

Appendix A:  
Study  
Intersection  
Selection



# Memorandum

**Date:** 04.25.2016  
**To:** Britt Tanner, Chava Kronenberg, SFMTA; person TBD, DPW  
**From:** Ryan Greene-Roesel, SFCTA; James Shahimiri, SFMTA  
**Subject:** Proposed study locations for Vision Zero freeway ramp intersections

## SUMMARY

SFMTA and SFCTA are collaborating on improving safety at ramp intersections to support progress towards Vision Zero. This memorandum provides initial draft recommended study intersections.

The first set of intersections would be studied this year as part of Supervisor Kim's Neighborhood Transportation Improvement Project (NTIP). They all fall within the South of Market Youth and Family Zone, which she has identified as her top priority. They include:

- I-80 WB off-ramp to 5th/Harrison Streets
- I-80 EB on-ramp from 5th/Bryant Streets
- US-101 SB on-ramp from 10th/Bryant Streets
- US-101 off-ramp to 9th/Bryant Streets
- I-80 WB off-ramp at 8<sup>th</sup> Street

Only 3-5 of these intersections would be included in the first phase of study being funded through the NTIP grant. Another set of intersections, including several that do not fall within the Youth and Family Zone, could be studied if additional funding is received through a Caltrans Planning Grant. Potential candidates may include:

- US-101 NB off-ramp to Otis/Mission/13th Streets and Duboce Avenue
- US 101 SB Onramp 13th SVN
- I-280 ramps at 6th and Brannan

## BACKGROUND

To eliminate traffic fatalities, collisions on San Francisco's freeway ramps must be addressed along with fatalities on surface streets. Our desired approach is to create a collaborative state/local partnership Vision Zero Freeway Ramp Safety and Access program that would address collisions on freeway ramps and ramp intersections while improving bicycle, pedestrian, and disabled safety and access at high-priority ramp intersections with local streets, typically within Caltrans' right-of-way. The intent is to deploy and pilot new ways of doing business in partnership among local and state agencies to expedite this work.

The purpose of this memorandum is to define an initial proposed list of study locations that could benefit from additional planning work to address safety issues. Our process for identifying candidate intersections is described below.

## **SELECTING A GEOGRAPHIC FOCUS AREA**

We identified an initial list of candidate study intersections by ranking ramp intersections by number of injury collisions 2008-2014 and selecting the top twenty citywide (Table 1), which fall into six geographic groupings:

- East SOMA (5<sup>th</sup> Street and East): Six intersections
- West SOMA (West of 5<sup>th</sup> Street): Seven intersections
- Cesar Chavez / Hairball: One intersection.
- Alemany Maze: Two intersections.
- Balboa Park: Two intersections
- Other: Two intersections.

We decided to set aside study of any intersections in the Cesar Chavez/Hairball, Alemany Maze, and at Balboa Park, because all have either been recently studied or are under study. Specifically:

- The Cesar Chavez-Potrero-Bayshore-US 101 Interchange Study, completed in 2012 by the San Francisco Planning Department, identified short term solutions to improve pedestrian and bicycle safety and personal safety at the interchange. Not all proposals from the study have been implemented, but some were recently funded through the Neighborhood Transportation Improvement Program Capital Projects fund.
- The SFCTA's Alemany Maze Interchange Improvement Study (underway) is examining options for improving pedestrian and bicycle safety and access at the Alemany Maze, including the two listed in Table 1.
- The SFCTA Balboa Park Station Area Circulation Study (2014) developed strategies for reducing multimodal conflicts and improving safety at the I-280 freeway ramps around Balboa Park.

It is possible that these studies did not or will not fully address all safety issues at these interchanges. However, because they have been recently studied, we judged them to be lower priority for initiating new planning effort.

The majority of the remaining intersections are in the West and East SOMA areas, so we recommend focusing study there. Additionally, when preparing the Caltrans Planning Grant application for this work, Caltrans recommended focusing the study on a specific neighborhood to maximize the competitiveness of the grant application. Due to its rapidly growing population and employment base, and high number of ramp intersections with a poor safety record, SOMA is the best candidate for this initial phase of work.

Note that we did not consider collisions on the ramps themselves at this stage, but may do so in a later phase of study.

**Table 1. Top Ranked Ramp Intersections**

Location	Geographic Area	Injury Collisions (2008-2014)
I-80 WB Onramp 4th/Harrison	E Soma	61
US 101 NB Offramp Market/Octavia	W Soma	59
US 101 NB Offramp 13th/Mission/Otis	W Soma	54
US 101 SB Onramp 13th/South Van Ness	W Soma	49
US 101 SB Offramp Alemany/Putnam	Alemany Maze	26
US 101 SB Onramp 10th/Bryant	W Soma	25
I-80 EB Onramp Essex/Harrison	E Soma	24
I-80 EB Onramp 5th/Bryant	W Soma	23
I-280 Ramps 6th/Brannan	W Soma	22
I-80 WB Offramp 5th/Harrison	E Soma	21
I-280 SB Ramps/Geneva	Balboa Park	20
I-280 NB Ramps/Geneva	Balboa Park	18
I-80 WB Offramp Fremont/Harrison	E Soma	18
US 101 NB Offramps Bayshore/Jerrold	Cesar Chavez Hairball	17
I-80 EB Onramp 1st/Harrison	E Soma	17
I-80 EB Offramp 4th/Bryant	E Soma	16
I-280 NB Onramp Alemany/San Jose	Alemany Maze	16
US-101 SB Offramp Bayshore/Hester	Bayview/Candlestick Park	15
US-101 NB Offramp 9th/Bryant	W Soma	12
I-280 SB Offramp Circular/Monterey	Glen Park BART	11

**SCREENING INTERSECTIONS IN SOMA**

We screened individual intersections in SOMA to determine if they are already under study; have recently been improved, or will be studied or improved in the near future. We researched intersections by consulting Envista, MyStreetSF, and by speaking with relevant project managers. Tables 2 and 3 list intersections recommended and not recommended for further study, pending final review.

**Table 2. SOMA Intersections Recommended for Further Study Pending Final Review**

Ramp	Relevant projects and studies and their status
<b>Eligible for NTIP Funding</b>	
US-101 SB on-ramp from 10 <sup>th</sup> /Bryant Streets*	This intersection does not appear to have been studied. However, Bryant Street was repaved in 2015, so any recommended capital treatments may need to wait five years for implementation.
US-101 off-ramp to 9 <sup>th</sup> /Bryant Streets*	This intersection does not appear to have been recently studied. However, both Bryant and 9 <sup>th</sup> Streets so any recommended capital treatments may need to wait five years for implementation
I-80 WB off-ramp to 5 <sup>th</sup> /Harrison Streets*	Some short term treatments are planned at this intersection (including re-opening closed crosswalks, upgraded curb ramps, and bicycle sharrows), but they do not appear to fully address safety issues. Need to consult with transit team to confirm need for collaboration with MuniFWD.
I-80 EB on-ramp from 5 <sup>th</sup> /Bryant Streets*	This intersection does not appear to have been recently studied for safety improvement, other than for bicyclists. Buffered bike lanes have been proposed, as well as green-backed sharrows. Need to consult with transit team to confirm need for collaboration with MuniFWD.
<b>Not Eligible for NTIP Funding</b>	
US-101 NB off-ramp to Otis/Mission/13 <sup>th</sup> Streets	Some short term improvements are proposed for this intersections (including transit improvements, Walkfirst improvements, and intersection improvements at Mission/Duboce/Erie), but do not appear to fully address safety issues (particularly bicycle collisions and vehicle sideswipes).
US 101 SB Onramp 13 <sup>th</sup> SVN	Envista indicates that the SF Planning Department may have initiated study of improvements in the vicinity of this intersection but they do not appear to be active. Note that South Van Ness Avenue is slated for pavement renovation.
I-280 ramps at 6 <sup>th</sup> and Brannan	SFMTA has done some work to update this intersection to improve safety (specifically by squaring off and signaling the right turn), however technical challenges have put these changes on hold. Further work is needed to define and confirm the changes. Note that Brannan Street was recently repaved, so any recommended capital treatments may need to wait five years for implementation.

*\*Intersections are eligible for Neighborhood Transportation Improvement Program funding because they are located with the SOMA Youth and Family Zone, which Supervisor Jane Kim has indicated is her priority*

In addition to the intersections listed in Table 2, we also recommended including the intersection of 8<sup>th</sup> Street with the I-80 West bound off-ramps. This intersection has had significantly fewer serious injuries and fatalities than those listed in Table 1, but is less complex and potentially easier to improve. We recommend including this intersection as a fallback location if one of those on the initial list proves too difficult to address.

**Table 3. Intersections Not Recommended for Further Study**

Ramp	Rationale for Recommending Not Pursuing Additional Study
I-80 WB on-ramp from 4 <sup>th</sup> /Harrison Streets	The Central Subway project will be making some improvements at this intersection, and SFMTA Traffic Engineering is already actively working on additional improvements, including a signal upgrade to address broadside and sideswipe collisions, as well as reopening the crosswalk crossing the onramp. Livable Streets is working on incorporating bulbouts into the signal upgrade.
US-101 NB/SB ramp at Market/Octavia Streets	Multiple projects are underway at this intersection and will address safety including the Better Market Street Project, Market/Octavia safety spot improvements (proposed), 17 <sup>th</sup> to Van Ness protected bike lane (proposed), raised cycletrack pilot on Market (bid and award, construction complete by 9/2016), and the Octavia Boulevard enhancement project (construction complete by 6/2016 – Octavia from Hayes to Market).
I-80 EB on-ramp from Essex/Harrison Streets	The Harrison Streetscape Project (DPW led) is developing designs to improve safety at this intersection, beginning in January, 2016. Construction is expected mid-2017. Opportunities may exist to implement short term improvements in the interim.
I-80 EB on-ramp from 1 <sup>st</sup> /Harrison Streets	The Harrison Streetscape Project (DPW led) is developing designs to improve safety at this intersection, beginning in January, 2016. Construction is expected mid-2017. Opportunities may exist to implement short term improvements in the interim.
I-80 EB off-ramp to 4 <sup>th</sup> /Bryant Streets	The Central Subway project will be making some improvements at this intersection, and SFMTA Traffic Engineering is already actively working on additional improvements. Livable Streets is also working on improvements for this intersection.
I-80 WB off-ramp to Fremont/Harrison/Folsom Streets	This intersection was recently reconstructed through the Fremont-Folsom Street off ramp realignment project. We believe a plan for re-opening a closed crosswalk at this location is in the works – but need to confirm.

# Appendix B: Traffic Counts

**TRAFFIC COUNTS PLUS**

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CITY OF SAN FRANCISCO

Latitude: 37.777816  
Longitude: -122.400311

File Name : 5-bryant-p  
Site Code : 1  
Start Date : 12/6/2016  
Page No : 1

**Groups Printed- Vehicles Only**

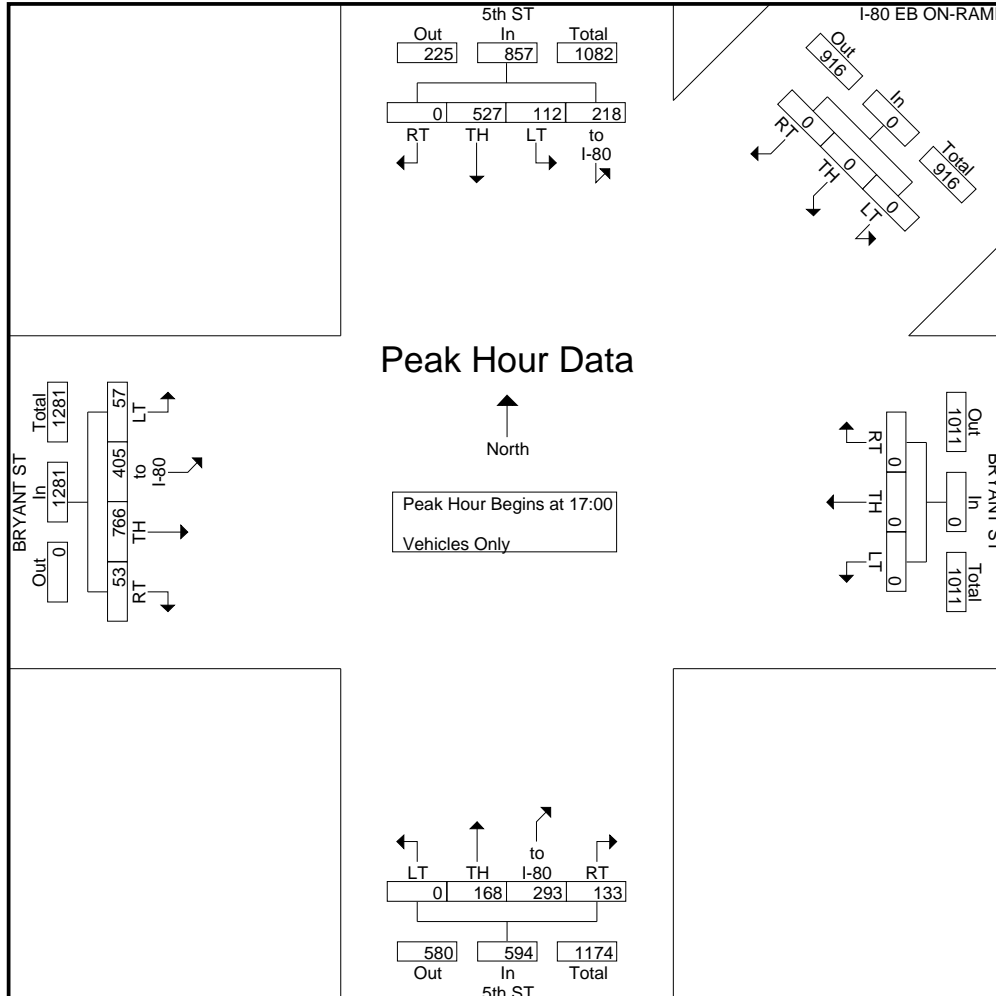
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	RT	TH	LT	to I-80	App. Total	RT	TH	LT	App. Total	RT	to I-80	TH	LT	App. Total	RT	TH	to I-80	LT	App. Total	RT	TH	LT	App. Total	
16:00	0	112	17	45	174	0	0	0	0	33	71	40	0	144	18	125	72	6	221	0	0	0	0	539
16:15	0	115	15	48	178	0	0	0	0	17	59	15	0	91	14	192	59	5	270	0	0	0	0	539
16:30	0	118	17	58	193	0	0	0	0	14	85	23	0	122	22	153	93	10	278	0	0	0	0	593
16:45	0	96	13	60	169	0	0	0	0	20	64	36	0	120	16	167	111	14	308	0	0	0	0	597
<b>Total</b>	0	441	62	211	714	0	0	0	0	84	279	114	0	477	70	637	335	35	1077	0	0	0	0	2268
17:00	0	122	24	59	205	0	0	0	0	38	76	37	0	151	11	150	84	9	254	0	0	0	0	610
17:15	0	131	33	60	224	0	0	0	0	24	79	44	0	147	15	196	104	15	330	0	0	0	0	701
17:30	0	140	28	55	223	0	0	0	0	36	68	46	0	150	18	199	107	17	341	0	0	0	0	714
17:45	0	134	27	44	205	0	0	0	0	35	70	41	0	146	9	221	110	16	356	0	0	0	0	707
<b>Total</b>	0	527	112	218	857	0	0	0	0	133	293	168	0	594	53	766	405	57	1281	0	0	0	0	2732
<b>Grand Total</b>	0	968	174	429	1571	0	0	0	0	217	572	282	0	1071	123	1403	740	92	2358	0	0	0	0	5000
Apprch %	0	61.6	11.1	27.3		0	0	0		20.3	53.4	26.3	0		5.2	59.5	31.4	3.9		0	0	0		
Total %	0	19.4	3.5	8.6	31.4	0	0	0	0	4.3	11.4	5.6	0	21.4	2.5	28.1	14.8	1.8	47.2	0	0	0	0	

Start Time	5th ST Southbound					BRYANT ST Westbound				5th ST Northbound					BRYANT ST Eastbound					I-80 EB ON-RAMP Southwestbound				Int. Total
	RT	TH	LT	to I-80	App. Total	RT	TH	LT	App. Total	RT	to I-80	TH	LT	App. Total	RT	TH	to I-80	LT	App. Total	RT	TH	LT	App. Total	

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 17:00

17:00	0	122	24	59	205	0	0	0	0	38	76	37	0	151	11	150	84	9	254	0	0	0	0	610
17:15	0	131	33	60	224	0	0	0	0	24	79	44	0	147	15	196	104	15	330	0	0	0	0	701
17:30	0	140	28	55	223	0	0	0	0	36	68	46	0	150	18	199	107	17	341	0	0	0	0	714
17:45	0	134	27	44	205	0	0	0	0	35	70	41	0	146	9	221	110	16	356	0	0	0	0	707
Total Volume	0	527	112	218	857	0	0	0	0	133	293	168	0	594	53	766	405	57	1281	0	0	0	0	2732
% App. Total	0	61.5	13.1	25.4		0	0	0		22.4	49.3	28.3	0		4.1	59.8	31.6	4.4		0	0	0		
PHF	.000	.941	.848	.908	.956	.000	.000	.000	.000	.875	.927	.913	.000	.983	.736	.867	.920	.838	.900	.000	.000	.000	.000	.957





**TRAFFIC COUNTS PLUS**

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Latitude: 37.777816  
Longitude: -122.400311

File Name : 5-bryant-a  
Site Code : 1  
Start Date : 12/6/2016  
Page No : 1

**Groups Printed- Vehicles Only**

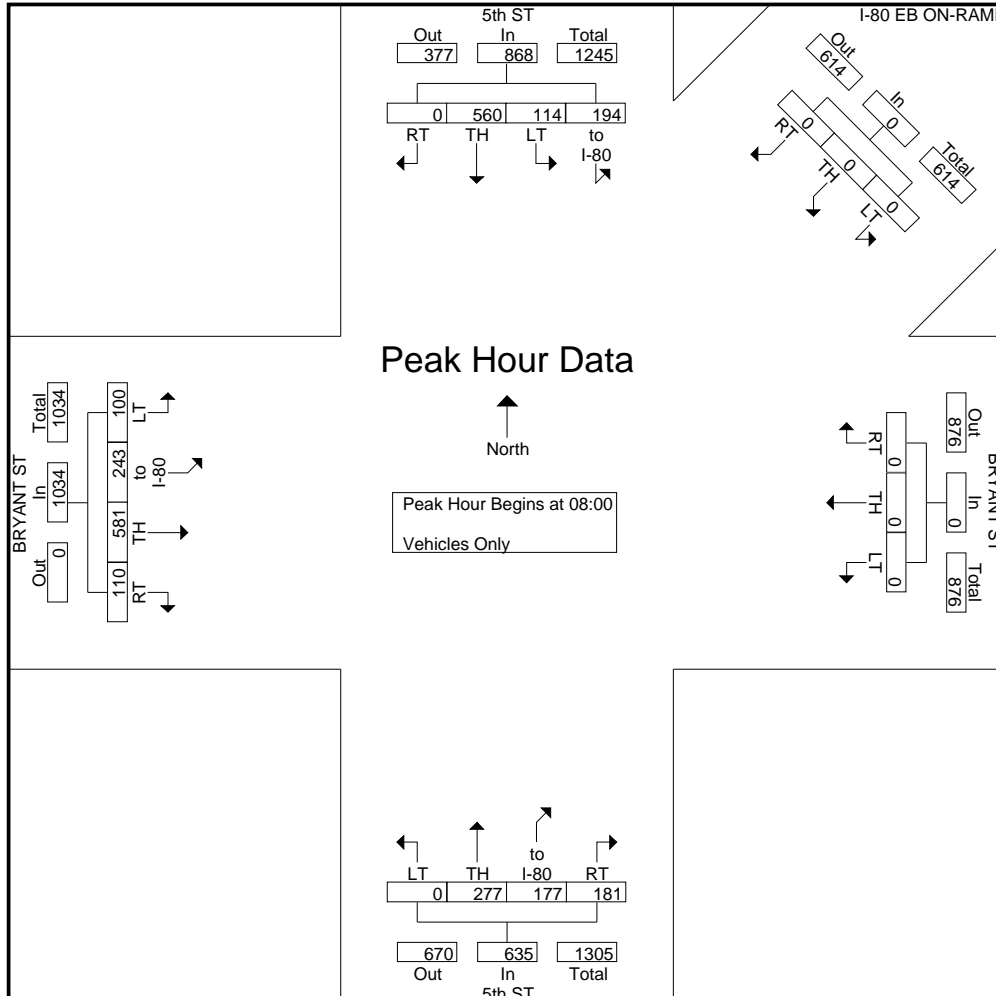
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07:00	0	119	8	37	164	0	0	0	0	15	53	38	0	106	21	56	71	6	154	0	0	0	0	424
07:15	0	112	24	25	161	0	0	0	0	16	57	48	0	121	13	70	69	17	169	0	0	0	0	451
07:30	0	131	13	29	173	0	0	0	0	18	55	55	0	128	27	81	57	11	176	0	0	0	0	477
07:45	0	138	25	30	193	0	0	0	0	24	45	59	0	128	18	113	49	14	194	0	0	0	0	515
Total	0	500	70	121	691	0	0	0	0	73	210	200	0	483	79	320	246	48	693	0	0	0	0	1867
08:00	0	140	23	48	211	0	0	0	0	39	43	62	0	144	24	120	64	20	228	0	0	0	0	583
08:15	0	150	25	47	222	0	0	0	0	42	38	74	0	154	24	132	66	15	237	0	0	0	0	613
08:30	0	133	34	58	225	0	0	0	0	38	48	65	0	151	24	170	61	28	283	0	0	0	0	659
08:45	0	137	32	41	210	0	0	0	0	62	48	76	0	186	38	159	52	37	286	0	0	0	0	682
Total	0	560	114	194	868	0	0	0	0	181	177	277	0	635	110	581	243	100	1034	0	0	0	0	2537
Grand Total	0	1060	184	315	1559	0	0	0	0	254	387	477	0	1118	189	901	489	148	1727	0	0	0	0	4404
Apprch %	0	68	11.8	20.2		0	0	0		22.7	34.6	42.7	0		10.9	52.2	28.3	8.6		0	0	0		
Total %	0	24.1	4.2	7.2	35.4	0	0	0	0	5.8	8.8	10.8	0	25.4	4.3	20.5	11.1	3.4	39.2	0	0	0	0	

Start Time	5th ST Southbound					BRYANT ST Westbound				5th ST Northbound					BRYANT ST Eastbound					I-80 EB ON-RAMP Southwestbound				Int. Total
	RT	TH	LT	to I-80	App. Total	RT	TH	LT	App. Total	RT	to I-80	TH	LT	App. Total	RT	TH	to I-80	LT	App. Total	RT	TH	LT	App. Total	

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00

08:00	0	140	23	48	211	0	0	0	0	39	43	62	0	144	24	120	64	20	228	0	0	0	0	583
08:15	0	150	25	47	222	0	0	0	0	42	38	74	0	154	24	132	66	15	237	0	0	0	0	613
08:30	0	133	34	58	225	0	0	0	0	38	48	65	0	151	24	170	61	28	283	0	0	0	0	659
08:45	0	137	32	41	210	0	0	0	0	62	48	76	0	186	38	159	52	37	286	0	0	0	0	682
Total Volume	0	560	114	194	868	0	0	0	0	181	177	277	0	635	110	581	243	100	1034	0	0	0	0	2537
% App. Total	0	64.5	13.1	22.4		0	0	0		28.5	27.9	43.6	0		10.6	56.2	23.5	9.7		0	0	0		
PHF	.000	.933	.838	.836	.964	.000	.000	.000	.000	.730	.922	.911	.000	.853	.724	.854	.920	.676	.904	.000	.000	.000	.000	.930



**TRAFFIC COUNTS PLUS**

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CITY OF SAN FRANCISCO

Latitude: 37.779056  
Longitude: -122.401850

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Site Code : 2  
Start Date : 12/6/2016  
Page No : 1

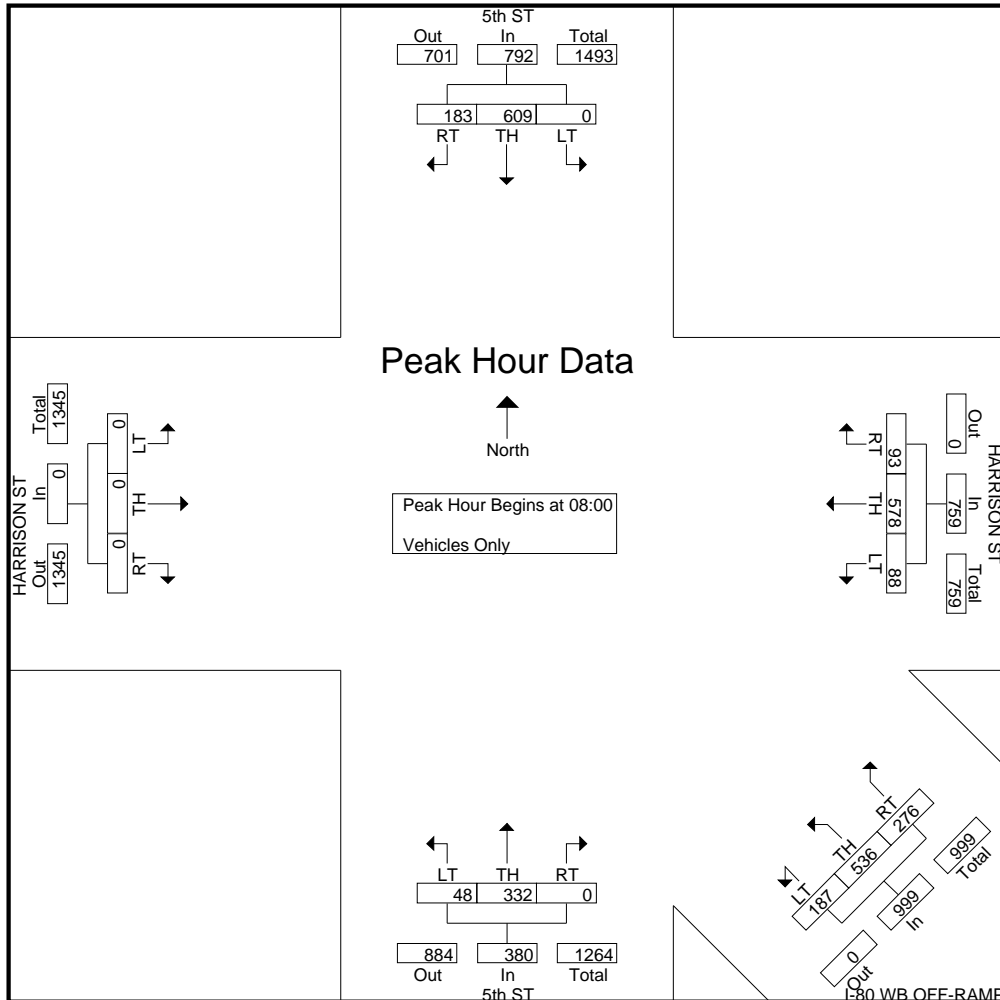
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07:00	30	109	0	139	15	88	13	116	0	46	6	52	0	0	0	0	61	149	48	258	565
07:15	36	98	0	134	17	107	10	134	0	55	8	63	0	0	0	0	59	143	50	252	583
07:30	43	114	0	157	18	135	16	169	0	58	9	67	0	0	0	0	71	146	41	258	651
07:45	50	143	0	193	17	125	14	156	0	58	10	68	0	0	0	0	59	159	46	264	681
Total	159	464	0	623	67	455	53	575	0	217	33	250	0	0	0	0	250	597	185	1032	2480
08:00	52	156	0	208	25	140	17	182	0	71	14	85	0	0	0	0	80	149	47	276	751
08:15	38	146	0	184	17	143	21	181	0	78	10	88	0	0	0	0	59	136	52	247	700
08:30	51	168	0	219	26	156	16	198	0	89	9	98	0	0	0	0	59	116	39	214	729
08:45	42	139	0	181	25	139	34	198	0	94	15	109	0	0	0	0	78	135	49	262	750
Total	183	609	0	792	93	578	88	759	0	332	48	380	0	0	0	0	276	536	187	999	2930
Grand Total	342	1073	0	1415	160	1033	141	1334	0	549	81	630	0	0	0	0	526	1133	372	2031	5410
Apprch %	24.2	75.8	0		12	77.4	10.6		0	87.1	12.9		0	0	0		25.9	55.8	18.3		
Total %	6.3	19.8	0	26.2	3	19.1	2.6	24.7	0	10.1	1.5	11.6	0	0	0	0	9.7	20.9	6.9	37.5	

Start Time	5th ST Southbound				HARRISON ST Westbound				5th ST Northbound				HARRISON ST Eastbound				I-80 WB OFF-RAMP Northwestbound				Int. Total
	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	
08:00	52	156	0	208	25	140	17	182	0	71	14	85	0	0	0	0	80	149	47	276	751
08:15	38	146	0	184	17	143	21	181	0	78	10	88	0	0	0	0	59	136	52	247	700
08:30	51	168	0	219	26	156	16	198	0	89	9	98	0	0	0	0	59	116	39	214	729
08:45	42	139	0	181	25	139	34	198	0	94	15	109	0	0	0	0	78	135	49	262	750
Total Volume	183	609	0	792	93	578	88	759	0	332	48	380	0	0	0	0	276	536	187	999	2930
% App. Total	23.1	76.9	0		12.3	76.2	11.6		0	87.4	12.6		0	0	0		27.6	53.7	18.7		
PHF	.880	.906	.000	.904	.894	.926	.647	.958	.000	.883	.800	.872	.000	.000	.000	.000	.863	.899	.899	.905	.975

**Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1**

Peak Hour for Entire Intersection Begins at 08:00



**TRAFFIC COUNTS PLUS**

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CITY OF SAN FRANCISCO

Latitude: 37.779056  
Longitude: -122.401850

File Name : 5-harrison-p  
Site Code : 2  
Start Date : 12/6/2016  
Page No : 1

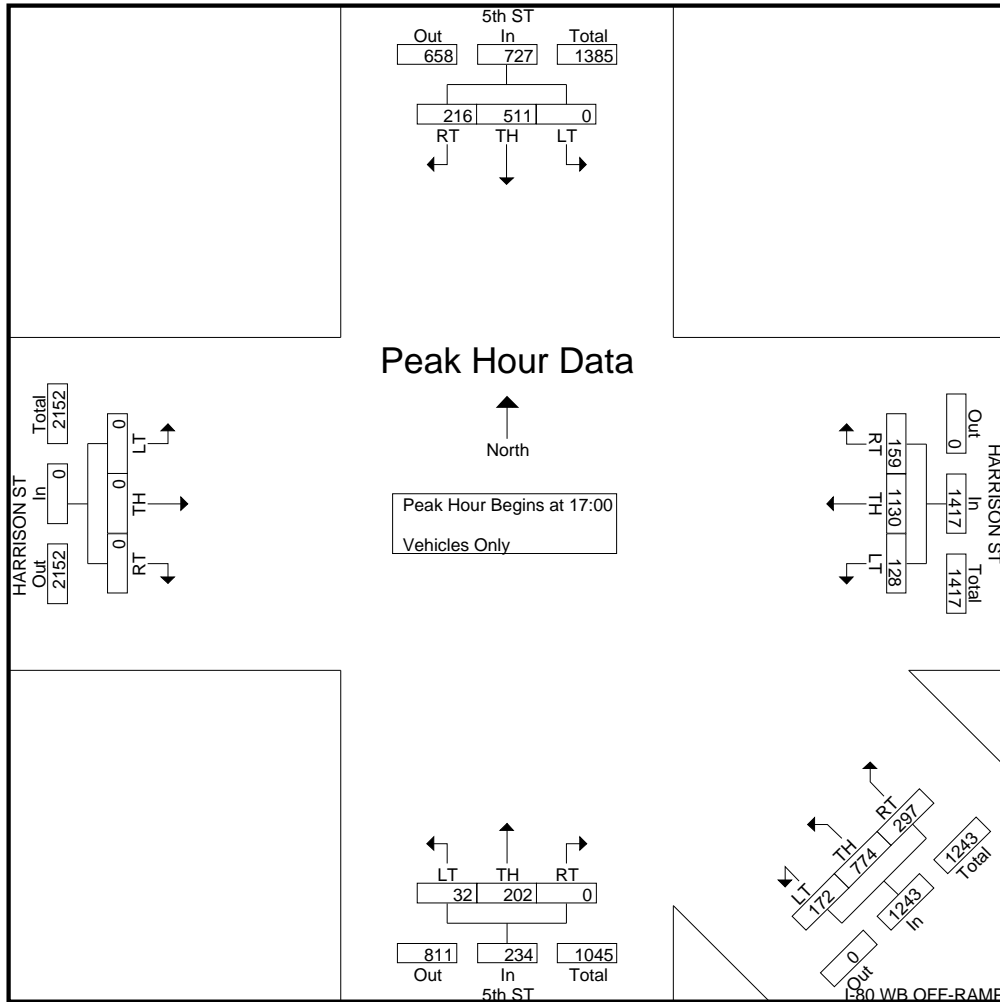
**Groups Printed- Vehicles Only**

Start Time	5th ST Southbound				HARRISON ST Westbound				5th ST Northbound				HARRISON ST Eastbound				I-80 WB OFF-RAMP Northwestbound				Int. Total
	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	
16:00	35	118	0	153	15	186	21	222	0	36	7	43	0	0	0	0	51	165	38	254	672
16:15	65	118	0	183	20	153	14	187	0	18	6	24	0	0	0	0	46	197	51	294	688
16:30	47	127	0	174	31	215	11	257	0	28	5	33	0	0	0	0	53	167	44	264	728
16:45	62	110	0	172	19	223	23	265	0	45	6	51	0	0	0	0	52	184	27	263	751
Total	209	473	0	682	85	777	69	931	0	127	24	151	0	0	0	0	202	713	160	1075	2839
17:00	50	113	0	163	37	287	35	359	0	34	9	43	0	0	0	0	60	200	42	302	867
17:15	55	142	0	197	38	265	37	340	0	56	8	64	0	0	0	0	85	192	41	318	919
17:30	58	137	0	195	42	282	27	351	0	57	7	64	0	0	0	0	81	190	46	317	927
17:45	53	119	0	172	42	296	29	367	0	55	8	63	0	0	0	0	71	192	43	306	908
Total	216	511	0	727	159	1130	128	1417	0	202	32	234	0	0	0	0	297	774	172	1243	3621
Grand Total	425	984	0	1409	244	1907	197	2348	0	329	56	385	0	0	0	0	499	1487	332	2318	6460
Apprch %	30.2	69.8	0		10.4	81.2	8.4		0	85.5	14.5		0	0	0		21.5	64.2	14.3		
Total %	6.6	15.2	0	21.8	3.8	29.5	3	36.3	0	5.1	0.9	6	0	0	0	0	7.7	23	5.1	35.9	

Start Time	5th ST Southbound				HARRISON ST Westbound				5th ST Northbound				HARRISON ST Eastbound				I-80 WB OFF-RAMP Northwestbound				Int. Total
	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	
17:00	50	113	0	163	37	287	35	359	0	34	9	43	0	0	0	0	60	200	42	302	867
17:15	55	142	0	197	38	265	37	340	0	56	8	64	0	0	0	0	85	192	41	318	919
17:30	58	137	0	195	42	282	27	351	0	57	7	64	0	0	0	0	81	190	46	317	927
17:45	53	119	0	172	42	296	29	367	0	55	8	63	0	0	0	0	71	192	43	306	908
Total Volume	216	511	0	727	159	1130	128	1417	0	202	32	234	0	0	0	0	297	774	172	1243	3621
% App. Total	29.7	70.3	0		11.2	79.7	9		0	86.3	13.7		0	0	0		23.9	62.3	13.8		
PHF	.931	.900	.000	.923	.946	.954	.865	.965	.000	.886	.889	.914	.000	.000	.000	.000	.874	.968	.935	.977	.977

**Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1**

Peak Hour for Entire Intersection Begins at 17:00



**TRAFFIC COUNTS PLUS**

mietekm@comcast.net  
925.305.4358

CITY OF SAN FRANCISCO

Latitude: 37.770355  
Longitude: -122.409726

File Name : 10-bryant-a  
Site Code : 3  
Start Date : 12/6/2016  
Page No : 1

**Groups Printed- Vehicles Only**

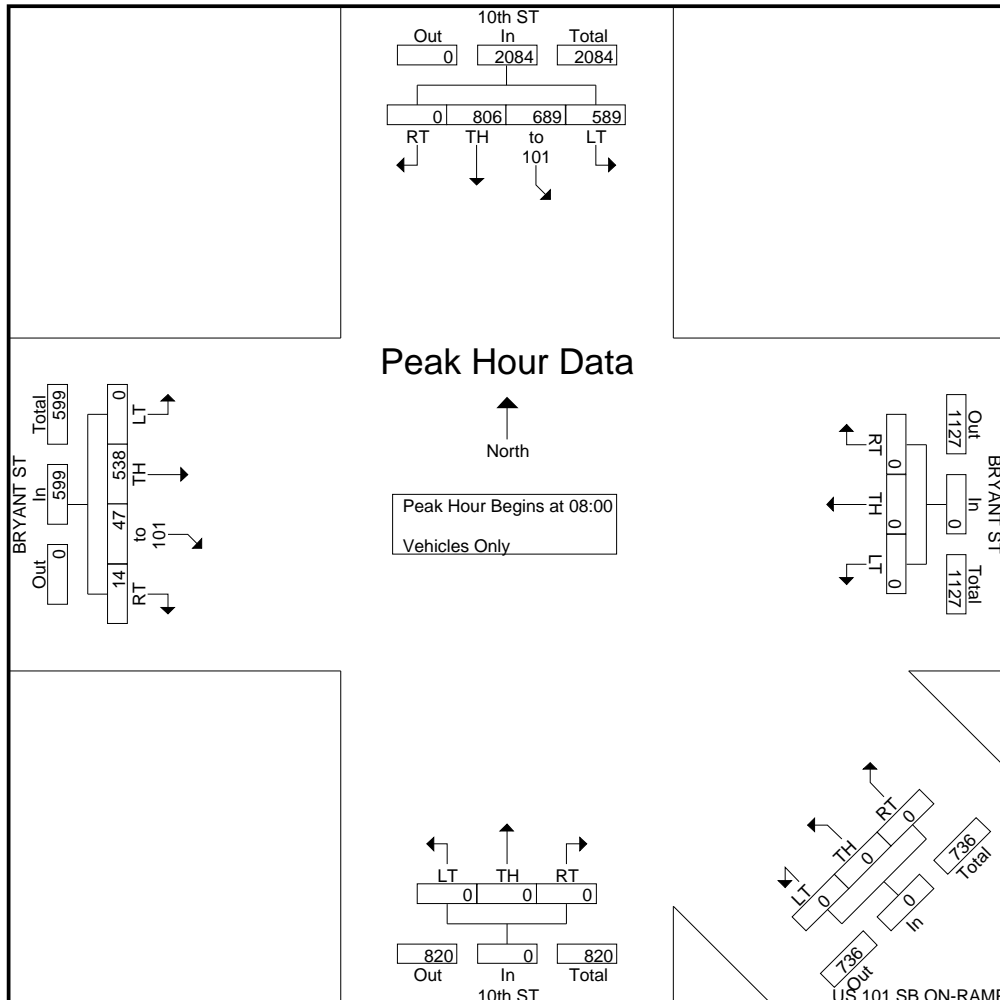
Start Time	10th ST Southbound					BRYANT ST Westbound				10th ST Northbound				BRYANT ST Eastbound					US 101 SB ON-RAMP Northwestbound					Int. Total
	RT	TH	to 101	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	to 101	TH	LT	App. Total	RT	TH	LT	App. Total		
07:00	0	126	221	83	430	0	0	0	0	0	0	0	0	3	15	58	0	76	0	0	0	0	506	
07:15	0	143	162	108	413	0	0	0	0	0	0	0	0	3	5	79	0	87	0	0	0	0	500	
07:30	0	150	172	113	435	0	0	0	0	0	0	0	0	3	15	112	0	130	0	0	0	0	565	
07:45	0	174	172	129	475	0	0	0	0	0	0	0	0	2	15	110	0	127	0	0	0	0	602	
Total	0	593	727	433	1753	0	0	0	0	0	0	0	0	11	50	359	0	420	0	0	0	0	2173	
08:00	0	194	182	141	517	0	0	0	0	0	0	0	0	4	9	107	0	120	0	0	0	0	637	
08:15	0	196	155	134	485	0	0	0	0	0	0	0	0	3	9	130	0	142	0	0	0	0	627	
08:30	0	202	168	155	525	0	0	0	0	0	0	0	0	1	12	156	0	169	0	0	0	0	694	
08:45	0	214	184	159	557	0	0	0	0	0	0	0	0	6	17	145	0	168	0	0	0	0	725	
Total	0	806	689	589	2084	0	0	0	0	0	0	0	0	14	47	538	0	599	0	0	0	0	2683	
Grand Total	0	1399	1416	1022	3837	0	0	0	0	0	0	0	0	25	97	897	0	1019	0	0	0	0	4856	
Apprch %	0	36.5	36.9	26.6		0	0	0	0	0	0	0	0	2.5	9.5	88	0		0	0	0	0		
Total %	0	28.8	29.2	21	79	0	0	0	0	0	0	0	0	0.5	2	18.5	0	21	0	0	0	0		

Start Time	10th ST Southbound					BRYANT ST Westbound				10th ST Northbound				BRYANT ST Eastbound					US 101 SB ON-RAMP Northwestbound					Int. Total
	RT	TH	to 101	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	to 101	TH	LT	App. Total	RT	TH	LT	App. Total		

Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 08:00

08:00	0	194	182	141	517	0	0	0	0	0	0	0	0	4	9	107	0	120	0	0	0	0	637
08:15	0	196	155	134	485	0	0	0	0	0	0	0	0	3	9	130	0	142	0	0	0	0	627
08:30	0	202	168	155	525	0	0	0	0	0	0	0	0	1	12	156	0	169	0	0	0	0	694
08:45	0	214	184	159	557	0	0	0	0	0	0	0	0	6	17	145	0	168	0	0	0	0	725
Total Volume	0	806	689	589	2084	0	0	0	0	0	0	0	0	14	47	538	0	599	0	0	0	0	2683
% App. Total	0	38.7	33.1	28.3		0	0	0	0	0	0	0	0	2.3	7.8	89.8	0		0	0	0	0	
PHF	.000	.942	.936	.926	.935	.000	.000	.000	.000	.000	.000	.000	.000	.583	.691	.862	.000	.886	.000	.000	.000	.000	.925



**TRAFFIC COUNTS PLUS**

mietekm@comcast.net  
925.305.4358

CITY OF SAN FRANCISCO

Latitude: 37.770355  
Longitude: -122.409726

File Name : 10-bryant-p  
Site Code : 3  
Start Date : 12/6/2016  
Page No : 1

**Groups Printed- Vehicles Only**

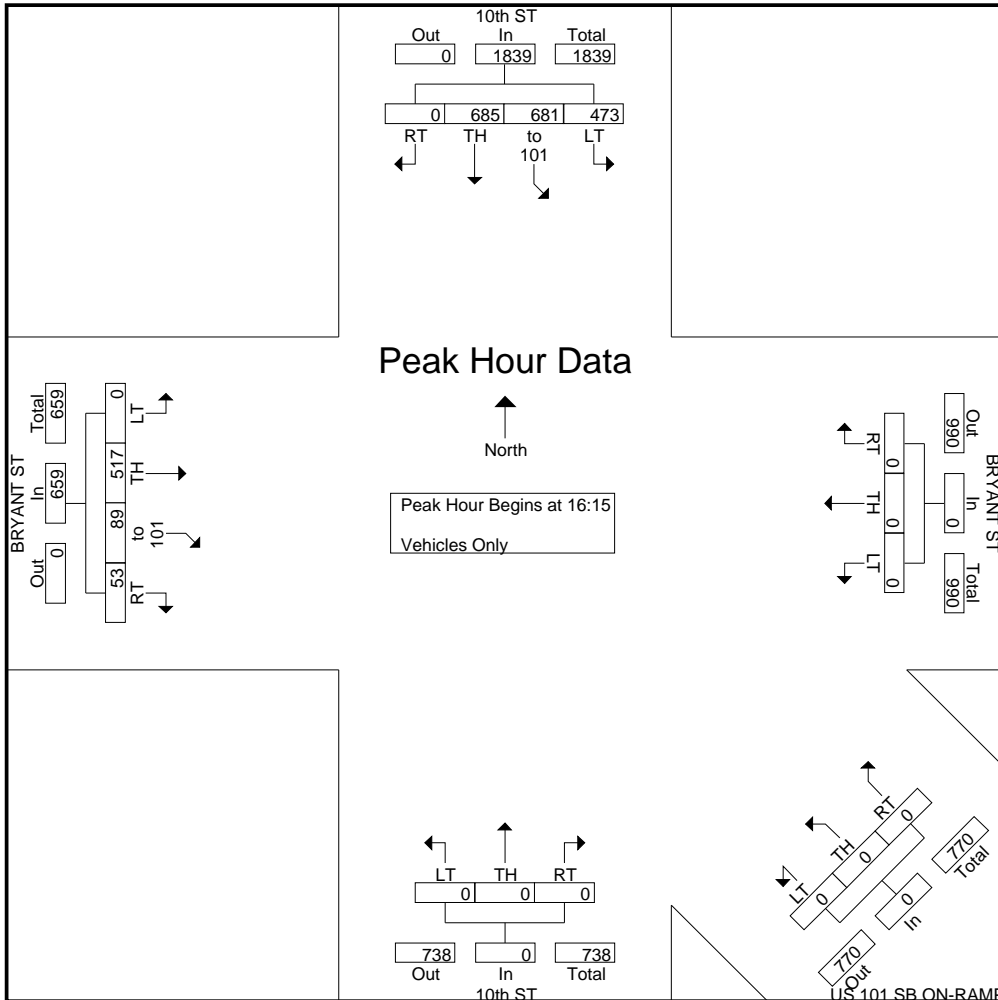
Start Time	10th ST Southbound					BRYANT ST Westbound				10th ST Northbound				BRYANT ST Eastbound					US 101 SB ON-RAMP Northwestbound					Int. Total
	RT	TH	to 101	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	to 101	TH	LT	App. Total	RT	TH	LT	App. Total		
16:00	0	136	157	113	406	0	0	0	0	0	0	0	0	14	25	138	0	177	0	0	0	0	583	
16:15	0	185	172	125	482	0	0	0	0	0	0	0	0	12	22	119	0	153	0	0	0	0	635	
16:30	0	171	172	133	476	0	0	0	0	0	0	0	0	11	26	127	0	164	0	0	0	0	640	
16:45	0	155	165	112	432	0	0	0	0	0	0	0	0	16	20	149	0	185	0	0	0	0	617	
Total	0	647	666	483	1796	0	0	0	0	0	0	0	0	53	93	533	0	679	0	0	0	0	2475	
17:00	0	174	172	103	449	0	0	0	0	0	0	0	0	14	21	122	0	157	0	0	0	0	606	
17:15	0	148	137	113	398	0	0	0	0	0	0	0	0	10	23	143	0	176	0	0	0	0	574	
17:30	0	180	143	115	438	0	0	0	0	0	0	0	0	7	25	132	0	164	0	0	0	0	602	
17:45	0	167	125	120	412	0	0	0	0	0	0	0	0	8	27	147	0	182	0	0	0	0	594	
Total	0	669	577	451	1697	0	0	0	0	0	0	0	0	39	96	544	0	679	0	0	0	0	2376	
Grand Total	0	1316	1243	934	3493	0	0	0	0	0	0	0	0	92	189	1077	0	1358	0	0	0	0	4851	
Apprch %	0	37.7	35.6	26.7		0	0	0		0	0	0		6.8	13.9	79.3	0		0	0	0			
Total %	0	27.1	25.6	19.3	72	0	0	0		0	0	0		1.9	3.9	22.2	0	28	0	0	0			

Start Time	10th ST Southbound					BRYANT ST Westbound				10th ST Northbound				BRYANT ST Eastbound					US 101 SB ON-RAMP Northwestbound					Int. Total
	RT	TH	to 101	LT	App. Total	RT	TH	LT	App. Total	RT	TH	LT	App. Total	RT	to 101	TH	LT	App. Total	RT	TH	LT	App. Total		

Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 16:15

16:15	0	185	172	125	482	0	0	0	0	0	0	0	0	12	22	119	0	153	0	0	0	0	635
16:30	0	171	172	133	476	0	0	0	0	0	0	0	0	11	26	127	0	164	0	0	0	0	640
16:45	0	155	165	112	432	0	0	0	0	0	0	0	0	16	20	149	0	185	0	0	0	0	617
17:00	0	174	172	103	449	0	0	0	0	0	0	0	0	14	21	122	0	157	0	0	0	0	606
Total Volume	0	685	681	473	1839	0	0	0	0	0	0	0	0	53	89	517	0	659	0	0	0	0	2498
% App. Total	0	37.2	37	25.7		0	0	0		0	0	0		8	13.5	78.5	0		0	0	0		
PHF	.000	.926	.990	.889	.954	.000	.000	.000	.000	.000	.000	.000	.000	.828	.856	.867	.000	.891	.000	.000	.000	.000	.976

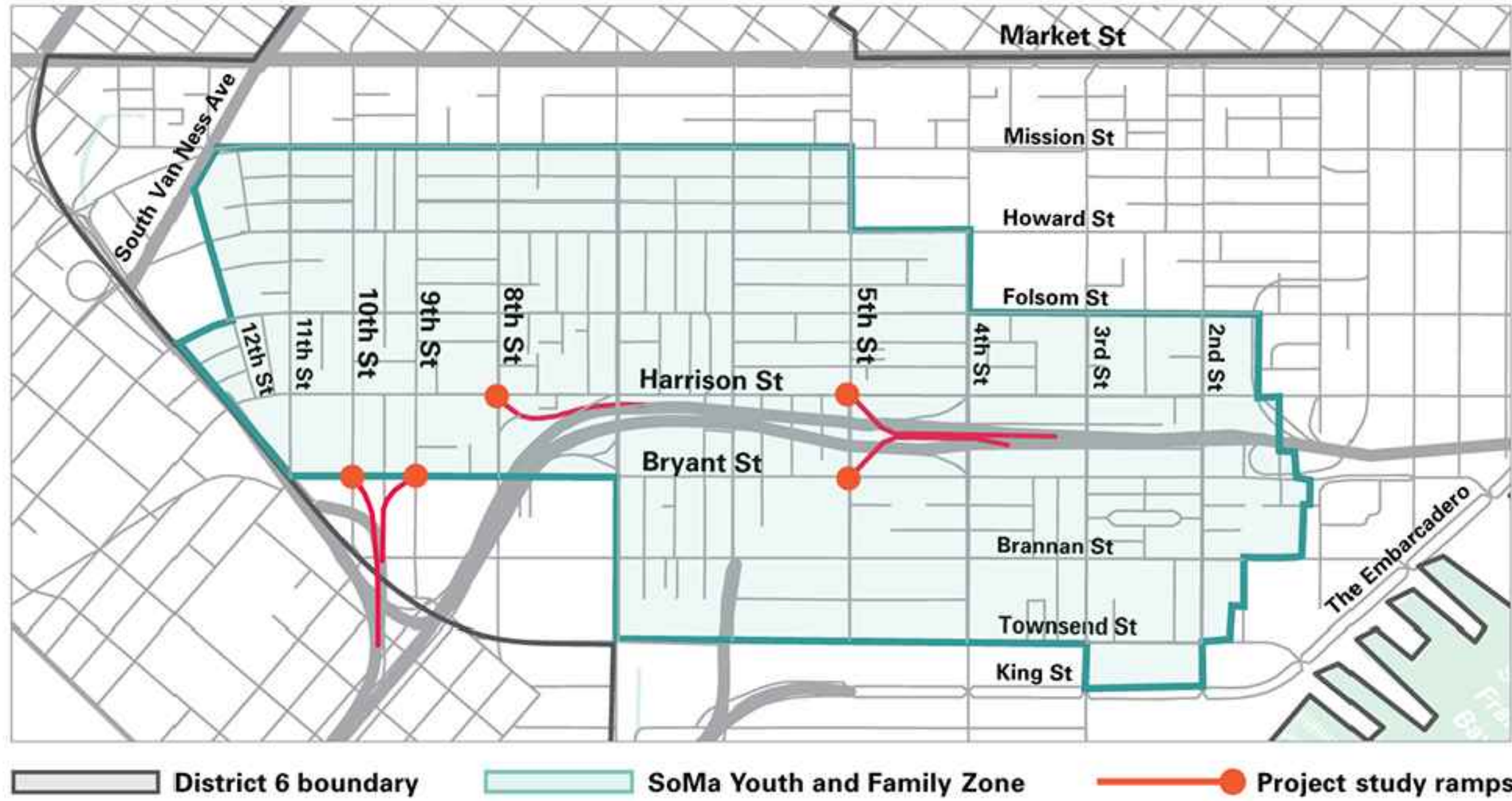


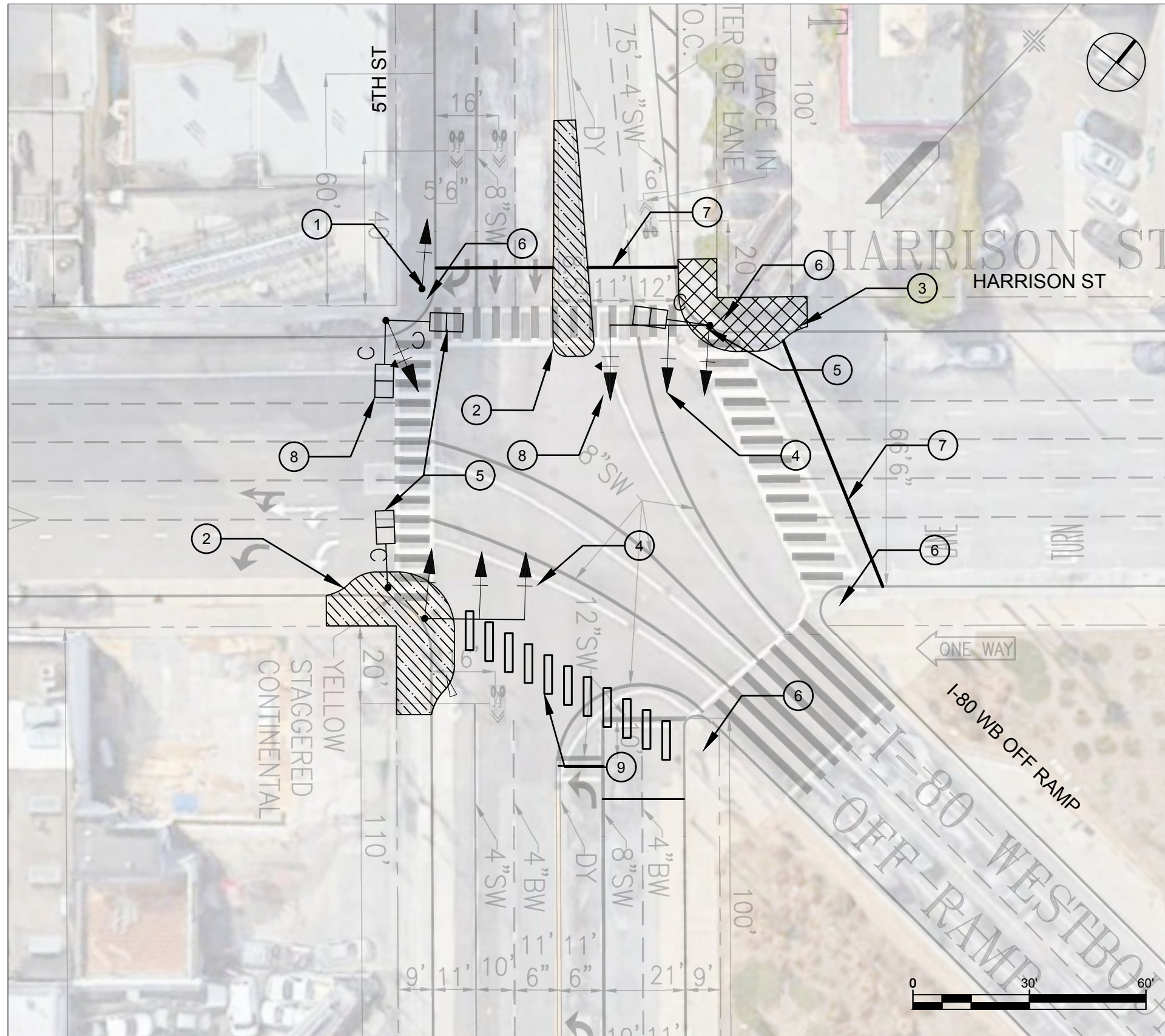
Appendix C:  
Recommended Concept  
Improvements

September, 2017

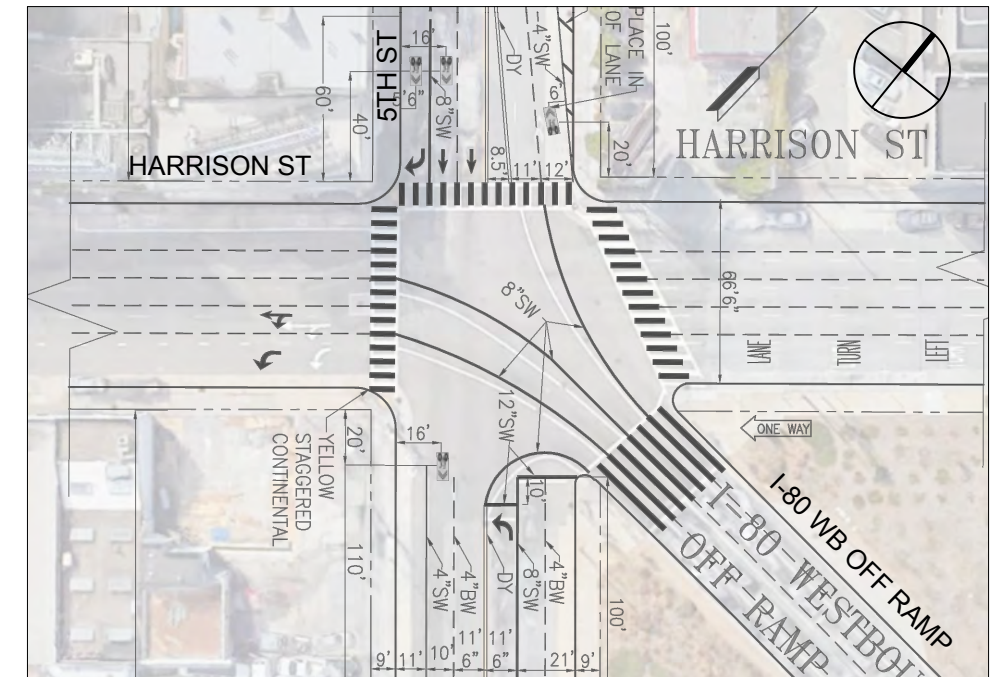
# VISION ZERO SF

## RAMP INTERSECTION IMPROVEMENT CONCEPTS





## HARRISON STREET / 5TH STREET



EXISTING CONDITIONS

### IMPROVEMENT CONCEPTS:

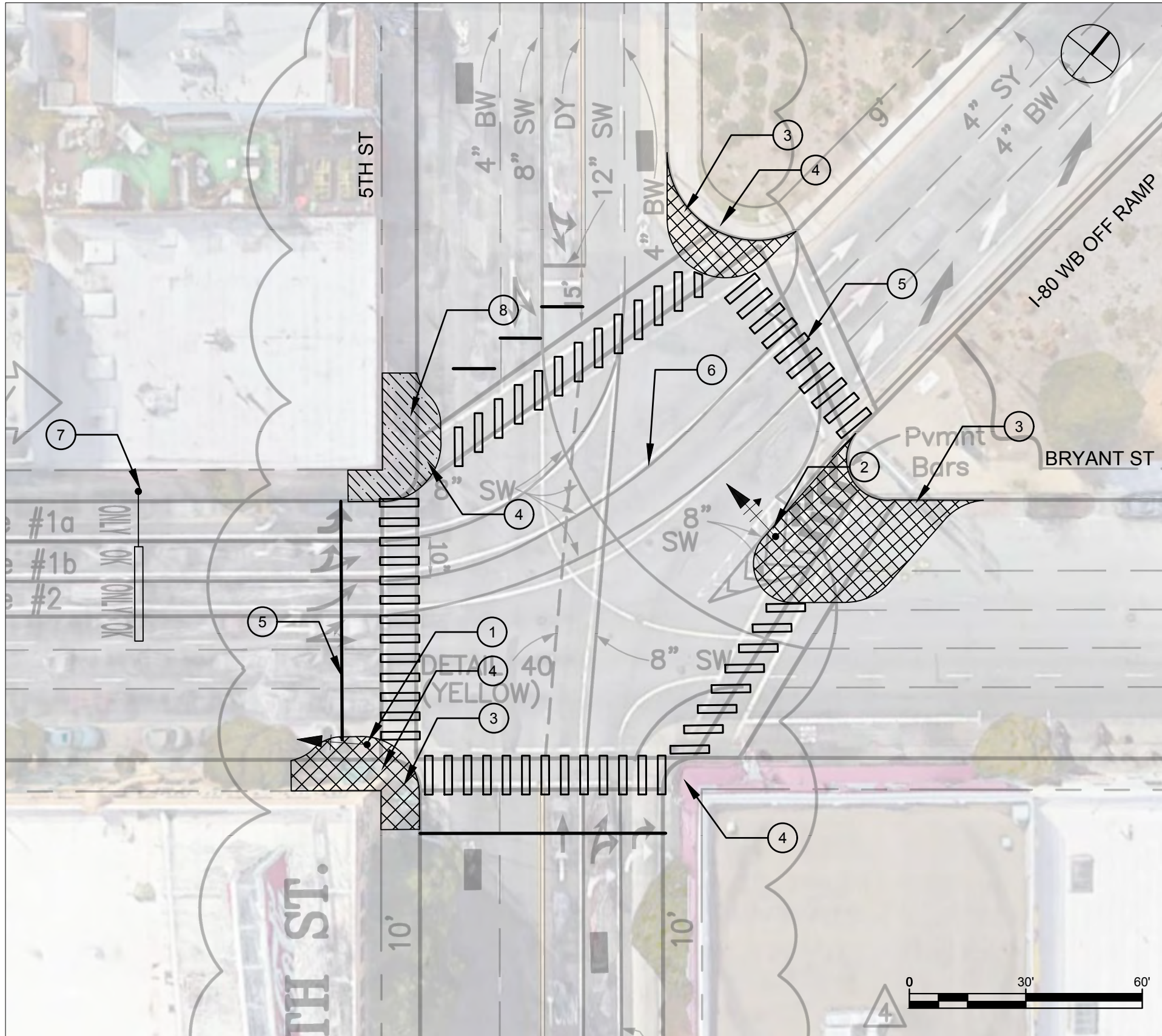
- ① INSTALL NEARSIDE TRAFFIC SIGNAL
- ② CONSIDER TEMPORARY INSTALLATION OF BULB AND MEDIAN UNTIL 5TH STREET STREETScape PROJECT PLANNING IS FINALIZED
- ③ INSTALL PEDESTRIAN BULB
- ④ INSTALL TRAFFIC SIGNAL MAST ARM POLE
- ⑤ PROVIDE LEADING PEDESTRIAN INTERVAL PHASING
- ⑥ UPGRADE 8" TRAFFIC SIGNAL HEADS TO 12"
- ⑦ INSTALL STOP BAR SET BACK FROM CROSSWALK
- ⑧ CONSIDER PROVIDING LAGGING OR PROTECTED LEFT TURN VEHICULAR PHASE
- ⑨ INSTALL PEDESTRIAN CROSSING WITH EXCLUSIVE SIGNAL PHASE
- ⑩ CONSIDER IMPROVED STREET LIGHTING AT THE INTERSECTION
- ⑪ CONSIDER POTENTIAL FUTURE BIKE NETWORK IMPROVEMENTS ON 5TH STREET DURING NEXT STAGE OF DESIGN

\*ALL PHYSICAL IMPROVEMENTS WILL REQUIRE CALTRANS APPROVAL

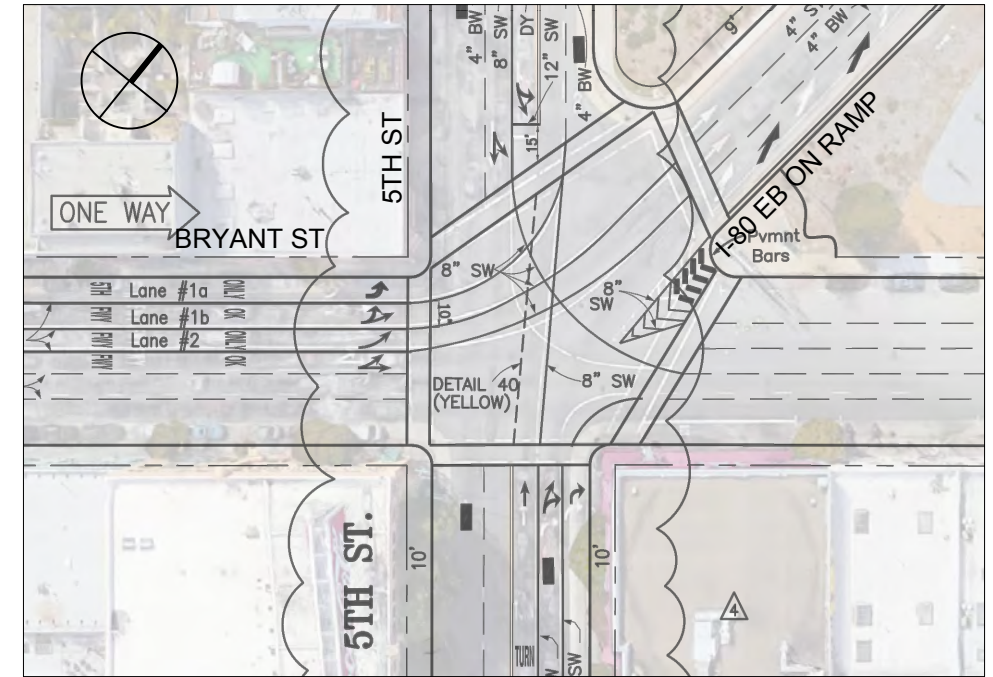


#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Proposed Project Completion Timeline	Proposed Implementation and Next Steps	Draft Planning Cost Estimate
<b>Signal Improvements</b>							
1	NW corner (SB 5th St approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	3-5 years	Funding and design for intersection signal upgrade.	<b>\$375,000</b>
4	NE & SW corner (NB & SB 5th St approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone			
6	NW, NE, SE, and south corner	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone			
8	NB 5th St approach	Convert permissive left turn to protected lagging left turn	Reduce left turn collisions	Reduce left turn collisions			
10	Entire intersection	Improve street lighting	Improve overall visibility at intersection	All types			
5	Pedestrian phases crossing Harrison and SB 5th St	Program a leading pedestrian interval	Improve pedestrian visibility in intersection	Pedestrian crash in crosswalk	within 1 year	Re-time signal.	<b>\$5,000</b>
<b>Civil Improvements</b>							
3	NE corner	Install corner bulb-out	Shorten pedestrian crossing distance	Pedestrian crash in crosswalk	3-5 years	Coordination with other civil projects. Design and funding.	<b>\$150,000</b>
9	NB 5th St approach	Install new pedestrian crossing	Improve pedestrian access				
<b>Signing / Striping Improvements</b>							
7	WB Harrison approach	Install advance stop bar	Reduce instances of crosswalk blocking	Pedestrian crash in crosswalk	1-3 years	Funding and design.	<b>\$50,000</b>
2	SW corner (SB 5th approach)	Install temporary bulb-out	Encourage slower vehicular turning	Pedestrian crash in crosswalk			
2	SB 5th Street approach	Install temporary median	Encourage slower vehicular turning	Pedestrian crash in crosswalk			
<b>Other Improvements</b>							
11	Entire intersection	Install bicycle network improvements	Improve bicycle access	All types	Complete 5th Street corridor planning.	Funding and design.	<b>TBD</b>
Subtotal							<b>\$580,000</b>
Planning & Outreach (5%)							<b>\$29,000</b>
Design (15%)							<b>\$87,000</b>
30% Contingency							<b>\$208,800</b>
Total							<b>\$904,800</b>

## HARRISON STREET / 5TH STREET



**BRYANT STREET / 5TH STREET**



EXISTING CONDITIONS

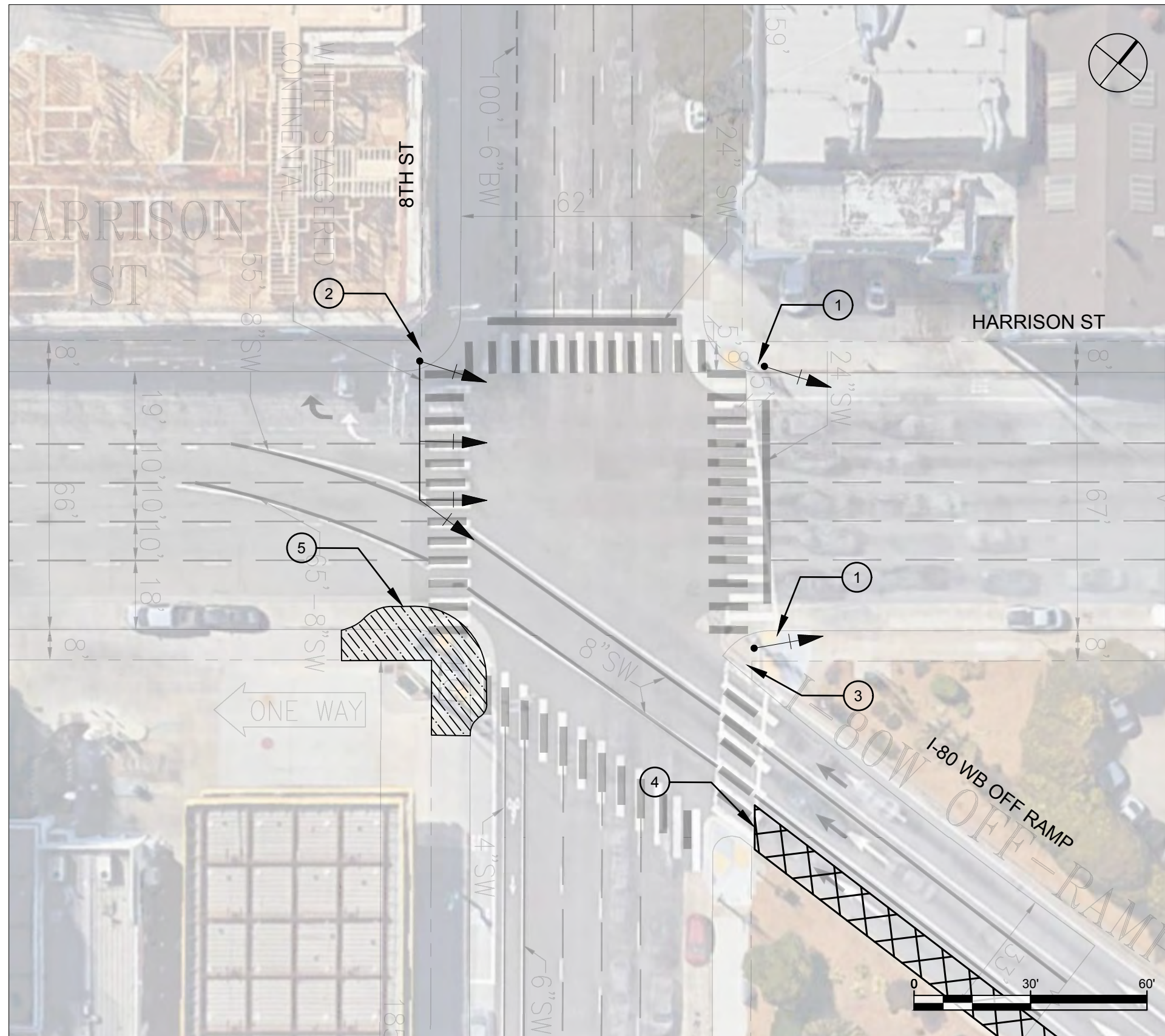
**IMPROVEMENT CONCEPTS::**

- ① INSTALL NEARSIDE TRAFFIC SIGNAL
- ② INSTALL FARSIDE TRAFFIC SIGNAL. CONSIDER PROVISION OF PROTECTED PHASING.
- ③ INSTALL PEDESTRIAN BULB
- ④ UPGRADE 8" TRAFFIC SIGNAL HEADS TO 12"
- ⑤ INSTALL HIGH-VISIBILITY STAGGERED CROSSWALK MARKINGS AND STOP BARS
- ⑥ REFRESH PAVEMENT MARKINGS AND LANE DELINEATOR LINES
- ⑦ INSTALL CANTILEVERED OVERHEAD SIGN TO DESIGNATE LANE ASSIGNMENTS
- ⑧ CONSIDER TEMPORARY INSTALLATION OF BULB UNTIL 5TH STREET STREETScape PROJECT PLANNING IS FINALIZED
- ⑨ CONSIDER POTENTIAL FUTURE BIKE NETWORK IMPROVEMENTS ON 5TH STREET DURING NEXT STAGE OF DESIGN

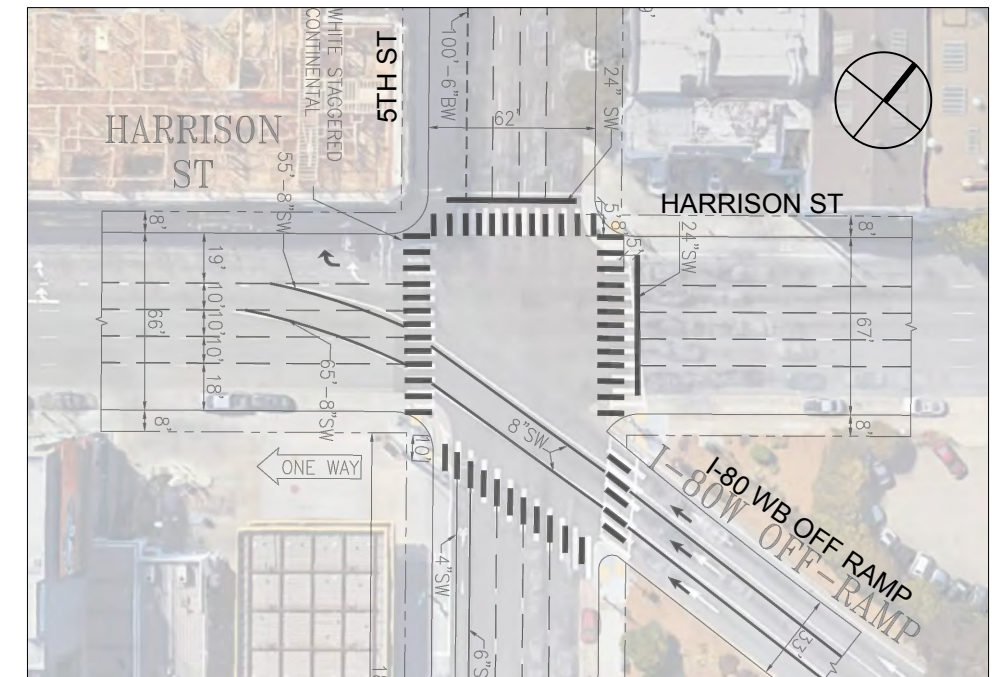
\*ALL PHYSICAL IMPROVEMENTS WILL REQUIRE CALTRANS APPROVAL

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Proposed Project Completion Timeline	Proposed Implementation and Next Steps	Draft Planning Cost Estimate
<b>Signal Improvements</b>							
1	SW corner (EB Bryant approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	3 - 5 Years	Funding and design for intersection signal upgrade.	<b>\$40,000</b>
2	East corner (SB 5th St approach)	Signal upgrade - far side traffic signal	Improve signal visibility	Rear end and left turn			
4	NW, NE and SW corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone			
7	EB Bryant approach	Install cantilevered wayfinding sign	Improve vehicular wayfinding for proper lane assignments	Sideswipes	1 - 3 Years	Outreach, planning, funding, and design.	<b>\$30,000</b>
<b>Civil Improvements</b>							
3	NE, SW and East corners	Install corner bulb-out	Shorten pedestrian crossing distance	Pedestrian crash in crosswalk	3 - 5 Years	Coordination with other civil projects. Design and funding.	<b>\$300,000</b>
<b>Signing / Striping Improvements</b>							
5	All crosswalks	Upgrade crosswalk to high-visibility type	Reduce instances of crosswalk blocking	Pedestrian crash in crosswalk	1 - 3 Years	Funding and design.	<b>\$15,000</b>
5	EB Bryant & NB 5th St approaches	Install advance stop bar	Reduce instances of crosswalk blocking	Pedestrian crash in crosswalk			
6	Entire intersection	Refresh pavement striping and markings	Maintenance	All types			
8	SW corner	Install temporary bulb-out	Encourage slower vehicular turning	Pedestrian crash in crosswalk			
<b>Other Improvements</b>							
9	Entire intersection	Install bicycle network improvements	Improve bicycle access	All types	3 - 5 Years	Complete 5th Street corridor planning. Funding and design.	<b>TBD</b>
Subtotal							<b>\$385,000</b>
Planning & Outreach (5%)							<b>\$20,000</b>
Design (15%)							<b>\$57,750</b>
30% Contingency							<b>\$138,825</b>
Total							<b>\$601,575</b>

**BRYANT STREET / 5TH STREET**



HARRISON STREET / 8TH STREET



EXISTING CONDITIONS

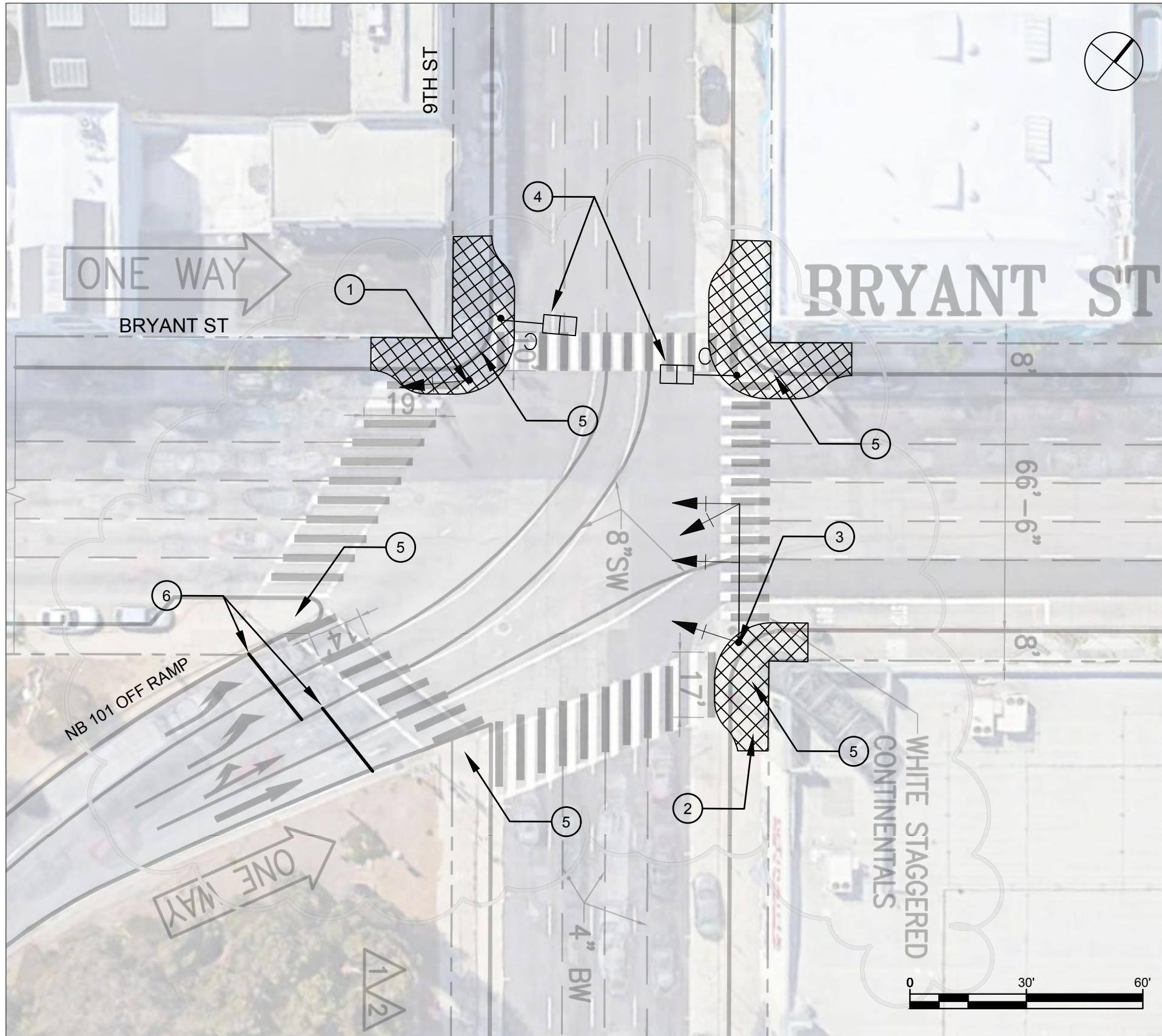
**IMPROVEMENT CONCEPTS:**

- ① INSTALL NEARSIDE TRAFFIC SIGNAL
- ② INSTALL TRAFFIC SIGNAL MAST ARM POLE
- ③ UPGRADE 8" TRAFFIC SIGNAL HEADS TO 12"
- ④ CONSIDER OFF-RAMP STRIPING CHANGE  
PENDING ON ADDITIONAL TRAFFIC ANALYSIS AND  
CALTRANS REVIEW
- ⑤ CONSIDER POTENTIAL INSTALLATION OF A  
PEDESTRIAN BULB PENDING OFF-RAMP STRIPING  
CHANGE

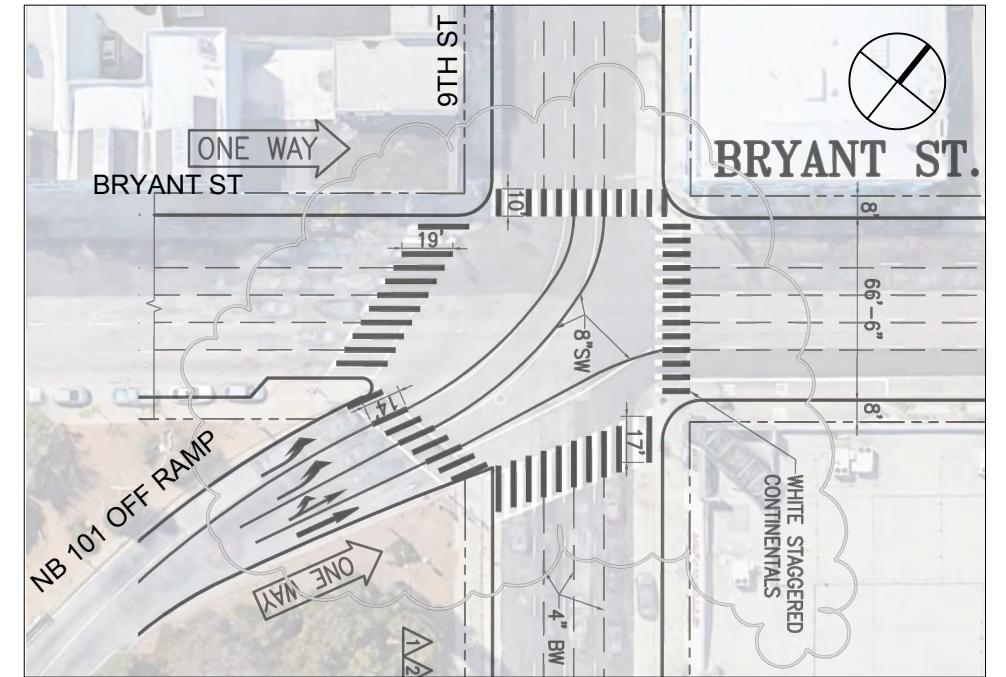
\*ALL PHYSICAL IMPROVEMENTS WILL REQUIRE CALTRANS APPROVAL

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Proposed Project Completion Timeline	Proposed Implementation and Next Steps	Draft Planning Cost Estimate
<b>Signal Improvements</b>							
1	NE & SE corners (EB Harrison approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	3 - 5 Years	Funding and design for intersection signal upgrade.	<b>\$375,000</b>
2	NW corner (WB Harrison approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone			
3	SE corner (WB I-80 off-ramp approach)	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone			
<b>Civil Improvements</b>							
5	SW corner	Install corner bulb-out	Shorten pedestrian crossing distance	Ped crash in Xwalk	3 - 5 Years	Coordination with westbound I-80 offramp project (#4)	<b>\$100,000</b>
<b>Other Improvements</b>							
4	WB I-80 off-ramp approach	Consider lane striping change to eliminate one off-ramp lane	Calm traffic from off-ramp approach	All types	3 - 5 Years	Planning, analysis and coordination with Caltrans D4. Funding and design.	<b>\$20,000</b>
Subtotal							<b>\$495,000</b>
Planning & Outreach (5%)							<b>\$25,000</b>
Design (15%)							<b>\$74,250</b>
30% Contingency							<b>\$178,275</b>
Total							<b>\$772,525</b>

HARRISON STREET / 8TH STREET



BRYANT STREET / 9TH STREET



EXISTING CONDITIONS

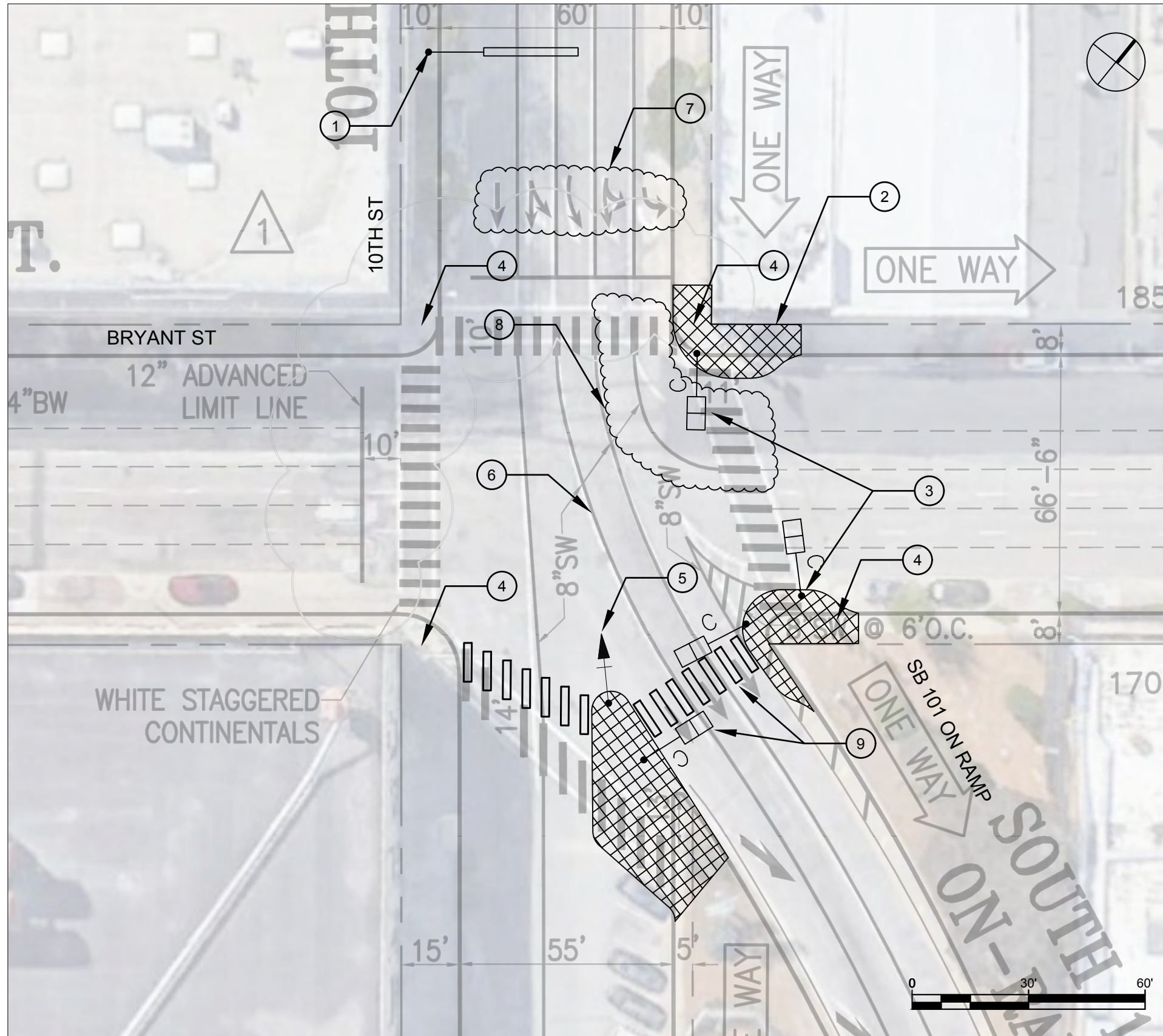
**IMPROVEMENT CONCEPTS:**

- ① INSTALL NEARSIDE TRAFFIC SIGNAL
- ② INSTALL PEDESTRIAN BULB
- ③ INSTALL TRAFFIC SIGNAL MAST ARM POLE
- ④ PROVIDE LEADING PEDESTRIAN INTERVAL PHASING
- ⑤ UPGRADE 8" TRAFFIC SIGNAL HEADS TO 12"
- ⑥ INSTALL STOP BAR

\*ALL PHYSICAL IMPROVEMENTS WILL REQUIRE CALTRANS APPROVAL

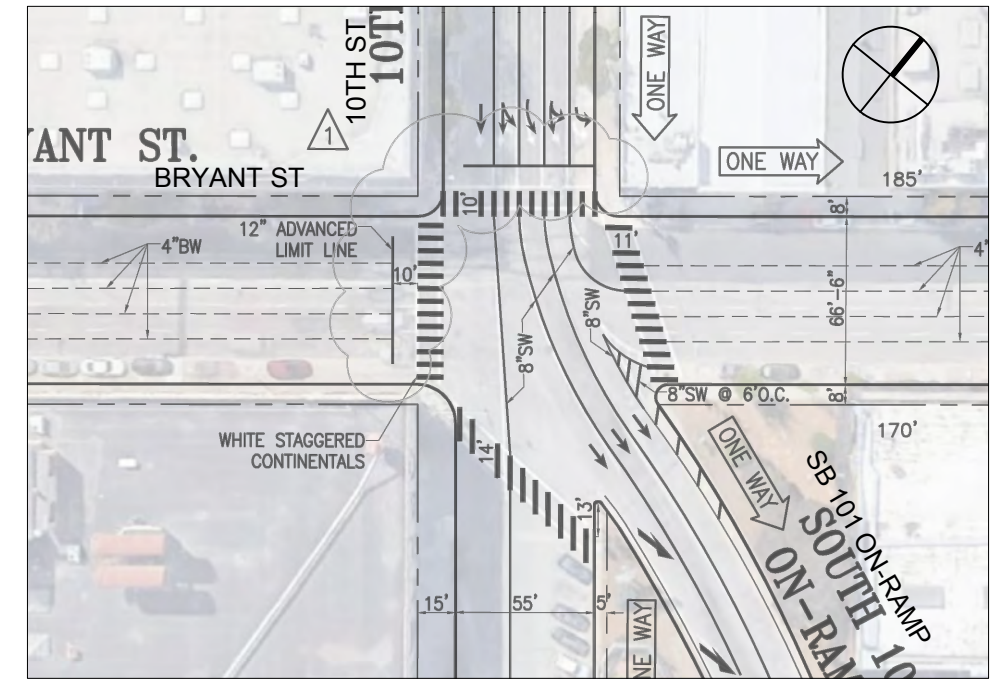
#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Proposed Project Completion Timeline	Proposed Implementation and Next Steps	Draft Planning Cost Estimate
<b>Signal Improvements</b>							
1	NW corner (EB Bryant approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	3 - 5 Years	Funding and design for intersection signal upgrade.	<b>\$375,000</b>
3	SE corner (EB Bryant approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone			
5	All corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone			
	Entire Intersection	Improve street lighting	Improve overall visibility at intersection	All types	Within 1 Year	Re-time signal.	<b>\$5,000</b>
4	NW & NE corners (SB 9th St approach)	Program a leading pedestrian interval	Improve pedestrian visibility in intersection	Pedestrian crash in crosswalk			
<b>Civil Improvements</b>							
2	SE, NE and NW corners	Install corner bulb-out	Shorten pedestrian Xing distance	Pedestrian crash in crosswalk	3 - 5 Years	Coordination with other civil projects. Design and funding.	<b>\$300,000</b>
<b>Signing / Striping Improvements</b>							
6	NB 101 off-ramp approach	Install advance stop bar	Reduce instances of crosswalk blocking	Pedestrian crash in crosswalk	1 - 3 Years	Funding and design.	<b>\$5,000</b>
						Subtotal	<b>\$685,000</b>
						Planning & Outreach (5%)	<b>\$35,000</b>
						Design (15%)	<b>\$103,000</b>
						30% Contingency	<b>\$246,900</b>
						Total	<b>\$1,069,900</b>

## BRYANT STREET / 9TH STREET



## BRYANT STREET / 10TH STREET

*\*All physical improvements will require Caltrans approval*



EXISTING CONDITIONS

### IMPROVEMENT CONCEPTS::

- ① INSTALL CANTILEVERED OVERHEAD SIGN TO DESIGNATE LANE ASSIGNMENTS
- ② INSTALL PEDESTRIAN BULB
- ③ PROVIDE LEADING PEDESTRIAN INTERVAL PHASE
- ④ UPGRADE 8" TRAFFIC SIGNAL HEADS TO 12"
- ⑤ INSTALL FARSIDE TRAFFIC SIGNAL
- ⑥ REFRESH PAVEMENT MARKINGS AND LANE DELINEATOR LINES
- ⑦ CONSIDER ALTERNATIVE LANE ARRANGEMENTS (E.G., TOW-AWAY LANE CLOSURE, TWO-STAGE BIKE BOX)
- ⑧ CONSIDER RESTRIPING CHANNELIZING LINES
- ⑨ INSTALL HIGH-VISIBILITY STAGGERED CROSSWALK MARKINGS AND NEW PEDESTRIAN SIGNALS

\*ALL PHYSICAL IMPROVEMENTS WILL REQUIRE CALTRANS APPROVAL



#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Proposed Project Completion Timeline	Proposed Implementation and Next Steps	Draft Planning Cost Estimate
<b>Signal Improvements</b>							
5	South corner (SB 10th St approach)	Signal upgrade - far side traffic signal	Improve signal visibility	Rear end and T-bone	3 - 5 Years	Funding and design for intersection signal upgrade.	\$22,000
4	All corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone			
3	NE and SE corners (Xing Bryant East leg)	Program a leading ped interval	Improve ped visibility in intersection	Ped crash in Xwalk	Within 1 Year	Re-time signal.	\$5,000
1	SB 10th St approach	Install cantilevered wayfinding sign	Improve vehicular wayfinding for proper lane assignments	Vehicular right-turn	1 - 3 Years	Outreach, planning, funding and design.	\$30,000
<b>Civil Improvements</b>							
2	NE, SE and South corners	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	3 - 5 Years	Coordination with other civil projects. Design and funding.	\$300,000
	Entire Intersection	Improve street lighting	Improve overall visibility at intersection	All types			
9	SE and South corners (crossing SB 101 on-ramp)	Install new ped Xing	Improve ped access	N/A			
<b>Signing / Striping Improvements</b>							
6	Entire intersection	Refresh pavement striping and markings	Maintenance	Vehicular right-turn	1 - 3 Years	Funding and design.	\$20,000
8	Entire intersection	Restripe channelizing lines	Maintenance	Vehicular right-turn		Analysis, funding and design.	
7	SB 10th St approach	Consider alternative lane arrangements	Reduce driver confusion at intersection	Vehicular right-turn			
						Subtotal	\$377,000
						Planning & Outreach (5%)	\$19,000
						Design (15%)	\$56,550
						30% Contingency	\$135,765
						Total	\$588,315

BRYANT STREET / 10TH STREET

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**[www.sfcta.org/NTIP-vision-zero-ramp-intersection-study](http://www.sfcta.org/NTIP-vision-zero-ramp-intersection-study)**

Appendix D:  
Existing  
Conditions  
Report

# PHASE I VISION ZERO RAMP INTERSECTION IMPROVEMENT STUDY

Existing Conditions Report Final



AUGUST 2016



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# EXISTING CONDITIONS REPORT

## 1. Executive Summary

### 1.1 | Introduction

The Vision Zero Ramp Intersection Study seeks to improve safety for all road users in the South of Market, especially the most vulnerable populations, to support progress towards the city's Vision Zero goal. This report summarizes existing conditions for the five study intersections, which are the focus of the first phase of work. It includes information on land use development and planned projects in the study area; conditions for bicycling, walking, transit, and an analysis of collisions at each of the study intersections.

**Figure 1 Study Intersections - Collisions; Land Use Context; Traffic Conditions**

TOTAL INJURY COLLISIONS 2011-2015 <sup>1</sup>	TOP COLLISION TYPES	EST. EXPECTED NEW RESIDENTS, EMPLOYEES WITHIN ¼ MILE <sup>2</sup>	OTHER NOTES
<b>8th and Harrison off ramp</b>			
9	Mix of collision types; none dominant	1500	
<b>10th and Bryant on ramp</b>			
17	Most involve vehicles traveling southbound on 10th and turning left onto the freeway or Bryant Streets and colliding with one another while turning.	1,400	Severe P.M. peak traffic congestion on this ramp
<b>5th and Bryant on ramp</b>			
16	Most involve vehicles turning left from 5th onto Bryant colliding with through traffic on 5th Street, and red light running -related collisions resulting in broadside, or "t-bone" type crashes. High share of bicycle-involved collisions.	12,200	Severe P.M. peak traffic congestion on this ramp
<b>5th and Harrison off ramp</b>			
20	Most involve vehicles turning left from 5th onto Harrison and colliding vehicles or bicyclists travelling southbound on 5th Street. Three fatal collisions (involving four fatalities) also occurred at this intersection, all located on the off-ramp. High share of bicyclist-involved and nighttime collisions.	11,200	Ramp has a tight curve at the end.
<b>9th and Bryant off ramp</b>			
10	Most involve vehicles failing to yield to pedestrians in the northern crosswalk on 9th Street, or vehicles being rear-ended on eastbound Bryant.	1,100	

1 - Source: State Integrated Traffic Records System for data 2011-2013; data from 2013-2015 comes from the San Francisco Police Departments Crossroads database, which does not include California Highway Patrol reported collisions that occur on state facilities, with the exception of fatalities which are tracked by the San Francisco Department of Public Health. The dataset is missing any non-fatal CHP-reported collisions 2011-2013.

2 - San Francisco Development Pipeline 2016 Quarter 1, San Francisco Transportation Sustainability Fee (Tsf) Nexus Study.



Figure 2 summarizes the characteristics of the study streets, including whether they make up part of the city’s modal priority network or high injury corridor, and whether they have been identified for capital project improvement.

**Figure 2 Study Streets - Multimodal Network Designation & Planned Capital Projects**

STUDY STREET NAME	MODAL NETWORKS & HIGH INJURY CORRIDORS <sup>4</sup>	POTENTIAL OR PLANNED CAPITAL PROJECTS
Harrison Street	Priority street for transit (other primary), streetscape (between 4 <sup>th</sup> & 6 <sup>th</sup> ); vehicle high injury corridor	Project to implement Central SoMa Plan recommendations (e.g. reconfiguration to add transit only lane, widened sidewalks) [start expected 2016] <sup>1,2</sup> 27-Bryant: Tenderloin Transit Reliability Enhancements- install up to ten transit bulbs along the route at approximately 20 intersections [start expected fall 2016].
Bryant Street	Priority street for transit (other primary), streetscape (between 4 <sup>th</sup> & 6 <sup>th</sup> )	Project to implement Central SoMa Plan recommendations (e.g. reconfiguration to add transit only lane, widened sidewalks) [start expected 2016] <sup>1,2</sup>
5 <sup>th</sup> Street	Priority street for transit (other primary), bicycle; bicycle high injury corridor	5 <sup>th</sup> Street Bicycle Project [start expected 2016]. <sup>2</sup>
8 <sup>th</sup> Street	Priority street for transit (other primary), bicycle	7 <sup>th</sup> /8 <sup>th</sup> Street Streetscape Project/Vision Zero Priority Project <sup>2,3</sup> - design expected by fall 2017. Safety measures to include design of buffered and/or protected bike lanes, concrete boarding islands, sidewalk bulbs, and traffic signal modifications.

1 - Source: Central SoMa Plan. SFMTA’s 2017-2021 Capital Plan also identifies a project to implement the recommendations of the Central SoMa Plan. Project start expected in 2016.

2 - SFMTA 2017-2021 Capital Improvement Program.

3 - Vision Zero Priority Project list.

4- Source: SFMTA March 2016- Multimodal Hierarchy Draft Policy Memorandum, transbasesf.org

## 2. Introduction

### 2.1 | Background

The Vision Zero Ramp Intersection Study seeks to improve safety for all road users in the South of Market, especially the most vulnerable populations, to support progress towards the city's Vision Zero goal. Ramp intersections are the study focus because they have higher than average concentrations of traffic injuries and fatalities. Addressing safety issues at ramp intersections requires a unique approach due to the need to coordinate between the state highway agencies that own and operate the freeway ramps and the city agencies that manage city streets.

The Study is proceeding in two phases, with the first phase focusing developing short-term safety improvements for up to five intersections within the South of Market Youth and Family Special Use District (SUD), an area characterized by high concentrations of senior centers, single-room occupancy hotels, and schools. The second phase will look at up to ten intersections throughout the entire South of Market area. This document presents existing conditions at the Phase I study intersections, focusing on analysis of traffic collisions. The study intersections are:

- I-80 Eastbound on-ramp from 5<sup>th</sup> and Bryant Streets
- I-80 Westbound off-ramp to 5<sup>th</sup> and Harrison Streets
- I-80 Westbound off-ramp to 8<sup>th</sup> & Harrison Streets
- US 101 Northbound off-ramp to 9<sup>th</sup> & Bryant Streets
- US 101 Southbound on-ramp from 10<sup>th</sup> & Bryant Streets

The study team selected these intersections based on the frequency of traffic injuries and fatalities and other considerations – see study Memorandum 1 for detail (available on request).

### 2.2 | Report organization

This report is organized as follows:

- Chapter 3 describes the land use context around the study intersections, including the amount of new development expected.
- Chapter 4 describes the transit, bicycle, pedestrian and vehicular traffic networks in the study area.
- Chapter 5 describes previous planning work and capital projects relevant to the study area.
- Chapter 6 provides a detailed analysis of previous collisions at each of the study intersections.

### 3. Land use context

The South of Market (SoMa) is characterized by a grid of wide, multi-lane arterial streets and a mix of residential, light industrial and office land uses. It is San Francisco's fastest-growing neighborhood, and is programmed to receive almost 20,000 new residents and 50,000 new jobs by 2040<sup>1</sup> – more than any other San Francisco priority development area, and together representing 20 percent of all growth in San Francisco by 2040. This growth could increase the number of traffic collisions occurring in SoMa and at ramp intersections. Figure 3 provides an estimate of the new employees and residents expected within a quarter mile of each of the study intersections, according to data from the SF Planning Department's development pipeline,<sup>2</sup> and shows that the number of new residents/employees expected is far greater around the intersections of 5<sup>th</sup> and Bryant and 5<sup>th</sup> and Harrison than other study intersections.

**Figure 3 Development Pipeline - Estimated New Residents and Employees within ¼ Mile of Study Intersection**

Intersection	Residential Units in 1/4 mile	Est. new residents	Commercial Sq. Ft. in 1/4 mile	Est. new employees	Total est. residents and employees
8th Street and Harrison Street	578	1,341	30,031	132	1,473
10th Street and Bryant Street	546	1,267	41,989	129	1,396
5th Street and Bryant Street	345	800	2,781,571	11,394	12,194
5th Street and Harrison Street	235	545	2,917,416	10,665	11,210
9th Street and Bryant Street	448	1,039	26,961	91	1,130

Source: San Francisco Transportation Sustainability Fee (Tsf) Nexus Study, San Francisco Development Pipeline 2016 Quarter 1.

Table A-4: Service Population, Building Space, and Trip Generation Rates:

Sq.ft per employee: 498

Avg. residents per unit: 2.32

<sup>1</sup> Source: San Francisco Planning Department, 2014.

<sup>2</sup> Source: 2016 Q1 Development Pipeline Report – San Francisco Planning Department. The pipeline includes only those projects with a land use or building permit application. It does not include projects undergoing preliminary Planning Department project review or projections based on area plan analysis. Projects vary in size from single units to larger multi-year development programs undergoing environmental review.

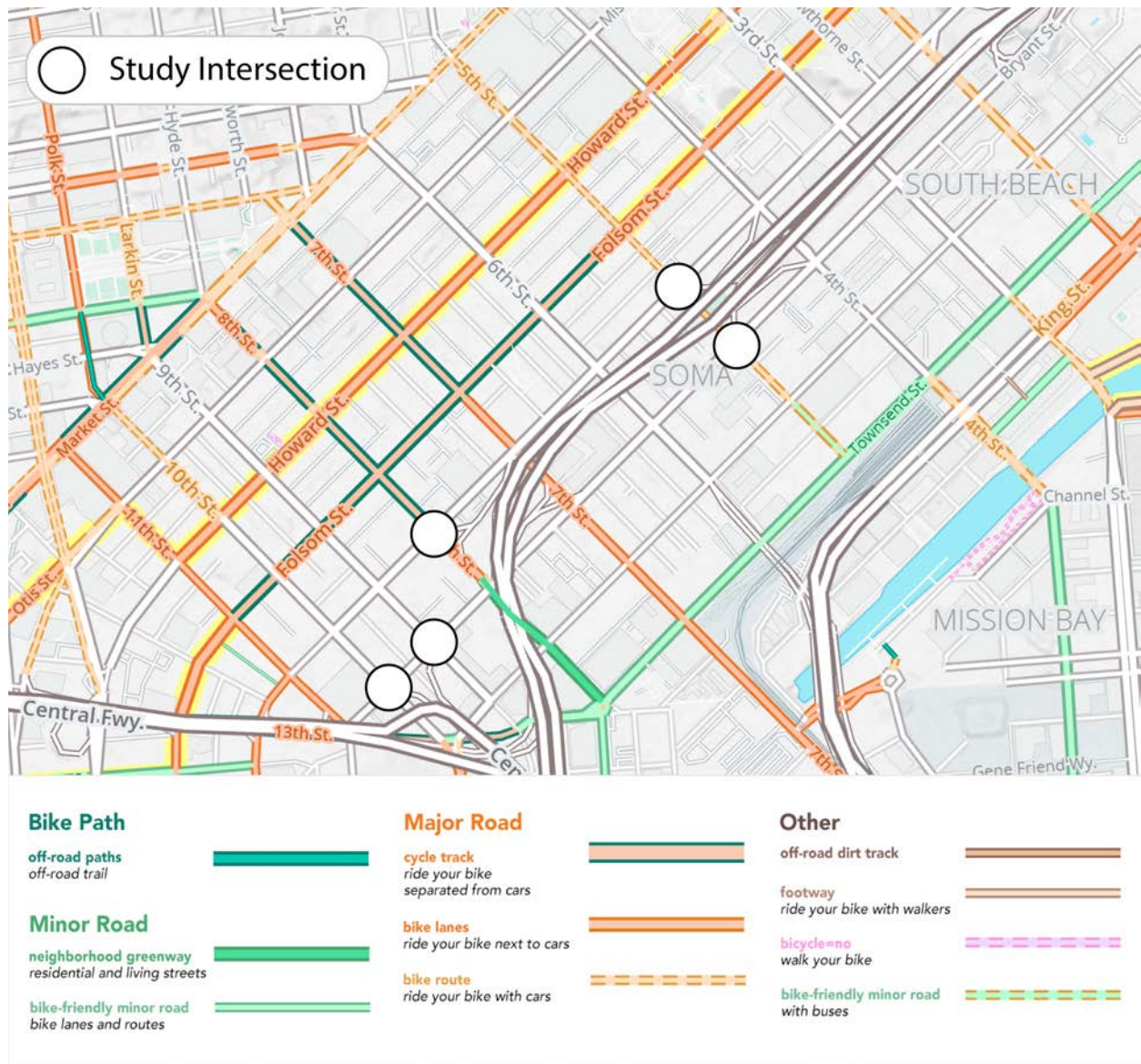
## 4. Bicycle, Pedestrian, Transit, and Traffic Conditions

This chapter discusses conditions for bicycle, pedestrian, transit, and automobile traffic within the study area and on the study streets in particular.

### 4.1 | Bicycle

Figure 4 illustrates bicycle routes in the study area along with the infrastructure currently available on each. A mix of buffered and Class II bike lanes exist along Howard, Folsom, 7<sup>th</sup>, and 8<sup>th</sup> Streets. 5<sup>th</sup> Street has greenbacked sharrows only.

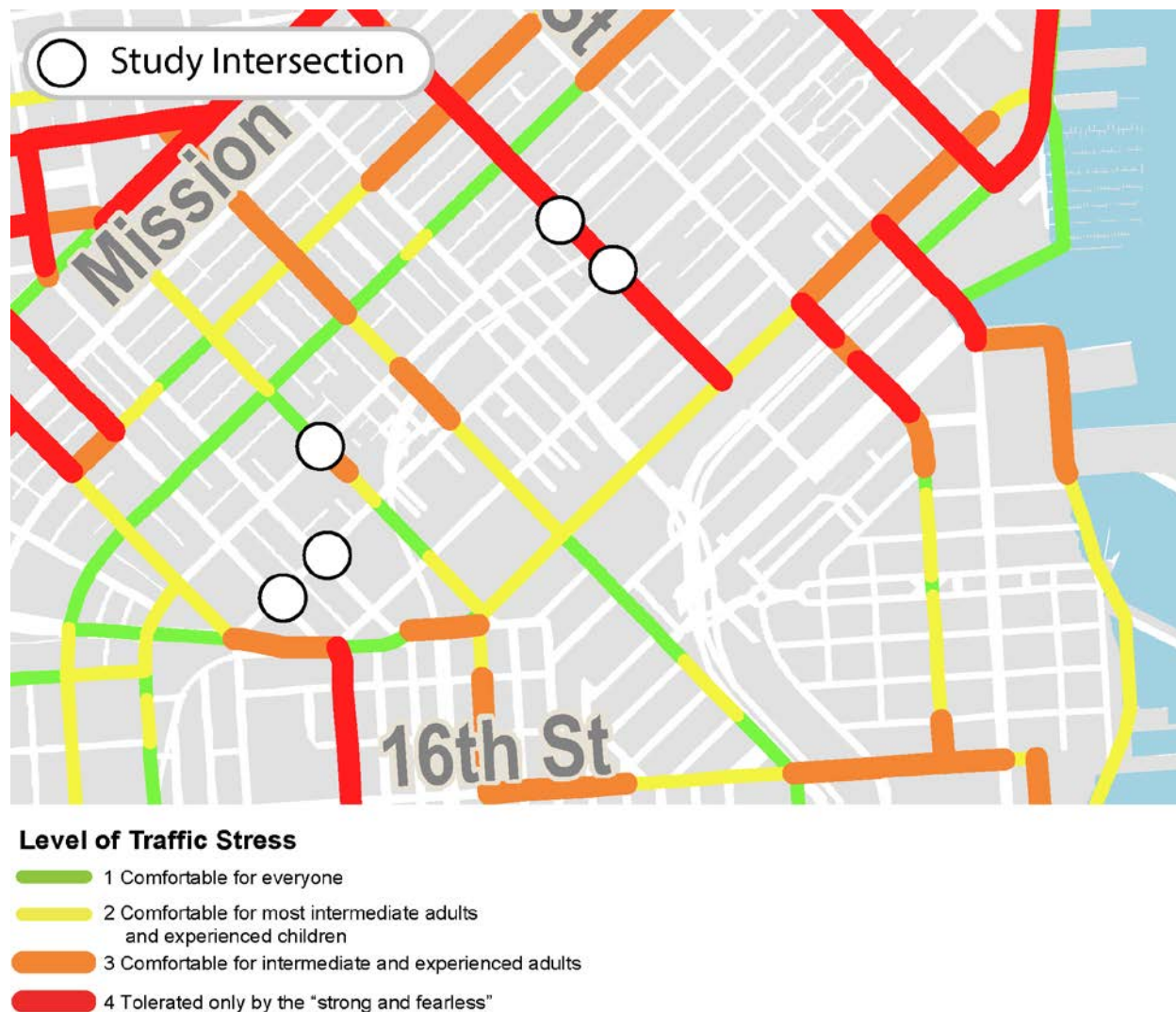
Figure 4 Bicycle Network Map



Source: Mapzen, Leaflet, OpenStreetMap, OpenStreetMap contributors, and San Francisco Municipal Transportation Agency

Figure 5 shows the results of SFMTA’s 2013 study of “Level of Traffic Stress” for bicyclists, and illustrates that most of the bicycle routes in the study area are very stressful for most bicyclists, especially when compared to other parts of the city. 5<sup>th</sup> Street, which is also a Vision Zero high injury corridor for bicyclists, is rated LTS 4, or “tolerated only by the strong and fearless.” 5<sup>th</sup> and 8<sup>th</sup> Streets are also part of the “Primary” bicycle network<sup>3</sup>, and will be prioritized for safety improvements in conjunction with other transportation and development projects.

Figure 5 Level of Traffic Stress



#### 4.2 | Pedestrian

All of the study intersections have poor pedestrian conditions and are in need of improvements. San Francisco’s 2017 High Injury Network (HIN) – compiled using the San Francisco Department of Public Health’s (SFDPH) Transportation Injury Surveillance System (TISS), which compiles data from San Francisco General Hospital medical records and San Francisco Police Department (SFPD) incident

<sup>3</sup> According to the SFMTA March 2016- Multimodal Hierarchy Draft Policy memorandum, bicycle routes that are connected to areas with high Demand Index and Hilly Score are designated as Primary Routes, transbasesf.org

reports – shows that all five intersections are along at least one HIN corridor. At the 5<sup>th</sup> and Harrison, 9<sup>th</sup> and Bryant, and 10<sup>th</sup> and Bryant intersections, both streets are included in the 2017 HIN, whereas the 5<sup>th</sup> and Bryant and 8<sup>th</sup> and Harrison intersections consist of only one HIN street (5<sup>th</sup> Street and Harrison Street, respectively).

Issues affecting pedestrian access and comfort at multiple study intersections include:

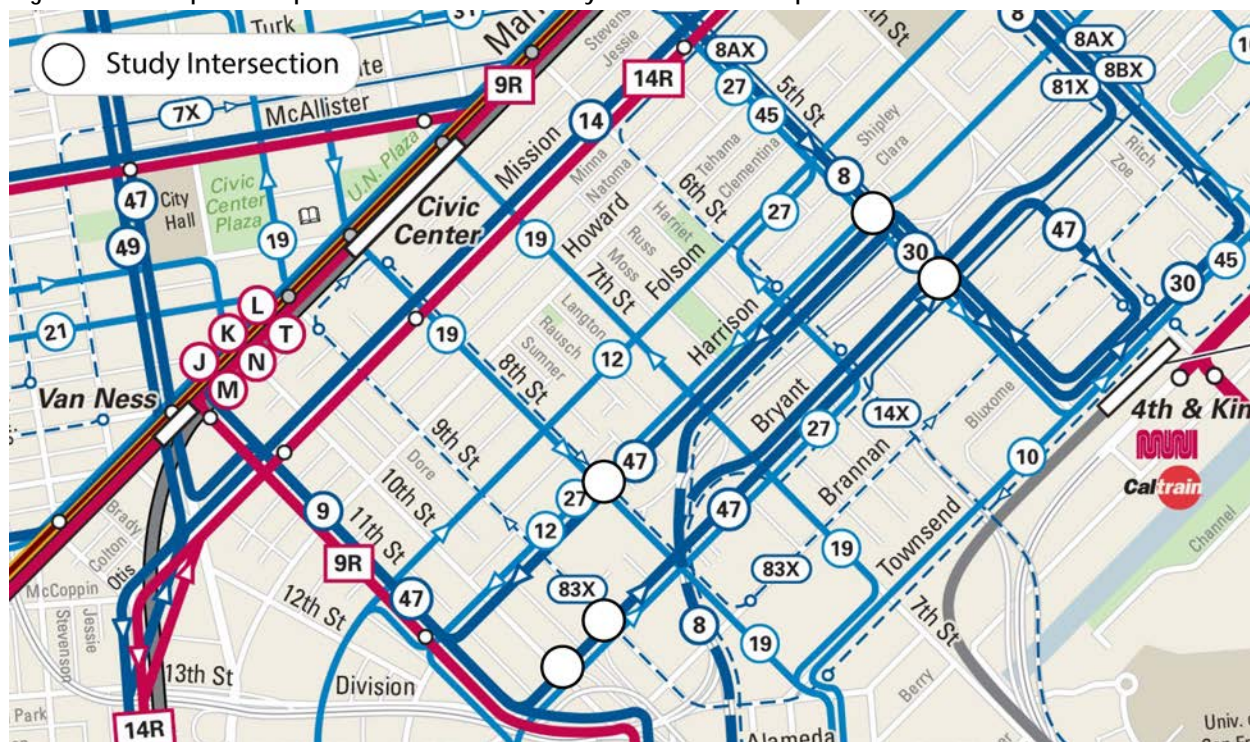
- Wide streets with high vehicle volumes and travel speeds;
- Long pedestrian crossing distances;
- Narrow sidewalks;
- Two closed crosswalks: one at Harrison Street and 5<sup>th</sup> Street and another at Bryant Street and 10<sup>th</sup> Street; and
- Vehicles queuing at freeway on-ramps frequently block crosswalks.
- 

The Planning Department’s draft Central SoMa Plan (revised version published 2016, final pending) recommends improvements to similarly narrow sidewalks in its plan area (which includes the two of this study’s intersections along 5<sup>th</sup> Street), including widening them to a minimum of 12 feet. The draft Plan calls for several new midblock crossings on Harrison and Bryant Streets between 2<sup>nd</sup> Street and 6<sup>th</sup> Street, as well as opening a previously closed crosswalk at 5<sup>th</sup> Street and Harrison Street.

### 4.3 | Transit

Currently, 10 Muni routes serve the study area, of which the 8, 8AX, 30, and 47, all have service headways of less than 10 minutes during the day on weekdays. These frequent routes travel along 5<sup>th</sup> Street and/or Harrison and Bryant streets through the study intersections. 8<sup>th</sup> Street and 9<sup>th</sup> Street serve less-frequent transit routes through study intersections. Figure 6 shows Muni service in and around the study intersections.

Figure 6: Municipal Transportation Services at Study Intersection Ramps



Source: Muni bus routes and stops, <https://www.sfmta.com/getting-around/transit/routes-stops>

#### 4.4 | Automobile traffic

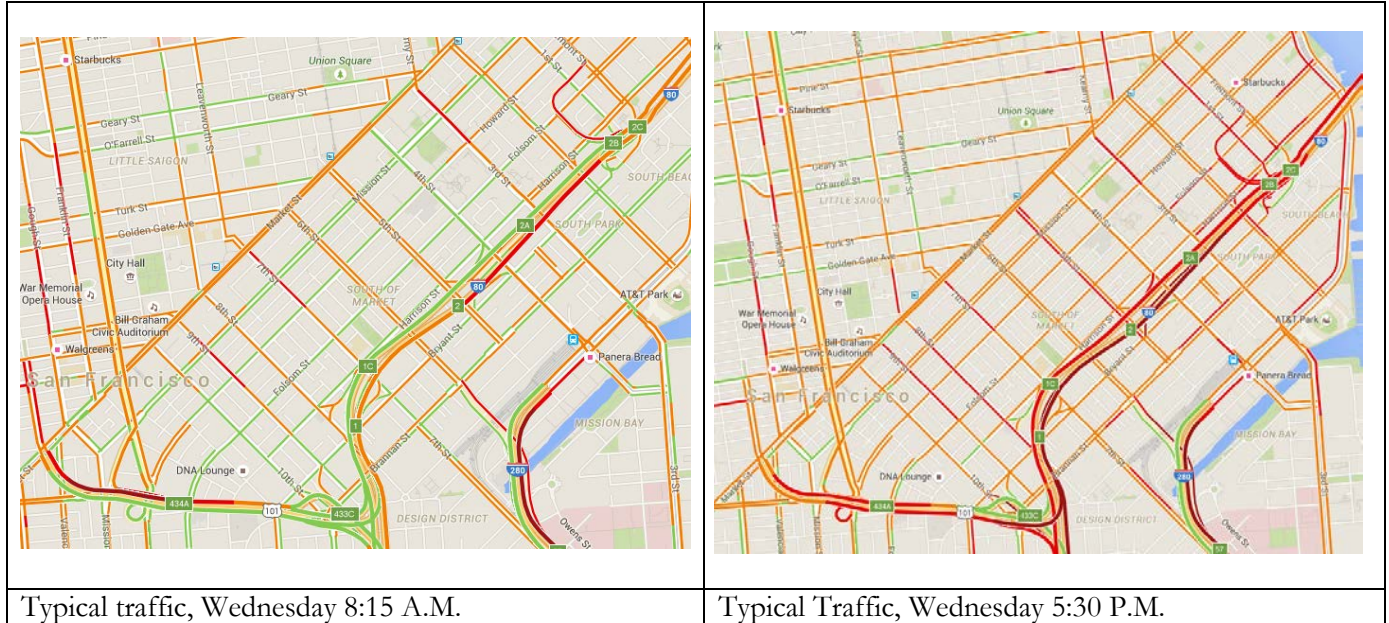
SoMa's roadway network includes the elevated I-80, I-280, and US-101 freeways above a grid of arterial streets and local streets all with 25 m.p.h. speed limits. Many of the arterials are one-way, multi-lane (typically 4-5 lane) streets designed primarily to accommodate large flows of vehicular traffic. Each study intersection has five legs, four to serve the grid of city streets and an additional on- or off-ramp leg. Many of the approach legs have multiple lanes serving one or more turning movements, with some lanes requiring turns while others allow optional turning movements, resulting in complicated traffic patterns.

To obtain a general picture of traffic congestion levels, the project team reviewed SoMa streets with Google Maps' Typical Traffic feature, which collects speed and location data from users' mobile phones to create an index for vehicle speeds on any given road. Figure 7 illustrates traffic conditions during the AM peak (7am – 9am) and PM peak (4pm-6pm) periods in SoMa (ranging from green for uncongested and dark red for slow/congested). On freeways, traffic is relatively free-flowing on westbound I-80, southbound I-280, and southbound US-101 during the morning commute as indicated by Typical Traffic's green to orange rating. However, northbound U.S. 101 is congested on the Central Freeway and eastbound I-80 experiences moderate to high congestion, especially between 5<sup>th</sup> Street and 7<sup>th</sup> Street approaching the Bay Bridge. Traffic congestion in the PM peak period is significantly worse than in the morning throughout the SoMa freeway network, particularly on eastbound I-80. Congestion begins on both I-80 E and US-101 N as early as 1:30pm.

Typical Traffic indicates that congestion on the street network exhibits similar patterns, with morning congestion primarily on northbound streets in the one or two blocks approaching Market Street, while the PM peak has more widespread congestion across the SoMa street network. PM peak congestion is especially high on streets approaching freeway on-ramps. Freeway congestion, especially during the PM

peak, frequently results in on-ramp queues spilling back across study intersections to upstream blocks. Both the study team and community stakeholders frequently observed these queues resulting in blocked crosswalks and intersections.

Figure 7 Typical traffic in the SoMa- AM and PM Peak



Source: Google maps, typical traffic conditions, accessed June 2016.

Figure 8 illustrates how congestion affects ramps at the study intersections. The I-80 eastbound on-ramp from 5<sup>th</sup> and Bryant streets and the US-101 southbound on-ramp from 10<sup>th</sup> and Bryant streets experience the most severe traffic congestion during the PM peak period, while the remaining ramps have moderate traffic congestion throughout the day.

Figure 8 Typical traffic conditions on study intersection ramps

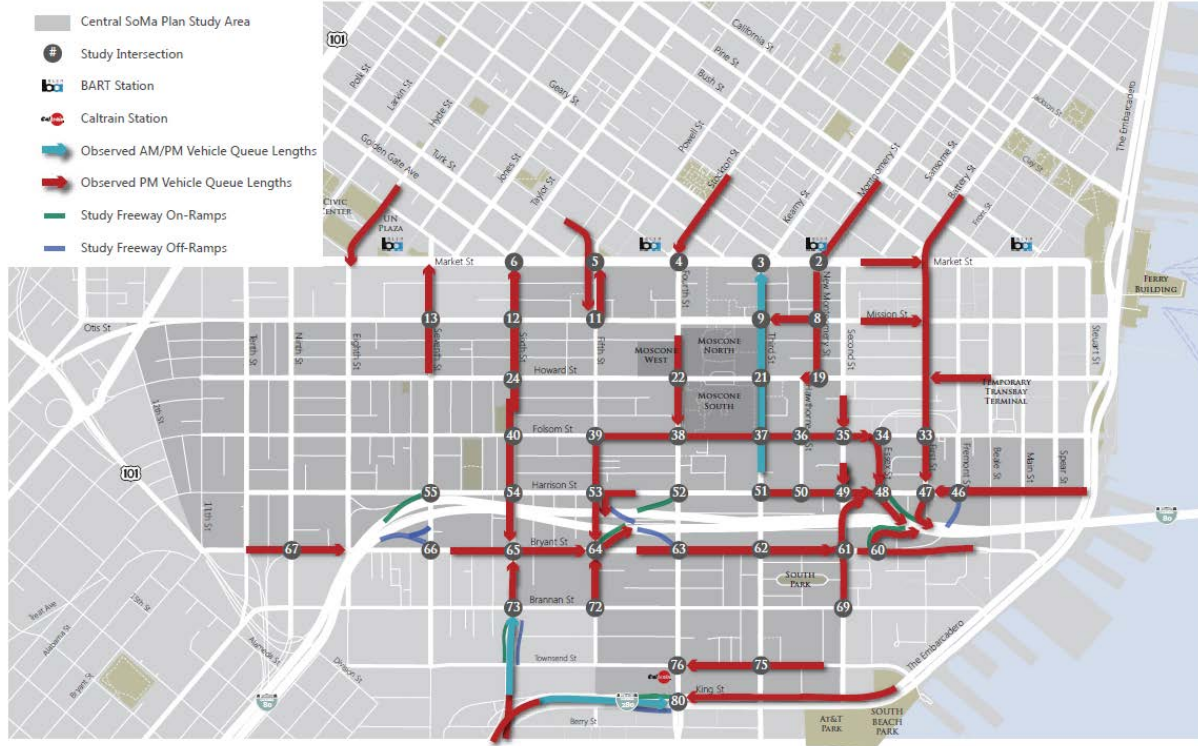
Traffic conditions on study ramps	AM Peak (7-9am)	Off-peak (12-2pm)	PM Peak (4-6pm)
I-80 WB off-ramp to 5th/Harrison Streets	Orange	Orange	Orange
I-80 EB on-ramp from 5th/Bryant Streets	Green	Green	Dark Red
US-101 SB on-ramp from 10th/Bryant Streets	Green	Red	Dark Red
US-101 NB off-ramp to 9th/Bryant Streets	Orange	Orange	Orange
I-80 WB off-ramp at 8th Street	Orange	Orange	Orange

Fast ■ ■ ■ ■ Slow

Source: Google maps, "Typical Traffic Conditions," 2016



Figure 9 Observed AM and PM period vehicle queues



**FEHR PEERS**

SF12-0658 Central Corridor EIR/Graphics

OBSERVED AM AND PM PEAK PERIOD VEHICLE QUEUES

FIGURE 63

Figure 9 shows the observed vehicle queue during AM and PM peak hour in SoMa. This figure is developed for Central SoMa EIR in which the SF Planning Department is proposing to rezone the area (southern portion of upcoming central subway transit line) to increase the allowable mixed-uses developments in SoMa. To estimate the existing traffic condition, the City collected 80 intersections traffic counts in April 2013. This queuing figure is generated from the collected traffic counts.

During PM peak hour, there is observed queue on north and south side of I-80 on/off ramp (5th Street and Bryant Street). The queue of I-80 on/off ramp would extend from 5th Street and Folsom Street to 5th Street and Brannan Street. The observed queue on I-80 westbound off ramp at 8th Street and Bryant Street would extend to 10th Street and Bryant Street. The study area does not include on/off ramps of US-101 at 10th Street/Bryant Street.

## 5. Multi-modal network & previous projects

### 5.1 | Overview

This chapter summarizes previous projects and planning efforts relevant to the study streets and study area. Figure 10 provides an overview summary for each of the study streets, including whether the street is included on a priority modal network (as discussed in the previous chapter), a Vision Zero high injury corridor, and whether any major capital projects are planned for the street. More detail on the projects is provided below.

**Figure 10 Study Streets - Multimodal Network Designation & Planned Capital Projects**

STUDY STREET NAME	MODAL NETWORKS	HIGH INJURY CORRIDORS	POTENTIAL OR PLANNED CAPITAL PROJECTS
Harrison Street	Transit (other primary), streetscape (between 4 <sup>th</sup> & 6 <sup>th</sup> ),	Vehicle	Project to implement Central SoMa Plan recommendations (e.g. reconfiguration to add transit only lane, widened sidewalks) [start expected 2016] <sup>1,2</sup> 27-Bryant: Tenderloin Transit Reliability Enhancements- install up to ten transit bulbs along the route at approximately 20 intersections [start expected fall 2016].
Bryant Street	Transit (other primary), streetscape (between 4 <sup>th</sup> & 6 <sup>th</sup> )		Project to implement Central SoMa Plan recommendations (e.g. reconfiguration to add transit only lane, widened sidewalks) [start expected 2016] <sup>1,2</sup> 27-Bryant: Tenderloin Transit Reliability Enhancements- install up to ten transit bulbs along the route at approximately 20 intersections [start expected fall 2016].
5 <sup>th</sup> Street	Transit (other primary), bicycle	Bicycle	5 <sup>th</sup> Street Bicycle Project [start expected 2016]. <sup>2</sup> 27-Bryant: Tenderloin Transit Reliability Enhancements- install up to ten transit bulbs along the route at approximately 20 intersections [start expected fall 2016].
8 <sup>th</sup> Street	Transit (other primary), bicycle		7 <sup>th</sup> /8 <sup>th</sup> Street Streetscape Project/Vision Zero Priority Project <sup>2,3</sup> - [design expected by fall 2017]. Safety measures to include design of buffered and/or protected bike lanes, concrete boarding islands, sidewalk bulbs, and traffic signal modifications.
9 <sup>th</sup> Street	Transit (secondary)	Pedestrian (between Market and Bryant Streets)	
10 <sup>th</sup> Street	N/A		

1 - Source: Central SoMa Plan. SFMTA's 2017-2021 Capital Plan also identifies a project to implement the recommendations of the Central SoMa Plan. Project start expected in 2016.

2 - SFMTA 2017-2021 Capital Improvement Program.

3 - Vision Zero Priority Project list.

### 5.2 | Summary of Relevant Planning Efforts and Major Capital Projects

We reviewed several sources, including the SFMTA 2017-2021 Capital Improvement Program, the SFMTA Vision Zero priority projects lists, the SF Public Works' Envista Database, the SFCTA's Web Site and mystreetSF project portal, and other sources to identify planning studies and capital projects relevant to the study area. These are summarized below:

## PLANNED OR POTENTIAL CAPITAL PROJECTS

- Central SoMa Plan & Plan Implementation Project.** The Central SoMa Plan, led by the San Francisco Planning Department, seeks to improve safety and livability along and around 4<sup>th</sup> St. between Townsend and Market streets in anticipation of projected job and population growth, and the arrival of the Central Subway. It recommends adding more signalized mid-block crossings on all major streets in the plan area and adding wider sidewalks and other upgrades to streets throughout the study area, including Harrison and Bryant Streets. It also recommended study of consolidating study certain on-ramps and off-ramps in the SoMa area and vicinity to improve pedestrian and bicycle safety, enhance transit performance, facilitate local vehicular access, and allow for improved land use and urban design treatments. The Central SoMa Draft Plan is expected to be completed in 2016. SFMTA's 2017-2024 Capital Improvement Program (CIP) includes a project to develop an implementation plan for transportation projects in the plan. Locations to be studied include 4th Street (Market Street to Harrison Street), 3rd Street (Market Street to Townsend Street), Harrison Street (2nd Street to 6th Street), Bryant Street (2nd Street to 6th Street), and Brannan Street (2nd Street to 6th Street). Potential projects may include road diets, parking modifications, sidewalk widening, midblock crossings, bike facilities, transit-only lanes, and other safety treatments and transportation enhancements.
- 5<sup>th</sup> Street bicycle strategy:** This project may include installing dedicated bicycle facilities in both directions on 5th Street between Mission and Townsend Streets. The project will upgrade the existing green-back sharrows with increased bicycle separation, which may include cycle tracks. The project could be ready for implementation with the completion of the Central Subway and the relocation of Muni service to 4th Street.
- 7<sup>th</sup> Street and 8<sup>th</sup> Street Streetscape project:** This project will implement bicycle and pedestrian improvements along 7th and 8th Street between Harrison Street and Market Street, aligned with the Eastern Neighborhoods Transportation Implementing Planning Study (ENTRIPS). The scope will include a concrete buffered bike lane, concrete boarding islands, potential alley traffic signals, sidewalk bulbs, new striping, traffic lane reduction, safe hit posts, and possibly a limited amount of paving. The project is expected to be initiated in 2016.
- NoMa/SoMa Signal Retiming & Upgrades:** This project will upgrade and retime up to 345 signalized intersections in the northeast quadrant of San Francisco, which includes 251 intersections in the North of Market (NoMa) neighborhood and 94 intersections in the South of Market (SoMa) neighborhood. This project will also replace aging controllers that are approaching the end of their service life cycles. Newer controllers will provide much-improved reliability and require less maintenance. This project will also allow the Agency to retire older controllers that are prone to “clock drift”, causing them to lose coordination with adjacent signals on the network, which typically leads to increased delays and congestion. The project is expected to begin in 2017.
- Bicycle and Pedestrian Spot Improvements.** Numerous bicycle and pedestrian safety spot improvements are underway or recently completed in the study area, including pedestrian countdown signals at multiple locations, spot improvements around Bessie Carmichael Elementary School, and green-backed sharrows on 5<sup>th</sup> Street.

## PLANNING STUDIES

- Eastern Neighborhoods Transportation Implementation Planning Study:** Led by SFMTA, the Eastern Neighborhoods Transportation Implementation Planning Study (EN TRIPS) begins

to implement the transportation vision established in the Eastern Neighborhoods area plans. Under the Folsom and Howard streets between 5th and 11th streets have been prioritized for analysis and investment because of expected residential and employment growth and community priority. These segments were identified as an area of need by participants in the EN TRIPS community workshops, Eastern Neighborhoods area plans process, and Western SoMa Community Task Force. This plan identifies Folsom St. as the highest priority for pedestrian improvements, and recommends several alternatives for reconfiguring the street to better accommodate transit, bicycles, and pedestrians.

- **Western SoMa Community Plan:** This plan created a special use district in the western portion of the SoMa neighborhood in 2008 (see projects map for boundaries). Last updated in 2013, this plan enacts a set of amendments to the city's zoning code to maintain and enhance the neighborhood quality of life. It recommends reducing traffic speeds, restoring two-way streets, and installing mid-block crosswalks and sidewalk bulb outs where appropriate.
- **Western SoMa Neighborhood Transportation Plan:** The Western SoMa Neighborhood Transportation Plan supports the implementation of the Western SoMa Community Plan's transportation policy recommendations. Adopted in March 2012, the plan calls for signalized mid-block crossings, traffic calming measures, and streetscape improvements along Minna, Natoma, and Ringold streets.
- **Core Circulation Study.** As part of developing the 2014 San Francisco Transportation Plan, the SFCTA completed a study of traffic circulation in the downtown and South of Market Neighborhoods. The study examined several approaches to reducing future congestion, including conversion of freeway lanes and ramps from general purpose lanes to transit/carpool lanes. The study found that "a strategy that would close or re-purpose some ramps or travel lanes for use by transit- or carpool-only may both increase the competitiveness of non-single occupant vehicle modes and improve the throughput of those facilities that may be degraded by closely spaced interchanges (which are about 0.5-0.7 miles apart throughout SoMa).

#### OTHER RELEVANT PROJECTS

Other major projects in the vicinity that do not intersect with study streets but simultaneous constructions of all projects may cause traffic congestion.

- **Central Subway & 4<sup>th</sup> Street pedestrian bulbouts:** The Central Subway Project is a light rail line that will direct transit link between the Bayshore and Mission Bay areas to SoMa, downtown, and Chinatown. SFMTA's CIP calls for improving the intersections of 4th Street at Bryant Street and Harrison in coordination with construction of the Central Subway. Bulb-outs are not currently in the Central Subway scope of work, but the contract plans call for the opening of the crosswalk across the I-80 on-ramp and for the installation of signal equipment to support this new crosswalk. The inclusion of bulb-outs, particularly at the I-80 on-and off-ramps at Harrison and Bryant Streets, respectively, will improve pedestrian safety by opening the closed crosswalk across the I-80 on ramp, providing pedestrian space through sidewalk extensions, and decreasing the overall crossing distances for pedestrians.
- **6<sup>th</sup> Street Streetscape project:** This project aims to improve street safety and create a more inviting pedestrian environment on 6th Street from Market Street to Brannan Street by removing one lane of vehicle travel in each direction. A broad scope of streetscape improvements will be implemented, including: sidewalk widening, pedestrian safety bulb-outs, raised crosswalks at alleyways, new traffic signals, landscaping, and other improvements to the pedestrian

environment. This project will also remove peak-hour tow-away lanes on 6th Street, and install a class II bike lane on 6th Street from Market Street to Folsom Street to connect to the existing bike network. The project is currently in environmental review.

- **Folsom & Howard Streetscape project:** This project involves developing conceptual designs, conduct public outreach, develop detail design plans and initiating construction of streetscape improvements on Folsom Street between The Embarcadero and 11th Street. Streetscape improvements may include: improved bicycle facilities, new corner bulbs and bus bulbs at intersections to reduce pedestrian crossing distances and improve Muni service, transit-only lanes, new signals at midblock locations or alleyways, traffic circulation changes, and construction of raised crosswalks at alleyways. Additional details are outlined in the Central SoMa Environmental Impact Report (EIR). Construction is expected to begin in Spring 2019.
- **27 Bryant: Tenderloin Transit Reliability Enhancements:** This project will install up to ten transit bulbs for the 27 Bryant and 31 Balboa in the Tenderloin and through SoMa. Transit signal priority would also be added at approximately 20 intersections. Improvements will reduce travel times and improve reliability for Muni riders. The project is expected to start in 2016.
- **7<sup>th</sup> Street and Bryant Street Ramp Reconfiguration.** SF Public Works is studying the feasibility of relocating the I-80 off ramp at 7th and Bryant Street to create a large site for an office building immediately Northwest of the intersection of 7th Street and Bryant Streets.

## 6. Safety Analysis of Study Intersections and Corridors

### 6.1 | Overview

This section analyzes the traffic collision history at the study intersections between 2011-2015. At least 72 injury collisions occurred at study intersections over this period including two severe injuries and five fatalities. The intersections of 5<sup>th</sup> Street and Bryant Streets, 5<sup>th</sup> Street and Harrison Streets, and 10<sup>th</sup> Street and Bryant Streets had the highest number of collisions. This dataset does not include any non-fatal California-Highway Patrol-reported injuries during 2013-2015.<sup>4</sup> The study team believe these collisions are likely to be few in number. Keeping in mind this limitation, the following overall observations can be drawn:

- **Most collisions occurred on city street right-of-way.** All recorded injury collisions occurred on city streets with the exception of the five fatal collisions that all occurred on state right of way. Some state reported collisions may be missing from the dataset as noted above.
- **All five fatal collisions appear to involve a vehicle losing control on or near a ramp, and most involved impact with a median or guardrail.** The ramp geometries or design may have been a contributing factor in these cases.
- **Most injury collisions involved two vehicles or a vehicle and motorcycle.** About 60% of the injury collisions involved two vehicles (including motorcycles); 11 percent involved a vehicle and bicyclist and 9 percent involved a vehicle and a pedestrian.
- **About a third of the collisions occurred at dusk or nighttime.** This is likely higher than the share of traffic occurring during the night.
- **Collisions involving a turning vehicle were the most common collision type overall.**

#### Summary of Fatal Collisions

Five fatal collisions occurred at or near the study intersections between 2011-2015. Two involved a single vehicle. One occurred when a scooter lost control while making a left turn onto northbound US-101 south of the 9th Street exit, hit a guardrail, and fell to his death, and another occurred when a motorcyclist heading southbound on US 101 near 10th street lost control, hit the guardrail, and fell to the street below.

The three remaining fatal collisions all occurred at the 5th Street off-ramp on Harrison Street. One involved a high-speed chase with a stolen car that hit a median on the ramp, rolled over, and burst into flames. The second occurred when an alleged drunk driver missed the ramp's 25 mph right curve, lost control, and ran over a homeless man in a clearing near the ramp. The final incident involved a driver who lost control of her vehicle near the bottom of the ramp and hit the concrete divider, causing the vehicle to roll over. Several occupants were injured and one who had not been wearing a seatbelt was ejected and killed.

<sup>4</sup> Collisions from this period are not yet available from the Statewide Integrated Traffic Records Systems Database. San Francisco obtains SFPD-reported collisions from this period from the city-owned Crossroads database. CHP-reported collisions are not included in crossroads. However, the SF Department of Health tracks all fatal collisions in the city, so those are included.

## 6.2 | Collision Analysis

We analyzed police reports to determine which parties were involved in collisions (Figure 11). Overall, collisions at the intersection of 8<sup>th</sup> and Harrison were more evenly distributed across modes, whereas collisions between vehicles were much more frequent at 10<sup>th</sup> Street and Bryant Street. We also analyzed which types of traffic violations or behaviors were most frequent causes of each collision (Figure 12). Speeding and cell-phone use may be under-reported since police may not have been presented to observe these behaviors prior to the collision.

Figure 11: 5 Parties involved in collisions by intersection

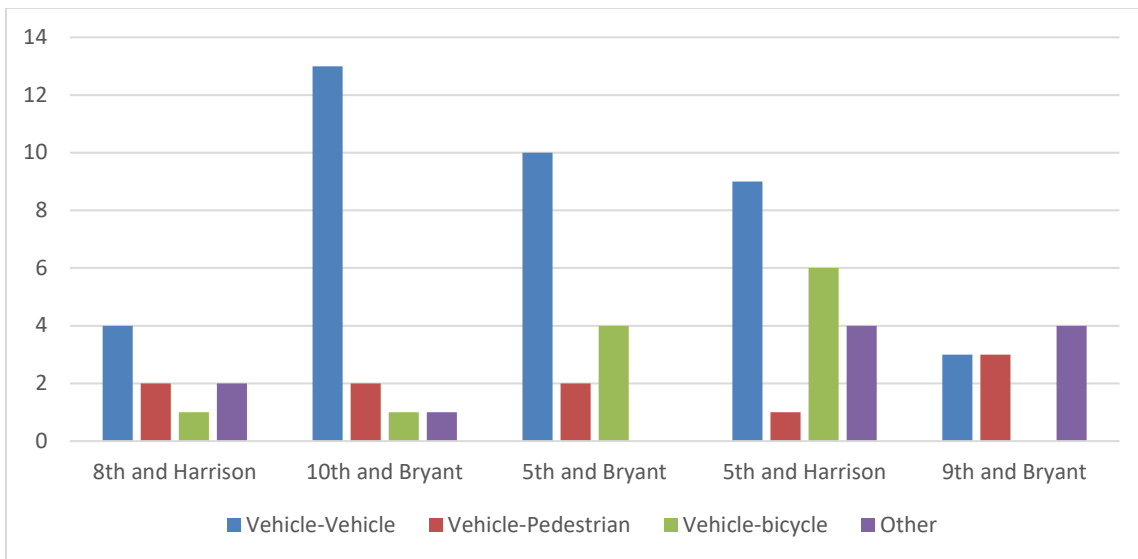


Figure 12: Collision types by intersection

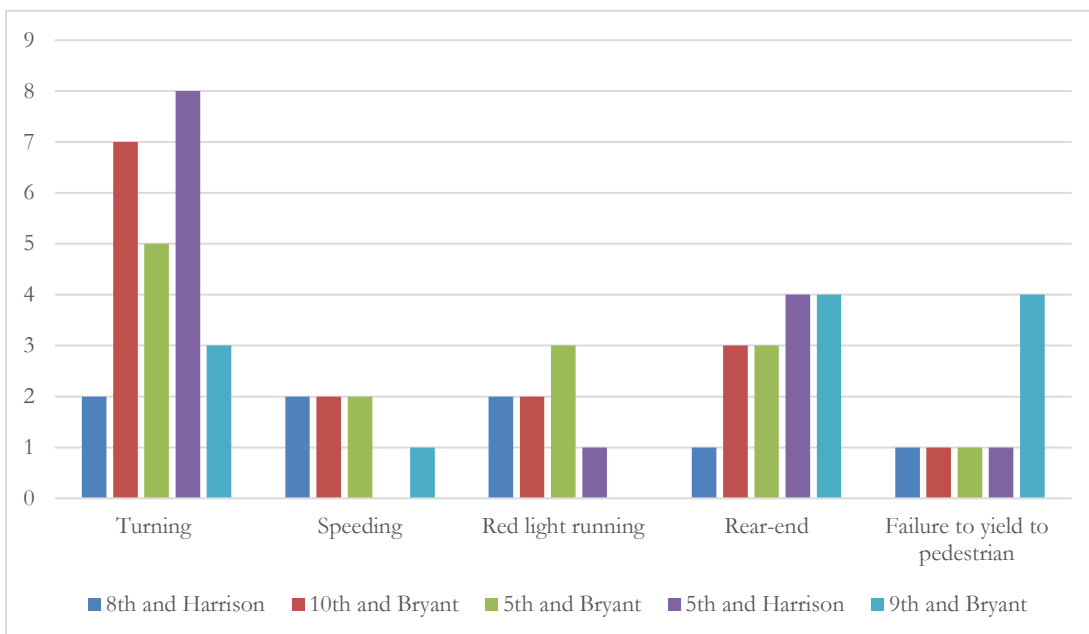
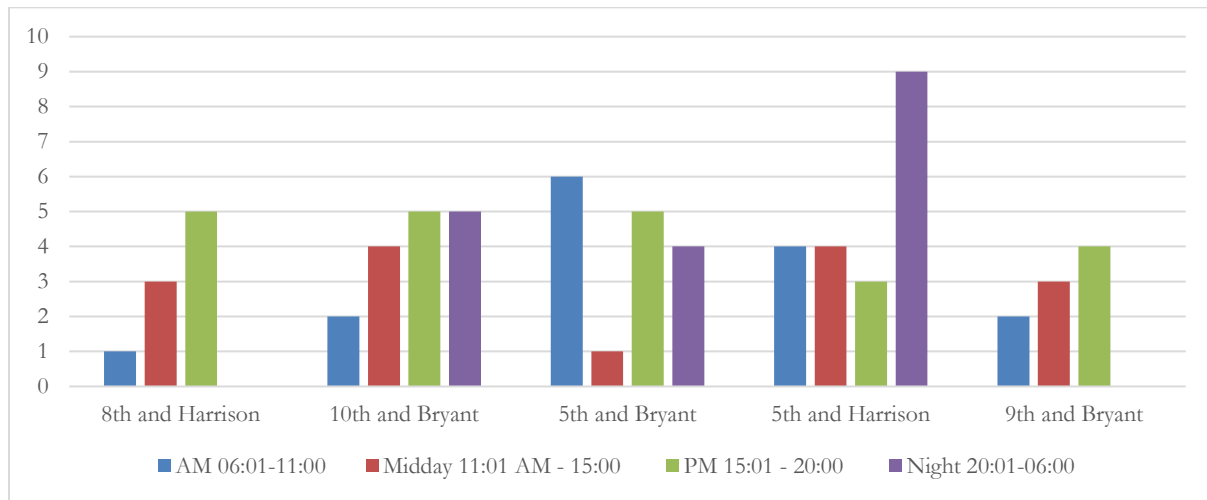


Figure 13: Collisions by time of day



We also examined the time of day when collisions occurred. As shown in Figure 13, certain intersections such as 5<sup>th</sup> Street and Bryant Street experienced more collisions during the AM period, whereas 5<sup>th</sup> and Harrison experienced more collisions during the night time period.



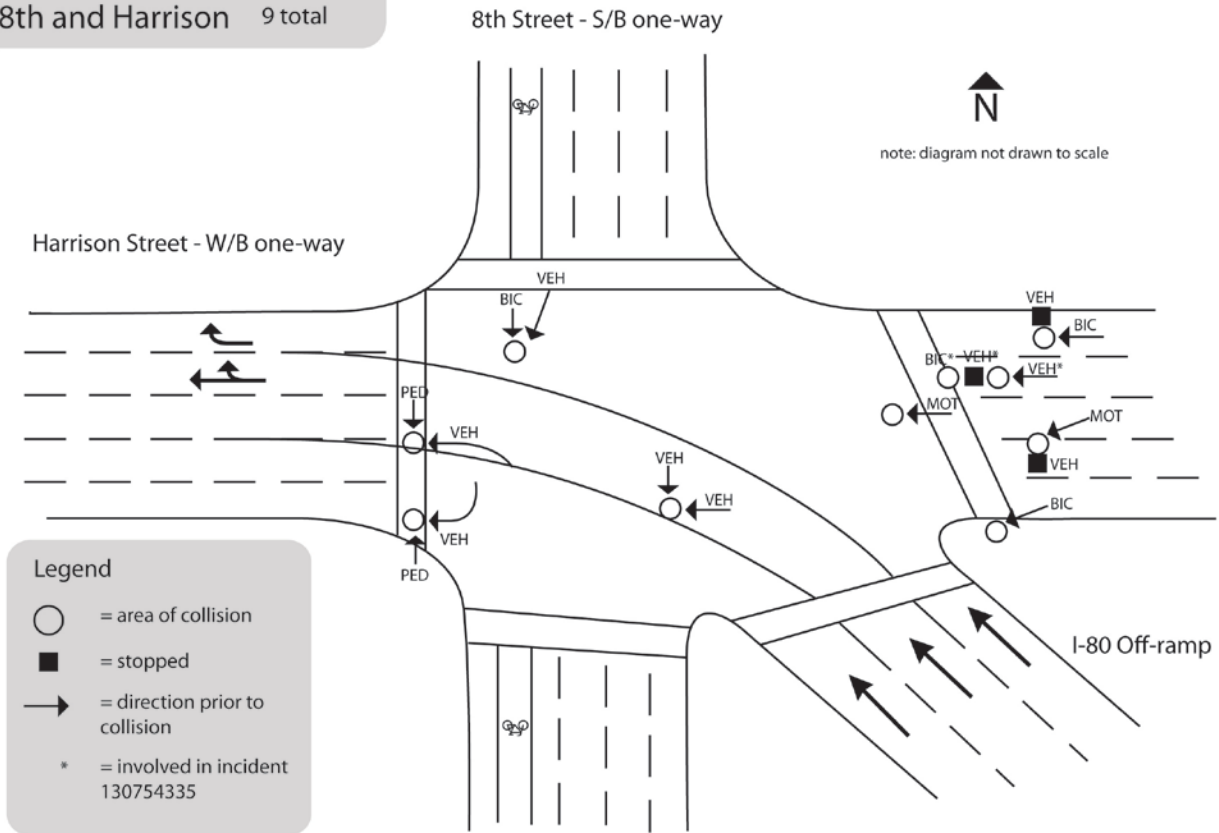
### 6.3 | Collision Diagrams

This section provides diagrams of all collisions for which we had access to a police report. Appendix B contains short narrative summaries of all the collisions.

#### 8TH AND HARRISON

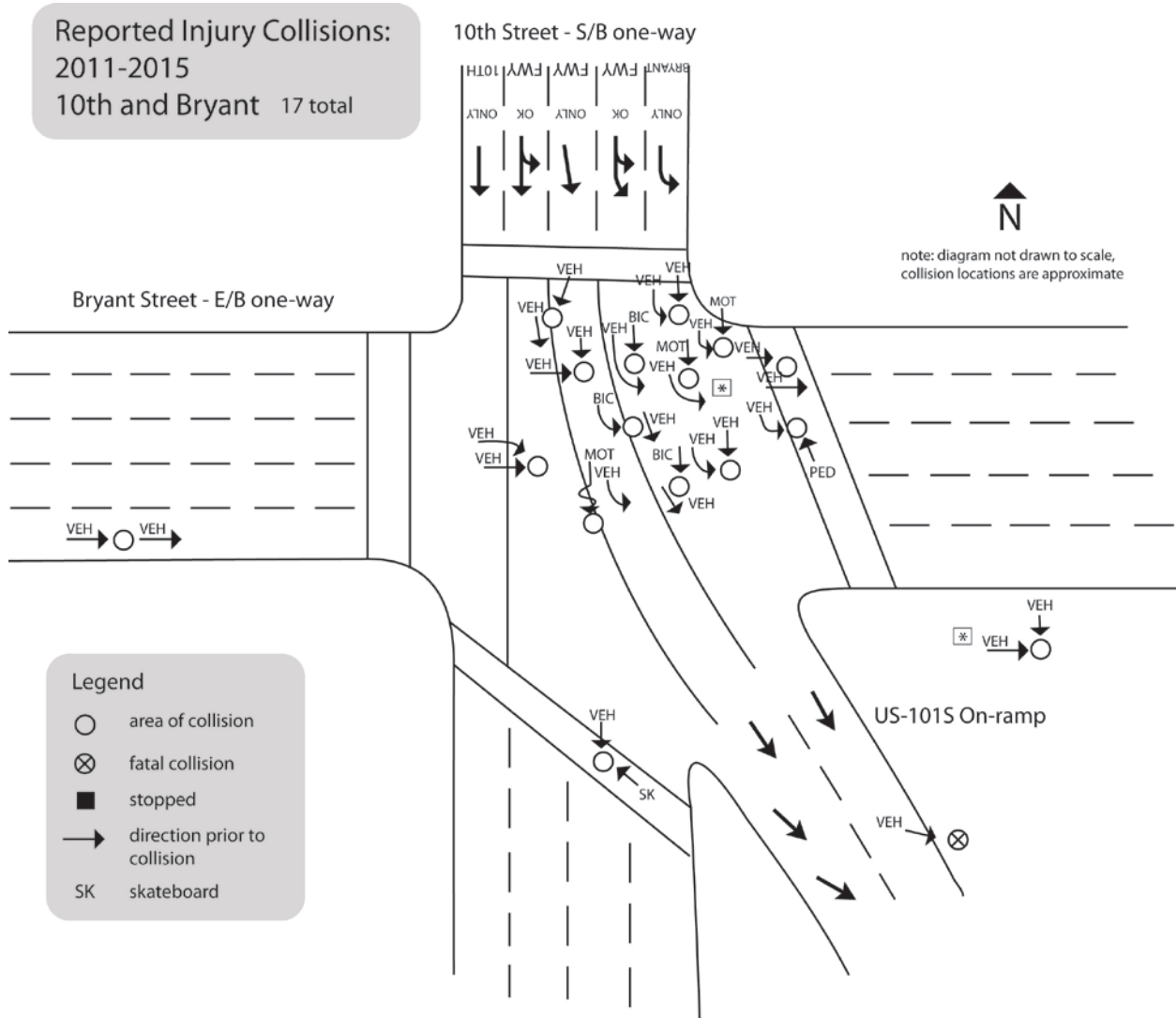
The fewest number of collisions occurred at the intersection of 8<sup>th</sup> and Harrison. The most common collision types involved stopped vehicles and turning movements.

Reported Injury Collisions:  
2011-2015  
8th and Harrison 9 total



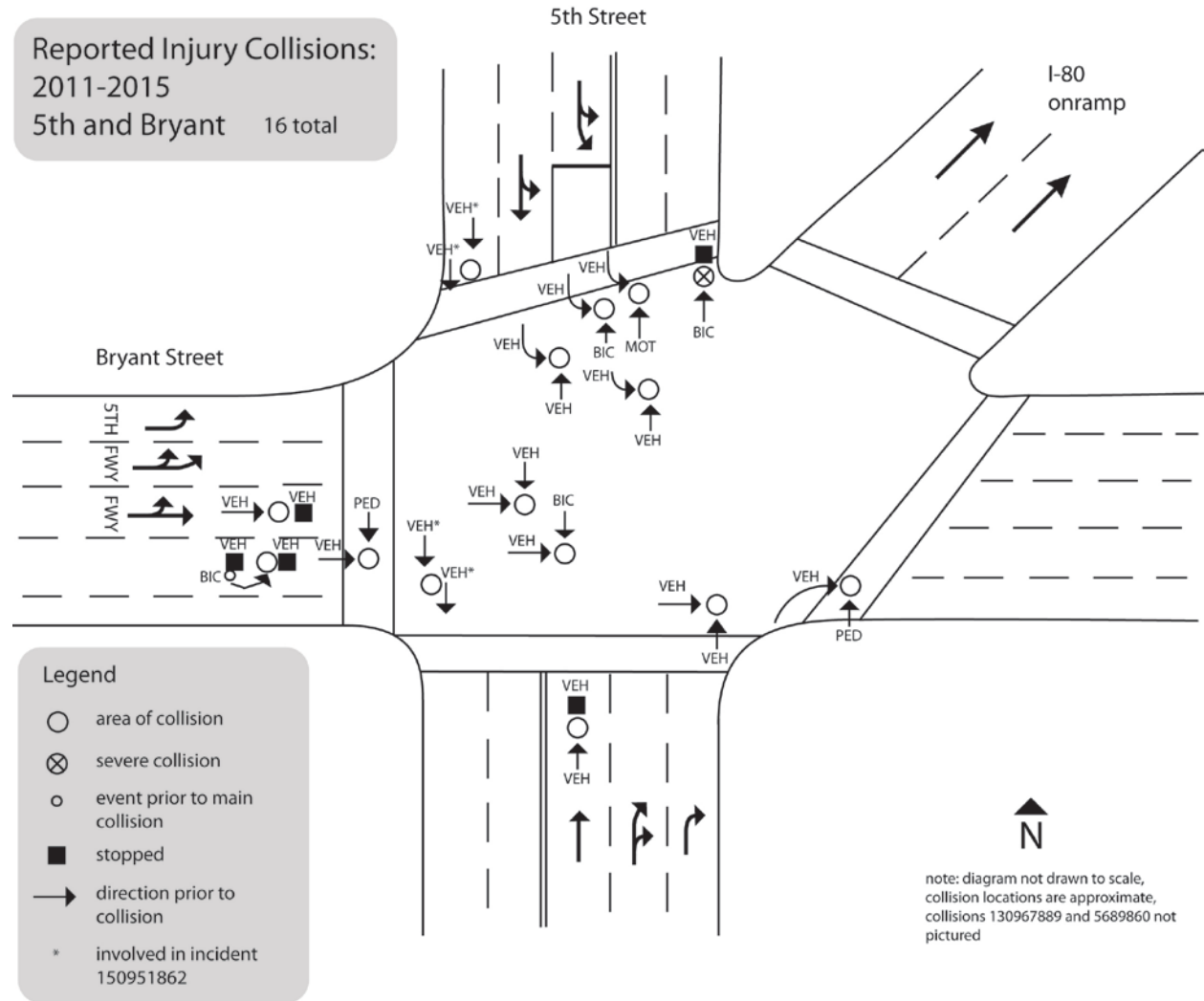
**10<sup>TH</sup> STREET AND BRYANT STREET**

An especially high number of turning collisions occurred at the intersection of 10<sup>th</sup> Street and Bryant Street, most due to vehicles negotiating turns and lane changes near other vehicles in adjacent lanes. Almost all collisions happened as vehicles proceeded from 10<sup>th</sup> Street onto the US-101S ramp or as they made left turns onto Bryant Street. A consistent number of collisions occurred throughout the day, but more collisions were concentrated during the PM and night time periods.



5TH STREET AND BRYANT STREET

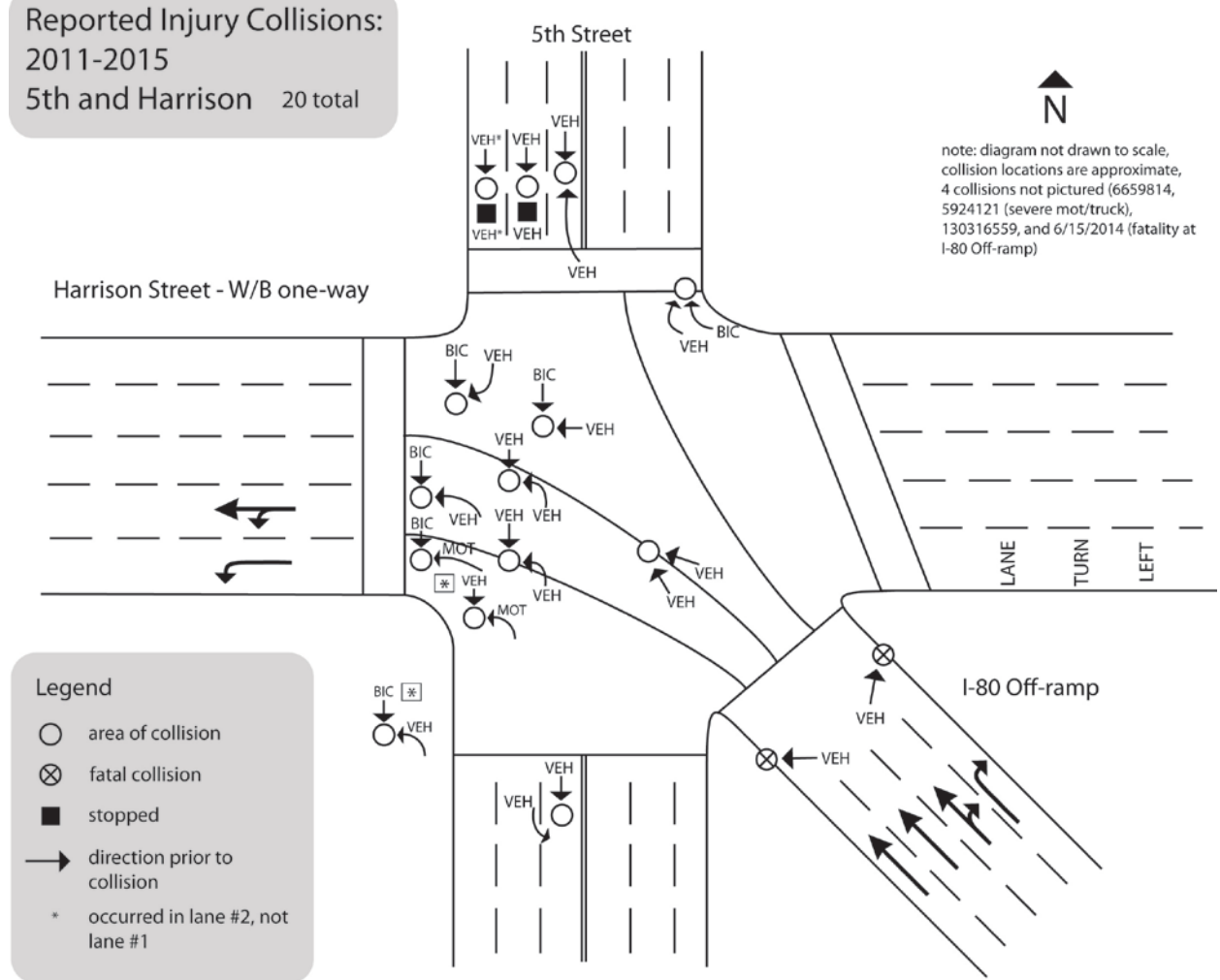
The intersection of 5<sup>th</sup> Street and Bryant Street experiences a high frequency of turning (especially involving vehicles turning left from 5<sup>th</sup> Street onto Bryant Street colliding with through traffic on 5<sup>th</sup> Street) and red light running –related collisions resulting in broadside, or “t-bone” type crashes.



5TH AND HARRISON

The intersection of 5th and Harrison had the highest number of turning and multiple-injury collisions. Most turn collisions happened when vehicles turned left from 5th onto Harrison and hit vehicles or bicyclists travelling southbound on 5th Street. Three fatal collisions (involving four fatalities) also occurred at this intersection, all located at the terminus of the off-ramp. This may be related to the fact that the ramp has a 25 mph curve at the end. A higher number of collisions also occurred during night time compared to the other study intersections.

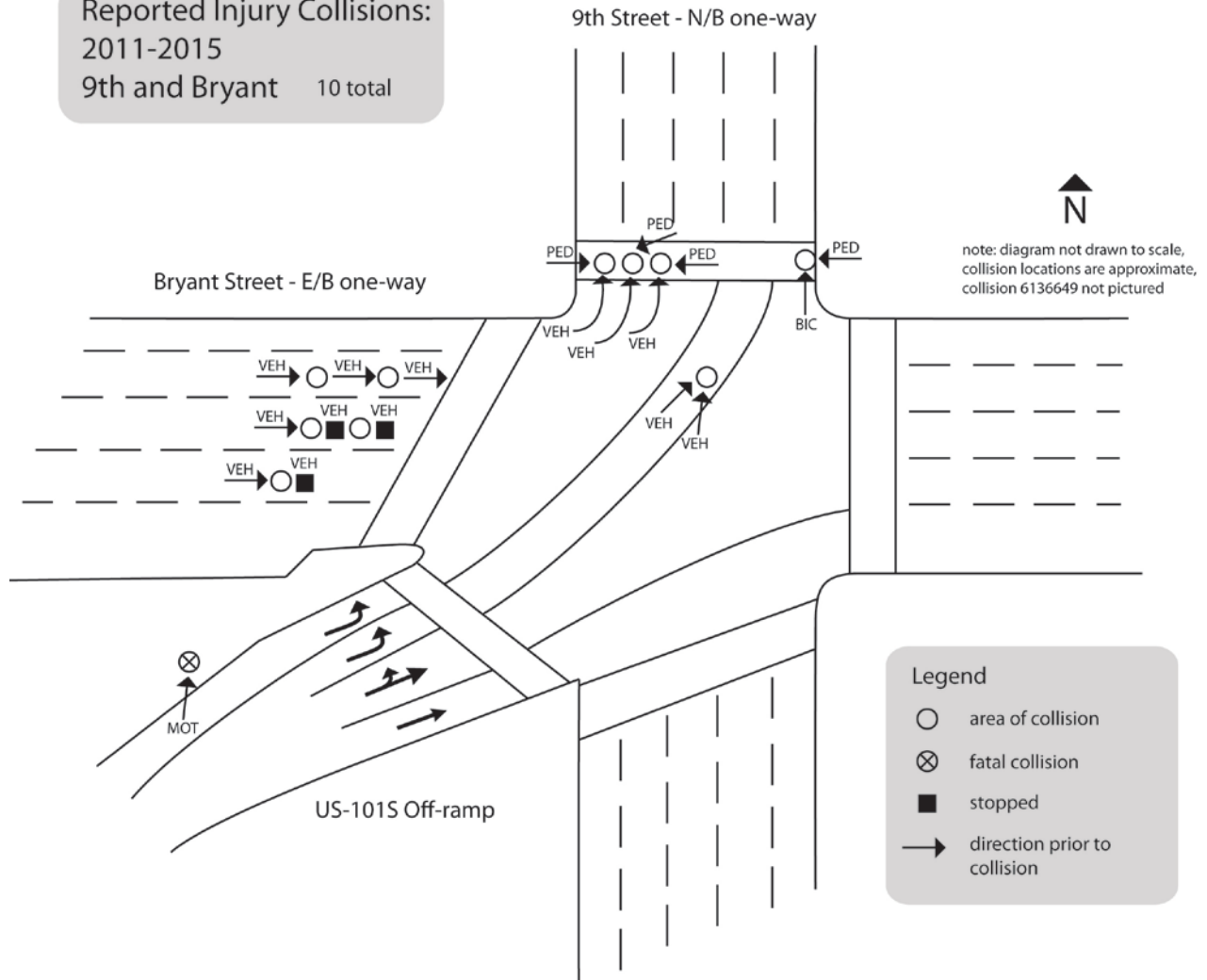
Reported Injury Collisions:  
2011-2015  
5th and Harrison 20 total



**9TH STREET AND BRYANT STREET**

The intersection of 9<sup>th</sup> and Bryant Street had the most vehicle/pedestrian conflicts of all five study intersections, mostly resulting from a failure of vehicles to yield to pedestrians in the northern crosswalk on 9<sup>th</sup> Street. More rear-end collisions (most on eastbound Bryant Street before 9<sup>th</sup>) occurred here than in other intersections. One fatality also occurred near this intersection where a motorcycle lost control, hit the divider of the US 101S Freeway, and fell off the edge.

**Reported Injury Collisions:  
2011-2015**  
9th and Bryant 10 total



## Appendix A: Supporting Tables

### Summary of Injury collisions 2011-2015\* - parties involved, time, severity, and sobriety

Intersection	Total	Parties Involved								Time	Severity	Sobriety
		Veh-ped	%	Veh/bike	%	Veh-Veh <sup>a</sup>	%	Other <sup>b</sup>	%	Dusk/nighttime	Severe/fatal	Alcohol-involved
8th and Harrison	9	2	22	1	11	4	44	2	22	3	0	0 <sup>c</sup>
10th and Bryant	17	2	12	1	6	13	76	1		7	1	0 <sup>c</sup>
5th and Bryant	16	2	13	4	25	10	63			6	1	1
5th and Harrison	20	1	5	6	30	9	45	4	20	7	4	0 <sup>c</sup>
9th and Bryant	10	3	30			3	30	4	30	1	1	0 <sup>c</sup>
<b>Total</b>	<b>72</b>	<b>10</b>		<b>12</b>		<b>39</b>		<b>11</b>		<b>7</b>		

\* Data from 2013-2015 comes from the San Francisco Police Departments Crossroads database, which does not include California Highway Patrol reported collisions that occur on state facilities, with the exception of fatalities which are tracked by the San Francisco Department of Public Health and are included in the table.

<sup>a</sup> includes: veh-motorcycle, veh-bus, veh-truck

<sup>b</sup> includes: Veh-emergency veh, veh only, bike-ped

<sup>c</sup> Includes sobriety not stated, impairment not known

### Summary of injury collisions 2011 - 2015\* - collision type

Intersection	Total	Turning	Speeding	Red light running	Rear-end	Failure to yield to pedestrian	Broadside	Sideswipe
8th and Harrison	9	2	2	2	1	1	1	2
10th and Bryant	17	7	2	2	3	1	1	1
5th and Bryant	16	5	2	3	3	1	6	2
5th and Harrison	20	8	0	1	4	1	5	2
9th and Bryant	10	3	1	0	4	4	1	1

\* Data from 2013-2015 comes from the San Francisco Police Departments Crossroads database, which does not include California Highway Patrol reported collisions that occur on state facilities, with the exception of fatalities which are tracked by the San Francisco Department of Public Health and are included in the table.



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10th and Bryant	17	2	12	1	6	13	76	1		7	1	0 <sup>c</sup>
5th and Bryant	16	2	13	4	25	10	63			6	1	1
5th and Harrison	20	1	5	6	30	9	45	4	20	7	4	0 <sup>c</sup>
9th and Bryant	10	3	30			3	30	4	30	1	1	0 <sup>c</sup>
<b>Total</b>	<b>72</b>	<b>10</b>		<b>12</b>		<b>39</b>		<b>11</b>			<b>7</b>	

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Intersection	Total	Turning	Speeding	Red light running	Rear-end	Failure to yield to pedestrian	Broadside	Sideswipe
8th and Harrison	9	2	2	2	1	1	1	2
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5th and Harrison	20	8	0	1	4	1	5	2
9th and Bryant	10	3	1	0	4	4	1	1

\* Data from 2013-2015 comes from the San Francisco Police Departments Crossroads database, which does not include California Highway Patrol reported collisions that occur on state facilities, with the exception of fatalities which are tracked by the San Francisco Department of Public Health and are included in the table.



## Appendix B Police Report Summaries

### 8<sup>th</sup> and Harrison

#### 120045906

On 1/17/2012 at 12:30 pm, a pedestrian entered the crosswalk starting from the S/W corner of 8<sup>th</sup> and Harrison on a red light, and was struck by a truck making a left turn onto Harrison. "P1 told me that he saw the green light and started to cross n/b in the crosswalk said he then saw the red hand light and realized the green round light was for the off ramp traffic." The pedestrian was found to be at fault.

#### 120115468

On 2/10/2012 at 4:18 pm, a motorcycle stopped on Harrison Street facing West was revving its engine, lost control, and fell over into the intersection.

#### 120766920

On 9/23/2012 at 2:00 pm, a bicyclist was "doored" by a parked vehicle facing Westbound on the North side of Harrison Street. The bicyclist was slowing down as the light turned red.

#### 121021793

On 12/19/2012 at 5:30 pm, a pedestrian was hit by a vehicle making a right turn from 8<sup>th</sup> Street onto Harrison. The pedestrian had the right of way when entering the intersection from the Southwest corner, and the driver was found to be at fault for making an unsafe turn, and failing to yield.

#### 130125071

On 2/13/2013 at 5:57 pm, a motorcycle had weaved between vehicles on Harrison Street to enter the front of the intersection. The motorcycle and vehicle to its left were stopped on the red light, and as the light turned green, the vehicle ran over the motorcyclist's foot, and as he fell over, his bike caught the rear bumper of the vehicle. The motorcycle was found to be at fault for passing other in the wrong situation.

#### 130161376

Single vehicle: "Party 1 stated that he was pedaling Westbound Harrison Street when he did not see the curb in front of him. As he approached the curb line he proceeded to go over the curb as though it were a flat surface When he did this his bike flipped and he flew off the bike."

#### 130754335

On 9/9/2013 at 9:01 am, a vehicle rear-ended another vehicle stopped facing Westbound on Harrison Street, and this impact caused the second vehicle to rear-end a bicyclist who was also stopped at the light. Case of unsafe speed.

#### 150282532

On 3/31/15 at 11:41 am, a vehicle traveling Southbound on 8<sup>th</sup> Street ran a red light and hit an SFPD patrol car that was traveling Westbound on Harrison Street in the intersection. The patrol car had a green light at the time and the vehicle was found to be speeding.

#### 150792149

On 9/9/2015 at 4:10 pm, a bicyclist traveling Southbound on 8th Street moved to the left side of the number 1 lane to overtake a motorcycle which had slowed to execute a right turn onto westbound Harrison. As he maneuvered to the left side of the lane, he checked over his left shoulder to see if any vehicles were close enough to him to constitute a safety hazard. There, saw the V1- Smart Car that was

traveling southbound on 8th St, in the number 2 lane. As continued into the intersection of 8th and Harrison, his bicycle was hit on the rear left side, knocking him from the bicycle and onto the ground.

**10<sup>th</sup> and Bryant****110348130**

On 4/29/2011 at 5:10 pm, a bicycle was driving down 10<sup>th</sup> Street in the number two lane when a vehicle in front of the bicyclist was making a left turn onto Bryant Street. The bicyclist couldn't stop as the vehicle made the turn and slid into the car. The bicyclist was found to be at fault for maintaining an unsafe speed.

**120079030**

On 1/28/2012 at 8:40 pm, a skateboarder was riding across 10<sup>th</sup> street on the South side of the intersection against a red light because he thought the car was turning left onto the freeway. The skateboarder had caused the collision but the vehicle was found to be at fault – unclear explanation on the report.

**120205514**

On 3/12/2012 at 4:39 pm, a vehicle driving Southbound on 10<sup>th</sup> Street in the number 2 lane made a left turn onto Eastbound Bryant Street in the number 2 lane, and hit another vehicle making the same turn but from the number one lane.

**120241637**

On 3/25/2012 at 12:41 pm, a pedestrian walking Northbound on 10<sup>th</sup> Street in the crosswalk and was hit by a vehicle making a left turn from the number 2 lane on 10<sup>th</sup> Street onto Bryant Street. The vehicle was found to be at fault.

**120370010**

On 5/9/2012 at 8:23 pm, a motorcycle was driving Southbound on 10<sup>th</sup> Street and making a left turn onto Bryant Street in the number two lane when a vehicle traveling in the number 3 lane (FWY only lane) turned left into the number 2 lane, cut off the motorcycle, causing them to swerve, lose control and crash. No contact was made and the motorcyclist had pain in his left thumb and a scratch on his knee.

**120610026**

On 8/2/2012 at 12:10 pm, a tow truck traveling on Bryant Street was rear-ended by another vehicle as they both approached the red light. The person driving the vehicle was found to be at fault for driving at an unsafe speed, as well as for using his cell phone. The officer found the cell phone in the front passenger area with viewed text messages at the approximate time of the collision.

**120799567**

On 10/5/2012 at 3:22 pm, a vehicle turning left onto the freeway was clipped by a motorcycle that was turning left onto Bryant Street. Both were in the number two lane and the motorcycle was found to be at fault for following too closely.

**120877577**

On 10/30/2012 at 7:28 pm, a bicycle making a left turn collided with a vehicle going onto the freeway in the number three lane. "I was riding my bike south in that middle lane which is the third one over from the east curb. I saw that the cars passing me on the left were all turning left on to Bryant St so I thought I could do the same. As I started to turn I ran in to the passenger side of this Prius and fell to the ground thought she was going to turn left also."

**130017967**

On 1/7/2013 at 2:46 pm, a truck in the number three lane was traveling East on Bryant Street, attempted to make a right turn onto the on-ramp, and hit another vehicle in the number four lane.

**130536707**

On 6/30/2013 at 10:28 am, a vehicle traveling Southbound on 10<sup>th</sup> Street was hit by a vehicle traveling Eastbound on Bryant Street. The Southbound vehicle was t-boned by the Eastbound vehicle that had proceeded on a red light.

**130550224**

On 8/24/2013 at 11:42 pm, two vehicles were traveling Southbound on 10<sup>th</sup> Street. One vehicle was making a left turn onto Bryant Street and another was attempting to make a left onto the freeway. No fault was attributed due to conflicting statements.

**130752113**

On 9/8/2013 at 12:30 pm, a vehicle traveling Southbound on 10<sup>th</sup> Street and was cut off and hit by another vehicle as they were trying to merge out of the freeway only lane to continue onto 10<sup>th</sup> Street. The second vehicle was found to be at fault for making an unsafe lane change.

**140085409**

On 1/29/2014 at 10:10 am, a motorcycle traveling Southbound on 10<sup>th</sup> Street in the number two lane was approaching the freeway ramp and was behind a large truck. The truck began to turn left from the number three lane and put on his brakes after he heard an acceleration from behind. The motorcycle couldn't stop in time and collided with the truck. The motorcyclist was found to be at fault for not proceeding at a safe distance behind vehicles in front of him.

**140481001**

On 6/10/2014 at 9:40 pm, a motorcycle traveling Southbound on 10<sup>th</sup> Street in the number two lane attempting to proceed straight in a lane marked for turning. Another vehicle in the same lane was turning left and the motorcycle hit this vehicle when passing it and fell down.

**150182590**

On 2/28/2015 at 3:12 am, a vehicle driving Eastbound in the number two lane on Bryant Street on a green light and a vehicle traveling Southbound on 10<sup>th</sup> Street collided as they both entered the intersection. The vehicle traveling Southbound was found to be at fault for running a red light and for failing to yield.

## 5th and Bryant

### 110627291

A hit and run collision between two cars took place at the Northeast corner of 5<sup>th</sup> and Bryant Streets at 2:10 am on 8/6/2011. A taxi cab driving North-bound on 5<sup>th</sup> Street (on a green light) was hit on the driver's door by a Honda Civic turning left. The arrow in the diagram indicates the passenger of the Honda walking over to the taxi, returning, and driving off onto the freeway.

"We were driving straight and all of a sudden we got hit. We got out of the cab and the female passenger of the other car came over to us and asked if we were all ok. The female driver of the other car then came over and started yelling at the female passenger to get back in the car and then they drove off onto the freeway."

### 110765471

On 9/22/11 at 6:46 pm, a pedestrian was walking south on 5<sup>th</sup> street was in the crosswalk when driver in a Volvo pulled forward on a green light and made contact with a pedestrian on the driver's side. According to the Officer, the pedestrian was disoriented, had an unsteady gait, and appeared to be under the influence of alcohol.

### 120009623

On 1/4/2012 at 1:34 pm, a person driving a city vehicle was traveling Northbound on 5th St approaching Bryant St. They changed lanes before the intersection but did not stop before the limit, entered the intersection on a red light, and hit an Eastbound vehicle that had proceeded into the intersection on a green light.

### 130203417

On 3/11/2013 at 8:38 am a car heading Eastbound on Bryant stopped on a yellow light before entering the intersection. A big rig following this car smashed into its rear end as the light turned from yellow to red.

### 130984037

On 11/20/2013 at 4:04 pm a vehicle heading Northbound on 5<sup>th</sup> Street stopped in the intersection of 5<sup>th</sup> and Bryant Streets just before the I-80 E onramp. A bicyclist also traveling Northbound on 5<sup>th</sup> Street hit the rear end of the vehicle and sustained a serious head injury. The bicyclist was not wearing a helmet, and was found to be at fault for unsafe speed, but no citation was issued.

### 140333098

On 4/22/2014 at 9:20 am, a bicyclist was heading eastbound on Bryant Street in lane five approaching 5<sup>th</sup> Street when she accidentally hit the passenger side mirror of one vehicle, lost balance, and went through the window of a vehicle stopped in front of the first vehicle.

### 140516783

On 6/22/2014 at 1:59 am Vehicle #2 was traveling Northbound on 5<sup>th</sup> Street and approached a red light at Bryant Street. As the light turned green, vehicle #1 traveling Southbound on 5<sup>th</sup> Street turned left, and went directly into the path of Vehicle #2. Vehicle #2 hit the rear passenger quarter panel of Vehicle #1. Vehicle #1 was found at fault for failing to yield to Vehicle #2.

### 140658335

On 8/7/2014 at 8:35 pm, a pedestrian heading North from the Southeast corner of 5<sup>th</sup> and Bryant took several steps into the crosswalk when he was struck by the side of a van, leaving him with a twisted ankle.

The driver of the van claimed that he looked at the pedestrian and yelled, “Are you going to cross?” The driver was found to be at fault for failing to yield to pedestrians crossing the roadway.

**140753606**

On 9/11/2014 at 10:50 am, a vehicle (#1) headed Eastbound on Bryant Street was hit on its left side, or “t-boned” by the front end of another vehicle (#2) traveling Southbound on 5<sup>th</sup> Street. Vehicle (#2) had just exited the freeway and had turned left onto southbound 5<sup>th</sup> street with a green light. Vehicle #1 was found to be at fault for failing to stop at a red light.

**150042881**

On 1/14/2015 at 10:30 pm, a vehicle traveling South on 5<sup>th</sup> Street was attempting to make a left turn and claimed that he did not see a motorcycle driving North on 5<sup>th</sup> Street in the opposite direction when he was making the turn. The two collided in the northern part of the intersection just past the crosswalk, and the vehicle was found to be at fault for failing to yield to oncoming traffic.

**150121601**

On 2/9/2015 at 9:07 am a vehicle was making a left turn onto Bryant Street from 5<sup>th</sup> Street and hit a bicyclist traveling Northbound with its front bumper. The vehicle claimed to have had a green light arrow. Other pages from the report are not available, but the first page indicates that the vehicle involved was “school bus related.”

**150823578**

On 9/19/2015 at 6:50 pm, a hit-and-run collision occurred in the southern portion of the intersection at 5<sup>th</sup> and Bryant Streets. A vehicle rear-ended another vehicle that was stopped in the northbound lane, causing whiplash and back pain for the driver and passenger, but not the two children in the back seat. The suspect vehicle made a U-turn and fled the scene. A witness recorded the license plate of the suspect vehicle, which was later found to be stolen. Speeding and failure to yield.

**150951862**

On 10/31/2015 at 6:00 pm, a vehicle traveling Southbound on 5<sup>th</sup> Street rear-ended a parking enforcement vehicle that had pulled over to the curb on the north side of the intersection after hearing sirens. The vehicle also hit the right side of another car crossing Bryant Street, and sped away with police cars in pursuit. It was not caught.

**151081319**

On 12/15/15 at 9:20 am, a bicyclist traveling Southbound on 5<sup>th</sup> Street at Bryant Street rode through a red light and hit the left front corner panel of a vehicle traveling Eastbound on Bryant Street. The bicyclist was found to be at fault for running a red light, and had complaints of pain in his head, shoulder, and left hand. The report does not indicate whether or not he was wearing a helmet.

**5th and Harrison****110691252**

On 8/28/2011 at 4:54 pm, two vehicles were exiting the I-80 off-ramp at 5<sup>th</sup> Street, and turned in on each other in the intersection. Each vehicle driver claimed that the other vehicle turned into their lane. No fault was determined due to conflicting claims.

**110802045**

On 10/4/2011 at 11:40 pm, a vehicle proceeding Northbound on 5<sup>th</sup> Street entered the intersection and began to make a left turn, and collided with another vehicle traveling Southbound on 5<sup>th</sup> Street that was going straight through the intersection. The Southbound vehicle was traveling on a green light.

**120013862**

On 1/5/2012 at 9:44 pm, vehicle #1 traveling Northbound on 5<sup>th</sup> Street made a left turn onto Harrison Street when it was struck by another vehicle traveling Southbound on 5<sup>th</sup> Street. Vehicle #1 was talking to her daughter on her blue tooth cell phone, and was driving with a suspended license. They were found to be at fault for failing to yield to oncoming traffic.

**120108059**

On 2/8/2012 at 6:30 am, a bicyclist was traveling Southbound on 5<sup>th</sup> Street and was struck by a truck turning left from 5<sup>th</sup> Street onto Harrison Street. The driver claimed to have never seen the bicyclist, and the bicyclist claimed that the truck turned right in front of him. The truck driver was found to be at fault for failing to yield to oncoming traffic.

**120189645**

On 3/7/2012 at 12:02 pm, there were two vehicles in the first lane of 5<sup>th</sup> Street facing Northbound. As the light turned from red to green, the first vehicle was rear-ended by the vehicle behind it. The second vehicle claimed that the first vehicle accelerated and abruptly came to a stop, which did not leave enough time to react and stop in time. There was no damage to either vehicle.

**120335406**

On 4/27/2012 at 10:23 pm, a bicyclist traveling Southbound on 5<sup>th</sup> Street was hit by a motorcycle traveling Westbound exiting the I-80 off-ramp. The bicyclist had entered the intersection on a red light, believing that it would turn green. The motorcycle could not see the bicyclist, who was not using a light, and struck them. The bicyclist was found to be at fault for entering the intersection on a red light and for failing to use a forward light during darkness.

**121045442**

On 12/28/2012 at 11:16 pm, a vehicle traveling Northbound on 5<sup>th</sup> Street was making a left turn onto Harrison Street and collided with another vehicle traveling South on 5<sup>th</sup> Street. It was raining at the time. The vehicle making a left was found to be at fault for failing to yield to oncoming traffic.

**130653715**

On 8/8/2013 at 8:20 am, a truck was making a right turn from Harrison Street onto North 5<sup>th</sup> Street, hit a bicyclist traveling West on Harrison Street and fled the scene. The bicyclist claimed that he proceeded into the intersection on a green light, he jumped off the bike and the truck ran over the bike's front wheel.

**130692785**

On 8/20/2013 at 1:34 pm, a vehicle traveling Northbound on 5<sup>th</sup> Street was making a left turn onto Harrison Street and struck a bicyclist traveling Southbound on 5<sup>th</sup> Street. According to witness #1 – “I

looked up at the intersection and saw a bicyclist yelling at the driver of a Subaru. The Subaru was making a left turn and going fast as it passed in front of the bicyclist. The bicyclist then yelled once again at the white van who was also making a left turn, I believed he yelled “Hey” then he was struck by the van. I believe it happened in the street on the other side of the crosswalk.” The vehicle was found to be at fault for failing to yield to oncoming traffic.

**140238238**

On 3/21/2014 at 2:32 am, a vehicle had exited the I-80 off-ramp and was traveling Northbound on 5<sup>th</sup> Street and collided with the front left fender of another vehicle that was stopped facing Eastbound on 5<sup>th</sup> Street in the number 1 lane. The first driver had driven into an opposing traffic lane. The driver of the second vehicle had complaint of back pain and was transported to the hospital. The first vehicle was found to be at fault for driving on the wrong side of the roadway.

**140723364**

On 8/28/2014 at 7:15 am, a vehicle traveling Southbound on 5<sup>th</sup> Street made a right turn heading Westbound onto Harrison Street and hit the rear wheel of a bicyclist that was traveling Southbound on 5<sup>th</sup> Street in the number 3 lane. A witness W1 stated that she was in the intersection headed W/B on Harrison St. when the vehicle went around her vehicle on the left side, cut her off, and made contact with the bicyclist’s rear wheel. The vehicle fled the scene.

**140724685**

On 8/28/14 at 4:31pm, a bicyclist traveling Southbound on 5<sup>th</sup> Street entered the intersection on a red light and collided with a vehicle traveling Westbound on Harrison that had entered the intersection on a green light. The bicyclist had a laceration from falling to ground (specifics not told) and was found to be at fault for failing to yield at the limit line.

**140960500**

On 11/12/2014 at 9:01 pm, a vehicle traveling Southbound on 5<sup>th</sup> Street rear-ended another vehicle that was stopped at a red light in the number two lane. The first vehicle fled the scene after exiting his vehicle and talking briefly with the driver of the other vehicle.

**150822401**

On 9/19/2015 at 11:11 am, a vehicle traveling Southbound on 5<sup>th</sup> Street in the number two lane made an unsafe lane change in the intersection in front of another vehicle, and was hit by that vehicle. Both parties had exchanged verbal insults claiming that the other did not know how to drive. The lane-changing vehicle was found to be at fault.



**9th and Bryant****110678307**

On 8/24/2011 at 9:05 am, a pedestrian crossing the north side of Bryant Street walking Eastbound was hit by a vehicle making a left turn from Bryant onto 9<sup>th</sup> Street. Both parties had a green light, but the vehicle failed to yield.

**120687031**

On 8/28/2012 at 5:40 pm, two vehicles were exiting the US-101 freeway. "Party 2 was on the 3 lane and the suspect vehicle was on the 4 lane According to Party 2, Party 1 was supposed to turn eastbound on Bryant Street but instead Party 1 turned northbound on 9 and contacted her vehicle. Party 1 fled prior to making contact and exchanging information."

**120714565**

On 9/6/2012 at 5:42 pm, a pedestrian's feet were run over by a vehicle making a left turn. "Party 1 stated: I was making a left turn from Bryant onto 9th Street. I was distracted by another vehicle making the same turn in front of me. I didn't see the pedestrian at all. Party 2: I was walking in the crosswalk when the Jeep ran over both of my feet."

**130410929**

On 5/19/2013 at 6:30 am, three vehicles were involved in a collision. The first vehicle was traveling Eastbound on Bryant Street towards a red light where the two other cars were stopped; one in front of the other. The first vehicle accidentally accelerated rather than stopped and rear ended the second car, which then rear-ended the third car. The first vehicle was found to be speeding.

**140035573**

On 1/13/2014 at 1:40 pm, a pedestrian had entered the crosswalk on the North side of Bryant Street and was heading Westbound across 9<sup>th</sup> Street when she was hit by a bicyclist heading Northbound on 9<sup>th</sup> Street. The bicyclist had sped up to avoid a vehicle traveling Eastbound on Bryant Street while the light had turned green for the crosswalk, and was not able to stop in time before hitting the pedestrian.

**140248180**

On 3/24/2014 at 2:50 pm, three vehicles were involved in a collision. A vehicle facing Eastbound on Bryant Street rear-ended the car in front of them, which in turn caused that vehicle to rear-end the vehicle in front of them, which had just started to accelerate as the light turned green.

**140428871**

On 5/22/2014 at 3:58 pm, a pedestrian was walking Eastbound on Bryant Street in the crosswalk was hit by a vehicle turning left from the number two lane of Bryant Street onto the number two lane on 9<sup>th</sup> Street. The vehicle had a green light but failed to yield.

**150319420**

On 4/12/2015 at 1:01 pm, a vehicle traveling Eastbound on Bryant Street approaching 9<sup>th</sup> Street stopped upon seeing a yellow light, and was hit from behind by another vehicle. The first vehicle was found to be at fault for failing to signal when stopping.

# Appendix E:

## Potential Parking Loss

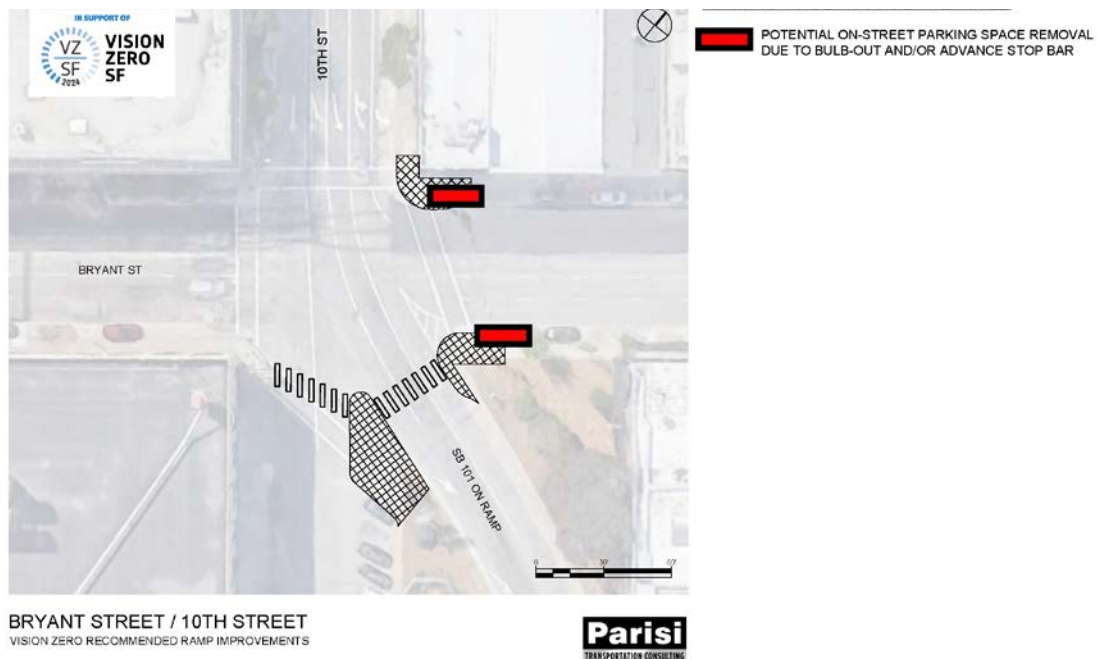
## Potential Parking Loss

The proposed intersection safety measures will need additional street space to accommodate curb extension bulb-outs and advance stop bars. Improvements at four of the five study intersections combined will require approximately 13 on-street parking spaces be removed. Average car-sized rectangles were digitally overlaid at the approximate location of proposed curb bulb-outs and advance stop bars at each location where on-street parking currently exists to determine parking removal metrics. The 5<sup>th</sup> Street and Harrison Street intersection will need the removal of two on-street parking spaces for curb extension bulb-outs on the northwest and southeast corners of the intersection. The 5<sup>th</sup> Street and Bryant Street intersection will need four on-street parking spaces removed for bulb-outs and advance stop bars on the southwest and southeast corners of the intersection. The 9<sup>th</sup> Street and Bryant Street location will need five on-street parking spaces removed for bulb-outs on the north, west, and east corners of the intersection, and 10<sup>th</sup> Street and Bryant Street will need two spaces removed for bulb-outs on the northeast and southeast intersection corners. Safety measures proposed at the 8<sup>th</sup> Street and Harrison Street intersection will not require any on-street parking removal.

### 10th Street and Bryant Street

The 10<sup>th</sup> and Bryant intersection will likely require two (2) on-street parking spaces to be removed on Bryant Street, on the northeast and southeast corners of the intersection, to create space for the construction of raised concrete bulb-out curb extensions.

Figure 1: Parking Removal - 10th and Bryant Street

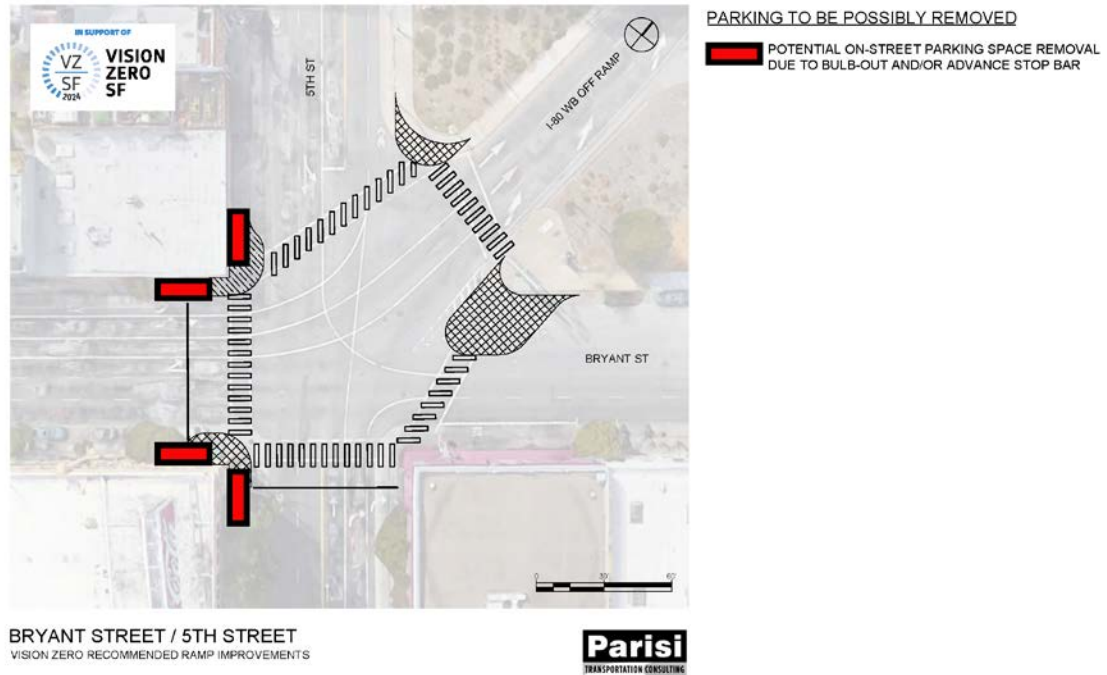


### 5th Street and Bryant Street

5<sup>th</sup> and Bryant will likely require four (4) on-street parking spaces to be removed to accommodate for both curb extension bulb-outs and advance stop bars. Two spaces on the northwest corner of 5<sup>th</sup> and

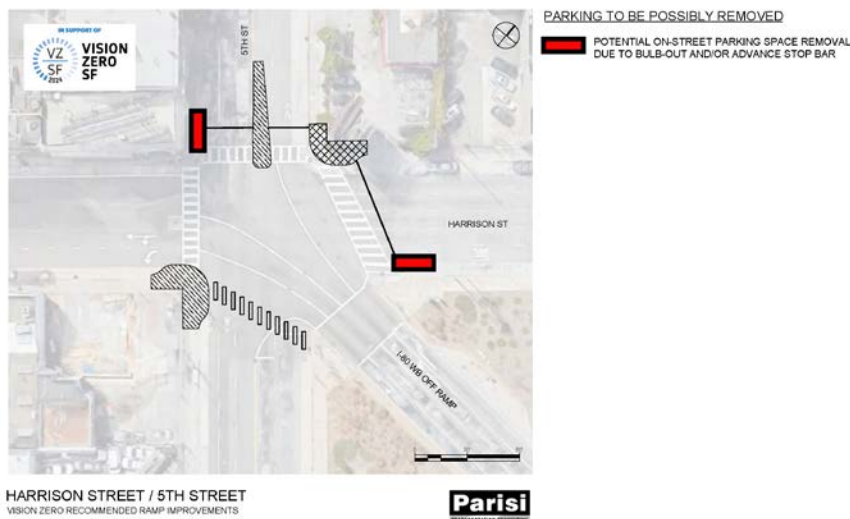
Bryant streets (one on 5<sup>th</sup> and one on Bryant closest to the intersection), and two spaces on the southwest corner of the intersection, one on 5<sup>th</sup> Street and the other on Bryant. Other bulb-out curb extensions improvements recommended for this intersection are located where there are no on-street parking spaces.

Figure 2: Parking Removal - 5th and Bryant Street



### 5th Street and Harrison Street

5<sup>th</sup> and Harrison will likely necessitate the removal of two (2) on-street parking spaces to accommodate for the installation of two advance stop bars. One space slated for removal is located on the southeast corner of Harrison and the I-80 westbound off ramp (on Harrison Street), and the other space likely for removal is located on the northwest corner of 5<sup>th</sup> and Harrison (on 5<sup>th</sup> Street). Although this intersection

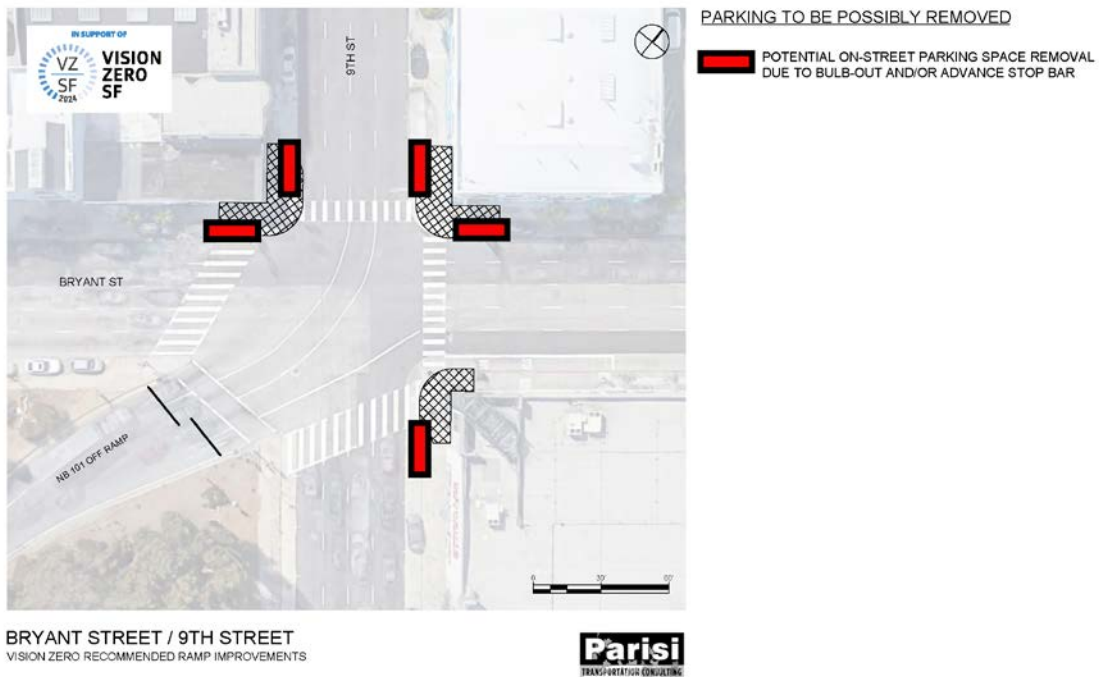


design recommendation calls for one raised curb extension bulb-out, and one painted bulb-out, these safety measures happen not to conflict with any existing parking.

### 9th Street and Bryant Street

The 9<sup>th</sup> and Bryant intersection will likely require five (5) on-street parking spaces to be removed from three of the intersection's corners. The five parking spaces likely necessitated for removal will make way for the installation of permanent raised curb extension bulb-outs. Two advance stop bars recommended for installation on the northbound 101 off ramp do not impinge on any existing parking areas. Spaces likely for removal are located on the northeast corner of 9<sup>th</sup> and Bryant streets (two spaces, one on each street), the northwest corner of 9<sup>th</sup> and Bryant streets (two spaces, one on each street), and the southeast corner of 9<sup>th</sup> and Bryant (on 9<sup>th</sup> Street).

Figure 4: Parking Removal: 9th and Bryant Street



Appendix F:  
Caltrans Short-term  
Improvement List

## Status of Caltrans Approvals of Treatments Related to Pedestrian & Bicycle Travel

### Geometric Design Elements and Geometric Cross-Section

<p><b>Raised crosswalks (on speed table)</b></p>	<p>Caltrans has approved one of these through the encroachment permit process at the NB 101 entrance in Windsor. Future installations would be evaluated on a case-by-case basis. <b>If doing a set of these at freeway entrances or conventional (surface) route intersections is desired, then developing a pilot program is advisable.</b> On State Routes, they could be applicable if placed parallel to the route, rather than across it, for slowing turns onto minor (particularly residential) streets, and if placed where pedestrians cross the entrance to uncontrolled loop or curving slip lane freeway onramps, or at freeway entrances meeting an uncontrolled T-intersection. On curves, they would need to be oriented perpendicular to the traffic crossing them, rather than diagonally, to avoid causing motorcyclists to lose control.</p>
<p><b>Transverse rumble strips</b></p>	<p>These may be appropriate to warn of a crosswalk ahead at the entrance to uncontrolled loop or curving slip lane freeway onramps, or at freeway entrances meeting an uncontrolled T-intersection. Caltrans would probably not approve these where bicyclists are legal roadway users. Installations would be evaluated on a case-by-case basis. <b>If doing a set of these at freeway entrances, then developing a pilot program is advisable.</b></p>
<p><b>Side rumble strips</b></p>	<p>District 4 only uses these where we have four feet of shoulder for use by bicyclists to the right of the rumble strip.</p>
<p><b>Curb extensions and corner radius reductions</b></p>	<p>CT has standards &amp; guidance for curb extensions/bulbouts in Index 303.4 of the Caltrans Highway Design Manual (HDM). The corner radius would need to still accommodate the design vehicle, which would be a large truck at freeway entrances and exits. In order to minimize the corner radius, the truck should be allowed to off-track into adjacent receiving lanes serving the same direction of travel if the location has only one-turn lane.</p>
<p><b>Truck aprons at corners</b></p>	<p>This may be a useful tool where the corner radius cannot be reduced to the extent desired to slow passenger cars due to the need to accommodate large truck turns. The trucks would use a mountable corner apron to complete turns, while passenger cars would follow the smaller radius along the perimeter of the apron. This has been done in</p>

	North Carolina and a few locations in Oregon. <b>If doing a set of these at freeway entrances or conventional (surface) route intersections is desired, then developing a pilot program is advisable.</b>
<b>Pedestrian refuge islands</b>	CT has standards & guidance for ped refuge islands in Index 405.4 of the HDM. This section has an advisory standard encouraging providing a ped refuge island at unsignalized intersections in urbanized areas where pedestrians cross two or more through-lanes having the same direction of travel, with or without a marked crosswalk. An advisory design exception fact sheet is required if the ped refuge island is not provided.
<b>Traffic circles</b>	These are generally more applicable on streets that are more minor than state highway routes.
<b>Roundabouts</b>	These are required to be analyzed as an alternative wherever a new signal is proposed per the Caltrans Intersection Control Evaluation (ICE) policy (Traffic Operations Policy Directive 13-02); Trucks are accommodated through the use of a truck apron on the perimeter of the center island. Guidance and standards for roundabouts are provided in Index 405.10 of the HDM.
<b>Road diets</b>	Requires an operational study to determine capacity and traffic impacts versus safety benefits; Caltrans sponsored a road diet project on Sloat Blvd (SR 35)

## Traffic Control Devices & Operational Strategies

<b>Temporary painted safety zones (e.g. bulbouts) with safe-hit posts</b>	These have been discouraged in the past due to concerns about maintenance when flexible posts are damaged and effectiveness once the posts are compromised. (Note that Caltrans refers to safe-hit posts as flexible channelizers per the California Manual on Uniform Traffic Control Devices (CA MUTCD) terminology). <b>This treatment would thus likely require a maintenance agreement wherein the local agency takes this responsibility.</b> A pilot program may also be necessary if concerns are raised about pedestrians waiting on the striped bulbout. <b>A report documenting the local positive safety results with these would help.</b>
<b>Pedestrian Hybrid Beacons (formerly HAWKs)</b>	These are approved and covered in Chapter 4F of the CA MUTCD. Caltrans may require that these be interconnected with the signals along the corridor, but this can be done through wireless interconnect if the project will not be reconstructing the street.



<b>Rectangular Rapid Flashing Beacons</b>	<p>FHWA has granted blanket approval for use of these in CA based on the federal interim approval (IA 11): <a href="http://www.dot.ca.gov/hq/traffops/engineering/mutcd/pdf/interim/RRFB-IA-11-83_REPLY_CA_Statewide.pdf">http://www.dot.ca.gov/hq/traffops/engineering/mutcd/pdf/interim/RRFB-IA-11-83_REPLY_CA_Statewide.pdf</a>. The guidance for their use can be found in the FHWA IA 16 Memo: <a href="http://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/fhwamemo.htm">http://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/fhwamemo.htm</a>.</p> <p>D4 has been requiring that these be hard-wired, rather than solar powered, on Caltrans-sponsored projects, causing them to lose much of their cost-competitiveness with PHBs and resulting in the use of PHBs instead. However, some locally-sponsored solar-powered RRFB installations have been approved through the encroachment permit process. If the reliability of the power source becomes an issue of concern, documentation regarding improvements in battery life over recent years may be necessary.</p>
<b>Ped countdown signals</b>	<p>These are standard per the CA MUTCD Section 4E.07. D4 consistently employs them where new ped signal heads are installed and has a project to retrofit existing per signal heads.</p>
<b>Lengthen time for pedestrian crossing</b>	<p>The default walking speed that Caltrans uses is 3.5 feet per second per the CA MUTCD Section 4E.06 (07) (reduced from the old 4 feet per second). If the local agency wishes to use a further reduced walking speed at a particular location, the CA MUTCD Section 4E.06 has guidance stating that "Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered" and "where older or disabled pedestrians routinely use the crosswalk, a walking speed of 2.8 feet per second should be considered".</p>
<b>Leading pedestrian intervals</b>	<p>These can be done per CA MUTCD Section 4E.06 (19). Per the guidance, they should be timed to provide a head start equal to the time it takes to cross the first lane of traffic - typically 4 seconds and no less than 3 seconds. Although an interagency review team may raise concerns regarding impacts on signal progression, a 4 second delay is too small for traffic impacts to be modeled and is thus not a significant impact. In other words, the actual traffic volume may be more different from the level modeled than the degree to which the extra 4 seconds differs from the cycle length without it.</p>
<b>Turn prohibitions</b>	<p>A traffic study would need to be performed to analyze the impact on traffic operations at other nearby, alternative</p>

	route intersections relative to the safety benefit and so that, if the turn prohibition is approved, the timing of the signal phases can be adjusted to optimize traffic flow.
<b>Protected left turns</b>	These are provided at all new signalized intersections and when ramp terminal intersections are reconstructed. At already signalized locations not undergoing reconstruction, a traffic study would need to be performed to determine if the turn pocket needs to be lengthened to provide more storage and to adjust the timing of the signal phases to optimize traffic flow.
<b>Lighting</b>	Installation of safety lighting is encouraged. Lighting has a proven safety benefit and a very high benefit to cost ratio.
<b>Advance stop lines (signalized intersections)</b>	Approved for use per CA MUTCD Section 3B.16.
<b>Advance yield lines (“sharks’ teeth”) (uncontrolled crossings)</b>	Approved for use per CA MUTCD Section 3B.16. District 4 supports using these at uncontrolled pedestrian crossing locations (where traffic is not controlled by a signal or stop sign) and is developing projects to start retrofitting these.
<b>Lane narrowing</b>	11 foot lane widths are the standard minimum on conventional routes in urbanized areas where the posted speed limit is 40 mph or less and the truck volume is less than 250 <u>per lane</u> per day per the HDM Index 301.1. Reducing lane widths to 10 feet on routes meeting these conditions would require a design exception. <b>If doing this at multiple locations within Caltrans right-of-way is desired, then developing a pilot program is advisable.</b>
<b>Bicycle Boxes</b>	<b>Requires submitting a request to experiment to FHWA &amp; the California Traffic Control Devices Committee (CTCDC). Local jurisdictions are encouraged to do so.</b>
<b>Two-Stage Turn Queue Boxes</b>	<b>Requires submitting a request to experiment to FHWA &amp; CTCDC. Local jurisdictions are especially encouraged to submit these,</b> as the level of experimentation with this device has lagged compared to experimentation with bike boxes.
<b>Bicycle Signals</b>	The CTCDC recommended, at their June 2015 meeting, that Caltrans seek blanket approval for optional use of these in CA based on federal interim approval 16 (IA 16). As of this writing (July 2015), Caltrans has not yet submitted the letter to FHWA, but this is expected to occur soon. District 4 approved the installation of a bicycle signal within an exclusive bicycle left-turn pocket through an encroachment permit for a locally-sponsored project on San Pablo Ave (SR 123) at West MacArthur Blvd in Emeryville.

<b>Bicycle Lanes</b>	These are supported by the Caltrans Complete Streets Policy (Deputy Directive 64-R-2). The challenge is finding enough space within the street cross-section.
<b>Buffered Bicycle Lanes</b>	Standards and guidance for these can now be found in the CA MUTCD Section 9C.04 (42-47). District 4 installed buffered bike lanes as part of the Caltrans-sponsored road diet project on Sloat Blvd (SR 35) and approved their use through an encroachment permit for a locally-sponsored project on Alpine Rd at I-280 in unincorporated San Mateo County.
<b>Green Bicycle Lanes</b>	<p>FHWA has granted blanket approval for use of these in CA based on the federal interim approval (IA 14):  <a href="http://www.dot.ca.gov/hq/traffops/engineering/mutcd/pdf/interim/2011-08-2_Ltr_to_CADOT_ColoredBikeLane.pdf">http://www.dot.ca.gov/hq/traffops/engineering/mutcd/pdf/interim/2011-08-2_Ltr_to_CADOT_ColoredBikeLane.pdf</a></p> <p>The guidance for their use can be found in the FHWA IA 16 Memo:  <a href="http://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/index.htm">http://mutcd.fhwa.dot.gov/resources/interim_approval/ia16/index.htm</a>.</p> <p>District 4 has approved these through encroachment permits for locally-sponsored projects on Alpine Rd at I-280 in unincorporated San Mateo County, on Rohnert Park Expressway at US 101 in Rohnert Park, and on Old Redwood Highway at US 101 in Windsor.</p>
<b>Protected Bikeways / Cycle Tracks (new Class IV Bikeway)</b>	CT has until January 1, 2016, to develop guidance for these per AB 1193. Until then, these are being evaluated through the design exception process, the key exception being a reduced setback from motor traffic compared to Class I bike path standards in the HDM.

Appendix G:

Project Cost  
Estimates

**PROJECT COST**

<b>Intersection</b>	<b>Construction Subtotal</b>	<b>Planning &amp; Outreach (5%)</b>	<b>Design (15%)</b>	<b>Contingency (30%)</b>	<b>Total</b>
Harrison / 5th Street	\$ 580,000	\$ 29,000	\$ 87,000	\$ 208,800	\$ 904,800
Bryant / 5th Street	\$ 385,000	\$ 20,000	\$ 58,000	\$ 138,900	\$ 601,900
Harrison / 8th Street	\$ 495,000	\$ 25,000	\$ 75,000	\$ 178,500	\$ 773,500
Bryant / 9th Street	\$ 685,000	\$ 35,000	\$ 103,000	\$ 246,900	\$ 1,069,900
Bryant / 10th Street	\$ 377,000	\$ 19,000	\$ 57,000	\$ 135,900	\$ 588,900
Potential Enhancements*	\$ 468,000				
<b>Total</b>	\$ 4,407,000				

Potential Enhancements\* Enhancements are added after community engagement. See Community Outreach Section for more information

**HARRISON STREET / 5TH STREET**

VISION ZERO RAMP RECOMMENDED IMPROVEMENTS

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Planning Cost Estimate	Implementation Next Steps and Timeline
<b>Signal Improvements</b>						
1	NW corner (SB 5th St approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	\$ 375,000	Funding and design for intersection signal upgrade (3-5 years)
4	NE & SW corner (NB & SB 5th St approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone		
6	NW, NE, SE, and south corner	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone		
8	NB 5th St approach	Convert permissive left turn to protected lagging left turn	Reduce left turn collisions	Reduce left turn collisions		
10	Entire intersection	Improve street lighting	Improve overall visibility at intersection	All types		
5	Ped phases Xing Harrison and SB 5th St	Program a leading ped interval	Improve ped visibility in intersection	Ped crash in Xwalk	\$ 5,000	Re-time signal (within 1 year)
<b>Civil Improvements</b>						
3	NE corner	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	\$ 150,000	Coordination with other civil projects. Design and funding. (3-5 years)
9	NB 5th St approach	Install new ped Xing	Improve ped access			
<b>Signing / Striping Improvements</b>						
7	WB Harrison approach	Install advance stop bar	Reduce instances of Xwalk blocking	Ped crash in Xwalk	\$ 50,000	Funding and design. (1-3 years)
2	SW corner (SB 5th approach)	Install temporary bulb-out	Encourage slower vehicular turning	Ped crash in Xwalk		
2	SB 5th Street approach	Install temporary median	Encourage slower vehicular turning	Ped crash in Xwalk		
<b>Other Improvements</b>						
11	Entire intersection	Install bicycle network improvements	Improve bicycle access	All types	TBD	Complete 5th Street corridor planning. Funding and design (3-5 years)

All directions consider numbered streets as running in the N-S direction and named streets in the E-W direction

Subtotal	\$ 580,000
Planning & Outreach (5%)	\$ 29,000
Design (15%)	\$ 87,000
30% Contingency	\$ 208,800
Total	\$ 904,800

**BRYANT STREET / 5TH STREET**

VISION ZERO RAMP RECOMMENDED IMPROVEMENTS

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Planning Cost Estimate	Implementation Next Steps and Timeline
<b>Signal Improvements</b>						
1	SW corner (EB Bryant approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	\$ 40,000	Funding and design for intersection signal upgrade (3-5 years)
2	East corner (SB 5th St approach)	Signal upgrade - far side traffic signal	Improve signal visibility	Rear end and left turn		
4	NW, NE and SW corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone		
7	EB Bryant approach	Install cantilevered wayfinding sign	Improve vehicular wayfinding for proper lane assignments	Sideswipes	\$ 30,000	Outreach, planning, funding and design. (1-3 years).
<b>Civil Improvements</b>						
3	NE, SW and East corners	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	\$ 300,000	Coordination with other civil projects. Design and funding. (3-5 years)
<b>Signing / Striping Improvements</b>						
5	All Xwalks	Upgrade Xwalk to high-visibility type	Reduce instances of Xwalk blocking	Ped crash in Xwalk	\$ 15,000	Funding and design (1-3 years)
5	EB Bryant & NB 5th St approaches	Install advance stop bar	Reduce instances of Xwalk blocking	Ped crash in Xwalk		
6	Entire intersection	Refresh pavement striping and markings	Maintenance	All types		
8	SW corner	Install temporary bulb-out	Encourage slower vehicular turning	Ped crash in Xwalk		
<b>Other Improvements</b>						
9	Entire intersection	Install bicycle network improvements	Improve bicycle access	All types	TBD	Complete 5th Street corridor planning. Funding and design (3-5 years)

All directions consider numbered streets as running in the N-S direction and named streets in the E-W direction

Subtotal	\$ 385,000
Planning & Outreach (5%)	\$ 20,000
Design (15%)	\$ 58,000
30% Contingency	\$ 138,900
<b>Total</b>	<b>\$ 601,900</b>

**HARRISON STREET / 8TH STREET**

VISION ZERO RAMP RECOMMENDED IMPROVEMENTS

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Planning Cost Estimate	Implementation Next Steps and Timeline
<b>Signal Improvements</b>						
1	NE & SE corners (EB Harrison approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	\$ 375,000	Funding and design for intersection signal upgrade (3-5 years)
2	NW corner (WB Harrison approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone		
3	SE corner (WB I-80 off-ramp approach)	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone		
<b>Civil Improvements</b>						
5	SW corner	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	\$ 100,000	Coordination with WB I-80 off-ramp project (#5) (3-5 years)
<b>Other Improvements</b>						
4	WB I-80 off-ramp approach	Close one lane on the off-ramp	Calm traffic from off-ramp approach	All types	\$ 20,000	Planning, analysis and coordination with Caltrans D4. Funding and design. (3-5 years)

All directions consider numbered streets as running in the N-S direction and named streets in the E-W direction

Subtotal	\$ 495,000
Planning & Outreach (5%)	\$ 25,000
Design (15%)	\$ 75,000
30% Contingency	\$ 178,500
<b>Total</b>	<b>\$ 773,500</b>



**BRYANT STREET / 9TH STREET**

VISION ZERO RAMP RECOMMENDED IMPROVEMENTS

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Planning Cost Estimate	Implementation Next Steps and Timeline
<b>Signal Improvements</b>						
1	NW corner (EB Bryant approach)	Signal upgrade - nearside traffic signal	Improve signal visibility	Rear end and T-bone	\$ 375,000	Funding and design for intersection signal upgrade (3-5 years)
3	SE corner (EB Bryant approach)	Signal upgrade - traffic signal mast arm poles	Improve signal visibility	Rear end and T-bone		
5	All corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone		
	Entire Intersection	Improve street lighting	Improve overall visibility at intersection	All types		
4	NW & NE corners (SB 9th St approach)	Program a leading ped interval	Improve ped visibility in intersection	Ped crash in Xwalk	\$ 5,000	Re-time signal (within 1 year)
<b>Civil Improvements</b>						
2	SE, NW, and NE corners	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	\$ 300,000	Coordination with other civil projects. Design and funding. (3-5 years)
<b>Signing / Striping Improvements</b>						
6	NB 101 off-ramp approach	Install advance stop bar	Reduce instances of Xwalk blocking	Ped crash in Xwalk	\$ 5,000	Funding and design (1-3 years)

All directions consider numbered streets as running in the N-S direction and named streets in the E-W direction

Subtotal	\$ 685,000
Planning & Outreach (5%)	\$ 35,000
Design (15%)	\$ 103,000
30% Contingency	\$ 246,900
<b>Total</b>	<b>\$ 1,069,900</b>

**BRYANT STREET / 10TH STREET**

VISION ZERO RAMP RECOMMENDED IMPROVEMENTS

#	Location	Type of Improvement	Safety Purpose	Collision Type Addressed	Planning Cost Estimate	Implementation Next Steps and Timeline
<b>Signal Improvements</b>						
5	South corner (SB 10th St approach)	Signal upgrade - far side traffic signal	Improve signal visibility	Rear end and T-bone	\$ 22,000	Funding and design for intersection signal upgrade (3-5 years)
4	All corners	Upgrade signal heads from 8" to 12"	Improve signal visibility	Rear end and T-bone		
3	NE and SE corners (Xing Bryant East leg)	Program a leading ped interval	Improve ped visibility in intersection	Ped crash in Xwalk	\$ 5,000	Re-time signal (within 1 year)
1	SB 10th St approach	Install cantilevered wayfinding sign	Improve vehicular wayfinding for proper lane assignments	Vehicular right-turn	\$ 30,000	Outreach, planning, funding and design. (1-3 years).
<b>Civil Improvements</b>						
2	NE, SE and South corners	Install corner bulb-out	Shorten ped Xing distance	Ped crash in Xwalk	\$ 300,000	Coordination with other civil projects. Design and funding. (3-5 years)
	Entire Intersection	Improve street lighting	Improve overall visibility at intersection	All types		
9	SE and South corners (crossing SB 101 on-ramp)	Install new ped Xing	Improve ped access	NA		
<b>Signing / Striping Improvements</b>						
6	Entire intersection	Refresh pavement striping and markings	Maintenance	Vehicular right-turn	\$ 20,000	Funding and design. (1-3 years)
8	Entire intersection	Restripe channelizing lines	Maintenance	Vehicular right-turn		
7	SB 10th St approach	Consider alternative lane arrangements	Reduce driver confusion at intersection	Vehicular right-turn		Analysis, funding and design. (1-3 years)

All directions consider numbered streets as running in the N-S direction and named streets in the E-W direction

Subtotal	\$ 377,000
Planning & Outreach (5%)	\$ 19,000
Design (15%)	\$ 57,000
30% Contingency	\$ 135,900
<b>Total</b>	<b>\$ 588,900</b>