



# **DRAFT ENVIRONMENTAL IMPACT REPORT**

## **Better Market Street Project EIR APPENDIX 7: TRANSPORTATION SUPPORTING INFORMATION**

PLANNING DEPARTMENT  
CASE NO. 2014.0012E

STATE CLEARINGHOUSE NO. 2015012027



**SAN FRANCISCO  
PLANNING  
DEPARTMENT**

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*Written comments should be sent to:*

Chris Thomas, AICP | 1650 Mission Street, Suite 400 | San Francisco, CA 94103 or  
[christopher.thomas@sfgov.org](mailto:christopher.thomas@sfgov.org)

## **APPENDIX 7: TRANSPORTATION SUPPORTING INFORMATION**

# **Better Market Street Environmental Impact Report**

Case Number 2014.0012E

## **Transportation Technical Appendix**

*Prepared for:*

**City and County of San Francisco  
Planning Department**

*Prepared by:*

**Fehr & Peers  
LCW Consulting  
Parisi Transportation Consulting  
CHS Consulting**

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# TRANSPORTATION TECHNICAL APPENDIX

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## **Attachment 1: Roadway Network Classifications**

# STREET NETWORK DESCRIPTION AND FUNCTIONAL CLASSIFICATION

Street	No. of Mixed-Flow Lanes	Direction of Travel	No. of Transit-Only Lane	Sidewalk Width	SF GENERAL PLAN CLASSIFICATION			Bicycle Facility Class
					Transit	Vehicle	Pedestrian	
Market St, Octavia to 12 <sup>th</sup>	6	EB/WB	0 to 2	16 feet	Transit Oriented	Major Arterial	Neighborhood Commercial/Citywide	II and III
Market St, 12 <sup>th</sup> to 8 <sup>th</sup>	2	EB/WB	2	26 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	II
Market St, 8 <sup>th</sup> to 5 <sup>th</sup>	2	EB/WB	2	35 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	III
Market St, 5 <sup>th</sup> to Montgomery	2	EB/WB	0-2	35 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	III
Market St, Montgomery to Steuart	3-4	EB/WB	0	25/35 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	III
Mission St, Van Ness to 10 <sup>th</sup>	4	EB/WB	0	15 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	--
Mission St, 10 <sup>th</sup> to Embarcadero	2-4	EB/WB	0 to 2	15 feet	Transit Oriented	Transit Conflict	Neighborhood Commercial/Citywide	--
Drumm Street	4	NB/SB	0	--	--	Major Arterial	--	--
California Street	2-4	EB/WB	0-2	--	Transit Oriented	--	Neighborhood Commercial/Citywide	--
Davis Street	3	SB	0	--	--	Major Arterial	--	--
Pine Street	2	WB	0-1 (part time)	--	Transit Important	Major Arterial	Neighborhood Commercial	--
Front Street	2-3	NB	0	--	--	--	--	--
Battery Street	3	SB	0	--	Transit Oriented	Secondary Arterial	Neighborhood Commercial	III
Bush Street	2	EB	0-1 (part time)	--	Transit Important	Major Arterial	--	--
Sansome Street	2	NB/SB	0	--	--	--	Neighborhood Commercial	III
Sutter Street	2	WB	1	--	Secondary Transit	Transit Conflict	Neighborhood Commercial	III
Montgomery Street	2	SB	0	--	--	--	--	--
Post Street	2	EB	0-1	--	Secondary Transit	--	Neighborhood Commercial	III
Kearny Street	4	NB	0	--	Transit Important	Major Arterial	--	--
Geary Street	1	WB	1	--	Transit Important	--	Neighborhood Commercial	--
Grant Avenue	2	NB	0	--	--	--	Neighborhood Commercial/Citywide	--
O'Farrell Street	2	EB	1	--	Transit Important	--	Neighborhood Commercial	--
Stockton Street	2	SB	1	--	Transit Oriented	--	Neighborhood Commercial	--

Street	No. of Mixed-Flow Lanes	Direction of Travel	No. of Transit-Only Lane	Sidewalk Width	SF GENERAL PLAN CLASSIFICATION			Bicycle Facility Class
					Transit	Vehicle	Pedestrian	
Ellis Street	2	EB/WB	0	--	--	--	Neighborhood Commercial	--
Powell Street	0	NB/SB	2	--	Transit Oriented	--	--	--
Cyril Magnin Street	4	NB/SB	0	--	--	--	--	--
Eddy Street	2	EB	0	--	--	--	Neighborhood Commercial	--
Mason Street	1-2	SB	0-1	--	--	--	--	--
Turk Street	2	WB	0	--	--	--	--	IV
Taylor Street	3	NB	0	--	--	--	--	--
Golden Gate Avenue	3	EB	0	--	--	--	Neighborhood Commercial	II/IV
Jones Street	3-2	SB	0	--	--	Secondary Arterial	--	--
McAllister Street	2	EB/WB	0	--	Secondary Transit	Secondary Arterial	Neighborhood Commercial	III
Charles J. Brenham Pl.	3	NB/SB	0	--	--	Secondary Arterial	--	III
Hyde Street	3	SB	0	--	--	Secondary Arterial	--	--
Grove Street	2	EB/WB	0	--	--	--	--	II/III
Larkin Street	3	NB/SB	0	--	--	Secondary Arterial	--	III
Hayes Street	3	WB	0	--	--	--	--	--
Polk Street	2	SB	0	--	--	--	--	IV
Fell Street	3-2	EB	0	--	--	--	--	--
Van Ness Avenue	6	NB/SB	0	--	Transit Important	Major Arterial	Citywide	--
Franklin Street	3	NB	0	--	--	Major Arterial	Neighborhood Commercial	--
Page Street	2	EB/WB	0	--	Secondary Transit	--	--	III
Rose Street	1	WB	0	--	--	--	--	--
Gough Street	3	SB	0	--	--	Major Arterial	Neighborhood Commercial	--
Haight Street	2	WB	1	--	Secondary Transit	--	Neighborhood Commercial/Citywide	--
Octavia Boulevard	6	NB/SB	0	--	--	Major Arterial	Neighborhood Commercial	III
Steuart Street	2	NB/SB	0	--	Transit Oriented	Secondary Arterial	--	III
Spear Street	2	SB	0	--	--	--	--	--
Main Street	3	NB	0	--	Transit Important/Oriented	Major Arterial	--	--
Beale Street	4-3	SB	0	--	Transit Important/Oriented	Major Arterial	--	--
Fremont Street	3	NB	1	--	Transit Important	Major Arterial	--	--
First Street	2	SB	1	--	Transit Important	Major Arterial	Neighborhood Commercial	--

Street	No. of Mixed-Flow Lanes	Direction of Travel	No. of Transit-Only Lane	Sidewalk Width	SF GENERAL PLAN CLASSIFICATION			Bicycle Facility Class
					Transit	Vehicle	Pedestrian	
Second Street	2-3	NB/SB	0	--	--	--	Neighborhood Commercial	II
New Montgomery St	2	SB	0	--	--	--	--	--
Third Street	3	NB	1	--	Transit Important	Major Arterial	Neighborhood Commercial/Citywide	--
Fourth Street	4	SB	0	--	Transit Important	Major Arterial	Neighborhood Commercial/Citywide	--
Fifth Street	4	NB/SB	0	--	--	Major Arterial	Neighborhood Commercial	III
Sixth Street	4	NB/SB	0	--	--	Major Arterial	Neighborhood Commercial	--
Seventh Street	2	NB	0	--	--	Major Arterial	Neighborhood Commercial	IV
Eighth Street	3	SB	0	--	--	Major Arterial	Neighborhood Commercial	IV
Ninth Street	4	NB	0	--	--	Major Arterial	Neighborhood Commercial	--
10th Street	4	SB	0	--	--	Major Arterial	Neighborhood Connection	III
11th Street	2	NB/SB	0	--	Secondary Transit	--	Neighborhood Connection	II
So. Van Ness Avenue	6	NB/SB	0	--	--	--	Citywide	--
12th Street	2	NB/SB	0	--	--	--	--	--
Gough Street	3	NB/SB	0	--	--	--	--	--
Brady Street	1	NB	0	--	--	--	--	--
Valencia Street	3	NB/SB	0	--	--	Secondary Arterial	Neighborhood Commercial	II
McCoppin Street	2	EB/WB	0	--	--	--	--	II
Otis Street	4	WB	0	--	Transit Oriented	--	Neighborhood Commercial	II

NOTES:

<sup>a</sup> San Francisco General Plan, Transportation Element

<sup>b</sup> CMP = Congestion Management Plan, MTS = Metropolitan Transportation System.

<sup>c</sup> Class II = bicycle lane, Class III = shared lane bicycle route.

SOURCE: SF General Plan.

## **Attachment 2: Traffic Volumes**

## **Attachment 2a: All Scenarios**



Better Market Street Private Auto Traffic Volumes - All Scenarios (PM Peak Period)  
All study intersections

Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
1	Steuart	NB	LT	88	110	10	-100	120	20	-100
			TH	0	0	0	0	0	0	0
			RT	0	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	186	210	160	-50	240	190	-50
2	Spear	NB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	0	0	20	20	0	20	20
	Market	EB	LT	0	0	0	0	0	0	0
			TH	186	210	140	-70	240	170	-70
			RT	321	220	100	-120	240	120	-120
		WB	LT	2	0	0	0	0	0	0
			TH	86	110	10	-100	120	20	-100
			RT	0	0	0	0	0	0	0
3	Drumm-Main	NB	LT	221	210	0	-210	220	0	-220
			TH	334	440	440	0	480	500	20
			RT	89	90	0	-90	100	0	-100
		SB	LT	200	170	240	70	190	280	90
			TH	0	0	0	0	0	0	0
			RT	60	60	60	0	70	80	10
	Market	EB	LT	105	30	0	-30	30	0	-30
			TH	218	170	0	-170	190	10	-180
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	86	100	0	-100	110	10	-100
			RT	0	10	10	0	10	10	0
4	Davis-Beale	SW	LT	35	20	0	-20	20	0	-20
			TH	1263	1400	1500	100	1520	1620	100
			RT	83	40	0	-40	40	0	-40
			RT2	61	90	90	0	100	100	0
			LT	0	0	0	0	0	0	0
	Market	EB	TH	288	180	0	-180	200	10	-190
			RT	142	80	0	-80	90	0	-90
			LT	0	0	0	0	0	0	0
		WB	TH	205	210	40	-170	230	60	-170
			RT	162	160	20	-140	170	30	-140
			LT	20	20	20	0	30	40	10
			TH	1276	1020	1350	330	1090	1420	330
5	Front-Fremont	NB	RT	94	80	0	-80	90	0	-90
			LT	0	0	0	0	0	0	0
			TH	336	180	0	-180	200	10	-190
	Market	EB	RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
			TH	245	220	20	-200	230	30	-200
		WB	RT	43	30	20	-10	40	30	-10
			LT	0	0	0	0	0	0	0
			TH	976	1150	950	-200	1260	1040	-220
6	Battery-First	Battery - SB	RT	0	0	0	0	0	0	0
			LT	93	60	0	-60	70	0	-70
			TH	965	1250	1140	-110	1370	1260	-110
		SB	RT	124	120	50	-70	130	50	-80
			LT	0	0	0	0	0	0	0
			TH	206	280	190	-90	310	220	-90
	Market	Bush - EB	RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
			TH	243	120	0	-120	130	10	-120
		EB	RT	203	170	10	-160	190	20	-170
			LT	0	0	0	0	0	0	0
			TH	265	240	40	-200	260	70	-190
7	Sansome	Sansome - SB	RT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	92	100	100	0	110	110	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	446	290	10	-280	320	30	-290
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	261	260	30	-230	290	60	-230
			RT	128	100	60	-40	100	60	-40
8	Second	NB	LT	16	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	193	280	0	-280	320	0	-320
	Market	EB	LT	0	0	0	0	0	0	0
			TH	253	80	10	-70	80	30	-50
			RT	307	220	10	-210	230	10	-220
		WB	LT	0	0	0	0	0	0	0
			TH	261	260	30	-230	290	60	-230
			RT	0	0	0	0	0	0	0

Better Market Street Private Auto Traffic Volumes - All Scenarios (PM Peak Period)  
All study intersections

Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
9	Montgomery	Mont - SB	LT	0	0	0	0	0	0	0
			TH	810	1500	1300	-200	1580	1380	-200
			RT	0	0	0	0	0	0	0
		SB	LT	223	120	0	-120	130	0	-130
			TH	773	1560	1570	10	1660	1690	30
			RT	100	150	0	-150	160	0	-160
		Post - EB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	286	330	270	-60	370	310	-60
	Market	EB	LT	0	0	0	0	0	0	0
			TH	337	0	20	20	0	40	40
			RT	135	10	0	-10	30	0	-30
		WB	LT	0	0	0	0	0	0	0
			TH	277	260	30	-230	290	60	-230
			RT	0	0	0	0	0	0	0
			LT	47	0	0	0	0	0	0
10	Third-Kearny	Third - NB	TH	1701	1550	1600	50	1710	1760	50
			RT	98	0	0	0	0	0	0
			LT	386	320	330	10	370	380	10
		Kearny - NB	TH	1315	1230	1270	40	1340	1380	40
			RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
	Market	Market - EB	TH	374	10	20	10	30	40	10
			RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
		Geary - WB	TH	115	70	5	-65	80	5	-75
			RT	27	20	5	-15	20	5	-15
			LT	0	0	0	0	0	0	0
		Market - WB	TH	235	320	20	-300	360	50	-310
			RT	142	90	10	-80	100	10	-90
			LT	203	200	200	0	230	230	0
11	Grant-O'Farrell	O'Farrell - EB	TH	27	0	0	0	0	0	0
			RT	79	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
	Market	EB	TH	171	10	20	10	30	40	10
			RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
		WB	TH	266	310	20	-290	350	50	-300
			RT	16	0	0	0	0	0	0
			LT	2	0	0	0	0	0	0
12	Fourth-Stockton	Stockton - SB	TH	943	920	920	0	970	970	0
			RT	0	0	0	0	0	0	0
			RT2	42	60	100	40	70	110	40
		Ellis - SB	LT	0	0	0	0	0	0	0
			TH	172	300	0	-300	330	0	-330
			RT	42	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	169	10	20	10	30	40	10
			RT	162	20	10	-10	30	20	-10
		WB	LT	0	0	0	0	0	0	0
			TH	293	310	20	-290	350	50	-300
			RT	0	0	0	0	0	0	0
13	Market at Powell	EB	LT	0	0	0	0	0	0	0
			TH	331	30	30	0	60	60	0
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	335	310	20	-290	350	50	-300
			RT	0	0	0	0	0	0	0
14	Fifth	NB	LT	0	0	0	0	0	0	0
			TH	496	800	700	-100	870	770	-100
			RT	109	0	0	0	0	0	0
		SB	LT	0	0	0	0	0	0	0
			TH	643	720	970	250	800	1050	250
			RT	95	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	222	30	30	0	60	60	0
			RT	52	50	40	-10	60	40	-20
		WB	LT	0	0	0	0	0	0	0
			TH	306	270	10	-260	310	40	-270
			RT	29	40	10	-30	40	10	-30
15	Mason	SB	LT	56	60	60	0	70	80	10
			RT	145	0	0	0	0	0	0
			RT2	70	70	70	0	80	80	0
	Turk	SB	LT2	0	0	100	100	0	110	110
			LT	0	0	0	0	0	0	0
			RT	0	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	218	20	10	-10	50	20	-30
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	235	240	10	-230	280	40	-240
			RT	166	30	0	-30	30	0	-30

Better Market Street Private Auto Traffic Volumes - All Scenarios (PM Peak Period)  
All study intersections

Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
16	Sixth	NB	LT	0	0	0	0	0	0	0
			TH	990	1200	1240	40	1300	1340	40
			RT	77	0	0	0	0	0	0
	Taylor-Golden Gate	SB	LT2	50	50	50	0	60	60	0
			LT	0	0	0	0	0	0	0
			TH	825	980	980	0	1060	1060	0
	Market	EB	RT	31	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
			TH	141	20	10	-10	50	20	-30
		WB	RT	125	240	10	-230	240	10	-230
			LT	0	0	0	0	0	0	0
			TH	351	220	10	-210	260	40	-220
17	Jones	SB	RT	29	20	0	-20	20	0	-20
			LT	0	0	0	0	0	0	0
			RT2	61	20	0	-20	20	0	-20
	McAllister	SB	LT2	130	130	150	20	150	170	20
			LT	0	0	20	20	0	20	20
			RT	0	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	266	260	20	-240	290	30	-260
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	337	170	10	-160	210	30	-180
			RT	45	50	0	-50	50	10	-40
18	Seventh	NB	LT	91	0	0	0	0	0	0
			TH	1400	1600	1680	80	1750	1830	80
			RT	48	0	0	0	0	0	0
	Market	EB	LT	0	0	0	0	0	0	0
			TH	218	260	20	-240	290	30	-260
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	386	170	10	-160	210	30	-180
			RT	12	20	0	-20	20	0	-20
19	Market at UN Plaza	EB	LT	0	0	0	0	0	0	0
			TH	218	260	20	-240	290	30	-260
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	477	170	10	-160	210	30	-180
			RT	0	0	0	0	0	0	0
20	Eighth	Hyde - SB	LT	0	0	0	0	0	0	0
			TH	1380	1390	1620	230	1500	1740	240
			RT	25	30	40	10	30	40	10
		Grove - SB	LT	0	0	0	0	0	0	0
			TH	178	180	130	-50	210	160	-50
			RT	0	0	0	0	0	0	0
	Market	Eighth - SB	LT	18	0	0	0	0	0	0
			TH	1447	1450	1750	300	1600	1900	300
			RT2	93	120	0	-120	110	0	-110
		EB	LT2	0	0	0	0	0	0	0
			TH	200	260	20	-240	290	30	-260
			RT	159	160	0	-160	180	0	-180
21	Ninth	NB	LT2	0	0	0	0	0	0	0
			LT	119	50	0	-50	60	0	-60
			RT	1497	1750	1770	20	1930	1980	50
	Market	EB	RT2	1496	1750	1920	170	1970	2170	200
			LT	143	400	0	-400	450	0	-450
			TH	0	0	0	0	0	0	0
		WB	TH	216	20	20	0	20	30	10
			RT	0	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
22	Tenth	Polk - SB	TH	492	250	10	-240	280	30	-250
			RT	38	20	0	-20	20	0	-20
			RT2	40	20	0	-20	20	0	-20
	Market	Fell - SB	LT	24	0	0	0	0	0	0
			TH	837	860	860	0	930	930	0
			RT	0	0	0	0	0	0	0
		EB	LT	0	0	0	0	0	0	0
			TH	192	20	20	0	20	30	10
			RT	281	270	320	50	310	350	40
23	Eleventh	NB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	90	10	20	10	10	20	10
	Market	SB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	0	0	0	0	0	0	0
		EB	LT	0	0	0	0	0	0	0
			TH	383	280	320	40	320	360	40
			RT	50	120	30	-90	140	30	-110
		WB	LT	0	0	0	0	0	0	0
			TH	627	370	10	-360	410	30	-380
			RT	0	0	0	0	0	0	0

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Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes	Volumes	Volumes	2020 PP - 2020 NP	Volumes	Volumes	2040 PP - 2040 NP
				PM	PM	PM	PM	PM	PM	PM
24	Van Ness	NB	LT	0	0	0	0	0	0	0
			TH	1725	1830	1830	0	1930	1950	20
			RT	116	120	0	-120	140	0	-140
		SB	LT	0	0	0	0	0	0	0
			TH	1173	1280	980	-300	1390	1090	-300
			RT	188	230	400	170	250	420	170
	Market	EB	LT	0	0	0	0	0	0	0
			TH	317	280	350	70	320	390	70
			RT	40	40	40	0	40	40	0
		WB	LT	0	0	0	0	0	0	0
			TH	544	320	10	-310	340	30	-310
			RT	83	50	0	-50	70	0	-70
25 and 26	Twelfth-Franklin	NB	LT2	15	0	0	0	0	0	0
			LT	0	0	0	0	0	0	0
			RT	0	0	0	0	0	0	0
			RT2	12	10	20	10	10	20	10
		SB	LT	24	20	20	0	20	20	0
			TH	59	50	0	-50	60	10	-50
	Market	EB	RT	5	10	10	0	10	10	0
			LT2	34	60	60	0	70	70	0
			LT	885	1000	1000	0	1100	1100	0
		WB	TH	286	260	370	110	290	400	110
			RT	49	60	60	0	60	60	0
			LT	0	0	0	0	0	0	0
27	Gough	NB	TH	654	470	350	-120	510	390	-120
			RT	40	40	30	-10	40	30	-10
			RT2	38	40	30	-10	40	30	-10
			LT	0	0	0	0	0	0	0
		SB	TH	49	40	40	0	50	50	0
			TH	697	760	840	80	840	920	80
	Market	EB	RT	671	790	1000	210	860	1070	210
			RT2	92	100	100	0	110	110	0
			LT	0	0	0	0	0	0	0
		WB	TH	1114	1220	1330	110	1330	1440	110
			RT	77	100	100	0	110	110	0
			LT	0	0	0	0	0	0	0
28	Valencia	NB	TH	578	420	310	-110	460	350	-110
			RT	96	60	50	-10	60	50	-10
			LT	0	0	0	0	0	0	0
		EB	TH	0	0	0	0	0	0	0
			RT	291	450	390	-60	480	420	-60
			LT	0	0	0	0	0	0	0
	Market	WB	TH	0	0	0	0	0	0	0
			RT	900	870	1040	170	960	1130	170
			RT	30	130	160	30	140	170	30
		EB	LT	334	470	500	30	500	530	30
			TH	915	740	810	70	820	890	70
			RT	0	0	0	0	0	0	0
29	Octavia	NB	LT	0	0	0	0	0	0	0
			TH	1635	1780	1780	0	1950	1950	0
			RT	99	270	270	0	290	290	0
		SB	LT	0	0	0	0	0	0	0
			TH	1701	2010	2010	0	2240	2240	0
			RT	38	50	200	150	60	210	150
	Market	EB	LT	74	260	210	-50	290	240	-50
			TH	831	730	930	200	810	1010	200
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	885	690	780	90	760	850	90
			RT	30	50	30	-20	60	40	-20
30	Embarcadero	NB	LT	0	0	0	0	0	0	0
			TH	2551	2920	2920	0	3340	3340	0
			RT	0	0	0	0	0	0	0
		SB	LT	0	0	0	0	0	0	0
			TH	1687	1850	1860	10	2000	2010	10
			RT	195	220	220	0	230	230	0
	Mission	EB	LT	84	180	260	80	190	270	80
			TH	0	0	0	0	0	0	0
			RT	195	200	210	10	220	230	10
31	Steuart	SB	LT	79	80	70	-10	90	80	-10
			TH	78	90	70	-20	110	90	-20
			RT	29	40	20	-20	40	20	-20
	Mission	EB	LT	33	50	0	-50	60	10	-50
			TH	206	290	390	100	310	410	100
			RT	64	20	30	10	20	30	10
		WB	LT	21	70	70	0	70	70	0
			TH	112	80	120	40	90	130	40
			RT	55	60	10	-50	60	10	-50
32	Spear	SB	LT	44	30	10	-20	30	10	-20
			TH	249	170	90	-80	190	110	-80
			RT	60	30	10	-20	30	10	-20
	Mission	EB	LT	0	0	20	20	0	20	20
			TH	259	330	410	80	360	440	80
			RT	172	160	180	20	180	200	20
		WB	LT	47	10	10	0	10	10	0
			TH	94	110	130	20	120	140	20
			RT	0	0	10	10	0	10	10

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Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes	Volumes	Volumes	2020 PP - 2020 NP	Volumes	Volumes	2040 PP - 2040 NP
				PM	PM	PM	PM	PM	PM	PM
33	Main	NB	LT	194	210	190	-20	230	210	-20
			TH	430	530	280	-250	570	320	-250
			RT	79	120	180	60	140	200	60
	Mission	EB	LT	64	80	50	-30	90	60	-30
			TH	348	370	430	60	400	460	60
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	98	100	120	20	110	130	20
			RT	68	50	30	-20	50	30	-20
34	Beale	SB	LT	51	30	30	0	30	30	0
			TH	1227	1320	1340	20	1440	1450	10
			RT	151	150	150	0	160	160	0
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	361	420	450	30	460	490	30
			RT	173	130	140	10	140	150	10
		WB	LT	51	30	30	0	30	30	0
			TH	241	280	280	0	310	310	0
			RT	0	0	0	0	0	0	0
35	Fremont	NB	LT	142	80	60	-20	80	60	-20
			TH	1124	820	1040	220	870	1090	220
			RT	77	60	60	0	70	70	0
	Mission	EB	LT	15	20	30	10	20	30	10
			TH	457	490	530	40	530	570	40
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	303	360	340	-20	390	370	-20
			RT	89	70	90	20	80	100	20
36	First	SB	LT	57	60	60	0	60	60	0
			TH	1002	1240	990	-250	1360	1100	-260
			RT	190	200	180	-20	220	200	-20
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	415	450	500	50	490	540	50
			RT	283	370	410	40	400	460	60
		WB	LT	11	10	10	0	10	10	0
			TH	434	430	390	-40	460	420	-40
			RT	0	0	0	0	0	0	0
37	Second	NB	LT	159	0	0	0	0	0	0
			TH	145	210	50	-160	240	70	-170
			RT	135	120	200	80	140	220	80
		SB	LT	19	10	10	0	10	10	0
			TH	273	50	70	20	60	70	10
			RT	59	100	10	-90	110	20	-90
	Mission	EB	LT	7	10	10	0	10	10	0
			TH	489	590	620	30	650	680	30
			RT	181	50	50	0	50	50	0
		WB	LT	4	0	0	0	0	0	0
			TH	532	550	610	60	580	640	60
			RT	142	140	20	-120	160	40	-120
38	N. Mont	SB	LT	110	30	30	0	30	30	0
			TH	736	1600	1610	10	1720	1730	10
			RT	166	110	100	-10	120	110	-10
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	567	620	650	30	680	710	30
			RT	245	300	270	-30	350	320	-30
		WB	LT	88	10	10	0	10	10	0
			TH	662	640	610	-30	700	670	-30
			RT	0	0	0	0	0	0	0
39	Third	NB	LT	103	290	350	60	320	380	60
			TH	1592	1430	1410	-20	1600	1580	-20
			RT	196	270	270	0	300	300	0
	Mission	EB	LT	46	50	80	30	50	80	30
			TH	616	650	650	0	730	730	0
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	576	580	500	-80	630	550	-80
			RT	252	110	150	40	120	160	40
40	Fourth	SB	LT	114	180	170	-10	190	180	-10
			TH	1079	960	700	-260	1040	750	-290
			RT	131	200	150	-50	210	160	-50
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	548	520	560	40	590	630	40
			RT	186	180	200	20	180	200	20
		WB	LT	15	40	40	0	40	40	0
			TH	691	850	830	-20	920	900	-20
			RT	0	0	0	0	0	0	0
41	Fifth	NB	LT	8	10	10	0	10	10	0
			TH	346	500	420	-80	550	470	-80
			RT	174	130	130	0	140	140	0
		SB	LT	96	100	150	50	110	160	50
			TH	489	560	680	120	630	740	110
			RT	116	120	190	70	130	200	70
	Mission	EB	LT	9	10	10	0	10	10	0
			TH	621	660	680	20	740	760	20
			RT	196	210	230	20	240	260	20
		WB	LT	10	10	10	0	10	10	0
			TH	597	670	670	0	730	730	0
			RT	226	270	250	-20	290	270	-20

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				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
42	Sixth	NB	LT	0	0	0	0	0	0	0
			TH	937	990	990	0	1080	1080	0
			RT	65	70	70	0	80	80	0
		SB	LT	0	0	0	0	0	0	0
			TH	939	1240	1030	-210	1310	1100	-210
			RT	117	110	90	-20	130	110	-20
	Mission	EB	LT	5	10	20	10	10	20	10
			TH	694	740	780	40	830	870	40
			RT	201	180	200	20	190	210	20
		WB	LT	4	10	10	0	10	10	0
			TH	554	560	600	40	620	660	40
			RT	133	200	230	30	210	240	30
43	Seventh	NB	LT	88	80	80	0	90	90	0
			TH	1394	1520	1590	70	1660	1730	70
			RT	130	180	180	0	210	210	0
		EB	LT	5	10	10	0	10	10	0
			TH	748	730	800	70	800	870	70
			RT	0	0	0	0	0	0	0
	Mission	WB	LT	0	0	0	0	0	0	0
			TH	551	640	650	10	720	730	10
			RT	150	80	90	10	90	100	10
44	Eighth	SB	LT	260	250	200	-50	280	230	-50
			TH	1310	1370	1580	210	1520	1710	190
			RT	187	180	160	-20	190	170	-20
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	498	510	630	120	550	670	120
			RT	204	180	210	30	210	240	30
		WB	LT	4	0	0	0	0	0	0
			TH	598	670	680	10	750	760	10
			RT	0	0	0	0	0	0	0
45	Ninth	NB	LT	49	70	70	0	70	70	0
			TH	2824	3420	3160	-260	3830	3570	-260
			RT	106	110	180	70	120	190	70
	Mission	EB	LT	3	0	0	0	0	0	0
			TH	619	590	690	100	650	750	100
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	515	520	510	-10	600	590	-10
			RT	297	360	360	0	380	380	0
46	Tenth	SB	LT	338	290	320	30	330	360	30
			TH	1685	1790	1770	-20	1990	1960	-30
			RT	128	130	140	10	150	160	10
	Mission	EB	LT	0	0	0	0	0	0	0
			TH	299	330	400	70	350	420	70
			RT	68	80	100	20	90	110	20
		WB	LT	8	10	10	0	10	10	0
			TH	550	570	560	-10	650	640	-10
			RT	0	0	0	0	0	0	0
47	Eleventh	NB	LT	132	180	180	0	200	200	0
			TH	95	70	80	10	80	90	10
			RT	92	100	100	0	110	110	0
		SB	LT	56	30	20	-10	30	20	-10
			TH	139	170	130	-40	210	150	-60
			RT	88	170	150	-20	180	160	-20
	Mission	EB	LT	8	10	10	0	10	10	0
			TH	211	290	390	100	310	410	100
			RT	44	50	50	0	60	60	0
		WB	LT	0	0	0	0	0	0	0
			TH	604	640	640	0	730	730	0
			RT	80	70	70	0	80	80	0
48	Van Ness	NB	LT	0	0	0	0	0	0	0
			TH	874	980	860	-120	980	860	-120
			RT	77	80	180	100	90	190	100
		SB	LT	0	0	0	0	0	0	0
			TH	1146	1220	920	-300	1320	1020	-300
			RT	107	140	140	0	150	150	0
	Mission	EB	UT	67	80	80	0	80	80	0
			LT	801	800	800	0	910	910	0
			TH	204	300	300	0	320	320	0
		WB	RT	111	110	110	0	130	130	0
			LT	150	140	140	0	140	140	0
			TH	488	660	640	-20	760	740	-20
49	Mission	NB	RT	196	200	200	0	220	220	0
			LT	0	0	0	0	0	0	0
			TH	695	760	760	0	860	860	0
		SB	RT	423	460	460	0	520	520	0
			UT	73	90	90	0	110	110	0
			LT	721	830	860	30	930	960	30
	Thirteenth Street	EB	TH	399	430	460	30	470	500	30
			RT	135	150	160	10	170	180	10
			LT	0	0	0	0	0	0	0
		WB	TH	538	590	590	0	630	630	0
			RT	37	50	50	0	50	50	0
			LT	0	0	0	0	0	0	0
49	Mission	NB	TH	567	630	610	-20	710	690	-20
			RT	415	440	440	0	480	480	0
			LT	0	0	0	0	0	0	0
		SB	TH	695	760	760	0	860	860	0
			RT	423	460	460	0	520	520	0
			UT	73	90	90	0	110	110	0
	Thirteenth Street	EB	LT	721	830	860	30	930	960	30
			TH	399	430	460	30	470	500	30
			RT	135	150	160	10	170	180	10
		WB	LT	0	0	0	0	0	0	0
			TH	538	590	590	0	630	630	0
			RT	37	50	50	0	50	50	0



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				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
50	Gough	SB	LT	0	0	0	0	0	0	0
			TH	729	800	880	80	890	970	80
			RT	15	30	30	0	30	30	0
	McCoppin	EB	LT	11	10	10	0	10	10	0
			TH	0	0	0	0	0	0	0
			RT	89	100	100	0	110	110	0
	Otis	WB	LT	508	600	590	-10	680	670	-10
			TH	55	160	150	-10	180	170	-10
			RT	73	110	110	0	120	120	0
51	Cyril Magnin	NB	LT	465	500	430	-70	540	460	-80
			TH	173	200	280	80	220	310	90
			RT	118	140	0	-140	150	0	-150
		SB	LT	61	70	0	-70	80	0	-80
			TH	0	0	0	0	0	0	0
			RT	47	50	140	90	60	160	100
	Ellis	WB	LT	0	0	0	0	0	0	0
			TH	106	120	120	0	130	130	0
			RT	29	30	30	0	30	30	0
52	Grant	NB	LT	117	120	120	0	140	140	0
			TH	96	90	90	0	100	100	0
			RT	0	0	0	0	0	0	0
		SB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	144	170	170	0	190	190	0
	Geary	WB	LT	0	0	0	0	0	0	0
			TH	320	340	430	90	390	470	80
			RT	32	60	90	30	70	100	30
53	Grant	NB	LT	0	0	0	0	0	0	0
			TH	67	90	140	50	100	150	50
			RT	140	60	40	-20	70	50	-20
		SB	LT	74	40	40	0	50	50	0
			TH	51	60	60	0	70	70	0
			RT	0	0	0	0	0	0	0
	Post	EB	LT	135	160	190	30	170	200	30
			TH	506	380	330	-50	400	350	-50
			RT	85	110	110	0	120	120	0
54	Kearny	NB	LT	0	0	0	0	0	0	0
			TH	1386	1220	1220	0	1320	1320	0
			RT	34	30	40	10	40	50	10
	Post	EB	LT	197	180	180	0	190	190	0
			TH	409	300	230	-70	330	260	-70
			RT	0	0	0	0	0	0	0
55	Stockton	SB	LT	57	30	70	40	40	80	40
			TH	768	690	790	100	730	830	100
			RT	0	0	0	0	0	0	0
	O'Farrell	EB	LT	0	0	0	0	0	0	0
			TH	405	170	280	110	190	300	110
			RT	251	230	260	30	240	270	30
56	Mason	NB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	0	0	100	100	0	110	110
		SB	LT	310	350	350	0	390	390	0
			TH	143	80	80	0	90	100	10
			RT	0	0	0	0	0	0	0
	Eddy	EB	LT	0	0	0	0	0	0	0
			TH	311	370	450	80	410	490	80
			RT	123	50	50	0	60	60	0
57	Jones	NB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	0	0	20	20	0	20	20
		SB	LT	449	450	390	-60	480	420	-60
			TH	176	90	100	10	100	110	10
			RT	0	0	0	0	0	0	0
	Golden Gate	EB	LT	0	0	0	0	0	0	0
			TH	586	580	510	-70	640	570	-70
			RT	76	60	50	-10	70	60	-10
58	Franklin	NB	LT	0	0	0	0	0	0	0
			TH	1220	1080	1100	20	1150	1150	0
			RT	0	0	0	0	0	0	0
	Oak	EB	LT	1071	1290	1290	0	1420	1420	0
			TH	0	0	0	0	0	0	0
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	0	0	0	0	0	0	0
			RT	41	50	50	0	50	50	0
59	Franklin	NB	LT	247	280	280	0	310	310	0
			TH	1344	1530	1550	20	1650	1650	0
			RT	528	610	610	0	660	660	0
	Fell	EB	LT	23	30	30	0	40	40	0
			TH	186	340	360	20	390	410	20
			RT	0	0	0	0	0	0	0
		WB	LT	0	0	0	0	0	0	0
			TH	51	70	70	0	90	90	0
			RT	35	40	40	0	40	40	0
60	Gough	SB	LT	53	70	70	0	90	90	0
			TH	1382	1480	1710	230	1630	1860	230
			RT	0	0	0	0	0	0	0
	Oak	EB	LT	0	0	0	0	0	0	0
			TH	1126	1220	1220	0	1330	1330	0
			RT	174	210	270	60	230	290	60

Better Market Street Private Auto Traffic Volumes - All Scenarios (PM Peak Period)  
All study intersections

Intersection# - Consistent with Figure	Street Name	Turning Movement		2010-2012 Existing	2020 No Project	2020 Plus Project	Volume Difference	2040 No Project	2040 Plus Project	Volume Difference
				Volumes PM	Volumes PM	Volumes PM	2020 PP - 2020 NP PM	Volumes PM	Volumes PM	2040 PP - 2040 NP PM
61	Van Ness	NB	LT	0	0	0	0	0	0	0
			TH	1602	1820	1780	-40	1910	1870	-40
			RT	41	60	50	-10	90	80	-10
		SB	LT	133	0	0	0	0	0	0
			TH	1407	1450	1240	-210	1580	1360	-220
			RT	106	110	110	0	130	130	0
	Fell	EB	LT	43	50	50	0	60	60	0
			TH	700	840	820	-20	920	900	-20
			RT	41	60	100	40	70	110	40
62	First	SB	LT	0	0	0	0	0	0	0
			TH	880	1040	910	-130	1140	1010	-130
			RT	409	580	540	-40	620	580	-40
	Howard	WB	LT	400	440	440	0	480	480	0
			TH	1291	1390	1400	10	1530	1540	10
			RT	0	0	0	0	0	0	0
63	Third	NB	LT	365	350	330	-20	390	370	-20
			TH	1582	1520	1520	0	1700	1700	0
			RT	0	0	0	0	0	0	0
	Howard	WB	LT	0	0	0	0	0	0	0
			TH	1731	1840	1800	-40	2020	1980	-40
			RT	323	300	350	50	330	380	50
64	Fifth	NB	LT	84	80	80	0	90	90	0
			TH	617	550	480	-70	600	530	-70
			RT	0	0	0	0	0	0	0
		SB	LT	0	0	0	0	0	0	0
			TH	579	650	800	150	720	820	100
			RT	213	130	170	40	140	180	40
	Howard	WB	LT	187	100	100	0	110	110	0
			TH	1170	1450	1480	30	1600	1630	30
			RT	241	90	80	-10	100	90	-10
65	Howard	WB	LT	0	0	0	0	0	0	0
			TH	1014	1120	1150	30	1230	1260	30
			RT	222	240	230	-10	260	250	-10
	Seventh	NB	LT	183	210	220	10	230	240	10
			TH	1390	1540	1600	60	1700	1760	60
			RT	0	0	0	0	0	0	0
66	Howard	WB	LT	0	0	0	0	0	0	0
			TH	774	840	870	30	920	950	30
			RT	483	640	640	0	700	700	0
	Ninth	NB	LT	112	150	140	-10	170	160	-10
			TH	2377	2960	2710	-250	3320	3070	-250
			RT	0	0	0	0	0	0	0
67	Folsom	EB	LT	109	120	120	0	130	130	0
			TH	1155	1250	1250	0	1380	1380	0
			RT	127	140	140	0	150	150	0
	Second	SB	LT	114	0	0	0	0	0	0
			TH	580	430	350	-80	470	390	-80
			RT	0	0	0	0	0	0	0
		NB	LT	0	0	0	0	0	0	0
			TH	280	400	400	0	440	440	0
			RT	97	110	110	0	120	120	0
68	Folsom	EB	LT	0	0	0	0	0	0	0
			TH	1640	1800	1800	0	1980	1980	0
			RT	274	320	320	0	350	350	0
	Fourth	SB	LT	187	200	220	20	220	240	20
			TH	1397	1350	1350	0	1490	1490	0
			RT	0	0	0	0	0	0	0
69	Folsom	EB	LT	86	100	100	0	110	110	0
			TH	1555	1680	1680	0	1850	1850	0
			RT	183	200	200	0	220	220	0
	Sixth	SB	LT	153	150	130	-20	170	150	-20
			TH	827	890	1040	150	980	1130	150
			RT	0	0	0	0	0	0	0
		NB	LT	0	0	0	0	0	0	0
			TH	918	950	1050	100	1050	1150	100
			RT	359	390	390	0	430	430	0
70	Folsom	EB	LT	0	0	0	0	0	0	0
			TH	1527	1580	1580	0	1740	1740	0
			RT	151	180	180	0	200	200	0
	Eighth	SB	LT	315	330	290	-40	360	320	-40
			TH	1110	1200	1450	250	1320	1570	250
			RT	0	0	0	0	0	0	0
71	Folsom	EB	LT	0	0	0	0	0	0	0
			TH	1210	1260	1260	0	1390	1390	0
			RT	76	100	100	0	110	110	0
	Tenth	SB	LT	478	510	490	-20	560	540	-20
			TH	1864	1930	1900	-30	2120	2090	-30
			RT	0	0	0	0	0	0	0

**Attachment 2b: Comparison (2015-2012)**

Better Market Street Traffic Volumes - All Scenarios (PM Peak Period)  
Comparison of 'Existing' Volumes to 2015 Counts

Intersection# - Consistent with Figure	Intersection# - Old	Street Name	Turning Movement	2010-2012 Existing	2015 Count	Difference	Difference (Intersection)	Percent Difference	
				Volumes					
				PM					
4	3	Davis-Beale	SW	LT	35	47	12	-222	-10%
				TH	1263	1001	-262		
				RT	83	90	7		
				RT2	61	104	43		
		Market	EB	LT	0	0	0		
				TH	288	213	-75		
				RT	142	189	47		
			WB	LT	0	0	0		
				TH	205	248	43		
				RT	162	125	-37		
9	8			Montgomery	Mont - SB	LT	0	0	0
						TH	810	727	-83
		RT	0			0	0		
		SB	LT		223	185	-38		
			TH		773	906	133		
			RT		100	110	10		
			LT		0	0	0		
		Post - EB	TH		0	0	0		
			RT		286	483	197		
			LT		0	0	0		
		Market	EB	TH	337	362	25		
				RT	135	249	114		
				LT	0	0	0		
			WB	TH	277	276	-1		
RT	0			0	0				
LT	91			124	33				
18	16	Seventh	NB	TH	1400	1133	-267		
				RT	48	26	-22		
				LT	0	0	0		
		Market	EB	TH	218	142	-76		
				RT	0	0	0		
				LT	0	0	0		
			WB	TH	386	356	-30		
				RT	12	10	-2		
				LT	24	10	-14		
				22	19	Tenth	Polk - SB	TH	837
RT	0	0	0						
LT	0	0	0						
Fell - SB	TH	887	811				-76		
	RT	16	58				42		
Market	EB	LT	0			0	0		
		TH	192			95	-97		
		RT	281			237	-44		
	WB	LT	0			8	8		
		TH	611			450	-161		
42	38	Sixth	NB	LT	0	0	0		
				TH	937	917	-20		
				RT	65	93	28		
			SB	LT	0	0	0		
				TH	939	913	-26		
				RT	117	49	-68		
		Mission	EB	LT	5	4	-1		
				TH	694	591	-103		
				RT	201	163	-38		
			WB	LT	4	17	13		
				TH	554	497	-57		
				RT	133	159	26		

### **Attachment 3: VMT Information**

SF-CHAMP Existing and 2040 VMT per capita for TAZs adjacent to Market Street project area

Residential					Office				Retail			
TAZ	Existing	% below regional avg	2040	% below regional avg	Existing	% below regional avg	2040	% below regional avg	Existing	% below regional avg	2040	% below regional avg
242	4.5	74%	3.8	76%	7.6	60%	6.9	59%	8.9	40%	9.1	38%
578	3.7	78%	3.1	81%	7.6	60%	6.9	59%	8.9	40%	9.0	38%
591	3.1	82%	2.7	83%	7.7	60%	6.9	59%	9.0	40%	8.9	39%
608	2.5	85%	2.3	86%	7.6	60%	6.7	61%	8.3	44%	8.2	44%
620	2.1	88%	1.9	88%	7.5	61%	6.6	61%	8.3	44%	7.9	46%
621	2.0	88%	1.7	89%	7.4	61%	6.5	62%	8.0	46%	7.7	47%
666	1.9	89%	1.6	90%	7.4	61%	6.3	63%	7.2	52%	7.1	51%
667	1.5	91%	1.3	92%	7.5	61%	6.5	62%	5.4	64%	5.4	63%
684	1.5	91%	1.3	92%	7.7	60%	6.7	61%	5.1	66%	4.7	68%
744	1.5	91%	1.3	92%	7.8	59%	6.6	61%	3.8	74%	3.8	74%
742	1.6	91%	1.4	91%	7.9	59%	6.7	61%	3.4	77%	3.6	75%
740	2.4	86%	1.9	88%	7.8	59%	6.1	64%	9.0	40%	8.2	44%
773	2.4	86%	2.0	88%	7.8	59%	6.1	64%	8.7	42%	7.9	46%
774	2.4	86%	2.1	87%	7.8	59%	6.2	64%	9.1	39%	8.1	45%
775	2.4	86%	2.0	88%	7.9	59%	6.2	64%	9.2	38%	8.2	44%
776	2.4	86%	2.1	87%	7.9	59%	6.2	64%	9.3	38%	8.3	43%
777	2.4	86%	2.1	87%	7.9	59%	6.2	64%	9.3	38%	8.2	44%
806	2.2	87%	1.9	88%	7.9	59%	6.2	64%	9.1	39%	8.0	45%
955	2.3	87%	2.0	88%	7.9	59%	6.2	64%	9.3	38%	8.1	45%
953	2.4	86%	2.1	87%	7.8	59%	6.2	64%	9.0	40%	8.0	45%
950	2.3	87%	2.0	88%	7.7	60%	6.1	64%	8.8	41%	7.9	46%
941	2.3	87%	2.0	88%	7.7	60%	6.1	64%	8.8	41%	8.0	45%
939	2.0	88%	1.7	89%	7.7	60%	6.1	64%	8.6	42%	8.0	45%
938	1.9	89%	1.7	89%	7.7	60%	6.1	64%	8.5	43%	7.9	46%
935	1.8	90%	1.6	90%	7.7	60%	6.1	64%	8.5	43%	8.0	45%
931	1.8	90%	1.6	90%	7.6	60%	6.1	64%	8.1	46%	7.7	47%
751	1.9	89%	1.5	91%	7.5	61%	6.1	64%	7.8	48%	7.5	49%
679	1.9	89%	1.6	90%	7.4	61%	6.1	64%	7.3	51%	7.1	51%
296	2.0	88%	1.6	90%	7.2	62%	6.2	64%	7.8	48%	7.5	49%
286	2.1	88%	1.8	89%	7.2	62%	6.5	62%	7.7	48%	7.6	48%
647	2.5	85%	2.3	86%	7.6	60%	6.8	60%	8.1	46%	8.2	44%
588	3.5	80%	3.0	81%	7.6	60%	6.9	59%	8.3	44%	8.5	42%
587	3.8	78%	3.3	80%	7.6	60%	6.9	59%	8.5	43%	8.7	40%
<b>Regional Avg</b>	<b>17.2</b>		<b>16.1</b>		<b>19.1</b>		<b>17.0</b>		<b>14.9</b>		<b>14.6</b>	

SOURCE: San Francisco Planning Department Transportation Information Map (TIM), <http://www.sftransportationmap.org>.



VTM Outputs from DTA Model  
Prepared by Fehr & Peers, October 2018

Timeslice	2:30 PM	2:35 PM	2:40 PM	2:45 PM	2:50 PM	2:55 PM	3:00 PM	3:05 PM	3:10 PM	3:15 PM	3:20 PM	3:25 PM
Baseline2020	5,120	10,434	12,004	12,084	12,675	12,608	12,502	12,458	12,834	12,487	12,586	12,282
Project2020	5,107	10,409	11,989	12,177	12,706	12,660	12,505	12,555	12,912	12,593	12,542	12,386

Timeslice	3:30 PM	3:35 PM	3:40 PM	3:45 PM	3:50 PM	3:55 PM	4:00 PM	4:05 PM	4:10 PM	4:15 PM	4:20 PM	4:25 PM
Baseline2020	13,851	16,316	17,334	17,357	17,591	17,921	18,114	18,434	18,334	18,182	18,444	18,497
Project2020	13,917	16,304	17,281	17,319	17,718	17,836	18,339	18,272	18,392	18,362	18,688	18,482

Peak Hour is highlighted

Timeslice	4:30 PM	4:35 PM	4:40 PM	4:45 PM	4:50 PM	4:55 PM	5:00 PM	5:05 PM	5:10 PM	5:15 PM	5:20 PM	5:25 PM
Baseline2020	18,943	19,165	19,273	19,227	19,256	19,427	19,556	20,152	20,283	20,414	20,199	20,064
Project2020	18,992	19,177	19,368	19,288	19,311	19,491	19,601	20,095	20,211	20,457	20,255	20,217

Peak Hour is highlighted

Timeslice	5:30 PM	5:35 PM	5:40 PM	5:45 PM	5:50 PM	5:55 PM	6:00 PM	6:05 PM	6:10 PM	6:15 PM	6:20 PM	6:25 PM
Baseline2020	20,144	19,983	20,178	20,035	19,971	20,027	19,697	19,440	19,342	19,272	19,343	19,174
Project2020	20,253	19,980	20,038	19,949	20,065	20,032	19,832	19,607	19,486	19,293	19,489	19,360

Timeslice	6:30 PM	6:35 PM	6:40 PM	6:45 PM	6:50 PM	6:55 PM	7:00 PM	7:05 PM	7:10 PM	7:15 PM	7:20 PM	7:25 PM	7:30 PM
Baseline2020	16,100	13,930	12,952	12,805	12,306	11,997	11,679	11,385	11,141	11,218	11,238	11,156	7,651
Project2020	16,656	14,338	13,299	12,769	12,417	11,915	11,606	11,479	11,409	11,451	11,360	11,196	7,720

### 2020 Conditions VMT Summary

Peak Hour	4:45 PM
Baseline2020	238,884
Project2020	239,195
Change	0.1%

### Evening Period 2:30 PM to 7:30PM

Baseline2020	978,570
Project2020	982,910
Change	0.4%

### Notes:

1. Evening period is the entire DTA model period and is more reflective of the daily conditions than the PM peak hour.

## **Attachment 4: Parking and Loading Information**

## **Attachment 4a: Loading Recommendations Report**



MEMORANDUM

**TO:** File

**FROM:** Ian Trout, PE, Assistant Engineer *IT*  
Aishni Rao, Student Design Trainee 3 *Aishni Rao*

**THROUGH:** Britt Tanner, PE, Senior Engineer *BT*  
Andrea (Tig) Glerum, PE, Project Manager 2 *agg*  
Amy Lam, AIA, Project Manager 2 *AL*

**DATE:** February 22, 2018

**SUBJECT:** Better Market Street Loading and Parking Recommendations:

**EXECUTIVE SUMMARY**

This memorandum discusses current loading practices on Market Street, best measures based on a literature and peer city review, and the proposed loading recommendations for the Better Market Street (BMS) project, including loading for commercial vehicles (yellow zones), passengers (white zones) and people with disabilities (especially Paratransit). To achieve BMS project goals, 42 parking spaces are proposed for removal. Overall, all the cross streets and alleyways within one block of Market Street would have the maximum possible parking spaces allocated to loading while considering existing bus zones, bike share stations, blue parking zones and passenger loading zones. There could be up to 227 commercial loading zones, eight blue accessible parking zones, and 46 white passenger loading zones added near the Market Street corridor. Most of these new zones are currently general metered parking. Paratransit data was analyzed to identify six hot spot locations where paratransit loading would need to be accommodated on Market Street. Due to site constraints and project objectives, many of the existing loading bays on Market Street would be relocated or removed. Most remaining or relocated loading zones on Market Street would be redesigned to be flex zones, which are sidewalk-level mixed-use areas, available not only to pedestrians and bicyclists but also for loading and unloading vehicles. Market Street would have time-of-day restrictions and increased enforcement for the flex zones to promote safety, improve the pedestrian experience, and maximize throughput for people walking, taking transit and riding bicycles. In addition, nighttime loading (e.g. 10 p.m. to 6 a.m.) and the use of smaller delivery vehicles on Market Street would be incentivized. This memo describes all 22 of the remaining loading zones/flex zones proposed along Market Street after completion of the BMS project. For a summary of the proposed loading and parking changes, please refer to **Table 1** below. Recommendations and next steps are outlined in order to finalize a loading and parking strategy for Market Street.

**Table 1. Potential Parking Changes Overview.**

Type of Parking	Potential Parking Removal with BMS Project	Potential Loss of commercial loading with Hub Variant <sup>1</sup>	Potential new/converted Parking with BMS Project
Existing loading bays on Market	23		
Existing metered spaces on Market Street	6		
Existing metered spaces off of Market Street	36		
Flex zones on Market Street		3	22
Commercial loading zones not on Market Street			227
White passenger loading zones not on Market Street			46
Blue accessible parking spaces not on Market Street			8

<sup>1</sup>spaces would be designated for paratransit vehicles and taxis.

## LITERATURE REVIEW OF BEST PRACTICES FOR LOADING

A review of literature related to commercial loading best practices has provided some insight as to how to manage loading activities for the BMS project. Some potential tools to use on Market Street are the following: flex zones, time-of-day restrictions, urban consolidation centers (UCC), graduated fees for use of loading bays, stricter enforcement, and alternative last mile delivery methods (e.g. smaller delivery vehicles, bicycle delivery). While some of these practices only require more enforcement and signage, other concepts require a new sub-fleet of delivery vehicles (e.g. e-bikes, electric vehicles) or available land (UCC). Each of these tools are explained in detail in the following paragraphs.

A flex zone is essentially a space that is designed to be “available not only to pedestrians but also for loading and unloading delivery vehicles” (San Francisco County Transportation Authority, 2010). Flex zones use bollards and other design features to clearly demarcate the pedestrian space from the flexible loading area.

Time-of-day and time limit restrictions are used throughout the world, including in San Francisco, to restrict the use of a loading zone during certain hours and for a specific duration. Currently the loading zones on Market Street are restricted to 6-wheel or greater and a time limit of 30 minutes in the space. However, other restrictions used might be late-night delivery, such as between 10 p.m. and 6 a.m. only. There have been studies and reports that agree that “off-hour/off-peak deliveries not only benefit the wider transport system, by moving traffic to less congested times of day, but also improve the efficient and cost effectiveness of deliveries” (Dack, Epstein, Hodge, Segev, & Wainwright, 2015).

Other best practices charge a varying fee based on how long a delivery vehicle is parked in a space. This would increase turnover, which in turn would allow loading spaces to be available for other deliveries. The graduated fees would incentivize delivery companies to be more efficient. Stricter enforcement would need to be undertaken in order to catch violators, promote compliance with time limits, prevent double parking, and provide a fair chance for all delivery companies to access precious curb space.

A UCC is a warehouse located in a central location that is used by freight companies to sort deliveries and reorganize them into smaller vehicles to reduce ‘last-mile’ truck traffic in the center core. Smaller vehicles have fewer blind spots, are more maneuverable, and take up less space in urban core’s congested streets. UCC’s can either be run under a Public Private Partnership (PPP) or privately, as is the case with larger delivery companies such as FedEx or UPS. A UCC that is created in collaboration with the Chamber of Commerce, the City and County of San Francisco, and freight companies would be able to attract various delivery companies to a central location, where deliveries can be sorted by destination so that fewer, smaller vehicles enter the downtown area. UCC’s have been implemented in several countries with varying degrees of success. France has had some success with it, as it “offers the guarantee of an available and secure unloading area close to the commercial area in the city center” (Best Urban Freight Solutions, 2007). Additional information on the literature review and the sources can be found in the Reference section.

## **MARKET STREET PASSENGER, BLUE ZONES, & COMMERCIAL LOADING**

Market Street is the most important multi-modal corridor in San Francisco. With three levels of rail transit and over a dozen local bus routes converging on the corridor, it provides an integrated transit network with BART, AC Transit, SamTrans, Golden Gate Transit and other regional transit services and shuttles. Over 400,000 people per day travel the Market Street corridor by transit. On a typical weekend near Powell Street, over 200,000 people walk along Market Street, getting to work, going shopping, visiting museums and enjoying the sights of the city. In addition, cyclists make up a significant share of the users of Market Street, outnumbering motor vehicles at various times during the day. Many people like the vibrancy and character of Market Street and the businesses help attract people to the street. Due to the high commercial and retail activity along the corridor, commercial, and paratransit loading is important for the continued success and vitality of Market Street.

With the advent of ride hail services or Transportation Network Companies (TNCs) such as Uber or Lyft, there has been an ever-increasing need to better manage commercial and passenger loading throughout the city of San Francisco, but in particular along Market Street due to it being the backbone of the city. A San Francisco County Transportation Authority (SFCTA) DRAFT report that analyzed TNC hot spots, found that “between 20-25% of all vehicle trips in [Supervisory] Districts 3 & 6, which includes all of SOMA/Chinatown/FiDi/Civic Center/Union Square/North Beach, are TNC’s” (San Francisco County Transportation Agency, 2017). Taxi data was not looked at due to the inaccuracy of the GPS data caused by tall buildings in downtown and the age of the GPS units mounted on taxicabs. Additional white passenger loading zones would be implemented with the BMS project and are discussed further down in this section.

### Current Loading Bay locations and usage

There are 23 loading bays within the BMS project corridor of which 20 are for commercial loading only and three are a mixture of passenger and commercial loading (see **Table 2** below). Today, commercial loading bays on Market Street are restricted to commercial vehicles with 6-wheels or more with a 30 minute time limit, but they are unmetered. Paratransit may use all loading bays along Market Street today and in current practice paratransit vehicles load from the bicycle and travel lanes along much of Market Street. A 2003 study found that there were large amounts of illegal parking at the Market Street loading bays, but “at no time is more than 50% of the available [loading bay] capacity being used” (San Francisco County Transportation Authority, 2003). An additional loading video analysis is currently



underway to get more recent data but initial trends are showing that 36% of vehicles using the loading bays are not commercial vehicles. The video data has revealed that roughly 80% of all commercial vehicles on Market Street are 30 foot long trucks (SU-30).

**Table 2. Existing Loading Bays.** Note that regular metered parking spaces located at Steuart Street were not included.

Block Market	Side of Street	Loading bay length (ft.) <sup>1</sup>	Type	Approximate capacity of SU 30' trucks <sup>2</sup>
12 <sup>th</sup> Street to Van Ness Ave	North	140	Commercial	3
9 <sup>th</sup> to 8 <sup>th</sup> streets	South	80	Passenger	2
8 <sup>th</sup> to 7 <sup>th</sup> streets	South	60	Commercial	1
	North	65	Commercial	1
7 <sup>th</sup> to McAllister	South	55	Active loading and unloading only	1
McAllister to 6 <sup>th</sup> streets	North	116	Commercial	3
	South	90	Commercial	2
6 <sup>th</sup> to Mason streets	North	40	Commercial	1
	South	89	Commercial	2
Mason Street Intersection	South	52	Commercial	1
5 <sup>th</sup> to 4 <sup>th</sup> streets	North	57	Commercial	1
	South	58	Commercial	1
4 <sup>th</sup> to O'Farrell streets	North	64	Commercial	1
O'Farrell Street Intersection	South	173	Commercial/Passenger	4
O'Farrell to 3 <sup>rd</sup> streets	North	62	Commercial	1
Kearny to Montgomery streets	North	55	Commercial	1
	South	110	Commercial	2
Montgomery to 2 <sup>nd</sup> streets	South	56	Commercial	1
2 <sup>nd</sup> to Sutter streets	North	60	Commercial	1
Battery to Front streets	North	88	Commercial	2
Fremont to Beale streets	South	72	Commercial	2
Spear to Steuart streets	North	84 <sup>3</sup>	Commercial	2
	South	50	Commercial	1
<b>TOTAL</b>	<b>23</b>	<b>1776</b>		<b>37</b>

1. Measured as parallel length along roadway without transitions
2. Assuming 40 feet needed for each SU-30 for buffer and maneuvering
3. Denotes that this length does not include the bus zone located at the end of the loading bay

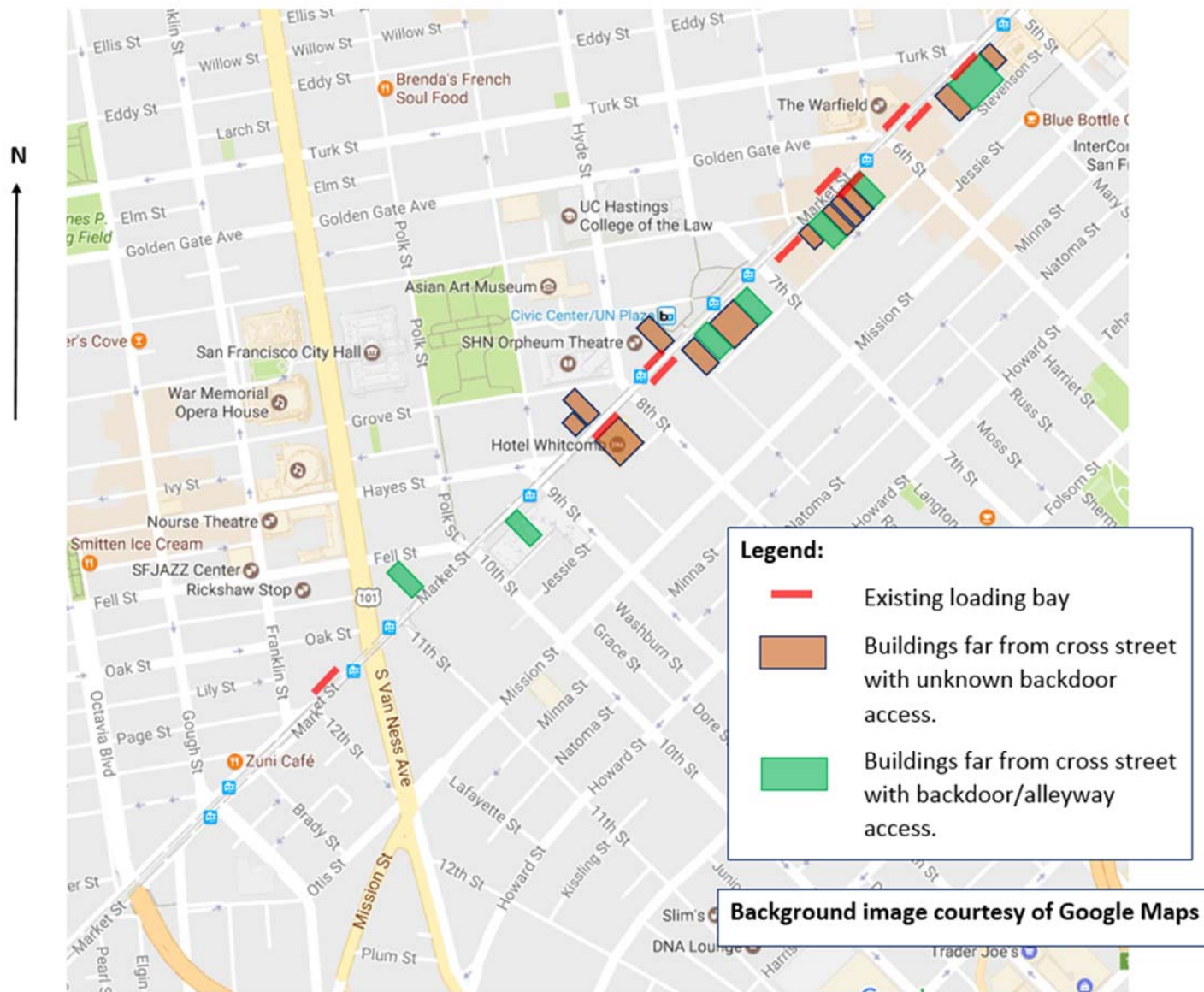
#### Location of building doors from cross street parking

A key consideration in making commercial loading recommendations for the BMS project was to identify businesses that are more than 250 feet from a cross street parking space. The presumption is that should a loading zone be removed on Market Street, the nearest cross street parking space would be designated as a loading zone if it is not already one. In 2014, data was collected to count businesses that have doors more than 250 feet away from any cross street parking space and do not have a door onto a cross street or alley (see Attachment 1 for detailed list of businesses and locations). It is important to note that a few doorways may have shifted since 2014 due to new construction or renovations. Visual observations of back doors to alleyways such as Jessie or Stevenson streets were undertaken in June 2017. A study of building plans and interviews with property owners would need to be undertaken to fully understand if a business could use their back door access to the alleyways for loading/unloading. **Table 2** notes the 85 doorways that are greater than 250 feet away from a cross street parking space (not necessarily an existing commercial loading space).

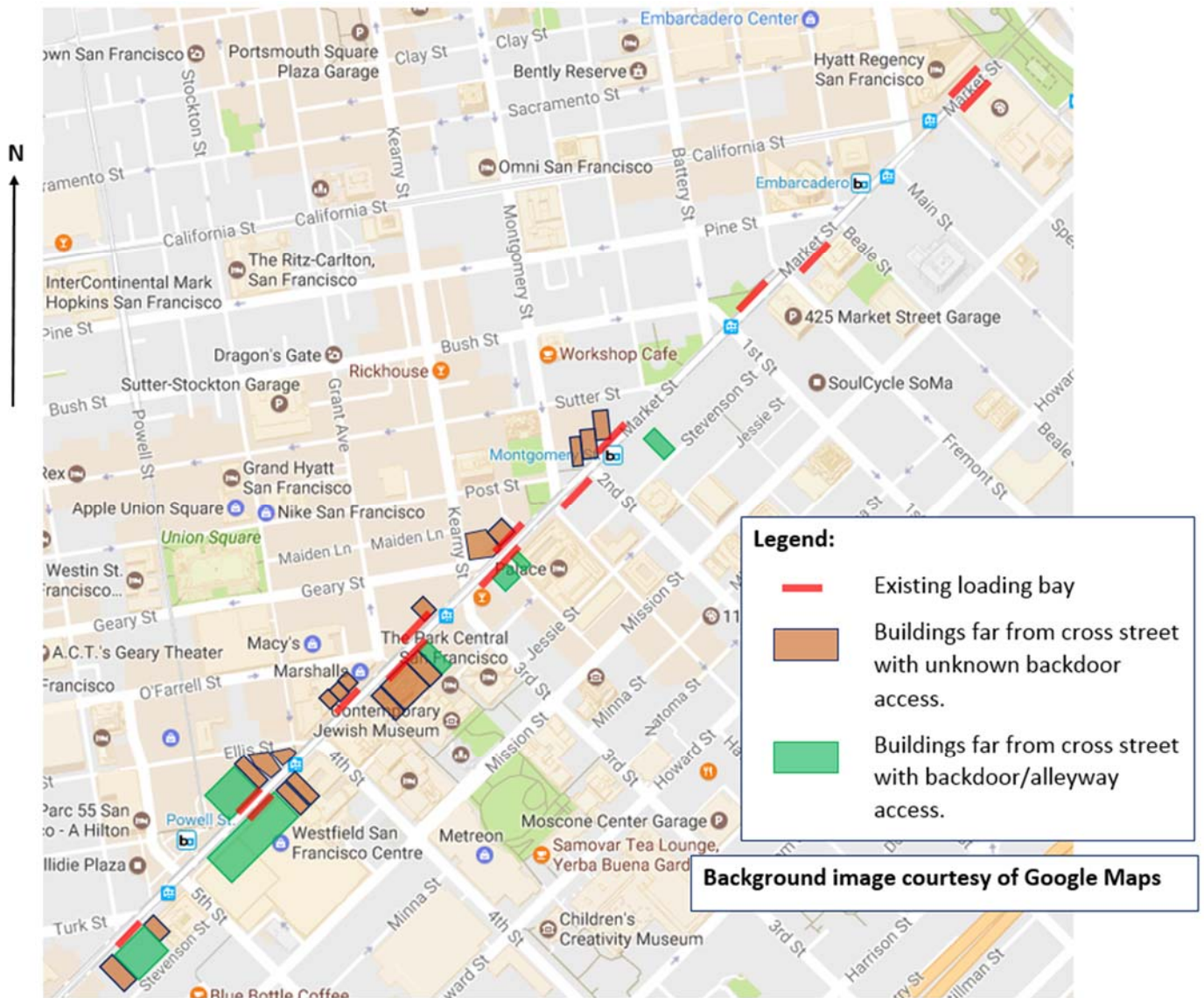
**Table 2. Existing Businesses >250' from Cross Street Loading Spaces.**

Block of Market Street	Side	Addresses > 250' from Loading	# of Doorways
11 <sup>th</sup> and 10 <sup>th</sup> streets	North	1440 Market St	1
10 <sup>th</sup> and 9 <sup>th</sup> streets	South	1355 Market St	2
9 <sup>th</sup> and 8 <sup>th</sup> streets	South	1231 Market St	2
	North	between 1240-1254 Market St	4
8 <sup>th</sup> and 7 <sup>th</sup> streets	South	between 1117-1155 Market St	8
	North	1170 Market St	1
7 <sup>th</sup> and 6 <sup>th</sup> streets	South	between 1025-1073 Market St	10
6 <sup>th</sup> and 5 <sup>th</sup> streets	South	between 923-969 Market St	4
5 <sup>th</sup> and 4 <sup>th</sup> streets	South	between 815-871 Market St	12
	North	between 830-890 Market St	9
4 <sup>th</sup> and 3 <sup>rd</sup> streets	South	between 731-767 Market St	8
	North	726 Market St	4
3 <sup>rd</sup> and New Montgomery streets	South	between 665-685 Market St	6
	North	between 650-690 Market St	7
New Montgomery and Sutter streets	South	575 Market St	1
	North	between 570-590 Market St	6

**Table 2** above depicts businesses that could be more effected by the BMS project proposals for removal of loading bays due to their location away from a cross street. Many of the businesses listed in **Table 2** and **Figure 1** and **Figure 2** below are close to existing loading bays along Market Street. Targeted outreach, in addition to the general project-wide outreach, would need to be done to these businesses in order to try to accommodate their loading/unloading needs. Figures 1 and 2 show where existing loading bays are on Market Street and the 85 doorways that are located greater than 250 feet from a cross street parking space.



**Figure 1. Buildings with entryways more than 250 feet from cross street parking space, and existing parking/loading bays from Octavia to 5th streets**



**Figure 2. Businesses with entryway greater than 250 feet from cross street parking space, and existing parking/loading bays from 5th to Steuart streets**

Proposed changes on the side streets to accommodate daylighting, project objectives, and bus zones. The City and County of San Francisco has adopted the Vision Zero policy to eliminate traffic fatalities by 2024. One of the traffic engineering tools to achieve this policy goal is daylighting intersections so that pedestrians waiting at the corner are more visible to motorists. This is done by removing the parking space closest to the intersection so that pedestrians are not visually blocked by a parked vehicle. **Table 3** below lists the side streets and the metered spaces that could be removed for daylighting and also describes other parking removal due to the BMS project.



**Table 3. Potential Parking Removal in the area near to Market Street**

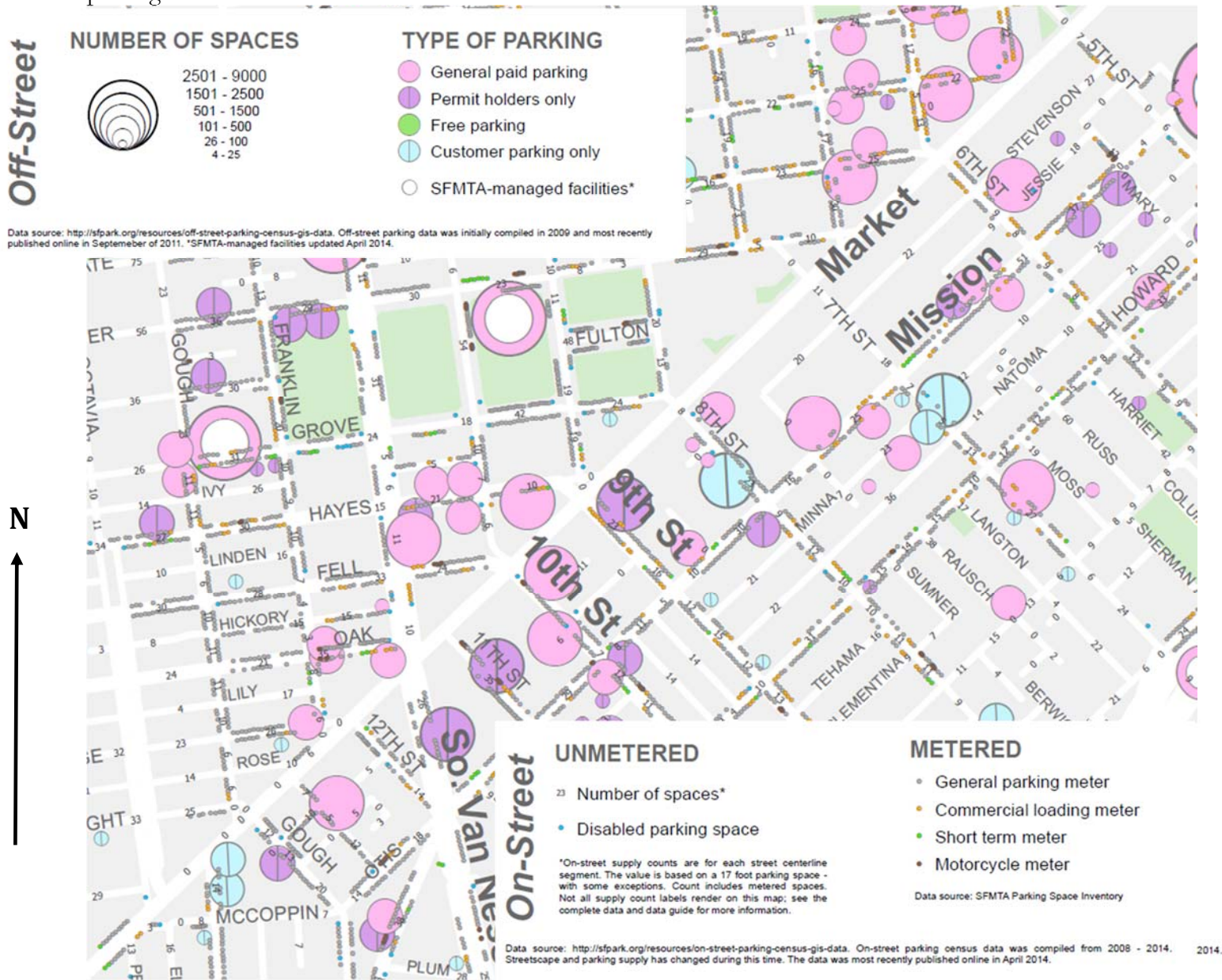
Street name	From Cross street	To Cross street	Side of street	Removal of yellow zone	Removal of general parking space	Notes
Spear	Market	Mission	East	12		1 space for blue zone & 11 for new Muni layover
Market	Spear	Steuart	North		6	Used today by art/street vendors
Main	Market	Mission	West	1		For proposed bulb-out at Market St
Davis	California	Market	West		1	For daylighting at Market St
Pine	Market	Front	North	2		For daylighting at Market and Front
Pine	Market	Front	South	1	1	For daylighting at Market and Front
Beale	Market	Mission	West	1		For daylighting at Market and Beale
Battery	Market	Pine	East	1		For daylighting at Market/Bush/Battery
1 <sup>st</sup>	Market	Mission	East	1		For proposed bulb-out at Market
Sutter	Market	Montgomery	South	1		For daylighting at Montgomery and Sutter
Post	Market	Kearny	North	1		For daylighting at Montgomery/Post/Market
Post	Market	Kearny	South	1		For daylighting at Montgomery/Post/Market
Grant	Market	Geary	West	2		For daylighting at Grant and Geary
Jessie	4 <sup>th</sup>	Jessie St East	South		1	Shift motorcycle spaces to daylight 4 <sup>th</sup> /Jessie
Mason	Market	Eddy	East	2		For daylighting at Eddy and Mason
McAllister	Market	Leavenworth	North		3	For proposed boarding island
Jones	Golden Gate	Market	West		1	To create three 25' yellow zones
Hayes	Market	Polk	South		1	For daylighting Polk and Hayes
Valencia	Market	McCoppin	West	1		For daylighting McCoppin and Valencia
Valencia	Market	McCoppin	East		1	For proposed traffic calming island
<b>TOTAL POTENTIAL REMOVED PARKING SPACES</b>				<b>27</b>	<b>15</b>	

Capacity on the side streets to accommodate commercial loading activities.

Currently the cross streets that intersect Market Street have varying curbside parking allocations. These include blue zones, yellow zones, white zones, and regular metered spaces. Blue accessible parking zones are designated for disabled persons with a disabled parking placard, yellow zones are meant for commercial loading/unloading (3 min active loading is allowed for all vehicles) and can be limited to trucks with 6-wheels or more, and white zones represent areas where passenger loading/unloading,

including Paratransit loading occurs (5 min max). Several of the white zones on the side streets were installed as part of the Safer Market Street (SMS) project to provide space for informal drop offs/pickups since TNCs and regular motorists were prohibited from turning onto Market Street.

**Figure 3** and **Figure 4** below detail the type of parking on the cross streets near Market Street as of April 2014. These figures depict metered parking spaces, motorcycle parking, yellow commercial metered parking, general metered parking, short term green metered parking, and blue accessible parking near the BMS corridor area.

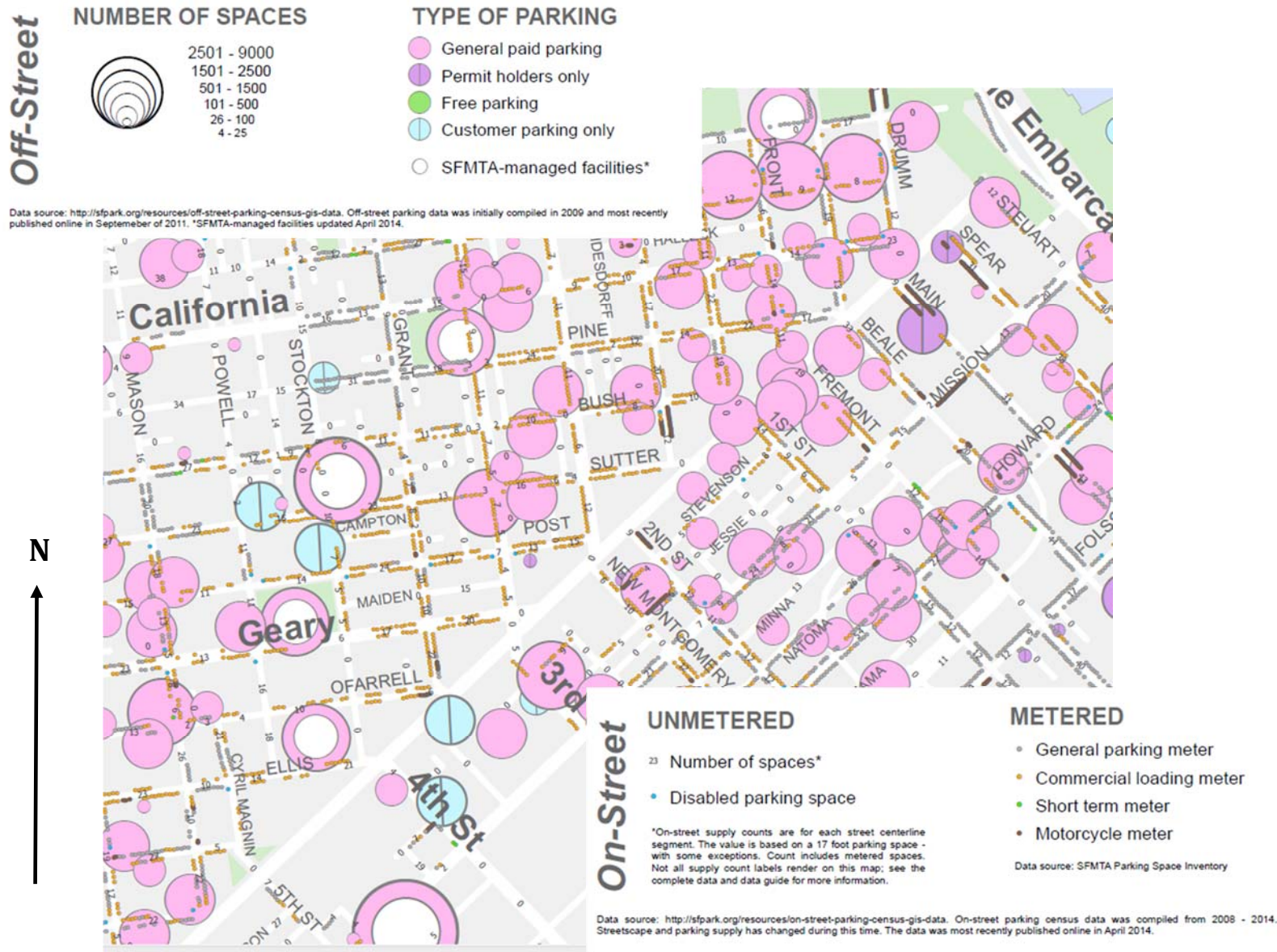


**Figure 3. 2014 Parking census map, including metered loading zones – Market Street, from Octavia to 5th streets.**

The side streets along Market Street also have truck deliveries; a more detailed occupancy study would need to be undertaken to determine if existing yellow loading zones along cross streets would be able to



absorb the additional commercial loading demand created by the removal of some loading bays along Market Street. In total, there are approximately 1350 metered spaces within a block of Market Street.



**Figure 4. 2014 Parking census map, including metered loading zones --Market Street, from 5<sup>th</sup> to Stuart streets.**

Please note that neither figure shows unmetered commercial loading zones as they are not differentiated between regular unmetered parking spaces. The 2014 census map gives the visual confirmation that there is a small amount of general metered parking spaces east of 5<sup>th</sup> Street (grey circles) and that there is a large amount of off-street parking (large circles). An important note is that since 2014 many of these cross streets have had their parking spaces changed for various reasons, such as sidewalk widening, addition of bike share stations, the SMS project, the 2<sup>nd</sup> Street improvement

project, etc. This reports' recommendations use the most current information that the SFMTA has on parking, which dates from May 2017.

As of May 2017 there are 29 cross streets in the project area that could have parking spaces converted into commercial loading spaces. The 32 other cross streets are already commercial loading zones, bus zones, do not have any parking spaces, or have motorcycle spaces. In addition, there are alleyways such as Jessie, Stevenson, and Annie streets that could accommodate additional commercial loading zones. Alleyways may not be able to accommodate larger commercial vehicles, but would be well suited for smaller vehicles that conduct freight activities. Whilst many commercial loading spaces in downtown are only 20-22 feet long, that is not long enough for an SU-30 to park. This leads to larger commercial vehicles either double parking or taking up multiple 20-22 foot commercial loading spaces. Given the wide variety of commercial vehicle lengths and variety of vehicles that a commercial space can serve, this report proposes minimal existing commercial loading zone resizing. **Table 4** below notes all the side street locations in more detail and gives the maximum possible number of spaces that could be converted to commercial loading. The analysis went a block in either direction from Market Street (e.g. north to next cross street, or south to Mission Street).

**Table 4. Potential Additional Commercial Loading on Side Streets or Alleys**

Street name	Side of street	Notes on restrictions	Parking spaces which may be converted to commercial <sup>1</sup>	Other notes
The Embarcadero (Washington to Don Chee)	West	Tow-away No Stopping Anytime between 7 to 9 a.m. & 3 to 6 p.m. (tow-away lane) Mon thru Fri	24	Potential spaces for art vendor loading/unloading
Drumm Street, (Market to Sacramento)	West		3	Replace spaces taken for white zone on block face
California Street (Drumm to Davis)	South		6	Cable Car line & layover
Main Street (Market to Mission)	West		2	Make these 6-wheel commercial
Beale Street (Market to Mission)	East		5	Spaces are between bike share station & 6-wheel commercial spaces
Davis Street (Market to California)	West	Tow-away No Stopping Anytime between 3 to 7 p.m. (Muni Richmond Express routes) Mon thru Fri	3	
Pine Street (Market to Front)	North	Tow-away No Stopping Anytime between 3 to 7 p.m. (Muni Richmond Express routes) Mon thru Fri	1	
Pine Street (Market to Front)	South		4	
Montgomery Street (Market to Sutter)	East		8	



Street name	Side of street	Notes on restrictions	Parking spaces which may be converted to commercial <sup>1</sup>	Other notes
Montgomery Street (Market to Sutter)	West	Tow-away No Stopping Anytime between 7 to 9 a.m. & 3 to 7 p.m. Mon thru Fri	11	Would remove the tow-away only
Stevenson Street (3 <sup>rd</sup> to Annie streets)	North		2	Would need to be cognizant about large vehicle access.
Annie Street (Stevenson to Jessie)	East	Currently, the entire street is Tow-Away No Parking Anytime (narrow dead-end street)	Approximately 4	Recommend removing Tow-Away due to adequate street width. Would need to be cognizant about large vehicle access.
Grant Avenue (Market to Geary)	East		2	Replace spaces taken for daylighting on same block
Jessie Street (4 <sup>th</sup> to 5 <sup>th</sup> streets)	South	These spaces are Tow-Away No Parking Anytime, 12 a.m. to 10 a.m., Daily (morning loading dock activity)	2 spaces close to 4 <sup>th</sup> and 4 spaces close to 5 <sup>th</sup>	Would need to be cognizant about large vehicle access.
Eddy Street (Cyril Magnin to Mason)	South	Tow-away No Stopping Anytime between 3 to 6 p.m. (Former Muni 7X Express PM Layover) Mon thru Fri	2	Layover is no longer needed, so can make them 7 a.m.-6 p.m.
Stevenson Street (5 <sup>th</sup> to 7 <sup>th</sup> streets)	South	Currently 1 hour time limit, 7 a.m. to 6 p.m. Mon thru Sat	30-40	Non-metered blocks. Would need to be cognizant about large vehicle access.
Mason Street (Market to Eddy)	East		3	
Taylor Street (Market to Turk)	East		2	
Golden Gate Ave (Market to Jones)	North		2	Next to the Golden Gate Theatre and existing yellow zones
Golden Gate Ave (Market to Jones)	South		4	
Jones Street (Market to Golden Gate)	East		2	North of existing white zone
Jones Street (Market to Golden Gate)	West		3	In front of the old Hibernia Bank
McAllister Street (Market to Charles J. Brenham)	South		2	In front of Old Renoir Hotel
Stevenson Street (Angelo's Alley to 7 <sup>th</sup> Street)	North	Currently 2-hour time limit 7 a.m. to 6 p.m. Mon thru Sat. Before November 2009, there were meters.	Approximately 20	US Federal Building on south side of Street
Hyde Street (Market to Fulton)	West	Spaces are reserved for Farmer's Market permit	4	

Street name	Side of street	Notes on restrictions	Parking spaces which may be converted to commercial <sup>1</sup>	Other notes
		holders 6 to 930 a.m., Wed, Fri, Sun		
Hyde Street (Market to Fulton)	East	Spaces are reserved for Farmer's Market permit holders 6 to 930 a.m., Wed, Fri, Sun	4	Next to the Orpheum Theatre
8 <sup>th</sup> Street (Market to Mission)	East		5	Spaces would be dependent upon Trinity development project
Grove Street (Market to Larkin)	North		2	
Larkin Street (Market to Grove)	West		3	Next to Bill Graham Auditorium
Hayes Street (Market to Polk)	South		1	Next to post office and could convert to 6-wheel
Jessie Street (9 <sup>th</sup> to 10 <sup>th</sup> streets)	Either	Currently, the entire street is Tow-Away No Parking Anytime (narrow one-way street)	Approximately 4	Maybe access to The Market, Twitter, and other buildings
10 <sup>th</sup> Street (Market to Mission)	East	Currently, the first 80 feet is Tow-Away No Parking Anytime (lane lines)	3	Assumes that the lane lines are shifted to create spaces
Fell Street (Market to Van Ness)	North	Currently, 2 of the spaces are part time loading zones	7	Convert all 7 spaces to full time loading zones
Van Ness Ave (Market to Fell)	West		2	Spaces associated with the VN BRT project
S Van Ness Ave (Market to Mission)	West		1	Space would be dependent upon 10 S Van Ness development and VN BRT projects
S Van Ness Ave (Market to Mission)	East		5	Space would be dependent upon 1500 Mission development project
Oak Street (Van Ness to Franklin)	South		2	Spaces would be dependent upon 1 Oak & 1554 Market development projects
12 <sup>th</sup> Street (Market to S Van Ness)	East		4	Spaces would be dependent upon 10 S Van Ness redevelopment project
12 <sup>th</sup> Street (Market to S Van Ness)	West		4	Convert 10 perpendicular to parallel spaces. Spaces would be dependent upon 1629 Market development project
Page Street (Market to Gough)	South		2	
Franklin Street (Market to Oak)	West		3	
Brady Street (Market to Stevenson)	East		3	Spaces would be dependent upon 1629 Market development project
Gough Street (Page to Market streets)	West		2	
Gough Street (Market to Otis streets)	East		1	Convert 4 angled parking spaces into 1 commercial loading space

Street name	Side of street	Notes on restrictions	Parking spaces which may be converted to commercial <sup>1</sup>	Other notes
Gough Street (Market to Otis streets)	West	1 space is currently a blue zone	3	After the blue zone & shift the blue zone past Stevenson St
Valencia Street (Market to McCoppin)	West		1	Due to daylighting at McCoppin intersection
<b>TOTAL POSSIBLE COMMERCIAL SPACES ADDED</b>			<b>227</b>	

<sup>1</sup>Note: Assumes that one commercial space was 40 feet on non-metered blocks, while metered blocks assumed that each existing space would be converted to one commercial space regardless of length

The above table does not include motorcycle or passenger loading spaces that could also be converted to commercial loading spaces. Those particular uses, along with blue accessible parking zones, bus zones, and green zones, serve a specific purpose due to their adjacent land use. A case-by-case analysis would need to be undertaken if the aforementioned spaces were to be considered for reallocation.

#### Capacity on the side streets to accommodate passenger loading activities.

As mentioned in the top of this section, with the advent of TNCs and the increased use of taxis and carpools, there is an ever increasing need for accommodate passenger loading. The BMS project would prohibit private vehicles and TNCs from travelling along Market Street between 10<sup>th</sup> and Drumm streets. As such, the BMS project would install additional white passenger zones at cross streets in order to provide a safe space for informal drop-offs and pickups. **Table 5** below describes possible passenger loading zones near Market Street. All the proposed passenger loading zones are currently general metered parking spaces unless otherwise noted.

**Table 5. Proposed White Passenger Loading Zones near Market Street**

Street name	Cross street	Cross street	Side of street	Number of 20' spaces	Notes
Embarcadero	Clay	Market	West	2	
Steuart	Market	Mission	West	3	Convert existing part time white zone to full time.
Drumm	Sacramento	California	West	3	Currently yellow zones
California	Davis	Drumm	South	2	
Davis	California	Pine	West	2	Convert 44' Taxi zone
Pine	Davis	Front	North	2	
Beale	Market	Mission	West	2	Currently yellow zones
1 <sup>st</sup>	Market	Stevenson	West	2	Currently yellow zones. These spaces become tow-away between 7 to 9 a.m. & 3 to 7 p.m.
Montgomery	Sutter	Market	East	2	
Stevenson	2 <sup>nd</sup>	New Montgomery	North	1	In what is currently a red zone

Street name	Cross street	Cross street	Side of street	Number of 20' spaces	Notes
Ellis	Market	Powell	North	3	Currently yellow zones. Due to westbound street conversion
Eddy	Mason	Cyril Magnin	South	2	Currently yellow zones.
Golden Gate Ave	Jones	Market	South	2	
Jones	Golden Gate	Market	West	2	
7 <sup>th</sup>	Stevenson	Market	East	2	In front of new Yotel hotel
Larkin	Hayes	Grove	West	2	
Hayes	Market	Polk	South	1	Shift green meter closer to post office
10 <sup>th</sup> Street	Market	Mission	East	2	Assumes that the lane lines are shifted to create spaces
10 <sup>th</sup> Street	Market	Mission	West	1	Shifts existing blue zone down to Jessie St
Fell Street	Van Ness	Market	South	1	Convert existing part time white zone to full time.
11 <sup>th</sup>	Mission	Market	East	3	
Franklin	Market	Oak	West	2	
Valencia	McCoppin	Market	East	2	
<b>TOTAL POTENTIAL ADDITIONAL WHITE LOADING ZONES</b>				<b>46</b>	

Capacity on the side streets to accommodate blue accessible parking activities (blue zone).

Per the DRAFT Public Right of Way Accessibility Guidelines (PROWAG) outlined by the United States Department of Justice (USDoJ), whenever metered parking is removed for a project, to the extent possible, 4% of remaining metered parking spaces should be blue accessible zones. There are currently 46 blue zones located near the BMS project corridor (up to 2 blocks in any direction from Market Street). When calculating all the metered parking spaces that border the BMS project (one block in either direction from Market St), the number of blue zones to meet DRAFT PROWAG recommendations would be 55. While there are currently no blue zones or metered parking on Market Street west of Spear Street, vehicles serving people with disabilities currently use the existing loading bays, block bus zones or bike lanes, and use parking spaces on cross streets. The BMS project would remove/repurpose cross street commercial and general parking spaces for daylighting, bulb-outs and additional commercial loading spaces as listed in **Table 3** and **Table 4** above. There are also streets proposed to be converted to two-way which opens up further opportunities for blue zones (the ADA requirements are that the passenger door has to fully open up onto sidewalk and there is an ADA-compliant curb ramp to the rear of the vehicle). **Table 6** depicts the potential blue zones that could be added as part of the BMS project in order to meet PROWAG recommendations. While **Table 6** lists eight potential locations, it does not provide the recommended nine additional blue zones that would meet the DRAFT PROWAG recommendation. This is due to the strict guidelines that govern blue zone placement. The project team will work to identify an additional potential blue zone to meet the DRAFT PROWAG recommendation as design progresses.

**Table 6. Potential Additional Blue Accessible Zones near Market Street.**

Street Name	Cross Street	Cross Street	Side of Street	Notes
Beale Street	Market	Mission	West	
Eddy Street	Mason	Cyril Magnin	South	Removal of the tow-away lane (bus layover)
Mason Street	Market	Eddy	East	Due to 2-way street conversion

Street Name	Cross Street	Cross Street	Side of Street	Notes
Jones Street	Market	Golden Gate	East	Due to 2-way street conversion
Embarcadero	Clay	Market	West	Dependent upon Embarcadero Improvement project
10 <sup>th</sup> Street	Mission	Minna	West	
Van Ness Ave	Fell	Market	West	Shift existing blue zone from Hickory St onto Van Ness (to make it compliant)
Page Street	Gough	Franklin	South	
<b>TOTAL POTENTIAL ADDITIONAL BLUE ZONES</b>				<b>8</b>

## PARATRANSIT

An evaluation of commercial and passenger loading activities must also consider access for people with disabilities, and in particular, paratransit services. A key consideration in making loading recommendations is the ability to accommodate and, to the extent possible, design for paratransit needs.

The BMS design includes features that would allow paratransit vehicles to stop at and provide access to most addresses along Market Street while minimizing disruptions for transit and bicycle traffic. The BMS project features a buffer space between the curb lane and bicycle facility along with flex zones to accommodate paratransit access along Market Street. Areas adjacent to curbside boarding islands and BART portals cannot accommodate paratransit today or under BMS. A Memorandum of Understanding (MOU) or other contractual agreement would be created to require that San Francisco paratransit providers train their operators in the proper ways of unloading/loading customers on Market Street, into the bike facility if necessary. Paratransit vehicles would be required to park in a loading zone, flex zone or other parking space on Market Street. San Francisco paratransit vehicle data was collected (including both paratransit vans and taxis) for all the pick-ups/drop-offs along Market Street for the year between October 2015 and October 2016. In total, there were roughly 13,700 pickups and drop-offs along Market St with 44% of them being drop offs. Paratransit activities are similar to commercial loading in that the vehicle prefers to be parked as close as possible to a doorway. Paratransit drivers normally assist their passengers to their destination's front door. Based on the paratransit activity data, paratransit flex zones could be located at five of the six most active locations in **Table 7** below, each of which had over 500 combined pickups/drop-offs during the year. The location on the south side of Market, between 4<sup>th</sup> and 5<sup>th</sup> cannot be accommodated due to physical constraints. Alternative locations for paratransit loading would be across Market Street or on Ellis, 4<sup>th</sup>, or 5<sup>th</sup> streets.

***Table 7\_High Paratransit Activity Locations along Market Street.***

Block	Side	Annual Paratransit Pick-ups	Annual Paratransit Drop-offs	Potential Generators
10 <sup>th</sup> -9 <sup>th</sup>	north	313	304	Fox Plaza apartments and commerce, including US Post Office
7 <sup>th</sup> -8 <sup>th</sup>	both	1038	1358	Mayor's Office on Disability, Lighthouse for the Blind at 1155 Market Street, BART
4 <sup>th</sup> -5 <sup>th</sup>	both	414	613	retail, small doctors' facilities, BART
4 <sup>th</sup> -3 <sup>rd</sup>	south	214	293	retail and offices

For more information about the paratransit pickup analysis, please see Attachment 2.

## OTHER LOADING DEMANDS

In addition to the paratransit activity and the doorway analysis, the BMS project team has received other loading requests via 311 or other means, and has also identified additional loading needs based on observations:

- Desire to have loading close to BART/Muni elevators at all 5 stations along the corridor, for example to avoid fare collection convoys continuing current practice of parking on the sidewalk or in travel lane near BART/Muni elevators.
- Desire to have loading between 10<sup>th</sup> and Van Ness Ave on the north and south sides due to Walgreens store with future Van Ness BRT street configuration and Uber headquarters.
- Request to maintain a dedicated passenger loading zone for the Ritz Carlton Residences due to no cross street access.

## POTENTIAL FLEX ZONE LOCATIONS ON MARKET STREET

The BMS project team recommends the use of flex zones on Market Street. These zones are designed to accommodate a multitude of purposes depending on the time of day and week. Flex zones, as mentioned earlier in this report, would be designed to allow for bicyclists and vehicles to safely navigate along Market whilst accomplishing the loading demands. Flex zones would be designed, to the extent possible, to be 100 feet in length in order to accommodate two WB-40 tractor trailer trucks. The project team evaluated the available sidewalk space on Market Street and identified where flex zones could be constructed and would be logical to serve current business and accessibility/paratransit needs for Market Street. The flex zones would be for active paratransit/taxi/commercial vehicle loading only and would be restricted to minimize disruption to bicyclists and pedestrians during peak hours (paratransit would still be able to access the flex zones at any time). The specific peak hour restrictions are still to be determined via further data analysis and outreach but would be the a.m. peak period for the south side of Market Street and the p.m. peak period for the north side of Market Street.

**Figure 5** below depicts the proposed flex zones that could be placed along the BMS corridor. Note that the flex zones are shown for illustrative purposes only and do not represent the actual length of the proposed zone. Also, Figure 5 shows the three flex zones that would be restricted to paratransit and taxis under the Hub variant. For more information on the proposed Market Street flex locations and the Hub variant, including side street/alleyway opportunities for additional loading areas, see **Table 8** below.





**Figure 5 Existing and Potential Loading locations on Market Street.**

There are some blocks of Market Street that are unable to accommodate a flex zone due to BART portals, proposed transit stop locations, or proximity to an intersection. However, with up to 22 potential flex zone locations proposed for BMS, there would be a minimal loss of one loading/flex zones on Market Street over the existing 23 loading bays.

The proposed flex zone locations represent an initial proposal; further analysis and outreach would be undertaken throughout the design process for the BMS project to inform the final configuration of commercial & accessible loading. Also, as in any dynamic environment, this memorandum does not preclude further changes to commercial loading practices as a result of adjacent land use changes, transportation projects, vehicle fleet changes (such as automated vehicles) or other changing circumstances.

**Table 8. Proposed Potential Flex Zones on Market Street**

Block	Side of Street	Notes	Cross street /alleyway Opportunities	Current land use
Franklin-Van Ness <sup>1</sup>	North	All the buildings here are being demolished as part of development projects	Oak, 12 <sup>th</sup> , Franklin, Page streets	Currently being redeveloped; buildings can be designed to accommodate loading off Market
10 <sup>th</sup> and 11 <sup>th</sup> streets <sup>2</sup>	Both		11 <sup>th</sup> Street	Walgreens, Uber, SFCTA
Polk-Hayes <sup>1</sup>	North	Constrained due to 120' boarding island & distance between intersections	Use loading zones currently on Hayes	Starbucks, Fox Plaza apartments, Paratransit hot spot, empty store fronts
9 <sup>th</sup> and 8 <sup>th</sup> streets	Both		9 <sup>th</sup> , Grove, Larkin streets	Hotel Whitcomb & Sam's Diner
8 <sup>th</sup> and 7 <sup>th</sup> streets	Both	Civic Center plaza	Stevenson, Hyde streets	MOD, Lighthouse, BART, Paratransit hot spot
7 <sup>th</sup> -6 <sup>th</sup>	South	Constrained due to numerous closely spaces intersections/crosswalks & boarding island	Use Stevenson to the greatest extent possible, 6 <sup>th</sup> , Jones, McAllister streets	Hotel (under construction), Huckleberry bicycles, Flying Falafel, Smoke shops, art museum
Golden Gate and Jones	North	Redevelopment project on part of north side	Golden Gate	The Hall
6 <sup>th</sup> and Mason streets	Both	Redevelopment project on part of north side	Stevenson, Turk streets	The Warfield theater, The village
5 <sup>th</sup> -4 <sup>th</sup>	North	Constrained due to boarding islands, new midblock intersections, & BART portals/elevator	Use Ellis, Jessie, 4 <sup>th</sup> , 5 <sup>th</sup> streets	Paratransit hot spot, medical offices (above Westfield mall), Flood building, Converse, Diesel USA, GAP, Oakley
4 <sup>th</sup> -3 <sup>rd</sup>	South	Constrained due to boarding islands	Grant Ave, Stevenson (already used as a back entrance to Four Seasons Hotel) Street	Paratransit hot spot, Neiman Marcus Last Call, Four Seasons Hotel, CVS Pharmacy, Super Duper
3 <sup>rd</sup> and O'Farrell streets	North	No access to buildings from Geary; have to load from Market		FedEx office, Walgreens
in the slip lane to go to Geary Street	North	No access to buildings from Kearny or Post streets		Ritz-Carlton Residences
2 <sup>nd</sup> and Sutter streets	South		Stevenson Street	CVS pharmacy
Fremont and 1 <sup>st</sup> streets	Both	No access to buildings from cross streets; loading has to occur from Market		AT&T, Bank of America, 1 <sup>st</sup> Republic, offices
Fremont-Beale	South	Constrained due to BART portal & short distance between intersections		Wells Fargo, Starbucks, 333 Market Street



Block	Side of Street	Notes	Cross street /alleyway Opportunities	Current land use
Steuart and Spear streets	Both		Spear and Steuart streets	Dica Salon, 1 Market, bike rental. Philz coffee, offices

<sup>1</sup>This proposed flex zone could be restricted to paratransit/taxi use under the Hub variant.

<sup>2</sup>The proposed flex zone on the north side of Market could be restricted to paratransit/taxi use under the Hub variant.

There is a design variant, called the Hub variant which could restrict three flex zones near Van Ness Avenue to be accessible only via paratransit and taxis. This is due to the creation of a Muni, bicycle, pedestrian plaza between 11<sup>th</sup> and 12<sup>th</sup> streets on Market Street. The Hub variant would require all buses (except Muni) and commercial vehicles heading in the westbound direction to turn off Market Street at 9<sup>th</sup>/Hayes/Larkin. All vehicles except paratransit, taxis, emergency vehicles, Muni, bicycles heading in the eastbound direction would be required to turn either left onto Franklin Street or right onto 12<sup>th</sup> Street. Paratransit, taxis, emergency vehicles, Muni, bicycles would be able to continue straight along Market Street.

## RECOMMENDATIONS

The BMS project is a major upgrade of one of the City's most vibrant commercial and transportation corridor. Continuing to maintain access for commercial and passenger loading is one of the BMS project goals. Accounting for all the above factors mentioned in this report, the BMS project team recommends adding 22 flex zones on Market Street, detailed in **Table 8** above. Under the Hub variant, 3 of them would be restricted to paratransit and taxis. As many short term (30 min or less) commercial loading spaces should be added within 100 foot of Market Street on the cross streets as possible, as detailed in **Table 4** above. In addition, commercial loading spaces should be created on the alleys south of Market to accommodate truck loading in order to promote more use of the alleyways to access the rear of Market Street buildings. This includes Angelo's Alley, Jessie (100 and 800 blocks), Stevenson (unit, 100, 200, 400, 500 and 600 blocks), and Annie streets (unit block). The alleyways may be better suited for smaller commercial vehicles and personal vehicles that perform freight activities. Up to 227 new or lengthened cross street and alleyway commercial loading spaces could be created to discourage commercial loading along Market Street. Careful consideration and outreach must be done to businesses along Market Street to encourage the use of alleyways if at all possible.

Time-of-day commercial loading restrictions on Market Street would be used to promote more efficient use of limited curb space and to avoid conflicts between loading activities and other modes during peak hour periods. Nighttime loading (e.g. 10 p.m. to 6 a.m.) should be incentivized as there are less conflicts between transit, paratransit, bicycles, and delivery vehicles which may mean faster delivery times. The use of smaller delivery trucks (no larger than SU-30's) should be incentivized as smaller vehicles have less blind spots, are more maneuverable, and take up less space in the urban core's congested streets. A UCC or last mile delivery methods such as by tricycle or electric vehicle may be more viable options in the future. An incentive program could be established in order to promote changing delivery schedules. Once the BMS project is built, a continued analysis effort would need to be undertaken, along with enforcement feedback, to ensure that commercial loading needs are being adequately addressed.

In addition, up to 46 proposed new passenger loading zones and eight new blue accessible parking zones listed in **Table 5** and **Table 6** would be created on cross streets as part of the BMS project. These zones would strive to meet PROWAG draft goals for blue zones and the project's goal of maintaining access for people in TNC's and private vehicles. The BMS project team would proceed with further evaluation and outreach with businesses and developing relationships that can be conducive for both the City and County of San Francisco (CCSF) and businesses alike while trying to promote loading on non-Market Street locations.

## NEXT STEPS

- Proceed with the design of the flex zones and all the side street/alleyway white, yellow, and blue zone changes as noted in Tables 5, 6, 7, and 9 above.
- Proceed with further evaluation and outreach with businesses and developing relationships that can be conducive for both the City and County of San Francisco and businesses alike while trying to promote loading at non-Market Street locations.
- Conduct additional research and analysis to develop recommendations related to implementation considerations for flex zones including:
  - Definition in Transportation Code
  - Enforcement
  - Time of day and time limit restrictions
  - Strategies to promote or incentivize alternative hours of delivery
  - Paratransit loading
- Finalize the data analysis of current loading bays along Market Street and identify final cross street loading zones, time-of-day restrictions, and locations for flex zones that would remain on Market Street.

## REFERENCES

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DISTANCE FROM MARKET STREET DOORWAY TO CROSS STREET LOADING ZONE

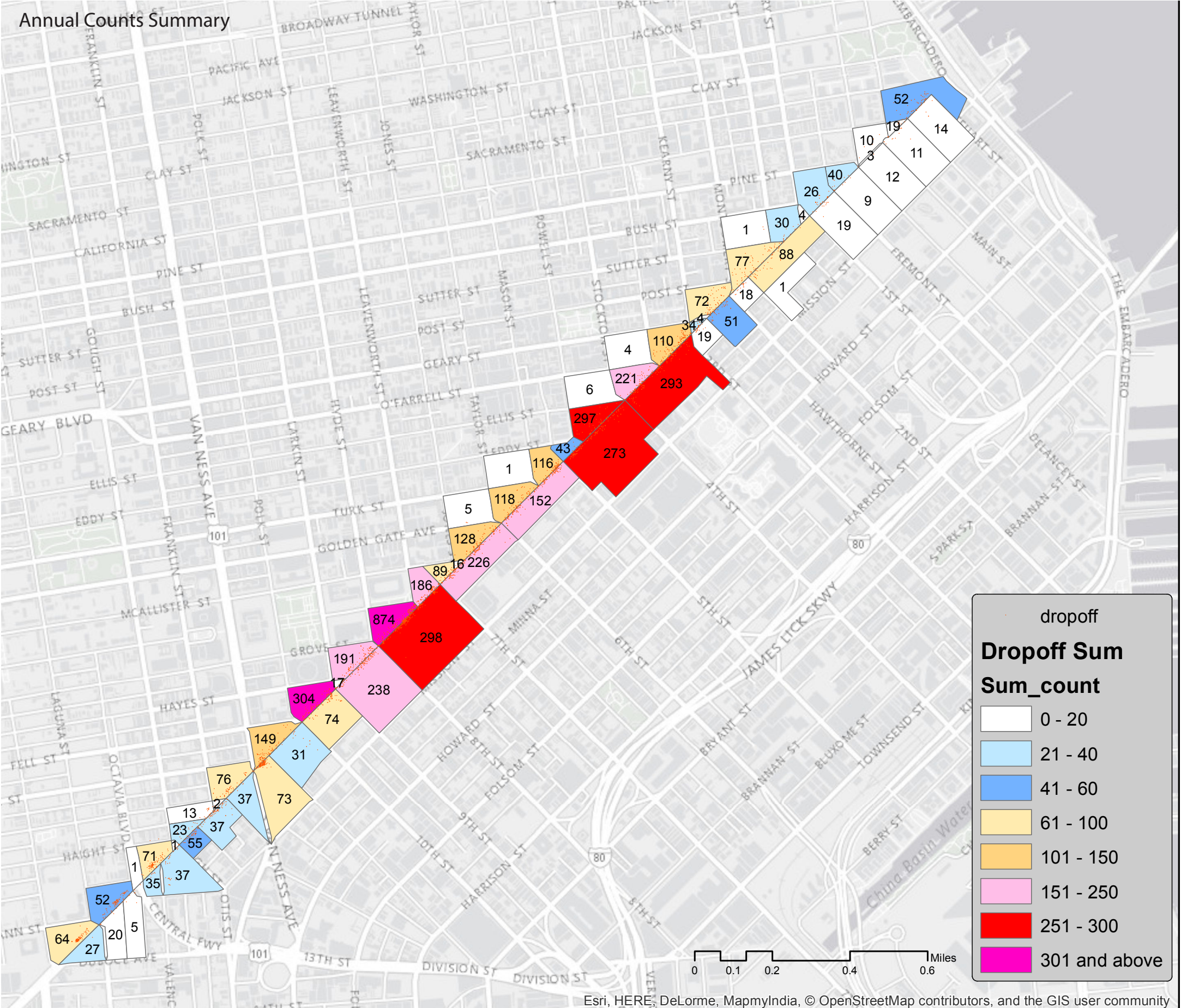
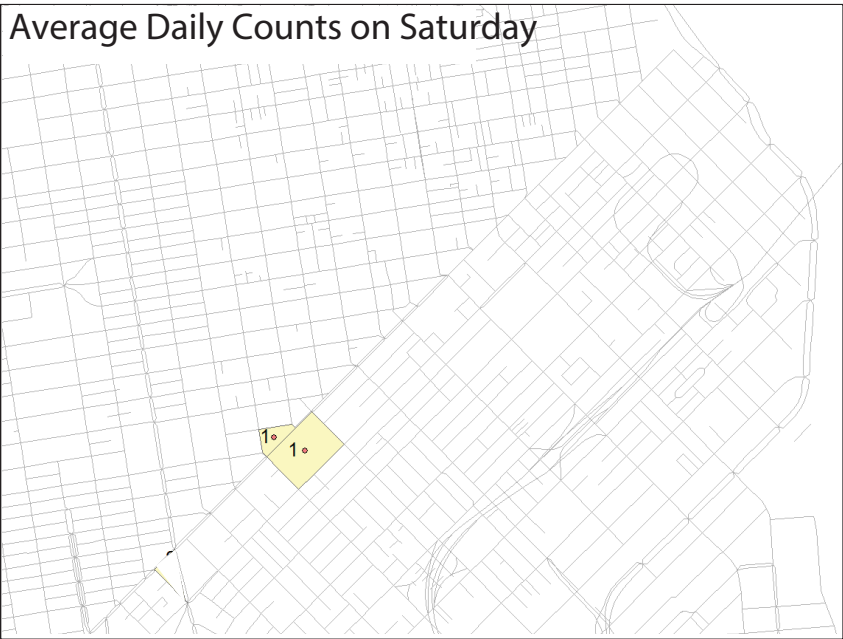
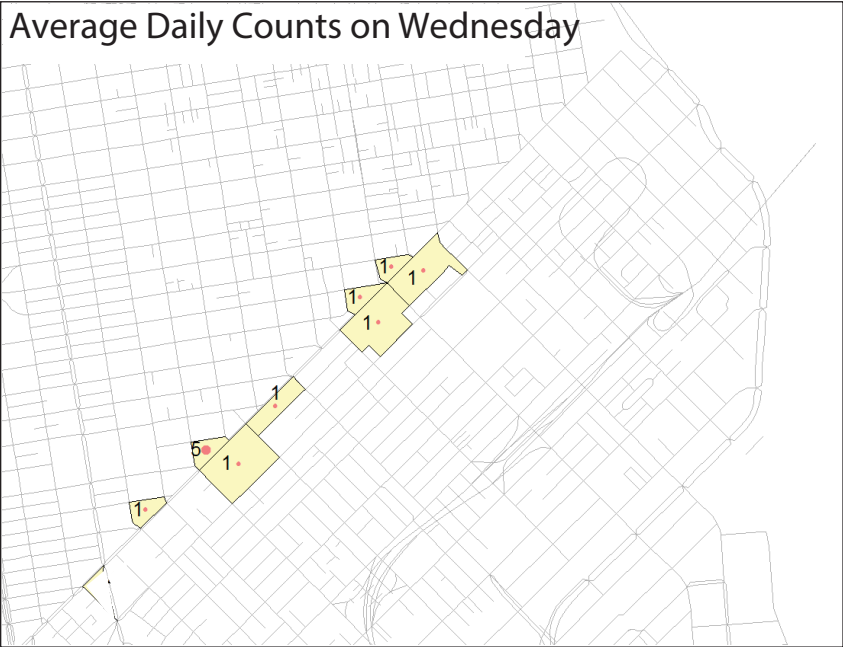
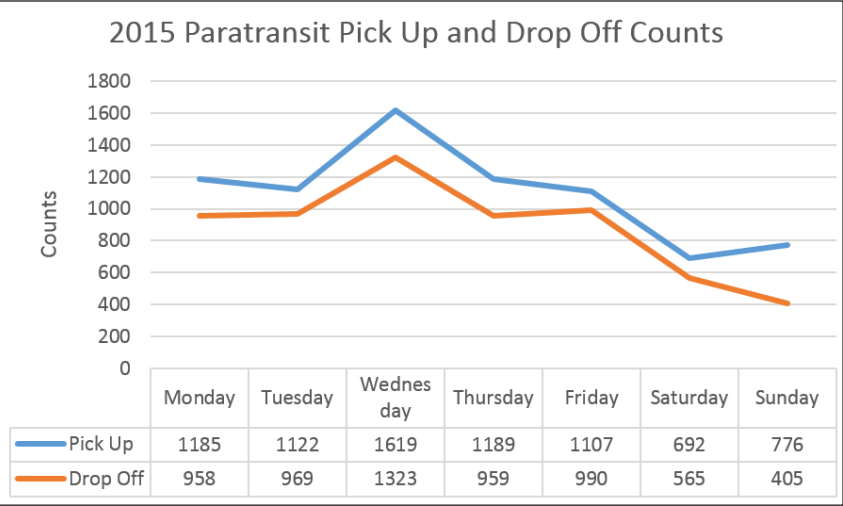
MEASUREMENTS--NORTHSIDE

Block	building to building length	Business Name	Address	Business Type	Distance from cross street loading to corner		Distance from corner to door		total distance from loading on cross st to door		smallest total	Door on side street?	Loading within 250'?	Loading within 250'?	visual survey performed on 6/15/17
					West	East	West	East	West	East			Loading within 250'	Adjusted for ad'l door	
Van Ness to Fell/Polk	482	One Taste	1440		182	11	223	250	405	261	261		No	no	Yes
Hayes/Larkin to Grove/Hyde	519	Legal Services for Children	1254	service	45	13	216	299	261	312	261		No	no	No
Hayes/Larkin to Grove/Hyde	519	Subway		service	45	13	234	280	279	293	279		No	no	No
Hayes/Larkin to Grove/Hyde	519	Munch Maven		food	45	13	242	274	287	287	287		No	no	No
Hayes/Larkin to Grove/Hyde	519	1240 Market	1240	food	45	13	269	245	314	258	258		No	no	No
Grove/Hyde to Cj Brenham	unknown	Art Institute of SF	1170		17	150	268	1000	285	1150	285		No	no	No
Cyril Magnin to Ellis/Stockton	729	Gap_Door 1	890	retail	24	259	256	467	280	726	280		No	no	Yes
Cyril Magnin to Ellis/Stockton	729	_Door 2		retail	24	259	313	410	337	669	337		No	no	Yes
Cyril Magnin to Ellis/Stockton	729	Anthropologie		retail	24	259	396	329	420	588	420		No	no	?
Cyril Magnin to Ellis/Stockton	729	Flood Building	870		24	259	435	283	459	542	459		No	no	?
Cyril Magnin to Ellis/Stockton	729	Puma	856	retail	24	259	469	257	493	516	493		No	no	?
Cyril Magnin to Ellis/Stockton	729	Solstice	846	retail	24	259	498	228	522	487	487		No	no	?
Cyril Magnin to Ellis/Stockton	729	Aldo		retail	24	259	511	216	535	475	475		No	no	?
Cyril Magnin to Ellis/Stockton	729	For Lease			24	259	591	136	615	395	395		No	no	?
Cyril Magnin to Ellis/Stockton	729	Game Stop	830	retail	24	259	640	89	664	348	348		No	no	?
Ellis/Stockton to O'Farrell/Grant	454	Door			200	5	114	334	314	339	314		No	no	?
Ellis/Stockton to O'Farrell/Grant	454	Wells Fargo		service	200	5	126	322	326	327	326		No	no	?
Ellis/Stockton to O'Farrell/Grant	454	Starbucks	780	food	200	5	152	293	352	298	298		No	no	No
O'Farrell/Grant to Geary/Kearny	465	FedEx Office	726	retail	12	33	239	219	251	252	251		No	no	?
Geary/Kearny to Post/Montgome	481	Sprint	690	retail	201	11	52	423	253	434	253		No	no	No
Geary/Kearny to Post/Montgome	481	Doors			201	11	77	398	278	409	278		No	no	No
Geary/Kearny to Post/Montgome	481	Ritz Carlton Club		hotel	201	11	111	364	312	375	312		No	no	No
Geary/Kearny to Post/Montgome	481	660 Market	660		201	11	150	326	351	337	337		No	no	No
Geary/Kearny to Post/Montgome	481	Under Construction	658		201	11	168	309	369	320	320		No	no	No
Geary/Kearny to Post/Montgome	481	Radio Shack		retail	201	11	212	263	413	274	274		No	no	No
Geary/Kearny to Post/Montgome	481	Bun Mee	650	food	201	11	228	251	429	262	262		No	no	No
Post/Mont to Sutter/Sansome	517	Citi Bank	590	service	201	9	114	396	315	405	315		No	no	No
Post/Mont to Sutter/Sansome	517	582 Market	582		201	9	144	365	345	374	345		No	no	No
Post/Mont to Sutter/Sansome	517	Spicely		retail	201	9	180	333	381	342	342		No	no	No
Post/Mont to Sutter/Sansome	517	GNC		retail	201	9	191	316	392	325	325		No	no	No
Post/Mont to Sutter/Sansome	517	Creative Marketing	572		201	9	223	290	424	299	299		No	no	No
Post/Mont to Sutter/Sansome	517	Daiso Japan	570	retail	201	9	239	270	440	279	279		No	no	No

DISTANCE FROM MARKET STREET DOORWAY TO CROSS STREET LOADING					Distance from cross street		Distance from corner to door		total distance from loading on					visual survey performed on 6/15/17	
ZONE MEASUREMENTS--SOUTHSIDE					loading to corner				cross st to door						
Block	building to building length	Business Name	Address	Business Type	West	East	West	East	West	East	smallest total	Loading within 250'?	adjusted for having multiple doors	Backdoor/alleyway access??	
10th to 9th	421	Door 1	1355		359	3	114	300	473	303	303	no	no	Yes	
10th to 9th	421	Doors 2, 3, 4			359	3	155	249	514	252	252	no	no	Yes	
9th to 8th	549	Sliding Doors-Witcomb		Hotel	156	86	356	189	512	275	275	no	no	Yes	
9th to 8th	549	Revoloving Doors-Witcomb		Hotel	156	86	371	172	527	258	258	no	no	Yes	
8th to 7th	829	1155 Market	1155		42	140	360	462	402	602	402	no	no	No	
8th to 7th	829	Café Trinity- bar'd gate			42	140	409	416	451	556	451	no	no	?	
8th to 7th	829	One Trinity center	1145		42	140	449	373	491	513	491	no	no	Yes	
8th to 7th	829	Budget Inn	1139		42	140	499	327	541	467	467	no	no	No	
8th to 7th	829	Tobacco for Less			42	140	512	315	554	455	455	no	no	?	
8th to 7th	829	Dollar Store			42	140	532	291	574	431	431	no	no	?	
8th to 7th	829	American Conservatory Theater	1119		42	140	680	145	722	285	285	no	no	Yes	
8th to 7th	829	The Costume Shop	1117		42	140	699	125	741	265	265	no	no	Yes	
7th to 6th	842	Huckleberry Bicycles	1073	retail	15	20	236	597	251	617	251	no	no	?	
7th to 6th	842	Residence	1067		15	20	271	564	286	584	286	no	no	Yes	
7th to 6th	842	Oriental Restaurant	1063	food	15	20	288	544	303	564	303	no	no	?	
7th to 6th	842	Kaplan	1055		15	20	366	444	381	464	381	no	no	No	
7th to 6th	842	Cigarettes for Less	1053		15	20	414	418	429	438	429	no	no	No	
7th to 6th	842	3 Potato 4	1051		15	20	441	392	456	412	412	no	no	?	
7th to 6th	842	Door	1049		15	20	450	385	465	405	405	no	no	?	
7th to 6th	842	Marinello School of Beauty			15	20	487	347	502	367	367	no	no	?	
7th to 6th	842	Seligman Western Enterprise, LT	1035		15	20	540	288	555	308	308	no	no	?	
7th to 6th	842	Int'l Art Museum of America	1025		15	20	595	237	610	257	257	no	no	Yes	
6th to 5th	839	Wooden Doors/The Village	969		18	20	252	581	270	601	270	no	no	Yes	
6th to 5th	839	Shiekh	929	retail	18	20	578	252	596	272	272	no	no	No	
6th to 5th	839	929 market	929	office	18	20	600	232	618	252	252	no	no	No	
6th to 5th	839	923 market	923		18	20	636	298	654	318	318	no	no	?	
5th to 4th	835	4 Doors			8	128	259	566	267	694	267	no	no	?	
5th to 4th	835	3 Copper doors			8	128	287	542	295	670	295	no	no	?	
5th to 4th	835	Adidas	865	retail	8	128	319	511	327	639	327	no	no	No	
5th to 4th	835	Tourneau		retail	8	128	367	463	375	591	375	no	no	Yes	
5th to 4th	835	Westfield Entrance		retail	8	128	413	412	421	540	421	no	no	Yes	
5th to 4th	835	Copper Door			8	128	461	368	469	496	469	no	no	Yes	
5th to 4th	835	Timberland		retail	8	128	510	319	518	447	447	no	no	Yes	
5th to 4th	835	SFSU	835	institution	8	128	542	284	550	412	412	no	no	?	
5th to 4th	835	James Bong Building	833		8	128	563	265	571	393	393	no	no	Yes	
5th to 4th	835	Walgreens	825	retail	8	128	614	200	622	328	328	no	no	Yes	
5th to 4th	835	Levis Two Big Double Door Sets		retail	8	128	645	187	653	315	315	no	no	?	
5th to 4th	835	Levis	815	retail	8	128	676	150	684	278	278	no	no	?	
4th to 3rd	840	Nieman Marcus	767	retail	3	55	325	510	328	565	328	no	no	?	
4th to 3rd	840	St. John		retail	3	55	373	459	376	514	376	no	no	?	
4th to 3rd	840	four Seasons		hotel	3	55	441	382	444	437	437	no	no	Yes	
4th to 3rd	840	Sports Club/LA		service	3	55	474	356	477	411	411	no	no	No	
4th to 3rd	840	Golfsmith		retail	3	55	520	312	523	367	367	no	no	No	
4th to 3rd	840	735 Market			3	55	543	292	546	347	347	no	no	No	
4th to 3rd	840	Bancroft Building			3	55	562	272	565	327	327	no	no	No	
4th to 3rd	840	CVS	731	retail	3	55	591	242	594	297	297	no	no	Yes	
3rd to New Montgom	511	Lens Crafters_Door 1	685	retail	200	10	65	447	265	457	265	no	no	Yes	
3rd to New Montgom	511	La Boulange		food	200	10	107	401	307	411	307	no	no	Yes	
3rd to New Montgom	511	Monadnock			200	10	125	379	325	389	325	no	no	Yes	
3rd to New Montgom	511	Yocup		food	200	10	148	360	348	370	348	no	no	Yes	
3rd to New Montgom	511	Jeffrey's Toys & Comics		retail	200	10	188	320	388	330	330	no	no	Yes	
3rd to New Montgom	511	Corner Bakery and Café	665	food	200	10	248	260	448	270	270	no	no	?	
2nd to 1st	832	575 Market	575		2	19	272	556	274	575	274	no	no	Yes	



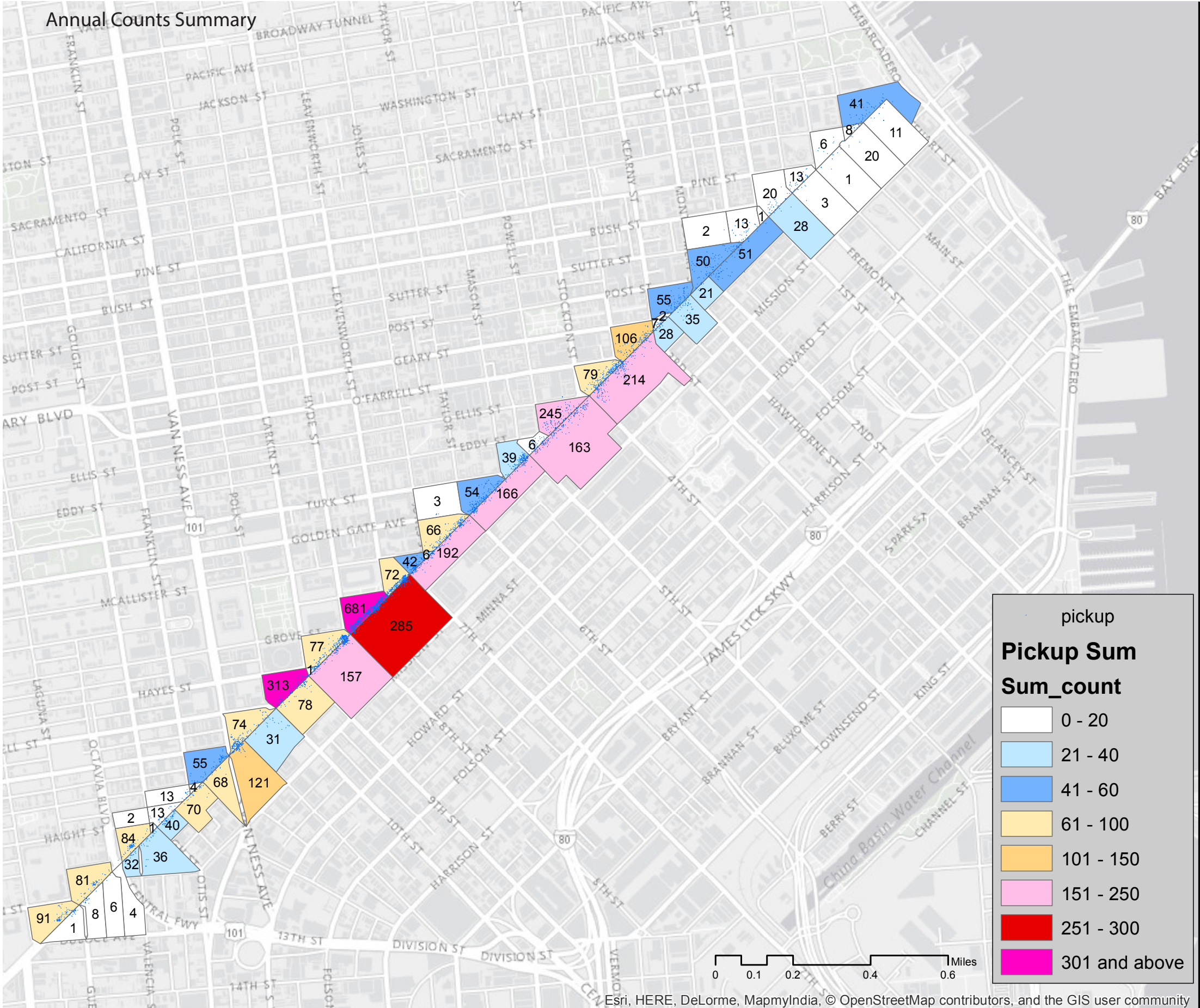
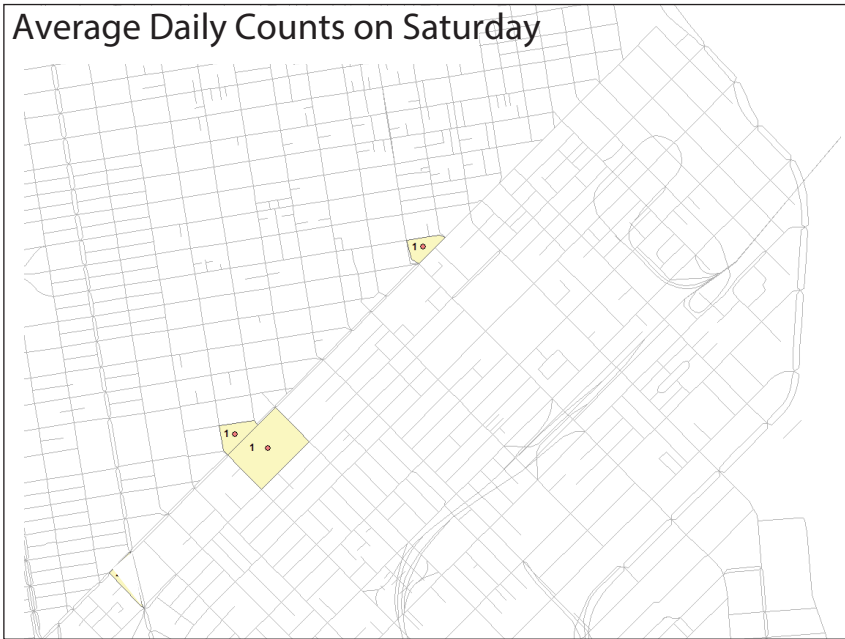
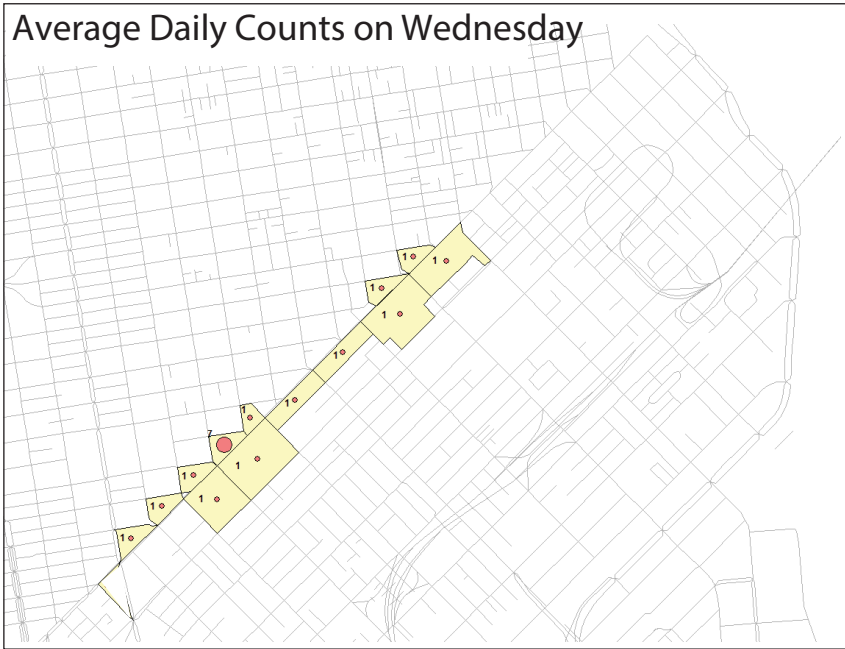
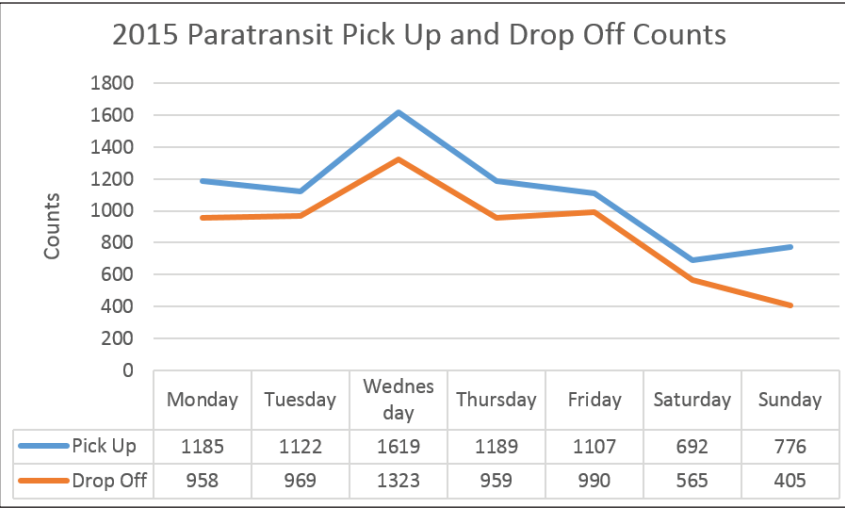
# 2015 Paratransit Drop Off Counts Analysis





# 2015 Paratransit Pick Up Counts Analysis

Attachment 2



## **Attachment 4b: Pipeline Development List**

**List of Development Projects in Transportation Study Area that were Considered in Determining Increase in Loading Demand within Market Street Loading Zones for 2020 Baseline Conditions**

ID	Planning Dept. Case #	APN	Address	OCT 2017 Status	Included in 2020 Baseline
1302		APN 0342001	950 - 974 MARKET ST	BP FILED	X
1399		APN 0350002	1028 MARKET ST	PL APPROVED	X
1411		APN 3703066	1053 MARKET ST	PL FILED	
1418		APN 0350003	1066 MARKET ST	PL APPROVED	X
1421		APN 3703062	1075 MARKET ST	CONSTRUCTION	X
1431		APN 3703059	1095 MARKET ST	CONSTRUCTION	X
1437		APN 0351001	1100 MARKET ST	CONSTRUCTION	X
8	2013.0511U	APN 3702047	1125 MARKET ST	PL FILED	
1370		APN 3702391	1177 Market St (Trinity Plaza)	CONSTRUCTION	X
319		APN 0836002	1500 MARKET ST	BP FILED	
233		APN 0836007	1546 - 1564 MARKET ST	BP ISSUED	X
249	2015-005848PPA	APN 3505001	1601 - 1637 MARKET ST/53 COLTON ST	PL FILED	
267	2014.0484U	APN 3504030	1699 MARKET ST	BP ISSUED	X
271	2013.1179U	APN 0855016	1700 MARKET ST	BP FILED	X
337	2014.0409U	APN 0855010	1740 MARKET ST	BP FILED	

PL FILED: Application Filed with Planning Department  
 PL APPROVED: Application Approved by Planning Department  
 BP FILED: Building Permit Application Filed with Department of Building Inspection  
 BP APPROVED: Building Permit Application Approved by Department of Building Inspection  
 BP ISSUED: Approved Building Permit Application Issued by Department of Building Inspection  
 BP REINSTATED: Lapsed Building Permit Application is "re-instated" by Department of Building Inspection  
 CONSTRUCTION: Project is Under Construction



## **Attachment 4c: Loading and Parking Tables**

Street	From	To	Side of Street	Parking Spaces converted to commercial spaces
Embarcadero	Washington	Don Chee	West	24
Drumm Street	Market	Sacramento	West	3
California Street	Drumm	Davis	South	6
Main Street	Market	Mission	West	2
Beale Street	Market	Mission	East	5
Davis Street	Market	California	West	3
Pine Street	Market	Front	North	1
Pine Street	Market	Front	South	4
Montgomery Street	Market	Sutter	East	8
Montgomery Street	Market	Sutter	West	11
Stevenson Street	3rd	Annie	North	2
Annie Street	Stevenson	Jessie	East	4
<b>Segment Total</b>				<b>73</b>
Grant Avenue	Market	Geary	East	2
Jessie Street	4th	5th	South	6
Eddy Street	Cyril Magnin	Mason	South	2
Stevenson Street	5th	7th	South	40
Mason Street	Market	Eddy	East	3
Taylor Street	Market	Turk	East	2
Golden Gate Avenue	Market	Jones	North	2
Golden Gate Avenue	Market	Jones	South	4
Jones Street	Market	Golden Gate	East	2
Jones Street	Market	Golden Gate	West	3
McAllister Street	Market	Charles J. Brenham	South	2
Stevenson Street	Angello's Alley	7th	North	20
Hyde Street	Market	Fulton	West	4
Hyde Street	Market	Fulton	East	4
8th Street	Market	Mission	East	5
<b>Segment Total</b>				<b>101</b>
Grove Street	Market	Larkin	North	2
Larkin Street	Market	Grove	West	3
Hayes Street	Market	Polk	South	1
Jessie Street	9th	10th	Either	4
10th Street	Market	Mission	East	3
Fell Street	Market	Van Ness	North	7
Van Ness Avenue	Market	Fell	West	2
S Van Ness Avenue	Market	Mission	West	1
S Van Ness Avenue	Market	Mission	East	5
Oak Street	Van Ness	Franklin	South	2
12th Street	Market	S Van Ness	East	4
12th Street	Market	S Van Ness	West	4
Page Street	Market	Gough	South	2
Franklin Street	Market	Oak	West	3
Brady Street	Market	Stevenson	East	3
Gough Street	Page	Market	West	2
Gough Street	Market	Otis	East	1
Gough Street	Market	Otis	West	3
Valencia Street	Market	McCoppin	West	1
<b>Segment Total</b>				<b>53</b>
<b>Total</b>				<b>227</b>

## Better Market Street EIR - Parking and Loading Analysis

### Changes in on-street general parking, commercial vehicle, and passenger loading spaces

#### Increase in commercial loading spaces

227 spaces	Table 4	convert general parking to commercial vehicle spaces
-12 spaces	Table 5	less - covert commercial spaces to passenger loading
<u>-27</u> spaces	Table 3	less - removal of commercial spaces due to daylighting, etc
188		net increase in commerical loading spaces

#### Passenger Loading - Table 5

23 zones  
46 spaces

#### Removal of General Parking Spaces

6 spaces Table 3 on Market St  
9 spaces Table 3 on other streets  
15

227 spaces	Table 4	convert general parking spaces to commercial vehicle spaces
46 spaces	Table 5	total number of new passenger loading spaces
<u>-12</u> spaces	Table 5	less - convert commercial to passenger spaces, rest is general parking conversion
34 spaces		convert general parking spaces to passenger loading spaces

Source: SFMTA Better Market Street Loading and Parking Recommendations Memorandum, February 22, 2018

## **Attachment 5: Analysis Methodology**

## **Attachment 5a: 2020 Baseline Conditions Projects**

## **Better Market Street EIR**

### **Transportation and Development Projects included in 2020 Baseline Conditions**

#### **Reasonably Foreseeable Transportation Projects included in the Transportation Analysis**

- Central Subway Project
- Van Ness Bus Rapid Transit/Van Ness Improvement Project
- Transit Center District Plan Streetscape Improvements
- Polk Street Streetscape Project
- Vision Zero Improvements to Sixth and Jessie streets
- SFMTA Mission St/So. Van Ness Avenue/Otis Street Intersection Improvements
- Bay Area Bike Share System

#### **Background Growth Assumed for intersection Volumes**

- SF-CHAMP Travel Demand Model output for 2020 Baseline Conditions

#### **Development Projects Included in the Transportation Analysis – Loading Demand**

- 950-974 Market Street
- 1028 Market Street
- 1066 Market Street
- 1075 Market Street
- 1095 Market Street
- 1100 Market Street
- 1177 Market Street
- 1546 -1564 Market Street
- 1699 Market Street
- 1700 Market Street

## **Attachment 5b: Methodology and Validation for Market/Mission Street VISSIM Model**



# SAN FRANCISCO PLANNING DEPARTMENT

**MEMO**

**DATE:** January 30, 2012  
**TO:** Better Market Street Team  
**FROM:** Greg Riessen  
**RE:** Methodology and Validation for  
Market/Mission Street VISSIM Model

1650 Mission St.  
Suite 400  
San Francisco,  
CA 94103-2479

Reception:  
**415.558.6378**

Fax:  
**415.558.6409**

Planning  
Information:  
**415.558.6377**

This memorandum explains the methodology of the creation of the existing conditions Market/Mission Street VISSIM model, as well as the validation of the model.

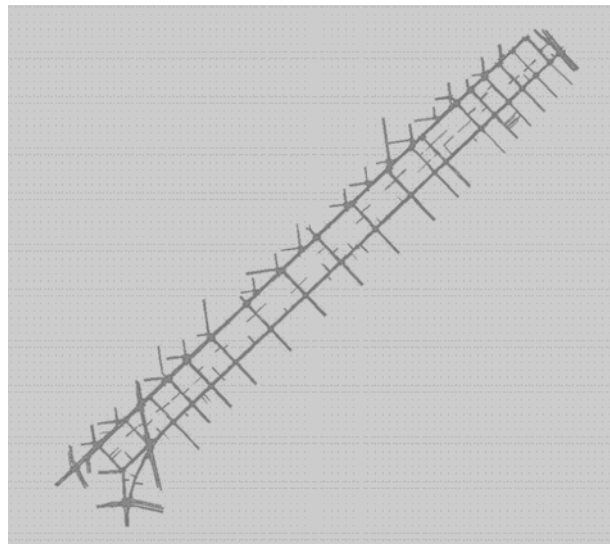
The model simulates existing conditions during the weekday PM peak period, including transit, private vehicles, trucks, bicycles, and pedestrians. The extent of the model includes every intersection along Market and Mission Street, from the Embarcadero and Steuart Street in the east, to Octavia Boulevard and Division Street in the west. The simulation includes a 30-minute seeding period, and then runs for two hours, simulating the time period from 4:00 to 6:00 PM.

Below, each element of the VISSIM model is summarized, including assumptions and any modifications to default VISSIM parameters.

At the end of this document is a summary of the validation results. Transit and auto travel times were validated using SFMTA's recent Muni travel time surveys and SFCTA's Spring 2011 Level of Service monitoring, respectively.

## Aerials and Scale

The model was built to-scale based on satellite photos. The model extent is depicted in Figure 1.



**Figure 1: Model Extents**  
*Market Streets from Steuart to Octavia – Mission Street from Embarcadero to Division*



### **Vehicle Inputs (traffic volumes) and Routing Decisions (turning movements)**

Traffic volumes for almost every intersection along Market and Mission streets were obtained from a collection of existing PM peak period turning movement counts. These were input into a Synchro file (only for purposes of volume balancing as explained below). See the “Unbalanced” Synchro file, which contains the raw traffic counts as assembled by Fehr & Peers. This includes volumes that only certain vehicles can legally perform, i.e. left turns off of Mission Street and driving straight on eastbound Market at Tenth and Sixth streets.

Four intersections are missing from this Synchro file: Fremont/Market, Fifth/Mission, Eleventh/Mission and Eleventh/Market. Volumes at these intersections were interpolated based on adjacent intersections, and also based on volumes contained within the SFMTA downtown Synchro file.

Both along Market and Mission streets, and along north-south streets, driveways and alleys were included on block segments where a parking garage or alley exists (driveways and alleys are collectively referred to as “driveways” in the remainder of this memo). On block segments with more than one driveway, they were consolidated into a single driveway for simplicity. Generally, the driveway location matches up with the actual location, but in a few instances where a driveway was located immediately downstream of an intersection, the driveway was shifted downstream (in order to avoid unrealistically abrupt lane changes within VISSIM).

Once all the raw intersection volumes and driveways were coded into Synchro, the volumes were balanced. See the “Balanced” Synchro file. Volumes were primarily balanced by utilizing the driveways, while checking against SFMTA’s off-street parking survey to ensure that the amount of traffic entering or leaving a driveway was realistic based on the size of the parking garage accessed from the driveway. The traffic volumes as shown in the “Balanced” Synchro file were directly coded into VISSIM as described below.

In VISSIM, two functions were used to code in the traffic volumes. The “Volume Input” (subsequently known as Input) is the amount of vehicles per hour entering a roadway on the edge of a network, or entering from a driveway. Inputs were directly coded based on the amount of vehicles on a link entering the network as shown in Synchro. The Inputs were coded as stochastic inputs, which creates randomness in vehicle arrivals over the course of simulation (but generally matching the total volume over the course of an hour), which simulates a Peak Hour Factor effect.

The second function is the “Static Routing Decision” (subsequently known as Route) that determines the path of vehicles within the network. Routes can be as short as turning left, right or straight through an intersection or driveway (and coding vehicles to consecutively travel one routing decision after another at each intersection), or Routes can be as long as a route across the entire network, through multiple intersections.

The Routes were initially coded as a separate Route for every intersection and every driveway, in order to exactly match the “Balanced” Synchro file. See the “Individual Routing Decision” VISSIM file, which has each individual Routes. This VISSIM file matches up with the “Balanced” Synchro file.

Next, the Routes within VISSIM were consolidated into fewer, longer Routes using the Combine Routes feature. Using longer Routes prevents erratic lane changes in VISSIM, and also will enable

for Routes to be easily shifted from Market onto Mission when creating the alternatives. On Market and Mission streets, Routes were combined to be one block long, including any driveways on that block. On north-south streets, routes were combined so that a route would extend across both Market and Mission streets, including any driveways along the Route. After this step the Inputs and Routes are complete.

Note that the process outlined above directly coded into VISSIM the balanced intersection turning movement counts. The SFCTA CHAMP model was not utilized in the development of this Existing Conditions model (although the CHAMP model could be utilized later during development of the alternatives). This means that the traffic volumes in the VISSIM model exactly match the balanced turning movement counts, and therefore the traffic volumes in the model are validated by definition.

### **Traffic Composition**

The San Francisco passenger vehicle fleet, as developed for the Geary Bus Rapid Transit traffic microsimulation, was coded into the model.<sup>1</sup> The fleet includes a mix of vehicles (sedans, SUVs, motorcycles, etc.) that is different from the default VISSIM (German) vehicle fleet. Of the private vehicle fleet, 99.5% is personal vehicles (57% sedans, 35% SUVs, 5% sports cars, and 3% motorcycles) while 0.5% is trucks (67% two-axle and 33% three-axle).

As described below under **Transit Lanes**, 70% of auto traffic on Market Street was observed as private autos, while 29.5% was taxis, shuttles and other vehicles allowed in the transit lane, and 0.5% trucks as described above. Therefore, the proportion of all auto traffic that is private autos *which obey the transit lane regulation* is 56% ( $70\% \times 80\%$ ), the proportion that is taxis/shuttles *and private autos that disobey the transit lane* is 43.5% ( $29.5\% + (70.5\% \times 20\%)$ ), and the proportion that is trucks (which are coded to obey the transit lane) is 0.5%. These are the three components of the auto traffic composition, and are graphically depicted in the model as dark blue, light blue, and pink vehicles, respectively.

### **Boarding Islands**

Boarding islands were coded on Market Street (and also Fremont, Seventh, and Bush Streets) by coding a two-lane link, and then disallowing lane changes at the island. This allows vehicles to realistically choose the less-congested lane (unless a vehicle is not permitted to enter a transit lane, see **Transit Lanes** below). Note that some vehicles (especially streetcars) appear to slide into the left lane at a slight angle while approaching the boarding island, or vehicles occasionally appear to be driving on the boarding island. This effect is due to the way the boarding island had to be coded (there is no explicit function within VISSIM). This phenomenon is visual only and does not affect the analysis.

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<sup>1</sup> Memorandum from Fehr & Peers to Geary BRT Project Team. *Geary BRT – Existing Conditions VISSIM Model Calibration and Validation*. March 8, 2011.

### **Desired Speeds (free flow speeds)**

Desired speeds for general auto traffic and trucks were coded at 23-27 mph for all streets. Desired speeds for buses were set at 18-22 mph. For streetcars, the desired speed was set at 14-16 mph, and also the acceleration of the streetcar was reduced by 50% from the default value, because the default represents a modern streetcar rather than a historic streetcar.

### **Reduced Speed Zones (turns)**

Reduced speed zones were coded at all turns. Wide Turns (generally left turns) were coded at 14-16 mph for cars and 12-14 mph for trucks and buses. Tight turns (generally right turns) were coded at 8-10 mph for cars and 6-8 mph for trucks and buses.

Reduced speed zones were also coded for streets crossing Market Street at skewed intersections, and to simulate congested situations at some locations (see **Cross Street Congestion**) below. Reduced speed zones were also coded for streetcars and trolleybuses traversing overhead wire switches and crossings, see **Overhead Contact System** below.

### **Conflict Areas (yielding behavior)**

Conflict areas were used to simulate vehicle/vehicle, vehicle/pedestrian and vehicle/bicycle merging, crossing and diverging conflicts. Default values were used, except for vehicle/pedestrian conflicts, where the Front Gap and Rear Gap was increased from the default 0.5 seconds to 1.0 second. This is because vehicles generally require a larger gap when crossing a pedestrian conflict than when crossing a vehicle conflict.

### **Transit Routes**

All transit routes within the network area were coded, specifically: Muni routes 2, 5, 5L, 6, 8X, 9, 9L, 10, 12, 14, 14L, 16X, 19, 21, 27, 30, 30X, 38, 38L, 41, 45, 47, 49, 71, 71L, and F, as well as Samtrans 292, 391 and KX, and Golden Gate Transit 70/80 and commuter service. Transit routes that cross Market Street and have the same vehicle type and same stops were consolidated for simplicity (i.e. the 30 and 45 were combined into a single route). Transit vehicles were coded as 40' diesel, 40' electric, 60' articulated diesel, and 60' articulated electric vehicles (diesel and electric vehicles are coded as having the same default operating characteristics). For routes where the inbound and outbound direction are entirely within the model extents (specifically the 2, 5, 6, 9/9L, 14/14L, 21, 31, 38/38L, and 71/71L) the layover area was also coded.

Muni service frequencies were obtained from the SFMTA website, included as the "Muni Weekday Frequency Guide". Routes were determined from the "Market Street Transit Map", also obtained from the SFMTA website. Golden Gate Transit and Samtrans stops and frequencies were obtained from their websites.

Transit vehicles were coded to have a random arrival within the network. Also, vehicles were coded to arrive in a bunch of two vehicles, occurring 50% of the time, based on guidance from SFMTA.

Within the model, Muni streetcars are orange, Muni diesel buses are red, Muni electric buses are purple, Samtrans buses are maroon, and Golden Gate Transit vehicles are dark green.

### Transit Stops

The Market Street speed/delay survey provided valuable information on dwell times at stops, and also variation in dwell times. SFMTA provided this information in a spreadsheet, included as “Muni Dwell Time Raw”.

A review of the dwell times in the spreadsheet indicated that the F streetcar line tends to have longer dwell times than the buses, whereas the various bus lines tended to have similar dwell times at any given stop. In other words, at any given stop, bus route X and bus route Y were observed to generally have similar dwell times. Therefore, the average dwell times across all bus routes (as supplied by SFMTA) was coded into each transit stop for all bus routes serving that stop. However, the transit routes that were utilized for the transit travel time validation (see **Validation**) *did* have their individual dwell times coded in for each stop. Specifically, this included the F streetcar and the 9/9L, 14, 21, and 71 bus routes.

The dwell times and standard deviations were rounded to the nearest 5-second value, see “Muni Dwell Time Rounded” spreadsheet. Within VISSIM, values for dwell time and standard deviation were created for each of these combinations. These were then assigned to each transit stop.

Dwell times at transit stop locations that were not surveyed (such as along cross streets, and for Golden Gate Transit and Samtrans) were assumed to be 20 seconds with a standard deviation of 20 seconds.

The F streetcar also occasionally must stop at disabled access ramps and lifts along Market Street, before stopping again at the adjacent boarding island. At transit stops with disabled ramps or lifts, the streetcar was coded to have a 5% chance of stopping. At locations with ramps the dwell was coded as 90 seconds, and locations with lifts was coded as 180 seconds.

The boarding islands along Market Street are generally 100 feet long. Based on field observations, two 60' buses are able to load simultaneously, because the rear bus operator usually can open only the front door for boarding passengers. However, operators of the F streetcar were observed as more likely to only allow loading if the entire length of the streetcar was able to reach the boarding island. This phenomenon was coded with separate (overlapping) transit stops for bus routes (130' in length) and the streetcar (100' in length). Also (as noted under **Driving Behavior**) the average standstill distance was decreased for buses and increased for streetcars.

Based on field observations, transit vehicles in the curb lanes on Market Street sometimes cannot pull into their stop due to private vehicles temporarily parking in them (i.e. taxis dropping off passengers). This phenomenon was simulated by placing parking spaces within the transit stops. This effect also simulates sporadic, localized congestion, as described under **Sporadic Congestion** below.

### **Transit Lanes**

The center-running transit lanes on Market Street were coded into the model. Based on field observations during the PM peak period, it was determined that approximately 70% of auto traffic on Market Street is private autos, while 29.5% of auto traffic is taxis, shuttles and other vehicles that are permitted to use the transit lanes, and 0.5% are trucks. Of the private auto traffic, 80% was observed to obey the transit lane, while 20% was observed to illegally drive in the transit lane. This was coded into the model (see **Vehicle Composition**).

Transit lanes on Mission Street were not coded, because it is not possible in VISSIM to code a curb-lane transit lane which vehicles can enter the lane to turn right or access a driveway, but are otherwise not permitted to use the lane. The capabilities of VISSIM are limited to two options: either code 100% of all auto traffic in the center lane (i.e. full obedience of the transit lane), or code 100% of traffic as using either lane (i.e. no obedience of the transit lane). Based on field observations, obedience of transit lanes on Mission Street is not as high as on Market Street. This is especially true at intersections, where right-turning vehicles are delayed by pedestrians, which causes through-vehicles (which should not enter the transit lane) to shift into the center lane to bypass the queue. Therefore, the latter coding option (not coding in any transit lane) was considered to better match reality.

### **Streetcar Track Switches**

Streetcars must come to a stop for five seconds before any track switch where they can turn left or right. This occurs on inbound Market nearside 11<sup>th</sup> Street, and at outbound Market nearside 11<sup>th</sup> Street. This was coded as a STOP sign with a five second dwell.

### **Overhead Contact System Trolley Switches**

Streetcars and trolleybuses must proceed at reduced speed across an OCS turn switch or crossing in order to minimize the possibility of the trolley losing contact with the wire. At every turn switch and every crossing along Market, Mission and all cross streets, this was coded as a 7 mph reduced speed zone, 5 feet in length. Switch locations along Market Street were provided in spreadsheet format by SFMTA, and is included in the Data Collection folder.

### **Driving Behavior**

Default driving behavior settings were generally used, with a few exceptions.

Lane Change behavior was modified based on recommendations from the software developer, to simulate congested lane-changing behavior. The Cooperative Braking was increased and the Headway Reduction Factor was decreased. This allows vehicles to change lanes while in queues, rather than unrealistically block the lane while waiting for a gap.

Average standstill distance for buses was reduced, because bus operators were observed to pull up close to the vehicle in front of them at a boarding island (in order to fit two buses at a boarding

island, as discussed under **Transit Stops**). For streetcars, the average standstill distance was increased, to simulate observed behavior of streetcar operators.

### **Traffic Signals**

Traffic signals were coded in based on signal timing cards provided by SFMTA. Signal timing for intersections on Mission Street were created based on the timing cards. Signal timing for intersections on Market Street was already embedded within SFMTA's 2006 Market Street VISSIM model; these timings were double-checked and updated as necessary, and imported.

At the majority of intersections, the pedestrian flashing DON'T WALK phase was reduced from the value shown on the signal timing card (generally ten to fifteen seconds) to five seconds, based on guidance from SFMTA. In other words, pedestrians were coded to begin to cross the intersection until only five seconds remained on the countdown timer. This is to replicate observed pedestrian behavior. At very large intersections, the flashing DON'T WALK phase was only reduced to ten seconds.

At some congested locations (specifically, Main/Market and 10<sup>th</sup>/Mission), the yellow time for vehicles was reduced and/or the WALK time for pedestrians was reduced, to simulate vehicles running the yellow light and simulate more vehicles merging through heavy pedestrian volumes.

### **Pedestrians**

Pedestrian volumes for intersections along Market Street were embedded within SFMTA's 2006 VISSIM model, and were not modified. For intersections along Mission Street, volumes were estimated based on location. From Steuart to 4<sup>th</sup>, volumes were assumed at 300 pedestrians per hour per direction (total 600 per crosswalk). From 5<sup>th</sup> to South Van Ness, volumes were assumed at 200 pedestrians per hour per direction, while at other locations they were assumed at 100 pedestrians per hour per direction. Pedestrian walking speeds were set at 2-4 mph. Pedestrians are shown as yellow in the model.

### **Bicycles**

Bicycle volumes were obtained from SFMTA's annual counts, which indicated that the intersections of Market/Eleventh and Market/Fifth had approximately 800 bicycles during the peak hour. This was coded as 300 eastbound and 500 westbound bicycles on Market Street, with origins and destinations split between Valencia and Upper Market. 100 bicycles per hour per direction were assumed on Mission, Eleventh, Fifth, Second, and Sansome/Battery streets. Bicycle speeds were coded as 10-15 mph.

On streets without bike lanes, bicycles are coded to take the curb lane; except on very wide one-lane segments (e.g. eastbound Mission Street east of Main Street) vehicles generally must shift lanes to pass bikes in the curb lane. Bikes are able to overtake queued cars at red lights. Bike boxes are simulated with a second set of traffic signal heads. Bicycles are shown as green in the model.

### **Sporadic Congestion:**

Sporadic, localized congestion due to traffic signals, loading buses, conflicting movements, etc, is inherently modeled within the simulation.

Double-parked vehicles were observed to frequently but temporarily block traffic, primarily along Market Street and along cross-streets.<sup>2</sup> This was simulated in the model by coding in short-term parking spaces within the travel lane. As described under **Transit Stops** the parking spaces were also coded in the curbside transit lanes in order to simulate stopped vehicles blocking bus access to the stop.

### **Cross-street Congestion:**

The traffic volumes obtained from the Synchro file represent the number of cars that was counted as passing through the intersection. At several bottleneck locations crossing Market Street, the demand is higher, but not all vehicles can be processed, resulting in a queue. This phenomenon regularly occurs at Market/Hyde, Market/Stockton, Market/Montgomery, and Market/Octavia.

To simulate these bottlenecks and the resulting queues, reduced speed areas and double-parked vehicles (as described above under **Sporadic Congestion**) were coded in, until the traffic volume was observed as just barely making it through, without creating a queue. Then, 100 or 200 additional vehicles were added to the volume input, creating the queue.

The cross-street congestion of streets described above generally does not affect the operation of Market or Mission streets, unlike the congested segments described below which were coded differently.

### **Recurring Congestion/Queues:**

Based on field observations, there are three segments within the study area that exhibit major congestion and long vehicle queues occur on a regular basis. Two of the three segments are from southbound congestion on First Street (traffic destined for the Bay Bridge), which routinely forms long queues that spill back onto both eastbound Mission and eastbound Market streets. The third segment is northbound Third Street, which regularly backs up and spills back onto westbound Mission Street.

On First Street, the congestion was simulated with a “dummy” metering traffic signal on southbound First Street south of Mission Street. In regular operation the signal only gives several seconds of green time to First Street, which meters traffic and causes queues to form along First Street that spill back onto eastbound Mission and eastbound Market streets. Vehicle queue detectors are placed on eastbound Mission and Market streets, just downstream of Second Street. When the queue on either eastbound Mission or Market reaches as far back as Second Street, the

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<sup>2</sup> Vehicles were also observed to illegally park on Mission Street within the peak-period tow-away lane, but this generally does not affect traffic flow on Mission Street because it does not block a travel lane. Therefore illegal parking was not coded on Mission Street.

detector is tripped and the metering signal holds the green for a long period, flushing out the accumulated queue. When the tripped detector no longer detects a queue, the metering signal resumes normal metering operation. This cycle repeats throughout the simulation, which creates fluctuating queues that simulate the effect of the congestion on Market and Mission streets.

Similarly, on Third Street, a “dummy” metering signal was coded on Kearny Street north of Market Street. The queue backs up on Third Street and back onto westbound Mission Street. A queue detector is placed on westbound Mission Street just downstream of New Montgomery Street, which maintains the queue length

### **Validation:**

As described above, the traffic volumes within the network were coded directly from the turning movement counts, and are therefore validated by definition. The transit and auto travel times are the only elements that require a validation exercise.

Transit travel times from the SFMTA survey were determined by taking the sum of the Average Running Time for each segment. The sum of each segment equals the total running time. See “Muni Travel Time Raw”. Note that transit travel time data was only available east of Van Ness Avenue.

Auto travel times were obtained from the SFCTA Level of Service monitoring, which also provided an average running time for each block segment. Note that auto travel time data was not available for inbound Market Street from Tenth to Sixth streets or from Main to Steuart streets.

Four transit routes in both directions (eight routes total) were analyzed within the simulation: the F streetcar on Market Street, a center-lane bus route (the 9/9L in both direction), a curbside bus route (the 21 outbound, the 71 inbound from Van Ness Avenue to First Street, and the 21 inbound from First Street to Steuart Street) and the 14 on Mission Street. Transit travel segments were analyzed from Tenth to Seventh Street, from Seventh to Fourth Street, from Fourth to First Street, and from First to Spear or Steuart Street.

Auto travel times were analyzed on both Market and Mission streets, in both directions. Auto travel segments were analyzed from Octavia Boulevard or Division Street to Tenth Street, from Tenth to Seventh or Sixth Street, from Seventh or Sixth to Fourth Street, from Fourth to First Street, and from First to Main or Steuart Street.

Travel time surveys were placed within the model to collect travel times. The model was run for two hours (with a 30-minute seeding period), a total of 10 times (with different random seeds). The average travel time across the ten runs for each segment was compared against the surveyed time. Detailed travel time outputs are contained within the “Validation Results” spreadsheet.

There are a total of 51 travel time segments. To be considered validated, at least 85% of the travel time segments should be within 15% of the surveyed travel times. Of the 51 travel time segments, 47 were within 15% of the surveyed travel time. Therefore 92% of the segments meet or exceed the criteria, and the model is considered validated. The worst segment was 21% off the surveyed time, and the average segment was 7% off.



### **Baseline Model**

After completion of the validated Existing Conditions model, a new Baseline model was created, which is the Existing Conditions model with several modifications to reflect planned or recently-implemented changes to the street network.

Three changes were coded:

- Two-way McAllister Street, including rerouting of the inbound 5 Fulton bus route via McAllister Street, and modifications to signal timing and lane configuration at the intersections of Market/McAllister/Jones and Market/Seventh;
- Two-way Haight Street, including rerouting of the inbound 6 Parnassus and 71/71L Haight-Noriega bus routes via Haight Street, and modifications to signal timing and lane configuration at Market/Haight/Gough;
- Construction of the Transbay Transit Center bus plaza between Beale and Fremont streets, including rerouting of the 5 Fulton, 38 and 38L Geary, 71/71L Haight-Noriega, and Golden Gate Transit bus routes to approach the plaza via Market – First – Mission – Beale and depart the plaza via Fremont – Market. (At the intersection of Market/First streets, the inbound travel time segment for the 71 bus was relocated to account for its shifted inbound route via First Street instead of Beale Street.)

This Baseline model should be utilized to extract Measures of Effectiveness from the simulation. These MOE's would then be compared against the MOE's from the Project alternatives, which will be developed in the next phase of the Better Market Street study.

Travel Times												
Travel Time Segment Name	Travel Time Segment Number	Distance (feet)	Travel Time							Average Speed (mph)	85th Percentile (mph)	
			Average (seconds)	Surveyed (seconds)	% Accuracy	Pass/Fail	Standard Deviation (seconds)	Min (seconds)	Max (seconds)			
Inbound Streetcar												
IB F Octavia-10th	101	2393.6	282.9	(no data)				27.4	213.2	369.6	5.8	7.7
IB F 10th-7th	102	2040.9	252.2	263	-4%	Pass		35.4	160.4	333.5	5.5	8.7
IB F 7th-4th	103	2689.7	320.6	339	-6%	Pass		62.1	173.1	479.5	5.7	10.6
IB F 4th-1st	104	2733.1	313.6	356	-14%	Pass		66.3	183	543.2	5.9	10.2
1st-Steurtart	105	1690.8	206.1	207	0%	Pass		50.8	115.4	401.7	5.6	10
Outbound Streetcar												
OB F Steurtart-1st	151	1757.7	274	257	6%	Pass		44.1	157.8	408.2	4.4	7.6
OB F 1st-4th	152	2809.9	274.7	303	-10%	Pass		41.4	185.5	374.7	7	10.3
OB F 4th-7th	153	2629.7	266.1	275	-3%	Pass		42.5	179.3	426.3	6.7	10
OB F 7th-10th	154	2101.2	223	226	-1%	Pass		39.1	126.8	342.7	6.4	11.3
OB F 10th-Octavia	155	2317.2	295.5	(no data)				43.6	236.6	436.6	5.3	6.7
Inbound Center Lane Bus												
IB 9 10th-7th	202	2040.7	215.6	214	1%	Pass		37.5	110.3	328.3	6.5	12.6
IB 9 7th-4th	203	2687.9	285.8	280	2%	Pass		58.4	170.8	482.7	6.4	10.7
IB 9 4th-1st	204	2732	309.3	323	-4%	Pass		74.2	160	515.7	6	11.6
IB 9 1st-Spear	205	1396.1	170.5	135	21%	Fail		51.3	96.8	312.4	5.6	9.8
Outbound Center Lane Bus												
OB 9 Main-1st	251	1065.1	123.4	137	-11%	Pass		23.9	78.2	228.4	5.9	9.3
OB 9 1st-4th	252	2808.6	255.9	284	-11%	Pass		52.9	174.2	423.5	7.5	11
OB 9 4th-7th	253	2629.4	265.3	274	-3%	Pass		52	167.5	428.9	6.8	10.7
OB 9 7th-10th	254	2101.2	205.8	221	-7%	Pass		42.3	116.5	325.7	7	12.3
Inbound Curb Lane Bus												
IB 71 10th-7th	302	2040.6	209.9	224	-7%	Pass		39.1	102.4	336.2	6.6	13.6
IB 71 7th-4th	303	2688.4	259.1	289	-12%	Pass		41	171	408	7.1	10.7
IB 71 4th-1st	304	2732.5	358.6	372	-4%	Pass		107.3	217.2	811.5	5.2	8.6
IB 21 1st-Spear	305	1396.3	179	141	21%	Fail		52	92.3	340.3	5.3	10.3
Outbound Curb Lane Bus												
OB 21 Steurtart-1st	351	1758.8	268.9	265	1%	Pass		54.1	170.9	424.5	4.5	7
OB 21 1st-4th	352	2810.4	317.5	333	-5%	Pass		48	192.4	448.1	6	10
OB 21 4th-7th	353	2628.9	269.3	301	-12%	Pass		40.3	185.7	366.2	6.7	9.7
OB 21 7th-9th	354	1460.4	142.4	129	9%	Pass		37.5	79.5	279.8	7	12.5
Inbound Mission Bus												
IB 14 S Van Ness-7th	402	3141	320	336	-5%	Pass		40.3	236.8	437.3	6.7	9
IB 14 7th-4th	403	2714.5	258.9	281	-9%	Pass		44.7	181.6	381.4	7.1	10.2
IB 14 4th-1st	404	2722.1	347.4	320	8%	Pass		116.5	224.2	853.5	5.3	8.3
IB 14 1st-Main	405	1058.1	122.1	113	7%	Pass		35.2	74.9	258.5	5.9	9.6
Outbound Mission Bus												
OB 14 Steurtart-1st	451	1787.5	230.9	244	-6%	Pass		36.1	139.7	348.6	5.3	8.7
OB 14 1st-4th	452	2724.2	317.3	351	-11%	Pass		82.6	178.7	526.8	5.9	10.4
OB 14 4th-7th	453	2716.5	258.8	268	-4%	Pass		38.9	186.4	391.6	7.2	9.9
OB 14 7th-S Van Ness	454	3159.7	391.6	430	-10%	Pass		57.3	250.1	539.4	5.5	8.6
Inbound Market Cars												
IB Market Cars Octavia-10th	501	2391.8	174.5	169	3%	Pass		48.8	96.4	361.3	9.3	16.9
IB Market Cars 10th - 6th	502	2950.2	196	(no data)				32.9	113.3	317.7	10.3	17.7
IB Market Cars 6th-4th	503	1780.5	144.9	140	3%	Pass		42.6	89.5	298.5	8.4	13.6
IB Market Cars 4th-1st	504	2732.8	236.7	273	-15%	Fail		72.7	108.9	479.3	7.9	17.1
IB Market Cars 1st-Main	505	1091.1	107.2	87	19%	Fail		49	33	336.4	6.9	22.6
Outbound Market Cars												
OB Market Cars Main-1st	551	1062.9	92.5	83	10%	Pass		32.2	41.5	169.5	7.8	17.5
OB Market Cars 1st-4th	552	2810.2	212.6	192	10%	Pass		51.9	105.2	359.2	9	18.2
OB Market Cars 4th-7th	553	2628.4	190.7	178	7%	Pass		55.8	87	426	9.4	20.6
OB Market Cars 7th-10th	554	2101	140.2	127	9%	Pass		43.3	57.1	321.2	10.2	25.1
OB Market Cars 10th-Octavia	555	2317.8	206.8	213	-3%	Pass		57.6	81.3	358.5	7.6	19.4
Inbound Mission Cars												
IB Mission Cars Division - 10th	601	2208.3	129.8	118	9%	Pass		39.9	76	216.1	11.6	19.8
IB Mission Cars 10th - 7th	602	2030.2	98.4	103	-5%	Pass		19.2	54.5	190.1	14.1	25.4
IB Mission Cars 7th-4th	603	2714.4	140.5	156	-11%	Pass		16.6	118	199.2	13.2	15.7
IB Mission Cars 4th - 1st	604	2722.2	205.5	184	10%	Pass		89.1	112	593.5	9	16.6
IB Mission Cars 1st - Steurtart	605	1780.6	145.5	133	9%	Pass		26	110.5	264.7	8.3	11
Outbound Mission Cars												
OB Mission Cars Steurtart - 1st	651	1788.9	135.5	149	-10%	Pass		29.5	72.3	220.6	9	16.9
OB Mission Cars 1st - 4th	652	2724	182.1	180	1%	Pass		76.1	72.2	547.1	10.2	25.7
OB Mission Cars 4th - 7th	653	2715.4	117.6	106	10%	Pass		19.1	92.5	172.6	15.7	20
OB Mission Cars 7th-10th	654	2031.1	119.8	125	-4%	Pass		21.1	75.1	189.7	11.6	18.4
OB Mission Cars 10th - Division	655	2432.3	144.6	140	3%	Pass		41.2	76.3	283.5	11.5	21.7

51 Total

4 Fail

47 Pass

92% Pass Rate

## **Attachment 5c: Better Market Street VISSIM Modeling Approach**

## MEMORANDUM

Date: August 10, 2016 (*Revised October 31, 2018*)  
To: City of San Francisco Department of Public Works  
Better Market Street Project Team  
From: Matt Goyne, Fehr & Peers  
CC: Andrew Lee, Parisi Transportation Consulting  
Subject: Better Market Street VISSIM Modeling Approach

SF13-0715

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### OCTOBER 2018 UPDATE

The August 10, 2016 version of this memorandum was updated in October 2018 for the purpose of including it within the appendices of the Better Market Street Draft Environmental Impact Report (Better Market Street DEIR). The October 2018 memorandum includes the following changes:

- Updates the purpose for the VISSIM analysis, changes references to match scenario names in the DEIR document, and removes references to Alternatives 1 through 3 from the 2016 alternative screening analysis;
- Revises traffic volumes for the 2020 baseline and 2020 baseline plus project VISSIM models based on the latest DTA models, as described in the memorandum *Better Market Street Forecasting Approach* (Fehr & Peers, October 31, 2018);
- Updates transit routing and stop spacing plans for the 2020 Plus Project VISSIM models to reflect the revised stop spacing plan presented in **Attachment E**;
- Includes additional information on 2040 cumulative conditions VISSIM analysis.

### INTRODUCTION

The VISSIM operations analysis models for the Better Market Street DEIR were used to evaluate multi-modal operations and estimate transit travel times on Market and Mission streets, while the Synchro traffic operations software was used to conduct isolated intersection analysis for study



intersections located to the north and south of Market and Mission streets. Specifically, outputs from the VISSIM models included estimated transit travel times for transit operating along Market and Mission streets and the intersection delay on the north-south streets. The Synchro models were used to estimate vehicular delay within mixed-flow lanes at intersections within the transportation study area to the north and south of Market and Mission streets. The rest of this memorandum focuses on the inputs to the VISSIM models for each of the following four scenarios:

- **Existing conditions (2012)** – This model was calibrated to existing conditions in 2012 and was used as the foundation to support the development of future year models;
- **2020 baseline conditions** – This model is used to establish a baseline for impact evaluation;
- **2020 baseline plus project conditions** - This model is used to assess the near-term impacts of the proposed project;
- **2040 cumulative conditions** - This model is used to assess the long-term impacts of the proposed project in combination with other reasonably foreseeable development.

The results of the VISSIM analysis are presented with the transit and traffic analysis in the Better Market Street DEIR appendix.

## EXISTING CONDITIONS (2012)

Fehr & Peers received the model files and a memo dated January 30, 2012 titled “Methodology and Validation for Market/Mission Street VISSIM Model” (San Francisco Planning Department). The model is bounded by the Embarcadero/Steuart Street in the east and Octavia Boulevard/Division Street in the west and contains every intersection in between on Market and Mission Streets. The model simulates the 4:00 PM to 6:00 PM peak period and includes all bus traffic crossing Mission Street and Market Street. The Planning Department’s VISSIM model included an “Existing Conditions” scenario, which represented conditions as they were at the time the data was collected. No changes were made to this scenario. Fehr & Peers was able to re-run this model and re-produce the results included in the documentation. Traffic counts collected along Market Street in 2015 confirmed that the traffic volumes had not changed substantially since the January 2012 memorandum, as shown in **Attachment A**.



## 2020 BASELINE CONDITIONS

The Planning Department's VISSIM model and documentation also included a "Baseline Conditions" model, which reflects the same travel demand conditions, but includes implementation of several near-term roadway projects that may affect travel behavior, including:

- Two-way McAllister Street, including rerouting of the inbound 5 Fulton bus route via McAllister Street, and modifications to signal timing and lane configuration at the intersections of Market/McAllister/Jones and Market/Seventh;
- Two-way Haight Street, including rerouting of the inbound 6 Parnassus and 71/71L Haight-Noriega bus routes via Haight Street, and modifications to signal timing and lane configuration at Market/Haight/Gough;
- Construction of the Transbay Transit Center bus plaza between Beale and Fremont Streets, including rerouting of the 5 Fulton, 38 and 38R Geary, and 7/7R Haight-Noriega bus routes to approach the plaza via Market – First – Mission – Beale and depart the plaza via Fremont – Market.

Fehr & Peers also used a dynamic traffic assignment (DTA) model provided by the SFCTA to generate 2020 baseline vehicle volume forecasts.<sup>1</sup> No Project forecasts were developed by initially comparing the 2020 baseline model output to the 2012 existing model output, and adding/subtracting that difference to/from the existing volumes. The second check was to ensure that the restricted movements between Third and Eighth streets due to Safer Market Street were reflected in the forecasts. These volumes were then balanced throughout the study area. As the evaluation occurs in VISSIM, a connected microsimulation network, the forecasts must balance without exception.

At the request of SFMTA and the project team, several additional changes were made in 2016 to the Baseline Conditions model files provided Planning Department. As shown in **Attachment B**, transportation improvements that were proposed subsequent to the completion of the DTA and VISSIM modelling process were not incorporated within the quantitative analysis models. Justification for each of the 2020 improvements is provided in footnotes and supporting

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<sup>1</sup> The calibration and validation of the DTA model for the Better Market Street study area are described in the memorandum *Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project* (Fehr & Peers, October 30, 2015).



documentation and plans can be found in **Attachment C**. The 2020 baseline VISSIM models include the following planned near-term transit and streetscape changes:

- Van Ness Avenue Bus Rapid Transit, including center-running transit lanes north of Mission Street, a reduction from three to two mixed flow lanes north of Mission Street, conversion of the northbound shared through-right turn lane to a right-turn only lane, a 200 foot right-turn pocket on westbound Mission Street at South Van Ness Avenue, and signal timing changes to account for a protected southbound right transit-only phase with a westbound right overlap phase;<sup>2</sup>
- Signal timing updates on Market Street to reflect the planned increase from 60 to 90 second cycle lengths. The signal timing changes on Market Street are based on the signal timing cards provided by SFMTA staff in April 2016, which are scheduled for implementation in 2016-17;<sup>3</sup>
- Signal timing updates on Mission Street to reflect the planned increase from 60 to 90 second cycle lengths and the addition of leading pedestrian intervals along the corridor. The signal timing changes on Mission Street were developed in coordination with SFMTA staff in June 2016;<sup>3,4</sup>

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<sup>2</sup> SFMTA recommended modifying the signal timing at South Van Ness Avenue and Mission Street to include an overlapping eastbound right-turn arrow during the actuated transit phase to reflect the Van Ness BRT project, which will start construction in 2016, and the Mission Muni Forward Project's right turn pocket, which was legislated in December 2015.

<sup>3</sup> As discussed with SFMTA staff in the May 26, 2016 meeting, transit signal priority (TSP) will not be coded into VISSIM on Market or Mission streets under any 2020 or 2040 scenario. This is due to the limits of VISSIM to model TSP on streets with a high number of transit vehicles where TSP is therefore called most cycles such as Market and Mission streets under the PM peak hour.

<sup>4</sup> SFMTA applied for and received a grant in late 2015 to retime the NoMa/SoMa networks, increasing the cycle length to 90 seconds on Mission Street (and all of SoMa) to accommodate leading pedestrian intervals (LPIs), upgrading the yellow and all-red-times, and control vehicular speeds while maintaining decent traffic progression. These changes will be implemented with the Second Street Improvement Project in advance of 2020. The SFMTA provided new signal timing cards for Second Street (near-term change) and 11<sup>th</sup> Street (new split phasing in operation). For the remaining intersections, Mission Street signals were coded to include the following assumptions: similar split ratios as existing conditions, four second LPIs on all approaches, and four seconds protected right turn phases for vehicles at congested turning locations, Intersections that currently don't have LPIs include: Ninth, Sixth (only for Sixth Street), Fremont, Beale, Main, Spear, and Steuart streets.



- Transbay Center District Plan improvements to eastbound Mission Street to accommodate additional bus and pedestrian traffic associated with the opening of the new transbay terminal, including the addition of a near-side inbound Mission Street boarding island at Fremont Street;<sup>5</sup>
- Second Street Improvement Project, including a road diet from two to one through lane with right-turn pockets in each direction, cycletracks in each direction, and new protected right-turn phases on Second Street;<sup>6</sup>
- Golden Gate Avenue Road Diet, including reduction from two lanes to one lane approaching Market Street and the addition of an eastbound bicycle lane;<sup>7</sup>
- Eighth Street bicycle lane and road diet from four to three lanes south of Market Street and a bus boarding island at Eighth Street / Market Street;<sup>8</sup>
- Polk Street contra-flow bike lane completed in May 2014, which provided two-way bicycle access to Market Street at Polk Street;
- Safer Market Street plan changes completed in August 2015, including additional turn restrictions and vehicle routing decision changes at Market Street (as reflected in the DTA model) and geometry changes to Third Street approaching Mission Street (one northbound shared through/left lane converted to northbound left turn lane) and Market Street (reduction from four to three through mixed-flow lanes across Market Street);

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<sup>5</sup> The boarding island is funded by the Transbay Joint Powers Authority (TJPA) and includes a 13 foot curb lane inside the island, and a 12 foot wide lane to the outside of the island. The curbside lane, south side, between First and Fremont streets, will be built by the Salesforce Tower project (scheduled to open in 2018), and curbs legislated, funded, and built by Salesforce.

<sup>6</sup> SFMTA recommended modifying the lane geometry and signal timing along Second Street between Market and Mission streets to include the Second Street Improvement Project. This proposal was approved by SFMTA Board of Directors in August 2015 and the construction duration is Winter 2017 to Fall 2018.

<sup>7</sup> SFMTA recommended including the Golden Gate Ave Safety Project, which removed a travel lane to create an eastbound buffered bike lane between Polk and Market streets. This project covers a busy pedestrian corridor and ranks high on Vision Zero priority streets. The project was implemented in June 2016.

<sup>8</sup> SFMTA recommended modifying the lane geometry on Eighth Street to include a new 160 foot long boarding island at the southwest corner of Market/8<sup>th</sup>/Hyde/Grove, per the recommendation by the Bike Strategic plan to create bus boarding islands whenever possible when a bike lane is along a Muni bus line. This project is part of the bike spot improvement program and is included due to the acceleration of the construction schedule of this island prior to 2020.





- Inclusion of mid-block signal at Jessie Street and Sixth Street.<sup>9</sup>

In addition, the following changes were made to reflect new data for model file inputs and changes in service for the transit agencies:

- Updated Golden Gate Transit and SamTrans dwell times based on data provided by the respective agencies (see **Attachment D**). Golden Gate Transit and SamTrans services and frequencies have been updated as of January 27, 2014 based on the information contained on their respective websites;
- Increased area of influence and decreased speed for trolley buses crossing at a switch (3-5 mph);
- Addition of the 5R, 14X, 16X, and 19 routes;
- Adjusted stop locations for several SFMTA routes to reflect current operations, which have changed slightly from 2012 (Existing Conditions model)
- Updated service frequencies for Market Street and Mission Street Muni routes as of June 2014 based on the information contained on the SFMTA website;
- Bike volumes were increased 70 percent from the 2015 existing volumes to represent bicycle growth.<sup>10</sup>

The following parameters were used to calibrate the existing conditions model and will not change under 2020 or 2040 scenarios, except where specifically noted above. The parameters are described in more detail in the memorandum titled "Methodology and Validation for Market/Mission Street VISSIM Model" (San Francisco Planning Department, January 2012).

- Traffic composition (i.e. proportion of passenger vehicles, trucks, etc.);
- Transit Lane violator rate;
- Bus boarding island location and size;
- Bus stop locations (for all routes);
- Desired vehicle speeds;

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<sup>9</sup> The physical hardware for the Jessie Street signal was constructed in 2016 as a part of the Vision Zero high-priority pedestrian safety improvements. The signal is expected to be turned on in 2017. Per June 23, 2016 conference call, Fehr & Peers will use the Sixth Street / Minna Street timing card as a reference for this signal.

<sup>10</sup> As described in the memorandum "Better Market Street 2020 VISSIM Bicycle Projections (Final Draft)" (Parisi Transportation Consulting, July 14, 2016, revised August 5, 2016).



- Reduced speed zones;
- Conflict areas;
- Transit Lanes;
- Streetcar track switches;
- Overhead Contact System trolley switches;
- Vehicle driver behavior;
- Pedestrian volumes;
- Sporadic congestion simulation;
- Cross-street congestion simulation;
- Recurring congestion simulation.

In addition, curb side transit-only lanes along Mission Street were coded as regular mixed traffic flow lanes in the Existing model (as documented in the 2012 memo). Since the model was calibrated to existing conditions with this assumption in place, this assumption will be used for other models that have curb side transit-only lanes.

### **Additional Forecast Adjustments for VISSIM**

Additional adjustments to the forecasts were completed in August 2016 as a part of the development of the 2020 baseline VISSIM model. While most outputs from the Better Market Street VISSIM models represent the PM peak hour conditions, such as peak hour volume served and intersection delay, the travel time runs along Market and Mission Street are recorded in VISSIM over a two-hour period in order to provide a greater sample size. Therefore, the final step to finalizing the forecasts for the VISSIM models included determining the volumes entering the network during the hour following the PM peak hour. The 2020 baseline DTA model shows an eight percent decrease in the total volumes entering the study area during this second hour.<sup>11</sup> Therefore, the study area forecasts were decreased by eight percent across entire VISSIM networks for all 2020 and 2040 scenarios. In a congested network with peak hour volumes that last for two hours, congestion would continue to increase as queues entering the network or within the network continue to grow. This adjustment to the second hour volumes allows the VISSIM model to more accurately model real-world conditions

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<sup>11</sup> The eight percent decrease from the peak hour to the following hour is representative of the fact that the study area has high levels of vehicle demand spread across the entire evening peak period. This is atypical as the peak hour of the commute period in most environments is usually much busier than subsequent hours.



where congestion peaks at the end of the peak hour and gradually decreases during the second hour.

## 2020 BASELINE PLUS PROJECT CONDITIONS

From the 2020 baseline model files, Fehr & Peers built a 2020 baseline plus project model. The proposed project includes the updated transit spacing plan, signal phasing changes (including new signals at Market Street / 11<sup>th</sup> Street and Market Street / Steuart Street), a new rail loop for the F-Short line, and additional turn restrictions on Market Street.<sup>12</sup> DTA forecasts were completed for this scenario with the additional turn restrictions along Market Street as described in the *Better Market Street Forecasting Approach* (Fehr & Peers, October 31, 2018). The initial details for this model was provided by the SFMTA and confirmed in June and July 2016. The final transit stop locations and lane assignment on Market Street were updated in the VISSIM models based on new information provided by the SFMTA in October 2018. Signal phases were also revised to reflect draft timing cards provided by SFMTA staff in June 2016. This includes a leading bike interval (LBI) for eastbound bicycles at Market Street/8<sup>th</sup> Street.

Transit stops were modeled such that two vehicles would be able to stop at an outbound transit stop and three vehicles would be able to stop at an inbound transit stop. Dwell times for all Market Street transit vehicles were increased to account for greater ridership at each transit stop, though overall corridor dwell times typically decrease due to the improved station spacing. Detailed changes to the transit dwell times are provided in **Attachment D**.

The development of the VISSIM models occurred prior to the adoption of a cycletrack into the proposed project design. Therefore, bicyclists operate within the curb-side mixed-flow lane similar to 2020 baseline conditions.

## 2040 CUMULATIVE CONDITIONS

The additional transit vehicles due to the Muni Forward service enhancements and the additional riders generated by cumulative land use changes would affect transit operating conditions on

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<sup>12</sup> Transit stop locations, transit route lane operations, and private vehicle turn restrictions are shown in **Attachment E**. The signal phasing changes along Market Street were provided by SFMTA staff as draft signal timing cards in June 2016.



Market Street under 2040 cumulative conditions. Other transportation projects and land use changes projected by 2040 would not substantially affect transit operating conditions on Market Street due to the proposed project's private vehicle turn restrictions. Therefore, transit operations for 2040 cumulative conditions were assessed for Market Street by updating the 2020 baseline plus project VISSIM network to reflect the proposed service enhancements under Muni Forward (including headway and fleet mix changes) anticipated to occur between 2020 and 2040 cumulative conditions. In addition, 2040 cumulative transit operations also account for the increased transit ridership along Market Street due to the anticipated land use changes by 2040. The inputs for 2040 cumulative conditions are presented in **Attachment F**.

It should be noted that travel demand forecasts used in the analysis of 2040 cumulative conditions do not include the influence of new disruptive trends in transportation that could affect future travel demand, including travel modes. As discussed above, these forecasts rely on previously observed travel behavior and presumes that behavior continues under future conditions. In reality, a number of trends including app-based ride hailing services (e.g., Uber and Lyft) and autonomous vehicles could influence how people travel in the future. The City is currently conducting multi-agency planning efforts such as the Emerging Mobility Strategy to plan for the growing popularity of emerging mobility services such as app-based ride hailing services or bike/scooter sharing services and the introduction of new technologies such as autonomous vehicles, robot delivery, or drones.<sup>17</sup> However, the time horizon for these services and technologies, such as increased use of autonomous vehicles, the level of automation in the vehicle fleet, or the popularity and competitiveness of non-auto modes, is currently uncertain. Additionally, when adding the influence of demographics (e.g., residential or workplace shifts, millennial and future generational preferences, etc.), there could be shifts in travel behavior in the future that cannot be accurately predicted in the models used for this project.

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<sup>17</sup> SFCTA, *Emerging Mobility Evaluation Report, Evaluating Emerging Mobility Services and Technologies in San Francisco*, July 2018. Accessed on October 31, 2018. Available at <https://www.sfcta.org/emerging-mobility/evaluation>.

**ATTACHMENT A**  
**EXISTING TRAFFIC COUNT VALIDATION**

Better Market Street Traffic Volumes - All Scenarios (PM Peak Period)  
Comparison of 'Existing' Volumes to 2015 Counts

Intersection# - Consistent with Figure	Intersection# - Old	Street Name	Turning Movement	2010-2012 Existing	2015 Count	Difference	Difference (Intersection)	Percent Difference		
				Volumes						
				PM						
4	3	Davis-Beale	SW	LT	35	47	12	-222	-10%	
				TH	1263	1001	-262			
				RT	83	90	7			
				RT2	61	104	43			
		Market	EB	LT	0	0	0			
				TH	288	213	-75			
				RT	142	189	47			
			WB	LT	0	0	0			
				TH	205	248	43			
				RT	162	125	-37			
9	8	Montgomery	Mont - SB	LT	0	0	0	357	12%	
				TH	810	727	-83			
				RT	0	0	0			
			SB	LT	223	185	-38			
				TH	773	906	133			
				RT	100	110	10			
			Post - EB	LT	0	0	0			
				TH	0	0	0			
				RT	286	483	197			
			Market	EB	LT	0	0			0
					TH	337	362			25
					RT	135	249			114
		WB		LT	0	0	0			
			TH	277	276	-1				
			RT	0	0	0				
		18	16	Seventh	NB	LT	91			124
TH	1400					1133	-267			
RT	48					26	-22			
Market	EB			LT	0	0	0			
				TH	218	142	-76			
				RT	0	0	0			
	WB			LT	0	0	0			
				TH	386	356	-30			
				RT	12	10	-2			
22	19			Tenth	Polk - SB	LT	24	10	-14	-238
		TH	837			941	104			
		RT	0			0	0			
		Fell - SB	LT		0	0	0			
			TH		887	811	-76			
			RT		16	58	42			
		Market	EB	LT	0	0	0			
				TH	192	95	-97			
				RT	281	237	-44			
			WB	LT	0	8	8			
				TH	611	450	-161			
				RT	0	0	0			
42	38	Sixth	NB	LT	0	0	0	-246	-7%	
				TH	937	917	-20			
				RT	65	93	28			
			SB	LT	0	0	0			
				TH	939	913	-26			
				RT	117	49	-68			
		Mission	EB	LT	5	4	-1			
				TH	694	591	-103			
				RT	201	163	-38			
			WB	LT	4	17	13			
				TH	554	497	-57			
				RT	133	159	26			

**ATTACHMENT B**  
**RECENT AND FUTURE PLANNED TRANSPORTATION PROJECTS**

### Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline				2040 Cumulative	
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
<b>“Existing Conditions” - Projects completed 2011 through 2018 <sup>5</sup></b>						
Folsom Road Diet 4 <sup>th</sup> to 11 <sup>th</sup> <sup>6</sup>	X	X	X		X	
Minor Restriping Projects (Harrison at 11 <sup>th</sup> , Sixth from Folsom to Market, Beale bike lane from Folsom to Bryant) <sup>6</sup>	X	X	X		X	
Haight Contraflow Transit Lane <sup>6</sup>	X	X	X		X	
Muni, Golden Gate, and SamTrans Transit Service Changes (Muni Forward or otherwise) <sup>6</sup>	X	X	X		X	
Two-Way McAllister Street (part of Muni Forward) <sup>6</sup>	X	X	X		X	
Signal Timing Changes on Market and Mission Streets	X	X	X		X	
Salesforce Transit Center <sup>6</sup>	X	X	X		X	
Safer Market Street <sup>7,8</sup>		X	X		X	
Golden Gate Avenue Safety Project <sup>8,9</sup>			X			X
Eighth Street Safety Project <sup>8,10</sup>		X	X			X
Second Street Improvement Project <sup>7,8, 11</sup>		X	X		X	
Seventh Street Safety Project <sup>8,10</sup>				X		X
Turk Street Safety Project <sup>8,12,13</sup>				X		X
Upper Market Street Safety Project <sup>8,13,14</sup>				X		X
Eddy Street Two-Way Conversion Project <sup>8,15</sup>				X		X
Powell Streetscape Project <sup>8,13,16</sup>				X		X
<b>2020 Reasonably Foreseeable Projects</b>						
Central Subway Project <sup>6</sup>	X	X	X		X	
Van Ness BRT Project/Van Ness Improvement Project <sup>6</sup>	X	X	X		X	
Transit Center District Plan Streetscape Improvements <sup>7,8</sup>		X	X		X	
Polk Street Streetscape Project <sup>7,8,13</sup>				X	X	
Vision Zero improvements to Sixth and Jessie streets <sup>8</sup>			X		X	
SFMTA Mission Street/South Van Ness Avenue/Otis Street Intersection Improvements <sup>8,17</sup>			X			X
Bay Area Bike Share System <sup>18</sup>				X		X



### Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline				2040 Cumulative	
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
<b>2040 Reasonably Foreseeable Projects</b>						
Sixth Street Road Diet Project <sup>7</sup>					X	
San Francisco Bicycle Plan short-term improvements to Fifth Street <sup>7</sup>					X	
Central SoMa Plan Street Network Changes <sup>7</sup>					X	
Muni Forward (Travel Time Reduction Projects) <sup>6,7</sup>					X	
Geary Rapid and Bus Rapid Transit Projects <sup>7,19</sup>					X	
Safer Taylor Street <sup>8,20</sup>						X
Hub Plan Street Network Changes <sup>8, 21</sup>						X

Notes: All websites shown below were current as of June 29, 2018, as confirmed by Fehr & Peers.

1. SF-CHAMP assumptions are presented in memorandums *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (SFCTA, May 11, 2015) and *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (SFCTA, July 17, 2015). This table only includes projects within the transportation study area. Additional projects outside of the study area that were included in the SF-CHAMP models are documented within these memorandums.
2. The DTA model validation and calibration processes is described in the memorandum *Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project* (Fehr & Peers, October 30, 2015).
3. *Final Better Market Street 2020 VISSIM Model Updates and Changes* (Fehr & Peers, September 29, 2016).
4. SF-CHAMP was the only analysis model prepared for 2040 cumulative conditions as forecasting long-range conditions is fraught with uncertainty that diminishes the value of analyzing the scale differences due to the proposed project. For 2040 transportation conditions, tools with detailed inputs and outputs such as DTA and VISSIM have input variable ranges that would be larger than the measurable effects of the proposed project.
5. "Existing conditions" in the EIR represents the conditions as they are in 2018, or the most recent information available. This section is intended for clarification about what has changed since the existing validation and calibration efforts were completed for the VISSIM model in 2011/2012 as documented in the memorandum *Methodology and Validation for Market/Mission Street VISSIM Model* (San Francisco Planning Department, January 30, 2012).
6. Project described in *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (SFCTA, May 11, 2015).
7. Project described in *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (SFCTA, July 17, 2015).
8. Project or Plan was not reasonably foreseeable at the time the SF-CHAMP and/or DTA models were completed in 2015.
9. Golden Gate Avenue was adopted approved in May 2016, after the completion of the SF-CHAMP and DTA models were completed in 2015. The project was completed in 2016. More details on project are shown here: <https://www.sfmta.com/projects/golden-gate-avenue-safety-project>

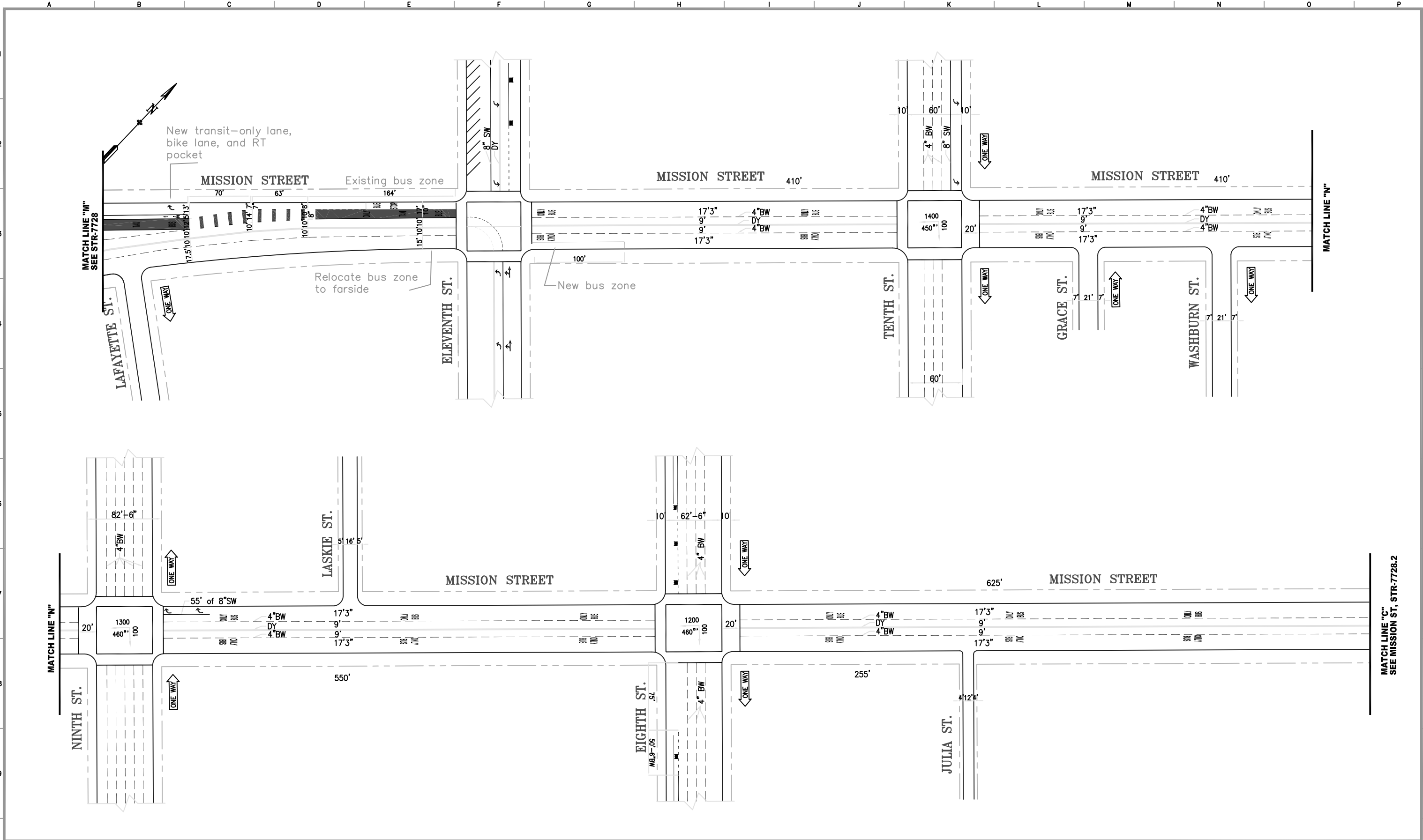
## Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline			2040 Cumulative		
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/ Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
10. Phase 1 of the Seventh and Eighth Street Near Term Safety Project received approval from the SFMTA Board on November 15, 2016, after the VISSIM models were completed. Phase 1 was constructed between March and May 2017. More details are on the project webpage: <a href="https://www.sfmta.com/projects/7th-street-8th-street-near-term-safety-project">https://www.sfmta.com/projects/7th-street-8th-street-near-term-safety-project</a> . Accessed by Fehr & Peers on May 25, 2018. Preliminary planning and funding for the Eighth Street Phase 1 component was completed in 2015, hence why it was incorporated into the DTA and VISSIM models at that time, before the Eighth Street portion was incorporated into the broader project.						
11. Initial turn restrictions for Second Street Improvement Project were implemented in March 2016. The complete project is expected to be complete in 2019 and is therefore included within the 2020 baseline analysis. More details on project are shown here: <a href="https://www.sfpublicworks.org/project/second-street-improvements-project">https://www.sfpublicworks.org/project/second-street-improvements-project</a>						
12. The Turk Street Safety project was approved in January 2018 and was therefore not reasonably foreseeable at the time any of the analysis models were completed. More details are on the project webpage: <a href="https://www.sfmta.com/projects/turk-street-safety-project">https://www.sfmta.com/projects/turk-street-safety-project</a>						
13. While the Turk Street, Polk Street, Upper Market Street Safety, and Powell Streetscape projects are directly adjacent to the study area, they do not touch the VISSIM or Synchro study locations.						
14. The Upper Market Street Safety Project includes near-term improvements implemented in 2015 and spring of 2018, starting west of Octavia Boulevard. Long-term improvements were approved by the SFMTA Board of Directors in May 2017 and are expected to be constructed by 2020. More details are on the project webpage: <a href="https://www.sfmta.com/projects/upper-market-street-safety-project">https://www.sfmta.com/projects/upper-market-street-safety-project</a>						
15. The Eddy Street Two-Way Conversation Project received approval from the SFMTA Board in July 2017, after the analysis was completed. More details are on the project webpage: <a href="https://www.sfmta.com/projects/eddy-street-two-way-conversion-project">https://www.sfmta.com/projects/eddy-street-two-way-conversion-project</a> . Accessed by Fehr & Peers on June 29, 2018.						
16. The Powell Streetscape Project included elements completed in November 2015 after the SF-CHAMP and DTA models were completed. Additional elements are currently under consideration for implementation by an estimated Early 2021 as described on the project’s webpage: <a href="https://www.sfmta.com/projects/powell-streetscape-project">https://www.sfmta.com/projects/powell-streetscape-project</a> . Accessed by Fehr & Peers on June 29, 2018.						
17. SF-CHAMP does not include the model parameters in order to incorporate this local streetscape project.						
18. While a general increase in biking is included in future year models to reflect the buildout of the network, a bikeshare system is not a specific model parameter that can be included in these models.						
19. The Geary Rapid Project is expected to be implemented by 2021 according to the project’s website. The Geary Bus Rapid Transit project is the related project that includes longer term improvements west of Stanyan Street, outside of the transportation study area. More details are on the project webpage: <a href="https://www.sfmta.com/projects/geary-rapid-project">https://www.sfmta.com/projects/geary-rapid-project</a>						
20. Safer Taylor Street is expected to go before the SFMTA Board of Directors in the Fall of 2018. More details are on the project webpage: <a href="https://www.sfmta.com/projects/safer-taylor-street">https://www.sfmta.com/projects/safer-taylor-street</a>						
21. Hub Plan Street Network Changes are part of the Market Street Hub project, which is currently in the planning stages. More details are on the project webpage: <a href="http://sf-planning.org/market-street-hub-project">http://sf-planning.org/market-street-hub-project</a>						

Source: SF Planning Department, Fehr & Peers. 2018.

**ATTACHMENT C**  
**2020 NO PROJECT – PLANNED IMPROVEMENTS**

**Mission Street / Otis Street / South Van Ness Avenue**



NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				

REFERENCE INFORMATION  
& FILE NO. OF SURVEYS



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY

CITY AND COUNTY OF SAN FRANCISCO

DESIGNED:	DATE:
DRAWN:	DATE:
CHECKED:	DATE:

APPROVED	
SECTION ENGINEER	DATE:
CITY TRAFFIC ENGINEER	DATE:

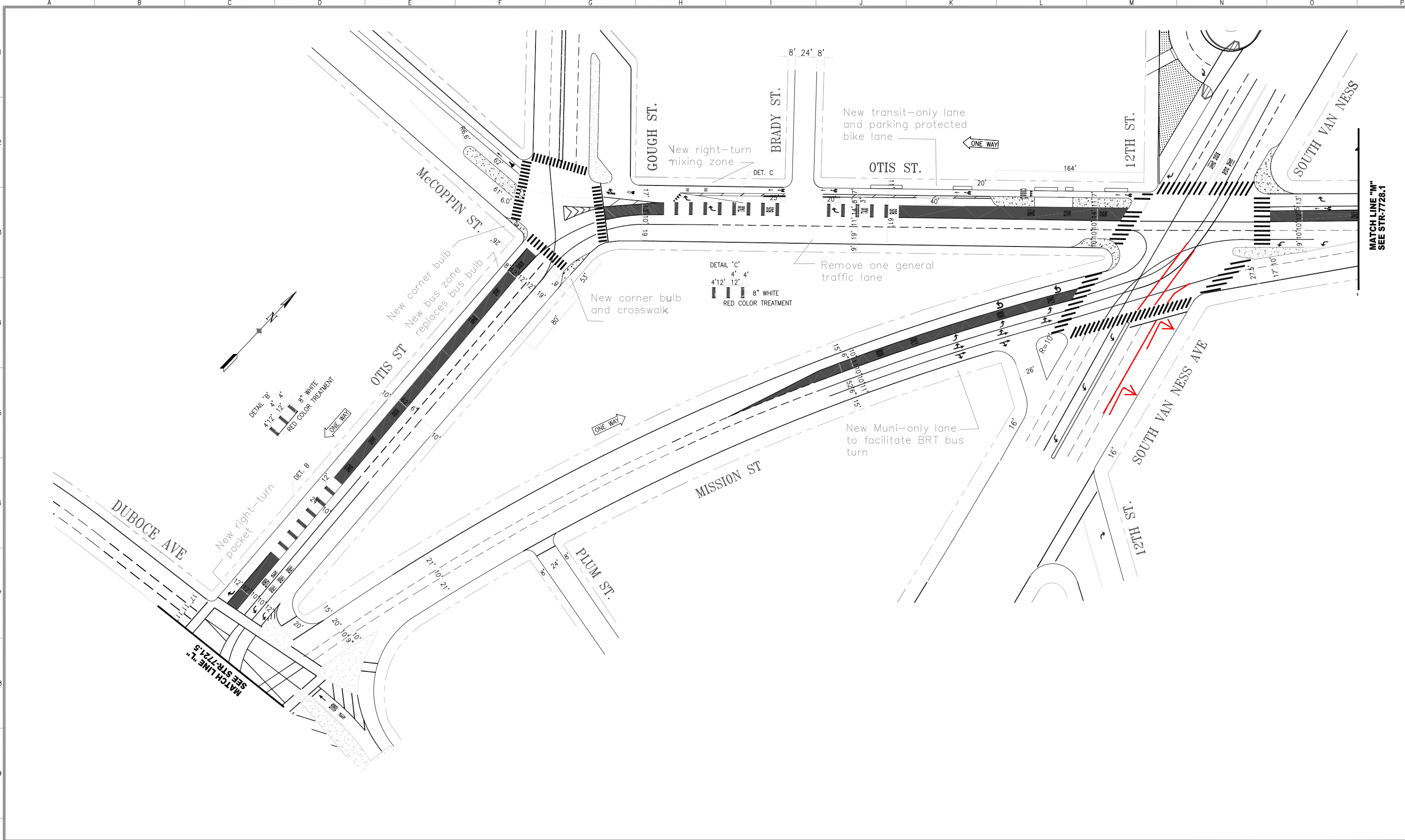
SCALE:
1"=50'
SHEET OF SHEETS

TTRP PROPOSALS

MISSION STREET  
11TH STREET TO 7TH STREET

CONTRACT NO.
DRAWING NO.
FILE NO.
REV. NO.
0

EXTERNAL REFERENCES:  
SCALE FACTOR:  
ORIGIN:  
FILE NAME:



NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				

REFERENCE INFORMATION  
& FILE NO. OF SURVEYS



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY  
CITY AND COUNTY OF SAN FRANCISCO

DESIGNED:	DATE:
DRAWN:	DATE:
CHECKED:	DATE:

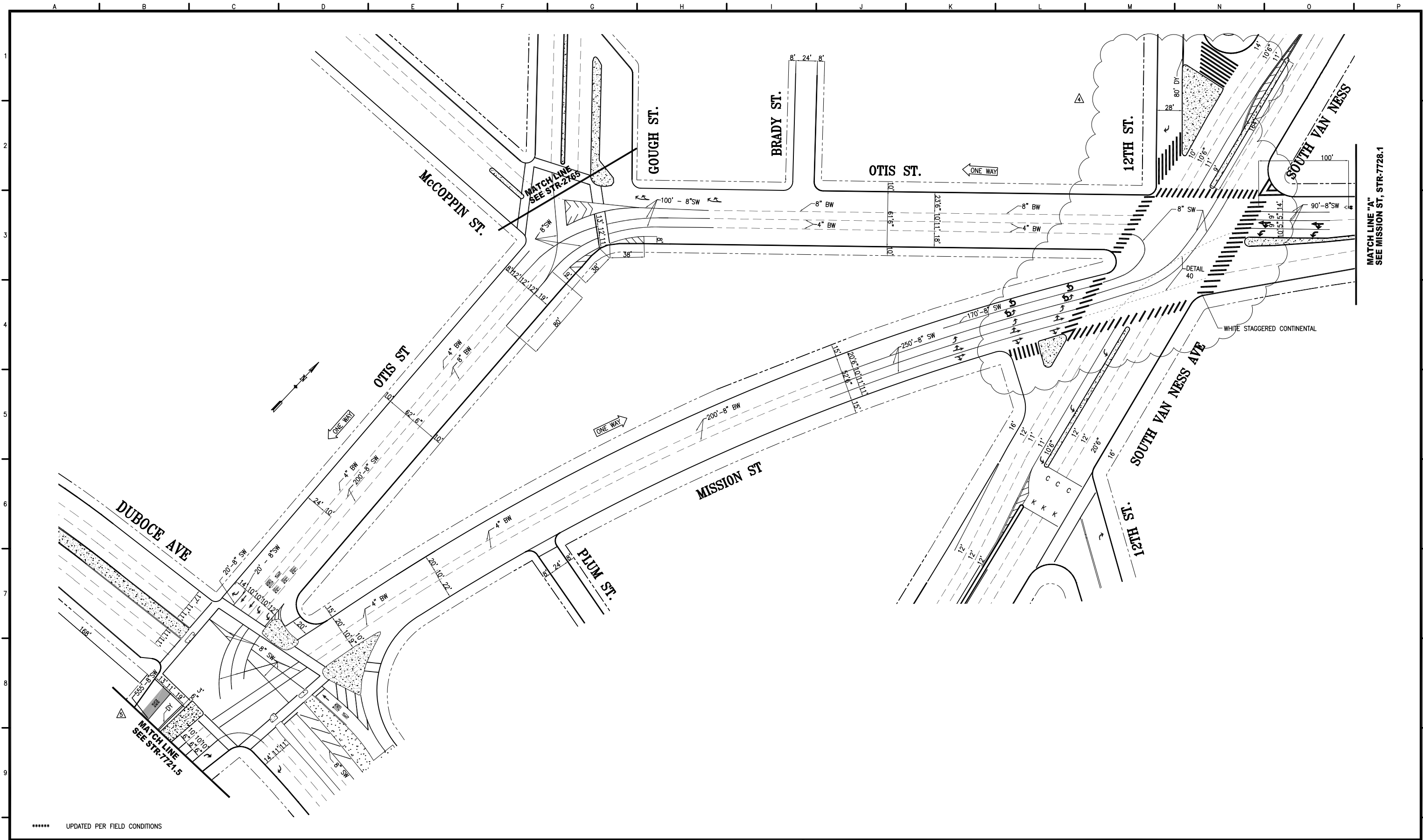
APPROVED	
SECTION ENGINEER	DATE:
CITY TRAFFIC ENGINEER	DATE:

SCALE:
1"=50'
SHEET OF SHEETS

TTRP PROPOSALS
MISSION STREET
MISSION / OTIS / SOUTH VAN NESS AVENUE

CONTRACT NO.
DRAWING NO.
FILE NO.
REV. NO.
1

EXTERNAL REFERENCES: F0015 1050-  
SCALE FACTOR: 1"=50'-  
PLOT SCALE:  
ORIGIN:  
FILE NAME: 0111-11-11



\*\*\*\*\* UPDATED PER FIELD CONDITIONS

NO.	DATE	DESCRIPTION	BY	APP.
1	02/18/16	RESTRIPTED MISSION AND ADDED RED BUS LANES	JVT	CL
2	02/17/10	ADDED STAGGERED CONTINENTALS @ S. VAN NESS, 12TH & OTIS	DCarr	GD
3	*****	UPDATED PER FIELD CONDITIONS	AW	BBD
4	2/17/10	ADDED SHARED USE LANE MARKINGS SVN - 11TH	PKO	DRC
5	*****	REMOVED "KC" MESSAGE AT GOUGH/OTIS STS. REPAVED	TA	MG

TABLE OF REVISIONS  
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION

REFERENCE INFORMATION & FILE NO. OF SURVEYS
SUPERCEDES STR-4602 REV 25



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY  
CITY AND COUNTY OF SAN FRANCISCO

DESIGNED:	DATE:
DRAWN:	DATE:
T.A	2007
CHECKED:	DATE:
R.O	2007

APPROVED
THOMAS P FOLKS 5/27/07
SECTION ENGINEER DATE:
JACK L. FLECK 5/27/07
CITY TRAFFIC ENGINEER DATE:

SCALE:
1"=50'
SHEET OF SHEETS

TRAFFIC STRIPING
MISSION STREET
MISSION / OTIS / SOUTH VAN NESS AVENUE

CONTRACT NO.
DRAWING NO. STR-7728
FILE NO.
REV. NO. 4

FILE NAME: T:\\_e\_files\off\_rec\dwg\A-2\TRANS\OPERATIONS\STR-7728.dwg  
DATE:



12<sup>th</sup> St, Mission, Otis, & S. Van Ness

CHANGE  
Intersection No. 24358000  
ENGINEER: Ian Trout  
Date: 11/7/2014  
Programmed by:  
Installed by:  
Date Completed:

DRAFT for VN BRT 2020 BASELINE CONDITIONS  
NOTES: Page 1 of 9  

PHASE	STREET NAME	Emer Flash	Prog Flash	Controller:	2070
2	S. Van Ness NB	R	N/A	Cabinet	MSF
3	Mission WBRT	R	N/A	Oper. Date:	8/31/1951
4	Mission EB	R	N/A	System:	Isolated
6	Van Ness SB	R	N/A	Master:	TBC GPS
7	Mission EBLT	R	N/A		
8	Mission WB/WBLT	R	N/A		
15T	Van Ness BRT SB	R	N/A	Cascade:	n/a

☒ Base Timing
☒ Actuation
☐ Transit Priority
☐ Preemption

ATTACHMENTS

OPERATION TIMES

PLAN ONE (1)

X = YES	-- = NO	S	M	T	W	T	F	S	CYCLE	SPLIT	OFFSET	FLASH
AT ALL TIMES		X	X	X	X	X	X	X	1	1	1	--

STREET	PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
S. Van Ness NB	2	R	G				Y	R																
Mission WBRT	3	OFF						f	OFF															
Mission EB	4	R															G			Y	R			
Van Ness SB	6	R	G				Y	R																
Mission EBLT	7	R															G			Y	R			
Mission WB/WBLT	8	R						G + G						Y	R									
Van Ness BRT SB	15T	--							F	--														
Peds Xing Mission ES--n half	2P	W		FRH		RH												W		FRH	RH			
Peds Xing S. Van Ness SS	4P	RH																		W		FRH	RH	
Peds Xing Mission St WS	6P	W												FRH			RH							
Peds Xing S. Van Ness NS	8P	RH						W			FRH			RH										
Peds Xing Mission St ES--s he	9P	W			FRH		RH						W			FRH		RH						
Peds Xing Otis St	11P	W		FRH		RH																		
		ws 3.5																						

CSO	CYCLE (sec)	OFFSET (sec)	SIGNAL INTERVALS (seconds)																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
111	160.0	0	3.0	29.5	2.0	3.0	8.0	4.0	3.5	11.5	4.0	3.5	3.0	9.0	12.0	5.0	8.0	4.0	3.0	6.5	19.0	11.0	4.0	3.5

12th St, Mission, Otis, &amp; S. Van Ness

CHANGE XX

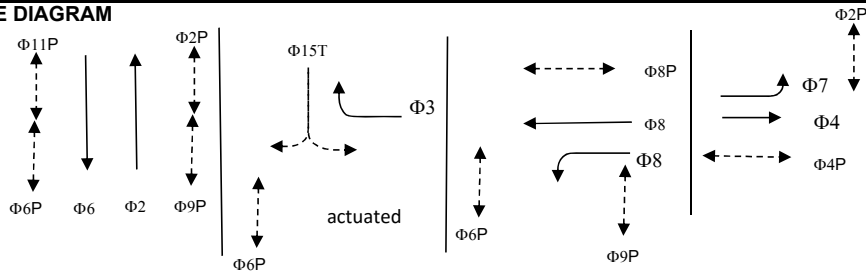
## PAGE 2: BASE TIMING, ACTUATION, COORDINATION SETTINGS

Use this card only when you have Actuation, Priority or Preempts, or want Custom Transitioning.

12th St, Mission, Otis, & S. Van Ness

Page 2 of 9

### PHASE DIAGRAM



Are there conflicting protected left turn phases?

no

### BASE TIMINGS:

Phase	1	2	3-OVL	4	5	6	7	8	9P	11P	15T
Movement		NB	WBRT	EB		SB	EBLT	WB	ESP	WSP	BRT
Absolute Min Green (whole #)		34	11	36		34	36	30			11
Yellow		4.0		4.0		4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance		3.5		3.5		3.5	3.5	3.0	3.5	3.5	3.5
Absolute Min Walk		8		6		8		5	7	8	
FRH		11		30		13		25	8	13	

### ACTUATION: \*\* if Actuation setting vary by plan, use special comments.

Phase	1	2	3-OVL	4	5	6	7	8	9P	11P	15P
Vehicle Det Type		None	None	None		None	None	None			Sensys
Ped Detection		None		None		None		None	None	None	None
Vehicle Recall (Max, Min, Soft or None)		Max		Max		Max	Max	Max			None
Absolute Min Green (same as above)		34	11	36		34	36	30			11
Vehicle Extension (seconds)											11
Max Green (only used for FREE)											
Pedestrian Recall (Yes or No)		Yes		Yes		Yes		Yes	Yes	Yes	
Ped Recycle (Yes or No)		Yes		Yes		Yes		Yes	Yes	Yes	
"WALK EXPAND" (Yes or No)		Yes		Yes		Yes		Yes	Yes	Yes	

### CUSTOM TRANSITIONING (phase splits = Max G + Y + R Clearance)

Phase	1-8 Cycle length	1	2	3	4	5	6	7	8
Dial 1 Splits									
Max Trans									
Min Trans									
Dial 2 Splits									
Max Trans									
Min Trans									
Dial 3 Splits									
Max Trans									
Min Trans									
Coordinated Phases									

### Special Comments

Start Flash = 0 seconds; Start Red = 6 seconds  
3 second LPI for 8P, 9P, 11P, 13P, 15P.

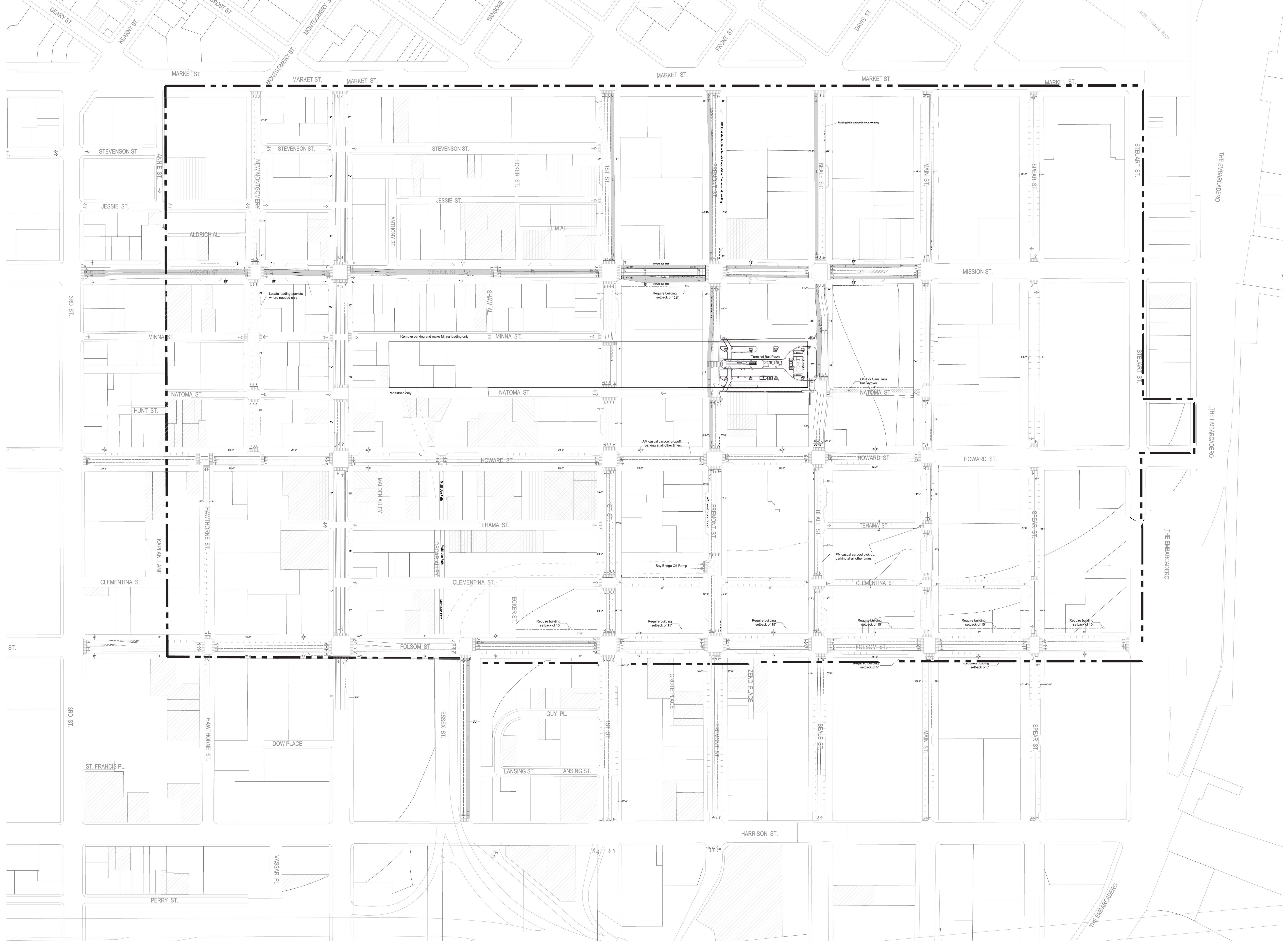
12th St, Mission, Otis, & S. Van Ness

Change

XXXX

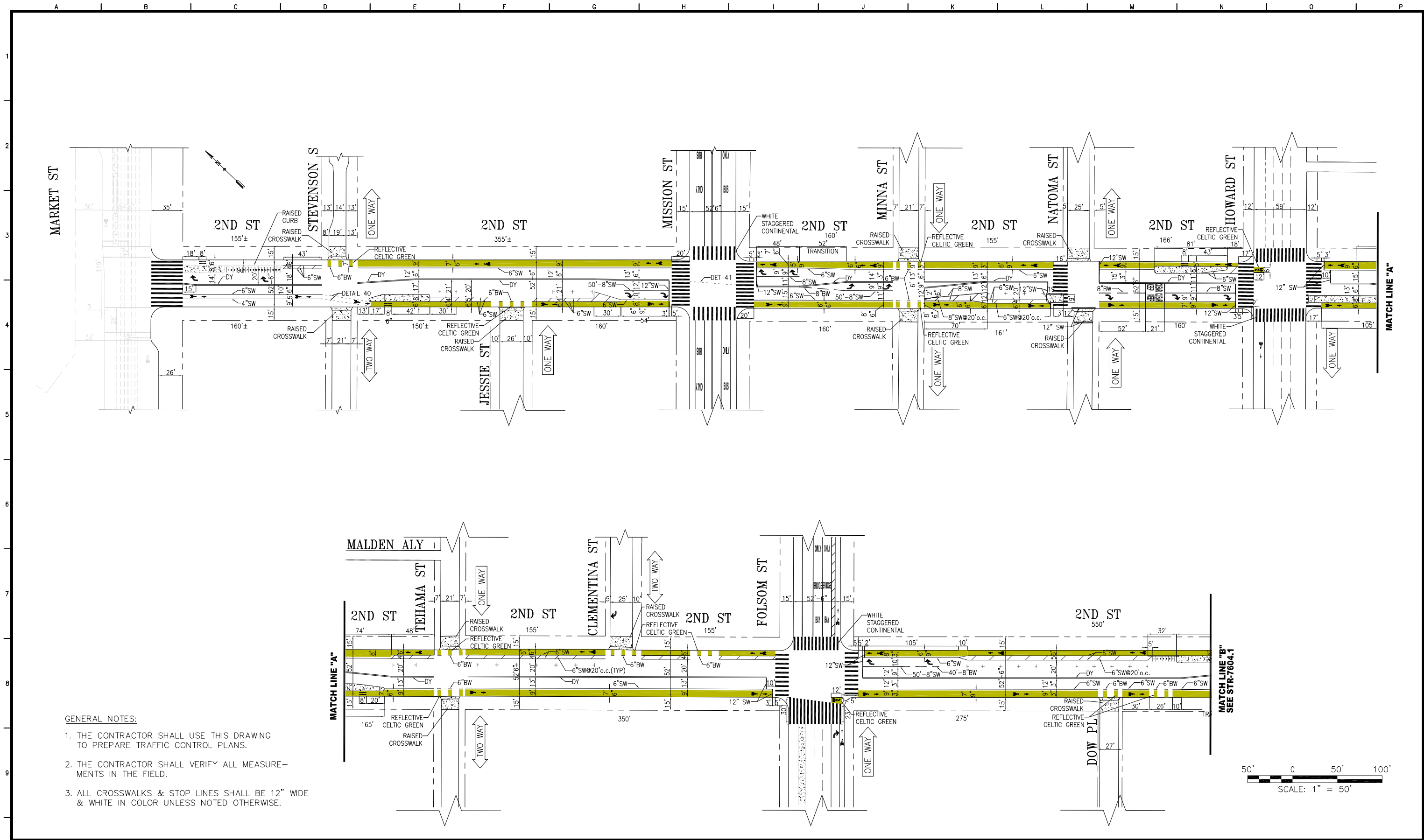
## **Transbay Center District Plan**



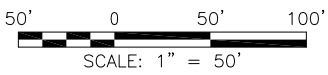




## **Second Street Road Diet**



- GENERAL NOTES:
1. THE CONTRACTOR SHALL USE THIS DRAWING TO PREPARE TRAFFIC CONTROL PLANS.
  2. THE CONTRACTOR SHALL VERIFY ALL MEASUREMENTS IN THE FIELD.
  3. ALL CROSSWALKS & STOP LINES SHALL BE 12" WIDE & WHITE IN COLOR UNLESS NOTED OTHERWISE.



NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY  
CITY AND COUNTY OF SAN FRANCISCO

DRAWN:	DATE:
EER/DM	12/15
CHECKED:	DATE:
MS	12/15

APPROVED	
SECTION ENGINEER	DATE:
CITY TRAFFIC ENGINEER	DATE:

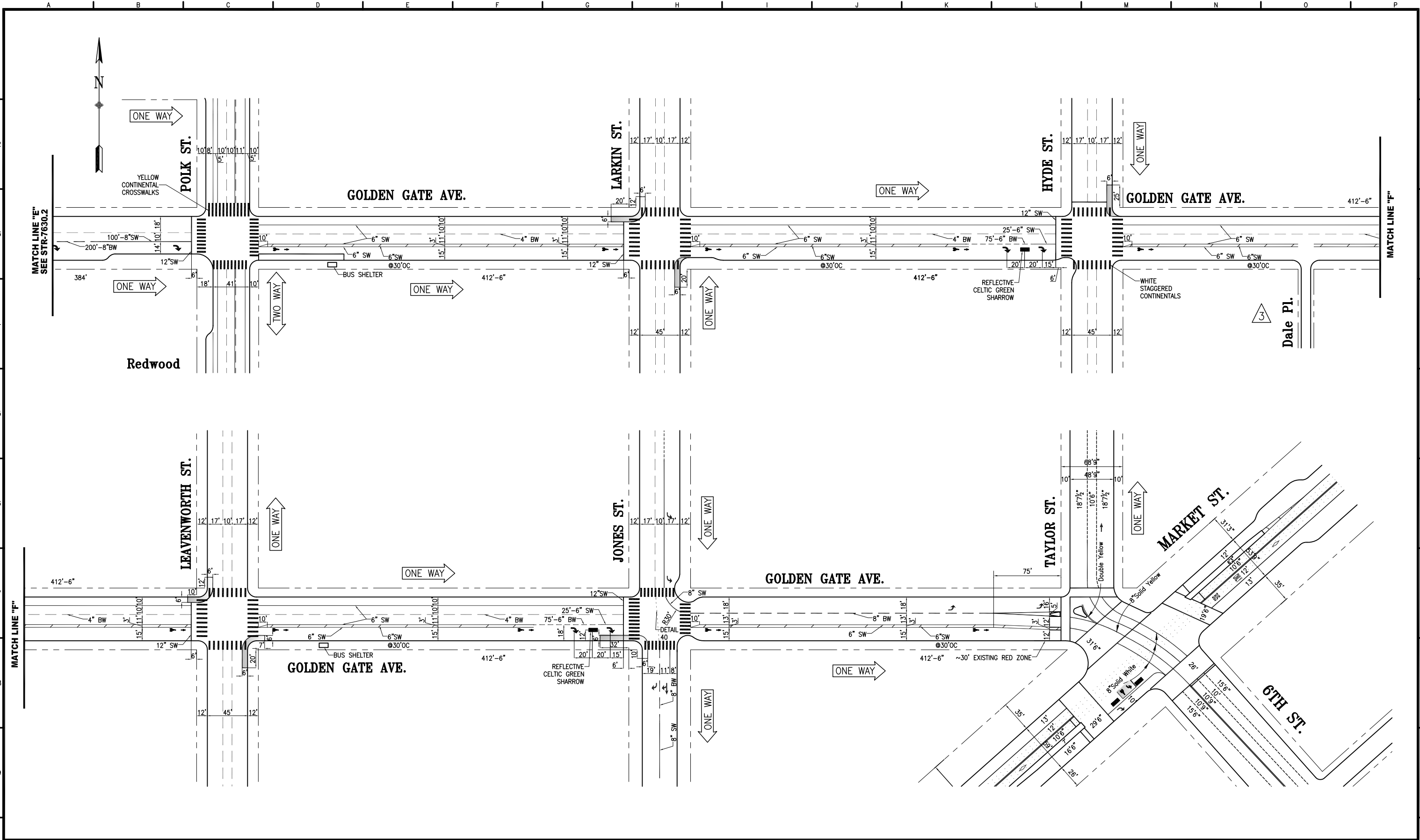
SCALE:
1" = 50'
SHEET OF SHEETS
3 OF 4

SECOND STREET IMPROVEMENTS PROJECT
-DRAFT- NEW TRAFFIC STRIPING
MARKET STREET TO DOW PLACE

CONTRACT NO.	1064J
DRAWING NO.	T-3
FILE NO.	
REV. NO.	0

EXTERNAL REFERENCES: XREFS  
FONTS USED: FONTS  
SCALE FACTOR: XX  
PLOT SCALE: X.X  
ORIGIN: LIVABLE STREETS  
FILE NAME: --/--/--  
DATE: --/--/----

## **Golden Gate Avenue Road Diet**



NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY  
CITY AND COUNTY OF SAN FRANCISCO

SUPERCEDES STR-1841 REV. "4" & STR-1841.1 REV."10"	
MS	05/01
DRAWN:	DATE:
DY	05/01
CHECKED:	DATE:
AKW	05/01

APPROVED	
SENIOR ENGINEER	DATE:
CITY TRAFFIC ENGINEER	DATE:

SCALE:
1"=50'
SHEET OF SHEETS
4 OF 5

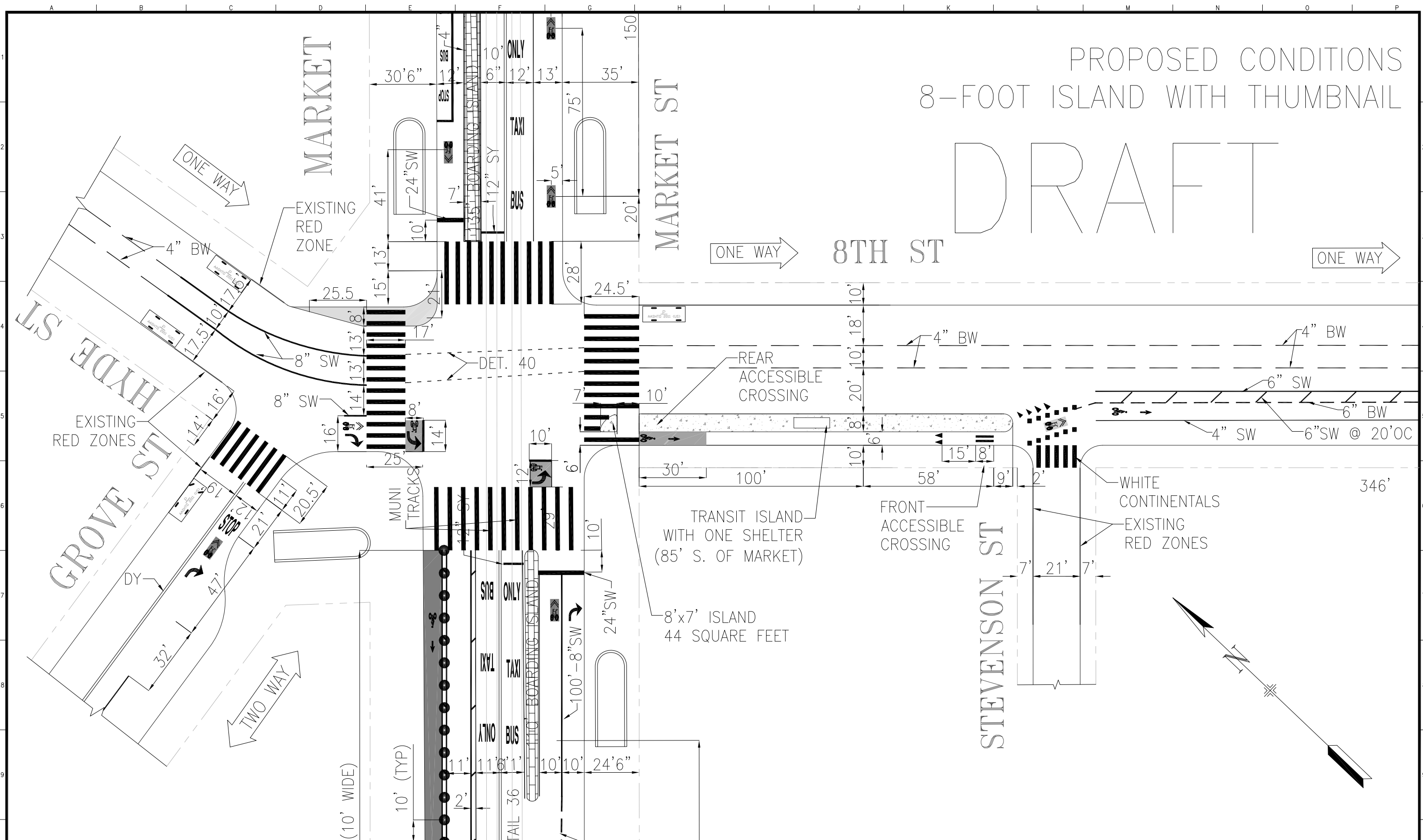
TRAFFIC STRIPING
GOLDEN GATE AVENUE POLK STREET TO MARKET STREET

CONTRACT NO.
DRAWING NO.
FILE NO.
REV. NO.


FILE NAME: T:\e\office\_rec\dwgs\10.2\10.2 STR-7630.2  
DATE: 05/02  
SCALE FACTOR: 1=1  
PLOT SCALE: 1=1  
EXTERNAL REFERENCES:  
FONTS USED:



## **Eighth Street & Market Re-striping and Bus Island**



NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY

CITY AND COUNTY OF SAN FRANCISCO

DESIGNED: DATE:	APPROVED	SCALE:	CONTRACT NO.
DRAWN: DATE:	SECTION ENGINEER DATE:	1"=20'	DRAWING NO.
DRAFT 01/2016		SHEET OF SHEETS	FILE NO.
CHECKED: DATE:	CITY TRAFFIC ENGINEER DATE:		REV. NO.
			12

EXTERNAL REFERENCES:  
FONT: USED:  
SCALE FACTOR:  
PLOT SCALE:  
FILE NAME: T:\e\off\_rec\dwgs\02\2\m\market\_8th\02\_2604.dwg  
DATE: 01/2016

## **Safer Market Street Plan Turn Restrictions**

Turn Restrictions



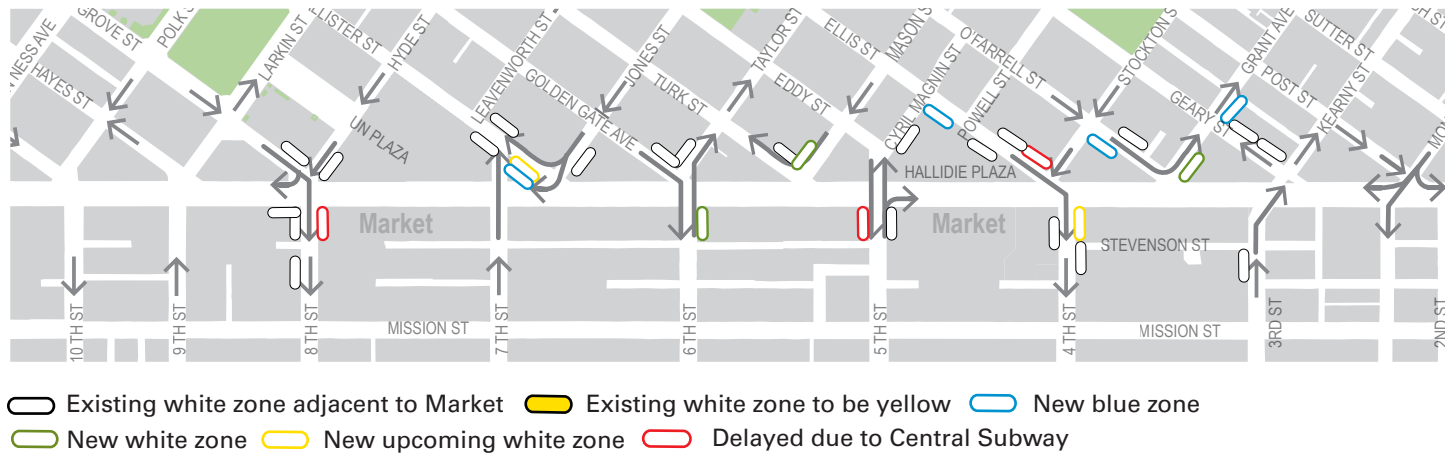
Safer Market Street covers the segment of Market between 3<sup>rd</sup> - 8<sup>th</sup> streets and the upcoming turn restrictions in addition to the existing required turns limit private vehicle access. Transit, paratransit, taxis, bicycles and emergency and commercial vehicles would be exempt. All motorists are free to cross Market Street; the objective is to divert traffic off of Market to reduce conflicts between road users.

Transit-only Lanes



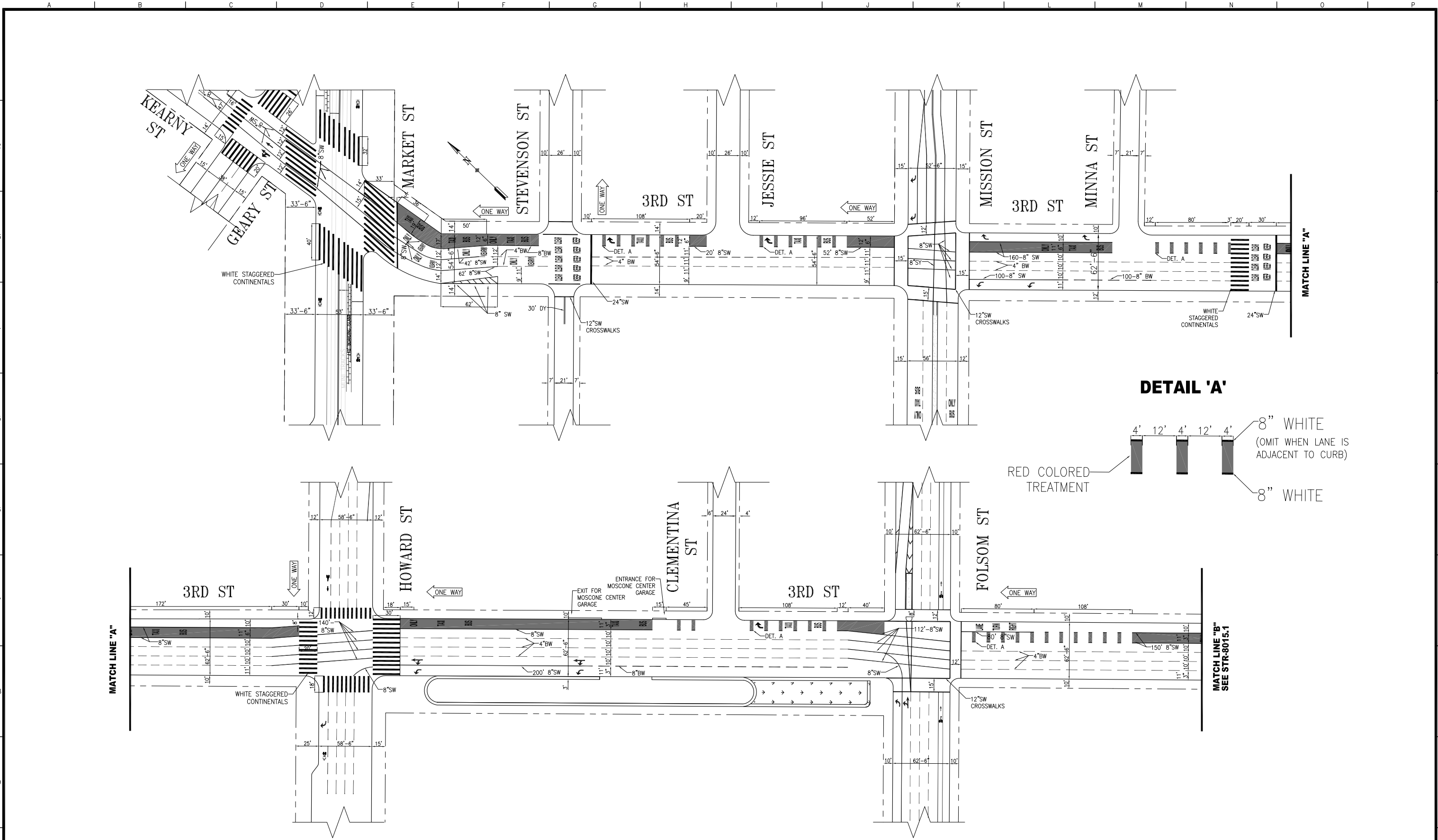
The extension of the existing transit-only lanes gives buses dedicated space increasing transit efficiency and improving service reliability. It additionally reduces problems caused by lane weaving.

Loading Zones

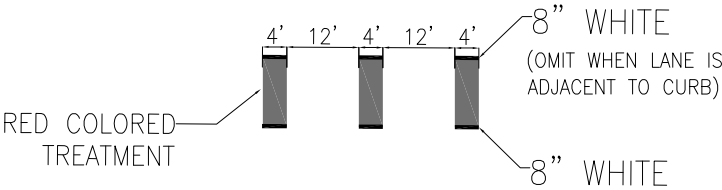


The project team collaborated with hotels and merchants and as part of a pilot program is creating additional loading zones to encourage safe loading and unloading of private vehicles off of Market Street. New blue zones increase access for people with disabilities.

## **Third Street Re-Striping Plan**



DETAIL 'A'



△	7/19/15	RECONFIGURED MARKET INTERSECTION GUIDELINES, ADDED RED TRANSIT LANE AND ADJUSTED STRIPING FROM MISSION TO MARKET. REMOVED TOW-AWAY LANE BETWEEN MISSION & MARKET.	IRT	KK
△	-/-/15	UPGRADED TO WHITE STAGGERED CONTINENTALS @ MARKET	AU	GD
△	1/10/14	UPGRADED TO WHITE STAGGERED CONTINENTALS @ HOWARD	AU	GD
△	3/22/14	NEW STRIPING DRAWING	JJK	BT
NO.	DATE	DESCRIPTION	BY	APP.
TABLE OF REVISIONS				
CHECK WITH TRACING TO SEE IF YOU HAVE LATEST REVISION				



SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY  
CITY AND COUNTY OF SAN FRANCISCO

SUPERSEDES  
STR-6143  
REV. 20

DRAWN:	DATE:
JJK	03/2014
CHECKED:	DATE:
BT	03/2014

APPROVED	
C. LIU	03/10/2014
SENIOR ENGINEER	
R. OLEA	03/10/2014
CITY TRAFFIC ENGINEER	

SCALE:
1" = 50'
SHEET OF SHEETS
1 OF 2

TRAFFIC STRIPING
THIRD STREET MARKET STREET TO FOLSOM STREET

CONTRACT NO.
DRAWING NO. STR-8015
FILE NO.
REV. NO. 2

EXTERNAL REFERENCES:  
FONTS USED:  
SCALE FACTOR:  
PLOT SCALE: 1"=1'  
ORIGIN: TRANSIT ENGINEERING  
FILE NAME: --/--/---  
DATE: --/--/---

**ATTACHMENT D**  
**TRANSIT DWELL TIMES**

Line	Stop	Existing Inbound Dwell Time (seconds)		Stop	Proposed Inbound(2020) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
2	1st Street	15	10	1st Street	15	10
	Beale Street	25	25	Main-Beale Street	25	25
	<b>Total</b>	<b>40</b>		<b>Total</b>	<b>40</b>	
5	7th Street	15	10			
	6th Street	15	5	4th Street	45	25
	5th Street	25	10	3rd Street	30	20
	4th Street	15	10			
	3rd Street	15	10	1st Street	10	5
	1st Street	10	5			
	<b>Total</b>	<b>95</b>		<b>Total</b>	<b>85</b>	
6	Van Ness Avenue	20	15	Van Ness Avenue	20	15
	9th Street	20	15	9th Street	20	15
	8th Street	25	15	7th Street	40	20
	7th Street	25	15	6th Street	25	10
	6th Street	20	10	5th Street	25	30
	5th Street	30	35	4th Street	25	15
	4th Street	35	35	New Montgomery Street	30	20
	3rd Street	25	20	1st Street	20	10
	2nd Street	20	10	Main-Beale Street	25	25
	1st Street	15	10			
	Beale Street	25	25			
	<b>Total</b>	<b>260</b>		<b>Total</b>	<b>230</b>	
9	11th Street/Market	25	15	11th Street/Market	25	15
	9th Street	20	15			
	8th Street	15	5	7th Street	45	25
	7th Street	30	20			
	6th Street	20	10	4th Street	45	25
	5th Street	45	25	3rd Street	45	25
	4th Street	20	10			
	3rd Street	25	20	1st Street	15	10
	New Montgomery Street	10	5	Main-Beale Street	25	25
	1st Street	10	5			
	Beale Street	25	25			
	<b>Total</b>	<b>245</b>		<b>Total</b>	<b>200</b>	
9R	11th Street/Market	25	15	11th Street/Market	25	15
	9th Street	20	15	7th Street	40	20
	8th Street	15	5	4th Street	25	15
	7th Street	30	20	3rd Street	20	10
	6th Street	20	10	1st Street	20	10
	5th Street	45	25	Main-Beale Street	25	25
	4th Street	20	10			
	3rd Street	25	20			
	New Montgomery Street	10	5			
	1st Street	10	5			
	Beale Street	25	25			
	<b>Total</b>	<b>245</b>		<b>Total</b>	<b>155</b>	
21	9th Street	20	15	9th Street	20	15
	8th Street	25	15	7th Street	40	20
	7th Street	25	15	6th Street	20	10
	6th Street	20	10	5th Street	30	35
	5th Street	30	35	4th Street	35	35
	4th Street	35	35	New Montgomery Street	35	20
	3rd Street	25	20	1st Street	20	10
	New Montgomery Street	20	15	Main-Beale Street	25	25
	1st Street	15	10			
	Beale Street	25	25			
	<b>Total</b>	<b>240</b>		<b>Total</b>	<b>225</b>	



Line	Stop	Existing Inbound Dwell Time (seconds)		Stop	Proposed Inbound(2020) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
31	5th Street	30	35	5th Street	30	30
	4th Street	35	35	4th Street	35	35
	3rd Street	25	20	New Montgomery Street	30	20
	New Montgomery Street	20	15	1st Street	20	10
	1st Street	15	10	Main-Beale Street	25	25
	Beale Street	25	25			
	<b>Total</b>	<b>150</b>		<b>Total</b>	<b>140</b>	
38	3rd Street	25	20	New Montgomery Street	30	20
	New Montgomery Street	15	10	1st Street	15	10
	1st Street	10	5			
	<b>Total</b>	<b>50</b>		<b>Total</b>	<b>45</b>	
38R	New Montgomery Street	15	10	New Montgomery Street	15	10
	1st Street	10	5	1st Street	10	5
	<b>Total</b>	<b>25</b>		<b>Total</b>	<b>25</b>	
7	Van Ness Avenue	25	15	Van Ness Avenue	25	15
	9th Street	25	15	9th Street	25	15
	8th Street	25	15	7th Street	25	15
	7th Street	15	10	6th Street	15	10
	6th Street	15	10	5th Street	10	10
	5th Street	10	10	4th Street	25	15
	4th Street	25	10	New Montgomery Street	20	10
	4th Street	25	15	1st Street	25	15
	3rd Street	20	10			
	1st Street	15	10			
	<b>Total</b>	<b>200</b>		<b>Total</b>	<b>170</b>	
F	Gough Street - 90	25	10	Gough Street - 90	25	10
	Van Ness Avenue - 90	25	10	Van Ness Avenue - 90	40	20
	9th Street	25	10	7th Street - 90	45	25
	8th Street	30	10	5th Street - 90	45	25
	7th Street - 90	30	20	3rd Street - 90	30	20
	6th Street	25	10	1st Street - 90	30	20
	5th Street - 180	45	25	Main-Beale Street - 90	40	25
	4th Street	60	45			
	3rd Street - 90	35	35			
	New Montgomery Street	25	15			
	1st Street - 180	20	15			
	Main Street - 90	40	25			
	<b>Total</b>	<b>385</b>		<b>Total</b>	<b>255</b>	
	Where 90 (disabled ramps) or 180 (disabled lifts) is shown with stop, there is a 5 percent chance that the streetcar stops to load a disabled passenger. It stops again at the boarding island.			There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.		
5R				4th Street	30	20
				3rd Street	15	10
				1st Street	20	15
	<b>Total</b>			<b>Total</b>	<b>65</b>	
16X/7X				4th Street	25	20
				3rd Street	20	15
				1st Street	20	15
				Main-Beale Street	25	25
	<b>Total</b>			<b>Total</b>	<b>90</b>	
19				7th Street	40	20

Line	Stop	Existing Inbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Inbound(2020) Dwell Time (seconds) Average      Std. Dev.	
The following bus routes run along Mission Street.						
Line	Stop	Existing Inbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Inbound Dwell Time (seconds) Average      Std. Dev.	
14	13th Street	25	15	13th Street/Mission	25	20
	South Van Ness	20	15	South Van Ness/Mission/11th	20	10
	11th Street	20	15	11th Street/Market	25	20
	9th Street	20	10	9th Street	25	20
	8th Street	25	15	7th Street	30	20
	7th Street	20	15	6th Street	25	20
	6th Street	25	15	5th Street	30	20
	5th Street	25	15	4th Street	25	20
	4th Street	25	20	3rd Street	30	20
	3rd Street	15	5	1st Street	15	10
	2nd Street	15	5	Main-Beale Street	10	5
	1st Street	15	5	Steuart Street	10	5
	Main Street	10	5			
	Steuart Street & Market St	10	5			
	Total		270	Total		270
14R	11th Street	20	15	11th Street/Market	25	20
	8th Street	25	15	7th Street	30	20
	5th Street	25	15	5th Street	30	20
	4th Street	25	20	3rd Street	25	20
	3rd Street	15	5	1st Street	25	20
	2nd Street	15	5	Main-Beale Street	15	10
	1st Street	15	5	Steuart Street	15	10
	Main Street	15	5			
	Steuart Street & Market St	15	5			
	Total		170	Total		165
14X	Does not operate inbound in PM Peak					
	Total		0	Total		0
292/KX	9th Street	20	20	9th Street	25	25
	7th Street	20	20	7th Street	25	25
	5th Street	20	20	5th Street	25	25
	3rd Street	20	20	3rd/New Montgomery Street	25	25
	2nd Street	20	20	1st Street	20	20
	1st Street	20	20			
	Total		120	Total		120
GGT Basic	8th Street	20	20	7th Street	35	35
	7th Street	20	20	5th Street	35	35
	5th Street	20	20	3rd/New Montgomery Street	35	35
	4th Street	20	20	1st Street	35	35
	3rd Street	20	20			
	2nd Street	20	20			
	1st Street	20	20			
	Total		140	Total		140

Line	Stop	Existing Inbound		Stop	Proposed Inbound(2020)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.

The following bus routes run along Van Ness, Mission, or 11th streets.

Line	Stop	Existing Inbound(2020)		Stop	Proposed Inbound	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
47	11th/Mission	15	10	Van Ness Ave/Market	45	35
	Van Ness Ave/Market	40	30			
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>45</b>	
49	13th Street	20	10	13th Street/Mission	20	10
	Van Ness Ave/Market	45	35	Van Ness Ave/Market	45	35
	<b>Total</b>	<b>65</b>		<b>Total</b>	<b>65</b>	

Line	Stop	Existing Outbound Dwell Time (seconds)		Stop	Proposed Outbound(2020) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
2	Drumm Street	30	20	Drumm Street	30	20
	Front Street	25	15	Front Street	25	15
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>55</b>	
5	Front Street	20	20	Montgomery Street	45	25
	Sutter Street	25	20			
	Montgomery Street	30	15			
	Grant Avenue	25	15	Cyril Magnin Street	45	25
	Powell Street	40	15			
	Mason Street	20	10			
	<b>Total</b>	<b>160</b>		<b>Total</b>	<b>90</b>	
6	Drumm Street	30	20	Drumm Street	30	20
	Battery Street	25	15	Front Street	25	15
	Montgomery Street	20	10	Sansome Street	20	10
	Kearny Street	25	10	Kearny Street	25	10
	Stockton Street	35	15	Grant Avenue	35	15
	Taylor Street	25	15	Cyril Magnin Street	25	15
	Jones Street	25	15	Taylor Street	25	15
	Hyde Street	30	20	Hyde Street	30	20
	Larkin Street	20	15	Larkin Street	20	15
	Van Ness Avenue	30	15	Van Ness Avenue	30	15
	<b>Total</b>	<b>265</b>		<b>Total</b>	<b>265</b>	
9	Front Street	20	15	Drumm Street	15	10
	Montgomery Street	20	10	Front Street	30	15
	Kearny Street	20	5	Montgomery Street	45	15
	Stockton Street	25	10			
	Cyril Magnin Street	30	15			
	Taylor Street	25	10	Cyril Magnin Street	30	15
	Jones Street	25	10			
	Hyde Street	25	15	Hyde Street	45	25
	Larkin Street	20	10			
	11th Street/Market	25	15	11th Street/Market	25	15
	11th Street/Mission	10	5	11th Street/Mission	10	5
	<b>Total</b>	<b>245</b>		<b>Total</b>	<b>200</b>	
9R	Front Street	25	15	Front Street	25	15
	Montgomery Street	20	10	Montgomery Street	30	15
	Kearny Street	25	10	Cyril Magnin Street	45	15
	Stockton Street	35	15	Hyde Street	40	20
	Cyril Magnin Street	35	20	11th Street/Market	25	15
	Taylor Street	25	15			
	Jones Street	25	15			
	Hyde Street	30	20			
	Larkin Street	20	15			
	11th Street/Market	25	15			
	<b>Total</b>	<b>265</b>		<b>Total</b>	<b>165</b>	
21	Drumm Street	30	20	Drumm Street	30	20
	Fremont Street	20	10	Front Street	20	10
	Sansome Street	20	10	Sansome Street	25	20
	Montgomery Street	25	20	Kearny Street	25	15
	Grant Avenue	25	20	Grant Avenue	25	20
	Powell Street	40	20	Cyril Magnin Street	45	15
	Mason Street	15	10	Taylor Street	20	10
	Jones Street	20	10	Hyde Street	25	15
	Hyde Street	25	20			
	<b>Total</b>	<b>220</b>		<b>Total</b>	<b>215</b>	

Line	Stop	Existing Outbound Dwell Time (seconds)		Stop	Proposed Outbound(2020) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
31	Drumm Street	30	20	Drumm Street	30	20
	Fremont Street	25	15	Front Street	25	15
	Sansome Street	25	20	Sansome Street	25	20
	Montgomery Street	30	15	Kearny Street	30	15
	Grant Avenue	25	15	Grant Avenue	25	15
	Powell Street	40	15	Cyril Magnin Street	40	15
	<b>Total</b>	<b>175</b>		<b>Total</b>	<b>175</b>	
38	Sansome Street	25	20	Sansome Street	25	20
	Montgomery Street	30	15	Kearny Street	30	15
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>55</b>	
38R	Montgomery Street	30	15	Montgomery Street	30	15
	Sansome Street	25	20	Sansome Street	25	20
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>55</b>	
7	Front Street					
	Montgomery Street	20	10	Sansome Street	20	10
	Kearny Street	25	10	Kearny Street	25	10
	Stockton Street	35	15	Grant Avenue	35	15
	Cyril Magnin Street	35	20	Cyril Magnin Street	35	20
	Taylor Street	25	15	Taylor Street	25	15
	Jones Street	25	15	Hyde Street	40	20
	Hyde Street	30	20	Larkin Street	20	15
	Larkin Street	20	15	Van Ness Avenue	30	15
	Van Ness Avenue	30	15			
	<b>Total</b>	<b>245</b>		<b>Total</b>	<b>230</b>	
F	Drumm Street - 90	45	25	Drumm Street - 90	50	25
	Front Street	25	10	Montgomery Street	30	15
	Montgomery Street	20	10	Cyril Magnin Street - 180	60	45
	Kearny Street - 90	25	10	Hyde Street - 90	45	30
	Stockton Street	35	15	Van Ness Avenue - 90	40	20
	Cyril Magnin Street - 180	45	20	Gough Street - 90	25	10
	Taylor Street	25	15			
	Jones Street	20	15			
	Hyde Street - 90	30	30			
	Larkin Street	25	15			
	Van Ness Avenue - 90	30	15			
	Gough Street - 90	25	10			
	<b>Total</b>	<b>350</b>		<b>Total</b>	<b>250</b>	
	Where 90 (disabled ramps) or 180 (disabled lifts) is shown with stop, there is a 5 percent chance that the streetcar stops to load a disabled passenger. It stops again at the boarding island.			There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.		
5R				Montgomery Street	25	20
				Cyril Magnin Street	30	15
	<b>Total</b>			<b>Total</b>	<b>55</b>	
16X/7X				Front Street	20	10
				Sansome Street	25	20
				Kearny Street	15	10
				Grant Avenue	15	10
				Cyril Magnin Street	30	15
	<b>Total</b>			<b>Total</b>	<b>105</b>	
19				Hyde Street	40	20

Line	Stop	Existing Outbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Outbound(2020) Dwell Time (seconds) Average      Std. Dev.	
The following bus routes run along Mission Street.						
Line	Stop	Existing Outbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Outbound Dwell Time (seconds) Average      Std. Dev.	
14	Spear/Main Street	15	10	Drumm Street	25	20
	Beale Street	20	10	Front Street	25	20
	1st Street	25	20	Montgomery Street	25	20
	2nd Street	20	10	Kearny Street	35	30
	3rd Street	20	10	Grant Avenue	25	20
	4th Street	30	15	Cyril Magnin Street	35	20
	5th Street	30	15	Taylor Street	25	15
	6th Street	40	25	Hyde Street	35	30
	7th Street	35	20	Larkin Street	25	15
	8th Street	20	20	11th Street/Market	35	30
	9th Street	25	15	Otis/Van Ness Avenue	30	20
	11th Street	30	25	Otis/Mc Coppin streets	25	15
	Van Ness Avenue	30	20			
	Otis/Mc Coppin streets	25	15			
		<b>Total</b>	<b>365</b>		<b>Total</b>	<b>345</b>
14R	Spear/Main Street	15	10	Drumm Street	40	30
	Beale Street	20	10	Montgomery Street	40	30
	1st Street	25	20	Cyril Magnin Street	40	30
	2nd Street	20	10	Hyde Street	40	30
	3rd Street	20	10	11th Street/Market	30	25
	4th Street	30	15	Otis/Van Ness Avenue	20	20
	5th Street	30	15			
	8th Street	20	20			
	11th Street	30	25			
		<b>Total</b>	<b>210</b>		<b>Total</b>	<b>210</b>
14X	Spear Street	20	20	Montgomery Street	45	30
	1st Street	20	20	Cyril Magnin Street	45	30
	2nd Street	20	20			
	3rd Street	20	20			
	4th Street	20	20			
	5th Street	20	20			
		<b>Total</b>	<b>120</b>		<b>Total</b>	<b>90</b>
292/KX	1st Street	20	20	Montgomery Street	20	20
	2nd Street	20	20	Kearny Street	25	25
	3rd Street	20	20	Cyril Magnin Street	25	25
	5th Street	20	20	Hyde Street	25	25
	7th Street	20	20	9th Street	25	25
	9th Street	20	20			
		<b>Total</b>	<b>120</b>		<b>Total</b>	<b>120</b>
GGT Basic	1st Street	20	20	Montgomery Street	25	25
	2nd Street	20	20	Kearny Street	25	25
	4th Street	20	20	Cyril Magnin Street	30	30
	5th Street	20	20			
		<b>Total</b>	<b>80</b>		<b>Total</b>	<b>80</b>

Line	Stop	Existing Outbound		Stop	Proposed Outbound(2020)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
The following bus routes run along Van Ness, Mission, or 11th streets.						
Line	Stop	Existing Outbound(2020)		Stop	Proposed Outbound	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
47	Van Ness Ave/Market	25	20	Van Ness Ave/Market	25	20
	11th/Mission	15	10	11th/Mission	15	10
	<b>Total</b>	<b>40</b>		<b>Total</b>	<b>40</b>	
49	Van Ness/Market	25	20	Van Ness/Market	25	20
	Otis/Van Ness Avenue	10	5	Otis/Van Ness Avenue	10	5
	Otis/Mc Coppin streets	10	5	Otis/Mc Coppin streets	10	5
	<b>Total</b>	<b>45</b>		<b>Total</b>	<b>45</b>	

Golden Gate Transit - Dwell Times at Mission & 1st - 1/28/14

Outbound/Westbound - Pick-Up Only

Route	Time	Patrons	Seconds	S/Patron	S/Trip
10	3:30p	3	15	5	
101	3:36p	3	33	11	
70	3:38p	2	36	18	+1 bike
70	4:05p	1	11	11	
101	4:06p	0	0	-	
10	4:25p	0	0	-	
101	4:34p	1	24	24	
70	5:03p	0	0	-	
101	5:09p	2	24	12	
10	5:30p	0	0	-	
70	5:32p	0	0	-	
Average	11	12	143	11.92	13.00

Inbound/Eastbound - Drop-Off Only

Route	Time	Patrons	Seconds	S/Patron	S/Trip
70	5:03p	2	8	4	
Average	1	2	8	4.00	8.00

Average of All Pick-Up Only Trips:

Seconds/Patron: 14.03      Seconds/Trip: 28.81

Golden Gate Transit - Dwell Times at 7th & Market - 2/20/14

Outbound/Northbound - Pick-Up Only

Route	Time	Patrons	Seconds	S/Patron	S/Trip
93	4:05p	0	0	-	
92	4:12p	4	80	20	
70	4:13p	1	15	15	
101	4:14p	1	9	9	
10	4:32p	0	0	-	
93	4:35p	2	13	6.5	
101	4:41p	1	8	8	
54	5:02p	2	42	21	
92	5:12p	1	19	19	
70	5:13p	6	130	21.67	
101	5:14p	4	20	5	+1 bike
10	5:37p	0	0	-	
70	5:43p	6	59	9.83	
Average	13	28	395	14.11	30.38

Average of All 7th & Market Trips:

Seconds/Patron: 14.42      Seconds/Trip: 35.50

Golden Gate Transit - Dwell Times at 7th & Market - 2/25/14

Outbound/Northbound - Pick-Up Only

Route	Time	Patrons	Seconds	S/Patron	S/Trip
93	4:05p	1	20	20	
92	4:11p	4	30	7.5	
70	4:14p	1	19	19	
101	4:18p	6	65	10.83	
10	4:32p	1	18	18	
93	4:35p	2	36	18	
101	4:41p	2	18	9	
54	5:05p	2	23	11.5	
92	5:11p	1	16	16	
70	5:14p	5	74	14.8	+1 bike
101	5:14p	4	61	15.25	+1 bike
10	5:37p	2	12	6	
70	5:44p	5	136	27.2	
Average	13	36	528	14.67	40.62

Note: All seconds listed are from time door opens until time door closes. Dwell time associated with waiting for traffic signal with door closed is NOT included.

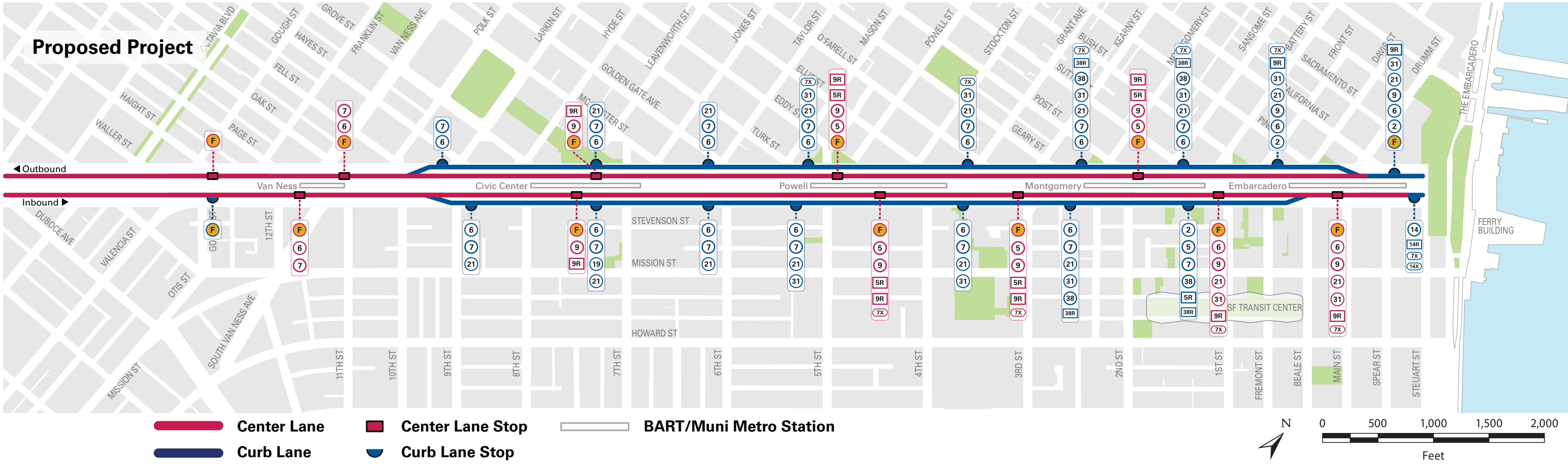


SamTrans Stop	Average Dwell (seconds)
10TH ST & HOWARD ST	19
11th & MARKET	20
9TH ST & FOLSOM ST	21
9TH ST & HARRISON ST	10
FOLSOM & BEALE (Dropoff)	1,085
MAIN & FOLSOM (Westside)	971
MISSION ST & 1ST ST	42
MISSION ST & 2ND ST	25
MISSION ST & 3RD ST	25
MISSION ST & 4TH ST	8
MISSION ST & 5TH ST	16
MISSION ST & 7TH ST	14
MISSION ST & 8TH ST	13
MISSION ST & 9TH ST	19
MISSION ST & NEW MONTGOMERY	11
POTRERO AVE & 16TH ST	16
POTRERO AVE & 18TH ST	19
POTRERO AVE & 22ND ST	10
POTRERO AVE & 24TH ST	19

**ATTACHMENT E**  
**2020 BASELINE PLUS PROJECT INPUTS**

## **Transit Stop Locations and Lane Assignment**

Proposed Project



The following changes were provided by MTA staff on October 29, 2018: Route 19 Polk should be shown in outbound direction at Civic Center stops and the 9R is not present at the curb outbound stop between Spear and Stuart streets.

## **Private Vehicle Turn Restrictions**

# VEHICLE CIRCULATION



## Private vehicles proposed to be restricted on Market Street:

- Eastbound between 10th Street and Spear Street
- Westbound between Steuart Street and Van Ness Avenue

San Francisco implemented private vehicle turn restrictions between 3rd and 8th streets in 2015. To increase safety for all users of the street and improve transit, San Francisco proposes to extend restrictions west to Van Ness Avenue and east to Steuart Street. Additionally, some existing one-way streets would be converted to two-way streets to maintain access. The permitted vehicles — Muni, paratransit, taxis, commercial vehicles and bicycles — are not subject to the restrictions.

The project proposes to accommodate passenger loading by private vehicles, including Uber and Lyft, at cross street and side street passenger loading zones. The project plans to install 46 new passenger white zones on streets adjacent to Market.



## What are Private Vehicles?

Personal cars, trucks, vans, scooters and motorcycles including Uber, Lyft and similar companies.



UBER  
LYFT  
scoot

## What are Commercial Vehicles?

Trucks and vans with commercial license plates; shuttle buses with 10 or more passengers



Commercial plates have 1 letter and 6 numbers

**ATTACHMENT F**  
**2040 CUMULATIVE INPUTS**

# At Market/First Screenline (2020 vs 2040 Capacity Test)

Route	Year 2020 (PM Peak)			Year 2040 Capacity Test (Muni Forward)		
	Frequency	Buses/hr (one-way)	Buses/hr (two-way)	Frequency	Buses/hr (one-way)	Buses/hr (two-way)
2 Clement	7.5	8	16	7.5	8	16
5 Fulton	7.5	8	16	6	10	20
5R Fulton Rapid	7.5	8	16	6	10	20
6 Haight	12	5	10	12	5	10
9 San Bruno	10	6	12	10	6	12
9R San Bruno Rapid	10	6	12	8	8	16
7, 7R Haight/Noriega, Rapid	7	9	18	7.5	8	16
7X Noriega Express	9	7	14	10	6	12
21 Hayes	9	7	14	9	7	14
31 Balboa	12	5	10	12	5	10
38 Geary	6	10	20	6	10	20
38R Geary Rapid	5	12	24	2.5	24	48
F Market/Wharves	10	6	12	8	8	16
F Short/Loop	10	6	12	8	8	16
<b>Total</b>	-	<b>103</b>	<b>206</b>	-	<b>123</b>	<b>246</b>

15 Diesel and 15 Electric



Table 1 Muni Vehicle Fleet Changes (2040)			
Bus Line	2020 Vehicle Length (feet)	2040 Vehicle Length (feet)	Change to Electric Trolley Bus?
2 Clement	40	40	Half
5 Fulton	40	60	Yes
5R Fulton Rapid	60	60	Yes
7, 7R			
Haight/Noriega, Rapid	40	60	No
14 Mission	60	60	Motorcoach
14R Mission Rapid	60	60	Yes
30 Stockton	40	60	No
30X Marina Express	40	60	No
38AX Geary A Express	40	60	No
47 Van Ness	40	60	No

Source: SFMTA, March 2016, Revised in August 2016

Line	Stop	Proposed Inbound(2020)		Stop	Proposed Inbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
2	1st Street	15	10	1st Street	17	10
	Main-Beale Street	25	25	Main-Beale Street	28	25
	<b>Total</b>	<b>40</b>		<b>Total</b>	<b>45</b>	
5	4th Street	45	25	4th Street	45	25
	3rd Street	30	20	3rd Street	45	25
	1st Street	10	5	1st Street	14	5
	<b>Total</b>	<b>85</b>		<b>Total</b>	<b>104</b>	
6	Van Ness Avenue	20	15	Van Ness Avenue	33	15
	9th Street	20	15	9th Street	33	15
	7th Street	40	20	7th Street	45	20
	6th Street	25	10	6th Street	40	10
	5th Street	25	30	5th Street	40	30
	4th Street	25	15	4th Street	40	15
	New Montgomery Street	30	20	New Montgomery Street	40	20
	1st Street	20	10	1st Street	33	10
	Main-Beale Street	25	25	Main-Beale Street	40	25
<b>Total</b>	<b>230</b>		<b>Total</b>	<b>344</b>		
9	11th Street/Market	25	15	11th Street/Market	34	15
	7th Street	45	25	7th Street	45	25
	4th Street	45	25	4th Street	45	25
	3rd Street	45	25	3rd Street	45	25
	1st Street	15	10	1st Street	20	10
	Main-Beale Street	25	25	Main-Beale Street	34	25
	<b>Total</b>	<b>200</b>		<b>Total</b>	<b>223</b>	
9R	11th Street/Market	25	15	11th Street/Market	40	15
	7th Street	40	20	7th Street	45	20
	4th Street	25	15	4th Street	40	15
	3rd Street	20	10	3rd Street	36	10
	1st Street	20	10	1st Street	36	10
	Main-Beale Street	25	25	Main-Beale Street	40	25
	<b>Total</b>	<b>155</b>		<b>Total</b>	<b>237</b>	
21	9th Street	20	15	9th Street	32	15
	7th Street	40	20	7th Street	45	20
	6th Street	20	10	6th Street	32	10
	5th Street	30	35	5th Street	40	35
	4th Street	35	35	4th Street	40	35
	New Montgomery Street	35	20	New Montgomery Street	40	20
	1st Street	20	10	1st Street	32	10
	Main-Beale Street	25	25	Main-Beale Street	40	25
<b>Total</b>	<b>225</b>		<b>Total</b>	<b>301</b>		

Line	Stop	Proposed Inbound(2020)		Stop	Proposed Inbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
31	5th Street	30	30	5th Street	32	30
	4th Street	35	35	4th Street	37	35
	New Montgomery Street	30	20	New Montgomery Street	32	20
	1st Street	20	10	1st Street	21	10
	Main-Beale Street	25	25	Main-Beale Street	26	25
	<b>Total</b>	<b>140</b>		<b>Total</b>	<b>148</b>	
38	New Montgomery Street	30	20	New Montgomery Street	40	20
	1st Street	15	10	1st Street	20	10
	<b>Total</b>	<b>45</b>		<b>Total</b>	<b>60</b>	
38R	New Montgomery Street	15	10	New Montgomery Street	17	10
	1st Street	10	5	1st Street	11	5
	<b>Total</b>	<b>25</b>		<b>Total</b>	<b>28</b>	
7	Van Ness Avenue	25	15	Van Ness Avenue	33	15
	9th Street	25	15	9th Street	33	15
	7th Street	25	15	7th Street	33	15
	6th Street	15	10	6th Street	20	10
	5th Street	10	10	5th Street	15	10
	4th Street	25	15	4th Street	40	15
	New Montgomery Street	20	10	New Montgomery Street	32	10
	1st Street	25	15	1st Street	32	10
	<b>Total</b>	<b>170</b>		<b>Total</b>	<b>238</b>	
F	Gough Street - 90	25	10	Gough Street - 90	25	10
	Van Ness Avenue - 90	40	20	Van Ness Avenue - 90	40	20
	7th Street - 90	45	25	7th Street - 90	45	25
	5th Street - 180	45	25	5th Street - 180	45	25
	3rd Street - 180	30	20	3rd Street - 180	30	20
	1st Street - 180	30	20	1st Street - 180	30	20
	Main-Beale Street - 90	40	25	Main-Beale Street - 90	40	25
	<b>Total</b>	<b>255</b>		<b>Total</b>	<b>255</b>	
	There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.			There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.		
	5R	4th Street	30	20	4th Street	40
3rd Street		15	10	3rd Street	21	10
1st Street		20	15	1st Street	28	15
<b>Total</b>		<b>65</b>		<b>Total</b>	<b>89</b>	
16X/7X	4th Street	25	20	Does not operate inbound in PM Peak		
	3rd Street	20	15			
	1st Street	20	15			
	Main-Beale Street	25	25			
	<b>Total</b>	<b>90</b>			<b>Total</b>	<b>0</b>
19	7th Street	40	20	7th Street	45	20

Line	Stop	Proposed Inbound(2020) Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Inbound(2040) Dwell Time (seconds) Average      Std. Dev.	
The following bus routes run along Mission Street.						
Line	Stop	Proposed Inbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Inbound Dwell Time (seconds) Average      Std. Dev.	
14	13th Street/Mission	25	20	13th Street/Mission	30	20
	South Van Ness/Mission/11th	20	10	South Van Ness/Mission/11th	24	10
	11th Street/Market	25	20	11th Street/Market	30	20
	9th Street	25	20	9th Street	30	20
	7th Street	30	20	7th Street	36	20
	6th Street	25	20	6th Street	30	20
	5th Street	30	20	5th Street	36	20
	4th Street	25	20	4th Street	30	20
	3rd Street	30	20	3rd Street	36	20
	1st Street	15	10	1st Street	18	10
	Main-Beale Street	10	5	Main-Beale Street	12	5
	Steuart Street	10	5	Steuart Street	12	5
	Total		270		Total	
14R	11th Street/Market	25	20	11th Street/Market	30	20
	7th Street	30	20	7th Street	36	20
	5th Street	30	20	5th Street	36	20
	3rd Street	25	20	3rd Street	30	20
	1st Street	25	20	1st Street	30	20
	Main-Beale Street	15	10	Main-Beale Street	18	10
	Steuart Street	15	10	Steuart Street	18	10
Total		165		Total		198
14X						
	Total		0	Total		0
292/KX	9th Street	25	25	9th Street	31	25
	7th Street	25	25	7th Street	31	25
	5th Street	25	25	5th Street	31	25
	3rd/New Montgomery Street	25	25	3rd/New Montgomery Street	31	25
	1st Street	20	20	1st Street	25	20
Total		120		Total		149
GGT Basic	7th Street	35	35	7th Street	43	35
	5th Street	35	35	5th Street	43	35
	3rd/New Montgomery Street	35	35	3rd/New Montgomery Street	43	35
	1st Street	35	35	1st Street	43	35
	Total		140		Total	

Line	Stop	Proposed Inbound(2020)		Stop	Proposed Inbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
The following bus routes run along Van Ness, Mission, or 11th streets.						
Line	Stop	Proposed Inbound		Stop	Proposed Inbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
47	Van Ness Ave/Market	45	35	Van Ness Ave/Market	45	35
	<b>Total</b>	<b>45</b>		<b>Total</b>	<b>45</b>	
49	13th Street/Mission	20	10	13th Street/Mission	34	10
	Van Ness Ave/Market	45	35	Van Ness Ave/Market	45	35
	<b>Total</b>	<b>65</b>		<b>Total</b>	<b>79</b>	

Line	Stop	Proposed Outbound(2020) Dwell Time (seconds)		Stop	Proposed Outbound(2040) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
2	Drumm Street	30	20	Drumm Street	40	20
	Front Street	25	15	Front Street	36	15
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>76</b>	
5	Montgomery Street	45	25	Montgomery Street	45	25
	Cyril Magnin Street	45	25	Cyril Magnin Street	45	25
	<b>Total</b>	<b>90</b>		<b>Total</b>	<b>90</b>	
6	Drumm Street	30	20	Drumm Street	30	20
	Front Street	25	15	Front Street	25	15
	Sansome Street	20	10	Sansome Street	20	10
	Kearny Street	25	10	Kearny Street	25	10
	Grant Avenue	35	15	Grant Avenue	35	15
	Cyril Magnin Street	25	15	Cyril Magnin Street	25	15
	Taylor Street	25	15	Taylor Street	25	15
	Hyde Street	30	20	Hyde Street	30	20
	Larkin Street	20	15	Larkin Street	20	15
	Van Ness Avenue	30	15	Van Ness Avenue	30	15
	<b>Total</b>	<b>265</b>		<b>Total</b>	<b>265</b>	
9	Drumm Street	15	10	Drumm Street	15	10
	Front Street	30	15	Front Street	39	15
	Montgomery Street	45	15	Montgomery Street	45	15
	Cyril Magnin Street	30	15	Cyril Magnin Street	39	15
	Hyde Street	45	25	Hyde Street	45	25
	11th Street/Market	25	15	11th Street/Market	33	15
	11th Street/Mission	10	5	11th Street/Mission	13	5
	<b>Total</b>	<b>200</b>		<b>Total</b>	<b>229</b>	
9R	Front Street	25	15	Front Street	28	15
	Montgomery Street	30	15	Montgomery Street	37	15
	Cyril Magnin Street	45	15	Cyril Magnin Street	45	15
	Hyde Street	40	20	Hyde Street	45	20
	11th Street/Market	25	15	11th Street/Market	31	15
	<b>Total</b>	<b>165</b>		<b>Total</b>	<b>186</b>	
21	Drumm Street	30	20	Drumm Street	40	20
	Front Street	20	10	Front Street	30	10
	Sansome Street	25	20	Sansome Street	38	20
	Kearny Street	25	15	Kearny Street	38	15
	Grant Avenue	25	20	Grant Avenue	38	20
	Cyril Magnin Street	45	15	Cyril Magnin Street	45	15
	Taylor Street	20	10	Taylor Street	30	10
	Hyde Street	25	15	Hyde Street	38	15
	<b>Total</b>	<b>215</b>		<b>Total</b>	<b>297</b>	

Line	Stop	Proposed Outbound(2020) Dwell Time (seconds)		Stop	Proposed Outbound(2040) Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
31	Drumm Street	30	20	Drumm Street	39	20
	Front Street	25	15	Front Street	32	15
	Sansome Street	25	20	Sansome Street	32	20
	Kearny Street	30	15	Kearny Street	39	15
	Grant Avenue	25	15	Grant Avenue	32	15
	Cyril Magnin Street	40	15	Cyril Magnin Street	45	15
	<b>Total</b>	<b>175</b>		<b>Total</b>	<b>219</b>	
38	Sansome Street	25	20	Sansome Street	34	15
	Kearny Street	30	15	Kearny Street	28	25
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>62</b>	
38R	Montgomery Street	30	15	Montgomery Street	34	15
	Sansome Street	25	20	Sansome Street	28	25
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>62</b>	
7	Sansome Street	20	10	Sansome Street	25	10
	Kearny Street	25	10	Kearny Street	30	10
	Grant Avenue	35	15	Grant Avenue	40	15
	Cyril Magnin Street	35	20	Cyril Magnin Street	40	20
	Taylor Street	25	15	Taylor Street	28	15
	Hyde Street	40	20	Hyde Street	45	20
	Larkin Street	20	15	Larkin Street	25	15
	Van Ness Avenue	30	15	Van Ness Avenue	33	15
	<b>Total</b>	<b>230</b>		<b>Total</b>	<b>266</b>	
F	Drumm Street - 90	50	25	Drumm Street - 90	50	25
	Montgomery Street	30	15	Montgomery Street	32	15
	Cyril Magnin Street - 180	60	45	Cyril Magnin Street - 180	60	45
	Hyde Street - 90	45	30	Hyde Street - 90	45	30
	Van Ness Avenue - 90	40	20	Van Ness Avenue - 90	45	20
	Gough Street - 90	25	10	Gough Street - 90	27	10
	<b>Total</b>	<b>250</b>		<b>Total</b>	<b>259</b>	
	There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.			There is now a 10 percent chance that streetcar stops at mini-highs before advancing to the boarding island.		
5R	Montgomery Street	25	20	Montgomery Street	29	20
	Cyril Magnin Street	30	15	Cyril Magnin Street	35	15
	<b>Total</b>	<b>55</b>		<b>Total</b>	<b>64</b>	
16X/7X	Front Street	20	10	Front Street	26	10
	Sansome Street	25	20	Sansome Street	33	20
	Kearny Street	15	10	Kearny Street	20	10
	Grant Avenue	15	10	Grant Avenue	20	10
	Cyril Magnin Street	30	15	Cyril Magnin Street	40	15
	<b>Total</b>	<b>105</b>		<b>Total</b>	<b>139</b>	
19	Hyde Street	40	20	Hyde Street	45	20

Line	Stop	Proposed Outbound(2020) Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Outbound(2040) Dwell Time (seconds) Average      Std. Dev.	
The following bus routes run along Mission Street.						
Line	Stop	Proposed Outbound Dwell Time (seconds) Average      Std. Dev.		Stop	Proposed Outbound Dwell Time (seconds) Average      Std. Dev.	
14	Drumm Street	25	20	Drumm Street	40	20
	Front Street	25	20	Front Street	40	20
	Montgomery Street	25	20	Montgomery Street	40	20
	Kearny Street	35	30	Kearny Street	40	30
	Grant Avenue	25	20	Grant Avenue	40	20
	Cyril Magnin Street	35	20	Cyril Magnin Street	40	20
	Taylor Street	25	15	Taylor Street	40	15
	Hyde Street	35	30	Hyde Street	40	30
	Larkin Street	25	15	Larkin Street	40	15
	11th Street/Market	35	30	11th Street/Market	40	30
	Otis/Van Ness Avenue	30	20	Otis/Van Ness Avenue	40	20
	Otis/Mc Coppin streets	25	15	Otis/Mc Coppin streets	40	15
	Total		345	Total		480
14R	Drumm Street	40	30	Drumm Street	45	30
	Montgomery Street	40	30	Montgomery Street	45	30
	Cyril Magnin Street	40	30	Cyril Magnin Street	45	30
	Hyde Street	40	30	Hyde Street	45	30
	11th Street/Market	30	25	11th Street/Market	40	25
	Otis/Van Ness Avenue	20	20	Otis/Van Ness Avenue	30	20
	Total		210	Total		250
14X	Montgomery Street	45	30	Montgomery Street	45	30
	Cyril Magnin Street	45	30	Cyril Magnin Street	45	30
	Total		90	Total		90
292/KX	Montgomery Street	20	20	Montgomery Street	23	20
	Kearny Street	25	25	Kearny Street	29	25
	Cyril Magnin Street	25	25	Cyril Magnin Street	29	25
	Hyde Street	25	25	Hyde Street	29	25
	9th Street	25	25	9th Street	29	25
	Total		120	Total		141
GGT Basic	Montgomery Street	25	25	Montgomery Street	29	25
	Kearny Street	25	25	Kearny Street	29	25
	Cyril Magnin Street	30	30	Cyril Magnin Street	35	30
	Total		80	Total		94



Line	Stop	Proposed Outbound(2020)		Stop	Proposed Outbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
The following bus routes run along Van Ness, Mission, or 11th streets.						
Line	Stop	Proposed Outbound		Stop	Proposed Outbound(2040)	
		Dwell Time (seconds)			Dwell Time (seconds)	
		Average	Std. Dev.		Average	Std. Dev.
47	Van Ness Ave/Market	25	20	Van Ness Ave/Market	27	20
	11th/Mission	15	10	11th/Mission	16	10
	<b>Total</b>	<b>40</b>		<b>Total</b>	<b>43</b>	
49	Van Ness/Market	25	20	Van Ness/Market	40	20
	Otis/Van Ness Avenue	10	5	Otis/Van Ness Avenue	20	5
	Otis/Mc Coppin streets	10	5	Otis/Mc Coppin streets	20	5
	<b>Total</b>	<b>45</b>		<b>Total</b>	<b>80</b>	

**Attachment 5d: Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project**



## MEMORANDUM

Date: October 30, 2015

To: Simon Bertrang, City of San Francisco Department of Public Works  
Manoj Madhavan and Wade Wietgreffe, San Francisco Planning Department

From: Dennis Lee, Dan Hennessey, and Chris Mitchell, Fehr & Peers

Cc: Andrew Lee, Parisi Transportation Consulting

**Subject: Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project**

*SF13-0715*

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San Francisco County Transportation Authority (SFCTA) staff have provided Fehr & Peers with the raw network and demand files for use in a Dynamic Traffic Assignment (DTA) model for the Better Market Street (BMS) Project (Project). The DTA files were based on the San Francisco Chained Activity Modeling Process (SF-CHAMP) model and generated using an automated process developed by the SFCTA. The DTA model will be used to forecast shifts in demand and traffic flow caused by implementation of the Project. The major component of the Project is the closure of Market Street to vehicular traffic.

This memorandum summarizes the calibration process and validation results for the PM peak period traffic assignment.

### TECHNICAL APPROACH

Most transportation demand forecasting (TDF) models, such as SF-CHAMP, rely on static assignment to determine the traffic volumes on the transportation roadway network and identify potential areas for needed capacity improvements. Therefore, the demand is allowed to exceed the capacity of individual roadways (though there are congestion functions to approximate resistance to additional traffic). In addition, static assignment typically does not account for the influence of departure time, varying capacity over time, or the effects of congestion on actual travel time. Other issues with static assignment include lack of representation of spill-back effects upstream from



bottlenecks or changing conditions throughout a peak period. These limitations result in static assignments being of limited benefit in informing the effects of the Project.

To address these limitations, DTA was implemented using Dynameq software for the Better Market Street Project. Dynamic assignment accounts for congestion, signal timing, delay due to transit, individual lane assignments, queuing, and other factors that directly influence the routes and reliability of vehicle assignment.

## SUBAREA EXTRACTION

Fehr & Peers worked with SFCTA staff to size the DTA network appropriately, keeping the area small enough that the model would run in a reasonable amount of time but large enough to assess broad route shifts due to implementation of the Project. The borders were determined to encompass the northeastern corner of the City of San Francisco, with the San Francisco Bay to the north and east, Divisadero Street to the west, and 22nd Street to the south. The subarea extraction also includes regional facilities, including the Bay Bridge (I-80) to the east, and US-101 and I-280 to the south.

## CALIBRATION PROCESS

The “as received” transportation system network and vehicle demand, automatically generated by the SFCTA process, were developed for a static assignment. This network included signal timing and a dynamic demand profile. Both of these elements were designed exclusively for DTA application. As such, both transportation system network and vehicle demand were refined to more accurately reflect the 2012 base year conditions.

Prior to an initial DTA model run, the transportation system network within and near the study area was reviewed for errors carried over from the auto-generation process. Various corrections were made, including:

- Lane geometry
- Allowable turning movements at intersection
- Signal timing

After the initial DTA model run, the results from the modified network were reviewed. Specifically, queue, vehicle volume, and travel time information were reviewed at key segments within the study



area as well as major gateways at the network edge near the study area. The review resulted in the following observations:

- Queues were not present for approaches leading to and on eastbound Bay Bridge
- Queues were not present at the southbound US-101 merge with westbound I-80
- Vehicle volumes were very high along Market Street in the section east of Third Street
- Vehicle volumes were low on the major north/south arterials in the western section of the study area

The calibration/validation processes are iterative, and the changes from “as received” to the final calibrated/validated transportation system network and vehicle demand are presented below. To calibrate the input data and improve the validation, the following steps were taken:

- The Bay Bridge and southbound US-101 segments are gateway links that lead off-network. Because of this, the network cannot produce downstream congestion that would occur under existing conditions. To address this issue, the capacity of these two facilities were reduced to approximately match vehicle volume counts taken from 2012 from the Caltrans PeMS database. This capacity modification resulted in realistic queues for both highway facilities and local approaches to those facilities.
- The network was coded to have centroid connectors load volume directly on to Market Street. This is not realistic, as Market Street does not contain any driveways. Most demand for Market Street locations load onto side streets. To address this issue, centroid connectors along Market Street were removed. This centroid removal resulted in more realistic volumes along both Market and Mission Streets, particularly in the eastern section of the corridor.
- The major north/south arterials in the western section of the study area were examined to ensure realistic network attributes and vehicle trip patterns. Several errors were corrected on alternative north/south routes outside of the study area which increased the vehicular volume within the study area.

## VALIDATION GUIDELINES AND RESULTS

In order to evaluate the model’s performance in replicating existing conditions, two comparisons were made. First, the model results were compared to the model validation thresholds from the



current *California Regional Transportation Plan (RTP) Guidelines* (2010)<sup>1</sup>. It is important to note that the thresholds in the RTP Guidelines were developed to be applied to regional- or city-scale models and not to a model that is used only for a small project-specific study area; however, the thresholds can still provide a useful indication of how well the model results match the existing demand volumes in the study area. Our goal is not to meet all of the thresholds, but rather to confirm or improve the model's performance within our project study area.

Table 1 compares the base year model results to the observed volumes at 26 link locations throughout the study area; as shown, the updated DTA model met all of the validation thresholds in the PM peak hour. The validation results are quite good, particularly in light of the fact that this is an application of a Citywide model to a localized study area. Model volumes and results on a link-by-link basis are attached to the end of this memo.

**TABLE 1 BASE YEAR MODEL VALIDATION**

Validation Measure	Result	Threshold
Model Volume-to-Demand Ratio (Sum of all Locations) <sup>1</sup>	0.94	None specified <sup>2</sup>
Percent of Links within Caltrans Deviation Allowance <sup>1</sup>	77%	At least 75%
Percent Root Mean Square Error <sup>1</sup>	30%	Below 40%
Correlation Coefficient <sup>1</sup>	0.90	At least 0.88
Number of Links / Validation Locations	26	

Notes:

1. Static Validation Criteria and Thresholds, *California Regional Transportation Plan Guidelines*, 2010, California Transportation Commission.

2. Although no specific threshold is specified, Fehr & Peers uses a threshold "within 10%" of the sum of all locations.

Source: Fehr & Peers, 2015.

Second, the travel speeds estimated by the model along study corridors were compared to travel speeds from the *2013 San Francisco Congestion Management Program* (CMP). Travel speeds estimated by the model were generally two to five miles per hour higher than the average speeds listed in the CMP. The consistent but mild overestimation indicates that the model assigned realistic volumes across the CMP segments. Overestimation is appropriate because the DTA model does not account for pedestrian friction at intersections. At pedestrian-heavy, downtown intersections,

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<sup>1</sup> [http://www.catc.ca.gov/programs/rtp/2010\\_RTP\\_Guidelines.pdf](http://www.catc.ca.gov/programs/rtp/2010_RTP_Guidelines.pdf)



this may cause the DTA model to underestimate link delay and thus overestimate speeds. Additionally, CMP segment speeds and DTA link speeds represent slightly different evaluations. A table comparing the CMP and model travel speeds for each of the corridors is attached to the end of this memo.

As a result of these two comparisons, we propose to move ahead using this version of the model to develop forecasts for this Project. Please call Chris Mitchell or Dan Hennessey at (415) 348-0300 with any questions or comments.





Corridor	From	To	2011 CMP Avg Speed (mph)	2013 CMP Avg Speed (mph)	Model Avg Speed (mph)	Difference (Model to 2013) (mph)
Fremont	Harrison	Market	10.6	18.4	18.0	-0.4
1st	Market	Harrison	18.2	15.3	14.7	-0.6
2nd	Market	Brannan	12.2	6		
2nd	Brannan	Market	13.3	3.1		
3rd	Terry Francois	Market	12.9	15.4	19.0	3.6
4th	O'Farrell	Harrison	15.1	13.9	15.7	1.8
4th	Harrison	Channel	14.9	14.2		
5th	Market	Brannan	13.8	5.4	19.9	14.5
5th	Brannan	Market	14.7	4	20.7	16.7
6th	Market	Brannan	9.6	14.4	18.3	3.9
6th	Brannan	Market	11	14.2	20.1	5.9
7th	Brannan	Market	20.9	17	19.6	2.6
8th	Market	Bryant	23.8	18.1	21.3	3.2
9th	Brannan	Market	13.4	15.8	22.5	6.7
10th	Market	Brannan	20.4	23.3	21.3	-2.0
Market	Van Ness	Drumm	10.6	15.9	17.9	2.0
Market	Drumm	Van Ness	12.1	13.6	18.0	4.4
Mission	Embarcadero	3rd	11	14	18.0	4.0
Mission	3rd	Embarcadero	10.9	15.2	17.0	1.8
Mission	3rd	9th	14.4	16.1	19.5	3.4
Mission	9th	3rd	12.4	16.8	20.2	3.4

**Attachment 5e: Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP  
Model Run**



# Memorandum

**DATE:** 05.11.2015  
**TO:** Better Market Street Team  
**FROM:** Dan Tischler, Senior Transportation Planner, Technology, Data & Analysis, SFCTA  
**SUBJECT:** Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run

## Summary and Context

The purpose of this memo is to document inputs used in the SF-CHAMP 5.1 regional travel demand model for the purpose of modeling a 2020 Baseline Scenario to be used to evaluate the feasibility of implementing the Better Market Street project.

## STUDY OVERVIEW

Market Street is a primary multi-modal corridor in San Francisco. The current design accommodates the demands of various modes of travel such as walking, bicycling, transit, and driving, but it falls well short of the potential of the street.

The Better Market Street project offers a special opportunity to envision a new Market Street. The goal of the project is to revitalize Market Street from Octavia Boulevard to The Embarcadero and reestablish the street as the premier cultural, civic and economic center of San Francisco and the Bay Area. The transportation system analysis will include blocks south and north of Market and Mission streets. The new design should create a comfortable, universally accessible, sustainable, and enjoyable place that attracts more people on foot, bicycle and public transit to visit shops, adjacent neighborhoods and area attractions.

## SCENARIO DESCRIPTION

The 2020 Baseline Scenario is designed to reflect projected baseline conditions in the San Francisco Bay Area in the year 2020. More detail is provided within the City of San Francisco than elsewhere in the San Francisco Bay Area and the scenario will be used for focused analysis of travel in the Better Market Street corridor.

## LAND USE

2020 land use assumptions are derived from the “Jobs-Housing-Connections Strategy” (JHCS) projections developed by ABAG and MTC. While ABAG/MTC Jobs-Housing Connections Strategy Land Use numbers for population, employment, employed residents and jobs are used at a TAZ (close

to Census Tract size) level of geographic granularity outside San Francisco, the San Francisco Planning Department (SF Planning) uses the ABAG/MTC Jobs-Housing Connections Strategy control totals to allocate base year land use data within San Francisco. SF Planning makes use of numerous commercial datasets to refine initial ABAG distribution within San Francisco.

The land use inputs are saved on a server at SFCTA at:

Y:\champ\landuse\p2011\SCS.JobsHousingConnection.Spring2014update\2020\runinputs\_champ5parkingUpdate

## TRANSPORTATION NETWORKS

This section discusses 2020 Baseline assumptions for transit, and assumptions for other San Francisco and regional road, and toll policy projects. The transportation networks used in the 2020 Baseline Scenario reflect a representative baseline from our current understanding of projects scheduled for implementation by the year 2020. Project implementation dates are not always able to be determined exactly, and shift during the planning and construction processes. This section discusses the near-term baseline assumptions for San Francisco and Regional road projects, transit projects, and tolling policies.

## NETWORK PROJECTS NOT INCLUDED IN THIS SCENARIO

The projects included in the SF-CHAMP 2020 Baseline Scenario reflect projects funded and approved by February 2015. Better Market Street EIR analysis for the 2020 Baseline Alternative also assumes several additional projects approved or implemented between February 2015 and October 2015. These projects include Safer Market Street and the 2<sup>nd</sup> Street Project. These projects are not included in the SF-CHAMP 2020 Baseline scenario, but are accounted for in EIR analysis. SF-CHAMP is used to develop travel demand and mode choice forecasts for project scenarios. Since Safer Market Street and the 2<sup>nd</sup> Street project are unlikely to have significant effects on travel demand or mode choice decisions a revised SF-CHAMP model run is not required to analyze how these projects will change 2020 Baseline transportation conditions. Subsequent modeling steps include dynamic traffic assignment and traffic microsimulation for core areas of San Francisco. These subsequent modeling steps both include the Safer Market Street and 2<sup>nd</sup> Street Projects and will adequately and comprehensively reflect traffic routing changes and traffic operational changes related to these projects.

## ROAD NETWORK

Table 1 presents San Francisco street and road projects anticipated for completion before 2020. SF-CHAMP also assumes regional roadway project implementation in accordance with the most recent Regional Transportation Plan.

Table 1: Roadway Projects in San Francisco Completed before 2020

Network Project	Description
<b>Fell/Oak Bikeways (Bike Plan)</b> <i>BikePlan\Bike_FellOakBikeways</i>	Bike lane addition and general purpose lane removal on Fell and Oak between Baker and Scott.
<b>Cesar Chavez Streetscape (Bike Plan)</b>	Bike lane addition and general purpose lane removal on Cesar Chavez between Guerrero and

<i>BikePlan\Streetscape_CesarChavez</i>	Hampshire.
<b>Sansome Contraflow Transit Lane (TEP/Muni Forward<sup>1</sup>)</b> <i>TEP_SansomeContraflow</i>	Contraflow bus-only lane on Sansome between Broadway and Washington.
<b>Folsom Road Diet, 19<sup>th</sup> to 26<sup>th</sup></b> <i>RoadDiets\Folsom19thTo26th</i>	Bike lane addition and general purpose lane removal on Folsom from 19 <sup>th</sup> to 26 <sup>th</sup> .
<b>Folsom Road Diet 4<sup>th</sup> to 11<sup>th</sup></b> <i>RoadDiets\Folsom4thTo11th</i>	Bike lane addition and general purpose lane removal on Folsom from 4 <sup>th</sup> to 11 <sup>th</sup> .
<b>Doyle Drive / Presidio Parkway Rebuild</b> <i>DoyleDrive</i>	Construction of new Presidio Parkway and on/off ramps
<b>Mariposa Ramp, Mission Bay</b> <i>MissionBay_MariposaRamp</i>	Increase Hwy 101 offramp to Mariposa from 1 to 2 lanes.
<b>Mission Bay Street Grid</b> <i>MissionBayGrid</i>	Build out Mission Bay grid street network between 16th and the channel.
<b>Minor Restriping Projects</b> <i>DPW_Restriping</i>	Left turn lane on WB Harrison at 11 <sup>th</sup> , removal of EB lane  Removal of NB Tow-away lane on 6 <sup>th</sup> from Folsom to Market  Bike lane SB on Beale from Folsom to Bryant
<b>Haight Contraflow Transit Lane</b> <i>TwoWayHaight</i>	Add a contraflow bus-only lane on easternmost block of Haight, between Octavia and Gough/Market.
<b>Alemaný Bike Lanes</b> <i>BikePlan\2014</i>	Bike lanes are added to Alemany Blvd between Rousseau and Putnam. Sharrows are added between Putnam and Bayshore Blvd. To accommodate the new bike lanes, one general-purpose lane is removed on eastbound Alemany between Rousseau and Putnam and westbound Alemany between Putnam and Ellsworth.
<b>San Bruno Bike Lanes</b> <i>BikePlan\2014</i>	A southbound bike lane and northbound sharrows are added to San Bruno between Silver and Dwight/Paul. There are no lane reductions.
<b>Bike Plan 2014</b> <i>BikePlan\2014</i>	Expansion of sharrows and bike lanes throughout the city from the San Francisco Bicycle Plan.

## REGIONAL TRANSIT NETWORK

<sup>1</sup> Muni TEP has been renamed “Muni Forward”.

By 2020, several regional transit improvements are anticipated. These projects include BART extensions and the first phase of SMART. Table 2: lists regional transit projects assumed in the 2020 Baseline Scenario.

**Table 2: Regional Transit Agency Projects Completed before 2020**

<b>Network Project</b>	<b>Description</b>
<b>eBART</b> <i>BART_eBART</i>	eBART line from Pittsburg to Antioch
<b>BART Irvington Station</b> <i>BART_Irvington</i>	Add Irvington station between Fremont and Warm Springs
<b>BART Metro Bayfair</b> <i>BART_Metro_Bayfair</i>	Increase PM Frequency on the Green Line (Daily City-Fremont) and replace evening service on the Blue Line (Dublin/Pleasanton-Daly City) with new Dublin-Bayfair service
<b>BART Oakland Airport Connector</b> <i>BART_OAC</i>	Replace AirBART with the Oakland Airport Connector
<b>BART Warm Springs Station</b> <i>BART_WarmSprings</i>	Extend BART service from Fremont to Warm Springs
<b>BART Berryessa Extension</b> <i>BART_SanJose (Phase 1)</i>	Extend BART service from Warm Springs to Milpitas and Berryessa
<b>SMART Phase 1</b> <i>SMART</i>	Phase 1 of SMART, providing service from San Rafael to Santa Rosa.

## MUNI NETWORK

The MUNI transit network has several planned service expansions and improvements scheduled by 2020. Muni will implement the projects listed in Table 3: :

**Table 3: MUNI Transit Projects Completed Before 2020**

<b>Network Project</b>	<b>Description</b>
<b>Transit Effectiveness Project/Muni Forward)</b> <i>Muni_TEP</i>	Muni service changes consistent with the Transit Effectiveness Project (TEP) EIR <sup>2</sup> . Projects and their corresponding service changes attached in Table 4: Headways of Muni routes .
<b>Muni Transit Signal Priority</b> <i>Muni_TSP\Future</i>	Transit Signal Priority along Muni Rapid bus routes.
<b>Muni Treasure Island Service</b> <i>Muni_TI</i>	Muni service between the Transbay Terminal and Treasure Island and Civic Center and Treasure Island.
<b>Central Subway</b> <i>Muni_CentralSubway</i>	Central Subway will run above ground from 4 <sup>th</sup> and King to 4 <sup>th</sup> and Harrison, and below ground from 4 <sup>th</sup> and Harrison, along Stockton, to Chinatown. Phase 1 will have 7.5 minute headways on a short (Chinatown to 3 <sup>rd</sup> and 18 <sup>th</sup> /19 <sup>th</sup> Street) and long route

<sup>2</sup> The Transit Effectiveness Project EIR cleared a set of improvements that are now being implemented through the “Muni Forward” program.

	(Chinatown to Bayshore). Full build will have 5 minute headways.
<b>Lincoln/Crossover Transit-only Left-turn</b> <i>Muni_Lincoln_Crossover</i>	Muni-only left-turn from Lincoln Way onto 19th/Crossover Drive.
<b>Muni Low Floor Buses</b> <i>Muni_LowFloorBuses</i>	Muni fleet will be replaced by all low-floor buses by 2020.
<b>Van Ness Bus Rapid Transit</b> <i>Muni_VanNessBRT</i>	Center A Variation on Van Ness from Mission to Lombard. Project scheduled to be completed by 2019.
<b>Transbay Terminal Bus Ramps</b> <i>TransbayTerminalBusRamps</i>	Bus-only ramps to the Transbay Terminal from the Bay Bridge.

## TRANSIT FREQUENCY

Table 4: Headways of Muni routes lists assumptions for Muni line headways after services changes planned under “Muni Forward” have been implemented. These headways are assumed in the 2020 Baseline Scenario. This also assumes realignment of transit routes that have been approved and funded as of January 2015.

Table 4: Headways of Muni routes at full implementation of Muni Forward (in minutes)

Muni Line	Time of Day		
	AM Period	Midday Period	PM Period
<b>1 California</b>	7	5	6
<b>2 Clement</b>	7.5	10	7.5
<b>3 Jackson</b>	15	30	15
<b>5 Fulton</b>	3	5	3.5
<b>6 Haight-Parnassus</b>	12	15	12
<b>7R Haight/Noriega Rapid</b>	7.5	8	7.5
<b>8AX Bayshore 'A' Express</b>	6	--	7
<b>8BX Bayshore 'B' Express</b>	6	--	7
<b>8 Bayshore</b>	--	7.5	--
<b>9 San Bruno</b>	10	12	10
<b>9L San Bruno Rapid</b>	10	12	10
<b>10 Townsend</b>	6	10	6
<b>11 Downtown Connector</b>	15	15	15
<b>14R Mission Rapid</b>	7.5	9	7.5
<b>14X Mission Express</b>	7.5	0	7.5

<b>21 Hayes</b>	8	12	9
<b>22 Fillmore</b>	6	7.5	8
<b>24 Divisadero</b>	9	10	9
<b>28 19th Avenue</b>	9	9	9
<b>28R 19th Avenue Rapid</b>	9	9	9
<b>29 Sunset</b>	8	15	10
<b>30 Stockton</b>	3.5	4	4
<b>30X Marina Express</b>	4	--	7
<b>31 Balboa</b>	12	15	12
<b>33 Ashbury-18th</b>	12	12	12
<b>35 Eureka</b>	20	20	20
<b>37 Corbett</b>	15	20	15
<b>38 Geary</b>	6	7.5	6
<b>38R Geary Rapid</b>	5	5	5
<b>41 Union</b>	7	--	7
<b>43 Masonic</b>	8	12	10
<b>44 O'Shaughnessy</b>	7.5	12	8
<b>47 Van Ness</b>	7.5	9	7.5
<b>48 Quintara/24th Street</b>	15	15	15
<b>52 Excelsior</b>	20	20	20
<b>54 Felton</b>	15	20	15
<b>55 16th Street</b>	15	15	15
<b>57 Parkmerced</b>	20	20	15
<b>F Market &amp; Wharves</b>	7.5	6	5
<b>J Church</b>	8	10	9
<b>K Ingleside (KT)</b>	8	10	8
<b>L Taraval</b>	7.5	10	7.5
<b>M Oceanview</b>	8.5	10	8.5
<b>N Judah</b>	5.5	10	6

## TOLLS

SF-CHAMP assumes that Bay Area Bridge tolls increase in line with inflation over the long term. For future year scenarios, SF-CHAMP tolls are assessed at values that are constant in real terms. In addition to this assumption, scheduled toll changes are also assumed in the model. SF-CHAMP assumes the scheduled 2018 Golden Gate Bridge toll increase. Starting in 2018, Golden Gate Bridge tolls will be \$8.00 for two-axle vehicles and \$5.00 for high occupancy vehicles in 2018\$ terms.





**Attachment 5f: Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP  
Model Run**



# *Memorandum*

**DATE:** 07.17.2015

**TO:** Better Market Street Team

**FROM:** Dan Tischler, Senior Transportation Planner, Technology, Data & Analysis, SFCTA

**SUBJECT:** DRAFT Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run

## Summary and Context

The purpose of this memo is to document inputs used in the SF-CHAMP 5.1 regional travel demand model for the purpose of modeling a 2040 Baseline Scenario to be used to evaluate the feasibility of implementing the Better Market Street project.

## STUDY OVERVIEW

Market Street is a primary multi-modal corridor in San Francisco. The current design accommodates the demands of various modes of travel such as walking, bicycling, transit, and driving, but it falls well short of the potential of the street.

The Better Market Street project offers a special opportunity to envision a new Market Street. The goal of the project is to revitalize Market Street from Octavia Boulevard to The Embarcadero and reestablish the street as the premier cultural, civic and economic center of San Francisco and the Bay Area. The transportation system analysis will include blocks south and north of Market and Mission streets. The new design should create a comfortable, universally accessible, sustainable, and enjoyable place that attracts more people on foot, bicycle and public transit to visit shops, adjacent neighborhoods and area attractions.

This memo describes the 2040 Baseline Scenario. For brevity, this memo summarizes differences between the 2040 Baseline Scenario and the 2020 Baseline Scenario. See the memo titled “Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run” (2020 Baseline Input Memo) for additional detail on the 2020 Baseline Scenario.

## SCENARIO DESCRIPTION

The 2040 Baseline Scenario is designed to reflect projected baseline conditions in the San Francisco Bay Area in the year 2040. More detail is provided within the City of San Francisco than elsewhere in the San Francisco Bay Area and the scenario will be used for focused analysis of travel in the Better Market Street corridor.

## LAND USE

2040 land use assumptions are derived from the Jobs-Housing-Connections projections developed by ABAG and MTC. While ABAG/MTC Jobs-Housing Connections Strategy Land Use numbers for population, employment, employed residents and jobs are used at a TAZ (close to Census Tract size) level of geographic granularity outside San Francisco, the San Francisco Planning Department (SF Planning) uses the ABAG/MTC Jobs-Housing Connections Strategy control totals to allocate base year land use data within San Francisco. SF Planning makes use of numerous commercial datasets to refine initial ABAG distribution within San Francisco.

The land use inputs are saved on a server at SFCTA at:

Y:\champ\landuse\p2011\SCS.JobsHousingConnection.Spring2014update\2040\runinputs\_champ5parkingUpdate

## TRANSPORTATION NETWORKS

This section discusses 2040 Baseline assumptions for transit, and assumptions for other San Francisco and regional road, and toll policy projects. The 2040 Baseline Scenario includes all transportation projects assumed in the 2020 Baseline Scenario, plus additional transportation projects expected to be implemented between 2020 and 2040.

## ROAD NETWORK

Table 1 presents San Francisco street and road projects anticipated for completion between 2020 and 2040. SF-CHAMP also assumes regional roadway project implementation in accordance with the most recent Regional Transportation Plan.

Table 1: Roadway Projects in San Francisco Completed Between 2020 and 2040

Project	Description
<b>Safer Market Street</b>	<ul style="list-style-type: none"><li>• No turns allowed onto Market Street between 8th and 3rd Streets with the exception of southbound Jones Street onto westbound Market Street.</li><li>• Streets, such as Mason or O'Farrell, will have required turns onto Turk and Grant respectively.</li><li>• No left turn onto Market Street from southbound Hyde Street.</li><li>• Commercial vehicles, transit, bicycles, and taxis would be exempt from these proposed turn restrictions.</li><li>• The following turn restriction would apply to all vehicles: No right turn onto Grant Ave from Market Street.</li></ul>
<b>Sixth Street</b>	Between Market Street and Howard Street, convert four travel lanes to two travel lanes; add a new bicycle lane in each direction with sidewalks widened by 3 to 6 feet (3 to 4 feet at block corners and 6 feet along the block). Traffic signal cycle lengths would be increased from 60 to 90 seconds, and the offsets would be adjusted.

<b>Polk Street</b>	Between McAllister Street and Union Street, various changes will happen depending on location, including road diets, turn restrictions, and bicycle facilities.
<b>Annie Street</b>	<ul style="list-style-type: none"> <li>• The existing mini-plaza at the intersection of Annie St and Market St will be expanded to Stevenson Street</li> <li>• Between Mission Street and Ambrose Bierce Alley, Annie Street would be closed to vehicular traffic and transformed into a new pedestrian plaza</li> <li>• The remainder of Annie St between the two plazas would retain vehicular traffic but be redesigned as a single-surface shared street</li> </ul>
<b>Treasure Island</b>	Reconstruct Treasure Island street network per full build-out plan for Treasure Island
<b>Transit Center District Plan</b>	Road diets, transit facilities, and bike facilities consistent with the Transit Center District Plan
<b>2<sup>nd</sup> Street Bike Lanes (Bike Plan)</b> <i>BikePlan\2ndStreet</i>	Bike lanes on 2nd Street between Market and Townsend
<b>5<sup>th</sup> Street Bike Lanes (Bike Plan)</b> <i>BikePlan\5thStreet</i>	Bike lanes on 5th Street between Market and Townsend
<b>16<sup>th</sup> Street</b>	<ul style="list-style-type: none"> <li>• Between Church and Bryant streets, create a side running transit-only lane in the westbound direction through lane conversion.</li> <li>• Between Bryant and Mississippi streets, create center-lane transit only lanes in both directions through lane conversion.</li> <li>• Between 7<sup>th</sup>/Mississippi and Third streets, create side running transit-only lane in both directions through lane conversion.</li> <li>• Along the length of the corridor, add traffic signals, add left turn restrictions, and add some left turn pockets.</li> </ul>
<b>Move Bike Lane from 16<sup>th</sup> to 17<sup>th</sup> (Bike Plan)</b> <i>MoveBikeLaneFrom16thTo17th</i>	Move Bike Lane from 16th Street to 17th Street between Kansas and Mississippi
<b>Brannan (Central SoMa)</b> <i>CentralCorridor\Brannan</i>	Brannan St between 2nd and 6th, 1 auto lane and 1 protected cycletrack for each direction
<b>Harrison/Bryant (Central SoMa)</b> <i>CentralCorridor\Harrison_Bryant</i>	Harrison between 3rd and 6th, Bryant between 2nd and 6th, 4 travel lanes and 1 transit lane during Peak hours, 3 travel lanes and 2 parking lanes off-peak
<b>Howard/Folsom One-Way (Central SoMa)</b> <i>CentralCorridor\Howard_Folsom_OneWay</i>	Howard Lane reduction to 2 travel lanes(3 during peak), and protected bidirectional cycletrack; Folsom 2 travel lanes, 1 bus lane during peak and protected bidirectional cycletrack

<b>3<sup>rd</sup>/4<sup>th</sup> (Central SoMa)</b> <i>CentralCorridor\Third_4th_st</i>	3rd St from King St to Market St, 4th from Market St to Harrison St, 3 auto lanes, 1 bike lane, 1 bus lane
<b>Treasure Island Ramps</b> <i>TI_Ramps</i>	Reconstruction and realignment of Treasure Island freeway ramps according to TI-TIP.
<b>Masonic Boulevard Option</b> <i>Fix_Masonic</i>	The Boulevard Option on Masonic between Geary and Fell, reducing travel lanes to 2 in both directions and eliminating additional peak-period lanes.
<b>19th Avenue Corridor</b>	Tier 4C projects from the 19th Avenue Corridor Study: <ul style="list-style-type: none"> <li>• 19th Ave / Holloway Ave – add a fourth southbound lane</li> <li>• 19th Ave / Crespi Dr – fourth southbound lane will be extended and converted into a through-right into Crespi</li> <li>• 19th Ave / Junipero Serra Blvd – add a fourth lane for southbound right-turn onto Junipero Serra</li> </ul>
<b>Harney Way Rebuild</b> <i>HarneyRebuild</i>	Harney expansion to 3-lanes WB, 2-lanes EB for 4 links north of the 101 interchange, plus BRT lanes & TSP North/East of Alana
<b>Palou Transit Lane and Transit Signal Priority</b> <i>TransitLaneTSP_Palou</i>	Transit Signal Priority and transit-only lane on Palou between Phelps and Fitch.
<b>Geneva Transit Preferential Treatment</b>	This section is the Geneva Four-Lane Option: two general-purpose lanes and one transit lane in each direction. (TEP transit treatment west of Santos: one general-purpose lane and one side-running transit lane.)
<b>Geneva Extension</b>	<ul style="list-style-type: none"> <li>• Geneva will be extended over Tunnel Ave and the Recology site, with connections to US 101 ramps.</li> <li>• Two general-purpose lanes in each direction; three during the PM peak period.</li> <li>• Transit-only lanes</li> <li>• Class II bicycle facility</li> <li>• Two pedestrian bridges will connect Bayshore/Sunnydale and Bayshore/MacDonald with Tunnel Ave</li> </ul>
<b>Mission Transit Lane (TEP)</b>	Side-running transit lanes on Mission between 11th to 16th St. Note: this project is included as a subset within the MUNI Travel Time Reduction Program (Project-level Expanded) project
<b>Candlestick Point / Hunters Point Shipyard Street Grid Rebuild</b> <i>Candlestick_HuntersPoint</i>	Rebuild of the street grid per the Candlestick Point / Hunters Point Shipyard Transportation Plan using the no-stadium variant. Includes separated transitways or center-running transit lane corridor for the 28L.
<b>Candlestick Interchange Rebuild</b>	<ul style="list-style-type: none"> <li>• Geneva will extend under the US 101 to Harney Way</li> <li>• Between the Geneva Extension and Alana, two general-purpose lanes and one transit-only lane in each direction.</li> <li>• Between Alana and Harney, three general-purpose travel lanes in each direction</li> <li>• Alana becomes transit-only between Harney and Geneva</li> <li>• On/off ramps will be single-lane with no transit treatment</li> </ul>

<b>Yosemite Slough Bridge</b> <i>Yosemite_Slough</i>	Transit, bike, and pedestrian bridge connecting Candlestick Point and Hunters Point Shipyard
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## REGIONAL TRANSIT NETWORK

Between 2020 and 2040, Caltrain, SMART, BART and WETA will each provide expanded services to new stations and terminals. Table 2: Regional Transit Agency Projects lists these projects.

Table 2: Regional Transit Agency Projects Completed Between 2020 and 2040

Project	Description
<b>Caltrain DTX</b>	Caltrain Electrification and Downtown Extension
<b>Caltrain Electrification</b> <i>Caltrain_Electrification</i>	Service increase resulting from Caltrain Electrification project.
<b>SamTrans Caltrain Shuttle Frequency</b> <i>Samtrans_ShuttleFreq</i>	Double the frequency of Samtrans' Caltrain shuttle.
<b>WETA Expansion Phase 2</b> <i>WETA_Expansion_Phase2</i>	New ferry lines: Berkeley-SF, Hercules-SF, Redwood City-SF, Richmond-SF.
<b>BART: Silicon Valley Phase 2</b>	BART extended from Berryessa to Alum Rock, Downtown San Jose, Diridon, and Santa Clara
<b>SMART: Larkspur to San Rafael</b>	SMART - Extend SMART from San Rafael to Larkspur
<b>SMART: Santa Rosa to Cloverdale</b>	SMART - Extend SMART from Santa Rosa to Cloverdale

## MUNI NETWORK

The MUNI transit network has several planned service expansions and improvements scheduled for the period between 2020 and 2040. Table 3: MUNI Transit Projects summarizes projects assumed in the SF-CHAMP 2040 Baseline Scenario.

Table 3: MUNI Transit Projects to be Completed Between 2020 and 2040

Project	Description
<b>19<sup>th</sup> Avenue Corridor (M Ocean View split service)</b>	Tier 4C Transit projects from the 19 <sup>th</sup> Avenue Corridor Study: <ul style="list-style-type: none"> <li>• M Ocean View realignment <ul style="list-style-type: none"> <li>○ Diverts into Parkmerced at 19<sup>th</sup> Ave / Holloway Ave</li> <li>○ Relocate SFSU station into Parkmerced</li> <li>○ Two new Parkmerced stations</li> <li>○ Split tracks in Parkmerced and split end-of-line service between Parkmerced and Balboa Park BART</li> </ul> </li> </ul>
<b>Travel Time Reduction Program (Programmatic Expanded)</b> <i>Muni_TTRP\ProgrammaticExpanded</i>	Muni TEP: Travel Time Reduction Program, Expanded level (programmatic)
<b>Travel Time Reduction Program (Project-level Expanded)</b>	Muni TEP: Travel Time Reduction Program, Expanded level (project-level)

<i>Muni_TTRP\ProjectLevelExpanded</i>	
<b>Treasure Island</b>	Increased line 25 service, new line 109, and ferry service to the Ferry Building
<b>AC Transit Treasure Island Service</b> <i>AC_TI</i>	AC Transit Service to Treasure Island
<b>Geary Bus Rapid Transit</b> <i>Muni_GearyBRT\LPA</i>	Geary Side-Running BRT west of 25th Avenue and east of Stanyan, and Center-Running BRT between 25th and Stanyan.
<b>Candlestick Point Express</b> <i>Muni_CPX</i>	Express bus service between Downtown/SoMa and Candlestick Point
<b>Hunters Point Express</b> <i>Muni_HPX</i>	Express bus service between Downtown/SoMa and Hunters Point.
<b>Candlestick Point/Hunters Point Shipyard Muni Extensions</b> <i>Muni_CSP_HP_LineExtensions</i>	Extensions of 24-Divisadero, 23-Monterey, 44-O'Shaughnessy, 48-Quintara, and 29-Sunset into Candlestick Point and Hunters Point Shipyard neighborhoods
<b>Parkmerced Shuttles</b> <i>Parkmerced_Shuttle</i>	Free shuttle service between Parkmerced and Daly City BART, and between Parkmerced and nearby shopping centers.
<b>Muni F to Fort Mason</b>	Extend F Line to Fort Mason
<b>T-Third Extension to Caltrain</b>	The T-Third will be extended from Sunnydale to Bayshore Caltrain Station
<b>16<sup>th</sup> St BRT</b>	Realignment of the 22-Fillmore along 16 <sup>th</sup> St to 3rd St

## TOLLS

SF-CHAMP assumes that Bay Area bridge tolls increase in line with inflation over the long term. For future year scenarios, SF-CHAMP tolls are assessed at values that are constant in real terms. 2040 toll assumptions are the same in real terms as 2020 toll assumptions.



## **Attachment 5g: Forecasting Approach Memorandum**



## MEMORANDUM

Date: August 26, 2016 (*Revised October 6, 2016 and October 31, 2018*)  
To: City of San Francisco Public Works  
Better Market Street Project Team  
From: Matt Goyne, Fehr & Peers  
CC: Andrew Lee, Parisi Transportation Consulting  
Subject: Better Market Street Forecasting Approach

SF13-0715

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### OCTOBER 2018 UPDATE

This memorandum was updated for the purposes of including it within the appendices of the Better Market Street Environmental Impact Report. This includes the following changes:

- Replaced Alternatives 1 through 3 from the 2016 alternative screening analysis with proposed project.
- Removed the section describing 2040 VISSIM model documentation as this is presented within the memorandum *Better Market Street VISSIM Modeling Approach* (Fehr & Peers, October 31, 2018). **Attachment A** shows the transportation plans and projects assumed under each scenario as presented in the “Recent and Future Planned Transportation Projects within Transportation Study Area”.
- Updated the 2020 baseline plus project DTA analysis to reflect fixes to the model completed in September 2018.

### INTRODUCTION

The purpose of this memo is to describe the traffic volume forecasting methodology that was used for 2020 Baseline and Cumulative Conditions (Year 2040). This memorandum is a supplement to the information presented for 2020 conditions in the *Better Market Street VISSIM Modeling Approach* (Fehr & Peers, October 31, 2018).



## BETTER MARKET STREET FORECASTING APPROACH

As shown in **Figure 1**, the following transportation planning models were used to forecast future year transportation conditions for the Better Market Street project: SF-CHAMP, Dynameq/DTA, Synchro, and VISSIM. The specific approach used to develop future 2020 baseline and 2040 cumulative traffic volume forecasts for use in the Better Market Street travel time (operations) analysis are described in more depth in the following sections.

### SF-CHAMP

The SF-CHAMP model is an activity-based travel demand model that has been developed and validated by SFCTA using household travel survey information to represent existing and future transportation conditions in San Francisco. The model predicts all person travel for a full day (a typical weekday) based on total and locations of population, housing units and employment, which are then allocated to different periods throughout the day, using time of day sub-models. The SF-CHAMP model predicts person travel by mode for auto, transit, walk and bicycle trips. The SF-CHAMP model also provides forecasts of vehicular traffic on regional freeways, major arterials and on the study area local roadway network considering the available roadway capacity, origin-destination demand and travel speeds when assigning the future travel demand to the roadway network.

SF-CHAMP divides San Francisco into 981 geographic areas, known as Transportation Analysis Zones (TAZ). It also includes zones outside of San Francisco, for which it uses the same geography as the current Metropolitan Transportation Commission (MTC) Model: "Travel Model One." For each TAZ, the model estimates the travel demand based on TAZ population and employment assumptions developed by ABAG. Within San Francisco, the San Francisco Planning Department is responsible for allocating ABAG's countywide growth forecast to each TAZ for the future cumulative year model, based upon existing zoning and approved plans, using an area's potential zoning capacity, and the anticipated extent of redevelopment of existing uses. The current cumulative future year of 2040 has been used consistently for recent large transportation studies in San Francisco. The ABAG assumptions used for this study are from the Projections, Jobs-Housing Connection, May 2012 (i.e., P2012).

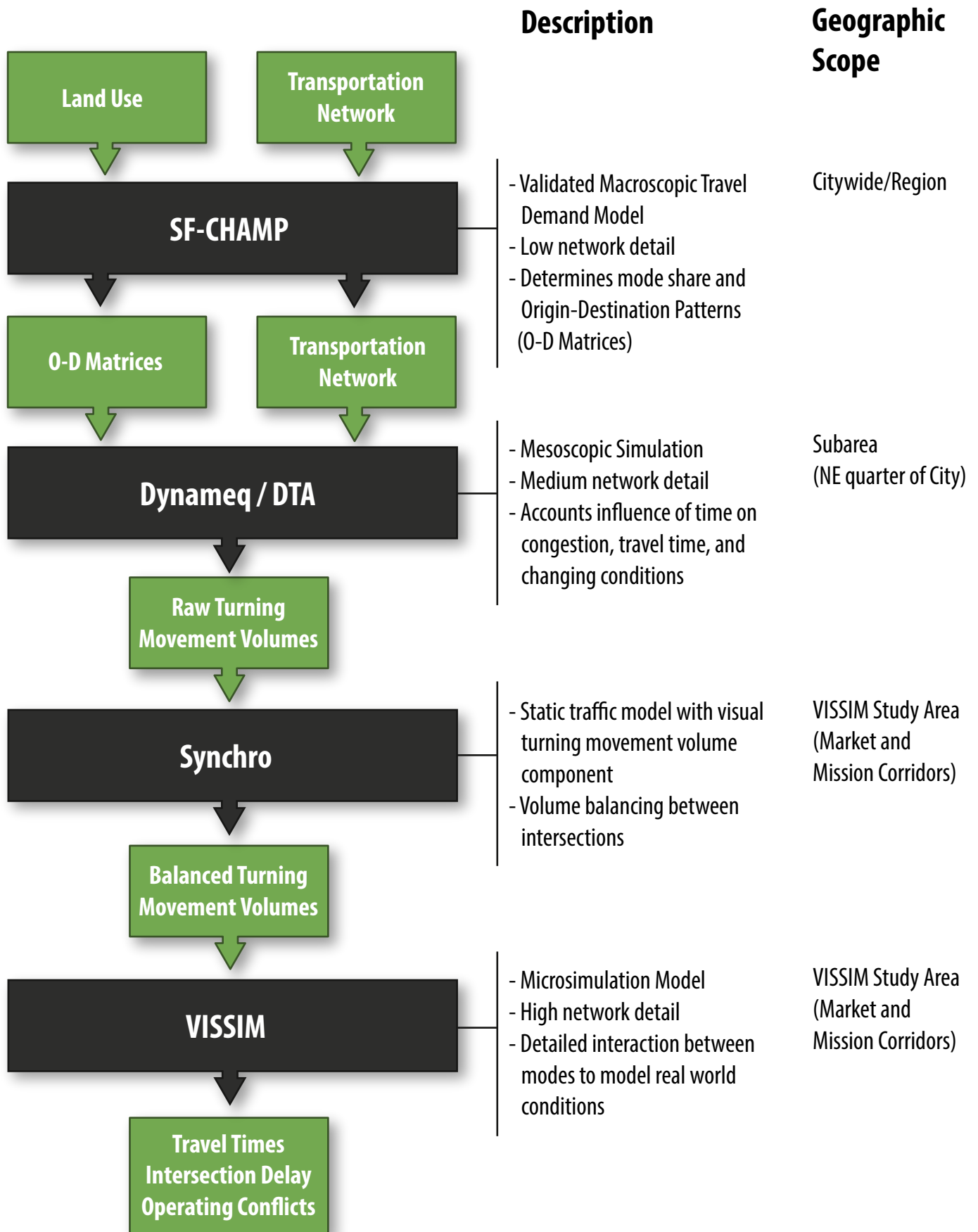


Figure 1  
Modeling Process for Better Market Street





For the “project” scenario, the SF-CHAMP model run was coded to include the changes to the transportation network proposed in the project. These network changes were modified to best reflect the street network changes (i.e., changes to the turn restrictions, transit stop spacing, total number of travel lanes, etc.). The proposed project is a transportation project and not a land use project, and therefore, would not generate new trips by any mode. Thus, the primary changes between the “project” and “no project” scenarios are the redistribution of auto trips due to private auto restrictions on Market Street.

Regional travel demand models such as SF-CHAMP are designed to be able to represent citywide and regional trends and do not always capture localized improvements to transit, such as those proposed by the project, nor do they represent an intersection level of analysis commensurate with projecting specific vehicle turning movements. Instead, the SF-CHAMP model provides traffic demand outputs that can then be modeled in other traffic modeling software (such as Dynameq, VISSIM, or Synchro), to account for network effects of intersection bottlenecks, queuing, etc. Therefore, the SF-CHAMP traffic demand outputs for each scenario were used as inputs for the Dynameq/Dynamic Traffic Assignment (DTA) model to develop intersection turning movement forecasts as described below. Additionally, as SF-CHAMP was not sensitive to the operational transit improvements proposed by the project, transit ridership was forecast separately based on the results on the VISSIM operations analysis. For the purposes of this study, the SF-CHAMP traffic forecasts do not account for a substantial change in travel modes (e.g., from driving to walking, bicycling or transit, or from walking to bicycling or vice versa).

### **Dynameq**

Most transportation demand forecasting models, such as SF-CHAMP, rely on static assignment to determine the traffic volumes on the transportation roadway network and identify potential areas for needed capacity improvements. Therefore, the demand is allowed to exceed the capacity of individual roadways, though there are some congestion functions to approximate resistance to additional traffic. In addition, static assignment typically does not account for the influence of departure time, varying capacity over time, or the effects of congestion on actual travel time. Other issues with static assignment include lack of representation of spill-back effects upstream from bottlenecks or changing conditions throughout a peak period. These limitations result in static assignments being of limited benefit in informing the effects of the proposed project due to the complex interactions of vehicle traffic within the study area.



To address these limitations, a Dynamic Traffic Assignment (DTA) model was implemented using Dynameq software for the proposed project. Dynamic assignment accounts for congestion, signal timing, delay due to transit, individual lane assignments, queuing, and other factors that directly influence the routes and reliability of vehicle assignment. The DTA files were based on the SF-CHAMP model and generated using an automated process developed by the SFCTA. The existing DTA model went through a calibration and validation process before being coded with the proposed project, reasonably foreseeable transportation projects, and future year vehicle travel demand to produce future year turning movement forecasts for the study area.<sup>1,2</sup> The approach used to develop the 2020 and 2040 future year forecasts for each mode are described below.

After sizing the DTA model network to an appropriate size that captured the broad route shifts due to the proposed project, the existing DTA model went through a calibration and validation process. This entailed comparing traffic volumes and queues produced by the model with observed traffic volumes and queues within and around the study area. Where volumes and queues differed significantly, the network was inspected and fixed for coding issues that may have caused unrealistic traffic behavior such as incorrect signal timing, driver behavior, segment or turning movement capacities. After completion of the calibration and validation process on the existing network, the model was determined to be adequate for the purposes of forecasting future year turning movement forecasts for the study area.

The transportation network in the existing base year DTA model was then updated to include the transportation projects that were funded and anticipated to be completed by 2020 or reasonably foreseeable to be completed by 2040. Additionally, the proposed project was coded into the "plus project" scenarios. Separately, the vehicle trip origin-destination model inputs were updated based on information from the SF-CHAMP model for each scenario. The DTA models were then run with the new transportation network and vehicle demand assumptions to create preliminary turning movement forecasts for each scenario.

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<sup>1</sup> The model validation and calibration processes are described in more detail in the memorandum *Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project*, dated October 30, 2015, presented in Appendix 7 of the Draft Better Market Street EIR.

<sup>2</sup> Additional details about these projects are presented in the following memorandums: *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (SFCTA, May 11, 2015) and *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (SFCTA, July 17, 2015). These are presented in Appendix 7 of the Draft Better Market Street EIR.



## Vehicle Forecasts

Forecasts of vehicle trips for use in the impact analysis were developed by using observed vehicle turning movement counts and adding differences in growth from the DTA model output between a 'no project' scenario, and a 'plus project' scenario. This ensures that each scenario is evaluated against a standard set of numbers that is rooted in observed data. These DTA outputs, each compared against observed data, were evaluated and adjusted using professional judgment and identified methodology for developing forecasts. Thus, 2020 travel demand forecasts for vehicles for each analysis scenario (as defined below) were estimated as follows:

- Separate SF-CHAMP runs were conducted for existing and 2020 baseline to create existing and 2020 baseline vehicle demand matrices for the study area.
- The DTA models were run as follows: the existing model used the existing vehicle demand matrix and the existing transportation network; the 2020 baseline model used the 2020 baseline vehicle demand matrix and the 2020 baseline transportation network; the 2020 baseline plus project model used the 2020 baseline vehicle demand matrix and the 2020 baseline plus project transportation network.
- The "2020 baseline" traffic volumes were estimated by subtracting the existing DTA model volumes from the baseline DTA model volumes and adding this difference to the observed existing turning movement volumes.
- The "2020 baseline plus project" traffic volumes were estimated by subtracting the baseline DTA model volumes from the baseline plus project DTA model volumes and adding this difference to the observed existing turning movement volumes.

The development of 2040 cumulative conditions followed a similar approach to the 2020 baseline conditions. However, due to the higher vehicle demand under the 2040 scenario, DTA model runs resulted in network gridlock, where much of the vehicle demand was not able to reach the desired path or destination. The 2040 cumulative no project vehicle demand exceeded the DTA model parameters, and therefore the use of the DTA model was not used for this analysis.<sup>3</sup> Instead, the 2040 travel demand forecasts were estimated by allocating the estimated traffic growth between

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<sup>3</sup> Fehr & Peers, in coordination with SFCTA, SFMTA, and Planning Department staff, reviewed several alternative approaches in February 2016 and determined that this was the most effective approach to capture the results and potential delays associated with the 2040 vehicle demand. The percentage changes to the traffic volumes entering the networks are presented in Appendix 6.



2020 and 2040 from SF-CHAMP to roadways entering the study area. This growth was then allocated to downstream turning movements, accounting for turn restrictions.

The traffic volume outputs from the SF-CHAMP and DTA models reflects any changes to traffic volumes that could result from the proposed project, including diversions from one street to another, or shifts in vehicle travel from inside the study area to outside the study area. In addition to the application of a standard methodology, creating forecasts from model output involves engineering judgment, past experience, and knowledge of the transportation characteristics of the study area. The processing of raw SF-CHAMP and DTA model outputs to determine vehicle turning movement volumes or roadway growth for each scenario was performed consistent with methodologies defined in National Cooperative Highway Research Program (NCHRP Report 255), Highway Traffic Data for Urbanized Area Project Planning and Design, Pedersen, N.J. and Samdahl, D.R., Transportation Research Board, 1982, specifically, those outlined in Chapter Eight, Turning Movement Procedures.

Traffic volumes at the study intersections are projected to increase by an average of 10 percent of the p.m. peak-period vehicles between 2020 baseline and 2040 cumulative conditions. The projected growth in traffic volumes is slightly higher on a percentage basis on the north-south streets in the eastern half of the study area than in the western half. This generally reflects the relative land use change in the eastern versus the western half of the study area due to the Transit Center District Plan, the Central SoMa Plan and other development projects to the south in Mission Bay (e.g., Mission Rock, etc.). The number of vehicles on Mission Street are projected to increase more on the western half of the street due to the limited capacity for additional vehicles on the eastern half of the street. Market Street volumes generally were consistent between 2020 and 2040 due to the turn restrictions that limit non-transit vehicles. The percentage changes to the traffic volumes on Mission Street and entering the networks are presented in **Attachment B**.



**ATTACHMENT A**  
**RECENT AND FUTURE PLANNED TRANSPORTATION PROJECTS WITHIN THE**  
**TRANSPORTATION STUDY AREA**

### Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline				2040 Cumulative	
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
<b>“Existing Conditions” - Projects completed 2011 through 2018 <sup>5</sup></b>						
Folsom Road Diet 4 <sup>th</sup> to 11 <sup>th</sup> <sup>6</sup>	X	X	X		X	
Minor Restriping Projects (Harrison at 11 <sup>th</sup> , Sixth from Folsom to Market, Beale bike lane from Folsom to Bryant) <sup>6</sup>	X	X	X		X	
Haight Contraflow Transit Lane <sup>6</sup>	X	X	X		X	
Muni, Golden Gate, and SamTrans Transit Service Changes (Muni Forward or otherwise) <sup>6</sup>	X	X	X		X	
Two-Way McAllister Street (part of Muni Forward) <sup>6</sup>	X	X	X		X	
Signal Timing Changes on Market and Mission Streets	X	X	X		X	
Salesforce Transit Center <sup>6</sup>	X	X	X		X	
Safer Market Street <sup>7,8</sup>		X	X		X	
Golden Gate Avenue Safety Project <sup>8,9</sup>			X			X
Eighth Street Safety Project <sup>8,10</sup>		X	X			X
Second Street Improvement Project <sup>7,8, 11</sup>		X	X		X	
Seventh Street Safety Project <sup>8,10</sup>				X		X
Turk Street Safety Project <sup>8,12,13</sup>				X		X
Upper Market Street Safety Project <sup>8,13,14</sup>				X		X
Eddy Street Two-Way Conversion Project <sup>8,15</sup>				X		X
Powell Streetscape Project <sup>8,13,16</sup>				X		X
<b>2020 Reasonably Foreseeable Projects</b>						
Central Subway Project <sup>6</sup>	X	X	X		X	
Van Ness BRT Project/Van Ness Improvement Project <sup>6</sup>	X	X	X		X	
Transit Center District Plan Streetscape Improvements <sup>7,8</sup>		X	X		X	
Polk Street Streetscape Project <sup>7,8,13</sup>				X	X	
Vision Zero improvements to Sixth and Jessie streets <sup>8</sup>			X		X	
SFMTA Mission Street/South Van Ness Avenue/Otis Street Intersection Improvements <sup>8,17</sup>			X			X
Bay Area Bike Share System <sup>18</sup>				X		X

### Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline				2040 Cumulative	
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/ Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
<b>2040 Reasonably Foreseeable Projects</b>						
Sixth Street Road Diet Project <sup>7</sup>					X	
San Francisco Bicycle Plan short-term improvements to Fifth Street <sup>7</sup>					X	
Central SoMa Plan Street Network Changes <sup>7</sup>					X	
Muni Forward (Travel Time Reduction Projects) <sup>6,7</sup>					X	
Geary Rapid and Bus Rapid Transit Projects <sup>7,19</sup>					X	
Safer Taylor Street <sup>8,20</sup>						X
Hub Plan Street Network Changes <sup>8, 21</sup>						X

Notes: All websites shown below were current as of June 29, 2018, as confirmed by Fehr & Peers.

1. SF-CHAMP assumptions are presented in memorandums *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (SFCTA, May 11, 2015) and *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (SFCTA, July 17, 2015). This table only includes projects within the transportation study area. Additional projects outside of the study area that were included in the SF-CHAMP models are documented within these memorandums.
2. The DTA model validation and calibration processes is described in the memorandum *Dynamic Traffic Assignment Model PM Peak Period Validation for Better Market Street Project* (Fehr & Peers, October 30, 2015).
3. *Final Better Market Street 2020 VISSIM Model Updates and Changes* (Fehr & Peers, September 29, 2016).
4. SF-CHAMP was the only analysis model prepared for 2040 cumulative conditions as forecasting long-range conditions is fraught with uncertainty that diminishes the value of analyzing the scale differences due to the proposed project. For 2040 transportation conditions, tools with detailed inputs and outputs such as DTA and VISSIM have input variable ranges that would be larger than the measurable effects of the proposed project.
5. "Existing conditions" in the EIR represents the conditions as they are in 2018, or the most recent information available. This section is intended for clarification about what has changed since the existing validation and calibration efforts were completed for the VISSIM model in 2011/2012 as documented in the memorandum *Methodology and Validation for Market/Mission Street VISSIM Model* (San Francisco Planning Department, January 30, 2012).
6. Project described in *Input Assumptions for Better Market Street 2020 Baseline SF-CHAMP Model Run* (SFCTA, May 11, 2015).
7. Project described in *Input Assumptions for Better Market Street 2040 Baseline SF-CHAMP Model Run* (SFCTA, July 17, 2015).
8. Project or Plan was not reasonably foreseeable at the time the SF-CHAMP and/or DTA models were completed in 2015.
9. Golden Gate Avenue was adopted approved in May 2016, after the completion of the SF-CHAMP and DTA models were completed in 2015. The project was completed in 2016. More details on project are shown here: <https://www.sfmta.com/projects/golden-gate-avenue-safety-project>

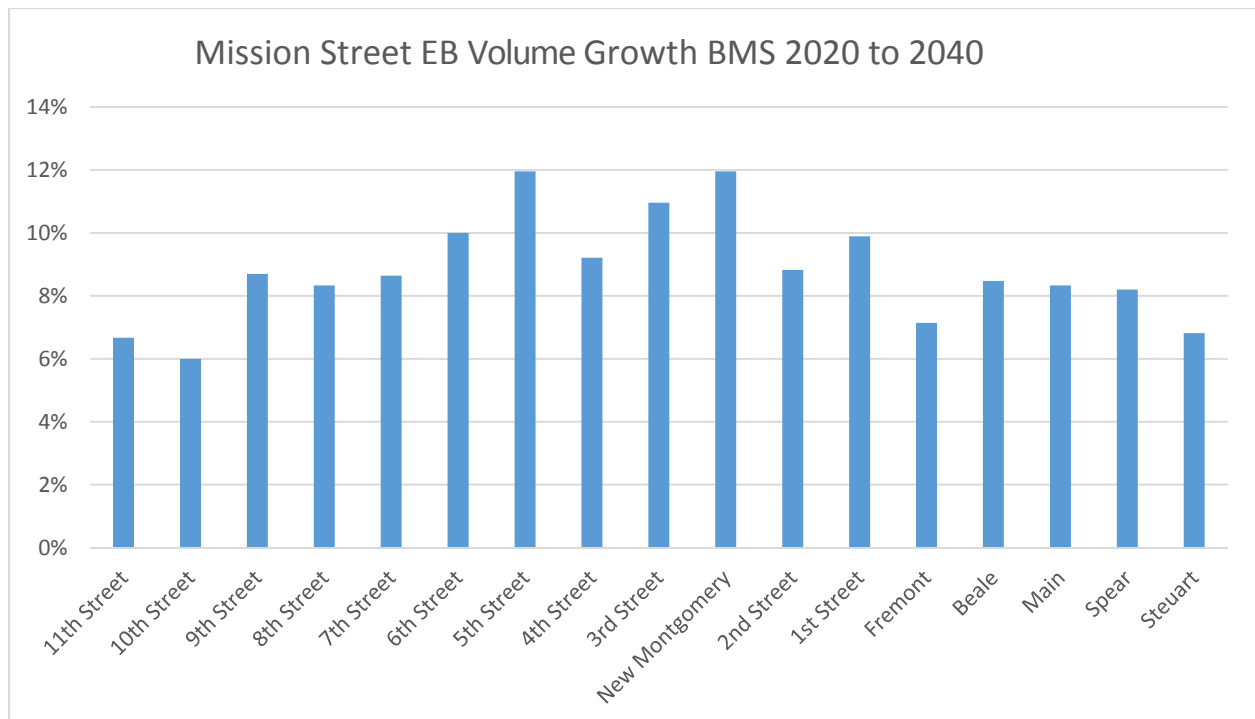
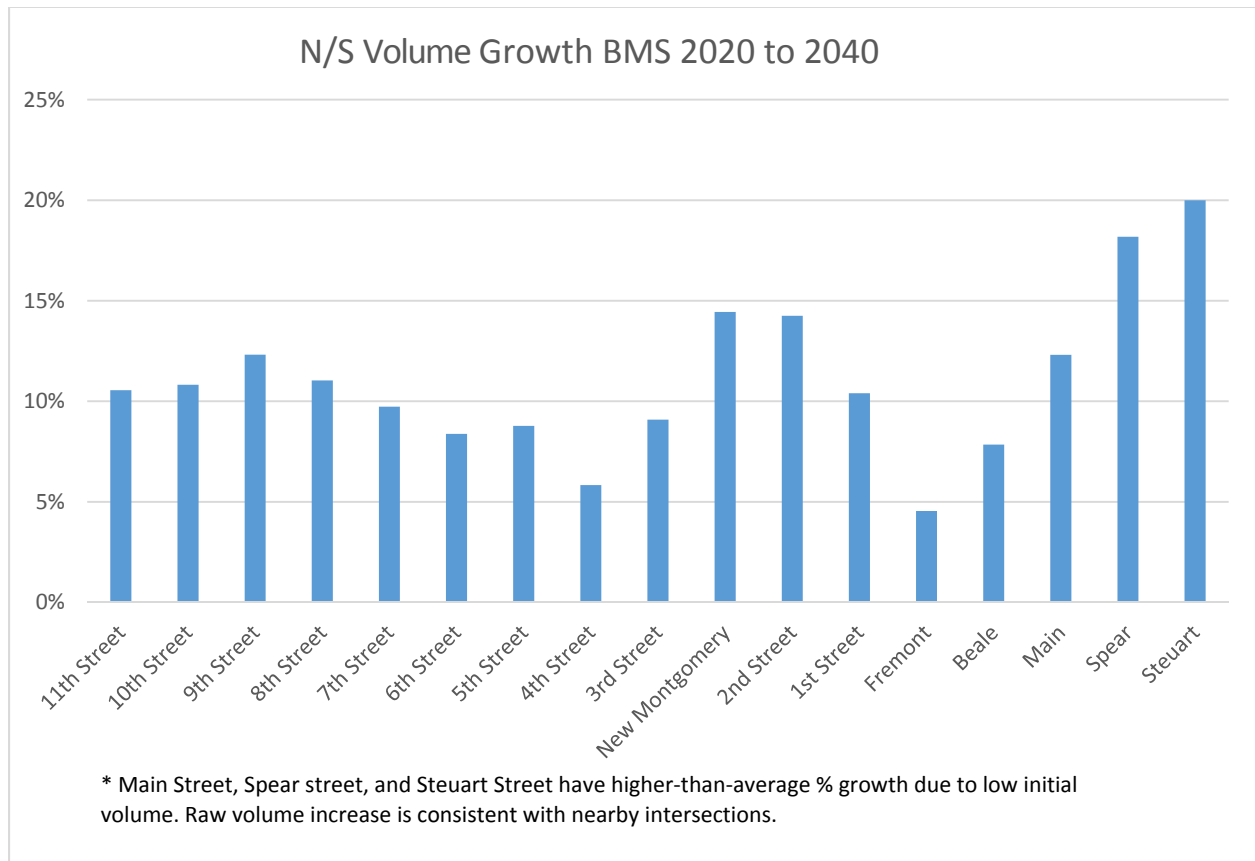
## Recent and Future Planned Transportation Projects within the Transportation Study Area

Transportation Plan/Project	2020 Baseline			2040 Cumulative		
	SF-CHAMP <sup>1</sup>	DTA <sup>2</sup>	VISSIM/ Synchro <sup>3</sup>	Qualitative Only	SF-CHAMP <sup>4</sup>	Qualitative Only
10. Phase 1 of the Seventh and Eighth Street Near Term Safety Project received approval from the SFMTA Board on November 15, 2016, after the VISSIM models were completed. Phase 1 was constructed between March and May 2017. More details are on the project webpage: <a href="https://www.sfmta.com/projects/7th-street-8th-street-near-term-safety-project">https://www.sfmta.com/projects/7th-street-8th-street-near-term-safety-project</a> . Accessed by Fehr & Peers on May 25, 2018. Preliminary planning and funding for the Eighth Street Phase 1 component was completed in 2015, hence why it was incorporated into the DTA and VISSIM models at that time, before the Eighth Street portion was incorporated into the broader project.						
11. Initial turn restrictions for Second Street Improvement Project were implemented in March 2016. The complete project is expected to be complete in 2019 and is therefore included within the 2020 baseline analysis. More details on project are shown here: <a href="https://www.sfpublicworks.org/project/second-street-improvements-project">https://www.sfpublicworks.org/project/second-street-improvements-project</a>						
12. The Turk Street Safety project was approved in January 2018 and was therefore not reasonably foreseeable at the time any of the analysis models were completed. More details are on the project webpage: <a href="https://www.sfmta.com/projects/turk-street-safety-project">https://www.sfmta.com/projects/turk-street-safety-project</a>						
13. While the Turk Street, Polk Street, Upper Market Street Safety, and Powell Streetscape projects are directly adjacent to the study area, they do not touch the VISSIM or Synchro study locations.						
14. The Upper Market Street Safety Project includes near-term improvements implemented in 2015 and spring of 2018, starting west of Octavia Boulevard. Long-term improvements were approved by the SFMTA Board of Directors in May 2017 and are expected to be constructed by 2020. More details are on the project webpage: <a href="https://www.sfmta.com/projects/upper-market-street-safety-project">https://www.sfmta.com/projects/upper-market-street-safety-project</a>						
15. The Eddy Street Two-Way Conversation Project received approval from the SFMTA Board in July 2017, after the analysis was completed. More details are on the project webpage: <a href="https://www.sfmta.com/projects/eddy-street-two-way-conversion-project">https://www.sfmta.com/projects/eddy-street-two-way-conversion-project</a> . Accessed by Fehr & Peers on June 29, 2018.						
16. The Powell Streetscape Project included elements completed in November 2015 after the SF-CHAMP and DTA models were completed. Additional elements are currently under consideration for implementation by an estimated Early 2021 as described on the project’s webpage: <a href="https://www.sfmta.com/projects/powell-streetscape-project">https://www.sfmta.com/projects/powell-streetscape-project</a> . Accessed by Fehr & Peers on June 29, 2018.						
17. SF-CHAMP does not include the model parameters in order to incorporate this local streetscape project.						
18. While a general increase in biking is included in future year models to reflect the buildout of the network, a bikeshare system is not a specific model parameter that can be included in these models.						
19. The Geary Rapid Project is expected to be implemented by 2021 according to the project’s website. The Geary Bus Rapid Transit project is the related project that includes longer term improvements west of Stanyan Street, outside of the transportation study area. More details are on the project webpage: <a href="https://www.sfmta.com/projects/geary-rapid-project">https://www.sfmta.com/projects/geary-rapid-project</a>						
20. Safer Taylor Street is expected to go before the SFMTA Board of Directors in the Fall of 2018. More details are on the project webpage: <a href="https://www.sfmta.com/projects/safer-taylor-street">https://www.sfmta.com/projects/safer-taylor-street</a>						
21. Hub Plan Street Network Changes are part of the Market Street Hub project, which is currently in the planning stages. More details are on the project webpage: <a href="http://sf-planning.org/market-street-hub-project">http://sf-planning.org/market-street-hub-project</a>						

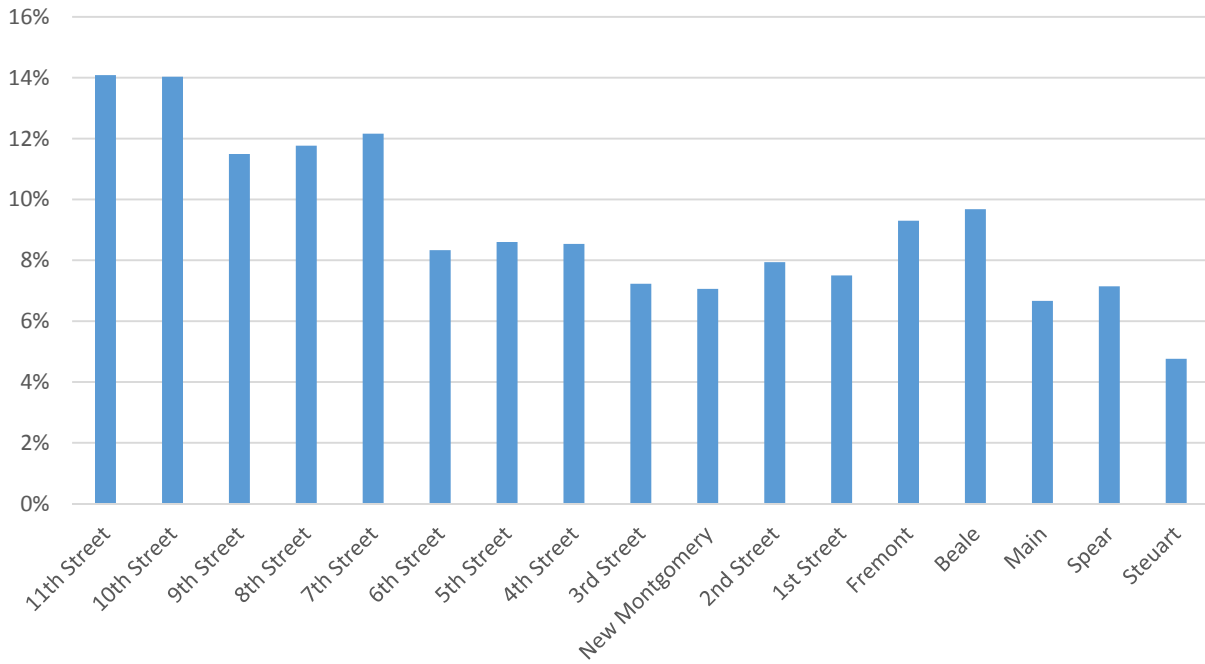
Source: SF Planning Department, Fehr & Peers. 2018.

**ATTACHMENT B**  
**2020 TO 2040 GROWTH**

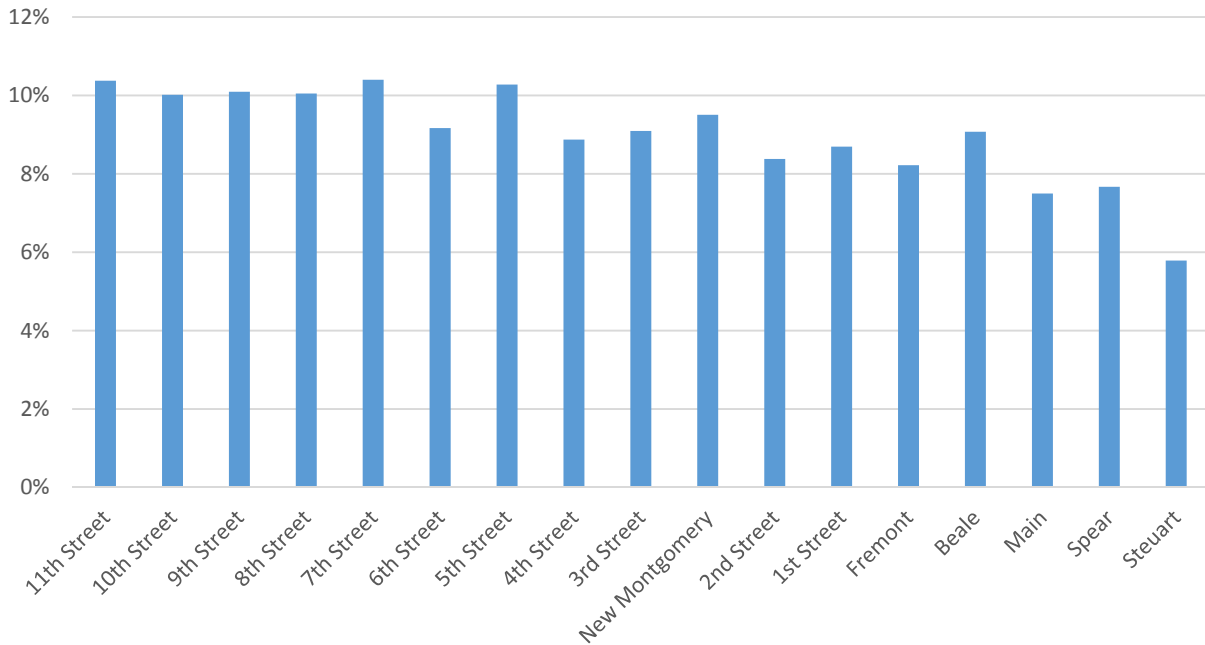
## Summary of forecasted volume growth from 2020 to 2040 for Better Market Street



Mission Street WB Volume Growth BMS 2020 to 2040



Mission Street combined E/W Volume Growth



## **Attachment 6: Transit Analysis**



## **Attachment 6a: VISSIM and Synchro Movement Delays**

**Route by Route Transit Delay Analysis**

2020 Transit Travel Time Summary - Market and Mission Streets

Purple indicates lane change along the route		No Project			NP Travel Time						Project			Project Travel Time						TT Difference	
Route - direction	Vehicle Type	Lane Position	Entrance	Exit	Octavia - 10th	10th - 7th	7th - 4th	4th -1st	1st - Spear/Main/ Steuart	Total Travel Time	Lane Position	Entrance	Exit	Octavia - 10th	10th - 7th	7th - 4th	4th -1st	1st - Spear/Main/ Steuart	Total Travel Time		
Market Street																					
F Market & Wharves - inbound	streetcar	center	Castro	Steuart	06:13	05:16	06:48	06:28	04:13	28:58	center	Castro	Steuart	06:39	03:13	05:04	05:21	03:34	23:51	-05:07	
F Market & Wharves - outbound	streetcar	center	Steuart	Castro	05:36	03:57	05:16	05:35	06:52	27:16	center	Steuart	Castro	05:33	02:14	03:49	04:46	04:09	20:31	-06:45	
2 Clement - inbound	trolleybus	center	Montgomery	1st				02:40		02:40	curb	Montgomery	1st				03:15		03:15	00:35	
2 Clement - outbound	trolleybus	curb	Steuart	Sutter					07:15	07:15	curb	Steuart	Sutter					05:12	05:12	-02:03	
5 Fulton - inbound	motorcoach	curb	McAllister	1st			05:55	07:53		13:48	center	McAllister	2nd			04:11	02:07		06:18		
		-	-	-						13:48	curb	2nd	1st				03:15		09:33	-04:16	
5 Fulton - outbound	motorcoach	curb	Fremont	McAllister			05:53	06:48		12:41	center	Fremont	McAllister			03:45	04:28		08:13	-04:28	
5R Fulton Rapid - inbound	trolleybus	curb	McAllister	1st			05:55	07:53		13:48	center	McAllister	2nd			04:11	02:07		06:18		
		-	-	-						13:48	curb	2nd	1st				03:15		09:33	-04:16	
5R Fulton Rapid - outbound	trolleybus	curb	Fremont	McAllister			05:53	06:48		12:41	center	Fremont	McAllister			03:45	04:28		08:13	-04:28	
6 Haight/Parnassus - inbound <sup>1</sup>	trolleybus	center	Haight	1st			05:41	05:19		11:00	center	Haight	10th						00:00		
		curb	1st	Spear					02:58	02:58	curb	10th	1st			05:39	06:29		12:08		
		-	-	-						13:58	center	1st	Spear					02:45	14:53	00:55	
6 Haight/Parnassus - outbound <sup>1</sup>	trolleybus	curb	Steuart	1st					07:15	07:15	curb	Steuart	10th			02:36	05:19	05:35	05:12	18:42	
		center	1st	Haight			02:08	04:58	04:57	19:18	center	10th	Haight							18:42	
7 Haight/Noriega - inbound <sup>1</sup>	motorcoach	center	Haight	7th						00:00	center	Haight	10th						00:00		
		curb	7th	1st			05:55	07:53		13:48	curb	10th	1st			05:39	06:29		12:08	-01:40	
7 Haight/Noriega - outbound <sup>1</sup>	motorcoach	center	Fremont	Haight			04:58	04:57		09:55	curb	Fremont	10th			05:19	05:35		10:54	00:59	
		-	-	-						00:00	center	10th	Haight						00:00		
7X Noriega Express - outbound <sup>2</sup>	motorcoach	curb	Main	Turk			02:57	06:48		07:15	17:00	curb	Main	Turk			02:40	05:35	05:12	13:26	-03:33
9 San Bruno - inbound <sup>1</sup>	motorcoach	center	11th	1st			04:13	05:19		15:13	center	11th	Spear			02:48	04:11	04:14	02:45	13:58	
		curb	1st	Spear					03:12	18:25	-	-	-						13:58	-04:27	
9 San Bruno - outbound <sup>1</sup>	motorcoach	curb	Main	1st					07:15	07:15	curb	Steuart	1st					05:12	05:12		
		center	1st	11th			03:12	04:58	04:57	20:22	center	1st	11th			02:44	03:45	04:28	16:09	-04:13	
9R San Bruno Rapid - inbound <sup>1</sup>	motorcoach	center	11th	1st			04:13	05:19		15:13	center	11th	Spear			02:48	04:11	04:14	02:45	13:58	
		curb	1st	Spear					03:12	18:25	-	-	-						13:58	-04:27	
9R San Bruno Rapid - outbound <sup>1</sup>	motorcoach	curb	Main	1st					07:15	07:15	curb	Main	1st					05:12	05:12		
		center	1st	11th			03:12	04:58	04:57	20:22	center	1st	11th			02:44	03:45	04:28	16:09	-04:13	
21 Hayes - inbound <sup>1</sup>	trolleybus	center	Polk/10th	1st			05:41	05:19		11:00	curb	Polk/10th	1st			05:39	06:29		12:08		
		curb	1st	Spear					03:12	14:12	center	1st	Spear					02:45	14:53	00:41	
21 Hayes - outbound	trolleybus	curb	Steuart	Hayes			02:48	05:53	06:48	07:15	22:44	curb	Steuart	Hayes			02:36	05:19	05:35	05:12	18:42
31 Balboa - inbound	trolleybus	center	Turk	1st			02:51	05:19		08:09	curb	Turk	1st			02:50	06:29		09:18		
		curb	1st	Spear					03:12	11:22	center	1st	Spear					02:45	12:03	00:42	
31 Balboa - outbound	trolleybus	curb	Steuart	Turk			02:57	06:48		07:15	17:00	curb	Steuart	Turk			02:40	05:35	05:12	13:26	-03:33
38 Geary - inbound	motorcoach	curb	O'Farrell	1st				03:57		03:57	curb	O'Farrell	1st				03:15		03:15	-00:42	
38 Geary - outbound	motorcoach	curb	Fremont	Geary				03:24		03:24	curb	Fremont	Geary				02:47		02:47	-00:37	
38R Geary Rapid - inbound	motorcoach	curb	O'Farrell	1st				03:57		03:57	curb	O'Farrell	1st				03:15		03:15	-00:42	
38R Geary Rapid - outbound	motorcoach	curb	Fremont	Geary				03:24		03:24	curb	Fremont	Geary				02:47		02:47	-00:37	
Mission Street																					
14 Mission - inbound <sup>3</sup>	motorcoach	curb	S. Van Ness	Main			05:45	05:10	08:50	02:14	21:59	curb	S. Van Ness	Main			05:55	05:22	07:17	02:14	20:48
14 Mission - outbound <sup>3</sup>	motorcoach	curb	Steuart	S. Van Ness			07:58	05:00	05:04	04:07	22:09	curb	Steuart	S. Van Ness			07:14	04:56	05:04	04:08	21:22
14R Mission Rapid - inbound <sup>3</sup>	trolleybus	curb	S. Van Ness	Main			05:45	05:10	08:50	02:14	21:59	curb	S. Van Ness	Main			05:55	05:22	07:17	02:14	20:48
14R Mission Rapid - outbound <sup>3</sup>	trolleybus	curb	Steuart	S. Van Ness			07:58	05:00	05:04	04:07	22:09	curb	Steuart	S. Van Ness			07:14	04:56	05:04	04:08	21:22
14X Mission Express - inbound	motorcoach	curb	6th	Main			05:10	08:50	02:14	16:14	curb	6th	Main				05:22	07:17	02:14	14:53	-01:21
14X Mission Express - outbound	motorcoach	curb	Steuart	6th			05:00	05:04	04:07	14:11	curb	Steuart	6th				04:56	05:04	04:08	14:08	-00:03

<sup>1</sup> Gray shaded cells indicate locations where travel time comparisons were not available. There are not any bus routes that run the length of the Market Street travel time segment from Octavia Blvd to 10th Street, therefore it was not feasible to record the travel times for buses this segment in order to extrapolate travel times for those that do run on a portion of this segment (e.g., the 6 and 7). In a similar manner, there are not any bus routes that run the length of the Market Street travel time segment between 10th to 7th streets in the inbound curb lane (the curb transit lane currently starts east of 8th Street). Therefore, the travel time comparison for Baseline and 2020 Plus Project scenarios is based on the segments starting at 10th Street for the 6 Haight/Parnassus and 7 Haight/Noriega, and at 7th Street for inbound routes that travel in the curb lane.

<sup>2</sup> 7X inbound is not analyzed here because it does not operate in the PM.

<sup>3</sup> The western most travel time segment for Mission Street is from 7th to South Van Ness, instead of 10th Street or Octavia. Therefore, the travel times extend to South Van Ness.

2040 Transit Travel Time Summary - Market and Mission Streets

Purple indicates lane change along the route <sup>3</sup>		No Project			2020 Baseline Travel Times (no 2040 Baseline modeled) <sup>4</sup>						Project			2040 Project Travel Time						TT Difference (2020 Baseline to 2040 PP)
Route - direction	Vehicle Type	Lane Position	Entrance	Exit	1st - Octavia - 10th - 7th - 4th - Spear/Main/ 10th 7th 4th 1st Steuart Total Travel Time						Lane Position	Entrance	Exit	1st - Octavia - 10th - 7th - 4th - Spear/Main/ 10th 7th 4th 1st Steuart Total Travel Time						
					Market Street															
F Market & Wharves - inbound	streetcar	center	Castro	Steuart	06:13	05:16	06:48	06:28	04:13	28:58	center	Castro	Steuart	06:35	03:15	05:09	05:36	03:48	24:23	-04:35
F Market & Wharves - outbound	streetcar	center	Steuart	Castro	05:36	03:57	05:16	05:35	06:52	27:16	center	Steuart	Castro	05:36	02:15	04:03	04:53	04:08	20:55	-06:21
2 Clement - inbound	trolleybus	center	Montgomery	1st				02:40		02:40	curb	Montgomery	1st				03:29		03:29	00:49
2 Clement - outbound	trolleybus	curb	Steuart	Sutter					07:15	07:15	curb	Steuart	Sutter					05:33	05:33	-01:42
5 Fulton - inbound	motorcoach	curb	McAllister	1st			05:55	07:53		13:48	center	McAllister	2nd			04:38	02:42		07:20	-03:00
		-	-	-						13:48	curb	2nd	1st			03:29		10:48		
5 Fulton - outbound	motorcoach	curb	Fremont	McAllister			05:53	06:48		12:41	center	Fremont	McAllister			04:00	04:46		08:46	-03:55
5R Fulton Rapid - inbound	trolleybus	curb	McAllister	1st			05:55	07:53		13:48	center	McAllister	2nd			04:38	02:42		07:20	-03:00
		-	-	-						13:48	curb	2nd	1st			03:29		10:48		
5R Fulton Rapid - outbound	trolleybus	curb	Fremont	McAllister			05:53	06:48		12:41	center	Fremont	McAllister			04:00	04:46		08:46	-03:55
6 Haight/Parnassus - inbound <sup>1</sup>	trolleybus	center	Haight	1st			05:41	05:19		11:00	center	Haight	10th						00:00	02:23
		curb	1st	Spear					02:58	02:58	curb	10th	1st			06:02	06:57		12:59	
		-	-	-						13:58	center	1st	Spear				03:22		16:21	
6 Haight/Parnassus - outbound <sup>1</sup>	trolleybus	curb	Steuart	1st					07:15	07:15	curb	Steuart	10th		02:42	05:22	07:50	05:33	21:27	02:09
		center	1st	Haight		02:08	04:58	04:57		19:18	center	10th	Haight						21:27	
7 Haight/Noriega - inbound <sup>1</sup>	motorcoach	center	Haight	7th						00:00	center	Haight	10th						00:00	-00:49
		curb	7th	1st			05:55	07:53		13:48	curb	10th	1st			06:02	06:57		12:59	
7 Haight/Noriega - outbound <sup>1</sup>	motorcoach	center	Fremont	Haight			04:58	04:57		09:55	curb	Fremont	10th			05:22	07:50		13:12	03:17
		-	-	-						00:00	center	10th	Haight					00:00		
7X Noriega Express - outbound <sup>2</sup>	motorcoach	curb	Main	Turk			02:57	06:48	07:15	17:00	curb	Main	Turk			02:41	07:50	05:33	16:04	-00:55
9 San Bruno - inbound <sup>1</sup>	motorcoach	center	11th	1st		04:13	05:41	05:19		15:13	center	11th	Spear		02:54	04:38	05:23	03:22	16:17	-02:08
		curb	1st	Spear					03:12	18:25	-	-	-						16:17	
9 San Bruno - outbound <sup>1</sup>	motorcoach	curb	Main	1st					07:15	07:15	curb	Steuart	1st					05:33	05:33	-03:16
		center	1st	11th		03:12	04:58	04:57		20:22	center	1st	11th		02:47	04:00	04:46		17:06	
9R San Bruno Rapid - inbound <sup>1</sup>	motorcoach	center	11th	1st		04:13	05:41	05:19		15:13	center	11th	Spear		02:54	04:38	05:23	03:22	16:17	-02:08
		curb	1st	Spear					03:12	18:25	-	-	-						16:17	
9R San Bruno Rapid - outbound <sup>1</sup>	motorcoach	curb	Main	1st					07:15	07:15	curb	Main	1st					05:33	05:33	-03:16
		center	1st	11th		03:12	04:58	04:57		20:22	center	1st	11th		02:47	04:00	04:46		17:06	
21 Hayes - inbound <sup>1</sup>	trolleybus	center	Polk/10th	1st			05:41	05:19		11:00	curb	Polk/10th	1st			06:02	06:57		12:59	02:09
		curb	1st	Spear					03:12	14:12	center	1st	Spear				03:22		16:21	
21 Hayes - outbound	trolleybus	curb	Steuart	Hayes		02:48	05:53	06:48	07:15	22:44	curb	Steuart	Hayes		02:42	05:22	07:50	05:33	21:27	-01:17
31 Balboa - inbound	trolleybus	center	Turk	1st			02:51	05:19		08:09	curb	Turk	1st			03:01	06:57		09:58	01:58
		curb	1st	Spear					03:12	11:22	center	1st	Spear				03:22		13:20	
31 Balboa - outbound	trolleybus	curb	Steuart	Turk			02:57	06:48	07:15	17:00	curb	Steuart	Turk			02:41	07:50	05:33	16:04	-00:55
38 Geary - inbound	motorcoach	curb	O'Farrell	1st				03:57		03:57	curb	O'Farrell	1st				03:29		03:29	-00:28
38 Geary - outbound	motorcoach	curb	Fremont	Geary				03:24		03:24	curb	Fremont	Geary				03:55		03:55	00:31
38R Geary Rapid - inbound	motorcoach	curb	O'Farrell	1st				03:57		03:57	curb	O'Farrell	1st				03:29		03:29	-00:28
38R Geary Rapid - outbound	motorcoach	curb	Fremont	Geary				03:24		03:24	curb	Fremont	Geary				03:55		03:55	00:31

<sup>1</sup> Gray shaded cells indicate locations where travel time comparisons were not available. There are not any bus routes that run the length of the Market Street travel time segment from Octavia Blvd to 10th Street, therefore it was not feasible to record the travel times for buses this segment in order to extrapolate travel times for those that do run on a portion of this segment (e.g., the 6 and 7). In a similar manner, there are not any bus routes that run the length of the Market Street travel time segment between 10th to 7th streets in the inbound curb lane (the curb transit lane currently starts east of 8th Street). Therefore, the travel time comparison for Baseline and 2020 Plus Project scenarios is based on the segments starting at 10th Street for the 6 Haight/Parnassus and 7 Haight/Noriega, and at 7th Street for inbound routes that travel in the curb lane.

<sup>2</sup> 7X inbound is not analyzed here because it does not operate in the PM.

<sup>3</sup> Mission Street transit would operate within center-running transit only lanes in the future based on the Muni Forward project.

<sup>4</sup> 2020 no project conditions are used as a proxy to conservatively represent 2040 no project conditions. 2040 conditions without the project would have slower travel times compared to the 2020 shown here due to growth in traffic using Market Street.

# 2020 Transit Delay Analysis - Cross Streets

## Transit Delay Analysis Summary

		PM Peak Hour									
		Route	3	10	12 / 11	19	27	41 / 30X <sup>1</sup>	82X <sup>2</sup>	24 / 54 / 92 / 93	FiDi
Inbound	Baseline Travel Delay	04:04	05:08	23:47	02:16	06:17	00:45		12:02	17:10	17:19
	Baseline Plus Project Travel Delay	04:16	03:54	22:40	03:12	06:28	00:40		12:40	14:11	16:13
	Delay Added by Project	+0:11	-1:14	-1:06	+0:55	+0:11	-0:05		+0:37	-2:59	-1:05
	Transit Headway	15:00	06:00	15:00	15:00	15:00	08:00		15:00	12:00	30:00
	Delay as Percent of Headway	1%	-21%	-7%	6%	1%	-1%		4%	-25%	-4%
	Significant Impact?	NO	NO	NO	NO	NO	NO		NO	NO	NO
Outbound	Baseline Travel Delay	03:43	06:35	06:16	01:43	01:57	02:25	00:45	02:11	04:21	15:42
	Baseline Plus Project Travel Delay	03:55	06:25	06:14	02:19	05:28	01:30	00:40	05:03	04:22	17:22
	Delay Added by Project	+0:12	-0:10	-0:02	+0:36	+3:32	-0:55	-0:05	+2:52	+0:01	+1:40
	Transit Headway	15:00	06:00	15:00	15:00	15:00	08:00	15:00	15:00	12:00	30:00
	Delay as Percent of Headway	1%	-3%	0%	4%	24%	-11%	-1%	19%	0%	6%
	Significant Impact?	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Notes: Transit headways current as of December 2017. Golden Gate Transit headways reflect the shortest headway of all routes along each shared alignment.

1. 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.

2. Not studied because 82X is a peak-direction-only express route so only the 82X outbound operates during the PM peak hour.

3. Golden Gate Transit Transbay Terminal (TT) routes' "travel delay" includes total travel time along Mission Street rather than solely delay.

Source: Fehr & Peers, 2018

## 2020 Transit Delay Analysis - Cross Streets

### Transit Delay - 2020 Baseline Conditions (in minutes)

Route <sup>1,2</sup>	3	10	12 / 11	19	27	41 / 30X <sup>3</sup>	82X <sup>4</sup>	24 / 54 / 92 / 93	FiDi	TT <sup>5</sup>
<b>PM Peak Hour</b>										
<i>Inbound</i>										
Intersection Delay	04:04.4	05:07.8	23:34.9	02:13.9	06:10.7	00:45.3		11:54.1	17:00.8	17:16.1
Re-Entry Delay	00:00.0	00:00.5	00:12.0	00:02.5	00:06.0	00:00.0		00:08.0	00:09.5	00:02.5
Total Travel Delay	04:04.4	05:08.3	23:46.9	02:16.4	06:16.7	00:45.3		12:02.1	17:10.3	17:18.6
<i>Outbound</i>										
Intersection Delay	03:43.4	06:34.7	06:16.4	01:38.0	01:49.7	02:23.4	00:45.3	02:06.4	04:20.0	15:37.7
Re-Entry Delay	00:00.0	00:00.0	00:00.0	00:05.0	00:07.0	00:01.5	00:00.0	00:04.5	00:01.5	00:04.5
Total Travel Delay	03:43.4	06:34.7	06:16.4	01:43.0	01:56.7	02:24.9	00:45.3	02:10.9	04:21.5	15:42.2

#### Notes:

1. Passenger Loading Delay is not included in this analysis because passenger loads are not anticipated to change between Existing and Plus Project conditions.
2. The Muni 47, 49, 30, 45, and 8 routes also provide cross-street transit service. However, they are not included in this analysis because their routes are in dedicated transit-only lanes through the Better Market Street study area.
3. 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.
4. Not studied because 82X is a peak-direction-only express route so only the 82X outbound operates during the PM peak hour.
5. Golden Gate Transit Transbay Terminal (TT) routes' "travel delay" includes total travel time along Mission Street rather than solely delay.

Source: Fehr & Peers, 2018

## Intersection Delay Calculations by Line

## Notes:

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Hardcode inputs based on SFMTA route maps and Existing Transit Facilities Figure

Unsignalized intersections (the delay is manually removed from the Total Delay calculations)

Delay over 100 seconds

Corridor / HOV Adjust = Delay adjustments applied per SF Bike Plan methodology to account for transit-only Lanes ("HOV") or three intersections in a row with LOS F approaches.

## 2020 Baseline PM

Line No	Direction	Input	Study Intersections												Total Delay		Ave Delay		Non-Study		Final Delay		
			Grant/Post	Kearny/Post	Sansome/Sutter										Signal	Unsig	Signal	Unsig	Signal	Unsig			
3	Inbound	Intersection Approach	EB	EB	SW											3				0	0		
		Appr. Delay	6.5	14.5	223.4											244							
		Appr. V/C	0.23	0.30	-																		
		Adjusted Delay	6.5	14.5	223.4																		
		Corridor/HOV Adjust																					
	Final Delay	6.5	14.5	223.4											244	0	1				244		
	Outbound	Intersection Approach	Sansome/Sutter	SW											1				0	0			
		Appr. Delay	223.4											223									
		Appr. V/C	-																				
		Adjusted Delay	223.4																				
Corridor/HOV Adjust																							
Final Delay	223.4											223	0	1				223					
10	Inbound	Intersection Approach	2nd/Folsom	2nd/Howard	2nd/Mission	2nd/Market	Market/Sansome	Sansome/Sutter							6				0	0			
		Appr. Delay	NB	NB	NB	NB	EB	WB							308								
		Appr. V/C	39.6	49.0	58.4	112.7	29.8	18.3															
		Adjusted Delay	0.94	0.98	-	-	-	-															
		Corridor/HOV Adjust	39.6	49.0	58.4	112.7	29.8	18.3															
	Final Delay	39.6	49.0	58.4	112.7	29.8	18.3							308	0	1				308			
	Outbound	Intersection Approach	2nd/Folsom	2nd/Howard	2nd/Mission	2nd/Market	Market/Sansome	Sansome/Sutter							6				0	0			
		Appr. Delay	SB	SB	SB	WB	WB	SW							395								
		Appr. V/C	17.1	39.4	61.6	34.9	18.3	223.4															
		Adjusted Delay	0.70	0.98	-	-	-	-															
Corridor/HOV Adjust		17.1	39.4	61.6	34.9	18.3	223.4																
Final Delay	17.1	39.4	61.6	34.9	18.3	223.4							395	0	1				395				
12 / 11	Inbound	Intersection Approach	10th/Folsom	9th/Folsom	8th/Folsom	7th/Folsom	6th/Folsom	5th/Folsom	4th/Folsom	3rd/Folsom	2nd/Folsom	2nd/Howard	2nd/Mission	2nd/Market	Market/Sansome	13				0	0		
		Appr. Delay	EB	EB	EB	EB	EB	EB	EB	EB	EB	NB	NB	NB	EB								
		Appr. V/C	28.9	23.0	17.0	51.1	85.1	160.3	235.5	213.9	192.3	49.0	58.4	112.7	29.8	1257							
		Adjusted Delay	0.80	0.82	0.83	0.98	1.13	1.33	1.52	1.45	1.37	0.98	-	-	-								
		Corridor/HOV Adjust	28.9	23.0	17.0	51.1	85.1	240.0	240.0	240.0	240.0	49.0	58.4	112.7	29.8								
	Final Delay	28.9	23.0	17.0	51.1	85.1	240.0	240.0	240.0	240.0	49.0	58.4	112.7	29.8	1415	0	1			1415			
	Outbound	Intersection Approach	Sansome/Sutter	2nd/Market	2nd/Mission	2nd/Howard	2nd/Folsom										5				0	0	
		Appr. Delay	SW	WB	SB	SB	SB										376						
		Appr. V/C	223.4	34.9	61.6	39.4	17.1																
		Adjusted Delay	-	-	-	0.98	0.70																
Corridor/HOV Adjust		223.4	34.9	61.6	39.4	17.1																	
Final Delay	223.4	34.9	61.6	39.4	17.1										376	0	1				376		
19	Inbound	Intersection Approach	7th/Howard	7th/Mission	7th/Market	8th/Market	9th/Market									5				0	0		
		Appr. Delay	NB	NB	NB	WB	WB									201							
		Appr. V/C	15.0	34.7	76.7	40.0	34.2																
		Adjusted Delay	0.70	-	-	-	-																
		Corridor/HOV Adjust	15.0	34.7	76.7	40.0	34.2																
	Final Delay	15.0	34.7	76.7	40.0	34.2									134	0	1				134		
	Outbound	Intersection Approach	Hyde/Market	8th/Mission	8th/Howard	8th/Folsom								4				0	0				
		Appr. Delay	SW	SB	SB	SB								98									
		Appr. V/C	20.1	32.0	26.0	19.9																	
		Adjusted Delay	-	-	0.94	0.86																	
Corridor/HOV Adjust		20.1	32.0	26.0	19.9																		
Final Delay	20.1	32.0	26.0	19.9								98	0	1				98					
27	Inbound	Intersection Approach	6th/Folsom	5th/Folsom	5th/Howard	5th/Mission	5th/Market	Cyril Magnin/Ellis								6				0	0		
		Appr. Delay	NB	EB	NB	NB	NB	NB								291							
		Appr. V/C	30.6	160.3	11.0	19.4	49.1	20.6															
		Adjusted Delay	0.92	1.33	0.50	-	-	0.30															
		Corridor/HOV Adjust	30.6	240.0	11.0	19.4	49.1	20.6															
	Final Delay	30.6	240.0	11.0	19.4	49.1	20.6								371	0	1				371		
	Outbound	Intersection Approach	Mason/Eddy	5th/Market	5th/Mission	5th/Howard							4				0	0					
		Appr. Delay	SB	SB	SB	SB							110										
		Appr. V/C	7.1	18.8	73.0	10.8																	
		Adjusted Delay	0.23	-	-	0.50																	
Corridor/HOV Adjust		7.1	18.8	73.0	10.8																		
Final Delay	7.1	18.8	73.0	10.8							110	0	1				110						

## Intersection Delay Calculations by Line

## Notes:

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Hardcode inputs based on SFMTA route maps and Existing Transit Facilities Figure

Unsignalized intersections (the delay is manually removed from the Total Delay calculations)

Delay over 100 seconds

Corridor / HOV Adjust = Delay adjustments applied per SF Bike Plan methodology to account for transit-only Lanes ("HOV") or three intersections in a row with LOS F approaches.

## 2020 Baseline PM

Line No	Direction	Input	Study Intersections								Total Delay		Ave Delay		Non-Study		Final Delay	
											Signal	Unsig	Signal	Unsig	Signal	Unsig		
41 / 30X*	Inbound	Intersection Approach	Davis/Market SW	Beale/Mission SB									2		0	0		
		Appr. Delay	35.3	43.8									79					
		Appr. V/C	-	-														
		Adjusted Delay	35.3	43.8														
		Corridor/HOV Adjust		33.8														
		Final Delay	35.3	10.0									45	0	1		45	
	Outbound	Intersection Approach	Main/Mission NB	Main/Market NB									2		0	0		
		Appr. Delay	70.7	72.7									143					
		Appr. V/C	-	-	*Note: 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.													
		Adjusted Delay	70.7	72.7														
		Corridor/HOV Adjust																
		Final Delay	70.7	72.7									143	0	1		143	
82X	Inbound	Intersection Approach											0		0	0		
		Appr. Delay	Not studied because 82X is a peak-direction-only express route so only the 82X outbound operates during the PM peak hour.										0					
		Appr. V/C																
		Adjusted Delay																
		Corridor/HOV Adjust																
		Final Delay											0	0	#DIV/0!		0	
	Outbound	Intersection Approach	Davis/Market SW	Beale/Mission SB									2		0	0		
		Appr. Delay	35.3	43.8									79					
		Appr. V/C	-	-														
		Adjusted Delay	35.3	43.8														
		Corridor/HOV Adjust		33.8														
		Final Delay	35.3	10.0									45	0	1		45	
24 / 54 / 92 / 93	Inbound	Intersection Approach	8th/Market SW	8th/Mission SB	8th/Howard SB	8th/Folsom SB	7th/Folsom EB	6th/Folsom EB	5th/Folsom EB	4th/Folsom EB	8			0	0			
		Appr. Delay	20.1	32.0	26.0	19.9	51.1	85.1	160.3	235.5	630							
		Appr. V/C	-	-	0.94	0.86	0.98	1.13	1.33	1.52								
		Adjusted Delay	20.1	32.0	26.0	19.9	51.1	85.1	240.0	240.0								
		Corridor/HOV Adjust																
		Final Delay	20.1	32.0	26.0	19.9	51.1	85.1	240.0	240.0	714	0	1			714		
	Outbound	Intersection Approach	7th/Howard NB	7th/Mission NB	7th/Market NB								3		0	0		
		Appr. Delay	15.0	34.7	76.7								126					
		Appr. V/C	0.70	-	-													
		Adjusted Delay	15.0	34.7	76.7													
		Corridor/HOV Adjust																
		Final Delay	15.0	34.7	76.7								126	0	1		126	
FIDI	Inbound	Intersection Approach	Battery/Market SW	1st/Mission SB	1st/Howard SB	2nd/Howard WB	3rd/Howard WB	4th/Howard WB	4th/Folsom SB		7			0	0			
		Appr. Delay	382.6	458.2	102.9	120.7	90.4	55.6	42.2		1253							
		Appr. V/C	-	-	0.96	1.23	1.16	0.89	0.98									
		Adjusted Delay	382.6	458.2	200.0	240.0	90.4	55.6	42.2									
		Corridor/HOV Adjust		448.2														
		Final Delay	382.6	10.0	200.0	240.0	90.4	55.6	42.2		1021	0	1			1021		
	Outbound	Intersection Approach	2nd/Folsom EB	Fremont/Mission NB	Fremont/Market NB								3		0	0		
		Appr. Delay	192.3	33.3	47.6								273					
		Appr. V/C	1.37	-	-													
		Adjusted Delay	240.0	33.3	47.6													
		Corridor/HOV Adjust		23.3	37.6													
		Final Delay	240.0	10.0	10.0								260	0	1		260	
TT	Inbound	Intersection Approach	Hyde/Market SW	8th/Mission SB	7th to Main uses travel times	Beale/Mission EB								4		0	0	
		Appr. Delay	20.1	32.0		64.9								117				
		Appr. V/C	-	-		-												
		Adjusted Delay	20.1	32.0		64.9												
		Corridor/HOV Adjust				54.9												
		Final Delay	20.1	32.0	974.0	10.0								1036	0	9		1036
	Outbound	Intersection Approach	Fremont/Mission NB	Steuart to 7th uses travel times	7th/Market NB								3		0	0		
		Appr. Delay	33.3		76.7								110					
		Appr. V/C	-		-													
		Adjusted Delay	33.3		76.7													
		Corridor/HOV Adjust	23.3															
		Final Delay	10.0	851.0	76.7								938	0	9		938	





**Re-Entry Delay by Line****Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Grey Shaded Cells are hardcode inputs

Unsignalized intersection

Far side stops - Use downstream intersection volume. Otherwise, the stop is near side and the approach volume for the nearest intersection to the stop is used.

"Stop Present" refers to stops where buses have to pull out of the travel lane. Stops with bulb outs, boarding islands, or transit-only lanes (and therefore without re-entry delay) are noted with "Bulb".

**2020 Baseline PM**

Line No	Direction	Input	Study Intersections							Total	
27	Inbound	Intersection	6th/Folsom	5th/Folsom	5th/Howard	5th/Howard	5th/Mission	5th/Market	Cyril Magnin/Ellis	7	
		Approach	NB	EB	NB	NB	NB	NB	NB		
		Stop Present?	Bulb		Y	Y	Y	Bulb		5	
		Appr. Lanes			2	2	2				
		Appr. Volume			630	630	646				
		Vol/Lane Round			300	300	300				
	Outbound	Re-Entry Delay			2.0	2.0	2.0			6	
		Intersection	Mason/Eddy	5th/Market	5th/Mission	5th/Howard	Note that the 5th/Howard delay is counted twice because the stop at 5th/Folsom is a far side stop on the northbound leg after the 27 Bryant turns from Folsom to 5th Street.				
		Approach	SB	SB	SB	SB					4
		Stop Present?		Y	Y	Y					3
Appr. Lanes			2	2	3						
41 / 30X*	Inbound	Appr. Volume		722	755	780					
		Vol/Lane Round		350	400	250					
		Re-Entry Delay		2.5	3.0	1.5					7
		Intersection	Davis/Market	Beale/Mission							2
		Approach	SW	SB							
	Outbound	Stop Present?		Bulb							1
		Intersection	Main/Mission	Main/Market							0
		Approach	NB	NB							2
		Stop Present?		Y							1
		Appr. Lanes		3							
82X	Inbound	Appr. Volume		688	*Note: 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.						
		Vol/Lane Round		250							
		Re-Entry Delay		1.5						2	
		Intersection	Davis/Market	Beale/Mission							0
		Approach	SW	SB							
	Outbound	Stop Present?		Bulb							0
		Intersection	Davis/Market	Beale/Mission							2
		Approach	SW	SB							
		Stop Present?		Bulb							1
		Appr. Lanes									
24 / 54 / 92 / 93	Inbound	Appr. Volume									0
		Vol/Lane Round									
		Re-Entry Delay									
		Intersection	8th/Market	8th/Mission	8th/Howard	8th/Folsom	7th/Folsom	6th/Folsom	5th/Folsom	4th/Folsom	8
		Approach	SW	SB	SB	SB	EB	EB	EB	EB	
	Outbound	Stop Present?	Y	Bulb			Bulb			Y	4
		Appr. Lanes	3							4	
		Appr. Volume	1,398							2,120	
		Vol/Lane Round	450							550	
		Re-Entry Delay	3.5							4.5	8
Outbound	Intersection	7th/Howard	7th/Mission	7th/Market						3	
	Approach	NB	NB	NB							
	Stop Present?			Y						1	
	Appr. Lanes			3							
	Appr. Volume			1,620							
Outbound	Vol/Lane Round			550							
	Re-Entry Delay			4.5						5	

**Re-Entry Delay by Line****Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Grey Shaded Cells are hardcode inputs

Unsignalized intersection

Far side stops - Use downstream intersection volume. Otherwise, the stop is near side and the approach volume for the nearest intersection to the stop is used.

"Stop Present" refers to stops where buses have to pull out of the travel lane. Stops with bulb outs, boarding islands, or transit-only lanes (and therefore without re-entry delay) are noted with "Bulb".

**2020 Baseline PM**

Line No	Direction	Input	Study Intersections							Total
FiDi	Inbound	Intersection	Battery/Market	1st/Mission	1st/Howard	2nd/Howard	3rd/Howard	4th/Howard	4th/Folsom	7
		Approach	SW	SB	SB	WB	WB	WB	SB	
		Stop Present?	Y	Y		Y			Y	4
		Appr. Lanes	3	4		4			4	
		Appr. Volume	654	1,013		1,985			1,550	
		Vol/Lane Round	200	250		500			400	
		Re-Entry Delay	1.0	1.5		4.0			3.0	10
	Outbound	Intersection	2nd/Folsom	Fremont/Mission	Fremont/Market					3
		Approach	EB	NB	NB					
		Stop Present?	Bulb		Y					2
		Appr. Lanes			4					
		Appr. Volume			1,081					
TT	Inbound	Vol/Lane Round			250					
		Re-Entry Delay			1.5					2
	Outbound	Intersection	Hyde/Market	8th/Mission	7th to Main	Beale/Mission				4
		Approach	SW	SB	uses travel times	EB				
		Stop Present?	Y	Bulb						2
		Appr. Lanes	4							
		Appr. Volume	1,398							
		Vol/Lane Round	350							
		Re-Entry Delay	2.5		in int. delay					3
	Outbound	Intersection	Fremont/Mission	Steuart to 7th	7th/Market					3
		Approach	NB	uses travel times	NB					
		Stop Present?	Bulb		Y					2
		Appr. Lanes			3					
		Appr. Volume			1,620					
		Vol/Lane Round			550					
		Re-Entry Delay		in int. delay	4.5					5

## 2020 Transit Delay Analysis - Cross Streets

### Transit Delay - 2020 Baseline Plus Project Conditions (in minutes)

Route <sup>1,2</sup>	3	10	12 / 11	19	27	41 / 30X <sup>3</sup>	82X <sup>4</sup>	24 / 54 / 92 / 93	FiDi	TT <sup>5</sup>
<b>PM Peak Hour</b>										
<i>Inbound</i>										
Intersection Delay	04:15.7	03:54.1	22:29.0	03:08.6	06:22.2	00:40.2		12:30.5	14:01.2	16:10.4
Re-Entry Delay	00:00.0	00:00.0	00:11.5	00:03.0	00:05.5	00:00.0		00:09.0	00:10.0	00:03.0
Total Travel Delay	04:15.7	03:54.1	22:40.5	03:11.6	06:27.7	00:40.2		12:39.5	14:11.2	16:13.4
<i>Outbound</i>										
Intersection Delay	03:55.4	06:24.8	06:14.2	02:14.3	05:19.9	01:29.4	00:40.2	04:59.1	04:20.0	17:18.3
Re-Entry Delay	00:00.0	00:00.0	00:00.0	00:04.5	00:08.5	00:00.5	00:00.0	00:04.0	00:02.5	00:04.0
Total Travel Delay	03:55.4	06:24.8	06:14.2	02:18.8	05:28.4	01:29.9	00:40.2	05:03.1	04:22.5	17:22.3

#### Notes:

1. Passenger Loading Delay is not included in this analysis because passenger loads are not anticipated to change between Existing and Plus Project conditions.
2. The Muni 47, 49, 30, 45, and 8 routes also provide cross-street transit service. However, they are not included in this analysis because their routes are in dedicated transit-only lanes through the Better Market Street study area.
3. 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.
4. Not studied because 82X is a peak-direction-only express route so only the 82X outbound operates during the PM peak hour.
5. Golden Gate Transit Transbay Terminal (TT) routes' "travel delay" includes total travel time along Mission Street rather than solely delay.

Source: Fehr & Peers, 2018

## Intersection Delay Calculations by Line

## Notes:

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Hardcode inputs based on SFMTA route maps and Existing Transit Facilities Figure

Unsignalized intersections (the delay is manually removed from the Total Delay calculations)

Delay over 100 seconds

Corridor / HOV Adjust = Delay adjustments applied per SF Bike Plan methodology to account for transit-only Lanes ("HOV") or three intersections in a row with LOS F approaches.

## 2020 Baseline Plus Project PM

Line No	Direction	Input	Study Intersections												Total Delay				
			Signal	Unsig	Final Delay														
3	Inbound	Intersection Approach	Grant/Post EB	Kearny/Post EB	Sansome/Sutter SW								3						
		Appr. Delay	6.4	13.9	235.4								256						
		Appr. V/C	0.23	0.25	-														
		Adjusted Delay	6.4	13.9	235.4														
		Corridor/HOV Adjust																	
		Final Delay	6.4	13.9	235.4								256	0	256				
	Outbound	Intersection Approach	Sansome/Sutter SW											1					
		Appr. Delay	235.4											235					
		Appr. V/C	-																
		Adjusted Delay	235.4																
		Corridor/HOV Adjust																	
		Final Delay	235.4											235	0	235			
10	Inbound	Intersection Approach	2nd/Folsom NB	2nd/Howard NB	2nd/Mission NB	2nd/Market NB	Market/Sansome EB	Sansome/Sutter WB						6					
		Appr. Delay	39.6	48.1	56.6	57.0	22.3	10.5						234					
		Appr. V/C	0.94	1.05	-	-	-	-											
		Adjusted Delay	39.6	48.1	56.6	57.0	22.3	10.5											
		Corridor/HOV Adjust																	
		Final Delay	39.6	48.1	56.6	57.0	22.3	10.5						234	0	234			
	Outbound	Intersection Approach	2nd/Folsom SB	2nd/Howard SB	2nd/Mission SB	2nd/Market WB	Market/Sansome WB	Sansome/Sutter SW						6					
		Appr. Delay	13.3	29.8	46.2	49.6	10.5	235.4						385					
		Appr. V/C	0.57	0.79	-	-	-	-											
		Adjusted Delay	13.3	29.8	46.2	49.6	10.5	235.4											
		Corridor/HOV Adjust																	
		Final Delay	13.3	29.8	46.2	49.6	10.5	235.4						385	0	385			
12 / 11	Inbound	Intersection Approach	10th/Folsom EB	9th/Folsom EB	8th/Folsom EB	7th/Folsom EB	6th/Folsom EB	5th/Folsom EB	4th/Folsom EB	3rd/Folsom EB	2nd/Folsom EB	2nd/Howard NB	2nd/Mission NB	2nd/Market NB	Market/Sansome EB	13			
		Appr. Delay	28.9	23.0	17.0	51.1	85.1	160.3		235.5	213.7	191.8	48.1	56.6	57.0	22.3	1190		
		Appr. V/C	0.80	0.82	0.83	0.98	1.13	1.33		1.52	1.45	1.37	1.05	-	-	-			
		Adjusted Delay	28.9	23.0	17.0	51.1	85.1	240.0		240.0	240.0	240.0	48.1	56.6	57.0	22.3			
		Corridor/HOV Adjust																	
		Final Delay	28.9	23.0	17.0	51.1	85.1	240.0		240.0	240.0	240.0	48.1	56.6	57.0	22.3	1349	0	1349
	Outbound	Intersection Approach	Sansome/Sutter SW	2nd/Market WB	2nd/Mission SB	2nd/Howard SB	2nd/Folsom SB										5		
		Appr. Delay	235.4	49.6	46.2	29.8	13.3										374		
		Appr. V/C	-	-	-	0.79	0.57												
		Adjusted Delay	235.4	49.6	46.2	29.8	13.3												
		Corridor/HOV Adjust																	
		Final Delay	235.4	49.6	46.2	29.8	13.3										374	0	374
19	Inbound	Intersection Approach	7th/Howard NB	7th/Mission NB	7th/Market NB	8th/Market WB	9th/Market WB									5			
		Appr. Delay	15.5	103.3	180.3	36.3	23.5									359			
		Appr. V/C	0.73	-	-	-	-												
		Adjusted Delay	15.5	103.3	180.3	36.3	23.5												
		Corridor/HOV Adjust			170.3														
		Final Delay	15.5	103.3	100	36.3	23.5									189	0	189	
	Outbound	Intersection Approach	Hyde/Market SW	8th/Mission SB	8th/Howard SB	8th/Folsom SB									4				
		Appr. Delay	29.8	37.6	34.9	32.1									134				
		Appr. V/C	-	-	0.98	0.98													
		Adjusted Delay	29.8	37.6	34.9	32.1													
		Corridor/HOV Adjust																	
		Final Delay	29.8	37.6	34.9	32.1									134	0	134		
27	Inbound	Intersection Approach	6th/Folsom NB	5th/Folsom EB	5th/Howard NB	5th/Mission NB	5th/Market NB	Cyril Magnin/Ellis NB								6			
		Appr. Delay	44.3	160.3	11.0	19.9	48.6	18.4								303			
		Appr. V/C	1.02	1.33	0.49	-	-	0.42											
		Adjusted Delay	44.3	240.0	11.0	19.9	48.6	18.4											
		Corridor/HOV Adjust																	
		Final Delay	44.3	240.0	11.0	19.9	48.6	18.4								382	0	382	
	Outbound	Intersection Approach	Mason/Eddy SB	5th/Market SB	5th/Mission SB	5th/Howard SB								4					
		Appr. Delay	8.5	100.1	198.8	12.5								320					
		Appr. V/C	0.09	-	-	0.63													
		Adjusted Delay	8.5	100.1	198.8	12.5													
		Corridor/HOV Adjust																	
		Final Delay	8.5	100.1	198.8	12.5								320	0	320			

### Intersection Delay Calculations by Line

**Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Hardcode inputs based on SFMTA route maps and Existing Transit Facilities Figure

Unsignalized intersections (the delay is manually removed from the Total Delay calculations)

Unsignalized Intersection  
Delay over 100 seconds

Corridor / HOV Adjust = Delay adjustments applied per SF Bike Plan methodology to account for transit-only Lanes ("HOV") or three intersections in a row with LOS F approaches.

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											Total Delay			
Line No	Direction	Input	Study Intersections								Signal	Unsig	Final Delay	
41 / 30X*	Inbound	Intersection	Davis/Market	Beale/Mission							2			
		Approach	SW	SB										
		Appr. Delay	30.2	43.3							74			
		Appr. V/C	-	-										
		Adjusted Delay	30.2	43.3										
		Corridor/HOV Adjust		33.3										
	Outbound	Final Delay	30.2	10.0							40	0	40	
		Intersection	Main/Mission	Main/Market							2			
		Approach	NB	NB										
		Appr. Delay	50.5	38.9							89			
		Appr. V/C	-	-										
		Adjusted Delay	50.5	38.9	*Note: 30X operates along the same segment as the 41 in the outbound direction in mixed flow lanes through the study area. The 30X outbound also travels along Market Street for one block then exits the study area at Pine Street. The 30X operates in transit only lanes within the study area in the inbound direction, from Market at Bush Street to Beale Street; therefore, is not assessed with the cross-street travel time analysis.									
82X	Inbound	Corridor/HOV Adjust									89	0	89	
		Final Delay	50.5	38.9										
		Intersection									0			
		Approach												
		Appr. Delay	Not studied because 82X is a peak-direction-only express route so only the 82X outbound operates during the PM peak hour.								0			
		Appr. V/C												
	Outbound	Adjusted Delay												
		Corridor/HOV Adjust									0	0	0	
		Final Delay												
		Intersection	Davis/Market	Beale/Mission							2			
		Approach	SW	SB										
		Appr. Delay	30.2	43.3							74			
24 / 54 / 92 / 93	Inbound	Appr. V/C	-	-	0.98	0.98	0.98	1.13	1.33	1.52				
		Adjusted Delay	29.8	37.6	34.9	32.1	51.1	85.1	240.0	240.0				
		Corridor/HOV Adjust												
		Final Delay	29.8	37.6	34.9	32.1	51.1	85.1	240.0	240.0				
		Intersection	8th/Market	8th/Mission	8th/Howard	8th/Folsom	7th/Folsom	6th/Folsom	5th/Folsom	4th/Folsom	8			
		Approach	SW	SB	SB	SB	EB	EB	EB	EB				
	Outbound	Appr. Delay	29.8	37.6	34.9	32.1	51.1	85.1	160.3	235.5	666			
		Appr. V/C	-	-	0.98	0.98	0.98	1.13	1.33	1.52				
		Adjusted Delay	29.8	37.6	34.9	32.1	51.1	85.1	240.0	240.0				
		Corridor/HOV Adjust												
		Final Delay	29.8	37.6	34.9	32.1	51.1	85.1	240.0	240.0	751	0	751	
		Intersection	7th/Howard	7th/Mission	7th/Market							3		
FIDi	Inbound	Approach	NB	NB	NB									
		Appr. Delay	15.5	103.3	180.3						299			
		Appr. V/C	0.73	-	-									
		Adjusted Delay	15.5	103.3	180.3									
		Corridor/HOV Adjust												
		Final Delay	15.5	103.3	180.3						299	0	299	
	Outbound	Intersection	Battery/Market	1st/Mission	1st/Howard	2nd/Howard	3rd/Howard	4th/Howard	4th/Folsom		7			
		Approach	SW	SB	SB	WB	WB	WB	SB					
		Appr. Delay	308.7	366.5	82.0	124.4	98.5	59.7	42.3		1082			
		Appr. V/C	-	-	0.84	1.23	1.17	0.90	0.98					
		Adjusted Delay	308.7	366.5	82.0	240.0	98.5	59.7	42.3					
		Corridor/HOV Adjust		356.5										
TT	Inbound	Final Delay	308.7	10.0	82.0	240.0	98.5	59.7	42.3		841	0	841	
		Intersection	2nd/Folsom	Fremont/Mission	Fremont/Market						3			
		Approach	EB	NB	NB									
		Appr. Delay	191.8	37.7	54.3						284			
		Appr. V/C	1.37	-	-									
		Adjusted Delay	240.0	37.7	54.3									
	Outbound	Corridor/HOV Adjust		27.7	44.3									
		Final Delay	240.0	10.0	10.0						260	0	260	
		Intersection	Hyde/Market	8th/Mission	7th to Main	Beale/Mission						4		
		Approach	SW	SB	uses travel times	EB								
		Appr. Delay	29.8	37.6		64.4						132		
		Appr. V/C	-	-		-								
Outbound	Adjusted Delay	29.8	37.6		64.4									
	Corridor/HOV Adjust				54.4									
	Final Delay	29.8	37.6	893.0	10.0						970	0	970	
	Intersection	Fremont/Mission	Stewart to 7th	7th/Market						3				
	Approach	NB	uses travel times	NB										
Outbound	Appr. Delay	37.7		180.3						218				
	Appr. V/C	-		-										
	Adjusted Delay	37.7		180.3										
	Corridor/HOV Adjust	27.7												
	Final Delay	10.0	848.0	180.3						1038	0	1038		

## Re-Entry Delay by Line

**Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Grey Shaded Cells are hardcode inputs

### Unsignalized intersection

**Far side stops** - Use downstream intersection volume. Otherwise, the stop is near side and the approach volume for the nearest intersection to the stop is used.

"Stop Present" refers to stops where buses have to pull out of the travel lane. Stops with bulb outs, boarding islands, or transit-only lanes (and therefore without re-entry delay) are noted with "Bulb".

## 2020 Baseline Plus Project PM

Line No	Direction	Input	Study Intersections												Total		
3	Inbound	Intersection Approach	Grant/Post EB	Kearny/Post EB	Sansome/Sutter SW								3				
		Stop Present?	Bulb		Y									2			
		Appr. Lanes	1														
		Appr. Volume	85														
		Vol/Lane Round	100														
		Re-Entry Delay	0.0								0						
	Outbound	Intersection Approach	Sansome/Sutter SW												1		
		Stop Present?	Y													1	
		Appr. Lanes	1														
		Appr. Volume	85														
Vol/Lane Round		100															
Re-Entry Delay		0.0													0		
10	Inbound	Intersection Approach	2nd/Folsom NB	2nd/Howard NB	2nd/Mission NB	2nd/Market NB	Market/Sansome EB	Sansome/Sutter WB						6			
		Stop Present?		Bulb		Bulb		Y						3			
		Appr. Lanes							2								
		Appr. Volume							47								
		Vol/Lane Round							0								
		Re-Entry Delay							0.0					0			
	Outbound	Intersection Approach	2nd/Folsom SB	2nd/Howard SB	2nd/Mission SB	2nd/Market WB	Market/Sansome WB	Sansome/Sutter SW						6			
		Stop Present?		Bulb		Bulb		Y						3			
		Appr. Lanes							1								
		Appr. Volume							85								
Vol/Lane Round								100									
Re-Entry Delay								0.0					0				
12 / 11	Inbound	Intersection Approach	10th/Folsom EB	9th/Folsom EB	8th/Folsom EB	7th/Folsom EB	6th/Folsom EB	5th/Folsom EB	4th/Folsom EB	3rd/Folsom EB	2nd/Folsom EB	2nd/Howard NB	2nd/Mission NB	2nd/Market NB	Market/Sansome EB	13	
		Stop Present?		Bulb		Bulb		Bulb		Y		Bulb		Bulb	Y	10	
		Appr. Lanes							3	4					2		
		Appr. Volume							2,050	2,120					27		
		Vol/Lane Round							700	550					0		
		Re-Entry Delay							7.0	4.5					0.0		
	Outbound	Intersection Approach	Sansome/Sutter SW	2nd/Market WB	2nd/Mission SB	2nd/Howard SB	2nd/Folsom SB										5
		Stop Present?	Y	Bulb		Bulb											3
		Appr. Lanes	1														
		Appr. Volume	85														
Vol/Lane Round		100															
Re-Entry Delay		0.0														0	
19	Inbound	Intersection Approach	Hyde/Market SW	8th/Mission SB	8th/Howard SB	8th/Folsom SB										4	
		Stop Present?	Y	Bulb		Bulb											4
		Appr. Lanes	4														
		Appr. Volume	1,699														
		Vol/Lane Round	400														
		Re-Entry Delay	3.0														3
	Outbound	Intersection Approach	7th/Howard NB	7th/Mission NB	7th/Market NB	8th/Market WB	9th/Market WB										5
		Stop Present?	Bulb	Y		Y											4
		Appr. Lanes	3			2											
		Appr. Volume	1,666			39											
Vol/Lane Round		550			0												
Re-Entry Delay		4.5			0.0											5	

**Re-Entry Delay by Line****Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Grey Shaded Cells are hardcode inputs

Unsignalized intersection

Far side stops - Use downstream intersection volume. Otherwise, the stop is near side and the approach volume for the nearest intersection to the stop is used.

"Stop Present" refers to stops where buses have to pull out of the travel lane. Stops with bulb outs, boarding islands, or transit-only lanes (and therefore without re-entry delay) are noted with "Bulb".

**2020 Baseline Plus Project PM**

Line No	Direction	Input	Study Intersections							Total	
27	Inbound	Intersection	6th/Folsom	5th/Folsom	5th/Howard	5th/Howard	5th/Mission	5th/Market	Cyril Magnin/Ellis	7	
		Approach	NB	EB	NB	NB	NB	NB	NB	5	
		Stop Present?	Bulb		Y	Y	Y	Bulb			
		Appr. Lanes			2	2	2				
		Appr. Volume			560	560	540				
		Vol/Lane Round			300	300	250				
	Re-Entry Delay			2.0	2.0	1.5			6		
	Outbound	Intersection	Mason/Eddy	5th/Market	5th/Mission	5th/Howard				4	
		Approach	SB	SB	SB	SB				3	
		Stop Present?		Y	Y	Y					
Appr. Lanes			2	2	3						
Appr. Volume			828	880	970						
Vol/Lane Round			400	450	300						
Re-Entry Delay		3.0	3.5	2.0				9			
41 / 30X*	Inbound	Intersection	Davis/Market	Beale/Mission						2	
		Approach	SW	SB						1	
		Stop Present?		Bulb							
		Appr. Lanes									
		Appr. Volume									
		Vol/Lane Round								0	
	Re-Entry Delay										
	Outbound	Intersection	Main/Mission	Main/Market						2	
		Approach	NB	NB						1	
		Stop Present?		Y							
Appr. Lanes			3								
Appr. Volume			464								
Vol/Lane Round			150								
Re-Entry Delay		0.5						1			
82X	Inbound	Intersection								0	
		Approach								0	
		Stop Present?									
		Appr. Lanes									
		Appr. Volume									
		Vol/Lane Round								0	
	Re-Entry Delay										
	Outbound	Intersection	Davis/Market	Beale/Mission						2	
		Approach	SW	SB						0	
		Stop Present?									
Appr. Lanes											
Appr. Volume											
Vol/Lane Round									0		
Re-Entry Delay											
24 / 54 / 92 / 93	Inbound	Intersection	8th/Market	8th/Mission	8th/Howard	8th/Folsom	7th/Folsom	6th/Folsom	5th/Folsom	4th/Folsom	8
		Approach	SW	SB	SB	SB	EB	EB	EB	EB	4
		Stop Present?	Y	Bulb			Bulb			Y	
		Appr. Lanes		3						4	
		Appr. Volume		1,699						2,120	
		Vol/Lane Round		550						550	
	Re-Entry Delay		4.5						4.5	9	
	Outbound	Intersection	7th/Howard	7th/Mission	7th/Market						3
		Approach	NB	NB	NB						1
		Stop Present?			Y						
Appr. Lanes				3							
Appr. Volume				1,543							
Vol/Lane Round				500							
Re-Entry Delay			4.0						4		



**Re-Entry Delay by Line****Notes:**

Per SF Bike Plan methodology, intersection approach delay is used for transit delay calculation.

Grey Shaded Cells are hardcode inputs

Unsignalized intersection

Far side stops - Use downstream intersection volume. Otherwise, the stop is near side and the approach volume for the nearest intersection to the stop is used.

"Stop Present" refers to stops where buses have to pull out of the travel lane. Stops with bulb outs, boarding islands, or transit-only lanes (and therefore without re-entry delay) are noted with "Bulb".

**2020 Baseline Plus Project PM**

Line No	Direction	Input	Study Intersections							Total
FiDi	Inbound	Intersection	Battery/Market	1st/Mission	1st/Howard	2nd/Howard	3rd/Howard	4th/Howard	4th/Folsom	7
		Approach	SW	SB	SB	WB	WB	WB	SB	
		Stop Present?	Y	Y		Y			Y	4
		Appr. Lanes	3	4		4			4	
		Appr. Volume	768	1,046		1,995			1,570	
		Vol/Lane Round	250	250		500			400	
		Re-Entry Delay	1.5	1.5		4.0			3.0	10
	Outbound	Intersection	2nd/Folsom	Fremont/Mission	Fremont/Market					3
		Approach	EB	NB	NB					
		Stop Present?	Bulb		Y					2
		Appr. Lanes			4					
		Appr. Volume			1,381					
		Vol/Lane Round			350					
		Re-Entry Delay			2.5					3
TT	Inbound	Intersection	Hyde/Market	8th/Mission	7th to Main	Beale/Mission				4
		Approach	SW	SB	uses travel times	EB				
		Stop Present?	Y	Bulb						2
		Appr. Lanes	4							
		Appr. Volume	1,699							
		Vol/Lane Round	400							
		Re-Entry Delay	3.0		in int. delay					3
	Outbound	Intersection	Fremont/Mission	Steuart to 7th	7th/Market					3
		Approach	NB	uses travel times	NB					
		Stop Present?	Bulb		Y					2
		Appr. Lanes			3					
		Appr. Volume			1,543					
		Vol/Lane Round			500					
		Re-Entry Delay		in int. delay	4.0					4

## **VISSIM travel time results**

		Travel Time (mm:ss)					
Mode	Description	Distance	2020 No Project	2020 Proposed Project <sup>1</sup>	Change from 2020NP	2020 Proposed Project - 2040 Transit Changes	Change from 2020NP
		(ft)					
Streetcar Center Lane Market	IB F Octavia-10th	2,390	06:13	06:39		06:35	
	IB F 10th-7th	2,040	05:16	03:13		03:15	
	IB F 7th-4th	2,690	06:48	05:04		05:09	
	IB F 4th-1st	2,730	06:28	05:21		05:36	
	IB F 1st-Steuart	1,690	04:13	03:34		03:48	
	<b>Total</b>	<b>11,540</b>	<b>29:00</b>	<b>24:00</b>	<b>-17%</b>	<b>24:30</b>	<b>-16%</b>
Streetcar Center Lane Market	OB F Steuart-1st	1,760	06:52	04:09		04:08	
	OB F 1st-4th	2,810	05:35	04:46		04:53	
	OB F 4th-7th	2,630	05:16	03:49		04:03	
	OB F 7th-10th	2,100	03:57	02:14		02:15	
	OB F 10th-Octavia	2,320	05:36	05:33		05:36	
	<b>Total</b>	<b>11,620</b>	<b>27:30</b>	<b>20:30</b>	<b>-25%</b>	<b>21:00</b>	<b>-24%</b>
Bus Center Lane Market	IB 9R 10th-7th	2,040	04:13	02:48		02:54	
	IB 9R 7th-4th	2,690	05:41	04:11		04:38	
	IB 9R 4th-1st	2,730	05:19	04:14		05:23	
	IB 9R 1st-Spear	1,400	02:53	02:45		03:22	
	<b>Total</b>	<b>8,860</b>	<b>18:00</b>	<b>14:00</b>	<b>-22%</b>	<b>16:30</b>	<b>-8%</b>
Bus Center Lane Market	OB 9R Main-1st	1,070	02:20	02:39		02:45	
	OB 9R 1st-4th	2,810	04:57	04:28		04:46	
	OB 9R 4th-7th	2,630	04:58	03:45		04:00	
	OB 9R 7th-10th	2,100	03:12	02:44		02:47	
	<b>Total</b>	<b>8,610</b>	<b>15:30</b>	<b>13:30</b>	<b>-13%</b>	<b>14:30</b>	<b>-6%</b>
Bus Curb Lane Market	IB 7/21 10th-7th <sup>2</sup>						
	IB 7/21 7th-4th <sup>2</sup>	2,690	05:55	05:39		06:02	
	IB 7/21 4th-1st <sup>2</sup>	2,730	07:53	06:29		06:57	
	IB 21 1st-Spear	1,400	03:12	02:58		03:28	
	<b>Total</b>	<b>6,820</b>	<b>17:00</b>	<b>15:00</b>	<b>-12%</b>	<b>16:30</b>	<b>-3%</b>
Bus Curb Lane Market	OB 21 Steuart-1st	1,760	07:15	05:12		05:33	
	OB 21 1st-4th	2,810	06:48	05:35		07:50	
	OB 21 4th-7th	2,630	05:53	05:19		05:22	
	OB 21 7th-9th	1,550	02:48	02:36		02:42	
	<b>Total</b>	<b>8,750</b>	<b>22:30</b>	<b>18:30</b>	<b>-18%</b>	<b>21:30</b>	<b>-4%</b>
Bus Mission	IB 14 S Van Ness-7th	3,140	05:45	05:55		05:53	
	IB 14 7th-4th	2,720	05:10	05:22		05:17	
	IB 14 4th-1st	2,720	08:50	07:17		07:19	
	IB 14 1st-Main	1,060	02:14	02:14		02:00	
	<b>Total</b>	<b>9,640</b>	<b>22:00</b>	<b>21:00</b>	<b>-5%</b>	<b>20:30</b>	<b>-7%</b>
Bus Mission	OB 14 Steuart-1st	1,790	04:07	04:08		03:54	
	OB 14 1st-4th	2,720	05:04	05:04		05:24	
	OB 14 4th-7th	2,720	05:00	04:56		05:02	
	OB 14 7th-S Van Ness	3,160	07:58	07:14		07:13	
	<b>Total</b>	<b>10,390</b>	<b>22:00</b>	<b>21:30</b>	<b>-2%</b>	<b>21:30</b>	<b>-2%</b>
Taxis Market	IB Market Cars Octavia-10th	2,390	03:19	04:48		04:46	
	IB Market Cars 10th-6th	2,950	04:12	02:43		02:53	
	IB Market Cars 6th-4th	1,780	03:55	03:08		03:14	
	IB Market Cars 4th-1st	2,730	05:24	04:20		04:41	
	IB Market Cars 1st-Main	1,090	01:49	01:52		01:54	
	<b>Total</b>	<b>10,940</b>	<b>18:30</b>	<b>17:00</b>	<b>-8%</b>	<b>17:30</b>	<b>-5%</b>
Taxis Market	OB Market Cars Main-1st	1,060	01:36	01:25		01:26	
	OB Market Cars 1st-4th	2,810	04:22	04:05		04:30	
	OB Market Cars 4th-7th	2,630	04:18	03:35		03:43	
	OB Market Cars 7th-10th	2,100	02:36	02:11		02:10	
	OB Market Cars 10th-Octavia	2,320	02:43	02:34		02:34	
	<b>Total</b>	<b>10,920</b>	<b>15:30</b>	<b>14:00</b>	<b>-10%</b>	<b>14:30</b>	<b>-6%</b>
Cars Mission	IB Mission Cars S Van Ness - 7th	3,140	02:29	02:37			
	IB Mission Cars 7th-4th	2,720	03:11	03:11			
	IB Mission Cars 4th - 1st	2,720	05:42	05:18			
	IB Mission Cars 1st - Main	1,090	01:46	01:53			
	<b>Total</b>	<b>9,670</b>	<b>13:00</b>	<b>13:00</b>	<b>0%</b>		
Cars Mission	OB Mission Cars Steuart - 1st	1,790	02:06	02:08			
	OB Mission Cars 1st - 4th	2,720	03:32	03:40			
	OB Mission Cars 4th - 7th	2,720	02:12	02:10			
	OB Mission Cars 7th- S Van Ness	3,160	04:53	04:37			
	<b>Total</b>	<b>10,390</b>	<b>12:30</b>	<b>12:30</b>	<b>0%</b>		
Bikes Market	<b>Inbound Total</b>	11,700	20:30	19:30	<b>-5%</b>		
	<b>Outbound Total</b>	11,610	20:00	19:30	<b>-3%</b>		
Bikes Mission	<b>Inbound Total</b>	11,310	20:00	18:30	<b>-8%</b>		
	<b>Outbound Total</b>	11,450	17:30	17:00	<b>-3%</b>		

Notes:

<sup>1</sup> The proposed project analysis is based on the initial roadway design, which assumed that bicyclists would travel in the curb mixed-flow travel lane (rather than in a separated bikeway) and that the One Bush Driveway connecting to Market Street would be closed. The current proposed project provides a separated bikeway and allows the One Bush driveway at Market Street to remain open. The separated bikeway would likely improve transit travel times as there would be fewer conflicts between transit vehicles and people bicycling in the curb lane. With the One Bush driveway to Market Street remaining open, there would be an additional 50 vehicles (or less than one per minute) traveling the block of Market Street in the curb lane before turning onto Sutter Street during the PM peak hour. This change would have negligible effect on corridor transit operations due to the low traffic volumes on this short segment.


















<sup>2</sup> Line 7 travel times are used for No Project (no data available for 10th-7th segment) ; Line 21 travel times are used for Proposed Project (10th-7th segment not reported).

## **Synchro intersection delay results - 2020 No Project**

# HCM Signalized Intersection Capacity Analysis

## 7: Kearny St & Post

















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations								  				
Traffic Volume (vph)	180	300	0	0	0	0	0	1220	30	0	0	0
Future Volume (vph)	180	300	0	0	0	0	0	1220	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0						2.4				
Lane Util. Factor	0.91	0.91						0.86				
Frpb, ped/bikes	1.00	1.00						0.99				
Flpb, ped/bikes	0.62	0.97						1.00				
Frt	1.00	1.00						1.00				
Flt Protected	0.95	1.00						1.00				
Satd. Flow (prot)	892	2950						5703				
Flt Permitted	0.95	1.00						1.00				
Satd. Flow (perm)	892	2950						5703				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	188	312	0	0	0	0	0	1271	31	0	0	0
RTOR Reduction (vph)	33	16	0	0	0	0	0	5	0	0	0	0
Lane Group Flow (vph)	129	323	0	0	0	0	0	1297	0	0	0	0
Confl. Peds. (#/hr)	782								646			
Turn Type	Perm	NA						NA				
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)	20.0	20.0						31.6				
Effective Green, g (s)	22.0	22.0						33.6				
Actuated g/C Ratio	0.37	0.37						0.56				
Clearance Time (s)	4.0	4.0						4.4				
Lane Grp Cap (vph)	327	1081						3193				
v/s Ratio Prot								c0.23				
v/s Ratio Perm	c0.14	0.11										
v/c Ratio	0.39	0.30						0.41				
Uniform Delay, d1	14.1	13.5						7.5				
Progression Factor	0.96	0.93						1.00				
Incremental Delay, d2	3.5	0.7						0.4				
Delay (s)	17.0	13.3						7.9				
Level of Service	B	B						A				
Approach Delay (s)		14.5			0.0			7.9			0.0	
Approach LOS		B			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.7			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.40										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			4.4				
Intersection Capacity Utilization		43.0%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 8: Grant & Geary St/Geary St.




















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	340	60	120	90	0	0	0	170
Future Volume (vph)	0	0	0	0	340	60	120	90	0	0	0	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.7		3.1	3.1				3.5
Lane Util. Factor					1.00		1.00	1.00				1.00
Frpb, ped/bikes					0.92		1.00	1.00				1.00
Flpb, ped/bikes					1.00		0.36	1.00				1.00
Frt					0.98		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					1512		579	1676				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					1512		579	1676				1450
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	0	378	67	133	100	0	0	0	189
RTOR Reduction (vph)	0	0	0	0	10	0	76	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	435	0	57	100	0	0	0	134
Confl. Peds. (#/hr)						444	926					926
Turn Type					NA		Perm	NA				Prot
Protected Phases					6			8				4
Permitted Phases							8					
Actuated Green, G (s)					22.8		23.5	23.5				23.5
Effective Green, g (s)					25.3		25.9	25.9				25.5
Actuated g/C Ratio					0.42		0.43	0.43				0.42
Clearance Time (s)					8.2		5.5	5.5				5.5
Lane Grp Cap (vph)					637		249	723				616
v/s Ratio Prot					c0.29			0.06				0.09
v/s Ratio Perm							c0.10					
v/c Ratio					0.68		0.23	0.14				0.22
Uniform Delay, d1					14.1		10.8	10.3				10.9
Progression Factor					1.00		1.00	1.00				0.74
Incremental Delay, d2					5.8		2.2	0.4				0.8
Delay (s)					19.9		12.9	10.7				8.9
Level of Service					B		B	B				A
Approach Delay (s)		0.0			19.9			12.0			8.9	
Approach LOS		A			B			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.4				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			9.2		
Intersection Capacity Utilization			67.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 9: Stockton St. & O'Farrell













Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  									  	
Traffic Volume (vph)	0	170	230	0	0	0	0	0	0	30	690	0
Future Volume (vph)	0	170	230	0	0	0	0	0	0	30	690	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5								2.0	
Lane Util. Factor		0.86	0.86								0.95	
Frpb, ped/bikes		0.96	0.91								1.00	
Flpb, ped/bikes		1.00	1.00								0.99	
Frt		0.94	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		3918	1117								3137	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		3918	1117								3137	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	177	240	0	0	0	0	0	0	31	719	0
RTOR Reduction (vph)	0	71	71	0	0	0	0	0	0	0	216	0
Lane Group Flow (vph)	0	226	49	0	0	0	0	0	0	0	534	0
Confl. Peds. (#/hr)			100								100	
Turn Type		NA	Perm								Perm	NA
Protected Phases		2										4
Permitted Phases			2								4	
Actuated Green, G (s)		23.0	23.0								4.5	
Effective Green, g (s)		24.5	24.5								7.0	
Actuated g/C Ratio		0.41	0.41								0.12	
Clearance Time (s)		5.0	5.0								4.5	
Lane Grp Cap (vph)		1599	456								365	
v/s Ratio Prot		c0.06										
v/s Ratio Perm			0.04								0.17	
v/c Ratio		0.14	0.11								1.46	
Uniform Delay, d1		11.1	11.0								26.5	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		0.2	0.5								222.4	
Delay (s)		11.3	11.5								248.9	
Level of Service		B	B								F	
Approach Delay (s)		11.4			0.0			0.0			248.9	
Approach LOS		B			A			A			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			164.0				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			0.30									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			48.0%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 14: Jones St. & Golden Gate

Better Market Street  
2020 No Project PM Peak Hour



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑							↑	↑↑	
Traffic Volume (vph)	0	580	60	0	0	0	0	0	0	450	90	0
Future Volume (vph)	0	580	60	0	0	0	0	0	0	450	90	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.5							2.0	2.0	
Lane Util. Factor		0.95	1.00							0.91	0.91	
Frpb, ped/bikes		1.00	0.85							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	0.97	
Satd. Flow (prot)		3539	1341							1610	3273	
Flt Permitted		1.00	1.00							0.95	0.97	
Satd. Flow (perm)		3539	1341							1610	3273	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	630	65	0	0	0	0	0	0	489	98	0
RTOR Reduction (vph)	0	0	49	0	0	0	0	0	0	163	163	0
Lane Group Flow (vph)	0	630	16	0	0	0	0	0	0	81	180	0
Confl. Peds. (#/hr)			100							185		
Turn Type		NA	Perm							Prot	NA	
Protected Phases		2								7	4	
Permitted Phases			2									
Actuated Green, G (s)		12.5	12.5							17.5	17.5	
Effective Green, g (s)		15.0	14.5							20.0	20.0	
Actuated g/C Ratio		0.25	0.24							0.33	0.33	
Clearance Time (s)		4.5	4.5							4.5	4.5	
Lane Grp Cap (vph)		884	324							536	1091	
v/s Ratio Prot		c0.18								0.05	c0.05	
v/s Ratio Perm			0.01									
v/c Ratio		0.71	0.05							0.15	0.16	
Uniform Delay, d1		20.5	17.5							14.0	14.1	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		4.9	0.3							0.6	0.3	
Delay (s)		25.4	17.7							14.6	14.4	
Level of Service		C	B							B	B	
Approach Delay (s)		24.7			0.0			0.0			14.5	
Approach LOS		C			A			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.0									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.26									
Actuated Cycle Length (s)			60.0									Sum of lost time (s) 8.0
Intersection Capacity Utilization			35.2%									ICU Level of Service A
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

## 18: Sixth St. & Folsom St.













Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1680	200	0	0	0	0	950	390	150	890	0
Future Volume (vph)	100	1680	200	0	0	0	0	950	390	150	890	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	12	12	12	12	12	10	12	12	10	12
Total Lost time (s)		3.3						1.0	1.5		2.5	
Lane Util. Factor		0.86						0.95	1.00		0.91	
Frpb, ped/bikes		0.99						1.00	0.93		1.00	
Flpb, ped/bikes		1.00						1.00	1.00		1.00	
Frt		0.98						1.00	0.85		1.00	
Flt Protected		1.00						1.00	1.00		0.99	
Satd. Flow (prot)		5344						3004	1361		4340	
Flt Permitted		1.00						1.00	1.00		0.67	
Satd. Flow (perm)		5344						3004	1361		2933	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	108	1806	215	0	0	0	0	1022	419	161	957	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	98	0	0	0
Lane Group Flow (vph)	0	2100	0	0	0	0	0	1022	321	0	1118	0
Confl. Peds. (#/hr)	66		81	81		66	100		61	61		100
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	6	0	0	6	0
Turn Type	Split	NA						NA	Perm	Prot	NA	
Protected Phases	2	2						4		3	8	
Permitted Phases									4			
Actuated Green, G (s)		21.2						21.5	21.5		34.0	
Effective Green, g (s)		22.7						24.0	23.5		36.5	
Actuated g/C Ratio		0.35						0.37	0.36		0.56	
Clearance Time (s)		4.8						3.5	3.5		5.0	
Lane Grp Cap (vph)		1866						1109	492		1895	
v/s Ratio Prot		c0.39						c0.34			c0.10	
v/s Ratio Perm									0.24		0.23	
v/c Ratio		1.13						0.92	0.65		0.59	
Uniform Delay, d1		21.1						19.6	17.3		9.3	
Progression Factor		1.00						1.00	1.00		1.00	
Incremental Delay, d2		64.0						13.7	6.6		1.4	
Delay (s)		85.1						33.3	23.9		10.7	
Level of Service		F						C	C		B	
Approach Delay (s)		85.1			0.0			30.6			10.7	
Approach LOS		F			A			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		50.6										
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		65.0										
Intersection Capacity Utilization		92.8%										
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 25: Mason & Eddy

Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑									↑↑	
Traffic Volume (vph)	0	370	50	0	0	0	0	0	0	350	80	0
Future Volume (vph)	0	370	50	0	0	0	0	0	0	350	80	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0									2.0	
Lane Util. Factor		0.91									0.95	
Frpb, ped/bikes		0.97									1.00	
Flpb, ped/bikes		1.00									0.88	
Frt		0.98									1.00	
Flt Protected		1.00									0.96	
Satd. Flow (prot)		4369									2685	
Flt Permitted		1.00									0.96	
Satd. Flow (perm)		4369									2685	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	402	54	0	0	0	0	0	0	380	87	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	119	0
Lane Group Flow (vph)	0	427	0	0	0	0	0	0	0	0	348	0
Confl. Peds. (#/hr)			268								268	
Turn Type		NA								Perm	NA	
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		21.0									32.0	
Effective Green, g (s)		22.5									33.5	
Actuated g/C Ratio		0.38									0.56	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1638									1499	
v/s Ratio Prot		c0.10										
v/s Ratio Perm											0.13	
v/c Ratio		0.26									0.23	
Uniform Delay, d1		13.0									6.7	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		13.4									7.1	
Level of Service		B									A	
Approach Delay (s)		13.4			0.0			0.0			7.1	
Approach LOS		B			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.24									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			50.8%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 34: Third & Howard St.
















Better Market Street  
2020 No Project PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					1111		1111	1111				
Traffic Volume (vph)	0	0	0	0	1840	300	350	1520	0	0	0	0
Future Volume (vph)	0	0	0	0	1840	300	350	1520	0	0	0	0
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Lane Width	12	12	12	12	10	12	10	10	12	12	12	12
Total Lost time (s)					2.0		2.0	2.0				
Lane Util. Factor					0.86		0.81	0.81				
Frpb, ped/bikes					0.96		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					0.98		1.00	1.00				
Flt Protected					1.00		0.95	1.00				
Satd. Flow (prot)					4402		1046	4245				
Flt Permitted					1.00		0.95	1.00				
Satd. Flow (perm)					4402		1046	4245				
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	0	0	0	0	1859	303	354	1535	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	13	13	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2162	0	306	1557	0	0	0	0
Confl. Peds. (#/hr)	382		366	366		382	370		748	748		370
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	3	0	0	35	0	0	0	0
Turn Type					NA		Split	NA				
Protected Phases					8		6	6				
Permitted Phases												
Actuated Green, G (s)					23.0		24.0	24.0				
Effective Green, g (s)					25.5		30.5	30.5				
Actuated g/C Ratio					0.42		0.51	0.51				
Clearance Time (s)					4.5		8.5	8.5				
Lane Grp Cap (vph)					1870		531	2157				
v/s Ratio Prot					c0.49		0.29	c0.37				
v/s Ratio Perm												
v/c Ratio					1.16		0.58	0.72				
Uniform Delay, d1					17.2		10.3	11.5				
Progression Factor					1.13		1.00	1.00				
Incremental Delay, d2					70.9		4.5	2.1				
Delay (s)					90.4		14.7	13.6				
Level of Service					F		B	B				
Approach Delay (s)		0.0			90.4			13.8			0.0	
Approach LOS		A			F			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			54.7				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			78.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 38: First & Howard St.
















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1390	0	0	0	0	0	1040	580
Future Volume (vph)	0	0	0	440	1390	0	0	0	0	0	1040	580
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Lane Width	12	12	12	11	11	11	12	12	12	11	11	11
Total Lost time (s)					2.0						2.0	2.0
Lane Util. Factor					*0.70						0.95	1.00
Frpb, ped/bikes					1.00						1.00	0.82
Flpb, ped/bikes					0.96						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					3390						2431	897
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					3390						2431	897
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	478	1511	0	0	0	0	0	1130	630
RTOR Reduction (vph)	0	0	0	0	26	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	0	0	0	1963	0	0	0	0	0	1130	624
Confl. Peds. (#/hr)				250								250
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					25.5						27.0	27.0
Effective Green, g (s)					27.0						29.0	29.0
Actuated g/C Ratio					0.45						0.48	0.48
Clearance Time (s)					3.5						4.0	4.0
Lane Grp Cap (vph)					1525						1174	433
v/s Ratio Prot											0.46	
v/s Ratio Perm					0.58							c0.70
v/c Ratio					1.29						0.96	1.44
Uniform Delay, d1					16.5						15.0	15.5
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					134.4						18.7	211.6
Delay (s)					150.9						33.7	227.1
Level of Service					F						C	F
Approach Delay (s)		0.0			150.9			0.0			102.9	
Approach LOS		A			F			A			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			128.4									HCM 2000 Level of Service F
HCM 2000 Volume to Capacity ratio			1.34									
Actuated Cycle Length (s)			60.0								4.0	Sum of lost time (s)
Intersection Capacity Utilization			103.2%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 133: Grant & Post


Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	380	110	0	0	0	0	90	60	40	60	0
Future Volume (vph)	160	380	110	0	0	0	0	90	60	40	60	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.4			4.4	
Lane Util. Factor		0.91						1.00			1.00	
Frt		0.97						0.95			1.00	
Flt Protected		0.99						1.00			0.98	
Satd. Flow (prot)		4896						1762			1826	
Flt Permitted		0.99						1.00			0.85	
Satd. Flow (perm)		4896						1762			1575	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	413	120	0	0	0	0	98	65	43	65	0
RTOR Reduction (vph)	0	51	0	0	0	0	0	40	0	0	0	0
Lane Group Flow (vph)	0	656	0	0	0	0	0	123	0	0	108	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		34.5						16.6			16.6	
Effective Green, g (s)		34.5						16.6			16.6	
Actuated g/C Ratio		0.58						0.28			0.28	
Clearance Time (s)		4.5						4.4			4.4	
Lane Grp Cap (vph)		2815						487			435	
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.13									0.07	
v/c Ratio		0.23						0.25			0.25	
Uniform Delay, d1		6.3						16.9			16.9	
Progression Factor		1.00						1.15			1.00	
Incremental Delay, d2		0.2						1.2			1.4	
Delay (s)		6.5						20.5			18.2	
Level of Service		A						C			B	
Approach Delay (s)		6.5			0.0			20.5			18.2	
Approach LOS		A			A			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		10.1										
HCM 2000 Volume to Capacity ratio		0.24										
Actuated Cycle Length (s)		60.0										
Intersection Capacity Utilization		40.0%										
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 146: Tenth St. & Folsom St.













Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑								↑↑↑	
Traffic Volume (vph)	0	1260	100	0	0	0	0	0	0	510	1930	0
Future Volume (vph)	0	1260	100	0	0	0	0	0	0	510	1930	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	10	12	12	12	12	12	12	12	10	12
Total Lost time (s)		2.5	2.5								2.5	
Lane Util. Factor		0.91	1.00								0.86	
Frpb, ped/bikes		1.00	0.94								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								0.99	
Satd. Flow (prot)		4435	1309								5607	
Flt Permitted		1.00	1.00								0.99	
Satd. Flow (perm)		4435	1309								5607	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1326	105	0	0	0	0	0	0	537	2032	0
RTOR Reduction (vph)	0	0	15	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1326	90	0	0	0	0	0	0	0	2559	0
Confl. Peds. (#/hr)	28		51	51		28	39		43	43		39
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	0	0	0	0	0
Turn Type		NA	Perm							Split	NA	
Protected Phases		2								4	4	
Permitted Phases			2									
Actuated Green, G (s)		31.0	31.0								49.0	
Effective Green, g (s)		33.5	33.5								51.5	
Actuated g/C Ratio		0.37	0.37								0.57	
Clearance Time (s)		5.0	5.0								5.0	
Lane Grp Cap (vph)		1650	487								3208	
v/s Ratio Prot		c0.30									c0.46	
v/s Ratio Perm			0.07									
v/c Ratio		0.80	0.18								0.80	
Uniform Delay, d1		25.3	19.0								15.1	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		4.3	0.8								2.2	
Delay (s)		29.6	19.9								17.3	
Level of Service		C	B								B	
Approach Delay (s)		28.9			0.0			0.0			17.3	
Approach LOS		C			A			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.4									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			90.0								5.0	Sum of lost time (s)
Intersection Capacity Utilization			73.3%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 161: Eighth St. & Folsom St.




















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↗								↖↑↑↑	
Traffic Volume (vph)	0	1580	180	0	0	0	0	0	0	330	1200	0
Future Volume (vph)	0	1580	180	0	0	0	0	0	0	330	1200	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	12	12	12	12	12	12	12	12	10	12
Total Lost time (s)		2.0	2.5								2.0	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.93								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								0.99	
Satd. Flow (prot)		4392	1375								4218	
Flt Permitted		1.00	1.00								0.99	
Satd. Flow (perm)		4392	1375								4218	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	1736	198	0	0	0	0	0	0	363	1319	0
RTOR Reduction (vph)	0	0	14	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	1736	184	0	0	0	0	0	0	0	1667	0
Confl. Peds. (#/hr)	73		79	79		73	109		67	67		109
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	7%	7%	7%
Bus Blockages (#/hr)	0	3	0	0	3	0	0	0	0	0	4	0
Turn Type		NA	Perm							Split	NA	
Protected Phases		2								4	4	
Permitted Phases			2									
Actuated Green, G (s)		26.0	26.0								25.0	
Effective Green, g (s)		28.5	28.0								27.5	
Actuated g/C Ratio		0.48	0.47								0.46	
Clearance Time (s)		4.5	4.5								4.5	
Lane Grp Cap (vph)		2086	641								1933	
v/s Ratio Prot		c0.40									c0.40	
v/s Ratio Perm			0.13									
v/c Ratio		0.83	0.29								0.86	
Uniform Delay, d1		13.7	9.8								14.6	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		4.1	1.1								5.4	
Delay (s)		17.7	11.0								19.9	
Level of Service		B	B								B	
Approach Delay (s)		17.0			0.0			0.0			19.9	
Approach LOS		B			A			A			B	
Intersection Summary												
HCM 2000 Control Delay			18.4		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					4.0		
Intersection Capacity Utilization			72.6%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 184: Franklin & Oak

Better Market Street  
2020 No Project PM Peak Hour
















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	  							  				
Traffic Volume (vph)	1290	0	0	0	0	50	0	1080	0	0	0	0
Future Volume (vph)	1290	0	0	0	0	50	0	1080	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5					2.5		2.0				
Lane Util. Factor	0.94					1.00		0.91				
Frt	1.00					0.86		1.00				
Flt Protected	0.95					1.00		1.00				
Satd. Flow (prot)	4990					1611		5085				
Flt Permitted	0.95					1.00		1.00				
Satd. Flow (perm)	4990					1611		5085				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1358	0	0	0	0	53	0	1137	0	0	0	0
RTOR Reduction (vph)	48	0	0	0	0	17	0	0	0	0	0	0
Lane Group Flow (vph)	1310	0	0	0	0	36	0	1137	0	0	0	0
Turn Type	Perm					Perm		NA				
Protected Phases								2				
Permitted Phases	4					8						
Actuated Green, G (s)	42.5					42.5		37.0				
Effective Green, g (s)	45.5					45.5		40.0				
Actuated g/C Ratio	0.51					0.51		0.44				
Clearance Time (s)	5.5					5.5		5.0				
Lane Grp Cap (vph)	2522					814		2260				
v/s Ratio Prot								c0.22				
v/s Ratio Perm	c0.26					0.02						
v/c Ratio	0.52					0.04		0.50				
Uniform Delay, d1	14.9					11.3		17.9				
Progression Factor	0.48					1.00		1.00				
Incremental Delay, d2	0.5					0.1		0.8				
Delay (s)	7.7					11.4		18.7				
Level of Service	A					B		B				
Approach Delay (s)	7.7			11.4			18.7			0.0		
Approach LOS	A			B			B			A		
Intersection Summary												
HCM 2000 Control Delay	12.7			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			7.5					
Intersection Capacity Utilization	110.4%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

## 185: Van Ness & Fell/Fell St.













Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	840	60	0	0	0	0	1820	60	0	1450	110
Future Volume (vph)	50	840	60	0	0	0	0	1820	60	0	1450	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.5						1.5			2.5	
Lane Util. Factor		0.95						0.95			0.95	
Frt		0.99						1.00			0.99	
Flt Protected		1.00						1.00			1.00	
Satd. Flow (prot)		3496						3522			3502	
Flt Permitted		1.00						1.00			1.00	
Satd. Flow (perm)		3496						3522			3502	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	55	923	66	0	0	0	0	2000	66	0	1593	121
RTOR Reduction (vph)	0	5	0	0	0	0	0	3	0	0	6	0
Lane Group Flow (vph)	0	1039	0	0	0	0	0	2063	0	0	1708	0
Parking (#/hr)	0		10						10			
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Actuated Green, G (s)		26.0						55.0			54.0	
Effective Green, g (s)		28.5						57.5			56.5	
Actuated g/C Ratio		0.32						0.64			0.63	
Clearance Time (s)		5.0						4.0			5.0	
Vehicle Extension (s)		3.0						1.0			3.0	
Lane Grp Cap (vph)		1107						2250			2198	
v/s Ratio Prot								0.59			0.49	
v/s Ratio Perm		0.30										
v/c Ratio		0.94						0.92			0.78	
Uniform Delay, d1		29.9						14.2			12.2	
Progression Factor		0.79						1.00			1.00	
Incremental Delay, d2		14.1						7.4			2.8	
Delay (s)		37.8						21.6			14.9	
Level of Service		D						C			B	
Approach Delay (s)		37.8			0.0			21.6			14.9	
Approach LOS		D			A			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		22.7						HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio		0.92										
Actuated Cycle Length (s)		90.0						Sum of lost time (s)		5.0		
Intersection Capacity Utilization		85.5%						ICU Level of Service		E		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 188: Fourth St. & Folsom St.













Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↗							↖	↑↑↑↑	
Traffic Volume (vph)	0	1800	320	0	0	0	0	0	0	200	1350	0
Future Volume (vph)	0	1800	320	0	0	0	0	0	0	200	1350	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	10	12	12	12	12	12	12	10	10	12
Total Lost time (s)		1.8	1.8							2.8	2.8	
Lane Util. Factor		0.91	1.00							0.86	0.86	
Frpb, ped/bikes		1.00	1.00							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		4392	1373							1295	3939	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		4392	1373							1295	3939	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	2022	360	0	0	0	0	0	0	225	1517	0
RTOR Reduction (vph)	0	0	77	0	0	0	0	0	0	56	35	0
Lane Group Flow (vph)	0	2022	283	0	0	0	0	0	0	146	1505	0
Confl. Peds. (#/hr)	95		159	159		95	255		228	228		255
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	6%	6%	6%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	0	0	0	27	0
Turn Type		NA	Prot							Split	NA	
Protected Phases		2	2							4	4	
Permitted Phases												
Actuated Green, G (s)		24.2	24.2							33.2	33.2	
Effective Green, g (s)		27.2	27.2							35.2	35.2	
Actuated g/C Ratio		0.30	0.30							0.39	0.39	
Clearance Time (s)		4.8	4.8							4.8	4.8	
Lane Grp Cap (vph)		1327	414							506	1540	
v/s Ratio Prot		c0.46	0.21							0.11	c0.38	
v/s Ratio Perm												
v/c Ratio		1.52	0.68							0.29	0.98	
Uniform Delay, d1		31.4	27.6							18.8	27.0	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		239.6	8.8							1.4	18.1	
Delay (s)		271.0	36.4							20.2	45.1	
Level of Service		F	D							C	D	
Approach Delay (s)		235.5			0.0			0.0			42.2	
Approach LOS		F			A			A			D	
Intersection Summary												
HCM 2000 Control Delay			153.9		HCM 2000 Level of Service					F		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			90.0		Sum of lost time (s)					7.6		
Intersection Capacity Utilization			71.0%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 191: Ninth St. & Howard St.















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑	↑		↑↑↑↑				
Traffic Volume (vph)	0	0	0	0	840	640	150	2960	0	0	0	0
Future Volume (vph)	0	0	0	0	840	640	150	2960	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	10	10	12	10	12	12	12	12
Total Lost time (s)					2.0	2.0		2.0				
Lane Util. Factor					0.91	1.00		0.81				
Frpb, ped/bikes					1.00	0.90		1.00				
Flpb, ped/bikes					1.00	1.00		1.00				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		1.00				
Satd. Flow (prot)					4478	1257		6633				
Flt Permitted					1.00	1.00		1.00				
Satd. Flow (perm)					4478	1257		6633				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	0	875	667	156	3083	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	19	0	19	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	875	648	0	3220	0	0	0	0
Confl. Peds. (#/hr)	92		91	91		92	104		205	205		104
Confl. Bikes (#/hr)						60						
Bus Blockages (#/hr)	0	0	0	0	3	0	0	4	0	0	0	0
Turn Type					NA	Perm	Split	NA				
Protected Phases					6		8	8				
Permitted Phases						6						
Actuated Green, G (s)					25.0	25.0		25.0				
Effective Green, g (s)					28.0	28.0		28.0				
Actuated g/C Ratio					0.47	0.47		0.47				
Clearance Time (s)					5.0	5.0		5.0				
Lane Grp Cap (vph)					2089	586		3095				
v/s Ratio Prot					0.20			c0.49				
v/s Ratio Perm						c0.52						
v/c Ratio					0.42	1.11		1.04				
Uniform Delay, d1					10.6	16.0		16.0				
Progression Factor					0.46	0.38		1.00				
Incremental Delay, d2					0.5	66.1		27.9				
Delay (s)					5.3	72.2		43.9				
Level of Service					A	E		D				
Approach Delay (s)		0.0			34.3			43.9			0.0	
Approach LOS		A			C			D			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			40.8				HCM 2000 Level of Service			D		
HCM 2000 Volume to Capacity ratio			1.05									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			92.4%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 196: Oak & Gough















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1220	210	0	0	0	0	0	0	70	1480	0
Future Volume (vph)	0	1220	210	0	0	0	0	0	0	70	1480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.0	
Lane Util. Factor		0.91									0.86	
Frpb, ped/bikes		0.98									1.00	
Flpb, ped/bikes		1.00									0.99	
Frt		0.98									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		4867									6354	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		4867									6354	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1284	221	0	0	0	0	0	0	74	1558	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	17	0
Lane Group Flow (vph)	0	1500	0	0	0	0	0	0	0	0	1615	0
Confl. Peds. (#/hr)			200								200	
Turn Type		NA								Perm	NA	
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		39.5									40.0	
Effective Green, g (s)		39.5									40.0	
Actuated g/C Ratio		0.44									0.44	
Clearance Time (s)		5.5									5.0	
Lane Grp Cap (vph)		2136									2824	
v/s Ratio Prot		0.31										
v/s Ratio Perm											0.25	
v/c Ratio		0.70									0.57	
Uniform Delay, d1		20.5									18.6	
Progression Factor		1.00									1.00	
Incremental Delay, d2		2.0									0.8	
Delay (s)		22.4									19.5	
Level of Service		C									B	
Approach Delay (s)		22.4			0.0			0.0			19.5	
Approach LOS		C			A			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			20.9				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			10.5		
Intersection Capacity Utilization			110.4%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 202: Seventh St. & Howard St.


















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	1120	240	210	1540	0	0	0	0
Future Volume (vph)	0	0	0	0	1120	240	210	1540	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	10	12	12	10	12	12	12	12
Total Lost time (s)					2.0			2.0				
Lane Util. Factor					0.91			0.86				
Frpb, ped/bikes					0.98			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4277			5577				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4277			5577				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	0	1143	245	214	1571	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1387	0	0	1765	0	0	0	0
Confl. Peds. (#/hr)	142		160	160		142	241		254	254		241
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	3	0	0	0	0	0	0	0
Turn Type					NA		Split	NA				
Protected Phases					6		8	8				
Permitted Phases												
Actuated Green, G (s)					26.0			24.0				
Effective Green, g (s)					29.0			27.0				
Actuated g/C Ratio					0.48			0.45				
Clearance Time (s)					5.0			5.0				
Lane Grp Cap (vph)					2067			2509				
v/s Ratio Prot					c0.32			c0.32				
v/s Ratio Perm												
v/c Ratio					0.67			0.70				
Uniform Delay, d1					11.9			13.3				
Progression Factor					0.59			1.00				
Incremental Delay, d2					1.4			1.7				
Delay (s)					8.4			15.0				
Level of Service					A			B				
Approach Delay (s)		0.0			8.4			15.0			0.0	
Approach LOS		A			A			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.1									
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			60.0									
Intersection Capacity Utilization			64.9%									
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 235: Cyril Magnin & Ellis
















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	120	30	500	200	140	70	0	50
Future Volume (vph)	0	0	0	0	120	30	500	200	140	70	0	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5		3.5	3.5	3.5		3.0	
Lane Util. Factor					1.00		1.00	1.00	1.00		1.00	
Frpb, ped/bikes					0.89		1.00	1.00	0.42		1.00	
Flpb, ped/bikes					1.00		1.00	1.00	1.00		1.00	
Frt					0.97		1.00	1.00	0.85		0.94	
Flt Protected					1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)					1610		1770	1863	658		1708	
Flt Permitted					1.00		0.95	1.00	1.00		0.35	
Satd. Flow (perm)					1610		1770	1863	658		619	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	0	132	33	549	220	154	77	0	55
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	94	0	62	0
Lane Group Flow (vph)	0	0	0	0	150	0	549	220	60	0	70	0
Confl. Peds. (#/hr)						438	64		688			
Turn Type					NA		Split	NA	Perm	Perm	NA	
Protected Phases					8		6	6			2	
Permitted Phases									6	2		
Actuated Green, G (s)					17.5		23.5	23.5	23.5		9.0	
Effective Green, g (s)					17.5		23.5	23.5	23.5		9.0	
Actuated g/C Ratio					0.29		0.39	0.39	0.39		0.15	
Clearance Time (s)					3.5		3.5	3.5	3.5		3.0	
Lane Grp Cap (vph)					469		693	729	257		92	
v/s Ratio Prot					c0.09		c0.31	0.12				
v/s Ratio Perm									0.09		c0.11	
v/c Ratio					0.32		0.79	0.30	0.23		0.76	
Uniform Delay, d1					16.6		16.1	12.6	12.2		24.5	
Progression Factor					1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2					1.8		9.0	1.1	2.1		44.1	
Delay (s)					18.4		25.1	13.7	14.4		68.5	
Level of Service					B		C	B	B		E	
Approach Delay (s)		0.0			18.4			20.6			68.5	
Approach LOS		A			B			C			E	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.5				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)		10.0			
Intersection Capacity Utilization			59.8%				ICU Level of Service		B			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 248: Second St. & Folsom St.


















Better Market Street  
2020 No Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	1250	140	0	0	0	0	400	110	0	430	0
Future Volume (vph)	120	1250	140	0	0	0	0	400	110	0	430	0
Ideal Flow (vphpl)	1500	1500	1500	1700	1700	1700	1500	1500	1500	1500	1500	1500
Lane Width	11	11	11	12	12	12	11	11	11	11	11	11
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		*0.65						1.00			1.00	
Frpb, ped/bikes		0.98						0.91			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.97			1.00	
Flt Protected		1.00						1.00			1.00	
Satd. Flow (prot)		3198						1083			1228	
Flt Permitted		1.00						1.00			1.00	
Satd. Flow (perm)		3198						1083			1228	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	1316	147	0	0	0	0	421	116	0	453	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1571	0	0	0	0	0	536	0	0	453	0
Confl. Peds. (#/hr)	230		120				463		836	836		463
Confl. Bikes (#/hr)									100			100
Bus Blockages (#/hr)	0	3	0	0	0	0	0	10	0	0	10	0
Parking (#/hr)									10			10
Turn Type	Split	NA						NA			NA	
Protected Phases	2	2						4			8	
Permitted Phases												
Actuated Green, G (s)		20.0						30.0			30.0	
Effective Green, g (s)		21.5						31.5			31.5	
Actuated g/C Ratio		0.36						0.52			0.52	
Clearance Time (s)		5.0						5.0			5.0	
Lane Grp Cap (vph)		1145						568			644	
v/s Ratio Prot		c0.49						c0.49			0.37	
v/s Ratio Perm												
v/c Ratio		1.37						0.94			0.70	
Uniform Delay, d1		19.2						13.4			10.7	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		173.0						26.2			6.3	
Delay (s)		192.3						39.6			17.1	
Level of Service		F						D			B	
Approach Delay (s)		192.3			0.0			39.6			17.1	
Approach LOS		F			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		129.7						HCM 2000 Level of Service			F	
HCM 2000 Volume to Capacity ratio		1.12										
Actuated Cycle Length (s)		60.0						Sum of lost time (s)		7.0		
Intersection Capacity Utilization		80.2%						ICU Level of Service		D		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 261: Fifth St. & Howard St.

Better Market Street  
2020 No Project PM Peak Hour

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	100	1450	90	80	550	0	0	650	130
Future Volume (vph)	0	0	0	100	1450	90	80	550	0	0	650	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					2.0	2.0		2.0			2.0	
Lane Util. Factor					0.86	1.00		0.95			0.95	
Frpb, ped/bikes					1.00	0.87		1.00			0.97	
Flpb, ped/bikes					1.00	1.00		0.99			1.00	
Frt					1.00	0.85		1.00			0.98	
Flt Protected					1.00	1.00		0.99			1.00	
Satd. Flow (prot)					6368	1371		3459			3304	
Flt Permitted					1.00	1.00		0.77			1.00	
Satd. Flow (perm)					6368	1371		2692			3304	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	109	1576	98	87	598	0	0	707	141
RTOR Reduction (vph)	0	0	0	0	0	43	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	0	1685	55	0	685	0	0	847	0
Confl. Peds. (#/hr)				237		159	295		193	193		295
Bus Blockages (#/hr)	0	0	0	0	3	0	0	5	0	0	5	0
Turn Type				Split	NA	Perm	Perm	NA			NA	
Protected Phases				2	2			4			4	
Permitted Phases						2	4					
Actuated Green, G (s)					23.0	23.0		28.0			28.0	
Effective Green, g (s)					25.5	25.5		30.5			30.5	
Actuated g/C Ratio					0.42	0.42		0.51			0.51	
Clearance Time (s)					4.5	4.5		4.5			4.5	
Lane Grp Cap (vph)					2706	582		1368			1679	
v/s Ratio Prot					c0.26						c0.26	
v/s Ratio Perm						0.04		0.25				
v/c Ratio					0.62	0.09		0.50			0.50	
Uniform Delay, d1					13.5	10.3		9.7			9.8	
Progression Factor					1.51	2.38		1.00			1.00	
Incremental Delay, d2					0.1	0.0		1.3			1.1	
Delay (s)					20.5	24.6		11.0			10.8	
Level of Service					C	C		B			B	
Approach Delay (s)		0.0			20.7			11.0			10.8	
Approach LOS		A			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.2		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)				4.0			
Intersection Capacity Utilization			79.4%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

## 273: Franklin & Fell

Better Market Street  
2020 No Project PM Peak Hour

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	340	0	0	70	40	280	1530	610	0	0	0
Future Volume (vph)	30	340	0	0	70	40	280	1530	610	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.5			-0.5	2.1			
Lane Util. Factor		0.95			1.00			0.81	0.81			
Frt		1.00			0.95			0.99	0.85			
Flt Protected		1.00			1.00			0.99	1.00			
Satd. Flow (prot)		3525			1772			5913	1282			
Flt Permitted		0.91			1.00			0.99	1.00			
Satd. Flow (perm)		3233			1772			5913	1282			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	370	0	0	76	43	304	1663	663	0	0	0
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	236	0	0	0
Lane Group Flow (vph)	0	403	0	0	97	0	0	2159	235	0	0	0
Turn Type	Perm	NA			NA		Perm	NA	custom			
Protected Phases		4			8			2 1	1			
Permitted Phases	4						2 1					
Actuated Green, G (s)		18.5			18.5			57.4	42.4			
Effective Green, g (s)		21.0			20.5			59.9	44.9			
Actuated g/C Ratio		0.23			0.23			0.67	0.50			
Clearance Time (s)		9.5			9.5				4.6			
Lane Grp Cap (vph)		754			403			3935	639			
v/s Ratio Prot					0.05				0.18			
v/s Ratio Perm		c0.12						0.37				
v/c Ratio		0.53			0.24			0.55	0.37			
Uniform Delay, d1		30.2			28.4			7.9	13.8			
Progression Factor		1.00			1.69			1.13	3.12			
Incremental Delay, d2		2.7			1.2			0.5	1.4			
Delay (s)		32.9			49.1			9.4	44.7			
Level of Service		C			D			A	D			
Approach Delay (s)		32.9			49.1			15.7			0.0	
Approach LOS		C			D			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.2				HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)		9.1			
Intersection Capacity Utilization			52.6%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

## **Synchro intersection delay results - 2020 Plus Project**

# HCM Signalized Intersection Capacity Analysis

## 7: Kearny St & Post

Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	230	0	0	0	0	0	1220	40	0	0	0
Future Volume (vph)	180	230	0	0	0	0	0	1220	40	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0						2.4				
Lane Util. Factor	0.91	0.91						0.86				
Frpb, ped/bikes	1.00	1.00						0.99				
Flpb, ped/bikes	0.62	0.93						1.00				
Frt	1.00	1.00						1.00				
Flt Protected	0.95	0.99						1.00				
Satd. Flow (prot)	892	2828						5681				
Flt Permitted	0.95	0.99						1.00				
Satd. Flow (perm)	892	2828						5681				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	188	240	0	0	0	0	0	1271	42	0	0	0
RTOR Reduction (vph)	33	27	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	106	262	0	0	0	0	0	1306	0	0	0	0
Confl. Peds. (#/hr)	782								646			
Turn Type	Perm	NA						NA				
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)	20.0	20.0						31.6				
Effective Green, g (s)	22.0	22.0						33.6				
Actuated g/C Ratio	0.37	0.37						0.56				
Clearance Time (s)	4.0	4.0						4.4				
Lane Grp Cap (vph)	327	1036						3181				
v/s Ratio Prot								c0.23				
v/s Ratio Perm	c0.12	0.09										
v/c Ratio	0.32	0.25						0.41				
Uniform Delay, d1	13.7	13.3						7.5				
Progression Factor	0.97	0.93						1.00				
Incremental Delay, d2	2.6	0.6						0.4				
Delay (s)	15.9	12.9						7.9				
Level of Service	B	B						A				
Approach Delay (s)		13.9			0.0			7.9			0.0	
Approach LOS		B			A			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		9.4			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		60.0			Sum of lost time (s)			4.4				
Intersection Capacity Utilization		42.2%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 8: Grant & Geary St/Geary St.


Better Market Street  
2020 Proposed Project PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰		↰	↱				↱
Traffic Volume (vph)	0	0	0	0	430	90	120	90	0	0	0	170
Future Volume (vph)	0	0	0	0	430	90	120	90	0	0	0	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.7		3.1	3.1				3.5
Lane Util. Factor					1.00		1.00	1.00				1.00
Frpb, ped/bikes					0.91		1.00	1.00				1.00
Flpb, ped/bikes					1.00		0.36	1.00				1.00
Frt					0.98		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					1488		579	1676				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					1488		579	1676				1450
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	0	0	478	100	133	100	0	0	0	189
RTOR Reduction (vph)	0	0	0	0	13	0	76	0	0	0	0	55
Lane Group Flow (vph)	0	0	0	0	565	0	57	100	0	0	0	134
Confl. Peds. (#/hr)						444	926					926
Turn Type					NA		Perm	NA				Prot
Protected Phases					6			8				4
Permitted Phases							8					
Actuated Green, G (s)					22.8		23.5	23.5				23.5
Effective Green, g (s)					25.3		25.9	25.9				25.5
Actuated g/C Ratio					0.42		0.43	0.43				0.42
Clearance Time (s)					8.2		5.5	5.5				5.5
Lane Grp Cap (vph)					627		249	723				616
v/s Ratio Prot					c0.38			0.06				0.09
v/s Ratio Perm							c0.10					
v/c Ratio					0.90		0.23	0.14				0.22
Uniform Delay, d1					16.2		10.8	10.3				10.9
Progression Factor					1.00		1.00	1.00				0.74
Incremental Delay, d2					18.5		2.2	0.4				0.8
Delay (s)					34.7		12.9	10.7				8.9
Level of Service					C		B	B				A
Approach Delay (s)		0.0			34.7			12.0			8.9	
Approach LOS		A			C			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.5		HCM 2000 Level of Service				C			
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)				9.2			
Intersection Capacity Utilization			75.4%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 9: Stockton St. & O'Farrell













Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑								↑↑	
Traffic Volume (vph)	0	280	260	0	0	0	0	0	0	70	790	0
Future Volume (vph)	0	280	260	0	0	0	0	0	0	70	790	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5								2.0	
Lane Util. Factor		0.86	0.86								0.95	
Frpb, ped/bikes		0.97	0.91								1.00	
Flpb, ped/bikes		1.00	1.00								0.97	
Frt		0.95	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		4003	1117								3090	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		4003	1117								3090	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	292	271	0	0	0	0	0	0	73	823	0
RTOR Reduction (vph)	0	80	80	0	0	0	0	0	0	0	216	0
Lane Group Flow (vph)	0	348	55	0	0	0	0	0	0	0	680	0
Confl. Peds. (#/hr)			100							100		
Turn Type		NA	Perm							Perm	NA	
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								4.5	
Effective Green, g (s)		24.5	24.5								7.0	
Actuated g/C Ratio		0.41	0.41								0.12	
Clearance Time (s)		5.0	5.0								4.5	
Lane Grp Cap (vph)		1634	456								360	
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.05								0.22	
v/c Ratio		0.21	0.12								1.89	
Uniform Delay, d1		11.5	11.0								26.5	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		0.3	0.5								409.8	
Delay (s)		11.8	11.6								436.3	
Level of Service		B	B								F	
Approach Delay (s)		11.7			0.0			0.0			436.3	
Approach LOS		B			A			A			F	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			272.5				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			17.0		
Intersection Capacity Utilization			52.4%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 14: Jones St. & Golden Gate

















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗						↗	↗↗	↑	
Traffic Volume (vph)	0	510	50	0	0	0	0	0	20	390	100	0
Future Volume (vph)	0	510	50	0	0	0	0	0	20	390	100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.5						2.0	2.0	2.0	
Lane Util. Factor		0.95	1.00						1.00	0.97	1.00	
Frpb, ped/bikes		1.00	0.74						1.00	1.00	1.00	
Flpb, ped/bikes		1.00	1.00						1.00	0.67	1.00	
Frt		1.00	0.85						0.86	1.00	1.00	
Flt Protected		1.00	1.00						1.00	0.95	1.00	
Satd. Flow (prot)		3539	1167						1611	2308	1863	
Flt Permitted		1.00	1.00						1.00	0.95	1.00	
Satd. Flow (perm)		3539	1167						1611	2308	1863	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	554	54	0	0	0	0	0	22	424	109	0
RTOR Reduction (vph)	0	0	41	0	0	0	0	0	14	274	0	0
Lane Group Flow (vph)	0	554	13	0	0	0	0	0	8	150	109	0
Confl. Peds. (#/hr)			100							185		
Turn Type		NA	Perm						Perm	Perm	NA	
Protected Phases		2									4	
Permitted Phases			2						8	4		
Actuated Green, G (s)		12.5	12.5						20.0	19.5	19.5	
Effective Green, g (s)		15.0	14.5						22.0	22.0	22.0	
Actuated g/C Ratio		0.24	0.23						0.35	0.35	0.35	
Clearance Time (s)		4.5	4.5						4.0	4.5	4.5	
Lane Grp Cap (vph)		856	272						571	818	661	
v/s Ratio Prot		c0.16									0.06	
v/s Ratio Perm			0.01						0.00	c0.07		
v/c Ratio		0.65	0.05						0.01	0.18	0.16	
Uniform Delay, d1		21.1	18.4						13.0	13.8	13.7	
Progression Factor		1.00	1.00						1.00	1.00	1.00	
Incremental Delay, d2		3.8	0.3						0.0	0.5	0.5	
Delay (s)		24.9	18.7						13.0	14.3	14.2	
Level of Service		C	B						B	B	B	
Approach Delay (s)		24.3			0.0			13.0			14.3	
Approach LOS		C			A			B			B	
Intersection Summary												
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.26									
Actuated Cycle Length (s)			62.0		Sum of lost time (s)					10.0		
Intersection Capacity Utilization			38.6%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 18: Sixth St. & Folsom St.
















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1680	200	0	0	0	0	1050	390	130	1040	0
Future Volume (vph)	100	1680	200	0	0	0	0	1050	390	130	1040	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	12	12	12	12	12	10	12	12	10	12
Total Lost time (s)		3.3						1.0	1.5		2.5	
Lane Util. Factor		0.86						0.95	1.00		0.91	
Frpb, ped/bikes		0.99						1.00	0.93		1.00	
Flpb, ped/bikes		1.00						1.00	1.00		1.00	
Frt		0.98						1.00	0.85		1.00	
Flt Protected		1.00						1.00	1.00		0.99	
Satd. Flow (prot)		5344						3004	1361		4348	
Flt Permitted		1.00						1.00	1.00		0.68	
Satd. Flow (perm)		5344						3004	1361		2961	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	108	1806	215	0	0	0	0	1129	419	140	1118	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	109	0	0	0
Lane Group Flow (vph)	0	2100	0	0	0	0	0	1129	310	0	1258	0
Confl. Peds. (#/hr)	66		81	81		66	100		61	61		100
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	5%	5%	5%	4%	4%	4%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	6	0	0	6	0
Turn Type	Split	NA						NA	Perm	Prot	NA	
Protected Phases	2	2						4		3	8	
Permitted Phases									4			
Actuated Green, G (s)		21.2						21.5	21.5		34.0	
Effective Green, g (s)		22.7						24.0	23.5		36.5	
Actuated g/C Ratio		0.35						0.37	0.36		0.56	
Clearance Time (s)		4.8						3.5	3.5		5.0	
Lane Grp Cap (vph)		1866						1109	492		1908	
v/s Ratio Prot		c0.39						c0.38			c0.12	
v/s Ratio Perm									0.23		0.25	
v/c Ratio		1.13						1.02	0.63		0.66	
Uniform Delay, d1		21.1						20.5	17.2		9.9	
Progression Factor		1.00						1.00	1.00		1.00	
Incremental Delay, d2		64.0						31.6	6.0		1.8	
Delay (s)		85.1						52.1	23.2		11.7	
Level of Service		F						D	C		B	
Approach Delay (s)		85.1			0.0			44.3			11.7	
Approach LOS		F			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		53.6						HCM 2000 Level of Service		D		
HCM 2000 Volume to Capacity ratio		0.98										
Actuated Cycle Length (s)		65.0						Sum of lost time (s)		6.8		
Intersection Capacity Utilization		97.7%						ICU Level of Service		F		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 25: Mason & Eddy

Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	450	50	0	0	0	0	0	100	350	80	0
Future Volume (vph)	0	450	50	0	0	0	0	0	100	350	80	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0							2.0	2.0	2.0	
Lane Util. Factor		0.91							1.00	1.00	1.00	
Frpb, ped/bikes		0.96							1.00	1.00	1.00	
Flpb, ped/bikes		1.00							1.00	0.85	1.00	
Frt		0.99							0.86	1.00	1.00	
Flt Protected		1.00							1.00	0.95	1.00	
Satd. Flow (prot)		4331							1450	1353	1676	
Flt Permitted		1.00							1.00	0.95	1.00	
Satd. Flow (perm)		4331							1450	1353	1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	489	54	0	0	0	0	0	109	380	87	0
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	10	87	0	0
Lane Group Flow (vph)	0	521	0	0	0	0	0	0	99	293	87	0
Confl. Peds. (#/hr)			268							268		
Turn Type		NA							Perm	Perm	NA	
Protected Phases		4									6	
Permitted Phases									2	6		
Actuated Green, G (s)		21.0							31.5	32.0	32.0	
Effective Green, g (s)		22.5							33.5	33.5	33.5	
Actuated g/C Ratio		0.38							0.56	0.56	0.56	
Clearance Time (s)		3.5							4.0	3.5	3.5	
Lane Grp Cap (vph)		1624							809	755	935	
v/s Ratio Prot		c0.12									0.05	
v/s Ratio Perm									0.07	c0.22		
v/c Ratio		0.32							0.12	0.39	0.09	
Uniform Delay, d1		13.3							6.3	7.5	6.2	
Progression Factor		1.00							1.00	1.00	1.00	
Incremental Delay, d2		0.5							0.3	1.5	0.2	
Delay (s)		13.8							6.6	9.0	6.4	
Level of Service		B							A	A	A	
Approach Delay (s)		13.8			0.0			6.6			8.5	
Approach LOS		B			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.9		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					6.0		
Intersection Capacity Utilization			61.0%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

## 34: Third & Howard St.
















Better Market Street  
2020 Proposed Project PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					TTTB		T	TTTB				
Traffic Volume (vph)	0	0	0	0	1800	350	330	1520	0	0	0	0
Future Volume (vph)	0	0	0	0	1800	350	330	1520	0	0	0	0
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Lane Width	12	12	12	12	10	12	10	10	12	12	12	12
Total Lost time (s)					2.0		2.0	2.0				
Lane Util. Factor					0.86		0.81	0.81				
Frpb, ped/bikes					0.95		1.00	1.00				
Flpb, ped/bikes					1.00		1.00	1.00				
Frt					0.98		1.00	1.00				
Flt Protected					1.00		0.95	1.00				
Satd. Flow (prot)					4353		1046	4245				
Flt Permitted					1.00		0.95	1.00				
Satd. Flow (perm)					4353		1046	4245				
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	0	0	0	0	1818	354	333	1535	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	13	13	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2172	0	287	1555	0	0	0	0
Confl. Peds. (#/hr)	382		366	366		382	370		748	748		370
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	3	0	0	35	0	0	0	0
Turn Type					NA		Split	NA				
Protected Phases					8		6	6				
Permitted Phases												
Actuated Green, G (s)					23.0		24.0	24.0				
Effective Green, g (s)					25.5		30.5	30.5				
Actuated g/C Ratio					0.42		0.51	0.51				
Clearance Time (s)					4.5		8.5	8.5				
Lane Grp Cap (vph)					1850		531	2157				
v/s Ratio Prot					c0.50		0.27	c0.37				
v/s Ratio Perm												
v/c Ratio					1.17		0.54	0.72				
Uniform Delay, d1					17.2		10.0	11.4				
Progression Factor					1.13		1.00	1.00				
Incremental Delay, d2					78.9		3.9	2.1				
Delay (s)					98.5		13.9	13.6				
Level of Service					F		B	B				
Approach Delay (s)		0.0			98.5			13.6			0.0	
Approach LOS		A			F			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			59.2				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			78.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 38: First & Howard St.

















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	440	1400	0	0	0	0	0	910	540
Future Volume (vph)	0	0	0	440	1400	0	0	0	0	0	910	540
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Lane Width	12	12	12	11	11	11	12	12	12	11	11	11
Total Lost time (s)					2.0						2.0	2.0
Lane Util. Factor					*0.70						0.95	1.00
Frpb, ped/bikes					1.00						1.00	0.82
Flpb, ped/bikes					0.96						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					3391						2431	897
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					3391						2431	897
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	478	1522	0	0	0	0	0	989	587
RTOR Reduction (vph)	0	0	0	0	39	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	0	0	0	1961	0	0	0	0	0	989	582
Confl. Peds. (#/hr)				250								250
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						8	
Permitted Phases				6								8
Actuated Green, G (s)					25.5						27.0	27.0
Effective Green, g (s)					27.0						29.0	29.0
Actuated g/C Ratio					0.45						0.48	0.48
Clearance Time (s)					3.5						4.0	4.0
Lane Grp Cap (vph)					1525						1174	433
v/s Ratio Prot											0.41	
v/s Ratio Perm					0.58							c0.65
v/c Ratio					1.29						0.84	1.34
Uniform Delay, d1					16.5						13.5	15.5
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					133.7						7.4	169.5
Delay (s)					150.2						20.9	185.0
Level of Service					F						C	F
Approach Delay (s)		0.0			150.2			0.0			82.0	
Approach LOS		A			F			A			F	
Intersection Summary												
HCM 2000 Control Delay			120.2		HCM 2000 Level of Service					F		
HCM 2000 Volume to Capacity ratio			1.29									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					4.0		
Intersection Capacity Utilization			100.0%		ICU Level of Service					F		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 133: Grant & Post


Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	330	110	0	0	0	0	140	40	40	60	0
Future Volume (vph)	190	330	110	0	0	0	0	140	40	40	60	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.4			4.4	
Lane Util. Factor		0.91						1.00			1.00	
Frt		0.97						0.97			1.00	
Flt Protected		0.99						1.00			0.98	
Satd. Flow (prot)		4878						1807			1826	
Flt Permitted		0.99						1.00			0.83	
Satd. Flow (perm)		4878						1807			1555	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	359	120	0	0	0	0	152	43	43	65	0
RTOR Reduction (vph)	0	51	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	635	0	0	0	0	0	178	0	0	108	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		34.5						16.6			16.6	
Effective Green, g (s)		34.5						16.6			16.6	
Actuated g/C Ratio		0.58						0.28			0.28	
Clearance Time (s)		4.5						4.4			4.4	
Lane Grp Cap (vph)		2804						499			430	
v/s Ratio Prot								c0.10				
v/s Ratio Perm		0.13									0.07	
v/c Ratio		0.23						0.36			0.25	
Uniform Delay, d1		6.2						17.4			16.9	
Progression Factor		1.00						1.06			1.00	
Incremental Delay, d2		0.2						1.7			1.4	
Delay (s)		6.4						20.2			18.3	
Level of Service		A						C			B	
Approach Delay (s)		6.4			0.0			20.2			18.3	
Approach LOS		A			A			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			10.4									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			60.0								8.9	
Intersection Capacity Utilization			41.1%								A	
ICU Level of Service												
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 146: Tenth St. & Folsom St.













Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑								↑↑↑	
Traffic Volume (vph)	0	1260	100	0	0	0	0	0	0	490	1900	0
Future Volume (vph)	0	1260	100	0	0	0	0	0	0	490	1900	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	10	12	12	12	12	12	12	12	10	12
Total Lost time (s)		2.5	2.5								2.5	
Lane Util. Factor		0.91	1.00								0.86	
Frpb, ped/bikes		1.00	0.94								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								0.99	
Satd. Flow (prot)		4435	1309								5608	
Flt Permitted		1.00	1.00								0.99	
Satd. Flow (perm)		4435	1309								5608	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1326	105	0	0	0	0	0	0	516	2000	0
RTOR Reduction (vph)	0	0	15	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1326	90	0	0	0	0	0	0	0	2506	0
Confl. Peds. (#/hr)	28		51	51		28	39		43	43		39
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	0	0	0	0	0
Turn Type		NA	Perm							Split	NA	
Protected Phases		2								4	4	
Permitted Phases			2									
Actuated Green, G (s)		31.0	31.0								49.0	
Effective Green, g (s)		33.5	33.5								51.5	
Actuated g/C Ratio		0.37	0.37								0.57	
Clearance Time (s)		5.0	5.0								5.0	
Lane Grp Cap (vph)		1650	487								3209	
v/s Ratio Prot		c0.30									c0.45	
v/s Ratio Perm			0.07									
v/c Ratio		0.80	0.18								0.78	
Uniform Delay, d1		25.3	19.0								14.9	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		4.3	0.8								2.0	
Delay (s)		29.6	19.9								16.8	
Level of Service		C	B								B	
Approach Delay (s)		28.9			0.0			0.0			16.8	
Approach LOS		C			A			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.2									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			90.0								5.0	Sum of lost time (s)
Intersection Capacity Utilization			73.3%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 161: Eighth St. & Folsom St.




















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑								↑↑↑	
Traffic Volume (vph)	0	1580	180	0	0	0	0	0	0	290	1450	0
Future Volume (vph)	0	1580	180	0	0	0	0	0	0	290	1450	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	12	12	12	12	12	12	12	12	10	12
Total Lost time (s)		2.0	2.5								2.0	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.93								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								0.99	
Satd. Flow (prot)		4392	1375								4228	
Flt Permitted		1.00	1.00								0.99	
Satd. Flow (perm)		4392	1375								4228	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	1736	198	0	0	0	0	0	0	319	1593	0
RTOR Reduction (vph)	0	0	14	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	1736	184	0	0	0	0	0	0	0	1897	0
Confl. Peds. (#/hr)	73		79	79		73	109		67	67		109
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	7%	7%	7%
Bus Blockages (#/hr)	0	3	0	0	3	0	0	0	0	0	4	0
Turn Type		NA	Perm							Split	NA	
Protected Phases		2								4	4	
Permitted Phases			2									
Actuated Green, G (s)		26.0	26.0								25.0	
Effective Green, g (s)		28.5	28.0								27.5	
Actuated g/C Ratio		0.48	0.47								0.46	
Clearance Time (s)		4.5	4.5								4.5	
Lane Grp Cap (vph)		2086	641								1937	
v/s Ratio Prot		c0.40									c0.45	
v/s Ratio Perm			0.13									
v/c Ratio		0.83	0.29								0.98	
Uniform Delay, d1		13.7	9.8								16.0	
Progression Factor		1.00	1.00								1.00	
Incremental Delay, d2		4.1	1.1								16.2	
Delay (s)		17.7	11.0								32.1	
Level of Service		B	B								C	
Approach Delay (s)		17.0			0.0			0.0			32.1	
Approach LOS		B			A			A			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.5				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			4.0		
Intersection Capacity Utilization			76.9%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 184: Franklin & Oak

Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	  							  				
Traffic Volume (vph)	1290	0	0	0	0	50	0	1100	0	0	0	0
Future Volume (vph)	1290	0	0	0	0	50	0	1100	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.5					2.5		2.0				
Lane Util. Factor	0.94					1.00		0.91				
Frt	1.00					0.86		1.00				
Flt Protected	0.95					1.00		1.00				
Satd. Flow (prot)	4990					1611		5085				
Flt Permitted	0.95					1.00		1.00				
Satd. Flow (perm)	4990					1611		5085				
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1358	0	0	0	0	53	0	1158	0	0	0	0
RTOR Reduction (vph)	45	0	0	0	0	16	0	0	0	0	0	0
Lane Group Flow (vph)	1313	0	0	0	0	37	0	1158	0	0	0	0
Turn Type	Perm					Perm		NA				
Protected Phases								2				
Permitted Phases	4					8						
Actuated Green, G (s)	42.5					42.5		37.0				
Effective Green, g (s)	45.5					45.5		40.0				
Actuated g/C Ratio	0.51					0.51		0.44				
Clearance Time (s)	5.5					5.5		5.0				
Lane Grp Cap (vph)	2522					814		2260				
v/s Ratio Prot								c0.23				
v/s Ratio Perm	c0.26					0.02						
v/c Ratio	0.52					0.05		0.51				
Uniform Delay, d1	14.9					11.3		18.0				
Progression Factor	0.46					1.00		1.00				
Incremental Delay, d2	0.5					0.1		0.8				
Delay (s)	7.3					11.4		18.8				
Level of Service	A					B		B				
Approach Delay (s)	7.3			11.4			18.8			0.0		
Approach LOS	A			B			B			A		
Intersection Summary												
HCM 2000 Control Delay	12.6			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.53											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)			7.5					
Intersection Capacity Utilization	113.6%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 185: Van Ness & Fell/Fell St.













Better Market Street  
2020 Proposed Project PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔						↔↔			↔↔	
Traffic Volume (vph)	50	820	100	0	0	0	0	1780	50	0	1240	110
Future Volume (vph)	50	820	100	0	0	0	0	1780	50	0	1240	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.5						1.5			2.5	
Lane Util. Factor		0.95						0.95			0.95	
Frt		0.98						1.00			0.99	
Flt Protected		1.00						1.00			1.00	
Satd. Flow (prot)		3475						3525			3496	
Flt Permitted		1.00						1.00			1.00	
Satd. Flow (perm)		3475						3525			3496	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	55	901	110	0	0	0	0	1956	55	0	1363	121
RTOR Reduction (vph)	0	10	0	0	0	0	0	2	0	0	7	0
Lane Group Flow (vph)	0	1056	0	0	0	0	0	2009	0	0	1477	0
Parking (#/hr)	0		10						10			
Turn Type	Perm	NA						NA			NA	
Protected Phases		4						2			6	
Permitted Phases	4											
Actuated Green, G (s)		26.0						55.0			54.0	
Effective Green, g (s)		28.5						57.5			56.5	
Actuated g/C Ratio		0.32						0.64			0.63	
Clearance Time (s)		5.0						4.0			5.0	
Vehicle Extension (s)		3.0						1.0			3.0	
Lane Grp Cap (vph)		1100						2252			2194	
v/s Ratio Prot								c0.57			0.42	
v/s Ratio Perm		0.30										
v/c Ratio		0.96						0.89			0.67	
Uniform Delay, d1		30.2						13.6			10.8	
Progression Factor		0.94						1.00			1.00	
Incremental Delay, d2		17.2						5.9			1.7	
Delay (s)		45.5						19.5			12.5	
Level of Service		D						B			B	
Approach Delay (s)		45.5			0.0			19.5			12.5	
Approach LOS		D			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		23.3						HCM 2000 Level of Service			C	
HCM 2000 Volume to Capacity ratio		0.91										
Actuated Cycle Length (s)		90.0						Sum of lost time (s)		5.0		
Intersection Capacity Utilization		84.8%						ICU Level of Service		E		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 188: Fourth St. & Folsom St.

Better Market Street  
2020 Proposed Project PM Peak Hour


												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑							↑	↑↑↑	
Traffic Volume (vph)	0	1800	320	0	0	0	0	0	0	220	1350	0
Future Volume (vph)	0	1800	320	0	0	0	0	0	0	220	1350	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	10	10	12	12	12	12	12	12	10	10	12
Total Lost time (s)		1.8	1.8							2.8	2.8	
Lane Util. Factor		0.91	1.00							0.86	0.86	
Frpb, ped/bikes		1.00	1.00							1.00	1.00	
Flpb, ped/bikes		1.00	1.00							1.00	1.00	
Frt		1.00	0.85							1.00	1.00	
Flt Protected		1.00	1.00							0.95	1.00	
Satd. Flow (prot)		4392	1373							1295	3939	
Flt Permitted		1.00	1.00							0.95	1.00	
Satd. Flow (perm)		4392	1373							1295	3939	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	2022	360	0	0	0	0	0	0	247	1517	0
RTOR Reduction (vph)	0	0	77	0	0	0	0	0	0	62	35	0
Lane Group Flow (vph)	0	2022	283	0	0	0	0	0	0	160	1507	0
Confl. Peds. (#/hr)	95		159	159		95	255		228	228		255
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	2%	2%	2%	6%	6%	6%
Bus Blockages (#/hr)	0	3	0	0	0	0	0	0	0	0	27	0
Turn Type		NA	Prot							Split	NA	
Protected Phases		2	2							4	4	
Permitted Phases												
Actuated Green, G (s)		24.2	24.2							33.2	33.2	
Effective Green, g (s)		27.2	27.2							35.2	35.2	
Actuated g/C Ratio		0.30	0.30							0.39	0.39	
Clearance Time (s)		4.8	4.8							4.8	4.8	
Lane Grp Cap (vph)		1327	414							506	1540	
v/s Ratio Prot		c0.46	0.21							0.12	c0.38	
v/s Ratio Perm												
v/c Ratio		1.52	0.68							0.32	0.98	
Uniform Delay, d1		31.4	27.6							19.0	27.0	
Progression Factor		1.00	1.00							1.00	1.00	
Incremental Delay, d2		239.6	8.8							1.6	18.3	
Delay (s)		271.0	36.4							20.7	45.4	
Level of Service		F	D							C	D	
Approach Delay (s)		235.5			0.0			0.0			42.3	
Approach LOS		F			A			A			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			153.3				HCM 2000 Level of Service			F		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			7.6		
Intersection Capacity Utilization			71.0%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												



# HCM Signalized Intersection Capacity Analysis

## 191: Ninth St. & Howard St.















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑	↑		↑↑↑↑				
Traffic Volume (vph)	0	0	0	0	870	640	140	2710	0	0	0	0
Future Volume (vph)	0	0	0	0	870	640	140	2710	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	10	10	12	10	12	12	12	12
Total Lost time (s)					2.0	2.0		2.0				
Lane Util. Factor					0.91	1.00		0.81				
Frpb, ped/bikes					1.00	0.90		1.00				
Flpb, ped/bikes					1.00	1.00		1.00				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		1.00				
Satd. Flow (prot)					4478	1257		6633				
Flt Permitted					1.00	1.00		1.00				
Satd. Flow (perm)					4478	1257		6633				
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	0	906	667	146	2823	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	19	0	19	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	906	648	0	2950	0	0	0	0
Confl. Peds. (#/hr)	92		91	91		92	104		205	205		104
Confl. Bikes (#/hr)						60						
Bus Blockages (#/hr)	0	0	0	0	3	0	0	4	0	0	0	0
Turn Type					NA	Perm	Split	NA				
Protected Phases					6		8	8				
Permitted Phases						6						
Actuated Green, G (s)					25.0	25.0		25.0				
Effective Green, g (s)					28.0	28.0		28.0				
Actuated g/C Ratio					0.47	0.47		0.47				
Clearance Time (s)					5.0	5.0		5.0				
Lane Grp Cap (vph)					2089	586		3095				
v/s Ratio Prot					0.20			c0.44				
v/s Ratio Perm						c0.52						
v/c Ratio					0.43	1.11		0.95				
Uniform Delay, d1					10.7	16.0		15.4				
Progression Factor					0.44	0.38		1.00				
Incremental Delay, d2					0.5	65.8		8.4				
Delay (s)					5.2	71.9		23.8				
Level of Service					A	E		C				
Approach Delay (s)		0.0			33.5			23.8			0.0	
Approach LOS		A			C			C			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			27.2									
HCM 2000 Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			60.0									
Intersection Capacity Utilization			89.2%									
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 196: Oak & Gough













Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1220	270	0	0	0	0	0	0	70	1710	0
Future Volume (vph)	0	1220	270	0	0	0	0	0	0	70	1710	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.0	
Lane Util. Factor		0.91									0.86	
Frpb, ped/bikes		0.97									1.00	
Flpb, ped/bikes		1.00									0.99	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		4816									6361	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		4816									6361	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1284	284	0	0	0	0	0	0	74	1800	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	17	0
Lane Group Flow (vph)	0	1566	0	0	0	0	0	0	0	0	1857	0
Confl. Peds. (#/hr)			200								200	
Turn Type		NA								Perm	NA	
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		39.5									40.0	
Effective Green, g (s)		39.5									40.0	
Actuated g/C Ratio		0.44									0.44	
Clearance Time (s)		5.5									5.0	
Lane Grp Cap (vph)		2113									2827	
v/s Ratio Prot		0.33										
v/s Ratio Perm											0.29	
v/c Ratio		0.74									0.66	
Uniform Delay, d1		21.0									19.6	
Progression Factor		1.00									1.00	
Incremental Delay, d2		2.4									1.2	
Delay (s)		23.4									20.8	
Level of Service		C									C	
Approach Delay (s)		23.4			0.0			0.0			20.8	
Approach LOS		C			A			A			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			22.0				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)			10.5		
Intersection Capacity Utilization			113.6%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 202: Seventh St. & Howard St.



















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑			↑↑↑				
Traffic Volume (vph)	0	0	0	0	1150	230	220	1600	0	0	0	0
Future Volume (vph)	0	0	0	0	1150	230	220	1600	0	0	0	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	10	12	12	10	12	12	12	12
Total Lost time (s)					2.0			2.0				
Lane Util. Factor					0.91			0.86				
Frbp, ped/bikes					0.98			1.00				
Flpb, ped/bikes					1.00			1.00				
Frt					0.97			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4287			5577				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4287			5577				
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	0	1173	235	224	1633	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1407	0	0	1837	0	0	0	0
Confl. Peds. (#/hr)	142		160	160		142	241		254	254		241
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	3	0	0	0	0	0	0	0
Turn Type					NA		Split	NA				
Protected Phases					6		8	8				
Permitted Phases												
Actuated Green, G (s)					26.0			24.0				
Effective Green, g (s)					29.0			27.0				
Actuated g/C Ratio					0.48			0.45				
Clearance Time (s)					5.0			5.0				
Lane Grp Cap (vph)					2072			2509				
v/s Ratio Prot					c0.33			c0.33				
v/s Ratio Perm												
v/c Ratio					0.68			0.73				
Uniform Delay, d1					11.9			13.5				
Progression Factor					0.59			1.00				
Incremental Delay, d2					1.4			1.9				
Delay (s)					8.4			15.5				
Level of Service					A			B				
Approach Delay (s)		0.0			8.4			15.5			0.0	
Approach LOS		A			A			B			A	
Intersection Summary												
HCM 2000 Control Delay			12.4		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					4.0		
Intersection Capacity Utilization			66.3%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 235: Cyril Magnin & Ellis


Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	120	30	430	280	0	0	0	140
Future Volume (vph)	0	0	0	0	120	30	430	280	0	0	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5		3.5	3.5			3.0	
Lane Util. Factor					1.00		1.00	1.00			1.00	
Frpb, ped/bikes					0.89		1.00	1.00			1.00	
Flpb, ped/bikes					1.00		1.00	1.00			1.00	
Frt					0.97		1.00	1.00			0.86	
Flt Protected					1.00		0.95	1.00			1.00	
Satd. Flow (prot)					1610		1770	1863			1611	
Flt Permitted					1.00		0.95	1.00			1.00	
Satd. Flow (perm)					1610		1770	1863			1611	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	0	132	33	473	308	0	0	0	154
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	0	0	113	0
Lane Group Flow (vph)	0	0	0	0	150	0	473	308	0	0	41	0
Confl. Peds. (#/hr)						438	64		688			
Turn Type					NA		Split	NA	Perm		NA	
Protected Phases					8		6	6			2	
Permitted Phases									6	2		
Actuated Green, G (s)					17.5		23.5	23.5			9.0	
Effective Green, g (s)					17.5		23.5	23.5			9.0	
Actuated g/C Ratio					0.29		0.39	0.39			0.15	
Clearance Time (s)					3.5		3.5	3.5			3.0	
Lane Grp Cap (vph)					469		693	729			241	
v/s Ratio Prot					c0.09		c0.27	0.17			c0.03	
v/s Ratio Perm												
v/c Ratio					0.32		0.68	0.42			0.17	
Uniform Delay, d1					16.6		15.2	13.3			22.2	
Progression Factor					1.00		1.00	1.00			1.00	
Incremental Delay, d2					1.8		5.4	1.8			1.5	
Delay (s)					18.4		20.5	15.1			23.8	
Level of Service					B		C	B			C	
Approach Delay (s)		0.0			18.4			18.4			23.8	
Approach LOS		A			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			60.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			57.1%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 248: Second St. & Folsom St.






















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←↑↑↑→						↑			↑	
Traffic Volume (vph)	120	1250	140	0	0	0	0	400	110	0	350	0
Future Volume (vph)	120	1250	140	0	0	0	0	400	110	0	350	0
Ideal Flow (vphpl)	1500	1500	1500	1700	1700	1700	1500	1500	1500	1500	1500	1500
Lane Width	11	11	11	12	12	12	11	11	11	11	11	11
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		*0.65						1.00			1.00	
Frpb, ped/bikes		0.98						0.91			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.97			1.00	
Flt Protected		1.00						1.00			1.00	
Satd. Flow (prot)		3198						1083			1228	
Flt Permitted		1.00						1.00			1.00	
Satd. Flow (perm)		3198						1083			1228	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	1316	147	0	0	0	0	421	116	0	368	0
RTOR Reduction (vph)	0	19	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1570	0	0	0	0	0	536	0	0	368	0
Confl. Peds. (#/hr)	230		120					463		836	836	463
Confl. Bikes (#/hr)									100			100
Bus Blockages (#/hr)	0	3	0	0	0	0	0	10	0	0	10	0
Parking (#/hr)									10			10
Turn Type	Split	NA						NA			NA	
Protected Phases	2	2						4			8	
Permitted Phases												
Actuated Green, G (s)		20.0						30.0			30.0	
Effective Green, g (s)		21.5						31.5			31.5	
Actuated g/C Ratio		0.36						0.52			0.52	
Clearance Time (s)		5.0						5.0			5.0	
Lane Grp Cap (vph)		1145						568			644	
v/s Ratio Prot		c0.49						c0.49			0.30	
v/s Ratio Perm												
v/c Ratio		1.37						0.94			0.57	
Uniform Delay, d1		19.2						13.4			9.7	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		172.6						26.2			3.7	
Delay (s)		191.8						39.6			13.3	
Level of Service		F						D			B	
Approach Delay (s)		191.8			0.0			39.6			13.3	
Approach LOS		F			A			D			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		132.7						HCM 2000 Level of Service			F	
HCM 2000 Volume to Capacity ratio		1.12										
Actuated Cycle Length (s)		60.0						Sum of lost time (s)		7.0		
Intersection Capacity Utilization		80.2%						ICU Level of Service		D		
Analysis Period (min)		15										
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 261: Fifth St. & Howard St.

















Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					   			 			 	
Traffic Volume (vph)	0	0	0	100	1480	80	80	480	0	0	800	170
Future Volume (vph)	0	0	0	100	1480	80	80	480	0	0	800	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					2.0	2.0		2.0			2.0	
Lane Util. Factor					0.86	1.00		0.95			0.95	
Frpb, ped/bikes					1.00	0.87		1.00			0.97	
Flpb, ped/bikes					1.00	1.00		0.99			1.00	
Frt					1.00	0.85		1.00			0.97	
Flt Protected					1.00	1.00		0.99			1.00	
Satd. Flow (prot)					6368	1371		3462			3293	
Flt Permitted					1.00	1.00		0.70			1.00	
Satd. Flow (perm)					6368	1371		2455			3293	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	109	1609	87	87	522	0	0	870	185
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	0	1718	45	0	609	0	0	1054	0
Confl. Peds. (#/hr)				237		159	295		193	193		295
Bus Blockages (#/hr)	0	0	0	0	3	0	0	5	0	0	5	0
Turn Type				Split	NA	Perm	Perm	NA			NA	
Protected Phases				2	2			4			4	
Permitted Phases						2	4					
Actuated Green, G (s)					23.0	23.0		28.0			28.0	
Effective Green, g (s)					25.5	25.5		30.5			30.5	
Actuated g/C Ratio					0.42	0.42		0.51			0.51	
Clearance Time (s)					4.5	4.5		4.5			4.5	
Lane Grp Cap (vph)					2706	582		1247			1673	
v/s Ratio Prot					c0.27						c0.32	
v/s Ratio Perm						0.03		0.25				
v/c Ratio					0.63	0.08		0.49			0.63	
Uniform Delay, d1					13.6	10.3		9.6			10.7	
Progression Factor					1.52	2.48		1.00			1.00	
Incremental Delay, d2					0.1	0.0		1.4			1.8	
Delay (s)					20.7	25.4		11.0			12.5	
Level of Service					C	C		B			B	
Approach Delay (s)		0.0			20.9			11.0			12.5	
Approach LOS		A			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.6		HCM 2000 Level of Service				B			
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			60.0		Sum of lost time (s)				4.0			
Intersection Capacity Utilization			85.3%		ICU Level of Service				E			
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 273: Franklin & Fell

Better Market Street  
2020 Proposed Project PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	360	0	0	70	40	280	1550	610	0	0	0
Future Volume (vph)	30	360	0	0	70	40	280	1550	610	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			7.5			-0.5	2.1			
Lane Util. Factor		0.95			1.00			0.81	0.81			
Frt		1.00			0.95			0.99	0.85			
Flt Protected		1.00			1.00			0.99	1.00			
Satd. Flow (prot)		3525			1772			5914	1282			
Flt Permitted		0.92			1.00			0.99	1.00			
Satd. Flow (perm)		3240			1772			5914	1282			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	391	0	0	76	43	304	1685	663	0	0	0
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	236	0	0	0
Lane Group Flow (vph)	0	424	0	0	97	0	0	2181	235	0	0	0
Turn Type	Perm	NA			NA		Perm	NA	custom			
Protected Phases		4			8			2 1	1			
Permitted Phases	4						2 1					
Actuated Green, G (s)		18.5			18.5			57.4	42.4			
Effective Green, g (s)		21.0			20.5			59.9	44.9			
Actuated g/C Ratio		0.23			0.23			0.67	0.50			
Clearance Time (s)		9.5			9.5				4.6			
Lane Grp Cap (vph)		756			403			3936	639			
v/s Ratio Prot					0.05				0.18			
v/s Ratio Perm		c0.13						0.37				
v/c Ratio		0.56			0.24			0.55	0.37			
Uniform Delay, d1		30.4			28.4			8.0	13.8			
Progression Factor		1.00			1.71			1.12	3.09			
Incremental Delay, d2		3.0			1.3			0.5	1.4			
Delay (s)		33.4			49.9			9.5	44.1			
Level of Service		C			D			A	D			
Approach Delay (s)		33.4			49.9			15.6			0.0	
Approach LOS		C			D			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.3				HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			90.0				Sum of lost time (s)		9.1			
Intersection Capacity Utilization			53.4%				ICU Level of Service		A			
Analysis Period (min)			15									
c Critical Lane Group												

## **Attachment 6b: Western Variant Analysis**

**See "Attachment 7c: Western Variant Analysis" for the volume changes with the Western Variant compared to the Project**



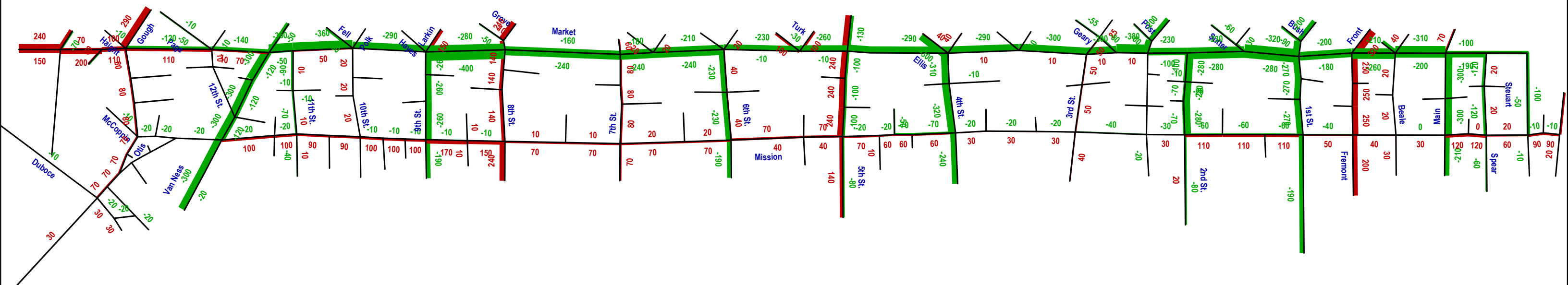
		Travel Time (mm:ss)					
Mode	Description	Distance	2020 No Project	2020 Proposed Project	Change from 2020NP (%)	2020 Proposed Project - Hub Circulation	Change from 2020 Proposed Project (%)
		(ft)					
Streetcar Center Lane	Inbound Total	11,540	29:00	24:00	-17%	23:30	-2%
Streetcar Center Lane	Outbound Total	11,620	27:30	20:30	-25%	20:00	-2%
Bus Center Lane	Inbound Total	8,860	18:00	14:00	-22%	14:00	0%
Bus Center Lane	Outbound Total	8,610	15:30	13:30	-13%	13:30	0%
Bus Curb Lane	Inbound Total*	6,820	17:00	15:00	-12%	15:00	0%
Bus Curb Lane	Outbound Total	8,750	22:30	18:30	-18%	18:30	0%

\* Line 7 travel times are used for No Project (no data available for 10th-7th segment) ; Line 21 travel times are used for Proposed Project (10th-7th segment not reported).

## **Attachment 7: Traffic Analysis**

## **Attachment 7a: Traffic Redistribution**

**See "Attachment 2a: Traffic Volumes All Scenarios" for the turn by turn volume changes due to the proposed project.**



This plot shows the difference between the 2020 Proposed Project and 2020 No Project alternatives. Increases are shown in red and decreases are shown in green. The volumes are PM peak one-hour volumes. These volumes were used in the VISSIM traffic analysis.

## **Attachment 7b: Unserved Vehicles**

			2020 No Project					Proposed Project				
				Demand	Served	% Served <sup>1</sup>			Demand	Served	% Served <sup>1</sup>	
Total				35,200	31,900	91%			35,100	31,500	90%	
Southbound Toward Market				17,200	15,800	92%			17,400	15,900	91%	
Northbound Toward Market				18,000	16,100	89%			17,700	15,600	88%	
Appro Street Name			#Lanes	Demand	Served	% Served <sup>1</sup>	Queue Length (ft) <sup>2</sup>	#Lanes	Demand	Served	% Served <sup>1</sup>	Queue Length (ft) <sup>2</sup>
Market Street Intersections (Southbound Approaches)	SB	Drumm	3	230	230	100%	0	2	300	300	100%	0
	SW	Davis	4	1,550	1,590	103%	0	4	1,590	1,580	99%	60
	SW	Battery	4	1,150	650	57%	3,130	4	950	770	81%	1,130
	SE	Bush	2	280	250	89%	380	2	190	190	100%	0
	SW	Sansome	1	100	90	90%	250	1	100	80	80%	500
	SW	Montgomery	4	1,500	1,380	92%	750	4	1,300	1,290	99%	60
	SE	Post	2	330	240	73%	1,130	2	270	210	78%	750
	SE	O'Farrell	2	200	190	95%	130	2	200	200	100%	0
	SW	Stockton	2	980	970	99%	130	2	1,020	1,000	98%	250
	SB	Cyril Magnin	2	720	720	100%	0	2	970	830	86%	1,750
	SW	Mason	1	130	120	92%	250	1	130	110	85%	500
	SE	Golden Gate	1	1,030	910	88%	3,000	1	1,030	900	87%	3,250
	SW	Jones	1	150	150	100%	0	1	150	150	100%	0
	SW	Hyde	3	1,420	1,400	99%	170	3	1,660	1,700	102%	0
	SE	Grove	1	180	180	100%	0	1	130	120	92%	250
	SW	Polk	2	860	860	100%	0	2	860	850	99%	130
	SE	Fell	3	1,000	960	96%	330	3	900	860	96%	330
	SB	Van Ness	2	1,510	1,260	83%	3,130	2	1,380	980	71%	5,000
	SE	Page	1	80	70	88%	250	1	30	30	100%	0
	SW	Gough	4	1,690	1,520	90%	1,060	4	1,980	1,630	82%	2,190
	SB	Octavia	2	2,060	2,020	98%	500	2	2,210	2,110	95%	1,250
Mission Street Intersections (Northbound Approaches)	NB	Main	3	860	820	95%	330	3	650	660	102%	0
	NB	Fremont	4	960	920	96%	250	4	1,160	1,150	99%	60
	NB	Second	1	330	320	97%	250	1	250	240	96%	250
	NB	Third	4	1,990	1,340	67%	4,060	4	2,030	1,480	73%	3,440
	NB	Fifth	2	640	650	102%	0	2	560	540	96%	250
	NB	Sixth	2	1,060	1,040	98%	250	2	1,060	1,050	99%	130
	NB	Seventh	3	1,780	1,840	103%	0	3	1,850	1,670	90%	1,500
	NB	Ninth	5	3,600	3,040	84%	2,800	5	3,410	2,790	82%	3,100
	NB	Eleventh	2	350	360	103%	0	2	360	370	103%	0
	NB	S. Van Ness	2	1,060	550	52%	6,380	2	1,040	490	47%	6,880
	EB	13th/Duboce	3	640	620	97%	170	3	640	650	102%	0
	NB	Mission @ Duboce	3	1,220	1,090	89%	1,080	3	1,220	1,100	90%	1,000
	WB	13th/Duboce/Off-Ramp	4	1,070	1,000	93%	440	4	1,050	980	93%	440
	NB	Valencia	2	450	490	109%	0	2	390	390	100%	0
	NB	Octavia	3	2,050	2,040	100%	80	3	2,050	2,040	100%	80

## Notes

- 1 Demand served tends to fluctuate as a part of the model process. Any demand served percentage within 10 percentage points of 100 percent is considered fully served.
- 2 Queue length is calculated as a function of the number of cars in queue (i.e., number of vehicles not served), multiplied by an average vehicle length of 25 feet, and divided by the number of available lanes for queue storage.

## **Attachment 7c: Western Variant Analysis**

**Western Variant redistribution of vehicle trips due to forced eastbound right-turn on 12<sup>th</sup> Street**

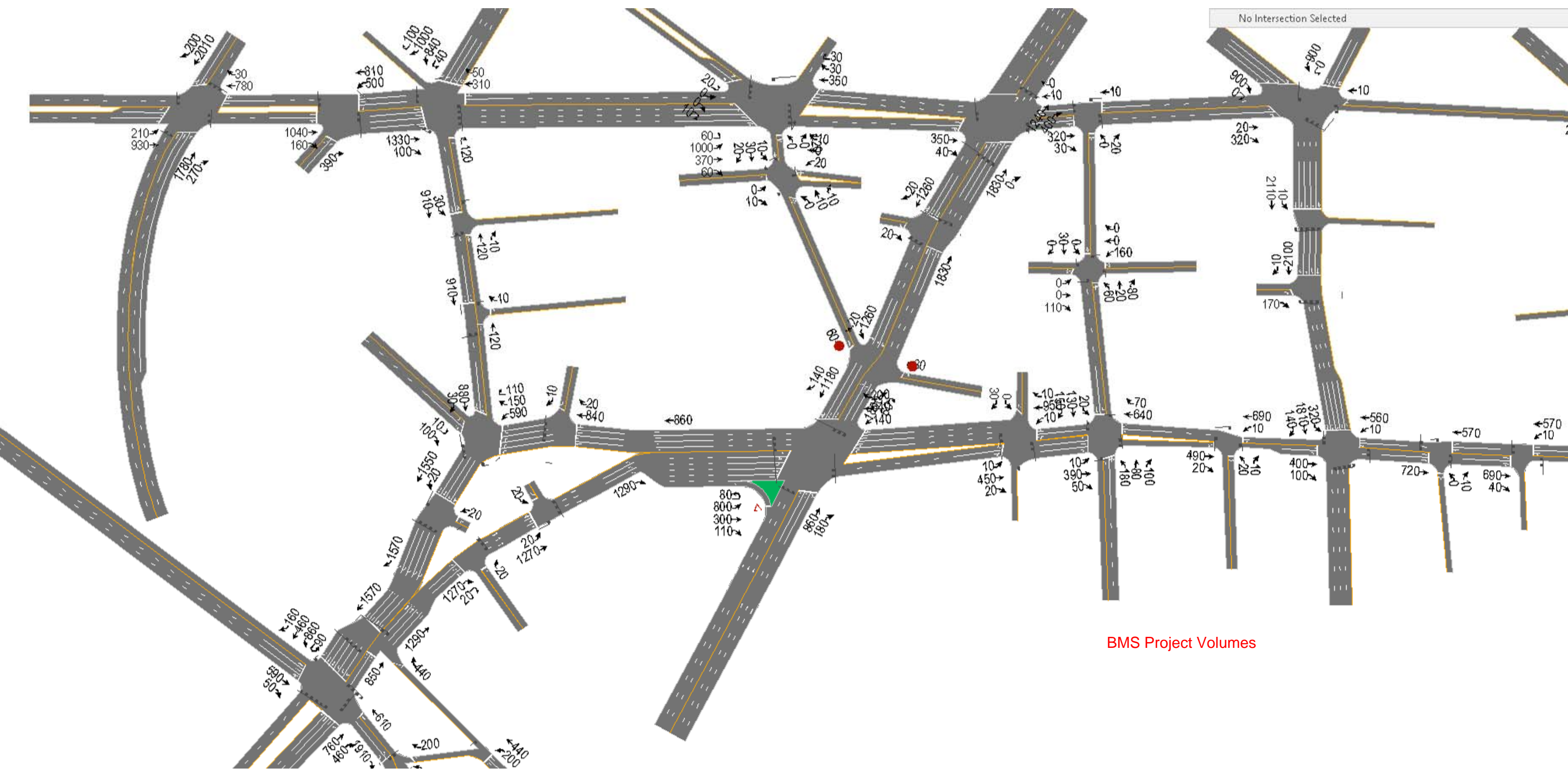
The following information is provided in this Attachment:

- Three maps of volume changes
- Meeting notes describing changes

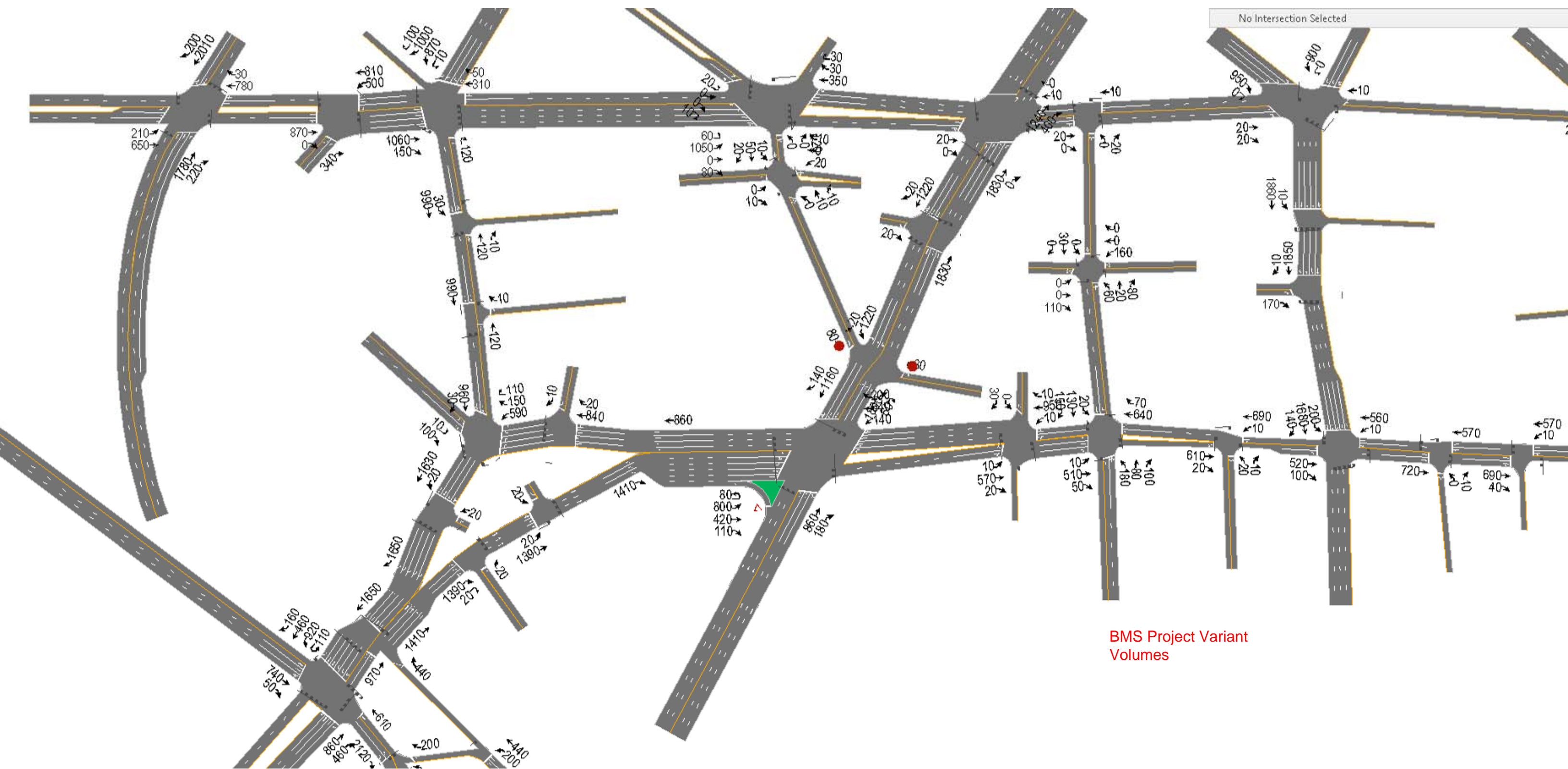








## BMS Project Volumes



## BMS Project Variant Volumes



# Better Market Street

## 12<sup>th</sup> Street BMS/Hub VISSIM Test Results Meeting Notes

**February 8, 2018 – 3:00pm-4:00pm**

**Location: Fehr & Peers Office, 332 Pine Street 4th Floor, San Francisco, CA 94104**

1. Discuss 12<sup>th</sup> Street BMS and Hub VISSIM Test results
  - a. Review input changes to VISSIM test, including volume redistribution, roadway geometry, and land use assumptions [FP]

*City agrees with 2020 volume redistribution, roadway geometry and land assumptions.*

*2040 assumptions were discussed briefly, as they related to the vehicle distribution of the three 12<sup>th</sup> Street projects in place (30 Otis, 1629 Market, 10 South Van Ness). These volumes will be a part of the 2040 qualitative conditions discussed below.*

- b. Review preliminary draft results, including visual review of model and summary of changes to transit travel times along Market Street [FP]

*No change to travel times on Market Street. Results show that 2020 conditions would not create any substantial change to transit conditions or most other modes (loading still TBD).*

*Loading on Project Variant – Ian Trout (MTA) mentioned that the Project Variant section on Market from Hayes to SVN would likely require freight/paratransit loading through flex zones in both directions. There was also the question of whether taxis would be allowed on this section. These uses are allowed for the rest of the length of the corridor in the curb lane, but this section is the only one with just one lane in each direction. Planning Department and MTA will meet to sort this out for the consulting team. This will not affect the VISSIM analysis, but will impact the rest of the EIR assessment.*

*Fehr & Peers to prepare additional scope of work to document 2020 conditions on Westbound Market Street associated with the proposed SBR restriction from Van Ness to Westbound Market, as follows:*

- *Conduct new 2020 DTA run to determine the effects of incorporating the proposed SBR restriction from Van Ness to Westbound Market.*
- *We think that most of this traffic will go to Gough and Octavia, or go straight through on SVN to Otis. Confirm via DTA.*
- *Add queue lengths to VISSIM outputs for these locations for Project Variant.*
- *Qualitatively discuss changes on Hayes Street which includes 21 Hayes transit, and is the only potentially impacted transit line.*





# Better Market Street

## 12<sup>th</sup> Street BMS/Hub VISSIM Test Results Meeting Notes

- *No VISSIM because this will improve things on WB Market, which we can describe qualitatively in the EIR. But will need to address this in report because Caltrans will be especially concerned with limiting vehicles off their street.*

*Per follow up discussion between Fehr & Peers and EP (Wade and Manoj) on February 15<sup>th</sup>, 2040 conditions as they relate to the Project Variant would be discussed qualitatively. This qualitative discussion would cover conditions on Market and 12<sup>th</sup> Street with the addition of vehicles generated by the proposed 12<sup>th</sup> Street land uses. The combination of the Project Variant and the proposed land uses would not generate any new significant impacts as the Project Variant separates private vehicles from transit vehicles and bicycles on Market Street between 12<sup>th</sup> and Valencia Streets. Therefore, any vehicle queues turning right from eastbound Market Street to 12<sup>th</sup> Street would be contained within this storage area and would not create additional delay to transit vehicles or conflicts to bicycles. In the unlikely scenario that vehicle queues extend all the way back to block the F-Line west of Valencia, increased delay to the F-Line would be much smaller than the net gain the Project and Project Variant provide to the F-line along the rest of Market Street.*

*The City will continue to refine the design of 12<sup>th</sup> Street to improve accessibility to the proposed land uses along that street, such as a mini-roundabout to allow vehicles to turn around at Stevenson or Keep Clear Zone on South Van Ness to allow vehicles to exit. Additional VISSIM tests may be required in the future to assist with this planning portion of the project not associated with the CEQA/NEPA documents.*

2. Strategize how the test results get wrapped into the BMS EIR
  - a. How do Proposed Project versus new Project Variant compare? [FP]
  - b. Information that will change and need to be presented separately (go through each mode) [FP/LCW]
  - c. High-level schedule and budget impacts [FP/LCW]

*This will be in the project variant in the EIR. Schedule changes to be finalized pending the review of the above 2020 items.*

3. Next Steps
4. Summary and Action Item Review

### **Action Items – Schedule highlighted in bold**

- *FP to prepare scope of work for the 2020 effort through the Hub. Draft scope will be discussed with City on 2/15 Hub conference call and delivered to City for review **on 2/16**. **City will need to review by 2/22**. The additional analysis will take approximately 2*





## Better Market Street

### 12<sup>th</sup> Street BMS/Hub VISSIM Test Results Meeting Notes

*weeks from authorization date. This will be incorporated into the EIR section at that time.*

- *Manoj (EP) to send spreadsheet showing what elements of project are included in Hub and which are in BMS. **Due 2/22.***
- *City Planning to prepare 12th Street traffic circle design as a part of the Hub. **Date TBD as not required for CEQA process.***
- *Matt (FP) and Luba to evaluate schedule impacts of Project Variant with ICF and transportation team. **Due by 2/22 BMS team check-in.***
- *EP/MTA to determine loading conditions for BMS Project Variant. **Due by 2/22 BMS team check-in.***

**Western Variant redistribution of vehicle trips due to restricted southbound right-turn onto westbound Market Street**

The following information is provided in this Attachment

- Write-up of effects of closing turn
- One map showing the volume changes

## Analysis of Better Market Street Hub Variant – Part 2

3/8/18

This memorandum summarizes the traffic operational effects of restricting the southbound right turn at the intersection of Market Street and South Van Ness Avenue. The analysis is based on the year 2020 analysis prepared for the Better Market Streets project alternative scenario.

### Traffic Volume Shifts

Figure 1 summarizes the estimated traffic volume shifts (during the PM peak hour) that would result from restricting the SBR movement. These shifts are based on the outputs and traffic patterns suggested by the DTA model run. They have been post-processed taking into account the volumes developed for the year 2020 Better Market Streets project alternative. Key traffic shifts include:

- Approximately 350 vph would shift from SBR at Market/Van Ness to SBR at Market/Gough.
- The reduced demand on Van Ness would allow for approximately 100 vph to shift from southbound 10<sup>th</sup> Street to southbound Van Ness.
- The DTA also suggests a shift of 50 vph that used the “jug handle” turn from northbound 9<sup>th</sup> Street to westbound Market Street via Hayes Street and Southbound Van Ness. With the southbound right turn from Van Ness to Market Street unavailable, these trips would shift to other routes outside of the study area.

### Queue Length Results

Table 1 summarizes the updates to queue length estimates prepared as part of the Better Market Streets project alternative analysis. These queue length estimates are based on a deterministic approach that considers the “unserved” demand reported by the Vissim microsimulation model. The queue length estimates reflect the updated unserved demand due to the traffic volume shifts resulting from restricting the SBR movement at Market/Van Ness.

**Table 1: Queue Length Estimates**

Location	Queue Length (feet) (BMS Proposed Project)	Queue Length (feet) (Project Variant)	Difference (feet)
<b>Southbound Van Ness</b>	5,000	1,100	-3,900
<b>Southbound Gough</b>	2,200	4,400	+2,200

In summary, our assessment based on the DTA outputs is that restricting the southbound right turn at Market/Van Ness would result in nearly all of the right turning vehicles shifting to Gough Street. The queue lengths would decrease on Van Ness and increase on Gough Street. Gough Street has one additional lane (for private vehicles) in the southbound direction compared to Van Ness, hence the difference in queue lengths.

### Impacts to Line 21

The DTA outputs suggest that there will be a slight decrease in vehicular demand on Hayes Street (in part due to the traffic volume shift on 9<sup>th</sup> Street). Therefore, there will be no impacts to Muni Line 21.



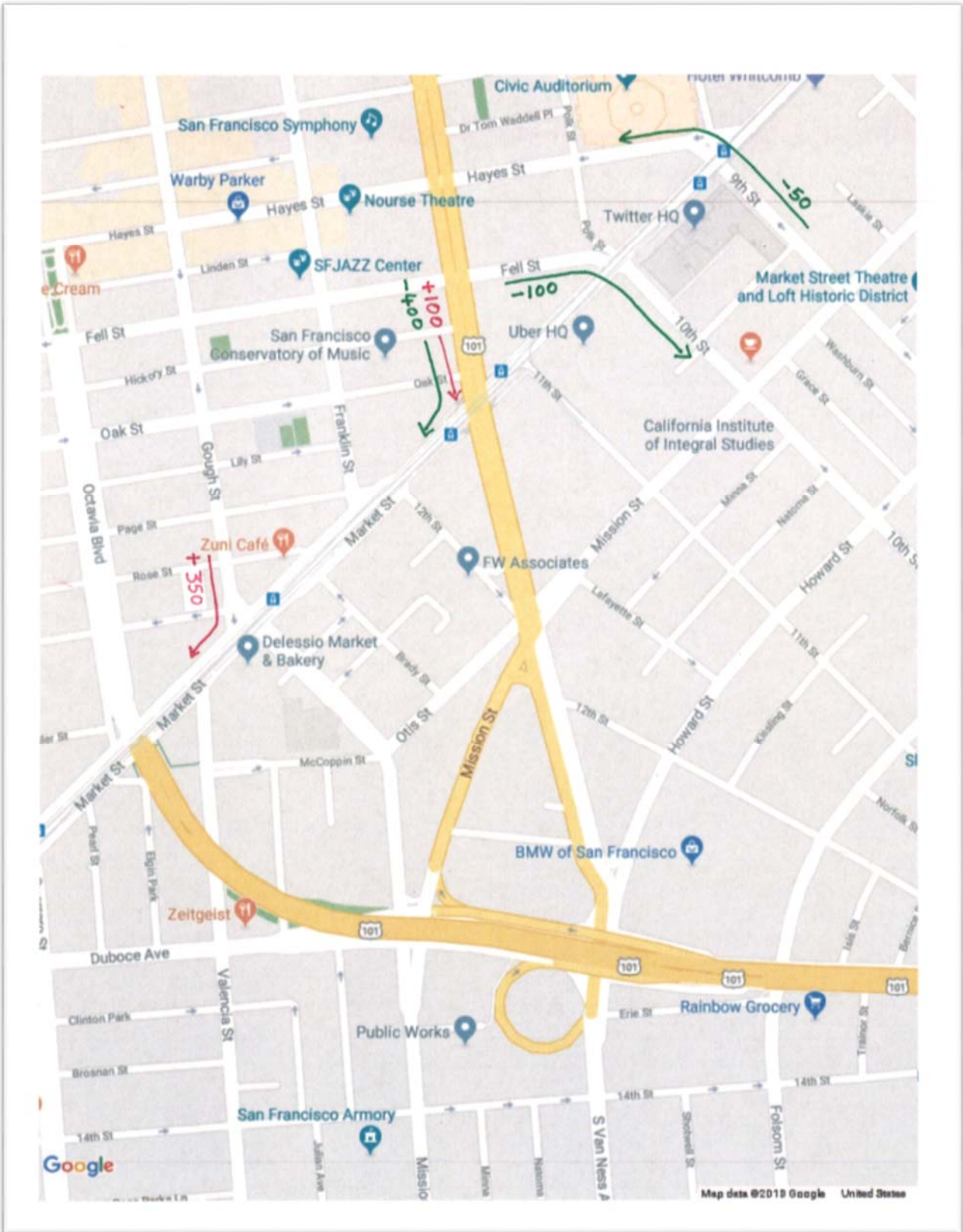


Figure 1: Traffic Volume Shifts Resulting from SBR Restriction at Market/Van Ness

## **Attachment 8: Pedestrian Analysis**

## Market Street Crosswalk Inventory: Existing Conditions and Proposed Project Improvements

Intersection	Existing Crosswalk Condition	Proposed Project Crosswalk Condition	Project Variant Crosswalk Condition <sup>1</sup>
Octavia Boulevard	Straight forward	No change	
Valencia Street	Missing crosswalk (crossing Market Street, east leg)	Longer crossing southwest leg. Shorter crossing Valencia south leg.	
Gough Street	Traffic island crosswalk (crossing Market)	Longer crossing, west leg. Shorter crossing, east leg.	
12th Street/Page Street/Franklin Street	Traffic island crosswalk (crossing Market Street)	Larger traffic island (Page / Franklin). East crosswalk removed.	Shorter east leg across Market
Van Ness Avenue	Straight forward	No change	Shorter crossing across Market
11 <sup>th</sup> Street	Missing crosswalk (Market Street east and west)	New crosswalk, Market Street east leg	
10th Street	Straight forward	No change	Shorter crossing across Market
9th Street/Hayes Street/Larkin Street	Interrupted island crossing (crossing Hayes Street)	New direct crossing between Larkin and Hayes streets	
8th Street/Grove Street/Hyde Street	Straight forward	Longer crossing, east leg. New Hyde crosswalk.	
7th Street	Straight forward	Longer crossing, east and west legs	
Jones Street/ McAllister Street	Interrupted island crossing (crossing McAllister Street)	Smaller traffic island (northeast corner), pedestrian refuge, southeast corner). New east crosswalk across Market.	
Golden Gate Ave/Taylor Street/6th Street	Straight forward	Longer crossing, east and west legs. Shorter crossing south leg.	
Turk Street /Mason Street	Interrupted island crossing (crossing Turk Street)	Realigned straight forward crossing with modified traffic island	
Cyril Magnin Street/5th Street	Straight forward	Longer crossing, east and west legs. Shorter crossing, south leg	
Powell Street	Straight forward	Longer crossing; new midblock crossing	

<b>Intersection</b>	<b>Existing Crosswalk Condition</b>	<b>Proposed Project Crosswalk Condition</b>	<b>Project Variant Crosswalk Condition<sup>1</sup></b>
Stockton Street/Ellis Street/4th Street	Straight forward	Longer crossing, east and west legs. Shorter crossing, north and south legs	
O'Farrell Street/Grant Avenue	Missing crosswalk (crossing Market Street east leg)	Missing crosswalk (east leg). Longer crossing, west leg. Shorter crossing, north leg	
Geary Street/Kearny Street/3rd Street	Interrupted island crossing (crossing Geary Street)	Interrupted island crossing. Longer crossing, east and west legs.	
Montgomery Street/New Montgomery Street	Straight forward	Longer crossing, east and west legs. Shorter crossing, north leg	
2nd Street	Straight forward	Longer crossing, east and west legs.	
Sutter Street / Sansome Street	Interrupted crossing (crossing Sutter Street), missing crosswalk (crossing Market Street east leg)	Longer crossing, north leg. Direct crossing across Sutter Street at Market Street (north crosswalk)	
Bush Street/Battery Street/1st Street	Island crossing (crossing Battery Street)	Island crossing removed. Longer crossing, east and west legs. Shorter crossing, south leg	
Front Street/Fremont Street	Straight forward	Longer crossing, east and west legs	
Pine Street/Davis Street/Beale Street	Straight forward	Longer crossing, west leg. Shorter crossing, north and south leg	
Drumm Street / Main Street	Straight forward	Shorter crossing, north leg. New crossing at east leg.	
Spear Street	Straight forward	No change	
Steuart Street	Straight forward	New signal	
Eddy Street / Mason Street (off-Market)	Straight forward.	Shorter crossings.	

1. Same as Proposed Project unless otherwise noted.

## Market Street Curb Ramp Deficiency Inventory: Existing Conditions and Proposed Project Improvements

Intersection	Existing Curb Ramp Deficiency	Proposed Project Improvements
Page Street / Franklin Street /12 <sup>th</sup> Street	Missing curb ramp across Market Street at southeast corner. Island on north side is not ADA accessible.	East crosswalk removed. Island improved to ADA standard.
9th Street/Hayes Street/Larkin Street	Incorrectly positioned EB and WB curb ramps at north Larkin crosswalk  Missing NB curb ramp at west Hayes crosswalk	Correctly positioned EB and WB curb ramps aligned within the north Larkin crosswalk.  New NB curb ramp at north Hayes crosswalk
Golden Gate Ave/Taylor Street/6th Street	Missing NB curb ramp at west Golden Gate crosswalk  Missing WB curb ramp at Taylor crosswalk  Non-compliant SB curb ramp at corner of Golden Gate / Taylor	New NB curb ramp at west Golden Gate crosswalk  New WB curb ramp at Taylor crosswalk  New directional curb ramps at corner of Golden Gate / Taylor
Turk Street /Mason Street	Missing SB curb ramp at Turk/Mason west crosswalk	New SB curb ramp at Turk/Mason west crosswalk
Geary Street/Kearny Street/3rd Street	Missing EB curb ramp at Kearny / Geary east crosswalk	New EB curb ramp at Kearny / Geary east crosswalk
2nd Street	Incorrectly positioned curb ramps at east Market crosswalk	Correctly positioned curb ramps aligned within the east Market crosswalk
Sutter Street / Sansome Street	Missing SB curb ramp at Sutter / Sansome west crosswalk	Missing SB curb ramp at Sutter / Sansome west crosswalk
Battery Street / Bush Street	Non-ADA compliant curb ramps at corners or missing curb ramps.	
Pine Street/Davis Street/Beale Street	Missing NB curb ramp at west Pine crosswalk	New NB curb ramp at west Pine crosswalk

Source: Parisi Transportation Consulting, 2018.

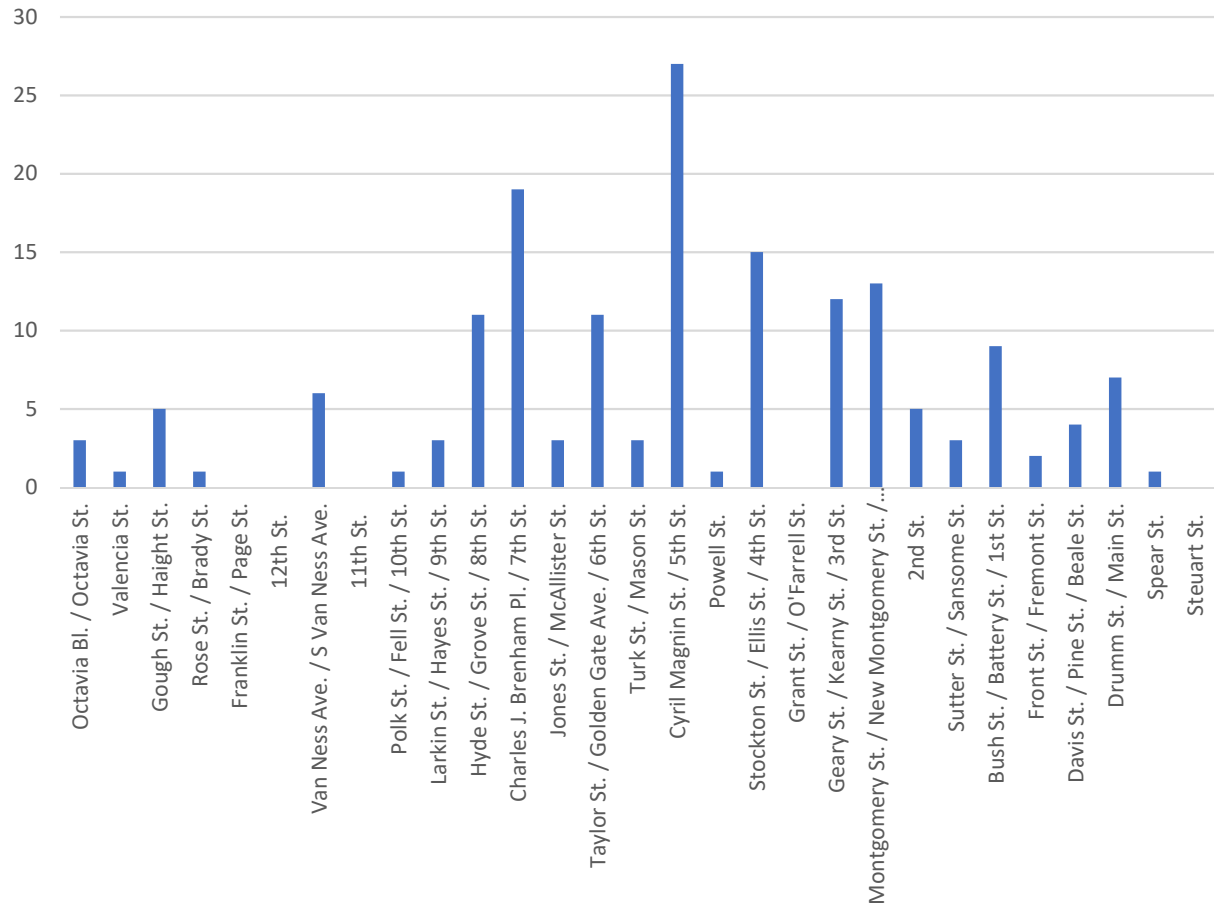
# Market Street Pedestrian-Involved Collisions, January 2012-December 2016

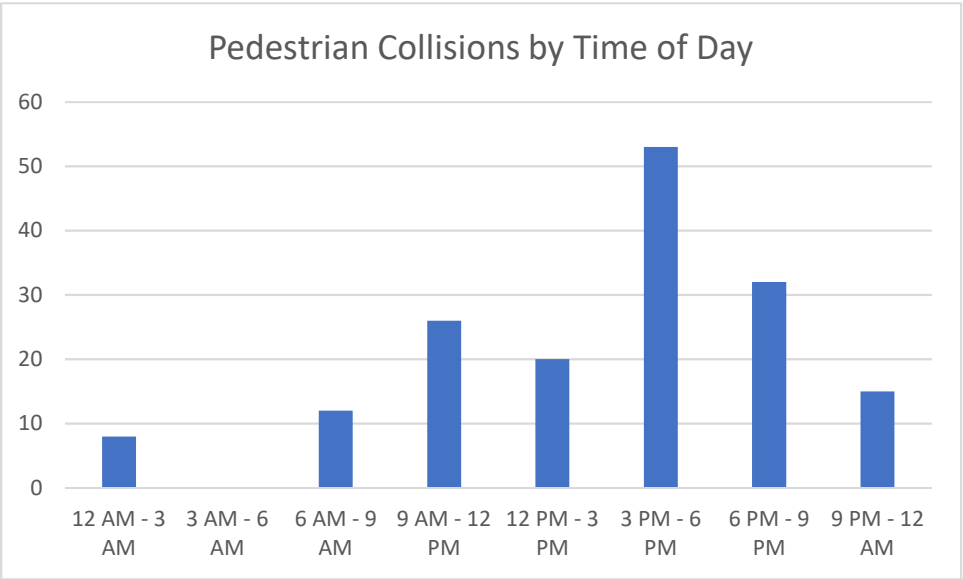
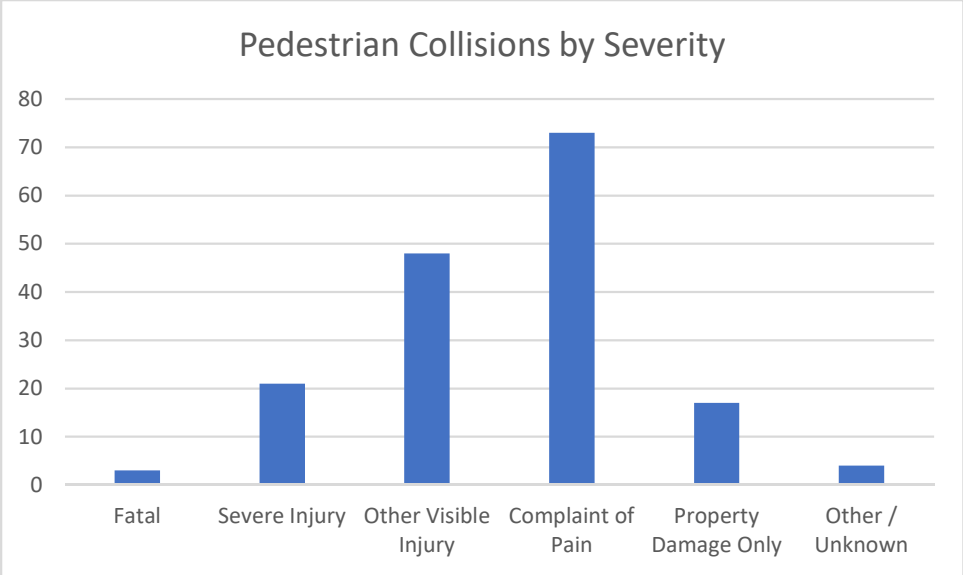
INTERSECTION	Ped-Involved Crashes (includes Bikes)				Ped-Bike Crashes Only			
	I/S	Isl.	MB	Total	I/S	Isl.	MB	Total
Steuart St.	0	--	0	0	0	--	0	0
Spear St.	1	--	0	1	0	--	0	0
Drumm St. / Main St.	4	--	3	7	1	--	0	1
Davis St. / Pine St. / Beale St.	2	--	2	4	0	--	0	0
Front St. / Fremont St.	1	--	1	2	1	--	0	1
Bush St. / Battery St. / 1st St.	5	4	0	9	0	0	0	0
Sutter St. / Sansome St.	2	--	1	3	0	--	0	0
2nd St.	5	0	0	5	0	0	0	0
Montgomery St. / New Montgomery St. / Post St.	9	4	0	13	0	1	0	1
Geary St. / Kearny St. / 3rd St.	7	3	2	12	3	0	1	4
Grant St. / O'Farrell St.	0	--	0	0	0	--	0	0
Stockton St. / Ellis St. / 4th St.	4	10	1	15	3	2	0	5
Powell St.	1	--	0	1	1	--	0	1
Cyril Magnin St. / 5th St.	18	8	1	27	4	2	0	6
Turk St. / Mason St.	2	--	1	3	0	--	0	0
Taylor St. / Golden Gate Ave. / 6th St.	8	3	0	11	2	0	0	2
Jones St. / McAllister St.	1	--	2	3	0	--	0	0
Charles J. Brenham Pl. / 7th St.	9	9	1	19	2	1	1	4
Hyde St. / Grove St. / 8th St.	6	2	3	11	1	0	1	2
Larkin St. / Hayes St. / 9th St.	2	1	0	3	0	0	0	0
Polk St. / Fell St. / 10th St.	1	--	0	1	0	--	0	0
11th St.	0	--	0	0	0	--	0	0
Van Ness Ave. / S Van Ness Ave.	3	3	0	6	0	0	0	0
12th St.	0	--	0	0	0	--	0	0
Franklin St. / Page St.	0	--	0	0	0	--	0	0
Rose St. / Brady St.	1	--	0	1	0	--	0	0
Gough St. / Haight St.	3	2	0	5	0	1	0	1
Valencia St.	1	0	0	1	1	0	0	1
Octavia Bl. / Octavia St.	3	--	0	3	0	--	0	0
<b>TOTAL</b>	<b>99</b>	<b>49</b>	<b>18</b>	<b>166</b>	<b>19</b>	<b>7</b>	<b>3</b>	<b>29</b>

Source: City of San Francisco Crossroads Collision Database 2012-2016

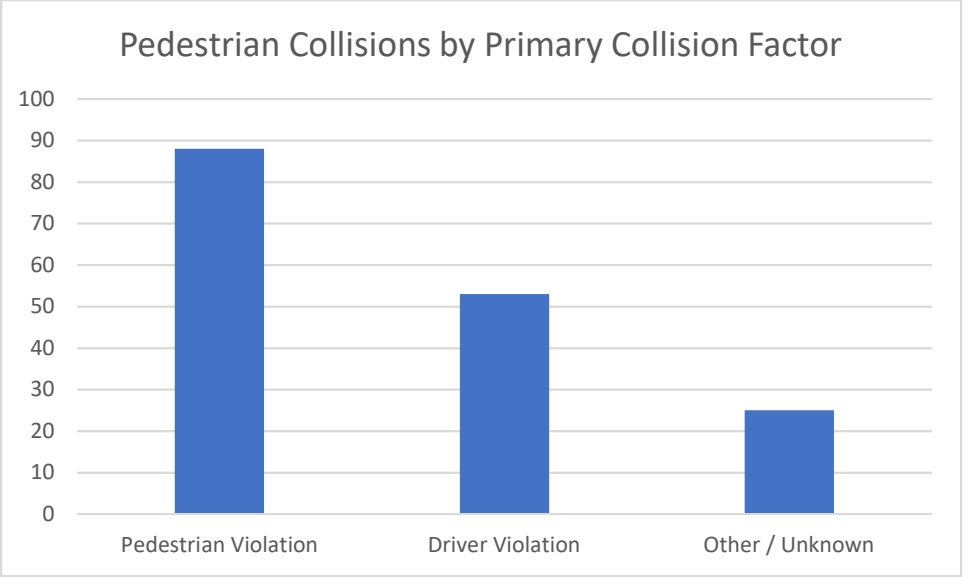
Abbreviations: I/S – intersection, Isl. – Transit Island, MB - Midblock

## Pedestrian Collisions by Nearest Intersection









**Pedestrian Sidewalk LOS (Pinch Points) – 2020 Baseline & Baseline plus Project PM Peak Hour Conditions**

Side of Street & Segment	Pedestrians (Hourly)	2020 Baseline			2020 Baseline plus Project		
		Effective Sidewalk Width (ft) <sup>1</sup>	Density Ped/Min/Ft <sup>2</sup>	LOS	Effective Sidewalk Width (ft) <sup>1</sup>	Density Ped/Min/Ft <sup>2</sup>	LOS
North Side							
Drumm to Steuart	3,836	32	2.0	B	16	4.0	C
Montgomery to Sutter	4,008	13	5.1	C	7.5	8.9	D
5th to Ellis	3,242	11.5	4.7	C	8.5	6.4	D
Larkin to Grove	1,474	18.5	1.3	B	15	1.6	B
South Side							
Fremont to Beale	4,518	12	6.3	D	12	6.3	D
New Montgomery to 2 <sup>nd</sup>	4,028	19	3.5	C	17	3.9	C
5th to 4th	5,112	11.5	7.4	D	11.5	7.4	D
8th to 7th	1,928	11	2.9	B	6.5	4.9	C
Valencia to Gough	776	9	1.4	B	5	2.6	B
Valencia to Gough (project variant)	776	--	--	--	5	2.6	B

1. "Effective width" equals sidewalk pinch point width minus four feet of walkable area due to street furniture and a two-foot shy distance from buildings.
2. Pedestrians per minute per foot of sidewalk width

**Pedestrian Sidewalk LOS (Pinch Points) – 2040 Cumulative, Cumulative plus Project PM Peak Hour Conditions**

Side of Street & Segment	Pedestrians (Hourly)	2040 Cumulative			2040 Cumulative plus Project		
		Effective Sidewalk Width (ft) <sup>1</sup>	Density Ped/Min/Ft <sup>2</sup>	LOS	Effective Sidewalk Width (ft) <sup>1</sup>	Density Ped/Min/Ft <sup>2</sup>	LOS
North Side							
Drumm to Steuart	4,660	32	2.4	B	16	4.9	C
Montgomery to Sutter	4,869	13	6.2	D	7.5	10.8	D
5th to Ellis	3,938	11.5	5.7	C	8.5	7.7	D
Larkin to Grove	1,791	18.5	1.6	B	15	2.0	B
South Side							
Fremont to Beale	5,489	12	7.6	D	12	7.6	D
New Montgomery to 2 <sup>nd</sup>	4,893	19	4.3	C	17	4.8	C
5th to 4th	6,210	11.5	9.0	D	11.5	9.0	D
8th to 7th	2,342	11	3.5	C	6.5	6.0	D
Valencia to Gough	943	9	1.7	B	5	3.1	C
Valencia to Gough (project variant)	943	--	--	--	5	3.1	C

1. "Effective width" equals pinch point sidewalk width minus four feet of walkable area due to street furniture and a two-foot shy distance from buildings.
2. Pedestrians per minute per foot of sidewalk width

## **Attachment 9: Bicycle Analysis**

### Bicycle Facility Inventory, Roadway Segments

From	To	Length (feet)	Existing Bicycle Facility	Proposed Project Bicycle Facility
<b>Market Street – Inbound (Eastbound)</b>				
Octavia Blvd. / US 101	Gough Street	610	Shared lane	Separated bikeway
Gough Street	8 <sup>th</sup> Street	2,940	Enhanced bike lane	Bike lane from 12 <sup>th</sup> to South Van Ness; Separated bikeway all other segments  Project variant: Separated bikeway all segments.
8 <sup>th</sup> Street	Steuart Street	8,150	Shared lane	Separated bikeway
<b>Market Street – Outbound (Westbound)</b>				
Steuart Street	8 <sup>th</sup> Street	8,150	Shared lane	Separated bikeway
8 <sup>th</sup> Street	Van Ness Avenue	1,850	Enhanced bike lane	Bike lane from 11 <sup>th</sup> to South Van Ness; Separated bikeway all other segments
Van Ness Avenue	Valencia Street	1,390	Bike lane (simple)	Bike lane from Rose to Gough; Separated bikeway all other segments  Project variant: Bike lane from Rose to Gough; separated bikeway all other segments
Valencia Street	Octavia Boulevard / US 101	310	Enhanced bike lane	Separated bikeway

Source: Parisi Transportation Consulting, 2018.

## Bicycle Facility Inventory, Intersections

Intersection	Existing Bicycle Crossing Treatment	Proposed Project Bicycle Crossing Treatment
Octavia Boulevard	Outbound and inbound crossing markings and barriers	Leading bicycle interval (LBI)
Valencia Street	Outbound left turn pocket and markings	Crossing markings; raised bicycle channel (NB Valencia turning right onto Market).
Gough Street	Outbound bike box, inbound shared lane markings	Crossing markings. Dedicated bicycle signal phase.
12th Street/Page Street/Franklin Street	Outbound crossing markings.	Crossing markings
Van Ness Avenue	Outbound and inbound bike boxes	Crossing markings. Leading bicycle interval (LBI)
11th Street	Inbound crossing markings.	Outbound left turn channel onto 11th. Crossing markings for bicycles to/from 11th crossing Market Street.  Project variant: Crossing channel for westbound bicycles east of Van Ness Avenue to southbound 11th Street. Northbound 11th Street bicycles not permitted to turn onto westbound Market Street.
10th Street	Painted two-stage left turn bike box inbound Market onto NB Polk, inbound crossing markings.	Raised two-stage left turn bike box onto NB Polk, crossing markings
9th Street/Hayes Street/Larkin Street	Outbound and inbound Market bike boxes	Crossing markings. Leading bicycle interval (LBI)
8th Street/Grove Street/Hyde Street	Painted two-stage left turn bike box: outbound Market onto SB 8th, SB Grove onto inbound Market.	Painted two-stage left turn bike box: outbound onto SB 8th, SB Grove onto inbound Market, inbound Market onto NB Grove. Left turn channel, NB Hyde onto NB Grove. Leading bicycle interval (LBI)
7th Street	Painted two-stage left turn bike box: NB 7th onto outbound Market.	Painted two-stage left turn bike box: inbound Market to NB Charles J. Brenham.
Jones Street/McAllister Street	Outbound and inbound crossing markings	Channel and crossing markings, SB Jones / McAllister to inbound Market. Dedicated bicycle signal phase.
Golden Gate Ave/Taylor Street/6th Street	Inbound crossing markings, painted two-stage left turn bike box: SB Golden Gate onto inbound Market.	Crossing markings, painted two-stage left turn bike box: SB Golden Gate onto inbound Market, NB 6th onto outbound Market. Leading bicycle interval (LBI)
Turk Street /Mason Street	No treatments	Crossing markings, outbound Market. Leading bicycle interval (LBI)

<b>Intersection</b>	<b>Existing Bicycle Crossing Treatment</b>	<b>Proposed Project Bicycle Crossing Treatment</b>
Cyril Magnin Street/5th Street	No treatments	Painted two-stage left turn bike box: NB 5th onto outbound Market, outbound Market onto SB 5 <sup>th</sup> . Crossing markings. Leading bicycle interval (LBI).
Powell Street	No treatments	No treatments
Stockton Street/Ellis Street/4th Street	No treatments	Crossing markings. Inbound Market channel. Leading bicycle interval (LBI).
O'Farrell Street/Grant Avenue	Inbound crossing markings.	Outbound crossing markings.
Geary Street/Kearny Street/3rd Street	No treatments	Crossing markings.
Montgomery Street/New Montgomery Street	No treatments	Crossing markings. Outbound Market channel. Leading bicycle interval (LBI).
2nd Street	NB 2 <sup>nd</sup> Street bike box.	Crossing markings. Raised two-stage left turn bike box, outbound Market to SB 2 <sup>nd</sup> . Leading bicycle interval (LBI).
Sutter Street / Sansome Street	No treatment.	Outbound crossing markings. Raised two-stage left turn bike box, inbound Market to NB Sansome. Leading bicycle interval (LBI).
Bush Street/Battery Street/1st Street	No treatment.	Crossing markings. Dedicated bicycle signal phase.
Front Street/Fremont Street	No treatment.	Crossing markings. Leading bicycle interval (LBI).
Pine Street/Davis Street/Beale Street	No treatment.	Crossing markings. Painted two-stage left turn bike box, inbound Market to NB Pine. Dedicated bicycle signal phase.
Drumm Street / Main Street	No treatment.	Crossing markings. Leading bike interval
Spear Street	No treatment.	Dedicated bicycle signal phase and crossing markings.
Steuart Street	No treatment.	Dedicated bicycle signal phase and crossing markings.

Source: Parisi Transportation Consulting, 2018.

# Market Street Bicycle-Involved Collisions, January 2012-December 2016

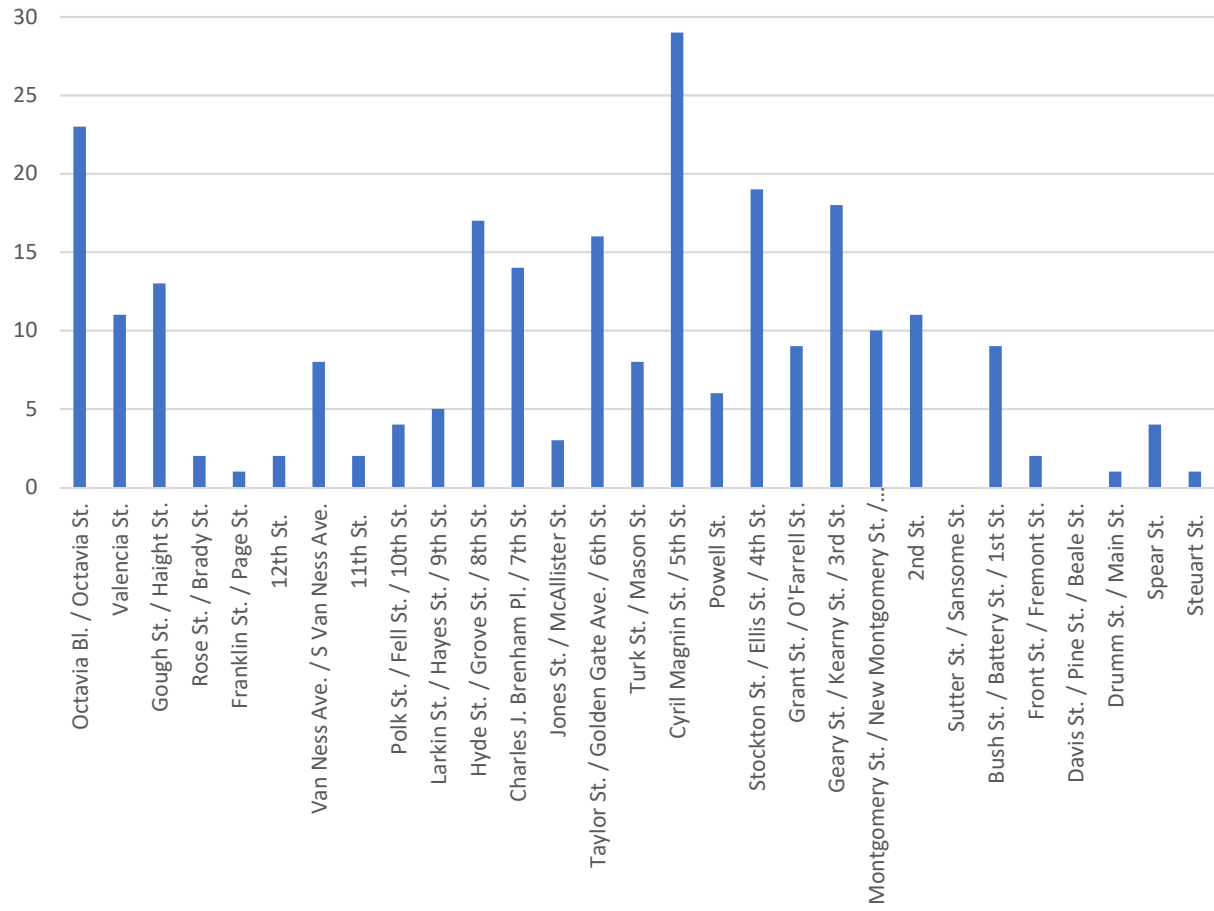
INTERSECTION	Bike-Involved Crashes (includes Peds)				Ped-Bike Crashes Only			
	I/S	Isl.	MB	Total	I/S	Isl.	MB	Total
Steuart St.	0	--	1	1	0	--	0	0
Spear St.	2	--	2	4	0	--	0	0
Drumm St. / Main St.	1	--	0	1	1	--	0	1
Davis St. / Pine St. / Beale St.	0	--	0	0	0	--	0	0
Front St. / Fremont St.	2	--	0	2	1	--	0	1
Bush St. / Battery St. / 1st St.	1	4	4	9	0	0	0	0
Sutter St. / Sansome St.	0	--	0	0	0	--	0	0
2nd St.	7	4	0	11	0	0	0	0
Montgomery St. / New Montgomery St. / Post St.	2	6	2	10	0	1	0	1
Geary St. / Kearny St. / 3rd St.	6	4	8	18	3	0	1	4
Grant St. / O'Farrell St.	5	--	4	9	0	--	0	0
Stockton St. / Ellis St. / 4th St.	10	7	2	19	3	2	0	5
Powell St.	4	--	2	6	1	--	0	1
Cyril Magnin St. / 5th St.	17	7	5	29	4	2	0	6
Turk St. / Mason St.	7	--	1	8	0	--	0	0
Taylor St. / Golden Gate Ave. / 6th St.	9	5	2	16	2	0	0	2
Jones St. / McAllister St.	3	--	0	3	0	--	0	0
Charles J. Brenham Pl. / 7th St.	6	3	5	14	2	1	1	4
Hyde St. / Grove St. / 8th St.	7	3	7	17	1	0	1	2
Larkin St. / Hayes St. / 9th St.	4	1	0	5	0	0	0	0
Polk St. / Fell St. / 10th St.	2	--	2	4	0	--	0	0
11th St.	1	--	1	2	0	--	0	0
Van Ness Ave. / S Van Ness Ave.	7	0	1	8	0	0	0	0
12th St.	2	--	0	2	0	--	0	0
Franklin St. / Page St.	1	--	0	1	0	--	0	0
Rose St. / Brady St.	0	--	2	2	0	--	0	0
Gough St. / Haight St.	9	4	0	13	0	1	0	1
Valencia St.	10	1	0	11	1	0	0	1
Octavia Bl. / Octavia St.	19	--	4	23	0	--	0	0
<b>TOTAL</b>	<b>144</b>	<b>49</b>	<b>55</b>	<b>248</b>	<b>19</b>	<b>7</b>	<b>3</b>	<b>29</b>

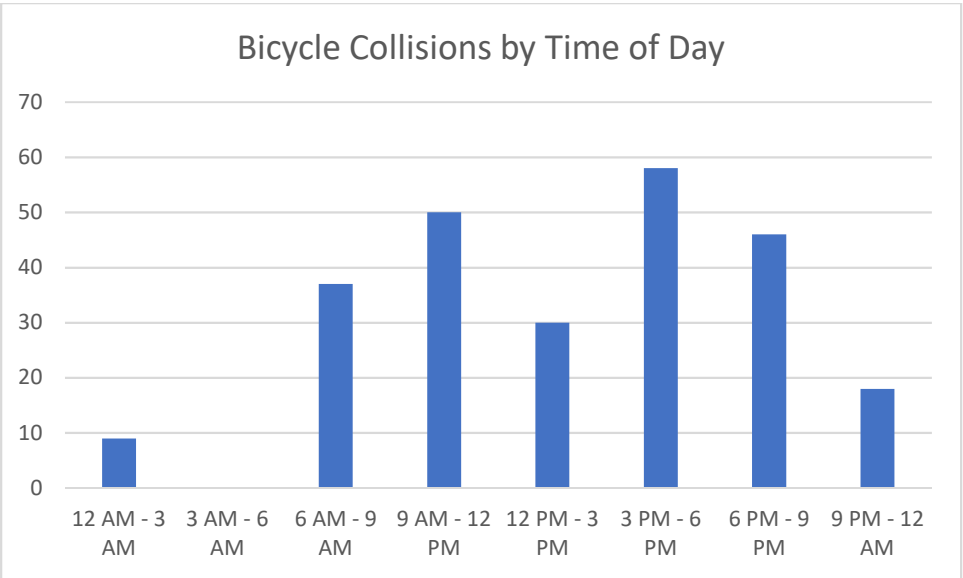
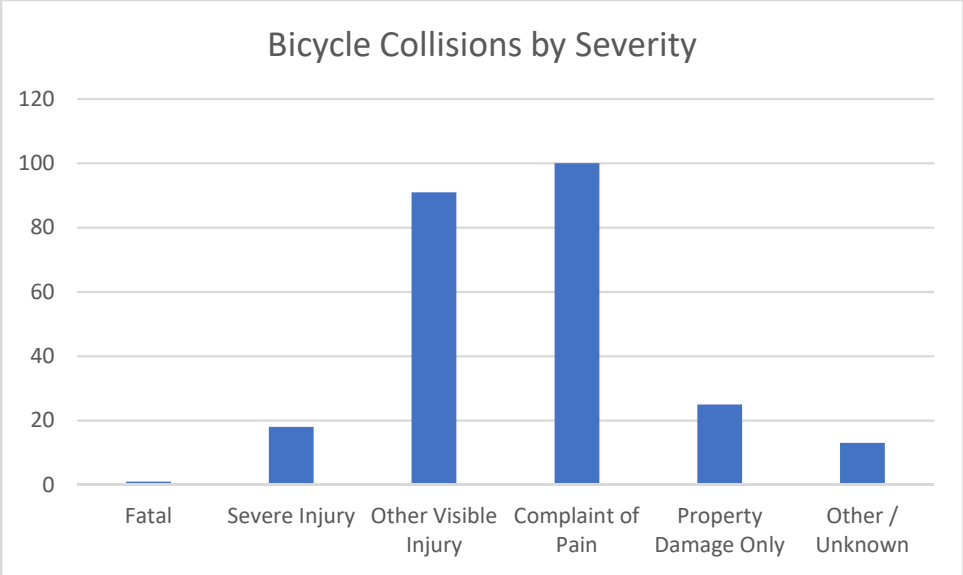
Source: City of San Francisco Crossroads Collision Database 2012-2016

Abbreviations: I/S – intersection, Isl. – Transit Island, MB - Midblock



## Bicycle Collisions by Nearest Intersection





## Bicycle Rack Inventory

Market Street - South Side			Market Street – North Side		
From	To	Racks	From	To	Racks
Octavia Boulevard / US 101	Valencia Street	2	Octavia Boulevard / US 101	Gough / Haight Street	7
Valencia Street	Gough Street	2	Gough / Haight Street	Rose Street	4
Gough Street	12th Street	3	Rose Street	Page / Franklin Street	4
12th Street	S. Van Ness Avenue	3	Page / Franklin Street	Van Ness Avenue	3
S. Van Ness Avenue	11th Street	1	Van Ness Avenue	Polk / Fell Street	5
11th Street	10th Street	3	Polk / Fell Street	Larkin / Hayes Street	5
10th Street	9th Street	4	Larkin / Hayes Street	Hyde Street	14
9th Street	8th Street	1	Hyde Street	Charles J. Brenham Street	11
8th Street	7th Street	11	Charles J. Brenham Street	Jones Street	1
7th Street	6th Street	11	Jones Street	Golden Gate / Taylor Street	5
6th Street	5th Street	6	Golden Gate / Taylor Street	Mason / Turk Street	9
5th Street	4th Street	9	Mason / Turk Street	Cyril Magnin Street	2
4th Street	3rd Street	10	Cyril Magnin Street	Stockton Street	2
3rd Street	New Montgomery Street	4	Stockton Street	O'Farrell Street	2
New Montgomery Street	2nd Street	2	O'Farrell Street	Kearny Street	3
2nd Street	Sutter Street	11	Kearny Street	Montgomery Street	3
Sutter Street	1st Street	3	Montgomery Street	Sutter Street	5
1st Street	Fremont Street	0	Sutter Street	Battery Street	1
Fremont Street	Beale Street	1	Battery Street	Front Street	0
Beale Street	Main Street	0	Front Street	Davis Street	1
Main Street	Spear Street	0	Davis Street	Drumm Street	0
Spear Street	Steuart Street	5	Drumm Street	Steuart Street	0
	<b>Total</b>	<b>116</b>		<b>Total</b>	<b>75</b>

Source: Parisi Transportation Consulting, 2017.

\*One rack equals two bicycle parking spaces

### Bay Area Bike Share Inventory

Location	Bike Share Positions (Docking Spaces)
Market Street north, between Rose and Page Streets	34
Market Street south, between S Van Ness Ave and Eleventh Street	27
Market Street south, between Tenth and Ninth Streets	26
Market Street south, between Seventh and Sixth Streets	22
Market Street north, between Turk and Fifth Streets	19
Market Street south, between Fourth and Third Streets	35
Market Street south, between Second and First Streets	36
Market Street north, between Bush and Fremont Streets	23
Market Street south, between Beale and Main Streets	27
Steuart at Market Street	22
<b>Total</b>	<b>271</b>

Source: Parisi Transportation Consulting, 2017.