

## 5.16 MITIGATION MEASURES

### 5.16.1 Introduction

CEQR and SEQRA require that identified potential significant adverse impacts be minimized or avoided to the fullest extent practicable and that mitigation measures be identified and evaluated in an EIS. Where no mitigation is available, the EIS must disclose the potential for unmitigable significant adverse impacts.

This Section presents mitigation measures for potential temporary adverse traffic impacts from construction of the water main connections. While no significant adverse air quality impacts requiring mitigation were found for mobile sources, a mobile source analysis of the traffic mitigation measures is presented here.

### 5.16.2 Traffic and Parking

As presented in Section 5.9, construction-related temporary adverse traffic impacts were identified for numerous Study Area locations for the reasonable worst-case First Avenue route and the other two representative routes, Sutton Place route and E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street route. It is expected that construction efforts would be coordinated with NYCDOT OCMC and incorporate conventional mitigation and more aggressive measures as an overall effort to attenuate conditions for traffic flow at critical locations. This Section provides a description of conventional mitigation measures that could be implemented to reduce congestion at impacted locations. Where the temporary adverse traffic impacts could not be fully mitigated with these measures, conceptual traffic management strategies that could further alleviate traffic congestion during the construction of the water main connections were also explored. In addition, potential impacts from traffic diversion were addressed in the context of the reasonable worst-case First Avenue route.

#### First Avenue Route Base Scenario

Construction of the water main connections along the reasonable worst-case Base Scenario of the First Avenue route would result in temporary adverse traffic impacts along First Avenue at all intersections between E. 55<sup>th</sup> and E. 59<sup>th</sup> Streets during Segment 1 and Segment 3 construction. There would also be temporary adverse traffic impacts on the eastbound approach of E. 56<sup>th</sup> Street at Second Avenue during Segment 7 construction. The conventional mitigation measures used to address these impacts consist of extending the curbside restrictions on the west side of First Avenue and incorporating signal timing changes at Second Avenue and E. 56<sup>th</sup> Street. These measures are summarized in Table 5.16-1 and described in further detail below.

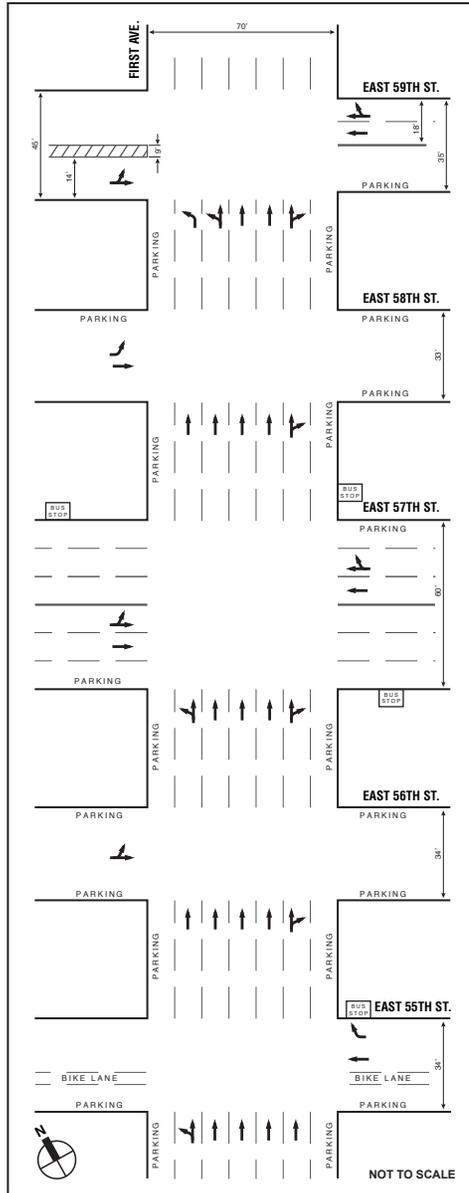
**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-1**  
**Conventional Mitigation Measures – First Avenue Route**

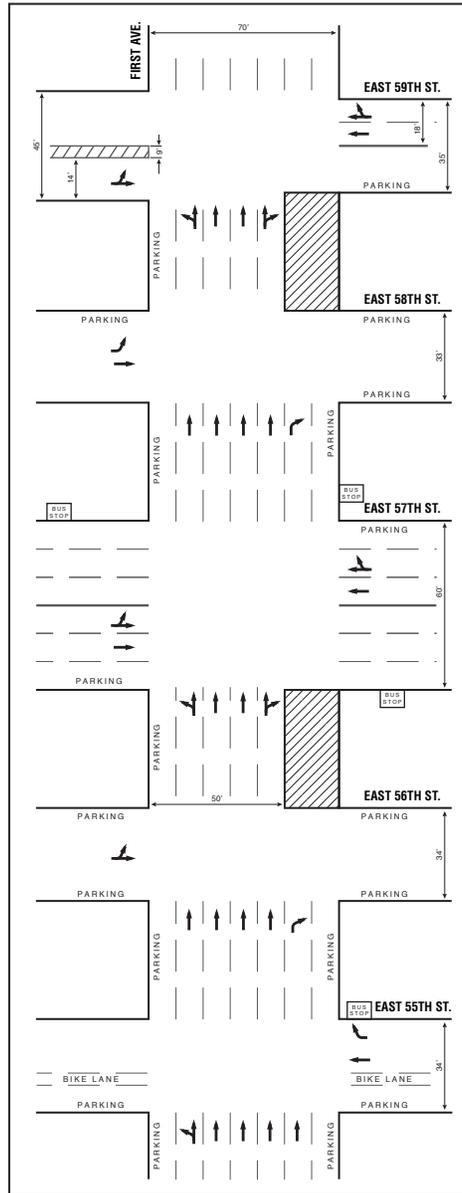
Analysis Intersection	Approach	Existing Signal Timing (sec)	Mitigation Measures	
			Mitigated Build Signal Timing (sec)	Description of Mitigation
<b>Construction on First Avenue – Segment 1 Only (between E. 59<sup>th</sup> and E. 58<sup>th</sup> and between E. 57<sup>th</sup> and E. 56<sup>th</sup> Streets)</b>				
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB/WB NB	43/43/43 47/47/47	43/43/43 47/47/47	Implement No Standing/Parking from 7:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane.
E. 58 <sup>th</sup> Street (EB) First Avenue (NB)	EB NB	40/40/40 50/50/50	40/40/40 50/50/50	Implement No Standing/Parking from 7:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane.
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB/WB Ped NB Ped	37/37/37 6/6/6 41/41/41 6/6/6	37/37/37 6/6/6 41/41/41 6/6/6	Implement No Standing/Parking from 7:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane.
<b>Construction on First Avenue – Segment 3 Only (between E. 58<sup>th</sup> and E. 57<sup>th</sup> and between E. 56<sup>th</sup> and E. 55<sup>th</sup> Streets)</b>				
E. 58 <sup>th</sup> Street (EB) First Avenue (NB)	EB NB	40/40/40 50/50/50	40/40/40 50/50/50	Implement No Standing/Parking from 10:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane. Implement No Standing/Parking from 10:00 a.m. to 3:00 p.m. for 100 feet north of the intersection on the west side of First Avenue to provide a transition lane.
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB/WB Ped NB Ped	37/37/37 6/6/6 41/41/41 6/6/6	37/37/37 6/6/6 41/41/41 6/6/6	Implement No Standing/Parking from 7:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane. Implement No Standing/Parking from 7:00 a.m. to 10:00 a.m. for 100 feet north of the intersection on the west side of First Avenue to provide a transition lane.
E. 56 <sup>th</sup> Street (EB) First Avenue (NB)	EB NB	36/36/36 54/54/54	36/36/36 54/54/54	Implement No Standing/Parking from 10:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane.
E. 55 <sup>th</sup> Street (WB) First Avenue (NB)	WB NB	36/36/36 54/54/54	36/36/36 54/54/54	Implement No Standing/Parking from 10:00 a.m. to 3:00 p.m. on the west side of First Avenue to provide an additional travel lane.
<b>Construction on E. 56<sup>th</sup> Street – Segment 7 Only (between First and Second Avenues)</b>				
E. 56 <sup>th</sup> Street (EB) Second Avenue (SB)	EB SB	36/36/36 54/54/54	38/38/38 52/52/52	Transfer 2 seconds of green time from southbound phase to eastbound phase in all peak periods.
<b>Notes:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound, Ped-Pedestrian Phase.				

- **Segments 1 and 3:** Current curbside regulations permit delivery activities along the west side of First Avenue for most of the day, except for the PM peak period. Extending the curbside restrictions currently in place for the PM peak period to other hours would provide an additional northbound travel lane along First Avenue during these hours. Specifically, this measure would require changing the existing “No Standing 3:00 p.m. to 8 p.m.” regulation to include other hours along the west side of First Avenue. As shown in Figures 5.16-1 and 5.16-2 for Segment 1 construction, the above measure were assumed for the west curb of First Avenue between E. 56<sup>th</sup> and E. 59<sup>th</sup> Streets in the AM and midday peak hour mitigation analyses, thereby requiring a change of the curbside regulation to “No Standing 7:00 a.m. to 8 p.m.” For Segment 3 construction, the restrictions would be extended to include the midday peak hour (No Standing 10:00 a.m. to 8 p.m.) for the blocks between E. 54<sup>th</sup> and E.

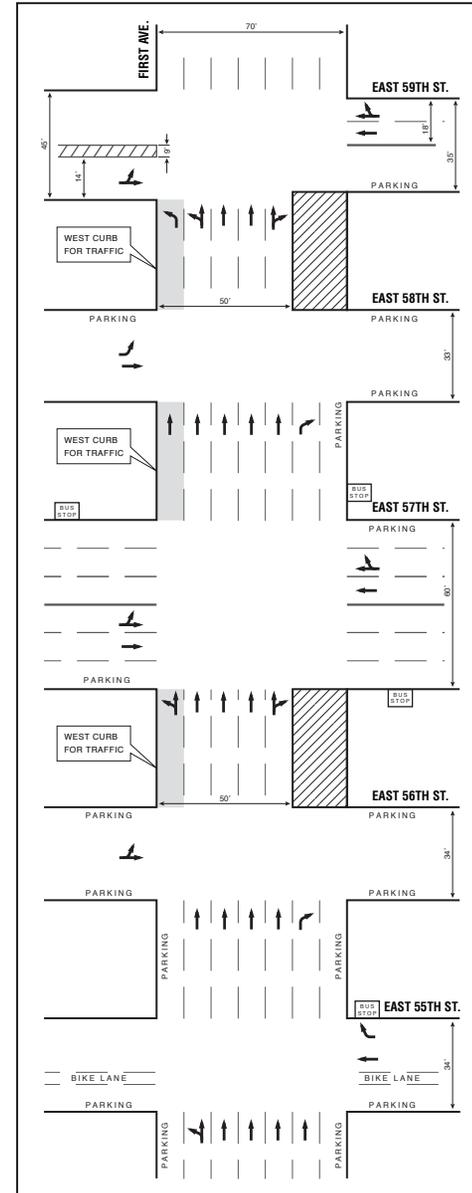
EXISTING CONFIGURATION



FIRST AVENUE ROUTE BASE SCENARIO



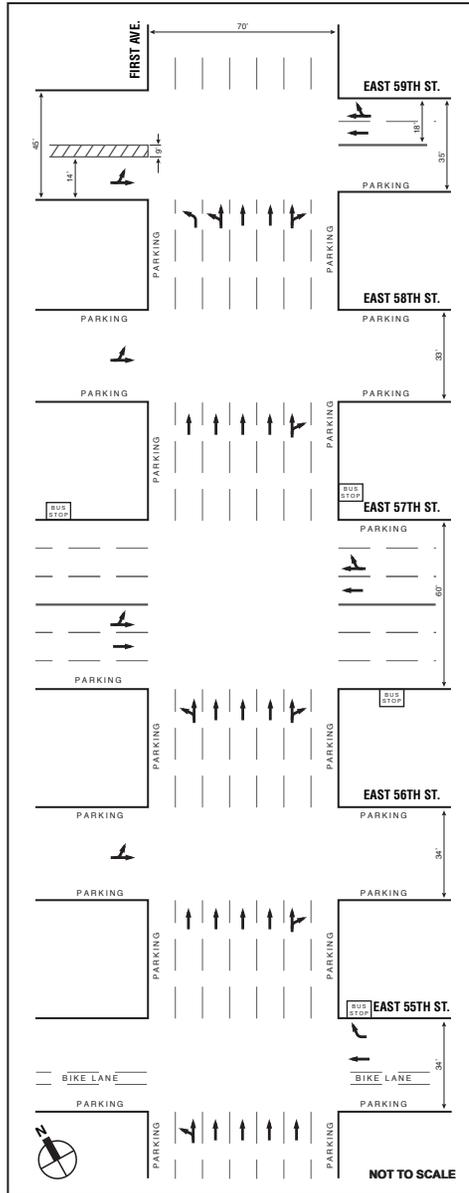
CONCEPTUAL MITIGATION



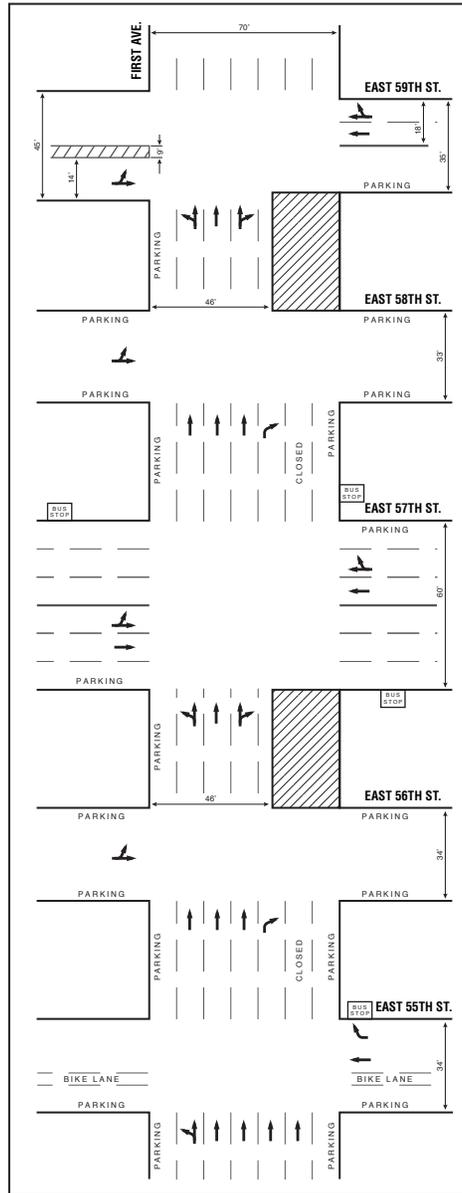
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 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 FIRST AVENUE ROUTE BASE SCENARIO - SEGMENT 1  
 2004 EXISTING & 2008 ROADWAY CONFIGURATIONS  
 WATER MAIN STUDY AREA  
 AM PEAK HOUR

FIGURE 5.16-1

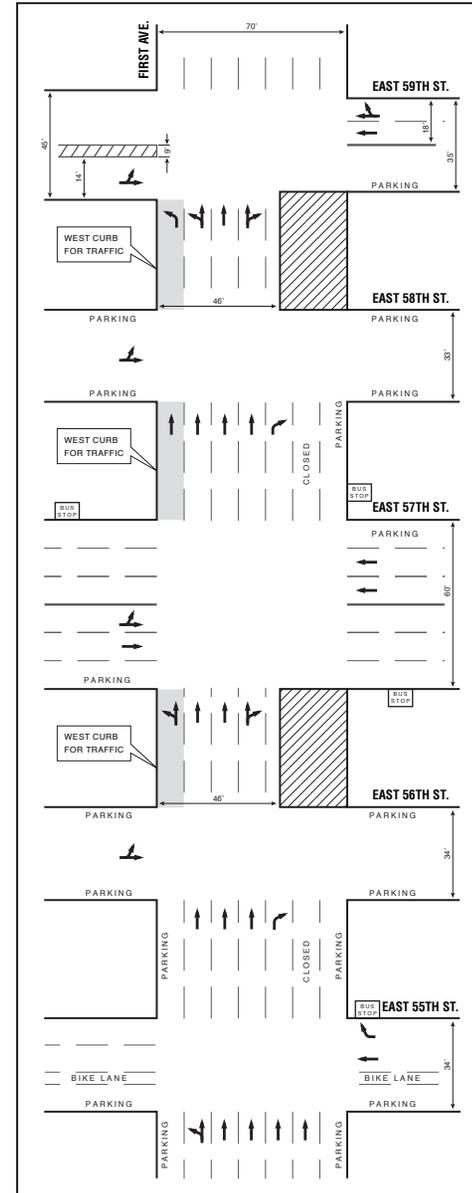
EXISTING CONFIGURATION



FIRST AVENUE ROUTE BASE SCENARIO



CONCEPTUAL MITIGATION



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 WATER MAIN STUDY AREA  
 MIDDAY PEAK HOUR

FIGURE 5.16-2

58<sup>th</sup> Streets, while for the block between E. 56<sup>th</sup> and E. 57<sup>th</sup> Streets, the restrictions also encompass the AM peak hour (No Standing 7:00 a.m. to 8 p.m.). These Segment 3 mitigation measures are depicted in Figures 5.16-3 and 5.16-4.

Based on discussions with NYCDOT, it was determined that imposing the above curbside restrictions beyond the PM peak period would not likely be as effective in achieving an increase in vehicle capacity along the First Avenue corridor as it has been for the PM peak period. The reasons are: 1) the PM peak period restrictions have been in effect for awhile, such that delivery vehicles and motorists have become accustomed to these restrictions, and for the most part, comply with the restrictions; 2) delivery activities during the PM peak period are relatively low, whereas, curbside demand is typically higher during the morning and middle of the day; 3) motorists need time to acclimate themselves to the new curbside restrictions even if adequate signage is provided; and, 4) it would be difficult to curtail deliveries for the entire day, especially over a period spanning over several months. Therefore, it was agreed that the mitigation analysis would assume a certain level of curbside violations during the extended restriction periods. Accounting for occasional blockages of the additional travel lane, the mitigation analysis conservatively assumed only 25 percent of a normal lane's capacity for the west curb lane during periods of extended curbside restrictions. Since the PM peak period already considers the use of the west curb lane as an active traffic lane, no further mitigation measures were assumed.

- Segment 7: Signal timing modifications involving the transfer of two seconds of green time from the northbound phase to the eastbound phase during all analysis peak hours were assumed for the mitigation analysis of the Second Avenue and E. 56<sup>th</sup> Street intersection (Figure 5.16-5).

Capacity analysis was conducted to determine the effectiveness of the above measures, as summarized in Tables 5.16-2, 5.16-3, and 5.16-4 for the AM, midday, and PM peak hours, respectively. While the mitigation measures would improve conditions at all intersections on First Avenue during the construction of Segments 1 and 3, there would still be unmitigated impacts in both the AM and midday peak hours. During the PM peak hour, which is not affected by these mitigation measures, there would also be unmitigated impacts during the construction of Segments 1 and 3. The signal timing measures proposed for Segment 7 would be sufficient to eliminate all temporary adverse impacts at Second Avenue and E. 56<sup>th</sup> Street.

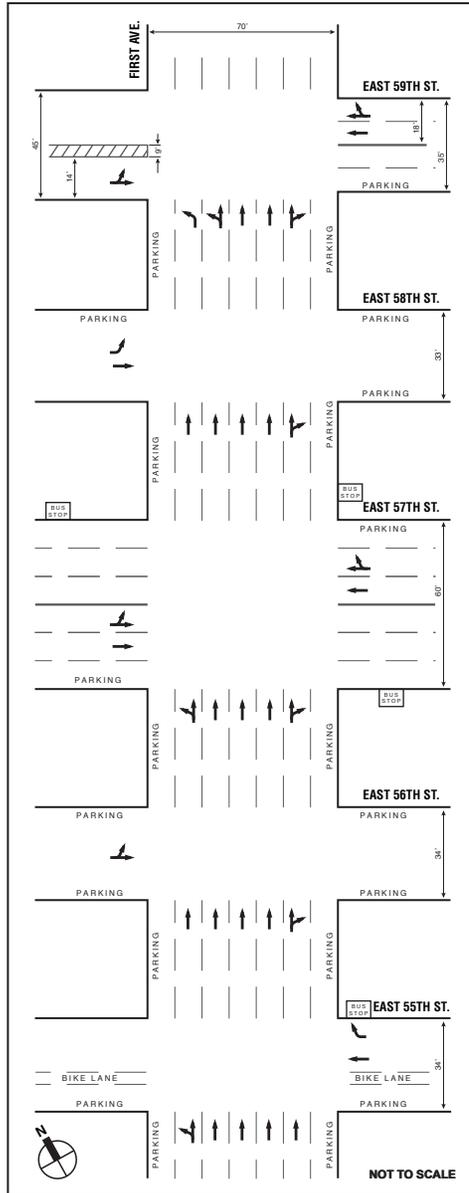
#### *Segment 1 – Construction on First Avenue*

Temporary adverse impacts were identified for the First Avenue intersections at E. 57<sup>th</sup>, E. 58<sup>th</sup>, and E. 59<sup>th</sup> Streets. While the above mitigation measures would fully mitigate the temporary adverse impacts at E. 58<sup>th</sup> Street in the midday peak hour, all other impacts would remain unmitigated, as described below.

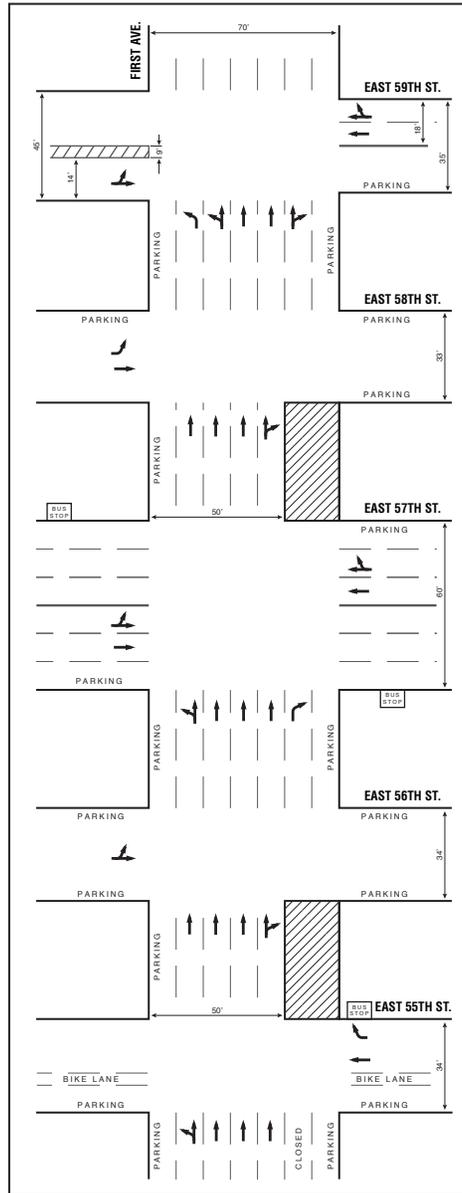
#### *Mitigated*

- First Avenue and E. 58<sup>th</sup> Street – During the midday peak hour, northbound approach impacts would be mitigated from LOS E with 71.0 seconds per vehicle (spv) of delay to LOS C with 29.6 spv of delay.

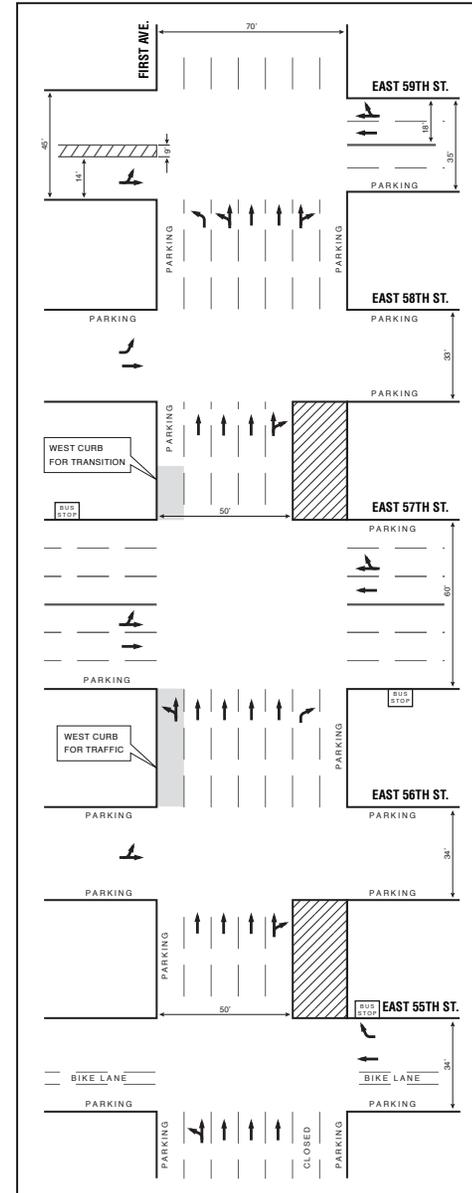
EXISTING CONFIGURATION



FIRST AVENUE ROUTE BASE SCENARIO



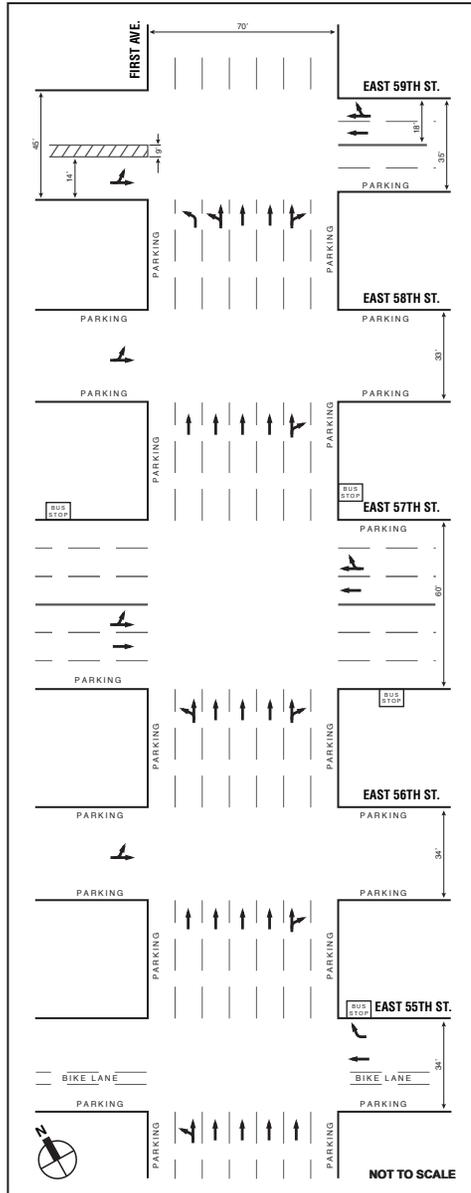
CONCEPTUAL MITIGATION



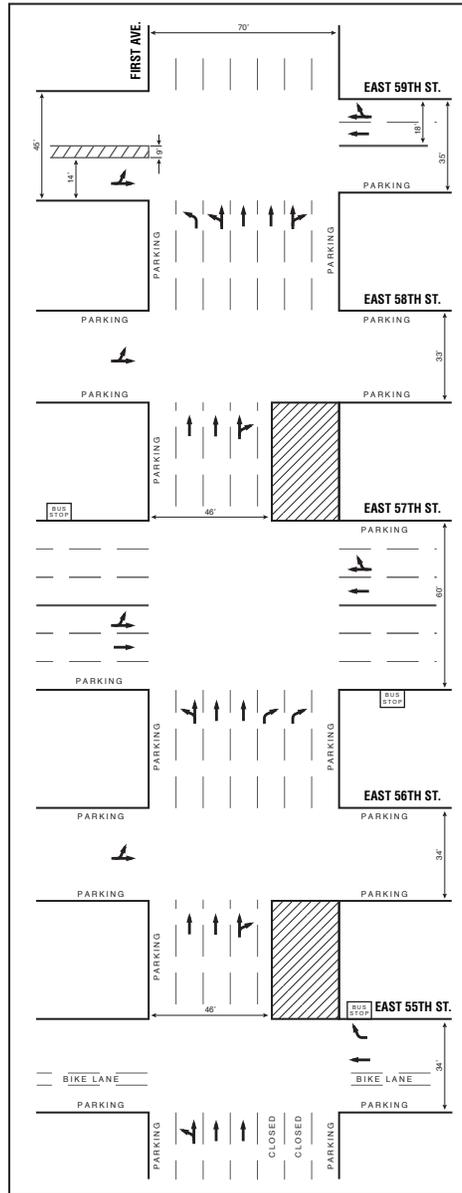
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 WATER MAIN STUDY AREA  
 AM PEAK HOUR

FIGURE 5.16-3

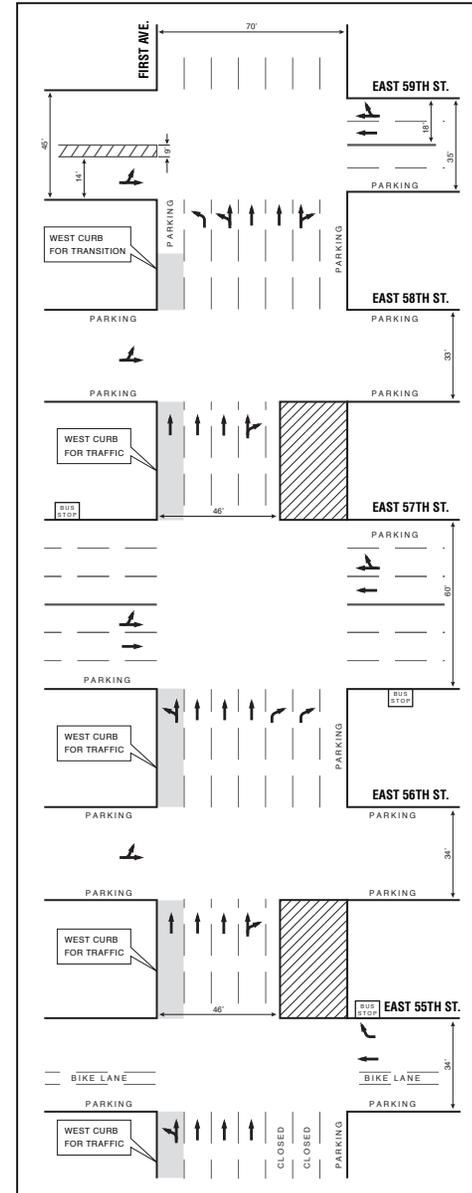
EXISTING CONFIGURATION



FIRST AVENUE ROUTE BASE SCENARIO

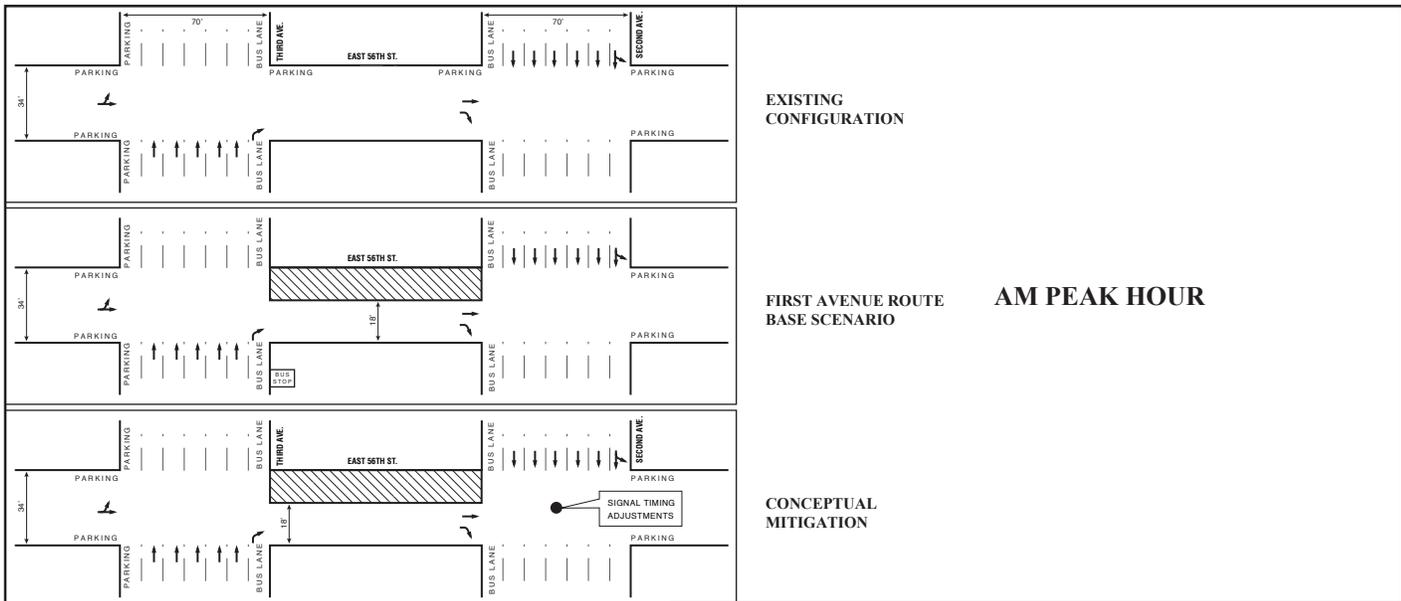


CONCEPTUAL MITIGATION



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 WATER MAIN STUDY AREA  
 MIDDAY PEAK HOUR

FIGURE 5.16-4

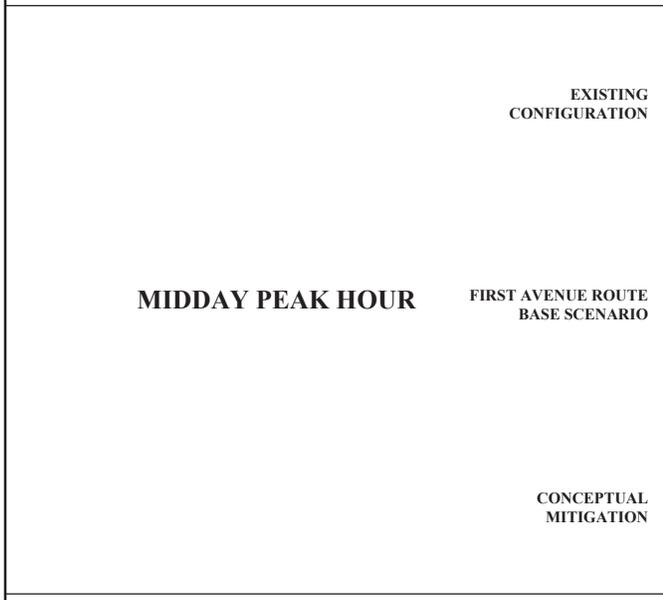


EXISTING CONFIGURATION

FIRST AVENUE ROUTE BASE SCENARIO

AM PEAK HOUR

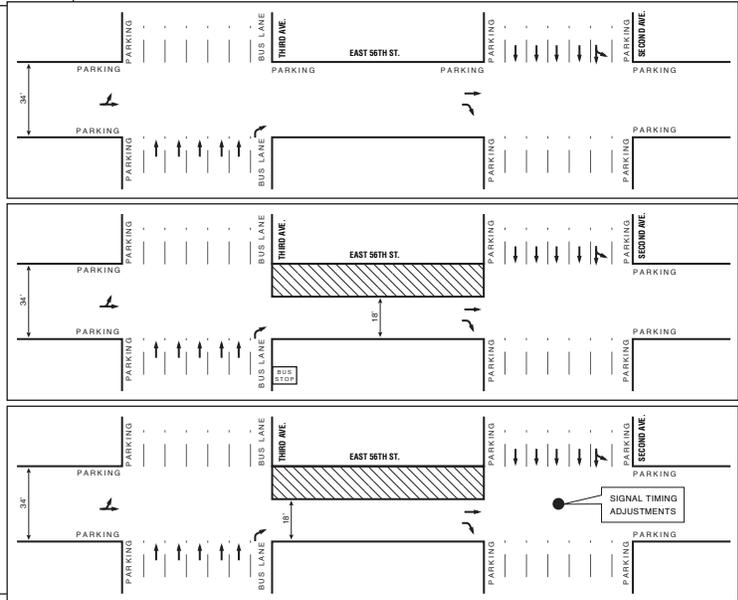
CONCEPTUAL MITIGATION



MIDDAY PEAK HOUR

FIRST AVENUE ROUTE BASE SCENARIO

CONCEPTUAL MITIGATION



EXISTING CONFIGURATION

FIRST AVENUE ROUTE BASE SCENARIO

PM PEAK HOUR

CONCEPTUAL MITIGATION



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 WATER MAIN CONNECTIONS

FIRST AVENUE ROUTE BASE SCENARIO - SEGMENT 7  
 2004 EXISTING & 2008 ROADWAY CONFIGURATIONS  
 WATER MAIN STUDY AREA

FIGURE 5.16-5

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-2**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**First Avenue Route Water Main Connection Study Area – AM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on First Avenue – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>												
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-LT	0.28	18.9	B	EB-LT	0.31	19.5	B	EB-LT	0.31	19.5	B
	WB-TR	0.53	21.0	C	WB-TR	0.53	21.0	C	WB-TR	0.53	21.0	C
	NB-L	0.96	48.3	D					NB-L	1.01	93.5	F *
	NB-LTR	0.99	36.2	D	NB-LTR	1.22	121.8	F *	NB-LTR	1.12	81.0	F *
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E
	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C
	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C
	NB-LTR	1.03	50.9	D	NB-LTR	1.29	159.4	F *	NB-LTR	1.18	109.5	F *
<b>Construction on First Avenue – Segment 3 Only (between E. 58<sup>th</sup> and E. 57<sup>th</sup> and between E. 56<sup>th</sup> and E. 55<sup>th</sup> Streets)</b>												
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E
	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C
	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C
	NB-LTR	1.03	50.9	D	NB-LT	1.21	125.9	F *	NB-LT	1.11	80.5	F *
				NB-R	0.37	23.2	C	NB-R	0.37	23.2	C	
<b>Construction on E. 56<sup>th</sup> Street – Segment 7 Only (between Second and Third Avenues)</b>												
E. 56 <sup>th</sup> Street (EB) Second Avenue (SB)	EB-T	0.70	34.3	C	EB-T	0.64	31.2	C	EB-T	0.60	28.3	C
	EB-R	1.00	80.5	F	EB-R	1.07	102.2	F *	EB-R	1.00	79.5	E
	SB-LT	0.66	10.9	B	SB-LT	0.66	10.9	B	SB-LT	0.69	12.7	B
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).											

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-3**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**First Avenue Route Water Main Connection Study Area – Midday Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on First Avenue – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>												
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-LT	0.44	22.7	C	EB-LT	0.47	23.7	C	EB-LT	0.47	23.7	C
	WB-TR	0.38	18.9	B	WB-TR	0.38	18.9	B	WB-TR	0.38	18.9	B
	NB-L	0.63	21.7	C					NB-L	0.91	78.0	E *
	NB-LTR	0.76	18.7	B	NB-LTR	1.22	123.5	F *	NB-LTR	1.10	74.6	E *
E. 58 <sup>th</sup> Street (EB) First Avenue (NB)	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B
	NB-TR	0.67	14.2	B	NB-T	1.10	71.0	E *	NB-T	0.96	29.6	C
					NB-R	0.11	12.4	B	NB-R	0.11	12.4	B
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D
	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C
	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C
	NB-LTR	0.93	31.8	C	NB-LTR	1.58	287.4	F *	NB-LTR	1.38	200.2	F *
<b>Construction on First Avenue – Segment 3 Only (between E. 58<sup>th</sup> and E. 57<sup>th</sup> and between E. 56<sup>th</sup> and E. 55<sup>th</sup> Streets)</b>												
E. 58 <sup>th</sup> Street (EB) First Avenue (NB)	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B
	NB-TR	0.67	14.2	B	NB-TR	1.13	84.5	F *	NB-TR	0.99	35.5	D
E. 57 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D
	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C
	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C
	NB-LTR	0.93	31.8	C	NB-LT	1.54	268.9	F *	NB-LT	1.35	184.0	F *
				NB-R	0.14	18.2	B	NB-R	0.14	18.2	B	
E. 56 <sup>th</sup> Street (EB) First Avenue (NB)	EB-LT	0.63	31.5	C	EB-LT	0.64	32.0	C	EB-LT	0.64	32.0	C
	NB-TR	0.64	10.9	B	NB-TR	1.08	60.1	E *	NB-TR	0.95	23.5	C
E. 55 <sup>th</sup> Street (WB) First Avenue (NB)	WB-T	0.64	32.3	C	WB-T	0.64	32.3	C	WB-T	0.64	32.3	C
	WB-R	0.24	22.9	C	WB-R	0.24	22.9	C	WB-R	0.24	22.9	C
	NB-LT	0.70	11.7	B	NB-LT	1.19	107.2	F *	NB-LT	1.07	54.9	D *
<b>Construction on E. 56<sup>th</sup> Street – Segment 7 Only (between Second and Third Avenues)</b>												
E. 56 <sup>th</sup> Street (EB) Second Avenue (SB)	EB-T	0.42	25.7	C	EB-T	0.37	24.2	C	EB-T	0.34	22.5	C
	EB-R	0.84	50.5	D	EB-R	0.90	60.7	E *	EB-R	0.84	49.4	D
	SB-LT	0.59	10.2	B	SB-LT	0.59	10.3	B	SB-LT	0.62	11.9	B
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).											

**Table 5.16-4  
2008 Mitigated Build, Build, and No Build Conditions Comparison  
First Avenue Route Water Main Connection Study Area – PM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on E. 56<sup>th</sup> Street – Segment 7 Only (between Second and Third Avenues)</b>												
E. 56 <sup>th</sup> Street (EB)	EB-T	0.50	27.2	C	EB-T	0.46	26.0	C	EB-T	0.43	24.0	C
Second Avenue (SB)	EB-R	0.89	58.0	E	EB-R	0.95	71.8	E *	EB-R	0.89	56.9	E
	SB-LT	0.48	9.2	A	SB-LT	0.48	9.2	A	SB-LT	0.50	10.7	B
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).											

*Unmitigated*

- First Avenue and E. 59<sup>th</sup> Street – During the AM peak hour, northbound approach impacts would be partially mitigated from LOS F with 121.8 spv of delay to LOS F with 93.5 spv of delay for left-turns and 81.0 spv for the left-through-right movement. During the midday peak hour, impacts from the same approach would be partially mitigated from LOS F with 123.5 spv of delay to LOS E with 78.0 spv of delay for the exclusive left-turn movement and 74.6 spv for the left-through-right movement.
- First Avenue and E. 57<sup>th</sup> Street – During the AM peak hour, northbound approach impacts would be partially mitigated from LOS F with 159.4 spv of delay to LOS F with 109.5 spv of delay. During the midday peak hour, impacts from the same approach would be partially mitigated from LOS F with 287.4 spv of delay to LOS F with 200.2 spv of delay.

*Segment 3 – Construction on First Avenue*

Temporary adverse impacts were identified for the First Avenue intersections at E. 55<sup>th</sup>, E. 56<sup>th</sup>, E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets. While the above mitigation measures would fully mitigate the temporary adverse impacts at E. 56<sup>th</sup> and E. 58<sup>th</sup> Streets during the midday peak hour, all other impacts would remain unmitigated, as described below.

*Mitigated*

- First Avenue and E. 56<sup>th</sup> Street – During the midday peak hour, northbound through movement impacts would be mitigated from LOS E with 60.1 spv of delay to LOS C with 23.5 spv of delay.

- First Avenue and E. 58<sup>th</sup> Street – During the midday peak hour, northbound through movement impacts would be mitigated from LOS F with 84.5 spv of delay to LOS D with 35.5 spv of delay.

*Unmitigated*

- First Avenue and E. 55<sup>th</sup> Street – During the midday peak hour, northbound approach impacts would be partially mitigated from LOS F with 107.2 spv of delay to LOS D with 54.9 spv of delay.
- First Avenue and E. 57<sup>th</sup> Street – During the AM peak hour, northbound left-through movement impacts would be partially mitigated from LOS F with 125.9 spv of delay to LOS F with 80.5 spv of delay. During the midday peak hour, impacts from the same movement would be partially mitigated from LOS F with 268.9 spv of delay to LOS F with 184.0 spv of delay.

*Segment 7 – Construction on E. 56<sup>th</sup> Street*

Temporary adverse impacts were identified for the Second Avenue intersection with E. 56<sup>th</sup> Street. The above mitigation measures would fully mitigate the temporary adverse impacts at this intersection during all three analysis peak hours.

*Mitigated*

- Second Avenue and E. 56<sup>th</sup> Street – During the AM peak hour, eastbound right-turn movement impacts would be mitigated from LOS F with 102.2 spv of delay to LOS E with 79.9 spv of delay. During the midday peak hour, impacts from the same movement would be mitigated from LOS E with 60.7 spv of delay to LOS D with 49.4 spv of delay. During the PM peak hour, impacts from the same movement would be mitigated from LOS E with 71.8 spv of delay to LOS E with 56.9 spv of delay.

As detailed above, several temporary adverse impacts identified for construction along First Avenue could not be mitigated with conventional mitigation measures. In addition, the intersection of First Avenue and E. 57<sup>th</sup> Street would experience temporary adverse impacts during the PM peak hour under both Segment 1 and Segment 3 construction. Considering the service levels projected for the First Avenue intersections during construction of water main connections and the amount of traffic traveling on the First Avenue corridor during peak periods, long queues would develop, extending for numerous blocks. It is anticipated that under such congested conditions, motorists would seek alternate routes, rather than sitting in traffic on First Avenue. An evaluation of potential traffic diversions and of the anticipated effects of diverted traffic on intersection operations along Sutton Place is discussed below.

Imposing the above restrictions on the west curb of First Avenue between E. 55<sup>th</sup> and E. 59<sup>th</sup> Streets would temporarily displace up to 10 curbside spaces per block that are currently used for deliveries during the AM and midday peak periods. Hence, for Segment 1 construction, approximately 30 spaces along the west curb of First Avenue would be lost during the AM and midday peak period. Under Segment 3 construction, the above restrictions would result in a

temporary displacement of approximately 15 spaces in the AM peak period and approximately 45 spaces in the midday peak period. These conditions are also depicted in Figures 5.16-1 to 5.16-4.

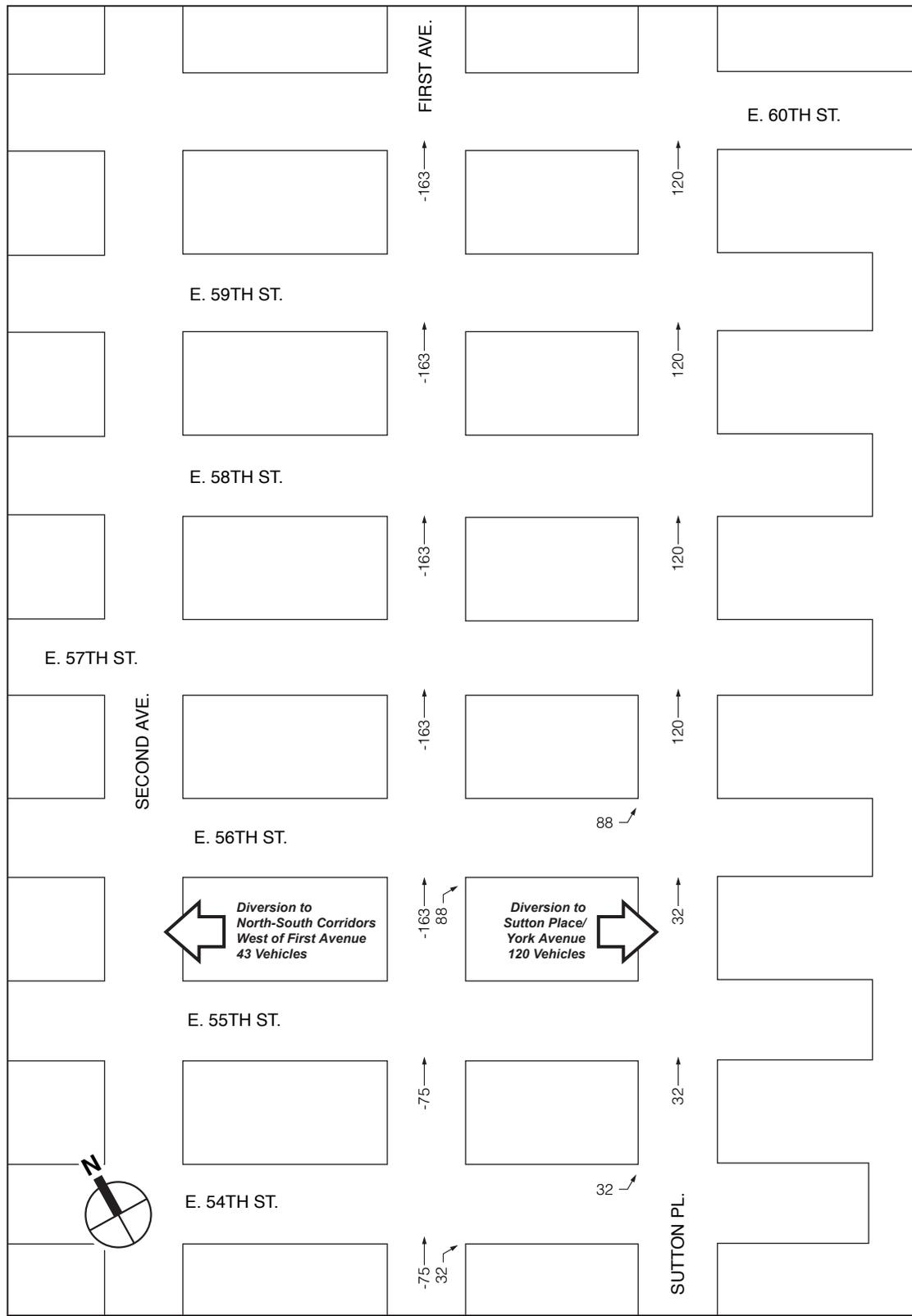
### *Traffic Diversions*

Potential traffic diversions along the First Avenue corridor are expected to result from 1) traffic choosing to not travel on First Avenue at all; and, 2) traffic on First Avenue diverting to Sutton Place. Although congested during peak periods, First Avenue still currently provides one of the better northbound options for traffic departing the Manhattan Central Business District (CBD). Hence, many motorists whose trips originate further west toward the center of Manhattan elect to use First Avenue as the preferred route. During construction of the water main connections, the anticipated deterioration in operating conditions and increase in travel time would make First Avenue a less attractive northbound route. Instead, some motorists who currently travel on First Avenue may choose to divert to the Third Avenue, Park Avenue, or Madison Avenue for the trip north. Based on projected traffic volumes and mitigated Build delays on First Avenue, it was estimated that up to 5 percent of the traffic currently using First Avenue could elect to avoid First Avenue entirely for the trip north. For those motorists that remain on First Avenue, opportunities to divert to Sutton Place are available at E. 54<sup>th</sup> and E. 56<sup>th</sup> Streets. The likely amount of traffic making such a diversion would largely depend on the perceived traffic flow of First Avenue versus the cross street that leads to a less congested route. Hence, the percentage of traffic that potentially could be diverting to Sutton Place varies by time period and depends on relative operating conditions on First Avenue, E. 54<sup>th</sup> and E. 56<sup>th</sup> Streets, and Sutton Place. It is assumed that north of E. 56<sup>th</sup> Street, while diversion opportunities are still available at E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets, motorists at this point would have endured several blocks of congested traffic and been able to see the end of the congestion. Therefore, no diversions to Sutton Place using these two cross-town routes were assumed.

Using the above criteria, traffic diversion estimates were developed, accounting for complete avoidance and diversion to Sutton Place, as shown in Figures 5.16-6, 5.16-7, and 5.16-8 for the AM, midday, and PM peak hours, respectively. The future traffic network volumes incorporating these diversion estimates are illustrated in Figures 5.16-9 through 5.16-11. The resulting operating levels at the First Avenue intersections analyzed under Segment 1 and Segment 3 construction are presented in Table 5.16-5. To determine the potential effect this traffic diversion would have on Sutton Place, three representative intersections along Sutton Place<sup>1</sup> (at E. 54<sup>th</sup>, E. 56<sup>th</sup>, and E. 59<sup>th</sup> Streets) were selected for analysis, the results of which are presented in Table 5.16-6. For the First Avenue corridor, the conditions shown after accounting for potential traffic diversions represent a more realistic state of traffic congestion, in that practical capacities at each intersection approach would not be substantially exceeded (i.e., v/c ratio above 1.05).

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<sup>1</sup> The Sutton Place intersection with E. 54<sup>th</sup> Street was not analyzed in Section 5.9 under the Sutton Place route. However, it was added here to address potential impacts resulting from diverted traffic due to construction along First Avenue.

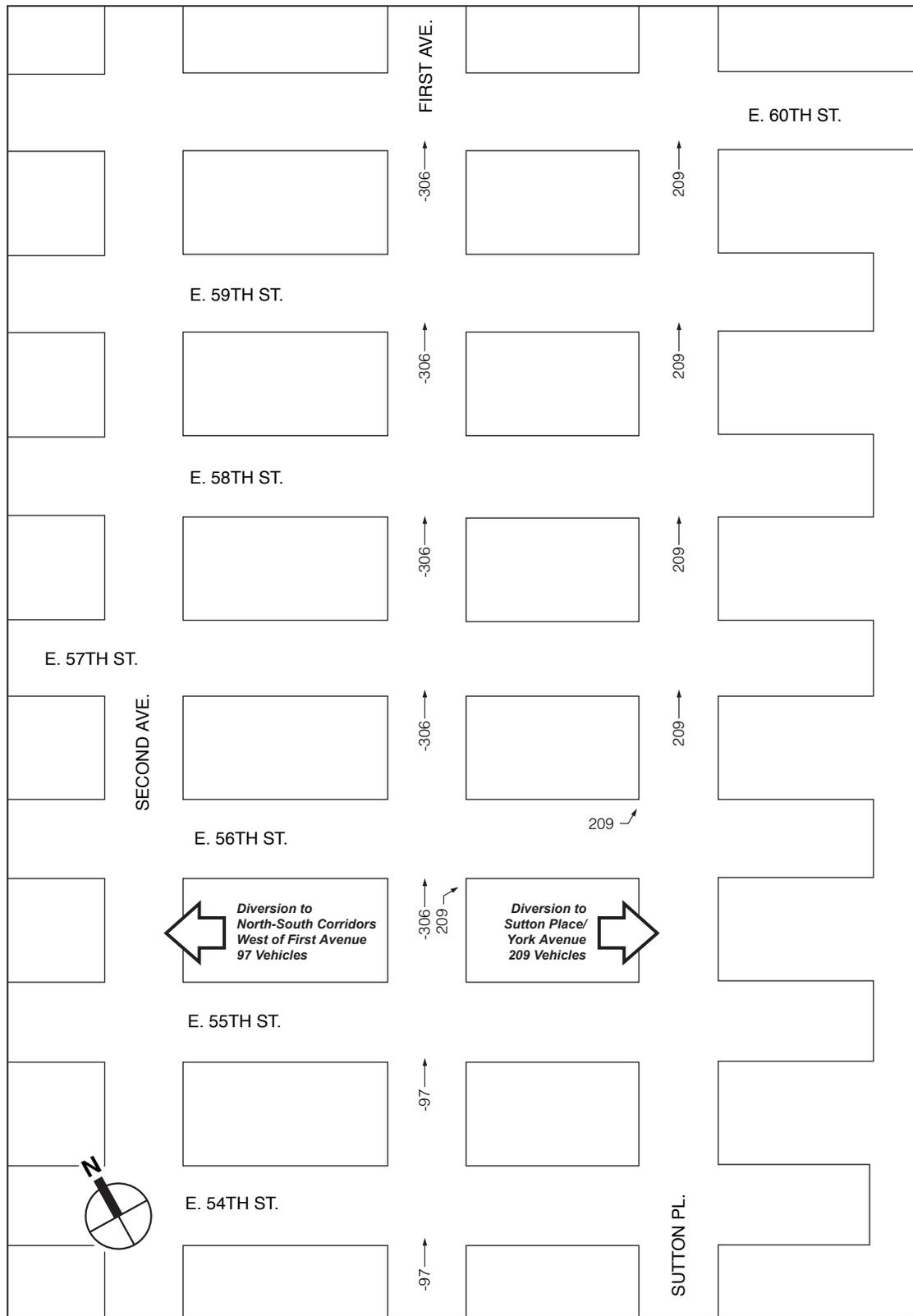


NOT TO SCALE



NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 PROPOSED SHAFT 33B TO CITY WATER TUNNEL NO. 3  
 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 TRAFFIC DIVERSION ESTIMATES - FIRST AVENUE ROUTE  
 AM PEAK HOUR

FIGURE 5.16-6



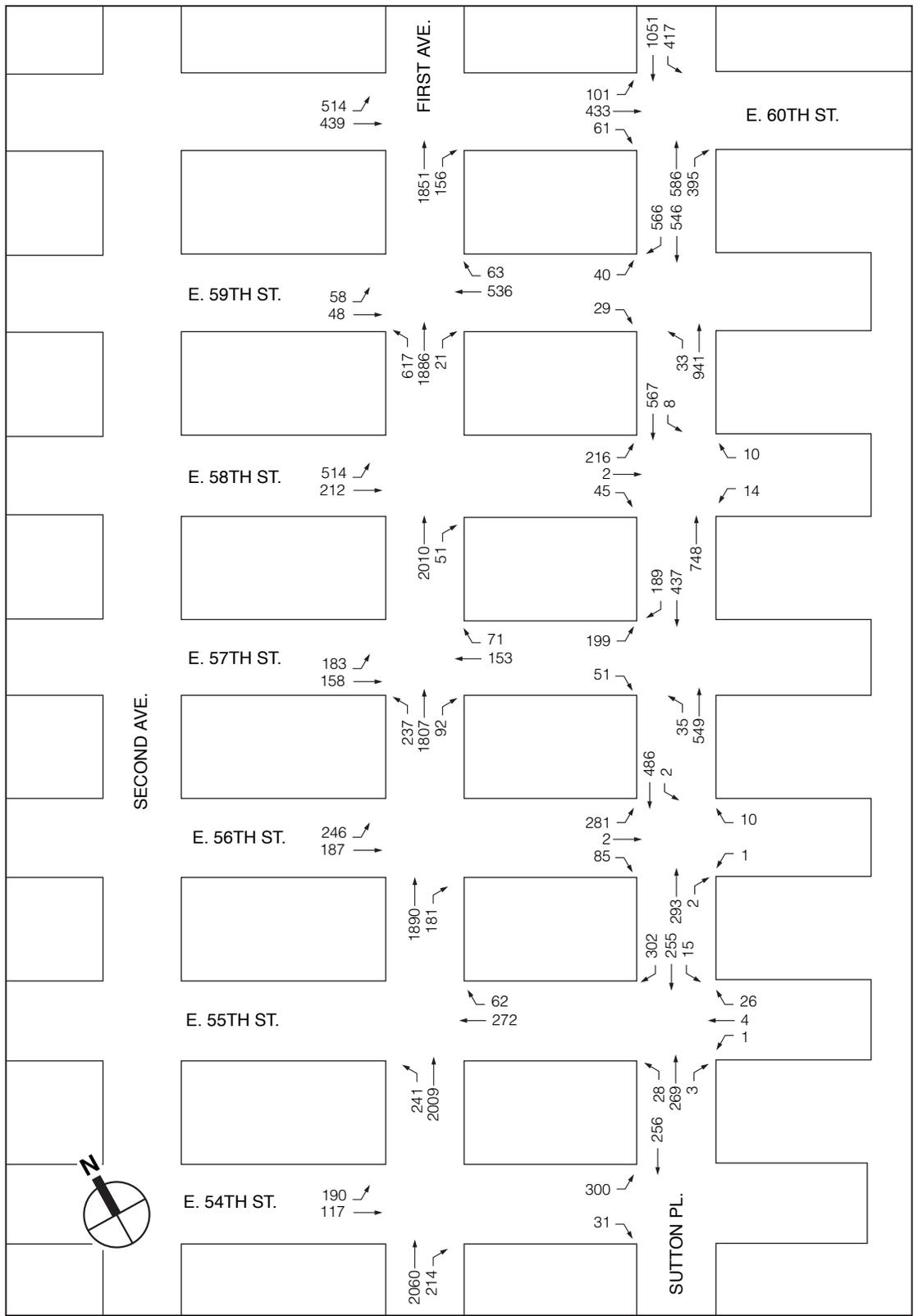
NOT TO SCALE



NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 PROPOSED SHAFT 33B TO CITY WATER TUNNEL NO. 3  
 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 TRAFFIC DIVERSION ESTIMATES - FIRST AVENUE ROUTE  
 MIDDAY PEAK HOUR

FIGURE 5.16-7



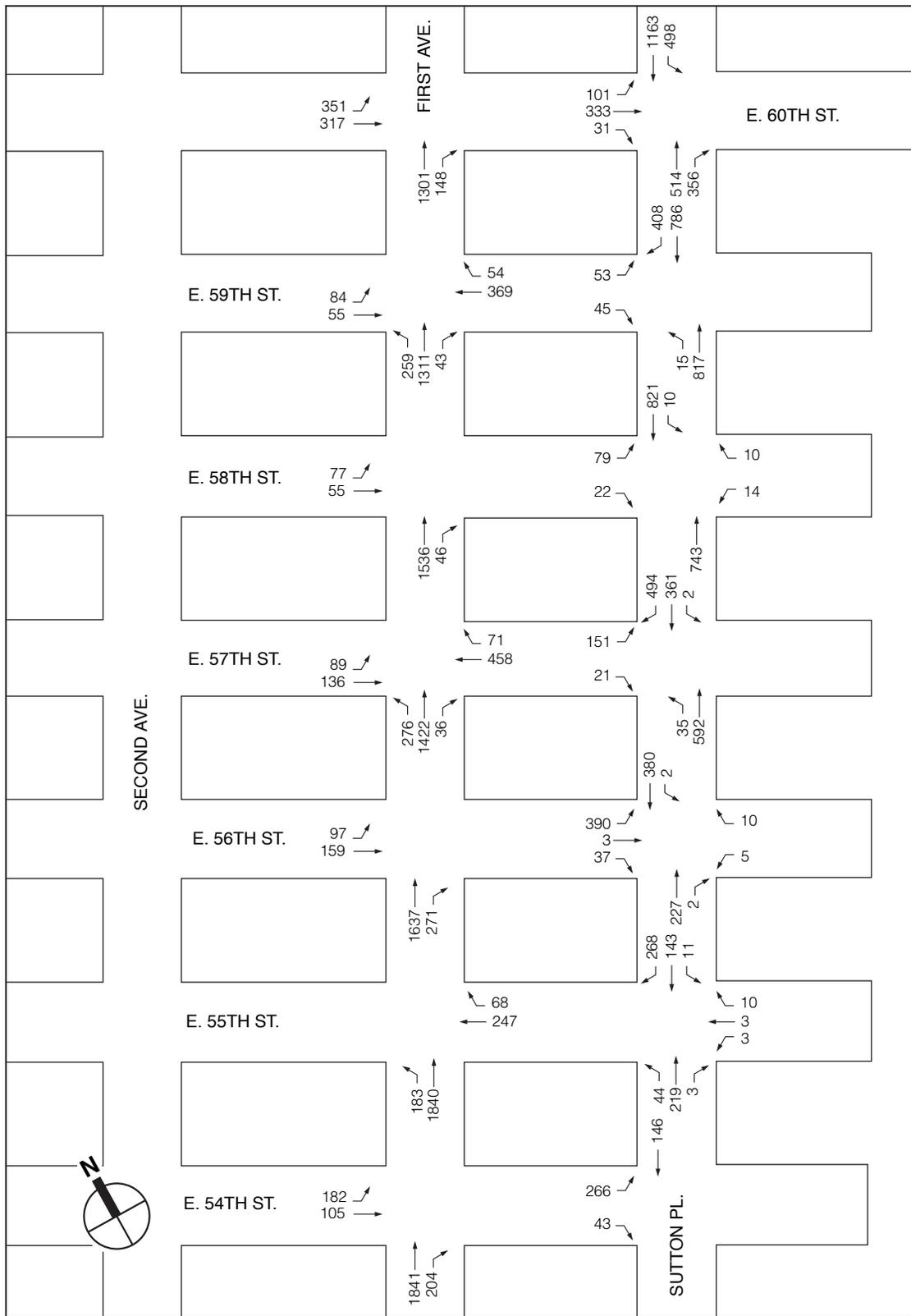


NOT TO SCALE



NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 PROPOSED SHAFT 33B TO CITY WATER TUNNEL NO. 3  
 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 2008 BUILD TRAFFIC VOLUME WITH DIVERSION  
 FIRST AVENUE ROUTE  
 AM PEAK HOUR

FIGURE 5.16-9

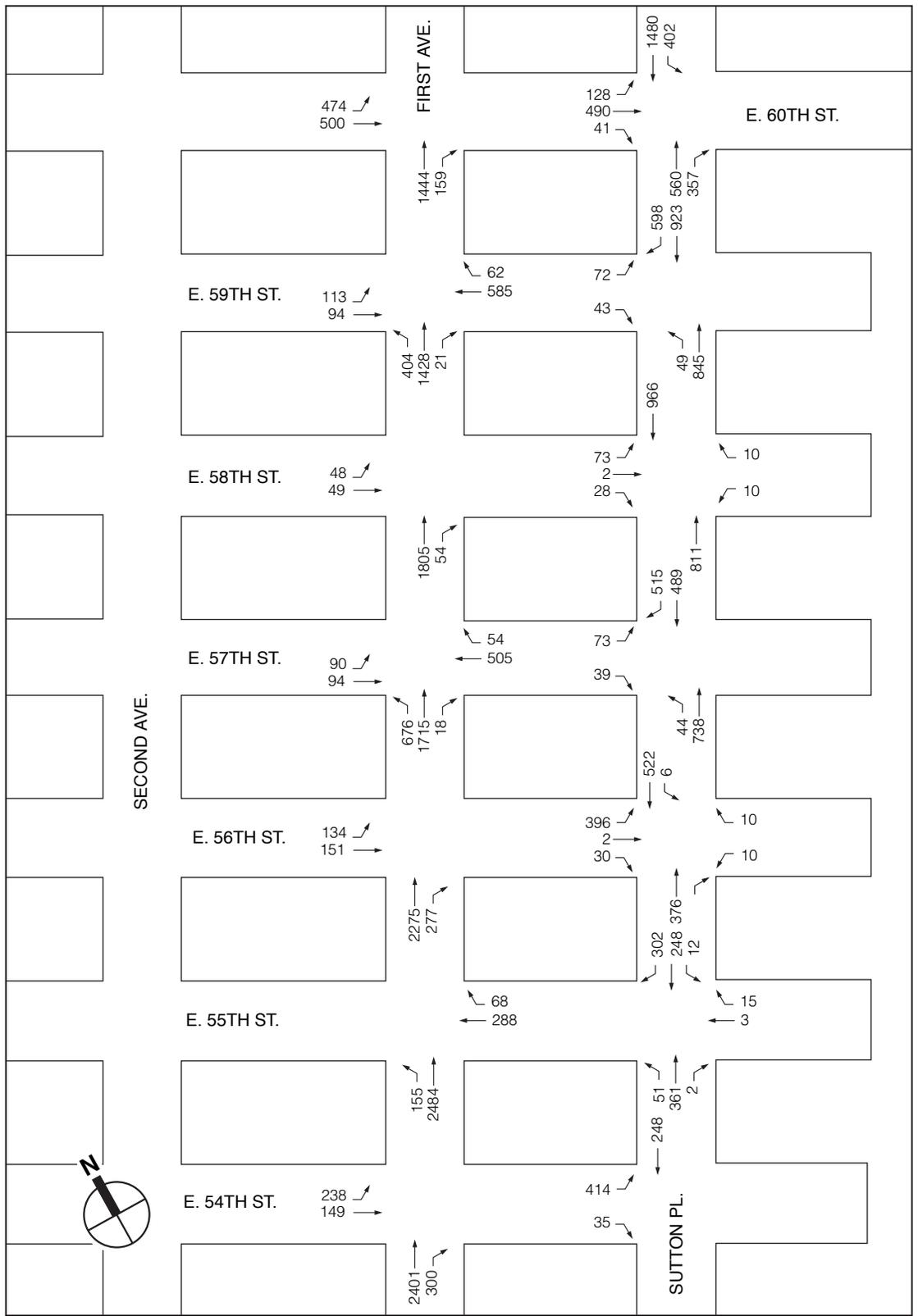


NOT TO SCALE



NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 PROPOSED SHAFT 33B TO CITY WATER TUNNEL NO. 3  
 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 2008 BUILD TRAFFIC VOLUME WITH DIVERSION  
 FIRST AVENUE ROUTE  
 MIDDAY PEAK HOUR

FIGURE 5.16-10



NOT TO SCALE



NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 PROPOSED SHAFT 33B TO CITY WATER TUNNEL NO. 3  
 STAGE 2-MANHATTAN LEG  
 WATER MAIN CONNECTIONS  
 2008 BUILD TRAFFIC VOLUME WITH DIVERSION  
 FIRST AVENUE ROUTE  
 PM PEAK HOUR

FIGURE 5.16-11

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-5**  
**2008 Traffic Diversion and Mitigated Build Conditions Comparison – First Avenue Intersections**

Analysis Intersection	AM Peak Hour				Midday Peak Hour				PM Peak Hour																		
	Mitigated Build Conditions		Traffic Diversion Conditions		Mitigated Build Conditions		Traffic Diversion Conditions		Mitigated Build Conditions		Traffic Diversion Conditions																
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS															
<b>Construction on First Avenue – Segment 1 Only (between E. 59<sup>th</sup> and E. 58<sup>th</sup> and between E. 57<sup>th</sup> and E. 56<sup>th</sup> Streets)</b>																											
<b>E. 59<sup>th</sup> Street (E-W) First Avenue (NB)</b>	EB-LT	0.31	19.5	B	EB-LT	0.31	19.5	B	EB-LT	0.47	23.7	C	EB-LT	0.47	23.7	C	EB-LT	0.81	45.4	D	EB-LT	0.81	45.4	D			
	WB-TR	0.53	21.0	C	WB-TR	0.53	21.0	C	WB-TR	0.38	18.9	B	WB-TR	0.38	18.9	B	WB-TR	0.57	21.8	C	WB-TR	0.57	21.8	C			
	NB-L	1.01	93.5	F *	NB-L	0.84	56.3	E *	NB-L	0.91	78.0	E *	NB-L	0.60	34.4	C	NB-L	0.85	34.6	C	NB-L	0.52	17.9	B			
	NB-LTR	1.12	81.0	F *	NB-LTR	1.06	57.3	E *	NB-LTR	1.10	74.6	E *	NB-LTR	0.95	31.4	C	NB-LTR	0.76	18.3	B	NB-LTR	0.71	17.3	B			
<b>E. 58<sup>th</sup> Street (EB) First Avenue (NB)</b>	EB-L	1.04	77.9	E	EB-L	1.04	77.9	E	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B	EB-LT	0.19	18.9	B	EB-LT	0.19	18.9	B			
	EB-T	0.35	21.0	C	EB-T	0.35	21.0	C	NB-T	0.96	29.6	C	NB-T	0.80	17.9	B	NB-T	0.66	13.9	B	NB-T	0.56	12.7	B			
	NB-T	0.81	17.1	B	NB-T	0.75	15.7	B	NB-R	0.11	12.4	B	NB-R	0.11	12.4	B	NB-R	0.11	9.6	A	NB-R	0.11	9.6	A			
	NB-R	0.11	12.4	B	NB-R	0.11	12.4	B																			
<b>E. 57<sup>th</sup> Street (E-W) First Avenue (NB)</b>	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D	EB-DfL	0.69	49.9	D	EB-DfL	0.69	49.9	D			
	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C	EB-T	0.20	20.9	C	EB-T	0.20	20.9	C			
	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C	WB-TR	0.65	28.0	C	WB-TR	0.65	28.0	C			
	NB-LTR	1.18	109.5	F *	NB-LTR	1.10	77.3	E *	NB-LTR	1.38	200.2	F *	NB-LTR	1.19	116.3	F *	NB-L	0.97	62.2	E	NB-L	1.04	81.6	F			
																				NB-LTR	1.29	158.0	F *	NB-LTR	1.11	81.8	F *
<b>Construction on First Avenue – Segment 3 Only (between E. 58<sup>th</sup> and E. 57<sup>th</sup> and between E. 56<sup>th</sup> and E. 55<sup>th</sup> Streets)</b>																											
<b>E. 58<sup>th</sup> Street (EB) First Avenue (NB)</b>	EB-L	1.04	77.9	E	EB-L	1.04	77.9	E	EB-LT	0.25	19.7	B	EB-LT	0.25	19.7	B	EB-LT	0.19	18.9	B	EB-LT	0.19	18.9	B			
	EB-T	0.35	21.0	C	EB-T	0.35	21.0	C	NB-TR	0.99	35.5	D	NB-TR	0.83	19.0	B	NB-TR	0.68	14.2	B	NB-TR	0.58	12.9	B			
	NB-TR	0.92	22.8	C	NB-TR	0.85	18.9	B																			
<b>E. 57<sup>th</sup> Street (E-W) First Avenue (NB)</b>	EB-DfL	0.90	67.9	E	EB-DfL	0.90	67.9	E	EB-DfL	0.64	43.1	D	EB-DfL	0.64	43.1	D	EB-DfL	0.69	49.9	D	EB-DfL	0.69	49.9	D			
	EB-T	0.39	24.3	C	EB-T	0.39	24.3	C	EB-T	0.34	23.4	C	EB-T	0.34	23.4	C	EB-T	0.20	20.9	C	EB-T	0.20	20.9	C			
	WB-TR	0.33	22.3	C	WB-TR	0.33	22.3	C	WB-TR	0.61	27.0	C	WB-TR	0.61	27.0	C	WB-TR	0.65	28.0	C	WB-TR	0.65	28.0	C			
	NB-LT	1.11	80.5	F *	NB-LT	1.03	52.1	D *	NB-LT	1.35	184.0	F *	NB-LT	1.15	101.1	F *	NB-L	0.97	62.2	E	NB-L	1.03	76.5	E			
																				NB-LT	1.27	151.6	F *	NB-LT	1.09	73.8	E *
																				NB-R	0.09	16.0	B	NB-R	0.09	16.0	B
<b>E. 56<sup>th</sup> Street (EB) First Avenue (NB)</b>	EB-LT	0.96	60.2	E	EB-LT	0.96	60.2	E	EB-LT	0.64	32.0	C	EB-LT	0.64	32.0	C	EB-LT	0.63	28.7	C	EB-LT	0.63	28.7	C			
	NB-TR	0.93	23.7	C	NB-TR	0.92	23.4	C	NB-TR	0.95	23.5	C	NB-TR	0.97	26.9	C	NB-TR	0.84	17.6	B	NB-TR	0.84	17.9	B			
<b>E. 55<sup>th</sup> Street (WB) First Avenue (NB)</b>	WB-T	0.74	37.9	D	WB-T	0.74	37.9	D	WB-T	0.64	32.3	C	WB-T	0.64	32.3	C	WB-T	0.77	39.8	D	WB-T	0.77	39.8	D			
	WB-R	0.22	22.5	C	WB-R	0.22	22.5	C	WB-R	0.24	22.9	C	WB-R	0.24	22.9	C	WB-R	0.24	22.9	C	WB-R	0.24	22.9	C			
	NB-LT	0.95	23.1	C	NB-LT	0.92	20.0	C	NB-LT	1.07	54.9	D *	NB-LT	1.02	39.5	D	NB-L	0.37	11.0	B	NB-L	0.46	12.8	B			
																				NB-LT	0.97	24.8	C	NB-LT	0.91	18.1	B
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).																										

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-6**  
**2008 Traffic Diversion and No Build Conditions Comparison – Sutton Place/York Avenue Intersections**

Analysis Intersection	AM Peak Hour								Midday Peak Hour								PM Peak Hour							
	No Build Conditions				Traffic Diversion Conditions				No Build Conditions				Traffic Diversion Conditions				No Build Conditions				Traffic Diversion Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on First Avenue – Segments 1 &amp; 3</b>																								
<b>E. 59<sup>th</sup> Street (E-W) York Avenue (N-S)</b>	EB-LTR	0.23	28.7	C	EB-LTR	0.23	28.7	C	EB-LTR	0.33	30.9	C	EB-LTR	0.33	30.9	C	EB-LTR	0.40	32.7	C	EB-LTR	0.40	32.7	C
	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C
	NB-LTR	0.67	15.0	B	NB-LTR	0.75	17.3	B	NB-LTR	0.46	11.6	B	NB-LTR	0.61	13.7	B	NB-LTR	0.72	17.6	B	NB-LTR	0.91	28.5	C
	SB-LTR	0.87	23.3	C	SB-LTR	0.87	23.3	C	SB-LTR	0.93	28.4	C	SB-LTR	0.93	28.4	C	SB-LTR	1.11	78.0	E	SB-LTR	1.11	78.0	E
<b>E. 56<sup>th</sup> Street (E-W) Sutton Place (N-S)</b>	EB-LTR	0.65	39.5	D	EB-LTR	0.85	53.8	D *	EB-LTR	0.54	35.5	D	EB-LTR	1.05	96.7	F *	EB-LTR	0.57	36.6	D	EB-LTR	1.05	94.5	F *
	WB-LR	0.03	25.2	C	WB-LR	0.03	25.2	C	WB-LR	0.04	25.3	C	WB-LR	0.05	25.4	C	WB-LR	0.06	25.6	C	WB-LR	0.07	25.7	C
	NB-TR	0.18	8.9	A	NB-TR	0.20	9.1	A	NB-TR	0.15	8.7	A	NB-TR	0.15	8.7	A	NB-TR	0.25	9.5	A	NB-TR	0.25	9.5	A
	SB-LT	0.35	10.3	B	SB-LT	0.35	10.3	B	SB-LT	0.28	9.8	A	SB-LT	0.28	9.8	A	SB-LT	0.39	10.7	B	SB-LT	0.39	10.7	B
<b>E. 54<sup>th</sup> Street (EB) Sutton Place (SB)</b>	EB-LR	0.86	57.7	E	EB-LR	0.95	73.6	E *	EB-LR	<u>0.88</u>	<u>61.2</u>	<u>E</u>	EB-LR	<u>0.88</u>	<u>61.2</u>	<u>E</u>	EB-LR	<u>1.08</u>	<u>106.4</u>	F	EB-LR	<u>1.08</u>	<u>106.4</u>	F
	SB-T	0.16	8.8	A	SB-T	0.16	8.8	A	SB-T	<u>0.10</u>	<u>8.3</u>	A	SB-T	<u>0.10</u>	<u>8.3</u>	A	SB-T	<u>0.17</u>	<u>8.8</u>	A	SB-T	<u>0.17</u>	<u>8.8</u>	A
<b>Notes:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a defacto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).																								

Along Sutton Place, the analysis results for the three selected intersections show that the anticipated traffic diversion would result in temporary adverse impacts at the Sutton Place intersections with E. 54<sup>th</sup> and E. 56<sup>th</sup> Streets. Although the diverted traffic would not be expected to impact northbound traffic flow along Sutton Place, the additional turning traffic from First Avenue at these two intersections would result in congested operating conditions at each of the eastbound approaches to these streets' intersections with Sutton Place. Currently, Sutton Place intersections operate with unusually lengthy signal cycles (120 seconds), which discourage diversion of traffic from First Avenue to the all-residential Sutton Place corridor. While signal timing adjustments could potentially mitigate the diversion-induced temporary adverse impacts to the Sutton Place intersections at E. 54<sup>th</sup> and E. 56<sup>th</sup> Streets, such measures would likely result in additional diversions to Sutton Place. Therefore, no mitigation measures are proposed for these temporary diversion-induced impacts.

#### *Mitigation Assessment Summary*

While the provision of an extra travel lane by imposing more stringent curbside restrictions on First Avenue during the AM and midday peak periods would, after accounting for traffic diversions, reduce temporary adverse impacts at many of the affected intersections, unmitigated impacts lasting several months would persist at the E. 57<sup>th</sup> intersection during the AM and midday peak periods and at the E. 59<sup>th</sup> Street intersection during the AM peak period. Furthermore, with no mitigation measures imposed for the PM peak period, the temporary adverse impacts at First Avenue and E. 57<sup>th</sup> Street would also remain unmitigated. However, the projected congestion at these intersections would be substantially less than what was portrayed in Section 5.9. As discussed, the agencies, including NYCDEP, NYCDDC, and NYCDOT would coordinate during construction to determine the appropriate actions to further alleviate congestion and improve traffic flow beyond the conditions described above. Some more aggressive traffic attenuating measures that may be considered as part of a comprehensive traffic management plan are discussed below.

#### *Conceptual Traffic Management Strategies*

The use of traffic enforcement agents (TEAs) to facilitate more efficient traffic flow is commonly adapted at congested locations in New York City. Along First Avenue, TEA presence is currently evident at its intersections with E. 57<sup>th</sup> and E. 59<sup>th</sup> Streets during peak periods. Increasing additional TEA presence at these locations and at intersections upstream from the immediate access/egress links of the Queensboro Bridge (i.e., at E. 54<sup>th</sup>, E. 55<sup>th</sup>, and E. 56<sup>th</sup> Streets) could further improve traffic flow and reduce the potential for gridlock conditions at congested intersections. A more aggressive measure may be to impose more stringent enforcement on the west curb lane restriction on First Avenue during construction. Through ticketing and even towing of violators, blockages on the west curb lane could become less frequent, thereby increasing the effectiveness of the mitigation measure and potentially achieving a higher throughput capacity than the 25 percent assumed for this lane. Installing appropriate signage, including fixed and possibly variable message signs (VMSs), well in advance of the construction zone (i.e., at E. 42<sup>nd</sup> Street and south of the First Avenue tunnel) would provide motorists the opportunity to make informed decisions on what travel routes to take. Making frequent public announcements of conditions during construction could also further enhance the choice-making of motorists and reduce the traffic demand on First Avenue.

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Sutton Place Route**

Construction of the water main connections along the Sutton Place route would result in temporary adverse traffic impacts at the First Avenue intersection with E. 59<sup>th</sup> Street and at the Sutton Place intersections at E. 57<sup>th</sup>, E. 58<sup>th</sup>, and E. 59<sup>th</sup> Streets. Since the Sutton Place route joins the First Avenue route at First Avenue to continue west along E. 55<sup>th</sup> and E. 56<sup>th</sup> Streets, the Segment 7 impacts identified above for the First Avenue route would also occur. The conventional mitigation measures used to address these impacts consist of imposing curbside restrictions on the east side of Sutton Place and incorporating signal timing changes at several Study Area intersections. These measures are summarized in Table 5.16-7 and described in further detail below. As noted in Section 5.9, for ease of comparison, the Sutton Place segments are analogously referred to as Segments 1 and 3, whereas the E. 56<sup>th</sup> Street and E. 55<sup>th</sup> Street segments are referred to as Segment 5 and Segment 9, respectively.

**Table 5.16-7**  
**Conventional Mitigation Measures – Sutton Place Route**

Analysis Intersection	Approach	Existing Signal Timing (sec)	Mitigation Measures	
			Mitigated Build Signal Timing (sec)	Description of Mitigation
<b>Construction on E. 59<sup>th</sup> Street (between First and York Avenues)</b>				
E. 59 <sup>th</sup> Street (E-W)	EB/WB	43/43/43	43/45/45	Transfer 2 seconds from the northbound phase to the east-west phase during the midday and PM peak hours.
First Avenue (NB)	NB	47/47/47	47/45/45	
E. 59 <sup>th</sup> Street (E-W)	EB/WB	48/48/48	48/48/46	Transfer 2 seconds from the east-west phase to the north-south phase during the PM peak hour.
York Avenue (N-S)	NB/SB	72/72/72	72/72/74	
<b>Construction on Sutton Place – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>				
E. 59 <sup>th</sup> Street (E-W)	EB/WB	48/48/48	48/48/48	Implement No Standing from 7:00 AM to 10:00 AM and from 4:00 PM to 7:00 PM on the east side of York Avenue to provide an additional northbound travel lane during the AM and PM peak hours.
York Avenue (N-S)	NB/SB	72/72/72	72/72/72	
E. 58 <sup>th</sup> Street (EB)	EB	48/48/48	48/44/48	Transfer 4 seconds from the eastbound phase to the north-south phase during the midday peak hour.
Sutton Place (N-S)	NB/SB	72/72/72	72/76/72	
<b>Construction on Sutton Place – Segment 3 Only (between E. 55<sup>th</sup> and E. 56<sup>th</sup> and between E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets)</b>				
E. 58 <sup>th</sup> Street (EB)	EB	48/48/48	48/44/48	Transfer 4 seconds from the eastbound phase to the north-south phase during the midday peak hour.
Sutton Place (N-S)	NB/SB	72/72/72	72/76/72	
E. 57 <sup>th</sup> Street (E-W)	EB/WB	48/48/48	48/48/47	Transfer 1 second from the east-west phase to the north-south phase during the PM peak hour.
Sutton Place (N-S)	NB/SB	72/72/72	72/72/73	
<b>Note:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound.				

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION**

- **E. 59<sup>th</sup> Street Segment:** Signal timing modifications were considered at both the First Avenue and Sutton Place/York Avenue intersections with E. 59<sup>th</sup> Street. At First Avenue, 2 seconds would be transferred from the northbound phase to the east-west phase during the midday and PM peak periods. At Sutton Place/York Avenue, 2 seconds from the east-west phase would be transferred to the north-south phase during the PM peak period.
- **Segment 1:** Signal timing modifications at Sutton Place and E. 58<sup>th</sup> Street would include transferring 4 seconds from the eastbound phase to the north-south phase during the midday peak period. Imposing curbside restrictions for the east side of Sutton Place between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets during the AM and PM peak periods (No Standing 7:00 a.m. to 10:00 a.m. and 4 PM to 7 PM) would enhance northbound capacity by providing an additional travel lane. Since curbside deliveries are not prevalent along Sutton Place, this curbside restriction is expected to be substantially more effective than what was described for the west curb of First Avenue in providing a fully functional travel lane.
- **Segment 3:** Signal timing modifications were considered at the Sutton Place intersections with E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets. At E. 58<sup>th</sup> Street, 4 seconds would be transferred from the eastbound phase to the north-south phase during the midday peak period. At E. 57<sup>th</sup> Street, 1 second would be transferred from the east-west phase to the north-south phase during the PM peak period.

Capacity analysis was conducted to determine the effectiveness of the above measures, as summarized in Tables 5.16-8, 5.16-9, and 5.16-10, for the AM, midday, and PM peak hours, respectively. While the mitigation measures would improve conditions at all intersections, there would still be unmitigated impacts during the midday peak hour at the Sutton Place intersection with E. 57<sup>th</sup> Street and during PM peak hours at the First Avenue intersection with E. 59<sup>th</sup> Street.

**Table 5.16-8**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**Sutton Place Route Water Main Connection Study Area – AM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on Sutton Place – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>												
<b>E. 59<sup>th</sup> Street (E-W) York Avenue (N-S)</b>	EB-LTR	0.23	28.7	C	EB-LTR	0.25	29.2	C	EB-LTR	0.23	28.7	C
	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C
	NB-LTR	0.67	15.0	B	NB-LTR	1.26	145.1	F *	NB-LTR	0.63	14.1	B
	SB-LTR	0.87	23.3	C	SB-LTR	0.87	23.3	C	SB-LTR	0.87	23.3	C
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).											

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION MEASURES**

**Table 5.16-9**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**Sutton Place Route Water Main Connection Study Area – Midday Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on E. 59<sup>th</sup> Street (between First and York Avenues)</b>												
<b>E. 59<sup>th</sup> Street (E-W) First Avenue (NB)</b>	EB-LT	0.44	22.7	C	EB-LT	0.80	52.7	D *	EB-LT	0.72	40.5	D
	WB-TR	0.38	18.9	B	WB-TR	0.65	25.3	C	WB-TR	0.61	23.0	C
	NB-L	0.63	21.7	C	NB-L	0.63	21.7	C	NB-L	0.68	25.5	C
	NB-LTR	0.76	18.7	B	NB-LT	0.73	17.9	B	NB-LT	0.77	20.4	C
<b>Construction on Sutton Place – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>												
<b>E. 58<sup>th</sup> Street (EB) Sutton Place (N-S)</b>	EB-LTR	0.25	28.5	C	EB-LTR	0.28	29.4	C	EB-LTR	0.32	33.2	C
	WB-LR	0.06	25.5	C	WB-LR	0.07	25.6	C	WB-LR	0.08	28.5	C
	NB-TR	0.33	10.1	B	NB-TR	0.64	15.7	B	NB-TR	0.60	12.1	B
	SB-LT	0.58	13.1	B	SB-LT	1.05	62.9	E *	SB-LT	0.99	42.6	D
<b>Construction on Sutton Place – Segment 3 Only (between E. 55<sup>th</sup> and E. 56<sup>th</sup> and between E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets)</b>												
<b>E. 58<sup>th</sup> Street (EB) Sutton Place (N-S)</b>	EB-LTR	0.25	28.5	C	EB-LTR	0.28	29.4	C	EB-LTR	0.32	33.2	C
	WB-LR	0.06	25.5	C	WB-LR	0.07	25.6	C	WB-LR	0.08	28.5	C
	NB-TR	0.33	10.1	B	NB-TR	0.64	15.7	B	NB-TR	0.60	12.1	B
	SB-LTR	0.58	13.1	B	SB-LTR	1.05	62.9	E *	SB-LTR	0.99	42.6	D
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).											

**Table 5.16-10**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**Sutton Place Route Water Main Connection Study Area – PM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on E. 59<sup>th</sup> Street (between First and York Avenues)</b>												
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-LT	0.78	42.3	D	EB-LT	1.10	119.6	F *	EB-LT	1.00	87.3	F *
	WB-TR	0.57	21.8	C	WB-TR	0.55	21.4	C	WB-TR	0.51	19.3	B
	NB-L	0.70	22.6	C	NB-L	0.70	22.6	C	NB-L	0.75	27.2	C
	NB-LT	0.74	18.0	B	NB-LT	0.74	18.0	B	NB-LT	0.78	20.5	C
	NB-R	0.07	11.2	B								
E. 59 <sup>th</sup> Street (E-W) York Avenue (N-S)	EB-LTR	0.40	32.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	26.0	C
	WB-LTR	0.00	24.7	C	NB-LTR	0.76	19.0	B	NB-LTR	0.72	16.0	B
	NB-LTR	0.72	17.6	B	SB-LTR	1.14	89.5	F *	SB-LTR	1.10	73.6	E
	SB-LTR	1.11	78.0	E								
<b>Construction on Sutton Place – Segment 1 Only (between E. 56<sup>th</sup> and E. 57<sup>th</sup> and between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets)</b>												
E. 59 <sup>th</sup> Street (E-W) York Avenue (N-S)	EB-LTR	0.40	32.7	C	EB-LTR	0.43	34.1	C	EB-LTR	0.40	32.7	C
	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C
	NB-LTR	0.72	17.6	B	NB-LTR	1.26	149.6	F *	NB-LTR	0.68	16.0	B
	SB-LTR	1.11	78.0	E	SB-LTR	1.11	78.0	E	SB-LTR	1.11	78.0	E
<b>Construction on Sutton Place – Segment 3 Only (between E. 55<sup>th</sup> and E. 56<sup>th</sup> and between E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets)</b>												
E. 57 <sup>th</sup> Street (E-W) Sutton Place (N-S)	EB-DfL	0.22	28.2	C	EB-DfL	0.26	29.3	C	EB-DfL	0.27	30.2	C
	EB-TR	0.10	26.2	C	EB-TR	0.11	26.3	C	EB-TR	0.11	27.0	C
	WB-LTR	0.00	24.7	C	WB-LTR	0.00	24.7	C	WB-LTR	0.00	25.4	C
	NB-LTR	0.50	12.3	B	NB-LTR	0.97	45.7	D *	NB-LTR	0.95	41.6	D
	SB-LTR	0.81	19.9	B	SB-LTR	0.77	18.0	B	SB-LTR	0.76	16.8	B
<b>Notes:</b>	EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 Highway Capacity Manual Methodology (HCS 2000).											

*E. 59<sup>th</sup> Street Segment – Construction on E. 59<sup>th</sup> Street*

Temporary adverse impacts were identified for the E. 59<sup>th</sup> Street intersection with First Avenue during the midday and PM peak hours and at its intersection with Sutton Place/York Avenue during the PM peak hour.

*Mitigated*

- First Avenue and E. 59<sup>th</sup> Street – During the midday peak hour, eastbound approach impacts would be mitigated from LOS D with 52.7 spv of delay to LOS D with 40.5 spv of delay.

- Sutton Place/York Avenue and E. 59<sup>th</sup> Street – During the PM peak hour, southbound approach impacts would be mitigated from LOS F with 89.5 spv of delay to LOS E with 73.6 spv of delay.

*Unmitigated*

- First Avenue and E. 59<sup>th</sup> Street – During the PM peak hour, eastbound approach impacts would be partially mitigated from LOS F with 119.6 spv of delay to LOS F with 87.3 spv of delay. Although additional signal timing adjustments could further reduce the eastbound delay, fully mitigating the projected impact could not be achieved without impacting First Avenue northbound traffic. Hence, only a nominal signal timing change was considered and the temporary adverse impacts identified for eastbound traffic would remain unmitigated.

*Segment 1 – Construction on Sutton Place*

Temporary adverse impacts were identified for the Sutton Place/York Avenue and E. 59<sup>th</sup> Street intersection during the AM and PM peak hours and for the Sutton Place and E. 58<sup>th</sup> Street intersection during the midday peak hour.

*Mitigated*

- Sutton Place/York Avenue and E. 59<sup>th</sup> Street – During the AM peak hour, northbound approach impacts would be mitigated from LOS F with 145.1 spv of delay to LOS B with 14.1 spv of delay. During the PM peak hour, impacts from the same approach would be mitigated from LOS F with 149.6 spv of delay to LOS B with 16.0 spv of delay.
- Sutton Place and E. 58<sup>th</sup> Street – During the midday peak hour, southbound approach impacts would be mitigated from LOS E with 62.9 spv of delay to LOS D with 42.6 spv of delay.

*Segment 3 – Construction on Sutton Place*

Temporary adverse impacts were identified for Sutton Place at E. 58<sup>th</sup> Street during the midday peak hour and at E. 57<sup>th</sup> Street during the midday and PM peak hours.

*Mitigated*

- Sutton Place and E. 58<sup>th</sup> Street - During the midday peak hour, southbound approach impacts would be mitigated from LOS E with 62.9 spv of delay to LOS D with 42.6 spv of delay.
- Sutton Place and E. 57<sup>th</sup> Street - During the PM peak hour, northbound approach impacts would be mitigated from LOS D with 45.7 spv of delay to LOS D with 41.6 spv of delay.

*Unmitigated*

- Sutton Place and E. 57<sup>th</sup> Street – During the midday peak hour, southbound approach impacts would remain unmitigated at LOS F with 163.0 spv of delay.

The mitigation measures considered above involve primarily changes to signal timing. For the Sutton Place block between E. 58<sup>th</sup> and E. 59<sup>th</sup> Streets, the current curbside regulations on the east side of the street permit parking for up to 7 vehicles. A bus stop is also located on this block

towards the southern end. The curbside restriction considered as mitigation would temporarily displace the use of up to 7 parking spaces during the AM and PM peak periods.

#### *Mitigation Assessment Summary*

While the above mitigation measures would reduce temporary adverse impacts at most of the affected intersections, unmitigated impacts would persist at First Avenue and E. 59<sup>th</sup> Street in the PM peak hour until the E. 59<sup>th</sup> Street Segment construction is complete and two-way traffic is restored between First Avenue and Sutton Place/York Avenue. At Sutton Place and E. 57<sup>th</sup> Street, the temporary adverse impacts identified for the midday peak hour during Segment 3 construction would remain unmitigated. With construction along E. 59<sup>th</sup> Street staged in 200-foot intervals at a time, the projected temporary adverse impacts at adjacent intersections are likely to be less severe and mitigation measures would not likely to be required for the entire duration of the segment's construction. For southbound Sutton Place at E. 57<sup>th</sup> Street, the unmitigated impacts would persist for the duration of Segment 3 construction. Although conventional mitigation measures would not be appropriate at this location due to substantial traffic volumes in competing approaches, it would be viable for a TEA to facilitate more efficient traffic flow. To mitigate the temporary southbound impact during the midday peak period, a second southbound lane is needed. While it would be infeasible to create a lane-shift via restriping for this additional southbound lane, similar operational results could be achieved with using traffic cones to expand the available width on the southbound roadway while adjacent construction is in under way. When the construction zone would be narrowed after the midday peak period, the "manual" shifting of lane channelization could be terminated at the discretion of the TEA stationed at the intersection. As discussed, the agencies, including NYCDEP, NYCDDC, and NYCDOT would coordinate during construction to determine the appropriate actions to further alleviate congestion and improve traffic flow beyond the conditions described above.

#### **E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street Route**

Construction of the water main connections along the E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street route would result in temporary adverse traffic impacts at the First Avenue intersections with E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets, the Second Avenue intersections with E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets, and at the Third Avenue intersections with E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets. The conventional mitigation measures used to address these impacts consist of only incorporating signal timing changes at the First Avenue intersections with E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets. These measures are summarized in Table 5.16-11 and described in further detail below. As noted in Section 5.9, for ease of comparison, the First Avenue segment between E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets is analogously referred to as Segment 1, whereas the cross-town street segments are referred to as Segments 3 and 5 along E. 61<sup>st</sup> Street and as Segments 6 and 8 along E. 59<sup>th</sup> Street. While all applicable conventional mitigation measures were explored, conditions at most of the Study Area intersections anticipated to experience temporary adverse traffic impacts could not be mitigated with these measures. A discussion of potential traffic management strategies is provided following the detailed analysis of the intersections where conventional mitigation measures would be effective in alleviating the projected impacts.

**Table 5.16-11  
Conventional Mitigation Measures – E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street Route**

Analysis Intersection	Approach	Existing Signal Timing (sec)	Mitigation Measures	
			Mitigated Build Signal Timing (sec)	Description of Mitigation
<b>Construction on E. First Avenue – Segment 1 Only (between E 59<sup>th</sup> and E. 61<sup>st</sup> Streets)</b>				
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB/WB NB	43/43/43 47/47/47	43/43/44 47/47/46	Transfer 1 second from the northbound phase to the east-west phase during the PM peak hour.
E. 61 <sup>st</sup> Street (WB) First Avenue (NB)	WB NB	40/40/40 50/50/50	38/40/40 52/50/50	Transfer 2 seconds from the westbound phase to the northbound phase during the AM peak hour.
<b>Construction on E. 59<sup>th</sup> Street – Segment 6 Only (between First and Second Avenues)</b>				
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB/WB NB	43/43/43 47/47/47	43/43/46 47/47/44	Transfer 3 seconds from the northbound phase to the east-west phase during the PM peak hour.
<b>Notes:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound.				

- Segment 1: Signal timing modifications were considered at both the E. 59<sup>th</sup> and E. 61<sup>st</sup> Street intersections with First Avenue. At E. 59<sup>th</sup> Street, 1 second would be transferred from the northbound phase to the east-west phase during the PM peak period. At E. 61<sup>st</sup> Street, 2 seconds would be transferred from the westbound phase to the northbound phase during the AM peak period.
- Segment 6: Signal timing modifications at First Avenue and E. 59<sup>th</sup> Street would include transferring 3 seconds from the northbound phase to the east-west phase during the PM peak hour.

Capacity analysis was conducted to determine the effectiveness of the above measures, as summarized in Tables 5.16-12 and 5.16-13, for the AM and PM peak hours, respectively. At the two intersections where conventional mitigation measures were applied, all projected temporary adverse impacts would be fully mitigated. Conceptual traffic management strategies that could more readily address conditions at the other analysis locations are provided after the following summary of analysis results.

*Segment 1 – Construction on First Avenue*

Temporary adverse impacts were identified along First Avenue, at E. 61<sup>st</sup> Street during the AM peak hour and at E. 59<sup>th</sup> Street during the PM peak hour, both of which could be mitigated by signal timing adjustments.

*Mitigated*

- First Avenue and E. 59<sup>th</sup> Street – During the PM peak hour, eastbound approach impacts would be mitigated from LOS D with 50.7 spv of delay to LOS D with 43.7 spv of delay.
- First Avenue and E. 61<sup>st</sup> Street – During the AM peak hour, northbound approach impacts would be mitigated from LOS E with 60.9 spv of delay to LOS D with 42.6 spv of delay.

**CHAPTER 5: WATER MAIN CONNECTIONS**  
**5.16 MITIGATION**

**Table 5.16-12**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street Route Water Main Connection Study Area – AM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on First Avenue – Segment 1 Only (between E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets)</b>												
E. 61 <sup>st</sup> Street (WB) First Avenue (NB)	WB-TR	0.62	24.9	C	WB-TR	0.62	24.9	C	WB-TR	0.66	27.3	C
	NB-LT	0.86	18.6	B	NB-LT	1.08	60.9	E *	NB-LT	1.03	42.6	D
<b>Notes:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).												

**Table 5.16-13**  
**2008 Mitigated Build, Build, and No Build Conditions Comparison**  
**E. 59<sup>th</sup> Street/E. 61<sup>st</sup> Street Route Water Main Connection Study Area – PM Peak Hour**

Analysis Intersection	No Build Conditions				Build Conditions				Mitigated Build Conditions			
	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS	Lane Group	V/C Ratio	Delay (sec)	LOS
<b>Construction on First Avenue – Segment 1 Only (between E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets)</b>												
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-LT	0.78	42.3	D	EB-LT	0.85	50.7	D *	EB-LT	0.80	43.7	D
	WB-TR	0.57	21.8	C	WB-TR	0.57	21.8	C	WB-TR	0.56	20.9	C
	NB-L	0.70	22.6	C	NB-L	0.70	22.6	C	NB-L	0.72	24.7	C
	NB-LT	0.74	18.0	B	NB-LT	0.74	18.0	B	NB-LT	0.76	19.2	B
	NB-R	0.07	11.2	B	NB-R	0.07	11.2	B	NB-R	0.07	11.9	B
<b>Construction on E. 59<sup>th</sup> Street – Segment 6 Only (between First and Second Avenues)</b>												
E. 59 <sup>th</sup> Street (E-W) First Avenue (NB)	EB-LT	0.78	42.3	D	EB-LT	0.95	73.0	E *	EB-LT	0.82	44.2	D
	WB-TR	0.57	21.8	C	WB-TR	0.57	21.8	C	WB-TR	0.53	19.2	B
	NB-L	0.70	22.6	C	NB-L	0.70	22.6	C	NB-L	0.78	30.2	C
	NB-LT	0.74	18.0	B	NB-LT	0.74	18.0	B	NB-LT	0.80	21.9	C
	NB-R	0.07	11.2	B	NB-R	0.07	11.2	B	NB-R	0.08	13.4	B
<b>Notes:</b> EB-Eastbound, WB-Westbound, NB-Northbound, SB-Southbound L-Left, T-Through, R-Right, DfL-Analysis considers a Defacto Left Lane on this approach. Defacto left lane: As per HCM 2000, page 16-135, when the proportion of left turns in the left-hand lane group is 1.0, this left-hand lane should be analyzed as an exclusive left-turn lane (a de facto left-turn lane), since occupied entirely by left-turning vehicles. V/C Ratio - Volume to Capacity Ratio, SEC/VEH - Seconds per vehicle LOS - Level of service * Denotes impacted locations Analysis is based on the 2000 <i>Highway Capacity Manual Methodology</i> (HCS 2000).												

*Segment 3 – Construction on E. 61<sup>st</sup> Street*

Temporary adverse impacts were identified at Second Avenue and E. 61<sup>st</sup> Street during all analysis peak hours. These impacts could not be mitigated by conventional mitigation measures and would remain unmitigated.

*Segment 5 – Construction on E. 61<sup>st</sup> Street*

Temporary adverse impacts were identified at Third Avenue and E. 61<sup>st</sup> Street during all analysis peak hours. These impacts could not be mitigated by conventional mitigation measures and would remain unmitigated.

*Segment 6 – Construction on E. 59<sup>th</sup> Street*

Temporary adverse impacts were identified at First Avenue and E. 59<sup>th</sup> Street during the PM peak hour, which could be mitigated by signal timing adjustment.

*Mitigated*

- First Avenue and E. 59<sup>th</sup> Street – During the PM peak hour, eastbound approach impacts would be mitigated from LOS E with 73.0 spv of delay to LOS D with 44.2 spv of delay.

*Segment 8 – Construction on E. 59<sup>th</sup> Street*

Temporary adverse impacts were identified along E. 59<sup>th</sup> Street at Second and Third Avenues during all peak periods. These impacts could not be mitigated by conventional mitigation measures and would remain unmitigated.

*Mitigation Assessment Summary*

As stated in Section 5.9 and evident from the above mitigation analysis, construction of the water main connections along the E. 59<sup>th</sup> Street/ E. 61<sup>st</sup> Street route would result in temporary adverse traffic impacts that could not be mitigated with conventional mitigation measures. While projected impacts at the First Avenue intersections with E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets could be mitigated with adjustments to signal timing, unmitigable impacts predicted for the E. 61<sup>st</sup> Street corridor from First Avenue to Third Avenue and for the E. 59<sup>th</sup> Street block from Third Avenue to Second Avenue have the potential to cause noticeable queuing and traffic diversions. As discussed, the agencies, including NYCDEP, NYCDDC, and NYCDOT would coordinate during construction to determine the appropriate actions to further alleviate congestion and improve traffic flow. Some more aggressive traffic attenuating measures that may be considered as part of a comprehensive traffic management plan are discussed below.

*Conceptual Traffic Management Strategies*

As discussed earlier, the construction efforts would be conducted in coordination with NYCDOT OCMC, which requires the preparation of maintenance and protection of traffic (MPT) plans to address potential traffic impacts, such as those resulting from capacity reductions during construction on the heavily traveled cross-town routes of E. 59<sup>th</sup> and E. 61<sup>st</sup> Streets. Currently, two or three traffic lanes are available at the approaches of these streets at Second and Third

Avenues, and the reduction to a single lane on these approaches would result in delays and queues that are beyond what conventional mitigation techniques could alleviate.

To address the unmitigated construction-related impacts, while temporary, on these cross-town streets during the construction of Segments 3, 5, and 8, a comprehensive traffic management plan considering various options would need to be formulated. This plan, which may identify potential diversion routes and coordinate traffic controls at key locations, would need to be managed within a more sizeable area beyond only the E. 59<sup>th</sup> and E. 61<sup>st</sup> Street corridors to further attenuate traffic flow at critical locations. The potential elements of such a plan are likely to be similar to those described previously for the First Avenue route and could include the following.

- Identify alternate westbound routes for traffic exiting the northbound FDR Drive at E. 61<sup>st</sup> Street, which may include E. 57<sup>th</sup>, E. 63<sup>rd</sup>, E. 66<sup>th</sup>, and E. 72<sup>nd</sup> Streets;
- Identify alternate routes to the Queensboro Bridge for eastbound traffic on E. 59<sup>th</sup> Street, which may include E. 57<sup>th</sup> and E. 58<sup>th</sup> Streets, First Avenue, and Second Avenue;
- Implement “Buses Only” traffic restrictions on Marginal Street between the Queensboro Bridge and E. 61<sup>st</sup> Street during Segment 3 and 5 construction;
- Recommend temporary capacity improvement measures to accommodate additional traffic volumes on designated detour routes, which may include additional restrictions of curbside usage, daylighting of intersection approaches, modifying signal timing, and creating channelization for enhanced traffic flow; and,
- Provide appropriate signage, frequent public announcements, TEAs, and traffic enforcement, where necessary, to facilitate effective traffic detours.

After completion of construction, the mitigation measures discussed above to address temporary construction-related traffic impacts would no longer be necessary and would therefore be discontinued.

### **5.16.3 Air**

Section 5.11 summarized the potential air quality impacts from the construction of the water main connections from the preferred Shaft Site, and the combined construction of the water main connections and the preferred Shaft Site. Traffic mitigation for the water main construction period under this alternative would result in improvements in traffic conditions, compared to those undertaken in the air quality analyses. Therefore, no potential significant adverse air quality impacts from the construction of water main connections for the preferred Shaft Site, or the combined construction of water main connections and the preferred Shaft Site, with traffic mitigation would be expected.

