TRANSPORTATION IMPACT STUDY

FOR

LOFTS AT KALAMA

OLD PACIFIC HIGHWAY S NORTH OF ROBB ROAD

CITY OF KALAMA, WASHINGTON

6/15/2021

PREPARED BY

KELLY ENGINEERING

June 2021

TRANSPORTATION IMPACT STUDY

Lofts at Kalama

City of Kalama, Washington

June 15, 2021

Prepared for:

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INTRODUCTION

A transportation impact study (TIS) for a 311 unit apartment complex was conducted to determine the potential traffic related impacts of the development to the surrounding roadway system. The development will consist of three and four story buildings. The TIS for the Lofts at Kalama was based on correspondence with representatives from Gray & Osborne, Inc. Gray & Osborne, Inc. are transportation engineering consultants for the City of Kalama.

The site is located on the west side of Old Pacific Highway S and approximately ¼ mile south of Cloverdale Road in the City of Kalama. The zoning designation is R-3 (high density residential). The tax lot is 411460100. The property is undeveloped with no existing buildings or structures. The vegetation is grass and scattered trees.

Land uses in the vicinity of the site consist of single-family homes and vacant land. The future Cedar Springs Subdivision will be constructed on the opposite side of Old Pacific Highway S. A vicinity map, aerial photograph and pre-app submittal site plans are shown in Figures 1a, 1b, 1c(a), 1c(b) and 1c(c).

Roadway Characteristics

The site will have four accesses onto Old Pacific Highway S. Old Pacific Highway S is a two lane paved arterial roadway with intermittent gravel/grass shoulders. The posted speed limit along the site frontage is 35 mph.

The Elm Street/1st Street, Robb Road/Old Pacific Highway S, I-5 NB and SB on/off ramps at Robb Road and the site access(s) onto Old Pacific Highway S were analyzed in this report. The Elm Street/1st Street intersection is controlled by stop signs on all approaches. The Robb Road/Old Pacific Highway S intersection is controlled by stop signs on the northbound, southbound and westbound approaches. The I-5 NB and SB ramps at Robb Road are controlled by stop signs at the off ramps. The lane configurations for the intersections are shown in Figure 2.

Traffic Volumes

The traffic counts in this report were conducted from 7:00 to 9:00 am and 4:00 to 6:00 pm during March 2018 and June 2021. The AM peak hour occurred between approximately 7:30 to 8:30 am and the PM peak hour occurred between approximately 4:40 to 5:40 pm. The peak hour at the intersections is the one-hour time period when traffic volumes are the highest and congestion is most likely to occur. The existing traffic volumes are shown in Figure 3. The raw traffic count data is shown in Appendix A.

As a result of the current service oriented facility and other closures required by Washington State due to the Covid 19 virus there has been a noticeable decline in traffic volumes. Therefore, traffic counts obtained during 2018 were increased by a factor of 6% to current year. The adjustments were based on discussions with representatives from Gray & Osborn Inc. Traffic counts obtained during 2021 at the I-5 northbound and southbound on/off ramps were adjusted as based on the historical traffic counts. The adjusted traffic volumes are shown in Figure 4.

Trip Generation/Distribution

The Lofts at Kalama will generate approximately 1,692 trips per day, ITE Trip Generation Manual, 10th edition. A trip is a one-directional vehicle movement. 112 trips will occur during the AM peak hour and 137 trips will occur during the PM peak hour. The trip generation rates are shown in Table 1.

Table 1
Site Traffic Generation

Land Use	ITE code	Trip Generation	Units	Trips/ Day	Trips/ AM Peak	Trips/ PM Peak
Multifamily Housing (Mid-Rise)	221	5.44 trips/d.u.-Day 0.36 trips/d.u.-AM peak hour 0.44 trips/d.u.-PM peak hour	311	1,692	112 (in-28, out-84)	137 (in-83, out-54)

The directional distribution of traffic generated by the development was assigned to the study area intersections and site access(s). The distribution was based on the existing traffic counts and a survey conducted within the vicinity of the site. The site traffic distribution and assignment diagrams are shown in Figures 7a and 7b.

Year 2026 Traffic Volumes

The year 2026 traffic volumes at the study area intersections included a 2.0 percent per year compounded growth rate over the adjusted existing traffic volumes. The growth rate was based on discussions with representatives from Gray & Osborne, Inc. The year 2026 traffic volumes also included traffic from the future Cedar Springs Subdivision. The growth rate and in-process traffic from the Cedar Springs Subdivision was included to provide an analysis of the intersections for build-out of the Lofts at Kalama, forecast year 2026 traffic conditions.

Peak Hour Traffic Operations

The scope of the transportation impact study was based on discussions with representatives from Gray & Osborne, Inc. Based on the discussions the following intersections were analyzed in this report:

(1) 1st Street & Elm Street.
(2) Old Pacific Highway S & Robb Road
(3) I-5 NB ramps at Robb Road
(4) I-5 SB ramps at Robb Road
(5) Old Pacific Highway S & site access(s) (future)

The intersections were analyzed to determine existing, year 2026 without project and year 2026 with project conditions. The site access(s) onto Old Pacific Highway S were analyzed for the year 2026 with and without project conditions. The assumption was made that site build out will occur within a five year time period. The year 2026 traffic volumes without the project are shown in Figure 6. The year 2026 traffic volumes with the project are shown in Figure 8.

The HCS + software was used to determine the level of service at the study area intersections. The software program is based on the Highway Capacity Manual methodology.

The Highway Capacity Manual procedures describe the operation of an intersection in terms of its level of service (LOS). The LOS criteria ranges from "A", which indicates little, if any, delay to "F", which indicates that vehicles experience very long delays. The LOS criteria with the corresponding delay in seconds per vehicle and capacity analysis summary are shown in Tables 2 and 3 on page 4.

Table 2
Level of Service Criteria

Level of Service (LOS)	A	B	C	D	E	F
Unsignalized Intersections Average Delay (seconds per vehicle)	≤10	>10-15	>15-25	>25-35	>35-50	>50

Table 3
Capacity Analysis Summary

	AM Peak Hour		PM Peak Hour	
	LOS	Delay	LOS	Delay
1st Street & Elm Street				
Existing	B	12.3	B	10.4
Year 2026 w/o project	B	14.4	B	11.5
Year 2026 with project	C	15.7	B	12.4
Robb Road & Old Pacific Highway S				
Existing	A	8.4	A	9.1
Year 2026 w/o project	A	8.6	A	9.7
Year 2026 with project	A	8.8	B	10.9
I-5 NB ramps & Robb Road				
Existing	A	9.7	B	10.6
Year 2026 w/o project	A	9.9	B	11.1
Year 2026 with project	B	10.1	B	11.7
I-5 SB ramps & Robb Road				
Existing	B	12.2	B	12.1
Year 2026 w/o project	B	13.2	B	13.1
Year 2026 with project	B	14.8	B	14.6
Old Pacific Highway S & site access(s)				
Year 2026 w/o Project	A	9.0	A	9.0
Year 2026 with project	A	9.4	A	9.8

LOS = Level of Service
Delay = Approach Delay in seconds per vehicle

Based on the findings of this transportation impact study the study area intersections will operate at LOS "C" or better with build-out of the Lofts at Kalama during the AM and PM peak hours. The LOS computer printouts are included in Appendix D.

Turn Lanes

The requirement for turn lanes was not conducted at the site access(s) due to low traffic volumes on S Pacific Highway and a very acceptable projected level of service with build out of the development.

Sight Distance

Sight distance was measured at the location of the future access(s) onto Old Pacific Highway S. The measured corner sight distance was over 400 feet when looking towards the north and south. A distance of 390 feet is required as based on the posted speed limit of 35 mph on Old Pacific Highway S and the criteria in AASHTO, A Policy on Geometric Design of Highways and Streets, 2010. Therefore, the sight distance requirement is met.

Collision Records

Collision records were obtained from the Washington State Department of Transportation (WSDOT) for the three year time period between June 1, 2018 and June 1, 2021. Based on the findings the calculated accident rates are below the threshold of 1.0 accidents per million entering vehicles (MEV) that usually identifies an intersection with a high accident rate. The collision data is shown in Table 4 and Appendix C.

Table 4
Collision Data

Intersection	Number of Collisions	Collision Type			Rate *
		Angle	Opposite Direction	Other	
Elm St./1st St.	3	3		0	0.40
Old Pacific Hwy S/Robb Rd.	0				
I-5 NB ramps & Robb Rd.	2	1	1	0	0.34
I-5 SB ramps & Robb Rd.	0				

* Accident rate per million entering vehicles

Pedestrian/Bicycle/Transit Considerations

No pedestrian or bicycle activities were observed within the vicinity of the site. Sidewalks and bike lanes will be provided for along the site frontage of Old Pacific Highway S. The site is not served by public transit service.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this transportation impact study the surrounding roadway system can adequately accommodate traffic from the Lofts at Kalama. The study area intersections will operate at LOS "C" or better with build-out of the development.

Adequate sight distance should be maintained at the site access onto Old Pacific Highway S. Obstructions by landscaping, signs, parked vehicles or other objects should not be allowed.

No additional off-site traffic control devices were identified to accommodate the development.

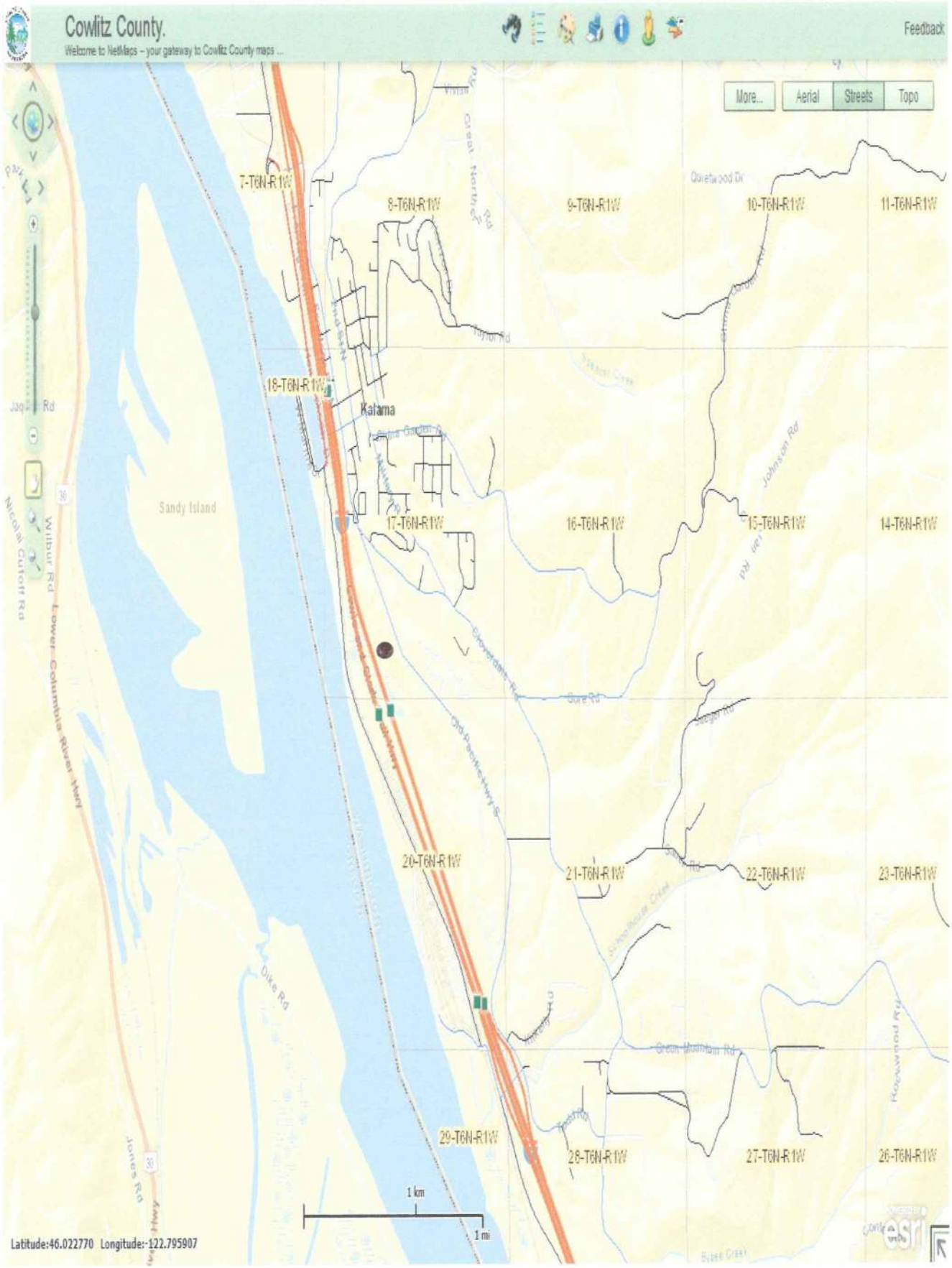
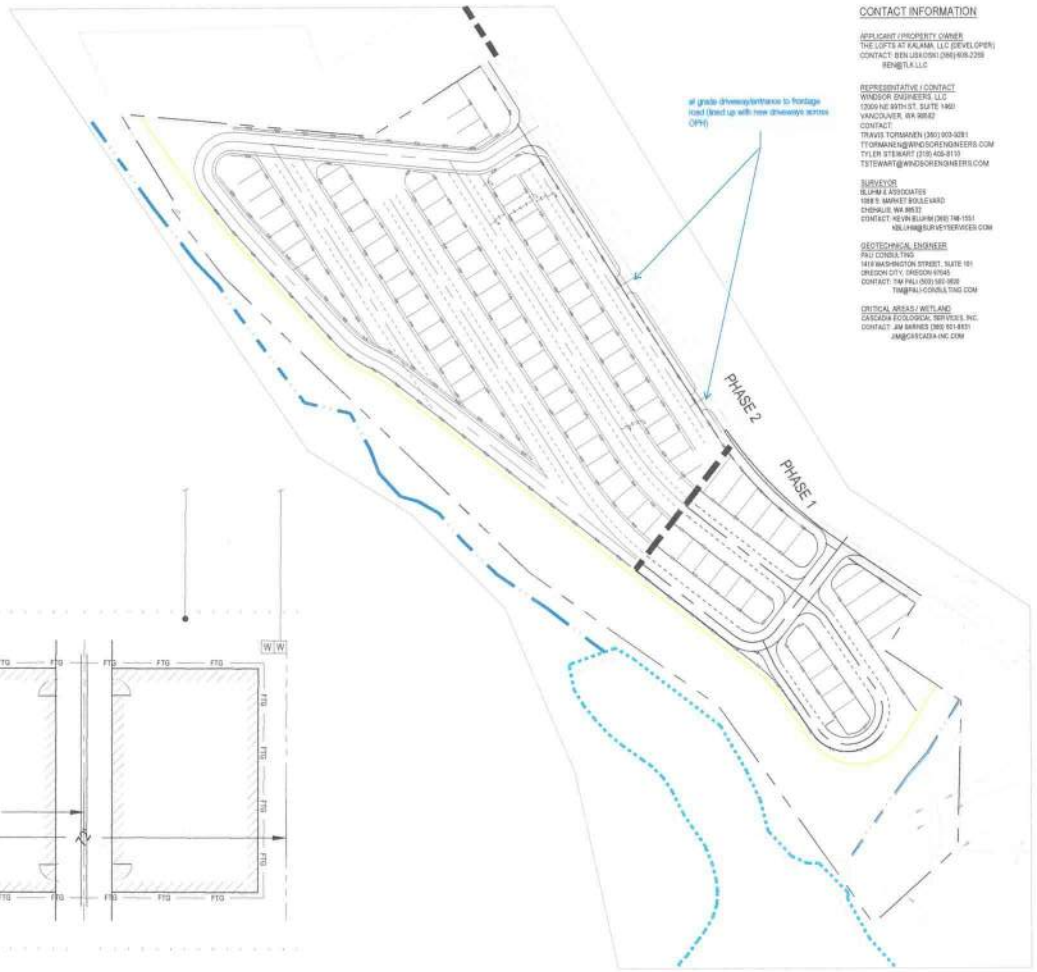


FIGURE 1a

3/24/2018

FIGURE 1b

3/21/2018



CONTACT INFORMATION

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BEN@TLK.LLC

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JIM@CASCADIA-INC.COM

PROJECT NOTES

CONSTRUCT PHASE 1 BUILDINGS AND INFRASTRUCTURE. PROJECT IS A CONVERSION OF THE APPROVED SUNSET TERRACE SUBDIVISION TO A HIGH DENSITY DEVELOPMENT.

PARCEL NO (S): 4114481100

SITE ADDRESS: 6446 OLD PACIFIC HIGHWAY

QUARTER SECTION: NE ¼ 4 SW ¼ S17 T6N R1W

COUNTY: CowlitZ

CURRENT USE: VACANT LAND

ZONING DESIGNATION: R-3

TRANSIT ROUTES: NO KNOWN BUS ROUTES WITHIN 1 MILE OF THE SITE

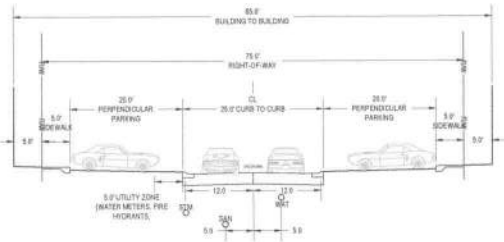
EXISTING WATER AND SEWER: SEWER SERVICE WILL BE PROVIDED BY THE CITY OF KALAMA. PUBLIC WATER SERVICE WILL BE PROVIDED BY THE CITY OF KALAMA. NO SEPTIC SYSTEMS ARE KNOW TO EXIST ON THE SITE. NO WELLS ARE KNOWN TO EXIST ON THE SITE.

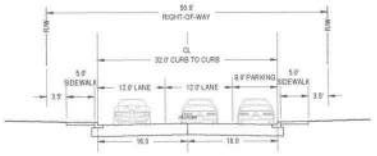
CRITICAL AREAS: THE SITE CONTAINS SIGNIFICANT ENVIRONMENTAL CONDITIONS LISTED IN THE APPLICATION CHECKLIST. THE SITE IS LOCATED IN THE COLUMBIA RIVER WATERSHED.

PROPOSED

PROPOSED LOT AREAS: THERE ARE APPROXIMATELY 80 LOTS PROPOSED TO BE USED FOR 4-STORY, ZERO LOT LINE TOWNHOMES FOR A TOTAL OF 320 DWELLING UNITS.

SITE/AREA SUMMARY		
CURRENT USE:	VACANT LAND	
ZONING:	R-3 HIGH DENSITY RESIDENTIAL	
	ACRES	SQ. FT.
GROSS SITE AREA	±17.00	740,827 SF
OPENS SPACE	±4.54	203,861 SF
RIGHT-OF-WAY DEDICATION	±2.81	303,178 SF
DEVELOPABLE AREA	±9.65	234,788 SF
MIN. LOT AREA	±0.04	1,800 SF
MAX # OF LOTS / BUILDINGS	130	
PROPOSED # OF LOTS / BUILDINGS	80	
MINIMUM DENSITY / QUANTITY	X DU / AC	X UNITS
MAXIMUM DENSITY / QUANTITY	X DU / AC	X UNITS
PROPOSED # OF UNITS		311 UNITS
FRONT YARD SETBACK	X FT	
SIDE / REAR SETBACK	X FT	
MAX HEIGHT	X FT	
MAX IMPERVIOUS	X%	





LINE IS 1" ON FULL SCALE DRAWING

Scale: 1" = 100'

Scale: 1" = 100'

N

Scale: 1" = 10'

PRELIMINARY

811 Know what's below. Call before you dig.
CALL 2 BUSINESS DAYS BEFORE YOU DIG
LOCATE UTILITY INFORMATION IS APPROXIMATE
LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION

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www.windsorengineers.com
Project No: 21002

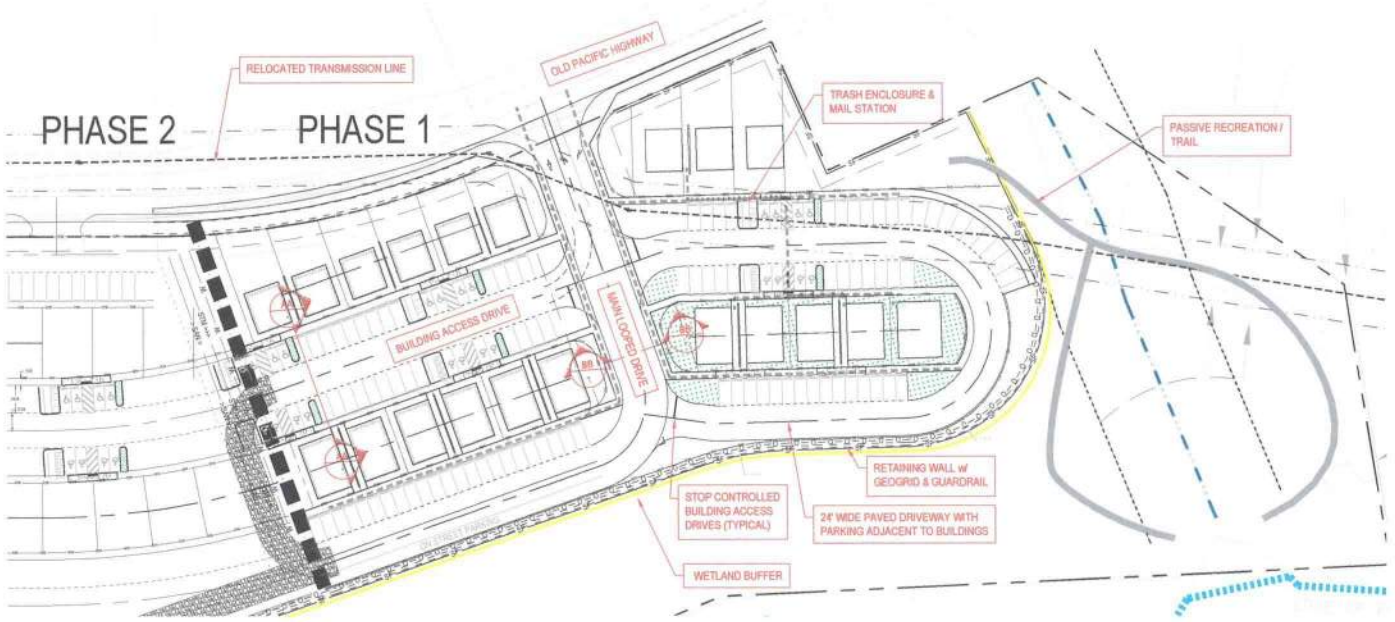
THE LOFTS AT KALAMA
KALAMA, WA

PRE-APP SUBMITTAL
Issue Date: 05/11/2021

COVER SHEET

-

FIGURE 1c (a)



DESIGN CRITERIA:

ROAD
- THE MAXIMUM ROADWAY SLOPE IS 15%.
- THE RECOMMENDED INTERSECTION SLOPE IS < 5%
- THE MIN RADIUS INSIDE RADIUS FOR A FIRE APPARATUS ACCESS ROAD IS 25' AND 45' FOR AN OUTSIDE RADIUS.

PARKING
- ACCESSIBLE PARKING IS 2% MAX.
- THE RECOMMENDED PARKING SLOPE IS < 5%.
- PARALLEL PARKING AT APPROPRIATE LOCATIONS

SIDEWALKS
GENERALLY ALL SIDEWALKS ARE INTENDED TO BE WITHIN PUBLIC RIGHT OF WAY.
- SIDEWALK SLOPE CAN MATCH ROAD PER PROWAG
- PRIVATE RAMP 5% MAX.

BUILDING
- 10' SPACING
- 8 PLEX AND 4 PLEX WITH FIREWALL
- INTENDED TO BE THE FOLLOWING TYPES:
  - 1 - FOUR STORY WITH GROUND AND THIRD STORY ACCESS
  - 2 - THREE STORY WITH GROUND ACCESS ONLY
  - 3 - FOUR STORY WITH GROUND AND SECOND STORY ACCESS

PRELIMINARY

LINE IS 1" ON FULL SCALE DRAWING

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THE LOFTS AT KALAMA
KALAMA, WA

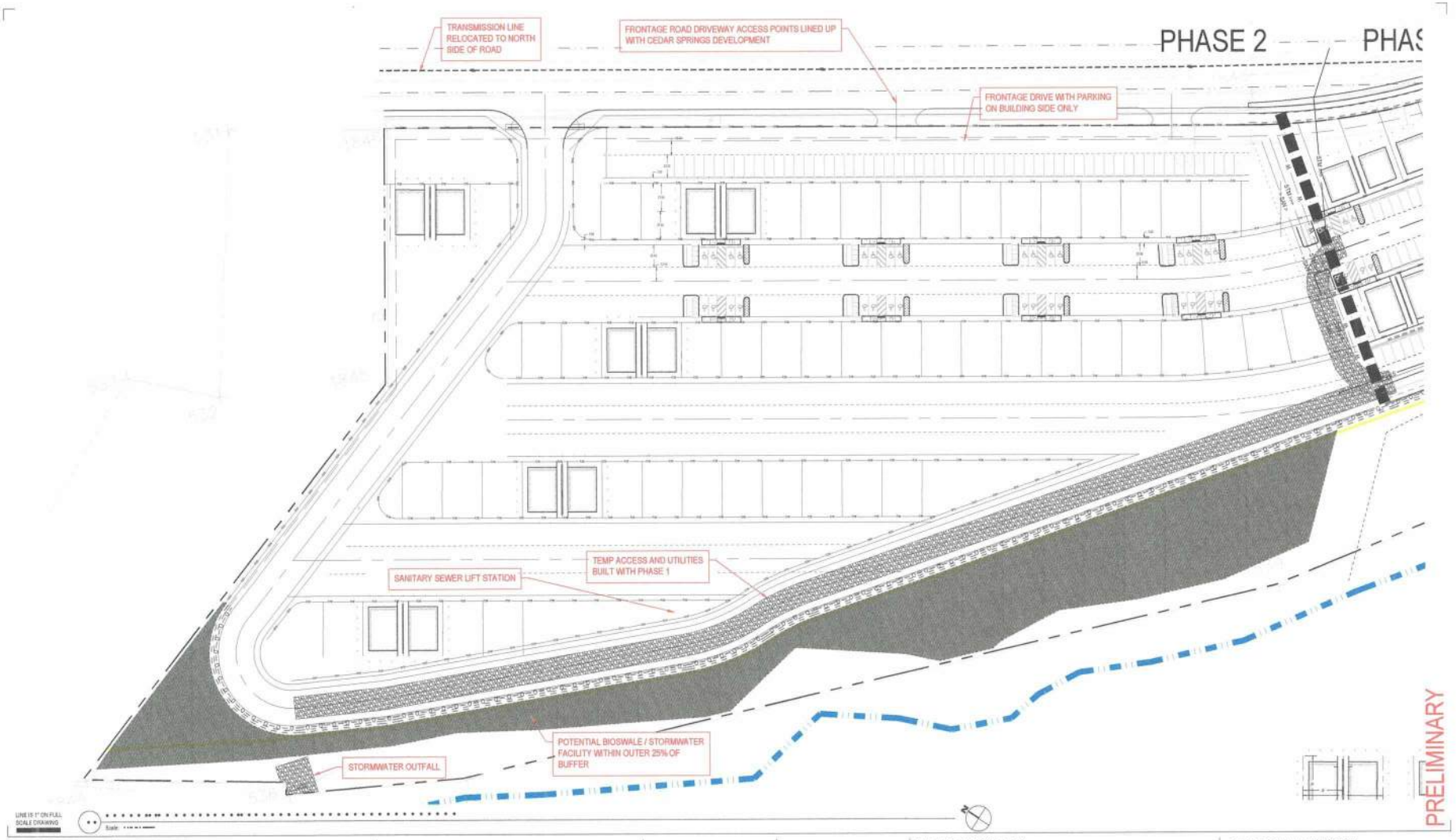
PRE-APP SUBMITTAL
Issue Date: 05/11/2021

Phase 1 Conceptual Siteplan

-

6.3 PH1 SITE PLAN, 5/11/2021 9:42:05 AM

FIGURE 1c (b)


TRANSMISSION LINE RELOCATED TO NORTH SIDE OF ROAD
FRONTAGE ROAD DRIVEWAY ACCESS POINTS LINED UP WITH CEDAR SPRINGS DEVELOPMENT
PHASE 2
PHAS
FRONTAGE DRIVE WITH PARKING ON BUILDING SIDE ONLY
SANITARY SEWER LIFT STATION
TEMP ACCESS AND UTILITIES BUILT WITH PHASE 1
POTENTIAL BIOSWALE / STORMWATER FACILITY WITHIN OUTER 25% OF BUFFER
STORMWATER OUTFALL
PRELIMINARY
LINE IS 1" ON FULL SCALE DRAWING
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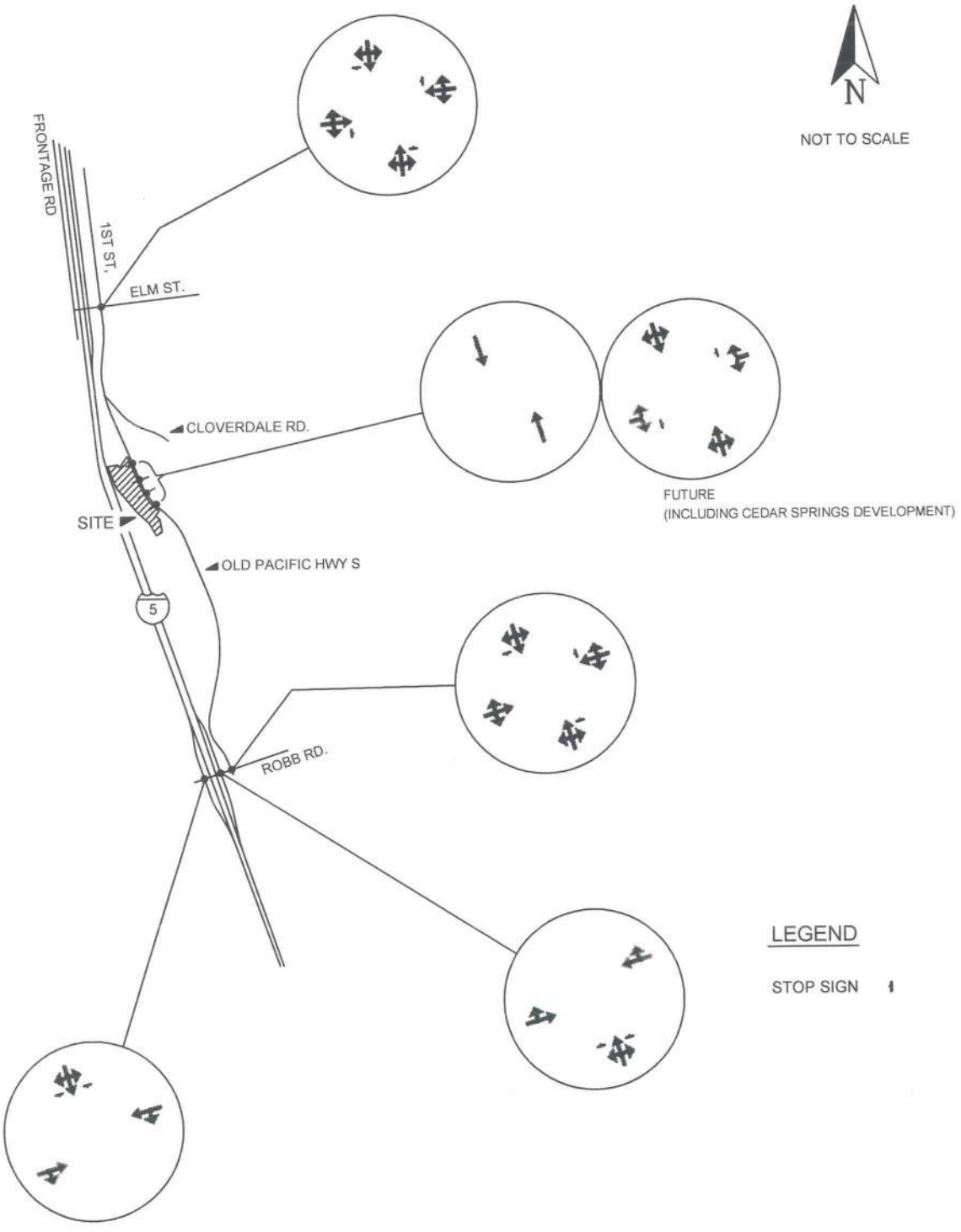
Issue Date: 05/11/2021
Phase 2 Conceptual Siteplan

FIGURE 1c (c)



EXISTING CONDITIONS UNLESS NOTED

LOFTS AT KALAMA

FIGURE 2
LANE CONFIGURATIONS

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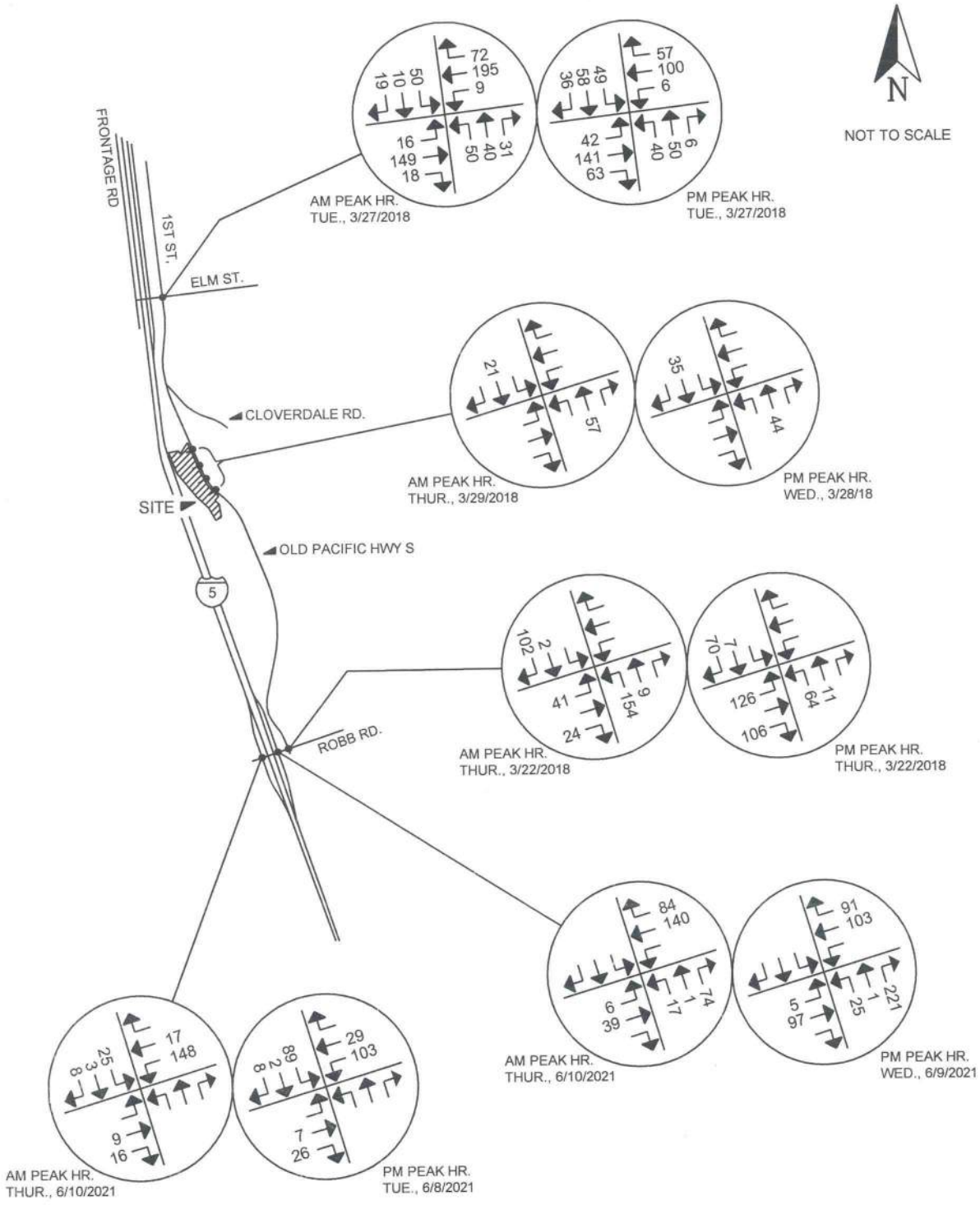

LOFTS AT KALAMA

FIGURE 3
EXISTING TRAFFIC VOLUMES

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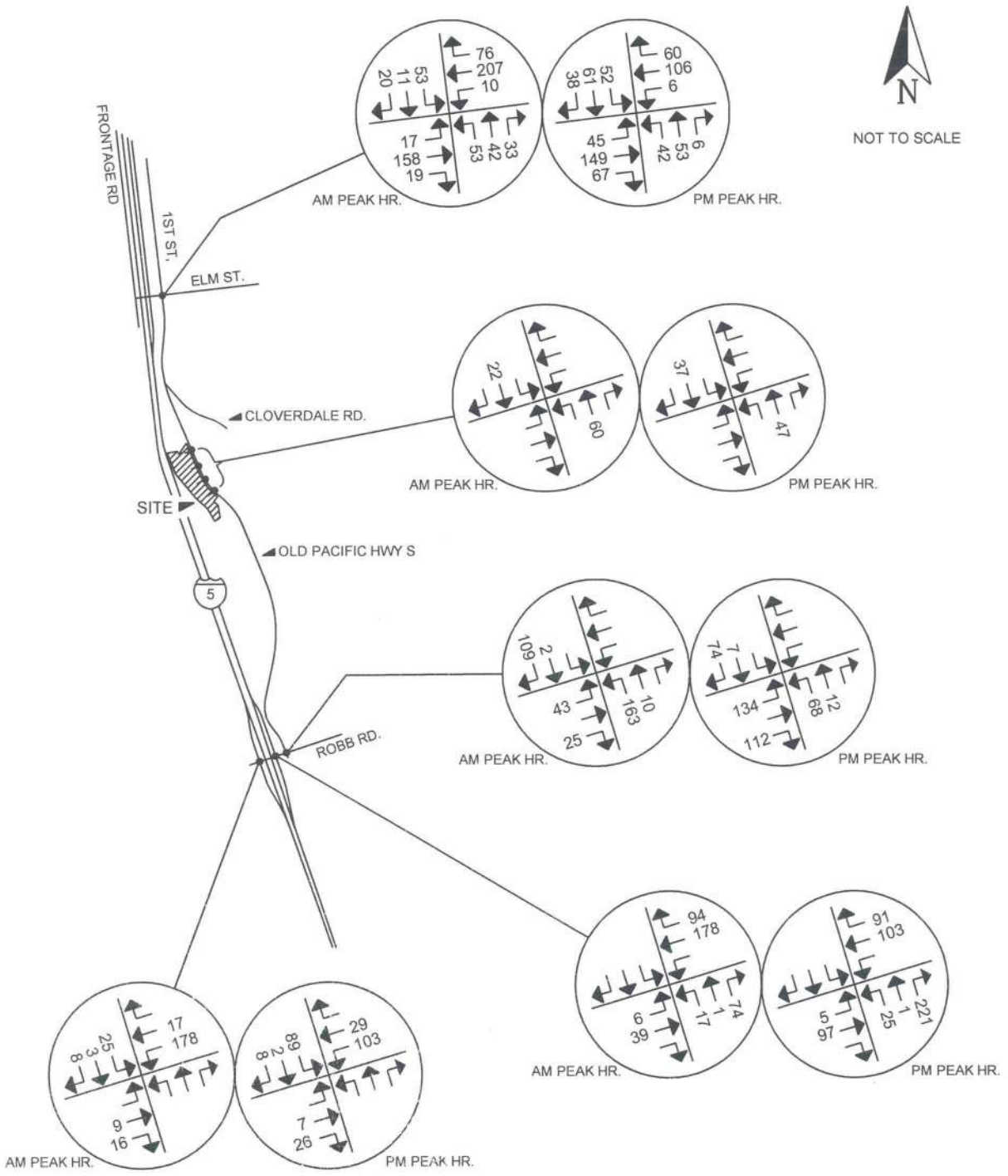

LOFTS AT KALAMA

FIGURE 4
ADJUSTED TRAFFIC VOLUMES

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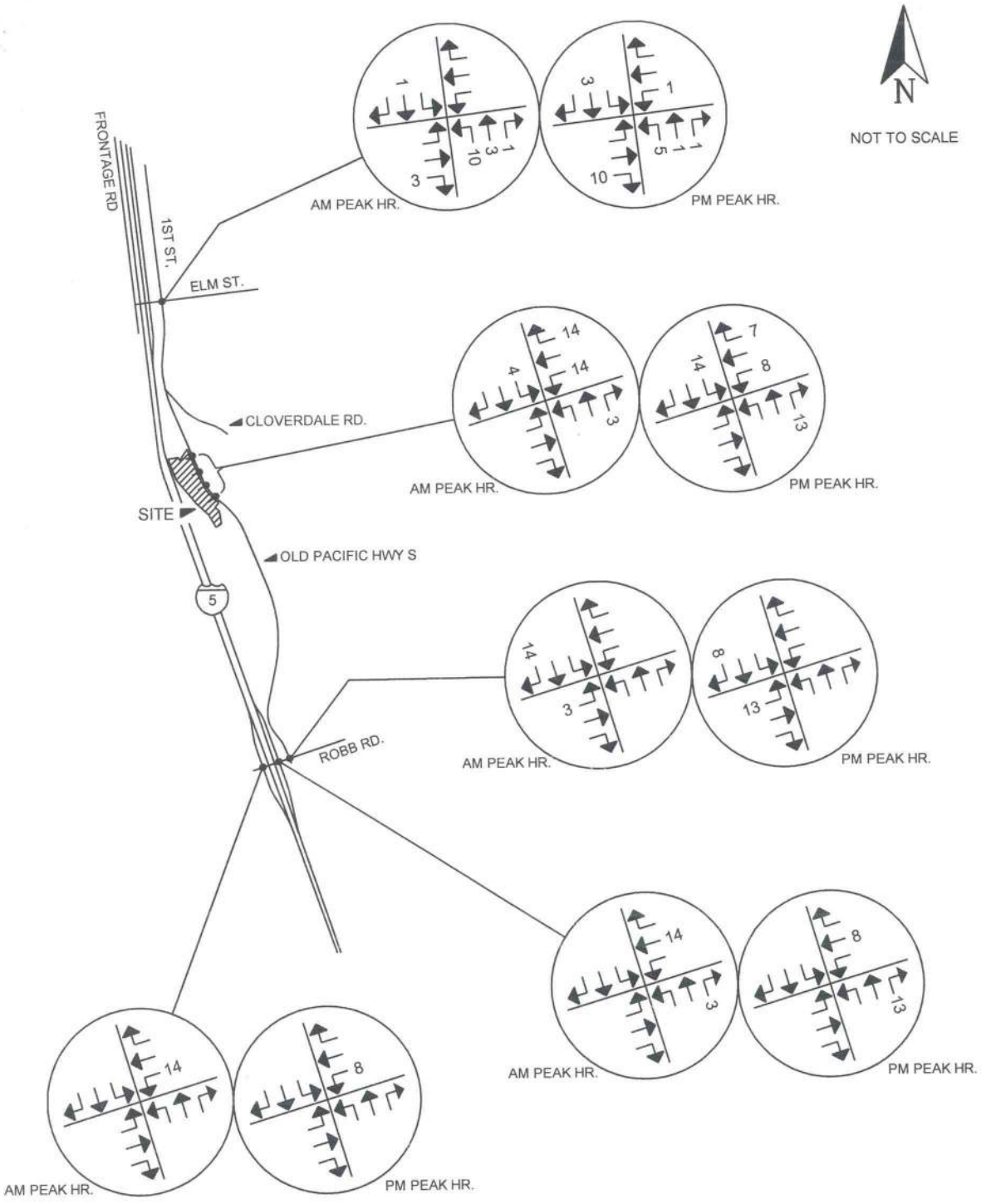

LOFTS AT KALAMA

FIGURE 5
IN-PROCESS TRAFFIC

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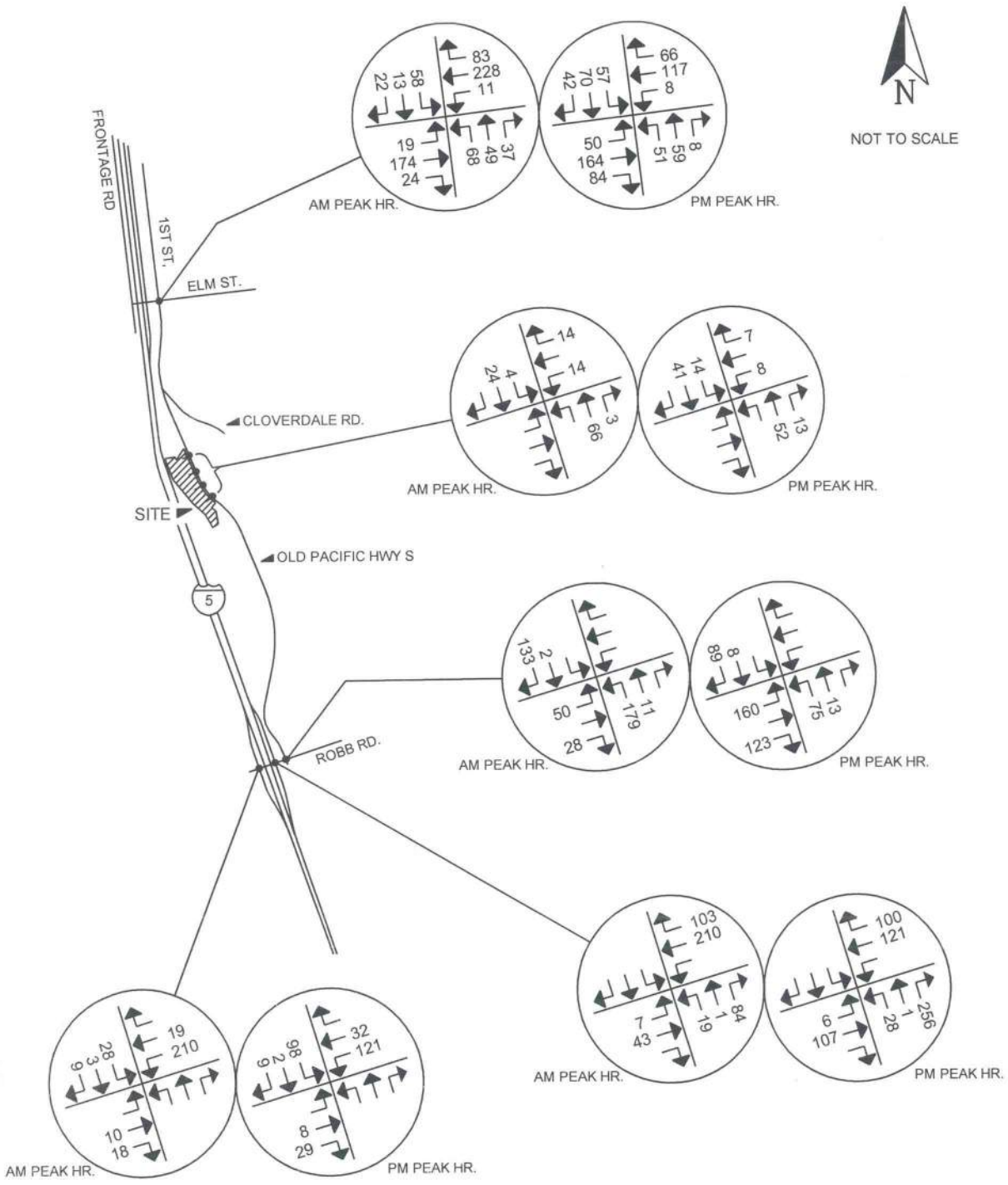

LOFTS AT KALAMA

FIGURE 6
YEAR 2026 TRAFFIC VOLUMES
W/O PROJECT

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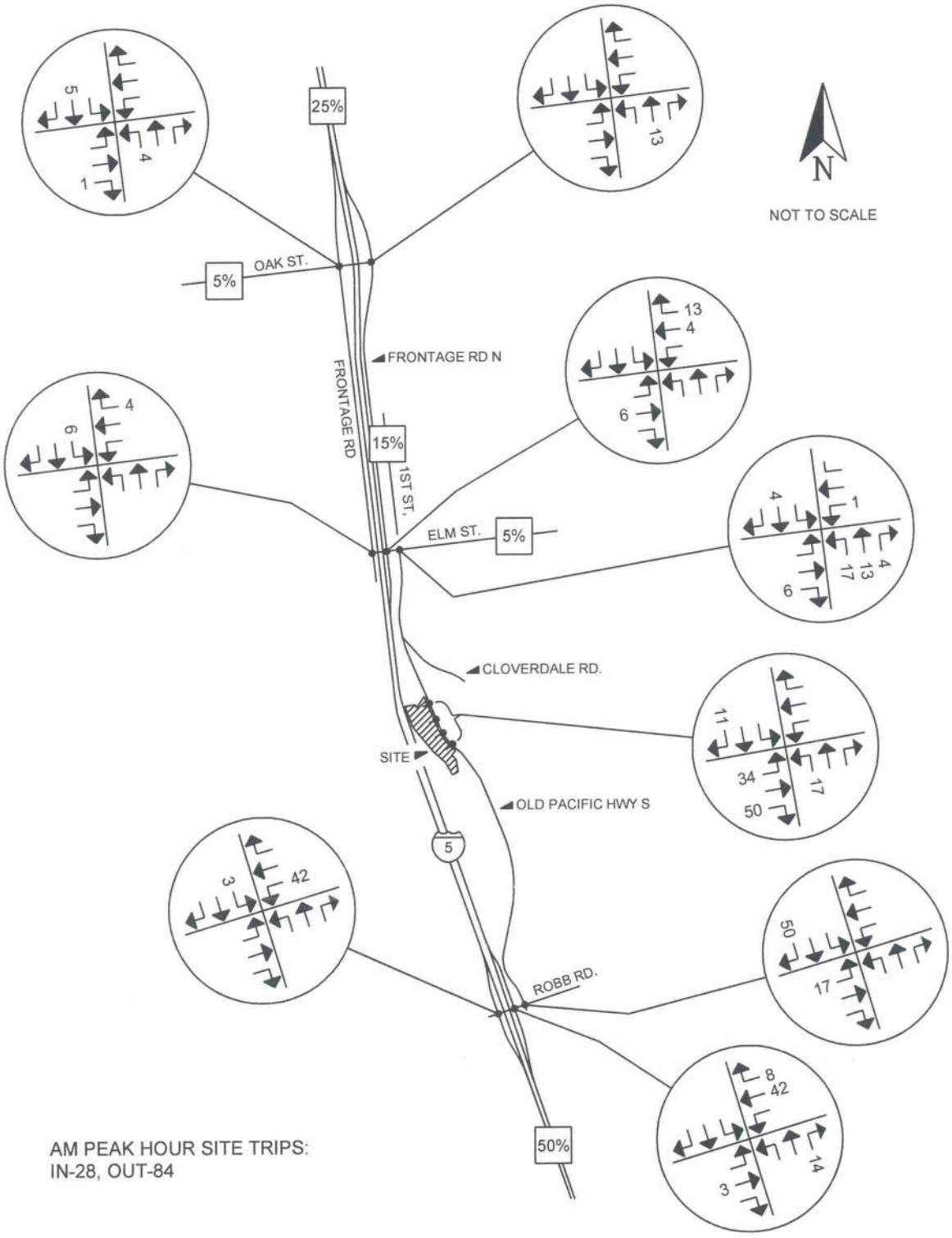

LOFTS AT KALAMA

FIGURE 7a
SITE TRAFFIC DISTRIBUTION/ ASSIGNMENT, AM PEAK HOUR

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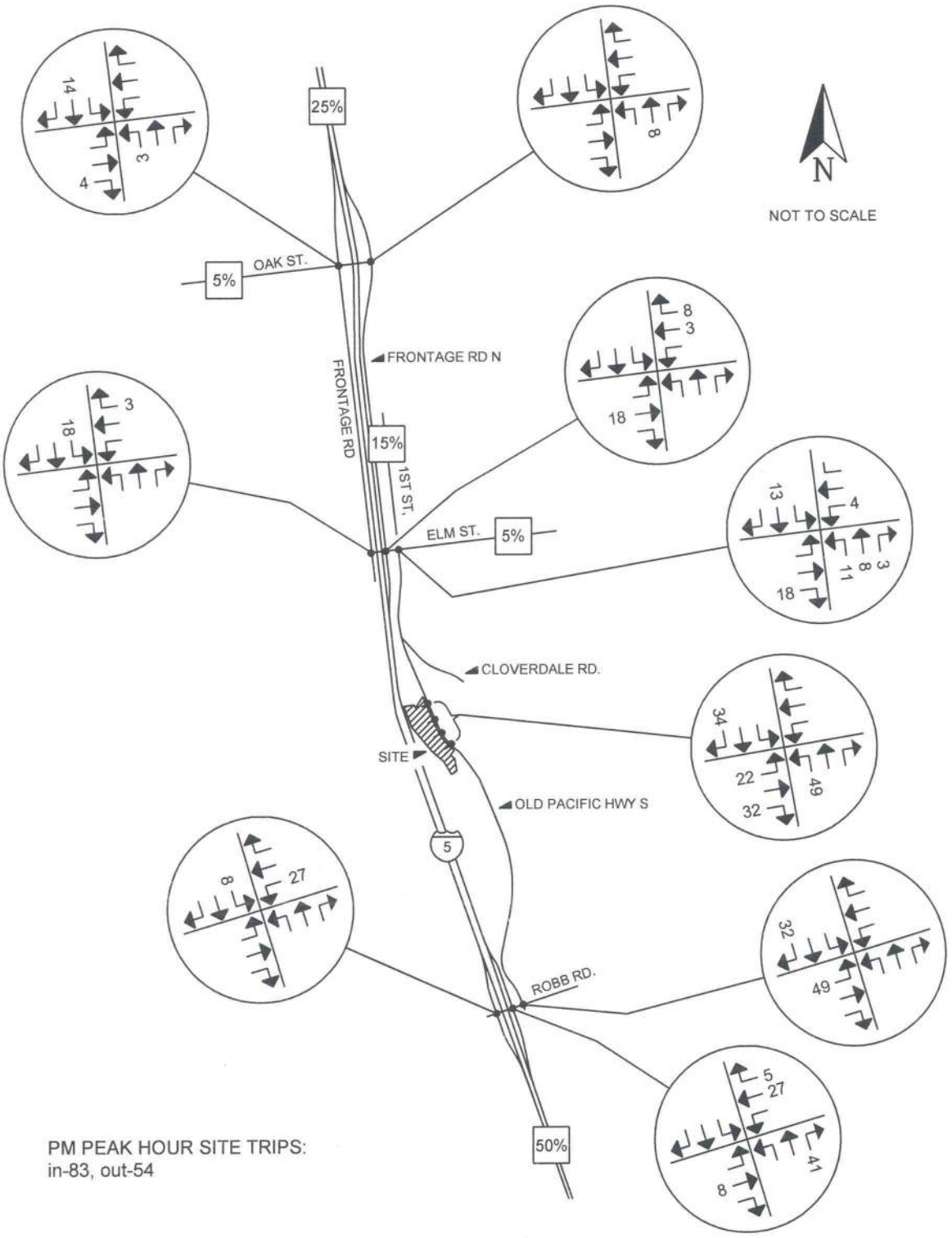

PM PEAK HOUR SITE TRIPS:
in-83, out-54

LOFTS AT KALAMA

FIGURE 7b
SITE TRAFFIC DISTRIBUTION/ ASSIGNMENT, PM PEAK HOUR

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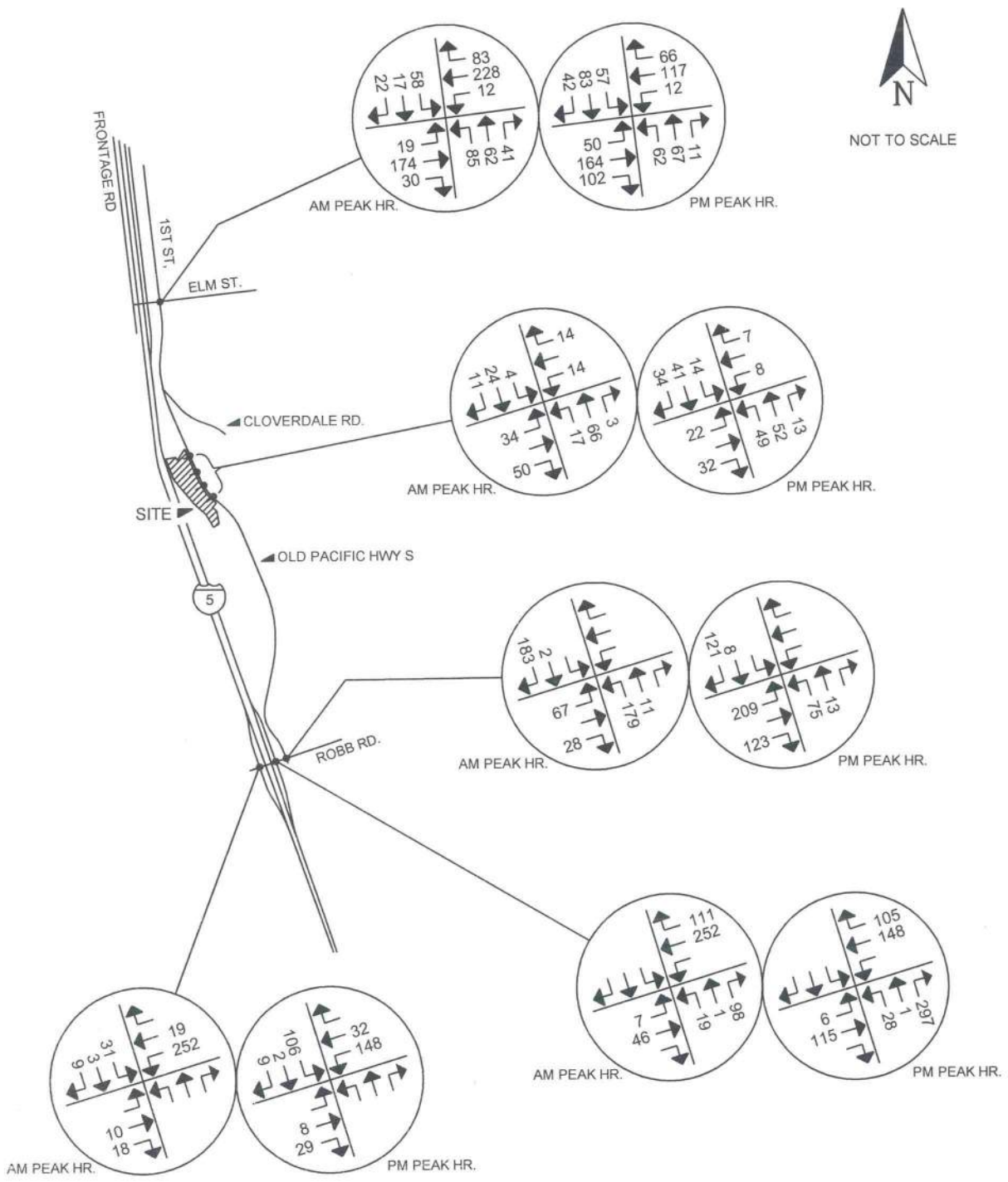

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FIGURE 8
YEAR 2026 TRAFFIC VOLUMES
WITH PROJECT

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Phone: 360-433-7530

APPENDIX A
RAW TRAFFIC COUNT DATA

INTERSECTION TURN MOVEMENT SURVEY
ELM STREET & FIRST STREET

DATE OF COUNT: 3/27/2018, 07:00-09:00
DAY OF WEEK: TUE.
WEATHER: RAIN
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
07:00-07:05	3	2	4	0	4	2	3	2	0	1	3	1	25
07:05-07:10	0	1	3	1	8	4	7	4	0	0	5	0	33
07:10-07:15	1	0	0	0	13	1	4	3	0	0	1	0	23
07:15-07:20	1	1	0	0	6	3	4	2	0	2	2	0	21
07:20-07:25	1	2	1	0	12	2	0	5	0	0	7	0	30
07:25-07:30	1	3	2	1	12	5	7	3	2	0	7	1	44
07:30-07:35	3	1	3	1	16	3	7	0	1	1	7	0	43
07:35-07:40	**0**	**1**	**4**	**0**	**12**	**1**	**9**	**3**	**0**	**3**	**9**	**1**	**43**
07:40-07:45	**4**	**0**	**2**	**0**	**12**	**3**	**6**	**3**	**1**	**0**	**8**	**1**	**40**
07:45-07:50	**2**	**0**	**0**	**0**	**11**	**3**	**4**	**2**	**0**	**1**	**17**	**3**	**43**
07:50-07:55	**5**	**0**	**2**	**0**	**16**	**2**	**4**	**4**	**1**	**0**	**11**	**1**	**46**
07:55-08:00	**3**	**3**	**1**	**0**	**14**	**3**	**5**	**2**	**2**	**1**	**10**	**0**	**44**
08:00-08:05	**2**	**0**	**1**	**0**	**11**	**4**	**3**	**3**	**6**	**0**	**16**	**3**	**49**
08:05-08:10	**7**	**1**	**0**	**2**	**15**	**6**	**1**	**6**	**5**	**1**	**18**	**1**	**63**
08:10-08:15	**8**	**1**	**2**	**0**	**16**	**7**	**3**	**4**	**5**	**4**	**13**	**1**	**64**
08:15-08:20	**6**	**0**	**2**	**3**	**23**	**9**	**2**	**4**	**3**	**3**	**20**	**2**	**77**
08:20-08:25	**4**	**2**	**1**	**1**	**21**	**13**	**3**	**3**	**6**	**3**	**16**	**2**	**75**
08:25-08:30	**5**	**0**	**2**	**0**	**22**	**11**	**4**	**3**	**1**	**0**	**10**	**2**	**60**
08:30-08:35	**4**	**2**	**2**	**3**	**22**	**10**	**6**	**3**	**1**	**0**	**1**	**1**	**55**
08:35-08:40	2	1	1	1	14	2	1	1	0	1	1	1	26
08:40-08:45	2	1	0	0	9	2	4	3	0	0	6	3	30
08:45-08:50	3	0	1	0	8	1	4	2	0	0	4	2	25
08:50-08:55	4	0	2	1	8	2	2	4	1	1	3	1	29
08:55-09:00	2	1	1	0	9	3	1	3	0	1	2	1	24
Peak Hour Total	**50**	**10**	**19**	**9**	**195**	**72**	**50**	**40**	**31**	**16**	**149**	**18**	**659**
% Trucks	0	0	0	11	1	0	0	0	0	6	0	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 07:35-08:35
PHF Intersection: 0.77

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
ELM STREET & FIRST STREET

DATE OF COUNT: 3/27/2018, 16:00-18:00
DAY OF WEEK: TUE.
WEATHER: CLOUDY, DRY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
16:00-16:05	5	4	3	1	2	12	2	5	0	1	12	5	52
16:05-16:10	4	1	3	1	7	9	4	3	0	7	9	8	56
16:10-16:15	5	5	0	0	7	7	0	4	1	6	16	3	54
16:15-16:20	4	5	2	1	8	5	2	6	1	2	14	6	56
16:20-16:25	7	5	4	1	5	2	0	1	0	3	14	2	44
16:25-16:30	7	6	0	0	3	6	3	3	2	4	7	4	45
16:30-16:35	2	2	3	1	4	5	3	3	1	3	15	5	47
16:35-16:40	8	1	4	1	6	8	1	4	0	2	9	7	51
16:40-16:45	**5**	**5**	**3**	**0**	**7**	**6**	**6**	**1**	**0**	**5**	**10**	**6**	**54**
16:45-16:50	**6**	**6**	**1**	**0**	**9**	**3**	**2**	**4**	**0**	**4**	**15**	**4**	**54**
16:50-16:55	**3**	**4**	**0**	**1**	**7**	**3**	**5**	**4**	**0**	**5**	**6**	**7**	**45**
16:55-17:00	**3**	**4**	**3**	**0**	**4**	**3**	**2**	**6**	**0**	**6**	**9**	**5**	**45**
17:00-17:05	**0**	**4**	**4**	**1**	**10**	**4**	**0**	**5**	**1**	**2**	**13**	**5**	**49**
17:05-17:10	**6**	**4**	**7**	**1**	**8**	**3**	**2**	**7**	**0**	**2**	**10**	**2**	**52**
17:10-17:15	**4**	**6**	**1**	**1**	**7**	**4**	**1**	**4**	**1**	**4**	**11**	**8**	**52**
17:15-17:20	**6**	**5**	**1**	**0**	**12**	**6**	**5**	**3**	**2**	**3**	**10**	**2**	**55**
17:20-17:25	**5**	**9**	**5**	**1**	**6**	**3**	**4**	**7**	**0**	**2**	**11**	**6**	**59**
17:25-17:30	**4**	**3**	**1**	**0**	**11**	**4**	**5**	**6**	**1**	**4**	**16**	**7**	**62**
17:30-17:35	**2**	**2**	**5**	**1**	**10**	**10**	**6**	**0**	**1**	**1**	**19**	**7**	**64**
17:35-17:40	**5**	**6**	**5**	**0**	**9**	**8**	**2**	**3**	**0**	**4**	**11**	**4**	**57**
17:40-17:45	7	3	2	1	8	6	0	4	0	2	14	1	48
17:45-17:50	4	4	3	1	5	5	2	2	0	3	13	3	45
17:50-17:55	5	3	1	0	7	4	1	2	2	2	10	4	41
17:55-18:00	6	3	2	0	6	3	0	3	0	3	10	5	41
Peak Hour Total	**49**	**58**	**36**	**6**	**100**	**57**	**40**	**50**	**6**	**42**	**141**	**63**	**648**
% Trucks	0	0	0	17	0	0	0	0	0	0	1	0	
Peds	0	5	0	0	2	0	0	1	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 16:40-17:40
PHF Intersection: 0.88

KELLY ENGINEERING

OLD PACIFIC HWY S SURVEY
SITE ACCESS & OLD PACIFIC HWY S

DATE OF COUNT: 3/29/2018, 07:00-09:00
DAY OF WEEK: THUR.
WEATHER: CLOUDY, DRY
COUNTER: DSK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
07:00-07:05	0	1	0	0	0	0	0	2	0	0	0	0	3
07:05-07:10	0	3	0	0	0	0	0	2	0	0	0	0	5
07:10-07:15	0	2	0	0	0	0	0	1	0	0	0	0	3
07:15-07:20	0	1	0	0	0	0	0	3	0	0	0	0	4
07:20-07:25	0	2	0	0	0	0	0	3	0	0	0	0	5
07:25-07:30	0	2	0	0	0	0	0	5	0	0	0	0	7
07:30-07:35	0	1	0	0	0	0	0	4	0	0	0	0	5
07:35-07:40	0	0	0	0	0	0	0	1	0	0	0	0	1
07:40-07:45	0	2	0	0	0	0	0	5	0	0	0	0	7
07:45-07:50	0	2	0	0	0	0	0	2	0	0	0	0	4
07:50-07:55	0	4	0	0	0	0	0	1	0	0	0	0	5
07:55-08:00	0	4	0	0	0	0	0	2	0	0	0	0	6
08:00-08:05	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**5**
08:05-08:10	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**5**
08:10-08:15	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**4**
08:15-08:20	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**4**
08:20-08:25	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
08:25-08:30	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**5**
08:30-08:35	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**4**
08:35-08:40	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**6**
08:40-08:45	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**6**
08:45-08:50	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**9**
08:50-08:55	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**14**
08:55-09:00	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**14**
Peak Hour Total	**0**	**21**	**0**	**0**	**0**	**0**	**0**	**57**	**0**	**0**	**0**	**0**	**78**
% Trucks	0	5	0	0	0	0	0	3	0	0	0	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 08:00-09:00

KELLY ENGINEERING

OLD PACIFIC HWY S SURVEY
SITE ACCESS & OLD PACIFIC HWY S

DATE OF COUNT: 3/28/18, 16:00-18:00
DAY OF WEEK: WED.
WEATHER: RAIN
COUNTER: DSK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
16:00-16:05	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**13**
16:05-16:10	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**10**
16:10-16:15	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**7**
16:15-16:20	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**6**
16:20-16:25	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**7**
16:25-16:30	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**7**
16:30-16:35	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**7**
16:35-16:40	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**7**
16:40-16:45	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**6**
16:45-16:50	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**3**
16:50-16:55	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
16:55-17:00	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**4**
17:00-17:05	0	4	0	0	0	0	0	2	0	0	0	0	6
17:05-17:10	0	4	0	0	0	0	0	5	0	0	0	0	9
17:10-17:15	0	0	0	0	0	0	0	3	0	0	0	0	3
17:15-17:20	0	3	0	0	0	0	0	1	0	0	0	0	4
17:20-17:25	0	7	0	0	0	0	0	2	0	0	0	0	9
17:25-17:30	0	7	0	0	0	0	0	3	0	0	0	0	10
17:30-17:35	0	2	0	0	0	0	0	1	0	0	0	0	3
17:35-17:40	0	1	0	0	0	0	0	2	0	0	0	0	3
17:40-17:45	0	3	0	0	0	0	0	3	0	0	0	0	6
17:45-17:50	0	1	0	0	0	0	0	2	0	0	0	0	3
17:50-17:55	0	2	0	0	0	0	0	1	0	0	0	0	3
17:55-18:00	0	1	0	0	0	0	0	0	0	0	0	0	1
Peak Hour Total	**0**	**35**	**0**	**0**	**0**	**0**	**0**	**44**	**0**	**0**	**0**	**0**	**79**
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 16:00-17:00

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
OLD PACIFIC HIGHWAY & ROBB ROAD/TODD ROAD

DATE OF COUNT: 3/22/2018, 07:00-09:00
DAY OF WEEK: THUR.
WEATHER: CLOUDY, DRY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
07:00-07:05	0	1	9	0	0	0	7	0	0	4	0	1	22
07:05-07:10	0	0	23	0	0	0	9	0	0	2	0	2	36
07:10-07:15	0	0	12	0	0	0	7	1	0	2	0	5	27
07:15-07:20	0	0	7	0	0	0	5	0	0	3	0	0	15
07:20-07:25	**0**	**0**	**7**	**0**	**0**	**0**	**18**	**1**	**0**	**3**	**0**	**3**	**32**
07:25-07:30	**0**	**0**	**6**	**0**	**0**	**0**	**11**	**1**	**0**	**3**	**0**	**1**	**22**
07:30-07:35	**0**	**0**	**11**	**0**	**0**	**0**	**14**	**1**	**0**	**1**	**0**	**2**	**29**
07:35-07:40	**0**	**0**	**7**	**0**	**0**	**0**	**11**	**1**	**0**	**2**	**0**	**1**	**22**
07:40-07:45	**0**	**0**	**11**	**0**	**0**	**0**	**15**	**0**	**0**	**3**	**0**	**5**	**34**
07:45-07:50	**0**	**0**	**6**	**0**	**0**	**0**	**16**	**1**	**0**	**3**	**0**	**2**	**28**
07:50-07:55	**0**	**0**	**5**	**0**	**0**	**0**	**12**	**0**	**0**	**1**	**0**	**1**	**19**
07:55-08:00	**0**	**0**	**9**	**0**	**0**	**0**	**17**	**0**	**0**	**5**	**0**	**3**	**34**
08:00-08:05	**0**	**0**	**8**	**0**	**0**	**0**	**9**	**1**	**0**	**2**	**0**	**3**	**23**
08:05-08:10	**0**	**0**	**9**	**0**	**0**	**0**	**7**	**0**	**0**	**3**	**0**	**0**	**19**
08:10-08:15	**0**	**2**	**14**	**0**	**0**	**0**	**9**	**2**	**0**	**8**	**0**	**2**	**37**
08:15-08:20	**0**	**0**	**9**	**0**	**0**	**0**	**15**	**1**	**0**	**7**	**0**	**1**	**33**
08:20-08:25	0	0	7	0	0	0	9	0	0	5	0	6	27
08:25-08:30	0	0	7	0	0	0	5	1	0	2	0	3	18
08:30-08:35	0	1	6	0	0	0	3	0	0	4	0	3	17
08:35-08:40	0	1	5	0	0	0	9	0	0	7	0	3	25
08:40-08:45	0	1	6	0	0	0	2	0	0	3	0	4	16
08:45-08:50	0	0	7	0	0	0	4	1	0	4	0	2	18
08:50-08:55	0	0	9	0	0	0	5	0	0	2	0	1	17
08:55-09:00	0	1	8	0	0	0	3	0	0	1	0	3	16
Peak Hour Total	**0**	**2**	**102**	**0**	**0**	**0**	**154**	**9**	**0**	**41**	**0**	**24**	**332**
% Trucks	0	0	11	0	0	0	1	11	0	15	0	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 07:20-08:20
PHF Intersection: 0.93

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
OLD PACIFIC HIGHWAY & ROBB ROAD/TODD ROAD

DATE OF COUNT: 3/22/2018, 16:00-18:00
DAY OF WEEK: THUR.
WEATHER: SUNNY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
16:00-16:05	**0**	**1**	**8**	**0**	**0**	**0**	**13**	**1**	**0**	**10**	**0**	**8**	**41**
16:05-16:10	**0**	**3**	**8**	**0**	**0**	**0**	**10**	**2**	**0**	**12**	**0**	**4**	**39**
16:10-16:15	**0**	**1**	**8**	**0**	**0**	**0**	**3**	**1**	**0**	**13**	**0**	**10**	**36**
16:15-16:20	**0**	**0**	**3**	**0**	**0**	**0**	**6**	**2**	**0**	**8**	**0**	**11**	**30**
16:20-16:25	**0**	**0**	7	**0**	**0**	**0**	**8**	**1**	**0**	**19**	**0**	**8**	**43**
16:25-16:30	**0**	**0**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**15**	**0**	**9**	**27**
16:30-16:35	**0**	**0**	**5**	**0**	**0**	**0**	**6**	**0**	**0**	**12**	**0**	**15**	**38**
16:35-16:40	**0**	**0**	7	**0**	**0**	**0**	**2**	**0**	**0**	**5**	**0**	**14**	**28**
16:40-16:45	**0**	**2**	**6**	**0**	**0**	**0**	**3**	**1**	**0**	**15**	**0**	**6**	**33**
16:45-16:50	**0**	**0**	**4**	**0**	**0**	**0**	**6**	**0**	**0**	**5**	**0**	**8**	**23**
16:50-16:55	**0**	**0**	**4**	**0**	**0**	**0**	**3**	**2**	**0**	**5**	**0**	**6**	**20**
16:55-17:00	**0**	**0**	**9**	**0**	**0**	**0**	**2**	**1**	**0**	7	**0**	7	**26**
17:00-17:05	1	0	6	0	0	0	6	0	0	11	0	10	34
17:05-17:10	0	0	6	0	0	0	2	0	0	11	0	4	23
17:10-17:15	0	1	9	0	0	0	4	1	0	11	0	9	35
17:15-17:20	0	0	11	0	0	0	5	2	0	12	0	11	41
17:20-17:25	0	2	10	0	0	0	7	0	0	12	0	8	39
17:25-17:30	0	2	5	0	0	0	10	0	0	6	0	9	32
17:30-17:35	0	0	10	0	0	0	3	0	0	7	0	7	27
17:35-17:40	0	1	8	0	0	0	3	1	0	10	0	15	38
17:40-17:45	0	0	8	0	0	0	2	1	0	8	0	8	27
17:45-17:50	0	0	5	0	0	0	2	0	0	7	0	9	23
17:50-17:55	0	1	7	0	0	0	4	0	0	7	0	5	24
17:55-18:00	0	0	7	0	0	0	5	1	0	9	0	7	29
Peak Hour Total	**0**	**7**	**70**	**0**	**0**	**0**	**64**	**11**	**0**	**126**	**0**	**106**	**384**
% Trucks	0	0	4	0	0	0	3	0	0	6	0	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 16:00-17:00

PHF Intersection: 0.83

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
I-5 NB RAMPS & ROBB ROAD

DATE OF COUNT: 6/10/2021, 07:00-09:00
DAY OF WEEK: THUR.
WEATHER: CLOUDY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
07:00-07:05	0	0	0	0	8	7	0	0	0	1	1	0	17
07:05-07:10	0	0	0	0	10	2	0	0	1	0	2	0	15
07:10-07:15	0	0	0	0	18	10	1	0	1	0	3	0	33
07:15-07:20	0	0	0	0	11	5	1	0	2	0	2	0	21
07:20-07:25	0	0	0	0	13	4	0	0	3	0	3	0	23
07:25-07:30	**0**	**0**	**0**	**0**	**16**	**4**	**2**	**0**	**7**	**1**	**1**	**0**	**31**
07:30-07:35	**0**	**0**	**0**	**0**	**16**	**3**	**1**	**0**	**9**	**0**	**2**	**0**	**31**
07:35-07:40	**0**	**0**	**0**	**0**	**20**	**17**	**1**	**0**	**5**	**2**	**5**	**0**	**50**
07:40-07:45	**0**	**0**	**0**	**0**	**8**	**6**	**0**	**0**	**2**	**3**	**0**	**0**	**19**
07:45-07:50	**0**	**0**	**0**	**0**	**4**	**9**	**3**	**0**	**6**	**0**	**4**	**0**	**26**
07:50-07:55	**0**	**0**	**0**	**0**	**10**	**8**	**1**	**0**	**11**	**0**	**1**	**0**	**31**
07:55-08:00	**0**	**0**	**0**	**0**	**17**	**10**	**2**	**1**	**7**	**0**	**4**	**0**	**41**
08:00-08:05	**0**	**0**	**0**	**0**	**12**	**6**	**0**	**0**	**1**	**0**	**5**	**0**	**24**
08:05-08:10	**0**	**0**	**0**	**0**	**9**	**6**	**2**	**0**	**5**	**0**	**2**	**0**	**24**
08:10-08:15	**0**	**0**	**0**	**0**	**13**	**5**	**0**	**0**	**5**	**0**	**5**	**0**	**28**
08:15-08:20	**0**	**0**	**0**	**0**	**7**	**5**	**2**	**0**	**8**	**0**	**7**	**0**	**29**
08:20-08:25	**0**	**0**	**0**	**0**	**8**	**5**	**3**	**0**	**8**	**0**	**3**	**0**	**27**
08:25-08:30	0	0	0	0	6	7	1	0	4	1	4	0	23
08:30-08:35	0	0	0	0	4	8	3	0	8	0	5	0	28
08:35-08:40	0	0	0	0	12	9	1	0	6	0	4	0	32
08:40-08:45	0	0	0	0	11	13	2	0	4	0	2	0	32
08:45-08:50	0	0	0	0	8	9	1	0	5	0	1	0	24
08:50-08:55	0	0	0	0	7	8	2	0	2	0	3	0	22
08:55-09:00	0	0	0	0	7	4	0	0	3	0	1	0	15
Peak Hour Total	**0**	**0**	**0**	**0**	**140**	**84**	**17**	**1**	**74**	**6**	**39**	**0**	**361**
% Trucks	0	0	0	0	6	7	18	0	8	17	5	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 07:25-08:25

PHF Intersection: 0.81

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
I-5 NB RAMPS & ROBB ROAD

DATE OF COUNT: 6/9/2021, 16:00-18:00
DAY OF WEEK: WED.
WEATHER: CLOUDY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
16:00-16:05	0	0	0	0	10	7	3	0	9	0	8	0	37
16:05-16:10	0	0	0	0	9	6	4	0	7	0	9	0	35
16:15-16:20	0	0	0	0	8	5	2	0	10	2	11	0	38
16:10-16:15	0	0	0	0	10	5	5	0	6	0	10	0	36
16:20-16:25	**0**	**0**	**0**	**0**	**8**	**5**	**3**	**0**	**21**	**1**	**9**	**0**	**47**
16:25-16:30	**0**	**0**	**0**	**0**	**5**	**6**	**4**	**0**	**21**	**1**	**7**	**0**	**44**
16:30-16:35	**0**	**0**	**0**	**0**	**9**	**12**	**1**	**1**	**20**	**1**	**12**	**0**	**56**
16:35-16:40	**0**	**0**	**0**	**0**	**9**	**6**	**2**	**0**	**25**	**0**	**8**	**0**	**50**
16:40-16:45	**0**	**0**	**0**	**0**	**10**	**7**	**4**	**0**	**12**	**0**	**6**	**0**	**39**
16:45-16:50	**0**	**0**	**0**	**0**	**5**	**2**	**2**	**0**	**29**	**0**	**6**	**0**	**44**
16:50-16:55	**0**	**0**	**0**	**0**	**5**	**9**	**3**	**0**	**16**	**1**	**6**	**0**	**40**
16:55-17:00	**0**	**0**	**0**	**0**	**9**	**11**	**2**	**0**	**20**	**0**	**9**	**0**	**51**
17:00-17:05	**0**	**0**	**0**	**0**	**13**	**6**	**1**	**0**	**13**	**0**	**7**	**0**	**40**
17:05-17:10	**0**	**0**	**0**	**0**	**12**	**6**	**0**	**0**	**14**	**1**	**4**	**0**	**37**
17:10-17:15	**0**	**0**	**0**	**0**	**9**	**10**	**0**	**0**	**15**	**0**	**11**	**0**	**45**
17:15-17:20	**0**	**0**	**0**	**0**	**9**	**11**	**3**	**0**	**15**	**0**	**12**	**0**	**50**
17:20-17:25	0	0	0	0	6	7	4	0	16	2	6	0	41
17:25-17:30	0	0	0	0	7	6	2	0	13	0	5	0	33
17:30-17:35	0	0	0	0	4	4	4	1	15	0	8	0	36
17:35-17:40	0	0	0	0	12	7	4	0	10	0	4	0	37
17:40-17:45	0	0	0	0	7	4	2	1	14	0	9	0	37
17:45-17:50	0	0	0	0	6	2	0	0	10	1	5	0	24
17:50-17:55	0	0	0	0	5	5	3	0	9	0	7	0	29
17:55-18:00	0	0	0	0	8	7	2	0	11	0	10	0	38
Peak Hour Total	**0**	**0**	**0**	**0**	**103**	**91**	**25**	**1**	**221**	**5**	**97**	**0**	**543**
% Trucks	0	0	0	0	7	3	0	0	2	20	7	0	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 16:20-17:20

PHF Intersection: 0.91

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
I-5 SB RAMPS & ROBB ROAD

DATE OF COUNT: 6/10/2021, 07:00-09:00
DAY OF WEEK: THUR.
WEATHER: CLOUDY
COUNTER: KAK

Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
07:00-07:05	3	0	2	8	0	0	0	0	0	0	1	1	15
07:05-07:10	**2**	**0**	**2**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**16**
07:10-07:15	**2**	**1**	**0**	**16**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**21**
07:15-07:20	**0**	**1**	**0**	**11**	**3**	**0**	**0**	**0**	**0**	**0**	**2**	**5**	**22**
07:20-07:25	**2**	**0**	**0**	**14**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**19**
07:25-07:30	**1**	**0**	**1**	**13**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**20**
07:30-07:35	**2**	**0**	**1**	**15**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**
07:35-07:40	**4**	**0**	**0**	**16**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**24**
07:40-07:45	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**10**
07:45-07:50	**3**	**0**	**3**	**4**	**3**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**16**
07:50-07:55	**1**	**0**	**1**	**11**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**16**
07:55-08:00	**3**	**1**	**0**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**23**
08:00-08:05	**5**	**0**	**0**	**12**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**20**
08:05-08:10	2	0	0	9	1	0	0	0	0	0	0	1	13
08:10-08:15	5	0	0	13	2	0	0	0	0	0	0	3	23
08:15-08:20	7	1	0	7	1	0	0	0	0	0	0	1	17
08:20-08:25	4	0	0	6	3	0	0	0	0	0	1	0	14
08:25-08:30	2	1	0	7	1	0	0	0	0	0	2	1	14
08:30-08:35	5	0	0	4	3	0	0	0	0	0	0	0	12
08:35-08:40	4	0	0	12	1	0	0	0	0	0	0	1	18
08:40-08:45	1	1	0	10	2	0	0	0	0	0	1	1	16
08:45-08:50	2	0	0	5	2	0	0	0	0	0	0	0	9
08:50-08:55	0	0	0	6	1	0	0	0	0	0	0	1	8
08:55-09:00	2	0	0	9	0	0	0	0	0	0	1	0	12
Peak Hour Total	**25**	**3**	**8**	**148**	**17**	**0**	**0**	**0**	**0**	**0**	**9**	**16**	**226**
% Trucks	12	33	50	5	18	0	0	0	0	0	11	31	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

PEAK HOUR: 07:05-08:05

PHF Intersection: 0.90

KELLY ENGINEERING

INTERSECTION TURN MOVEMENT SURVEY
I-5 SB RAMPS & ROBB ROAD

DATE OF COUNT: 6/8/2021, 16:00-18:00
DAY OF WEEK: TUE.
WEATHER: CLOUDY
COUNTER: KAK

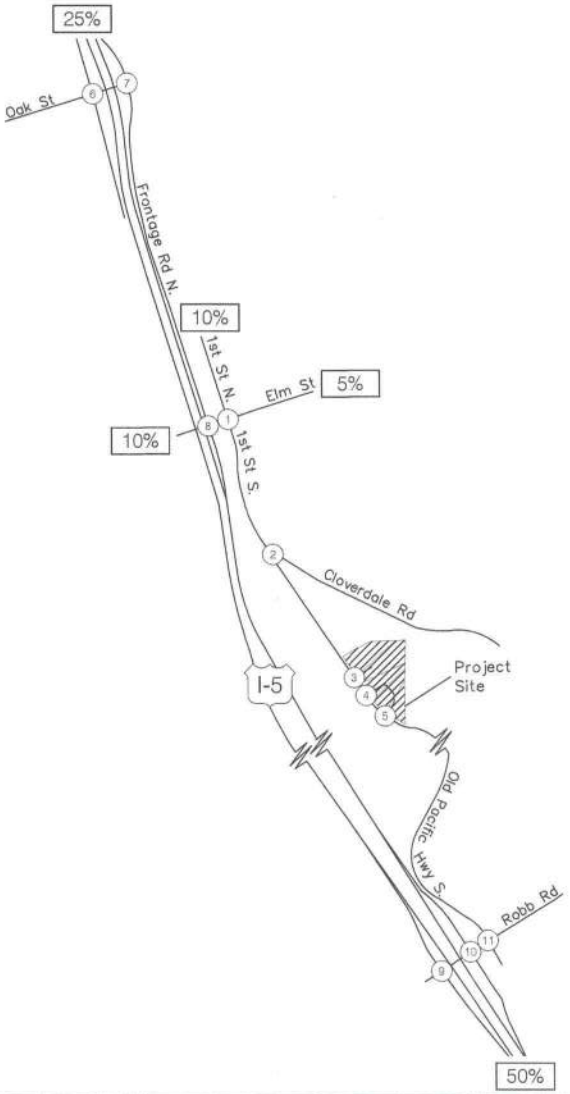
Time Period From – To	FROM NORTH			FROM EAST			FROM SOUTH			FROM WEST			TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R	
16:00-16:05	7	0	0	7	2	0	0	0	0	0	1	1	18
16:05-16:10	9	0	0	8	3	0	0	0	0	0	0	0	20
16:10-16:15	**13**	**1**	**0**	**9**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**27**
16:15-16:20	**8**	**0**	**2**	**11**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**28**
16:20-16:25	**10**	**0**	**1**	**9**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**28**
16:25-16:30	**6**	**0**	**1**	**3**	**4**	**0**	**0**	**0**	**0**	**0**	**1**	**4**	**19**
16:30-16:35	**10**	**0**	**0**	**8**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**25**
16:35-16:40	**8**	**0**	**0**	**8**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**19**
16:40-16:45	**6**	**0**	**1**	**9**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**21**
16:45-16:50	**5**	**0**	**0**	**6**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**16**
16:50-16:55	**6**	**1**	**0**	**7**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**16**
16:55-17:00	**9**	**0**	**0**	**7**	**2**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**20**
17:00-17:05	**6**	**0**	**2**	**13**	**1**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**28**
17:05-17:10	**2**	**0**	**1**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**17**
17:10-17:15	11	0	1	8	1	0	0	0	0	0	0	0	21
17:15-17:20	11	0	1	9	3	0	0	0	0	0	0	0	24
17:20-17:25	6	0	0	5	4	0	0	0	0	0	0	1	16
17:25-17:30	5	0	0	7	2	0	0	0	0	0	1	2	17
17:30-17:35	7	1	0	4	4	0	0	0	0	0	1	5	22
17:35-17:40	4	0	0	12	4	0	0	0	0	0	0	0	20
17:40-17:45	8	0	0	6	2	0	0	0	0	0	0	0	16
17:45-17:50	5	0	0	8	3	0	0	0	0	0	0	2	18
17:50-17:55	7	0	0	8	1	0	0	0	0	0	0	0	16
17:55-18:00	3	0	0	5	4	0	0	0	0	0	0	0	12
Peak Hour Total	**89**	**2**	**8**	**103**	**29**	**0**	**0**	**0**	**0**	**0**	**7**	**26**	**264**
% Trucks	7	50	0	7	0	0	0	0	0	0	0	4	
Peds	0	0	0	0	0	0	0	0	0	0	0	0	
Bikes	0	0	0	0	0	0	0	0	0	0	0	0	

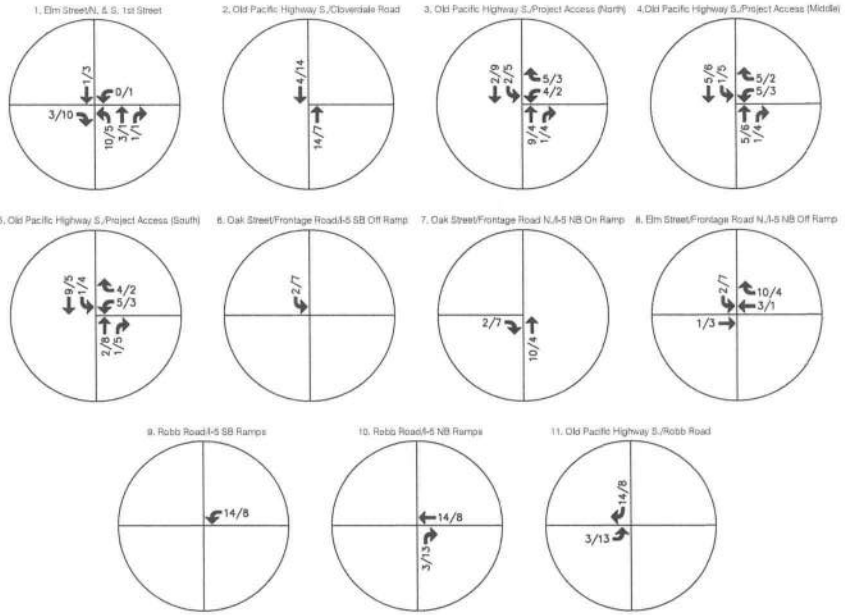
PEAK HOUR: 16:10-17:10

PHF Intersection: 0.80

KELLY ENGINEERING

APPENDIX B
IN-PROCESS TRAFFIC





LEGEND

100/128 A.M./P.M. Peak Hour Traffic Volumes

10% Peak Hour Trip Distribution

NOT TO SCALE

FIGURE 6
Trip Distribution and Assignment
Traffic Volumes

17031_Figures.Dwg

APPENDIX C
COLLISION DATA

CITY STREETS

ELM ST @ 1st ST

COUNTY ROADS

TODD RD - *south leg* (CO RD #32840, MP 0.590 - 0.630) @ ROBB RD (CO RD # 33320, MP 0.000 - 0.020) - *No Reported Crashes*

OLD PACIFIC HWY - *north leg* (CO RD #33950, MP 1.960 - 1.980) @ ROBB RD (CO RD # 33320, MP 0.000 - 0.020) - *No Reported Crashes*

STATE ROUTES

005LX02770 (aka Robb Rd, MP 0.000 - 0.020) @ SB SR 5 ON/OFF-RAMPS

005R102800 (MP 0.26 - 0.28) @ ROBB RD - *No Reported Crashes*

005S102722 (MP 0.00 - 0.02) @ ROBB RD - *No Reported Crashes*

005LX02770 (aka Robb Rd, MP 0.08 - 0.10) @ NB SR 5 ON/OFF-RAMPS

005P102740 (MP 0.33 - 0.35) @ ROBB RD - *No Reported Crashes*

005Q102822 (MP 0.00 - 0.02) @ ROBB RD - *No Reported Crashes*

OFFICER REPORTED CRASHES THAT OCCURRED *at* OR *in the vicinity of* MULTIPLE INTERSECTIONS IN THE CITY OF KALAMA & COWLITZ COUNTY

01/01/2018 - *available 2021* *See 2nd tab below for road information & interchange drawing for reference*

Under 23 U.S. Code § 148 and 23 U.S. Code § 409, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

JURISDICTION	COUNTY	CITY	PRIMARY TRAFFICWAY	MILEPOST	A / B	BLOCK NUMBER	INTERSECTING TRAFFICWAY	CO ONLY INTERSECTING COUNTY ROAD MILEPOST	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME
City Street	Cowlitz	Kalama	ELM ST			0	S 1ST ST					
City Street	Cowlitz	Kalama	ELM ST			100			240	F	E	S 1ST ST
City Street	Cowlitz	Kalama	N 1ST ST			0	ELM ST					
City Street	Cowlitz	Kalama	N 1ST ST			101	ELM ST					
City Street	Cowlitz	Kalama	N 1ST ST			100			76	F	N	S 1ST ST
City Street	Cowlitz	Kalama	S 1ST ST			100			100	F	N	ELM ST
State Route	Cowlitz		005LX02770	0.00								
State Route	Cowlitz		005LX02770	0.10								

SR ONLY HISTORY / SUSPENSE IND	REPORT NUMBER	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	# FAT	# VEH	# PEDS	# BIKES	VEHICLE 1 TYPE
No	E901014	01/09/2019	18:10	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	EA85661	11/27/2020	13:50	No Apparent Injury	0	0	5	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	E979162	11/04/2019	14:47	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	EB23242	04/19/2021	14:25	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	E950996	07/24/2019	14:40	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	E760976	01/19/2018	10:42	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	EB10244	02/26/2021	10:52	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb
No	E933438	06/23/2019	11:30	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb

VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	WEATHER	ROADWAY SURFACE CONDITION	LIGHTING CONDITION
Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Overcast	Wet	Dark-Street Lights On
Pickup,Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	Clear	Dry	Daylight
Passenger Car	At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight
Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight
Pickup,Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight
Pickup,Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	Clear or Partly Cloudy	Dry	Daylight
Passenger Car	At Intersection and Related	Clear	Dry	Daylight
Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Clear or Partly Cloudy	Dry	Daylight

FIRST COLLISION TYPE / OBJECT STRUCK	VEHICLE 1 ACTION	VEHICLE 2 ACTION	VEHICLE 1 COMPASS DIRECTION FROM	VEHICLE 1 COMPASS DIRECTION TO
Entering at angle	Going Straight Ahead	Going Straight Ahead	East	West
One parked--one moving	Going Straight Ahead	Legally Parked, Unoccupied	East	West
Entering at angle	Starting in Traffic Lane	Starting in Traffic Lane	South	North
Entering at angle	Going Straight Ahead	Going Straight Ahead	West	East
One car leaving parked position	Backing	Going Straight Ahead	Vehicle Backing	Vehicle Backing
One parked--one moving	Backing	Legally Parked, Unoccupied	Vehicle Backing	Vehicle Backing
From opposite direction - one left turn - one straight	Going Straight Ahead	Making Left Turn	West	East
Entering at angle	Going Straight Ahead	Going Straight Ahead	North	South

VEHICLE 2 COMPASS DIRECTION FROM	VEHICLE 2 COMPASS DIRECTION TO	MV DRIVER CONTRIBUTING CIRCUMSTANCE 1 (UNIT 1)	MV DRIVER CONTRIBUTING CIRCUMSTANCE 1 (UNIT 2)
South	North	Did Not Grant RW to Vehicle	Driver Not Distracted
		None	None
West	East	Did Not Grant RW to Vehicle	None
South	North	None	None
North	South	Improper Backing	None
		Inattention	None
East	South	None	Improper Turn/Merge
West	East	Operating Defective Equipment	Driver Not Distracted

FIRST IMPACT LOCATION (City, County & Misc Trafficways - 2010 forward)	WA STATE PLANE SOUTH - X 2010 - FORWARD	WA STATE PLANE SOUTH - Y 2010 - FORWARD
Lane of Primary Trafficway	1044801.99	254755.24
Outside Shoulder of Primary Trafficway	1045032.58	254820.06
Lane of Primary Trafficway	1044801.99	254755.23
Lane of Primary Trafficway	1044801.58	254754.5
Lane of Primary Trafficway	1044677.07	255197.22
Outside Shoulder of Primary Trafficway	1044774.8	254851.45
Lane 1 LX Increasing Milepost (Prior to 2002 Impact Location Code was not lane specific)	1049276.29	244559.97
Lane 1 LX Increasing Milepost (Prior to 2002 Impact Location Code was not lane specific)	1049719.86	244836.69

APPENDIX D
LEVEL OF SERVICE COMPUTER PRINTOUTS

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	*DSK*	Intersection	*Elm St. & 1st St.*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*AM Peak Hour*		

Project ID *Existing*

East/West Street: *Elm St.* | North/South Street: *1st St.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*17*	*158*	*19*	*10*	*207*	*76*
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*53*	*42*	*33*	*53*	*11*	*20*
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	*LTR*		*LTR*		*LTR*		*LTR*	
PHF	*0.77*		*0.77*		*0.77*		*0.77*	
Flow Rate (veh/h)	*251*		*378*		*164*		*107*	
% Heavy Vehicles	*6*		*11*		*0*		*0*	
No. Lanes	*1*		*1*		*1*		*1*	
Geometry Group	*1*		*1*		*1*		*1*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
Prop. Left-Turns	*0.1*		*0.0*		*0.4*		*0.6*	
Prop. Right-Turns	*0.1*		*0.3*		*0.3*		*0.2*	
Prop. Heavy Vehicle	*0.1*		*0.1*		*0.0*		*0.0*	
hLT-adj	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
hRT-adj	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*
hHV-adj	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed	*0.1*		*0.0*		*-0.1*		*-0.0*	

Departure Headway and Service Time

	Eastbound		Westbound		Northbound		Southbound	
hd, initial value (s)	*3.20*		*3.20*		*3.20*		*3.20*	
x, initial	*0.22*		*0.34*		*0.15*		*0.10*	
hd, final value (s)	*5.35*		*5.15*		*5.72*		*5.90*	
x, final value	*0.37*		*0.54*		*0.26*		*0.18*	
Move-up time, m (s)	*2.0*		*2.0*		*2.0*		*2.0*	
Service Time, t_s (s)	*3.4*		*3.1*		*3.7*		*3.9*	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	*501*		*628*		*414*		*357*	
Delay (s/veh)	*11.51*		*14.04*		*10.72*		*10.15*	
LOS	*B*		*B*		*B*		*B*	
Approach: Delay (s/veh)	*11.51*		*14.04*		*10.72*		*10.15*	
LOS	*B*		*B*		*B*		*B*	
Intersection Delay (s/veh)	*12.27*							
Intersection LOS	*B*							

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ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Elm St. & 1st St.
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	AM Peak Hour		

Project ID

East/West Street: Elm St. | North/South Street: 1st St.

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	19	174	24	11	228	83
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	68	49	37	58	13	22
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.77		0.77		0.77		0.77	
Flow Rate (veh/h)	280		417		199		119	
% Heavy Vehicles	6		11		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
Prop. Left-Turns	0.1		0.0		0.4		0.6	
Prop. Right-Turns	0.1		0.3		0.2		0.2	
Prop. Heavy Vehicle	0.1		0.1		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.1		0.0		-0.1		-0.0	

Departure Headway and Service Time

	Eastbound		Westbound		Northbound		Southbound	
hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.25		0.37		0.18		0.11	
hd, final value (s)	5.68		5.45		6.06		6.31	
x, final value	0.44		0.63		0.34		0.21	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.7		3.4		4.1		4.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	530		637		449		369	
Delay (s/veh)	13.09		17.30		12.09		10.96	
LOS	B		C		B		B	
Approach: Delay (s/veh)	13.09		17.30		12.09		10.96	
LOS	B		C		B		B	
Intersection Delay (s/veh)	14.37							
Intersection LOS	B							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	DSK
Agency/Co.	Kelly Engineering
Date Performed	6/11/2021
Analysis Time Period	AM Peak Hour

Site Information

Intersection	Elm St. & 1st St.
Jurisdiction	City of Kalama
Analysis Year	2026

Project ID *Year 2026 with Project*

East/West Street: *Elm St.* North/South Street: *1st St.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	19	174	30	12	228	83
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	85	62	41	58	17	22
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.77		0.77		0.77		0.77	
Flow Rate (veh/h)	287		418		243		125	
% Heavy Vehicles	6		11		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.1		0.0		0.5		0.6	
Prop. Right-Turns	0.1		0.3		0.2		0.2	
Prop. Heavy Vehicle	0.1		0.1		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		0.0		-0.0		-0.0	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.26		0.37		0.22		0.11	
hd, final value (s)	5.93		5.71		6.23		6.57	
x, final value	0.47		0.66		0.42		0.23	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.9		3.7		4.2		4.6	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	537		607		493		375	
Delay (s/veh)	14.15		19.19		13.66		11.50	
LOS	B		C		B		B	
Approach: Delay (s/veh)	14.15		19.19		13.66		11.50	
LOS	B		C		B		B	
Intersection Delay (s/veh)	15.69							
Intersection LOS	C							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Elm St. & 1st St.
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2021
Analysis Time Period	PM Peak Hour		

Project ID *Existing*

East/West Street: *Elm St.* | North/South Street: *1st St.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	45	149	67	6	106	60
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	42	53	6	52	61	38
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.88		0.88		0.88		0.88	
Flow Rate (veh/h)	296		194		113		171	
% Heavy Vehicles	1		17		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
Prop. Left-Turns	0.2		0.0		0.4		0.3	
Prop. Right-Turns	0.3		0.4		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.2		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		0.1		0.1		-0.1	

Departure Headway and Service Time

	Eastbound		Westbound		Northbound		Southbound	
hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.26		0.17		0.10		0.15	
hd, final value (s)	4.88		5.20		5.51		5.28	
x, final value	0.40		0.28		0.17		0.25	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.9		3.2		3.5		3.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	546		444		363		421	
Delay (s/veh)	11.12		10.21		9.66		10.03	
LOS	B		B		A		B	
Approach: Delay (s/veh)	11.12		10.21		9.66		10.03	
LOS	B		B		A		B	
Intersection Delay (s/veh)	10.44							
Intersection LOS	B							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Elm St. & 1st St.
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	PM Peak Hour		

Project ID *Year 2026 w/o Project*

East/West Street: *Elm St.* | North/South Street: *1st St.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	50	164	84	8	117	66
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	59	8	57	70	42
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.88		0.88		0.88		0.88	
Flow Rate (veh/h)	337		216		133		190	
% Heavy Vehicles	1		17		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.0		0.4		0.3	
Prop. Right-Turns	0.3		0.3		0.1		0.2	
Prop. Heavy Vehicle	0.0		0.2		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		0.1		0.0		-0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.30		0.19		0.12		0.17	
hd, final value (s)	5.09		5.46		5.79		5.56	
x, final value	0.48		0.33		0.21		0.29	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.1		3.5		3.8		3.6	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	587		466		383		440	
Delay (s/veh)	12.62		11.10		10.36		10.85	
LOS	B		B		B		B	
Approach: Delay (s/veh)	12.62		11.10		10.36		10.85	
LOS	B		B		B		B	
Intersection Delay (s/veh)	11.52							
Intersection LOS	B							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Elm St. & 1st St.
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	PM Peak Hour		

Project ID *Year 2026 with Project*

East/West Street: *Elm St.* | North/South Street: *1st St.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	50	164	102	12	117	66
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	62	67	11	57	83	42
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.88		0.88		0.88		0.88	
Flow Rate (veh/h)	357		220		158		205	
% Heavy Vehicles	1		17		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.4		0.3	
Prop. Right-Turns	0.3		0.3		0.1		0.2	
Prop. Heavy Vehicle	0.0		0.2		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		0.1		0.0		-0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.32		0.20		0.14		0.18	
hd, final value (s)	5.24		5.69		5.96		5.75	
x, final value	0.52		0.35		0.26		0.33	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.2		3.7		4.0		3.7	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	607		470		408		455	
Delay (s/veh)	13.79		11.70		11.06		11.52	
LOS	B		B		B		B	
Approach: Delay (s/veh)	13.79		11.70		11.06		11.52	
LOS	B		B		B		B	
Intersection Delay (s/veh)	12.35							
Intersection LOS	B							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	*DSK*	Intersection	*Pacific Hwy. & Robb Road*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*AM Peak Hour*		

Project ID *Existing*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*43*	*0*	*25*	*0*	*0*	*0*
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*163*	*10*	*0*	*0*	*2*	*109*
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	*LTR*		*LTR*		*LTR*		*LTR*	
PHF	*0.93*		*0.93*		*0.93*		*0.93*	
Flow Rate (veh/h)	*72*		*0*		*185*		*119*	
% Heavy Vehicles	*15*		*0*		*11*		*11*	
No. Lanes	*1*		*1*		*1*		*1*	
Geometry Group	*1*		*1*		*1*		*1*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	*0.6*		*0.0*		*0.9*		*0.0*	
Prop. Right-Turns	*0.4*		*0.0*		*0.0*		*1.0*	
Prop. Heavy Vehicle	*0.1*		*0.0*		*0.1*		*0.1*	
hLT-adj	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
hRT-adj	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*
hHV-adj	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed	*0.2*		*0.0*		*0.4*		*-0.4*	

Departure Headway and Service Time

hd, initial value (s)	*3.20*		*3.20*		*3.20*		*3.20*	
x, initial	*0.06*		*0.00*		*0.16*		*0.11*	
hd, final value (s)	*4.75*		*4.68*		*4.57*		*3.88*	
x, final value	*0.10*		*0.00*		*0.23*		*0.13*	
Move-up time, m (s)	*2.0*		*2.0*		*2.0*		*2.0*	
Service Time, t_s (s)	*2.8*		*2.7*		*2.6*		*1.9*	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	*322*		*0*		*435*		*369*	
Delay (s/veh)	*8.25*		*7.68*		*8.97*		*7.45*	
LOS	*A*		*A*		*A*		*A*	
Approach: Delay (s/veh)	*8.25*		*7.68*		*8.97*		*7.45*	
LOS	*A*		*A*		*A*		*A*	
Intersection Delay (s/veh)	*8.35*							
Intersection LOS	*A*							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*DSK*
Agency/Co.	*Kelly Engineering*
Date Performed	*6/11/2021*
Analysis Time Period	*AM Peak Hour*

Site Information

Intersection	*Pacific Hwy. & Robb Road*
Jurisdiction	*City of Kalama*
Analysis Year	*2026*

Project ID *Year 2026 w/o Project*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*50*	*0*	*28*	*0*	*0*	*0*
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*179*	*11*	*0*	*0*	*2*	*133*
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	*LTR*		*LTR*		*LTR*		*LTR*	
PHF	*0.93*		*0.93*		*0.93*		*0.93*	
Flow Rate (veh/h)	*83*		*0*		*203*		*145*	
% Heavy Vehicles	*15*		*0*		*11*		*11*	
No. Lanes	*1*		*1*		*1*		*1*	
Geometry Group	*1*		*1*		*1*		*1*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	*0.6*		*0.0*		*0.9*		*0.0*	
Prop. Right-Turns	*0.4*		*0.0*		*0.0*		*1.0*	
Prop. Heavy Vehicle	*0.1*		*0.0*		*0.1*		*0.1*	
hLT-adj	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
hRT-adj	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*
hHV-adj	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed	*0.2*		*0.0*		*0.4*		*-0.4*	

Departure Headway and Service Time

hd, initial value (s)	*3.20*		*3.20*		*3.20*		*3.20*	
x, initial	*0.07*		*0.00*		*0.18*		*0.13*	
hd, final value (s)	*4.85*		*4.80*		*4.63*		*3.94*	
x, final value	*0.11*		*0.00*		*0.26*		*0.16*	
Move-up time, m (s)	*2.0*		*2.0*		*2.0*		*2.0*	
Service Time, t_s (s)	*2.9*		*2.8*		*2.6*		*1.9*	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	*333*		*0*		*453*		*395*	
Delay (s/veh)	*8.46*		*7.80*		*9.26*		*7.68*	
LOS	*A*		*A*		*A*		*A*	
Approach: Delay (s/veh)	*8.46*		*7.80*		*9.26*		*7.68*	
LOS	*A*		*A*		*A*		*A*	
Intersection Delay (s/veh)	*8.58*							
Intersection LOS	*A*							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Pacific Hwy. & Robb Road
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	AM Peak Hour		

Project ID *Year 2026 with Project*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	67	0	28	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	179	11	0	0	2	183
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.93		0.93		0.93		0.93	
Flow Rate (veh/h)	102		0		203		198	
% Heavy Vehicles	15		0		11		11	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.7		0.0		0.9		0.0	
Prop. Right-Turns	0.3		0.0		0.0		1.0	
Prop. Heavy Vehicle	0.1		0.0		0.1		0.1	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.2		0.0		0.4		-0.4	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.09		0.00		0.18		0.18	
hd, final value (s)	5.03		4.96		4.75		4.00	
x, final value	0.14		0.00		0.27		0.22	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.0		3.0		2.7		2.0	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	352		0		453		448	
Delay (s/veh)	8.86		7.96		9.48		8.13	
LOS	A		A		A		A	
Approach: Delay (s/veh)	8.86		7.96		9.48		8.13	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.82							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*DSK*
Agency/Co.	*Kelly Engineering*
Date Performed	*6/11/2021*
Analysis Time Period	*PM Peak Hour*

Site Information

Intersection	*Pacific Hwy. & Robb Road*
Jurisdiction	*City of Kalama*
Analysis Year	*2021*

Project ID *Existing*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*134*	*0*	*112*	*0*	*0*	*0*
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	*68*	*12*	*0*	*0*	*7*	*74*
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	*LTR*		*LTR*		*LTR*		*LTR*	
PHF	*0.83*		*0.83*		*0.83*		*0.83*	
Flow Rate (veh/h)	*295*		*0*		*95*		*97*	
% Heavy Vehicles	*6*		*0*		*3*		*4*	
No. Lanes	*1*		*1*		*1*		*1*	
Geometry Group	*1*		*1*		*1*		*1*	
Duration, T	*0.25*							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	*0.5*		*0.0*		*0.9*		*0.0*	
Prop. Right-Turns	*0.5*		*0.0*		*0.0*		*0.9*	
Prop. Heavy Vehicle	*0.1*		*0.0*		*0.0*		*0.0*	
hLT-adj	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*
hRT-adj	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*	*-0.6*
hHV-adj	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*	*1.7*
hadj, computed	*-0.1*		*0.0*		*0.2*		*-0.5*	

Departure Headway and Service Time

hd, initial value (s)	*3.20*		*3.20*		*3.20*		*3.20*	
x, initial	*0.26*		*0.00*		*0.08*		*0.09*	
hd, final value (s)	*4.30*		*4.70*		*4.92*		*4.22*	
x, final value	*0.35*		*0.00*		*0.13*		*0.11*	
Move-up time, m (s)	*2.0*		*2.0*		*2.0*		*2.0*	
Service Time, t_s (s)	*2.3*		*2.7*		*2.9*		*2.2*	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	*545*		*0*		*345*		*347*	
Delay (s/veh)	*9.62*		*7.70*		*8.65*		*7.77*	
LOS	*A*		*A*		*A*		*A*	
Approach: Delay (s/veh)	*9.62*		*7.70*		*8.65*		*7.77*	
LOS	*A*		*A*		*A*		*A*	
Intersection Delay (s/veh)	*9.06*							
Intersection LOS	*A*							

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ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Pacific Hwy. & Robb Road
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	PM Peak Hour		

Project ID *Year 2026 w/o Project*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	160	0	123	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	75	13	0	0	8	89
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.83		0.83		0.83		0.83	
Flow Rate (veh/h)	340		0		105		116	
% Heavy Vehicles	6		0		3		4	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6		0.0		0.9		0.0	
Prop. Right-Turns	0.4		0.0		0.0		0.9	
Prop. Heavy Vehicle	0.1		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.0		0.2		-0.5	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.30		0.00		0.09		0.10	
hd, final value (s)	4.40		4.85		5.07		4.36	
x, final value	0.42		0.00		0.15		0.14	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.4		2.8		3.1		2.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	590		0		355		366	
Delay (s/veh)	10.49		7.85		8.95		8.08	
LOS	B		A		A		A	
Approach: Delay (s/veh)	10.49		7.85		8.95		8.08	
LOS	B		A		A		A	
Intersection Delay (s/veh)	9.70							
Intersection LOS	A							

ALL-WAY STOP CONTROL ANALYSIS

General Information		Site Information	
Analyst	DSK	Intersection	Pacific Hwy. & Robb Road
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	PM Peak Hour		

Project ID *Year 2026 with Project*

East/West Street: *Robb Road* | North/South Street: *Pacific Hwy.*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	209	0	123	0	0	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	75	13	0	0	8	121
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.83		0.83		0.83		0.83	
Flow Rate (veh/h)	399		0		105		154	
% Heavy Vehicles	6		0		3		4	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.6		0.0		0.9		0.0	
Prop. Right-Turns	0.4		0.0		0.0		0.9	
Prop. Heavy Vehicle	0.1		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.0		0.0		0.2		-0.5	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.35		0.00		0.09		0.14	
hd, final value (s)	4.56		5.07		5.31		4.54	
x, final value	0.51		0.00		0.15		0.19	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.6		3.1		3.3		2.5	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	649		0		355		404	
Delay (s/veh)	12.13		8.07		9.28		8.63	
LOS	B		A		A		A	
Approach: Delay (s/veh)	12.13		8.07		9.28		8.63	
LOS	B		A		A		A	
Intersection Delay (s/veh)	10.86							
Intersection LOS	B							

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 NB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*AM Peak Hour*		

Project Description *Existing*	
East/West Street: *Robb Road*	North/South Street: *I-5 NB ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*6*	*39*			*178*	*94*
Peak-Hour Factor, PHF	*0.81*	*0.81*	*1.00*	*1.00*	*0.81*	*0.81*
Hourly Flow Rate, HFR (veh/h)	*7*	*48*	*0*	*0*	*219*	*116*
Percent Heavy Vehicles	*5*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*17*	*1*	*74*			
Peak-Hour Factor, PHF	*0.81*	*0.81*	*0.81*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*20*	*1*	*91*	*0*	*0*	*0*
Percent Heavy Vehicles	*18*	*0*	*17*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*7*			*112*				
C (m) (veh/h)	*1208*			*883*				
v/c	*0.01*			*0.13*				
95% queue length	*0.02*			*0.43*				
Control Delay (s/veh)	*8.0*			*9.7*				
LOS	*A*			*A*				
Approach Delay (s/veh)	--	--		*9.7*				
Approach LOS	--	--		*A*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DSK`	Intersection	I-5 NB ramps
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	AM Peak Hour		
Project Description	Year 2026 w/o Project		
East/West Street:	Robb Road	North/South Street:	I-5 NB ramps
Intersection Orientation:	East-West	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	7	43			210	103
Peak-Hour Factor, PHF	0.81	0.81	1.00	1.00	0.81	0.81
Hourly Flow Rate, HFR (veh/h)	8	53	0	0	259	127
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	1	84			
Peak-Hour Factor, PHF	0.81	0.81	0.81	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	23	1	103	0	0	0
Percent Heavy Vehicles	18	0	17	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
v (veh/h)	8			127				
C (m) (veh/h)	1156			861				
v/c	0.01			0.15				
95% queue length	0.02			0.52				
Control Delay (s/veh)	8.1			9.9				
LOS	A			A				
Approach Delay (s/veh)	--	--	9.9					
Approach LOS	--	--	A					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DSK`	Intersection	I-5 NB ramps
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	AM Peak Hour		

Project Description	Year 2026 with Project
East/West Street:	Robb Road
North/South Street:	I-5 NB ramps
Intersection Orientation:	East-West
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	7	46			252	111
Peak-Hour Factor, PHF	0.81	0.81	1.00	1.00	0.81	0.81
Hourly Flow Rate, HFR (veh/h)	8	56	0	0	311	137
Percent Heavy Vehicles	5	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LT					TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	19	1	98			
Peak-Hour Factor, PHF	0.81	0.81	0.81	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	23	1	120	0	0	0
Percent Heavy Vehicles	18	0	17	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT			LTR				
v (veh/h)	8			144				
C (m) (veh/h)	1097			852				
v/c	0.01			0.17				
95% queue length	0.02			0.61				
Control Delay (s/veh)	8.3			10.1				
LOS	A			B				
Approach Delay (s/veh)	--	--	10.1					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 NB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Existing*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 NB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*97*			*103*	*91*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*5*	*106*	*0*	*0*	*113*	*99*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*25*	*1*	*221*			
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*27*	*1*	*242*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*5*			*270*				
C (m) (veh/h)	*1358*			*916*				
v/c	*0.00*			*0.29*				
95% queue length	*0.01*			*1.23*				
Control Delay (s/veh)	*7.7*			*10.6*				
LOS	*A*			*B*				
Approach Delay (s/veh)	--	--		*10.6*				
Approach LOS	--	--		*B*				

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*I-5 NB Ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*city of Kalama*
Date Performed	*6/12/2021*	Analysis Year	*2026*
Analysis Time Period	*PM Peak Hour*		

Project Description	*Year 2026 w/o Project*
East/West Street: *Robb Road*	North/South Street: *I-5 NB ramps*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*6*	*107*			*121*	*100*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*1.00*	*1.00*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*6*	*117*	*0*	*0*	*132*	*109*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*28*	*1*	*256*			
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*30*	*1*	*281*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*6*			*312*				
C (m) (veh/h)	*1326*			*900*				
v/c	*0.00*			*0.35*				
95% queue length	*0.01*			*1.56*				
Control Delay (s/veh)	*7.7*			*11.1*				
LOS	*A*			*B*				
Approach Delay (s/veh)	--	--	*11.1*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 NB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Year 2026 with Project*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 NB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*6*	*115*			*148*	*106*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*6*	*126*	*0*	*0*	*162*	*116*
Percent Heavy Vehicles	*2*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*28*	*1*	*297*			
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*30*	*1*	*326*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*			*LTR*				
v (veh/h)	*6*			*357*				
C (m) (veh/h)	*1285*			*889*				
v/c	*0.00*			*0.40*				
95% queue length	*0.01*			*1.96*				
Control Delay (s/veh)	*7.8*			*11.7*				
LOS	*A*			*B*				
Approach Delay (s/veh)	--	--		*11.7*				
Approach LOS	--	--		*B*				

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 SB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Existing*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 SB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*9*	*16*	*178*	*17*	
Peak-Hour Factor, PHF	*0.91*	*0.90*	*0.90*	*0.90*	*0.90*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*10*	*17*	*197*	*18*	*0*
Percent Heavy Vehicles	*2*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*25*	*3*	*8*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*27*	*3*	*8*
Percent Heavy Vehicles	*0*	*0*	*2*	*12*	*33*	*50*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*197*					*38*	
C (m) (veh/h)		*1568*					*538*	
v/c		*0.13*					*0.07*	
95% queue length		*0.43*					*0.23*	
Control Delay (s/veh)		*7.6*					*12.2*	
LOS		*A*					*B*	
Approach Delay (s/veh)	--	--					*12.2*	
Approach LOS	--	--					*B*	

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DSK`	Intersection	I-5 SB ramps
Agency/Co.	Kelly Engineering	Jurisdiction	City of Kalama
Date Performed	6/11/2021	Analysis Year	2026
Analysis Time Period	AM Peak Hour		

Project Description	Year 2026 w/o Project
East/West Street:	Robb Road
North/South Street:	I-5 SB ramps
Intersection Orientation:	East-West
Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		10	18	210	19	
Peak-Hour Factor, PHF	0.91	0.90	0.90	0.90	0.90	0.91
Hourly Flow Rate, HFR (veh/h)	0	11	20	233	21	0
Percent Heavy Vehicles	2	--	--	5	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration			TR	LT		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				28	3	9
Peak-Hour Factor, PHF	0.91	0.91	0.91	0.90	0.90	0.90
Hourly Flow Rate, HFR (veh/h)	0	0	0	31	3	10
Percent Heavy Vehicles	0	0	2	12	33	50
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		LT					LTR	
v (veh/h)		233					44	
C (m) (veh/h)		1562					483	
v/c		0.15					0.09	
95% queue length		0.52					0.30	
Control Delay (s/veh)		7.7					13.2	
LOS		A					B	
Approach Delay (s/veh)	--	--				13.2		
Approach LOS	--	--				B		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 SB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Year 2026 with Project*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 SB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*10*	*18*	*252*	*19*	
Peak-Hour Factor, PHF	*0.91*	*0.90*	*0.90*	*0.90*	*0.90*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*11*	*20*	*280*	*21*	*0*
Percent Heavy Vehicles	*2*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*31*	*3*	*9*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*34*	*3*	*10*
Percent Heavy Vehicles	*0*	*0*	*2*	*12*	*33*	*50*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*280*					*47*	
C (m) (veh/h)		*1562*					*415*	
v/c		*0.18*					*0.11*	
95% queue length		*0.65*					*0.38*	
Control Delay (s/veh)		*7.8*					*14.8*	
LOS		*A*					*B*	
Approach Delay (s/veh)	--	--				*14.8*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 SB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Existing*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 SB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*7*	*26*	*103*	*29*	
Peak-Hour Factor, PHF	*0.91*	*0.80*	*0.80*	*0.80*	*0.80*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*8*	*32*	*128*	*36*	*0*
Percent Heavy Vehicles	*2*	--	--	*7*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*89*	*2*	*8*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.80*	*0.80*	*0.80*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*111*	*2*	*9*
Percent Heavy Vehicles	*0*	*0*	*2*	*7*	*50*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*128*					*122*	
C (m) (veh/h)		*1538*					*627*	
v/c		*0.08*					*0.19*	
95% queue length		*0.27*					*0.72*	
Control Delay (s/veh)		*7.6*					*12.1*	
LOS		*A*					*B*	
Approach Delay (s/veh)	--	--				*12.1*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*I-5 SB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*PM Peak Hour*		

Project Description *Year 2026 w/o Project*

East/West Street: *Robb Road* | North/South Street: *I-5 SB ramps*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*8*	*29*	*121*	*32*	
Peak-Hour Factor, PHF	*0.91*	*0.80*	*0.80*	*0.80*	*0.80*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*9*	*36*	*151*	*39*	*0*
Percent Heavy Vehicles	*2*	--	--	*7*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*98*	*2*	*9*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.80*	*0.80*	*0.80*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*122*	*2*	*11*
Percent Heavy Vehicles	*0*	*0*	*2*	*7*	*50*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*151*					*135*	
C (m) (veh/h)		*1531*					*580*	
v/c		*0.10*					*0.23*	
95% queue length		*0.33*					*0.90*	
Control Delay (s/veh)		*7.6*					*13.1*	
LOS		*A*					*B*	
Approach Delay (s/veh)	--	--				*13.1*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK`*	Intersection	*I-5 SB ramps*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2021*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Year 2026 with Project*		
East/West Street:	*Robb Road*	North/South Street:	*I-5 SB ramps*
Intersection Orientation:	*East-West*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*8*	*29*	*148*	*32*	
Peak-Hour Factor, PHF	*0.91*	*0.80*	*0.80*	*0.80*	*0.80*	*0.91*
Hourly Flow Rate, HFR (veh/h)	*0*	*9*	*36*	*184*	*39*	*0*
Percent Heavy Vehicles	*2*	--	--	*7*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*106*	*2*	*9*
Peak-Hour Factor, PHF	*0.91*	*0.91*	*0.91*	*0.80*	*0.80*	*0.80*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*132*	*2*	*11*
Percent Heavy Vehicles	*0*	*0*	*2*	*7*	*50*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*					*LTR*	
v (veh/h)		*184*					*145*	
C (m) (veh/h)		*1531*					*519*	
v/c		*0.12*					*0.28*	
95% queue length		*0.41*					*1.14*	
Control Delay (s/veh)		*7.7*					*14.6*	
LOS		*A*					*B*	
Approach Delay (s/veh)	--	--				*14.6*		
Approach LOS	--	--				*B*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*Pacific Hwy. & site access*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*AM Peak Hour*		

Project Description	*Year 2026 w/o Project*
East/West Street:	*site access*
Intersection Orientation:	*North-South*
North/South Street:	*Pacific Hwy.*
Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*66*	*3*	*4*	*24*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*73*	*3*	*4*	*26*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*14*		*14*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*15*	*0*	*15*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*4*		*30*				
C (m) (veh/h)		*1536*		*940*				
v/c		*0.00*		*0.03*				
95% queue length		*0.01*		*0.10*				
Control Delay (s/veh)		*7.3*		*9.0*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--	*9.0*					
Approach LOS	--	--	*A*					

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*Pacific Hwy. & site access*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*AM Peak Hour*		
Project Description	*Year 2026 with Project*		
East/West Street:	*site access*	North/South Street:	*Pacific Hwy.*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*17*	*66*	*3*	*4*	*24*	*11*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*18*	*73*	*3*	*4*	*26*	*12*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*34*	*0*	*50*	*14*	*0*	*14*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*37*	*0*	*55*	*15*	*0*	*15*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*18*	*4*		*30*			*92*	
C (m) (veh/h)	*1585*	*1536*		*847*			*927*	
v/c	*0.01*	*0.00*		*0.04*			*0.10*	
95% queue length	*0.03*	*0.01*		*0.11*			*0.33*	
Control Delay (s/veh)	*7.3*	*7.3*		*9.4*			*9.3*	
LOS	*A*	*A*		*A*			*A*	
Approach Delay (s/veh)	--	--	*9.4*			*9.3*		
Approach LOS	--	--	*A*			*A*		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*Pacific Hwy. & site access*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*PM Peak Hour*		
Project Description	*Year 2026 w/o Project*		
East/West Street:	*site access*	North/South Street:	*Pacific Hwy.*
Intersection Orientation:	*North-South*	Study Period (hrs):	*0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*52*	*13*	*14*	*41*	
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*57*	*14*	*15*	*45*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration			*TR*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*9*		*7*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*10*	*0*	*7*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*LR*				
v (veh/h)		*15*		*17*				
C (m) (veh/h)		*1542*		*909*				
v/c		*0.01*		*0.02*				
95% queue length		*0.03*		*0.06*				
Control Delay (s/veh)		*7.4*		*9.0*				
LOS		*A*		*A*				
Approach Delay (s/veh)	--	--	*9.0*					
Approach LOS	--	--	*A*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*DSK*	Intersection	*Pacific Hwy. & site access*
Agency/Co.	*Kelly Engineering*	Jurisdiction	*City of Kalama*
Date Performed	*6/11/2021*	Analysis Year	*2026*
Analysis Time Period	*PM Peak Hour*		

Project Description *Year 2026 with Project*

East/West Street: *site access* | North/South Street: *Pacific Hwy.*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*49*	*52*	*13*	*14*	*41*	*34*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*54*	*57*	*14*	*15*	*45*	*37*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*22*	*0*	*32*	*8*	*0*	*7*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*24*	*0*	*35*	*8*	*0*	*7*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*54*	*15*		*15*			*59*	
C (m) (veh/h)	*1528*	*1542*		*760*			*828*	
v/c	*0.04*	*0.01*		*0.02*			*0.07*	
95% queue length	*0.11*	*0.03*		*0.06*			*0.23*	
Control Delay (s/veh)	*7.4*	*7.4*		*9.8*			*9.7*	
LOS	*A*	*A*		*A*			*A*	
Approach Delay (s/veh)	--	--	*9.8*			*9.7*		
Approach LOS	--	--	*A*			*A*		

APPENDIX E
REFERENCES

References

1. Trip Generation Manual, 10th Edition, 2017, Institute of Transportation Engineers.

2. Highway Capacity Manual, 2000 and 2010, Transportation Research Board, National Research Council.

3. Discussions with representatives from Gray & Osborne, Inc., 8513 NE Hazel Dell Avenue, Suite 202, Vancouver, WA 98665.