APPENDIX E

TRANSPORTATION IMPACT ANALYSIS

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Menlo Portal – Transportation Impact Analysis

INTRODUCTION

This Transportation Impact Analysis (TIA) presents the analysis methodology and findings of the level of service assessment conducted for the Menlo Portal project at 115 Independence Drive in Menlo Park, California.

For purposes of disclosing potential transportation impacts, the proposed project uses the City of Menlo Park's current TIA Guidelines to ensure compliance with both State and local requirements.[1] Up until July 1, 2020, the City's TIA Guidelines used roadway congestion or level of service (LOS) as the primary study metric for planning and environmental review purposes. However, Senate Bill (SB) 743 required the Governor's Office of Planning and Research (OPR) to establish a new metric for identifying and mitigating transportation impacts under CEQA in an effort to meet the State's goals to reduce GHG emissions, encourage infill development, and improve public health through more active transportation. CEQA Section 21099(b)(2) states that upon certification of the revised guidelines for determining transportation impacts pursuant to CEQA Section 21099(b)(1), automobile delay, as described solely by LOS or similar measures of vehicular capacity or traffic congestion, shall not be considered a significant impact on the environment under CEQA. OPR identified vehicle miles traveled (VMT) as the required CEQA transportation metric for determining potentially significant environmental impacts.[2] In December 2018, the California Natural Resources Agency certified and adopted the CEQA Guidelines update package, including the section implementing SB 743 (CEQA Guidelines Section 15064.3). OPR developed a *Technical Advisory on Evaluating Transportation Impacts in CEQA,* which contains OPR's technical recommendations regarding assessment of VMT, thresholds of significance, and mitigation measures.[3] As of July 1, 2020, VMT (not LOS) is the only legally acceptable threshold for transportation-related environmental impacts pursuant to CEQA.

As stated above, LOS is no longer a CEQA threshold. However, the City's TIA Guidelines require that the TIA also analyze LOS for local planning purposes. The LOS analysis would determine whether the project traffic would cause an intersection LOS to exceed the City's LOS thresholds or cause either the average delay or average critical delay to exceed the City's intersection delay thresholds under near term and

[1] Menlo Park, City of. 2020a. *Transportation Impact Analysis Guidelines*. Website: www.menlopark.org/DocumentCenter/View/302/Transportation-Impact-Analysis-Guidelines?bidId= (accessed July 10, 2020). July.

[2] California Office of Planning and Research. 2016. *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA, Implementing Senate Bill 743 (Steinberg, 2013)*. January 20.

[3] California Office of Planning and Research. 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA.* Available online at: http://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf (accessed February 7, 2019). December 18.

cumulative conditions. The LOS and delay thresholds vary depending on the street classifications as well as whether the intersection is on a State route or not. The City's TIA Guidelines further require an analysis of the proposed project in relation to relevant policies of the Circulation Element and consideration of specific measures to address noncompliance with local policies which may occur as a result of the addition of project traffic. This analysis is prepared to determine if there are potential measures that could bring the proposed project into conformance with Circulation Policy 3.4 (strive to maintain LOS D at all City controlled intersections).

PROJECT DESCRIPTION

The proposed project would result in the demolition of the existing building on the site and construction of one seven-story apartment building with 335 dwelling units and one office building with approximately 34,819 square feet of office space and 1,609 square feet of ground floor commercial space. The tenant and specific commercial land use type for the ground floor space was uncertain at the time of analysis. However, it is known that the commercial space would be a non-residential community amenity space and would therefore be expected to serve nearby residents and employees and would not be expected to generate a substantial number of vehicle trips. Therefore, for purposes of the LOS analysis, the commercial space was analyzed as commercial office space.[4]

The residential building includes parking for 324 vehicles while the office building includes 93 vehicle parking spaces on two levels. Direct local access to the project site is via Independence Drive that borders the site immediately to the west and south, Constitution Drive that borders the site immediately to the north, and Chrysler Drive approximately 0.2 mile to the east of the site. Access to the residential parking garage would be via a single two-way entry point at the north eastern corner of the project site from Constitution Drive. Access to the office parking would be via a single two-way entry point on the west side of the project site from Independence Drive. The ground floor would also include an access lane along the eastern boundary of the project site to provide emergency vehicle access.

Pedestrian access to the proposed building would be provided from Independence Drive, from Constitution Drive, and within the site interior. The project includes dedication of an easement along Independence Drive and Constitution Drive to construct a portion of public sidewalk within the site. Residential lobbies would be provided on the ground floor, and the residential units would be accessed via entry porches on Independence Drive and on Constitution Drive. A central pedestrian plaza would be provided between the apartment and office buildings to enable residents and employees to walk between buildings and parking areas.

A total of 552 bicycle parking spaces and a bike repair station would be provided. The apartment building includes a secured bike room on the first level for 480 long-term parking spaces and bike racks on the exterior of the building to hold 48 bicycles for short-term use. The office building includes 12 long-term bike parking spaces on the first level of the parking garage and 12 short-term bike parking spaces near the entry of the office building.

[4] The commercial space was evaluated as a child care center for the CEQA analysis. For CEQA purposes, this approach allows for flexibility and can be considered conservative because it classifies the non-residential space as a commercial/retail land use, thereby requiring VMT screening for commercial/retail use.

Transportation Demand Management Plan

The proposed project would implement the Menlo Portal Mixed-Use Development Transportation Demand Management Plan[5] as part of the proposed project in an effort to reduce project-generated vehicle trips and encourage travel by other modes. The TDM Plan includes the following measures in compliance with the City of Menlo Park Transportation Demand Management Guidelines:

- TDM Administration and Promotion
    - Assign a Transportation Coordinator to provide information regarding alternative modes of transportation to residents
    - Establish an online kiosk with transportation information including a summary of SamTrans, Caltrain, and nearby shuttle services, information about ride matching services and ridesharing services, local bikeway map and bicycling resources, and links to other resources in the Bay Area
    - Provide transportation information packets to new residents
- Bicycle and Pedestrian Amenities
    - Provide long-term bicycle parking spaces in secured bike storage rooms
    - Provide short-term bicycle parking spaces outdoors
    - Provide bicycle repair shop adjacent to bike storage room with services available for residents
    - Add new sidewalks with street trees along the project's Constitution Drive and Independence Drive frontages
    - Provide well-lit, accessible sidewalks around the apartment and office buildings
    - Incorporate a central pedestrian plaza between the apartment and office buildings to enable residents and employees to walk between buildings and parking areas
- On-site Amenities
    - Include business center, fitness center, and café on the ground floor of the apartment building
    - Include electric vehicle charging stations
    - Provide high-bandwidth internet connections to facilitate telecommunications
    - Include refrigerated mail areas to facilitate the delivery of groceries
- Carpool and Vanpool Programs

[5] Hexagon Transportation Consultants, Inc. 2019. *Menlo Portal Housing Development in Menlo Park, Transportation Demand Management Plan*. November 1.

- Provide a carpool/vanpool matching application to all residents as part of the welcome packets
- Promote 511 RideMatch service and Scoop services

- Unbundle parking costs from each living unit

Project Trip Generation

The vehicle trip generation estimates for the proposed residential and office space and the existing office and industrial buildings were calculated using the trip generation rates from the most recent ITE Trip Generation Manual (10th Edition, 2018).[6] The land use categories for General Office Building (ITE Code 710), Multi-Family Housing Mid-Rise (ITE Code 221), and General Light Industrial (ITE Code 110) were applied to this analysis.

Consistent with the Menlo Park TIA Guidelines,[7] vehicle trip reductions were taken to account for internalized trips, the TDM Plan,[8] and existing uses.

The trip subtotal for the office including a 5 percent internalization reduction for the trips made onsite and not utilizing external streets. A 20 percent reduction was applied to account for the proposed TDM Plan which would comply with City Ordinance 1026 and achieved the required minimum of 20 percent reduction of peak hour vehicle trips.[9] Additionally, because the site is occupied by existing active office and industrial buildings, trip credits were applied to account for the removal of the existing 64,832 square feet of office and industrial space.

As shown in Table 1, application of the vehicle trip generation rates, assumptions, and trip reductions would result in a net project-generated increase in the number of daily and AM and PM peak hour vehicle trips. The proposed project would generate 1,204 net new daily vehicle trips, 63 net new AM peak hour vehicle trips (-6 inbound trips and 69 outbound trips) and 86 net new PM peak hour vehicle trips (63 inbound trips and 18 outbound trips). The vehicle trip generation estimates used in this analysis have been approved by the City of Menlo Park.

[6] Institute of Transportation Engineers. 2018. *Trip Generation Manual, 10th Edition*.

[7] Menlo Park, City of. 2020a, op. cit.

[8] Caltrans Transportation Management Association. 2019. *111 Independence Drive TDM Plan*. August.

[9] Menlo Park, City of. Ordinance No. 1026. Available online at: www.menlopark.org/DocumentCenter/View/12605/1026---GP-MU-District?bidId= (accessed September 28, 2020).

Table 1 Vehicle Trip Generation Estimates

Land Use (ITE Code)	Size	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Existing Uses								
Office Building (ITE Code 710)	39,741 sf	(387)	(40)	(6)	(46)	(7)	(39)	(46)
Industrial Building (ITE Code 110)	25,091 sf	(124)	(16)	(2)	(18)	(2)	(14)	(16)
Proposed Uses								
Residential ITE Code 221)	335 du	1,822	31	90	121	90	57	147
Office (ITE Code 710)[1]	36,428 sf	339	34	6	40	6	34	40
Internalization: 5%	-	(17)	(2)	0	(2)	0	(2)	(2)
Commercial Office Subtotal	-	322	32	6	38	6	32	38
PROPOSED USES SUBTOTAL		2,144	63	96	159	96	89	185
TDM Plan: 20%		(429)	(13)	(19)	(32)	(19)	(18)	(37)
PROPOSED USES TOTAL		1,715	50	77	127	77	71	148
NET NEW PROJECT VEHICLE TRIPS		**1,204**	**-6**	**69**	**63**	**68**	**18**	**86**

Source: *ITE Trip Generation Manual, 10th Edition* (2018).
du = dwelling units
sf = square feet
[1] The square footage includes 34,819 sf office and 1,609 sf ground floor commercial.

Project Trip Distribution

Project-generated vehicle traffic was distributed to the surrounding roadway network based on travel surveys and existing traffic patterns. Project-added traffic volumes at the study intersections are included in Attachment 1.

SCOPE OF ANALYSIS AND METHODOLOGY

The analysis scope and methodology, data collection methods, and study locations are described in this section. The analysis scope presented in this chapter and all methodologies herein were reviewed and approved by the City of Menlo Park.

Analysis Scenarios

Transportation conditions were evaluated in this study for the following five scenarios:

- **Existing Conditions** – This scenario represents the current transportation network and traffic conditions. Existing turning movement counts collected in March 2019 were obtained from City staff and grown by one percent to represent growth from 2019 to 2020 when the analysis was conducted. [10] Signal timing information was obtained from the City.

[10] The analysis relies on historical data with application of growth factors to estimate traffic volumes representing existing conditions because collection of new data was not recommended during the public health crisis, COVID-19. The COVID-19 pandemic has resulted in shelter-in-place orders across the Bay Area and travel demand is significantly

- **Near Term (2022) Conditions** – This scenario represents the transportation network and traffic conditions at the time of expected occupancy of the proposed project but does not include the proposed project. This scenario includes transportation network changes, background traffic, and traffic generated from approved development projects in the area.

- **Near Term (2022) Plus Project Conditions** – This scenario represents Near Term (2022) Conditions with the addition of project-generated traffic.

- **Cumulative (2040) Conditions** – This scenario represents the transportation network and traffic conditions over a longer-term horizon to account for the cumulative effects of transportation network changes as well as background growth and land use development within the project area. This scenario assumes Conditions (2040) Conditions plus traffic generated from additional approved and reasonably foreseeable development projects in the area. This scenario does not include the proposed project. Volumes used for this scenario were estimated using the citywide traffic model and adjusted to reflect cumulative growth and development in the area.

- **Cumulative (2040) Plus Project Conditions** – This scenario represents Cumulative (2040) Conditions with the addition of project-generated traffic.

Level of Service Analysis

Although the law required the transition to VMT as the metric for significance in environmental analysis, level of service (LOS) can still be considered for planning purposes. With the adoption of the updated TIA Guidelines the City Council indicated continued concern over roadway congestion and the TIA Guidelines continue to require analysis of LOS alongside VMT. Consistent with the City's TIA Guidelines, the TIA includes a level of service analysis to evaluate compliance with local policies.

Roadway Segment Level of Service

C/CAG has adopted guidelines to evaluate the impacts of net new vehicle trips generated by new developments on the CMP network. These guidelines apply to all developments that generate 100 or more net new peak period vehicular trips on the CMP network and are subject to CEQA review. The proposed project would generate fewer than 100 net new peak period vehicular trips. Therefore, roadway segment level of service analysis is not required.

Intersection Level of Service

Level of service describes the operating conditions experienced by motorists. LOS is a qualitative measure of the effect of several factors, including speed and travel time, traffic interruptions, freedom to maneuver, driving comfort, and convenience. LOS A through LOS F covers the entire range of traffic operations that might occur. Motorists using a facility that operates at LOS A experience very little delay,

reduced across all modes. Travel behaviors and travel patterns have also changed substantially as a result of multiple factors such as school closures, restrictions on business operations, and an increased amount of telecommuting.

while those using a facility that operates at LOS F will experience long delays. These conditions are generally described in Table 2.

Table 2: General Level of Service Definitions

Level of Service	Description
A	**Free Flow or Insignificant Delays:** Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.
B	**Stable Operation or Minimal Delays:** The ability to maneuver within the traffic stream is only slightly restricted, and control delay at signalized intersections are not significant.
C	**Stable Operation or Acceptable Delays:** The ability to maneuver and change lanes is somewhat restricted, and average travel speeds may be about 50 percent of the free flow speed.
D	**Approaching Unstable or Tolerable Delays:** Small increases in flow may cause substantial increases in delay and decreases in travel speed.
E	**Unstable Operation or Significant Delays:** Significant delays may occur and average travel speeds may be 33 percent or less of the free flow speed.
F	**Forced Flow or Excessive Delays:** Congestion, high delays, and extensive queuing occur at critical signalized intersections with urban street flow at extremely low speeds.

Source: *Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2016.

Signalized Intersections

Signalized intersection analysis was conducted using the operational methodology outlined in the Highway Capacity Manual (HCM) (Transportation Research Board, Washington, D.C., 2016), as operationalized by Vistro 2020[11]. The HCM 6th Edition procedure calculates a weighted average stop delay in seconds per vehicle at an intersection and assigns a level of service designation based on the delay. Table 3 presents the relationship of average delay to level of service at signalized intersections.

[11] Vistro is a traffic engineering software that allows creation of a transportation network model and applies industry standard methodologies to evaluate signalized and unsignalized intersections.

Table 3: Signalized Intersection Level of Service Definitions

Average Delay per Vehicle (Seconds)	Level of Service	Description of Traffic Conditions
≤10.0	A	Free flowing. Most vehicles do not have to stop.
>10.0 and ≤20.0	B	Minimal delays. Some vehicles have to stop, although waits are not bothersome.
>20.0 and ≤35.0	C	Acceptable delays. Significant numbers of vehicles have to stop because of steady, high traffic volumes. Still, many pass without stopping.
>35.0 and ≤55.0	D	Tolerable delays. Many vehicles have to stop. Drivers are aware of heavier traffic. Cars may have to wait through more than one red light. Queues begin to form, often on more than one approach.
>55.0 and ≤80.0	E	Significant delays. Cars may have to wait through more than one red light. Long queues form, sometimes on several approaches.
≤80.0	F	Excessive delays. Intersection is jammed. Many cars have to wait through more than one red light, or more than 60 seconds. Traffic may back up into "up-stream" intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2016.

Unsignalized Intersections

Unsignalized intersection analysis was also conducted using the operational methodology outlined in the HCM, as operationalized by Vistro 2020. Table 4 presents the relationship of average delay to level of service for unsignalized intersections.

Table 4: Unsignalized Intersection Level of Service Definitions

Average Delay per Vehicle (Seconds)	Level of Service	Description of Traffic Conditions
≤10.0	A	Free flowing. Most vehicles do not have to stop.
>10.0 and ≤15.0	B	Minimal delays. Some vehicles have to stop, although waits are not bothersome.
>15.0 and ≤25.0	C	Acceptable delays. Significant numbers of vehicles have to stop because of steady, high traffic volumes. Still, many pass without stopping.
>25.0 and ≤35.0	D	Tolerable delays. Many vehicles have to stop. Drivers are aware of heavier traffic. Queues begin to form, often on more than one approach.
>35.0 and ≤50.0	E	Significant delays. Long queues form, sometimes on several approaches.
>50.0	F	Excessive delays. Intersection is jammed. Many cars have to wait more than 60 seconds. Traffic may back up into "up-stream" intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, Washington, D.C., 2016.

Study Intersections

Level of service was analyzed[12] at fifteen study intersections. The study locations are presented in Figure 1. The City of Menlo Park conducted traffic counts for the two peak periods, 7 AM to 9 AM and 4 PM to 6 PM, in March 2019. The peak hours at each location were identified in these counts and used in the operations analysis.

[12] Intersection operations are not a CEQA topic but are analyzed as a local requirement in compliance with the General Plan Circulation Element.

Study Intersections

The study intersections and associated jurisdiction are listed below.

1. Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)
2. Marsh Road & US-101 NB Off-Ramp (State)
3. Marsh Road & US-101 SB Off-Ramp (State)
4. Marsh Road & Scott Drive (Menlo Park)
5. Marsh Road & Bay Road (Menlo Park)
6. Marsh Road & Middlefield Road (Atherton)
7. Chrysler Drive & Bayfront Expressway (Local Approaches to State)
8. Chrysler Drive & Constitution Drive (Menlo Park)
9. Chrysler Drive & Jefferson Drive (Menlo Park)
10. Chrysler Drive & Independence Drive (Menlo Park)
11. Chilco Street & Bayfront Expressway (Local Approaches to State)
12. Chilco Street & Constitution Drive (Menlo Park)
13. Willow Road & Bayfront Expressway (State)
14. University & Bayfront Expressway (State)
15. Marsh Road & Florence Street-Bohannon Drive (Menlo Park)

EXISTING CONDITIONS

The turning movement volumes for the 15 study intersections were acquired from the City's database, which reflects the 2019 counts. The turning movement volumes for the study intersection are provided in Attachment 1 and the existing lane configurations are provided in Attachment 2.

The level of service results for the study intersections during the existing AM and PM peak hours are shown in Table 5. The Vistro analysis outputs are provided in Attachment 3. The intersections listed below operate at LOS not meeting the City's LOS Standard during one or both peak hours. All other study intersections operate in compliance with the LOS standard under Existing Conditions.

- Intersection #1, Marsh Road and Bayfront Expressway/Haven Avenue (Local Approaches to State): AM
- Intersection #10, Chrysler Drive and Independence Drive (Menlo Park): AM
- Intersection #12, Chilco Street and Constitution Drive (Menlo Park): AM and PM
- Intersection #13, Willow Road and Bayfront Expressway (State): AM and PM
- Intersection #14, University Avenue and Bayfront Expressway (State): PM

Manual on Uniform Traffic Control Devices (MUTCD) peak hour signal warrant analysis was conducted at the unsignalized intersections. The intersection of Chilco Street and Constitution Drive (Intersection #12), which operates with all-way stop control under Existing Conditions, met the peak hour signal warrant during both the AM and PM peak hours. No other study unsignalized intersections met the peak hour signal warrant during either peak hour.

Table 5: Existing Conditions Level of Service

No.	Intersection	Control	Peak Hour	Existing		Meet General Plan Standard?
				Delay	LOS	
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	**56.9**	**E**	No
			PM	36.5	D	Yes
2	Marsh Road & US-101 NB Off-Ramp (State)	Signal	AM	15.8	B	N/A
			PM	13.3	B	N/A
3	Marsh Road & US-101 SB Off-Ramp (State)	Signal	AM	18.1	B	N/A
			PM	17.0	B	N/A
4	Marsh Road & Scott Drive (Menlo Park)	Signal	AM	18.5	B	Yes
			PM	15.3	B	Yes
5	Marsh Road & Bay Road (Menlo Park)	Signal	AM	19.7	B	Yes
			PM	18.6	B	Yes
6	Marsh Road & Middlefield Road (Atherton)	Signal	AM	35.0	D	N/A
			PM	37.9	D	N/A
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	8.4	A	Yes
			PM	13.1	B	Yes
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	50.6	D	Yes
			PM	28.0	C	Yes
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	18.6	C	Yes
			PM	19.0	C	Yes
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	**44.0**	**E**	No
			PM	17.9	C	Yes
11	Chilco Street & Bayfront Expressway (Local Approaches to State)	Signal	AM	12.7	B	Yes
			PM	16.0	B	Yes
12	Chilco Street & Constitution Drive (Menlo Park)	AWSC[3]	AM	**32.1**	**D**	No
			PM	**32.5**	**D**	No
13	Willow Road & Bayfront Expressway (State)	Signal	AM	**106.0**	**F**	N/A
			PM	**168.1**	**F**	N/A
14	University Avenue & Bayfront Expressway (State)	Signal	AM	11.4	B	N/A
			PM	**94.1**	**F**	N/A
15	Marsh Road & Florence Street-Bohannon Drive (Menlo Park)	Signal	AM	35.3	D	Yes
			PM	34.6	C	Yes

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
AWSC - All-way stop-controlled.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A – Not applicable. The "General Plan Standard" information is only relevant where the City's LOS policy standards apply.
[1] This intersection does not meet signal warrant criteria under Existing Conditions during both peak hours.
[2] This intersection does not meet signal warrant criteria under Existing Conditions during both peak hours.
[3] This intersection meets signal warrant criteria under Existing Conditions during both peak hours.

NEAR TERM (2022) CONDITIONS

Near Term (2022) Conditions represent the transportation network and traffic conditions at the time of expected occupancy of the proposed project. This scenario includes transportation network changes, land use changes, and traffic generated from approved development projects in the area.

Programmed/Planned Transportation Facility Improvements

At the direction of the City of Menlo Park, the following programmed and planned improvements to study facilities were included in the Near Term (2022) Conditions analysis:

- **Chilco Street & Constitution Drive** was analyzed with a shared left-through-right lane in the northbound direction, a shared left-thru lane and right-turn lane in the southbound direction, a left turn lane and shared through-right lane in the eastbound direction, and with a left turn lane and shared through-right lane in the westbound direction. This intersection was evaluated with a signal in all future analysis scenarios.

The lane configurations under Near Term (2022) Conditions are provided in Attachment 2.

Additionally, Caltrain's Modernization Program is currently upgrading the Caltrain signal system for improved safety and performance and replacing diesel-powered trains with electric multiple-unit trains. Improvements are expected to finish prior to 2022 and result in improved frequency and speed of trains and increased ridership.

Development Projects

Approved development projects included in the Near Term (2022) Conditions analysis are detailed in Table 6. The Near Term scenario includes traffic that would be generated by these projects. The traffic volumes from approved projects were included in the Vistro analysis network. Additionally, a growth rate of one percent per year was applied to account for growth in regional traffic until the horizon year of 2022. The turning movement volumes under Near Term (2022) Conditions are provided in Attachment 1.

Table 6: Near Term (2022) Conditions Approved Projects

Project	Land Use	Size
Greenheart 1300 El Camino Real	Residential	183 units
	Office	203,000 square feet
	Retail/Personal Service	18,600 square feet
Menlo Gateway Constitution 100-155 Constitution Drive	Office	487,244 square feet
	Restaurant	7,420 square feet
Facebook Expansion Project 301-309 Constitution Drive	Office	450,400 square feet
	Hotel	200 rooms
Stanford 500 El Camino Real	Residential	215 units
	Office	143,900 square feet
	Retail	10,000 square feet
New Magnet High School 150 Jefferson Drive	High School	400 students
1275 El Camino Real	Residential	3 units
	Office	9,334 square feet
	Retail	589 square feet
1430 O'Brien Drive	Research & Development	46,608 square feet
	Fitness	10,223 square feet
	Cafe	7,652 square feet
1345 Willow Road	Residential	140 units

Source: City of Menlo Park, 2020.

Intersection Level of Service

Table 7 provides LOS results for the study intersections during the AM and PM peak hours under Near Term (2022) Conditions. The Vistro analysis outputs are provided in Attachment 3.

The intersections listed below would operate at LOS exceeding the City's LOS standard during one or both peak hours. All other study intersections would operate in compliance with the LOS standard under Near Term (2022) Conditions.

- Intersection #1, Marsh Road and Bayfront Expressway/Haven Avenue (Local Approaches to State): AM
- Intersection #6, Marsh Road and Middlefield Road (Atherton): AM
- Intersection #8, Chrysler Drive and Constitution Drive (Menlo Park): AM
- Intersection #10, Chrysler Drive and Independence Drive (Menlo Park): AM
- Intersection #13, Willow Road and Bayfront Expressway (State): AM and PM
- Intersection #14, University Avenue and Bayfront Expressway (State): PM

None of the unsignalized study intersections would meet the peak hour MUTCD signal warrant during either peak hour.

Table 7: Near Term (2022) Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Near Term		Meet General Plan Standard?
					Delay	LOS	
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**59.7**	**E**	No
				EB	**114.1**	**F**	
				WB	36.5	D	
			PM	N/A	37.4	D	Yes
2	Marsh Road & US-101 NB Off-Ramp (State)	Signal	AM	N/A	25.3	C	N/A
			PM	N/A	13.3	B	N/A
3	Marsh Road & US-101 SB Off-Ramp (State)	Signal	AM	N/A	22.9	C	N/A
			PM	N/A	17.7	B	N/A
4	Marsh Road & Scott Drive (Menlo Park)	Signal	AM	N/A	20.0	B	Yes
			PM	N/A	15.1	B	Yes
5	Marsh Road & Bay Road (Menlo Park)	Signal	AM	N/A	22.7	C	Yes
			PM	N/A	18.4	B	Yes
6	Marsh Road & Middlefield Road (Atherton)	Signal	AM	N/A	**73.8**	**E**	N/A
			PM	N/A	44.2	D	N/A
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	9.5	A	Yes
			PM	N/A	20.1	C	Yes
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**111.1**	**F**	No
				NB	24.2	C	
				SB	**176.1**	**F**	
				EB	**104.4**	**F**	
				WB	**56.7**	**E**	
			PM	N/A	39.8	D	Yes
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	N/A	23.2	C	Yes
			PM	N/A	20.1	C	Yes
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	N/A	**69.3**	**F**	No
			PM	N/A	18.3	C	Yes
11	Chilco Street & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	21.9	C	Yes
			PM	N/A	25.3	C	Yes
12	Chilco Street & Constitution Drive (Menlo Park)	Signal	AM	N/A	33.8	C	Yes
			PM	N/A	50.0	D	Yes
13	Willow Road & Bayfront Expressway (State)	Signal	AM	N/A	**193.1**	**F**	N/A
			PM	N/A	**180.9**	**F**	N/A
14	University & Bayfront Expressway (State)	Signal	AM	N/A	12.7	B	N/A
			PM	N/A	**113.1**	**F**	N/A
15	Marsh Road & Florence Street-Bohannon Drive (Menlo Park)	Signal	AM	N/A	38.3	D	Yes
			PM	N/A	37.0	D	Yes

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards. The "General Plan Standard" information is only relevant where the City's LOS policy standards apply.
[1] This intersection does not meet signal warrant criteria under Near Term Conditions during both peak hours.

[2] This intersection does not meet signal warrant criteria under Near Term Conditions during both peak hours.

CUMULATIVE (2040) CONDITIONS

Cumulative (2040) Conditions represent the transportation network and traffic conditions over a longer-term horizon to account for the cumulative effects of transportation network changes as well as background growth and land use development within the project area. Intersection geometry and signal changes are incorporated into this scenario and described in the Programmed/Planned Transportation Facility Improvements section. Development projects included in the Cumulative (2040) Conditions analysis are detailed in the Development Projects section.

Programmed/Planned Transportation Facility Improvements

The programmed/planned transportation facility improvements affecting the study intersections are the same as those identified under Near Term (2022) Conditions. The lane configurations for Cumulative (2040) Conditions are provided in Attachment 2.

The following bicycle network improvements were identified in the Comprehensive Bicycle Development Plan[13] for streets near the project site and are anticipated to be completed prior to 2040:

- Class II bike lanes are recommended on Marsh Road, which would connect to the existing bike path next to Bayfront Expressway. These proposed bike lanes would allow bicyclists to cross US 101 safely and access the bikeway network on the west side of the freeway.

- A Class I Connector Path is recommended on Independence Drive, which would connect the planned Class II bike lanes on Marsh Road and the existing Class II bike lanes on Constitution Drive. Because Independence Drive is one-way in the southbound direction off Marsh Road, a Class I off-street connection would allow bicyclists to travel counter-flow to traffic on this short one-way roadway segment. This bike path would provide bicyclists from the project site with safer access to the proposed bike lanes on Marsh Road.

- A new bicycle and pedestrian bridge over the Atherton Channel is recommended to extend the bike lanes and sidewalks on Haven Avenue to Marsh Road.

The Marsh Road bike lanes and Independence Drive Connector Path are identified as long-term projects. The Marsh Road bike lanes are also identified as proposed improvements in the San Mateo County Comprehensive Bicycle and Pedestrian Plan. The implementation timeline of these proposed improvements is unknown.

The following improvements for walking and biking are identified in the Transportation Master Plan [14]:

[13] Menlo Park Comprehensive Bicycle Development Plan (2005). Accessed online on July 30, 2020.

[14] City of Menlo Park. 2017. City of Menlo Park Transportation Master Plan. https://menloparktmp.participate.online/project-map. Accessed on July 31, 2020.

- The Haven Avenue Streetscape Project includes pedestrian crossing improvements to the Marsh Road-Haven Avenue-Bayfront Expressway intersection. Although this project is not in the immediate vicinity of the project site, it will improve the overall pedestrian network in the area east of US 101. The improvements include widened sidewalks, replacement of curb ramps to comply with Americans with Disabilities Act (ADA) standards, realigning with the existing crosswalk on the northwest (Haven Avenue) leg of the intersection, and improving the existing median to provide a crossing refuge island. Additionally, as adjacent land parcels are redeveloped, new sidewalks will be constructed on the street frontages, which will improve pedestrian facilities in the general vicinity of the project.

- Improvements to bicycle safety on Marsh Road from Bay Road to Scott Drive and from Independence Drive to Scott Drive include adding bike lanes and constructing a bicycle and pedestrian bridge over US 101. Class II Bike Lanes are proposed along both sections of Marsh Road.

- Improvements to pedestrian safety on Constitution Drive from Chrysler Drive to Chilco Street and on Jefferson Drive from Chrysler Drive to Constitution Drive include construction of sidewalks on both sides of the roadways.

- Enhancements to pedestrian and bicycle crossing along Bayfront Expressway, including high visibility pedestrian crossings along Bayfront Expressway at Chrysler Drive, Chilco Street, and Willow Road. Construction of a bicycle and pedestrian bridge is proposed over Bayfront Expressway between Chilco Street and Willow Road.

- Proposed multiuse pathways on Willow Road from Dumbarton Rail Corridor to Hamilton Avenue and at Facebook from Chilco Street to the proposed bicycle and pedestrian bridge over Bayfront Expressway.

- A new bicycle and pedestrian bridge over Bayfront Expressway, east of Chilco Street.

The following improvements to transit within the study area are identified in the Transportation Master Plan[15] and are anticipated to be completed prior to 2040:

- Allow buses to use existing right turn lane on Willow Road and O'Brien Drive for queue jump with transit signal priority (TSP) and implement peak hour left-turn restrictions at Willow Road and O'Brien Drive.

- Increase mobility along the Dumbarton Corridor by supporting the reactivation of the Dumbarton rail service between the East Bay and Peninsula.

- Install shoulder-running peak hour bus lane on Bayfront Expressway and install TSP at signalized intersections.

- Increase the number of people traveling on Bayfront Expressway by removing traffic signals and converting a travel lane to a managed (toll) lane for carpools and buses. Implement the corridor with

[15] City of Menlo Park Transportation Master Plan (2017), https://menloparktmp.participate.online/project-map, Accessed July 31, 2020.

improved mixed flow and managed lane connections, including grade separations with revised access at University Avenue, Willow Road, Chilco Street, Marsh Road, and Chrysler Drive.

Caltrain's Modernization Program and related infrastructure improvements on the Caltrain corridor will also accommodate the California High-Speed Rail service as early as 2025[16].

SamTrans completed the El Camino Corridor Bus Rapid Transit Phasing Study in 2014 and is evaluating options to improve transit service along El Camino Real[17]. Recommendations include consolidating existing bus service along El Camino Real to improve reliability and frequency of routes. SamTrans will continue to work from this study to evaluate long-term transit vision for El Camino Real. Although the project is not in the immediate vicinity of the project site, it will improve transit service in the transportation network south of the project.

The implementation timeline of these proposed improvements is unknown. However, these are anticipated to be completed by 2040 and are therefore assumed in the Cumulative (2040) Conditions analysis.

Development Projects

The Cumulative scenario includes all approved projects incorporated into the Near-Term Conditions analysis, plus the cumulative development identified in Table 4.A of the EIR. The Cumulative (2040) Conditions traffic volumes includes traffic from these development projects and a growth rate of one percent per year was applied to account for growth in regional traffic until the horizon year of 2040. The turning movement volumes under Cumulative (2040) Conditions are provided in Attachment 1.

Intersection Level of Service

Table 8 provides LOS results for the study intersections during the AM and PM peak hours under Cumulative (2040) Conditions. Vistro output sheets are included in Attachment 3.

The intersections listed below would operate at LOS exceeding the City's LOS standard during one or both peak hours. All other study intersections would operate in compliance with the LOS standard under Cumulative (2040) Conditions.

- Intersection #1, Marsh Road and Bayfront Expressway/Haven Avenue (Local Approaches to State): AM
- Intersection #3, Marsh Road and US-101 SB Off-Ramp (State): AM and PM
- Intersection #6, Marsh Road and Middlefield Road (Atherton): AM

[16] Caltrain, Accessed Online July 31, 2020
https://www.caltrain.com/projectsplans/CaltrainModernization/BlendedSystem.html

[17] SamTrans El Camino Real Bus Rapid Transit Phasing Study, 2014; Accessed July 31, 2020
https://www.samtrans.com/Assets/_Planning/BRT/SamTrans+ECR+BRT+Phasing+Study.pdf

- Intersection #7, Chrysler Drive and Bayfront Expressway (Local Approaches to State): PM
- Intersection #8, Chrysler Drive and Constitution Drive (Menlo Park): AM and PM
- Intersection #9, Chrysler Drive and Jefferson Drive (Menlo Park): AM and PM
- Intersection #10, Chrysler Drive and Independence Drive (Menlo Park): AM
- Intersection #11, Chilco Street and Bayfront Expressway (Local Approaches to State): AM and PM
- Intersection #12, Chilco Street and Constitution Drive (Menlo Park): AM and PM
- Intersection #13, Willow Road and Bayfront Expressway (State): AM and PM
- Intersection #14, University Avenue and Bayfront Expressway (State): AM and PM

Manual on Uniform Traffic Control Devices peak hour signal warrant analysis was conducted at the two unsignalized intersections. The intersection of Chrysler Drive and Jefferson Drive (Intersection #9) would meet the peak hour warrant during the PM peak hour and the intersection of Chrysler Drive and Independence Drive (Intersection #10) would meet the peak hour warrant during the AM peak hour.

Table 8: Cumulative (2040) Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Cumulative		Meet General Plan Standard?
					Delay	LOS	
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**99.1**	**F**	No
				EB	**169.2**	**F**	
				WB	**79.6**	**E**	
			PM	N/A	36.5	D	Yes
2	Marsh Road & US-101 NB Off-Ramp (State)	Signal	AM	N/A	34.6	C	N/A
			PM	N/A	16.6	B	N/A
3	Marsh Road & US-101 SB Off-Ramp (State)	Signal	AM	N/A	**36.5**	**D**	N/A
			PM	N/A	**38.9**	**D**	N/A
4	Marsh Road & Scott Drive (Menlo Park)	Signal	AM	N/A	32.8	C	Yes
			PM	N/A	22.9	C	Yes
5	Marsh Road & Bay Road (Menlo Park)	Signal	AM	N/A	28.6	C	Yes
			PM	N/A	19.8	B	Yes
6	Marsh Road & Middlefield Road (Atherton)	Signal	AM	N/A	**81.0**	**F**	N/A
			PM	N/A	52.8	D	N/A
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	10.9	B	Yes
			PM	N/A	**56.5**	**E**	No
				NB	**190.5**	**F**	
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**356.6**	**F**	No
				NB	40.2	D	
				SB	**118.3**	**F**	
				EB	**159.4**	**F**	
				WB	**1394.8**	**F**	
			PM	N/A	**222.8**	**F**	No
				NB	27.7	C	

Table 8: Cumulative (2040) Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Cumulative		Meet General Plan Standard?
					Delay	LOS	
				SB	**763.6**	**F**	
				EB	**102.5**	**F**	
				WB	**396.7**	**F**	
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	N/A	**44.8**	**E**	No
			PM	N/A	**132.9**	**F**	No
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	N/A	**271.6**	**F**	No
			PM	N/A	21.6	C	Yes
11	Chilco Street & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	**61.6**	**E**	No
				NB	**164.3**	**F**	
			PM	N/A	**67.4**	**E**	No
				NB	**257.3**	**F**	
12	Chilco Street & Constitution Drive (Menlo Park)	Signal	AM	N/A	**85.5**	**F**	No
				NB	**92.1**	**F**	
				SB	**94.4**	**F**	
				EB	35.9	D	
				WB	50.0	D	
			PM	N/A	**252.3**	**F**	No
				NB	**98.6**	**F**	
				SB	**211.6**	**F**	
				EB	**521.3**	**F**	
				WB	**113.7**	**F**	
13	Willow Road & Bayfront Expressway (State)	Signal	AM	N/A	**326.6**	**F**	N/A
			PM	N/A	**370.7**	**F**	N/A
14	University & Bayfront Expressway (State)	Signal	AM	N/A	**101.1**	**F**	N/A
			PM	N/A	**215.3**	**F**	N/A
15	Marsh Road & Florence Street-Bohannon Drive (Menlo Park)	Signal	AM	N/A	39.9	D	Yes
			PM	N/A	45.9	D	Yes

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards. The "General Plan Standard" information is only relevant where the City's LOS policy standards apply.
[1] This intersection meets signal warrant criteria under Cumulative Conditions during the PM peak hour.
[2] This intersection meets signal warrant criteria under Cumulative Conditions during the AM peak hour.

GENERAL PLAN LEVEL OF SERVICE POLICY STANDARDS

The following plans, ordinances, or policies are applicable to determine planning consistency and whether decision makers can make the necessary findings to issue entitlements, but are not a CEQA impact:

City of Menlo Park Level of Service Policy

Menlo Park General Plan requires that all City-controlled signalized intersections shall be maintained at level of service D or better during peak hours, except at the intersection of Ravenswood Avenue and Middlefield Road and the intersections along Willow Road from Middlefield Road to US101.

Town of Atherton Level of Service Policy

The circulation element of the Town of Atherton General Plan 2019 provides minimum acceptable level of service standards for the Town facilities by roadway type. that the Town facilities shall be maintained by roadway type, LOS D for highways, LOS D for minor arterials, and LOS C for local roads.

One of the study intersections, Marsh Road and Middlefield Road, is located within the Town limit. Marsh Road and Middlefield Road are classified as part of the minor arterial system connecting between residential areas and other transportation facilities and serving as emergency and evacuation routes. The intersection of Marsh Road and Middlefield Road was analyzed based on the Town standard for minor arterial facility.

Caltrans Level of Service Policy

Caltrans establishes level of service standards at the transition between LOS C and LOS D on State facilities. For purposes of this study and a consistency with past studies in Menlo Park, the City's LOS standard is also applied to State-controlled intersections while Caltrans LOS standard still applies to ramp intersections.

City/County Association of Governments (C/CAG) Level of Service Policy

The LOS standards established by C/CAG vary based on geographic differences to prevent the Congestion Management Program (CMP) facilities to operate at level of service worse than currently anticipated in San Mateo County CMP 2019. The CMP intersection level of service standards were set based on the following considerations:

- LOS F for the intersections operating at LOS F.
- LOS E for the remaining intersections.

Although C/CAG monitors three of the study intersections for compliance with the CMP LOS standards, these intersections are also under Caltrans' jurisdiction. Given that City or Caltrans' standards are more stringent than the C/CAG's CMP standards, the analysis based on City or Caltrans' level of service standards would be more conservative.

Table 9 shows the jurisdiction and corresponding LOS standard applied for each study intersection.

Table 9: Level of Service Standard for the Study Intersections

No.	Intersection	Traffic Control	Jurisdiction	LOS Standard[2]
1	Marsh Road & Bayfront Expressway	Signal	State (local approach)	D
2	Marsh Road & US-101 NB Off-Ramp	Signal	State	C
3	Marsh Road & US-101 SB Off-Ramp	Signal	State	C
4	Marsh Road & Scott Drive	Signal	Menlo Park	D
5	Marsh Road & Bay Road	Signal	Menlo Park	D
6	Marsh Road & Middlefield Road	Signal	Atherton	D
7	Chrysler Drive & Bayfront Expressway	Signal	State (local approach)	D
8	Chrysler Drive & Constitution Drive	Signal	Menlo Park	D
9	Chrysler Drive & Jefferson Drive	TWSC	Menlo Park	C
10	Chrysler Drive & Independence Drive	TWSC	Menlo Park	C
11	Chilco Street & Bayfront Expressway	Signal	State (local approach)	D
12	Chilco Street & Constitution Drive	Signal[1]	Menlo Park	D
13	Willow Road & Bayfront Expressway	Signal	State	D
14	University Avenue & Bayfront Expressway	Signal	State	D
15	Marsh Road & Florence Street-Bohannon Drive	Signal	Menlo Park	D

Sources:
Menlo Park General Plan, 2016.
Town of Atherton General Plan, 2019.
C/CAG of San Mateo County Transportation Congestion Management Program, 2019.
Caltrans' Guide for the Preparation of Traffic Impact Studies, 2002.
Note:
TWSC - Two-way stop-controlled.
[1] Intersection was analyzed with all-way stop-controlled under Existing Conditions.
[2] City LOS standard is applied to State-controlled intersections except for ramp intersections for consistency with the prior studies in Menlo Park.

NEAR TERM (2022) PLUS PROJECT CONDITIONS

The following analysis is based on the City's TIA Guidelines for intersection level of service under Near Term (2022) Plus Project Conditions. The turning movement volumes under Near Term (2022) Plus Project Conditions are provided in Attachment 1 and the lane configurations are provided in Attachment 2. Table 10 provides LOS results for the study intersections during the AM and PM peak hours under Near Term (2022) Plus Project Conditions. The Vistro outputs are provided in Attachment 3.

The intersections listed below would operate at LOS exceeding the City's LOS standard during one or both peak hours. All other study intersections would operate in compliance with the LOS standard under Near Term (2022) Plus Project Conditions.

- Intersection #1, Marsh Road and Bayfront Expressway/Haven Avenue (Local Approaches to State): AM
- Intersection #6, Marsh Road and Middlefield Road (Atherton): AM
- Intersection #8, Chrysler Drive and Constitution Drive (Menlo Park): AM
- Intersection #10, Chrysler Drive and Independence Drive (Menlo Park): AM
- Intersection #13, Willow Road and Bayfront Expressway (State): AM and PM

- Intersection #14, University Avenue and Bayfront Expressway (State): PM

None of the unsignalized study intersections would meet the MUTCD peak hour signal warrant during either peak hour under Near Term (2022) Plus Project Conditions.

Table 10: Near Term (2022) Plus Project Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Near Term		Near Term Plus Project		Meet General Plan Standard?	Non-Compliant with TIA Guidelines?
					Delay	LOS	Delay	LOS		
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**59.7**	**E**	**59.9**	**E**	No	Yes
				EB	**114.1**	**F**	**114.1**	**F**		
				WB	36.5	D	37.3	D		
			PM	N/A	37.4	D	38.0	D	Yes	No
2	Marsh Road & US-101 NB Off-Ramp (State)	Signal	AM	N/A	25.3	C	25.2	C	N/A	No
			PM	N/A	13.3	B	13.6	B	N/A	No
3	Marsh Road & US-101 SB Off-Ramp (State)	Signal	AM	N/A	22.9	C	22.9	C	N/A	No
			PM	N/A	17.7	B	17.9	B	N/A	No
4	Marsh Road & Scott Drive (Menlo Park)	Signal	AM	N/A	20.0	B	20.0	C	Yes	No
			PM	N/A	15.1	B	15.1	B	Yes	No
5	Marsh Road & Bay Road (Menlo Park)	Signal	AM	N/A	22.7	C	22.7	C	Yes	No
			PM	N/A	18.4	B	18.5	B	Yes	No
6	Marsh Road & Middlefield Road (Atherton)	Signal	AM	N/A	**73.8**	**E**	**73.9**	**E**	N/A	No
			PM	N/A	44.2	D	44.5	D	N/A	No
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	9.5	A	9.9	A	Yes	No
			PM	N/A	20.1	C	21.0	C	Yes	No
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**111.1**	**F**	**114.5**	**F**	No	Yes
				NB	24.2	C	24.6	C		
				SB	**176.1**	**F**	**197.2**	**F**		
				EB	**104.4**	**F**	**100.8**	**F**		
				WB	**56.7**	**E**	**56.5**	**E**		
			PM	N/A	39.8	D	45.5	D	Yes	No
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	N/A	23.2	C	24.4	C	Yes	No
			PM	N/A	20.1	C	20.8	C	Yes	No
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	N/A	**69.3**	**F**	**117.7**	**F**	No	Yes
			PM	N/A	18.3	C	19.7	C	Yes	No
11	Chilco Street & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	21.9	C	22.2	C	Yes	No
			PM	N/A	25.3	C	25.3	C	Yes	No
12	Chilco Street & Constitution Drive (Menlo Park)	Signal	AM	N/A	33.8	C	33.7	C	Yes	No
			PM	N/A	50.0	D	51.1	D	Yes	No
13	Willow Road & Bayfront Expressway (State)	Signal	AM	N/A	**193.1**	**F**	**192.2**	**F**	N/A	No
			PM	N/A	**180.9**	**F**	**180.9**	**F**	N/A	No
14	University Avenue & Bayfront Expressway (State)	Signal	AM	N/A	12.7	B	12.8	B	N/A	No
			PM	N/A	**113.1**	**F**	**113.2**	**F**	N/A	No
15	Marsh Road & Florence Street-Bohannon Drive (Menlo Park)	Signal	AM	N/A	38.3	D	38.4	D	Yes	No
			PM	N/A	37.0	D	37.1	D	Yes	No

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC Intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.

N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards. The "General Plan Standard" information is only relevant where the City's LOS policy standards apply.
[1] This intersection does not meet signal warrant criteria under Near Term or Near Term Plus Project Conditions during both peak hours.
[2] This intersection does not meet signal warrant criteria under Near Term or Near Term Plus Project Conditions during both peak hours

The proposed project would increase the average critical movement delay by 0.8 seconds or more during at least one peak hour and cause three intersections to be non-compliant with the TIA Guidelines under Near Term (2022) Plus Project Conditions. Followings are the recommended conditions of approval to improve intersection operations to pre-project conditions, or better, at locations the proposed project would cause to operate in non-compliance with the TIA Guidelines. Implementation of the recommended conditions of approval would not result in any changes to VMT associated with the proposed project and would not result in secondary effects or contribute to impacts under CEQA.

Marsh Road and Bayfront Expressway/Haven Avenue (Intersection #1)

Implementation of the proposed project would cause the Marsh Road and Bayfront Expressway intersection to operate in non-compliance with the TIA Guidelines under Near Term (2022) Plus Project Conditions. The proposed project would cause this intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM peak hour.

The recommended modification for this location is to restripe the through lane on Haven Avenue to a shared through/right lane. The lane configuration on Haven Avenue would have one shared left/through lane, one shared through/right lane, and one right-turn lane. This improvement is in the City's TIF program and the project is required to pay traffic impact fees according to the City's current TIF schedule.

With implementation of this intersection modification, the intersection would operate at or better than Near Term (2022) Conditions and would be in compliance with the TIA Guidelines by reducing the increase in the average critical movement delay at the intersection such that the increase becomes less than 0.8 seconds or more during the AM peak hour.

Chrysler Drive and Constitution Drive (Intersection #8)

Implementation of the proposed project would cause the Chrysler Drive and Constitution Drive intersection to operate in non-compliance with the TIA Guidelines under Near Term (2022) Plus Project Conditions. The proposed project would cause this City-controlled intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM peak hour.

The recommended modification for this location is to install one left-turn lane on westbound Chrysler Drive and convert the shared left/through/right lane to shared through/right lane resulting in having one left-turn lane and one shared through/right lane in this direction. The excessive delay on southbound Constitution Drive would require installation of a right-turn lane and conversion of the shared through/right lane to through lane resulting in having one left-turn lane, one through lane, and one right-turn lane in this direction. The recommended modifications would require a widening to accommodate the lane modifications on westbound Chrysler Drive and on southbound Constitution Drive and would potentially require acquisition of additional right-of-way. This may require traffic signal modification if traffic signal poles need to be replaced due to the widening. The project is

required to pay traffic impact fees (TIF) according to the current TIF schedule. While the improvements to the westbound approach are included in the City's TIF program, the improvements on the other approaches are beyond those in the TIF program and payment of the TIF would not entirely address the change to LOS as a result of project traffic.

With implementation of these intersection modifications, the intersection would be in compliance with the TIA Guidelines and address the proposed project's share of the non-compliant operation.

Chrysler Drive and Independence Drive (Intersection #10)

Implementation of the proposed project would cause the Chrysler Drive and Independence Drive intersection to operate in non-compliance with the TIA Guidelines under Near Term (2022) Plus Project Conditions. The proposed project would cause this City-controlled intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM peak hour.

The recommended modification for this location is to install a stop control for both approaches of Chrysler Drive, thereby converting the intersection from a two-way stop control to an all-way stop control. The intersection of Chrysler Drive and Independence Drive would not meet the peak hour signal warrant based on MUTCD. A conversion from side-street stop control to all-way stop control would reduce the average vehicle delay on southbound Independence Drive.

Alternatively, the City's Transportation Master Plan identifies installation of a traffic signal as a future improvement at the intersection of Chrysler Drive and Independence Drive. If additional traffic studies indicate a traffic signal is warranted in compliance with MUTCD, the City may choose to install a signal. This improvement is in the City's TIF program and the project is required to pay traffic impact fees according to the City's current TIF schedule.

With implementation of these intersection modifications, the intersection would be in compliance with the TIA Guidelines and address the proposed project's share of the non-compliant operation.

Table 11 provides results for the intersection LOS operations with the improvements during the AM and PM peak hours under Near Term (2022) Plus Project Conditions. The Vistro outputs are provided in Attachment 3.

Table 11: Near Term (2022) Plus Project Conditions with Improvements Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Near Term		Near Term Plus Project		Near Term Plus Project with Improvements		Meet General Plan Standard?[2]
					Delay	LOS	Delay	LOS	Delay	LOS	
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**59.7**	**E**	**59.9**	**E**	41.7	D	Yes
				EB	**114.1**	**F**	**114.1**	**F**	**84.6**	**F**	
				WB	36.5	D	37.3	D	37.3	D	
			PM	N/A	37.4	D	38.0	D	38.8	D	Yes
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**111.1**	**F**	**114.5**	**F**	30.2	C	Yes
				NB	24.2	C	24.6	C	17.6	B	
				SB	**176.1**	**F**	**197.2**	**F**	33.6	C	
				EB	**104.4**	**F**	**100.8**	**F**	29.8	C	
				WB	**56.7**	**E**	**56.5**	**E**	38.9	D	
			PM	N/A	39.8	D	45.5	D	33.7	C	Yes
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[1]	AM	N/A	**69.3**	**F**	**117.7**	**F**	15.0	B	Yes
			PM	N/A	18.3	C	19.7	C	11.3	B	Yes

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards.
[1] This intersection does not meet signal warrant criteria under Near Term or Near Term Plus Project Conditions during both peak hours. The intersection operates with all-way stop-control with the improvements.
[2] Indicates the General Plan compliance for the intersection LOS operations under Near Term (2022) Plus Project Conditions with improvements.

CUMULATIVE (2040) PLUS PROJECT CONDITIONS.

The following analysis is based on the City's TIA Guidelines for intersection level of service under Cumulative (2040) Plus Project Conditions. The turning movement volumes are provided in Attachment 1 and the lane configurations are provided in Attachment 2.

Table 12 provides LOS results for the study intersections during the AM and PM peak hours under Cumulative (2040) Plus Project Conditions. The Vistro outputs are included in Attachment 3. The intersections listed below would operate at LOS exceeding the City's LOS standard during one or both peak hours. All other study intersections would operate in compliance with the LOS standard under Cumulative (2040) Plus Project Conditions.

- Intersection #1, Marsh Road and Bayfront Expressway/Haven Avenue (Local Approaches to State): AM
- Intersection #3, Marsh Road and US-101 SB Off-Ramp (State): AM and PM
- Intersection #6, Marsh Road and Middlefield Road (Atherton): AM
- Intersection #7, Chrysler Drive and Bayfront Expressway (Local Approaches to State): PM
- Intersection #8, Chrysler Drive and Constitution Drive (Menlo Park): AM and PM
- Intersection #9, Chrysler Drive and Jefferson Drive (Menlo Park): AM and PM

- Intersection #10, Chrysler Drive and Independence Drive (Menlo Park): AM
- Intersection #11, Chilco Street and Bayfront Expressway (Local Approaches to State): AM and PM
- Intersection #12, Chilco Street and Constitution Drive (Menlo Park): AM and PM
- Intersection #13, Willow Road and Bayfront Expressway (State): AM and PM
- Intersection #14, University Avenue and Bayfront Expressway (State): AM and PM

The intersection of Chrysler Drive and Independence Drive (Intersection #10) would meet the MUTCD peak hour signal warrant during the AM peak hour and the intersection of Chrysler Drive and Jefferson Drive (Intersection #9) would meet the MUTCD peak hour signal warrant during the PM peak hour.

Table 12: Cumulative (2040) Plus Project Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Cumulative		Cumulative Plus Project		Meet General Plan Standard?	Non-Compliant with TIA Guidelines?
					Delay	LOS	Delay	LOS		
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**99.1**	**F**	**101.8**	**F**	No	Yes
				EB	**169.2**	**F**	**169.2**	**F**		
				WB	**79.6**	**E**	**85.1**	**F**		
			PM	N/A	36.5	D	37.1	D	N/A	No
2	Marsh Road & US-101 NB Off-Ramp (State)	Signal	AM	N/A	34.6	C	34.5	C	N/A	No
			PM	N/A	16.6	B	17.5	B	N/A	No
3	Marsh Road & US-101 SB Off-Ramp (State)	Signal	AM	N/A	**36.5**	**D**	**36.7**	**D**	N/A	No
			PM	N/A	**38.9**	**D**	**41.1**	**D**	No	No
4	Marsh Road & Scott Drive (Menlo Park)	Signal	AM	N/A	32.8	C	32.9	C	Yes	No
			PM	N/A	22.9	C	22.9	C	Yes	No
5	Marsh Road & Bay Road (Menlo Park)	Signal	AM	N/A	28.6	C	28.6	C	Yes	No
			PM	N/A	19.8	B	19.9	B	Yes	No
6	Marsh Road & Middlefield Road (Atherton)	Signal	AM	N/A	**81.0**	**F**	**81.2**	**F**	N/A	No
			PM	N/A	52.8	D	53.4	D	N/A	No
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	10.9	B	12.0	B	Yes	No
			PM	N/A	**56.5**	**E**	**59.8**	**E**	No	Yes
				NB	**190.5**	**F**	**202.2**	**F**		
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**356.6**	**F**	**361.5**	**F**	No	Yes
				NB	40.2	D	40.8	D		
				SB	**118.3**	**F**	**123.7**	**F**		
				EB	**159.4**	**F**	**175.9**	**F**		
				WB	**1394.8**	**F**	**1430.7**	**F**		
			PM	N/A	**222.8**	**F**	**242.7**	**F**	No	Yes
				NB	27.7	C	28.0	C		
				SB	**763.6**	**F**	**837.5**	**F**		
				EB	**102.5**	**F**	**107.4**	**F**		
				WB	**396.7**	**F**	**403.1**	**F**		
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	N/A	**44.8**	**E**	**48.3**	**E**	No	Yes
			PM	N/A	**132.9**	**F**	**141.8**	**F**	No	Yes
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	N/A	**271.6**	**F**	**394.4**	**F**	No	Yes
			PM	N/A	21.6	C	23.8	C	Yes	No
11	Chilco Street & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	**61.6**	**E**	**61.6**	**E**	No	No
				NB	**164.3**	**F**	**164.7**	**F**		
			PM	N/A	**67.4**	**E**	**67.2**	**E**	No	No
				NB	**257.3**	**F**	**257.2**	**F**		
12	Chilco Street & Constitution Drive (Menlo Park)	Signal	AM	N/A	**85.5**	**F**	**85.3**	**F**	No	No
				NB	**92.1**	**F**	**92.2**	**F**		
				SB	**94.4**	**F**	**94.0**	**F**		
				EB	35.9	D	35.8	D		

Table 12: Cumulative (2040) Plus Project Conditions Level of Service

No.	Intersection	Control	Peak Hour	Critical Approach	Cumulative		Cumulative Plus Project		Meet General Plan Standard?	Non-Compliant with TIA Guidelines?
					Delay	LOS	Delay	LOS		
				WB	50.0	D	50.1	D		
			PM	N/A	**252.3**	**F**	**252.2**	**F**	No	No
				NB	**98.6**	**F**	**98.6**	**F**		
				SB	**211.6**	**F**	**211.6**	**F**		
				EB	**521.3**	**F**	**521.3**	**F**		
				WB	**113.7**	**F**	**113.7**	**F**		
13	Willow Road & Bayfront Expressway (State)	Signal	AM	N/A	**326.6**	**F**	**325.5**	**F**	N/A	No
			PM	N/A	**370.7**	**F**	**372.4**	**F**	N/A	No
14	University Avenue & Bayfront Expressway (State)	Signal	AM	N/A	**101.1**	**F**	**101.0**	**F**	N/A	No
			PM	N/A	**215.3**	**F**	**215.2**	**F**	N/A	No
15	Marsh Road & Florence Street-Bohannon Drive (Menlo Park)	Signal	AM	N/A	39.9	D	40.0	D	Yes	No
			PM	N/A	45.9	D	46.1	D	Yes	No

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards. The "General Plan Standard" information is only relevant where the City's LOS policy standards apply.
[1] This intersection meets signal warrant criteria under Cumulative and Cumulative Plus Project Conditions during the PM peak hour.
[2] This intersection meets signal warrant criteria under Cumulative and Cumulative Plus Project Conditions during the AM peak hour.

The proposed project would increase average critical movement delay by 0.8 seconds or more during at least one peak hour and cause five intersections to be non-compliant with the TIA Guidelines under Cumulative (2040) Plus Project Conditions. Followings are the recommended conditions of approval to improve intersection operations to pre-project conditions, or better, at locations the proposed project would cause to operate in non-compliance with the TIA Guidelines. Implementation of the recommended conditions of approval would not result in any changes to VMT associated with the proposed project and would not result in secondary effects or contribute to impacts under CEQA.

Marsh Road and Bayfront Expressway/Haven Avenue (Intersection #1)

Implementation of the proposed project would cause the Marsh Road and Bayfront Expressway/Haven Avenue intersection to operate in non-compliance with the TIA Guidelines under Cumulative (2040) Plus Project Conditions. The proposed project would cause this intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM peak hour.

The recommended modification is to restripe the through lane on Haven Avenue to a shared through/right lane resulting in having one shared left/through lane, one shared through/right lane,

and one right-turn lane. This improvement is in the City's TIF program and the project is required to pay traffic impact fees according to the City's current TIF schedule.

With implementation of these intersection modifications, the intersection would operate at or better than Cumulative (2040) Conditions and would be in compliance with the TIA Guidelines by reducing the increase in the average critical movement critical delay at the intersection by such that the increase becomes less than 0.8 seconds or more during the AM peak hour.

Chrysler Drive and Bayfront Expressway (Intersection #7)

Implementation of the proposed project would cause the Chrysler Drive and Bayfront Expressway intersection to operate in non-compliance with the TIA Guidelines under Cumulative (2040) Plus Project Conditions. The proposed project would cause this intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the PM peak hour.

The recommended modification is to convert the existing right-turn lane on Chrysler Drive to shared left/right-turn lane resulting in having two left-turn lanes and one shared left/right-turn lane in this direction. Since the intersection is located under Caltrans jurisdiction, the recommended modification would be subject to Caltrans's approval and the implementation cannot be guaranteed.

With implementation of these intersection modifications, the intersection would be in compliance with LOS standard and address the proposed project's share of the non-compliant operation.

Chrysler Drive and Constitution Drive (Intersection #8)

Implementation of the proposed project would cause the Chrysler Drive and Constitution Drive intersection to operate in non-compliance with the TIA Guidelines under Near Term (2022) Plus Project Conditions. The proposed project would cause this City-controlled intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM and PM peak hour.

The recommended modification is to install left-turn lane on westbound Chrysler Drive and convert the shared left/through/right to a shared through/right lane resulting in having one left-turn lane and one shared through/right lane in this direction. The excessive delays on southbound Constitution Drive would require an installation of right-turn lane and a conversion of the shared through/right lane to through lane resulting in having one left-turn lane, one through lane, and one right-turn lane. The northbound Constitution Drive would require an installation of right-turn lane and a conversion of the shared left/through/right lane to shared left/through lane resulting in having one shared left/through lane and one right-turn lane. The recommended modification to lane configurations would require a widening of westbound Chrysler Drive and a widening of Constitution Drive on both sides of the intersection and consequently, would potentially require acquisition of additional right of way. This may also require traffic signal modification if poles need to be replaced due to the widening. The project is required to pay traffic impact fees according to the current TIF schedule. While the improvements to the westbound approach are included in the City's TIF program, the improvement's on the other approaches are beyond those in the TIF program and payment of the TIF would not entirely address the change to LOS as a result of project traffic.

With implementation of these intersection modifications, the intersection would operate at or better than Cumulative (2040) Conditions and would be in compliance with the TIA Guidelines by reducing

the increase in the average critical movement delay at the intersection by such that the increase becomes less than 0.8 seconds during the AM and PM peak hours.

Chrysler Drive and Jefferson Drive (Intersection #9)

Implementation of the proposed project would cause the Chrysler Drive and Jefferson Drive intersection to operate in non-compliance with the TIA Guidelines under Cumulative (2040) Plus Project Conditions. The proposed project would cause this City-controlled intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM and PM peak hour.

The recommended modification is to install a traffic signal and convert the shared left/right lane to one left-turn lane and one right-turn lane on northbound Jefferson Drive to operate at level of service compliance with the LOS standard. The installation of a traffic signal is consistent with the City's Transportation Master Plan, which identifies traffic signal installation as a future improvement at the intersection of Chrysler Drive and Jefferson Drive. This improvement is also in the City's TIF program and the project is required to pay traffic impact fees according to the City's current TIF schedule.

With implementation of these intersection modifications, the intersection would be in compliance with LOS standard and address the project's share of the non-compliant operation.

Chrysler Drive and Independence Drive (Intersection #10)

Implementation of the proposed project would cause the Chrysler Drive and Independence Drive intersection to operate in non-compliance with the TIA Guidelines under Cumulative (2040) Plus Project Conditions. The proposed project would cause this City-controlled intersection to experience an increase in average critical movement delay of 0.8 seconds or greater during the AM peak hour.

The recommended modification to bring this intersection back to pre-project conditions and operate in compliance with the TIA Guidelines is to install a traffic signal. The City's Transportation Master Plan identifies traffic signal installation as a future improvement at the intersection of Chrysler Drive and Independence Drive. This improvement is also in the City's TIF program and the project is required to pay traffic impact fees according to the City's current TIF schedule.

With implementation of these intersection modifications, the intersection would be in compliance with LOS standard and address the project's share of the non-compliant operation.

Table 13 provides results for the intersection LOS operations with the improvements during the AM and PM peak hours under Cumulative (2040) Plus Project Conditions. The Vistro outputs are provided in Attachment 3.

Table 13: Cumulative (2040) Plus Project Conditions with Improvements Level of Service

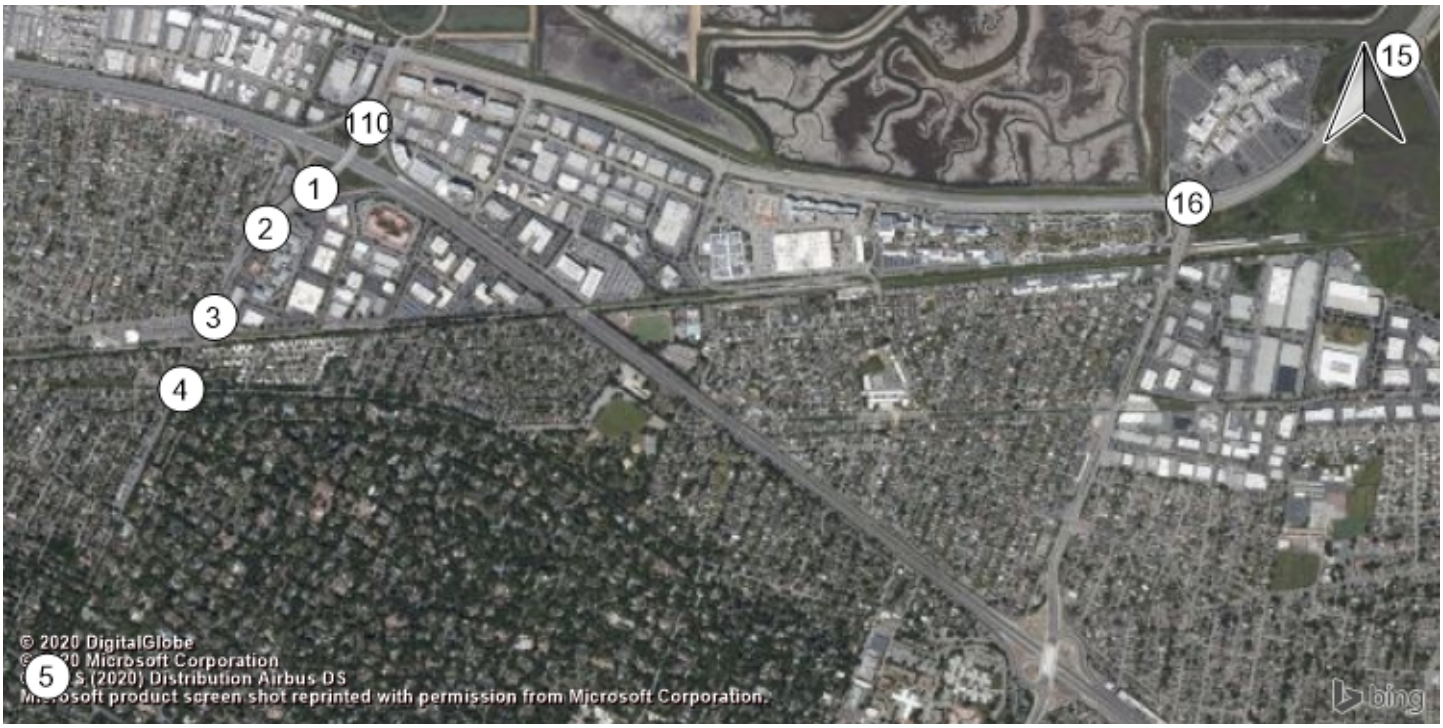
No.	Intersection	Control	Peak Hour	Critical Approach	Cumulative		Cumulative Plus Project		Cumulative Plus Project with Improvements		Meet General Plan Standard?[3]
					Delay	LOS	Delay	LOS	Delay	LOS	
1	Marsh Road & Bayfront Expressway/Haven Avenue (Local Approaches to State)	Signal	AM	N/A	**99.1**	**F**	**101.8**	**F**	**78.2**	**E**	No
				EB	**169.2**	**F**	**169.2**	**F**	**84.1**	**F**	
				WB	**79.6**	**E**	**85.1**	**F**	**84.8**	**F**	
			PM	N/A	36.5	D	37.1	D	38.0	D	Yes
7	Chrysler Drive & Bayfront Expressway (Local Approaches to State)	Signal	AM	N/A	10.9	B	12.0	B	11.2	B	Yes
			PM	N/A	**56.5**	**E**	**59.8**	**E**	25.1	C	Yes
				NB	**190.5**	**F**	**202.2**	**F**	49.4	D	
8	Chrysler Drive & Constitution Drive (Menlo Park)	Signal	AM	N/A	**356.6**	**F**	**361.5**	**F**	49.4	D	Yes
				NB	40.2	D	40.8	D	40.8	D	
				SB	**118.3**	**F**	**123.7**	**F**	**61.1**	**E**	
				EB	**159.4**	**F**	**175.9**	**F**	46.3	D	
				WB	**1394.8**	**F**	**1430.7**	**F**	45.5	D	
			PM	N/A	**222.8**	**F**	**242.7**	**F**	**121.7**	**F**	No
				NB	27.7	C	28.0	C	28.0	C	
				SB	**763.6**	**F**	**837.5**	**F**	**410.3**	**F**	
				EB	**102.5**	**F**	**107.4**	**F**	**86.6**	**F**	
				WB	**396.7**	**F**	**403.1**	**F**	**80.8**	**F**	
9	Chrysler Drive & Jefferson Drive (Menlo Park)	TWSC[1]	AM	N/A	**44.8**	**E**	**48.3**	**E**	26.4	C	Yes
			PM	N/A	**132.9**	**F**	**141.8**	**F**	50.1	D	Yes
10	Chrysler Drive & Independence Drive (Menlo Park)	TWSC[2]	AM	N/A	**271.6**	**F**	**394.4**	**F**	14.4	B	Yes
			PM	N/A	21.6	C	23.8	C	6.1	A	Yes

Notes:
TWSC - Two-way stop-controlled. Delay and LOS for the worst movement is reported for TWSC intersections.
Bold text - Indicates intersections operate at LOS not meeting LOS standard.
N/A = Not applicable. The "Critical Approach" information is only relevant where the proposed project would increase delay per the LOS policy standards.
[1] This intersection meets signal warrant criteria under Cumulative and Cumulative Plus Project Conditions during the PM peak hour. The intersection is signalized with the improvements.
[2] This intersection meets signal warrant criteria under Cumulative and Cumulative Plus Project Conditions during the AM peak hour. The intersection is signalized with the improvements.
[3] Indicates the General Plan compliance for the intersection LOS operations under Cumulative (2040) Plus Project Conditions with improvements.

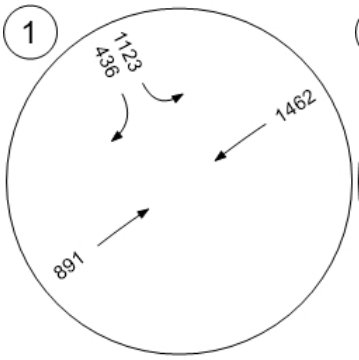
Transportation Impact Analysis Attachments

Attachment 1. Turning Movement Volumes – All Scenarios

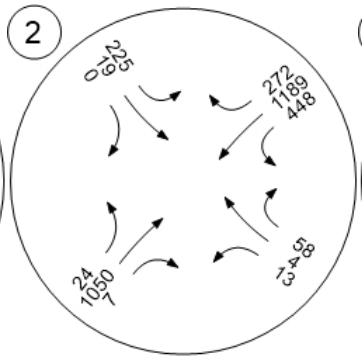
Traffic Volume - Future Total Volume



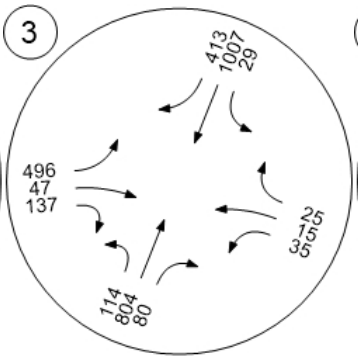
Marsh Rd (SR 84)/US 101 S



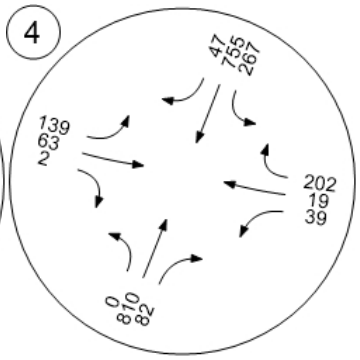
Marsh Rd/Rolison Rd-Scott D



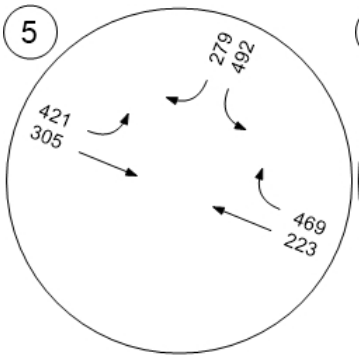
Marsh Rd/Florence St-Bohan



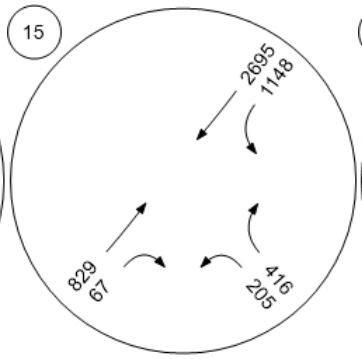
Marsh Rd/Bay Rd



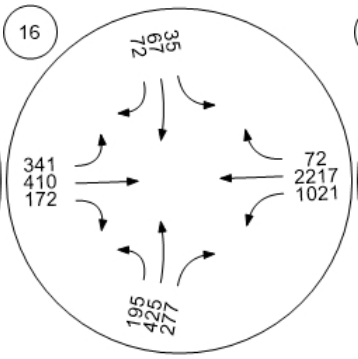
Middlefield Rd/Marsh Rd



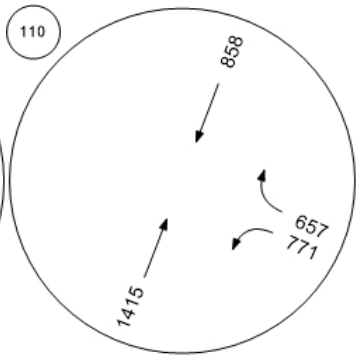
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

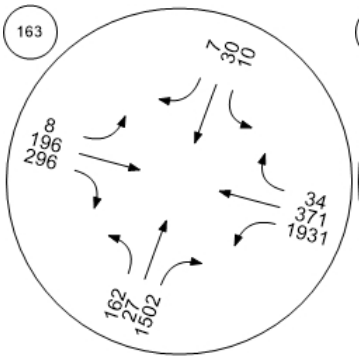


Marsh Road and US 101 NB

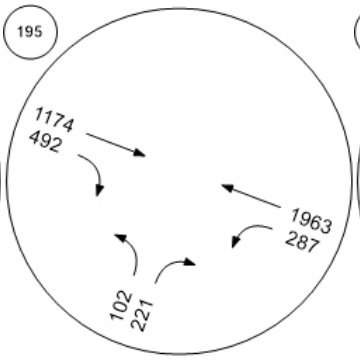


Traffic Volume - Future Total Volume

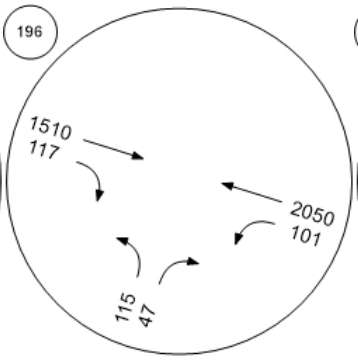
Bayfront Expy/Marsh Rd



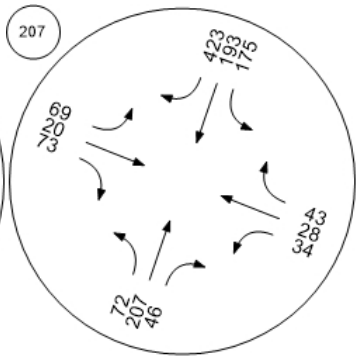
Bayfront Expy/Chilco St



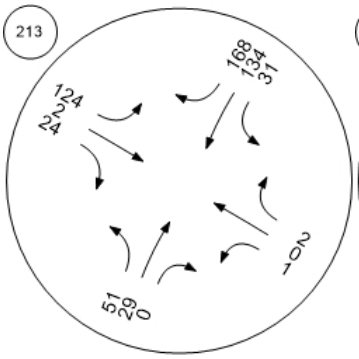
Bayfront Expy/Chrysler Drive



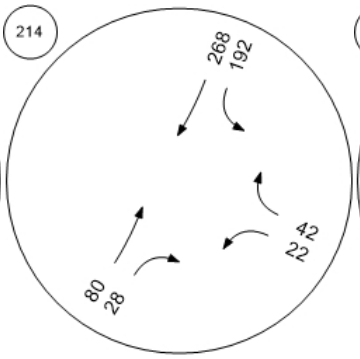
Chilco St/Constitution Dr



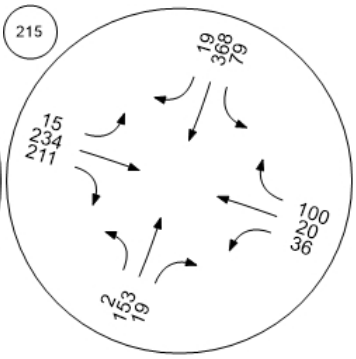
Chrysler Dr/Independence Dr



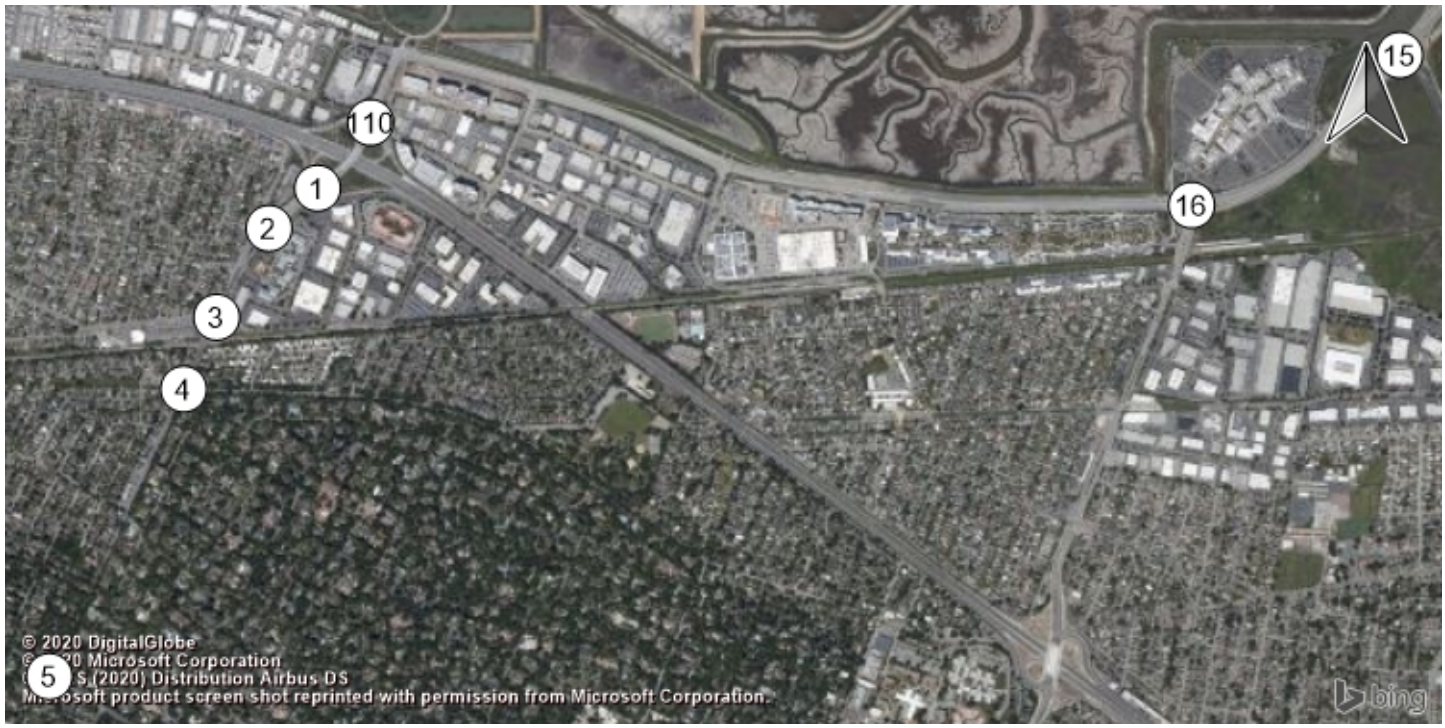
Chrysler Dr/Jefferson Dr



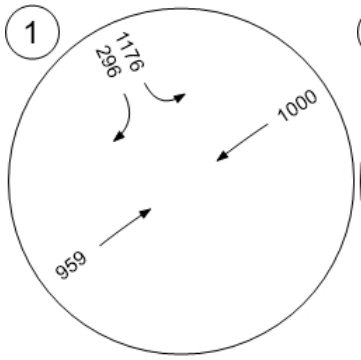
Chrysler Dr/Constitution Dr



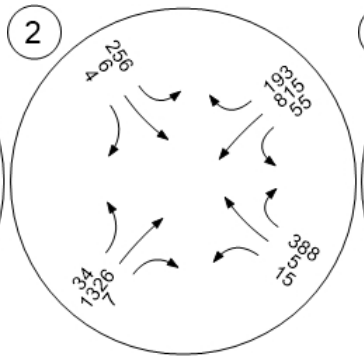
Traffic Volume - Future Total Volume



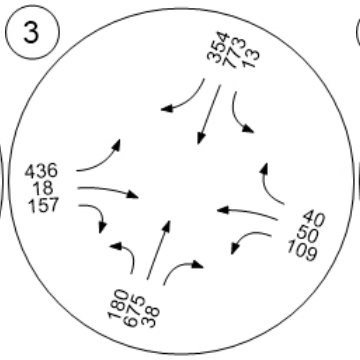
Marsh Rd (SR 84)/US 101 S



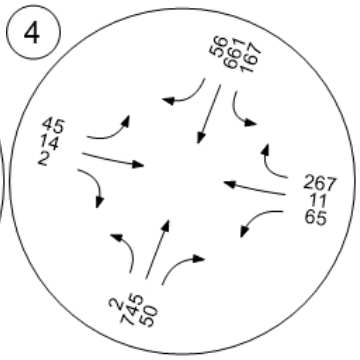
Marsh Rd/Rolison Rd-Scott D



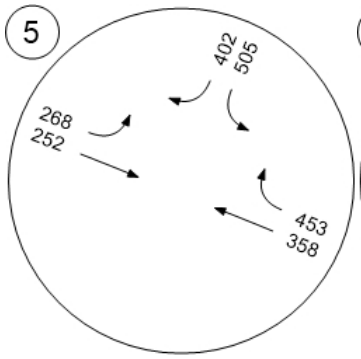
Marsh Rd/Florence St-Bohan



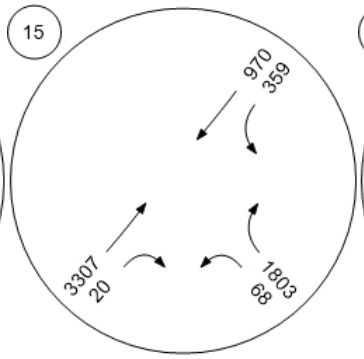
Marsh Rd/Bay Rd



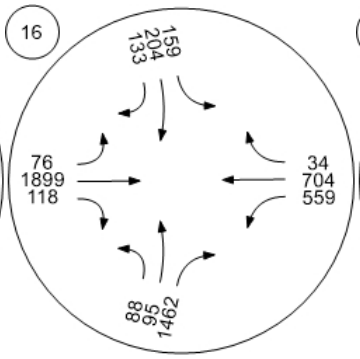
Middlefield Rd/Marsh Rd



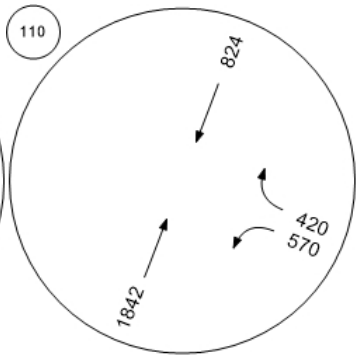
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

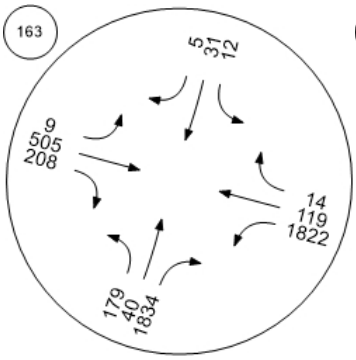


Marsh Road/101 NB Ramps

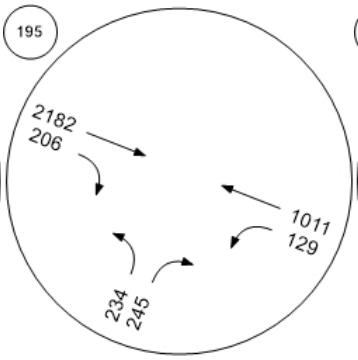


Traffic Volume - Future Total Volume

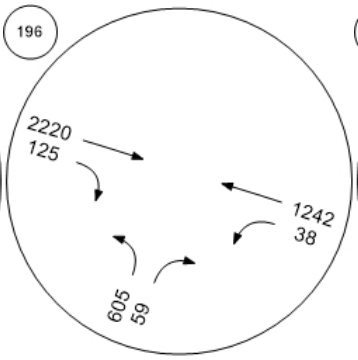
Bayfront Expy/Marsh Rd



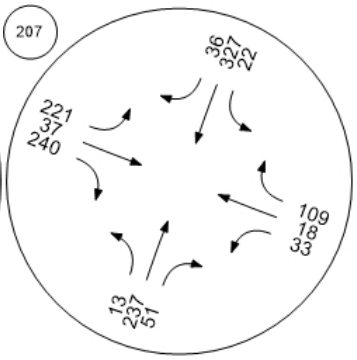
Bayfront Expy/Chilco St



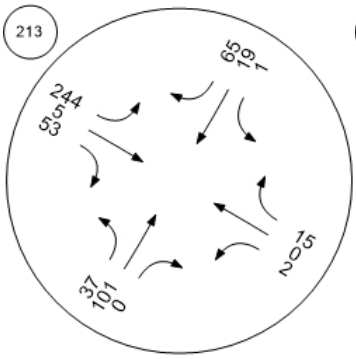
Bayfront Expy/Chrysler Drive



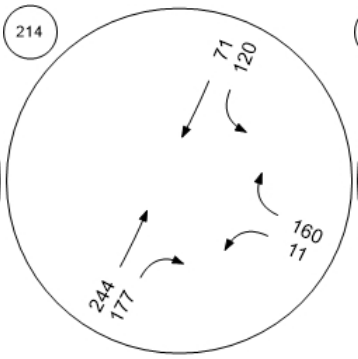
Chilco St/Constitution Dr



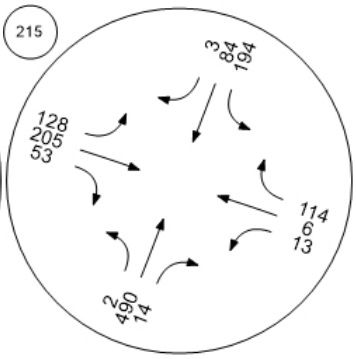
Chrysler Dr/Independence Dr



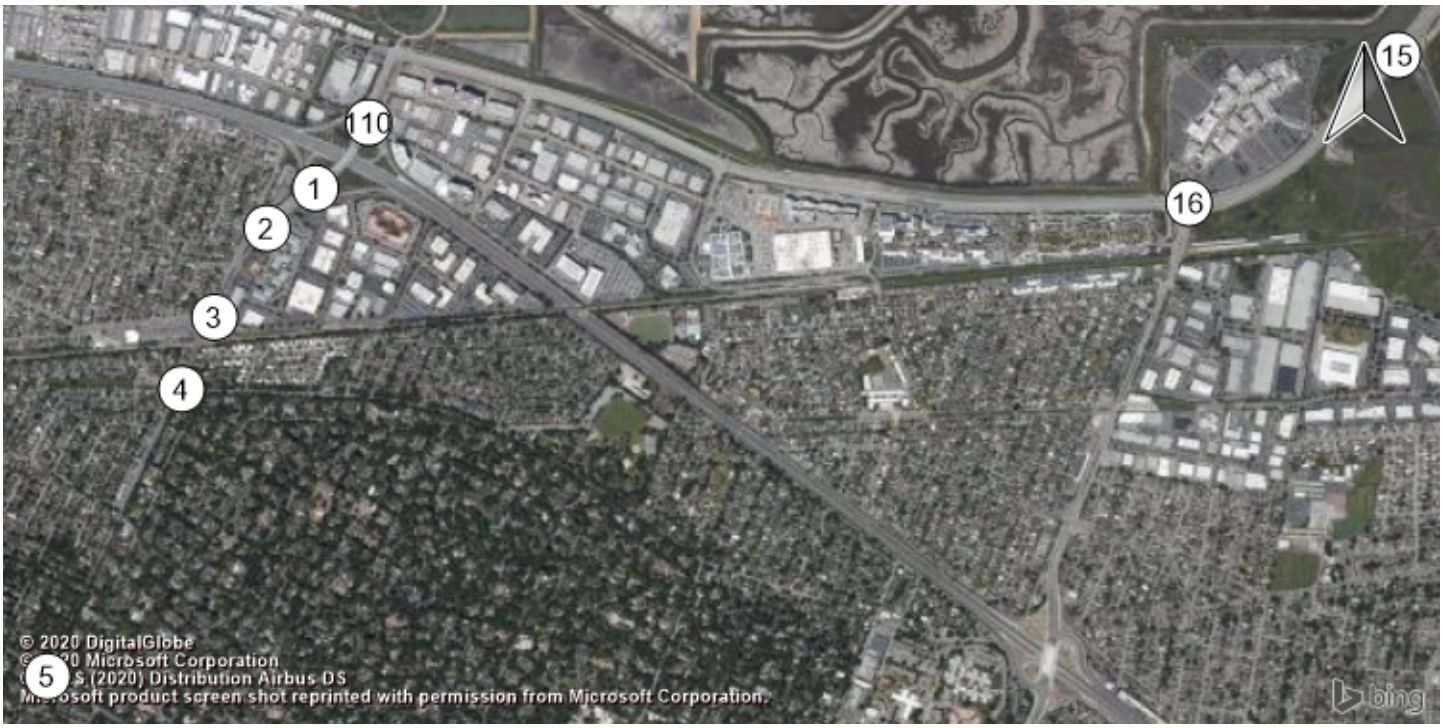
Chrysler Dr/Jefferson Dr



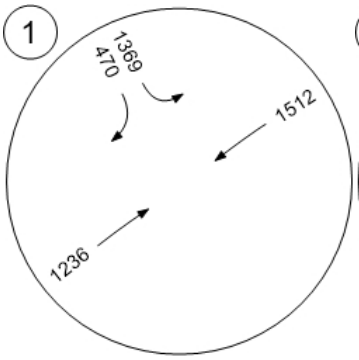
Chrysler Dr/Constitution Dr



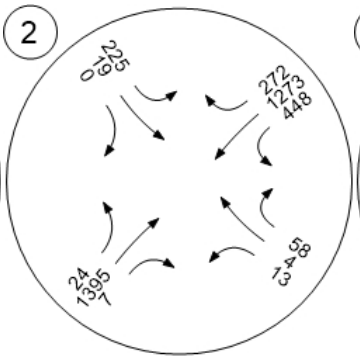
Traffic Volume - Future Total Volume



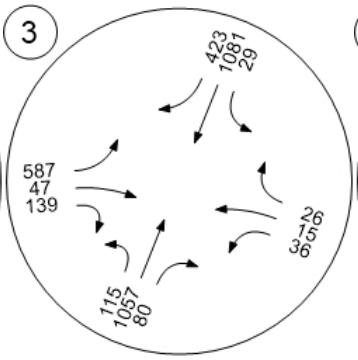
Marsh Rd (SR 84)/US 101 S



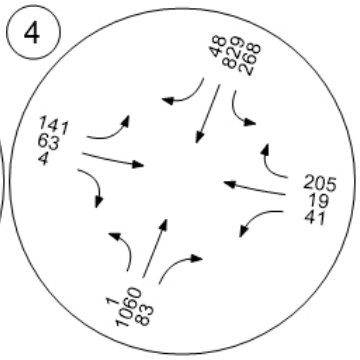
Marsh Rd/Rolison Rd-Scott D



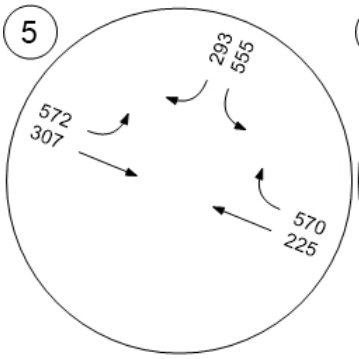
Marsh Rd/Florence St-Bohan



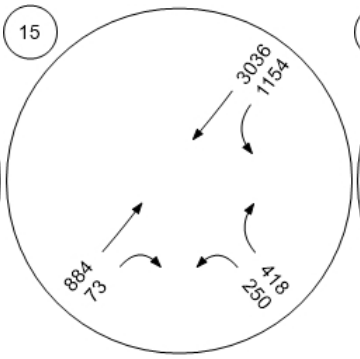
Marsh Rd/Bay Rd



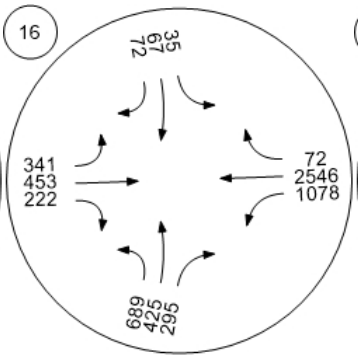
Middlefield Rd/Marsh Rd



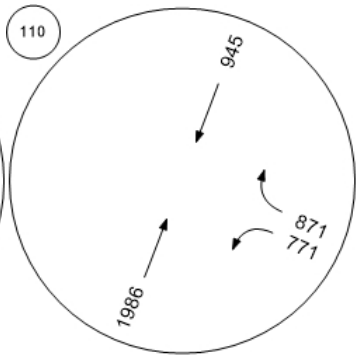
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

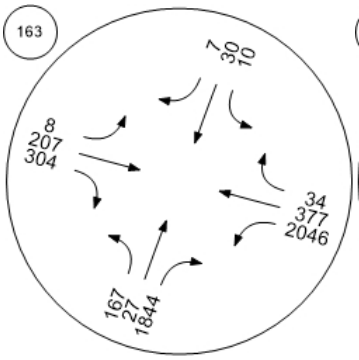


Marsh Road and US 101 NB

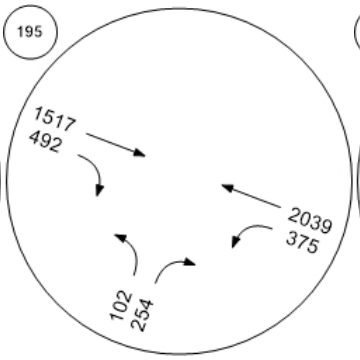


Traffic Volume - Future Total Volume

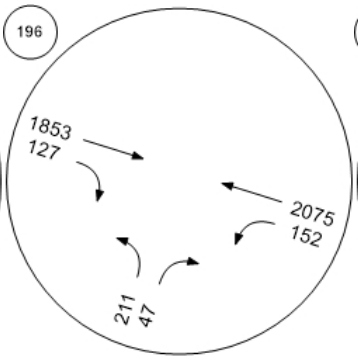
Bayfront Expy/Marsh Rd



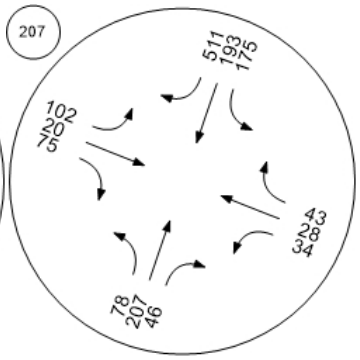
Bayfront Expy/Chilco St



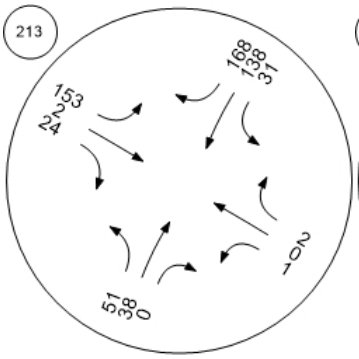
Bayfront Expy/Chrysler Drive



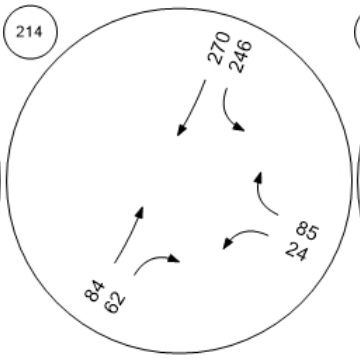
Chilco St/Constitution Dr



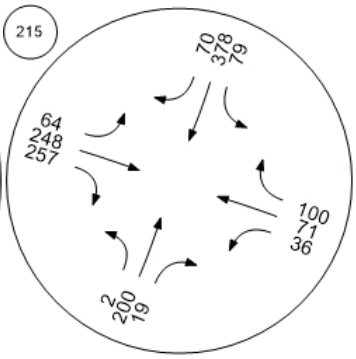
Chrysler Dr/Independence Dr



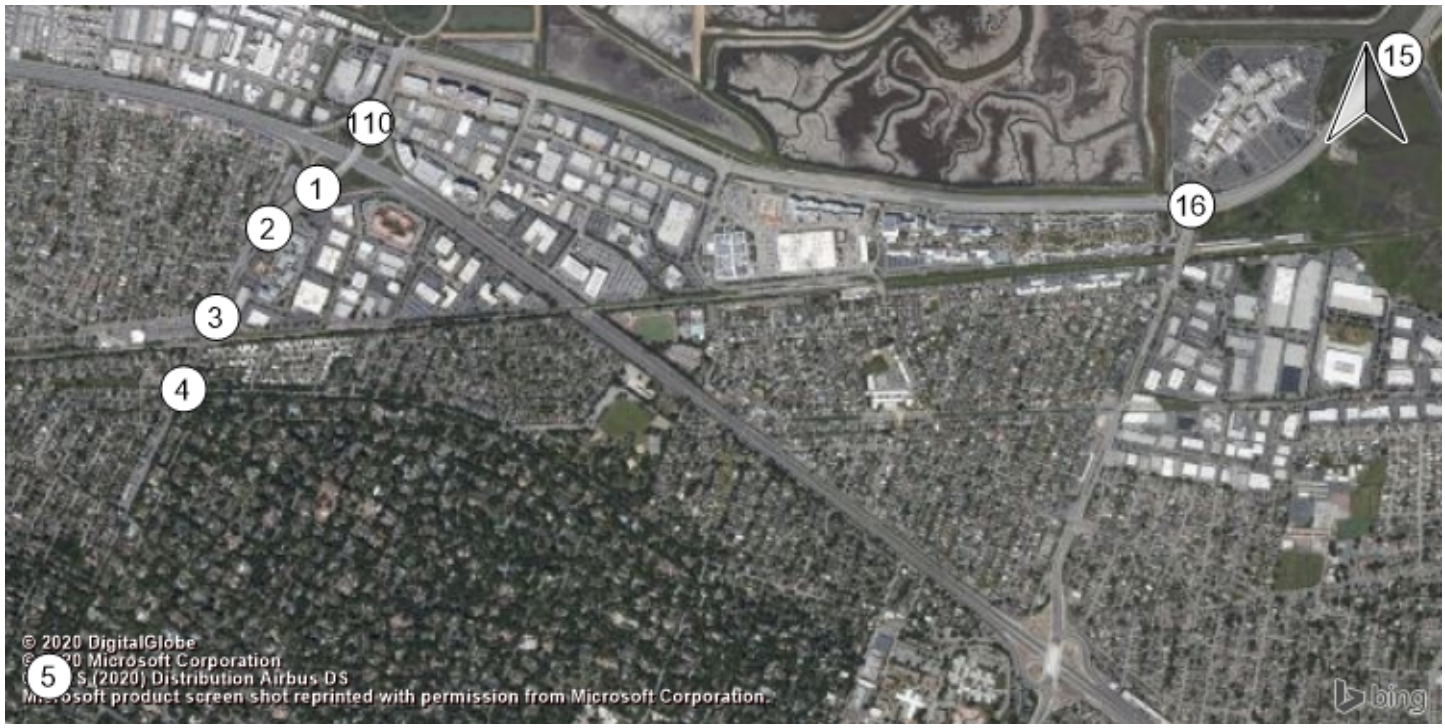
Chrysler Dr/Jefferson Dr



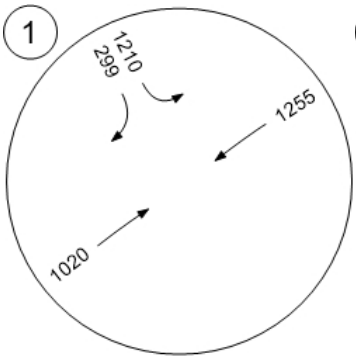
Chrysler Dr/Constitution Dr



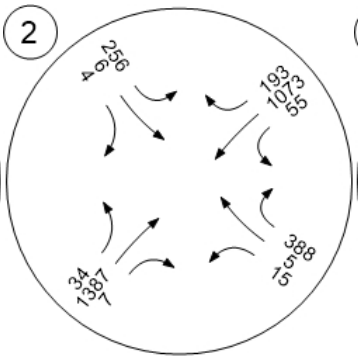
Traffic Volume - Future Total Volume



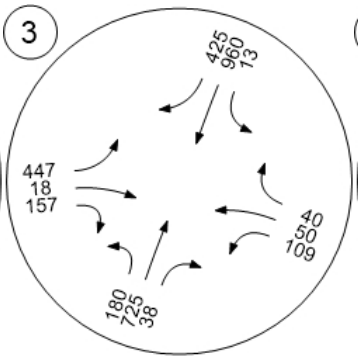
Marsh Rd (SR 84)/US 101 S



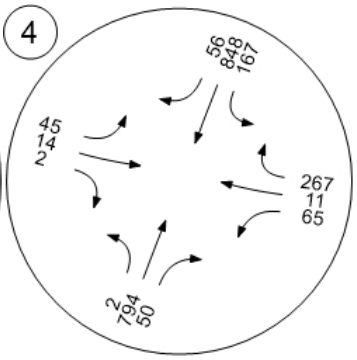
Marsh Rd/Rolison Rd-Scott D



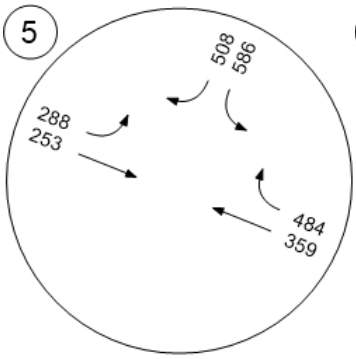
Marsh Rd/Florence St-Bohan



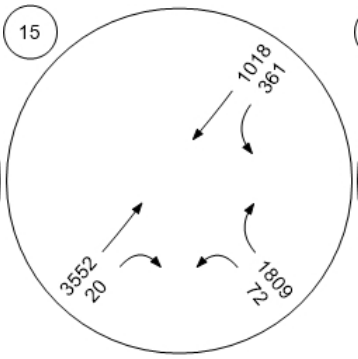
Marsh Rd/Bay Rd



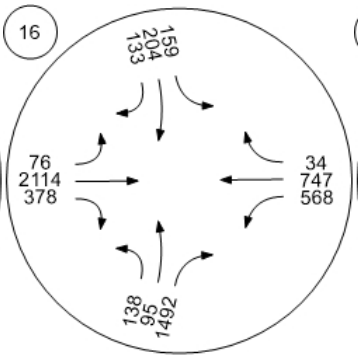
Middlefield Rd/Marsh Rd



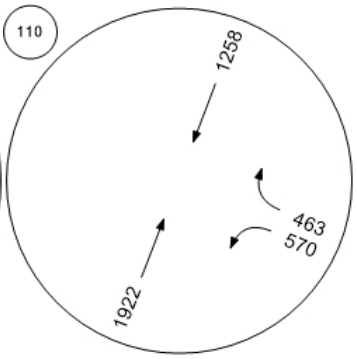
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

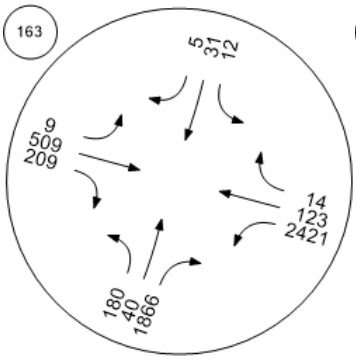


Marsh Road/101 NB Ramps

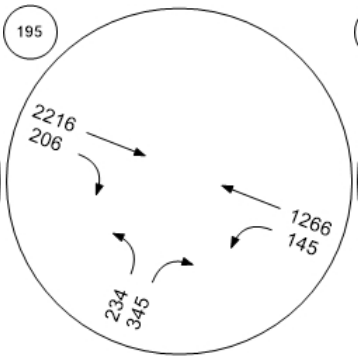


Traffic Volume - Future Total Volume

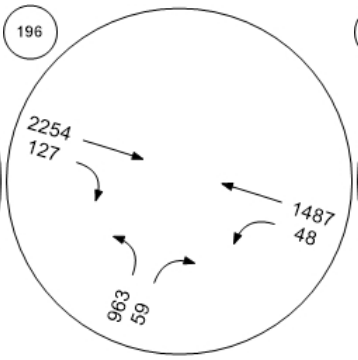
Bayfront Expy/Marsh Rd



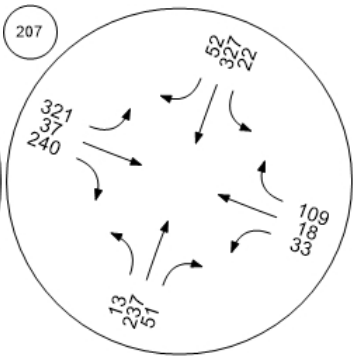
Bayfront Expy/Chilco St



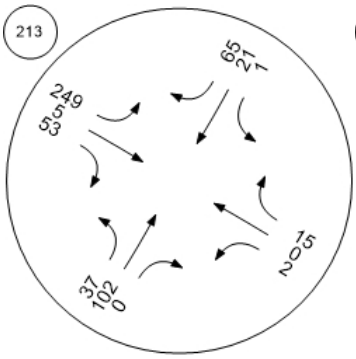
Bayfront Expy/Chrysler Drive



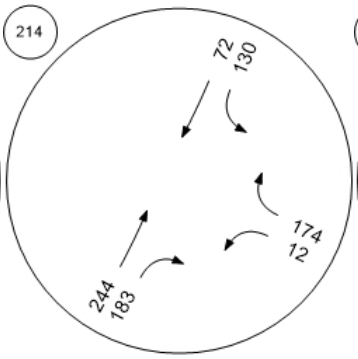
Chilco St/Constitution Dr



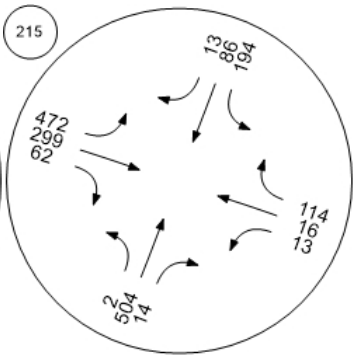
Chrysler Dr/Independence Dr



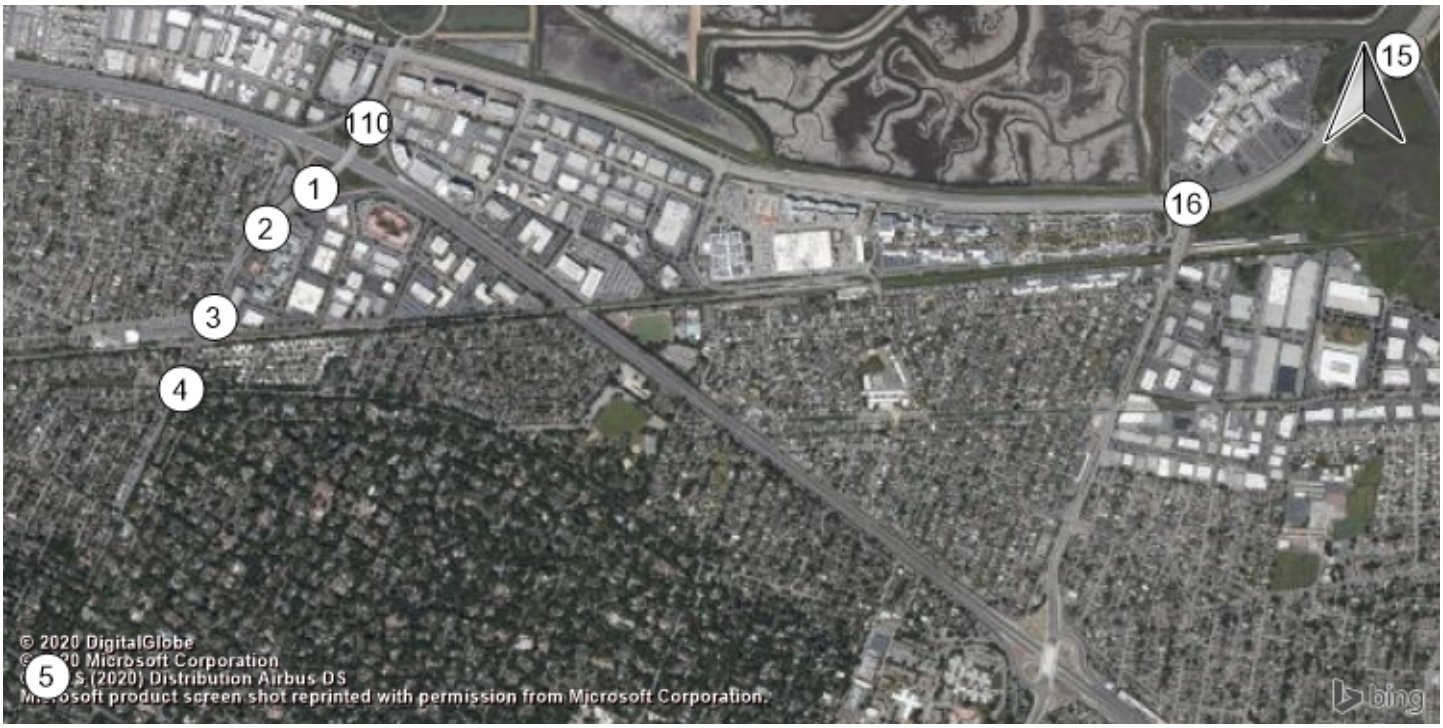
Chrysler Dr/Jefferson Dr



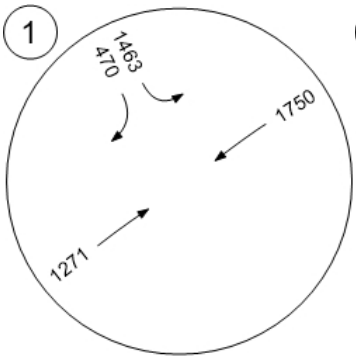
Chrysler Dr/Constitution Dr



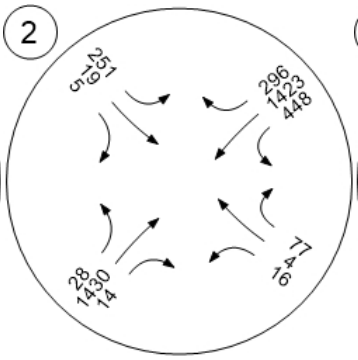
Traffic Volume - Future Total Volume



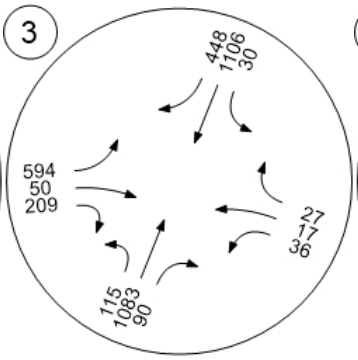
Marsh Rd (SR 84)/US 101 S



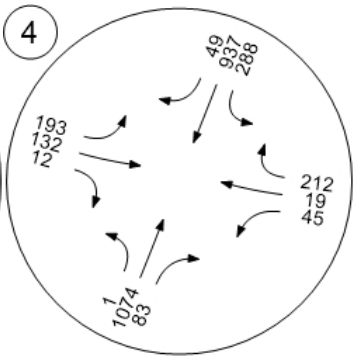
Marsh Rd/Rolison Rd-Scott D



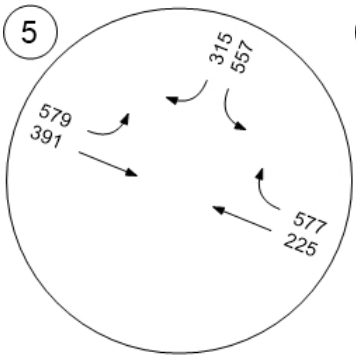
Marsh Rd/Florence St-Bohan



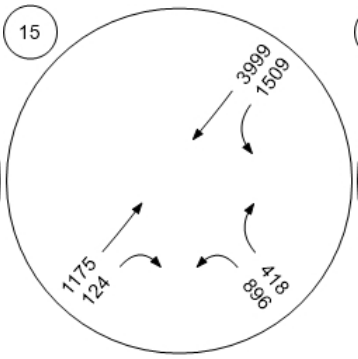
Marsh Rd/Bay Rd



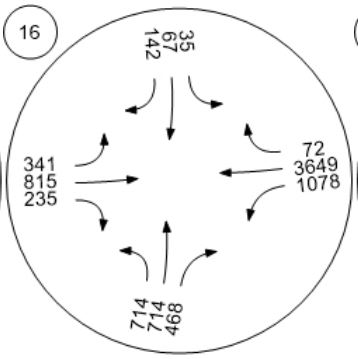
Middlefield Rd/Marsh Rd



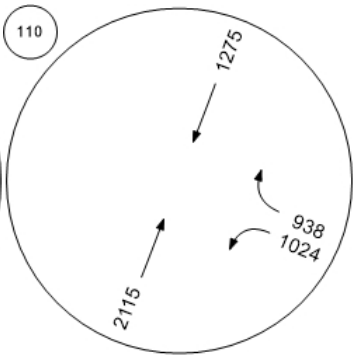
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

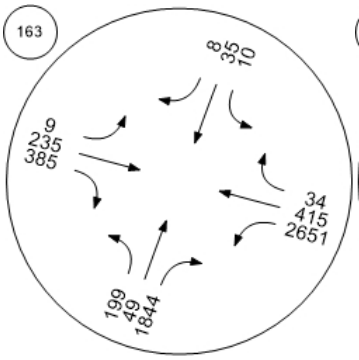


Marsh Road and US 101 NB

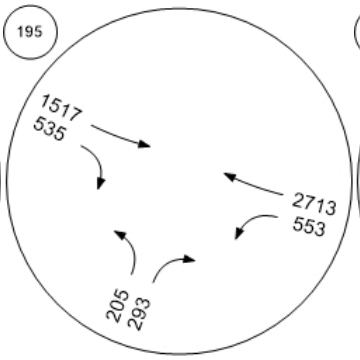


Traffic Volume - Future Total Volume

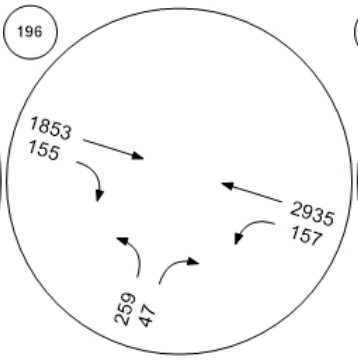
Bayfront Expy/Marsh Rd



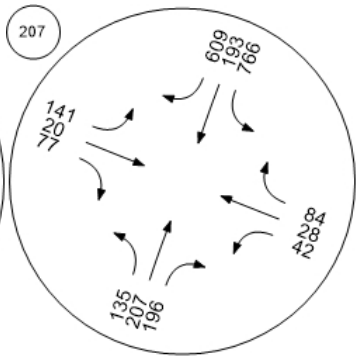
Bayfront Expy/Chilco St



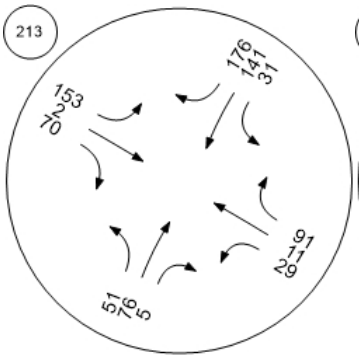
Bayfront Expy/Chrysler Drive



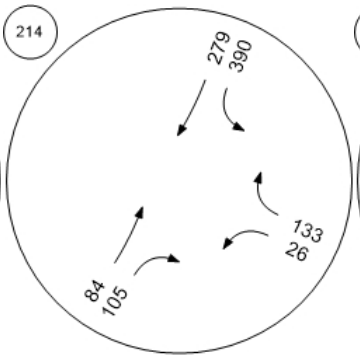
Chilco St/Constitution Dr



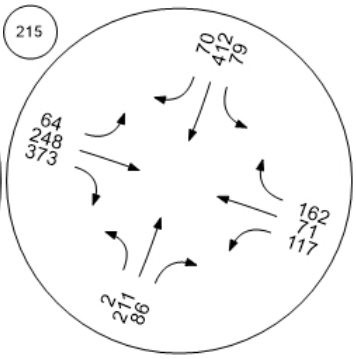
Chrysler Dr/Independence Dr



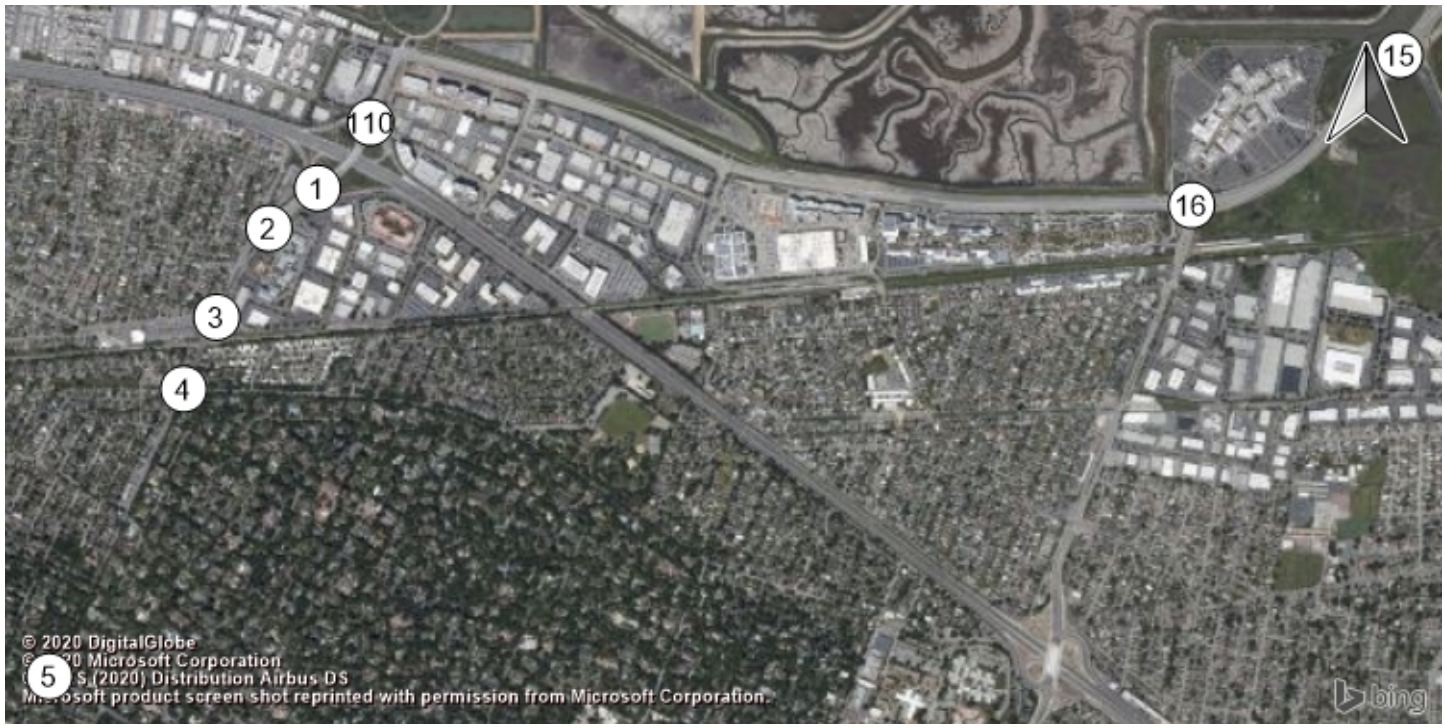
Chrysler Dr/Jefferson Dr



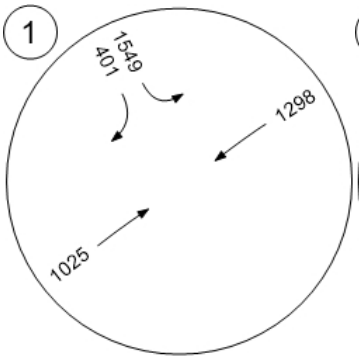
Chrysler Dr/Constitution Dr



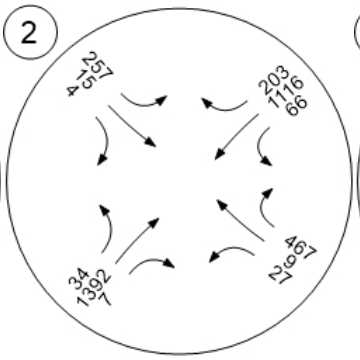
Traffic Volume - Future Total Volume



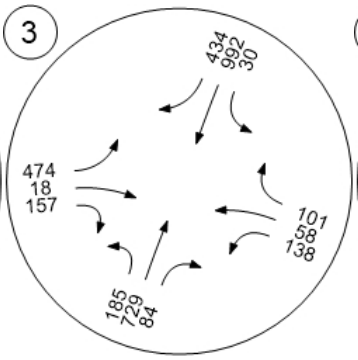
Marsh Rd (SR 84)/US 101 S



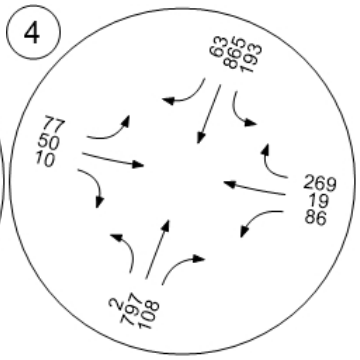
Marsh Rd/Rolison Rd-Scott D



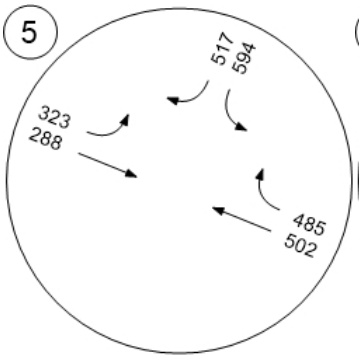
Marsh Rd/Florence St-Bohan



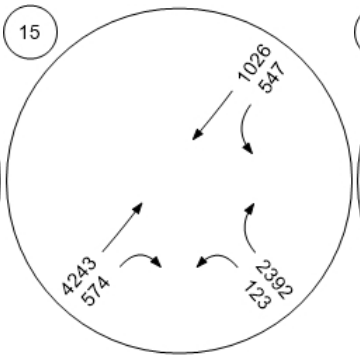
Marsh Rd/Bay Rd



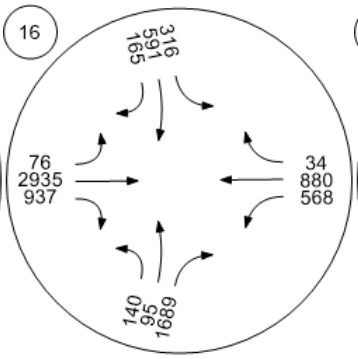
Middlefield Rd/Marsh Rd



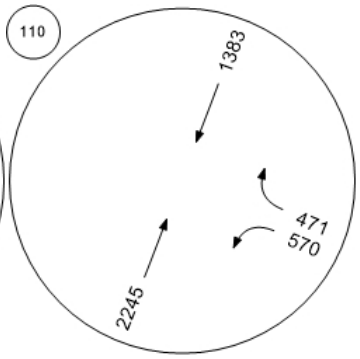
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

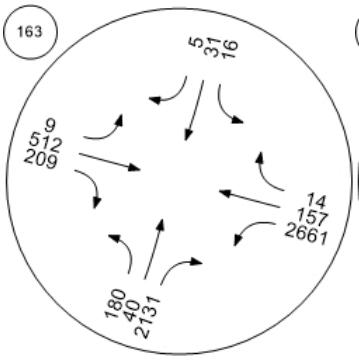


Marsh Road/101 NB Ramps

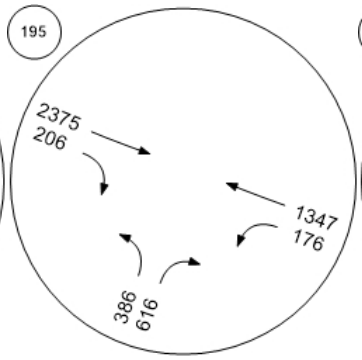


Traffic Volume - Future Total Volume

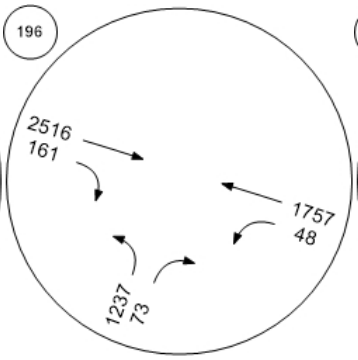
Bayfront Expy/Marsh Rd



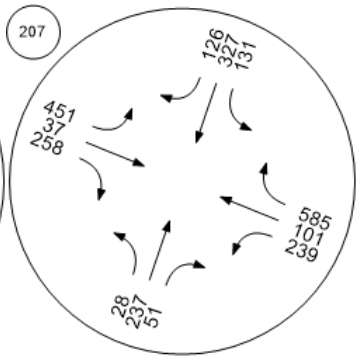
Bayfront Expy/Chilco St



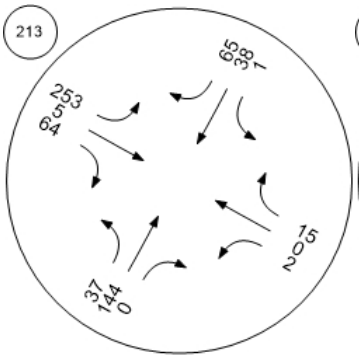
Bayfront Expy/Chrysler Drive



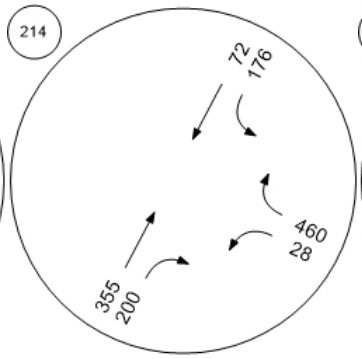
Chilco St/Constitution Dr



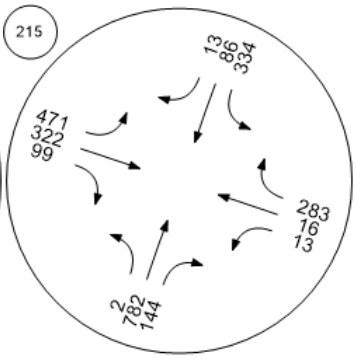
Chrysler Dr/Independence Dr



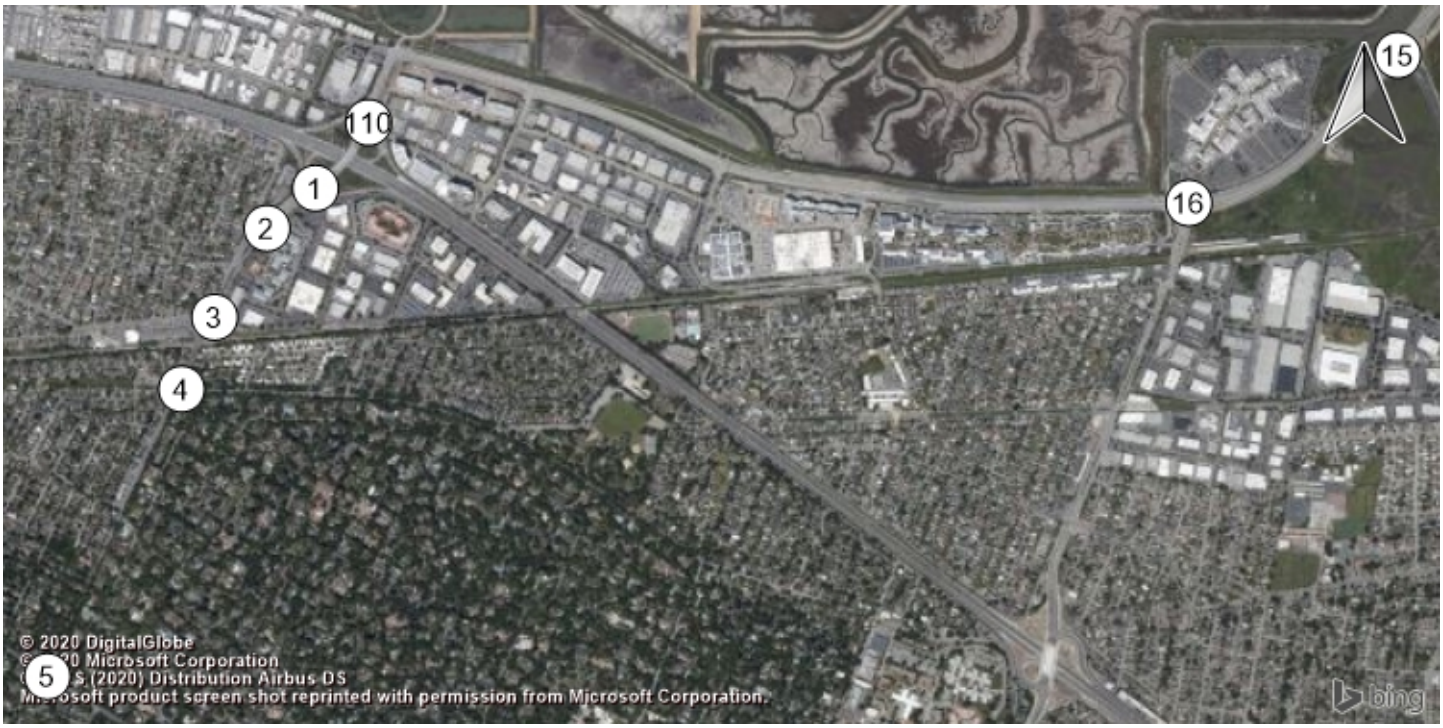
Chrysler Dr/Jefferson Dr



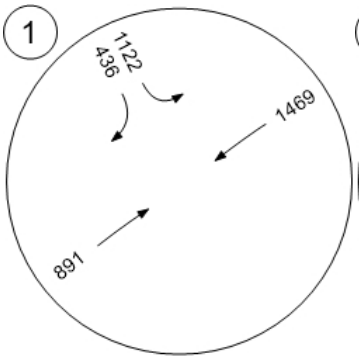
Chrysler Dr/Constitution Dr



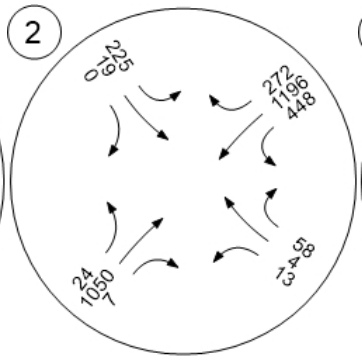
Traffic Volume - Future Total Volume



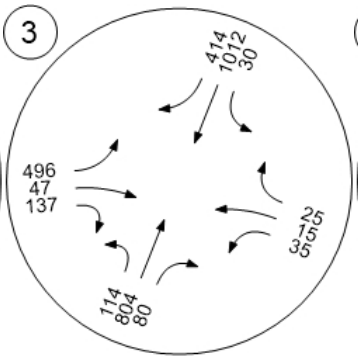
Marsh Rd (SR 84)/US 101 S



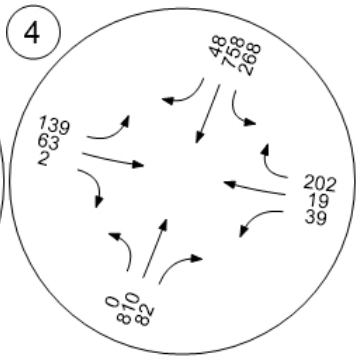
Marsh Rd/Rolison Rd-Scott D



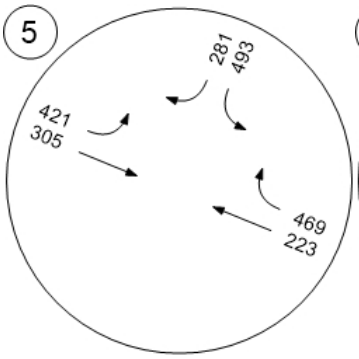
Marsh Rd/Florence St-Bohan



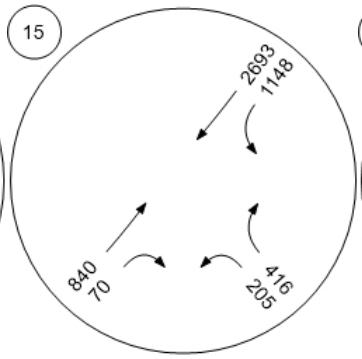
Marsh Rd/Bay Rd



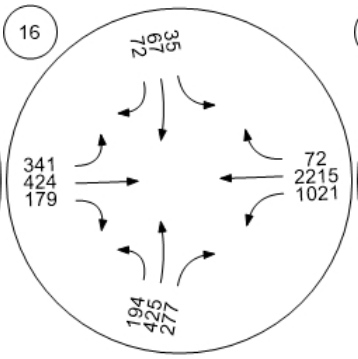
Middlefield Rd/Marsh Rd



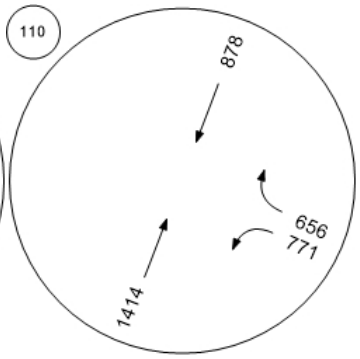
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

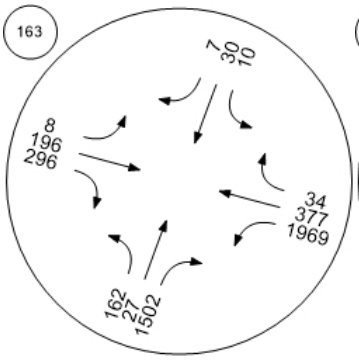


Marsh Road and US 101 NB

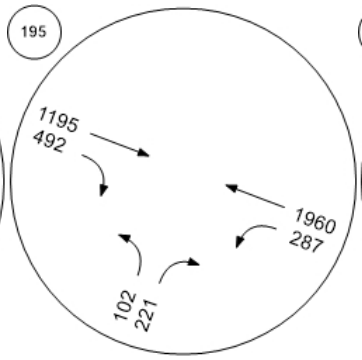


Traffic Volume - Future Total Volume

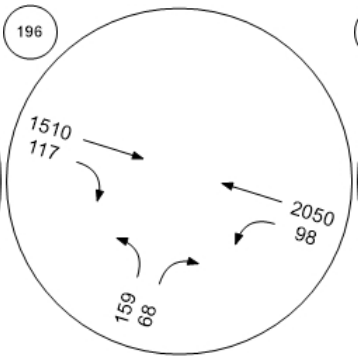
Bayfront Expy/Marsh Rd



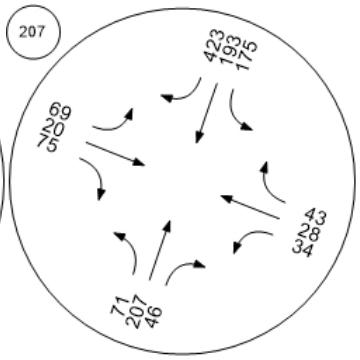
Bayfront Expy/Chilco St



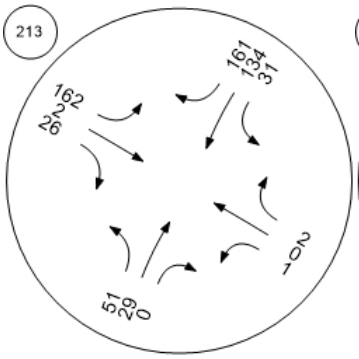
Bayfront Expy/Chrysler Drive



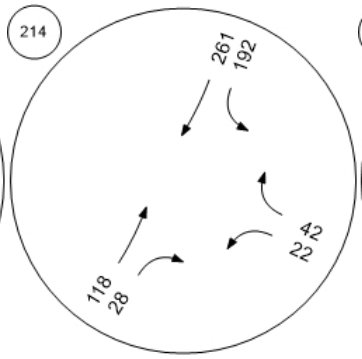
Chilco St/Constitution Dr



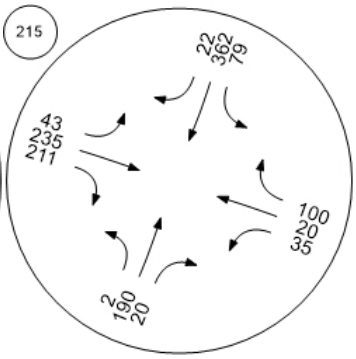
Chrysler Dr/Independence Dr



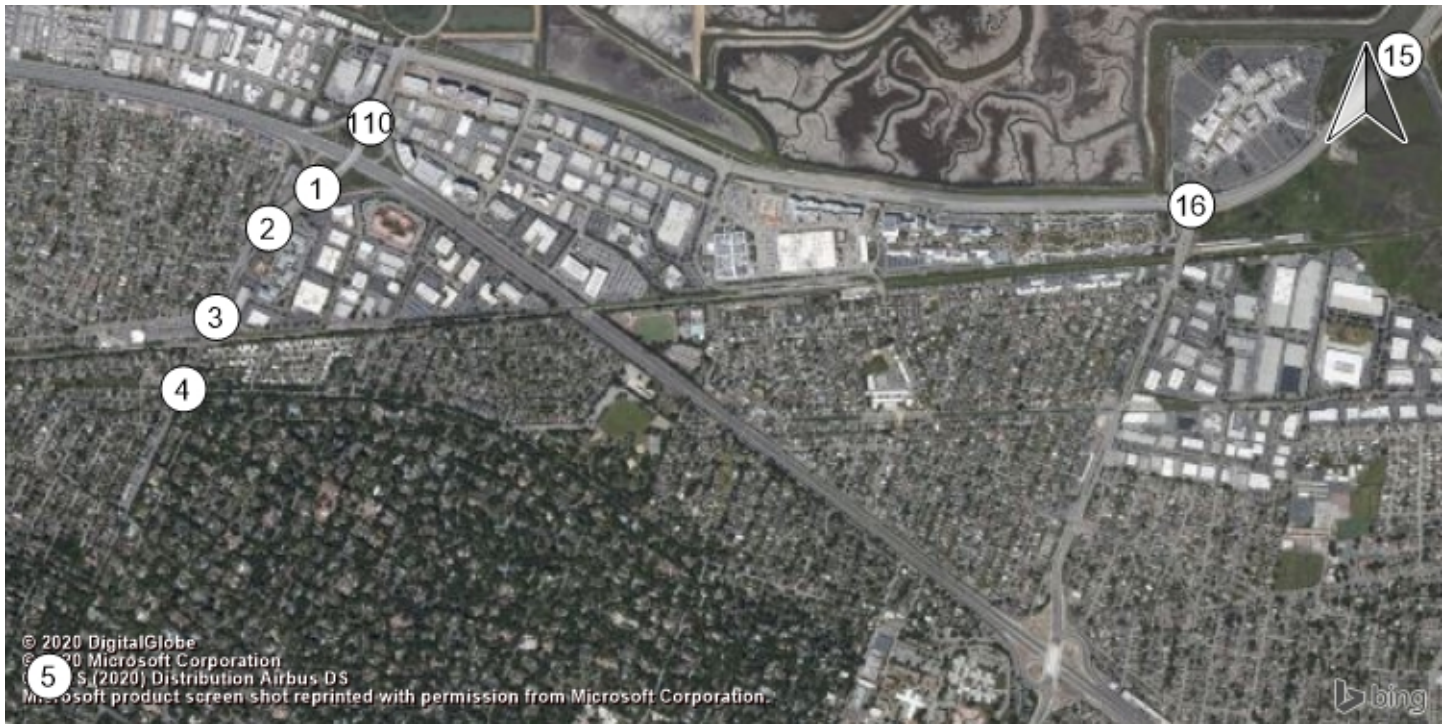
Chrysler Dr/Jefferson Dr



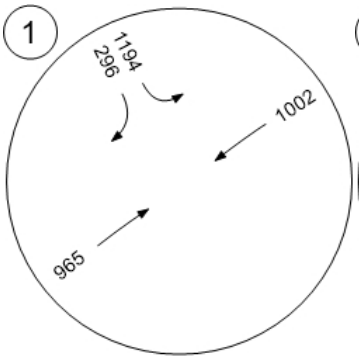
Chrysler Dr/Constitution Dr



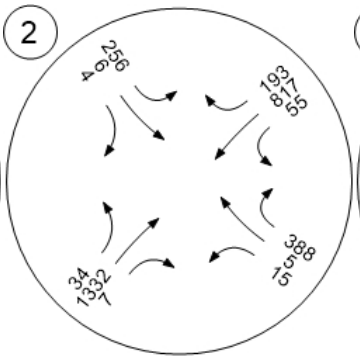
Traffic Volume - Future Total Volume



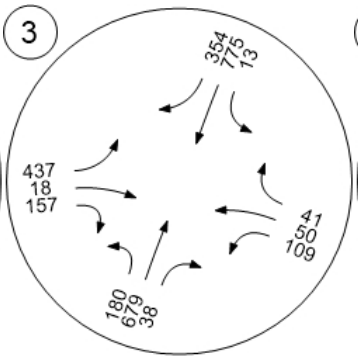
Marsh Rd (SR 84)/US 101 S



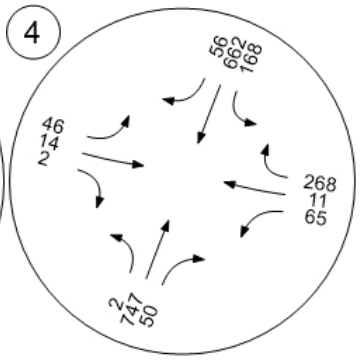
Marsh Rd/Rolison Rd-Scott D



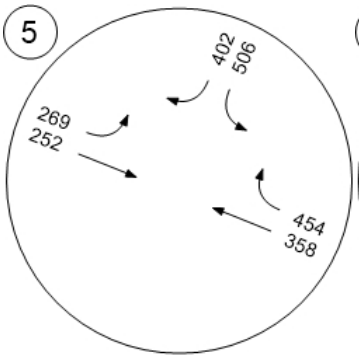
Marsh Rd/Florence St-Bohan



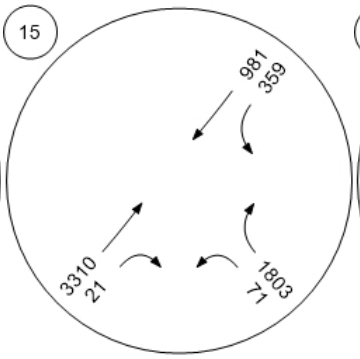
Marsh Rd/Bay Rd



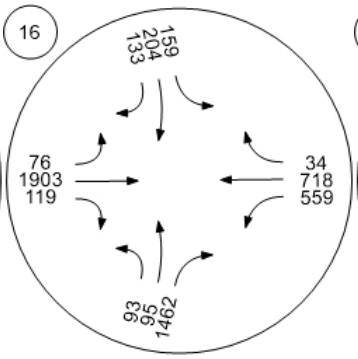
Middlefield Rd/Marsh Rd



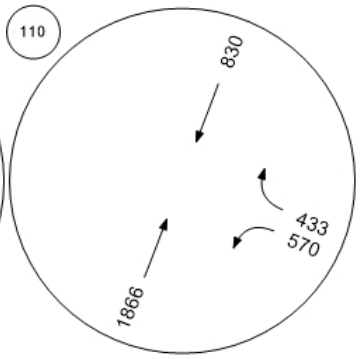
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

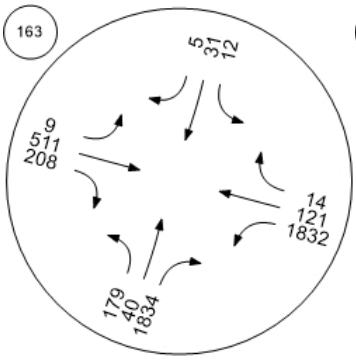


Marsh Road/101 NB Ramps

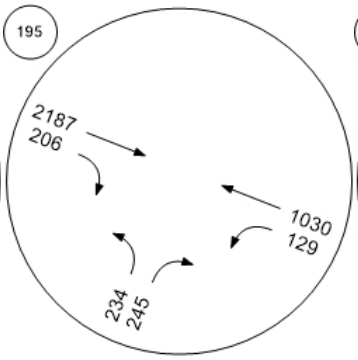


Traffic Volume - Future Total Volume

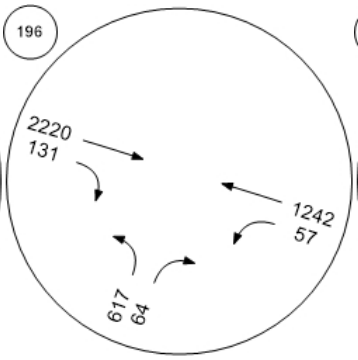
Bayfront Expy/Marsh Rd



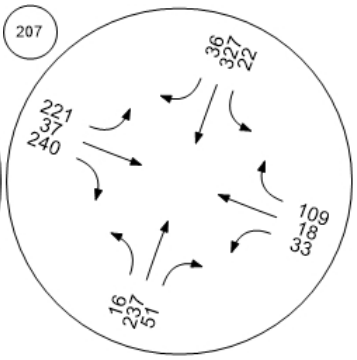
Bayfront Expy/Chilco St



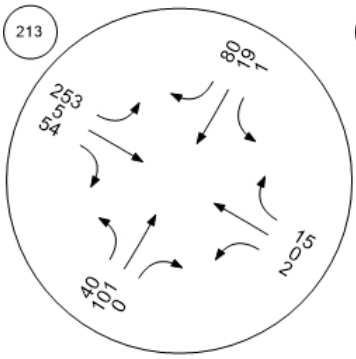
Bayfront Expy/Chrysler Drive



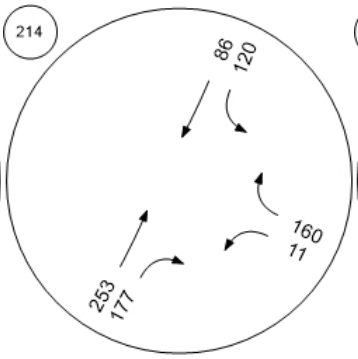
Chilco St/Constitution Dr



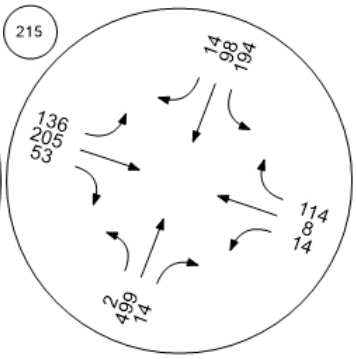
Chrysler Dr/Independence Dr



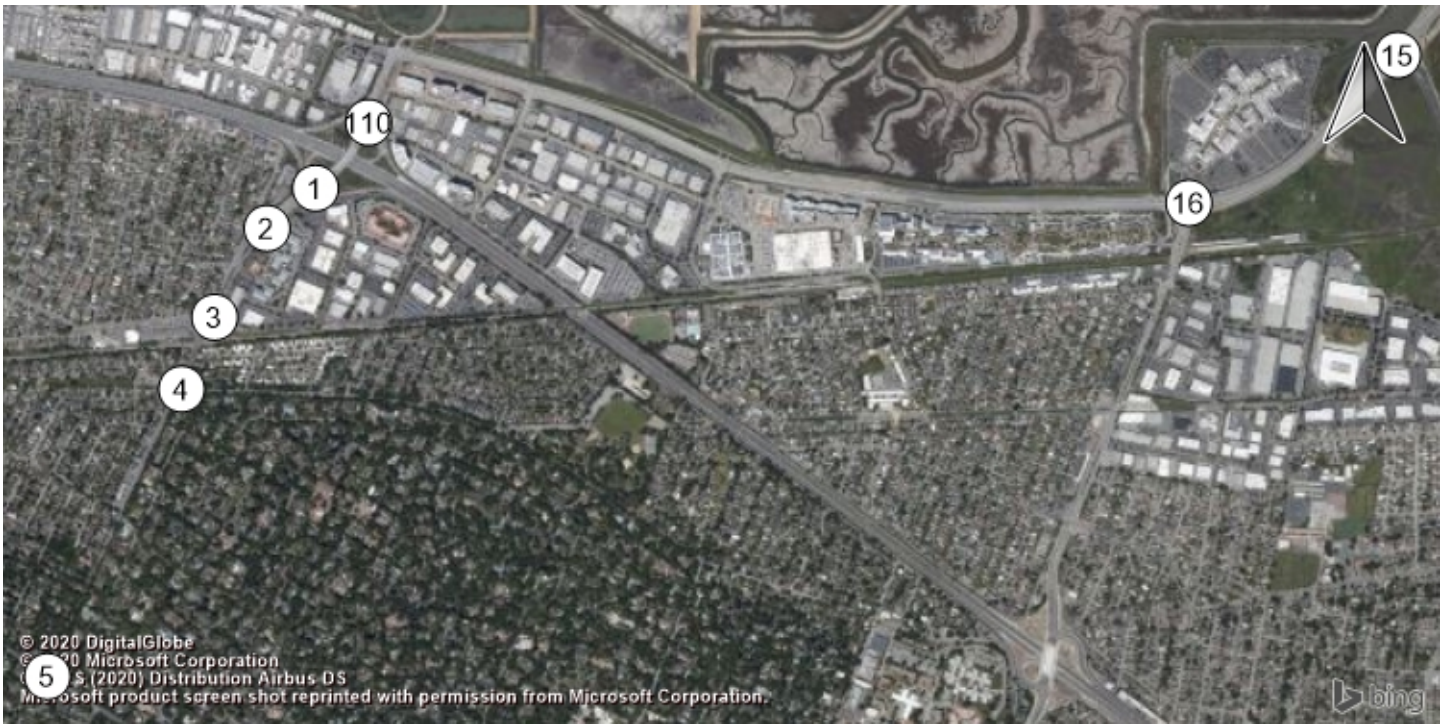
Chrysler Dr/Jefferson Dr



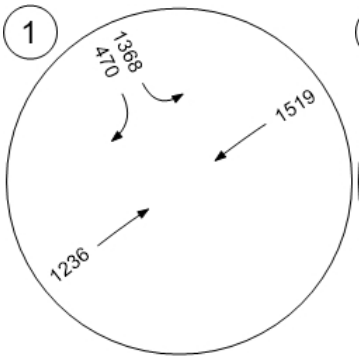
Chrysler Dr/Constitution Dr



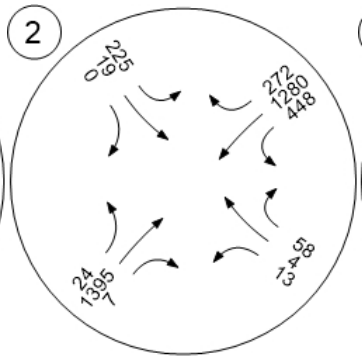
Traffic Volume - Future Total Volume



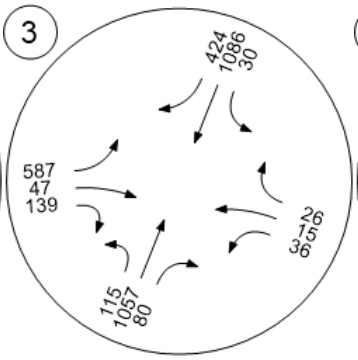
Marsh Rd (SR 84)/US 101 S



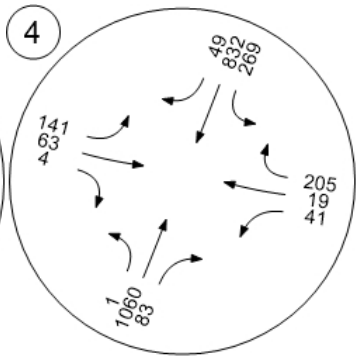
Marsh Rd/Rolison Rd-Scott D



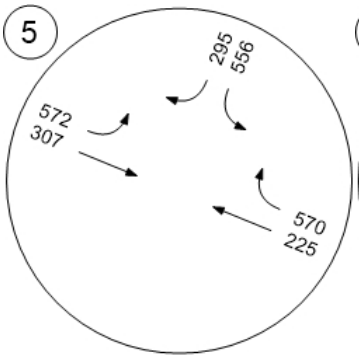
Marsh Rd/Florence St-Bohan



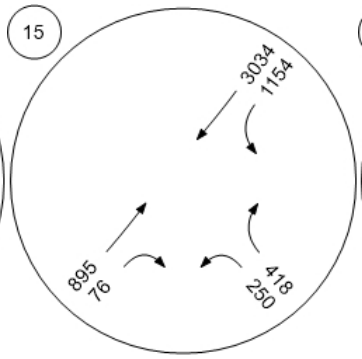
Marsh Rd/Bay Rd



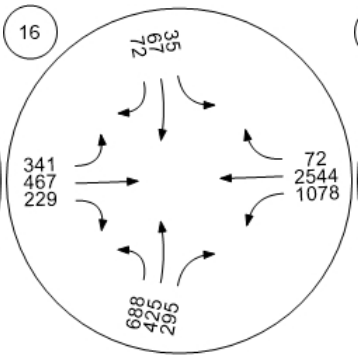
Middlefield Rd/Marsh Rd



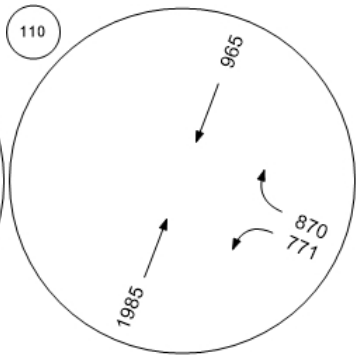
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

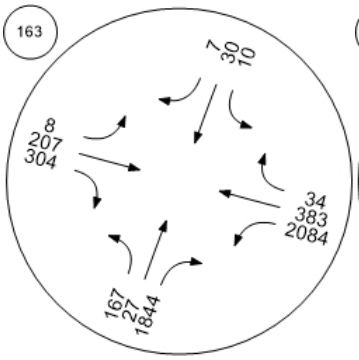


Marsh Road and US 101 NB

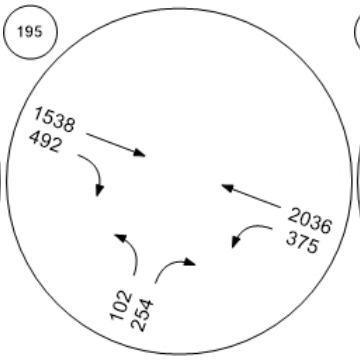


Traffic Volume - Future Total Volume

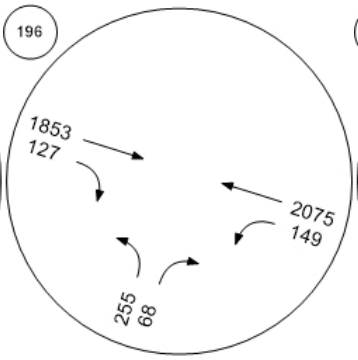
Bayfront Expy/Marsh Rd



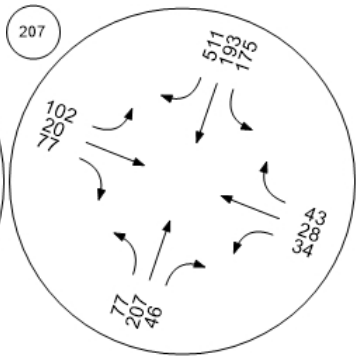
Bayfront Expy/Chilco St



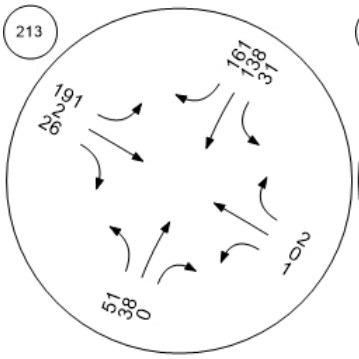
Bayfront Expy/Chrysler Drive



Chilco St/Constitution Dr



Chrysler Dr/Independence Dr



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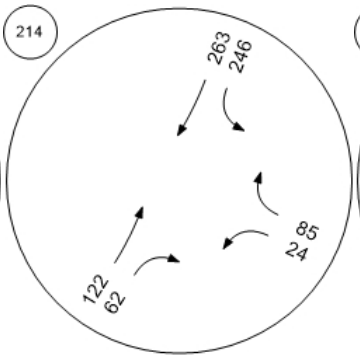

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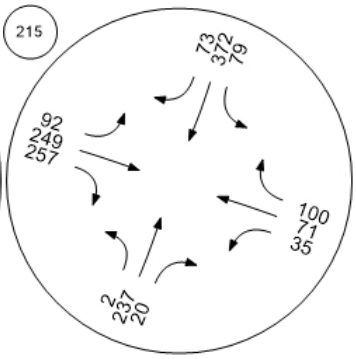
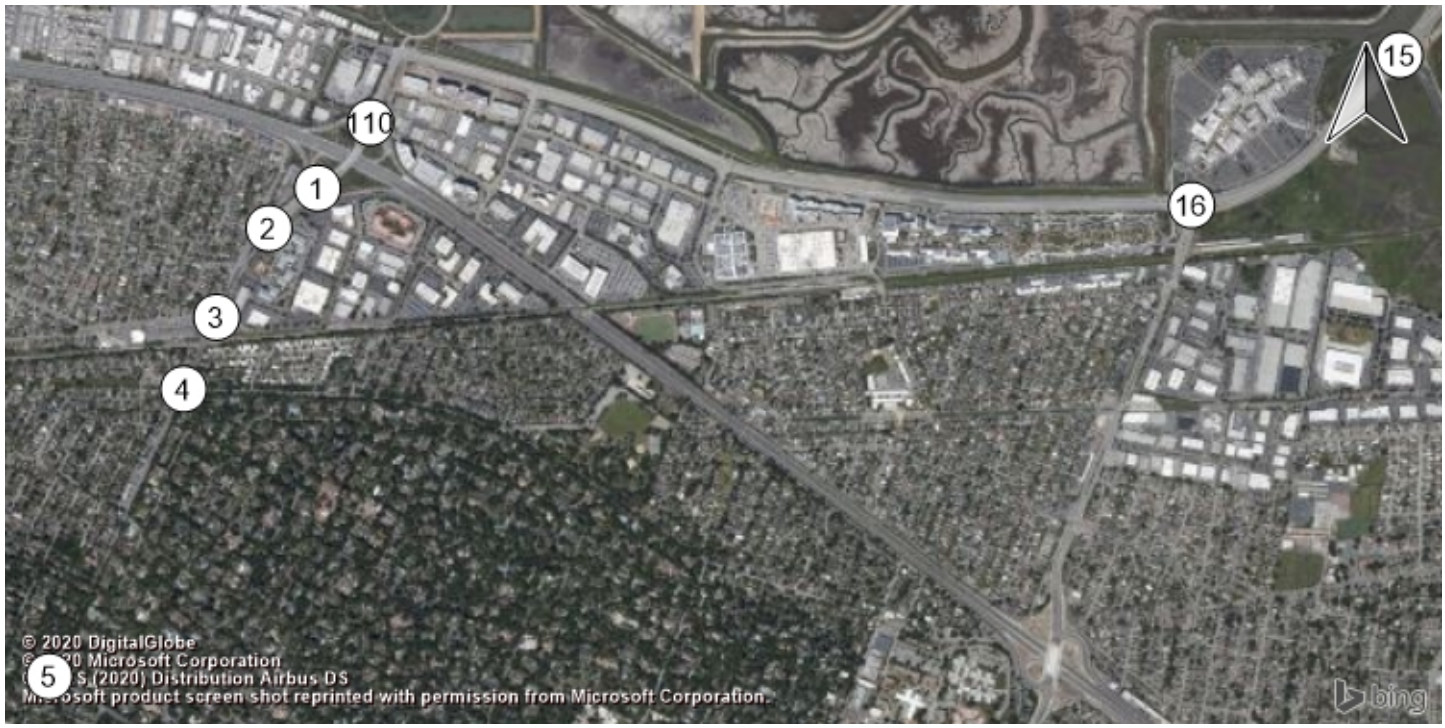
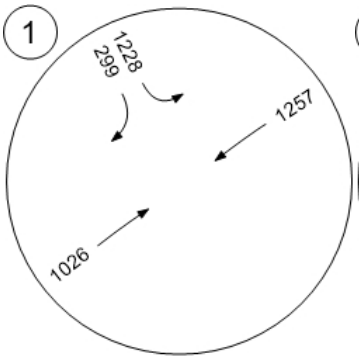


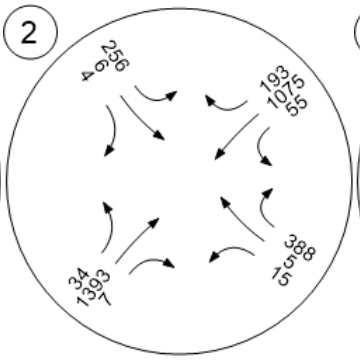
Traffic Volume - Future Total Volume



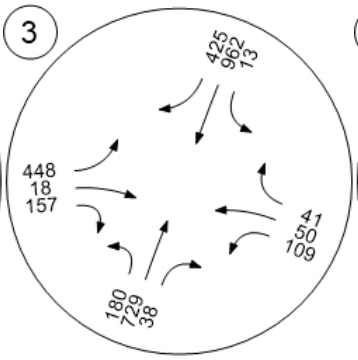
Marsh Rd (SR 84)/US 101 S



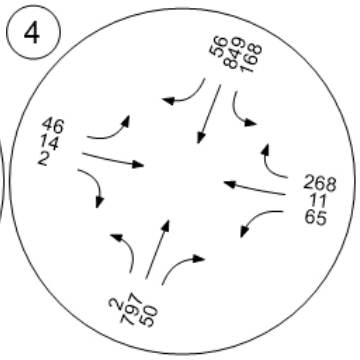
Marsh Rd/Rolison Rd-Scott D



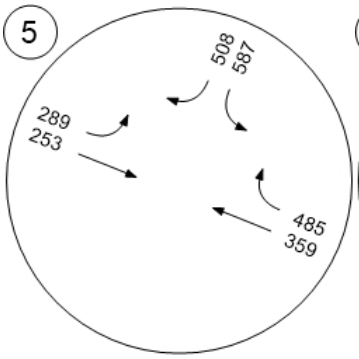
Marsh Rd/Florence St-Bohan



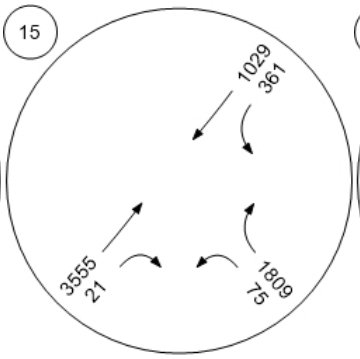
Marsh Rd/Bay Rd



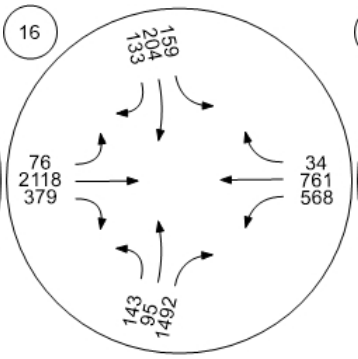
Middlefield Rd/Marsh Rd



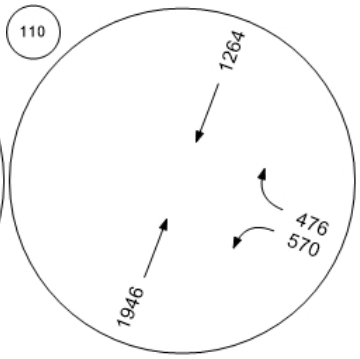
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

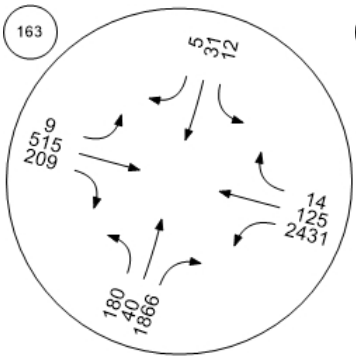


Marsh Road/101 NB Ramps

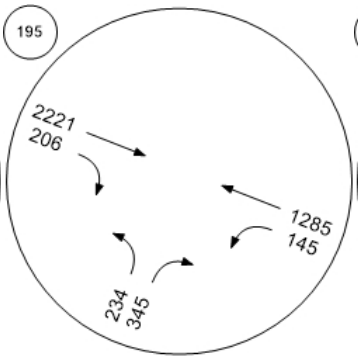


Traffic Volume - Future Total Volume

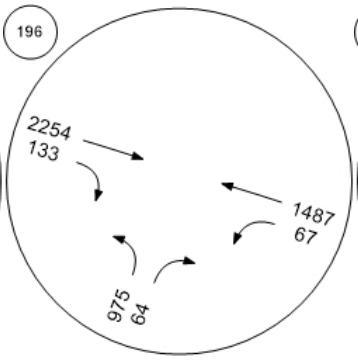
Bayfront Expy/Marsh Rd



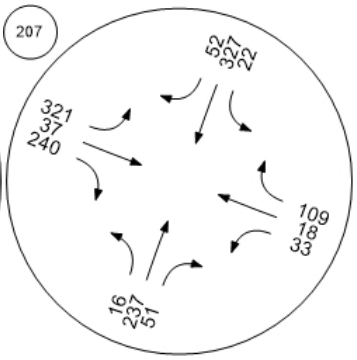
Bayfront Expy/Chilco St



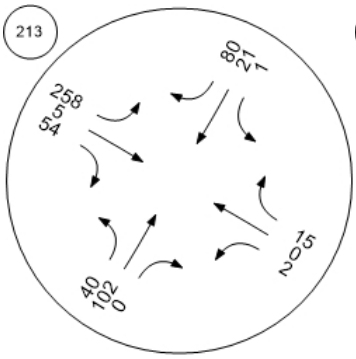
Bayfront Expy/Chrysler Drive



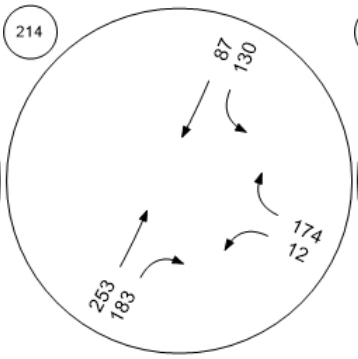
Chilco St/Constitution Dr



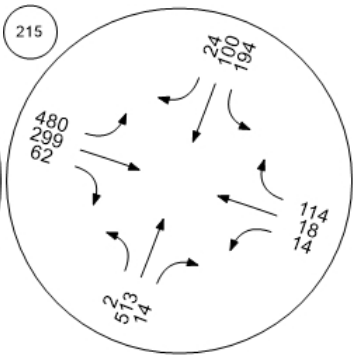
Chrysler Dr/Independence Dr



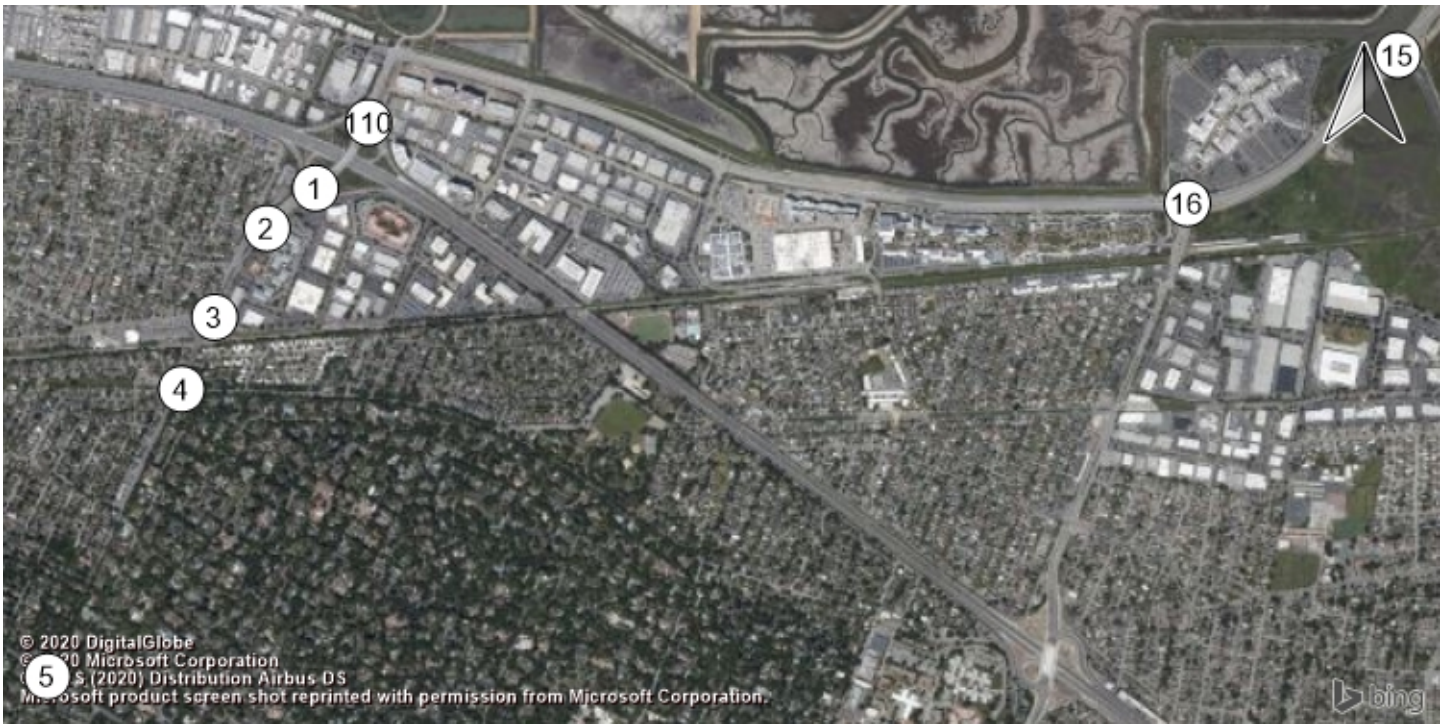
Chrysler Dr/Jefferson Dr



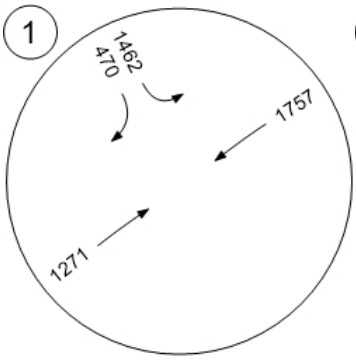
Chrysler Dr/Constitution Dr



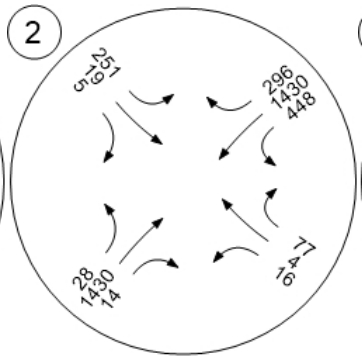
Traffic Volume - Future Total Volume



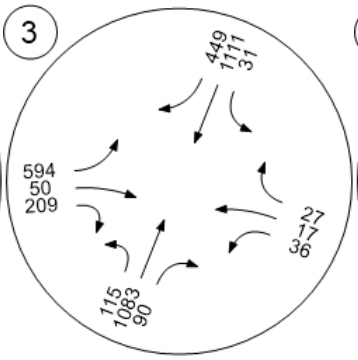
Marsh Rd (SR 84)/US 101 S



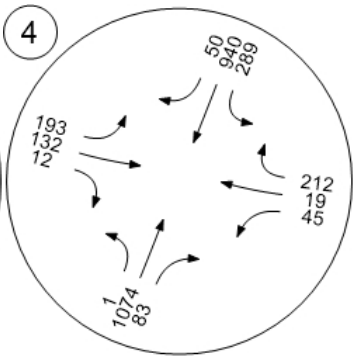
Marsh Rd/Rolison Rd-Scott D



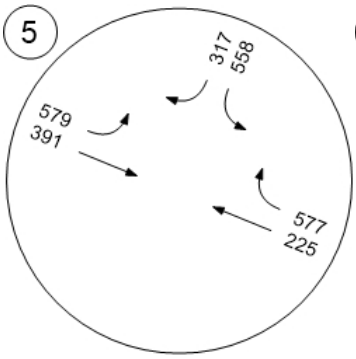
Marsh Rd/Florence St-Bohan



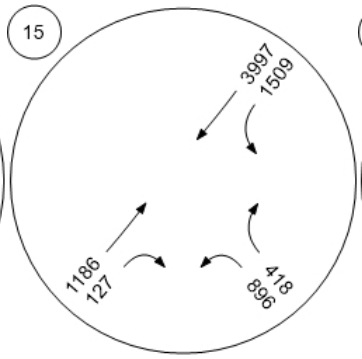
Marsh Rd/Bay Rd



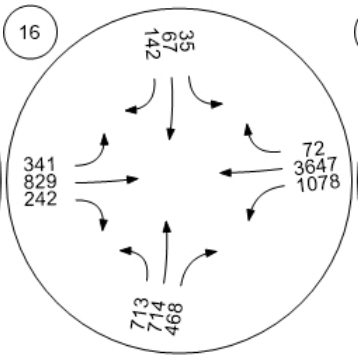
Middlefield Rd/Marsh Rd



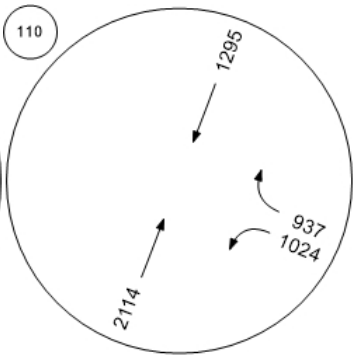
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

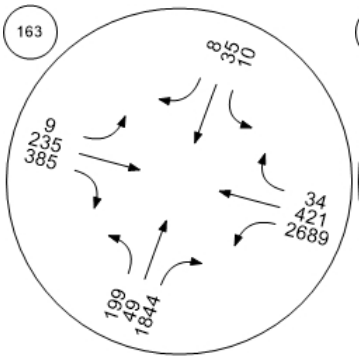


Marsh Road and US 101 NB

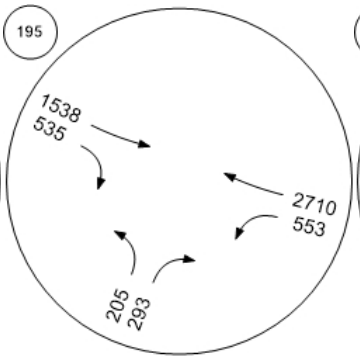


Traffic Volume - Future Total Volume

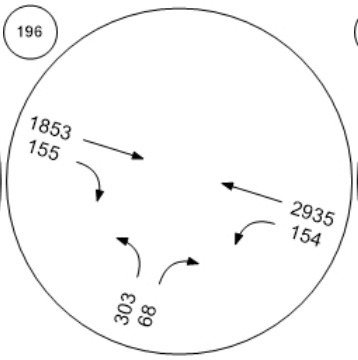
Bayfront Expy/Marsh Rd



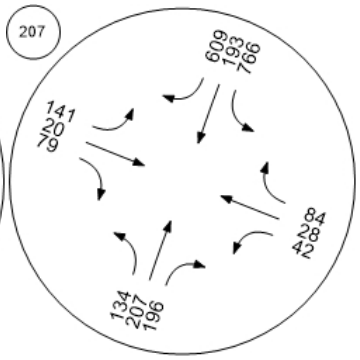
Bayfront Expy/Chilco St



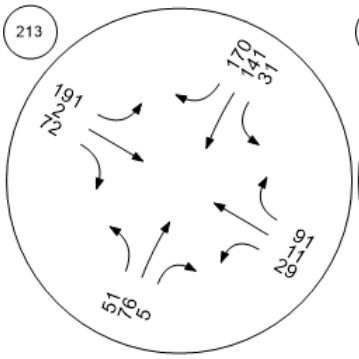
Bayfront Expy/Chrysler Drive



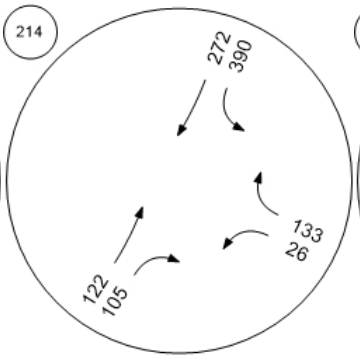
Chilco St/Constitution Dr



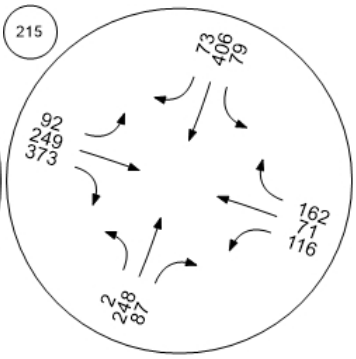
Chrysler Dr/Independence Dr



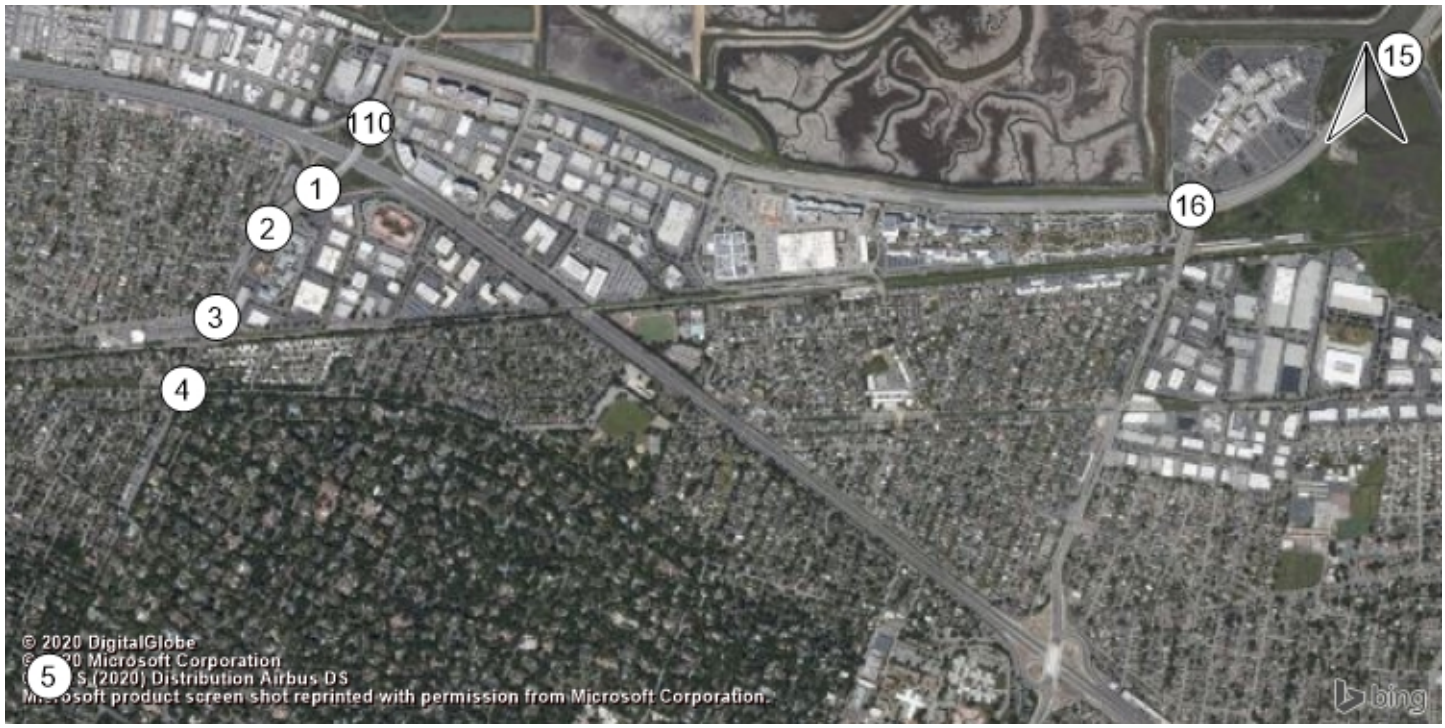
Chrysler Dr/Jefferson Dr



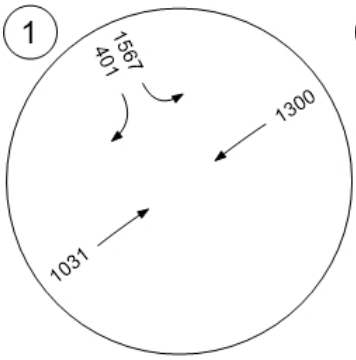
Chrysler Dr/Constitution Dr



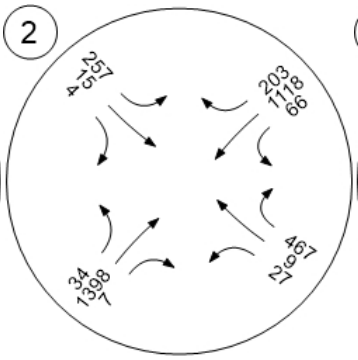
Traffic Volume - Future Total Volume



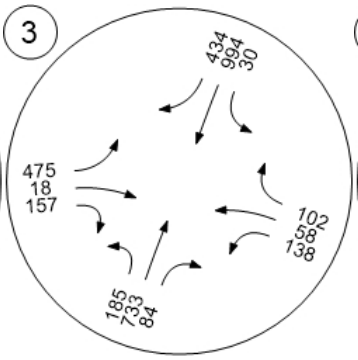
Marsh Rd (SR 84)/US 101 S



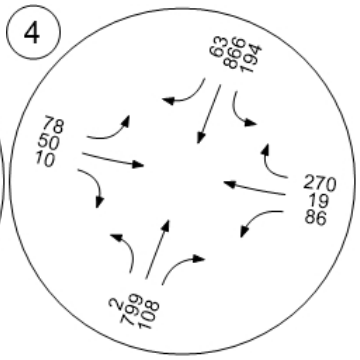
Marsh Rd/Rolison Rd-Scott D



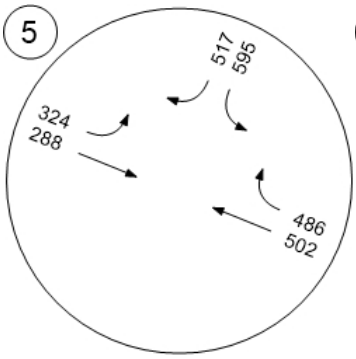
Marsh Rd/Florence St-Bohan



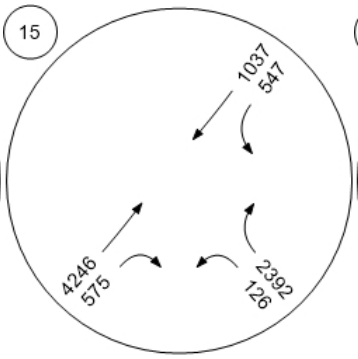
Marsh Rd/Bay Rd



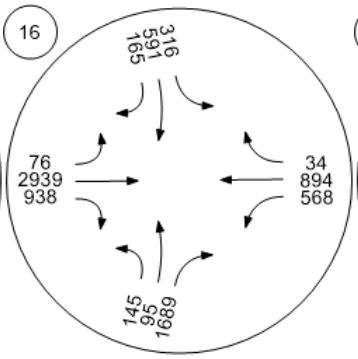
Middlefield Rd/Marsh Rd



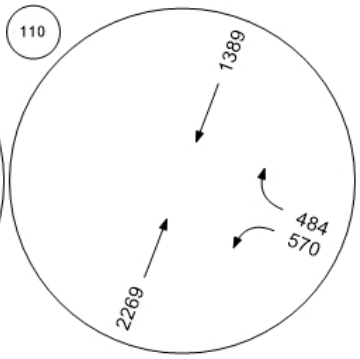
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

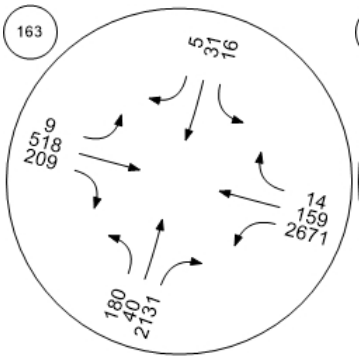


Marsh Road/101 NB Ramps

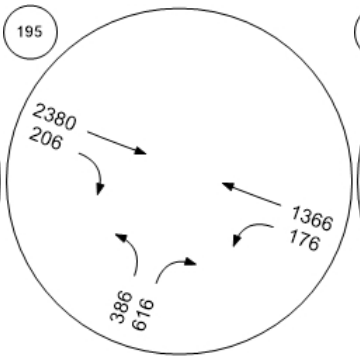


Traffic Volume - Future Total Volume

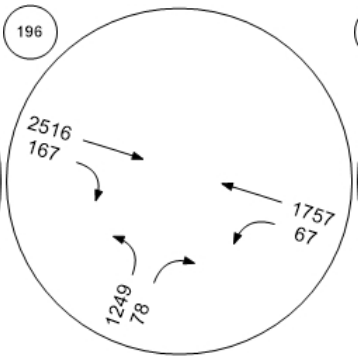
Bayfront Expy/Marsh Rd



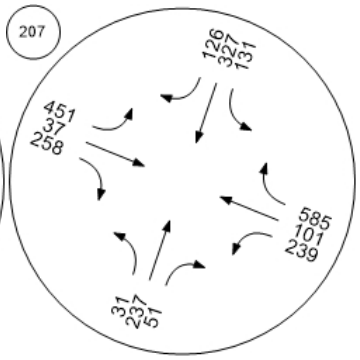
Bayfront Expy/Chilco St



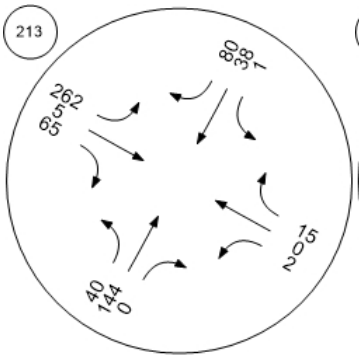
Bayfront Expy/Chrysler Drive



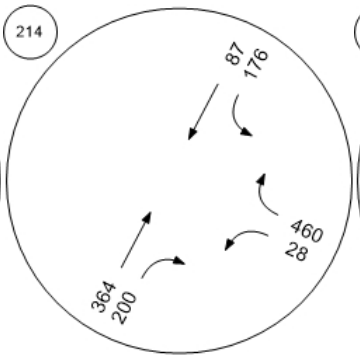
Chilco St/Constitution Dr



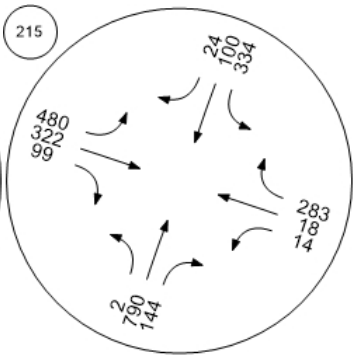
Chrysler Dr/Independence Dr



Chrysler Dr/Jefferson Dr

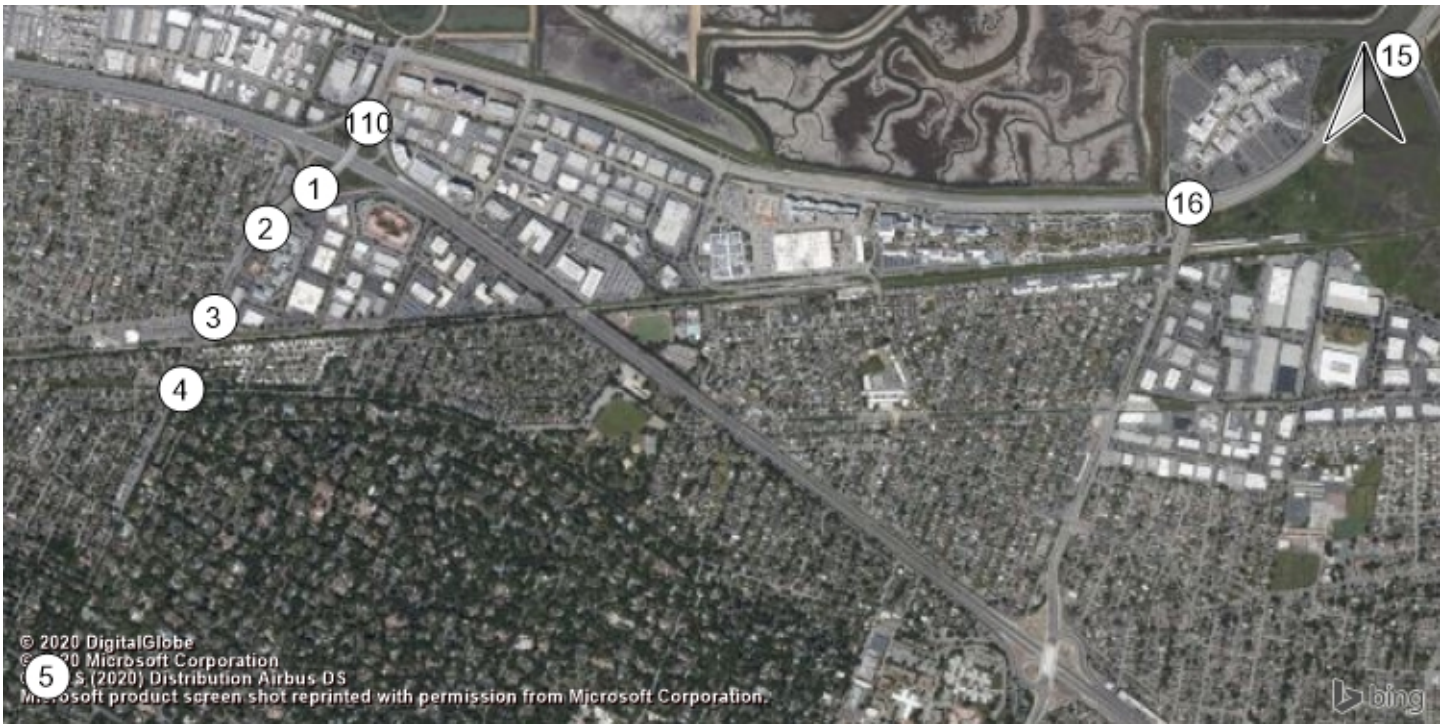


Chrysler Dr/Constitution Dr

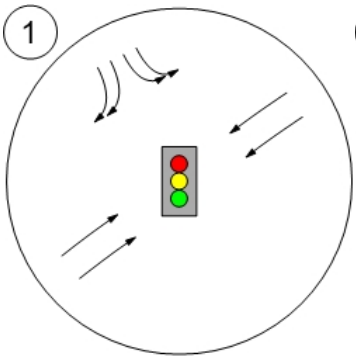


Attachment 2. Intersection Lane Configurations – All Scenarios

Lane Configuration and Traffic Control (Existing Conditions)



Marsh Rd (SR 84)/US 101 S



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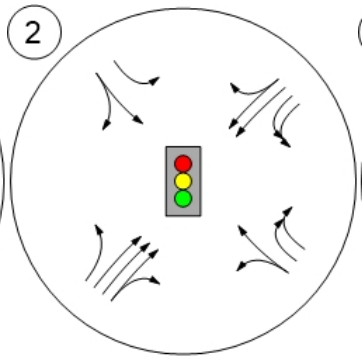
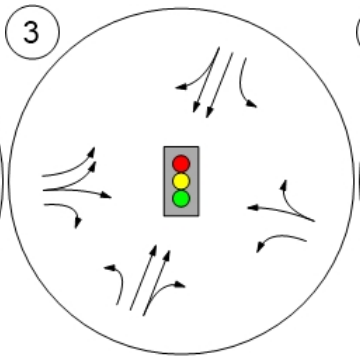
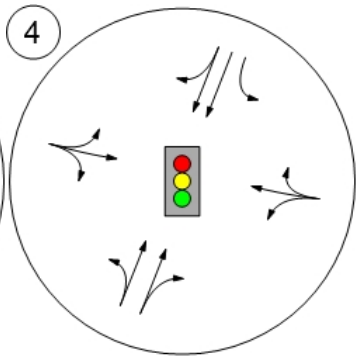


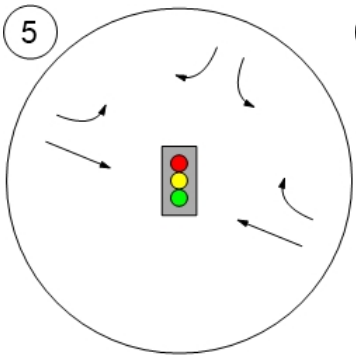
Marsh Rd/Florence St-Bohan



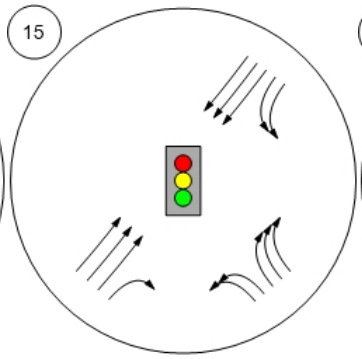
Marsh Rd/Bay Rd



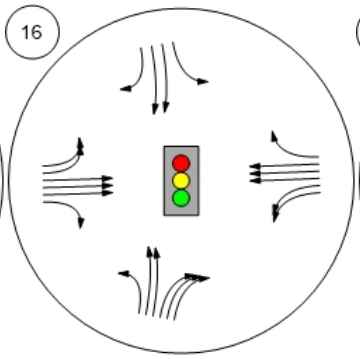
Middlefield Rd/Marsh Rd



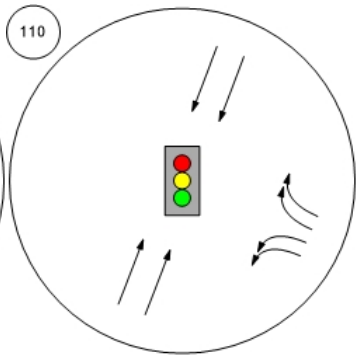
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

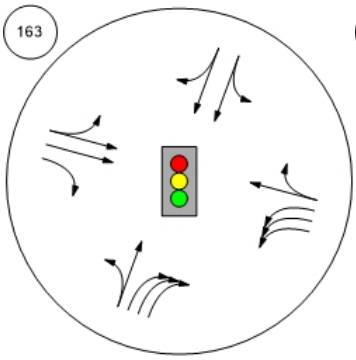


Marsh Road and US 101 NB

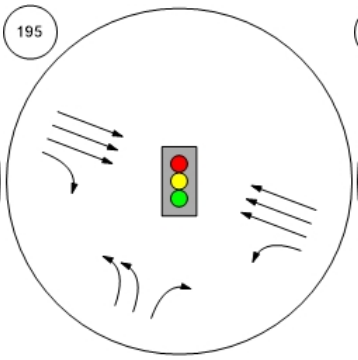


Lane Configuration and Traffic Control (Existing Conditions)

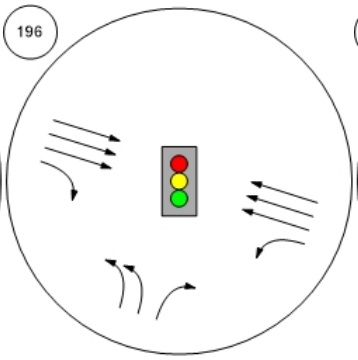
Bayfront Expy/Marsh Rd



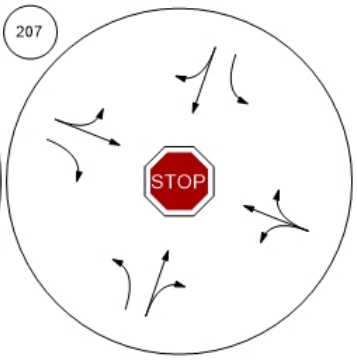
Bayfront Expy/Chilco St



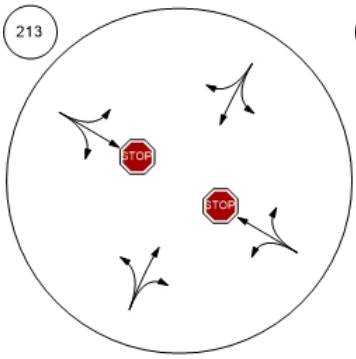
Bayfront Expy/Chrysler Drive



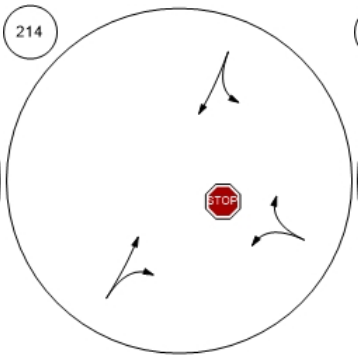
Chilco St/Constitution Dr



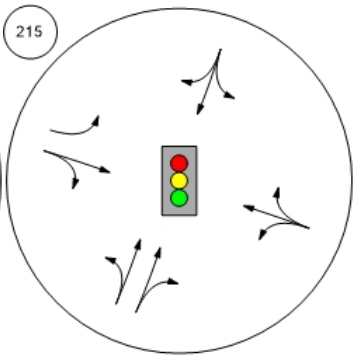
Chrysler Dr/Independence Dr



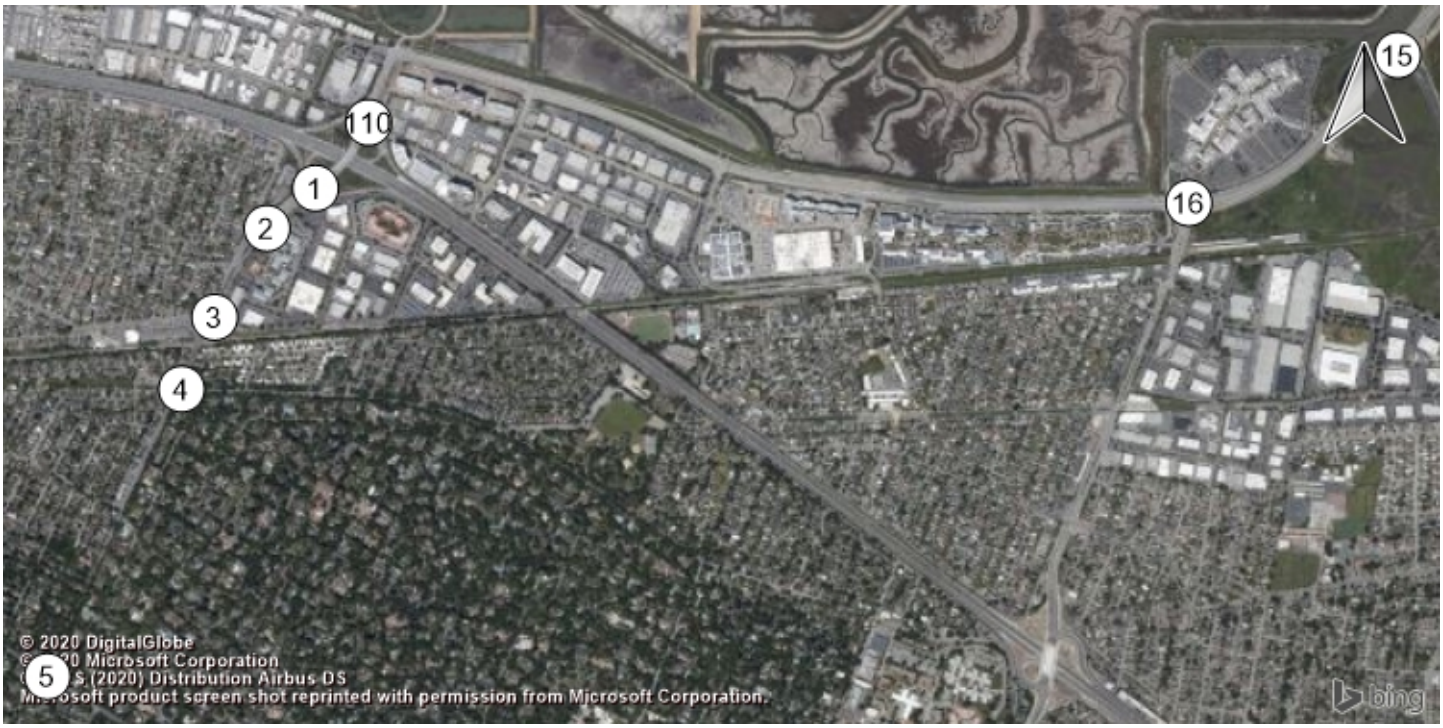
Chrysler Dr/Jefferson Dr



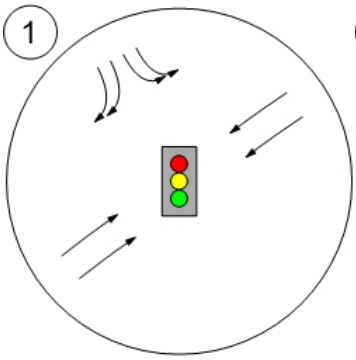
Chrysler Dr/Constitution Dr



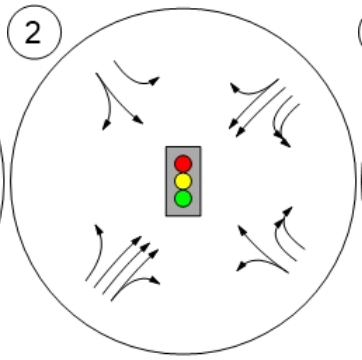
Lane Configuration and Traffic Control (Near Term Conditions)



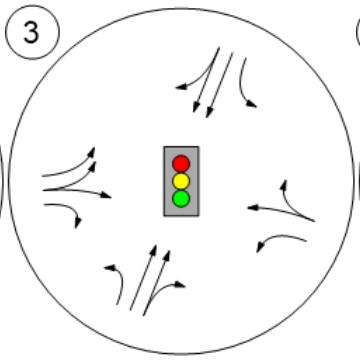
Marsh Rd (SR 84)/US 101 S



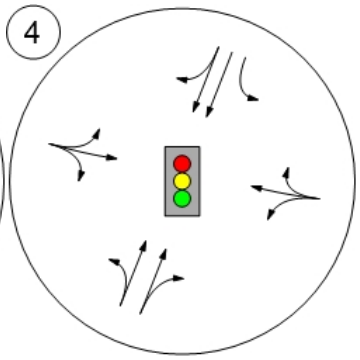
Marsh Rd/Rolison Rd-Scott D



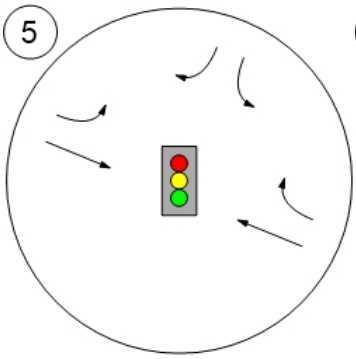
Marsh Rd/Florence St-Bohan



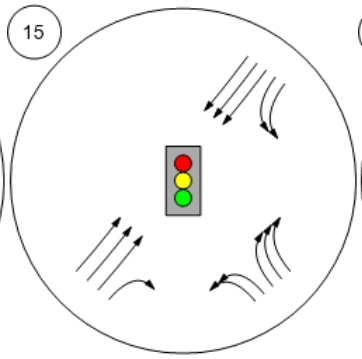
Marsh Rd/Bay Rd



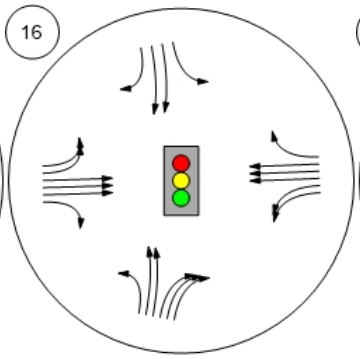
Middlefield Rd/Marsh Rd



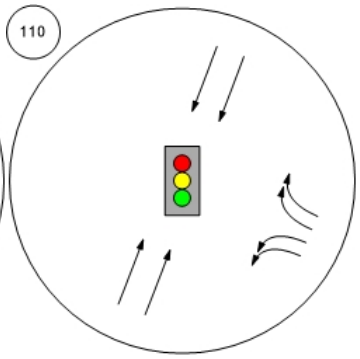
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

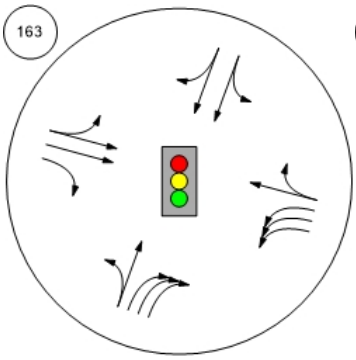


Marsh Road and US 101 NB

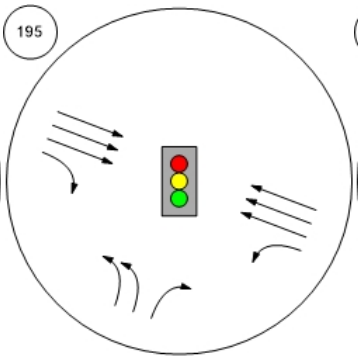


Lane Configuration and Traffic Control (Near Term Conditions)

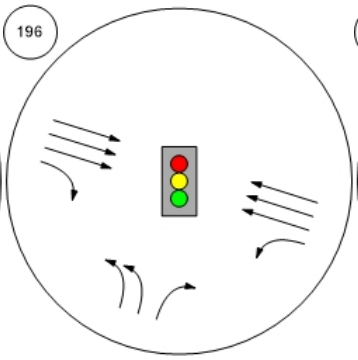
Bayfront Expy/Marsh Rd



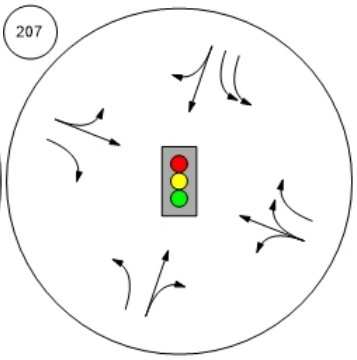
Bayfront Expy/Chilco St



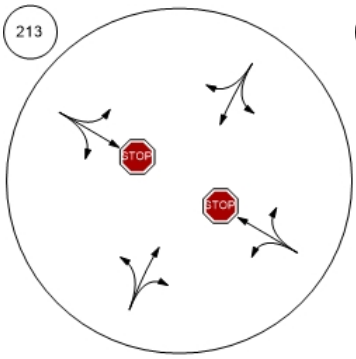
Bayfront Expy/Chrysler Drive



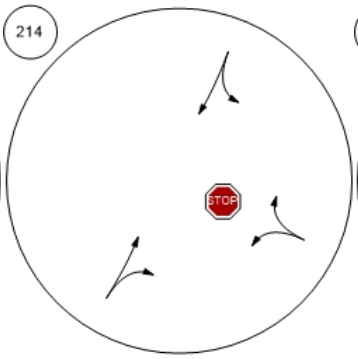
Chilco St/Constitution Dr



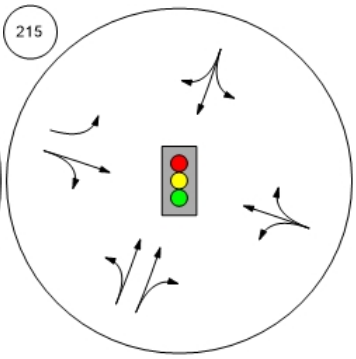
Chrysler Dr/Independence Dr



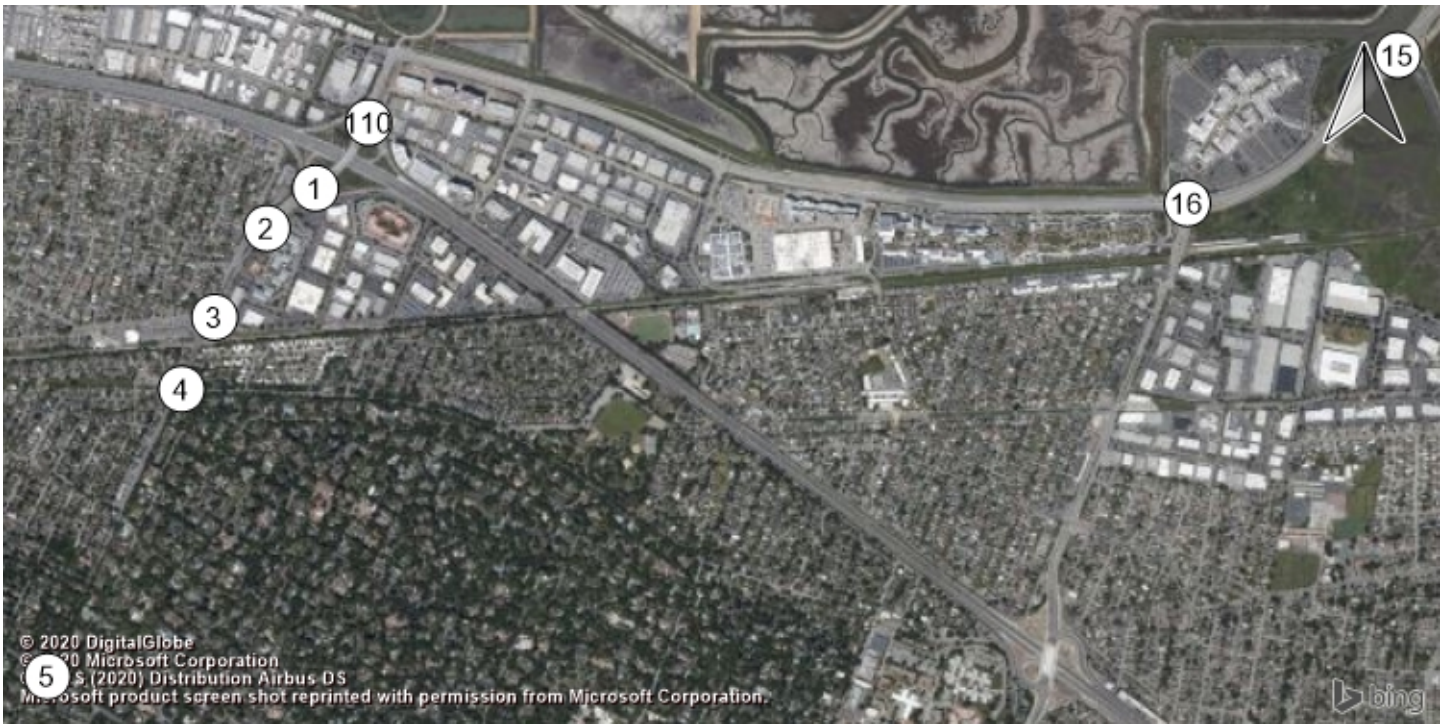
Chrysler Dr/Jefferson Dr



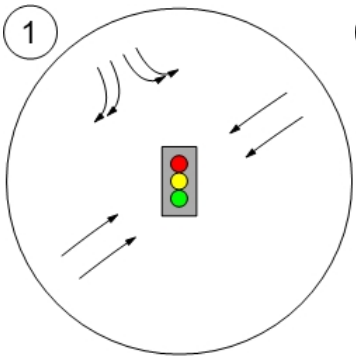
Chrysler Dr/Constitution Dr



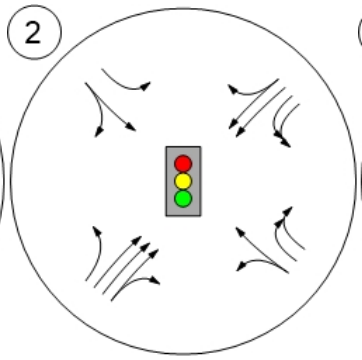
Lane Configuration and Traffic Control (Cumulative Conditions)



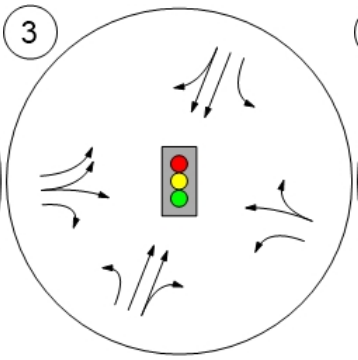
Marsh Rd (SR 84)/US 101 S



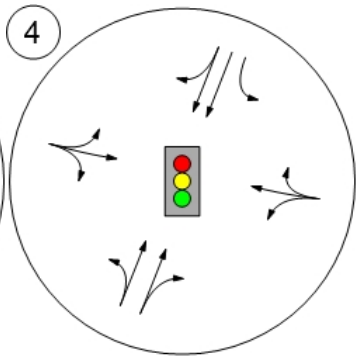
Marsh Rd/Rolison Rd-Scott D



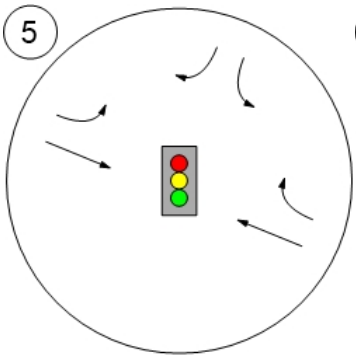
Marsh Rd/Florence St-Bohan



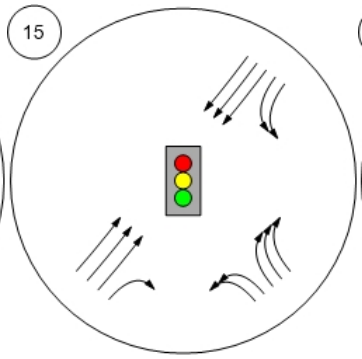
Marsh Rd/Bay Rd



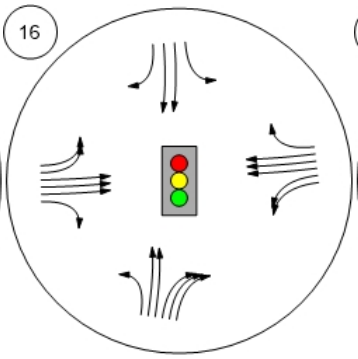
Middlefield Rd/Marsh Rd



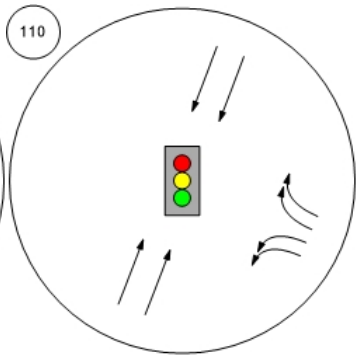
Bayfront Expy (SR 84)/Univer



Bayfront Expy (SR 84)/Willow

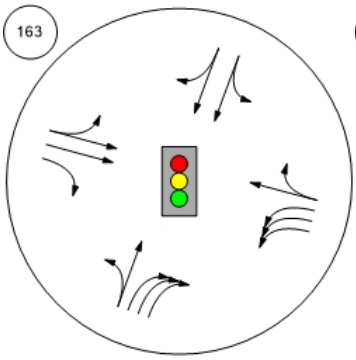


Marsh Road and US 101 NB

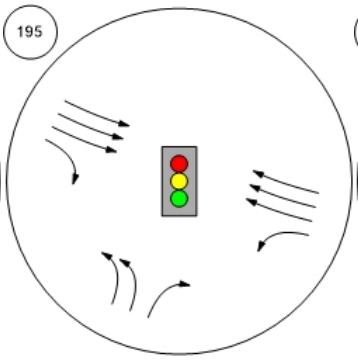


Lane Configuration and Traffic Control (Cumulative Conditions)

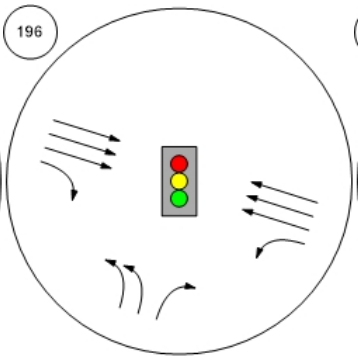
Bayfront Expy/Marsh Rd



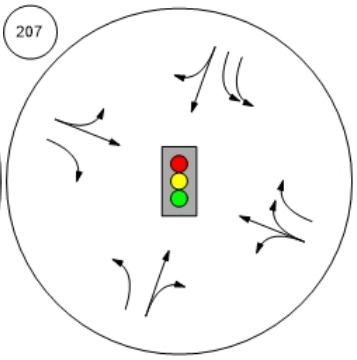
Bayfront Expy/Chilco St



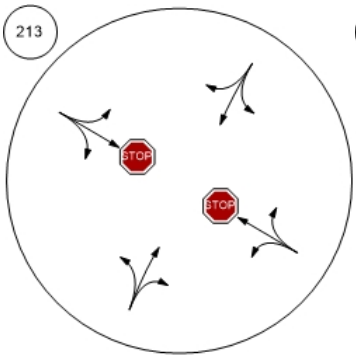
Bayfront Expy/Chrysler Drive



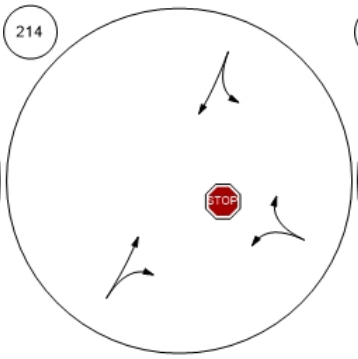
Chilco St/Constitution Dr



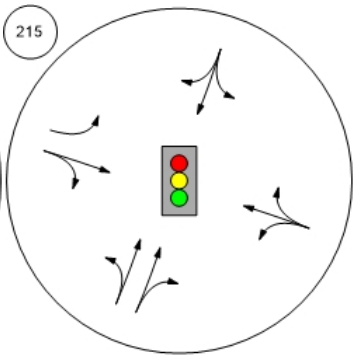
Chrysler Dr/Independence Dr



Chrysler Dr/Jefferson Dr



Chrysler Dr/Constitution Dr



Attachment 3. Intersection Level of Service Results

Existing Conditions

Vistro File: H:\...\Existing Conditions_AM.vistro
Report File: H:\...\Existing_AM.pdf
Scenario 16 Existing AM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.838	18.1	B
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.696	18.5	B
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.711	35.3	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.641	19.7	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	0.855	35.0	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Left	0.727	11.4	B
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Thru	0.967	106.0	F
110	Marsh Road and US 101 NB Ramps	Signalized	HCM 6th Edition	NWB Right	0.727	15.8	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.792	56.9	E
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.808	12.7	B
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.621	8.4	A
207	Chilco St/Constitution Dr	All-way stop	HCM 6th Edition	SB Right	0.985	32.1	D
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	44.0	E
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.084	18.6	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Thru	0.846	50.6	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Vistro File: H:\...\Existing Conditions_PM.vistro
Report File: H:\...\Existing_PM.pdf
Scenario 16 Existing PM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.701	17.0	B
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.460	15.3	B
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.682	34.6	C
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.634	18.6	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	0.849	37.9	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Right	1.043	94.1	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Right	1.249	168.1	F
110	Marsh Road/101 NB Ramps	Signalized	HCM 6th Edition	WB Left	0.771	13.3	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.765	36.5	D
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.862	16.0	B
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.779	13.1	B
207	Chilco St/Constitution Dr	All-way stop	HCM 6th Edition	SB Thru	0.916	32.5	D
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	17.9	C
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.041	19.0	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	WB Right	0.666	28.0	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Attachment 3. Intersection Level of Service Results

Near-Term (2022) Conditions

Vistro File: H:\...\Existing Conditions_AM.vistro
Report File: H:\...\Near Term_AM.pdf
Scenario 18 Near Term AM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.935	22.9	C
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.724	20.0	B
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.768	38.3	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.722	22.7	C
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	0.990	73.8	E
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Left	0.815	12.7	B
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Left	1.229	193.1	F
110	Marsh Road and US 101 NB Ramps	Signalized	HCM 6th Edition	NB Thru	0.999	25.3	C
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.827	59.7	E
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.839	21.9	C
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.690	9.5	A
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	NB Left	0.711	33.8	C
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.012	69.3	F
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.118	23.2	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Thru	1.029	111.1	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Vistro File: H:\...\Existing Conditions_PM.vistro
Report File: H:\...\Near Term_PM.pdf
Scenario 18 Near Term PM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.793	17.7	B
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.542	15.1	B
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.772	37.0	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.650	18.4	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	WB Right	0.956	44.2	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Right	1.097	113.1	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Right	1.317	180.9	F
110	Marsh Road/101 NB Ramps	Signalized	HCM 6th Edition	WB Right	0.808	13.3	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.898	37.4	D
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.942	25.3	C
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.863	20.1	C
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	EB Left	0.776	50.0	D
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	18.3	C
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.046	20.1	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Left	0.909	39.8	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Attachment 3. Intersection Level of Service Results

Cumulative (2040) Conditions

Vistro File: H:\...\2040(c)_AM.vistro
Report File: H:\...\Cumulative_AM.pdf

Scenario 17 115 Indep - Cum No Proj AM
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	1.042	36.5	D
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.807	32.8	C
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.793	39.9	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	NB Right	0.834	28.6	C
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	1.041	81.0	F
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Left	1.171	101.1	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Thru	1.573	326.6	F
110	Marsh Road and US 101 NB Ramps	Signalized	HCM 6th Edition	NB Thru	1.069	34.6	C
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	1.059	99.1	F
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	WB Left	1.139	61.6	E
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.777	10.9	B
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	SB Right	0.863	85.5	F
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Left	1.218	271.6	F
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.266	44.8	E
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	WB Right	3.769	356.6	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Vistro File: H:\...\2040(c)_PM.vistro
Report File: H:\...\Cumulative_PM.pdf

Scenario 17 115 Indep - Cum No Proj PM
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.917	38.9	D
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.666	22.9	C
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.835	45.9	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.712	19.8	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	WB Right	0.974	52.8	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Right	1.394	215.3	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	SB Thru	2.073	370.7	F
110	Marsh Road/101 NB Ramps	Signalized	HCM 6th Edition	WB Right	0.914	16.6	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.935	36.5	D
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	1.173	67.4	E
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	NB Left	0.994	56.5	E
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	EB Left	1.498	252.3	F
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	21.6	C
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.171	132.9	F
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Left	2.468	222.8	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Attachment 3. Intersection Level of Service Results

Near-Term (2022) Plus Project Conditions

Vistro File: H:\...\Existing Conditions_AM.vistro
Report File: H:\...\Near Term Plus Project_AM.pdf
Scenario 19 Near Term Plus Project AM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.937	22.9	C
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.726	20.0	C
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.771	38.4	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.722	22.7	C
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	0.991	73.9	E
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Left	0.814	12.8	B
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Left	1.228	192.2	F
110	Marsh Road and US 101 NB Ramps	Signalized	HCM 6th Edition	NB Thru	0.999	25.2	C
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.836	59.9	E
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.838	22.2	C
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.702	9.9	A
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	NB Left	0.711	33.7	C
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.012	117.7	F
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.125	24.4	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Thru	1.049	114.5	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Vistro File: H:\...\Existing Conditions_PM.vistro
Report File: H:\...\Near Term Plus Project_PM.pdf
Scenario 19 Near Term Plus Project PM (2019 vols)
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.799	17.9	B
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.542	15.1	B
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.773	37.1	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.652	18.5	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	WB Right	0.957	44.5	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Right	1.098	113.2	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Right	1.318	180.9	F
110	Marsh Road/101 NB Ramps	Signalized	HCM 6th Edition	WB Right	0.821	13.6	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.900	38.0	D
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	0.943	25.3	C
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.875	21.0	C
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	SB Thru	0.779	51.1	D
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	19.7	C
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.048	20.8	C
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Left	0.953	45.5	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Attachment 3. Intersection Level of Service Results

Near-Term (2022) Plus Project Conditions, With Modifications

Generated with PTV VISTRO

Version 2020 (SP 0-7)

Option 1: Chrysler Dr/Constitution Dr: Mitigation Near Term Plus Project AM

Number	215											
Intersection	Chrysler Dr/Constitution Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive						Constitution Drive					
Approach	Southbound			Eastbound			Westbound			Northeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	79	368	19	15	234	211	36	20	100	2	153	19
Total Analysis Volume [veh/h]	88	413	81	102	277	286	39	79	111	2	263	22

Intersection Settings

Cycle Length [s]	90											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss
Signal Group	0	8	0	0	6	0	0	2	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	46	0	0	25	0	0	19	0	0	46	0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.36	0.36	0.24	0.24	0.24	0.24	0.36	0.36
(v / s)_i Volume / Saturation Flow Rate	0.10	0.32	0.08	0.16	0.20	0.21	0.11	0.11
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3			3	3	
s, saturation flow rate [veh/h]	893	1539	1357	1699	1412	1069	1335	1297
c, Capacity [veh/h]	326	558	326	408	339	256	532	470
X, volume / capacity	0.27	0.89	0.31	0.68	0.84	0.89	0.27	0.30
d, Delay for Lane Group [s/veh]	23.58	35.37	24.28	28.21	33.23	38.94	17.46	17.72
Lane Group LOS	C	D	C	C	C	D	B	B
Critical Lane Group	No	Yes	No	No	Yes	Yes	No	No

50th-Percentile Queue Length [veh/ln]	1.28	9.62	1.50	4.57	5.24	4.61	1.73	1.73
50th-Percentile Queue Length [ft/ln]	32.04	240.51	37.39	114.14	130.96	115.16	43.25	43.32
95th-Percentile Queue Length [veh/ln]	2.31	14.71	2.69	8.07	8.99	8.13	3.11	3.12
95th-Percentile Queue Length [ft/ln]	57.66	367.68	67.30	201.75	224.79	203.15	77.86	77.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	23.58	35.37	35.37	24.28	28.21	33.23	38.94	38.94	38.94	17.46	17.58	17.72
Movement LOS	C	D	D	C	C	C	D	D	D	B	B	B
Critical Movement	No	No	No	No	No	No	No	No	Yes	No	No	No
d_A, Approach Delay [s/veh]	33.59			29.77			38.94			17.59		
Approach LOS	C			C			D			B		
d_I, Intersection Delay [s/veh]	30.24											
Intersection LOS	C											
Intersection V/C	0.738											

Option 1: Chrysler Dr/Independence Dr: Mitigation Near Term Plus Project AM

Number	213											
Intersection	Chrysler Dr/Independence Dr											
Control Type	All-way stop											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive			Chrysler Drive						Independence Drive		
Approach	Northbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	51	29	0	31	134	168	1	0	2	124	2	24
Total Analysis Volume [veh/h]	71	53	0	43	192	224	1	0	3	265	3	36

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	634	700	630	646

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	10.06	17.38	8.75	13.42
95th-Percentile Queue Length [veh]	0.72	4.91	0.02	2.52
95th-Percentile Queue Length [ft]	18.04	122.78	0.48	62.90
Approach Delay [s/veh]	10.06	17.38	8.75	13.42
Approach LOS	B	C	A	B
Intersection Delay [s/veh]	14.97			
Intersection LOS	B			

Option 1: Bayfront Expy/Marsh Rd: Mitigation Near Term Plus Project AM

Number	163											
Intersection	Bayfront Expy/Marsh Rd											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name				Marsh Road			Haven Avenue			Bayfront Expressway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	162	27	1502	10	30	7	8	196	296	1931	371	34
Total Analysis Volume [veh/h]	174	28	1921	10	31	7	8	216	317	2171	399	35

Intersection Settings

Cycle Length [s]	160											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	12.00											
Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	2	3	3	7	4	6	4	1	4	1	2	8
Auxiliary Signal Groups		3	2,3									
Lead / Lag	Lag	-	-	-	-	-	Lag	-	-	Lead	-	-
Minimum Green [s]	10	6	6	0	4	10	4	12	4	12	10	0
Maximum Green [s]	0	0	0	0	0	10	0	0	0	0	0	0
Amber [s]	4.7	3.6	3.6	0.0	3.6	3.6	3.6	3.6	3.6	3.6	4.7	0.0
All red [s]	1.0	1.0	1.0	0.0	0.5	0.5	0.5	0.0	0.5	0.0	1.0	0.0
Split [s]	82	11	11	0	32	25	32	35	32	35	82	0
Walk [s]	5	0	0	0	5	10	5	0	5	0	5	0
Pedestrian Clearance [s]	16	0	0	0	22	10	22	0	22	0	16	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall		No	No		No			No			Yes	
Maximum Recall		No	No		No			No			No	
Pedestrian Recall		No	No		Yes			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.11	0.62	0.18	0.18	0.15	0.15	0.15	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.11	0.47	0.01	0.01	0.12	0.13	0.13	0.43	0.24
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3	
s, saturation flow rate [veh/h]	1822	4117	1863	1610	1623	1238	1424	5075	1789
c, Capacity [veh/h]	206	2476	339	293	237	180	208	2533	893
X, volume / capacity	0.98	0.78	0.07	0.08	0.83	0.88	0.90	0.86	0.49
d, Delay for Lane Group [s/veh]	128.11	26.18	54.31	54.36	77.35	89.09	88.26	39.10	28.40
Lane Group LOS	F	C	D	D	E	F	F	D	C
Critical Lane Group	No	Yes	No	Yes	No	No	Yes	Yes	No

50th-Percentile Queue Length [veh/ln]	11.59	18.30	0.86	0.78	8.52	7.53	8.69	25.43	11.56
50th-Percentile Queue Length [ft/ln]	289.80	457.42	21.43	19.47	212.96	188.36	217.29	635.63	289.06
95th-Percentile Queue Length [veh/ln]	17.18	25.31	1.54	1.40	13.31	12.04	13.53	33.69	17.14
95th-Percentile Queue Length [ft/ln]	429.39	632.80	38.58	35.04	332.63	300.90	338.16	842.37	428.47

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	128.11	128.11	26.18	54.31	54.33	54.36	77.35	78.90	88.58	39.10	28.40	28.40
Movement LOS	F	F	C	D	D	D	E	E	F	D	C	C
Critical Movement	Yes	No	No	No	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	35.87			54.33			84.56			37.32		
Approach LOS	D			D			F			D		
d_I, Intersection Delay [s/veh]	41.70											
Intersection LOS	D											
Intersection V/C	0.755											

Option 1: Chrysler Dr/Constitution Dr: Mitigation Near Term Plus Project PM

Number	215											
Intersection	Chrysler Dr/Constitution Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name				Chrysler Drive						Constitution Drive		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	2	490	14	194	84	3	128	205	53	13	6	114
Total Analysis Volume [veh/h]	2	513	14	194	100	24	480	299	62	14	18	114

Intersection Settings

Cycle Length [s]	90											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	0	4	0	0	8	0	0	6	0	0	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	41	0	0	41	0	0	27	0	0	22	0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.36	0.36	0.36	0.36	0.33	0.33	0.33	0.18
(v / s)_i Volume / Saturation Flow Rate	0.16	0.16	0.25	0.07	0.30	0.18	0.05	0.16
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3
s, saturation flow rate [veh/h]	1709	1539	789	1654	1609	1686	1326	905
c, Capacity [veh/h]	654	553	245	594	531	557	438	161
X, volume / capacity	0.43	0.45	0.79	0.21	0.90	0.54	0.14	0.91
d, Delay for Lane Group [s/veh]	24.11	24.79	59.45	20.80	37.46	25.37	21.34	53.36
Lane Group LOS	C	C	E	C	D	C	C	D
Critical Lane Group	No	No	Yes	No	Yes	No	No	Yes

50th-Percentile Queue Length [veh/ln]	4.72	4.35	5.82	1.89	10.77	5.17	0.92	3.84
50th-Percentile Queue Length [ft/ln]	118.12	108.74	145.54	47.29	269.25	129.21	23.01	96.03
95th-Percentile Queue Length [veh/ln]	8.29	7.77	9.78	3.40	16.15	8.90	1.66	6.91
95th-Percentile Queue Length [ft/ln]	207.24	194.24	244.47	85.12	403.81	222.42	41.42	172.86

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	24.11	24.43	24.79	59.45	20.80	20.80	37.46	25.37	21.34	53.36	53.36	53.36
Movement LOS	C	C	C	E	C	C	D	C	C	D	D	D
Critical Movement	No	No	No	Yes	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	24.44			44.38			31.97			53.36		
Approach LOS	C			D			C			D		
d_I, Intersection Delay [s/veh]	33.65											
Intersection LOS	C											
Intersection V/C	0.705											

Option 1: Chrysler Dr/Independence Dr: Mitigation Near Term Plus Project PM

Number	213											
Intersection	Chrysler Dr/Independence Dr											
Control Type	All-way stop											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive									Independence Drive		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	37	101	0	1	19	65	2	0	15	244	5	53
Total Analysis Volume [veh/h]	49	124	0	1	26	98	2	0	18	315	6	66

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	691	760	769	745

Movement, Approach, & Intersection Results

Average Lane Delay [s/veh]	9.93	8.68	7.80	12.94
95th-Percentile Queue Length [veh]	0.99	0.59	0.08	3.04
95th-Percentile Queue Length [ft]	24.64	14.68	2.00	75.95
Approach Delay [s/veh]	9.93	8.68	7.80	12.94
Approach LOS	A	A	A	B
Intersection Delay [s/veh]	11.30			
Intersection LOS	B			

Option 1: Bayfront Expy/Marsh Rd: Mitigation Near Term Plus Project PM

Number	163											
Intersection	Bayfront Expy/Marsh Rd											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name				Marsh Road			Haven Avenue			Bayfront Expressway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	179	40	1834	12	31	5	9	505	208	1822	119	14
Total Analysis Volume [veh/h]	188	42	1944	13	32	5	9	536	218	2532	130	15

Intersection Settings

Cycle Length [s]	160											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	12.00											
Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	2	3	3	6	4	6	4	1	4	1	2	8
Auxiliary Signal Groups			2,3									
Lead / Lag	Lag	-	-	Lag	-	-	Lag	-	-	Lead	-	-
Minimum Green [s]	10	6	6	10	4	10	4	12	4	12	10	0
Maximum Green [s]	0	0	0	10	0	10	0	0	0	0	0	0
Amber [s]	4.7	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	4.7	0.0
All red [s]	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.0	0.5	0.0	1.0	0.0
Split [s]	82	11	11	0	32	0	32	35	32	35	82	0
Walk [s]	5	0	0	10	5	10	5	0	5	0	5	0
Pedestrian Clearance [s]	16	0	0	10	22	10	22	0	22	0	16	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall		No	No		No			No			Yes	
Maximum Recall		No	No		No			No			No	
Pedestrian Recall		No	No		No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.08	0.80	0.06	0.06	0.17	0.17	0.17	0.63	0.63
(v / s)_i Volume / Saturation Flow Rate	0.13	0.46	0.02	0.01	0.15	0.16	0.14	0.49	0.09
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3	
s, saturation flow rate [veh/h]	1825	4190	1707	1588	1891	1724	1551	5150	1647
c, Capacity [veh/h]	155	3239	137	97	319	291	262	3222	1030
X, volume / capacity	1.49	0.60	0.20	0.23	0.87	0.92	0.83	0.79	0.14
d, Delay for Lane Group [s/veh]	323.51	8.52	71.86	72.00	78.63	89.24	76.22	24.08	12.59
Lane Group LOS	F	A	E	E	E	F	E	C	B
Critical Lane Group	No	Yes	Yes	No	No	Yes	No	Yes	No

50th-Percentile Queue Length [veh/ln]	17.14	8.96	1.10	0.89	12.27	12.74	9.49	23.41	2.27
50th-Percentile Queue Length [ft/ln]	428.60	224.01	27.52	22.30	306.86	318.49	237.26	585.15	56.65
95th-Percentile Queue Length [veh/ln]	27.12	13.87	1.98	1.61	18.02	18.59	14.54	31.34	4.08
95th-Percentile Queue Length [ft/ln]	678.02	346.74	49.54	40.15	450.51	464.83	363.56	783.51	101.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	323.51	323.51	8.52	71.86	71.94	72.00	78.63	83.94	76.22	24.08	12.59	12.59
Movement LOS	F	F	A	E	E	E	E	F	E	C	B	B
Critical Movement	Yes	No	No	No	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	41.84			71.92			81.67			23.46		
Approach LOS	D			E			F			C		
d_I, Intersection Delay [s/veh]	38.78											
Intersection LOS	D											
Intersection V/C	0.902											

Attachment 3. Intersection Level of Service Results

Cumulative (2040) Plus Project Conditions

Vistro File: H:\...\2040(c)_AM.vistro
Report File: H:\...\Cumulative Plus Project_AM.pdf
Scenario 16 115 Indep - Cum Plus Proj AM
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	1.044	36.7	D
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.810	32.9	C
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.795	40.0	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	NB Right	0.835	28.6	C
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	EB Left	1.042	81.2	F
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Left	1.171	101.0	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	NB Thru	1.572	325.5	F
110	Marsh Road and US 101 NB Ramps	Signalized	HCM 6th Edition	NB Thru	1.068	34.5	C
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	1.068	101.8	F
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	WB Left	1.139	61.6	E
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	WB Left	0.791	12.0	B
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	SB Right	0.862	85.3	F
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Left	1.504	394.4	F
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.284	48.3	E
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	WB Right	3.817	361.5	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Vistro File: H:\...\2040(c)_PM.vistro
Report File: H:\...\Cumulative Plus Project_PM.pdf

Scenario 16 115 Indep - Cum Plus Proj PM
9/30/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Marsh Rd (SR 84)/US 101 SB Offramp	Signalized	HCM 6th Edition	SEB Left	0.924	41.1	D
2	Marsh Rd/Rolison Rd-Scott Dr	Signalized	HCM 6th Edition	NEB Left	0.667	22.9	C
3	Marsh Rd/Florence St-Bohannon Dr	Signalized	HCM 6th Edition	NB Left	0.836	46.1	D
4	Marsh Rd/Bay Rd	Signalized	HCM 6th Edition	SB Left	0.714	19.9	B
5	Middlefield Rd/Marsh Rd	Signalized	HCM 6th Edition	WB Right	0.975	53.4	D
15	Bayfront Expy (SR 84) /University Ave (SR 109)	Signalized	HCM 6th Edition	NWB Right	1.394	215.2	F
16	Bayfront Expy (SR 84)/Willow Rd (SR 114)	Signalized	HCM 6th Edition	SB Thru	2.077	372.4	F
110	Marsh Road/101 NB Ramps	Signalized	HCM 6th Edition	WB Right	0.927	17.5	B
163	Bayfront Expy/Marsh Rd	Signalized	HCM 6th Edition	NB Left	0.938	37.1	D
195	Bayfront Expy/Chilco St	Signalized	HCM 6th Edition	NB Right	1.174	67.2	E
196	Bayfront Expy/Chrysler Drive	Signalized	HCM 6th Edition	NB Left	1.009	59.8	E
207	Chilco St/Constitution Dr	Signalized	HCM 6th Edition	EB Left	1.498	252.2	F
213	Chrysler Dr/Independence Dr	Two-way stop	HCM 6th Edition	SEB Thru	0.011	23.8	C
214	Chrysler Dr/Jefferson Dr	Two-way stop	HCM 6th Edition	NWB Left	0.179	141.8	F
215	Chrysler Dr/Constitution Dr	Signalized	HCM 6th Edition	SB Left	2.569	242.7	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Attachment 3. Intersection Level of Service Results

Cumulative (2040) Plus Project Conditions, With Modifications

Option 1: Bayfront Expy/Chrysler Drive: Mitigation Cumulative Plus Project AM

Number	196					
Intersection	Bayfront Expy/Chrysler Drive					
Control Type	Signalized					
Analysis Method	HCM 6th Edition					
Name	Chrysler Drive		Bayfront Expy		Bayfront Expy	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	298	71	1817	156	191	2914
Total Analysis Volume [veh/h]	312	70	1910	160	159	3026

Intersection Settings

Cycle Length [s]	90					
Coordination Type	Free Running					
Actuation Type	Fully actuated					
Lost time [s]	9.00					
Control Type	Permissive	Permissive	Permissive	Permissive	Protected	Permissive
Signal Group	4	7	6	0	5	2
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-
Minimum Green [s]	5	5	10	0	7	10
Maximum Green [s]	25	30	50	0	20	50
Amber [s]	4.1	3.0	5.2	0.0	3.6	5.2
All red [s]	0.5	1.0	1.0	0.0	0.5	1.0
Split [s]	0	0	0	0	0	0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	26	0	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	2.0
Minimum Recall	No		Yes		No	Yes
Maximum Recall	No		No		No	No
Pedestrian Recall	No		No		No	No
Pedestrian Signal Group	0					
Pedestrian Walk [s]	0					
Pedestrian Clearance [s]	0					

Lane Group Calculations

g / C, Green / Cycle	0.12	0.12	0.58	0.58	0.11	0.74
(v / s)_i Volume / Saturation Flow Rate	0.08	0.08	0.39	0.11	0.09	0.60
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3	
s, saturation flow rate [veh/h]	3173	1586	4959	1493	1810	5024
c, Capacity [veh/h]	371	186	2869	864	200	3729
X, volume / capacity	0.69	0.69	0.67	0.19	0.80	0.81
d, Delay for Lane Group [s/veh]	34.77	37.00	11.36	7.72	36.05	6.86
Lane Group LOS	C	D	B	A	D	A
Critical Lane Group	No	Yes	No	No	No	Yes

50th-Percentile Queue Length [veh/ln]	2.35	2.47	5.66	0.99	2.83	5.02
50th-Percentile Queue Length [ft/ln]	58.71	61.72	141.59	24.75	70.83	125.61
95th-Percentile Queue Length [veh/ln]	4.23	4.44	9.57	1.78	5.10	8.70
95th-Percentile Queue Length [ft/ln]	105.67	111.09	239.17	44.55	127.49	217.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	35.18	37.00	11.36	7.72	36.05	6.86
Movement LOS	D	D	B	A	D	A
Critical Movement	No	Yes	No	No	No	No
d_A, Approach Delay [s/veh]	35.52		11.08		8.31	
Approach LOS	D		B		A	
d_I, Intersection Delay [s/veh]	11.17					
Intersection LOS	B					
Intersection V/C	0.774					

Option 1: Chrysler Dr/Constitution Dr: Mitigation Cumulative Plus Project AM

Number	215											
Intersection	Chrysler Dr/Constitution Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive			Constitution Drive			Constitution Drive			Chrysler Drive		
Approach	Southbound			Eastbound			Westbound			Northeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	79	417	99	107	250	327	119	74	162	4	231	88
Total Analysis Volume [veh/h]	88	451	81	102	277	414	129	79	180	2	276	97

Intersection Settings

Cycle Length [s]	90											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Split	Split	Split
Signal Group	0	6	0	3	8	0	7	4	0	0	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	25	0	0	46	0	0	46	0	0	19	0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.18	0.18
(v / s)_i Volume / Saturation Flow Rate	0.06	0.34	0.10	0.16	0.29	0.41	0.13	0.14	0.14
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3			3		3	
s, saturation flow rate [veh/h]	1461	1542	1006	1699	1414	509	1341	1467	1195
c, Capacity [veh/h]	500	528	88	584	486	242	461	259	211
X, volume / capacity	0.18	1.01	1.16	0.47	0.85	0.86	0.39	0.78	0.82
d, Delay for Lane Group [s/veh]	20.24	67.80	139.58	23.05	38.86	65.61	22.25	39.39	42.36
Lane Group LOS	C	F	F	C	D	E	C	D	D
Critical Lane Group	No	Yes	No	No	No	Yes	No	No	Yes

50th-Percentile Queue Length [veh/ln]	1.24	16.21	4.22	4.41	9.27	6.51	2.78	4.37	3.92
50th-Percentile Queue Length [ft/ln]	31.09	405.16	105.55	110.15	231.87	162.68	69.40	109.18	97.88
95th-Percentile Queue Length [veh/ln]	2.24	22.92	7.60	7.85	14.27	10.69	5.00	7.79	7.05
95th-Percentile Queue Length [ft/ln]	55.96	573.00	189.99	196.21	356.74	267.26	124.92	194.86	176.18

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.24	67.80	67.80	139.58	23.05	38.86	65.61	65.61	22.25	39.39	40.21	42.36
Movement LOS	C	E	E	F	C	D	E	E	C	D	D	D
Critical Movement	No	No	No	Yes	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	61.05			46.29			45.49			40.76		
Approach LOS	E			D			D			D		
d_I, Intersection Delay [s/veh]	49.40											
Intersection LOS	D											
Intersection V/C	0.898											

Option 2: Chrysler Dr/Independence Dr: Mitigation Cumulative Plus Project AM_Signal

Number	213											
Intersection	Chrysler Dr/Independence Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive			Chrysler Drive						Independence Drive		
Approach	Northbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	53	67	5	31	136	199	29	11	91	176	2	72
Total Analysis Volume [veh/h]	71	106	7	43	196	236	40	15	126	265	3	100

Intersection Settings

Cycle Length [s]	90											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	4	0	0	8	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	53	0	0	53	0	0	37	0	0	37	0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.49	0.49	0.34	0.34
(v / s)_i Volume / Saturation Flow Rate	0.22	0.45	0.12	0.30
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900
Arrival type	3	3	3	3
s, saturation flow rate [veh/h]	835	1046	1554	1225
c, Capacity [veh/h]	513	594	625	550
X, volume / capacity	0.36	0.80	0.29	0.67
d, Delay for Lane Group [s/veh]	7.46	16.90	11.96	15.96
Lane Group LOS	A	B	B	B
Critical Lane Group	No	Yes	No	Yes

50th-Percentile Queue Length [veh/ln]	0.87	4.25	1.28	3.36
50th-Percentile Queue Length [ft/ln]	21.66	106.18	32.12	83.95
95th-Percentile Queue Length [veh/ln]	1.56	7.63	2.31	6.04
95th-Percentile Queue Length [ft/ln]	38.98	190.68	57.81	151.11

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.46	7.46	7.46	16.90	16.90	16.90	11.96	11.96	11.96	15.96	15.96	15.96
Movement LOS	A	A	A	B	B	B	B	B	B	B	B	B
Critical Movement	No	No	No	No	No	Yes	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	7.46			16.90			11.96			15.96		
Approach LOS	A			B			B			B		
d_I, Intersection Delay [s/veh]	14.44											
Intersection LOS	B											
Intersection V/C	0.755											

Option 2: Chrysler Dr/Jefferson Dr: Mitigation Cumulative Plus Project AM_Signal

Number	214					
Intersection	Chrysler Dr/Jefferson Dr					
Control Type	Signalized					
Analysis Method	HCM 6th Edition					
Name	Chrysler Drive		Chrysler Drive		Jefferson Drive	
Approach	Southbound		Northeastbound		Northwestbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Base Volume Input [veh/h]	333	298	135	69	25	107
Total Analysis Volume [veh/h]	429	299	134	115	29	146

Intersection Settings

Cycle Length [s]	70					
Coordination Type	Time of Day Pattern Coordinated					
Actuation Type	Fully actuated					
Lost time [s]	0.00					
Control Type	Permissive	Permissive	Permissive	Permissive	Split	Split
Signal Group	0	8	4	0	2	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-
Minimum Green [s]	0	5	5	0	5	0
Maximum Green [s]	0	30	30	0	30	0
Amber [s]	0.0	3.0	3.0	0.0	3.0	0.0
All red [s]	0.0	1.0	1.0	0.0	1.0	0.0
Split [s]	0	49	49	0	21	0
Walk [s]	0	5	5	0	5	0
Pedestrian Clearance [s]	0	10	10	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall		No	No		No	
Maximum Recall		No	No		No	
Pedestrian Recall		No	No		No	
Pedestrian Signal Group	0					
Pedestrian Walk [s]	0					
Pedestrian Clearance [s]	0					

Lane Group Calculations

g / C, Green / Cycle	0.67	0.67	0.15	0.15
(v / s)_i Volume / Saturation Flow Rate	0.77	0.20	0.02	0.12
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900
Arrival type	3	3	3	
s, saturation flow rate [veh/h]	945	1255	1629	1245
c, Capacity [veh/h]	761	841	246	188
X, volume / capacity	0.96	0.30	0.12	0.78
d, Delay for Lane Group [s/veh]	35.00	3.23	16.64	25.03
Lane Group LOS	D	A	B	C
Critical Lane Group	Yes	No	No	Yes

50th-Percentile Queue Length [veh/ln]	10.26	0.42	0.25	1.66
50th-Percentile Queue Length [ft/ln]	256.49	10.44	6.19	41.47
95th-Percentile Queue Length [veh/ln]	15.51	0.75	0.45	2.99
95th-Percentile Queue Length [ft/ln]	387.82	18.78	11.14	74.65

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	35.00	35.00	3.23	3.23	16.64	25.03
Movement LOS	D	D	A	A	B	C
Critical Movement	Yes	No	No	No	No	No
d_A, Approach Delay [s/veh]	35.00		3.23		23.64	
Approach LOS	D		A		C	
d_I, Intersection Delay [s/veh]	26.41					
Intersection LOS	C					
Intersection V/C	0.888					

Option 1: Bayfront Expy/Marsh Rd: Mitigation Cumulative Plus Project AM

Number	163											
Intersection	Bayfront Expy/Marsh Rd											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name				Marsh Road			Haven Avenue			Bayfront Expressway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	199	49	1832	10	35	8	9	212	385	2677	407	34
Total Analysis Volume [veh/h]	207	51	1921	10	36	8	9	245	401	2801	439	35

Intersection Settings

Cycle Length [s]	160											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	12.00											
Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	2	3	3	6	4	6	4	1	4	8	2	8
Auxiliary Signal Groups		3	2,3									
Lead / Lag	Lag	-	-	-	-	-	Lag	-	-	-	-	-
Minimum Green [s]	10	6	6	0	4	0	4	12	4	0	10	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	4.7	3.6	3.6	0.0	3.6	0.0	3.6	3.6	3.6	0.0	4.7	0.0
All red [s]	1.0	1.0	1.0	0.0	0.5	0.0	0.5	0.0	0.5	0.0	1.0	0.0
Split [s]	82	11	11	0	32	0	32	35	32	0	82	0
Walk [s]	5	0	0	0	5	0	5	5	5	0	5	0
Pedestrian Clearance [s]	16	0	0	0	22	0	22	26	22	0	16	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall		No	No		No			No			Yes	
Maximum Recall		No	No		No			No			No	
Pedestrian Recall		No	No		Yes			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.09	0.60	0.18	0.18	0.18	0.18	0.18	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.14	0.47	0.02	0.02	0.15	0.16	0.16	0.55	0.26
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3	
s, saturation flow rate [veh/h]	1827	4119	1867	1608	1624	1221	1434	5075	1792
c, Capacity [veh/h]	166	2386	340	293	289	217	255	2534	895
X, volume / capacity	1.55	0.81	0.08	0.09	0.83	0.88	0.88	1.11	0.53
d, Delay for Lane Group [s/veh]	347.89	29.43	54.41	54.46	77.40	89.47	86.63	94.11	29.52
Lane Group LOS	F	C	D	D	E	F	F	F	C
Critical Lane Group	Yes	No	No	Yes	No	No	Yes	Yes	No

50th-Percentile Queue Length [veh/ln]	19.59	19.57	0.97	0.88	10.58	9.13	10.53	45.32	13.03
50th-Percentile Queue Length [ft/ln]	489.73	489.28	24.16	21.93	264.51	228.36	263.22	1132.98	325.78
95th-Percentile Queue Length [veh/ln]	30.85	26.83	1.74	1.58	15.91	14.09	15.85	60.99	18.95
95th-Percentile Queue Length [ft/ln]	771.21	670.66	43.49	39.48	397.87	352.28	396.26	1524.85	473.78

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	347.89	347.89	29.43	54.41	54.43	54.46	77.40	78.11	87.81	94.11	29.52	29.52
Movement LOS	F	F	C	D	D	D	E	E	F	F	C	C
Critical Movement	Yes	No	No	No	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	67.13			54.43			84.08			84.76		
Approach LOS	E			D			F			F		
d_I, Intersection Delay [s/veh]	78.19											
Intersection LOS	E											
Intersection V/C	0.936											

Option 1: Bayfront Expy/Chrysler Drive: Mitigation Cumulative Plus Project PM

Number	196					
Intersection	Bayfront Expy/Chrysler Drive					
Control Type	Signalized					
Analysis Method	HCM 6th Edition					
Name	Chrysler Drive		Bayfront Expy		Bayfront Expy	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Base Volume Input [veh/h]	1249	114	2516	167	77	1716
Total Analysis Volume [veh/h]	1274	80	2567	170	68	1793

Intersection Settings

Cycle Length [s]	90					
Coordination Type	Free Running					
Actuation Type	Fully actuated					
Lost time [s]	9.00					
Control Type	Split	Split	Permissive	Permissive	Protected	Permissive
Signal Group	4	0	6	0	5	2
Auxiliary Signal Groups						
Lead / Lag	Lag	-	-	-	Lead	-
Minimum Green [s]	5	0	10	0	5	10
Maximum Green [s]	25	0	50	0	20	50
Amber [s]	4.1	0.0	5.2	0.0	3.6	5.2
All red [s]	0.5	0.0	1.0	0.0	0.5	1.0
Split [s]	0	0	0	0	0	0
Walk [s]	7	0	7	0	0	0
Pedestrian Clearance [s]	26	0	21	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	0.0	2.0	0.0	2.0	2.0
Minimum Recall	No		Yes		No	Yes
Maximum Recall	No		No		No	No
Pedestrian Recall	No		No		No	No
Pedestrian Signal Group	0					
Pedestrian Walk [s]	0					
Pedestrian Clearance [s]	0					

Lane Group Calculations

g / C, Green / Cycle	0.26	0.26	0.53	0.53	0.05	0.62
(v / s)_i Volume / Saturation Flow Rate	0.26	0.26	0.51	0.11	0.04	0.36
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3	
s, saturation flow rate [veh/h]	3464	1773	5061	1569	1810	4975
c, Capacity [veh/h]	916	469	2674	829	90	3092
X, volume / capacity	0.97	0.99	0.96	0.21	0.75	0.58
d, Delay for Lane Group [s/veh]	38.51	70.18	22.57	11.82	49.02	10.66
Lane Group LOS	D	E	C	B	D	B
Critical Lane Group	No	Yes	Yes	No	Yes	No

50th-Percentile Queue Length [veh/ln]	10.48	15.10	15.60	1.69	1.63	5.98
50th-Percentile Queue Length [ft/ln]	262.02	377.57	389.99	42.15	40.72	149.48
95th-Percentile Queue Length [veh/ln]	15.79	21.48	22.08	3.03	2.93	9.99
95th-Percentile Queue Length [ft/ln]	394.76	536.91	551.92	75.86	73.30	249.74

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.03	70.18	22.57	11.82	49.02	10.66
Movement LOS	D	E	C	B	D	B
Critical Movement	No	Yes	No	No	No	No
d_A, Approach Delay [s/veh]	49.38		21.90		12.06	
Approach LOS	D		C		B	
d_I, Intersection Delay [s/veh]	25.07					
Intersection LOS	C					
Intersection V/C	0.892					

Option 1: Chrysler Dr/Constitution Dr: Mitigation Cumulative Plus Project PM

Number	215											
Intersection	Chrysler Dr/Constitution Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive			Chrysler Drive			Constitution Drive			Constitution Drive		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	3	762	147	334	99	35	544	325	82	15	19	283
Total Analysis Volume [veh/h]	2	790	144	334	100	24	480	322	99	14	18	283

Intersection Settings

Cycle Length [s]	90											
Coordination Type	Time of Day Pattern Isolated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	4	0	0	8	0	5	6	0	0	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	0	4	0	4	4	0	0	4	0
Maximum Green [s]	0	26	0	0	46	0	16	26	0	0	21	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	41	0	0	41	0	11	27	0	0	22	0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.41	0.41	0.41	0.41	0.25	0.25	0.25	0.20	0.20
(v / s)_i Volume / Saturation Flow Rate	0.29	0.30	0.62	0.08	0.30	0.19	0.08	0.03	0.20
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3	
s, saturation flow rate [veh/h]	1704	1467	541	1651	1609	1686	1313	1012	1384
c, Capacity [veh/h]	743	605	159	681	410	429	334	202	277
X, volume / capacity	0.68	0.72	2.10	0.18	1.17	0.75	0.30	0.16	1.02
d, Delay for Lane Group [s/veh]	26.93	29.21	556.16	17.40	132.87	35.73	27.54	30.12	86.51
Lane Group LOS	C	C	F	B	F	D	C	C	F
Critical Lane Group	No	No	Yes	No	Yes	No	No	No	Yes

50th-Percentile Queue Length [veh/ln]	9.43	8.47	26.28	1.70	19.95	6.84	1.73	0.59	9.80
50th-Percentile Queue Length [ft/ln]	235.77	211.84	657.05	42.42	498.66	170.98	43.26	14.65	245.09
95th-Percentile Queue Length [veh/ln]	14.47	13.25	46.46	3.05	29.77	11.13	3.11	1.05	15.11
95th-Percentile Queue Length [ft/ln]	361.68	331.19	1161.57	76.35	744.27	278.20	77.86	26.37	377.66

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.93	27.77	29.21	556.16	17.40	17.40	132.87	35.73	27.54	30.12	30.12	86.51
Movement LOS	C	C	C	F	B	B	F	D	C	C	C	F
Critical Movement	No	No	No	Yes	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	27.99			410.29			86.58			80.78		
Approach LOS	C			F			F			F		
d_I, Intersection Delay [s/veh]	121.67											
Intersection LOS	F											
Intersection V/C	1.120											

Option 2: Chrysler Dr/Independence Dr: Mitigation Cumulative Plus Project PM_Signal

Number	213											
Intersection	Chrysler Dr/Independence Dr											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name	Chrysler Drive									Independence Drive		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	41	139	0	1	28	92	2	0	15	316	5	67
Total Analysis Volume [veh/h]	49	176	0	1	46	98	2	0	18	320	6	79

Intersection Settings

Cycle Length [s]	110											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	4	0	0	8	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	5	0	0	5	0	0	5	0	0	5	0
Maximum Green [s]	0	30	0	0	30	0	0	30	0	0	30	0
Amber [s]	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	0	28	0	0	28	0	0	82	0	0	82	0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	10	0	0	10	0	0	10	0	0	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Minimum Recall		No			No			No			No	
Maximum Recall		No			No			No			No	
Pedestrian Recall		No			No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.20	0.20	0.36	0.36
(v / s)_i Volume / Saturation Flow Rate	0.14	0.09	0.01	0.29
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900
Arrival type	3	3	3	3
s, saturation flow rate [veh/h]	1650	1634	1545	1413
c, Capacity [veh/h]	567	522	779	867
X, volume / capacity	0.40	0.28	0.03	0.47
d, Delay for Lane Group [s/veh]	7.24	6.77	3.76	5.39
Lane Group LOS	A	A	A	A
Critical Lane Group	Yes	No	No	Yes

50th-Percentile Queue Length [veh/ln]	0.37	0.23	0.01	0.27
50th-Percentile Queue Length [ft/ln]	9.29	5.66	0.24	6.79
95th-Percentile Queue Length [veh/ln]	0.67	0.41	0.02	0.49
95th-Percentile Queue Length [ft/ln]	16.71	10.19	0.43	12.22

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	7.24	7.24	7.24	6.77	6.77	6.77	3.76	3.76	3.76	5.39	5.39	5.39
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
Critical Movement	No	Yes	No	No	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	7.24			6.77			3.76			5.39		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	6.12											
Intersection LOS	A											
Intersection V/C	0.423											

Option 2: Chrysler Dr/Jefferson Dr: Mitigation Cumulative Plus Project PM_Signal

Number	214					
Intersection	Chrysler Dr/Jefferson Dr					
Control Type	Signalized					
Analysis Method	HCM 6th Edition					
Name			Chrysler Drive		Jefferson Drive	
Approach	Northeastbound		Southwestbound		Northwestbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Base Volume Input [veh/h]	428	185	151	94	23	371
Total Analysis Volume [veh/h]	428	235	207	102	33	541

Intersection Settings

Cycle Length [s]	100					
Coordination Type	Time of Day Pattern Coordinated					
Actuation Type	Fully actuated					
Lost time [s]	0.00					
Control Type	Permissive	Permissive	Permissive	Permissive	Split	Split
Signal Group	4	0	0	8	2	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-
Minimum Green [s]	5	0	0	5	5	0
Maximum Green [s]	30	0	0	30	30	0
Amber [s]	3.0	0.0	0.0	3.0	3.0	0.0
All red [s]	1.0	0.0	0.0	1.0	1.0	0.0
Split [s]	78	0	0	78	22	0
Walk [s]	5	0	0	5	5	0
Pedestrian Clearance [s]	10	0	0	10	10	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	0.0	0.0	2.0	2.0	0.0
Minimum Recall	No			No	No	
Maximum Recall	No			No	No	
Pedestrian Recall	No			No	No	
Pedestrian Signal Group	0					
Pedestrian Walk [s]	0					
Pedestrian Clearance [s]	0					

Lane Group Calculations

g / C, Green / Cycle	0.47	0.47	0.41	0.41
(v / s)_i Volume / Saturation Flow Rate	0.41	0.84	0.02	0.38
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900
Arrival type	3	3	3	
s, saturation flow rate [veh/h]	1599	367	1629	1428
c, Capacity [veh/h]	751	266	660	579
X, volume / capacity	0.88	1.16	0.05	0.94
d, Delay for Lane Group [s/veh]	26.25	130.59	11.57	35.57
Lane Group LOS	C	F	B	D
Critical Lane Group	No	Yes	No	Yes

50th-Percentile Queue Length [veh/ln]	9.69	11.77	0.26	9.47
50th-Percentile Queue Length [ft/ln]	242.36	294.30	6.60	236.80
95th-Percentile Queue Length [veh/ln]	14.80	19.10	0.48	14.52
95th-Percentile Queue Length [ft/ln]	370.01	477.45	11.88	362.98

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	26.25	26.25	130.59	130.59	11.57	35.57
Movement LOS	C	C	F	F	B	D
Critical Movement	No	No	Yes	No	No	No
d_A, Approach Delay [s/veh]	26.25		130.59		34.19	
Approach LOS	C		F		C	
d_I, Intersection Delay [s/veh]	50.05					
Intersection LOS	D					
Intersection V/C	1.222					

Option 1: Bayfront Expy/Marsh Rd: Mitigation Cumulative Plus Project PM

Number	163											
Intersection	Bayfront Expy/Marsh Rd											
Control Type	Signalized											
Analysis Method	HCM 6th Edition											
Name				Marsh Road			Haven Avenue			Bayfront Expressway		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	180	40	2131	16	31	5	9	518	209	2657	132	14
Total Analysis Volume [veh/h]	188	42	2220	17	32	5	9	540	218	2782	166	15

Intersection Settings

Cycle Length [s]	160											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	12.00											
Control Type	Permiss	Permiss	Overlap	Permiss	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	2	3	3	6	4	6	4	1	4	8	2	8
Auxiliary Signal Groups			2,3									
Lead / Lag	Lag	-	-	-	-	-	Lag	-	-	-	-	-
Minimum Green [s]	10	6	6	0	4	0	4	12	4	0	10	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	4.7	3.6	3.6	0.0	3.6	0.0	3.6	3.6	3.6	0.0	4.7	0.0
All red [s]	1.0	1.0	1.0	0.0	0.5	0.0	0.5	0.0	0.5	0.0	1.0	0.0
Split [s]	82	11	11	0	32	0	32	35	32	0	82	0
Walk [s]	5	0	0	0	5	0	5	0	5	0	5	0
Pedestrian Clearance [s]	16	0	0	0	22	0	22	0	22	0	16	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
l1, Start-Up Lost Time [s]	2.0	2.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	0.0	2.0	0.0
Minimum Recall		No	No		No			No			Yes	
Maximum Recall		No	No		No			No			No	
Pedestrian Recall		No	No		No			No			No	
Pedestrian Signal Group	0											
Pedestrian Walk [s]	0											
Pedestrian Clearance [s]	0											

Lane Group Calculations

g / C, Green / Cycle	0.08	0.79	0.04	0.04	0.17	0.17	0.17	0.64	0.64
(v / s)_i Volume / Saturation Flow Rate	0.13	0.53	0.02	0.01	0.15	0.16	0.14	0.54	0.11
so, Base Saturation Flow per Lane [pc/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3		3		3			3	
s, saturation flow rate [veh/h]	1825	4190	1522	1652	1891	1724	1587	5150	1657
c, Capacity [veh/h]	152	3233	101	72	322	293	270	3311	1066
X, volume / capacity	1.51	0.69	0.30	0.33	0.86	0.92	0.81	0.84	0.17
d, Delay for Lane Group [s/veh]	333.66	10.08	75.29	75.29	78.37	89.60	73.53	24.93	11.79
Lane Group LOS	F	B	E	E	E	F	E	C	B
Critical Lane Group	No	Yes	Yes	No	No	Yes	No	Yes	No

50th-Percentile Queue Length [veh/ln]	17.31	11.80	1.23	0.98	12.32	12.89	9.32	26.98	2.74
50th-Percentile Queue Length [ft/ln]	432.74	294.97	30.85	24.57	308.09	322.36	232.91	674.52	68.39
95th-Percentile Queue Length [veh/ln]	27.42	17.43	2.22	1.77	18.08	18.78	14.32	35.50	4.92
95th-Percentile Queue Length [ft/ln]	685.51	435.80	55.53	44.23	452.02	469.58	358.06	887.49	123.11

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	333.66	333.66	10.08	75.29	75.29	75.29	78.37	84.00	73.53	24.93	11.79	11.79
Movement LOS	F	F	B	E	E	E	E	F	E	C	B	B
Critical Movement	Yes	No	No	No	No	No	No	No	No	No	No	No
d_A, Approach Delay [s/veh]	40.46			75.29			80.96			24.13		
Approach LOS	D			E			F			C		
d_I, Intersection Delay [s/veh]	37.98											
Intersection LOS	D											
Intersection V/C	0.939											