

Feasibility Study Report

On Alder Avenue

At State Route 210 Interchange in the City of Rialto

Vicinity Map



Along: Alder Avenue at SR-210

Between: Casmalia Street

And: Renaissance Parkway

This Feasibility Study Report has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.



REGISTERED CIVIL ENGINEER

9/1/2017

DATE

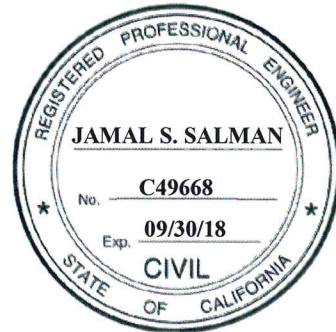


Table of Contents

- 1. INTRODCUTION**
- 2. BACKGROUND**
- 3. PURPOSE AND NEED**
- 4. TRAFFIC ASSESSMENT**
- 5. DEFICIENCIES**
- 6. ALTERNATIVE**
- 7. RIGHT-OF-WAY**
- 8. COST ESTIMATE**
- 9. DELIVERY SCHEDULE**
- 10. ATTACHEMENTS**

1. INTRODUCTION

The Foothill Freeway, State Route 210 (SR-210), is a major east-west transportation route within San Bernardino County and is an integral part of the freeway network for the Southern California metropolitan area. In an effort to improve traffic operations along Alder Avenue, the City of Rialto (City), in cooperation with the California Department of Transportation (Caltrans) District 8, is proposing improvements on Alder Avenue between Casmalia Street and Renaissance Parkway near the State Route 210 interchange (Proposed Project). These improvements are recommended to accommodate projected traffic demand from various development projects, including the new Renaissance Community project, which will use 1,439 acres of land to build a variety of developments, including housing, business, schools, and other projects.

This Feasibility Study Report discusses the proposed roadway improvements at the Alder Avenue and SR-210 Interchange. This area is projected to experience substantial growth from planned development projects. To accommodate this forecasted growth, Alder Avenue will be restriped and widened in certain locations. This study provides the background data needed to evaluate improvements and highlights the proposed project features needed to accommodate the development in the surrounding area.

The proposed improvements will:

- Accommodate projected year (2040) traffic volumes
- Improve existing intersection operation
- Facilitate traffic operations generated from regional growth and new residential and commercial developments within community

2. BACKGROUND

SR-210 is an east-west transportation route within Los Angeles and San Bernardino counties. It connects Los Angeles metropolitan area with southwest San Bernardino County. The west terminus is located at its junction with I-5 in Sylmar. Its east terminus is located at the junction with I-10 in Redlands. SR-210 is a Surface Transportation Assistance Act (STAA) Route for use by oversized trucks. At the location of the Proposed Project, SR-210 is a divided 8-lane freeway. It has three mixed-flow lanes and one High Occupancy Vehicle (HOV) lane in each direction.

Alder Avenue is a north-south arterial in the City of Rialto providing access throughout the City. Per the Renaissance Specific Plan, figure 3-1 Vehicular Circulation Plan, Alder Avenue is identified as a major arterial. Currently, it is a 4-lane divided roadway with left turn pockets, a median, curbs and sidewalks to the north and south of the interchange. Alder Avenue ends at Lake Padden Lane located approximately 3500 feet north of the intersection with the SR-210.

The Proposed Project is in the vicinity of the Alder Avenue overcrossing with westbound (WB) and eastbound (EB) entrance and exit ramps at the SR-210. The Alder Avenue overcrossing (PM R15.93, Bridge Number 54-0649) was built in 2005. The entire structure now measures approximately 92 feet in width and 240 feet in length.

The interchange is currently a Type L-2 spread diamond interchange. The existing ramps terminate at Alder Avenue and the ramps termini are signal controlled. The entrance ramps are metered two-lane facilities, while the exit ramps are single lanes that transition into a dual lane at the interchange. The existing development in the immediate vicinity of the interchange is a gas station. Development to the north and south of the interchange consists mostly of industrial buildings and warehouses.

Alder Avenue at this location is not a bicycle facility, but does have full pedestrian access via sidewalks, crosswalks, and curb ramps.

3. PURPOSE AND NEED

Purpose:

The purpose of the proposed project is to:

- Relieve congestion and improve traffic operations on Alder Avenue between Casmalia Street and Renaissance Parkway near the SR-210 interchange
- Address increased travel associated with existing and planned development anticipated in the City of Rialto, including the Renaissance Community development to the south of SR-210

Need:

The proposed project is needed to address the following deficiencies:

- The forecast increased traffic volumes, due to existing and planned development, in conjunction with deficient left and right-turn storage length from Alder Avenue to SR-210 are expected to result in the deterioration of the traffic operations to level of service F by the design year 2040

4. TRAFFIC ASSESSMENT

A Traffic Operations Analysis has been prepared for the Proposed Project to examine the LOS for expected design year 2040. The analysis of existing conditions was based on the traffic volumes obtained from traffic counts conducted for the Renaissance Specific Plan Amendment Traffic Impact Analysis. Intersection traffic volumes were developed for the design year using the 2040 San Bernardino Transportation Analysis Model (SBTAM). Peak-hour turning movement volumes were developed using raw traffic data from the SBTAM base and future year model runs were post-processed using the National Cooperative Highway Research Program (NCHRP) 255 methodologies. The traffic model was run using a base year of 2012 and a forecast year 2040.

The Traffic Operations Analysis will be used as a reference to support the purpose and need for this Feasibility Study Report. Per the Southern California Association of Governments (SCAG) the Metropolitan Transportation Organization (MPO), guidelines for AM and PM peak hour percentages were factored as the incremental changes in peak hour volumes were developed. Forecast growth between the year 2015 and 2040 ground counts were surmised using an assumed incremental growth in approach and departure volumes between 2012 and 2040. A factor of 0.89 (i.e., 25/28) was used since the desired study period was 25 years of the available 28-year span. This resulted in post-processed 2040 link volumes. While reviewing the SBTAM, it was observed that the model did not include some land uses. To correct this, trips to those projects were added to the 2040 post-processed traffic volumes.

Existing lane geometrics and existing traffic volumes were used to calculate the level of service for existing conditions. The results of the LOS analysis for existing conditions with and without Proposed Project can be found in the table below.

Table 1: Existing Levels of Service

Intersection	LOS Standard	Control	Without Project				With IC Improvements			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 . Alder Avenue(NS)/ Casmalia Street(EW)	D	Signal	33.4	C	28.7	C	23.6	C	20.9	C
2 . Alder Avenue(NS)/ SR-210 WB Ramps(EW)	D	Signal	81.2	F *	31.9	C	11.1	B	10.5	B
3 . Alder Avenue(NS)/ SR-210 EB Ramps(EW)	D	Signal	14.3	B	15.6	B	12.7	B	14.4	B
4 . Alder Avenue(NS)/ Easton St-Renaissance Pkwy(EW)	D	Signal	21.3	C	18.5	B	16.4	B	15.2	B

Notes:

* Exceeds LOS Standard

LOS = Level of Service

Source: Translutions, 2017

Currently, the majority of the examined intersections operate at an acceptable LOS, with the exception being the Alder Ave(NS)/ SR-210 WB Ramps(EW) intersection which operates below standards. As the table shows, implementing the planned improvements will enhance the LOS for existing traffic conditions.

The LOS for design year 2040 was determined using forecast growth from the traffic analysis. The table below shows the LOS for 2040 with and without Proposed Project.

Table 2: Year 2040 Levels of Service

Intersection	LOS Standard	Control	Without Project				With IC Improvements			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 . Alder Avenue(NS)/ Casmalia Street(EW)	D	Signal	69.2	E *	>100	F *	33.6	C	49.3	D
2 . Alder Avenue(NS)/ SR-210 WB Ramps(EW)	D	Signal	93	F *	>100	F *	23.4	C	29.2	C
3 . Alder Avenue(NS)/ SR-210 EB Ramps(EW)	D	Signal	52	D	93.7	F *	17.2	B	15.1	B
4 . Alder Avenue(NS)/ Easton St-Renaissance Pkwy(EW)	D	Signal	70.2	E *	>100	F *	21.9	C	31.2	C

Notes:

* Exceeds LOS Standard

LOS = Level of Service

Source: Translutions, 2017

As Table 2 demonstrates, under design year 2040 conditions, all intersections operate at an unsatisfactory LOS, except for the intersection of Alder/SR-210 Eastbound Ramps, which operates at a LOS of D in the AM peak hour. Construction of the proposed project will alleviate traffic congestions and improve intersection operations to a satisfactory LOS.

A Queue Analysis was performed to determine the intersection movements, that are experiencing and will experience back-up, due to deficiency in storage length. Table 3 and 4 below present the data in the analysis.

Table 3: Queue Analysis for No Improvements

Intersection	Movement	Storage Length (In Feet)	Existing		Year 2040 Without Project	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
			Queue Length ¹	Queue Length ¹	Queue Length ¹	Queue Length ¹
1 . Alder Ave/Casmalia Street	NBL	115	87	121	187	294
	SBL	220	16	42	66	69
	SBR	800	13	0	0	0
	EBL	300	24	31	50	60
	EBR	250	31	74	57	244
	WBL	300	488	271	581	566
	WBR	600	0	0	0	0
2 . Alder Ave/SR-210 Westbound Ramps	NBL	235	227	182	324	572
	WBL	600	185	181	480	546
3 . Alder Ave/SR-210 Eastbound Ramps	SBL	225	79	140	57	119
	EBR	600	53	49	671	623
4 . Alder Ave/Easton St-Renaissance Pkwy	NBL	115	48	47	91	88
	NBR	100	0	0	0	75
	SBL	275	66	14	375	293
	SBR	400	0	0	5	54
	EBL	315	72	63	153	351
	EBR	150	0	13	9	19
	WBL	315	96	81	105	122

Notes:

Bold = Exceeds storage length

¹Queues reported are 95th Percentile queue lengths per movement in feet.

* The NBT queue will be unaffected by the right turn queue as the NBT queue is <50 feet.

Source: Translutions, 2017

In Table 3, under existing conditions, the Alder Ave/Casmalia Street west bound left turn in the AM peak hour and north bound left turn in the PM peak hour experience a

queuing length greater than the available storage length. This will cause back up and congestion in other lanes as well as previous intersections. Furthermore, under design year 2040, conditions for these two turns further deteriorate, and other intersections will experience similar complications.

Table 4: Queue Analysis for Build Alternative

Intersection	Movement	Storage Length (In Feet)	Existing With Project		Year 2040 With Project	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
			Queue Length ¹	Queue Length ¹	Queue Length ¹	Queue Length ¹
1 . Alder Ave/Casmalia Street	NBL	170	39	47	72	103
	NBR	175	83	52	124	113
	SBL	220	23	38	59	69
	SBR	800	0	0	0	0
	EBL	300	22	28	39	60
	EBR	250	33	47	52	243
2 . Alder Ave/SR-210 Westbound Ramps	WBL	300	174	117	202	227
	NBL	260	101	101	39	50
	SBR*	125	0	0	265	289
	WBL	600	82	82	170	197
3 . Alder Ave/SR-210 Eastbound Ramps	NBR	125	1	2	11	74
	SBL	125	73	73	41	88
	EBL	600	167	167	360	354
	EBR	600	45	45	277	247
4 . Alder Ave/Easton St-Renaissance Pkwy	NBL	115	44	43	82	88
	NBR	100	0	0	0	98
	SBL	200	169	13	178	153
	EBL	315	64	57	120	303
	EBR	50	0	0	3	18
	WBL	315	86	74	94	122
	WBR	315	25	0	55	197

Notes:

Bold = Exceeds storage length

¹Queues reported are 95th Percentile queue lengths per movement in feet.

* The NBT queue will be unaffected by the right turn queue as the NBT queue is <50 feet.

Source: Translutions, 2017

With the Build Alternative, for existing conditions no queuing lengths will be greater than storage length, which will improve traffic operation in the area. For future conditions, most queuing lengths will be acceptable, with the only exception being the Alder Ave/SR-210 Westbound Ramps, which will have a greater queuing length in the AM and PM peak hours, than the available storage length.

Per the data analyzed in the Traffic Operations Analysis, improvements must be implemented to Alder Avenue to allow it to function efficiently and safely. Failure to implement these improvements will cause the LOS for the area to deteriorate. This will cause delays and operational challenges in the future.

The proposed improvements will enhance the LOS for the area and allow the intersections mentioned above to function with more efficiency. Furthermore, forecast growth for design year 2040 traffic conditions are regulated to provide a satisfactory LOS.

5. DEFICIENCIES

As illustrated in the Traffic Operations Analysis, the existing roadway system along Alder Avenue does not provide sufficient turning and through movements onto SR-210 and intersections in the immediate vicinity to serve forecasted 2040 travel demands. Due to the construction of new communities, such as the Renaissance Community project, and growth of industry in the area, transportation and economic demand will increase. If this demand is not addressed, traffic operations will continually deteriorate until the LOS for the area reaches an unsatisfactory level. To address this demand, improvements will need to be implemented in a timely manner.

The proposed project satisfies the requirements to accommodate regional growth and improve the LOS. Without the project, conditions will continue to worsen, causing traffic congestion and major delays at most of the intersections along Alder between Casmalia Street and Renaissance Parkway. Furthermore, improvements that are delayed to a later date will experience a higher cost and a complicated construction process due to the growth in the region.

6. ALTERNATIVE

The Build alternative proposes modifications to the existing spread diamond interchange, including improvements to Alder Avenue and the SR-210 ramps through restriping and widening. Improvements include widening southbound Alder Avenue to include a right turn lane onto westbound on-ramp; restriping to add a second left turn lane onto Renaissance Parkway; restriping to add a second left turn lane onto the EB on-ramp; and adding a shared thru lane. Northbound Alder Avenue will also be widened to provide right turn lanes onto Casmalia Street and the eastbound on-ramp. Additionally, northbound Alder Avenue will be restriped to add a second left turn lane onto Casmalia Street. The westbound off-ramp will be widened to provide a second left turn lane, while the eastbound off-ramp will be widened to provide a right turn lane. See attachment A for Build Alternative Plan Layout.

The Build Alternative may require additional right-of-way (ROW) in the form of temporary construction easements. Further analysis will be completed during the next project development phases to determine and document any ROW needs.

The following engineering technical reports are anticipated for the Build Alternative during the PA/ED phase of the Proposed Project:

- Preliminary Drainage Reports to address existing and proposed hydrology and hydraulic designs.
- Preliminary Materials and Geotechnical Reports
- Life-Cycle Cost Analysis for pavement design
- Right of Way Data sheets
- Traffic Forecasting
- Traffic Analyses

- Traffic Management Plan Data Sheets

Table 3: Design Standards Risk Assessment

Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Design Exception Approval (None, Low, Medium, High,)
Standard for Shoulder Width with Gutter Pan HDM Index (308.1)	Medium
Distance Between Ramp intersection and local street intersection HDM Index (504.3)	High

Mandatory Design Exceptions Features:

1. Standard Shoulder Width, HDM Index (308.1) – The HDM requires that if gutter pans are used, the minimum shoulder width shall be 3 feet wider than the gutter pan being used. However, at several areas in the proposed project the shoulder width is 3 feet including the gutter pan. This is due to a potential impact to right-of-way and an increase in cost.
2. Location and Design of Ramp Intersections on the Crossroads, HDM Index (504.3), Distance between ramp intersection and local street intersection – The HDM states that the distance between a ramp intersection and a local street intersection shall be at least 400 ft. Currently, both the north-end and south-end of the project do not meet this requirement. This is an existing condition and changes will require major realignment.

7. RIGHT-OF-WAY**Utilities:**

A list of potential utilities in and around the Proposed project was created using Alder Avenue as-built plans.

<u>Utility</u>	<u>Owner</u>
Cable	AT&T
Electrical	Southern California Edison
Water	Fontana Water Company

To verify whether the utilities listed above are still within limits, a dig alert search will be used. Utility companies will be contacted to provide facility maps.

8. COST ESTIMATE

The preliminary cost estimate for the Proposed Project is included as attachment 1. The table below summarizes the capital outlay cost of the project.

Table 4: Capital Outlay Project Estimate

SUMMARY OF PROJECT COST ESTIMATE		
TOTAL ROADWAY ITEMS		\$2,217,000
TOTAL STRUCTURE ITEMS		\$110,000
SUBTOTAL CONSTRUCTION COSTS		\$2,327,000
TOTAL RIGHT OF WAY ITEMS*		\$0
TOTAL PROJECT CAPITAL OUTLAY COSTS		\$2,327,000

* ROW and Utility Cost not included

Per the guidance in the PDPM Chapter 9, Article 8, it is anticipated that the project will follow the Permit Engineering Evaluation Report (PEER) process since the estimated cost is below \$3M.

9. DELIVERY SCHEDULE

Table 5: Project Schedule

Project Stage	Preliminary Schedule	
	Start	Finish
PEER/PAED	October 2017	August 2018
PS&E	Sep 2018	March 2020
Construction	June 2020	June 2021

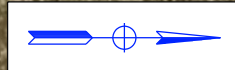
10. ATTACHMENTS (Number of Pages)

- A. Build Alternative Layout Plan (1)
- B. Cost Estimate (5)
- C. Traffic Operations Analysis (12)
- D. Bridge As-built General Plan (1)

Attachment A
Build Alternative Layout Plan

PROPOSED IMPROVEMENTS:

- 1 WIDEN SOUTHBOUND ALDER AVENUE TO PROVIDE RIGHT TURN LANE ONTO WESTBOUND ON-RAMP
- 2 WIDEN NORTHBOUND ALDER AVENUE TO PROVIDE RIGHT TURN LANE ONTO EASTBOUND CASMALIA STREET
- 3 WIDEN WESTBOUND OFF-RAMP TO PROVIDE SECOND LEFT TURN LANE
- 4 RE-STRIPE TO PROVIDE SECOND NORTHBOUND LEFT TURN LANE
- 5 WIDEN EASTBOUND OFF-RAMP TO PROVIDE RIGHT TURN LANE
- 6 WIDEN NORTHBOUND ALDER AVENUE TO PROVIDE RIGHT TURN LANE ONTO EASTBOUND CASMALIA STREET
- 7 RE-STRIPE TO PROVIDE SECOND SOUTHBOUND LEFT TURN LANE
- 8 RE-STRIPE TO PROVIDE SECOND NORTHBOUND LEFT TURN LANE



RENAISSANCE PARKWAY

RENAISSANCE PARKWAY

3' SHOULDER

ALDER AVENUE

3' SHOULDER

3' SHOULDER

EB ON-RAMP

EB SR-210

WB SR-210

WB OFF-RAMP

3' SHOULDER

4

ALDER AVENUE

3' SHOULDER

WB ON-RAMP

3' SHOULDER

1

ALDER AVENUE

3' SHOULDER

3' SHOULDER

8

CASMALIA STREET

CASMALIA STREET

Attachment B
Cost Estimate

PROJECT COST ESTIMATE SUMMARY

PROJECT DESCRIPTION:

Limits	SR-210/Alder Avenue Interchange in the County of San Bernardino
Proposed Improvement (Scope)	The proposed project widens Alder Avenue at several locations at the intersections between Renaissance Parkway and Casmalia Street including SR-210 EB and WB On- and Off-ramps
Alternative	1 (Non-Standard Shoulder Width)

SUMMARY OF PROJECT COST ESTIMATE

TOTAL ROADWAY ITEMS	\$ 2,217,000
TOTAL STRUCTURE ITEMS	\$ 110,000
SUBTOTAL CONSTRUCTION COSTS	\$ 2,327,000
TOTAL RIGHT OF WAY ITEMS	\$ 0
TOTAL PROJECT CAPITAL OUTLAY COSTS	\$ 2,327,000

PROJECT COST ESTIMATE SUMMARY

I. ROADWAY ITEMS

<u>Section 1 Earthwork</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>		<u>Section Cost</u>
Remove Concrete (Curb and Gutter)	1,100	LF	\$	5.00	\$ 5,500
Remove Concrete (Sidewalk And Driveway)	8,800	SF	\$	1.00	\$ 8,800
Roadway Excavation	2,200	CY	\$	20.00	\$ 44,000
Clearing and Grubbing	1	LS	\$	50,000.00	\$ 50,000
Develop Water Supply	1	LS	\$	15,000.00	\$ 15,000
				Subtotal Earthwork	\$ 123,300
<u>Section 2 Pavement Structural Section</u>					
PCC	210	CY	\$	160.00	\$ 33,600
Rubberized Hot Mix Asphalt	120	TON	\$	80.00	\$ 9,600
Hot Mix Asphalt (Type A)	890	TON	\$	70.00	\$ 62,300
Lean Concrete Base	80	CY	\$	90.00	\$ 7,200
Class 2 Aggregate Base	930	CY	\$	25.00	\$ 23,250
Minor Concrete (Curb and Gutter)	70	CY	\$	370.00	\$ 25,900
Minor Concrete (Sidewalk And Driveway)	110	CY	\$	370.00	\$ 40,700
				Subtotal Pavement Structural Section	\$ 202,550
<u>Section 3 Drainage</u>					
Remove Inlet		EA	\$	863.00	\$
Abandon Culvert		EA	\$	1,294.00	\$
Remove Culvert		LF	\$	25.90	\$
Adjust Inlet		EA	\$	1,725.00	\$
Cap Inlet		EA	\$	1,294.00	\$
Remove Reinforced Concrete Box		CY	\$	86.30	\$
Remove Shotcrete Ditch		CY	\$	60.40	\$
Remove Trap Channel		CY	\$	69.00	\$
Class 1 Concrete (Box Culvert)		CY	\$	520.00	\$
Class 1 Concrete (Transition Structure)		CY	\$	604.00	\$
Minor Concrete (Minor Structure) Type G2 Inlet, H=6'		CY	\$	949.00	\$
Minor Concrete (Minor Structure) (Curb Opening Inlet)		CY	\$	1,035.00	\$
Minor Concrete (Minor Structure) (Collar)		CY	\$	1,208.00	\$
Minor Concrete (Minor Structure) (Junction Structure)		CY	\$	1,208.00	\$
Minor Concrete (Minor Structure) (Headwall)		CY	\$	1,294.00	\$
Minor Concrete (Channel Lining)		CY	\$	1,121.00	\$
Bar Reinforcing Steel (Box Culvert)		LB	\$	0.90	\$
Shotcrete Ditch		CY	\$	1,035.00	\$
24" Alternative Pipe Culvert		LF	\$	60.40	\$
36" Alternative Pipe Culvert		LF	\$	112.00	\$
54" Alternative Pipe Culvert		LF	\$	302.00	\$
36" Reinforced Concrete Pipe		LF	\$	259.00	\$
Jacked 24" Reinforced Concrete Pipe		LF	\$	604.00	\$
Jacked 36" Reinforced Concrete Pipe		LF	\$	690.00	\$
24" Alternative Flared End Section		EA	\$	949.00	\$
36" Alternative Pipe Inlet (Use 6' Avg H)		EA	\$	2,160.00	\$
Rock Slope Protection (Facing Method B)		CY	\$	259.00	\$
				Subtotal Drainage	\$ 32,585

PROJECT COST ESTIMATE SUMMARY

Section 4 Specialty Items

Planting/Aesthetics	<u>1</u>	<u>LS</u>	\$ <u>40,000.00</u>	\$ <u>40,000</u>
Storm Water Pollution Prevention Plan (SWPPP)	<u>1</u>	<u>LS</u>	\$ <u>20,000.00</u>	\$ <u>20,000</u>
Prepare SWPPP	<u>1</u>	<u>LS</u>	\$ <u>5,000.00</u>	\$ <u>5,000</u>
Subtotal Specialty Items				\$ <u>65,000</u>

Section 5 Traffic Items

Construction Area Signs	<u>1</u>	<u>LS</u>	\$ <u>50,000.00</u>	\$ <u>50,000</u>
Traffic Delineation Items	<u>1</u>	<u>LS</u>	\$ <u>100,000.00</u>	\$ <u>100,000</u>
Traffic Signals	<u>3</u>	<u>LS</u>	\$ <u>250,000.00</u>	\$ <u>750,000</u>
Roadside Sign	<u>1</u>	<u>LS</u>	\$ <u>20,000.00</u>	\$ <u>20,000</u>
Subtotal Traffic Items				\$ <u>920,000</u>

TOTAL SECTIONS 1 thru 5 \$ 1,343,435

PROJECT COST ESTIMATE SUMMARY

<u>Section 6 Minor Items</u>					<u>Section Cost</u>
Subtotal Sections 1 thru 5	\$ <u>1,343,435</u>	x	10%	= \$ <u>134,344</u>	
	TOTAL MINOR ITEMS				\$ <u>134,344</u>
<u>Section 7 Roadway Mobilization</u>					
Subtotal Sections 1 thru 6	\$ <u>1,477,779</u>	x	10%	= \$ <u>147,778</u>	
	TOTAL ROADWAY MOBILIZATION				\$ <u>147,778</u>
<u>Section 8 Roadway Additions</u>					
Supplemental Work:	\$ <u>1,477,779</u>	x	5%	= \$ <u>73,889</u>	
Subtotal Sections 1 thru 6					\$ <u>73,889</u>
Contingencies:	\$ <u>1,477,779</u>	x	35%	= \$ <u>517,222</u>	
Subtotal Sections 1 thru 6					\$ <u>517,222</u>
	TOTAL ROADWAY ADDITIONS				\$ <u>591,111</u>
	TOTAL ROADWAY ITEMS				\$ <u>2,216,668</u>
	(Subtotal Sections 1 thru 8)				
	USE				\$ <u>2,217,000</u>

Estimate Prepared By _____
Estimate Checked By _____

Phone No. _____
Phone No. _____

Date 5/1/2017
Date _____

PROJECT COST ESTIMATE SUMMARY

II. STRUCTURE ITEMS

	Alder Channel Extension				
Bridge Name					
Structure Type					
Width (out to out) - (ft)	22				
Span Lengths - (ft)	25				
Total Area - (ft ²)	550				
Footing Type (pile/spread)	Spread				
Cost Per ft ² (incl. 10% mobilization, 25 % stage construction, 25% contingency)	\$ 200.00	\$	\$	\$	\$
Bridge Removal	\$	\$	\$	\$	\$
Bridge Retrofit	\$	\$	\$	\$	\$
Ground And Channel Improvements	\$	\$	\$	\$	\$
RCB Extension	\$	\$	\$	\$	\$
Total Cost for Structure	\$ 110,000	\$	\$	\$	\$

Structure Name					
Structure Type					
Avg. Height - (ft)					
Length - (ft)					
Total Area - (ft ²)					
Cost Per ft ² (incl. 10% mobilization and 25% contingency)	\$	\$	\$	\$	\$
Total Cost for Structure	\$	\$	\$	\$	\$

SUBTOTAL STRUCTURES ITEMS \$ 110,000
(Sum of Total Cost for Structures)

Railroad Related Costs:		\$
		\$

SUBTOTAL RAILROAD ITEMS \$

TOTAL STRUCTURES ITEMS \$ 110,000
(Sum of Structures Items plus Railroad Items)
USE \$ 110,000

Estimate Prepared By _____ Phone No. _____ Date 5/1/2017

PROJECT COST ESTIMATE SUMMARY

III. RIGHT OF WAY ITEMS

	Current Value	Escalation Rate/year	Escalated Value
A. Acquisition, including excess lands, damages to remainder(s) and Goodwill	\$ _____	3.0%	\$ _____
B. Utility Relocation	\$ _____	3.0%	\$ _____
C. Relocation Assistance	\$ _____	3.0%	\$ _____
D. Clearance/Demolition	\$ _____	3.0%	\$ _____
E. Title and Escrow Fees	\$ _____	3.0%	\$ _____

TOTAL RIGHT OF WAY \$ _____
(Current Value)

TOTAL RIGHT OF WAY \$ _____
(Escalated Value)

ROUNDED \$ _____

Anticipated Date of Right of Way Certification
(Date to which Values are Escalated)

F. Construction Contract Work

Brief Description of Work:

Right of Way Branch Cost Estimate for Work

\$ _____

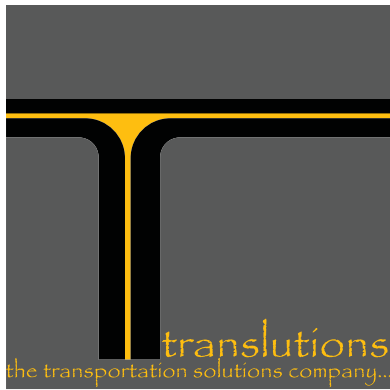
COMMENTS:

Estimate Prepared By _____

Phone No. _____

Date _____

Attachment C
Traffic Operations Analysis



m e m o r a n d u m

DATE: August 29, 2017
TO: Jamal Salman, P.E.
FROM: Sandipan Bhattacharjee, P.E., AICP
SUBJECT: SR-210-Alder Avenue Interchange Feasibility Study Report
Traffic Operations Analysis

Translutions, Inc. (Translutions) is pleased to provide this memorandum discussing the volume development and operations analysis for the Feasibility Study Report for the State Route 210 (SR-210)-Alder Avenue interchange located in the City of Rialto. Since this analysis is part of a feasibility study report, the analysis focuses on the Alder Avenue corridor. Therefore, the following intersections were evaluated:

Intersections

1. Alder Avenue/Casmalia Street;
2. Alder Avenue/SR-210 Westbound Ramps;
3. Alder Avenue/SR-210 Eastbound Ramps; and
4. Alder Avenue/Renaissance Parkway.

VOLUME DEVELOPMENT

Existing Conditions

The analysis of existing conditions was based on the traffic volumes obtained from traffic counts conducted for the Renaissance Specific Plan Amendment Traffic Impact Analysis. The traffic counts are from 2015 and include vehicle classification counts. Figure 1 shows the existing turning volumes during the a.m. and p.m. peak hours at study intersections. Figure 2 shows that existing passenger vehicle volumes, and Figure 3 shows the existing truck traffic volumes. Traffic volumes were converted to PCEs using SBCTA conversion factors and balanced along the corridor. Figure 4 shows the balanced PCE traffic volumes.

Future Volumes: The intersection traffic volumes for design year conditions were developed using the 2040 San Bernardino Transportation Analysis Model (SBTAM) base year and future year model networks. Raw traffic model data from the SBTAM base and future year model runs were post-processed using National Cooperative Highway Research Program (NCHRP) 255 methodologies to develop peak-hour turning movement volumes at each study area intersection. The base year for the traffic model is 2012 and the forecast year is 2040. The difference between the modeled 2012 and 2040 peak period directional arterial traffic volumes (for each intersection approach and departure) was identified from loaded network model plots. This difference defines the growth in traffic over the 28-year period. This incremental growth in peak period approach and departure volumes was factored to develop the incremental change in peak hour volumes. The SBTAM uses a three-hour a.m. peak period and a four-hour p.m. peak period. SCAG, the regional Metropolitan Transportation Organization (MPO) has established that the a.m. peak hour comprises 38 percent of the a.m. peak period and that the p.m. peak hour comprises 28 percent of the p.m. peak period. Therefore, the incremental changes in peak period volumes were multiplied by the appropriate factor to develop incremental changes in peak hour volumes. The incremental growth in approach and departure volumes between 2012 and 2040 was factored to reflect the forecast growth between the year of the ground counts (2015) and 2040. For this purpose, linear growth between 2012 and forecast 2040 (and beyond) was assumed. Since the increment between 2015 and 2040 is 25 years of the 28-year time span, a factor of 0.89 (i.e., 25/28) was used. This forecast growth in approach and departure volumes were added to the 2015 ground counts, resulting in post-processed 2040 link volumes.

Year 2040 intersection turn volumes were developed using existing turn volumes and the future approach and departure volumes, based on the methodologies contained in National Cooperative Highway Research Program Report (NCHRP) 255: Highway Traffic Data for Urbanized Area Project Planning and Design (Transportation Research Board, December 1982).

Upon review of the SBTAM, it was observed that some land uses were not included in the model. Trips for those projects were added to the 2040 post processed traffic volumes.

Year 2040 traffic volumes are shown on Figure 5. Figure 6 shows that year 2040 passenger vehicle volumes, and Figure 7 shows the year 2040 truck traffic volumes. Traffic volumes were converted to PCEs using SBCTA conversion factors and balanced along the corridor. Figure 8 shows the balanced PCE traffic volumes.

OPERATIONS ANALYSIS

Level of service (LOS) is a measure of the quality of operational conditions within a traffic stream, and is generally expressed in terms of such measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Levels range from A to F, with LOS A representing excellent (free-flow) conditions and LOS F representing extreme congestion. The analysis was conducted according to the Highway Capacity Manual 6th Edition (HCM) delay methodologies, which is described in the Highway Capacity Manual (Transportation Research Board, Washington, D.C., December 2016). Under the HCM methodology, LOS for signalized intersections is based on the average delay experienced by vehicles traveling through an intersection. Table A presents a brief description of each level of service letter grade.

Table A: Intersection LOS Criteria

LOS	Description of Drivers' Perception and Traffic Operation	Delay in Seconds	
		Unsignalized	Signalized
A	This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.	≤ 10	≤ 10
B	This level is assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.	> 10 and ≤ 15	> 10 and ≤ 20
C	This level is typically assigned when progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	> 15 and ≤ 25	> 20 and ≤ 35
D	This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.	> 25 and ≤ 35	> 35 and ≤ 55
E	This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	> 35 and ≤ 50	> 55 and ≤ 80
F	This level is typically assigned when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.	> 50	> 80

Source: *Highway Capacity Manual, 2010*

The City of Rialto and Caltrans both endeavor to maintain LOS D as the minimum level of service standard for intersection and interchange operations.

Existing Levels of Service. The levels of service for existing conditions were calculated by using existing lane geometrics and existing traffic volumes. Existing lane geometrics are shown on Figure 9. Under existing conditions, all intersections with the exception of Alder Avenue/Casmalia Street operate at acceptable levels of service. Table B shows the existing LOS at study intersections. Figure 10 shows the lane geometrics with the proposed interchange improvements, as well as improvements identified in the Renaissance Specific Plan Amendment for intersections along Casmalia Street and Renaissance Parkway. With construction of the proposed interchange improvements, all intersections will operate at satisfactory levels of service.

Year 2040 Levels of Service. Under year 2040 conditions, all intersections operate at unsatisfactory levels of service, except the intersection of Alder Avenue/SR-210 Eastbound Ramps. Table C shows the existing LOS at study intersections. With construction of the proposed interchange improvements, and improvements identified in the Renaissance Specific Plan Amendment for Casmalia Street and Renaissance Parkway, all intersections will operate at satisfactory levels of service.

Queuing Analysis. A queuing analysis was conducted to evaluate traffic operations under existing and 2040 conditions. Table D shows the results of this analysis. Under existing conditions, queues exceed available storage space at the intersection of Alder Avenue/Casmalia Street. Under existing plus project conditions all queues are anticipated to fit available storage space. Under Year 2040 without project conditions, all intersections have at least one turning movement where queues are exceeded, blocking through traffic. Under 2040 with project conditions, the southbound right turn queue at the intersection of Alder Avenue/SR-210 Westbound Ramps are forecast to exceed available space – but this will not block through traffic as the through traffic volume is minimal and southbound through queues are minimal (less than 50 feet).



5 / 13	61 / 90	7 / 19	7 / 8
6 / 10	46 / 228	87 / 154	66 / 118
429 / 281	70 / 106	69 / 64	263 / 295

1 Alder Ave/Casmalia Street

477 / 305	135 / 230	73 / 54	4 / 3
202 / 200	346 / 268	301 / 390	

2 Alder Ave/SR-210 Westbound Ramps

297 / 317	42 / 104	207 / 293	1 / 2
291 / 281	413 / 352	232 / 223	

3 Alder Ave/SR-210 Eastbound Ramps

23 / 38	515 / 551	59 / 7	79 / 26
61 / 51	115 / 52	46 / 29	66 / 110
85 / 66	27 / 25	515 / 505	32 / 57

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 1

XXX / YYY AM / PM Volumes



SR-210 At Alder Avenue FSR
Existing Peak Hour Traffic Volumes



1 / 8	35 / 65	2 / 12	2 / 4
45 / 224	71 / 139	64 / 102	40 / 46
234 / 284	401 / 262	63 / 114	

1 Alder Ave/Casmalia Street

392 / 251	114 / 202	54 / 47	3 / 3
198 / 194	324 / 245	239 / 325	

2 Alder Ave/SR-210 Westbound Ramps

287 / 303	22 / 81	148 / 236	1 / 2
276 / 254	392 / 321	216 / 216	

3 Alder Ave/SR-210 Eastbound Ramps

23 / 37	479 / 508	59 / 7	77 / 25
61 / 51	114 / 49	40 / 18	65 / 107
23 / 21	486 / 471	32 / 55	84 / 63

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 2

XXX / YYY AM / PM Volumes

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SR-210 At Alder Avenue FSR
Existing Passenger Vehicles Traffic Volumes



4 / 5	26 / 25	5 / 7	5 / 4
4 / 5	1 / 4	16 / 15	3 / 4
28 / 19	6 / 4	29 / 18	29 / 11

1 Alder Ave/Casmalia Street

91 / 54	24 / 28	23 / 7
1 / 0	4 / 6	22 / 23
85 / 65		

2 Alder Ave/SR-210 Westbound Ramps

12 / 14	21 / 23	
74 / 57	18 / 27	33 / 31
18 / 7		

3 Alder Ave/SR-210 Eastbound Ramps

2 / 1	40 / 43	2 / 1
2 / 3	6 / 11	3 / 3
4 / 4	43 / 34	2 / 3
0 / 2		

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 3

XXX / YYY AM / PM Volumes

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SR-210 At Alder Avenue FSR
Existing Truck Traffic Volumes



11 / 19	116 / 141	14 / 28	13 / 14
12 / 18	47 / 233	127 / 195	70 / 123
529 / 341	80 / 121	112 / 97	309 / 331

1 Alder Ave/Casmalia Street

605 / 402	167 / 275	96 / 62
6 / 3	204 / 208	375 / 304
406 / 487		

2 Alder Ave/SR-210 Westbound Ramps

301 / 343	70 / 140	320 / 388
1 / 2	461 / 403	248 / 231
315 / 310		

3 Alder Ave/SR-210 Eastbound Ramps

22 / 40	538 / 606	56 / 7	82 / 28
62 / 51	117 / 57	57 / 49	68 / 113
35 / 33	565 / 555	32 / 60	87 / 71

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 4

XXX / YYY AM / PM Volumes



SR-210 At Alder Avenue FSR
Existing Peak Hour Traffic Volumes (Balanced, in PCEs)



19 / 24	242 / 293	26 / 38	29 / 27
18 / 26	99 / 197	140 / 330	76 / 111
519 / 463	163 / 222	283 / 281	521 / 471

1 Alder Ave/Casmalia Street

600 / 665	337 / 504	162 / 111
477 / 467	434 / 636	784 / 808

2 Alder Ave/SR-210 Westbound Ramps

763 / 815	54 / 147	463 / 395
1 / 2	695 / 598	728 / 1036
299 / 514		

3 Alder Ave/SR-210 Eastbound Ramps

117 / 242	902 / 788	442 / 322	200 / 425
125 / 256	386 / 508	58 / 52	235 / 501
63 / 59	713 / 871	68 / 208	94 / 106

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 5

XXX / YYY AM / PM Volumes



SR-210 At Alder Avenue FSR
Year 2040 Peak Hour Traffic Volumes



4 / 15	139 / 212	7 / 24	8 / 13
6 / 13	97 / 194	114 / 298	73 / 107
485 / 432	149 / 214	164 / 202	464 / 453

1 Alder Ave/Casmalia Street

493 / 547	285 / 443	120 / 97	3 / 4
468 / 453	406 / 581	623 / 673	

2 Alder Ave/SR-210 Westbound Ramps

737 / 779	28 / 114		
331 / 318	1 / 2	659 / 541	691 / 945
			278 / 498

3 Alder Ave/SR-210 Eastbound Ramps

117 / 236	839 / 727	442 / 322	195 / 409
125 / 256	383 / 479	50 / 32	231 / 487
			93 / 101
			54 / 50
			673 / 812
			68 / 201

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 6

XXX / YYY AM / PM Volumes



SR-210 At Alder Avenue FSR
Year 2040 Passenger Vehicle Traffic Volumes



15 / 9	103 / 81	19 / 14	21 / 14
12 / 13	2 / 3	26 / 32	3 / 4
34 / 31	14 / 8	119 / 79	57 / 18

1 Alder Ave/Casmalia Street

107 / 118	52 / 61	42 / 14
1 / 0	9 / 14	28 / 55
161 / 135		

2 Alder Ave/SR-210 Westbound Ramps

26 / 36	26 / 33	132 / 77
36 / 57	37 / 91	21 / 16

3 Alder Ave/SR-210 Eastbound Ramps

0 / 6	63 / 61	5 / 16
3 / 29	8 / 20	4 / 14
9 / 9	40 / 59	1 / 5
0 / 7		

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 7

XXX / YYY AM / PM Volumes

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SR-210 At Alder Avenue FSR
Year 2040 Truck Traffic Volumes



42 / 35	414 / 472	53 / 56	54 / 48
36 / 47	101 / 201	185 / 429	80 / 116
577 / 579	188 / 237	465 / 402	617 / 497

1 Alder Ave/Casmalia Street

761 / 877	416 / 602	213 / 127
6 / 4	482 / 486	471 / 722
1057 / 1009		

2 Alder Ave/SR-210 Westbound Ramps

804 / 888	94 / 200	
715 / 530	1 / 2	813 / 1201
753 / 659		320 / 532

3 Alder Ave/SR-210 Eastbound Ramps

117 / 274	997 / 926	443 / 347	211 / 475
130 / 266	392 / 556	73 / 88	243 / 515
81 / 77	792 / 993	68 / 219	96 / 114

4 Alder Ave/Easton St-Renaissance Pkwy

FIGURE 8

XXX / YYY AM / PM Volumes



SR-210 At Alder Avenue FSR
Year 2040 Peak Hour Traffic Volumes (Balanced, in PCEs)

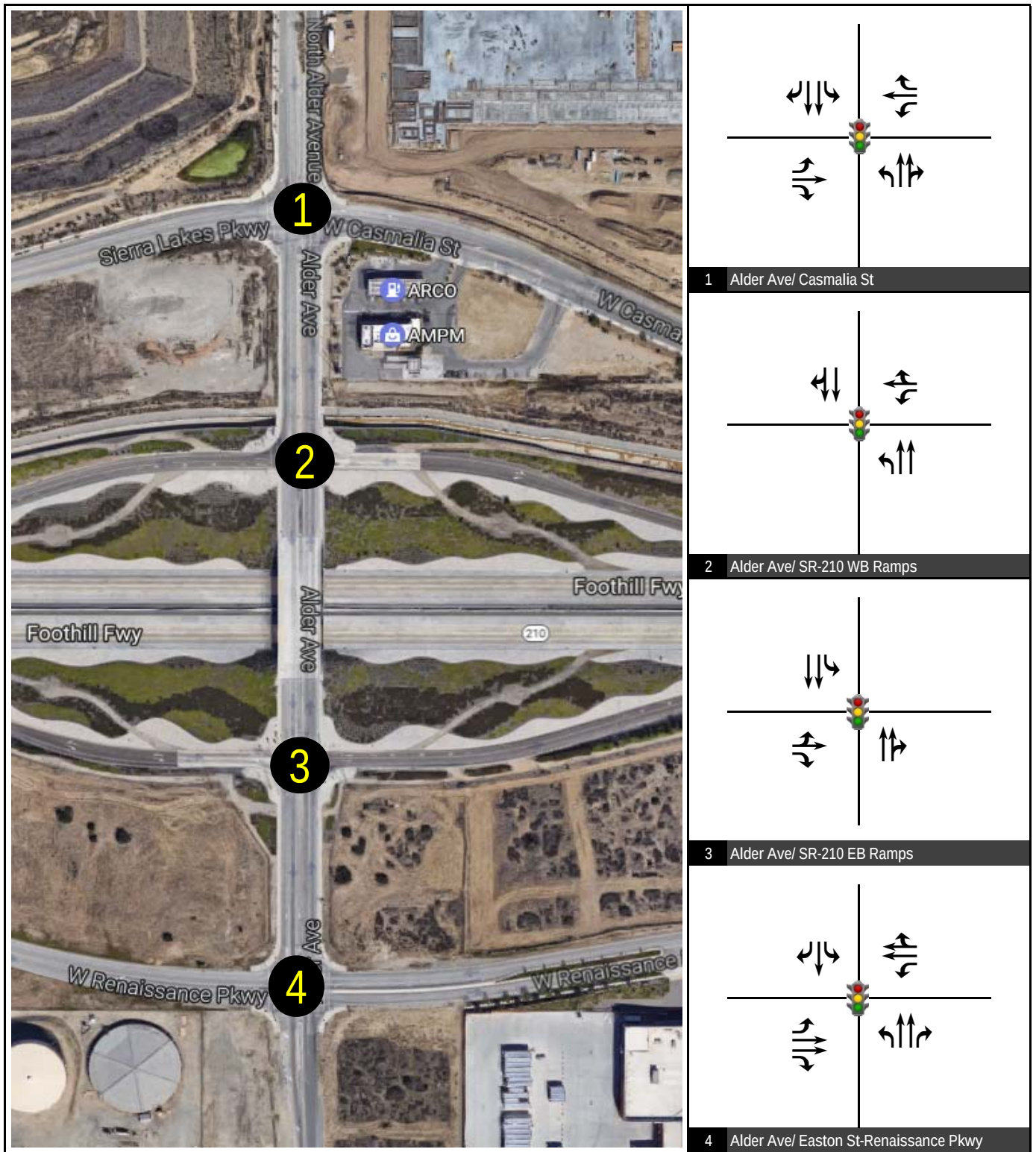


FIGURE 9

Legend



Signal

○ RT Overlap



Stop Sign

d Defacto right turn

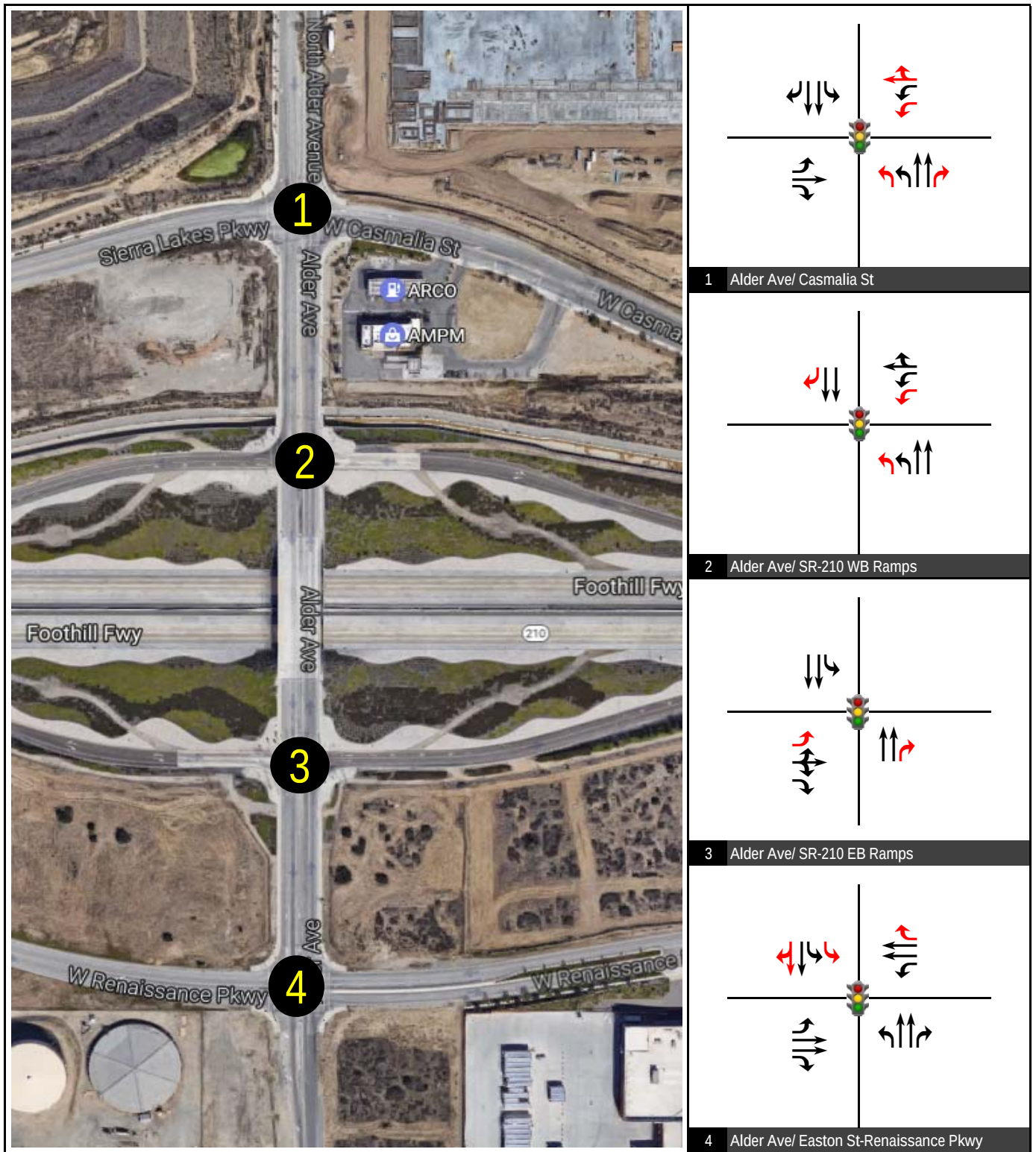


FIGURE 10

Legend



Signal

○ RT Overlap



Stop Sign

d Defacto right turn



Changed Geometrics

Table B: Existing Levels of Service

Intersection	LOS Standard	Control	Without Project				With IC Improvements			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 . Alder Avenue(NS)/ Casmalia Street(EW)	D	Signal	33.4	C	28.7	C	23.6	C	20.9	C
2 . Alder Avenue(NS)/ SR-210 WB Ramps(EW)	D	Signal	81.2	F *	31.9	C	11.1	B	10.5	B
3 . Alder Avenue(NS)/ SR-210 EB Ramps(EW)	D	Signal	14.3	B	15.6	B	12.7	B	14.4	B
4 . Alder Avenue(NS)/ Easton St-Renaissance Pkwy(EW)	D	Signal	21.3	C	18.5	B	16.4	B	15.2	B

Notes:

* Exceeds LOS Standard

LOS = Level of Service

Table C: Year 2040 Levels of Service

Intersection	LOS Standard	Control	Without Project				With IC Improvements			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 . Alder Avenue(NS)/ Casmalia Street(EW)	D	Signal	69.2	E *	>100	F *	33.6	C	49.3	D
2 . Alder Avenue(NS)/ SR-210 WB Ramps(EW)	D	Signal	93	F *	>100	F *	23.4	C	29.2	C
3 . Alder Avenue(NS)/ SR-210 EB Ramps(EW)	D	Signal	52	D	93.7	F *	17.2	B	15.1	B
4 . Alder Avenue(NS)/ Easton St-Renaissance Pkwy(EW)	D	Signal	70.2	E *	>100	F *	21.9	C	31.2	C

Notes:

* Exceeds LOS Standard

LOS = Level of Service

Table D: Queue Analysis

Intersection	Movement	Storage Length (In Feet)	Existing		Year 2040 Without Project	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
			Queue Length ¹	Queue Length ¹	Queue Length ¹	Queue Length ¹
1 . Alder Ave/Casmalia Street	NBL	115	87	121	187	294
	SBL	220	16	42	66	69
	SBR	800	13	0	0	0
	EBL	300	24	31	50	60
	EBR	250	31	74	57	244
	WBL	300	488	271	581	566
	WBR	600	0	0	0	0
2 . Alder Ave/SR-210 Westbound Ramps	NBL	235	227	182	324	572
	WBL	600	185	181	480	546
3 . Alder Ave/SR-210 Eastbound Ramps	SBL	225	79	140	57	119
	EBR	600	53	49	671	623
4 . Alder Ave/Easton St-Renaissance Pkwy	NBL	115	48	47	91	88
	NBR	100	0	0	0	75
	SBL	275	66	14	375	293
	SBR	400	0	0	5	54
	EBL	315	72	63	153	351
	EBR	150	0	13	9	19
	WBL	315	96	81	105	122

Intersection	Movement	Storage Length (In Feet)	Existing With Project		Year 2040 With Project	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
			Queue Length ¹	Queue Length ¹	Queue Length ¹	Queue Length ¹
1 . Alder Ave/Casmalia Street	NBL	170	39	47	72	103
	NBR	175	83	52	124	113
	SBL	220	23	38	59	69
	SBR	800	0	0	0	0
	EBL	300	22	28	39	60
	EBR	250	33	47	52	243
	WBL	300	174	117	202	227
2 . Alder Ave/SR-210 Westbound Ramps	NBL	260	101	101	39	50
	SBR*	125	0	0	265	289
	WBL	600	82	82	170	197
3 . Alder Ave/SR-210 Eastbound Ramps	NBR	125	1	2	11	74
	SBL	125	73	73	41	88
	EBL	600	167	167	360	354
	EBR	600	45	45	277	247
4 . Alder Ave/Easton St-Renaissance Pkwy	NBL	115	44	43	82	88
	NBR	100	0	0	0	98
	SBL	200	169	13	178	153
	EBL	315	64	57	120	303
	EBR	50	0	0	3	18
	WBL	315	86	74	94	122
	WBR	315	25	0	55	197

Notes:

Bold = Exceeds storage length

¹Queues reported are 95th Percentile queue lengths per movement in feet.

* The NBT queue will be unaffected by the right turn queue as the NBT queue is <50 feet.

Existing and Year 2040 Traffic Volumes

AM Peak Hour							PM Peak Hour					
	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE
1 Alder Ave/Casmalia Street												
NBL	70	64	0	5	1	80	106	102	0	1	3	114
NBT	69	40	4	18	7	112	64	46	3	7	8	92
NBR	263	234	3	17	9	308	295	284	1	6	4	313
SBL	7	2	2	1	2	14	19	12	3	2	2	28
SBT	61	35	1	15	10	104	90	65	3	13	9	129
SBR	5	1	1	2	1	11	13	8	2	2	1	19
EBL	6	2	1	2	1	12	10	5	1	2	2	18
EBT	46	45	1	0	0	47	228	224	2	1	1	233
EBR	87	71	0	10	6	114	154	139	1	10	4	178
WBL	429	401	2	16	10	474	281	262	1	11	7	312
WBT	66	63	1	2	0	70	118	114	2	1	1	123
WBR	7	2	2	2	1	13	8	4	1	2	1	14
North Leg												
Approach	73	38	4	18	13	129	122	85	8	17	12	176
Departure	82	44	7	22	9	137	82	55	5	11	11	124
Total	155	82	11	40	22	266	204	140	13	28	23	300
South Leg												
Approach	402	338	7	40	17	500	465	432	4	14	15	519
Departure	577	507	3	41	26	692	525	466	5	34	20	619
Total	979	845	10	81	43	1,192	990	898	9	48	35	1,138
East Leg												
Approach	502	466	5	20	11	557	407	380	4	14	9	449
Departure	316	281	6	18	11	369	542	520	6	9	7	574
Total	818	747	11	38	22	926	949	900	10	23	16	1,023
West Leg												
Approach	139	118	2	12	7	173	392	368	4	13	7	429
Departure	141	128	2	9	2	161	237	224	4	4	5	256
Total	280	246	4	21	9	334	629	592	8	17	12	685
Total Approaches												
Approach	1,116	960	18	90	48	1,359	1,386	1,265	20	58	43	1,573
Departure	1,116	960	18	90	48	1,359	1,386	1,265	20	58	43	1,573
Total	2,232	1,920	36	180	96	2,718	2,772	2,530	40	116	86	3,146

Existing and Year 2040 Traffic Volumes

AM Peak Hour							PM Peak Hour					
	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE
2 Alder Ave/SR-210 Westbound Ramps												
NBL	346	324	9	4	9	375	268	245	6	3	14	304
NBT	301	239	13	0	49	406	390	325	18	12	35	487
NBR	0	0	0	0	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0	0	0	0	0
SBT	135	114	7	0	14	167	230	202	7	1	20	275
SBR	477	392	28	0	57	605	305	251	6	5	43	402
EBL	0	0	0	0	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0	0	0	0	0
WBL	202	198	4	0	0	204	200	194	3	0	3	208
WBT	4	3	0	0	1	6	3	3	0	0	0	3
WBR	73	54	10	0	9	96	54	47	4	0	3	62
North Leg												
Approach	612	506	35	0	71	772	535	453	13	6	63	677
Departure	374	293	23	0	58	502	444	372	22	12	38	549
Total	986	799	58	0	129	1,274	979	825	35	18	101	1,226
South Leg												
Approach	647	563	22	4	58	781	658	570	24	15	49	791
Departure	337	312	11	0	14	371	430	396	10	1	23	483
Total	984	875	33	4	72	1,152	1,088	966	34	16	72	1,274
East Leg												
Approach	279	255	14	0	10	306	257	244	7	0	6	273
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	279	255	14	0	10	306	257	244	7	0	6	273
West Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	827	719	37	4	67	986	576	499	12	8	57	709
Total	827	719	37	4	67	986	576	499	12	8	57	709
Total Approaches												
Approach	1,538	1,324	71	4	139	1,859	1,450	1,267	44	21	118	1,741
Departure	1,538	1,324	71	4	139	1,859	1,450	1,267	44	21	118	1,741
Total	3,076	2,648	142	8	278	3,718	2,900	2,534	88	42	236	3,482

Existing and Year 2040 Traffic Volumes

	AM Peak Hour						PM Peak Hour					
	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE
3 Alder Ave/SR-210 Eastbound Ramps												
NBL	0	0	0	0	0	0	0	0	0	0	0	0
NBT	413	392	6	0	15	446	352	321	10	5	16	397
NBR	232	216	11	0	5	248	223	216	4	0	3	231
SBL	42	22	7	0	13	72	104	81	7	1	15	139
SBT	297	287	5	0	5	310	317	303	2	2	10	341
SBR	0	0	0	0	0	0	0	0	0	0	0	0
EBL	207	148	11	0	48	309	293	236	14	8	35	382
EBT	1	1	0	0	0	1	2	2	0	0	0	2
EBR	291	276	4	0	11	315	281	254	15	5	7	310
WBL	0	0	0	0	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0	0	0	0	0
North Leg												
Approach	339	309	12	0	18	382	421	384	9	3	25	480
Departure	620	540	17	0	63	755	645	557	24	13	51	779
Total	959	849	29	0	81	1,137	1,066	941	33	16	76	1,259
South Leg												
Approach	645	608	17	0	20	694	575	537	14	5	19	628
Departure	588	563	9	0	16	625	598	557	17	7	17	651
Total	1,233	1,171	26	0	36	1,319	1,173	1,094	31	12	36	1,279
East Leg												
Approach	0	0	0	0	0	0	0	0	0	0	0	0
Departure	275	239	18	0	18	321	329	299	11	1	18	372
Total	275	239	18	0	18	321	329	299	11	1	18	372
West Leg												
Approach	499	425	15	0	59	625	576	492	29	13	42	694
Departure	0	0	0	0	0	0	0	0	0	0	0	0
Total	499	425	15	0	59	625	576	492	29	13	42	694
Total Approaches												
Approach	1,483	1,342	44	0	97	1,701	1,572	1,413	52	21	86	1,802
Departure	1,483	1,342	44	0	97	1,701	1,572	1,413	52	21	86	1,802
Total	2,966	2,684	88	0	194	3,402	3,144	2,826	104	42	172	3,604

Existing and Year 2040 Traffic Volumes

	AM Peak Hour						PM Peak Hour					
	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE	Existing Total	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	Total PCE
4 Alder Ave/Easton St-Renaissance Pkwy												
NBL	27	23	0	1	3	35	25	21	0	0	4	33
NBT	515	486	15	0	14	551	505	471	11	6	17	554
NBR	32	32	0	0	0	32	57	55	1	0	1	60
SBL	59	59	0	0	0	59	7	7	0	0	0	7
SBT	515	479	13	0	23	568	551	508	21	7	15	602
SBR	23	23	0	0	0	23	38	37	0	0	1	40
EBL	61	61	0	0	0	61	51	51	0	0	0	51
EBT	115	114	0	0	1	117	52	49	0	3	0	57
EBR	46	40	1	0	5	57	29	18	1	1	9	49
WBL	85	84	0	0	1	87	66	63	0	3	0	71
WBT	66	65	0	0	1	68	110	107	2	1	0	113
WBR	79	77	2	0	0	80	26	25	0	0	1	28
North Leg												
Approach	597	561	13	0	23	650	596	552	21	7	16	649
Departure	655	624	17	0	14	692	582	547	11	6	18	633
Total	1,252	1,185	30	0	37	1,342	1,178	1,099	32	13	34	1,282
South Leg												
Approach	574	541	15	1	17	618	587	547	12	6	22	647
Departure	646	603	14	0	29	712	646	589	22	11	24	722
Total	1,220	1,144	29	1	46	1,330	1,233	1,136	34	17	46	1,369
East Leg												
Approach	230	226	2	0	2	235	202	195	2	4	1	212
Departure	206	205	0	0	1	208	116	111	1	3	1	124
Total	436	431	2	0	3	443	318	306	3	7	2	336
West Leg												
Approach	222	215	1	0	6	235	132	118	1	4	9	157
Departure	116	111	0	1	4	126	173	165	2	1	5	186
Total	338	326	1	1	10	361	305	283	3	5	14	343
Total Approaches												
Approach	1,623	1,543	31	1	48	1,738	1,517	1,412	36	21	48	1,665
Departure	1,623	1,543	31	1	48	1,738	1,517	1,412	36	21	48	1,665
Total	3,246	3,086	62	2	96	3,476	3,034	2,824	72	42	96	3,330

Existing Truck Percentage & PCE Factor Calculations

	AM Peak Hour						PM Peak Hour					
	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %
1 Alder Ave/Casmalia Street												
NBL	64	0	5	1	2.67	9%	102	0	1	3	3.00	4%
NBT	40	4	18	7	2.48	42%	46	3	7	8	2.56	28%
NBR	234	3	17	9	2.55	11%	284	1	6	4	2.64	4%
SBL	2	2	1	2	2.40	71%	12	3	2	2	2.29	37%
SBT	35	1	15	10	2.65	43%	65	3	13	9	2.56	28%
SBR	1	1	2	1	2.50	80%	8	2	2	1	2.20	38%
EBL	2	1	2	1	2.50	67%	5	1	2	2	2.60	50%
EBT	45	1	0	0	2.00	2%	224	2	1	1	2.25	2%
EBR	71	0	10	6	2.69	18%	139	1	10	4	2.60	10%
WBL	401	2	16	10	2.61	7%	262	1	11	7	2.63	7%
WBT	63	1	2	0	2.33	5%	114	2	1	1	2.25	3%
WBR	2	2	2	1	2.20	71%	4	1	2	1	2.50	50%
North Leg												
Approach	38	4	18	13			85	8	17	12		
Departure	44	7	22	9			55	5	11	11		
Total	82	11	40	22			140	13	28	23		
South Leg												
Approach	338	7	40	17			432	4	14	15		
Departure	507	3	41	26			466	5	34	20		
Total	845	10	81	43			898	9	48	35		
East Leg												
Approach	466	5	20	11			380	4	14	9		
Departure	281	6	18	11			520	6	9	7		
Total	747	11	38	22			900	10	23	16		
West Leg												
Approach	118	2	12	7			368	4	13	7		
Departure	128	2	9	2			224	4	4	5		
Total	246	4	21	9			592	8	17	12		
Total Approaches												
Approach	960	18	90	48			1,265	20	58	43		
Departure	960	18	90	48			1,265	20	58	43		
Total	1,920	36	180	96			2,530	40	116	86		

Existing Truck Percentage & PCE Factor Calculations

	AM Peak Hour						PM Peak Hour					
	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %
2 Alder Ave/SR-210 Westbound Ramps												
NBL	324	9	4	9	2.32	6%	245	6	3	14	2.57	9%
NBT	239	13	0	49	2.69	21%	325	18	12	35	2.49	17%
NBR	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
SBL	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
SBT	114	7	0	14	2.52	16%	202	7	1	20	2.61	12%
SBR	392	28	0	57	2.51	18%	251	6	5	43	2.80	18%
EBL	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
EBT	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
EBR	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
WBL	198	4	0	0	1.50	2%	194	3	0	3	2.33	3%
WBT	3	0	0	1	3.00	25%	3	0	0	0	0.00	0%
WBR	54	10	0	9	2.21	26%	47	4	0	3	2.14	13%
North Leg												
Approach	506	35	0	71			453	13	6	63		
Departure	293	23	0	58			372	22	12	38		
Total	799	58	0	129			825	35	18	101		
South Leg												
Approach	563	22	4	58			570	24	15	49		
Departure	312	11	0	14			396	10	1	23		
Total	875	33	4	72			966	34	16	72		
East Leg												
Approach	255	14	0	10			244	7	0	6		
Departure	0	0	0	0			0	0	0	0		
Total	255	14	0	10			244	7	0	6		
West Leg												
Approach	0	0	0	0			0	0	0	0		
Departure	719	37	4	67			499	12	8	57		
Total	719	37	4	67			499	12	8	57		
Total Approaches												
Approach	1,324	71	4	139			1,267	44	21	118		
Departure	1,324	71	4	139			1,267	44	21	118		
Total	2,648	142	8	278			2,534	88	42	236		

Existing Truck Percentage & PCE Factor Calculations

	AM Peak Hour						PM Peak Hour					
	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %
3 Alder Ave/SR-210 Eastbound Ramps												
NBL	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
NBT	392	6	0	15	2.57	5%	321	10	5	16	2.45	9%
NBR	216	11	0	5	2.00	7%	216	4	0	3	2.14	3%
SBL	22	7	0	13	2.50	48%	81	7	1	15	2.52	22%
SBT	287	5	0	5	2.30	3%	303	2	2	10	2.71	4%
SBR	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
EBL	148	11	0	48	2.73	29%	236	14	8	35	2.56	19%
EBT	1	0	0	0	0.00	0%	2	0	0	0	0.00	0%
EBR	276	4	0	11	2.60	5%	254	15	5	7	2.07	10%
WBL	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
WBT	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
WBR	0	0	0	0	0.00	0%	0	0	0	0	0.00	0%
North Leg												
Approach	309	12	0	18			384	9	3	25		
Departure	540	17	0	63			557	24	13	51		
Total	849	29	0	81			941	33	16	76		
South Leg												
Approach	608	17	0	20			537	14	5	19		
Departure	563	9	0	16			557	17	7	17		
Total	1,171	26	0	36			1,094	31	12	36		
East Leg												
Approach	0	0	0	0			0	0	0	0		
Departure	239	18	0	18			299	11	1	18		
Total	239	18	0	18			299	11	1	18		
West Leg												
Approach	425	15	0	59			492	29	13	42		
Departure	0	0	0	0			0	0	0	0		
Total	425	15	0	59			492	29	13	42		
Total Approaches												
Approach	1,342	44	0	97			1,413	52	21	86		
Departure	1,342	44	0	97			1,413	52	21	86		
Total	2,684	88	0	194			2,826	104	42	172		

Existing Truck Percentage & PCE Factor Calculations

	AM Peak Hour						PM Peak Hour					
	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %	Existing Auto	2-Axle Trucks	3-Axle Trucks	4-Axle Trucks	TPCE Factor	Truck %
4 Alder Ave/Easton St-Renaissance Pkwy												
NBL	23	0	1	3	3.00	15%	21	0	0	4	3.00	16%
NBT	486	15	0	14	2.24	6%	471	11	6	17	2.44	7%
NBR	32	0	0	0	0.00	0%	55	1	0	1	2.50	4%
SBL	59	0	0	0	0.00	0%	7	0	0	0	0.00	0%
SBT	479	13	0	23	2.47	7%	508	21	7	15	2.19	8%
SBR	23	0	0	0	0.00	0%	37	0	0	1	3.00	3%
EBL	61	0	0	0	0.00	0%	51	0	0	0	0.00	0%
EBT	114	0	0	1	3.00	1%	49	0	3	0	2.67	6%
EBR	40	1	0	5	2.83	13%	18	1	1	9	2.82	38%
WBL	84	0	0	1	3.00	1%	63	0	3	0	2.67	5%
WBT	65	0	0	1	3.00	2%	107	2	1	0	2.00	3%
WBR	77	2	0	0	1.50	3%	25	0	0	1	3.00	4%
North Leg												
Approach	561	13	0	23			552	21	7	16		
Departure	624	17	0	14			547	11	6	18		
Total	1,185	30	0	37			1,099	32	13	34		
South Leg												
Approach	541	15	1	17			547	12	6	22		
Departure	603	14	0	29			589	22	11	24		
Total	1,144	29	1	46			1,136	34	17	46		
East Leg												
Approach	226	2	0	2			195	2	4	1		
Departure	205	0	0	1			111	1	3	1		
Total	431	2	0	3			306	3	7	2		
West Leg												
Approach	215	1	0	6			118	1	4	9		
Departure	111	0	1	4			165	2	1	5		
Total	326	1	1	10			283	3	5	14		
Total Approaches												
Approach	1,543	31	1	48			1,412	36	21	48		
Departure	1,543	31	1	48			1,412	36	21	48		
Total	3,086	62	2	96			2,824	72	42	96		

Table B-7
Forecast Peak Hour Link Volume Worksheet
Year 2040 Link Volumes

2014				Base Year Link Volume	Base Yr. Modeled Pk. Period Volume	Fut. Yr. Modeled Pk. Period Volume	Base to Future Year Pk. Period Change	Base to Future Year Pk. Hr. Change	"New" Link Volume ¹	2035 Link Volume
Volume				Volume	Volume	Volume	Change	Change	Volume	Volume
1 Alder Ave/Casmalia Street										
AM Peak Hour										
Northbound	Left	70	Approach	402	506	1,180	674	256	238	640
	Through	69	Departure	577	578	1,120	542	206	191	768
	Right	263								
Southbound	Left	7	Approach	73	390	914	524	199	185	258
	Through	61	Departure	82	403	1,005	602	229	212	294
	Right	5								
Eastbound	Left	6	Approach	139	21	34	13	5	5	144
	Through	46	Departure	141	0	25	25	10	9	150
	Right	87								
Westbound	Left	429	Approach	502	190	228	38	14	13	515
	Through	66	Departure	316	126	204	78	30	28	344
	Right	7								
PM Peak Hour										
Northbound	Left	106	Approach	465	765	2,029	1,264	354	329	794
	Through	64	Departure	525	702	2,127	1,425	399	371	896
	Right	295								
Southbound	Left	19	Approach	122	918	1,632	714	200	186	308
	Through	90	Departure	82	1,032	1,857	825	231	215	297
	Right	13								
Eastbound	Left	10	Approach	392	59	215	156	44	41	433
	Through	228	Departure	237	3	99	96	27	25	262
	Right	154								
Westbound	Left	281	Approach	407	277	525	248	69	64	471
	Through	118	Departure	542	283	318	35	10	9	551
	Right	8								

¹ Modeled base year (2012) to modeled future year (2040) conditions represent 28 years of traffic growth. Since it is 26 years from 2014 (base count conditions) to 2040, the 'new link volume' represents 92.86% of the modeled growth.

Table B-7
Forecast Peak Hour Link Volume Worksheet
Year 2040 Link Volumes

		2014		Base	Base Yr.	Fut. Yr.	Base to	Base to	"New"	2035
		Volume		Year	Modeled	Modeled	Future Year	Future Year	Link	Link
				Link	Pk. Period	Pk. Period	Pk. Period	Pk. Hr.	Volume ¹	Volume
				Volume	Volume	Volume	Change	Change		

2 Alder Ave/SR-210 Westbound Ramps

AM Peak Hour

Northbound	Left	346	Approach	647	1,044	1,693	649	247	229	876
	Through	301	Departure	337	504	1,191	687	261	242	579
	Right	0								
Southbound	Left	0	Approach	612	578	1,120	542	206	191	803
	Through	135	Departure	374	506	1,180	674	256	238	612
	Right	477								
Eastbound	Left	0	Approach	0	0	0	0	0	0	0
	Through	0	Departure	827	1,033	1,337	304	116	107	934
	Right	0								
Westbound	Left	202	Approach	279	421	894	473	180	167	446
	Through	4	Departure	0	0	0	0	0	0	0
	Right	73								

PM Peak Hour

Northbound	Left	268	Approach	658	1,426	2,698	1,272	356	331	989
	Through	390	Departure	430	1,244	2,198	954	267	248	678
	Right	0								
Southbound	Left	0	Approach	535	1,031	2,127	1,096	307	285	820
	Through	230	Departure	444	918	2,029	1,111	311	289	733
	Right	305								
Eastbound	Left	0	Approach	0	0	0	0	0	0	0
	Through	0	Departure	576	1,271	2,176	905	253	235	811
	Right	0								
Westbound	Left	200	Approach	257	976	1,578	602	169	157	414
	Through	3	Departure	0	0	0	0	0	0	0
	Right	54								

¹ Modeled base year (2012) to modeled future year (2040) conditions represent 28 years of traffic growth. Since it is 26 years from 2014 (base count conditions) to 2040, the 'new link volume' represents 92.86% of the modeled growth.

Table B-7
Forecast Peak Hour Link Volume Worksheet
Year 2040 Link Volumes

2014			Base	Base Yr.	Fut. Yr.	Base to	Base to	"New"	2035	
Volume			Link	Modeled	Modeled	Future Year	Future Year	Link	Link	
			Volume	Pk. Period	Pk. Period	Pk. Period	Pk. Hr.	Volume ¹	Volume	
			Volume	Volume	Volume	Change	Change			
3 Alder Ave/SR-210 Eastbound Ramps										
AM Peak Hour										
Northbound	Left	0	Approach	645	1,343	1,910	567	215	200	845
	Through	413	Departure	588	810	2,004	1,194	454	421	1,009
	Right	232								
Southbound	Left	42	Approach	339	504	1,191	687	261	242	581
	Through	297	Departure	620	1,044	1,693	649	247	229	849
	Right	0								
Eastbound	Left	207	Approach	499	677	1,362	685	260	242	741
	Through	1	Departure	0	0	0	0	0	0	0
	Right	291								
Westbound	Left	0	Approach	0	0	0	0	0	0	0
	Through	0	Departure	275	671	766	95	36	34	309
	Right	0								
PM Peak Hour										
Northbound	Left	0	Approach	575	1,587	3,094	1,507	422	392	967
	Through	352	Departure	598	2,181	3,577	1,396	391	363	961
	Right	223								
Southbound	Left	104	Approach	421	1,244	2,198	954	267	248	669
	Through	317	Departure	645	1,426	2,698	1,272	356	331	976
	Right	0								
Eastbound	Left	293	Approach	576	1,640	2,231	591	165	154	730
	Through	2	Departure	0	0	0	0	0	0	0
	Right	281								
Westbound	Left	0	Approach	0	0	0	0	0	0	0
	Through	0	Departure	329	864	1,248	384	108	100	429
	Right	0								

¹ Modeled base year (2012) to modeled future year (2040) conditions represent 28 years of traffic growth. Since it is 26 years from 2014 (base count conditions) to 2040, the 'new link volume' represents 92.86% of the modeled growth.

Table B-7
Forecast Peak Hour Link Volume Worksheet
Year 2040 Link Volumes

2014 Volume				Base Year Link Volume	Base Yr. Modeled Pk. Period Volume	Fut. Yr. Modeled Pk. Period Volume	Base to Future Year Pk. Period Change	Base to Future Year Pk. Hr. Change	"New" Link Volume ¹	2035 Link Volume
4 Alder Ave/Easton St-Renaissance Pkwy										
AM Peak Hour										
Northbound	Left	27	Approach	574	1,049	1,520	471	179	166	740
	Through	515	Departure	646	685	1,249	564	214	199	845
	Right	32								
Southbound	Left	59	Approach	597	809	2,004	1,195	454	422	1,019
	Through	515	Departure	655	1,343	1,910	567	215	200	855
	Right	23								
Eastbound	Left	61	Approach	222	326	700	374	142	132	354
	Through	115	Departure	116	99	593	494	188	174	290
	Right	46								
Westbound	Left	85	Approach	230	102	537	435	165	153	383
	Through	66	Departure	206	160	1,009	849	323	300	506
	Right	79								
PM Peak Hour										
Northbound	Left	25	Approach	587	1,385	2,334	949	266	247	834
	Through	505	Departure	646	1,788	2,304	516	144	134	780
	Right	57								
Southbound	Left	7	Approach	596	2,181	3,577	1,396	391	363	959
	Through	551	Departure	582	1,587	3,094	1,507	422	392	974
	Right	38								
Eastbound	Left	51	Approach	132	677	1,929	1,252	351	326	458
	Through	52	Departure	173	535	1,340	805	225	209	382
	Right	29								
Westbound	Left	66	Approach	202	272	1,436	1,164	326	303	505
	Through	110	Departure	116	605	2,537	1,932	541	502	618
	Right	26								

¹ Modeled base year (2012) to modeled future year (2040) conditions represent 28 years of traffic growth. Since it is 26 years from 2014 (base count conditions) to 2040, the 'new link volume' represents 92.86% of the modeled growth.

Calculation of Future Directional Turn Volumes From
Future Directional Link Volumes (NCHRP 255)
Year 2040 Conditions

Approach Direction			Base Year Count	Forecast Future Year		
				Link Volume		Turn Volume
1	Alder Ave/Casmalia Street					
A.M. Peak Hour						
Northbound	Left	70	Approach	640	Left	85
	Through	69	Departure	768	Through	262
	Right	263			Right	292
Southbound	Left	7	Approach	258	Left	18
	Through	61	Departure	294	Through	226
	Right	5			Right	14
Eastbound	Left	6	Approach	144	Left	15
	Through	46	Departure	150	Through	34
	Right	87			Right	95
Westbound	Left	429	Approach	515	Left	447
	Through	66	Departure	344	Through	51
	Right	7			Right	17
P.M. Peak Hour						
Northbound	Left	106	Approach	794	Left	161
	Through	64	Departure	896	Through	260
	Right	295			Right	370
Southbound	Left	19	Approach	308	Left	24
	Through	90	Departure	297	Through	265
	Right	13			Right	20
Eastbound	Left	10	Approach	433	Left	22
	Through	228	Departure	262	Through	158
	Right	154			Right	253
Westbound	Left	281	Approach	471	Left	377
	Through	118	Departure	551	Through	81
	Right	8			Right	15

Calculation of Future Directional Turn Volumes From
Future Directional Link Volumes (NCHRP 255)
Year 2040 Conditions

Approach Direction			Base Year Count	Forecast Future Year		
				Link Volume		Turn Volume
2	Alder Ave/SR-210 Westbound Ramps					
A.M. Peak Hour						
Northbound	Left	346	Approach	876	Left	377
	Through	301	Departure	579	Through	499
	Right	0			Right	0
Southbound	Left	0	Approach	803	Left	0
	Through	135	Departure	612	Through	250
	Right	477			Right	553
Eastbound	Left	0	Approach	0	Left	0
	Through	0	Departure	934	Through	0
	Right	0			Right	0
Westbound	Left	202	Approach	446	Left	329
	Through	4	Departure	0	Through	4
	Right	73			Right	113
P.M. Peak Hour						
Northbound	Left	268	Approach	989	Left	353
	Through	390	Departure	678	Through	636
	Right	0			Right	0
Southbound	Left	0	Approach	820	Left	0
	Through	230	Departure	733	Through	366
	Right	305			Right	454
Eastbound	Left	0	Approach	0	Left	0
	Through	0	Departure	811	Through	0
	Right	0			Right	0
Westbound	Left	200	Approach	414	Left	312
	Through	3	Departure	0	Through	4
	Right	54			Right	97

Calculation of Future Directional Turn Volumes From
Future Directional Link Volumes (NCHRP 255)
Year 2040 Conditions

Approach Direction			Base Year Count	Forecast Future Year		
				Link Volume		Turn Volume
3	Alder Ave/SR-210 Eastbound Ramps					
A.M. Peak Hour						
Northbound	Left	0	Approach	845	Left	0
	Through	413	Departure	1,009	Through	583
	Right	232			Right	260
Southbound	Left	42	Approach	581	Left	47
	Through	297	Departure	849	Through	535
	Right	0			Right	0
Eastbound	Left	207	Approach	741	Left	266
	Through	1	Departure	0	Through	1
	Right	291			Right	474
Westbound	Left	0	Approach	0	Left	0
	Through	0	Departure	309	Through	0
	Right	0			Right	0
P.M. Peak Hour						
Northbound	Left	0	Approach	967	Left	0
	Through	352	Departure	961	Through	649
	Right	223			Right	317
Southbound	Left	104	Approach	669	Left	110
	Through	317	Departure	976	Through	559
	Right	0			Right	0
Eastbound	Left	293	Approach	730	Left	327
	Through	2	Departure	0	Through	2
	Right	281			Right	401
Westbound	Left	0	Approach	0	Left	0
	Through	0	Departure	429	Through	0
	Right	0			Right	0

Calculation of Future Directional Turn Volumes From
Future Directional Link Volumes (NCHRP 255)
Year 2040 Conditions

Approach Direction		Base Year Count	Forecast Future Year			
			Link Volume		Turn Volume	
4 Alder Ave/Easton St-Renaissance Pkwy						
A.M. Peak Hour						
Northbound	Left	27	Approach	740	Left	48
	Through	515	Departure	845	Through	637
	Right	32			Right	59
Southbound	Left	59	Approach	1,019	Left	212
	Through	515	Departure	855	Through	723
	Right	23			Right	79
Eastbound	Left	61	Approach	354	Left	83
	Through	115	Departure	290	Through	234
	Right	46			Right	37
Westbound	Left	85	Approach	383	Left	86
	Through	66	Departure	506	Through	163
	Right	79			Right	135
P.M. Peak Hour						
Northbound	Left	25	Approach	834	Left	13
	Through	505	Departure	780	Through	673
	Right	57			Right	176
Southbound	Left	7	Approach	959	Left	121
	Through	551	Departure	974	Through	696
	Right	38			Right	106
Eastbound	Left	51	Approach	458	Left	135
	Through	52	Departure	382	Through	321
	Right	29			Right	13
Westbound	Left	66	Approach	505	Left	71
	Through	110	Departure	618	Through	263
	Right	26			Right	166

(Including trips not in the model)

		AM Peak Hour				PM Peak Hour			
		Existing Volume	2040 Model	Other Projects	2040 Volume	Existing Volume	2040 Model	Other Projects	2040 Volume
1	Alder Ave/Casmalia Street								
	NBL	70	85	78	163	106	161	61	222
	NBT	69	262	21	283	64	260	21	281
	NBR	263	292	229	521	295	370	101	471
	SBL	7	18	8	26	19	24	14	38
	SBT	61	226	16	242	90	265	28	293
	SBR	5	14	5	19	13	20	4	24
	EBL	6	15	3	18	10	22	4	26
	EBT	46	34	65	99	228	158	39	197
	EBR	87	95	45	140	154	253	77	330
	WBL	429	447	72	519	281	377	86	463
	WBT	66	51	25	76	118	81	30	111
	WBR	7	17	12	29	8	15	12	27
North Leg									
	Approach	73	258	29	287	122	309	46	355
	Departure	82	294	36	330	82	297	37	334
	Total	155	552	65	617	204	606	83	689
South Leg									
	Approach	402	639	328	967	465	791	183	974
	Departure	577	768	133	901	525	895	191	1,086
	Total	979	1,407	461	1,868	990	1,686	374	2,060
East Leg									
	Approach	502	515	109	624	407	473	128	601
	Departure	316	344	302	646	542	552	154	706
	Total	818	859	411	1,270	949	1,025	282	1,307
West Leg									
	Approach	139	144	113	257	392	433	120	553
	Departure	141	150	108	258	237	262	95	357
	Total	280	294	221	515	629	695	215	910
Total Approaches									
	Approach	1,116	1,556	579	2,135	1,386	2,006	477	2,483
	Departure	1,116	1,556	579	2,135	1,386	2,006	477	2,483
	Total	2,232	3,112	1,158	4,270	2,772	4,012	954	4,966

(Including trips not in the model)

	AM Peak Hour				PM Peak Hour			
	Existing Volume	2040 Model	Other Projects	2040 Volume	Existing Volume	2040 Model	Other Projects	2040 Volume
2 Alder Ave/SR-210 Westbound Ramps								
NBL	346	377	57	434	268	353	283	636
NBT	301	499	285	784	390	636	172	808
NBR	0	0	0	0	0	0	0	0
SBL	0	0	0	0	0	0	0	0
SBT	135	250	87	337	230	366	138	504
SBR	477	553	47	600	305	454	211	665
EBL	0	0	0	0	0	0	0	0
EBT	0	0	0	0	0	0	0	0
EBR	0	0	0	0	0	0	0	0
WBL	202	329	148	477	200	312	155	467
WBT	4	4	0	4	3	4	0	4
WBR	73	113	49	162	54	97	14	111
North Leg								
Approach	612	803	134	937	535	820	349	1,169
Departure	374	612	334	946	444	733	186	919
Total	986	1,415	468	1,883	979	1,553	535	2,088
South Leg								
Approach	647	876	342	1,218	658	989	455	1,444
Departure	337	579	235	814	430	678	293	971
Total	984	1,455	577	2,032	1,088	1,667	748	2,415
East Leg								
Approach	279	446	197	643	257	413	169	582
Departure	0	0	0	0	0	0	0	0
Total	279	446	197	643	257	413	169	582
West Leg								
Approach	0	0	0	0	0	0	0	0
Departure	827	934	104	1,038	576	811	494	1,305
Total	827	934	104	1,038	576	811	494	1,305
Total Approaches								
Approach	1,538	2,125	673	2,798	1,450	2,222	973	3,195
Departure	1,538	2,125	673	2,798	1,450	2,222	973	3,195
Total	3,076	4,250	1,346	5,596	2,900	4,444	1,946	6,390

(Including trips not in the model)

	AM Peak Hour				PM Peak Hour			
	Existing Volume	2040 Model	Other Projects	2040 Volume	Existing Volume	2040 Model	Other Projects	2040 Volume
3 Alder Ave/SR-210 Eastbound Ramps								
NBL	0	0	0	0	0	0	0	0
NBT	413	583	145	728	352	649	387	1,036
NBR	232	260	39	299	223	317	197	514
SBL	42	47	7	54	104	110	37	147
SBT	297	535	228	763	317	559	256	815
SBR	0	0	0	0	0	0	0	0
EBL	207	266	197	463	293	327	68	395
EBT	1	1	0	1	2	2	0	2
EBR	291	474	221	695	281	401	197	598
WBL	0	0	0	0	0	0	0	0
WBT	0	0	0	0	0	0	0	0
WBR	0	0	0	0	0	0	0	0
North Leg								
Approach	339	582	235	817	421	669	293	962
Departure	620	849	342	1,191	645	976	455	1,431
Total	959	1,431	577	2,008	1,066	1,645	748	2,393
South Leg								
Approach	645	843	184	1,027	575	966	584	1,550
Departure	588	1,009	449	1,458	598	960	453	1,413
Total	1,233	1,852	633	2,485	1,173	1,926	1,037	2,963
East Leg								
Approach	0	0	0	0	0	0	0	0
Departure	275	308	46	354	329	429	234	663
Total	275	308	46	354	329	429	234	663
West Leg								
Approach	499	741	418	1,159	576	730	265	995
Departure	0	0	0	0	0	0	0	0
Total	499	741	418	1,159	576	730	265	995
Total Approaches								
Approach	1,483	2,166	837	3,003	1,572	2,365	1,142	3,507
Departure	1,483	2,166	837	3,003	1,572	2,365	1,142	3,507
Total	2,966	4,332	1,674	6,006	3,144	4,730	2,284	7,014

(Including trips not in the model)

	AM Peak Hour				PM Peak Hour			
	Existing Volume	2040 Model	Other Projects	2040 Volume	Existing Volume	2040 Model	Other Projects	2040 Volume
4 Alder Ave/Easton St-Renaissance Pkwy								
NBL	27	48	15	63	25	13	46	59
NBT	515	637	76	713	505	673	198	871
NBR	32	59	9	68	57	176	32	208
SBL	59	212	230	442	7	121	201	322
SBT	515	723	179	902	551	696	92	788
SBR	23	79	38	117	38	106	136	242
EBL	61	83	42	125	51	135	121	256
EBT	115	234	152	386	52	321	187	508
EBR	46	37	21	58	29	13	39	52
WBL	85	86	8	94	66	71	35	106
WBT	66	163	72	235	110	263	238	501
WBR	79	135	65	200	26	166	259	425
North Leg								
Approach	597	1,014	447	1,461	596	923	429	1,352
Departure	655	855	183	1,038	582	974	578	1,552
Total	1,252	1,869	630	2,499	1,178	1,897	1,007	2,904
South Leg								
Approach	574	744	100	844	587	862	276	1,138
Departure	646	846	208	1,054	646	780	166	946
Total	1,220	1,590	308	1,898	1,233	1,642	442	2,084
East Leg								
Approach	230	384	145	529	202	500	532	1,032
Departure	206	505	391	896	116	618	420	1,038
Total	436	889	536	1,425	318	1,118	952	2,070
West Leg								
Approach	222	354	215	569	132	469	347	816
Departure	116	290	125	415	173	382	420	802
Total	338	644	340	984	305	851	767	1,618
Total Approaches								
Approach	1,623	2,496	907	3,403	1,517	2,754	1,584	4,338
Departure	1,623	2,496	907	3,403	1,517	2,754	1,584	4,338
Total	3,246	4,992	1,814	6,806	3,034	5,508	3,168	8,676

Year 2040 Traffic Volumes in PCEs

	AM Peak Hour							PM Peak Hour						
	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE
1 Alder Ave/Casmalia Street														
NBL	163	9%	14	149	2.67	37	186	222	4%	8	214	3.00	24	238
NBT	283	42%	119	164	2.48	295	459	281	28%	79	202	2.56	202	404
NBR	521	11%	57	464	2.55	145	609	471	4%	18	453	2.64	47	500
SBL	26	71%	19	7	2.40	46	53	38	37%	14	24	2.29	32	56
SBT	242	43%	103	139	2.65	273	412	293	28%	81	212	2.56	207	419
SBR	19	80%	15	4	2.50	38	42	24	38%	9	15	2.20	20	35
EBL	18	67%	12	6	2.50	30	36	26	50%	13	13	2.60	34	47
EBT	99	2%	2	97	2.00	4	101	197	2%	3	194	2.25	7	201
EBR	140	18%	26	114	2.69	70	184	330	10%	32	298	2.60	83	381
WBL	519	7%	34	485	2.61	89	574	463	7%	31	432	2.63	82	514
WBT	76	5%	3	73	2.33	7	80	111	3%	4	107	2.25	9	116
WBR	29	71%	21	8	2.20	46	54	27	50%	14	13	2.50	35	48
North Leg														
Approach	287		137	150		357	507	355		104	251		259	510
Departure	330		152	178		371	549	334		106	228		271	499
Total	617		289	328		728	1,056	689		210	479		530	1,009
South Leg														
Approach	967		190	777		477	1,254	974		105	869		273	1,142
Departure	901		163	738		432	1,170	1,086		144	942		372	1,314
Total	1,868		353	1,515		909	2,424	2,060		249	1,811		645	2,456
East Leg														
Approach	624		58	566		142	708	601		49	552		126	678
Departure	646		78	568		195	763	706		35	671		86	757
Total	1,270		136	1,134		337	1,471	1,307		84	1,223		212	1,435
West Leg														
Approach	257		40	217		104	321	553		48	505		124	629
Departure	258		32	226		82	308	357		21	336		53	389
Total	515		72	443		186	629	910		69	841		177	1,018
Total Approaches														
Approach	2,135		425	1,710		1,080	2,790	2,483		306	2,177		782	2,959
Departure	2,135		425	1,710		1,080	2,790	2,483		306	2,177		782	2,959
Total	4,270		850	3,420		2,160	5,580	4,966		612	4,354		1,564	5,918

Year 2040 Traffic Volumes in PCEs

	AM Peak Hour							PM Peak Hour						
	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE
2 Alder Ave/SR-210 Westbound Ramps														
NBL	434	6%	28	406	2.32	65	471	636	9%	55	581	2.57	141	722
NBT	784	21%	161	623	2.69	434	1,057	808	17%	135	673	2.49	336	1,009
NBR	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
SBL	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
SBT	337	16%	52	285	2.52	131	416	504	12%	61	443	2.61	159	602
SBR	600	18%	107	493	2.51	268	761	665	18%	118	547	2.80	330	877
EBL	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
EBT	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
EBR	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
WBL	477	2%	9	468	1.50	14	482	467	3%	14	453	2.33	33	486
WBT	4	25%	1	3	3.00	3	6	4	0%	0	4	0.00	0	4
WBR	162	26%	42	120	2.21	93	213	111	13%	14	97	2.14	30	127
North Leg														
Approach	937		159	778		399	1,177	1,169		179	990		489	1,479
Departure	946		203	743		527	1,270	919		149	770		366	1,136
Total	1,883		362	1,521		926	2,447	2,088		328	1,760		855	2,615
South Leg														
Approach	1,218		189	1,029		499	1,528	1,444		190	1,254		477	1,731
Departure	814		61	753		145	898	971		75	896		192	1,088
Total	2,032		250	1,782		644	2,426	2,415		265	2,150		669	2,819
East Leg														
Approach	643		52	591		110	701	582		28	554		63	617
Departure	0		0	0		0	0	0		0	0		0	0
Total	643		52	591		110	701	582		28	554		63	617
West Leg														
Approach	0		0	0		0	0	0		0	0		0	0
Departure	1,038		136	902		336	1,238	1,305		173	1,132		471	1,603
Total	1,038		136	902		336	1,238	1,305		173	1,132		471	1,603
Total Approaches														
Approach	2,798		400	2,398		1,008	3,406	3,195		397	2,798		1,029	3,827
Departure	2,798		400	2,398		1,008	3,406	3,195		397	2,798		1,029	3,827
Total	5,596		800	4,796		2,016	6,812	6,390		794	5,596		2,058	7,654

Year 2040 Traffic Volumes in PCEs

	AM Peak Hour							PM Peak Hour						
	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE
3 Alder Ave/SR-210 Eastbound Ramps														
NBL	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
NBT	728	5%	37	691	2.57	95	786	1,036	9%	91	945	2.45	223	1,168
NBR	299	7%	21	278	2.00	42	320	514	3%	16	498	2.14	34	532
SBL	54	48%	26	28	2.50	65	93	147	22%	33	114	2.52	83	197
SBT	763	3%	26	737	2.30	60	797	815	4%	36	779	2.71	98	877
SBR	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
EBL	463	29%	132	331	2.73	360	691	395	19%	77	318	2.56	197	515
EBT	1	0%	0	1	0.00	0	1	2	0%	0	2	0.00	0	2
EBR	695	5%	36	659	2.60	94	753	598	10%	57	541	2.07	118	659
WBL	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
WBT	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
WBR	0	0%	0	0	0.00	0	0	0	0%	0	0	0.00	0	0
North Leg														
Approach	817		52	765		125	890	962		69	893		181	1,074
Departure	1,191		169	1,022		455	1,477	1,431		168	1,263		420	1,683
Total	2,008		221	1,787		580	2,367	2,393		237	2,156		601	2,757
South Leg														
Approach	1,027		58	969		137	1,106	1,550		107	1,443		257	1,700
Departure	1,458		62	1,396		154	1,550	1,413		93	1,320		216	1,536
Total	2,485		120	2,365		291	2,656	2,963		200	2,763		473	3,236
East Leg														
Approach	0		0	0		0	0	0		0	0		0	0
Departure	354		47	307		107	414	663		49	614		117	731
Total	354		47	307		107	414	663		49	614		117	731
West Leg														
Approach	1,159		168	991		454	1,445	995		134	861		315	1,176
Departure	0		0	0		0	0	0		0	0		0	0
Total	1,159		168	991		454	1,445	995		134	861		315	1,176
Total Approaches														
Approach	3,003		278	2,725		716	3,441	3,507		310	3,197		753	3,950
Departure	3,003		278	2,725		716	3,441	3,507		310	3,197		753	3,950
Total	6,006		556	5,450		1,432	6,882	7,014		620	6,394		1,506	7,900

Year 2040 Traffic Volumes in PCEs

	AM Peak Hour							PM Peak Hour						
	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE	2040 Volume	2040 Truck%	2040 Trucks	2040 PV	TPCE Factor	2040 TPCE	2040 PCE
4 Alder Ave/Easton St-Renaissance Pkwy														
NBL	63	15%	9	54	3.00	27	81	59	16%	9	50	3.00	27	77
NBT	713	6%	40	673	2.24	90	763	871	7%	59	812	2.44	144	956
NBR	68	0%	0	68	0.00	0	68	208	4%	7	201	2.50	18	219
SBL	442	0%	0	442	0.00	0	442	322	0%	0	322	0.00	0	322
SBT	902	7%	63	839	2.47	156	995	788	8%	61	727	2.19	133	860
SBR	117	0%	0	117	0.00	0	117	242	3%	6	236	3.00	18	254
EBL	125	0%	0	125	0.00	0	125	256	0%	0	256	0.00	0	256
EBT	386	1%	3	383	3.00	9	392	508	6%	29	479	2.67	77	556
EBR	58	13%	8	50	2.83	23	73	52	38%	20	32	2.82	56	88
WBL	94	1%	1	93	3.00	3	96	106	5%	5	101	2.67	13	114
WBT	235	2%	4	231	3.00	12	243	501	3%	14	487	2.00	28	515
WBR	200	3%	5	195	1.50	8	203	425	4%	16	409	3.00	48	457
North Leg														
Approach	1,461		63	1,398		156	1,554	1,352		67	1,285		151	1,436
Departure	1,038		45	993		98	1,091	1,552		75	1,477		192	1,669
Total	2,499		108	2,391		254	2,645	2,904		142	2,762		343	3,105
South Leg														
Approach	844		49	795		117	912	1,138		75	1,063		189	1,252
Departure	1,054		72	982		182	1,164	946		86	860		202	1,062
Total	1,898		121	1,777		299	2,076	2,084		161	1,923		391	2,314
East Leg														
Approach	529		10	519		23	542	1,032		35	997		89	1,086
Departure	896		3	893		9	902	1,038		36	1,002		95	1,097
Total	1,425		13	1,412		32	1,444	2,070		71	1,999		184	2,183
West Leg														
Approach	569		11	558		32	590	816		49	767		133	900
Departure	415		13	402		39	441	802		29	773		73	846
Total	984		24	960		71	1,031	1,618		78	1,540		206	1,746
Total Approaches														
Approach	3,403		133	3,270		328	3,598	4,338		226	4,112		562	4,674
Departure	3,403		133	3,270		328	3,598	4,338		226	4,112		562	4,674
Total	6,806		266	6,540		656	7,196	8,676		452	8,224		1,124	9,348

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
1	Alder Ave/Casmalia Street						
	NBL	80		80	114	7	121
	NBT	112		112	92	5	97
	NBR	308	1	309	313	18	331
	SBL	14		14	28		28
	SBT	104	12	116	129	12	141
	SBR	11		11	19		19
	EBL	12		12	18		18
	EBT	47		47	233		233
	EBR	114	13	127	178	17	195
	WBL	474	55	529	312	29	341
	WBT	70		70	123		123
	WBR	13		13	14		14
North Leg							
	Approach	129	12	141	176	12	188
	Departure	137	0	137	124	5	129
	Total	266	12	278	300	17	317
South Leg							
	Approach	500	1	501	519	30	549
	Departure	692	80	772	619	58	677
	Total	1,192	81	1,273	1,138	88	1,226
East Leg							
	Approach	557	55	612	449	29	478
	Departure	369	1	370	574	18	592
	Total	926	56	982	1,023	47	1,070
West Leg							
	Approach	173	13	186	429	17	446
	Departure	161	0	161	256	7	263
	Total	334	13	347	685	24	709
Total Approaches							
	Approach	1,359	81	1,440	1,573	88	1,661
	Departure	1,359	81	1,440	1,573	88	1,661
	Total	2,718	162	2,880	3,146	176	3,322

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
2	Alder Ave/SR-210 Westbound Ramps						
	NBL	375		375	304		304
	NBT	406		406	487		487
	NBR	0		0	0		0
	SBL	0		0	0		0
	SBT	167		167	275		275
	SBR	605		605	402		402
	EBL	0		0	0		0
	EBT	0		0	0		0
	EBR	0		0	0		0
	WBL	204		204	208		208
	WBT	6		6	3		3
	WBR	96		96	62		62
North Leg							
	Approach	772	0	772	677	0	677
	Departure	502	0	502	549	0	549
	Total	1,274	0	1,274	1,226	0	1,226
South Leg							
	Approach	781	0	781	791	0	791
	Departure	371	0	371	483	0	483
	Total	1,152	0	1,152	1,274	0	1,274
East Leg							
	Approach	306	0	306	273	0	273
	Departure	0	0	0	0	0	0
	Total	306	0	306	273	0	273
West Leg							
	Approach	0	0	0	0	0	0
	Departure	986	0	986	709	0	709
	Total	986	0	986	709	0	709
Total Approaches							
	Approach	1,859	0	1,859	1,741	0	1,741
	Departure	1,859	0	1,859	1,741	0	1,741
	Total	3,718	0	3,718	3,482	0	3,482

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
2	Alder Ave/SR-210 Westbound Ramps						
	NBL	375		375	304		304
	NBT	406		406	487		487
	NBR	0		0	0		0
	SBL	0		0	0		0
	SBT	167		167	275		275
	SBR	605		605	402		402
	EBL	0		0	0		0
	EBT	0		0	0		0
	EBR	0		0	0		0
	WBL	204		204	208		208
	WBT	6		6	3		3
	WBR	96		96	62		62
North Leg							
	Approach	772	0	772	677	0	677
	Departure	502	0	502	549	0	549
	Total	1,274	0	1,274	1,226	0	1,226
South Leg							
	Approach	781	0	781	791	0	791
	Departure	371	0	371	483	0	483
	Total	1,152	0	1,152	1,274	0	1,274
East Leg							
	Approach	306	0	306	273	0	273
	Departure	0	0	0	0	0	0
	Total	306	0	306	273	0	273
West Leg							
	Approach	0	0	0	0	0	0
	Departure	986	0	986	709	0	709
	Total	986	0	986	709	0	709
Total Approaches							
	Approach	1,859	0	1,859	1,741	0	1,741
	Departure	1,859	0	1,859	1,741	0	1,741
	Total	3,718	0	3,718	3,482	0	3,482

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
3	Alder Ave/SR-210 Eastbound Ramps						
	NBL	0		0	0		0
	NBT	446	15	461	397	6	403
	NBR	248		248	231		231
	SBL	72	-2	70	139	1	140
	SBT	310	-9	301	341	2	343
	SBR	0		0	0		0
	EBL	309	11	320	382	6	388
	EBT	1		1	2		2
	EBR	315		315	310		310
	WBL	0		0	0		0
	WBT	0		0	0		0
	WBR	0		0	0		0
	North Leg						
	Approach	382	-11	371	480	3	483
	Departure	755	26	781	779	12	791
	Total	1,137	15	1,152	1,259	15	1,274
	South Leg						
	Approach	694	15	709	628	6	634
	Departure	625	-9	616	651	2	653
	Total	1,319	6	1,325	1,279	8	1,287
	East Leg						
	Approach	0	0	0	0	0	0
	Departure	321	-2	319	372	1	373
	Total	321	-2	319	372	1	373
	West Leg						
	Approach	625	11	636	694	6	700
	Departure	0	0	0	0	0	0
	Total	625	11	636	694	6	700
	Total Approaches						
	Approach	1,701	15	1,716	1,802	15	1,817
	Departure	1,701	15	1,716	1,802	15	1,817
	Total	3,402	30	3,432	3,604	30	3,634

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
3	Alder Ave/SR-210 Eastbound Ramps						
	NBL	0		0	0		0
	NBT	461		461	403		403
	NBR	248		248	231		231
	SBL	70		70	140		140
	SBT	301		301	343		343
	SBR	0		0	0		0
	EBL	320		320	388		388
	EBT	1		1	2		2
	EBR	315		315	310		310
	WBL	0		0	0		0
	WBT	0		0	0		0
	WBR	0		0	0		0
	North Leg						
	Approach	371	0	371	483	0	483
	Departure	781	0	781	791	0	791
	Total	1,152	0	1,152	1,274	0	1,274
	South Leg						
	Approach	709	0	709	634	0	634
	Departure	616	0	616	653	0	653
	Total	1,325	0	1,325	1,287	0	1,287
	East Leg						
	Approach	0	0	0	0	0	0
	Departure	319	0	319	373	0	373
	Total	319	0	319	373	0	373
	West Leg						
	Approach	636	0	636	700	0	700
	Departure	0	0	0	0	0	0
	Total	636	0	636	700	0	700
	Total Approaches						
	Approach	1,716	0	1,716	1,817	0	1,817
	Departure	1,716	0	1,716	1,817	0	1,817
	Total	3,432	0	3,432	3,634	0	3,634

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
4	Alder Ave/Easton St-Renaissance Pkwy						
	NBL	35		35	33		33
	NBT	551	14	565	554	1	555
	NBR	32		32	60		60
	SBL	59	-3	56	7		7
	SBT	568	-30	538	602	4	606
	SBR	23	-1	22	40		40
	EBL	61	1	62	51		51
	EBT	117		117	57		57
	EBR	57		57	49		49
	WBL	87		87	71		71
	WBT	68		68	113		113
	WBR	80	2	82	28		28
North Leg							
	Approach	650	-34	616	649	4	653
	Departure	692	17	709	633	1	634
	Total	1,342	-17	1,325	1,282	5	1,287
South Leg							
	Approach	618	14	632	647	1	648
	Departure	712	-30	682	722	4	726
	Total	1,330	-16	1,314	1,369	5	1,374
East Leg							
	Approach	235	2	237	212	0	212
	Departure	208	-3	205	124	0	124
	Total	443	-1	442	336	0	336
West Leg							
	Approach	235	1	236	157	0	157
	Departure	126	-1	125	186	0	186
	Total	361	0	361	343	0	343
Total Approaches							
	Approach	1,738	-17	1,721	1,665	5	1,670
	Departure	1,738	-17	1,721	1,665	5	1,670
	Total	3,476	-34	3,442	3,330	10	3,340

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
1	Alder Ave/Casmalia Street						
	NBL	186	2	188	238	-1	237
	NBT	459	6	465	404	-2	402
	NBR	609	8	617	500	-3	497
	SBL	53		53	56		56
	SBT	412	2	414	419	53	472
	SBR	42		42	35		35
	EBL	36		36	47		47
	EBT	101		101	201		201
	EBR	184	1	185	381	48	429
	WBL	574	3	577	514	65	579
	WBT	80		80	116		116
	WBR	54		54	48		48
North Leg							
	Approach	507	2	509	510	53	563
	Departure	549	6	555	499	-2	497
	Total	1,056	8	1,064	1,009	51	1,060
South Leg							
	Approach	1,254	16	1,270	1,142	-6	1,136
	Departure	1,170	6	1,176	1,314	166	1,480
	Total	2,424	22	2,446	2,456	160	2,616
East Leg							
	Approach	708	3	711	678	65	743
	Departure	763	8	771	757	-3	754
	Total	1,471	11	1,482	1,435	62	1,497
West Leg							
	Approach	321	1	322	629	48	677
	Departure	308	2	310	389	-1	388
	Total	629	3	632	1,018	47	1,065
Total Approaches							
	Approach	2,790	22	2,812	2,959	160	3,119
	Departure	2,790	22	2,812	2,959	160	3,119
	Total	5,580	44	5,624	5,918	320	6,238

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
2	Alder Ave/SR-210 Westbound Ramps						
	NBL	471		471	722		722
	NBT	1,057		1,057	1,009		1,009
	NBR	0		0	0		0
	SBL	0		0	0		0
	SBT	416		416	602		602
	SBR	761		761	877		877
	EBL	0		0	0		0
	EBT	0		0	0		0
	EBR	0		0	0		0
	WBL	482		482	486		486
	WBT	6		6	4		4
	WBR	213		213	127		127
North Leg							
	Approach	1,177	0	1,177	1,479	0	1,479
	Departure	1,270	0	1,270	1,136	0	1,136
	Total	2,447	0	2,447	2,615	0	2,615
South Leg							
	Approach	1,528	0	1,528	1,731	0	1,731
	Departure	898	0	898	1,088	0	1,088
	Total	2,426	0	2,426	2,819	0	2,819
East Leg							
	Approach	701	0	701	617	0	617
	Departure	0	0	0	0	0	0
	Total	701	0	701	617	0	617
West Leg							
	Approach	0	0	0	0	0	0
	Departure	1,238	0	1,238	1,603	0	1,603
	Total	1,238	0	1,238	1,603	0	1,603
Total Approaches							
	Approach	3,406	0	3,406	3,827	0	3,827
	Departure	3,406	0	3,406	3,827	0	3,827
	Total	6,812	0	6,812	7,654	0	7,654

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
2	Alder Ave/SR-210 Westbound Ramps						
	NBL	471		471	722		722
	NBT	1,057		1,057	1,009		1,009
	NBR	0		0	0		0
	SBL	0		0	0		0
	SBT	416		416	602		602
	SBR	761		761	877		877
	EBL	0		0	0		0
	EBT	0		0	0		0
	EBR	0		0	0		0
	WBL	482		482	486		486
	WBT	6		6	4		4
	WBR	213		213	127		127
North Leg							
	Approach	1,177	0	1,177	1,479	0	1,479
	Departure	1,270	0	1,270	1,136	0	1,136
	Total	2,447	0	2,447	2,615	0	2,615
South Leg							
	Approach	1,528	0	1,528	1,731	0	1,731
	Departure	898	0	898	1,088	0	1,088
	Total	2,426	0	2,426	2,819	0	2,819
East Leg							
	Approach	701	0	701	617	0	617
	Departure	0	0	0	0	0	0
	Total	701	0	701	617	0	617
West Leg							
	Approach	0	0	0	0	0	0
	Departure	1,238	0	1,238	1,603	0	1,603
	Total	1,238	0	1,238	1,603	0	1,603
Total Approaches							
	Approach	3,406	0	3,406	3,827	0	3,827
	Departure	3,406	0	3,406	3,827	0	3,827
	Total	6,812	0	6,812	7,654	0	7,654

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
3	Alder Ave/SR-210 Eastbound Ramps						
	NBL	0		0	0		0
	NBT	786	27	813	1,168	33	1,201
	NBR	320		320	532		532
	SBL	93	1	94	197	3	200
	SBT	797	7	804	877	11	888
	SBR	0		0	0		0
	EBL	691	24	715	515	15	530
	EBT	1		1	2		2
	EBR	753		753	659		659
	WBL	0		0	0		0
	WBT	0		0	0		0
	WBR	0		0	0		0
	North Leg						
	Approach	890	8	898	1,074	14	1,088
	Departure	1,477	51	1,528	1,683	48	1,731
	Total	2,367	59	2,426	2,757	62	2,819
	South Leg						
	Approach	1,106	27	1,133	1,700	33	1,733
	Departure	1,550	7	1,557	1,536	11	1,547
	Total	2,656	34	2,690	3,236	44	3,280
	East Leg						
	Approach	0	0	0	0	0	0
	Departure	414	1	415	731	3	734
	Total	414	1	415	731	3	734
	West Leg						
	Approach	1,445	24	1,469	1,176	15	1,191
	Departure	0	0	0	0	0	0
	Total	1,445	24	1,469	1,176	15	1,191
	Total Approaches						
	Approach	3,441	59	3,500	3,950	62	4,012
	Departure	3,441	59	3,500	3,950	62	4,012
	Total	6,882	118	7,000	7,900	124	8,024

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
3	Alder Ave/SR-210 Eastbound Ramps						
	NBL	0		0	0		0
	NBT	813		813	1,201		1,201
	NBR	320		320	532		532
	SBL	94		94	200		200
	SBT	804		804	888		888
	SBR	0		0	0		0
	EBL	715		715	530		530
	EBT	1		1	2		2
	EBR	753		753	659		659
	WBL	0		0	0		0
	WBT	0		0	0		0
	WBR	0		0	0		0
	North Leg						
	Approach	898	0	898	1,088	0	1,088
	Departure	1,528	0	1,528	1,731	0	1,731
	Total	2,426	0	2,426	2,819	0	2,819
	South Leg						
	Approach	1,133	0	1,133	1,733	0	1,733
	Departure	1,557	0	1,557	1,547	0	1,547
	Total	2,690	0	2,690	3,280	0	3,280
	East Leg						
	Approach	0	0	0	0	0	0
	Departure	415	0	415	734	0	734
	Total	415	0	415	734	0	734
	West Leg						
	Approach	1,469	0	1,469	1,191	0	1,191
	Departure	0	0	0	0	0	0
	Total	1,469	0	1,469	1,191	0	1,191
	Total Approaches						
	Approach	3,500	0	3,500	4,012	0	4,012
	Departure	3,500	0	3,500	4,012	0	4,012
	Total	7,000	0	7,000	8,024	0	8,024

SR-210 Alder Avenue Interchange FSR
Table B-4 Volume Balancing For Existing Conditions

		A.M. Peak Hour Volumes			P.M. Peak Hour Volumes		
		Model Volume	Adjust.	Balanced Volume	Model Volume	Adjust.	Balanced Volume
4	Alder Ave/Easton St-Renaissance Pkwy						
	NBL	81		81	77		77
	NBT	763	29	792	956	37	993
	NBR	68		68	219		219
	SBL	442	1	443	322	25	347
	SBT	995	2	997	860	66	926
	SBR	117		117	254	20	274
	EBL	125	5	130	256	10	266
	EBT	392		392	556		556
	EBR	73		73	88		88
	WBL	96		96	114		114
	WBT	243		243	515		515
	WBR	203	8	211	457	18	475
North Leg							
	Approach	1,554	3	1,557	1,436	111	1,547
	Departure	1,091	42	1,133	1,669	65	1,734
	Total	2,645	45	2,690	3,105	176	3,281
South Leg							
	Approach	912	29	941	1,252	37	1,289
	Departure	1,164	2	1,166	1,062	66	1,128
	Total	2,076	31	2,107	2,314	103	2,417
East Leg							
	Approach	542	8	550	1,086	18	1,104
	Departure	902	1	903	1,097	25	1,122
	Total	1,444	9	1,453	2,183	43	2,226
West Leg							
	Approach	590	5	595	900	10	910
	Departure	441	0	441	846	20	866
	Total	1,031	5	1,036	1,746	30	1,776
Total Approaches							
	Approach	3,598	45	3,643	4,674	176	4,850
	Departure	3,598	45	3,643	4,674	176	4,850
	Total	7,196	90	7,286	9,348	352	9,700

Balanced Existing and Year 2040 Traffic Volumes (PCEs)

		AM Peak Hour		PM Peak Hour	
		Existing	Year	Existing	Year
		Year	2040	Year	2040
1	Alder Ave/Casmalia Street				
	NBL	80	188	121	237
	NBT	112	465	97	402
	NBR	309	617	331	497
	SBL	14	53	28	56
	SBT	116	414	141	472
	SBR	11	42	19	35
	EBL	12	36	18	47
	EBT	47	101	233	201
	EBR	127	185	195	429
	WBL	529	577	341	579
	WBT	70	80	123	116
	WBR	13	54	14	48
	North Leg				
	Approach	141	509	188	563
	Departure	137	555	129	497
	Total	278	1,064	317	1,060
	South Leg				
	Approach	501	1,270	549	1,136
	Departure	772	1,176	677	1,480
	Total	1,273	2,446	1,226	2,616
	East Leg				
	Approach	612	711	478	743
	Departure	370	771	592	754
	Total	982	1,482	1,070	1,497
	West Leg				
	Approach	186	322	446	677
	Departure	161	310	263	388
	Total	347	632	709	1,065
	Total Approaches				
	Approach	1,440	2,812	1,661	3,119
	Departure	1,440	2,812	1,661	3,119
	Total	2,880	5,624	3,322	6,238

Balanced Existing and Year 2040 Traffic Volumes (PCEs)

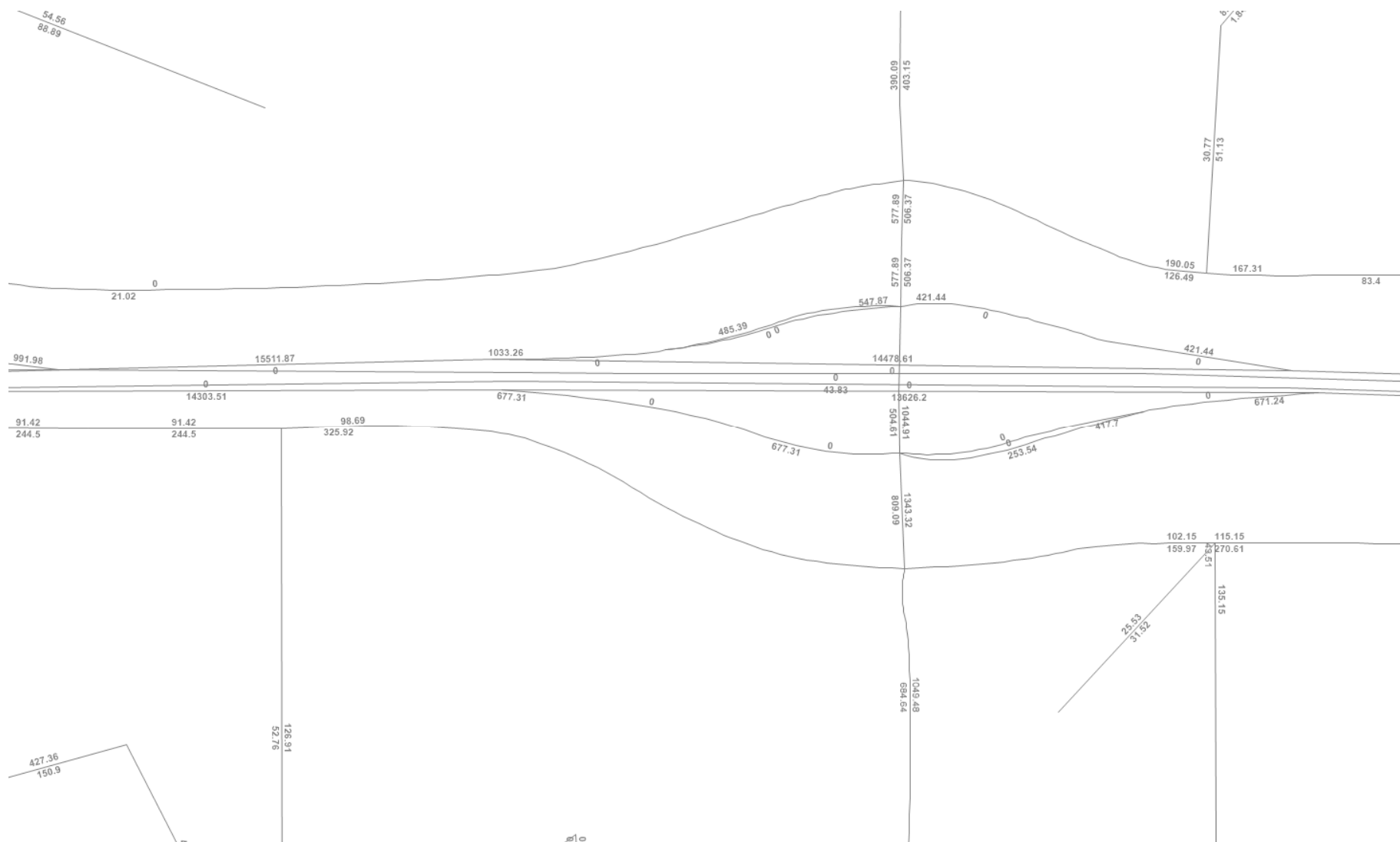
	AM Peak Hour		PM Peak Hour	
	Existing Year	Year 2040	Existing Year	Year 2040
2 Alder Ave/SR-210 Westbound Ramps				
NBL	375	471	304	722
NBT	406	1,057	487	1,009
NBR	0	0	0	0
SBL	0	0	0	0
SBT	167	416	275	602
SBR	605	761	402	877
EBL	0	0	0	0
EBT	0	0	0	0
EBR	0	0	0	0
WBL	204	482	208	486
WBT	6	6	3	4
WBR	96	213	62	127
North Leg				
Approach	772	1,177	677	1,479
Departure	502	1,270	549	1,136
Total	1,274	2,447	1,226	2,615
South Leg				
Approach	781	1,528	791	1,731
Departure	371	898	483	1,088
Total	1,152	2,426	1,274	2,819
East Leg				
Approach	306	701	273	617
Departure	0	0	0	0
Total	306	701	273	617
West Leg				
Approach	0	0	0	0
Departure	986	1,238	709	1,603
Total	986	1,238	709	1,603
Total Approaches				
Approach	1,859	3,406	1,741	3,827
Departure	1,859	3,406	1,741	3,827
Total	3,718	6,812	3,482	7,654

Balanced Existing and Year 2040 Traffic Volumes (PCEs)

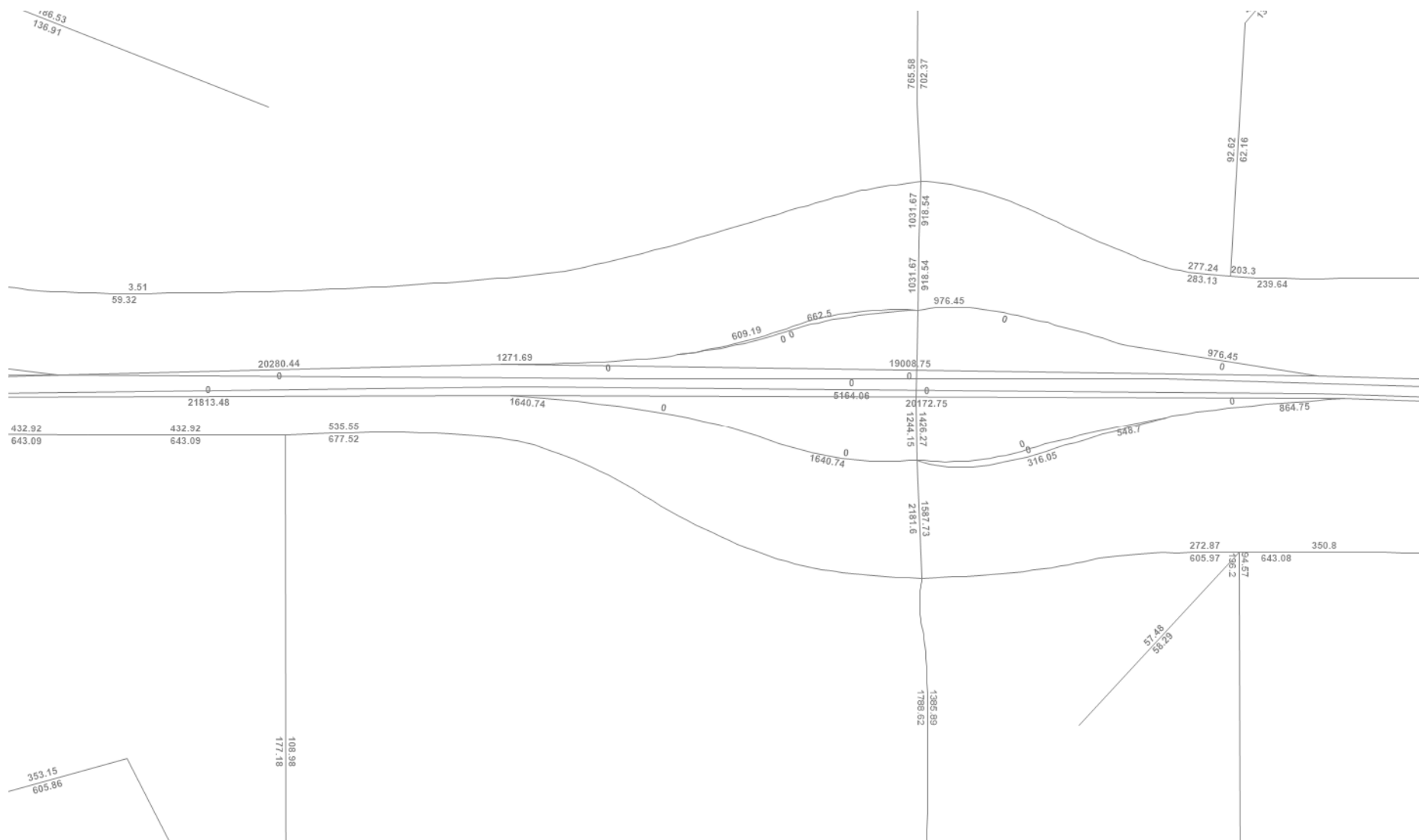
	AM Peak Hour		PM Peak Hour	
	Existing Year	Year 2040	Existing Year	Year 2040
3 Alder Ave/SR-210 Eastbound Ramps				
NBL	0	0	0	0
NBT	461	813	403	1,201
NBR	248	320	231	532
SBL	70	94	140	200
SBT	301	804	343	888
SBR	0	0	0	0
EBL	320	715	388	530
EBT	1	1	2	2
EBR	315	753	310	659
WBL	0	0	0	0
WBT	0	0	0	0
WBR	0	0	0	0
North Leg				
Approach	371	898	483	1,088
Departure	781	1,528	791	1,731
Total	1,152	2,426	1,274	2,819
South Leg				
Approach	709	1,133	634	1,733
Departure	616	1,557	653	1,547
Total	1,325	2,690	1,287	3,280
East Leg				
Approach	0	0	0	0
Departure	319	415	373	734
Total	319	415	373	734
West Leg				
Approach	636	1,469	700	1,191
Departure	0	0	0	0
Total	636	1,469	700	1,191
Total Approaches				
Approach	1,716	3,500	1,817	4,012
Departure	1,716	3,500	1,817	4,012
Total	3,432	7,000	3,634	8,024

Balanced Existing and Year 2040 Traffic Volumes (PCEs)

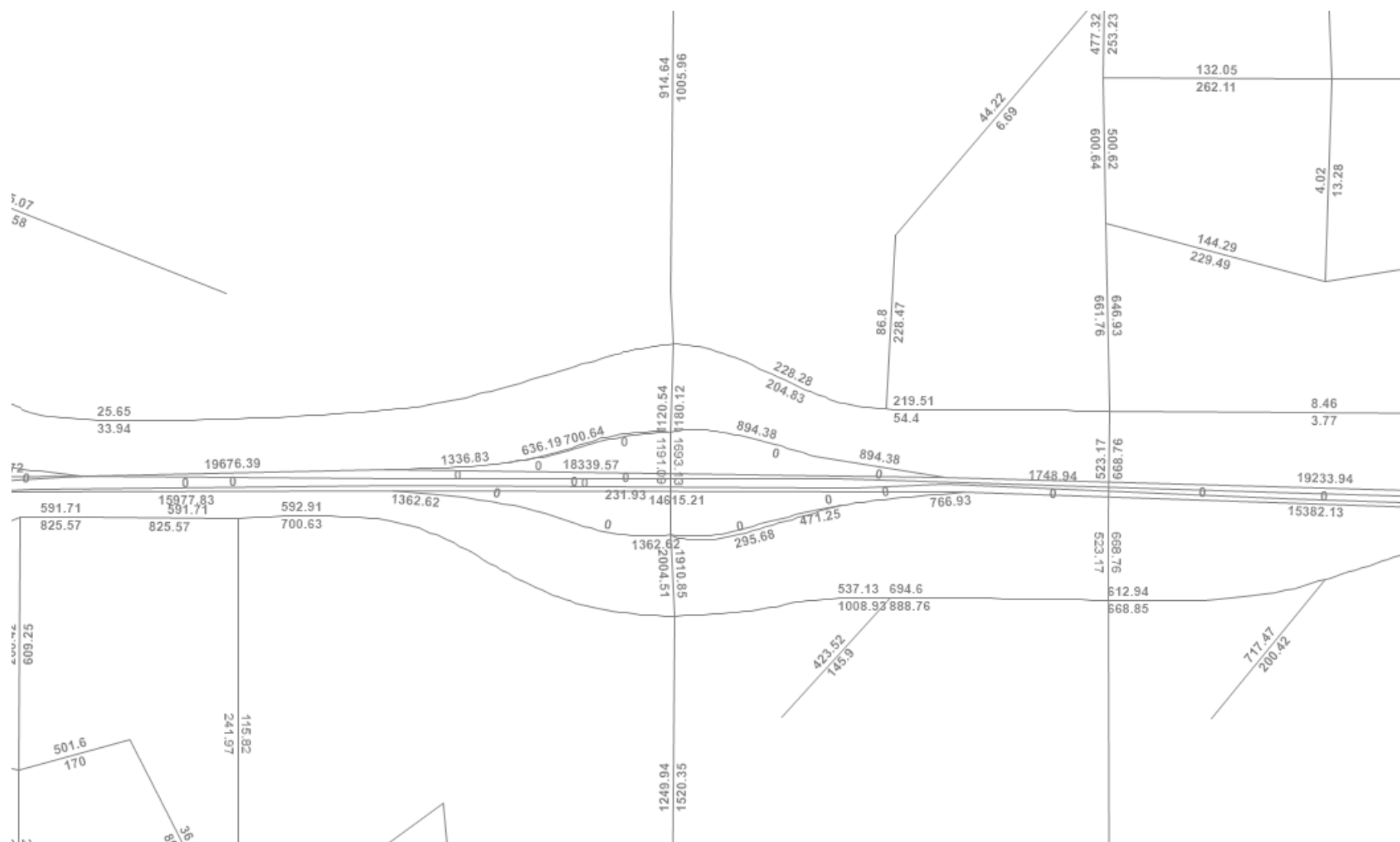
	AM Peak Hour		PM Peak Hour	
	Existing Year	Year 2040	Existing Year	Year 2040
4 Alder Ave/Easton St-Renaissance Pkwy				
NBL	35	81	33	77
NBT	565	792	555	993
NBR	32	68	60	219
SBL	56	443	7	347
SBT	538	997	606	926
SBR	22	117	40	274
EBL	62	130	51	266
EBT	117	392	57	556
EBR	57	73	49	88
WBL	87	96	71	114
WBT	68	243	113	515
WBR	82	211	28	475
North Leg				
Approach	616	1,557	653	1,547
Departure	709	1,133	634	1,734
Total	1,325	2,690	1,287	3,281
South Leg				
Approach	632	941	648	1,289
Departure	682	1,166	726	1,128
Total	1,314	2,107	1,374	2,417
East Leg				
Approach	237	550	212	1,104
Departure	205	903	124	1,122
Total	442	1,453	336	2,226
West Leg				
Approach	236	595	157	910
Departure	125	441	186	866
Total	361	1,036	343	1,776
Total Approaches				
Approach	1,721	3,643	1,670	4,850
Departure	1,721	3,643	1,670	4,850
Total	3,442	7,286	3,340	9,700



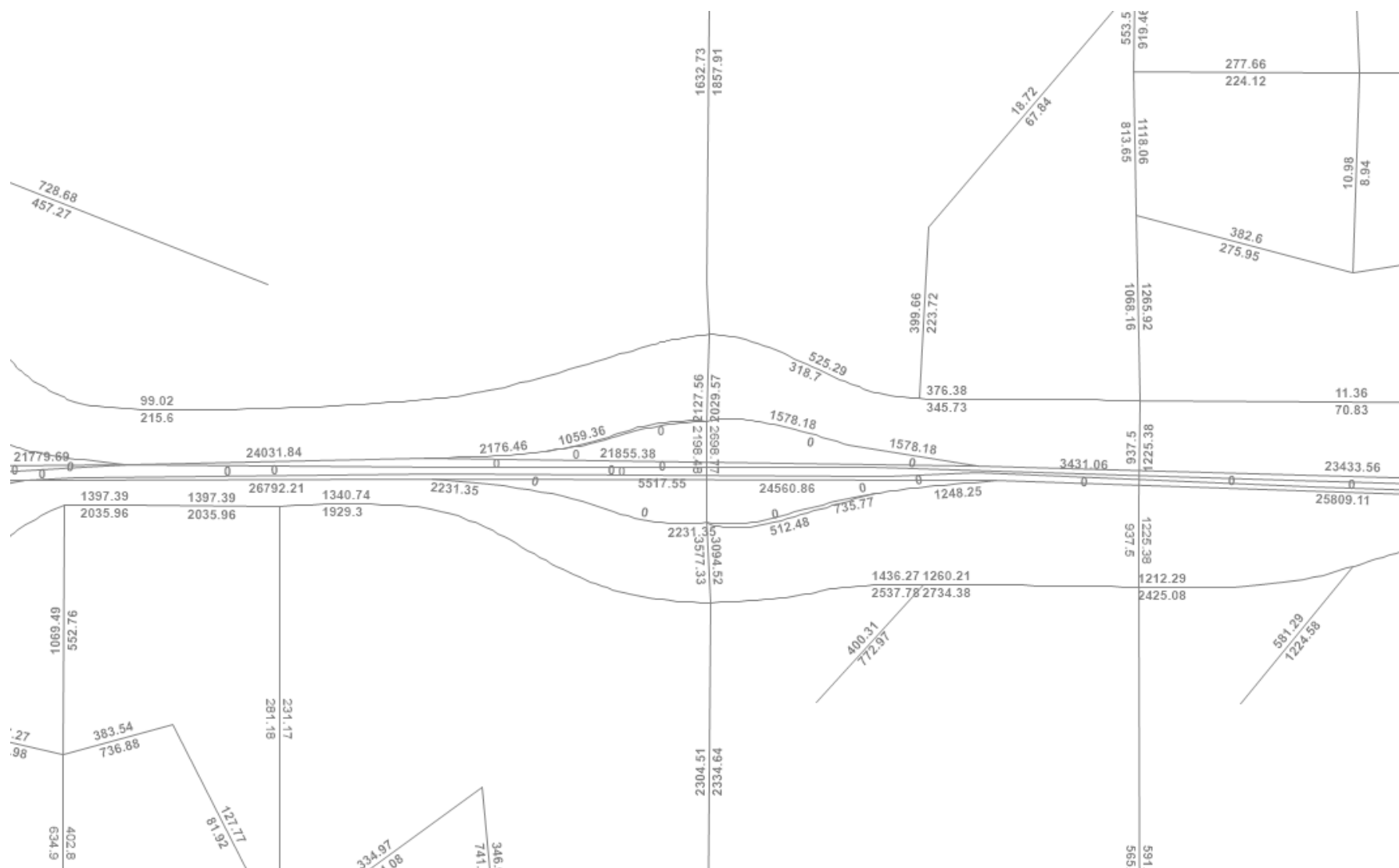
YEAR 2012 AM



YEAR 2012 PM



YEAR 2040 AM



YEAR 2040 PM

Queues

SR-210/Alder Avenue Feasibility Study Report

1: Alder Avenue & Casmalia Street

Existing Without Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	14	55	149	622	82	15	94	496	16	136	13
v/c Ratio	0.08	0.26	0.45	0.93	0.09	0.02	0.42	0.31	0.09	0.11	0.02
Control Delay	38.2	39.5	8.4	50.5	13.7	0.1	36.1	5.1	38.3	23.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	39.5	8.4	50.5	13.7	0.1	36.1	5.1	38.3	23.8	0.1
Queue Length 50th (ft)	7	29	0	330	23	0	43	19	9	29	0
Queue Length 95th (ft)	24	59	31	#488	53	0	87	53	26	51	0
Internal Link Dist (ft)		419			1315			439		376	
Turn Bay Length (ft)	300		50	300		300	115		220		800
Base Capacity (vph)	240	380	463	681	917	848	240	1586	240	1190	621
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.14	0.32	0.91	0.09	0.02	0.39	0.31	0.07	0.11	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	47	127	529	70	13	80	112	309	14	116	11
Future Volume (veh/h)	12	47	127	529	70	13	80	112	309	14	116	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	14	55	149	622	82	15	94	132	364	16	136	13
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	72	197	167	671	826	700	428	712	635	77	722	322
Arrive On Green	0.04	0.10	0.10	0.37	0.43	0.43	0.24	0.39	0.39	0.04	0.20	0.20
Sat Flow, veh/h	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	3610	1610
Grp Volume(v), veh/h	14	55	149	622	82	15	94	132	364	16	136	13
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	1805	1610
Q Serve(g_s), s	0.7	2.4	5.3	29.6	2.3	0.5	3.8	4.3	15.9	0.8	2.8	0.5
Cycle Q Clear(g_c), s	0.7	2.4	5.3	29.6	2.3	0.5	3.8	4.3	15.9	0.8	2.8	0.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	72	197	167	671	826	700	428	712	635	77	722	322
V/C Ratio(X)	0.20	0.28	0.89	0.93	0.10	0.02	0.22	0.19	0.57	0.21	0.19	0.04
Avail Cap(c_a), veh/h	241	380	322	684	844	716	428	712	635	241	722	322
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	37.2	16.8	27.1	15.0	14.5	27.7	17.8	21.3	41.6	29.9	21.1
Incr Delay (d2), s/veh	1.3	0.8	15.0	18.6	0.1	0.0	0.3	0.6	3.7	1.3	0.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.1	3.8	15.6	1.0	0.2	1.6	1.9	6.4	0.4	1.3	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	38.0	31.8	45.7	15.1	14.5	27.9	18.4	25.0	43.0	30.5	21.4
LnGrp LOS	D	D	C	D	B	B	C	B	C	D	C	C
Approach Vol, veh/h		218			719			590			165	
Approach Delay, s/veh		34.1			41.6			24.0			31.0	
Approach LOS		C			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.8	37.5	35.4	11.3	23.3	20.0	5.6	41.1				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	16.5	32.5	16.5	10.5	16.5	10.5	38.5				
Max Q Clear Time (g_c+I1), s	2.8	17.9	31.6	7.3	5.8	4.8	2.7	4.3				
Green Ext Time (p_c), s	0.0	0.0	0.2	0.5	0.1	0.6	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	33.4
HCM 6th LOS	C

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	232	116	426	461	878
v/c Ratio	0.66	0.29	0.63	0.17	0.59
Control Delay	42.4	8.7	20.2	1.3	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	8.7	20.2	1.3	2.9
Queue Length 50th (ft)	122	3	150	6	0
Queue Length 95th (ft)	185	43	227	15	m0
Internal Link Dist (ft)		281		551	439
Turn Bay Length (ft)			125		
Base Capacity (vph)	421	464	681	2746	1499
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.55	0.25	0.63	0.17	0.59

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	204	6	96	375	406	0	0	167	605
Future Volume (veh/h)	0	0	0	204	6	96	375	406	0	0	167	605
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				232	7	109	426	461	0	0	190	688
Peak Hour Factor				0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				307	17	259	799	2838	0	0	582	519
Arrive On Green				0.17	0.17	0.17	0.15	0.26	0.00	0.00	0.11	0.11
Sat Flow, veh/h				1810	98	1527	1810	3705	0	0	1900	1610
Grp Volume(v), veh/h				232	0	116	426	461	0	0	190	688
Grp Sat Flow(s),veh/h/ln				1810	0	1625	1810	1805	0	0	1805	1610
Q Serve(g_s), s				11.0	0.0	5.7	19.6	8.9	0.0	0.0	8.8	29.0
Cycle Q Clear(g_c), s				11.0	0.0	5.7	19.6	8.9	0.0	0.0	8.8	29.0
Prop In Lane				1.00		0.94	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				307	0	275	799	2838	0	0	582	519
V/C Ratio(X)				0.76	0.00	0.42	0.53	0.16	0.00	0.00	0.33	1.33
Avail Cap(c_a), veh/h				422	0	379	799	2838	0	0	582	519
HCM Platoon Ratio				1.00	1.00	1.00	0.33	0.33	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.93	0.93	0.00	0.00	0.61	0.61
Uniform Delay (d), s/veh				35.6	0.0	33.4	29.8	10.4	0.0	0.0	31.2	40.2
Incr Delay (d2), s/veh				5.1	0.0	1.0	0.6	0.1	0.0	0.0	0.9	154.9
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				5.2	0.0	2.3	9.6	3.6	0.0	0.0	4.2	34.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				40.7	0.0	34.4	30.5	10.5	0.0	0.0	32.1	195.1
LnGrp LOS				D	A	C	C	B	A	A	C	F
Approach Vol, veh/h					348			887			878	
Approach Delay, s/veh					38.6			20.1			159.8	
Approach LOS					D			C			F	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	72.7			41.7			31.0			17.3		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	63.5			32.5			27.5			19.5		
Max Q Clear Time (g_c+I1), s	10.9			21.6			31.0			13.0		
Green Ext Time (p_c), s	3.5			1.1			0.0			0.8		
Intersection Summary												
HCM 6th Ctrl Delay	81.2											
HCM 6th LOS	F											

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

	→	↘	↑	↙	↓
Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	341	335	754	74	320
v/c Ratio	0.67	0.48	0.39	0.34	0.13
Control Delay	34.6	4.9	5.8	55.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.6	4.9	5.8	55.0	4.2
Queue Length 50th (ft)	171	0	22	45	17
Queue Length 95th (ft)	228	53	67	m79	31
Internal Link Dist (ft)	960		402		551
Turn Bay Length (ft)		400		125	
Base Capacity (vph)	704	832	1958	280	2435
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.40	0.39	0.26	0.13

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	1	315	0	0	0	0	461	248	70	301	0
Future Volume (veh/h)	320	1	315	0	0	0	0	461	248	70	301	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No						No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	340	1	335				0	490	264	74	320	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	477	1	426				0	1331	714	149	2495	0
Arrive On Green	0.26	0.26	0.26				0.00	1.00	1.00	0.16	1.00	0.00
Sat Flow, veh/h	1804	5	1610				0	2364	1217	1810	3705	0
Grp Volume(v), veh/h	341	0	335				0	389	365	74	320	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1681	1810	1805	0
Q Serve(g_s), s	15.4	0.0	17.4				0.0	0.0	0.0	3.3	0.0	0.0
Cycle Q Clear(g_c), s	15.4	0.0	17.4				0.0	0.0	0.0	3.3	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.72	1.00		0.00
Lane Grp Cap(c), veh/h	479	0	426				0	1059	986	149	2495	0
V/C Ratio(X)	0.71	0.00	0.79				0.00	0.37	0.37	0.50	0.13	0.00
Avail Cap(c_a), veh/h	704	0	626				0	1059	986	281	2495	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.97	0.97	0.77	0.77	0.00
Uniform Delay (d), s/veh	30.0	0.0	30.7				0.0	0.0	0.0	35.9	0.0	0.0
Incr Delay (d2), s/veh	2.0	0.0	4.0				0.0	1.0	1.0	2.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.0	7.0				0.0	0.3	0.3	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.0	0.0	34.8				0.0	1.0	1.0	37.9	0.1	0.0
LnGrp LOS	C	A	C				A	A	A	D	A	A
Approach Vol, veh/h	676						754			394		
Approach Delay, s/veh	33.4						1.0			7.2		
Approach LOS	C						A			A		
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	9.4	54.8		25.8			64.2					
Change Period (Y+Rc), s	3.5	3.5		3.5			3.5					
Max Green Setting (Gmax), s	12.5	33.5		33.5			49.5					
Max Q Clear Time (g_c+I1), s	5.3	2.0		19.4			2.0					
Green Ext Time (p_c), s	0.1	5.5		2.9			2.3					
Intersection Summary												
HCM 6th Ctrl Delay				14.3								
HCM 6th LOS				B								

Queues
4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	66	124	61	93	159	37	601	34	60	572	23
v/c Ratio	0.29	0.30	0.20	0.43	0.37	0.20	0.28	0.03	0.27	0.47	0.02
Control Delay	38.2	38.1	1.5	43.0	20.4	39.2	11.1	0.1	34.2	8.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	38.2	38.1	1.5	43.0	20.4	39.2	11.1	0.1	34.2	9.2	0.1
Queue Length 50th (ft)	34	34	0	49	20	20	93	0	33	125	0
Queue Length 95th (ft)	72	59	0	96	48	48	140	0	66	308	m0
Internal Link Dist (ft)	786			1237			212			402	
Turn Bay Length (ft)	315		50	315		115		50	275		
Base Capacity (vph)	250	722	429	240	732	240	2161	1020	240	1224	1087
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	181	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.17	0.14	0.39	0.22	0.15	0.28	0.03	0.25	0.55	0.02

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	117	57	87	68	82	35	565	32	56	538	22
Future Volume (veh/h)	62	117	57	87	68	82	35	565	32	56	538	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	66	124	61	93	72	87	37	601	34	60	572	23
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	153	341	152	157	174	155	115	1604	716	516	1266	1073
Arrive On Green	0.08	0.09	0.09	0.09	0.10	0.10	0.06	0.44	0.44	0.29	0.67	0.67
Sat Flow, veh/h	1810	3610	1610	1810	1805	1610	1810	3610	1610	1810	1900	1610
Grp Volume(v), veh/h	66	124	61	93	72	87	37	601	34	60	572	23
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1810	1900	1610
Q Serve(g_s), s	3.1	2.9	3.2	4.5	3.4	4.6	1.8	10.0	0.8	2.2	12.9	0.2
Cycle Q Clear(g_c), s	3.1	2.9	3.2	4.5	3.4	4.6	1.8	10.0	0.8	2.2	12.9	0.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	153	341	152	157	174	155	115	1604	716	516	1266	1073
V/C Ratio(X)	0.43	0.36	0.40	0.59	0.41	0.56	0.32	0.37	0.05	0.12	0.45	0.02
Avail Cap(c_a), veh/h	241	722	322	241	361	322	241	1604	716	516	1266	1073
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96
Uniform Delay (d), s/veh	39.1	38.2	38.4	39.6	38.3	38.8	40.3	16.7	7.0	23.8	7.2	1.3
Incr Delay (d2), s/veh	1.9	0.7	1.7	3.5	1.6	3.1	1.6	0.7	0.1	0.1	1.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.3	1.3	2.1	1.6	1.9	0.8	4.1	0.4	0.9	4.9	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.0	38.9	40.1	43.1	39.8	42.0	41.9	17.3	7.2	23.9	8.3	1.4
LnGrp LOS	D	D	D	D	D	D	D	B	A	C	A	A
Approach Vol, veh/h	251				252				672			
Approach Delay, s/veh	39.7				41.8				18.2			
Approach LOS	D				D				B			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.7	42.0	9.8	10.5	7.7	62.0	9.6	10.7				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	38.5	10.5	16.5	10.5	38.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	4.2	12.0	6.5	5.2	3.8	14.9	5.1	6.6				
Green Ext Time (p_c), s	0.0	4.5	0.1	0.6	0.0	4.0	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	21.3
HCM 6th LOS	C

Queues

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	19	251	210	367	132	15	130	460	30	152	20
v/c Ratio	0.11	0.67	0.46	0.76	0.16	0.02	0.54	0.31	0.17	0.13	0.03
Control Delay	38.4	42.6	10.8	40.2	15.3	0.1	38.0	6.2	38.9	25.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	42.6	10.8	40.2	15.3	0.1	38.0	6.2	38.9	25.2	0.1
Queue Length 50th (ft)	10	132	16	189	38	0	56	0	16	33	0
Queue Length 95th (ft)	31	207	74	271	80	0	121	65	42	62	0
Internal Link Dist (ft)		419			1315			439		376	
Turn Bay Length (ft)	300		50	300		300	115		220		800
Base Capacity (vph)	240	427	499	581	854	799	240	1466	240	1127	595
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.59	0.42	0.63	0.15	0.02	0.54	0.31	0.13	0.13	0.03
Intersection Summary											

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	233	195	341	123	14	121	97	331	28	141	19
Future Volume (veh/h)	18	233	195	341	123	14	121	97	331	28	141	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	19	251	210	367	132	15	130	104	356	30	152	20
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	83	334	283	435	703	596	473	789	704	104	842	376
Arrive On Green	0.05	0.18	0.18	0.24	0.37	0.37	0.26	0.44	0.44	0.06	0.23	0.23
Sat Flow, veh/h	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	3610	1610
Grp Volume(v), veh/h	19	251	210	367	132	15	130	104	356	30	152	20
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	1805	1610
Q Serve(g_s), s	0.9	11.3	6.5	17.4	4.2	0.5	5.1	3.1	14.4	1.4	3.0	0.7
Cycle Q Clear(g_c), s	0.9	11.3	6.5	17.4	4.2	0.5	5.1	3.1	14.4	1.4	3.0	0.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	83	334	283	435	703	596	473	789	704	104	842	376
V/C Ratio(X)	0.23	0.75	0.74	0.84	0.19	0.03	0.27	0.13	0.51	0.29	0.18	0.05
Avail Cap(c_a), veh/h	241	422	358	583	781	662	473	789	704	241	842	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.4	35.2	12.2	32.6	19.2	18.0	26.4	15.1	18.3	40.6	27.6	18.8
Incr Delay (d2), s/veh	1.4	5.6	6.1	8.4	0.1	0.0	0.3	0.3	2.6	1.5	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.6	4.5	8.4	1.8	0.2	2.2	1.3	5.6	0.7	1.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.8	40.9	18.3	40.9	19.3	18.0	26.8	15.5	20.9	42.1	28.1	19.1
LnGrp LOS	D	D	B	D	B	B	C	B	C	D	C	B
Approach Vol, veh/h		480			514			590			202	
Approach Delay, s/veh		31.1			34.7			21.2			29.3	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.2	41.3	23.6	17.8	25.5	23.0	6.1	35.3				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	19.5	27.5	18.5	10.5	19.5	10.5	35.5				
Max Q Clear Time (g_c+I1), s	3.4	16.4	19.4	13.3	7.1	5.0	2.9	6.2				
Green Ext Time (p_c), s	0.0	0.9	0.8	1.0	0.1	0.7	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay			28.7									
HCM 6th LOS			C									

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	231	72	338	541	753
v/c Ratio	0.63	0.19	0.54	0.20	0.49
Control Delay	40.4	8.8	19.1	1.8	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	8.8	19.1	1.8	6.1
Queue Length 50th (ft)	121	1	107	10	0
Queue Length 95th (ft)	181	33	182	31	54
Internal Link Dist (ft)		281		551	439
Turn Bay Length (ft)			125		
Base Capacity (vph)	481	484	621	2721	1537
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.48	0.15	0.54	0.20	0.49
Intersection Summary					

HCM 6th Signalized Intersection Summary 2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report Existing Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	208	3	62	304	487	0	0	275	402
Future Volume (veh/h)	0	0	0	208	3	62	304	487	0	0	275	402
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				231	3	69	338	541	0	0	306	447
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				306	11	262	800	2840	0	0	582	519
Arrive On Green				0.17	0.17	0.17	0.15	0.26	0.00	0.00	0.11	0.11
Sat Flow, veh/h				1810	68	1553	1810	3705	0	0	1900	1610
Grp Volume(v), veh/h				231	0	72	338	541	0	0	306	447
Grp Sat Flow(s),veh/h/ln				1810	0	1620	1810	1805	0	0	1805	1610
Q Serve(g_s), s				10.9	0.0	3.5	15.3	10.5	0.0	0.0	14.4	24.6
Cycle Q Clear(g_c), s				10.9	0.0	3.5	15.3	10.5	0.0	0.0	14.4	24.6
Prop In Lane				1.00		0.96	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				306	0	274	800	2840	0	0	582	519
V/C Ratio(X)				0.76	0.00	0.26	0.42	0.19	0.00	0.00	0.53	0.86
Avail Cap(c_a), veh/h				483	0	432	800	2840	0	0	582	519
HCM Platoon Ratio				1.00	1.00	1.00	0.33	0.33	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.90	0.90	0.00	0.00	0.82	0.82
Uniform Delay (d), s/veh				35.6	0.0	32.5	28.0	11.0	0.0	0.0	33.7	38.2
Incr Delay (d2), s/veh				3.8	0.0	0.5	0.3	0.1	0.0	0.0	2.8	14.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				5.1	0.0	1.4	7.4	4.9	0.0	0.0	7.4	12.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				39.4	0.0	33.0	28.3	11.1	0.0	0.0	36.5	52.6
LnGrp LOS				D	A	C	C	B	A	A	D	D
Approach Vol, veh/h					303			879			753	
Approach Delay, s/veh					37.9			17.7			46.1	
Approach LOS					D			B			D	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	72.8			41.8			31.0			17.2		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	60.5			29.5			27.5			22.5		
Max Q Clear Time (g_c+I1), s	12.5			17.3			26.6			12.9		
Green Ext Time (p_c), s	4.2			0.8			0.5			0.8		
Intersection Summary												
HCM 6th Ctrl Delay	31.9											
HCM 6th LOS	C											

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

					
Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	428	341	697	154	377
v/c Ratio	0.71	0.45	0.44	0.55	0.17
Control Delay	32.6	4.0	10.7	57.1	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.6	4.0	10.7	57.1	4.4
Queue Length 50th (ft)	211	0	75	92	12
Queue Length 95th (ft)	272	49	46	140	45
Internal Link Dist (ft)	960		402		551
Turn Bay Length (ft)		400		125	
Base Capacity (vph)	764	878	1600	340	2255
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	4	0	0	43
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.56	0.39	0.44	0.45	0.17
Intersection Summary					

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	388	2	310	0	0	0	0	403	231	140	343	0
Future Volume (veh/h)	388	2	310	0	0	0	0	403	231	140	343	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	426	2	341				0	443	254	154	377	0
Peak Hour Factor	0.91	0.91	0.91				0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	534	3	477				0	1152	655	212	2379	0
Arrive On Green	0.30	0.30	0.30				0.00	1.00	1.00	0.23	1.00	0.00
Sat Flow, veh/h	1801	8	1610				0	2312	1261	1810	3705	0
Grp Volume(v), veh/h	428	0	341				0	360	337	154	377	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1673	1810	1805	0
Q Serve(g_s), s	19.6	0.0	17.0				0.0	0.0	0.0	7.1	0.0	0.0
Cycle Q Clear(g_c), s	19.6	0.0	17.0				0.0	0.0	0.0	7.1	0.0	0.0
Prop In Lane	1.00		1.00				0.00		0.75	1.00		0.00
Lane Grp Cap(c), veh/h	537	0	477				0	938	869	212	2379	0
V/C Ratio(X)	0.80	0.00	0.71				0.00	0.38	0.39	0.73	0.16	0.00
Avail Cap(c_a), veh/h	764	0	680				0	938	869	342	2379	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.98	0.98	0.84	0.84	0.00
Uniform Delay (d), s/veh	29.2	0.0	28.3				0.0	0.0	0.0	33.1	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.0	2.0				0.0	1.2	1.3	3.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	0.0	6.6				0.0	0.3	0.3	3.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.1	0.0	30.3				0.0	1.2	1.3	37.0	0.1	0.0
LnGrp LOS	C	A	C				A	A	A	D	A	A
Approach Vol, veh/h		769						697			531	
Approach Delay, s/veh		31.8						1.2			10.8	
Approach LOS		C						A			B	
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	12.6	48.7		28.7			61.3					
Change Period (Y+Rc), s	3.5	3.5		3.5			3.5					
Max Green Setting (Gmax), s	15.5	27.5		36.5			46.5					
Max Q Clear Time (g_c+I1), s	9.1	2.0		21.6			2.0					
Green Ext Time (p_c), s	0.2	4.8		3.6			2.8					
Intersection Summary												
HCM 6th Ctrl Delay			15.6									
HCM 6th LOS			B									

Queues

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	55	62	53	77	153	36	603	65	8	659	43
v/c Ratio	0.27	0.16	0.21	0.36	0.36	0.19	0.24	0.06	0.04	0.53	0.04
Control Delay	39.6	37.0	4.5	40.8	31.8	39.1	6.8	0.1	32.0	9.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay	39.6	37.0	4.5	40.8	31.8	39.1	6.8	0.1	32.0	9.2	0.1
Queue Length 50th (ft)	29	17	0	41	34	19	52	0	5	113	1
Queue Length 95th (ft)	63	35	13	81	62	47	137	0	m14	363	0
Internal Link Dist (ft)		786			1237		212			402	
Turn Bay Length (ft)	315		50	315		115		50	275		
Base Capacity (vph)	242	722	395	244	724	240	2534	1173	240	1239	1099
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	115	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.09	0.13	0.32	0.21	0.15	0.24	0.06	0.03	0.59	0.04

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	57	49	71	113	28	33	555	60	7	606	40
Future Volume (veh/h)	51	57	49	71	113	28	33	555	60	7	606	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	55	62	53	77	123	30	36	603	65	8	659	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	150	341	152	150	273	65	523	1604	716	523	844	716
Arrive On Green	0.08	0.09	0.09	0.08	0.09	0.09	0.29	0.44	0.44	0.58	0.89	0.89
Sat Flow, veh/h	1810	3610	1610	1810	2896	686	1810	3610	1610	1810	1900	1610
Grp Volume(v), veh/h	55	62	53	77	75	78	36	603	65	8	659	43
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1777	1810	1805	1610	1810	1900	1610
Q Serve(g_s), s	2.6	1.4	1.7	3.7	3.5	3.7	1.3	10.0	1.5	0.2	11.3	0.3
Cycle Q Clear(g_c), s	2.6	1.4	1.7	3.7	3.5	3.7	1.3	10.0	1.5	0.2	11.3	0.3
Prop In Lane	1.00		1.00	1.00		0.39	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	150	341	152	150	170	168	523	1604	716	523	844	716
V/C Ratio(X)	0.37	0.18	0.35	0.51	0.44	0.46	0.07	0.38	0.09	0.02	0.78	0.06
Avail Cap(c_a), veh/h	241	722	322	241	361	355	523	1604	716	523	844	716
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.96	0.96
Uniform Delay (d), s/veh	39.0	37.5	13.5	39.5	38.5	38.6	23.2	16.7	7.3	13.5	3.4	2.8
Incr Delay (d2), s/veh	1.5	0.3	1.4	2.7	1.8	2.0	0.1	0.7	0.3	0.0	6.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.6	1.1	1.7	1.6	1.7	0.6	4.1	0.8	0.1	3.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.5	37.8	14.9	42.2	40.3	40.6	23.3	17.3	7.6	13.5	10.2	2.9
LnGrp LOS	D	D	B	D	D	D	C	B	A	B	B	A
Approach Vol, veh/h		170			230			704			710	
Approach Delay, s/veh		31.5			41.0			16.7			9.8	
Approach LOS		C			D			B			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	28.0	42.0	9.5	10.5	28.0	42.0	9.5	10.5				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	38.5	10.5	16.5	10.5	38.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	2.2	12.0	5.7	3.7	3.3	13.3	4.6	5.7				
Green Ext Time (p_c), s	0.0	4.6	0.1	0.3	0.0	5.0	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	18.5
HCM 6th LOS	B

Queues

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	14	55	149	622	97	94	132	364	16	136	13
v/c Ratio	0.07	0.24	0.33	0.67	0.16	0.23	0.07	0.25	0.08	0.08	0.02
Control Delay	33.1	34.1	6.0	29.8	15.2	33.2	13.3	2.0	31.7	16.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	34.1	6.0	29.8	15.2	33.2	13.3	2.0	31.7	16.1	0.0
Queue Length 50th (ft)	6	26	0	139	25	19	11	0	7	22	0
Queue Length 95th (ft)	22	53	33	174	58	39	46	83	23	42	0
Internal Link Dist (ft)		419			1315		439			376	
Turn Bay Length (ft)	300		50	300		115			220		800
Base Capacity (vph)	270	427	505	1050	749	525	2008	1434	270	1624	809
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.13	0.30	0.59	0.13	0.18	0.07	0.25	0.06	0.08	0.02

Intersection Summary

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	47	127	529	70	13	80	112	309	14	116	11
Future Volume (veh/h)	12	47	127	529	70	13	80	112	309	14	116	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	14	55	149	622	82	15	94	132	364	16	136	13
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	76	244	360	802	492	90	335	812	730	576	1616	721
Arrive On Green	0.04	0.13	0.13	0.23	0.31	0.31	0.10	0.22	0.22	0.32	0.45	0.45
Sat Flow, veh/h	1810	1900	1610	3510	1563	286	3510	3610	1610	1810	3610	1610
Grp Volume(v), veh/h	14	55	149	622	0	97	94	132	364	16	136	13
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1755	0	1849	1755	1805	1610	1810	1805	1610
Q Serve(g_s), s	0.6	2.1	6.3	13.3	0.0	3.0	2.0	2.4	3.1	0.5	1.7	0.4
Cycle Q Clear(g_c), s	0.6	2.1	6.3	13.3	0.0	3.0	2.0	2.4	3.1	0.5	1.7	0.4
Prop In Lane	1.00		1.00	1.00		0.15	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	76	244	360	802	0	582	335	812	730	576	1616	721
V/C Ratio(X)	0.18	0.23	0.41	0.78	0.00	0.17	0.28	0.16	0.50	0.03	0.08	0.02
Avail Cap(c_a), veh/h	271	428	516	1053	0	693	527	812	730	576	1616	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.0	31.3	26.6	28.9	0.0	19.8	33.6	24.9	6.4	18.8	12.7	12.3
Incr Delay (d2), s/veh	1.1	0.5	0.8	2.7	0.0	0.1	0.4	0.4	2.4	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.0	0.1	5.7	0.0	1.3	0.9	1.0	2.5	0.2	0.7	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	31.8	27.3	31.6	0.0	20.0	34.1	25.4	8.8	18.8	12.8	12.3
LnGrp LOS	D	C	C	C	A	B	C	C	A	B	B	B
Approach Vol, veh/h		218			719			590			165	
Approach Delay, s/veh		29.1			30.1			16.5			13.3	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.5	20.0	20.3	12.3	9.6	37.8	5.4	27.2				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	16.5	22.5	16.5	10.5	16.5	10.5	28.5				
Max Q Clear Time (g_c+I1), s	2.5	5.1	15.3	8.3	4.0	3.7	2.6	5.0				
Green Ext Time (p_c), s	0.0	1.7	1.5	0.4	0.1	0.6	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay			23.6									
HCM 6th LOS			C									

Queues 2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report Existing With Interchange Improvements - AM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	232	116	426	461	534	344
v/c Ratio	0.43	0.34	0.59	0.16	0.28	0.35
Control Delay	32.8	10.0	25.0	2.1	1.0	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	10.0	25.0	2.1	1.0	1.4
Queue Length 50th (ft)	55	3	79	11	0	0
Queue Length 95th (ft)	81	42	110	41	0	0
Internal Link Dist (ft)		281		551	439	
Turn Bay Length (ft)			125			
Base Capacity (vph)	963	527	1400	2875	1911	979
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.22	0.30	0.16	0.28	0.35
Intersection Summary						

HCM 6th Signalized Intersection Summary 2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report Existing With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	204	6	96	375	406	0	0	167	605
Future Volume (veh/h)	0	0	0	204	6	96	375	406	0	0	167	605
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				232	7	109	426	461	0	0	190	688
Peak Hour Factor				0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				444	12	193	591	2973	0	0	1197	2030
Arrive On Green				0.13	0.13	0.13	0.34	1.00	0.00	0.00	1.00	1.00
Sat Flow, veh/h				3510	98	1527	3510	3705	0	0	1900	3220
Grp Volume(v), veh/h				232	0	116	426	461	0	0	190	688
Grp Sat Flow(s),veh/h/ln				1755	0	1625	1755	1805	0	0	1900	1610
Q Serve(g_s), s				4.9	0.0	5.4	8.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s				4.9	0.0	5.4	8.5	0.0	0.0	0.0	0.0	0.0
Prop In Lane				1.00		0.94	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				444	0	205	591	2973	0	0	1197	2030
V/C Ratio(X)				0.52	0.00	0.56	0.72	0.16	0.00	0.00	0.16	0.34
Avail Cap(c_a), veh/h				965	0	447	1404	2973	0	0	1197	2030
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.67	1.67
Upstream Filter(I)				1.00	0.00	1.00	0.95	0.95	0.00	0.00	0.84	0.84
Uniform Delay (d), s/veh				32.7	0.0	32.9	24.9	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh				1.0	0.0	2.4	1.6	0.1	0.0	0.0	0.2	0.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.1	0.0	2.2	3.1	0.0	0.0	0.0	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				33.6	0.0	35.3	26.5	0.1	0.0	0.0	0.2	0.4
LnGrp LOS				C	A	D	C	A	A	A	A	A
Approach Vol, veh/h					348			887			878	
Approach Delay, s/veh					34.2			12.8			0.4	
Approach LOS					C			B			A	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	67.9			15.5			52.4			12.1		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	52.5			30.5			18.5			20.5		
Max Q Clear Time (g_c+I1), s	2.0			10.5			2.0			7.4		
Green Ext Time (p_c), s	3.5			1.5			3.8			1.2		
Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									
Notes												

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour



Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	235	227	214	490	264	74	320
v/c Ratio	0.56	0.51	0.40	0.23	0.25	0.19	0.13
Control Delay	30.6	19.0	5.5	4.4	0.7	26.2	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.6	19.0	5.5	4.4	0.7	26.2	9.8
Queue Length 50th (ft)	108	65	0	17	0	20	55
Queue Length 95th (ft)	156	118	46	46	1	42	88
Internal Link Dist (ft)		960		402			551
Turn Bay Length (ft)			400		75	125	
Base Capacity (vph)	664	653	725	2145	1066	656	2546
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.35	0.30	0.23	0.25	0.11	0.13
Intersection Summary							

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	1	315	0	0	0	0	461	248	70	301	0
Future Volume (veh/h)	320	1	315	0	0	0	0	461	248	70	301	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No						No				No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	445	0	224				0	490	264	74	320	0
Peak Hour Factor	0.94	0.94	0.94				0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	728	0	324				0	2290	1021	314	2703	0
Arrive On Green	0.20	0.00	0.20				0.00	1.00	1.00	0.18	1.00	0.00
Sat Flow, veh/h	3619	0	1610				0	3705	1610	3510	3705	0
Grp Volume(v), veh/h	445	0	224				0	490	264	74	320	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1610	1755	1805	0
Q Serve(g_s), s	9.0	0.0	10.3				0.0	0.0	0.0	1.4	0.0	0.0
Cycle Q Clear(g_c), s	9.0	0.0	10.3				0.0	0.0	0.0	1.4	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	728	0	324				0	2290	1021	314	2703	0
V/C Ratio(X)	0.61	0.00	0.69				0.00	0.21	0.26	0.24	0.12	0.00
Avail Cap(c_a), veh/h	1402	0	624				0	2290	1021	658	2703	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.97	0.97	0.95	0.95	0.00
Uniform Delay (d), s/veh	29.1	0.0	29.6				0.0	0.0	0.0	30.5	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	2.6				0.0	0.2	0.6	0.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	4.1				0.0	0.1	0.2	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.9	0.0	32.3				0.0	0.2	0.6	30.9	0.1	0.0
LnGrp LOS	C	A	C				A	A	A	C	A	A
Approach Vol, veh/h	669						754			394		
Approach Delay, s/veh	30.7						0.3			5.9		
Approach LOS	C						A			A		
Timer - Assigned Phs	1	2	4		6							
Phs Duration (G+Y+Rc), s	9.1	52.7	18.1		61.9							
Change Period (Y+Rc), s	3.5	3.5	3.5		3.5							
Max Green Setting (Gmax), s	13.5	26.5	29.5		43.5							
Max Q Clear Time (g_c+I1), s	3.4	2.0	12.3		2.0							
Green Ext Time (p_c), s	0.1	4.4	2.3		2.3							

Intersection Summary

HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Queues

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	66	124	61	93	72	87	37	601	34	60	595
v/c Ratio	0.26	0.28	0.19	0.39	0.18	0.18	0.18	0.28	0.03	0.24	0.26
Control Delay	32.3	33.2	1.2	36.4	33.1	4.7	33.8	11.9	0.1	37.2	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	33.2	1.2	36.4	33.1	4.7	33.8	11.9	0.1	37.2	12.6
Queue Length 50th (ft)	30	30	0	43	17	0	17	91	0	26	106
Queue Length 95th (ft)	64	53	0	86	36	25	44	138	0	63	169
Internal Link Dist (ft)		786			1237			212			402
Turn Bay Length (ft)	315		50	315			115		50	275	
Base Capacity (vph)	283	812	479	270	812	495	270	2121	1011	270	2302
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.15	0.13	0.34	0.09	0.18	0.14	0.28	0.03	0.22	0.26
Intersection Summary											

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	117	57	87	68	82	35	565	32	56	538	22
Future Volume (veh/h)	62	117	57	87	68	82	35	565	32	56	538	22
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	66	124	61	93	72	87	37	601	34	60	572	23
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	172	384	171	172	384	692	123	1354	604	586	2231	90
Arrive On Green	0.10	0.11	0.11	0.10	0.11	0.11	0.07	0.38	0.38	0.65	1.00	1.00
Sat Flow, veh/h	1810	3610	1610	1810	3610	1610	1810	3610	1610	1810	3537	142
Grp Volume(v), veh/h	66	124	61	93	72	87	37	601	34	60	292	303
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1810	1805	1874
Q Serve(g_s), s	2.7	2.5	2.8	3.9	1.5	0.0	1.6	10.0	0.8	1.0	0.0	0.0
Cycle Q Clear(g_c), s	2.7	2.5	2.8	3.9	1.5	0.0	1.6	10.0	0.8	1.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	172	384	171	172	384	692	123	1354	604	586	1139	1182
V/C Ratio(X)	0.38	0.32	0.36	0.54	0.19	0.13	0.30	0.44	0.06	0.10	0.26	0.26
Avail Cap(c_a), veh/h	271	812	362	271	812	883	271	1354	604	586	1139	1182
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98
Uniform Delay (d), s/veh	34.0	33.1	33.2	34.5	32.6	13.7	35.5	18.7	8.0	9.7	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.5	1.3	2.6	0.2	0.1	1.4	1.1	0.2	0.1	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	1.1	1.1	1.8	0.6	0.9	0.7	4.2	0.4	0.4	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	33.6	34.5	37.1	32.8	13.8	36.8	19.8	8.2	9.8	0.5	0.5
LnGrp LOS	D	C	C	D	C	B	D	B	A	A	A	A
Approach Vol, veh/h		251			252			672			655	
Approach Delay, s/veh		34.3			27.9			20.2			1.4	
Approach LOS		C			C			C			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	27.9	32.0	9.6	10.5	7.4	52.5	9.6	10.5				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	28.5	10.5	16.5	10.5	28.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	3.0	12.0	5.9	4.8	3.6	2.0	4.7	3.5				
Green Ext Time (p_c), s	0.1	3.8	0.1	0.6	0.0	3.8	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	16.4
HCM 6th LOS	B

Queues

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	19	251	210	367	147	130	104	356	30	152	20
v/c Ratio	0.10	0.66	0.29	0.53	0.21	0.25	0.06	0.29	0.15	0.12	0.03
Control Delay	33.3	38.4	4.6	31.1	17.2	31.6	16.1	2.0	33.7	19.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.3	38.4	4.6	31.1	17.2	31.6	16.1	2.0	33.7	19.8	0.1
Queue Length 50th (ft)	9	114	7	85	41	30	16	26	14	27	0
Queue Length 95th (ft)	28	187	47	117	88	47	34	0	38	53	0
Internal Link Dist (ft)		419			1315		439			376	
Turn Bay Length (ft)	300		50	300		115			220		800
Base Capacity (vph)	270	427	721	1050	733	525	1698	1247	270	1276	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.59	0.29	0.35	0.20	0.25	0.06	0.29	0.11	0.12	0.03

Intersection Summary

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

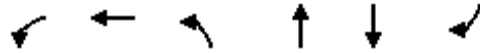
Existing With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	233	195	341	123	14	121	97	331	28	141	19
Future Volume (veh/h)	18	233	195	341	123	14	121	97	331	28	141	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	19	251	210	367	132	15	130	104	356	30	152	20
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	88	342	836	546	481	55	1191	1815	1060	111	812	362
Arrive On Green	0.05	0.18	0.18	0.16	0.29	0.29	0.34	0.50	0.50	0.06	0.22	0.22
Sat Flow, veh/h	1810	1900	1610	3510	1675	190	3510	3610	1610	1810	3610	1610
Grp Volume(v), veh/h	19	251	210	367	0	147	130	104	356	30	152	20
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1755	0	1866	1755	1805	1610	1810	1805	1610
Q Serve(g_s), s	0.8	10.0	0.0	7.9	0.0	4.9	2.0	1.2	1.5	1.3	2.7	0.6
Cycle Q Clear(g_c), s	0.8	10.0	0.0	7.9	0.0	4.9	2.0	1.2	1.5	1.3	2.7	0.6
Prop In Lane	1.00		1.00	1.00		0.10	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	88	342	836	546	0	535	1191	1815	1060	111	812	362
V/C Ratio(X)	0.21	0.73	0.25	0.67	0.00	0.27	0.11	0.06	0.34	0.27	0.19	0.06
Avail Cap(c_a), veh/h	271	428	908	1053	0	700	1191	1815	1060	271	812	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.6	31.0	10.6	31.9	0.0	22.1	18.1	10.2	2.0	35.8	25.1	16.5
Incr Delay (d2), s/veh	1.2	4.9	0.2	1.4	0.0	0.3	0.0	0.1	0.8	1.3	0.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.9	1.9	3.4	0.0	2.1	0.8	0.5	0.8	0.6	1.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.8	35.9	10.8	33.3	0.0	22.4	18.2	10.2	2.9	37.1	25.6	16.8
LnGrp LOS	D	D	B	C	A	C	B	B	A	D	C	B
Approach Vol, veh/h		480			514			590			202	
Approach Delay, s/veh		25.0			30.2			7.5			26.4	
Approach LOS		C			C			A			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.9	42.2	14.4	16.4	29.1	20.0	5.9	25.0				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	16.5	22.5	16.5	10.5	16.5	10.5	28.5				
Max Q Clear Time (g_c+I1), s	3.3	3.5	9.9	12.0	4.0	4.7	2.8	6.9				
Green Ext Time (p_c), s	0.0	1.6	1.1	0.9	0.2	0.7	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay			20.9									
HCM 6th LOS			C									

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	231	72	338	541	516	237
v/c Ratio	0.43	0.23	0.53	0.19	0.26	0.25
Control Delay	32.7	10.3	23.5	1.3	1.6	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	10.3	23.5	1.3	1.6	0.8
Queue Length 50th (ft)	54	1	55	11	1	0
Queue Length 95th (ft)	82	34	101	18	21	0
Internal Link Dist (ft)		281		551	439	
Turn Bay Length (ft)			125			
Base Capacity (vph)	875	458	1313	2875	1987	963
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.26	0.19	0.26	0.25
Intersection Summary						

HCM 6th Signalized Intersection Summary 2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report Existing With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔↔	↔		↔↔	↔↔			↔↔	↔
Traffic Volume (veh/h)	0	0	0	208	3	62	304	487	0	0	275	402
Future Volume (veh/h)	0	0	0	208	3	62	304	487	0	0	275	402
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				231	3	69	338	541	0	0	306	447
Peak Hour Factor				0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				412	8	182	502	3006	0	0	1263	2140
Arrive On Green				0.12	0.12	0.12	0.29	1.00	0.00	0.00	1.00	1.00
Sat Flow, veh/h				3510	68	1553	3510	3705	0	0	1900	3220
Grp Volume(v), veh/h				231	0	72	338	541	0	0	306	447
Grp Sat Flow(s),veh/h/ln				1755	0	1620	1755	1805	0	0	1900	1610
Q Serve(g_s), s				5.0	0.0	3.3	6.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s				5.0	0.0	3.3	6.8	0.0	0.0	0.0	0.0	0.0
Prop In Lane				1.00		0.96	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				412	0	190	502	3006	0	0	1263	2140
V/C Ratio(X)				0.56	0.00	0.38	0.67	0.18	0.00	0.00	0.24	0.21
Avail Cap(c_a), veh/h				878	0	405	1316	3006	0	0	1263	2140
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.67	1.67
Upstream Filter(I)				1.00	0.00	1.00	0.94	0.94	0.00	0.00	0.93	0.93
Uniform Delay (d), s/veh				33.4	0.0	32.6	26.9	0.0	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh				1.2	0.0	1.2	1.5	0.1	0.0	0.0	0.4	0.2
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				2.1	0.0	1.3	2.6	0.1	0.0	0.0	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				34.5	0.0	33.8	28.4	0.1	0.0	0.0	0.4	0.2
LnGrp LOS				C	A	C	C	A	A	A	A	A
Approach Vol, veh/h					303			879			753	
Approach Delay, s/veh					34.4			11.0			0.3	
Approach LOS					C			B			A	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	68.6			13.4			55.2			11.4		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	54.5			28.5			22.5			18.5		
Max Q Clear Time (g_c+I1), s	2.0			8.8			2.0			7.0		
Green Ext Time (p_c), s	4.2			1.1			3.7			0.9		

Intersection Summary

HCM 6th Ctrl Delay	10.5
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour



Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	268	259	242	443	254	154	377
v/c Ratio	0.58	0.57	0.41	0.23	0.26	0.34	0.15
Control Delay	29.5	24.4	4.9	5.3	0.8	28.9	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	24.4	4.9	5.3	0.8	28.9	7.4
Queue Length 50th (ft)	123	101	0	14	0	41	54
Queue Length 95th (ft)	167	150	45	34	2	73	92
Internal Link Dist (ft)		960		402			551
Turn Bay Length (ft)			400		75	125	
Base Capacity (vph)	664	640	742	1899	970	787	2461
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.40	0.33	0.23	0.26	0.20	0.15
Intersection Summary							

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	388	2	310	0	0	0	0	403	231	140	343	0
Future Volume (veh/h)	388	2	310	0	0	0	0	403	231	140	343	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No						No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	533	0	228				0	443	254	154	377	0
Peak Hour Factor	0.91	0.91	0.91				0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	769	0	342				0	2199	981	363	2662	0
Arrive On Green	0.21	0.00	0.21				0.00	1.00	1.00	0.14	0.98	0.00
Sat Flow, veh/h	3619	0	1610				0	3705	1610	3510	3705	0
Grp Volume(v), veh/h	533	0	228				0	443	254	154	377	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1610	1755	1805	0
Q Serve(g_s), s	10.9	0.0	10.4				0.0	0.0	0.0	3.2	0.2	0.0
Cycle Q Clear(g_c), s	10.9	0.0	10.4				0.0	0.0	0.0	3.2	0.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	769	0	342				0	2199	981	363	2662	0
V/C Ratio(X)	0.69	0.00	0.67				0.00	0.20	0.26	0.42	0.14	0.00
Avail Cap(c_a), veh/h	1402	0	624				0	2199	981	790	2662	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	1.33	1.33	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.98	0.98	0.96	0.96	0.00
Uniform Delay (d), s/veh	29.1	0.0	28.9				0.0	0.0	0.0	32.3	0.2	0.0
Incr Delay (d2), s/veh	1.1	0.0	2.2				0.0	0.2	0.6	0.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	4.1				0.0	0.1	0.2	1.4	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.2	0.0	31.1				0.0	0.2	0.6	33.1	0.3	0.0
LnGrp LOS	C	A	C				A	A	A	C	A	A
Approach Vol, veh/h	761						697			531		
Approach Delay, s/veh	30.5						0.4			9.8		
Approach LOS	C						A			A		
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	10.3	50.7		19.0			61.0					
Change Period (Y+Rc), s	3.5	3.5		3.5			3.5					
Max Green Setting (Gmax), s	16.5	23.5		29.5			43.5					
Max Q Clear Time (g_c+I1), s	5.2	2.0		12.9			2.2					
Green Ext Time (p_c), s	0.3	3.8		2.6			2.7					

Intersection Summary

HCM 6th Ctrl Delay	14.4
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Queues

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	55	62	53	77	123	30	36	603	65	8	702
v/c Ratio	0.25	0.15	0.17	0.33	0.23	0.06	0.18	0.26	0.06	0.03	0.30
Control Delay	34.3	32.2	1.1	35.4	31.4	0.2	33.8	10.3	0.1	32.6	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	32.2	1.1	35.4	31.4	0.2	33.8	10.3	0.1	32.6	10.8
Queue Length 50th (ft)	26	15	0	36	30	0	17	87	0	4	117
Queue Length 95th (ft)	57	31	0	74	53	0	43	138	0	m13	185
Internal Link Dist (ft)		786			1237			212			402
Turn Bay Length (ft)	315		50	315			115		50	275	
Base Capacity (vph)	270	812	479	270	825	552	270	2286	1077	270	2335
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.08	0.11	0.29	0.15	0.05	0.13	0.26	0.06	0.03	0.30

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

Existing With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	57	49	71	113	28	33	555	60	7	606	40
Future Volume (veh/h)	51	57	49	71	113	28	33	555	60	7	606	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	55	62	53	77	123	30	36	603	65	8	659	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	164	383	171	164	383	700	121	1354	604	594	2190	143
Arrive On Green	0.09	0.11	0.11	0.09	0.11	0.11	0.07	0.38	0.38	0.66	1.00	1.00
Sat Flow, veh/h	1810	3610	1610	1810	3610	1610	1810	3610	1610	1810	3440	224
Grp Volume(v), veh/h	55	62	53	77	123	30	36	603	65	8	345	357
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1810	1805	1860
Q Serve(g_s), s	2.3	1.2	2.4	3.2	2.5	0.0	1.5	10.0	1.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	2.3	1.2	2.4	3.2	2.5	0.0	1.5	10.0	1.5	0.1	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.12
Lane Grp Cap(c), veh/h	164	383	171	164	383	700	121	1354	604	594	1149	1184
V/C Ratio(X)	0.34	0.16	0.31	0.47	0.32	0.04	0.30	0.45	0.11	0.01	0.30	0.30
Avail Cap(c_a), veh/h	271	812	362	271	812	891	271	1354	604	594	1149	1184
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98
Uniform Delay (d), s/veh	34.1	32.5	33.0	34.6	33.1	13.0	35.5	18.8	8.3	9.2	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.2	1.0	2.1	0.5	0.0	1.4	1.1	0.4	0.0	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.5	1.0	1.5	1.1	0.3	0.7	4.2	0.8	0.1	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.3	32.7	34.1	36.7	33.6	13.1	36.9	19.8	8.7	9.3	0.7	0.6
LnGrp LOS	D	C	C	D	C	B	D	B	A	A	A	A
Approach Vol, veh/h		170			230			704			710	
Approach Delay, s/veh		34.0			31.9			19.7			0.7	
Approach LOS		C			C			B			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	28.3	32.0	9.2	10.5	7.4	52.9	9.2	10.5				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	28.5	10.5	16.5	10.5	28.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	2.1	12.0	5.2	4.4	3.5	2.0	4.3	4.5				
Green Ext Time (p_c), s	0.0	4.0	0.1	0.3	0.0	4.7	0.0	0.6				

Intersection Summary

HCM 6th Ctrl Delay	15.2
HCM 6th LOS	B

Queues
1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report
2040 Without Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	38	106	195	607	84	57	198	1138	56	436	44
v/c Ratio	0.24	0.48	0.54	0.91	0.10	0.07	0.68	0.95	0.33	0.62	0.10
Control Delay	41.8	43.4	11.3	47.7	16.9	0.2	32.3	26.6	43.2	37.7	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	43.4	11.3	47.7	16.9	0.2	32.3	26.6	43.2	37.7	0.5
Queue Length 50th (ft)	21	57	0	320	29	0	94	~213	30	120	0
Queue Length 95th (ft)	50	102	57	#581	61	0	#187	#403	66	170	0
Internal Link Dist (ft)		419			1315			439		376	
Turn Bay Length (ft)	300		50	300		300	115		220		800
Base Capacity (vph)	210	348	455	669	851	797	290	1193	210	701	421
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.30	0.43	0.91	0.10	0.07	0.68	0.95	0.27	0.62	0.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	101	185	577	80	54	188	465	617	53	414	42
Future Volume (veh/h)	36	101	185	577	80	54	188	465	617	53	414	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	38	106	195	607	84	57	198	489	649	56	436	44
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	86	275	233	553	765	649	361	605	540	106	702	313
Arrive On Green	0.05	0.14	0.14	0.31	0.40	0.40	0.27	0.45	0.45	0.06	0.19	0.19
Sat Flow, veh/h	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	3610	1610
Grp Volume(v), veh/h	38	106	195	607	84	57	198	489	649	56	436	44
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	1805	1610
Q Serve(g_s), s	1.8	4.5	10.6	27.5	2.5	2.0	8.5	21.1	30.2	2.7	10.0	1.7
Cycle Q Clear(g_c), s	1.8	4.5	10.6	27.5	2.5	2.0	8.5	21.1	30.2	2.7	10.0	1.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	86	275	233	553	765	649	361	605	540	106	702	313
V/C Ratio(X)	0.44	0.38	0.84	1.10	0.11	0.09	0.55	0.81	1.20	0.53	0.62	0.14
Avail Cap(c_a), veh/h	211	348	295	553	765	649	361	605	540	211	702	313
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.87	0.87	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.7	34.8	37.4	31.3	16.8	16.6	29.6	22.4	24.9	41.2	33.2	21.4
Incr Delay (d2), s/veh	3.5	0.9	15.2	67.8	0.1	0.1	1.5	9.8	105.8	4.0	4.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.1	5.1	21.9	1.1	0.7	3.6	9.3	25.6	1.3	4.7	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.2	35.7	52.6	99.0	16.9	16.7	31.1	32.2	130.7	45.2	37.3	22.3
LnGrp LOS	D	D	D	F	B	B	C	C	F	D	D	C
Approach Vol, veh/h		339			748			1336			536	
Approach Delay, s/veh		46.5			83.5			79.9			36.9	
Approach LOS		D			F			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.8	33.7	31.0	16.5	21.5	21.0	7.8	39.8				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	21.5	27.5	16.5	14.5	17.5	10.5	33.5				
Max Q Clear Time (g_c+I1), s	4.7	32.2	29.5	12.6	10.5	12.0	3.8	4.5				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.4	0.2	1.4	0.0	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			69.2									
HCM 6th LOS			E									

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	507	230	496	1113	1239
v/c Ratio	0.96	0.42	0.97	0.49	0.91
Control Delay	63.5	16.3	55.3	10.8	14.9
Queue Delay	0.0	0.0	0.0	0.0	4.4
Total Delay	63.5	16.3	55.3	10.8	19.3
Queue Length 50th (ft)	282	55	285	160	169
Queue Length 95th (ft)	#480	119	m#324	m185	m#233
Internal Link Dist (ft)		281		551	439
Turn Bay Length (ft)			125		
Base Capacity (vph)	531	551	511	2272	1368
Starvation Cap Reductn	0	0	0	0	85
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.95	0.42	0.97	0.49	0.97

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	482	6	213	471	1057	0	0	416	761
Future Volume (veh/h)	0	0	0	482	6	213	471	1057	0	0	416	761
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				507	6	224	496	1113	0	0	438	801
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				533	12	462	513	2266	0	0	552	492
Arrive On Green				0.29	0.29	0.29	0.57	1.00	0.00	0.00	0.10	0.10
Sat Flow, veh/h				1810	42	1568	1810	3705	0	0	1900	1610
Grp Volume(v), veh/h				507	0	230	496	1113	0	0	438	801
Grp Sat Flow(s),veh/h/ln				1810	0	1610	1810	1805	0	0	1805	1610
Q Serve(g_s), s				24.7	0.0	10.6	23.7	0.0	0.0	0.0	21.3	27.5
Cycle Q Clear(g_c), s				24.7	0.0	10.6	23.7	0.0	0.0	0.0	21.3	27.5
Prop In Lane				1.00		0.97	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				533	0	474	513	2266	0	0	552	492
V/C Ratio(X)				0.95	0.00	0.49	0.97	0.49	0.00	0.00	0.79	1.63
Avail Cap(c_a), veh/h				533	0	474	513	2266	0	0	552	492
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.19	0.19	0.00	0.00	0.58	0.58
Uniform Delay (d), s/veh				31.1	0.0	26.1	19.1	0.0	0.0	0.0	37.7	40.5
Incr Delay (d2), s/veh				27.3	0.0	0.8	10.8	0.1	0.0	0.0	6.8	288.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				14.4	0.0	4.1	7.1	0.0	0.0	0.0	11.3	51.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				58.4	0.0	26.9	29.9	0.1	0.0	0.0	44.5	328.5
LnGrp LOS				E	A	C	C	A	A	A	D	F
Approach Vol, veh/h					737			1609			1239	
Approach Delay, s/veh					48.6			9.3			228.1	
Approach LOS					D			A			F	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	60.0			29.0			31.0			30.0		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	56.5			25.5			27.5			26.5		
Max Q Clear Time (g_c+I1), s	2.0			25.7			29.5			26.7		
Green Ext Time (p_c), s	11.1			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay	93.0											
HCM 6th LOS	F											

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

	→	↘	↑	↙	↓
Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	754	793	1193	99	846
v/c Ratio	0.93	1.01	0.96	0.51	0.50
Control Delay	42.9	59.2	27.3	33.5	9.7
Queue Delay	0.0	18.0	0.0	0.0	0.2
Total Delay	42.9	77.2	27.3	33.5	9.9
Queue Length 50th (ft)	390	~416	~381	53	91
Queue Length 95th (ft)	#632	#671	#478	m57	m105
Internal Link Dist (ft)	960		402		551
Turn Bay Length (ft)		400		125	
Base Capacity (vph)	814	782	1246	210	1704
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	39	0	0	215
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.93	1.07	0.96	0.47	0.57

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	715	1	753	0	0	0	0	813	320	94	804	0
Future Volume (veh/h)	715	1	753	0	0	0	0	813	320	94	804	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	753	1	793				0	856	337	99	846	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	813	1	725				0	802	315	211	1705	0
Arrive On Green	0.45	0.45	0.45				0.00	0.63	0.63	0.16	0.63	0.00
Sat Flow, veh/h	1807	2	1610				0	2628	994	1810	3705	0
Grp Volume(v), veh/h	754	0	793				0	609	584	99	846	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1721	1810	1805	0
Q Serve(g_s), s	35.4	0.0	40.5				0.0	28.5	28.5	4.5	11.4	0.0
Cycle Q Clear(g_c), s	35.4	0.0	40.5				0.0	28.5	28.5	4.5	11.4	0.0
Prop In Lane	1.00		1.00				0.00		0.58	1.00		0.00
Lane Grp Cap(c), veh/h	814	0	725				0	572	545	211	1705	0
V/C Ratio(X)	0.93	0.00	1.09				0.00	1.07	1.07	0.47	0.50	0.00
Avail Cap(c_a), veh/h	814	0	725				0	572	545	211	1705	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	1.33	1.33	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.64	0.64	0.27	0.27	0.00
Uniform Delay (d), s/veh	23.3	0.0	24.8				0.0	16.5	16.5	35.5	11.0	0.0
Incr Delay (d2), s/veh	16.4	0.0	62.2				0.0	49.3	51.7	0.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.7	0.0	26.8				0.0	13.1	12.9	1.9	3.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.7	0.0	86.9				0.0	65.8	68.2	35.9	11.2	0.0
LnGrp LOS	D	A	F				A	F	F	D	B	A
Approach Vol, veh/h		1547						1193			945	
Approach Delay, s/veh		63.9						67.0			13.8	
Approach LOS		E						E			B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	14.0	32.0		44.0		46.0						
Change Period (Y+Rc), s	3.5	3.5		3.5		3.5						
Max Green Setting (Gmax), s	10.5	28.5		40.5		42.5						
Max Q Clear Time (g_c+I1), s	6.5	30.5		42.5		13.4						
Green Ext Time (p_c), s	0.1	0.0		0.0		6.8						
Intersection Summary												
HCM 6th Ctrl Delay			52.0									
HCM 6th LOS			D									

Queues
4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	137	413	77	101	478	85	834	72	466	1049	123
v/c Ratio	0.63	0.63	0.19	0.54	0.72	0.43	0.72	0.11	0.99	1.12	0.14
Control Delay	51.7	38.9	2.2	48.8	26.3	44.5	32.6	0.4	63.1	83.5	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	38.9	2.2	48.8	26.3	44.5	32.6	0.4	63.1	83.5	0.9
Queue Length 50th (ft)	73	115	0	55	74	46	230	0	274	~768	0
Queue Length 95th (ft)	#153	164	9	105	122	91	304	0	m#375	m#866	m5
Internal Link Dist (ft)		786			1237		212			402	
Turn Bay Length (ft)	315		50	315		115		50	275		
Base Capacity (vph)	228	683	413	210	789	210	1152	635	471	940	866
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.60	0.19	0.48	0.61	0.40	0.72	0.11	0.99	1.12	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	392	73	96	243	211	81	792	68	443	997	117
Future Volume (veh/h)	130	392	73	96	243	211	81	792	68	443	997	117
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	137	413	77	101	256	222	85	834	72	466	1049	123
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	170	685	305	130	312	261	281	1023	456	543	813	689
Arrive On Green	0.09	0.19	0.19	0.07	0.17	0.17	0.16	0.28	0.28	0.40	0.57	0.57
Sat Flow, veh/h	1810	3610	1610	1810	1866	1558	1810	3610	1610	1810	1900	1610
Grp Volume(v), veh/h	137	413	77	101	247	231	85	834	72	466	1049	123
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1619	1810	1805	1610	1810	1900	1610
Q Serve(g_s), s	6.7	9.4	2.6	4.9	11.9	12.4	3.7	19.4	2.4	21.2	38.5	3.3
Cycle Q Clear(g_c), s	6.7	9.4	2.6	4.9	11.9	12.4	3.7	19.4	2.4	21.2	38.5	3.3
Prop In Lane	1.00		1.00	1.00		0.96	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	170	685	305	130	302	271	281	1023	456	543	813	689
V/C Ratio(X)	0.81	0.60	0.25	0.78	0.82	0.85	0.30	0.82	0.16	0.86	1.29	0.18
Avail Cap(c_a), veh/h	211	685	305	211	331	297	281	1023	456	543	813	689
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.58	0.58	0.58
Uniform Delay (d), s/veh	40.0	33.4	15.7	41.1	36.2	36.4	33.7	30.1	15.2	25.3	19.4	11.8
Incr Delay (d2), s/veh	16.6	1.5	0.4	9.7	13.9	19.2	0.6	7.2	0.7	8.1	136.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	4.2	1.4	2.5	6.3	6.3	1.7	9.2	1.2	9.2	43.8	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.6	34.9	16.2	50.8	50.0	55.6	34.3	37.2	15.9	33.4	155.7	12.1
LnGrp LOS	E	C	B	D	D	E	C	D	B	C	F	B
Approach Vol, veh/h		627			579			991			1638	
Approach Delay, s/veh		37.3			52.4			35.4			110.1	
Approach LOS		D			D			D			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	30.5	29.0	9.9	20.6	17.5	42.0	12.0	18.6				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	23.5	25.5	10.5	16.5	10.5	38.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	23.2	21.4	6.9	11.4	5.7	40.5	8.7	14.4				
Green Ext Time (p_c), s	0.1	2.2	0.1	1.3	0.1	0.0	0.1	0.6				
Intersection Summary												
HCM 6th Ctrl Delay			70.2									
HCM 6th LOS			E									

Queues

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	49	212	452	609	122	51	249	946	59	497	37
v/c Ratio	0.30	0.69	0.87	0.96	0.14	0.06	1.00	0.87	0.35	0.73	0.09
Control Delay	42.4	47.2	30.9	57.1	15.6	0.1	84.2	21.6	43.5	41.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	47.2	30.9	57.1	15.6	0.1	84.2	21.6	43.5	41.6	0.4
Queue Length 50th (ft)	27	112	78	342	41	0	137	156	32	142	0
Queue Length 95th (ft)	60	185	#244	#566	79	0	#294	#339	69	197	0
Internal Link Dist (ft)		419			1315			439		376	
Turn Bay Length (ft)	300		50	300		300	115		220		800
Base Capacity (vph)	210	348	545	637	895	831	250	1085	210	684	413
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.61	0.83	0.96	0.14	0.06	1.00	0.87	0.28	0.73	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	201	429	579	116	48	237	402	497	56	472	35
Future Volume (veh/h)	47	201	429	579	116	48	237	402	497	56	472	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	212	452	609	122	51	249	423	523	59	497	37
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	99	348	295	613	888	752	251	473	422	109	662	295
Arrive On Green	0.05	0.18	0.18	0.34	0.47	0.47	0.14	0.26	0.26	0.06	0.18	0.18
Sat Flow, veh/h	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	3610	1610
Grp Volume(v), veh/h	49	212	452	609	122	51	249	423	523	59	497	37
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1810	1900	1610	1810	1805	1610	1810	1805	1610
Q Serve(g_s), s	2.4	9.2	16.5	30.2	3.3	1.6	12.4	20.3	23.6	2.9	11.7	1.4
Cycle Q Clear(g_c), s	2.4	9.2	16.5	30.2	3.3	1.6	12.4	20.3	23.6	2.9	11.7	1.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	99	348	295	613	888	752	251	473	422	109	662	295
V/C Ratio(X)	0.49	0.61	1.53	0.99	0.14	0.07	0.99	0.89	1.24	0.54	0.75	0.13
Avail Cap(c_a), veh/h	211	348	295	613	888	752	251	473	422	211	662	295
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.3	33.8	36.8	29.6	13.6	13.2	38.7	32.0	33.2	41.1	34.8	21.5
Incr Delay (d2), s/veh	3.7	3.1	255.5	34.5	0.1	0.0	51.2	20.2	124.5	4.2	7.7	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	4.5	27.3	18.4	1.4	0.6	9.0	11.2	23.5	1.4	5.8	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.1	36.8	292.2	64.1	13.7	13.2	89.9	52.2	157.7	45.3	42.5	22.4
LnGrp LOS	D	D	F	E	B	B	F	D	F	D	D	C
Approach Vol, veh/h		713			782			1195			593	
Approach Delay, s/veh		199.3			53.0			106.2			41.5	
Approach LOS		F			D			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	27.1	34.0	20.0	16.0	20.0	8.4	45.6				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	18.5	30.5	16.5	12.5	16.5	10.5	36.5				
Max Q Clear Time (g_c+I1), s	4.9	25.6	32.2	18.5	14.4	13.7	4.4	5.3				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay			102.1									
HCM 6th LOS			F									

Queues 2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	512	138	760	1062	1557
v/c Ratio	1.19	0.28	1.33	0.43	1.14
Control Delay	138.5	7.3	181.0	6.8	80.0
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	138.5	7.3	181.0	6.8	80.1
Queue Length 50th (ft)	~354	2	~572	128	~421
Queue Length 95th (ft)	#546	46	m#501	m113	m#452
Internal Link Dist (ft)		281		551	439
Turn Bay Length (ft)			125		
Base Capacity (vph)	431	489	571	2466	1371
Starvation Cap Reductn	0	0	0	0	32
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.19	0.28	1.33	0.43	1.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	486	4	127	722	1009	0	0	602	877
Future Volume (veh/h)	0	0	0	486	4	127	722	1009	0	0	602	877
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach				No			No				No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				512	4	134	760	1062	0	0	634	923
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				432	11	375	573	2467	0	0	592	528
Arrive On Green				0.24	0.24	0.24	0.32	0.68	0.00	0.00	0.22	0.22
Sat Flow, veh/h				1810	47	1570	1810	3705	0	0	1900	1610
Grp Volume(v), veh/h				512	0	138	760	1062	0	0	634	923
Grp Sat Flow(s),veh/h/ln				1810	0	1617	1810	1805	0	0	1805	1610
Q Serve(g_s), s				21.5	0.0	6.4	28.5	11.9	0.0	0.0	29.5	29.5
Cycle Q Clear(g_c), s				21.5	0.0	6.4	28.5	11.9	0.0	0.0	29.5	29.5
Prop In Lane				1.00		0.97	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				432	0	386	573	2467	0	0	592	528
V/C Ratio(X)				1.18	0.00	0.36	1.33	0.43	0.00	0.00	1.07	1.75
Avail Cap(c_a), veh/h				432	0	386	573	2467	0	0	592	528
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67
Upstream Filter(I)				1.00	0.00	1.00	0.09	0.09	0.00	0.00	0.40	0.40
Uniform Delay (d), s/veh				34.3	0.0	28.5	30.8	6.4	0.0	0.0	35.1	35.1
Incr Delay (d2), s/veh				104.3	0.0	0.6	148.0	0.0	0.0	0.0	45.2	340.1
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				21.7	0.0	2.5	35.4	3.8	0.0	0.0	20.7	61.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				138.5	0.0	29.1	178.7	6.4	0.0	0.0	80.3	375.3
LnGrp LOS				F	A	C	F	A	A	A	F	F
Approach Vol, veh/h					650			1822			1557	
Approach Delay, s/veh					115.3			78.3			255.2	
Approach LOS					F			E			F	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	65.0			32.0			33.0			25.0		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	61.5			28.5			29.5			21.5		
Max Q Clear Time (g_c+I1), s	13.9			30.5			31.5			23.5		
Green Ext Time (p_c), s	10.2			0.0			0.0			0.0		
Intersection Summary												
HCM 6th Ctrl Delay				152.6								
HCM 6th LOS				F								

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour

	→	↘	↑	↙	↓
Lane Group	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	560	694	1824	211	935
v/c Ratio	0.98	1.14	1.14	1.00	0.43
Control Delay	64.7	106.6	81.8	54.4	4.9
Queue Delay	0.0	1.2	0.3	0.0	0.1
Total Delay	64.7	107.8	82.1	54.4	5.0
Queue Length 50th (ft)	313	~407	~620	~119	52
Queue Length 95th (ft)	#524	#623	m#595	m100	m45
Internal Link Dist (ft)	960		402		551
Turn Bay Length (ft)		400		125	
Base Capacity (vph)	573	609	1605	210	2186
Starvation Cap Reductn	0	0	129	0	0
Spillback Cap Reductn	0	86	0	0	399
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.98	1.33	1.24	1.00	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	530	2	659	0	0	0	0	1201	532	200	888	0
Future Volume (veh/h)	530	2	659	0	0	0	0	1201	532	200	888	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	558	2	694				0	1264	560	211	935	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	571	2	510				0	1116	467	211	2186	0
Arrive On Green	0.32	0.32	0.32				0.00	0.15	0.15	0.16	0.81	0.00
Sat Flow, veh/h	1803	6	1610				0	2575	1038	1810	3705	0
Grp Volume(v), veh/h	560	0	694				0	900	924	211	935	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1713	1810	1805	0
Q Serve(g_s), s	27.6	0.0	28.5				0.0	40.5	40.5	10.5	6.9	0.0
Cycle Q Clear(g_c), s	27.6	0.0	28.5				0.0	40.5	40.5	10.5	6.9	0.0
Prop In Lane	1.00		1.00				0.00		0.61	1.00		0.00
Lane Grp Cap(c), veh/h	573	0	510				0	812	771	211	2186	0
V/C Ratio(X)	0.98	0.00	1.36				0.00	1.11	1.20	1.00	0.43	0.00
Avail Cap(c_a), veh/h	573	0	510				0	812	771	211	2186	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.33	0.33	1.33	1.33	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.20	0.20	0.09	0.09	0.00
Uniform Delay (d), s/veh	30.4	0.0	30.8				0.0	38.3	38.3	38.0	4.1	0.0
Incr Delay (d2), s/veh	31.7	0.0	174.9				0.0	52.9	92.0	18.5	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.5	0.0	35.3				0.0	31.3	38.1	5.4	1.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.1	0.0	205.6				0.0	91.2	130.3	56.5	4.2	0.0
LnGrp LOS	E	A	F				A	F	F	E	A	A
Approach Vol, veh/h		1254						1824			1146	
Approach Delay, s/veh		141.5						111.0			13.8	
Approach LOS		F						F			B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	14.0	44.0		32.0		58.0						
Change Period (Y+Rc), s	3.5	3.5		3.5		3.5						
Max Green Setting (Gmax), s	10.5	40.5		28.5		54.5						
Max Q Clear Time (g_c+I1), s	12.5	42.5		30.5		8.9						
Green Ext Time (p_c), s	0.0	0.0		0.0		8.4						
Intersection Summary												
HCM 6th Ctrl Delay			93.7									
HCM 6th LOS			F									

Queues

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	280	585	93	120	1042	81	1045	231	365	975	288
v/c Ratio	1.22	0.79	0.21	0.62	1.30	0.45	0.88	0.36	0.98	1.13	0.34
Control Delay	166.8	43.6	3.6	53.0	172.1	45.8	39.1	8.2	71.2	95.0	7.0
Queue Delay	8.0	0.0	0.0	0.0	2.0	0.0	0.1	0.0	0.0	0.6	0.0
Total Delay	174.9	43.6	3.6	53.0	174.2	45.8	39.2	8.2	71.2	95.6	7.0
Queue Length 50th (ft)	~197	170	0	66	~346	44	293	22	212	~679	29
Queue Length 95th (ft)	#351	#253	19	#122	#473	88	#409	75	m#293	m#769	m54
Internal Link Dist (ft)		786			1237		212			402	
Turn Bay Length (ft)	315		50	315		115		50	275		
Base Capacity (vph)	230	737	436	210	799	210	1183	647	371	866	858
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	83	0
Spillback Cap Reductn	88	0	0	0	212	0	4	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.97	0.79	0.21	0.57	1.78	0.39	0.89	0.36	0.98	1.25	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 Without Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	556	88	114	515	475	77	993	219	347	926	274
Future Volume (veh/h)	266	556	88	114	515	475	77	993	219	347	926	274
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	280	585	93	120	542	500	81	1045	231	365	975	288
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	231	821	366	151	331	295	122	1183	528	372	885	750
Arrive On Green	0.13	0.23	0.23	0.08	0.18	0.18	0.07	0.33	0.33	0.07	0.15	0.15
Sat Flow, veh/h	1810	3610	1610	1810	1805	1610	1810	3610	1610	1810	1900	1610
Grp Volume(v), veh/h	280	585	93	120	542	500	81	1045	231	365	975	288
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1810	1900	1610
Q Serve(g_s), s	11.5	13.4	4.3	5.9	16.5	16.5	3.9	24.6	10.1	18.1	41.9	8.9
Cycle Q Clear(g_c), s	11.5	13.4	4.3	5.9	16.5	16.5	3.9	24.6	10.1	18.1	41.9	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	231	821	366	151	331	295	122	1183	528	372	885	750
V/C Ratio(X)	1.21	0.71	0.25	0.79	1.64	1.69	0.66	0.88	0.44	0.98	1.10	0.38
Avail Cap(c_a), veh/h	231	821	366	211	331	295	211	1183	528	372	885	750
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.61	0.61
Uniform Delay (d), s/veh	39.3	32.0	28.5	40.5	36.8	36.8	41.0	28.6	23.7	41.8	38.1	10.0
Incr Delay (d2), s/veh	128.1	2.9	0.4	12.9	300.4	326.4	6.0	9.7	2.6	31.6	56.6	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.2	6.1	1.7	3.1	34.7	33.1	1.9	11.8	4.1	12.0	35.1	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	167.3	35.0	28.9	53.4	337.1	363.2	47.0	38.3	26.4	73.4	94.7	10.9
LnGrp LOS	F	C	C	D	F	F	D	D	C	E	F	B
Approach Vol, veh/h		958			1162			1357			1628	
Approach Delay, s/veh		73.1			319.0			36.8			75.1	
Approach LOS		E			F			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.0	33.0	11.0	24.0	9.6	45.4	15.0	20.0				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	18.5	29.5	10.5	17.5	10.5	37.5	11.5	16.5				
Max Q Clear Time (g_c+I1), s	20.1	26.6	7.9	15.4	5.9	43.9	13.5	18.5				
Green Ext Time (p_c), s	0.0	2.0	0.1	0.9	0.1	0.0	0.0	0.0				

Intersection Summary

HCM 6th Ctrl Delay	120.1
HCM 6th LOS	F

Queues

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	106	195	607	141	198	489	649	56	436	44
v/c Ratio	0.14	0.44	0.52	0.76	0.26	0.43	0.32	0.62	0.30	0.36	0.07
Control Delay	27.8	37.4	10.0	35.7	19.6	25.1	11.3	5.2	37.1	22.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	27.8	37.4	10.0	35.7	19.6	25.1	11.3	5.4	37.1	22.0	0.2
Queue Length 50th (ft)	18	50	0	143	30	37	47	17	27	86	0
Queue Length 95th (ft)	39	92	52	202	95	72	132	124	59	135	0
Internal Link Dist (ft)		419			1315		439			376	
Turn Bay Length (ft)	300		50	300		115			220		800
Base Capacity (vph)	317	391	490	812	616	459	1517	1054	236	1226	647
Starvation Cap Reductn	0	0	0	0	0	0	0	51	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.27	0.40	0.75	0.23	0.43	0.32	0.65	0.24	0.36	0.07
Intersection Summary											

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	101	185	577	80	54	188	465	617	53	414	42
Future Volume (veh/h)	36	101	185	577	80	54	188	465	617	53	414	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	38	106	195	607	84	57	198	489	649	56	436	44
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	428	283	240	691	115	78	695	1505	671	113	1015	453
Arrive On Green	0.24	0.15	0.15	0.20	0.11	0.11	0.07	0.14	0.14	0.06	0.28	0.28
Sat Flow, veh/h	1810	1900	1610	3510	1055	716	3510	3610	1610	1810	3610	1610
Grp Volume(v), veh/h	38	106	195	607	0	141	198	489	649	56	436	44
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1755	0	1771	1755	1805	1610	1810	1805	1610
Q Serve(g_s), s	1.3	4.0	9.4	13.4	0.0	6.2	4.3	9.8	16.4	2.4	7.9	1.6
Cycle Q Clear(g_c), s	1.3	4.0	9.4	13.4	0.0	6.2	4.3	9.8	16.4	2.4	7.9	1.6
Prop In Lane	1.00		1.00	1.00		0.40	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	428	283	240	691	0	194	695	1505	671	113	1015	453
V/C Ratio(X)	0.09	0.37	0.81	0.88	0.00	0.73	0.29	0.32	0.97	0.50	0.43	0.10
Avail Cap(c_a), veh/h	428	392	332	724	0	498	695	1505	671	238	1015	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.8	30.7	32.9	31.2	0.0	34.5	32.0	24.3	8.9	36.3	23.5	21.2
Incr Delay (d2), s/veh	0.1	0.8	10.2	11.6	0.0	5.2	0.2	0.5	25.8	3.4	1.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.9	4.2	6.6	0.0	2.9	1.9	4.7	11.5	1.1	3.4	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.9	31.5	43.1	42.8	0.0	39.6	32.2	24.9	34.8	39.7	24.8	21.7
LnGrp LOS	C	C	D	D	A	D	C	C	C	D	C	C
Approach Vol, veh/h		339			748			1336			536	
Approach Delay, s/veh		37.3			42.2			30.8			26.1	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.5	36.8	19.2	15.4	19.3	26.0	22.4	12.2				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	22.5	16.5	16.5	10.5	22.5	10.5	22.5				
Max Q Clear Time (g_c+I1), s	4.4	18.4	15.4	11.4	6.3	9.9	3.3	8.2				
Green Ext Time (p_c), s	0.0	2.2	0.3	0.6	0.2	2.4	0.0	0.6				

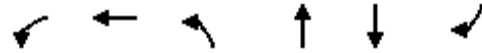
Intersection Summary

HCM 6th Ctrl Delay	33.6
HCM 6th LOS	C

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	507	230	496	1113	438	801
v/c Ratio	0.72	0.53	0.34	0.43	0.23	0.66
Control Delay	35.9	17.3	4.5	4.6	2.7	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.8
Total Delay	35.9	17.3	4.5	4.6	2.7	6.8
Queue Length 50th (ft)	120	41	39	124	10	204
Queue Length 95th (ft)	170	107	m39	105	m20	265
Internal Link Dist (ft)		281		551	439	
Turn Bay Length (ft)			150			
Base Capacity (vph)	766	457	1478	2565	1933	1210
Starvation Cap Reductn	0	0	0	0	0	163
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.50	0.34	0.43	0.23	0.77

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	482	6	213	471	1057	0	0	416	761
Future Volume (veh/h)	0	0	0	482	6	213	471	1057	0	0	416	761
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				507	6	224	496	1113	0	0	438	801
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				638	8	285	1115	2638	0	0	1873	835
Arrive On Green				0.18	0.18	0.18	0.34	1.00	0.00	0.00	0.17	0.17
Sat Flow, veh/h				3510	42	1568	3510	3705	0	0	3705	1610
Grp Volume(v), veh/h				507	0	230	496	1113	0	0	438	801
Grp Sat Flow(s),veh/h/ln				1755	0	1610	1755	1805	0	0	1805	1610
Q Serve(g_s), s				11.1	0.0	10.9	0.0	0.0	0.0	0.0	8.4	39.5
Cycle Q Clear(g_c), s				11.1	0.0	10.9	0.0	0.0	0.0	0.0	8.4	39.5
Prop In Lane				1.00		0.97	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				638	0	293	1115	2638	0	0	1873	835
V/C Ratio(X)				0.79	0.00	0.79	0.44	0.42	0.00	0.00	0.23	0.96
Avail Cap(c_a), veh/h				768	0	352	1115	2638	0	0	1873	835
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.66	0.66	0.00	0.00	0.79	0.79
Uniform Delay (d), s/veh				31.3	0.0	31.2	11.3	0.0	0.0	0.0	19.4	32.3
Incr Delay (d2), s/veh				4.9	0.0	9.4	0.2	0.3	0.0	0.0	0.2	19.4
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				5.0	0.0	4.9	2.5	0.1	0.0	0.0	3.8	21.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				36.2	0.0	40.6	11.5	0.3	0.0	0.0	19.7	51.7
LnGrp LOS				D	A	D	B	A	A	A	B	D
Approach Vol, veh/h					737			1609			1239	
Approach Delay, s/veh					37.6			3.8			40.4	
Approach LOS					D			A			D	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	62.0			17.0			45.0			18.0		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	55.5			10.5			41.5			17.5		
Max Q Clear Time (g_c+I1), s	2.0			2.0			41.5			13.1		
Green Ext Time (p_c), s	11.1			1.3			0.0			1.5		
Intersection Summary												
HCM 6th Ctrl Delay	23.4											
HCM 6th LOS	C											

Queues

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour



Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	535	520	492	856	337	99	846
v/c Ratio	0.79	0.77	0.73	0.62	0.46	0.23	0.45
Control Delay	31.1	25.3	22.6	10.8	3.2	28.2	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	25.3	22.6	10.8	3.2	28.2	8.1
Queue Length 50th (ft)	230	185	157	122	0	24	138
Queue Length 95th (ft)	360	321	277	122	11	m41	187
Internal Link Dist (ft)		960		402			551
Turn Bay Length (ft)			400		75	175	
Base Capacity (vph)	718	708	708	1370	735	459	1876
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.73	0.69	0.62	0.46	0.22	0.45

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	715	1	753	0	0	0	0	813	320	94	804	0
Future Volume (veh/h)	715	1	753	0	0	0	0	813	320	94	804	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No						No			No		
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	1006	0	522				0	856	337	99	846	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	1352	0	601				0	1151	513	620	1946	0
Arrive On Green	0.37	0.00	0.37				0.00	0.64	0.64	0.35	1.00	0.00
Sat Flow, veh/h	3619	0	1610				0	3705	1610	3510	3705	0
Grp Volume(v), veh/h	1006	0	522				0	856	337	99	846	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1610	1755	1805	0
Q Serve(g_s), s	19.3	0.0	24.0				0.0	13.1	10.4	1.5	0.0	0.0
Cycle Q Clear(g_c), s	19.3	0.0	24.0				0.0	13.1	10.4	1.5	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1352	0	601				0	1151	513	620	1946	0
V/C Ratio(X)	0.74	0.00	0.87				0.00	0.74	0.66	0.16	0.43	0.00
Avail Cap(c_a), veh/h	1515	0	674				0	1151	513	620	1946	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.77	0.77	0.87	0.87	0.00
Uniform Delay (d), s/veh	21.7	0.0	23.2				0.0	12.2	11.8	21.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	10.8				0.0	3.4	5.0	0.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	0.0	10.3				0.0	3.7	3.2	0.6	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	0.0	34.0				0.0	15.6	16.8	21.9	0.6	0.0
LnGrp LOS	C	A	C				A	B	B	C	A	A
Approach Vol, veh/h	1528						1193			945		
Approach Delay, s/veh	27.1						16.0			2.8		
Approach LOS	C						B			A		
Timer - Assigned Phs	1	2	4		6							
Phs Duration (G+Y+Rc), s	17.6	29.0	33.4		46.6							
Change Period (Y+Rc), s	3.5	3.5	3.5		3.5							
Max Green Setting (Gmax), s	10.5	25.5	33.5		39.5							
Max Q Clear Time (g_c+I1), s	3.5	15.1	26.0		2.0							
Green Ext Time (p_c), s	0.1	5.2	3.8		7.1							

Intersection Summary

HCM 6th Ctrl Delay	17.2
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Queues

SR-210/Alder Avenue Feasibility Study Report

4: Alder Avenue & Renaissance Parkway

2040 With Interchange Improvements - AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	137	413	77	101	256	222	85	834	72	466	1172
v/c Ratio	0.54	0.58	0.17	0.49	0.49	0.52	0.42	0.63	0.10	0.79	0.73
Control Delay	39.7	32.7	1.0	41.1	34.0	9.2	39.4	24.4	0.3	34.1	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	32.7	1.0	41.1	34.0	9.2	39.4	24.4	0.3	34.1	16.6
Queue Length 50th (ft)	63	100	0	48	62	0	40	184	0	104	180
Queue Length 95th (ft)	120	143	3	94	93	55	82	258	0	#178	#406
Internal Link Dist (ft)		786			1237			212			402
Turn Bay Length (ft)	315		50	315			115		50	275	
Base Capacity (vph)	271	762	459	236	744	509	236	1330	689	590	1613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.54	0.17	0.43	0.34	0.44	0.36	0.63	0.10	0.79	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	392	73	96	243	211	81	792	68	443	997	117
Future Volume (veh/h)	130	392	73	96	243	211	81	792	68	443	997	117
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	137	413	77	101	256	222	85	834	72	466	1049	123
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	172	672	300	142	610	272	134	1151	513	849	1583	185
Arrive On Green	0.10	0.19	0.19	0.08	0.17	0.17	0.07	0.32	0.32	0.48	0.97	0.97
Sat Flow, veh/h	1810	3610	1610	1810	3610	1610	1810	3610	1610	3510	3255	381
Grp Volume(v), veh/h	137	413	77	101	256	222	85	834	72	466	581	591
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1755	1805	1831
Q Serve(g_s), s	5.9	8.4	3.3	4.4	5.1	10.6	3.7	16.4	1.9	7.5	2.0	2.0
Cycle Q Clear(g_c), s	5.9	8.4	3.3	4.4	5.1	10.6	3.7	16.4	1.9	7.5	2.0	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	172	672	300	142	610	272	134	1151	513	849	878	891
V/C Ratio(X)	0.79	0.61	0.26	0.71	0.42	0.82	0.63	0.72	0.14	0.55	0.66	0.66
Avail Cap(c_a), veh/h	238	745	332	238	745	332	238	1151	513	849	878	891
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.81	0.81	0.81
Uniform Delay (d), s/veh	35.4	29.9	27.8	36.0	29.7	32.0	36.0	24.1	11.1	17.6	0.6	0.6
Incr Delay (d2), s/veh	12.0	1.3	0.4	6.5	0.5	12.2	4.8	4.0	0.6	0.6	3.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	3.7	1.3	2.1	2.2	4.9	1.8	7.3	1.0	2.5	1.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.4	31.2	28.3	42.5	30.2	44.3	40.8	28.1	11.7	18.2	3.8	3.7
LnGrp LOS	D	C	C	D	C	D	D	C	B	B	A	A
Approach Vol, veh/h		627			579			991			1638	
Approach Delay, s/veh		34.4			37.7			28.0			7.9	
Approach LOS		C			D			C			A	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	29.0	9.8	18.4	9.4	42.4	11.1	17.0				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	13.5	25.5	10.5	16.5	10.5	28.5	10.5	16.5				
Max Q Clear Time (g_c+I1), s	9.5	18.4	6.4	10.4	5.7	4.0	7.9	12.6				
Green Ext Time (p_c), s	0.7	3.3	0.1	1.5	0.1	8.9	0.1	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			21.9									
HCM 6th LOS			C									

Queues
1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report
2040 With Interchange Improvements - PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	49	212	452	609	173	249	423	523	59	497	37
v/c Ratio	0.30	0.58	0.86	0.81	0.26	0.61	0.32	0.57	0.35	0.43	0.06
Control Delay	42.4	38.8	29.9	43.2	18.2	32.8	14.1	5.7	43.5	27.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay	42.4	38.8	29.9	43.2	18.2	32.8	14.1	5.9	43.5	27.0	0.2
Queue Length 50th (ft)	27	107	98	167	57	64	60	34	32	123	0
Queue Length 95th (ft)	60	172	#243	227	108	103	124	113	69	177	0
Internal Link Dist (ft)		419			1315		439			376	
Turn Bay Length (ft)	300		50	300		115			220		800
Base Capacity (vph)	210	453	591	799	682	408	1326	924	210	1160	609
Starvation Cap Reductn	0	0	0	0	0	0	0	58	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.47	0.76	0.76	0.25	0.61	0.32	0.60	0.28	0.43	0.06

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

1: Alder Avenue & Casmalia Street

SR-210/Alder Avenue Feasibility Study Report

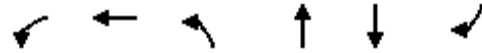
2040 With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	201	429	579	116	48	237	402	497	56	472	35
Future Volume (veh/h)	47	201	429	579	116	48	237	402	497	56	472	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	49	212	452	609	122	51	249	423	523	59	497	37
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	99	454	385	701	488	204	508	1249	557	109	943	420
Arrive On Green	0.05	0.24	0.24	0.20	0.38	0.38	0.05	0.11	0.11	0.06	0.26	0.26
Sat Flow, veh/h	1810	1900	1610	3510	1272	532	3510	3610	1610	1810	3610	1610
Grp Volume(v), veh/h	49	212	452	609	0	173	249	423	523	59	497	37
Grp Sat Flow(s),veh/h/ln	1810	1900	1610	1755	0	1804	1755	1805	1610	1810	1805	1610
Q Serve(g_s), s	2.4	8.6	21.5	15.1	0.0	5.9	6.2	9.7	16.7	2.9	10.6	1.3
Cycle Q Clear(g_c), s	2.4	8.6	21.5	15.1	0.0	5.9	6.2	9.7	16.7	2.9	10.6	1.3
Prop In Lane	1.00		1.00	1.00		0.29	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	99	454	385	701	0	692	508	1249	557	109	943	420
V/C Ratio(X)	0.49	0.47	1.18	0.87	0.00	0.25	0.49	0.34	0.94	0.54	0.53	0.09
Avail Cap(c_a), veh/h	211	454	385	800	0	692	508	1249	557	211	943	420
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.3	29.3	34.2	34.9	0.0	18.9	39.6	30.4	12.9	41.1	28.5	16.9
Incr Delay (d2), s/veh	3.7	0.7	102.8	9.2	0.0	0.2	0.7	0.7	24.3	4.2	2.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	3.9	19.1	7.2	0.0	2.4	2.8	4.7	10.7	1.4	4.8	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.1	30.1	137.1	44.1	0.0	19.1	40.3	31.1	37.2	45.3	30.6	17.3
LnGrp LOS	D	C	F	D	A	B	D	C	D	D	C	B
Approach Vol, veh/h		713			782			1195			593	
Approach Delay, s/veh		99.0			38.6			35.7			31.2	
Approach LOS		F			D			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.9	34.6	21.5	25.0	16.5	27.0	8.4	38.0				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	10.5	23.5	20.5	21.5	10.5	23.5	10.5	31.5				
Max Q Clear Time (g_c+l1), s	4.9	18.7	17.1	23.5	8.2	12.6	4.4	7.9				
Green Ext Time (p_c), s	0.0	2.1	0.9	0.0	0.2	2.5	0.0	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			49.3									
HCM 6th LOS			D									

Queues
2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - PM Peak Hour



Lane Group	WBL	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	512	138	760	1062	634	923
v/c Ratio	0.79	0.34	0.60	0.40	0.30	0.75
Control Delay	44.5	8.7	7.3	3.3	3.6	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.8
Total Delay	44.5	8.7	7.3	3.3	3.6	7.0
Queue Length 50th (ft)	142	2	55	86	39	61
Queue Length 95th (ft)	197	49	50	75	47	289
Internal Link Dist (ft)		281		551	439	
Turn Bay Length (ft)			125			
Base Capacity (vph)	680	423	1263	2658	2096	1226
Starvation Cap Reductn	0	0	0	0	0	103
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.33	0.60	0.40	0.30	0.82
Intersection Summary						

HCM 6th Signalized Intersection Summary

2: Alder Avenue & SR-210 WB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	486	4	127	722	1009	0	0	602	877
Future Volume (veh/h)	0	0	0	486	4	127	722	1009	0	0	602	877
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach					No			No			No	
Adj Sat Flow, veh/h/ln				1900	1900	1900	1900	1900	0	0	1900	1900
Adj Flow Rate, veh/h				512	4	134	760	1062	0	0	634	923
Peak Hour Factor				0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %				0	0	0	0	0	0	0	0	0
Cap, veh/h				607	8	272	905	2705	0	0	2066	921
Arrive On Green				0.17	0.17	0.17	0.28	1.00	0.00	0.00	0.19	0.19
Sat Flow, veh/h				3510	47	1570	3510	3705	0	0	3705	1610
Grp Volume(v), veh/h				512	0	138	760	1062	0	0	634	923
Grp Sat Flow(s),veh/h/ln				1755	0	1617	1755	1805	0	0	1805	1610
Q Serve(g_s), s				12.7	0.0	6.9	5.9	0.0	0.0	0.0	13.6	51.5
Cycle Q Clear(g_c), s				12.7	0.0	6.9	5.9	0.0	0.0	0.0	13.6	51.5
Prop In Lane				1.00		0.97	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				607	0	280	905	2705	0	0	2066	921
V/C Ratio(X)				0.84	0.00	0.49	0.84	0.39	0.00	0.00	0.31	1.00
Avail Cap(c_a), veh/h				683	0	314	905	2705	0	0	2066	921
HCM Platoon Ratio				1.00	1.00	1.00	2.00	2.00	1.00	1.00	0.33	0.33
Upstream Filter(I)				1.00	0.00	1.00	0.53	0.53	0.00	0.00	0.65	0.65
Uniform Delay (d), s/veh				36.0	0.0	33.7	22.4	0.0	0.0	0.0	21.1	36.5
Incr Delay (d2), s/veh				8.7	0.0	1.3	3.9	0.2	0.0	0.0	0.3	24.3
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				6.1	0.0	2.8	6.6	0.1	0.0	0.0	6.6	28.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				44.7	0.0	35.0	26.3	0.2	0.0	0.0	21.4	60.8
LnGrp LOS				D	A	D	C	A	A	A	C	F
Approach Vol, veh/h					650			1822			1557	
Approach Delay, s/veh					42.6			11.1			44.8	
Approach LOS					D			B			D	
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	70.9			15.9			55.0			19.1		
Change Period (Y+Rc), s	3.5			3.5			3.5			3.5		
Max Green Setting (Gmax), s	65.5			10.5			51.5			17.5		
Max Q Clear Time (g_c+I1), s	2.0			7.9			53.5			14.7		
Green Ext Time (p_c), s	10.5			0.9			0.0			0.9		
Intersection Summary												
HCM 6th Ctrl Delay	29.2											
HCM 6th LOS	C											

Queues

SR-210/Alder Avenue Feasibility Study Report

3: Alder Avenue & SR-210 EB Ramps

2040 With Interchange Improvements - PM Peak Hour



Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	435	416	403	1264	560	211	935
v/c Ratio	0.81	0.73	0.70	0.77	0.65	0.52	0.43
Control Delay	41.0	26.4	24.9	14.2	6.6	37.7	5.4
Queue Delay	0.0	0.1	0.1	0.3	0.2	0.0	0.1
Total Delay	41.0	26.5	25.0	14.5	6.8	37.7	5.5
Queue Length 50th (ft)	228	151	135	167	42	57	142
Queue Length 95th (ft)	#354	271	247	m195	m74	m88	180
Internal Link Dist (ft)		960		402			551
Turn Bay Length (ft)			400		75	125	
Base Capacity (vph)	581	603	607	1635	860	408	2196
Starvation Cap Reductn	0	0	0	75	36	0	0
Spillback Cap Reductn	0	8	8	0	0	0	220
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.70	0.67	0.81	0.68	0.52	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

3: Alder Avenue & SR-210 EB Ramps

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	530	2	659	0	0	0	0	1201	532	200	888	0
Future Volume (veh/h)	530	2	659	0	0	0	0	1201	532	200	888	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No						No				No	
Adj Sat Flow, veh/h/ln	1900	1900	1900				0	1900	1900	1900	1900	0
Adj Flow Rate, veh/h	796	0	441				0	1264	560	211	935	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0				0	0	0	0	0	0
Cap, veh/h	1119	0	498				0	1544	689	514	2213	0
Arrive On Green	0.31	0.00	0.31				0.00	0.86	0.86	0.29	1.00	0.00
Sat Flow, veh/h	3619	0	1610				0	3705	1610	3510	3705	0
Grp Volume(v), veh/h	796	0	441				0	1264	560	211	935	0
Grp Sat Flow(s),veh/h/ln	1810	0	1610				0	1805	1610	1755	1805	0
Q Serve(g_s), s	17.5	0.0	23.5				0.0	15.2	14.9	4.3	0.0	0.0
Cycle Q Clear(g_c), s	17.5	0.0	23.5				0.0	15.2	14.9	4.3	0.0	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1119	0	498				0	1544	689	514	2213	0
V/C Ratio(X)	0.71	0.00	0.89				0.00	0.82	0.81	0.41	0.42	0.00
Avail Cap(c_a), veh/h	1226	0	546				0	1544	689	514	2213	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	2.00	2.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.41	0.41	0.84	0.84	0.00
Uniform Delay (d), s/veh	27.5	0.0	29.6				0.0	4.8	4.8	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	15.2				0.0	2.1	4.4	0.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	10.8				0.0	2.4	2.6	1.7	0.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	0.0	44.8				0.0	6.9	9.2	29.1	0.5	0.0
LnGrp LOS	C	A	D				A	A	A	C	A	A
Approach Vol, veh/h	1237						1824			1146		
Approach Delay, s/veh	34.8						7.6			5.8		
Approach LOS	C						A			A		
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	16.7	42.0		31.3			58.7					
Change Period (Y+Rc), s	3.5	3.5		3.5			3.5					
Max Green Setting (Gmax), s	10.5	38.5		30.5			52.5					
Max Q Clear Time (g_c+I1), s	6.3	17.2		25.5			2.0					
Green Ext Time (p_c), s	0.3	12.4		2.4			8.5					

Intersection Summary

HCM 6th Ctrl Delay	15.1
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Queues

SR-210/Alder Avenue Feasibility Study Report

4: Alder Avenue & Renaissance Parkway

2040 With Interchange Improvements - PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	280	585	93	120	542	500	81	1045	231	365	1263
v/c Ratio	0.91	0.67	0.19	0.62	0.84	0.79	0.45	0.87	0.37	0.65	0.85
Control Delay	71.3	35.2	3.0	53.0	48.9	21.4	45.8	37.6	11.8	36.7	26.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.1
Total Delay	71.3	35.2	3.0	53.0	48.9	21.4	45.8	38.2	11.8	36.7	26.9
Queue Length 50th (ft)	158	159	0	66	157	105	44	293	40	104	357
Queue Length 95th (ft)	#303	217	18	#122	#235	#197	88	#409	98	153	#506
Internal Link Dist (ft)		786			1237			212			402
Turn Bay Length (ft)	315		50	315			115		50	275	
Base Capacity (vph)	310	876	493	210	661	636	210	1205	627	564	1484
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	11
Spillback Cap Reductn	0	0	0	0	0	1	0	29	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.67	0.19	0.57	0.82	0.79	0.39	0.89	0.37	0.65	0.86

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

4: Alder Avenue & Renaissance Parkway

SR-210/Alder Avenue Feasibility Study Report

2040 With Interchange Improvements - PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	266	556	88	114	515	475	77	993	219	347	926	274
Future Volume (veh/h)	266	556	88	114	515	475	77	993	219	347	926	274
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	280	585	93	120	542	500	81	1045	231	365	975	288
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	312	958	427	151	638	555	122	1183	528	589	1177	346
Arrive On Green	0.17	0.27	0.27	0.08	0.18	0.18	0.07	0.33	0.33	0.34	0.86	0.86
Sat Flow, veh/h	1810	3610	1610	1810	3610	1610	1810	3610	1610	3510	2751	809
Grp Volume(v), veh/h	280	585	93	120	542	500	81	1045	231	365	638	625
Grp Sat Flow(s),veh/h/ln	1810	1805	1610	1810	1805	1610	1810	1805	1610	1755	1805	1754
Q Serve(g_s), s	13.6	12.8	4.1	5.9	13.1	8.6	3.9	24.6	7.7	7.9	15.7	16.0
Cycle Q Clear(g_c), s	13.6	12.8	4.1	5.9	13.1	8.6	3.9	24.6	7.7	7.9	15.7	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.46
Lane Grp Cap(c), veh/h	312	958	427	151	638	555	122	1183	528	589	772	751
V/C Ratio(X)	0.90	0.61	0.22	0.79	0.85	0.90	0.66	0.88	0.44	0.62	0.83	0.83
Avail Cap(c_a), veh/h	312	958	427	211	662	565	211	1183	528	589	772	751
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.85
Uniform Delay (d), s/veh	36.5	29.0	25.8	40.5	35.9	11.7	41.0	28.6	13.7	27.5	4.8	4.9
Incr Delay (d2), s/veh	27.0	1.1	0.3	12.9	9.9	17.5	6.0	9.7	2.6	1.7	8.5	9.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	5.6	1.6	3.1	6.5	7.2	1.9	11.8	3.0	3.0	3.8	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.5	30.1	26.0	53.4	45.8	29.1	47.0	38.3	16.3	29.2	13.3	13.9
LnGrp LOS	E	C	C	D	D	C	D	D	B	C	B	B
Approach Vol, veh/h		958			1162			1357			1628	
Approach Delay, s/veh		39.5			39.4			35.1			17.1	
Approach LOS		D			D			D			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.6	33.0	11.0	27.4	9.6	42.0	19.0	19.4				
Change Period (Y+Rc), s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				
Max Green Setting (Gmax), s	14.5	29.5	10.5	21.5	10.5	33.5	15.5	16.5				
Max Q Clear Time (g_c+I1), s	9.9	26.6	7.9	14.8	5.9	18.0	15.6	15.1				
Green Ext Time (p_c), s	0.6	2.0	0.1	2.3	0.1	7.9	0.0	0.8				
Intersection Summary												
HCM 6th Ctrl Delay			31.2									
HCM 6th LOS			C									

Attachment D
Bridge As-built General Plan

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	SBd	210	R21.8/R27.3	478	540

4-29-02

REGISTERED CIVIL ENGINEER

12-30-02

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER

Keng Mun Low

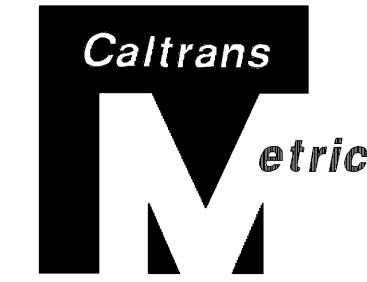
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Exp. 9/30/04

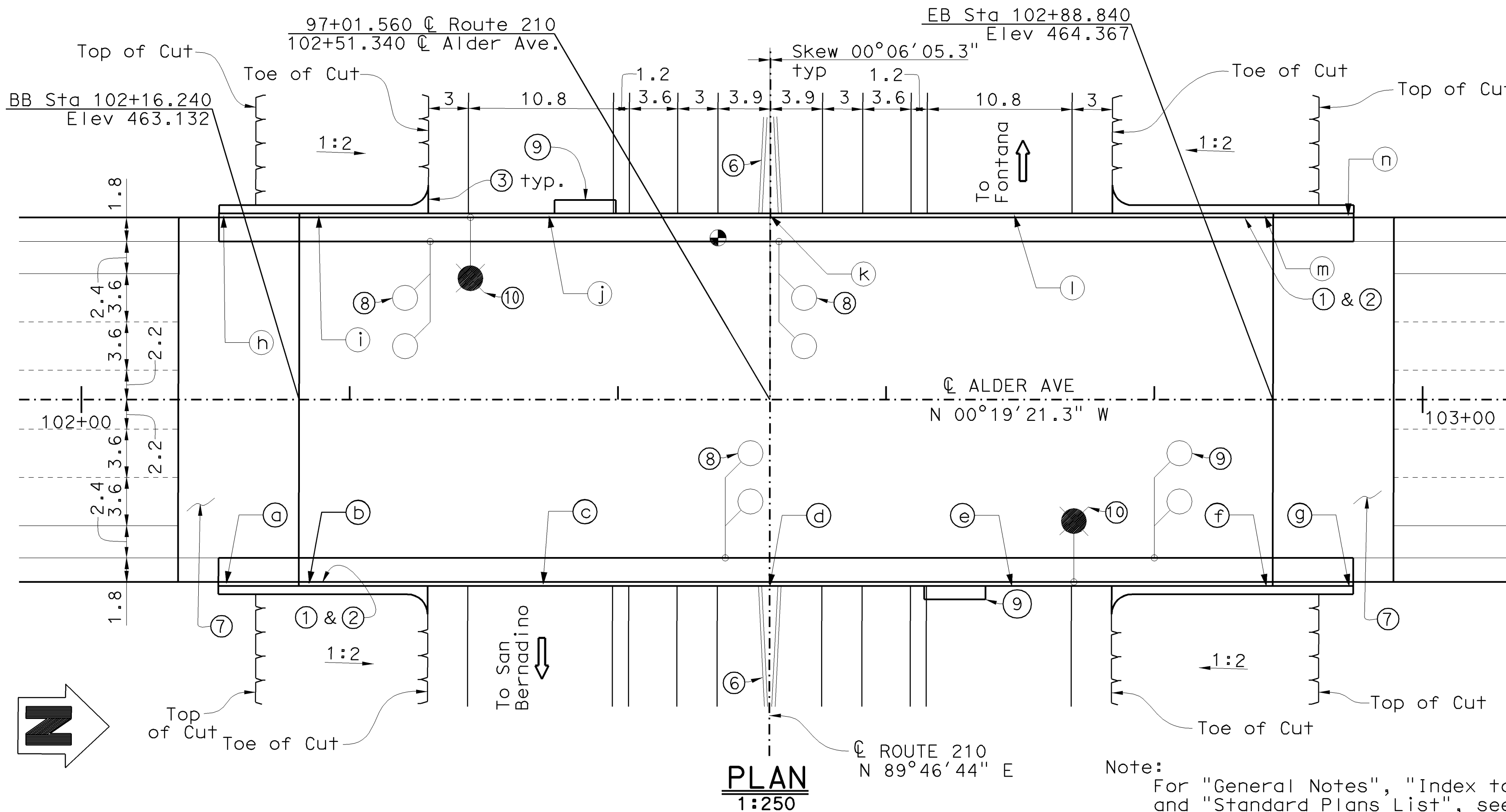
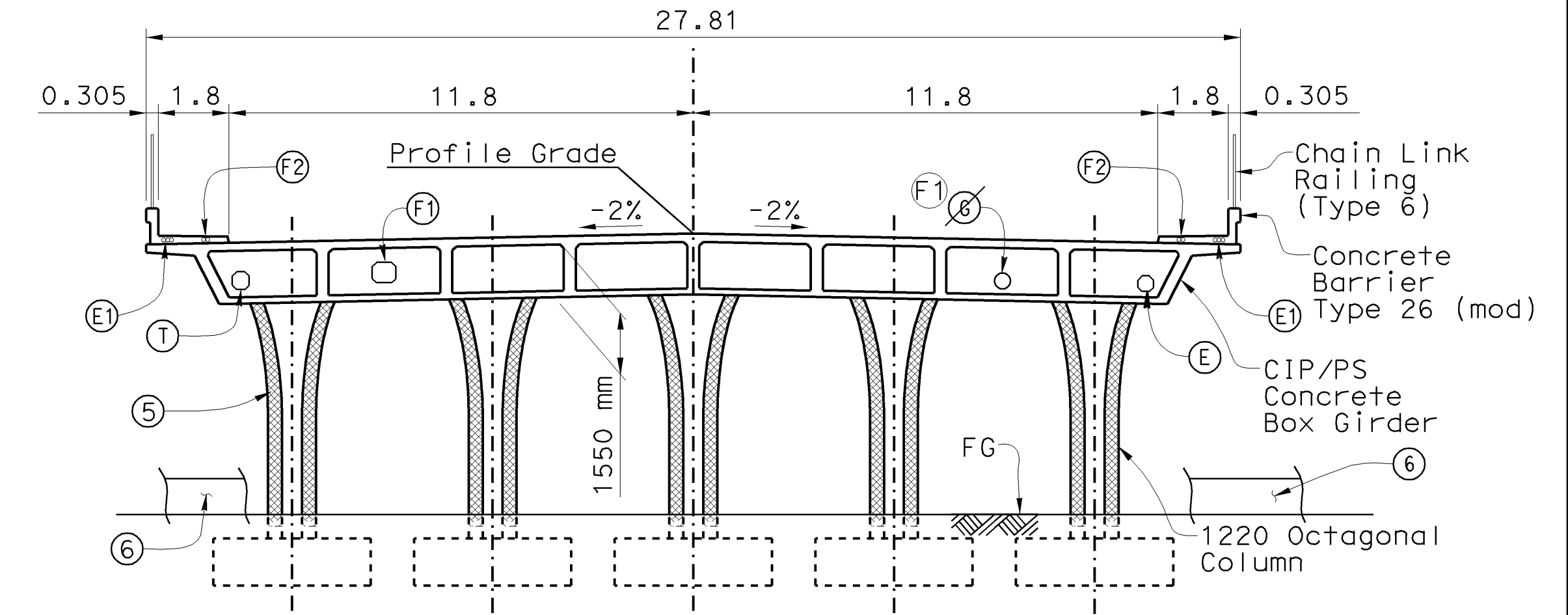
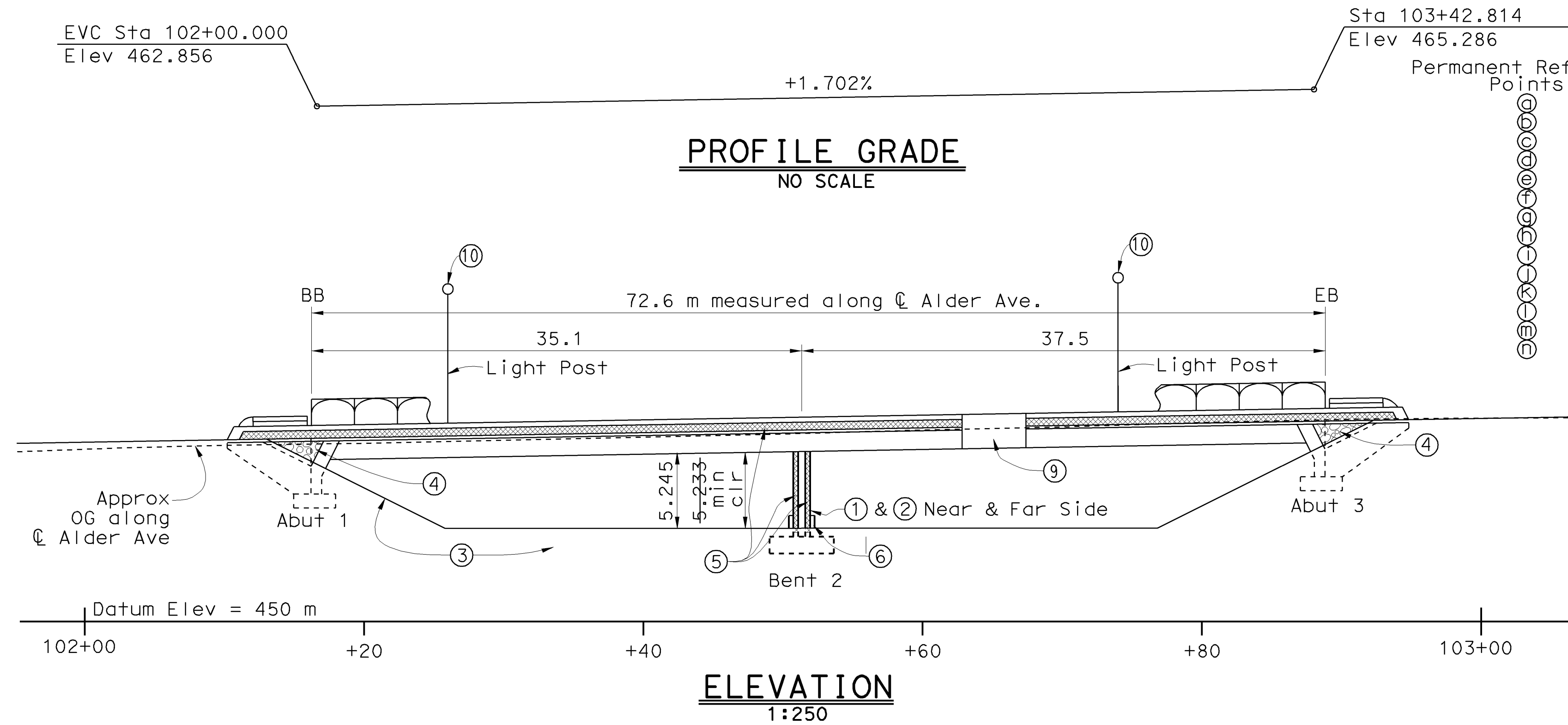
CIVIL

STATE OF CALIFORNIA

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☐ Alder Ave.



- ① Pacific Bell Telephone, Util
by others Not used by Pacific Bell
- ② Southern California Edison - Power,
Util by others
- ③ Southern California Gas Co. - Gas,
Util by others
Not used by Gas Company
Replaced with Future Utility
- ④ 3-53 mm Conduits for bridge electrical
system, see "ELECTRICAL PLANS"
- ⑤ Future Utility Opening
- ⑥ 2-130 mm Future Utility Opening
- NOTES:**
- ① Paint "Br No. 54-0649"
- ② Paint "ALDER AVE OC"
- ③ Slope paving (Cobblestone)
- ④ Architectural Treatment,
Cobblestone Texture
- ⑤ Architectural Treatment,
Heavy Blast
- ⑥ Conc. Barrier (type 60E),
see "ROAD PLANS"
- ⑦ Structure Approach Type N(9S)
- ⑧ Bridge Deck Preformed Detector
Loops, see "ELECTRICAL PLANS"
- ⑨ Bridge Mounted Sign Structure,
see "SIGN PLANS"
- ⑩ Light standards, see
"ELECTRICAL PLANS"
- - Indicates point of min
vertical clearance

QUANTITIES		
STRUCTURE EXCAVATION (BRIDGE)	900	m ³
STRUCTURE BACKFILL (BRIDGE)	600	m ³
PRESTRESSING CAST-IN-PLACE CONCRETE	LUMP	SUM
STRUCTURAL CONCRETE, BRIDGE FOOTING	220	m ³
STRUCTURAL CONCRETE, BRIDGE	1,410	m ³
STRUCTURAL CONCRETE, APPROACH SLAB	151	m ³
(TYPE N)		
ARCHITECTURAL TREATMENT (COBBLESTONE TEXTURE)	19	m ²
HEAVY BLAST TEXTURE	35	m ²
JOINT SEAL (MR 50 mm)	55	m
BAR REINFORCING STEEL (BRIDGE)	221,500	kg
610 mm WELDED STEEL PIPE CASING (BRIDGE)	47	m
SLOPE PAVING (COBBLESTONE)	92	m ³
MISCELLANEOUS METAL (BRIDGE)	400	kg
CHAIN LINK RAILING (TYPE 6)	146	m
TUBULAR HANDRAILING	29	m
CONCRETE BARRIER (TYPE 26 MODIFIED)	174	m

ALL DIMENSIONS ARE IN
METERS UNLESS OTHERWISE SHOWN

DESIGN ENGINEER	DESIGN	BY Keng Mun Low	CHECKED Hubert Wong	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD		STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 8	BRIDGE NO. 54-0649	ALDER AVENUE OVERCROSSING GENERAL PLAN								
	DETAILS	BY Eric Hallstrom	CHECKED Hubert Wong	LAYOUT	BY Keng Mun Low	CHECKED Hubert Wong			KILOMETER POST R25.65									
	QUANTITIES	BY Brian Mori	CHECKED Hubert Wong	SPECIFICATIONS	BY Mark Okimura	PLANS AND SPECS COMPARED Mark Okimura												
STRUCTURES DESIGN GENERAL PLAN SHEET (METRIC) (REV.4/20/00)											CU 08250 EA 4437U1		DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES (PRELIMINARY STAGE ONLY)		SHEET	OF
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS											0 10 20 30 40 50 60 70 80 90 100				5-31-01 6-5-01 11-11-01 12-16-01 2-22-02 2-22-02 02-22-02 1-3-01 1-3-02 5-6-02		1	21