APPENDIX A

CalEEMod Summary

Tentative Tract 18935

South Coast Air Basin, Summer

1.0 Pro ect Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	71.00	Dwelling Unit	23.05	127,800.00	203
Other Non-Asphalt Surfaces	4.00	Acre	4.00	174,240.00	0

1.2 Other Pro ect Characteristics

Urbani ation	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Fre (Days)**	31
Climate Zone	10			**Operational Year**	2017
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Assume architectural coatings applied throughout the building construction phase.

Demolition -

Woodstoves - Assume no wood burning, all residences have a natural gas fireplace.

Construction Off-road Equipment Mitigation - Required dust control measures per SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	35.00	380.00
tblConstructionPhase	PhaseEndDate	11/30/2018	6/16/2017

tblConstructionPhase	PhaseStartDate	6/17/2017	1/2/2016
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	60.35	71.00
tblFireplaces	NumberNoFireplace	7.10	0.00
tblFireplaces	NumberWood	3.55	0.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblWoodstoves	NumberCatalytic	3.55	0.00
tblWoodstoves	NumberNoncatalytic	3.55	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	6.8674	79.1621	52.2726	0.0646	18.2675	3.8042	21.3575	9.9840	3.4998	12.8269	0.0000	6,732.6496	6,732.6496	1.9497	0.0000	6,773.5927
2016	17.8277	34.6246	31.7001	0.0545	1.5551	2.2259	3.7810	0.4168	2.1020	2.5188	0.0000	5,151.8503	5,151.8503	0.7734	0.0000	5,168.0921
2017	17.4126	31.9969	30.3601	0.0545	1.5552	2.0106	3.5658	0.4169	1.8978	2.3147	0.0000	5,055.4836	5,055.4836	0.7518	0.0000	5,071.2722
Total	**42.1076**	**145.7836**	**114.3328**	**0.1735**	**21.3778**	**8.0406**	**28.7043**	**10.8177**	**7.4996**	**17.6604**	**0.0000**	**16,939.9836**	**16,939.9836**	**3.4749**	**0.0000**	**17,012.9570**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	6.8674	79.1621	52.2726	0.0646	7.2470	3.8042	10.3371	3.9263	3.4998	6.7692	0.0000	6,732.6496	6,732.6496	1.9497	0.0000	6,773.5927
2016	17.8277	34.6246	31.7001	0.0545	1.5551	2.2259	3.7810	0.4168	2.1020	2.5188	0.0000	5,151.8503	5,151.8503	0.7734	0.0000	5,168.0921
2017	17.4126	31.9969	30.3601	0.0545	1.5552	2.0106	3.5658	0.4169	1.8978	2.3147	0.0000	5,055.4836	5,055.4836	0.7518	0.0000	5,071.2722
Total	**42.1076**	**145.7836**	**114.3328**	**0.1735**	**10.3574**	**8.0406**	**17.6839**	**4.7600**	**7.4996**	**11.6027**	**0.0000**	**16,939.9835**	**16,939.9835**	**3.4749**	**0.0000**	**17,012.9570**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**51.55**	**0.00**	**38.39**	**56.00**	**0.00**	**34.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Energy	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Mobile	2.5283	7.3559	29.9353	0.0774	5.1861	0.1077	5.2938	1.3857	0.0991	1.4848		6,587.7848	6,587.7848	0.2485		6,593.0042
Total	**10.2818**	**8.0302**	**36.1175**	**0.0816**	**5.1861**	**0.2840**	**5.4700**	**1.3857**	**0.2744**	**1.6601**	**0.0000**	**8,874.6106**	**8,874.6106**	**0.3028**	**0.0417**	**8,893.9053**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Energy	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Mobile	2.5283	7.3559	29.9353	0.0774	5.1861	0.1077	5.2938	1.3857	0.0991	1.4848		6,587.7848	6,587.7848	0.2485		6,593.0042
Total	**10.2818**	**8.0302**	**36.1175**	**0.0816**	**5.1861**	**0.2840**	**5.4700**	**1.3857**	**0.2744**	**1.6601**	**0.0000**	**8,874.6106**	**8,874.6106**	**0.3028**	**0.0417**	**8,893.9053**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2015	7/10/2015	5	30	
2	Site Preparation	Site Preparation	7/11/2015	8/7/2015	5	20	
3	Grading	Grading	8/8/2015	10/9/2015	5	45	
4	Building Construction	Building Construction	10/10/2015	6/16/2017	5	440	
5	Architectural Coating	Architectural Coating	1/2/2016	6/16/2017	5	380	
6	Paving	Paving	6/17/2017	8/4/2017	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 112.5

Acres of Paving: 0

Residential Indoor: 258,795 Residential Outdoor: 86,265 Non-Residential Indoor: 261,360 Non-Residential Outdoor: 87,120

OffRoad E uipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	2	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	45.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	99.00	36.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3281	0.0000	0.3281	0.0497	0.0000	0.0497			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858		4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**0.3281**	**2.4508**	**2.7789**	**0.0497**	**2.2858**	**2.3355**		**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0293	0.4705	0.3156	1.1100e-003	0.0261	8.0300e-003	0.0342	7.1500e-003	7.3900e-003	0.0145		112.8651	112.8651	8.9000e-004		112.8839
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0692	0.0866	1.0745	2.1300e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		184.8048	184.8048	9.9400e-003		185.0135

Total	**0.0985**	**0.5570**	**1.3901**	**3.2400e-003**	**0.1938**	**9.5100e-003**	**0.2033**	**0.0516**	**8.7400e-003**	**0.0604**		**297.6699**	**297.6699**	**0.0108**		**297.8974**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.1280	0.0000	0.1280	0.0194	0.0000	0.0194			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858	0.0000	4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**0.1280**	**2.4508**	**2.5788**	**0.0194**	**2.2858**	**2.3052**	**0.0000**	**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0293	0.4705	0.3156	1.1100e-003	0.0261	8.0300e-003	0.0342	7.1500e-003	7.3900e-003	0.0145		112.8651	112.8651	8.9000e-004		112.8839
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0692	0.0866	1.0745	2.1300e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		184.8048	184.8048	9.9400e-003		185.0135
Total	**0.0985**	**0.5570**	**1.3901**	**3.2400e-003**	**0.1938**	**9.5100e-003**	**0.2033**	**0.0516**	**8.7400e-003**	**0.0604**		**297.6699**	**297.6699**	**0.0108**		**297.8974**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412		4,111.7444	4,111.7444	1.2275		4,137.5225
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**18.0663**	**3.0883**	**21.1545**	**9.9307**	**2.8412**	**12.7719**		**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5225**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0830	0.1039	1.2894	2.5500e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		221.7657	221.7657	0.0119		222.0162
Total	**0.0830**	**0.1039**	**1.2894**	**2.5500e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**221.7657**	**221.7657**	**0.0119**		**222.0162**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412	0.0000	4,111.7444	4,111.7444	1.2275		4,137.5224
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**7.0458**	**3.0883**	**10.1341**	**3.8730**	**2.8412**	**6.7142**	**0.0000**	**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5224**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0830	0.1039	1.2894	2.5500e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		221.7657	221.7657	0.0119		222.0162
Total	**0.0830**	**0.1039**	**1.2894**	**2.5500e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**221.7657**	**221.7657**	**0.0119**		**222.0162**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980		6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**8.6733**	**3.8022**	**12.4755**	**3.5965**	**3.4980**	**7.0945**		**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0922	0.1154	1.4326	2.8300e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		246.4063	246.4063	0.0133		246.6847
Total	**0.0922**	**0.1154**	**1.4326**	**2.8300e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**246.4063**	**246.4063**	**0.0133**		**246.6847**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980	0.0000	6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**3.3826**	**3.8022**	**7.1848**	**1.4026**	**3.4980**	**4.9006**	**0.0000**	**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0922	0.1154	1.4326	2.8300e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		246.4063	246.4063	0.0133		246.6847
Total	**0.0922**	**0.1154**	**1.4326**	**2.8300e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**246.4063**	**246.4063**	**0.0133**		**246.6847**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.3402	3.5376	3.9025	7.8500e-003	0.2249	0.0612	0.2861	0.0640	0.0563	0.1203		794.2415	794.2415	6.2400e-003		794.3726
Worker	0.4566	0.5714	7.0915	0.0140	1.1066	9.7400e-003	1.1163	0.2935	8.9300e-003	0.3024		1,219.7114	1,219.7114	0.0656		1,221.0892
Total	**0.7968**	**4.1090**	**10.9940**	**0.0219**	**1.3315**	**0.0709**	**1.4024**	**0.3575**	**0.0652**	**0.4227**		**2,013.9529**	**2,013.9529**	**0.0719**		**2,015.4618**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3402	3.5376	3.9025	7.8500e-003	0.2249	0.0612	0.2861	0.0640	0.0563	0.1203		794.2415	794.2415	6.2400e-003		794.3726
Worker	0.4566	0.5714	7.0915	0.0140	1.1066	9.7400e-003	1.1163	0.2935	8.9300e-003	0.3024		1,219.7114	1,219.7114	0.0656		1,221.0892
Total	**0.7968**	**4.1090**	**10.9940**	**0.0219**	**1.3315**	**0.0709**	**1.4024**	**0.3575**	**0.0652**	**0.4227**		**2,013.9529**	**2,013.9529**	**0.0719**		**2,015.4618**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.4062	28.5063	18.5066	0.0268		1.9674	1.9674		1.8485	1.8485		2,669.2864	2,669.2864	0.6620		2,683.1890
Total	**3.4062**	**28.5063**	**18.5066**	**0.0268**		**1.9674**	**1.9674**		**1.8485**	**1.8485**		**2,669.2864**	**2,669.2864**	**0.6620**		**2,683.1890**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3007	3.1265	3.5909	7.8300e-003	0.2250	0.0508	0.2758	0.0641	0.0467	0.1108		785.5126	785.5126	5.6400e-003		785.6310
Worker	0.4121	0.5154	6.4215	0.0140	1.1066	9.2500e-003	1.1158	0.2935	8.5000e-003	0.3020		1,177.6867	1,177.6867	0.0604		1,178.9546
Total	**0.7129**	**3.6419**	**10.0123**	**0.0219**	**1.3316**	**0.0600**	**1.3916**	**0.3575**	**0.0552**	**0.4127**		**1,963.1994**	**1,963.1994**	**0.0660**		**1,964.5855**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.4062	28.5063	18.5066	0.0268		1.9674	1.9674		1.8485	1.8485	0.0000	2,669.2864	2,669.2864	0.6620		2,683.1890
Total	**3.4062**	**28.5063**	**18.5066**	**0.0268**		**1.9674**	**1.9674**		**1.8485**	**1.8485**	**0.0000**	**2,669.2864**	**2,669.2864**	**0.6620**		**2,683.1890**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3007	3.1265	3.5909	7.8300e-003	0.2250	0.0508	0.2758	0.0641	0.0467	0.1108		785.5126	785.5126	5.6400e-003		785.6310
Worker	0.4121	0.5154	6.4215	0.0140	1.1066	9.2500e-003	1.1158	0.2935	8.5000e-003	0.3020		1,177.6867	1,177.6867	0.0604		1,178.9546
Total	**0.7129**	**3.6419**	**10.0123**	**0.0219**	**1.3316**	**0.0600**	**1.3916**	**0.3575**	**0.0552**	**0.4127**		**1,963.1994**	**1,963.1994**	**0.0660**		**1,964.5855**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730		2,639.8053	2,639.8053	0.6497		2,653.4490

Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**		**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.2757	2.8468	3.3771	7.8300e-003	0.2251	0.0453	0.2704	0.0641	0.0417	0.1058		772.8018	772.8018	5.4500e-003		772.9162
Worker	0.3705	0.4655	5.8116	0.0140	1.1066	8.9000e-003	1.1155	0.2935	8.2100e-003	0.3017		1,132.6170	1,132.6170	0.0557		1,133.7870
Total	**0.6462**	**3.3122**	**9.1888**	**0.0219**	**1.3317**	**0.0542**	**1.3859**	**0.3576**	**0.0499**	**0.4075**		**1,905.4187**	**1,905.4187**	**0.0612**		**1,906.7033**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730	0.0000	2,639.8053	2,639.8053	0.6497		2,653.4490
Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**	**0.0000**	**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.2757	2.8468	3.3771	7.8300e-003	0.2251	0.0453	0.2704	0.0641	0.0417	0.1058		772.8018	772.8018	5.4500e-003		772.9162
Worker	0.3705	0.4655	5.8116	0.0140	1.1066	8.9000e-003	1.1155	0.2935	8.2100e-003	0.3017		1,132.6170	1,132.6170	0.0557		1,133.7870
Total	**0.6462**	**3.3122**	**9.1888**	**0.0219**	**1.3317**	**0.0542**	**1.3859**	**0.3576**	**0.0499**	**0.4075**		**1,905.4187**	**1,905.4187**	**0.0612**		**1,906.7033**

3.6 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**13.6253**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0833	0.1041	1.2973	2.8300e-003	0.2236	1.8700e-003	0.2254	0.0593	1.7200e-003	0.0610		237.9165	237.9165	0.0122		238.1726
Total	**0.0833**	**0.1041**	**1.2973**	**2.8300e-003**	**0.2236**	**1.8700e-003**	**0.2254**	**0.0593**	**1.7200e-003**	**0.0610**		**237.9165**	**237.9165**	**0.0122**		**238.1726**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**13.6253**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0833	0.1041	1.2973	2.8300e-003	0.2236	1.8700e-003	0.2254	0.0593	1.7200e-003	0.0610		237.9165	237.9165	0.0122		238.1726
Total	**0.0833**	**0.1041**	**1.2973**	**2.8300e-003**	**0.2236**	**1.8700e-003**	**0.2254**	**0.0593**	**1.7200e-003**	**0.0610**		**237.9165**	**237.9165**	**0.0122**		**238.1726**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.0721
Total	**13.5892**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.0721**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0749	0.0940	1.1741	2.8300e-003	0.2236	1.8000e-003	0.2254	0.0593	1.6600e-003	0.0610		228.8115	228.8115	0.0113		229.0479
Total	**0.0749**	**0.0940**	**1.1741**	**2.8300e-003**	**0.2236**	**1.8000e-003**	**0.2254**	**0.0593**	**1.6600e-003**	**0.0610**		**228.8115**	**228.8115**	**0.0113**		**229.0479**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.0721
Total	**13.5892**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.0721**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0749	0.0940	1.1741	2.8300e-003	0.2236	1.8000e-003	0.2254	0.0593	1.6600e-003	0.0610		228.8115	228.8115	0.0113		229.0479
Total	**0.0749**	**0.0940**	**1.1741**	**2.8300e-003**	**0.2236**	**1.8000e-003**	**0.2254**	**0.0593**	**1.6600e-003**	**0.0610**		**228.8115**	**228.8115**	**0.0113**		**229.0479**

3.7 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473		2,281.0588	2,281.0588	0.6989		2,295.7360
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**		**2,281.0588**	**2,281.0588**	**0.6989**		**2,295.7360**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0561	0.0705	0.8806	2.1200e-003	0.1677	1.3500e-003	0.1690	0.0445	1.2400e-003	0.0457		171.6086	171.6086	8.4400e-003		171.7859
Total	**0.0561**	**0.0705**	**0.8806**	**2.1200e-003**	**0.1677**	**1.3500e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**171.6086**	**171.6086**	**8.4400e-003**		**171.7859**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473	0.0000	2,281.0588	2,281.0588	0.6989		2,295.7360
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000

Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**	**0.0000**	**2,281.0588**	**2,281.0588**	**0.6989**		**2,295.7360**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0561	0.0705	0.8806	2.1200e-003	0.1677	1.3500e-003	0.1690	0.0445	1.2400e-003	0.0457		171.6086	171.6086	8.4400e-003		171.7859
Total	**0.0561**	**0.0705**	**0.8806**	**2.1200e-003**	**0.1677**	**1.3500e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**171.6086**	**171.6086**	**8.4400e-003**		**171.7859**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.5283	7.3559	29.9353	0.0774	5.1861	0.1077	5.2938	1.3857	0.0991	1.4848		6,587.7848	6,587.7848	0.2485		6,593.0042
Unmitigated	2.5283	7.3559	29.9353	0.0774	5.1861	0.1077	5.2938	1.3857	0.0991	1.4848		6,587.7848	6,587.7848	0.2485		6,593.0042

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	679.47	715.68	622.67	2,311,801	2,311,801
Total	679.47	715.68	622.67	2,311,801	2,311,801

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.513125	0.060112	0.180262	0.139218	0.042100	0.006630	0.016061	0.030999	0.001941	0.002506	0.004348	0.000594	0.002104

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
NaturalGas Unmitigated	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	6568.36	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0708**	**0.6053**	**0.2576**	**3.8600e-003**		**0.0489**	**0.0489**		**0.0489**	**0.0489**		**772.7482**	**772.7482**	**0.0148**	**0.0142**	**777.4510**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	6.56836	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0708**	**0.6053**	**0.2576**	**3.8600e-003**		**0.0489**	**0.0489**		**0.0489**	**0.0489**		**772.7482**	**772.7482**	**0.0148**	**0.0142**	**777.4510**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Unmitigated	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3802					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.9804					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1378	1.0000e-005	7.5200e-003	0.0000		0.0952	0.0952		0.0942	0.0942	0.0000	1,503.5294	1,503.5294	0.0288	0.0276	1,512.6796
Landscaping	0.1843	0.0690	5.9170	3.1000e-004		0.0321	0.0321		0.0321	0.0321		10.5481	10.5481	0.0106		10.7705
Total	**7.6826**	**0.0690**	**5.9245**	**3.1000e-004**		**0.1274**	**0.1274**		**0.1264**	**0.1264**	**0.0000**	**1,514.0775**	**1,514.0775**	**0.0394**	**0.0276**	**1,523.4501**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					

Architectural Coating	1.3802					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.9804					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1378	1.0000e-005	7.5200e-003	0.0000		0.0952	0.0952		0.0942	0.0942	0.0000	1,503.5294	1,503.5294	0.0288	0.0276	1,512.6796
Landscaping	0.1843	0.0690	5.9170	3.1000e-004		0.0321	0.0321		0.0321	0.0321		10.5481	10.5481	0.0106		10.7705
Total	**7.6826**	**0.0690**	**5.9245**	**3.1000e-004**		**0.1274**	**0.1274**		**0.1264**	**0.1264**	**0.0000**	**1,514.0775**	**1,514.0775**	**0.0394**	**0.0276**	**1,523.4501**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Tentative Tract 18935

South Coast Air Basin, Winter

1.0 Pro ect Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	71.00	Dwelling Unit	23.05	127,800.00	203
Other Non-Asphalt Surfaces	4.00	Acre	4.00	174,240.00	0

1.2 Other Pro ect Characteristics

Urbani ation	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Fre (Days)**	31
Climate Zone	10			**Operational Year**	2017
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Assume architectural coatings applied throughout the building construction phase.

Demolition -

Woodstoves - Assume no wood burning, all residences have a natural gas fireplace.

Construction Off-road Equipment Mitigation - Required dust control measures per SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	35.00	380.00
tblConstructionPhase	PhaseEndDate	11/30/2018	6/16/2017

tblConstructionPhase	PhaseStartDate	6/17/2017	1/2/2016
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	60.35	71.00
tblFireplaces	NumberNoFireplace	7.10	0.00
tblFireplaces	NumberWood	3.55	0.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblWoodstoves	NumberCatalytic	3.55	0.00
tblWoodstoves	NumberNoncatalytic	3.55	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	6.8696	79.1735	52.1651	0.0644	18.2675	3.8042	21.3575	9.9840	3.4998	12.8269	0.0000	6,717.3720	6,717.3720	1.9497	0.0000	6,758.3151
2016	17.8676	34.7646	31.8168	0.0534	1.5551	2.2264	3.7815	0.4168	2.1025	2.5193	0.0000	5,057.3417	5,057.3417	0.7736	0.0000	5,073.5869
2017	17.4469	32.1221	30.5056	0.0533	1.5552	2.0110	3.5662	0.4169	1.8983	2.3151	0.0000	4,964.2499	4,964.2499	0.7520	0.0000	4,980.0421
Total	**42.1841**	**146.0601**	**114.4874**	**0.1711**	**21.3778**	**8.0416**	**28.7052**	**10.8177**	**7.5005**	**17.6613**	**0.0000**	**16,738.9636**	**16,738.9636**	**3.4753**	**0.0000**	**16,811.9441**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2015	6.8696	79.1735	52.1651	0.0644	7.2470	3.8042	10.3371	3.9263	3.4998	6.7692	0.0000	6,717.3720	6,717.3720	1.9497	0.0000	6,758.3151
2016	17.8676	34.7646	31.8168	0.0534	1.5551	2.2264	3.7815	0.4168	2.1025	2.5193	0.0000	5,057.3417	5,057.3417	0.7736	0.0000	5,073.5869
2017	17.4469	32.1221	30.5056	0.0533	1.5552	2.0110	3.5662	0.4169	1.8983	2.3151	0.0000	4,964.2499	4,964.2499	0.7520	0.0000	4,980.0421
Total	**42.1841**	**146.0601**	**114.4874**	**0.1711**	**10.3574**	**8.0416**	**17.6848**	**4.7600**	**7.5005**	**11.6036**	**0.0000**	**16,738.9636**	**16,738.9636**	**3.4753**	**0.0000**	**16,811.9441**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**51.55**	**0.00**	**38.39**	**56.00**	**0.00**	**34.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Energy	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Mobile	2.6076	7.7371	29.3359	0.0735	5.1861	0.1081	5.2942	1.3857	0.0995	1.4851		6,269.6930	6,269.6930	0.2487		6,274.9164
Total	**10.3611**	**8.4114**	**35.5180**	**0.0777**	**5.1861**	**0.2844**	**5.4704**	**1.3857**	**0.2748**	**1.6604**	**0.0000**	**8,556.5187**	**8,556.5187**	**0.3030**	**0.0417**	**8,575.8175**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Energy	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Mobile	2.6076	7.7371	29.3359	0.0735	5.1861	0.1081	5.2942	1.3857	0.0995	1.4851		6,269.6930	6,269.6930	0.2487		6,274.9164
Total	**10.3611**	**8.4114**	**35.5180**	**0.0777**	**5.1861**	**0.2844**	**5.4704**	**1.3857**	**0.2748**	**1.6604**	**0.0000**	**8,556.5187**	**8,556.5187**	**0.3030**	**0.0417**	**8,575.8175**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2015	7/10/2015	5	30	
2	Site Preparation	Site Preparation	7/11/2015	8/7/2015	5	20	
3	Grading	Grading	8/8/2015	10/9/2015	5	45	
4	Building Construction	Building Construction	10/10/2015	6/16/2017	5	440	
5	Architectural Coating	Architectural Coating	1/2/2016	6/16/2017	5	380	
6	Paving	Paving	6/17/2017	8/4/2017	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 112.5

Acres of Paving: 0

Residential Indoor: 258,795 Residential Outdoor: 86,265 Non-Residential Indoor: 261,360 Non-Residential Outdoor: 87,120

OffRoad E uipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	2	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	45.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	99.00	36.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3281	0.0000	0.3281	0.0497	0.0000	0.0497			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858		4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**0.3281**	**2.4508**	**2.7789**	**0.0497**	**2.2858**	**2.3355**		**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0310	0.4875	0.3580	1.1100e-003	0.0261	8.0600e-003	0.0342	7.1500e-003	7.4100e-003	0.0146		112.5979	112.5979	9.0000e-004		112.6168
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0709	0.0951	0.9938	1.9900e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		173.3466	173.3466	9.9400e-003		173.5553

Total	**0.1019**	**0.5827**	**1.3518**	**3.1000e-003**	**0.1938**	**9.5400e-003**	**0.2033**	**0.0516**	**8.7600e-003**	**0.0604**		**285.9444**	**285.9444**	**0.0108**		**286.1722**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.1280	0.0000	0.1280	0.0194	0.0000	0.0194			0.0000			0.0000
Off-Road	4.5083	48.3629	36.0738	0.0399		2.4508	2.4508		2.2858	2.2858	0.0000	4,127.1934	4,127.1934	1.1188		4,150.6886
Total	**4.5083**	**48.3629**	**36.0738**	**0.0399**	**0.1280**	**2.4508**	**2.5788**	**0.0194**	**2.2858**	**2.3052**	**0.0000**	**4,127.1934**	**4,127.1934**	**1.1188**		**4,150.6886**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0310	0.4875	0.3580	1.1100e-003	0.0261	8.0600e-003	0.0342	7.1500e-003	7.4100e-003	0.0146		112.5979	112.5979	9.0000e-004		112.6168
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0709	0.0951	0.9938	1.9900e-003	0.1677	1.4800e-003	0.1691	0.0445	1.3500e-003	0.0458		173.3466	173.3466	9.9400e-003		173.5553
Total	**0.1019**	**0.5827**	**1.3518**	**3.1000e-003**	**0.1938**	**9.5400e-003**	**0.2033**	**0.0516**	**8.7600e-003**	**0.0604**		**285.9444**	**285.9444**	**0.0108**		**286.1722**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412		4,111.7444	4,111.7444	1.2275		4,137.5225
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**18.0663**	**3.0883**	**21.1545**	**9.9307**	**2.8412**	**12.7719**		**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5225**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0850	0.1141	1.1926	2.3900e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		208.0159	208.0159	0.0119		208.2664
Total	**0.0850**	**0.1141**	**1.1926**	**2.3900e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**208.0159**	**208.0159**	**0.0119**		**208.2664**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	5.2609	56.8897	42.6318	0.0391		3.0883	3.0883		2.8412	2.8412	0.0000	4,111.7444	4,111.7444	1.2275		4,137.5224
Total	**5.2609**	**56.8897**	**42.6318**	**0.0391**	**7.0458**	**3.0883**	**10.1341**	**3.8730**	**2.8412**	**6.7142**	**0.0000**	**4,111.7444**	**4,111.7444**	**1.2275**		**4,137.5224**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0850	0.1141	1.1926	2.3900e-003	0.2012	1.7700e-003	0.2030	0.0534	1.6200e-003	0.0550		208.0159	208.0159	0.0119		208.2664
Total	**0.0850**	**0.1141**	**1.1926**	**2.3900e-003**	**0.2012**	**1.7700e-003**	**0.2030**	**0.0534**	**1.6200e-003**	**0.0550**		**208.0159**	**208.0159**	**0.0119**		**208.2664**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980		6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**8.6733**	**3.8022**	**12.4755**	**3.5965**	**3.4980**	**7.0945**		**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0945	0.1268	1.3251	2.6600e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		231.1287	231.1287	0.0133		231.4071
Total	**0.0945**	**0.1268**	**1.3251**	**2.6600e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**231.1287**	**231.1287**	**0.0133**		**231.4071**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7751	79.0467	50.8400	0.0618		3.8022	3.8022		3.4980	3.4980	0.0000	6,486.2433	6,486.2433	1.9364		6,526.9080
Total	**6.7751**	**79.0467**	**50.8400**	**0.0618**	**3.3826**	**3.8022**	**7.1848**	**1.4026**	**3.4980**	**4.9006**	**0.0000**	**6,486.2433**	**6,486.2433**	**1.9364**		**6,526.9080**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0945	0.1268	1.3251	2.6600e-003	0.2236	1.9700e-003	0.2255	0.0593	1.8000e-003	0.0611		231.1287	231.1287	0.0133		231.4071
Total	**0.0945**	**0.1268**	**1.3251**	**2.6600e-003**	**0.2236**	**1.9700e-003**	**0.2255**	**0.0593**	**1.8000e-003**	**0.0611**		**231.1287**	**231.1287**	**0.0133**		**231.4071**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904		2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**		**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.3737	3.6296	4.6286	7.7900e-003	0.2249	0.0619	0.2868	0.0640	0.0569	0.1210		787.6163	787.6163	6.4200e-003		787.7510
Worker	0.4677	0.6278	6.5592	0.0132	1.1066	9.7400e-003	1.1163	0.2935	8.9300e-003	0.3024		1,144.0873	1,144.0873	0.0656		1,145.4651
Total	**0.8414**	**4.2574**	**11.1878**	**0.0209**	**1.3315**	**0.0717**	**1.4032**	**0.3575**	**0.0659**	**0.4234**		**1,931.7035**	**1,931.7035**	**0.0720**		**1,933.2161**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.6591	30.0299	18.7446	0.0268		2.1167	2.1167		1.9904	1.9904	0.0000	2,689.5771	2,689.5771	0.6748		2,703.7483
Total	**3.6591**	**30.0299**	**18.7446**	**0.0268**		**2.1167**	**2.1167**		**1.9904**	**1.9904**	**0.0000**	**2,689.5771**	**2,689.5771**	**0.6748**		**2,703.7483**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3737	3.6296	4.6286	7.7900e-003	0.2249	0.0619	0.2868	0.0640	0.0569	0.1210		787.6163	787.6163	6.4200e-003		787.7510
Worker	0.4677	0.6278	6.5592	0.0132	1.1066	9.7400e-003	1.1163	0.2935	8.9300e-003	0.3024		1,144.0873	1,144.0873	0.0656		1,145.4651
Total	**0.8414**	**4.2574**	**11.1878**	**0.0209**	**1.3315**	**0.0717**	**1.4032**	**0.3575**	**0.0659**	**0.4234**		**1,931.7035**	**1,931.7035**	**0.0720**		**1,933.2161**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.4062	28.5063	18.5066	0.0268		1.9674	1.9674		1.8485	1.8485		2,669.2864	2,669.2864	0.6620		2,683.1890
Total	**3.4062**	**28.5063**	**18.5066**	**0.0268**		**1.9674**	**1.9674**		**1.8485**	**1.8485**		**2,669.2864**	**2,669.2864**	**0.6620**		**2,683.1890**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3296	3.2054	4.3100	7.7800e-003	0.2250	0.0513	0.2763	0.0641	0.0472	0.1112		778.9300	778.9300	5.8000e-003		779.0519
Worker	0.4213	0.5662	5.9202	0.0131	1.1066	9.2500e-003	1.1158	0.2935	8.5000e-003	0.3020		1,104.5382	1,104.5382	0.0604		1,105.8060
Total	**0.7510**	**3.7716**	**10.2303**	**0.0209**	**1.3316**	**0.0605**	**1.3921**	**0.3575**	**0.0557**	**0.4132**		**1,883.4682**	**1,883.4682**	**0.0662**		**1,884.8579**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.4062	28.5063	18.5066	0.0268		1.9674	1.9674		1.8485	1.8485	0.0000	2,669.2864	2,669.2864	0.6620		2,683.1890
Total	**3.4062**	**28.5063**	**18.5066**	**0.0268**		**1.9674**	**1.9674**		**1.8485**	**1.8485**	**0.0000**	**2,669.2864**	**2,669.2864**	**0.6620**		**2,683.1890**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3296	3.2054	4.3100	7.7800e-003	0.2250	0.0513	0.2763	0.0641	0.0472	0.1112		778.9300	778.9300	5.8000e-003		779.0519
Worker	0.4213	0.5662	5.9202	0.0131	1.1066	9.2500e-003	1.1158	0.2935	8.5000e-003	0.3020		1,104.5382	1,104.5382	0.0604		1,105.8060
Total	**0.7510**	**3.7716**	**10.2303**	**0.0209**	**1.3316**	**0.0605**	**1.3921**	**0.3575**	**0.0557**	**0.4132**		**1,883.4682**	**1,883.4682**	**0.0662**		**1,884.8579**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730		2,639.8053	2,639.8053	0.6497		2,653.4490

Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**		**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3011	2.9170	4.0917	7.7700e-003	0.2251	0.0458	0.2708	0.0641	0.0421	0.1062		766.3099	766.3099	5.6200e-003		766.4279
Worker	0.3779	0.5112	5.3383	0.0131	1.1066	8.9000e-003	1.1155	0.2935	8.2100e-003	0.3017		1,062.1174	1,062.1174	0.0557		1,063.2875
Total	**0.6790**	**3.4282**	**9.4299**	**0.0209**	**1.3317**	**0.0547**	**1.3863**	**0.3576**	**0.0503**	**0.4079**		**1,828.4273**	**1,828.4273**	**0.0613**		**1,829.7154**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1024	26.4057	18.1291	0.0268		1.7812	1.7812		1.6730	1.6730	0.0000	2,639.8053	2,639.8053	0.6497		2,653.4490
Total	**3.1024**	**26.4057**	**18.1291**	**0.0268**		**1.7812**	**1.7812**		**1.6730**	**1.6730**	**0.0000**	**2,639.8053**	**2,639.8053**	**0.6497**		**2,653.4490**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3011	2.9170	4.0917	7.7700e-003	0.2251	0.0458	0.2708	0.0641	0.0421	0.1062		766.3099	766.3099	5.6200e-003		766.4279
Worker	0.3779	0.5112	5.3383	0.0131	1.1066	8.9000e-003	1.1155	0.2935	8.2100e-003	0.3017		1,062.1174	1,062.1174	0.0557		1,063.2875
Total	**0.6790**	**3.4282**	**9.4299**	**0.0209**	**1.3317**	**0.0547**	**1.3863**	**0.3576**	**0.0503**	**0.4079**		**1,828.4273**	**1,828.4273**	**0.0613**		**1,829.7154**

3.6 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966		281.4481	281.4481	0.0332		282.1449
Total	**13.6253**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**		**281.4481**	**281.4481**	**0.0332**		**282.1449**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0851	0.1144	1.1960	2.6500e-003	0.2236	1.8700e-003	0.2254	0.0593	1.7200e-003	0.0610		223.1390	223.1390	0.0122		223.3952
Total	**0.0851**	**0.1144**	**1.1960**	**2.6500e-003**	**0.2236**	**1.8700e-003**	**0.2254**	**0.0593**	**1.7200e-003**	**0.0610**		**223.1390**	**223.1390**	**0.0122**		**223.3952**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3685	2.3722	1.8839	2.9700e-003		0.1966	0.1966		0.1966	0.1966	0.0000	281.4481	281.4481	0.0332		282.1449
Total	**13.6253**	**2.3722**	**1.8839**	**2.9700e-003**		**0.1966**	**0.1966**		**0.1966**	**0.1966**	**0.0000**	**281.4481**	**281.4481**	**0.0332**		**282.1449**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0851	0.1144	1.1960	2.6500e-003	0.2236	1.8700e-003	0.2254	0.0593	1.7200e-003	0.0610		223.1390	223.1390	0.0122		223.3952
Total	**0.0851**	**0.1144**	**1.1960**	**2.6500e-003**	**0.2236**	**1.8700e-003**	**0.2254**	**0.0593**	**1.7200e-003**	**0.0610**		**223.1390**	**223.1390**	**0.0122**		**223.3952**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.0721
Total	**13.5892**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.0721**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0764	0.1033	1.0784	2.6500e-003	0.2236	1.8000e-003	0.2254	0.0593	1.6600e-003	0.0610		214.5692	214.5692	0.0113		214.8056
Total	**0.0764**	**0.1033**	**1.0784**	**2.6500e-003**	**0.2236**	**1.8000e-003**	**0.2254**	**0.0593**	**1.6600e-003**	**0.0610**		**214.5692**	**214.5692**	**0.0113**		**214.8056**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	13.2569					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.0721
Total	**13.5892**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.0721**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0764	0.1033	1.0784	2.6500e-003	0.2236	1.8000e-003	0.2254	0.0593	1.6600e-003	0.0610		214.5692	214.5692	0.0113		214.8056
Total	**0.0764**	**0.1033**	**1.0784**	**2.6500e-003**	**0.2236**	**1.8000e-003**	**0.2254**	**0.0593**	**1.6600e-003**	**0.0610**		**214.5692**	**214.5692**	**0.0113**		**214.8056**

3.7 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473		2,281.0588	2,281.0588	0.6989		2,295.7360
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**		**2,281.0588**	**2,281.0588**	**0.6989**		**2,295.7360**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0573	0.0775	0.8088	1.9900e-003	0.1677	1.3500e-003	0.1690	0.0445	1.2400e-003	0.0457		160.9269	160.9269	8.4400e-003		161.1042
Total	**0.0573**	**0.0775**	**0.8088**	**1.9900e-003**	**0.1677**	**1.3500e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**160.9269**	**160.9269**	**8.4400e-003**		**161.1042**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473	0.0000	2,281.0588	2,281.0588	0.6989		2,295.7360
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000

Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**	**0.0000**	**2,281.0588**	**2,281.0588**	**0.6989**		**2,295.7360**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0573	0.0775	0.8088	1.9900e-003	0.1677	1.3500e-003	0.1690	0.0445	1.2400e-003	0.0457		160.9269	160.9269	8.4400e-003		161.1042
Total	**0.0573**	**0.0775**	**0.8088**	**1.9900e-003**	**0.1677**	**1.3500e-003**	**0.1690**	**0.0445**	**1.2400e-003**	**0.0457**		**160.9269**	**160.9269**	**8.4400e-003**		**161.1042**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.6076	7.7371	29.3359	0.0735	5.1861	0.1081	5.2942	1.3857	0.0995	1.4851		6,269.6930	6,269.6930	0.2487		6,274.9164
Unmitigated	2.6076	7.7371	29.3359	0.0735	5.1861	0.1081	5.2942	1.3857	0.0995	1.4851		6,269.6930	6,269.6930	0.2487		6,274.9164

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	679.47	715.68	622.67	2,311,801	2,311,801
Total	679.47	715.68	622.67	2,311,801	2,311,801

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.513125	0.060112	0.180262	0.139218	0.042100	0.006630	0.016061	0.030999	0.001941	0.002506	0.004348	0.000594	0.002104

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
NaturalGas Unmitigated	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	6568.36	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Total		**0.0708**	**0.6053**	**0.2576**	**3.8600e-003**		**0.0489**	**0.0489**		**0.0489**	**0.0489**		**772.7482**	**772.7482**	**0.0148**	**0.0142**	**777.4510**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	6.56836	0.0708	0.6053	0.2576	3.8600e-003		0.0489	0.0489		0.0489	0.0489		772.7482	772.7482	0.0148	0.0142	777.4510
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0708**	**0.6053**	**0.2576**	**3.8600e-003**		**0.0489**	**0.0489**		**0.0489**	**0.0489**		**772.7482**	**772.7482**	**0.0148**	**0.0142**	**777.4510**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501
Unmitigated	7.6826	0.0690	5.9245	3.1000e-004		0.1274	0.1274		0.1264	0.1264	0.0000	1,514.0775	1,514.0775	0.0394	0.0276	1,523.4501

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3802					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.9804					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1378	1.0000e-005	7.5200e-003	0.0000		0.0952	0.0952		0.0942	0.0942	0.0000	1,503.5294	1,503.5294	0.0288	0.0276	1,512.6796
Landscaping	0.1843	0.0690	5.9170	3.1000e-004		0.0321	0.0321		0.0321	0.0321		10.5481	10.5481	0.0106		10.7705
Total	**7.6826**	**0.0690**	**5.9245**	**3.1000e-004**		**0.1274**	**0.1274**		**0.1264**	**0.1264**	**0.0000**	**1,514.0775**	**1,514.0775**	**0.0394**	**0.0276**	**1,523.4501**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					

Architectural Coating	1.3802					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	5.9804					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.1378	1.0000e-005	7.5200e-003	0.0000		0.0952	0.0952		0.0942	0.0942	0.0000	1,503.5294	1,503.5294	0.0288	0.0276	1,512.6796
Landscaping	0.1843	0.0690	5.9170	3.1000e-004		0.0321	0.0321		0.0321	0.0321		10.5481	10.5481	0.0106		10.7705
Total	**7.6826**	**0.0690**	**5.9245**	**3.1000e-004**		**0.1274**	**0.1274**		**0.1264**	**0.1264**	**0.0000**	**1,514.0775**	**1,514.0775**	**0.0394**	**0.0276**	**1,523.4501**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Tentative Tract 18935

South Coast Air Basin, Annual

1.0 Pro ect Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	71.00	Dwelling Unit	23.05	127,800.00	203
Other Non-Asphalt Surfaces	4.00	Acre	4.00	174,240.00	0

1.2 Other Pro ect Characteristics

Urbani ation	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Fre (Days)**	31
Climate Zone	10			**Operational Year**	2017
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Assume architectural coatings applied throughout the building construction phase.

Demolition -

Woodstoves - Assume no wood burning, all residences have a natural gas fireplace.

Construction Off-road Equipment Mitigation - Required dust control measures per SCAQMD Rule 403.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	35.00	380.00
tblConstructionPhase	PhaseEndDate	11/30/2018	6/16/2017

tblConstructionPhase	PhaseStartDate	6/17/2017	1/2/2016
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	60.35	71.00
tblFireplaces	NumberNoFireplace	7.10	0.00
tblFireplaces	NumberWood	3.55	0.00
tblProjectCharacteristics	OperationalYear	2014	2017
tblWoodstoves	NumberCatalytic	3.55	0.00
tblWoodstoves	NumberNoncatalytic	3.55	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.4086	4.1000	3.0588	3.9300e-003	0.4291	0.2179	0.6470	0.1939	0.2022	0.3962	0.0000	360.7491	360.7491	0.0864	0.0000	362.5634
2016	2.3198	4.5464	4.1581	7.0000e-003	0.1992	0.2904	0.4896	0.0535	0.2742	0.3277	0.0000	601.3950	601.3950	0.0916	0.0000	603.3176
2017	1.0790	2.2884	2.1052	3.6400e-003	0.0945	0.1406	0.2351	0.0254	0.1322	0.1576	0.0000	310.3055	310.3055	0.0522	0.0000	311.4008
Total	**3.8075**	**10.9348**	**9.3221**	**0.0146**	**0.7228**	**0.6489**	**1.3717**	**0.2728**	**0.6087**	**0.8815**	**0.0000**	**1,272.4496**	**1,272.4496**	**0.2301**	**0.0000**	**1,277.2818**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.4086	4.1000	3.0588	3.9300e-003	0.1968	0.2179	0.4148	0.0836	0.2022	0.2858	0.0000	360.7487	360.7487	0.0864	0.0000	362.5630
2016	2.3198	4.5464	4.1581	7.0000e-003	0.1992	0.2904	0.4896	0.0535	0.2742	0.3277	0.0000	601.3946	601.3946	0.0916	0.0000	603.3171
2017	1.0790	2.2884	2.1052	3.6400e-003	0.0945	0.1406	0.2351	0.0254	0.1322	0.1576	0.0000	310.3053	310.3053	0.0522	0.0000	311.4006
Total	**3.8075**	**10.9348**	**9.3221**	**0.0146**	**0.4905**	**0.6489**	**1.1395**	**0.1624**	**0.6087**	**0.7711**	**0.0000**	**1,272.4486**	**1,272.4486**	**0.2301**	**0.0000**	**1,277.2808**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**32.13**	**0.00**	**16.93**	**40.47**	**0.00**	**12.52**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3681	8.6200e-003	0.7397	4.0000e-005		5.2100e-003	5.2100e-003		5.1900e-003	5.1900e-003	0.0000	18.2459	18.2459	1.5300e-003	3.1000e-004	18.3749
Energy	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	283.9709	283.9709	9.6200e-003	3.8300e-003	285.3602
Mobile	0.4270	1.3575	5.1013	0.0128	0.8760	0.0185	0.8945	0.2344	0.0171	0.2515	0.0000	989.3339	989.3339	0.0388	0.0000	990.1478
Waste						0.0000	0.0000		0.0000	0.0000	16.8949	0.0000	16.8949	0.9985	0.0000	37.8626
Water						0.0000	0.0000		0.0000	0.0000	1.4676	26.5091	27.9767	0.1520	3.8100e-003	32.3492
Total	**1.8080**	**1.4766**	**5.8880**	**0.0136**	**0.8760**	**0.0327**	**0.9087**	**0.2344**	**0.0312**	**0.2656**	**18.3625**	**1,318.0597**	**1,336.4223**	**1.2003**	**7.9500e-003**	**1,364.0946**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3681	8.6200e-003	0.7397	4.0000e-005		5.2100e-003	5.2100e-003		5.1900e-003	5.1900e-003	0.0000	18.2459	18.2459	1.5300e-003	3.1000e-004	18.3749
Energy	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	283.9709	283.9709	9.6200e-003	3.8300e-003	285.3602
Mobile	0.4270	1.3575	5.1013	0.0128	0.8760	0.0185	0.8945	0.2344	0.0171	0.2515	0.0000	989.3339	989.3339	0.0388	0.0000	990.1478
Waste						0.0000	0.0000		0.0000	0.0000	16.8949	0.0000	16.8949	0.9985	0.0000	37.8626
Water						0.0000	0.0000		0.0000	0.0000	1.4676	26.5091	27.9767	0.1519	3.8100e-003	32.3469
Total	**1.8080**	**1.4766**	**5.8880**	**0.0136**	**0.8760**	**0.0327**	**0.9087**	**0.2344**	**0.0312**	**0.2656**	**18.3625**	**1,318.0597**	**1,336.4223**	**1.2003**	**7.9500e-003**	**1,364.0923**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**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**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/1/2015	7/10/2015	5	30	
2	Site Preparation	Site Preparation	7/11/2015	8/7/2015	5	20	
3	Grading	Grading	8/8/2015	10/9/2015	5	45	
4	Building Construction	Building Construction	10/10/2015	6/16/2017	5	440	
5	Architectural Coating	Architectural Coating	1/2/2016	6/16/2017	5	380	
6	Paving	Paving	6/17/2017	8/4/2017	5	35	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 112.5

Acres of Paving: 0

Residential Indoor: 258,795 Residential Outdoor: 86,265 Non-Residential Indoor: 261,360 Non-Residential Outdoor: 87,120

OffRoad E uipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	162	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	2	8.00	162	0.38
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	125	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	174	0.41
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Paving Equipment	2	8.00	130	0.36
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	45.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	99.00	36.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.9200e-003	0.0000	4.9200e-003	7.5000e-004	0.0000	7.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0676	0.7254	0.5411	6.0000e-004		0.0368	0.0368		0.0343	0.0343	0.0000	56.1619	56.1619	0.0152	0.0000	56.4816
Total	**0.0676**	**0.7254**	**0.5411**	**6.0000e-004**	**4.9200e-003**	**0.0368**	**0.0417**	**7.5000e-004**	**0.0343**	**0.0350**	**0.0000**	**56.1619**	**56.1619**	**0.0152**	**0.0000**	**56.4816**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.6000e-004	7.4400e-003	5.2800e-003	2.0000e-005	3.9000e-004	1.2000e-004	5.1000e-004	1.1000e-004	1.1000e-004	2.2000e-004	0.0000	1.5343	1.5343	1.0000e-005	0.0000	1.5346
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-003	1.4700e-003	0.0153	3.0000e-005	2.4700e-003	2.0000e-005	2.4900e-003	6.6000e-004	2.0000e-005	6.8000e-004	0.0000	2.3956	2.3956	1.4000e-004	0.0000	2.3984
Total	**1.4600e-003**	**8.9100e-003**	**0.0205**	**5.0000e-005**	**2.8600e-003**	**1.4000e-004**	**3.0000e-003**	**7.7000e-004**	**1.3000e-004**	**9.0000e-004**	**0.0000**	**3.9299**	**3.9299**	**1.5000e-004**	**0.0000**	**3.9330**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9200e-003	0.0000	1.9200e-003	2.9000e-004	0.0000	2.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0676	0.7254	0.5411	6.0000e-004		0.0368	0.0368		0.0343	0.0343	0.0000	56.1618	56.1618	0.0152	0.0000	56.4816
Total	**0.0676**	**0.7254**	**0.5411**	**6.0000e-004**	**1.9200e-003**	**0.0368**	**0.0387**	**2.9000e-004**	**0.0343**	**0.0346**	**0.0000**	**56.1618**	**56.1618**	**0.0152**	**0.0000**	**56.4816**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.6000e-004	7.4400e-003	5.2800e-003	2.0000e-005	3.9000e-004	1.2000e-004	5.1000e-004	1.1000e-004	1.1000e-004	2.2000e-004	0.0000	1.5343	1.5343	1.0000e-005	0.0000	1.5346

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-003	1.4700e-003	0.0153	3.0000e-005	2.4700e-003	2.0000e-005	2.4900e-003	6.6000e-004	2.0000e-005	6.8000e-004	0.0000	2.3956	2.3956	1.4000e-004	0.0000	2.3984
Total	**1.4600e-003**	**8.9100e-003**	**0.0205**	**5.0000e-005**	**2.8600e-003**	**1.4000e-004**	**3.0000e-003**	**7.7000e-004**	**1.3000e-004**	**9.0000e-004**	**0.0000**	**3.9299**	**3.9299**	**1.5000e-004**	**0.0000**	**3.9330**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1807	0.0000	0.1807	0.0993	0.0000	0.0993	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0526	0.5689	0.4263	3.9000e-004		0.0309	0.0309		0.0284	0.0284	0.0000	37.3011	37.3011	0.0111	0.0000	37.5350
Total	**0.0526**	**0.5689**	**0.4263**	**3.9000e-004**	**0.1807**	**0.0309**	**0.2115**	**0.0993**	**0.0284**	**0.1277**	**0.0000**	**37.3011**	**37.3011**	**0.0111**	**0.0000**	**37.5350**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	1.1700e-003	0.0122	2.0000e-005	1.9700e-003	2.0000e-005	1.9900e-003	5.2000e-004	2.0000e-005	5.4000e-004	0.0000	1.9165	1.9165	1.1000e-004	0.0000	1.9187
Total	**8.0000e-004**	**1.1700e-003**	**0.0122**	**2.0000e-005**	**1.9700e-003**	**2.0000e-005**	**1.9900e-003**	**5.2000e-004**	**2.0000e-005**	**5.4000e-004**	**0.0000**	**1.9165**	**1.9165**	**1.1000e-004**	**0.0000**	**1.9187**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0705	0.0000	0.0705	0.0387	0.0000	0.0387	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0526	0.5689	0.4263	3.9000e-004		0.0309	0.0309		0.0284	0.0284	0.0000	37.3011	37.3011	0.0111	0.0000	37.5349
Total	**0.0526**	**0.5689**	**0.4263**	**3.9000e-004**	**0.0705**	**0.0309**	**0.1013**	**0.0387**	**0.0284**	**0.0671**	**0.0000**	**37.3011**	**37.3011**	**0.0111**	**0.0000**	**37.5349**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-004	1.1700e-003	0.0122	2.0000e-005	1.9700e-003	2.0000e-005	1.9900e-003	5.2000e-004	2.0000e-005	5.4000e-004	0.0000	1.9165	1.9165	1.1000e-004	0.0000	1.9187
Total	**8.0000e-004**	**1.1700e-003**	**0.0122**	**2.0000e-005**	**1.9700e-003**	**2.0000e-005**	**1.9900e-003**	**5.2000e-004**	**2.0000e-005**	**5.4000e-004**	**0.0000**	**1.9165**	**1.9165**	**1.1000e-004**	**0.0000**	**1.9187**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1952	0.0000	0.1952	0.0809	0.0000	0.0809	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1524	1.7786	1.1439	1.3900e-003		0.0856	0.0856		0.0787	0.0787	0.0000	132.3950	132.3950	0.0395	0.0000	133.2250
Total	**0.1524**	**1.7786**	**1.1439**	**1.3900e-003**	**0.1952**	**0.0856**	**0.2807**	**0.0809**	**0.0787**	**0.1596**	**0.0000**	**132.3950**	**132.3950**	**0.0395**	**0.0000**	**133.2250**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-003	2.9400e-003	0.0305	6.0000e-005	4.9400e-003	4.0000e-005	4.9800e-003	1.3100e-003	4.0000e-005	1.3500e-003	0.0000	4.7911	4.7911	2.7000e-004	0.0000	4.7968
Total	**2.0000e-003**	**2.9400e-003**	**0.0305**	**6.0000e-005**	**4.9400e-003**	**4.0000e-005**	**4.9800e-003**	**1.3100e-003**	**4.0000e-005**	**1.3500e-003**	**0.0000**	**4.7911**	**4.7911**	**2.7000e-004**	**0.0000**	**4.7968**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0761	0.0000	0.0761	0.0316	0.0000	0.0316	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Off-Road	0.1524	1.7786	1.1439	1.3900e-003		0.0856	0.0856		0.0787	0.0787	0.0000	132.3948	132.3948	0.0395	0.0000	133.2249
Total	**0.1524**	**1.7786**	**1.1439**	**1.3900e-003**	**0.0761**	**0.0856**	**0.1617**	**0.0316**	**0.0787**	**0.1103**	**0.0000**	**132.3948**	**132.3948**	**0.0395**	**0.0000**	**133.2249**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0000e-003	2.9400e-003	0.0305	6.0000e-005	4.9400e-003	4.0000e-005	4.9800e-003	1.3100e-003	4.0000e-005	1.3500e-003	0.0000	4.7911	4.7911	2.7000e-004	0.0000	4.7968
Total	**2.0000e-003**	**2.9400e-003**	**0.0305**	**6.0000e-005**	**4.9400e-003**	**4.0000e-005**	**4.9800e-003**	**1.3100e-003**	**4.0000e-005**	**1.3500e-003**	**0.0000**	**4.7911**	**4.7911**	**2.7000e-004**	**0.0000**	**4.7968**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1079	0.8859	0.5530	7.9000e-004		0.0624	0.0624		0.0587	0.0587	0.0000	71.9783	71.9783	0.0181	0.0000	72.3576
Total	**0.1079**	**0.8859**	**0.5530**	**7.9000e-004**		**0.0624**	**0.0624**		**0.0587**	**0.0587**	**0.0000**	**71.9783**	**71.9783**	**0.0181**	**0.0000**	**72.3576**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0107	0.1092	0.1332	2.3000e-004	6.5300e-003	1.8100e-003	8.3500e-003	1.8600e-003	1.6700e-003	3.5300e-003	0.0000	21.1810	21.1810	1.7000e-004	0.0000	21.1845
Worker	0.0130	0.0191	0.1981	3.9000e-004	0.0320	2.9000e-004	0.0323	8.5100e-003	2.6000e-004	8.7700e-003	0.0000	31.0943	31.0943	1.7600e-003	0.0000	31.1312
Total	**0.0237**	**0.1282**	**0.3312**	**6.2000e-004**	**0.0386**	**2.1000e-003**	**0.0407**	**0.0104**	**1.9300e-003**	**0.0123**	**0.0000**	**52.2753**	**52.2753**	**1.9300e-003**	**0.0000**	**52.3157**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1079	0.8859	0.5530	7.9000e-004		0.0624	0.0624		0.0587	0.0587	0.0000	71.9782	71.9782	0.0181	0.0000	72.3575
Total	**0.1079**	**0.8859**	**0.5530**	**7.9000e-004**		**0.0624**	**0.0624**		**0.0587**	**0.0587**	**0.0000**	**71.9782**	**71.9782**	**0.0181**	**0.0000**	**72.3575**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0107	0.1092	0.1332	2.3000e-004	6.5300e-003	1.8100e-003	8.3500e-003	1.8600e-003	1.6700e-003	3.5300e-003	0.0000	21.1810	21.1810	1.7000e-004	0.0000	21.1845
Worker	0.0130	0.0191	0.1981	3.9000e-004	0.0320	2.9000e-004	0.0323	8.5100e-003	2.6000e-004	8.7700e-003	0.0000	31.0943	31.0943	1.7600e-003	0.0000	31.1312
Total	**0.0237**	**0.1282**	**0.3312**	**6.2000e-004**	**0.0386**	**2.1000e-003**	**0.0407**	**0.0104**	**1.9300e-003**	**0.0123**	**0.0000**	**52.2753**	**52.2753**	**1.9300e-003**	**0.0000**	**52.3157**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4445	3.7201	2.4151	3.5000e-003		0.2567	0.2567		0.2412	0.2412	0.0000	316.0104	316.0104	0.0784	0.0000	317.6563
Total	**0.4445**	**3.7201**	**2.4151**	**3.5000e-003**		**0.2567**	**0.2567**		**0.2412**	**0.2412**	**0.0000**	**316.0104**	**316.0104**	**0.0784**	**0.0000**	**317.6563**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0418	0.4265	0.5475	1.0200e-003	0.0289	6.6500e-003	0.0356	8.2500e-003	6.1200e-003	0.0144	0.0000	92.6677	92.6677	6.8000e-004	0.0000	92.6818

Worker	0.0518	0.0761	0.7913	1.7400e-003	0.1417	1.2100e-003	0.1430	0.0376	1.1100e-003	0.0388	0.0000	132.7993	132.7993	7.1500e-003	0.0000	132.9494
Total	**0.0936**	**0.5026**	**1.3388**	**2.7600e-003**	**0.1707**	**7.8600e-003**	**0.1785**	**0.0459**	**7.2300e-003**	**0.0531**	**0.0000**	**225.4669**	**225.4669**	**7.8300e-003**	**0.0000**	**225.6312**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4445	3.7201	2.4151	3.5000e-003		0.2567	0.2567		0.2412	0.2412	0.0000	316.0101	316.0101	0.0784	0.0000	317.6560
Total	**0.4445**	**3.7201**	**2.4151**	**3.5000e-003**		**0.2567**	**0.2567**		**0.2412**	**0.2412**	**0.0000**	**316.0101**	**316.0101**	**0.0784**	**0.0000**	**317.6560**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0418	0.4265	0.5475	1.0200e-003	0.0289	6.6500e-003	0.0356	8.2500e-003	6.1200e-003	0.0144	0.0000	92.6677	92.6677	6.8000e-004	0.0000	92.6818
Worker	0.0518	0.0761	0.7913	1.7400e-003	0.1417	1.2100e-003	0.1430	0.0376	1.1100e-003	0.0388	0.0000	132.7993	132.7993	7.1500e-003	0.0000	132.9494
Total	**0.0936**	**0.5026**	**1.3388**	**2.7600e-003**	**0.1707**	**7.8600e-003**	**0.1785**	**0.0459**	**7.2300e-003**	**0.0531**	**0.0000**	**225.4669**	**225.4669**	**7.8300e-003**	**0.0000**	**225.6312**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1861	1.5843	1.0878	1.6100e-003		0.1069	0.1069		0.1004	0.1004	0.0000	143.6875	143.6875	0.0354	0.0000	144.4301
Total	**0.1861**	**1.5843**	**1.0878**	**1.6100e-003**		**0.1069**	**0.1069**		**0.1004**	**0.1004**	**0.0000**	**143.6875**	**143.6875**	**0.0354**	**0.0000**	**144.4301**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0176	0.1785	0.2386	4.7000e-004	0.0133	2.7300e-003	0.0160	3.7900e-003	2.5100e-003	6.3000e-003	0.0000	41.9160	41.9160	3.0000e-004	0.0000	41.9223
Worker	0.0213	0.0316	0.3283	8.0000e-004	0.0652	5.3000e-004	0.0657	0.0173	4.9000e-004	0.0178	0.0000	58.7132	58.7132	3.0300e-003	0.0000	58.7768
Total	**0.0389**	**0.2100**	**0.5668**	**1.2700e-003**	**0.0785**	**3.2600e-003**	**0.0817**	**0.0211**	**3.0000e-003**	**0.0241**	**0.0000**	**100.6292**	**100.6292**	**3.3300e-003**	**0.0000**	**100.6992**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Off-Road	0.1861	1.5843	1.0878	1.6100e-003		0.1069	0.1069		0.1004	0.1004	0.0000	143.6873	143.6873	0.0354	0.0000	144.4299
Total	**0.1861**	**1.5843**	**1.0878**	**1.6100e-003**		**0.1069**	**0.1069**		**0.1004**	**0.1004**	**0.0000**	**143.6873**	**143.6873**	**0.0354**	**0.0000**	**144.4299**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0176	0.1785	0.2386	4.7000e-004	0.0133	2.7300e-003	0.0160	3.7900e-003	2.5100e-003	6.3000e-003	0.0000	41.9160	41.9160	3.0000e-004	0.0000	41.9223
Worker	0.0213	0.0316	0.3283	8.0000e-004	0.0652	5.3000e-004	0.0657	0.0173	4.9000e-004	0.0178	0.0000	58.7132	58.7132	3.0300e-003	0.0000	58.7768
Total	**0.0389**	**0.2100**	**0.5668**	**1.2700e-003**	**0.0785**	**3.2600e-003**	**0.0817**	**0.0211**	**3.0000e-003**	**0.0241**	**0.0000**	**100.6292**	**100.6292**	**3.3300e-003**	**0.0000**	**100.6992**

3.6 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.7234					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0479	0.3084	0.2449	3.9000e-004		0.0256	0.0256		0.0256	0.0256	0.0000	33.1923	33.1923	3.9100e-003	0.0000	33.2745

Total	**1.7713**	**0.3084**	**0.2449**	**3.9000e-004**		**0.0256**	**0.0256**		**0.0256**	**0.0256**	**0.0000**	**33.1923**	**33.1923**	**3.9100e-003**	**0.0000**	**33.2745**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0104	0.0153	0.1593	3.5000e-004	0.0285	2.4000e-004	0.0288	7.5800e-003	2.2000e-004	7.8000e-003	0.0000	26.7254	26.7254	1.4400e-003	0.0000	26.7556
Total	**0.0104**	**0.0153**	**0.1593**	**3.5000e-004**	**0.0285**	**2.4000e-004**	**0.0288**	**7.5800e-003**	**2.2000e-004**	**7.8000e-003**	**0.0000**	**26.7254**	**26.7254**	**1.4400e-003**	**0.0000**	**26.7556**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.7234					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0479	0.3084	0.2449	3.9000e-004		0.0256	0.0256		0.0256	0.0256	0.0000	33.1923	33.1923	3.9100e-003	0.0000	33.2744
Total	**1.7713**	**0.3084**	**0.2449**	**3.9000e-004**		**0.0256**	**0.0256**		**0.0256**	**0.0256**	**0.0000**	**33.1923**	**33.1923**	**3.9100e-003**	**0.0000**	**33.2744**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0104	0.0153	0.1593	3.5000e-004	0.0285	2.4000e-004	0.0288	7.5800e-003	2.2000e-004	7.8000e-003	0.0000	26.7254	26.7254	1.4400e-003	0.0000	26.7556
Total	**0.0104**	**0.0153**	**0.1593**	**3.5000e-004**	**0.0285**	**2.4000e-004**	**0.0288**	**7.5800e-003**	**2.2000e-004**	**7.8000e-003**	**0.0000**	**26.7254**	**26.7254**	**1.4400e-003**	**0.0000**	**26.7556**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7954					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0199	0.1311	0.1121	1.8000e-004		0.0104	0.0104		0.0104	0.0104	0.0000	15.3195	15.3195	1.6200e-003	0.0000	15.3535
Total	**0.8154**	**0.1311**	**0.1121**	**1.8000e-004**		**0.0104**	**0.0104**		**0.0104**	**0.0104**	**0.0000**	**15.3195**	**15.3195**	**1.6200e-003**	**0.0000**	**15.3535**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3100e-003	6.3800e-003	0.0663	1.6000e-004	0.0132	1.1000e-004	0.0133	3.5000e-003	1.0000e-004	3.6000e-003	0.0000	11.8612	11.8612	6.1000e-004	0.0000	11.8741
Total	**4.3100e-003**	**6.3800e-003**	**0.0663**	**1.6000e-004**	**0.0132**	**1.1000e-004**	**0.0133**	**3.5000e-003**	**1.0000e-004**	**3.6000e-003**	**0.0000**	**11.8612**	**11.8612**	**6.1000e-004**	**0.0000**	**11.8741**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7954					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0199	0.1311	0.1121	1.8000e-004		0.0104	0.0104		0.0104	0.0104	0.0000	15.3195	15.3195	1.6200e-003	0.0000	15.3535
Total	**0.8154**	**0.1311**	**0.1121**	**1.8000e-004**		**0.0104**	**0.0104**		**0.0104**	**0.0104**	**0.0000**	**15.3195**	**15.3195**	**1.6200e-003**	**0.0000**	**15.3535**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.3100e-003	6.3800e-003	0.0663	1.6000e-004	0.0132	1.1000e-004	0.0133	3.5000e-003	1.0000e-004	3.6000e-003	0.0000	11.8612	11.8612	6.1000e-004	0.0000	11.8741

Total	**4.3100e-003**	**6.3800e-003**	**0.0663**	**1.6000e-004**	**0.0132**	**1.1000e-004**	**0.0133**	**3.5000e-003**	**1.0000e-004**	**3.6000e-003**	**0.0000**	**11.8612**	**11.8612**	**6.1000e-004**	**0.0000**	**11.8741**

3.7 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0334	0.3552	0.2577	3.9000e-004		0.0199	0.0199		0.0183	0.0183	0.0000	36.2135	36.2135	0.0111	0.0000	36.4465
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0334**	**0.3552**	**0.2577**	**3.9000e-004**		**0.0199**	**0.0199**		**0.0183**	**0.0183**	**0.0000**	**36.2135**	**36.2135**	**0.0111**	**0.0000**	**36.4465**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.4000e-004	1.4000e-003	0.0145	4.0000e-005	2.8800e-003	2.0000e-005	2.9000e-003	7.6000e-004	2.0000e-005	7.9000e-004	0.0000	2.5947	2.5947	1.3000e-004	0.0000	2.5975
Total	**9.4000e-004**	**1.4000e-003**	**0.0145**	**4.0000e-005**	**2.8800e-003**	**2.0000e-005**	**2.9000e-003**	**7.6000e-004**	**2.0000e-005**	**7.9000e-004**	**0.0000**	**2.5947**	**2.5947**	**1.3000e-004**	**0.0000**	**2.5975**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0334	0.3552	0.2577	3.9000e-004		0.0199	0.0199		0.0183	0.0183	0.0000	36.2134	36.2134	0.0111	0.0000	36.4465
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0334**	**0.3552**	**0.2577**	**3.9000e-004**		**0.0199**	**0.0199**		**0.0183**	**0.0183**	**0.0000**	**36.2134**	**36.2134**	**0.0111**	**0.0000**	**36.4465**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.4000e-004	1.4000e-003	0.0145	4.0000e-005	2.8800e-003	2.0000e-005	2.9000e-003	7.6000e-004	2.0000e-005	7.9000e-004	0.0000	2.5947	2.5947	1.3000e-004	0.0000	2.5975
Total	**9.4000e-004**	**1.4000e-003**	**0.0145**	**4.0000e-005**	**2.8800e-003**	**2.0000e-005**	**2.9000e-003**	**7.6000e-004**	**2.0000e-005**	**7.9000e-004**	**0.0000**	**2.5947**	**2.5947**	**1.3000e-004**	**0.0000**	**2.5975**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4270	1.3575	5.1013	0.0128	0.8760	0.0185	0.8945	0.2344	0.0171	0.2515	0.0000	989.3339	989.3339	0.0388	0.0000	990.1478
Unmitigated	0.4270	1.3575	5.1013	0.0128	0.8760	0.0185	0.8945	0.2344	0.0171	0.2515	0.0000	989.3339	989.3339	0.0388	0.0000	990.1478

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	679.47	715.68	622.67	2,311,801	2,311,801
Total	679.47	715.68	622.67	2,311,801	2,311,801

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.513125	0.060112	0.180262	0.139218	0.042100	0.006630	0.016061	0.030999	0.001941	0.002506	0.004348	0.000594	0.002104

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	156.0338	156.0338	7.1700e-003	1.4800e-003	156.6444
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	156.0338	156.0338	7.1700e-003	1.4800e-003	156.6444
NaturalGas Mitigated	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	127.9371	127.9371	2.4500e-003	2.3500e-003	128.7157
NaturalGas Unmitigated	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	127.9371	127.9371	2.4500e-003	2.3500e-003	128.7157

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	2.39745e+006	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	127.9371	127.9371	2.4500e-003	2.3500e-003	128.7157
Total		**0.0129**	**0.1105**	**0.0470**	**7.1000e-004**		**8.9300e-003**	**8.9300e-003**		**8.9300e-003**	**8.9300e-003**	**0.0000**	**127.9371**	**127.9371**	**2.4500e-003**	**2.3500e-003**	**128.7157**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					

Single Family Housing	2.39745e+006	0.0129	0.1105	0.0470	7.1000e-004		8.9300e-003	8.9300e-003		8.9300e-003	8.9300e-003	0.0000	127.9371	127.9371	2.4500e-003	2.3500e-003	128.7157
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0129**	**0.1105**	**0.0470**	**7.1000e-004**		**8.9300e-003**	**8.9300e-003**		**8.9300e-003**	**8.9300e-003**	**0.0000**	**127.9371**	**127.9371**	**2.4500e-003**	**2.3500e-003**	**128.7157**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	545254	156.0338	7.1700e-003	1.4800e-003	156.6444
Total		**156.0338**	**7.1700e-003**	**1.4800e-003**	**156.6444**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	545254	156.0338	7.1700e-003	1.4800e-003	156.6444
Total		**156.0338**	**7.1700e-003**	**1.4800e-003**	**156.6444**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.3681	8.6200e-003	0.7397	4.0000e-005		5.2100e-003	5.2100e-003		5.1900e-003	5.1900e-003	0.0000	18.2459	18.2459	1.5300e-003	3.1000e-004	18.3749
Unmitigated	1.3681	8.6200e-003	0.7397	4.0000e-005		5.2100e-003	5.2100e-003		5.1900e-003	5.1900e-003	0.0000	18.2459	18.2459	1.5300e-003	3.1000e-004	18.3749

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2519					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0914					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.7200e-003	0.0000	9.0000e-005	0.0000		1.1900e-003	1.1900e-003		1.1800e-003	1.1800e-003	0.0000	17.0497	17.0497	3.3000e-004	3.1000e-004	17.1535
Landscaping	0.0230	8.6200e-003	0.7396	4.0000e-005		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003	0.0000	1.1961	1.1961	1.2000e-003	0.0000	1.2214
Total	**1.3681**	**8.6200e-003**	**0.7397**	**4.0000e-005**		**5.2100e-003**	**5.2100e-003**		**5.2000e-003**	**5.2000e-003**	**0.0000**	**18.2459**	**18.2459**	**1.5300e-003**	**3.1000e-004**	**18.3749**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2519					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.0914					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.7200e-003	0.0000	9.0000e-005	0.0000		1.1900e-003	1.1900e-003		1.1800e-003	1.1800e-003	0.0000	17.0497	17.0497	3.3000e-004	3.1000e-004	17.1535
Landscaping	0.0230	8.6200e-003	0.7396	4.0000e-005		4.0200e-003	4.0200e-003		4.0200e-003	4.0200e-003	0.0000	1.1961	1.1961	1.2000e-003	0.0000	1.2214
Total	**1.3681**	**8.6200e-003**	**0.7397**	**4.0000e-005**		**5.2100e-003**	**5.2100e-003**		**5.2000e-003**	**5.2000e-003**	**0.0000**	**18.2459**	**18.2459**	**1.5300e-003**	**3.1000e-004**	**18.3749**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	27.9767	0.1519	3.8100e-003	32.3469
Unmitigated	27.9767	0.1520	3.8100e-003	32.3492

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4.62594 / 2.91635	27.9767	0.1520	3.8100e-003	32.3492
Total		**27.9767**	**0.1520**	**3.8100e-003**	**32.3492**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4.62594 / 2.91635	27.9767	0.1519	3.8100e-003	32.3469
Total		**27.9767**	**0.1519**	**3.8100e-003**	**32.3469**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			

Mitigated	16.8949	0.9985	0.0000	37.8626
Unmitigated	16.8949	0.9985	0.0000	37.8626

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	83.23	16.8949	0.9985	0.0000	37.8626
Total		**16.8949**	**0.9985**	**0.0000**	**37.8626**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	83.23	16.8949	0.9985	0.0000	37.8626
Total		**16.8949**	**0.9985**	**0.0000**	**37.8626**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX B

Highland Raptor Survey Memos

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

December 19, 2014
(2014-011/006)

Phillip Burum
Diversified Pacific Development Group
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Subject: Biological Survey for Nesting/Breeding Raptors and Other Biological Resources of Concern in Support of a Housing Development on APN 1210-371-03 and 1210-371-37 in Highland, San Bernardino County, California

---

Dear Mr. Burum:

This letter provides the results of two surveys (Surveys) to identify raptor nests and other evidence of breeding raptors (hawks, eagles, and owls) that were conducted by ECORP Consulting, Inc. (ECORP) for the Diversified Pacific Development Group (Diversified Pacific) in support of environmental permitting for a proposed residential development (APN 1210-371-03 and 1210-371-37) (Project) in Highland, California. Diversified Pacific is proposing the development of a new residential community that will include up to 71 10,000 square-foot minimum lots with homes ranging in size between 2,300 square feet and 3,200 square feet.

Project Location

The Project site is located in an area known as East Highland, north of Plunge Creek and the Santa Ana River in the City of Highland, San Bernardino County, California (Attachment 1). As shown on the U.S. Geological Survey (USGS) 7.5-minute Redlands topographic quadrangle, the parcel lies in the west half of the southwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (Attachment 2). The Project lies on Assessor's Parcel Number (APN) 1210-371-03-0000 (North Parcel) and 1210-371-37-0000 (South Parcel), consisting of 27.24 acres.

Environmental Setting

The surrounding area consists of suburban and residential land uses. In recent years, most of the adjacent properties were planted in with citrus groves. The Project area North Parcel is composed of former orchard lands, with the Aplin/Cram house, barn, and many irrigation remnants still in place. The Project area South Parcel is entirely a citrus orchard with current and old irrigation in place. More recently, the community of East Highlands has been built up around the property. To the north of Water Street is Cram Elementary School. On the east is North Fork Road and a housing subdivision. Santa Ana Canyon Road defines the southern boundary of the property with Aurantia Park on the south side of the road. To the west there is Alpin Street, a vacant parcel, and a housing subdivision.

The elevation within the Project area ranges between approximately 1,450 and 1,580 feet above mean sea level. It is located 0.4 mile (620 meters) north of Plunge Creek, a tributary of the Santa Ana River that emanates from the San Bernardino Mountains 0.80 mile (1,293 meters) to the east. Soil in the area consists of alluvial sediments of the Santa Ana River flood plain, made up of coarse granitic sand and gravel, with numerous large boulders. Vegetation within the project area consists of non-native grasses, citrus, and ornamental trees. At the southern extent of the North Parcel there are large native and non-native trees including eucalyptus (*Eucalyptus* spp.), sycamore (*Platanus* spp.), and fan palm (*Washingtonia filifera*).

Methods

ECORP conducted a biological survey of the Project site to identify raptor nests and other evidence of breeding raptors (hawks, eagles, and owls). ECORP biologists who are qualified in raptor identification and biology conducted the survey at an appropriate time of day that would maximize detection of breeding/nesting raptors. During the survey, the biologists scanned the Project site and adjacent areas (up to 500 feet from the project boundary) with binoculars. Any potential raptor nests or evidence of breeding raptors encountered during the survey were fully recorded using Global Positioning System (GPS) technology, photography, and field notes. In addition, areas that were suitable habitat for burrowing owl (*Athene cunicularia*) and San Bernardino kangaroo rat (*Dipodomys merriami parvus*) (SBKR) were scanned for potential presence and/or sign (burrows, pellets, tracks, whitewash, bones, feathers, etc.).

Results

ECORP biologists Kevin Cornell and Jerry Aguirre conducted the survey of the North Parcel on November 11, 2014. Kevin Cornell conducted the survey of the South Parcel on December 18, 2014. Survey timing and weather conditions are provided in Table 1.

Table 1 - Weather Conditions During Field Surveys

Date	Surveyors	Time		Temperature (°F)		Cloud Cover (%)		Wind Speed (mph)
		Start	End	Start	End	Start	End	
11/11/14	Kevin Cornell, Jerry Aguirre	0940	1050	59	64	100	100	<1
12/18/14	Kevin Cornell	0940	1125	53	58	20	15	1 – 3

The surveys were conducted in all areas of suitable habitat within the Project site plus 500 feet of the Project site. Transects spaced approximately 10 feet apart were walked within the Project site. All trees and vegetation within and adjacent to the Project site suitable for raptor nests were scanned with binoculars. Areas not accessible by foot were also scanned with binoculars.

No raptor nests or breeding behavior by raptors was observed during the survey. Ornamental, native, and non-native trees surrounding the perimeter of the Project site and the Alpin/Cram house have potential to facilitate nesting raptors, but no existing nests or roosts were observed during the survey. The barn was scanned for owls, nests, and evidence of bats (e.g.,guano), but none were observed. During the first survey, two raptor species were observed adjacent to the Project site including a red-tailed hawk (*Buteo jamaicensis*) flying southwest and an American kestrel (*Falco sparverius*) perched on a dead tree in the field to the west of the

Project site. During the second survey, two red-tailed hawks were observed above and to the south of the Project area. Although one of the red-tailed hawks was possibly a female, no mating behavior was observed between the two and the individuals had no interaction with each other during observation. There are four radio/satellite towers to the south of the Project where the hawks were perched for a portion of the observation. These towers are desirable perches by local raptors and likely frequently used, but are well outside the 500-foot buffer for the Project area. No other raptors or raptor breeding behavior was observed during the survey.

Hundreds of burrows were observed within the Project site, but none were determined to house burrowing owl or SBKR. Most burrows appeared to have been long vacant or occupied by pocket gopher (*Thomomys bottae*) or California ground squirrels (*Spermophilus beecheyii*). Burrows that were covered in spider webs, collapsed, or generally unmaintained were considered to be vacant. No burrowing owl or SBKR sign was detected.

Because no breeding/nesting raptors were observed within the survey area or at any of the potential burrowing owl burrows, the project site and 500 foot buffer is currently considered to be unoccupied by nesting raptors. If construction is not completed before the next breeding season begins (roughly mid-February 2015), an additional pre-construction survey should be conducted.

Photos from the biological surveys can be found in Attachment 3. Field notes from the surveys can be found in Attachment 4. If you have any questions regarding the information we have provided in this letter, or if you need further assistance, please contact me or Don Mitchell at (909) 307-0046.

Sincerely,

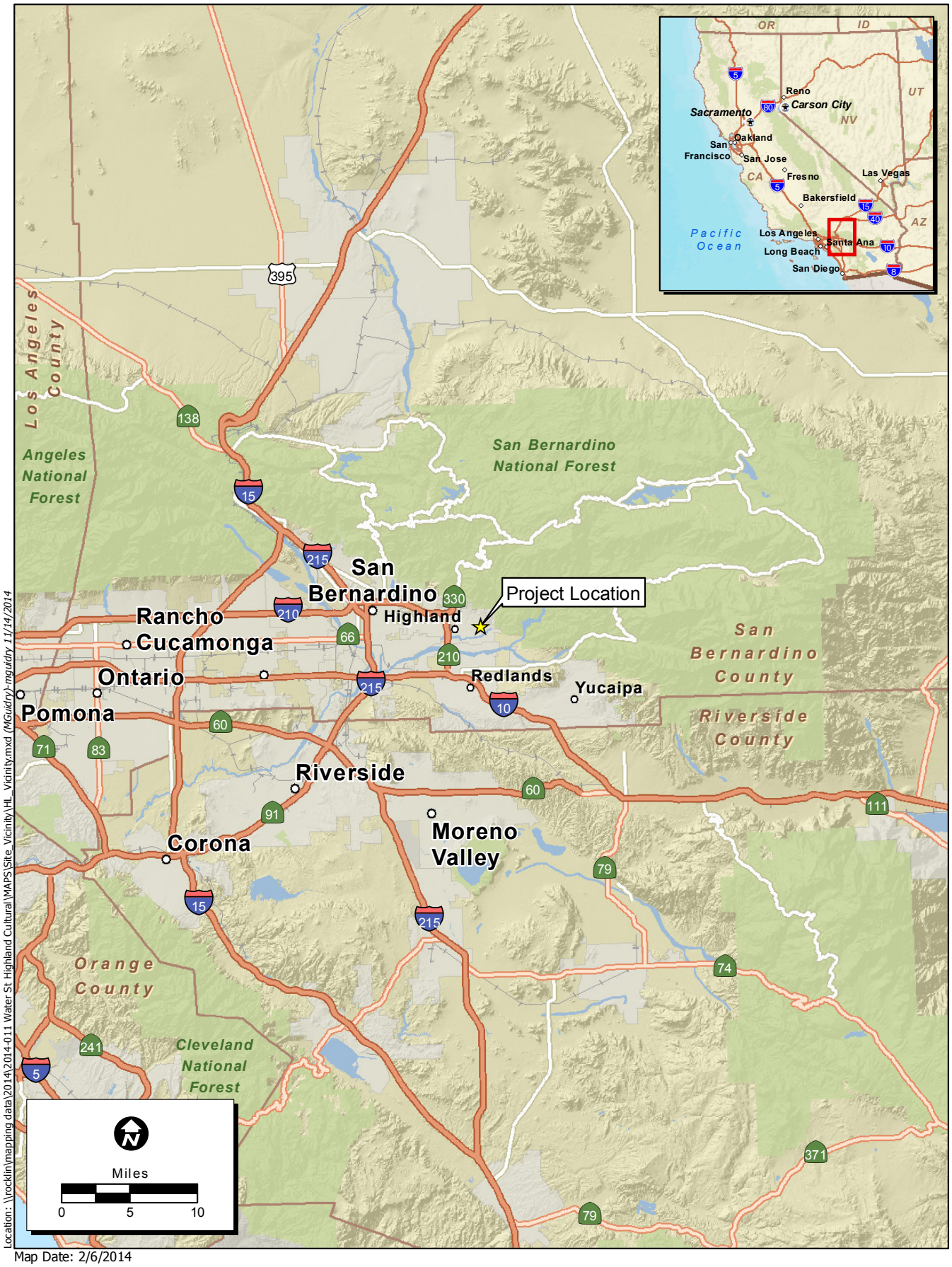
ECORP Consulting, Inc.

Bradley J Haley

Brad Haley
Senior Biologist

Attachments

Attachment 1: Project Vicinity
Attachment 2: Project Location
Attachment 3: Photo Compendium
Attachment 4: Survey Notes



Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Site_Vicinity\HL_Vicinity.mxd (MGuidry)-mguidry 11/14/2014

Map Date: 2/6/2014

Service Layer Credits: Sources: USGS, ESRI, TANA, AND

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Attachment 1. Project Vicinity

2014-011 Water St. Highland

Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Meeting_Maps_and_Analysis\2014-01-15 Native American Notification\Highland_Location.mxd (MGuidry)-mguidry 12/18/2014

Map Date: 12/18/2014
Arial Source: USGS (2011)

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Project Location

2014-011 Water Street Highland

Attachment 3: Photo Compendium

Photo 1: Overview of Project site northern parcel, looking southeast from the northwest corner of the property

Photo 2: Barn on the Project site, looking northwest

Photo 3: Inside the vacant barn, looking northwest

Photo 4: View of the barn and trees to the south, looking south

Photo 5: Large trees capable of hosting raptor nests around the Alpin/Cram home, looking northwest

Photo 6: Concrete drainage/irrigation system of the northern parcel on the eastern end of the Project site, looking north

Photo 7: Various large trees at the southern end of the Project site, looking south

Photo 8: Western half of the Project site northern parcel, looking north

Photo 9: Overlook of the southern parcel of the Project area, looking south

Photo 10: Representative row of citrus trees in the southern parcel of the Project area, looking southeast

Photo 11: South end of the Project site, looking east

Photo 12: East side of the southern parcel, looking north

Attachment 4: Survey Notes

Breeding/Nesting Raptor Survey – Highland

Weather Conditions: 11/11/14

59°, 1mph, 100%, ~~[illegible]~~ moderate

Time: 0940 – 1050

64°, 1mph, 100%, moderate

Notes: Cottontail

		SAPH
AMCK	WCSP	~~AFIT~~
ANHU	YBWA	AMKF
HOFI	SOSP	WEML
EUST	KILL	

RTHA → Flying SW

* Soil compact and dry; disturbed
* Orange grove to the SE
* ~~Drainage and water features around project boundary and in ag. area~~
* Gopher holes present

X Concrete irrigation pipes and canals around Project boundary & in ag. area

Raptor Survey Pt. 2 2014-011/006

Species list: Start: 0940

DEJU 53°F K.A

ANHU 1-3 mph Cornell

WEST 20% CC

CAKI END: 1125 12/18

SOSP 58°F

AMCR 1-3 mph

NOFL 15% CC

RTHA ~ 1/4 mile to the South in air

↳ Turned into a pair of them perched on the radio towers to the Southeast

WCSP irrigation pipes

Concrete ~~drainages~~ on every row; old irrigation system similar to N Parcel

WEBL → Drab male, little blue

~~FOSP? → Chuck~~ → SASP

NOMO

ACWO

CALT

BEWR RTHA w/n project area

NUWO - Chased away by a AMCR

* No interaction between M/F RTHA

Aurantia Park to the South

Project

Split ~~parcel~~ into two parcels

1210-371-03 : North

1210-371-37 : South

* No nests observed

March 26, 2015
(2014-011/006)

Phillip Burum
Diversified Pacific Development Group
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Subject: Biological Survey for Nesting/Breeding Raptors and Other Biological Resources of Concern in Support of a Housing Development on APN 1210-371-03 and 1210-371-37 in Highland, San Bernardino County, California

---

Dear Mr. Burum:

This letter provides the results of a survey to identify raptor nests and other evidence of breeding raptors (hawks, eagles, and owls) conducted by ECORP Consulting, Inc. (ECORP) for the Diversified Pacific Development Group (Diversified Pacific) in support of environmental permitting for a proposed residential development (APN 1210-371-03 and 1210-371-37) (Project) in Highland, California. Diversified Pacific is proposing the development of a new residential community that will include up to 71 10,000 square-foot minimum lots with homes ranging in size between 2,300 square feet and 3,200 square feet. Surveys for the property were previously conducted in November and December of 2014.

Project Location

The Project site is located in an area known as East Highland, north of Plunge Creek and the Santa Ana River in the City of Highland, San Bernardino County, California (Attachment 1). As shown on the U.S. Geological Survey (USGS) 7.5-minute Redlands topographic quadrangle, the parcel lies in the west half of the southwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (Attachment 2). The Project lies on Assessor's Parcel Number (APN) 1210-371-03-0000 (North Parcel) and 1210-371-37-0000 (South Parcel), consisting of 27.24 acres.

Environmental Setting

The Project area consists of former orchard lands, with rural residential houses, a barn, and several orchard-related structures (smudge pots, irrigation, etc.). Portions of the northwestern corner of the Project area have been cleared of vegetation. Vegetation communities present on the property consisted of orchard and disturbed habitat. There were also developed areas. The surrounding area consists of Water Street and Cram Elementary School to the north, residential housing to the east and west, and Santa Ana Canyon Road and Aurantia Park to the south.

The elevation within the Project area ranges between approximately 1,450 and 1,580 feet above mean sea level. It is located 0.4 mile (620 meters) north of Plunge Creek, a tributary of the Santa Ana River that emanates from the San Bernardino Mountains 0.80 mile (1,293

meters) to the east. Soil in the area consists of Greenfield sandy loam, which is considered to be an alluvial sediment. Besides the orange groves, there are large non-native trees including eucalyptus (*Eucalyptus* spp.), myoporum (*Myoporum* sp.), and fan palm (*Washingtonia filifera*).

Methods

ECORP conducted a biological survey of the Project site to identify raptor nests and other evidence of breeding raptors (hawks, eagles, and owls). ECORP biologists who are qualified in raptor identification and biology conducted the survey at an appropriate time of day that would maximize detection of breeding/nesting raptors.

During the survey, the biologists scanned the Project site and adjacent areas (up to 500 feet from the project boundary) with binoculars. Any potential raptor nests or evidence of breeding raptors encountered during the survey were fully recorded using Global Positioning System (GPS) technology, photography, and field notes. In addition, areas that were suitable habitat for burrowing owl (*Athene cunicularia*) were scanned for potential presence and/or sign (burrows, pellets, tracks, whitewash, bones, feathers, etc.). Representative photographs were taken of the site during the survey to document current conditions.

Results

ECORP biologist Scott Taylor conducted the survey on March 26, 2015. Survey timing and weather conditions are provided in Table 1.

Table 1 - Weather Conditions During Field Surveys

Date	Surveyors	Time		Temperature (°F)		Cloud Cover (%)		Wind Speed (mph)
		Start	End	Start	End	Start	End	
3/26/2015	Scott Taylor	0800	0900	65	70	0	0	<3

The entire property and buffer was accessible on foot or by viewing through binoculars. No active raptor nests or active burrowing owl burrows were observed on the property during the survey. A nest occupied by breeding red-shouldered hawks (*Buteo lineatus*) was observed approximately 550 feet west of the property's western boundary. Due to the distance away from the Project area, this nest will not pose a constraint to the proposed Project.

Hundreds of burrows were observed within the Project site, but none were determined to house burrowing owl. Most burrows appeared to have been long vacant or occupied by pocket gopher (*Thomomys bottae*) or California ground squirrels (*Spermophilus beecheyii*). Burrows that were covered in spider webs, collapsed, or generally unmaintained were considered to be vacant. No burrowing owl sign was detected.

Because no breeding/nesting raptors were observed within the survey area or at any of the potential burrowing owl burrows, the project site and 500 foot buffer is currently considered to be unoccupied by nesting raptors. These results are considered valid for 30 days from the time of this survey.

Photos from the biological surveys can be found in Attachment 3. The field form from the survey can be found in Attachment 4. If you have any questions regarding the information we have provided in this letter, or if you need further assistance, please contact me or Don Mitchell at (909) 307-0046.

Sincerely,

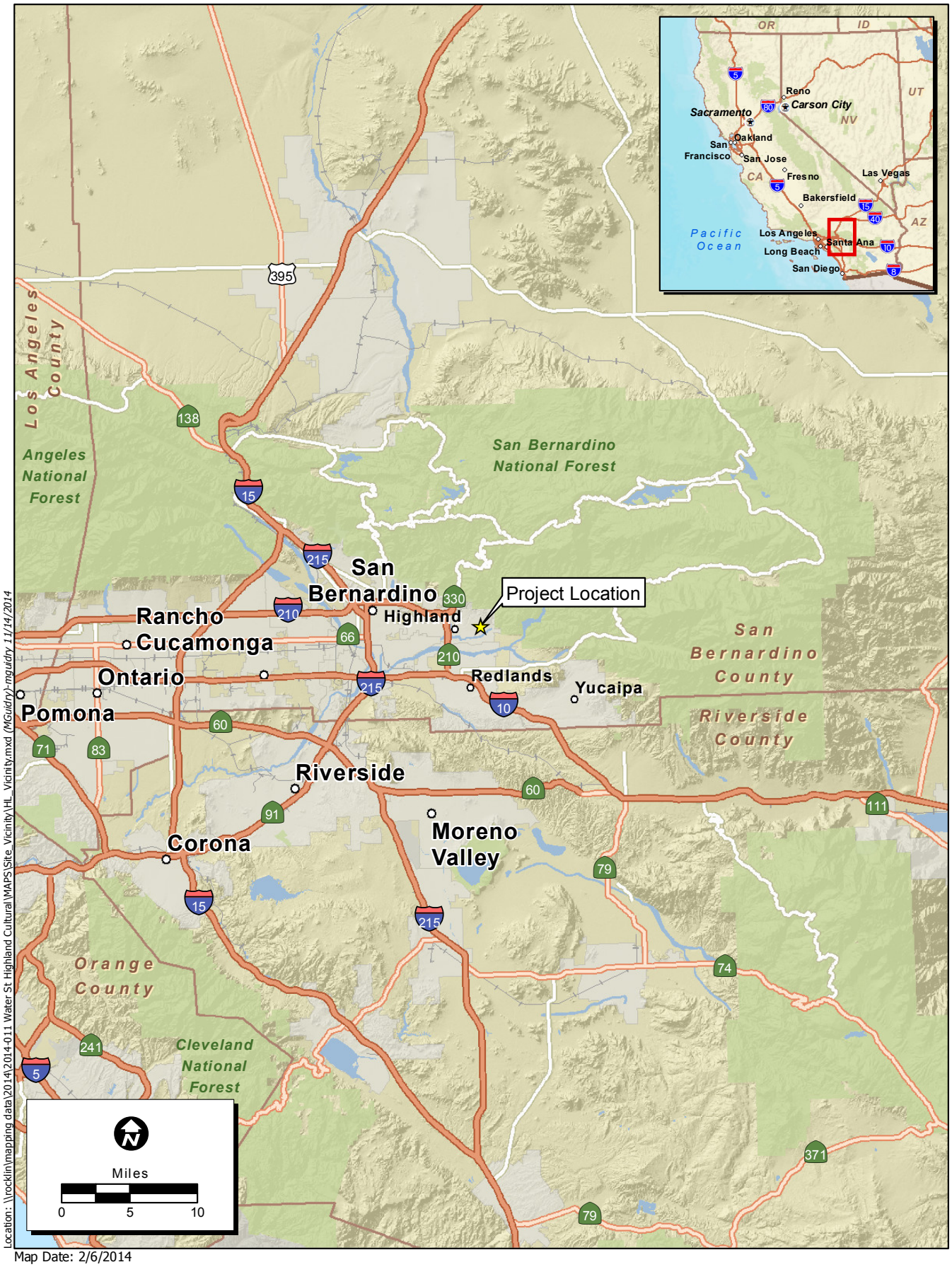
ECORP Consulting, Inc.

Scott Taylor
Senior Biological Program Manager

Attachments

Attachment 1: Project Vicinity
Attachment 2: Project Location
Attachment 3: Photo Compendium
Attachment 4: Field Form

Attachment 1: Project Vicinity



Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Site_Vicinity\HL_Vicinity.mxd (MGuidry)-mguidry 11/14/2014

Map Date: 2/6/2014

Service Layer Credits: Sources: USGS, ESRI, TANA, AND

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Attachment 1. Project Vicinity

2014-011 Water St. Highland

Attachment 2: Project Location

Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Meeting_Maps_and_Analysis\2014-01-15 Native American Notification\Highland_Location.mxd (MGuidry)-mguidry 12/18/2014

Map Date: 12/18/2014
Arial Source: USGS (2011)

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Project Location

2014-011 Water Street Highland

Attachment 3: Photo Compendium

Photo 1: Northwestern portion of Project area

Photo 2: Barn on the Project site, looking northwest

Photo 3: Large ornamental trees within Project area

Photo 4: House and ornamental trees within Project area

Photo 5: Additional ornamental trees within Project area

Photo 6: Orange groves within Project area

Photo 7: Orange groves within Project area

Photo 8: Former orchard within the Project area near houses

Attachment 4: Field Form

Date: 3/26/2015

Biological Resources Assessment

Project #: 2014-011
Client: Diversified Pacific

General Information	Weather Data		
Observers:	Time (24 hr)	Start: 0800	End: 0900
Scott Taylor	Temp (°F) 6" above ground in shade	Start: 65°	End: 70°
	Wind (mph)	Start: 0 mph	End: 0.3 mph
	% Cloud Cover	Start: 0%	End: 0%

Site Information		
Project Name: Water Street 27 acres		
Location: Highland, Santa Ana Cyn Rd	**UTM Coordinates** (NAD 83)	
County: San Bernardino	NW:	[PHOTOS? ___]
Quad: Redlands	NE:	[PHOTOS? ___]
T 1 S R 3W S 1	SE:	[PHOTOS? ___]
Parcel #: 1210-371-03, -37	SW:	[PHOTOS? ___]

Physical Characteristics		
Elevation: 1500	Aspect: SE	Soils: Greenfield Sandy Loam
Land Form*: Hillslope	%Slope: 5%	Other:
* e.g. mesa, bajada, wash		

Is there an obvious wildlife movement corridor? [Y] Draw on Map [N]

Land Uses: (residential, commercial, open space, etc.)	
NW: Residential	SE: Park
NE: Residential	SW: Residential

Disturbances on Site: [e.g. tracks (vehicle, human, livestock, dog); trash; dump sites; bullet shells; blading; ravens; other]

Orange orchard, Houses, outbuildings, land clearing

Existing structures? [Y] [N]	Is site staked or marked? [Y] [N]
Transect Length:	Transect Width:

Microhabitats on site for special-status species or raptors: [e.g. trees (standing or down), buildings, debris piles, gopher/ground squirrel burrow colonies, riparian woodlands, etc.] (Describe below and mark on map)

Fallen trees, attics, rock outcrops, debris piles, brick structures

Potential Jurisdictional Issues (take photos and draw on map)

Drainages on site? [Y] [Maybe] [N]

shelving	[Y] [N]	sediment deposits	[Y] [N]
debris lines	[Y] [N]	destruction - upland veg.	[Y] [N]
OHWM	[Y] [N]	riparian vegetation	[Y] [N]
water marks	[Y] [N]	flowing/standing water	[Y] [N]

Potential jurisdictional issues on and adjacent to the site:

Date: 3/26/2015

Biological Resources Assessment

Project # 2014-011
Client Diversified Pacific

Field Observations

Vegetation Communities:

Orchard, Disturbed, Developed

Plants [include dominance: 1 - individual, 2 - rare, 3 - frequent, 4 - common, 5 - abundant]

Orange trees
Scarlet pimpernel
Prickly pear
Mayoporum
Eucalyptus
Pine Sp.
Peruvian pepper tree
Bromus diandrus
Avena barbata
Mexican elderberry
Bougainvillea
Fiddleneck
Hirschfeldia incana
London rocket
Shepherd's purse
Malva parviflora
Pigweed

Animals: [include: B - burrow, Fe - feathers, P - pellets, Fu - fur, S - scat, Ob, observed, T - tracks, C - carcass, O - other (specify)]

Common raven
Dark eyed junco
Red-shouldered hawk
Lesser goldfinch
Anna's hummingbird
Mourning dove
California ground squirrel
Western fence lizard
Side-blotched lizard
Northern mockingbird

Additional Notes

APPENDIX C

Cultural Resources Report

Cultural Resources Inventory and Evaluation for the Water Street Project in the City of Highland

San Bernardino County, California

Submitted to:

Diversified Pacific
10621 Civic Center Dr.
Rancho Cucamonga, CA
91730

Submitted by:

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

215 N. 5th Street
Redlands, CA 92374
(909) 307-0046
(909) 307-0056 fax

April 2015

Cultural Resources Inventory and Evaluation for the Water Street Project in the City of Highland, San Bernardino County, California

April 2015

Prepared For:

DIVERSIFIED PACIFIC
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Prepared By:

Cary Cotterman, Kristina Lindgren, Wendy Blumel, Andrew Myers, and Roger D. Mason, Ph.D, RPA

ECORP CONSULTING, INC.
215 North 5th Street
Redlands, California 92374

U.S. Geological Survey 7.5-minute Quadrangles:
Redlands, California 1996

Area Surveyed: 27 acres

Keywords: Cultural Resources Survey, Ethnohistory, Prehistory History, Serrano, Redlands, Santa Ana River, Plunge Creek, North Fork Canal, Citrus Farming, A.M. Aplin, Henry Cram

Cultural Resources Identified:

WTS-1- Aplin/Cram Ranch
WTS-2 - Historic-age Agricultural Features
WTS-3 - Kiel Family Property

MANAGEMENT SUMMARY

A cultural resources investigation was conducted for a 27-acre project area located in the City of Highland, San Bernardino County, California in support of a proposed residential development (Figure 1). Diversified Pacific Development Group (Diversified Pacific) is proposing the development of a new residential community that will include up to 69 10,000-square-foot minimum lots with homes ranging in size between 2,300 square feet and 3,200 square feet. The project area consists of three parcels (APNs 1210-371-03-0000, 1210-371-37-0000, and 1210-371-16-0000) and totals approximately 27 acres. The study was completed by ECORP Consulting, Inc. (ECORP) at the request of the Diversified Pacific to identify cultural resources that could be affected by the proposed project, pursuant to the terms of the California Environmental Quality Act (CEQA).

Between December 2013 and January 2014, an initial round of investigations was conducted for one (northern) of the three parcels (APN 1210-371-03-0000) measuring 12.42 acres in size. These studies included a cultural resources records search, intensive pedestrian survey of the parcel, a Native American Heritage Commission Sacred Lands File search, archival research, and site evaluations for eligibility to the California Register of Historical Resources (CRHR). In February 2015, an additional 15 acres of land were added to the southern portion of the project area. These 15 additional acres fall within the original cultural resources records search and Sacred Lands File Search areas. Therefore, these investigations were not repeated for the additional areas. However, an intensive pedestrian survey of the two added parcels (APNs 1210-371-37-0000 and 1210-371-16-0000) and CRHR evaluations were conducted as part of the second round of investigations. In March and April 2015, additional archival research was conducted on the original northern parcel to supplement existing information on the history, use, and significance of an historic-age residence located within the parcel. This information was applied to the CRHR eligibility evaluation of the site.

The Sacred Lands File search indicates that no known Native American resources have been identified within 0.5 mile of the project area. The NAHC identified eight Native American groups with traditional ties to the project area. All eight were contacted via letter. No responses were received from the eight contacted Native American groups. The records search results indicate that 11 cultural resources have been documented within 0.5 mile (800 meters) of the project area. No previously recorded resources are located within the project area but one resource, the Cram and Van Leuven Ditch (CA-SBR-6848H) is located approximately 10 meters south of the project boundary.

As a result of two rounds of field surveys, three historic-period sites were identified within the project area. These include two historic-period home/agricultural sites (WTS-1[Aplin/Cram property] and WTS-3 [Kiel property]), and one linear grouping of agricultural features (WTS-2). Because the Aplin/Cram house will be affected by the proposed development, archival research and an architectural historical study/CRHR evaluation were conducted for this property. Evaluations for the CRHR were also conducted for WTS-2 and the Kiel Property (WTS-3). The Kiel property will be subdivided into two sections, one containing the main house and barn structures, and one containing the orchards and agricultural features. Because the main house and barn fall outside the current project area, these structures were not recorded in detail and were not evaluated for the CRHR as part of the current project. Rather, only the agricultural features located to the south of the house and barn structures were evaluated for the CRHR.

As a result of the CRHR evaluations, WTS-1, the Aplin/Cram property, and WTS-2, the linear agricultural site, are recommended as not eligible for the CRHR. For WTS-3 (the Kiel property), although the Kiel residence may prove to be eligible for the CRHR following formal evaluation, the associated agricultural features were evaluated separately from the main residence and are recommended as not eligible for the CRHR.

Because sites WTS 1, WTS-2 and the portion of the Kiel Property that lies within the project area (WTS-3) are recommended as not eligible for the CRHR, the alteration or removal of the recorded features associated with these three sites as a result of the proposed redevelopment of the project area would not result in a significant impact to a Historical Resource under CEQA, and no mitigation measures are required. That said, should alterations to the project plans affect the subdivision containing the Kiel residence, archival research and a formal architectural history study shall be conducted to determine whether or not the residence is eligible for the CRHR.

The prehistoric archaeological sensitivity of the project area is believed to be low. However, in the event that any prehistoric archaeological materials (e.g. stone tools or milling-related artifacts like manos or metates) are encountered during ground-disturbing construction activities, all activities must be suspended in the vicinity of the find until the deposits are recorded and evaluated by a qualified archaeologist. There may be subsurface historic–period artifacts or features within the project area, related to the three sites recorded. However, these materials, if present, most likely would be consistent with the existing agricultural features and refuse deposits that have little or no potential to yield significant data that would be important to the eligibility of these three sites. Therefore, if these materials are encountered no action would be required. If human remains of any kind are found during construction, the requirements of CEQA Guidelines Section 15064.5(e) and AB 2641 shall be followed.

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 LOCATION AND SETTING 1

3.0 CULTURAL SETTING 2
3.1 Prehistory 2
3.2 Ethnohistory 5
3.2.1 Serrano 5
3.3 History 6

4.0 METHODS 8
4.1 Methods for the Northern Parcel (APN 1210-371-03-0000) 8
4.1.1 Records Search Methods 8
4.1.2 Archival Methods 9
4.1.3 Sacred Lands File Search Methods 9
4.1.4 Field Survey Methods 9
4.2 Methods for the Southern (APN 1210-371-37-0000) and Western (APN 1210-371-16-0000) Parcels 10
4.2.1 Field Survey Methods 10
4.3 Evaluation Methods 10

5.0 RESULTS 12
5.1 Record Search Results 12
5.2 Sacred Lands File Search Results 17
5.3 Results Specific to the Northern Parcel (APN 1210-371-03-0000) 18
5.3.1 Archival Results 18
5.3.2 Field Survey Results for the Northern Parcel 19
5.4 Results Specific to the Western Parcel (APN 1201-371-16-0000) 28
5.5 Results Specific to the Southern Parcel (APN 1201-371-37-0000) 29

6.0 CRHR Evaluation Results 31
6.1 Evaluation of WTS-1 (The Aplin/Cram Ranch) 31
6.1.1 Historical Context Statement 31
6.1.2 CRHR Evaluation 33
6.2 Evaluation of WTS-2 (Agricultural Site) 38
6.3 Evaluation of WTS-3 (Kiel Property) 38

7.0 SUMMARY AND RECOMMENDATIONS 39

8.0 REFERENCES 41

8.0 REPORT AND FIELD PERSONNEL 45
8.1 Report Preparers 45
8.2 Field Personnel 45

LIST OF TABLES

Table 1. Criteria for Inclusion of a Property on the California Register of Historical Resources 11
Table 2. Qualities of Integrity Related to Eligibility for the California Register of Historical Resources 12
Table 3. Previous Investigations within 0.5-mile of the Project Area 13
Table 4. Previously Recorded Cultural Resources within 0.5-mile of the Project Area 15

LIST OF FIGURES

Figure 1. Project Area Vicinity, San Bernardino County, California 3
Figure 2. Project Location Map 4
Figure 3. Overview of WTS-1 36
Figure 3. Close-up of House and Related Features of WTS-1 37

APPENDICES

Appendix A Sacred Lands File Search and Native American Correspondence
Appendix B Photographs of WTS-1
Appendix C DPR Archaeological Site Records (CONFIDENTIAL)

1.0 INTRODUCTION

A cultural resources investigation was conducted for a 27-acre project area located in the City of Highland, San Bernardino County, California in support of a proposed residential development (Figure 1). Diversified Pacific Development Group (Diversified Pacific) is proposing the development of a new residential community that will include up to 69 10,000-square-foot minimum lots with homes ranging in size between 2,300 square feet and 3,200 square feet. The project area is located near the intersection of Aplin Street and Santa Ana Canyon Road and consists of three parcels (APNs 1210-371-03-0000, 1210-371-37-0000, and 1210-371-16-0000) totaling approximately 27 acres. The study was completed by ECORP Consulting, Inc. (ECORP) at the request of Diversified Pacific to identify cultural resources that could be affected by the proposed project, pursuant to the terms of the California Environmental Quality Act (CEQA).

Between December 2013 and January 2014, an initial round of investigations was conducted for one (northern) of the three parcels (APN 1210-371-03-0000) measuring 12.42 acres in size. These studies included a cultural resources records search, intensive pedestrian survey of the parcel, a Native American Heritage Commission Sacred Lands File search, archival research, and site evaluations for eligibility to the California Register of Historical Resources (CRHR). In February 2015, an additional 15 acres of land were added to the project area. These additions consist of two parcels of land. The western parcel (1210-371-16-0000) measures approximately 5 acres in size and the southern parcel (1210-371-37-0000) measures approximately 10 acres in size. These 15 additional acres fall within the original cultural resources records search and Sacred Lands File Search areas. Therefore, these investigations were not repeated for the additional areas. However, an intensive pedestrian survey of the two added parcels and CRHR evaluations were conducted as part of the second round of investigations. The combined survey areas, (approximately 27 acres) make up the total project area. This report presents the methods and results of the records search, Sacred Lands File Search, field surveys, archival research, and CRHR evaluations that were conducted for the combined 27-acre project area, along with management recommendations.

2.0 LOCATION AND SETTING

The project area is located in the area known as East Highland, north of Plunge Creek and the Santa Ana River in the City of Highland, San Bernardino County, California. As shown on the U.S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map, the parcel lies in the southwest quarter of the northwest quarter and the northwest quarter of the southwest quarter of Section 1 and the southeast quarter of the northeast quarter of Section 2, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (Figure 2).

The surrounding setting is suburban and residential. In previous years, most of the adjacent properties contained citrus groves. More recently, the community of East Highlands has been built around the project area. Across Water Street to the north is Cram Elementary School. North Fork Road and a housing subdivision are located the east of the Project area. A housing development is located to the west and Santa Ana Canyon Road lines the southern boundary of the project area.

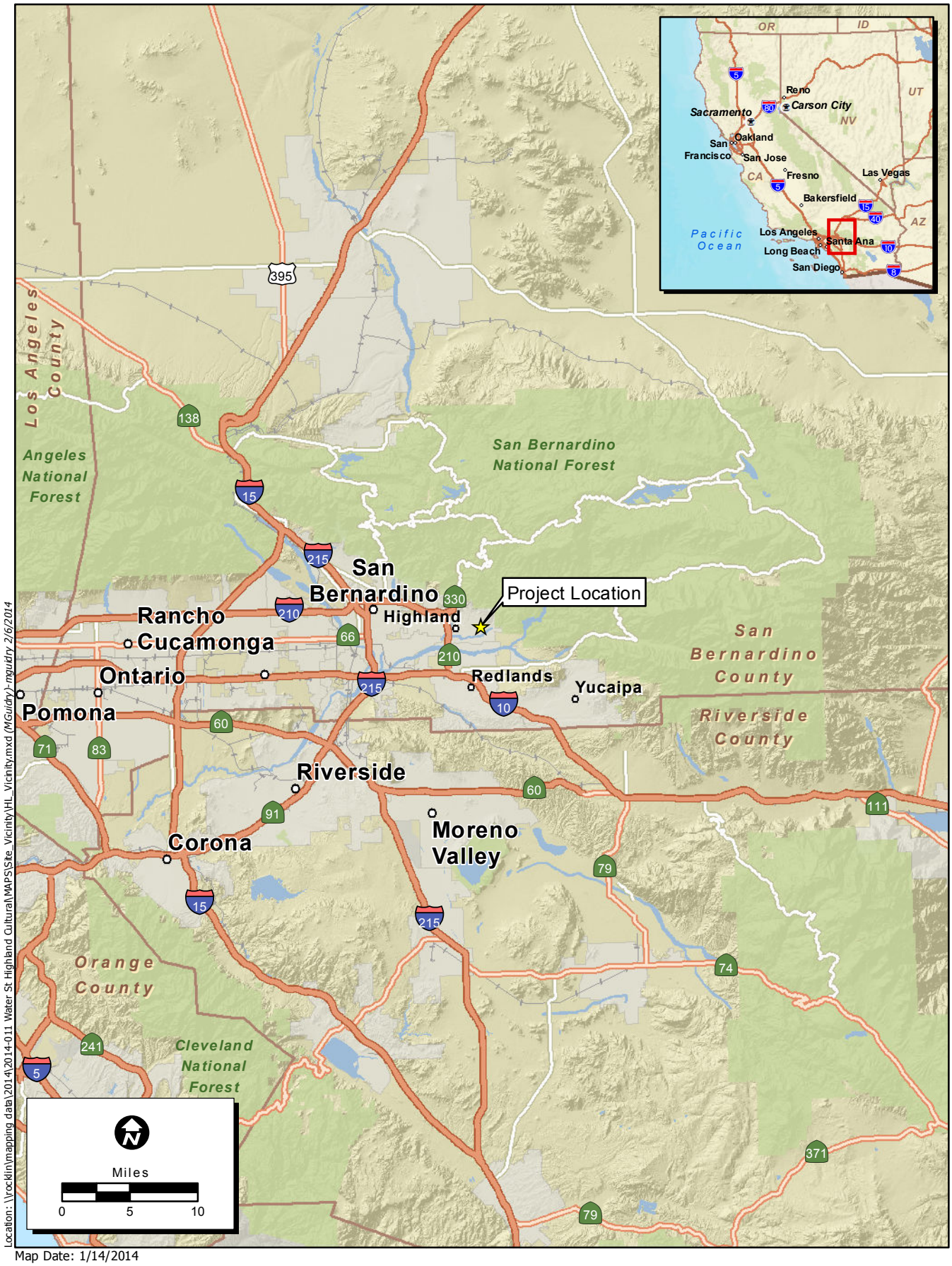
The elevation within the project area ranges between approximately 1,450 and 1,580 feet above mean sea level. It is located 0.45 mile (730 meters) north of Plunge Creek, a tributary of the Santa Ana River that emanates from the San Bernardino Mountains 0.80 mile (1,293 meters) to the east. Soil in the area consists of fluvial sediments of the Santa Ana River flood plain, made up of coarse granitic sand and gravel, with numerous large boulders. Vegetation within the project area consists entirely of non-native grasses, citrus tree stumps, and ornamental trees. The orchards were removed from the northern parcel of the project area (APN 1210-371-03-0000) some time in between 2011 and 2012, and at the time of the cultural resources field survey, ground visibility was excellent. The western parcel of the project area (APN 1210-371-16-0000) contained dense grasses at the time of survey with low ground visibility. The southern parcel (APN 1210-371-37-0000) contained planted orchards and some dense vegetation. Ground visibility in the southern parcel varied from moderate to low.

3.0 CULTURAL SETTING

3.1 Prehistory

It is generally believed that human occupation of southern California dates back to at least 10,000 years before present (BP). Four cultural periods of prehistoric occupation of California during the Holocene Epoch (10,000 years BP to present) are discussed below: the Early Holocene Period, the Early Horizon Period, the Middle Horizon Period, and the Late Horizon Period. During the Early Holocene Period (10,000 to 8,000 years BP), hunters/gatherers utilized lacustrine and marshland settings, such as those along the Mojave River, for the varied and abundant resources found there. Milling-related artifacts are lacking during this period, but the atlatl and dart are common. Hunting of large and small game occurred, as well as fishing. A few, scattered permanent settlements were established near large water sources, but a nomadic lifestyle was more common (Moratto 1984).

Milling-related artifacts first appear in sites dating to the Early Horizon Period (8,000 to 4,000 years BP). Hunting and gathering continued during this period, but with greater reliance on vegetable foods. Mussels and oysters were a staple. This gave way to greater consumption of shellfish in the Middle Horizon Period (4,000 to 2,000 years BP). Use of bone artifacts appears to have increased during this period, and baked-earth steaming ovens were developed. Occupation of permanent or semi-permanent villages occurred in this period, as did reoccupation of seasonal sites. During the Late Horizon Period (2,000 years BP to the time of European Contact [i.e., AD 1769]), population densities were high and settlement in permanent villages increased (Erlandson 1994; Moratto 1984). Regional subcultures also developed, each with their own geographical territory and language or dialect. These groups, bound by shared cultural traits, maintained a high degree of interaction, including trading extensively with one another.



Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Site_Vicinity\HL_Vicinity.mxd (MGuidry) - mguidry 2/6/2014

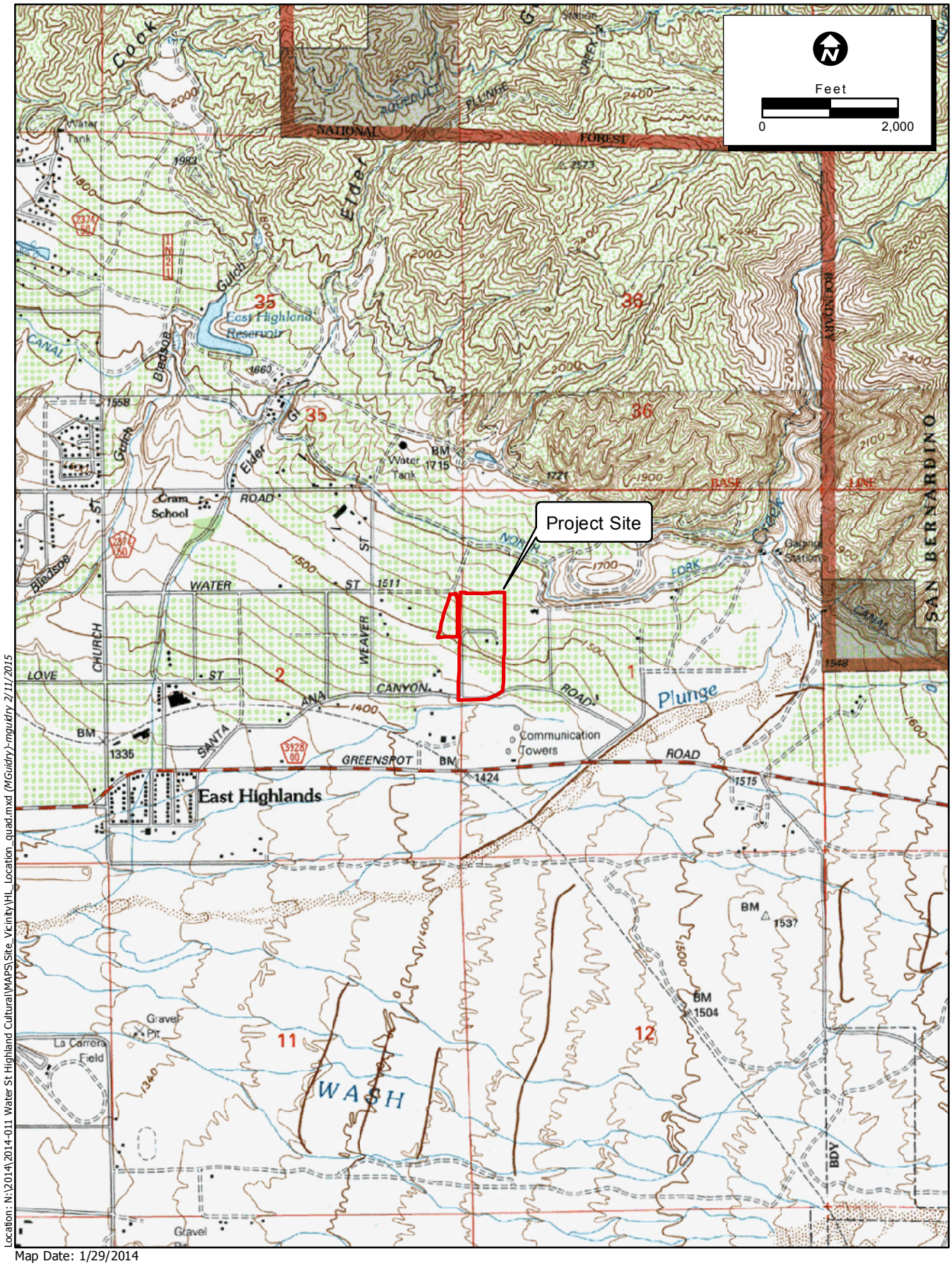
Map Date: 1/14/2014

Service Layer Credits: Sources: USGS, ESRI, TANA, AND

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 1. Project Vicinity

2014-011 Water St. Highland



Location: N:\2014\2014-011 Water St Highland Cultural\MAPS\Site_Vicinity\HL_Location_quad.mxd (MGuidry)-mguidry 2/11/2015

Map Date: 1/29/2014
Source: USGS Quadrangle Redlands (1996)

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 2. Project Location

2014-011 Water St. Highland

3.2 Ethnohistory

3.2.1 Serrano

The project area is located within the territory known to have been occupied by the Serrano group of Native Americans at the time of contact with Europeans, around A.D. 1769. The Serrano occupied an area in and around the San Bernardino Mountains and northward into the Mojave Desert. Their territory also extended west along the north slope of the San Gabriel Mountains, east as far as Twentynine Palms, north into the Victorville and Lucerne Valley areas, and south to the Yucaipa Valley and San Jacinto Valley (Cultural Systems Research 2005). The Serrano speakers in the Mojave Desert who lived along the Mojave River were known as Vanyume. Serrano is a language within the Takic family of the Uto-Aztecan language stock.

The Serrano were mainly hunters and gatherers who occasionally fished. Game that was hunted included mountain sheep, deer, antelope, rabbits, small rodents, and various birds, particularly quail. Vegetable staples consisted of acorns, pinyon nuts, bulbs and tubers, shoots and roots, juniper berries, mesquite, barrel cacti, and Joshua tree (Bean and Smith 1978).

A variety of materials were used for hunting, gathering, and processing food, as well as for shelter, clothing, and luxury items. Shells, wood, bone, stone, plant materials, and animal skins and feathers were used for making baskets, pottery, blankets, mats, nets, bags and pouches, cordage, awls, bows, arrows, drills, stone pipes, musical instruments, and clothing (Bean and Smith 1978).

Settlement locations were determined by water availability, and most Serranos lived in villages near water sources. Houses and ramadas were round and constructed of poles covered with bark and tule mats (Kroeber 1925). Most Serrano villages also had a ceremonial house used as a religious center. Other structures within the village might include granaries and sweathouses (Bean and Smith 1978).

Serrano social and political units were clans, patrilineal exogamous territorial groups. Each clan was led by a chief who had both political and ceremonial roles. The chief lived in a principal village within the clan's territory. The clans were part of a moiety system such that each clan was either a wildcat or coyote clan and marriages could only occur between members of opposite moieties (Earle 2004). On the north side of the San Bernardino Mountains, clan villages were located along the desert-mountain interface on Deep Creek, on the upper Mojave River, in Summit Valley, and in Cajon Pass. The principal plant food available near these villages was juniper berries. These villages also had access to mountain resources, such as acorns and pinyon nuts.

Partly due to their mountainous and desert inland territory, contact between Serrano and European-Americans was minimal prior to the early 1800s. In 1819, an *asistencia* (mission outpost) was established near present-day Redlands and was used to help relocate many Serrano to Mission San Gabriel. However, small groups of Serrano remained in the area northeast of the San Gorgonio Pass and were able to preserve some of their native culture. Today, most Serrano live either on the Morongo or San Manuel reservations (Bean and Smith 1978).

3.3 History

The first significant European settlement of California began during the Spanish Period (1769 to 1821) when 21 missions and 4 presidios were established between San Diego and Sonoma. Although located primarily along the coast, the missions dominated economic and political life over the majority of the California region. The purpose of the missions was primarily Indian control, along with economic support to the *presidios*, assimilation of the Indians to Hispanic society, and conversion of the native population to Spanish Catholicism (Castillo 1978).

The Mexican Period (1821-1848) began with the success of the Mexican Revolution in 1821, but changes to the mission system were slow to follow. When secularization of the missions occurred in the 1830s, their vast land holdings were divided into large grants called *ranchos*. The Mexican government granted ranchos throughout California to Hispanic soldiers and settlers, as well as a small number of foreigners (Castillo 1978; Cleland 1941).

In 1848, the Treaty of Guadalupe Hidalgo ended the Mexican-American War and marked the beginning of the American Period (1848 to present). The discovery of gold that same year initiated the 1849 California Gold Rush, bringing thousands of miners and settlers to California from various parts of the United States, most of whom settled in the north. For those settlers who chose to come to southern California, much of their economic prosperity was fueled by cattle ranching rather than by gold. This prosperity, however, came to a halt in the 1860s as a result of severe floods and droughts, which put many ranchos into bankruptcy (Castillo 1978; Cleland 1941).

The City of Highland is located on a portion of the land known as Rancho San Bernardino, purchased from the Mexican government by Don Antonio Maria Lugo and his three sons in 1842. In 1851, the Lugos sold part of the rancho to Mormon settlers, who founded the City of San Bernardino on a portion of the rancho (Cleland 1941; Richards 1966).

The first non-Native American settler in the vicinity of Highland was probably Walter A. Shay, who built a small cabin near the mouth of City Creek Canyon in the early 1850s. In 1856, on the land that is now occupied by the Village Lakes subdivision at Fifth and Orange Streets, John Henry Cram established a ranch. This area, which would eventually become East Highlands, initially became known as Cramville, after John Henry Cram and six of his sons who settled in the area (Beattie 1994). Cram was the name of the first school district for the area, established in 1869 on land donated by Lewis F. Cram (Alexander 2007). In 1857 Lewis F. Cram, one of John's sons, purchased 160 acres of land in what is now East Highlands and in 1861 planted a few orange trees. His wife was Sarah Ann Wakefield and together they had seven children: Andrew, William H., Mary E., Lewis F., John E., James E., and Robert E. Cram. Earlier in 1858, the Crams, in partnership with another local pioneer family, the Van Leuvens, constructed a three-mile-long ditch from the mouth of Santa Ana River Canyon to the Cram homestead. The Cram-Van Leuven Ditch was the first irrigation project in the vicinity (Beattie 1994; Richards 1966). Many of the Cram children continued to live and own property in the area and manage extensive citrus holdings.

Santa Ana Canyon Road was the first road in the area built and maintained by the county. It was graded through Cramville in 1860 on its way to the gold mines in Bear Valley. The 12-mile

road, later known as the Old County Road, began in San Bernardino, and its route is now followed by Fifth Street (Beattie 1994).

A few houses and small commercial buildings were built in 1873 near what is now the intersection of Base Line and Palm Avenue. By 1883, the settlement, named Messina, opened its own school district, called Highland, which was the first official use of the name (Beattie 1994).

As late as 1880, there were still few, if any, good roads east of present-day Boulder Avenue. Base Line and Highland Avenue only reached as far east as City Creek Wash. In 1881, settlers, augmented by hired Native American labor, extended Base Line east from Boulder, and Church Street from Redlands was extended north across the Santa Ana River (Beattie 1994).

Messina was the location of the first post office in the present-day Highland area. The post office opened in 1887 in the community's grocery store. Mail was originally handled by a private carrier until the U.S. Post Office took over in 1892. In 1899, the post office was relocated from Messina to the Atchison and held in the Topeka and Santa Fe (Santa Fe) Railway Depot. Also in 1899, the name of the community was changed from Messina to Highland and most of the old business district at Base Line and Palm Avenue was demolished. Construction began on a new town center at Palm and Pacific Avenues, reusing salvaged bricks and lumber from the demolished business district (Beattie 1994).

In 1883, the same year the Highland School District was established, the North Fork Ditch was dug by the Highland Ditch Co., incorporating the old Cram-Van Leuven Ditch. While several crops, including peaches, apricots, various grains, and grapes had been planted before, a good supply of irrigation water enabled local ranchers to begin planting oranges and lemons. Although there were water rights disputes with ranchers in Redlands, agreement was eventually reached and citrus groves, particularly of navel and Valencia oranges, spread rapidly (Beattie 1994; Richards 1966).

A subsidiary of the Santa Fe Railway laid tracks from San Bernardino to Redlands and Mentone by 1888. In 1892, the Santa Fe's "Kite-Shaped Track", a loop through the San Bernardino Valley with another loop to Los Angeles via both Fullerton and Pomona, was completed when the segment from San Bernardino through Patton, Highland, and East Highland to Mentone was built (Robertson 1998). Three depots, called Cramville, Del Rosa, and Highland, were built along this route in the Messina/Cramville area. The arrival of the railroad, along with the real estate boom of the 1880s (Dumke 1944) brought more people into the vicinity. Along with the irrigation water provided by the North Fork Ditch, the railroad helped to boost the citrus industry, and several orange and lemon packing houses were built. The Highland Lumber Company was founded in the mountains to the north, and City Creek Toll Road was graded to the sawmill in Fredalba. A citrus packing crate factory was constructed west of Boulder Avenue on a Santa Fe siding, and operated until 1914 (Beattie 1994).

The Highland Chamber of Commerce was established in 1906, and was instrumental in the early development of the community. Since Highland was not an incorporated city, the Chamber served many of the functions that would have been overseen by a city government, including

road building and maintenance, town improvements, and studies of citrus industry issues (Beattie 1994).

In the first half of the 20th century, the local citrus industry grew and agriculture became the predominant economy of the area. The Great Depression in the 1930s, however, brought hardships to the region and some farmers were forced to sell their groves. During the United States' involvement in World War II (1941-1945), the San Bernardino area was made headquarters of the Western Defense Command because of its safe distance from the threat of an aircraft-carrier-based aerial attack and its status as a regional rail, highway, and communications hub. The economy of the entire San Bernardino area, including Highland, was boosted by military establishments such as the U.S. Army Air Depot (later Norton Air Force Base) and the U.S. Army Base General Depot (Camp Ono) in San Bernardino.

The gradual post-World War II expansion of San Bernardino and the continued operation and growth of Norton Air Force Base into the 1990s resulted in Highland becoming, in effect, a suburb of its larger neighbor city. During the 1980s, residents and the Highland Chamber of Commerce began a campaign to establish their community as a separate city, and the City of Highland, which included both Highland and East Highlands, was incorporated on November 24, 1987 (Beattie 1994). The completion of the "Cross-Town Freeway," State Route 30, through the community in 1992 and the ongoing construction of new residential tracts and businesses has contributed to the city's growth in recent years. As of 2012, the population of Highland was approximately 54,150 (City-Data.com 2014).

4.0 METHODS

4.1 Methods for the Northern Parcel (APN 1210-371-03-0000)

Between December 2013 and January 2014, ECORP conducted the initial round of studies for this project. This round of studies dealt solely with the 12.42-acre northern parcel of the project area (APN 1210-371-03-0000) and consisted of a cultural resources records search, archival research, Sacred Lands File search, and a field survey.

4.1.1 Records Search Methods

A cultural resources records search was conducted by an ECORP archaeologist in January 2014, using the California Historical Resources Information System (CHRIS), at the San Bernardino Archaeological Information Center (SBAIC), San Bernardino County Museum, Redlands, California. The purpose of the records search was to determine the extent and location of previous surveys, previously identified prehistoric or historic archaeological site locations, architectural resources, historic properties, cultural landscapes, or ethnic resources within a 0.5-mile (800-meter) radius of the project area. Materials reviewed included survey and evaluation reports, archaeological site records, historic maps, and listings of resources on the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), California Points of Historical Interest, California Historical Landmarks, and National Historic Landmarks.

4.1.2 Archival Research Methods

Archival research was conducted to provide property-specific history and to assist in the evaluation of a historic-period house, barn and agricultural site located in the project area. Archival research included a search of modern and historic-period San Bernardino County Assessor's records, the Data Quick information system, BLM-GLO online records, historic-period aerial photographs, and a search of the archives at the Arda Haenzel California Room of the Norman F. Feldhym Central Library in San Bernardino. Phone consultations were conducted with the Highland Area Historical Society, and the Heritage Room of the AK Smiley Library, Redlands. Two oral history interviews were conducted over the phone with a prior owner of the property, Lisa Wright McComber. Archival research for this project was conducted at the San Bernardino Archeological Information Center (SBAIC), the San Bernardino County Office of the Assessor (online), historicaerials.com, the San Bernardino County Archives, the California Room of the Norman F. Feldhym Central Library in San Bernardino, and the Highland Public Library.

4.1.3 Sacred Lands File Search Methods

A search of the Sacred Lands File was conducted by the Native American Heritage Commission (NAHC) in Sacramento, California in December 2013. This search was requested to determine whether there are sensitive or sacred Native American resources in the vicinity of the project area that could be affected by the proposed project. Each individual Native American group on the list provided by the NAHC was then notified of the proposed project by a letter inviting them to provide any comments or concerns regarding the proposed project. Copies of correspondence between ECORP Consulting, Inc. and the NAHC are provided in Appendix A.

4.1.4 Field Survey Methods

Fieldwork was conducted on January 17, 2014 and consisted of an intensive systematic pedestrian survey of the 12.42-acre property by ECORP archaeologist/historic resource specialist Cary Cotterman and ECORP archaeologist Kristina Lindgren. North-south transects were walked with 15-meter intervals between each transect. Cultural resources were recorded and mapped using a handheld Trimble Juno GPS. Notes and photographs were taken on the environmental setting and disturbances within the project area. In addition to the intensive pedestrian survey of the former orchards, detailed notes were taken on the architectural characteristics of the main house and barn, as well as their materials, modifications, integrity, and setting to assist in their evaluation for eligibility to the California Register of Historic Resources (CRHR). Digital photographs were also taken of the house, barn, and irrigation features, and are provided in Appendix B.

Department of Parks and Recreation (DPR) forms were prepared for all of the features and buildings that were documented during the archaeological survey and architectural history building recordation. Copies of DPR records are provided in Appendix C.

4.2 Methods for the Southern (APN 1210-371-37-0000) and Western (APN 1210-371-16-0000) Parcels

In February 2015, approximately 15 acres were added to the initial project area. These consisted of APN 1210-371-37-0000 located to the south of the original project area and a portion of APN 1210-371-16-0000 located to the west of the original project area. Because the initial cultural resources records search and NAHC Sacred Lands File search encompassed the 15-acres added to the project area. These searches were not repeated during the second round of studies.

4.2.1 Field Survey Methods

Field survey for these two additional areas was conducted on February 6, 2015 by ECORP archaeologist Andrew Myers. Where possible, the entire project area was walked using parallel transects spaced 15 meters apart. In the northern portion of the southern parcel (APN 1210-371-37-0000) steep slopes and dense vegetation made regular transects impossible. For this area, visual inspection of the area was conducted from the nearest accessible point. Cultural resources were recorded and mapped using a handheld Trimble Juno GPS. Notes and photographs were taken on the environmental setting and disturbances within the project area. DPR records were prepared for all resources identified during the survey. All DPR records are provided in Appendix C.

One known historic-period residence and associated barn are located within the southern parcel but outside the current project area. The proposed project plans to subdivide this parcel into two sections. The house and barn structures are located on a section that will not be disturbed during the proposed development and the current occupants will continue to reside on their lots. Because of this, the fenced portion of the parcel will not be surveyed and these two structures were not recorded in detail but were noted with only basic information recorded. More detailed recording was conducted for the features located in the surveyed area, on the section of the southern parcel that will be affected by the proposed development.

4.3 Evaluation Methods

The four standard eligibility criteria (Table 1) and seven elements of integrity (Table 2) were applied to all identified resources when conducting the evaluation for CRHR eligibility.

California Register Eligibility Criteria. The California Register of Historical Resources (CRHR) was legislated in 1992 (Public Resources Code [PCR] Sections 5020.1, 5020.4, 5020.7, 5024.1, 5024.5, 5024.6, 21084 and 21084.1). Its implementing regulations are in California Code of Regulations (CCR) Title 14, Chapter 11.5. The purpose of the CRHR is to act as "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (CCR Title 14 § 4850.1). A historical resource as defined by the PCR "includes, but is not limited to, any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California"

(PCR §5020.1 q). A substantial adverse change as defined by the PCR constitutes "demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired" (PCR § 5020.1 q).

The California Environmental Quality Act (CEQA) further establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC § 21084.1). Therefore, the resource needs to be evaluated using CRHR eligibility criteria to determine whether it is a Historical Resource. If it is a Historical Resource, then impacts to it may be considered significant on the environment. There are four criteria for determining eligibility for the CRHR (see Table 1).

In addition to historical significance, a property must have integrity to be eligible to the CRHR. Integrity is the property's ability to convey its demonstrated historical significance. Seven individual elements comprise integrity (see Table 2). It is not required that a historic property display all of these qualities.

Some resources are listed on the CRHR automatically (California Department of Parks and Recreation 1998a). These include:

- Properties that are listed on the NRHP;
- Properties that have been determined eligible for listing in the NRHP whether by the Keeper of the National Register or through a consensus determination; and
- California Historical Landmarks from Number 777 on.

Table 1
Criteria for Inclusion of a Property on the California Register of Historical Resources

Criterion	Association	Characteristic
1	Event	It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.
2	Person	It is associated with the lives of persons important to local, California, or national history.
3	Design/ Construction	It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values.
4	Information Potential	It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Sources: California Department of Parks and Recreation 1998a,b; CCR Title 14 § 4852

Table 2
Qualities of Integrity Related to Eligibility for the California Register of Historical Resources

Quality	Description
Location	The place the historic property was constructed or the historic event occurred.
Design	The combination of elements creating the property's form, plan, space, structure, and style.
Setting	The physical environment of the historic property.
Materials	The physical elements combined at a particular period of time and in a particular pattern or configuration to form a historic property.
Workmanship	The physical evidence of the craft of a particular culture or people during any given period.
Feeling	The property's expression of the aesthetic or historic sense of a particular period of time.
Association	The direct link between an important historic event or person and the property.

Sources: California Department of Parks and Recreation 1998a,b; CCR Title 14 § 4852

5.0 RESULTS

5.1 Records Search Results

The records search indicated that no part of the project area has been surveyed within the past 10 years. It is general practice that cultural resource surveys are considered valid for a period of no more than 10 years.

A total of 14 cultural resources investigations were conducted within the 0.5-mile records search radius between 1987 and 2010. None of these studies have either crossed over, or taken place partially within, the boundaries of the project area. Details of all 14 investigations are presented below in Table 3.

Table 3
Previous Investigations within a 0.5-Mile of the Project Area

Author	Report Title and Number	Year	Location Relative to Project Area
Hatheway, Roger	*Historical and Architectural Evaluation Seven Oaks Dam Bridges (NADB 1061754)*	1987	Linear survey located approximately 0.37 mile (0.59 km) northwest of the project area.
Brock, James and John Elliott	*Historical Resources of the East Highlands Ranch: Parcels 19 and 22 (NADB 1061728)*	1987	Block survey located approximately 0.25 mile (0.4 km) southeast of the project area.
Hornbeck, David and Howard Botts	*Seven Oaks Dam Project Water Systems (NADB 1061783)*	1988	Linear survey located approximately 0.12 mile (0.19 km) north of the project area.
Hampson, Paul	*Cultural Resource Survey for a Proposed Storm Drain Channel, Near East Highlands, San Bernardino County, California (NADB 1061878)*	1989	Block survey located approximately 0.35 mile (0.56) southwest of the project area.
McGuire, Kelly	*An Archaeological Reconnaissance for a Mojave Pipeline Corridor Expansion in San Bernardino County, California (NADB 1062583)*	1991	Block and linear survey located approximately 0.2 mile (0.32 km) northeast of the project area.
McKenna et al.	*Results of an Archaeological Monitoring Program for the Greenspot Road Pipeline Along Greenspot Road, East Highlands, San Bernardino County, California (NADB 1062652)*	1992	Linear survey located approximately 0.3 mile (0.48 km) south of the project area.
McKenna et al.	*Archaeological Testing and Mitigation of Adverse Impacts at CA-SBR-7166H, and Historic Habitation Site, East Highlands, San Bernardino County, California (NADB 1062685A)*	1992	Linear survey located approximately 0.32 mile (0.51 km) south and southeast of the project area.
Gallegos & Associates	*Cultural Resource Survey Report for the Concordia Homes Project City of Highlands, California (NADB 1062828)*	1993	Block survey located approximately 0.45 mile (0.72 km) southwest of the project area.
McLean, Deborah, Mari Pritchard-Parker, and Brad Sturm	*Cultural Resources Assessment for 278.4 Acres within East Highlands Ranch, San Bernardino County, California (NADB 1063037)*	1995	Block survey with three sections located approximately 0.12 mile (0.19 km) northeast and 0.3 mile (0.48 km) northwest of the project area.

Author	Report Title and Number	Year	Location Relative to Project Area
McLean, Deborah	*Cultural Resources Assessment for the Highland Surface Transportation Program Roadways Project, City of Highland, San Bernardino County, California (NADB 1064063)*	1999	Linear survey located approximately 0.37 mile (0.59 km) northwest of the project area.
Tetra Tech, Inc.	*Proposed Wireless Device Monopalm and Equipment Cabinet; East Highlands, Site, Near 29800 Greenspot Road, Highland, California 92346 (NADB 1064062)*	2002	Point survey located approximately 0.23 mile (0.37 km) south of the project area.
Harper, Caprice D.	*Cultural Resources Assessment for the Ontario Dry-Year Yield Program Wellhead Treatment Facility Project, City of Ontario, San Bernardino County California (NADB 1066082)*	2006	Two point surveys located approximately 0.2 mile (0.32 km) southwest of the project area.
Mason, Roger and Cary Cotterman	*Cultural Resources Survey Report for the Heather Glen Project (TT17604) City of Highland, San Bernardino County, California (NADB 1065671)*	2006	Block survey located approximately 0.45 mile (0.72 km) southeast of the project area.
Dynamic Environmental Associates, Inc.	*Cultural Resource Survey Report Greenspot Road Site, San Bernardino, CA (NADB 1066638)*	2010	Block survey located approximately 0.25 mile (0.4 km) southeast of the project area.

The records search results show that 11 cultural resources have been previously recorded within the records search radius. These consist of five historic-period water transportation sites, two historic-period homesites, one historic-period ranch, one historic-period house, one historic period bridge, and one historic period railroad grade. One of these, the Cram and Van Leuven Ditch (CA-SBR-6848H) is located approximately 10 to 15 meters south of the southern boundary of the project area. There are no previously recorded resources located within the Project area. Details of previously recorded resources within the records search radius are located in Table 4.

Table 4
Previously Recorded Cultural Resources within 0.5 Mile of the Project Area

Location in Relation to Project Area	Resource Designation	Age or Period of Resource	Description	Reference
53 feet (10 meters) south of the project area	CA-SBR-6848H (P36-006848)	Historic	Cram and Van Leuven Ditch	Tang, B. DPR Update (2010); ECORP Consulting, Inc. DPR Update (2006); Eighmey, J., I. Strudwick, R. Phillips, P. McHenry, J. Boughton, and R. Collett. DPR Record (1993); McKenna, J. DPR Record (1992); Romani, G., G. Head, N. Kaptain, and T. Webb. DPR Record (1990).
0.12 mile (0.19 km) north of the project area	CA-SBR-6544 (P36-006544)	Historic	North Fork Canal	Porter, R. and M. Hogan. DPR Update (2011); McKenna, J. DPR Record (1993); Sutton, P. DPR Record (1990); Elliott, J. DPR Record (1986).
0.15 mile (0.24 km) north of the project area	CA-SBR-7051H (P36-007051)	Historic	East Highlands Ranch	Pritchard-Parker, M., A. Delu, and H. Peterson DPR Record (1994); Harper, C. and P. Shattuck DPR Record (2003); Schmidt, J., G. Romani, J. Schmidt, and B. Texier. DPR Record (1990).
0.2 mile (0.32 km) southwest of the project area	CA-SBR-6847H (P36-006847)	Historic	California Southern Railroad, Atchison Topeka & Santa Fe Railway "Kite Shaped Track"	Tibbet, C. DPR Record (2010); Potter, E. DPR Record (2010); Harper, C. DPR Record (2008); Robinson, M. DPR Record (2000); Horne, M. and Inoway, C. DPR Record (1998); Tang, B. Letter Report (1997); Smith, F. DPR

Location in Relation to Project Area	Resource Designation	Age or Period of Resource	Description	Reference
				Record (1995); Romani, G., N. Kaptain, Head, G., and T. Webb. DPR Record (1990); Romani, G., K. VanderVeen, J. Kenney, and B. Texier. DPR Record (1990).
0.25mile (0.4 km) southeast of the project area	CA-SBR-7166H (P36-007166)	Historic	Homesite with two foundations, a reservoir, a well, privies, access roads, a cement channel, a depression, a refuse scatter, a water diversion channel, and trees.	McKenna, J. and J. Franklin. DPR Record (1992).
0.3 mile (0.48 km) southeast of the project area	CA-SBR-7165H (P36-007165)	Historic	Plunge Creek Bridge	McKenna, J. DPR Record (1992); Hatheway, R. DPR Record (1987).
0.4 mile (0.64 km) east of the project area	CA-SBR-6850H (P36-006850)	Historic	Earthen irrigation ditch and mortared cinder block canal	Romani, G. and N. Kaptain. DPR Record (1990).
0.4 mile (0.64 km) northeast of the project area	Pending site P1063-57-H	Historic	Plunge Creek diversion	Record contains a map and excerpt from NADB 1060447 (no name or date).
0.4 mile (0.64 km) northwest of the project area	CA-SBR-11475H (P36-011475)	Historic	Homesite with a Craftsman style bungalow, a cobble wall, a mortar irrigation flume, and an orange orchard	McLean, D. DPR Record (1998).
0.45 mile (0.72 km) northwest of the project area	CA-SBR-11476H (P36-011476)	Historic	Eight cobble walls, one concrete gutter, and one cobble irrigation ditch	McLean, D. DPR Record (1998).
0.45 mile (0.72 km) northwest of the project area	Pending site P1063-6-H	Historic	The Hamilton House	Record contains a map and excerpt from report 81-5.7 (no name or date).

A review of historic-period maps indicates that several historic-period roads and structures were located in the vicinity of the project area. The *Lippencott Water Survey Map* from 1898 shows Plunge Creek and a drainage ditch to the north of the project area. This map does not show any structures within the project area, but the project is located within an area labeled as Irrigated Areas. The USGS 15-minute Redlands Quadrangle map from 1899 shows the North Fork Ditch, the Southern California Railroad (Highlands Division) railroad grade (known as the Kite-Shaped Track or Kite-Shaped Loop), and what is likely Santa Ana Canyon Road to the south of the project area. The Highlands Ditch and several roads appear to the north of the project area; an unnamed road, likely Aplin Street, runs through the project area; and an east-west trending unnamed road (that appears to correspond to a current east-west trending driveway within the project area) turns to the north and connects with another road. This 1899 map also shows two structures in the near vicinity of the project area. One of these structures is located adjacent to the intersection of the presumed Aplin Street and the east-west trending street. The other structure is in the project area, very near the vicinities of the current Aplin/Cram house and Kiel house. However, it is unclear which house this structure may represent. The USGS 15-minute Redlands Quadrangle map from 1901 (reprinted 1924) show the same features as the 1899 map. Both the 1899 and 1901 maps also show the presence of a siding or stop on the Kite-Shaped Track named Aplin, which is not present on the 1943 map. It is further south, in Section 12 of Township 1 South, Range 3 West. By 1943, the USGS 15-minute Redlands Quadrangle map shows Santa Ana Canyon Road and the railroad grade south of the project area, Plunge Creek to the north of the project area, Aplin Road adjacent to the western edge of the project area, two structures, and the unpaved east-west drive that leads to the eastern structure adjacent to the project area. The two structures likely represent the Aplin/Cram house and the Kiel house.

The Historic Property Data File for San Bernardino County was searched and revealed there are no resources listed on the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), and there are no California Points of Historical Interest, California Historical Landmarks, or National Historic Landmarks within the 0.5-mile (800 meter) record search radius.

5.2 Sacred Lands File Search Results

The results of the Sacred Lands File search from the Native American Heritage Commission (NAHC) did not indicate the presence of any known Native American resources within 0.5 mile of the project area. The NAHC provided a list of eight Native American groups and representatives with traditional and historic ties to the project area who should be contacted for information about resources of religious and cultural significance to the tribes that could be affected by the proposed residential development. Letters were sent to each of these groups, and as of this writing, no responses were received as a result. Copies of the correspondence between ECORP, the NAHC and the responding tribes can be found in Appendix A. Any additional responses will be forwarded to the client upon receipt.

5.3 Results Specific to the Northern Parcel (APN 1210-371-03-0000)

5.3.1 Archival Research Results

Results of the archival research that was conducted for the project were used to develop the historic context of the northern parcel (APN 1210-371-03-0000). The history of the Aplin/Cram Ranch is discussed in Section 6.1. Further specific details from the archival research and references are provided in this section.

Aerial photographs of the project area spanning the period from 1938 to 2005 show the location of the house and barn consistently through the years. By 1938, the diagonally planted triangle-shaped orchard is well established, as are the house, barn, and reservoir. Later aerials show three separate sections of orchards in different stages of planting. These sections consist of the triangle-shaped portion in the western half of the property, the north and east large square section of orchard, and the southern sections of orchards to the east and west of the house, and east of the barn (NETRonline 2014).

Historic-period San Bernardino County Assessor's Lot books were available for the years 1895-1946 and show that the property associated with WTS-1 was owned by Alfred Marcy (A.M.) Aplin in 1895 (Series 1, Lot Book 9, 1895-1917). The property was described as the "W ½ NW ¼ Section 1, Township 1 South, Range 3 West" and contained 55 acres. There was an assessed land value of $3000, an improvement value assessed at $600 and Tree/Vine assessment of $500. In 1897, the property size was reduced to 46 acres and split into the west half (22 Acres) and the east half (24 acres). It should be noted that the east half retained the structure assessment and there was no structure assessment for the west half.

A.M. Aplin retained ownership of the west half of the northwest quarter of Section 1 (22 acres). A.M. Aplin owned this property until 1919, and then the property was transferred to his wife Mary E. Aplin in 1920 (Series 2 Lot Book 9 1918-1922). In 1920, the property changed its description to the Licensed Survey Map of Lands of A.M. Aplin, and was subdivided into Tracts A, B, C and D. Mary Aplin transferred all four tracts of this property to Myrtle Aplin in 1922, and then it was sold to W.H Cram, Arthur D. Cram and Henry Cram in 1923 (Lot Book 21 1923-1928). In 1926, ownership was listed as W.H. Cram 1/3, Henry Cram 1/3, Arthur D. Cram 1/6 and Marguerita Cram 1/6, listed together as W.H. Cram et al. The ownership was retained by W. H. Cram et al. through the year 1945, and then in 1946, is listed as W. H. Cram 1/3, Henry Cram 1/3 and Marguerita Batchelor 1/3 (Lot books 42 1929-1934, Lot Book 85B 1935-1940 and Lot book 118B 1941-1946). Throughout these years, assessment for the land, structure, and trees and vines remained consistent. Tract D, the southernmost parcel, was the only parcel of the four to have a structure assessment.

At the time the archival research was conducted, the San Bernardino County Assessor's Property Information Management System showed the ownership as the Wright/York Family Trust. There were various contributors to this trust for the years 1993-2009, including Margaret C. and Arnold L. Wright, Lisa Wright McComber and Bruce Wright. Margaret C. and Arnold L Wright were listed as owners in 1993, the earliest record this system contains. The property was purchased from the Wright/York Family Trust by Water Street Land, LLC in 2014.

Research conducted at the California Room of the Feldheym Central Library in San Bernardino and through internet sources produced a short biography of A.M. Aplin, several historical newspaper articles about the Aplins and the Crams, as well as obituaries for Mrs. A.M. (Mary E.) Aplin and Henry Cram. The obituary for Mrs. A.M. Aplin and a genealogy file for Alfred Marcy Aplin provided additional biographic detail, as well as history about their time in East Highlands. The California room also contained a lot of biographical information about the Cram family, early pioneers of the Highland area, and who in later years were owners of the property.

A phone conversation between Kristina Lindgren of ECORP Consulting and Lisa McComber, a prior property owner, was conducted on January 20, 2014, with the permission of ECORP's client, Diversified Pacific. The conversation with Mrs. McComber confirmed that her grandfather, Henry Cram, lived on the property along with her mother Margaret Cram Wright until 1953, when they moved to the Cram/Wright family house on Water Street, northwest of the property. Mrs. McComber stated her father (Arnold "Bud" Wright) told her that Henry moved into the house in the 1930s, possibly 1934 or 1936. After 1953, the house was occupied by different farm workers' families who tended the orchards until 2009. The house has been vacant since 2009. Mrs. McComber confirmed that the orchards were planted in their distinct patterns by the Aplins. She also said her father told her the house on the property was built in the 1880s by the Aplins, which conflicts with the Assessor's building date of 1902. Although historic maps from 1898, 1899 and 1901 (see above) reveal a structure in the vicinity, it appears to be located slightly to the east of the current structure, and may be the structure on the adjacent parcel, or an earlier structure that was replaced by the current house.

An additional conversation between Robert Cunningham of ECORP Consulting and Lisa McComber was conducted on April 4, 2015, regarding additional Cram properties in the East Highlands area. During this conversation, Mrs. McComber identified a house located at 29412 Water Street as the home of William Henry Cram Sr., her great-grandfather. She stated that the house was built by W.H. Cram Sr. in 1898, and that the home, which is currently occupied by her parents, has been held by the Cram family for generations. She also identified a home on Church Street and Highland Avenue as the former home of James Cram, a nephew of W.H. Cram Sr., and an additional Cram home located on Greenspot Road and Florida Avenue, but she was unsure which member of the Cram family lived at that location. Mrs. McComber stressed that, of all the Cram properties in the area, the home at 29412 Water Street is regarded as the most important by the Cram family, as it was built by a Cram, and for generations it served as the location of family gatherings (McComber 2015). This is consistent with written accounts by Tom Hixson, a descendent of W.H. Cram Sr. who identified the house as a central fixture to the Cram family, and as the location of all Cram family meetings and gatherings (Hixson 2010).

5.3.2 Field Survey Results for the Northern Parcel

During the cultural resources field survey of the northern parcel and the historic building recording that were conducted in January 2014, one historic-period site, the Aplin/Cram Ranch (WTS-1), consisting of 31 newly-identified features, was documented. In addition to the 31 recorded features, there were four agricultural implements located south of the house, a very sparse scatter of artifacts located just west of the western boundary fence of the yard surrounding the house, and a few isolated artifacts in the former orchards.

Photographs of the buildings and features within the site are provided in Appendix B. DPR records for the site can be found in Appendix C. The sketch maps in Appendix C show the location of the 31 features within WTS-1. The results of the survey and building recording are discussed in detail below.

Feature 1 (House). San Bernardino County Assessor's records indicate that the house was built in 1902. Its remaining architectural features, including the symmetrical façade, large central cross-gabled dormer, pedimented gable ends, and simple wood-framed construction suggest that it originally may have been an example of National Folk design. Extensive modifications, however, have drastically altered its appearance. A distinctive architectural style can no longer be ascribed to what now appears to be a vernacular building.

The two-story house was originally L-shaped in plan, with the main mass oriented east-west and a smaller wing projecting southward from the west half. Additions, all of which have designs, materials, and construction techniques that indicate they are historical in age, have been built onto the south end of the original wing, the south side of the original main mass of the house, and at the front entry. The perimeter foundation for the original house, as well as the rear additions, consists of wood timbers lying on locally collected stones and on the bare ground surface. Makeshift augmentation with mortared stones and concrete bricks has been added along the outer edge of the wood foundation in some areas, apparently to prevent soil erosion. Floor support within the perimeter is provided by joists resting on wooden piers standing on stones. The front entry addition has a concrete slab foundation. The wood-framed walls are covered with clapboards, except for the foundation below floor level, which is covered with vertical planks. At the corners the clapboards are covered with vertical boards. The steeply pitched, cross-gabled roof is covered with modern composition shingles, and has boxed eaves approximately 1 foot deep. Narrow skirt roofs complete the triangular pediments formed by the gable ends. The original front door has been replaced but most of the windows appear to be original.

The front (north) elevation of the house originally had a porch that extended along its entire width and was sheltered under the main roof. The wood-floored porch has been completely enclosed to form a long, narrow room. A small entry vestibule with a front-gabled roof, vertical siding, fixed multi-pane windows, and a wooden door with multiple glass panes in its upper half has been constructed. The porch and original entry, with a modern door, can be seen inside, through the windows of the vestibule, which is offset toward the west side of the façade. Two one-over-one wood-framed windows are to the left (east) of the vestibule. A narrow red-brick chimney, which has been shortened and capped, is to the left of the windows. Above, the end of the cross-gabled second story has had its original tall window removed, and replaced by three boards attached horizontally across the bottom of the opening, with a fixed pane of glass above. A narrow drainage flume (Feature 2) runs along the north wall of the house. A concrete walkway (Feature 5) extends north from the entry door to a gate in the front-yard fence.

The west side of the entry vestibule addition can be seen at the far left (north) end of the west elevation of the house. To its right is the original main part of the building and its wing extending south. A kitchen addition with a lower gabled roof, and a lean-to service porch addition with a shed roof extend farther to the south from the wing. At the left in the original building, a small wood-framed casement window is in the walled-in end of the former front

porch. A former one-over-one wood-framed window in the end of the main mass of the house now holds a large swamp cooler, above which the window is covered with wood lattice. To the right of this window, a larger window has been replaced with a single fixed pane of glass, and is covered with wood lattice. Farther to the right are a red-brick fireplace and chimney. The fireplace has a steel clean-out door with "GRAHAM HAMBLY & SON LOS ANGELES" embossed. The chimney has been shortened, and a modern steel stove pipe projects from its top. Near the south end of the original wing, a pair of wood-framed French doors with screen mesh doors opens onto a small concrete porch with four steps. The porch extends farther south than the wing, across part of the kitchen addition, and a wood-framed door with glass panes in its upper half opens onto it from the kitchen. A strip of three wood-framed casement windows are to the right of the door. Pipes from the kitchen sink exit the wall below the windows, and a narrow drainage flume (Feature 3) comes from below the house. The shed-roofed service porch addition leans against the south end of the kitchen addition, and has a single window opening, covered with screen, in its west side. The exhaust tube from a modern clothes dryer projects through the bottom of the screen.

The prominent feature of the rear (south) elevation of the house is the end of the south wing, which is on the far left (west). It consists of the south side of the service porch addition, and the gable end and red-brick chimney of the kitchen addition above the porch's shed roof. A wooden door into the porch, with a screened opening in its upper half, overlooks a low wooden stoop. To the left of the door is a small, screened window opening, and water pipes for a laundry sink inside. A wood-framed hatch with mesh is at ground level, giving access to the crawl space. A small bump-out can be seen on the east side of the original part of the wing, extending a few feet eastward along the back of the main mass of the house. At the far right (east) of the south elevation, a small lean-to rear entry addition with a shed roof has a wood-paneled door in its south end, opening onto two concrete steps. In between the wing on the left and the entry addition on the right, two wood-framed one-over-one windows illuminate the interior of the original main part of the house. A planter formed by split-granite boulders (Feature 4) fills the gap between the wing and the entry lean-to.

The left (south) half of the east elevation of the house consists of the east side of the original wing with its kitchen and service porch additions. The service porch has a large, screened window opening. The kitchen addition has a pair of wood-framed French doors with mesh screen doors, opening onto a concrete stoop with four steps. To the right (north) of the wing, the main body of the building has two wood-framed one-over-one windows in the ground floor, and a pair of wood-framed one-over-one windows in the second-story gable end. The side of the front entry vestibule addition, with multiple fixed glass panes in the upper half of its wall, is on the far right (north).

The house is surrounded by a yard that is currently dirt, enclosed within a chain-link fence (Feature 12). The entire yard and house are shaded by mature ornamental trees, including olive, eucalyptus, palm, acacia, sycamore, and a very large rubber tree in the east side yard. Several features are associated with the house (see Features 2 through 12, below). Artifacts observed in association with the house consist of a steel-framed glider swing, disks from a disk harrow, a shovel, a small shovel for the fireplace clean-out, and several pieces of concrete pipe standing around the yard, possibly used for planters or plant stands. The yard, like the remainder of the parcel, has several small exposed granite bedrock outcrops. A barn (Feature

13) is located approximately 100 feet north of the house, and is separated from it by a dirt and gravel driveway that crosses the property from east to west, then turns south and leads to Santa Ana Canyon Road.

Feature 2 (Drainage flume). A drainage flume made of mortared split-granite boulders is parallel with the front (north) wall of the house. The flume is approximately 2 feet 6 inches from the wall, and measures roughly 1 foot 9 inches wide and 8 inches deep. It extends from a point even with the northeast corner of the house to the west wall of the entry vestibule, a distance of 22 feet.

Feature 3 (Drainage flume). A second flume, similar to the one by the north side of the house, emerges from the crawl space under the house on the west side of the building. It is made of mortared granitic cobbles, varies in width from approximately 1 to 2 feet, and has a depth ranging from 6 to 8 inches. The flume exits the crawl space under the kitchen addition windows, and turns south, parallel and adjacent to the west wall of the house. The feature may have functioned to drain gray water from the kitchen sink.

Feature 4 (Planter). This feature fills the space along the rear (south) wall of the house that lies between the kitchen addition on the west and the rear entry lean-to on the east. It is delineated by a low east-west retaining wall made of mortared split-granite boulders. Two sections of cement pipe, about 2 feet high, stand on the ground surface within the planter and might have functioned as additional planters.

Feature 5 (Walkway). A narrow concrete walkway extends from the entry door in the vestibule on the front (north) elevation of the house to a gate in the chain-link fence that forms the northern boundary of the front yard. The walkway is 60 feet long, and is partially buried.

Feature 6 (Fountain). A large palm tree in the eastern half of the front yard of the house is surrounded by a circular pond with a fountain. The outer circle is 15 feet in diameter and is made of mortared split-granite boulders. An inner circle of split boulders closely surrounds the tree trunk. The sides range in height from approximately 12 to 15 inches, and the interior of the pond has a cement floor and side lining that is painted light blue. A narrow red-brick flume extends from the inner circle almost to the outer circle, inside the west half of the pond. A 1-inch-diameter steel pipe projects upward from inside the flume, forming a fountain.

Feature 7 (Brick patio). A ground-level patio made of unmortared red bricks is located 13 feet west of the northwest corner of the house. The patio is square, measuring 9 feet 6 inches on each side. The lack of significant weathering of the bricks suggests that this feature might have been constructed post-historically.

Feature 8 (Bird bath). A large bird bath is located beneath an ornamental tree near the northwest corner of the front yard of the house. The bowl, a shallow cement disk about 3 feet in diameter, appears to be home-made. It sits atop a stand made of a piece of 15-inch-diameter cement pipe.

Feature 9 (Pond). A slightly elliptical pond, 12 feet across, is located in the back yard, 18 feet south of the house. The sides are made of mortared granitic rocks and red bricks, except for an

approximately 7-foot segment of the north side, which consists of a low granite bedrock outcrop. A small piece of granite bedrock also forms part of the east side of the pond. The walls stand only a few inches above ground level on the exterior. The interior, which is lined with cement and painted yellow, is filled with soil and leaves, but is less than 2 feet deep.

Feature 10 (Clothes line). Two T-shaped poles for a clothes line, made from round steel poles welded together, stand in the back yard of the house, between the building and the pond (Feature 9). The ropes or cables that once spanned the gap between the poles are gone.

Feature 11 (Animal pen). An animal enclosure is built into the southeast corner of the chain-link fence that borders the back yard of the house. The enclosure measures 11 feet 6 inches (east-west) by 8 feet 6 inches (north-south), and is approximately 6 feet high. On the south, east, and west sides, the chain-link fencing is augmented by wire mesh, chicken wire, and corrugated galvanized steel sheets. The roof is made of chain-link fencing, and is covered with sheets of corrugated galvanized steel. The fencing, wire, and steel sheets are supported by wood framing. A small gate is in the left (east) side of the north side of the pen. The interior has a dirt floor, and a wooden shelf in the back that is reached by a wooden ladder about 4 feet high. An 18-inch-diameter, 5-inch-deep galvanized steel water container is on the floor of the enclosure.

Feature 12 (Fence). A chain-link fence ranging from 4 to 6 feet in height surrounds the house (Feature 1), forming front, back, and side yards. Gates are in the north and east sides of the rectangle formed around the yards by the fence.

Feature 13 (Barn). The barn is located approximately 100 feet north of the house (Feature 1), and is separated from it by a dirt and gravel driveway. It is a utilitarian wood-framed vernacular building with no distinguishing architectural characteristics. The foundation consists of wood timbers lying on the ground, and the floor is mostly dirt. Some areas have concrete floors; however, the concrete appears to have been poured post-historically. The front-gabled roof of the original building is steeply pitched, and is covered with sheets of corrugated galvanized steel. The eaves extend 1 foot beyond the walls, and are supported by exposed 2-by-4 rafters. The original one-and-one-half-story barn is rectangular, and is oriented east-west. It does not contain a loft, but a small door in the front (east) gable end suggests that there might once have been one. The walls are covered with vertical plank siding on the south and west sides, and horizontal planks on the north. The east side is open. The north wall, originally exterior but now inside an addition, is partially constructed of stacked wooden lemon crates that form shelves on one side. The crates are all labeled "U.L.G. Association" (United Lemon Growers). Lean-to additions have been constructed on the north, south, and west sides of the original barn structure. Aerial photographs indicate that the barn existed by 1938, and that the additions had been constructed by 1959 (Historic Aerials 1938, 1959).

The single-story lean-to on the north side has a shed roof, originally covered with wood shingles, which have been covered with corrugated galvanized steel and flat steel sheeting. The east half of this lean-to consists of animal coops. Horizontal planks cover the lower halves of the walls, and chicken wire encloses the upper halves. The interior is divided into three areas by low walls and chicken wire. A shed roof for a small open sheltered area extends a short distance to the east, and is supported by 6-by-6-inch wooden posts. The walls of the west half

of the lean-to are enclosed with vertical plank siding. A cylindrical storage tank (Feature 14) and a corral (Feature 15) are adjacent to the north side of the barn.

Another single-story lean-to, on the south side of the barn, consists of two areas. The half nearest the original barn is enclosed with corrugated galvanized steel siding, and has a garage door in its west side, covered with the same material. The half farthest from the barn is open, the corrugated steel shed roof supported by 4-by-4-inch wooden posts. The floor is concrete.

A large single-story addition with a low-pitched gabled roof extends west from the original barn. The roof is covered with corrugated galvanized steel, and is supported at the sides by wooden 6-by-6-inch posts. The south and west sides are open, and part of the floor is concrete.

Several features are associated with the barn (see Features 14 through 18, below). Artifacts observed in association with the barn consist of five interior valve or flood gate mechanisms from irrigation standpipes or weirs, miscellaneous pieces of lumber, scattered red bricks that have never been mortared, sheets of corrugated galvanized steel that have been blown off of the roof, a rectangular galvanized steel tank measuring 8 by 4 feet, a set of steel truck wheels with rubber tires, wooden lemon crates, a red rubber garden hose, sheet metal pipe sections possibly from orchard heaters, a wooden wire or cable spool, terra cotta pipe fragments, a hoe, a wood-framed glass-paneled door, and a small wooden night stand or end table. At the time the fieldwork was conducted (January 2014), two modern trailers and a modern air compressor were stored inside the barn.

Feature 14 (storage tank). A cylindrical steel tank for storing oil or fuel lies horizontally on a 5-foot-high steel frame near the north wall of the barn, within the corral (Feature 15). The rusty tank measures 8 feet 1 inch long and is 3 feet 6 inches in diameter. "NO SMOKING" and "FLAMMABLE" are visible in faded paint on its east side and north end, respectively. A small plate on the north end reads "MFG. BY KEESEE TANK & PUMP Co. 1922 SO. LOS ANGELES ST. ANAHEIM, CALIFORNIA".

Feature 15 (Corral). An animal enclosure measuring approximately 40 feet (east-west) by 30 feet (north-south) is located along the north side of the barn (Feature 13). The barn forms the southern boundary of the corral, and wire-mesh fencing, approximately 5 feet high, with a strand of barbed wire on top, forms the north and west sides. The east boundary no longer exists. A slab of concrete, measuring 7 by 8 feet is in the northwest corner of the corral, and might have once functioned as the floor of a coop, which is now gone.

Feature 16 (Underground vault). An subterranean vault of undetermined function is located 23 feet north of the northeast corner of the barn. The rectangular feature is oriented northwest to southeast, and measures 8 feet by 4.5 feet. It has a flat hatch made of a wooden frame covered with corrugated galvanized steel sheeting, which lies on re-used railroad ties imbedded in the ground. The interior of the vault has walls of mortared concrete blocks. It is partially filled with soil, and ranges in depth from approximately 2 to 3 feet. The floor, if there is one, is not visible.

Feature 17 (Standpipe row). Five concrete irrigation standpipes forming a 70-foot-long north-south row are located near the west side of the barn. The pipes are 15 inches in

diameter, and stand approximately 2 feet high. Each has several leak gates, and the southernmost standpipe, located at the north edge of the dirt and gravel driveway that separates the barn from the house, has a smaller concrete standpipe attached to its south side.

Feature 18 (Pole). A 40-foot-high utility pole, originally used to hold the wire bringing electricity to the house, is located approximately 60 feet southeast of the barn. The pole bears a 1928 date nail, and most likely represents the original electrification of the property. The Southern California Edison pole number is 376980E.

Feature 19 (Standpipe Row). Thirteen square concrete irrigation standpipes arranged roughly east-west are located south of the main driveway into the property. The row of 13 standpipes measures approximately 285 feet long. Each are composed of red brick covered in concrete mortar, with several having exposed bricks on top. The westernmost standpipe (Standpipe 1) has a terracotta pipe and PVC pipe leading away from it to the northwest, and measures 3 feet 3 inches (east-west) by 1 foot 8.5 inches (north-south, with a 3-inch rim, and is approximately 1 foot 5 inches deep in the interior. Standpipes 2 through 11, heading in an eastern direction, are all approximately the same shape and size, averaging 1 foot 2 inches (east-west) by 1 foot 5 inches to 1 foot 7 inches (north-south) with rims varying in length from 2-3 inches, and interior depths ranging from 2 feet 3 inches to 2 feet 6 inches. Standpipe 12, on the eastern end of the row, is larger than most of the others, measuring 2 feet 5 inches (east-west) by 1 foot 8.5 inches (north/south), with a 3-inch rim and interior depth of 2 feet 9 inches. Standpipe 12 has a wood frame, wire mesh top covering the opening. Standpipe 13, the easternmost standpipe, is also larger than the others, measuring 1 foot 10 inches (east-west) by 1 foot 10 inches (north-south), with an adjacent concrete pipe on the west end leading to an open concrete box measuring 2 feet 1 inch (east-west) by 1 foot 7 inches (north-south).

Feature 20, (Weir Box at Southwest Corner). This is a mortared cobble weir box located near the southwest corner of the property, measuring 8 feet 5 inches (east-west) by 5 feet 4 inches (north-south). A pair of flumes lead to the box from the north, and away to the west into the adjacent property. It is covered by a metal plate, and varies in height from 1 foot above ground on the north and east sides to approximately 3 feet above ground on the west and south sides. It is surrounded by chain link fence on three sides, possibly marking adjacent property boundaries.

Feature 21, (Flumes on West Boundary Line). This feature consists of two flumes, on the western boundary of the property, that run in a north-south direction between the southwest weir box (Feature 20) to a northwest weir box (Feature 22), for a length of . The southern segment of the two flumes are fenced in the adjacent property to the west. At a midpoint on the western boundary the fence jogs around the flumes and they are inside the property boundaries. The eastern flume is composed of red brick covered by concrete mortar, and the western flume is composed of split granite cobbles and concrete mortar. Together they measure 2 feet wide, with a depth of 6 inches. There is a height difference between the two flumes, with the western one lower than the eastern one by approximately 1 foot. There is no space between them, as the western wall of the taller eastern flume marks the eastern wall of the lower western flume.

Feature 22, (Northwest Weir) box. This feature is a mortared granite cobble open weir box measuring 5 feet (east-west) by 3 feet (north-south) with a 1-foot diameter pipe on the eastern side. The eastern flume of Feature 21 runs in a southern direction from the south side of the weir box.

Feature 23, (Reservoir in northeast corner). This feature is a poured-concrete reservoir made from cobbles, measuring 26 feet by 26 feet located in the northeast corner of the property. It appears to be made of granite cobbles native to the surrounding area with 29-inch thick walls, covered by concrete with wood forms apparent in the sidewalls. It is approximately 5 feet deep, and the bottom of the reservoir is filled with modern debris including broken glass, 15+ wood boards and planks in various sizes, granite cobbles, concrete chunks and sheets (which appear to have fallen from the sidewalls), metal pipes, nails, plastic water bottles, and broken earthenware ceramic. There is a small diameter pipe set in the interior east wall.

Feature 24 (NE Corner Cinderblock Weir Box). Located approximately 5 feet east of Feature 23, this feature is an open weir box made from cinderblock measuring 7 feet 2 inches (north-south) by 4 feet 6 inches (east-west), with a 1-foot diameter pipe on the east side. Based on the building material, it appears to be more modern in age than the adjacent reservoir. The inside had two metal head gates marked "Water Main" on the eastern interior wall.

Feature 25 (NE corner Weir boxes). Located approximately 2 feet east of the cinderblock weir box in the northeast corner, this feature consists of two open mortared-brick weir boxes that attach to a pair of flumes that run the eastern length of the property. They are both rectangular, with the western one measuring 2 feet 10 inches (east-west) by 2 feet 5 inches (north-south), with a 6-inch rim and the eastern one measuring 5 feet (north-south) by 3 feet (east-west), with a 6-inch rim. The western weir box has a flume opening to the south, and the eastern weir box has a flume opening on the east.

Feature 26 (Eastern Flumes). This feature consists of two flumes that run in a north-south direction along the length of eastern boundary. The segments of flumes that are in the current project area are approximately 577 feet in length. The inner, western flume is made of mortared split granite cobbles and is 1 foot 8.5 inches wide, with a 4-inch rim and measures approximately 6-10 inches deep. The outer, eastern flume is located 1 foot east of the inner flume, up against the chain-link fence of the property boundary. It appears newer in age, and more uniformly made. The eastern flume measures 2 feet 2 inches wide, with a 4-inch rim and is 8-inches deep. It is made of concrete and is paved on the bottom with asphalt. This flume appears to be fed by water from the both the reservoir and weir on the property, and also from an adjacent 1-foot diameter pipe in the extreme northeast corner of the property. Both flumes continue to the south, onto the adjacent property.

Feature 27 (SE corner weir box). This feature consists of a closed weir box made of cinderblock, brick and concrete mortar covered by a metal plate. It measures approximately 5 feet by feet and on the eastern side opens to a triangular-shaped concrete trough with a wood and metal apparatus that appears to turn in circles to direct water flow.

Feature 28 (Cobble and concrete curb and gutter). This feature is located in the western portion of the site and consists of a mortared split cobble and concrete curb and gutter. Starting

near the northwest corner of the property, the curb and gutter runs in a southeast direction and curves mid-property to run in a southwest direction, ending in an underground pipe, for a total length of 551 feet. It appears this was built to separate the northern orchards into two sections and curb runoff from the higher elevation of the eastern portion of the property. It measures approximately 1 foot wide, and the cobble curb is approximately 6 inches tall. The northern portion of the gutter is partially buried by sand. The southern portion has two sections where a concrete ramp was fashioned over a pipe to allow vehicles to drive through the orchards.

Feature 29 Diagonally planted orchard. This feature is a section of orchard planted in a diagonal pattern and called the Triangle by previous residents. IT consists of approximately 1.7 acres. Aerial Photos (NETR 2009) show this section of orchard planted in this pattern as early as 1938. Contributing to its triangle shape is the cobble curb and gutter of Feature 28. This curb and gutter helped shield the Triangle from runoff from the orchard to the east, which is at a higher elevation.

Feature 30 Eastern Orchard. This feature is the northeastern portion of orchard that historic aerial photos show was planted with similarly sized trees throughout the years, and consists of approximately 5.1 acres.
f
Feature 31 Southern Orchards. This feature consists of the southern sections of orchards, which are geographically separate in places, but historic-period aerial photos show were planted in a similar grouping. This orchard is in three sections; on either side of the house complex, south of the main driveway, and on the north side of the driveway, east of the barn complex. The approximate acreage for these southern orchards is 2.8 acres.

Agricultural Implements and Artifacts. Four agricultural implements and a large saw are parked or abandoned behind (south of) the back yard of the house, between the backyard fence and the southern property boundary.

Scraper. This implement is parked approximately 10 feet south of the animal pen (Feature 11) that is at the southeast corner of the back yard of the house. It has a barrel-like, steel body, mounted horizontally between two solid steel spoked wheels with no tires. A towing bar is designed to be coupled to a tractor. The cylindrical scraper body is open on one side, and is attached to a lever mechanism which can be used to rotate it, changing its angle to the ground surface. A small manufacturer's plate reads "ATLAS ROTARY WHEEL SCRAPER//MFG. BY ATLAS SCRAPER CO.//5203 MAYWOOD AVE. BELL, CALIF.//PAT. SEPT. 1922//MODEL NO. 5AB SER. NO. 2989".

Dump trailer. This small trailer, which is designed to be towed behind a tractor, is parked just outside the backyard fence of the house, directly behind the animal pen (Feature 11). It is only a few feet away from the scraper. It has a rectangular bed with steel sides, mounted on a chassis that includes a mechanism for tilting the bed upwards to dump its load. The chassis rolls on two wooden-spoked wheels with rubber tires. A small manufacturer's plate on the front of the scraper reads "LEE LINE//AUTOMATIC DUMP BODIES, LOADERS, AND TRAILERS//LEE TRAILER AND BODY COMPANY//CHICAGO, U.S.A.//TYPE 4D CAPACITY 1 YARD SER. NO. 14341". Patent dates from October, 1915 to July, 1921 are also listed.

Plow. This implement is located approximately 60 feet south of the southeast corner of the back yard of the house, near the southern property boundary. It consists of four spring-loaded, steel plow blades mounted on a long steel axle, with a towing bar attached for coupling with a tractor. The plow is parked on wooden and concrete blocks. If it had wheels, they are missing.
Unidentified implement. An agricultural implement of undetermined function is parked approximately 10 feet south of the southwest corner of the backyard fence of the house. It consists of a steel-framed wooden flatbed, mounted on an axle with a differential and two steel wheels with rubber tires. The differential has a power shaft projecting upward, with four different-size pulley wheels for a rubber drive belt. The drive belt connects this shaft with another shaft farther back that has two different-size pulley wheels. The smaller shaft enters the bottom of a cylindrical container, possibly a hopper, and probably rotates some internal mechanism. A manufacturer's plate on the front reads "Corl & Fleming Kustum Bilt Farm Machinery Phone 89-J 227 Central Ave. Fillmore, California".

Saw. A large circular-bladed saw lies approximately 75 feet south of the southeast corner of the back yard of the house, near the southern property boundary. The saw blade is 30 inches in diameter, and has large teeth. It is on a steel axle that also holds a 6-inch-wide wooden pulley wheel for a large rubber or leather drive belt. The axle is mounted in large pillow-block bearings, which are bolted to a steel frame. A galvanized steel guard covers most of the blade, and the saw table is made of wood.

Located just west of the western boundary fence of the yard surrounding the house (Feature 1) and located within the orchard of Feature 31 is a very sparse scatter of artifacts. The scatter measures approximately 170 feet (north-south) by 70 feet (east-west). Artifacts consist of fewer than 25 small, undiagnostic fragments of clear, green, aqua, and cobalt blue bottle glass; fewer than 15 small fragments of ceramic plates, none of which bear any makers' marks; a small fragment of white plastic with "LOS ANGELES" embossed; and 5 fragments of sawed large mammal bone. Disturbances to the area consist primarily of more than a century of plowing, disking, and irrigation associated with agriculture.

In addition to this scatter of artifacts, there are 4 isolated artifacts located east of the western boundary of the property, and inside the triangle shaped orchard of Feature 29. Approximately 15 feet east of the western project area boundary fence, near the middle is a small milk white glass jar base with only "3" embossed. Approximately 80 feet east of the western project area boundary fence, is one undiagnostic brown glass bottle fragment, and one undiagnostic porcelain bowl or cup base fragment. Approximately 185 feet southeast of the northwest corner of the project area is one undiagnostic brown glass bottle base fragment.

5.4 Results Specific to the Western Parcel (APN 1210-371-16-0000)

As a result of the pedestrian survey of the western parcel of the project area, one newly-recorded historic-age agricultural site (WTS-2) was identified.

WTS-2. This historic-period site is composed of three water transportation features. The site is located in a parcel that appears to have once been used in an agricultural capacity and has been plowed or graded in the past.

Feature 1 is a north-south trending drainage flume constructed of varying section of construction material including cut stone and brick and mortar. The eastern wall of this flume doubles as a retaining wall ranging in height from 5 to 7 feet. This retaining wall stabilizes a higher elevation property to the east and the footing of this wall serves as a drainage flume. The western wall of the flume is significantly shorter, ranging from 1 to 2 feet in height. The average width of the flume is approximately 9 inches.

Feature 2 is a weir box located in the southeastern corner of the site. This feature measures 66 inches (north-south) by 101 inches (east-west). The external, exposed, depth of the feature varies but measures a maximum of 2 feet; the internal depth could not be determined. This feature is constructed of granite and mortar and is covered by a steel plate.

Feature 3 is a rock-lined flume trending east-west at the southern extent of the site. This feature varies in height and width. The eastern, upstream portion, of the feature measures 1 foot deep by 1.5 feet wide and the downstream or western portion of the feature measures 2 feet wide by 3 feet wide. Feature 3 increases in size from east (smallest) to west (largest). A modern concrete flume parallels this feature to the south.

5.5 Results Specific to the Southern Parcel (APN 1210-371-37-0000)

As a result of the pedestrian survey of the southern parcel of the project area, one newly-recorded historic-age home site (WTS-3) was identified.

WTS-3. Referred to as the Kiel property after current owner Charles Kiel, this site is a historic-period homesite with associated outbuildings, agricultural features and a citrus orchard. As previously stated, archival research and was not conducted for this site and the main house and barn structures were not recorded at the same level of detail as the Aplin/Cram house above. The section containing the main house and barn is fenced off from the remainder of the property and is located in the northeast portion of site boundary and measures 153 feet east-west by 113 feet north-south. The northwestern portion of this section contains the residence while the southeastern corner has a large red wooden outbuilding with a metallic roof a large western-facing, barn-style sliding door. The orange orchard and all associated irrigation features appear associated with the Kiel Property, built in 1906 (RealQuest.com 2015). However personal communication between Evelyn Chandler of ECORP Consulting Inc. and property owner Charles Kiel indicate original orange grove was planted circa 1892 (Kiel 2015). More detailed recording was conducted for the features located on the southern section of the property that will be affected by the proposed development.

Feature 1 is a historic-period irrigation or drainage flume composed of multiple segments designated F1-A through F1-F. F1-A is the northern portion of this feature and is comprised of two adjoining cinderblock and concrete vault boxes. The western box has a hinged steel top and measure 64 inches (east-west) by 79 inches (north-south) by 22 inches in exposed exterior height. Internal depth of this feature could not be determined. The eastern box has a metallic mesh screen top with horizontal suspended four-arm steel and wooden 2 by 4 circular turning device, possibly a directional lever for water flow within the box. The eastern box of F1-A measures 67 inches north-south by 63 inches east-west by 22 inches in exterior exposed height; interior depth could not be determined. F1-B is a rock lined flume trending north-south at the eastern edge of the recorded site boundary. This feature measures approximately 293

feet in length north-south. This segment's interior measurements are 9 inches deep by 1 inch wide. The exterior of this feature varies but averages approximately 21 inches wide by 8 inches in height. Feature 1-B continues to the north of the site boundary but was not recorded due to the limits of the project survey area. A modern concrete flume parallels and is adjoined to this feature to the east. F1-C is a low laying granite and concrete subterranean vault of undetermined function located just outside the southeast outbuilding of the Kiel Property. This vault adjoins F1-B but does not appear to receive or distribute water from or into the rock-lined flume. The vault is sealed on top and has no apparent steel or wooden access. F1-C measures 13 feet east-west by 10 feet north-south. There are two small windows or ports on the eastern exposed wall of the vault, and one small window or port on the western exposed wall. All windows or ports appear to have once been screened and measure 24 inches wide by 13 inches tall. At the southwest corner of the vault is a rectangular brick standpipe connected to the vault by a cement pipe at the floor of a standpipe. This brick standpipe measures 17 inches square with an external height of 27 inches. The stand pipe is covered by a manufactured cement top with a metal handle in the center. From the northern midpoint of F3-C a 2-inch diameter L-shaped pipe connects the vault to an outbuilding on the Kiel Property. F1-D is a steel pipe connecting the southern portion of F3-B to a standpipe (F1-E) at the base a steep decline. This steel pipe begins underground in the northern section but quickly becomes exposed as it descends downhill. This feature measures approximately 94 feet north-south with a diameter of 4 inches. F1-E is a standpipe that receives water from the steel pipe (F1-D), immediately discharging water into an additional rock lined flume (F1-F). F1-F is a pair of parallel flumes trending north-south sharing a center wall. This feature measures approximately 433 feet north-south. The interior of the western flume varies but averages 10 inches wide by 8 inches tall; concrete lines the interior of this flume. The eastern flume has slightly tapered interior walls measuring 1 foot wide at the floor and 28 inches at the top. Height of the interior of eastern flume varies but averages 2.5 feet. The western flume, the smaller of the two, extends 25 feet further to the south than the eastern flume.

Feature 2 is a single concrete standpipe located outside the fenced portion of the Kiel property at the southwest corner of the outbuilding. The diameter of the interior measures 11 inches with approximately 1 inch thick concrete. A concrete pipe runs from the floor of this stand pipe and connects into the south side of the Kiel property outbuilding.

Feature 3 is an erosion control feature containing large boulders on a steep south facing slope separating the Kiel house from the main orange orchard. It is unclear if this slope is man-made or natural. The southern toe of the slope is stabilized by an east west trending rock and mortar wall measuring 357 feet east-west by 30 inches high.

Feature 4 is a small enclosed concrete standpipe with four metal outflow valves. The feature is completely intact. and measures 10.5 inches in diameter by 8.5 inches in exposed height. Interior depth could not be determined.

Feature 5 is a small enclosed concrete standpipe identical in style and measurement to Feature 4 but with 11 inches exposed.

Feature 6 is a row of north-south trending standpipes punctuated by larger open top standpipes in the southern half. In total, this row contains 28 smaller standpipes roughly distributed every

20 feet and 4 larger standpipes distributed across the southern half of the feature. The smaller stand pipes measure 10.5 inches wide and range from 6 inches to 1 foot in exposed height. Larger standpipes are consistent in appearance; two different sized standpipes measuring 18 inches and 7 inches in diameter are conjoined vertically. The larger standpipes' heights vary but average about 41 inches.

Feature 7 is a low lying east-west trending granite flume encased in concrete that is located at the southeastern site boundary. This feature serves as the border and retaining wall between the orange orchard (Feature 10) to the north and a public paved road, Santa Ana Canyon, to the south. Feature 7 measures 256 feet in length east-west by 16 inches in height. The interior of the flume measures 5.5inches wide by 5 inches high.

Feature 8 is a north-south trending flume with attached cut stone gutter. This feature also acts a retaining wall at the western edge of the northern portion of the orange orchard (Feature 10). The interior of the flume measures 8.5 inches wide by 6 inches high. The total exterior width of feature measures 22 inches.

Feature 9 is a cut stone curb and gutter. The northern extent of this feature connects to and receives water from Feature 8. This feature is similar in style to Feature 8 but does not act as a retaining wall. The curb height varies but averages 7 inches. The floor of the cut stone gutter extends 16 inches west from the base of the cut stone curb. Portions of this curb are deteriorated.

Feature 10 is a historic-period orange orchard described by the property owner to be 123 years old (Kiel 2015). The orchard measures 625 feet east-west by 741 feet north-south. The orchard is bisected by a 35-foot wide northwest-southeast trending dirt road. It is unlikely that the present-day trees are the original trees planted. Various modern irrigation features including polymer tubing and drip lines are present throughout the orchard.

Artifact 1 is a historic-period granitic stone that has been ground into a tapered cylindrical, plug-like shape. This artifact was found on surface just south of Feature 2 and measures 3.5 inches in height by 3.5 inches in diameter.

Concentration 1 is a historic period collection of various pieces of concrete stand pipe fragments. Concentration 1 contains five circular fragments ranging in size from 1 to 4 feet in height by 12 to18 inches in diameter, accompanied by 5 smaller pieces of broken concrete standpipe.

6.0 CRHR EVALUATION RESULTS

6.1 Evaluation of WTS-1 (The Aplin/Cram Ranch)

6.1.1 Historical Context Statement

The northern parcel of the project area, at 29744 Santa Ana Canyon Road, contains 12.42 acres of land, and is described in historic records as Tract C and Tract D of the Licensed Survey Map of Lands of A.M. Aplin. At one time, these lands included Tract A and B for a total of 22 acres;

however, these two tracts were developed as the Cram Elementary School in 1997. This parcel contains a house and barn with related decorative and utilitarian features, in addition to the surrounding former orange orchards with related irrigation features. Earliest property-specific research showed that Section 1, Township 1 South, Range 3 West, was a part of the land granted to the Southern Pacific Railroad by the federal government (BLM-GLO online 2014). The railroad sold these lands to fund railroad construction (Robinson 1948).

In 1875, Alfred Marcy Aplin, his wife Mary Elizabeth, and their children came to reside in the East Highlands area. According to his biography in *History of San Bernardino and Riverside Counties* (Brown and Boyd 1922), Alfred Marcy Aplin was born in Ohio in 1837, served in the Union Army during the Civil War, rising to the rank of Captain, and married Mary Elizabeth Winn in 1865. Together they had six children: John, Myrtle, Guy, Donald, Alfred Porter, and Ethel. The Aplins lived in Iowa and Kansas and came to California in 1875. They lived temporarily on Base Line Road and then settled on a homestead which was later known as the Smith Ranch. They lived on the Smith Ranch, which was located in the eastern part of East Highlands, for approximately 14 years. About 1890, the Aplins moved to the current property after purchasing the former railroad land on East Highlands Mesa. They planted several hundred orange trees on the property, which was one of the earliest citrus groves in the area (Brown and Boyd 1922; *San Bernardino Sun* 1922). While living in Highland, A.M. Aplin was an important early irrigation developer. He was instrumental in the development of two water ditches from the Santa Ana River to irrigate groves in the higher foothills. He engineered and supervised construction of the North Fork Canal, and later completed its paving. He also built the Plunge Creek Ditch to bring water to East Highlands. Aplin contracted with the North Fork and Bear Valley Water companies to divert water into the North Fork Canal in the dry summer months, and was a consultant in the site selection and construction of the Bear Valley Dam. Mr. and Mrs. Aplin had the house in the project area constructed around 1902. Having reached retirement age, they quit citrus farming and left East Highlands in 1908. They moved to Hollywood and six years later moved to San Francisco where A.M. Aplin died in 1918. Until her death in 1922, Mary Aplin was cared for by her daughter, Myrtle, who resigned from her position as a physician with Napa State Hospital to look after her mother. The Aplins are both buried in San Francisco. At least two of the Aplin children, Donald and Guy, remained in the East Highlands area through the early 20th century and tended the orchards. One of the boys, Alfred Porter, drowned in the North Fork Canal when he was two years old (Brown and Boyd 1922; *San Bernardino Sun* 1922).

In 1923, the property was sold to William Henry Cram Sr.; and his sonsr, Arthur D. Cram; and William Henry Cram, Jr. (Henry). William Henry Cram Sr. was a son of Lewis Fillmore Cram and the Cram family was one of the earliest pioneer families in the Highland area, responsible for many of the orchards. William Henry Cram Sr. was born in 1869 and he followed his father into the family citrus business. By 1922, William Henry Cram Sr. had amassed a 60-acre orchard that was among the largest in San Bernardino County (Brown and Boyd 1922). A 1926 article on successful California orange growers describes William Henry Cram Sr. as a successful pioneer East Highlands grower, and describes his stately home on Water Street with a commanding view of the valley (Hixson 2010).

William Henry Cram Sr.'s son, Henry Cram, lived on the property on Santa Ana Road from at least 1934 until 1953, according to an interview with his granddaughter Lisa McComber. After 1953, he inherited and moved into his parents' house on Water Street, where he resided until

his death in 1964. An obituary for Henry from the *San Bernardino Sun*, dated January 20, 1964, called Henry "Mr. East Highlands" and discussed his extensive citrus holdings; his numerous terms as vice president of the Gold Buckle Association, including seven consecutive terms; his directorship and seven-year presidency of the North Fork Water Company; and his directorship of the Bear Valley Mutual Water Company and its land committee. Henry Cram was very involved in East Highlands, not only as a citrus farm owner, but as a member of the Elks Lodge, the Masons, and the Highland Congregational Church. He also belonged to the Al Malaikah Shriners Temple of Los Angeles. His survivors are listed as his wife Henrietta; a daughter, Margaret Cram Wright; a granddaughter, Lisa Alison Wright; and an uncle, James, all of East Highlands. While Henry managed the family business in the twilight years of his father's life and after his father's passing, that period is regarded as one of declining fortunes for the Cram family. In a letter written by Robert Campbell, a grandson of William Henry Sr., Mr. Campbell details the decline of the family business under the leadership of Henry Cram (Hixson 2010).

After Henry Cram left the property in 1953, the house was occupied by various orchard farm workers and their families. The house has been vacant since 2009, and the orchards were removed in 2011 or 2012. According to Lisa McComber there were six acres of Valencia oranges, and six acres of navel oranges, and A.M. Aplin was responsible for the particular pattern of planting, as he was a horticulturalist. The property is currently owned by the Wright/York trust comprised of the descendants of Henry Cram including Margaret Cram Wright and Lisa Wright McComber.

Architectural Context

The house most closely resembles the National Folk architectural style. The National Folk style of house was a response to the rise of railroad transportation after ca. 1850 and lasted into the early 20th century. Prior to 1850, folk style houses were built from local building materials; in southern California this was usually adobe or stone. After the railroad network expanded across America, houses could be built of easily transported wood lumber. As discussed above, the Santa Fe Railroad expanded into the Redlands, Highland, and Mentone area by 1891, so affordable building material was available by 1902 when the house was built. National Folk style houses are distinguished by simple and affordable designs with minimal or no ornamentation. Typical National Folk style houses include are constructed with balloon or braced framing with wooden sheathing and feature front gable and/or side gable roofs with a rectangular plan (McAlester 1984).

6.1.2 CRHR Evaluation

WTS-1. This resource consists of the Aplin/Cram residence, barn, former orchard, and associated landscaping elements, and agricultural and irrigation features. Evaluation of the site with regard to each of the four CRHR criteria is provided below.

Criterion 1. By the early 1890s, the farm was established by Alfred Marcy Aplin and his wife, Mary Elizabeth Aplin, early residents of the East Highlands area, who built the house about 1902. A.M. Aplin was instrumental in the development of irrigation in the East Highlands area, having engineered and supervised construction of the North Fork Canal, built the Plunge Creek Ditch, contracted with the North Fork and Bear Valley Water companies to divert water into the

North Fork Canal, and consulted on the site selection for and construction of the Bear Valley Dam. Some of this work took place while he owned the parcel containing site WTS-1; however, by the time the current house was built in 1902, Aplin was in his mid-sixties, his pioneering agricultural work more than a decade in the past. Furthermore, he and his wife only resided there for six years before moving to Hollywood.

When the Cram family purchased the farm in 1923, they, particularly Henry Cram, continued to grow citrus, but are not known to have expanded the operation or added any innovative farming features. In spite of A.M. Aplin's personal accomplishments and importance in local and regional history, the house post-dates Aplin's years as a local pioneer and innovator. While the house and associated orchard are associated with the Cram family, it was not the main Cram residence or the location of important developments in the growth of the local citrus industry. As a result, the resource is not historically significant to the broad patterns of local, regional, or state history. The residence, barn, and all associated features of Site WTS-1, therefore, are evaluated as not eligible for listing in the CRHR under Criterion 1.

Criterion 2. From its construction around 1902, the residence (Feature 1) was owned by Alfred Marcy Aplin and his wife, Mary Elizabeth Aplin. As discussed above, A.M. Aplin was important to the establishment of irrigation and citrus agriculture in the East Highlands area. However, by 1902 he was in his mid-sixties and his pioneering irrigation and farming work were many years in the past. He and his wife resided there for only six years before retiring and moving from the area. The house, therefore, post-dates Aplin's period of significance, roughly the 1870s to 1890s and, therefore, is not eligible under Criterion 2 as a result of their association.

Beginning in 1923, the property was owned and occupied by members of the Cram family, the preeminent pioneer family of the Highland/East Highlands area. For at least two decades, between about 1934 and 1953, and for possibly longer, possibly dating back to 1923, it was the residence of William Henry Cram, Jr., known as Henry. In addition to farming extensive citrus holdings, Henry Cram, Jr. was appointed to numerous terms as vice president of the leading growers' association in the area, the Gold Buckle Association, including seven consecutive terms. He was a director and seven-year president of the North Fork Water Company, and director of the Bear Valley Mutual Water Company and its land committee.

While Henry Cram played an important role in local and regional agriculture, the most significant contribution of the Cram family to the development of Highland is due to the pioneering efforts of his grandfather, his great uncle, and his father. Henry Cram Jr.'s grandfather, Lewis Cram, and his great-uncle, Henry Cram Sr., were among the first to settle in the area that would become Highland/East Highlands. They undertook the first efforts to irrigate the area by constructing the Cram-Van Leuven Canal. Lewis Cram was the first person to begin growing citrus in the area, and he also founded the local school district (Donahue and Suttle 2013). William Henry Cram Sr., Henry Cram's father, expanded and further developed the family's citrus holdings becoming one of the most successful growers in the Highland/East Highlands area (Brown and Boyd 1922). Although William Henry Cram Sr. and his sons, Henry; and Arthur Cram, purchased this property in 1923, William Henry Cram Sr. continued to reside in his home located on Water Street, west of this property. Henry took residence in the smaller house located on Aplin/Cram property until moving into the family home on Water Street in 1953, after the deaths of both of his parents. Accounts of members of the Cram family

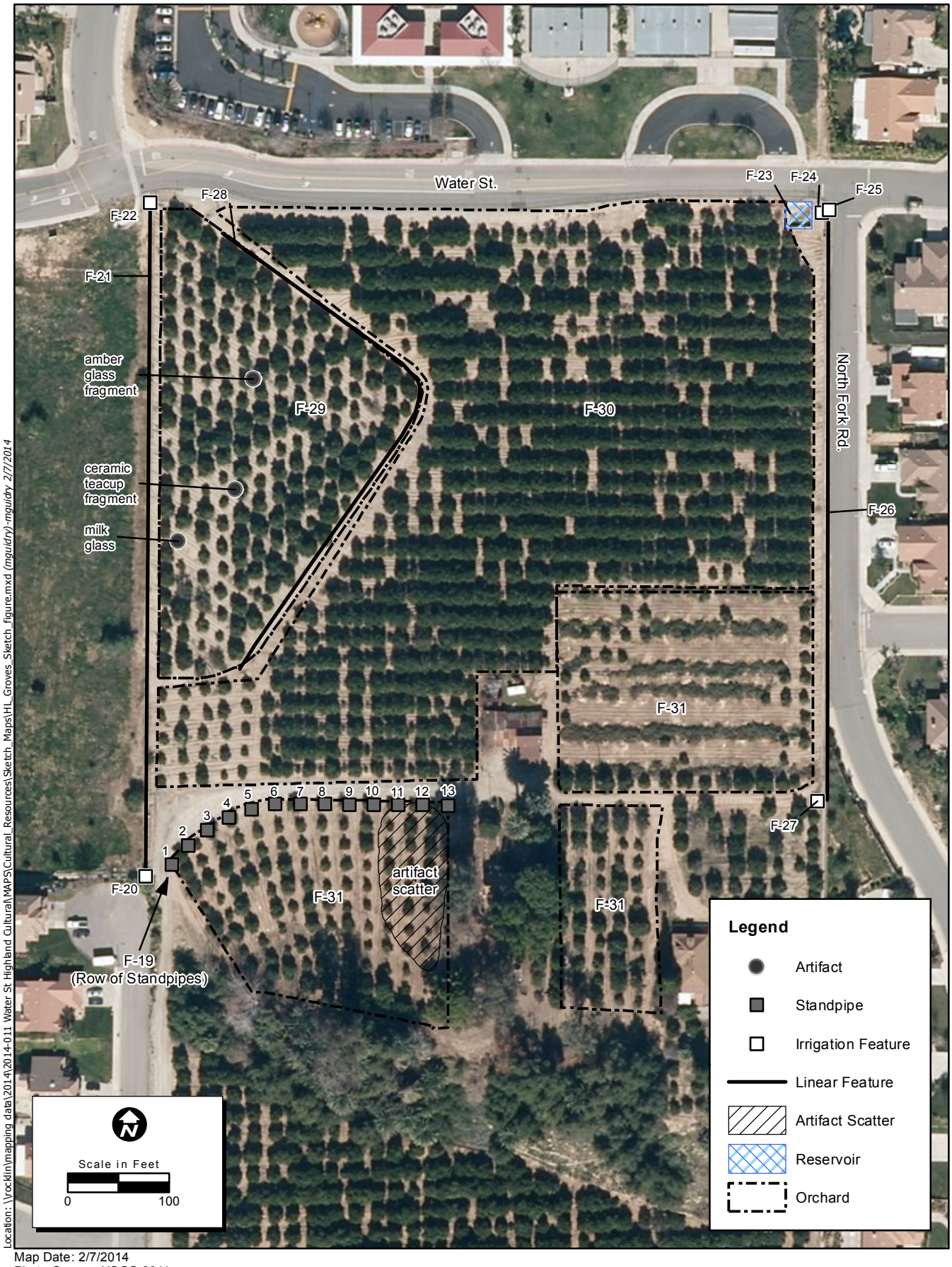
confirm that the Water Street home of W.H. Cram Sr. was regarded as the central home of the Cram family, and was where all family gatherings and meetings were held (Hixson 2010, McComber 2015).

While Henry Cram Jr. played an important role in managing the holdings of one of the most prominent families in the region, he was not party to his family's most significant contribution to the local area: the development of the land for citrus production. Also, this property was not regarded as a significant fixture in the lives of the Cram family. Members of the Cram Family held multiple properties throughout the Highland/East Highlands area including the James Cram home, located on Church Street and Highland Avenue; a home located on Greenspot Road and Florida Avenue; and the W.H. Cram Sr. home on Water Street. It is the home of W.H. Cram Sr. on Water Street that was considered the nucleus of the Cram family. This home was built by, and served as the residence of, a historically significant member of the Cram family, during his period of historical significance and at the height of the Cram family's local influence (McComber 2015, Hixson 2010). The W.H. Cram Sr. home on Water Street more readily reflects the historic significance of W.H. Cram Sr. and the Cram family.

The Aplin/Cram property was not occupied by a historically significant member of the Cram family. It is neither the only Cram home extant in the Highland/East Highlands area, nor is it among the properties best able to convey the local historical significance of the Cram family. Therefore, the Aplin/Cram property is evaluated as not eligible for listing in the CRHR under Criterion 2.

Criterion 3. The Aplin/Cram house (Feature 1) is an early 20th century wood-framed vernacular farm house that contains elements of the National Folk style. Although it contains elements of the National Folk style, the house lacks architectural distinction of that style. The house does not strongly embody the distinctive characteristics of the period, type, or method of construction of the National Folk style, nor does it represent the important work of a master architect. The house was constructed well after the pioneering period of National Folk architecture and does not contain any features that can be considered prime examples or excellent distinctive representations of that style of architecture, nor does it possess any artistic values. In addition, neither A.M. Aplin nor any local laborers or contractors who may have worked on the construction of the house were master builders, and their work did not influence the architectural development of Highland/East Highlands.

The house has undergone extensive modification since it was built circa 1902 as a residence for the Aplin family, yet the modifications are historic-period. The extensive modifications did not add artistic value and were not themselves characteristic of any architectural movement or specific development. The modifications themselves neither add nor detract from the National Folk elements of the house and are not architecturally or historically significant. The house retains a moderate level of integrity to the period of 1923 through 1953, when it was occupied by members of the Cram family, most notably Henry Cram. Regardless of integrity, because the house does not embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of a master or possesses high artistic values, the house is evaluated as not eligible for the CRHR under Criterion 3.



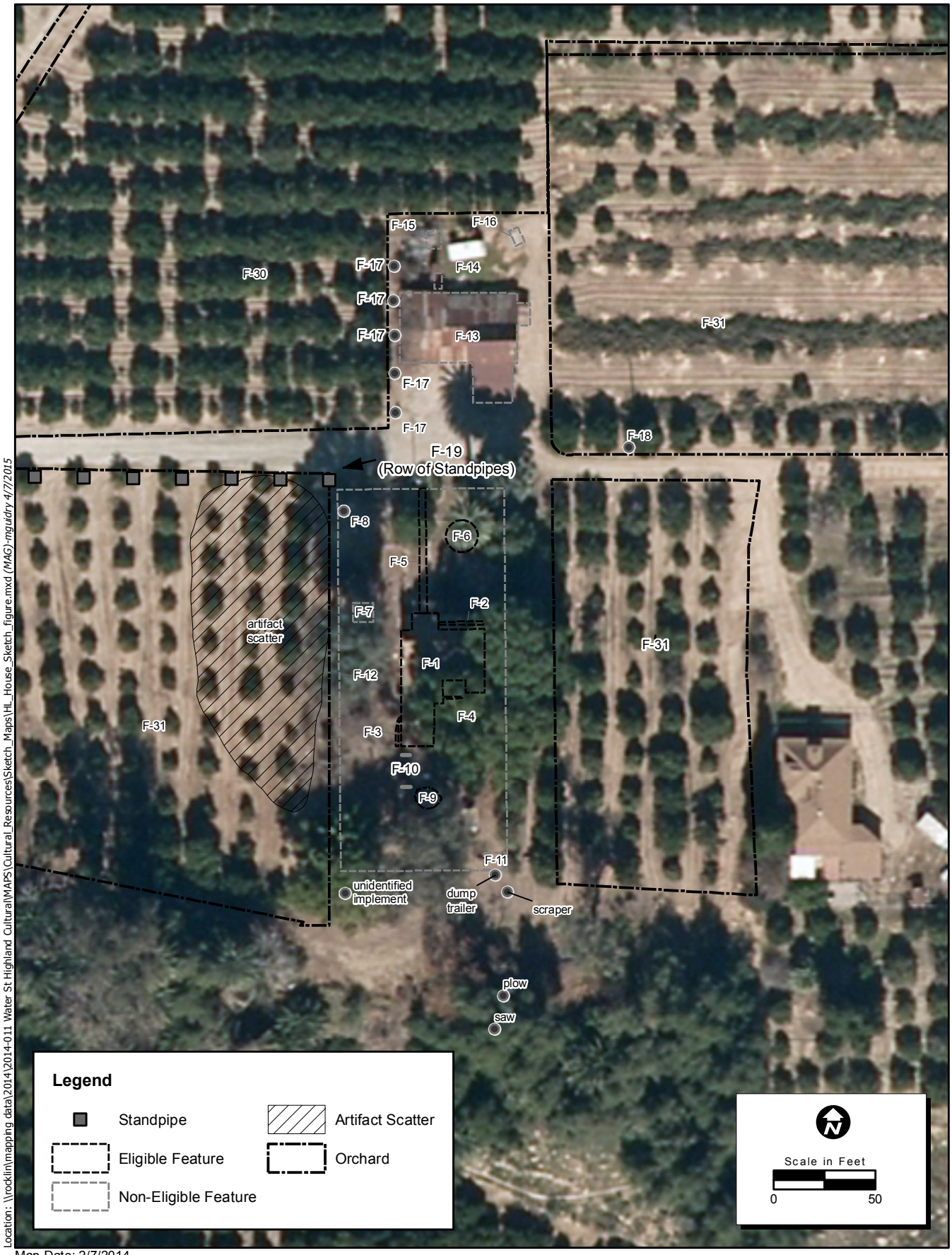
Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Cultural_Resources\Sketch_Maps\HL_Groves_Sketch_figure.mxd (mguidry)-mguidry 2/7/2014

Map Date: 2/7/2014
Photo Source: USGS 2011

Figure 3. Overview of WTS-1

2014-011 Highland CRM

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS



Location: \\rocklin\mapping data\2014\2014-011 Water St Highland Cultural\MAPS\Cultural_Resources\Sketch_Maps\HL_House_Sketch_figure.mxd (MAG)-mguidry 4/7/2015

Map Date: 2/7/2014
Photo Source: USGS 2011

Figure 4. Close-up of House and Related Features of WTS-1

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2014-011 Highland CRM

The barn (Feature 13) is of utilitarian design, lacks architectural distinction, and does not strongly embody the distinctive characteristics of any period, type, or method of construction. Furthermore, it is in extremely poor condition and lacks integrity. The other agricultural features that are not related to the house, consisting mainly of irrigation structures, do not possess any distinctive engineering characteristics, and have poor integrity. The barn and agricultural features are, therefore, evaluated as not eligible for listing in the CRHR under Criterion 3.

Criterion 4. One historic-period refuse deposit exists within the site, located west of the house (Feature 1), outside the fence surrounding the yard in an area formerly occupied by orchard trees. The deposit is extremely sparse, is very unlikely to include a subsurface component, and contains no diagnostic artifacts. It has no potential to yield significant data that would be important to the history of the farm. The house, barn, and other features within the site have no potential to yield further data about their architecture or construction. The site is therefore, recommended not eligible for listing in the CRHR under Criterion 4.

6.2 Evaluation of WTS-2 (Agricultural Site)

WTS-2. This site is a single, linear set of water transportation features that consist of a cut granite and mortar/ brick and mortar drainage flume doubling as a retaining wall, a weir box constructed of granite and mortar with a steel top, and an east-west trending rock-lined channel or flume. These features have no known associations with persons or events that are important in regional history. They are not the work of a master or a particularly good representation of an architectural style. Thus, this site is not eligible under Criteria 1, 2, or 3. This site consists of a single set of water transport features that are unlikely to have any more data potential than what has already been recorded. This site is not eligible under Criterion 4. Thus, because it does not meet any of the four eligibility criteria, this site is not recommended eligible for the CRHR and the NRHP.

6.3 Evaluation of WTS-3 (Kiel Property)

WTS-3. This resource consists of the Kiel residence, barn, orchards, and associated agricultural features. The Kiel residence was built in 1906 and the orchards may date as far back as 123 years (Kiel 2015). As previously stated, the current project plans stipulate that is property will be subdivided into two sections. The section containing the main house and barn structures will not be affected by the proposed project and are outside the current project area. As such, the house and barn structures were not recorded in detail and will not be evaluated for the CRHR as part of the current project. Given its age, the main Kiel residence and barn may be eligible for the CRHR and, should changes be made to the project design that will affect these structures, archival research and a formal evaluation shall be conducted.

For the current project, only the agricultural features located to the south of the house and barn structures will be evaluated for the CRHR. As part of the larger trend of citrus farming in the region, these features may be eligible under Criterion 1. However, the Kiel farm is only one example of the many citrus groves in the area and none of these agricultural features possess any distinctive or innovative engineering characteristics, being of common types found on early 20th century citrus farming sites throughout southern California. As such, they are not likely to be eligible for the CRHR under Criteria 1 or 3. These features are associated with the Kiel

family. No archival research has been done for the Kiel property and this family's role in Highland's development is unknown. That said, even if Kiel family played a significant role in the local history of Highland, this grove is a small, limited family orchard and is unlikely to be part of the activities that might have made them significant to the area. As such, these agricultural features are not likely to be eligible under Criterion 2. These types of features are unlikely to have significant subsurface deposits and are unlikely to yield additional information to the level of documentation already recorded. As such, these features are not likely to be eligible under Criterion 4.

In summary, although the Kiel residence may prove to be eligible for the CRHR following archival research, the residence and barn structures are not being evaluated during the current project. The associated agricultural features will be affected by the proposed project and are, thus, being evaluated separately from the main residence. These features are not considered significant resources and do not meet any of the four criteria necessary to be considered eligible for the CRHR. Thus, this portion of the site is not recommended eligible for the CRHR.

7.0 SUMMARY AND RECOMMENDATIONS

A cultural resources investigation was conducted for a 27-acre project area located in the City of Highland, San Bernardino County, California in support of Diversified Pacific's proposed residential development. The combined project area consists of three parcels. For the purposes of this study, these parcels are named the northern parcel (APN 1210-371-03-0000), the southern parcel (APN 1210-371-37-0000), and the western parcel (APN 1210-371-16-000).

No prehistoric archaeological sites or isolated finds were identified within the project area as a result of the cultural resources records search, NAHC Sacred Lands File search, or the two rounds of field surveys. No previously recorded NRHP or CRHR-listed or eligible properties exist within the 0.5-mile (800-meter) records search radius.

As a result of two rounds of field surveys, three historic-period sites were identified within the project area. These include two historic-period home/agricultural sites (WTS-1[Aplin/Cram property] and WTS-3 [Kiel property]), and one linear grouping of agricultural features (WTS-2). Because the Aplin/Cram house will be affected by the proposed development, archival research and an architectural historical study/CRHR evaluation were conducted for this property. Evaluations for the CRHR were also conducted for WTS-2 and the Kiel Property (WTS-3). The Kiel property will be subdivided into two sections, one containing the main house and barn structures, and one containing the orchards and agricultural features. Because the main house and barn will not be affected by the proposed project, these structures were not recorded in detail and were not evaluated for the CRHR as part of the current project. Rather, only the agricultural features located to the south of the house and barn structures were evaluated for the CRHR.

As a result of the CRHR evaluations, the Aplin/Cram Ranch (WTS-1) is recommended as not eligible for the CRHR. As the residence and associated features are evaluated as not eligible for the CRHR under any criterion

WTS-2, the linear agricultural site is recommended as not eligible for the CRHR. For WTS-3, the Kiel property, although the Kiel residence may prove to be eligible for the CRHR following

archival research and formal evaluation, the associated agricultural features were evaluated separately from the main residence and are recommended as not eligible for the CRHR.

Because sites WTS 1, WTS-2 and the portion of the Kiel Property that lies within the project area (WTS-3) are recommended as not eligible for the CRHR, the alteration or removal of the recorded features associated with these three sites as a result of the proposed redevelopment of the project area would not result in a significant impact to a Historical Resource under CEQA, and no mitigation measures are required. That said, should alterations to the project plans affect the subdivision containing the Kiel residence, archival research and a formal architectural history study shall be conducted to determine whether or not the residence is eligible for the CRHR.

The prehistoric archaeological sensitivity of the project area is believed to be low. However, in the event that any prehistoric archaeological materials (e.g. stone tools or milling-related artifacts like manos or metates) are encountered during ground-disturbing construction activities, all activities must be suspended in the vicinity of the find until the deposits are recorded and evaluated by a qualified archaeologist. There may be subsurface historic–period artifacts or features within the project area, related to the three sites recorded. However, these materials, if present, would most likely be consistent with the existing agricultural features and refuse deposits that have little or no potential to yield significant data that would be important to the eligibility of these three sites. Therefore, if these materials are encountered no action would be required.

If human remains of any kind are found during construction, the requirements of CEQA Guidelines Section 15064.5(e) and AB 2641 shall be followed. According to these requirements, all construction activities must cease immediately and the San Bernardino County Coroner and a qualified archaeologist must be notified. The Coroner will examine the remains and determine the next appropriate action based on his or her findings. If the coroner determines the remains to be of Native American origin, he or she will notify the NAHC. The NAHC will then identify the most likely descendants (MLD) to be consulted regarding treatment and/or reburial of the remains. If an MLD cannot be identified, or the MLD fails to make a recommendation regarding the treatment of the remains within 48 hours after gaining access to the remains, Diversified Pacific shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.

8.0 REFERENCES

Alexander, Nancy
2007 *The History of Cram Elementary School.* In Highland Community News, July 31, 2007.

Bean, Lowell John
1972 *Mukat's People: The Cahuilla Indians of Southern California*. University of California Press, Berkeley.

1978 Cahuilla. In *Handbook of North American Indians, Volume 8, California*. Edited by Robert F. Heizer, pp. 575-587. W.C. Sturtevant, general editor. Smithsonian Institution, Washington, DC.

Bean, Lowell John and Katherine Siva Saubel
1972 *Temalpakh: Cahuilla Indian Knowledge and Use of Plants*. Malki Museum, Banning, California.

Bean, Lowell J. and Charles R. Smith
1978a Serrano. In *Handbook of North American Indians, Volume 8, California*, pp. 570-574. Edited by Robert F. Heizer. Smithsonian Institution, Washington, D.C.

1978b Gabrielino. In *Handbook of North American Indians, Volume 8, California*, pp. 538-549. Edited by Robert F. Heizer. Smithsonian Institution, Washington, D.C.

Beattie, Kay
1994 *A Brief History of Highland*. Highland Area Historical Society, Highland, California.

BLM/GLO Records
2014 http://www.glorecords.blm.gov/search/default.aspx. Accessed 01/23/2014.

Brown, John Jr., and James Boyd
1922 *History of San Bernardino and Riverside Counties, with Selected Biography of Actors and Witnesses of the Period of Growth*. The Lewis Publishing Company, Chicago. Viewable on-line at archive.org/details/historyofsanbern03brow. Pp. 1095–1098.

California Room, Norman Feldhym Central Library
n.d. Genealogy files, Aplin and Cram.

City-Data.com
2014 http://www.city-data.com/city/Highland-California.html. Accessed January 28, 2014.

Castillo, Edward D.
1978 The Impact of Euro-American Exploration and Settlement. In *Handbook of North American Indians, Volume 8, California,* edited by R.F. Heizer, pp. 99-127. William C. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

Cleland, Robert G.
1941 The Cattle on a Thousand Hills: Southern California, 1850-1870. Huntington Library, San Marino, California.

Donahue, Marilyn Cram, and Lucille Cram Whitecotton Suttle
2013 *Cram Family History.* http://oldtimetales.blogspot.com/2013/06/cram-family- history.html

Dumke, Glenn S.
1944 *The Boom of the Eighties in Southern California*. Huntington Library, San Marino.

Erlandson, Jon M.
1994 *Early Hunter-Gatherers of the California Coast*. Plenum Press, New York.

Hixson, Tom
2010 *Packrat: A Tale of Compulsive Hoarding.* Lulu.com.

Kiel, Charles
2015 Personal communication by phone with Evelyn Chandler of ECORP Consulting, Inc. February 5th 2015.

Kroeber, Alfred L.
1925 Handbook of the Indians of California. *Bureau of American Ethnology Bulletin No. 78*. U.S. Government Printing Office, Washington, DC.

Lippencott
1898 Lippencott Water Survey Map. On file at the San Bernardino Archaeological Information Center.

McAlester, Virginia and Lee
1984 *A Field Guide to American Houses.* Alfred A Knopf, New York.

McCawley, William
1996 *The First Angelinos: the Gabrielino Indians of Los Angeles.* Malki Museum Press, Morongo Indian Reservation, Banning, California.

McComber, Lisa
2014 Prior Property Owner of APN 1210-371-03-000. Personal communication with Kristina Lindgren, ECORP Consulting, Inc.

2015 Prior Property Owner of APN 1210-371-03-000 and granddaughter of Henry Cram. Personal communication with Robert Cunningham, ECORP Consulting, Inc.

Miller, Bruce W.
1991 *The Gabrielino*. Sand River Press, Los Osos, California.

Moratto, Michael J.
1984 California Archaeology. Academic Press, Inc., New York.

Nationwide Environmental Title Research, LLC. (NETRonline)
2014 Historic Aerials. http://www.historicaerials.com/

RealQuest.com
2015 Property Detail Report for APN 1210-371-37-0000. http://www.realquest.com/jsp/rq.jsp?action=switch&page=main. Accessed February 10, 2015.

Richards, Elizabeth W.
1966 *Guideposts to History: Concerning Origins of Place and Street Names in San Bernardino County*. Santa Fe Federal Savings and Loan Association, San Bernardino, California.

Robertson, Donald B.
1998 *Encyclopedia of Western Railroad History, Volume IV, California*. The Caxton Printers, Caldwell, Idaho.

Robinson, W. W.
1948 *Land in California: The Story of Mission Lands, Ranchos, Squatters, Mining Claims, Railroad Grants, Land Scrip, Homesteads*. University of California Press, Berkeley.

San Bernardino County Sun, California
1922 "Mrs A.M. Aplin Passes in North" February 26. Newspaper clipping on file at the California Room of the Feldhym Central Library, San Bernardino.

1964 "Henry Cram, 69, Known as 'Mr. East Highlands,' Dies" January 20. Newspaper clipping on file at the California room of the Feldhym Central Library.

San Bernardino County Office of the Assessor
2014 Property Information Management System . http://nppublic.co.san-bernardino.ca.us/newpims/(S(tdj40255e102433jyd5p31um))/PIMSINTERFACE.ASPX. Accessed 01/21/2014.

San Bernardino County Historic Assessors Records
1895-1917 Assessor's Lot Book 9, Series 1. On file at the San Bernardino County Archives. Accessed in 1/16/2014

1918-1922 Assessors Lot Book 9, Series 2. On file at the San Bernardino County Archives. Accessed on 01/16/2014

1923-1928 Assessor's Lit book 21, Series 2. On file at the San Bernardino County Archives. Accessed on 01/16/2014.

1929-1934 Assessor's Lot Book 42, Series 2. On file at the San Bernardino County Archives. Accessed on 01/16/2014.

1935-1940 Assessor's Lot Book 85B, Series 2. On file at the San Bernardino County Archives. Accessed on 01/16/2014.

1941-1946 Assessor's Lot book 118B, Series 2. On file at the San Bernardino County Archives. Accessed on 01/16/2014

U.S. Geological Survey (USGS)

1899 Redlands 15-minute topographic quadrangle map. Department of the Interior, Washington, D.C.

1901 (reprinted 1924) Redlands 15-minute topographic quadrangle map. Department of the Interior, Washington, D.C.

1943 Redlands and vicinity California 7.5-minute topographic quadrangle map. Department of the Interior, Washington, D.C.

1996 Redlands, California 7.5-minute topographic quadrangle map. Department of the Interior, Washington, D.C.

9.0 REPORT AND FIELD PERSONNEL

9.1 Report Preparers

Cary D. Cotterman, Co-Author
1994 B.A., Anthropology, California State University, San Bernardino
Years of experience: 21

Kristina Lindgren, Co-Author
2001 B.A., Anthropology, California State University San Bernardino, San Bernardino
Years of experience: 10

Wendy Blumel, M.A./RPA, Co-Author
2003 M.A., Anthropology, Louisiana State University
2000 B.A., Anthropology, Beloit College
Years of Experience: 7

Andrew Myers, Co-Author
2011 B.A. Anthropology, University of California Santa Barbara, Santa Barbara
Years of experience: 3

Roger D. Mason, Ph.D./RPA, Contributing Author
1980 Ph.D., Anthropology (Archaeology), University of Texas at Austin
1971 B.A., Anthropology, University of Washington
Years of Experience: 30

9.2 Field Personnel

Cary D. Cotterman, Field Director/Historic Building Specialist
1994 B.A., Anthropology, California State University, San Bernardino
Years of experience: 21

Kristina Lindgren, Field Archaeologist
2001 B.A., Anthropology, California State University San Bernardino, San Bernardino
Years of experience: 10

Andrew Myers, Field Technician
2011 B.A. Anthropology, University of California Santa Barbara, Santa Barbara
Years of experience: 3

APPENDIX A SACRED LANDS FILE SEARCH AND NATIVE AMERICAN CORRESPONDENCE

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

January 14, 2014
(P-13-489)

Mr. Dave Singleton
1550 Harbor Boulevard
Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710

VIA EMAIL ds_nahc@pacbell.net

Subject: Cultural Resources Survey of a 12.42-acre parcel (APN 1210-371-03) in Highland, San Bernardino County

Dear Mr. Singleton:

We are requesting on behalf of our client that a review of the Sacred Lands File be conducted for a cultural resources study in Highland, San Bernardino County. The property is slated for a proposed residential development project. The 12.42-acre parcel is located on the southwest corner of the intersection of Water Street and North Fork Road within the city of Highland.

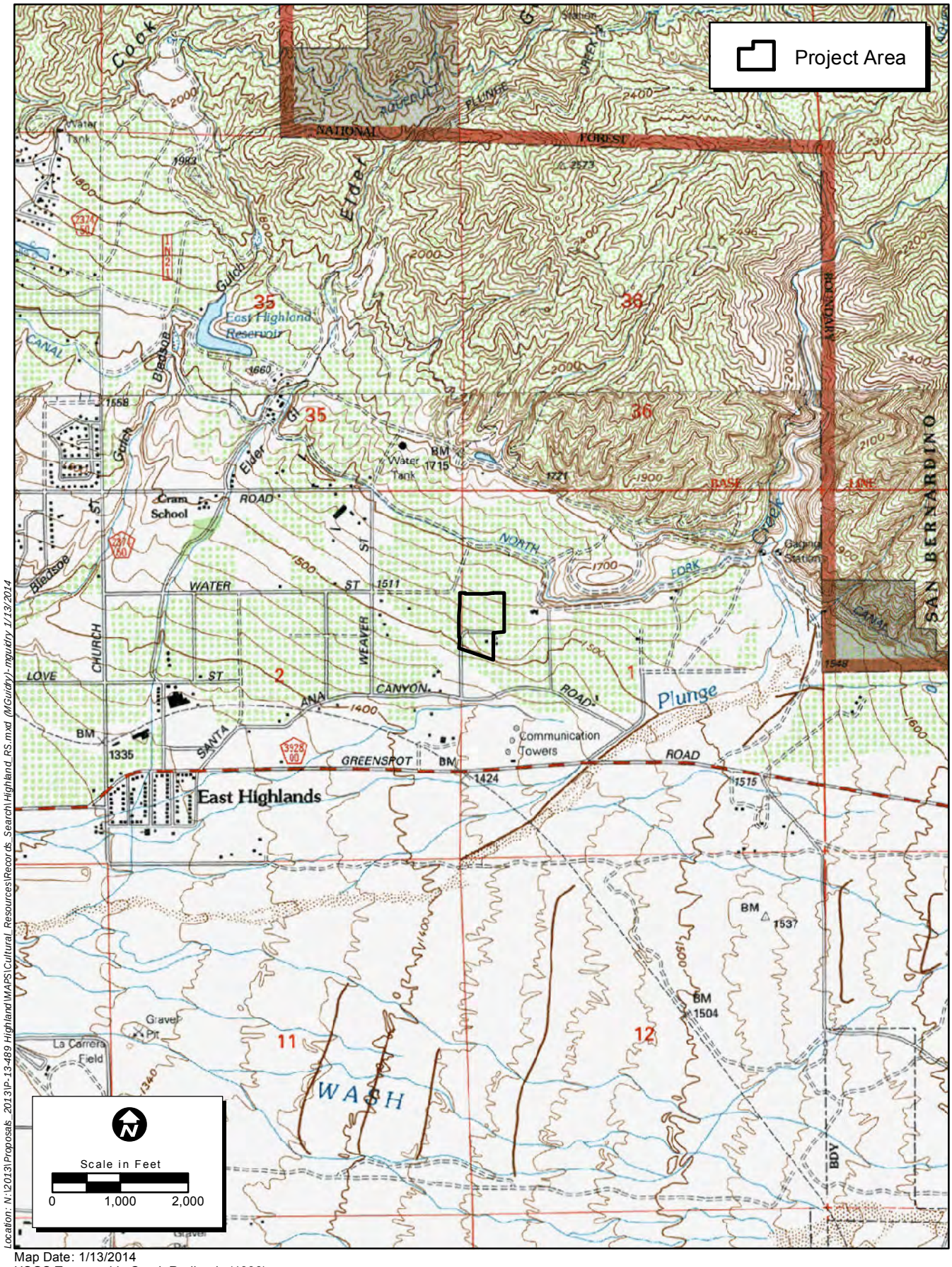
As shown on the U.S. Geological Survey (USGS) Redlands 7.5-minute California topographic quadrangle maps (1996), the project area is located within Section 1 of Township 1 South, Range 3 West, of the San Bernardino Base and Meridian (see attached map).

Please email the results of this search to me at wblumel@ecorpconsulting.com. They can also be faxed to my attention at **(909) 307-0056**. For correspondence, please reference P-13-489. If you have any questions regarding this request, please do not hesitate to contact me at (909) 307-0046 or via the email listed above. Thank you for your assistance with this project.

Sincerely,
ECORP Consulting, Inc.

Wendy Blumel
Staff Archaeologist

Attachment: as stated



Location: N:\2013\Proposals_2013\P-13-489 Highland\MAPS\Cultural_Resources\Records_Search\Highland_RS.mxd (MGuidry)-mguidry 1/13/2014

Map Date: 1/13/2014
USGS Topographic Quad: Redlands (1996)

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Record Search

P-13-489 Highland

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
(916) 373-3715
Fax (916) 373-5471
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

January 14, 2014

Ms. Wendy Blumel, Staff Archaeologist
ECORP Consulting, Inc.
215 North 5th Street
Redlands, CA 92324

Sent by FAX to: 909-307-0056
No. Pages: 3

RE: Sacred Lands File Search and Native American Contacts list for the **"Residential Development Project;"** located on 12.42-acres in the City of Highland; San Bernardino County, California.

Dear Ms. Blumel:

A record search of the NAHC Sacred Lands File **failed to indicate** the presence of Native American traditional cultural places in the project site(s) submitted as defined by the USGS coordinates configuring the 'Area of Potential Effect' or APE. Furthermore, the absence of archaeological or other cultural resources does not preclude their existence at the subsurface level.

In the 1985 Appellate Court decision (170 Cal App 3rd 604), the Court held that the NAHC has jurisdiction and special expertise, as a state agency, over affected Native American resources impacted by proposed projects, including archaeological places of religious significance to Native Americans, and to Native American burial sites.

Attached is a list of Native American tribes, Native American individuals or organizations that may have knowledge of cultural resources in or near the project area (APE). As part of the consultation process the NAHC recommends that local government and project developers contact the tribal governments and individuals in order to determine the proposed action on any cultural places/sacred sites. If a response from those listed is not received in two weeks of notification, the NAHC requests that a follow-up telephone call be made to ensure the project information has been received.

California Government Code Section 65040.12(e) defines "environmental justice" to provide "fair treatment of People...with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations and policies" and Executive Order B-10-11 requires consultation with Native American tribes their elected officials and other representatives of tribal governments to provide meaningful input into the development of legislation, regulations, rules, and policies on matters that may affect tribal communities.

Gabrielino/Tongva Nation
Sam Dunlap, Cultural Resources Director
P.O Box 86908
Los Angeles, CA 90086

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Dunlap:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

If you have any questions or need additional information, please contact me at (916) 373-3715.

Sincerely,

Dave Singleton
Program Analyst

Attachments

Native American Contacts
San Bernardino County California
January 14, 2014

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670 Cahuilla
Anza , CA 92539
admin@ramonatribe.com
(951) 763-4105
(951) 763-4325 Fax

San Manuel Band of Mission Indians
Carla Rodriguez, Chairwoman
26569 Community Center Drive Serrano
Highland , CA 92346
(909) 864-8933
(909) 864-3724 - FAX
(909) 864-3370 Fax

Gabrieleno/Tongva San Gabriel Band of Mission
Anthony Morales, Chairperson
PO Box 693 Gabrielino Tongva
San Gabriel , CA 91778
GTTribalcouncil@aol.com
(626) 286-1232 - FAX
(626) 286-1758 - Home
(626) 286-1262 -FAX

Morongo Band of Mission Indians
William Madrigal, Jr.,Cultural Resources Manager
12700 Pumarra Road Cahuilla
Banning , CA 92220 Serrano
(951) 201-1866 - cell
wmadrigal@morongo-nsn.gov
(951) 572-6004 Fax

San Manuel Band of Mission Indians
Daniel McCarthy, M.S.., Director-CRM Dept.
26569 Community Center. Drive Serrano
Highland , CA 92346
(909) 864-8933, Ext 3248
dmccarthy@sanmanuel-nsn.gov
(909) 862-5152 Fax

Serrano Nation of Mission Indians
Goldie Walker, Chairwoman
P.O. Box 343 Serrano
Patton , CA 92369

(909) 528-9027 or
(909) 528-9032

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
9570 Mias Canyon Road Serrano
Banning , CA 92220 Cahuilla
siva@dishmail.net
(951) 849-4676

Gabrielino /Tongva Nation
Sam Dunlap, Cultural Resorces Director
P.O. Box 86908 Gabrielino Tongva
Los Angeles , CA 90086
samdunlap@earthlink.net
909-262-9351

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

his list s only applicable for contacting local Native Americans with regard to cultural resources for the proposed Residential Development Project; located on 12.42-acres in the City of Highland; San Bernardino County, California for which a Sacred Lands File search and Native American Contacts list were requested.

Gabrielino/Tongva Nation
Sam Dunlap, Cultural Resources Director
P.O Box 86908
Los Angeles, CA 90086

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Dunlap:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached map).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670
Anza, CA 92539

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Hamilton:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

Morongo Band of Mission Indians
William Madrigal, Jr., Cultural Resources Manager
12700 Pumarra Road
Banning, CA 92220

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Madrigal, Jr.:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

cc: Ernest Siva, Tribal Elder (via email: siva@dishmall.net)

San Manuel Band of Mission Indians
Daniel McCarthy, Director-CRM Department
26569 Community Center Drive
Highland, CA 92346

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. McCarthy:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached Location Maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA 91778

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Morales:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

San Manuel Band of Mission Indians
Carla Rodriguez, Chairwoman
26569 Community Center Drive
Highland, CA 92346

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Ms. Rodriguez:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

cc: Daniel McCarthy, Director-CRM Department (via email:dmccarthy@sanmanuel-nsn.gov)

Morongo Band of Mission Indians
Ernest Siva, Tribal Elder
9570 Mias Canyon Road
Banning, CA 92220

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Mr. Siva:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

cc: William Madrigal, Jr. Cultural Resources Manager (via email:wmadrigal@morongo-nsn.gov)

Serrano Nation of Mission Indians
Goldie Walker, Chairwoman
P.O. Box 343
Patton, CA 92369

January 15, 2014
Project Number: P-13-489

SUBJECT: *Residential Development Project in the City of Highland, San Bernardino County, California*

Dear Ms. Walker:

Water Street Land, LLC. proposes to construct an in-fill residential development on a 12.42-acre parcel (APN 1210-371-03) in the city of Highland, San Bernardino County. The project area is located on the southwest corner of the intersection of Water Street and North Fork Road, San Bernardino County, California. As shown on the U. S. Geological Survey (USGS) 7.5-minute Redlands, California topographic quadrangle map (1996), the project area is located in the southwest quarter of the northwest quarter of Section 1, Township 1 South, Range 3 West of the San Bernardino Base and Meridian (please see attached maps).

To identify previously recorded cultural resources that could be affected by the proposed project, a cultural resources records search was conducted at the San Bernardino Archaeological Information Center. This records search identified a total of 11 sites within a half-mile of the project area. All the sites are historic-period in nature. No resources have been previously recorded within the boundaries of the project area. An examination of aerial photographs indicate the project area has been used for agricultural pursuits for at least 20 years, and one house and associated outbuildings are located in the southern portion of the project area. Field survey of the parcel will be conducted by ECORP Consulting within the next few days.

A search of the Sacred Lands File has been conducted with the Native American Heritage Commission in Sacramento, California. The Sacred Lands File did not identify any known Native American cultural resources within the immediate project area, but suggested we contact additional sources for information regarding knowledge of unrecorded cultural resources.

ECORP is contacting you about the proposed project to provide you with an opportunity to comment on the project. We would appreciate any information you may have regarding Native American cultural resources located within or near the proposed project area that could be affected by the proposed project. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project for planning purposes only. We will protect the confidentiality of information concerning the identity, location, character, and traditional use of cultural places identified during this process.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated without your input. We would appreciate receiving your response to this inquiry within 30 days

of receipt of this letter. Please note that this data gathering process is not considered formal consultation under Section 106 of the National Historic Preservation Act.

If you have any questions, please feel free to call me at (909) 307-0046 or via email at wblumel@ecorpconsulting.com. Thank you for your assistance and participation in this project.

Sincerely,
ECORP Consulting, Inc.

Wendy M. Blumel
Staff Archaeologist

Attachments: as stated

APPENDIX B PHOTOGRAPHS OF WTS-1

Feature 1 (house), north and west elevations. View to southeast. 01/17/2014.

Feature 1 (house), west elevation, View to northeast. 01/17/2014.

Feature 1 (house), west elevation. View to northeast. 01/17/2014.

Feature 1 (house) west and south elevations. View to northeast. 01/17/2014.

Feature 1 (house), south elevation. View to north. 01/17/2014.

Feature 1 (house), east elevation. View to northwest. 01/17/2014.

Feature 1 (house), east elevation. View to northwest. 01/17/2014.

Feature 1 (house). North elevation. View Southwest. 01/17/2014.

Feature 2 (Drainage Flume) along north side of Feature 1 (house) View to southwest. 01/17/2014.

Feature 3 (Drainage Flume) exiting underside of west side of Feature 1(house). View to northeast. 01/17/2014.

Feature 4 (Split granite planter) against back of Feature 1 (house). View to southwest. 01/17/2014.

Feature 6 (fountain) around palm in front yard of Feature 1(house). View northeast. 01/17/2014.

Feature 7 (brick Patio) near northwest corner of Feature 1 (house). View to south. 01/17/2014.

Feature 8 (birdbath) in front yard of Feature 1(house). View west. 01/17/2014.

Feature 9 (pond) with bedrock, Feature 10 clothes line) in back yard of Feature 1 (house). View southeast 01/17/2014.

Feature 11 (animal pen) in southeast corner of backyard of Feature 1 (House). View southeast. 01/17/2014.

Feature 11 (animal pen) in southeast corner of back yard of Feature 1 (house). View northwest. 01/17/2014.

Saw behind back yard of Feature 1 (house). View to northeast. 01/17/2014.

Plow behind back yard of Feature 1 (house). View to East. 01/17/2014.

Dump Trailer behind back yard of Feature 1 (house). View to northwest. 01/17/2014.

Scraper behind back yard of Feature 1 (house). View to southwest. 01/17/2014.

Scraper and Dump Trailer behind back yard of Feature 1 (house). View to west. 01/17/2014.

Unidentified agricultural implement located behind back yard of Feature 1 (house). View South. 01/17/2014.

Feature 13 (barn), south side View to north. 01/17/2014.

Feature 13 (barn), west and south sides. View to northeast. 01/17/2014.

Feature 13 (barn), west side, with Feature 17 (row of standpipes). View to east. 01/17/2014.

Feature 13 (barn), north and west sides. View to southeast. 01/17/2014.

Feature 13 (barn), north side. View to south. 01/17/2014.

Feature 13 (barn), east and north sides. View to southwest. 01/17/2014.

Feature 13 (barn), east side. View to west. 01/17/2014.

Feature 13 (barn), south and east sides. View northwest. 01/17/2014.

Feature 13 (oil or fuel tank) north of Feature 13 (barn). View to west. 01/17/2014.

Feature 15 (concrete slab in northwest corner of corral), north of Feature 13 (barn). View to northwest. 01/17/2014.

Feature 16 (underground vault) north of Feature 13 (barn). View to northwest. 01/17/2014.

Feature 19 (row of standpipes) with portion of Feature 31(former southern orchard). View east. 01/17/2014.

Feature 20 (southwest weir box). View northwest. 01/17/2014.

Feature 21 (west flumes) on western boundary of property. View north. 01/17/2014.

Feature 22 (northwest corner weir box), near Aplin and Water Streets. View west. 01/17/2014.

Feature 23 (reservoir) and Feature 24 (cinderblock weir) northeast corner of property. View northeast. 01/17/2014

Feature 24 (cinderblock weir) adjacent to reservoir. View south. 01/17/2014.

Feature 24 (cinderblock weir) and Feature 25 (brick and mortar weir) in northeast corner. View northeast. 01/17/2014.

Feature 25 (brick and mortar weir) with Feature 26 (east flumes). View south. 01/17/2014.

Portion of Feature 25 (brick and mortar weir), feeding into Feature 26 (east flumes). View south. 01/17/2014.

Feature 26 (east flumes) on east boundary of property. View South. 01/17/2014.

Feature 27 (weir box and gate) southeast corner of property. View south. 01/17/2014.

Northern Portion of Feature 28 (cobble curb/gutter). View southeast. 01/17/2014.

Southern portion of Feature 28 (cobble curb/gutter), and dividing line for Feature 29 (Triangle Orchard) and Feature 30 (eastern orchard). 01/17/2014.

Point where Feature 28 cobble curb/gutter ends in buried pipeline. View southwest. 01/17/2014.

Feature 30 (eastern orchard) from northeast corner of property. View southwest. 01/17/2014.

Feature 28 (cobble curb/gutter) on left and Feature 30 (former eastern orchard). View northeast. 01/17/2014.

APPENDIX D

Geotechnical Report and Grading Plan

RMA Group
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL CONSULTANTS

GEOTECHNICAL INVESTIGATION
FOR
PROPOSED RESIDENTIAL DEVELOPMENT
12.4 ACRE PARCEL, APN 1210-371-03
HIGHLAND, CA

For

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

November 6, 2013

13-594-01

RMA Group
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL CONSULTANTS

November 6, 2013

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Attention: Mr. Phil Burum
Executive Vice President

Subject: Geotechnical Investigation for
Proposed Residential Development
APN 1210-371-03
Highland, CA

Dear Mr. Burum:

In accordance with your request, a geotechnical investigation has been completed for the above-referenced project. The report addresses both engineering geologic and geotechnical conditions. The results of the investigation are presented in the accompanying report, which includes a description of site conditions, results of our field exploration and laboratory testing, conclusions, and recommendations.

We appreciate this opportunity to be of continued service to you. If you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,

RMA Group

Gary Wallace, PG | CEG
Vice President - Geology
CEG 1255

PROFESSIONAL GEOLOGIST
GARY W. WALLACE
No. 1255
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Danny Cohen, PE | GE
Chief Geotechnical Engineer
GE 2346

REGISTERED PROFESSIONAL ENGINEER
DANNY COHEN
No. 2346
Exp. Date 3/31/14
GEOTECHNICAL
STATE OF CALIFORNIA

TABLE OF CONTENTS

		PAGE
1.00	**INTRODUCTION**	1
1.01	Purpose	1
1.02	Scope of the Investigation	1
1.03	Site Location and Description	1
1.04	Current and Past Land Usage	2
1.05	Planned Usage	2
1.06	Investigation Methods	2
2.00	**FINDINGS**	3
2.01	Geologic Setting	3
2.02	Earth Materials	3
2.03	Expansive Soils	4
2.04	Surface and Groundwater Conditions	4
2.05	Faults	4
2.06	Historic Seismicity	5
2.07	Flooding Potential	5
2.08	Landslides	5
3.00	**CONCLUSIONS AND RECOMMENDATIONS**	5
3.01	General Conclusions	5
3.02	General Earthwork and Grading	5
3.03	Earthwork Shrinkage and Subsidence	6
3.04	Removals and Overexcavation	6
3.05	Excavation Characteristics and Rock Disposal	7
3.06	Subdrains	9
3.07	Fill and Cut Slopes	9
3.08	Faulting	9
3.09	Seismic Design Parameters	9
3.10	Liquefaction and Secondary Earthquake Hazards	10
3.11	Foundations	12
3.12	Foundation Setbacks from Slopes	13
3.13	Slabs-on-Grade	13
3.14	Miscellaneous Concrete Flatwork	14

TABLE OF CONTENTS
(Continued)

		PAGE
3.15	Import Soils	14
3.16	Lateral Load Resistance	14
3.17	Drainage and Moisture Proofing	15
3.18	Cement Type and Corrosion Potential	16
3.19	Temporary Slopes and Excavations	16
3.20	Utility Trench Backfill	18
3.21	Pavement Sections	18
3.22	Plan Review	19
3.23	Geotechnical Observation and Testing During Rough Grading	19
3.24	Post-Grading Geotechnical Observation and Testing	19
4.00	**CLOSURE**	20

FIGURES AND TABLES

Figure 1	Site Location Map
Figure 2	Regional Geologic Map
Figure 3	Site Geologic Map
Figure 4	Earthquake Fault Zone Map
Figure 5	Regional Fault Map
Table 1	Notable Faults within 100 Km
Table 2	Historical Strong Earthquakes

APPENDICES

Appendix A	Field Investigation	A1
Appendix B	Laboratory Tests	B1
Appendix C	General Earthwork and Grading Specifications	C1
Appendix D	Shear Wave Velocity Survey	D1
Appendix E	References	E1

1.00 INTRODUCTION

1.01 Purpose

A geotechnical investigation has been completed for a 12.4 acre parcel (APN 1210-371-03) in Highland, California. The purpose of the investigation was to summarize geotechnical and geologic conditions at the site, to assess their potential impact on the proposed development, and to develop geotechnical and engineering geologic design parameters.

1.02 Scope of the Investigation

The general scope of this investigation included the following:

- Review of published and unpublished geologic, seismic, groundwater and geotechnical literature.
- Examination of aerial photographs.
- Contacting of underground service alert to locate onsite utility lines.
- Logging, sampling and backfilling of 8 exploratory borings drilled with a CME-75 drill rig.
- Logging of 9 exploratory trenches excavated and backfilled with a backhoe.
- One seismic line to determine subsurface shear wave velocities.
- Laboratory testing of representative soil samples.
- Geotechnical evaluation of the compiled data.
- Preparation of this report presenting our findings, conclusions and recommendations.

1.03 Site Location and Description

The site consists of 12.4 acre parcel located approximately 2.5 miles east of the 210 Freeway in the City of Highland, San Bernardino County, California (Figure 1). The site is identified as APN 1210-371-03. It is also identified by a street address of 29744 Santa Ana Canyon Road. The property is bordered by Water Street to the north, by North Fork Road to the east, by citrus orchards and a single family residence to the south, and by Alpin Street and vacant land to the west. The approximate geographic center of the site is identified by the coordinates 34.1160º latitude and -117.1553º longitude.

The topography of the property consists of a gently sloping essentially planar surface that slopes to the south at an overall gradient of about 7% and a fairly steep bluff along the south property line. Elevations range from approximately 1,570 to 1,500 feet above sea level.

Most of the site was vacant at the time of our investigation. Aerial photographs indicate that the site previously contained a citrus orchard. Much of the ground surface was covered with broken tree branches in areas that previously contained citrus trees. Dirt roads and pathways that ran between the citrus trees were still present. Other remnants of the citrus orchard consisted of abandoned irrigation lines, rock lined channels, a basin and cistern in the northeast corner of the site, and tree stumps.

Structures on the site consisted of an abandoned single-family residence and a dilapidated barn. Aerial photographs indicate that these structures were built before the 1930s. A representative of the property owner reported that there is an underground septic system east of the residence. A chain link fence surrounded the residence. Trash and debris such as

rusted farm equipment were present behind the residence and around the barn. There was also an abandoned above ground storage tank behind the barn. Stained soils were noted within the barn and in the area of the above ground storage tank. Buried pipes were encountered during our subsurface investigation in Trenches T-5 and T-6. A Phase 1 Environmental Site Assessment is being prepared under separate cover.

Much of the site had been cleared of vegetation at the time of our study. The former orchard area contained scattered dry weeds and a few small trees. Large trees were present around the residence in the southern part of the site and along the bluff paralleling the southern property line.

Large granitic boulders were exposed at the ground surface throughout the site and were particularly prevalent on the eastern side of the site.

A chain link fence had been placed along the western and northern sides of the site, and along the eastern side of the site adjacent to North Fork Road. The property is accessed by a dirt driveway extending to the north off of Santa Ana Canyon Road.

1.04 Current and Past Land Usage

The site was previously used as a citrus orchard with residence and a barn since the early 1900s. The orchard was demolished in 2011. The site is currently vacant and the house and barn are abandoned. There is no apparent current land usage.

1.05 Planned Development

It is our understanding that the site will be developed as a residential subdivision. Our investigation was performed prior to the preparation of grading or foundation plans. To aid in preparation of this report, we utilized the following assumptions:

- Maximum foundation loads of 2 to 3 kips per linear foot for continuous footings and 60 kips for isolated spread footings.
- Cut and fill depths will generally be on the order of 15 feet or less.

1.06 Investigation Methods

Our investigation consisted of office research, field exploration, laboratory testing, review of the compiled data, and preparation of this report. It has been performed in a manner consistent with generally accepted engineering and geologic principles and practices, and has incorporated applicable requirements of the California Building Code. Definitions of technical terms and symbols used in this report include those of the ASTM International, the California Building Code, and commonly used geologic nomenclature.

Technical supporting data are presented in the attached appendices. Appendix A presents a description of the methods and equipment used in performing the field exploration and logs of our subsurface exploration. Appendix B presents a description of our laboratory testing and the test results. Standard grading specifications, the results of a shear wave velocity survey and references are presented in Appendices C, D and E, respectively.

2.00 FINDINGS

2.01 Geologic Setting

The site is located within a structural mass of the earth's crust known as the Bunker Hill - San Timoteo Basin. This basin formed as a rift zone between the active San Andreas Fault on the northeast and the active San Jacinto fault on the southwest. The southern boundary of the basin is less well defined, but is generally believed to coincide with the Banning fault zone. The basin itself is infilled with Quaternary age younger and older alluvial deposits. There are also topographic highs within the basin which expose Mesozoic age and older granitic and metamorphic rocks.

In the vicinity of the site the Bunker Hill – San Timoteo alluvial deposits are underlain by crystalline San Gabriel Mountains-type basement rocks composed of granitic-type rocks and schist. North of the San Andreas fault the basement bedrock consists of San Bernardino Mountains-type crystalline rocks composed of granitoid and metasedimentary rocks.

According to regional geologic mapping performed by U.S. Geological Survey (Figure 2), the northwest portion of the site is underlain by younger (middle Holocene) alluvial-fan deposits and the remainder of the site is underlain by older (late to middle Pleistocene age) alluvial-fan deposits. As discussed below our investigation revealed that the entire site is underlain by older alluvial deposits and thin artificial fills.

The dominant neotectonic structure in the vicinity of the site is the San Bernardino Strand of the San Andreas Fault, which is located at the base of the San Bernardino Mountains approximately 1,600 feet northeast of the site at its nearest point.

2.02 Earth Materials

Our field investigation revealed the site is underlain by older alluvium and relatively thin deposits of fill. Regional geologic mapping (Figure 2) indicates that the northwest portion of the site is younger alluvium. These deposits were not found during our subsurface investigation, but might be present between our points of subsurface investigation.

The older alluvium encountered in our borings and trenches was found to typically be composed of reddish brown and dark reddish brown, medium dense to dense silty sand with varying amounts of gravel, cobbles and boulders. The boulders were found to range in size from 12 inches to approximately 15-feet in maximum dimension and were found to be widely scattered in some areas and clustered in others. These cobbles and boulders caused refusal to drilling in all of our borings at depths ranging from 1.5 to 15.5-feet. Boulders also caused refusal to excavation in 3 trenches at depths ranging from 2 to 4-feet.

Slight terracing of the former orchard suggests the presence of thin fills throughout much of the site. The fills were not encountered during our subsurface investigation, but are expected to be on the order of 1 to 3-feet thick. The composition of the fill soils is expected to be similar to the older alluvium, since it appears the soils were derived from the site. In addition, it appears that plant cuttings were tossed over the top of the slope along the southern property line. The thickness of these materials is not known, as the area could not be accessed with exploration equipment due to the presence of trees and heavy brush.

Younger alluvial soils were not encountered during our field investigation. If such soils are present within the site between our points of subsurface investigation, the deposits are expected to be thin and granular given the geologic setting of the site.

A Site Geologic Map showing the locations of our borings, trenches and seismic line is presented as Figure 3. Subsurface conditions encountered during our field investigation are described in greater detail in Appendices A and D.

2.03 Expansive Soils

Expansion testing performed in accordance with ASTM D4829 indicates that soils underlying the site have an expansion classification of very low. Results of the expansion test are presented in Appendix B. Since site grading will redistribute earth materials, potential expansive properties should be verified at the completion of rough grading.

2.04 Surface and Groundwater Conditions

No areas of ponding or standing water were present at the time of our study. Further, no springs or areas of natural seepage were found.

Groundwater was not encountered during our subsurface exploration which extended to a maximum depth of 15.5-feet. According to the U. S. Geological Survey (Matti and Carson, 1991), the minimum depth to groundwater between 1973 and 1983 was less than 30-feet. The seismic line run for this study indicates that the current depth to groundwater is in excess of 75-feet.

2.05 Faults

The site is not located within the boundaries of an Earthquake Fault Zone for fault-rupture hazard as defined by the Alquist-Priolo Earthquake Fault Zoning Act of 1972 and the site is not located within the boundaries of a similar City of Highland or County of San Bernardino fault rupture hazard zone. The nearest Earthquake Fault Zone is located about 1,000 feet northeast of the site along the San Bernardino Strand of the San Andreas fault. This fault strand is located about 1,600 feet northeast of the site at its nearest point (Figure 4).

No faults are known to pass through the property. The U.S. Geological Survey (Matti, Morton, Cox and Kendrick, 2003) mapped the Mission Creek Strand of the San Andreas fault as a concealed (buried) fault approximately 100 feet northeast of the site. The map references earlier work that was performed in 1992 by Matti, Morton and Cox (U.S. Geological Survey OFR 92-354). OFR 92-354 indicates that the existence of the Mission Creek fault along the southwestern base of the San Bernardino Mountains has been inferred to explain the juxtaposition of the San Gabriel Mountains-type basement rocks against the Wilson Creek block and rocks of San Bernardino Mountains-type. OFR 92-354 also indicates that the Mission Creek fault is an older abandoned strand of the San Andreas fault that is either buried under Quaternary surficial sediments or has been reactivated where it coincides with the San Bernardino Strand of the San Andreas fault. The 2003 U.S. Geological Survey map shows that in the vicinity of the site, the postulated trace of the Mission Creek Strand is concealed by Holocene and Pleistocene alluvial-fan deposits (Figure 2). Consequently, the Mission Creek Strand of the San Andreas fault within the vicinity of the site would not meet the current Alquist-Priolo criteria for active faulting which is defined as surface rupture within Holocene time, approximately within the last 11,000 years. The postulated Mission Creek Strand of the San Andreas fault in the vicinity of the site is not located within the boundaries of a State of California Alquist-Priolo Earthquake Fault Zone for fault rupture hazards or a similar City of Highland or County of San Bernardino fault hazard rupture zone. Approximately 5 miles to the southeast another U.S. Geological Survey Map (OFR 03-301) shows where the Mission Creek Strand coincides with the San Bernardino strand. This portion of the Mission Creek Strand is included within an Alquist-Priolo Earthquake Fault Zone and is considered active.

We reviewed aerials photographs of the area but were not able to identify a lineament within the site parallel to the mapped location Mission Creek fault strand. The base of a hill to the east of the site does coincide with the postulated fault trace, however there is no lineament extending away from the hill. Breaks-in-slope along the south side of the site and further to the east are visible on aerial photographs. The U. S. Geological Survey interprets these features to be contacts between terraced and incised alluvial deposits rather than faulting (Figure 2). We agree with this interpretation because the contacts essentially parallel Plunge Creek and the Santa Ana River Wash, and are diagonal to the regional trend of the San Andreas fault.

The location of the site with respect to major faults in the region is illustrated on the accompanying Regional Fault Map

(Figure 5). The distances to notable faults within 100 kilometers of the site are presented on Table 1.

2.06 Historic Seismicity

The nearest large historic earthquakes in the vicinity of the site were epicentered in San Bernardino in 1858, 1907 and 1923. These earthquakes were epicentered approximately 7 to 12-miles from the site and had magnitudes in the range of approximately 5.3 to 6.0. These events occurred prior to the development of seismic monitoring networks, and thus their locations and magnitudes are only approximate. Strong earthquakes that have occurred in this region in historic time and their approximate epicentral distances are summarized in Table 2.

Our research of regional geologic and seismic data did not reveal any known instances of ground failure within the site associated with regional seismic activity. Seismic design parameters relative to the requirements of the 2010 California Building Code are presented in Section 3.09.

2.07 Flooding Potential

According to San Bernardino County Hazard Overlay Map FH31B, the site is not located within either a 100 or 500 year flood zone. Control of surface runoff originating from within and outside of the site should, of course, be included in design of the project.

2.08 Landslides

The low gradient of the site and surrounding area precludes landsliding within the majority of the site. There is however a steep bluff along the south property line. Because of the dense, massive nature of the older alluvium underlying the site and the inclination of the bluff, large scale landsliding is not expected to occur in that area. The slope could experience surficial instability as a result of dumping over the top of the slope and loose surficial soils. The stability of the bluff area should be further evaluated upon development of a grading plan.

3.00 CONCLUSIONS AND RECOMMENDATIONS

3.01 General Conclusions

Based on specific data and information contained in this report, our understanding of the project and our general experience in engineering geology and geotechnical engineering, it is our professional judgment that the proposed development is geologically and geotechnically feasible. This is provided that the recommendations presented below are fully implemented during design, grading and construction.

3.02 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications outlined in Appendix C, unless specifically revised or amended below. Recommendations contained in Appendix C are general specifications for typical grading projects and may not be entirely applicable to this project.

It is also recommended that all earthwork and grading be performed in accordance with Appendix J of the 2010 California Building Code and all applicable governmental agency requirements. In the event of conflicts between this report and Appendix J, this report shall govern.

3.03 Earthwork Shrinkage and Subsidence

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Subsidence occurs as natural ground is densified to receive fill. These factors account for changes in soil volumes that will occur during grading. Our estimates are as follows:

- Shrinkage factor = 10% - 15% for soil removed and replaced as compacted fill.
- Subsidence factor = 0.1 foot.

These estimates do not include losses due to removal of existing structures, improvements or over-sized materials (boulders, concrete or other similar materials greater than 12 inches in maximum dimension). Removal and exporting of these materials could significantly impact earthwork balance and should be considered in design, planning and cost estimating.

The degree to which fill soils are compacted and variations in the insitu density of existing soils will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

3.04 Removals and Overexcavation

All vegetation, trash and debris should be cleared from the grading area and removed from the site. Although a grading plan was not available during the preparation of this report, it is assumed that the existing house and barn will be demolished. Debris from demolition of these structures should be hauled from the site. Tree stumps, branches and roots will need to be hauled from the site and may not be placed in fills. Oil stained soils noted in the dilapidated barn and in the area of the above ground tank behind the barn will need to be handled by a hazardous waste contractor and may not be used as fill material. In addition, any other soils indentified to contain chemical contamination should not be used for compacted fill unless such use is approved by environmental studies.

Prior to placement of compacted fills, all non-engineered fills and loose, porous, or compressible soils will need to be removed down to competent ground. Removal and requirements will also apply to cut areas, if the depth of cut is not sufficient to reach competent ground. Removed and/or over-excavated soils may be moisture-conditioned and recompacted as engineered fill, except for soils containing detrimental amounts of organic material or chemical contamination. Estimated depths of removals are based on the following:

- Any former irrigation pipes, channels, septic systems, cistern and basin structures, building foundations and similar structures will need to be demolished and completely removed down to competent natural ground, including all loose soils resulting from the demolition. Concrete and rock generated by the demolition may be either hauled off the site or processed and placed in the compacted fill provided the concrete and rock are reduced to less than 8 inches in maximum dimension and mixed thoroughly with on-site soils. No large and flat pieces are to be used for fill. Concrete with reinforcing steel shall not be placed in compacted fills.

- Non-engineered fills in the orchard, which are expected to be on the order of 1 to 3-feet thick, will need to be removed down to competent native ground. If grading extends into the bluff on the south side of the site, any non-engineered fills in that area will also need to be removed to competent native ground. If other non-engineered fills are encountered during grading, they will also need to be removed along with any underlying compressible native soils.

- Loose, porous and compressible native soils and soils disturbed by removal of citrus trees are expected to extend to approximately 3-feet below existing grades. Thus we expect the depth of removal within the

former orchard to be on the order of 3-feet below the existing ground surface or bottom of non-engineered fill. Deeper removals may be necessary in some areas.

- It is expected that competent native soils will be encountered in cuts deeper than approximately 3 to 5 feet below existing grade or the base of existing non-engineered fill. Provided competent soils are exposed, these cut surfaces should be scarified to a minimum depth of 12 inches, moisture conditioned and compacted to at least 90 percent of the maximum dry density in accordance with ASTM: D1557, provided that footing overexcavation requirements are met.

- Soils disturbed by demolition of existing structures will need to be over-excavated to competent native ground and then scarified to a minimum depth of 12 inches, moisture conditioned and compacted to at least 90 percent of the maximum dry density (ASTM: D1557).

In addition to the above requirements, over-excavation will also need to meet the following criteria for the building pads, concrete flatwork and pavement areas:

- All building pad areas shall be undercut to a minimum depth of 2-feet below the bottom of the deepest footing, and the exposed subgrade scarified to a minimum depth of 12 inches, moisture conditioned, and compacted as necessary to produce soils compacted to a minimum of 90% relative compaction (ASTM: D1557). Building pad areas shall be defined as the building footprint including the area extending from the outer edge of the footings for a distance of 5 feet.

- All concrete flatwork and paved areas shall be underlain by a minimum of 12 inches of soil compacted to a minimum of 90% relative compaction (ASTM: D1557).

- Transition lots will need to be over-excavated in accordance with the detail presented in Appendix C.

The exposed soils beneath all over-excavations should be scarified an additional 12 inches, moisture conditioned and compacted to a minimum of 90% relative compaction (ASTM: D1557).

The above recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. Hence, overexcavation depths must be verified, and adjusted if necessary, at the time of grading. The overexcavated materials may be moisture-conditioned and re-compacted as engineered fill.

3.05 Excavation Characteristics and Rock Disposal

Some trenches and all borings encountered refusal to excavation during our subsurface investigation due to the presence of hard granitic cobbles and boulders. Cobbles are rocks having maximum dimension ranging from 3 to 12 inches. Boulders are rocks having a maximum dimension of 12 inches or greater. Because some boulders were found to be up to about 15 feet in maximum dimension, it is expected that boulders will interfere with grading operations and installation of underground utilities.

Because of the size and clustering of boulders, it is expected that rock rakes or rock buckets mounted on heavy duty dozers or loaders, or similar equipment, will be needed to excavate boulders throughout much of the site. It is expected that scrapers will have difficulty or may not be able to excavate soils in areas containing large boulders and areas with high concentrations of boulders. Once fills are placed, provided the soils do not contain boulders, it is expected that conventional heavy duty earthmoving equipment will be able to excavate the soils.

Because of the size and concentration of boulders, consideration should be given to excavating utility corridors to a depth at least one foot below the lowest utility line to remove boulders. Boulders should not be placed back into the excavated utility corridors and the maximum size of rock placed in these areas should be consistent with trench backfilling requirements of the particular utility trenches.

Rock Disposal

Boulders (rocks greater than 12 inches in maximum dimension) on the site may be exported from the site, reduced in size, placed as rock blankets or placed in windrows. Because of the abundance and size of boulders within the site, it is expected that it will not be feasible to dispose of all rocks in windrows or rock blankets unless boulders are reduced in size below 12 inches. Rock disposal methods are discussed individually below.

- Exporting Boulders

  Boulders may be separated from other soils and exported from the site. This method of construction will eliminate the need for special handling and placement of boulders, but could affect earthwork balance and may necessitate importing of soils. Any imported soils should be granular and have a very low expansion potential such that the physical and chemical properties of the soils are similar to soils already on the site.

- Size Reduction

  If the maximum dimension of boulders is reduced to less than 12 inches, they may be placed as fill without special handling methods, provided nesting cobbles does not occur. Because of the hard nature of the boulders on the site, it is expected that rock crushing will need to be performed to reduce the size of the boulders. No appreciable size reduction is anticipated from handling of boulders by conventional earthmoving equipment.

  Consideration may also be given to crushing the boulders for use as aggregate and base material for the project. Evaluating whether this is feasible should take into consideration not only the cost of crushing versus the cost of importing aggregate and base material, but should also consider noise and dust.

- Rock Blankets

  Boulders may be placed in designated rock disposal areas. Oversized materials should not be placed in utility corridors or foundation areas unless the rock blankets are deeper than anticipated excavations that will occur in these areas. Oversized rocks placed as fill should be placed in such a manner as to assure the filling of all void spaces around the rocks with sufficient well graded soils to avoid rock-to-rock contacts and nesting of boulders.

  Intermediate sized rocks between 8 and 24 inches in maximum dimension may be placed in alternating rock and standard fill lifts. The rock lifts shall be no more than 24 inches thick and shall be separated vertically by layers of compacted fill soils at least 24 inches thick. The loose thickness of the rock blanket lift shall be no more than 24 inches. The 24 inch thick intermediate layers of fill shall be placed and compacted as standard fill lifts each with a loose thickness of not be more than 8 inches and compacted to at least 90 percent relative compaction (ASTM: D1557). The rock blanket lifts shall be placed so that no more than 30% of the total volume of the lift contains rock with a maximum dimension greater than 8 inches. Ample water shall be applied to flood well graded soils into all available void spaces around the rock. The soils utilized to fill the areas around the oversized rocks should be granular with a minimum sand equivalent value of 30.

  Individual large rocks, rocks greater than 24 inches in maximum dimension, should be placed so that the

grading equipment has ample access to all sides to compact fill adjacent to the rock. Ample water and compactive effort shall be applied for each individual rock placed in this manner.

Oversized materials larger than 8 feet in maximum dimension should either be reduced in size or removed from the site.

Each lift of rock fill shall be blade mixed under the observation of the geotechnical consultant to verify the filling of the voids between rocks and the absence of rock-to-rock contact. Any areas containing insufficient fines or with apparent rock-to-rock contacts shall be reworked with ample water and additional fines to the satisfaction of the geotechnical consultant. Fill materials composed of predominantly well graded soils shall be placed and compacted immediately adjacent to and above each layer of rock fill. Construction of rock blankets will require continuous testing and observation by a member of our staff.

- Rock Windrows

  Boulders may be placed in windrows in accordance with the detail presented in Appendix C. The boulders should be placed in a manner to prevent rock-to-rock contacts and nesting of boulders. Soils flooded around the boulders should be granular with a minimum sand equivalent value of 30. Horizontal and vertical setbacks from the ground surface depicted on the illustration in Appendix C should be utilized unless specifically revised for the site with due consideration of the potential impacts of such changes. Construction of rock windrows will require continuous testing and observation by a member of our staff.

3.06 Subdrains

Groundwater and surface water were not encountered during the course of our investigation. The proposed grading will not fill any large canyons and the underlying soils are fairly permeable. Consequently, installation of subdrains is not expected to be necessary.

3.07 Fill and Cut Slopes

Fill and cut slopes should be constructed at inclinations of 2 horizontal to 1 vertical or flatter. The stability of cut and fill slopes should be further reviewed when a rough grading plan for the site has been prepared.

3.08 Faulting

The site is not located within the boundaries of an Alquist-Priolo Earthquake Fault Zone. The postulated, concealed trace of the Mission Creek Strand mapped northeast of the site by the U.S. Geological Survey is apparently an abandoned strand of the San Andreas fault that is covered by Holocene and Pleistocene age deposits. It is not included within an Alquist-Priolo Earthquake Fault Zone or similar City or County fault rupture hazard zone. In addition, no other faults are known to pass through the property. Consequently, based on the current state of knowledge about faulting in the region, the potential for future surface fault rupture within the site is judged to be unlikely. It is anticipated that the site will experience high levels of ground shaking in future seismic events, as indicated in section 3.09 below.

3.09 Seismic Design Parameters

Because of the proximity of the San Andreas fault and other active faults in the region, the site is expected to experience high levels of ground shaking during future seismic events. As a minimum, seismic design of structures will need to conform to requirements of the California Building Code.

Seismic design parameters have been developed in accordance with Section 1613 of the 2010 California Building Code (CBC) using the online U.S. Geological Survey Java Ground Motion Parameter Calculator (Version 5.1.0, ASCE 7

Standard) and a site location based on latitude and longitude. The calculator generates probabilistic and deterministic maximum considered earthquake spectral parameters represented by a 5-percent damped acceleration response spectrum having a 2-percent probability of exceedance in 50 years. The deterministic response accelerations are calculated as 150 percent of the largest median 5-percent damped spectral response acceleration computed on active faults within a region, where the deterministic values govern. The calculator does not, however, produce separate probabilistic and deterministic results. The parameters generated for the subject site are presented below:

2010 California Building Code (CBC) Seismic Parameters

Parameter	Value
Site Location	Latitude = 34.1160 degrees Longitude = -117.1553 degrees
Site Class	Site Class = C Soil Profile Name = very dense soil and soft rock
Mapped Spectral Accelerations (Site Class B)	S_s (0.2- second period) = 2.138g S_1 (1-second period) = 1.040g
Site Coefficients (Site Class C)	F_a = 1.0 F_v = 1.3
Maximum Considered Earthquake Spectral Accelerations (Site Class C)	S_{MS} (0.2- second period) = 2.138g S_{M1} (1-second period) = 1.352g
Design Earthquake Spectral Accelerations (Site Class C)	S_{DS} (0.2- second period) = 1.425g S_{D1} (1-second period) = 0.901g

The above table shows that the mapped spectral response acceleration parameter for a 1-second period (S_1) $\geq$ 0.75g. Therefore, for Occupancy Category II the Seismic Design Category is E (CBC Table 1604.5 and Section 1613.5.6). Consequently, as required for Seismic Design Categories D through F by CBC Section 1803.5.12, lateral pressures for earthquake ground motions, liquefaction and soil strength loss have been evaluated (see Sections 3.10 and 3.16).

For preliminary design purposes, we recommend a peak ground acceleration, PGA = $S_{DS}/2.5$ = 1.425g/2.5 = 0.57g.

3.10 Liquefaction and Secondary Earthquake Hazards

Potential secondary seismic hazards that can affect land development projects include liquefaction, tsunamis, seiches, seismically induced settlement, seismically induced flooding and seismically induced landsliding.

<u>Liquefaction</u>

Liquefaction is a phenomenon where earthquake- induced ground vibrations increase the pore pressure in saturated, granular soils until it is equal to the confining, overburden pressure. When this occurs, the soil can completely loose its shear strength and enter a liquefied state. The possibility of liquefaction is dependent upon grain size, relative density, confining pressure, saturation of the soils, and intensity and duration of ground shaking. In order for liquefaction to occur, three criteria must be met: underlying loose, coarse-grained (sandy) soils, a groundwater depth of less than about 50 feet, and a potential for seismic shaking from nearby large-magnitude earthquakes.

The U.S. Geological Survey (Matti and Carson, 1991) prepared a series of maps identifying liquefaction hazards in the San Bernardino Valley Region. One of the maps indicates that during a Magnitude 8.0 earthquake on the San Andreas fault the northwest portion of the site (which they indicate is underlain by younger Holocene alluvium) will have a high susceptibility to liquefaction, but that the remainder of the site (which they indicate is underlain by older Pleistocene alluvium) will not be susceptible to liquefaction. This map is similar to City of Highland and County of San Bernardino

liquefaction hazard maps. During our subsurface investigation we found that the entire site is underlain by older alluvium. Younger alluvium, if present, is anticipated to be thin. The Matti and Carson maps also indicate that the site is not susceptible to liquefaction during a Magnitude 7.0 earthquake on the San Jacinto fault or a Magnitude 6.75 earthquake on the Cucamonga fault.

Typically, liquefaction potential is evaluated by drilling of borings or advancement of cone penetrometer soundings to depths of about 50-feet below the ground surface. However, all borings drilled during our subsurface investigation encountered refusal due to cobbles and boulders at depths ranging from 1.5 to 15.5-feet below the ground surface. Alternatively, a shear wave velocity survey was performed in the northwest portion of the site. Shear wave velocities were then converted to Standard Penetration Blows counts using conversion tables contained in the U.S. Defense Department Soil Dynamics and Special Design Aspects Handbook.

For our evaluation we have considered a groundwater depth of 30-feet, the minimum depth to groundwater reported Matti and Carson (1991). The shear wave velocity survey yielded a value of 1,336 ft/sec from a depth of 21.6 to 50.5-feet below the ground surface. According to the U. S. Department of Defense conversion table, this equates to a Standard Penetration Blow count (N_{60}) of greater than 60, a value too high for liquefaction to occur. Thus performance of liquefaction calculations were not performed.

It should be noted that the California Geological Survey has not yet prepared a Seismic Hazard Zone Map of potential liquefaction hazards for the quadrangle in which the site is located.

Tsunamis and Seiches

Tsunamis are sea waves that are generated in response to large-magnitude earthquakes. When these waves reach shorelines, they sometimes produce coastal flooding. Seiches are the oscillation of large bodies of standing water, such as lakes, that can occur in response to ground shaking. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water.

Seismically Induced Settlement

Seismically induced settlement occurs most frequently in areas underlain by loose, granular sediments. Damage as a result of seismically induced settlement is most dramatic when differential settlement occurs in areas with large variations in the thickness of underlying sediments. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

Boring, trench and geophysical data indicate that aside from loose surficial soils, the soils underlying the site are medium dense to very dense. Provided surficial soils are compacted as recommended in this report, it is our opinion that the potential for significant seismically induced settlement is low.

Seismically Induced Flooding

According to San Bernardino County Hazard Overlay Map FH31B the site is not located within a potential dam inundation area.

Seismically Induced Landsliding

Due to the low gradient of the majority of the site, the potential for seismically induced landsliding is nil. There is however a steep bluff along the south property line. Because of the dense, massive nature of the older alluvium underlying the site and the inclination of the bluff, large scale seismically induced landsliding is not expected to occur. The slope could experience surficial instability as a result of seismic activity. This possibility should be further evaluated upon development of a grading plan.

3.11 Foundations

Isolated spread footings and/or continuous wall footings are recommended to support the proposed structures. If the recommendations in the section on grading are followed and footings are established in firm native soils or compacted fill materials, footings may be designed using the following allowable soil bearing values:

- Continuous Wall Footings:

  Footings having a minimum width of 12 inches and a minimum depth of 12 inches below the lowest adjacent grade may be designed for an allowable bearing capacity of 1,500 pounds per square foot (psf). A lateral bearing value of 250 pounds per square foot per foot of depth and a coefficient of friction between foundation soil and concrete of 0.4 may be assumed.

- Isolated Spread Footings:

  Footings having a minimum width of 24 inches and a minimum depth of 12 inches below the lowest adjacent grade may be designed for an allowable bearing capacity of 1,500 psf. A lateral bearing value of 250 pounds per square foot per foot of depth and a coefficient of friction between foundation soil and concrete of 0.4 may be assumed.

- Retaining Wall Footings:

  Footings for retaining walls should be founded a minimum depth of 18 inches and have a minimum width of 24 inches. Footings may be designed using the allowable bearing capacity and lateral resistance values recommended for building footings. However, when calculating passive resistance, the upper 6 inches of the footings should be ignored in areas where the footings will not be covered with concrete flatwork. Reinforcement should be provided for structural considerations as determined by the design engineer.

The above bearing capacities represent an allowable net increase in soil pressure over existing soil pressure and may be increased by one-third for short-term wind or seismic loads. The maximum expected settlement of footings designed with the recommended allowable bearing capacity is expected to be on the order of ½ inch with differential settlement on the order of ¼ inch.

Soils at the site are generally granular with a very low expansion potential. Therefore, reinforcement of footings for expansive soil is not required. However, in view of the seismic setting, a nominal reinforcement consisting of one #4 bar placed within 3 inches of the top of footings and another placed within 3 inches of the bottom of footings is recommended. The structural engineer may require heavier reinforcement.

All footing excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent soils. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed in slab or footing areas unless properly compacted.

Footings may experience an overall loss in bearing capacity or an increased potential to settle where located in close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause cracking, collapse and/or a loss of serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom corner of the trench.

Due to the preliminary nature of the expansion tests performed for this study, we recommend additional testing be performed near the completion of rough grading to verify the test results and recommended foundation design criteria.

3.12 Foundation Setbacks from Slopes

Setbacks for footings adjacent to slopes should conform to the requirements of the California Building Code. Specifically, footings should maintain a horizontal distance or setback between any adjacent slope face and the bottom outer edge of the footing.

For slopes descending away from the foundation, the horizontal distance may be calculated by using h/3, where h is the height of the slope. The horizontal setback should not be less than 5-feet, nor need not be greater than 40-feet per the California Building Code. Where structures encroach within the zone of h/3 from the top of the slope the setback may be maintained by deepening the foundations. Flatwork and utilities within the zone of h/3 from the top of slope may be subject to lateral distortion caused by gradual downslope creep. Walls, fences and landscaping improvements constructed at the top of descending slopes should be designed with consideration of the potential for gradual downslope creep.

For ascending slopes, the horizontal setback required may be calculated by using h/2 where h is the height of the slope. The horizontal setback need not be greater than 15-feet per the California Building Code.

3.13 Slabs-on-Grade

We recommend the use of non-structural slab-on-grade floors for structures supported on properly compacted fill placed in accordance with the recommendations contained in this report. These floor slabs should have a minimum thickness of 4 inches and should be divided into squares or rectangles using weakened plane joints (contraction joints), each with maximum dimensions not exceeding 15 feet. Contraction joints should be made in accordance with American Concrete Institute (ACI) guidelines. Slab-on-grade floors should be reinforced with at least the reinforcement required to control cracking due to shrinkage and temperature stresses or with a minimum of 6x6-10/10 welded wire fabric placed at mid-height of the slab. Due to the difficulty of installing and maintaining welded wire fabric in the middle of concrete slabs-on-grade during construction, consideration should be given to using steel reinforcement consisting of steel rebar (i.e. No. 3 bars) in lieu of welded wire fabric.

Special care should be taken on floors slabs to be covered with thin-set tile or other inflexible coverings. Alternatively, inflexible flooring may be installed with unbonded fabric or liners to prevent reflection of slab cracks through the flooring.

A moisture vapor retarder/barrier is recommended beneath all slab-on-grade floors that will be covered by moisture-sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber, rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the vapor retarder or barrier conform to Section 1805 of the 2010 California Building Code (CBC) and pertinent sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

The moisture vapor retarder/barrier should be designed by the Project Architect or Structural Engineer, but at a minimum should consist of a 10 mils thick polyethylene with a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed.

ACI guidelines allow for the placement of the moisture vapor retarder/barrier either directly beneath floor slabs or below an intermediate granular soil layer. Placing the moisture retarder/barrier directly beneath the floor slab will eliminate potential problems caused by water being trapped in a granular fill layer. Concrete slabs poured directly on a vapor retarder/barrier, however, can experience increased shrinkage cracking and curling due to differential rates of curing through the thickness of the slab. Therefore, for concrete placed directly on the vapor retarder, we recommend

a maximum water cement ratio of 0.45 and the use of water-reducing admixtures to increase workability and decrease bleeding. Full depth construction joints and control joints should be provided to control cracking and slab thickness and reinforcement as recommended by the Structural Engineer to resist the effects of curling.

If granular soil is placed over the vapor retarder/barrier, we recommend that the layer be at least 2 inches thick in accordance with traditional practice in southern California. Granular fill should consist of clean fine graded materials with 10 to 30% passing the No. 100 sieve and free from clay or silt. The granular layer should be uniformly compacted and trimmed to provide the full design thickness of the proposed slab. The granular fill layer should not be left exposed to rain or other sources of water such as wet-grinding, power washing, pipe leaks or other processes, and should be dry at the time of concrete placement. Granular fill layers that become saturated should be removed and replaced prior to concrete placement.

An additional layer of sand may be placed beneath the vapor retarder/barrier at the developer's discretion to minimize the potential of the retarder/barrier being punctured by underlying soils.

Prior to the placement of the moisture barrier and sand, the subgrade soils underlying the slab should be observed by the geotechnical consultant to verify that all under-slab utility trenches have been properly backfilled and compacted, that no loose or soft soils are present, and that the slab subgrade has been properly compacted to a minimum of 90 percent relative compaction within the upper 12 inches.

3.14 Miscellaneous Concrete Flatwork

Miscellaneous concrete flatwork and walkways may be designed with a minimum thickness of 4 inches. Large slabs should be reinforced with a minimum of 6x6-10/10 welded wire mesh placed at mid-height in the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15-feet.

Walkways may be constructed without reinforcement. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into non-reinforced walkways at a maximum of 5-feet spacing.

The subgrade soils beneath all miscellaneous concrete flatwork should be compacted to a minimum of 90 percent relative compaction for a minimum depth of 12 inches. The geotechnical engineer should monitor the compaction of the subgrade soils and perform testing to verify that proper compaction has been obtained.

3.15 Import Soils

Any imported soils should be such that the physical and chemical properties of the soils are similar to soils already on the site. The soils should be granular, non-corrosive and have a very low expansion potential (an expansion index of less than 20). The soils should also be free of deleterious material and organics, and not contain rock particles or fragments in excess of 8 inches in diameter. Fill material shall be sampled and reviewed by the geotechnical consultant prior to import to the site.

3.16 Lateral Load Resistance

Lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Passive Earth Pressure = 250 pcf (equivalent fluid weight).
- Coefficient of Friction (soil to footing) = 0.4
- Retaining structures should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Materials (Horizontal:Vertical)	Equivalent Fluid Weight (pcf)
Level	33
5:1	35
4:1	36
3:1	38
2:1	46

These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required minimum horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at-rest lateral earth pressure if this horizontal strain cannot be achieved.

- At-rest Lateral Earth Pressure = 53 pcf (equivalent fluid weight)

The Mononobe-Okabe method is commonly utilized for determining seismically induced active and passive lateral earth pressures and is based on the limit equilibrium Coulomb theory for static stress conditions. This method entails three fundamental assumptions (e.g., Seed and Whitman, 1970): Wall movement is sufficient to ensure either active or passive conditions, the driving soil wedge inducing the lateral earth pressures is formed by a planar failure surface starting at the heel of the wall and extending to the free surface of the backfill, and the driving soil wedge and the retaining structure act as rigid bodies, and therefore, experiences uniform accelerations throughout the respective bodies (U.S. Army Corps of Engineers, 2003, Engineering and Design - Stability Analysis of Concrete Structures).

- Seismic Lateral Earth Pressure = 21 pcf (equivalent fluid weight).

The seismic lateral earth pressure given above is an inverted triangle, and the resultant of this pressure is an increment of force which should be applied to the back of the wall in the upper 1/3 of the wall height and also applied as a reduction of force to the front of the wall in the upper 1/3 of the footing depth.

3.17 Drainage and Moisture Proofing

Surface drainage should be directed away from the proposed structure into suitable drainage devices. Neither excess irrigation nor rainwater should be allowed to collect or pond against building foundations or within low-lying or level areas of the lot. Surface waters should be diverted away from the tops of slopes and prevented from draining over the top of slopes and down the slope face.

Walls and portions thereof that retain soil and enclose interior spaces and floors below grade should be waterproofed and dampproofed in accordance with CBC Section 1805.

Retaining structures should be drained to prevent the accumulation of subsurface water behind the walls. Backdrains should be installed behind all retaining walls exceeding 3 feet in height. A typical detail for retaining wall back drains is presented in Appendix C. All backdrains should outlet to suitable drainage devices. Retaining wall less than 3 feet in height should be provided with backdrains or weep holes. Dampproofing and/or waterproofing should also be provided on all retaining walls.

3.18 Cement Type and Corrosion Potential

Soluble sulfate tests indicate that concrete at the subject site will have a negligible exposure to water-soluble sulfate in the soil. Our recommendations for concrete exposed to sulfate-containing soils are presented in the table below.

Recommendations for Concrete exposed to Sulfate-containing Soils

Sulfate Exposure	Water Soluble Sulfate (SO_4) in Soil (% by Weight)	Sulfate (SO_4) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
Negligible	0.00 - 0.10	0-150	--	--	2,500
Moderate	0.10 - 0.20	150-1,500	II	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan or slag	0.45	4,500

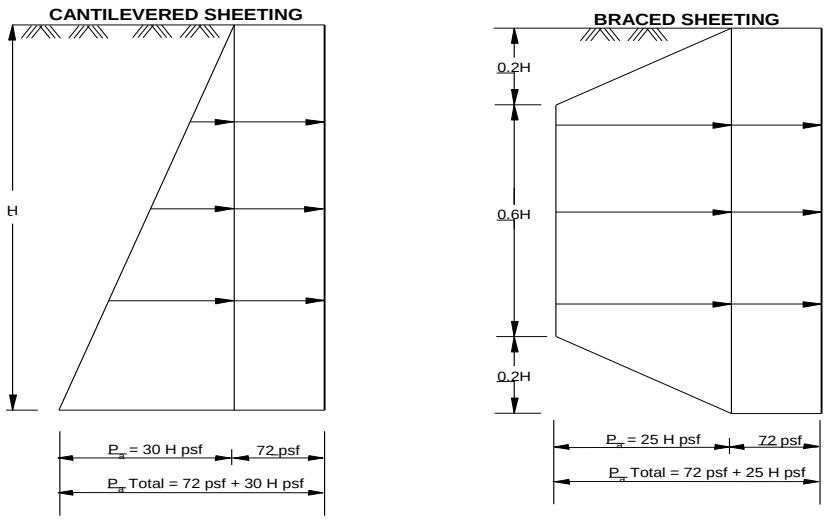
Use of alternate combinations of cementitious materials may be permitted if the combinations meet design recommendations contained in American Concrete Institute guideline ACI 318-11.

The soils were also tested for soil reactivity (pH) and electrical resistivity (ohm-cm). The test results indicate that the on-site soils have a soil reactivity of 7.7 and an electrical resistivity of 1,850 ohm-cm. A neutral or non-corrosive soil has a value ranging from 5.5 to 8.4. Generally, soils that could be considered moderately corrosive to ferrous metals have resistivityvalues of about 3,000 ohm-cm to 10,000 ohm-cm. Soils with resistivity values less than 3,000 ohm-cm can be considered corrosive and soils with resistivity values less than 1,000 ohm-cm can be considered extremely corrosive.

Based on our analysis, it appears that the underlying onsite soils are corrosive to ferrous metals. Protection of buried pipes utilizing coatings on all underground pipes; clean backfills and a cathodic protection system can be effective in controlling corrosion. A qualified corrosion engineer may be consulted to further assess the corrosive properties of the soil.

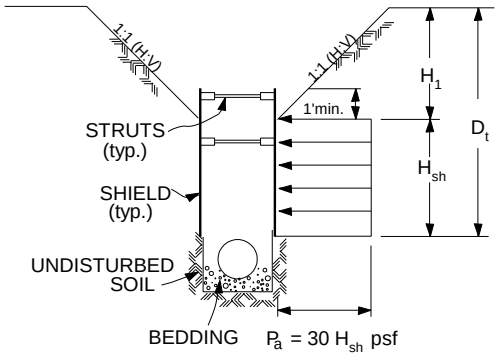
3.19 Temporary Slopes and Excavations

Excavation of utility trenches will require either temporary sloped excavations or shoring. Temporary excavations in existing alluvial soils may be safely made at an inclination of 1:1 or flatter. If vertical sidewalls are required in excavations greater than 5 feet in depth, the use of cantilevered or braced shoring is recommended. Excavations less than 5 feet in depth may be constructed with vertical sidewalls without shoring or shielding. Our recommendations for lateral earth pressures to be used in the design of cantilevered and/or braced shoring are presented below. These values incorporate a uniform lateral pressure of 72 psf to provide for the normal construction loads imposed by vehicles, equipment, materials, and workmen on the surface adjacent to the trench excavation. However, if vehicles, equipment, materials, etc., are kept a minimum distance equal to the height of the excavation away from the edge of the excavation, this surcharge load need not be applied.



SHORING DESIGN: LATERAL SHORING PRESSURES

Design of the shield struts should be based on a value of 0.65 times the indicated pressure, Pa, for the approximate trench depth. The wales and sheeting can be designed for a value of 2/3 the design strut value.



HEIGHT OF SHIELD, H_{sh} = DEPTH OF TRENCH, D_t , MINUS DEPTH OF SLOPE, H_1

TYPICAL SHORING
DETAIL

Placement of the shield may be made after the excavation is completed or driven down as the material is excavated from inside of the shield. If placed after the excavation, some overexcavation may be required to allow for the shield width and advancement of the shield. The shield may be placed at either the top or the bottom of the pipe zone. Due to the anticipated thinness of the shield walls, removal of the shield after construction should have negligible effects on the load factor of pipes. Shields may be successively placed with conventional trenching equipment.

Vehicles, equipment, materials, etc. should be set back away from the edge of temporary excavations a minimum distance of 15 feet from the top edge of the excavation. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a

visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

Cal/OSHA construction safety orders should be observed during all underground work.

3.20 Utility Trench Backfill

All pipes should be bedded in a sand, gravel or crushed aggregate imported material complying with the requirements of the Standard Specifications for Public Works Construction Section 306-1.2.1. Crushed rock products that do not contain appreciable fines should not be utilized as pipe bedding and/or backfill. Based on limited testing onsite soils have a sand equivalent value greater than 30. Therefore, onsite soils might be suitable for use as pipe bedding provided the soils are screened to remove cobbles and boulders. Additional testing of onsite soils at the time of construction would need to be performed if use of these soils for bedding is proposed. Bedding materials should be densified to at least 90% relative compaction (ASTM D1557) by mechanical methods. The geotechnical consultant should review and approve of proposed bedding materials prior to use.

The on-site soils are expected to be suitable as trench backfill provided they are screened of organic matter, cobbles and boulders in accordance with the current edition of the Standard Specifications for Public Works Construction. Backfill soils should be densified to at least 90% relative compaction (ASTM D1557) by mechanical methods.

All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the footing influence zone defined as the area within a line projected at a 1:1 drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Cal/OSHA construction safety orders should be observed during all underground work.

3.21 Pavement Sections

Sand equivalent and R-value tests were performed on anticipated subgrade soils at the site in order to provide information on their soil properties for design of pavement structural sections. Structural sections were designed using the procedures outlined in Chapter 630 of the California Highway Design Manual (Caltrans, 2008). This procedure uses the principle that the pavement structural section must be of adequate thickness to distribute the load from the design Traffic Index (TI) to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R-value).

Development of the design traffic indexes on the basis of a traffic study is beyond the scope of this report. The City of Highland specifies a Traffic Index value of 5.0 for local residential streets and requires a minimum pavement section of 3 inches of asphalt over 4 inches of crushed aggregate base. Selection of the final pavement structural section should be based on economic considerations which are beyond the scope of this investigation. Utilizing an R-Value of 51, the recommended structural section is as follows:

- Local Residential Street (TI=5.0, R-Value=51):
  3 inches of asphaltic concrete over
  4 inches of crushed aggregate base

Portland cement concrete (PCC) pavements for areas which are not subject to traffic loads may be designed with a minimum thickness of 4.0 inches of Portland cement concrete on compacted native soils. If traffic loads are anticipated, PCC pavements should be designed for a minimum thickness of 6.0 inches of Portland cement concrete on 4.0 inches of crushed aggregate base.

Prior to paving, the subgrade soils should be scarified and the moisture adjusted to within 2% of the optimum moisture content. The subgrade soils should be compacted to a minimum of 90% relative compaction. All aggregate base courses should be compacted to a minimum of 95% relative compaction.

3.22 Plan Review

Once formal grading and foundation plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the plan used during preparation of this report and revise the recommendations of this report where necessary.

3.23 Geotechnical Observation and Testing During Rough Grading

The geotechnical engineer should be contacted to provide observation and testing during the following stages of grading:

- During the clearing and grubbing of the site.
- During the demolition of any existing structures, buried utilities or other existing improvements.
- During excavation and overexcavation of compressible soils.
- During all phases of grading including ground preparation and filling operations.
- When any unusual conditions are encountered during grading.

A final geotechnical report summarizing conditions encountered during grading should be submitted upon completion of the rough grading operations.

3.24 Post-Grading Geotechnical Observation and Testing

After the completion of grading the geotechnical engineer should be contacted to provide additional observation and testing during the following construction activities:

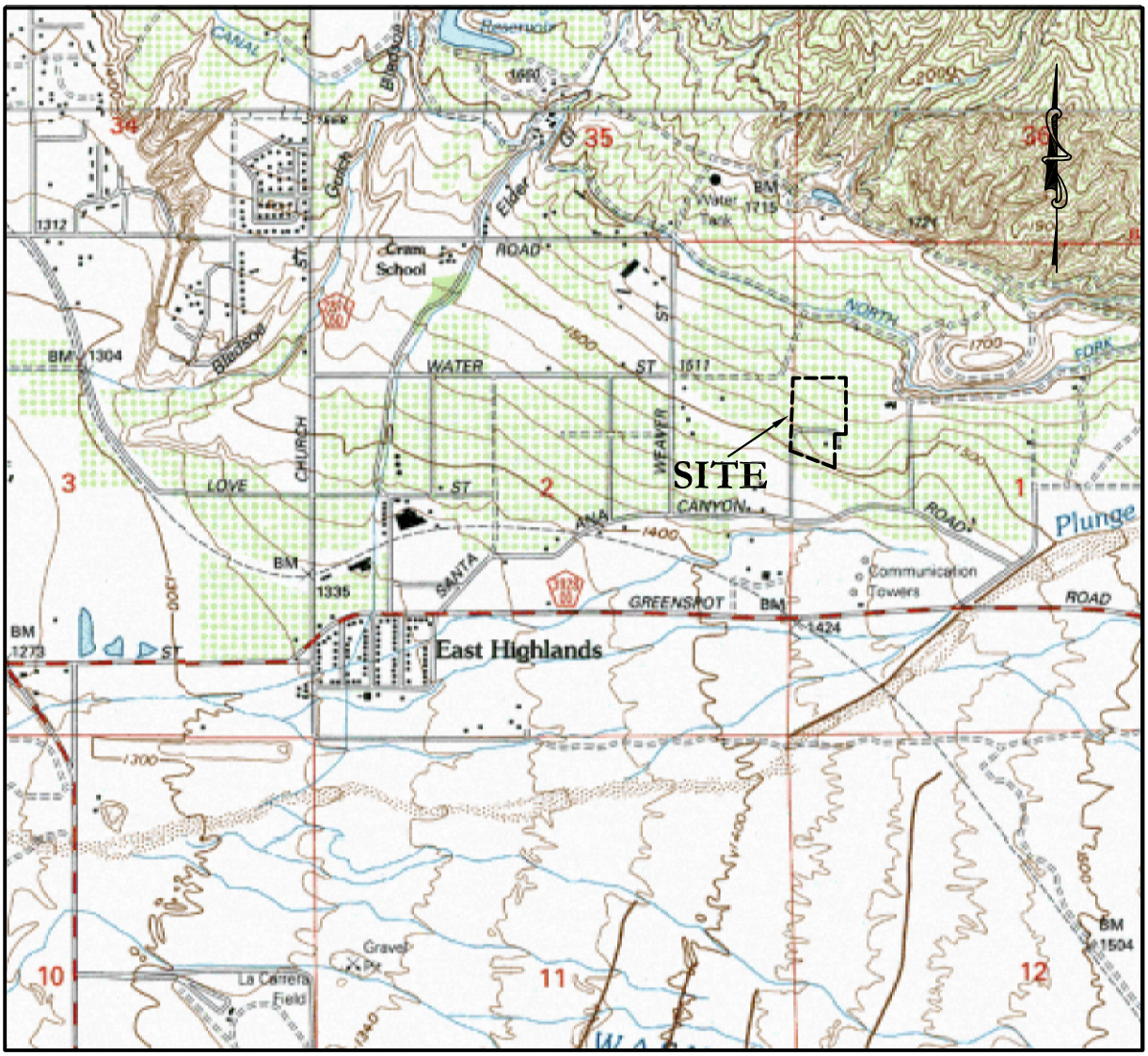
- During trenching and backfilling operations of buried improvements and utilities to verify proper backfill and compaction of the utility trenches.
- After excavation and prior to placement of reinforcing steel or concrete within footing trenches to verify that footings are properly founded in competent materials.
- During fine or precise grading involving the placement of any fills underlying driveways, sidewalks, walkways, or other miscellaneous concrete flatwork to verify proper placement, mixing and compaction of fills.
- When any unusual conditions are encountered during construction.
-

4.00 CLOSURE

The findings, conclusions and recommendations in this report were prepared in accordance with generally accepted engineering and geologic principles and practices. No other warranty, either express or implied, is made. This report has been prepared for Diversified Pacific to be used solely for design purposes. Anyone using this report for any other purpose must draw their own conclusions regarding required construction procedures and subsurface conditions.

The geotechnical and geologic consultant should be retained during the earthwork and foundation phases of construction to monitor compliance with the design concepts and recommendations and to provide additional recommendations as needed. If a firm other than RMA Group is retained to provide these services, that firm must notify the owner, project designers, government building officials and RMA Group that the firm has assumed responsibility for all phases of the project within the purview of the geotechnical engineer, including design and construction. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-evaluated.

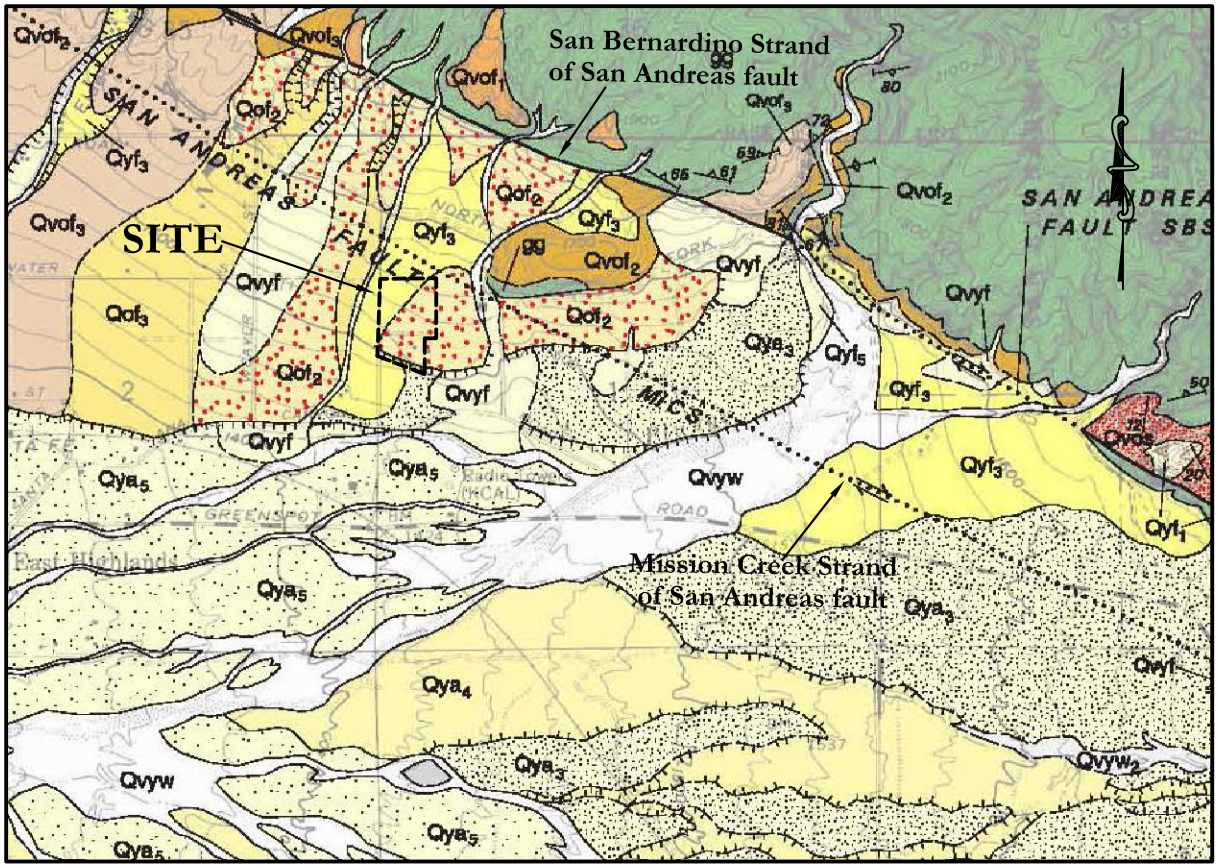
FIGURES AND TABLES



SITE LOCATION MAP

Scale: 1" = 2,000'

Base Map: U.S. Geological Survey Redlands Quadrangle (1996)



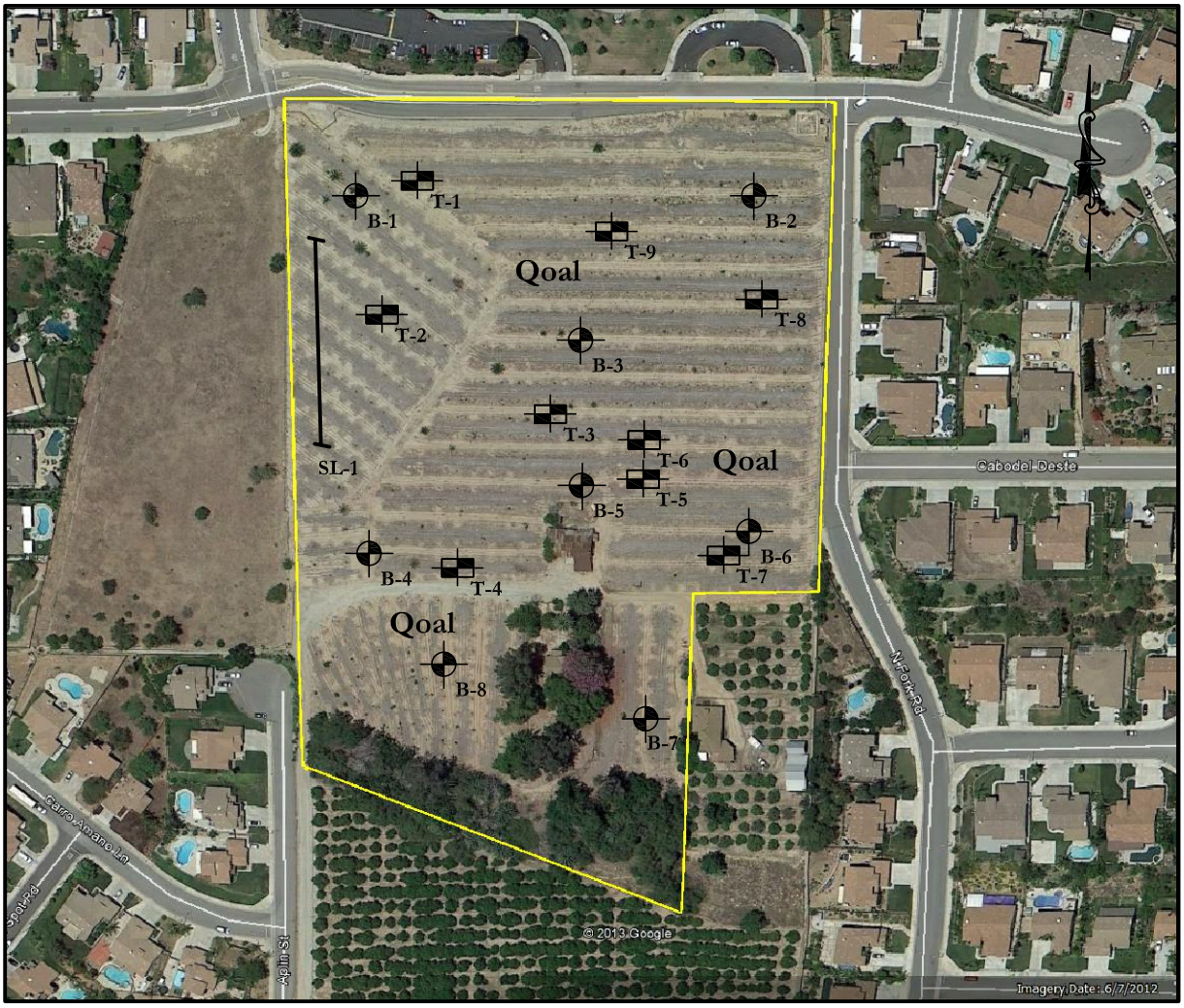
REGIONAL GEOLOGIC MAP

Scale: 1" ~ 2,100'

Partial Legend

Qyf_3 - Young alluvial-fan deposits (middle Holocene)
Qof_2 - Older alluvial-fan deposits (late to middle Pleistocene)
$Qvof_2$, $Qvpf_3$ - Very old alluvial-fan deposits (middle to early Pleistocene)
gg - Gneissose granitold rock and gneiss (Mesozoic and older)
Dotted lines indicate concealed faults
- Contact between terraced and incised alluvial units, hachures point down slope

Source: U.S. Geological Survey OFR 03-302 (Matti, Morton, Cox and Kendrick, 2003)



SITE GEOLOGIC MAP

Scale: 1" ~ 240'

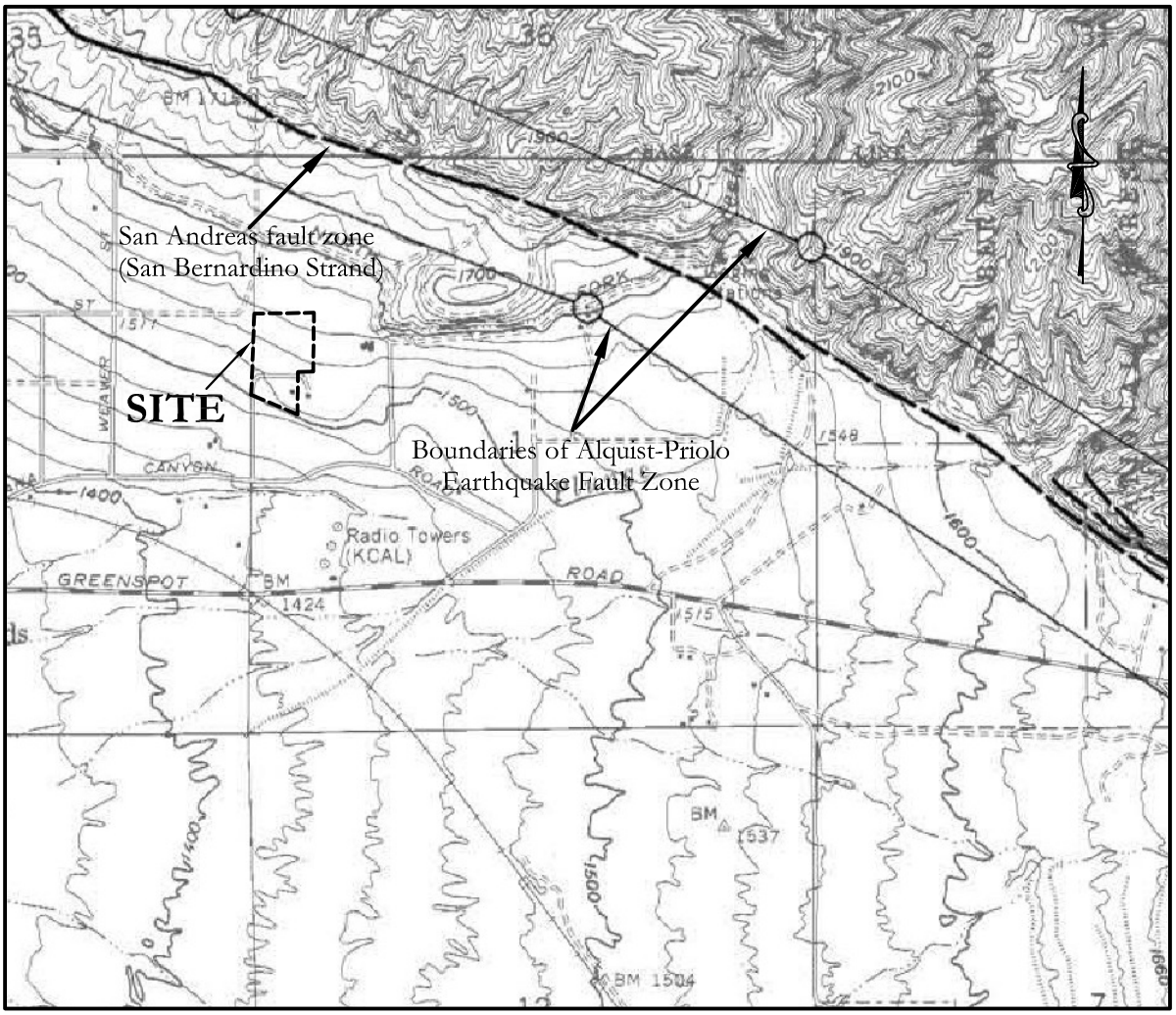
Qoal - Older alluvium (locally covered by thin fill)

T-9 - Approximate location of exploratory trench

B-8 - Approximate location of exploratory boring

SL-1 - Approximate location of seismic line

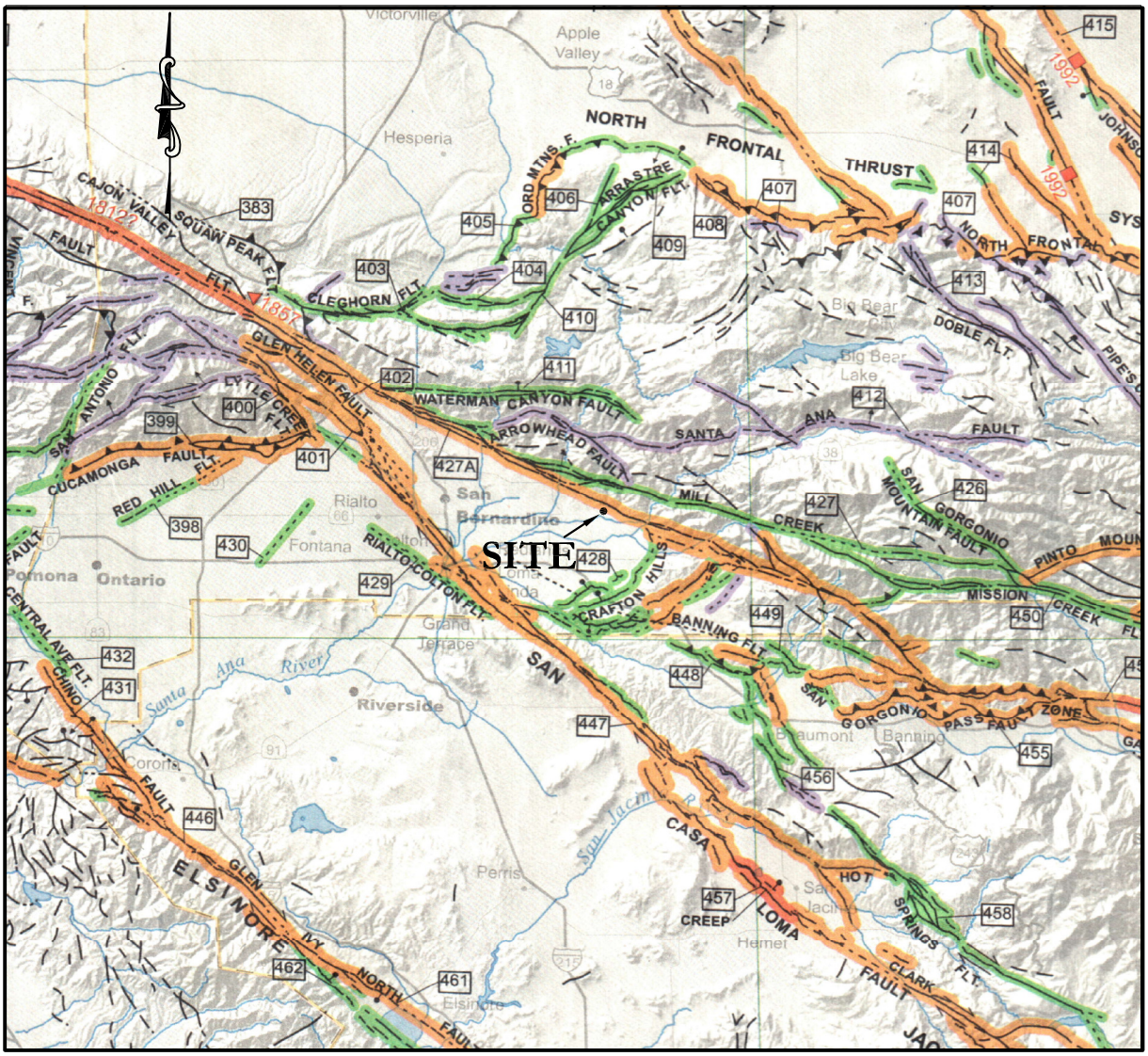
Base photograph: Google Earth



EARTHQUAKE FAULT ZONE MAP

Scale: 1" ~ 1,800'

Source: California Division of Mines and Geology, Special Studies Zone Map of the Redlands Quadrangle (1977).



REGIONAL FAULT MAP

Scale: 1" ~ 12 miles

Base Map: California Activity Map of California, California Geological Survey (Jennings and Bryant, 2010)

TABLE 1
NOTABLE FAULTS WITHIN 100 KILOMETERS AND SEISMIC DATA

Fault Zone & geometry	Distance (km)	Distance (mi.)	Maximum Moment Magnitude	Slip Rate (mm/yr)
Anacapa-Dume (r-ll-o)	81	50	7.5	3.0
Chino-Central Ave. (rl-r-o)	29	18	6.7	1.0
Clamshell-Sawpit (r)	51	32	6.5	0.5
Cleghorn (ll-ss)	74	46	6.5	3.0
Coronado Bank (rl-ss)	52	32	7.4	3.0
Cucamonga (r)	45	28	6.9	5.0
Elsinore - Glen Ivy (rl-ss)	25	16	6.8	5.0
Upper Elysian Park (r)	43	27	6.4	1.3
Hollywood (ll-r-o)	54	34	6.4	1.0
Holser (r)	99	62	6.5	0.4
Malibu Coast (ll-r-o)	70	43	6.7	0.3
Newport-Inglewood (rl-ss)	13	8	6.9	1.5
North Frontal - Western (r)	85	53	7.2	1.0
Northridge (r)	78	48	7	1.5
Palos Verde (rl-ss)	31	19	7.3	3.0
Puente Hills Blind Thrust (r)	21	13	7.1	0.7
Raymond (ll-r-o)	48	30	6.5	1.5
Rose Canyon (rl-ss)	80	50	6.9	1.5
San Andreas (rl-ss)	71	44	7.5	24.0
San Gabriel (rl-ss)	75	47	7.2	1.0
San Jacinto - San Bernardino (rl-ss)	64	40	6.7	12.0
San Joaquin Hills (r)	5	3	6.6	0.5
San Jose (ll-r-o)	34	21	6.4	0.5
Santa Monica (ll-r-o)	63	39	6.6	1.0
Santa Susana (r)	87	54	6.7	5.0
Sierra Madre (r)	44	27	7.2	2.0
San Fernando (r)	72	45	6.7	2.0
Simi-Santa Rosa (ll-r-o)	99	62	7	1.0
Verdugo (r)	51	32	6.9	0.5
Whittier (rl-ss)	21	13	6.8	2.5

Notes:

Fault geometry - (ss) strike slip, (r) reverse, (n) normal, (rl) right lateral, (ll) left lateral, (o) oblique
Fault and Seismic Data - California Geological Survey (Cao), 2003

TABLE 2
HISTORIC STRONG EARTHQUAKES IN SOUTHERN CALIFORNIA SINCE 1812

Date	Event	Causitive Fault	Magnitude	Epicentral Distance (miles)
Dec. 12, 1812	Wrightwood	San Andreas?	7.3	45
Jan. 9, 1857	Fort Tejon	San Andreas	7.9	259
Dec. 16, 1858	San Bernardino Area	uncertain	6.0	12
Feb. 9,1890	San Jacinto	uncertain	6.3	70
May 28, 1892	San Jacinto	uncertain	6.3	72
July 30, 1894	Lytle Creek	uncertain	6.0	29
July 22, 1899	Cajon Pass	uncertain	6.4	24
Dec.25, 1899	San Jacinto	San Jacinto	6.7	24
Sept. 20, 1907	San Bernardino Area	uncertain	5.3	7
May 15, 1910	Elsinore	Elsinore	6.0	32
April 21, 1918	Hemet	San Jacinto	6.8	27
July 23, 1923	San Bernardino	San Jacinto	6.0	12
March 11, 1933	Long Beach	Newport-Inglewood	6.4	58
April 10, 1947	Manix	Manix	6.4	70
Dec. 4, 1948	Desert Hot Springs	San Andreas or Banning	6.5	47
July 21, 1952	Wheeler Ridge	White Wolf	7.3	126
Feb. 9, 1971	San Fernando	San Fernando	6.6	76
July 8, 1986	North Palm Springs	Banning or Garnet Hills	5.6	33
Oct. 1, 1987	Whittier Narrows	Puente Hills Thrust	6.0	55
Feb. 28, 1990	Upland	San Jose	5.5	32
June 28, 1991	Sierra Madre	Clamshell Sawpit	5.8	50
April 22, 1992	Joshua Tree	Eureka Peak	6.1	51
June 28, 1992	Landers	Johnson Valley & others	7.3	43
June 28, 1992	Big Bear	uncertain	6.5	20
Jan. 17, 1994	Northridge	Northridge Thrust	6.7	82
Oct. 16, 1999	Hector Mine	Lavic Lake	7.1	62

Notes:

Earthquake data: U.S. Geological Survey P.P. 1515 & online data, Southern California Earthquake Center
California Geological Survey online data
Magnitudes prior to 1932 are estimated from intensity.
Magnitudes after 1932 are moment, local or surface wave magnitudes.
Attenuation relationship - Boore et al., 1997 (mean values), values at distances > 50 miles are approxima

Site Location:

Site Longitude: 117.1553
Site Latitude: 34.116

APPENDIX A

FIELD INVESTIGATION

APPENDIX A

FIELD INVESTIGATION

A-1.00 FIELD EXPLORATION

A-1.01 Number of Borings, Trenches and Seismic Lines

Our subsurface investigation consisted of 8 borings drilled with a CME-75 drill rig, 9 trenches excavated with a backhoe and one seismic line.

A-1.02 Location of Borings, Trenches and Seismic Line

A Site Geologic Map showing the approximate locations of the borings, trenches and seismic line is presented as Figure 3.

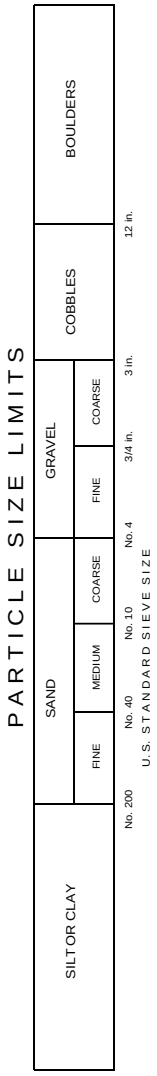
A-1.03 Boring and Trench Logging

Logs of borings and trenches were prepared by one of our staff and are attached in this appendix. The logs contain factual information and interpretation of subsurface conditions between samples. The strata indicated on these logs represent the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soils Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this appendix. Bag samples of the major earth units were obtained for laboratory inspection and testing, and the in-place density of the various strata encountered in the exploration was determined

A-1.04 Seismic Line Results

Results of the shear wave velocity survey are presented in Appendix D.



MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravel, gravel-sand mixtures. little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatamaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

UNIFIED SOIL CLASSIFICATION SYSTEM

I. SOIL STRENGTH/DENSITY

BASED ON STANDARD PENETRATION TESTS

Compactness of sand		Consistency of clay	
Penetration Resistance N (blows/Ft)	Compactness	Penetration Resistance N (blows/ft)	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

N = Number of blows of 140 lb. weight falling 30 in. to drive 2-in OD sampler 1 ft.

BASED ON RELATIVE COMPACTION

Compactness of sand		Consistency of clay	
% Compaction	Compactness	% Compaction	Consistency
<75	Loose	<80	Soft
75-83	Medium Dense	80-85	Medium Stiff
83-90	Dense	85-90	Stiff
>90	Very Dense	>90	Very Stiff

II. SOIL MOISTURE

Moisture of sands		Moisture of clays	
% Moisture	Description	% Moisture	Description
<5%	Dry	<12%	Dry
5-12%	Moist	12-20%	Moist
>12%	Very Moist	>20%	Very Moist, wet

SOIL DESCRIPTION LEGEND

Exploratory Trench Log

Trench No. T-1

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,559'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Light brown silty sand with fine veins of caliche, porous, dry. Below 1', light brown to medium brown color, moist, some porosity.
5					SM		Reddish brown silty sand, medium grained silty sand, root at 4', loose and easily excavated, no cobbles or boulders.
10					SP		Yellow brown coarse grained sand, moist, no cobbles or boulders. Total depth 11 feet No groundwater Trench backfilled
15							

Exploratory Trench Log

Trench No. T-2

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,543'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Light brown silty with gravel, porous, hard, dry.
					SM		Light to medium brown, medium grained silty sand, porous to 3', root at 4', one cobble in trench sidewall, moist.
5					SM		Reddish brown silty sand with 10% cobbles and boulders. Total depth 7 feet No groundwater Trench backfilled
10							
15							

Exploratory Trench Log

Trench No. T-3

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,544'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Reddish brown medium grained silty sand, porous, dry, slightly cemented, 2.5' to 3' diameter boulder at east end of trench, refusal at 2' at east end of trench.
					SM		Reddish brown coarse grained silty sand, dense, moist. ~5% cobbles up to 8" in diameter from 4' to 5' ~3% cobbles up to 8" in diameter from 5' to 7' Total depth 7 feet (refusal at 2' at east end of trench due to a boulder) No groundwater Trench backfilled
5							
10							
15							

Exploratory Trench Log

Trench No. T-4

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,530'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Reddish brown medium grained silty sand with ~25% cobbles and 35% boulders measuring 2 to 4' in diameter.
					SM		Reddish brown medium grained silty sand with >50% boulders. Total depth 4 feet (Refusal due to boulders) No groundwater Trench backfilled
5							
10							
15							

Exploratory Trench Log

Trench No. T-5

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,544'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
5 10 15					SM		Older alluvim (Qoal): Reddish brown silty sand. @1' - 2" diameter steel pipe, dry, no water, trending east-west. Total depth 1 foot (trench abandoned because of pipe) No groundwater Trench backfilled

Exploratory Trench Log

Trench No. T-6

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,544'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
5 10 15					ML		Older alluvium (Qoal): Reddish brown silty sand. @2' - 5" diameter clay pipe, dry, no water, trending N68E. Total depth 2 feet (trench abandoned due to pipe) No groundwater Trench backfilled

Exploratory Trench Log

Trench No. T-7

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,540'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Brown to reddish brown silty sand, dense, moist.
					SM		Reddish brown coarse grained silty sand with gravel, dense moist. @3' - boulders 2' to 3' in diameter clustered at the east end of the trench, ~ 10% boulders.
5					SM		Reddish brown medium grained silty sand, loose, easily excavated, no cobbles or boulders.
							Total depth 7 feet No groundwater Trench backfilled
10							
15							

Exploratory Trench Log

Trench No. T-8

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,562'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Light brown silty sand, dry, roots.
					SM		Reddish brown medium grained silty sand, >50% boulders with a maximum diameter of 4'.
							Total depth 4 feet (Refusal due to boulders) No groundwater Trench backfilled
5							
10							
15							

Exploratory Trench Log

Trench No. T-9

Location: See Site Geologic Map
Logged By: MPS
Elevation: ~1,561'
Equipment: Backhoe w/24" bucket
Date Excavated: 8-20-13

Depth (ft)	Bulk Sample	Moisture Content (%)	Dry Density (pcf)		USCS	Graphic Symbol	Material Description This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
					SM		Older alluvium (Qoal): Light brown silty sand, dry, roots.
					SM		Reddish brown medium grained silty sand with 1' to 4' diameter boulders clustered at the east end of the trench (~10% boulders). @4' – Boulders exposed over the entire base of the trench, >50% boulders. Total depth 4' feet (refusal due to boulders) No groundwater Trench backfilled
5							
10							
15							

RMA Group
Every Project Matters | www.rmacompanies.com

Exploratory Boring Log

Boring No. B-1

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,555'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
	R	10	▨	7.3	105.5	SM		Older alluvium (Qoal): Dark yellowish brown silty fine to coarse grained sand with trace of gravel, dry, slightly porous to 2 feet then non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense (31% passing #200). At 2.5 feet, becomes reddish brown in color, moist
5	R	17		6.2	110.4			Increase in sand versus silt content, sandier
10	R	22		4.7	110.4			Dark yellowish-brown to reddish brown in color, decrease in sand versus silt content. Minor gravel
15	R	50 for 6"		5.2	105.5			Total depth 15.5 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample ▨ - Bulk Sample ▽ - Groundwater

T - Tube Sample S - SPT Sample ◣ - End of Boring

RMA Group
Every Project Matters | www.rmacompanies.com

Exploratory Boring Log

Boring No. B-2

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,567'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
	R	30		--	--	SM		Older alluvium (Qoal): Grayish-brown to 1 foot then yellowish brown, silty fine to coarse grained sand with trace of gravel, dry to 1 foot then slightly moist to moist, non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense
5	R	50 for 6"		6.2	102.3			Total depth 5.5 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
10								
15								
20								
25								

Material Description: This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample
Bulk Sample
- Groundwater
T - Tube Sample
S - SPT Sample
- End of Boring

Exploratory Boring Log

Boring No. B-3

Sheet 1 of 1

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,551'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
	R	31		8.0	122.0	SM		Older alluvium (Qoal): Grayish-brown to 1 foot then dark reddish brown, silty fine to coarse grained sand, dry to 1 foot then slightly moist to moist, slightly porous to 2 feet then non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense
5	R	50 for 2"		5.7	111.7			Total depth 5.5 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
10								
15								
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample - Bulk Sample - Groundwater

T - Tube Sample S - SPT Sample - End of Boring

Exploratory Boring Log

Boring No. B-4

Sheet 1 of 1

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:		Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
						SM		Older alluvium (Qoal): Grayish-brown to 1 foot then reddish brown, silty fine to coarse grained sand, dry to 1 foot then slightly moist to moist, slightly porous to 2 feet then non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense.
	R	24		6.0	108.2			
5	R	53		6.9	129.3			Sampled granite boulder Becomes dark reddish brown color below 5'. Increasing gravel and cobbles
10								Total depth 9 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
15								
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample - Bulk Sample - Groundwater

T - Tube Sample S - SPT Sample - End of Boring

RMA Group
Every Project Matters | www.rmacompanies.com

Exploratory Boring Log

Boring No. B-5

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,540'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
	R	42		5.6	114.2	SM		Older alluvium (Qoal): Grayish-brown to 1 foot then dark reddish brown, silty fine to coarse grained sand, dry to 1 foot then slightly moist to moist, slightly porous to 2 feet then non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense to dense.
5								Total depth 4.5 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
10								
15								
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample - Bulk Sample - Groundwater

T - Tube Sample S - SPT Sample - End of Boring

RMA Group
Every Project Matters | www.rmacompanies.com

Exploratory Boring Log

Boring No. B-6

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,542'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
						SM		Older alluvium (Qoal): Light brown to 1 foot then dark reddish brown, silty fine to coarse grained sand, dry to 1 foot then slightly moist to moist, slightly porous to 1 foot then non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense.
	R	88		6.8	127.2			Granite boulder encountered at 3 feet
5	R	50 for 5"		3.9	114.5			Sampled in granite boulder
								Total depth 7 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
10								
15								
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample - Bulk Sample - Groundwater

T - Tube Sample S - SPT Sample - End of Boring

Exploratory Boring Log

Boring No. B-7

Sheet 1 of 1

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,531'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
						SM		Alluvium (Qal): Light brown to 1 foot then reddish, brown silty fine to coarse grained sand, dry to 1 foot then moist, non-porous, non-cohesive, medium dense.
								Total depth 1.5 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
5								
10								
15								
20								
25								

Material Description

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample - Bulk Sample - Groundwater

T - Tube Sample S - SPT Sample - End of Boring

RMA Group
Every Project Matters | www.rmacompanies.com

Exploratory Boring Log

Boring No. B-8

Date Drilled:	8-7-2013	Drilling Equipment:	CME-75
Logged By:	KRD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	~1,523'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
	R	25		6.9	125.2	SM		Older alluvium (Qoal): Light brown to 1 foot then dark reddish brown, silty fine to coarse grained sand, dry to 1 foot then slightly moist to moist, non-porous, non-cohesive, loose to medium dense to 2 feet then medium dense.
5	R	75	▨	4.8	114.0			Dark yellowish-brown fine to coarse grained sand with silt and minor gravel, moist, poorly sorted, dense (14% passing #200).
10								Total depth 8 feet (refusal due to subsurface rocks) No groundwater Hole backfilled
15								
20								
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample ▨ - Bulk Sample ▽ - Groundwater

T - Tube Sample S - SPT Sample ◣ - End of Boring

APPENDIX B

LABORATORY TESTS

APPENDIX B

LABORATORY TESTS

B-1.00 LABORATORY TESTS

B-1.01 Maximum Density

Maximum density - optimum moisture relationships for the major soil types encountered during the field exploration were performed in the laboratory using the standard procedures of ASTM D1557.

B-1.02 Expansion Tests

An expansion index test was performed on a representative soil sample by the test methods outlined in ASTM D4829.

B-1.03 Soluble Sulfates

A test was performed on a representative soil sample using the HACH DR3 (Calcium Phosphate Extractable) procedures.

B-1.04 Sand Equivalent

A sand equivalent test was performed on a representative soil sample by the test methods of ASTM D2419.

B-1.05 Soil Reactivity (pH) and Electrical Conductivity (Ec)

A representative soil sample was tested for soil reactivity (pH) and electrical conductivity (Ec) using California Test Method S3.0 and S5.0. The pH measurement determines the degree of acidity or alkalinity in the soils. The Ec is a measure of the electrical resistivity and is expressed as the reciprocal of the resistivity.

B-1.06 Particle Size Analysis

Particle size analysis was performed on representative samples of the major soils types in accordance to the standard test methods of ASTM D422. The hydrometer portion of the standard procedure was not performed and the material retained on the #200 screen was washed.

B-1.07 Direct Shear

A direct shear test was performed on representative soil sample using the standard test method of ASTM D3080 (consolidated and drained). Tests were performed on remolded samples. Remolded samples were tested at 90 percent relative compaction.

The shear test was performed on a direct shear machine of the strain-controlled type. To simulate possible adverse field conditions, the sample was saturated prior to shearing. Several samples were sheared at varying normal loads and the results plotted to establish the angle of internal friction and cohesion of the tested samples.

B-1.08 Resistance Value (R-Value)

A resistance value test was performed on a representative soil sample by the test methods outlined in California 301.

B-1.09 Moisture Determination

Moisture content of the soil samples was performed in accordance with standard method for determination of water content of soil by drying oven, ASTM D2216. The mass of material remaining after oven drying is used as the mass of the solid particles.

B-1.10 Density of Split-Barrel Samples

Soil samples were obtained by using a split-barrel sampler in accordance with standard method of ASTM D1586.

B-1.11 Test Results

Test results for all laboratory tests performed on the subject project are presented in this appendix.

SAMPLE INFORMATION

Sample Number	Sample Description	Sample Location	
		Boring No.	Depth (ft)
1	Grayish-brown silty sand	1	1-4
2	Brown silty sand	3	2-4
3	Grayish-brown and brown silty sand	4	1-5
4	Light brown and brown silty sand	7	0-1.5
5	Dark yellowish-brown silty sand	8	5-8

MAXIMUM DENSITY - OPTIMUM MOISTURE
(Test Method: ASTM D1557)

Sample Number	Optimum Moisture (Percent)	Maximum Density (lbs/ft^3)
1	8.2	132.3
5	7.8	131.6

EXPANSION TEST
Test Method: ASTM D4829

Sample Number	Molding Moisture Content (Percent)	Final Moisture Content (Percent)	Initial Dry Density (lbs/ft^3)	Expansion Index	Expansion Classification
3	8.0	12.6	119.5	0	Very low

SOLUBLE SULFATES
(Test Method: Hach DR3 - Calcium Phosphate Extractable)

Sample Number	Soluble Sulfate (ppm)
3	77

SAND EQUIVALENT

Test Method: ASTM D2419

Sample Number	Sand Equivalent
1	81

SOIL REACTIVITY (pH) AND ELECTRICAL CONDUCTIVITY

(Test Method: ASTM D4972)

Sample Number	pH	Resistivity (ohm-cm)
3	7.7	1,850

RMA Group
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL CONSULTANTS

PARTICLE SIZE ANALYSIS

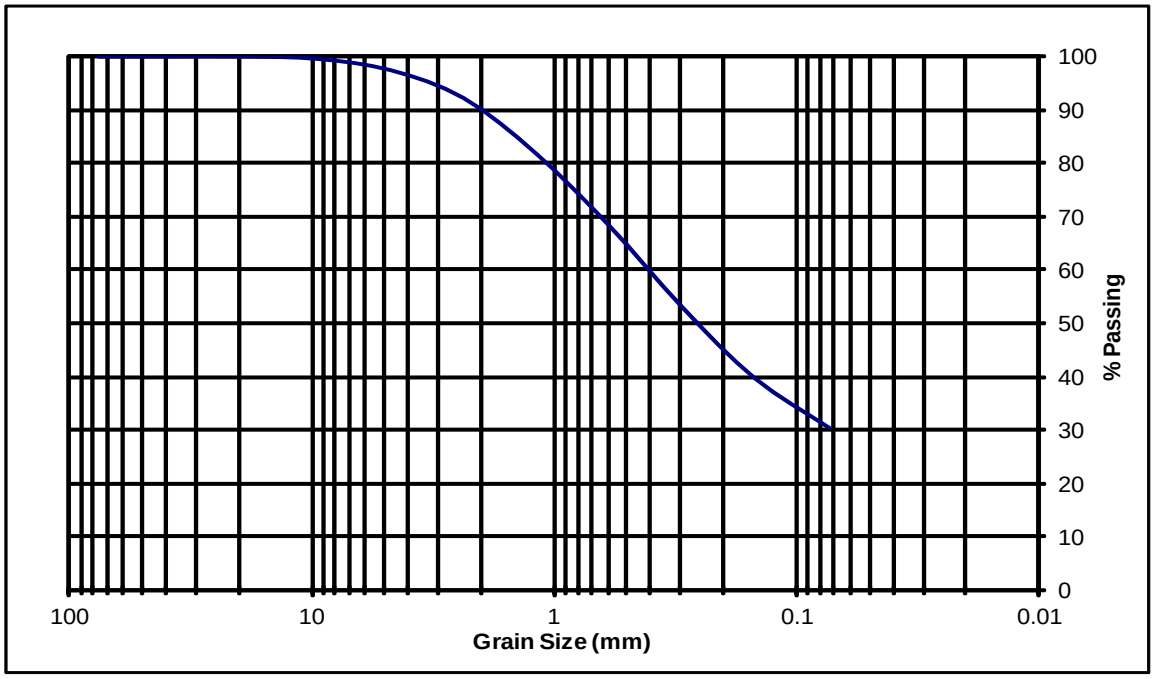
ASTM D422

Sample ID: 1
Location: B-1, 1-4'

Fraction A: Dry Net Weight (gms): 1,184
Fraction B: Dry Net Weight (gms): 493.2

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction A:	3"	0	1184	100
	1-1/2"	0	1184	100
	3/4"	0	1184	100
	3/8"	5	1179	100
	#4	30	1154	97

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction B:	#8	26.3	466.9	92
	#16	79.1	414.1	82
	#30	148.3	344.9	68
	#50	224.7	268.5	53
	#100	291.5	201.7	40
	#200	338.7	154.5	31



RMA Group
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL CONSULTANTS

PARTICLE SIZE ANALYSIS

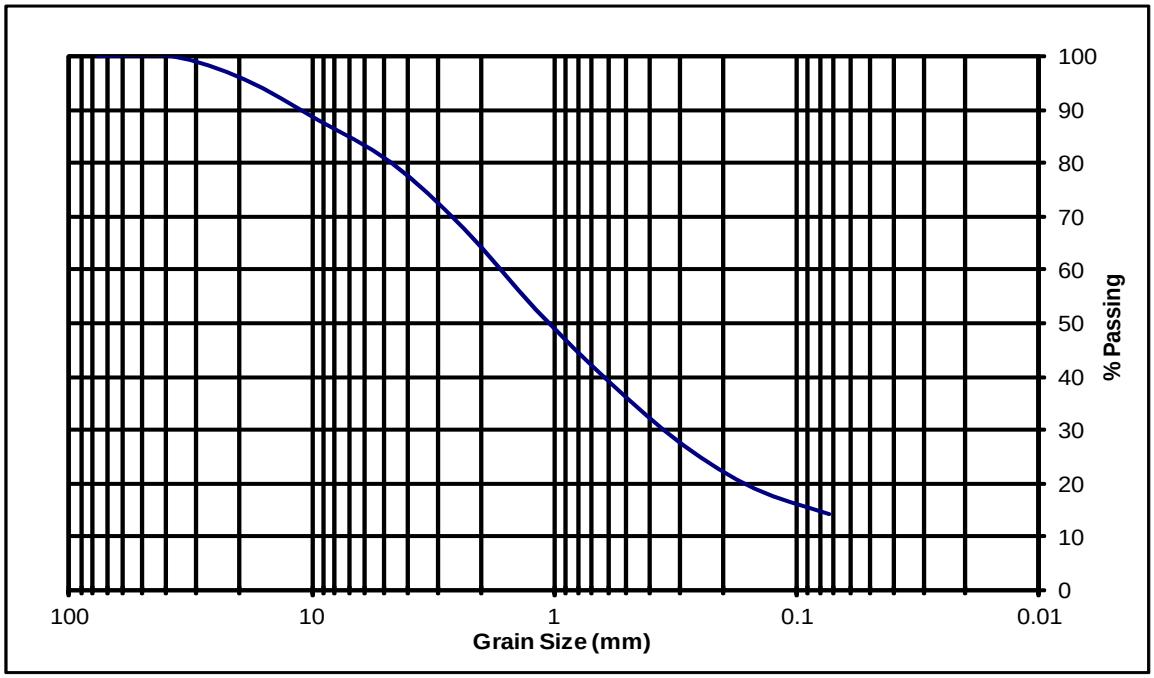
ASTM D422

Sample ID: 5
Location: B-8, 5-8'

Fraction A: Dry Net Weight (gms): 5,393
Fraction B: Dry Net Weight (gms): 508.4

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction A:	3"	0	5393	100
	1-1/2"	0	5393	100
	3/4"	235	5158	96
	3/8"	642	4751	88
	#4	1072	4321	80

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction B:	#8	78.1	430.3	68
	#16	175.5	332.9	52
	#30	261.9	246.5	39
	#50	335.1	173.3	27
	#100	387.4	121.0	19
	#200	417.8	90.6	14



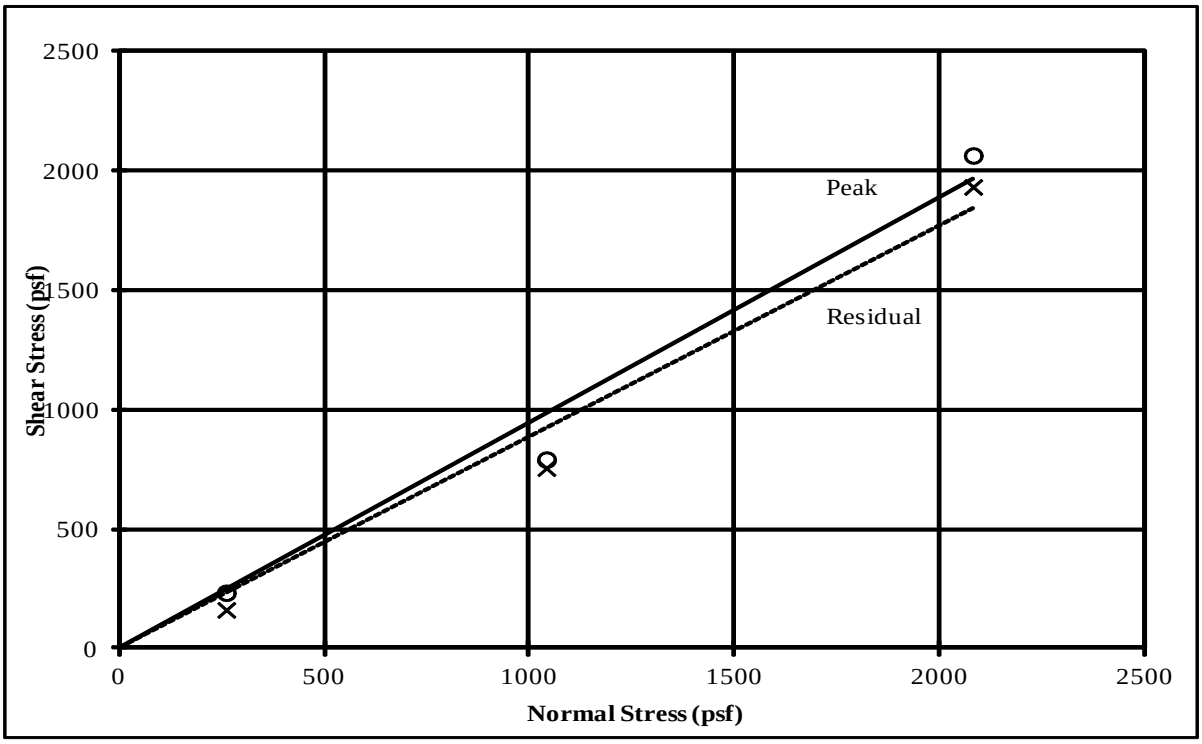
DIRECT SHEAR TEST
ASTM D3080

Sample ID: 1
Location: B-1, 1-4'

Maximum Dry Density (pcf) = 132.3
Optimum Moisture Content (%) = 8.2
Initial Dry Density (pcf) = 119.1
Initial Moisture Content (%) = 8.2
Final Moisture Content (%) = 13.8

Normal Pressure	Peak Dial Reading	Peak Shear Resist	Residual Dial Reading	Residual Shear Resist
260		235		163
1040		792		756
2080		2064		1932

	Peak	Residual
Cohesion (psf) =	0	0
Friction Angle (deg) =	45	44



CTM 301 - DETERMINATION OF RESISTANCE "R" VALUE OF TREATED AND UNTREATED BASES, SUBBASES, AND BASEMENT SOILS BY THE STABILOMETER

Sample ID: 4

Specimen No	A	B	C
Moisture Content (%)	8.0	10.1	9.1
Dry Density (pcf)	125.5	125.0	125.4
Exudation Pressure (psi)	547	140	274
Stabilometer R Value	65	18	49
Expansion Pressure Dial	15	0	4

Use: Traffic Index = 5.0 Gravel Factor = 1.00

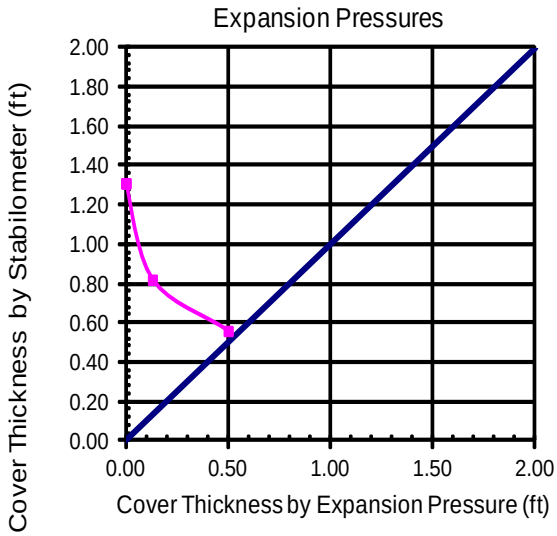
Thickness by Expansion (ft)	0.50	0.00	0.13
Thickness by Stabilometer (ft)	0.56	1.31	0.82

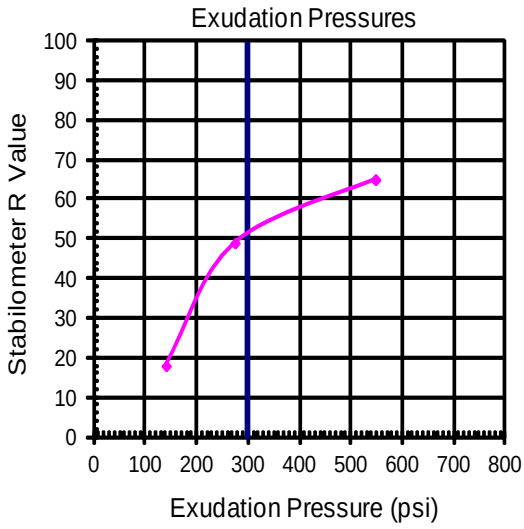
Equilibrium Thick (ft) 0.55

Equilibrium Pressure R Value **66**

Exudation Pressure R Value @ 300 psi **51**

Use Exudation R Value





Expansion Pressure R-Value is based on the following structural section:

Thickness of AC (ft)=	**0.25**	G_f(ac) =	2.50	W(ac) =	145
Thickness of Aggregate Base (ft)=	**0.33**	G_f(base) =	1.10	W(base) =	130
		G_f(avg) =	1.70	W(avg) =	136

APPENDIX C

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX C

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

C-1.00 GENERAL DESCRIPTION

C-1.01 Introduction

These specifications present our general recommendations for earthwork and grading as shown on the approved grading plans for the subject project. These specifications shall cover all clearing and grubbing, removal of existing structures, preparation of land to be filled, filling of the land, spreading, compaction and control of the fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades and slopes as shown on the approved plans.

The recommendations contained in the geotechnical report of which these general specifications are a part of shall supersede the provisions contained hereinafter in case of conflict.

C-1.02 Laboratory Standard and Field Test Methods

The laboratory standard used to establish the maximum density and optimum moisture shall be ASTM D1557.

The insitu density of earth materials (field compaction tests) shall be determined by the sand cone method (ASTM D1556), direct transmission nuclear method (ASTM D6938) or other test methods as considered appropriate by the geotechnical consultant.

Relative compaction is defined, for purposes of these specifications, as the ratio of the in-place density to the maximum density as determined in the previously mentioned laboratory standard.

C-2.00 CLEARING

C-2.01 Surface Clearing

All structures marked for removal, timber, logs, trees, brush and other rubbish shall be removed and disposed of off the site. Any trees to be removed shall be pulled in such a manner so as to remove as much of the root system as possible.

C-2.02 Subsurface Removals

A thorough search should be made for possible underground storage tanks and/or septic tanks and cesspools. If found, tanks should be removed and cesspools pumped dry.

Any concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the site.

C-2.03 Backfill of Cavities

All cavities created or exposed during clearing and grubbing operations or by previous use of the site shall be cleared of deleterious material and backfilled with native soils or other materials approved by the soil engineer. Said backfill shall be compacted to a minimum of 90% relative compaction.

C-3.00 ORIGINAL GROUND PREPARATION

C-3.01 Stripping of Vegetation

After the site has been properly cleared, all vegetation and topsoil containing the root systems of former vegetation shall be stripped from areas to be graded. Materials removed in this stripping process may be used as fill in areas designated by the soil engineer, provided the vegetation is mixed with a sufficient amount of soil to assure that no appreciable settlement or other detriment will occur due to decaying of the organic matter. Soil materials containing more than 3% organics shall not be used as structural fill.

C-3.02 Removals of Non-Engineered Fills

Any non-engineered fills encountered during grading shall be completely removed and the underlying ground shall be prepared in accordance to the recommendations for original ground preparation contained in this section. After cleansing of any organic matter the fill material may be used for engineered fill.

C-3.03 Overexcavation of Fill Areas

The existing ground in all areas determined to be satisfactory for the support of fills shall be scarified to a minimum depth of 6 inches. Scarification shall continue until the soils are broken down and free from lumps or clods and until the scarified zone is uniform. The moisture content of the scarified zone shall be adjusted to within 2% of optimum moisture. The scarified zone shall then be uniformly compacted to 90% relative compaction.

Where fill material is to be placed on ground with slopes steeper than 5:1 (H:V) the sloping ground shall be benched. The lowermost bench shall be a minimum of 15 feet wide, shall be a minimum of 2 feet deep, and shall expose firm material as determined by the geotechnical consultant. Other benches shall be excavated to firm material as determined by the geotechnical consultant and shall have a minimum width of 4 feet.

Existing ground that is determined to be unsatisfactory for the support of fills shall be overexcavated in accordance to the recommendations contained in the geotechnical report of which these general specifications are a part.

C-4.00 FILL MATERIALS

C-4.01 General

Materials for the fill shall be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than is recommended by the geotechnical consultant, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength properties shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils providing satisfactory fill material.

C-4.02 Oversize Material

Oversize material, rock or other irreducible material with a maximum dimension greater than 12 inches, shall not be placed in fills, unless the location, materials, and disposal methods are specifically approved by the geotechnical consultant. Oversize material shall be placed in such a manner that nesting of oversize material does not occur and in such a manner that the oversize material is completely surrounded by fill material compacted to a minimum of 90% relative compaction. Oversize material shall not be placed within 10 feet of finished grade without the approval of the geotechnical consultant.

C-4.03 Import

Material imported to the site shall conform to the requirements of Section 4.01 of these specifications. Potential import material shall be approved by the geotechnical consultant prior to importation to the subject site.

C-5.00 PLACING AND SPREADING OF FILL

C-5.01 Fill Lifts

The selected fill material shall be placed in nearly horizontal layers which when compacted will not exceed approximately 6 inches in thickness. Thicker lifts may be placed if testing indicates the compaction procedures are such that the required compaction is being achieved and the geotechnical consultant approves their use.
Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to insure uniformity of material in each layer.

C-5.02 Fill Moisture

When the moisture content of the fill material is below that recommended by the soils engineer, water shall then be added until he moisture content is as specified to assure thorough bonding during the compacting process.

When the moisture content of the fill material is above that recommended by the soils engineer, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

C-5.03 Fill Compaction

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than 90% relative compaction. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tired rollers, or other types approved by the soil engineer.

Rolling shall be accomplished while the fill material is at the specified moisture content. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to insure that the desired density has been obtained.

C-5.04 Fill Slopes

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting of the slopes may be done progressively in increments of 3 to 4 feet in fill height. At the completion of grading, the slope face shall be compacted to a minimum of 90% relative compaction. This may require track rolling or rolling with a grid roller attached to a tractor mounted side-boom.

Slopes may be over filled and cut back in such a manner that the exposed slope faces are compacted to a minimum of 90% relative compaction.

The fill operation shall be continued in six inch (6") compacted layers, or as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

C-5.05 Compaction Testing

Field density tests shall be made by the geotechnical consultant of the compaction of each layer of fill. Density tests shall be made at locations selected by the geotechnical consultant.

Frequency of field density tests shall be not less than one test for each 2.0 feet of fill height and at least every one thousand cubic yards of fill. Where fill slopes exceed four feet in height their finished faces shall be tested at a frequency of one test

for each 1000 square feet of slope face.

Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density reading shall be taken in the compacted material below the disturbed surface. When these readings indicate that the density of any layer of fill or portion thereof is below the required density, the particular layer or portion shall be reworked until the required density has been obtained.

C-6.00 SUBDRAINS

C-6.01 Subdrain Material

Subdrains shall be constructed of a minimum 4-inch diameter pipe encased in a suitable filter material. The subdrain pipe shall be Schedule 40 Acrylonitrile Butadiene Styrene (ABS) or Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe or approved equivalent. Subdrain pipe shall be installed with perforations down. Filter material shall consist of 3/4" to 1 1/2" clean gravel wrapped in an envelope of filter fabric consisting of Mirafi 140N or approved equivalent.

C-6.02 Subdrain Installation

Subdrain systems, if required, shall be installed in approved ground to conform the approximate alignment and details shown on the plans or herein. The subdrain locations shall not be changed or modified without the approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in the subdrain line, grade or material upon approval by the design civil engineer and the appropriate governmental agencies.

C-7.00 EXCAVATIONS

C-7.01 General

Excavations and cut slopes shall be examined by the geotechnical consultant. If determined necessary by the geotechnical consultant, further excavation or overexcavation and refilling of overexcavated areas shall be performed, and/or remedial grading of cut slopes shall be performed.

C-7.02 Fill-Over-Cut Slopes

Where fill-over-cut slopes are to be graded the cut portion of the slope shall be made and approved by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope.

C-8.00 TRENCH BACKFILL

C-.01 General

Trench backfill within street right of ways shall be compacted to 90% relative compaction as determined by the ASTM D1557 test method. Backfill may be jetted as a means of initial compaction; however, mechanical compaction will be required to obtain the required percentage of relative compaction. If trenches are jetted, there must be a suitable delay for drainage of excess water before mechanical compaction is applied.

C-9.00 SEASONAL LIMITS

C-9.01 General

No fill material shall be placed, spread or rolled while it is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.

C-10.00 SUPERVISION

C-10.01 Prior to Grading

The site shall be observed by the geotechnical consultant upon completion of clearing and grubbing, prior to the preparation of any original ground for preparation of fill.

The supervisor of the grading contractor and the field representative of the geotechnical consultant shall have a meeting and discuss the geotechnical aspects of the earthwork prior to commencement of grading.

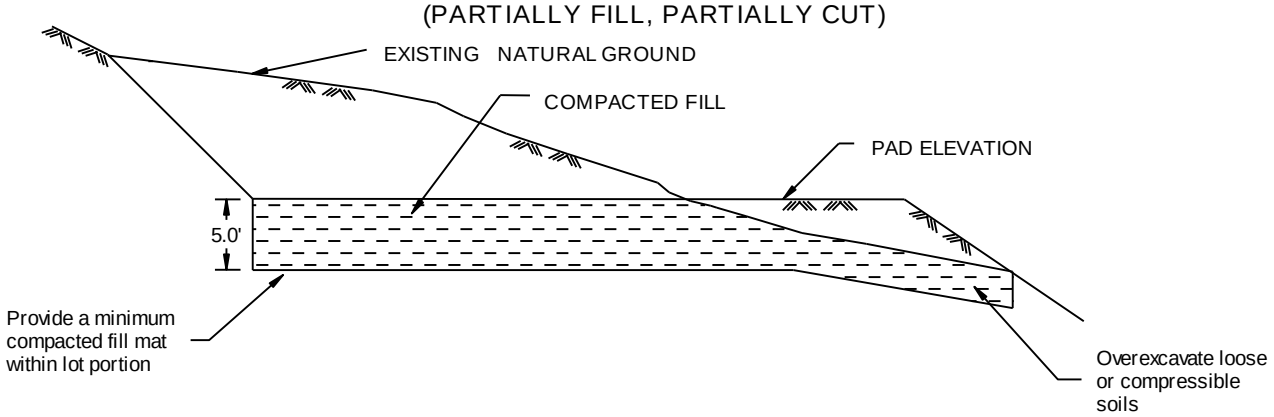
C-10.02 During Grading

Site preparation of all areas to receive fill shall be tested and approved by the geotechnical consultant prior to the placement of any fill.

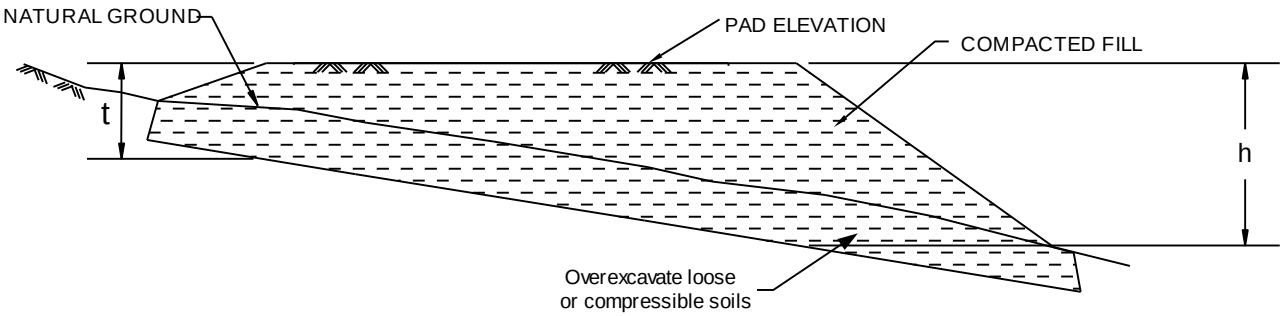
The geotechnical consultant or his representative shall observe the fill and compaction operations so that he can provide an opinion regarding the conformance of the work to the recommendations contained in this report.

CUT TO FILL TRANSITION PADS

(PARTIALLY FILL, PARTIALLY CUT)



FILL PADS

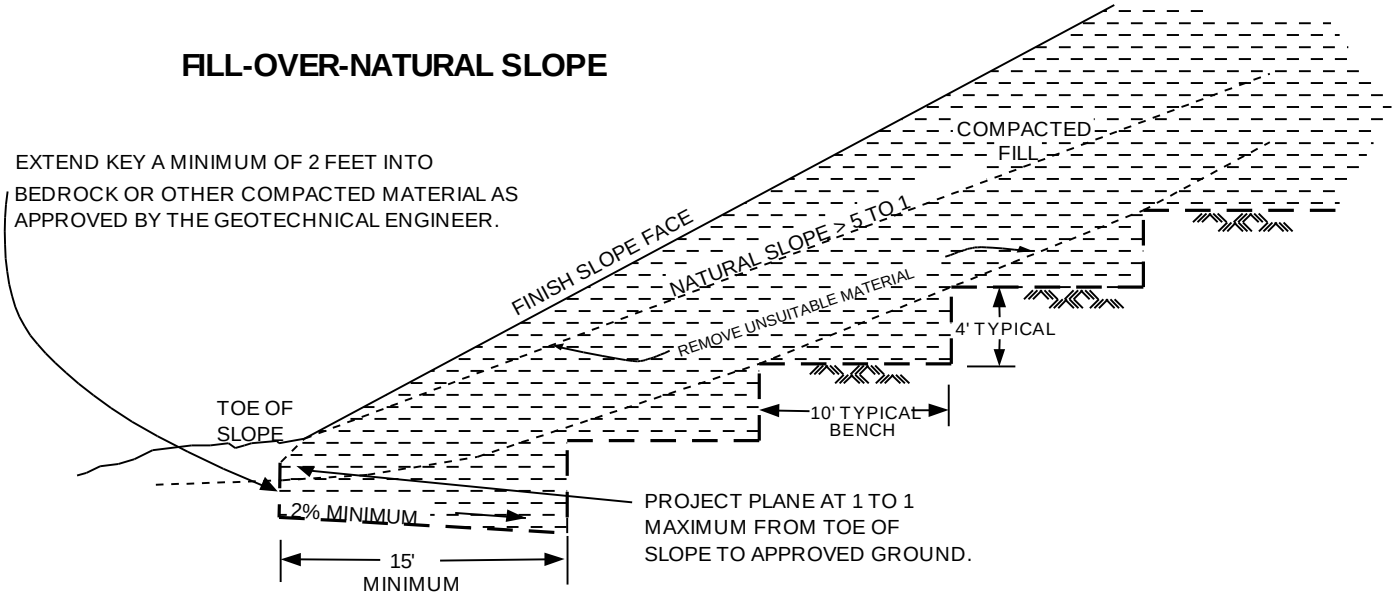


Minimum Mat Thickness t (ft)	Maximum Fill Depth h (ft)
5.0	0 to 15
one third the maximum	> 15

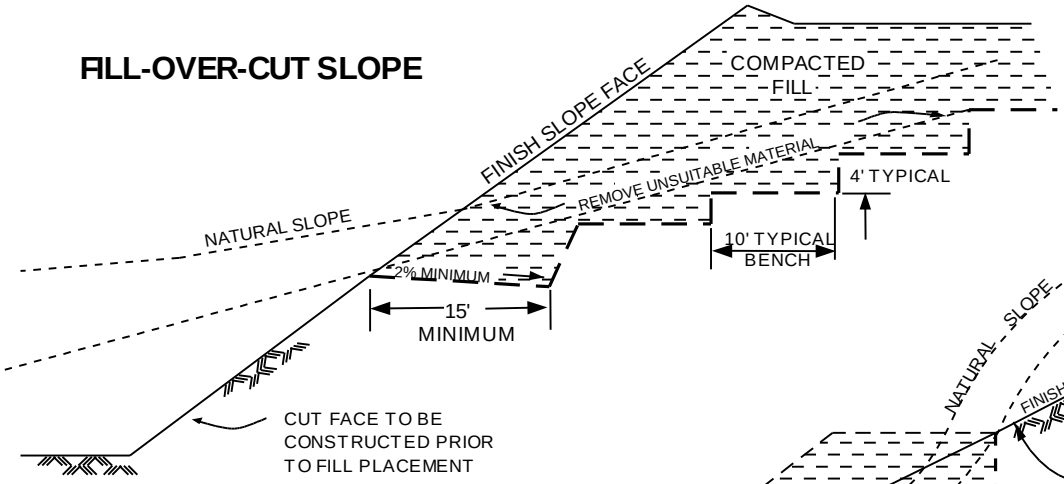
fill depth not to exceed 15 feet

FILL TRANSITIONS OVEREXCAVATION REQUIREMENTS

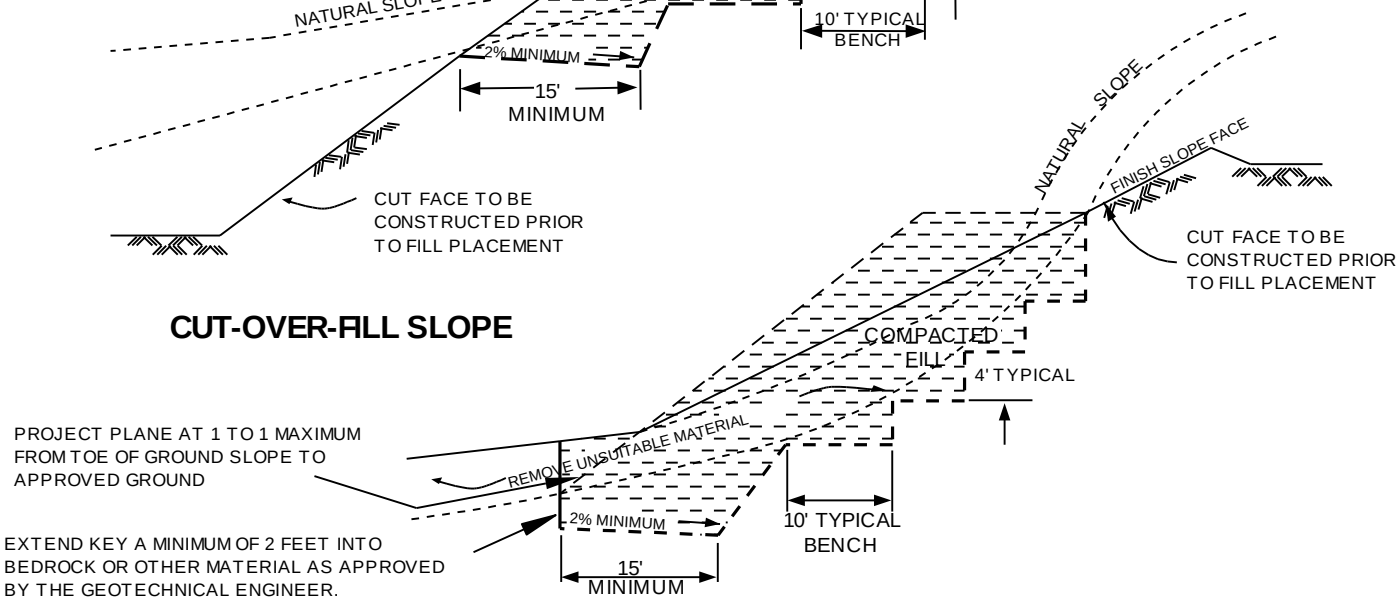
FILL-OVER-NATURAL SLOPE



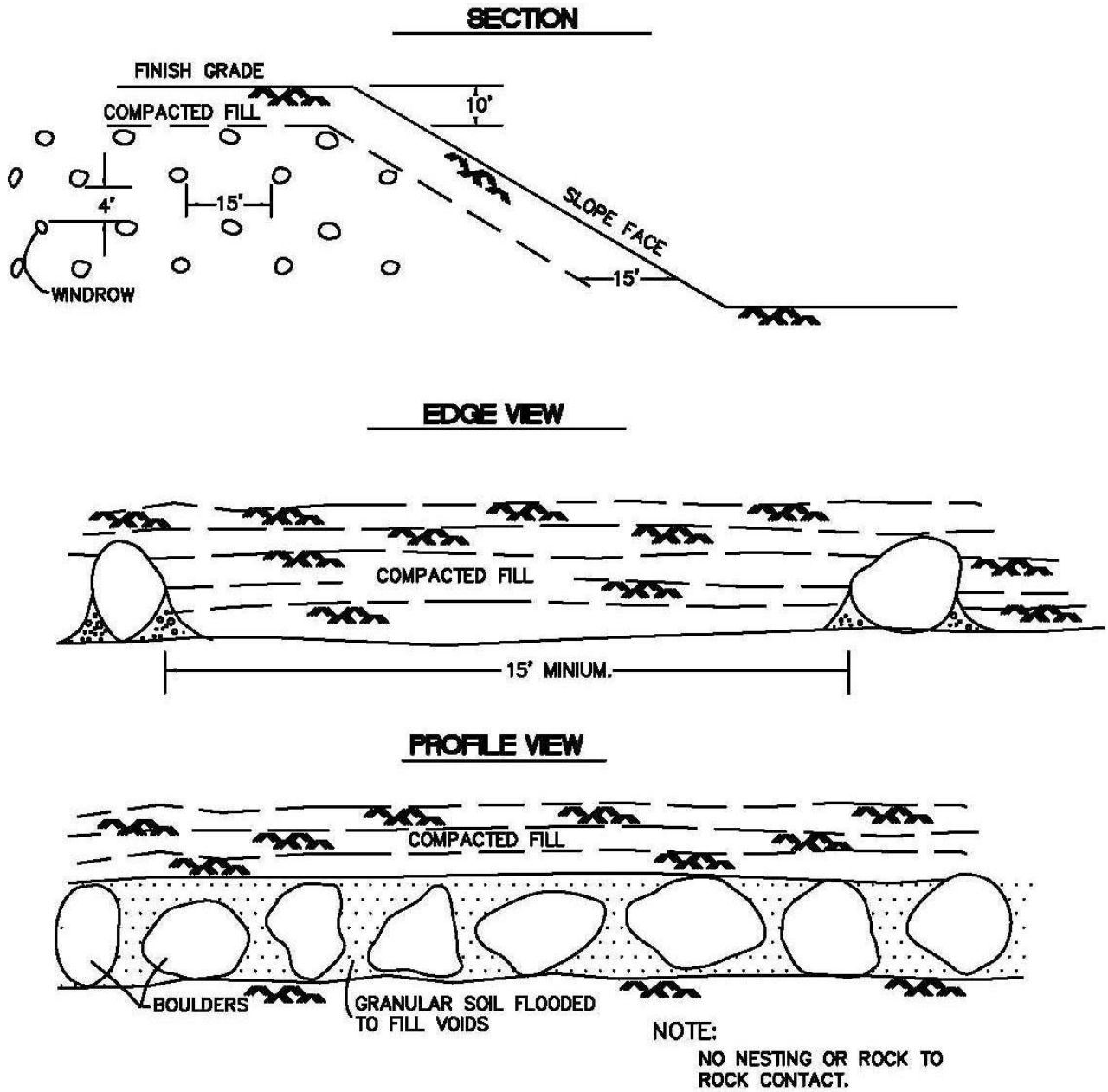
FILL-OVER-CUT SLOPE



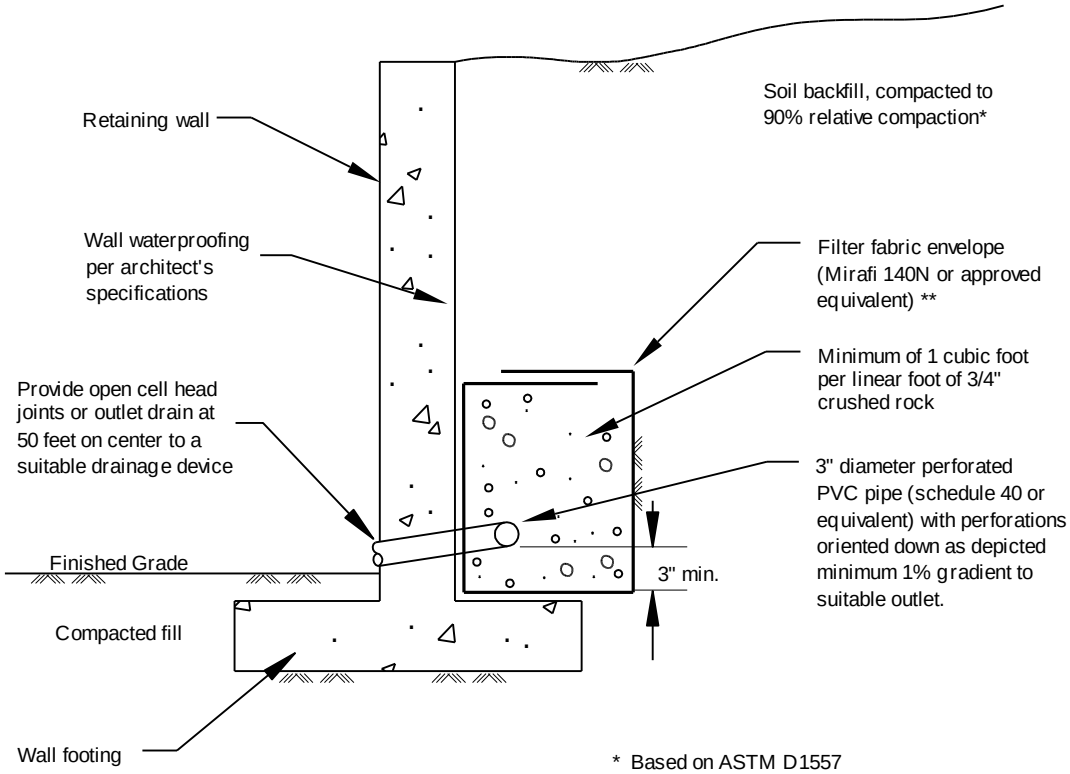
CUT-OVER-FILL SLOPE



KEY AND BENCHING DETAIL



ROCK DISPOSAL WINDROW DETAIL



* Based on ASTM D1557

** If class 2 permeable material (See gradation to left) is used in place of 3/4" - 1 1/2" gravel. Filter fabric may be deleted. Class 2 permeable material compacted to 90% relative compaction. *

SPECIFICATIONS FOR CLASS 2 PERMEABLE MATERIAL (CAL TRANS SPECIFICATIONS)

Sieve Size	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.8	18-33
No.30	5-15
No.50	0-7
No.200	0-3

RETAINING WALL DRAINAGE DETAIL

APPENDIX D

SHEAR WAVE VELOCITY SURVEY

TERRA GEOSCIENCES

SEISMIC SHEAR-WAVE SURVEY

DIVERSIFIED PACIFIC PRO ECT

CITY OF HIGHLAND, CALIFORNIA

Project No. 132665-1

August 19, 2013

Prepared for:

RMA Group, Inc.
12130 Santa Margarita Court
Rancho Cucamonga, CA 91730

Consulting Engineering Geology & Geophysics

P.O. Box 1090, Loma Linda, CA 92354 • 909 796-4667

RMA Group, Inc.
12130 Santa Margarita Court
Rancho Cucamonga, CA 91730

Attention: Mr. Gary Wallace

Regarding: Seismic Shear-Wave Survey
Diversified Pacific Project
City of Highland, California
RMA Job No. 13-594-01

INTRODUCTION

As requested, this firm has performed a seismic shear-wave survey using the multi-channel analysis of surface waves (MASW) and microtremor array measurements (MAM) methods for the above-referenced site. The purpose of this survey was to assess the one-dimensional average shear-wave velocity structure beneath the subject survey area to a depth of at least 100 feet. Geologic mapping by Matti et al. (2003) indicates the local survey area to be mantled by middle Holocene age young alluvial fan deposits generally comprised of slightly to moderately consolidated sand and gravel, presumably underlain at depth by late to middle Pleistocene age old alluvial fan deposits, generally comprised of moderately to well consolidated silt, sand, and gravel.

The location of the seismic survey traverse has been approximated on a captured Google Earth™ image (Google™ Earth, 2013) and appears as Figure 1. Additionally, a southerly photographic view of the survey line also appears on Figure 1 for visual and reference purposes.

As authorized by you, the following services were performed during this study

- **Review of available pertinent published and unpublished geologic and geophysical data in our files pertaining to the site.**
- **Performing a seismic surface-wave survey by a licensed State of California Professional Geophysicist that included one traverse for shear-wave velocity analysis purposes.**
- **Preparation of this report, presenting the results of our findings with respect to the shear-wave velocities of the subsurface earth materials.**

Accompanying Map and Appendices

Figure 1 - Seismic Line Location Map
Appendix A - Shear-Wave Survey Model and Data
Appendix B - References

SUMMARY OF SHEAR-WAVE SURVEY

Methodology

The fundamental premise of this survey uses the fact that the Earth is always in motion at various seismic frequencies. These relatively constant vibrations of the Earth's surface are called microtremors, which are very small with respect to amplitude and are generally referred to as background "noise" that contain abundant surface waves. These microtremors are caused by both human activity (i.e., cultural noise, traffic, factories, etc.) and natural phenomenon (i.e., wind, wave motion, rain, atmospheric pressure, etc.) which have now become regarded as useful signal information. Although these signals are generally very weak, the recording, amplification, and processing of these surface waves has greatly improved by the use of technologically improved seismic recording instrumentation and recently developed computer software. For this application, we are mainly concerned with the Rayleigh wave portion of the seismic signals, which is also referred to as "ground roll" since the Rayleigh wave is the dominant component of ground roll.

For the purposes of this study, there are two ways that the surface waves were recorded, one being "active" and the other being "passive." Active means that seismic energy is intentionally generated at a specific location relative to the survey spread and recording begins when the source energy is imparted into the ground (i.e., MASW survey technique). Passive surveying, also called "microtremor surveying," is where the seismograph records ambient background vibrations (i.e., MAM survey technique), with the ideal vibration sources being at a constant level. Longer wavelength surface waves (longer-period and lower-frequency) travel deeper and thus contain more information about deeper velocity structure and are generally obtained with passive survey information. Shorter wavelength (shorter-period and higher-frequency) surface waves travel shallower and thus contain more information about shallower velocity structure and are generally collected with the use of active sources. For the most part, higher frequency active source surface waves will resolve the shallower velocity structure and lower frequency passive source surface waves will better resolve the deeper velocity structure. Therefore, the combination of both of these surveying techniques provides a more accurate depiction of the subsurface velocity structure.

The assemblage of the data that is gathered from these surface wave surveys results in development of a dispersion curve. Dispersion, or the change in phase velocity of the seismic waves with frequency, is the fundamental property utilized in the analysis of surface wave methods. The fundamental assumption of these survey methods is that the signal wavefront is planar, stable, and isotropic (coming from all directions) making it independent of source locations and for analytical purposes uses the spatial autocorrelation method (SPAC). The SPAC method is based on theories that are able to detect "signals" from background "noise" (Okada, 2003). The shear wave velocity (V_s) can then be calculated by mathematical inversion of the dispersive phase velocity of the surface waves which can be significant in the presence of velocity layering, which is common in the near-surface environment.

Field Procedures

One seismic refraction survey traverse was performed within the subject study area as shown and approximated on Figure 1, having a total length of 230 feet. For data collection, the field survey employed a twenty-four channel Geometrics StrataVisor™ NZXP model signal-enhancement refraction seismograph. This survey employed both active (MASW) and passive (MAM) source methods to insure that both quality shallow and deeper shear-wave velocity information was recorded (Park et al., 2005). Both the MASW and MAM survey lines used the same linear geometry array that consisted of a 230-foot long spread using a series of twenty-four 4.5-Hz geophones that were spaced at regular ten-foot intervals. For the MASW survey, the ground vibrations were recorded using a one second record length at a sampling rate of 0.5-milliseconds. Two seismic records were obtained, both using a 35-foot offset from the beginning and end of the survey line, utilizing a 16-pound sledge-hammer as the energy source to produce the seismic waves.

The MAM survey did not require the introduction of any artificial seismic sources and only background ambient noise was recorded. If vehicular traffic or other noise sources adversely impacted the recorded data, these files were deleted and were re-recorded. The ambient ground vibrations were recorded using a thirty-two second record length at a two-millisecond sampling rate with 25 separate seismic records being obtained for quality control purposes. The seismic-wave forms and associated frequency spectrum that were displayed on the seismograph screen were used to assess the recorded seismic wave data for quality control purposes in the field. The acceptable records were digitally recorded on the in-board seismograph computer and subsequently transferred to a flash drive so that they could be subsequently transferred to our office computer for analysis.

Data Reduction

For analysis and presentation of the shear-wave profile and supportive illustrations, this study used the SeisImager/SW™ computer software program developed by Geometrics, Inc. (2009). Both the active (MASW) and passive (MAM) survey results were combined for this analysis (Park et al., 2005). The combined results maximize the resolution and overall depth range in order to obtain one high resolution V_s curve over the entire sampled depth range. These methods economically and efficiently estimate one-dimensional subsurface shear-wave velocities using data collected from standard primary-wave (P-wave) refraction surveys, however, it should be noted that surface waves by their physical nature cannot resolve relatively abrupt or small-scale velocity anomalies.

Processing of the data proceeded by calculating the dispersion curve from the input data which subsequently created an initial shear-wave (V_s) model based on the observed data. This initial model was then inverted in order to converge on the best fit of the initial model and the observed data, creating the final V_s curve as presented within Appendix A.

SUMMARY OF DATA ANALYSIS

Data acquisition went very smoothly and the quality was considered to be very good. Analysis of the seismic model revealed that the average shear-wave velocity beneath the seismic survey traverse has several velocity layers that all increase with depth. Analysis revealed that the average shear-wave velocity ("weighted average") in the upper 100 feet of the subject survey area is **1,330.7** feet per second as shown on the shear-wave model for Seismic Line S-1, as presented within Appendix A. The "weighted average" velocity is computed from a formula that is used by the ASCE (2007; ASCE 7-05, 20.4.1) to determine the average shear-wave velocity for the upper 100 feet of the subsurface (V100). This formula is as follows:

V100 100/ (T1/V1) (T2/V2) ... (TN/VN)

Where t1, t2, t3,...,tn, are the thicknesses for layers 1, 2, 3,...n, up to 100 feet, and v1, v2, v3,...,vn, are the seismic velocities (feet/second) for layers 1, 2, 3,...n. The detailed shear-wave model displays these calculated layer boundaries/depths and associated velocities (feet/second) to the maximum obtained depth of 276 feet where locally sampled. The associated Dispersion Curves (for both the active and passive methods) which show the data quality and picks, along with the resultant combined dispersion curve model (Phase Velocity vs. Period) are also included within Appendix A for visual and reference purposes.

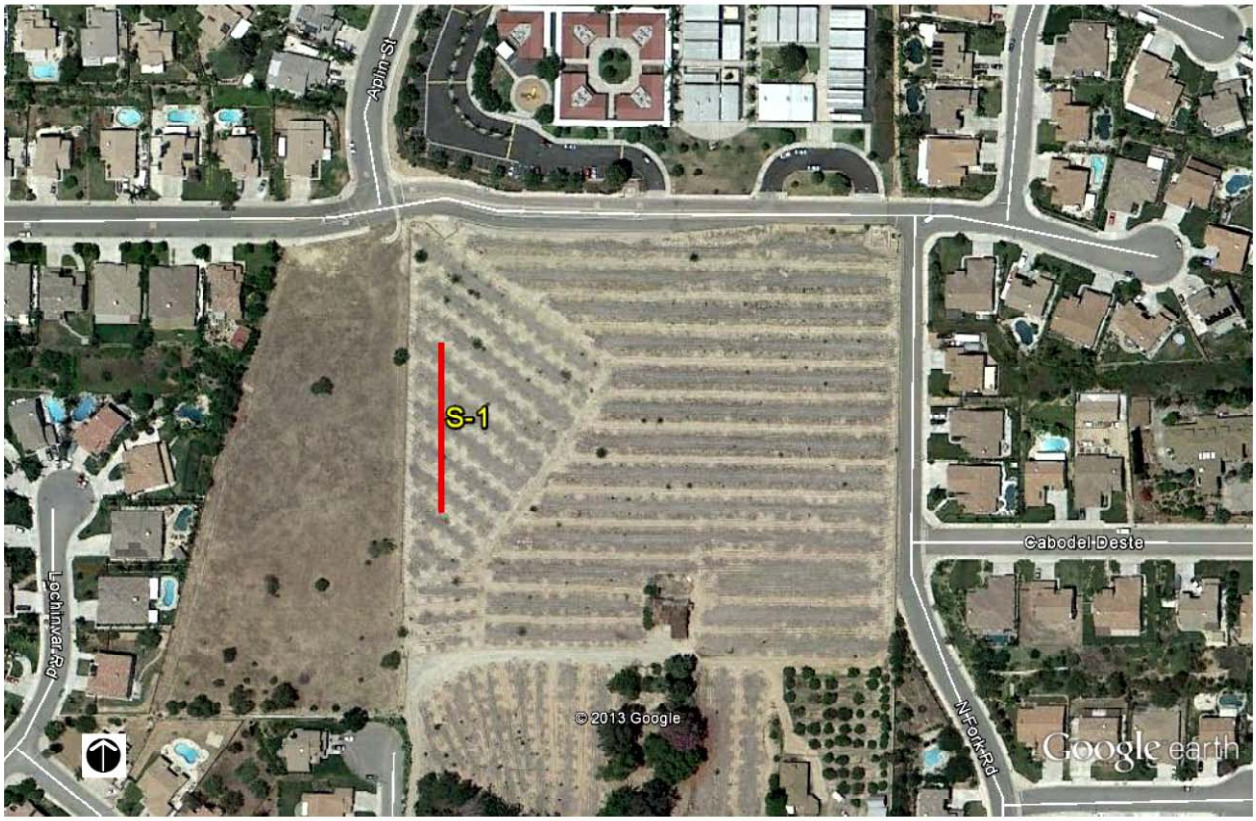
CLOSURE

This survey was performed using "state of the art" geophysical equipment, techniques, and computer software. We make no warranty, either expressed or implied. It should be understood that when using these theoretical geophysical principles and techniques, sources of error are possible in both the data obtained and in the interpretation. Compared with traditional borehole shear-wave surveys of which use vertical body waves, the sources of error (if present) using horizontal surface waves for this project are not believed to be greater than 15 percent. If you should have any questions regarding this report or do not understand the limitations or interpretations of this survey, please do not hesitate to contact our office.

Respectfully submitted,
TERRA GEOSCIENCES

Donn C. Schwart kopf
Principal Geophysicist
PGP 1002

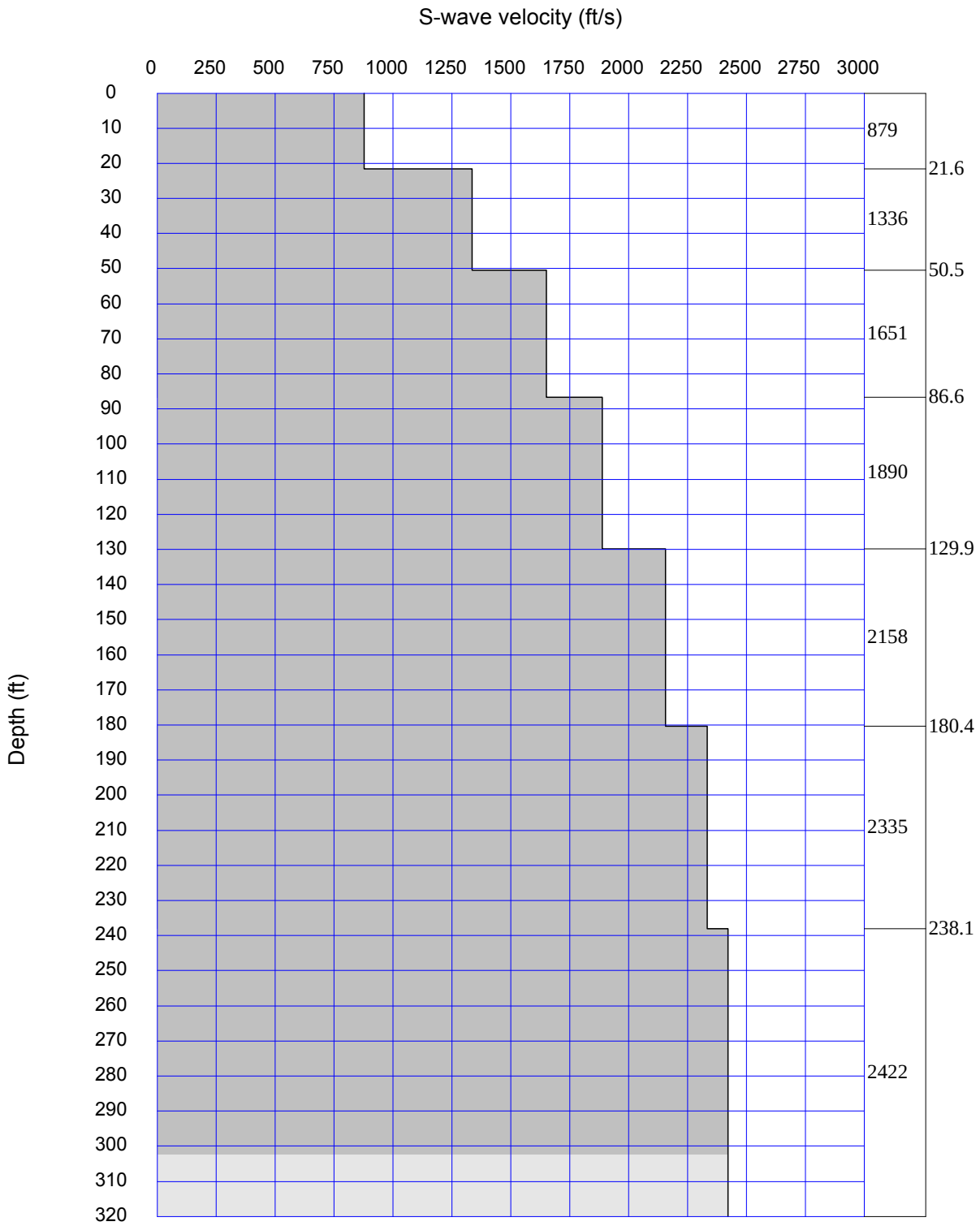
SEISMIC LINE LOCATION MAP



View looking south along Seismic Line S-1.

APPENDIX A

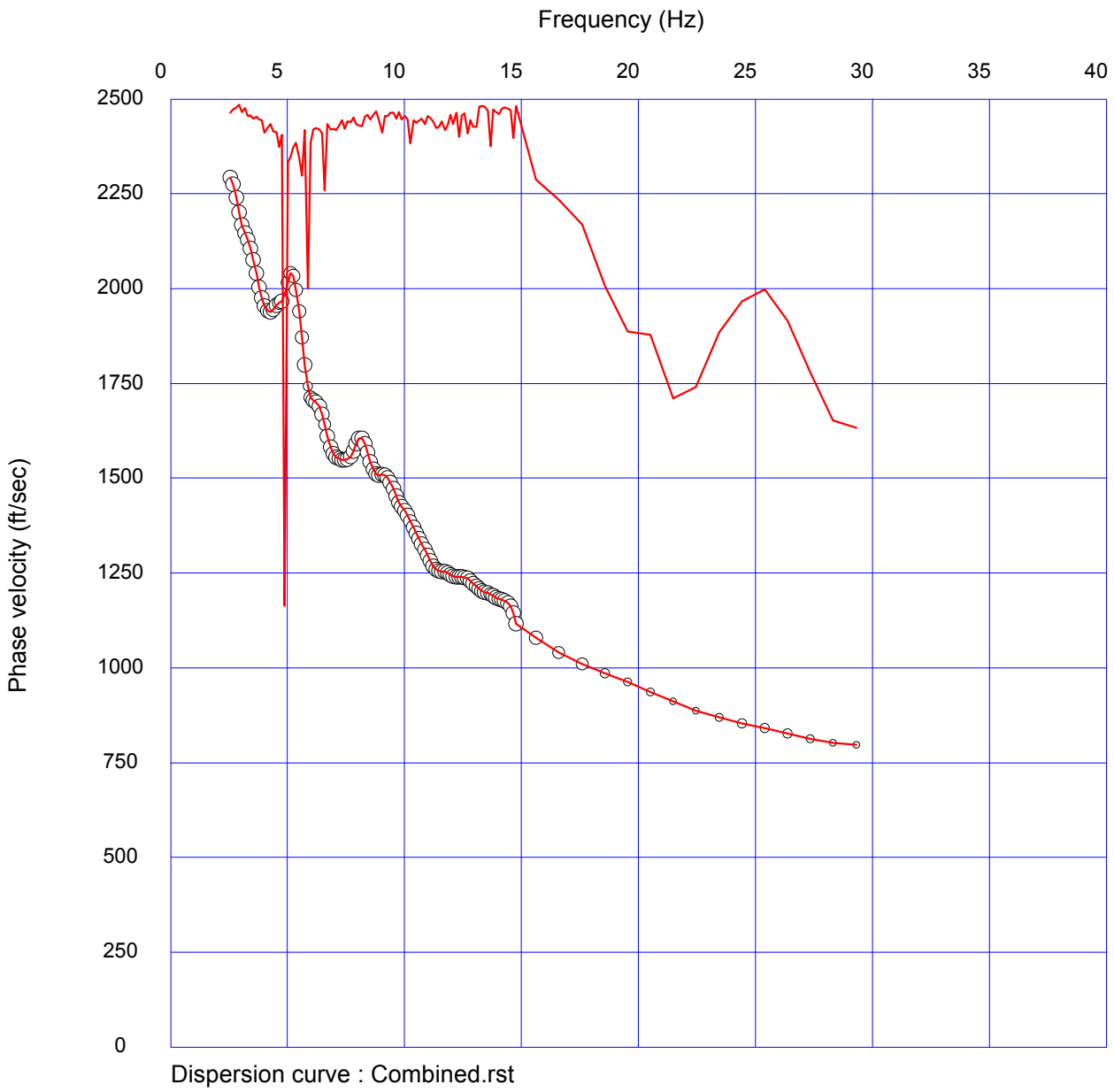
SHEAR-WAVE SURVEY MODEL AND DATA



S-wave velocity model : Combined.rst

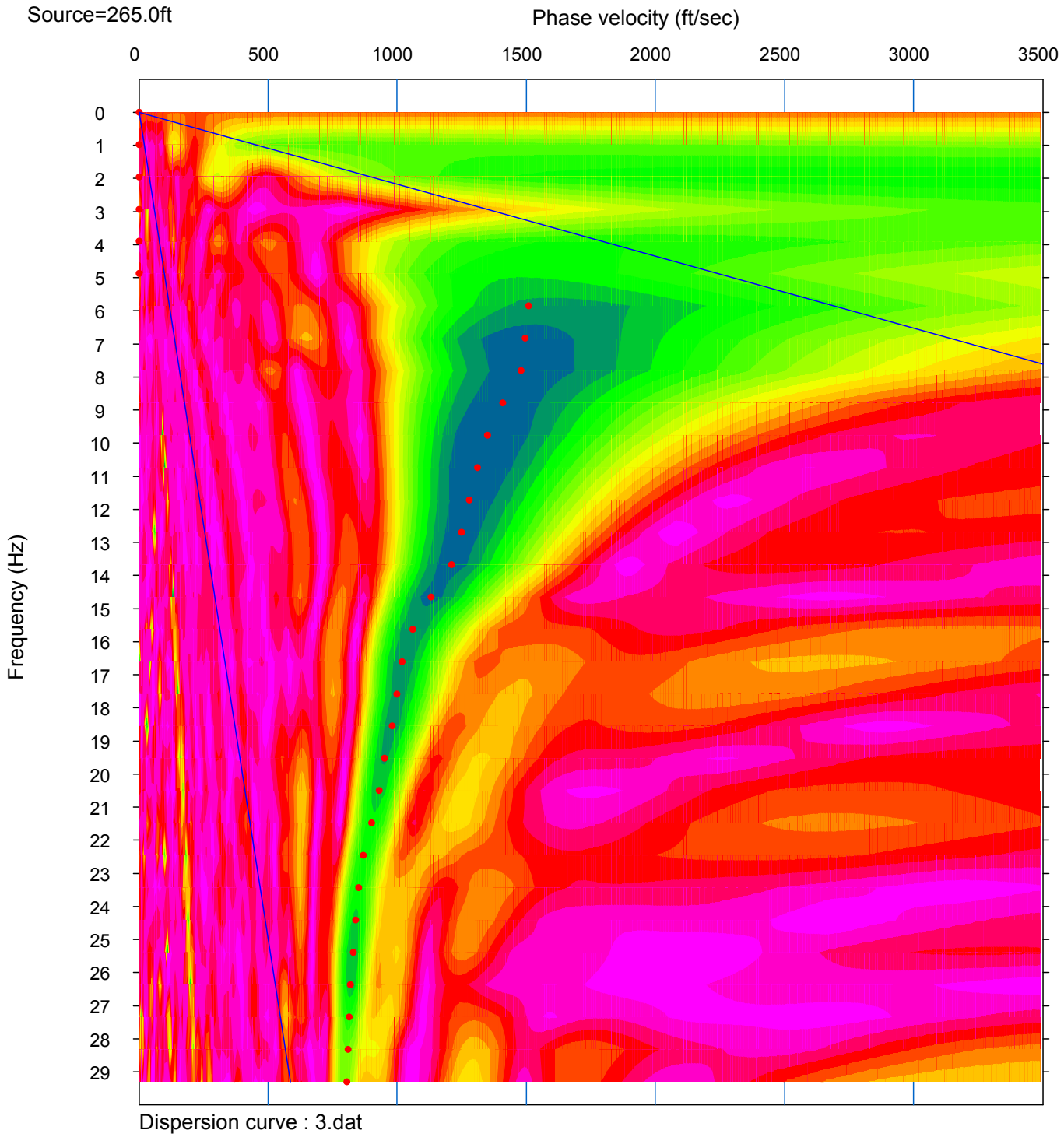
Average Vs 100ft = 1330.7 ft/sec

SEISMIC LINE S-1
SHEAR-WAVE MODEL



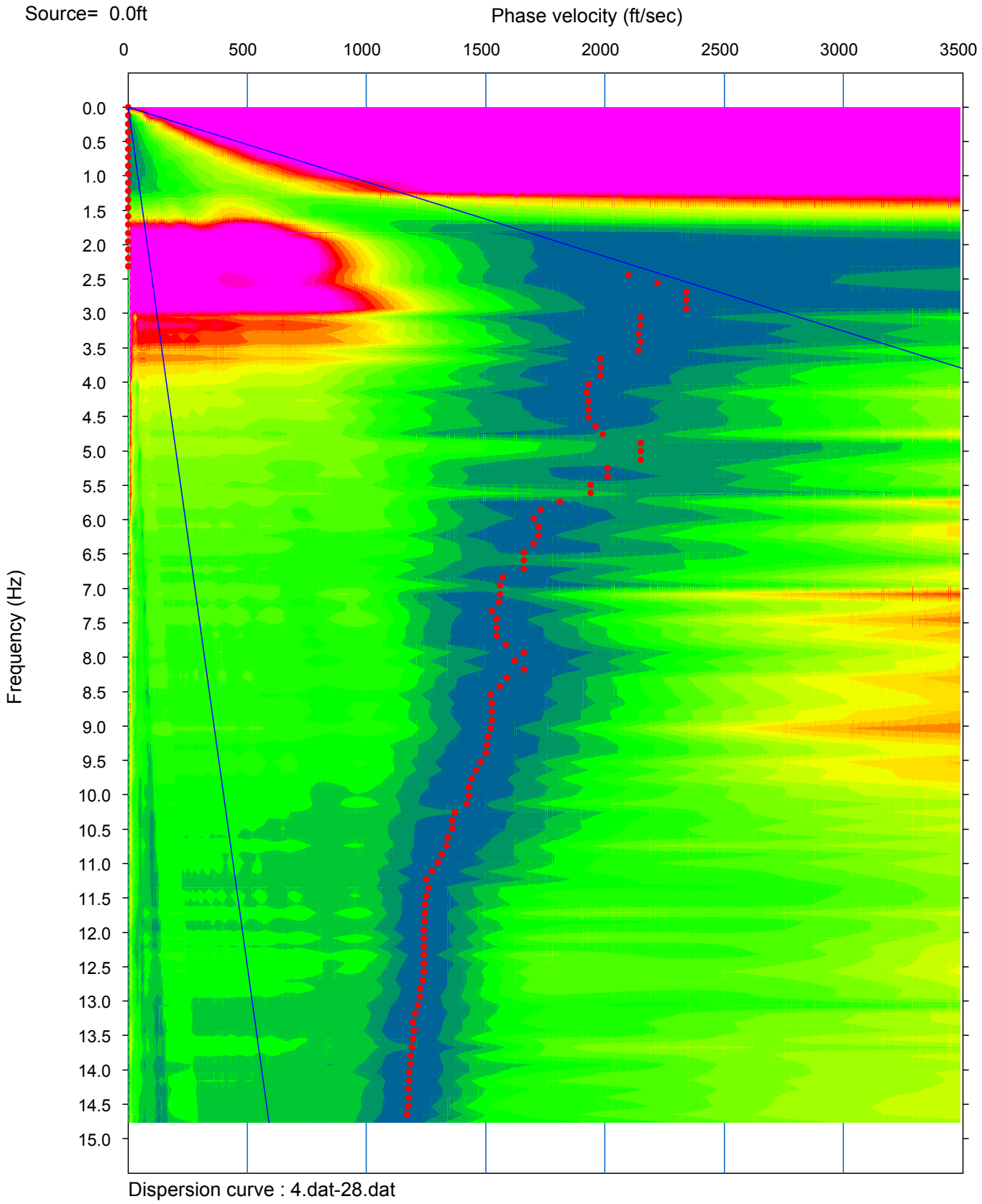
COMBINED DISPERSION CURVE

SEISMIC LINE S-1



ACTIVE METHOD DISPERSION CURVE

SEISMIC LINE S-1



PASSIVE METHOD DISPERSION CURVE

SEISMIC LINE S-1

APPENDIX B

REFERENCES

REFERENCES

American Society of Civil Engineers (ASCE), 2007, Minimum Design Loads for Buildings and other Structures, ASCE Standard 7-05, 419 pp.

American Society for Testing and Materials, Intl. (ASTM), 2000, Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation, Designation D 5777-00, 13 pp.

Building Seismic Safety Council (BSSC), 2000, NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, 2000 Edition.

California State Board for Geologists and Geophysicists, Department of Consumer Affairs, 1998, Guidelines for Geophysical Reports for Environmental and Engineering Geology, 5 pp.

Crice, Douglas B., undated, Shear Waves, Techniques and Systems, Reprinted by Geometrics, Sunnyvale, California.

Geometrics, Inc., 2004, StrataVisor™ NZXP Operation Manual, Revision B, San Jose, California, 234 pp.

Geometrics, Inc., 2009, SeisImager/SW™ Manual, Windows Software for Analysis of Surface Waves, Version 3.0, 314 pp.

Google™ Earth, 2013, http://earth.google.com/, Version 7.1.1.1580 (beta).

Louie, .N., 2001, Faster, Better: Shear-Wave Velocity to 100 Meters Depth From Refraction Microtremor Arrays, *in,* Bulletin of the Seismological Society of America, Volume 91, pp. 347-364.

Matti, .C., Morton, D.M., Cox, B.F., and Kendrick, K. ., 2003, Geologic Map of the Redlands 7.5' Quadrangle, San Bernardino and Riverside Counties, California, Scale 1:24,000, U.S.G.S. Open-File Report 03-302.

Okada, H., 2003, The Microtremor Survey Method, Society of Exploration Geophysicists, Geophysical Monograph Series Number 12, 135 pp.

Park, C.B, Milner, R.D., Rynden, N., Xia, ., and Ivanov, ., 2005, Combined use of Active and Passive Surface Waves, *in*, Journal of Environmental and Engineering Geophysics, Volume 10, Issue 3, pp. 323-334.

APPENDIX E

REFERENCES

APPENDIX E

REFERENCES

1. Bryant, W.A. and Hart, E.W., 2007, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology Special Publication 42, Interim Revision 2007 and online updates.

2. California Building Standards Commission, 2010 California Building Code.

3. California Department of Conservation, Division of Mines and Geology, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117.

4. California Division of Mines and Geology, 1977, Special Studies Zone Map, Redlands Quadrangle, Effective date January 1, 1997.

5. Cao, Y. and others, 2003, The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003.

6. Carson, S.E. and Matti, J.C., 1985, Contour Map Showing Minimum Depth to Ground Water, Upper Santa Ana River Valley, California, 1973-1979: U.S. Geological Survey Miscellaneous Field Studies Map MF-1802.

7. City of Highland, 2013, General Plan Safety Element.

8. Dibblee, T.W., Jr., 2004, Geologic Map of the Harrison Mountain/North ½ of Redlands Quadrangles, San Bernardino and Riverside County, California: Dibblee Geology Center Map #DF-126.

9. Fife, D.L. and others, 1976, Geologic Hazards in Southwestern San Bernardino County, California: California Division of Mines and Geology Special Report 113

10. Google Earth, Aerial Photographs, 2012, 2011, 2009, 2007, 2006, 2005, 2003, 2002 and 1995.

11. Historicaerials.com, Aerial Photographs, 2005, 1980, 1968, 1959 and 1938.

12. Jennings, C.W., and Bryant, W.A, 2010, Fault Activity Map of California, California Geological Survey, Geologic Data Map No. 6.

13. Martin, G.R. and Lew, M., 1999, Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California, Southern California Earthquake Center publication.

14. Matti, J.C., Morton, D.M. and Cox, B.F., 1992, The San Andreas Fault System in the Vicinity of the Central Transverse Ranges Province, Southern California: U.S. Geological Survey OFR 92-354.

15. Matti, J.C. and Carson, S.E., 1991, Liquefaction Susceptibility in the San Bernardino Valley and Vicinity, Southern California – A Regional Evaluation: U.S. Geological Survey Bulletin 1898.

16. Matti, J. C., 2003, Geologic Map of the Redlands 7.5' Quadrangle, San Bernardino and Riverside Counties, California: U.S. Geological Survey OFR 03-302.

17. Morton, D.M., 1974, Generalized Geologic Map of Southwestern San Bernardino County, California: California Division of Mines and Geology Special Report 113.

18. San Bernardino County Land Use Services Department, 2010, General Plan, Geologic Hazards Overlays Map FH31C – Redlands, dated March 9, 2010.

19. San Bernardino County Land Use Services Department, 2010, General Plan, Hazards Overlay Map FH31B – Redlands, dated March 9, 2010.

20. Seed, H.B. and Whitman, R.V., 1970, Design of Earth Structures for Dynamic Loads *in* American Society of Civil Engineers Specialty Conference State-of-the Art Paper, Lateral Stresses in the Ground and Design of Earth-Retaining Structures.

21. Tokimatsu, K. and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, Journal of Soil Mechanics and Foundation Engineering, Vol. 113, No. 8.

22. U.S. Army Corps of Engineers, 2003, Engineering and Design - Stability Analysis of Concrete Structures, Publication CECW-E, Circular No. 1110-2-6058, Appendix G, http://www.usace.army.mil/publications/eng-circulars/ec1110-2-6058/.

23. U.S. Department of Defense, 1997, Soil Dynamics and Special Design Aspects Handbook, MIL-HDBK-1007/3.

24. U.S. Geological Survey EROS Data Center, 1989, Color Infrared Steroscopic Aerial Photographs, NAPP 1836-105, 106, Flight date 8-15-89.

25. U.S. Geological Survey, 2013, Java Ground Motion Parameter Calculator, Version 5.1.0, ASCE 7 Standard, htpp://earthquake.usgs.gov/research/hazmaps/design/.

RMA GeoScience

December 8, 2014 Project No. 14-G74-0/03

Cayman Construction
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Attention: Mr. Phillip Burum

Subject: Geotechnical Review of Tentative Tract Map
Water Street Land LLC, Tentative Tract No. 18935
Highland, California

Mr. Burum,

In accordance with your request and authorization, RMA GeoScience performed a geotechnical investigation for the Kiel Property north of Santa Ana Canyon Road and east of Alpin Street and a review of the current Tentative Tract Map for Tract No. 18935. The results of the investigation are presenting in the accompanying report, which includes a description of site conditions, results of our field exploration and laboratory testing, conclusions, and recommendations.

We trust this letter will serve your needs at this time. If you have any questions or require further assistance, please do not hesitate to contact us.

Respectfully,

RMA GeoScience,

PROFESSIONAL GEOLOGIST
MARK A. SWIATEK
No. 1781
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Mark Swiatek

Mark Swiatek,
Principal Geologist
CEG 1781

REGISTERED PROFESSIONAL ENGINEER
MELVIN BRUCE SMITH
No. GE 2673
Exp. 06-30-16
GEOTECHNICAL
STATE OF CALIFORNIA

MB Smith

Bruce Smith, PE, GE
Geotechnical Engineer
GE 2673

RMA GeoScience

GEOTECHNICAL REVIEW OF TENTATIVE TRACT MAP
WATER STREET LAND LLC, TRACT NO. 18935
HIGHLAND, CALIFORNIA

For

Cayman Construction
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

December 8, 2014

Project No. 14-G74-0/03

9854 Glenoaks Boulevard, Sun Valley, CA 91352 Phone 800.762.4396 Fax 888.248.8130

1. INTRODUCTION

1.1 Purpose

This report presents the results of our geotechnical review of the current Tentative Tract Map for the proposed residential development, Tract 18935, in the City of Highland, San Bernardino County, California. The purpose of our review of the current tentative map was to evaluate the overall compatibility of the proposed grading with respect to the known geotechnical conditions at the site, and to provide recommendations to mitigate adverse geotechnical conditions affecting the proposed project.

This phase of the project included research and review of available documents pertaining to the geologic and geotechnical characteristics of the site, geologic site reconnaissance, geotechnical review of the current tentative tract map, and preparation of this report summarizing our preliminary findings.

Our review was based on the current Tentative Tract Map, scale: 1 inch = 60 feet, dated November, 2014 prepared by SITETECH, Inc. The tentative map was used as a base in preparing the attached Geotechnical Map, Plate 1 and Cross Sections, Plate 2.

1.2 Proposed Development

Based on the results of our geotechnical review of the current tentative tract map, it is our understanding that the proposed project will involve grading of conventional cut-fill grading to develop 71 single family residential lots and an infiltration basin. The map indicates that maximum cuts of approximately 29 ft. and maximum fills on the order of 25 ft. will be made to achieve final grades. Cut slopes are planned at gradients of 2:1 up to a maximum height of 14.5 feet of slope with a 4 foot retaining wall to obtain a total of 18.5 feet. Fill slopes are planned at gradients of 2:1 up to a maximum height of 22 feet of slope with a 6 foot retaining wall for a total of 28 feet. Also planned are paved residential streets, earth retaining structures, attendant utilities consisting of water, sewer, dry utilities, surface and subsurface drainage systems, infiltration basin and landscape improvements. Planned grading is illustrated on the attached Cross Sections, Plate 2.

1.3 Scope of Work

The scope of services performed during the tentative tract map review included the following:

a) Review and evaluation of the 60-scale Tentative Tract Map (Sheet 1, scale: 1 inch = 60 feet, dated November, 2014.

b) Preparation of Geotechnical Map utilizing the 60-scale Tentative Tract Map as a base map, Plate 1.

c) Compilation of RMA Group's investigation for the northern section of the tract, dated November 2013.

d) Engineering/geologic analysis of the geotechnical aspects of the design concepts in relation to conformance with the previous geotechnical data, preliminary recommendations and

conclusions.

e) Preparation of this report, with appropriate maps, summarizing our findings, conclusions, and recommendations. Additional recommendations for grading and construction of the planned residential project are included.

f) Excavation, logging and sampling of six backhoe test pits. The logs of the test pits are included in this report. The approximate locations of the test pits are on the enclosed Geotechnical Map.

g) Drilling, logging and sampling of five hollow stem borings. The logs of the borings are included in this report. The approximate locations of the borings are on the enclosed Geotechnical Map.

h) Laboratory testing on bulk samples and undisturbed samples of the earth materials collected form the backhoe test pits and borings. Laboratory testing results are included in Appendix B.

1.4 Authorization

The scope of work outlined above was performed in accordance with your verbal authorization.

2. SITE DESCRIPTION

The subject site is a rectangular shaped property located at the northeast corner of Santa Ana Canyon Road and Aplin Street in the City of Highland, California. The site is bound at the north by the Water Street and to the east by North Fork Road.

The southern portion of the subject site is currently occupied by the current owner whom resides in Lot 62 per the tentative tract map. The remainder of the Kiel Property is being utilized for citrus farming. There are three other structures on the property which are to be demolished upon grading.

The northern portion of the subject site is vacant with the exception of a barn that is to be demolished upon grading. Large boulders are present on the surface. There is an approximate 6 foot diameter high pressure water pipe between 8 and 25 feet below existing grade running parallel to "A" Street as noted on the Tentative Tract Map.

Vegetation on site generally consists of approximately 10 foot high orange trees and small weeds. Several large trees are present on and around the approximately 37 foot high slope near the center of Tract 18935 which runs east-northeast to west-southwest from Lot 29 to Lot 65.

3. FINDINGS

3.1 Geologic Setting

The site is located within a structural mass of the earth's crust known as the Bunker Hill - San Timoteo Basin. This basin formed as a rift zone between the active San Andreas Fault on the northeast and the active San Jacinto fault on the southwest. The southern boundary of the basin is less well defined, but is generally believed to coincide with the Banning fault zone. The basin itself is infilled with Quaternary age younger and older alluvial deposits. There are also topographic highs within the basin which expose Mesozoic age and older granitic and metamorphic rocks.

In the vicinity of the site the Bunker Hill – San Timoteo alluvial deposits are underlain by crystalline San Gabriel Mountains-type basement rocks composed of granitic-type rocks and schist. North of the San Andreas Fault the basement bedrock consists of San Bernardino Mountains-type crystalline rocks composed of granitoid and metasedimentary rocks.

According to regional geologic mapping performed by U.S. Geological Survey, the northwest portion of the site is underlain by younger (middle Holocene) alluvial-fan deposits and the remainder of the site is underlain by older (late to middle Pleistocene age) alluvial-fan deposits. As discussed below our investigation revealed that the entire site is underlain by older alluvial deposits and thin artificial fills.

The dominant neotectonic structure in the vicinity of the site is the San Bernardino Strand of the San Andreas Fault, which is located at the base of the San Bernardino Mountains approximately 1,600 feet northeast of the site at its nearest point.

3.2 Earth Materials

Our field investigation revealed the site is underlain by older alluvium and relatively thin deposits of fill. The old alluvium encountered in test pits was typically composed of reddish brown and dark reddish brown, medium dense to dense silty sand with limited amounts of gravel, cobbles and boulders. The northern portion of Tract 18935 contains boulders widely scattered on the surface and ranged in size from 12 inches to approximately 15-feet in maximum dimension. Boulders on the order of 3 feet in diameter were encountered on the southern portion of the tract ranging from 3 feet below ground surface to 7 feet below ground surface.

A site geologic map showing the locations of our test pits, cross section, and seismic line is presented as Plate 1 and Plate 2. Subsurface conditions encountered during our field investigation are described in greater detail in Appendix A.

3.3 Expansive Soils

Expansion testing was performed on a bulk sample from the southern portion of the tract. These results yielded an expansion classification of very low. RMA Group performed an expansion test for the northern portion of the tract, which also indicated that soils underlying the site have an expansion classification of very low. These expansion tests were performed in accordance with ASTM D4829. Since site grading will redistribute earth materials, potential expansive properties should be verified at the completion of rough grading.

3.4 Surface and Groundwater Conditions

No areas of ponding or standing water were present at the time of our study. Further, no springs or areas of natural seepage were found.

Groundwater was not encountered during our subsurface exploration which extended to a maximum depth of 16 feet. According to the U.S. Geological Survey (Matti and Carson, 1991), the minimum depth to groundwater between 1973 and 1983 was less than 30-feet. The seismic line study (RMA

Group, 2013) run for the northern portion of the tract (SL-1) indicates that the current depth to groundwater is in excess of 75-feet.

3.5 Faults

The site is not located within the boundaries of an Earthquake Fault Zone for fault-rupture hazard as defined by the Alquist-Priolo Earthquake Fault Zoning Act of 1972 and the site is not located within the boundaries of a similar City of Highland or County of San Bernardino fault rupture hazard zone. The nearest Earthquake Fault Zone is located about 1,000 feet northeast of the site along the San Bernardino Strand of the San Andreas Fault. This fault strand is located about 1,600 feet northeast of the site at its nearest point.

No faults are known to pass through the property. The U.S. Geological Survey (Matti, Morton, Cox and Kendrick, 2003) mapped the Mission Creek Strand of the San Andreas Fault as a concealed (buried) fault approximately 100 feet northeast of the site. The map references earlier work that was performed in 1992 by Matti, Morton and Cox (U.S. Geological Survey OFR 92-354). OFR 92-354 indicates that the existence of the Mission Creek fault along the southwestern base of the San Bernardino Mountains has been inferred to explain the juxtaposition of the San Gabriel Mountains-type basement rocks against the Wilson Creek block and rocks of San Bernardino Mountains-type. OFR 92-354 also indicates that the Mission Creek fault is an older abandoned strand of the San Andreas Fault that is either buried under Quaternary surficial sediments or has been reactivated where it coincides with the San Bernardino Strand of the San Andreas Fault. The 2003 U.S. Geological Survey map shows that in the vicinity of the site, the postulated trace of the Mission Creek Strand is concealed by Holocene and Pleistocene alluvial-fan deposits.

Consequently, the Mission Creek Strand of the San Andreas Fault within the vicinity of the site would not meet the current Alquist-Priolo criteria for active faulting which is defined as surface rupture within Holocene time, approximately within the last 11,000 years. The postulated Mission Creek Strand of the San Andreas Fault in the vicinity of the site is not located within the boundaries of a State of California Alquist-Priolo Earthquake Fault Zone for fault rupture hazards or a similar City of Highland or County of San Bernardino fault hazard rupture zone. Approximately 5 miles to the southeast another U.S. Geological Survey Map (OFR 03-301) shows where the Mission Creek Strand coincides with the San Bernardino strand. This portion of the Mission Creek Strand is included within an Alquist-Priolo Earthquake Fault Zone and is considered active.

We reviewed aerials photographs of the area but were not able to identify a lineament within the site parallel to the mapped location Mission Creek fault strand. The base of a hill to the east of the site does coincide with the postulated fault trace, however there is no lineament extending away from the hill. Breaks-in-slope along the south side of the site and further to the east are visible on aerial photographs. The U.S. Geological Survey interprets these features to be contacts between terraced and incised alluvial deposits rather than faulting. We agree with this interpretation because the contacts essentially parallel Plunge Creek and the Santa Ana River Wash, and are diagonal to the regional trend of the San Andreas Fault.

The location of the site with respect to major faults in the region is illustrated on the accompanying Regional Fault Map. The distances to notable faults within 100 kilometers of the site are presented on Table 1.

3.6 Historic Seismicity

The nearest large historic earthquakes in the vicinity of the site were epicentered in San Bernardino in 1858, 1907 and 1923. These earthquakes were epicentered approximately 7 to 12-miles from the site and had magnitudes in the range of approximately 5.3 to 6.0. These events occurred prior to the development of seismic monitoring networks, and thus their locations and magnitudes are only approximate. Strong earthquakes that have occurred in this region in historic time and their approximate epicentral distances are summarized in Table 2.

Our research of regional geologic and seismic data did not reveal any known instances of ground failure within the site associated with regional seismic activity. Seismic design parameters relative to the requirements of the 2013 California Building Code are presented in Section 4.9.

3.7 Flooding Potential

According to San Bernardino County Hazard Overlay Map FH31B, the site is not located within either a 100 or 500 year flood zone. Control of surface runoff originating from within and outside of the site should, of course, be included in design of the project.

3.8 Landslides

The low gradient of the site and surrounding area precludes landsliding within the site boundaries.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 General Conclusions

Based on specific data and information contained in this report, our understanding of the project and our general experience in engineering geology and geotechnical engineering, it is our professional judgment that the proposed development is geologically and geotechnically feasible. This is provided that the recommendations presented below are fully implemented during design, grading and construction.

4.2 General Earthwork and Grading

It is recommended that all earthwork and grading be performed in accordance with Appendix J of the 2013 California Building Code and all applicable governmental agency requirements. In the event of conflicts between this report and Appendix J, this report shall govern.

4.3 Earthwork Shrinkage and Subsidence

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Subsidence occurs as fill (elevated building pad, embankment, etc.) is placed over natural ground. These factors account for changes in soil volumes that will occur during grading. Our estimates are as follows:

- Shrinkage factor = 10% - 15% for soil removed and replaced as compacted fill.

- Subsidence factor = approximately 0.8 percent of the height of fill that is placed.

These estimates do not include losses due to removal of existing structures, improvements or over-sized materials (boulders, concrete or other similar materials greater than 12 inches in maximum dimension). Removal and exporting of these materials could significantly impact earthwork balance and should be considered in design, planning and cost estimating.

The degree to which fill soils are compacted and variations in the insitu density of existing soils will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

4.4 Removals and Overexcavation

All vegetation, trash and debris should be cleared from the grading area and removed from the site. Existing orange trees, tree stumps, branches and roots will need to be hauled from the site and may not be placed in fills. In addition, any other soils indentified to contain chemical contamination should not be used for compacted fill unless such use is approved by environmental studies.

Prior to placement of compacted fills, all non-engineered fills and loose, porous, or compressible soils will need to be removed down to competent ground. Removal and requirements will also apply to cut areas, if the depth of cut is not sufficient to reach competent ground. Removed and/or over-excavated soils may be moisture-conditioned and recompacted as engineered fill, except for soils containing detrimental amounts of organic material or chemical contamination. Estimated depths of removals are based on the following:

- Any former irrigation pipes, channels, septic systems, cistern and basin structures, building foundations and similar structures will need to be demolished and completely removed down to competent natural ground, including all loose soils resulting from the demolition. Concrete and rock generated by the demolition may be either hauled off the site or processed and placed in the compacted fill provided the concrete and rock are reduced to less than 8 inches in maximum dimension and mixed thoroughly with on-site soils. No large and flat pieces are to be used for fill. Concrete with reinforcing steel shall not be placed in compacted fills.

- Loose, porous and compressible native soils and soils disturbed by removal of citrus trees are expected to extend to approximately 3-feet below existing grades. Thus we expect the depth of removal within the orchard to be on the order of 3-feet below the existing ground surface or bottom of non-engineered fill. Deeper removals may be necessary in some areas.

- It is expected that competent native soils will be encountered in cuts deeper than approximately 3 feet below existing grade or the base of existing non-engineered fill. Provided competent soils are exposed, these cut surfaces should be scarified to a minimum depth of 12 inches, moisture conditioned and compacted to a minimum of 90% relative compaction (ASTM: D1557) provided that footing overexcavation requirements are met.

In addition to the above requirements, over-excavation will also need to meet the following criteria for the building pads, concrete flatwork and pavement areas:

- All building pad areas shall be undercut to a minimum depth of 3 feet below the bottom of the deepest footing, and the exposed subgrade scarified to a minimum depth of 12 inches, moisture conditioned, and compacted as necessary to produce soils compacted to a minimum of 90% relative compaction (ASTM: D1557). Building pad areas shall be defined as the building footprint including the area extending from the outer edge of the footings for a distance of 5 feet.

- All concrete flatwork and paved areas shall be underlain by a minimum of 12 inches of soil compacted to a minimum of 90% relative compaction (ASTM: D1557).

The exposed soils beneath all over-excavations should be scarified an additional 12 inches, moisture conditioned and compacted to a minimum of 90% relative compaction (ASTM: D1557).

The above recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. Hence, overexcavation depths must be verified, and adjusted if necessary, at the time of grading. The overexcavated materials may be moisture-conditioned and re-compacted as engineered fill.

4.5 Excavation Characteristics and Rock Disposal

Some trenches and all borings encountered refusal to excavation during our subsurface investigation due to the presence of hard granitic cobbles and boulders. Cobbles are rocks having maximum dimension ranging from 3 to 12 inches. Boulders are rocks having a maximum dimension of 12 inches or greater. Because some boulders were encountered during borings and test pits on both the southern and northern potions of Tract 18935 to be up to about 15 feet in maximum dimension, it is expected that boulders may be encountered that may interfere with grading operations and installation of underground utilities.

Because of the potential for large boulders, it is expected that rock rakes or rock buckets mounted on heavy duty dozers or loaders, or similar equipment, may be needed to excavate boulders throughout the site. Once fills are placed, provided the soils do not contain boulders, it is expected that conventional heavy duty earthmoving equipment will be able to excavate the soils.

Rock Disposal

Boulders (rocks greater than 12 inches in maximum dimension) on the site may be exported from the site, reduced in size, placed as rock blankets or placed in windrows. If boulders are encountered on site, rock disposal methods are discussed individually below.

- Exporting Boulders

  Boulders may be separated from other soils and exported from the site. This method of construction will eliminate the need for special handling and placement of boulders, but could affect earthwork balance and may necessitate importing of soils. Any imported soils should be granular and have a very low expansion potential such that the physical and chemical properties

of the soils are similar to soils already on the site.

- Size Reduction

  If the maximum dimension of boulders is reduced to less than 12 inches, they may be placed as fill without special handling methods, provided nesting cobbles does not occur. Because of the hard nature of the boulders on the site, it is expected that rock crushing will need to be performed to reduce the size of the boulders. No appreciable size reduction is anticipated from handling of boulders by conventional earthmoving equipment.

  Consideration may also be given to crushing the boulders for use as aggregate and base material for the project. Evaluating whether this is feasible should take into consideration not only the cost of crushing versus the cost of importing aggregate and base material, but should also consider noise and dust.

- Rock Blankets

  Boulders may be placed in designated rock disposal areas. Oversized materials should not be placed in utility corridors or foundation areas unless the rock blankets are deeper than anticipated excavations that will occur in these areas. Oversized rocks placed as fill should be placed in such a manner as to assure the filling of all void spaces around the rocks with sufficient well graded soils to avoid rock-to-rock contacts and nesting of boulders.

  Intermediate sized rocks between 8 and 24 inches in maximum dimension may be placed in alternating rock and standard fill lifts. The rock lifts shall be no more than 24 inches thick and shall be separated vertically by layers of compacted fill soils at least 24 inches thick. The loose thickness of the rock blanket lift shall be no more than 24 inches. The 24 inch thick intermediate layers of fill shall be placed and compacted as standard fill lifts each with a loose thickness of not be more than 8 inches and compacted to at least 90 percent relative compaction (ASTM: D1557). The rock blanket lifts shall be placed so that no more than 30% of the total volume of the lift contains rock with a maximum dimension greater than 8 inches. Ample water shall be applied to flood well graded soils into all available void spaces around the rock. The soils utilized to fill the areas around the oversized rocks should be granular with a minimum sand equivalent value of 30.

  Individual large rocks, rocks greater than 24 inches in maximum dimension, should be placed so that the grading equipment has ample access to all sides to compact fill adjacent to the rock. Ample water and compactive effort shall be applied for each individual rock placed in this manner.

  Oversized materials larger than 8 feet in maximum dimension should either be reduced in size or removed from the site.

  Each lift of rock fill shall be blade mixed under the observation of the geotechnical consultant to verify the filling of the voids between rocks and the absence of rock-to-rock contact. Any areas containing insufficient fines or with apparent rock-to-rock contacts shall be reworked with ample water and additional fines to the satisfaction of the geotechnical consultant. Fill materials composed of predominantly well graded soils shall be placed and compacted immediately

adjacent to and above each layer of rock fill. Construction of rock blankets will require continuous testing and observation by a member of our staff.

- Rock Windrows

  The boulders should be placed in a manner to prevent rock-to-rock contacts and nesting of boulders. Soils flooded around the boulders should be granular with a minimum sand equivalent value of 30. Horizontal and vertical setbacks from the ground surface depicted on the illustration in Appendix C should be utilized unless specifically revised for the site with due consideration of the potential impacts of such changes. Construction of rock windrows will require continuous testing and observation by a member of our staff.

4.6 Subdrains

Groundwater and surface water were not encountered during the course of our investigation. The proposed grading will not fill any large canyons and the underlying soils are fairly permeable. Consequently, installation of subdrains is not expected to be necessary.

4.7 Fill and Cut Slopes

All fill and cut slopes should be constructed at inclinations of 2 horizontal to 1 vertical or flatter.

The gross static, seismic and surficial stability analyses for the maximum height cut slope and fill slope are summarized below. The failure surfaces are projected onto cross sections in Plate 2.

Cut Slope (Cross Section CC)

	Gross Static	Gross Seismic
Friction Angle (°)	31	31
Cohesion (psf)	300	300
Unit Weight, γ (pcf)	110	110
Horizontal Seismic Factor	0.000	0.150
Vertical Seismic Factor	0.000	0.000
Slope Height (ft)	14.5	14.5
Retaining Wall Height (ft)	4	4
Slope Gradient (H:V)	2:1	2:1
Factor of Safety	3.079	2.166

	Surficial Static Stability
Saturated Thickness (ft)	4
Slope Angle (°)	26.6
Cohesion (psf)	300
Friction Angle (°)	31
Saturated Unit Weight (pcf)	140
Factor of Safety	2.003

Fill Slope (Cross Section DD)

	Gross Static	Gross Seismic
Friction Angle (°)	31	31
Cohesion (psf)	200	320
Unit Weight, γ (pcf)	137.5	137.5
Horizontal Seismic Factor	0.000	0.150
Vertical Seismic Factor	0.000	0.000
Slope Height (ft)	22	22
Retaining Wall Height (ft)	6	6
Slope Gradient (H:V)	2:1	2:1
Factor of Safety	2.157	1.775

	Surficial Static Stability
Saturated Thickness (ft)	4
Slope Angle (°)	26.6
Cohesion (psf)	200
Friction Angle (°)	31
Saturated Unit Weight (pcf)	145
Factor of Safety	1.545

Given these factors of safety, we believe that all graded slopes will be grossly and surficially stable at the maximum gradient of 2:1 (H:V) and the referenced conditions above. If the grading plans change, the geotechnical engineer should be notified for subsequent calculations.

4.8 Faulting

The site is not located within the boundaries of an Alquist-Priolo Earthquake Fault Zone. The postulated, concealed trace of the Mission Creek Strand mapped northeast of the site by the U.S. Geological Survey is apparently an abandoned strand of the San Andreas Fault that is covered by Holocene and Pleistocene age deposits. It is not included within an Alquist-Priolo Earthquake Fault Zone or similar City or County fault rupture hazard zone. In addition, no other faults are known to pass through the property. Consequently, based on the current state of knowledge about faulting in the region, the potential for future surface fault rupture within the site is judged to be unlikely. It is anticipated that the site will experience high levels of ground shaking in future seismic events, as indicated in section 3.09 below.

4.9 Seismic Design Parameters

Because of the proximity of the San Andreas Fault and other active faults in the region, the site is expected to experience high levels of ground shaking during future seismic events. As a minimum, seismic design of structures will need to conform to requirements of the California Building Code.

Seismic design parameters have been developed in accordance with Section 1613 of the 2013 California Building Code (CBC) using the online U.S. Geological Survey Seismic Design Maps Calculator (Version 3.1.0, ASCE 7-10 Standard) and a site location based on latitude and longitude.

The calculator generates probabilistic and deterministic maximum considered earthquake spectral parameters represented by a 5-percent damped acceleration response spectrum having a 2-percent probability of exceedance in 50 years. The deterministic response accelerations are calculated as 150 percent of the largest median 5-percent damped spectral response acceleration computed on active faults within a region, where the deterministic values govern. The calculator does not, however, produce separate probabilistic and deterministic results. The parameters generated for the subject site are presented below.

Parameter	Value
Site Location	Latitude = 34.114 degrees Longitude = -117.155 degrees
Site Class	Site Class = D Soil Profile Name = stiff soil
Mapped Spectral Accelerations (Site Class D)	Ss (0.2- second period) = 2.552g S_1 (1-second period) = 1.250g
Site Coefficients (Site Class D)	F_a = 1.0 F_v = 1.5
Maximum Considered Earthquake Spectral Accelerations (Site Class D)	S_{MS} (0.2- second period) = 2.552g S_{M1} (1-second period) = 1.875g
Design Earthquake Spectral Accelerations (Site Class D)	S_{DS} (0.2- second period) = 1.701g S_{D1} (1-second period) = 1.250g

The above table shows that the mapped spectral response acceleration parameter a 1-second period (S_1) ≥ 0.75g. Therefore, for Risk Categories I, II and II the Seismic Design Category is E (CBC Table 1604.5 and Section 1613.3.5). Consequently, as required for Seismic Design Categories C through F by CBC Section 1803.5.11, the following geologic and seismic hazards have been evaluated in the preliminary site reports: slope instability, liquefaction, total and differential settlement, and surface displacement by faulting or seismically lateral spreading or lateral flow. Applicable portions of CBC Section 1803.5.12 have been included in evaluation of the above listed geologic and seismic hazards.

For preliminary design purposes, we recommend a peak ground acceleration, PGA_M = 0.984g.

4.10 Liquefaction and Secondary Earthquake Hazards

Potential secondary seismic hazards that can affect land development projects include liquefaction, tsunamis, seiches, seismically induced settlement, seismically induced flooding and seismically induced landsliding.

Liquefaction

Liquefaction is a phenomenon where earthquake-induced ground vibrations increase the pore pressure in saturated, granular soils until it is equal to the confining, overburden pressure. When this occurs, the soil can completely lose its shear strength and enter a liquefied state. The possibility of liquefaction is dependent upon grain size, relative density, confining pressure, saturation of the soils, and intensity and duration of ground shaking. In order for liquefaction to occur, three criteria must

be met: underlying loose, relatively fine-grained sandy soils, a groundwater depth of less than about 50 feet, and a potential for seismic shaking from nearby large-magnitude earthquakes.

The U.S. Geological Survey (Matti and Carson, 1991) prepared a series of maps identifying liquefaction hazards in the San Bernardino Valley Region. One of the maps indicates that during a Magnitude 8.0 earthquake on the San Andreas fault the northwest portion of the site (which they indicate is underlain by younger Holocene alluvium) will have a high susceptibility to liquefaction, but that the remainder of the site (which they indicate is underlain by older Pleistocene alluvium) will not be susceptible to liquefaction. This map is similar to City of Highland and County of San Bernardino liquefaction hazard maps. During our subsurface investigation we found that the entire site is underlain by older alluvium. Younger alluvium, if present, is anticipated to be thin. The Matti and Carson maps also indicate that the site is not susceptible to liquefaction during a Magnitude 7.0 earthquake on the San Jacinto fault or a Magnitude 6.75 earthquake on the Cucamonga fault.

Typically, liquefaction potential is evaluated by drilling of borings or advancement of cone penetrometer soundings to depths of about 50-feet below the ground surface. However, all borings drilled during previous subsurface investigations encountered refusal due to cobbles and boulders at depths ranging from 5 to 16 feet below the ground surface. Due to our literature review findings and knowledge of the soil within that region, we believe the groundwater is greater than 50 feet below existing grade. Thus, liquefaction at this site should not be an issue and performance of liquefaction calculations were not performed.

It should be noted that the California Geological Survey has not yet prepared a Seismic Hazard Zone Map of potential liquefaction hazards for the quadrangle in which the site is located.

Tsunamis and Seiches

Tsunamis are sea waves that are generated in response to large-magnitude earthquakes. When these waves reach shorelines, they sometimes produce coastal flooding. Seiches are the oscillation of large bodies of standing water, such as lakes, that can occur in response to ground shaking. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water.

Seismically Induced Settlement

Seismically induced settlement occurs most frequently in areas underlain by loose, granular sediments. Damage as a result of seismically induced settlement is most dramatic when differential settlement occurs in areas with large variations in the thickness of underlying sediments. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

Boring, trench and geophysical data indicate that aside from loose surficial soils, the soils underlying the site are medium dense to very dense. Provided surficial soils are compacted as recommended in this report, it is our opinion that the potential for significant seismically induced settlement is low.

Seismically Induced Flooding

According to San Bernardino County Hazard Overlay Map FH31B the site is not located within a

potential dam inundation area.

Seismically Induced Landsliding

Due to the low gradient of the majority of the site, the potential for seismically induced landsliding is nil. Graded slopes to the maximum height planned and graded in accordance with our recommendations, will not be subject to the hazard of landsliding.

4.11 Foundations

Isolated spread footings and/or continuous wall footings are recommended to support the proposed structures. If the recommendations in the section on grading are followed and footings are established in firm native soils or compacted fill materials, footings may be designed using the following allowable soil bearing values:

- Continuous Wall Footings:

  Footings having a minimum width of 12 inches and a minimum depth of 12 inches below the lowest adjacent grade may be designed for an allowable bearing pressure of 2000 pounds per square foot (psf). An allowable lateral bearing value (passive pressure) of 250 pounds per square foot per foot of depth and an allowable coefficient of friction between foundation soil and concrete of 0.4 may be assumed.

- Isolated Spread Footings:

  Footings having a minimum width of 24 inches and a minimum depth of 12 inches below the lowest adjacent grade may be designed for an allowable bearing pressure of 2,000 psf. An allowable lateral bearing value (passive pressure) of 250 pounds per square foot per foot of depth and a coefficient of friction between foundation soil and concrete of 0.4 may be assumed.

- Retaining Wall Footings:

  Footings for retaining walls should be founded a minimum depth of 18 inches and have a minimum width of 24 inches. Footings may be designed using a maximum toe pressure of 2,500 psf and the lateral resistance values recommended above for building footings. However, when calculating passive resistance, the upper 12 inches of the footings should be ignored in areas where the footings will not be covered with concrete flatwork. Reinforcement should be provided for structural considerations as determined by the design engineer.

The above bearing pressures represent an allowable net increase in soil pressure over existing soil pressure and may be increased by one-third for short-term wind or seismic loads. The maximum expected settlement of footings designed with the recommended allowable bearing pressure is expected to be on the order of ½ inch with differential settlement on the order of ¼ inch in a span of 30 feet..

Soils at the site are generally granular with a very low expansion potential. Therefore, reinforcement of footings for expansive soil is not required. However, in view of the seismic setting, a nominal

reinforcement consisting of one #4 bar placed within 3 inches of the top of footings and another placed within 3 inches of the bottom of footings is recommended. The structural engineer may require heavier reinforcement.

All footing excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent soils. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed in slab or footing areas unless properly compacted.

Footings may experience an overall loss in bearing capacity or an increased potential to settle where located in close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause cracking, collapse and/or a loss of serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom corner of the trench.

Due to the preliminary nature of the expansion tests performed for this study, we recommend additional testing be performed near the completion of rough grading to verify the test results and recommended foundation design criteria.

4.12 Foundation Setbacks from Slopes

Setbacks for footings adjacent to slopes should conform to the requirements of the California Building Code. Specifically, footings should maintain a horizontal distance or setback between any adjacent slope face and the bottom outer edge of the footing.

For slopes descending away from the foundation, the horizontal distance may be calculated by using h/3, where h is the height of the slope. The horizontal setback should not be less than 5-feet, nor need not be greater than 40-feet per the California Building Code. Where structures encroach within the zone of h/3 from the top of the slope the setback may be maintained by deepening the foundations. Flatwork and utilities within the zone of h/3 from the top of slope may be subject to lateral distortion caused by gradual downslope creep. Walls, fences and landscaping improvements constructed at the top of descending slopes should be designed with consideration of the potential for gradual downslope creep.

For ascending slopes, the horizontal setback required may be calculated by using h/2 where h is the height of the slope. The horizontal setback need not be greater than 15-feet per the California Building Code.

4.13 Slabs-on-Grade

We recommend the use of non-structural slab-on-grade floors for structures supported on properly compacted fill placed in accordance with the recommendations contained in this report. These floor slabs should have a minimum thickness of 4 inches and should be divided into squares or rectangles using weakened plane joints (contraction joints), each with maximum dimensions not exceeding 15 feet. Contraction joints should be made in accordance with American Concrete Institute (ACI) guidelines. Slab-on-grade floors should be reinforced with at least the reinforcement required to control cracking due to shrinkage and temperature stresses or with a minimum of 6x6-10/10 welded

wire fabric placed at mid- height of the slab. Due to the difficulty of installing and maintaining welded wire fabric in the middle of concrete slabs-on- grade during construction, consideration should be given to using steel reinforcement consisting of steel rebar (i.e. No. 3 bars) placed 24 inches on-center in both directions in lieu of welded wire fabric.

Special care should be taken on floors slabs to be covered with thin-set tile or other inflexible coverings. Alternatively, inflexible flooring may be installed with unbonded fabric or liners to prevent reflection of slab cracks through the flooring.

A moisture vapor retarder/barrier is recommended beneath all slab-on-grade floors that will be covered by moisture- sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber, rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the vapor retarder or barrier conform to Section 1805 of the 2010 California Building Code (CBC) and pertinent sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

The moisture vapor retarder/barrier should be designed by the Project Architect or Structural Engineer, but at a minimum should consist of a 10 mils thick polyethylene with a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed.

ACI guidelines allow for the placement of the moisture vapor retarder/barrier either directly beneath floor slabs or below an intermediate granular soil layer. Placing the moisture retarder/barrier directly beneath the floor slab will eliminate potential problems caused by water being trapped in a granular fill layer. Concrete slabs poured directly on a vapor retarder/barrier, however, can experience increased shrinkage cracking and curling due to differential rates of curing through the thickness of the slab. Therefore, for concrete placed directly on the vapor retarder, we recommend a maximum water cement ratio of 0.45 and the use of water-reducing admixtures to increase workability and decrease bleeding. Full depth construction joints and control joints should be provided to control cracking and slab thickness and reinforcement as recommended by the Structural Engineer to resist the effects of curling.

If granular soil is placed over the vapor retarder/barrier, we recommend that the layer be at least 2 inches thick in accordance with traditional practice in southern California. Granular fill should consist of clean fine graded materials with 10 to 30% passing the No. 100 sieve and free from clay or silt. The granular layer should be uniformly compacted and trimmed to provide the full design thickness of the proposed slab. The granular fill layer should not be left exposed to rain or other sources of water such as wet-grinding, power washing, pipe leaks or other processes, and should be dry at the time of concrete placement. Granular fill layers that become saturated should be removed and replaced prior to concrete placement.

An additional layer of sand may be placed beneath the vapor retarder/barrier at the developer's discretion to minimize the potential of the retarder/barrier being punctured by underlying soils.

Prior to the placement of the moisture barrier and sand, the subgrade soils underlying the slab should be observed by the geotechnical consultant to verify that all under-slab utility trenches have been properly backfilled and compacted, that no loose or soft soils are present, and that the slab subgrade has been properly compacted to a minimum of 90 percent relative compaction within the upper 12 inches.

4.14 Miscellaneous Concrete Flatwork

Miscellaneous concrete flatwork and walkways may be designed with a minimum thickness of 4 inches. Large slabs should be reinforced with a minimum of 6x6-10/10 welded wire mesh placed at mid-height in the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15-feet.

Walkways may be constructed without reinforcement. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into non-reinforced walkways at a maximum of 5-feet spacing.

The subgrade soils beneath all miscellaneous concrete flatwork should be compacted to a minimum of 90 percent relative compaction for a minimum depth of 12 inches. The geotechnical engineer should monitor the compaction of the subgrade soils and perform testing to verify that proper compaction has been obtained.

4.15 Import Soils

Any imported soils should be such that the physical and chemical properties of the soils are similar to soils already on the site. The soils should be granular, non-corrosive and have a very low expansion potential (an expansion index of less than 20). The soils should also be free of deleterious material and organics, and not contain rock particles or fragments in excess of 8 inches in diameter. Fill material shall be sampled and reviewed by the geotechnical consultant prior to import to the site.

4.16 Lateral Load Resistance

Lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Allowable Passive Earth Pressure = 250 pcf (equivalent fluid weight).
- Allowable Coefficient of Friction (soil to footing) = 0.4
- Retaining structures should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Materials (Horizontal:Vertical)	Equivalent Fluid Weight (pcf)
Level	35
5:1	37
4:1	38
3:1	41
2:1	51

These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required minimum horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at-rest lateral earth pressure if this horizontal strain cannot be achieved.

- At-rest Lateral Earth Pressure = 55 pcf (equivalent fluid weight)

The Mononobe-Okabe method is commonly utilized for determining seismically induced active and passive lateral earth pressures and is based on the limit equilibrium Coulomb theory for static stress conditions. This method entails three fundamental assumptions (e.g., Seed and Whitman, 1970): Wall movement is sufficient to ensure either active or passive conditions, the driving soil wedge inducing the lateral earth pressures is formed by a planar failure surface starting at the heel of the wall and extending to the free surface of the backfill, and the driving soil wedge and the retaining structure act as rigid bodies, and therefore, experiences uniform accelerations throughout the respective bodies (U.S. Army Corps of Engineers, 2003, Engineering and Design - Stability Analysis of Concrete Structures).

- Seismic Lateral Earth Pressure = 30H psf.

The seismic lateral earth pressure given above is an inverted triangle with the resultant acting at a height of 0.6 H above the base of the wall.

4.17 Drainage and Moisture Proofing

Surface drainage should be directed away from the proposed structure into suitable drainage devices.

Neither excess irrigation nor rainwater should be allowed to collect or pond against building foundations or within low-lying or level areas of the lot. Surface waters should be diverted away from the tops of slopes and prevented from draining over the top of slopes and down the slope face.

Walls and portions thereof that retain soil and enclose interior spaces and floors below grade should be waterproofed and dampproofed in accordance with CBC Section 1805.

Retaining structures should be drained to prevent the accumulation of subsurface water behind the walls. Backdrains should be installed behind all retaining walls exceeding 3 feet in height. All backdrains should outlet to suitable drainage devices. Retaining wall less than 3 feet in height should be provided with backdrains or weep holes. Dampproofing and/or waterproofing should also be provided on all retaining walls.

4.18 Cement Type and Corrosion Potential

Soluble sulfate tests were not performed at the time of the geotechnical investigation on the southern portion of the tract. However, soluble sulfate tests were performed for the northern portion of the tract previously by RMA Group and the results yielded a corrosion potential to concrete material to be negligible. We expect similar results in the southern portion of the site due to similar earth materials and previous land uses. Upon completion of grading, soil samples should be taken and tested for water-soluble sulfate for further consulting for any concrete placed on site. Our recommendations for concrete exposed to sulfate-containing soils are presented in the table below.

Recommendations for Concrete exposed to Sulfate-containing Soils

Sulfate Exposure	Water Soluble Sulfate (SO4) in Soil (% by	Sulfate (SO4) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
Negligible	0.00 - 0.10	0-150	--	--	2,500
Moderate	0.10 - 0.20	150-1,500	II	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan or slag	0.45	4,500

Use of alternate combinations of cementitious materials may be permitted if the combinations meet design recommendations contained in American Concrete Institute guideline ACI 318-11.

The soils were tested for soil reactivity (pH), electrical resistivity (ohm-cm), chloride content (ppm), and sulfate content (ppm) on the southern portion of the tract. The testing was performed on a bulk sample from B1 and yielded a pH of 7.5 an electrical resistivity of 2350 ohm-cm, chloride content of 120 ppm, and sulfate content of 87 ppm. The northern portion of the tract was tested previously; the test results indicated that the on-site soils have a soil reactivity of 7.7 and an electrical resistivity of 1,850 ohm-cm for the northern potion. A neutral or non-corrosive soil has a pH value ranging from 5.5 to 8.4. Generally, soils that could be considered moderately corrosive to ferrous metals have resistivity values of about 3,000 ohm-cm to 10,000 ohm-cm. Soils with resistivity values less

than 3,000 ohm-cm can be considered corrosive and soils with resistivity values less than 1,000 ohm-cm can be considered extremely corrosive.

Based on our preliminary analysis, it appears that the onsite soils may be corrosive to ferrous metals and non-corrosive to cementitious materials. Upon completion of grading, soil samples should also be taken and tested for pH and resistivity for further consulting on ferrous materials placed on site.

4.19 Temporary Slopes and Excavations

Excavation of utility trenches will require either temporary sloped excavations or shoring. Temporary excavations in existing alluvial soils may be safely made at an inclination of 1:1 or flatter. If vertical sidewalls are required, the use of cantilevered or braced shoring is recommended.

Vehicles, equipment, materials, etc. should be set back away from the edge of temporary excavations a minimum distance of 10 feet from the top edge of the excavation. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

Cal/OSHA construction safety orders should be observed during all underground work.

4.20 Utility Trench Backfill

All pipes should be bedded in a sand, gravel or crushed aggregate imported material complying with the requirements of the Standard Specifications for Public Works Construction Section 306-1.2.1. Crushed rock products that do not contain appreciable fines should not be utilized as pipe bedding and/or backfill. Based on limited testing onsite soils have a sand equivalent value greater than 30. Therefore, onsite soils might be suitable for use as pipe bedding provided the soils are screened to remove cobbles and boulders. Additional testing of onsite soils at the time of construction would need to be performed if use of these soils for bedding is proposed. Bedding materials should be compacted to at least 90% relative compaction (ASTM D1557) by mechanical methods. The geotechnical consultant should review and approve of proposed bedding materials prior to use.

The on-site soils are expected to be suitable as trench backfill provided they are screened of organic matter, cobbles and boulders in accordance with the current edition of the Standard Specifications for Public Works Construction. Backfill soils should be compacted to at least 90% relative compaction (ASTM D1557) by mechanical methods.

All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the

footing influence zone defined as the area within a line projected at a 1:1 drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Cal/OSHA construction safety orders should be observed during all underground work.

4.21 Pavement Sections

Sand equivalent and R-value tests were not performed for preliminary design on the southern portion. We relied upon data presented in the northern portion of Tract 18935. Structural sections were designed using the procedures outlined in Chapter 630 of the California Highway Design Manual (Caltrans, 2008). This procedure uses the principle that the pavement structural section must be of adequate thickness to distribute the load from the design Traffic Index (TI) to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R- value).

Development of the design traffic indexes on the basis of a traffic study is beyond the scope of this report. The City of Highland specifies a Traffic Index value of 5.0 for local residential streets and requires a minimum pavement section of 3 inches of asphalt over 4 inches of crushed aggregate base. Selection of the final pavement structural section should be based on economic considerations which are beyond the scope of this investigation. Utilizing an assumed R-Value of 40 due to our literature review and knowledge of the material found on site, the recommended structural section is as follows:

- Local Residential Street (TI=5.0, R-Value=40):
  3 inches of asphaltic concrete over 4 inches of crushed aggregate base

Portland Cement Concrete (PCC) pavements for areas which are not subject to traffic loads may be designed with a minimum thickness of 4.0 inches of Portland cement concrete on compacted native soils. If traffic loads are anticipated, PCC pavements should be designed for a minimum thickness of 6.0 inches of Portland cement concrete on 4.0 inches of crushed aggregate base.

Prior to paving, the subgrade soils should be scarified and the moisture adjusted to within 2% of the optimum moisture content. The subgrade soils should be compacted to a minimum of 90% relative compaction. All aggregate base courses should be compacted to a minimum of 95% relative compaction.

4.22 Plan Review

Once formal grading and foundation plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the plan used during preparation of this report and revise the recommendations of this report where necessary.

4.23 Geotechnical Observation and Testing During Rough Grading

The geotechnical engineer should be contacted to provide observation and testing during the following stages of grading:

- During the clearing and grubbing of the site.
- During the demolition of any existing structures, buried utilities or other existing improvements.
- During excavation and overexcavation of compressible soils.
- During all phases of grading including ground preparation and filling operations.
- When any unusual conditions are encountered during grading.

A final geotechnical report summarizing conditions encountered during grading should be submitted upon completion of the rough grading operations.

4.24 Post-Grading Geotechnical Observation and Testing

After the completion of grading the geotechnical engineer should be contacted to provide additional observation and testing during the following construction activities:

- During trenching and backfilling operations of buried improvements and utilities to verify proper backfill and compaction of the utility trenches.
- After excavation and prior to placement of reinforcing steel or concrete within footing trenches to verify that footings are properly founded in competent materials.
- During fine or precise grading involving the placement of any fills underlying driveways, sidewalks, walkways, or other miscellaneous concrete flatwork to verify proper placement, mixing and compaction of fills.
- When any unusual conditions are encountered during construction.

5. Closure

The findings, conclusions and recommendations in this report were prepared in accordance with generally accepted engineering and geologic principles and practices. No other warranty, either expressed or implied, is made. This report has been prepared for Cayman Construction to be used solely for design purposes. Anyone using this report for any other purpose must draw their own conclusions regarding required construction procedures and subsurface conditions.

The geotechnical and geologic consultant should be retained during the earthwork and foundation phases of construction to monitor compliance with the design concepts and recommendations and to provide additional recommendations as needed. If a firm other than RMA GeoScience is retained to provide these services, that firm must notify the owner, project designers, government building officials and RMA GeoScience that the firm has assumed responsibility for all phases of the project within the purview of the geotechnical engineer, including design and construction. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-

evaluated.

Attachments:

Plate 1: Geotechnical Map of Tentative Tract Map
Plate 2: Cross Sections
Figure 1: Site Location Map
Figure 2: Regional Geologic Map
Figure 3: Earthquake Fault Zone Map
Figure 4: Regional Fault Map

Table 1: Notable Faults Within 100 kilometers and Seismic Data
Table 2: Historic Strong Earthquakes in Southern California Since 1812

Appendix A: Test Pit Logs
Appendix B: Laboratory Test Data
Appendix C: Rock Disposal
Appendix D: Abbreviation Legend
Appendix E: References

PLATES, FIGURES AND TABLES

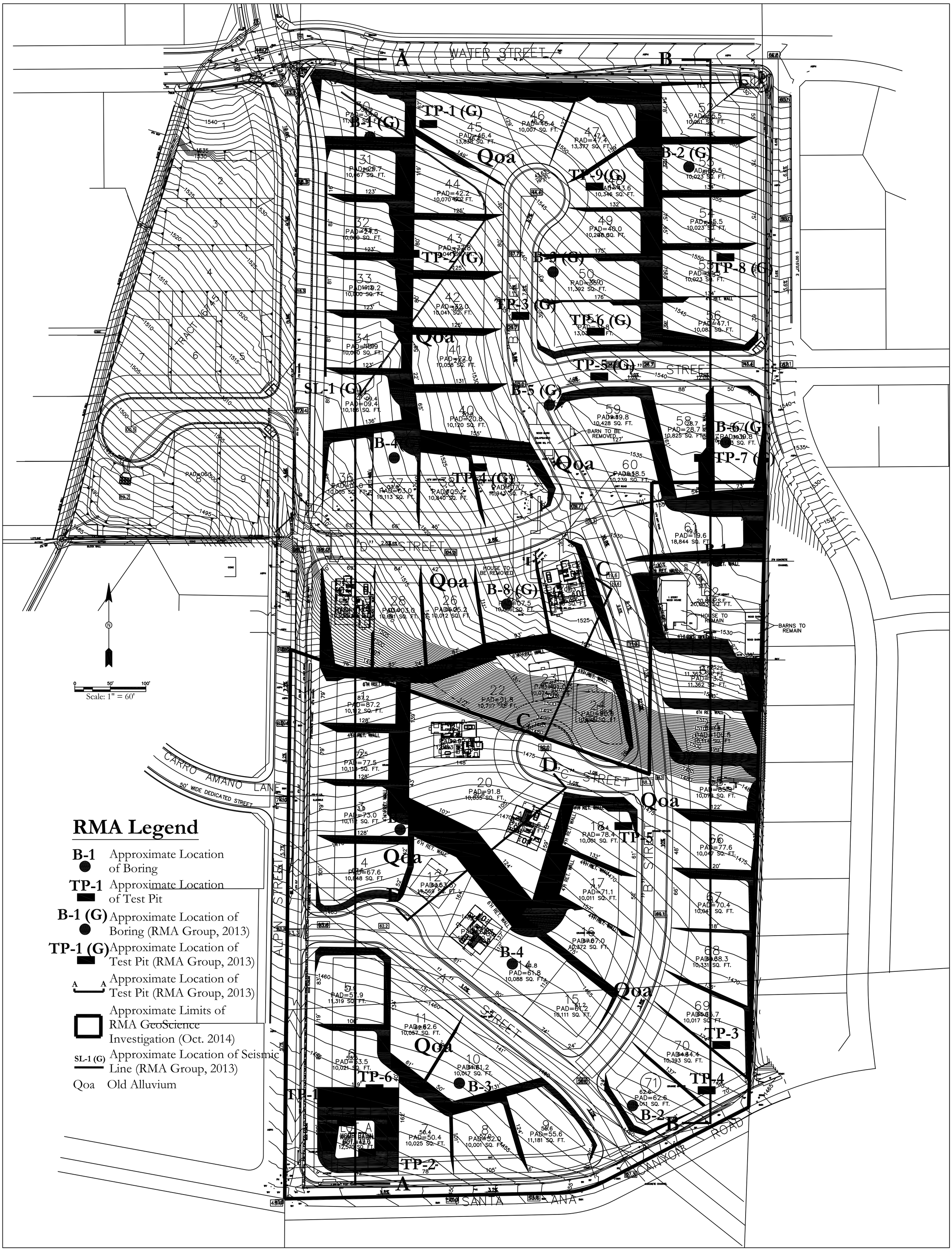
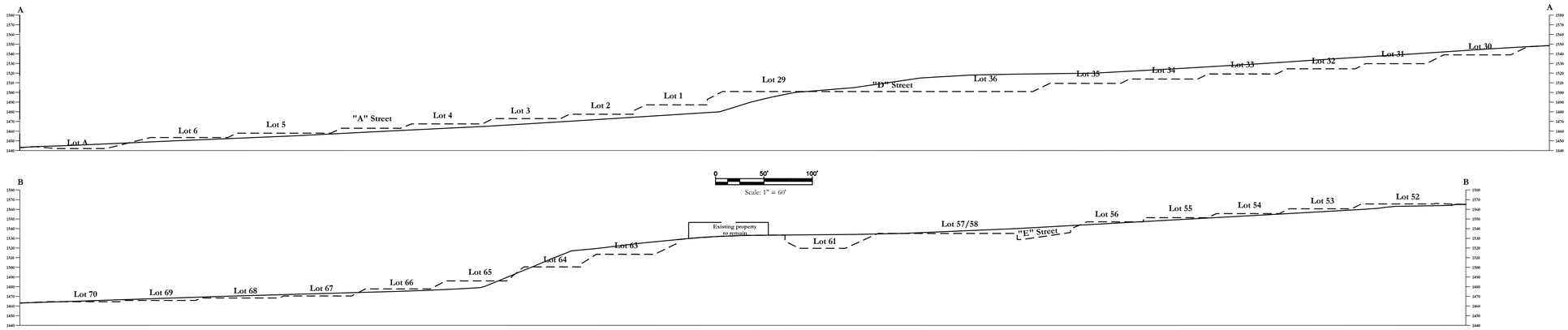


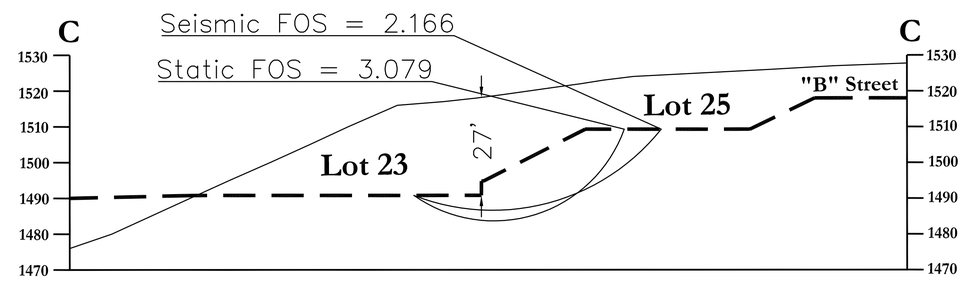
PLATE 1

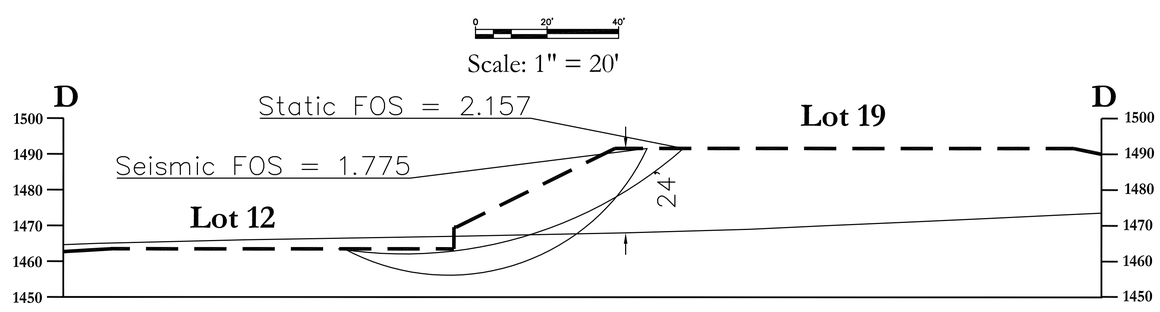
Geotechnical Map
Tentative Tract No. 18935
Santa Ana Canyon Road & Alpin Street
Highland, California

RMA Job No.	14-G74-0/03
Date:	November, 2014
Prepared By:	NRA

RMA GeoScience







RMA Legend

Approximate Location of Existing Grade

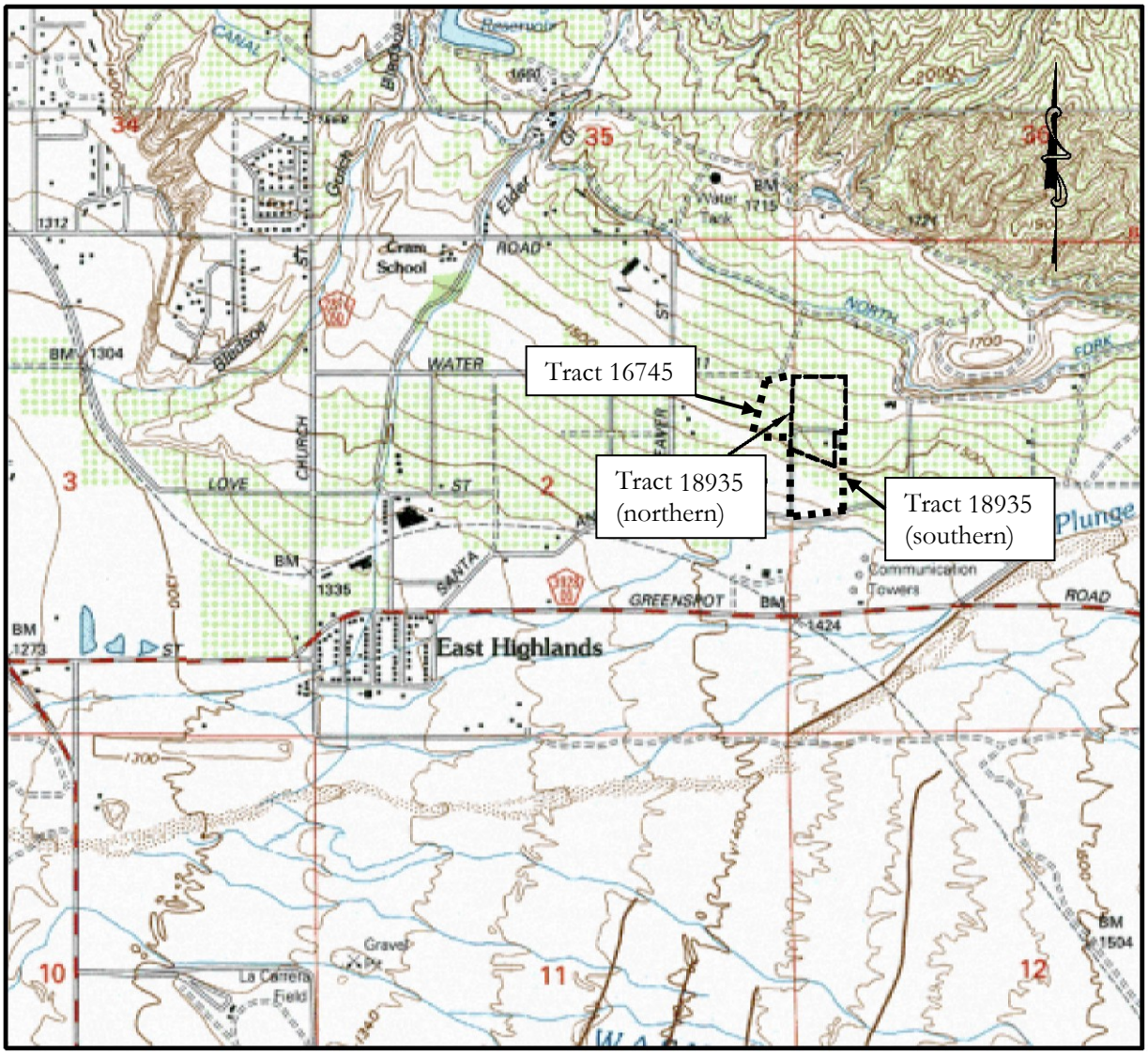
Approximate Location of Proposed Grade

PLATE 2

RMA Job No.	14-G74-0/03
Date:	November, 2014
Prepared By:	NRA

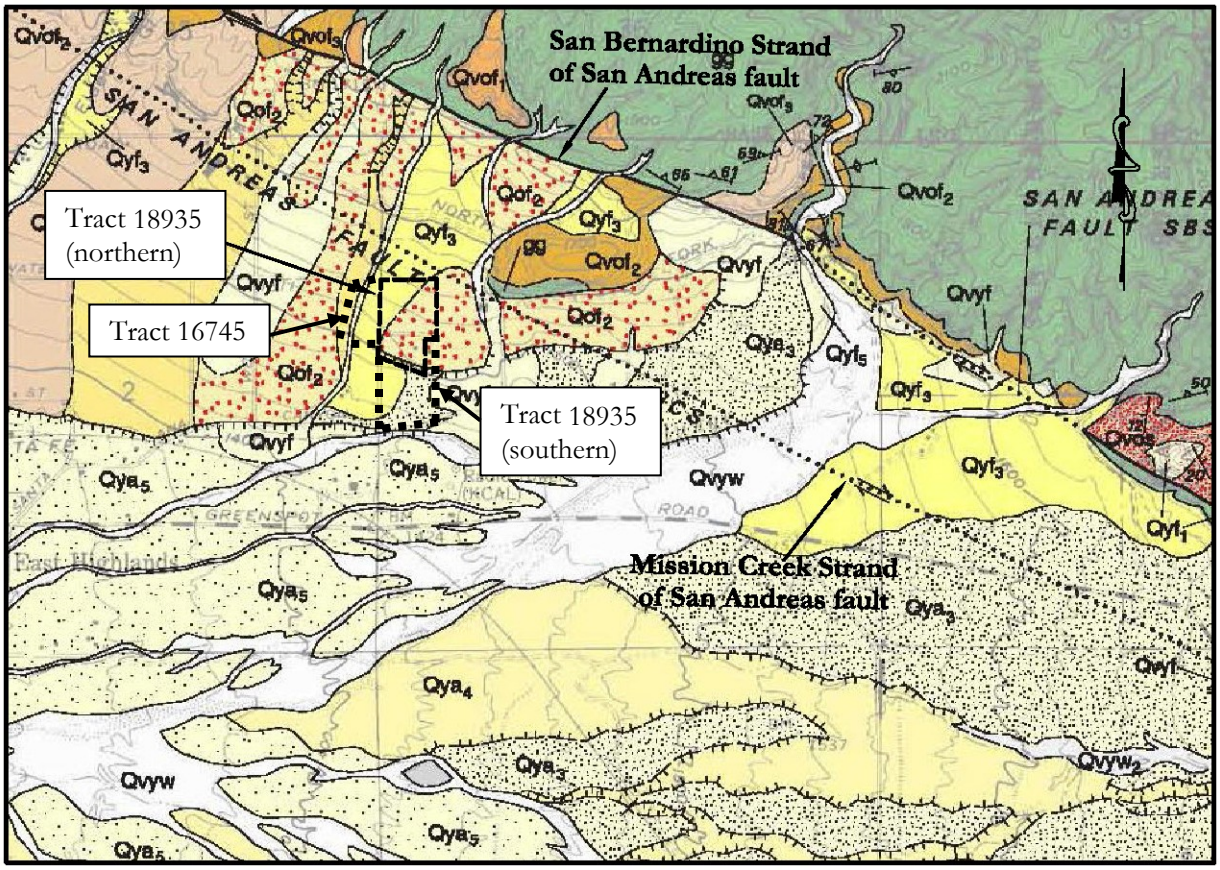
RMA GeoScience

Cross Sections
Tract No. 18935
Santa Ana Canyon Road & Alpin Street
Highland, California



SITE LOCATION MAP
Scale: 1" = 2,000'

Base Map: U.S. Geological Survey Redlands Quadrangle (1996)

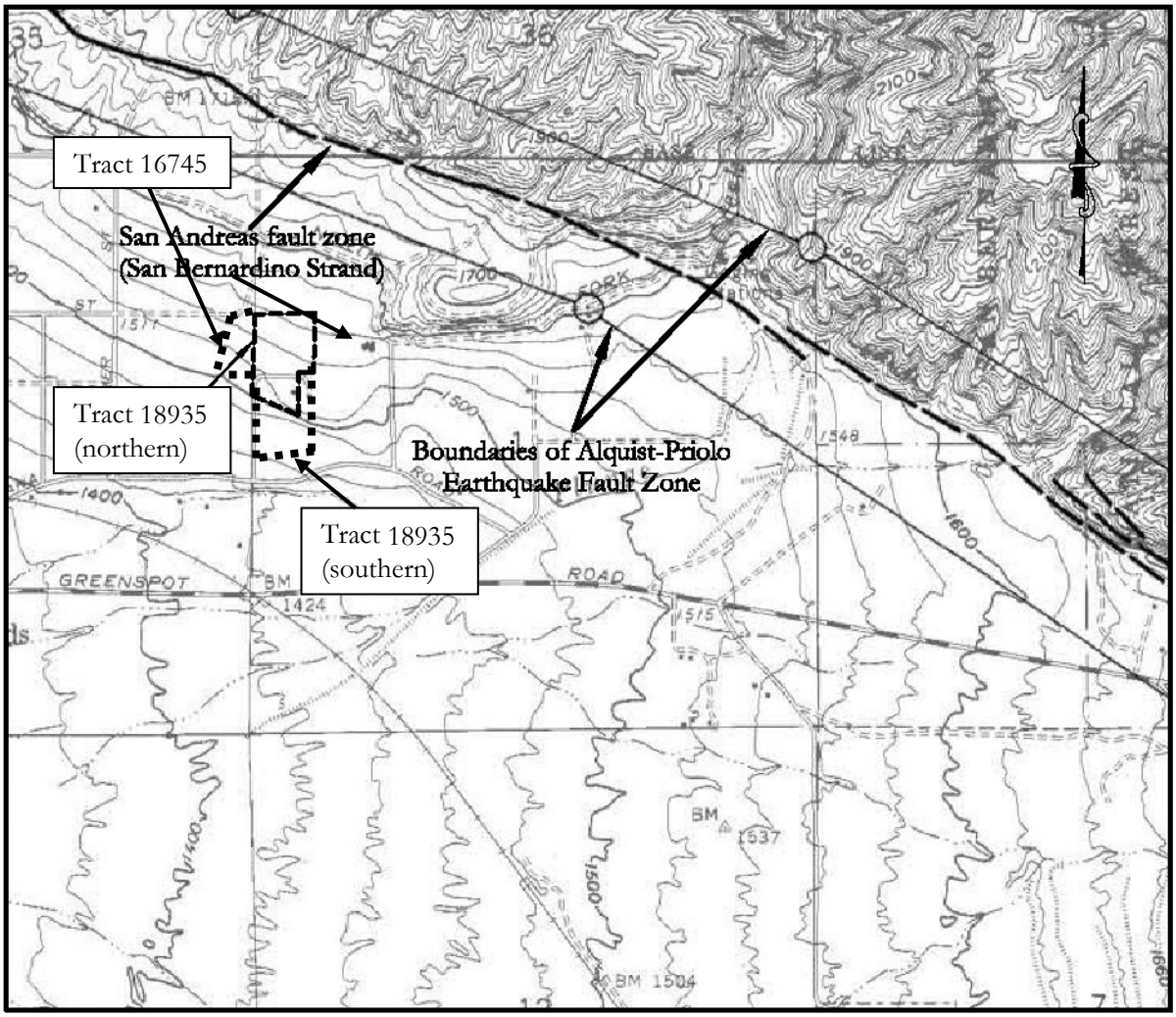


REGIONAL GEOLOGIC MAP
Scale: 1" - 2,100'

Partial Legend

Qyf3- Young alluvial-fan deposits (middle Holocene)
Qofz- Older alluvial-fan deposits
Qate to middle Pleistocene)
Qvof2, Qvpf3- Very old alluvial-fan deposits (middle to early Pleistocene)
gg - Gneissose granitoid rock and gneiss (Mesozoic and older) Dotted lines indicate concealed faults
/ - Contact between terraced and incised alluvial units, hachures point down slope

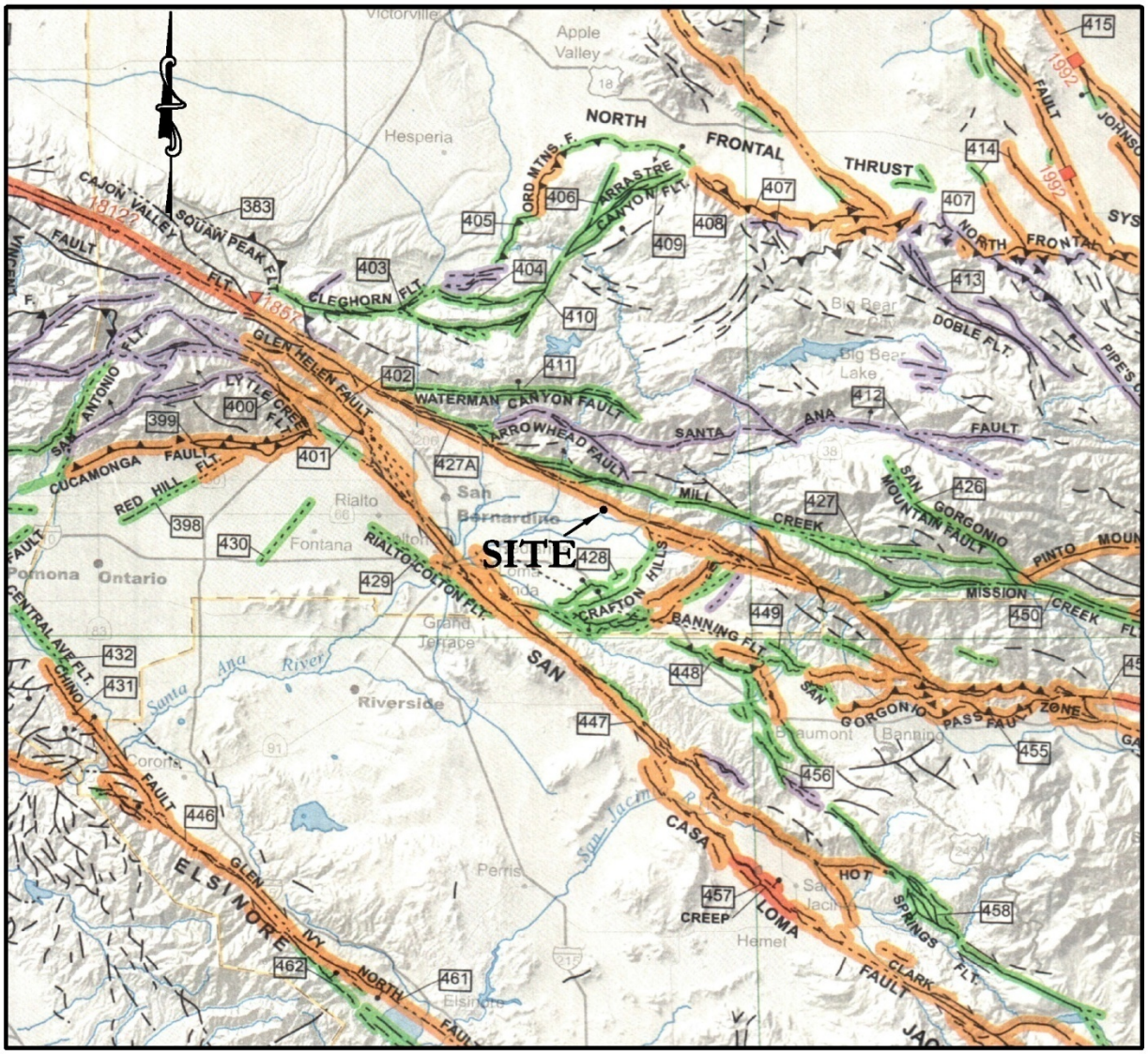
Source: U.S. Geological Survey OFR 03-302 (Matti, Morton, Cox and Kendrick, 2003)



EARTHQUAKE FAULT ZONE MAP
Scale: 1" - 1,800'

Source: California Division of Mines and Geology, Special Studies Zone Map of the Redlands Quadrangle (1977).

RMA GeoScience



Base Map: California Activity Map of California, California Geological Survey Oennings and Bryant, 2010)

RMA GeoScience

TABLE 1
NOTABLE FAULTS WITHIN 100 KILOMETERS AND SEISMIC DATA

Fault Zone & geometry	Distance (km)	Distance (mi.)	Maximum Moment Magnitude	Slip Rate (mm/yr)
Calico-Hidalgo (rl-ss)	83	52	7.3	0.6
Chino-Central Ave. (rl-r-o)	50	31	6.7	1.0
Clamshell-Sawpit (r)	65	40	6.5	0.5
Cleghorn (ll-ss)	19	12	6.5	3.0
Cucamonga (r)	27	17	6.9	5.0
Elsinore - Glen Ivy (rl-ss)	51	32	6.8	5.0
Upper Elysian Park (r)	87	54	6.4	1.3
Eureka Peak (rl-ss)	70	43	6.4	0.6
Gravel Hills-Harper (rl-ss)	87	54	7.1	0.6
Helendale - S Lockhart (rl-ss)	39	24	7.3	0.6
Hollywood (ll-r-o)	99	62	6.4	1.0
Johnson Valley (rl-ss)	62	39	6.7	0.6
Landers (rl-ss)	67	42	7.3	0.6
Lenwood-Lockhart - (rl-ss)	55	34	7.5	0.6
Newport-Inglewood (rl-ss)	90	56	6.9	1.5
North Frontal - Western (r)	25	16	7.2	1.0
Pinto Mountain (ll-ss)	41	25	7.2	2.5
Pisgah-Bullion Mtn. - (rl-ss)	91	57	7.3	0.6
Puente Hills Blind Thrust (r)	69	43	7.1	0.7
Raymond (ll-r-o)	77	48	6.5	1.5
San Andreas (rl-ss)	0.9	0.6	7.5	24.0
San Jacinto - San Bernardino (rl-ss)	13	8	6.7	12.0
San Joaquin Hills (r)	75	47	6.6	0.5
San Jose (ll-r-o)	49	30	6.4	0.5
Sierra Madre (r)	54	34	7.2	2.0
Verdugo (r)	92	57	6.9	0.5
Whittier (rl-ss)	53	33	6.8	2.5

Notes:

Fault geometry - (ss) strike slip, (r) reverse, (n) normal, (rl) right lateral, (ll) left lateral, (o) oblique

Fault and Seismic Data - California Geological Survey (Cao), 2003

RMA GeoScience

HISTORIC STRONG EARTHQUAKES IN SOUTHERN CALIFORNIA SINCE 1812

Date	Event	Causitive Fault	Magnitude	Epicentral Distance (miles)
Dec. 12, 1812	Wrightwood	San Andreas?	7.3	45
Jan. 9, 1857	Fort Tejon	San Andreas	7.9	259
Dec. 16, 1858	San Bernardino Area	uncertain	6.0	12
Feb. 9,1890	San Jacinto	uncertain	6.3	70
May 28, 1892	San Jacinto	uncertain	6.3	72
July 30, 1894	Lytle Creek	uncertain	6.0	29
July 22, 1899	Cajon Pass	uncertain	6.4	24
Dec.25, 1899	San Jacinto	San Jacinto	6.7	24
Sept. 20, 1907	San Bernardino Area	uncertain	5.3	7
May 15, 1910	Elsinore	Elsinore	6.0	32
April 21, 1918	Hemet	San Jacinto	6.8	27
July 23, 1923	San Bernardino	San Jacinto	6.0	12
March 11, 1933	Long Beach	Newport-Inglewood	6.4	58
April 10, 1947	Manix	Manix	6.4	70
Dec. 4, 1948	Desert Hot Springs	San Andreas or Banning	6.5	47
July 21, 1952	Wheeler Ridge	White Wolf	7.3	126
Feb. 9, 1971	San Fernando	San Fernando	6.6	76
July 8, 1986	North Palm Springs	Banning or Garnet Hills	5.6	33
Oct. 1, 1987	Whittier Narrows	Puente Hills Thrust	6.0	55
Feb. 28, 1990	Upland	San Jose	5.5	32
June 28, 1991	Sierra Madre	Clamshell Sawpit	5.8	50
April 22, 1992	Joshua Tree	Eureka Peak	6.1	51
June 28, 1992	Landers	Johnson Valley & others	7.3	43
June 28, 1992	Big Bear	uncertain	6.5	20
Jan. 17, 1994	Northridge	Northridge Thrust	6.7	82
Oct. 16, 1999	Hector Mine	Lavic Lake	7.1	62

Notes:

Earthquake data: U.S. Geological Survey P.P. 1515 & online data, Southern California Earthquake Center
California Geological Survey online data
Magnitudes prior to 1932 are estimated from intensity.
Magnitudes after 1932 are moment, local or surface wave magnitudes.
Attenuation relationship - Boore et al., 1997 (mean values), values at distances > 50 miles are approxima

Site Location:

Site Longitude: 117.1553
Site Latitude: 34.116

APPENDIX A

TEST PIT LOGS

RMA GeoScience

BORING NUMBER B-1

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Hollow Stem Auger
Drilling Contractor: Martini Drilling
Logged By: MPS Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A Boring Diameter: 8"
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow (Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
	☒	8/14/15		6.7	123.8	132.1				4' Reddish brown silty sand with ~20% gravel, dense, moist.			SM
5	☒	50 for 5.5"		1.8	112.9	114.9				6' Tan coarse sand with gravel, moist, dense.			SM
10		44/ 50 for 2"		1.9	126.6	129.1				9' Tan medium to coarse sand with gravel, dense.			SM
15		50 for 2.5"		2.2	107.7	110.1				15' Sand, abundant gravel.			SM
										Total Depth: 15			
										No Water, No Caving			
20													
25													
30													

RMA GeoScience

BORING NUMBER B-2

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Hollow Stem Auger
Drilling Contractor: Martini Drilling
Logged By: MPS Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A Boring Diameter: 8"
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
		36/ 50 for 2.5"		7.0	103.9	111.1				4' Reddish brown silty sand with gravel.			SM
5										Note: Refusal at 5' due to cobbles			
										Total Depth: 4			
										No Water, No Caving			
10													
15													
20													
25													
30													

RMA GeoScience

BORING NUMBER B-3

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Hollow Stem Auger
Drilling Contractor: Martini Drilling
Logged By: MPS Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A Boring Diameter: 8"
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
		13/20/40		2.6	NR	NR				3' Reddish brown silty sand with gravel, medium dense.			SM
5										5-6' Abundant gravel starting.			
										Note: Refusal at 6' due to cobbles.			
10										**Total Depth: 6**			
										No Water, No Caving			
15													
20													
25													
30													

RMA GeoScience

BORING NUMBER B-4

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Hollow Stem Auger
Drilling Contractor: Martini Drilling
Logged By: MPS Checked By:

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A Boring Diameter: 8"
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
	☒									Old Alluvium (Qoa)			
	☒									0-5' Reddish brown, medium to coarse sand.	☒		SM
5		50 for 6"		2.3	113.6	116.1				5' Grayish brown coarse sand with gravel, moist.			SM
		18/14/17		5.3	129.2	136.1				8' Reddish brown silty sand with gravel, moist, dense.			SM
10													
		50 for 2.5"		4	120.7	125.5				12' Reddish brown silty sand with gravel, moist, dense.			SM
15													
										Note: Refusal at 16' due to cobbles			
										Total Depth: 16			
										No Water, No Caving			
20													
25													
30													

RMA GeoScience

BORING NUMBER B-5

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Hollow Stem Auger
Drilling Contractor: Martini Drilling
Logged By: MPS Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A Boring Diameter: 8"
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	~~Material Description~~	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-5' Reddish brown medium to coarse sand.			SM
5		50 for 2"		5.1	105.0	110.4				5' Light reddish brown medium to coarse sand.			SM
										Note: Refusal at 6' due to cobbles.			
10										**Total Depth: 6**			
										No Water, No Caving			
15													
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-1

Page 1 OF 1

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction

Project Number: 14-G74-0/03

Date Started: 10/8/2014 Completed: 10/8/2014

Excavation Method: Backhoe

Backhoe Contractor: Williams Construction & Backhoe

Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property

Project Location: Highland - Santa Ana Canyon Rd

Ground Elevation: N/A

Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			SM
										0-6" Dry light brown silty sand, loose, disturbed.			SM
5										6"-2.5' Moist taupe brown silty sand, medium dense. Roots to 2.5'			SM
										Total Depth: 2.5			
10										**No Water, No Caving**			
15													
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-2

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Backhoe
Backhoe Contractor: Williams Construction & Backhoe
Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-6" Slightly moist light brown silty sand, loose, disturbed.			SM
5										6"-2.5' Moist taupe brown silty sand, medium dense. Roots to 2.5'			SM
10										**Total Depth: 2.5** **No Water, No Caving**			
15													
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-3

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Backhoe
Backhoe Contractor: Williams Construction & Backhoe
Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-1' Dry taupe brown silty sand, loose, disturbed. No roots.			SM
5										1-4' Moist tayppe brown silty sand with scattered pebbles, medium dense.			SM
10										4-7' Moist taupe brown silty sand with scattered pebbles and cobbles, medium dense.			SM
										Note: Refusal at 7' due to large granitic boulders approximately 3' in diameter.			
15										**Total Depth: 7**			
										No Water, No Caving			
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-4

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction

Project Number: 14-G74-0/03

Date Started: 10/8/2014 Completed: 10/8/2014

Excavation Method: Backhoe

Backhoe Contractor: Williams Construction & Backhoe

Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property

Project Location: Highland - Santa Ana Canyon Rd

Ground Elevation: N/A

Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index		<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-1' Dry taupe brown silty sand, loose, disturbed. No roots.			SM
5										1-4' Moist tayppe brown silty sand with scattered pebbles, medium dense.			SM
10										4-7' Moist taupe brown silty sand with scattered pebbles and cobbles, medium dense.			SM
										Note: Refusal at 7' due to large granitic boulders approximately 3' in diameter.			
15										**Total Depth: 7**			
										No Water, No Caving			
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-5

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Backhoe
Backhoe Contractor: Williams Construction & Backhoe
Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-1' Dry tan to light brown silty sand to sandy silt, loose, disturbed.			SM
5										1-3' Slightly moist brown silty sand, medium dense. Roots to 2.5'.			SM
10										Note: Refusal at 3' due to large granitic boulders approximately 3' in diameter.			SM
										Total Depth: 3			
										No Water, No Caving			
15													
20													
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-6

9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction

Project Number: 14-G74-0/03

Date Started: 10/8/2014 Completed: 10/8/2014

Excavation Method: Backhoe

Backhoe Contractor: Williams Construction & Backhoe

Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property

Project Location: Highland - Santa Ana Canyon Rd

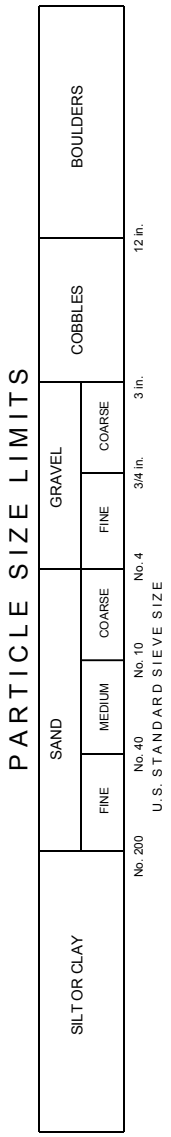
Ground Elevation: N/A

Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-3' Medium reddish brown clayey silty sand, moist. Roots to 3'.			SM
5										3-4' Light reddish brown to brown coarse to medium silty sand, dense. Moist, no porosity noted.			SM
10										Note: Refusal at 4' due to large granitic boulders approximately 2' in diameter.			SM
										Total Depth: 4			
										No Water, No Caving			
15													
20													
25													
30													

RMA GeoScience

UNIFIED SOIL CLASSIFICATION SYSTEM



MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravel, gravel-sand mixtures. little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatamaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

I. SOIL STRENGTH/DENSITY

BASED ON STANDARD PENETRATION TESTS

Compactness of sand		Consistency of clay	
Penetration Resistance N (blows/ft)	Compactness	Penetration Resistance N (blows/ft)	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

N = Number of blows of 140 lb. weight falling 30 in. to drive 2-in OD sampler 1 ft.

BASED ON RELATIVE COMPACTION

Compactness of sand		Consistency of clay	
% Compaction	Compactness	% Compaction	Consistency
<75	Loose	<80	Soft
75-83	Medium	80-85	Medium Stiff
83-90	Dense Dense	85-90	Stiff
>90	Very Dense	>90	Very Stiff

II. SOIL MOISTURE

Moisture of sands		Moisture of clays	
% Moisture	Description	% Moisture	Description
<5%	Dry Moist	<12%	Dry
5-12%	Very	12-20%	Moist
>12%	Moist	>20%	Very Moist, wet

APPENDIX B

LABORATORY TEST DATA

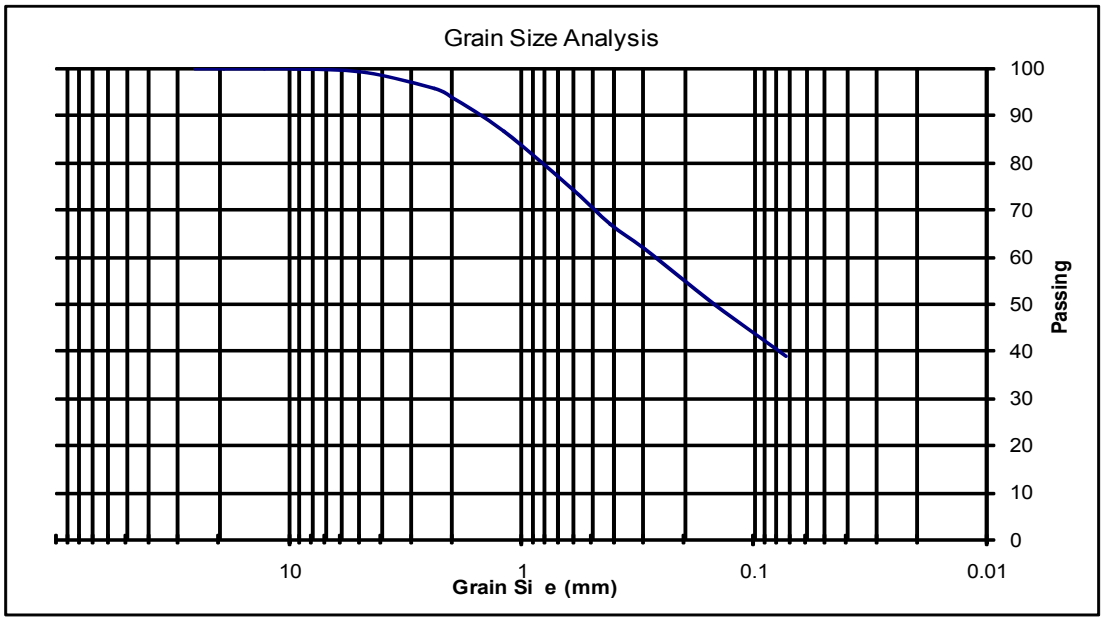
RMA GeoScience

Sieve Analysis:
ASTM D422

Project ID: 14-G74-0/03
Sample ID: <>
Location: TP-1
Depth: 1-2.5'
Soil Description: Tan/brown silty clayey sand

Fraction A Dry Net Weight (gms): 1281.6

Fraction A: Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
1"	0.0	1281.6	100
3/4"	0.0	1281.6	100
1/2"	0.0	1281.6	100
3/8"	1.7	1279.9	100
#4	10.7	1270.9	99
#8	57.2	1224.4	96
#10	77.8	1203.8	94
#16	171.2	1110.4	87
#30	333.1	948.5	74
#40	423.7	857.9	67
#50	491.8	789.8	62
#100	640.6	641.0	50
#200	784.8	496.8	39



Modified Maximum Compaction:
ASTM 1557-12

Location	Soil Description	Maximum Dry Density (pcf)	Optimum Water Content (%)
B1 @ 0-5'	Dry brown silty clayey sand	132.3	7.6
B2 @ 0-5	Slightly moist brown silty clayey sand	131.3	7.5

Expansion Potential
ASTM D4829

Location	Soil Description	Expansion Potential (EI_{50})
B2 @ 0-5	Slightly moist brown silty clayey sand	0

Corrosion Potential
Resistivity and pH– CT 643
Sulfate Content – CT 417
Chloride Content – CT 422

Location	Soil Description	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B1 @ 0-5	Slightly moist brown silty clayey sand	2350	7.5	87	120

RMA GeoScience

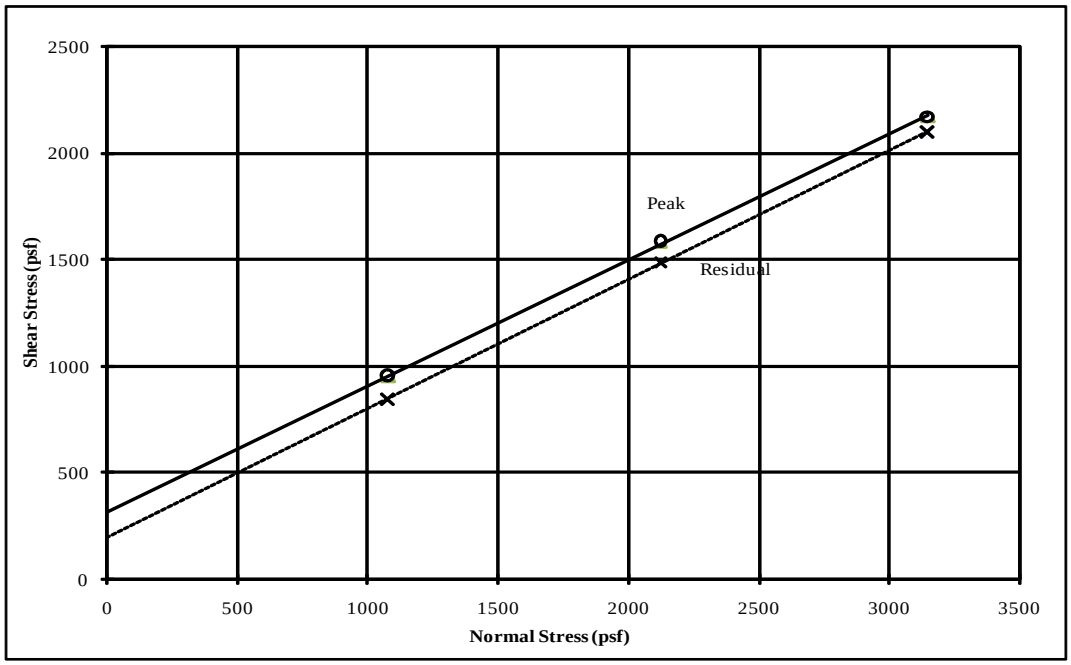
Direct Shear
ASTM D3080

		Remolded or Undisturbed:	Remolded
		Maximum Dry Density (pcf) =	131.3
Project ID:	14-G74-0/03	Optimum Moisture Content (%) =	7.5
Sample ID:	<>	Initial Dry Density (pcf) =	118.4
Location:	B2	Relative Compaction (%) =	90%
Depth:	0-5'	Initial Moisture Content (%) =	7.5
Soil Description:	Brown silty clayey sand	Final Moisture Content (%) =	13.3

Diameter (in)	2.50
Area of sample (in^2)	4.91
Load Ring Constant (lb/in)	4480

Load Applied (g)	Normal Pressure (psf)	Peak		Residual	
		Dial Reading	Shear Resist (psf)	Dial Reading	Shear Resist (psf)
16739	1080	0.0072	950	0.0064	841
32739	2120	0.0120	1580	0.0113	1489
48739	3150	0.0165	2170	0.0159	2090

	Peak	Residual
Cohesion (psf) =	320	200
Friction Angle (deg) =	31	31

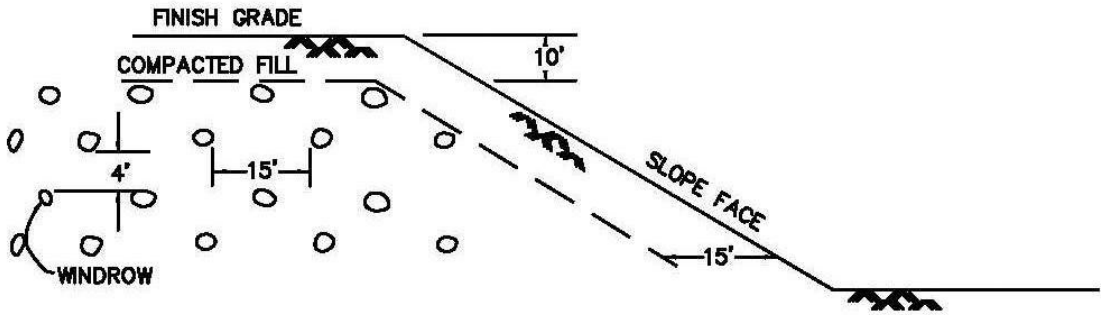


APPENDIX C

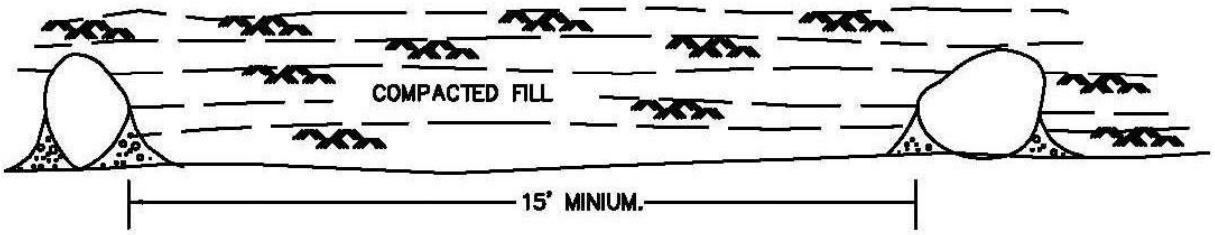
ROCK DISPOSAL

RMA GeoScience

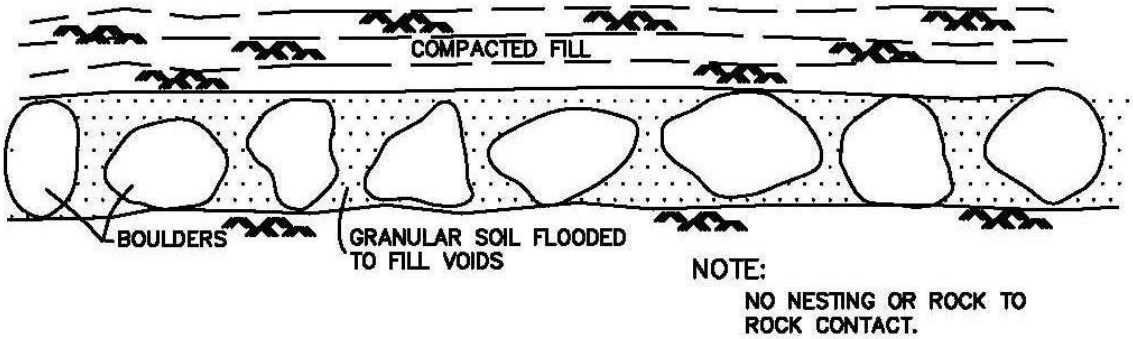
SECTION



EDGE VIEW



PROFILE VIEW



ROCK DISPOSAL WINDROW DETAIL

APPENDIX D

ABBREVIATION LEGEND

ABBREVIATION LEGEND

Abbreviation	Full Name
'	feet
"	inches
/	per
ASTM	American Society for Testing and Materials
cm	centimeters
cm^2	squared centimeters
cm^3	cubic centimeters
ft	feet
ft^2	squared feet
ft^3	cubic feet
hr	hour
in	inches
in^2	squared inches
in^3	cubic inches
min	minute
ohm-cm	ohm-centimeters
ppm	parts per million
s	second

APPENDIX E

REFERENCES

Bryant, W.A. and Hart, E.W., 2007, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology Special Publication 42, Interim Revision 2007 and online updates.

California Building Standards Commission, 2010 California Building Code.

California Department of Conservation, Division of Mines and Geology, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117.

California Division of Mines and Geology, 1977, Special Studies Zone Map, Redlands Quadrangle, Effective date January 1, 1997.

Cao, Y. and others, 2003, The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003.

Carson, S.E. and Matti, J.C., 1985, Contour Map Showing Minimum Depth to Ground Water, Upper Santa Ana River Valley, California, 1973-1979: U.S. Geological Survey Miscellaneous Field Studies Map MF-1802.

City of Highland, 2013, General Plan Safety Element.

Dibblee, T.W., Jr., 2004, Geologic Map of the Harrison Mountain/North ½ of Redlands Quadrangles, San Bernardino and Riverside County, California: Dibblee Geology Center Map #DF-126.

Fife, D.L. and others, 1976, Geologic Hazards in Southwestern San Bernardino County, California: California Division of Mines and Geology Special Report 113

Google Earth, Aerial Photographs, 2012, 2011, 2009, 2007, 2006, 2005, 2003, 2002 and 1995.

Historicaerials.com, Aerial Photographs, 2005, 1980, 1968, 1959 and 1938.

Jennings, C.W., and Bryant, W.A, 2010, Fault Activity Map of California, California Geological Survey, Geologic Data Map No. 6.

Martin, G.R. and Lew, M., 1999, Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California, Southern California Earthquake Center publication.

Matti, J.C., Morton, D.M. and Cox, B.F., 1992, The San Andreas Fault System in the Vicinity of the Central Transverse Ranges Province, Southern California: U.S. Geological Survey OFR 92-354.

Matti, J.C. and Carson, S.E., 1991, Liquefaction Susceptibility in the San Bernardino Valley and Vicinity, Southern California – A Regional Evaluation: U.S. Geological Survey Bulletin 1898.

Matti, J. C., 2003, Geologic Map of the Redlands 7.5' Quadrangle, San Bernardino and Riverside Counties, California: U.S. Geological Survey OFR 03-302.

California: California Division of Mines and Geology Special Report 113.

RMA GeoScience, 2014, Geotechnical Review of Precise Grading Plans, Tract 16745, Highland, California, dated September 17, 2014.

RMA Group, 2013, Geotechnical Investigation for Proposed Residential Development, 12.4 Acre Parcel, APN 1270-371-03, Highland, California, dated November 6, 2013.

San Bernardino County Land Use Services Department, 2010, General Plan, Geologic Hazards Overlays Map FH31C – Redlands, dated March 9, 2010.

San Bernardino County Land Use Services Department, 2010, General Plan, Hazards Overlay Map FH31B – Redlands, dated March 9, 2010.

Schroeder Engineering, 2004, Geotechnical Investigation Report for Tract 16745 on Water Street, Highland, California, dated April 14, 2004.

Seed, H.B. and Whitman, R.V., 1970, Design of Earth Structures for Dynamic Loads *in* American Society of Civil Engineers Specialty Conference State-of-the Art Paper, Lateral Stresses in the Ground and Design of Earth- Retaining Structures.

SITETECH Inc., Tentative Tract Map No. 18395, Highland, California, dated November 2014.

Tokimatsu, K. and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, Journal of Soil Mechanics and Foundation Engineering, Vol. 113, No. 8.

U.S. Army Corps of Engineers, 2003, Engineering and Design - Stability Analysis of Concrete Structures, Publication CECW-E, Circular No. 1110-2-6058, Appendix G, http://www.usace.army.mil/publications/eng- circulars/ec1110-2-6058/.

U.S. Department of Defense, 1997, Soil Dynamics and Special Design Aspects Handbook, MIL-HDBK-1007/3.

U.S. Geological Survey EROS Data Center, 1989, Color Infrared Steroscopic Aerial Photographs, NAPP 1836-105, 106, Flight date 8-15-89.

U.S. Geological Survey, 2013, Java Ground Motion Parameter Calculator, Version 5.1.0, ASCE 7 Standard, http://earthquake.usgs.gov/designmaps/us/application.php

APENDIX E

Phase I Environmental Site Assessment

APPENDIX F

Stormwater Infiltration Study and Drainage Map

RMA Group
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL CONSULTANTS

PHASE I ENVIRONMENTAL SITE ASSESSMENT
FOR
APN 1210-371-03
SEC OF WATER STREET AND ALPIN STREET
HIGHLAND, CA

for

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

November 12, 2013

13-594-01

TABLE OF CONTENTS

		PAGE
1.00	**SUMMARY**	1
2.00	**INTRODUCTION**	2
2.01	Purpose	2
2.02	Scope of Work	3
2.03	Significant Assumptions	3
2.04	Limitations and Exceptions	3
2.05	Special Terms and Conditions	4
2.06	User Reliance	4
3.00	**SITE DESCRIPTION**	4
3.01	Location and Legal Description	4
3.02	Site and Vicinity Characteristics	4
3.03	Current Uses of Property	5
3.04	Descriptions of Structures, Roads and Improvements	5
3.05	Current Uses of Adjoining Property	5
4.00	**USER PROVIDED INFORMATION**	5
4.01	Environmental Liens	5
4.02	Activity and Use Limitations	5
4.03	Specialized Knowledge	5
4.04	Valuation Reduction for Environmental Issues	5
4.05	Commonly Known and Reasonably Ascertainable Information	5
4.06	Obvious Indicators of Contamination	6
4.07	Other Information	6
5.00	**RECORDS REVIEW**	6
5.01	Standard Environmental Record Sources	6
5.02	Additional Environmental Record Sources	6
5.03	Physical Setting	7
5.04	Historical Use Information on the Property	7
5.05	Historical Use Information on Adjoining Properties	7

TABLE OF CONTENTS
(Continued)

6.00	**SITE RECONNAISSANCE**	8
6.01	Methodology and Limiting Conditions	8
6.02	General Site Setting	8
6.03	Exterior Observations	9
6.04	Interior Observations	10
7.00	**INTERVIEWS**	10
7.01	Interview with Owner	10
7.02	Interviews with Others	10
8.00	**CHEMICAL TESTING**	10
8.01	Field Methods	10
8.02	Analytical Findings	11
8.03	Discussion	11
9.00	**FINDINGS, OPINIONS AND CONCLUSIONS**	12
10.00	**DEVIATIONS**	13
11.00	**ADDITIONAL SERVICES**	13
12.00	**SIGNATURES AND QUALIFICATIONS**	13

FIGURES

Figure 1	Site Location Map
Figure 2	Site Reconnaissance Map

APPENDICES

Appendix A	Photographs
Appendix B	EDR Environmental Record Search
Appendix C	Chemical Test Results
Appendix D	References

1.00 SUMMARY

In accordance with your request, a Phase I environmental site assessment has been completed for APN 1210-371-03 Highland, California. The assessment was performed in general accordance with ASTM Standard E 1527-05 which was the current ASTM Standard at the start of this study. During preparation of the final draft of this report, the standard was updated to E1527-13. Because of the timing of this release, the report follows the general format recommended in the -05 standard, but also incorporates pertinent sections from the -13 standard.

The site is located approximately 2.5 miles east of the 210 Freeway in the City of Highland, San Bernardino County, California. The site consists of vacant land, an abandoned single-family residence and a dilapidated barn. The site was formerly a citrus orchard. The residence, barn and orchard dated back to the early 1900s. The orchard was removed from the site about 3 years ago.

Governmental records searched for this study revealed no recognized environmental conditions in connection with the site or within ASTM specified radius search distances.

During our reconnaissance of the site an above ground storage tank was found behind the barn. Stained soil was observed underneath the tank. An oily residue was observed around the tank outlet pipe and the words "flammable" were painted on the tank. Stained soil that smelled of motor oil was also observed to cover most of the dirt floor in the west side of the barn. Stained soil may also be present in the east side of the barn. An air compressor was observed in the barn along with a pop-up camping trailer and another small trailer. Debris such as lumber, bricks, wooden fencing, corrugated metal sheeting, rusty tools, and windows were observed behind the barn in the area of the above ground storage tank.

Four soil samples from the site were tested for organochlorine pesticides, organophosphorus pesticides, chlorinated herbicides and heavy metals. Concentrations of pesticides fell below California Office of Environmental Health Hazard Assessment Soil-Screening levels for residential scenarios except for the concentration of Dieldrin detected in one sample (HS-4). In addition, the concentration of DDE in one sample (HS-6) was found to be at the screening level for residential scenarios. Herbicides were not detected. All metals were found to be below residential soil screening levels established by California Office of Environmental Health Assessment, with the exception of arsenic. However, arsenic levels (2.1 to 2.8 mg/kg) were found to be below background levels of naturally occurring arsenic in southern California, which is typically on the order of approximately 12 mg/kg (Cheroff, Bosan and Oudiz, undated). Chromium (12 to 35 mg/kg) was also found to be below residential screening level for total chromium (100,000 mg/kg) and below background levels for naturally occurring chromium in southern California, which is typically on the order of 37 to 49 mg/kg (Shacklette and Boerngen, 1984, and Hunter, Davie and Roach, 2005).

This assessment revealed the following recognized environmental conditions:

- The concentration of Dieldrin in one soil sample exceeded California Office of Environmental Health Hazard Assessment Soil-Screening Levels for a residential scenario.

- The concentration of DDE in one soil sample was found to be at the California Office of Environmental Health Hazard Assessment Soil-Screening Levels for a residential scenario.

- Stained soil both inside and outside the barn and under the AST that smelled of motor oil. The tank may contain a chemical substance.

To address the recognized environmental concerns noted above, we recommend the following:

- Collection and chemical testing of additional soil samples in the vicinity of Samples HS-4 and HS-6. We recommend that the soils samples be analyzed for organochlorine pesticides (Dieldrin and DDE) concentrations in order to further evaluate the potential impact of these substances on residential development of the site.

- Because the staining of oils in and around the barn appears to be surficial, we recommend that the stained soils be removed from the site by a qualified environmental contractor and hauled to a hazardous waste disposal site. Cleanup should be performed under the oversight of the Local Enforcement Agency. Chemical testing should be performed to verify cleanup. The Local Enforcement Agency could require additional investigation of the site.

- The existing above ground storage tank (AST) should be removed and disposed of by a qualified environmental contractor. If there is any product in the tank, it should be evaluated and properly disposed of as a hazardous waste.

Although outside of the scope in this assessment, we recommend that asbestos and lead based paint surveys of the abandoned house and barn be performed by a qualified inspector/consultant. Remediation, if required, should be in accordance with the recommendations of the inspector/consultant

2.00 INTRODUCTION

2.01 Purpose

The purpose of this assessment was to identify, to the extent feasible pursuant to the general processes prescribed in ASTM Standard E 1527-05, recognized environmental conditions in connection with the subject site using reasonably ascertainable and relevant information. During preparation of the final draft of this report, the updated E1527-13 standard was released. Because of the timing of this release, the report follows the general format recommended in the -05 standard, but has also incorporates pertinent sections from the -13 standard. Recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not recognized environmental concerns. Reasonably ascertainable information as information that is publicly available with reasonable time and cost constraints and yields relevant information without the need for extraordinary analysis of irrelevant data.

2.02 Scope of Work

The scope of our work performed during this assessment consisted of the following tasks:

- An interview with a representative of the property owner to obtain information about property history and environmental actions (if any).
- Review of available literature to acquire background information on the geologic, soil and groundwater conditions at the site and in the surrounding area.
- Review of historical aerial photographs and topographic maps of the subject site and surrounding area to observe past conditions.
- A visual site reconnaissance to observe present site conditions.
- Review of available governmental records and interviews with personnel of governmental agencies regarding environmental conditions at the site and in the surrounding area.
- Collect soil samples at various locations on site to test for chemical testing.
- Preparation of this report presenting the results of this assessment.

2.03 Significant Assumptions

This report was prepared using reasonably ascertainable information from public agencies and information provided by the client, persons familiar with the site and other sources. Information and databases used during the preparation of this report are considered to be reliable. However, many records are regularly changing, can be incomplete, and may not reflect the current case status. Consequently, this assessment may have failed to detect potential recognized environmental conditions or other environmental liabilities. Conclusions presented in this report are based on the information gathered during the study and do not guarantee the quality of the information collected.

2.04 Limitations and Exceptions

No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions. This study is intended to be an appropriate inquiry to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the property. The report was prepared in substantial conformance with the scope and practice set forth by the ASTM Standard E 1527 with a level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in southern California. The report presents our professional opinions and is not a warranty or positive assertion as to the possible presence, absence, or extent of recognized environmental conditions. No guarantees are made, either express or implied.

No samples of air, water, or building materials were collected. The investigation of potential radon, asbestos, threatened rare or endangered species/habitats, electromagnetic frequencies, geotechnical conditions, or other issues not customarily associated with the completion of a Phase I environmental assessment was also beyond the scope of this study.

2.05 Special Terms and Conditions

The report documents a specific scope of work that RMA Group developed in consultation with Diversified Pacific, based on their unique needs. In addition, the report is subject to specific contractual and technical limitations to which the Diversified Pacific has agreed. Not all of these limitations may be set forth in this report.

2.06 User Reliance

This report has been prepared for the sole use and benefit of the Diversified Pacific for land evaluation purposes. Its contents are considered to be privileged and confidential. No person or entity other than Diversified Pacific may rely on this report without first obtaining express written permission from Diversified Pacific and RMA Group.

3.00 SITE DESCRIPTION

3.01 Location and Legal Description

The site consists of 12.4 acre parcel located approximately 2.5 miles east of the 210 Freeway in the City of Highland, San Bernardino County, California (Figure 1). The site is identified as APN 1210-371-03. It is also identified by a street address of 29744 Santa Ana Canyon Road. The property is bordered by Water Street to the north, North Fork Road to the east, citrus orchards and a single family residence to the south, and Alpin Street and vacant land and to the west. The approximate geographic center of the site is 34.1160º latitude and -117.1553º longitude.

3.02 Site and Vicinity Characteristics

The site consists of vacant land, an abandoned single-family residence and a dilapidated barn. A chain link fence surrounds the house. The property was accessed by dirt driveway extending to the north off of Santa Ana Canyon Road. There was also a gate in the fence on the north side of the site off Water Street.

The topography of the property consists of an essentially planar surface that slopes to the south at an overall gradient of about 7% and a fairly steep bluff along the south property line. Elevations range from approximately 1,570 to 1,500 feet above sea level.

Remnants of an old citrus orchard such as wide furrows with tree stumps characterize most of the property. Dirt roads and pathways that ran between the citrus trees were still present. Other remnants of the citrus orchard consisted of abandoned concrete irrigation lines, rock lined channels, and a basin and cistern in the northeast corner of the site. The tops of boulders were noted at the ground surface throughout the site and were particularly prevalent on the eastern side of the site.

Rusted farm equipment was observed at the southern end of the site. At the time of our site visit, two small trailers were parked in the barn. The floor of the interior of the barn was soil except for one concrete slab upon which sat one of the trailers. An above ground storage tank (AST) was found behind the barn.

Much of the site had been cleared of vegetation at the time of our study. Vegetation on the site consisted of scattered fan palms in the old orchard and trees and overgrown shrubs around the house and along the bluff paralleling the southern property line.

Land uses in the vicinity of the site consisted single-family residential properties, an elementary school, citrus orchards and vacant land.

3.03 Current Uses of Property

There is no apparent current land usage.

3.04 Description of Structures, Roads and Improvements

Structures on the property consist of an abandoned residence and a dilapidated barn. There were no public roads on the site. Dirt roads and pathways that ran between the citrus trees were still present. Remnants of the citrus orchard still on the site consisted of abandoned concrete irrigation lines, rock lined channels, and a basin and cistern in the northeast corner of the site.

3.05 Current Uses of Adjoining Properties

Properties immediately adjacent to the site consist of the following:

- To the north – Water Street and an elementary school on the opposite side of the street.
- To the east– Residential properties.
- To the south– Citrus groves and a single –family residence.
- To the west – Vacant land and residential properties.

4.00 USER PROVIDED INFORMATION

The following user information was provided by Mr. Brian Bush of Diversified Pacific.

4.01 Environmental Liens

The user is not aware of any environmental liens or use limitations that are filed or recorded under federal, tribal, state or local law.

4.02 Activity and Use Limitations

The user is not aware of any activity or use limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law.

4.03 Specialized Knowledge

The user has no specialized knowledge related to chemicals or processes used at the types of businesses at the site or nearby properties.

4.04 Valuation Reduction for Environmental Issues

The user indicated that there is no value reduction for environmental reasons.

4.05 Commonly Known and Reasonably Ascertainable Information

The user does not know of any prior land uses. The user has no knowledge or information about specific chemicals that are or were present at the site, chemical spills or environmental cleanups at the property.

4.06 Obvious Indicators of Contamination

The user is not aware of any obvious indicators of the presence or likely presence of contamination at the property.

4.07 Other Information

The user also provided owner contact information.

5.00 RECORDS REVIEW

5.01 Standard Environmental Record Sources

A search of governmental records pertaining to hazardous materials and wastes was made by EDR, an environmental records search firm. The search encompassed federal, state, regional and local records. Environmental concerns were searched within a radius of ¼- to 1-mile of the site, or limited to the target property, depending upon the record searched. The search radii meet or exceed the ASTM standard. The record search did not identify any environmental issues at the site.

No sites were identified within the search radii. The orphan sites identified by EDR appear to be sufficiently distant so as not to be a concern with respect to the subject site.

The results of the EDR record search are presented in Appendix B.

5.02 Additional Environmental Record Sources

San Bernardino County Hazardous Materials Permits

San Bernardino County database was searched by EDR for underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers. No listings were found for the site or adjoining properties (Appendix B).

Sanborn Fire Insurance Maps

A search of Sanborn Fire Insurance maps was made by EDR. No such maps were found for the site (see Appendix B).

Telephone Directories

A search of telephone directories by EDR for the site and adjoining properties identifies individual persons (Appendix B). One business was listed at a residential property to the east on Water Street. The business is listed as HRI Filter Services and according to Yellowpages.com is a business that repairs and services restaurant equipment. Since the listed address is a residence, the identified location may be a telephone and mailing address only, rather than a business location. This business was not identified in any of the governmental databases searched by EDR.

Environmental Liens

Research by EDR did not identify any environmental liens or other activity and use limitations (Appendix B).

Vapor Encroachment

A search of available records was performed by EDR for assessment of vapor encroachment on to the site. No records were found for the site.

Building Permits

No building permits were found for the site (Appendix B). The absence for building records for the house and barn on the property is not unexpected, since historic data indicates that these structures were built in the early 1900s.

5.03 Physical Setting

Geologic Setting

The site is located within a structural mass of the earth's crust known as the Bunker Hill - San Timoteo Basin. This basin formed as a rift zone between the active San Andreas Fault on the northeast and the active San Jacinto fault on the southwest. The southern boundary of the basin is less well defined, but is generally believed to coincide with the Banning fault zone. The basin itself is infilled with Quaternary age younger and older alluvial deposits. There are also topographic highs within the basin which expose Mesozoic age and older granitic and metamorphic rocks.

In the vicinity of the site with Bunker Hill – San Timoteo alluvial deposits are underlain by crystalline San Gabriel Mountains-type basement rocks composed of granitic-type rocks and schist. North of the San Andreas fault the basement bedrock consists of San Bernardino Mountains-type crystalline rocks composed of granitoid and metasedimentary rocks.

According to regional geologic mapping performed by U.S. Geological Survey (Matti and others, 2003), the northwest portion of the site is underlain by young (middle Holocene) alluvial-fan deposits and the remainder of the site is underlain by older (late to middle Pleistocene age) alluvial-fan deposits. Our geotechnical investigation of the site revealed that the entire property is underlain by older alluvial deposits and thin artificial fills. Borings and trenches excavated during the geotechnical investigation did not encounter any visual indications of soil contamination.

The dominant neotectonic structure in the vicinity of the site is the San Bernardino Strand of the San Andreas Fault, which is located at the base of the San Bernardino Mountains approximately 1,600 feet northeast of the site at its nearest point. This fault in included within an Alquist-Priolo Earthquake Fault Zone for fault rupture hazards.

The U.S. Geological Survey (Matti and others, 2003) mapped a concealed (buried) trace of the San Andreas fault (the Mission Creek Strand) approximately 100 feet northeast of the site at its nearest point. U.S. Geological Survey (Morton, Matti and Cox, 1992) reports that Mission Creek fault along the southwestern base of the San Bernardino Mountains has been inferred to explain the juxtaposition of the San Gabriel Mountains-type basement rocks against the Wilson Creek block and rocks of San Bernardino Mountains-type. The report also indicates that the Mission Creek fault is an older abandoned strand of the San Andreas fault. In the vicinity of the site, the Mission Creek Strand is concealed by Holocene and Pleistocene alluvial-fan deposits and is not included within the boundaries of an Alquist-Priolo Earthquake Fault Zone.

Detailed evaluation geologic conditions including faulting, seismicity and groundwater are beyond the scope of this report.

Groundwater Conditions

According to the U. S. Geological Survey (Matti and Carson, 1991), the minimum depth to groundwater 1973 to 1983 was less than 30 feet. A seismic line run during our geotechnical investigation of the site indicated that the depth to groundwater was in excess of 75 feet. According to Federal databases searched by EDR depth to groundwater in a well located at the south side of Greenspot Road measured at 180 feet in 1998. Groundwater was not encountered in any of the trenches or borings excavated during our geotechnical investigation of the site. The maximum depth of exploration was 15.5 feet. Although we did not find data for groundwater gradients in the area, we presume based on topography and site proximity to the Santa Ana River that the groundwater flows south to southwest toward the river.

5.04 Historical Use Information on the Property

Historic topographic maps and aerial photographs provided by EDR and reviewed on Google Earth show that the site was an orchard as far back as 1930. A conversation with the owner's representative revealed that former orchard, residence and barn date back to the early 1990's. The house, barn and cistern are visible in the 1930's photograph. A cleared swath of the site appears behind the residence in the 1953 along with the appearance of a small structure, possibly a shed. Land use remained unchanged until sometime after 2011 when the orchards were demolished. No other past uses were identified at the site.

The topographic maps and aerial photographs researched by EDR are present in Appendix B. Historic information provided by the owner is summarized in Section 7.01.

5.05 Historical Use Information on Adjoining Properties

Aerial photographs and topographic maps show the adjoining properties were used as orchards from as early as 1930 through at least 1977. There was also a single-family residence in the orchard to the south of the site during this time frame. The house still exists. By 1989 land near the southwest corner of the site had been cleared and by 1995 a subdivision of single-family homes had been constructed on that property. A portion of the orchard to the west of the site had also been removed by 1995. By 2005 orchards to the north and east of the site had been removed and replaced by a school and single-family homes. The remaining portion of the orchard to the west was removed by 2005. There have been no substantial changes in adjoining properties since 2005.

6.00 SITE RECONNAISSANCE

6.01 Methodology and Limiting Conditions

A site reconnaissance was conducted by RMA geologist Martha Sgriccia on August 5, 2013. The site was easily accessed by foot from the driveway off of Santa Ana Canyon Road. The interior of the abandoned residence was not accessible during our reconnaissance.

6.02 General Site Setting

The site is located an area of Highland contains orchards, residential properties, a school and vacant land.

6.03 Exterior Observations

Photographs documenting our observations are included in Appendix A, and the location of each photograph is shown on Figure 2. Exterior observations are summarized below.

CHECKLIST OF STANDARD EXTERIOR OBSERVATIONS

Item	Observed or Suspected	Not Observed or Suspected
Hazardous substances & Petroleum products	X	
Above Ground Storage tanks	X	
Underground Storage Tanks		X
Odors	X	
Standing water or pools of liquids	X	
Drums, hazardous substance or petroleum containers		X
Unidentified substance containers		X
Electrical or hydraulic equipment known or likely to contain PCBs		X
Pits, ponds or lagoons		X
Stained soil or pavement	X	
Stresses vegetation (other than from insufficient water)		X
Solid waste, mounds or depressions suggesting trash or soil waste disposal		X
Waste water or storm water discharge into a drain, ditch, stream or adjacent property		X
Wells (active, inactive or abandoned)		X
Structures	X	
Roads	X	
Railroad lines and spurs		X
Potable water supply		X
Sewage disposal system	X	

Stained soil that smelled of motor oil was observed to cover most of the dirt floor in the west side of the barn. Oily smelling, stained soil was also observed behind the barn. Stained soil may also be present in the east side of the barn. Darkened, stained soil was observed underneath the AST that is located behind the barn (Photographs 1 through 5). An oily residue was observed around the tank outlet pipe and the words "flammable" were painted on the tank. An air compressor was observed in the barn along with a pop-up camping trailer and another small trailer. Debris such as lumber, bricks, wooden fencing, corrugated metal sheeting, rusty tools, and windows were observed behind the barn in the area of the AST.

Rusted remnants of farm equipment were observed at the south of the residence (Photograph 6). Stagnant water and trash consisting of lumber and metal was observed in the cistern located at the northeast corner of the site (Photographs 7 and 8).

There were no public roads on the site. However, dirt roads and pathways that ran between the citrus trees were still present.

The son-in-law of the most recent owner of the property reported that there is a buried septic system located east of the onsite residence.

Because of the age of the residence onsite, there may be asbestos containing building materials and lead based paint in the structure. Asbestos and lead based paint surveys are beyond the scope of this study.

6.04 Interior Observations

Observations of the interior of the barn are discussed above. Interior of the residence was not accessible.

7.00 INTERVIEWS

7.01 Interview with Owner

Mr. Tim McComber, son-in-law of the most recent owner of the property, was interviewed by telephone on October 30, 2013. He indicated that the site has been an orchard since the early 1900's and that the orchard was operated by his wife's grandfather. He also indicated that he operated the orchard for about 10 years before it was removed about 3 years ago. Between the time Mr. McComber and his wife's grandfather ran the orchard, a non-family member farmed the orchard.

Mr. McComber indicated that there were no underground tanks on the site except for a septic system for the house on the property. He indicated that the septic system is located east of the house. During the time Mr. McComber operated the orchard, he did not used roundup for weed control but did not use any pesticides. He reported that tractors were stored in the barn and that the tank at the rear of the barn was once used to store surfactant, a dish soap-like substance that is used to aid adhesion of herbicides to weeds. He also indicated that the tank has been empty for 15 to 16 years. Mr. McComber reported that smudge pots were not stored on the site and smudge pots had not been used on the site for more than 25 to 30 years. Prior to that time, smudge pots were used only sparingly. Smudge pots and smudge pots oil were not stored on the site. Fuel for tractors was not stored onsite. He indicated there have been no chemical releases on the site and there are no prior environmental reports. A geotechnical investigation of the site was performed approximately 8 years ago when development of the site was being considered.

7.02 Interviews with Others

We spoke with a neighbor from the adjacent property to the east who told us that his family had owned that property for more than 100 years and that it had been used as an orchard for as far back as he can remember.

8.00 CHEMICAL TESTING

8.01 Field Methods

The seven soil samples were collected at depths ranging from 6 to 12 inches below the ground surface. Sampling equipment consisted of a hand tools that were decontaminated in a non-phosphorous soap solution and double rinsed in de-ionized water. These samples were placed in clean samples containers and transported in a pre-chilled ice chest to BC Laboratories, a California State Certified hazardous waste testing laboratory in Bakersfield, California. Proper chain of custody protocols were followed for all samples. The following laboratory tests were performed on four soil samples (HS-1, HS-4, HS-5 and HS-6):

- EPA Test Method 8080 - Organochlorine Pesticides
- EPA Test Method 8141 - Organophosphorus Pesticides
- EPA Test Method 8151 - Chlorinated Herbicides
- EPA Test Method 6010B – Heavy Metals

The tests were performed to provide preliminary information regarding potential chemical contaminants at the site. The tests were not performed as part of a full Phase II environmental site assessment.

8.02 Analytical Findings

The chemicals detected in the soil samples and corresponding California Human Health Screening Levels (CHHSLs) of soils for residential land use are presented in the table below. Detailed laboratory test reports and Chain of Custody forms are presented in Appendix B.

SUMMARY OF CHEMICAL TEST RESULTS

Substance	Sample Location/Concentration (mg/kg)				Screening Level* (mg/kg)
	HS-1	HS-4	HS-5	HS-6	
DDD	ND	0.12	0.028	0.045	2.3
DDE	0.071	0.89	1.1	**1.6**	1.6
DDT	0.010	0.99	0.38	0.82	1.6
Dieldrin	ND	**0.23**	0.029	0.022	0.035
Endrin	0.002	0.053	ND	0.23	210
Arsenic	**2.7**	**2.8**	**2.1**	**2.8**	0.07
Barium	64	130	100	110	5,200
Beryllium	0.43	0.69	0.52	0.62	16
Cadmium	0.17	0.20	0.20	ND	1.7
Chromium	12	35	22	31	100,000
Cobalt	4.5	9.1	6.6	8.7	660
Copper	43	41	31	35	3,000
Lead	12	18	18	17	80
Molybdenum	0.35	0.64	0.48	0.70	380
Nickel	6.9	20	13	16	1,600
Selenium	3.6	3.0	3.3	3.3	380
Vanadium	26	48	37	48	530
Zinc	88	210	130	110	23,000

* California Office of Environmental Health Hazard Assessment Soil-Screening Numbers, Residential scenario, 9-23-10.
** Denotes screening number for lead compounds
ND = Not Detected
-- = Not test for this substance

8.03 Discussion

Concentrations of organochlorine and organophosphorous pesticides and chlorinated herbicides in the tested soil samples fell below California Office of Environmental Health Hazard Assessment Soil-Screening levels for residential scenarios except for the following:

- Sample HS-4 detected a concentration of Dieldrin that exceeded the resident soil screening level.
- Sample HS-6 detected a concentration of DDE at the residential screening level.

All metals were found to be below residential soil screening levels established by California Office of Environmental Health Assessment, with the exception of arsenic. However, arsenic levels (2.1 to 2.8 mg/kg) were found to be below

background levels of naturally occurring arsenic in southern California, which is typically on the order of approximately 12 mg/kg (Cheroff, Bosan and Oudiz, undated). Chromium (12 to 35 mg/kg) was also found to be below residential screening level for total chromium (100,000 mg/kg) and below background levels for naturally occurring chromium in southern California, which is typically on the order of 37 to 49 mg/kg (Shacklette and Boerngen, 1984, and Hunter, Davie and Roach, 2005).

9.00 FINDINGS, OPINIONS AND CONCLUSIONS

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527 of APN 1210-371-03, Highland, California. Any exceptions to, or deletions from, this practice are described in Section 10.00 of this report. The assessment has revealed the following recognized environmental conditions (RECs) in connection with the property:

- The concentration of Dieldrin in Sample HS-4 exceeded California Office of Environmental Health Hazard Assessment Soil-Screening Levels for a residential scenario.

- The concentration of DDE in Sample HS-6 was at the California Office of Environmental Health Hazard Assessment Soil-Screening Levels for a residential scenario.

- Stained soil both inside and outside the barn and under the AST that smelled of motor oil. Although he son-in-law of the most recent property owner reported that the tank was used to store surfactant, an oily residue around the tank nozzle along with the words "flammable" painted on the tank suggest that the tank may have been used to store petroleum products at some time. It is not known if that any product remaining in the tank.

To address the recognized environmental concerns noted above, we recommend the following:

- Collection and chemical testing of additional soil samples in the vicinity of Samples HS-4 and HS-6. We recommend that the soils samples be analyzed for organochlorine pesticides (Dieldrin and DDE) concentrations in order to further evaluate the potential impact of these substances on residential development of the site.

- Because the staining of oils in and around the barn appears to be surficial, we recommend that the stained soils be removed from the site by a qualified environmental contractor and hauled to a hazardous waste disposal site. Cleanup should be performed under the oversight of the Local Enforcement Agency. Chemical testing should be performed to verify cleanup. The Local Enforcement Agency could require additional investigation of the site.

- The existing above ground storage tank (AST) should be removed and disposed of by a qualified environmental contractor. If there is any product in the tank, it should be evaluated and properly disposed of as a hazardous waste if such substances are present.

Although outside of the scope in this assessment, we recommend that asbestos and lead based paint surveys of the abandoned house and barn be performed by a qualified inspector/consultant. Remediation, if required, should be in accordance with the recommendations of the inspector/consultant

10.00 DEVIATIONS

This study has been performed in general conformance with the scope and limitations of ASTM Practice E 1527. No significant deviations or deletions were made from this practice.

11.00 ADDITIONAL SERVICES

RMA Group is recently completed a geotechnical investigation at the site.

12.00 SIGNATURE AND QUALIFICATIONS

The following statements are provided as specified by ASTM E 1527 and 40 CFE 312.21(d):

> "I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental professional as defined by §312.10 of 40 CFR 312 and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquires in conformance with the standards and practices set forth in 40 CFR Part 312."

We appreciate this opportunity to be of service to you. If you have any questions regarding this report, please do not hesitate to contact us at your convenience.

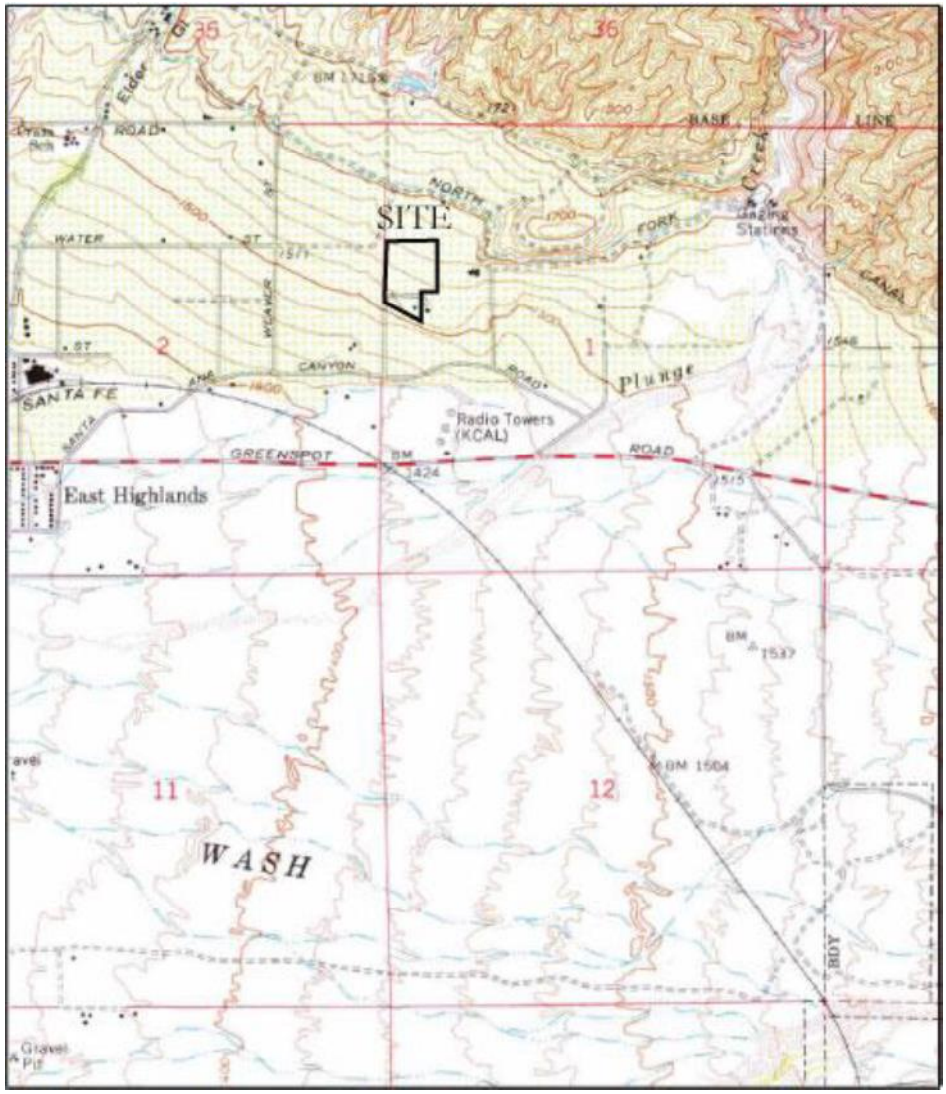
Respectfully submitted,

RMA Group

Gary Wallace
Vice President
CEG 1255

PROFESSIONAL GEOLOGIST
GARY W. WALLACE
No. 1255
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

FIGURES



SITE LOCATION MAP
Scale: 1" = 2,000'

Base Map: U.S. Geological Survey Redlands Quadrangle, 1973

HS-1 Soil Sample Location and Number

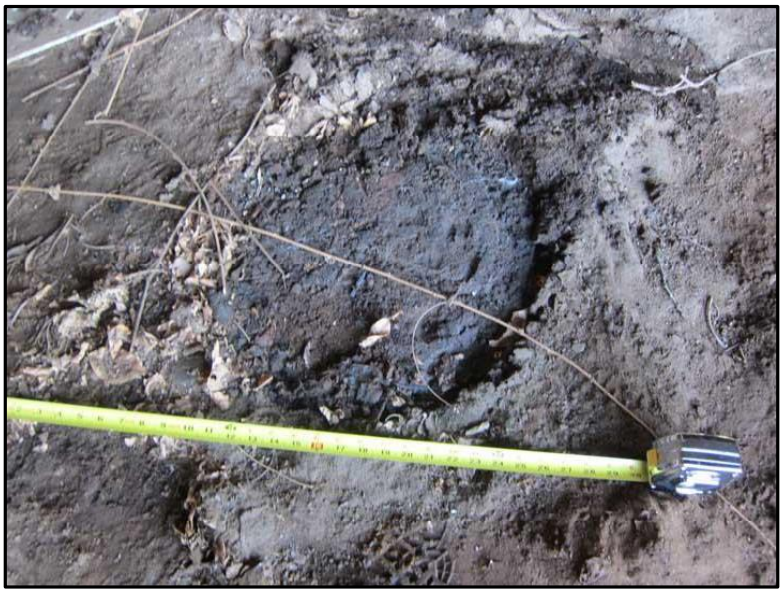
7 Photograph Location and Number

SITE RECONNAISSANCE MAP

Base Map: Google Earth, 2013

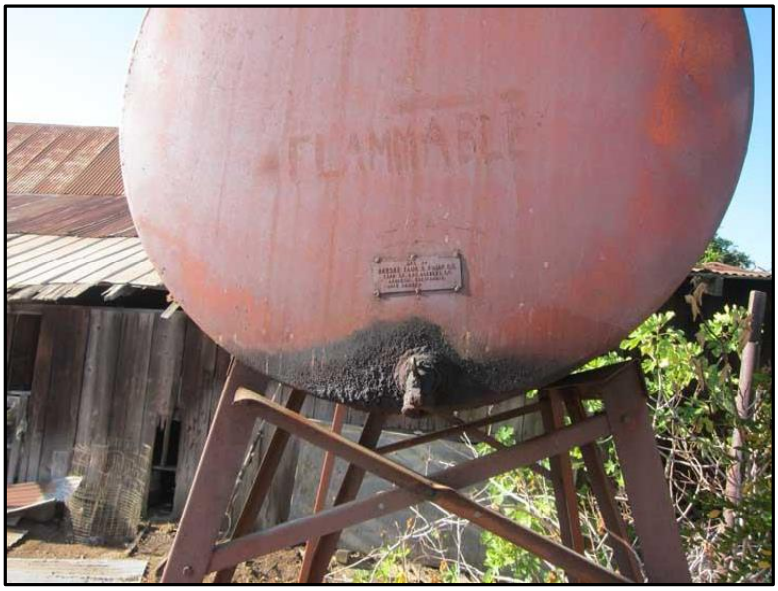
APPENDIX A

PHOTOGRAPHS



Photograph 1: Stained soil in dirt floor of barn

Photograph 2: Wide angle view of stained soil in dirt floor of barn



Photograph 3: AST at the back of barn with oil residue

Photograph 4: Oil stains on ground underneath AST

Photograph 5: Stained soil behind barn

Photograph 6: Rusted farm equipment at the south end of site

Photograph 7: Trash in dry cistern at the northeast corner of site

Photograph 8: Stagnant water in cistern located at the northeast corner of the site

APPENDIX B

EDR ENVIRONMENTAL RECORD SEARCH

APN 1210-371-03-0000
SEC of Water and Alpin Streets
Highland, CA 92346

Inquiry Number: 3682466.2s
July 31, 2013

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	ES1
Overview Map	2
Detail Map	3
Map Findings Summary	4
Map Findings	8
Orphan Summary	9
Government Records Searched/Data Currency Tracking	GR-1

GEOCHECK ADDENDUM

Physical Setting Source Addendum	A-1
Physical Setting Source Summary	A-2
Physical Setting SSURGO Soil Map	A-5
Physical Setting Source Map	A-12
Physical Setting Source Map Findings	A-14
Physical Setting Source Records Searched	A-26

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** *Purchaser accepts this Report "AS IS". Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.*

Copyright 2013 by Environmental Data Resources, Inc. All rights reserved. Reproduction in any media or format, in whole or in part, of any report or map of Environmental Data Resources, Inc., or its affiliates, is prohibited without prior written permission.

EDR and its logos (including Sanborn and Sanborn Map) are trademarks of Environmental Data Resources, Inc. or its affiliates. All other trademarks used herein are the property of their respective owners.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

SEC OF WATER AND ALPIN STREETS
HIGHLAND, CA 92346

COORDINATES

Latitude (North):	34.1160000 - 34˚ 6' 57.60''
Longitude (West):	117.1553000 - 117˚ 9' 19.08''
Universal Tranverse Mercator:	*Zone 11*
UTM X (Meters):	*485677.6*
UTM Y (Meters):	*3774834.0*
Elevation:	*1543 ft. above sea level*

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	*34117-A2 REDLANDS, CA*
Most Recent Revision:	*1988*
North Map:	*34117-B2 HARRISON MOUNTAIN, CA*
Most Recent Revision:	*1988*

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	*2012*
Source:	*USDA*

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL_____ National Priority List

EXECUTIVE SUMMARY

Proposed NPL_____ Proposed National Priority List Sites
NPL LIENS_____ Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL_____ National Priority List Deletions

Federal CERCLIS list

CERCLIS_____ Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY_____ Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP_____ CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS_____ Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF_____ RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG_____ RCRA - Large Quantity Generators
RCRA-SQG_____ RCRA - Small Quantity Generators
RCRA-CESQG_____ RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS_____ Engineering Controls Sites List
US INST CONTROL_____ Sites with Institutional Controls
LUCIS_____ Land Use Control Information System

Federal ERNS list

ERNS_____ Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE_____ State Response Sites

State- and tribal - equivalent CERCLIS

ENVIROSTOR_____ EnviroStor Database

State and tribal landfill and/or solid waste disposal site lists

SWF/LF_____ Solid Waste Information System

State and tribal leaking storage tank lists

LUST_____ Geotracker's Leaking Underground Fuel Tank Report

EXECUTIVE SUMMARY

SLIC _____ *Statewide SLIC Cases*
INDIAN LUST _____ *Leaking Underground Storage Tanks on Indian Land*

State and tribal registered storage tank lists

UST _____ *Active UST Facilities*
AST _____ *Aboveground Petroleum Storage Tank Facilities*
INDIAN UST _____ *Underground Storage Tanks on Indian Land*
FEMA UST _____ *Underground Storage Tank Listing*

State and tribal voluntary cleanup sites

VCP _____ *Voluntary Cleanup Program Properties*
INDIAN VCP _____ *Voluntary Cleanup Priority Listing*

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS _____ *A Listing of Brownfields Sites*

Local Lists of Landfill / Solid Waste Disposal Sites

ODI _____ *Open Dump Inventory*
DEBRIS REGION 9 _____ *Torres Martinez Reservation Illegal Dump Site Locations*
WMUDS/SWAT _____ *Waste Management Unit Database*
SWRCY _____ *Recycler Database*
HAULERS _____ *Registered Waste Tire Haulers Listing*
INDIAN ODI _____ *Report on the Status of Open Dumps on Indian Lands*

Local Lists of Hazardous waste / Contaminated Sites

US CDL _____ *Clandestine Drug Labs*
HIST Cal-Sites _____ *Historical Calsites Database*
SCH _____ *School Property Evaluation Program*
Toxic Pits _____ *Toxic Pits Cleanup Act Sites*
CDL _____ *Clandestine Drug Labs*
US HIST CDL _____ *National Clandestine Laboratory Register*

Local Lists of Registered Storage Tanks

CA FID UST _____ *Facility Inventory Database*
HIST UST _____ *Hazardous Substance Storage Container Database*
SWEEPS UST _____ *SWEEPS UST Listing*

Local Land Records

LIENS 2 _____ *CERCLA Lien Information*
LIENS _____ *Environmental Liens Listing*
DEED _____ *Deed Restriction Listing*

Records of Emergency Release Reports

HMIRS _____ *Hazardous Materials Information Reporting System*

EXECUTIVE SUMMARY

CHMIRS	*California Hazardous Material Incident Report System*
LDS	*Land Disposal Sites Listing*
MCS	*Military Cleanup Sites Listing*
SPILLS 90	*SPILLS 90 data from FirstSearch*

Other Ascertainable Records

RCRA NonGen / NLR	*RCRA - Non Generators*
DOT OPS	*Incident and Accident Data*
DOD	*Department of Defense Sites*
FUDS	*Formerly Used Defense Sites*
CONSENT	*Superfund (CERCLA) Consent Decrees*
ROD	*Records Of Decision*
UMTRA	*Uranium Mill Tailings Sites*
US MINES	*Mines Master Index File*
TRIS	*Toxic Chemical Release Inventory System*
TSCA	*Toxic Substances Control Act*
FTTS	*FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)*
HIST FTTS	*FIFRA/TSCA Tracking System Administrative Case Listing*
SSTS	*Section 7 Tracking Systems*
ICIS	*Integrated Compliance Information System*
PADS	*PCB Activity Database System*
MLTS	*Material Licensing Tracking System*
RADINFO	*Radiation Information Database*
FINDS	*Facility Index System/Facility Registry System*
RAATS	*RCRA Administrative Action Tracking System*
RMP	*Risk Management Plans*
CA BOND EXP. PLAN	*Bond Expenditure Plan*
UIC	*UIC Listing*
NPDES	*NPDES Permits Listing*
Cortese	*"Cortese" Hazardous Waste & Substances Sites List*
HIST CORTESE	*Hazardous Waste & Substance Site List*
CUPA Listings	*CUPA Resources List*
Notify 65	*Proposition 65 Records*
DRYCLEANERS	*Cleaner Facilities*
WIP	*Well Investigation Program Case List*
ENF	*Enforcement Action Listing*
San Bern. Co. Permit	*Hazardous Material Permits*
HAZNET	*Facility and Manifest Data*
EMI	*Emissions Inventory Data*
INDIAN RESERV	*Indian Reservations*
SCRD DRYCLEANERS	*State Coalition for Remediation of Drycleaners Listing*
MWMP	*Medical Waste Management Program Listing*
COAL ASH DOE	*Steam-Electric Plant Operation Data*
COAL ASH EPA	*Coal Combustion Residues Surface Impoundments List*
HWT	*Registered Hazardous Waste Transporter Database*
HWP	*EnviroStor Permitted Facilities Listing*
Financial Assurance	*Financial Assurance Information Listing*
LEAD SMELTERS	*Lead Smelter Sites*
2020 COR ACTION	*2020 Corrective Action Program List*
US AIRS	*Aerometric Information Retrieval System Facility Subsystem*
PRP	*Potentially Responsible Parties*
WDS	*Waste Discharge System*
EPA WATCH LIST	*EPA WATCH LIST*

EXECUTIVE SUMMARY

US FIN ASSUR_____ Financial Assurance Information
PCB TRANSFORMER_____ PCB Transformer Registration Database
PROC_____ Certified Processors Database

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP_____ EDR Proprietary Manufactured Gas Plants
EDR US Hist Auto Stat_____ EDR Exclusive Historic Gas Stations
EDR US Hist Cleaners_____ EDR Exclusive Historic Dry Cleaners

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

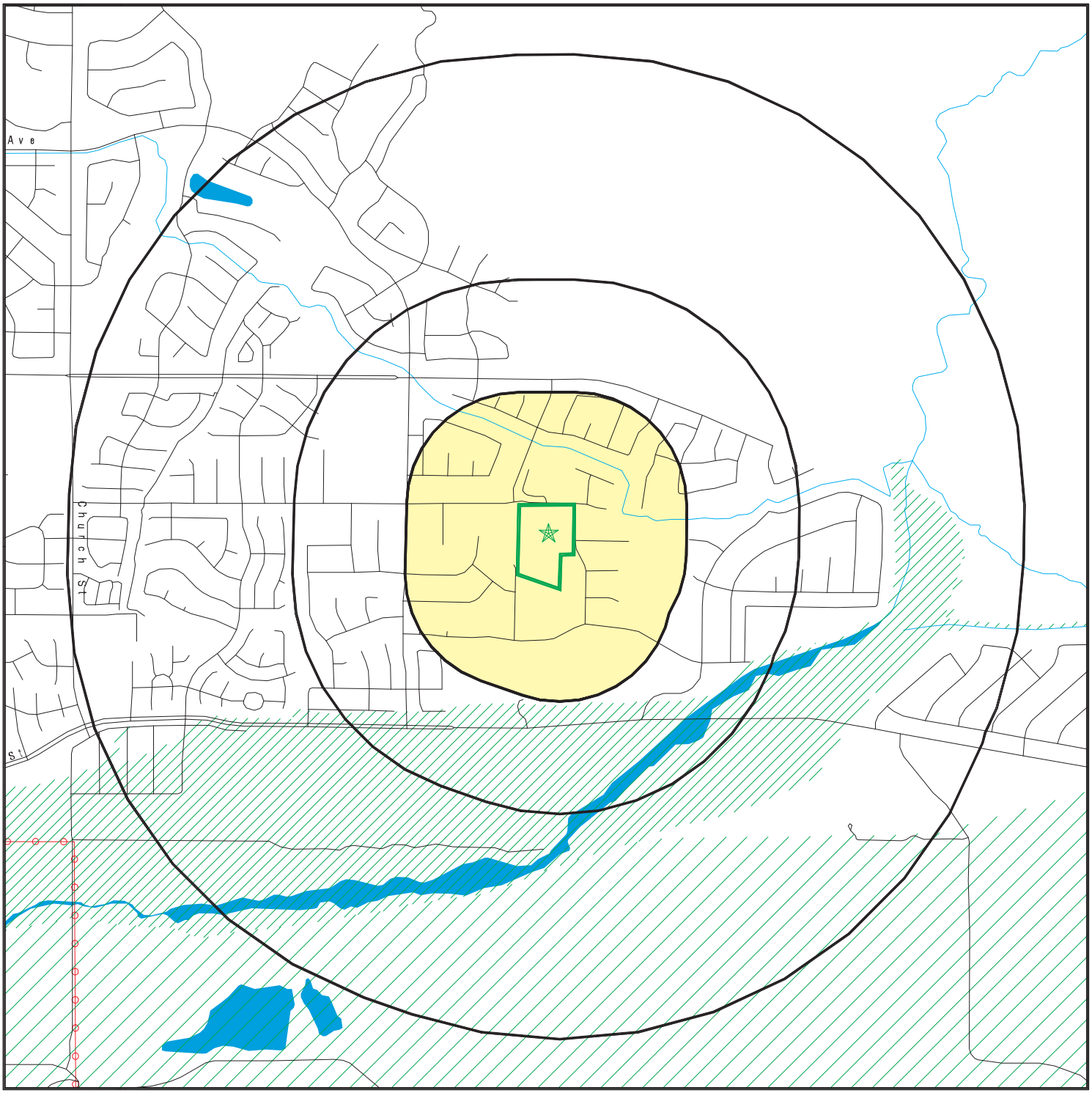
Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 7 records.

Site Name	*Database(s)*
FORT IRWIN LUCKY FUSE DISPOSAL	*WMUDS/SWAT, HIST CORTESE, CHMIRS*
CIMA ROAD MINE WASTE SITE	*CERCLIS*
SCE-SAR #3 POWERHOUSE/OFFICE/SHOPS	*AST, San Bern. Co. Permit*
PLUNGE CREEK LANDFILL LEVEES	*WMUDS/SWAT*
SCE EAST END HYDRO SAR3	*RCRA-LQG*
APACHE CANYON MINING CO	*US MINES*
SPECIALTY MINERALS, INC.	*US MINES*

OVERVIEW MAP - 3682466.2s



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Power transmission lines

Oil & Gas pipelines from USGS

100-year flood zone

500-year flood zone

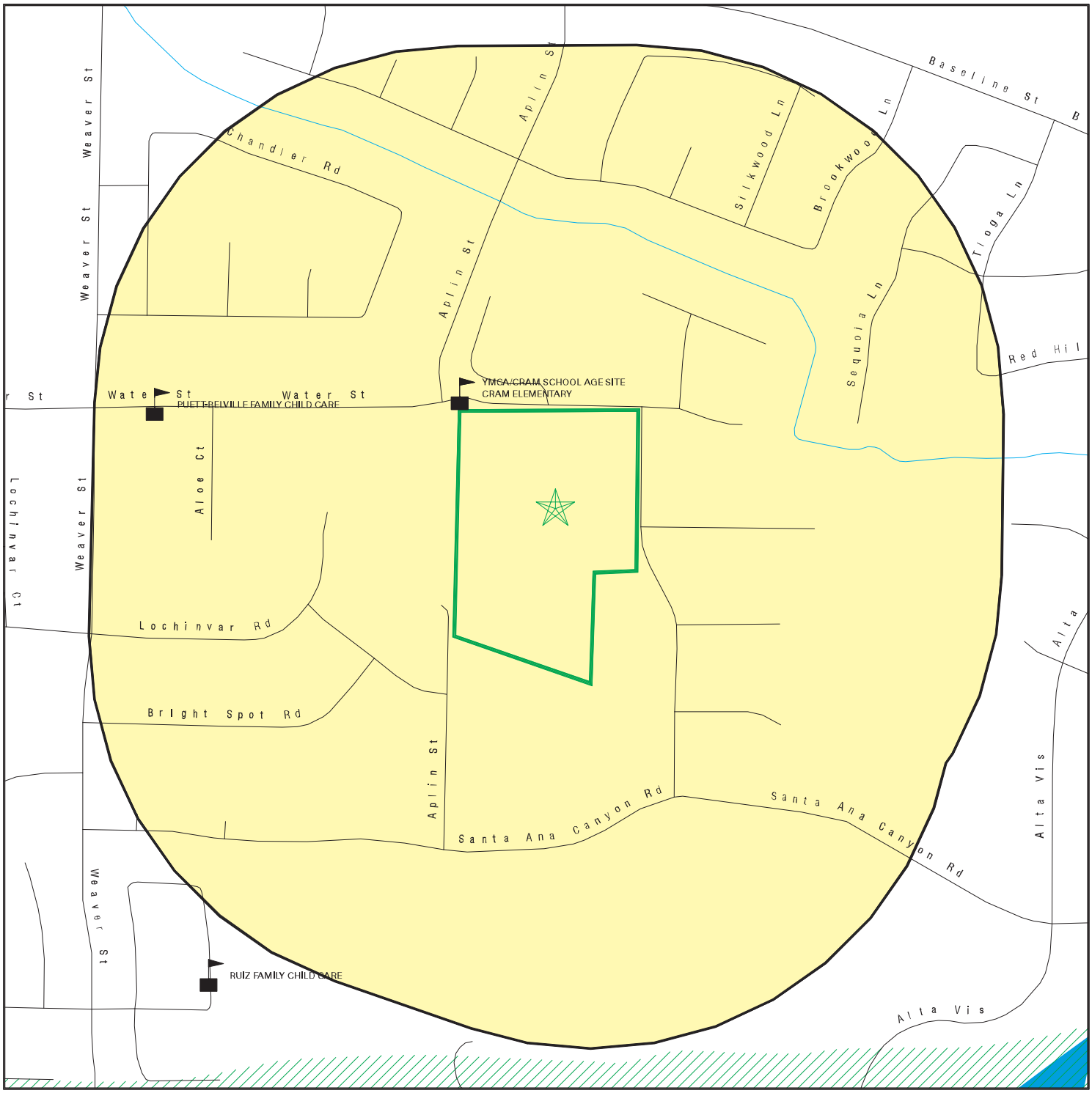
Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: APN 1210-371-03-0000 ADDRESS: SEC of Water and Alpin Streets Highland CA 92346 LAT/LONG: 34.116 / 117.1553	CLIENT: RMA Group CONTACT: Gary Wallace INQUIRY #: 3682466.2s DATE: July 31, 2013 7:48 pm

Copyright © 2013 EDR, Inc. © 2010 Tele Atlas Rel. 07/2009.

DETAIL MAP - 3682466.2s



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/16 1/8 1/4 Miles

Indian Reservations BIA

Oil & Gas pipelines from USGS

100-year flood zone

500-year flood zone

Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: APN 1210-371-03-0000	CLIENT: RMA Group
ADDRESS: SEC of Water and Alpin Streets Highland CA 92346	CONTACT: Gary Wallace INQUIRY #: 3682466.2s
LAT/LONG: 34.116 / 117.1553	DATE: July 31, 2013 7:50 pm

Copyright © 2013 EDR, Inc. © 2010 Tele Atlas Rel. 07/2009.

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SLIC	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
CA FID UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
SWEEPS UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
LIENS	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
Cortese	0.500		0	0	0	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
San Bern. Co. Permit	0.250		0	0	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
HWT	0.250		0	0	NR	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Map ID Direction Distance Elevation	Site	Database(s)	EDR ID Number EPA ID Number

NO SITES FOUND

Count: 7 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HIGHLAND	1012176350	SCE EAST END HYDRO SAR3	7865 SANTA ANA CANYON RD	92346	RCRA-LQG
HIGHLAND	S108205655	SCE-SAR #3 POWERHOUSE/OFFICE/SHOPS	7865 SANTA ANA CANYON RD	92346	AST, San Bern. Co. Permit
HIGHLAND-EAST HIGHLA	S103702339	PLUNGE CREEK LANDFILL LEVEES	NORTH SIDE OF SANTA ANA RIVER	92346	WMUDS/SWAT
SAN BERNARDINO COUNT	M300002118	APACHE CANYON MINING CO	APACHE CANYON AND NEW HIMALAYA		US MINES
SAN BERNARDINO COUNT	S103442535	FORT IRWIN LUCKY FUSE DISPOSAL	FORT IRWIN		WMUDS/SWAT, HIST CORTESE, CHI
SAN BERNARDINO COUNT	M300006408	SPECIALTY MINERALS, INC.	MARBLE CANYON		US MINES
SAN BERNARDINO COUNT	1015730665	CIMA ROAD MINE WASTE SITE	1 MIL W OF INTE. 15 OFF CIMA R		CERCLIS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: *Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.*

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 04/26/2013
Date Data Arrived at EDR: 05/09/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites
A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 04/26/2013
Date Data Arrived at EDR: 05/09/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 07/22/2013
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens
Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/26/2013	*Source: EPA*
Date Data Arrived at EDR: 05/09/2013	*Telephone: N/A*
Date Made Active in Reports: 07/10/2013	*Last EDR Contact: 05/09/2013*
Number of Days to Update: 62	*Next Scheduled EDR Contact: 07/22/2013*
	Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/04/2013	*Source: EPA*
Date Data Arrived at EDR: 03/01/2013	*Telephone: 703-412-9810*
Date Made Active in Reports: 03/13/2013	*Last EDR Contact: 05/29/2013*
Number of Days to Update: 12	*Next Scheduled EDR Contact: 09/09/2013*
	Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 07/31/2012	*Source: Environmental Protection Agency*
Date Data Arrived at EDR: 10/09/2012	*Telephone: 703-603-8704*
Date Made Active in Reports: 12/20/2012	*Last EDR Contact: 07/08/2013*
Number of Days to Update: 72	*Next Scheduled EDR Contact: 10/21/2013*
	Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/05/2013	*Source: EPA*
Date Data Arrived at EDR: 03/01/2013	*Telephone: 703-412-9810*
Date Made Active in Reports: 03/13/2013	*Last EDR Contact: 05/29/2013*
Number of Days to Update: 12	*Next Scheduled EDR Contact: 05/09/2013*
	Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 6
Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/15/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 12
Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/14/2013	*Source: Environmental Protection Agency*
Date Data Arrived at EDR: 03/29/2013	*Telephone: 703-603-0695*
Date Made Active in Reports: 05/10/2013	*Last EDR Contact: 06/10/2013*
Number of Days to Update: 42	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/14/2013	*Source: Environmental Protection Agency*
Date Data Arrived at EDR: 03/29/2013	*Telephone: 703-603-0695*
Date Made Active in Reports: 05/10/2013	*Last EDR Contact: 06/10/2013*
Number of Days to Update: 42	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005	*Source: Department of the Navy*
Date Data Arrived at EDR: 12/11/2006	*Telephone: 843-820-7326*
Date Made Active in Reports: 01/11/2007	*Last EDR Contact: 05/20/2013*
Number of Days to Update: 31	*Next Scheduled EDR Contact: 09/02/2013*
	Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2012	*Source: National Response Center, United States Coast Guard*
Date Data Arrived at EDR: 01/17/2013	*Telephone: 202-267-2180*
Date Made Active in Reports: 02/15/2013	*Last EDR Contact: 07/01/2013*
Number of Days to Update: 29	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Annually

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 05/06/2013	*Source: Department of Toxic Substances Control*
Date Data Arrived at EDR: 05/07/2013	*Telephone: 916-323-3400*
Date Made Active in Reports: 06/25/2013	*Last EDR Contact: 05/07/2013*
Number of Days to Update: 49	*Next Scheduled EDR Contact: 08/19/2013*
	Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 05/06/2013	*Source: Department of Toxic Substances Control*
Date Data Arrived at EDR: 05/07/2013	*Telephone: 916-323-3400*
Date Made Active in Reports: 06/25/2013	*Last EDR Contact: 05/07/2013*
Number of Days to Update: 49	*Next Scheduled EDR Contact: 08/19/2013*
	Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/20/2013	*Source: Department of Resources Recycling and Recovery*
Date Data Arrived at EDR: 05/21/2013	*Telephone: 916-341-6320*
Date Made Active in Reports: 06/25/2013	*Last EDR Contact: 05/21/2013*
Number of Days to Update: 35	*Next Scheduled EDR Contact: 09/02/2013*
	Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 8: Leaking Underground Storage Tanks

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005	*Source: California Regional Water Quality Control Board Santa Ana Region (8)*
Date Data Arrived at EDR: 02/15/2005	*Telephone: 909-782-4496*
Date Made Active in Reports: 03/28/2005	*Last EDR Contact: 08/15/2011*
Number of Days to Update: 41	*Next Scheduled EDR Contact: 11/28/2011*
	Data Release Frequency: Varies

LUST REG 7: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004	*Source: California Regional Water Quality Control Board Colorado River Basin Region (7)*
Date Data Arrived at EDR: 02/26/2004	*Telephone: 760-776-8943*
Date Made Active in Reports: 03/24/2004	*Last EDR Contact: 08/01/2011*
Number of Days to Update: 27	*Next Scheduled EDR Contact: 11/14/2011*
	Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005	*Source: California Regional Water Quality Control Board Victorville Branch Office (6)*
Date Data Arrived at EDR: 06/07/2005	*Telephone: 760-241-7365*
Date Made Active in Reports: 06/29/2005	*Last EDR Contact: 09/12/2011*
Number of Days to Update: 22	*Next Scheduled EDR Contact: 12/26/2011*
	Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 3: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List
Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST: Geotracker's Leaking Underground Fuel Tank Report

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 06/17/2013	*Source: State Water Resources Control Board*
Date Data Arrived at EDR: 06/17/2013	*Telephone: see region list*
Date Made Active in Reports: 06/27/2013	*Last EDR Contact: 07/26/2013*
Number of Days to Update: 10	*Next Scheduled EDR Contact: 09/30/2013*
	Data Release Frequency: Quarterly

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001	*Source: California Regional Water Quality Control Board San Diego Region (9)*
Date Data Arrived at EDR: 04/23/2001	*Telephone: 858-637-5595*
Date Made Active in Reports: 05/21/2001	*Last EDR Contact: 09/26/2011*
Number of Days to Update: 28	*Next Scheduled EDR Contact: 01/09/2012*
	Data Release Frequency: No Update Planned

SLIC: Statewide SLIC Cases

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 06/17/2013	*Source: State Water Resources Control Board*
Date Data Arrived at EDR: 06/17/2013	*Telephone: 866-480-1028*
Date Made Active in Reports: 06/27/2013	*Last EDR Contact: 07/26/2013*
Number of Days to Update: 10	*Next Scheduled EDR Contact: 09/30/2013*
	Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003	*Source: California Regional Water Quality Control Board, North Coast Region (1)*
Date Data Arrived at EDR: 04/07/2003	*Telephone: 707-576-2220*
Date Made Active in Reports: 04/25/2003	*Last EDR Contact: 08/01/2011*
Number of Days to Update: 18	*Next Scheduled EDR Contact: 11/14/2011*
	Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004	*Source: Regional Water Quality Control Board San Francisco Bay Region (2)*
Date Data Arrived at EDR: 10/20/2004	*Telephone: 510-286-0457*
Date Made Active in Reports: 11/19/2004	*Last EDR Contact: 09/19/2011*
Number of Days to Update: 30	*Next Scheduled EDR Contact: 01/02/2012*
	Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006	*Source: California Regional Water Quality Control Board Central Coast Region (3)*
Date Data Arrived at EDR: 05/18/2006	*Telephone: 805-549-3147*
Date Made Active in Reports: 06/15/2006	*Last EDR Contact: 07/18/2011*
Number of Days to Update: 28	*Next Scheduled EDR Contact: 10/31/2011*
	Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47
Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16
Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22
Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/01/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 162
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 05/01/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 11/11/2011
Number of Days to Update: 59
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Semi-Annually

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/01/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 42
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 06/17/2013
Date Data Arrived at EDR: 06/17/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 10
Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
Registered Aboveground Storage Tanks.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 21
Source: State Water Resources Control Board
Telephone: 916-327-5092
Last EDR Contact: 07/03/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 02/06/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 65
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 02/21/2013
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 45
Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/27/2012
Date Data Arrived at EDR: 08/28/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 49
Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/28/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 43

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 08/02/2012
Date Data Arrived at EDR: 08/03/2012
Date Made Active in Reports: 11/05/2012
Number of Days to Update: 94

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 02/06/2013
Date Data Arrived at EDR: 02/08/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 63

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 11/07/2012
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 156

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 04/29/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/19/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 05/06/2013
Date Data Arrived at EDR: 05/07/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 49
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/07/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/28/2012
Date Data Arrived at EDR: 10/02/2012
Date Made Active in Reports: 10/16/2012
Number of Days to Update: 14
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/02/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/10/2012
Date Data Arrived at EDR: 12/11/2012
Date Made Active in Reports: 12/20/2012
Number of Days to Update: 9
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: No Update Planned

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30
Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 03/18/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 8
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/17/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 04/26/2013
Date Data Arrived at EDR: 04/26/2013
Date Made Active in Reports: 05/16/2013
Number of Days to Update: 20
Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 09/02/2013
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 07/31/2013
Next Scheduled EDR Contact: 11/18/2013
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 03/04/2013
Date Data Arrived at EDR: 03/12/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 59
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: Quarterly

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21
Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 05/06/2013
Date Data Arrived at EDR: 05/07/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 49
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/07/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Quarterly

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27
Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/14/2013
Number of Days to Update: 41
Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 07/31/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Lists of Registered Storage Tanks

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994	Source: California Environmental Protection Agency
Date Data Arrived at EDR: 09/05/1995	Telephone: 916-341-5851
Date Made Active in Reports: 09/29/1995	Last EDR Contact: 12/28/1998
Number of Days to Update: 24	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database
A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/23/2009	Source: Department of Public Health
Date Data Arrived at EDR: 09/23/2009	Telephone: 707-463-4466
Date Made Active in Reports: 10/01/2009	Last EDR Contact: 06/03/2013
Number of Days to Update: 8	Next Scheduled EDR Contact: 09/16/2013
	Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990	Source: State Water Resources Control Board
Date Data Arrived at EDR: 01/25/1991	Telephone: 916-341-5851
Date Made Active in Reports: 02/12/1991	Last EDR Contact: 07/26/2001
Number of Days to Update: 18	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

SWEEPS UST: SWEEPS UST Listing
Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994	Source: State Water Resources Control Board
Date Data Arrived at EDR: 07/07/2005	Telephone: N/A
Date Made Active in Reports: 08/11/2005	Last EDR Contact: 06/03/2005
Number of Days to Update: 35	Next Scheduled EDR Contact: N/A
	Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/06/2013	Source: Environmental Protection Agency
Date Data Arrived at EDR: 04/25/2013	Telephone: 202-564-6023
Date Made Active in Reports: 05/10/2013	Last EDR Contact: 07/24/2013
Number of Days to Update: 15	Next Scheduled EDR Contact: 11/11/2013
	Data Release Frequency: Varies

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 03/15/2013	Source: Department of Toxic Substances Control
Date Data Arrived at EDR: 03/15/2013	Telephone: 916-323-3400
Date Made Active in Reports: 03/27/2013	Last EDR Contact: 06/10/2013
Number of Days to Update: 12	Next Scheduled EDR Contact: 09/23/2013
	Data Release Frequency: Varies

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 03/11/2013
Date Data Arrived at EDR: 03/12/2013
Date Made Active in Reports: 03/25/2013
Number of Days to Update: 13

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 06/11/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 55

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Annually

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 03/12/2013
Date Data Arrived at EDR: 05/01/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 55

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 05/01/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 06/17/2013
Date Data Arrived at EDR: 06/17/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 10

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 06/17/2013
Date Data Arrived at EDR: 06/17/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012	*Source: FirstSearch*
Date Data Arrived at EDR: 01/03/2013	*Telephone: N/A*
Date Made Active in Reports: 02/22/2013	*Last EDR Contact: 01/03/2013*
Number of Days to Update: 50	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/12/2013	*Source: Environmental Protection Agency*
Date Data Arrived at EDR: 02/15/2013	*Telephone: (415) 495-8895*
Date Made Active in Reports: 02/27/2013	*Last EDR Contact: 07/01/2013*
Number of Days to Update: 12	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012	*Source: Department of Transporation, Office of Pipeline Safety*
Date Data Arrived at EDR: 08/07/2012	*Telephone: 202-366-4595*
Date Made Active in Reports: 09/18/2012	*Last EDR Contact: 05/07/2013*
Number of Days to Update: 42	*Next Scheduled EDR Contact: 08/19/2013*
	Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005	*Source: USGS*
Date Data Arrived at EDR: 11/10/2006	*Telephone: 888-275-8747*
Date Made Active in Reports: 01/11/2007	*Last EDR Contact: 07/19/2013*
Number of Days to Update: 62	*Next Scheduled EDR Contact: 10/28/2013*
	Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2011	*Source: U.S. Army Corps of Engineers*
Date Data Arrived at EDR: 02/26/2013	*Telephone: 202-528-4285*
Date Made Active in Reports: 03/13/2013	*Last EDR Contact: 06/10/2013*
Number of Days to Update: 15	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 01/15/2013
Date Made Active in Reports: 03/13/2013
Number of Days to Update: 57
Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/18/2012
Date Data Arrived at EDR: 03/13/2013
Date Made Active in Reports: 04/12/2013
Number of Days to Update: 30
Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 06/11/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146
Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/05/2013
Date Data Arrived at EDR: 04/18/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 22
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 06/04/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 09/01/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 131
Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/29/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64
Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 11/10/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 07/01/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2012
Date Data Arrived at EDR: 01/16/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 114

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/17/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/14/2013
Date Data Arrived at EDR: 03/20/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 112

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 07/10/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 04/09/2013
Date Data Arrived at EDR: 04/11/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 29

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/12/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 03/08/2013
Date Data Arrived at EDR: 03/21/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 111

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 06/13/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35
Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 05/08/2012
Date Data Arrived at EDR: 05/25/2012
Date Made Active in Reports: 07/10/2012
Number of Days to Update: 46
Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 02/26/2013
Date Made Active in Reports: 04/19/2013
Number of Days to Update: 52
Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 05/30/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Biennially

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6
Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

Date of Government Version: 05/20/2013
Date Data Arrived at EDR: 05/21/2013
Date Made Active in Reports: 06/12/2013
Number of Days to Update: 22
Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/21/2013
Next Scheduled EDR Contact: 09/02/2013
Data Release Frequency: Quarterly

UIC: UIC Listing

A listing of underground control injection wells.

Date of Government Version: 03/05/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 8
Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/21/2013
Next Scheduled EDR Contact: 12/31/2012
Data Release Frequency: Varies

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 04/01/2013
Date Data Arrived at EDR: 04/02/2013
Date Made Active in Reports: 05/14/2013
Number of Days to Update: 42
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 07/05/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List
The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 10/21/1993
Date Data Arrived at EDR: 11/01/1993
Date Made Active in Reports: 11/19/1993
Number of Days to Update: 18
Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/18/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: No Update Planned

DRYCLEANERS: Cleaner Facilities
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 12/11/2012
Date Data Arrived at EDR: 12/12/2012
Date Made Active in Reports: 01/04/2013
Number of Days to Update: 23
Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 06/18/2013
Next Scheduled EDR Contact: 12/24/2012
Data Release Frequency: Annually

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13
Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

ENF: Enforcement Action Listing
A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 04/26/2013
Date Data Arrived at EDR: 04/29/2013
Date Made Active in Reports: 05/16/2013
Number of Days to Update: 17
Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 06/22/2012
Date Made Active in Reports: 07/06/2012
Number of Days to Update: 14

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 07/16/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 10/18/2010
Number of Days to Update: 19

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/19/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 07/18/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/04/2013
Date Data Arrived at EDR: 03/15/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 56

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 05/20/2013
Next Scheduled EDR Contact: 09/02/2013
Data Release Frequency: Quarterly

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/03/2013
Next Scheduled EDR Contact: 08/12/2013
Data Release Frequency: Varies

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 03/18/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 8
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/17/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 05/02/2013
Date Data Arrived at EDR: 06/13/2013
Date Made Active in Reports: 07/24/2013
Number of Days to Update: 41
Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 06/10/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 07/19/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 06/14/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Varies

HWT: Registered Hazardous Waste Transporter Database
A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/15/2013
Date Data Arrived at EDR: 04/16/2013
Date Made Active in Reports: 05/17/2013
Number of Days to Update: 31
Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 07/16/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Quarterly

HWP: EnviroStor Permitted Facilities Listing
Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 05/28/2013
Date Data Arrived at EDR: 05/29/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 29
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/29/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Quarterly

Financial Assurance 2: Financial Assurance Information Listing
A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/21/2013
Date Data Arrived at EDR: 05/22/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 36
Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/20/2013
Next Scheduled EDR Contact: 09/02/2013
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
Financial Assurance information

Date of Government Version: 03/01/2007
Date Data Arrived at EDR: 06/01/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 28
Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 08/26/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites
A listing of former lead smelter site locations.

Date of Government Version: 01/29/2013
Date Data Arrived at EDR: 02/14/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 13
Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 07/03/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites
A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36
Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

2020 COR ACTION: 2020 Corrective Action Program List
The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Date Data Arrived at EDR: 05/18/2012
Date Made Active in Reports: 05/25/2012
Number of Days to Update: 7
Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/17/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/19/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: N/A

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 12/18/2012
Date Data Arrived at EDR: 04/04/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 97
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 07/03/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Quarterly

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9
Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Quarterly

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 01/23/2013
Date Data Arrived at EDR: 01/30/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 100
Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 01/23/2013
Date Data Arrived at EDR: 01/30/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 100
Source: EPA
Telephone: 202-564-5962
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Annually

EPA WATCH LIST: EPA WATCH LIST
EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 02/18/2013
Date Made Active in Reports: 05/10/2013
Number of Days to Update: 81
Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Quarterly

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A	*Source: EDR, Inc.*
Date Data Arrived at EDR: N/A	*Telephone: N/A*
Date Made Active in Reports: N/A	*Last EDR Contact: N/A*
Number of Days to Update: N/A	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: No Update Planned

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	*Source: EDR, Inc.*
Date Data Arrived at EDR: N/A	*Telephone: N/A*
Date Made Active in Reports: N/A	*Last EDR Contact: N/A*
Number of Days to Update: N/A	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A	*Source: EDR, Inc.*
Date Data Arrived at EDR: N/A	*Telephone: N/A*
Date Made Active in Reports: N/A	*Last EDR Contact: N/A*
Number of Days to Update: N/A	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: Varies

EDR US Hist Cleaners: EDR Proprietary Historic Dry Cleaners - Cole

Date of Government Version: N/A	*Source: N/A*
Date Data Arrived at EDR: N/A	*Telephone: N/A*
Date Made Active in Reports: N/A	*Last EDR Contact: N/A*
Number of Days to Update: N/A	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: Varies

EDR US Hist Auto Stat: EDR Proprietary Historic Gas Stations - Cole

Date of Government Version: N/A	*Source: N/A*
Date Data Arrived at EDR: N/A	*Telephone: N/A*
Date Made Active in Reports: N/A	*Last EDR Contact: N/A*
Number of Days to Update: N/A	*Next Scheduled EDR Contact: N/A*
	Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 04/15/2013	*Source: Alameda County Environmental Health Services*
Date Data Arrived at EDR: 04/16/2013	*Telephone: 510-567-6700*
Date Made Active in Reports: 05/16/2013	*Last EDR Contact: 06/28/2013*
Number of Days to Update: 30	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 04/15/2013	*Source: Alameda County Environmental Health Services*
Date Data Arrived at EDR: 04/16/2013	*Telephone: 510-567-6700*
Date Made Active in Reports: 05/16/2013	*Last EDR Contact: 06/28/2013*
Number of Days to Update: 30	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA Facility List

Cupa Facility List

Date of Government Version: 03/13/2013	*Source: Amador County Environmental Health*
Date Data Arrived at EDR: 03/14/2013	*Telephone: 209-223-6439*
Date Made Active in Reports: 04/04/2013	*Last EDR Contact: 06/18/2013*
Number of Days to Update: 21	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing

Cupa facility list.

Date of Government Version: 10/16/2012	*Source: Public Health Department*
Date Data Arrived at EDR: 10/17/2012	*Telephone: 530-538-7149*
Date Made Active in Reports: 11/13/2012	*Last EDR Contact: 07/26/2013*
Number of Days to Update: 27	*Next Scheduled EDR Contact: 10/28/2013*
	Data Release Frequency: Varies

CALVERAS COUNTY:

CUPA Facility Listing

Cupa Facility Listing

Date of Government Version: 04/16/2013	*Source: Calveras County Environmental Health*
Date Data Arrived at EDR: 04/17/2013	*Telephone: 209-754-6399*
Date Made Active in Reports: 05/16/2013	*Last EDR Contact: 06/25/2013*
Number of Days to Update: 29	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 01/04/2013
Date Data Arrived at EDR: 01/14/2013
Date Made Active in Reports: 03/01/2013
Number of Days to Update: 46

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 06/13/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Varies

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 06/10/2013
Date Data Arrived at EDR: 06/11/2013
Date Made Active in Reports: 07/24/2013
Number of Days to Update: 43

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 05/06/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 01/09/2013
Date Data Arrived at EDR: 01/10/2013
Date Made Active in Reports: 02/25/2013
Number of Days to Update: 46

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 07/31/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 05/20/2013
Date Data Arrived at EDR: 05/21/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 35

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 05/06/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 06/30/2013
Date Data Arrived at EDR: 07/16/2013
Date Made Active in Reports: 07/24/2013
Number of Days to Update: 8

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 07/15/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Semi-Annually

HUMBOLDT COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 03/15/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 8

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

IMPERIAL COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 04/30/2013
Date Data Arrived at EDR: 07/05/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 10

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 06/26/2012
Date Data Arrived at EDR: 06/27/2012
Date Made Active in Reports: 08/17/2012
Number of Days to Update: 51

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 09/30/2010
Number of Days to Update: 29

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county?s Certified Unified Program Agency database. California?s Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 02/12/2013
Date Data Arrived at EDR: 02/13/2013
Date Made Active in Reports: 03/21/2013
Number of Days to Update: 36

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 06/10/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 01/23/2013
Date Data Arrived at EDR: 01/25/2013
Date Made Active in Reports: 02/27/2013
Number of Days to Update: 33

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 07/18/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 07/08/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 10/31/2012
Date Data Arrived at EDR: 12/28/2012
Date Made Active in Reports: 01/25/2013
Number of Days to Update: 28

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 07/15/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/24/2013
Date Data Arrived at EDR: 04/24/2013
Date Made Active in Reports: 05/17/2013
Number of Days to Update: 23

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 07/22/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 03/05/2009
Date Data Arrived at EDR: 03/10/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 29

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 07/17/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 01/30/2013
Date Data Arrived at EDR: 02/21/2013
Date Made Active in Reports: 03/25/2013
Number of Days to Update: 32

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 07/17/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 04/29/2013
Date Made Active in Reports: 05/17/2013
Number of Days to Update: 18
Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 07/18/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/28/2003
Date Data Arrived at EDR: 10/23/2003
Date Made Active in Reports: 11/26/2003
Number of Days to Update: 34
Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 07/26/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 04/15/2013
Date Data Arrived at EDR: 04/16/2013
Date Made Active in Reports: 05/17/2013
Number of Days to Update: 31
Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 07/15/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List
A listing of sites included in the county?s Certified Unified Program Agency database. California?s Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 04/15/2013
Date Data Arrived at EDR: 04/16/2013
Date Made Active in Reports: 05/17/2013
Number of Days to Update: 31
Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 11/26/2012
Date Data Arrived at EDR: 11/28/2012
Date Made Active in Reports: 01/21/2013
Number of Days to Update: 54
Source: Public Works Department Waste Management
Telephone: 415-499-6647
Last EDR Contact: 07/18/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 05/28/2013
Date Data Arrived at EDR: 05/29/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 27
Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 02/25/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List
CUPA Facility List

Date of Government Version: 06/04/2013
Date Data Arrived at EDR: 06/05/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 40

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 03/14/2013
Date Data Arrived at EDR: 03/15/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 12

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 12/05/2011
Date Data Arrived at EDR: 12/06/2011
Date Made Active in Reports: 02/07/2012
Number of Days to Update: 63

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 05/29/2013
Date Data Arrived at EDR: 05/30/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 46

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 07/31/2013
Next Scheduled EDR Contact: 11/18/2013
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2013
Date Data Arrived at EDR: 05/15/2013
Date Made Active in Reports: 06/12/2013
Number of Days to Update: 28
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 05/01/2013
Date Data Arrived at EDR: 05/15/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 41
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 05/01/2013
Date Data Arrived at EDR: 05/15/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 41
Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/10/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 03/12/2013
Date Data Arrived at EDR: 03/13/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 14
Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 06/10/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Semi-Annually

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 07/18/2013
Date Data Arrived at EDR: 07/18/2013
Date Made Active in Reports: 07/24/2013
Number of Days to Update: 6
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 04/23/2013
Date Data Arrived at EDR: 04/24/2013
Date Made Active in Reports: 05/16/2013
Number of Days to Update: 22
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/18/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List

List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 05/03/2013
Date Data Arrived at EDR: 07/08/2013
Date Made Active in Reports: 07/24/2013
Number of Days to Update: 16

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/05/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List

Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/04/2013
Date Data Arrived at EDR: 04/12/2013
Date Made Active in Reports: 05/16/2013
Number of Days to Update: 34

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 07/05/2013
Next Scheduled EDR Contact: 10/21/2013
Data Release Frequency: Quarterly

SAN BERNARDINO COUNTY:

Hazardous Material Permits

This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 05/30/2013
Date Data Arrived at EDR: 05/31/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 45

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 05/13/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 08/17/2012
Date Data Arrived at EDR: 08/20/2012
Date Made Active in Reports: 10/03/2012
Number of Days to Update: 44

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 07/15/2013
Next Scheduled EDR Contact: 09/23/2013
Data Release Frequency: Quarterly

Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 10/31/2012
Date Data Arrived at EDR: 11/06/2012
Date Made Active in Reports: 11/30/2012
Number of Days to Update: 24

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 07/24/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Varies

Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010	*Source: San Diego County Department of Environmental Health*
Date Data Arrived at EDR: 06/15/2010	*Telephone: 619-338-2371*
Date Made Active in Reports: 07/09/2010	*Last EDR Contact: 06/10/2013*
Number of Days to Update: 24	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008	*Source: Department Of Public Health San Francisco County*
Date Data Arrived at EDR: 09/19/2008	*Telephone: 415-252-3920*
Date Made Active in Reports: 09/29/2008	*Last EDR Contact: 05/10/2013*
Number of Days to Update: 10	*Next Scheduled EDR Contact: 08/26/2013*
	Data Release Frequency: Quarterly

Underground Storage Tank Information

Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/29/2010	*Source: Department of Public Health*
Date Data Arrived at EDR: 03/10/2011	*Telephone: 415-252-3920*
Date Made Active in Reports: 03/15/2011	*Last EDR Contact: 05/10/2013*
Number of Days to Update: 5	*Next Scheduled EDR Contact: 08/26/2013*
	Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST

A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 03/25/2013	*Source: Environmental Health Department*
Date Data Arrived at EDR: 03/25/2013	*Telephone: N/A*
Date Made Active in Reports: 04/18/2013	*Last EDR Contact: 06/18/2013*
Number of Days to Update: 24	*Next Scheduled EDR Contact: 10/07/2013*
	Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List

Cupa Facility List.

Date of Government Version: 06/04/2013	*Source: San Luis Obispo County Public Health Department*
Date Data Arrived at EDR: 06/05/2013	*Telephone: 805-781-5596*
Date Made Active in Reports: 07/15/2013	*Last EDR Contact: 05/28/2013*
Number of Days to Update: 40	*Next Scheduled EDR Contact: 09/09/2013*
	Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory

List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 04/09/2013
Date Data Arrived at EDR: 04/10/2013
Date Made Active in Reports: 05/14/2013
Number of Days to Update: 34
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/13/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/18/2013
Date Data Arrived at EDR: 03/19/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 8
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/17/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28
Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 07/17/2013
Next Scheduled EDR Contact: 06/10/2013
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 06/03/2013
Date Data Arrived at EDR: 06/04/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 41
Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22
Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 06/03/2013
Date Data Arrived at EDR: 06/06/2013
Date Made Active in Reports: 07/15/2013
Number of Days to Update: 39
Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 06/03/2013
Next Scheduled EDR Contact: 09/16/2013
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 05/16/2013
Date Data Arrived at EDR: 05/17/2013
Date Made Active in Reports: 06/25/2013
Number of Days to Update: 39

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 05/13/2013
Next Scheduled EDR Contact: 08/26/2013
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 05/28/2013
Date Data Arrived at EDR: 05/29/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 29

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 03/15/2013
Date Data Arrived at EDR: 03/15/2013
Date Made Active in Reports: 03/27/2013
Number of Days to Update: 12

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 03/20/2013
Date Data Arrived at EDR: 03/28/2013
Date Made Active in Reports: 05/14/2013
Number of Days to Update: 47

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/12/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 03/20/2013
Date Data Arrived at EDR: 03/28/2013
Date Made Active in Reports: 05/13/2013
Number of Days to Update: 46

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 06/12/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

SONOMA COUNTY:

Cupa Facility List
Cupa Facility list

Date of Government Version: 04/01/2013
Date Data Arrived at EDR: 04/03/2013
Date Made Active in Reports: 05/14/2013
Number of Days to Update: 41

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 06/25/2013
Next Scheduled EDR Contact: 10/14/2013
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/02/2013	*Source: Department of Health Services*
Date Data Arrived at EDR: 04/03/2013	*Telephone: 707-565-6565*
Date Made Active in Reports: 05/14/2013	*Last EDR Contact: 06/25/2013*
Number of Days to Update: 41	*Next Scheduled EDR Contact: 10/14/2013*
	Data Release Frequency: Quarterly

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 03/13/2013	*Source: Sutter County Department of Agriculture*
Date Data Arrived at EDR: 03/14/2013	*Telephone: 530-822-7500*
Date Made Active in Reports: 03/27/2013	*Last EDR Contact: 06/10/2013*
Number of Days to Update: 13	*Next Scheduled EDR Contact: 09/23/2013*
	Data Release Frequency: Semi-Annually

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 01/14/2013	*Source: Divison of Environmental Health*
Date Data Arrived at EDR: 01/16/2013	*Telephone: 209-533-5633*
Date Made Active in Reports: 02/27/2013	*Last EDR Contact: 07/26/2013*
Number of Days to Update: 42	*Next Scheduled EDR Contact: 11/11/2013*
	Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 04/26/2013	*Source: Ventura County Environmental Health Division*
Date Data Arrived at EDR: 05/22/2013	*Telephone: 805-654-2813*
Date Made Active in Reports: 06/25/2013	*Last EDR Contact: 05/20/2013*
Number of Days to Update: 34	*Next Scheduled EDR Contact: 09/02/2013*
	Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011	*Source: Environmental Health Division*
Date Data Arrived at EDR: 12/01/2011	*Telephone: 805-654-2813*
Date Made Active in Reports: 01/19/2012	*Last EDR Contact: 07/03/2013*
Number of Days to Update: 49	*Next Scheduled EDR Contact: 10/21/2013*
	Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008	*Source: Environmental Health Division*
Date Data Arrived at EDR: 06/24/2008	*Telephone: 805-654-2813*
Date Made Active in Reports: 07/31/2008	*Last EDR Contact: 02/18/2013*
Number of Days to Update: 37	*Next Scheduled EDR Contact: 06/03/2013*
	Data Release Frequency: Quarterly

Medical Waste Program List

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 01/28/2013
Date Data Arrived at EDR: 02/01/2013
Date Made Active in Reports: 03/20/2013
Number of Days to Update: 47

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 07/30/2013
Next Scheduled EDR Contact: 11/11/2013
Data Release Frequency: Quarterly

Underground Tank Closed Sites List

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 03/01/2013
Date Data Arrived at EDR: 03/28/2013
Date Made Active in Reports: 05/13/2013
Number of Days to Update: 46

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/12/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report

Underground storage tank sites located in Yolo county.

Date of Government Version: 03/25/2013
Date Data Arrived at EDR: 03/29/2013
Date Made Active in Reports: 05/13/2013
Number of Days to Update: 45

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/07/2013
Next Scheduled EDR Contact: 10/07/2013
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List

CUPA facility listing for Yuba County.

Date of Government Version: 05/24/2013
Date Data Arrived at EDR: 05/24/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 34

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 07/31/2013
Next Scheduled EDR Contact: 11/18/2013
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 05/20/2013
Date Data Arrived at EDR: 05/21/2013
Date Made Active in Reports: 06/27/2013
Number of Days to Update: 37

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/21/2013
Next Scheduled EDR Contact: 09/02/2013
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 08/28/2012
Number of Days to Update: 40
Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 07/19/2013
Next Scheduled EDR Contact: 10/28/2013
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 05/01/2013
Date Data Arrived at EDR: 05/09/2013
Date Made Active in Reports: 07/10/2013
Number of Days to Update: 62
Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 05/09/2013
Next Scheduled EDR Contact: 08/19/2013
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/23/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 57
Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/18/2013
Next Scheduled EDR Contact: 11/04/2013
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 06/22/2012
Date Made Active in Reports: 07/31/2012
Number of Days to Update: 39
Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/28/2013
Next Scheduled EDR Contact: 09/09/2013
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2011
Date Data Arrived at EDR: 07/19/2012
Date Made Active in Reports: 09/27/2012
Number of Days to Update: 70
Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 07/17/2013
Next Scheduled EDR Contact: 09/30/2013
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

STREET AND ADDRESS INFORMATION

© 2010 Tele Atlas North America, Inc. All rights reserved. This material is proprietary and the subject of copyright protection and other intellectual property rights owned by or licensed to Tele Atlas North America, Inc. The use of this material is subject to the terms of a license agreement. You will be held liable for any unauthorized copying or disclosure of this material.

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

APN 1210-371-03-0000
SEC OF WATER AND ALPIN STREETS
HIGHLAND, CA 92346

TARGET PROPERTY COORDINATES

Latitude (North):	34.116 - 34˚ 6' 57.60''
Longitude (West):	117.1553 - 117˚ 9' 19.08''
Universal Tranverse Mercator:	*Zone 11*
UTM X (Meters):	*485677.6*
UTM Y (Meters):	*3774834.0*
Elevation:	*1543 ft. above sea level*

USGS TOPOGRAPHIC MAP

Target Property Map:	*34117-A2 REDLANDS, CA*
Most Recent Revision:	*1988*
North Map:	*34117-B2 HARRISON MOUNTAIN, CA*
Most Recent Revision:	*1988*

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. *Groundwater flow direction, and*
2. *Groundwater flow velocity.*

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

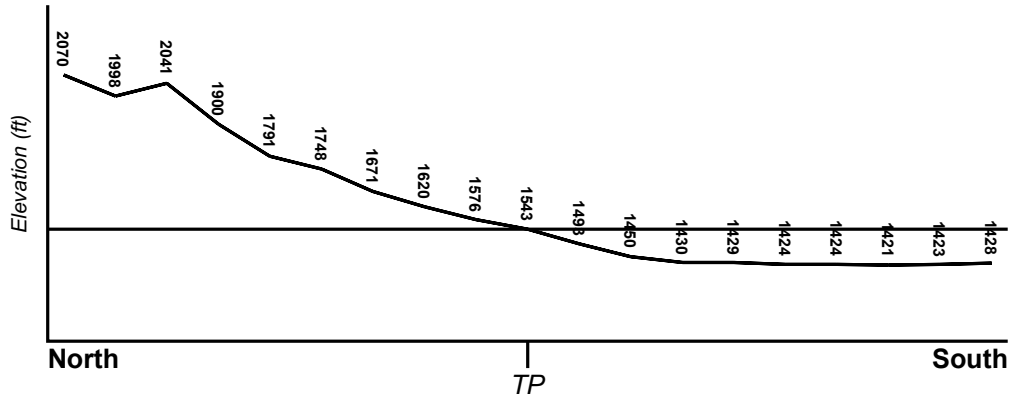
TOPOGRAPHIC INFORMATION

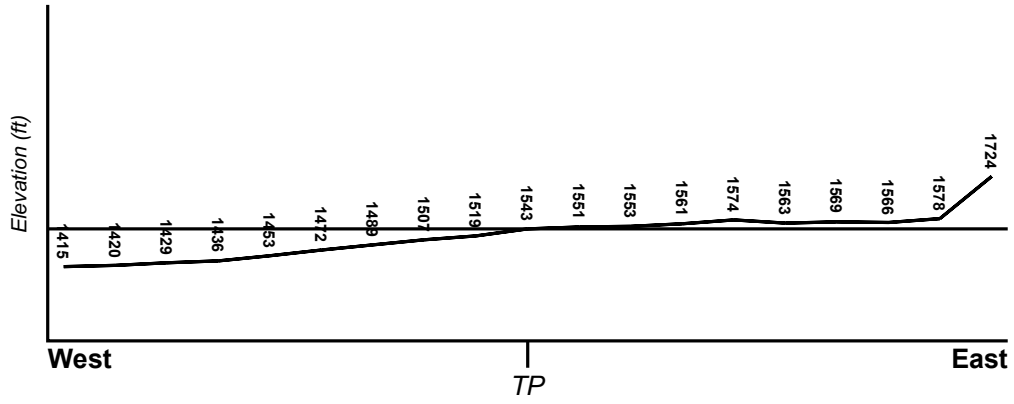
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 1543 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
SAN BERNARDINO, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property:	06071C - FEMA DFIRM Flood data
Additional Panels in search area:	Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NOT AVAILABLE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data:*

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
D11	1/2 - 1 Mile WNW	Not Reported
17	1/2 - 1 Mile WNW	SW

For additional site information, refer to Physical Setting Source Map Findings.

* ©1996 Site-specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

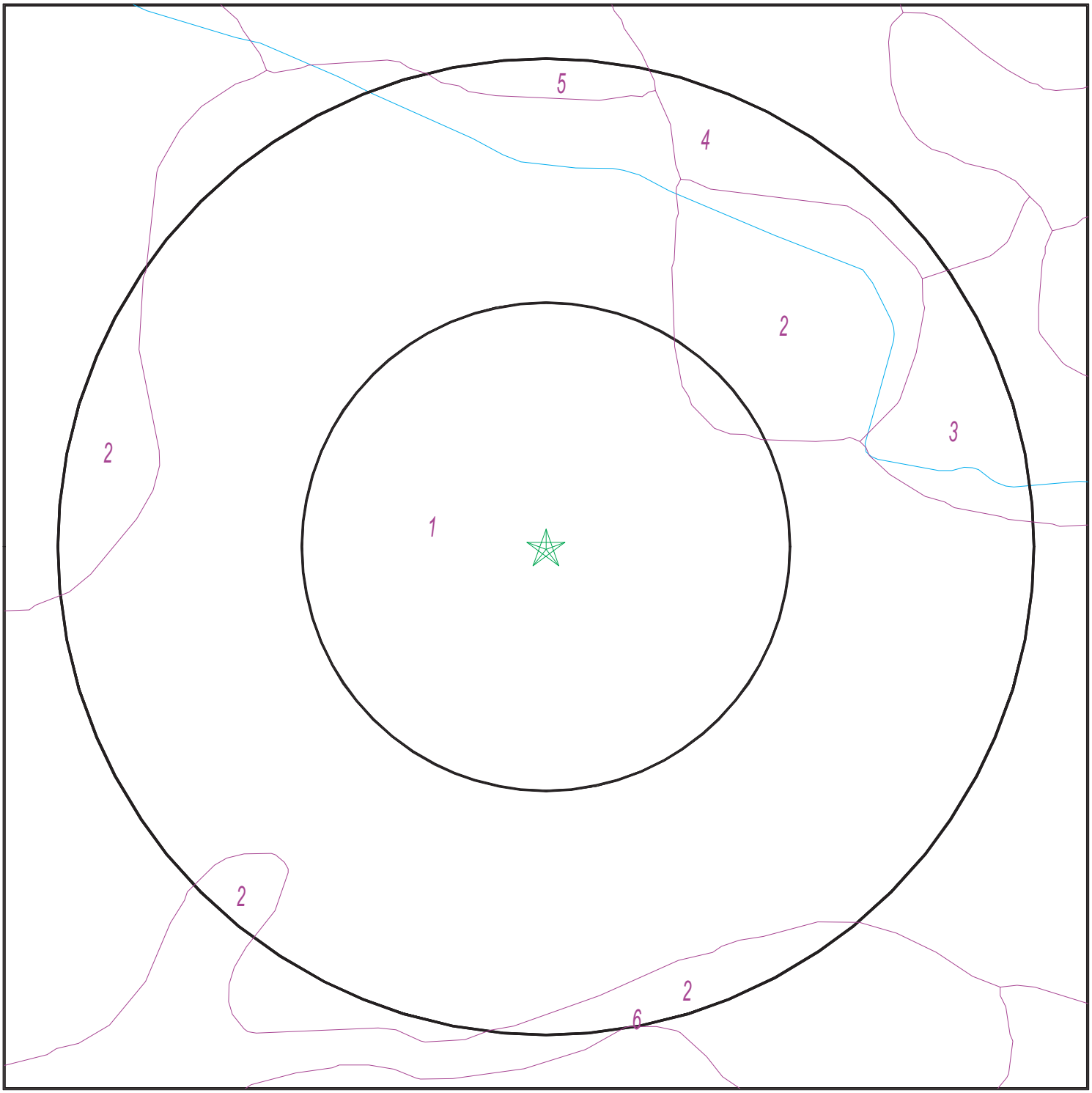
Era:	*Cenozoic*
System:	*Quaternary*
Series:	*Quaternary*
Code:	*Q (decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3682466.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	APN 1210-371-03-0000	CLIENT:	RMA Group
ADDRESS:	SEC of Water and Alpin Streets Highland CA 92346	CONTACT:	Gary Wallace
		INQUIRY #:	3682466.2s
LAT/LONG:	34.116 / 117.1553	DATE:	July 31, 2013 7:50 pm

Copyright © 2013 EDR, Inc. © 2010 Tele Atlas Rel. 07/2009.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: *GREENFIELD*

Soil Surface Texture: *sandy loam*

Hydrologic Group: *Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.*

Soil Drainage Class: *Well drained*

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: *Moderate*

Depth to Bedrock Min: *> 0 inches*

Depth to Watertable Min: *> 0 inches*

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6
2	16 inches	50 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6
3	50 inches	59 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6

Soil Map ID: 2

Soil Component Name: *Hanford*

Soil Surface Texture: *sandy loam*

Hydrologic Group: *Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.*

Soil Drainage Class: *Well drained*

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: *Moderate*

Depth to Bedrock Min: *> 0 inches*

Depth to Watertable Min: *> 0 inches*

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	11 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6

Soil Map ID: 3

Soil Component Name: *CIENEBA*

Soil Surface Texture: *sandy loam*

Hydrologic Group: *Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.*

Soil Drainage Class: *Somewhat excessively drained*

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: 0.42 Min: 0	Max: Min:
2	7 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: 0.42 Min: 0	Max: Min:
3	14 inches	18 inches	weathered bedrock	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 4

Soil Component Name: Hanford

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	11 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6

Soil Map ID: 5

Soil Component Name: *GREENFIELD*

Soil Surface Texture: *fine sandy loam*

Hydrologic Group: *Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.*

Soil Drainage Class: *Well drained*

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: *Moderate*

Depth to Bedrock Min: *> 0 inches*

Depth to Watertable Min: *> 0 inches*

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	16 inches	50 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6
3	50 inches	59 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.6

Soil Map ID: 6

Soil Component Name: *SOBOBA*

Soil Surface Texture: *gravelly loamy sand*

Hydrologic Group: *Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.*

Soil Drainage Class: *Excessively drained*

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: *Moderate*

Depth to Bedrock Min: *> 0 inches*

Depth to Watertable Min: *> 0 inches*

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	11 inches	gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 141	Max: 7.3 Min: 6.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	11 inches	35 inches	very gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 141	Max: 7.3 Min: 6.6
3	35 inches	59 inches	very stony sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Poorly graded sand.	Max: 141 Min: 141	Max: 7.3 Min: 6.6

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	USGS40000141306	1/4 - 1/2 Mile SSW
2	USGS40000141505	1/4 - 1/2 Mile NW
3	USGS40000141267	1/4 - 1/2 Mile SE
A4	USGS40000141227	1/2 - 1 Mile SSW
B6	USGS40000141268	1/2 - 1 Mile SW
B7	USGS40000141269	1/2 - 1 Mile WSW
9	USGS40000141329	1/2 - 1 Mile ESE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
C10	USGS40000141257	1/2 - 1 Mile WSW
12	USGS40000141109	1/2 - 1 Mile SSE
14	USGS40000141158	1/2 - 1 Mile SE
D15	USGS40000141535	1/2 - 1 Mile WNW
16	USGS40000141159	1/2 - 1 Mile SW

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

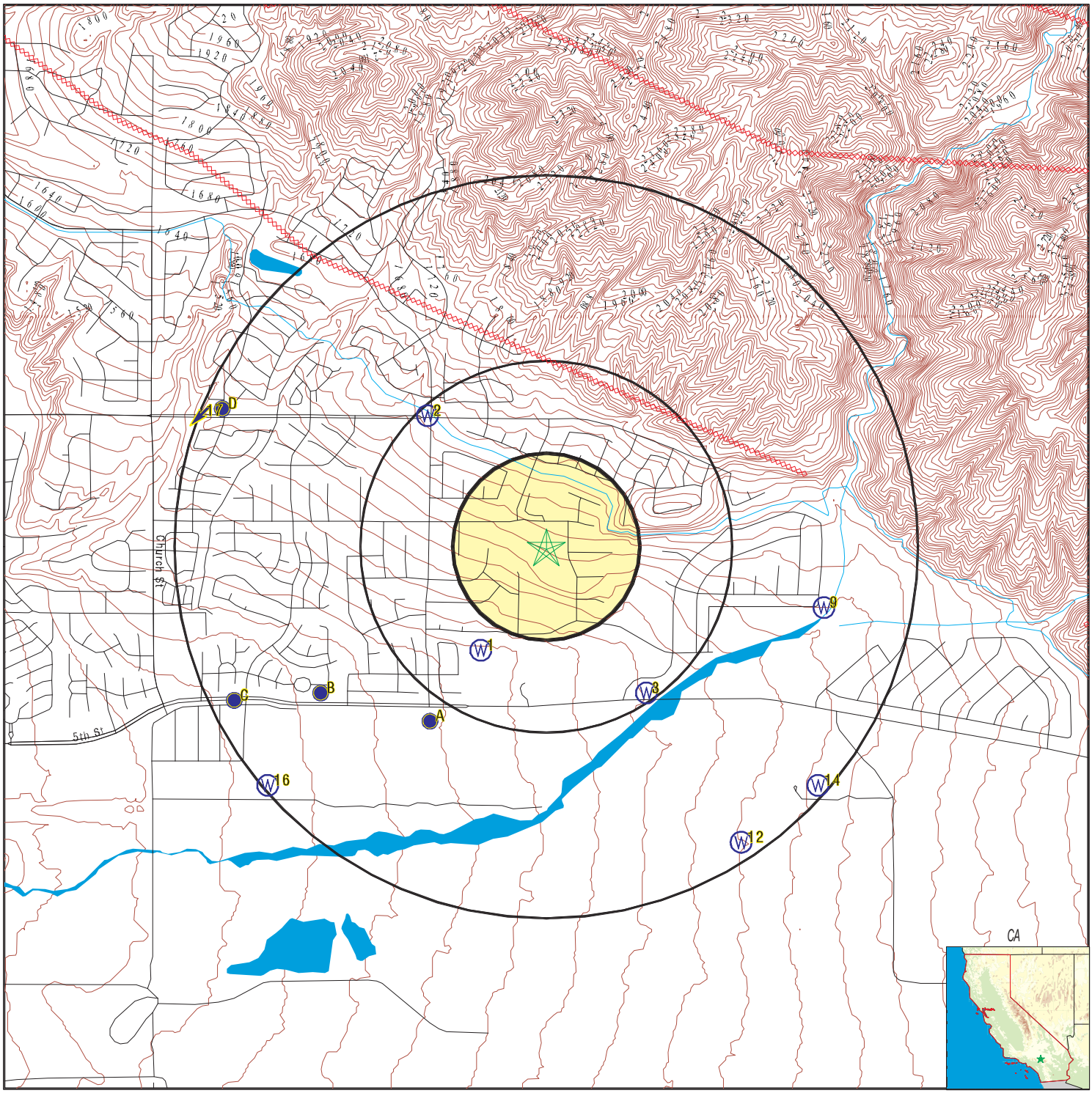
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A5	CADW50000004401	1/2 - 1 Mile SW
B8	CADW50000004404	1/2 - 1 Mile WSW
C13	CADW50000004403	1/2 - 1 Mile WSW

PHYSICAL SETTING SOURCE MAP - 3682466.2s



County Boundary
Major Roads
Contour Lines
Earthquake Fault Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

Groundwater Flow Direction
Indeterminate Groundwater Flow at Location
Groundwater Flow Varies at Location
Closest Hydrogeological Data
Oil, gas or related wells

SITE NAME: APN 1210-371-03-0000	CLIENT: RMA Group
ADDRESS: SEC of Water and Alpin Streets Highland CA 92346	CONTACT: Gary Wallace INQUIRY #: 3682466.2s
LAT/LONG: 34.116 / 117.1553	DATE: July 31, 2013 7:50 pm

Copyright © 2013 EDR, Inc. © 2010 Tele Atlas Rel. 07/2009.

Map ID Direction Distance Elevation	Database	EDR ID Number
1 **SSW** **1/4 - 1/2 Mile** **Lower**	**FED USGS**	**USGS40000141306**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340643117092701		
Monloc name:	001S003W02J002S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.111956
Longitude:	-117.1583713	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1415.00
Vert measure units:	feet	Vertacc measure val:	10
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	230
Welldepth units:	ft	Wellholedepth:	390
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 0

---

2 **NW** **1/4 - 1/2 Mile** **Higher**	**FED USGS**	**USGS40000141505**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340716117093601		
Monloc name:	001S003W02B001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.1211223
Longitude:	-117.1608716	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1593.00
Vert measure units:	feet	Vertacc measure val:	20
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		

Aquifer type:	*Not Reported*		
Construction date:	*19030101*	*Welldepth:*	*Not Reported*
Welldepth units:	*Not Reported*	*Wellholedepth:*	*600*
Wellholedepth units:	*ft*		

Ground-water levels, Number of Measurements: 0

3
SE **FED USGS** **USGS40000141267**
1/4 - 1/2 Mile
Lower

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340637117085901*		
Monloc name:	*001S003W01L001S*		
Monloc type:	*Well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1102893*
Longitude:	*-117.1505932*	*Sourcemap scale:*	*Not Reported*
Horiz Acc measure:	*1*	*Horiz Acc measure units:*	*seconds*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*1460.00*
Vert measure units:	*feet*	*Vertacc measure val:*	*10*
Vert accmeasure units:	*feet*		
Vertcollection method:	*Interpolated from topographic map*		
Vert coord refsys:	*NGVD29*	*Countrycode:*	*US*
Aquifername:	*California Coastal Basin aquifers*		
Formation type:	*Not Reported*		
Aquifer type:	*Not Reported*		
Construction date:	*19470101*	*Welldepth:*	*100*
Welldepth units:	*ft*	*Wellholedepth:*	*100*
Wellholedepth units:	*ft*		

Ground-water levels, Number of Measurements: 0

A4
SSW **FED USGS** **USGS40000141227**
1/2 - 1 Mile
Lower

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340633117093401*		
Monloc name:	*001S003W02J001S*		
Monloc type:	*Well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1091783*
Longitude:	*-117.1603158*	*Sourcemap scale:*	*24000*
Horiz Acc measure:	*1*	*Horiz Acc measure units:*	*seconds*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*1397.00*
Vert measure units:	*feet*	*Vertacc measure val:*	*10*
Vert accmeasure units:	*feet*		
Vertcollection method:	*Interpolated from topographic map*		
Vert coord refsys:	*NGVD29*	*Countrycode:*	*US*
Aquifername:	*California Coastal Basin aquifers*		
Formation type:	*Not Reported*		

Aquifer type:	Not Reported		
Construction date:	1928	Welldepth:	303
Welldepth units:	ft	Wellholedepth:	303
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 10

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1988-11-30	153.62		1987-12-09	137.53	
1987-06-17	128.93		1986-11-19	119.36	
1986-06-19	115.70		1985-09-30	104.06	
1980-05-14	13.9		1974-04-16	121.92	
1973-11-13	122.15		1965-01-27	289.7	

A5
SW **CA WELLS** **CADW50000004401**
1/2 - 1 Mile
Lower

Latitude :	34.1092		
Longitude :	117.1612		
Site code:	341092N1171612W001	Casgem sta:	01S03W02J001S
Local well:	Not Reported	Casgem s 1:	Unknown
County id:	36		
Basin cd:	8-2.06	Basin desc:	Bunker Hill
Org unit n:	Southern Region Office	Site id:	CADW50000004401

B6
SW **FED USGS** **USGS40000141268**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340637117095201		
Monloc name:	001S003W02P001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.1102894
Longitude:	-117.165316	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1369.00
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19300101	Welldepth:	418
Welldepth units:	ft	Wellholedepth:	438
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 3

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1993-04-12					
Note: The well was destroyed (no water level is recorded).					
1992-10-29	180.83		1992-08-12	184.17	

B7
WSW **FED USGS** **USGS40000141269**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340637117095501		
Monloc name:	001S003W02L001S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.1102894
Longitude:	-117.1661494	Sourcemap scale:	Not Reported
Horiz Acc measure:	Unknown	Horiz Acc measure units:	Unknown
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1375.00
Vert measure units:	feet	Vertacc measure val:	10
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

B8
WSW **CA WELLS** **CADW50000004404**
1/2 - 1 Mile
Lower

Latitude :	34.1103		
Longitude :	117.1662		
Site code:	341103N1171662W001	Casgem sta:	01S03W02P001S
Local well:	Not Reported	Casgem s 1:	Unknown
County id:	36		
Basin cd:	8-2.06	Basin desc:	Bunker Hill
Org unit n:	Southern Region Office	Site id:	CADW50000004404

9
ESE **FED USGS** **USGS40000141329**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340649117082901		
Monloc name:	001S003W01H001S		
Monloc type:	Well		
Monloc desc:	WELL DEEPENED 5/20/52		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.1136225
Longitude:	-117.1422596	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1541.3
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Other aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19291101	Welldepth:	414
Welldepth units:	ft	Wellholedepth:	465
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 36

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
2004-10-25	298.83				
2004-10-22					
Note: The site was being pumped.					
2004-04-22	280.68				
Note: The site had been pumped recently.					
2003-10-23	265.18				
Note: The site had been pumped recently.					
2003-04-24	251.70				
Note: The site had been pumped recently.					
2003-04-21					
Note: The site was being pumped.					
2002-10-29	287.83				
2002-04-09					
Note: The site was being pumped.					
2001-10-22	266.81		2001-04-17	254.74	
2000-10-24	240.94		2000-04-12	224.40	
1999-10-18	202.88		1999-04-14	168.00	
1998-10-19	127.66		1998-04-14	179.29	
1997-10-30	207.19		1997-04-16	165.38	
1996-10-07	175.61		1996-04-25	137.73	
1995-10-26	143.61		1995-04-20	128.32	
1994-10-26	173.35		1994-04-19	153.60	
1993-10-19	138.68		1993-04-12	230.07	
1992-10-29	288.15		1992-08-12	289.15	
1989-09-21	283.09		1988-11-29	271.95	
1988-06-30	262.77		1987-12-09	254.59	
1986-11-10	228.70		1986-06-19	218.77	
1970-03-24	135.2		1965-08-19	417.6	

Map ID / Direction / Distance / Elevation	Database	EDR ID Number
C10 / WSW / 1/2 - 1 Mile / Lower	**FED USGS**	**USGS40000141257**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-340636117100701		
Monloc name:	001S003W02P002S		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18070203	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	34.1100116
Longitude:	-117.1694828	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	1345.3
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	194805	Welldepth:	464
Welldepth units:	ft	Wellholedepth:	480
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 105

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1991-06-17					
Note: The well was destroyed (no water level is recorded).					
1990-12-03	180.88		1990-06-25	172.82	
1989-11-28	162.38		1989-09-22	159.20	
1988-11-23	146.03		1988-06-30	139.20	
1987-12-09	130.98		1987-06-17	124.61	
1986-11-10	118.53		1986-06-19	115.62	
1985-09-30	108.01				
1964-03-27	263.9				
Note: Other conditions existed that would affect the measured water level.					
1963-12-27	300.5				
Note: The site was being pumped.					
1963-11-24	258.2		1963-09-25	302.6	
1963-08-26	308.5		1963-07-30	271.3	
1963-06-26	310.0				
Note: The site was being pumped.					
1963-05-28	294.2				
Note: The site was being pumped.					
1963-04-25	240.6		1963-03-19	248.8	
1963-02-28	245.8				
1963-01-28	304.9				
Note: The site was being pumped.					
1962-11-22	301.7				
Note: The site was being pumped.					

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1962-10-29	289.3				
Note: The site was being pumped.					
1962-09-14	288.1				
Note: The site was being pumped.					
1962-07-20	283.5				
Note: The site was being pumped.					
1962-06-20	281.8				
Note: The site was being pumped.					
1962-05-23	238.3		1962-04-12	239.9	
1962-03-22	240.2		1962-02-28	245.4	
1962-01-17	289.8				
Note: The site was being pumped.					
1961-12-20	246.2		1961-11-28	248.6	
1961-10-03	288.1				
Note: The site was being pumped.					
1961-08-08	287.8				
Note: The site was being pumped.					
1961-07-13	283.7				
Note: The site was being pumped.					
1961-06-16	277.1				
Note: The site was being pumped.					
1961-05-23	277.5				
Note: The site was being pumped.					
1961-04-12	264.2				
Note: The site was being pumped.					
1961-03-09	221.0		1961-02-20	210.8	
1961-01-28	214.8				
1960-12-28	253.3				
Note: The site was being pumped.					
1960-11-30	212.7		1960-10-04	230.0	
1960-08-02	234.6				
Note: The site was being pumped.					
1960-05-26	233.9				
Note: The site was being pumped.					
1960-03-23	196.3		1960-03-02	191.3	
1960-01-15	195.0				
1959-12-04	230.0				
Note: The site was being pumped.					
1959-11-04	201.0				
1959-09-16	235.1				
Note: The site was being pumped.					
1959-07-11	219.7				
Note: The site was being pumped.					
1959-06-09	217.4				
Note: The site was being pumped.					
1959-05-13	216.5				
Note: The site was being pumped.					
1959-04-16	208.9				
Note: The site was being pumped.					
1959-03-13	181.8		1959-01-30	189.3	
1958-12-23	194.4		1958-11-17	201.5	
1958-10-08	225.8				
Note: The site was being pumped.					
1958-08-08	223.3				
Note: The site was being pumped.					

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1958-07-12	202.5		1958-06-12	195.6	
1958-05-08	194.8		1958-04-09	202.4	
1958-03-07	202.6		1958-02-07	205.3	
1958-01-11	210.3				
1957-12-04	251.7				
Note: The site was being pumped.					
1957-10-01	261.4				
Note: The site was being pumped.					
1957-08-27	267.4				
Note: The site was being pumped.					
1957-02-16	205.9		1957-01-15	213.8	
1956-10-30	256.7				
Note: The site was being pumped.					
1956-09-27	249.0				
1956-08-28	247.6				
Note: The site was being pumped.					
1955-06-06	182.5				
Note: Other conditions existed that would affect the measured water level.					
1955-05-02	179.8		1955-02-24	176.3	
1954-10-21	207.2				
1954-07-22	179.5				
Note: The site was being pumped.					
1954-05-26	173.4		1954-04-16	176.8	
1954-02-08	189.2		1952-08-07	170.3	
1952-05-05	173.1		1952-03-07	176.3	
1951-05-08	169.7		1951-03-06	166.1	
1951-01-12	181.1		1950-11-15	176.3	
1950-05-04	146.0		1950-02-28	144.4	
1949-12-29	150.7		1949-05-26	137.2	
1949-03-28	135.6		1949-01-18	137.5	
1948-11-27	147.7				
Note: A nearby site that taps the same aquifer was being pumped.					
1948-07-08	126.1		1948-05-17	121.5	

D11
WNW
1/2 - 1 Mile
Lower

AQUIFLOW **50145**

Site ID:	*083600059T*
Groundwater Flow:	*Not Reported*
Shallow Water Depth:	*Not Reported*
Deep Water Depth:	*Not Reported*
Average Water Depth:	*100*
Date:	*12/10/1990*

12
SSE
1/2 - 1 Mile
Lower

FED USGS **USGS40000141109**

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340616117084301*		
Monloc name:	*001S002W07B001S*		
Monloc type:	*Well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1044562*
Longitude:	*-117.1461485*	*Sourcemap scale:*	*Not Reported*

Horiz Acc measure:	*1*	*Horiz Acc measure units:*	*seconds*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*1649.00*
Vert measure units:	*feet*	*Vertacc measure val:*	*20*
Vert accmeasure units:	*feet*		
Vertcollection method:	*Interpolated from topographic map*		
Vert coord refsys:	*NGVD29*	*Countrycode:*	*US*
Aquifername:	*California Coastal Basin aquifers*		
Formation type:	*Not Reported*		
Aquifer type:	*Not Reported*		
Construction date:	*19270101*	*Welldepth:*	*458*
Welldepth units:	*ft*	*Wellholedepth:*	*458*
Wellholedepth units:	*ft*		

Ground-water levels, Number of Measurements: 0

C13
WSW **CA WELLS** **CADW50000004403**
1/2 - 1 Mile
Lower

Latitude :	*34.11*		
Longitude :	*117.1704*		
Site code:	*341100N1171704W001*	*Casgem sta:*	*01S03W02P002S*
Local well:	*Not Reported*	*Casgem s 1:*	*Unknown*
County id:	*36*		
Basin cd:	*8-2.06*	*Basin desc:*	*Bunker Hill*
Org unit n:	*Southern Region Office*	*Site id:*	*CADW50000004403*

14
SE **FED USGS** **USGS40000141158**
1/2 - 1 Mile
Lower

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340624117083001*		
Monloc name:	*001S003W01R001S*		
Monloc type:	*Well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1066783*
Longitude:	*-117.1425372*	*Sourcemap scale:*	*Not Reported*
Horiz Acc measure:	*Unknown*	*Horiz Acc measure units:*	*Unknown*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*Not Reported*
Vert measure units:	*Not Reported*	*Vertacc measure val:*	*Not Reported*
Vert accmeasure units:	*Not Reported*		
Vertcollection method:	*Not Reported*		
Vert coord refsys:	*Not Reported*	*Countrycode:*	*US*
Aquifername:	*California Coastal Basin aquifers*		
Formation type:	*Not Reported*		

Aquifer type:	*Not Reported*		
Construction date:	*Not Reported*	*Welldepth:*	*Not Reported*
Welldepth units:	*Not Reported*	*Wellholedepth:*	*Not Reported*
Wellholedepth units:	*Not Reported*		

Ground-water levels, Number of Measurements: 0

D15
WNW **FED USGS** **USGS40000141535**
1/2 - 1 Mile
Lower

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340718117101201*		
Monloc name:	*HOLE-22 LYSIMETER AT 39*		
Monloc type:	*Well: Test hole not completed as a well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1216778*
Longitude:	*-117.170872*	*Sourcemap scale:*	*Not Reported*
Horiz Acc measure:	*Unknown*	*Horiz Acc measure units:*	*Unknown*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*Not Reported*
Vert measure units:	*Not Reported*	*Vertacc measure val:*	*Not Reported*
Vert accmeasure units:	*Not Reported*		
Vertcollection method:	*Not Reported*		
Vert coord refsys:	*Not Reported*	*Countrycode:*	*US*
Aquifername:	*Other aquifers*		
Formation type:	*Not Reported*		
Aquifer type:	*Not Reported*		
Construction date:	*Not Reported*	*Welldepth:*	*Not Reported*
Welldepth units:	*Not Reported*	*Wellholedepth:*	*Not Reported*
Wellholedepth units:	*Not Reported*		

Ground-water levels, Number of Measurements: 0

16
SW **FED USGS** **USGS40000141159**
1/2 - 1 Mile
Lower

Org. Identifier:	*USGS-CA*		
Formal name:	*USGS California Water Science Center*		
Monloc Identifier:	*USGS-340624117100301*		
Monloc name:	*001S003W02P003S*		
Monloc type:	*Well*		
Monloc desc:	*Not Reported*		
Huc code:	*18070203*	*Drainagearea value:*	*Not Reported*
Drainagearea Units:	*Not Reported*	*Contrib drainagearea:*	*Not Reported*
Contrib drainagearea units:	*Not Reported*	*Latitude:*	*34.1066784*
Longitude:	*-117.1683716*	*Sourcemap scale:*	*Not Reported*
Horiz Acc measure:	*1*	*Horiz Acc measure units:*	*seconds*
Horiz Collection method:	*Interpolated from map*		
Horiz coord refsys:	*NAD83*	*Vert measure val:*	*1344.00*
Vert measure units:	*feet*	*Vertacc measure val:*	*20*
Vert accmeasure units:	*feet*		
Vertcollection method:	*Interpolated from topographic map*		
Vert coord refsys:	*NGVD29*	*Countrycode:*	*US*
Aquifername:	*California Coastal Basin aquifers*		
Formation type:	*Not Reported*		

Aquifer type:	*Not Reported*		
Construction date:	*19310101*	*Welldepth:*	*213*
Welldepth units:	*ft*	*Wellholedepth:*	*214*
Wellholedepth units:	*ft*		

Ground-water levels, Number of Measurements: 0

17	*Site ID:*	*083602018T*		
WNW	*Groundwater Flow:*	*SW*	**AQUIFLOW**	**54985**
1/2 - 1 Mile	*Shallow Water Depth:*	*Not Reported*		
Lower	*Deep Water Depth:*	*Not Reported*		
	Average Water Depth:	*90*		
	Date:	*02/25/1993*		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
92346	17	0

Federal EPA Radon Zone for SAN BERNARDINO County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 92346

Number of sites tested: 2

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.900 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

APPENDIX F

Stormwater Infiltration Study and Drainage Map

December 2, 2014 Project No. 14-G74-0/04

Diversified Pacific
10621 Civic Center Drive
Rancho Cucamonga, CA 91730

Attention: Mr. Phillip Burum

Subject: Storm Water Infiltration Testing
Tract 18935
Highland, California

Mr. Burum,

In accordance with your request and authorization, RMA GeoScience performed two soil infiltration tests at two locations near the planned infiltration basin for the Kiel Property. The tests were performed using a Double-Ring Infiltrometer (ASTM Test Method D 3385) near the proposed infiltration basins along the southwestern corner of the tract. The locations of the infiltration tests are shown on Figure 1.

The scope of work included review of the referenced reports and plans, excavation and logging of six test pits, two soil infiltration tests, backfilling of the test pit excavations, and preparation of this report.

Site Location and Description

The site is located at the northeast corner of the intersection of Aplin Street and Santa Ana Canyon Road in the City of Highland, California. It is bound to the west by Aplin Street, to the south by Santa Ana Canyon Road, to the north by Water Street, and to the east by a string of lots followed by North Fork Road. At the time of this report the site was comprised of partially developed land that is currently being used as an orange grove.

Plans utilized for the study were provided by the project engineer, SITETECH, Inc. RMA GeoScience utilized the tentative tract map to prepare Figure 1 showing the locations of the test pits. The test pits were excavated approximately to the planned bottom elevation of the basin. The tests were performed 2.5 feet below existing grade inside of the limits of the proposed infiltration basin. Four exploratory test pits were excavated with the intention of reaching 10 feet below the proposed infiltration basin elevation with refusal due to large granitic boulders ranging from 4 feet below ground surface to 7 feet below ground surface. During drilling, the deepest boring we achieved in the orange grove was to a depth of 16 feet with no groundwater present.

Soil and Groundwater Conditions

Current infiltration test pits of the site encountered young alluvium consisting mostly of slightly moist taupe brown silty sand in the upper 3 feet, moist dark taupe brown silty sand with scattered cobbles from a depth of 3 feet to 6 feet, and moist dark taupe brown silty sand with boulders and cobbles from 6 feet to our maximum achieved depth of 16 feet. There in an approximate 3 foot deep root zone with fine roots from the orange trees. The expected total depth of the base roots for the orange trees is approximately 7 feet of depth below existing grade. No groundwater was encountered in any of the test pits or borings that were achieved at the site. It is believed that the depth to groundwater is in excess of 75 feet according to the

seismic line study performed by RMA Group on the north end of the tract. The 75 feet of depth below the seismic line covers to beneath 10 feet below the bottom of the proposed infiltration basin.

In the proposed infiltration basin, the previously described conditions were found. The infiltration tests were performed at depths of 2.5 feet (TP-1) and 2.5 feet (TP-2) below the existing grade. Soils at the test locations consisted of the slightly moist, loose to medium dense taupe brown silty sand.

Infiltration Test Procedure

Two test pits were excavated by a backhoe to a depth of 2.5 feet and 2.5 feet below existing grades. Sides of the excavations were sloped for safety in accordance with Cal/OSHA requirements. DigAlert notification was provided by RMA GeoScience. Locations of the test pits are illustrated in Figure 1.

Infiltrometer equipment consisted of two graduated plastic cylinders, two steel rings, metal yard-sticks, and plastic tubing to connect the cylinders and steel rings. Millimeter graduations corresponding to water volume were marked directly on clear, rigid plastic tubing attached to the plastic cylinders. Cylinders were connected to special supports to prevent tipping and to maintain proper height. Steel rings were 12 and 24 inches in diameter and 20 inches high. Continual adjustment of the shutoff valves was used to maintain a constant water level in the steel rings. Infiltration rate of water during the test was determined by monitoring volume changes in the calibrated cylinders. Testing was continued until a relatively uniform infiltration rate was obtained.

Upon completion of testing, trenches were backfilled via backhoe with materials removed from the test excavations. Uncompacted backfill may require removal and re-compaction of the backfill, as the backhoe-placed backfill is not suitable for support of paving, concrete flatwork or other improvements. The geotechnical consultant will need to observe the removal of such backfill and test compaction of fill placed in these areas.

Infiltration Test Results

Testing yielded the following final field infiltration rates:

Location	Infiltration Rate (cm/hr)	Infiltration Rate (in/hr)
TP-1 @ 2.5'	9.9	3.9
TP-2 @ 2.5'	8.6	3.4

Infiltration test result sheets are included in Appendix A.

Discussion and Recommendations

Monitoring of actual facility performance has shown that the full-scale infiltration rate is far lower than the rate measured by small-scale testing. The infiltration rate will decline between maintenance cycles as the Best Management Practices (BMP) surface becomes clogged and fine soil particulates accumulate in the basin bottom. Thus an appropriate factor of safety must be applied to the measured infiltration rate and incorporated into facility design. The San Bernardino County Technical Guidance Document for WQMP (2011) specifies a procedure for determining safety factors by using a point system related to the suitability of underlying soils for infiltration and design of infiltration systems.

There are four safety factor considerations related to soil conditions (Factor Category A):

- Soil assessment methods (e.g., number of borings or test pits) and the measurement method used to determine short-term infiltration rates.
- Predominant soil texture and the percent of fines that can influence the potential for clogging.
- Vertical and horizontal soil variability.
- Depth to seasonal high groundwater and the presence of relatively impervious layers.

Descriptions of each concern are presented in the following table.

Factor Category A
Suitability Assessment Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern (3)	Medium Concern (2)	Low Concern (1)
Assessment methods	Use of soil survey maps or simple texture analysis to estimate short-term infiltration rates	Direct measurement of ≥ 20% of the infiltration area with localized infiltration measurement methods (e.g. infiltrometer)	Direct measurement of ≥ 50% of infiltration area with localized measurement methods or use of extensive test pit infiltration measurement methods
Texture Class	Silty and clayey soils with significant fines	Loamy soils	Granular to slightly loamy soils
Site soil variability	Highly variable soils indicated from site assessment or limited soil borings collected during site assessment	Soil borings/test pits indicate moderately homogeneous soils	Multiple soil borings/test pits indicate relatively homogenous soils.
Depth of groundwater or impervious layer	< 5 feet below facility bottom	5-10 feet below facility bottom	>10 feet below facility bottom

There are four safety factors considerations related to facility design (Factor Category B):

- Size of area tributary to facility.
- Level of pretreatment and expected influent sediment loads.
- Redundancy of BMP facilities.
- Intended or unintended compaction of soils during or after construction.

Descriptions of each concern are presented in the following table.

Factor Category B
Design Related Considerations for Infiltration Facility Safety Factors

Consideration	High Concern (3)	Medium Concern (2)	Low Concern (1)
Tributary area size	Greater than 10 acres	Greater than 2 acres but less than 10 acres	2 acres or less
Level of pretreatment or expected influent sediment load	Pretreatment from gross solids removal devices only such as hydrodynamic separators, racks and screens AND tributary area includes landscaped areas, steep slopes, high traffic areas, or any other areas expected to produce high sediment, trash or debris loads.	Good pretreatment with BMPs that mitigate coarse sediments such as vegetated swales AND influent sediment loads from the tributary area are expected to be relatively low (e.g. low traffic, mild slopes, disconnected impervious areas, etc.).	Excellent pretreatment with BMPs that mitigate fine sediments such as bioretention or media filtration OR sedimentation or facility only treats runoff only treats runoff from relatively clean surfaces, such as rooftops.
Redundancy of treatment	No redundancy in BMP treatment train.	Medium redundancy, other BMPs available in treatment train to maintain at least 50% of function of facility in event of failure.	High redundancy, multiple components capable of operating independently and in parallel, maintain at least 90% of facility functionality in event of failure.
Compaction during construction	Construction of facility on a compacted site or elevated probability of unintended/indirect compaction.	Medium probability of unintended/indirect compaction.	Heavy equipment actively prohibited from infiltration areas during construction and low probability of unintended/indirect compaction.

The San Bernardino County WQMP Guidance Document specifies the following procedure to determine a safety factors for measured infiltration rates:

- A level of concern is determined for each consideration in the Factor Category tables above. A corresponding Factor Value (v) is determined for each concern. The Factor Values are 3 for high concerns, 2 for medium concerns, and 1 for low concerns.
- Each Factor Value (v) is multiplied by an Assigned Weight (w) to determine a Product Value (p).
- The Product Values (p) within each Factor Category (A and B) are summed to obtain a Safety Factor (S_A and S_B) for each Factor Category.
- The Safety Factors for each Factor Category are multiplied to determine a Combined Safety

Factor (S_{TOT}). If the Combined Safety Factor is less than 2, then 2 shall be used as the Safety Factor.

- The Measured Infiltration Rate (K_M) is divided by the Combined Safety Factor (S_{TOT}) to determine the Design Infiltration Rate (K_{DESIGN}).

Because of slight local variability of soils, we have used the slower infiltration rate from our tests as the Measured Infiltration Rate.

Our selected Factor Values (v), Measured Infiltration Rate (K_M) and Calculated Safety Factor (S_A) are presented in the table below.

Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight	Factor Value (v)	Product (p)
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	2	0.5
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.5
B	Design	Tributary area size	0.25	*	*
		Level of pretreatment / expected sediment loads	0.25	*	*
		Redundancy	0.25	*	*
		Compaction during construction	0.25	2	0.50
		Design Safety Factor, $S_B = \Sigma p$			*
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					*
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					3.4
Design Infiltration Rate, in/hr, $K_{DESIGN} = K_M/S_{TOT}$					*
Supporting Data: See Appendix A for field test sheets					

* - Values to be determined by design civil engineer.

It is recommended that the design engineer determine the Factory Category B (Design) Factor Values (v) and the resultant safety factor. Our recommendation for the Factory Category B (Design) for compaction during construction is presented in the table above. The design engineer may also specify a higher safety factor at his discretion.

A maintenance plan should also be developed and implemented to restore infiltration properties of soils that may be impacted by sedimentation or other adverse conditions.

Compaction of soil below the proposed stormwater infiltration system could significantly lower infiltration rates and could make the tested rate inapplicable. Compaction of soil below the infiltration system could destroy soil structure and thus seriously impact the infiltration system's performance. Proper oversight is needed during construction to ensure that natural soils at the bottom of the infiltration system are not compacted and that the stormwater system excavation does not deviate from the proposed design depth. If the bottom of the stormwater system excavation is deeper than the design depth, the geotechnical engineer should be immediately contacted to provide additional recommendations. Loose fill soil should not be placed above naturally occurring soils at the bottom of the storm water system excavation, as saturation of such soils could

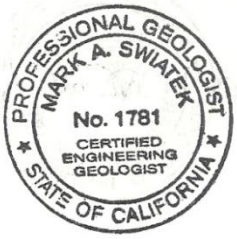
result in settlement that might adversely impact the storm water system and overlying improvements.

Additionally, any City of Highland, County of San Bernardino, State of California, or other applicable Agency design criteria should be followed.

We trust this letter will serve your needs at this time. If you have any questions or require further assistance, please do not hesitate to contact us.

Respectfully,

RMA GeoScience,



Mark Swiatek,
Principal Geologist
CEG 1781

Bruce Smith
Project Engineer
GE 65637

Attachments:	Figure 1:	Test Pit Location Map
	Appendix A:	Field Investigation and Infiltration Test Results
	Appendix B:	Laboratory Test Results
	Appendix C:	Test Pit Logs
	Appendix D:	Abbreviation Legend
	Appendix E:	References

FIGURES

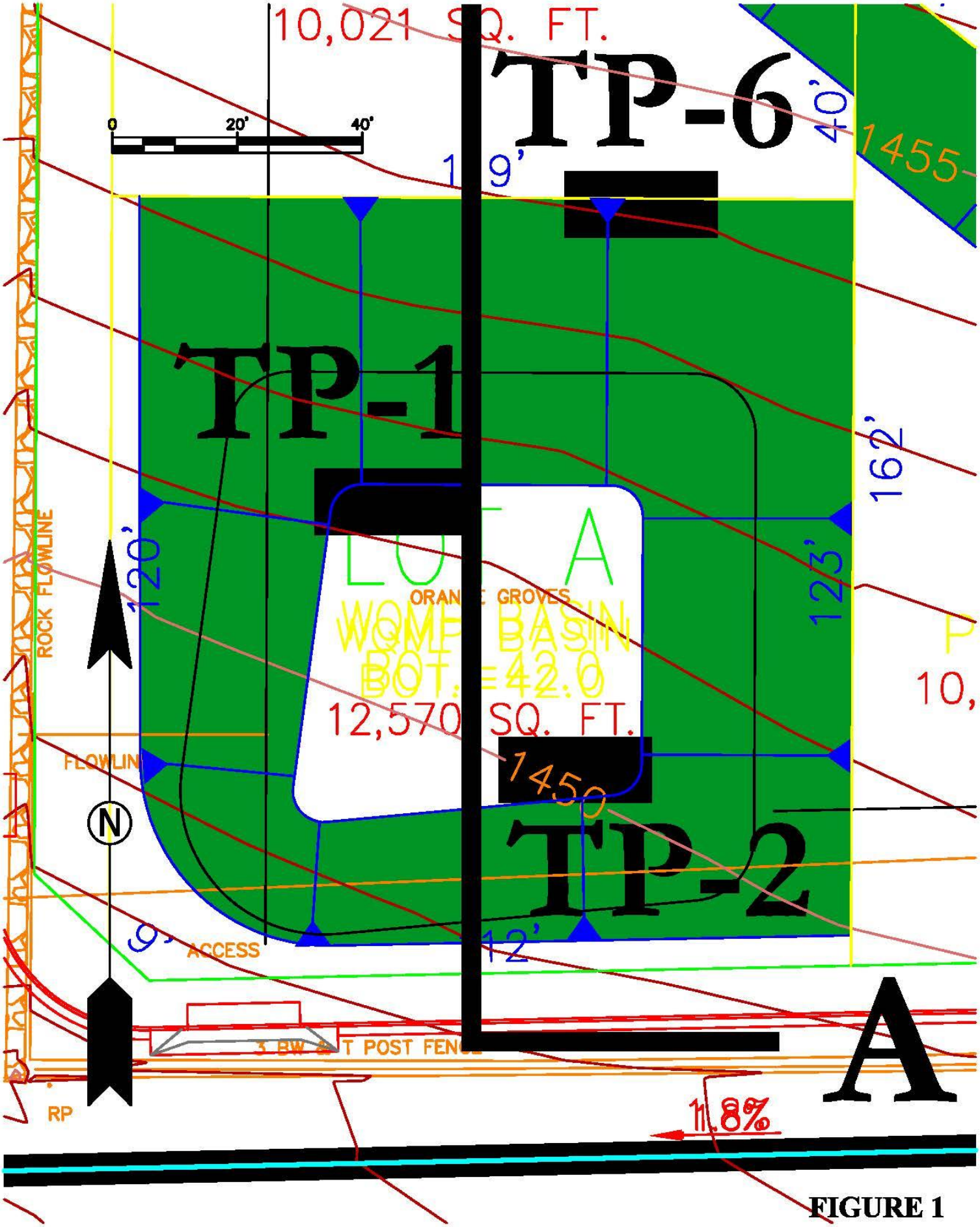


FIGURE 1

RMA GeoScience

Infiltration Basin Map
Tract No. 18935
Santa Ana Canyon Road & Alpin Street
Highland, California

RMA Job No.	14-G74-0/04
Date:	November, 2014
Prepared By:	NRA

APPENDIX A

FIELD INVESTIGATION AND INFILTRATION TEST RESULTS

APPENDIX A

FIELD INVESTIGATION

A-1.00 FIELD EXPLORATION

A-1.01 Number of Infiltration Tests

This portion of our scope of services consisted of two infiltration tests. The infiltration tests were performed in trenches excavated with a tractor mounted backhoe.

A-1.02 Location of Infiltration Tests

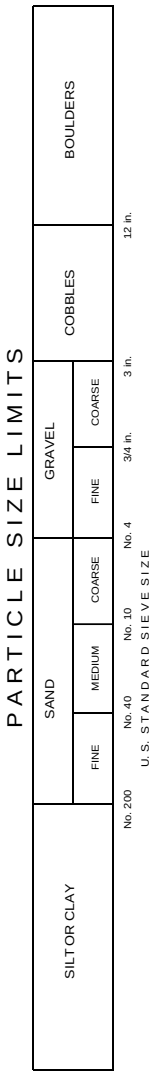
A Test Location Map showing the approximate locations of the test pits and infiltration tests is presented as Figure 1.

A-1.03 Infiltration Tests Logging

Logs of infiltration were prepared by our staff and are attached in this appendix. The logs contain factual information and interpretation of subsurface conditions. The strata indicated on these logs represent the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soil Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this Appendix.

RMA GeoScience



MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravel, gravel-sand mixtures. little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatamaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

UNIFIED SOIL CLASSIFICATION SYSTEM

RMA GeoScience

INFILTRATION TEST RESULTS

Project ID	14-G74-0/04
Test Location	TP-1 @ 2.5'
Tested By	NRA/JAR
Date	10/8/14
Tube Set	2

Constants	Area (cm^2)	Depth of Liq (cm)
Inner Ring	707	15.24
Anlr. Space	2106	15.24

No.	S or E	Date M/D/Y	Time Hr:Min	Interval Elapsed (min)	Flow Readings: Inner Ring Reading (mm)	Inner Ring Flow (cm^3)	Annular Space Reading (mm)	Annular Space Flow (cm^3)	Incr. Infiltration Rate Inner (cm/hr)	Incr. Infiltration Rate Annular (cm/hr)	Incr. Infiltration Rate Inner (in/hr)	Incr. Infiltration Rate Annular (in/hr)	Remarks
1	Start	10/8/14	8:30	15	490	2,505	500	7,656	14.17	14.54	5.58	5.73	
	End	10/8/14	8:45	15	93		84						
2	Start	10/8/14	8:45	15	0:00	1,703	466	7,748	9.64	14.72	3.79	5.79	
	End	10/8/14	9:00	30	245		45						
3	Start	10/8/14	9:00	15	469	1,994	490	7,362	11.28	13.98	4.44	5.51	
	End	10/8/14	9:15	45	153		90						
4	Start	10/8/14	9:15	15	474	1,729	462	7,086	9.78	13.46	3.85	5.30	
	End	10/8/14	9:30	60	200		77						
5	Start	10/8/14	9:30	15	464	1,861	472	6,313	10.53	11.99	4.15	4.72	
	End	10/8/14	9:45	75	169		129						
6	Start	10/8/14	9:45	15	468	1,615	465	6,534	9.14	12.41	3.60	4.89	
	End	10/8/14	10:00	90	212		110						
7	Start	10/8/14	10:00	15	467	1,943	450	7,436	10.99	14.12	4.33	5.56	
	End	10/8/14	10:15	105	159		46						
8	Start	10/8/14	10:15	15	479	1,552	428	5,871	8.78	11.15	3.46	4.39	
	End	10/8/14	10:30	120	233		109						

RMA GeoScience

INFILTRATION TEST RESULTS

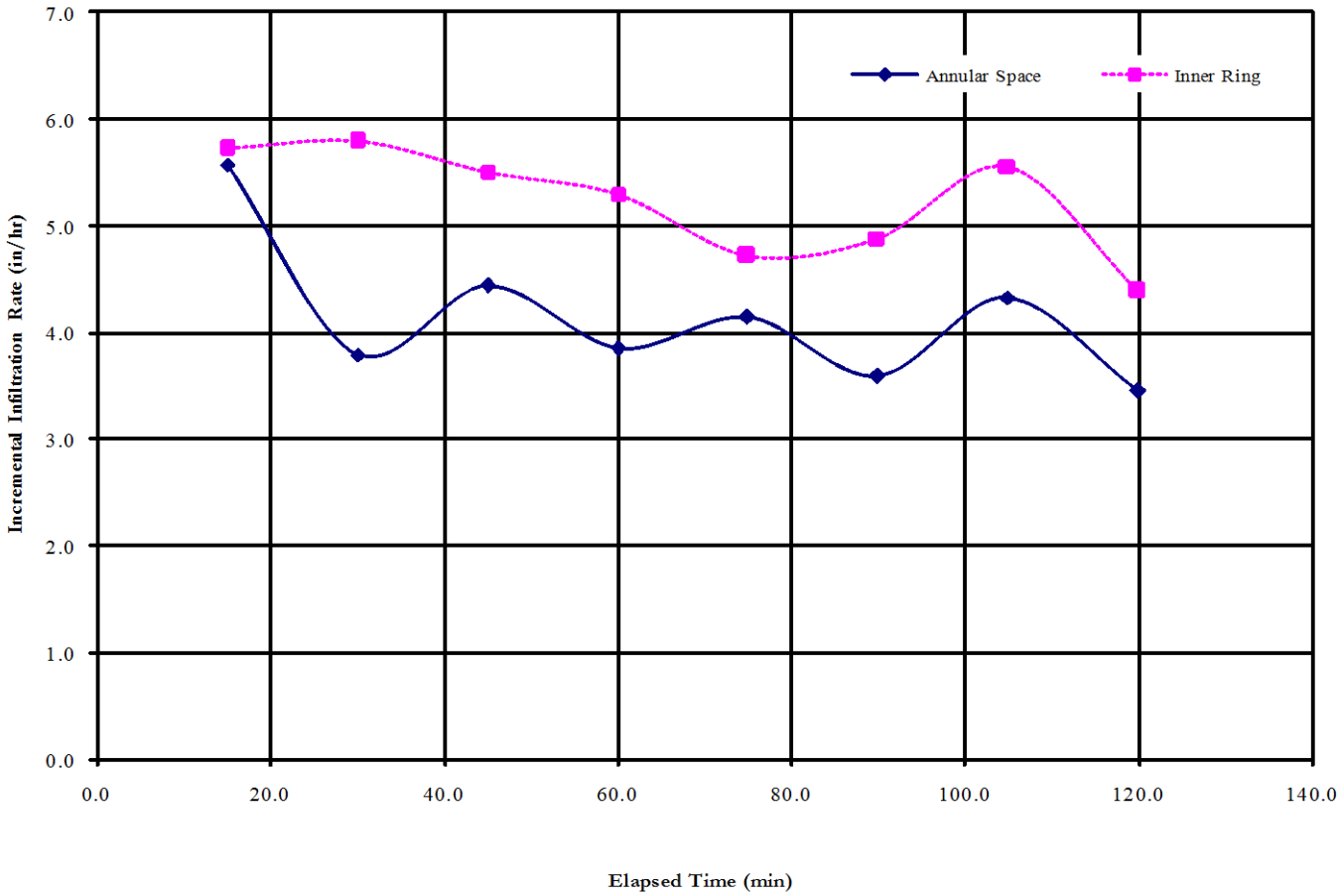
Project ID 14-G74-0/04

Tested By NRA/JAR

Test Location TP-1 @ 2.5'

Date of Test 10/8/14

INFILTRATION TEST



RMA GeoScience

INFILTRATION TEST RESULTS

Project ID	14-G74-0/04
Test Location	TP-2 @ 2.5'
Tested By	NRA/JAR
Date	10/8/14
Tube Set	2

Constants	Area (cm^2)	Depth of Liq (cm)
Inner Ring	707	15.24
Anlr. Space	2106	15.24

No.	S or E	Date M/D/Y	Time Hr:Min	Interval Elapsed (min)	Flow Readings: Inner Ring Reading (mm)	Inner Ring Flow (cm^3)	Annular Space Reading (mm)	Annular Space Flow (cm^3)	Incr. Infiltration Rate Inner (cm/hr)	Incr. Infiltration Rate Annular (cm/hr)	Incr. Infiltration Rate Inner (in/hr)	Incr. Infiltration Rate Annular (in/hr)	Remarks
1	Start	10/8/14	11:10	15	492	1,574	505	5,706	8.91	10.84	3.51	4.27	
	End	10/8/14	11:25	15	242		195						
2	Start	10/8/14	11:25	15	514	1,586	463	5,142	8.97	9.77	3.53	3.85	
	End	10/8/14	11:40	30	263		184						
3	Start	10/8/14	11:40	15	494	1,517	484	5,396	8.58	10.25	3.38	4.04	
	End	10/8/14	11:55	45	254		191						
4	Start	10/8/14	11:55	15	501	1,598	472	5,341	9.04	10.14	3.56	3.99	
	End	10/8/14	12:10	60	248		182						
5	Start	10/8/14	12:10	15	510	1,536	476	4,951	8.69	9.40	3.42	3.70	
	End	10/8/14	12:25	75	267		207						
6	Start	10/8/14	12:25	15	350	1,396	345	4,539	7.90	8.62	3.11	3.39	
	End	10/8/14	12:40	90	129		98						

RMA GeoScience

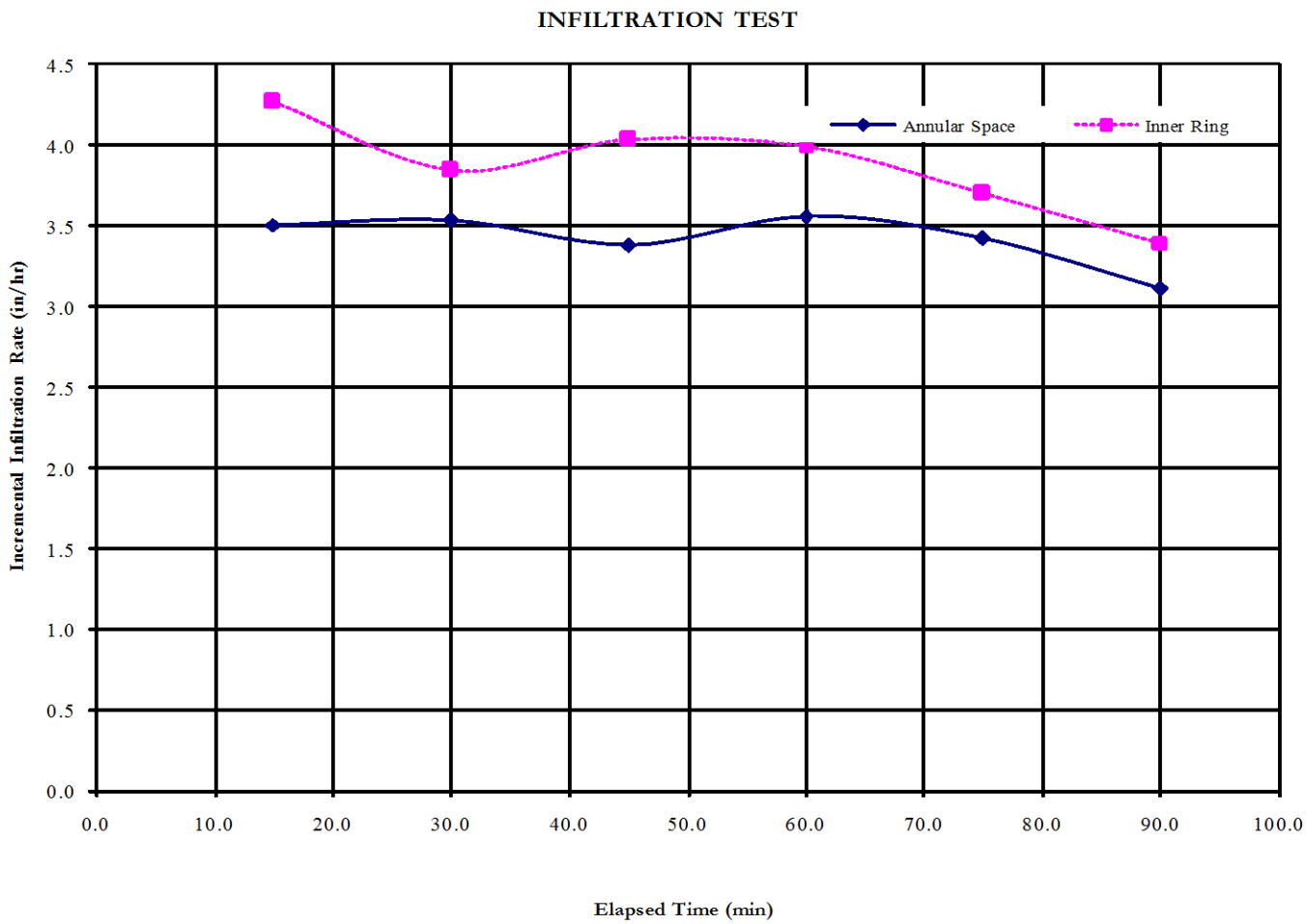
INFILTRATION TEST RESULTS

Project ID 14-G74-0/04

Test Location TP-2 @ 2.5'

Tested By NRA/JAR

Date of Test 10/8/14



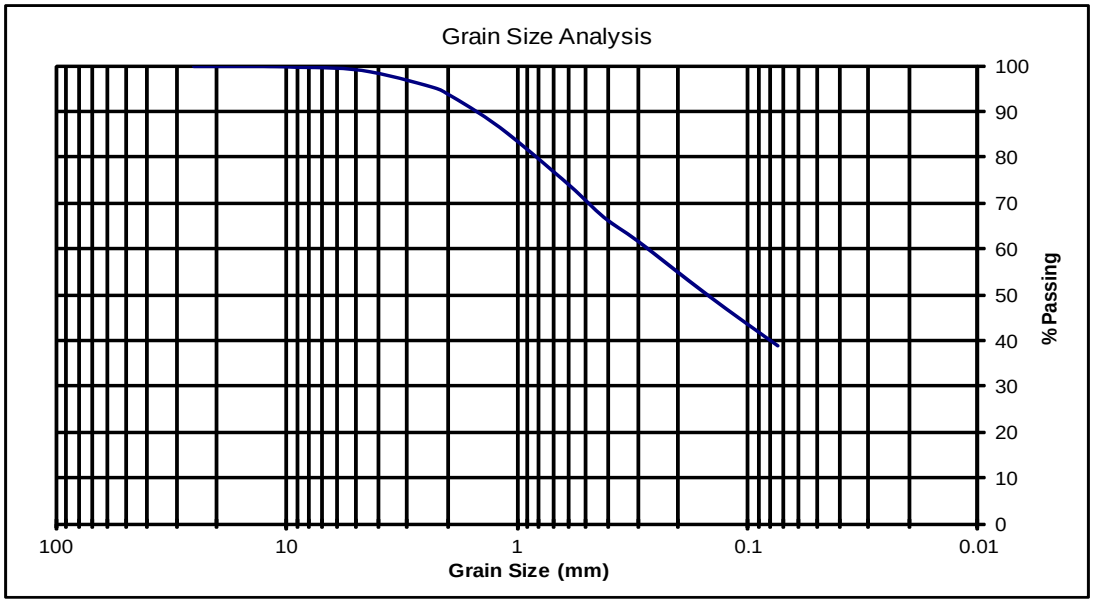
APPENDIX B

LABORATORY TEST RESULTS

PARTICLE SIZE ANALYSIS
ASTM D422

Project ID: 14-G74-0/03
Sample ID: <>
Location: TP-1 Fraction A Dry Net Weight (gms): 1281.6
Depth: 1-2.5'
Soil Description: Tan/brown silty clayey sand

Fraction A: Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
1"	0.0	1281.6	100
3/4"	0.0	1281.6	100
1/2"	0.0	1281.6	100
3/8"	1.7	1279.9	100
#4	10.7	1270.9	99
#8	57.2	1224.4	96
#10	77.8	1203.8	94
#16	171.2	1110.4	87
#30	333.1	948.5	74
#40	423.7	857.9	67
#50	491.8	789.8	62
#100	640.6	641.0	50
#200	784.8	496.8	39



APPENDIX C

TEST PIT LOGS

RMA GeoScience

TEST PIT NUMBER TP-1

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Backhoe
Backhoe Contractor: Williams Construction & Backhoe
Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			SM
										0-6" Dry light brown silty sand, loose, disturbed.			SM
5										6"-2.5' Moist taupe brown silty sand, medium dense. Roots to 2.5'			SM
										Total Depth: 2.5'			
10										**No Water, No Caving**			
15											☒		
20											☒		
25													
30													

RMA GeoScience

TEST PIT NUMBER TP-2

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Cayman Construction
Project Number: 14-G74-0/03
Date Started: 10/8/2014 Completed: 10/8/2014
Excavation Method: Backhoe
Backhoe Contractor: Williams Construction & Backhoe
Logged By: NRA Checked By: ---

Project Name: Cayman Construction - Kiel Property
Project Location: Highland - Santa Ana Canyon Rd
Ground Elevation: N/A
Ground Water Levels: N/A

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
										Old Alluvium (Qoa)			
										0-6" Slightly moist light brown silty sand, loose, disturbed.			SM
5										6"-2.5' Moist taupe brown silty sand, medium dense. Roots to 2.5'			SM
10										**Total Depth: 2.5'**			
										No Water, No Caving			
15													
20													
25													
30													

APPENDIX D

ABBREVIATION LEGEND

Abbreviation	Full Name
'	feet
"	inches
/	per
cm	centimeters
cm^2	squared centimeters
cm^3	cubic centimeters
ft	feet
ft^2	squared feet
ft^3	cubic feet
hr	hour
in	inches
in^2	squared inches
in^3	cubic inches
min	minute
s	second

APPENDIX E

REFERENCES

ASTM International, 2009, Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer, ASTM Designation D 3385-09.

RMA GeoScience, 2014, Geotechnical Review of Tentative Tract No. 18935 Map, Highland, California, dated November, 2014.

RMA Group, 2013, Geotechnical Investigation for Proposed Residential Development, 12.4 Acre Parcel, APN 1270-371-03, Highland, California, dated November 6, 2013.

IN THE CITY OF HIGHLAND

ON SITE HYDROLOGY MAP

TRACT NO. 16745 & 18935

THAT PORTION OF THE WEST 1/2 OF THE NORTHWEST 1/4 OF SECTION 1 AND THAT PORTION OF THE NORTHEAST 1/4 OF THE NORTHEAST 1/4 OF SECTION 2, ALL IN TOWNSHIP 1 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF HIGHLAND, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

SITETECH, INC. MARCH, 2015

OWNER/APPLICANT:

PHILLIP BURUM
DIVERSIFIED PACIFIC DEVELOPMENT GROUP
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730
PH: (909) 481-1150

PROJECT PLANNER:

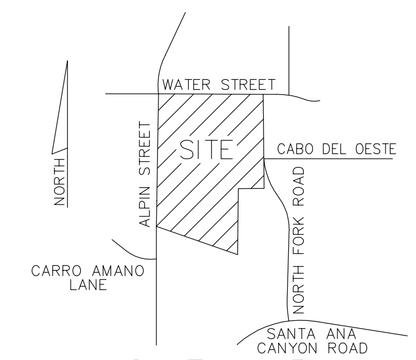
PATRIC MEYER
URBAN ENVIRONS
1345 FOUNTAIN PLACE
REDLANDS, CA 92373
PH: (909) 798-4446

ENGINEER/MAP PREPARER:

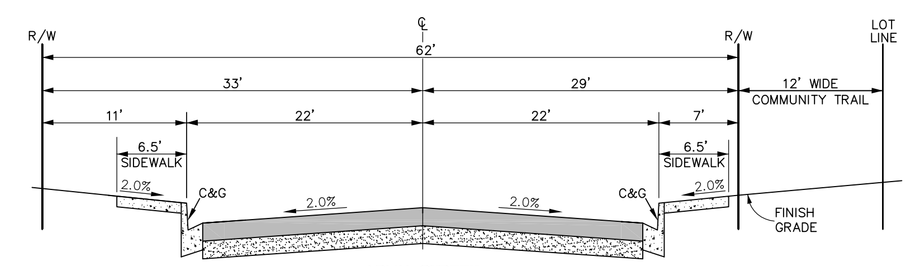
SITETECH, INC.
38248 POTATO CANYON RD.
OAK GLEN, CA. 92399
PH: (909) 864-3180

LEGEND:

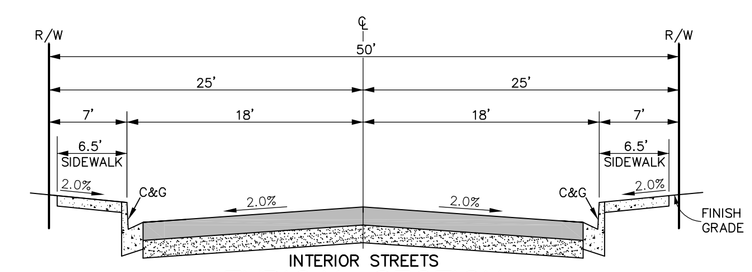
- 2400 – INDICATES EXISTING CONTOUR
- INDICATES STREET CENTERLINE
- INDICATES CURB LINE
- INDICATES EX STREET RIGHT-OF-WAY
- INDICATES BOUNDARY LINE
- INDICATES 2:1 MAX SLOPE
- P.E.=50.0 – INDICATES PAD ELEVATION



VICINITY MAP
NO SCALE



APLIN STREET
TYPICAL SECTION
T.I.=6
NO SCALE



INTERIOR STREETS
TYPICAL SECTION
T.I.=5
NO SCALE

DRAINAGE LEGEND:

- DRAINAGE AREA (AC) 10.00 / 500' FLOW PATH LENGTH
- NODE # 100
- FLOW LINE
- WATERSHED BOUNDARY

FLOW PROCESS CHART:

FROM NODE	TO NODE	FROM ELEV	TO ELEV	Q (CFS) 100 YR
100	130	1547.4	1525.2	5.67
110	130	1566.9	1525.2	5.34
120	130	1540.3	1525.2	2.31
130	130	1525.2	1525.2	12.86
130	140	1525.2	1498.6	19.79
140	160	1494.6	1494.2	19.79
150	160	1546.4	1498.6	9.62
160	160	1494.2	1494.2	28.96
160	210	1494.2	1493.3	28.96
170	180	1538.9	1500.6	6.53
180	210	1496.6	1493.3	6.53
190	200	1507.4	1499.28	0.64
200	210	1495.28	1493.3	0.64
210	210	1493.3	1493.3	35.93
210	240	1493.3	1489.7	35.93
220	240	1541.0	1489.7	7.34
230	240	1508.5	1489.7	2.07
240	240	1489.7	1489.7	44.90
240	250	1489.7	1489.6	44.90

REGISTERED PROFESSIONAL ENGINEER BERNHARD K. MAYER NO. 36866 Exp. 6-30-16 CIVIL STATE OF CALIFORNIA

SITETECH INC.
38248 POTATO CANYON RD., OAK GLEN, CALIFORNIA 92399
TELEPHONE (909) 864-3180

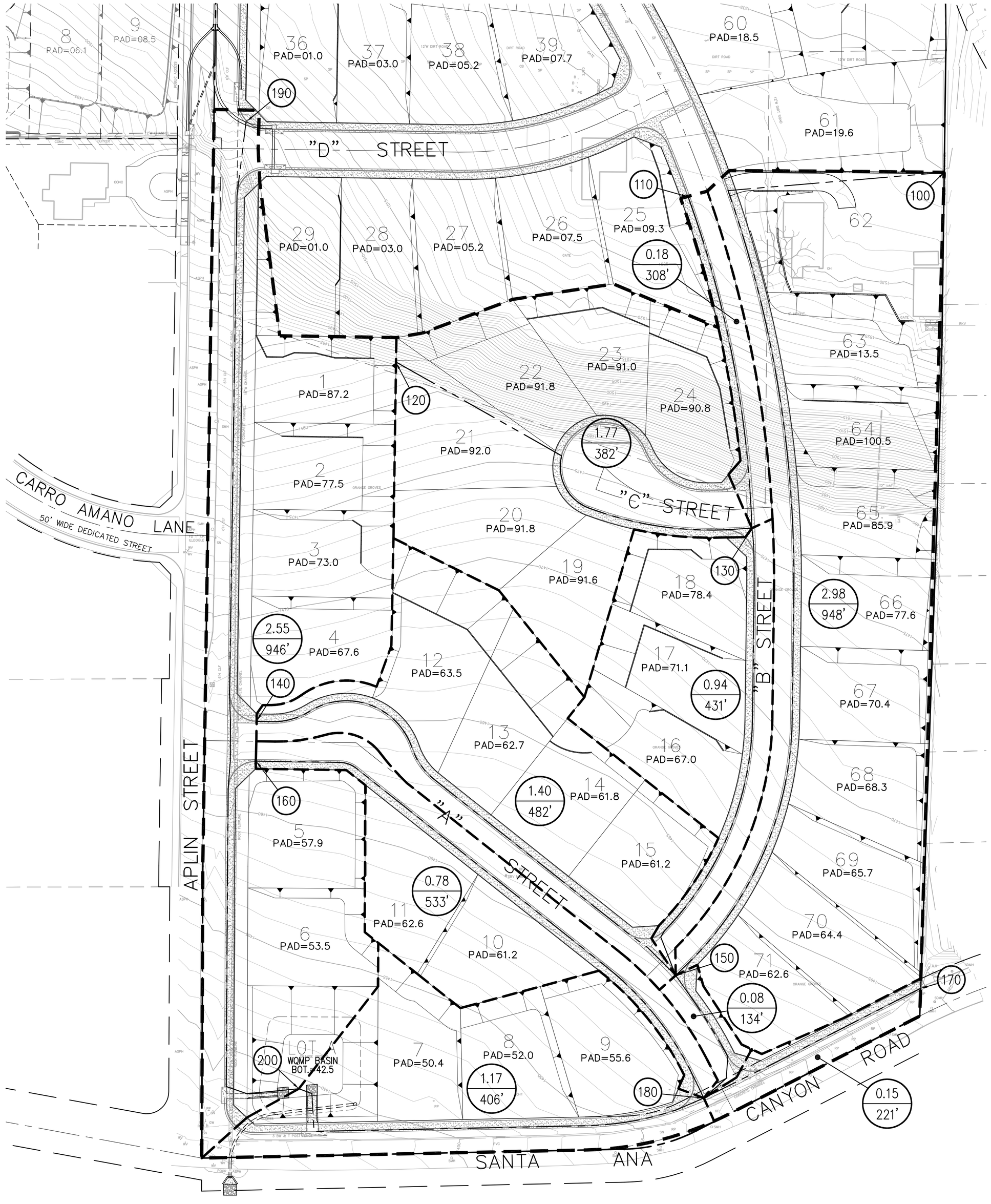
BERNHARD K. MAYER R.C.E. 36866 L.S. 7319 MARCH 12, 2015 DATE

IN THE CITY OF HIGHLAND

ON SITE HYDROLOGY MAP
TRACT NO. 18935 PHASE II

THAT PORTION OF THE WEST 1/2 OF THE NORTHWEST 1/4 AND THAT PORTION OF THE NORTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 1, AND THAT PORTION OF THE NORTHEAST 1/4 OF THE NORTHEAST 1/4 OF SECTION 2, ALL IN TOWNSHIP 1 SOUTH, RANGE 3 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE CITY OF HIGHLAND, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

SITETECH, INC. NOVEMBER, 2014



OWNER/APPLICANT:

PHILLIP BURUM
DIVERSIFIED PACIFIC DEVELOPMENT GROUP
10621 CIVIC CENTER DRIVE
RANCHO CUCAMONGA, CA 91730
PH: (909) 481-1150

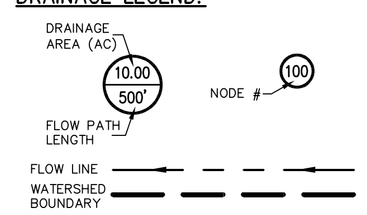
PROJECT PLANNER:

PATRIC MEYER
URBAN ENVIRONS
1345 FOUNTAIN PLACE
REDLANDS, CA 92373
PH: (909) 798-4446

ENGINEER/MAP PREPARER:

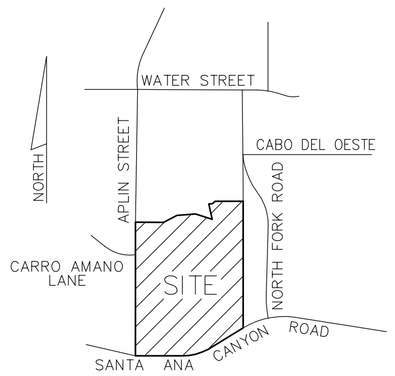
SITETECH, INC.
38248 POTATO CANYON RD.
OAK GLEN, CA. 92399
PH: (909) 864-3180

DRAINAGE LEGEND:

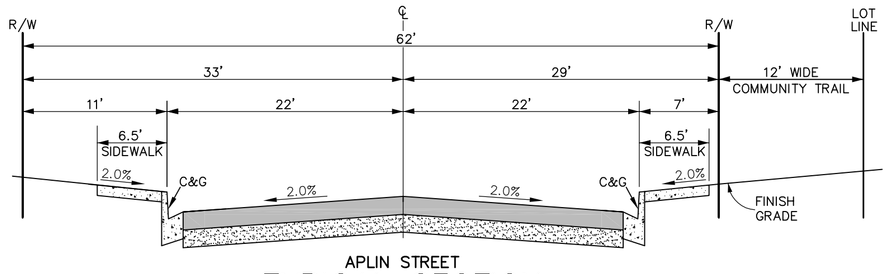


FLOW PROCESS CHART:

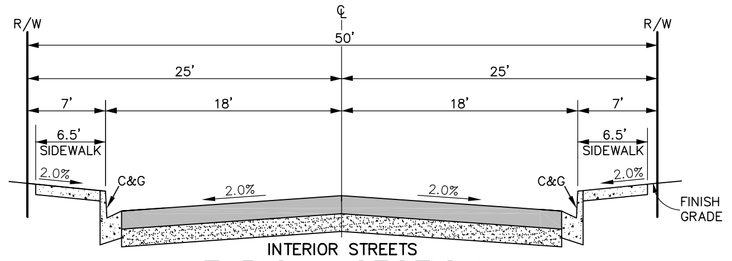
FROM NODE	TO NODE	FROM ELEV	TO ELEV	Q (CFS) 2 YR	Q (CFS) 100 YR
100	150	1534.0	1458.2	2.81	9.95
110	130	1519.2	1485.9	0.26	0.83
120	130	1493.0	1485.9	2.01	6.99
130	130	1485.9	1485.9	2.19	7.62
130	150	1485.9	1458.2	2.77	10.15
140	150	1463.2	1458.2	1.17	4.28
150	150	1458.2	1458.2	6.76	24.14
150	180	1458.2	1456.3	6.67	24.14
160	180	1463.2	1456.3	0.65	2.39
170	180	1463.8	1456.3	0.20	0.65
180	180	1456.3	1456.3	7.54	26.95
180	200	1456.3	1446.4	7.54	27.98
190	200	1499.2	1446.5	2.26	8.13
200	200	1446.5	1446.5	9.76	35.61



VICINITY MAP
NO SCALE



APLIN STREET
TYPICAL SECTION
T.I.=6
NO SCALE



INTERIOR STREETS
TYPICAL SECTION
T.I.=5
NO SCALE

LEGEND:

- 2400 – INDICATES EXISTING CONTOUR
- INDICATES STREET CENTERLINE
- INDICATES CURB LINE
- INDICATES EX STREET RIGHT-OF-WAY
- INDICATES BOUNDARY LINE
- INDICATES 2:1 MAX SLOPE
- P.E.=50.0 – INDICATES PAD ELEVATION

REGISTERED PROFESSIONAL ENGINEER BERNHARD K. MAYER NO. 36866 Exp. 6-30-16 CIVIL STATE OF CALIFORNIA

SITETECH INC.
38248 POTATO CANYON RD., OAK GLEN, CALIFORNIA 92399
TELEPHONE (909) 864-3180

BERNHARD K. MAYER R.C.E. 36866 L.S. 7319 MARCH 20, 2015 DATE

APPENDIX G

Traffic Impact Analysis

KUNZMAN ASSOCIATES, INC.

TENTATIVE TRACT MAP NO. 18935

TRAFFIC IMPACT ANALYSIS (REVISED)

April 2, 2015

Traffic Engineering | Transportation Planning | Parking | Noise/Vibration | Expert Witness
Air Quality | Global Climate Change | Health Risk Assessment

KUNZMAN ASSOCIATES, INC.

TENTATIVE TRACT MAP NO. 18935

TRAFFIC IMPACT ANALYSIS (REVISED)

April 2, 2015

Prepared by:

Perrie Ilercil, P.E.
Carl Ballard, LEED GA
William Kunzman, P.E.

William Kunzman

REGISTERED PROFESSIONAL ENGINEER
WILLIAM A. KUNZMAN
No. TR0056
TRAFFIC
STATE OF CALIFORNIA

1111 Town & Country Road, Suite 34
Orange, California 92868
(714) 973-8383

www.traffic-engineer.com

5799

Table of Contents

I. Introduction 1
- A. Project Description 1
- B. Study Area 1
- C. Analysis Methodology 2
- D. Definition of Deficiency and Significant Impact 3
  - 1. Definition of Deficiency 3
  - 2. Definition of Significant Impact 4

II. Existing Conditions 7
- A. Existing Roadway System 7
- B. Existing Volumes 7
- C. Existing Level of Service 8
- D. Planned Transportation Improvements and Relationship to General Plan 8

III. Project Traffic 16
- A. Project Description 16
- B. Trip Generation 16
- C. Trip Distribution 16
- D. Trip Assignment 17
- E. Traffic Contribution Test 17
- F. Aplin Street Connection Roadway Modification 17

IV. Future Conditions 25
- A. Future Volumes 25
- B. Aplin Street Connection Diverted Traffic 25
- C. Average Daily Traffic Volumes 25
  - 1. Existing Plus Project 25
  - 2. Opening Year (2017) Without Project 25
  - 3. Opening Year (2017) With Project 25
- D. Roadway Level of Service 26
- E. Future Level of Service 26
  - 1. Existing Plus Project 26
  - 2. Opening Year (2017) Without Project 26
  - 3. Opening Year (2017) With Project 26

V. Conclusions and Recommendations 45
- A. Summary 45
- B. Existing Conditions 45
- C. Project Traffic 46
- D. Future Conditions 46
  - 1. Existing Plus Project 46
  - 2. Opening Year (2017) Without Project 46
  - 3. Opening Year (2017) With Project 46
- E. Recommendations 47
  - 1. On-Site Improvements 47
  - 2. Off-Site Improvements 47

APPENDICES

Appendix A – Glossary of Transportation Terms

Appendix B – Scoping Agreement

Appendix C – Traffic Count Worksheets

Appendix D – Explanation and Calculation of Intersection Delay

Appendix E – Cram Elementary School Project Trips

List of Tables

Table 1. Existing Intersection Delay and Level of Service 9
Table 2. Project Trip Generation 18
Table 3. Existing Plus Project Intersection Delay and Level of Service 28
Table 4. Opening Year (2017) Without Project Intersection Delay and Level of Service 29
Table 5. Opening Year (2017) With Project Intersection Delay and Level of Service 30
Table 6. Turning Lane Storage Length Analysis 31

List of Figures

Figure 1. Project Location Map 5
Figure 2. Site Plan 6
Figure 3. Existing Through Travel Lanes and Intersection Controls 10
Figure 4. Existing Average Daily Traffic Volumes 11
Figure 5. Existing Morning Peak Hour Intersection Turning Movement Volumes 12
Figure 6. Existing Afternoon Peak Hour Intersection Turning Movement Volumes 13
Figure 7. City of Highland General Plan Circulation Element 14
Figure 8. City of Highland General Plan Roadway Cross-Sections 15
Figure 9. Project Outbound Trip Distribution 19
Figure 10. Project Inbound Trip Distribution 20
Figure 11. Project Average Daily Traffic Volumes 21
Figure 12. Project Morning Peak Hour Intersection Turning Movement Volumes 22
Figure 13. Project Afternoon Peak Hour Intersection Turning Movement Volumes 23
Figure 14. Project Trip Contribution Test Volumes 24
Figure 15. Diverted Trip Distribution 32
Figure 16. Diverted Traffic Average Daily Traffic Volumes 33
Figure 17. Diverted Traffic Morning Peak Hour Intersection Turning Movement Volumes 34
Figure 18. Diverted Traffic Afternoon Peak Hour Intersection Turning Movement Volumes 35
Figure 19. Existing Plus Project Average Daily Traffic Volumes 36
Figure 20. Opening Year (2017) Without Project Average Daily Traffic Volumes 37
Figure 21. Opening Year (2017) With Project Average Daily Traffic Volumes 38
Figure 22. Existing Plus Project Morning Peak Hour Intersection Turning Movement Volumes 39
Figure 23. Existing Plus Project Afternoon Peak Hour Intersection Turning Movement Volumes 40
Figure 24. Opening Year (2017) Without Project Morning Peak Hour Intersection Turning Movement Volumes 41
Figure 25. Opening Year (2017) Without Project Afternoon Peak Hour Intersection Turning Movement Volumes 42
Figure 26. Opening Year (2017) With Project Morning Peak Hour Intersection Turning Movement Volumes 43
Figure 27. Opening Year (2017) With Project Afternoon Peak Hour Intersection Turning Movement Volumes 44
Figure 28. Circulation Recommendations 49

I. Introduction

The purpose of this report is to provide an assessment of the traffic impacts resulting from the proposed Tentative Tract Map No. 18935 project and to identify the traffic mitigation measures necessary to maintain the established Level of Service standard for the elements of the impacted roadway system. The traffic issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act.

The City of Highland is the lead agency responsible for preparation of the traffic impact analysis, in accordance with the California Environmental Quality Act authorizing legislation. This report analyzes traffic impacts for the anticipated opening date with full occupancy of the development in Year 2017, at which time it will be generating trips at its full potential.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to transportation engineering, a glossary of terms is provided in Appendix A.

A. Project Description

The proposed development is bounded by Water Street on the north, Santa Ana Canyon Road on the south, Aplin Street on the west, and North Fork Road on the east in the City of Highland. A vicinity map showing the project location is provided on Figure 1.

The project site is proposed to be developed with an 80 single-family detached residential dwelling unit project. Figure 2 illustrates the project site plan.

B. Study Area

Regional access to the project site is provided by the SR-210 Freeway. Local access is provided by various roadways in the vicinity of the site. The north-south roadways which will be most affected by the project include Aplin Street and North Fork Road. The east-west roadways which will be most affected by the project include Water Street and Santa Ana Canyon Road.

Aplin Street roadway improvements are included with the project. The project will construct the continuation of Aplin Street from Water Street to Santa Ana Canyon Road. Aplin Street is classified as a Collector in the City of Highland General Plan. Currently, the Aplin Street roadway section is a half-section of the ultimate right of way on the west side of the road from approximately the Desmond Drive alignment to Santa Ana Road.

No analysis is required further than 5 miles from the project site. The roadway elements that must be analyzed are dependent on both the analysis year (project Opening Year or Horizon Year) and project generated traffic volumes. The identification of the study area, and the intersections and highway segments requiring analysis, was based on an estimate of the two-way traffic volumes on the roadway segments near the project site. All arterial segments have been included in the analysis when the anticipated project volume equals or

exceeds 50 two-way trips in the peak hours. The requirement is 100 two-way peak hour trips for freeways.

The project does not contribute trips greater than the freeway threshold volume of 100 two-way peak hour trips. The project does not contribute trips greater than the arterial link threshold volume of 50 two-way trips in the peak hours on facilities serving intersections in any adjacent city. Otherwise, each of these agencies must also be provided with a copy of the traffic impact analysis, once the document is accepted by the City of Highland[1].

C. Analysis Methodology

The analysis of the traffic impacts from the proposed development and the assessment of the required mitigation measures were based on an evaluation of the existing and forecast traffic conditions in the vicinity of the site with and without the project. The following analysis years are considered in this report based upon the scoping agreement (see Appendix B):

- Existing Conditions (2014)
- Existing Plus Project Conditions[2]
- Project Opening Year Conditions (2017)

Existing intersections traffic conditions were established through morning and afternoon[3] peak hour traffic counts obtained by Kunzman Associates, Inc. from December 2014 (see Appendix C).

Project traffic volumes for all future projections were estimated using the Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.

To determine the trip distributions for the proposed project, peak hour traffic counts of the existing directional distribution of traffic for existing areas in the vicinity of the site and other additional information were reviewed.

The Opening Year (2017) traffic volumes have been calculated based on an annual growth rate of existing traffic volumes over the number of year until the completion date.

Project traffic volumes were then added to the projected traffic volumes. The result of this traffic forecasting procedure is a series of traffic volumes suitable for traffic operations analysis.

---

[1] The purpose of this notification is to allow the California Department of Transportation and other agencies to identify opportunities to make improvements to intersections concurrent with adjacent development, at considerably less cost and disruption than would occur if it were done after-the-fact.

[2] The existing plus project conditions has been analyzed to comply with the Sunnyvale West Neighborhood Association v. City of Sunnyvale CEQA court case. This scenario assumes the full development of the proposed project and full absorption of the proposed project trips on the circulation system at the present time. This scenario is provided for informational purposes only, and will not be used for impact determinations or mitigation.

[3] Because of the proximity to the adjacent school, the morning and afternoon peak periods counted were to capture the morning arrival and afternoon dismissal period of the school. "Afternoon" and "Evening" are being used to describe the same peak period throughout the report and appendices.

The technique used to assess the capacity needs of an intersection is known as the Intersection Delay Method (see Appendix D) using the Transportation Research Board, Highway Capacity Manual, 2010 methodology using the HCS+ software, Version 6.5 (2014). To calculate delay, the volume of traffic using the intersection is compared with the capacity of the intersection. The intersections are considered deficient (Level of Service F) if the overall intersection critical volume to capacity ratio equals or exceeds 1.0, even if the level of service defined by the delay value is below the defined Level of Service standard. The volume to capacity ratio is defined as the critical volumes divided by the intersection capacity. A volume to capacity ratio greater than 1.0 implies an infinite queue.

The peak hour traffic volumes have been adjusted to peak 15 minute volumes for analysis purposes using the existing observed peak 15 minute to peak hour factors for all scenarios analyzed. This is to account for the effects of congestion on peak spreading. Peak spreading refers to the tendency of traffic to spread more evenly across time as congestion increases.

When required, the traffic mitigation needs anticipated at the time of the project opening with full occupancy are combined into a summary of mitigation requirements and costs. The mitigation cost responsibility for the proposed development was estimated based on the percent of the increase in traffic from the existing condition to the Opening Year that was attributed to the project-generated trips.

D. Definition of Deficiency and Significant Impact

The following definitions of deficiencies and significant impacts have been developed in accordance with the City of Highland requirements.

1. Definition of Deficiency

The definition of an intersection deficiency has been obtained from the City of Highland General Plan. The General Plan states that peak hour intersection operations of Level of Service D or better are generally acceptable. Therefore, any intersection operating at Level of Service E or F will be considered deficient.

For freeway facilities, the Congestion Management Program controls the definition of deficiency for purposes of this study. The Congestion Management Program definition of deficiency is based on maintaining a Level of Service standard of Level of Service E or better, except where an existing Level of Service F condition is identified in the Congestion Management Program document (San Bernardino County Congestion Management Program Table 2-1). A Congestion Management Program deficiency is, therefore, defined as any freeway segment operating or projected to operate at Level of Service F, unless the segment is identified explicitly in the Congestion Management Program document.

The identification of a Congestion Management Program deficiency requires further analysis in satisfaction of Congestion Management Program requirements, including:

- Evaluation of the mitigation measures required to restore traffic operations to an acceptable level with respect to Congestion Management Program Level of Service standards.

- Calculation of the project share of new traffic on the impacted Congestion Management Program facility during peak hours of traffic.

- Estimation of the cost required to implement the improvements required to restore traffic operations to an acceptable Level of Service as described above.

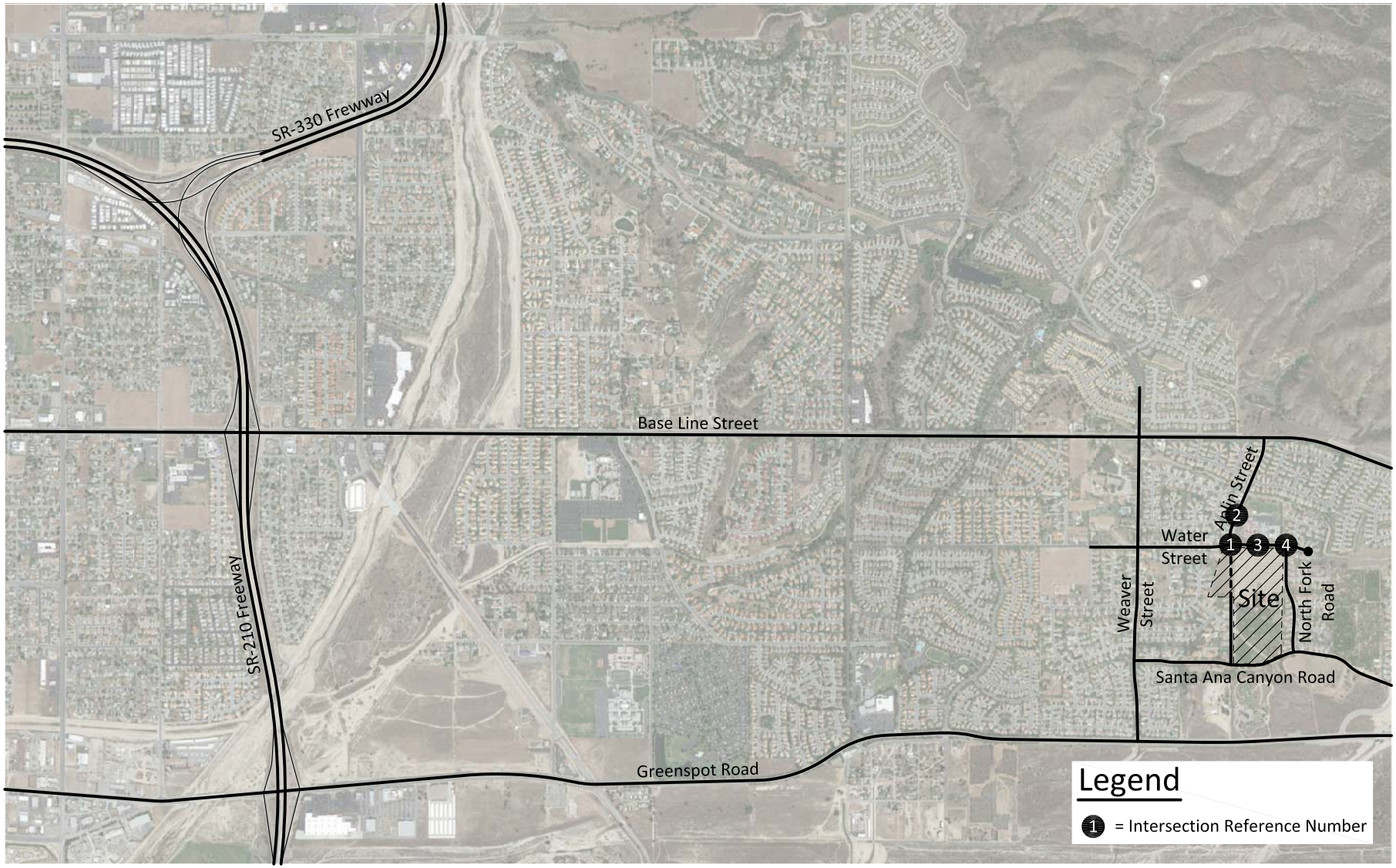
This study incorporates each of these aspects for all locations where a Congestion Management Program deficiency is identified.

2. Definition of Significant Impact

The identification of significant impacts is a requirement of the California Environmental Quality Act. The City of Highland General Plan and Circulation Element have been adopted in accordance with California Environmental Quality Act requirements, and any roadway improvements within the County of San Bernardino that are consistent with these documents are not considered a significant impact, so long as the project contributes its "fair share" funding for improvements.

A traffic impact is considered significant if the project both: i) contributes measurable traffic to and ii) substantially and adversely changes the Level of Service at any off-site location projected to experience deficient operations under fore-seeable cumulative conditions, where feasible improvements consistent with the City of Highland General Plan cannot be constructed.

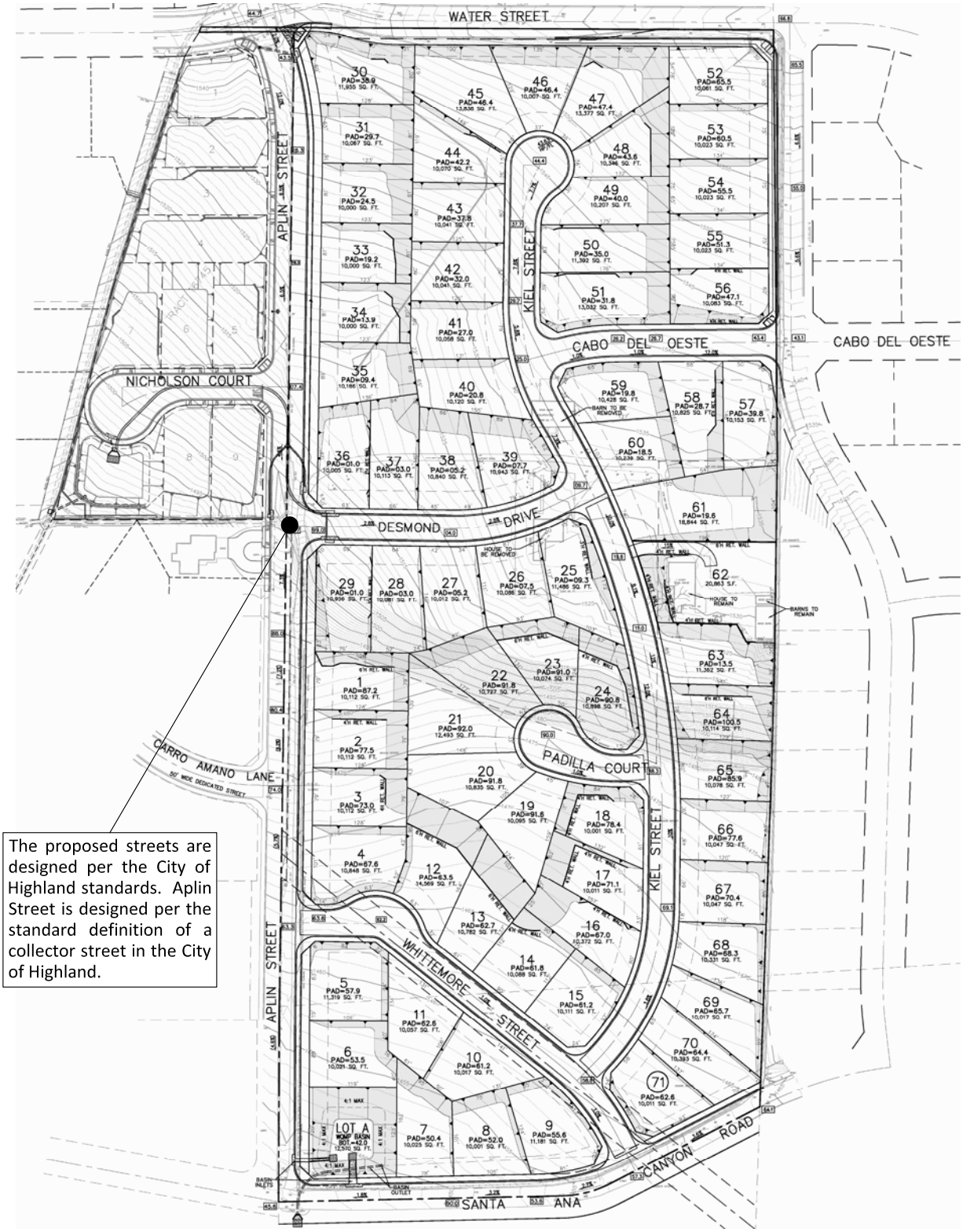
Figure 1
Project Location Map



KUNZMAN ASSOCIATES, INC.
OVER 35 YEARS OF EXCELLENT SERVICE

5799/1

Figure 2
Site Plan



The proposed streets are designed per the City of Highland standards. Aplin Street is designed per the standard definition of a collector street in the City of Highland.

5799/2

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

II. Existing Conditions

A. Existing Roadway System

Figure 3 identifies the existing conditions for study area roadways. The number of through lanes for existing roadways and the existing intersection controls are identified.

Regional access to the project site is provided by the SR-210 Freeway. Local access is provided by various roadways in the vicinity of the site. The north-south roadways which will be most affected by the project include Aplin Street and North Fork Road. The east-west roadways which will be most affected by the project include Water Street and Santa Ana Canyon Road.

B. Existing Volumes

Typically, the existing average daily traffic volumes are factored from peak hour counts using the following formula for each intersection leg:

PM Peak Hour (Approach + Exit Volume) x 11.5 = Daily Leg Volume.

This is a conservative estimate and may over estimate the average daily traffic volumes. Figure 4 depicts the approximate existing average daily traffic volumes using the afternoon peak hour volumes.

Existing intersection traffic conditions were established through morning and afternoon peak hour traffic counts obtained by Kunzman Associates, Inc. from December 2014 (see Appendix C) and shown on Figures 5 and 6, respectively. Explicit peak hour factors have been calculated using the data collected for this effort as well. The morning and afternoon peak hour traffic volumes were identified by counting the two-hour periods from 7:00 AM – 9:00 AM and 1:00 PM – 3:00 PM.

Because of the proximity to an adjacent elementary school the morning and afternoon peak periods counted were to capture the morning arrival and afternoon dismissal period of the school. School starts at 7:45 AM, and is dismissed at 12:00 NOON (early Kindergarten), 1:50 PM (Grades 1 to 5) and 1:54 PM (late Kindergarten).

It should be noted that illegal traffic maneuvers were made at the school exit on Aplin Street north of Water Street and entry on Water Street east of Aplin Street. The school driveways are clearly marked as one way. These illegal movements are shown on Figures 5 and 6 as well as Appendix B, but otherwise not included in the traffic report. Existing turning movements, which are in disregard of the posted one way sign of the school exit were <u>not</u> used for the traffic analysis, as this is an enforcement issue to be brought to the attention of the school.

As is common around most elementary schools there was congestion during the morning and afternoon related to student trips. While traffic was heavy at arrival and dismissal

times, the traffic dispersed quickly. Much of the congestion can be taken off Water Street if the school moves the on-site receiving line forward in the school pickup lane. This will allow additional vehicles to queue in the school on-site pickup lane versus the Water Street left turn lane. Also the school should encourage parents to arrive as early as possible in the morning and wait till after student dismissal to arrive.

C. Existing Level of Service

The Existing delay and Level of Service for primary intersection in the vicinity of the project are shown in Table 1. The study area intersections currently operate at an acceptable Level of Service during the peak hours for Existing traffic conditions (see Table 1). Existing intersection delay and level of service worksheets are provided in Appendix D.

D. Planned Transportation Improvements and Relationship to General Plan

The City of Highland General Plan Circulation Element is shown on Figure 7. Existing and future roadways are included in the Circulation Element of the General Plan and are graphically depicted on Figure 7. This figure shows the nature and extent of arterial highways that are needed to adequately serve the ultimate development depicted by the Land Use Element of the General Plan. The City of Highland General Plan roadway cross-sections are shown on Figure 8.

Table 1

Existing Intersection Delay and Level of Service

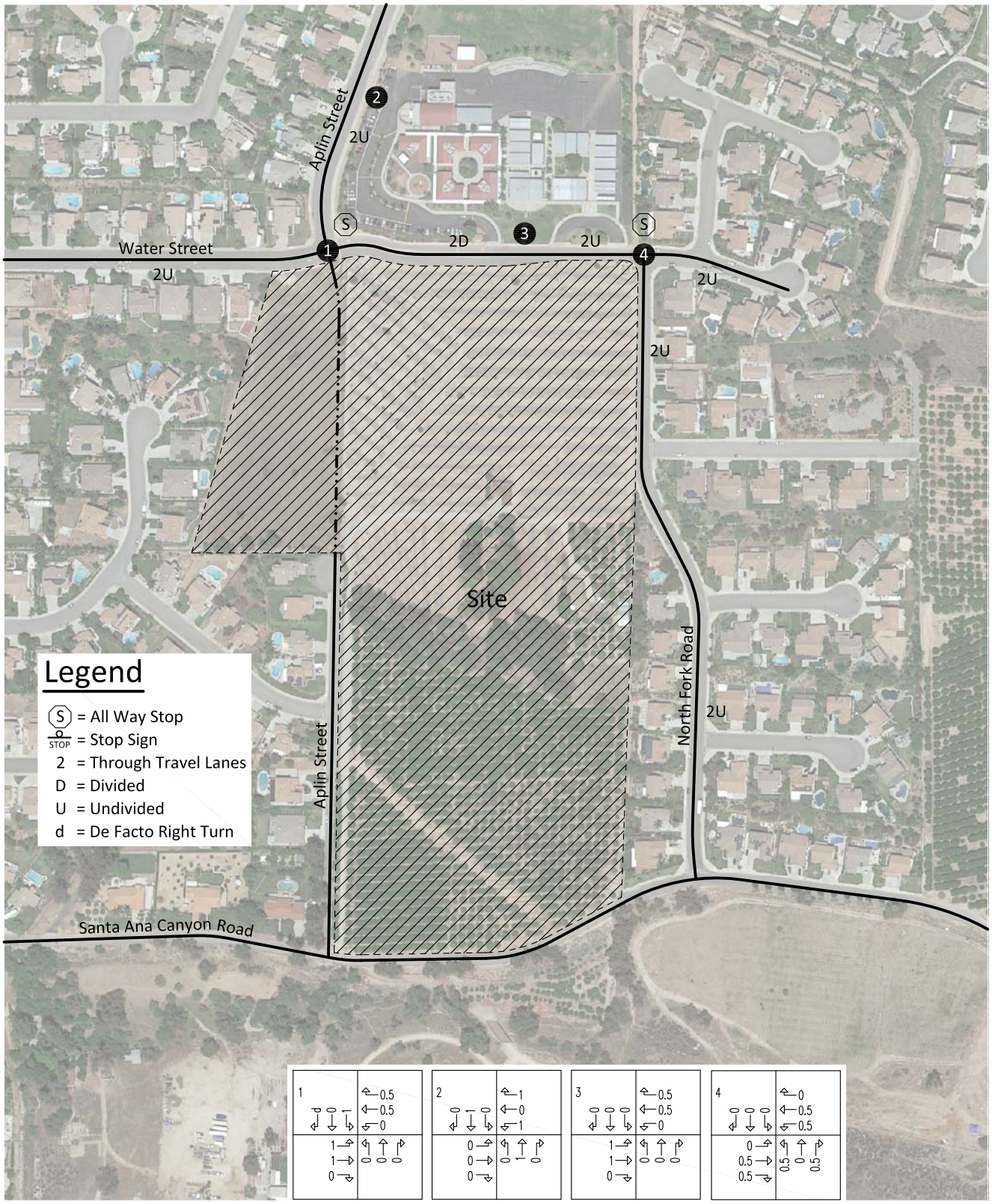
Intersection	Jurisdiction	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour Delay-LOS[2]	
			Northbound			Southbound			Eastbound			Westbound				
			L	T	R	L	T	R	L	T	R	L	T	R	Morning	Afternoon
Aplin Street (NS) at:																
Water Street - #1	Highland	AWS	0	0	0	1	0	d	1	1	0	0	0.5	0.5	11.89-B	8.48-A
School Exit (EW) - #2	Highland	CSS	0	1	0	0	1	0	0	0	0	1	0	1	11.0-B	10.1-B
School Entry (NS) at:																
Water Street (EW) - #3	Highland	CSS	0	0	0	0	0	0	1	1	0	0	0.5	0.5	9.4-A	7.8-A
North Fork Road (NS) at:																
Water Street (EW) - #4	Highland	AWS	0.5	0	0.5	0	0	0	0	0.5	0.5	0.5	0.5	0	8.59-A	7.30-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes. L = Left; T = Through; R = Right.

[2] Delay and level of service has been calculated using the following analysis software: Highway Capacity Software Version 6.65 (2014). Per the Highway Capacity Manual, overall average for intersection delay and level of service are shown for intersections with traffic signal or all way stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All-Way Stop; CSS= Cross Street Stop

Figure 3
Existing Travel Lanes and Intersection Controls

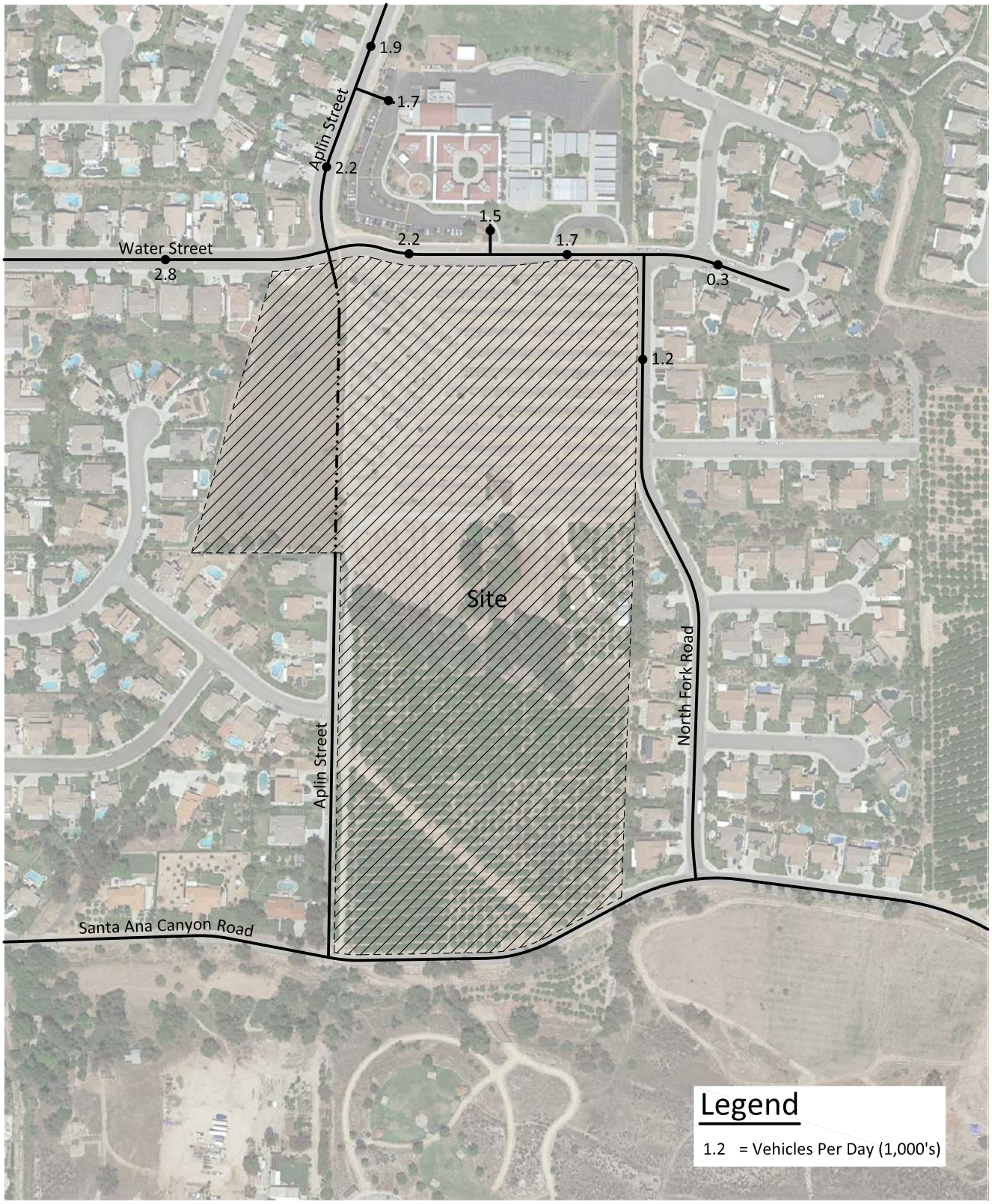


5799/3

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 4
Existing Average Daily Traffic Volumes

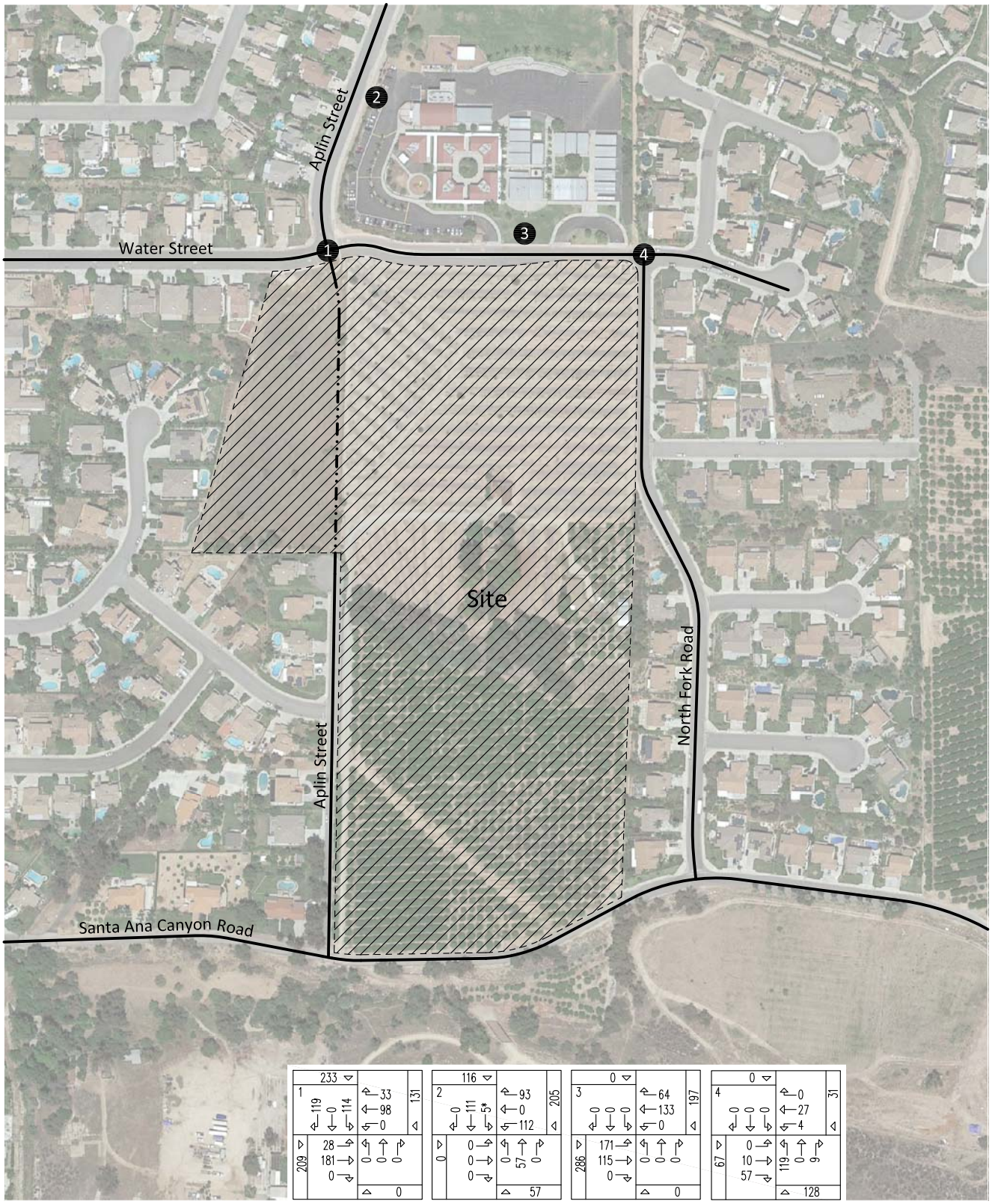


5799/4

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 5
Existing Morning Peak Hour Intersection Turning Movement Volumes



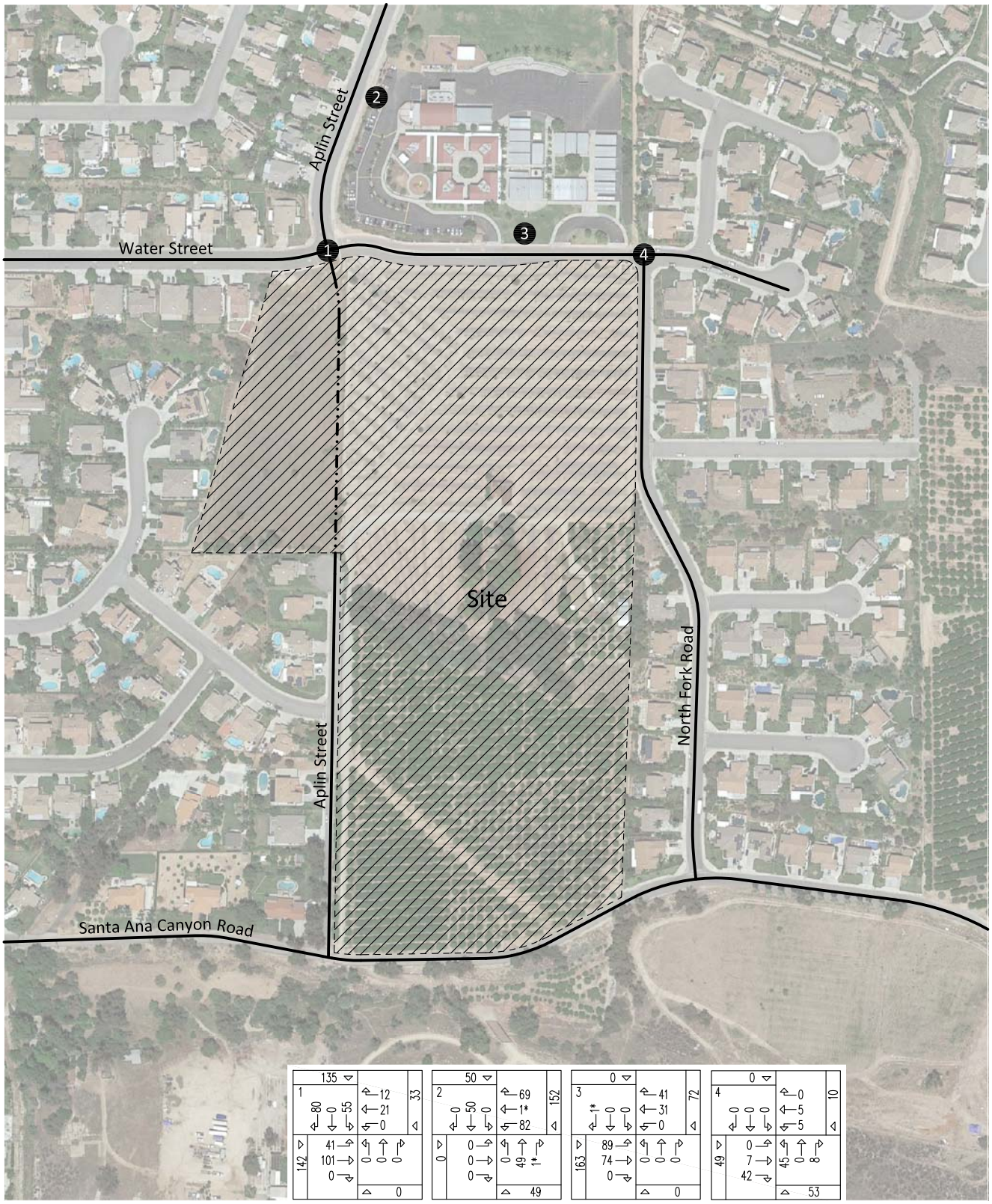
* Note: Movement in disregard of signing and striping.

5799/5

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 6
Existing Afternoon Peak Hour Intersection Turning Movement Volumes



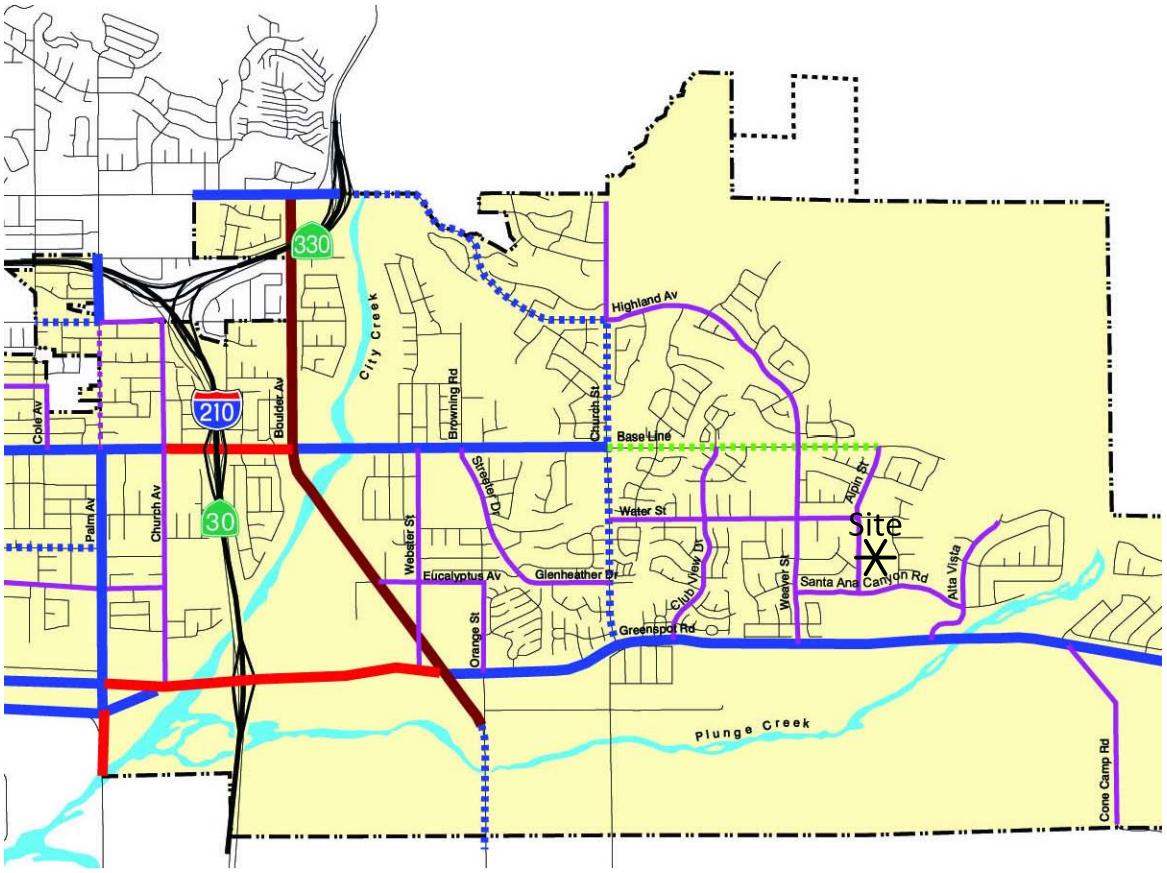
* Note: Movement in disregard of signing and striping.

5799/6

Kunzman Associates, Inc. Intersection reference numbers are in upper left corner of turning movement boxes.

Over 35 Years of Excellent Service

Figure 7
City of Highland General Plan Circulation Element



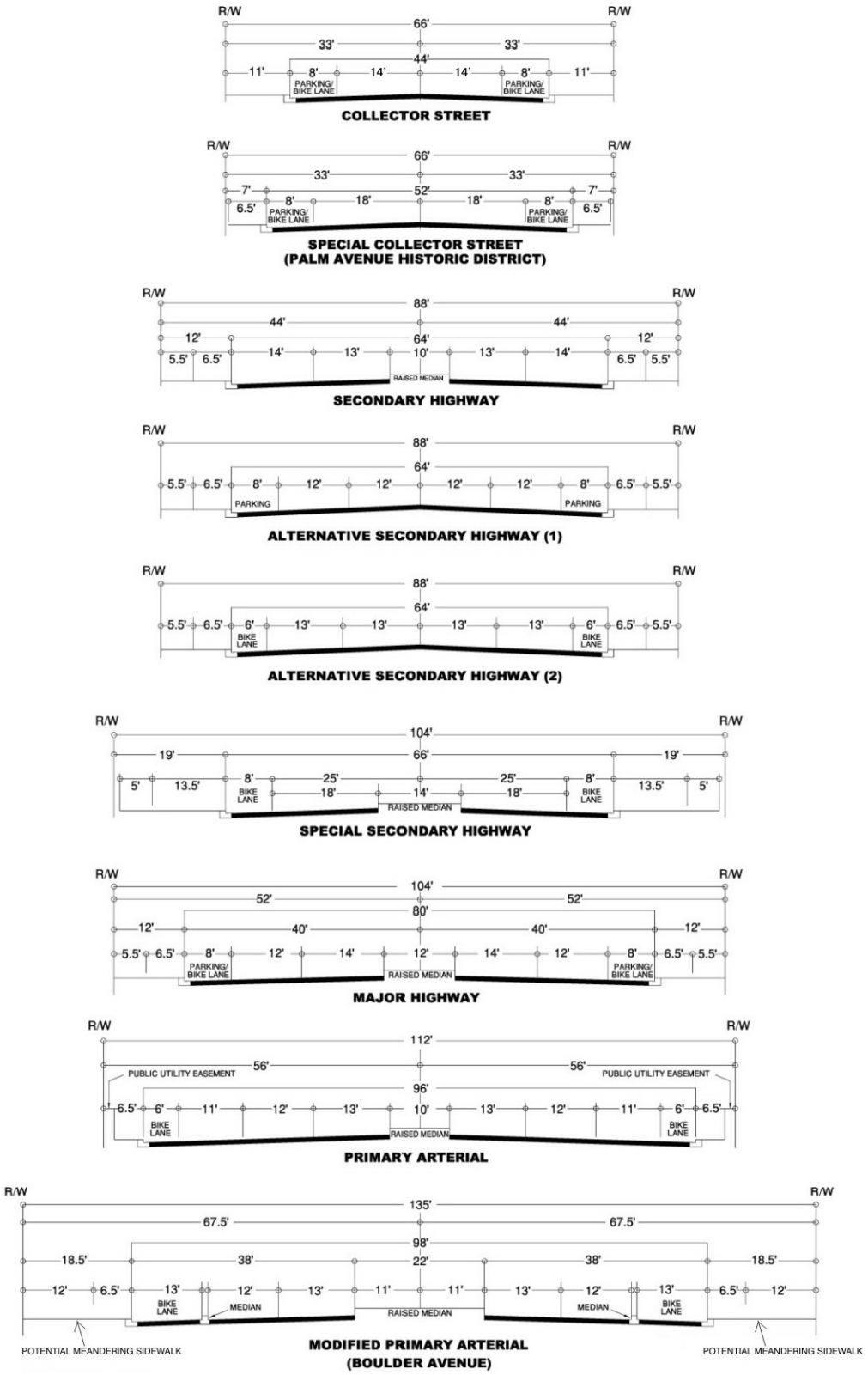
Legend

- Freeway
- Freeway Ramp
- Modified Primary Arterial
- Primary Arterial
- Major Highway
- Secondary Highway
- Special Secondary Highway
- Collector Street
- Special Collector Street
- City Boundary
- Sphere of Influence

Source: City of Highland

5799/7

Figure 8
City of Highland General Plan Roadway Cross-Sections



Source: City of Highland

5799/8

III. Project Traffic

A. Project Description

The project site is proposed to be developed with an 80 single-family detached residential dwelling unit project. The project will have access to Aplin Street, North Fork Road, and Santa Ana Canyon Road.

B. Trip Generation

The trips generated by the project are determined by multiplying an appropriate trip generation rate by the quantity of land use. Trip generation rates are predicated on the assumption that energy costs, the availability of roadway capacity, the availability of vehicles to drive, and life styles remain similar to what are known today. A major change in these variables may affect trip generation rates.

Trip generation rates were determined for daily trips, morning peak hour inbound and outbound trips, and afternoon peak hour inbound and outbound trips for the proposed land use. By multiplying the trip generation rates by the land use quantity, the traffic volumes are determined. Table 2 shows the project trip generation based upon rates obtained from the Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.

As shown in Table 2, the proposed development is projected to generate approximately 762 daily vehicle trips, 60 of which will occur during the morning peak hour and 80 of which will occur during the afternoon[4] peak hour.

C. Trip Distribution

Figures 9 and 10 contain the directional distributions of the project trips for the proposed land use.

To determine the trip distributions for the proposed project, peak hour traffic counts of the existing directional distribution of traffic for existing areas in the vicinity of the site and other additional information relating to the adjacent school.

A school walk zone is typically 1/2 mile or 1-mile out from an elementary school. However, a more conservation analysis which includes morning and afternoon drop off at the school is included for this traffic analysis even though the elementary school is across the street from the proposed subdivision. The number of elementary students from the proposed development, which might be dropped off during the morning and picked up in the afternoon, are determined based on Redlands Unified School District census information and counts taken at the school entry and exit. These calculations are shown in Appendix E.

[4] Because of the proximity to the adjacent school, the morning and afternoon peak periods counted were to capture the morning arrival and afternoon dismissal period of the school. In order to provide a "conservative" analysis, the evening peak hour trip generation was used for the afternoon peak hour.

D. Trip Assignment

Based on the identified trip generation and distributions, project average daily traffic volumes have been calculated and shown on Figure 11. Morning and afternoon peak hour intersection turning movement volumes expected from the project are shown on Figures 12 and 13, respectively.

E. Traffic Contribution Test

No analysis is required further than 5 miles from the project site. The roadway elements that must be analyzed are dependent on both the analysis year and project generated traffic volumes. The identification of the study area, and the intersections and highway segments requiring analysis, was based on an estimate of the two-way traffic volumes on the roadway segments near the project site. All arterial segments have been included in the analysis when the anticipated project volume equals or exceeds 50 two-way trips in the peak hours. The requirement is 100 two-way peak hour trips for freeways. Figure 14 graphically depicts the project trip contribution test volumes on all of the roadway segments adjacent to the potential intersection analysis locations until the project volume contribution has clearly dropped below the 50 trip threshold and 100 trip threshold.

The project does not contribute trips greater than the freeway threshold volume of 100 two-way peak hour trips. The project does not contribute trips greater than the arterial link threshold volume of 50 two-way trips in the peak hours on facilities serving intersections in any adjacent city. Otherwise, each of these agencies must also be provided with a copy of the traffic impact analysis, once the document is accepted by the City of Highland[5].

F. Aplin Street Connection Roadway Modification

Aplin Street roadway improvements are included with the project. The project will construct the continuation of Aplin Street from Water Street to Santa Ana Canyon Road. Aplin Street is classified as a Collector in the City of Highland General Plan.

The proposed project will construct Aplin Street at its the ultimate half-section width from between Santa Ana Road to Desmond Drive alignment, and at its the ultimate cross-section width from Water Street to Desmond Drive. The improvements will modify the existing turning movements for the Aplin Street at Water Street intersection. The proposed turning movement changes of the Aplin Street at Water Street intersection, are shown in Tables 3 and 5 as improvements in bold underline font (see footnote 1).

[5] The purpose of this notification is to allow the California Department of Transportation and other agencies to identify opportunities to make improvements to intersections concurrent with adjacent development, at considerably less cost and disruption than would occur if it were done after-the-fact.

Table 2

Project Trip Generation[1]

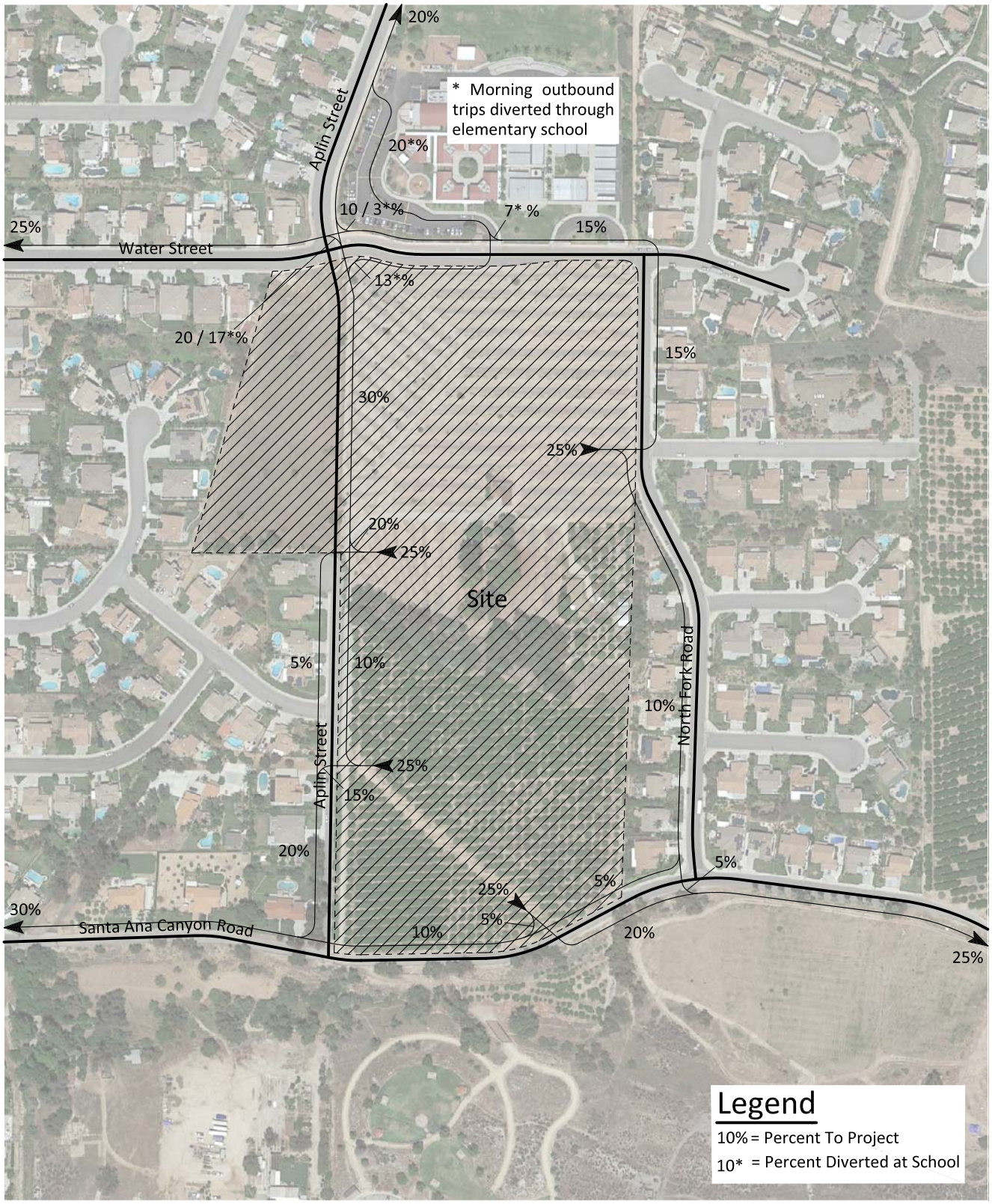
Land Use	Quantity	Units[3]	Peak Hour						Daily
			Morning			Afternoon[2]			
			Inbound	Outbound	Total	Inbound	Outbound	Total	
Trip Generation Rates									
Single-Family Detached Residential		DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52
Trips Generated									
Single-Family Detached Residential	80	DU	15	45	60	50	30	80	762

[1] Source: Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012, Land Use Category 210.

[2] Because of the proximity to the adjacent school the morning and afternoon peak periods counted were to capture the morning arrival and afternoon dismissal period of the school. In order to provide a "conservative" analysis, the evening peak hour trip generation was used for the afternoon peak hour.

[3] DU = Dwelling Units

Figure 9
Project Outbound Trip Distribution

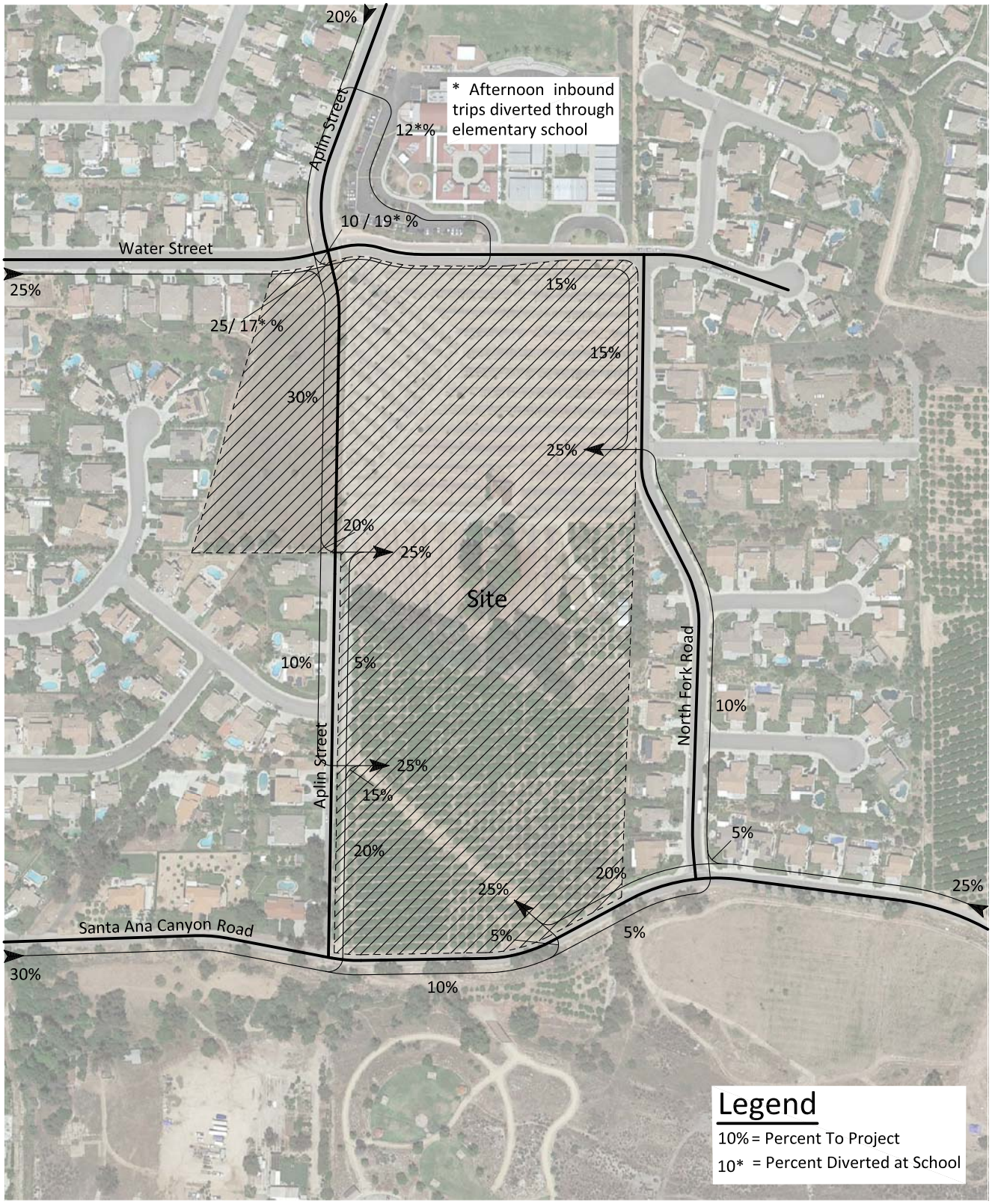


5799/9

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 10
Project Inbound Trip Distribution

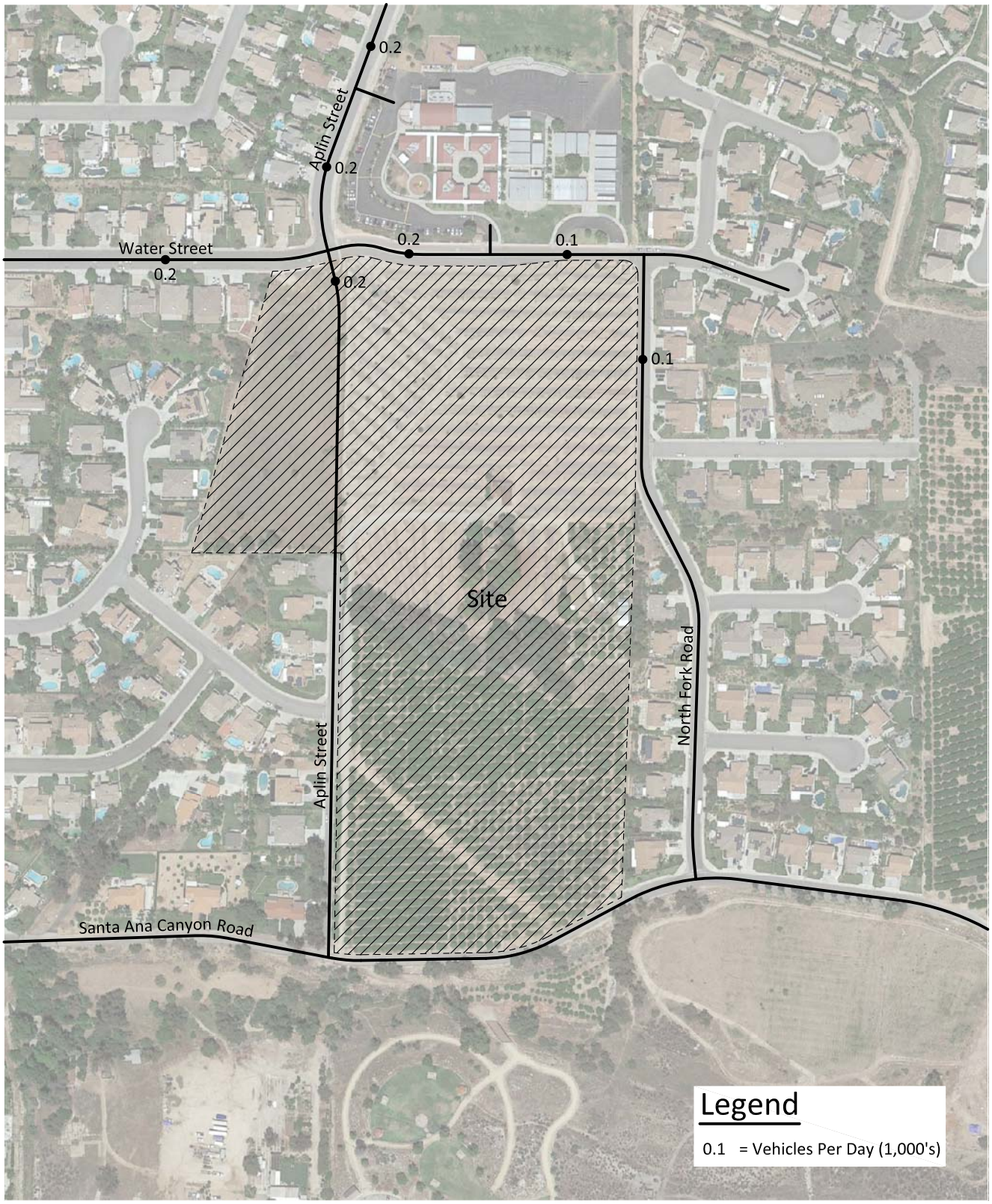


5799/10

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 11
Project Average Daily Traffic Volumes

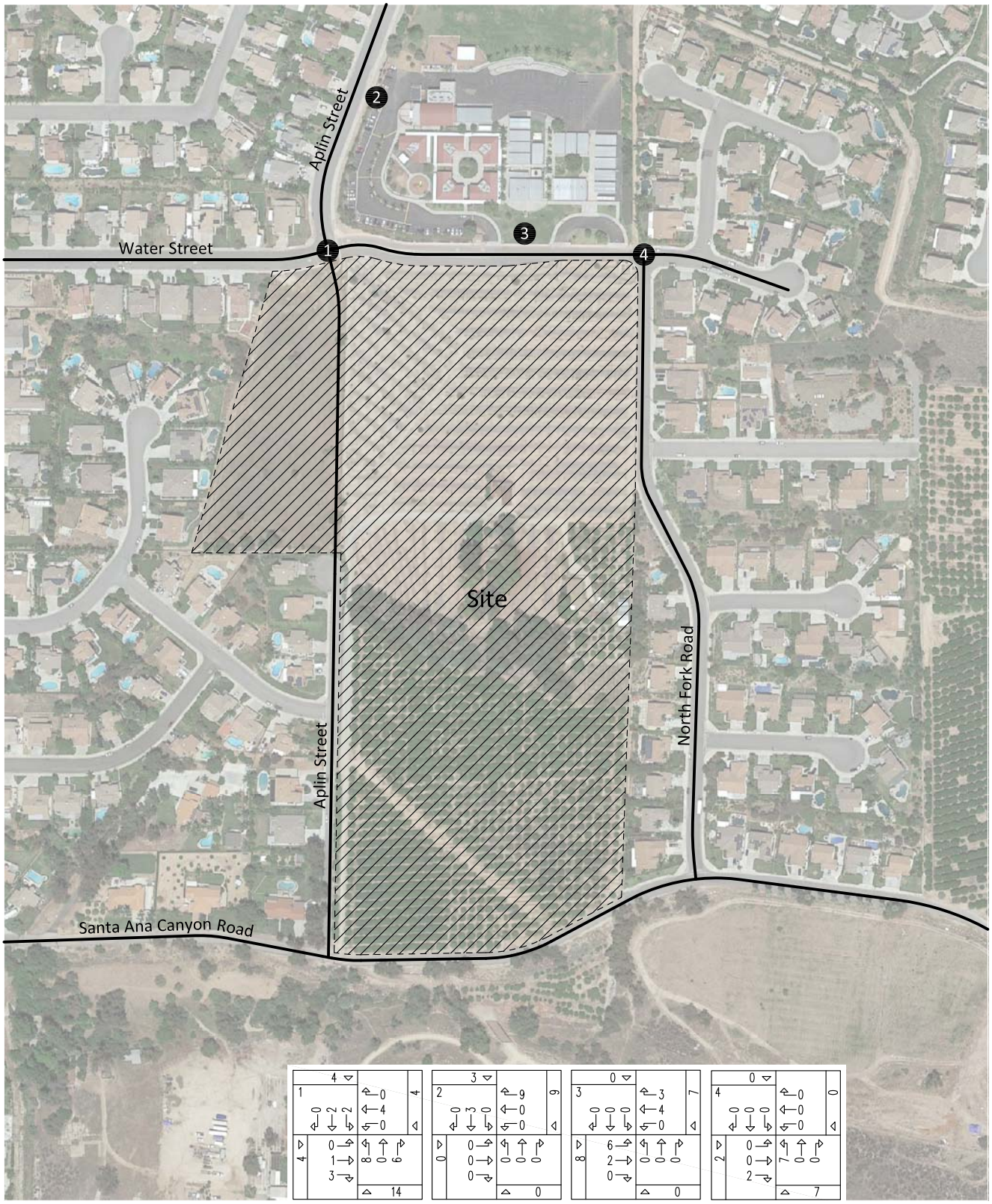


5799/11

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 12
Project Morning Peak Hour Intersection Turning Movement Volumes

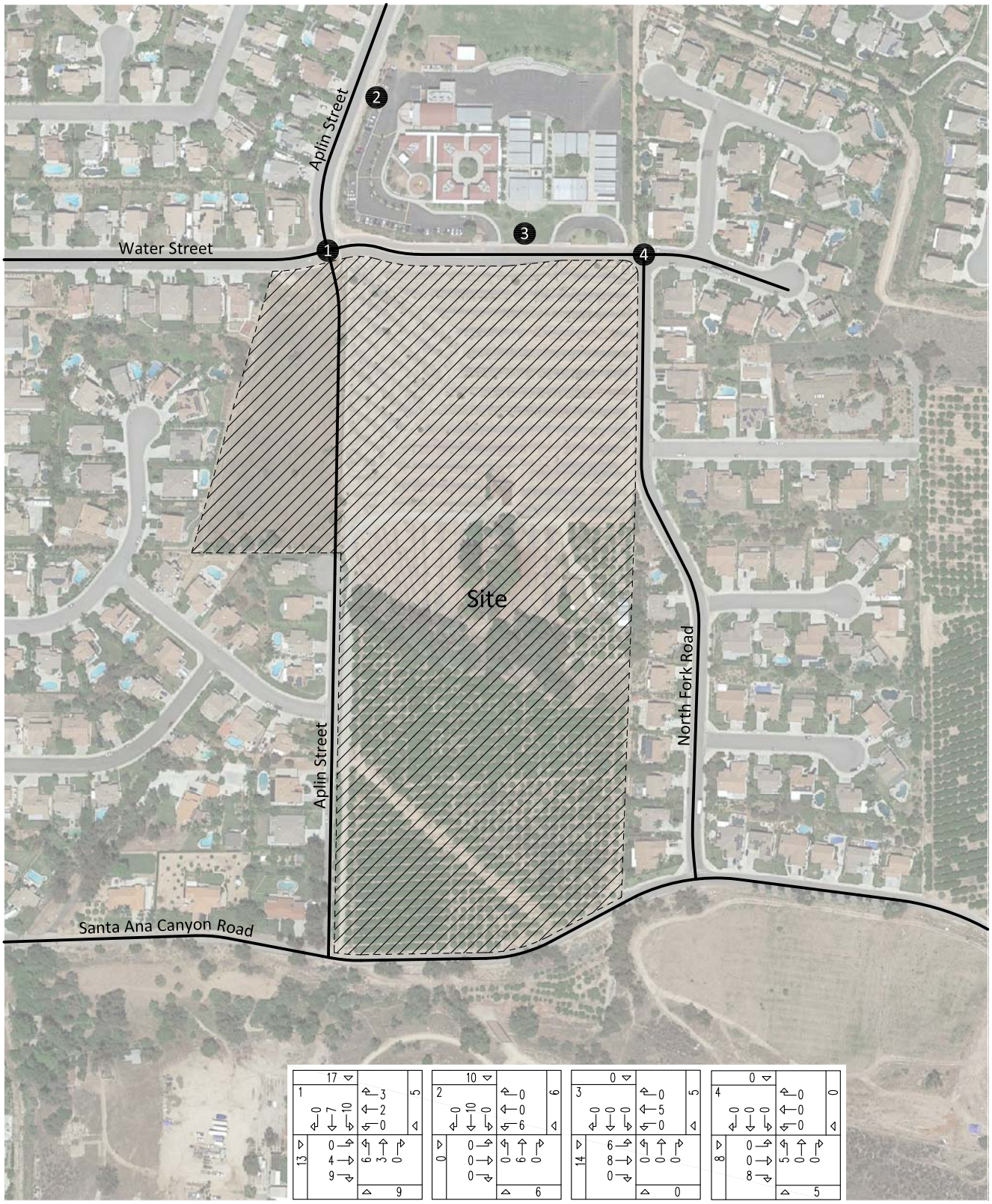


5799/12

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 13
Project Afternoon Peak Hour Intersection Turning Movement Volumes

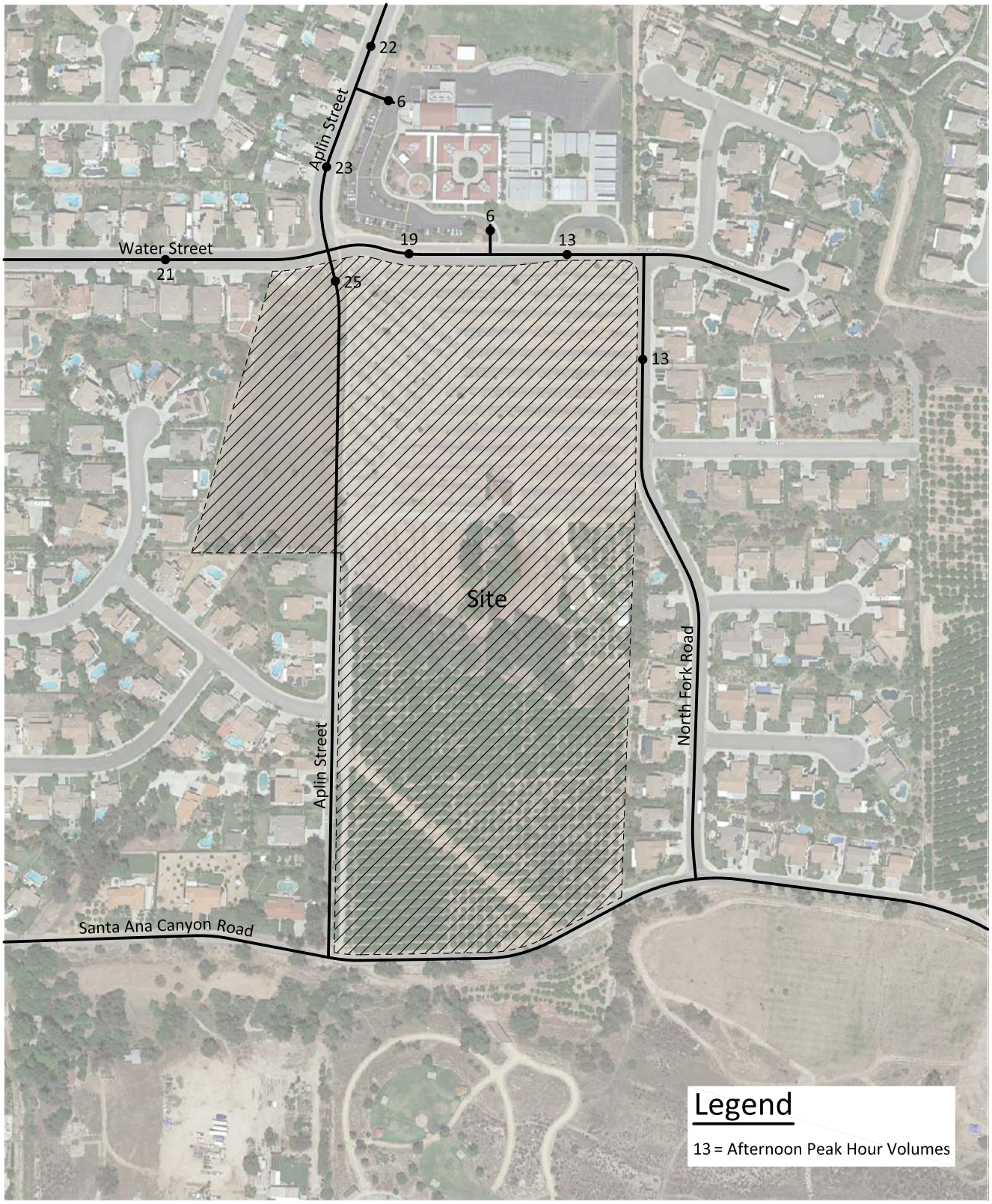


5799/13

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 14
Project Trip Contribution Test Volumes



5799/14

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

IV. Future Conditions

A. Future Volumes

The Opening Year (2017) traffic volumes have been calculated based on a 1.0 percent annual growth rate of existing traffic volumes over a three year period.

B. Aplin Street Connection Diverted Traffic

Aplin Street roadway improvements are included with the project. The project will construct the continuation of Aplin Street from Water Street to Santa Ana Canyon Road at the ultimate cross-section of the roadway. Aplin Street is classified as a Collector in the City of Highland General Plan. The extension of the existing Collector from the north to the south will allow the existing traffic an alternate route to travel. Based on the existing traffic patterns and engineering judgment, a percent of the existing northbound traffic volumes and existing southbound traffic volumes were diverted to the collector roadway. Figure 15 shows the directional distribution of the diverted background trips for the proposed connection.

Based on the existing traffic volumes and the estimated trip redistributions, diverted traffic average daily traffic volumes have been calculated and shown on Figure 16. Figures 17 and 18 show the diverted traffic morning and afternoon peak hour intersection turning movement volumes, respectively.

C. Average Daily Traffic Volumes

1. Existing Plus Project

The average daily traffic volumes for existing traffic conditions have been added to the average daily traffic volumes for project traffic to determine the Existing Plus Project values. Existing Plus Project average daily traffic volumes are shown on Figure 19.

2. Opening Year (2017) Without Project

The average daily traffic volumes for Opening Year (2017) Without Project traffic conditions have been determined as described above using the annual growth projection. Opening Year (2017) Without Project average daily traffic volumes are shown on Figure 20.

3. Opening Year (2017) With Project

The average daily traffic volumes for Opening Year (2017) With Project traffic conditions have been determined as described above using the volume addition process. Opening Year (2017) With Project average daily traffic volumes are shown on Figure 21.

D. Roadway Level of Service

Roadway segments are considered to operate at an acceptable level when the daily traffic volumes do not exceed the average daily traffic volumes as specified by the roadway classification. The City of Highland average daily traffic volume as specified for a Collector roadway is 10,000. The newly constructed Aplin Street connection is projected to have a volume of 500 vehicles for Opening Year With Project. The new Aplin Street roadway segment is projected to operate within acceptable Levels of Service during the peak hours.

E. Future Level of Service

Intersection delay and level of service worksheets are provided in Appendix D for future traffic conditions.

1. Existing Plus Project

The Existing Plus Project delay and Level of Service for the study area roadway network are shown in Table 3. Table 3 shows delay values based on the existing geometrics at the study area intersections. Existing Plus Project morning and afternoon peak hour intersection turning movement volumes are shown on Figures 22 and 23, respectively.

For Existing Plus Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during the peak hours.

2. Opening Year (2017) Without Project

The Opening Year (2017) Without Project delay and Level of Service for the study area roadway network without the proposed project are shown in Table 4. Table 4 shows delay values based on the existing geometrics at the study area intersections. Opening Year (2017) Without Project morning and afternoon peak hour intersection turning movement volumes are shown on Figures 24 and 25, respectively.

For Opening Year (2017) Without Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during peak hours.

3. Opening Year (2017) With Project

The Opening Year (2017) With Project delay and Level of Service for the study area roadway network with the proposed project are shown in Table 5. Table 5 shows delay values based on the existing geometrics at the study area intersections. Opening Year (2017) With Project morning and afternoon peak hour intersection turning movement volumes are shown on Figures 26 and 27, respectively.

For Opening Year (2017) With Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during the peak hours.

4. Turning Lane Storage Analysis

If the number of turning vehicles is below 25, an exclusive turning lane is generally not warranted. Typically, a left turn lane is needed for conditions with more than 100 turning vehicles per hour, and dual left turn lanes are recommended if the left turn volume exceeds 300 vehicles per hour during the peak hour. The recommended minimum acceptable design length for a turn storage length is 150 feet for arterials with speeds greater than 45 miles per hour. For local streets and driveways, smaller storage lengths are permitted when volumes permit. The recommended maximum single turn storage length shall be 300 feet; therefore, dual left hand turn lanes should be used when over 300 feet of storage is required or when necessary to provide acceptable levels of service at the intersection.

In general, right turn traffic delays are less critical than left turn delays. However, right turn storage lanes can be justified on the basis of capacity analysis and accident records. Right turn and left turn storage lengths are determined using the same methodology.

Required storage lengths have been calculated based on the guidelines provided in the California Department of Transportation Highway Design Manual, Section 405.2 (2)(e). For unsignalized intersections, the required storage length is calculated as the number of turning vehicles likely to arrive in an average 2-minute period during the peak hour. For signalized intersections, the required storage length is calculated based on 2 times the average turning vehicles per cycle. This provides a storage length to accommodate all turn arrivals during the peak hour 95 percent of the time. A minimum of 2 passenger cars should be provided at 25 feet per vehicle (50 feet minimum storage length).

Unsignalized
[TLV (vehicles per hour) x (2 minutes) x (hour/60 min)] * 25 feet per vehicle
= Length for 2 minutes

Signalized
[TLV (vehicles per hour) x (Cycle sec) x (hour/ 3600 sec)] * 25 feet per vehicle *2
= Length per cycle

Turning storage lengths at the Aplin Street and Water Street intersection were analyzed to verify the storage capacity for the proposed project.

Currently, there is no exclusive turning lane in the southbound direction of Aplin Street and Water Street intersection. The existing left turn volume is greater than 100 vehicles per hour, an exclusive left turn lane is recommended. See Table 6 for calculated storage lengths.

Table 3

Existing Plus Project Intersection Delay and Level of Service

Intersection	Jurisdiction	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour Delay-LOS[2]	
			Northbound			Southbound			Eastbound			Westbound				
			L	T	R	L	T	R	L	T	R	L	T	R	Morning	Afternoon
Aplin Street (NS) at:																
Water Street - #1	Highland	AWS	**1**	**0.5**	**0.5**	1	**0.5**	0.5	1	0.5	**0.5**	0	1	0	12.98-B	9.03-A
School Exit (EW) - #2	Highland	CSS	0	1	0	0	1	0	0	0	0	1	0	1	11.0-B	10.4-B
School Entry (NS) at:																
Water Street (EW) - #3	Highland	CSS	0	0	0	0	0	0	1	1	0	0	1	0	9.5-A	7.8-A
North Fork Road (NS) at:																
Water Street (EW) - #4	Highland	AWS	0.5	0	0.5	0	0	0	0	0.5	0.5	0.5	0.5	0	8.46-A	7.36-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes. L = Left; T = Through; R = Right; **1** = Improvement.

[2] Delay and level of service has been calculated using the following analysis software: Highway Capacity Software Version 6.65 (2014). Per the Highway Capacity Manual, overall average for intersection delay and level of service are shown for intersections with traffic signal or all way stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All-Way Stop; CSS= Cross Street Stop

Table 4

Opening Year (2017) Without Project Intersection Delay and Level of Service

Intersection	Jurisdiction	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour Delay-LOS[2]	
			Northbound			Southbound			Eastbound			Westbound				
			L	T	R	L	T	R	L	T	R	L	T	R	Morning	Afternoon
Aplin Street (NS) at:																
Water Street - #1	Highland	AWS	0	0	0	1	0	d	1	1	0	0	0.5	0.5	12.22-B	8.54-A
School Exit (EW) - #2	Highland	CSS	0	1	0	0	1	0	0	0	0	1	0	1	11.1-B	10.2-B
School Entry (NS) at:																
Water Street (EW) - #3	Highland	CSS	0	0	0	0	0	0	1	1	0	0	1	0	9.5-A	7.8-A
North Fork Road (NS) at:																
Water Street (EW) - #4	Highland	AWS	0.5	0	0.5	0	0	0	0	0.5	0.5	0.5	0.5	0	8.47-A	7.32-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes. L = Left; T = Through; R = Right.

[2] Delay and level of service has been calculated using the following analysis software: Highway Capacity Software Version 6.65 (2014). Per the Highway Capacity Manual, overall average for intersection delay and level of service are shown for intersections with traffic signal or all way stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All-Way Stop; CSS= Cross Street Stop

Table 5

Opening Year (2017) With Project Intersection Delay and Level of Service

Intersection	Jurisdiction	Traffic Control[3]	Intersection Approach Lanes[1]												Peak Hour Delay-LOS[2]	
			Northbound			Southbound			Eastbound			Westbound				
			L	T	R	L	T	R	L	T	R	L	T	R	Morning	Afternoon
Aplin Street (NS) at:																
Water Street - #1	Highland	AWS	**1**	**0.5**	**0.5**	1	**0.5**	0.5	1	0.5	**0.5**	0	1	0	12.70-B	9.21-A
School Exit (EW) - #2	Highland	CSS	0	1	0	0	1	0	0	0	0	1	0	1	11.2-B	10.5-B
School Entry (NS) at:																
Water Street (EW) - #3	Highland	CSS	0	0	0	0	0	0	1	1	0	0	1	0	9.6-A	7.9-A
North Fork Road (NS) at:																
Water Street (EW) - #4	Highland	AWS	0.5	0	0.5	0	0	0	0	0.5	0.5	0.5	0.5	0	8.53-A	7.36-A

[1] When a right turn lane is designated, the lane can either be striped or unstriped. To function as a right turn lane, there must be sufficient width for right turning vehicles to travel outside the through lanes. L = Left; T = Through; R = Right; **1** = Improvement.

[2] Delay and level of service has been calculated using the following analysis software: Highway Capacity Software Version 6.65 (2014). Per the Highway Capacity Manual, overall average for intersection delay and level of service are shown for intersections with traffic signal or all way stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] AWS = All-Way Stop; CSS= Cross Street Stop

Table 6

Turning Lane Storage Length Analysis[1]

Intersection	Jurisdiction	Traffic Control[2]	Peak Hour	Intersection Turn Lanes											
				Southbound				Eastbound				Westbound			
				Lane	Turning Volume[3]	Required Length	Approx Length[4]	Lane	Turning Volume[3]	Required Length	Approx Length[4]	Lane	Turning Volume[5]	Required Length	Approx Length[4]
Existing															
Aplin Street (NS) at:															
Water Street - #1	Highland	AWS		1				1				1			
- Morning Peak Hour			AM		114	95.0	100		28	23.3			33	27.5	30
- Afternoon Peak Hour			PM		55	45.8			41	34.2	40		12	10.0	
Existing Plus Project															
Aplin Street (NS) at:															
Water Street - #1	Highland	AWS		1				1				1			
- Morning Peak Hour			AM		105	87.5	90		17	14.2			33	27.5	30
- Afternoon Peak Hour			PM		58	48.3			34	28.3	30		15	12.5	
Opening Year (2017) Without Project															
Aplin Street (NS) at:															
Water Street - #1	Highland	AWS		1				1				1			
- Morning Peak Hour			AM		117	97.5	100		29	24.2			34	28.3	30
- Afternoon Peak Hour			PM		57	47.5			42	35.0	40		12	10.0	
Opening Year (2017) With Project															
Aplin Street (NS) at:															
Water Street - #1	Highland	AWS		1				1				1			
- Morning Peak Hour			AM		107	89.2	90		18	15.0			34	28.3	30
- Afternoon Peak Hour			PM		60	50.0			50	41.7	50		15	12.5	
Existing															
Aplin Street (NS) at:															
School Exit (EW) - #2	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		0	0.0	-		112	93.3	100
- Afternoon Peak Hour			PM		0	0.0	-		0	0.0	-		82	68.3	
Existing Plus Project															
Aplin Street (NS) at:															
School Exit (EW) - #2	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		0	0.0	-		112	93.3	100
- Afternoon Peak Hour			PM		0	0.0	-		0	0.0	-		89	74.2	
Opening Year (2017) Without Project															
Aplin Street (NS) at:															
School Exit (EW) - #2	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		0	0.0	-		115	95.8	100
- Afternoon Peak Hour			PM		0	0.0	-		0	0.0	-		86	71.7	
Opening Year (2017) With Project															
Aplin Street (NS) at:															
School Exit (EW) - #2	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		0	0.0	-		115	95.8	100
- Afternoon Peak Hour			PM		0	0.0	-		0	0.0	-		92	76.7	
Existing															
School Entry (NS) at:															
Water Street (EW) - #3	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		171	142.5	150		64	53.3	60
- Afternoon Peak Hour			PM		0	0.0	-		89	74.2			41	34.2	
Existing Plus Project															
School Entry (NS) at:															
Water Street (EW) - #3	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		177	147.5	150		67	55.8	60
- Afternoon Peak Hour			PM		0	0.0	-		95	79.2			41	34.2	
Opening Year (2017) Without Project															
School Entry (NS) at:															
Water Street (EW) - #3	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		176	146.7	150		66	55.0	60
- Afternoon Peak Hour			PM		0	0.0	-		92	76.7			42	35.0	
Opening Year (2017) With Project															
School Entry (NS) at:															
Water Street (EW) - #3	Highland	CSS		1				1				1			
- Morning Peak Hour			AM		0	0.0	-		182	151.7	160		69	57.5	60
- Afternoon Peak Hour			PM		0	0.0	-		98	81.7			42	35.0	

[1] Source: California Department of Transportation, Highway Design Manual, Section 405.2.

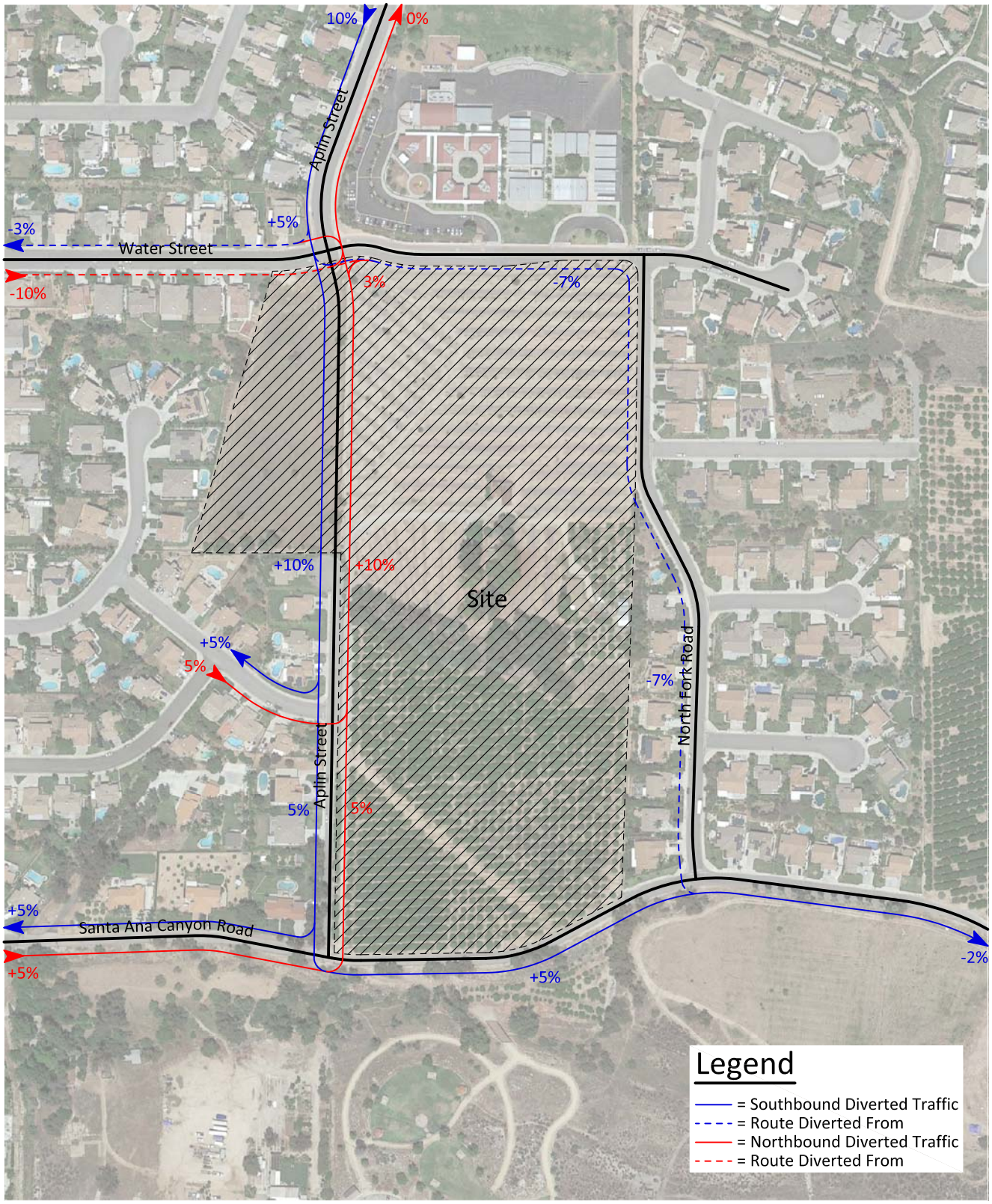
[2] CSS = Cross Street Stop, AWS = All-Way Stop.

[3] Left turn volume.

[4] Approximate queue length needed at the intersection for the turn volume.

[5] Turning volume either right turn or left turn depending on the intersection.

Figure 15
Diverted Trip Distribution

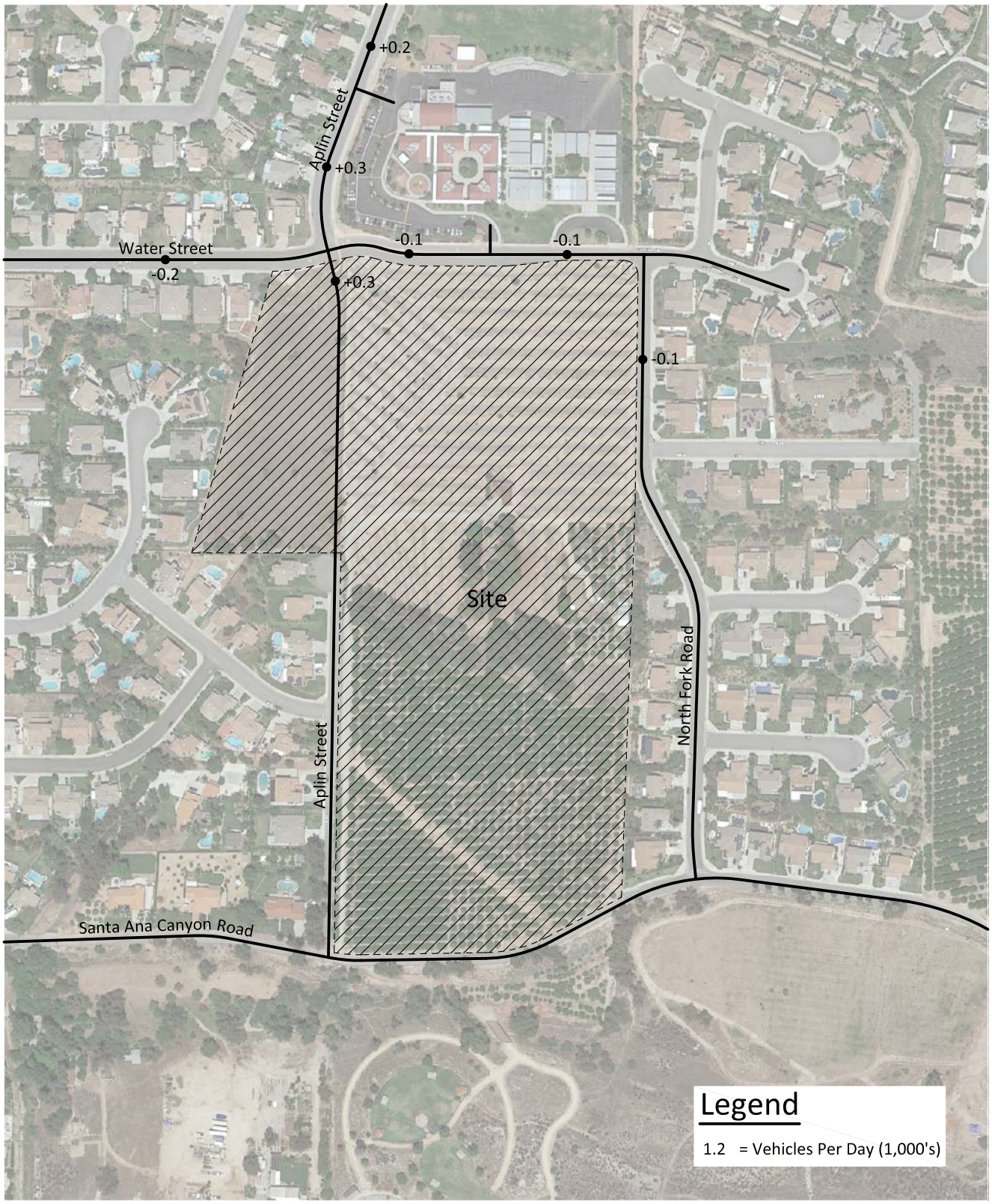


5799/15

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 16
Diverted Traffic Average Daily Traffic Volumes

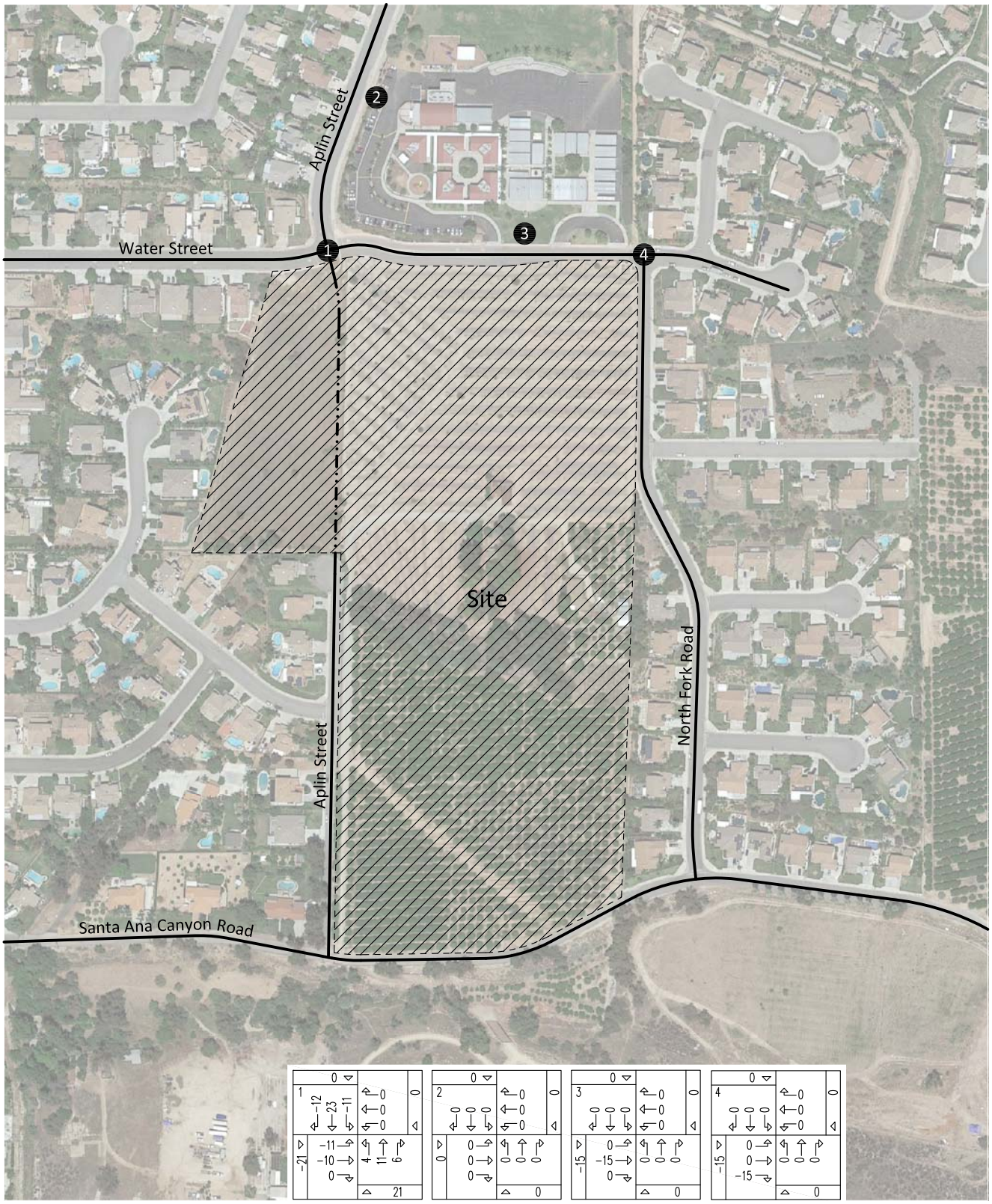


5799/16

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 17
Diverted Traffic
Morning Peak Hour Intersection Turning Movement Volumes

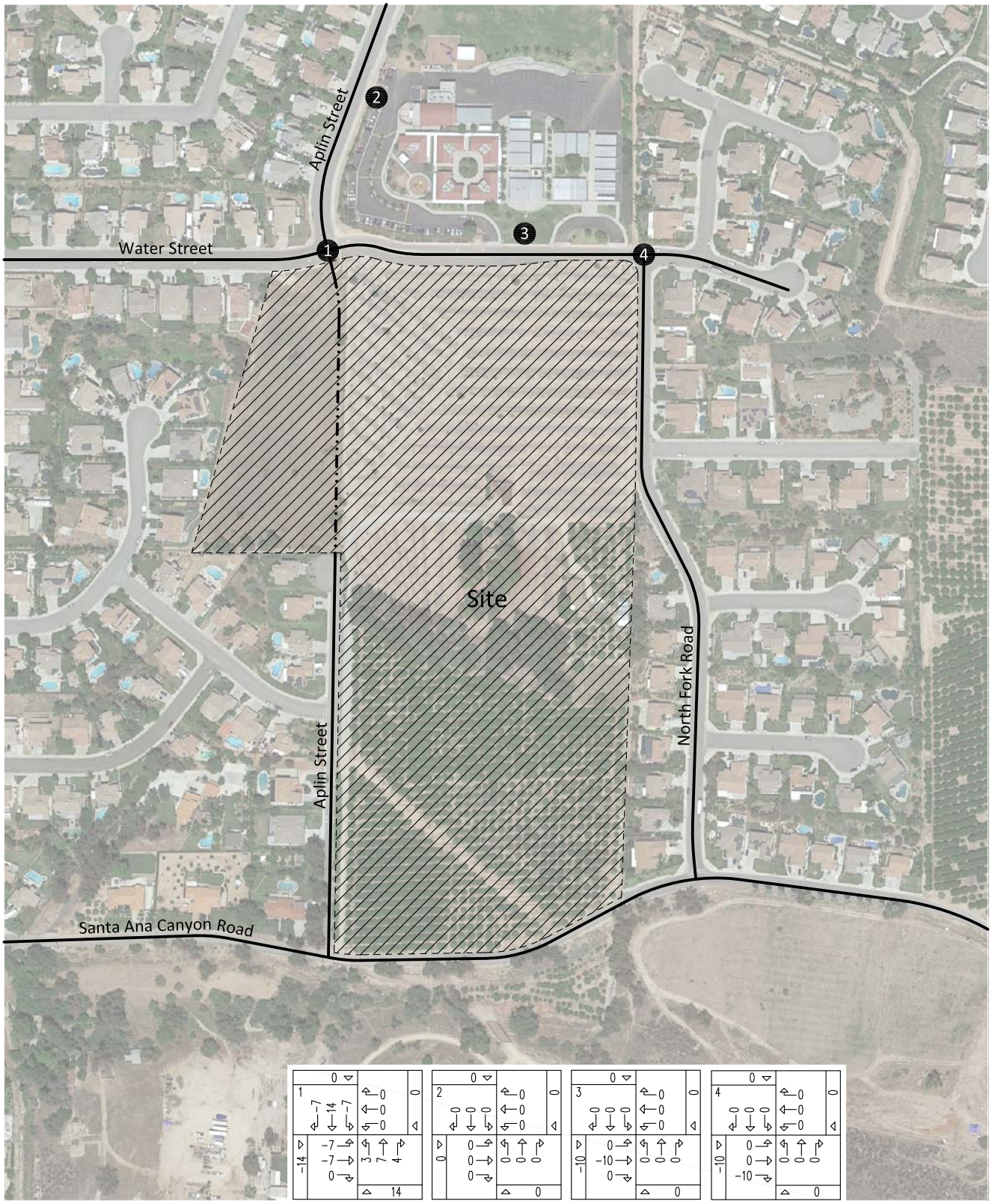


5799/17

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 18
Diverted Traffic
Afternoon Peak Hour Intersection Turning Movement Volumes

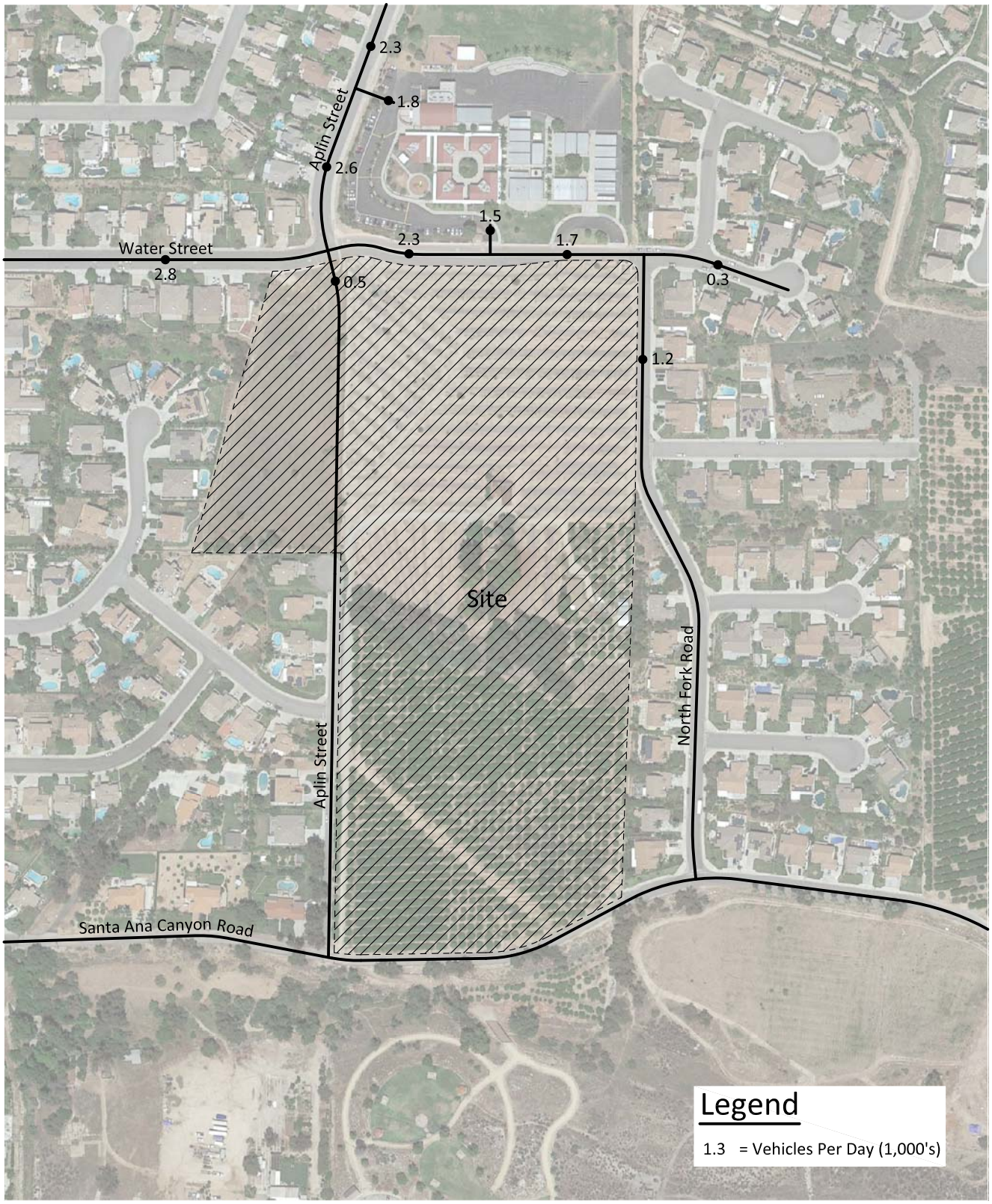


5799/18

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 19
Existing Plus Project Average Daily Traffic Volumes

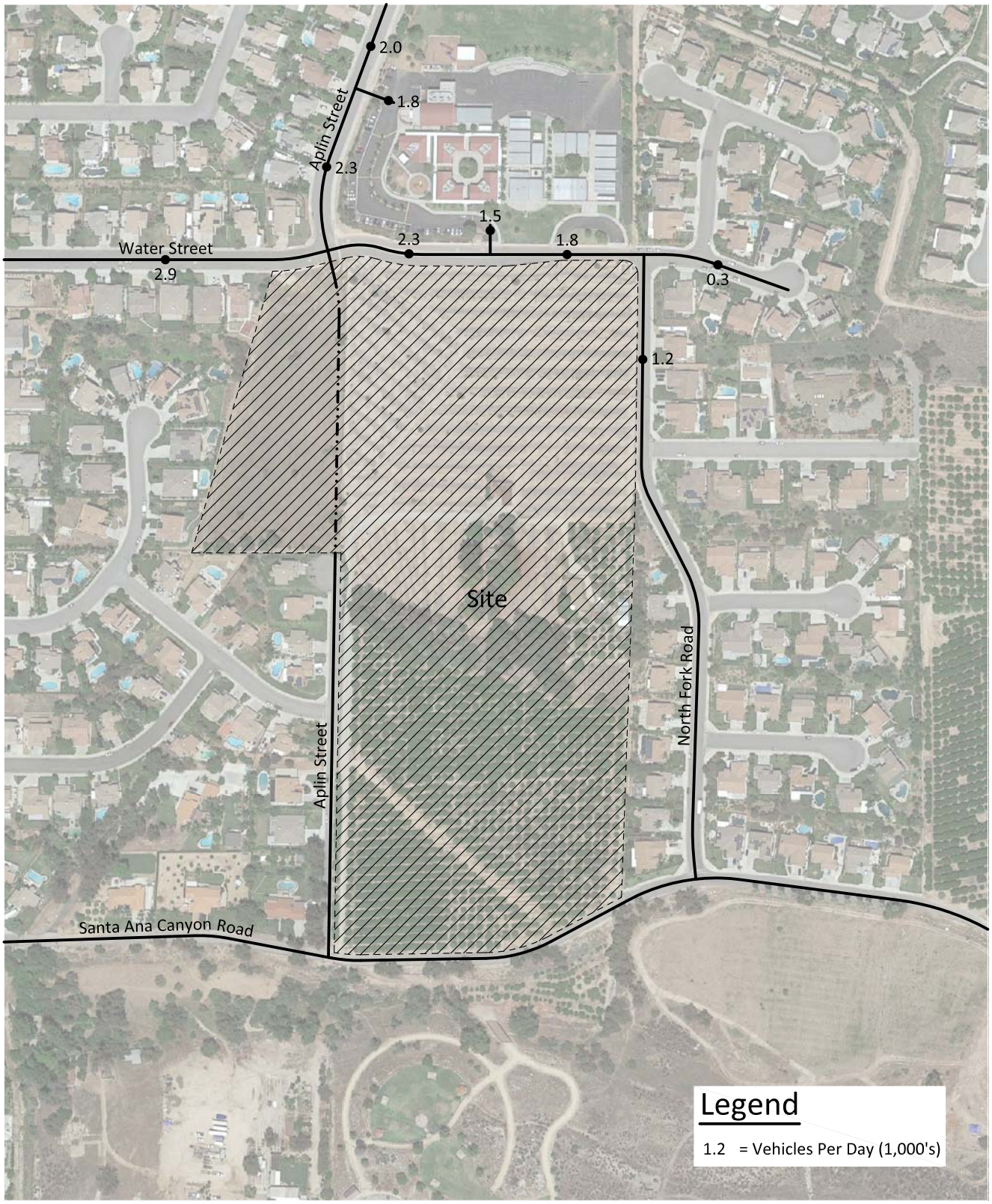


5799/19

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

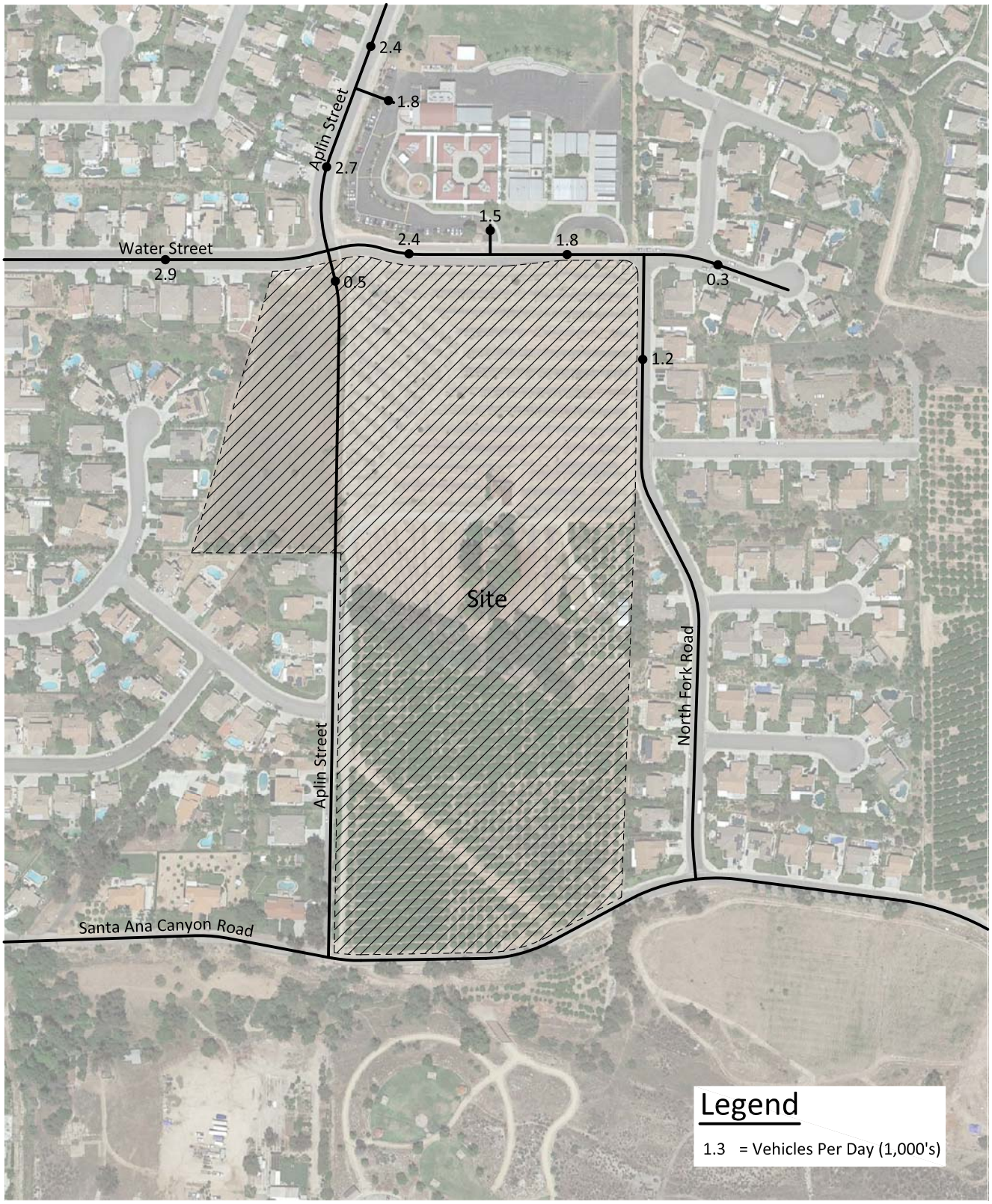
Figure 20
Opening Year (2017) Without Project Average Daily Traffic Volumes



5799/20

KUNZMAN ASSOCIATES, INC.
OVER 35 YEARS OF EXCELLENT SERVICE

Figure 21
Opening Year (2017) With Project Average Daily Traffic Volumes

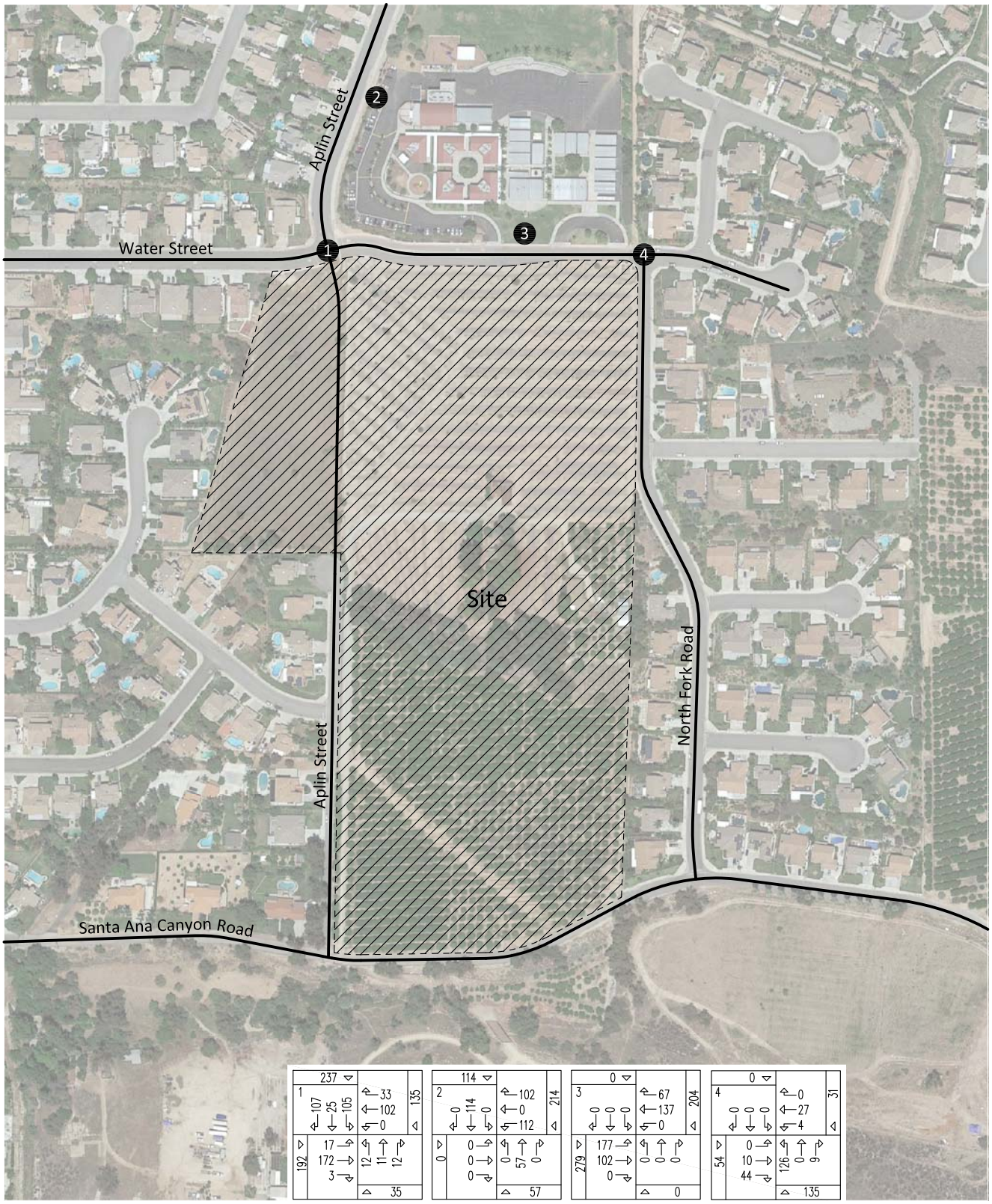


5799/21

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 22
Existing Plus Project
Morning Peak Hour Intersection Turning Movement Volumes

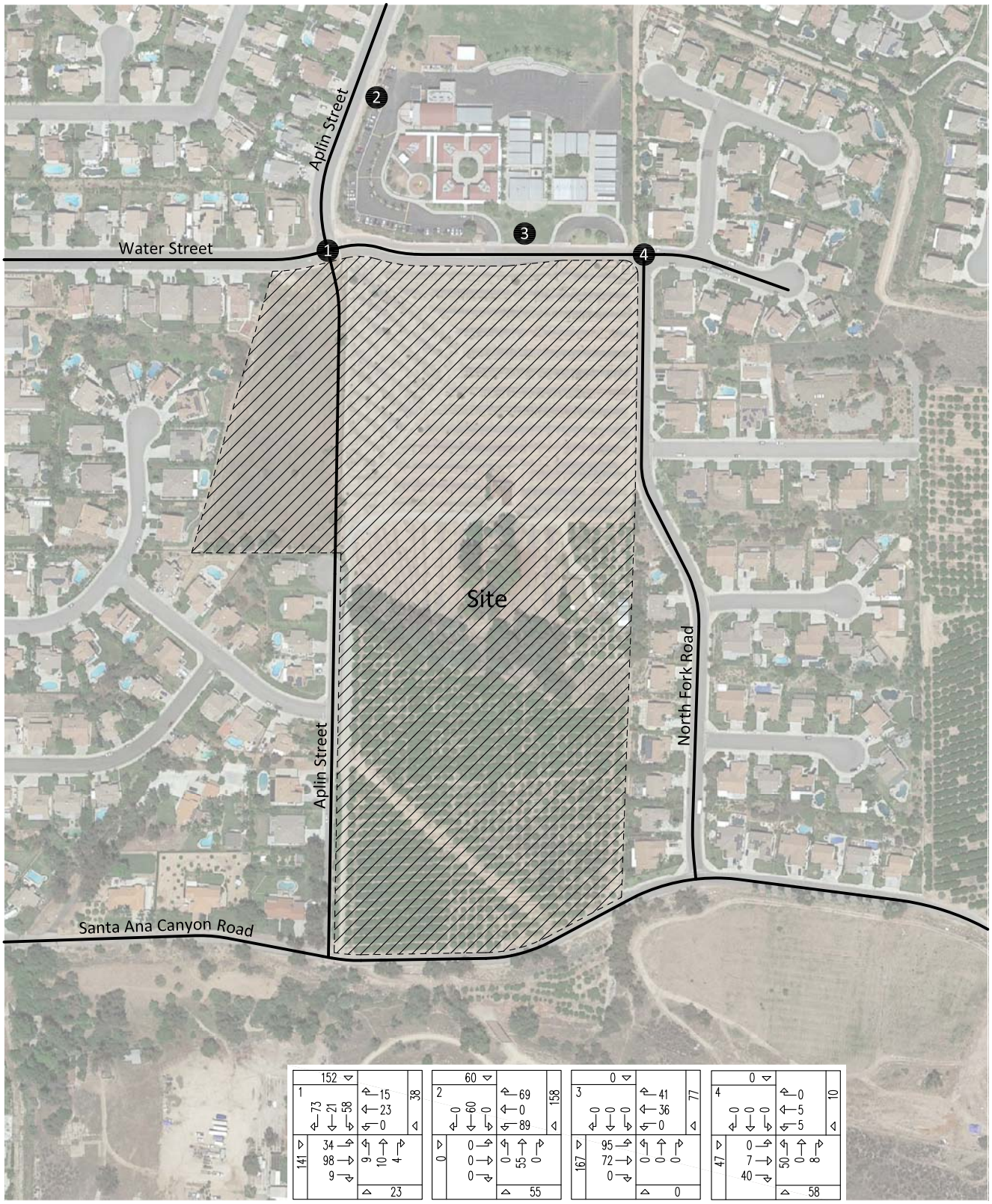


5799/22

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 23
Existing Plus Project
Afternoon Peak Hour Intersection Turning Movement Volumes

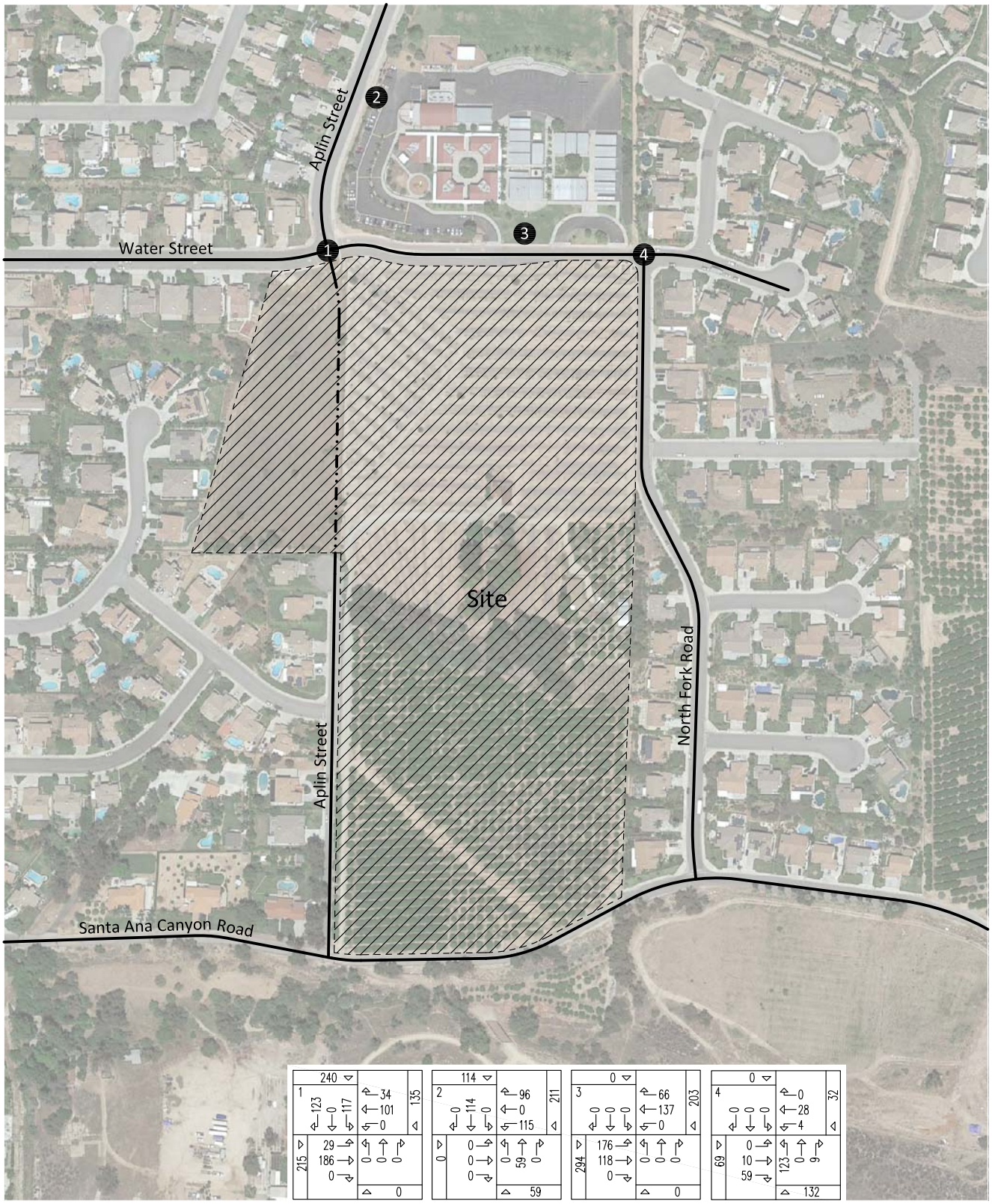


5799/23

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 24
Opening Year (2017) Without Project
Morning Peak Hour Intersection Turning Movement Volumes

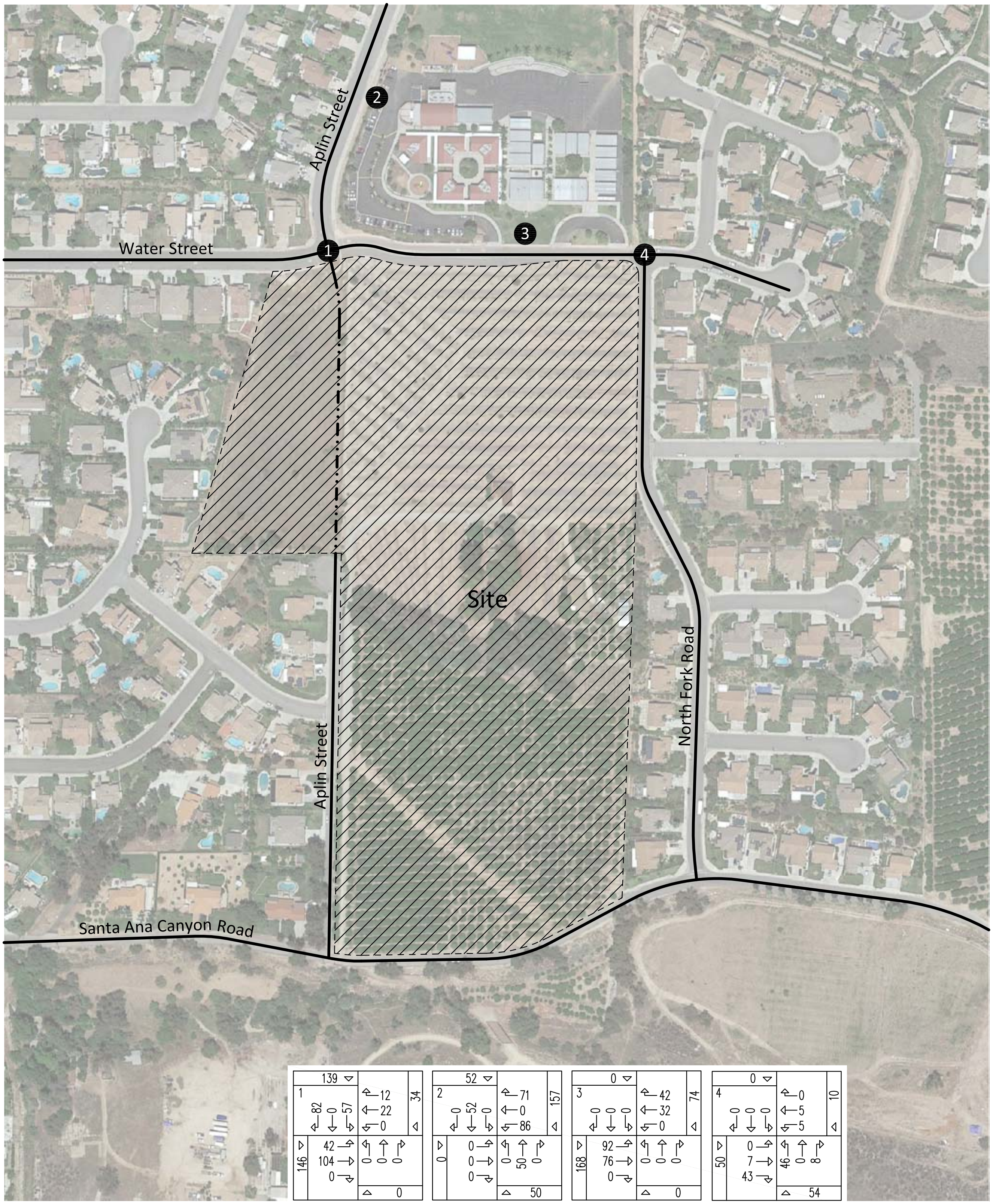


KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

5799/24

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 25
Opening Year (2017) Without Project
Afternoon Peak Hour Intersection Turning Movement Volumes

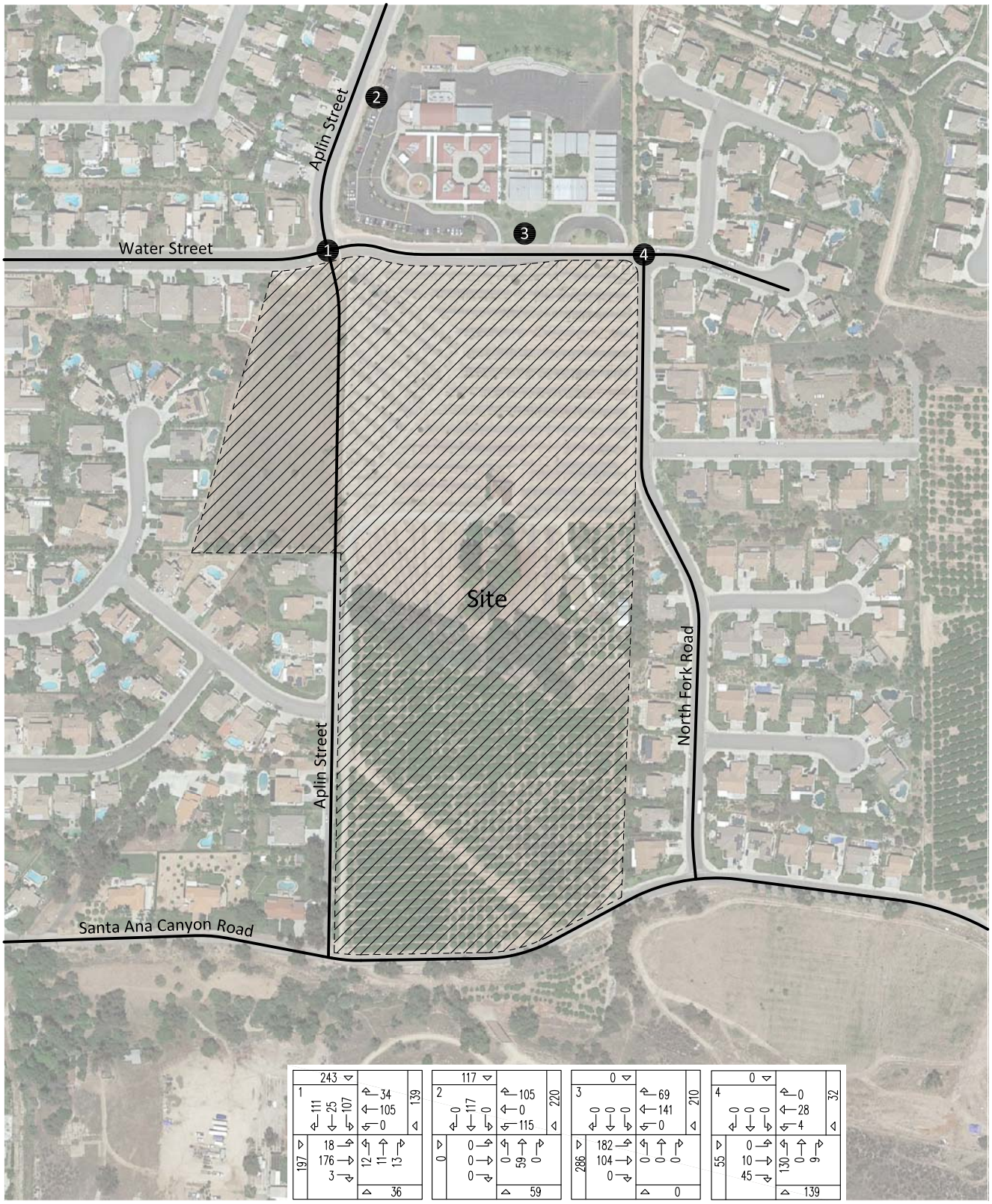


5799/25

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 26
Opening Year (2017) With Project
Morning Peak Hour Intersection Turning Movement Volumes

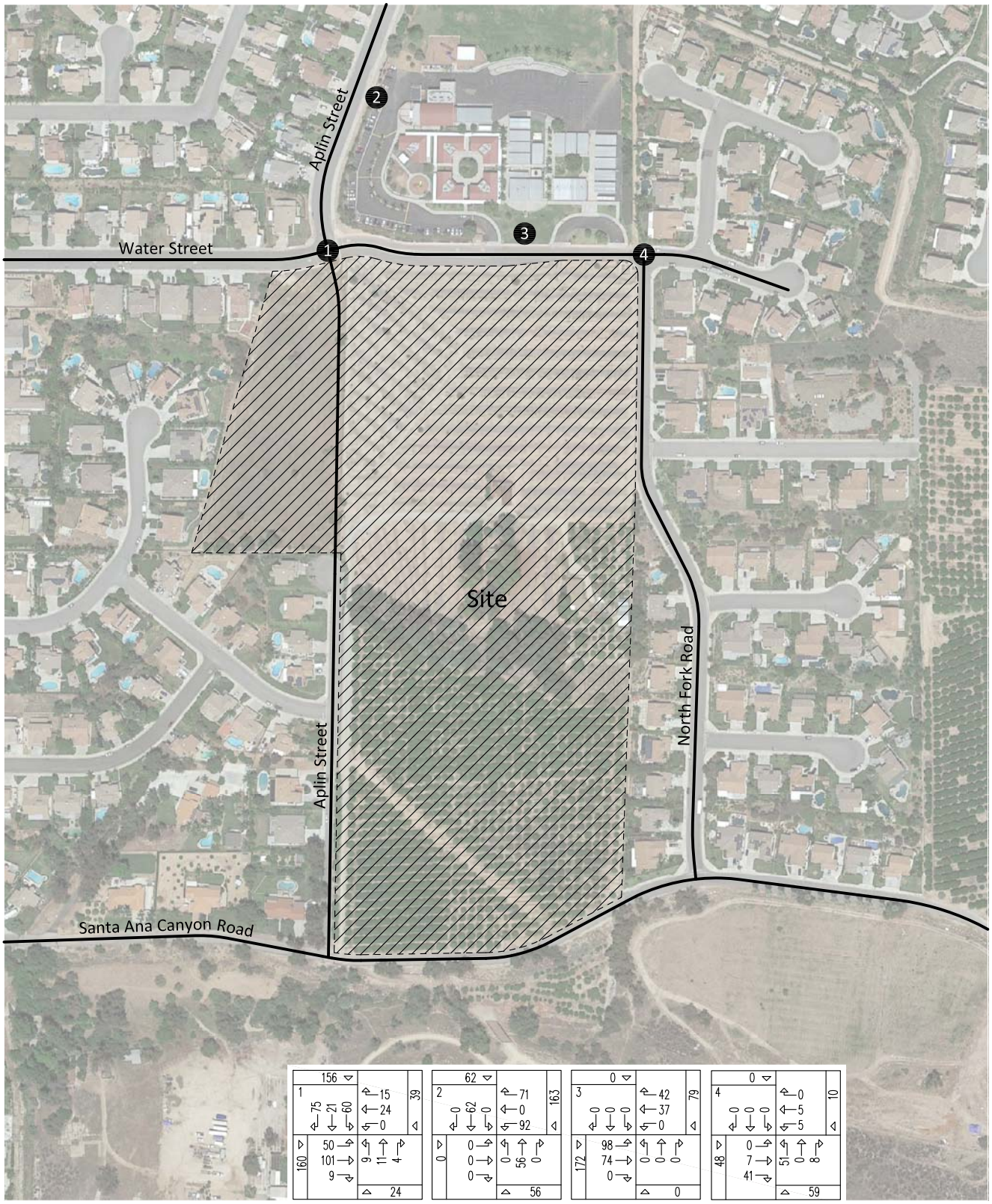


5799/26

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 27
Opening Year (2017) With Project
Afternoon Peak Hour Intersection Turning Movement Volumes



5799/27

KUNZMAN ASSOCIATES, INC. Intersection reference numbers are in upper left corner of turning movement boxes.

OVER 35 YEARS OF EXCELLENT SERVICE

V. Conclusions and Recommendations

A. Summary

The traffic issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act.

The City of Highland is the lead agency responsible for preparation of the traffic impact analysis, in accordance with the California Environmental Quality Act authorizing legislation. This report analyzes traffic impacts for the anticipated opening date with full occupancy of the development in Year 2017, at which time it will be generating trips at its full potential.

No analysis is required further than 5 miles from the project site. The roadway elements that must be analyzed are dependent on both the analysis year (project Opening Year or Horizon Year) and project generated traffic volumes. The identification of the study area, and the intersections and highway segments requiring analysis, was based on an estimate of the two-way traffic volumes on the roadway segments near the project site. All arterial segments have been included in the analysis when the anticipated project volume equals or exceeds 50 two-way trips in the peak hours. The requirement is 100 two-way peak hour trips for freeways.

The project does not contribute trips greater than the freeway threshold volume of 100 two-way peak hour trips. The project does not contribute trips greater than the arterial link threshold volume of 50 two-way trips in the peak hours on facilities serving intersections in any adjacent city.

The Opening Year (2017) traffic volumes have been calculated based on an annual growth rate of existing traffic volumes over the number of years until the completion date.

Project traffic volumes were then added to the projected traffic volumes. The result of this traffic forecasting procedure is a series of traffic volumes suitable for traffic operations analysis.

B. Existing Conditions

Regional access to the project site is provided by the SR-210 Freeway. Local access is provided by various roadways in the vicinity of the site. The north-south roadway which will be most affected by the project includes Aplin Street and North Fork Road. The east-west roadways which will be most affected by the project include Water Street and Santa Ana Canyon Road.

The Existing delay and Level of Service for intersections in the vicinity of the project are shown in Table 1. The study area intersections currently operate at an acceptable Level of Service during the peak hours for Existing traffic conditions (see Table 1). Existing delay worksheets are provided in Appendix D.

C. Project Traffic

Trip generation rates were determined for daily trips, morning peak hour inbound and outbound trips, and afternoon peak hour inbound and outbound trips for the proposed land use. By multiplying the trip generation rates by the land use quantity, the traffic volumes are determined. Table 2 shows the project trip generation based upon rates obtained from the Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.

The proposed development is projected to generate approximately 762 daily vehicle trips, 60 of which will occur during the morning peak hour and 80 of which will occur during the afternoon[6] peak hour.

To determine the trip distributions for the proposed project, peak hour traffic counts of the existing directional distribution of traffic for existing areas in the vicinity of the site, school attendance boundaries, and other additional information on future development and traffic impacts in the area were reviewed.

D. Future Conditions

An Existing Plus Project and Opening Year (2017) analysis are included in this report. The Existing Plus Project traffic operations analysis is summarized in Table 3. Opening Year (2017) traffic operations analysis has been completed for the morning and afternoon peak hours and is shown in Tables 4 and 5. Intersection delay and level of service worksheets are provided in Appendix D for existing and future traffic conditions.

1. Existing Plus Project

   For Existing Plus Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during the peak hours.

2. Opening Year (2017) Without Project

   For Opening Year (2017) Without Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during the peak hours.

3. Opening Year (2017) With Project

   For Opening Year (2017) With Project traffic conditions, the study area intersections are projected to operate at an acceptable Level of Service during the peak hours.

[6] Because of the proximity to the adjacent school, the morning and afternoon peak periods counted were to capture the morning arrival and afternoon dismissal period of the school. In order to provide a "conservative" analysis, the evening peak hour trip generation was used for the afternoon peak hour.

E. Recommendations

The recommendations in this section address on-site improvements, off-site improvements and the phasing of all necessary study area transportation improvements.

1. On-Site Improvements

On-site improvements and improvements adjacent to the site will be required in conjunction with the proposed development to ensure adequate circulation within the project itself (see Figure 28).

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the project.

2. Off-Site Improvements

As is the case for any roadway design, the City of Highland should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

Construct Aplin Street from Water Street to Desmond Drive at its ultimate cross-section width and from Desmond Drive to Santa Ana Canyon Road at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary. The construction of Aplin Street will change the street geometry at the Aplin Street/Water Street intersection from a 3-way intersection to a 4-way intersection (see Tables 3 and 5).

Construct North Fork Road from Water Street to Cabo Del Oeste at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.

Construct Water Street from the west project boundary to North Fork Road at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.

Construct Santa Ana Canyon Road from Aplin Street to the east project boundary at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.

Sight distance at each project access should be reviewed with respect to California Department of Transportation/City of Highland standards in conjunction with the preparation of final grading, landscaping, and street improvement plans. The final grading, landscaping, and street improvement plans shall demonstrate that sight distance standards are met. Such plans must be reviewed by the City and approved as consistent with this measure prior to issue of grading permits.

The left turn storage on the southbound leg of Aplin Street and Water Street is projected to require approximately 100 feet for turning vehicles during the peak hours

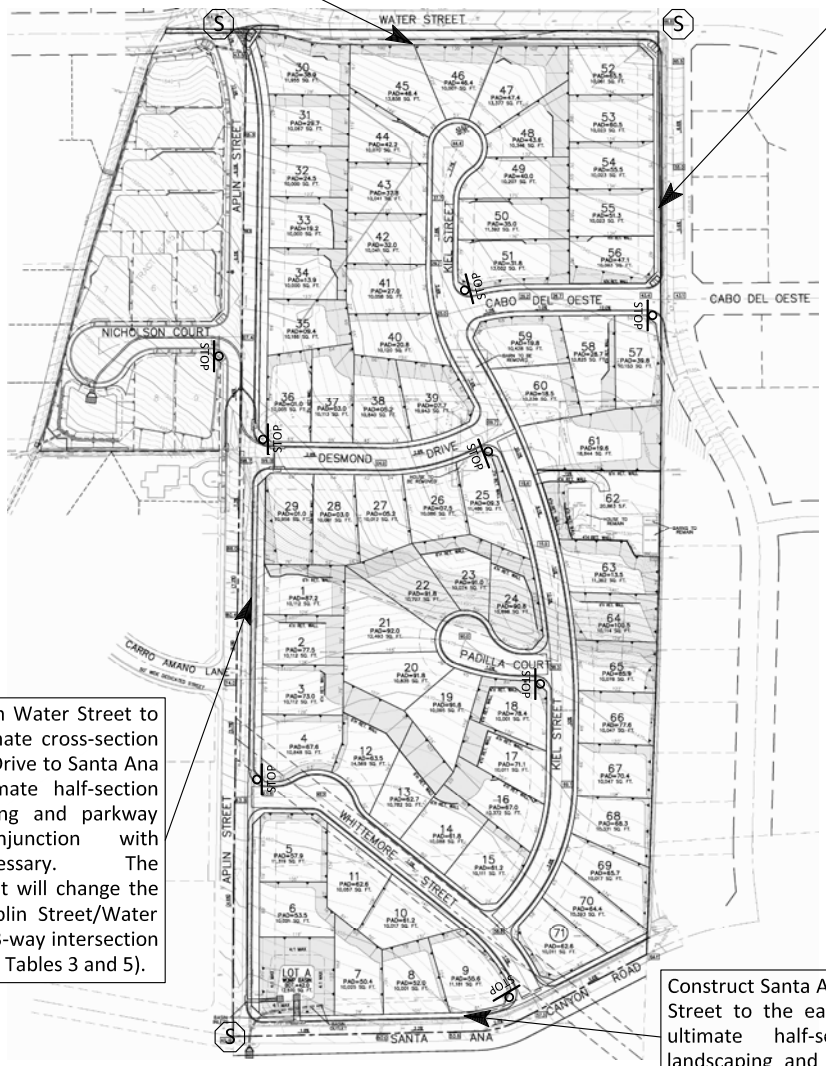
for Opening Year With Project conditions. The northbound and southbound left turn lanes should be striped in conjunction with the necessary pavement widening to the ultimate cross-section width required by the project.

As mitigation for the potential traffic impacts, the proposed project shall contribute through an adopted traffic impact fee program in addition to any fair share contributions shown within the traffic study which is not covered within this fee program.

Figure 28
Circulation Recommendations

Construct Water Street from the west project boundary to North Fork Road at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.

Construct North Fork Road from Water Street to Cabo Del Oeste at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.



Construct Aplin Street from Water Street to Desmond Drive at its ultimate cross-section width and from Desmond Drive to Santa Ana Canyon Road at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary. The construction of Aplin Street will change the street geometry at the Aplin Street/Water Street intersection from a 3-way intersection to a 4-way intersection (see Tables 3 and 5).

Construct Santa Ana Canyon Road from Alpin Street to the east project boundary at its ultimate half-section width including landscaping and parkway improvements in conjunction with development, as necessary.

Sight distance at each project access should be reviewed with respect to California Department of Transportation/City of Highland standards in conjunction with the preparation of final grading, landscaping, and street improvement plans. The final grading, landscaping, and street improvement plans shall demonstrate that sight distance standards are met. Such plans must be reviewed by the City and approved as consistent with this measure prior to issue of grading permits.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the project.

As is the case for any roadway design, the City of Highland should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

As mitigation for the potential traffic impacts, the proposed project shall contribute through an adopted traffic impact fee program in addition to any fair share contributions shown within the traffic study which is not covered within this fee program.

Legend

S = All Way Stop

STOP = Stop Sign

5799/28

Appendices

Appendix A – Glossary of Transportation Terms

Appendix B – Scoping Agreement

Appendix C – Traffic Count Worksheets

Appendix D – Explanation and Calculation of Intersection Delay

APPENDIX A

Glossary of Transportation Terms

GLOSSARY OF TRANSPORTATION TERMS

COMMON ABBREVIATIONS

AC:	Acres
ADT:	Average Daily Traffic
Caltrans:	California Department of Transportation
DU:	Dwelling Unit
ICU:	Intersection Capacity Utilization
LOS:	Level of Service
TSF:	Thousand Square Feet
V/C:	Volume/Capacity
VMT:	Vehicle Miles Traveled

TERMS

AVERAGE DAILY TRAFFIC: The total volume during a year divided by the number of days in a year. Usually only weekdays are included.

BANDWIDTH: The number of seconds of green time available for through traffic in a signal progression.

BOTTLENECK: A constriction along a travelway that limits the amount of traffic that can proceed downstream from its location.

CAPACITY: The maximum number of vehicles that can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

CHANNELIZATION: The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

CLEARANCE INTERVAL: Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

CORDON: An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).

CYCLE LENGTH: The time period in seconds required for one complete signal cycle.

CUL-DE-SAC STREET: A local street open at one end only, and with special provisions for turning around.

DAILY CAPACITY: The daily volume of traffic that will result in a volume during the peak hour equal to the capacity of the roadway.

DELAY: The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

DEMAND RESPONSIVE SIGNAL: Same as traffic-actuated signal.

DENSITY: The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

DETECTOR: A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

DESIGN SPEED: A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

DIRECTIONAL SPLIT: The percent of traffic in the peak direction at any point in time.

DIVERSION: The rerouting of peak hour traffic to avoid congestion.

FORCED FLOW: Opposite of free flow.

FREE FLOW: Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

GAP: Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

HEADWAY: Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.

INTERCONNECTED SIGNAL SYSTEM: A number of intersections that are connected to achieve signal progression.

LEVEL OF SERVICE: A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

LOOP DETECTOR: A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.

MINIMUM ACCEPTABLE GAP: Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

MULTI-MODAL: More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

OFFSET: The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

PLATOON: A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

PASSENGER CAR EQUIVALENTS (PCE): One car is one Passenger Car Equivalent. A truck is equal to 2 or 3 Passenger Car Equivalents in that a truck requires longer to start, goes slower, and accelerates slower. Loaded trucks have a higher Passenger Car Equivalent than empty trucks.

PEAK HOUR: The 60 consecutive minutes with the highest number of vehicles.

PRETIMED SIGNAL: A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions. Also, fixed time signal.

PROGRESSION: A term used to describe the progressive movement of traffic through several signalized intersections.

SCREEN-LINE: An imaginary line or physical feature across which all trips are counted, normally to verify the validity of mathematical traffic models.

SIGNAL CYCLE: The time period in seconds required for one complete sequence of signal indications.

SIGNAL PHASE: The part of the signal cycle allocated to one or more traffic movements.

STARTING DELAY: The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through a signalized intersection.

TRAFFIC-ACTUATED SIGNAL: A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

TRIP: The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

TRIP-END: One end of a trip at either the origin or destination; i.e. each trip has two trip-ends. A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

TRIP GENERATION RATE: The quantity of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

TRUCK: A vehicle having dual tires on one or more axles, or having more than two axles.

UNBALANCED FLOW: Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

VEHICLE MILES OF TRAVEL: A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.

APPENDIX B

Scoping Agreement

SCOPE FOR TRAFFIC STUDY

Pro ect Name:	TTM 18935 (APNs: 1210-371-03 and 1210-371-37) Highland, CA

This Scope for Traffic Study acknowledges that the City of Highland uses the San Bernardino Associated Governments Congestion Management Program (CMP) for the traffic impact study guidelines. Projects which generate 250 project trips, during the peak periods, will require a Traffic Impact Analysis. All intersections that are listed in the latest CMP which will receive 50 or more peak hour project trips (two-way) within a five mile radius should be evaluated. Additionally the City can request the evaluation of other key intersections.

This analysis must follow the most current Traffic Impact Study Guidelines for the County as stated in the County's Road Planning and Design Standards.

Pro ect Address:	SWC of Fork Road and Water Street		
Pro ect Description:	80 Single-Family Detached Residential Dwelling Units		
City:	City of Highland (County of San Bernardino)		
Pro ect Buildout Year:	2017	**Ambient Growth Rate per Year:**	1%
Closest Intersection (Xtn) to the Pro ect			
Xtn N/S Street Name:	Aplin Street / Fork Road		
Xtn E/W Street Name:	Water Street / Santa Ana Canyon Road		
Thomas Guide Pg Grid:	548E6	**County Supervisorial District:**	

	Engineer	**Developer**
Company:	KUNZMAN ASSOCIATES, INC.	WATER STREET LAND, LLC
Name:	Ms. Perrie Ilercil, P.E.	Mr. Phil Burum
Address:	1111 Town and Country Road, Suite 34	10621 Civic Center Drive
City, State, Zip Code:	Orange, CA 92868	Rancho Cucamonga, CA 91730
Phone :	714-973-8383	909-481-1150 x241
Fax :	714-973-8821	
Email:	Perrie@traffic-engineer.com	pburum@diversifiedpacific.com

By:

Print Name: Perrie Ilercil **12.10.2014**

Consultant/Developer s Representative **Date**

Reviewed By:

Print Name:

City Representative **Date**

SCOPE FOR TRAFFIC STUDY

Pro ect Name:	TTM 18935 (APNs: 1210-371-03 and 1210-371-37) Highland, CA

1. **Traffic Distribution**: Please insert or attach Figure(s) illustrating project trip distribution in percentages and volumes at the study intersections analyzed.

   See Figures:
   - Figure 1 Project Location Map,
   - Figure 2 Site Plan
   - Figure 3 Project Trip Distribution

2. Trip Credit: Exact amount of credit subject to approval by Traffic Division.

Transportation Demand Management (TDM)	NO	NO
Existing Active Land Use	NO	Vacant
Previous Land Use	NO	Vacant
Internal Trip Reduction	NO	NO
Pass-by Trip Reduction	NO	NO

3. Related Pro ects: Consultant should check with Planning in the San Bernardino County Department of Land Use Services and planning departments of adjoining Cities. Documentation of the consultation from these agencies shall be included in the traffic study. Related projects list shall be submitted to Traffic Division for our review and approval before being incorporated in the study.

4. Freeway Analysis: The potential traffic impact on the following Freeway(s) must be considered.

No

The applicant shall consult with the State of California Department of Transportation (Caltrans) to determine the California Environmental Quality Act levels of significance with regard to traffic impacts on Caltrans' freeway facilities. This consultation shall also include a determination of Caltrans requirements for the study of traffic impacts to its facilities and the mitigation of any such impacts. This analysis must follow the most current Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) and can be obtained from http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tiguide.pdf. If Caltrans finds that the project has a significant impact on the freeway, Caltrans shall be requested to include the basis for this finding in their response. If fees are proposed to mitigate the freeway impact, Caltrans shall be requested to identify the specific project to which the fees will apply. These written comments from Caltrans shall be included with the traffic study and submitted to Public Works for review and approval. If a documented good faith effort is made to consult with Caltrans and written comments cannot be obtained from within a reasonable amount of time, an analysis of the freeway impact shall be made using HCM procedures. Appendix A of the SANBAG CMP outlines allowable modifications to these procedures. The SANBAG CMP can be viewed online at:
http://www.sanbag.ca.gov/planning/subr_congestion.html

SCOPE FOR TRAFFIC STUDY

Pro ect Name:	TTM 18935 (APNs: 1210-371-03 and 1210-371-37) Highland, CA

5. Trip Generation: See Table 1.

6. Study Intersections: At minimum, the study shall include the following intersections. The list is subject to change after related projects, trip generation and distribution are determined. Consultant should check with adjoining Cities regarding their requirements in addition to the following County/City intersections. Documentation of the consultation from these agencies shall be included in the traffic study.

Xtn	Thomas Guide Page Grid	N/S/E/W Street Name	City	Signal	CMP
1	548E6	Aplin Street (NS) and Water Street (EW)	Highland	**no**	**no**
2	548E6	Aplin Street (NS) and School Exit (EW)	Highland	**no**	**no**
3	548E6	School Entry (NS) and Water Street (EW)	Highland	**no**	**no**
4	548E6	N Fork Road (NS) and Water Street (EW)	Highland	**no**	**no**
				Yes/no	Yes/no
				Yes/no	Yes/no
				Yes/no	Yes/no
				Yes/no	Yes/no
				Yes/no	Yes/no
.				Yes/no	Yes/no

Cites to be consulted: Highland

Table 1

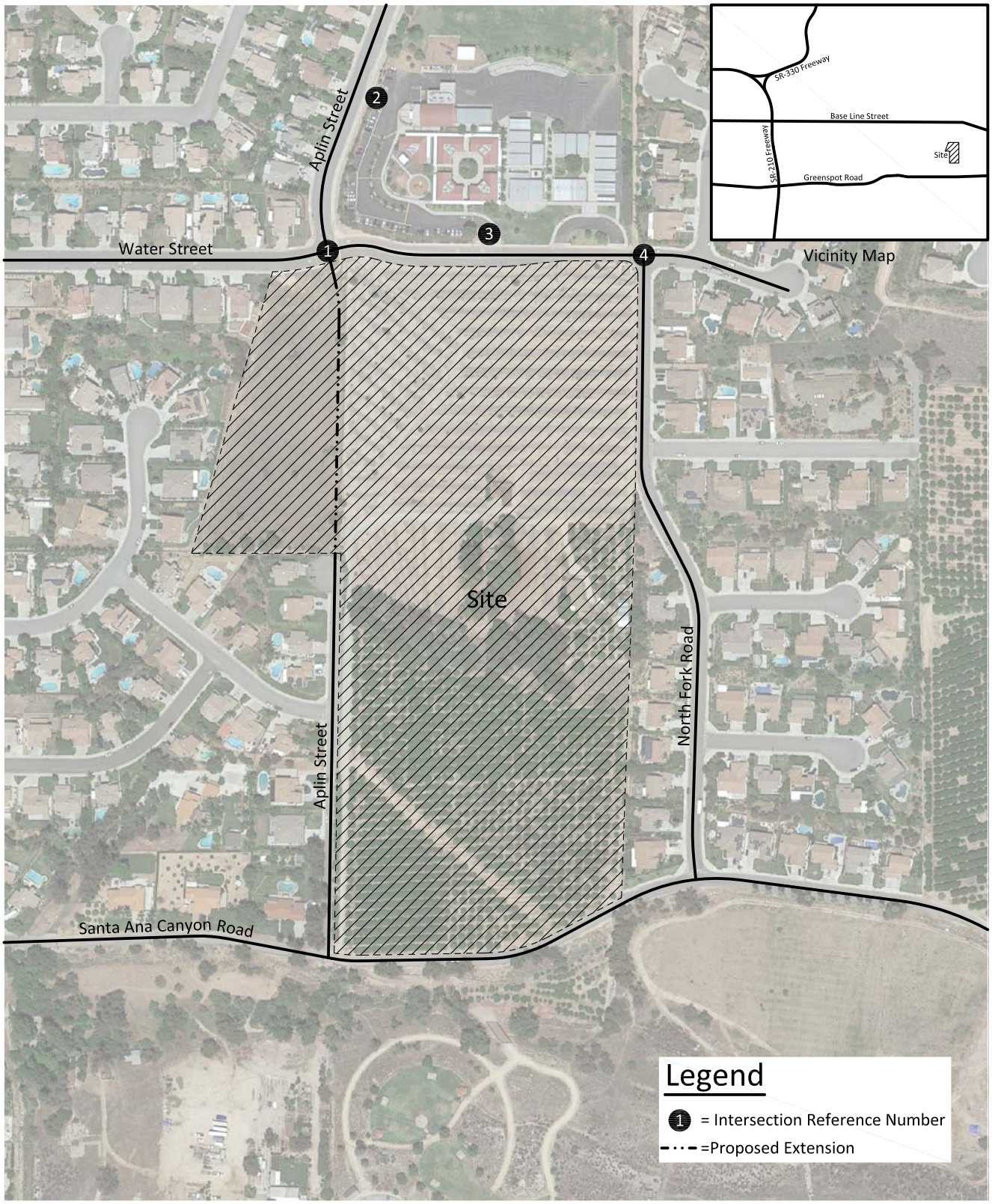
Project Trip Generation[1]

Land Use	Quantity	Units[2]	Peak Hour						Daily
			Morning			Evening			
			Inbound	Outbound	Total	Inbound	Outbound	Total	
Trip Generation Rates									
Single-Family Detached Residential		DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52
Trips Generated									
Single-Family Detached Residential	80	DU	15	45	60	50	30	80	762
Total	80	DU	15	45	60	50	30	80	762

[1] Source: Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012, Land Use Category 210.

[2] DU = Dwelling Units

Figure 1
Project Location Map

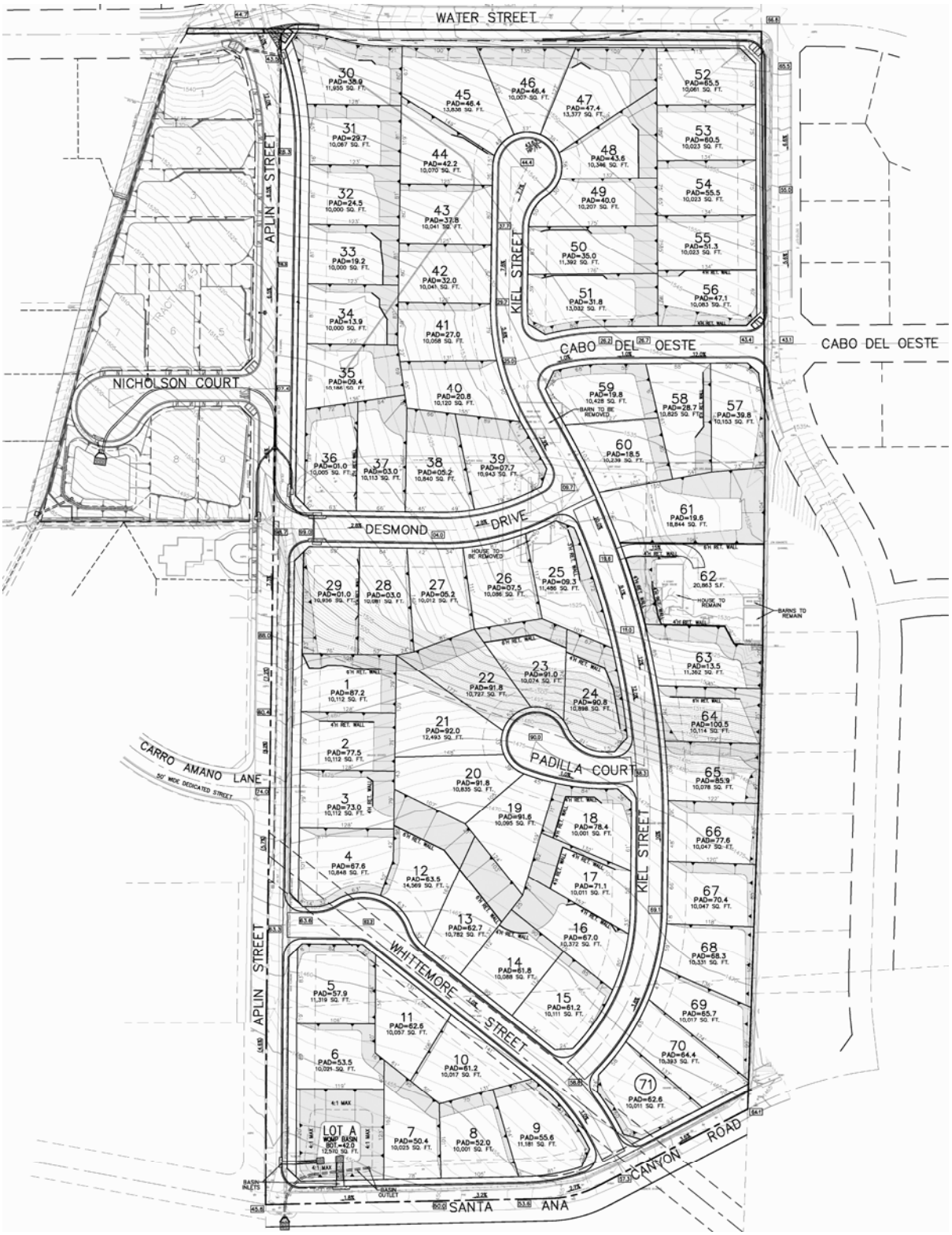


5799/1

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 2
Site Plan

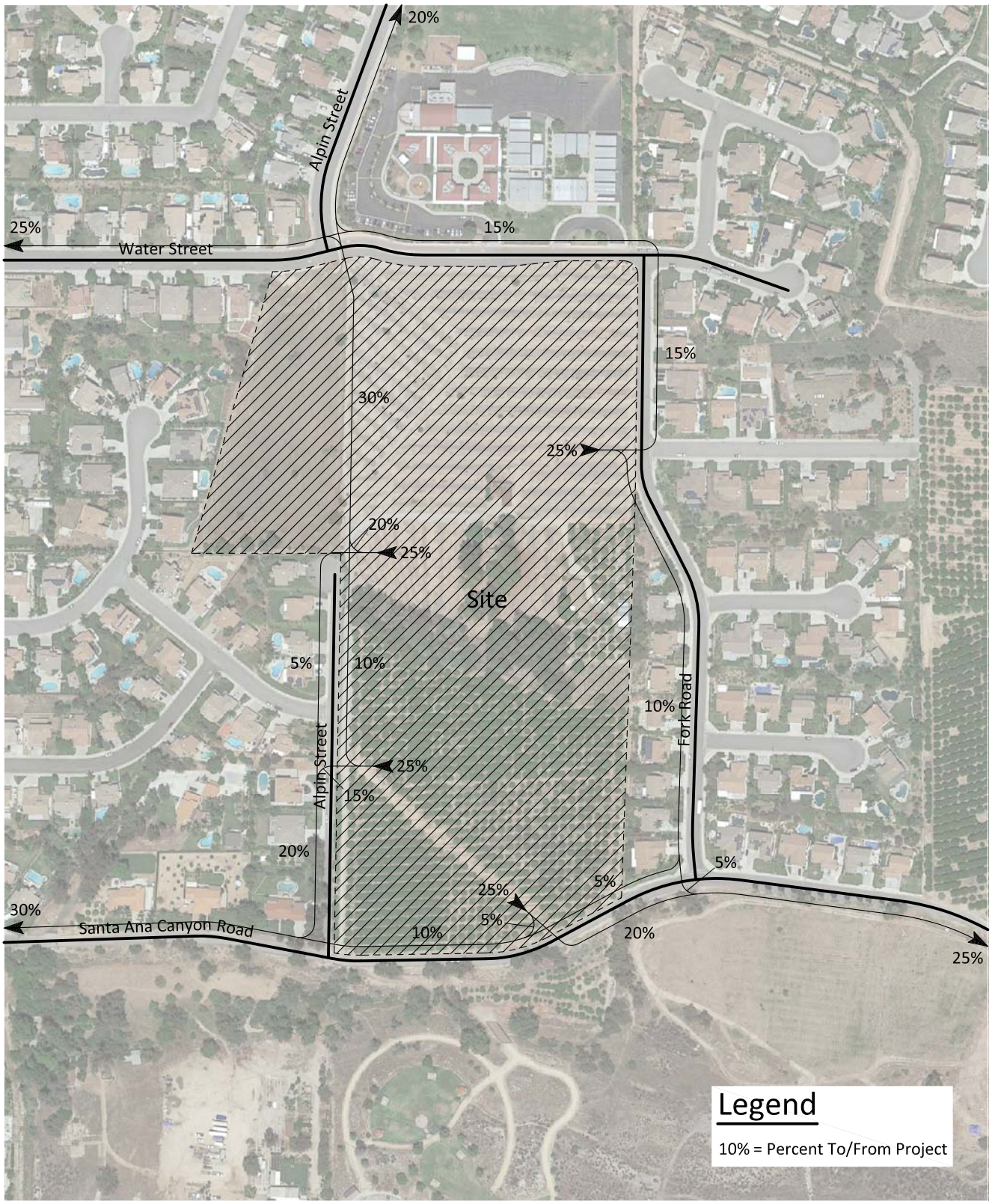


5799/2

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

Figure 3
Project Trip Distribution



5799/3

KUNZMAN ASSOCIATES, INC.

OVER 35 YEARS OF EXCELLENT SERVICE

APPENDIX C

Traffic Count Worksheets

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 951 249 3226 pacific@aimtd.com

DATE:				
Tue, Dec 9, 14	LOCATION:	Highland	PROJECT #:	SC0503
	NORTH & SOUTH:	Aplin	LOCATION #:	2
	EAST & WEST:	Water	CONTROL:	Stop All Ways

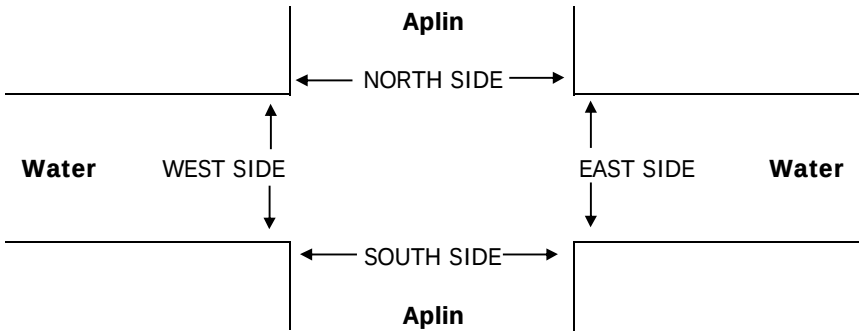
NOTES:

REVISED - PM label corrected, previously listed as AM.

AM
PM
MD
OTHER
OTHER

▲ N
◄ W
E ►
S ▼

		NORTHBOUND Aplin			SOUTHBOUND Aplin			EASTBOUND Water			WESTBOUND Water			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	X	X	0	X	0	1	1	X	X	1	0	
AM	7:00 AM	0	0	0	6	0	6	2	9	0	0	7	3	33
	7:15 AM	0	0	0	19	0	22	2	38	0	0	16	5	102
	7:30 AM	0	0	0	57	0	37	18	85	0	0	33	16	246
	7:45 AM	0	0	0	32	0	54	6	49	0	0	42	9	192
	8:00 AM	0	0	0	0	0	9	2	6	0	0	2	4	23
	8:15 AM	0	0	0	0	0	6	5	3	0	0	2	2	18
	8:30 AM	0	0	0	1	0	7	6	5	0	0	1	1	21
	8:45 AM	0	0	0	0	0	6	2	1	0	0	4	0	13
	VOLUMES	0	0	0	115	0	147	43	196	0	0	107	40	649
	APPROACH %	0%	0%	0%	44%	0%	56%	18%	82%	0%	0%	73%	27%	
	APP/DEPART	0	/	84	263	/	0	239	/	311	147	/	254	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	0	0	114	0	119	28	181	0	0	98	33	573
	APPROACH %	0%	0%	0%	49%	0%	51%	13%	87%	0%	0%	75%	25%	
	PEAK HR FACTOR		0.000			0.620			0.507			0.642		0.582
	APP/DEPART	0	/	61	233	/	0	209	/	295	131	/	217	0
PM	1:00 PM	0	0	0	4	0	2	4	10	0	0	0	0	20
	1:15 PM	0	0	0	6	0	3	3	18	0	0	0	3	33
	1:30 PM	0	0	0	5	0	5	19	25	0	0	2	5	61
	1:45 PM	0	0	0	17	0	24	7	33	0	0	9	2	92
	2:00 PM	0	0	0	27	0	48	12	25	0	0	10	2	124
	2:15 PM	0	0	0	8	0	13	3	4	0	0	3	1	32
	2:30 PM	0	0	0	2	0	6	5	10	0	0	2	3	28
	2:45 PM	0	0	0	9	0	7	7	19	0	0	0	4	46
	VOLUMES	0	0	0	78	0	108	60	144	0	0	26	20	438
	APPROACH %	0%	0%	0%	42%	0%	58%	29%	71%	0%	0%	57%	43%	
	APP/DEPART	0	/	80	186	/	0	206	/	222	46	/	136	0
	BEGIN PEAK HR		1:15 PM											
	VOLUMES	0	0	0	55	0	80	41	101	0	0	21	12	310
	APPROACH %	0%	0%	0%	41%	0%	59%	29%	71%	0%	0%	64%	36%	
	PEAK HR FACTOR		0.000			0.450			0.807			0.688		0.625
	APP/DEPART	0	/	53	135	/	0	142	/	156	33	/	101	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 951 249 3226 pacific@aimtd.com

DATE:				
Tue, Dec 9, 14	LOCATION:	Highland	PROJECT #:	SC0503
	NORTH & SOUTH:	Aplin	LOCATION #:	1
	EAST & WEST:	School Exit	CONTROL:	No Signal

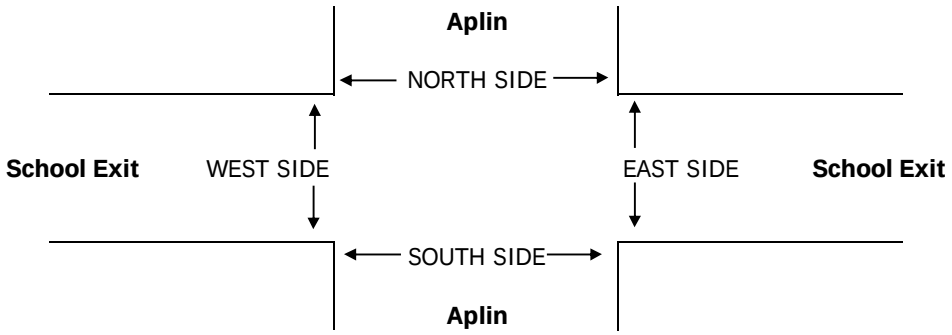
NOTES:

REVISED - PM label corrected, previously listed as AM.

AM
PM
MD
OTHER
OTHER

▲ N
◄ W
E ►
S ▼

		NORTHBOUND Aplin			SOUTHBOUND Aplin			EASTBOUND School Exit			WESTBOUND School Exit			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	1	0	0	1	X	X	X	X	0	X	0	
AM	7:00 AM	0	8	0	0	17	0	0	0	0	4	0	9	38
	7:15 AM	0	7	0	0	23	0	0	0	0	18	0	16	64
	7:30 AM	0	25	0	5	48	0	0	0	0	51	0	41	170
	7:45 AM	0	17	0	0	23	0	0	0	0	39	0	27	106
	8:00 AM	0	5	2	0	8	0	0	0	0	1	0	5	21
	8:15 AM	0	7	0	0	3	0	0	0	0	2	0	1	13
	8:30 AM	0	7	0	0	7	0	0	0	0	0	0	0	14
	8:45 AM	0	1	0	0	5	0	0	0	0	2	0	0	8
	VOLUMES	0	77	2	5	134	0	0	0	0	117	0	99	438
	APPROACH %	0%	97%	3%	4%	96%	0%	0%	0%	0%	54%	0%	46%	
	APP/DEPART	79	/	180	143	/	251	0	/	7	216	/	0	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	57	0	5	111	0	0	0	0	112	0	93	378
	APPROACH %	0%	100%	0%	4%	96%	0%	0%	0%	0%	55%	0%	45%	
	PEAK HR FACTOR		0.570			0.547			0.000			0.557		0.556
	APP/DEPART	57	/	150	116	/	223	0	/	5	205	/	0	0
PM	1:00 PM	0	3	0	0	4	0	0	0	0	3	0	0	10
	1:15 PM	0	6	1	0	10	0	0	0	0	5	0	0	22
	1:30 PM	0	13	0	0	11	0	0	0	0	4	0	3	31
	1:45 PM	0	16	1	0	12	0	0	0	0	18	0	19	66
	2:00 PM	0	15	0	0	21	0	0	0	0	47	1	42	126
	2:15 PM	0	5	0	0	6	0	0	0	0	13	0	5	29
	2:30 PM	0	7	0	1	6	0	0	0	0	2	0	4	20
	2:45 PM	0	10	0	3	9	0	0	0	0	6	0	6	34
	VOLUMES	0	75	2	4	79	0	0	0	0	98	1	79	342
	APPROACH %	0%	97%	3%	5%	95%	0%	0%	0%	0%	55%	1%	44%	
	APP/DEPART	79	/	156	85	/	179	0	/	6	178	/	1	0
	BEGIN PEAK HR		1:30 PM											
	VOLUMES	0	49	1	0	50	0	0	0	0	82	1	69	252
	APPROACH %	0%	98%	2%	0%	100%	0%	0%	0%	0%	54%	1%	45%	
	PEAK HR FACTOR		0.735			0.595			0.000			0.422		0.500
	APP/DEPART	50	/	118	50	/	132	0	/	1	152	/	1	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 951 249 3226 pacific@aimtd.com

DATE:				
Tue, Dec 9, 14	LOCATION:	Highland	PROJECT #:	SC0503
	NORTH & SOUTH:	School Entry	LOCATION #:	3
	EAST & WEST:	Water	CONTROL:	No Signal

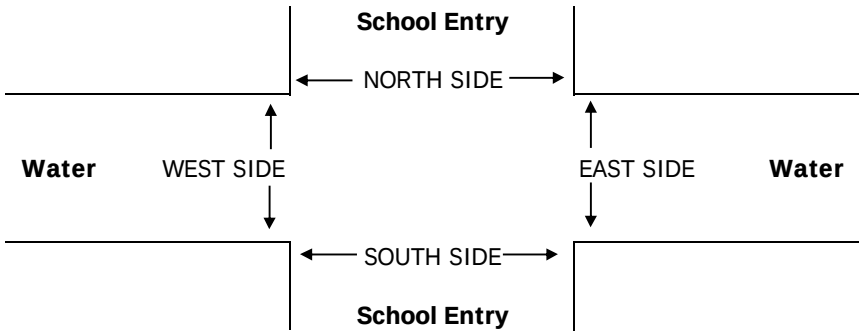
NOTES:

REVISED - PM label corrected, previously listed as AM.

AM
PM
MD
OTHER
OTHER

N
◄ W
E ►
S

		NORTHBOUND School Entry			SOUTHBOUND School Entry			EASTBOUND Water			WESTBOUND Water			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	X	X	X	0	X	0	1	1	X	X	1	0	
AM	7:00 AM	0	0	0	0	0	0	9	5	0	0	10	6	30
	7:15 AM	0	0	0	0	0	0	41	11	0	0	21	10	83
	7:30 AM	0	0	0	0	0	0	88	68	0	0	60	28	244
	7:45 AM	0	0	0	0	0	0	33	31	0	0	42	20	126
	8:00 AM	0	0	0	0	0	0	5	2	0	0	7	0	14
	8:15 AM	0	0	0	0	0	0	0	3	0	0	4	1	8
	8:30 AM	0	0	0	0	0	0	4	2	0	0	2	0	8
	8:45 AM	0	0	0	0	0	0	2	0	0	0	4	0	6
	VOLUMES	0	0	0	0	0	0	182	122	0	0	150	65	519
	APPROACH %	0%	0%	0%	0%	0%	0%	60%	40%	0%	0%	70%	30%	
	APP/DEPART	0	/	247	0	/	0	304	/	122	215	/	150	0
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	0	0	0	0	0	0	171	115	0	0	133	64	483
	APPROACH %	0%	0%	0%	0%	0%	0%	60%	40%	0%	0%	68%	32%	
	PEAK HR FACTOR		0.000			0.000			0.458			0.560		0.495
	APP/DEPART	0	/	235	0	/	0	286	/	115	197	/	133	0
PM	1:00 PM	0	0	0	0	0	0	9	5	0	0	0	2	16
	1:15 PM	0	0	0	0	0	1	22	8	0	0	3	5	39
	1:30 PM	0	0	0	0	0	0	7	13	0	0	6	3	29
	1:45 PM	0	0	0	0	0	0	16	21	0	0	10	10	57
	2:00 PM	0	0	0	0	0	0	44	32	0	0	12	23	111
	2:15 PM	0	0	0	0	0	0	6	6	0	0	4	2	18
	2:30 PM	0	0	0	0	0	0	4	6	0	0	5	2	17
	2:45 PM	0	0	0	0	0	0	18	8	0	0	4	8	38
	VOLUMES	0	0	0	0	0	1	126	99	0	0	44	55	325
	APPROACH %	0%	0%	0%	0%	0%	100%	56%	44%	0%	0%	44%	56%	
	APP/DEPART	0	/	181	1	/	0	225	/	99	99	/	45	0
	BEGIN PEAK HR		1:15 PM											
	VOLUMES	0	0	0	0	0	1	89	74	0	0	31	41	236
	APPROACH %	0%	0%	0%	0%	0%	100%	55%	45%	0%	0%	43%	57%	
	PEAK HR FACTOR		0.000			0.250			0.536			0.514		0.532
	APP/DEPART	0	/	130	1	/	0	163	/	74	72	/	32	0



INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 951 249 3226 pacific@aimtd.com

DATE:				
Tue, Dec 9, 14	LOCATION:	Highland	PROJECT #:	SC0503
	NORTH & SOUTH:	Fork	LOCATION #:	4
	EAST & WEST:	Water	CONTROL:	Stop All Ways

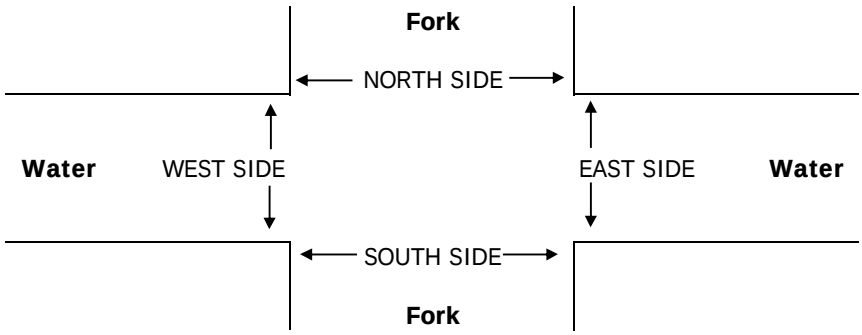
NOTES:

REVISED - PM label corrected, previously listed as AM.

AM
PM
MD
OTHER
OTHER

▲ N
◄ W
E ►
S ▼

		NORTHBOUND Fork			SOUTHBOUND Fork			EASTBOUND Water			WESTBOUND Water			
		NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	LANES:	0	1	0	0	x	0	0	1	0	0	1	0	
AM	7:00 AM	8	0	0	0	0	0	0	0	2	0	5	0	15
	7:15 AM	28	0	3	0	0	0	0	1	8	0	10	0	50
	7:30 AM	59	0	5	0	0	0	0	7	25	2	6	0	104
	7:45 AM	24	0	1	0	0	0	0	2	22	2	6	0	57
	8:00 AM	4	0	0	0	0	0	0	0	2	0	3	0	9
	8:15 AM	2	0	0	0	0	0	0	1	2	1	3	0	9
	8:30 AM	2	0	0	0	0	0	0	1	1	0	1	0	5
	8:45 AM	1	0	1	0	0	0	0	0	0	1	2	0	5
	VOLUMES	128	0	10	0	0	0	0	12	62	6	36	0	255
	APPROACH %	93%	0%	7%	0%	0%	0%	0%	16%	84%	14%	86%	0%	
	APP/DEPART	138	/	0	0	/	68	75	/	22	43	/	165	1
	BEGIN PEAK HR		7:00 AM											
	VOLUMES	119	0	9	0	0	0	0	10	57	4	27	0	226
	APPROACH %	93%	0%	7%	0%	0%	0%	0%	15%	85%	13%	87%	0%	
	PEAK HR FACTOR		0.500			0.000			0.523			0.775		0.543
	APP/DEPART	128	/	0	0	/	61	67	/	19	31	/	146	0
PM	1:00 PM	2	0	0	0	0	0	0	1	2	0	0	0	5
	1:15 PM	8	0	2	0	0	0	0	0	3	0	0	0	13
	1:30 PM	9	0	3	0	0	0	0	3	2	0	0	0	17
	1:45 PM	17	0	2	0	0	0	0	3	11	1	1	0	35
	2:00 PM	11	0	1	0	0	0	0	1	26	4	4	0	47
	2:15 PM	2	0	0	0	0	0	0	0	5	0	0	0	7
	2:30 PM	5	0	0	0	0	0	0	2	3	0	0	0	10
	2:45 PM	8	0	1	0	0	0	0	1	6	0	0	0	16
	VOLUMES	62	0	9	0	0	0	0	11	58	5	5	0	155
	APPROACH %	87%	0%	13%	0%	0%	0%	0%	16%	84%	50%	50%	0%	
	APP/DEPART	71	/	0	0	/	63	74	/	20	15	/	72	5
	BEGIN PEAK HR		1:15 PM											
	VOLUMES	45	0	8	0	0	0	0	7	42	5	5	0	112
	APPROACH %	85%	0%	15%	0%	0%	0%	0%	14%	86%	50%	50%	0%	
	PEAK HR FACTOR		0.697			0.000			0.454			0.313		0.596
	APP/DEPART	53	/	0	0	/	47	49	/	15	10	/	50	0



APPENDIX D

Explanation and Calculation of Intersection Delay

EXPLANATION AND CALCULATION OF INTERSECTION LEVEL OF SERVICE USING DELAY METHODOLOGY

The levels of service at the unsignalized and signalized intersections are calculated using the delay methodology in the Highway Capacity Manual. This methodology views an intersection as consisting of several lane groups. A lane group is a set of lanes serving a movement. If there are two northbound left turn lanes, then the lane group serving the northbound left turn movement has two lanes. Similarly, there may be three lanes in the lane group serving the northbound through movement, one lane in the lane group serving the northbound right turn movement, and so forth. It is also possible for one lane to serve two lane groups. A shared lane might result in there being 1.5 lanes in the northbound left turn lane group and 2.5 lanes in the northbound through lane group.

For each lane group, there is a capacity. That capacity is calculated by multiplying the number of lanes in the lane group times a theoretical maximum lane capacity per lane time's 12 adjustment factors.

Each of the 12 adjustment factors has a value of approximately 1.00. A value less than 1.00 is generally assigned when a less than desirable condition occurs.

The 12 adjustment factors are as follows:

1. Peak hour factor (to account for peaking within the peak hour)
2. Lane utilization factor (to account for not all lanes loading equally)
3. Lane width
4. Percent of heavy trucks
5. Approach grade
6. Parking
7. Bus stops at intersections
8. Area type (CBD or other)
9. Right turns
10. Left turns

11. Pedestrian activity

12. Signal progression

The maximum theoretical lane capacity and the 12 adjustment factors for it are all unknowns for which approximate estimates have been recommended in the Highway Capacity Manual. For the most part, the recommended values are not based on statistical analysis but rather on educated estimates. However, it is possible to use the delay method and get reasonable results as will be discussed below.

Once the lane group volume is known and the lane group capacity is known, a volume to capacity ratio can be calculated for the lane group.

With a volume to capacity ratio calculated, average delay per vehicle in a lane group can be estimated. The average delay per vehicle in a lane group is calculated using a complex formula provided by the Highway Capacity Manual, which can be simplified and described as follows:

Delay per vehicle in a lane group is a function of the following:

1. Cycle length

2. Amount of red time faced by a lane group

3. Amount of yellow time for that lane group

4. The volume to capacity ratio of the lane group

The average delay per vehicle for each lane group is calculated, and eventually an overall average delay for all vehicles entering the intersection is calculated. This average delay per vehicle is then used to judge Level of Service. The Level of Services are defined in the table that follows this discussion.

Experience has shown that when a maximum lane capacity of 1,900 vehicles per hour is used (as recommended in the Highway Capacity Manual), little or no yellow time penalty is used, and none of the 12 penalty factors are applied, calculated delay is realistic. The delay calculation for instance assumes that yellow time is totally unused. Yet experience shows that most of the yellow time is used.

An idiosyncrasy of the delay methodology is that it is possible to add traffic to an intersection and reduce the average total delay per vehicle. If the average total delay is 30 seconds per vehicle for all vehicles traveling through an intersection, and traffic is

added to a movement that has an average total delay of 15 seconds per vehicle, then the overall average total delay is reduced.

The delay calculation for a lane group is based on a concept that the delay is a function of the amount of unused capacity available. As the volume approaches capacity and there is no more unused capacity available, then the delay rapidly increases. Delay is not proportional to volume, but rather increases rapidly as the unused capacity approaches zero.

Because delay is not linearly related to volumes, the delay does not reflect how close an intersection is to overloading. If an intersection is operating at Level of Service C and has an average total delay of 18 seconds per vehicle, you know very little as to what percent the traffic can increase before Level of Service E is reached.

LEVEL OF SERVICE DESCRIPTION[1]

Level Of Service	Description	Average Total Delay Per Vehicle (Seconds)	
		Signalized	Unsignalized
A	Level of Service A occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	0 to 10.00	0 to 10.00
B	Level of Service B generally occurs with good progression and/or short cycle lengths. More vehicles stop than for Level of Service A, causing higher levels of average total delay.	10.01 to 20.00	10.01 to 15.00
C	Level of Service C generally results when there is fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.	20.01 to 35.00	15.01 to 25.00
D	Level of Service D generally results in noticeable congestion. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	35.01 to 55.00	25.01 to 35.00
E	Level of Service E is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences.	55.01 to 80.00	35.01 to 50.00
F	Level of Service F is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high volume to capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	80.01 and up	50.01 and up

[1] Source: Highway Capacity Manual Special Report 209, Transportation Research Board, National Research Council, Washington, D.C., 2000.

Existing

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	AM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Existing

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *Aplin Street*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	28	181	0	0	98	33
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	0	0	114	0	119
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR				L	R
PHF	0.58	0.58	0.58				0.58	0.58
Flow Rate (veh/h)	48	310	224				195	204
% Heavy Vehicles	0	0	0				0	0
No. Lanes	2		1		0		2	
Geometry Group	5		3b				1	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0				1.0	0.0
Prop. Right-Turns	0.0	0.0	0.3				0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0				0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2			0.2	0.2
hRT-adj	-0.7	-0.7	-0.6	-0.6			-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7			1.7	1.7
hadj, computed	0.5	0.0	-0.2				0.2	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20				3.20	3.20
x, initial	0.04	0.28	0.20				0.17	0.18
hd, final value (s)	6.33	5.83	5.68				5.67	4.87
x, final value	0.08	0.50	0.35				0.31	0.28
Move-up time, m (s)	2.3		2.0				2.0	
Service Time, t_s (s)	4.0	3.5	3.7				3.7	2.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	298	560	474				445	454
Delay (s/veh)	9.62	14.25	11.74				11.16	9.71
LOS	A	B	B				B	A
Approach: Delay (s/veh)	13.63		11.74				10.42	
LOS	B		B				B	
Intersection Delay (s/veh)	11.89							
Intersection LOS	B							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 4:06 PM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	PM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Existing

Project ID TTM 18935 Highland

East/West Street: Water Street

North/South Street:

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	41	101	0	0	21	12
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	0	0	55	0	80
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR				L	R
PHF	0.63	0.63	0.63				0.63	0.63
Flow Rate (veh/h)	65	160	52				87	126
% Heavy Vehicles	0	0	0				0	0
No. Lanes	2		1		0		2	
Geometry Group	5		3b				1	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0				1.0	0.0
Prop. Right-Turns	0.0	0.0	0.4				0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0				0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2			0.2	0.2
hRT-adj	-0.7	-0.7	-0.6	-0.6			-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7			1.7	1.7
hadj, computed	0.5	0.0	-0.2				0.2	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20				3.20	3.20
x, initial	0.06	0.14	0.05				0.08	0.11
hd, final value (s)	5.52	5.02	4.82				4.78	3.98
x, final value	0.10	0.22	0.07				0.12	0.14
Move-up time, m (s)	2.3		2.0				2.0	
Service Time, t_s (s)	3.2	2.7	2.8				2.8	2.0

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	315	410	302				337	376
Delay (s/veh)	8.83	9.15	8.17				8.40	7.62
LOS	A	A	A				A	A
Approach: Delay (s/veh)	9.06		8.17				7.94	
LOS	A		A				A	
Intersection Delay (s/veh)	8.48							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+TM Version 5.6 Generated: 4/1/2015 3:46 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst		Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*04/01/2015*	Analysis Year	*Existing*
Analysis Time Period	*AM*		

Project Description *TTM 18935 Highland*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*57*			*111*	
Peak-Hour Factor, PHF	*1.00*	*0.56*	*1.00*	*0.56*	*0.56*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*101*	*0*	*0*	*198*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*102*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.56*	*1.00*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*199*	*0*	*182*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*199*		*182*			
C (m) (veh/h)			*697*		*960*			
v/c			*0.29*		*0.19*			
95% queue length			*1.18*		*0.70*			
Control Delay (s/veh)			*12.2*		*9.6*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*11.0*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 5:08 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PDI*	Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*03/31/2015*	Analysis Year	*Existing*
Analysis Time Period	*PM*		

Project Description *TTM 18935 Highland*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*49*			*50*	
Peak-Hour Factor, PHF	*1.00*	*0.50*	*1.00*	*1.00*	*0.50*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*98*	*0*	*0*	*100*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*82*		*69*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.50*	*1.00*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*164*	*0*	*138*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*164*		*138*			
C (m) (veh/h)			*795*		*963*			
v/c			*0.21*		*0.14*			
95% queue length			*0.77*		*0.50*			
Control Delay (s/veh)			*10.7*		*9.4*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*10.1*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 5:00 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*AM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Existing*

Project Description *TTM 18935 Highland*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*171*	*115*			*133*	*64*
Peak-Hour Factor, PHF	*0.49*	*0.49*	*1.00*	*1.00*	*0.49*	*0.49*
Hourly Flow Rate, HFR (veh/h)	*346*	*233*	*0*	*0*	*269*	*129*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*346*							
C (m) (veh/h)	*1172*							
v/c	*0.30*							
95% queue length	*1.24*							
Control Delay (s/veh)	*9.4*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:26 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*PM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Existing*

Project Description *TTM 18935 Highland*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*89*	*74*			*31*	*41*
Peak-Hour Factor, PHF	*0.53*	*0.53*	*1.00*	*1.00*	*0.53*	*0.53*
Hourly Flow Rate, HFR (veh/h)	*168*	*139*	*0*	*0*	*58*	*77*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*168*							
C (m) (veh/h)	*1462*							
v/c	*0.11*							
95% queue length	*0.39*							
Control Delay (s/veh)	*7.8*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:41 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	AM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Existing

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *North Fork Road*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	10	57	4	27	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	119	0	9	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.54		0.54		0.54			
Flow Rate (veh/h)	122		56		234			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.11		0.05		0.21			
hd, final value (s)	4.02		4.62		4.44			
x, final value	0.14		0.07		0.29			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.0		2.6		2.4			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	372		306		484			
Delay (s/veh)	7.65		7.98		9.23			
LOS	A		A		A			
Approach: Delay (s/veh)	7.65		7.98		9.23			
LOS	A		A		A			
Intersection Delay (s/veh)	8.59							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 9:46 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	PM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Existing

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *North Fork Road*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	7	42	5	5	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	45	0	8	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.60		0.60		0.60			
Flow Rate (veh/h)	81		16		88			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.07		0.01		0.08			
hd, final value (s)	3.60		4.27		4.17			
x, final value	0.08		0.02		0.10			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	1.6		2.3		2.2			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	331		266		338			
Delay (s/veh)	6.91		7.35		7.65			
LOS	A		A		A			
Approach: Delay (s/veh)	6.91		7.35		7.65			
LOS	A		A		A			
Intersection Delay (s/veh)	7.30							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 9:54 AM

Existing Plus Project

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	AM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Existing With Project

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *Aplin Street*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	17	172	3	0	102	33
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	11	12	105	25	107
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	LTR		L	TR	L	TR
PHF	0.58	0.58	0.58		0.58	0.58	0.58	0.58
Flow Rate (veh/h)	29	300	230		20	38	180	225
% Heavy Vehicles	0	0	0		0	0	0	0
No. Lanes	2		1		2		2	
Geometry Group	5		4b		5		5	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		1.0	0.0	1.0	0.0
Prop. Right-Turns	0.0	0.0	0.2		0.0	0.5	0.0	0.8
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.0	-0.1		0.5	-0.4	0.5	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20	3.20	3.20	3.20
x, initial	0.03	0.27	0.20		0.02	0.03	0.16	0.20
hd, final value (s)	6.67	6.16	6.14		7.41	6.53	6.79	5.70
x, final value	0.05	0.51	0.39		0.04	0.07	0.34	0.36
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	4.4	3.9	3.8		5.1	4.2	4.5	3.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	279	550	480		270	288	430	475
Delay (s/veh)	9.75	15.18	12.74		10.43	9.71	12.93	11.53
LOS	A	C	B		B	A	B	B
Approach: Delay (s/veh)	14.70		12.74		9.96		12.15	
LOS	B		B		A		B	
Intersection Delay (s/veh)	12.98							
Intersection LOS	B							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 4:12 PM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	PM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Existing With Project

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *Aplin Street*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	34	98	9	0	23	15
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	9	10	4	58	21	73
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	LTR		L	TR	L	TR
PHF	0.63	0.63	0.63		0.63	0.63	0.63	0.63
Flow Rate (veh/h)	53	168	59		14	21	91	148
% Heavy Vehicles	0	0	0		0	0	0	0
No. Lanes	2		1		2		2	
Geometry Group	5		4b		5		5	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		1.0	0.0	1.0	0.0
Prop. Right-Turns	0.0	0.1	0.4		0.0	0.3	0.0	0.8
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.1	-0.2		0.5	-0.2	0.5	-0.5

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20	3.20	3.20	3.20
x, initial	0.05	0.15	0.05		0.01	0.02	0.08	0.13
hd, final value (s)	5.74	5.18	5.21		6.01	5.31	5.79	4.74
x, final value	0.08	0.24	0.09		0.02	0.03	0.15	0.19
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.4	2.9	2.9		3.7	3.0	3.5	2.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	303	418	309		264	271	341	398
Delay (s/veh)	8.97	9.53	8.40		8.86	8.18	9.48	8.58
LOS	A	A	A		A	A	A	A
Approach: Delay (s/veh)	9.39		8.40		8.45		8.92	
LOS	A		A		A		A	
Intersection Delay (s/veh)	9.03							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 4:21 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PDI*	Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*04/01/2015*	Analysis Year	*Existing With Project*
Analysis Time Period	*AM*		

Project Description *TTM 18935 Highland*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*57*			*114*	
Peak-Hour Factor, PHF	*1.00*	*0.56*	*1.00*	*0.56*	*0.56*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*101*	*0*	*0*	*203*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*102*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.56*	*1.00*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*199*	*0*	*182*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*199*		*182*			
C (m) (veh/h)			*692*		*960*			
v/c			*0.29*		*0.19*			
95% queue length			*1.19*		*0.70*			
Control Delay (s/veh)			*12.3*		*9.6*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*11.0*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 4:45 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PDI*	Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*03/31/2015*	Analysis Year	*Existing With Project*
Analysis Time Period	*PM*		

Project Description *TTM 18935 Highland*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*55*			*60*	
Peak-Hour Factor, PHF	*1.00*	*0.50*	*1.00*	*0.50*	*0.50*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*110*	*0*	*0*	*120*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*89*		*69*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.50*	*1.00*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*178*	*0*	*138*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*178*		*138*			
C (m) (veh/h)			*763*		*949*			
v/c			*0.23*		*0.15*			
95% queue length			*0.90*		*0.51*			
Control Delay (s/veh)			*11.1*		*9.4*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*10.4*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/2/2015 9:17 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*AM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Existing With Project*

Project Description *TTM 18935 Highland*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*177*	*102*			*137*	*67*
Peak-Hour Factor, PHF	*0.49*	*0.49*	*1.00*	*1.00*	*0.49*	*0.49*
Hourly Flow Rate, HFR (veh/h)	*359*	*206*	*0*	*0*	*277*	*135*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*359*							
C (m) (veh/h)	*1158*							
v/c	*0.31*							
95% queue length	*1.33*							
Control Delay (s/veh)	*9.5*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:30 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*PM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Existing With Project*

Project Description *TTM 18935 Highland*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*95*	*72*			*36*	*41*
Peak-Hour Factor, PHF	*0.53*	*0.53*	*1.00*	*1.00*	*0.53*	*0.53*
Hourly Flow Rate, HFR (veh/h)	*179*	*136*	*0*	*0*	*68*	*77*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*179*							
C (m) (veh/h)	*1450*							
v/c	*0.12*							
95% queue length	*0.42*							
Control Delay (s/veh)	*7.8*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:39 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	AM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Existing With Project

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *North Fork Road*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	10	44	4	27	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	126	0	9	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.54		0.54					
Flow Rate (veh/h)	99		56		223			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	0.0		0.1		0.9			
Prop. Right-Turns	0.8		0.0		0.1			
Prop. Heavy Vehicle	0.0		0.0		0.0			
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2		
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7		
hadj, computed	-0.5		0.0		0.1			

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.09		0.05		0.20			
hd, final value (s)	4.01		4.56		4.39			
x, final value	0.11		0.07		0.27			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.0		2.6		2.4			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	349		306		473			
Delay (s/veh)	7.50		7.91		9.03			
LOS	A		A		A			
Approach: Delay (s/veh)	7.50		7.91		9.03			
LOS	A		A		A			
Intersection Delay (s/veh)	8.46							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 9:42 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	PM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Existing With Project

Project ID *TTM 18935 Highland*

East/West Street: *Water Street* North/South Street: *North Fork Road*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	7	40	5	5	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	50	0	8	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.60		0.60		0.60			
Flow Rate (veh/h)	78		16		96			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.07		0.01		0.09			
hd, final value (s)	3.62		4.29		4.18			
x, final value	0.08		0.02		0.11			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	1.6		2.3		2.2			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	328		266		346			
Delay (s/veh)	6.93		7.37		7.70			
LOS	A		A		A			
Approach: Delay (s/veh)	6.93		7.37		7.70			
LOS	A		A		A			
Intersection Delay (s/veh)	7.36							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 9:53 AM

Opening Year (2017) Without Project

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	AM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Opening Year 2017 wo Project

Project ID TTM 18935 Highland Opening Year 2017 Without Project

East/West Street: Water Street

North/South Street: Aplin Street

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	29	186	0	0	101	34
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	0	0	117	0	123
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR				L	R
PHF	0.58	0.58	0.58				0.58	0.58
Flow Rate (veh/h)	49	319	231				200	212
% Heavy Vehicles	0	0	0				0	0
No. Lanes	2		1		0		2	
Geometry Group	5		3b				1	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0				1.0	0.0
Prop. Right-Turns	0.0	0.0	0.3				0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0				0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2			0.2	0.2
hRT-adj	-0.7	-0.7	-0.6	-0.6			-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7			1.7	1.7
hadj, computed	0.5	0.0	-0.2				0.2	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20				3.20	3.20
x, initial	0.04	0.28	0.21				0.18	0.19
hd, final value (s)	6.39	5.88	5.73				5.73	4.92
x, final value	0.09	0.52	0.37				0.32	0.29
Move-up time, m (s)	2.3		2.0				2.0	
Service Time, t_s (s)	4.1	3.6	3.7				3.7	2.9

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	299	569	481				450	462
Delay (s/veh)	9.70	14.81	12.03				11.37	9.92
LOS	A	B	B				B	A
Approach: Delay (s/veh)	14.13		12.03				10.62	
LOS	B		B				B	
Intersection Delay (s/veh)	12.22							
Intersection LOS	B							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+TM Version 5.6 Generated: 4/1/2015 4:24 PM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	PM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Opening Year 2017 wo Project

Project ID TTM 18935 Highland Opening Year 2017 Without Project

East/West Street: Water Street

North/South Street: Aplin Street

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	42	104	0	0	22	12
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	0	0	57	0	82
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	T	TR				L	R
PHF	0.63	0.63	0.63				0.63	0.63
Flow Rate (veh/h)	66	165	53				90	130
% Heavy Vehicles	0	0	0				0	0
No. Lanes	2		1		0		2	
Geometry Group	5		3b				1	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0				1.0	0.0
Prop. Right-Turns	0.0	0.0	0.4				0.0	1.0
Prop. Heavy Vehicle	0.0	0.0	0.0				0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2			0.2	0.2
hRT-adj	-0.7	-0.7	-0.6	-0.6			-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7			1.7	1.7
hadj, computed	0.5	0.0	-0.2				0.2	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20				3.20	3.20
x, initial	0.06	0.15	0.05				0.08	0.12
hd, final value (s)	5.54	5.04	4.84				4.80	4.00
x, final value	0.10	0.23	0.07				0.12	0.14
Move-up time, m (s)	2.3		2.0				2.0	
Service Time, t_s (s)	3.2	2.7	2.8				2.8	2.0

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	316	415	303				340	380
Delay (s/veh)	8.86	9.24	8.22				8.45	7.67
LOS	A	A	A				A	A
Approach: Delay (s/veh)	9.13		8.22				7.99	
LOS	A		A				A	
Intersection Delay (s/veh)	8.54							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+TM Version 5.6 Generated: 4/1/2015 3:41 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PDI*	Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*03/31/2015*	Analysis Year	*Opening Year 2017 Without*
Analysis Time Period	*AM*		

Project Description	*TTM 18935 Highland Opening Year 2017 Without Project*
East/West Street: *School Exit*	North/South Street: *Aplin Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*59*			*114*	
Peak-Hour Factor, PHF	*1.00*	*0.56*	*1.00*	*1.00*	*0.56*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*105*	*0*	*0*	*203*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*115*		*94*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.56*	*1.00*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*205*	*0*	*167*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*205*		*167*			
C (m) (veh/h)			*688*		*955*			
v/c			*0.30*		*0.17*			
95% queue length			*1.25*		*0.63*			
Control Delay (s/veh)			*12.4*		*9.6*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*11.1*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 6:07 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*PDI*	Intersection	*Aplin Street at School Exit 2*
Agency/Co.	*Kunzman Associates*	Jurisdiction	*Highland*
Date Performed	*03/31/2015*	Analysis Year	*Opening Year 2017 Without*
Analysis Time Period	*PM*		

Project Description	*TTM 18935 Highland Opening Year 2017 Without Project*
East/West Street: *School Exit*	North/South Street: *Aplin Street*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*50*			*52*	
Peak-Hour Factor, PHF	*1.00*	*0.50*	*1.00*	*1.00*	*0.50*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*100*	*0*	*0*	*104*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*86*		*71*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.50*	*1.00*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*172*	*0*	*142*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*172*		*142*			
C (m) (veh/h)			*789*		*961*			
v/c			*0.22*		*0.15*			
95% queue length			*0.83*		*0.52*			
Control Delay (s/veh)			*10.8*		*9.4*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*10.2*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 6:07 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*AM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Opening Yr 2017 wo*

Project Description *TTM 18935 Highland Opening Year 2017 Without Project*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*176*	*118*			*137*	*67*
Peak-Hour Factor, PHF	*0.49*	*0.49*	*1.00*	*1.00*	*0.49*	*0.49*
Hourly Flow Rate, HFR (veh/h)	*356*	*239*	*0*	*0*	*277*	*135*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*356*							
C (m) (veh/h)	*1158*							
v/c	*0.31*							
95% queue length	*1.31*							
Control Delay (s/veh)	*9.5*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:32 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*PM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Opening Yr 2017 without*

Project Description *TTM 18935 Highland Opening Year 2017 Without Project*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*92*	*76*			*32*	*42*
Peak-Hour Factor, PHF	*0.53*	*0.53*	*1.00*	*1.00*	*0.53*	*0.53*
Hourly Flow Rate, HFR (veh/h)	*173*	*143*	*0*	*0*	*60*	*79*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*173*							
C (m) (veh/h)	*1457*							
v/c	*0.12*							
95% queue length	*0.40*							
Control Delay (s/veh)	*7.8*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:38 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	AM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Opening Year 2017 Without

Project ID TTM 18935 Highland Opening Year 2017 Without Project

East/West Street: Water Street

North/South Street: North Fork Road

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	10	59	4	28	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	123	0	9	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.54		0.54					
Flow Rate (veh/h)	126		58		218			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.11		0.05		0.19			
hd, final value (s)	3.98		4.59		4.45			
x, final value	0.14		0.07		0.27			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.0		2.6		2.5			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	376		308		468			
Delay (s/veh)	7.63		7.95		9.09			
LOS	A		A		A			
Approach: Delay (s/veh)	7.63		7.95		9.09			
LOS	A		A		A			
Intersection Delay (s/veh)	8.47							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved HCS+TM Version 5.6 Generated: 2/27/2015 9:44 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	PM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Opening Year 2017 Without

Project ID *TTM 18935 Highland Opening Year 2017 Without Project*

East/West Street: *Water Street* North/South Street: *North Fork Road*

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	7	43	5	5	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	46	0	8	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.60		0.60		0.60			
Flow Rate (veh/h)	83		16		90			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.07		0.01		0.08			
hd, final value (s)	3.60		4.28		4.18			
x, final value	0.08		0.02		0.10			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	1.6		2.3		2.2			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	333		266		340			
Delay (s/veh)	6.93		7.36		7.67			
LOS	A		A		A			
Approach: Delay (s/veh)	6.93		7.36		7.67			
LOS	A		A		A			
Intersection Delay (s/veh)	7.32							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 9:50 AM

Opening Year (2017) With Project

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	AM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Opening Year 2017 with Project

Project ID TTM 18935 Highland Opening Year 2017 With Project

East/West Street: Water Street

North/South Street: Aplin Street

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	18	176	3	0	105	34
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	11	13	107	25	111
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	LTR		L	TR	L	TR
PHF	0.58	0.58	0.58		0.58	0.58	0.58	1.00
Flow Rate (veh/h)	31	308	239		20	40	184	136
% Heavy Vehicles	0	0	0		0	0	0	0
No. Lanes	2		1		2		2	
Geometry Group	5		4b		5		5	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		1.0	0.0	1.0	0.0
Prop. Right-Turns	0.0	0.0	0.2		0.0	0.6	0.0	0.8
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.0	-0.1		0.5	-0.4	0.5	-0.6

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20	3.20	3.20	3.20
x, initial	0.03	0.27	0.21		0.02	0.04	0.16	0.12
hd, final value (s)	6.48	5.97	5.97		7.29	6.39	6.79	5.71
x, final value	0.06	0.51	0.40		0.04	0.07	0.35	0.22
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	4.2	3.7	3.7		5.0	4.1	4.5	3.4

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	281	558	489		270	290	434	386
Delay (s/veh)	9.56	14.72	12.53		10.29	9.58	13.06	9.97
LOS	A	B	B		B	A	B	A
Approach: Delay (s/veh)	14.24		12.53		9.81		11.75	
LOS	B		B		A		B	
Intersection Delay (s/veh)	12.70							
Intersection LOS	B							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+TM Version 5.6 Generated: 4/1/2015 3:35 PM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	03/31/2015
Analysis Time Period	PM

Site Information

Intersection	Aplin Street at Water Street-1
Jurisdiction	Highland
Analysis Year	Opening Year 2017 with Project

Project ID TTM 18935 Highland Opening Year 2017 With Project

East/West Street: Water Street

North/South Street: Aplin Street

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	50	101	9	0	24	15
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	9	11	4	60	21	75
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	L	TR	LTR		L	TR	L	TR
PHF	0.63	0.63	0.63		0.63	0.63	0.63	0.63
Flow Rate (veh/h)	79	174	61		14	23	95	152
% Heavy Vehicles	0	0	0		0	0	0	0
No. Lanes	2		1		2		2	
Geometry Group	5		4b		5		5	
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	1.0	0.0	0.0		1.0	0.0	1.0	0.0
Prop. Right-Turns	0.0	0.1	0.4		0.0	0.3	0.0	0.8
Prop. Heavy Vehicle	0.0	0.0	0.0		0.0	0.0	0.0	0.0
hLT-adj	0.5	0.5	0.2	0.2	0.5	0.5	0.5	0.5
hRT-adj	-0.7	-0.7	-0.6	-0.6	-0.7	-0.7	-0.7	-0.7
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	0.5	-0.1	-0.2		0.5	-0.2	0.5	-0.5

Departure Headway and Service Time

hd, initial value (s)	3.20	3.20	3.20		3.20	3.20	3.20	3.20
x, initial	0.07	0.15	0.05		0.01	0.02	0.08	0.14
hd, final value (s)	5.78	5.23	5.29		6.13	5.44	5.89	4.83
x, final value	0.13	0.25	0.09		0.02	0.03	0.16	0.20
Move-up time, m (s)	2.3		2.3		2.3		2.3	
Service Time, t_s (s)	3.5	2.9	3.0		3.8	3.1	3.6	2.5

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	329	424	311		264	273	345	402
Delay (s/veh)	9.32	9.68	8.51		8.98	8.34	9.67	8.77
LOS	A	A	A		A	A	A	A
Approach: Delay (s/veh)	9.57		8.51		8.58		9.11	
LOS	A		A		A		A	
Intersection Delay (s/veh)	9.21							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+TM Version 5.6 Generated: 4/1/2015 4:27 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*03/31/2015*
Analysis Time Period	*AM*

Site Information

Intersection	*Aplin Street at School Exit 2*
Jurisdiction	*Highland*
Analysis Year	*Opening Year 2017 With Project*

Project Description *TTM 18935 Highland Opening Year 2017 With Project*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*59*			*117*	
Peak-Hour Factor, PHF	*1.00*	*0.56*	*1.00*	*1.00*	*0.56*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*105*	*0*	*0*	*208*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*115*		*105*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.56*	*1.00*	*0.56*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*205*	*0*	*187*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*205*		*187*			
C (m) (veh/h)			*684*		*955*			
v/c			*0.30*		*0.20*			
95% queue length			*1.26*		*0.72*			
Control Delay (s/veh)			*12.5*		*9.7*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*11.2*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 6:08 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*03/31/2015*
Analysis Time Period	*PM*

Site Information

Intersection	*Aplin Street at School Exit 2*
Jurisdiction	*Highland*
Analysis Year	*Opening Year 2017 With Project*

Project Description *TTM 18935 Highland Opening Year 2017 With Project*

East/West Street: *School Exit* | North/South Street: *Aplin Street*

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

Vehicle Volumes and Ad ustments

Ma or Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*56*			*62*	
Peak-Hour Factor, PHF	*1.00*	*0.50*	*1.00*	*1.00*	*0.50*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*112*	*0*	*0*	*124*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*92*		*71*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.50*	*1.00*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*184*	*0*	*142*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration			*L*		*R*			
v (veh/h)			*184*		*142*			
C (m) (veh/h)			*757*		*947*			
v/c			*0.24*		*0.15*			
95% queue length			*0.95*		*0.53*			
Control Delay (s/veh)			*11.3*		*9.5*			
LOS			*B*		*A*			
Approach Delay (s/veh)	--	--	*10.5*					
Approach LOS	--	--	*B*					

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 4/1/2015 6:08 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*AM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Opening Yr 2017 with*

Project Description *TTM 18935 Highland Opening Year 2017 With Project*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*182*	*104*			*141*	*69*
Peak-Hour Factor, PHF	*0.49*	*0.49*	*1.00*	*1.00*	*0.49*	*0.49*
Hourly Flow Rate, HFR (veh/h)	*369*	*210*	*0*	*0*	*286*	*139*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*369*							
C (m) (veh/h)	*1145*							
v/c	*0.32*							
95% queue length	*1.41*							
Control Delay (s/veh)	*9.6*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:34 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*PDI*
Agency/Co.	*Kunzman Associates*
Date Performed	*2/27/2015*
Analysis Time Period	*PM*

Site Information

Intersection	*School Entry at Water Street 3*
Jurisdiction	*Highland*
Analysis Year	*Opening Yr 2017 with*

Project Description *TTM 18935 Highland Opening Year 2017 With Project*

East/West Street: *Water Street* | North/South Street: *School Entry*

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

Vehicle Volumes and Ad ustments

Ma or Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*98*	*74*			*37*	*42*
Peak-Hour Factor, PHF	*0.53*	*0.53*	*1.00*	*1.00*	*0.53*	*0.53*
Hourly Flow Rate, HFR (veh/h)	*185*	*139*	*0*	*0*	*69*	*79*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

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

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*							
v (veh/h)	*185*							
C (m) (veh/h)	*1446*							
v/c	*0.13*							
95% queue length	*0.44*							
Control Delay (s/veh)	*7.9*							
LOS	*A*							
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

Copyright © 2010 University of Florida, All Rights Reserved *HCS+*™ Version 5.6 Generated: 2/27/2015 8:36 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	PM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Opening Year 2017 With

Project ID TTM 18935 Highland Opening Year 2017 With Project

East/West Street: Water Street

North/South Street: North Fork Road

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	10	45	4	28	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	130	0	9	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.54		0.54					
Flow Rate (veh/h)	100		58		230			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

Prop. Left-Turns	0.0		0.1		0.9			
Prop. Right-Turns	0.8		0.0		0.1			
Prop. Heavy Vehicle	0.0		0.0		0.0			
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2		
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7		
hadj, computed	-0.5		0.0		0.2			

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.09		0.05		0.20			
hd, final value (s)	4.03		4.58		4.40			
x, final value	0.11		0.07		0.28			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.0		2.6		2.4			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	350		308		480			
Delay (s/veh)	7.53		7.95		9.12			
LOS	A		A		A			
Approach: Delay (s/veh)	7.53		7.95		9.12			
LOS	A		A		A			
Intersection Delay (s/veh)	8.53							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved HCS+™ Version 5.6 Generated: 2/27/2015 9:44 AM

ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	PDI
Agency/Co.	Kunzman Associates
Date Performed	2/27/2015
Analysis Time Period	PM

Site Information

Intersection	N Fork Road at Water Street 4
Jurisdiction	Highland
Analysis Year	Opening Year 2017 With

Project ID TTM 18935 Highland Opening Year 2017 With Project

East/West Street: Water Street

North/South Street: North Fork Road

Volume Ad ustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	7	41	5	5	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	51	0	9	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	TR		LT		LR			
PHF	0.60		0.60					
Flow Rate (veh/h)	79		16		98			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Ad ustment Worksheet

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

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.07		0.01		0.09			
hd, final value (s)	3.62		4.29		4.17			
x, final value	0.08		0.02		0.11			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	1.6		2.3		2.2			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	329		266		348			
Delay (s/veh)	6.93		7.38		7.71			
LOS	A		A		A			
Approach: Delay (s/veh)	6.93		7.38		7.71			
LOS	A		A		A			
Intersection Delay (s/veh)	7.36							
Intersection LOS	A							

Copyright © 2010 University of Florida, All Rights Reserved

HCS+™ Version 5.6 Generated: 2/27/2015 9:48 AM

APPENDIX E

Cram Elementary School Project Trips

Appendix E

Elementary School Trip Generation[1]

Land Use	Quantity[2]	Units[3]	Peak Hour					
			Morning			Afternoon		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Trip Generation Rates								
Cram Elementary School		STU	0.38	0.33	0.71	0.21	0.25	0.46
Trips Generated								
Cram Elementary School	619	STU	235	205	440	130	152	282
Total	619	DU	235	205	440	130	152	282

Elementary Students per Project	
Elementary Students[4]	13,288
Households[4]	43,577
Elementary Students per Household[4]	0.3049
Households in Project	80
Students in Project	24.3945

Cram Elementary School Trips	Students	Drop Off / Pick Up	
		Morning	Afternoon
Elementary Trip Rate per school[5]	619	35.5%	23.0%
Elementary Trips per Project[6]	24.39	8.66 (~ 9)	5.61 (~ 6)

Percent of School Diverted Project Trips for AM outbound and PM inbound		
Project AM Outbound Trips	45	NA
Project PM Inbound Trips	NA	50
School Diverted Trips	20%	12%

[1] Source: Counts at the Cram Elementary School Entry and Exit were conducted December 9, 2014.

[2] Cram Elementary School Attendance on December 9, 2014.

[3] STU = Students

[4] Source: http://www.usa.com/school-district-0632070.htm#schools. Redlands Unified School District Census Data.

[5] The average of the inbound and outbound rates is the percent of students dropped off in the morning and percent of the students picked up in the afternoon.

Kunzman Associates, Inc.

OVER 35 YEARS OF EXCELLENT SERVICE

1111 Town & Country Road, Suite 34
Orange, California 92868
(714) 973-8383

www.traffic-engineer.com