Appendix A

CalEEMod Worksheets

Rose Avenue Bikes Lanes v2 Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Rose Avenue Bikes Lanes v2
Construction Start Date	6/1/2028
Lead Agency	Ventura County
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	2.70
Precipitation (days)	7.20
Location	34.259605, -119.132882
County	Ventura
City	Unincorporated
Air District	Ventura County APCD
Air Basin	South Central Coast
TAZ	3451
EDFZ	8
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Road Widening	1.90	Mile	58.6	0.00	—	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.28	21.8	23.6	0.05	0.82	3.87	4.69	0.76	1.63	2.38	—	6,692	6,692	0.21	0.49	7.34	6,850
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	—	—	—	—	—	—	—	—	—	—	—	1.17	1.17	< 0.005	< 0.005	—	1.18
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.20	1.70	2.10	< 0.005	0.07	0.18	0.25	0.06	0.06	0.12	—	517	517	0.02	0.02	0.14	523
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.04	0.31	0.38	< 0.005	0.01	0.03	0.05	0.01	0.01	0.02	—	85.7	85.7	< 0.005	< 0.005	0.02	86.6
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	25.0	25.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	25.0	25.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unmit.	No	No	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	2.28	21.8	23.6	0.05	0.82	3.87	4.69	0.76	1.63	2.38	—	6,692	6,692	0.21	0.49	7.34	6,850
2028	2.14	20.0	23.2	0.05	0.72	3.87	4.59	0.66	1.63	2.29	—	6,548	6,548	0.20	0.47	6.19	6,699
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	—	—	—	—	—	—	—	—	—	—	—	0.67	0.67	< 0.005	< 0.005	—	0.67
2028	—	—	—	—	—	—	—	—	—	—	—	1.17	1.17	< 0.005	< 0.005	—	1.18
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.20	1.70	2.10	< 0.005	0.07	0.18	0.25	0.06	0.06	0.12	—	517	517	0.02	0.02	0.14	523
2028	0.11	0.95	1.19	< 0.005	0.04	0.16	0.19	0.03	0.05	0.09	—	309	309	0.01	0.01	0.09	313
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2026	0.04	0.31	0.38	< 0.005	0.01	0.03	0.05	0.01	0.01	0.02	—	85.7	85.7	< 0.005	< 0.005	0.02	86.6
2028	0.02	0.17	0.22	< 0.005	0.01	0.03	0.04	0.01	0.01	0.02	—	51.1	51.1	< 0.005	< 0.005	0.01	51.8

3. Construction Emissions Details

3.1. S - Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.13	18.0	21.2	0.03	0.78	—	0.78	0.72	—	0.72	—	3,557	3,557	0.14	0.03	—	3,569
Dust From Material Movement	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.7	48.7	< 0.005	< 0.005	—	48.9
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.07	8.07	< 0.005	< 0.005	—	8.09
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	1.47	0.00	0.00	0.33	0.33	0.00	0.08	0.08	—	328	328	< 0.005	0.01	1.23	332
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.32	4.32	< 0.005	< 0.005	0.01	4.38
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.72	0.72	< 0.005	< 0.005	< 0.005	0.73
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. S - Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.83	7.26	7.97	0.01	0.40	—	0.40	0.37	—	0.37	—	1,122	1,122	0.05	0.01	—	1,126

Dust From Material Movement	—	—	—	—	—	0.41	0.41	—	0.04	0.04	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	0.99	0.99	—	0.15	0.15	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.20	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	30.8	30.8	< 0.005	< 0.005	—	30.9
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.09	5.09	< 0.005	< 0.005	—	5.11
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	1.17	0.00	0.00	0.26	0.26	0.00	0.06	0.06	—	262	262	< 0.005	0.01	0.98	266
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.56	0.39	0.01	0.02	0.32	0.34	0.02	0.09	0.11	—	1,209	1,209	0.03	0.19	2.62	1,270
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	6.91	6.91	< 0.005	< 0.005	0.01	7.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	33.1	33.1	< 0.005	0.01	0.03	34.7
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.14	1.14	< 0.005	< 0.005	< 0.005	1.16
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.48	5.48	< 0.005	< 0.005	0.01	5.75

3.5. N - Site Preparation (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.00	16.6	21.1	0.03	0.68	—	0.68	0.63	—	0.63	—	3,559	3,559	0.14	0.03	—	3,571

Dust From Material Movement	—	—	—	—	—	2.76	2.76	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.23	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.7	48.7	< 0.005	< 0.005	—	48.9
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.07	8.07	< 0.005	< 0.005	—	8.10
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	1.29	0.00	0.00	0.33	0.33	0.00	0.08	0.08	—	316	316	< 0.005	0.01	1.01	321
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.17	4.17	< 0.005	< 0.005	0.01	4.22
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.69	0.69	< 0.005	< 0.005	< 0.005	0.70
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. N - Demolition (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.71	6.45	7.90	0.01	0.30	—	0.30	0.28	—	0.28	—	1,123	1,123	0.05	0.01	—	1,127
Dust From Material Movement	—	—	—	—	—	0.41	0.41	—	0.04	0.04	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	0.99	0.99	—	0.15	0.15	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.22	< 0.005	0.01	—	0.01	0.01	—	0.01	—	30.8	30.8	< 0.005	< 0.005	—	30.9
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	0.03	0.03	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.09	5.09	< 0.005	< 0.005	—	5.11
Dust From Material Movement	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.07	1.03	0.00	0.00	0.26	0.26	0.00	0.06	0.06	—	253	253	< 0.005	0.01	0.81	257
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.43	0.37	0.01	0.02	0.32	0.34	0.02	0.09	0.11	—	1,150	1,150	0.02	0.18	2.22	1,208

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	6.67	6.67	< 0.005	< 0.005	0.01	6.76
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.04	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	31.5	31.5	< 0.005	0.01	0.03	33.1
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.10	1.10	< 0.005	< 0.005	< 0.005	1.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.22	5.22	< 0.005	< 0.005	< 0.005	5.48

3.9. S - Grading and Excavation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.13	18.0	21.2	0.03	0.78	—	0.78	0.72	—	0.72	—	3,557	3,557	0.14	0.03	—	3,569
Dust From Material Movement	—	—	—	—	—	2.79	2.79	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.7	48.7	< 0.005	< 0.005	—	48.9
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.07	8.07	< 0.005	< 0.005	—	8.09
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.10	1.47	0.00	0.00	0.33	0.33	0.00	0.08	0.08	—	328	328	< 0.005	0.01	1.23	332
Vendor	< 0.005	0.11	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	90.9	90.9	< 0.005	0.01	0.24	95.1
Hauling	0.04	3.51	0.87	0.02	0.04	0.72	0.76	0.04	0.20	0.24	—	2,716	2,716	0.06	0.43	5.88	2,853
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.32	4.32	< 0.005	< 0.005	0.01	4.38
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.25	1.25	< 0.005	< 0.005	< 0.005	1.30

Hauling	< 0.005	0.05	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	37.2	37.2	< 0.005	0.01	0.03	39.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.72	0.72	< 0.005	< 0.005	< 0.005	0.73
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	< 0.005	< 0.005	< 0.005	0.22
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.16	6.16	< 0.005	< 0.005	0.01	6.46

3.11. N - Grading and Excavation (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.00	16.6	21.1	0.03	0.68	—	0.68	0.63	—	0.63	—	3,559	3,559	0.14	0.03	—	3,571
Dust From Material Movement	—	—	—	—	—	2.79	2.79	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.23	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	48.7	48.7	< 0.005	< 0.005	—	48.9
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.07	8.07	< 0.005	< 0.005	—	8.10
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	1.29	0.00	0.00	0.33	0.33	0.00	0.08	0.08	—	316	316	< 0.005	0.01	1.01	321
Vendor	< 0.005	0.10	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	87.0	87.0	< 0.005	0.01	0.18	91.0
Hauling	0.04	3.22	0.84	0.02	0.04	0.72	0.76	0.04	0.20	0.24	—	2,585	2,585	0.05	0.42	4.99	2,715
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	4.17	4.17	< 0.005	< 0.005	0.01	4.22
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.19	1.19	< 0.005	< 0.005	< 0.005	1.25
Hauling	< 0.005	0.05	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	35.4	35.4	< 0.005	0.01	0.03	37.2
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.69	0.69	< 0.005	< 0.005	< 0.005	0.70
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.20	0.20	< 0.005	< 0.005	< 0.005	0.21
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.86	5.86	< 0.005	< 0.005	< 0.005	6.15

3.13. S - Utility Relocation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	4.49	5.29	0.02	0.17	—	0.17	0.16	—	0.16	—	1,622	1,622	0.07	0.01	—	1,628
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.25	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	88.9	88.9	< 0.005	< 0.005	—	89.2
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.7	14.7	< 0.005	< 0.005	—	14.8

Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.05	0.73	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	164	164	< 0.005	0.01	0.61	166
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.64	8.64	< 0.005	< 0.005	0.01	8.76
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.43	1.43	< 0.005	< 0.005	< 0.005	1.45
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.15. N - Utility Relocation (2028) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.10	5.28	0.02	0.15	—	0.15	0.14	—	0.14	—	1,621	1,621	0.07	0.01	—	1,627
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.22	0.29	< 0.005	0.01	—	0.01	0.01	—	0.01	—	88.8	88.8	< 0.005	< 0.005	—	89.1
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.7	14.7	< 0.005	< 0.005	—	14.8
Dust From Material Movement	—	—	—	—	—	0.00	0.00	—	0.00	0.00	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.04	0.65	0.00	0.00	0.16	0.16	0.00	0.04	0.04	—	158	158	< 0.005	0.01	0.50	160
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	8.34	8.34	< 0.005	< 0.005	0.01	8.45
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.38	1.38	< 0.005	< 0.005	< 0.005	1.40
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.17. S + N - Asphalt Paving and Pouring (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.92	7.86	9.74	0.02	0.31	—	0.31	0.28	—	0.28	—	2,235	2,235	0.09	0.02	—	2,243
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.65	0.80	< 0.005	0.03	—	0.03	0.02	—	0.02	—	184	184	0.01	< 0.005	—	184
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.12	0.15	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	30.4	30.4	< 0.005	< 0.005	—	30.5
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.08	1.17	0.00	0.00	0.26	0.26	0.00	0.06	0.06	—	262	262	< 0.005	0.01	0.98	266
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.09	0.00	0.00	0.02	0.02	0.00	0.01	0.01	—	20.7	20.7	< 0.005	< 0.005	0.03	21.0
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.43	3.43	< 0.005	< 0.005	0.01	3.48
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
S - Site Preparation	Linear, Grubbing & Land Clearing	6/1/2026	6/7/2026	5.00	5.00	—
S - Demolition	Linear, Grubbing & Land Clearing	7/6/2026	7/19/2026	5.00	10.0	—
N - Site Preparation	Linear, Grubbing & Land Clearing	6/1/2028	6/7/2028	5.00	5.00	—
N - Demolition	Linear, Grubbing & Land Clearing	7/6/2028	7/19/2028	5.00	10.0	—
S - Grading and Excavation	Linear, Grading & Excavation	7/20/2026	7/24/2026	5.00	5.00	—
N - Grading and Excavation	Linear, Grading & Excavation	7/26/2028	8/1/2028	5.00	5.00	—
S - Utility Relocation	Linear, Drainage, Utilities, & Sub-Grade	6/8/2026	7/5/2026	5.00	20.0	—
N - Utility Relocation	Linear, Drainage, Utilities, & Sub-Grade	6/8/2028	7/5/2028	5.00	20.0	—

S + N - Asphalt Paving and Pouring	Linear, Paving	8/3/2026	9/11/2026	5.00	30.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
S - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
S - Site Preparation	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
S - Site Preparation	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
S - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
S - Site Preparation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
S - Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
S - Site Preparation	Rubber Tired Loaders	Diesel	Average	1.00	8.00	150	0.36
S - Site Preparation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
S - Site Preparation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
S - Site Preparation	Trenchers	Diesel	Average	1.00	8.00	40.0	0.50
S - Demolition	Signal Boards	Electric	Average	3.00	8.00	6.00	0.82
S - Demolition	Crawler Tractors	Diesel	Average	2.00	8.00	87.0	0.43
S - Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
N - Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
N - Site Preparation	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
N - Site Preparation	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
N - Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
N - Site Preparation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
N - Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41

N - Site Preparation	Rubber Tired Loaders	Diesel	Average	1.00	8.00	150	0.36
N - Site Preparation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
N - Site Preparation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
N - Site Preparation	Trenchers	Diesel	Average	1.00	8.00	40.0	0.50
N - Demolition	Signal Boards	Electric	Average	3.00	8.00	6.00	0.82
N - Demolition	Crawler Tractors	Diesel	Average	2.00	8.00	87.0	0.43
N - Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
S - Grading and Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
S - Grading and Excavation	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
S - Grading and Excavation	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
S - Grading and Excavation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
S - Grading and Excavation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
S - Grading and Excavation	Graders	Diesel	Average	1.00	8.00	148	0.41
S - Grading and Excavation	Rubber Tired Loaders	Diesel	Average	1.00	8.00	150	0.36
S - Grading and Excavation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
S - Grading and Excavation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
S - Grading and Excavation	Trenchers	Diesel	Average	1.00	8.00	40.0	0.50
N - Grading and Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
N - Grading and Excavation	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43

N - Grading and Excavation	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
N - Grading and Excavation	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
N - Grading and Excavation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
N - Grading and Excavation	Graders	Diesel	Average	1.00	8.00	148	0.41
N - Grading and Excavation	Rubber Tired Loaders	Diesel	Average	1.00	8.00	150	0.36
N - Grading and Excavation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
N - Grading and Excavation	Skid Steer Loaders	Diesel	Average	1.00	8.00	71.0	0.37
N - Grading and Excavation	Trenchers	Diesel	Average	1.00	8.00	40.0	0.50
S - Utility Relocation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
S - Utility Relocation	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
S - Utility Relocation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
S - Utility Relocation	Surfacing Equipment	Diesel	Average	1.00	8.00	399	0.30
S - Utility Relocation	Cement and Mortar Mixers	Diesel	Average	1.00	8.00	10.0	0.56
N - Utility Relocation	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
N - Utility Relocation	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
N - Utility Relocation	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
N - Utility Relocation	Surfacing Equipment	Diesel	Average	1.00	8.00	399	0.30
N - Utility Relocation	Cement and Mortar Mixers	Diesel	Average	1.00	8.00	10.0	0.56
S + N - Asphalt Paving and Pouring	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
S + N - Asphalt Paving and Pouring	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48

S + N - Asphalt Paving and Pouring	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
S + N - Asphalt Paving and Pouring	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
S + N - Asphalt Paving and Pouring	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
S + N - Asphalt Paving and Pouring	Rollers	Diesel	Average	1.00	8.00	36.0	0.38
S + N - Asphalt Paving and Pouring	Signal Boards	Diesel	Average	1.00	8.00	6.00	0.82
S + N - Asphalt Paving and Pouring	Surfacing Equipment	Diesel	Average	1.00	8.00	399	0.30

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
S - Site Preparation	—	—	—	—
S - Site Preparation	Worker	25.0	18.5	LDA,LDT1,LDT2
S - Site Preparation	Vendor	0.00	10.2	HHDT,MHDT
S - Site Preparation	Hauling	0.00	20.0	HHDT
S - Site Preparation	Onsite truck	0.00	0.00	HHDT
S - Utility Relocation	—	—	—	—
S - Utility Relocation	Worker	12.5	18.5	LDA,LDT1,LDT2
S - Utility Relocation	Vendor	0.00	10.2	HHDT,MHDT
S - Utility Relocation	Hauling	0.00	20.0	HHDT
S - Utility Relocation	Onsite truck	0.00	0.00	HHDT
S - Demolition	—	—	—	—
S - Demolition	Worker	20.0	18.5	LDA,LDT1,LDT2
S - Demolition	Vendor	0.00	10.2	HHDT,MHDT

S - Demolition	Hauling	17.8	20.0	HHDT
S - Demolition	Onsite truck	0.00	0.00	HHDT
S - Grading and Excavation	—	—	—	—
S - Grading and Excavation	Worker	25.0	18.5	LDA,LDT1,LDT2
S - Grading and Excavation	Vendor	3.00	10.2	HHDT,MHDT
S - Grading and Excavation	Hauling	40.0	20.0	HHDT
S - Grading and Excavation	Onsite truck	0.00	0.00	HHDT
S + N - Asphalt Paving and Pouring	—	—	—	—
S + N - Asphalt Paving and Pouring	Worker	20.0	18.5	LDA,LDT1,LDT2
S + N - Asphalt Paving and Pouring	Vendor	0.00	10.2	HHDT,MHDT
S + N - Asphalt Paving and Pouring	Hauling	0.00	20.0	HHDT
S + N - Asphalt Paving and Pouring	Onsite truck	0.00	0.00	HHDT
N - Site Preparation	—	—	—	—
N - Site Preparation	Worker	25.0	18.5	LDA,LDT1,LDT2
N - Site Preparation	Vendor	0.00	10.2	HHDT,MHDT
N - Site Preparation	Hauling	0.00	20.0	HHDT
N - Site Preparation	Onsite truck	—	—	HHDT
N - Demolition	—	—	—	—
N - Demolition	Worker	20.0	18.5	LDA,LDT1,LDT2
N - Demolition	Vendor	0.00	10.2	HHDT,MHDT
N - Demolition	Hauling	17.8	20.0	HHDT
N - Demolition	Onsite truck	—	—	HHDT
N - Grading and Excavation	—	—	—	—
N - Grading and Excavation	Worker	25.0	18.5	LDA,LDT1,LDT2
N - Grading and Excavation	Vendor	3.00	10.2	HHDT,MHDT
N - Grading and Excavation	Hauling	40.0	20.0	HHDT
N - Grading and Excavation	Onsite truck	—	—	HHDT

N - Utility Relocation	—	—	—	—
N - Utility Relocation	Worker	12.5	18.5	LDA,LDT1,LDT2
N - Utility Relocation	Vendor	0.00	10.2	HHDT,MHDT
N - Utility Relocation	Hauling	0.00	20.0	HHDT
N - Utility Relocation	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (Ton of Debris)	Acres Paved (acres)
S - Site Preparation	—	—	58.6	0.00	—
S - Demolition	—	0.00	7.00	711	—
N - Site Preparation	—	—	58.6	0.00	—
N - Demolition	—	0.00	58.6	711	—
S - Grading and Excavation	—	7,000	7.00	0.00	—
N - Grading and Excavation	—	7,000	58.6	0.00	—
S - Utility Relocation	—	—	58.6	0.00	—
N - Utility Relocation	—	—	58.6	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Road Widening	58.6	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	88.1	532	0.03	< 0.005
2028	88.1	532	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	8.58	annual days of extreme heat
Extreme Precipitation	5.95	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	36.5	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A

Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	42.6
AQ-PM	34.8
AQ-DPM	17.1
Drinking Water	98.3
Lead Risk Housing	32.7
Pesticides	97.0
Toxic Releases	20.9
Traffic	8.22
Effect Indicators	—
CleanUp Sites	19.0
Groundwater	63.4
Haz Waste Facilities/Generators	67.6
Impaired Water Bodies	99.0
Solid Waste	96.2
Sensitive Population	—
Asthma	27.5
Cardio-vascular	22.1
Low Birth Weights	41.5
Socioeconomic Factor Indicators	—
Education	63.4
Housing	39.2

Linguistic	67.2
Poverty	41.5
Unemployment	29.4

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	76.10676248
Employed	68.92082638
Median HI	83.69049147
Education	—
Bachelor's or higher	61.31143334
High school enrollment	100
Preschool enrollment	26.60079559
Transportation	—
Auto Access	78.96830489
Active commuting	62.03002695
Social	—
2-parent households	29.86013089
Voting	84.89670217
Neighborhood	—
Alcohol availability	78.98113692
Park access	4.632362376
Retail density	6.569998717
Supermarket access	9.957654305
Tree canopy	62.59463621

Housing	—
Homeownership	65.95662774
Housing habitability	77.21031695
Low-inc homeowner severe housing cost burden	59.25830874
Low-inc renter severe housing cost burden	80.94443732
Uncrowded housing	46.83690491
Health Outcomes	—
Insured adults	38.84255101
Arthritis	0.0
Asthma ER Admissions	77.7
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	42.2
Cognitively Disabled	36.6
Physically Disabled	22.7
Heart Attack ER Admissions	80.5
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—

Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	15.2
SLR Inundation Area	0.0
Children	83.0
Elderly	13.7
English Speaking	55.4
Foreign-born	41.4
Outdoor Workers	8.3
Climate Change Adaptive Capacity	—
Impervious Surface Cover	94.3
Traffic Density	16.8
Traffic Access	23.0
Other Indices	—
Hardship	40.8
Other Decision Support	—
2016 Voting	85.3

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	51.0
Healthy Places Index Score for Project Location (b)	67.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Construction: Construction Phases	Applicant provided schedule. CalEEMod does not allow for duplicate linear paving phases, therefore the combined paving schedule (six weeks) for both segments is used
Construction: Demolition	Applicant provided dimensions of pavement to be demolished. Converted to tons of debris (32,000 cubic feet = 1185 cy; 1185 cy X 1.2 tons per cy of concrete (broken) = 1422 tons of debris.
Construction: Trips and VMT	Maximum of 40 one-way haul truck trips per day per applicant provided data
Construction: Dust From Material Movement	Applicant provided. Grading material export split proportionally between construction of north and south segments
Construction: Off-Road Equipment	Per applicant provided data. Defaults used for demolition phase in absence of available project-specific data. Equipment list adjusted based on knowledge of similar linear projects.

Appendix B

Geotechnical and Geohazards Report

Preliminary Geotechnical and Geohazards Report

Rose Avenue Bike Lanes

Oxnard, Ventura County, California

Yeh Project No.: 222-292

October 30, 2023

Prepared for:

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, CA 93003
Attn: Mr. Chris Bersbach, Supervising Environmental Planner

Prepared by:

Yeh and Associates, Inc.
56 East Main Street, Suite 104
Ventura, California 93001
Phone: 805-481-9590

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(805) 481-9590
www.yeh-eng.com

October 30, 2023

Project No. 222-292

Rincon Consultants, Inc.
180 North Ashwood Avenue
Ventura, California 93003

Attn: Chris Bersbach

Subject: Preliminary Geotechnical and Geohazards Report, Rose Avenue Bike Lane, Ventura County, CA

Dear Mr. Bersbach:

Yeh and Associates, Inc. is pleased to submit this *Preliminary Geotechnical and Geologic Hazards Report* as input to the Environmental Impact report (EIR) being prepared by Rincon Consultants for the Rose Avenue Widening and Bike Lanes project in Oxnard, California. This report provides a summary of the data reviewed, pertinent geologic maps, and a discussion of the geologic hazards, and geotechnical considerations for the preliminary design and construction of the project. The evaluation was performed in general compliance with Appendix G of CEQA based on a site reconnaissance, published data available for the site vicinity and geotechnical data from the County as also provided. This data supports widening on Rose Avenue: approximately 1.5 miles from Central Avenue to Los Angeles Avenue (SR118), and approximately 0.35 miles from East Collins Drive to Simon Way, that includes northbound and southbound widening.

We appreciate the opportunity to be of service. Please contact Danya Pollard at 805-481-9590 or dpollard@yeh-eng.com if you have questions or require additional information.

Sincerely,
YEH AND ASSOCIATES, INC.

Danya Pollard, P.G.
Project Geologist/Manager

Gresham D. Eckrich, C.E.G.
Senior Engineering Geologist

Reviewed by:

Jonathan Blanchard, G.E.
Principal Geotechnical Engineer

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1. Purpose and Scope of Study

Yeh and Associates was retained by Rincon Consultants, Inc. (Rincon) to provide geotechnical services as input to the environmental impact report for the widening of Rose Avenue for new Class II bike lanes. The location of the site is shown in Figure 1.

The geotechnical evaluation consisted of a desktop study, reviewing published maps and previous geotechnical studies available for the site vicinity, evaluating the potential for the site to be impacted by geologic hazards, and providing geotechnical considerations that may be considered for preliminary design.

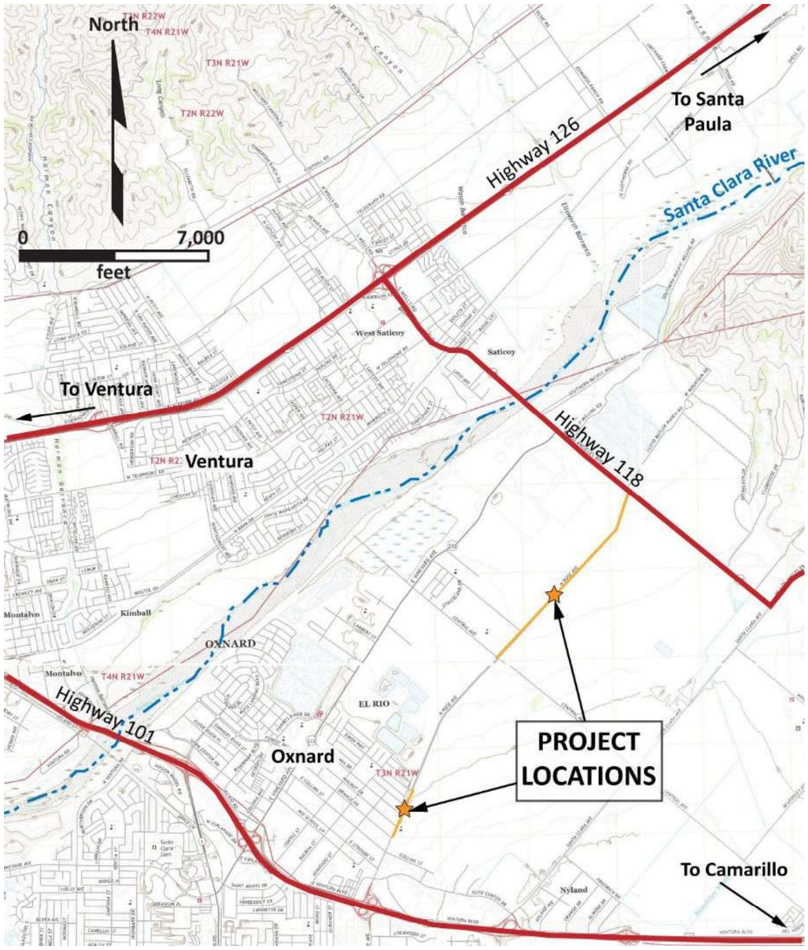

Figure 1: Project Locations Map

2. Project Understanding

2.1 Proposed Improvements

The street improvements are shown on preliminary plans prepared by the County of Ventura that were provided by Rincon on July 15, 2022 (5 layout sheets for County Project No. 50621). The project consists of widening along the northbound and southbound sides of Rose Avenue, approximately 1.5 miles from Central Avenue to Los Angeles Avenue (SR118), and approximately 0.35 miles from East Collins Drive to Simon Way.

2.2 Existing Site Description

2.2.1 Central Avenue to Route 118 Site

The terrain along Rose Avenue (previously mapped as Ditch Road) from Central Avenue to SR118 is sloping at less than 0.5% grade southwest, with existing site grades ranging from approximately 120 feet elevation (NAVD88) at the Rose Avenue and Central Avenue intersection, to approximately 140 feet elevation (NAVD88) at the Rose Avenue and SR118 intersection.

At the intersection of Central Avenue, Rose Avenue has two northbound lanes, narrowing to one lane 350 feet north of the intersection and remains one lane until the lane splits to a left and right turn lane 100 feet south of the SR118 intersection. At the intersection of SR118, Rose Avenue has one southbound lane that becomes a left turn lane, and a right turn lane within approximately 350 feet north of the Central Avenue intersection. The northbound and southbound lanes of Rose Avenue are approximately 12 feet wide along the route with a 20-25-foot unpaved median or left turn lane along the route. The roadway has an approximately 3-foot-wide paved shoulder and a typical 5-foot-wide outside shoulder composed of compacted dirt and gravel along the northbound side of Rose Avenue. The southbound side of Rose Avenue has an approximately 2-foot-wide paved shoulder and a typical 3-foot-wide outside shoulder also composed of compacted dirt and gravel.

These shoulders are relatively clear, except for utility poles in the first 2,700 feet north from the intersection with Central Avenue, where the utility poles cross the southbound lane and continue north along Rose Avenue in the median space; the utility lines split and go back to the shoulder spaces approximately 1,000 feet south of the SR118 intersection. There is a shoulder area crowded with tree stumps and roots along the southbound shoulder from approximately 2,500 to 3,500 feet north of the Central Avenue intersection. Beyond the shoulder of the Rose Avenue southbound lane is a drainage ditch from the Central Avenue intersection to approximately 500 feet north. Beyond the ditch, the current land use in this site vicinity is agricultural. Existing site conditions along the route can be viewed in the Project Site Photography Log in Appendix C.

2.2.2 EAST COLLINS DRIVE TO SIMON WAY SITE

The terrain along Rose Avenue (shown on historical maps as Ditch Road) from East Collins Drive to Simon Way is sloping at less than 0.5% grade southwest, with existing site grades ranging from approximately 94 feet elevation (NAVD88) at the Rose Avenue and East Collins Drive intersection, to approximately 106 feet elevation (NAVD88) at the Rose Avenue and Simon Way intersection.

At the intersection of East Collins Drive, Rose Avenue has two northbound lanes, left turn lane and right turn lane in the northbound direction, two southbound lanes, and a left turn lane in the southbound direction. At the intersection of Orange Drive, Rose Avenue has two northbound lanes, two southbound lanes and a southbound left turn lane for school parking lot access. At the intersection of Walnut Drive, Rose Avenue has two northbound lanes, a northbound left turn lane for access to Walnut Drive, and two southbound lanes. At the intersection of Corsicana Drive, Rose Avenue has two northbound lanes, a northbound left turn lane for access to Corsicana Drive, and two southbound lanes. At the intersection of Simon Way, Rose Avenue has two northbound lanes, a northbound left turn lane for access to Simon Way, and two southbound lanes. Between the intersections of Walnut Drive and Simon Way there is unpaved median. At the intersection of SR118, Rose Avenue has one southbound lane that becomes a left turn lane, and a right turn lane within approximately 350 feet north of the Central Avenue intersection.

These shoulders are relatively narrow in the northbound direction along Rose Avenue, with approximately 18 inches of paved space and utility poles and utility boxes approximately 3 to 5 feet from the edge of the northbound lane, from Orange Drive to Corsicana Drive. There is approximately 3 feet of paved shoulder, and the utility poles are located approximately 6 feet from the edge of the northbound lane, from Corsicana Drive to Simon Way on the northbound side of Rose Avenue. There is a bus stop on the shoulder of Rose Avenue in the southbound lane nearest to Simon Way. The southbound shoulder lane is paved but narrows from approximately 6 feet to 1 foot with a guardrail that protects a pedestrian sidewalk between the bus stop at Simon Way and Corsicana Drive. The narrow southbound shoulder and protective guardrail and pedestrian sidewalk continue through the intersection of Rose Avenue and Orange Drive. Existing site conditions along the route can be viewed in the Project Site Photography Log in Appendix C.

3. Data Review and Previous Field Exploration

3.1 Previous Studies

Boring logs and field penetration test data were collected for previous bridge and highway improvements in the site vicinity from the State of California, Department of Transportation (Caltrans) records. The previous investigations were reviewed to provide subsurface information in the site vicinity. Selected as-built Log of Test Borings considered most significant to the site are provided in Appendix A and summarized as follows:

- Log of Test Borings for the Rose Road Overcrossing (1957), prepared for Caltrans Bridge Department that included Borehole B-6 (35-footdepth) and the log for a Penetration Test Pile #18 and #40 (approximately 17-foot depth). The overcrossing is located 2 miles southwest of the site vicinity.
- Log of Test Borings for the Rose Avenue Overcrossing (1972), prepared for Caltrans, that included logs for Borehole B-4 (51.5-foot depth) and a Penetration Test B-1 (27.5-foot depth). The overcrossing is located 2 miles southwest of the site vicinity.
- Log of Test Borings for the Sparrow Draw Culvert Widening (1992), prepared for Caltrans, that included a log for B-1 (31.0-foot depth). The culvert is located 1 mile east of the site's vicinity.
- Geotechnical Report and Log of Test Borings for the Rose Avenue/Highway 101, Interchange Improvements, PM21.01 (1994), prepared for Moffatt & Nichol, Engineers by Fugro West, Inc.

that included B-5 (31.5-foot depth). The interchange is located 2 miles southwest of site vicinity.

- Foundation Investigation for Rio Mesa High School (1963), prepared by LeRoy Crandall & Associates for Fisher and Wilde, Architects that included logs for14 borings drilled to depths of 11 to 15 feet for the development of Rio Mesa High School located approximately 2,500 feet northwest of the intersection of Central and Rose Avenue.

3.2 Aerial Photography

Aerial photography for each decade, dating from 1927 through 2020 were collected by Environmental Data Resources, Inc. and reviewed for Rose Avenue extending from Central Avenue to SR118 and extending from Orange Drive to Simon Way (Appendix B).

3.2.1 Central Avenue to Route 118 Site

- The 1927 photo shows Ditch Road existed as a tree lined road, surrounded by agricultural fields, with 5 structures built along the southbound lane and 3 structures built along the northbound lane.
- The 1938 and 1947 photos show Ditch Road existed as a tree lined road, surrounded by agricultural fields, with 4 structures built along the southbound lane and 4 structures built along the northbound lane.
- The 1953 and 1959 photos show the existing agricultural buildings and utilities were being developed within the fields along the site vicinity.
- The 1967 photo shows Rio Mesa High School beginning development on the southern end of this project site.
- The 1978 photo shows the existing agricultural buildings and utilities continued developing within their footprints in the fields along the site vicinity. It is unclear if the roadway was paved.
- The 1985 photo shows the trees lining Ditch Road have been cleared for 1,000 feet from the intersection of Central Avenue, and the roadway has been paved in two directions.
- The 1994 photo shows more trees lining Ditch Road have been cleared and the roadway has been paved in two directions. The agricultural buildings have expanded and lots for parking adjacent to those facilities are being used.
- The 2005 photo shows most trees lining Rose Avenue have been cleared and the roadway is clearly paved in two directions. The agricultural buildings include four structures built along the southbound lane and five structures built along the northbound lane with expanded parking lots adjacent to those facilities being used.
- The 2009 through 2020 photos show the site vicinity is primarily agricultural with the agricultural buildings and lots still being utilized in the same manner.

3.2.2 East Collins Drive to Simon Way Site

- The 1927 photo shows Ditch Road (now Rose Avenue) existed as a tree lined road, surrounded by agricultural fields, with 2 structures built along the northbound lane.
- The 1947 photo shows Ditch Road with development of East Collins Street, just south of the project site vicinity.
- The 1953 photo shows the residential development of Orange Drive, Walnut Drive and Corsicana Drive along the southbound side of Ditch Road.
- The 1959 photo shows continued dense residential development from Orange Drive to Simon Way along the southbound side of Ditch Road.
- The 1967 photo shows that trees have been cleared along the shoulders of both northbound and southbound Ditch Road and that Rio Del Valle Junior High School began development on the southern end and northbound side of the project site vicinity.
- The 1978, 1985, and 1994 photos show the existing residential, school, and agricultural buildings and utilities expanded development within their footprints in the site vicinity from Orange Drive to Simon Way along Ditch Road.
- The 2005, 2009, 2012, 2016 and 2020 photos show most trees lining Rose Avenue have been cleared and the roadway is clearly paved in two directions. The agricultural buildings include two structures built along the southbound lane, as well as the Rio Del Valle Junior High School and dense residential housing along the northbound lane of Rose Avenue, from Orange Drive to Simon Way.

4. Engineering Geology and Site Conditions

4.1 Regional Geologic Setting

The project site is located on the Oxnard Plain proximal to the Santa Clara River and within the Western Transverse Ranges Geomorphic Province of California. The Western Transverse Ranges are a regional deformation belt characterized by a northeast-southwest trending structural grain and corresponding geomorphic features that extend from the Santa Barbara Channel to the Mojave section of the San Andreas Fault. The Oxnard Plain is an alluvial fan that is bordered to the southeast by the Santa Monica Mountains, to the northwest by the Santa Clara River, and to the east by the Camarillo and the Las Posas Hills. The regional geology is mapped by Tan, et al. (2004) and Clahan

(2003) is shown in Figure 2. The surface geology in the site vicinity is mapped as Holocene alluvial deposits (Qha) that were placed in point bar and overbank settings associated with active and historic wash deposits. The Qha unit is recognized by scour and incised channeling features.

4.2 Subsurface Conditions

The following units are the predominant soil types encountered in previous explorations and are

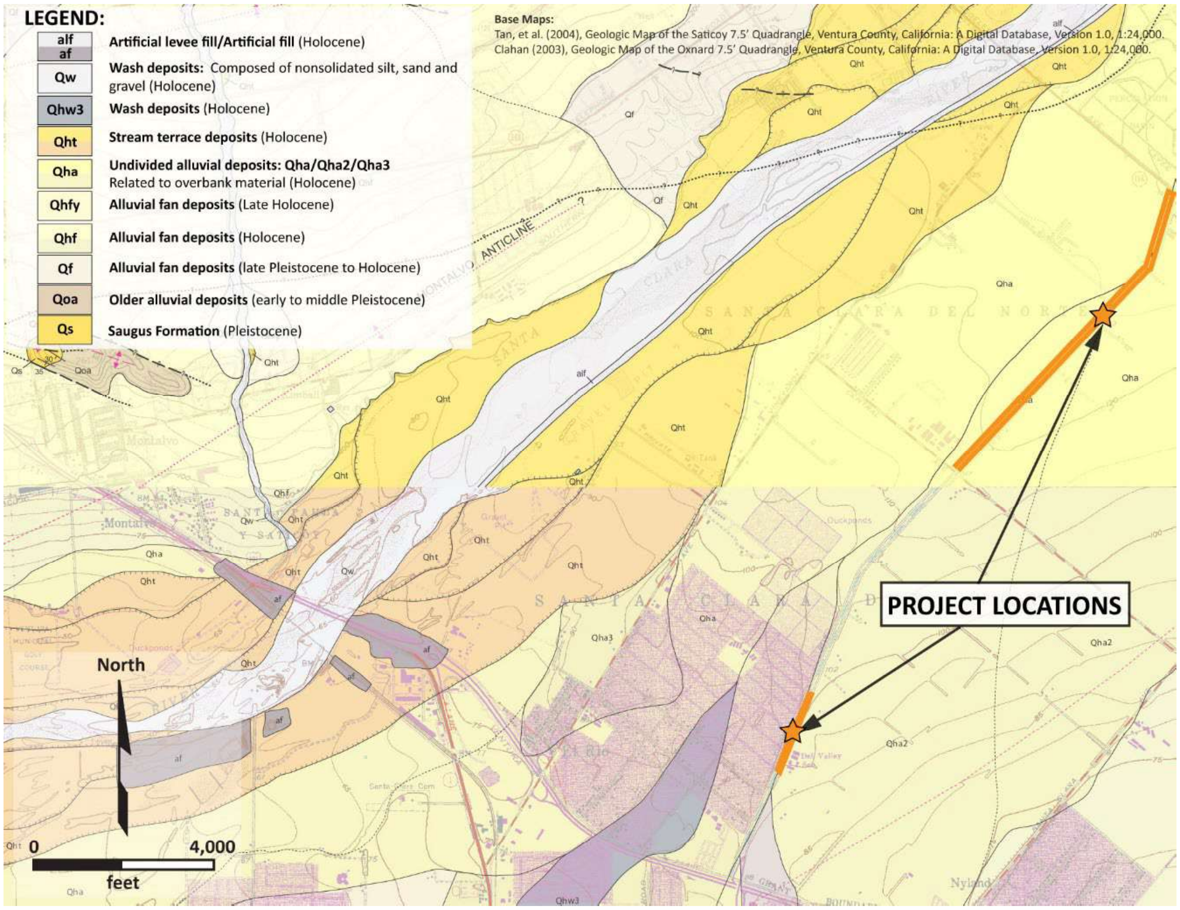

Figure 2: Geologic Map (Tan, et al. 2004, Clahan 2003)

assumed to be typical of the site vicinity for the purposes of this report, and are presented in Appendix A.

Deeper Pleistocene age alluvial sediments are expected to extend below the Oxnard Plain by up to approximately 500 feet below the surficial alluvial sediments that are in turn underlain by Pico Formation, based on interpretations projected from the South to North Structural Cross-Section A-A' through the Santa Paula Quadrangle (Dibblee, 1992).

Artificial Fill (Af). Artificial fill was encountered during the Foundation Investigation for Rio Mesa High School in 14 explorations. The fill ranged from 1 to 4 feet in depth and consisted of moderately firm silty sand underlain by firm to very firm sand and gravel (Crandall, 1963). Artificial fill encountered along the existing approach embankments to the 101-overpass ranged from the ground surface up to approximately 14.5 feet thick. The fill consisted of loose, dry, brown sandy silt (ML); loose, brown, moist, well-graded sand with silt (SW-SM); and poorly graded Sands (SP). Alluvial and overbank deposits were encountered below the artificial fill in both of those explorations. There is no geotechnical data available along the proposed road widening; however, we assume that the upper 2 to 4 feet of surface sediments are predominately silty sands and are underlain by the older alluvial well-graded to poorly graded sands and gravels to depth, throughout the project site vicinity.

Alluvial and Overbank Deposits (Qha). The alluvial and overbank deposits immediately underlying the site vicinity are part of the Oxnard Forebay and comprise a surfacing of the underlying Oxnard Aquifer. These units appear to unconformably overlie underlying Pleistocene sediments. All are considered alluvial deposits and generally show some lenticularity laterally and vertically. Sediments range from slightly clayey very sandy silts to fine to coarse grain sands. Fines are minimal and appear to form a matrix for coarser clastic materials (Buena Engineers Inc., 1976). During the Foundation Investigation for Rio Mesa High School in 14 explorations Crandall (1963) encountered older alluvial deposits composed of well-graded and poorly-graded sand and gravel to 15-feet depth. Alluvial and overbank deposits were encountered below the artificial fill in explorations up to as deep as 51.5 feet below the road surface that generally consisted of medium dense to very dense sand and gravel with varying amounts of clay and silt) with interbedded layers of cobbles in Caltrans (1957 and1972) borings.

4.3 Regional and Local Groundwater Conditions

The groundwater conditions are variable across the site. Historically high groundwater in the site vicinity has ranged from approximately 25 feet below the ground surface near the intersection of Rose Avenue and Central Avenue, to 10 feet below ground surface at the intersection of Rose Avenue and SR118 (SHRZ 066, 2003 and SHRZ 052, 2002).

5. Geologic Hazard Considerations

5.1 Earthquake Hazards

5.1.1 Historic Seismicity

The site is located within a seismically active region of Southern California where earthquakes resulting in strong and damaging ground motion have occurred within the historical record. A summary of magnitude 2.0 and greater seismic events recorded from 1931 through May 2016 by the

Advanced National Seismic System (ANSS 2023) and Quaternary faults in the region of the site (CGS) is presented on Plate 2. Record of strong ground shaking that pre-date the ANSS catalogue, includes the Ventura Earthquake of 1812 (Magnitude >7.0), believed to have damaged multiple missions and created a seismic sea wave that damaged a Spanish vessel 61 kilometers off the coast of Santa Barbara (SCEDC). An example of recorded ground motion in recent time includes The Santa Barbara Earthquake of 1925 (Magnitude 6.8), which was felt as far away as Mojave, Lake Arrowhead, and even San Diego, reached an intensity of VIII (on the Modified Mercalli intensity scale) in Carpinteria and Santa Barbara, breaking several water mains, cracking walls, snapping off the tops of streetlights and throwing goods from store shelves. (SCEDC). Strong ground motion impact the site vicinity in response to the Northridge Earthquake of 1994 (Magnitude 6.7) that occurred on a blind thrust fault and produced the strongest ground motions ever instrumentally recorded in an urban setting in North America, with widespread damage (SCEDC).

5.1.2 Regional Faulting and Seismicity

Highway structures such as bridges, retaining walls, soundwalls, are designed with consideration for seismic shaking and related hazards in accordance with applicable state and federal design manuals and practices. While those design methods are not specifically applicable to the design of a road or street, pavement, or bike lane, seismic forces are considered in slope stability analyses used in the evaluation and design of slopes, embankments, and landslide mitigation projects.

The seismic setting for the site was characterized using the Caltrans program ARS online application. The site location was input at -34.2582 degrees latitude and -119.1337 degrees longitude for a central point at the site. The general time-averaged shear-wave velocity in the upper 30 meters of the site (Vs30) was assumed to be 270 meters per second for stiff soil condition. ARS online estimated that the design earthquake for the site having a 5 percent probability of occurrence in 50 years would be a magnitude 7.0 earthquake occurring about 3.5 miles from the site and resulting in a peak ground acceleration of approximately 0.72g. Significant nearby faults with potential to create strong ground motion at the site were researched using ARS Online and are listed in Table 1 with their approximate distance to the rupture surface and maximum magnitude.

Table 1: Summary of Nearby Active Faults

Fault	Approximate Distance to Rupture Surface from Site (Miles)	Maximum Magnitude (M_{Max})
Oak Ridge (onshore)	1.9	7.2
Oak Ridge (onshore)	2.9	7.6
Oak Ridge (offshore)	7.9	6.8
Simi-Santa Rosa	3.3	6.8

Fault	Approximate Distance to Rupture Surface from Site (Miles)	Maximum Magnitude (M_{Max})
Ventura-Pitas Point	4.1	7.4
Red Mountain	12	7.2
Channel Islands Thrust	12	7.0

The closest mapped fault to the site is the Oak Ridge Fault mapped trending east-west approximately 2 miles north of the site. The Oak Ridge Fault is a thrust fault that forms an east-west ridge roughly paralleled by the Santa Clara River and Highway 126 and extends from the town of Piru to the coast, southeast of Ventura, and then continuing offshore. The Oakridge Fault dips to the south at a shallow (<45 degree) angle with epicenters of historical earthquakes on this fault that appear far removed from the fault's surface trace. Evidence of Holocene activity on the Oakridge Fault is apparent as far east as the towns of Bardsdale and Fillmore, California and the offshore zone to the west is associated with a definite zone of seismic activity (SCEDC).

5.1.3 Fault Rupture

Fault rupture or coseismic deformation is the displacement of the ground surface caused by tectonic movement during a seismic event. The Caltrans Highway Design manual acknowledges that streets, roads, highway and transportation systems commonly traverse known faults and generally cannot function without doing so. Highway structures, arterial junctions, or interchanges will be sited away from active faults where possible.

Plate 2 shows a map of Quaternary age faults in the project region that were obtained from the CGS fault database (Bryant, W.A. 2005). The faults shown on Plate 2 are classified as Historic, Holocene, Late Quaternary or Quaternary. CGS defines these terms based on the age of a fault as follows:

Historic. Faults that show evidence of displacement or activity within the historical record; approximately the last 200 years.

Holocene. Faults that show evidence of displacement in Holocene time (the last 11,000 years).

Late Quaternary. Faults that show evidence of displacement in the Late Quaternary period (the last 750,000 years), but no evidence of movement in Holocene time.

Quaternary. Faults that show evidence of displacement in the Quaternary period (the last 1,600,000 years), but no evidence of movement in Holocene time.

The site does not cross a mapped Quaternary of active fault, is not within a designated Alquist Priolo Fault Hazard Zone, and is about 2 miles away from the nearest mapped active fault. Fault rupture does not need to be considered in the design for this project.

5.2 Tsunami and Seiche

Tsunamis are long-period sea waves created due to seismic events or submarine landslides, which have historically occurred along the coast in the project region. Tsunamis behave like a very fast-moving tide and can result in run-ups or bores extending great distances up streams, rivers, and creeks. Tsunami loading can be estimated by the AASHTO Guide Specifications for Bridges Subjected to Tsunami Effects (AASHTO 2022). The estimated limits of tsunami inundation for a 1,000-year return event are shown on the Natural Hazards Risk and Resiliency Research Center Tsunami Inundation Portal (NHR3 2022). The site is located approximately 7 miles from the coast, 1 mile southeast of the Santa Clara River, with site elevations that range from about 110 feet to 150 feet above sea level. The site is not proximal to a tsunami inundation hazard area based on the Ventura County General Plan Hazards Appendix (VC, 2013) or AASHTO. Tsunami hazards are not a consideration for this project.

A seiche is a wave caused by an earthquake or seismically-induced landslide falling into an isolated body of water such as a bay, lake or reservoir. The site is not immediately downstream or near a reservoir or water body that would produce a seiche or inundation hazard to the site, unless that event was associated with a complete failure of the dam as discussed in a following section of this report.

5.3 Flooding

The project site is not located within a flood hazard zone prepared by the Federal Emergency Management Program and referenced in the Ventura County General Plan Hazard Appendix (VC, 2013). Flooding hazards are not a consideration for this project. Storm runoff and surface drainage provisions, such as culverts and catch basins, will need to be designed according to applicable codes and design standards.

5.4 Dam Inundation

The project site is located within a flood hazard inundation zone based on maps provided by the California Division of Safety of Dams prepared by the Federal Emergency Management Program and referenced in the Ventura County General Plan Hazard Appendix (VC, 2013).

The site is located downstream of two dams that could result in inundation of areas along the Santa Clara River in the event of a major breach or failure of one of those dams. Lake Piru and the Santa Felecia Dam are located approximately 26 miles upstream of the site. The Rose Avenue-SR118

Intersection is located at the edge of the estimated limits for the inundation zone for the "Main Dam Scenario" due to failure of the Santa Felecia Dam. The zone runs parallel to Rose Avenue about 0.1 miles north of the route west of the Rose Avenue-SR118 intersection.

The site is located approximately 35 miles downstream of the dam at Castaic Lake. The site is within the estimated limits of inundation zone for a failure of the main dam. The estimated water depths at the site could range from more than 2 feet to up to 10 feet.

The Ventura County Office of Emergency Services utilizes a hazard alert and notification system to alert residents and those registered at their site of emergency events and evacuations.

5.5 Liquefaction, Seismic Settlement and Lateral Spreading

Liquefaction typically occurs in young loose to medium dense granular sand or sensitive clay and silt below the groundwater table that are subject to ground motions from an earthquake. The potential for liquefaction is dependent on site-specific properties such as the relative density, plasticity, particle size of soil, groundwater conditions, and geologic history. Potentially liquefiable soil may be vulnerable to loss of strength and foundation support, seismic settlement, slope instability or lateral spreading depending on the severity of the liquefaction hazard and site conditions. Liquefaction and seismic settlement are considered in the design of highway structures, foundation systems, and roadway embankments.

No field exploration nor site-specific evaluation of potential liquefaction hazards has been performed for the project at this time. For the most part, the Quaternary sediments in the Oxnard Quadrangle typically consist of interbedded sand, silt, clay, and gravel deposited in alluvial fan, alluvial valley, and stream channel (wash) depositional environments associated with the Santa Clara River. These geologic units include late Quaternary alluvial and fluvial sedimentary deposits and artificial fill, which generally have been found to contain thick clay layers and variable depth to ground water that make it often not vulnerable to liquefaction. The interbedded nature of the material and depth of the groundwater make a site-specific evaluation necessary to assess liquefaction and seismic settlement hazards for a project. Although, it would be unusual for a design for bike lane project to include an assessment for liquefaction hazards unless the project involved structures, bridges or high embankments that would be particularly vulnerable to those hazards or costly to repair.

It is our experience that the soil encountered in the upper 20 to 25 feet of a site on the Oxnard Plain may contain loose or medium dense sandy soil that could be potentially liquefiable depending on the groundwater depths at the site, similar to the conditions encountered at the Rose Avenue Interchange at Highway 101 (Fugro, 1994). However, groundwater was not encountered within these sediments and therefore no liquefaction hazards were identified for the design of that project. It is not likely that liquefaction induced hazards such as seismic settlement and lateral spreading will need to be addressed for the design of this project.

5.6 Hydroconsolidation, Collapse and Subsidence

Hydroconsolidation is the potential for a soil to consolidate or collapse due to wetting. Roadways can be impacted by poor subgrade soils that are loose or soft and prone to excessive settlement or collapse upon wetting. More regional subsidence can occur from deep extraction of groundwater or oil that can impact roads and other infrastructure over a large or localized area.

Deep subsidence is typically associated with the extraction of groundwater from water or oil wells that results in lowering of the groundwater table. Dewatering of young sediments or porous soil types that are prone to consolidation or collapse due to an increase in effective overburden stress that occurs when the groundwater level is lowered can result in subsidence of the ground surface over the area where dewatering occurred. The subsurface conditions encountered are not considered prone to subsidence from the removal of groundwater and there are no known or documented (Luhdorff & Scalmanini 2014) subsidence cases in the immediate area due to the extraction of fluids from the ground. Deep subsidence due to extraction of fluids does not need to be considered in the design of this project.

Near-surface soil that may be prone to settlement or collapse due to wetting would be addressed and mitigated based on the design-level geotechnical report and site investigation. The report should provide recommendations for the design of earthwork and preparation of the subgrade for support of pavements to reduce the potential for post-construction settlement or subsidence of the subgrade to impact the roadway.

5.7 Expansive Soil

Roads built on expansive soil can be vulnerable to differential heaving and cracking of the paved surface. Expansive soil conditions are predominantly associated with specific clay minerals that shrink and swell when subjected to cycles of wetting and drying. Caltrans pavement design methods, and R-value testing that are performed on samples of the subgrade, estimate the expansion potential of the subgrade and allow for the pavement thickness to be increased to mitigate expansive subgrade conditions if needed. Mitigation for severely expansive soil conditions may include subgrade treatments with lime or other stabilizers to reduce the expansiveness of the soil, subsurface drainage, or removal and replacement of the subgrade with non-expansive soil prior to placing the pavement structural section.

Subgrade soil that may be prone to shrinking and swelling would be addressed and mitigated based on the design-level geotechnical report and site investigation. The report should provide recommendations for the design of earthwork and preparation of the subgrade for support of pavements to reduce the potential for shrinking and swelling of the subgrade to impact the roadway.

5.8 Corrosive Soil

Corrosive soil and surface water can damage concrete or steel culverts, foundations, and substructures associated with the road system. Those conditions are mitigated by providing appropriate mix designs for concrete, steel thicknesses, coating, or other methods that are evaluated based on site-specific testing of soil and water samples, and design methods in the Caltrans design manuals and AASHTO *LRFD Bridge Design Specifications.* There are no test results for pH and electrical resistivity test performed on the borings previously drilled near the project site.

The corrosion potential of the on-site soil would be addressed and mitigated based on the design-level geotechnical report and site investigation. The report should provide corrosivity data that can be used by designers to mitigate for corrosive soil or environments using established design methods and protocols for design of reinforced concrete and steel structures and infrastructure.

5.9 Erosion

Graded slopes are vulnerable to erosion. Erosion control and suitable vegetation should be provided to reduce the potential for erosion on graded slopes. On-going maintenance of the slopes should be provided, as needed, to assist in establishing appropriate vegetation on the slope and to repair erosion that occurs. Concentrated flows of runoff should not be permitted to run over slopes. Lined ditches, drainage culverts, and pipes should be provided as needed to reduce the potential for erosion. Energy dissipation devices should be provided at outlets of drainage pipes and in areas of concentrated flows of runoff to reduce the potential for erosion.

6. Geotechnical Considerations

6.1 Road Widening

Widening Rose Avenue would involve earthwork to widen the existing embankment and roadway to accommodate the new bike lanes. Rose Avenue is constructed near or within 1 to 2 feet above the adjacent site grades. The earthwork for the widening would likely consist of clearing and grubbing to remove existing vegetation and fencing within the footprint of the new road, preparing the subgrade by removing a 1 to 2 feet of the existing soil below the widening and replacing that material as compacted fill. The earthwork could involve importing additional fill material for the embankment widening. The earthwork would typically provide at least a 3-foot-wide outside shoulder beyond the new edge of pavement, and any additional embankment fill beyond that point to conform to adjacent grades. Fill materials for embankment construction would typically consist of onsite soil removed from excavations or similar soil that is imported to the site and is free of oversized rock (greater than

3 inches), organics or other deleterious material. Embankment fill should be compacted to at least 90 percent relative compaction per ASTM D-1557 and to at least 95 percent relative compaction within 3 feet of finished grade below pavements.

6.2 Pavement Structural Section

The exposed pavement surface along Rose Avenue consisted of asphalt concrete. The overall roadway was in fair condition with a posted limiting speed of 55 mph between Central Avenue and the SR118 Intersections. The pavement surface along Rose Avenue had mild raveling and block cracking. It appears that crack sealing and filling has been performed as part of roadway maintenance. Typical surface pavement conditions observed along Rose Avenue are shown in photos in Appendix C.

The pavement will be designed to support the traffic loads projected for a design life of at least 20 years. Traffic loads for the pavement design should be provided by the County. Borings and R-value testing of the subgrade soil are used to characterize the subgrade support for pavement design. The pavement design should be consistent with the procedures in the Caltrans Highway Design Manual. We assume that Rose Avenue would be widened in-kind, with a layer of hot mix asphalt pavement over aggregate base course materials. The asphalt thickness would likely be about 6 inches thick for an arterial street over 12 to 24 inches of base course material depending on the quality of the subgrade.

6.3 Design of Graded Slopes

Cut and fill slopes for the widening should be designed to inclinations of 2h:1v or flatter. Flatter slopes may be appropriate to conform to existing grades. Slopes should have adequate drainage and landscaping to reduce the potential for erosion.

6.4 Erosion and Site Drainage

Newly graded slopes are vulnerable to erosion. Providing suitable vegetation, erosion control mats where needed, and proper surface drainage can help to reduce the potential for erosion to impact slopes and assist in establishing suitable vegetation. Areas where gullies or erosion occurs should be repaired promptly and slopes should be maintained. Concentrated flows of runoff should not be allowed to run uncontrolled over slopes. Lined ditches, down drains, and culverts should be provided when needed to convey drainage water to slope bases. Energy dissipation devices should be provided at the outlet of drainage devices or concentrated flows of runoff to reduce the potential for scour and erosion. Surface drainage improvements should be provided to reduce the potential for concentrated flows to run over slopes.

6.5 Construction Considerations

6.5.1 Reuse of On-Site Soil

The existing fill and alluvial soil at the project site should be suitable for reuse as compacted fill for general embankment construction, earthwork and trench backfill. The soil is likely not suitable for reuse as select material such as maybe needed for pipe bedding and pipe zone material for culverts, retaining wall backfill, or road base.

6.5.2 Compaction

Compacted fill should be constructed by conditioning the soil being placed to a moisture content suitable for compaction, typically within about 2 percent of the optimum moisture content needed for compaction as determined by laboratory tests. The fill should be placed in lifts, typically 8 inches or less, and be compacted with equipment that is suitable for the location and type of soil being compacted. The lift thickness may need to be reduced to achieve the minimum compaction with the equipment being used. Soil that is too wet should be aerated by scarifying and blading to reduce the moisture content to near optimum. Water should be added to soil that is dry, and the soil should then be bladed and mixed to provide a relatively uniform moisture content throughout the material being placed.

Climatic conditions can affect the ability to control and condition the moisture content of the fill. The late summer and early fall months along the Oxnard Plain frequently reach highs of up to 90 degrees while winter months' high temperatures are around 60 degrees. Coastal fog that is common in the summer can slow the time it takes to aerate and dry the fill. Increased water conditioning of soil may be needed for grading performed during periods of hot and dry conditions that typically occur in the summer and fall months. Precipitation can increase the soil moisture above what is suitable for compaction and may delay earthwork during construction until more suitable weather conditions allow for proper control and handling of the soil.

6.5.3 Recycling of On-site Materials

Existing roadways and building materials (rubberized asphalt, concrete and brick) may be processed to manufacture graded aggregate materials. Construction specifications typically allow for reclaimed materials to be included in base coarse aggregates, provided quality and gradation requirements are met.

6.5.4 Dewatering

Dewatering to lower groundwater levels for construction is likely not needed for foundation excavations. Control of surface water and storm water control plans will be needed if the construction is performed during periods of wet weather.

6.5.5 Excavation Characteristics

Artificial fill underlain with Alluvium and overbank materials are expected to be excavatable with conventional earthmoving equipment, such as bulldozers, excavators, and backhoes.

6.5.6 Temporary Excavations and Shoring

Temporary slopes and shoring systems may be needed for trenches to construct culvert and should be designed by the contractor based on the soil types and conditions encountered using Cal OSHA guidelines. Shoring systems such as trench shields or slide rail shoring systems that do not provide positive support for excavated slopes may allow soil movement beyond the limits of the shoring. Sheet pile or tight shoring systems that are cross braced can be used to provide active support for excavations and reduce the potential for ground movement beyond the excavation limits. Competent personnel at the time of construction should review the excavations and provide input to augment slopes and shoring as needed.

6.6 Design-Level Geotechnical Report

A design-level geotechnical report should be prepared based on subsurface exploration that includes additional laboratory testing of soil samples and design recommendations for earthwork, pipelines, foundations, slabs, erosion, and other project components.

7. Limitations

Yeh prepared this report for Rincon Consultants and their authorized agents only. It is not intended to address issues or conditions pertinent to other parties, projects or for other uses. This report is for preliminary planning purposes only and is not intended for use in final design or construction. The results of this study are preliminary and subject to change pending the results of our design-level field exploration and geotechnical evaluation. No services have been performed to evaluate environmental impacts, or the presence of hazardous or toxic materials.

Site conditions will vary between points of observation or sampling, seasonally, and with time. The nature and extent of subsurface variations across the site may not become evident until excavation is performed. If during construction, fill, soil, or water conditions appear to be different from those described herein, Yeh should be advised and provided the opportunity to evaluate those conditions and provide additional recommendations, if necessary.

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