

# **Appendix A**

## **Traffic Analysis**

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**APPENDIX A-1. EXISTING INTERSECTION LOS SUMMARY (AM & PM)**

Study Intersection		AM Peak Hour			PM Peak Hour		
		LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup> or WM <sup>4</sup>	LOS	Delay	V/C or WM
	S Jackson St/1 <sup>st</sup> Ave S	B	14.3	0.64	A	10.0	0.45
	S Jackson St/4 <sup>th</sup> Ave S	E	73.8	0.64	C	20.9	0.52
	S King St/1 <sup>st</sup> Ave S	B	10.5	0.32	B	11.5	0.39
	S Weller St/4 <sup>th</sup> Ave S	B	18.9	0.65	B	10.1	0.43
	Airport Way S/4 <sup>th</sup> Ave S	C	30.5	0.63	D	35.2	0.68
	I-90 Off Ramp/4 <sup>th</sup> Ave S	C	33.4	0.75	D	42.7	0.68
	Alaskan Way/S Royal Brougham Way	B	19.6	0.39	C	25.0	0.34
	1 <sup>st</sup> Ave S/S Royal Brougham Way	E	66.6	0.81	E	67.8	1.00
	Occidental Ave/ Royal Brougham Way	C	28.8	0.34	C	26.7	0.44
	4 <sup>th</sup> Ave S/S Royal Brougham Way	D	48.2	0.76	E	71.6	1.00
	Alaskan Way/S Atlantic St	C	15.2	WBL	D	33.3	WBL
	Utah Ave S/S Atlantic St	B	10.7	SB	B	11.2	SB
	1 <sup>st</sup> Ave S/S Atlantic St	F	90.9	1.34	E	55.7	1.19
	Occidental Ave S/S Atlantic St	C	23.8	NB	C	21.5	NB
	4 <sup>th</sup> Ave S/S Atlantic St	B	18.3	0.54	B	13.7	0.66
	Utah Ave S/S Massachusetts St	A	7.3	- <sup>5</sup>	A	7.6	- <sup>5</sup>
	1 <sup>st</sup> Ave S/S Massachusetts St	F	86.3	WB	E	38.7	EB
	Occidental Ave S/S Massachusetts St	B	11.2	WB	B	13.1	EB
	1 <sup>st</sup> Ave S/S Holgate St	E	63.0	0.82	C	27.2	0.73
	Occidental Ave S/S Holgate St	C	15.4	NB	C	20.6	NB
	3 <sup>rd</sup> Ave S/S Holgate St	B	13.2	NB	C	15.5	NB/SB
	4 <sup>th</sup> Ave S/S Holgate St	C	22.6	0.51	C	22.3	0.52
	1 <sup>st</sup> Ave S/S Lander St	B	18.4	0.59	C	34.2	0.88
	4 <sup>th</sup> Ave S/S Lander St	B	14.9	0.37	C	25.0	0.63
	1 <sup>st</sup> Ave S/S Spokane St	D	38.5	0.67	D	47.5	0.81
	4 <sup>th</sup> Ave S/S Spokane St	C	27.0	0.57	D	36.5	0.72
	5 <sup>th</sup> Ave S/Airport Way S	D	41.2	0.59	D	48.6	0.45
	Colorado Ave S/S Atlantic St	B	10.9	NB	B	10.3	NB

1. Level of service, based on 2000 Highway Capacity Manual methodology.

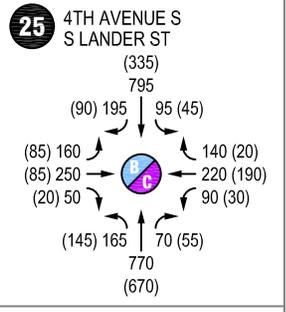
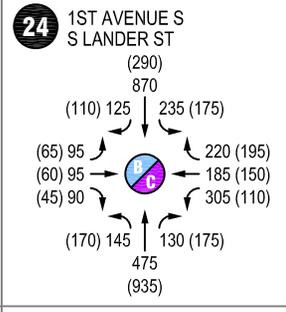
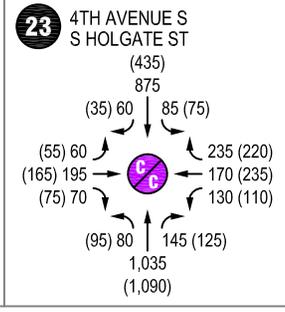
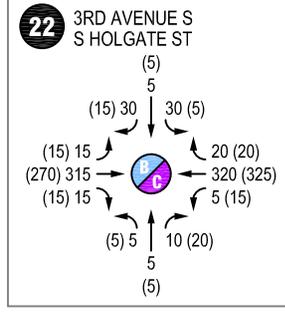
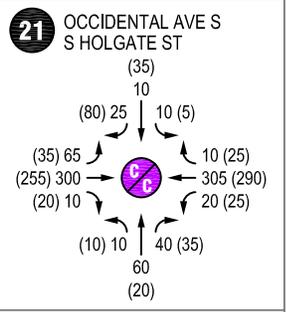
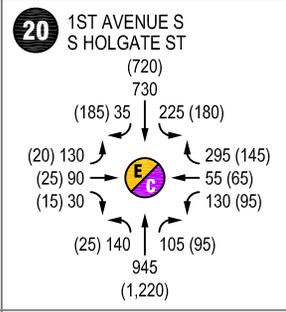
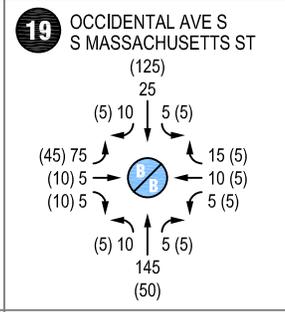
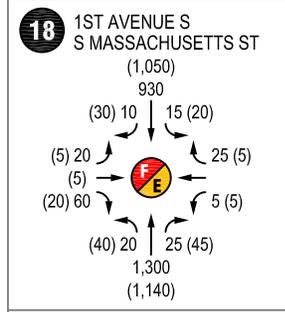
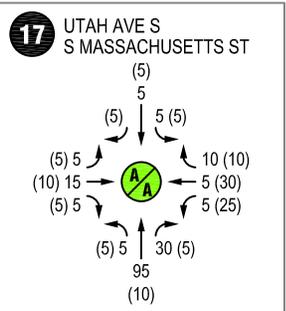
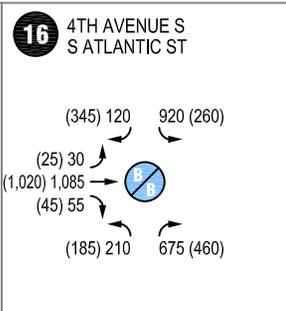
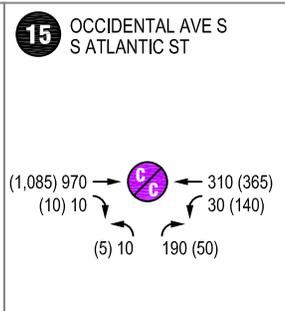
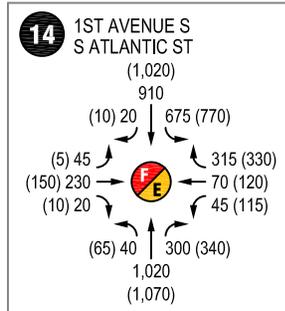
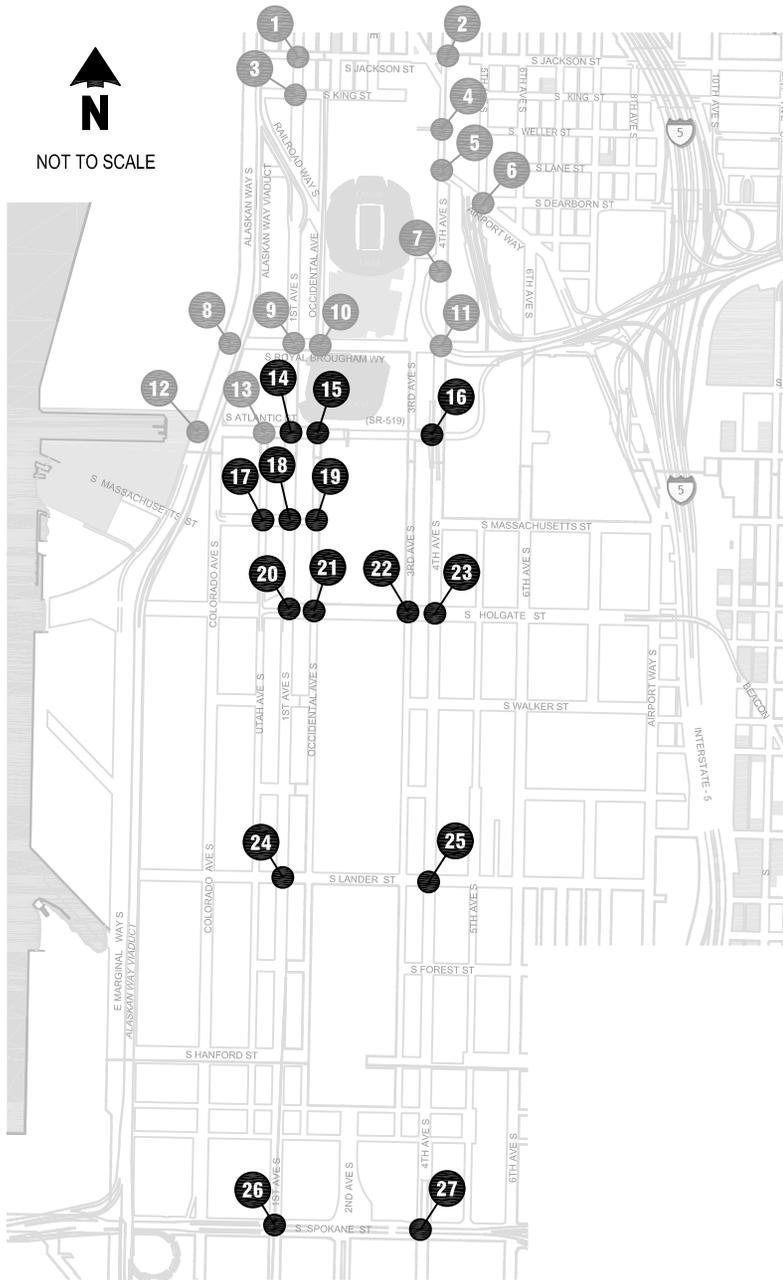
2. Average delay in seconds per vehicle.

3. Volume-to-capacity ratio reported for signalized intersections.

4. Worst movement reported for two-way stop controlled intersections.

5. Volume-to-capacity ratio not reported for all-way stop controlled intersections.



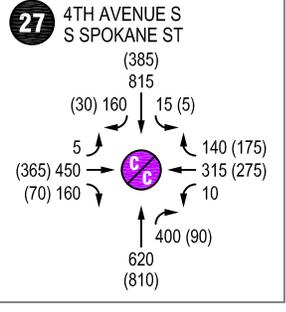
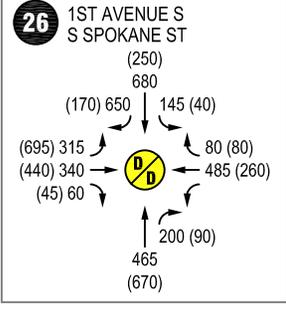


**LEGEND**

X = PM PEAK HOUR

(X) = AM PEAK HOUR

= LEVEL OF SERVICE



**Appendix A-2b**

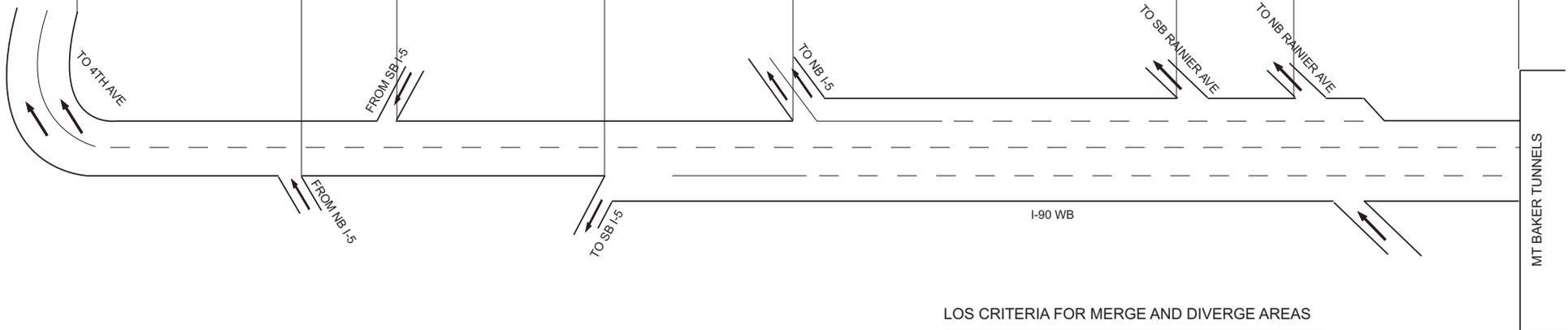
Existing Peak Hour Traffic Volumes and Intersection Levels of Service (South)

SR 519 Intermodal Access Project, Phase 2



Appendix A-3a (1 of 2)  
 2011 Conditions (No-Build Scenario)  
 Weekday AM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	D <sup>3</sup>	B	B	B	D	C	C
Density (pc/mi/ln)	31	20	16	18	28	23	26
Speed (mph)	27	40	41	50	50	51	49
Volume <sup>1</sup>	1,710	1,560	1,300	2,650	5,610	5,920	5,040



1. Volume = quantity of vehicles model processed in segment during system peak hour.
2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On- ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

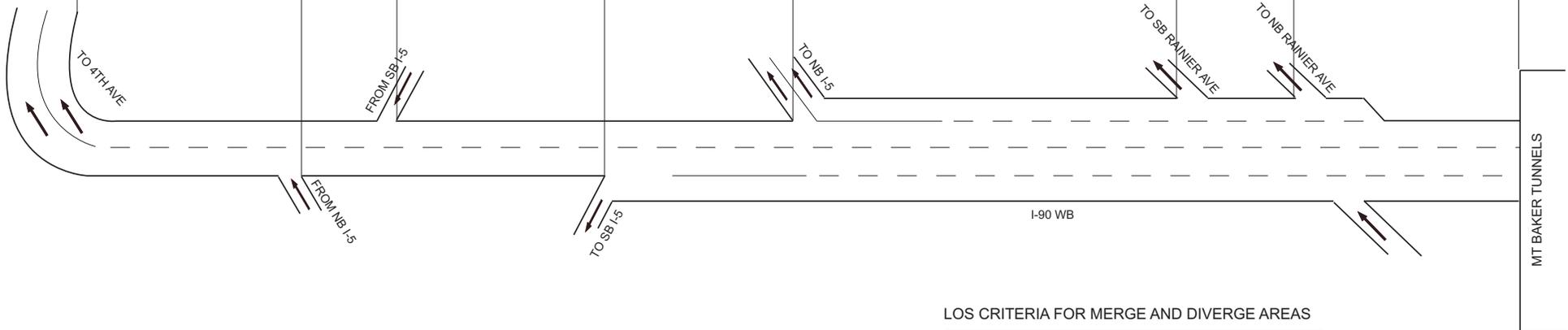
LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

Appendix A-3a (2 of 2)

2011 Conditions (No-Build Scenario)

Weekday PM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	C <sup>3</sup>	B	A	B	B	B	C
Density (pc/mi/ln)	24	11	10	12	18	17	24
Speed (mph)	22	45	46	51	51	52	51
Volume <sup>1</sup>	1,080	980	880	1,880	3,740	4,330	4,860



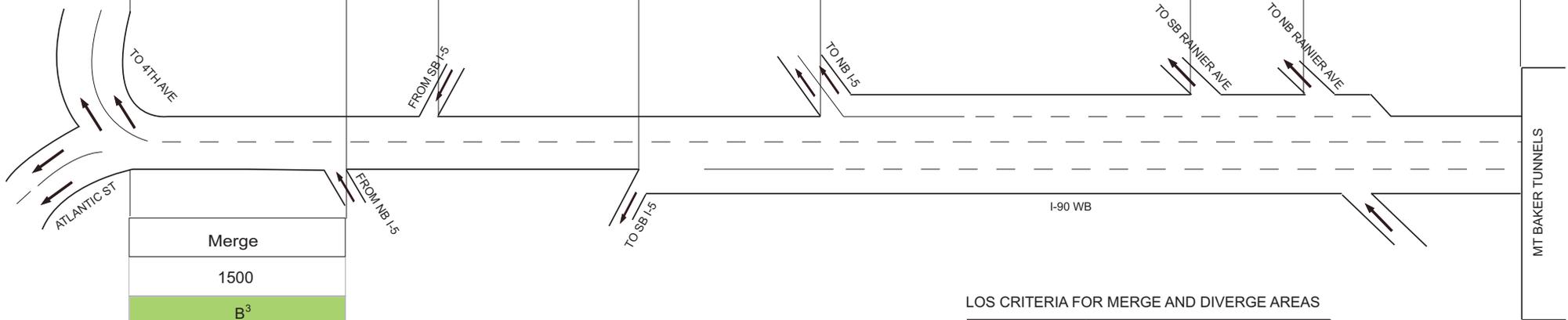
1. Volume = quantity of vehicles model processed in segment during system peak hour.
2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On-ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

Appendix A-3b (1 of 2)  
 2011 Conditions (Proposed Action)  
 Weekday AM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	B <sup>3</sup>	C	B	B	C	C	C
Density (pc/mi/ln)	19	21	17	18	28	23	25
Speed (mph)	25	40	41	50	51	51	50
Volume <sup>1</sup>	940	1,640	1,370	2,700	5,630	5,930	5,040



Merge
1500
B <sup>3</sup>
15
28
850

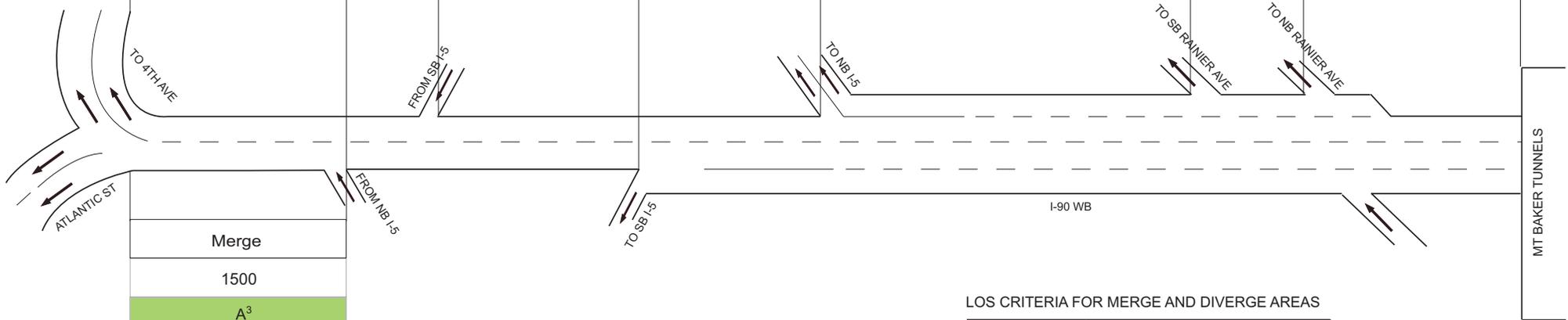
LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

1. Volume = quantity of vehicles model processed in segment during system peak hour.
2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On- ramp queues.

Appendix A-3b (2 of 2)  
 2011 Conditions (Proposed Action)  
 Weekday PM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	A <sup>3</sup>	B	A	B	B	B	C
Density (pc/mi/ln)	10	11	9	12	18	17	24
Speed (mph)	27	45	46	51	51	52	50
Volume <sup>1</sup>	540	970	870	1,880	3,740	4,330	4,860



LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

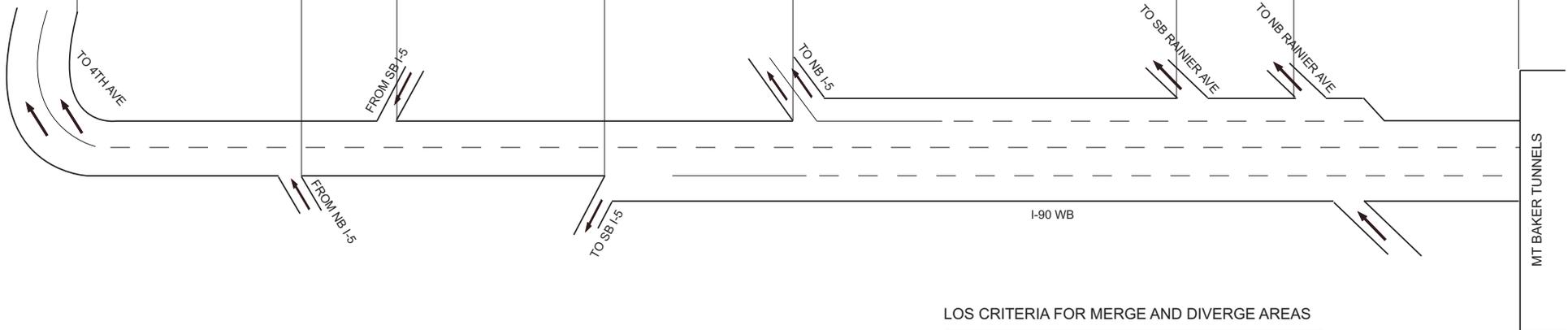
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2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On- ramp queues.

Appendix A-4a (1 of 2)

2030 Conditions (No-Build Scenario)

Weekday AM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	F	F	F <sup>4</sup>	C	D	C	F
Density (pc/mi/ln)	123	90	51	27	29	24	46
Speed (mph)	9	10	15	33	47 <sup>4</sup>	50 <sup>4</sup>	42
Volume <sup>1</sup>	2,080	1,880	1,540	2,670	5,400	6,110	7,730



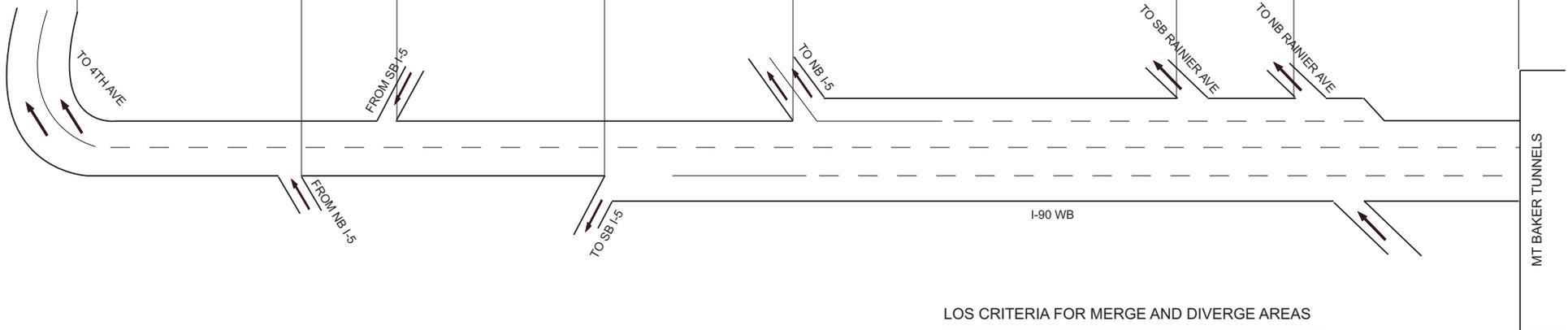
1. Volume = quantity of vehicles model processed in segment during system peak hour.
2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On-ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

Appendix A-4a (2 of 2)  
 2030 Conditions (No-Build Scenario)  
 Weekday PM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	F	B	B	B	C	C	E
Density (pc/mi/ln)	64	14	12	14	22	22	36
Speed (mph)	10	45	46	51 <sup>5</sup>	51 <sup>5</sup>	51	48
Volume <sup>1</sup>	1,270	1,260	1,140	2,120	4,410	5,680	6,840



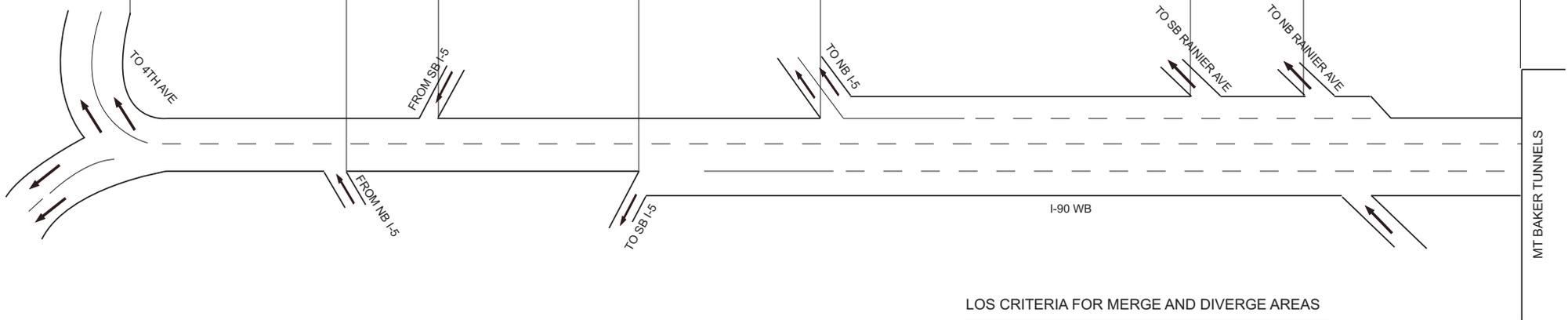
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2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
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4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On- ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

Appendix A-4b (1 of 2)  
 2030 Conditions (Proposed Action)  
 Weekday AM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	D	C	C	B	D	C	F
Density (pc/mi/ln)	33	25	20	18	27	24	41
Speed (mph)	16	39	40	51	51	51	47
Volume <sup>1</sup>	1,070	1,920	1,580	2,680	5,480	6,140	7,680



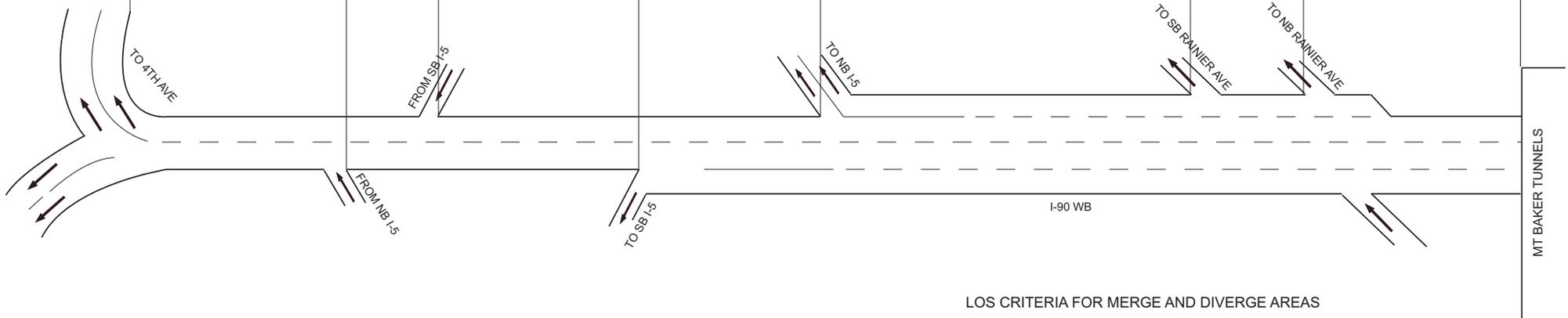
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2. During the AM peak hour, I-5 NB on ramp congestion impacts segments 2 and 3
3. HCM LOS methodology limited when speeds fall below 55 mph.
4. Density impacted by speeds less than 55 mph and queues/delays at I-90/4th Avenue intersection
5. Operations on this segment impacted by I-5 SB On- ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40

Appendix A-4b (2 of 2)  
 2030 Conditions (Proposed Action)  
 Weekday PM Peak Hour

Segment Type	Merge	Merge	Basic	Diverge	Diverge	Diverge	Diverge
Distance (ft)	1500	540	1230	1060	2560	890	1500
LOS	F	B	B	B	C	C	E
Density (pc/mi/ln)	44	15	13	14	22	22	35
Speed (mph)	9	44	46	51	51	51	49
Volume <sup>1</sup>	750	1,290	1,170	2,150	4,440	5,700	6,850



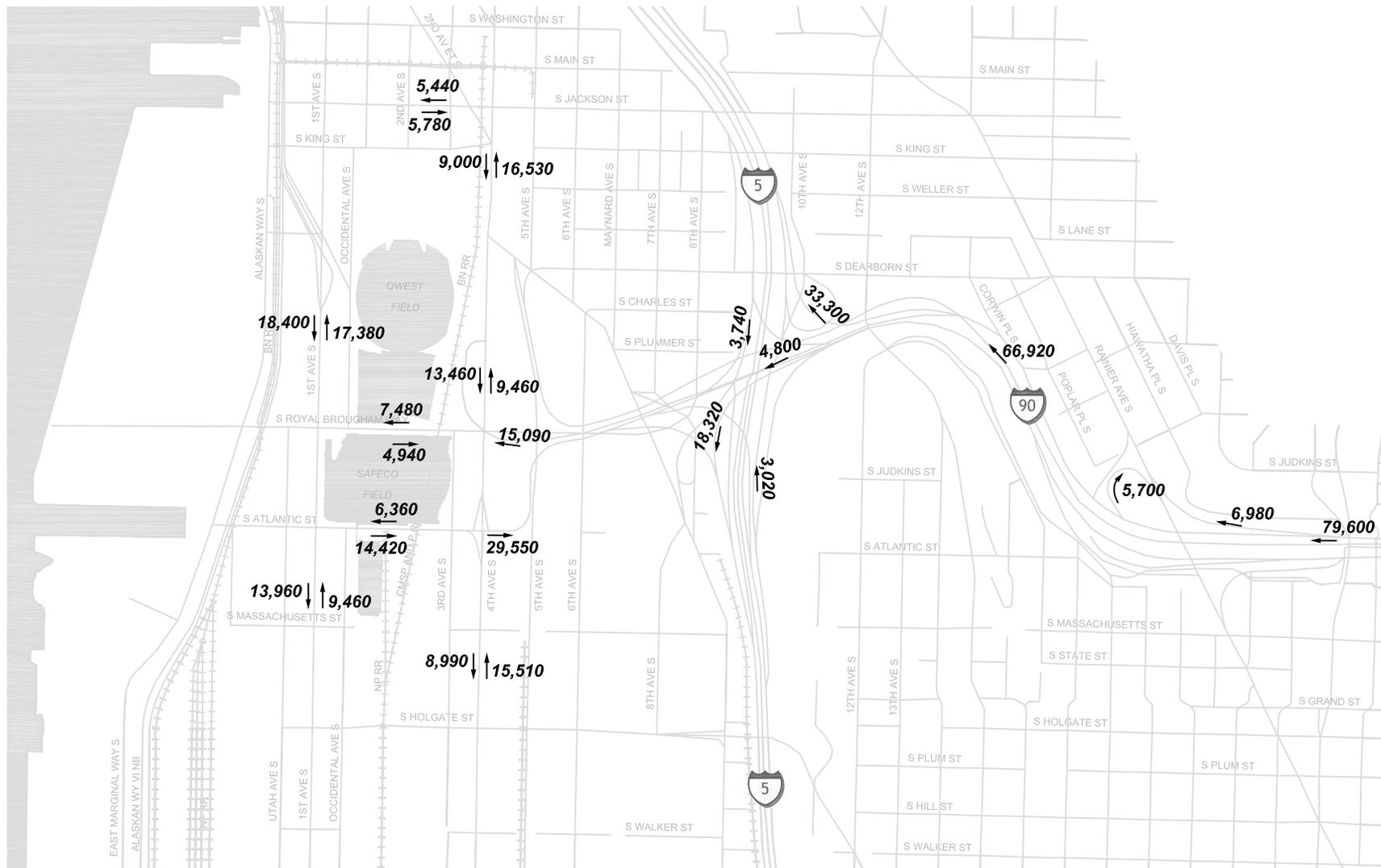
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5. Operations on this segment impacted by I-5 SB On- ramp queues.

LOS CRITERIA FOR MERGE AND DIVERGE AREAS

LOS	Density (pc/mi/ln)
A	≤ 10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35-40
F	> 40



NOT TO SCALE



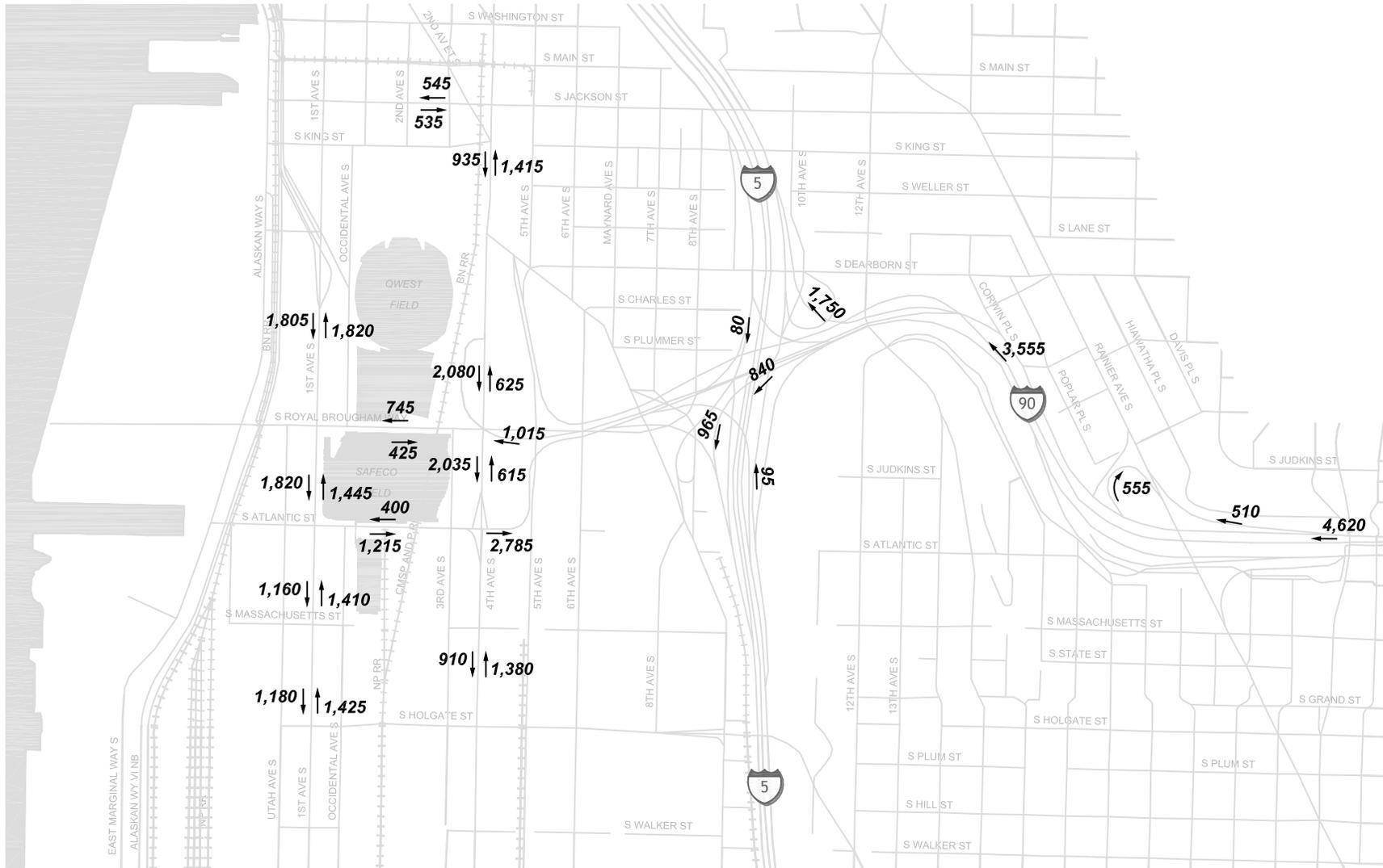
## Appendix A-5a

### 2011 No-Build Average Daily Traffic Volumes

SR 519 Intermodal Access Project, Phase 2







# Appendix A-5c

## 2011 No-Build PM Peak Hour Traffic Volumes

### SR 519 Intermodal Access Project, Phase 2

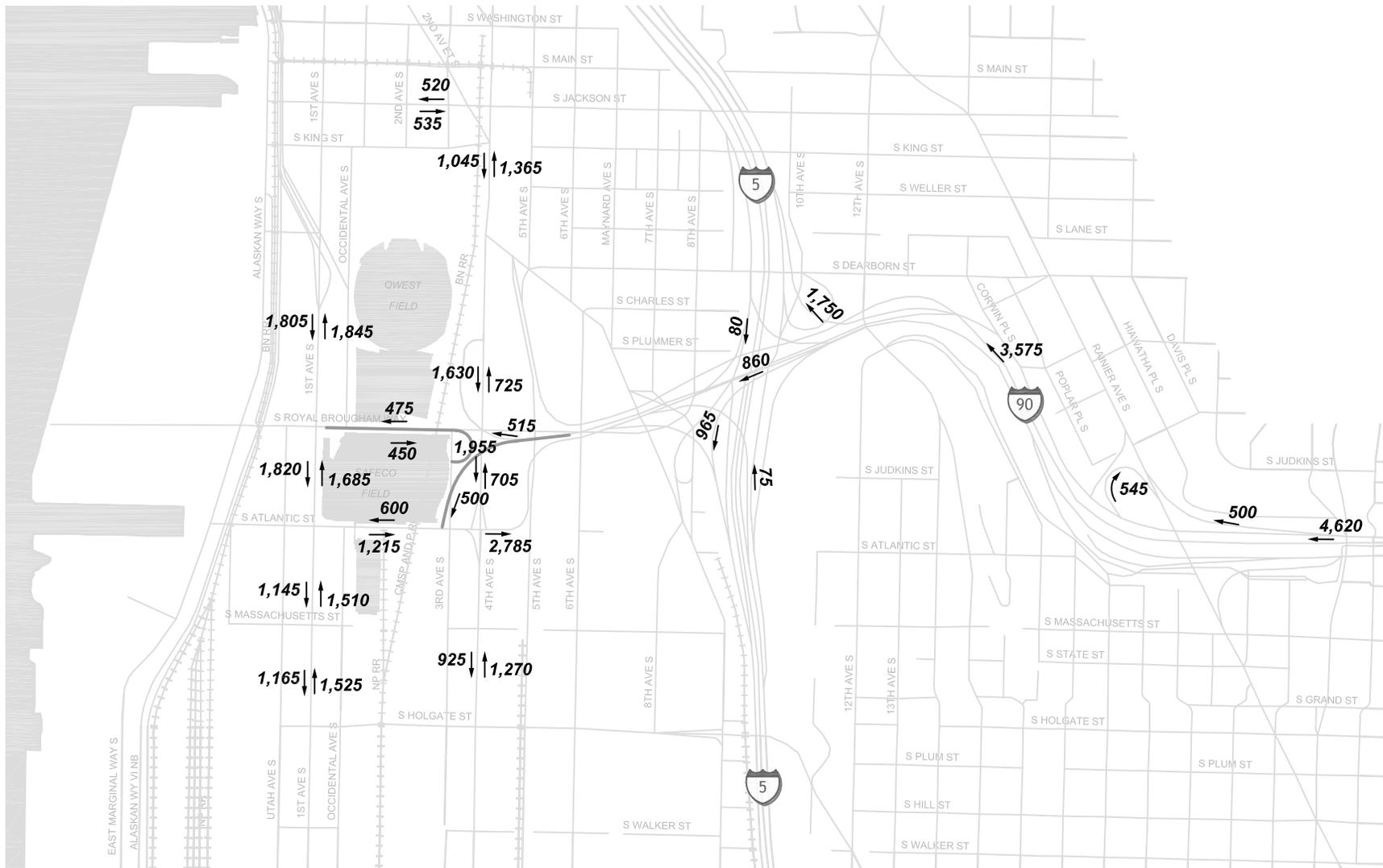








NOT TO SCALE

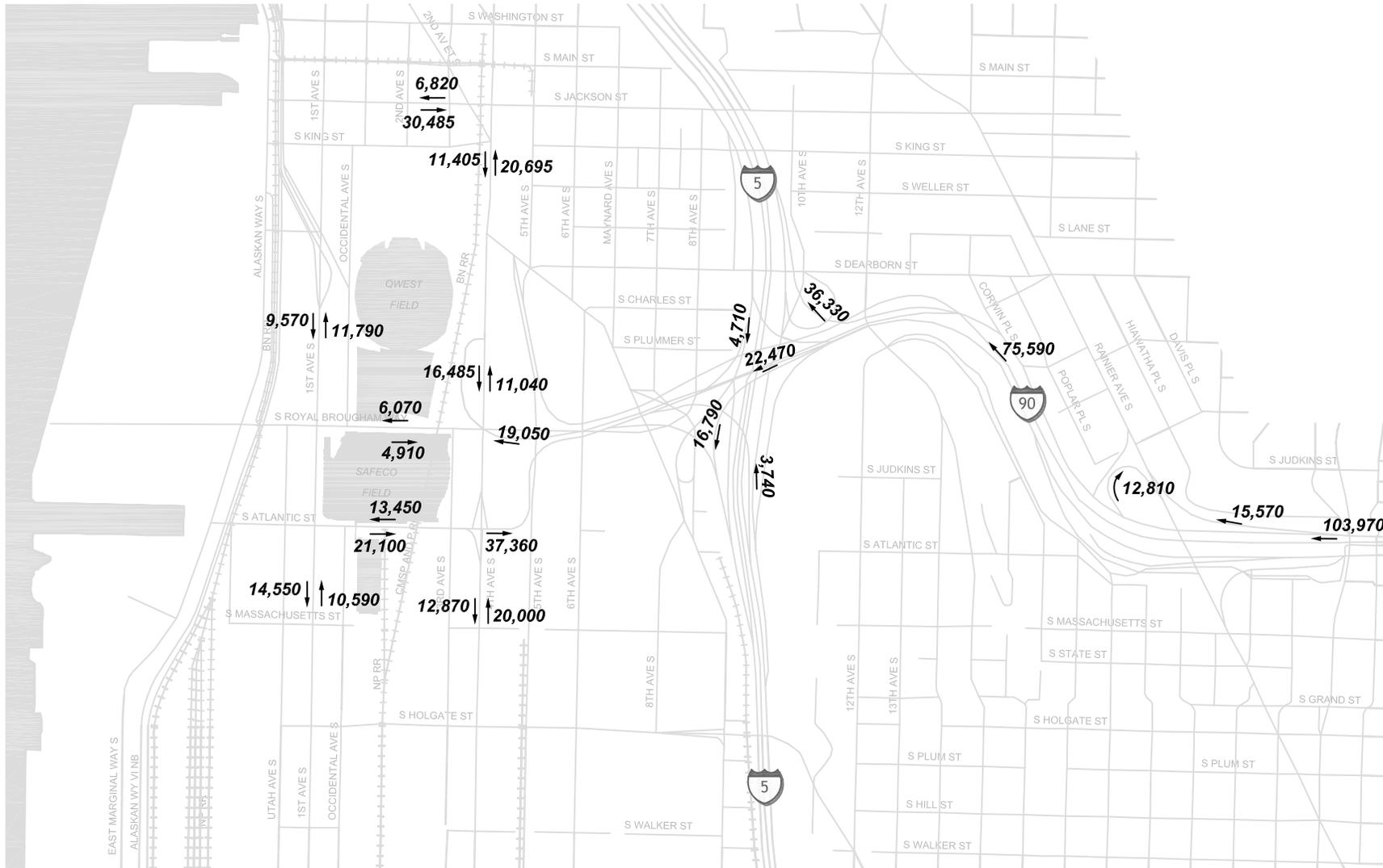


## Appendix A-6c

### 2011 Proposed Action PM Peak Hour Traffic Volumes

SR 519 Intermodal Access Project, Phase 2



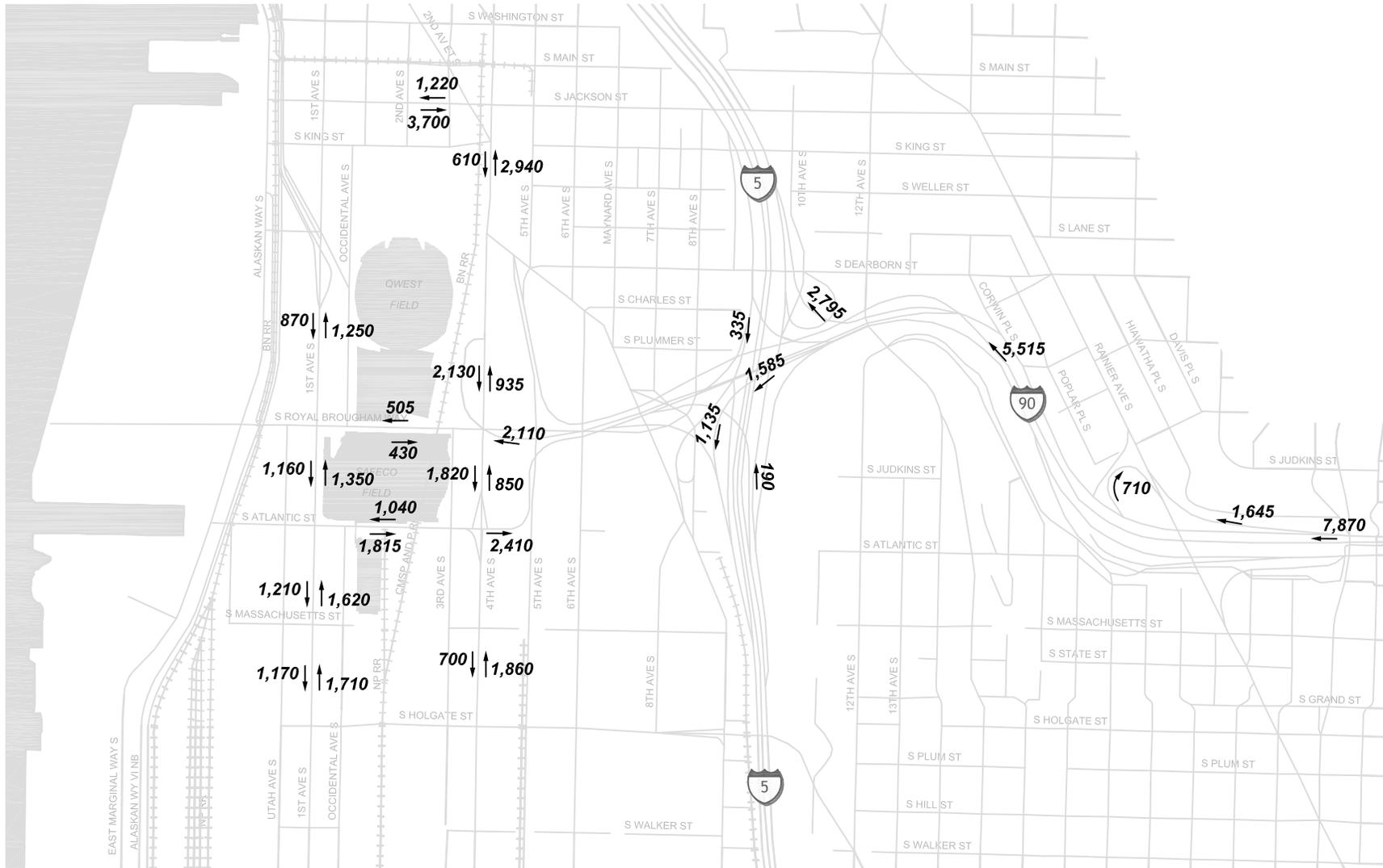


# Appendix A-7a

## 2030 No-Build Average Daily Traffic Volumes

SR 519 Intermodal Access Project, Phase 2





## Appendix A-7b

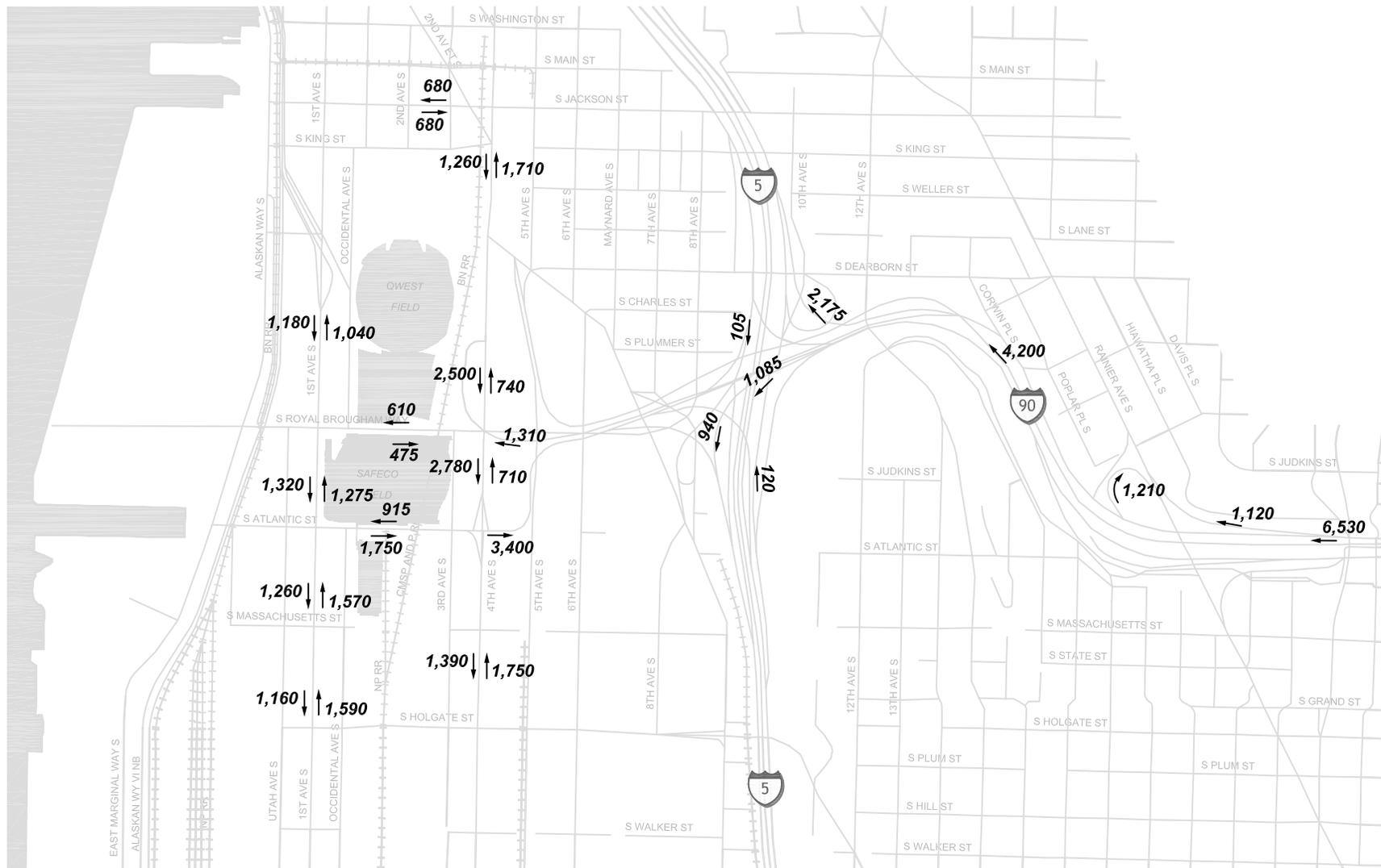
### 2030 No-Build AM Peak Hour Traffic Volumes

SR 519 Intermodal Access Project, Phase 2





NOT TO SCALE



## Appendix A-7c

### 2030 No-Build PM Peak Hour Traffic Volumes

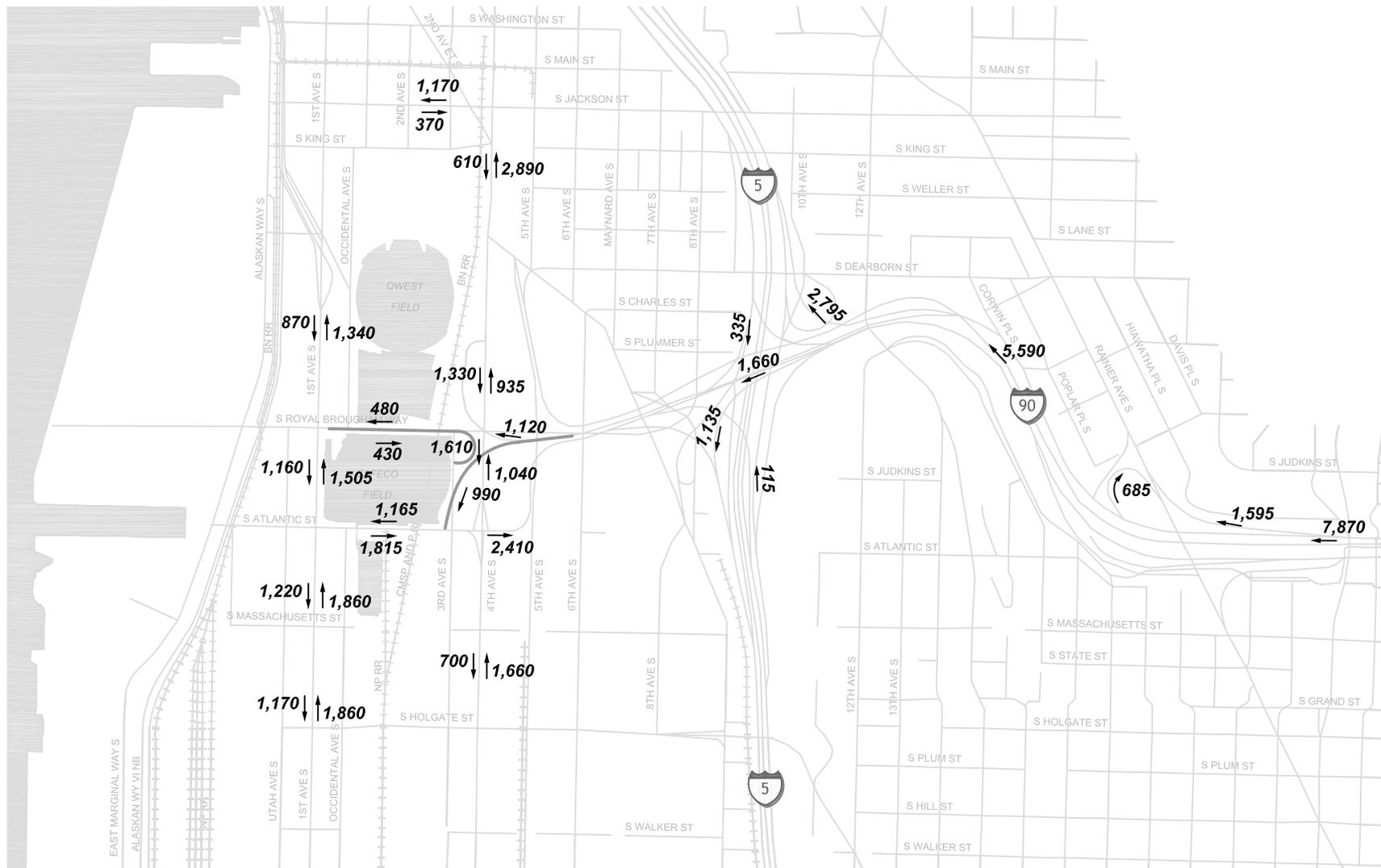
SR 519 Intermodal Access Project, Phase 2







NOT TO SCALE



## Appendix A-8b

### 2030 Proposed Action AM Peak Hour Traffic Volumes

SR 519 Intermodal Access Project, Phase 2



APPENDIX A-9A. 2011 AM PEAK HOUR INTERSECTION LOS SUMMARY (NO BUILD & PROPOSED ACTION)

Study Intersection		No Build			Proposed Action		
		LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup> or WM <sup>4</sup>	LOS	Delay	V/C or WM
	S Jackson St/1 <sup>st</sup> Ave S	B	14.5	0.68	B	14.9	0.70
	S Jackson St/4 <sup>th</sup> Ave S	B	19.3	0.69	B	19.3	0.69
	S King St/1 <sup>st</sup> Ave S	B	11.9	0.34	B	12.1	0.36
	S Weller St/4 <sup>th</sup> Ave S	B	19.2	0.67	B	18.1	0.66
	Airport Way S/4 <sup>th</sup> Ave S	E	65.9	1.00	E	78.0	1.08
	I-90 Off Ramp/4 <sup>th</sup> Ave S	C	30.0	0.71	C	26.4	0.53
	Alaskan Way/S Royal Brougham Way	B	18.6	0.38	C	20.8	0.40
	1 <sup>st</sup> Ave S/S Royal Brougham Way	D	54.8	0.99	F	94.5	1.04
	Occidental Ave S/S Royal Brougham Way	C	28.1	0.33	C	22.5	0.18
	4 <sup>th</sup> Ave S/S Royal Brougham Way	C	31.0	0.68	C	32.4	0.58
	Alaskan Way/S Atlantic St	C	15.1	WB	C	15.5	WB
	Utah Ave S/S Atlantic St	B	10.7	SB	B	12.0	SB
	1 <sup>st</sup> Ave S/S Atlantic St	E	76.8	1.16	D	51.7	0.92
	Occidental Ave S/S Atlantic St	F	176.6	NB	C	17.5	NBR
	4 <sup>th</sup> Ave S/S Atlantic St	B	18.9	0.56	B	11.0	0.49
	Utah Ave S/S Massachusetts St	A	7.3	- <sup>5</sup>	A	7.3	- <sup>5</sup>
	1 <sup>st</sup> Ave S/S Massachusetts St	F	62.0	EB	F	59.0	EB
	Occidental Ave S/S Massachusetts St	B	11.2	WB	B	11.2	WB
	1 <sup>st</sup> Ave S/S Holgate St	B	16.9	0.69	B	18.2	0.71
	Occidental Ave S/S Holgate St	B	13.7	NB	B	14.2	NB
	3 <sup>rd</sup> Ave S/S Holgate St	B	12.1	NB	B	12.5	NB
	4 <sup>th</sup> Ave S/S Holgate St	B	19.9	0.60	C	20.9	0.56
	1 <sup>st</sup> Ave S/S Lander St	C	32.0	0.72	C	33.5	0.75
	4 <sup>th</sup> Ave S/S Lander St	B	14.3	0.50	B	16.4	0.53
	1 <sup>st</sup> Ave S/S Spokane St	C	28.6	0.44	C	28.6	0.44
	4 <sup>th</sup> Ave S/S Spokane St	C	32.3	0.74	C	32.1	0.74
	5 <sup>th</sup> Ave S/Airport Way S	D	41.8	0.62	D	41.8	0.62
	Colorado Ave S/S Atlantic St	B	10.5	NB	B	11.0	NB
	SR 519 Ramp/S Atlantic St	-	-	-	B	11.2	0.35

1. Level of service, based on 2000 Highway Capacity Manual methodology.

2. Average delay in seconds per vehicle.

3. Volume-to-capacity ratio reported for signalized intersections.

4. Worst movement reported for two-way stop-controlled intersections.

5. Volume-to-capacity ratio not reported for all-way stop-controlled intersections.

APPENDIX A-9B. 2011 PM PEAK HOUR INTERSECTION LOS SUMMARY (NO BUILD & PROPOSED ACTION)

Study Intersection		No Build			Proposed Action		
		LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup> or WM <sup>4</sup>	LOS	Delay	V/C or WM
	S Jackson St/1 <sup>st</sup> Ave S	B	11.1	0.47	B	11.2	0.49
	S Jackson St/4 <sup>th</sup> Ave S	B	19.4	0.63	B	19.4	0.63
	S King St/1 <sup>st</sup> Ave S	B	11.3	0.43	B	11.3	0.43
	S Weller St/4 <sup>th</sup> Ave S	B	18.3	0.40	B	18.2	0.39
	Airport Way S/4 <sup>th</sup> Ave S	D	40.4	0.68	D	36.3	0.67
	I-90 Off Ramp/4 <sup>th</sup> Ave S	D	40.5	0.64	D	39.4	0.52
	Alaskan Way/S Royal Brougham Way	C	23.7	0.37	C	26.3	0.38
	1 <sup>st</sup> Ave S/S Royal Brougham Way	F	89.2	1.06	F	119.8	1.20
	Occidental Ave/S Royal Brougham Way	D	36.3	0.43	C	30.0	0.39
	4 <sup>th</sup> Ave S/S Royal Brougham Way	D	45.9	0.96	D	46.7	0.91
	Alaskan Way/S Atlantic St	E	41.0	WB	E	49.4	WB
	Utah Ave S/S Atlantic St	B	11.9	SB	B	13.0	SB
	1 <sup>st</sup> Ave S/S Atlantic St	D	42.8	0.95	D	39.7	0.83
	Occidental Ave S/S Atlantic St	F	127.6	NB	C	21.3	NBR
	4 <sup>th</sup> Ave S/S Atlantic St	B	14.5	0.69	B	12.1	0.69
	Utah Ave S/S Massachusetts St	A	7.6	- <sup>5</sup>	A	7.6	- <sup>5</sup>
	1 <sup>st</sup> Ave S/S Massachusetts St	F	57.6	EB	E	41.6	EB
	Occidental Ave S/S Massachusetts St	B	11.7	EB	B	11.7	EB
	1 <sup>st</sup> Ave S/S Holgate St	C	24.0	0.70	C	21.3	0.71
	Occidental Ave S/S Holgate St	C	17.9	NB	C	19.1	NB
	3 <sup>rd</sup> Ave S/S Holgate St	B	13.4	NB	B	14.1	SB
	4 <sup>th</sup> Ave S/S Holgate St	B	19.7	0.51	C	21.5	0.54
	1 <sup>st</sup> Ave S/S Lander St	E	68.6	1.11	E	70.0	1.12
	4 <sup>th</sup> Ave S/S Lander St	C	32.5	0.71	C	32.4	0.78
	1 <sup>st</sup> Ave S/S Spokane St	D	43.7	0.55	D	45.5	0.55
	4 <sup>th</sup> Ave S/S Spokane St	D	39.2	0.81	D	38.9	0.81
	5 <sup>th</sup> Ave S/Airport Way S	D	36.1	0.49	D	36.1	0.49
	Colorado Ave S/S Atlantic St	B	10.2	NB	B	10.2	NB
	SR 519 Ramp/S Atlantic St	-	-	-	A	8.0	0.37

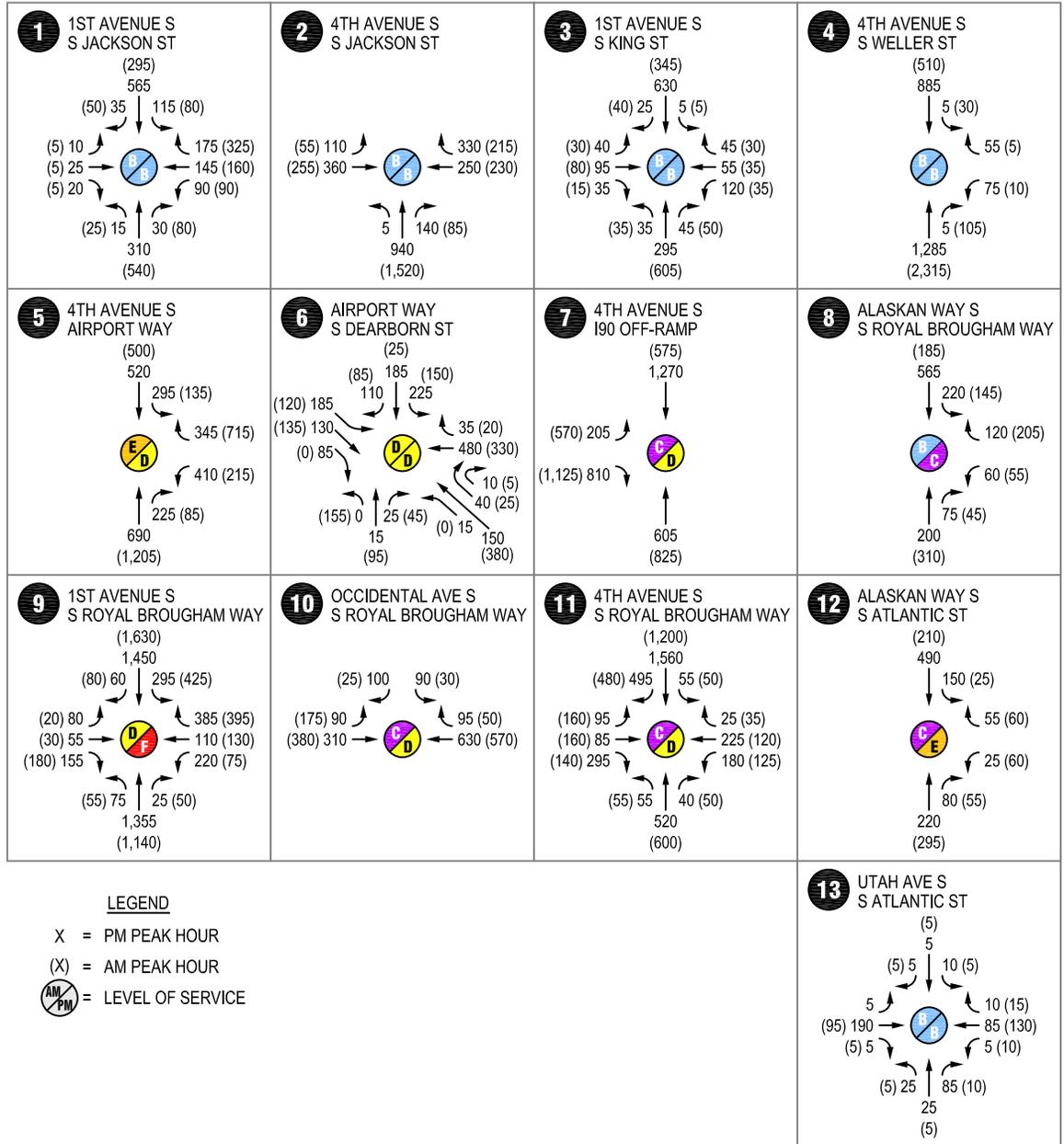
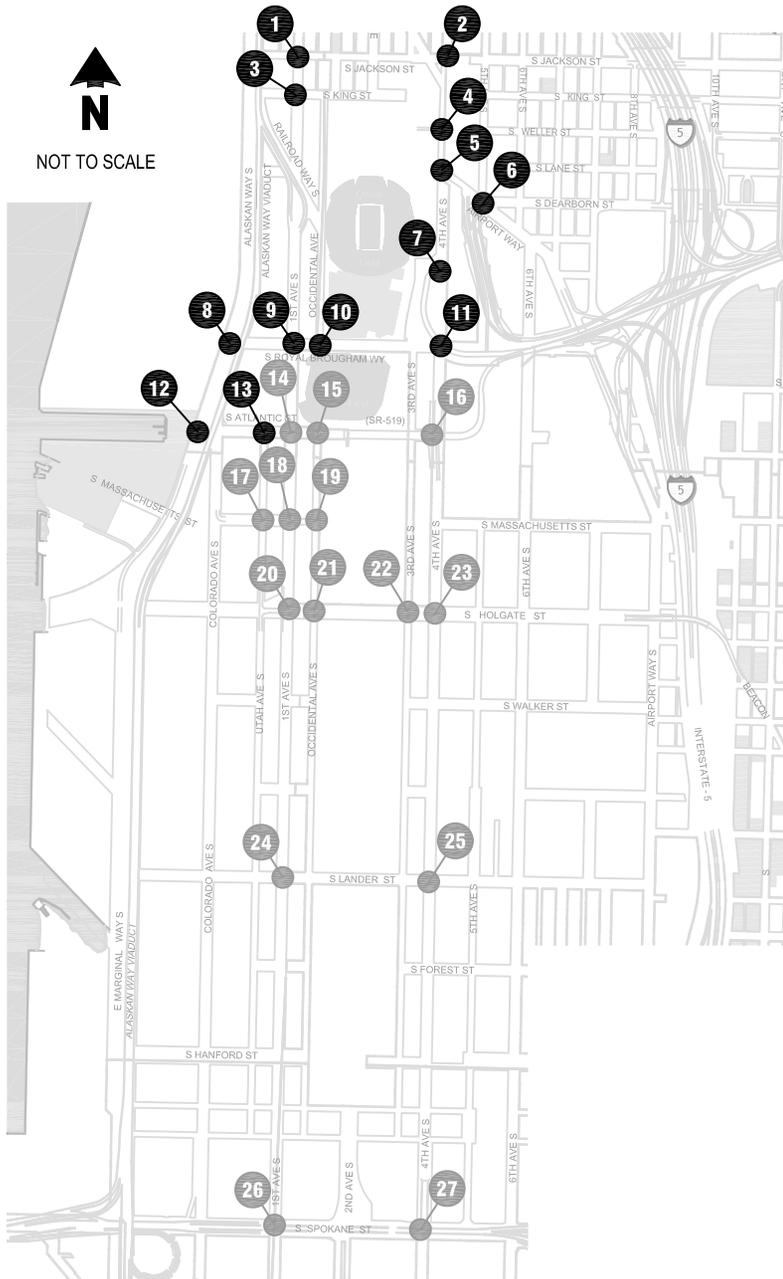
1. Level of service, based on 2000 Highway Capacity Manual methodology.

2. Average delay in seconds per vehicle.

3. Volume-to-capacity ratio reported for signalized intersections.

4. Worst movement reported for two-way stop-controlled intersections.

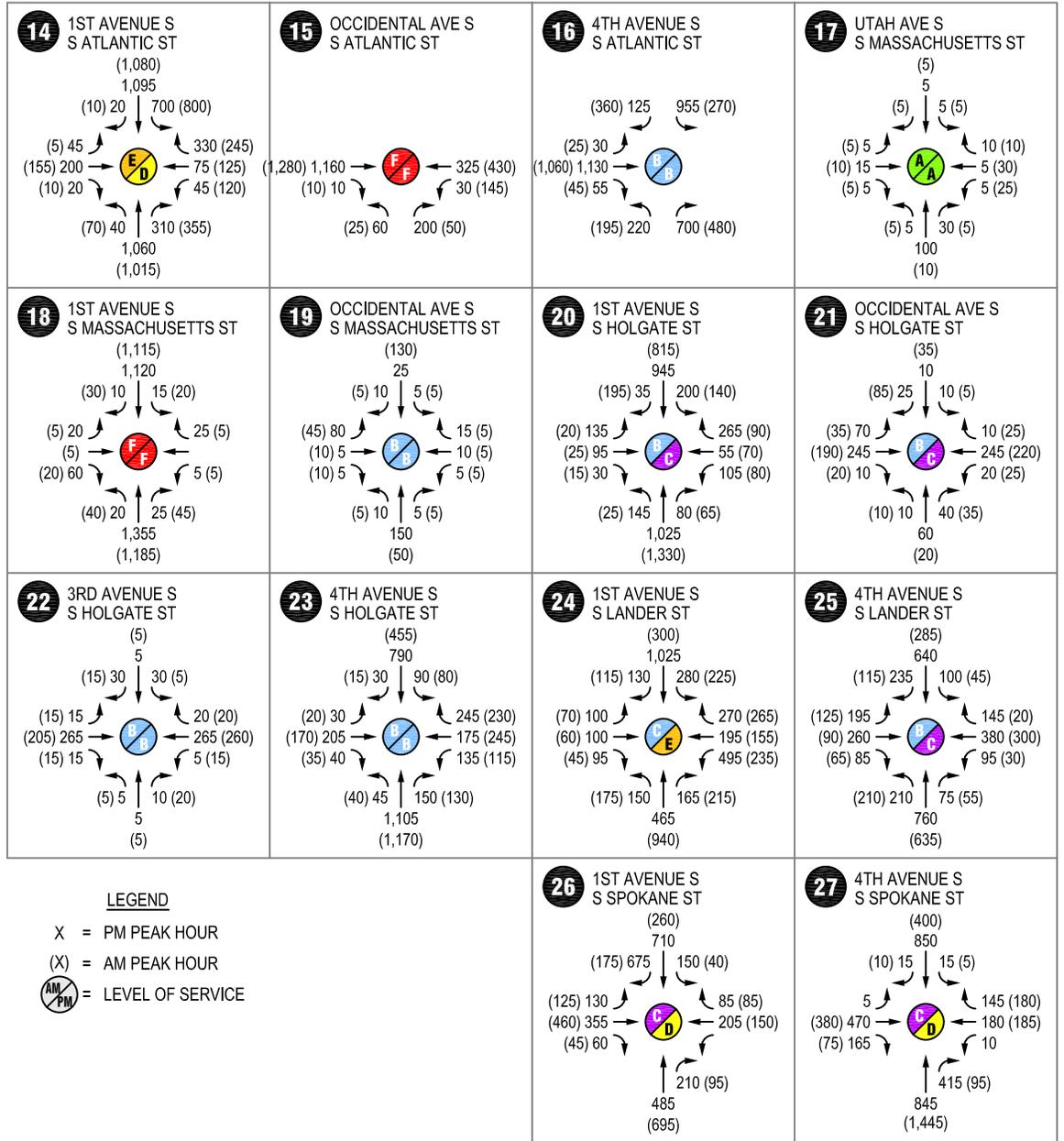
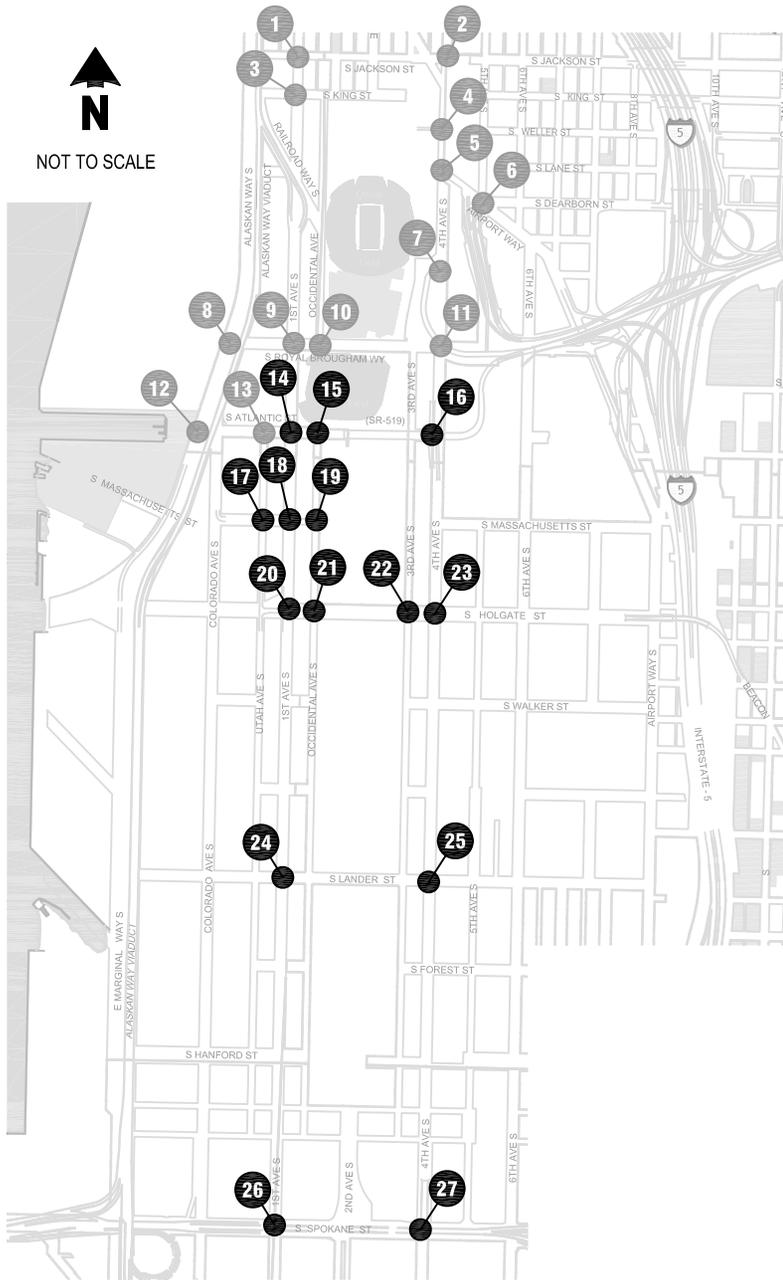
5. Volume-to-capacity ratio not reported for all-way stop-controlled intersections.



## Appendix A-10a

### 2011 No-Build Peak Hour Traffic Volumes and Intersection Levels of Service (North)

#### SR 519 Intermodal Access Project, Phase 2



**LEGEND**

X = PM PEAK HOUR

(X) = AM PEAK HOUR

= LEVEL OF SERVICE

## Appendix A-10b

### 2011 No-Build Peak Hour Traffic Volumes and Intersection Levels of Service (South)

#### SR 519 Intermodal Access Project, Phase 2