

RTIP ID#				
TIP ID# <u>ALA 110030</u>				
Air Quality Conformity Task Force Consideration Date March 2012				
Project Description (<i>clearly describe project</i>) -The City of Albany proposes to build a Class I bicycle facility along the south side of Buchanan St./Marin Ave. from the intersection with Pierce St. to the Marin Ave./San Pablo Ave intersection in the. -Installation of sharrows on the eastbound direction along Buchanan St. and Marin Avenue. -Implementation of a bicycle lane on the westbound direction (north side of Buchanan/Marin Ave. -Elimination of the Buchanan St. connection to Cleveland Ave. (known as Buchanan Ave.) at the intersection of Pierce Street and Buchanan St. -reconfiguration of the USDA driveway -Implementation of pedestrian bulb outs on the south side of Buchanan Street. -Implementation of a traffic signal at Buchanan St./Pierce St. intersection, -Installation of a flashing Stop Sign at the USDA driveway -Construction of a dedicated right turn lane in the eastbound direction at the Marin/San Pablo intersection.				
Type of Project: Bicycle/Pedestrian facility				
County Alameda	<i>Narrative Location/Route & Postmiles</i> Located along Buchanan Street and Marin Avenue, between Pierce Street and San Pablo Avenue in Albany between post mile 4.40 and 4.43 Caltrans Projects – EA#			
Lead Agency: City of Albany				
<i>Contact Person</i> Aleida Andrino-Chavez	<i>Phone#</i> 510-528-5759	<i>Fax#</i> 510-524-9359	<i>Email</i> achavez@albanyca.org	
Federal Action for which Project-Level PM Conformity is Needed (<i>check appropriate box</i>)				
<i>Categorical Exclusion (NEPA)</i>	EA or Draft EIS	FONSI or Final EIS	<input checked="" type="checkbox"/> PS&E or Construction	<i>Other</i>
Scheduled Date of Federal Action: 4/30/2012				
NEPA Delegation – Project Type (<i>check appropriate box</i>)				
<i>Exempt</i>	<input checked="" type="checkbox"/> Section 6004 – Categorical Exemption	Section 6005 – Non-Categorical Exemption		
Current Programming Dates (<i>as appropriate</i>)				
	PE/Environmental	ENG	ROW	CON
Start	2/29/2012	3/30/2012	3/15/2012	06/2012
End				

Project Purpose and Need (Summary): *(please be brief)*

The project will close the existing gap in the local and regional bicycle network between the Ohlone Greenway and the Bay Trail. The Buchanan Bikeway project will address a major portion of this gap by installing bikeway facilities on Buchanan Street and Marin Avenue from the existing Class I Bikeway located at the west end of the Buchanan Street Overhead west of Pierce Street to San Pablo Avenue. This project was ranked top priority in the Alameda Countywide Bicycle Plan for its local and regional significance in advancing utilitarian bicycle trips in Alameda County and for its direct connection with bus transit trunk lines and BART station accessibility via the Ohlone Greenway.

Surrounding Land Use/Traffic Generators *(especially effect on diesel traffic)* The project is surrounded by institutional land use along the southern limit (USDA, public park, Albany School District, and University of California). At the northern limit, land uses consist of single and multi family homes. At the westerly limit is the Buchanan overcrossing and at the easterly limit is San Pablo Avenue.

Brief summary of assumptions and methodology used for conducting analysis

Traffic counts were taken as part of the traffic studies developed during the design process and it was part of the Mitigated Negative Declaration under CEQA.

Opening Year: If facility is a highway or street, Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility.

The proposed project is construction of a bicycle facility along the south and north sides of Buchanan Street and Marin Avenue. 8 intersections were analyzed for this project. Attached are the tables showing existing conditions, cumulative conditions and plus project conditions for the year 2030.

Current AADT is 30,138 vehicles.

Percentage trucks: 2% this is maintained throughout the planning period.

RTP Horizon Year / Design Year: If facility is a highway or street, Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility

Opening Year: If facility is an interchange(s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

RTP Horizon Year / Design Year: If facility is an interchange (s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

Opening Year: If facility is a bus, rail or intermodal facility/terminal/transfer point, # of bus arrivals for Build and No Build, % and # of bus arrivals will be diesel buses

RTP Horizon Year / Design Year: If facility is a bus, rail or intermodal facility/terminal/transfer point, # of bus arrivals for Build and No Build, % and # of bus arrivals will be diesel buses

Describe potential traffic redistribution effects of congestion relief (*impact on other facilities*)

This project will increase the LOS of the Buchanan/Pierce intersection by the implementation of the traffic signal. Currently, this intersection operates at LOS F, with the signal, it will operate at LOS A, even in the future conditions with project scenario.

Comments/Explanation/Details (please be brief)

With the project, trucks heading to Cleveland will not be able to access Cleveland Avenue via Buchanan Avenue (the Buchanan spur that will be closed to traffic to allow for bike and pedestrian crossings at Pierce Street. The new truck route will direct trucks heading to Cleveland Avenue back to the I-580 freeway (east), exit on Central Avenue and a right turn onto Jacuzzi in Richmond (Jacuzzi becomes Cleveland in Albany). It is estimated that approximately 42 trucks traveling east (according to existing conditions) will take this route to access Cleveland Avenue.

CITY OF ALBANY

ALAMEDA COUNTY, CALIFORNIA

PLANS FOR THE CONSTRUCTION OF BUCHANAN BIKEWAY PIERCE STREET TO CORNELL AVENUE

CITY OF ALBANY CONTRACT NO. 09-XX
FEDERAL CONTRACT NO. XXXXXX

CLIENT:
Buchanan Bikeway

FOR
CITY OF ALBANY, CA

1000 SAN PABLO AVENUE
ALBANY, CALIFORNIA 94706
(510) 528-5760

DESIGNER:
AECOM

2101 Webster Street, Suite 1900
Oakland, CA 94612
510-622-6600
510-834-5220

REGISTRATION:



NOTES LEGEND

- # CONSTRUCTION NOTE
- # DETAIL NUMBER PER CALTRANS STANDARD PLANS (MAY 2006)
- G# CURVE NUMBER

GENERAL LEGEND

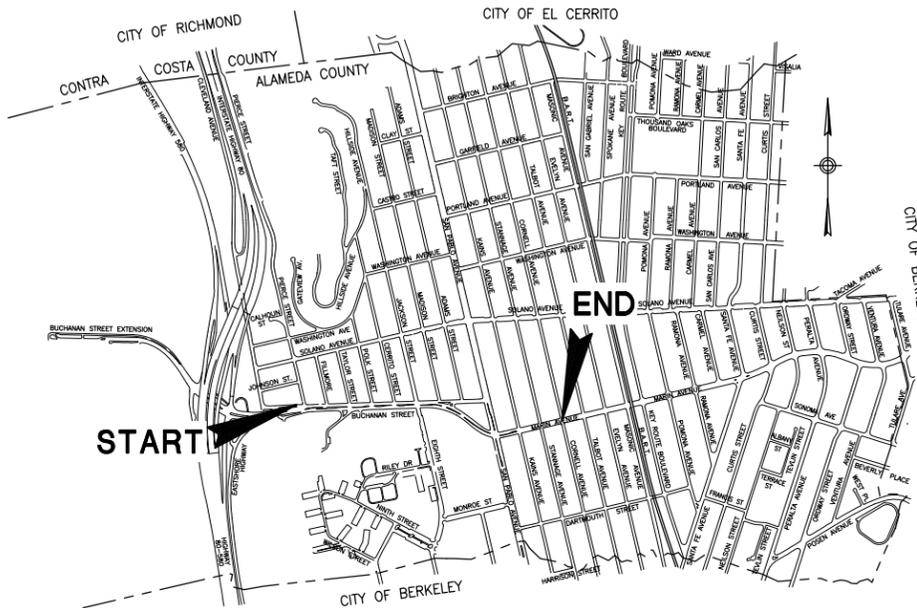
EXISTING	NEW	DESCRIPTION
		UTILITY POLE
		ELECTROLIER
		FIRE HYDRANT
		ROADSIDE SIGN
		CURB RAMP
		DRAINAGE CATCH BASIN
		FENCE
		SANITARY SEWER MANHOLE
		STORM DRAIN MANHOLE
		STORM DRAIN INLET
		UTILITY BOX
		STORM DRAIN CATCH BASIN
		TRAFFIC SIGNAL
		LANDSCAPING
		TREE

SHEET INDEX

SHEET NUMBER	DRAWING NUMBER	DESCRIPTION
1	G-1	TITLE SHEET AND LEGEND
2	X-1	TYPICAL CROSS SECTIONS
3	X-2	TYPICAL CROSS SECTIONS
4	L-1	BUCHANAN ST. STA 116+00 TO STA 121+00
5	L-2	BUCHANAN ST. STA 121+00 TO STA 126+00
6	L-3	BUCHANAN ST. STA 126+00 TO STA 131+00
7	L-4	BUCHANAN ST. STA 131+00 TO STA 136+00
8	L-5	MARIN AVE. STA 136+00 TO STA 140+50
9	L-6	MARIN AVE. STA 140+50 TO STA 145+00
10	L-7	MARIN AVE. STA 145+00 TO STA 150+00

ABBREVIATIONS

AB	AGGREGATE BASE	RT	RIGHT
AC TRANSIT	ALAMEDA COUNTY TRANSIT	R/W	RIGHT OF WAY
AC	ASPHALT CONCRETE	SHLD	SHOULDER
APPROX	APPROXIMATELY	ST	STREET
CL	CENTERLINE	SW	SIDEWALK
(E)	EXISTING	TYP	TYPICAL
L	LEFT	USDA	UNITED STATES DEPARTMENT OF AGRICULTURE
LS	LANDSCAPE	VAR	VARIES
N	NORTH		
NO	NUMBER		
(P)	PROPOSED		
PRKG	PARKING		



VICINITY MAP

NOT TO SCALE

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35% SUBMITTAL
NOT FOR CONSTRUCTION

DRAWING TITLE:

TITLE SHEET
ABBREVIATIONS
AND LEGENDS

DRAWING NUMBER:

G-1

SHEET 1

REV XXX

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Vehicle Classification Aggregate Summary
Location: Buchanan St btwn Pierce St & Buchanan St underpass

	Motorcycle	Passenger Car	Other SU Vehicle	Buses	2-axle, 6-tire, SU Truck	3-axle, SU Truck	4-axle, SU Truck	>4-axle, Single Trailer Truck	5-axle, Single Trailer Truck	<6-axle, Single Trailer Truck	5-axle, Multi-Trailer Truck	6-axle, Multi-Trailer Truck	7-axle, Multi-Trailer Truck	Total	
Totals	2	446	39		36	1	0	4	0	0	0	0	30	558	SATURDAY
% of Totals	0%	80%	7%		6%	0%	0%	1%	0%	0%	0%	0%	5%	100%	12/13/08
Totals		324	27		32	0	0	0	0	0	0	0	14	397	SUNDAY
% of Totals		82%	7%		8%	0%	0%	0%	0%	0%	0%	0%	4%	100%	12/14/08
Totals	3	496	89	1	18	1	1	34	0	0	0	0	9	652	MONDAY
% of Totals	0%	76%	14%	0%	3%	0%	0%	5%	0%	0%	0%	0%	1%	100%	12/15/08
Totals	4	505	83	3	21	0	0	27	0	0	2	0	4	649	TUESDAY
% of Totals	1%	78%	13%	0%	3%	0%	0%	4%	0%	0%	0%	0%	1%	100%	12/16/08
Totals	4	527	76	5	23	2	0	25	1	0	1	0	20	684	WEDNESDAY
% of Totals	1%	77%	11%	1%	3%	0%	0%	4%	0%	0%	0%	0%	3%	100%	12/17/08
Totals	9	529	76	1	20	2	0	34	0	0	0	0	18	689	THURSDAY
% of Totals	1%	77%	11%	0%	3%	0%	0%	5%	0%	0%	0%	0%	3%	100%	12/18/08
Totals	5	533	88		18	0	0	39	0	0	0	0	23	706	FRIDAY
% of Totals	1%	75%	12%		3%	0%	0%	6%	0%	0%	0%	0%	3%	100%	12/19/08
Totals	27	3360	478	10	168	6	1	163	1	0	3	0	118	4335	7-DAY COUNTS
% of Totals	0.6%	77.5%	11.0%	0.2%	3.9%	0.1%	0.0%	3.8%	0.0%	0.0%	0.1%	0.0%	2.7%		

AVERAGE TRUCKS PER DAY : 42

Trucks traveling westbound on Buchanan Street.

AECOM

155 Grand Avenue, Suite 700, Oakland, CA 94612
T 510.763.2929 F 510.834.5220

Memorandum

Date: September 21, 2009
To: Aleida Andrino-Chavez, City of Albany
From: Bill Burton, Sudeep Deshmukh
Subject: Buchanan Bike Path Traffic Study - Final

Dear Ms. Andrino-Chavez,

AECOM Transportation is pleased to submit this final memorandum summarizing our assessment of the potential traffic impacts of a proposed bike path in the Marin Avenue/Buchanan Street corridor.

As outlined in the scope of work, this study evaluates the Levels of Service (LOS) of eight intersections along the Marin Avenue/Buchanan Street corridor between San Pablo Avenue and I-580 WB Ramps for the following four scenarios:

- Existing Conditions,
- Existing plus Project Conditions,
- Cumulative Conditions (2030), and
- Cumulative plus Project Conditions (2030).

Intersection operations were evaluated for the weekday AM and PM peak hours of travel, including queuing analysis and signal warrant analysis at unsignalized study intersections of Pierce Street & Taylor Street. The results of the analysis are included in this memorandum.

Please do not hesitate to contact me if you have any questions.

Yours Sincerely,



Bill Burton, PE
AECOM Transportation
D 510.622.6642
bill.burton@aecom.com

Introduction

This analysis has been conducted to assess the potential transportation impacts of a proposed bike facility along the Buchanan Street corridor between Main Avenue and the Bay Trail at the I-580/I-80 interchange. Class I, II and III bike facilities were reviewed and assessed for potential installation along the Buchanan Street Corridor. The project site location and the surrounding study are shown on **Figure 1**.

Proposed Project Alternatives

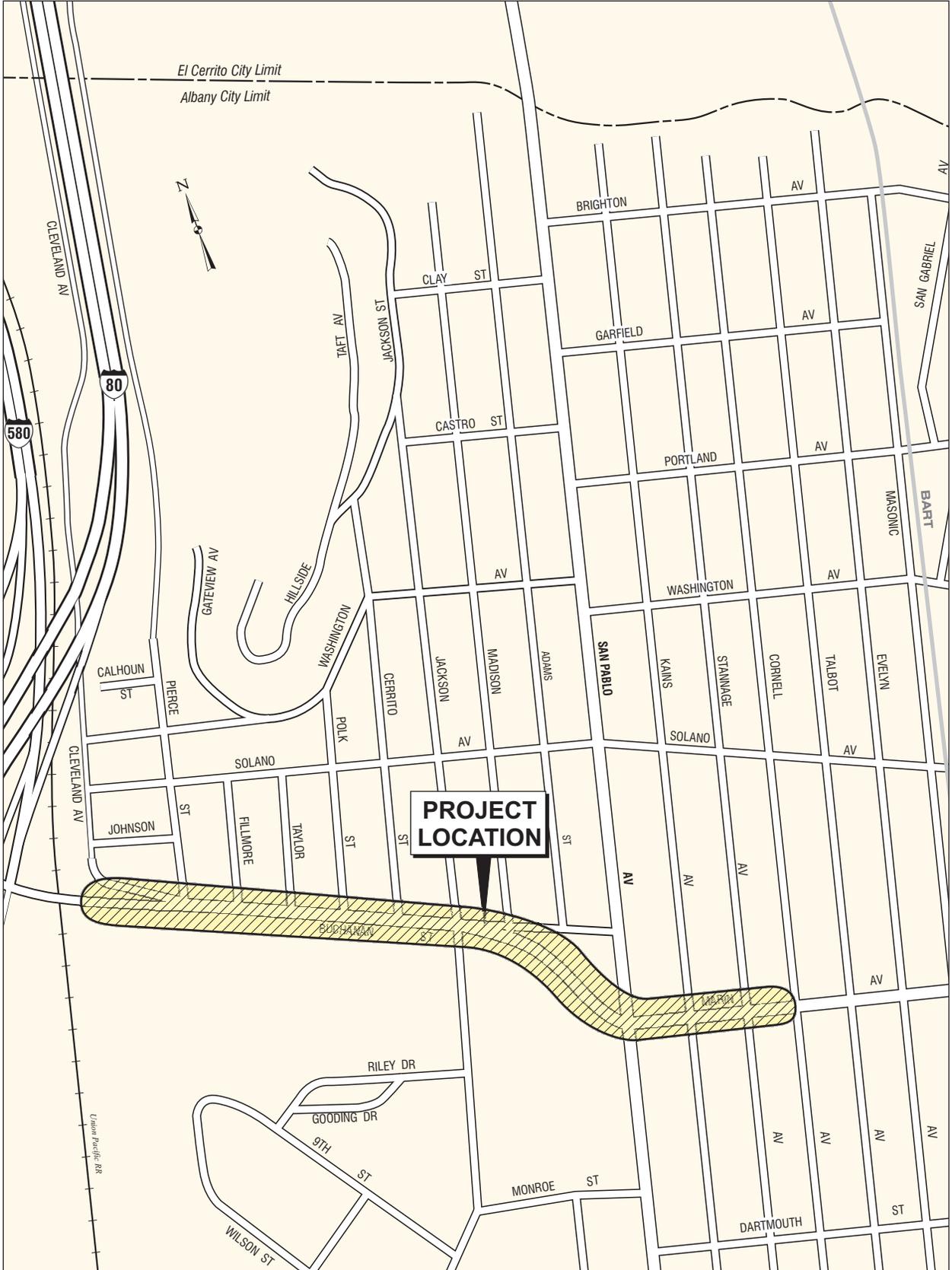
The following alternatives have been evaluated to close the bike facility gap in the Buchanan Street corridor between Main Avenue and the Bay Trail at the I-580/I-80 interchange:

Alternative 1: This alternative would feature a Class I bike path along the south side of the Marin Avenue/Buchanan Street corridor between San Pablo Avenue and Taylor Street; and on the north side between the Taylor Street and Pierce Street intersections. It would also include a Class II bike lane on the north side of the Marin Avenue/Buchanan Street corridor between Taylor Street and San Pablo Avenue, and on both sides of the roadway between San Pablo Avenue and Cornell Avenue, east of the San Pablo Avenue/Marin Avenue intersection. In addition to the proposed bike lanes, this alternative also proposes the signalization of the current two-way stop controlled Buchanan Street/Taylor Street intersection and introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

Alternative 2: This alternative would feature a Class I bike path along the south side of the Marin Avenue/Buchanan Street corridor between San Pablo Avenue and Pierce Street. It would also include a Class II bike lane on the north side of the corridor between Pierce Street and San Pablo Avenue, and on both sides of the corridor between San Pablo Avenue and Cornell Avenue, east of the San Pablo Avenue/Marin Avenue intersection. In addition to the proposed bike lanes, this alternative proposes the signalization of the current two-way stop controlled Buchanan Street/Pierce Street intersection; the closure of skewed westbound one-way single lane Buchanan Street section on the north side of the corridor; and the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

Alternative 3: This alternative would feature a Class I bike path along the south side of the Marin Avenue/Buchanan Street corridor between San Pablo Avenue and Pierce Street. The path would loop underneath the overpass west of Pierce Street to the north side of the corridor. The alternative would also include a Class II bike lane on the north side of the corridor between Taylor Street and San Pablo Avenue, and on both sides of the corridor between San Pablo Avenue and Cornell Avenue, east of the San Pablo Avenue/Marin Avenue intersection. This alternative also proposes the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

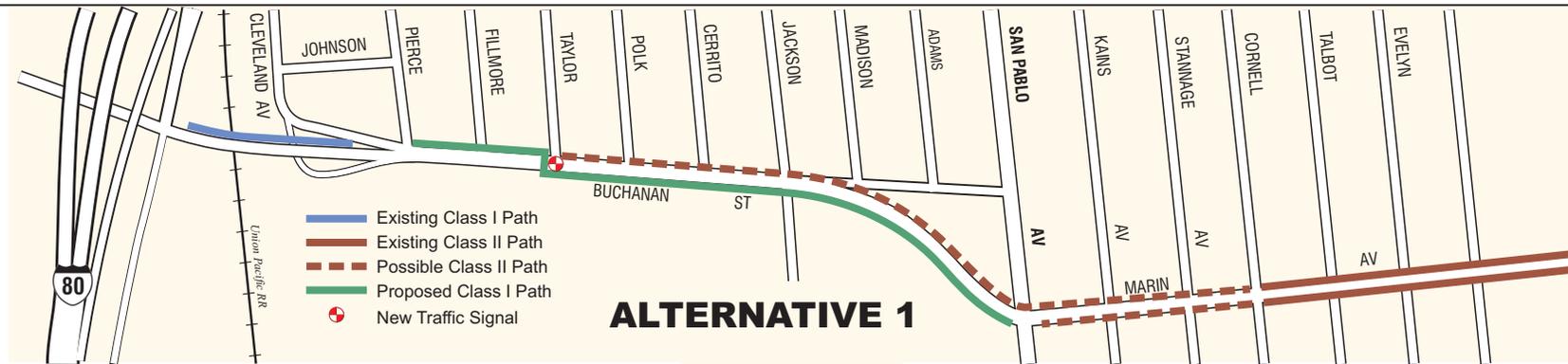
The proposed bike path alternatives are shown on **Figure 2**.



Location.cdr

BUCHANAN STREET BIKE PATH

Figure 1
PROJECT LOCATION



alignment options.cdr

BUCHANAN STREET BIKE PATH

Figure 2

BICYCLE / PEDESTRIAN PATH ALIGNMENT ALTERNATIVES

Study Scope

The following scenarios were evaluated to identify the potential transportation impacts associated with proposed alternatives:

- Existing Conditions;
- Existing plus Project Conditions;
- 2030 Cumulative Conditions; and
- 2030 Cumulative plus Project Conditions.

Intersection Levels of Service were analyzed at the following study intersections for the AM and PM peak hours:

1. San Pablo Avenue/Marin Avenue;
2. Marin Avenue/ Buchanan Street;
3. Buchanan Street/Jackson Street;
4. Buchanan Street/Taylor Street / USDA Entrance;
5. Buchanan Street/Pierce Street;
6. Buchanan Street/Eastshore Highway;
7. Buchanan Street/I-580 EB Ramps; and
8. Buchanan Street/I-580 WB Ramps.

Analysis Methodology and Intersection Level of Service Standards

Traffic conditions at the study intersections were evaluated using Level of Service calculations. The LOS concept qualitatively characterizes traffic conditions associated with varying levels of traffic. A LOS determination is a measure of congestion, which is the principal measure of roadway service. Level of Service definitions for signalized and unsignalized intersections is illustrated in **Table 1**. The qualitative measure ranges from LOS A which indicates a free-flow condition to LOS F, which indicates a congested or overloaded condition, with extremely long delays.

Traffic conditions at the study intersections are evaluated for the morning and evening peak hours using the methodology of the Transportation Research Board's *2000 Highway Capacity Manual (HCM)* and calculated using the Synchro 7.0 software package. With this methodology, a Level of Service is assigned based on average total vehicle delay.

Table 1: Intersection Level of Service Definitions

LOS	Description	Total Delay (seconds/vehicle)	Total Delay (seconds/vehicle)
		Signalized Intersections	Unsignalized Intersections
A	Little or no delay	≤ 10.0	≤ 10.0
B	Short traffic delay	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	Average traffic delay	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0
D	Long traffic delay	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	Very long traffic delay	> 55.0 and ≤ 80.0	> 35.1 and ≤ 50.0
F	Extreme traffic delay	> 80.0	> 50.0

Source: Highway Capacity Manual, Transportation Research Board, 2000.

All of the study intersections are located in the City of Albany's jurisdiction, and are therefore subject to the City of Albany Level of Service standards except the I-580 eastbound and westbound ramps intersections, which are located within the Caltrans right-of-way. The Level of Service standard for intersections in City of Albany's jurisdiction is LOS D. The I-580 eastbound and westbound ramps intersections with Buchanan Street are located in Caltrans' jurisdiction, and are therefore subject to Caltrans' Level of Service standards. Caltrans endeavors to maintain a target LOS at the transition between LOS 'C' and LOS 'D' on state highway facilities.

Existing Conditions

This section describes the existing transportation conditions in the vicinity of the site, including the road network, bicycle and pedestrian facilities.

Existing Roadway Network

Buchanan Street is an east-west arterial that originates south of the proposed project at the intersection of Gilman Street/Frontage Road and terminates at San Pablo Avenue. Between the I-80/I-580 ramp intersections and Marin Avenue, Buchanan Street provides two travel lanes in each direction, and between Marin Avenue and San Pablo Avenue, it provides one travel lane in the westbound direction and one travel lane in the eastbound direction. The posted speed limit on this street is 25 miles per hour.

Marin Avenue is an east-west arterial that extends from Buchanan Street in Albany to the Berkeley hills, featuring two travel lanes in each direction in the study area. The posted speed limit on this street is 25 miles per hour.

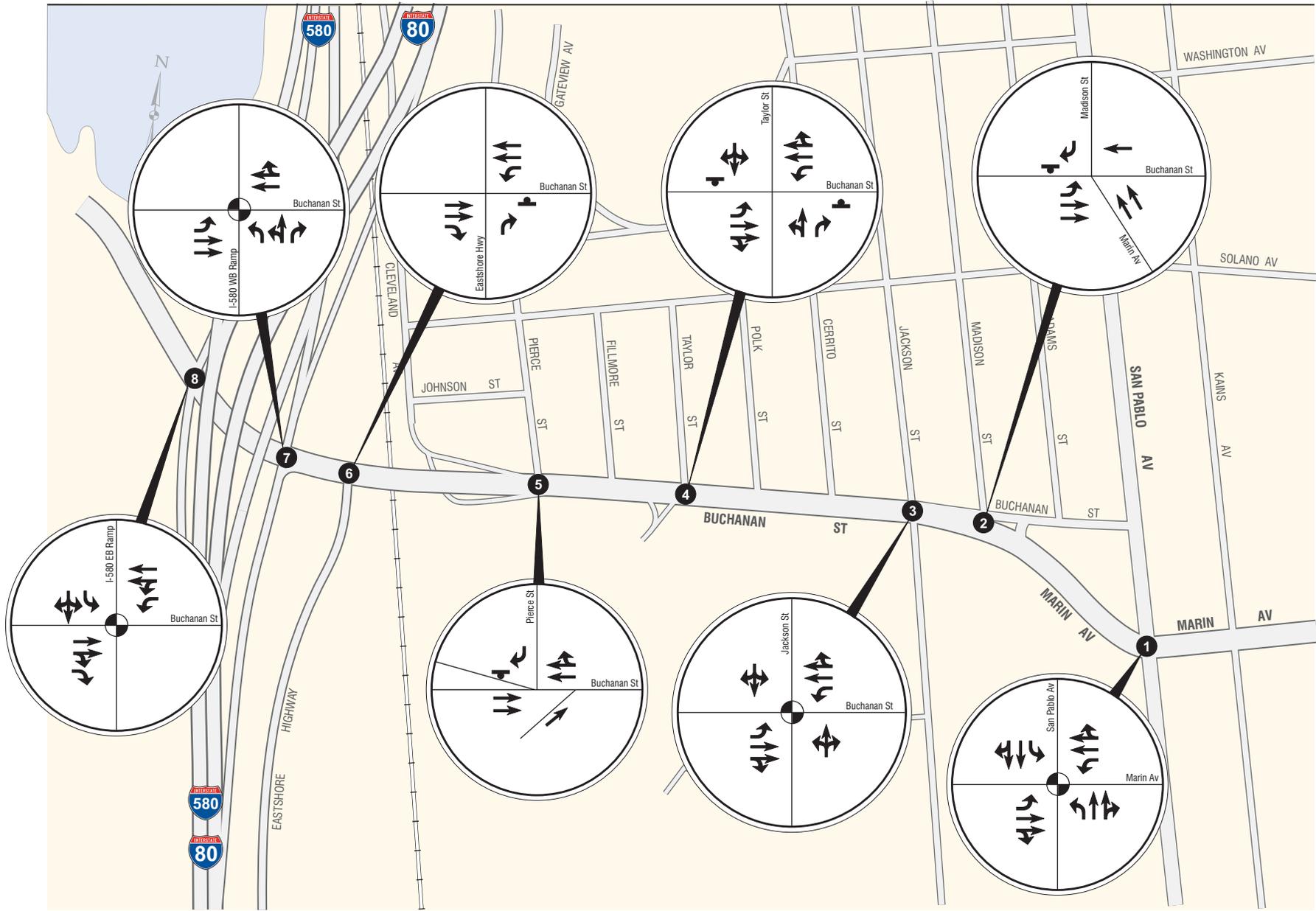
Existing Bicycle and Pedestrian Facilities

Currently, there is an existing Class II bike lane on Marin Avenue on both sides of the street from the Berkeley border to Cornell Avenue. The lanes extend further east within the City of Berkeley. This existing Class II bike lane is the only east-west connection in Albany that provides continuous access between the Berkeley hills and the Bay Trail. These bike lanes are dropped between Stannage Avenue and San Pablo Avenue in order to provide additional travel lanes at the congested intersection of Marin Avenue/San Pablo Avenue. Bicyclists share the road right-of way with vehicular traffic in this section and on Buchanan Street between San Pablo Avenue and Pierce Street as there are no designated bicycle facilities.

Sidewalks are provided on all of the existing roadways in the study area. The Marin Avenue/San Pablo Avenue and Buchanan Street/Jackson Street are the only intersections in the study corridor that provide striped crosswalks and pedestrian signal heads.

Existing Intersection Lane configurations

The existing lane configurations and traffic control at the study intersections are shown on **Figure 3a**, and the alternative lane configurations due to the proposed Buchanan bike path are shown on **Figure 3b**.

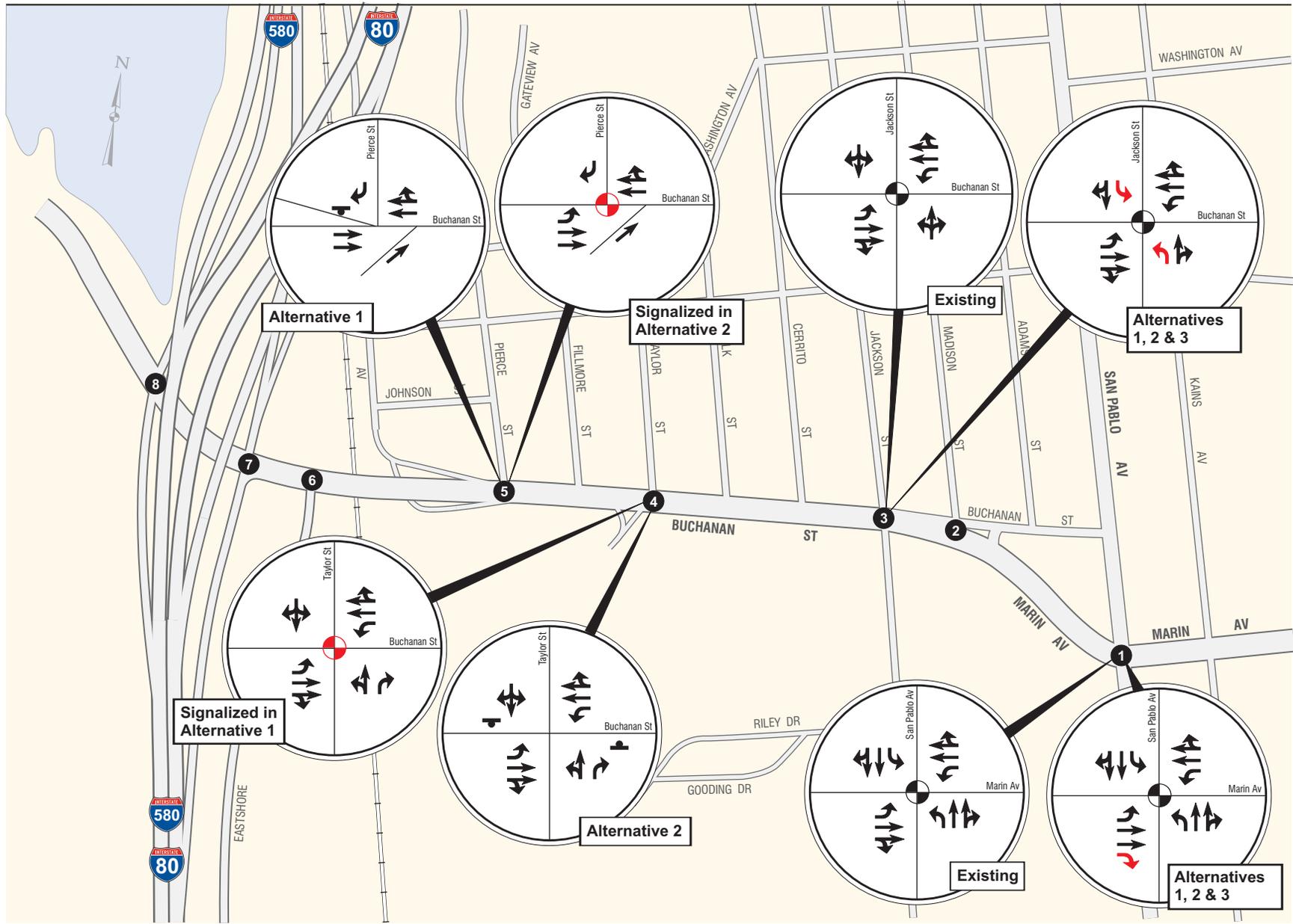


existing geometry.cdr

BUCHANAN STREET BIKE PATH

Figure 3a

EXISTING INTERSECTION GEOMETRY AND TRAFFIC CONTROL



proposed geometry.cdr

BUCHANAN STREET BIKE PATH

Figure 3b

PROPOSED INTERSECTION GEOMETRY AND TRAFFIC CONTROL

Data Collection

Existing weekday AM and PM peak-hour vehicular turning movement, bicycle and pedestrian counts at three study intersections were obtained from the “Albany Traffic Impact Analysis” draft report, dated April 2008, conducted by Fehr & Peers. New turning movement, bicycle and pedestrian counts were collected at the remaining five intersections on September 11, 2008. The existing peak-hour intersection volumes are shown on **Figure 4**. Summaries of these counts are attached in **Appendix A**.

Traffic signal timing and phasing data were collected for the signalized study intersections from field observations.

Existing Intersection Operations

The results of the Level of Service analysis under Existing Conditions are summarized in **Table 2**. The results indicate that all of the study intersections currently operate at an acceptable LOS D or better during the peak hours except the side streets at the unsignalized intersections of Buchanan Street/Taylor Street and Buchanan Street/Pierce Street.

Detailed intersection LOS calculations are provided in **Appendix B**.

Table 2: Intersection Level of Service – Existing Conditions

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽¹⁾	LOS	Delay ⁽¹⁾
1. San Pablo Avenue/Marin Avenue	Signal	D	39.0	D	54.0
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.1	A	9.0
3. Buchanan Street/Jackson Street	Signal	B	13.4	B	17.2
4. Buchanan Street/Taylor Street	Two-way Stop*	B	13.3	F	296.6
5. Buchanan Street/Pierce Street	Two-way Stop*	F	66.6	E	36.2
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.1	C	18.2
7. Buchanan Street/I-580 EB Ramps	Signal	A	8.6	A	9.7
8. Buchanan Street/I-580 WB Ramps	Signal	B	16.7	B	13.7

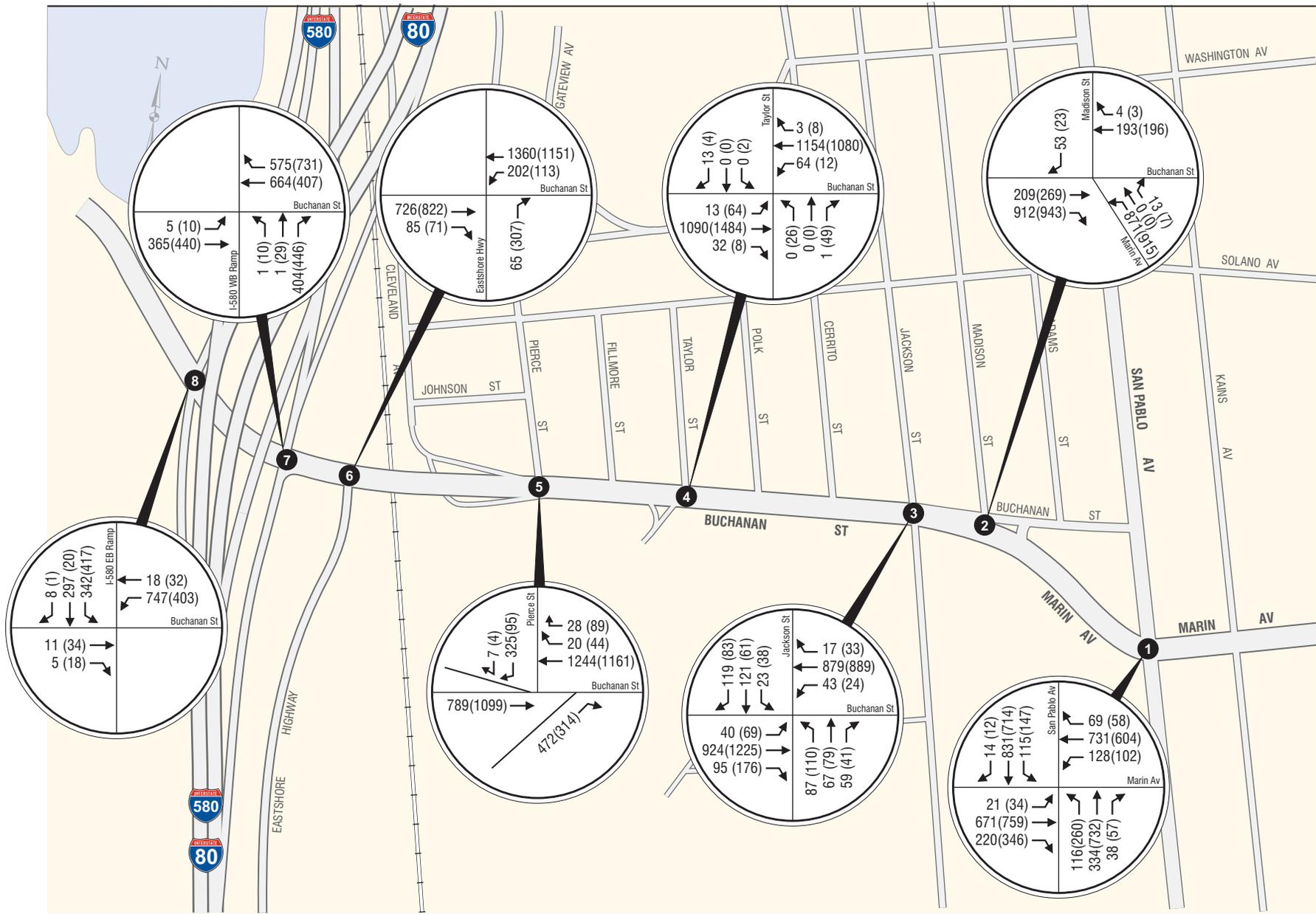
Source: AECOM – February 2009.

Notes: ⁽¹⁾ Delay in seconds per vehicle.

* Level of service and delay provided for the intersection’s worst movement.

Existing Peak Hour Signal Warrants

Peak hour signal warrant analyses were performed for the Buchanan Street/Taylor Street and Buchanan Street/Pierce Street intersections. The results of the peak-hour traffic signal warrant analyses are summarized in **Table 3**. The results indicate that the intersection of Buchanan Street/Pierce Street currently meets the peak-hour signal warrant for both the A.M. and P.M. peak hours. The peak-hour signal warrant worksheets are included in **Appendix C**.



existing volumes.cdr

BUCHANAN STREET BIKE PATH
Figure 4
EXISTING TRAFFIC VOLUMES
AM (PM) Peak Hour

Table 3: Peak-Hour Traffic Signal Warrant Results – Existing Conditions

Intersection	Existing Intersection Control	Peak Hour	Warrant Met?
1. Buchanan Street/Taylor Street	Stop	AM	No
		PM	No
2. Buchanan Street/Pierce Street	Stop	AM	Yes
		PM	Yes

Source: AECOM – February 2009.

Notes: Signal Warrant analyses are based on Warrant 3, Part B – Peak-Hour Signal Warrant contained in the 2006 CA-MUTCD

Existing Queue Lengths

Ninety-fifth percentile queue lengths were determined using the Synchro Percentile Delay Method for all signalized study intersections. Queue output sheets are available in **Appendix D**.

Table 4 shows the 95th percentile queue lengths at the signalized study intersections for the Existing Conditions as predicted by the Synchro software. It is important to note that the data reported in **Table 4** are maximum queue lengths which would only be exceeded for a small portion of the peak hour.

Table 4: Existing Conditions – 95th Percentile Queues

Intersection	Turning Movement	Available Storage (feet)	95 th Percentile Queue	
			AM Peak Hour (feet)	PM Peak Hour (feet)
1. San Pablo Avenue/Marin Avenue	EBT	900	454	691
	EBL	135	42	72
	WBT	---	189	329
	WBL	200	189	219
3. Buchanan Street/Jackson Street	EBT	775	228	442
	EBL	55	30	56
	WBT	900	37	24
	WBL	90	192	201
7. Buchanan Street/I-580 EB Ramps	EBT	375	58	88
	EBL	335	6	11
	WBT	---	167	100
8. Buchanan Street/I-580 WB Ramps	EBT	---	5	10
	WBT	375	87	41
	WBL	320	237	101

Source: AECOM – February 2009.

Bold indicates 95th percentile volume exceeds storage capacity.

Currently, the 95th percentile queue on the westbound left turn movement at the intersection of San Pablo Avenue/Marin Avenue exceeds the available storage capacity during the PM peak hour.

Existing plus Project Conditions

This section describes the project, and potential impacts from various project alternatives.

Proposed Intersection Improvements

As part of the bike facility alternatives described in the introduction section of this memo, the project proposes the following intersection modifications.

Alternative 1: This alternative would include a traffic signal and a bicycle/pedestrian crossing at the intersection of Buchanan Street/Taylor Street, and the addition of a dedicated right-turn lane in the eastbound direction at the intersection of San Pablo Avenue/Marin Avenue. Also, the width of travel lanes on the north side of Buchanan Street corridor would be reduced to 11 feet each to accommodate a Class II westbound bike lane. This alternative also proposes the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

Alternative 2: This alternative would include a traffic signal, bicycle/pedestrian crossing, addition of an eastbound left-turn lane at the intersection of Buchanan Street/Pierce Street and a dedicated right-turn lane in the eastbound direction at the intersection of San Pablo Avenue/Marin Avenue. This alternative proposes the closure of skewed westbound one-way single lane Buchanan Street section west of Pierce Street and the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications. The skewed eastbound leg of Buchanan Street connecting to the southern portion of the corridor at Pierce Street would remain unaffected. Also, the width of travel lanes on the north side of Buchanan Street corridor would be reduced to 11 feet each to accommodate a Class II bike lane.

Alternative 3: This alternative would include the addition of a dedicated right-turn lane in the eastbound direction at the intersection of San Pablo Avenue/Marin Avenue and the reduction of the width of travel lanes on the north side of the corridor to 11 feet each to accommodate a westbound Class II bike lane. This alternative also proposes the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

Intersection Operating Conditions

Alternative 1: The peak hour volumes under this alternative would be the same as in the Existing Conditions, shown on **Figure 4**. The results of the Level of Service analysis under this alternative are summarized in **Table 5**. With the implementation of this alternative under Existing Conditions all study intersections would operate at an acceptable LOS D or better during both peak hours except the side street at the intersection of Buchanan Street/Pierce Street. Also, it should be noted that the signalization of the Buchanan Street/Taylor Street intersection under this alternative would have a significant benefit to operations, with a LOS improvement from F (operating as stop controlled intersection) to LOS A for the P.M. peak hour (as a signal). The intersection of Buchanan Street/Jackson Street would operate at acceptable levels of service with the addition of separate left-turn storage lanes for the northbound and southbound approaches. Detailed intersection LOS calculations are provided in **Appendix E1**.

Table 5: Intersection Level of Service – Existing plus Project Conditions (Alternative 1)

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽²⁾	LOS	Delay ⁽²⁾
1. San Pablo Avenue/Marin Avenue	Signal ⁽¹⁾	D	35.2	D	44.3
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.1	A	9.0
3. Buchanan Street/Jackson Street	Signal ⁽³⁾	B	15.8	B	19.4
4. Buchanan Street/Taylor Street	Signal ⁽⁴⁾	A	0.9	A	2.4
5. Buchanan Street/Pierce Street	Two-way Stop*	F	66.6	E	36.2
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.1	C	18.2
7. Buchanan Street/I-580 EB Ramps	Signal	A	8.6	A	9.7
8. Buchanan Street/I-580 WB Ramps	Signal	B	16.7	B	13.7

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Addition of dedicated right-turn lane in the eastbound direction.

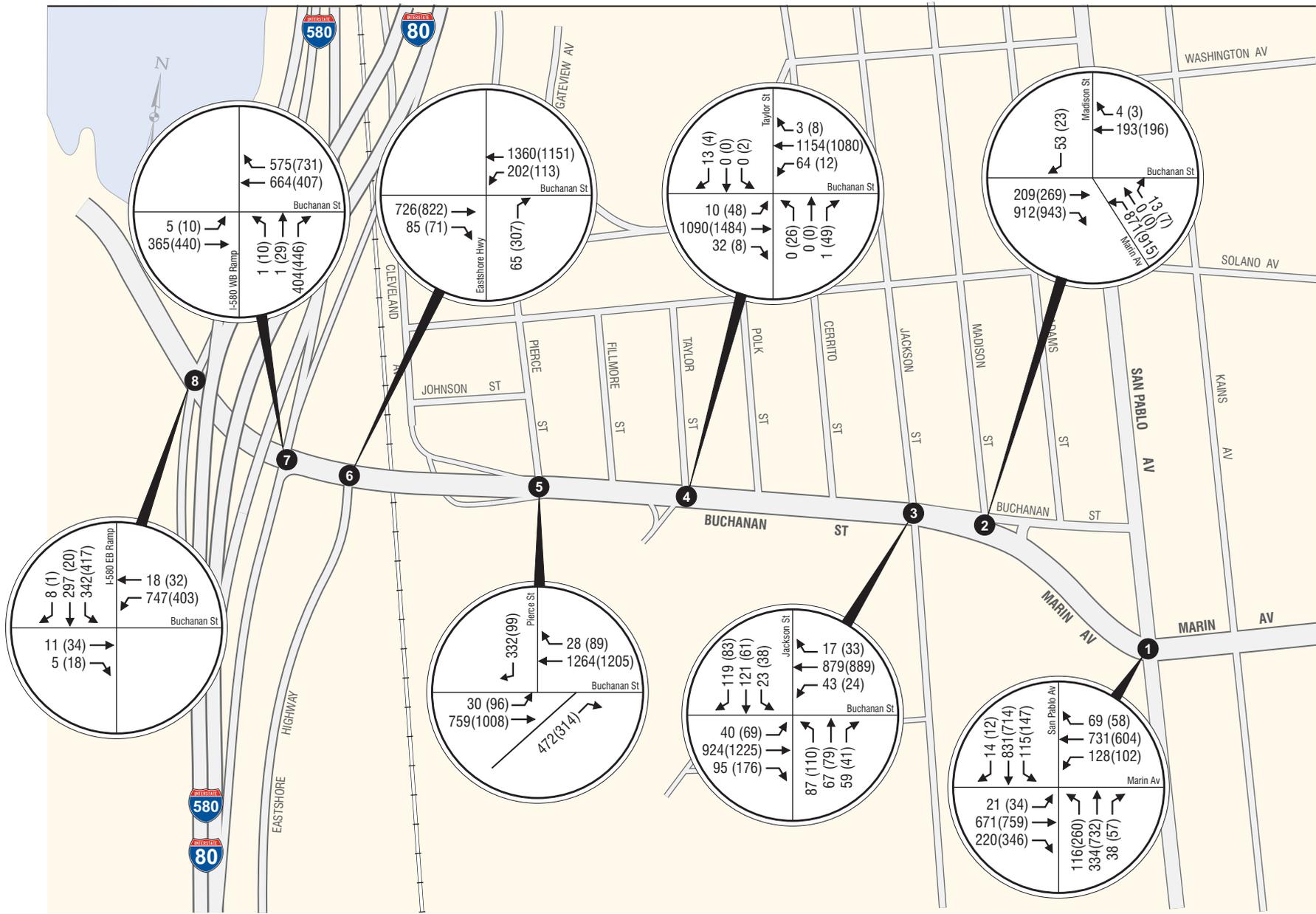
⁽²⁾ Delay in seconds per vehicle.

⁽³⁾ Buchanan Street/Jackson Street is analyzed with the addition of dedicated left-turn lanes for side streets in Alternative 1.

⁽⁴⁾ Buchanan Street/Taylor Street is analyzed as a signalized intersection in Alternative 1.

* Level of service and delay provided for the intersection's worst movement.

Alternative 2: The peak hour traffic volumes under this alternative are shown in **Figure 5**. The results of the Level of Service analysis under this alternative are summarized in **Table 6**. With the implementation of this alternative under Existing Conditions, all study intersections would operate at an acceptable LOS D or better during the peak hours except the side street movement at the intersection of Buchanan Street/Taylor Street. Also, it should be noted that the signalization of the Buchanan Street/Pierce Street intersection under this alternative would have a significant benefit in operations with a LOS improvement from F (operating as stop controlled intersection) to A for the P.M. peak hour (as a signalized intersection). The intersection of Buchanan Street/ Jackson Street would operate at acceptable levels of service with the addition of separate left-turn lanes for the northbound and southbound approaches. Detailed intersection LOS calculations are provided in **Appendix E2**.



existing + project volumes.cdr

BUCHANAN STREET BIKE PATH

Figure 5

EXISTING PLUS PROJECT TRAFFIC VOLUMES (ALTERNATIVE 2)

AM (PM) Peak Hour

Table 6: Intersection Level of Service – Existing plus Project Conditions (Alternative 2)

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽²⁾	LOS	Delay ⁽²⁾
1. San Pablo Avenue/Marin Avenue	Signal ⁽¹⁾	D	35.2	D	44.3
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.1	A	9.0
3. Buchanan Street/Jackson Street	Signal ⁽³⁾	B	15.8	B	19.4
4. Buchanan Street/Taylor Street	Two-way Stop*	B	12.0	F	86.6
5. Buchanan Street/Pierce Street	Signal ⁽³⁾	B	13.3	A	8.7
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.0	C	18.2
7. Buchanan Street/I-580 EB Ramps	Signal	A	8.9	A	9.7
8. Buchanan Street/I-580 WB Ramps	Signal	B	16.7	B	13.7

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Addition of dedicated right-turn lane in the eastbound direction.

⁽²⁾ Delay in seconds per vehicle.

⁽³⁾ Buchanan Street/Jackson Street is analyzed with the addition of dedicated left-turn lanes for side streets in Alternative 2.

* Level of service and delay provided for the intersection's worst movement.

Alternative 3: The Levels of Service of the study intersections under this alternative would remain the same as in Existing Conditions except at the intersection of San Pablo Avenue and Marin Avenue, which would improve to LOS D in both peak hours. This alternative also proposes the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications and would operate at LOS as reported in **Table 5** for Alternative 1 or **Table 6** for Alternative 2.

Alternative 1 and Alternative 2 were evaluated for the potential attraction of traffic with the introduction of traffic signals at Taylor Street and Pierce Street respectively. The attraction of traffic to either Taylor Street or Pierce Street was evaluated based on the additional time required to travel to reach the respective traffic signals with respect to the baseline (without the traffic signals) time required to travel without any change to the travel pattern.

Based on the additional time required to travel to the new signal under the proposed alternatives, the shift in local travel pattern was determined to be small. A new signal would not attract a large amount of additional traffic under Alternative 1. Under Alternative 2, a small volume of left-turning vehicles for the eastbound approaches of Buchanan Street / Taylor Street and Buchanan Street / Fillmore Street would gravitate towards the intersection of Buchanan Street / Pierce Street.

Existing plus Project Conditions Queue Lengths

Ninety-fifth percentile queue lengths were determined using the Synchro Percentile Delay Method for all signalized study intersections. Queue output sheets are available in **Appendix F**.

Table 7 shows the 95th percentile queue lengths at the study intersections for the Existing plus Project Conditions. It is important to note that the data reported in **Table 7** are maximum queue lengths which would only be exceeded for a small portion of the peak hour.

Table 7: Existing plus Project Conditions - 95th Percentile Queues

Intersection	Turning Movement	Available Storage (feet)	95 th Percentile Queue (feet) Alternative-1		95 th Percentile Queue (feet) Alternative-2	
			AM	PM	AM	PM
1. San Pablo Avenue/Marin Avenue	EBT	900	471	398	302	398
	EBL	135	42	72	42	72
	WBT	---	327	329	350	329
	WBL	200	189	219	189	219
3. Buchanan Street/Jackson Street	EBT	725	228	442	228	442
	EBL	55	30	56	30	56
	WBT	900	196	205	196	205
	WBL	90	37	25	37	25
	NBL	50	81	67	81	67
	SBL	50	32	49	32	49
4. Buchanan Street/Taylor Street	EBT	1,300	63	133	n/a ⁽¹⁾	n/a ⁽¹⁾
	EBL	70	3	15	n/a ⁽¹⁾	n/a ⁽¹⁾
	WBT	725	67	80	n/a ⁽¹⁾	n/a ⁽¹⁾
	WBL	95	12	4	n/a ⁽¹⁾	n/a ⁽¹⁾
5. Buchanan Street/Pierce Street	EBT	825	n/a ⁽²⁾	n/a ⁽²⁾	125	103
	EBL	150	n/a ⁽²⁾	n/a ⁽²⁾	41	95
	WBT	1,230	n/a ⁽²⁾	n/a ⁽²⁾	397	137
7. Buchanan Street/I-580 EB Ramps	EBT	375	58	88	66	88
	EBL	335	6	11	6	11
	WBT	---	167	100	197	100
8. Buchanan Street/I-580 WB Ramps	EBT	---	5	10	5	10
	WBL	320	237	101	237	101
	WBT	375	87	48	87	48

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Under Alternative 2, Buchanan Street/Taylor Street is analyzed as an unsignalized intersection.

⁽²⁾ Under Alternative 1, Buchanan Street/Pierce Street is analyzed as an unsignalized intersection.

Bold indicates 95th percentile volume exceeds storage capacity.

Under Existing plus Project Conditions, the 95th percentile queue at the westbound left-turn movement at the intersection of San Pablo Avenue/Marin Avenue would exceed the available storage capacity during the P.M. peak hour. The 95th percentile queue on the northbound left-turn movement would exceed the

storage capacity at the intersection of Buchanan Street/Jackson Street under both alternatives for the AM and PM peak hours.

Cumulative Conditions

This chapter presents a summary of the traffic conditions that would occur under Cumulative conditions. Cumulative conditions are defined as conditions expected in the study area with the build out of the City's General Plan for the year 2030. The travel demand forecasts are based on the Alameda County Congestion Management Agency's regional travel demand model.

Using ACCMA travel demand model outputs and land use data, growth factors between the base year (2005) and future year (2030) were calculated for each intersection approach. The growth factors were applied to existing traffic volumes at the study intersections to derive the 2030 cumulative traffic volumes. The 2030 forecasted cumulative traffic volumes were then analyzed with no improvements to the existing lane geometry (i.e. the "Base" condition). The cumulative peak-hour intersection volumes are shown on **Figure 6**.

Intersection Operating Conditions

The results of the Level of Service analysis for Cumulative Conditions are summarized in **Table 8**. Under Cumulative Conditions, most of the study intersections would continue to operate at acceptable levels of service, with the exception of the San Pablo Avenue/Marin Avenue, Buchanan Street/Taylor Street and Buchanan Street/Pierce Street intersections, which would operate at unacceptable levels of service. Detailed intersection LOS calculations are provided in **Appendix G**.

Table 8: Intersection Level of Service – Cumulative Conditions

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽¹⁾	LOS	Delay ⁽¹⁾
1. San Pablo Avenue/Marin Avenue	Signal	E	73.9	F	112.6
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.3	A	9.2
3. Buchanan Street/Jackson Street	Signal	B	16.5	C	27.5
4. Buchanan Street/Taylor Street	Two-way Stop*	C	16.0	F⁽²⁾	>300.0
5. Buchanan Street/Pierce Street	Two-way Stop*	F⁽²⁾	>300	F	197.4
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.8	D	29.0
7. Buchanan Street/I-580 EB Ramps	Signal	B	15.1	B	15.9
8. Buchanan Street/I-580 WB Ramps	Signal	C	22.1	B	15.3

Source: AECOM – February 2009.

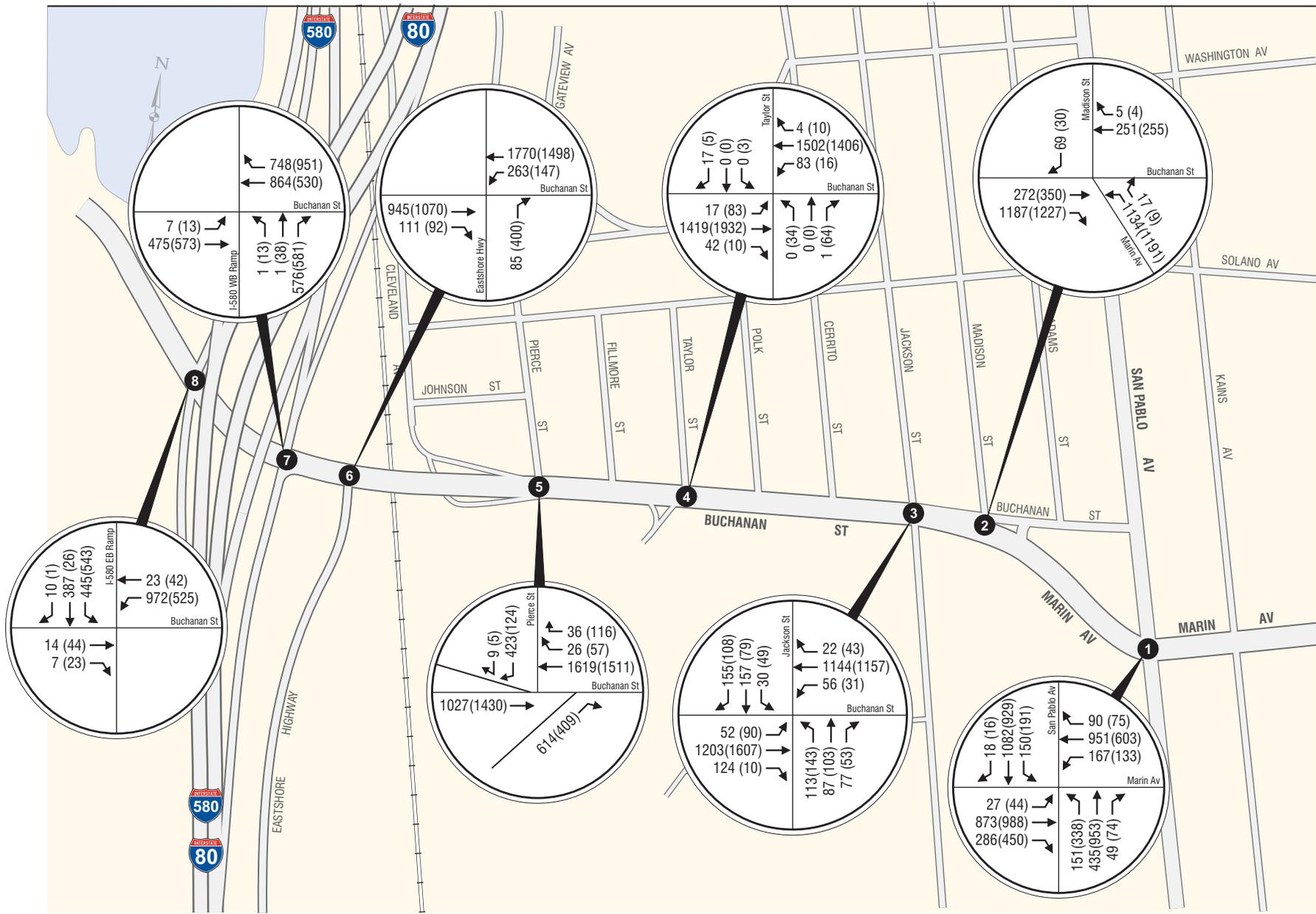
Notes: ⁽¹⁾ Delay in seconds per vehicle.

⁽²⁾ Estimated average delay is greater than 300 seconds per vehicle.

* Level of service and delay provided for the intersection's worst movement.

Cumulative Conditions Peak Hour Signal Warrants

The results of the Cumulative Conditions peak-hour traffic signal warrant analyses are summarized in **Table 9**. The results indicate that the intersection of Buchanan Street/Pierce Street would meet the peak-hour signal warrant for both the A.M. and P.M. peak hours under Cumulative Conditions. The peak-hour signal warrant worksheets are included in **Appendix H**.



BUCHANAN STREET BIKE PATH

Figure 6
CUMULATIVE TRAFFIC VOLUMES
AM (PM) Peak Hour

Table 9: Peak-Hour Traffic Signal Warrant Results – Cumulative Conditions

Intersection	Existing Intersection Control	Peak Hour	Warrant Met?
1. Buchanan Street/Taylor Street	Stop	AM	No
		PM	No
2. Buchanan Street/Pierce Street	Stop	AM	Yes
		PM	Yes

Notes: Signal Warrant analyses are based on Warrant 3, Part B – Peak-Hour Signal Warrant contained in the 2006 CA-MUTCD

Cumulative Queue Lengths

Ninety-fifth percentile queue lengths were determined using the Synchro Percentile Delay Method for all signalized study intersections. Queue output sheets for the Cumulative Condition are available in **Appendix I**.

Table 10 shows the 95th percentile queue lengths at the study intersections for the Cumulative Conditions.

Table 10: Cumulative Conditions - 95th Percentile Queues

Intersection	Turning Movement	Available Storage (feet)	95 th Percentile Queue	
			AM Peak Hour (feet)	PM Peak Hour (feet)
1. San Pablo Avenue/Marin Avenue	EBT	900	691	1,057
	EBL	135	50	88
	WBT	---	540	337
	WBL	200	267	298
3. Buchanan Street/Jackson Street	EBT	775	345	555
	EBL	55	69	129
	WBT	900	280	294
	WBL	90	81	33
7. Buchanan Street/I-580 EB Ramps	EBT	375	106	130
	EBL	335	10	15
	WBT	---	470	226
8. Buchanan Street/I-580 WB Ramps	EBT	---	6	13
	WBT	375	119	68
	WBL	320	405	62

Source: AECOM – February 2009.

Notes: Bold indicates 95th percentile volume exceeds storage capacity.

Under Cumulative Conditions, the 95th percentile queues in the east and westbound directions would exceed the existing storage capacity at the intersections of San Pablo Avenue/Marin Avenue and Buchanan Street/Jackson Street. Also, the 95th percentile queue on the westbound left turn movement would exceed the existing storage capacity at the intersection of Buchanan Street/I-580 WB Ramps.

The 95th percentile queue for eastbound through movement at the intersection of San Pablo Avenue/Marin Avenue would be 1,057 feet which impede the eastbound left turning traffic at the unsignalized intersection of Buchanan Street/Marin Avenue.

Cumulative plus Project Conditions

The year 2030 forecasted cumulative traffic volumes were analyzed with the project alternatives as shown in **Figure 3a** and described in the previous sections of this report.

Intersection Operating Conditions

Alternative 1: The peak hour volumes under this alternative would be the same as in Cumulative Conditions shown on **Figure 6**. The results of the Level of Service analysis under this alternative are summarized in **Table 11**. With the implementation of this alternative under Cumulative Conditions, most of the study intersections would continue to operate at an acceptable LOS D or better during both peak hours, with the exception of the Buchanan Street/Pierce Street intersection, which would operate at an unacceptable level of service. Also, it should be noted that the signalization of the Buchanan Street/Taylor Street intersection under this alternative would have a significant benefit in operations at this location with a LOS improvement from F (operating as stop controlled intersection) to LOS A for the P.M. peak. Detailed intersection LOS calculations are provided in **Appendix J1**.

Table 11: Intersection Level of Service – Cumulative plus Project Conditions (Alternative 1)

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽²⁾	LOS	Delay ⁽²⁾
1. San Pablo Avenue/Marin Avenue	Signal ⁽¹⁾	D	52.3	E	74.9
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.3	A	9.2
3. Buchanan Street/Jackson Street	Signal ⁽³⁾	C	23.2	C	23.0
4. Buchanan Street/Taylor Street	Signal ⁽⁴⁾	A	1.1	A	3.7
5. Buchanan Street/Pierce Street	Two-way Stop*	F⁽⁵⁾	>300	F	197.4
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.8	D	29.0
7. Buchanan Street/I-580 EB Ramps	Signal	B	15.1	B	15.9
8. Buchanan Street/I-580 WB Ramps	Signal	C	22.1	B	15.3

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Addition of dedicated right-turn lane in the eastbound direction.

⁽²⁾ Delay in seconds per vehicle.

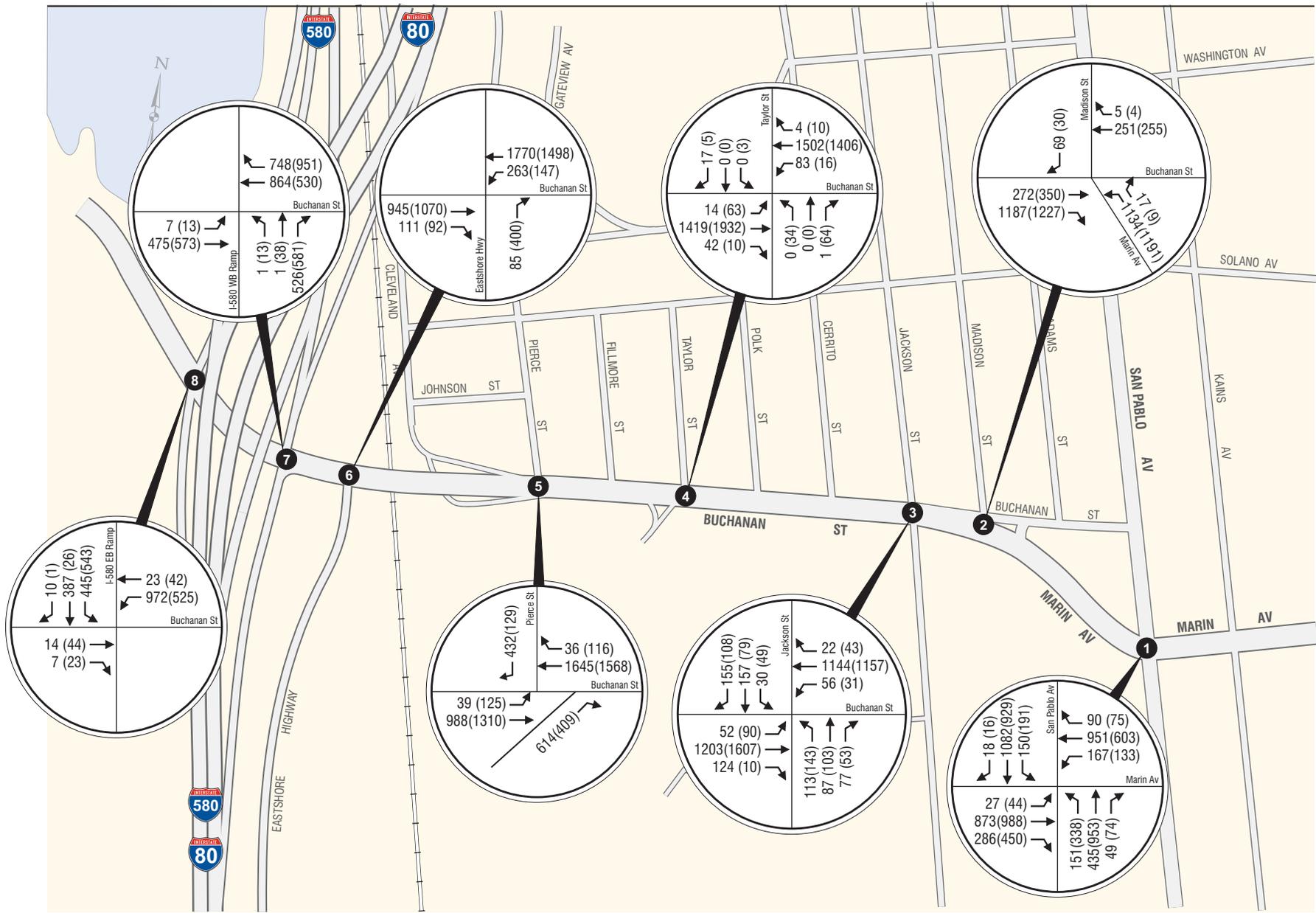
⁽³⁾ Buchanan Street/Jackson Street is analyzed with the addition of dedicated left-turn lanes for side streets in Alternative 1.

⁽⁴⁾ Buchanan Street/Taylor Street is analyzed as a signalized intersection in Alternative 1.

⁽⁵⁾ Estimated average delay is greater than 300 seconds per vehicle.

* Level of service and delay provided for the intersection's worst movement.

Alternative 2: The peak hour traffic volumes under this alternative are shown on **Figure 7**. The results of the Level of Service analysis under this alternative are summarized in **Table 12**. With the implementation of this alternative under Cumulative Conditions, most of the study intersections would continue to operate at an acceptable LOS D or better during both the peak hours, with the exception of the San Pablo Avenue/Marin Avenue and Buchanan Street/Taylor Street intersections, which would operate at unacceptable levels of service. The signalization of the Buchanan Street/Pierce Street intersection under this alternative would have a significant benefit to operations, with a LOS improvement from F (operating as stop controlled intersection) to LOS A. Detailed intersection LOS calculations are provided in **Appendix J2**.



cum + project volumes.cdr

BUCHANAN STREET BIKE PATH

Figure 7

CUMULATIVE PLUS PROJECT TRAFFIC VOLUMES (ALTERNATIVE 2)

AM (PM) Peak Hour

Table 12: Intersection Level of Service – Cumulative plus Project Conditions (Alternative 2)

Intersection	Traffic Control	Weekday AM Peak Hour		Weekday PM Peak Hour	
		LOS	Delay ⁽²⁾	LOS	Delay ⁽²⁾
1. San Pablo Avenue/Marin Avenue	Signal ⁽¹⁾	D	52.3	E	74.9
2. Marin Avenue/Buchanan Street	One-way Stop*	A	9.3	A	9.2
3. Buchanan Street/Jackson Street	Signal ⁽³⁾	C	23.2	C	23.0
4. Buchanan Street/Taylor Street	Two-way Stop*	B	12.3	F⁽⁵⁾	>300
5. Buchanan Street/Pierce Street	Signal ⁽⁴⁾	C	34.9	B	12.2
6. Buchanan Street/Eastshore Highway	One-way Stop*	B	12.7	D	29.0
7. Buchanan Street/I-580 EB Ramps	Signal	B	16.0	B	15.9
8. Buchanan Street/I-580 WB Ramps	Signal	C	22.1	B	15.3

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Addition of dedicated right turn lane in the eastbound direction.

⁽²⁾ Delay in seconds per vehicle.

⁽³⁾ Buchanan Street/Jackson Street is analyzed with separate left-turn lanes for side streets in Alternative 2.

⁽⁴⁾ Buchanan Street/Taylor Street is analyzed as a signalized intersection in Alternative 2.

⁽⁵⁾ Estimated average delay is greater than 300 seconds per vehicle.

* Level of service and delay provided for the intersection's worst movement.

Alternative 3: The levels of service at the study intersections under this alternative would be the same as in Cumulative Baseline Conditions except at the intersections of San Pablo Avenue/Marin Avenue and Buchanan Street/Jackson Street, which would have the same Level of Service as under Alternative 1 and Alternative 2. This alternative also proposes introduction of left-turn storage lanes for the northbound and southbound approaches of Buchanan Street/ Jackson Street intersection with associated signal timing modifications and would operate at LOS as reported in **Table 11** for Alternative 1 or **Table 12** for Alternative 2.

Cumulative plus Project Conditions Queue Lengths

Ninety-fifth percentile queue lengths were determined using the Synchro Percentile Delay Method for all signalized study intersections. Queue output sheets are available in **Appendix K**.

Table 13 shows the 95th percentile queue lengths at the study intersections for the Cumulative plus Project Conditions.

Table 13: Cumulative plus Project Conditions - 95th Percentile Queues

Intersection	Turning Movement	Available Storage (feet)	95 th Percentile Queue (feet) Alternative-1		95 th Percentile Queue (feet) Alternative-2	
			AM	PM	AM	PM
1. San Pablo Avenue / Marin Avenue	EBT	900	440	559	440	559
	EBL	135	50	88	50	88
	WBT	---	540	337	540	337
	WBL	200	267	298	267	298
3. Buchanan Street / Jackson Street	EBT	725	345	555	345	555
	EBL	55	69	129	69	129
	WBT	900	287	302	287	302
	WBL	90	82	34	82	34
	NBL	50	175	190	175	190
	SBL	50	46	81	46	81
4. Buchanan Street/Taylor Street	EBT	1,300	97	243	n/a ⁽¹⁾	n/a ⁽¹⁾
	EBL	70	4	34	n/a ⁽¹⁾	n/a ⁽¹⁾
	WBT	725	107	125	n/a ⁽¹⁾	n/a ⁽¹⁾
	WBL	95	26	7	n/a ⁽¹⁾	n/a ⁽¹⁾
5. Buchanan Street/Pierce Street	EBT	825	n/a ⁽²⁾	n/a ⁽²⁾	168	132
	EBL	150	n/a ⁽²⁾	n/a ⁽²⁾	49	141
	WBT	1,230	n/a ⁽²⁾	n/a ⁽²⁾	672	481
7. Buchanan Street/I-580 EB Ramps	EBT	375	106	130	113	130
	EBL	335	10	15	11	15
	WBT	---	470	226	497	226
8. Buchanan Street I-580 WB Ramps	EBT	---	6	13	6	13
	WBT	375	119	68	119	68
	WBL	320	405	150	405	150

Source: AECOM – February 2009.

Notes: ⁽¹⁾ Under Alternative 2, Buchanan Street/Taylor Street is analyzed as an unsignalized intersection.

⁽²⁾ Under Alternative 1, Buchanan Street/Pierce Street is analyzed as an unsignalized intersection.

Bold indicates 95th percentile volume exceeds storage capacity.

Under Cumulative plus Project Conditions, the 95th percentile queues in the westbound direction would exceed the existing storage capacity at the intersections of San Pablo Avenue/Marin Avenue. The 95th percentile queue on the northbound left turn movement would exceed the storage capacity at the intersection of Buchanan Street/ Jackson Street under both alternatives for the AM and PM peak hours

and for both the alternatives for the southbound left-turn movement for the PM peak hour. Also, the 95th percentile queue on the westbound left turn movement would exceed the existing storage capacity at the intersection of Buchanan Street/I-580 WB Ramps.

Evaluation of San Pablo Avenue/Marin Avenue with 1-Left, 1-Through, 1-Right Configuration on Eastbound approach

The San Pablo Avenue/Marin Avenue intersection was evaluated with one through travel lane in the eastbound direction in an effort to minimize the right-of-way acquisition requirements to provide Class I bike lane along the south side of the Buchanan Street corridor. This potential conversion would enable a Class II on-street bike lane to be striped on Marin Avenue between San Pablo Avenue and Cornell Avenue with the elimination of one eastbound through lane in this segment.

Following lane configuration in the eastbound direction at San Pablo Avenue/Marin Avenue was analyzed to evaluate the traffic operations under both Existing and Cumulative conditions:

- Eastbound Direction: 1-left, 1-through, 1-right turn lane.

Existing Conditions

Under Existing Conditions, with the above configuration, this intersection would operate at an unacceptable LOS E during both the AM and PM peak hours. Ninety-fifth percentile queues predicted by both Synchro and Sim-Traffic micro-simulation indicate that the eastbound and westbound through traffic would not exceed the available storage capacity during both peak hours.

Cumulative Conditions

Under Cumulative Conditions, with the above configuration, this intersection would operate at an unacceptable LOS F during both the peak hours. Ninety-fifth percentile queues predicted by Sim-Traffic micro-simulation indicate that the eastbound and westbound traffic would not exceed the available storage capacity during both the peak hours.

The results of the Sim-Traffic micro-simulation runs are included in **Appendix L**.

Summary

Existing Conditions

- The intersection of Buchanan Street/Taylor Street currently operates at an unacceptable level of service for the side street during the PM peak hour. The Buchanan Street/Pierce Street intersection operates at an unacceptable LOS during both peak hours for the side street movement.
- The intersection of Buchanan Street/Pierce Street currently meets peak hour signal warrants for both peak hours.
- Under Existing Conditions, none of the intersections result in queue spillover in the east or westbound directions along the corridor.

Existing plus Project Conditions

- Signalization of the intersection of Buchanan Street/Taylor Street under Alternative 1 would have a significant benefit, with a LOS improvement from F (operating as stop controlled intersection) to LOS A. However, this signal would not be warranted based on MUTCD guidelines.
- Signalization of the intersection of Buchanan Street/Pierce Street under Alternative 2 would have a significant benefit, with a LOS improvement from F (operating as stop controlled intersection) to LOS A. The intersection of Buchanan Street/ Pierce Street currently satisfies the peak hour signal warrant.
- The 95th percentile queue on the northbound left-turn movement would exceed the storage capacity at the intersection of Buchanan Street/ Jackson Street under both alternatives for both peak hours.
- Under Existing plus Project conditions, none of the intersections result in queue spillover in the east or westbound directions along the corridor.

Cumulative Conditions

- Based on forecasts from the ACCMA travel demand model, cumulative traffic growth of 27 percent over existing conditions is forecasted for the year 2030 on Buchanan Street.
- The intersections of San Pablo Avenue/Marin Avenue, Buchanan Street/Taylor Street and Buchanan Street/Pierce Street are forecasted to operate at unacceptable Levels of Service during both peak hours in Cumulative Conditions.
- Under Cumulative Conditions, the intersection of Buchanan Street/Pierce Street would meet peak hour signal warrants for both peak hours.
- Under Cumulative Conditions, the 95th percentile queues at the intersection of San Pablo Avenue/Marin Avenue would exceed the existing storage capacity in the eastbound direction during the P.M. peak hour.

Cumulative Plus Project Conditions

- Signalization of the intersection of Buchanan Street/Taylor Street under Alternative 1 would have a significant benefit, with a LOS improvement from F (operating as stop controlled intersection) to LOS A. However, this signal would not be warranted based on MUTCD guidelines.
- Signalization of the intersection of Buchanan Street/Pierce Street under Alternative 2 would have a significant benefit, with a LOS improvement from F (operating as stop controlled intersection) to LOS A.
- The 95th percentile queue on the northbound left turn movement would exceed the storage capacity at the intersection of Buchanan Street/Jackson Street under both alternatives for the AM

peak hour and for the both the alternatives for southbound left-turn movement for the PM peak hour.

- Under Cumulative plus Project conditions, none of the intersections result in queue spillover in the east or westbound directions along the corridor.

Recommendations

Based on the traffic study results, Alternative 2 would provide the greatest traffic benefit. This alternative would feature a Class I bike path along the south side of the Marin Avenue/Buchanan Street corridor between San Pablo Avenue and Pierce Street. It would also include a Class II bike lane on the north side of the corridor between Pierce Street and San Pablo Avenue, and on both sides of the corridor between San Pablo Avenue and Cornell Avenue, east of the San Pablo Avenue/Marin Avenue intersection. In addition to the proposed bike lanes, this alternative proposes the signalization of the current two-way stop controlled Buchanan Street/ Pierce Street intersection; the closure of the skewed westbound one-way single lane Buchanan Street section on to the north side of the corridor; and the introduction of left-turn lanes for the northbound and southbound approaches of the Buchanan Street/Jackson Street intersection with associated signal timing modifications.

The unsignalized intersection of the Buchanan Street/Pierce Street currently operates at unacceptable levels of service during both the AM and PM peak hours. The intersection of Buchanan Street/Pierce Street currently satisfies MUTCD signal warrant criteria for both the AM and PM peak hours. With the introduction of the signal at the intersection of the Buchanan Street/Pierce Street, the intersection is forecasted to operate at acceptable level of service under Existing plus Project conditions and Cumulative plus Project conditions for both the AM and PM peak hours. Ninety-fifth percentile queues with signalization of the intersection of the Buchanan Street/ Pierce Street do not extend into upstream or downstream intersection for Existing plus Project Conditions and Cumulative plus Project conditions for both the AM and PM peak hours.