



June 4, 2020

Laurie Doyle
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Central California Housing Corporation (CCHC)
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Clovis, CA 93612

Traffic Analysis – Cashin’s Field (170 Ridge Road)

Dear Ms. Doyle,

This letter provides a summary of the traffic analysis results for the Cashin’s Field Affordable Housing project in Nevada City, CA. The proposed project is located on the north side of Ridge Road between Zion Street and Searls Avenue (APN 005-290-026) as shown on **Figure 1**. The proposed project is an affordable housing development with approximately 56 units.

PROJECT GENERATED TRAFFIC

Trip Generation

Trip generation was estimated based on the Multifamily Low-Rise Housing land use from the *Trip Generation Manual, 10th Edition* published by the Institute of Transportation Engineers (ITE). **Table 1** shows the Daily, AM peak hour, and PM peak hour trip generation estimates for the proposed project.

Table 1: Trip Generation Estimates

Land Use	Units	Trips						
		Daily	AM	AM In	AM Out	PM	PM In	PM Out
Multifamily Low-Rise Housing ¹	56 d.u. ²	410	26	6	20	31	20	11

Notes: 1. ITE trip generation rates for Multifamily Housing-Low Rise (220): Daily – 7.32, AM – 0.46, PM – 0.56

2. d.u. = Dwelling Units

Source: Headway Transportation, 2020

As shown in the table, the project is expected to generate approximately 410 Daily, 26 AM peak hour, and 31 PM peak hour trips.

Project Access

The project will access Ridge Road via two project driveways, as shown on **Figure 2**. The main (west) access point is proposed to have full movements (i.e. right-in/right-out/left-in/left-out) with side-street STOP control on the driveway approach. The project proposes to extend the center turn lane on Ridge

Road to facilitate left turn movements to/from the west driveway. The east access is proposed as right-in/right-out only with STOP control on the driveway approach. The project proposed to construct a raised island in the project driveway to prohibit left-turns to/from Ridge Road.

Trip Distribution

Project generated traffic was distributed to the surrounding roadway network based on existing travel patterns and the locations of complimentary land uses. Project trips were distributed as follows:

- ▶ 70% to/from the east toward SR 49 via Ridge Road
- ▶ 10% to/from the west via Ridge Road
- ▶ 10% to/from the north via Zion Street
- ▶ 10% to/from the south via Nevada City Hwy

The estimated project trip assignment is shown on **Figure 3**.

LEVEL OF POTENTIAL IMPACTS

Gold Flat Road Corridor Study

The *Gold Flat Road Corridor Study* (Omni-Means, 2016) analyzed the Ridge Road/Gold Flat Road Corridor between Nevada City Highway and Hollow Way. The study indentified that long-term improvements would be required at the Gold Flat Road Interchange. It is important to note that the Nevada City Highway / Zion Street / Ridge Road and Ridge Road / Zion Street intersections are anticipated to operate at Level of Service "B" or better during the AM and PM peak hours under Future Year (2040) conditions per the *Gold Flat Road Corridor Study*. The corridor study estimated the Future Year (2040) traffic volumes on Ridge Road between Zion Street and Searls Avenue to be:

- ▶ 945 AM peak hour bi-direction volume
- ▶ 940 PM peak hour bi-direction volume

Project Traffic Analysis

Future Plus Project traffic volumes were developed by adding the project generated trips (**Figure 3**) to the Future Year traffic volumes obtained from the *Gold Flat Road Corridor Study* and are shown on **Figure 4**, attached. **Table 2** presents the level of service analysis summary for the Future Plus Project scenario. We evaluated the 20-year horizon as these are the worst case/highest traffic volumes available. Detailed calculation sheets are provided in **Attachment A**.



Table 2: Future Plus Project Intersection Level of Service Summary

Intersection	Movement	Intersection Control	AM Peak		PM Peak	
			LOS	Delay	LOS	Delay
Ridge Road / West Project Dwy	Southbound Left	Side Street STOP	C	19.2	C	17.4
	Southbound Right		B	11.3	B	11.1
	Eastbound Left		A	8.4	A	8.3
Ridge Road / East Project Dwy	Southbound Right	Side Street STOP	B	11.3	B	11.1

As shown in the table, both project driveways are anticipated to operate at acceptable level of service conditions during the AM and PM peak hours under Future Year (2040) conditions as the level of service target for Nevada County is generally LOS "D".

The proposed project is anticipated to increase the Future Year (2040) peak hour traffic volumes on Ridge Road by approximately 3.0%. The improvements at the Gold Flat Road Interchange identified in the *Gold Flat Road Corridor Study* will be needed with or without the proposed project. Additionally, the Nevada City Highway / Zion Street / Ridge Road and Ridge Road / Zion Street intersections are anticipated to operate at acceptable levels of service during the AM and PM peak hours with the addition of project traffic.

CONCLUSIONS

The proposed approximately 56 unit affordable housing project is estimated to generate approximately 410 Daily, 26 AM peak hour, and 31 PM peak hour trips. The proposed project driveways are anticipated to operate at acceptable levels of service conditions under Future Year (2040) conditions. Future improvements have already been identified at the Gold Flat Road Interchange and will be needed with or without the project. The project is anticipated to increase the Future Year (2040) peak hour traffic volumes on Ridge Road by approximately 3.0%. This minor increase in traffic is anticipated to have a less than significant impact on the local roadway network. The project will pay the appropriate traffic impact fees.

We appreciate the opportunity to assist CCHC with this study. Please do not hesitate to call with any questions.

Sincerely,
 Headway Transportation, LLC

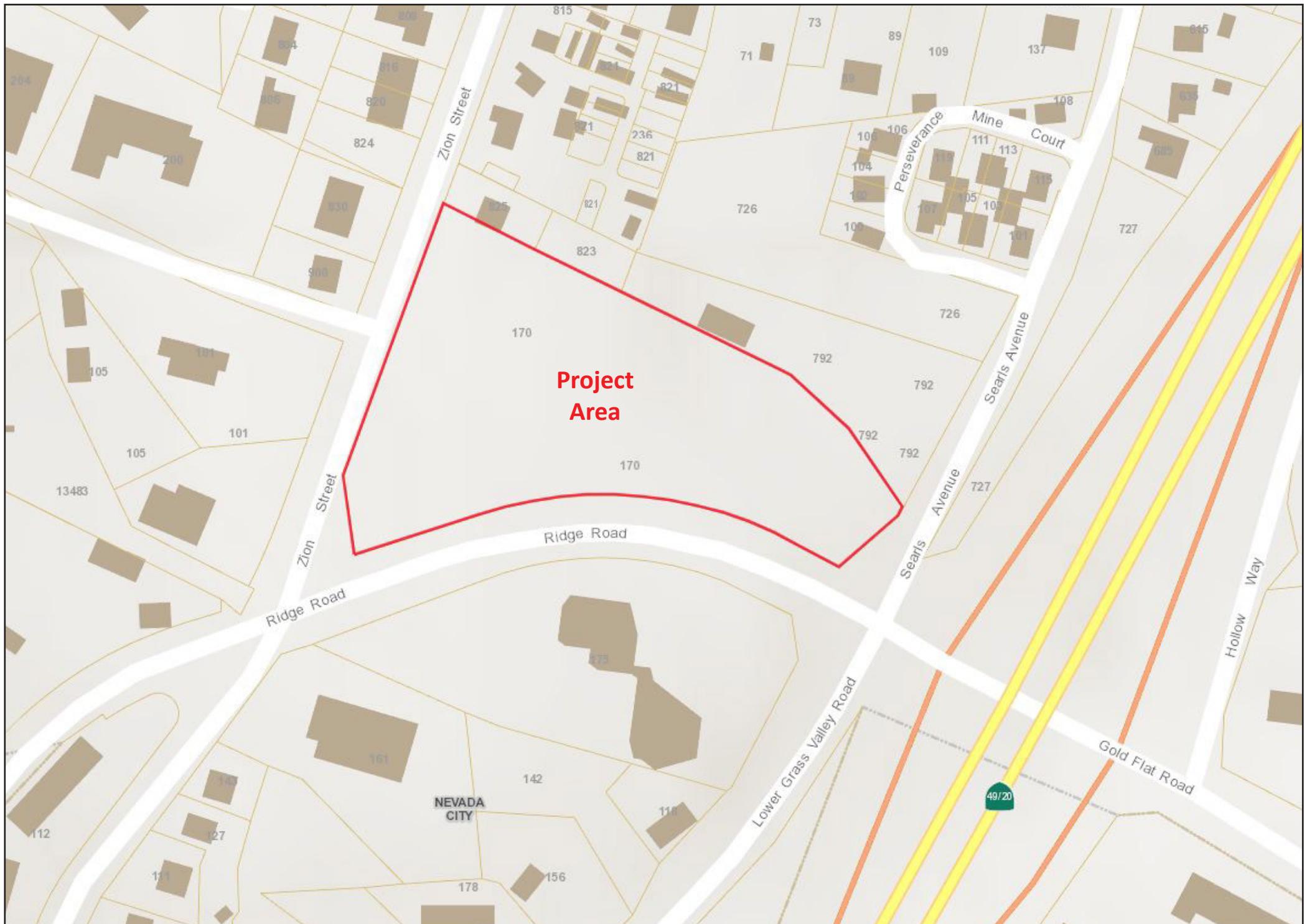
Loren E. Chilson, PE
 Principal



Attachments:

- ▶ Figure 1. Project Location
- ▶ Figure 2. Preliminary Site Plan
- ▶ Figure 3. Project Trip Assignment and Distribution
- ▶ Figure 4. Future (2040) Plus Project Traffic Volumes
- ▶ Attachment A. Future Plus Project LOS Calculations





	LAND USE					
	Existing			Proposed		
	SQ	AC	%	SQ	AC	%
Building Footprint	0	0		27,801	0.64	13.9%
Private Asphalt	0	0		34,090	0.78	17.1%
Right of Way Asphalt	0	0		353		0.2%
Concrete	65	0	0%	6,775	0.15	3.4%
Open Space	199,831	4.59	100%	130,812	3.02	65.5%
TOTALS	199,831	4.59	100%	199,831	4.59	100.0%

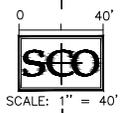
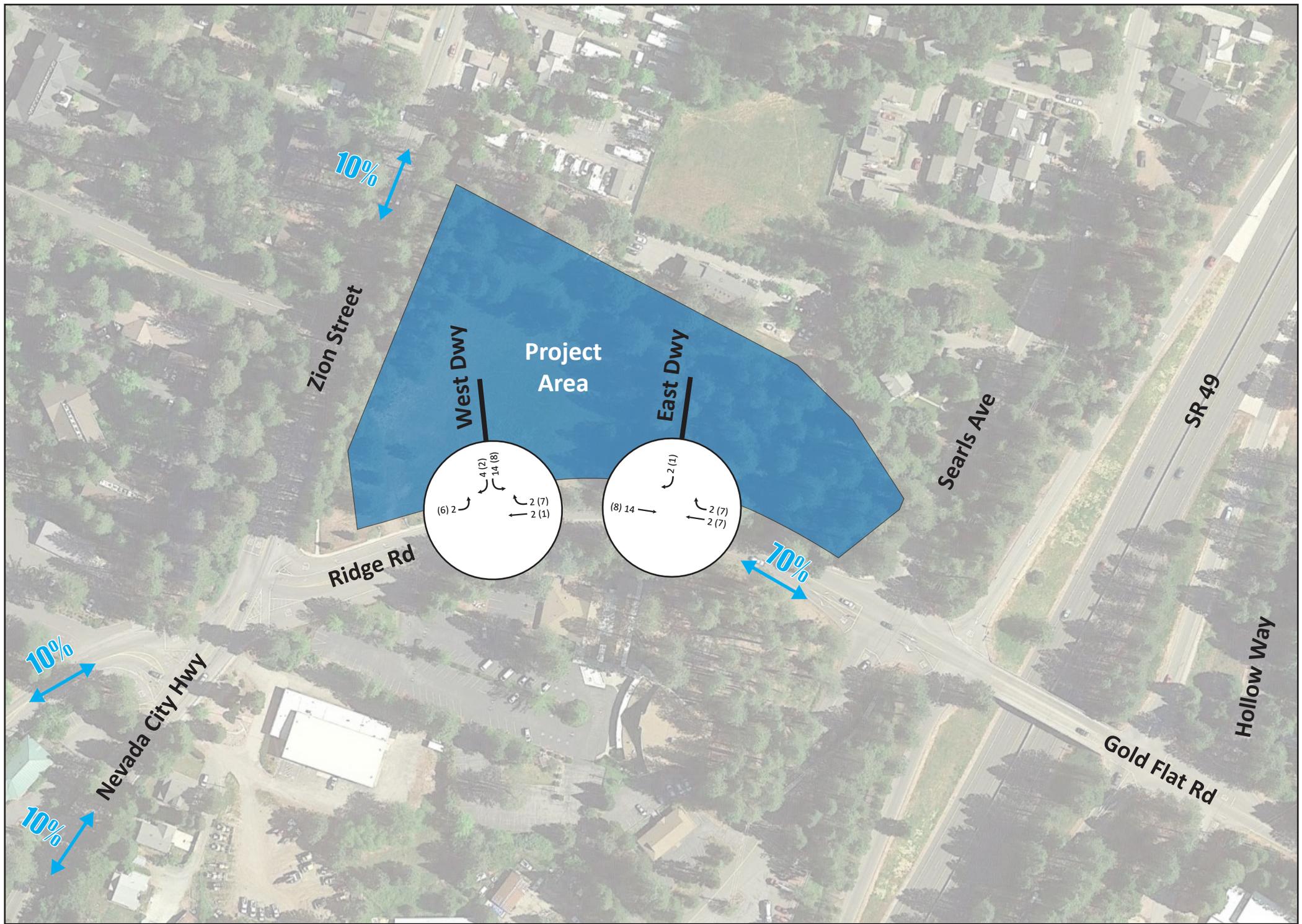
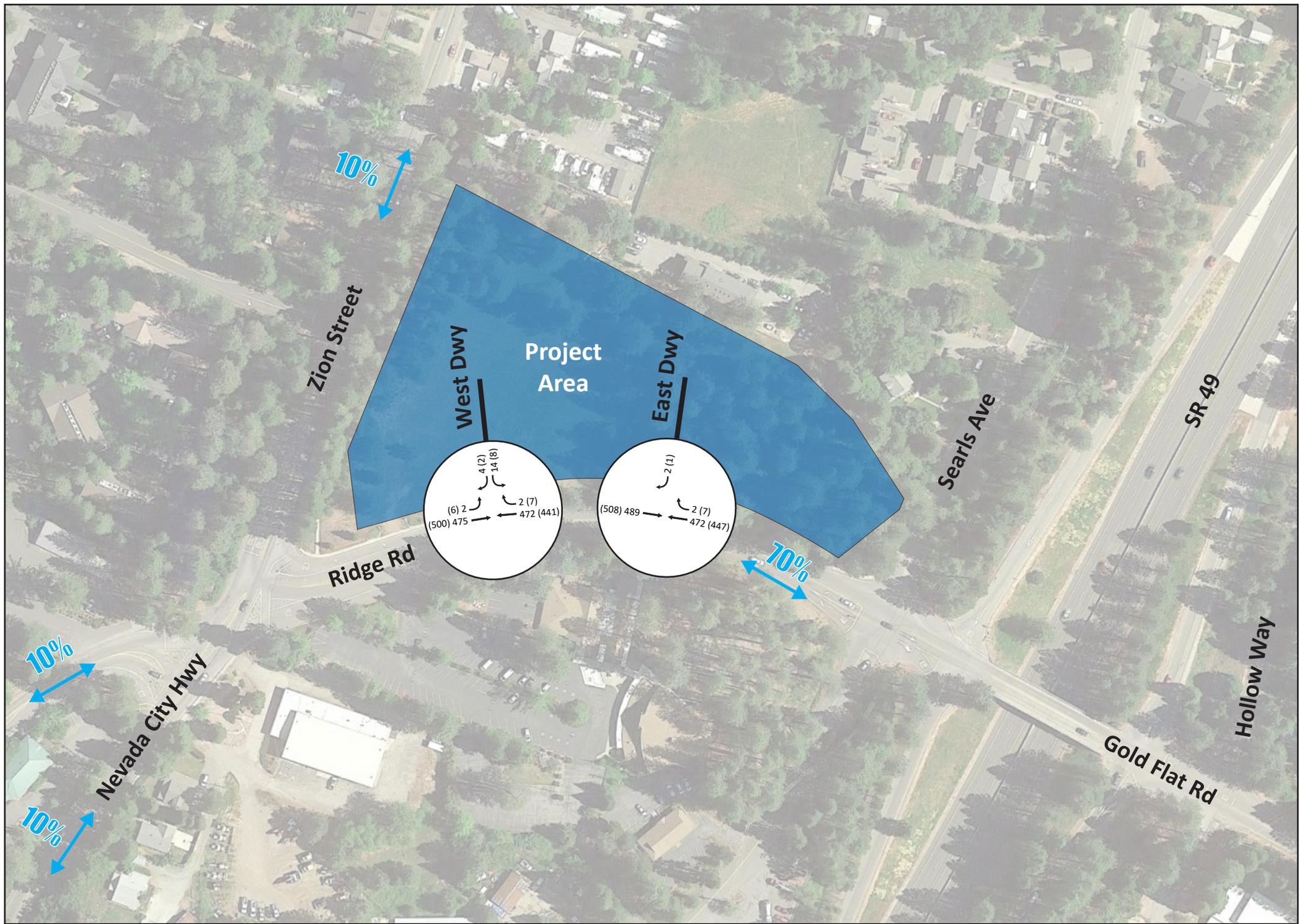


Figure 2

Cashin's Field (170 Ridge Road)
Traffic Analysis
Preliminary Site Plan





Intersection Level Of Service Report
Intersection 1: Ridge Road / Main Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	19.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.056

Intersection Setup

Name	Main Project Dwy		Ridge Road		Ridge Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration	↵↵		↵		↵	
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Main Project Dwy		Ridge Road		Ridge Road	
Base Volume Input [veh/h]	0	0	0	475	470	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	14	4	2	0	2	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	4	2	475	472	2
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	1	125	124	1
Total Analysis Volume [veh/h]	15	4	2	500	497	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	19.21	11.33	8.39	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.18	0.02	0.01	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	4.42	0.53	0.14	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.55		0.03		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.34					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 2: Ridge Road / South Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name	South Project Dwy		Ridge Road		Ridge Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration	↻		↑		↶	
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	South Project Dwy		Ridge Road		Ridge Road	
Base Volume Input [veh/h]	0	0	0	475	470	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	2	0	14	2	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	2	0	489	472	2
Peak Hour Factor	1.0000	0.9500	1.0000	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	1	0	129	124	1
Total Analysis Volume [veh/h]	0	2	0	515	497	2
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	11.31	0.00	0.00	0.00	0.00
Movement LOS		B		A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.26	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.31		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.02					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 1: Ridge Road / Main Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	19.0
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.030

Intersection Setup

Name	Main Project Dwy		Ridge Road		Ridge Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration	↵↵		↵		↵	
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	1	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	50.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	Main Project Dwy		Ridge Road		Ridge Road	
Base Volume Input [veh/h]	0	0	0	500	440	0
Base Volume Adjustment Factor	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	2	6	0	1	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	2	6	500	441	7
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	1	2	132	116	2
Total Analysis Volume [veh/h]	8	2	6	526	464	7
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	18.95	11.07	8.32	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.09	0.01	0.02	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.32	0.25	0.41	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.38		0.09		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	0.22					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 2: Ridge Road / South Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name	South Project Dwy		Ridge Road		Ridge Road	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration	↻		↑		↶	
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	25.00		35.00		35.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name	South Project Dwy		Ridge Road		Ridge Road	
Base Volume Input [veh/h]	0	0	0	500	440	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	8	7	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1	0	508	447	7
Peak Hour Factor	1.0000	0.9500	1.0000	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	134	118	2
Total Analysis Volume [veh/h]	0	1	0	535	471	7
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	11.11	0.00	0.00	0.00	0.00
Movement LOS		B		A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.13	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.11		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.01					
Intersection LOS	B					