TENW
Transportation Engineering NorthWest

MEMORANDUM

DATE: June 22, 2023

TO: Benjamin A. Annen, PE, Development Review Engineer
City of Cle Elum

FROM: Michael Read, PE, Principal, TENW

SUBJECT: Traffic Impact Analysis of Wildwood Ranch (Revised)
TENW Project No. 2021-310

This memorandum summarizes a traffic impact analysis of the proposed *Wildwood Ranch* project, a mixed residential development in Cle Elum, WA. This memo includes a summary of the project, a description of existing transportation conditions within the immediate site vicinity, methodology used to derive the trip generation estimate, traffic operational analysis of key site and other study intersections, review of historical collisions and safety, and identification of any transportation mitigation measures to offset traffic impacts.

Project Description

The proposed *Wildwood Ranch* project would consist of a mixed residential development, including approximately 48 detached and 40 attached residential homes on a 11.4-acre site in eastern Cle Elum.

A project site vicinity map is shown in **Figure 1**. A conceptual site plan of the proposed project is illustrated in **Figure 2**. Vehicular site access is proposed via construction of three site access roadways, two onto E 3rd Street to the north and a primary site access roadway that would become the "third leg" to the existing E 1st Street and Spanski Road intersection. Full build-out and utilization of the project is anticipated by 2028.

Existing Transportation Conditions

This section includes an inventory of existing roadway conditions, key intersections in the site vicinity and traffic volumes, levels of service, and planned roadway improvements.

Roadway Conditions

The following paragraphs describe existing arterial roadways that would be used for site access. Roadway characteristics are described in terms of number of lanes, speed limits, shoulder types and widths.

E 1st Street, **E 3rd Street**, and **Spanksi Road** are all classified as local access streets and are extensions of the existing grid street system within eastern Cle Elum. Each road has two travel lanes and are all posted at 25 mph. There are no sidewalks in the project vicinity, but various gravel/earthern shoulders are present in a wide range of widths from 2 TO 8 feet. The paved roadway section of Spanski Road itself narrows down to approximately 19.5-feet in total width (based on field measurements by TENW in September 2022), where an existing culvert structure is located approximately 200 feet north of the SR 903 northern fog-line. Outside of this width reduction, the pavement section of Spanksi Road is approximately 24 feet.

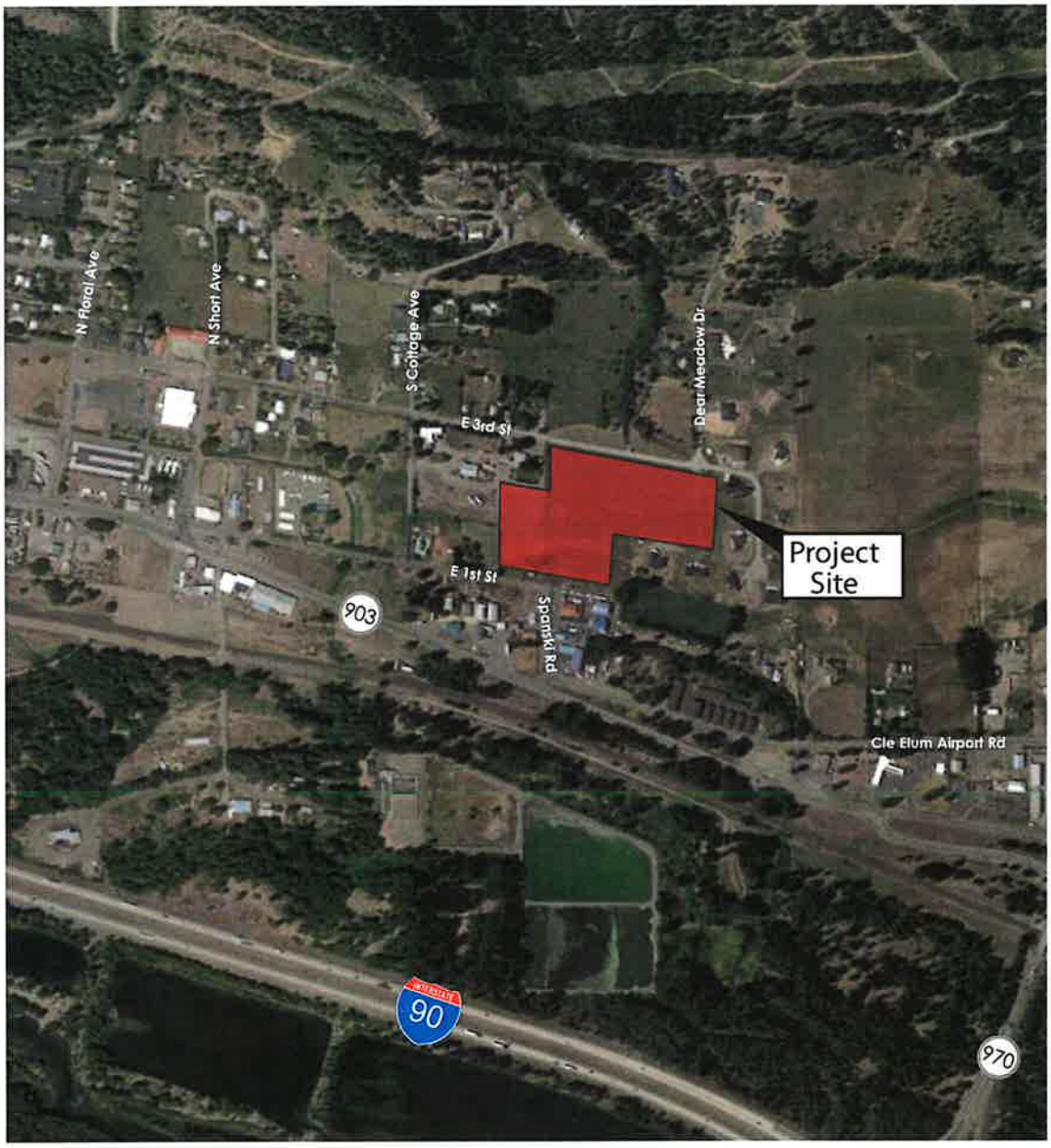


Figure 1: Project Site Vicinity

Figure 2: Preliminary Site Plan

SR 903 is a 2-lane east-west principal arterial with a posted speed limit of 45 mph. At its intersection with Spanski Road, a separate eastbound left turn only lane is provided. This roadway connects with the SR 970/I-90 Interchange to the east of the project site, traveling through the City of Cle Elum northwesterly to the Salmon La Sac wilderness area along Cle Elum Lake.

Airport Road is a two-lane, 30-foot paved roadway with a posted speed limit of 35 mph. It provides east-west circulation east of Cle Elum, parallel to SR 903/SR 970 corridor, serving lower density residential/commercial uses and the Cle Elum Municipal airport to the east.

Traffic Counts

Peak hour traffic volumes represent the highest hourly volume of vehicles passing through an intersection during a typical 4-6 p.m. weekday peak period. Peak period turning movement counts at all study intersections were collected by IDAX Data Solutions in September 2022 (see **Attachment A**). **Figure 3** summarizes the existing PM peak period turning movements at all study intersections that confirmed in scoping discussions with the City of Cle Elum in September 2022.

Intersection Levels of Service

Intersection level of service (LOS) analyses were conducted at the study intersections during the weekday PM peak hour of existing conditions and with project traffic generated. LOS refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes LOS. At signalized intersections, LOS A represents free-flow conditions-motorists experience little or no delays, and LOS F represents forced-flow conditions-motorists experience an average delay in excess of 80 seconds per vehicle. The LOS reported for signalized intersections represents the average control delay per vehicle entering the intersection. The LOS reported at stop-controlled intersections is also based on the average control delay (sec/veh) and is reported for each movement. Therefore, the reported LOS at unsignalized intersections does not represent a measure of the overall operations of the intersection.

LOS calculations for both signalized and stop-controlled intersections were calculated using the methodologies and procedures outlined in the 2016 *Highway Capacity Manual (HCM)*, Special Report 209, Transportation Research Board (TRB). **Table 1** outlines the LOS criteria for signalized and unsignalized intersections based on these methodologies.

Table 1 - Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Signalized Intersection Average Delay Range (sec)	Unsignalized Intersection Delay Range (sec)
A	≤ 10	≤ 10
B	> 10 to ≤ 20	> 10 to ≤ 15
C	> 20 to ≤ 35	> 15 to ≤ 25
D	> 35 to ≤ 55	> 25 to ≤ 35
E	> 55 to ≤ 80	> 35 to ≤ 50
F	> 80	> 50

Source: "Highway Capacity Manual", Special Report 209, Transportation Research Board, 2016.

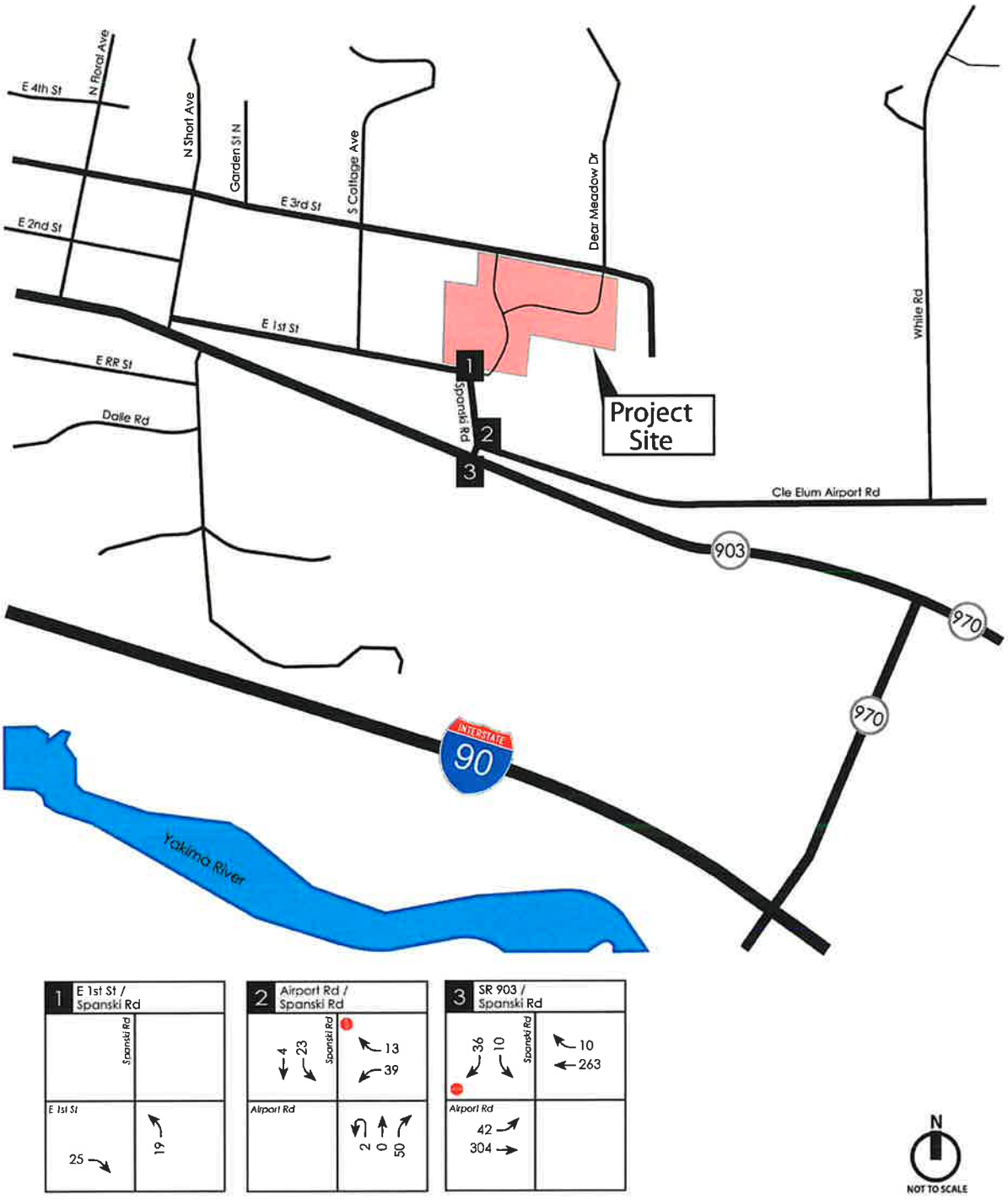


Figure 3: Existing 2022 Weekday PM Peak Hour Traffic Volumes

Intersection LOS were calculated using the methodology and procedures outlined in the 2016 *Highway Capacity Manual* (HCM), Special Report 209, Transportation Research Board (TRB), using the *Synchro 11* software program. Existing a.m. and p.m. peak hour LOS analyses are summarized in **Table 2**. As shown, all intersections or critical movements operate at LOS B or better currently. The City of Cle Elum maintains a level of service standard of LOS D for development review. Detailed LOS summary worksheets are included in **Attachment B**.

Table 2 – 2022 PM Peak Hour Intersection Levels of Service

Study Intersection		PM Peak Hour LOS	PM Peak Hour Delay (sec)	PM Peak Hour V/C Ratio
Stop Controlled Intersections				
#1. E 1st Street/Spanski Road	(WB)	A	--	--
#2. Airport Road/Spanski Road	(SB)	A	6.3	0.02
#3. SR 903/Spanski Road	(SB)	B	12.3	0.11

Source: TENW. Results based on *Synchro 11 Traffic Signal Coordination Software*.

Planned Transportation Improvements

The City of Cle Elum's *2022-2027 Transportation Improvement Program* was reviewed for planned transportation improvements within the immediate vicinity of the site and are documented below. While there are several sidewalk and roadway projects planned, several studies to evaluate intersection/roadway extensions, no capacity improvements are planned at study intersections or vicinity roadways.

Traffic Impact Analysis

The following section describes projected future baseline traffic growth, new trips generated by the proposed development, distribution and assignment of new project trips, intersection level of service impacts, site access, safety and circulation issues, and identification of transportation mitigation to offset impacts.

2025 Baseline Traffic Volumes

To evaluate project traffic impact at full buildout, future baseline traffic volumes in 2028 were factored by a 2 percent annual growth rate per year to review traffic impacts under a cumulative scenario.

Project Trip Generation

Documented trip rate equations compiled by the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11h Edition*, 2021, were used to estimate daily, a.m. peak hour and p.m. peak hour traffic that would be generated by the proposed residential development. **Attachment C** provides a detailed breakdown of trip generation estimates. As shown in **Table 3**, estimated total site trip generation of the proposed *Wildwood Ranch* project is estimated to generate approximately 723 new weekday daily trips, 50 new AM peak hour trips (13 entering and 37 exiting), and 54 p.m. peak hour trips (34 entering and 20 exiting).

Table 3 –Wildwood Ranch Trip Generation

Time Period	In	Out	Total
Weekday Daily	303	303	606
Weekday AM Peak Hour	11	31	42
Weekday PM Peak Hour	34	20	54

Source: *Trip Generation Manual, 11th Edition,* ITE, 2021.

Trip Distribution and Assignment

To distribute trips onto the vicinity-street and arterial network, trip distribution patterns were determined based on review of existing travel patterns, past traffic studies completed by TENW, and the relative distribution of growth and commercial and residential density in the vicinity. Generally, average distribution and assignment of project trips were applied as follows:

- 10 percent to/from the west via E 3rd Street;
- 10 percent to/from the west via E 1st Street;
- 5 percent to/from the east via Airport Road; and
- 75 percent onto SR 903 (50 percent to/from the west and 25 percent to/from the east).

Figure 4 illustrates trip distribution while Figures 5 and 6 summarize the resultant traffic volume impacts without and with the proposed *Wildwood Ranch* project during PM peak hour for the 2028 horizon year, respectively.

Intersection Level of Service Impacts

Table 4 summarizes level of service impacts in 2028 with and without completion of the proposed *Wildwood Ranch* project during the PM peak hour. As shown, all study intersections would operate at LOS B or better in 2028 with or without the project. At the intersection of Airport Road/Spanski Road it is recommended that regardless of the project, stop control be installed on the westbound approach and remain on the southbound approach. Additional channelization/island should also be installed to delineate the roadway approach from the adjacent "commercial parking lot". Detailed LOS summary worksheets are included in Attachment B.

Table 4: 2028 PM Intersection Level of Service Impacts

		PM Peak Hour Without Project			PM Peak Hour With Project		
Study Intersection		LOS	Delay (sec)	V/C Ratio	LOS	Delay (sec)	V/C Ratio
Stop Controlled Intersections							
#1. E 1st Street/Spanski Road	(WB)	--	--	--	A	7.4	0.02
#2. Airport Road/Spanski Road	(WB)	A	6.2	0.02	A	9.5	0.08
#3. SR 903/Spanski Road	(SB)	B	13.2	0.14	B	14.8	0.21

Source: TENW. Results based on *Synchro 11 Traffic Signal Coordination Software*.

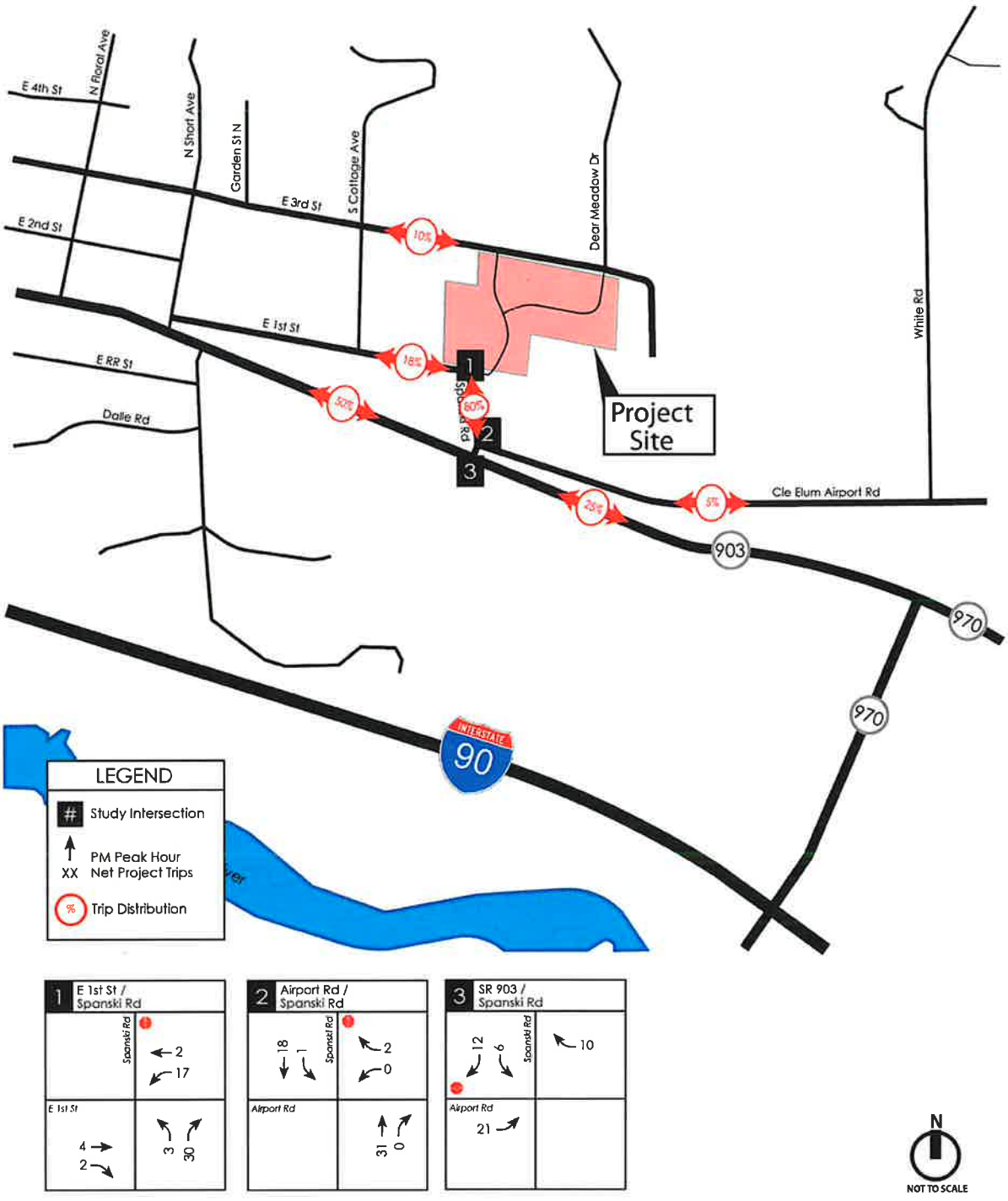


Figure 4: PM Peak Hour Project Trip Distribution and Assignment (2028 Buildout)

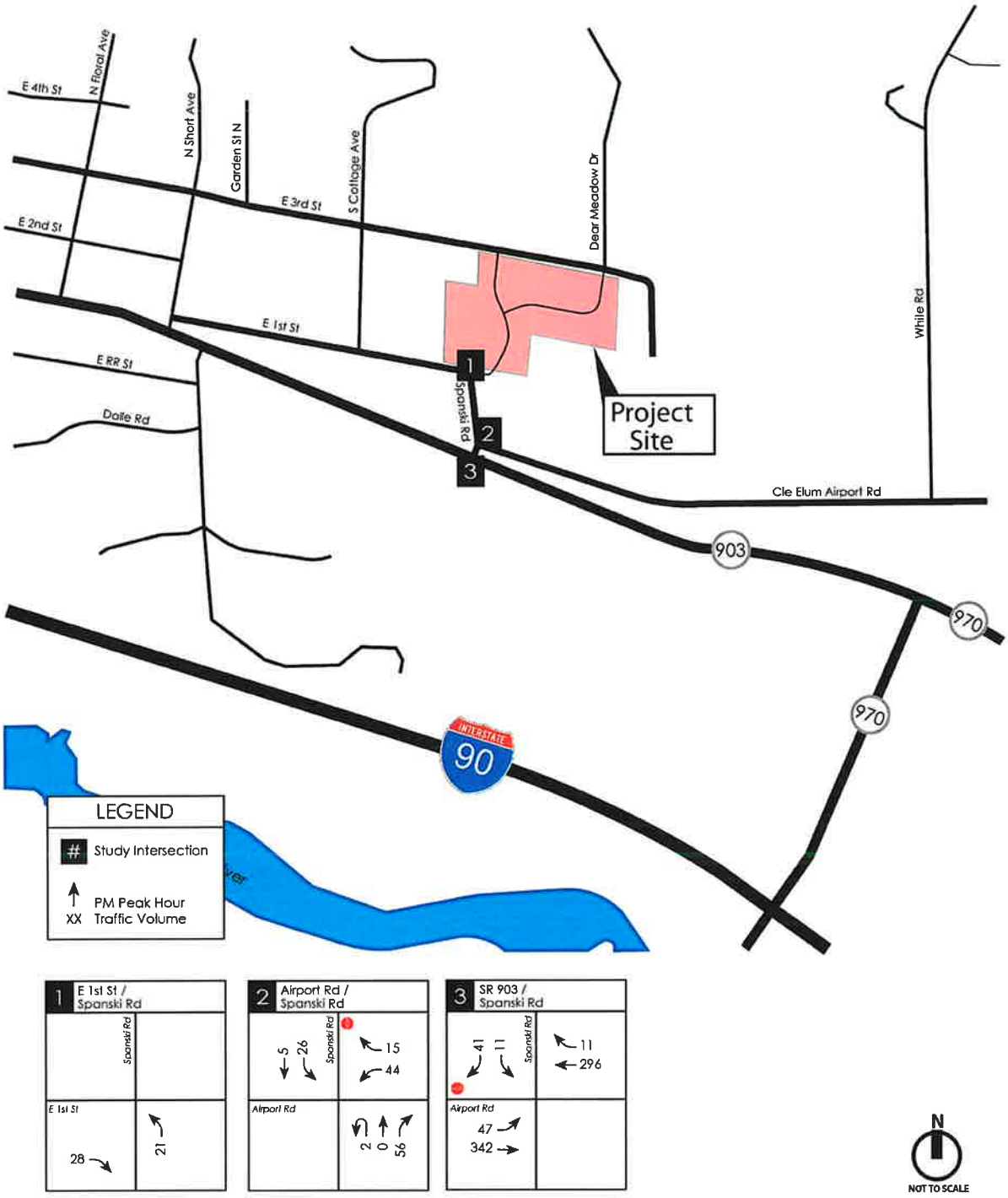


Figure 5: 2028 No Action Weekday PM Peak Hour Traffic Volumes (Buildout)

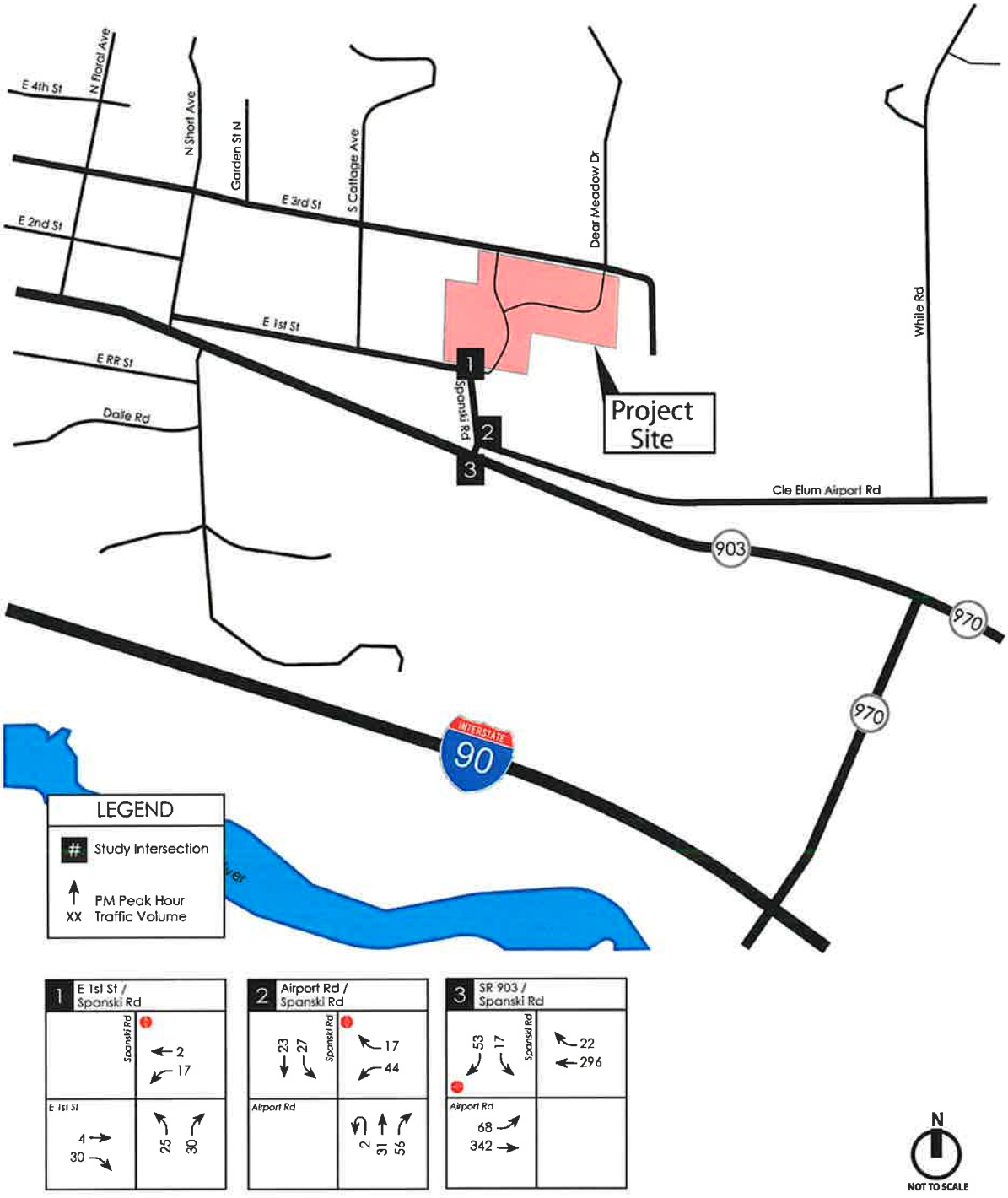


Figure 6: 2028 With Project Weekday PM Peak Hour Traffic Volumes

Site Access and Circulation

Vehicular site access is proposed via construction of three site access roadways, two onto E 3rd Street to the north and a primary site access roadway that would become the "third leg" to the existing E 1st Street and Spanski Road intersection. To construct the new intersection leg, the applicant will realign E 1st Street at its intersection and extend slighting Spanski road to build a new T-intersection. Under this configuration, northbound Spanski Road is recommended with stop control.

Although not specifically project related, at the intersection of Airport Road and Spanski Road additional intersection controls are warranted to provide proper traffic control and delineation between roadway and the adjacent commercial parking lot within the northeast quadrant of the intersection. As noted above, it is also recommended that this intersection be controlled by stop signs on both the southbound approach (currently stop controlled) as well as the westbound approach. This configuration is recommended to maintain a clear intersection from incoming vehicles from these 2 approaches to yield to incoming vehicles from the SR 903 intersection with Spanski Road.

Project Mitigation

A review of traffic impacts to intersection levels of service, site access, and circulation issues was conducted in association with *Wildwood Ranch,* a mixed residential development in Cle Elum, WA. The following mitigation measures are recommended to reduce or eliminate project impacts:

- The proposed project may have to provide proportional share contributions at the Airport Road and Spanski Road intersection, where additional intersection controls are warranted to provide proper traffic control and delineation between roadway and the adjacent commercial parking lot within the northeast quadrant of the intersection. Calculations of the proportional share is estimated as:
    - Airport Road/Spanski Road - TEV Baseline 148 by 2028 with 52 new Project trips. Proportional Share (148 + 52= 200. 52/200= 26.1%).
- Install signage and supporting channelization at the intersection of E 1st Street and Spanski Road intersection. Given the new intersection configuration stop-control on the northbound approach of Spanski Road is recommended.

If you have any questions regarding the information presented in this memo, please call me at (206) 361-7333 x 101 or mikeread@tenw.com.

ATTACHMENTS

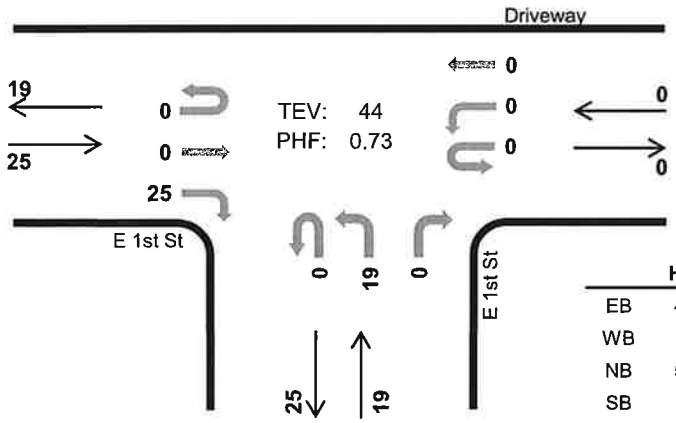
Attachment A
2022 PM Peak Hour Traffic Counts

E 1st St
Driveway

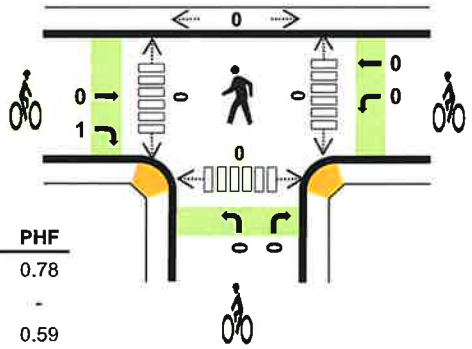
N

Peak Hour

Date: 09/20/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:30 PM to 5:30 PM



	HV %:	PHF
EB	4.0%	0.78
WB	-	-
NB	5.3%	0.59
SB	-	-
TOTAL	4.5%	0.73



Two-Hour Count Summaries

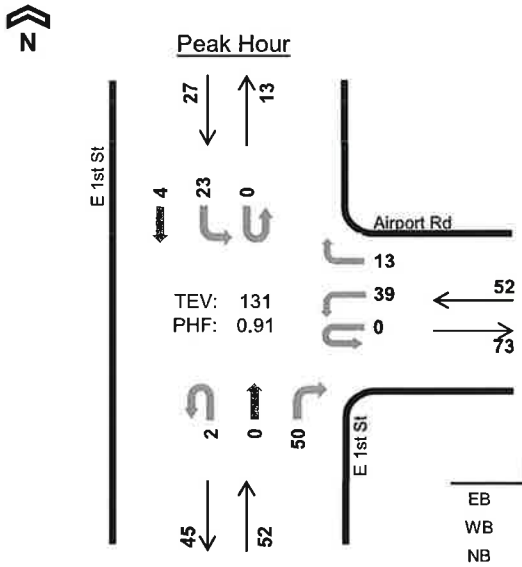
Interval Start		E 1st St Eastbound				Driveway Westbound				E 1st St Northbound				0 Southbound				15-min Total	Rolling One Hour
		UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM		0	0	0	8	0	0	0	0	0	2	0	0	0	0	0	0	10	0
4:15 PM		0	0	0	6	0	0	0	0	0	1	0	0	0	0	0	0	7	0
4:30 PM		**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**
4:45 PM		**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**41**
5:00 PM		**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**36**
5:15 PM		**0**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**15**	**44**
5:30 PM		0	0	0	2	0	1	0	0	0	2	0	0	0	0	0	0	5	36
5:45 PM		0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6	31
Count Total		0	0	0	47	0	1	0	0	0	24	0	0	0	0	0	0	72	0
Peak Hour	**All**	**0**	**0**	**0**	**25**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**44**	**0**
	HV	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**
	HV%	**-**	**-**	**-**	**4%**	**-**	**-**	**-**	**-**	**-**	**5%**	**-**	**-**	**-**	**-**	**-**	**-**	**5%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

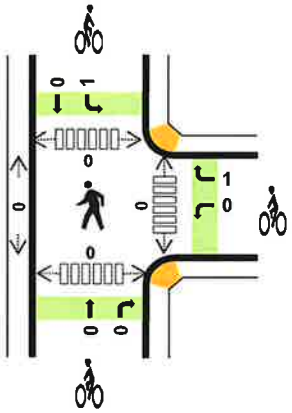
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
4:15 PM	0	0	0	0	*0*	0	0	1	0	*1*	0	0	0	0	*0*
4:30 PM	**1**	**0**	**1**	**0**	***2***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
4:45 PM	**0**	**0**	**0**	**0**	***0***	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	*0*
5:00 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	*0*
5:15 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:30 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	0	0	0	*0*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	1	0	1	0	*2*	1	0	1	0	*2*	0	0	0	0	*0*
Peak Hr	**1**	**0**	**1**	**0**	***2***	**1**	**0**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***

E 1st St
Airport Rd

Date: 09/20/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM



	HV %:	PHF
EB	-	-
WB	3.8%	0.87
NB	5.8%	0.81
SB	3.7%	0.84
TOTAL	4.6%	0.91



Two-Hour Count Summaries

Interval Start	0 Eastbound				Airport Rd Westbound				E 1st St Northbound				E 1st St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**2**	**1**	**0**	**0**	**11**	**0**	**7**	**1**	**0**	**32**	0
4:15 PM	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**1**	**0**	**0**	**0**	**16**	**0**	**5**	**1**	**0**	**32**	0
4:30 PM	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**7**	**0**	**0**	**0**	**11**	**0**	**5**	**0**	**0**	**31**	0
4:45 PM	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**3**	**1**	**0**	**0**	**12**	**0**	**6**	**2**	**0**	**36**	**131**
5:00 PM	0	0	0	0	0	13	0	1	0	0	0	7	0	4	0	0	25	124
5:15 PM	0	0	0	0	0	10	0	7	0	0	0	10	0	7	0	0	34	126
5:30 PM	0	0	0	0	0	5	0	3	0	0	0	9	0	4	0	0	21	116
5:45 PM	0	0	0	0	0	3	0	0	0	0	0	10	0	5	1	0	19	99
Count Total	0	0	0	0	0	70	0	24	2	0	0	86	0	43	5	0	230	0
Peak Hour All	**0**	**0**	**0**	**0**	**0**	**39**	**0**	**13**	**2**	**0**	**0**	**50**	**0**	**23**	**4**	**0**	**131**	**0**
Peak Hour HV	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**3**	**0**	**1**	**0**	**0**	**6**	**0**
Peak Hour HV%	-	-	-	-	-	**3%**	-	**8%**	**0%**	-	-	**6%**	-	**4%**	**0%**	-	**5%**	**0**

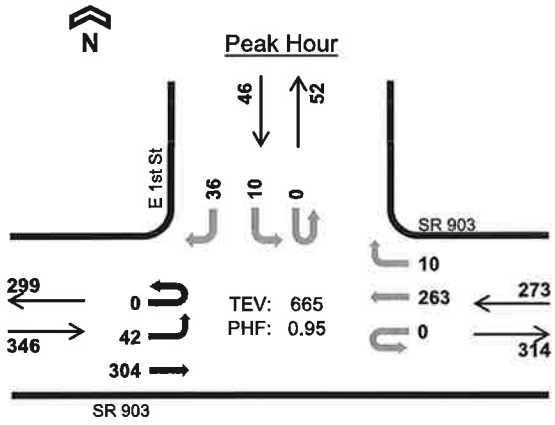
Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

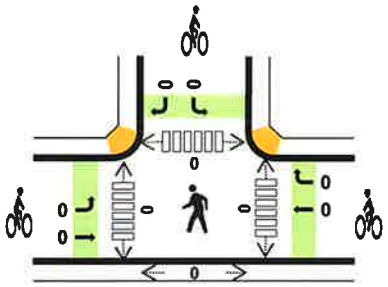
Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
4:15 PM	**0**	**0**	**2**	**0**	***2***	**0**	**1**	**0**	**0**	***1***	**0**	**0**	**0**	**0**	***0***
4:30 PM	**0**	**2**	**0**	**1**	***3***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
4:45 PM	**0**	**0**	**1**	**0**	***1***	**0**	**0**	**0**	**1**	***1***	**0**	**0**	**0**	**0**	***0***
5:00 PM	0	1	0	0	*1*	0	0	0	0	*0*	0	0	0	2	*2*
5:15 PM	0	0	1	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	0	1	0	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	0	1	0	0	*1*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	0	5	4	1	*10*	0	1	0	1	*2*	0	0	0	2	*2*
Peak Hr	**0**	**2**	**3**	**1**	***6***	**0**	**1**	**0**	**1**	***2***	**0**	**0**	**0**	**0**	***0***

E 1st St
SR 903

idax

Date: 09/20/2022
Count Period: 4:00 PM to 6:00 PM
Peak Hour: 4:00 PM to 5:00 PM





	HV %:	PHF
EB	8.7%	0.95
WB	10.6%	0.90
NB	-	-
SB	2.2%	0.77
TOTAL	9.0%	0.95

Two-Hour Count Summaries

Interval Start	SR 903 Eastbound				SR 903 Westbound				0 Northbound				E 1st St Southbound				15-min Total	Rolling One Hour
	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT	UT	LT	TH	RT		
4:00 PM	**0**	**10**	**81**	**0**	**0**	**0**	**69**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**11**	**175**	**0**
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4:30 PM	**0**	**10**	**72**	**0**	**0**	**0**	**75**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**8**	**167**	**0**
4:45 PM	**0**	**7**	**75**	**0**	**0**	**0**	**48**	**6**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**9**	**151**	**665**
5:00 PM	0	7	61	0	0	0	87	1	0	0	0	0	0	1	0	12	169	659
5:15 PM	0	8	73	0	0	0	54	2	0	0	0	0	0	2	0	8	147	634
5:30 PM	0	4	63	0	0	0	39	4	0	0	0	0	0	0	0	5	115	582
5:45 PM	0	6	35	0	0	0	40	4	0	0	0	0	0	1	0	2	88	519
Count Total	0	67	536	0	0	0	483	21	0	0	0	0	0	14	0	63	1,184	0
Peak Hour All	**0**	**42**	**304**	**0**	**0**	**0**	**263**	**10**	**0**	**0**	**0**	**0**	**0**	**10**	**0**	**36**	**665**	**0**
Peak Hour HV	**0**	**2**	**28**	**0**	**0**	**0**	**28**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**60**	**0**
Peak Hour HV%	**-**	**5%**	**9%**	**-**	**-**	**-**	**11%**	**10%**	**-**	**-**	**-**	**-**	**-**	**10%**	**-**	**0%**	**9%**	**0**

Note: Two-hour count summary volumes include heavy vehicles but exclude bicycles in overall count.

Interval Start	Heavy Vehicle Totals					Bicycles					Pedestrians (Crossing Leg)				
	EB	WB	NB	SB	Total	EB	WB	NB	SB	Total	East	West	North	South	Total
4:00 PM	**6**	**8**	**0**	**0**	***14***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
4:15 PM	**10**	**6**	**0**	**0**	***16***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
4:30 PM	**8**	**9**	**0**	**1**	***18***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
4:45 PM	**6**	**6**	**0**	**0**	***12***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***
5:00 PM	3	6	0	1	*10*	1	0	0	0	*1*	0	0	2	0	*2*
5:15 PM	3	3	0	0	*6*	0	0	0	0	*0*	0	0	0	0	*0*
5:30 PM	3	0	0	1	*4*	0	0	0	0	*0*	0	0	0	0	*0*
5:45 PM	2	1	0	0	*3*	0	0	0	0	*0*	0	0	0	0	*0*
Count Total	41	39	0	3	*83*	1	0	0	0	*1*	0	0	2	0	*2*
Peak Hr	**30**	**29**	**0**	**1**	***60***	**0**	**0**	**0**	**0**	***0***	**0**	**0**	**0**	**0**	***0***

Attachment B
Intersection LOS Summary Sheets

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	19	0	0	25
Future Vol, veh/h	0	0	19	0	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	16979
Grade, %	0	-	0	-	-	0
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	0	26	0	0	34

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	26	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.25	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.345	-	-
Pot Cap-1 Maneuver	0	1041	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	1041	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	0	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Control Delay (s)	-	-	0
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	-

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	39	13	2	50	23	4
Future Vol, veh/h	39	13	2	50	23	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	42	14	2	54	25	4

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	83	29	0	0	56	0
Stage 1	29	-	-	-	-	-
Stage 2	54	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	911	1037	-	-	1530	-
Stage 1	986	-	-	-	-	-
Stage 2	961	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	896	1037	-	-	1530	-
Mov Cap-2 Maneuver	896	-	-	-	-	-
Stage 1	986	-	-	-	-	-
Stage 2	946	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	6.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	928	1530	-
HCM Lane V/C Ratio	-	-	0.061	0.016	-
HCM Control Delay (s)	-	-	9.1	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	42	304	263	10	10	36
Future Vol, veh/h	42	304	263	10	10	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	40	95
Heavy Vehicles, %	9	9	10	10	2	2
Mvmt Flow	44	320	277	11	25	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	288	0	-	0	691	283
Stage 1	-	-	-	-	283	-
Stage 2	-	-	-	-	408	-
Critical Hdwy	4.19	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.281	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1235	-	-	-	410	756
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	671	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1235	-	-	-	395	756
Mov Cap-2 Maneuver	-	-	-	-	395	-
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	671	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1235	-	-	-	555
HCM Lane V/C Ratio	0.036	-	-	-	0.113
HCM Control Delay (s)	8	-	-	-	12.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	21	0	0	28
Future Vol, veh/h	0	0	21	0	0	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	16979
Grade, %	0	-	0	-	-	0
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	0	29	0	0	38

Major/Minor	Minor1		Major1	
Conflicting Flow All	-	29	0	0
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	-	6.25	-	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	-	3.345	-	-
Pot Cap-1 Maneuver	0	1037	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	-	1037	-	-
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	WB	NB
HCM Control Delay, s	0	0
HCM LOS	A	

Minor Lane/Major Mvmt	NBT	NBR	WBLn1
Capacity (veh/h)	-	-	-
HCM Lane V/C Ratio	-	-	-
HCM Control Delay (s)	-	-	0
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	-

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	15	2	56	26	5
Future Vol, veh/h	44	15	2	56	26	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	48	16	2	61	28	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	94	33	0	0	63	0
Stage 1	33	-	-	-	-	-
Stage 2	61	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	898	1032	-	-	1521	-
Stage 1	982	-	-	-	-	-
Stage 2	954	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	882	1032	-	-	1521	-
Mov Cap-2 Maneuver	882	-	-	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	937	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	6.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	916	1521	-
HCM Lane V/C Ratio	-	-	0.07	0.019	-
HCM Control Delay (s)	-	-	9.2	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	47	342	296	11	11	41
Future Vol, veh/h	47	342	296	11	11	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	40	95
Heavy Vehicles, %	9	9	10	10	2	2
Mvmt Flow	49	360	312	12	28	43

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	324	0	-	0	776	318
Stage 1	-	-	-	-	318	-
Stage 2	-	-	-	-	458	-
Critical Hdwy	4.19	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.281	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1197	-	-	-	366	723
Stage 1	-	-	-	-	738	-
Stage 2	-	-	-	-	637	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1197	-	-	-	351	723
Mov Cap-2 Maneuver	-	-	-	-	351	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	637	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1197	-	-	-	512
HCM Lane V/C Ratio	0.041	-	-	-	0.138
HCM Control Delay (s)	8.1	-	-	-	13.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	5.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	4	30	17	2	25	30
Future Vol, veh/h	4	30	17	2	25	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	73	73	73	73
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	5	41	23	3	34	41

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	46	0	75	26
Stage 1	-	-	-	-	26	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1543	-	921	1041
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	966	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1543	-	907	1041
Mov Cap-2 Maneuver	-	-	-	-	907	-
Stage 1	-	-	-	-	989	-
Stage 2	-	-	-	-	952	-

Approach	EB	WB	NB
HCM Control Delay, s	0	6.6	9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	975	-	-	1543	-
HCM Lane V/C Ratio	0.077	-	-	0.015	-
HCM Control Delay (s)	9	-	-	7.4	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Intersection	
Int Delay, s/veh	3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	44	17	31	56	27	23
Future Vol, veh/h	44	17	31	56	27	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	48	18	34	61	29	25

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	148	65	0	0	95	0
Stage 1	65	-	-	-	-	-
Stage 2	83	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	837	991	-	-	1480	-
Stage 1	950	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	820	991	-	-	1480	-
Mov Cap-2 Maneuver	820	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	914	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	861	1480	-
HCM Lane V/C Ratio	-	-	0.077	0.02	-
HCM Control Delay (s)	-	-	9.5	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	68	342	296	22	17	53
Future Vol, veh/h	68	342	296	22	17	53
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	40	95
Heavy Vehicles, %	9	9	10	10	2	2
Mvmt Flow	72	360	312	23	43	56

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	335	0	-	0	828	324
Stage 1	-	-	-	-	324	-
Stage 2	-	-	-	-	504	-
Critical Hdwy	4.19	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.281	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1186	-	-	-	341	717
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	607	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1186	-	-	-	320	717
Mov Cap-2 Maneuver	-	-	-	-	320	-
Stage 1	-	-	-	-	688	-
Stage 2	-	-	-	-	607	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1186	-	-	-	467
HCM Lane V/C Ratio	0.06	-	-	-	0.21
HCM Control Delay (s)	8.2	-	-	-	14.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8

Attachment C
Trip Generation Estimates

Wildwood Ranch						AM Trip Generation						PM Trip Generation			Daily	Daily
Land Use	**ITE LUC**	**Size**	**Avg Rate**	**Enter**	**Exit**	**Enter**	**Exit**	**Total**	**Avg Rate**	**Enter**	**Exit**	**Enter**	**Exit**	**Total**	**Trip Generation**	**Avg Rate**
Low-Rise Multifamily	220	40	0.40	24%	76%	4	12	16	0.51	63%	37%	13	7	20	270	6.74
Single Family	210	48	0.70	26%	74%	9	25	34	0.94	63%	37%	28	17	45	453	9.43
						13	37	50				41	24	65	723	

Wildwood Ranch

2028 PM Peak Hour Turning Movement Estimates

Growth Rate =	2.0%
Existing Year =	2022
Future Year =	2028

Enter	Exit
41	24
65	

Existing 2022	2028 Baseline	Trip Distribution	Project Trips	2028 With-Project