single, one-way westbound lane. A bicycle lane is provided on the north side of the roadway, and parking is allowed on both sides of the roadway.</p>

4.2 2013 Traffic Volumes

Traffic counts were conducted at various locations within the study areas. Existing counts were also utilized from previous DC Water studies. These previous counts were performed as part of the Northeast Boundary Neighborhood Protection Project and as part of the McMillan Stormwater Storage and the First Street Tunnel Construction Staging Area Package. Counts were also gathered from DDOTs' on-going traffic signal optimization project. Any counts conducted commenced in the autumn of 2013. These counts were performed for a thirteen (13) hour period as directed by DDOT and the resulting data is included in the Technical Traffic Appendices. The AM and PM peak hour volumes were determined based on the count data at all the intersection locations. Due to the differences in data collection days and the subsequent variation in traffic volumes and peak hours at the intersections, traffic volumes were adjusted between the intersections as per DDOTs direction. The volumes may not completely balance between intersections due to driveways, parking, unsignalized intersections or the range of variation in the counts. Table 4-3 identifies range of traffic volumes throughout the entire study areas. Peak hour volumes for Study Area 1, 2, and 3 are shown on Figures A-4, A-5, and A-6, respectively and found in Appendix A.

Table 4-3: AM and PM Peak Hour Volumes

Roadway	AM Peak Hour Volume	PM Peak Hour Volume
Florida Avenue NB	750 – 1,100	450 - 950
Florida Avenue SB	450 - 900	650 - 1,050
Mt Olivet Road NE WB	700 - 1,000	500 - 800
Mt Olivet Road NE EB	500 - 650	500 - 600
West Virginia Avenue NE WB	550 - 700	200 - 350
West Virginia Avenue NE EB	100 - 450	450 - 750
4th Street NE NB	100 - 400	250 - 500
4th Street NE SB	250 - 550	200 - 400
Rhode Island Avenue WB	1,400 -2,100	700 – 1,050
Rhode Island Avenue EB	500 - 900	1,250 - 1,850
First Street NW NB	150-200	150-300
First Street NW SB	200-250	200-350
3rd Street NW NB	250 - 350	350 - 500
3rd Street NW SB	100 - 800	400 - 600
6th Street NW SB	150 - 550	150 - 450
6th Street NW NB	100 - 250	150 - 550
R Street NW WB	150 - 350	100 - 350

The counts showed that the highest volume roadways adjacent to construction sites are Rhode Island Avenue and Florida Avenue. During the AM peak hour, along Rhode Island Avenue in the peak direction, volumes exceed over 2,000 vehicles per hour in the peak direction. Florida Avenue volumes approach 1,100 vehicles per hour in the peak hour, peak direction through certain sections.

4.3 2013 Traffic Analysis

Traffic analysis was performed for the three study area intersections using the 2000 Highway Capacity Manual (HCM) results generated from Synchro. The base Synchro models were provided by DDOT and were updated to reflect the latest signal timings as provided in the timing worksheets and the latest lane configurations. Existing conditions were field verified and travel time runs were performed to verify existing queuing and speeds that occur along the major arterials during the AM and PM peak periods of traffic. The Synchro models were calibrated to reflect existing AM and PM conditions. Multiple SimTraffic runs with one (1) hour durations were performed for each AM and PM peak hour scenarios until the results represent similar to the existing conditions. Table 4-4 shows the results of the analysis.

The 2013 analysis shows all intersections operate at a Level of Service (LOS) “C” or better during the AM peak hour. Within Study Area 1, Florida Avenue NE and 8th Street NE operates at a LOS “D” during the AM peak hour and during the PM peak hour, the West Virginia Avenue NE and Mt Olivet Road NE intersection operates at a LOS “D”. In Study Area 2 there are two (2) intersections which operate at a LOS “E”, Franklin Street NE and Lincoln Road NE in the AM peak hour and Franklin Street NE and 4th Street in the PM peak hour.

Table 4-4: Year 2013 Level of Service (Delay in seconds/vehicle)

SYNCHRO HCM LOS AND DELAY		
STUDY AREA 1		
Intersection	AM	PM
Florida Avenue NE @ 6th Street NE	B (12.7)	C (32.7)
Florida Avenue NE @ 7th Street NE	A (1.7)	A (2.3)
Florida Avenue NE @ 8th Street NE	D (33.9)	B (18.9)
Florida Avenue NE @ West Virginia Avenue NE	C (26.6)	B (16.5)
West Virginia Avenue NE @ Mt Olivet Road NE	C (23.4)	D (38.1)
West Virginia Avenue NE @ Fenwick Avenue NE	B (10.5)	A (7.6)
Mt Olivet Road NE @ 9th Street NE	C (22.3)	C (30.3)
Mt Olivet Road NE @ Brentwood Pkwy NE	B (15.1)	C (26.6)
Mt Olivet Road NE @ Capitol Avenue NE (stop controlled)	SB=B (10.7)	SB=B (10.9)
Mt Olivet Road NE @ Trinidad Avenue NE	A (7.4)	A (8.9)
New York Avenue NE @ Brentwood Parkway NE	A (8.9)	B (12.7)
New York Avenue NE @ Fairview Avenue NE	A (3.3)	C (23.7)
New York Avenue NE @ Kendall Street NE	B (13.4)	A (8.1)
New York Avenue NE @ Fenwick Avenue NE	A (8.2)	A (8.1)
STUDY AREA 2		
Intersection	AM	PM
Rhode Island Avenue NE @ Lincoln Road NE	B (10.1)	B (14.6)
Rhode Island Avenue NE @ 4th Street NE	C (28.7)	B (14.0)
Rhode Island Avenue NE @ 5th Street NE	A (4.7)	A (3.0)
Rhode Island Avenue NE @ Shopping Center	A (9.0)	B (12.2)
Rhode Island Avenue NE @ Reed Street NE	C (20.9)	C (21.3)

STUDY AREA 2	STUDY AREA 2	STUDY AREA 2
Intersection	Intersection	Intersection
Rhode Island Avenue NE @ 10th Street NE	B (14.2)	B (17.6)
Rhode Island Avenue NE @ 12th Street NE	B (19.7)	C (20.9)
Rhode Island Avenue NE @ 13th Street NE	B (11.3)	B (12.4)
Rhode Island Avenue NE @ 14th Street NE	B (15.4)	B (15.1)
Rhode Island Avenue NE @ Franklin Avenue NE	C (22.8)	C (20.4)
4th Street NE @ Douglas Street NE	A (6.7)	B (17.3)
4th Street NE @ Bryant Street NE	A (7.4)	A (7.9)
4th Street NE @ Adams Street NE (Stop Controlled)	EB=B (14.1)	EB=B (13.6)
4th Street NE @ W Street NE (Stop Controlled)	WB=B (12.3)	EB=B (13.0)
4th Street NE @ V Street NE (Stop Controlled)	SB=A (8.0)	EB=B (11.0)
4th Street NE @ Lincoln Road NE	B (16.9)	C (30.4)
5th Street NE @ W Street NE (Stop Controlled)	EB=A (9.7)	WB=A (9.8)
5th Street NE @ V Street NE (Stop Controlled)	EB=A (7.5)	EB=A (7.7)
Franklin Street NE @ Lincoln Road NE	E (56.1)	C (20.3)
Franklin Street NE @ 4th Street NE	C (26.2)	E (66.2)
Franklin Street NE @ 7th Street NE	C (30.1)	B (12.3)
Franklin Street NE @ 10th Street NE	B (17.2)	B (15.4)
Franklin Street NE @ 12th Street NE	C (29.3)	C (25.2)
Franklin Street NE @ 13th Street NE	C (26.9)	C (23.1)
Franklin Street NE @ 14th Street NE	B (15.1)	C (24.3)
STUDY AREA 3		
Intersection	AM	PM
Rhode Island Avenue NW @ 7th Street NW	A (9.4)	B (11.1)
Rhode Island Avenue NE @ R Street NW	A (5.5)	A (8.2)
Rhode Island Avenue NW @ 6th Street NW	A (9.7)	B (17.3)
Rhode Island Avenue NW @ New Jersey Avenue NW	B (14.1)	B (14.9)
Rhode Island Avenue NE @ Florida Avenue NW	A (9.4)	C (20.1)
Rhode Island Avenue NW @ 3rd Street NW	A (3.8)	A (5.6)
Rhode Island Avenue NW @ 2nd Street NW	A (6.8)	A (9.9)
Rhode Island Avenue NW @ First Street NW	B (19.9)	B (13.4)
Rhode Island Avenue @ North Capitol Street SB	B (13.0)	A (12.0)
Rhode Island Avenue @ North Capitol Street NB	A (9.1)	A (8.0)
Florida Avenue NW @ 7th Street NW	C (29.5)	C (25.2)
Florida Avenue NW @ 6th Street NW	B (18.6)	B (15.8)
Florida Avenue NW @ New Jersey Avenue NW	C (23.6)	B (18.3)
Florida Avenue NW @ 4th Street NW	A (7.1)	B (10.7)
Florida Avenue NW @ 3rd Street NW	B (14.4)	B (17.8)
Florida Avenue NE @ 2nd Street NW (Stop Controlled)	SB = B (13.4)	SB = C (17.3)
Florida Avenue NW @ First Street NW	C (24.9)	B (19.9)
Florida Avenue NW @ North Capitol Street NW	B (13.2)	C (23.0)
7th Street NW @ T Street NW	B (13.1)	B (19.5)

STUDY AREA 3	STUDY AREA 3	STUDY AREA 3
Intersection	Intersection	Intersection
7th Street NW @ S Street NW	B (11.5)	B (15.7)
7th Street NW @ R Street NW	B (16.7)	C (24.3)
7th Street NW @ Q Street NW	A (6.4)	A (8.4)
7th Street NW @ P Street NW	B (11.2)	B (15.8)
6th Street NW @ S Street NW	C (26.6)	C (24.6)
6th Street NW @ R Street NW	B (12.5)	B (11.7)
6th Street NW @ Q Street NW	A (8.2)	B (11.1)
6th Street NW @ P Street NW	B (12.6)	B (17.1)
New Jersey Avenue NW @ S Street NW	A (9.0)	B (10.6)
New Jersey Avenue NW @ R Street NW	B (10.9)	A (8.6)
New Jersey Avenue NW @ Q Street NW	A (6.4)	A (8.4)
First Street NW @ Q Street NW	C (20.9)	B (15.6)
North Capitol Street @ Randolph Street	C (27.6)	B (19.5)
North Capitol Street @ R Street	A (4.0)	A (6.4)
2nd Street NW @ Randolph Street NW (Stop Controlled)	WB = A (9.2)	WB = A (8.8)
2nd Street NW @ S Street NW (Stop Controlled)	WB = B (11.3)	WB = A (9.8)
Michigan Avenue NW @ North Capitol Street ¹	C (27.5)	C (30.7)

¹Analysis from previous McMillan and First Street Tunnel Traffic Study

4.4 2020 Background Traffic Volumes

Traffic volumes were developed for the 2020 background traffic condition. The year 2020 was selected since it represented the mid-point of the NEBT construction. The background traffic volumes were developed by utilizing a growth rate and incorporating any known developments that would impact traffic in the study areas. The growth rate was assumed to be 1% per year which is consistent with other studies throughout the District including the previously approved Northeast Boundary Neighborhood Protection Project Construction Staging Area Package and DDOT's 11th Street Bridge Corridor Project. The existing traffic volumes were multiplied by 1% per year for the seven years. The growth for each movement is shown in Figure A-7 for Study Area 1, Figure A-8 for Study Area 2 and Figure A-9 for Study Area 3 and located in Appendix A.

Proposed developments were identified that could impact traffic operations within the study year 2020. This list was developed based on information provided by DDOT, Chief Operating Officers, Directors of Facilities and Directors of Engineering. Additionally, further information was gathered from the Office of the Deputy Mayor for Planning and Economic Development (DMPED) to determine the level of development that was anticipated to occur during the study years. Table 4-5 lists the anticipated developments that will be completed, or under construction by the year 2020.

Table 4-5: Future Developments in Proximity to Study Area

Development	Size	Location
Catholic University		
Residential Apartments	562 units	Main Street between Michigan Avenue, Lawrence Street NE, 7th Street NE and 8th Street NE.
Retail	50,000 sf.	
VA Medical Center		
Research Office Building	100 employees	Intersection of First Street NW and Irving Street NW
Domiciliary Hospital	100 employees	
Howard University		
Dorm	800 beds	Intersection of 4th Street NW and W Street NW
Research Office Building	80,000 sf.	Intersection of Georgia Avenue NW and W Street NW
Howard Town Center		
Residential Apartments	450 units	Intersection of Georgia Avenue NW and V Street NW
Retail	75,000 sf.	
Envision McMillan		
Medical Office	1,054,000 sf.	Former McMillan Sand Filtration Plant
Residential Townhouses	160 units	
Residential Apartments	425 units	
Grocery Store	50,000 sf.	
Retail	30,000 sf.	
Community Center	17,000 sf.	
Air Force Retirement Home		
Office	179,200 sf.	Northwest quadrant of North Capitol Street and Irving Street NW intersection
Medical Office	290,000 sf.	
Retail	202,395 sf.	
Hotel	123 rooms	
Residential Condominiums	648 units	
Residential Apartments	543 units	
7th Street NW @ Rhode Island Avenue NW		
Retail	26,250 sf.	7th Street NW @ Rhode Island Avenue NW
Office	78,750 sf.	
UNCF Headquarters		
Residential Apartments	205 units	7th Street NW and S Street NW
Retail	22,000 sf.	
Office	93,000 sf.	
Gateway Market		
Residential Apartments	216 units	Florida Avenue NE and 4th Street NE
Retail	27,400 sf.	
NoMA: A group of developments including NPR Headquarters, Sentinel Square II, Camden NoMA Phase 1, Flats 130 Addition, Northwest One, Three Constitution Square, Hyatt Place, Archstone First and M, The Coliseum and 100 K Street		
Office	1,130,500 sf.	North of Massachusetts Avenue near K Street NE
Residential	2,080 units	

Union Market		
Grocery Store	25,000 sf.	1300 5th Street NE
Washington Gateway		
Residential Apartments	400 units	100 Florida Avenue NE
Hechts Redevelopment		
Retail	49,000 sf.	New York Avenue NE near Fenwick Street NE

An internal capture rate was calculated for the Envision McMillan, 7th at Rhode Island Avenue, UNCF and the Air Force Retirement Home developments based on EPA and ITE methodology. The worksheets associated with this calculation are included in Appendix E. The percentages utilized for transit were based on the Development Related Ridership Survey performed by WMATA. The trips generated by the developments are shown in Table 4-6.

Table 4-6: 2020 Background Trip Generation

Proposed Development	AM Enter	AM Exit	PM Enter	PM Exit
562 Apartments	67	150	150	109
50,000 sf. Retail	63	39	96	103
100 Employee Research Building	52	8	6	56
100 Employee Hospital Building	72	29	13	33
800 Bed Dorm	47	104	105	76
80,000 sf. Research Office	89	18	16	94
450 Apartments	53	118	119	86
75,000 sf. Retail (New Trips)	81	50	137	149
1,054,000 sf. Medical Office	1,711	455	561	1,444
160 Townhouses, 325 Apartments, 100 Senior Apartments	29	142	107	41
50,000 sf. Grocery Store	100	51	98	164
30,000 sf. Retail	40	24	47	51
17,000 sf. Community Center	23	12	23	24
290,650 sf. Medical Office; 179,200 sf. General Office	743	167	222	693
202,400 sf. Retail	136	85	254	262
543 Apartments; 648 condominiums	100	300	205	140
123 Room Hotel	35	25	38	40
26,250 sf. Retail	30	18	35	48
78,750 sf. Office	97	13	20	96
205 Apartments	12	37	19	15
22,000 sf. Retail	40	24	47	51
93,000 sf. Office	92	7	10	89
216 Dwelling Units, 27,400 sf. Retail	34	57	87	71
1,130,500 sf. Office	1,003	118	154	867
2,080 Dwelling Units	111	294	283	187
25,000 sf. Grocery Store	40	24	47	51
400 Dwelling Units	19	58	55	36
49,000 sf. Retail	27	16	60	65

Trips were generated for the different land uses associated with the proposed developments (dormitory, residential apartments, retail, general office, corporate headquarters and research office building) based on the ITE Trip Generation Handbook 9th Edition. The trip generation calculations are included in Appendix E.

DDOT provided traffic impact studies for the Gateway Market and the Hecht's redevelopment, which is located within the study area. The Gateway Market report included the NoMA, Union Market, and Washington Gateway developments as background traffic. Since these are approved studies, the trip generation and trip distribution were directly utilized for this report. The trip generation calculations for NoMA, Union Market and Washington Gateway are included in the Appendix on page 109 following the study.

The trips generated from these developments were assigned to the roadway network based on the existing travel patterns in the area. The assignment of the trips was based on several sources. This included the approved Gateway Market and Hecht's redevelopment reports and the Northeast Boundary Neighborhood Protection Project. The trip assignment matched exactly with those reports but since the study area was larger, trips were assigned based on existing travel patterns outside of the traffic impact study report boundaries. The individual assignment for each of these developments is included in Appendix E. The combined trips from all of these developments for Study Area 1 are shown in Figure A-10. The AM (PM) peak hour trips from the combined developments are depicted in Figure A-11 for Study Area 2. Figure A-12 is the combined development traffic for Study Area 3. Figures A-10 through A-12 are located in Appendix A.

For all three study areas the 2020 background traffic was developed by adding the 1% base growth and proposed combined development to the existing 2013 traffic volumes. Figure A-4, Figure A-5 and Figure A-6 respectively shows the 2013 traffic volumes for Study Areas 1, 2, and 3. Figure A-7, Figure A-8 and Figure A-9 respectively shows the 1% growth per year for Study Areas 1, 2, and 3. Figure A-10, Figure A-11 and Figure A-12 respectively shows the combined development traffic volumes for Study Areas 1, 2, and 3. Figure A-13, Figure A-14 and Figure A-15 respectively shows the total 2020 background traffic volumes. Figures A-4 through A-15 are located in Appendix A.

4.5 CSO 019 Construction Traffic Analysis

In December 2011, DC Water completed an analysis on existing roadways to support the estimated traffic volumes associated with the construction of the Anacostia River Tunnel from the CSO 019 site. This analysis was completed as part of the Surplus Property Disposal Package for the Anacostia River Tunnel and dated December 20, 2011. The analysis showed minimal changes in operation of Independence Avenue, C Street and Southeast Freeway at Barney Circle SE as a result of the construction volumes. Since mining for the NEBT will occur from the same site, the analysis was updated to the midpoint of NEBT construction to analyze potential impacts to the previously analyzed roadways.

Access to the construction site will be processed via a ramp from westbound C Street SE to a parking lot at RFK Stadium that provides access to RFK Stadium Access Road. The return movement will be made to Independence Avenue eastbound via a ramp from RFK Stadium Access Road. Both these ramps are presently gated which will need to be monitored when construction activities take place at CSO 019.

The second access to the construction site is where Southeast Freeway terminates/commences at Barney Circle SE. All traffic on to Southeast Freeway westbound turns right from Barney Circle SE and traffic on Southeast Freeway westbound make a left turn onto Barney Circle SE. No other movements occur at the intersection. The north leg of this intersection is the RFK Stadium Access Road which is gated. Table 4-7 reflects the construction trips generated for CSO 019.

Table 4-7: Trip Generation for the CSO 019 Site Mining Operations

Site	AM Enter	AM Exit	PM Enter	PM Exit
CSO 019	43	29		
CSO 019			29	43

In addition to the worker's trips, traffic data collection was conducted for the mainline of Independence Avenue, C Street SE and the Southeast Freeway/Barney Circle connection. The counts were performed in the AM and PM peak periods. The counts were grown by 1% per year to 2020 which represents an approximate year that the construction would take place. The 1% was the growth factor agreed to as part of the 11th Street Bridge Project which includes this area. The volumes are shown in Table 4-8.

Table 4-8: AM (PM) Peak Hour Volumes

Scenario	Southeast Freeway EB	Southeast Freeway WB	C Street SE WB	Independence Avenue EB
2014 Counts	205 (422)	528 (147)	3779 (939)	870 (4458)
2020 Projected Volumes	218 (448)	560 (156)	4010 (997)	923 (4731)
2020 With Construction	246 (469)	581 (184)	4039 (1019)	945 (4760)

4.5.1 Level of Service Analysis

Traffic analysis was performed using Highway Capacity Manual and Synchro software. The analysis for the intersection, mainline and ramp merges and diverges is shown in Table 4-9.

Table 4-9: AM (PM) Traffic Operations

Location	2014 Existing Conditions	2020 No-Build	2020 With Construction
Southeast Freeway @ RFK Access Road LOS AM(PM) [Delay]	N/A	N/A	C [20] (C [17])
Southeast Freeway WB LOS AM(PM) [Speed-mph]	A [39] (A [39])	A [39] (A [39])	A [38] (A [38])

Location	2014 Existing Conditions	2020 No-Build	2020 With Construction
Southeast Freeway EB LOS AM(PM) [Speed-[mph]	A [39] (A [38])	A [39] (A [38])	A [38] (A [38])
Independence Avenue EB LOS AM(PM) [Speed-[mph]	A [43] (B [35])	A [43] (B [35])	A [43] (B [35])
Independence Avenue EB Merge	N/A	N/A	A (D)
C Street WB LOS AM(PM) [Speed-[mph]	B [35] (A [43])	B [34] (A [42])	B [34] (A [42])
C Street WB Diverge	N/A	N/A	D (B)

The analysis identifies that with and without construction that there are only minimal changes in operation along Independence Avenue, C Street SE and the Southeast Freeway. No improvements are necessary to mitigate traffic during construction.

4.6 Study Area 1 Traffic Analysis

For the purposes of this analysis, it has been assumed that work at the Mt Olivet Road Shaft (MOR-S) and Mt Olivet Road Diversion (MOR-D) sites will occur simultaneously. This will require that the travel lanes along Mt Olivet Road NE be reduced from four to two lanes, closing an eastbound and westbound lane between West Virginia Avenue NE and Capitol Ave NE through the West Virginia Avenue NE intersection. Since construction is not occurring directly on the south side of the West Virginia Avenue intersection from Montello Avenue NE to West Virginia Avenue NE, the right most northbound lane will be converted from a through/right lane to a right turn only lane. Due to the construction at the Mt Olivet Road Diversion Site, there will only be one (1) receiving lane on Mt Olivet Road NE north and south of West Virginia Avenue NE. Conceptual Traffic Management Plans for Mt Olivet Road NE are provided in Appendix B.

This study area also includes the W Street site. It is not anticipated that any road or lane closures will be necessary to complete the work and therefore, traffic impacts associated with W Street have been excluded from this study. However, construction worker's trips for the site were included in the analysis.

DDOT identified critical intersections which required analysis as part of this study, which include:

- Florida Avenue NE @ 6th Street NE
- Florida Avenue NE @ 7th Street NE
- Florida Avenue NE @ 8th Street NE
- Florida Avenue NE @ West Virginia Avenue NE
- Mt Olivet Road NE @ 9th Street NE
- Mt Olivet Road NE @ Brentwood Road NE
- Mt Olivet Road NE @ Capitol Avenue NE
- Mt Olivet Road NE @ Trinidad Avenue NE
- New York Avenue NE @ Brentwood Parkway NE
- New York Avenue NE @ Fairview Avenue NE
- New York Avenue NE @ Kendall Street NE

- New York Avenue NE @ Fenwick Avenue NE
- West Virginia Avenue NE @ Fenwick Avenue NE
- West Virginia Avenue NE @ Mt Olivet Road NE

Figure A-16 found in Appendix A, further illustrates the locations of the study area intersections.

The construction trips were assigned to the roadway network for the Mt Olivet Road Shaft and Diversion sites and are shown in Figure A-17. The trip assignment for the W Street site is depicted in Figure A-18. The total traffic for Study Area 1 was generated by adding the background traffic (Figure A-13) and the construction traffic from the Mt Olivet Road sites (Figure A-17) and the W Street site (Figure A-18). The total volumes associated with this scenario are shown in Figure A-19. Table 4-10 depicts the trip generation for the construction workers. Figures A-13 and A-17 through A-19 are located in Appendix A.

Table 4-10: Study Area 1 Trip Generation (2020)

Location	AM Enter	AM Exit	PM Enter	PM Exit
Mt Olivet Road Shaft Site (MOR-S)	2	1	-	-
Mt Olivet Road Shaft Site (MOR-S)	-	-	1	2
Mt Olivet Road Diversion Site (MOR-D)	2	1	-	-
Mt Olivet Road Diversion Site (MOR-D)	-	-	1	2
W Street Site (WS)	5	1	-	-
W Street Site (WS)	-	-	1	5

4.6.1 Study Area 1 – Level of Service Analysis

Traffic volumes associated with the construction along Mt Olivet Road NE were analyzed to determine levels of service and delays associated with all intersections in the study area. The results of the analysis as reported from Synchro-HCM are shown in Table 4-11.

Table 4-11: Study Area 1 – Level of Service (Delay in seconds/vehicle)

AREA 1 - MT OLIVET ROAD SITE								
SYNCHRO – HCM LOS AND DELAY								
Intersection	2013		2020 Background		2020 Construction for MOR-S, and MOR-D,		2020 Construction for MOR-S, and MOR-D, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
Florida Avenue NE @ 6th Street NE	B (12.7)	C (32.7)	C (20.2)	E (62.9)	C (20.2)	E (62.9)	B (18.7)	E (62.4)
Florida Avenue NE @ 7th Street NE	A (1.7)	A (2.3)	A (1.7)	A (2.3)	A (1.7)	A (2.3)	A (1.7)	A (2.2)
Florida Avenue NE @ 8th Street NE	D (33.9)	B (18.9)	D (41.8)	C (20.9)	D (41.8)	C (20.9)	D (39.2)	C (20.5)
Florida Avenue NE @ West Virginia Avenue NE	C (26.6)	B (16.5)	C (28.0)	B (18.1)	C (27.2)	B (18.1)	C (24.7)	B (17.9)
West Virginia Avenue NE @ Mt Olivet Road NE	C (23.4)	D (38.1)	C (26.0)	D (54.5)	F (>100)	F (>100)	C (32.4)	C (30.2)
West Virginia Avenue NE @ Fenwick Avenue NE	B (10.5)	A (7.6)	B (11.2)	A (7.8)	B (11.2)	A (7.8)	B (10.5)	A (9.7)
Mt Olivet Road NE @ Brentwood Road NE	C (22.3)	C (30.3)	C (22.8)	C (31.3)	C (22.9)	C (31.6)	C (22.8)	C (32.6)
Mt Olivet Road NE @ Ramp to New York Avenue NE	B (15.1)	C (26.0)	B (16.3)	C (26.8)	B (16.9)	C (26.4)	B (16.4)	C (25.4)
Mt Olivet Road NE @ Capitol Avenue NE (stop controlled)	SB= B (10.7)	SB= B (10.9)	SB= B (10.8)	SB= B (11.1)	SB= C (22.4)	SB= C (20.8)	SB= C (17.5)	SB= B (12.0)
Mt Olivet Road NE @ Trinidad Avenue NE	A (7.4)	A (8.9)	A (7.7)	A (9.2)	B (11.6)	B (14.4)	B (10.1)	B (10.3)
New York Avenue NE @ Brentwood Parkway NE	A (8.9)	B (12.7)	A (9.5)	B (15.6)	A (9.5)	B (15.6)	A (9.5)	B (16.3)
New York Avenue NE @ Fairview Avenue NE	A (3.3)	C (23.7)	A (5.1)	D (39.1)	A (5.1)	D (39.1)	A (5.2)	D (47.7)
New York Avenue NE @ Kendall Street NE	B (13.4)	A (8.1)	B (16.8)	A (9.9)	B (16.8)	A (9.9)	B (16.6)	B (12.7)
New York Avenue NE @ Fenwick Avenue NE	A (8.2)	A (8.1)	A (12.7)	B (11.3)	A (12.8)	B (11.3)	A (12.3)	B (12.8)

1 For the purposes of this analysis, it was assumed that work at MOR-CSA1, and MOR-CSA2, will occur concurrently.

The intersection of West Virginia Avenue NE and Mt Olivet Road NE is the most adversely impacted due to the proposed construction activity at the Mt Olivet Road NE sites. The traffic analysis showed a failing level of service at this intersection due to the reduction to a single northbound and southbound lane along Mt Olivet Road. This intersection would be projected to operate at a LOS “F” for both the AM and PM peak hours with no improvements. The 2020 background level of service at this intersection (without

construction) is a “C” and “D” for the AM and PM peak hours, respectively. In order to mitigate the failing operations at the intersection during construction, the following improvements are proposed during construction:

- Restrict eastbound Mt Olivet Road NE traffic from turning left onto West Virginia Avenue NE.
- Restrict westbound Mt Olivet Road NE traffic from turning left onto West Virginia Avenue NE.
- Adjust signal timings at the Mt Olivet Road NE and West Virginia Avenue NE intersection to reduce delays.
- Adjust signal timing at the intersection of Mt Olivet Road NE and the Ramp to New York Avenue to accommodate the additional left turns from the detour.
- Restrict left turns in and out of Capitol Ave NE from Mt Olivet Road NE.

The traffic volume for the left turn from westbound Mt Olivet Road NE is relatively minor with slightly more than 50 vehicles in the AM peak hour and just over 10 vehicles in the PM peak hour. Despite the low volume, left turning motorists will block westbound through motorists while waiting to turn left at the intersection thus causing queuing and a reduction in traffic operations. Eastbound left turns are minor in the AM peak hour with just over 20 vehicles and a higher volume of 115 in the PM peak hour. As a result of the lane reduction during construction on eastbound Mt Olivet Road NE, similar traffic operations and queuing is expected in the PM peak hour as the westbound approach in the AM peak hour during construction. Therefore, eastbound and westbound left turning traffic was reassigned to detour routes. The westbound detour will follow Mt Olivet Road NE to Brentwood Parkway NE to Florida Avenue NE to West Virginia Avenue NE. The detour route assigned to the eastbound left turns will follow Mt Olivet Road NE to the Ramp to New York Avenue NE, eastbound on New York Avenue NE to Fenwick Street NE to West Virginia Avenue NE. The reassignment of the left turn movements are shown in Figure A-20. The reassigned traffic (Figure A-20) was added to the total construction traffic (Figure A-19) to produce the total reassigned traffic volumes with improvements. These are shown in Figure A-21. Appendix A includes Figures A-19 through A-21. The conceptual traffic management plans show the traffic detours and are located in Appendix B.

By implementing these improvements, the intersection it is predicted to function at a level of service “C,” for the AM and PM peak hours during construction.

4.6.2 Study Area 1 – Proposed Traffic Calming Measures

Traffic calming measures for the proposed detours routes during construction at the Mt Olivet Road NE sites were considered but not necessary due to the minimal amount of traffic being diverted and impact to these routes. The reassigned maximum volume is approximately 50 in the AM peak hour and 100 in the PM peak hour. Brentwood Parkway NE and 6th Street NE are a combination of commercial and industrial through the proposed detour with no residential properties along them. Florida Avenue NE through the proposed detour is a combination of residential and commercial and is a four (4) lane arterial roadway.

Projected queues were calculated from SimTraffic, 95th percentile queues for the intersection of Mt Olivet Road NE and West Virginia Avenue NE. The projected AM and PM peak hour queue lengths are shown in Table 4-12 and shown on diagrams in Appendix A. Increases in queuing distances along Mt Olivet Road NE are expected, but the elimination of the eastbound and westbound left turns in addition with

adjusted signal timings and offsets would assist in mitigating this issue. Diagrams showing AM and PM peak hour queues are located in Appendix A.

Table 4-12: Mt Olivet Road NE @ West Virginia Avenue NE Intersection Approach Queue Lengths

AREA 1 - MT OLIVET ROAD SITE								
SIMTRAFFIC 95th PERCENTILE QUEUES IN FEET								
Approach	2013		2020 Background		2020 Construction for MOR-CSA1, and MOR-CSA2,		2020 Construction for MOR-CSA1, and MOR-CSA2, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
EB Mt Olivet Road NE	LT=231 TR=242	LT=970 TR=986	LT=306 TR=276	LT=990 TR=994	LTR= 1593	LTR= >1 mile ¹	LTR=295	TR= 1277
WB Mt Olivet Road NE	LT=235 TR=231	LT=203 TR=215	LT=357 TR=347	LT=263 TR=270	LTR= >1mile ²	LTR= >1mile ²	LTR= 1485 ²	T=356
NB West Virginia Avenue NE	LT=163 TR=112	LT=391 TR=112	LT=189 TR=112	LT=442 TR=112	LT=186 TR=112	LT=386 TR=112	LT=156 TR=112	LT=625 TR=112
SB West Virginia Avenue NE	L=125 T=234 R=44	L=125 T=118 R=44	L=125 T=281 R=39	L=125 T=132 R=31	L=125 T=275 R=66	L=125 T=146 R=76	L=125 T=450 R=124	L=125 T=232 R=85

Approximate Queues:

1 – Queues Extend Through Brentwood Parkway NE

2 – Queues Extend Through Trinidad Avenue NE

As a result of lane reductions along Mt Olivet Road NE, motorists can expect an increase in travel time, speeds and delays along the corridor from east of Trinidad Avenue NE, through the construction staging areas to 9th Street NE. A travel time increase of approximately two (2) to five (5) minutes can be expected during construction. Motorist traveling westbound along Mt Olivet Road NE are expected to experience a longer travel time and lower speeds during the AM peak hour while eastbound motorist will experience a longer travel time and lower speeds during the PM peak period. Table 4-11 compares travel times, speeds and delays with and without construction for both peak hours along Mt Olivet Road NE.

Table 4-13: Study Area 1 Travel Times, Speeds and Delays

SimTraffic Arterial Travel Times, Speeds and Delays						
Scenario	Travel Time (min)		Speed (mph)		Delay (s/veh)	
	AM	PM	AM	PM	AM	PM
Without Construction ¹	WB = 3	EB = 4	WB = 14	EB = 9	127	151
With Construction ²	WB = 8	EB = 6	WB = 10	EB = 7	251	339

¹Based on Background Conditions

²Based on Construction with Improvements Conditions

4.7 Study Area 2

Work at the Rhode Island Avenue site will reduce the number of travel lanes on Rhode Island Avenue from six (6) to four (4) just east of the Reed Street NE/Washington Place NE intersection to west of the WMATA/ CSX railroad overpass. The two (2) center lanes (one (1) in each direction) and the median will be used for construction. Conceptual Traffic Management Plans for the Rhode Island Avenue site are located in Appendix B.

The 4th Street site will be located on 4th Street NE between Bryant Street NE and Rhode Island Avenue NE. One (1) southbound travel lane along 4th Street NE is proposed to be maintained during most of the construction at this site. The parking lanes adjacent to the 4th Street NE northbound and southbound travel lanes will be closed to accommodate construction. The southbound bicycle lane will be a shared lane with the southbound travel lane during construction. The travel lane will be aligned either to the west along the current southbound parking lane and the utility strip or to the east along the northbound parking lane depending on the phase of construction. Northbound 4th Street NE traffic will be detoured to northbound Lincoln Road NE located approximately 4 blocks west of 4th Street NE.

As part of the construction at the 4th Street site, work will be necessary along Rhode Island NE near the intersection of 4th Street NE. The construction will result in reducing Rhode Island Avenue NE one (1) lane in each direction. Two (2) lanes will be maintained during the construction along Rhode Island Avenue NE from east of 5th Street NE to west of 3rd Street NE. Conceptual traffic management plans for the 4th Street site are located in Appendix B. For this analysis, construction at the 4th Street NE Site and Rhode Island Avenue NE Site will take place simultaneously as requested by DDOT.

The option to detour traffic to northbound 3rd Street NE was considered and analyzed as an option for the northbound closure of 4th Street NE; however, under the recommendation of DDOT, Lincoln Road NE is being proposed as the preferred detour option as presented in this study.

In addition to the closures at the 4th Street NE site and Rhode Island Avenue site, it is proposed to convert a segment of 3rd Street NE to a northbound, one-way between Rhode Island Avenue NE and Bryant Street NE. This is being implemented as a requirement to maintain DC-FEMS access from 2225 5th Street NE Station to the Edgewood neighborhood and points north. Auto-turn analyses was conducted for three (3) intersections including Rhode Island Avenue NE to 3rd Street NE, 3rd Street NE to Bryant Street NE, and Bryant Street NE to 4th Street NE to determine if the emergency vehicles could execute the turns along the detour. The analysis concluded that all emergency vehicles are expected to execute the turns. Parking is proposed to be eliminated at the intersections to accommodate the turns. The Auto-turn diagrams are located in Appendix D. The speed hump located on Bryant Street NE between 3rd Street NE and 4th Street NE will need to be temporarily removed to accommodate effective DC-FEMS vehicles. From points north of Bryant Street NE, motorist traveling southbound on 3rd Street NE will have the option to turn right onto Bryant Street NE and left onto Lincoln Road NE to continue southbound.

DDOT identified critical intersections which required analysis as part of this study, which include:

- 4th Street NE @ Douglas Street NE
- 4th Street NE @ Bryant Street NE
- 4th Street NE @ Adams Street NE
- 4th Street NE @ W Street NE

- 4th Street NE @ V Street NE
- 4th Street NE @ Lincoln Road NE
- 5th Street NE @ W Street NE
- 5th Street NE @ V Street NE
- Franklin Street NE @ Lincoln Road NE
- Franklin Street NE @ 4th Street NE
- Franklin Street NE @ 7th Street NE
- Franklin Street NE @ 10th Street NE
- Franklin Street NE @ 12th Street NE
- Franklin Street NE @ 13th Street NE
- Franklin Street NE @ 14th Street NE
- Rhode Island Avenue NE @ Lincoln Road NE
- Rhode Island Avenue NE @ 4th Street NE
- Rhode Island Avenue NE @ 5th Street NE
- Rhode Island Avenue NE @ Shopping Center
- Rhode Island Avenue NE @ Reed Street NE
- Rhode Island Avenue NE @ 10th Street NE
- Rhode Island Avenue NE @ 12th Street NE
- Rhode Island Avenue NE @ 13th Street NE
- Rhode Island Avenue NE @ 14th Street NE
- Rhode Island Avenue NE @ Franklin Avenue NE

Area 2 intersections are included in Appendix A and shown in Figure A-22.

4.7.1 Study Area 2 – Level of Service Analysis

The trips generated by the construction workers were assigned to the roadway network. The trip assignment is shown in Figure A-23. The background traffic (Figure A-14) and the construction traffic (Figure A-23) were added together to develop the 2020 total traffic condition for Study Area 2. These volumes are depicted in Figure A-24. Figures A-14, A-23 and A-24 can be located in Appendix A. Table 4-13 shows the trip generation for the construction workers

Table 4-14: Study Area 2 Trip Generation (2020)

Location	AM Enter	AM Exit	PM Enter	PM Exit
Rhode Island Avenue Site RIA-CSA 1-5	2	1	-	-
Rhode Island Avenue Site RIA-CSA 1-5	-	-	1	2
4th Street Site 4S-CSA 1-4	2	1	-	-
4th Street Site 4S-CSA 1-4	-	-	1	2

The 2020 traffic volumes for Study Area 2 were analyzed to determine levels of service and delays associated with all intersections in the study area. The scenario analyzed assumed construction RIA-

CSA1 and the 4S-CSA2 will occur concurrently. This combination of construction along Rhode Island Avenue NE and 4th Street NE is the most traffic restrictive scenario for Study Area 2.

The results of the analysis for the 2020 background condition and the 2020 total traffic condition with construction are shown in Table 4-15.

Table 4-15: 4th Street and Rhode Island Avenue NE Level of Service (Delay in seconds/vehicle)

STUDY AREA 2 - 4th STREET NE SITE AND RHODE ISLAND AVENUE SITE								
SYNCHRO - HCM LOS AND DELAY								
Intersection	2013		2020 Background		2020 Construction For 4S CSA 2, and RIA-CSA1		2020 Construction For 4S CSA 2, and RIA-CSA1, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NE @ Lincoln Road NE	B (10.1)	B (14.6)	B (11.9)	B (16.2)	D (40.0)	C (26.3)	D(45.2)	C(25.7)
Rhode Island Avenue NE @ 4th Street NE	C (28.7)	B (14.1)	D (48.1)	B (16.0)	F (>100)	E (60.7)	F (84.1)	D (44.9)
Rhode Island Avenue NE @ 5th Street NE	A (4.7)	A (3.0)	A (7.3)	A (3.6)	A (6.6)	A (3.1)	A (5.7)	A (5.7)
Rhode Island Avenue NE @ Shopping Center	A (9.0)	B (12.2)	B (13.9)	B (12.5)	F (>100)	B (18.8)	F (88.2)	B (15.3)
Rhode Island Avenue NE @ Reed Street NE	C (20.9)	C (21.3)	C(22.6)	C (23.9)	E (78.8)	F (86.0)	C (23.2)	C (27.4)
Rhode Island Avenue NE @ 10th Street NE	B (14.2)	B (17.6)	C (32.5)	C (20.6)	F (>100)	E (64.5)	F (>100)	D (37.0)
Rhode Island Avenue NE @ 12th Street NE	B (19.7)	C (20.9)	C (23.5)	C (23.8)	C (22.4)	C (21.8)	B (17.8)	C (28.3)
Rhode Island Avenue NE @ 13th Street NE	B (11.3)	B (12.4)	B (11.9)	B (13.4)	B (12.3)	B (13.6)	B (12.3)	B (12.6)
Rhode Island Avenue NE @ 14th Street NE	B (15.4)	B (15.1)	B (18.0)	C (25.6)	C (18.8)	C (25.6)	B (18.0)	C (23.3)
Rhode Island Avenue NE @ Franklin Avenue NE	B (22.8)	C (20.4)	D (54.0)	E (61.4)	E (62.8)	E (71.4)	E (73.0)	C (27.4)
4th Street NE @ Douglas Street NE	A (6.7)	B (17.3)	A (6.7)	B (19.3)	A (8.4)	B (10.3)	A (6.4)	A (9.2)
4th Street NE @ Bryant Street NE	A (7.4)	A (7.9)	A (7.6)	A (8.4)	B (10.3)	B (10.8)	A (9.4)	B (10.0)
4th Street NE @ Adams Street NE (Stop Controlled)	EB= B (14.1)	EB= B (13.6)	EB= C 15.8)	EB= C (15.6)	EB= B(14.5)	EB= B(12.6)	EB= B(14.5)	EB= B(12.3)

STUDY AREA 2 - 4th STREET NE SITE AND RHODE ISLAND AVENUE SITE								
SYNCHRO - HCM LOS AND DELAY								
Intersection	2013		2020 Background		2020 Construction For 4S CSA 2, and RIA-CSA1		2020 Construction For 4S CSA 2, and RIA-CSA1, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
4th Street NE @ W Street NE (Stop Controlled)	WB= B (12.3)	EB= B (13.0)	WB= B (12.3)	EB= B (13.7)	WB= B (12.3)	EB= B (13.0)	WB= B (12.3)	EB= B (13.0)
4th Street NE @ V Street NE (Stop Controlled)	SB= A (8.0)	EB= B (11.0)	SB= A (8.2)	EB= B (11.7)	NB= A (8.7)	EB= B (11.2)	NB= A (8.7)	EB= B (11.2)
4th Street NE @ Lincoln Road NE	B (16.9)	C (30.4)	B (17.1)	C (31.0)	B (14.8)	C (32.0)	A (7.1)	B (10.5)
5th Street NE @ W Street NE (Stop Controlled)	EB= A (9.7)	WB= A (9.8)	EB= A (9.8)	WB= A (9.9)	EB= A (9.8)	WB= B (10.3)	EB= A (9.8)	WB= B (10.3)
5th Street NE @ V Street NE (Stop Controlled)	EB= A (7.5)	EB= A (7.7)	EB= A (7.7)	EB= A (7.9)	EB= A (7.7)	EB= A (8.0)	EB= A (7.7)	EB= A (8.0)
Franklin Street NE @ Lincoln Road NE	E (56.1)	C (20.3)	F (>100)	C (27.1)	F (>100)	D (46.2)	E (79.0)	C (31.3)
Franklin Street NE @ 4th Street NE	C (26.2)	E (66.2)	E (71.4)	F (>100)	E (62.4)	C (24.4)	D (39.4)	B (16.2)
Franklin Street NE @ 7th Street NE	C (30.1)	B (12.3)	D (52.3)	B (13.6)	D (45.4)	C (22.0)	D (45.4)	C (22.0)
Franklin Street NE @ 10th Street NE	B (17.2)	B (15.4)	B (18.6)	C (24.5)	B (18.8)	C (21.8)	B (18.8)	C (22.9)
Franklin Street NE @ 12th Street NE	C (29.3)	C (25.2)	F (83.5)	D (37.8)	F (87.2)	E (56.9)	F (85.3)	E (56.9)
Franklin Street NE @ 13th Street NE	C (26.9)	C (23.1)	D (36.1)	D (44.4)	D (36.1)	D (50.8)	D (42.5)	D (50.8)
Franklin Street NE @ 14th Street NE	B (15.1)	C (24.3)	B (16.3)	C (28.2)	B (16.3)	C (28.2)	B (15.2)	C (28.2)

1 For the purposes of this analysis, it was assumed that work at the 4th Street NE CSA-2 and Rhode Island Avenue NE CSA-1 will occur concurrently.

The projected queues were determined for the intersections of Rhode Island Avenue NE and 4th Street NE, Rhode Island Avenue NE and Reed Street NE, and Rhode Island Avenue NE @ Lincoln Road NE. The queues are depicted in Table 4-16.

Table 4-16: Rhode Island Avenue NE @ 4th St. NE and @ Reed St. NE Approach Queue Lengths

4th Street NE Site and Rhode Island Avenue NE Site								
95th Percentile Queues in Feet								
Approach	2013		2020 Background		2020 Construction For 4S CSA 2, and RIA-CSA1,		2020 Construction For 4S CSA 2, and RIA-CSA1, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NE @ 4th Street NE								
EB Rhode Island Avenue NE	L=95 T=108 TR=50	L=95 T=587 TR=595	L=95 T=206 R=89	L=95 T=1900 TR=1900	T=136 ¹ TR=139 ¹	T=>1mile ¹ TR=>1mile ¹	T=268 ¹ TR=250 ¹	T=2370 ¹ TR=2370 ¹
WB Rhode Island Avenue NE	L=75 T=1400 R=1400	L=75 T=157 TR=67	L=75 T=2130 R=2130	L=75 T=233 TR=72	T=>1mile ²	T=>1mile ²	T=109 ²	T= 90 ²
NB 4th Street NE	LT=70 R=45	LT=142 R=117	LT=83 R=48	LT=148 R=134	LT=107 R=51	LT=228 TR=144	LT=105 R=40	LT=183 R=17
SB 4th Street E	L=486 TR=486	L=700 TR=700	LT=850 TR=850	LT=860 TR=860	LTR=1273	LTR=3238	LTR=1770	LTR=2400
Rhode Island Avenue NE @ Reed Street/Metro Entrance NE								
EB Rhode Island Avenue NE	LT=264 T=280 TR=193	LT=537 T=656 TR=593	LT=359 T=382 TR=313	LT=550 T=660 TR=730	T=521 TR=558	T=>1mile ³ TR=>1mile ³	T=376 TR=441	T=1816 ³ TR=1816 ³
WB Rhode Island Avenue NE	L=167 T=105 TR=139	L=200 T=275 TR=86	L=200 T=298 TR=312	L=176 T=287 TR=134	L=200 T=>1mile ³ TR=>1mile ³	L=200 T=714 TR=714	L=200 T=>1mile ³ TR=>1mile ³	L= 200 T=1400 ³ TR=1400 ³
NB Metro Entrance	L=50 T=50 R=287	L=50 T=293 R=196	L=50 T=50 R=857	L=50 T=750 R=202	L=50 T=50 R=542	L=50 T=477 R=193	L=50 T=50 R=870	L=50 T=852 R=852
SB Reed Street NE	LTR=84	LTR=97	LTR=100	LTR=69	LTR=142	LTR=125	LTR=147	LTR=98
Rhode Island Avenue NE @ Lincoln Road NE								
EB Rhode Island Avenue NE	LT=159 TR=147	LT=192 T=184 TR=179	LT=167 TR=179	LT=331 T=334 TR=346	L=250 T=893 TR=693	L=300 T=> 1 mile TR=> 1 mile	L=109 T=120 TR=137	L=278 T=506 TR=510
WB Rhode Island Avenue NE	LT=24 T=53 TR=68	LT=45 TR=66	LT=14 T=61 TR=78	LT=65 TR=83	LT=66 T=87 TR=121	LT=575 T=632 TR=100	LT=108 T=3137 TR=137	LT=319 T=373 TR=100

4th Street NE Site and Rhode Island Avenue NE Site								
95th Percentile Queues in Feet								
Approach	2013		2020 Background		2020 Construction For 4S CSA 2, and RIA-CSA1,		2020 Construction For 4S CSA 2, and RIA-CSA1, with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM
NB Lincoln Road NE	LT=92 TR=69	LT=136 TR=150	LT=124 TR=99	LT=157 TR=176	LT=121 TR=99	LT=753 TR=793	LT=134 TR=100	LT=229 TR=259
SB Lincoln Road NE	LTR=208	LTR=303	LTR=331	LTR=301	LTR=582	LTR=488	LTR=616	LTR=388

1 – Queues Measured from 4th Street NE Intersection

2 – Queues begin and are measured from the Rhode Island NE/Shopping Center Intersection

3 – Queues Measured from the Reed Street NE/Washington PI NE Intersection

The two (2) primary intersections of concern in this analysis area are Rhode Island Avenue NE at 4th Street NE and at Reed Street NE. Construction activities will eliminate the southbound lane on 4th Street NE between Bryant Street NE and Rhode Island Avenue NE and reduce one (1) lane in each direction along Rhode Island Avenue NE from west of 4th Street NE to the east of 10th Street NE. The Rhode Island Avenue NE at 4th Street NE intersection showed a level of service reduction due to construction activities. During construction and without implementing improvements, the level of service decreased to an “F” for the AM peak hour and an “E” for the PM peak hour. The 2020 background level of service at the intersection (without construction) operates at a level of service “D” and “B” for AM and PM peak hours, respectively.

A level of service “E” is anticipated at the intersection of Rhode Island Avenue NE and Reed Street NE, with construction during the AM peak hour and “F” during the PM peak hour. The 2020 background level of service at this intersection is expected to be a “C” in the AM and PM peak hours. Increases in queuing distances along Rhode Island Avenue are expected during construction. The Rhode Island Avenue NE Shopping Center intersection which operates at a LOS “F” in the AM peak hour is where the queuing is expected to begin westbound in the AM peak hour and extends through the Reed Street NE intersection. In the PM peak hour eastbound queues are expected to begin from the Reed Street NE intersection and extend through the 4th Street NE intersection. The adjusted signal timings and offsets in addition to restricting eastbound left turns at the Reed Street NE, 10th Street NE and eastbound/westbound left turns at 4th Street NE are being proposed to mitigate this issue and improve operations to a level of service “C” at the Reed Street NE intersection. Diagrams showing AM and PM peak hour queues are located in Appendix A.

From field observations of this intersection, significant queues form along Rhode Island Avenue eastbound in the PM peak period. Several factors contribute to this queuing downstream of the Reed Street NE intersection, including a bus stop at 10th Street that impacts the right most lane and left turning motorists that block the left most lane. This bus stop location leaves only the center lane continuously open. Other factors affecting queuing include the signal timing offsets between the Reed Street intersection and the 10th Street NE intersection. Eastbound motorists receiving the green at Reed Street NE have to stop at the 10th Street NE intersection. It is recommended during the construction that the bus stop be moved to the far side of the intersection. It would also be preferred to restrict the eastbound left turn at the Reed Street NE and 10th Street NE intersections.

To assist in mitigating the reductions in the level of service at the intersections during construction of the 4th Street NE site and Rhode Island Avenue NE site, the following improvements are proposed:

- Adjust signal timings and offsets at the intersections along Rhode Island Avenue NE to reduce delays.
- Adjust signal timings and offsets at the intersection of 4th Street NE and Bryant Street NE to reduce delays.
- Remove the median on the west leg of Rhode Island Avenue NE at Lincoln Road NE to create an eastbound left turn bay. This will accommodate the additional left turns due to the northbound 4th Street NE detour from a queuing and safety standpoint.
- Reconstruct the signal at the intersection of Rhode Island Avenue NE and Lincoln Road NE to add a left turn phase for the eastbound left turn movement on Rhode Island Avenue NE.
- Eliminate left turn movements along eastbound Rhode Island Avenue NE at the intersections of Reed Street NE and 10th Street NE.
- Adjust signal timings at the Reed Street NE intersection.
- Eliminate eastbound and westbound left turn movements at the Rhode Island Avenue NE and 4th Street NE intersection during appropriate phases.

Implementing these mitigation measures in the model improves the level of service to a “D” for the PM peak hour during construction at the Rhode Island Avenue NE and 4th Street intersection. Even though the level of service remains at an “F” during the AM peak hour, overall queues are expected to be slightly better when implementing the improvements. The Rhode Island Avenue NE and Reed Street NE intersection improves to a LOS “C” in both AM and PM peak hours with implementing the improvements.

Conceptual traffic management plans showing detours and phasing for the 4th Street NE and Rhode Island Avenue sites are located in Appendix B.

Motorists along Rhode Island Avenue NE through the study area are expected to experience increased travel times during construction. It is anticipated that it will take motorist approximately 5-12 additional minutes to travel through the corridor during the AM and PM peak hours. Lower speeds are expected along the Rhode Island Avenue NE corridor during construction. Speeds will decrease by 5 mph during the AM peak direction and by 4 mph in the PM peak direction. A comparison of travel times, speeds and delays with and without construction is detailed in Table 4-17.

Table 4-17: Study Area 2 - Rhode Island Avenue Travel Times and Speeds

SimTraffic Arterial Travel Times, Speeds and Delays						
Scenario	Travel Time (min)		Speed (mph)		Delays (s/veh)	
	AM	PM	AM	PM	AM	PM
Without Construction ¹	WB = 13	EB = 11	WB = 11	EB = 13	508	494
With Construction ²	WB = 25	EB = 13	WB = 7	EB = 9	1147	556

¹Based on Background Conditions

²Based on Construction with Improvements Conditions

4.7.2 Study Area 2 – Proposed Traffic Calming Measures

In addition to the proposed mitigation measures, traffic calming was investigated for traffic being diverted onto residential detour routes. The preferred northbound detour for 4th Street NE is Lincoln Road NE which is bound by a cemetery to the west and a cemetery with residential units to the east. The closest signalized intersection on Lincoln Road NW from Rhode Island Avenue NW is approximately a half of a mile to the north at Franklin Street NW. An option to reduce speeds along Lincoln Road through the northbound detour would be installing speed cameras on northbound Lincoln Road NW.

Northbound 3rd Street NE is proposed to be converted to a one-way section from Rhode Island Avenue NE to Bryant Street NE. Southbound Bryant Street NE traffic will be detoured left to Bryant Street NE and right to southbound 4th Street NE.

4.8 Study Area 3

The T Street site will be located at the intersection of T Street NW and Rhode Island Avenue NW. The construction at TS-CSA1 will require T Street NW between First Street NW and 2nd Street NW to be closed along Rhode Island Avenue NW. Two (2) travel lanes along Rhode Island Avenue NW from First Street NW to 2nd Street NW, one (1) eastbound and one (1) westbound will be closed and parking restricted during the construction at TS-CSA2. Rhode Island Avenue NW will be reduced to two (2) lanes in the eastbound direction only when construction at TS-CSA3 occurs. Appendix B contains conceptual traffic management plans for the T Street NW site.

The Florida Avenue site will be located along Florida Avenue NW between Rhode Island Avenue NW and 3rd Street NW. The construction at FLA-CSA1, FLA-CSA2 and FLA-CSA3 will require a reduction in travel lanes along Rhode Island Avenue NW and Florida Avenue NW. It will also require the closure of 3rd Street NW. Construction at FLA-CSA1 will require the closure of 3rd Street NW in the southbound direction under one (1) phase and total closure during a subsequent phase. During the southbound closure of 3rd Street NW, traffic will be detoured along Rhode Island Avenue NW to 2nd Street NW. Northbound 3rd Street NW will be detoured along 2nd Street NW during the total closure. Four (4) lanes of traffic along Florida Avenue NW will be maintained when 3rd Street NW is completely closed between Florida Avenue NW and Rhode Island Avenue NW. The construction at FLA-CSA2 will require Florida Avenue NW to maintain one (1) lane westbound between 2nd Street NW and Rhode Island Avenue NW and one (1) lane eastbound between New Jersey Avenue NW and 3rd Street NW. During the construction at FLA-CSA3, the elimination of the parking lanes and reduction to two (2) travel lanes, one (1) in both directions along Rhode Island Avenue NW between 2nd Street NW and Florida Avenue NW is required. Construction reducing lanes along Rhode Island Avenue NW and Florida Avenue NW are prohibited to happen concurrently in the RFP documents. Conceptual traffic and management plans outline the phases of construction and are located in Appendix B.

The R Street site will be located at the intersection of Rhode Island Avenue NW, R Street NW and 6th Street NW. Construction at the R Street site will close one (1) eastbound travel lane along Rhode Island Avenue NW between 6th Street NW and 7th Street NW and two (2) travel lanes, one (1) in each direction along 6th Street NW from Rhode Island Avenue NW to south of R Street NW. R Street NW between Rhode Island Avenue NW and 6th Street NW will be closed during construction at RS-CSA1 and RS-CSA2. R Street NW vehicular and bicycle traffic will be detoured south along 6th Street NW, west along P Street NW and north along 7th Street NW. The traffic signal at the intersection of R Street NW and

Rhode Island Avenue NW will be taken out of service during construction when R Street NW is closed. R Street NW will be open upon completion of RS-CSA2 but parking will be restricted to allow for vehicular and bicycle traffic for the remaining construction at RS-CSA1. Conceptual traffic management plans for the R Street site are included in Appendix B.

There are three additional sites of construction within Study Area 3. These include the Michigan Avenue site, the Channing Street site, and the Pumping Station Site. The Michigan Avenue site is located along North Capitol Street just south of Michigan Avenue NE. The construction at all three (3) of these sites will occur during off peak traffic hours and require North Capitol Street to be reduced to two (2) lanes northbound and one (1) lane southbound between Girard Street NE to Michigan Avenue. The Channing Street site is located along First Street NW between Channing Street NW and McMillan Drive NW. The closure of First Street NW in the northbound direction will be necessary between Channing Street NW and McMillan Drive NW for the construction at CS-CSA2. This scenario was analyzed for the future year 2016 as part of the First Street tunnel project traffic study prepared and dated April 2013. The Pumping Station site is located along First Street NW between Rhode Island Avenue NW and Thomas Street NW. Construction at PS-CSA3 will require northbound First Street NW between Rhode Island Avenue NW and Thomas Street NW to be closed. Northbound traffic will be detoured to 2nd Street NW. Conceptual traffic management plans are located in Appendix B.

DDOT identified critical intersections which required analysis as part of this study. This includes:

- 2nd Street NW @ Randolph Street NW
- 2nd Street NW @ S Street NW
- 6th Street NW @ P Street NW
- 6th Street NW @ Q Street NW
- 6th Street NW @ R Street NW
- 6th Street NW @ S Street NW
- 7th Street NW @ P Street NW
- 7th Street NW @ Q Street NW
- 7th Street NW @ R Street NW
- Florida Avenue NW @ First Street NW
- Florida Avenue NW @ 2nd Street NW
- Florida Avenue NW @ 3rd Street NW
- Florida Avenue NW @ 4th Street NW
- Florida Avenue NW @ 6th Street NW
- Florida Avenue NW @ 7th Street NW
- Florida Avenue NW @ New Jersey Avenue NW
- New Jersey Avenue NW @ R Street NW
- New Jersey Avenue NW @ S Street NW
- Rhode Island Avenue NW @ First Street NW
- Rhode Island Avenue NW @ 2nd Street NW
- Rhode Island Avenue NW @ 3rd Street NW
- Rhode Island Avenue NW @ New Jersey Avenue NW
- Rhode Island Avenue NW @ 6th Street NW
- Rhode Island Avenue NW @ 7th Street NW
- Rhode Island Avenue NW @ Florida Avenue NW

- Rhode Island Avenue NW @ R Street NW

Study Area 3 intersections are shown in Figure A-25 located in Appendix A.

The construction traffic generated by the workers was assigned to the roadway network. These volumes are shown in Figure A-26. Traffic was reassigned due to the R Street NW closure. The reassignment is shown in Figure A-27. During the 3rd Street NW southbound closure from Rhode Island Avenue NW to Florida Avenue NW, traffic is detoured and reassigned. The reassignment is depicted in Figure A-28. The 2020 background traffic for Study Area 3 (Figure A-15), the construction traffic (Figure A-26), the reassigned traffic for the R Street NW closure (Figure A-27), and the reassigned traffic for the 3rd Street southbound closure (Figure A-28) were combined to develop the 2020 total traffic volumes. These volumes for scenario 1 are depicted in Figure A-29. Located in Appendix A are Figures A-15 and A-26 through A-28.

The total closure of 3rd Street NW between Rhode Island Avenue NW and Florida Avenue NW requires traffic to be detoured and reassigned through the study area network. The reassignment of traffic is shown in Figure A-30. The total volumes are developed by combining the background traffic (Figure A-15), the construction traffic (Figure A-26), the reassigned traffic due to the total closure of 3rd Street NW between Rhode Island Avenue NW and Florida Avenue NW (Figure A-30) and the reassigned traffic due to the closure of R Street NW between 6th Street NW and Rhode Island Avenue NW (Figure A-27). The 2020 total volumes for scenario 2 are depicted in Figure A-31.

Table 4-18 shows the trip generation for the construction workers.

Table 4-18: Study Area 3 Trip Generation (2020)

Location	AM Enter	AM Exit	PM Enter	PM Exit
T Street Site TS-CSA 1-3	2	1	-	-
T Street Site TS-CSA 1-3	-	-	1	2
Florida Avenue Site FLA-CSA 1-3	2	1	-	-
Florida Avenue Site FLA-CSA 1-3	-	-	1	2
R Street Site RS-CSA 1-2	5	1	-	-
R Street Site RS-CSA 1-2	-	-	1	5

4.8.1 Study Area 3 – Level of Service Analysis

The 2020 traffic volumes associated with the construction at the T Street site, Pumping Station site, Florida Avenue site and R Street site were analyzed to determine levels of service and delays associated with all intersections in Study Area 3. The analysis was broken into four (4) scenarios. Scenario 1 analysis assumed one (1) lane each direction of Florida Avenue NW and 3rd Street NW southbound lane closed with detoured traffic to 2nd Street NW. Scenario 1 also includes the closure of R Street NW with

detoured traffic to northbound 7th Street NW and Rhode Island Avenue NW reduced to two (2) lanes between Marion Street NW and 6th Street NW. Scenario 2 assumed the total closure of 3rd Street NW with traffic detoured to 2nd Street NW and Rhode Island Avenue reduced to two (2) lanes in each direction from First Street NW to Florida Avenue NW. The analysis results for Scenario 1 and Scenario 2 are depicted in Table 4-19.

Table 4-19: Study Area 3 – Level of Service Comparison (Delay in seconds/vehicle)

Synchro HCM LOS(Delay)												
STUDY AREA 3 - Florida Avenue NW/Rhode Island Avenue NW Diversions												
Intersection	2013		2020 Background ¹		2020 Construction Scenario 1		2020 Construction Scenario 1 with Improvements		2020 Construction Scenario 2		Construction Scenario 2 with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NW @ 7th Street NW	A (9.4)	B (11.1)	B (11.4)	B (19.3)	B (18.2)	C (25.6)	B (12.4)	C (24.1)	B (11.4)	B (19.3)	B (13.0)	B (18.4)
Rhode Island Avenue NE @ R Street NW	A (5.5)	A (8.4)	A (5.7)	A (3.6)	N/A	N/A	N/A	N/A	A (7.2)	A (9.3)	A (4.4)	A (9.5)
Rhode Island Avenue NW @ 6th Street NW	A (9.7)	B (17.3)	B (12.2)	C (21.1)	B (14.6)	F (85.8)	B (14.3)	C (21.5)	B (11.6)	F (85.9)	B (12.8)	B (19.2)
Rhode Island Avenue NW @ New Jersey Avenue NW	B (14.1)	B (14.9)	B (18.2)	C (21.8)	B (13.7)	C (22.8)	B (19.3)	C (22.9)	B (16.3)	B (18.2)	C (21.7)	C (24.7)
Rhode Island Avenue NE @ Florida Avenue NW	A (9.4)	C (20.1)	B (15.3)	A (8.6)	C (28.9)	E (73.5)	C (24.1)	B (15.4)	D (44.0)	B (16.9)	C (22.2)	B (12.6)
Rhode Island Avenue NW @ 3rd Street NW	A (3.8)	A (5.6)	A (3.4)	A (4.3)	A (2.7)	A (2.7)	A (1.7)	A (3.4)	A (6.5)	A (7.5)	A (4.9)	A (1.7)

Synchro HCM LOS(Delay)												
STUDY AREA 3 - Florida Avenue NW/Rhode Island Avenue NW Diversions												
Intersection	2013		2020 Background ¹		2020 Construction Scenario 1		2020 Construction Scenario 1 with Improvements		2020 Construction Scenario 2		Construction Scenario 2 with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NW @ 2nd Street NW	A (6.8)	A (9.9)	A (8.4)	A (5.6)	A (8.8)	A (7.0)	A (4.4)	A (9.3)	F (>100)	E (59.1)	D (50.6)	B (19.7)
Rhode Island Avenue NW @ First Street NW	B (19.9)	B (13.4)	C (28.2)	B (18.3)	C (28.2)	C (21.2)	C (22.3)	C (21.4)	C (21.7)	B (14.3)	C (21.6)	B (13.8)
Florida Avenue @ 7th Street NW	C (29.5)	C (25.2)	C (24.2)	C (23.9)	C (24.1)	C (23.9)	C (27.2)	C (24.2)	C (24.7)	C (24.6)	C (24.2)	C (20.7)
Florida Avenue @ 6th Street NW	B (18.6)	B (15.8)	B (11.2)	B (10.7)	B (11.6)	B (14.2)	A (6.7)	B (11.6)	B (11.5)	B (10.8)	B (11.5)	A (8.8)
Florida Avenue @ New Jersey Avenue NW	C (23.6)	B (18.3)	D (36.8)	C (23.2)	E (60.2)	C (36.2)	C (30.3)	C (22.5)	D (44.0)	C (25.1)	C (28.2)	C (25.7)
Florida Avenue @ 4th Street NW	A (7.1)	B (10.7)	A (9.6)	A (9.1)	B (10.7)	B (14.3)	A (9.5)	A (9.2)	A (9.5)	A (8.8)	A (8.6)	A (8.5)
Florida Avenue @ 3rd Street NW	B (14.4)	B (17.8)	B (16.9)	B (10.8)	A (9.0)	A (8.6)	A (6.1)	A (9.0)	A (4.1)	A (7.6)	A (1.9)	A (8.0)
Florida Avenue @ 2nd Street NW (Stop Controlled)	SB=B (13.4)	SB=C (17.3)	SB=B (12.9)	SB=B (14.5)	SB=F (65.5)	SB=F (53.6)	SB=F (65.5)	SB=F (53.6)	SB=D (31.6)	SB=D (27.1)	SB=C (23.0)	SB=D (27.1)

Synchro HCM LOS(Delay)												
STUDY AREA 3 - Florida Avenue NW/Rhode Island Avenue NW Diversions												
Intersection	2013		2020 Background ¹		2020 Construction Scenario 1		2020 Construction Scenario 1 with Improvements		2020 Construction Scenario 2		Construction Scenario 2 with Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Florida Avenue @ First Street NW	C (24.9)	B (19.9)	B (17.8)	B (13.8)	B (14.5)	B (18.7)	B (15.2)	B (15.4)	B (14.1)	B (12.6)	A (6.9)	B (12.7)
7th Street @ R Street NW	B (16.6)	C (15.7)	B (17.8)	B (19.5)	B (15.8)	C (21.7)	B (10.3)	A (7.6)	B (18.2)	B (15.7)	B (16.3)	B (13.0)
7th Street @ Q Street NW	A (6.4)	A (8.4)	A (7.4)	A (8.6)	A (6.4)	A (7.7)	A (7.2)	A (7.0)	A (7.4)	A (8.6)	A (7.2)	A (9.3)
7th Street @ P Street NW	B (11.2)	B (15.8)	B (11.7)	B (17.5)	C (24.5)	B (19.7)	B (18.5)	B (17.4)	B (11.6)	B (17.5)	B (14.6)	B (16.2)
6th Street @ S Street NW	C (26.6)	C (24.6)	B (14.8)	C (22.0)	B (15.9)	C (22.4)	C (24.7)	C (21.8)	B (15.3)	C (21.5)	B (20.0)	C (20.9)
6th Street @ R Street NW	B (12.5)	B (11.7)	A (9.3)	B (11.2)	A (9.8)	B (12.1)	B (10.5)	B (12.1)	A (9.9)	B (13.0)	B (10.8)	B (12.2)
6th Street @ Q Street NW	A (8.2)	B (11.1)	A (9.4)	A (6.6)	A (9.2)	A (5.5)	A (3.8)	A (6.8)	B (10.8)	A (6.5)	A (3.4)	A (7.3)
6th Street @ P Street NW	B (12.6)	B (17.1)	B (12.7)	B (13.6)	B (16.1)	B (16.6)	B (14.0)	B (15.3)	B (12.7)	B (13.2)	B (12.9)	B (13.3)
New Jersey Avenue @ S Street NW	A (9.0)	A (10.6)	B (14.9)	A (5.6)	B (14.2)	A (5.7)	B (11.2)	B (11.0)	B (14.7)	A (5.7)	A (10.6)	A (6.3)
2nd Street NW @ Randolph Street NW (Stop Controlled)	WB=A (9.2)	WB=A (8.8)	WB=A (9.2)	WB=A (8.8)	WB=A (9.9)	WB=A (9.2)	WB=A (9.8)	WB=A (9.2)	WB=A (10.3)	WB=A (9.8)	WB=A (10.3)	WB=A (9.8)
2nd Street NW @ S Street NW (Stop Controlled)	WB=B (11.3)	WB=A (9.8)	WB=B (11.4)	WB=B (10.0)	WB=B (12.8)	WB=B (10.3)	WB=B (13.0)	WB=B (10.3)	WB=B (14.3)	WB=B (11.0)	WB=B (14.2)	WB=B (11.4)

Synchro HCM LOS(Delay)													
STUDY AREA 3 - Florida Avenue NW/Rhode Island Avenue NW Diversions													
Intersection	2013		2020 Background ¹		2020 Construction Scenario 1		2020 Construction Scenario 1 with Improvements		2020 Construction Scenario 2		Construction Scenario 2 with Improvements		
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
Michigan Avenue NW @ North Capitol Street ²	C (27.5)	C (30.7)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- 1 For the purposes of this analysis, signalized intersections were optimized under the 2020 Background condition to allow traffic to enter the network. The same optimization was used for the construction scenarios.
- 2 Analysis from previous McMillan and First Street Tunnel Traffic Study Dated March 2013

The projected queues were determined for various intersections. The queues are depicted in Table 4-20. AM and PM peak hour queues are shown on diagrams in Appendix A.

Table 4-20: Florida Avenue NW/ R Street NW/ Rhode Island Avenue NW Approach Queue Lengths

Florida Avenue NW/R Street NW/Rhode Island Avenue NW Diversions													
SimTraffic 95th Percentile Queues in Feet													
Approach	2013		2020 Background		2020 Scenario 1 Construction		2020 Scenario 1 w/Improvements		2020 Scenario 2 Construction		2020 Scenario 2 w/Improvements		
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
Rhode Island Avenue NW and Florida Avenue NW Intersection													
EB Rhode Island Avenue NW	T=42 TR=5	T=342 TR=386	T=752 TR=752	T=491 TR=528	T=1527 TR=1527	T=641 TR=641	T=1316 TR=1316	T=109 TR=116	T=1106 TR=1106	T=> TR=> >1mile TR=> >1mile	T=893 TR=893	T=> TR=> >1mile	
WB Rhode Island Avenue NW	T=2700 TR=2700	T=274 TR=384	T=> TR=> >1mile	T=4100 TR=4100	T=> TR=> >1mile	T=> TR=> >1mile	T=> TR=> >1mile	T=4900 TR=4900	T=> TR=> >1mile	T=> TR=> >1mile	T=> TR=> >1mile	T=2200 TR=2200	
NB Florida Avenue NW	LT=252 TR=239	LT=353 TR=369	LT=691 TR=691	LT=503 TR=503	L=40 TR=> >1mile	L=44 TR=> >1mile	LT=970 TR=970	LT=560 TR=560	LT=642 TR=642	LT=567 TR=567	LT=1065 TR=1065	LT=250 TR=250	
SB Florida Avenue NW	T=507 TR=515	T=386 TR=381	T=1340 TR=1340	T=643 TR=643	TR=3795	TR=> >1mile	TR=1480	TR=3380	T=1595 TR=1595	T=> TR=> >1mile	T=1780 TR=1780	T=2190 TR=2190	

Florida Avenue NW/R Street NW/Rhode Island Avenue NW Diversions												
SimTraffic 95th Percentile Queues in Feet												
Approach	2013		2020 Background		2020 Scenario 1 Construction		2020 Scenario 1 w/Improvements		2020 Scenario 2 Construction		2020 Scenario 2 w/Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Florida Avenue NW and 3rd Street NW Intersection												
EB Florida Avenue NW	LT=199 TR=205	LT=444 TR=444	LT=1641 TR=1641	LT=316 TR=316	TR=4000	TR=>1mile	TR=1486	TR=2660	T=91 TR=126	T=146 TR=156	T=23 TR=80	T=87 TR=99
WB Florida Avenue NW	T=152 TR=192	T=191 TR=207	T=1876 TR=1876	T=212 TR=242	TR=>1mile	TR=>1mile	TR=435	TR=368	LT=404 T=436	LT=343 T=362	LT=863 T=863	LT=161 T=213
NB 3rd Street NW	LTR=76	LTR=120	LTR=91	LTR=306	R=53	R=56	LTR=53	LTR=134	LR=53	LR=81	LR=41	LR=171
SB 3rd Street NW	LT=50 R=94	LT=65 R=100	L=18 TR=113	L=62 TR=137	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rhode Island Avenue NW and 6th Street NW Intersection												
EB Rhode Island Avenue NW	L=47 T=101 R=22	L=39 T=108 TR=116	L=62 T=358 TR=27	L=75 T=3200 TR=3200	L=88 T=2800 TR=2800	L=175 T=>1mile TR=>1mile	L=101 T=215 TR=220	L=70 T=210 TR=232	L=114 T=403 TR=403	L=>1mile T=>1mile TR=>1mile	L=81 T=100 TR=121	L=175 T=4700 TR=4700
WB Rhode Island Avenue NW	L=151 T=265 TR=281	L=109 T=358 TR=496	L=150 T=>1mile TR=>1mile	L=150 T=4650 TR=4650	L=150 T=695 TR=695	L=150 T=>1mile TR=>1mile	L=154 T=154 TR=65	L=150 T=3500 TR=3500	L=95 T=65 TR=75	L=150 T=>1mile TR=>1mile	L=75 T=44 TR=72	L=150 T=2500 TR=2500
NB 6th Street NW	T=222 R=142	T=1023 R=1023	T=244 R=244	T=1041 R=1041	T=31 R=46	T=2505 R=2505	T=227 R=227	T=327 R=327	T=315 R=315	T=2100 R=2100	T=219 R=219	T=1400 R=1400
SB 6th Street NW	L=198 TR=50	L=238 TR=60	L=402 TR=50	L=270 TR=60	L=587 TR=587	L=613 TR=613	L=396 R=396	L=121 R=435	L=357 TR=357	L=94 TR=239	L=171 TR=256	LT=185 TR=256
6th Street NW and R Street NW Intersection												
WB R Street NW	LTR=683	LTR=785	LTR=612	LTR=1400	LTR=266	LTR=1573	LTR=124	LTR=349	LTR=624	LTR=1600	LTR=132	LTR=1305
NB 6th Street NW	LT=198 T=119	LT=1000 T=1000	LT=219 T=154	LT=988 T=988	TR=217	TR=2293	TR=183	TR=429	TR=197	TR=1900	TR=175	TR=1374
SB 6th Street NW	L=221 TR=50	L=261 TR=83	L=428 TR=428	L=279 TR=279	L=633 TR=633	L=665 TR=665	L=440 TR=440	L=488 TR=488	L=403 TR=403	L=286 TR=286	L=447 TR=447	L=303 TR=303

Florida Avenue NW/R Street NW/Rhode Island Avenue NW Diversions												
SimTraffic 95th Percentile Queues in Feet												
Approach	2013		2020 Background		2020 Scenario 1 Construction		2020 Scenario 1 w/Improvements		2020 Scenario 2 Construction		2020 Scenario 2 w/Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NW and 7th Street NW Intersection												
EB Rhode Island Avenue NW	T=137 TR=128	T=245 TR=248	T=235 TR=197	T=3100 TR=3100	T=2426 T=2431 R=20	T=>1mile TR=>1mile	T=265 R=25	T=4700 TR=4700	T=225 TR=164	T=>1mile TR=>1mile	T=725 TR=148	T=4500 TR=4500
WB Rhode Island Avenue NW	L=85 T=490	L=133 T=101	L=>1mile T=>1mile	L=5080 T=5080	L=>1mile T=>1mile	L=>1mile T=>1mile	L=3620 T=3620	L=>1mile T=>1mile	L=519 T=519	T=>1mile R=>1mile	L=387 T=387	L=2580 T=2580
NB 7th Street NW	LT=285 TR=136	LT=1168 TR=136	LT=246 TR=175	LT=4600 TR=4600	LT=2680 TR=2680	LT=>1mile TR=>1mile	LT=805 TR=803	LT=3900 TR=3900	LT=479 TR=479	LT=3000 TR=3000	LT=518 TR=518	LT=1600 TR=1600
SB 7th Street NW	LT=906	LT=1852	LT=459	LT=>1mile	LT=404	LT=>1mile	LT=265	LT=>1mile	LT=611	LT=>1mile	LT=364	LT=>1mile
7th Street NW and Q Street NW Intersection												
NB 7th Street NW	T=101 R=14	T=882 R=882	T=133 R=23	T=3400 R=3400	T=2500 R=2500	T=>1mile R=>1mile	T=826 TR=826	T=3500 TR=3500	T=126 R=126	T=2600 R=2600	T=165 R=22	T=1340 R=1340
SB 7th Street NW	LT=161	LT=154	LT=122	LT=207	LT=100	LT=194	LT=173	LT=85	LT=111	LT=104	LT=104	LT=137
EB Q Street NW	LTR=133	LTR=395	LTR=147	LTR=402	LTR=687	LTR=784	LTR=144	LTR=586	LTR=130	LTR=291	LTR=130	LTR=203
7th Street NW and R Street NW Intersection												
NB 7th Street NW	L=232 T=232	L=1194 T=1194	L=283 T=283	L=3870 T=3870	L=2865 T=2865	L=>1mile T=>1mile	L=817 T=817	L=3940 T=3940	L=494 T=494	L=3040 T=3040	L=532 T=532	L=1640 T=1640
SB 7th Street NW	T=859 TR=156	T=1851 TR=1851	T=371 TR=156	T=>1mile TR=>1mile	T=391 TR=87	T=>1mile TR=>1mile	T=251 TR=251	T=>1mile TR=>1mile	T=331 TR=107	T=>1mile TR=>1mile	T=350 TR=156	T=>1mile TR=>1mile

Florida Avenue NW/R Street NW/Rhode Island Avenue NW Diversions												
SimTraffic 95th Percentile Queues in Feet												
Approach	2013		2020 Background		2020 Scenario 1 Construction		2020 Scenario 1 w/Improvements		2020 Scenario 2 Construction		2020 Scenario 2 w/Improvements	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
WB R Street NW	LT=653 R=653	LT=731 R=731	LT=1454 R=1454	LT=1013 R=1013	LT=55 R=17	LT=34 R=34	LT=58 R=17	LT=215 R=28	LT=202 R=77	LT=244 R=84	LT=248 R=248	LT=262 R=262
Rhode Island Avenue NW and First Street NW Intersection												
EB Rhode Island Avenue NW	L=119 T=149 TR=146	L=96 T=81 TR=118	L=180 T=2000 TR=177	L=116 T=62 TR=102	L=203 T=4500 TR=4500	L=132 T=101 TR=101	L=234 T=236 TR=219	L=210 T=202 TR=60	T=1763 TR=1763	T=853 TR=853	T=154 TR=183	T=189 TR=186
WB Rhode Island Avenue NW	L=1770 T=1770 TR=1770	L=98 T=202 TR=242	L=56 T=4500 TR=4500	L=103 T= >1mile TR= >1mile	L=103 T= >1mile TR= >1mile	L=100 T= >1mile TR= >1mile	L= >1mile T= >1mile TR= >1mile	L= >1mile T= >1mile TR= >1mile	T= >1mile TR= >1mile	T=4100 TR=4100	T= >1mile TR= >1mile	T=3900 TR=3900
NB First Street NW	LTR=202	LTR=99	LTR=139	LTR= 264	LTR=714	LTR=969	LTR= 205	LTR= 806	LTR=185	LTR= 693	LTR= 150	LTR=325
SB First Street NW	LT=264 R=27	LT=258 R=27	LT=148 R=27	LT=595 R=595	LT=2351 R=27	LT=1366 R=27	LT=335 R=27	LT=1282 R=27	LT=254 R=27	LT=2300 R=27	LT=304 R=27	LT=634 R=27

Due to the amount of background traffic and growth in the study area, signalized intersections were optimized in the 2020 background analysis to allow traffic into the network. This methodology was carried through the construction scenarios for comparison.

The intersections along Rhode Island NW and Florida Avenue NW are of primary concern in this study area. In order to improve operations various timing, phasing and offset adjustments have been made. This includes providing for protected /permissive operations for the Rhode Island Avenue NW westbound movement at 7th Street NW and for the eastbound left turn at 2nd Street NW. In addition, additional parking restrictions would be required on 7th Street NW south of Rhode Island Avenue to provide for adequate storage for the detoured left turn movement. Other signal timing adjustments will take place in the area from First Street NW and Rhode Island Avenue NW to 7th Street NW and Rhode Island Avenue NW and along Florida Avenue NW along Rhode Island Avenue NW. The construction that reduces Rhode Island Avenue NW to two (2) lanes in each direction will reduce the level of service at the Rhode Island Avenue NE and 2nd Street NE intersection to an “F.” This is due to restricted left turns to northbound First Street NW from Rhode Island Avenue NW being detoured to 2nd Street NW during construction. In addition to the lane reduction along Rhode Island Avenue NW, the reduction in level of service relates to the volume of traffic generated by the Envision McMillan development anticipated to

turn left from Rhode Island Avenue NW northbound on First Street NW. At this time improvements cannot be designed for this intersection due to the variability in phasing associated with the Envision McMillan project and the Northeast Boundary Tunnel Project Depending on the progression of the projects mitigation measures such as increasing the green time on Rhode Island Avenue NW eastbound at the First Street NW intersection, and providing alternate routes for the McMillan Development traffic can be implemented.

Scenario 3 is the construction occurring at the pumping station on First Street NW and was analyzed separately. During the construction at the pumping station First Street NW will be closed in the northbound direction. The northbound traffic was detoured along Rhode Island Avenue to 2nd Street NW. The results of the analysis for the AM peak hour is 2nd Street will operate at a level of service “C” with minimal delays. A level of service “B” and minimal delays is expected during the PM peak hour at this intersection during construction.

Construction on T Street NW was analyzed separately as Scenario 4. T Street NW will be closed during the construction at TS-CSA1. Traffic traveling to T Street NW was detoured to 2nd Street NW during the closure. The analysis showed that 2nd Street NW will operate with a level of service “A” with minimal to no delays during the AM peak hour. In the PM peak hour 2nd Street NW is expected to operate at a level of service “A” and minimal delays during construction.

Travel times, speeds and delays along Rhode Island Avenue are expected to increase in the westbound direction in the AM peak hour and eastbound direction in the PM peak hour during construction. Approximately 4 to 6 minutes of additional time is anticipated for motorists to travel along the Rhode Island Avenue corridor during the peak hours. Eastbound Florida Avenue NW in the AM and westbound Florida Avenue NW in the PM peak hour will experience longer travel times and lower speeds during construction. Table 4-21 is a comparison of travel times, speeds and delays along the Rhode Island Avenue NW and Florida Avenue NW corridors through Study Area 3.

Table 4-21: Study Area 3 – Rhode Island Avenue NW and Florida Avenue NW Travel Times and Speeds

SimTraffic Arterial Travel Times, Speeds and Delays						
Scenario	Travel Time (min)		Speed (mph)		Delay (s/veh)	
	AM	PM	AM	PM	AM	PM
Rhode Island Avenue NW Without Construction ¹	WB = 16	EB = 15	WB = 11	EB = 14	576	491
Rhode Island Avenue NW With Construction ²	WB = 20	EB = 21	WB = 10	EB = 10	778	823
Florida Avenue NW Without Construction ¹	EB = 16	WB = 10	EB = 14	WB = 17	364	231
Florida Avenue NW With Construction ²	EB = 19	WB = 11	EB = 11	WB = 12	392	350

¹Based on Background Conditions

²Based on Construction with Improvements Conditions

4.8.2 Study Area 3 – Proposed Traffic Calming Measures

Detouring traffic through residential neighborhoods is proposed. Traffic calming measures were taken into consideration to help mitigate neighborhood impacts. The R Street NW detour along 6th Street NW, P Street NW and 7th Street NW will divert to the neighborhood approximately 270 additional vehicles during the AM and PM peak hours. A potential for increased speeds along P Street NW could result from the additional traffic being diverted.

The 3rd Street NW closure will detour approximately 100 vehicles to 2nd Street NW residential roadway during the AM and PM peak hour. The additional traffic could have the potential for increased speeds through the neighborhood along 2nd Street NW.

In order to calm traffic on detour routes and around construction staging areas, DC Water proposes to coordinate with the DC Metropolitan Police Department to perform the following duties:

- Provide officers at construction staging areas and along detour routes to limit speeding, illegal parking and aggressive driving
- Install speed cameras at and around construction staging areas and along detour routes

Based on coordination on the First Street Tunnel, currently under construction in Bloomingdale, DC Water has included an allowance provision in its Northeast Boundary Tunnel Contract to ensure these measures are fully covered.

4.9 Crash Data

The District Department of Transportation (DDOT) provided crash data for the three study areas identified for the Northeast Boundary Tunnel Project (NEBT). The data was collected using DDOT's Traffic Accident Reporting and Analysis System. The analyzed data spans a three (3) year period between January 2011 and December 2013. The sections below summarize the key intersections impacted by construction, and the anticipated impacts due to construction.

4.9.1 Study Area 1 – Crash Data

The Mt Olivet Road site mainly impacts one (1) signalized intersection, Mt Olivet Road NE at West Virginia Avenue NE. From 2011 to 2013, there were 171 reported crashes in Study Area 1 of which sixty-two (62) collisions occurred at the Mt. Olivet Road NE and West Virginia Avenue NE intersection.

During construction, Mt Olivet Road NE will be reduced to one (1) northbound lane and one (1) southbound lane. To improve operations at this intersection the northbound and southbound left turns from Mt Olivet Road NE onto West Virginia Avenue NE will be restricted. This restriction will eliminate left turn crashes at this intersection which amount to ten (10) crashes in the three (3) year period. Restricting turns will require traffic to be detoured. Northbound traffic will be detoured to the west and southbound traffic to the east through other intersections not directly impacted by the construction at the diversion facility as shown on Figure A-23 located in Appendix A.

Northbound traffic will be detoured left at the Mt Olivet Road NE at Brentwood Parkway and 9th Street NE intersection. This intersection had a total of fifty-five (55) reported crashes during the three year

period. The detour will continue southbound along 6th Street NE to left on Florida Avenue NE. Crash data showed twenty-four (24) crashes at the Florida Avenue NE and the 6th Street NE intersection. The detour will traverse eastbound on Florida Avenue NE to the 7th Street NE intersection which reported eight (8) crashes. The final intersection along the detour route is Florida Avenue NE at West Virginia Avenue NE. This intersection had twenty-two (22) crashes reported. Motorists will turn left from Florida Avenue NE to West Virginia Avenue NW completing the detour. Southbound traffic will be detoured left at the Mt Olivet Road NE Ramp to New York Avenue NE intersection and right at the New York Avenue NE intersection with the Ramp to Mt Olivet Road. These two (2) intersections have no reported crash data. The detour continues along New York Avenue NE to right on Fenwick Road NE. This intersection had 27 crashes reported during the study period. The intersection ending the detour route is Fenwick Avenue NE at West Virginia Avenue NE which had fifteen (15) reported crashes. Table 4-19 is a summary of the crash data collected for the three years in Study Area 1.

Increases in overall crashes through the study area is not anticipated due to the construction at the Mt Olivet Road site. Lane closures and turning restrictions proposed as mitigations measures to streamline traffic through the construction zones will assist in reducing left turn crashes that will be balanced by the potential increase in crashes in the work zone. The detoured route was chosen due to its ease of accessible and its capacity to carry additional traffic. The estimated detoured volume in the eastbound direction is below fifty (50) vehicles per hour peak and 100 vehicles per hour in the westbound direction.

Table 4-22: Study Area 1 – Summary of Crash Data

Location	Crash Type							TOTAL
	Rear End	Left Turn	Angle	Right Turn	Head On	Fixed Object	Other	
Mount Olivet Road NE @ West Virginia Avenue NE	14	10	3	3	4	8	20	62
Mount Olivet Road NE @ Brentwood Parkway/9th Street NE	10	13	3	3	4	7	15	55
Florida Avenue NE @ West Virginia Avenue NE	2	2	1	1	1	0	1	8
Florida Avenue NE @ 6th Street NE	3	1	0	0	0	0	1	5
Florida Avenue NE @ 7th Street NE	0	0	0	1	0	0	0	1
New York Avenue NE @ Fenwick Avenue NE	17	1	2	1	1	0	5	27
Fenwick Avenue NE @ West Virginia Avenue NE	4	3	1	1	0	0	6	15

4.9.2 Study Area 2 – Crash Data

The Rhode Island Avenue site and the 4th Street site are located in Study Area 2. Five (5) intersections will be affected by the construction within Study Area 2. Crash data collected between 2011 and 2013 showed 206 crashes occurring at 6 affected intersections.

Rhode Island Avenue Site

Construction at the Rhode Island Avenue site will primarily impact three (3) intersections: Rhode Island Avenue NE at Reed Street NE/Metro Station, Rhode Island Avenue NE at 10th Street NE, and Rhode Island Avenue NE at 8th Place NE.

The intersection of Rhode Island Avenue NE at Reed Street NE /Metro Station had the highest number of crashes in study area during the analysis period. The intersection had seventy-six (76) crashes, the highest in this study area.

Rhode Island Avenue NE at 10th Street NE will also be affected by the Rhode Island Avenue Diversion Facility. The intersection will experience queuing to the west of the construction staging area due to the lane reduction. Thirty-three (33) crashes occurred at this intersection.

Rhode Island Avenue NE at 8th Place NE will also be directly impacted by the construction at the Rhode Island Avenue Diversion Facility. Northbound left turn lanes from Rhode Island Avenue NW to 8th Place NW will be prohibited due to construction. This location experienced twenty-two (22) crashes

4th Street Site

Construction at the 4th Street site will directly impact two (2) intersections, Rhode Island Avenue NE at 4th Street NE and Rhode Island Avenue NE at Lincoln Road NE.

During the three (3) year analysis period, forty-seven (47) crashes were reported at the intersection of Rhode Island Avenue NE at 4th Street NE. It will be necessary to detour northbound 4th Street NE traffic during construction. Traffic will be detoured to Lincoln Road NE increasing the traffic volumes at the intersection of Rhode Island Avenue NE and Lincoln Road NE, which reported seventeen (17) crashes during the study period. A summary of crash data for the three (3) years in Study Area 2 is reflected in Table 4-23.

The removal of turning movements at some of the intersections will reduce left turn crashes but conversely it would be anticipated that crashes in the work zone will increase. Overall, Study Area 2 should not see a significant change in the crash rate.

Table 4-23: Study Area 2 – Summary of Crash Data

Location	Crash Type							TOTAL
	Rear End	Left Turn	Angle	Right Turn	Head On	Fixed Object	Other	
Rhode Island Avenue NE @ 4th Street NE	17	5	0	2	4	0	19	47
Rhode Island Avenue NE @ Lincoln Road NE	9	1	2	1	0	1	3	17
Rhode Island Avenue NE @ 8th Place NE	12	1	1	1	0	0	7	22
Rhode Island Avenue NE @ Reed Street/Metro Station NE	22	11	4	4	1	8	26	76
Rhode Island Avenue NE @ 10th Street NE	11	1	1	1	0	2	17	33

4.9.3 Study Area 3 – Crash Data

In Study Area 3, construction staging areas and detours associated with the construction will impact approximately thirteen (13) signalized intersections. Three (3) years of crash data for these intersections is summarized in Table 4-24. A total of 233 reported crashes occurred at the thirteen (13) intersections. Highlighted below are the intersections with the highest incidents of crashes in close proximity to the construction areas.

R Street Site

The intersection of Rhode Island Avenue NW at 7th Street NW is located one (1) block southwest of the R Street site. The intersection had thirty (30) crashes during the three year study period. The intersection of Rhode Island Avenue NW at 6th Street NW bounds the construction site to the northeast. The intersection had twenty six (26) crashes during the three year study period. The 6th Street NW intersection with R Street NW which is the most impacted by construction had six (6) collisions in a three (3) year period. The other adjacent intersection is at Rhode Island Avenue NW and R Street NW. This location had twelve (12) crashes in a three (3) year period.

Florida Avenue Site

The intersection of Rhode Island Avenue NW at Florida Avenue NW is located northwest of the Florida Avenue site. The intersection had the most reported crashes in Study Area 3 with a total of forty nine (49) crashes in the three (3) year study period. The intersection of Rhode Island Avenue NW and 3rd Street NW bounds the construction site to the southeast. Twenty (20) crashes were reported at this intersection during the three (3) year study period. Ten (10) crashes occurred during the three (3) year study period at the Florida Avenue NW and 3rd Street NW intersection.

T Street Site

Only three (3) crashes were reported at the intersection of Rhode Island Avenue NW and T Street NW.

In general, crashes will increase through a work zone. The closure of roadways and having one-way streets will reduce the number of conflict points that will in general reduce crashes. Overall changes will be experienced at different locations but throughout the study area but crash rates should remain relatively

neutral. Through the construction staging areas signing, channelizing device, portable variable message signs and signal timing adjustments will assist in mitigating the construction.

Table 4-24: Study Area 3 – Summary of Crash Data

Location	Crash Type							Total
	Rear End	Left Turn	Angle	Right Turn	Head On	Fixed Object	Other	
Rhode Island Avenue NW @ 7th Street NW	5	2	3	4	0	6	10	30
Rhode Island Avenue NW @ R Street NW	2	2	0	2	0	1	5	12
Rhode Island Avenue NW @ 6 th Street NW	9	2	3	2	1	2	7	26
Rhode Island Avenue NW @ Florida Avenue NW	10	9	5	4	4	1	16	49
Rhode Island Avenue NW @ 3rd Street NW	5	1	4	0	0	0	10	20
Rhode Island Avenue NW @ T Street NW	1	0	0	0	0	1	1	3
Florida Avenue NW @ 3 rd Street NW	4	0	0	0	1	0	5	10
7th Street NW @ R Street NW	2	1	4	0	0	4	6	17
6th Street NW @ R Street NW	2	1	2	0	0	0	1	6
7th Street NW @ Q Street NW	4	1	0	2	1	3	5	16
6th Street NW @ Q Street NW	0	1	2	1	0	0	4	8
7th Street NW @ P Street NW	4	1	2	0	0	0	11	18
6th Street NW @ P Street NW	3	1	1	1	0	0	8	14

4.10 Pedestrian and Bicycle Traffic

Pedestrian and bicycle traffic will be maintained throughout construction. Appendix A, and Tables A-1 through A-8 provide detail on how pedestrian and bicycle traffic will be maintained.