ATTACHMENTS

October 20, 2022
Revised December 11, 2024

Mr. Raymond DuVernay Jr.
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Subject: CalEEMod Air Quality and Greenhouse Gas Study for a Residential Development in Acton, CA (APN: 3057-014-012)

Dear Mr. DuVernay:

Yorke Engineering, LLC (Yorke) is pleased to provide this Air Quality (AQ) and Greenhouse Gas (GHG) Impacts Study Letter Report. This AQ/GHG Letter Report includes CalEEMod emissions estimates, criteria pollutant analysis, and GHG analysis for the proposed development of residential housing to be located in Acton, CA, which is in the County of Los Angeles (the County). These evaluations will support a CEQA Categorical Exemption, Initial Study (IS), Negative Declaration (ND), or a Mitigated Negative Declaration (MND), as applicable.

Attachment 1 contains the CalEEMod outputs, and Attachment 2 contains the Climate Action Plan (CAP) CEQA Streamlining Checklist with notes.

PROJECT DESCRIPTION

The proposed project is development of home sites to be located in Acton, CA, which is in the County of Los Angeles (the County) and is within the jurisdiction of Antelope Valley Air Quality Management District (AVAQMD). The project includes developing a vacant 785,160 square foot (18.025 acre) parcel at Sierra Highway East and Listie Avenue North [Assessor Parcel Number (APN) 3057-014-012] into three (3) single-family residential lots comprising 5 acres or more.

DATA SOURCES AND ASSUMPTIONS

The following lists sources of information used in developing the emission estimates for the proposed Project using the California Emissions Estimator Model® (CalEEMod). Not all CalEEMod defaults are listed, but some defaults which have a particularly important impact on the project are listed.

- The Applicant defined:
  - Basic project design features including size of the proposed building and parking area;
  - Sweep paved roads used by construction vehicle traffic to achieve dust suppression;
  - Low VOC paints and cleaning supplies will be used; and

- During construction, any exposed soil will be watered two times a day.
- Assumptions:
  - Proposed landscaping area is assumed to be approximately 97,791 square feet; and
  - To be conservative, proposed residential area is assumed to be two story housing, approximately 6,400 square feet per two-story house.
- CalEEMod defaults were used for:
  - Construction equipment count, load factor, and age;
  - Architectural coating areas;
  - Operational vehicle fleet mixes;
  - Weekday and weekend daily trip rates for the operational phase; and
  - Average vehicle trip distances.

LIST OF TABLES

The project analyses and results are summarized in the following tables:

AIR QUALITY AND GREENHOUSE GAS IMPACTS ANALYSES

In order to evaluate the potential for Air Quality and Greenhouse Gas impacts of a proposed project, quantitative significance criteria established by the local air quality agency, such as the AVAQMD, may be relied upon to make significance determinations based on mass emissions of criteria pollutants and GHGs, as presented in this report. As shown below, approval of the project would not result in any significant effects relating to air quality or greenhouse gases.

Project Emissions Estimation

The construction and operation analysis were performed using CalEEMod version 2022.1, the official statewide land use computer model designed to provide a uniform platform for estimating potential criteria pollutant and GHG emissions associated with both construction and operations of land use projects under CEQA. The model quantifies direct emissions from construction and operations (including vehicle use), as well as indirect emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. The mobile source emission factors used in the model –published by the California Air Resources Board (CARB) – include the Pavley standards and Low Carbon Fuel standards. The model also identifies project design features, regulatory measures, and control measures to reduce criteria pollutant and GHG emissions along with calculating the benefits achieved from the selected measures. CalEEMod was developed by the California Air Pollution Control Officers Association

(CAPCOA) in collaboration with the South Coast Air Quality Management District (SCAQMD), the Bay Area Air Quality Management District (BAAQMD), the San Joaquin Valley Air Pollution Control District (SJVAPCD), and other California air districts. Default land use data (e.g., emission factors, trip lengths, meteorology, source inventory, etc.) were provided by the various California air districts to account for local requirements and conditions. As the official assessment methodology for land use projects in California, CalEEMod is relied upon herein for construction and operational emissions quantification, which forms the basis for the impact analysis.

Based on information received from the Applicant, land use data for CalEEMod input is presented in Table 1. The AVAQMD quantitative significance thresholds shown in Table 2 were used to evaluate project emissions impacts (AVAQMD 2016).

Table 1: Land Use Data for CalEEMod Input

Project Element	CalEEMod Land Use Type	CalEEMod Land Use Subtype	Unit Amount	Size Metric	Lot Acreage (footprint)	Building Square Feet (est.)	Population
Houses	Residential	Single Family Housing	3.00	Dwelling Units	18.0	19,200	9
Paved Areas	Parking	Other Asphalt Surfaces	102	1,000 sq. ft.	2.33	N/A	N/A
Landscaping	Landscape Area	Landscape Area	97.79	1,000 sq. ft.	2.24	N/A	N/A
				Project Site	**22.57**	**19,200**	**9**

Source: Applicant 2022, CalEEMod version 2022.1
Notes:
Electric Utility: Southern California Edison
Gas Utility: Southern California Gas

Table 2: AVAQMD CEQA Thresholds of Significance

Pollutant	Project Construction	Project Operation
ROG (VOC)	137 lbs/day	137 lbs/day
NO_X	137 lbs/day	137 lbs/day
CO	548 lbs/day	548 lbs/day
SO_X	137 lbs/day	137 lbs/day
PM_{10}	82 lbs/day	82 lbs/day
$PM_{2.5}$	65 lbs/day	65 lbs/day
Pb	3 lbs/day	3 lbs/day
H_2S	54 lbs/day	54 lbs/day
CO_2e	100,000 tpy (90,718 MT/yr)	

Source: AVAQMD 2016

Criteria Pollutants from Project Construction

A project's construction phase produces many types of emissions, but PM_{10} (including $PM_{2.5}$) in fugitive dust and diesel engine exhaust are the pollutants of greatest concern. Fugitive dust emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle exhaust. Construction-related emissions can cause substantial increases in localized concentrations of PM_{10}, as well as affecting PM_{10} compliance with ambient air quality standards on a regional basis. Particulate emissions from construction activities can lead to adverse health effects as well as nuisance concerns such as reduced visibility and soiling of exposed surfaces. The use of diesel-powered construction equipment emits ozone precursors oxides of nitrogen (NO_x) and reactive organic gases (ROG), and diesel particulate matter (DPM), the latter being a composite of toxic air contaminants (TACs) containing a variety of hazardous substances. Large construction projects using multiple large earthmoving equipment are evaluated to determine if operations may exceed the District's daily threshold for NO_x emissions and could temporarily expose area residents to hazardous levels of DPM. Use of architectural coatings and other materials associated with finishing buildings may also emit ROG and TACs. CEQA significance thresholds address the impacts of construction activity emissions on local and regional air quality. Thresholds are also provided for other potential impacts related to project construction, such as odors and TACs.

The AVAQMD's approach to CEQA analyses of fugitive dust impacts is to require implementation of effective and comprehensive dust control measures rather than to require detailed quantification of emissions. PM_{10} emitted during construction can vary greatly depending on the level of activity, the specific operations taking place, the equipment being operated, local soils, weather conditions, and other factors, making quantification difficult. Despite this variability in emissions, experience has shown that there are several feasible control measures that can be reasonably implemented to significantly reduce fugitive dust emissions from construction. For larger projects, the AVAQMD has determined that compliance with an approved fugitive dust control plan comprising Best Management Practices (BMPs), primarily through frequent water application, constitutes sufficient control to reduce PM_{10} impacts to a level considered less than significant.

Criteria Pollutants from Project Operation

The term "project operations" refers to the full range of activities that can or may generate criteria pollutant, GHG, and TAC emissions when the project is functioning in its intended use. For projects, such as office parks, shopping centers, apartment buildings, residential subdivisions, and other indirect sources, motor vehicles traveling to and from the project represents the primary source of air pollutant emissions. For industrial projects and some commercial projects, equipment operation and manufacturing processes, i.e., permitted stationary sources, can be of greatest concern from an emissions standpoint. CEQA significance thresholds address the impacts of operational emission sources on local and regional air quality. Thresholds are also provided for other potential impacts related to project operations, such as odors.

Results of Criteria Emissions Analyses

Table 3 shows unmitigated and mitigated criteria construction emissions and evaluates mitigated emissions against AVAQMD significance thresholds.

Table 4 shows unmitigated and mitigated criteria operational emissions and evaluates mitigated emissions against AVAQMD significance thresholds.

As shown in Tables 3 and 4, mass emissions of criteria pollutants from construction and operation are below applicable AVAQMD significance thresholds.

IMPACT: Less Than Significant (LTS)

Table 3: Construction Emissions Summary and Significance Evaluation

Criteria Pollutants	Unmitigated (lbs/day)	Mitigated (lbs/day)	Threshold (lbs/day)	Significance
ROG (VOC)	9.1	6.9	137	LTS
NO_X	39.9	39.9	137	LTS
CO	36.8	36.8	548	LTS
SO_X	0.06	0.06	137	LTS
Total PM_{10}	21.7	9.7	82	LTS
Total $PM_{2.5}$	11.8	5.7	65	LTS

Sources: AVAQMD 2016, CalEEMod version 2022.1
Notes:
lbs/day are winter or summer maxima for planned land use
Total PM_{10} / $PM_{2.5}$ comprises fugitive dust plus engine exhaust
LTS - Less Than Significant

Table 4: Operational Emissions Summary and Significance Evaluation

Criteria Pollutants	Unmitigated (lbs/day)	Mitigated (lbs/day)	Threshold (lbs/day)	Significance
ROG (VOC)	5.3	5.2	137	LTS
NO_X	0.33	0.33	137	LTS
CO	7.8	7.8	548	LTS
SO_X	0.01	0.01	137	LTS
Total PM_{10}	0.9	0.9	82	LTS
Total $PM_{2.5}$	0.8	0.8	65	LTS

Sources: AVAQMD 2016, CalEEMod version 2022.1
Notes:
lbs/day are winter or summer maxima for planned land use
LTS - Less Than Significant

Greenhouse Gas Emissions from Construction and Operation

Greenhouse gases – primarily carbon dioxide (CO_2), methane (CH_4), and nitrous (N_2O) oxide, collectively reported as carbon dioxide equivalents (CO_2e) – are directly emitted from stationary source combustion of natural gas in equipment such as water heaters, boilers, process heaters, and furnaces. GHGs are also emitted from mobile sources such as on-road vehicles and off-road construction equipment burning fuels such as gasoline, diesel, biodiesel, propane, or natural gas (compressed or liquefied). Indirect GHG emissions result from electric power generated elsewhere (i.e., power plants) used to operate process equipment, lighting, and utilities at a facility. Also, included in GHG quantification is electric power used to pump the water supply (e.g., aqueducts, wells, pipelines) and disposal and decomposition of municipal waste in landfills. (CARB 2017)

California's Building Energy Efficiency Standards are updated on an approximately three-year cycle. The 2019 standards improved upon the 2016 standards for new construction of, and additions and alterations to, residential, commercial, and industrial buildings. The 2019 standards went into effect on January 1, 2020 (CEC 2019).

Since the Title 24 standards require energy conservation features in new construction (e.g., high-efficiency lighting, high-efficiency heating, ventilating, and air-conditioning (HVAC) systems, thermal insulation, double-glazed windows, water conserving plumbing fixtures, etc.), they indirectly regulate and reduce GHG emissions.

Using CalEEMod, direct onsite and offsite GHG emissions were estimated for construction and operation, and indirect offsite GHG emissions were estimated to account for electric power used by the proposed Project, water conveyance, and solid waste disposal.

Results of Greenhouse Gas Emissions Analyses

Table 5 shows unmitigated and mitigated GHG emissions and evaluates mitigated emissions against AVAQMD significance thresholds. Operational reduction measures incorporate typical code-required water conservation features. Off-site traffic impacts are included in these emissions estimates, along with construction emissions amortized over 30 years.

<u>IMPACT:</u> Less Than Significant (LTS)

Table 5: Greenhouse Gas Emissions Summary and Significance Evaluation

Greenhouse Gases	Unmitigated (MT/yr)	Mitigated (MT/yr)	Threshold (MT/yr)	Significance
CO_2	98	98	—	—
CH_4	0.03	0.03	—	—
N_2O	0.01	0.01	—	—
R	0.14	0.14	—	—
CO_2e	100	100	90,718	LTS

Sources: AVAQMD 2016, CalEEMod version 2022.1

<u>Notes:</u>

Comprises annual operational emissions plus construction emissions amortized over 30 years

LTS - Less Than Significant

CLOSING

Thank you very much for the opportunity to be of assistance to Raymond DuVernay. Should you have any questions, please contact me at (949) 324-2909 (mobile) or Tina Darjazanie at (949) 324-9041 (mobile).

Sincerely,

Ernesto Betancourt II

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Engineer
Yorke Engineering, LLC
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Enclosures/Attachments:

1. CalEEMod Outputs
2. CAP CEQA Streamlining Checklist

AIR QUALITY AND GHG REFERENCES

Antelope Valley Air Quality Management District (AVAQMD). 2016. CEQA and Federal Conformity Guidelines. Website (https://avaqmd.ca.gov/rules-plans).

California Air Resources Board (CARB). 2017. California's 2017 Climate Change Scoping Plan. Website (https://ww3.arb.ca.gov/cc/scopingplan/scopingplan.htm).

California Department of Resources Recycling and Recovery (CalRecycle). 2016. Solid Waste Cleanup Program Weights and Volumes for Project Estimates. Website (https://www.calrecycle.ca.gov).

California Emissions Estimation Model® (CalEEMod). Version 2022.1. Website (http://www.caleemod.com/).

California Energy Commission (CEC). 2019. Building Energy Efficiency Program. Website (https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards).

ATTACHMENT 1 – CALEEMOD OUTPUTS

CSU - Residential Development in Acton v2 Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	CSU - Residential Development in Acton v2
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.50
Precipitation (days)	13.0
Location	34.48703749286352, -118.15181363903925
County	Los Angeles-Mojave Desert
City	Unincorporated
Air District	Antelope Valley AQMD
Air Basin	Mojave Desert
TAZ	3625
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Single Family Housing	3.00	Dwelling Unit	18.0	19,200	97,791	—	9.00	—
Other Asphalt Surfaces	102	1000sqft	2.33	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-10-A	Water Exposed Surfaces
Construction	C-10-C	Water Unpaved Construction Roads
Construction	C-12	Sweep Paved Roads
Construction	C-13	Use Low-VOC Paints for Construction
Area	AS-1	Use Low-VOC Cleaning Supplies
Area	AS-2	Use Low-VOC Paints

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

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

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.85	37.4	33.7	0.06	1.59	9.47	11.1	1.47	3.72	5.18	—	6,898	6,898	0.28	0.06	1.34	6,925
Mit.	3.85	37.4	33.7	0.06	1.59	3.85	5.45	1.47	1.49	2.95	—	6,898	6,898	0.28	0.06	1.34	6,925
% Reduced	—	—	—	—	—	59%	51%	—	60%	43%	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	9.06	39.9	36.8	0.06	1.81	19.9	21.7	1.66	10.2	11.8	—	6,865	6,865	0.28	0.06	0.03	6,891
Mit.	6.85	39.9	36.8	0.06	1.81	7.89	9.70	1.66	3.99	5.65	—	6,865	6,865	0.28	0.06	0.03	6,891
% Reduced	24%	—	—	—	—	60%	55%	—	61%	52%	—	—	—	—	—	—	—

Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.15	10.9	11.2	0.02	0.49	1.46	1.96	0.45	0.64	1.09	—	2,090	2,090	0.08	0.02	0.09	2,098
Mit.	1.15	10.9	11.2	0.02	0.49	0.59	1.09	0.45	0.25	0.71	—	2,090	2,090	0.08	0.02	0.09	2,098
% Reduced	1%	—	—	—	—	59%	44%	—	60%	35%	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.21	2.00	2.04	< 0.005	0.09	0.27	0.36	0.08	0.12	0.20	—	346	346	0.01	< 0.005	0.02	347
Mit.	0.21	2.00	2.04	< 0.005	0.09	0.11	0.20	0.08	0.05	0.13	—	346	346	0.01	< 0.005	0.02	347
% Reduced	1%	—	—	—	—	59%	44%	—	60%	35%	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

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

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	3.85	37.4	33.7	0.06	1.59	9.47	11.1	1.47	3.72	5.18	—	6,898	6,898	0.28	0.06	1.34	6,925
2024	1.25	11.2	13.2	0.02	0.50	0.20	0.59	0.46	0.05	0.46	—	2,423	2,423	0.10	0.02	0.94	2,432
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	4.05	39.9	36.8	0.06	1.81	19.9	21.7	1.66	10.2	11.8	—	6,865	6,865	0.28	0.06	0.03	6,891
2024	9.06	11.2	13.2	0.02	0.50	0.20	0.59	0.46	0.05	0.46	—	2,422	2,422	0.10	0.02	0.02	2,430
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	1.15	10.9	11.2	0.02	0.49	1.46	1.96	0.45	0.64	1.09	—	2,090	2,090	0.08	0.02	0.09	2,098
2024	1.15	5.96	7.11	0.01	0.27	0.02	0.28	0.24	< 0.005	0.25	—	1,282	1,282	0.05	0.01	0.04	1,286

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	0.21	2.00	2.04	< 0.005	0.09	0.27	0.36	0.08	0.12	0.20	—	346	346	0.01	< 0.005	0.02	347
2024	0.21	1.09	1.30	< 0.005	0.05	< 0.005	0.05	0.04	< 0.005	0.05	—	212	212	0.01	< 0.005	0.01	213

2.3. Construction Emissions by Year, Mitigated

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

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	3.85	37.4	33.7	0.06	1.59	3.85	5.45	1.47	1.49	2.95	—	6,898	6,898	0.28	0.06	1.34	6,925
2024	1.25	11.2	13.2	0.02	0.50	0.20	0.59	0.46	0.05	0.46	—	2,423	2,423	0.10	0.02	0.94	2,432
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	4.05	39.9	36.8	0.06	1.81	7.89	9.70	1.66	3.99	5.65	—	6,865	6,865	0.28	0.06	0.03	6,891
2024	6.85	11.2	13.2	0.02	0.50	0.20	0.59	0.46	0.05	0.46	—	2,422	2,422	0.10	0.02	0.02	2,430
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	1.15	10.9	11.2	0.02	0.49	0.59	1.09	0.45	0.25	0.71	—	2,090	2,090	0.08	0.02	0.09	2,098
2024	1.03	5.96	7.11	0.01	0.27	0.02	0.28	0.24	< 0.005	0.25	—	1,282	1,282	0.05	0.01	0.04	1,286
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2023	0.21	2.00	2.04	< 0.005	0.09	0.11	0.20	0.08	0.05	0.13	—	346	346	0.01	< 0.005	0.02	347
2024	0.19	1.09	1.30	< 0.005	0.05	< 0.005	0.05	0.04	< 0.005	0.05	—	212	212	0.01	< 0.005	0.01	213

2.4. Operations Emissions Compared Against Thresholds

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

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.25	0.31	7.83	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	523	607	0.25	0.02	1.84	622
Mit.	5.21	0.31	7.83	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	523	607	0.25	0.02	1.84	622
% Reduced	1%	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.22	0.33	7.18	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	486	571	0.25	0.02	0.18	585
Mit.	5.18	0.33	7.18	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	486	571	0.25	0.02	0.18	585
% Reduced	1%	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.67	0.26	2.97	0.01	0.18	0.13	0.31	0.18	0.02	0.20	20.2	459	480	0.19	0.02	0.86	491
Mit.	1.62	0.26	2.97	0.01	0.18	0.13	0.31	0.18	0.02	0.20	20.2	459	480	0.19	0.02	0.86	491
% Reduced	3%	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.30	0.05	0.54	< 0.005	0.03	0.02	0.06	0.03	< 0.005	0.04	3.35	76.0	79.4	0.03	< 0.005	0.14	81.3
Mit.	0.30	0.05	0.54	< 0.005	0.03	0.02	0.06	0.03	< 0.005	0.04	3.35	76.0	79.4	0.03	< 0.005	0.14	81.3
% Reduced	3%	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.18	0.19	1.98	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	407	407	0.02	0.02	1.71	414
Area	5.07	0.09	5.84	0.01	0.78	—	0.78	0.78	—	0.78	83.3	35.2	119	0.08	0.01	—	122
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	5.25	0.31	7.83	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	523	607	0.25	0.02	1.84	622
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.16	0.21	1.50	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	372	372	0.02	0.02	0.04	377
Area	5.06	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	5.22	0.33	7.18	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	486	571	0.25	0.02	0.18	585
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.16	0.21	1.60	< 0.005	< 0.005	0.13	0.13	< 0.005	0.02	0.03	—	371	371	0.02	0.02	0.72	378
Area	1.51	0.02	1.36	< 0.005	0.18	—	0.18	0.17	—	0.17	18.7	8.03	26.7	0.02	< 0.005	—	27.6
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	1.67	0.26	2.97	0.01	0.18	0.13	0.31	0.18	0.02	0.20	20.2	459	480	0.19	0.02	0.86	491

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.03	0.04	0.29	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5
Area	0.27	< 0.005	0.25	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.33	4.43	< 0.005	< 0.005	—	4.57
Energy	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.1	11.1	< 0.005	< 0.005	—	11.1
Water	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29
Waste	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	0.30	0.05	0.54	< 0.005	0.03	0.02	0.06	0.03	< 0.005	0.04	3.35	76.0	79.4	0.03	< 0.005	0.14	81.3

2.6. Operations Emissions by Sector, Mitigated

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

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.18	0.19	1.98	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	407	407	0.02	0.02	1.71	414
Area	5.03	0.09	5.84	0.01	0.78	—	0.78	0.78	—	0.78	83.3	35.2	119	0.08	0.01	—	122
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	5.21	0.31	7.83	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	523	607	0.25	0.02	1.84	622
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.16	0.21	1.50	< 0.005	< 0.005	0.13	0.14	< 0.005	0.02	0.03	—	372	372	0.02	0.02	0.04	377
Area	5.01	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9

Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	5.18	0.33	7.18	0.01	0.79	0.13	0.92	0.78	0.02	0.81	84.8	486	571	0.25	0.02	0.18	585
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.16	0.21	1.60	< 0.005	< 0.005	0.13	0.13	< 0.005	0.02	0.03	—	371	371	0.02	0.02	0.72	378
Area	1.46	0.02	1.36	< 0.005	0.18	—	0.18	0.17	—	0.17	18.7	8.03	26.7	0.02	< 0.005	—	27.6
Energy	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	67.0	67.0	0.01	< 0.005	—	67.2
Water	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Waste	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	1.62	0.26	2.97	0.01	0.18	0.13	0.31	0.18	0.02	0.20	20.2	459	480	0.19	0.02	0.86	491
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.03	0.04	0.29	< 0.005	< 0.005	0.02	0.02	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5
Area	0.27	< 0.005	0.25	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.33	4.43	< 0.005	< 0.005	—	4.57
Energy	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	11.1	11.1	< 0.005	< 0.005	—	11.1
Water	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29
Waste	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	0.30	0.05	0.54	< 0.005	0.03	0.02	0.06	0.03	< 0.005	0.04	3.35	76.0	79.4	0.03	< 0.005	0.14	81.3

3. Construction Emissions Details

3.1. Site Preparation (2023) - Unmitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.95	39.7	35.5	0.05	1.81	—	1.81	1.66	—	1.66	—	5,295	5,295	0.21	0.04	—	5,314
Dust From Material Movement	—	—	—	—	—	19.7	19.7	—	10.1	10.1	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.09	0.97	< 0.005	0.05	—	0.05	0.05	—	0.05	—	145	145	0.01	< 0.005	—	146
Dust From Material Movement	—	—	—	—	—	0.54	0.54	—	0.28	0.28	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	24.0	24.0	< 0.005	< 0.005	—	24.1
Dust From Material Movement	—	—	—	—	—	0.10	0.10	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.13	1.34	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	233	233	0.01	0.01	0.03	236
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	6.57	6.57	< 0.005	< 0.005	0.01	6.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.09	1.09	< 0.005	< 0.005	< 0.005	1.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.2. Site Preparation (2023) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.95	39.7	35.5	0.05	1.81	—	1.81	1.66	—	1.66	—	5,295	5,295	0.21	0.04	—	5,314

Dust From Material Movement	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.09	0.97	< 0.005	0.05	—	0.05	0.05	—	0.05	—	145	145	0.01	< 0.005	—	146
Dust From Material Movement	—	—	—	—	—	0.21	0.21	—	0.11	0.11	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.20	0.18	< 0.005	0.01	—	0.01	0.01	—	0.01	—	24.0	24.0	< 0.005	< 0.005	—	24.1
Dust From Material Movement	—	—	—	—	—	0.04	0.04	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.13	1.34	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	233	233	0.01	0.01	0.03	236
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	6.57	6.57	< 0.005	< 0.005	0.01	6.66
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.09	1.09	< 0.005	< 0.005	< 0.005	1.10
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Grading (2023) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.72	37.3	31.4	0.06	1.59	—	1.59	1.47	—	1.47	—	6,598	6,598	0.27	0.05	—	6,621
Dust From Material Movement	—	—	—	—	—	9.20	9.20	—	3.65	3.65	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.72	37.3	31.4	0.06	1.59	—	1.59	1.47	—	1.47	—	6,598	6,598	0.27	0.05	—	6,621

Dust From Material Movement	—	—	—	—	—	9.20	9.20	—	3.65	3.65	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.36	3.58	3.01	0.01	0.15	—	0.15	0.14	—	0.14	—	633	633	0.03	0.01	—	635
Dust From Material Movement	—	—	—	—	—	0.88	0.88	—	0.35	0.35	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.65	0.55	< 0.005	0.03	—	0.03	0.03	—	0.03	—	105	105	< 0.005	< 0.005	—	105
Dust From Material Movement	—	—	—	—	—	0.16	0.16	—	0.06	0.06	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.13	0.13	2.26	0.00	0.00	0.02	0.02	0.00	0.00	0.00	—	300	300	0.01	0.01	1.34	305
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.11	0.15	1.53	0.00	0.00	0.02	0.02	0.00	0.00	0.00	—	266	266	0.01	0.01	0.03	270
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.02	0.16	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	26.3	26.3	< 0.005	< 0.005	0.06	26.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	4.35	4.35	< 0.005	< 0.005	0.01	4.41
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Grading (2023) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.72	37.3	31.4	0.06	1.59	—	1.59	1.47	—	1.47	—	6,598	6,598	0.27	0.05	—	6,621
Dust From Material Movement	—	—	—	—	—	3.59	3.59	—	1.42	1.42	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	3.72	37.3	31.4	0.06	1.59	—	1.59	1.47	—	1.47	—	6,598	6,598	0.27	0.05	—	6,621
Dust From Material Movement	—	—	—	—	—	3.59	3.59	—	1.42	1.42	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.36	3.58	3.01	0.01	0.15	—	0.15	0.14	—	0.14	—	633	633	0.03	0.01	—	635
Dust From Material Movement	—	—	—	—	—	0.34	0.34	—	0.14	0.14	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.65	0.55	< 0.005	0.03	—	0.03	0.03	—	0.03	—	105	105	< 0.005	< 0.005	—	105
Dust From Material Movement	—	—	—	—	—	0.06	0.06	—	0.02	0.02	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.13	0.13	2.26	0.00	0.00	0.02	0.02	0.00	0.00	0.00	—	300	300	0.01	0.01	1.34	305
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.15	1.53	0.00	0.00	0.02	0.02	0.00	0.00	0.00	—	266	266	0.01	0.01	0.03	270
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.02	0.16	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	26.3	26.3	< 0.005	< 0.005	0.06	26.7
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.03	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	4.35	4.35	< 0.005	< 0.005	0.01	4.41
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Building Construction (2023) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.26	11.8	13.2	0.02	0.55	—	0.55	0.51	—	0.51	—	2,397	2,397	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.26	11.8	13.2	0.02	0.55	—	0.55	0.51	—	0.51	—	2,397	2,397	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	6.24	6.96	0.01	0.29	—	0.29	0.27	—	0.27	—	1,267	1,267	0.05	0.01	—	1,271
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	1.14	1.27	< 0.005	0.05	—	0.05	0.05	—	0.05	—	210	210	0.01	< 0.005	—	210
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	16.2	16.2	< 0.005	< 0.005	0.07	16.4
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.91	9.91	< 0.005	< 0.005	0.03	10.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	14.4	14.4	< 0.005	< 0.005	< 0.005	14.6
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.92	9.92	< 0.005	< 0.005	< 0.005	10.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.82	7.82	< 0.005	< 0.005	0.02	7.93
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.24	5.24	< 0.005	< 0.005	0.01	5.47

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.29	1.29	< 0.005	< 0.005	< 0.005	1.31
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.6. Building Construction (2023) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.26	11.8	13.2	0.02	0.55	—	0.55	0.51	—	0.51	—	2,397	2,397	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.26	11.8	13.2	0.02	0.55	—	0.55	0.51	—	0.51	—	2,397	2,397	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.67	6.24	6.96	0.01	0.29	—	0.29	0.27	—	0.27	—	1,267	1,267	0.05	0.01	—	1,271
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.12	1.14	1.27	< 0.005	0.05	—	0.05	0.05	—	0.05	—	210	210	0.01	< 0.005	—	210
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.12	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	16.2	16.2	< 0.005	< 0.005	0.07	16.4
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.91	9.91	< 0.005	< 0.005	0.03	10.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	14.4	14.4	< 0.005	< 0.005	< 0.005	14.6
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.92	9.92	< 0.005	< 0.005	< 0.005	10.4
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.05	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.82	7.82	< 0.005	< 0.005	0.02	7.93
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	5.24	5.24	< 0.005	< 0.005	0.01	5.47
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.29	1.29	< 0.005	< 0.005	< 0.005	1.31
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.87	0.87	< 0.005	< 0.005	< 0.005	0.91
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.7. Building Construction (2024) - Unmitigated

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

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

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	5.47	6.39	0.01	0.24	—	0.24	0.22	—	0.22	—	1,168	1,168	0.05	0.01	—	1,172
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.00	1.17	< 0.005	0.04	—	0.04	0.04	—	0.04	—	193	193	0.01	< 0.005	—	194
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	15.9	15.9	< 0.005	< 0.005	0.07	16.2
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.79	9.79	< 0.005	< 0.005	0.03	10.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	14.1	14.1	< 0.005	< 0.005	< 0.005	14.3
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.80	9.80	< 0.005	< 0.005	< 0.005	10.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.09	7.09	< 0.005	< 0.005	0.01	7.19
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.77	4.77	< 0.005	< 0.005	0.01	4.98
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.17	1.17	< 0.005	< 0.005	< 0.005	1.19
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.79	0.79	< 0.005	< 0.005	< 0.005	0.83
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.8. Building Construction (2024) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.59	5.47	6.39	0.01	0.24	—	0.24	0.22	—	0.22	—	1,168	1,168	0.05	0.01	—	1,172
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	1.00	1.17	< 0.005	0.04	—	0.04	0.04	—	0.04	—	193	193	0.01	< 0.005	—	194
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.11	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	15.9	15.9	< 0.005	< 0.005	0.07	16.2
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.79	9.79	< 0.005	< 0.005	0.03	10.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	14.1	14.1	< 0.005	< 0.005	< 0.005	14.3
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	9.80	9.80	< 0.005	< 0.005	< 0.005	10.2
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.04	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	7.09	7.09	< 0.005	< 0.005	0.01	7.19
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.77	4.77	< 0.005	< 0.005	0.01	4.98

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.17	1.17	< 0.005	< 0.005	< 0.005	1.19
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.79	0.79	< 0.005	< 0.005	< 0.005	0.83
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Paving (2024) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	7.81	10.0	0.01	0.39	—	0.39	0.36	—	0.36	—	1,512	1,512	0.06	0.01	—	1,517
Paving	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	7.81	10.0	0.01	0.39	—	0.39	0.36	—	0.36	—	1,512	1,512	0.06	0.01	—	1,517
Paving	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.43	0.55	< 0.005	0.02	—	0.02	0.02	—	0.02	—	82.8	82.8	< 0.005	< 0.005	—	83.1
Paving	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Paving	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	1.59	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	221	221	0.01	0.01	0.94	225
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.10	1.08	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	196	196	0.01	0.01	0.02	199
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	11.1	11.1	< 0.005	< 0.005	0.02	11.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.83	1.83	< 0.005	< 0.005	< 0.005	1.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.10. Paving (2024) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	7.81	10.0	0.01	0.39	—	0.39	0.36	—	0.36	—	1,512	1,512	0.06	0.01	—	1,517
Paving	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	7.81	10.0	0.01	0.39	—	0.39	0.36	—	0.36	—	1,512	1,512	0.06	0.01	—	1,517
Paving	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.43	0.55	< 0.005	0.02	—	0.02	0.02	—	0.02	—	82.8	82.8	< 0.005	< 0.005	—	83.1
Paving	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.08	0.10	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	13.7	13.7	< 0.005	< 0.005	—	13.8
Paving	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	1.59	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	221	221	0.01	0.01	0.94	225
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08	0.10	1.08	0.00	0.00	0.01	0.01	0.00	0.00	0.00	—	196	196	0.01	0.01	0.02	199
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	0.01	0.07	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	11.1	11.1	< 0.005	< 0.005	0.02	11.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	1.83	1.83	< 0.005	< 0.005	< 0.005	1.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Architectural Coating (2024) - Unmitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.91	1.15	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	8.92	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	0.49	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	0.09	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	2.83	2.83	< 0.005	< 0.005	< 0.005	2.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	0.16	0.16	< 0.005	< 0.005	< 0.005	0.16
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Architectural Coating (2024) - Mitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.91	1.15	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	6.71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.05	0.06	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.32	7.32	< 0.005	< 0.005	—	7.34
Architectural Coatings	0.37	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.21	1.21	< 0.005	< 0.005	—	1.22
Architectural Coatings	0.07	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	2.83	2.83	< 0.005	< 0.005	< 0.005	2.86
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	0.16	0.16	< 0.005	< 0.005	< 0.005	0.16
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	0.00	0.00	—	0.03	0.03	< 0.005	< 0.005	< 0.005	0.03
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.18	0.19	1.98	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	407	407	0.02	0.02	1.71	414
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.18	0.19	1.98	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	407	407	0.02	0.02	1.71	414
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.16	0.21	1.50	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	372	372	0.02	0.02	0.04	377
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Total	0.16	0.21	1.50	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	372	372	0.02	0.02	0.04	377
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.03	0.04	0.29	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.03	0.04	0.29	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5

4.1.2. Mitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.18	0.19	1.98	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	407	407	0.02	0.02	1.71	414
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.18	0.19	1.98	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	407	407	0.02	0.02	1.71	414
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.16	0.21	1.50	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	372	372	0.02	0.02	0.04	377
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.16	0.21	1.50	< 0.005	< 0.005	0.02	0.03	< 0.005	0.01	0.01	—	372	372	0.02	0.02	0.04	377

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.03	0.04	0.29	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.03	0.04	0.29	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	61.5	61.5	< 0.005	< 0.005	0.12	62.5

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

Total	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	4.99	4.99	< 0.005	< 0.005	—	5.01
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	4.99	4.99	< 0.005	< 0.005	—	5.01

4.2.2. Electricity Emissions By Land Use - Mitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	30.1	30.1	< 0.005	< 0.005	—	30.3

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	4.99	4.99	< 0.005	< 0.005	—	5.01
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	4.99	4.99	< 0.005	< 0.005	—	5.01

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Single Family Housing	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.10	6.10	< 0.005	< 0.005	—	6.12
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.10	6.10	< 0.005	< 0.005	—	6.12

4.2.4. Natural Gas Emissions By Land Use - Mitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.03	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	36.9	36.9	< 0.005	< 0.005	—	37.0
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Single Family Housing	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.10	6.10	< 0.005	< 0.005	—	6.12
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.10	6.10	< 0.005	< 0.005	—	6.12

4.3. Area Emissions by Source

4.3.2. Unmitigated

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

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	4.59	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Consumer Products	0.42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.02	< 0.005	0.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.46	0.46	< 0.005	< 0.005	—	0.46
Total	5.07	0.09	5.84	0.01	0.78	—	0.78	0.78	—	0.78	83.3	35.2	119	0.08	0.01	—	122
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	4.59	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122

Consumer	0.42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.05	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	5.06	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.19	< 0.005	0.23	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.29	4.39	< 0.005	< 0.005	—	4.53
Consumer Products	0.08	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.04	0.04	< 0.005	< 0.005	—	0.04
Total	0.27	< 0.005	0.25	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.33	4.43	< 0.005	< 0.005	—	4.57

4.3.1. Mitigated

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

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	4.59	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Consumer Products	0.39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landscape Equipment	0.02	< 0.005	0.17	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.46	0.46	< 0.005	< 0.005	—	0.46
Total	5.03	0.09	5.84	0.01	0.78	—	0.78	0.78	—	0.78	83.3	35.2	119	0.08	0.01	—	122
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	4.59	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Consumer Products	0.39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	5.01	0.09	5.67	0.01	0.78	—	0.78	0.78	—	0.78	83.3	34.7	118	0.08	0.01	—	122
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.19	< 0.005	0.23	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.29	4.39	< 0.005	< 0.005	—	4.53
Consumer Products	0.07	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	< 0.005	< 0.005	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.04	0.04	< 0.005	< 0.005	—	0.04
Total	0.27	< 0.005	0.25	< 0.005	0.03	—	0.03	0.03	—	0.03	3.10	1.33	4.43	< 0.005	< 0.005	—	4.57

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29

4.4.1. Mitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	12.9	13.1	0.02	< 0.005	—	13.9
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.04	2.13	2.17	< 0.005	< 0.005	—	2.29

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75

4.5.1. Mitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	1.29	0.00	1.29	0.13	0.00	—	4.50
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	0.21	0.00	0.21	0.02	0.00	—	0.75

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02

4.6.2. Mitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.14	0.14
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

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

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

4.7.2. Mitigated

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

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

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

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

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

4.8.2. Mitigated

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

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

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

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

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

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

4.9.2. Mitigated

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

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

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

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

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

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

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

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

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

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

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

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

Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

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

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

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

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

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

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequeste red	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/31/2023	2/14/2023	5.00	10.0	—
Grading	Grading	2/15/2023	4/5/2023	5.00	35.0	—
Building Construction	Building Construction	4/6/2023	9/5/2024	5.00	370	—
Paving	Paving	9/6/2024	10/4/2024	5.00	20.0	—
Architectural Coating	Architectural Coating	10/5/2024	11/2/2024	5.00	20.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20

Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38

Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	—	10.2	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	1.08	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	10.2	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	18.5	LDA,LDT1,LDT2
Paving	Vendor	—	10.2	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—

Architectural Coating	Worker	0.22	18.5	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	10.2	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	20.0	18.5	LDA,LDT1,LDT2
Grading	Vendor	—	10.2	HHDT,MHDT
Grading	Hauling	0.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	1.08	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	10.2	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	15.0	18.5	LDA,LDT1,LDT2
Paving	Vendor	—	10.2	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT

Architectural Coating	—	—	—	—
Architectural Coating	Worker	0.22	18.5	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	10.2	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	38,880	12,960	0.00	0.00	6,090

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	15.0	0.00	—
Grading	—	—	105	0.00	—
Paving	0.00	0.00	0.00	0.00	2.36

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Single Family Housing	0.03	0%
Other Asphalt Surfaces	2.33	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2023	0.00	532	0.03	< 0.005
2024	0.00	532	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	28.3	28.6	25.7	10,213	481	486	436	173,420
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	28.3	28.6	25.7	10,213	481	486	436	173,420
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Single Family Housing	—
Wood Fireplaces	1
Gas Fireplaces	2
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	0
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.1.2. Mitigated

Hearth Type	Unmitigated (number)
Single Family Housing	—
Wood Fireplaces	1
Gas Fireplaces	2
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	0
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
38880	12,960	0.00	0.00	6,090

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Single Family Housing	20,685	532	0.0330	0.0040	115,006
Other Asphalt Surfaces	0.00	532	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)

Single Family Housing	20,685	532	0.0330	0.0040	115,006
Other Asphalt Surfaces	0.00	532	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	111,821	1,934,385
Other Asphalt Surfaces	0.00	0.00

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	111,821	1,934,385
Other Asphalt Surfaces	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	0.80	0.00
Other Asphalt Surfaces	0.00	0.00

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	0.80	0.00
Other Asphalt Surfaces	0.00	0.00

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

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

5.18.2.2. Mitigated

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

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

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

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	31.1	annual days of extreme heat
Extreme Precipitation	3.05	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	44.5	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	4	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack	N/A	N/A	N/A	N/A
Air Quality	0	0	0	N/A

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

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	4	1	1	4
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack	N/A	N/A	N/A	N/A

Air Quality	1	1	1	2

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

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

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

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	91.1
AQ-PM	31.6
AQ-DPM	9.88
Drinking Water	49.4
Lead Risk Housing	2.89
Pesticides	0.00
Toxic Releases	65.7
Traffic	98.2
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	0.00
Haz Waste Facilities/Generators	0.00
Impaired Water Bodies	0.00
Solid Waste	0.00

Sensitive Population	—
Asthma	29.7
Cardio-vascular	25.7
Low Birth Weights	40.7
Socioeconomic Factor Indicators	—
Education	22.8
Housing	21.6
Linguistic	3.74
Poverty	48.4
Unemployment	32.3

7.2. Healthy Places Index Scores

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

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	77.83908636
Employed	41.16514821
Median HI	77.22314898
Education	—
Bachelor's or higher	39.54831259
High school enrollment	100
Preschool enrollment	33.99204414
Transportation	—
Auto Access	95.6242782
Active commuting	17.13075837
Social	—
2-parent households	98.63980495

Voting	67.95842423
Neighborhood	—
Alcohol availability	86.4750417
Park access	25.51007314
Retail density	6.480174516
Supermarket access	2.399589375
Tree canopy	41.10098807
Housing	—
Homeownership	97.90837931
Housing habitability	99.01193379
Low-inc homeowner severe housing cost burden	73.38637239
Low-inc renter severe housing cost burden	99.08892596
Uncrowded housing	69.47260362
Health Outcomes	—
Insured adults	60.5800077
Arthritis	0.0
Asthma ER Admissions	86.4
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	18.8
Cognitively Disabled	87.2
Physically Disabled	69.8
Heart Attack ER Admissions	54.4

Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	85.0
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	98.4
SLR Inundation Area	0.0
Children	91.6
Elderly	37.4
English Speaking	98.1
Foreign-born	17.7
Outdoor Workers	18.2
Climate Change Adaptive Capacity	—
Impervious Surface Cover	96.9
Traffic Density	76.4
Traffic Access	23.0
Other Indices	—
Hardship	42.1
Other Decision Support	—
2016 Voting	54.6

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	14.0
Healthy Places Index Score for Project Location (b)	70.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

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

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Project specific
Construction: Construction Phases	No demolition

ATTACHMENT 2 – CAP CEQA STREAMLINING CHECKLIST

CAP CEQA Streamlining Checklist Notes

Project Description

The proposed project is development of home sites to be located in Acton, CA, which is in the County of Los Angeles (the County) and is within the jurisdiction of Antelope Valley Air Quality Management District (AVAQMD). The project includes developing a vacant 785,160 square foot (18.025 acre) parcel at Sierra Highway East and Listie Avenue North [Assessor Parcel Number (APN) 3057-014-012] into three (3) single-family residential lots for sale comprising 5 acres or more. The single-family homes will be designed by architects retained by the buyers of the residential lots.

Step 1.1

Project is consistent with the General Plan growth projections because predicted GHG emissions are well under the 90,718 MT/yr (100,000 tons/yr) threshold, where the threshold was developed by the AVAQMD for consistency with General Plan growth projections (see Table 5 in the Technical Report). The project is consistent with the Antelope Valley Area Plan which is a component of the General Plan. Therefore, the project is also consistent with the General Plan.

Step 2

No. Go to Step 3.

Step 3.1

Not applicable. Project is residential.

Step 3.2

Residences will 1) incorporate rooftop solar with battery energy storage systems, 2) participate in the SCE Green Rate level for all electricity accounts associated with the project until SCE provides 100% carbon-free electricity for all accounts by default or 3) participate in the Clean Power Alliance at the Clean Rate level for all electricity accounts associated with the project until CPA provides 100% carbon-free electricity for all accounts by default.

Step 3.3

Project is residential with less than 110 trips/day per CalEEMod (see Attachment 1 of the Technical Report).

Steps 3.4, 3.5

Skipped per Step 3.3 (less than 110 trips/day; the trail is pedestrian infrastructure).

Step 3.6

The Transportation Demand Management (TDM) Ordinance has not yet been adopted.

Step 3.7

The project complies. The project meets the Transportation Impact Analysis (TIA) Guidelines criteria for screening-out or exempting certain projects. Project is residential with less than 110 trips/day.

Step 3.8

Residences will feature "EV Ready" 208/240-volt branch circuit wiring for Level 2 charging equipment. The 2022 CalGreen Code Residential Tier 1 and Tier 2 EV charging requirements for one and two family dwelling units require that for each dwelling unit, a dedicated 208/240-volt branch circuit (Level 2 EVSE) will be installed. Each branch circuit and its overcurrent protective device will be rated at 40 amperes minimum (8.3/9.6 kVA), see 3.2 above.

Step 3.9

Not applicable. Project is residential.

Step 3.10

Project site is high desert chaparral without lawns or high-maintenance landscaping. Native and drought tolerant landscaping will be used. Artificial turf may be used. Project will utilize zero emissions landscaping equipment for low-maintenance landscaping (i.e., hand tools, battery powered electric).

During residential construction, all off-road equipment used on-site will meet CARB Tier 4 Final engine emission standards.

Step 3.11

Not applicable. Project is residential.

Steps 3.12, 3.13, 3.14

Skipped per Step 3.3 (less than 110 trips/day; the trail is pedestrian infrastructure).

Step 3.15

Not applicable. Project is new construction.

Step 3.16

Project is new construction and will achieve zero GHG emissions for on-site energy use and comply with the County's building decarbonization ordinance, as applicable, see 3.2 above.

Residences will utilize electric reversible heat pump HVAC systems, electric heat pump water heaters, electric magnetic induction cook tops, electric convection ovens, electric laundry equipment, and electric decorative hearths. Zero GHG emissions for on-site energy use will be achieved through the use of carbon-free electric power for these devices per 3.2 above. No combustion hearths will be installed.

Step 3.17

Not applicable. Project is new construction.

Step 3.18

Project site is high desert chaparral without lawns or conventional landscaping. Native and drought tolerant landscaping will be used with minimal irrigation requirements. Artificial turf may be used.

High-efficiency appliances (e.g., washing machines, dishwashers) and low-flow plumbing fixtures will be incorporated into the residences consistent with applicable standards and codes.

Step 3.19

Residential HVAC systems will utilize advanced low-GWP refrigerants, e.g., R-32, R-454B (Item C). Where applicable, low-GWP fire extinguishing agents (e.g., dry chemical, carbon dioxide) will be used for fire suppression equipment in lieu of Halons (Item C). Conventional high-GWP refrigerants will not be used, e.g., R-410A, R-134A (Item D).

Step 3.20

Residences will incorporate rooftop solar with battery energy storage systems (see 3.2 above).

Step 3.21

Project site is high desert chaparral without lawns or conventional landscaping. Native and drought tolerant landscaping will be used with minimal irrigation requirements. Artificial turf may be used.

The project will implement onsite water reuse strategies comprising (a) reclaimed/recycled water and/or graywater for outdoor irrigation uses; (b) residential graywater systems that meet applicable regulatory standards and code requirements; (c) rainfall capture and storage systems; and (d) dual plumbing systems for the use of recycled water to support (a), (b) and (c).

Step 3.22

Project is residential and will utilize green/organic waste composting infrastructure provided by the authorized waste disposal service.

Step 3.23

Project is residential and will utilize materials recycling infrastructure provided by the authorized waste disposal service.

Step 3.24

Not applicable. This is a voluntary action that would incorporate composting and mulching on-site rather than separating organics prior to hauling waste.

Step 3.25

Project site is high desert chaparral without lawns or conventional landscaping. Native and drought tolerant landscaping will be used, and suitable low water use trees will be planted where appropriate on the lots. Artificial turf may be used.

For any native trees removes during homesite construction, an equal or greater number of new native trees will be planted at suitable locations on the lots.

Step 3.26

Not applicable. Project is residential. Site is not mapped as an Agricultural Resource Area and does not include forest land.

Step 3.27

Not applicable. Project is residential.

Table F-1: General Plan and 2045 CAP CEQA Streamlining Checklist

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Step 1: Demonstrate Consistency with the General Plan Growth Projections		
1. The Project is Consistent with the General Plan Growth Projections The growth projections included in the General Plan were used in the 2045 CAP to estimate unincorporated Los Angeles County GHG emissions over time. Therefore, projects must be consistent with the General Plan to comply with the CEQA streamlining requirements. To determine a project's consistency with the General Plan growth projections, please answer the following question and provide an explanation with supporting documentation. **Is the proposed project consistent with the existing land use designation of the Land Use Element and the 2021 Housing Element Update?** If "Yes," proceed to **Step 2: Determine Whether the Project Screens Out of Certain CEQA Streamlining Requirements** below. If "No," the proposed project may not streamline its GHG impacts analysis by using the 2045 CAP's EIR and must prepare a comprehensive project-specific analysis of GHG emissions and impacts pursuant to CEQA.	*Describe how the project is consistent with the General Plan growth projections. Provide additional supporting documentation as an attachment as needed.* *OR,* *Explain why the project is not consistent with the General growth projections, and whether the project would include a General Plan amendment. If the project includes a General Plan amendment, STOP HERE.*	☑ Yes ☐ No
Step 2: Determine Whether the Project Screens Out of the CEQA Streamlining Requirements		
Certain projects may screen out of the 2045 CAP CEQA Streamlining Requirements if they meet the following screening criterion. **Does the project achieve net-zero GHG emissions?** The project must conduct a comprehensive project-specific analysis of all GHG emissions, sinks, and removals, consistent with all CEQA guidelines and standard practice for modeling GHG emissions for projects, to demonstrate that the project achieves net-zero GHG emissions. If "Yes," the project would comply with the CEQA streamlining requirements and no additional analysis is needed (no project-specific GHG impact analysis would be required). If "No," proceed to **Step 3: Demonstrate Compliance with the CEQA Streamlining Requirements** below.	*If "Yes," attach to this checklist the estimated project GHG emissions. Provide supporting calculation files and documentation for this analysis. If the proposed project is determined to result in net-zero GHG emissions, STOP HERE.* *If "No," proceed to Step 3 below.*	☐ Yes ☑ No

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Step 3: Demonstrate Compliance with the CEQA Streamlining Requirements		
Energy Supply		
1. TIER 1: Sunset Oil and Gas Operations For any project involving the decommissioning, replacement, retrofit, or redesign of infrastructure or facilities associated with the oil and gas industry, including energy generation (i.e., cogen), the project must: A) Comply with the Oil Well Ordinance (Title 22). B) Reduce fossil fuel–based emissions by at least 80% compared to existing conditions. C) If the project site includes existing active and abandoned oil wells, examine all wells for fugitive emissions of methane. Reduce such existing emissions by a minimum of 80%. D) To reduce any residual fossil fuel–based emissions generated by the project, incorporate carbon removal technologies including direct air capture and carbon and sequestration, as feasible. **Supports 2045 CAP Measures (and Actions):** ES1 (ES1.1, ES1.2, ES1.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed as a replacement strategy (provide additional documentation as described below).* *IN ADDITION, provide documentation of the project's ability to reduce fossil fuel–based emissions, including fugitive methane emissions.* *Provide the number of oil and gas operations/wells closed. Provide documentation of any carbon removal technologies incorporated at the project site.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
2. TIER 1: Utilize 100% Zero-Carbon Electricity The project must utilize 100% zero-carbon electricity on-site. The project must comply with one of the following options: A) Install on-site renewable energy systems or participate in a community solar program to supply 100% of the project's estimated energy demand to the maximum extent feasible. B) Participate in Southern California Edison at the Green Rate level (i.e., 100% carbon-free electricity) for all electricity accounts associated with the project until SCE provides 100% carbon-free electricity for all accounts by default. C) Participate in the Clean Power Alliance at the Clean Rate level (i.e., 100% carbon-free electricity) for all electricity accounts associated with the project until CPA provides 100% carbon-free electricity for all accounts by default. D) A combination of #1, #2, and #3 above such that 100% of the project's electricity consumption is supplied by zero-GHG emission sources of power generation, whether by utilities or by on-site electricity generation or both. **Supports 2045 CAP Measures (and Actions):** ES2 (ES2.1, ES2.2), ES3 (ES3.1, ES3.2, ES3.3, ES3.4, ES3.5, ES3.6)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below)* *IN ADDITION, provide the project's anticipated electricity demand, the project's participation and opt-out rates for SCE's Green Rate and CPA's Clean Rate electricity rate options used by tenants; and the total kW of solar PV panels installed at the project site.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Transportation		
3. Meets Transportation Screening Criteria For development projects, does the project: A) have no retail component and generate a net increase of less than 110 daily vehicle trips? If "Yes," skip streamlining requirements #4, #5, #12, #13, and #14 below. Please complete items #6 through #11 below. If "No," proceed to item (B) below. For development projects, does the project: B) have a retail component and contains retail uses that do not exceed 50,000 square feet of gross floor area? If "Yes," skip streamlining requirements #4, #5, #12, #13, and #14 below. Please complete items #6 through #11 below. If the project contains retail and is mixed use, proceed to item (C) below. If "No," proceed to item (C) below. For development projects, does the project: C) have a residential component and 100% of the units, excluding manager's units, are set aside for lower income households? If "Yes," skip streamlining requirements #4, #5, #12, #13, and #14 below. Please complete items #6 through #11 below. If the project contains retail and is mixed use, proceed to item (D) below. If "No," proceed to item (D) below. For development projects: D) Is the project located within a one-half mile radius of a major transit stop or an existing stop along a high-quality transit corridor and: i. has a Floor Area Ratio greater than 0.75? ii. provides less parking than required by the Los Angeles County Code? iii. is consistent with the Southern California Association of Governments (SCAG) Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS)? iv. does not replace residential units set aside for lower income households with a smaller number of market-rate residential units? If "Yes," skip streamlining requirements #4, #5, #12, #13, and #14 below. Please complete items #6 through #11 below. If "No," proceed to streamlining requirement #3 below. For transportation projects, does the project meet one of the following transportation screening criteria?	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why such actions are infeasible and identify the alternative measure(s) proposed as an alternative strategy (provide additional documentation as necessary).*	☑ Yes ☐ No

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
A) The project would not include the addition of through traffic lanes on existing or new highways, including general-purpose lanes, high-occupancy vehicle (HOV) lanes, peak-period lanes, auxiliary lanes, and lanes through grade-separated interchanges (except managed lanes, transit lanes, and auxiliary lanes of less than 1 mile in length designed to improve roadway safety). B) The project would reduce roadway capacity and VMT. If "Yes," skip streamlining requirements #4, #5, #12, #13, and #14 below. Please complete items #6 through #11 below. If "No," proceed to streamlining requirement #4 below. **Supports 2045 CAP Measures (and Actions):** T1 (T1.1, T1.2)		
4. TIER 1: Increase Density Near High-Quality Transit Areas If the project is located within a High Quality Transit Area (HQTA), it must achieve a minimum of 20 dwelling units (DU) per acre, consistent with the Housing Element Rezoning Program. If the project is not located within an HQTA, it must locate residential and employment centers within 1 mile of an HQTA. **Supports 2045 CAP Measures (and Actions):** T1 (T1.1, T1.2)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed as a replacement strategy (provide additional documentation as described below).*	☐ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
5. TIER 1: Incorporate Bicycle and Pedestrian Infrastructure The project must incorporate pedestrian and bicycle infrastructure into its design: A) Provide pedestrian facilities and connections to public transportation consistent with the Pedestrian Action Plan, Active Transportation Plans, and Vision Zero Action Plan, and any other relevant governing plan. B) Provide bicycle facilities consistent with the Bicycle Master Plan, Active Transportation Plans, and Vision Zero Action Plan, and any other relevant governing plan, and meet or exceed minimum standards for bicycle facilities in the Zoning Code and CALGreen Code. C) Increase sidewalk coverage to improve pedestrian access. D) Improve degraded or substandard sidewalks. E) Incorporate best practices to ensure pedestrian infrastructure is contiguous and links externally with existing and planned pedestrian facilities; best practices include high-visibility crosswalks, pedestrian hybrid beacons, and other pedestrian signals, mid-block crossing walks, pedestrian refuge islands, speed tables, bulb-outs (curb extensions), curb ramps, signage, pavement markings, pedestrian-only connections and districts, landscaping, and other improvements to pedestrian safety.	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed as a replacement strategy (provide additional documentation as described below)* *IN ADDITION, provide the length and/or amount of bicycle and pedestrian infrastructure incorporated, such as feet or miles of bikeways.*	☐ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
F) Minimize barriers to pedestrian access and interconnectivity, such as walls, landscaping buffers, slopes, and unprotected crossings. G) Provide bicycle facilities for new and expanded buildings, new dwelling units, change of occupancy, increase of use intensity, and added off-street vehicle parking spaces. H) Provide short- and long-term (secure) bicycle parking for at least 5% of motorized vehicle capacity and nothing less than CALGreen Code requirements, whichever is more restrictive. I) Support the County's goal to increase bikeway miles by 300 percent by 2030 (including Class I bike paths, Class II bike lanes, and Class III bike routes). **Supports 2045 CAP Measures (and Actions):** T3 (T3.1, T3.2, T3.3)		
6. TIER 1: Comply with the County Transportation Demand Management (TDM) Ordinance The Project must comply with the TDM ordinance at the time of project approval. This may include preferential carpool/vanpool parking, bicycle parking, and shower facilities and locker rooms; trip reduction plans; transit-supportive infrastructure development; and similar strategies. Comply with any applicable VMT reduction target and incorporate any required monitoring mechanisms for development, subject to the ordinance. **Supports 2045 CAP Measures (and Actions):** T4 (T4.5)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below)* *IN ADDITION, provide the number of employers participating in the TDM program, the total trip reduction goals for the project's TDM program, and the total trips and VMT reduced via the project's TDM program.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
7. TIER 1: Comply with the County's Transportation Impact Guidelines The project must comply with the County's current Transportation Impact Analysis (TIA) Guidelines. Projects may screen out if they meet certain criteria, such as being located in a transit priority area or local-serving retail development less than 50,000 square feet. Projects that do not screen out must meet the VMT efficiency metrics identified by the TIA Guidelines (e.g., daily VMT per capita for residential projects that is 16.8% below the existing residential VMT per capita for the Baseline Area in which the project is located) and quantitatively demonstrate how these metrics are achieved, pursuant to the TIA Guidelines requirements. **Supports 2045 CAP Measures (and Actions):** T1, T2, T3, T4, T5	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed strategy (provide additional documentation as described below).*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
8. TIER 1: Incorporate Electric Vehicle Charging Infrastructure The project must incorporate zero-emission vehicle (ZEV) infrastructure and incentives into its design as follows: A) Comply with any CALGreen Code requirement, County ordinance, building code, or condition of approval that requires a certain amount of electric vehicle (EV) charging infrastructure (EVCSs) and readiness. This may include minimum requirements for EV charging stations, EV-capable parking spaces, and EV-ready parking spaces. B) Comply with any provisions and requirements in the forthcoming Zero Emission Vehicle Master Plan.[1] C) Include electric options for promoting active transportation, such as electric scooters and e-bikes. D) Provide education and outreach to tenants and occupants about the benefits of ZEVs and the project's EV infrastructure. **Supports 2045 CAP Measures (and Actions):** T6 (T6.1, T6.2, T6.3, T6.4, T6.5, T6.6, T6.7)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below)* *IN ADDITION, provide the number of ZEVs in the project's tenant's and vendor fleet, if available; the number of public and private EVCSs installed; and the number of scooters/e-bikes available to tenants.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
9. TIER 1: Decarbonize Trucks For projects that include goods movement facilities and/or warehouses, the project must incorporate freight decarbonization technologies and infrastructure, including: A) Comply with any CALGreen Code requirement, County ordinance, building code, or condition of approval that requires a certain amount of EV charging infrastructure and readiness for goods movement facilities and trucks. B) Provide EVCSs at all new warehouse loading docks. C) Comply with any provisions and requirements in the forthcoming Zero Emission Vehicle Master Plan related to goods movement. D) Implement freight decarbonization technologies along highway corridors. E) For all goods movement facilities, install alternative fueling infrastructure such as EVCSs, green hydrogen fueling stations, and/or biomethane fueling stations. F) Comply with any established zero-emission delivery zones. **Supports 2045 CAP Measures (and Actions):** T8 (T8.1, T8.2, T8.3, T8.4, T8.5)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the number of ZEV trucks in the project's tenant's and vendor fleet if available and the number EVCS installed.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
10. TIER 1: Incorporate Zero-Emission Technologies for Off-Road Vehicles & Equipment The project must: A) Prohibit the use of small equipment powered by gasoline, diesel, propane, or other fossil fuels, including lawn and garden equipment and outdoor power equipment, for all tenants and owners. B) Provide educational materials to tenants regarding the SCAQMD Electric Lawn and Garden Equipment Incentive and Exchange Program, Commercial Lawn & Garden Battery Buy-Down Rebate Program, the Residential Lawn Mower Rebate Program, the new requirements of AB 1346, and any other available options and incentives for purchasing zero-emission equipment, including rebates and subsidies offered by CARB, the County, or other agencies and entities. C) Use electric and zero-emission construction equipment during project construction to the maximum extent feasible. Such equipment shall include forklifts, manlifts, loaders, welders, saws, pumps, fixed cranes, air compressors, sweepers, aerial lifts, pressure washers, and other small equipment. At minimum, the project must use off-road construction equipment that meet CARB Tier 4 Final engine emission standards. D) Use electric and zero-emission agriculture and manufacturing equipment to the maximum extent feasible. These requirements must be stipulated in the contract specifications for the project's construction and for the project's future tenants and any landscaping contracts for the property or tenants. **Supports 2045 CAP Measures (and Actions):** T9 (T9.1, T9.2, T9.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide off-road vehicle and equipment fleet count, type, and fuel type, as available.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
11. TIER 1: Electrify County Fleet Vehicles (for municipal projects only) For all new municipal projects and facilities that include the purchase or operation of new fleet vehicles, including public transit buses and shuttles, all such fleet vehicles must be ZEVs. **Supports 2045 CAP Measures (and Actions):** T7 (T7.1, T7.2)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the number of new ZEV buses and the total ZEV percentage of the project's fleet.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
12. TIER 2: Achieve a High Jobs/Housing Balance For projects with nonresidential development, the Project must incorporate the following design elements: A) Support the County's goal to achieve a job density of 300 jobs per acre. **Supports 2045 CAP Measures (and Actions):** T2 (T2.1)	*Describe how the project will achieve a job density of 300 jobs per acre.* *OR,* *Describe why this action is not applicable to your project.* *OR* *Describe why such actions are not incorporated into your project.* *IN ADDITION, provide the job density of the project in terms of jobs per acre.*	☐ Project Complies ☐ Not Applicable ☐ Project Does Not Comply
13. TIER 2: Encourage Transit, Active Transportation, and Alternative Modes of Transportation For transit projects only, incorporate the following: A) Expand and improve frequency of existing network of County shuttles. B) Install bus-only lanes and signal prioritization along major thoroughfares. C) Install full bus rapid transit infrastructure along priority corridors. For all other projects, incorporate the following: A) Provide new mobility services, such as micro transit, autonomous delivery vehicles, and on-demand autonomous shuttles, in unincorporated Los Angeles County. B) Offer free transit passes for students, youth, seniors, disabled, and low-income populations. C) Implement telecommuting by project tenants and residents. D) Establish temporary and permanent car-free areas at the project site. **Supports 2045 CAP Measures (and Actions):** T4 (T4.1, T4.2, T4.3, T4.6, T4.7, T4.8, T4.10)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project.* *IN ADDITION, for transit projects, provide the size of area served by transit, the number of employees and residents served by transit, the transit service frequency and headways, the increase in headways or frequencies provided by the project, total transit service hours provided by transit, the number and length of bus-only lanes, and information on signal prioritization on transit routes implemented by the project.* *For non-transit projects, provide the number of residents within one-half mile of bus or active transportation services; information on any new mobility services offered, information on free transit passes offered, the number of employers participating in telecommuting programs, and the number and location of car-free areas provided by the project.*	☐ Project Complies ☐ Not Applicable ☐ Project Does Not Comply
14. TIER 2: Implement Parking Limitations Projects should include the following characteristics: A) Shared and reduced parking strategies, such as shared parking facilities, carpool/vanpool-only spaces, shuttle facilities, EV-only spaces, and reduced parking below allowable amount B) Minimum amount of required parking C) Unbundled parking costs to reflect cost of parking D) Parking pricing to encourage "park-once" behavior E) Compliance with all County parking reform strategies and policies **Supports 2045 CAP Measures (and Actions):** T5 (T5.1)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions not incorporated into your project.* *IN ADDITION, provide the total number of parking spaces, carpool/vanpool-only spaces, shuttle facilities, EV-only spaces; information on parking costs and unbundling; and parking prices.*	☐ Project Complies ☐ Not Applicable ☐ Project Does Not Comply

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Building Energy and Water		
15. TIER 2: Decarbonize Existing Buildings This action applies only to projects that include a retrofit, remodel, or redesign of an existing building. If the proposed project does not include a retrofit, remodel, or redesign, select "Not Applicable" in the *Project Complies* column. The project must incorporate the following design elements: A) Achieve zero GHG emissions for on-site energy use. B) Comply with all applicable Building Performance Standards.[2] C) Comply with all building carbon intensity limits.[3] D) If the project is a major renovation, achieve ZNE and/or comply with the City's ZNE ordinance.[4] **Supports 2045 CAP Measures (and Actions):** E1 (E1.1, E1.2, E1.3, E1.4, E1.5, E1.6)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the project's anticipated GHG emissions associated with on-site energy consumption (i.e., natural gas use and electricity use) and the number of existing buildings transitioned to zero-GHG buildings.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
16. TIER 2: Decarbonize New Buildings For projects under construction before 2030, the project must achieve zero GHG emissions for on-site energy use, and/or comply with the County's building decarbonization ordinance, unless the project meets specific exemptions identified in the ordinance.[5] For projects under construction after 2030, the project must be zero-net-energy (ZNE) and achieve zero GHG emissions for on-site energy use, and/or comply with the County's ZNE ordinance, unless the project meets specific exemptions identified in the ordinance.[6] **Supports 2045 CAP Measures (and Actions):** E2 (E2.1, E2.2, E2.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the number and square footage of zero GHG emission buildings built, all ZNE buildings built, and the total GHG emissions anticipated for all buildings.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
17. TIER 1: Increase Building Energy Efficiency This action applies only to projects that include a retrofit of an existing building. If the proposed project does not include a retrofit, select "Not Applicable" in the *Project Complies* column. The project shall incorporate the following energy efficiency measures into the design: A) Comply with all applicable building performance standards.[7] B) Incorporate strategic energy management programs to reduce building energy demands. C) Conduct an energy audit or benchmarking analysis to identify potential energy savings opportunities and implement such opportunities. D) Achieve CALGreen Code Tier 2 or voluntary building energy measures as they apply to the retrofit. E) Replace existing appliances with higher-efficiency models. F) Install heat-trapping surfaces to cool or green surfaces, as feasible. G) Participate in SoCalREN, SCE, CPA, or other energy efficiency programs. H) Conduct other energy efficiency retrofits. I) Achieve zero-net-energy, if feasible. **Supports 2045 CAP Measures (and Actions):** E4 (E4.1, E4.2, E4.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the total number of energy retrofits performed, the building size (square footage) retrofit, the total project energy use and anticipated energy savings through retrofits, and the number and area of cool and green roofs installed.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed
18. TIER 1: Implement Water Use Efficiency and Water Conservation The project must comply with the current water conservation ordinance in place, including any requirements for LEED or Sustainable SITES standards.[8] The project must also incorporate water use efficiency and conservation measures, including: A) High-efficiency appliances/fixtures to reduce water use, and/or include water-efficient landscape design B) CALGreen Code Tier 1 and Tier 2 voluntary water conservation measures C) Low-flow or high-efficiency water fixtures D) Water-efficient landscapes with lower water demands than required by the DWR 2015 Model Water Efficient Landscape Ordinance E) Drought-tolerant and native plant species only F) A comprehensive water conservation strategy G) Educational materials provided to future tenants and building occupants about water-saving behaviors and water-conserving landscaping	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the project's estimated total water consumption (in GPCD or total gallons), the square footage of buildings that are water-neutral, and the project's building size (square footage).*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Supports 2045 CAP Measures (and Actions): E6 (E6.1, E6.2, E6.3, E6.4, E6.5)		
19. TIER 2: Reduce the Life-Cycle Carbon Intensity of Building Materials and Phase Out the Use of High-GWP Refrigerants The project must incorporate the following design elements to the maximum extent feasible: A) For projects that are not fully electric, incorporate biomethane into the natural gas mix in place of traditional natural gas. B) Use negative-carbon concrete for all construction. C) Use low-GWP refrigerants and fire suppression equipment for all uses on-site. D) Comply with all County codes and ordinances regarding building material carbon intensity and high-GWP refrigerants and other gases. **Supports 2045 CAP Measures (and Actions):** E3 (E3.1, E3.2, E3.3, E3.4)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project.* *IN ADDITION, provide the amount of biomethane used by the project, the quantify of negative-carbon concrete for construction, and the quantity of low-GWP refrigerants and fire suppression equipment used.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply
20. TIER 2: Use Energy Storage and Microgrids The project must incorporate the following design elements to the maximum extent feasible: A) Install energy storage systems. B) Use a building-scale or community microgrid to support demand management and peak shaving. **Supports 2045 CAP Measures (and Actions):** ES4 (ES4.1, ES4.2, ES4.3, ES4.4, ES4.5)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project* *IN ADDITION, provide the total kW of energy storage capacity installed and operational information for any microgrids utilized, if applicable.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply
21. TIER 2: Use Recycled Water and Graywater for Non-potable Uses and Include Rainfall Capture The project must implement water reuse strategies onsite through the following design elements: A) Require use of reclaimed/recycled water and/or graywater for outdoor uses. B) Install residential graywater systems that meet appropriate regulatory standards. C) Install rainfall capture systems. D) Install dual plumbing for the use of recycled water. **Supports 2045 CAP Measures (and Actions):** E5 (E5.1, E5.2, E5.3, E5.4)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project* *IN ADDITION, provide the amount of reclaimed/recycled water and/or graywater used by the project.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
Waste		
22. TIER 1: Compost Organic Materials The project must comply with all state and local requirements for composting and organic waste collection, including but not limited to Chapter 20.91 (Mandatory Organic Waste Disposal Reduction Ordinance) of the Los Angeles County Code, including all County requirements pursuant to AB 1826 and SB 1383. The project must also: A) Provide proper storage, collection, and loading of organics in a manner that is convenient and safe for all users of the building. Ensure there are sufficient sizes of collection containers for organics. Containers must be kept clean, be clearly labeled, and are co-located next to any other solid waste receptacles. Ensure sufficient pick-up of collection containers to meet the needs of the occupants. B) Include space for multi-stream collection containers for both recycling and organics in any location where a solid waste container is traditionally housed. This includes both outdoor collection containers serviced by a waste hauler or indoor collection containers utilized by occupants. Provide educational material and training to occupants and tenants in how to properly separate organics from all other solid waste and place organics in a separate container designated for organics. C) Ensure that all project occupants and tenants will separate compostables from all other refuse and place compostables in a separate container designated for composting. D) Require that all single-use food service ware (plates, bowls, cups) and accessories (straws, utensils, condiment cups) used by tenants at the project site be BPI certified compostable fiber, except where certain materials may be deemed medically necessary or necessary to ensure equal access for persons with disabilities. E) Require that any single-use accessories (straws, utensils, condiment cups) be only available on demand. F) Ensure that containers are audited annually to ensure proper service levels and to check for contamination. Report findings back to occupants within 30 days and to the County as requested. G) Work with the waste hauler to provide educational materials to tenants on at least an annual basis. H) Provide compliance data to the County as required for any current auditing program. **Supports 2045 CAP Measures (and Actions):** W1 (W1.1, W1.2) and W2 (W2.1, W2.2, W2.5)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the project's estimated organic waste generation (tons), the amount of organic waste sent to landfills, and the amount of organic waste generated by the project which is diverted from landfills.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
23. TIER 1: Recycle Recyclable Materials The project must comply with all state and local requirements for recycling, also including but not limited to Section 20.72.170 (Recyclable Materials Collection Program) of the Los Angeles County Code and all County requirements pursuant to AB 341 and AB 1826. The project must also: A) Comply with any zero waste ordinance in place at the time of project approval. B) Comply with all Mandatory Construction & Demolition (C&D) Recycling Program Requirements, including Chapter 20.87 (Construction and Demolition Debris Recycling and Reuse). C) Provide substantial storage, collection, and loading of recyclables in a manner that is convenient and safe for all users of the building. Ensure there are sufficient sizes and amount of collection containers for recyclables. Containers must be kept clean, be clearly labeled, and are co-located next to any other solid waste receptacles. Ensure sufficient pick-up of collection containers to meet the needs of the occupants. D) Include space for multi-stream collection containers in any location where a solid waste container is traditionally housed. This includes both outdoor collection containers serviced by a waste hauler or indoor collection containers utilized by occupants. Provide educational materials and training to occupants and tenants in how to properly separate recyclables from all other solid waste and place recyclables in a separate container designated for recycling. E) Ensure that all project occupants and tenants separate recyclables from all other refuse and place recyclables in a separate container designated for recycling. F) Require that all single-use food service ware (plates, bowls, cups) and accessories (straws, utensils, condiment cups) used by tenants at the project site be BPI certified compostable fiber, except where certain materials may be deemed medically necessary or necessary to ensure equal access for persons with disabilities. G) Require that any single-use accessories (straws, utensils, condiment cups) be only available on demand. H) Ensure that containers are audited annually to ensure proper service levels and to check for contamination. Report findings back to occupants within 30 days and to the County as requested. I) Work with the waste hauler to provide educational materials to tenants on at least an annual basis. J) Provide compliance data to the County as required for any current auditing program. **Supports 2045 CAP Measures (and Actions):** W1 (W1.1, W1.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the total C&D tonnage recycled and/or diverted from landfills, the project's estimated recyclable waste generation (tons), the amount of recyclable waste sent to landfills, and the amount of recyclable waste generated by the project which is diverted from landfills.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
24. TIER 2: Incorporate On-Site Composting, Mulching, and/or Anaerobic Digestion The project may incorporate organic waste processing capabilities, such as composting, mulching, or anaerobic digestion facilities (where applicable). Collaborate with PW and waste agencies to share organic processing information with interested parties. **Supports 2045 CAP Measures (and Actions):** W2 (W2.2, W2.3, W2.4)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project.* *IN ADDITION, provide information on any anaerobic digestion facilities constructed including their capacity and the amount of organic waste digested and converted to electricity, and the project's total energy generation from organic waste.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply
Agriculture, Forestry, and Other Land Use (AFOLU)		
25. TIER 1: Incorporate Tree Plantings and Expand Urban Forest Cover The project must: A) Enhance and expand urban forest cover and vegetation by planting trees and other vegetation. All trees and vegetation planted must be drought-tolerant or California native trees and plants. B) Comply with the Urban Forest Management Plan. C) Replace all native trees removed by the project with an equal or greater number of new trees. D) To the extent feasible, incorporate equitable urban forest practices and prioritize: i. Tree- and park-poor communities ii. Climate and watershed-appropriate and drought/pest-resistant vegetation iii. Appropriate watering, maintenance, and disposal practices iv. Shading v. Biodiversity **Supports 2045 CAP Measures (and Actions):** A3 (A3.1, A3.2, A3.3)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are infeasible and identify the alternative measure proposed (provide additional documentation as described below).* *IN ADDITION, provide the total number of trees planted, the total tree canopy cover, the project's total green space area, and the area of impervious surface converted to pervious surfaces.*	☑ Project Complies ☐ Not Applicable ☐ Project Does Not Comply and Alternative Measure Proposed

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES
26. TIER 2: Conserve Forests, Woodlands, Shrublands, Grasslands, Desert, and other Carbon-Sequestering Wildlands and Working Lands For all projects involving the preservation, conservation, and restoration of agricultural lands, working lands, rangelands, forest lands, wetlands, and other wildlands in unincorporated Los Angeles County, the project may: A) Support the use of public and private land for urban and peri-urban agriculture, such as community gardens, and including urban vertical surfaces. B) Conserve and restore natural forest lands, wetlands and wildlands through land acquisitions and conservation easements. C) Preserve existing agricultural and farmlands, including those mapped as Agricultural Resource Areas. Expand adjoining areas to enlarge farmland area. D) Actively manage forests to reduce wildfire risk and prevent carbon loss in forest lands. **Supports 2045 CAP Measures (and Actions):** A1 (A1.1 and A1.2)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project.* *IN ADDITION, provide the total number of acres preserved, conserved, and restored by land type, the number and size of community gardens added, the amount of vertical surface converted, and the acres of forest land managed for wildfire risk reduction and carbon stock savings if applicable.*	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply
27. TIER 2: Implement Regenerative Agricultural Practices For all agricultural projects, the project may: A) Utilize fallow and field resting practices to reduce bare-fallow land by adding cover crops and promoting crop rotation for active agricultural sites to improve soil quality and limit risks of nutrient erosion, pollutant runoff, and yield reduction. B) Implement a carbon farming plan with the primary objectives of carbon removal and regenerative agriculture. C) Use compost and/or organic fertilizer. **Supports 2045 CAP Measures (and Actions):** A2 (A2.1, A2.2)	*Describe which project compliance options from the leftmost column you are implementing.* *OR,* *Describe why this action is not applicable to your project.* *OR,* *Describe why such actions are not incorporated into your project.* *IN ADDITION, provide the* quantity of synthetic fertilizers and compost used / applied, the number of acres of cover crops using regenerative agricultural techniques, the tonnage of fertilizer/compost produced each year.	☐ Project Complies ☑ Not Applicable ☐ Project Does Not Comply

CEQA STREAMLINING REQUIREMENT	DESCRIPTION OF PROJECT MEASURE(S) / DOCUMENTATION OF COMPLIANCE / EXPLANATION OF NON-COMPLIANCE	PROJECT COMPLIES

NOTES:

Abbreviations: 2045 CAP = 2045 Los Angeles County Climate Action Plan; *AB = Assembly Bill; AFOLU = Agriculture, Forestry, and Other Land Use; C&D = Construction & Demolition; CALGreen Code = California Green Building Standards Code; CAP = Climate Action Plan; CARB = California Air Resources Board; CEQA = California Environmental Quality Act; County = County of Los Angeles; CPA = Clean Power Alliance; DU = dwelling unit(s); DWR = California Department of Water Resources; EIR = environmental impact report; EV = electric vehicle; EVCS = electric vehicle charging station; General Plan =* Los Angeles County General Plan 2035; *GHG = greenhouse gas; GWP = global warming potential; HOV = high-occupancy vehicle; HQTA = High Quality Transit Area; kW = kilowatts; LEED = Leadership in Energy and Environmental Design; MWELO = Model Water Efficient Landscape Ordinance; PV = photovoltaic; PW = Los Angeles County Department of Public Works; RTP/SCS = Regional Transportation Plan/Sustainable Communities Strategy; SB = Senate Bill; SCAG = Southern California Association of Governments; SCAQMD = South Coast Air Quality Management District; SCE = Southern California Edison; SoCalREN = Southern California Regional Energy Network; TDM = transportation demand management; TIA = Transportation Impact Analysis; VMT = vehicle miles traveled; WUI = wildland urban interface; ZEV = zero-emission vehicle; ZNE = zero net energy.*

1 *Although the County has not yet developed the Zero Emission Vehicle Master Plan, the County will develop such a Plan before 2030, pursuant to Implementing Action T6.1 in the 2045 CAP.*

2 *Although the County has not yet developed building performance standards, the County will develop such a standard before 2030, pursuant to Implementing Action E1.1 in the 2045 CAP.*

3 *Although the County has not yet developed carbon intensity limits, the County will develop such a standard before 2030, pursuant to Implementing Action E1.2 in the 2045 CAP.*

4 *Although the County has not yet developed a ZNE ordinance, the County will develop such a standard before 2030, pursuant to Implementing Action E1.3 in the 2045 CAP.*

5 *Although the County has not yet developed a building decarbonization ordinance, the County will develop such an ordinance before 2030, pursuant to Implementing Action E2.1 in the 2045 CAP.*

6 *Although the County has not yet developed a ZNE ordinance, the County will develop such a standard before 2030, pursuant to Implementing Action E2.2 in the 2045 CAP.*

7 *Although the County has not yet developed building performance standards, the County will develop such a standard before 2030, pursuant to Implementing Action E4.1 in the 2045 CAP.*

8 *Although the County has not yet developed a net-zero water ordinance, the County will develop such a standard before 2030, pursuant to Implementing Action E6.1 in the 2045 CAP.*

9 *Although the County has not yet developed building performance standards for building material carbon intensity and high-GWP refrigerants, the County will develop standards before 2030, pursuant to Implementing Actions E3.3 and E3.4 in the 2045 CAP.*

Table F-2: 2045 CAP Greenhouse Gas Emissions Reduction Alternative Measures

DESCRIPTION OF PROPOSED ALTERNATIVE MEASURE	DESCRIPTION OF GHG REDUCTION ESTIMATE
Alternative for 2045 CAP Compliance Requirement #: *[Number]* **Emissions Sector:** *[transportation, building energy and water, waste, AFOLU, or other sector]* **Measure Description:** [Describe the proposed project measure and why it is proposed]	*[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions. Include a description of how your measure will reduce emissions and provide supporting quantification documentation and assumptions. The GHG emissions reduction analysis must be consistent with all CEQA guidelines and standard practice for modeling GHG emissions for project measures and actions.]*
Alternative for 2045 CAP Compliance Requirement #: *[Number]* **Emissions Sector:** *[transportation, building energy and water, waste, AFOLU, or other sector]* **Measure Description:** [Describe the proposed project measure and why it is proposed]	*[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions. Include a description of how your measure will reduce emissions and provide supporting quantification documentation and assumptions. The GHG emissions reduction analysis must be consistent with all CEQA guidelines and standard practice for modeling GHG emissions for project measures and actions.]*
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BIOLOGICAL RESOURCES ASSESSMENT AND IMPACTS ANALYSIS

Tentative Parcel Map 71006
Unincorporated Los Angeles County
Acton, CA

Prepared for:

CRC ENTERPRISES
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Attn: Ms. Jean Lightell

Prepared by:

ENVICOM CORPORATION
4165 E. Thousand Oaks Boulevard, Suite 290
Westlake Village, California 91362
Contact: Ms. Damini Sindhar, Senior Biologist

June 29,2023,
October 16, 2023
(Revised per comments by L.A. County Planning)

FIGURES

PLATES

TABLES

APPENDICES

1.0 INTRODUCTION

Envicom Corporation (Envicom)has prepared this Biological Resources Assessment and Impacts Analysis (report) for the proposed Tentative Parcel Map 71006 Project (Project) located along Sierra Highway near Acton, CA, Unincorporated Los Angeles County (see **Figure 1, Regional Location Map**). The subject property's APN is 3057-014-012.

This report provides an inventory of the biological resources at the Project site and an analysis of potential Project impacts to biological resources. The report first covers the literature review and field surveys conducted to identify the biological resources at the site, which is followed by a discussion of existing biological conditions including vegetation and plant communities, natural communities of special concern, observed plant species, special-status plant species, protected trees, jurisdictional areas, wildlife species, special-status wildlife, and habitat linkages and wildlife movement. A vegetation and land cover map as well as representative photographs of habitat conditions at the site are also provided. The existing biological conditions discussion is followed by Project impacts and recommended measures to offset the impacts. Lists of plant and wildlife species observed, as well as an assessment of the potential for occurrence of special-status plant and wildlife species at the Project site are provided as appendices to the report.

1.1 SITE LOCATION AND PROJECT DESCRIPTION

The Project site is located approximately 215 feet north of Highway 14, approximately 2.05 miles west of Angeles Forest/Sierra Highway, and within the northeast quarter of the United States Geological Survey (USGS) 7.5' Acton topographical quadrangle, Section 29 of Township 5N, Range 12W.

The Project's site plan is shown as **Appendix 1** and is subject to the conditions of Conditional Use Permit (CUP) #2011-00056. The Project proposes to subdivide the larger parcel into three (3) smaller parcels, and develop each with a low impact development single-family residential parcel as well as associated infrastructure including a dirt access road. Infiltration pits and downspout routing will be installed on residential pad, a debris swale will be constructed around the eastern margin of the property, a retaining wall will be built south of the proposed residential pads, and a driveway/fire lane will be constructed to provide access to the proposed residential pads. A leach field will be established in the southeasternmost portion of the subject parcel. The slopes surrounding the pads will be graded and contoured and subsequently planted with landscaped species. For all three development pads, it is anticipated that there will be approximately 18,000 cubic yards (cy) of cut and 20,520 cy of fill for the project.

1.2 STUDY AREA

The biological Study Area encompassed the entirety of APN 3112-003-013 (**Figure 2, Aerial of the Study Area with Photo Locations**). The vegetation within the Study Area has both high desert and semi-desert chapparal. The western half of the Study Area has signs of prior disturbance and comprises native and non-native grasses and forbs and early seral post disturbance shrubs, such as rubber rabbitbrush (*Ericameria nauseoa*). Small patches of California juniper (*Juniperus californica*), California buckwheat (*Eriogonum fasciculatum* var *polifolium*) and fourwing saltbush (*Atriplex canescens*) were also noted. The eastern half of the project site is dominated by creosote bush (*Larrea tridentata)*. The Study Area has a north-south slope.

Source: ESRI World Street Map Background, 2023.

TENTATIVE PARCEL MAP 71006 – BIOLOGICAL RESOURCES ASSESSMENT

envicom

Regional Location Map

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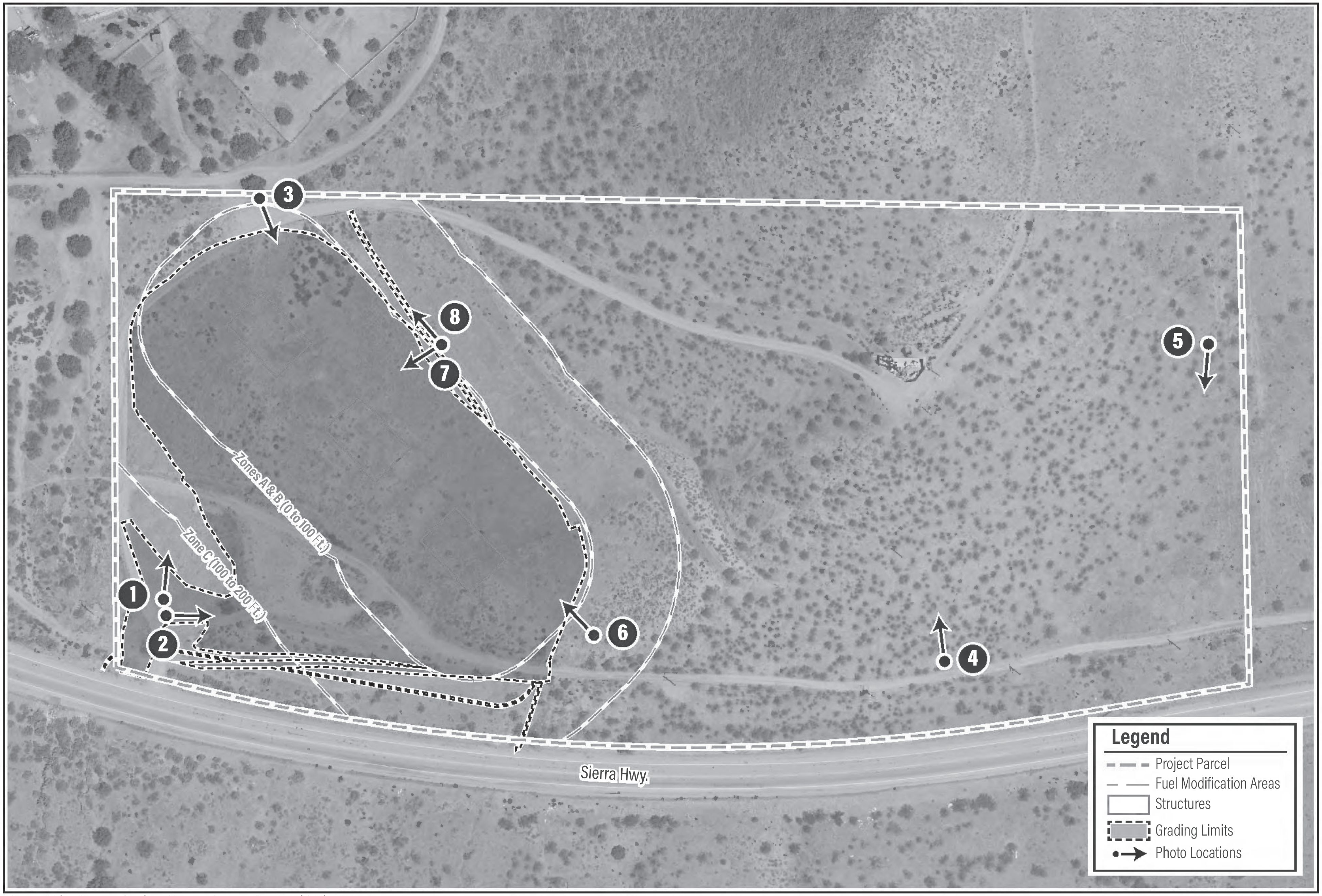
FIGURE 1



Source: Valtus Imagery Services: Hexagon Imagery Program (HxIP), 2022.

TENTATIVE PARCEL MAP 71006 – BIOLOGICAL RESOURCES ASSESSMENT

envicom

Aerial of the Study Area with Photo Locations

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FIGURE 2

1.3 DIRECTIONS AND CONTACT INFORMATION

Directions to the Project site beginning from the Los Angeles County Planning Division (320 W Temple Street) are as follows:

1. US-101 N from W Temple St. and Grand Ave
2. Continue on US-101 N. Take I-5 N and CA-14 N to Santiago Road in Acton. Take exit 26 (Santiago Road) from CA-14 N.
3. Turn left onto Santiago Rd.
4. From Santiago Road, turn right onto Sierra Highway. The destination will be on the left after about 0.5 mi.

Contact Information

The Los Angeles County Planning Division is the Lead Agency for permitting and compliance under the California Environmental Quality Act (CEQA). Contact information for the Los Angeles County Planning Division and the biological consultant are provided below.

Lead Agency	Biological Consultant
Los Angeles County Planning Division 320 West Temple Street Los Angeles, CA 90012 Office: (213) 974-4611	Envicom Corporation Ms. Damini Sindhar, Biologist 4165 E. Thousand Oaks Boulevard, Suite 290 Westlake Village, CA 91362 Office: (818) 879-4700

2.0 METHODS

A literature review included information available in standard biological references (e.g., Baldwin et al. 2012; Sawyer, Keeler-Wolf, and Evens 2009; Reid 2006; Stebbins 2003; and Sibley 2016) and relevant lists and databases pertaining to the status and known occurrences of sensitive and special-status resources. Other sources of information included aerial photographs, topographic maps, soil survey maps, climatic data, and relevant policy and planning documents. The following sources were among those reviewed in preparation for field surveys, or that were consulted during preparation of this report (for a complete list see the references section):

- *Biogeographic Information and Observation System (BIOS)*, California Department of Fish and Wildlife (CDFW), data as of March 29, 2023;
- *California Natural Diversity Database (CNDDB) Rarefind 5* report for the 7.5' United States Geological Survey (USGS) Lancaster West quadrangle and all adjacent quadrangles, CDFW, data as of March 29, 2023;
- *California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants of California* report for the 7.5' USGS Lancaster West quadrangle and all adjacent quadrangles, CNPS, data as of March 29, 2023;
- *FWS Critical Habitat Mapper for Threatened and Endangered Species*, U.S. Fish and Wildlife Service (USFWS), data as of March 29, 2023;
- *List of Special Vascular Plants, Bryophytes, and Lichens*, CDFW, January 2023;
- *California Natural Communities List, CDFW*, January 2023; and,
- *Special Animals*, CDFW, January 2023.

The CNDDB and CNPS database and other Literature search results are included as **Appendix 2**.

Envicom Senior Biologist Ms. Damini Sindhar conducted a biological survey and habitat mapping of the Project Parcel (Study Area) on March 30 and 31, 2023. A comprehensive botanical survey of all species in bloom was also conducted on this day, within the limits of disturbance extending to the 100 and 200 foot fuel modification zones. The surveys were conducted between the hours of 10:00 a.m. and 4:00 p.m. in cool and overcast conditions (high-50s °F) after recent rain. The survey involved a search for protected and regulated biological resources, including rare, threatened, and endangered plant and wildlife species, special habitats, sensitive natural communities, and locally sensitive resources, as well as an evaluation of the importance of the site for wildlife movement. A late spring botanical survey was conducted on June 6, 2023, within the limits of disturbance including the 100 and 200 foot fuel modification zones, The survey was conducted between the hours of 10:00 p.m. and 3:00 p.m. in warm and clear conditions (low-70s °F) and winds of 12 to 24 m.p.h. The surveys were performed by slowly walking several transects across the Study Area and investigating particular areas thoroughly as necessary. The survey methodology resulted in a thorough investigation of all plant communities and habitat types within the Study Area. An inventory of vascular plants and wildlife observed was recorded during both surveys. Vascular plant species determinations were made using *The Jepson Manual: Vascular Plants of California, 2nd edition*. Natural community classifications were correlated with the *California Natural Communities List* (CDFW, July 2022).

Vertebrate wildlife species observed at and in the vicinity of the Project site were identified by direct observation, sign (e.g., tracks, scat, or burrows), or vocalization. Wildlife species identification relied upon Reid (2006), Sibley (2016), and Stebbins (2003). Several photographs were taken as a record of site conditions at the time of the survey.

Vegetation mapping was done by drawing approximate boundaries onto high-resolution aerial images. These boundaries were then digitized into GIS shapefiles and additional mapping was done using ArcGIS (version 10.8). All mapping was done using aerial imagery of 0.15 meters/pixel resolution.

3.0 ENVIRONMENTAL SETTING

The subject property, which is entirely undeveloped, is situated within unincorporated Los Angeles County just north of the CA-14 freeway, near Acton, CA. The City of Palmdale is several miles north. The topography of the site is fairly level comprising some areas which have been more disturbed than others. Immediately south of the subject property is existing single-family residential development. To the northeast is continuous open space that is punctuated by small areas of residential development. This open space eventually connects with a much larger area of contiguous open space that is largely undeveloped, portions of which are established as parks managed by the Mountains Recreation and Conservation Authority.

The Study Area (photos are shown in **Plates 1 and 2, Representative Photos**) is fairly level with elevations ranging from 3,085 feet to 3275 feet above mean sea level (amsl). The soils at the Study Area are classified as Hanford coarse sandy loam, 9 to 15 percent slopes (typically found in alluvial fans/backslopes and weathered from granite and other quartz-bearing rocks of similar texture) and Vista coarse sandy loam, 30 to 50 percent slopes (typically weathered from decomposed granitic rock and typically found on hills and mountainous uplands). Mean annual precipitation near Acton is approximately 10 inches and the mean annual temperature is about 62 ° F.

Photo 1 – Photo taken from the southwestern corner of the Study Area looking north showing Fiddleneck fields in the foreground and Fourwing Saltbush scrub in the background.

Photo 2 – Photo taken from the southwestern corner of the Study Area looking east showing Fiddleneck fields in the foreground and Rabbitbrush scrub in the background.

Photo 3 – Photo taken from the northwestern part of the Study Area looking southeast showing California Buckwheat scrub.

Photo 4 – Photo taken from the southeastern part of the Study Area looking north showing Creosote Bush scrub.

Photo 5 – Photo taken from the northeastern part of the Study Area looking south showing Creosote Bush scrub.

Photo 6 – Photo taken from the southern part of the limits of disturbance looking northwest showing Fiddleneck Fields.

Photo 7 – Photo taken from the northern part of the limits of disturbance looking southwest showing Fiddleneck fields in the foreground and Rabbitbrush scrub in the background.

Photo 8 – Photo taken from the northern part of the limits of disturbance looking northwest showing Fiddleneck fields.

Representative Photos

4.0 BIOLOGICAL RESOURCES

4.1 VEGETATION AND PLANT COMMUNITIES

The vegetation within the Study Area has influences both high desert and semi-desert chapparal. The western half of the Study Area has signs of prior disturbance and is comprised of native and non-native grasses and forbs and early seral post disturbance shrubs like rubber rabbitbrush (*Ericameria nauseosa*). Small patches of California juniper (*Juniperus californica*), California buckwheat (*Eriogonum fasciculatum* var. *polifolium*) and fourwing saltbush (*Atriplex canescens*) were also noted. The eastern half of the project site is dominated by creosote bush (*Larrea tridentata).* There are also a few dirt roads and patches of barren or sparsely vegetated ground. The vegetation communities within the Study Area, are listed on **Table 1, Plant Communities and Other Land Cover Within the Study Area,** and illustrated on **Figure 3, Vegetation and Land Cover Impacts Map**. The acreages of the plant communities and land cover types within the Study Area are provided in Table 1.

In addition, based on a review of the CDFW CNDDB Rarefind 5 application, no rare or sensitive plant communities or habitats have been reported to the CNDDB for the Study Area.

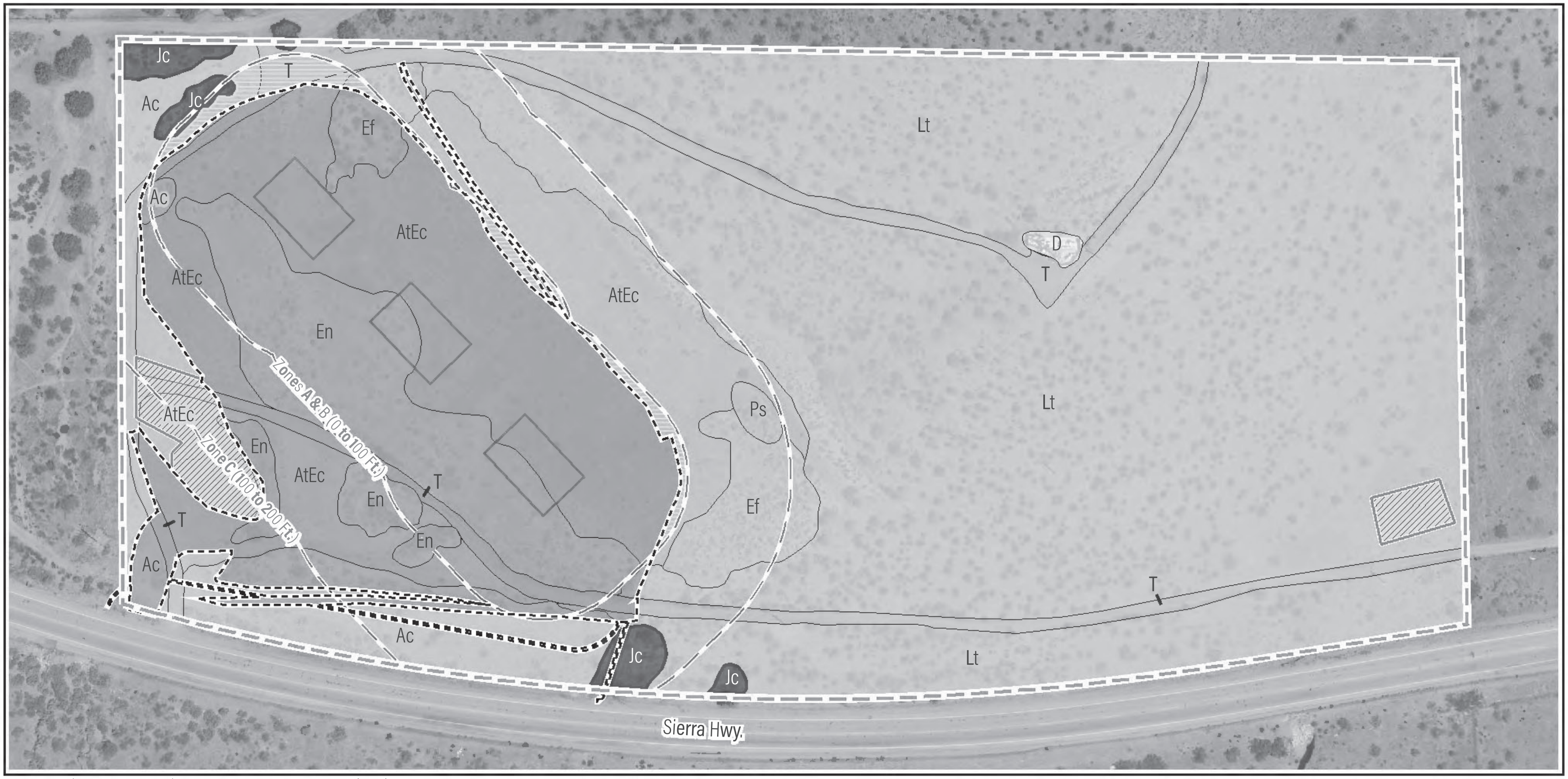
Table 1
Plant Communities and Other Land Cover Within the Study Area

Habitat Class	Plant Community / Other Land Cover	Conservation Status Rank	Total Cover within Parcel (acres)
Woodlands	California Juniper (*Juniperus californica*) Shrubland Alliance [89.100.00]	G4 S4	0.234
Shrublands	Fourwing Saltbush (*Atriplex canescens*) Shrubland Alliance [36.310.01]	G5 S4	1.077
	Creosote Bush (*Larrea tridentata*) Shrubland Alliance [33.140.04]	G5 S5	10.094
	Rubber Rabbitbrush *Ericameria nauseosa*) Shrubland Alliance ([35.310.00]	G5 S5	1.302
	California Buckwheat (*Eriogonum fasciculatum*) Shrubland Alliance [32.040.02]	G5 S5	0.503
Herbaceous	Fiddleneck - Coastal Heron's Bill (*Asminckia tessellata - Erodium cicutarium*) Herbaceous Association [42.110.05]	G4 S4	3.578
	Desert Needlegrass grassland ((*Pappostipa speciosa,* old name, *Achnatherum speciosum*) Herbaceous Alliance [41.090.01]	G4 S2	0.045
Other	Developed	Not Ranked	0.031
	Trail	Not Ranked	0.974
		Total Acreage	**17.839**

4.1.1 Plant Communities

Woodland Communities

The Study Area includes one (1) woodland community, which is categorized as California Juniper Woodland Alliance. This community is not considered sensitive by the CDFW, though considered sensitive by the Los Angeles County Planning Department (LA County Planning).



Source: Valtus Imagery Services: Hexagon Imagery Program (HxIP), 2022.

Legend

- Project Parcel
- Structures

Permanent Impacts

- Grading Impacts
- Fuel Modification (Zones A & B) Impacts

Temporary Impacts

- Temporary Impacts

No Impacts

- Fuel Modification (Zone C)*

Woodlands

- Jc — California juniper woodland (*Juniperus californica*) Woodland Alliance**

Shrubland

- Ac — Fourwing saltbush scrub (*Atriplex canescens*) Shrubland Alliance
- Ef — California buckwheat scrub (*Eriogonum fasciculatum*) Shrubland Alliance
- En — Rubber rabbitbrush scrub (*Ericameria nauseosa*) Shrubland Alliance
- Lt — Creosote bush scrub (*Larrea tridentata*) Shrubland Alliance

Herbaceous

- AtEc — Fiddleneck fields (*Amsinckia tessellata – Erodium cicutarium*) Herbaceous Alliance
- Ps — Desert Needlegrass grassland (*Pappostipa speciosa*) Herbaceous Alliance***

Other Landcover

- D — Development
- T — Trails

* Note to Fire Department- No fuel modification within Zone C to avoid impacts to sensitive and locally important Jc and Ps habitat

** Preserved in place or mitigated

*** Sensitive Natural Community

TENTATIVE PARCEL MAP 71006 – BIOLOGICAL RESOURCES ASSESSMENT

Vegetation and Land Cover Impacts Map

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FIGURE 3

California Juniper Woodland Alliance

California juniper is a slow-growing shrub or small tree that usually grows to 4 meters in height. Leaves are scalelike and rounded with obvious glandular pits, and fruits are berrylike cones with reddish color. The species is generally self-replacing in the absence of disturbance (Sampson and Jespersen 1963).

California Juniper occurs sporadically in both cismontane and transmontane California, often as individuals in many alliances. However, it dominates stands of varied species' composition and structure, depending on their juxtaposition to other stands of chaparral, scrub, desert scrub, or woodland vegetation. In some stands, junipers are open-grown trees over grassy understories. In others, the junipers form a mixed canopy with other trees or shrubs.

In the Californica Juniper Woodland Alliance, the species is dominant or co-dominant in the small tree canopy with pinyon pine, Joshua tree, Parry pinyon (*Pinus quadrifolia*), and small Oaks (*Quercus cornelius-mulleri; douglasii*). Shrubs may include desert agave (*Agave deserti*), Great Basin sagebrush, Cliff-rose (*Purshia stansburiana*, Antelope bitterbrush (*Purshia tridentata*)., blackbrush (*Coleogyne ramosissima), Ephedra* spp., Chaparral yucca (*Hesperoyucca whipplei*), scalebroom (*Lepidospartum squamatum*), Giant Nolina (*Nolina parryi*) or Mojave yucca (*Yucca schidigera*)
Tree canopy and shrub layer is open to intermittent. Herbaceous layer is sparse. The membership rules for this Alliance are:

- *J. californica* > 1% absolute cover, as a dominant shrub; Pinus monophylla < 1% cover (Thomas et al. 2004).
- *J. californica* > 3% cover over lower shrubs (Keeler-Wolf et al. 1998b).
- *J. californica* > 50% relative cover in shrub layer (Evens et al. 2006, Klein et al. 2007).
- *J. californica* as short tree (or large shrub) layer with > 1% and no other tree species equal or exceeding cover of J. californica (Keeler-Wolf et al. 2005).

Within the Study Area, small patches of this Alliance were noted in the north-western and middle southern portion just north of Sierra Highway outside the limits of disturbance. Associated species include creosote bush, non-native ornamental shrubs and fourwing saltbush. Understory includes some non-native brome grasses and forbs like lacy Phacelia (*Phacelia tanacetifolia*), caterpillar phacelia (*Phacelia cicutaria*) and fiddlenecks (*Amsinckia* spp.).

Californica Juniper Woodland Alliance is not considered sensitive by the CDFW, though the department has expressed concern over declines of juniper woodland in the Acton/Agua Dulce area and the community is considered locally sensitive by LA County Planning. This community mapped as a woodland is actually comprised of scattered Juniper trees remnants of a historic woodland community. All impacts to California Junipers will be avoided or mitigated at a 2:1 ratio (see MM-3)

Shrubland Communities

The Study Area includes four (4) shrub communities, which are categorized as fourwing saltbush Shrubland Alliance, Creosote Bush Shrubland Alliance, Rubber Rabbitbrush Shrubland Alliance, and California Buckwheat Shrubland Alliance. None of these communities are considered sensitive by the CDFW.

Fourwing Saltbush Shrubland Alliance

Fourwing saltbush is a widespread shrub in the western United States. Plants are long-lived, cold, and drought tolerant and also tolerate saline conditions. The species grows extensively in California, but the alliance is largely restricted to the deserts, the San Joaquin Valley, and surrounding foothills. Habitats include playas, old beach and shores, lake deposits, dissected alluvial fans, rolling hills or channel beds. Soils are carbonate rich, alkaline, sandy, or sandy clay loams. The USFWS Wetland Inventory (1996 national list) recognizes fourwing saltbush as a facultative upland plant.

Within the Alliance, the species is generally dominant or co-dominant in the shrub canopy with Ragweed (*Ambrosia dumosa)*, cheesebush (*Ambrosia Salsola*)*,* shadscale (*Atriplex confertifolia*)*,* allscale saltbush (*Atriplex polycarpa*)*,* yellow rabbitbrush (*Chrysothamnus viscidiflorus*)*,* Ephedra (*Ephedra viridis; californica; nevadensis*)*,* Spiny hopsage (*Grayia spinosa*) and Creosote bush with some emergent trees potentially present at low cover. Fourwing saltbush can be present with a > 2% absolute cover and > 50% relative cover in the shrub canopy (Keeler-Wolf et al. 1998b, Thomas et al. 2004).

Within the Study Area, fourwing saltbush Shrubland Alliance, was noted within the western edge and the south-western portion just north of Sierra Highway within sandy clay loam soil associated with some water flow and accumulation. The canopy is open with an absolute shrub cover of about 35%. Associated species include shrubs from adjacent plant communities including Creosote bush, rubber rabbitbrush Ephedra (*Ephedra viridis*) and native and non-native grasses and forbs.

Creosote Bush Shrubland Alliance

Creosote bush is a very long-lived shrub, more than 10,000 years as a clone, with low seedling recruitment. It is an evergreen resinous shrub and extremely resistant to high temperatures. Plants may die during severe droughts, though they typically persist longer than other shrubs, and can sprout from the base when moisture returns. Individuals of Creosote bush grow better in deep, sandy soils than other desert shrubs because of deep, spreading root systems (Marshall 1995a). Mature plants may be allelopathic to their own seedlings, encouraging an open community structure (Vasek and Barbour 1977).

Within the Alliance, creosote bush is dominant or co-dominant in the shrub canopy with burrobush (*Ambrosia dumosa*), cheesebush (*Ambrosia salsola*), shadscale Allscale saltbush, desert holly (*Atriplex hymenelytra)*, woolly brickellbush (*Brickellia incana*), desert brittlebush, *Ephedra* spp., *Lycium* spp. and goldenhead (*Acamptopappus* spp.). Emergent trees may be present at low cover, including mesquite (*Prosopis glandulosa*) or Joshua tree.

Within the Study Area, this Alliance is predominantly present within the eastern half. Creosote bush is dominant and exceeds other shrubs in cover (**Plate 1,** Photo 4, background; **Plate 2,** Photo 5). Other shrubs mostly present in the outer edges of the Alliance polygons include shrubs from adjacent alliances including fourwing saltbush, rubber rabbitbrush and California buckwheat. The understory includes the common native forbs and non-native grasses present within other Alliances.

Rubber Rabbitbrush Shrubland Alliance

Rubber rabbitbrush (*Ericameria nauseosa)* is a fast-growing, early-seral shrub that establishes after disturbance. Stands of this Alliance exist throughout the semiarid regions of California. They typically grow in disturbed areas, naturally disturbed by intermittent flooding or disturbed by overgrazing, road cuts, clearings, or old mine tailings. Plants colonize and persist for about ten (10) years and then transition into a different habitat community. In Southern California Mountains and Valleys stands are associated with the higher and cooler elevations frequenting road cuts and clearings. In the Desert, stands occur in the higher elevation and cooler parts along intermittent watercourses, fallow agricultural fields and old mine tailings. Within the Alliance, rubber rabbitbrush is dominant or co-dominant in the shrub canopy with Great Basin sagebrush (*Artemisia tridentata*), yellow rabbitbrush, Ephedra , California buckwheat (*Eriogonum fasciculatum*), scalebroom and Antelope bitterbrush. Emergent trees may be present at low cover, including California juniper (*Juniperus californica*), Joshua tree (*Yucca brevifolia*) and pinyon pine (*Pinus monophyla*).

Rubber rabbitbrush Shrubland Alliance was noted within the western half of the Study Area overlapping with the limits of disturbance. The area has signs of previous ground disturbance, and the canopy of the community is open with an absolute shrub cover of about 20-30% (Photo 7, Plate 2). Associated species include California buckwheat (*Eriogonum fasciculatum* var *polifolium*), green rabbitbrush (*Ericameria teretifolia*), Ephedra, non-native brome grasses (*Bromus* sp.), forbs like lacy Phacelia (*Phacelia tanacetifolia*), caterpillar phacelia (*Phacelia cicutaria*), and fiddleneck (*Amsinckia tessellata*; *intermedia).*

<u>California Buckwheat Shrubland Alliance</u>

California buckwheat is a semi-woody, many-branching shrub with woody, many-branched roots that penetrate to 1.5 m. The varieties of *E. fasciculatum* vary in a combination of traits, especially color, chromosome number, leaf shape, leaf margins, and pubescence. They also show some geographic separation. The variety *Eriogonum fasciculatum* var. *foliolosum* is known from along the Central Coast and mountains while E. *fasciculatum* var. *polifolium* present onsite is known from inland southern California. Suitable habitat includes upland slopes, intermittently flooded arroyos, channels and washes; rarely flooded low-gradient deposits. Soils coarse, well drained, and moderately acidic to slightly saline.

Within the Alliance, California buckwheat or chapparal yucca (*Hesperoyucca whipplei*) is dominant or co-dominant in the shrub canopy in cismontane stands with Great Basin sagebrush, coyotebrush (*Baccharis pilularis*), bush monkeyflower (*Diplacus aurantiacus*), Brittlebush (*Encelia actonii; farinosa*), goldenbush (*Isocoma menziesii*), bush mallow (*Malacothamnus fasciculatus),* white sage (*Salvia apiana*) or black sage (*Salvia mellifera*). Emergent trees may be present at low cover including California Juniper.
The membership rules for this Alliance are given below(Sawyer, Keeler-Wolf, and Evens 2009).

- *E. fasciculatum* > 50% relative cover in the shrub canopy; other shrubs, if present, < 50% relative cover (Evens and San 2005, Keeler-Wolf and Evens 2006).
- *E. fasciculatum* > 50% relative cover, or > 30% with *Encelia farinosa* in the shrub canopy (Klein and Evens 2005).
- *E. fasciculatum* > 50% relative cover in the shrub layer (Buck-Diaz et al. 2012).

The site is within an area that is an ecotone between inland chapparal and western Mojave desert. This Alliance is present within the central southern portion of the Study Area. Within this Alliance onsite, *E. fasciculatum* var. *polifolium* is present with a relative shrub cover of 55% co-dominant with green rabbitbrush with a 40% shrub cover. Other species present include creosote bush, rubber rabbitbrush and chapparal yucca. Occasional Desert needle grass (*Pappotipa speciosa*) was also noted interspersed with non-native brome grasses and native fiddleneck.

Herbaceous Communities

Fiddleneck - Coastal Heron's Bill Herbaceous Association

Fiddlenecks (*A. menziesii and A. tessellata*) are common native annuals of the California Floristic Province. Plants are well adapted to regular site disturbance and fluctuating Mediterranean climates through their ability to bank seeds and germinate quickly during relatively high rainfall years. *A. tessellata* grows under somewhat drier climate conditions than *A. menziesii*, but both species grow together in some stands in the inner central Coast Ranges.

The fiddleneck-filaree herbaceous Association is present within the western half of the site. The general composition of the vegetation within this habitat can be observed on (**Plate 1**, Photos 1 and 2 and **Plate 2,** Photos 7 and 8). Fiddlenecks are dominant with other native forbs including Wingnut Cryptantha (*Cryptantha pterocarya*), angled stem buckwheat (*Eriogonum angulosum*), strigose lotus (*Acmispon strigosus*), bicolored lupine (*Lupinus bicolor*) and other native and non-native grasses and forbs. Sporadic shrubs are also resent with less than a 10% cover and include creosote bush, rubber rabbitbrush and California buckwheat.

Desert Needlegrass Herbaceous Association

Desert needlegrass (*Pappostipa speciosa*) herbaceous Association is known from the Mojave Desert, southeastern Great Basin and the base of the Tehachapi mountains. The few stands known from the base of the Tehachapi Mountains are generally open and may contain annual native wildflowers. The stands known from the Antelope Valley are generally small (< 30 ha) and are interspersed among larger stands of interior goldenbush (*Ericameria linearifolia*), California Juniper and Joshua Tree (*Yucca brevifolia*) alliances.

Within the Study Area, a small area comprised of Desert Needlegrass grassland was noted in the central portion of the parcel/Study Area in between California Buckwheat Shrubland Alliance and Fiddleneck - Coastal Heron's Bill Herbaceous Association. Desert needlegrass is present with along with California buckwheat, rubber rabbitbrush, rabbitbrush, fiddlenecks and native other native forbs and invasive brome grasses. This community is present within Zone C of the Fuel Modification Area and is considered a sensitive natural community. This applicant has requested that the Los Angeles County Fire Department not conduct any Fuel Modification in Zone C, leaving this community undisturbed and preserved in place.

Other Land Cover

Developed

The Developed area is on the northeastern part of the Parcel associated with utilities, likely cell phone tower.

Trail

There are several compacted dirt roads and trails that are largely barren or sparsely vegetated within the Study Area.

4.1.2 Plant Communities/Habitats Listed in CNDDB

A review of the CDFW CNDDB Rarefind 5 application reveals nine (9) Sensitive Plant Communities/Habitats have been reported by other observers in the Acton Quadrangle area, or within adjacent quadrangles. These reported Sensitive Plant Communities/Habitats include the following:

- Riversidian Alluvial Fan Sage Scrub
- Southern California Arroyo Chub/Santa Ana Sucker Stream
- Southern California Threespine Stickleback Stream
- Southern Coast Live Oak Riparian Forest
- Southern Cottonwood Willow Riparian Forest
- Southern Mixed Riparian Forest
- Southern Riparian Scrub
- Southern Sycamore Alder Riparian Woodland
- Southern Willow Scrub

All CNDDB-listed plant communities and habitats are absent from the Project site.

4.2 PLANT SPECIES

4.2.1 Plant Species Observed

A total of **48** vascular plant taxa were identified during the March 30, 31 and June 6, 2023 surveys, including three (**3**) gymnosperms, **38** dicots and seven (7) monocots. These are documented in **Appendix 3.** Nine **(9)** of the plants observed were non-native and **39** were native, representing a high diversity of native species. A full list of vascular plant species observed during the general biological survey as well as the Spring botanical survey is included in Appendix 3.

4.2.2 SPECIAL-STATUS PLANT SPECIES

Special-status plant species either have unique biological significance, limited distribution, restricted habitat requirements, particular susceptibility to human disturbance, or a combination of these factors. For the purposes of this report, special-status plant species are those plants listed, proposed for listing, or candidates for listing as Threatened or Endangered by the USFWS under the Federal Endangered Species Act (FESA); those listed or proposed for listing as Rare, Threatened, or Endangered by the CDFW under the California Endangered Species Act (CESA); and plants on the CNPS Inventory of Rare and Endangered Vascular Plants with a California Rare Plant Rank (CRPR) of 1A (plants presumed extirpated in California and either rare or extinct elsewhere), 1B (plants considered to be rare, threatened, or endangered species in California and elsewhere), 2A (plants presumed extirpated in California, but more common elsewhere), 2B (plants considered rare, threatened, or endangered in California, but more common elsewhere), and 3 (review list: plants about which more information is needed). CRPR 3 plants are evaluated on a case-by-case basis. Special-status plant species also include CRPR 4 species that meet criteria to be considered locally significant.

The status codes for special-status plants are described in **Table 2, Status Codes for Special-Status Plants**.

Table 2
Status Codes for Special-Status Plants

FEDERALLY PROTECTED SPECIES	
FE (Federal Endangered)	A species that is in danger of extinction throughout all or a significant portion of its range.
FT (Federal Threatened)	A species that is likely to become Endangered in the foreseeable future.
FC (Federal Candidate)	A species for which USFWS has sufficient information on its biological status and threats to propose it as Endangered or Threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
STATE PROTECTED SPECIES	
CE (California Endangered)	A native species or subspecies which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.
CT (California Threatened)	A native species or subspecies that, although not presently threatened with extinction, is likely to become an Endangered species in the foreseeable future in the absence of the special protection and management efforts required by CESA. Any animal determined by the commission as "Rare" on or before January 1, 1985, is a "Threatened species."
CR (California Rare)	A species, subspecies, or variety of plant is rare under the Native Plant Protection Act when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become Endangered if its present environment worsens. Animals are no longer listed as Rare; all animals listed as Rare before 1985 have been listed as threatened.
CALIFORNIA RARE PLANT RANK (CRPR) (formerly CNPS Lists)	
CRPR 1A	Plants presumed extirpated in California and either rare or extinct elsewhere.
CRPR 1B	Plants rare, threatened, or endangered in California and elsewhere.
CRPR 2A	Plants presumed extirpated in California, but more common elsewhere.
CRPR 2B	Plants rare, threatened, or endangered in California, but more common elsewhere.
CRPR 3	A review list for plants for which there is inadequate information to assign them to one of the other lists or to reject them.
CRPR 4	A watch list for plants that are of limited distribution in California.
CALIFORNIA NATIVE PLANT SOCIETY (CNPS) THREAT RANK	
The CNPS Threat Rank is an extension added onto the California Rare Plant Rank and designates the level of endangerment, as follows: • 0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat) • 0.2-Fairly threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat) • 0.3-Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)	

Special-Status Species Observed

No special-status plant species were observed within the Study Area during the March 30 and 31,2023 biological surveys. Additionally, no special-status species were observed during the June 6, 2023, spring botanical survey, which was appropriately timed to detect special-status species. Also, based on a literature review no special-status plant species are known to occur in the Study Area.

Potential for Occurrence Analysis

An evaluation of the potential for occurrence at the site of special-status plant species known to occur in the region was undertaken through a search of the CNPS Online Inventory of Rare and Endangered Plants, 8th ed. (CNPS 2020) and CDFW CNDDB Rarefind 5 application (CDFW 2020) for sensitive "elements" reported within the Lancaster West USGS quadrangle, and all adjacent quadrangles. Additional special-status species not reported by the CNDDB that are anticipated to occur in the region were also considered. Based upon a review of the resources and databases listed above, 20 special-status vascular plant species have been documented within these nine (9) USGS quadrangles. The CNDDB/CNPS derived lists are provided in Appendix 2. The analysis of the potential for occurrence of special-status plants is presented in **Appendix 4**, which includes their growth form, blooming period, protection status, primary habitat associations, and an assessment of their potential for occurrence as observed, potentially present, presumed absent, or absent. CRPR 4 species were not included in the analysis.

As discussed in Appendix 4, most special-status plant species known to occur in the region are precluded from occurring at the site due to lack of suitable habitat or because the site is outside of the known range of the species. Other species, particularly shrubs and many of the perennial herbs could be confirmed as absent as they were not found during the survey.

After reviewing the habitat requirements, range, and distribution of the special-status plants that have been reported within the Acton quadrangle and all adjacent quadrangles, three (3) rare, threatened, or endangered plant species had potential to occur within the Study Area.

- San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). Blooming period is April-July.
- Rock Creek broomrape (*Aphyllon validum* var. *validum*). Blooming period is May-September.
- slender mariposa lily (*Calochortus clavatus* var. *gracilis*). Blooming period is April-June.

However, these species were not found during the general and spring botanical survey conducted on June 6, 2023, which was appropriately timed to detect these species. These species are therefore considered absent from the Study Area.

4.3 JURISDICTIONAL WATERS / HABITAT

The USFWS National Wetlands Inventory which identifies known surface waters and wetlands, does not identify any aquatic features within the Study Area.[1] Furthermore, no wetlands or streams were observed within the Study Area during the site surveys. The surveys were conducted during rain events and two shallow natural features were detected adjacent to existing trails where water flows from north-south in the western portion of the site.

4.4 WILDLIFE SPECIES

4.4.1 Wildlife Observed

Wildlife species observed during the survey of the Project site were species common or relatively common to the region, including year-round residents and potential winter migrants. A list of these species is included as **Appendix 5**. Other non-special-status wildlife species may also be expected to utilize habitats at the site for cover, foraging, and reproduction. Furthermore, in general, this list includes species that are more easily detected during daytime surveys. A few species (e.g., reptiles, birds, small mammals) can be expected to reproduce in the Study Area, and a wide range of larger or mobile species can be expected to utilize the site's resources routinely, such as foraging raptors, and medium to large-sized mammals (e.g., striped skunk, opossum, or coyote). Several bird species may nest within the Study Area in any given year.

[1] https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/)

4.4.2 Special-Status Wildlife

For the purposes of this assessment, special-status wildlife species are those species listed, proposed for listing, or that meet the criteria for listing as endangered, threatened, or rare under the FESA or CESA; and those listed on the CDFW Special Animals list with a designation of SSC (California Species of Special Concern) or CFP (California Fully Protected). The status codes for special-status wildlife are described in **Table 3, Status Codes for Special-Status Wildlife**.

Table 3
Status Codes for Special-Status Wildlife

FEDERALLY PROTECTED SPECIES	
FE (Federal Endangered)	A species that is in danger of extinction throughout all or a significant portion of its range.
FT (Federal Threatened)	A species that is likely to become endangered in the foreseeable future.
FC (Federal Candidate)	A species for which USFWS has sufficient information on its biological status and threats to propose it as endangered or threatened under the Endangered Species Act (ESA), but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
FSC (Federal Species of Concern)	A species under consideration for listing, for which there is insufficient information to support listing at this time. These species may or may not be listed in the future, and many of these species were formerly recognized as "Category-2 Candidate" species.
STATE PROTECTED SPECIES	
CE (California Endangered)	A native species or subspecies which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.
CT (California Threatened)	A native species or subspecies that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by CESA. Any animal determined by the commission as "rare" on or before January 1, 1985, is a "threatened species."
SSC (California Species of Special Concern)	Animals that are not listed under the California Endangered Species Act, but which nonetheless 1) are declining at a rate that could result in listing, or 2) historically occurred in low numbers and known threats to their persistence currently exist.
CFP (California Fully Protected)	This designation originated from the State's initial effort in the 1960s to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, mammals, amphibians, reptiles, and birds. Most fully protected species have also been listed as threatened or endangered species under the more recent endangered species laws and regulations. California Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.
SA (Special Animal)	"SA" is used herein if the animal is included on the CDFW Special Animals list but does not fall under any of the categories listed above. In general, special protection of these species is not mandatory under CEQA, although CDFW considers these species to be among those of greatest conservation need.

Special-Status Species Observed

No wildlife species that are designated or are candidates for listing as Threatened or Endangered under State or Federal law, or species that are designated as California Fully Protected or Species of Special

Concern under State law or regulations, were observed during the site surveys. The CNDDB was also searched prior to the surveys and there were no records for a special-status wildlife species within the immediate vicinity of the Project site. Nonetheless, reliable determination of the presence/absence of a listed or special-status wildlife species typically requires multiple focused surveys using a methodology designed to detect the particular species. Therefore, with regard to the presence of special-status wildlife, the biological surveys may be inconclusive. To determine whether the habitats at the site potentially support or are important to the viability of a special-status wildlife species, biological assessments typically rely on a potential for occurrence analysis, which can be followed by focused surveys for potentially occurring species, if necessary. A potential for occurrence analysis provides a speculative assessment of the potential for the occurrence of special-status animals at a site on the basis of their known distribution and habitat requirements.

A potential for occurrence analysis for special-status wildlife is presented in **Appendix 6**, which includes the species' protected status, primary habitat associations, and an assessment of their potential for occurrence (observed, potentially present, presumed absent, or absent). As for special-status plants, the potential for occurrence for special-status wildlife was undertaken through research of the CNDDB using the Rarefind 5 application for special-status "elements" on the USGS 7.5' Acton quadrangle and all adjacent quadrangles. Additional special-status species were also considered which are known to occur in the region based on the author's research and experience. Species which are considered sensitive in the County of LA, as listed on LA Audubon's Los Angeles County's Sensitive Bird Species list, are also considered in this analysis. The potential for occurrence analysis considers the potential for special-status wildlife to occur within the biological Study Area.

Per the potential for occurrence analysis, four (4) species of reptiles have potential to occur at the Study Area with varying probabilities ranging from moderate to low. As discussed in Appendix 6, these species are as follows:

Reptiles

- coast horned lizard (*Phrynosoma blainvillii*) [SSC]
- coastal whiptail (*Aspidoscelis tirgris stejnegeri*) [SSC]
- desert horned lizard (*Phrynosoma. platyrhinos*) [SSC]
- California glossy snake (*Arizona elegans occidentalis*) [SSC]
- Legless lizards (*Anniella* spp.) [SSC]

Insects

- *Crotch bumble bee (Bombus crotchii)* [SSC]

For additional information, see **Appendix 6**. Species which are identified in Appendix 6 as "unlikely" to occur are designated as such due the absence of necessary habitat features that these species would be dependent on at some point during their life stage. They cannot be entirely precluded from occurring as many of them are mobile species which could pass through the area, but they would be able to easily escape harm.

4.5 HABITAT LINKAGES AND WILDLIFE MOVEMENT

Habitat linkages are physical connections that allow wildlife to move between areas of suitable habitat in both undisturbed and fragmented landscapes. These can be critical at both the local and regional level. Habitat linkages are necessary not only to access essential resources, such as water sources or habitat for foraging, breeding, or cover, but also for dispersal and migration, to ensure the mixing of genes between populations, and so wildlife can respond and adapt to environmental stress, and thus are necessary to maintain healthy ecological and evolutionary processes. Wildlife corridors are areas of open space of sufficient width to permit the movement of larger, mobile species to move from one major open space region to another. Regional habitat linkages are larger wildlife corridors or regions of connectivity that are important for movement of multiple species and maintenance of ecological processes at a regional scale. Habitat loss and fragmentation are the leading threats to biodiversity, both globally and in southern California. Efforts to combat these threats include identifying and conserving large "core" areas of habitat and well as habitat linkages between them.

Wildlife crossings are generally small, narrow areas allowing wildlife to pass through an obstacle or barrier, such as a roadway to reach another patch of habitat. Examples of barriers or impediments to movement include housing and other urban development, roads, fencing, or open areas with little vegetative cover. Examples of wildlife crossings include culverts, drainage pipes, underpasses, and tunnels.

Based on a review of the following documents, the Project site and the Study Area are not within an area that has been identified as important to wildlife movement, such as a regional-scale habitat linkage or a wildlife movement corridor:

- *Los Angeles County General Plan 2035 (July 2022)*
- *South Coast Missing Linkages Project* (Penrod, K. et. al., 2006)
- *California Essential Connectivity Project: A Strategy for Conserving a Connected California* (Spencer et al., February 2010)

The potential importance of the Project site to wildlife movement was also evaluated both in the field and by reviewing recent aerial photographs of the site and the surrounding area. The site itself is located several hundred feet north of the CA-14 Highway and is adjacent to existing residential development.

5.0 PROJECT IMPACTS AND MITIGATION

The analysis of impacts to biological resources at the project site is based on Tentative Parcel Map 071006 dated September 16, 2019, is attached as Appendix 1. The limits of disturbance, as shown on **Figure 4, Vegetation and Land Cover Impacts Map**, are inclusive of all proposed permanent and temporary ground and vegetation disturbance associated with grading, development, and establishment of a leach field which will be established in the southeastern corner of the Project parcel. A summary of the impacted acreages is provided below in **Table 4, Impacts to Plant Communities and Land Cover.**

Approximately 4.338 acres of land cover and vegetation will be permanently removed by Project development, and an additional approximately 0.2-acre of land cover and vegetation within the 100-ft fuel modification buffer will be permanently impacted by fuel modification. Additionally, approximately 0.301-acre of land cover and vegetation will be temporarily impacted by Project development, Per the plan approved by Los Angeles Fire Department (LAFD), all areas between the 100-ft and 200-ft fuel modification buffers (Zone C[2]) are spaced far enough apart from one another such that fuel modification will not require significant changes to it. Further, though California junipers are located within grading limits/fuel modification-Zone B as well as a small portion of the proposed dirt road in the southern portion of the limits of disturbance, Junipers will be preserved in place to the maximum extent feasible, monitored during construction or if impacted will be mitigated at a 2:1 ratio if impacted.

Table 4
Impacts to Plant Communities and Other Land Cover

Habitat Class	Plant Community / Other Land Cover	Conservation Status Rank	Temporary Impacts (acres)	Permanent Impacts- Grading (acres)	Permanent Impacts- Fuel Modification (0-100 ft, outside grading limits) (acres)
Woodlands	California Juniper (*Juniperus californica*) Shrubland Alliance [89.100.00][3]	G4 S4	0.000	0.003	--
Shrublands	Fourwing Saltbush (*Atriplex canescens*) Shrubland Alliance [36.310.01]	G5 S4	0.000	0.334	0.044
	Creosote Bush (*Larrea tridentata*) Shrubland Alliance [33.140.04]	G5 S5	0.074	0.019	--
	Rubber Rabbitbrush Shrubland Alliance	G5 S5	0.008	1.295	--

[2] Los Angeles Fire Department (LAFD) categorizes fuel modification zones into three (3) zones. Within Zone A (30 ft from habitable structures), all vegetation is required to be removed except for low-lying herbaceous vegetation including grasses. Zone B (30-100 ft from habitable structures) is typically referred to as the "irrigated zone" and generally comprises an irrigated landscape area. Zone C (100-200 ft from habitable structures) is referred to as the "thinning zone" and requires a certain amount of space between existing shrubs. All fuel modification requirements are subject to the final approval of LAFD.

[3] Though small portions of two of the four locations of this community are located within the limits of disturbance & Fuel Modification (Zones A and B),, it will be protected in place to the maximum extent feasible, monitored during construction or mitigated at a 2:1 ratio

Habitat Class	Plant Community / Other Land Cover	Conservation Status Rank	Temporary Impacts (acres)	Permanent Impacts- Grading (acres)	Permanent Impacts- Fuel Modification (0-100 ft, outside grading limits) (acres)
	(*Ericameria nauseosa*) [35.310.00]				
	California Buckwheat (*Eriogonum fasciculatum*) Shrubland Alliance [32.040.02]	G5 S5	--	0.119	0.11
Herbaceous	Fiddleneck - Coastal Heron's Bill (*Asminckia tessellata - Erodium cicutarium*) Herbaceous Association [42.110.05]	G4 S4	0.193	2.364	0.096
Other	Developed	Not Ranked	--	--	--
	Trail	Not Ranked	0.027	0.205	0.049
		Total Impact Acreage	**0.301**	**4.338**	**0.200**

None of the plant communities to be impacted are considered rare or sensitive habitats by CDFW and therefore are not subject to special consideration or protection under CEQA.

5.1 IMPACTS TO SPECIAL-STATUS PLANT SPECIES

There are two locally protected plant species within the Study Area, silver cholla (*Cylindropuntia echinocarpa*) and California juniper. Some silver cholla's plants are located within the 200-ft fuel modification zone. Per CUP #2011-00056, these plants are to be be protected in place to the maximum extent feasible. The Junipers in the mid central portion of the Study Area may be impacted during trenching. The impacted Junipers will be mitigated at a 2:1 ration (see MM-3 for details).

Based on the results of the Spring botanical survey, there are no special-status plant species at the site. Because there are no impacts to special-status plant species, impacts to special-status plant species are considered ***less than significant***, and no mitigation is required.

5.2 IMPACTS TO SPECIAL-STATUS WILDLIFE SPECIES

This assessment of impacts to special-status wildlife considers those species that are listed, proposed for listing, or that meet the criteria for listing as Endangered or Threatened under the FESA or CESA; and those with a designation of SSC (California Species of Special Concern) or California Fully Protected (CFP), as mandatory special consideration and/or protection of these species is required pursuant to the Federal Endangered Species Act, the State Endangered Species Act, and/or CEQA. The following mitigation measure is meant to reduce impacts of all special-status species whose potential for occurrence range from low to high. It does not include species which would only potentially occur as foragers or transients since they would easily be able to escape harm.

Many of the special-status wildlife species that may potentially occur at the site are capable of escaping harm during project development (e.g., non-nesting birds), including grading or fuel modification, while others are vulnerable to direct impacts, including injury and mortality. In this case, the special-status species that could be directly impacted include potentially occurring land dwelling animals, including California glossy snake (*Arizona elegans occidentalis*), coastal whiptail (*Aspidoscelis tigris stejnegeri*), coast horned lizard (*Phrynosoma blainvilli*) and desert horned lizard (*Phrynosoma platyrhinos*). Though unlikely, several species of legless lizards (*Anniella* spp.) could be present onsite.

One special status insect Crotch bumble bee (*Bombus crotchii*), could also be present onsite. It is recommended that a plant palette rich in nectar rich native flowers to support foraging bee populations is used for landscaping. Additionally, the seed mix to be used on the graded slopes should be based on the native plant palette approved by Los Angeles County Planning. The graded slopes shall be revegetated in compliance with applicable building and Acton Community Standard District (CSD) codes.

Direct loss or injury to individuals of a special-status wildlife species would be a significant, but mitigable impact. Although potentially up to several individuals of some of these species could be impacted, if present, the habitat loss associated with the Project would not significantly impact a population of any of these species, given the acreage of habitat that would be affected and the amount of remaining suitable habitat in the surrounding area. Impacts to nesting birds, including nesting special-status bird species, are addressed under the Impacts to Nesting Birds heading, below. While impacts to special-status wildlife species would be considered potentially significant, adherence to the following mitigation measure MM-1 would reduce impacts to a ***less than significant*** level by requiring pre-construction surveys for special-status wildlife species:

MM-1 Pre-construction Surveys for Special-Status Wildlife Species

Prior to the commencement of ground or vegetation disturbing activities, including but not limited to grading and fuel modification, two (2) pre-construction surveys for potentially occurring special status wildlife species which could be directly impacted by project activities, including California glossy snake, coast horned lizard, desert horned lizard, legless lizards, crotch bumble bee and coastal whiptail. The first survey shall be conducted within fourteen (14) days and the second survey shall be conducted within three (3) days prior to the commencement of ground or vegetation disturbing activities. The pre-construction surveys shall incorporate appropriate methods and timing to detect these species, including individuals that could be concealed in burrows, beneath leaf litter, or in loose soil. If a special-status species is found, avoidance is the preferred mitigation option. If avoidance is not feasible, the species shall be captured and transferred to appropriate habitat and location where they would not be harmed by project activities, preferably to open space habitats in the vicinity of the project site. The Lead Agency and California Department of Fish and Wildlife (CDFW) shall be consulted regarding the presence of a special-status species at the site. If a federally listed species is found, the United States Fish and Wildlife Service (USFWS) shall also be notified. A letter report summarizing the methods and results of the surveys shall be submitted to the Lead Agency and CDFW prior to commencement of project activities.

5.3 IMPACTS TO NESTING BIRDS

The existing vegetation on the Project site provides suitable habitat for nesting birds; therefore, nesting bird surveys are required. Ground and vegetation disturbing activities including but not limited to grading and fuel modification, if conducted during the nesting bird season (February 1 to August 31), would have the potential to result in removal or disturbance to trees and shrubs that could contain active bird nests. In addition, these activities would also affect herbaceous vegetation that could support and conceal ground-nesting species. Project activities that result in the loss of bird nests, eggs, and young would be in violation of one or more of California Fish and Game Code sections 3503 (any bird nest), 3503.5 (birds-of-prey), or 3511 (Fully Protected birds). In addition, removal or destruction of one or more active nests of any other birds listed by the federal Migratory Bird Treaty Act of 1918 (MBTA), whether nest damage was due to vegetation removal or to other construction activities, would be considered a violation of the MBTA and California Fish and Game Code Section 3511. The loss of protected bird nests, eggs, or young due to Project activities would be a significant, but mitigable impact. Adherence to Mitigation Measure **MM-2** would reduce impacts to potentially occurring protected bird nests, eggs, or young to a ***less than significant*** level.

MM-2 Nesting Bird Survey

No earlier than 14 days prior to ground or vegetation disturbing activities during the nesting/breeding season of native bird species potentially nesting on the site (typically February 1 through August 31), a Lead Agency-approved qualified biologist shall perform two (2) field surveys to determine if active nests of any bird species protected by the state or federal Endangered Species Acts, Migratory Bird Treaty Act, and/or the California Fish and Game Code Sections 3503, 3503.5, or 3511 are present in the disturbance zone or within 300 feet of the disturbance zone for songbirds and within 500 feet of the disturbance zone for raptors and special-status bird species. The second nesting bird survey shall be conducted within three days of the start of ground or vegetation disturbing activities. A letter report summarizing the methods and results of the surveys shall be submitted to the Lead Agency and CDFW, if applicable. If an active nest is found within the survey area, site preparation, construction, and fuel modification activities shall stop until the biologist can establish an appropriate setback buffer, at the discretion of the biologist. If a special-status bird species is found nesting at the site then the Lead Agency, CDFW and, when applicable, USFWS, shall be consulted prior to the initiation of construction activities. The buffer shall be demarcated and project activities within the buffer shall be postponed or halted, at the discretion of the biologist, until the nest is vacated, and juveniles have fledged, as determined by the biologist, and there is no evidence of a second attempt at nesting.

5.4 IMPACTS TO SENSITIVE NATURAL COMMUNITIES

Desert needlegrass Herbaceous Alliance is present within Zone C of the Fuel Modification Area and is considered a sensitive natural community. The applicant has requested the Los Angeles County Fire Department to not conduct any fuel modification in Zone C, especially within this community. This community and will be left undisturbed and preserved in place. No impacts to this community are expected as a consequence of the project.

Californica Juniper Woodland Alliance observed in four areas, one of which in the south central portion of the Study Area, may be subject to impacts because of project trenching. The other areas including the areas within fuel modification- Zone C will not be impacted by project activities and left in place. This community, is not considered sensitive by the CDFW, though the department has expressed concern over declines of Juniper woodlands in the Acton/Agua Dulce area. This community is considered locally sensitive by LA County Planning. Adherence to Mitigation Measure MM-3, will reduce the impacts to this community to less than significant.

MM-3 Mitigation for Impacts to Protected Trees

All California Junipers that are killed or severely damaged during construction activities shall be replaced within suitable habitat onsite at 2:1 ratio. Mitigation planting for trees shall comply with appropriate County and local mitigation guidelines for removal of Protected Trees.

Construction vehicles shall avoid impacts to these trees. It is recommended that protective orange snow fencing be placed around Juniper trees adjacent to the grading footprint, establishing a ‘protected tree zone’ to avoid impacts to them. If encroachment within the protected tree zone’ is required by construction equipment, a biologist will be present onsite to monitor the tree in question.

Project impacts to protected trees would be reduced to less than significant after mitigation. Cumulative impacts to protected trees would be less than significant.

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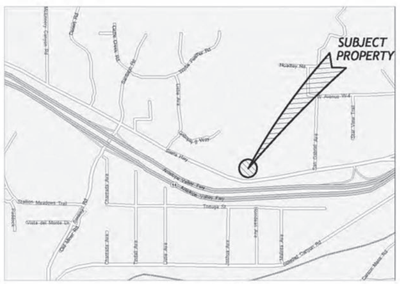
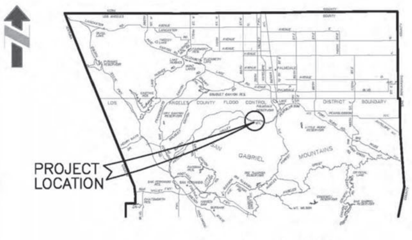
APPENDIX 1

Site Plans
September 2019



VICINITY MAP
NTS



LOCATION MAP
NTS

PARCEL AREAS

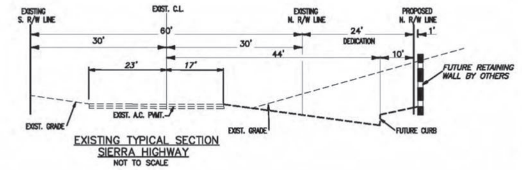
PARCEL #	PARCEL GROSS AREA	PARCEL NET AREA
1	5.22 Ac.	4.28 Ac.
2	5.96 Ac.	4.30 Ac.
3	6.86 Ac.	2.83 Ac.
TOTAL	18.04 Ac.	11.41 Ac.

AREAS SUBTRACTED FOR NET AREAS

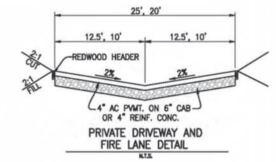
PARCEL	R/W DEDICATION	ACCESS EASEMENT	SLOPE EASEMENTS	TOTAL OF NET AREA	TOTAL PARCEL NET AREA
1	0.03 Ac.	0.03 Ac.	0.88 Ac.	0.94 Ac.	4.28 Ac.
2	0.09 Ac.	0.19 Ac.	1.38 Ac.	1.66 Ac.	4.30 Ac.
3	0.62 Ac.	———	3.41 Ac.	4.03 Ac.	2.83 Ac.

OPEN SPACE ANALYSIS

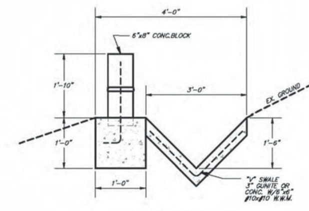
PARCEL	TOTAL AREA	UNDISTURBED OPEN SPACE	DISTURBED SPACE	PERCENT OPEN SPACE	PAD/ROADWAY AREA
1	227,383 sq. ft. / (5.22 Ac.)	164,900 sq. ft. / (3.78 Ac.)	25,683 sq. ft. / (0.59 Ac.)	73%	36,800 sq. ft. / (0.84 Ac.)
2	259,617 sq. ft. / (5.96 Ac.)	191,050 sq. ft. / (4.39 Ac.)	35,167 sq. ft. / (0.80 Ac.)	74%	33,400 sq. ft. / (0.76 Ac.)
3	298,821 sq. ft. / (6.86 Ac.)	230,380 sq. ft. / (5.29 Ac.)	36,941 sq. ft. / (0.84 Ac.)	78%	31,500 sq. ft. / (0.73 Ac.)
TOTAL	785,821 sq. ft. /(18.04 Ac.)	586,330 sq. ft. / (13.46 Ac.)	97,791 sq. ft. / (2.44 Ac.)	75%	101,700 sq. ft. / (2.33 Ac.)



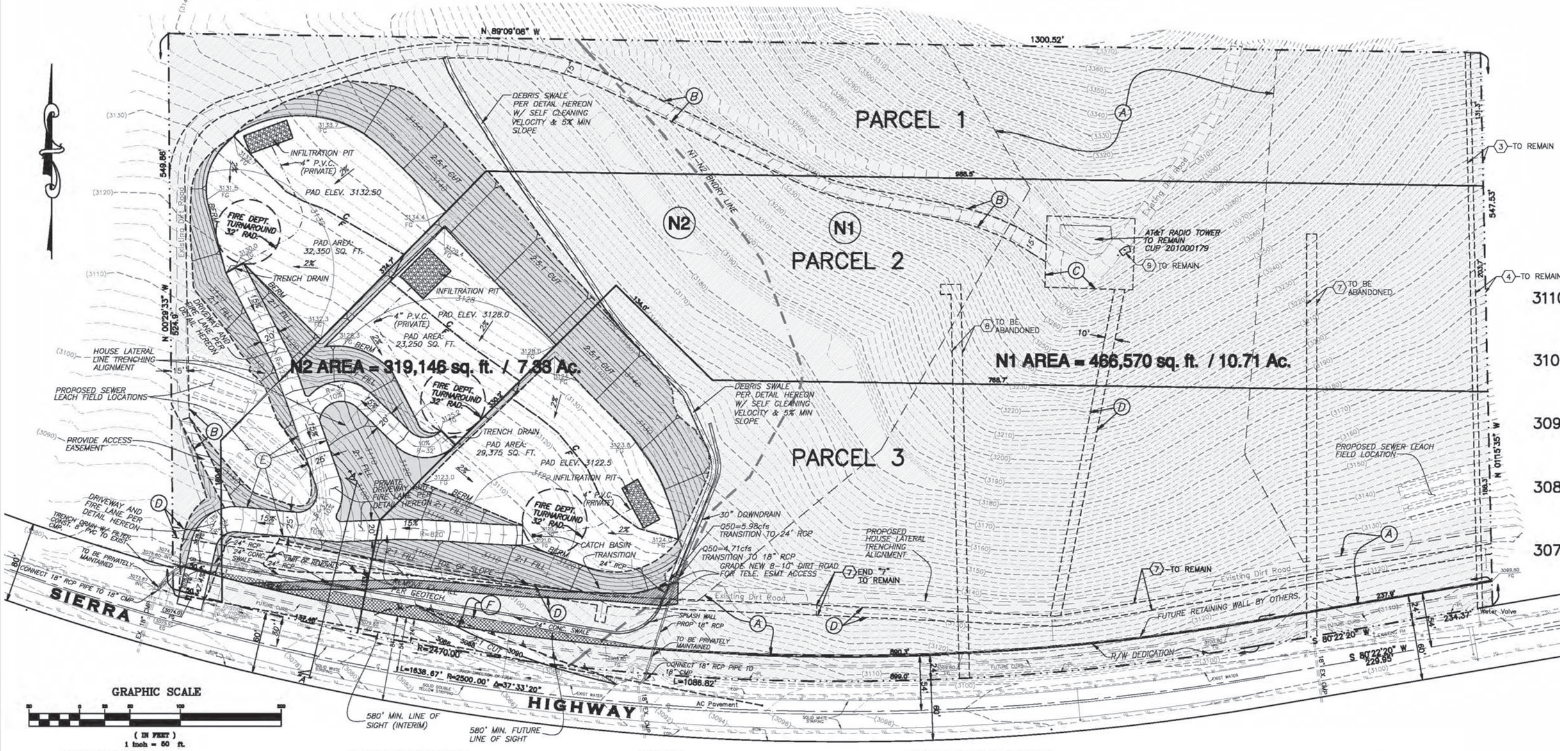
EXISTING TYPICAL SECTION SIERRA HIGHWAY
NOT TO SCALE



PRIVATE DRIVEWAY AND FIRE LANE DETAIL
N.T.S.

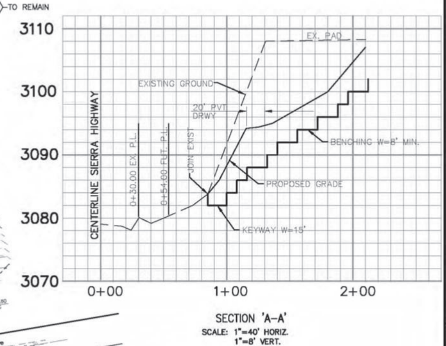


DEBRIS SWALE DETAIL
N.T.S.



GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.



SECTION 'A-A'
SCALE: 1"=40' HORIZ.
1"=8' VERT.

LEGEND:

- UNDISTURBED OPEN SPACE
- FUTURE LINE OF SIGHT EASEMENT
- PROPOSED DIRT ROAD FOR TELE. AND ACCESS EASEMENT.

BENCH MARK:

UL 1536
PALMDALE (2010) 3,084.840 940.259

CSBM MON 6" UP 0.25MI E/O C/L LISTIE AVE & 75' N/O C/L SIERRA HWY 161' NW/O MI MRK #25.16 MKD (BM201-68 1961 RE 5869) MKR 2' S MON

LEGAL DESCRIPTION:

BEING A SUBDIVISION OF A PORTION OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 29, T5N, R12W, SBM, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

UTILITY COMPANIES:

SEWER: PRIVATE

STORM DRAIN: LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

WATER: LOS ANGELES COUNTY WATER DISTRICT 37

ELECTRIC: SOUTHERN CALIFORNIA EDISON COMPANY

GAS: THE GAS COMPANY

TELEPHONE: AT&T

CABLE: TIME WARNER CABLE

EXISTING EASEMENTS:

3. ITEM NO. 3 AN EASEMENT FOR WATER PIPELINES AND DRAIN LINES RECORDED MAY 7, 1968 AS INST. NO. 2845 O.R. (TO REMAIN)
4. ITEM NO. 4 AN EASEMENT FOR ELECTRICAL AND COMMUNICATION RECORDED JUNE 26, 1970 AS INST. NO. 3976 D.R. (PORTION LIES WITHIN PROPOSED R/W DEDICATION) (TO REMAIN)
7. ITEM NO. 7 AN EASEMENT FOR PUBLIC UTILITIES RECORDED NOV 28, 2000 AS INST. NO. 00-1852114 D.R. (PORTION TO BE ABANDONED AT RECORDATION, SEE PLAN)
8. ITEM NO. 8 AN EASEMENT FOR PUBLIC UTILITIES RECORDED JUNE 4, 2001 AS INST. NO. 00-01-0964072 O.R. (TO BE ABANDONED AT RECORDATION)
9. ITEM NO. 9 AN EASEMENT FOR PUBLIC UTILITIES RECORDED JUNE 19, 2019 AS INST. NO. 20190581540 O.R. (TO REMAIN)

NOTES:

1. ALL EX. STORM DRAINS IN PUBLIC RIGHT-OF-WAY TO REMAIN AND BE MAINTAINED BY L.A.C.F.C.D.
2. REPAIR ANY DISPLACED, BROKEN, OR DAMAGED IMPROVEMENTS DURING CONSTRUCTION ALONG THE PROPERTY FRONTAGE ON SIERRA HWY. TO THE SATISFACTION OF PUBLIC WORKS.

FURTHER DIVISION OF THIS PROPERTY TO LOT/PARCEL SIZES BELOW FIVE ACRES WILL REQUIRE APPLICATION OF A NEW TENTATIVE MAP.

LOW IMPACT DEVELOPMENT REQUIREMENTS:
EACH OF THE 3 PARCELS SHALL INCLUDE DOWNSPOUT ROUTING AND INFILTRATION PIT (DRY WELL).

GENERAL INFORMATION

OWNER:
RAYMOND DUVERNAY
PO BOX 6587
LANCASTER, CALIFORNIA 93539
TEL.: (661) 645-0088
FAX: (661) 948-5684

CIVIL ENGINEER:
CRC ENTERPRISES
27600 BOUQUET CANYON ROAD, SUITE 200
SANTA CLARITA, CA 91350
ATTN: RON KOESTER, LS5930
(661) 297-2336
(661) 297-2331 FAX

SOILS/GEOLOGY:
SOUTHWEST GEOTECHNICAL
ATTN.: CONRAD CARRLE
TEL.: (661) 222-9544

EARTH WORK QUANTITY ESTIMATE:
TOTAL:
18,000 CU. YDS. CUT
20,520 CU. YDS. FILL
INTERM LINE OF SITE:
200 CU. YDS. CUT
20 CU. YDS. FILL
PARCEL 1:
5700 CU. YDS. CUT
6500 CU. YDS. FILL
PARCEL 2:
6700 CU. YDS. CUT
7100 CU. YDS. FILL
PARCEL 3:
5400 CU. YDS. CUT
6900 CU. YDS. FILL

CUP NUMBER: 2011-00056

PROJECT ADDRESS:
SIERRA HIGHWAY E/O LISTIE AVENUE
ACTON, CALIFORNIA

A.P.N.:
3057-014-012

AREA:
NET: 10.98 Ac.
GROSS: 18.04 Ac.

ZONE:
CURRENT: A-1-1
PROPOSED: A-1-1

PROPOSED DEVELOPMENT:
3 SINGLE FAMILY RESIDENCES

THOMAS BOOK MAP:
LOS ANGELES COUNTY THOMAS MAP DATED 2004 PAGE 4375 G-6

PROPOSED EASEMENTS:

- (A) VARIABLE WIDTH EASEMENT TO THE COUNTY OF LOS ANGELES FOR SLOPE AND ROAD CONSTRUCTION PURPOSES.
- (B) 15' AND VARIABLE WIDTH ACCESS EASEMENT TO AT&T.
- (C) EASEMENT TO AT&T FOR RADIO TOWER AND APPURTURENT STRUCTURES. APPROX. AREA: 6000 SQ. FT.
- (D) 10' WIDE EASEMENT TO AT&T FOR POWER POLES AND OVERHEAD POWER LINES, PORTIONS OF POWER LINES TO BE PLACED UNDERGROUND.
- (E) VAR. WIDTH ACCESS EASEMENT.
- (F) VAR. WIDTH FUTURE LINE OF SIGHT EASEMENT,

LICENSED LAND SURVEYOR RONALD N. KOESTER NO. 5930 STATE OF CALIFORNIA

PLANS PREPARED UNDER THE DIRECTION OF

RON KOESTER LS 5930 — 16 SEPT 2019 DATE

CUP NO. 2011-00056
MINOR LAND DIVISION
TENTATIVE PARCEL MAP NO.
071006
LOCATED IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF LOS ANGELES STATE OF CALIFORNIA

CRC Enterprises
27600 Bouquet Canyon Road Suite 200 Santa Clarita CA 91350
Telephone (661) 297-2336 FAX (661) 297-2331

PREPARED FOR
COMMERCIAL SERVICES UNLIMITED, INC.
P.O. BOX 6587
LANCASTER, CA. 93539
c/o Mr. Doug Beam

TENTATIVE PARCEL MAP
071006

SHEET 1 OF 1 SHEETS

CRC 2939

DATE | REVISIONS

APPENDIX 2

Literature Search Results

U.S. Fish and Wildlife Service
National Wetlands Inventory

National Wetlands Inventory

June 23, 2023

Wetlands_Alaska

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Critical Habitat for Threatened & Endangered Species [USFWS]

Final Polygon Features

Final Linear Features

Proposed Polygon Features

Proposed Linear Features

A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.

County of Los Angeles, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, EPA, USDA

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Acton (3411842) OR Palmdale (3411851) OR Condor Peak (3411832) OR Chilao Flat (3411831) OR Pacifico Mountain (3411841) OR Ritter Ridge (3411852) OR Agua Dulce (3411843) OR Sleepy Valley (3411853) OR Sunland (3411833))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G1G2	S1S2	SSC
Aimophila ruficeps canescens southern California rufous-crowned sparrow	ABPBX91091	None	None	G5T3	S3	WL
Anaxyrus californicus arroyo toad	AAABB01230	Endangered	None	G2G3	S2	SSC
Anniella pulchra Northern California legless lizard	ARACC01020	None	None	G3	S2S3	SSC
Anniella spp. California legless lizard	ARACC01070	None	None	G3G4	S3S4	SSC
Anniella stebbinsi Southern California legless lizard	ARACC01060	None	None	G3	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G4	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Arctostaphylos glandulosa ssp. gabrielensis San Gabriel manzanita	PDERI042P0	None	None	G5T3	S3	1B.2
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Artemisiospiza belli belli Bell's sparrow	ABPBX97021	None	None	G5T2T3	S3	WL
Aspidoscelis tigris stejnegeri coastal whiptail	ARACJ02143	None	None	G5T5	S3	SSC
Astragalus hornii var. hornii Horn's milk-vetch	PDFAB0F421	None	None	GUT1	S1	1B.1
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Berberis nevinii Nevin's barberry	PDBER060A0	Endangered	Endangered	G1	S1	1B.1
Bombus crotchii Crotch bumble bee	IIHYM24480	None	Candidate Endangered	G2	S2	
Buteo regalis ferruginous hawk	ABNKC19120	None	None	G4	S3S4	WL

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Calochortus clavatus var. gracilis slender mariposa-lily	PMLIL0D096	None	None	G4T2T3	S2S3	1B.2
Calochortus palmeri var. palmeri Palmer's mariposa-lily	PMLIL0D122	None	None	G3T2	S2	1B.2
Calochortus plummerae Plummer's mariposa-lily	PMLIL0D150	None	None	G4	S4	4.2
Calochortus striatus alkali mariposa-lily	PMLIL0D190	None	None	G3	S2S3	1B.2
Calystegia peirsonii Peirson's morning-glory	PDCON040A0	None	None	G4	S4	4.2
Canbya candida white pygmy-poppy	PDPAP05020	None	None	G3G4	S3S4	4.2
Castilleja gleasoni Mt. Gleason paintbrush	PDSCR0D140	None	Rare	G2	S2	1B.2
Catostomus santaanae Santa Ana sucker	AFCJC02190	Threatened	None	G1	S1	
Centromadia parryi ssp. australis southern tarplant	PDAST4R0P4	None	None	G3T2	S2	1B.1
Charadrius montanus mountain plover	ABNNB03100	None	None	G3	S2S3	SSC
Chorizanthe parryi var. fernandina San Fernando Valley spineflower	PDPGN040J1	None	Endangered	G2T1	S1	1B.1
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G4	S2	SSC
Diadophis punctatus modestus San Bernardino ringneck snake	ARADB10015	None	None	G5T2T3	S2?	
Dodecahema leptoceras slender-horned spineflower	PDPGN0V010	Endangered	Endangered	G1	S1	1B.1
Empidonax traillii extimus southwestern willow flycatcher	ABPAE33043	Endangered	Endangered	G5T2	S1	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Euphydryas editha quino quino checkerspot butterfly	IILEPK405L	Endangered	None	G5T1T2	S1S2	
Falco mexicanus prairie falcon	ABNKD06090	None	None	G5	S4	WL
Gasterosteus aculeatus williamsoni unarmored threespine stickleback	AFCPA03011	Endangered	Endangered	G5T1	S1	FP
Gila orcuttii arroyo chub	AFCJB13120	None	None	G2	S2	SSC

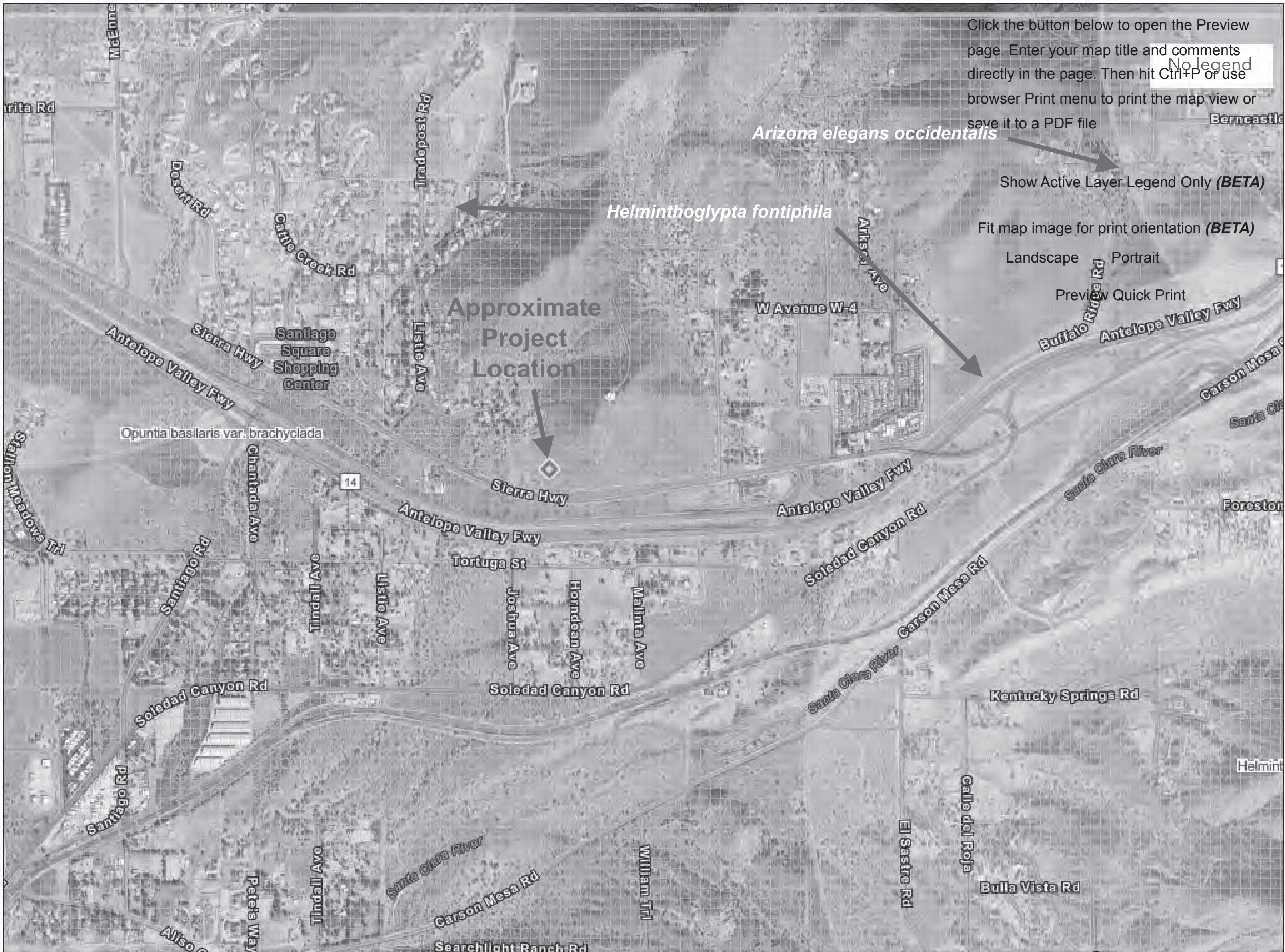
Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Glyptostoma gabrielense San Gabriel chestnut	IMGASB1010	None	None	G2	S3	
Helminthoglypta fontiphila Soledad shoulderband	IMGASC2250	None	None	G1	S1	
Helminthoglypta traskii pacoimensis Pacoima shoulderband	IMGASC2472	None	None	G1G2T1	S1	
Helminthoglypta vasquezi Vasquez shoulderband	IMGASC2660	None	None	G1	S1	
Imperata brevifolia California satintail	PMPOA3D020	None	None	G3	S3	2B.1
Lanius ludovicianus loggerhead shrike	ABPBR01030	None	None	G4	S4	SSC
Lepidium virginicum var. robinsonii Robinson's pepper-grass	PDBRA1M114	None	None	G5T3	S3	4.3
Lepus californicus bennettii San Diego black-tailed jackrabbit	AMAEB03051	None	None	G5T3T4	S3S4	
Lilium parryi lemon lily	PMLIL1A0J0	None	None	G3	S3	1B.2
Linanthus concinnus San Gabriel linanthus	PDPLM090D0	None	None	G2	S2	1B.2
Loeflingia squarrosa var. artemisiarum sagebrush loeflingia	PDCAR0E011	None	None	G5T3	S2	2B.2
Malacothamnus davidsonii Davidson's bush-mallow	PDMAL0Q040	None	None	G2	S2	1B.2
Mojave Riparian Forest Mojave Riparian Forest	CTT61700CA	None	None	G1	S1.1	
Monardella australis ssp. gabrielensis San Gabriel Mountains monardella	PDLAM18114	None	None	G4T2	S2	1B.2
Myotis yumanensis Yuma myotis	AMACC01020	None	None	G5	S4	
Onychomys torridus ramona southern grasshopper mouse	AMAFF06022	None	None	G5T3	S3	SSC
Opuntia basilaris var. brachyclada short-joint beavertail	PDCAC0D053	None	None	G5T3	S3	1B.2
Orobanche valida ssp. valida Rock Creek broomrape	PDORO040G2	None	None	G4T2	S2	1B.2
Perognathus inornatus San Joaquin pocket mouse	AMAFD01060	None	None	G2G3	S2S3	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3	S4	SSC
Polioptila californica californica coastal California gnatcatcher	ABPBJ08081	Threatened	None	G4G5T3Q	S2	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Pseudognaphalium leucocephalum white rabbit-tobacco	PDAST440C0	None	None	G4	S2	2B.2
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Rana muscosa southern mountain yellow-legged frog	AAABH01330	Endangered	Endangered	G1	S1	WL
Rhinichthys osculus ssp. 8 Santa Ana speckled dace	AFCJB3705K	None	None	G5T1	S1	SSC
Riversidian Alluvial Fan Sage Scrub Riversidian Alluvial Fan Sage Scrub	CTT32720CA	None	None	G1	S1.1	
Setophaga petechia yellow warbler	ABPBX03010	None	None	G5	S3S4	SSC
Southern California Arroyo Chub/Santa Ana Sucker Stream Southern California Arroyo Chub/Santa Ana Sucker Stream	CARE2330CA	None	None	GNR	SNR	
Southern California Threespine Stickleback Stream Southern California Threespine Stickleback Stream	CARE2320CA	None	None	GNR	SNR	
Southern Coast Live Oak Riparian Forest Southern Coast Live Oak Riparian Forest	CTT61310CA	None	None	G4	S4	
Southern Cottonwood Willow Riparian Forest Southern Cottonwood Willow Riparian Forest	CTT61330CA	None	None	G3	S3.2	
Southern Mixed Riparian Forest Southern Mixed Riparian Forest	CTT61340CA	None	None	G2	S2.1	
Southern Riparian Scrub Southern Riparian Scrub	CTT63300CA	None	None	G3	S3.2	
Southern Sycamore Alder Riparian Woodland Southern Sycamore Alder Riparian Woodland	CTT62400CA	None	None	G4	S4	
Southern Willow Scrub Southern Willow Scrub	CTT63320CA	None	None	G3	S2.1	
Stylocline masonii Mason's neststraw	PDAST8Y080	None	None	G1	S1	1B.1
Symphyotrichum greatae Greata's aster	PDASTE80U0	None	None	G2	S2	1B.3
Taricha torosa Coast Range newt	AAAAF02032	None	None	G4	S4	SSC
Thamnophis hammondii two-striped gartersnake	ARADB36160	None	None	G4	S3S4	SSC
Thysanocarpus rigidus rigid fringepod	PDBRA2Q070	None	None	G1G2	S2	1B.2
Toxostoma lecontei Le Conte's thrasher	ABPBK06100	None	None	G4	S3	SSC
Vireo bellii pusillus least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Xerospermophilus mohavensis Mohave ground squirrel	AMAFB05150	None	Threatened	G3	S2	

Record Count: 82

BIOS Map



0 km	0 mi

3/29/2023

BIOS Map for Tentative Parcel Map 71006

0.2 mi

Maxar | California Department of Fish and Wildlife, California Natural Diversity Database | Esri Community M... Powered by Esri

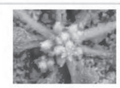
Search Results

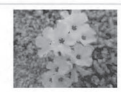
66 matches found. Click on scientific name for details

Search Criteria: 9-Quad include [3411851:3411832:3411831:3411841:3411852:3411843:3411842:3411853:3411833

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	CA ENDEMIC	DATE ADDED	PHOTO
Acanthoscyphus parishii var. abramsii	Abrams' oxytheca	Polygonaceae	annual herb	Jun-Aug	None	None	G4? T1T2	S1S2	1B.2	Yes	1994-01-01	 © 2007 Steve Matson
Acanthoscyphus parishii var. parishii	Parish's oxytheca	Polygonaceae	annual herb	Jun-Sep	None	None	G4? T3T4	S3S4	4.2	Yes	2007-04-05	 © 2014 Keir Morse
Androsace elongata ssp. acuta	California androsace	Primulaceae	annual herb	Mar-Jun	None	None	G5? T3T4	S3S4	4.2		1994-01-01	 © 2008 Aaron Schusteff
Aphyllon validum ssp. validum	Rock Creek broomrape	Orobanchaceae	perennial herb (parasitic)	May-Sep	None	None	G4T2	S2	1B.2	Yes	1974-01-01	No Photo Available
Arctostaphylos glandulosa ssp. gabrielensis	San Gabriel manzanita	Ericaceae	perennial evergreen shrub	Mar	None	None	G5T3	S3	1B.2	Yes	1994-01-01	 © 2016 Neal Kramer
Arctostaphylos parryana ssp. tumescens	interior manzanita	Ericaceae	perennial evergreen shrub	Feb-Apr	None	None	G4T3T4	S3S4	4.3	Yes	2001-01-01	No Photo Available
Asplenium vespertinum	western spleenwort	Aspleniaceae	perennial rhizomatous herb	Feb-Jun	None	None	G3?	S4	4.2		1974-01-01	No Photo Available
Astragalus hornii var. hornii	Horn's milk-vetch	Fabaceae	annual herb	May-Oct	None	None	GUT1	S1	1B.1		2006-12-01	No Photo Available
Berberis nevinii	Nevin's barberry	Berberidaceae	perennial evergreen shrub	(Feb)Mar-Jun	FE	CE	G1	S1	1B.1	Yes	1980-01-01	No Photo Available
Calochortus catalinae	Catalina mariposa lily	Liliaceae	perennial bulbiferous herb	(Feb)Mar-Jun	None	None	G3G4	S3S4	4.2	Yes	1974-01-01	No Photo Available

Calochortus clavatus var. avius	Pleasant Valley mariposa-lily	Liliaceae	perennial bulbiferous herb	May-Jul	None	None	G4T2	S2	1B.2	Yes	1980-01-01	No Photo Available
Calochortus clavatus var. clavatus	club-haired mariposa lily	Liliaceae	perennial bulbiferous herb	(Mar)May-Jun	None	None	G4T3	S3	4.3	Yes	1974-01-01	No Photo Available
Calochortus clavatus var. gracilis	slender mariposa-lily	Liliaceae	perennial bulbiferous herb	Mar-Jun(Nov)	None	None	G4T2T3	S2S3	1B.2	Yes	1994-01-01	No Photo Available
Calochortus palmeri var. palmeri	Palmer's mariposa-lily	Liliaceae	perennial bulbiferous herb	Apr-Jul	None	None	G3T2	S2	1B.2	Yes	1994-01-01	No Photo Available
Calochortus plummerae	Plummer's mariposa-lily	Liliaceae	perennial bulbiferous herb	May-Jul	None	None	G4	S4	4.2	Yes	1994-01-01	No Photo Available
Calochortus striatus	alkali mariposa-lily	Liliaceae	perennial bulbiferous herb	Apr-Jun	None	None	G3	S2S3	1B.2		1974-01-01	No Photo Available
Calystegia peirsonii	Peirson's morning-glory	Convolvulaceae	perennial rhizomatous herb	Apr-Jun	None	None	G4	S4	4.2	Yes	1974-01-01	No Photo Available
Canbya candida	white pygmy-poppy	Papaveraceae	annual herb	Mar-Jun	None	None	G3G4	S3S4	4.2	Yes	1974-01-01	No Photo Available
Castilleja gleasoni	Mt. Gleason paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	May-Jun(Sep)	None	CR	G2	S2	1B.2	Yes	1974-01-01	No Photo Available
Castilleja plagiotoma	Mojave paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	Apr-Jun	None	None	G4	S4	4.3	Yes	1974-01-01	No Photo Available
Centromadia parryi ssp. australis	southern tarplant	Asteraceae	annual herb	May-Nov	None	None	G3T2	S2	1B.1		1994-01-01	No Photo Available
Chorizanthe parryi var. fernandina	San Fernando Valley spineflower	Polygonaceae	annual herb	Apr-Jul	None	CE	G2T1	S1	1B.1	Yes	1974-01-01	No Photo Available
Chorizanthe spinosa	Mojave spineflower	Polygonaceae	annual herb	Mar-Jul	None	None	G4	S4	4.2	Yes	1974-01-01	 © 2011 Benjamin Smith
Clinopodium mimuloides	monkey-flower savory	Lamiaceae	perennial herb	Jun-Oct	None	None	G3	S3	4.2	Yes	2007-05-04	No Photo Available
Diplacus johnstonii	Johnston's monkeyflower	Phrymaceae	annual herb	May-Aug	None	None	G4	S4	4.3	Yes	2001-01-01	No Photo Available
Dodecahema leptoceras	slender-horned spineflower	Polygonaceae	annual herb	Apr-Jun	FE	CE	G1	S1	1B.1	Yes	1980-01-01	No Photo Available

Eriogonum umbellatum var. minus	alpine sulfur-flowered buckwheat	Polygonaceae	perennial herb	Jun-Sep	None	None	G5T4	S4	4.3	Yes	1974-01-01	No Photo Available
Erythranthe diffusa	Palomar monkeyflower	Phrymaceae	annual herb	Apr-Jun	None	None	G4	S3	4.3		1974-01-01	 Ron Vanderhoff, 2019
Frasera neglecta	pine green-gentian	Gentianaceae	perennial herb	May-Jul	None	None	G4	S4	4.3	Yes	1980-01-01	No Photo Available
Galium angustifolium ssp. gracillimum	slender bedstraw	Rubiaceae	perennial herb	Apr-Jun(Jul)	None	None	G5T4	S4	4.2	Yes	1994-01-01	 © 2011 Duncan S. Bell
Galium jepsonii	Jepson's bedstraw	Rubiaceae	perennial rhizomatous herb	Jul-Aug	None	None	G3	S3	4.3	Yes	1974-01-01	 © 2015 Keir Morse
Galium johnstonii	Johnston's bedstraw	Rubiaceae	perennial herb	Jun-Jul	None	None	G4	S4	4.3	Yes	1974-01-01	 © 2015 Keir Morse
Goodmania luteola	golden goodmania	Polygonaceae	annual herb	Apr-Aug	None	None	G3	S3	4.2		1994-01-01	 © 2007 Steve Matson
Heuchera abramsii	Abrams' alumroot	Saxifragaceae	perennial rhizomatous herb	Jul-Aug	None	None	G3	S3	4.3	Yes	1974-01-01	 © 2005 Charles E. Jones
Heuchera caespitosa	urn-flowered alumroot	Saxifragaceae	perennial rhizomatous herb	May-Aug	None	None	G3	S3	4.3	Yes	1974-01-01	 © 2015 Keir Morse
Hulsea vestita ssp. gabrielensis	San Gabriel Mountains sunflower	Asteraceae	perennial herb	May-Jul	None	None	G5T3	S3	4.3	Yes	1994-01-01	 © 2013 Anuja Parikh and Nathan Gale
Imperata brevifolia	California satintail	Poaceae	perennial rhizomatous herb	Sep-May	None	None	G3	S3	2B.1		2006-12-26	 © 2020 Matt C. Berger

Juglans californica	Southern California black walnut	Juglandaceae	perennial deciduous tree	Mar-Aug	None	None	G4	S4	4.2	Yes	1994-01-01	 © 2020 Zoya Akulova
Lepechinia fragrans	fragrant pitcher sage	Lamiaceae	perennial shrub	Mar-Oct	None	None	G3	S3	4.2	Yes	1974-01-01	 © 2014 Debra L. Cook
Lepidium virginicum var. *robinsonii*	Robinson's pepper-grass	Brassicaceae	annual herb	Jan-Jul	None	None	G5T3	S3	4.3		1994-01-01	 © 2015 Keir Morse
Lilium humboldtii ssp. *ocellatum*	ocellated Humboldt lily	Liliaceae	perennial bulbiferous herb	Mar-Jul(Aug)	None	None	G4T4?	S4?	4.2	Yes	1980-01-01	 © 2008 Thomas Stoughton
Lilium parryi	lemon lily	Liliaceae	perennial bulbiferous herb	Jul-Aug	None	None	G3	S3	1B.2		1974-01-01	 © 2009 Thomas Stoughton
Linanthus concinnus	San Gabriel linanthus	Polemoniaceae	annual herb	Apr-Jul	None	None	G2	S2	1B.2	Yes	1974-01-01	 © 2019 RT Hawke
Loeflingia squarrosa var. *artemisiarum*	sagebrush loeflingia	Caryophyllaceae	annual herb	Apr-May	None	None	G5T3	S2	2B.2		1974-01-01	No Photo Available
Lupinus albifrons var. *johnstonii*	interior bush lupine	Fabaceae	perennial shrub	May-Jul	None	None	G4T4	S4	4.3	Yes	1974-01-01	No Photo Available
Lycium torreyi	Torrey's box-thorn	Solanaceae	perennial shrub	(Jan-Feb)Mar-Jun(Sep-Nov)	None	None	G4G5	S3	4.2		2015-05-05	No Photo Available
Malacothamnus davidsonii	Davidson's bush-mallow	Malvaceae	perennial deciduous shrub	Jun-Jan	None	None	G2	S2	1B.2	Yes	1974-01-01	 © 2016 Keir Morse
Monardella australis ssp. *cinerea*	gray monardella	Lamiaceae	perennial rhizomatous herb	Jul-Aug	None	None	G4T3	S3	4.3	Yes	1974-01-01	No Photo Available
Monardella australis ssp. *gabrielensis*	San Gabriel Mountains monardella	Lamiaceae	shrub	Jul-Sep	None	None	G4T2	S2	1B.2		2022-05-23	No Photo Available
Monardella viridis	green monardella	Lamiaceae	perennial rhizomatous herb	Jun-Sep	None	None	G3	S3	4.3	Yes	1974-01-01	No Photo Available

Mucronea californica	California spineflower	Polygonaceae	annual herb	Mar-Jul(Aug)	None	None	G3	S3	4.2	Yes	1988-01-01	 © 2018 Debra L. Cook
Muhlenbergia californica	California muhly	Poaceae	perennial rhizomatous herb	Jun-Sep	None	None	G4	S4	4.3	Yes	1994-01-01	No Photo Available
Muilla coronata	crowned muilla	Themidaceae	perennial bulbiferous herb	Mar-Apr(May)	None	None	G3	S3	4.2		1988-01-01	No Photo Available
Opuntia basilaris var. brachyclada	short-joint beavertail	Cactaceae	perennial stem	Apr-Jun(Aug)	None	None	G5T3	S3	1B.2	Yes	1980-01-01	No Photo Available
Packera ionophylla	Tehachapi ragwort	Asteraceae	perennial herb	Jun-Jul	None	None	G4	S4	4.3	Yes	1974-01-01	No Photo Available
Perideridia pringlei	adobe yampah	Apiaceae	perennial herb	Apr-Jun(Jul)	None	None	G4	S4	4.3	Yes	1974-01-01	No Photo Available
Phacelia mohavensis	Mojave phacelia	Hydrophyllaceae	annual herb	Apr-Aug	None	None	G4Q	S4	4.3	Yes	1994-01-01	No Photo Available
Pseudognaphalium leucocephalum	white rabbit-tobacco	Asteraceae	perennial herb	(Jul)Aug-Nov(Dec)	None	None	G4	S2	2B.2		2006-11-03	No Photo Available
Quercus durata var. gabrielensis	San Gabriel oak	Fagaceae	perennial evergreen shrub	Apr-May	None	None	G4T3	S3	4.2	Yes	2001-01-01	No Photo Available
Senecio astephanus	San Gabriel ragwort	Asteraceae	perennial herb	May-Jul	None	None	G3	S3	4.3	Yes	2006-12-21	No Photo Available
Sidotheca caryophylloides	chickweed oxytheca	Polygonaceae	annual herb	Jul-Sep(Oct)	None	None	G4	S4	4.3	Yes	1980-01-01	 ©2021 Keir Morse
Stylocline masonii	Mason's neststraw	Asteraceae	annual herb	Mar-May	None	None	G1	S1	1B.1	Yes	1994-01-01	No Photo Available
Symphyotrichum greatae	Greata's aster	Asteraceae	perennial rhizomatous herb	Jun-Oct	None	None	G2	S2	1B.3	Yes	1974-01-01	No Photo Available
Syntrichopappus lemmonii	Lemmon's syntrichopappus	Asteraceae	annual herb	Apr-May(Jun)	None	None	G4	S4	4.3	Yes	1974-01-01	No Photo Available
Thysanocarpus rigidus	rigid fringepod	Brassicaceae	annual herb	Feb-May	None	None	G1G2	S2	1B.2		2011-03-17	No Photo Available
Yucca brevifolia							GNR	SNR	CBR		2011-12-13	No Photo Available

Showing 1 to 66 of 66 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2023. Rare Plant Inventory (online edition, v9.5). Website https://www.rareplants.cnps.org [accessed 29 March 2023].

APPENDIX 3

Vascular Plant Species Observed, March 30, 31 & June 6, 2023

GROUP **Family** ***Scientific Name*** "*" indicates non-native species	**Common Name**
GYMNOSPERMS	
Pinaceae (Pine Family)	
**Pinus* sp.	pine
Cupressaceae (Cypress Family)	
Juniperus californica	California juniper
Ephedraceae (Jointfir Family)	
Ephedra viridis	Mormon tea
FLOWERING PLANTS-DICOTS	
Asteraceae (Sunflower family)	
Ambrosia Salsola	burrobrush
Amsinckia intermedia	common fiddleneck
Baileya sp. (not in full bloom)	marigold
Bebbia juncea	sweetbush
Corethryogyne filaginifolia	woolly aster
Encelia farinosa	desert brittlebush
Encelia actonii	Acton encelia
Ericameria cooperi	Cooper's goldenbush
Ericameria nauseosa	rubber rabbitbrush
Ericameria pinifolia	pine bush
**Logfia gallica*	narrow-leaf cottonrose
Stephanomeria exigua	small wirelettuce
Amaranthaceae (Amaranth family)	
Atriplex canescens	Fourwing Saltbush
Brassicaceae (Mustard Family)	
**Brassica tournefortii*	Saharan mustard
Caulanthus lasiophyllus	California mustard
Descurainia pinnata	tansy mustard
Eulobus californicus	mustard evening-primrose
**Sisymbrium altissimum*	tall tumble-mustard
**Sisymbrium orientale*	oriental mustard
Boraginaceae (Borage or Waterleaf Family)	
Amsinckia tessellata	devil's lettuce
Cryptantha pterocarya	winged nut forget me not
Pectocarya anisocarpa	northern pectocarya
Pectocarya penicillata	northern pectocarya
Phacelia distans	common phacelia
Phacelia tanacetifolia	lacy Phacelia
Phacelia cicutaria	caterpillar phacelia
Cactaceae (Cactus Family)	
Cylindropuntia echinocarpa	silver cholla
Euphorbiaceae (Spurge Family)	
Euphorbia albomarginata	rattlesnake sandmat
Fabaceae (Legume Family)	
Acmispon strigosus	strigose lotus

GROUP **Family** ***Scientific Name*** "*" indicates non-native species	**Common Name**
Lupinus bicolor	bicolored lupine
Lamiaceae (Mint family)	
Scutellaria mexicana	Bladder sage
Nyctaginaceae (Four O'Clock Family)	
Mirabilis laevis	desert wishbone bush
Papaveraceae	
Eschscholzia caespitosa	collarless poppy
Eschscholzia californica	California poppy
Polygonaceae (Buckwheat Family)	
Eriogonum angulosum	angled stem buckwheat
Eriogonum fasciculatum var. *polifolium*	California buckwheat
Zygophyllaceae (Caltrop Family)	
Larrea tridentata	creosote bush
FLOWERING PLANTS-MONOCOTS	
Agavaceae (Agave Family)	
Hesperoyucca whipplei	chaparral yucca
Poaceae (Grass Family)	
**Bromus hordeacous*	soft chess
**Bromus rubens*	red brome
**Hordeum murinum*	foxtail barley
Poa secunda	pine blue grass
**Schismus barbatus*	Mediterranean grass
Pappostipa speciosa	desert needlegrass

APPENDIX 4

Potential for Occurrence – Special-Status Plant Species

Common Name (*Scientific Name*)	Lifeform	Blooming Period	Status (Federal / State / CNPS)	Primary Habitat Associations	Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)
Federal or State Listed Species					
FLOWERING PLANTS - DICOTS					
Nevin's barberry (*Berberis nevinii*)	perennial evergreen shrub	(Feb)Mar-Jun	FE / CE / 1B.1	Sandy or gravelly substrates in chaparral, cismontane woodland, coastal scrub, and riparian scrub at elevations between 70 and 825 meters.	**Absent**. There is marginal suitable habitat at the study area but this relatively large shrub was not observed during field surveys.
Mt. Gleason paintbrush (*Castilleja gleasoni*)	perennial herb (hemi-parasitic)	May – June (Sept.)	Granitic substrates in chaparral, lower montane coniferous forest, and pinyon and juniper woodland at elevations between 1,160 and 2,170 meters. San Gabriel Mountains (Mount Gleason).	CR/1B.2	**Absent**. Suitable habitat and substrate present but given the species' known distribution and that nearly all populations occur at higher elevations in the central San Gabriel Mountains it is not expected at this site. Also, no perennial *Castilleja* species were observed during the field surveys.
San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*)	annual herb	Apr-Jul	FC / CE / 1B.1	Sandy soils in coastal scrub and valley and foothill grassland at elevations between 3 and 1,035 meters.	**Absent.** Species not detected during spring botanical surveys.
slender-horned spineflower (*Dodecahema leptoceras*)	annual herb	Apr-Jun	FE / CE / 1B.1	Chaparral, cismontane woodland, coastal scrub (alluvial fan sage scrub). Flood deposited terraces and washes; associates include Encelia, Dalea, Lepidospartum, etc. Sandy soils. 200-765 m.	**Presumed Absent**. Suitable alluvial fan/ sage scrub habitat not present onsite.

Common Name (*Scientific Name*)	Lifeform	Blooming Period	Status (Federal / State / CNPS)	Primary Habitat Associations	Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)
Other Special-Status Species					
FLOWERING PLANTS - DICOTS					
Abrams' oxytheca (*Acanthosyphus parishii* var. *abramsii*)	annual herb	Jun-Aug	None / None / 1B.2	Chaparral. Shale or sandy places. 1675-2075 m.	**Presumed Absent**. Suitable substrate and habitat not present onsite. Species not detected during botanical surveys.
Rock Creek broomrape (*Aphyllon validum* ssp. *validum*)	perennial herb (parasitic)	May-Sep	None / None / 1B.2	Chaparral, pinyon and juniper woodland. On slopes of loose decomposed granite; parasitic on various chaparral shrubs. 975-1985 m.	**Absent.** Suitable habitat and granitic substrate noted within the study area but species was not observed during the late spring-June 2023 botanical survey.
San Gabriel manzanita (*Arctostaphylos glandulosa* ssp. *gabrielensis*)	perennial evergreen shrub	Mar	None / None / 1B.2	Chaparral. Rocky outcrops; can be dominant shrub where it occurs. 960-2015 m.	**Absent.** Perennial evergreen shrub not detected during the early and late Spring botanical surveys.
Horn's milk-vetch (*Astragalus hornii* var. *hornii*)	annual herb	May-Oct	None / None / 1B.1	Meadows and seeps, playas. Lake margins, alkaline sites. 75-350 m.	**Presumed Absent**. Suitable habitat and alkaline substrate not present onsite. Species not detected during the late spring-June 2023 botanical survey.
Peirson's morning-glory (*Calystegia peirsonii*)	perennial rhizomatous herb	Apr-Jun	None / None / 4.2	Chaparral, coastal scrub, chenopod scrub, cismontane woodland, lower montane coniferous forest, valley and foothill grassland. Often in disturbed areas or along roadsides or in grassy, open areas. 30-1500 m.	**Absent.** Suitable habitat noted within the study area but species was not observed during the late spring-June 2023 botanical survey.

Common Name (*Scientific Name*)	**Lifeform**	**Blooming Period**	**Status (Federal / State / CNPS)**	**Primary Habitat Associations**	**Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)**
southern tarplant (*Centromadia parryi* ssp. *australis*)	annual herb	May-Nov	None / None / 1B.1	Marshes and swamps (margins), valley and foothill grassland, vernal pools. Often in disturbed sites near the coast at marsh edges; also in alkaline soils sometimes with saltgrass. Sometimes on vernal pool margins. 0-975 m.	**Presumed absent**. Suitable habitat and substrate not present onsite.
California satintail (*Imperata brevifolia*)	perennial rhizomatous herb	Sep-May	None / None / 2B.1	Mesic sites, alkali seeps & riparian areas. in coastal scrub, chaparral, riparian scrub, Mojave desert scrub. 3-1495 m.	**Presumed absent**. Suitable habitat not present onsite.
San Gabriel linanthus (*Linanthus concinnus*)	annual herb	Apr-Jul	None / None / 1B.2	Rocky openings in chaparral, lower montane coniferous forest, and upper montane coniferous forest at elevations between 1,520 and 2800 m.	**Absent**. Though marginal suitable habitat is present onsite, species not detected during the early and late Spring botanical surveys.
sagebrush loeflingia (*Leoflingia squarrosa* var. *artemisiarum*)	annual herb	Apr-May	None / None / 2B.2	Great Basin scrub, Sonoran desert scrub, desert dunes. Sandy flats and dunes. Sandy areas around clay slicks w/*Sarcobatus, Atriplex, Tetradymia*, etc. 700-1615 m.	**Absent**. Though marginal suitable habitat is present onsite, species not detected during the early and late Spring botanical surveys.
Davidson's bush mallow (*Malacothamnus davidsonii*)	perennial deciduous shrub	Jun-Jan	None / None / 1B.2	Chaparral, cismontane woodland, coastal scrub, and riparian woodlands at elevations between 185 and 1,140 meters.	**Absent.** Suitable habitats may be present but this perennial shrub was notdetected during the surveys.

Common Name (*Scientific Name*)	Lifeform	Blooming Period	Status (Federal / State / CNPS)	Primary Habitat Associations	Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)
San Gabriel Mountains monardella (*Monardella australis* ssp. *gabrielensis*)	perennial herb	Jul-Sep	None / None / 1B.2	Broadleaved upland forest, chaparral (montane), lower montane coniferous forest. Granitic openings, outcrops. 1600-2200 m.	**Absent.** Suitable habitats may be present, but this perennial herb was not detected onsite during the surveys.
short-joint beavertail (*Opuntia basilaris* var. *brachyclada*)	perennial stem	Apr-Jun(Aug)	None / None / 1B.2	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodland. Sandy soil or coarse, granitic loam. 425-2015 m.	**Absent**. Though marginal suitable habitat is present onsite, this perennial plant was not detected during the surveys.
white rabbit-tobacco (*Pseudognaphalium leucocephalum*)	perennial herb	(Jul)Aug-Nov(Dec)	None / None / 2B.2	Sandy or gravelly substrates in chaparral, cismontane woodland, coastal scrub, and riparian woodlands at elevations between 0 and 2,100 meters.	**Absent**. Though marginal suitable habitat is present onsite, this perennial herb was not detected during the surveys.
Mason's nest straw (*Stylocline masonii*)	annual herb	Mar-May	None / None / 1B.1	Chenopod scrub, pinyon and juniper woodland. Sandy washes. 100-1200 m. Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats.	**Presumed absent**. Suitable habitat not present onsite.
Greata's aster (*Symphyotrichum greatae*)	perennial rhizomatous herb	Jun-Oct	None / None / 1B.3	Mesic habitats in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and riparian woodland at elevations between 300 and 2,010 meters.	**Presumed absent**. Suitable habitat not present onsite.

Common Name (*Scientific Name*)	Lifeform	Blooming Period	Status (Federal / State / CNPS)	Primary Habitat Associations	Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)
Lemmon's syntrichopappus (*Syntrichopappus lemmonii*)	Annual herb	Apr-May(Jun)	None / None / 4.3	Chaparral, Joshua tree woodland, pinyon and juniper woodland at elevations of 500-1830 m. Sometimes gravelly and/or sandy soils.	**Absent.** Some suitable habitat noted within the study area but species was not observed during the early and late spring botanical surveys.
rigid fringepod (*Thysanocarpus rigidus*)	annual herb	Feb-May	None / None / 1B.2	Pinyon and juniper woodland. Dry, rocky slopes and ridges of oak and pine woodland in arid mountain ranges. 425-2165.	**Presumed absent**. Suitable habitat not present onsite.
FLOWERING PLANTS – MONOCOTS					
Pleasant Valley mariposa-lily (*Calochortus clavatus* var. *avius*)	perennial bulbiferous herb	May-Jul	None / None / 1B.2	Lower montane coniferous forest. Josephine silt loam and volcanically derived soil; often in rocky areas. 300-1710 m.	**Presumed absent**. Suitable habitat and substrate not present onsite.
slender mariposa lily (*Calochortus clavatus* var. *gracilis*)	perennial bulbiferous herb	Mar-June	None / None / 1B.2	Chaparral, Coastal scrub, Valley and foothill grassland at elevations from 320 to 1000 meters amsl.	**Absent**. There may be suitable habitat within the study area but this species was not observed during the early and late Spring botanical surveys.
Palmer's mariposa lily (*Calochortus palmeri* var. *palmeri*)	perennial bulbiferous herb	Apr-Jul	None / None / 1B.2	Meadows and seeps, chaparral, lower montane coniferous forest. Vernally moist places in yellow-pine forest, chaparral. 195-2530 m.	**Presumed absent**. Suitable habitat not present onsite.
alkali mariposa lily (*Calochortus striatus*)	perennial bulbiferous herb	Apr-Jun	None / None / 1B.2	Chaparral, chenopod scrub, Mojavean desert scrub, meadows and seeps. Alkaline meadows and ephemeral washes. 70-1600m.	**Presumed absent**. Suitable habitat and substrate not present onsite.

Common Name (*Scientific Name*)	Lifeform	Blooming Period	Status (Federal / State / CNPS)	Primary Habitat Associations	Status / Potential to Occur on-site (Present, Moderate Potential, Low Potential, Presumed Absent, Absent)
lemon lily (*Lilium parryi*)	perennial bulbiferous herb	Jul-Aug	None / None / 1B.2	Lower montane coniferous forest, meadows and seeps, riparian forest, upper montane coniferous forest. Wet, mountainous terrain; generally in forested areas; on shady edges of streams, in open boggy meadows and seeps. 625-2930 m.	**Presumed absent**. Suitable habitat and substrate not present onsite.
western Joshua tree (*Yucca brevifolia*)	perennial tree-shrub	Jan-Apr (May)	None / CE / None	Joshua tree woodland, montane chaparral, pinyon and juniper woodland, Sonoran and Mojavean desert scrub. 750-2200 m.	**Absent.** Not observed on site. Would be detectable at all times of the year due to its lifeform.

APPENDIX 5

Wildlife Species Observed, March 30, 31 & June 6, 2023

Common Name	*Scientific Name*
BIRDS	
American crow	*Corvus brachyrhynchos*
northern mockingbird	*Mimus polyglottos*
turkey vulture	*Cathartes aura*
western bluebird	*Sialia mexicana*
MAMMALS	
coyote	*Canis latrans*
desert cottontail	*Sylvilagus audubonii*
INSECTS	
harvester ant	*Pogonomyrmex* sp.
velvet ant	*Mutillidae* sp.
Mormon Metalmark	*Apodemia mormo*

APPENDIX 6

Potential for Occurrence – Special-Status Wildlife Species

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
Federal and State Listed Species			
Insects and Crustaceans			
Crotch bumble bee (*Bombus crotchii*)	None / FC	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include *Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia*, and *Eriogonum.*	**Low Potential.** There is potential for this species to forage the site, as *Phacelia, Eriogonum, and Eschscholzia* genera are present at the study area. The proposed Project is not expected to have an adverse effect on individuals or population of the species. The insect is capable of flying out of harm's way during construction. Pre-construction presence/absence surveys should be conducted by a qualified biologist and appropriate measures should be incorporated for its protection if found nesting/burrowing onsite.
quino checkerspot butterfly (*Euphydryas editha quino*)	FE / None	Sunny openings within chaparral & coastal sage shrublands in parts of Riverside & San Diego counties. Hills and mesas near the coast. Need high densities of food plants *Plantago erecta, P. insularis*, and *Orthocarpus purpurescens.*	**No Potential**. Food plant genera are not present in the Study Area.
Fish			
Santa Ana sucker (*Catostomus santaanae*)	FT / None	Endemic to Los Angeles Basin south coastal streams. Habitat generalists, but prefer sand-rubble-boulder bottoms, cool, clear water, and algae.	**No Potential.** No streams present in the Study Area.
unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)	FE / CE	Weedy pools, backwaters, and among emergent vegetation at the stream edge in small Southern California streams. Cool (<24 C), clear water with abundant vegetation.	**No Potential.** No streams present in the study area.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
Amphibians			
arroyo toad (*Anaxyrus californicus*)	FE / SSC	Semi-arid regions near washes or intermittent streams, including valley-foothill and desert riparian, desert wash, etc. Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range.	**No Potential.** No streams present in the study area.
California red-legged frog (*Rana draytonii*)	FT / SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	**No Potential**. No streams present in the study area.
southern mountain yellow-legged frog (*Rana muscosa*)	FE / CE	Disjunct populations known from southern Sierras (northern DPS) and San Gabriel, San Bernardino, and San Jacinto Mtns (southern DPS). Found at 1,000 to 12,000 ft in lakes and creeks that stem from springs and snowmelt. May overwinter under frozen lakes. Often encountered within a few feet of water. Tadpoles may require 2 - 4 years to complete their aquatic development.	**No Potential**. No streams present in the study area.
Birds			
tricolored blackbird (*Agelaius tricolor*)	FT / SSC	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	**No Potential.** No open water present in the study area.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
golden eagle (*Aquila chrysaetos*)	None / CFP	Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	**Unlikely**. There is some potential for this species to occur at the study area either transiently or as a forager, but it would not nest.
Swainson's hawk (*Buteo swainsoni*)	None / CT	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, & agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Unlikely**. Species may occur at the study area either transiently or as a forager but would not nest.
southwestern willow flycatcher (*Empidonax traillii extimus*)	FE / CE	Riparian woodlands in Southern California.	**No Potential.** Suitable habitat not present at the Study Area.
coastal California gnatcatcher (*Polioptila californica californica*)	FT / SSC	Obligate, permanent resident of coastal sage scrub below 2500 ft in Southern California. Low, coastal sage scrub in arid washes, on mesas and slopes. Not all areas classified as coastal sage scrub are occupied.	**Unlikely**. Species could potentially forage the site but would not be dependent on habitat onsite for nesting or breeding..
least Bell's vireo (*Vireo bellii pusillus*)	FE / CE	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	**No Potential.** No reported occurrences of this species in the CNDDB for the Acton quadrangle. Additionally, no suitable habitat present at the Study Area.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
Other Special Status Species			
Fish			
arroyo chub (*Gila orcuttii*)	None / SSC	Native to streams from Malibu Creek to San Luis Rey River basin. Introduced into streams in Santa Clara, Ventura, Santa Ynez, Mojave & San Diego river basins. Slow water stream sections with mud or sand bottoms. Feeds heavily on aquatic vegetation and associated invertebrates.	**No Potential.** No streams present at the study area.
Santa Ana speckled dace (*Rhinichthys osculus* ssp. 8	None / SSC	Headwaters of the Santa Ana and San Gabriel rivers. May be extirpated from the Los Angeles River system. Requires permanent flowing streams with summer water temps of 17-20 C. Usually inhabits shallow cobble and gravel riffles.	**No Potential**. There are no permanent sources of flowing water or other aquatic habitats at the site.
Amphibians			
coast range newt (*Taricha torosa*)	None / SSC	Coastal drainages from Mendocino County to San Diego County. Lives in terrestrial habitats and will migrate over 1 km to breed in ponds, reservoirs and slow-moving streams.	**No Potential**. No streams or suitable habitat for this species present on site.
Reptiles			
Northern California legless lizard (*Anniella pulchra*)	None / SSC	Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential. They prefer soils with a high moisture content.	**Low Potential.** Loose soils present but soil moisture is very low. Some suitable habitat in the understory of a few scattered California Junipers onsite. However, the understory of Junipers lacks substantial leaf litter and soil moisture needed by the species.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
California legless lizard (*Anniella* spp.)	None / SSC	Contra Costa County south to San Diego, within a variety of open habitats. This element represents California records of Anniella not yet assigned to new species within the Anniella pulchra complex. Variety of habitats; generally, in moist, loose soil. They prefer soils with a high moisture content.	**Low Potential.** Loose soils present but soil moisture is very low. Some suitable habitat in the understory of a few scattered California Junipers onsite. However, the understory of Junipers lacks substantial leaf litter and soil moisture needed by the species.
southern California legless lizard (*Anniella stebbinsi*)	None / SSC	Generally, south of the Transverse Range, extending to northwestern Baja California. Occurs in sandy or loose loamy soils under sparse vegetation. Disjunct populations in the Tehachapi and Piute Mountains in Kern County. Variety of habitats; generally, in moist, loose soil. They prefer soils with a high moisture content.	**Low Potential.** Loose soils present but soil moisture is very low. Some suitable habitat in the understory of a few scattered California Junipers onsite. However, the understory of Junipers lacks substantial leaf litter and soil moisture needed by the species.
California glossy snake (*Arizona elegans occidentalis*)	None / SSC	Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	**Moderate Potential.** Loose and sandy soil is present at the site. Could potentially occur at the site as it is within the species' range.
coastal whiptail (*Aspidoscelis tigris stejnegeri*)	None / SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland & riparian areas. Ground may be firm soil, sandy, or rocky.	**Low Potential.** Suitable habitat is present within the study area although there are occurrence records within five miles of the site.

Common Name (Scientific Name)	**Status (Federal / State)**	**Primary Habitat Associations**	**Status on Site / Potential to Occur** (Observed, Moderate Potential, Unlikely, No Potential)
western pond turtle (*Emys marmorata*)	None / SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	**No Potential.** There are no aquatic habitats present at the study area.
coast horned lizard (*Phrynosoma blainvillii*)	None / SSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	**Moderate Potential.** Species could potentially occur. Ants were observed at the site which is main source of food for species.
desert horned lizard (*Phrynosoma. platyrhinos*)	None / SSC	Found in arid lands including sandy flats, edges of sand dunes, alluvial fans, and dry washes. Associated plants include creosote, salt bush, cacti, other small shrubs. Species is diurnal and adapted to hot and barren habitats. Remains underground during hot or cold weather, but can be active on the surface at any time of the year. Predominant diet consists of ants (90%). The remainder consists of small invertebrates, insects, spiders, and vegetation.	**Moderate Potential.** Species could potentially occur, though no occurrence records exist from a 9 quadrangle CNDDB search. Ants were observed at the site which is main source of food for species. Creosote and salt bush present onsite.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
two-striped gartersnake (*Thamnophis hammondii*)	None / SSC	Coastal California from vicinity of Salinas to northwest Baja California. From sea to about 7,000 ft elevation. Highly aquatic, found in or near permanent fresh water. Often along streams with rocky beds and riparian growth.	**No Potential.** No aquatic habitat present at the site.
Birds			
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	None / WL	Resident in Southern California coastal sage scrub and sparse mixed chaparral. Frequents relatively steep, often rocky hillsides with grass and forb patches.	**Unlikely.** Species would potentially occur as a transient or forager but would not nest. Typically occurs in rocky areas.
Bell's sage sparrow (*Artemisiospiza belli belli*)	None / WL	Nests in chaparral dominated by fairly dense stands of chamise. Found in coastal sage scrub in south of range. Nest located on the ground beneath a shrub or in a shrub 6-18 inches above ground. Territories about 50 yds apart.	**No Potential.** No reported occurrences of this species reported in CNDDB for the Acton quadrangle. Additionally, no suitable habitat present at the Study Area.
burrowing owl (*Athene cunicularia*)	None / SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	**Unlikely.** No burrows detected onsite, would not inhabit the Study Area but may potentially occur as a transient or forager.
mountain plover (*Charadrius montanus*)	None / SSC	Short grasslands, freshly plowed fields, newly sprouting grain fields, and sometimes sod farms. Short vegetation, bare ground, and flat topography. Prefers grazed areas and areas with burrowing rodents.	**Unlikely.** Species may occur as a transient or forager but would not nest.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
prairie falcon (*Falco mexicanus*)	None / WL	Inhabits dry, open terrain, either level or hilly. Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores.	**Unlikely.** Species may occur as a transient or forager but would not nest.
loggerhead shrike (*Lanius ludovicianus*)	None / SSC	Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	**No nesting potential, Low foraging potential.** Species could likely forage or be present as as a winter migrant but not nest within the project site...
yellow warbler (*Setophaga petechia*)	None / SSC	In the Los Angeles region, a common spring (late April through May) and fall (August to mid-October) migrant throughout the lowlands; a very few remain to winter in willow thickets, exotic growth. Fairly common breeder in tall foothill woodlands of cottonwood, willows or alders near watercourses; some breed in lowland willows in the Los Angeles region (Garrett et al 2006).	**No Potential.** This species requires riparian habitats which are not present at the study area.
Le Conte's thrasher (*Toxomstoma lecontei*)	None / SSC	Desert resident; primarily of open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub habitats. Commonly nests in a dense, spiny shrub or densely branched cactus in desert wash habitat, usually 2-8 feet above ground.	**Unlikely.** Species may occur at the site transiently or as a forager but is unlikely to nest.

Common Name (Scientific Name)	**Status (Federal / State)**	**Primary Habitat Associations**	**Status on Site / Potential to Occur** (Observed, Moderate Potential, Unlikely, No Potential)
Mammals			
pallid bat (*Antrozous pallidus*)	None / SSC	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Unlikely.** May occur transiently or as a forager but is unlikely to roost at the study area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	None / SSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	**No Potential.** No roosting sites present at the property.
San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)	None / SSC	Intermediate canopy stages of shrub habitats and open shrub / herbaceous and tree / herbaceous edges. Coastal sage scrub (CSS) habitats in Southern California. The San Diego black-tailed jackrabbit is a subspecies of the black-tailed jackrabbit (*Lepus californicus*), San Diego black-tailed jackrabbit occurs only on the coastal side of the southern California mountain ranges where habitat for the species is less suitable due to loss of habitat, fragmentation, and isolation of populations due to agriculture and urbanization.	**Unlikely.** Unlikely to occur at the study area as there is no CSS, only on the coastal side of the southern California mountain ranges.

Common Name (Scientific Name)	Status (Federal / State)	Primary Habitat Associations	Status on Site / Potential to Occur (Observed, Moderate Potential, Unlikely, No Potential)
southern grasshopper mouse (*Onychomys torridus ramona*)	None / SSC	Desert areas, especially scrub habitats with friable soils for digging. Prefers low to moderate shrub cover. Feeds almost exclusively on arthropods, especially scorpions and orthopteran insects.	**Unlikely.** Suitable habitat present within the Study Area. Low vegetation and some loose soils, no burrows detected onsite.

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12/22/2022 SCCIC File #: 24328.10455

Jean Lightell
CRC Enterprises
27600 Bouquet Canyon Rd. #200
Santa Clarita, CA, 91350

Re: Record Search Results for TPM 071006

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the Acton, CA USGS 7.5' quadrangle. The following summary reflects the results of the records search for the project area and a ½-mile radius. The search includes a review of all recorded archaeological and built-environment resources as well as a review of cultural resource reports on file. In addition, the California Points of Historical Interest (SPHI), the California Historical Landmarks (SHL), the California Register of Historical Resources (CAL REG), the National Register of Historic Places (NRHP), and the California State Built Environment Resources Directory (BERD) listings were reviewed for the above referenced project site and a ¼-mile radius. Due to the sensitive nature of cultural resources, archaeological site locations are not released.

RECORDS SEARCH RESULTS SUMMARY

Archaeological Resources* (*see Recommendations section)	Within project area: 0 Within project radius: 1
Built-Environment Resources	Within project area: 0 Within project radius: 0
Reports and Studies	Within project area: 0 Within project radius: 8
OHP Built Environment Resources Directory (BERD) 2019	Within project area: 0 Within ¼-mile radius: 0
California Points of Historical Interest (SPHI) 2019	Within project area: 0 Within ¼-mile radius: 0
California Historical Landmarks (SHL) 2019	Within project area: 0 Within ¼-mile radius: 0
California Register of Historical Resources (CAL REG) 2019	Within project area: 0 Within ¼-mile radius: 0
National Register of Historic Places (NRHP) 2019	Within project area: 0 Within ¼-mile radius: 0

Archaeological Determinations of Eligibility (ADOE): 2012	Within project area: 0 Within project radius: 0

HISTORIC MAP REVIEW – Acton, CA (1959) 15' USGS historic maps indicate that in 1959 there was no visible development within the project area. An unnamed 4 Lane highway ran directly south of the project area and the Vincent Fire Sta was located to the east. There were several additional private or secondary roads, two intermittent streams and one mine shaft within the project search radius. The Southern Pacific rail line and Canyon Road ran through the southern portion of the search radius.

RECOMMENDATIONS

**When we report that no archaeological resources are recorded in your project area or within a specified radius around the project area; that does not necessarily mean that nothing is there. It may simply mean that the area has not been studied and/or that no information regarding the archaeological sensitivity of the property has been filed at this office. The reported records search result does not preclude the possibility that surface or buried artifacts might be found during a survey of the property or ground-disturbing activities.*

The archaeological sensitivity of the project location is unknown because there are no previous studies for the subject property. Additionally, the natural ground-surface appears to be obscured by urban development; consequently, surface artifacts would not be visible during a survey. While there are currently no recorded archaeological sites within the project area, buried resources could potentially be unearthed during project activities. Therefore, customary caution and a halt-work condition should be in place for all ground-disturbing activities. In the event that any evidence of cultural resources is discovered, all work within the vicinity of the find should stop until a qualified archaeological consultant can assess the find and make recommendations. Moving or extraction of potential cultural resources should not be attempted by anyone other than a qualified cultural resources consultant. It is also recommended that the Native American Heritage Commission be consulted to identify if any additional traditional cultural properties or other sacred sites are known to be in the area. The NAHC may also refer you to local tribes with particular knowledge of potential sensitivity. The NAHC and local tribes may offer additional recommendations to what is provided here and may request an archaeological monitor. Finally, if any built-environment resources on the property are 45 years or older, a qualified architectural historian should be retained to study the property and make recommendations regarding those structures.

For your convenience, you may find a professional consultant**at www.chrisinfo.org. Any resulting reports by the qualified consultant should be submitted to the South Central Coastal Information Center as soon as possible.

**The SCCIC does not endorse any particular consultant and makes no claims about the qualifications of any person listed. Each consultant on this list self-reports that they meet current professional standards.

If you have any questions regarding the results presented herein, please contact the office at 657.278.5395 Monday through Thursday 9:00 am to 3:30 pm. Should you require any additional information for the above referenced project, reference the SCCIC number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

Isabela Kott
Assistant Coordinator, GIS Program Specialist

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

The California Office of Historic Preservation (OHP) contracts with the California Historical Resources Information System's (CHRIS) regional Information Centers (ICs) to maintain information in the CHRIS inventory and make it available to local, state, and federal agencies, cultural resource professionals, Native American tribes, researchers, and the public. Recommendations made by IC coordinators or their staff regarding the interpretation and application of this information are advisory only. Such recommendations do not necessarily represent the evaluation or opinion of the State Historic Preservation Officer in carrying out the OHP's regulatory authority under federal and state law.

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
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(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

November 13, 2023

Marie Pavlovic
Los Angeles Department of Regional Planning

Via Email to: mpavlovic@planning.lacounty.gov

Re: PM071006 Project, Los Angeles County

Dear Ms. Pavlovic:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance, we can assure that our lists contain current information.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Southwest Geotechnical, Inc.
Consulting Engineers & Geologists

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Tel: (661) 222-9544 - Fax: (661) 222-9549

October 18, 2010
SGI# 1008170

Mr. Raymond Duvernay
C/O Mr. Doug Beam
42947 48th Street West
Lancaster, California 93536

Subject: Preliminary Geologic and Soils Engineering Feasibility Investigation, "Tentative Parcel Map No. 71006", Three Proposed Residential Lots, APN 3057-014-012, Sierra Highway, Acton Area of Los Angeles County, California

References: See Plate R-1

INTRODUCTION

Per the request of the client, Southwest Geotechnical, Inc. (SGI) has prepared this Preliminary Geologic and Soils Engineering Feasibility Investigation to evaluate the feasibility of the 50'-scale "Tentative Parcel Map No. 71006" prepared by Rothman Engineering, dated October 5, 2010. Generally, this report therefore addresses the feasibility of subdividing the existing vacant property into three individual residential lots via typical cut-fill grading techniques, and the subsequent construction of three single-family residences at the site. This Report has been completed in order to provide geologic and soils engineering findings and recommendations pertaining to the currently proposed subject site improvements, and for review by the County of Los Angeles Department of Public Works, Materials Engineering Division (GMED) pursuant to obtaining approvals for the subdivision.

The findings and recommendations presented in this report are based on the aforementioned 50'-scale "Tentative Parcel Map No. 71006" by Rothman Engineering, dated August 3, 2010, though it has been presented at 40' scale. It should be understood that the findings and recommendations presented herein are intended to specifically address the proposed development indicated by the aforementioned plan.

Should the actual proposed site improvements vary significantly from the site configuration evaluated during this investigation, an addendum report addressing the updated plan may be required which may be subject to additional subsurface exploration and engineering analyses.

SCOPE AND PURPOSE

The intended purpose of this Feasibility Report is to present the findings of our field investigation, laboratory testing and geologic and geotechnical engineering analyses in order to determine if unfavorable geologic conditions exist onsite that would prevent the subject property from being developed as planned from either a geotechnical or economic standpoint. Included herein are preliminary foundation and grading recommendations pertaining to the currently proposed subject development. This report is intended for submittal to the County of Los Angeles (GMED) for review and approval for the purpose of obtaining a pertinent grading/building permit.

The scope of our investigation included but is not limited to the following:

1. Surface reconnaissance and subsurface investigations which were conducted on September 13, and 14, 2010 consisting of logging and sampling of several test holes at the site, and percolation testing (to be presented separately to the Los Angeles County Health Department).

2. Review of a “Preliminary Soils Report” dated August 15, 2006, and an “Updated Soils Report” dated April 15, 2010, prepared for the subject property by A.V. Geotechnics, Inc.

3. Laboratory testing on representative samples of the onsite earth materials obtained during our subsurface exploration.

4. Drafting of the appended Maps, Cross Sections, and other plates.

5. Analyses of obtained researched data and field and laboratory test data.

6. Stability analysis of selected slopes.

7. Preparation of this Report, which compiles and presents all procedures, findings, and recommendations accumulated during our investigation.

PROPOSED DEVELOPMENT

In general, based on a review of the Tentative Parcel Map, we understand that the project will consist of the subdivision of an existing 18 acre parcel into three separate lots of about six acres each.

The current parcel will be graded to create three separate cut-fill transition building pads. Grading will also be necessary in order to create a shared access driveway for the future building pads. The residences will be served by public water and private onsite sewage disposal systems.

SITE DESCRIPTION

The site fronts on the north side of Sierra Highway between 1,200 and 3,000 feet southeast of the intersection of Listie Avenue and Sierra Highway and is legally described as APN 3512-014-012 (Thomas Guide page 4375, grid G-6).

The site is currently developed with a cellular telephone relay tower which is located on a bedrock ridge above and well away from the planned development area. A small residential tract has been constructed northwest of the site, and a water tower has been constructed at the top of the ridge that ascends north of the cellular tower; otherwise the surrounding parcels are vacant.

The site's topography is characterized by lower areas at the southwest corner of the site adjacent to Sierra Highway being relatively level or generally at a gradient of approximately 7:1 (horizontal:vertical), hereafter referred to as 7:1. In a northeasterly direction the site gradually becomes steeper in gradient. A relatively large level pad (shown as "af on the attached Map) has been graded on the property with a maximum fill slope height of approximately 22 feet; and slope gradients of approximately 1½:1 (h:v) or steeper. This anomalous undocumented fill appears to have been placed directly onto the underlying original natural ground surface (original surface grade). The source of this undocumented fill in uncertain but may have been partially created from earth generated from some minor cuts upslope and possibly with the soil generated when making the pad for the cellular tower described above. The east-central portion of the site is characterized by a relatively steep bedrock ridge with slope gradients of 1.5:1 (h:v) or locally steeper. The far easterly portion of the site is moderately sloping with gradients of about 3.4:1 (h:v).

A large pit has been excavated four to five feet deep into the existing level pad, and the spoils (cuttings) from this pit have been stockpiled adjacent to the pit. The pit exposes artificial fill atop natural soils on the north side of the pit, and artificial fill only on the downslope side.

The maximum overall vertical relief of the site between the northeast and southwest corners of the subject property is approximately 300 feet, over a horizontal span of approximately 1,000 feet.

Vegetation on the site is limited to minor brush, sparse grasses and the occasional yucca.

Drainage on the site is primarily via uncontrolled sheet flows from the slopes towards the frontage portion of the lot, with minor topographic variations which accumulate some additional surface waters.

RESEARCH

The client has provided SGI with the referenced Soils Reports for the subject property which were prepared by AZ Geo Technics (AZGT) dated August 15, 2006 and April 15, 2010. We have reviewed these reports and the following should be noted: 1) The report indicates that no artificial fills were encountered. There is however (as described above) an approximately 25 foot high 1.5:1 and locally slightly steeper undocumented fill slope on the site that has been re-grown with native vegetation (annual weed and grass). 2) The report indicates that the test holes encounter conglomerate, and granite, however there is no sedimentary bedrock known to exist (and was not observed) in the area, 3) The remolded shear performed by AZGT contained bedrock that contained granite, while the planned cut-slopes will be almost constructed exclusively into older alluvium, indicating that the shear values presented may not represent the future fills, 4) AZGT recommends fills to be constructed at 2:1 (h:v) gradients with shear strengths for fills that do not pass surficial stability.

With the exceptions noted above, we accept and concur with the laboratory test data provided by AZGT. Copies of the AZGT reports are appended to this report for reference.

FIELD EXPLORATION AND TESTING

Exploration

On September 13 and 14, 2010, the undersigned geologist conducted field investigations at the site, which consisted of the excavation of 12 percolation test holes (PH-1 through PH-12), 3 “groundwater determination” holes (GW-1, through GW-3), and 4 geologic and geotechnical related test holes (TH-1 through TH-4). Exploratory trenches were logged in detail and the logs are presented on the appended Test Hole Log sheets.

Earth materials exposed within the area of the proposed site improvements and/or on the surface were mapped by visual examination, the approximate limits of which are illustrated on our Geotechnical Map. Representative samples of the earth materials encountered during our exploration were obtained for laboratory testing and analysis purposes.

The Logs and descriptions of the onsite earth materials presented herein reflect conditions observed onsite at the time of our field exploration only.

The subsurface conditions in unexplored areas of the site may vary from those presented herein, and minor discrepancy in subsurface conditions can be anticipated and may be encountered in such unexplored areas within the subject property at the time of onsite grading.

Soil Classification

The field classification is verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification will include visual examination and may include Atterberg Limits Testing and grain size distribution. The final classification is shown on the Test Hole Logs.

Moisture-Density

The field moisture content and dry density are determined for each of the undisturbed soil samples. The information is useful in providing a gross picture of the soil consistency between test holes and any local variations. The dry density is determined in pounds per cubic foot. The field moisture content is determined as a percentage of the dry density.

Shear Tests

Shear tests are performed in a Direct Shear Machine. The rate of deformation is approximately 0.025 inches per minute or as indicated on the shear test plot. Each sample is sheared under varying confining loads in order to determine the Coulomb shear strength envelope, cohesion and angle of internal friction. Samples are tested in a saturated condition unless otherwise specified. Depending upon the sample location and future site conditions, samples may be tested at field moisture content. The results are plotted in the Shear Test Diagram.

Consolidation

Settlement predictions of the soil's behavior under loads are made on the basis of the consolidation tests. The consolidation apparatus is designed to receive one of the one-inch thick rings. The relatively undisturbed sample specimen is restrained laterally and loaded axially. Loads are applied in several increments in a geometric progression and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid. Samples are generally tested at increased moisture content to determine the effect of water contacting the bearing soil. The normal load at which the water is added is noted on the drawing. Results are plotted on the Consolidation Curve Diagram. The test is performed according to the Standard Test Method for One-Dimensional Consolidation Properties of Soil, ASTM D 2435.

Remolded Tests

Remolded samples are generated from a disturbed bulk sample. The compaction characteristics are determined in accordance with ASTM D 1557. The remolded samples are then prepared at the relative density required for the corresponding test. The relative density and percent compaction is recorded on the test plot.

GEOLOGY

Regional Geology

Structurally, the site is located within southern flank of the Sierra Pelona Mountains. These east-west-trending mountains are bounded by the Santa Clara River and San Gabriel Mountains to the south and the Mojave Desert to the north. The Sierra Pelona Mountains lie within the Transverse Ranges Geomorphic Province of Southern California. In brief, the Transverse Ranges consist of an intertwined series of nearly west-trending mountain ranges and intervening valleys that stretch westward from the Mojave Desert to the Channel Islands. Other important mountain ranges within this Geomorphic Province include the Santa Monica, San Bernardino, and Santa Ynez Mountains. Many of these mountain ranges are bounded by large faults including the San Andreas, Malibu-Santa Monica, Hollywood, Raymond, Mint-Canyon, San Fernando-Sierra Madre, Oak Ridge and Santa Ynez faults. The nearest mapped fault indicated by Dibblee (1996) is the Kashmere Canyon fault, which is inferred to be located along Hubbard Road and is not considered active.

Major east-west trending faults associated with these mountain systems include the Malibu-Santa Monica-Hollywood, the Raymond and the San Fernando-Sierra Madre-Cucamonga fault systems; the latter fault system is associated with the two most devastating earthquakes in the Los Angeles area in historic times, i.e., the San Fernando earthquake, 1971, and the Northridge earthquake, 1994. According to current State publications the closest active fault zone to the site is the San Andreas Fault system.

The San Andreas Fault zone stretches from the Salton Sea in Southern California to Point Reyes north of San Francisco. Near Los Angeles, the fault “bends” to the left and trends east west along the north side of the Transverse Ranges. It is this segment of the fault that produced the Richter magnitude 8.0+ Fort Tejon earthquake in 1857, an event that shattered and ruptured the ground surface for over one hundred and fifty miles.

Other major faults associated with the Transverse Ranges of Southern California include the San Gabriel, Sierra Madre, Malibu-Santa Monica-Hollywood, Santa Susana, Oak Ridge and the Raymond fault systems.

The faults noted above are considered to be active or potentially active faults and are approximately located on the appended Regional Fault Map. This generalized fault map is intended to show the approximate site location with respect to some of the more significant, active or potentially active faults mapped within the greater Los Angeles area. The appended map also notes the epicenter location of some of the larger earthquakes recorded within this area in the past several years.

Future earthquakes generated by any of the faults noted on the attached map are considered to be capable of producing significant ground shaking at this site. However, this map is not a depiction of all of the faults capable of generating large earthquakes.

Regional Geologic Mapping

The area has been mapped by Thomas Dibblee (1996) as being underlain by older alluvium and granodiorite bedrock. Regional mapping indicates that foliation in the bedrock is oriented approximate north-south and is vertical.

Geologic Units

Undocumented artificial fill, natural soils, colluvium, older alluvium, and bedrock are present on and below the sites surface. Detailed descriptions of the observed onsite earth materials are discussed below, in the general order of increasing geologic age, and presented on the appended Test Hole Log sheets.

Undocumented Artificial Fill (af)

Undocumented artificial fill consists of silty to gravelly sand with bedrock clasts up to 10 inches in diameter, that is grayish-brown, dry, loose to medium dense, and slightly porous. Where explored, the fill was placed in approximately horizontal layers and was placed directly on the underlying natural ground without any apparent removal of underlying earth prior to fill placement; no excavated keyways were apparent within the explorations. The fill is expected to be a maximum thickness of 22 feet. The undocumented artificial fill is not considered suitable to support foundations or additional fill, and is considered grossly and surficially unstable.

Minor additional artificial fills are mapped around the various roadways above the planned development areas, however these are generally two feet thick or less and are of limited lateral extent, and are therefore not considered a potential hazard to the planned development.

Natural Soils (ns)

Natural soils are present over nearly all of the site, except for those areas where bedrock is exposed at grade and is the result of weathering of the underlying substrate.

The natural soils consist of silty fine-medium-grained sand with some gravels. It is medium brown, loose, generally dry, slightly porous, and contains common rootlets. The natural soils are compressible and therefore not recommended for support of foundations or future certified compacted fill.

Colluvium (Qcol)

The moderately sloping ground at the far easterly portion of the site is mapped as colluvium. These are similar to the older alluvium in general material gradation and texture, however they are substantially less dense than the older alluvial soils. The colluvium is generated from the soil from the steeper slopes above accumulating near the toe of the slopes. The colluvium consists of silty gravelly sand that is medium-brown, medium-dense, and moderately porous. The gravel and bedrock fragments within the soil profile are generally angular to subangular and usually three inches in diameter or less. Colluvium however is considered well-suited for percolation of sewage effluent, but not suitable for support of foundations or future compacted fill.

Older Alluvium (Qoal)

Most of the site is underlain by older alluvium and the planned residences are almost exclusively located within this material (and the described undocumented fill). The older alluvium consists of silty sand with gravel that is grayish-brown to brown, dry to damp, and generally dense to very dense. It is slightly porous in the upper approximately three feet, but has only minor “pinprick” porosity below this depth. While the upper section of the older alluvium is subject to hydroconsolidation, below a depth of five feet, the older alluvium is suitable for support of foundations or future compacted fill.

Bedrock: Lowe Granodiorite-biotite facies (lgdb)

Per Dibblee, 1996, the site is underlain by granodiorite bedrock. This rock is generally pale-gray to which with black speckles. Where observed, the rock was friable and fractured within the upper foot, but became denser, tighter, and less fractured below. The rock is overall strong, forming steep slopes and is expected to perform very well in the existing slopes and possible future cuts made in the bedrock. Bedrock is well-suited for support of foundations or future compacted fill.

Geologic Structure

Foliation

Foliation of the rock was not observed within our test holes and is generally appears to be poorly developed within the rock. Foliation planes are not considered to be a potential hazard to existing or proposed slopes.

Shears

A shear plane is the surface or zone along which shearing or ductile deformation has occurred.

While similar to faults, shears are localized and do not represent large-scale movement of rock and displacements are generally measurable within small diameter test holes. Shears planes were not observed or mapped during our study.

Folds

Folds may be defined as changes in the orientation of bedding. Folds may be very small and isolated within a test hole (more common in weaker bedrock such as claystone or shale), or regional such as within a mountain range. Folds were not observed on the site.

Faults

A fault is a fracture in the earths crust with significant displacement of earth materials of one side relative to the opposite side of the fault. It may be a single or fracture or series of fractures, or a wide shear zone miles thick. Faults have been classified by the State of California as active, potentially active, or inactive. Active faults have exhibited ruptures that extend to the earth’s surface within the last 11,000 years. Potentially active faults have had surface rupture within the last 11,000 to 1.6 million years.

Inactive faults do not have evidence of displacement within the last 1.6 million years. As a result of the 1971 San Fernando Earthquake, the State of California passed the Alquist-Priolo Special Studies Act of 1972. This act prohibits construction of structures for human occupancy upon active faults and required the State to map these faults. The act requires detailed geologic investigations (fault trenching studies) to be conducted to determine if the site is underlain by a fault. The most current State publications show that the site does not lie within any of the State's current Alquist-Priolo Earthquake Fault Zones.

Faults were not observed during our investigation, and no faults are mapped in the immediate vicinity. The potential seismicity of the various earthquakes are discussed in the Seismic Considerations section of this report.

Groundwater

Groundwater, manifested as springs or seeps, was not observed on the site’s existing ground surface or encountered in any excavations onsite which extended to a depth of 18 feet below current grade. The area is generally better known for deep, rather than shallow groundwater.

Based on this, we believe that free groundwater will not have an adverse impact on the future construction.

SOIL CHARACTERISTICS

Collapsible Soil

Settlement predictions of the soil's behavior under loads are made on the basis of the consolidation tests.

The consolidation apparatus is designed to receive one of the one-inch thick rings. The relatively undisturbed sample specimen is restrained laterally and loaded axially. Loads are applied in several increments in a geometric progression and the resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid.

Samples are generally tested at increased moisture content to determine the effect of water contacting the bearing soil. The normal load at which the water is added is noted on the drawing. Results are plotted on the Consolidation Curve Diagram. The test is performed according to the Standard Test Method for One-Dimensional Consolidation Properties of Soil, ASTM D 2435.

Based on the results of our consolidation testing, the older alluvium is subject to hydroconsolidation within the upper approximately 3 feet of the ground surface where porosity is slightly greater. Consolidation testing by AZGT indicates that at a depth of 4 feet, the soils were not subject to significant hydroconsolidation.

Expansion

The soils are comprised largely of silty sand with varying amounts of gravel. These granular soils are considered to be non-expansive.

Excavation Characteristics

The onsite earth materials can be excavated standard to heavy-duty excavating equipment, especially where bedrock may be encountered.

Soil Chemistry

Chemical tests were performed on representative samples of the onsite earth materials by A Z Geo Technics, Inc. and were presented in their report.

The chemical testing program indicates that chloride contents in the onsite earth materials are negligible, but Sulfate content of 150 is borderline Moderate. The pH of 4.0 is considered acidic and may cause increased corrosion.

The minimum resistivity of the on-site soils was determined to be 5,088 ohm-centimeters, which is considered to be moderately corrosive to ferrous metals. Our recommendations for mitigation are presented later in this report.

Shear Strength Values

Direct shear testing was conducted on a representative sample of the colluvium sampled from our test holes. Shear values for all other earth materials have been provided from research materials or in the case of the natural alluvial soils, have been conservatively assumed.

Shear strengths obtained by SGI, from the AZGT report, and from the Seismic Hazard Evaluation Report for the Acton Quadrangle are summarized below.

Material Type	Cohesion (psf)	Phi (degrees)	Source
Silty Sand (Qoal?)	**74**	**27.9**	**T-1 @ 6' (AZ Geo)**
90% Remolded Qoal & Bedrock	**78.7**	**30.2**	**T-1 & T-2 @ 4'-8' (AZ Geo)**
95% Remolded Qoal	**190**	**38**	**SGI, TH-2 0'-6'**

The shear values from the Seismic Hazard Evaluation report for the Acton Quadrangle have been used for the appended slope stability analyses.

SEISMIC CONSIDERATIONS

Earthquakes represent the largest natural threat to life and property in Southern California. The primary adverse effects of earthquakes are surface rupture and ground shaking. The secondary effects are liquefaction, differential settlement, lurching, and various forms of landsliding such as rockfall, bedrock shattering. Earthquakes under water can also result in tsunamis or seiches.

The San Andreas Fault is the closest active fault, and the fault capable of providing largest ground accelerations should an earthquake occur along the fault. This fault is located approximately 6 miles northeast of the site.

Surface Rupture

Surface rupture occurs when earth movement caused by an earthquake reaches to the ground surface. This typically only occurs in larger earthquakes, but may occur in smaller earthquakes, and may not occur in large earthquakes. The danger associated with surface rupture is severe if the structure is constructed directly atop the rupture surface.

The Alquist-Priolo Act prohibits new construction on known active fault rupture surfaces, and since surface ruptures have been well-mapped fault investigation studies are required for properties proximal to faults.

The San Andreas Fault is active but is approximately 6 miles north of the subject site. There is no potential for surface rupture on any known existing splays of the San Andreas fault to affect the site.

The 2007 California Building Code (CBC) has required that new projects be designed per specific requirements for the site-specific seismic and geologic conditions as indicated below.

CBC Seismic Design Criteria

The following table has been prepared in accordance with the Spectral Responses values calculated by the USGS Earthquake Ground Motion Parameters software, version 5.0.9 in accordance with the NERP, 2003 seismic design provisions. Structures should be designed per these seismic criterion.

2007 CBC SPECTRAL RESPONSE AND COEFFICIENTS	
Latitude	34.487 degrees north
Longitude	118.155 degrees west
Site Class	C - Dense Soil/Soft Rock
0.2 Sec Spectral Response SMs (SDs)	1.521 g (1.014 g)
1.0 Sec Spectral Response SMs (SDs)	0.956g (0.637 g)
Site Coefficient F_a	1.0
Site Coefficient F_v	1.3

Secondary effects of seismic activity include ground shaking, liquefaction, ground settlement, landsliding, rockfall, and tsunamis.

Ground Shaking

Ground shaking due to seismic events on many of the active or potentially active faults within Southern California could have an adverse effect on the site including, but not limited to differential settlement, structure distress, slope instability, and wall failures.

After the January 17, 1994 Northridge earthquake, many geologists began to focus additional attention to the concept of blind thrust faults. This particular type of fault cannot be accurately mapped at the surface because it lacks a well-defined surface expression.

Secondary mapping and location techniques, such as seismic refraction work and other geophysical methods, have lead many researching geologists to conclude that several of these “hidden” faults may underlie much of the greater Los Angeles area and are thought to be large enough as to generate an earthquake that is capable of producing high levels of ground shaking at the subject site.

The risk of damage to the proposed development due to a moderate or large earthquake cannot be totally eliminated, but can be mitigated by appropriate insurance.

Liquefaction and Ground Settlement

The Seismic Hazards Mapping Act of 1990, has required the California Geological Survey to publish reports and maps to show the locations of Seismic Hazard Zones, in order to help protect the public from hazards due to liquefaction and landsliding.

Liquefaction is a phenomenon that involves sudden loss of soil strength during a period of intense ground shaking caused primarily by earthquakes. The highest potential for liquefaction to occur is in saturated, loosely consolidated sands and silts below the water table when the groundwater level is at a depth of about 50 feet from the surface or shallower. It occurs when such a soil is acted upon by an earthquake which temporarily increases the internal pore pressure of water within the soil, which causes the soil to loose shearing strength, essentially liquefying briefly. Findings obtained from various studies on liquefaction suggest that it occurs almost exclusively in Holocene sediments (deposited within the past 11,000 years) that are generally less dense or ‘softer’ than older sediments and rocks.

Ground settlement, can still occur during seismic events without the presence of groundwater (dry settlement). This can occur differentially and result in substantial damage to a structure. Most often this settlement occurs in granular soils with relatively low cohesive strength or poorly compacted fill soils.

The Seismic Hazard Zones Map of the site’s vicinity indicates that the site is not located in a State-designated zone for seismically induced liquefaction. Therefore, a liquefaction study (calculations) is neither required nor has one been performed. This satisfies the requirement of the State of California, Public Resources Code, Section 2690 et seq. (“Seismic Hazard Mapping Act).

Seismically-Induced Landsliding

The Seismic Hazards Mapping Act of 1990, has also led to mapping of “Areas where previous occurrence of landslide movement, or l2ocal topographic, geologic geotechnical, or groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in the Public Resources code Section 2693-C would be required”.

According to the appended state Seismic Hazard Zones Map for the Acton Quadrangle, some steep portions of the ascending slope above the proposed development have been mapped by the State Geologist's office as being potentially seismically unstable.

We have accordingly conducted an analysis of the proposed slopes as presented in the Slope Stability section of this Feasibility Report.

Rockfall

Sloping sites which have large rocks to boulders exposed at the ground surface, may experience rockfalls during an earthquake, wherein the rocks are dislodged and roll downhill. The dislodged rocks may impact structures or cause loss of life. The hazards for rockfall are generally of lesser concern if the rocks are below any structures, roads or areas where humans are likely to congregate.

Rocks observed on the slopes were less than 1 foot in diameter and are generally buried with multiple flat faces, and are therefore considered to have little potential for to impact any structures. Rockfall is not considered to be a hazard for this project.

Tsunamis and Seiches

Tsunamis are large to massive surges or waves that result from submarine earthquakes, massive underwater landslides, or underwater volcanic eruptions which can travel thousands of miles. In 2004, an approximately 100-foot high tsunami resulting from a massive (magnitude 9.0) thrust fault earthquake impacted Indonesia and resulted in widespread devastation, and similar tsunamis have been recorded in the past. Should a large earthquake occur under the ocean floor of the shore of California, or indeed anywhere within the rim of the Pacific Ocean, a tsunami capable of substantial damage to coastal communities in this area could be generated.

Generally, properties higher in elevation than 50 feet, and farther inland than 1 mile are subject to less risk of damage from a tsunami, with increasing reduction in hazard with greater distance from the shoreline and greater elevation above sea level.

Seiches are similar to tsunamis except that they occur within smaller inland bodies of water and can be caused by land sliding into the water or by earthquakes or underwater landslides, and are much smaller in scope though still potentially damaging. There is no appreciable hazard due to seiches if no bodies of water are nearby.

There is considered to be no potential for Tsunamis or Sieches to affect the site.

SLOPE STABILITY

Surficial Stability

The bedrock as observed in the road-cut exposures on the site is covered with a very minimal soil profile that is considered insufficiently thick to saturate and fail surficially. Based upon the appended surficial stability analysis, the proposed slopes will be surficially stable at the recommended 95% minimum compaction in the outer 10 feet of the slope. Additionally, we anticipate that the proposed cut slopes into the dense older alluvium will be stable at the recommended 2.5:1 (h:v) gradients.

Gross Stability

The attached stability analyses have been performed along our Cross Section A-A' to evaluate the stability of the slopes under static and pseudostatic conditions. For the analysis, the upper end of Cross Section A-A' was extended past the available topography by comparison of the topography with that presented on the 1:2400-scale topographic map for the Acton Quadrangle which shows the top of the slope at contour 3440, some 50 feet above the end of topography extrapolated from the grading plan contours. Our analysis was performed using GSTABLE72™ developed by G.H. Gregory, P.E., utilizing the modified Bishop method of analysis.

The slope angles, cross sections, and geologic structure used are considered the most critical for the slopes analyzed. All other slopes are of flatter gradient, of lesser heights, or exhibit more favorable geologic conditions. A seismic coefficient of 0.15 for horizontal acceleration was utilized for our analyses of the onsite slope under pseudostatic (seismic) conditions, in accordance with the County requirements.

Shear strength testing for the appended slope stability analyses have been obtained from shear testing by SGI (for colluvium), and from the referenced reports from nearby properties which were researched as part of our proposed work. The shear test plots utilized are appended to this report, and the stability analyses completed are presented below.

Cross Section A-A'	Static f.s.	Seismic f.s.
As-Proposed	1.56	1.15

The static factors of safety presented above meet or exceed the minimum requirements of the Building Code, though the analysis for the static condition is at the lowest factor of safety allowable per County Codes.

PRIVATE SEWAGE DISPOSAL

The project will require the use of private sewage disposal systems, and currently relatively shallow leach lines are recommended. The recommended locations of the leach lines are shown on the appended Geotechnical Map. Effluent resulting from the proposed private sewage disposal system is expected to percolate downward into and through the natural soil and bedrock via intergranular pores and fractures, and is not expected to mound or daylight onsite or offsite.

CONCLUSIONS

Based upon our field reconnaissance, earth conditions observed within the excavated test holes, review of the referenced documents, results of our laboratory tests, and past professional experience, it is the opinion of SGI that, from a geologic and geotechnical viewpoint, the proposed grading will not be subject to hazard from settlement, slippage, or landslides and that the proposed site improvements will not adversely affect the geologic stability of the site or adjacent properties provided the recommendations of this report are incorporated into the site development and grading. Test findings and statements of professional opinion do not constitute a guarantee or warranty, expressed or implied. Our opinion regarding the overall site condition is provided with the assumptions that the project is designed and constructed in accordance with the recommendations of this Report and that SGI is afforded the opportunity to review the refined building plans. Our findings are as follows.

- The older alluvium (below a depth of approximately three feet) and relatively unweathered granite bedrock are suitable for the support of the proposed site improvements including keyways for fill.

- Footings may bear into future compacted fill, suitably-dense older alluvium (as is anticipated to exist near the toe of the proposed cut slopes), or bedrock.

- The existing natural and proposed slopes will be surficially and grossly stable.

- Daylighting of the effluent is not anticipated.

RECOMMENDATIONS

Based upon the present scope of work completed by SGI, the following recommendations were developed and are presented. It is our opinion that these recommendations should be incorporated into the design and construction of the future site improvements.

- SGI shall be provided the opportunity to review the proposed foundation plans to assess their compliance with the recommendations of this Report. The plans should be prepared in accordance with grading ordinances of the applicable reviewing agency, and the latest edition of the California Building Code (CBC).

- A pre-construction meeting shall be held at the site prior to start of any excavation. At a minimum, representatives of SGI, the owner, grading contractor and a representative of the County of Los Angeles shall be present at this meeting.

- Any fill placed at the site should be placed and compacted following the Grading and Earthwork Guidelines attached to this Report.

- All sites shall be maintained as set forth in the attached Hillside Maintenance Guidelines.

Foundations

- Foundations shall be designed in accordance with the Foundation Design section below.

- Footings may bear into future compacted fill, suitably-dense older alluvium anticipated to exist near the toe of the proposed cut slopes, or bedrock, i.e, foundations shall be supported by only one material type; foundations spanning or transitioning between or over different material types is not recommended.

- Excavations for foundations should be cleaned of all loose or unsuitable material and debris prior to placement of concrete. Foundation excavations shall be observed and verified by the project geologist/engineer to be in conformance with the City approved reports and plans prior to placing forms, reinforcing steel, and concrete.

Grading

- All fills shall be compacted to a **minimum of 90%** of the maximum dry density for that soil at or above optimum moisture content. Compacted fills **within 10 feet** of the future 2:1 (h:v) fill slopes shall be compacted to a **minimum of 95%** of the maximum density, and shall be **overbuilt a minimum of 3 feet** and trimmed back to the compacted fill core.

- Removal and recompaction on the cut side of the cut/fill pad shall be completed to a minimum of 5 feet below the proposed finished grade, but deeper excavations may be appropriate based upon the building locations and the maximum thickness of fill below structure footings on the fill side of the cut/fill line. This is shown on the appended Cut/Fill/Transition Pad Detail.

- Compaction testing by the project geotechnical consultant will be required at least every 500 cubic yards of fill placed, or at least every two feet vertical rise in fill, whichever occurs first.

- Following construction, the final site grades should be restored so that site water is diverted away from all structures and not allowed to pond anywhere on the site, especially not near the top of any fill slopes.

Foundation Design

All foundations for the proposed structures shall be supported entirely within the recommended bearing material, in this future certified fill, dense older alluvium, or competent bedrock. The foundation design recommendations presented herein are based on the assumptions that:

- All footings are founded in the recommended bearing material(s)
- Prescribed setbacks from descending slopes are maintained
- Primary loads on the foundations are applied vertically
- Wall loads on continuous footings are on the order of 1,500 pounds per lineal foot, with column loads not exceeding 10 kips

Our recommended design parameters for the proposed structure's foundations are tabulated herein:

	Foundation Bearing Materials	**Compacted Fill/Qoal**	**Bedrock**
Earth Material Parameters	Foundation Bearing Pressures	**2,000 psf**	**4000 psf**
	Coefficient of Friction [1]	**0.4**	**0.4**
	Passive Earth Pressure (EFP) [2]	**300 pcf**	**400 pcf**
	Maximum Passive Earth Pressure	**3,500 psf**	**4,000 psf**
Conventional Continuous Footing Design	Minimum Foundation Width	**12 inches**	**12 inches**
	Min. Embedment Depth into Bearing Material [3]	**1 foot**	**1 foot**
Independent (Pad) Footing Design	Minimum Foundation Dimensions (Width X Length)	**24 in X 24 in**	
	Min. Embedment Depth into Bearing Material [3]	**12 inches**	

Notes:
[1] When combining frictional resistance and passive pressure, the passive pressure component should be reduced by one-third.
[2] Passive earth pressures may be doubled for isolated piles spaced at distances equal to or exceeding the minimum recommended pile spacing.
[3] Foundation depths subject to increase per the project structural engineer's design.

Foundation and Building Setback

Appropriate setbacks from ascending and descending slopes should be maintained, per the requirements of the Building Code, as illustrated on the enclosed "Required Slope Setback Design" diagram.

Foundation Installation

All footing excavations should be observed and verified to be in conformance with the City approved reports and plans by the project soils engineer, and approved by the Department Official, prior to placing concrete forms, reinforcing steel, and concrete. The soil engineer or geologist should verify that footings penetrate adequately into the recommended bearing material.

All footing excavation depths will be measured from the lowest adjacent grade of recommended bearing material. Footing depth will not be measured from any proposed elevations or grades. Any foundation excavations that are not the recommended depth into the recommended bearing material will not be acceptable to this office. Any required footing backfill should be properly mechanically compacted; flooding or jetting of backfill with water is not recommended.

Foundation Settlement

Settlement of the foundation system bearing into certified fill or alluvium (Qoal) is expected to occur on initial application of loading. The amount of total (uniform) settlement is not expected to exceed ½-inch. Differential settlement is not expected to exceed ¼-inch between similar structural elements within a horizontal span of 30 feet. These values may be exceeded by any structures not supported by foundations bearing in the recommended foundation-bearing material. Settlement for foundations into competent bedrock is considered negligible.

Soil Corrosivity Mitigation

The onsite soil is considered to be moderately corrosive to ferrous metals. The following recommendations may be followed to reduce potential damage to buried metal elements, such as utility pipes and reinforcing steel:

- All steel and wire concrete reinforcement should have at least 3 inches of concrete cover where cast against soil.
- Below-grade ferrous metals should be given a high-quality protective coating, such as plastic tape, extruded polyethylene, hot-applied coal tar enamel, or fusion-bonded epoxy.
- Bond below-grade ferrous metals with non-conductive type joints.

- Coat any bare metals such as bolts, valves, joint harnesses, etc., with a coal tar or rubber-based mastic, wax tape, or equivalent after assembly, or alternatively use stainless steel bolts and washers.

- Below-grade metals should be electrically insulated (isolated) from dissimilar metals, cement-mortar coated and concrete-encased metals, and above-grade metals, using insulated joints.

- Bare copper tubing should be bedded and backfilled with clean sand at least 3 inches thick surrounding the tubing. The best corrosion control for hot-water copper tubing should be encased in impermeable, unstretched, non-shrink insulation with the joints and seams sealed.

Utility Trench Backfill

Utility trench excavation and backfill is the project contractor's responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations on an on-call basis, so only portions of the actual work are observed. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

- Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill, and to maintain adequate lateral support for any adjacent properties and structures.

- All utility trench backfill in slopes, structural areas, streets and beneath all flatwork or hardscape should be brought to near optimum moisture and compacted to at least 90 percent of the laboratory standard. Neither flooding nor jetting is recommended for native soils.

- Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in paved area, as overly wet soils may impact subgrade preparation.

Site Drainage

Positive surface gradients should be provided adjacent to all structures so as to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities in accordance with section 1803 of the CBC. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. All structures should be provided with roof gutters and downspouts that discharge a minimum of 5 feet from the exterior or the structure.

Typical compacted earthen berms shall be placed along the top of all fill slopes in accordance with the Grading Code. Water should not be flow uncontrolled over any descending slope.

Precautions should be taken during and after construction to minimize saturation of the foundation soils. Positive drainage should be established away from the exterior walls of structures. The finished grades within 10 feet of a structure should slope away from the structure at a gradient of not less than 5%. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2% away from the building.

Landscape trees and plants with high water needs should be planted at least 10 feet away from the footings. Downspouts from roof drains should discharge a minimum distance of 5 feet from the exterior building wall. Special care should be taken by the property owner not to over-water.

PLAN REVIEW

This Report has been compiled as an aid to site evaluation and to assist the contractor, civil and structural engineers in design and construction of the project. It is recommended that, prior to submittal of any design plans or specifications to any reviewing agencies, this office be provided with the opportunity to review such plans and specifications to determine that the final design criteria complies with the recommendations contained in this report.

SITE OBSERVATION

It is recommended that all foundation excavations be observed by a representative of this office prior to placing forms, steel, or concrete. Cut slopes and temporary excavations and all bottom excavations must be observed by a representative of this office during grading.

Should the observations reveal any unforeseen hazard, appropriate additional recommendations will be provided by SGI. Any fill that is placed must be approved, tested, and verified if used for engineered purposes.

Please advise Southwest Geotechnical, Inc. at least 48 hours prior to any required site visit. All approved plans, permits, and geotechnical reports must be at the job site and available during construction.

CONSTRUCTION SITE MAINTENANCE

It is the responsibility of the contractor to maintain a safe construction site. When excavations exist on a site, the area should be fenced and warning signs posted. Soil generated by foundation and subgrade excavations should be either removed from the site or properly placed as a certified compacted fill. Loose soil must not be spilled or cast over any descending slope.

Please call this office with any questions. This report and the exploration are subject to the following "Limitations" section. Please read the "Limitations" carefully, as it limits our liability.

LIMITATIONS

The conclusions and recommendations submitted in this Report as they pertain to the future development of this particular property are based, in part, upon the data obtained from exploratory test holes completed by SGI, site conditions as they existed at the time our field work was completed, factual information contained within the referenced documents listed at the end of this Report and past experience with similar projects in the general area.

Should changes occur to the property, or the project design vary significantly from that anticipated at the time of this report, revised recommendations may be warranted. The recommendations of this Report should be incorporated into the design drawings for the site grading and construction.

If conditions encountered during grading differ from those described in this document, this condition should be brought the attention of SGI immediately. Should this condition occur, the need for revision of the original recommendations would be assessed at that time.

SGI has attempted to prepare this report in accordance with generally accepted geologic and geotechnical engineering methods as practiced in this community at this time. No warranty or guarantee is expressed or implied. This Report has been prepared for the use of the client and their authorized agents.

The statements contained in this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties.

In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the broadening of knowledge. Accordingly, the conclusions of this Report may be invalidated, wholly or partially, by changes outside of our control, and should therefore be reviewed after one year.

CLOSURE

We expect that the recommendations presented in this Preliminary Feasibility Report meets your needs for the currently proposed site development. Southwest Geotechnical, Inc. appreciates this opportunity to provide professional geologic and soils engineering services for this project.

If you have any geologic or soils engineering questions regarding the information contained in this document, or if you require additional geologic and soils engineering input and services, please feel free to contact us.

Respectfully submitted,
SOUTHWEST GEOTECHNICAL, INC.

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Frank Miscione
Principal Engineer
RCE #C69031

CC/FM:ss
Duvernay 1008170 Soils-Geo.doc

Attachments:

- References (Plate R-1)
- Vicinity Map
- Regional Geologic Map
- Regional Fault Map
- Seismic Hazard Zones Map
- Test Hole Logs 1-4
- Logs GW 1-3
- Percolation Logs PH 1-12
- Consolidation Test
- Shear Test Plot/Stress-Strain
- Table 2.1 SHZR 100 - Shear Statistics
- Surficial & Gross Slope Stability Analysis
- Required Slope Setback Design
- Cut/Fill/Transition Pad Detail
- Grading and Earthwork Guidelines
- Hillside Maintenance Do's and Don'ts
- Referenced AZ Geotechnics Report
- Cross Section A-A'
- Geotechnical Map (pocket insert)

REFERENCES

1. AZ Geo Technics, Inc., April 15, 2010, "Updated Soils Report for a Site Located on Sierra Highway in the Vicinity of Listie Avenue, In the Community of Acton, County of Los Angeles, State of California APN: 3057-014-012", GT 2957a-AD

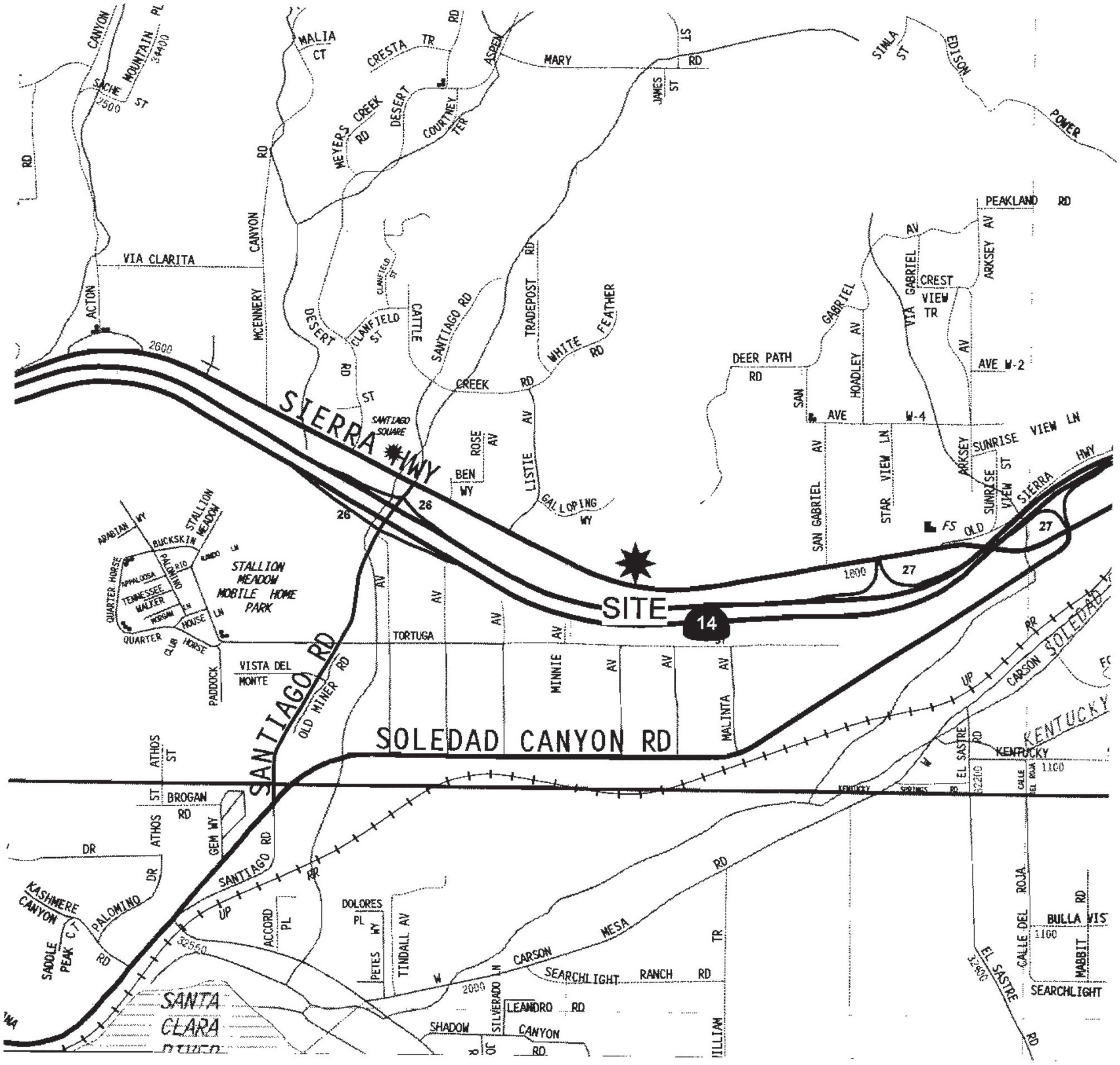
2. AZ Geo Technics, Inc., August 15, 2006, Geotechnical Report, for a Site Located on Sierra Highway in the Vicinity of Listie Avenue, In the Community of Acton, County of Los Angeles, State of California, APN: 3057-014-012, GT 2957a-AD

3. California Department of Conservation, California Geological Survey, 2003, "Seismic Hazard Zone Report for the Acton 7.5-Minute Quadrangle, Los Angeles County, California" , SHZR 100

4. Barrows, A.G., 1974, Newport-Inglewood Structural Zone, Southern California, CDMG, Special Report No. 114

5. Dibblee, Thomas, W., Jr., 1996, edited by Ehrenspeck, Helmut E., "Geologic Map of the Acton 7.5-Minute Quadrangle, Los Angeles County, California", DF-59

PLATE R-1



SITE LOCATION

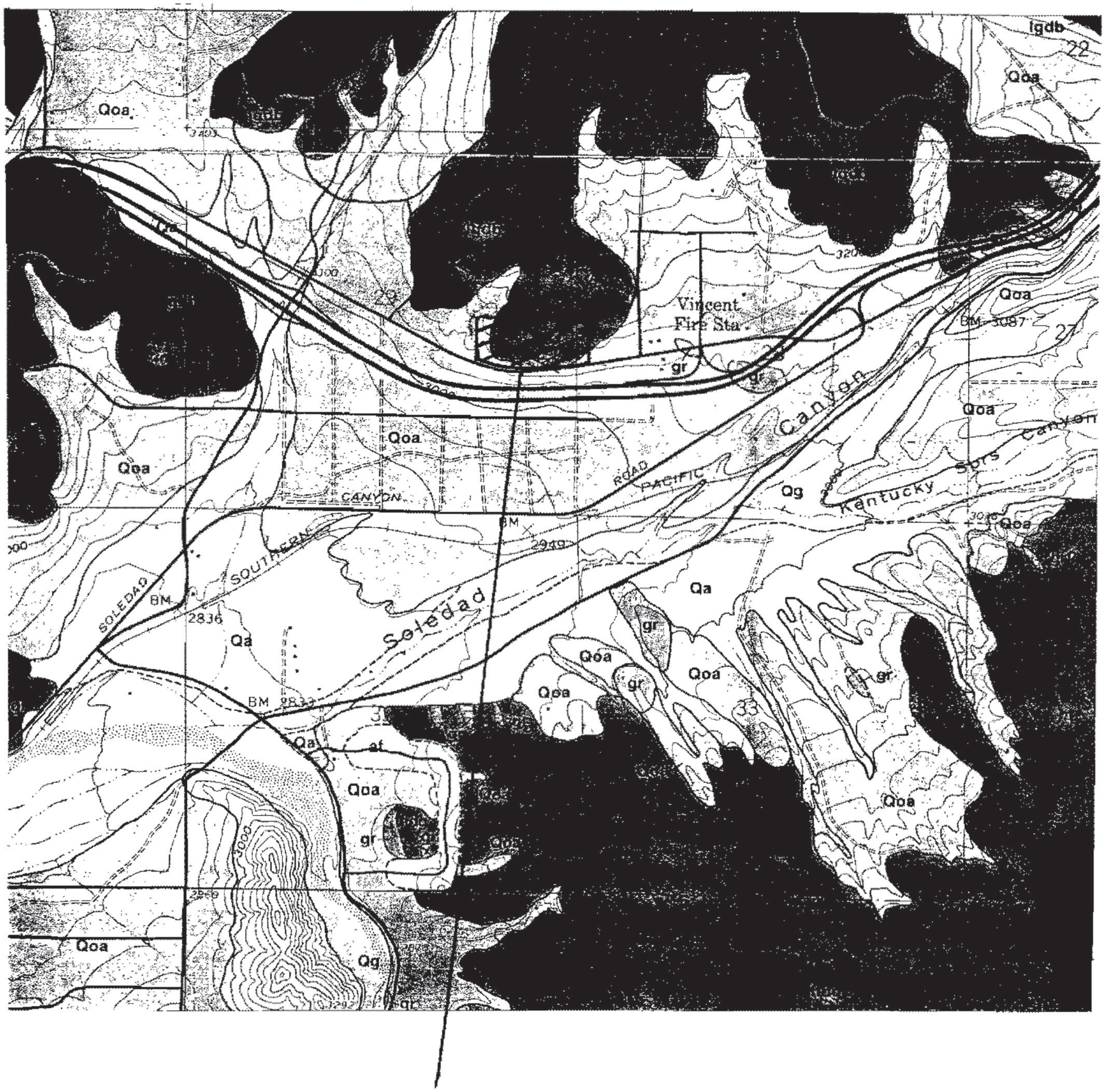
Southwest Geotechnical, Inc.

Vicinity Map

Proj. #:1008170	October 18, 2010

Client: Duvernay

Reference: Thomas Bros., 2006



Southwest Geotechnical, Inc.

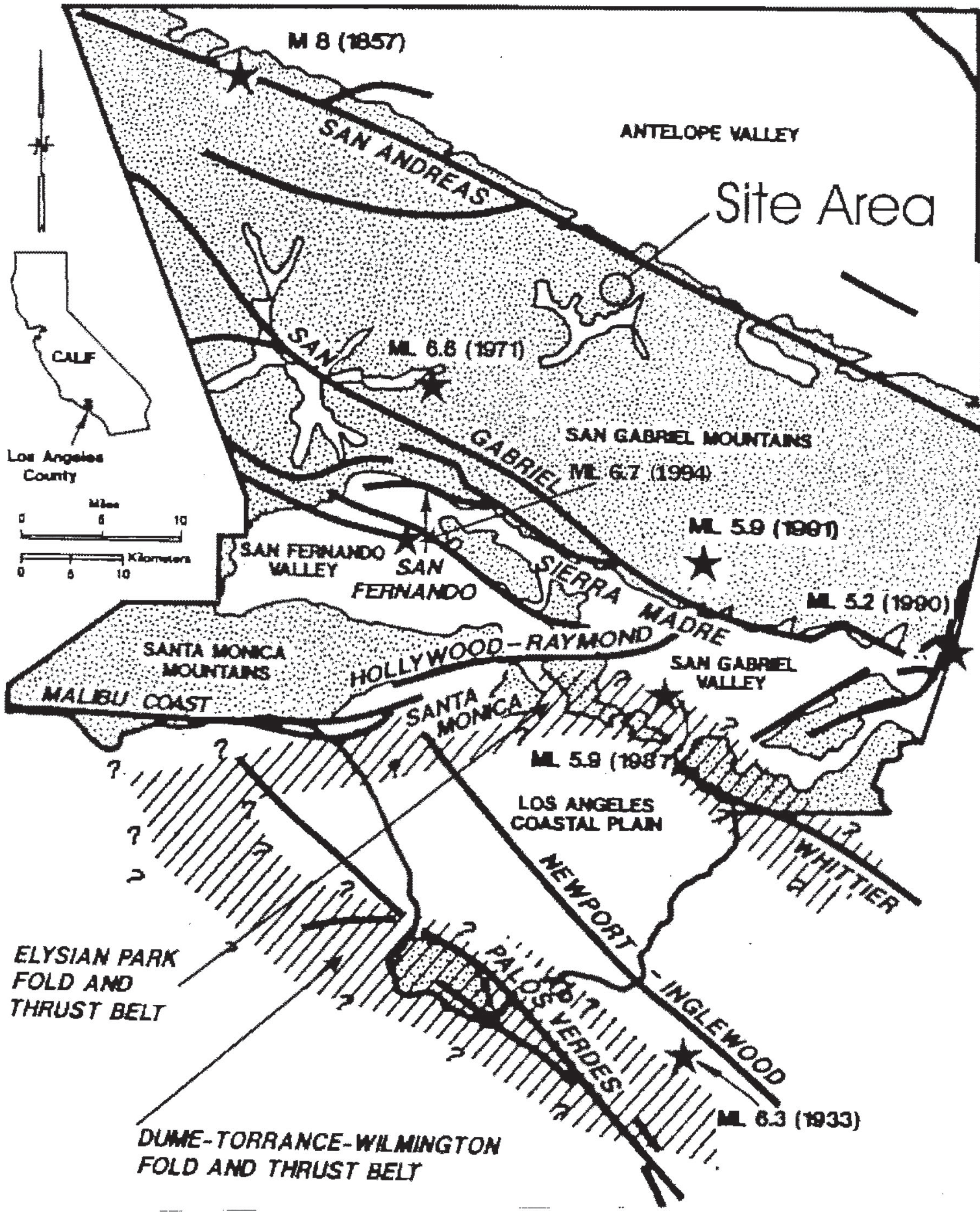
Regional Geologic Map

Proj. #:1008170	October 18, 2010

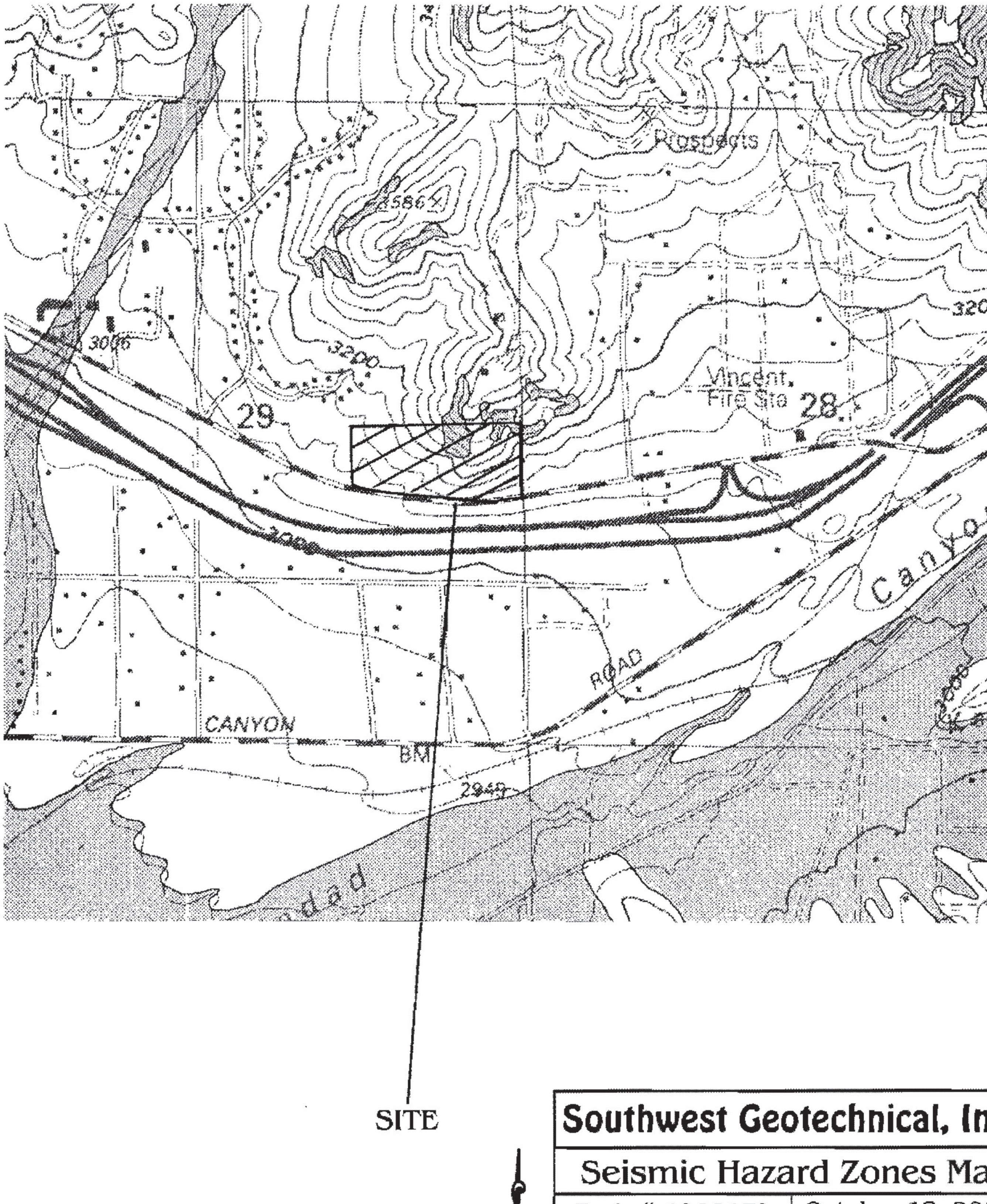
Client: Duvernay

Scale: 1"=2000'

Reference: Dibblee, T. W. 1996, "Geologic Map of Acton Quadrangle, Los Anglees County, California", DF-59



Southwest Geotechnical, Inc.	
Regional Fault Map	
Proj. #:1008170	October 18, 2010
Scale: See Plan	Client:Duvernay
Ref: Gath, 1992 (Modified)	



Southwest Geotechnical, Inc.	
Seismic Hazard Zones Map	
Proj. #:1008170	October 18, 2010
Scale: 1"=1000'	Client: Duvernay
Ref: Seismic Hazard Zones Map Acton 7.5-Minute Quad., 9-24-03	

SOUTHWEST GEOTECHNICAL, INC

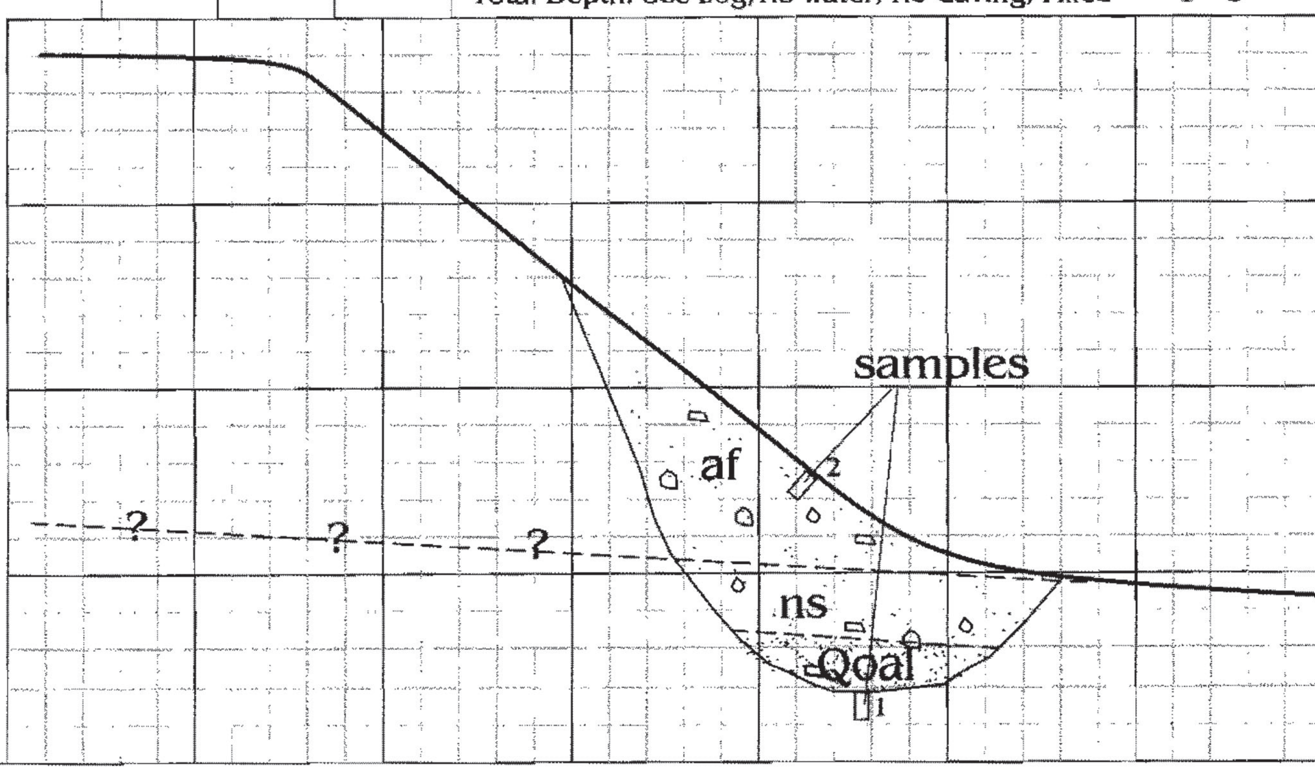
Test Hole Log TH-1

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Into toe of existing fill slope.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
#2	118.3	1.7	SM	**Artificial Fill (af):** Silty to gravelly Sand, grayish brown, dry, loose to medium dense, slighly porous, roughly horizontal layers 6"-14" thick , common bedrock clasts up to 10" in diameter, lower contact gently sloped out of slope. No Keyway.
			SM	**Natural Soil (ns):** Silty fine-medium-grained Sand with some gravel, medium brown, loose, damp, slighlty porous, commonrets and some decaying vegetation up to 4 inch diameter root.
#1	125.1	3.0	SM	**Older Alluvium (Qoal):** Silty gravelly Sand trace clay, medium brown, damp, minor pinprick porosity, dense.

Total Depth: See Log, No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

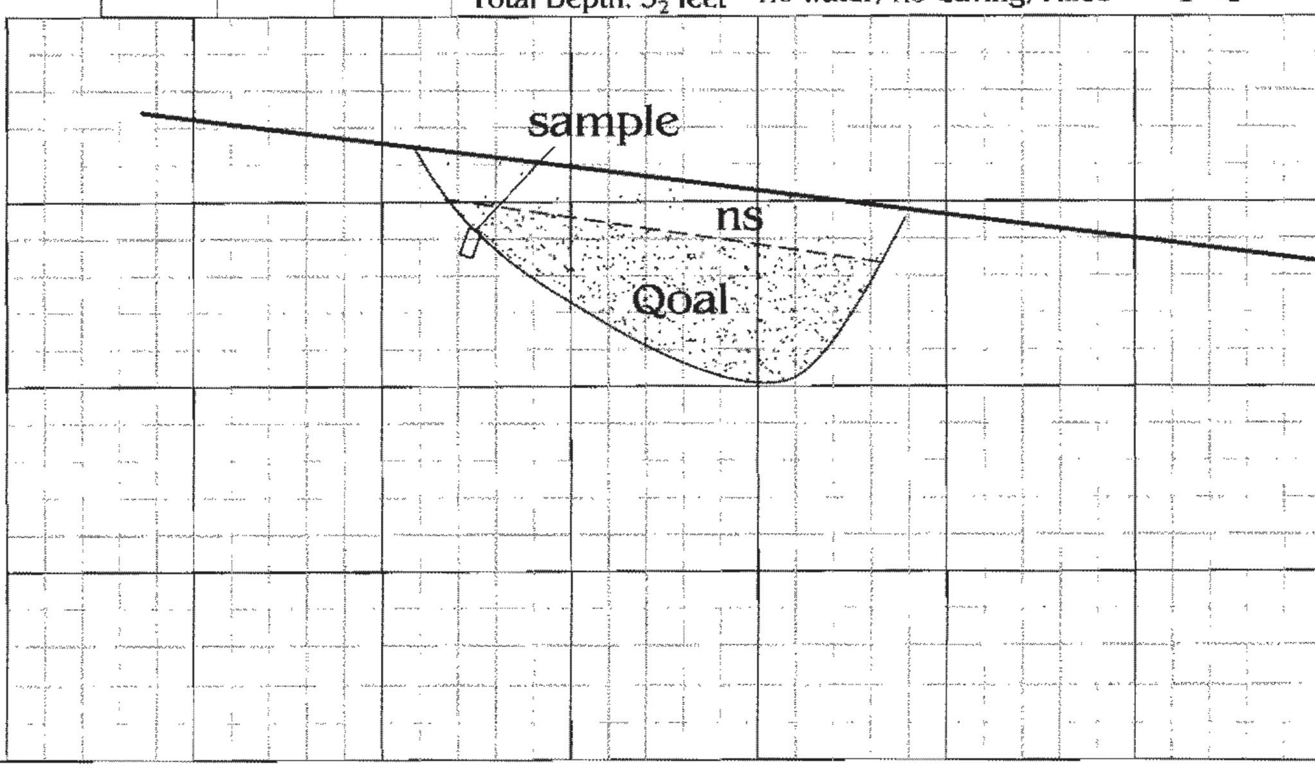
Test Hole Log TH-2

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near Proposed Cut slope. NW quadrant of site

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**Artificial Fill (af):** Silty to gravelly Sand, grayish brown, dry, loose to medium dense, slighly porous, roughly horizontal layers 6"-14" thick , common bedrock clasts up to 10" in diameter, lower contact gently sloped out of slope. No Keyway.
			SM	**Natural Soil (ns):** Silty fine-medium-grained Sand with some gravel, medium brown, loose, damp, slighlty porous, commonrets and some decaying vegetation up to 4 inch diameter root.
3' #1	120.5	3.8	SM	**Older Alluvium (Qoal):** Silty gravelly Sand trace clay, medium brown, damp, minor pinprick porosity, dense.

Total Depth: 5½ feet No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

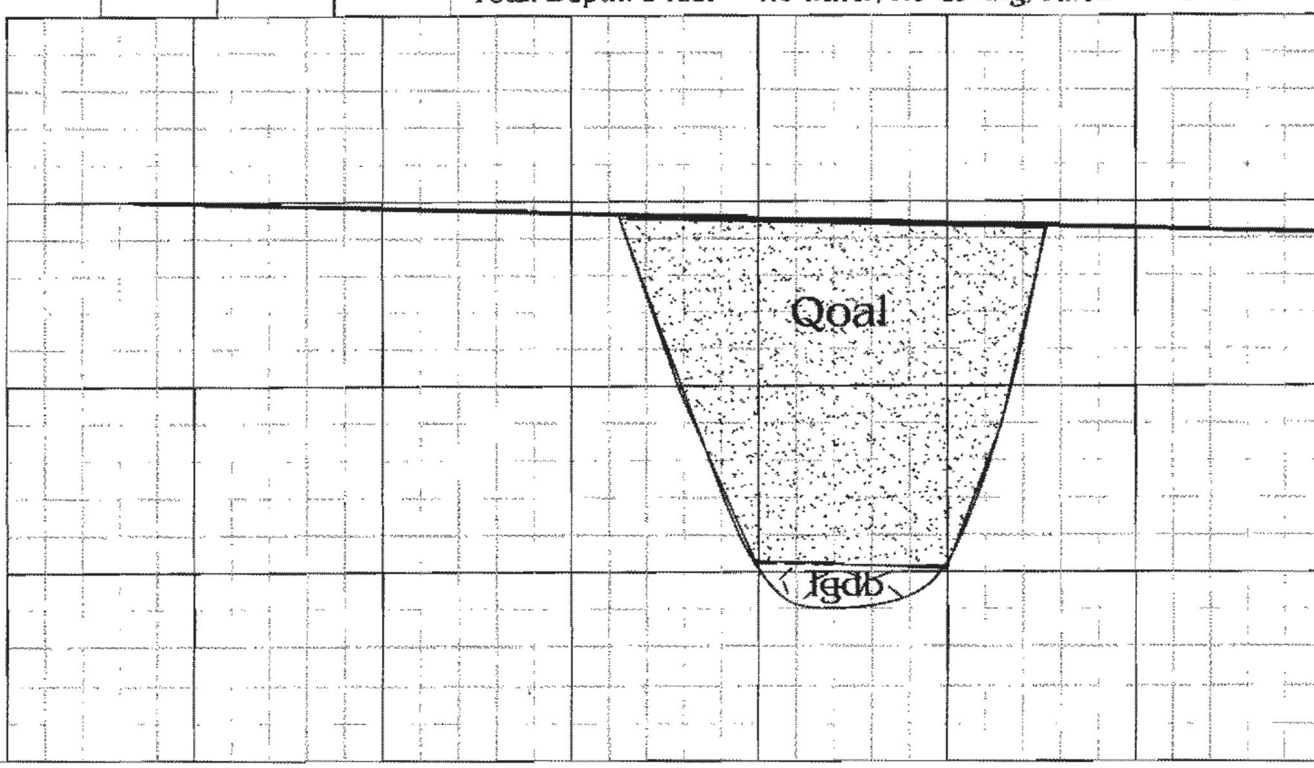
Test Hole Log TH-3

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: On existing road, near proposed fill at east end of easterly pad.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**0'-8' Older Alluvium (Qoal):** Silty Sand with gravel and trace clay, brown, dry to damp, medium dense in upper 12" and dense to very dense below. **8'-9' Lowe Granodiorite Bedrock (lgdb):** Granodiorite, pale gray with black speckles, fractured, weathered, friable but very dense.

Total Depth: 9 feet No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

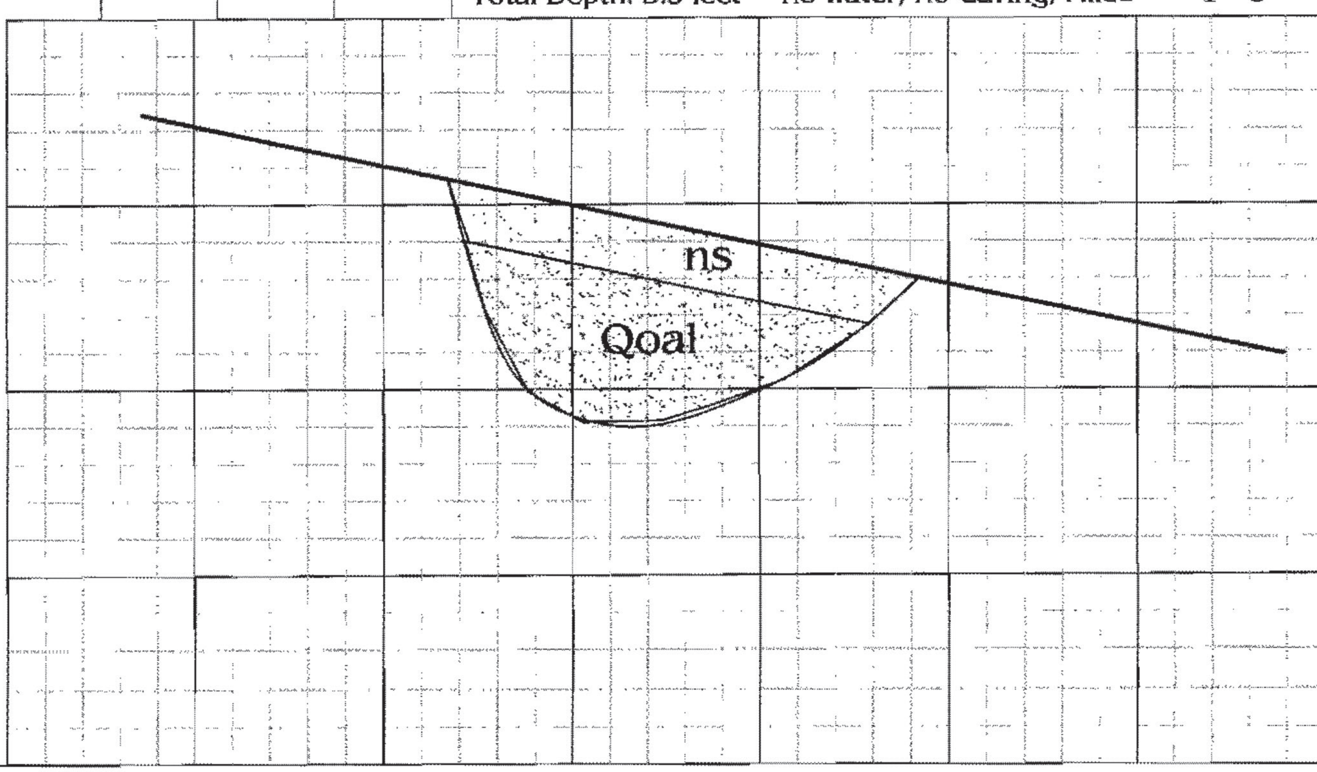
Test Hole Log TH-4

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near Proposed Cut slope. easterly lot.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**Natural Soil (ns):** Silty gravelly with angular granite fragments, brownish gray, dry, medium dense, porous, rodent burrows at 18", minor rootlets.
			SM	**Older Alluvium (Qoal):** Silty Sand with gravel, grayish brown, dry to damp, dense, some small roots.

Total Depth: 5.5 feet No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

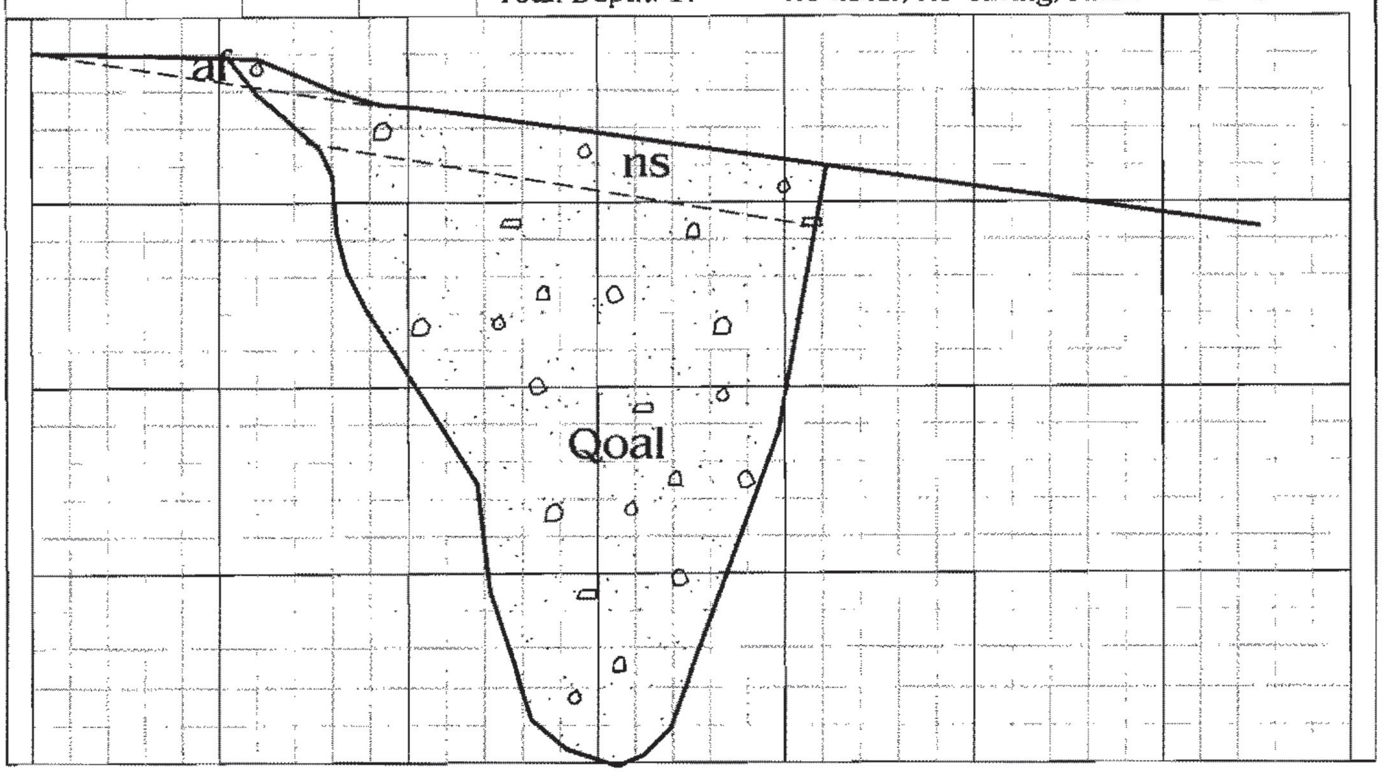
Test Hole Log GW-1

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near existing access roadway and planned septic system area.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
3.5'	131.8	4.1	SM	**Artificial Fill (af):** Silty gravelly Sand, gray, dry, very loose, very porous, minor rootlets. About 18 inches thick.
			SM	**Natural Soil (ns):** Silty gravelly Sand, grayish brown, dry, loose-medium dense, very porous, some rodent burrows, some rootlets throughout but mostly in the upper 3"-4", profile is 18"-2' thick.
			SM	**Older Alluvium (Qoal):** Silty gravelly Sand minor clay, medium brown, dense to very dense, difficult to excavate below 10 feet.

Total Depth: 17' No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

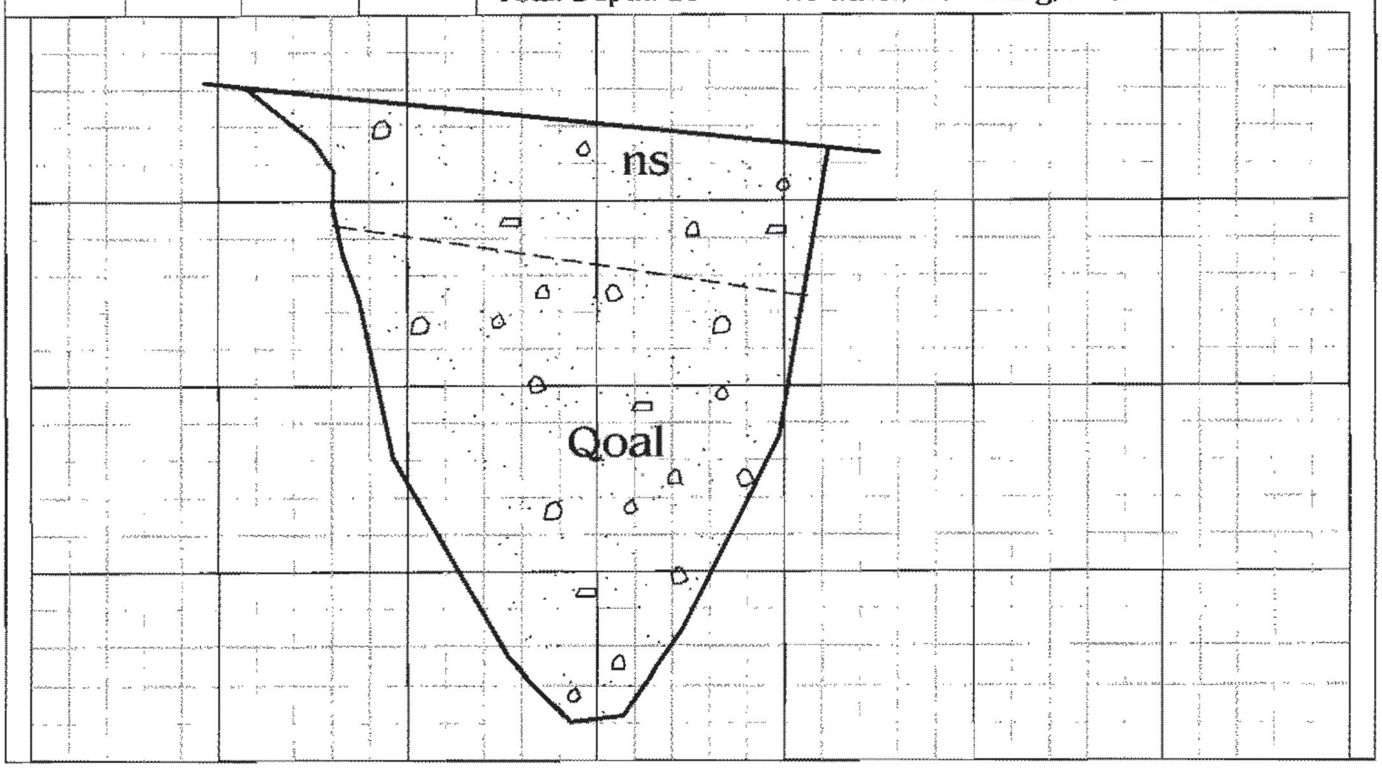
Test Hole Log GW-2

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near 50' road easement and planned septic system area.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**Natural Soil (ns):** Silty gravelly Sand, grayish brown, dry, loose-medium dense, porous,
			SM	**Older Alluvium (Qoal):** Silty gravelly Sand, medium brown, dense to very dense, slow excavation below 11 feet.

Total Depth: 16' No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

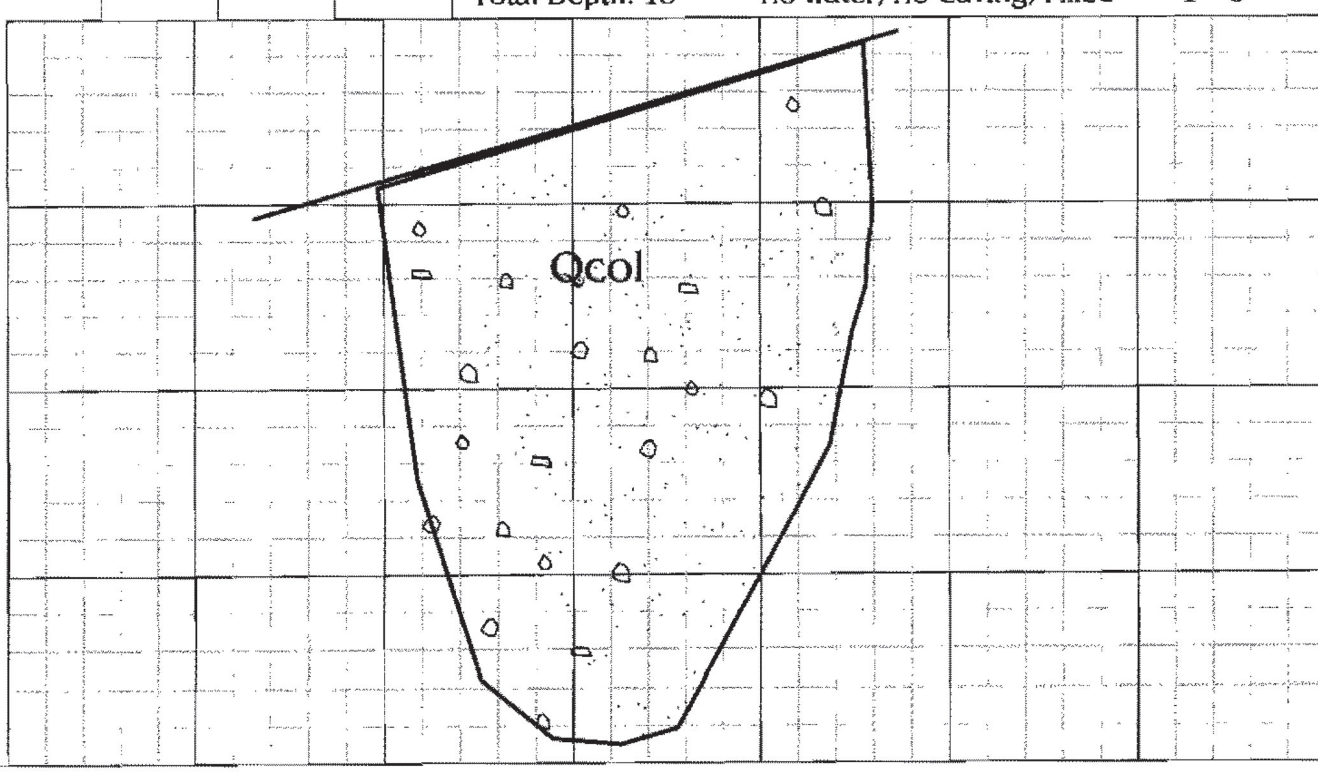
Test Hole Log GW-3

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near proposed septic system area, far east side of lot.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**0'-18' Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less.

Total Depth: 18' No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC.		Percolation Test Log
Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Listie Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-1 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:06	8:10	:04		
1"-2"	8:10	8:16	:06	0' to 5'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:16	8:29	:13		
3"-4"	8:29	8:48	:19		
4"-5"	8:48	9:14	:27	5' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 32 minutes
5"-6"	9:14	9:46	**:32**		

Percolation Hole #PH-2 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:10	8:19	:09		
1"-2"	8:19	8:43	:24	0' to 4'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:43	9:10	:27		
3"-4"	9:10	9:40	:30		
4"-5"	9:40	10:15	:35	4' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense to very dense. Percolation Rate: 42 minutes
5"-6"	10:15	10:57	**:42**		

Percolation Hole #PH-3 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:15	8:27	:12		
1"-2"	8:27	8:40	:13	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:40	8:58	:18		
3"-4"	8:58	9:20	:22		
4"-5"	9:20	9:45	:25	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, dry, slighly porous, dense. Percolation Rate: 29 minutes
5"-6"	9:45	10:14	**:29**		

Percolation Hole #PH-4 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:12	8:17	:05		
1"-2"	8:17	8:31	:14	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:31	8:48	:17		
3"-4"	8:48	9:07	:19		
4"-5"	9:07	9:31	:24	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 32 minutes
5"-6"	9:31	10:00	**:29**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. Percolation Test Log

Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Listie Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-5 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:32	8:39	:07		
1"-2"	8:39	8:41	:12	0' to 2'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:41	9:58	:17		
3"-4"	9:58	9:20	:22		
4"-5"	9:20	9:47	:27	2' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 30 minutes
5"-6"	9:47	10:17	**:30**		

Percolation Hole #PH-6 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:18	8:25	:07		
1"-2"	8:25	8:41	:16	0' to 3½'	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	8:41	9:04	:23		
3"-4"	9:04	9:34	:30		
4"-5"	9:34	10:06	:32	3½' to 6'	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense to very dense. Percolation Rate: 37 minutes
5"-6"	10:06	10:43	**:37**		

Percolation Hole #PH-7 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:27	8:44	:17		
1"-2"	8:44	9:09	:25	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	9:09	9:41	:32		
3"-4"	9:41	10:16	:35		
4"-5"	10:16	10:53	:37	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, dry, slighly porous, very dense. Percolation Rate: 40 minutes
5"-6"	10:53	11:33	**:40**		

Percolation Hole #PH-8 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:42	9:02	:20		
1"-2"	9:02	9:27	:25	0' to 4'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
2"-3"	9:27	9:58	:31		
3"-4"	9:58	10:33	:35		
4"-5"	10:33	11:10	:37	4' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 44 minutes
5"-6"	11:10	11:54	**:44**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC.

Percolation Test Log

Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Lisle Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-9 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:50	11:55	:05	0' to 6'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular cobbles up to 8" diameter averaging 3" diameter or less.
1"-2"	11:55	12:04	:09	6' to 8'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 25 minutes
2"-3"	12:04	12:17	:13		
3"-4"	12:17	12:32	:17		
4"-5"	12:32	12:51	:19		
5"-6"	12:51	1:04	**:25**		

Percolation Hole #PH-10 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:53	11:56	:03	0' to 7'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less.
1"-2"	11:56	12:04	:08	7' to 8'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 20 minutes
2"-3"	12:04	12:14	:10		
3"-4"	12:14	12:27	:13		
4"-5"	12:27	12:45	:18		
5"-6"	12:45	1:05	**:20**		

Percolation Hole #PH-11 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:56	11:59	:03	0' to 8'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less. Percolation Rate: 7 minutes
1"-2"	11:59	12:02	:03		
2"-3"	12:02	12:06	:04		
3"-4"	12:06	12:11	:05		
4"-5"	12:11	12:17	:06		
5"-6"	12:17	12:24	**:07**		

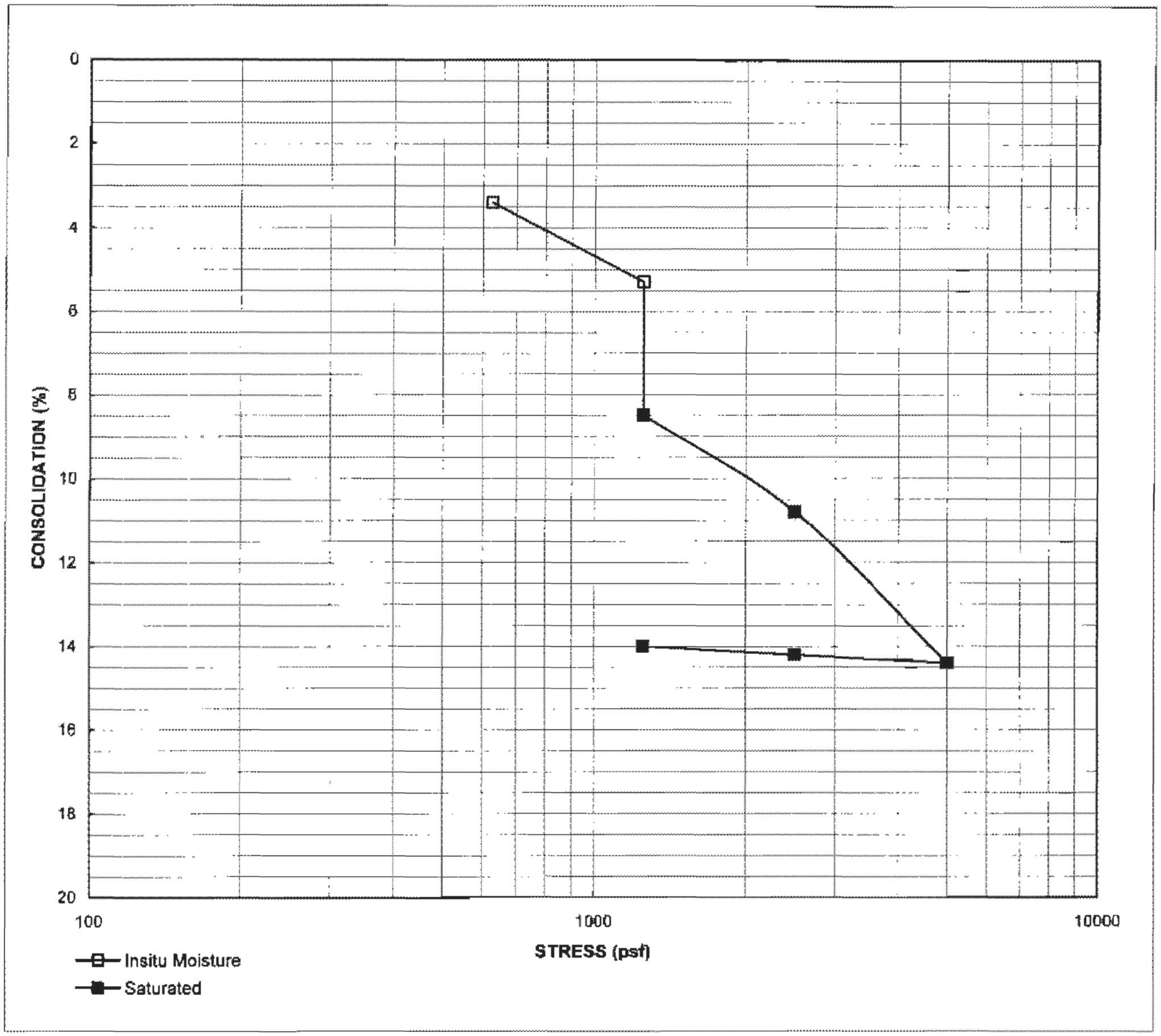
Percolation Hole #PH-12 — Surface Description: 3.5:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:58	12:00	:02	0' to 8'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less. Percolation Rate: 6 minutes
1"-2"	12:00	12:03	:03		
2"-3"	12:03	12:06	:03		
3"-4"	12:06	12:10	:04		
4"-5"	12:10	12:15	:05		
5"-6"	12:15	12:21	**:06**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

CONSOLIDATION TEST

ASTM D2435

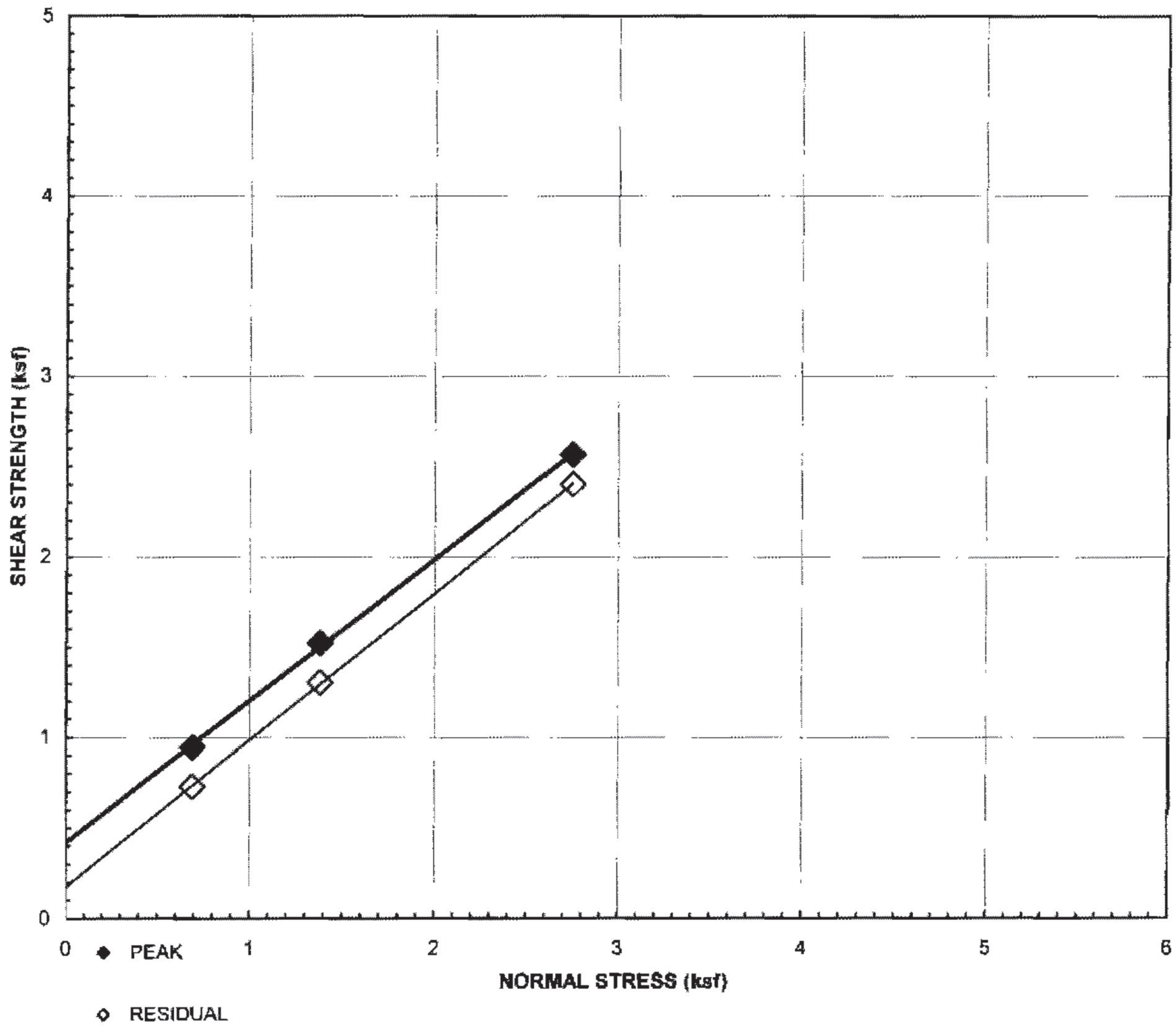


Client:	Dovernay	Sample Description:	Soil
Project Number:	1008170	Insitu Moisture:	4.1%
Project Location:	Sierra Hwy, Acton	Saturated Moisture:	9.6%
Sample Location:	GW-1	Dry Density (pcf):	131.8
Sample Number:	1		
Depth:	3.5 Feet		

SOUTHWEST GEOTECHNICAL, INC.

REMOLDED DIRECT SATURATED SHEAR

ASTM D3080



PEAK VALUE:	Cohesion (psf):	420	Phi (deg.):	38
RESIDUAL VALUE:	Cohesion (psf):	190	Phi (deg.):	39

Client: Duvernay
Project Number: 1008170
Project Location: Sierra Highway, Acton
Sample Location: TH 2
Sample Number: 1
Depth: 0-6 Feet

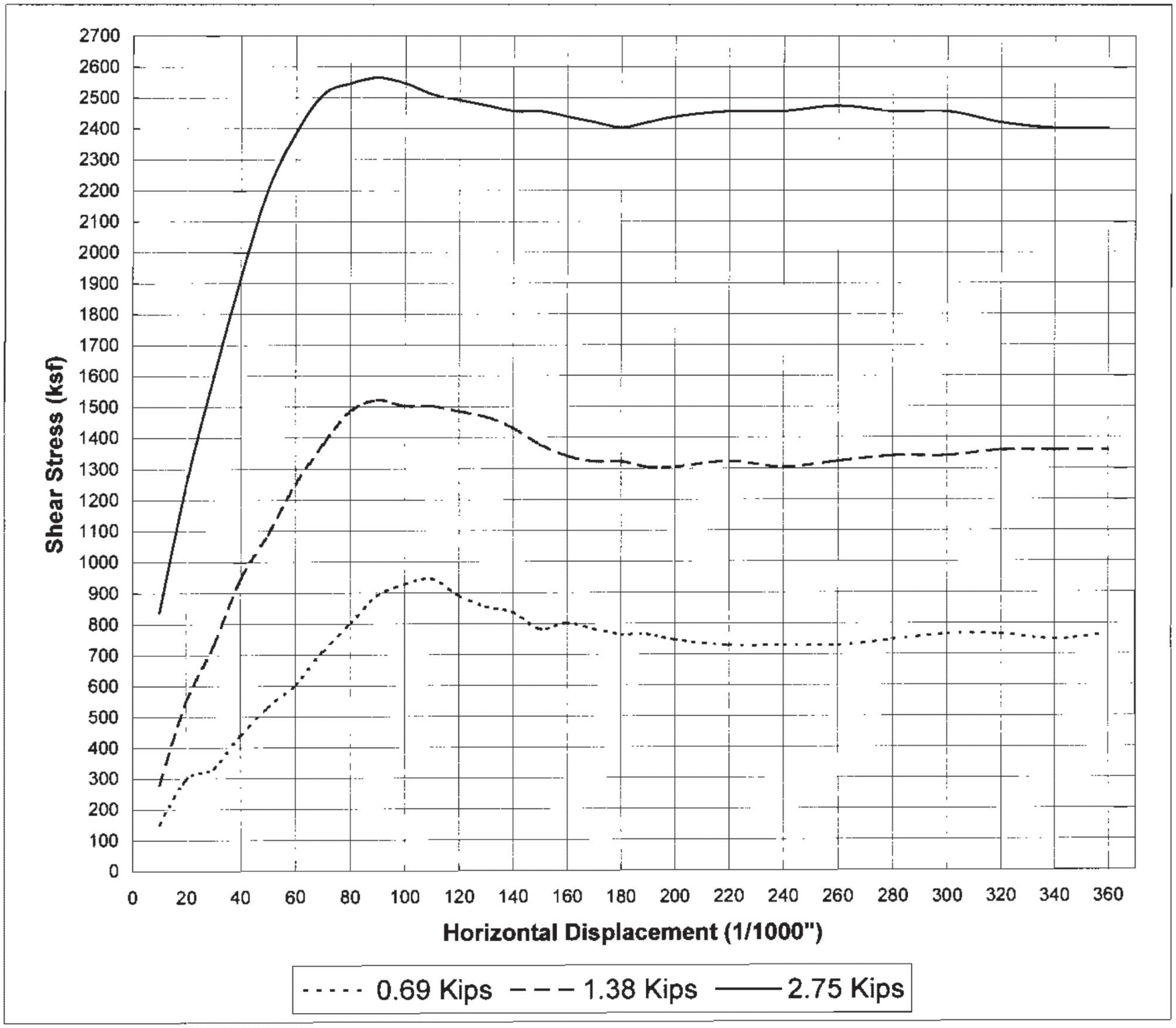
Sample Description: 95% Remolded Qoal
Dry Density (pcf): 130.3

	Insitu	Saturated
Moisture Content:	5.7%	56.1%
Percent Saturation	10.2%	100%

SOUTHWEST GEOTECHNICAL, INC.

DIRECT SHEAR - STRESS-STRAIN CURVES

ASTM D3080



PEAK VALUE:	Cohesion (psf):	420	Phi (deg.):	38
RESIDUAL VALUE:	Cohesion (psf):	190	Phi (deg.):	39

Client: Dovernay
Project Number: 1008170
Project Location: Sierra Hwy, Acton
Sample Location: TH 2
Sample Number: 1
Depth: 0-6Ft

Sample Description: 95% Remolded Qoa
Dry Density (pcf): 130.3
Strain rate: .02 inches/min

	Insitu	Saturated
Moisture Content:	5.7%	10.2%
Percent Saturation	56.1%	100%

SOUTHWEST GEOTECHNICAL, INC.

ACTON QUADRANGLE
SHEAR STRENGTH GROUPS

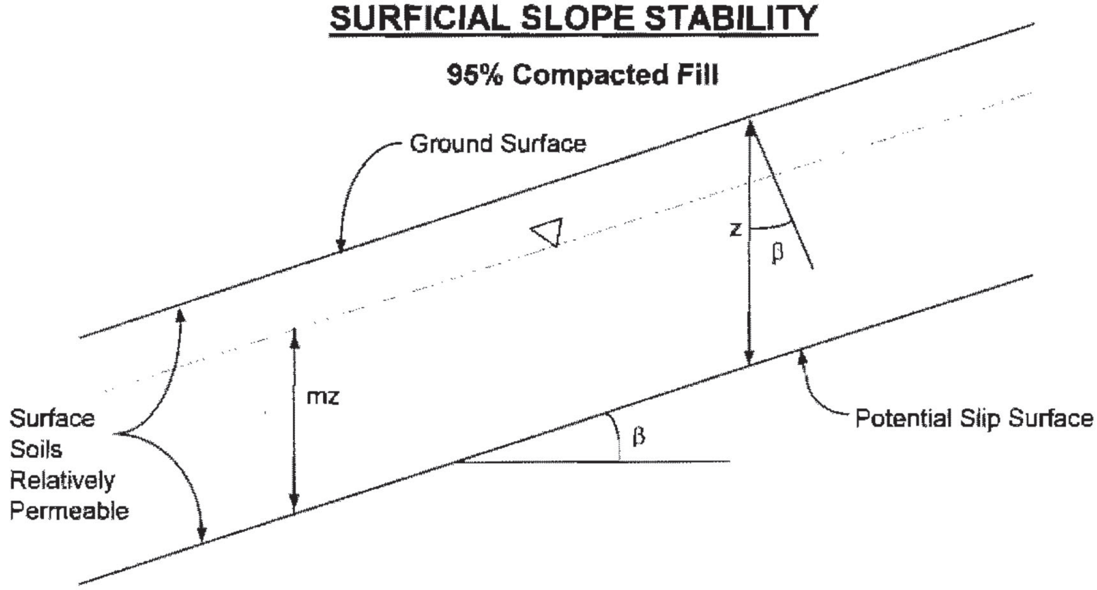
	Formation Name	Number Tests	Mean/Median Phi (deg)	Mean/Median Group Phi (deg)	Mean/Median Group C (psf)	No Data: Similar Lithology	Phi Values Used in Stability Analyses
GROUP 1	sy	5	38/39	38/38	259/200	msg	38
	hgd	10	38/35			ggn	
	lgdb	11	38/37			dgn	
	lgdp	6	39/39			lgb	
	lgdh	9	38/37			hgb	
	Tvcgl(fbc)	4	40/39			lgdd	
						Tvcg(fbc)	
						Tvcd(fbc)	
GROUP 2	gr	11	35/34	34/35	248/200	an	34
	Tvb(fbc)	19	35/35			Tal	
	Qoa	114	35/35			Tvcal(fbc)	
	Qa	17	33/33			Tva(fbc)	
						Tvbb(fbc)	
						Tvcs(fbc)	
						Tvcg(abc)	
						Tvcd(abc)	
						Qg	
GROUP 3	af	9	29/30	29/30	280/225	Tvcgl(abc)	30*
						Tpcal(abc)	
						Tvcs(abc)	
						rc	
GROUP 4	Tvb(abc)	3	28/26	28/26	475/200	Tva(abc)	26*
						Tvbb(abc)	
GROUP 5						Qls	16

* Median shear strength value was used in the stability analysis due to so few numbers in the sample set.
abc = adverse bedding condition, fine-grained material strength
fbc = favorable bedding condition, coarse-grained material strength
Formation abbreviations from Dibblee (1996)

Table 2.1. Summary of the Shear Strength Statistics for the Acton Quadrangle.

SURFICIAL SLOPE STABILITY

95% Compacted Fill



F.S.	= Static Factor of Safety		
γ	= Unit Weight of Soil	= 140	pcf
γw	= Unit Weight of Water	= 62.4	pcf
c	= Cohesion of Soil	= 190	psf
ϕ'	= Effective Angle of Internal Friction	= 38	degree
z	= Vertical Depth of Slip Surface	= 4	
mz	= Vertical Height of Temporary Water Surface Above Slip Surface	= 1	
β	= Slope Angle	= 26.5	degrees

$$F.S. = \frac{c + z(\gamma - m\gamma w)\,Cos^2\beta\,Tan\phi'}{z\,\gamma\,Sin\beta\,Cos\beta}$$

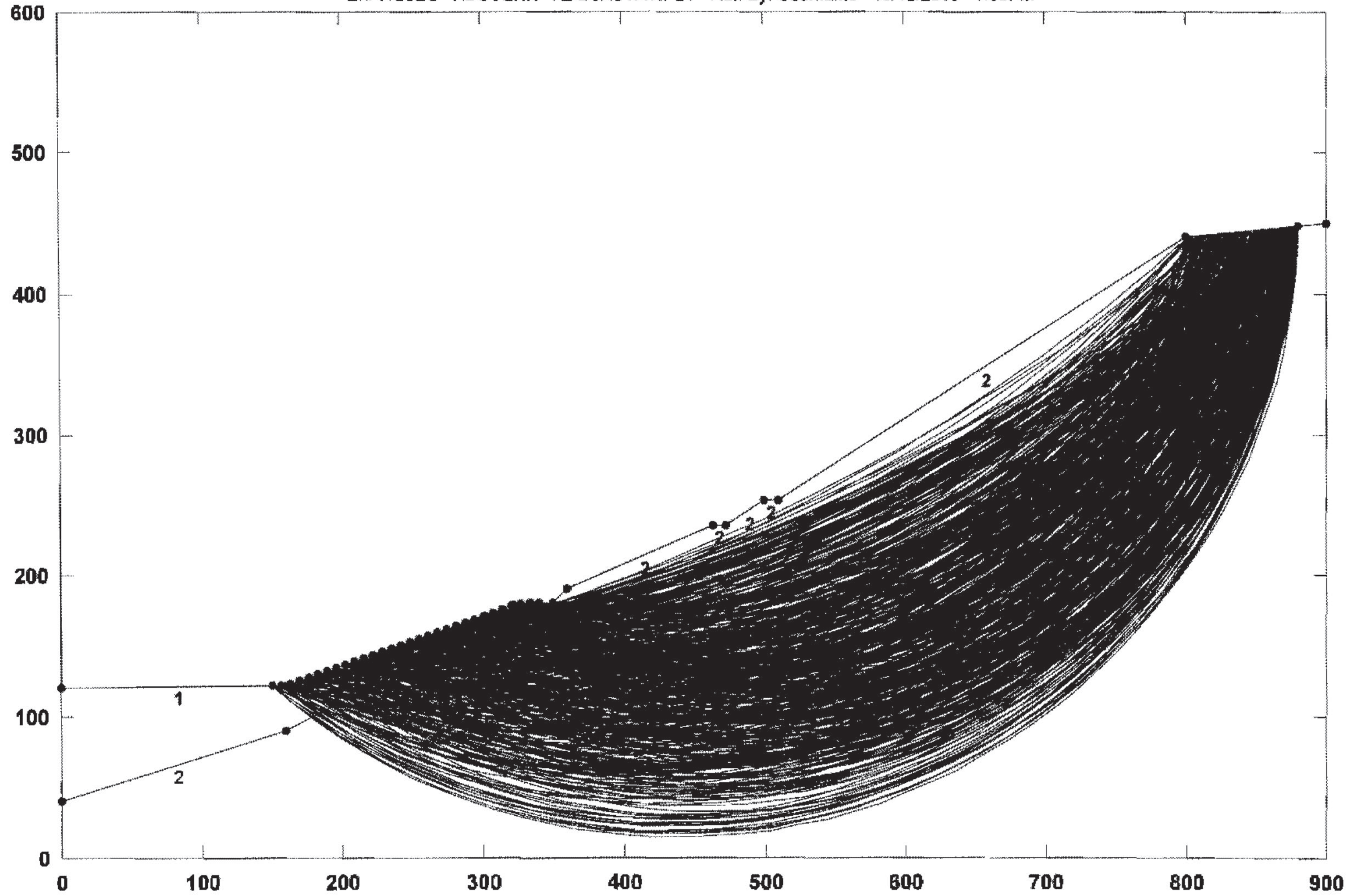
F.S. = 1.72

Client: Duvernay
Project Number: SGI # 1008170
Project Location: Sierra Highway, Acton

SOUTHWEST GEOTECHNICAL, INC.

Duvernay, Section A-A' Static Stability Analysis

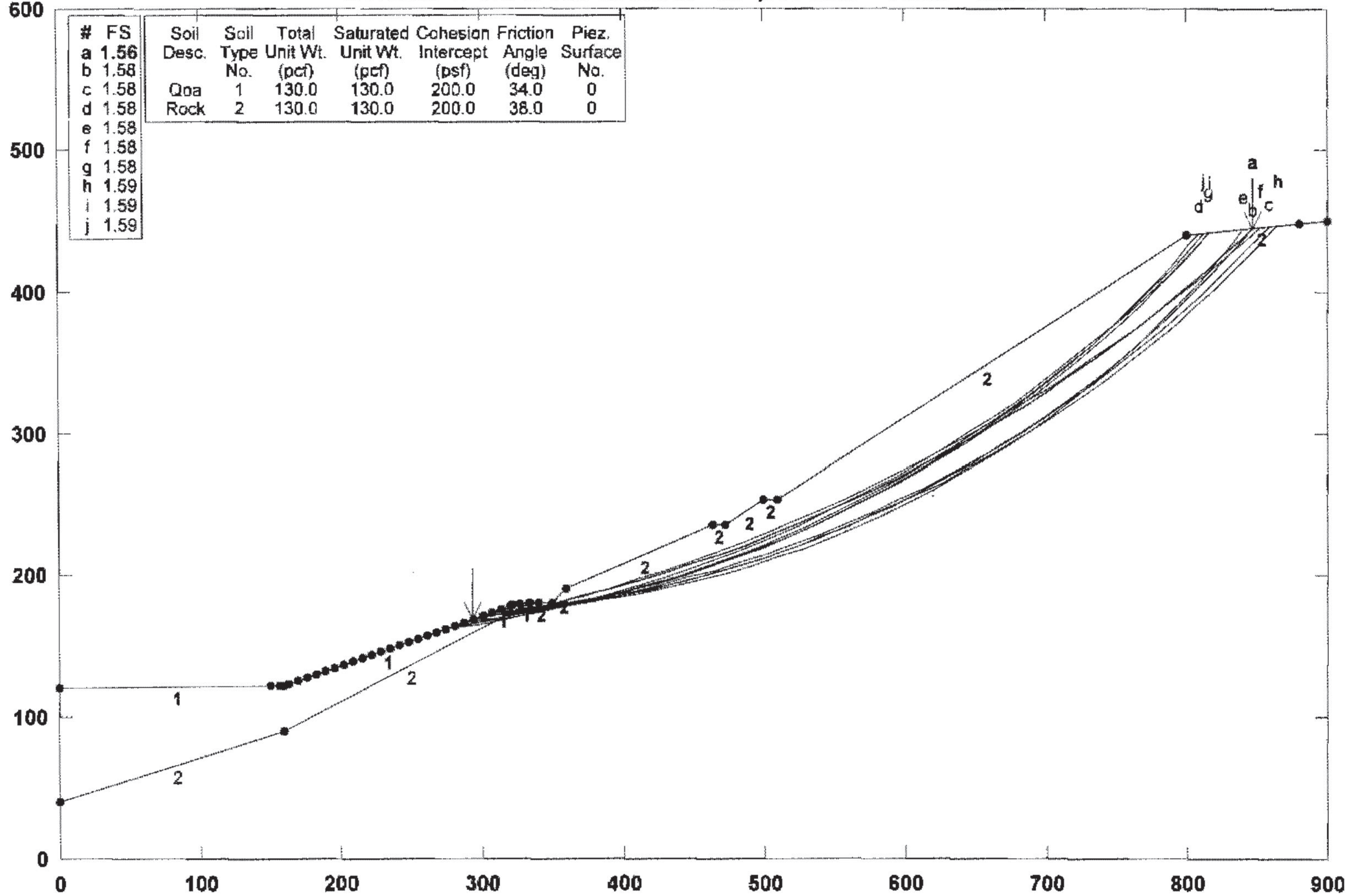
Z:\PROJEC~1\DUVERN~1\DUVASTAT.PLT Run By: Username 10/12/2010 1:30PM



GSTABL7

Duvernay, Section A-A' Static Stability Analysis

Z:\PROJEC~1\DUVERN~1\DUVASTAT.PL2 Run By: Username 10/12/2010 1:30PM



GSTABL7 v.2 FSmin=1.56

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

```
                          *** GSTABL7 ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
  ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
              (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:        10/12/2010
Time of Run:              1:30PM
Run By:                   Username
Input Data Filename:      Z:DUVASTAT.
Output Filename:          Z:DUVASTAT.OUT
Unit System:              English
Plotted Output Filename:  Z:DUVASTAT.PLT
PROBLEM DESCRIPTION:  Duvernay, Section A-A'
                      Static Stability Analysis
BOUNDARY COORDINATES
   12 Top   Boundaries
   14 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)      (ft)       (ft)      Below Bnd
    1          0.00     120.00     160.00     122.00        1
    2        160.00     122.00     302.00     171.00        1
    3        302.00     171.00     322.00     179.00        1
    4        322.00     179.00     334.00     180.00        1
    5        334.00     180.00     350.00     180.00        2
    6        350.00     180.00     360.00     190.00        2
    7        360.00     190.00     463.00     235.00        2
    8        463.00     235.00     473.00     235.00        2
    9        473.00     235.00     500.00     253.00        2
   10        500.00     253.00     510.00     253.00        2
   11        510.00     253.00     800.00     440.00        2
   12        800.00     440.00     900.00     450.00        2
   13          0.00      40.00     160.00      90.00        2
   14        160.00      90.00     334.00     180.00        2
Default Y-Origin = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore    Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept  Angle  Pressure Constant  Surface
 No.  (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)      No.
  1   130.0    130.0     200.0    34.0    0.00       0.0        0
  2   130.0    130.0     200.0    38.0    0.00       0.0        0
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
 600 Trial Surfaces Have Been Generated.
  20 Surface(s) Initiate(s) From Each Of   30 Points Equally Spaced
Along The Ground Surface Between  X = 150.00(ft)
                            and   X = 340.00(ft)
Each Surface Terminates Between   X = 800.00(ft)
                            and   X = 880.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
20.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Evaluated =    600
      Statistical Data On All Valid FS Values:
         FS Max =   2.858   FS Min =   1.562   FS Ave =   2.117
```

Standard Deviation = 0.356 Coefficient of Variation = 16.80 %

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	294.14	168.29
2	313.80	171.95
3	333.39	175.97
4	352.91	180.35
5	372.34	185.09
6	391.68	190.19
7	410.92	195.65
8	430.06	201.45
9	449.08	207.61
10	468.00	214.12
11	486.78	220.97
12	505.44	228.17
13	523.97	235.72
14	542.35	243.60
15	560.58	251.82
16	578.66	260.37
17	596.58	269.26
18	614.33	278.47
19	631.91	288.01
20	649.31	297.87
21	666.52	308.05
22	683.55	318.54
23	700.38	329.35
24	717.00	340.47
25	733.42	351.88
26	749.63	363.60
27	765.62	375.62
28	781.38	387.93
29	796.92	400.53
30	812.22	413.41
31	827.28	426.57
32	842.09	440.00
33	847.09	444.71

Circle Center At X = 105.20 ; Y = 1237.69 ; and Radius = 1085.97

Factor of Safety

*** 1.562 ***

Individual data on the 43 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	7.9	638.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	11.8	3851.3	0.0	0.0	0.	0.	0.0	0.0	0.0
3	7.7	4513.6	0.0	0.0	0.	0.	0.0	0.0	0.0
4	0.5	357.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	11.4	6921.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	0.6	311.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	16.0	4360.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	2.9	538.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	7.1	4827.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	12.3	14602.0	0.0	0.0	0.	0.	0.0	0.0	0.0
11	19.3	30095.6	0.0	0.0	0.	0.	0.0	0.0	0.0
12	19.2	37829.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	19.1	44477.5	0.0	0.0	0.	0.	0.0	0.0	0.0
14	19.0	50046.3	0.0	0.0	0.	0.	0.0	0.0	0.0
15	13.9	39718.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	5.0	14118.8	0.0	0.0	0.	0.	0.0	0.0	0.0
17	5.0	12991.0	0.0	0.0	0.	0.	0.0	0.0	0.0
18	13.8	37873.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	13.2	43074.1	0.0	0.0	0.	0.	0.0	0.0	0.0
20	5.4	18310.9	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.6	14157.2	0.0	0.0	0.	0.	0.0	0.0	0.0
22	14.0	44721.1	0.0	0.0	0.	0.	0.0	0.0	0.0

23	18.4	67567.2	0.0	0.0	0.	0.	0.0	0.0	0.0
24	18.2	75921.3	0.0	0.0	0.	0.	0.0	0.0	0.0
25	18.1	83083.2	0.0	0.0	0.	0.	0.0	0.0	0.0
26	17.9	89068.9	0.0	0.0	0.	0.	0.0	0.0	0.0
27	17.8	93896.5	0.0	0.0	0.	0.	0.0	0.0	0.0
28	17.6	97587.1	0.0	0.0	0.	0.	0.0	0.0	0.0
29	17.4	100164.1	0.0	0.0	0.	0.	0.0	0.0	0.0
30	17.2	101653.3	0.0	0.0	0.	0.	0.0	0.0	0.0
31	17.0	102083.4	0.0	0.0	0.	0.	0.0	0.0	0.0
32	16.8	101485.0	0.0	0.0	0.	0.	0.0	0.0	0.0
33	16.6	99891.3	0.0	0.0	0.	0.	0.0	0.0	0.0
34	16.4	97337.5	0.0	0.0	0.	0.	0.0	0.0	0.0
35	16.2	93861.4	0.0	0.0	0.	0.	0.0	0.0	0.0
36	16.0	89502.8	0.0	0.0	0.	0.	0.0	0.0	0.0
37	15.8	84303.7	0.0	0.0	0.	0.	0.0	0.0	0.0
38	15.5	78307.8	0.0	0.0	0.	0.	0.0	0.0	0.0
39	3.1	14903.9	0.0	0.0	0.	0.	0.0	0.0	0.0
40	12.2	51372.3	0.0	0.0	0.	0.	0.0	0.0	0.0
41	15.1	43048.9	0.0	0.0	0.	0.	0.0	0.0	0.0
42	14.8	19614.5	0.0	0.0	0.	0.	0.0	0.0	0.0
43	5.0	1368.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	307.24	173.10
2	327.17	174.85
3	347.04	177.10
4	366.85	179.86
5	386.58	183.11
6	406.23	186.86
7	425.77	191.11
8	445.20	195.85
9	464.50	201.08
10	483.67	206.79
11	502.69	212.99
12	521.54	219.66
13	540.22	226.81
14	558.71	234.43
15	577.00	242.51
16	595.09	251.06
17	612.95	260.05
18	630.58	269.50
19	647.96	279.39
20	665.09	289.71
21	681.96	300.46
22	698.54	311.64
23	714.84	323.23
24	730.84	335.23
25	746.54	347.62
26	761.91	360.42
27	776.96	373.59
28	791.67	387.14
29	806.03	401.06
30	820.04	415.34
31	833.68	429.96
32	846.71	444.67

Circle Center At X = 247.90 ; Y = 962.58 ; and Radius = 791.71

Factor of Safety
*** 1.575 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	307.24	173.10
2	327.13	175.24
3	346.96	177.85
4	366.72	180.92
5	386.41	184.44

6	406.01	188.42
7	425.51	192.85
8	444.91	197.73
9	464.18	203.05
10	483.33	208.83
11	502.34	215.04
12	521.20	221.70
13	539.90	228.78
14	558.44	236.30
15	576.79	244.25
16	594.96	252.62
17	612.92	261.41
18	630.68	270.61
19	648.22	280.22
20	665.53	290.23
21	682.61	300.64
22	699.44	311.45
23	716.01	322.64
24	732.33	334.21
25	748.37	346.16
26	764.13	358.47
27	779.60	371.15
28	794.77	384.18
29	809.64	397.56
30	824.19	411.28
31	838.42	425.33
32	852.32	439.71
33	857.94	445.79

Circle Center At X = 224.45 ; Y = 1032.87 ; and Radius = 863.75
Factor of Safety
*** 1.576 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	300.69	170.55
2	320.54	173.03
3	340.31	176.02
4	360.00	179.51
5	379.60	183.51
6	399.09	188.01
7	418.45	193.00
8	437.69	198.49
9	456.77	204.47
10	475.70	210.94
11	494.45	217.89
12	513.02	225.32
13	531.39	233.22
14	549.56	241.59
15	567.50	250.42
16	585.21	259.71
17	602.68	269.44
18	619.90	279.63
19	636.85	290.25
20	653.52	301.30
21	669.90	312.77
22	685.98	324.66
23	701.75	336.96
24	717.20	349.65
25	732.33	362.74
26	747.11	376.22
27	761.54	390.06
28	775.61	404.27
29	789.32	418.84
30	802.65	433.75
31	808.69	440.87

Circle Center At X = 213.72 ; Y = 946.64 ; and Radius = 780.95
Factor of Safety

*** 1.579 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	313.79	175.72
2	333.76	176.87
3	353.69	178.59
4	373.56	180.86
5	393.36	183.69
6	413.07	187.07
7	432.68	191.00
8	452.17	195.49
9	471.53	200.51
10	490.74	206.08
11	509.78	212.18
12	528.65	218.81
13	547.33	225.97
14	565.79	233.65
15	584.04	241.84
16	602.05	250.54
17	619.80	259.74
18	637.30	269.44
19	654.51	279.62
20	671.43	290.28
21	688.05	301.41
22	704.35	313.01
23	720.31	325.05
24	735.94	337.54
25	751.21	350.45
26	766.11	363.80
27	780.63	377.55
28	794.75	391.71
29	808.48	406.25
30	821.80	421.18
31	834.69	436.47
32	840.74	444.07

Circle Center At X = 282.62 ; Y = 888.48 ; and Radius = 713.44

Factor of Safety

*** 1.579 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	274.48	161.50
2	294.06	165.59
3	313.57	169.99
4	333.01	174.70
5	352.37	179.72
6	371.65	185.04
7	390.84	190.66
8	409.94	196.59
9	428.95	202.82
10	447.85	209.35
11	466.65	216.18
12	485.34	223.31
13	503.91	230.73
14	522.36	238.44
15	540.69	246.45
16	558.89	254.74
17	576.95	263.33
18	594.88	272.19
19	612.66	281.34
20	630.30	290.77
21	647.79	300.48
22	665.12	310.46
23	682.29	320.72
24	699.29	331.25
25	716.13	342.04

26	732.79	353.10
27	749.28	364.43
28	765.58	376.01
29	781.70	387.85
30	797.63	399.94
31	813.37	412.29
32	828.90	424.88
33	844.24	437.72
34	853.02	445.30

Circle Center At X = 26.20 ; Y = 1399.23 ; and Radius = 1262.38

Factor of Safety

*** 1.581 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	287.59	166.03
2	307.42	168.59
3	327.19	171.62
4	346.88	175.12
5	366.48	179.09
6	385.98	183.53
7	405.37	188.44
8	424.64	193.81
9	443.77	199.63
10	462.76	205.92
11	481.59	212.65
12	500.26	219.83
13	518.75	227.46
14	537.05	235.52
15	555.15	244.03
16	573.05	252.96
17	590.72	262.31
18	608.17	272.09
19	625.38	282.28
20	642.34	292.88
21	659.04	303.88
22	675.48	315.28
23	691.64	327.06
24	707.51	339.23
25	723.08	351.78
26	738.35	364.69
27	753.31	377.97
28	767.95	391.60
29	782.26	405.57
30	796.23	419.89
31	809.85	434.53
32	816.13	441.61

Circle Center At X = 190.60 ; Y = 996.67 ; and Radius = 836.29

Factor of Safety

*** 1.581 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	300.69	170.55
2	320.59	172.56
3	340.44	175.03
4	360.22	177.95
5	379.94	181.31
6	399.57	185.13
7	419.11	189.39
8	438.55	194.10
9	457.87	199.24
10	477.08	204.83
11	496.15	210.85
12	515.08	217.31
13	533.86	224.19
14	552.48	231.50

```
  15        570.92      239.23
  16        589.19      247.38
  17        607.26      255.94
  18        625.13      264.91
  19        642.80      274.29
  20        660.25      284.07
  21        677.47      294.24
  22        694.45      304.80
  23        711.19      315.74
  24        727.68      327.06
  25        743.90      338.76
  26        759.86      350.82
  27        775.53      363.24
  28        790.92      376.02
  29        806.01      389.14
  30        820.80      402.60
  31        835.28      416.40
  32        849.44      430.52
  33        863.28      444.96
  34        864.66      446.47
Circle Center At X =   222.23 ; Y =  1045.25 ; and Radius =   878.21
      Factor of Safety
    ***    1.590   ***
Failure Surface Specified By 33 Coordinate Points
  Point     X-Surf      Y-Surf
   No.       (ft)        (ft)
   1        274.48      161.50
   2        294.24      164.63
   3        313.92      168.17
   4        333.53      172.13
   5        353.04      176.50
   6        372.46      181.29
   7        391.77      186.50
   8        410.97      192.11
   9        430.04      198.13
  10        448.98      204.56
  11        467.78      211.39
  12        486.43      218.61
  13        504.92      226.23
  14        523.24      234.25
  15        541.39      242.65
  16        559.36      251.44
  17        577.13      260.61
  18        594.71      270.15
  19        612.07      280.07
  20        629.23      290.35
  21        646.16      301.00
  22        662.86      312.01
  23        679.32      323.36
  24        695.53      335.07
  25        711.50      347.12
  26        727.20      359.51
  27        742.64      372.22
  28        757.80      385.27
  29        772.68      398.63
  30        787.27      412.31
  31        801.56      426.30
  32        815.56      440.58
  33        816.57      441.66
Circle Center At X =   137.83 ; Y =  1090.51 ; and Radius =   939.00
      Factor of Safety
    ***    1.590   ***
Failure Surface Specified By 32 Coordinate Points
  Point     X-Surf      Y-Surf
   No.       (ft)        (ft)
   1        281.04      163.77
   2        300.85      166.48
```

3	320.60	169.65
4	340.26	173.28
5	359.84	177.37
6	379.32	181.91
7	398.69	186.91
8	417.93	192.35
9	437.04	198.25
10	456.01	204.59
11	474.83	211.36
12	493.48	218.58
13	511.96	226.22
14	530.26	234.30
15	548.36	242.80
16	566.27	251.72
17	583.95	261.05
18	601.42	270.79
19	618.65	280.94
20	635.65	291.49
21	652.39	302.43
22	668.87	313.75
23	685.09	325.46
24	701.03	337.54
25	716.68	349.99
26	732.04	362.80
27	747.09	375.97
28	761.84	389.48
29	776.26	403.34
30	790.36	417.52
31	804.12	432.03
32	812.47	441.25

Circle Center At X = 174.74 ; Y = 1014.98 ; and Radius = 857.82

Factor of Safety

*** 1.591 ***

**** END OF GSTABL7 OUTPUT ****

Duvernay, Section A-A' Seismic Stability Analysis

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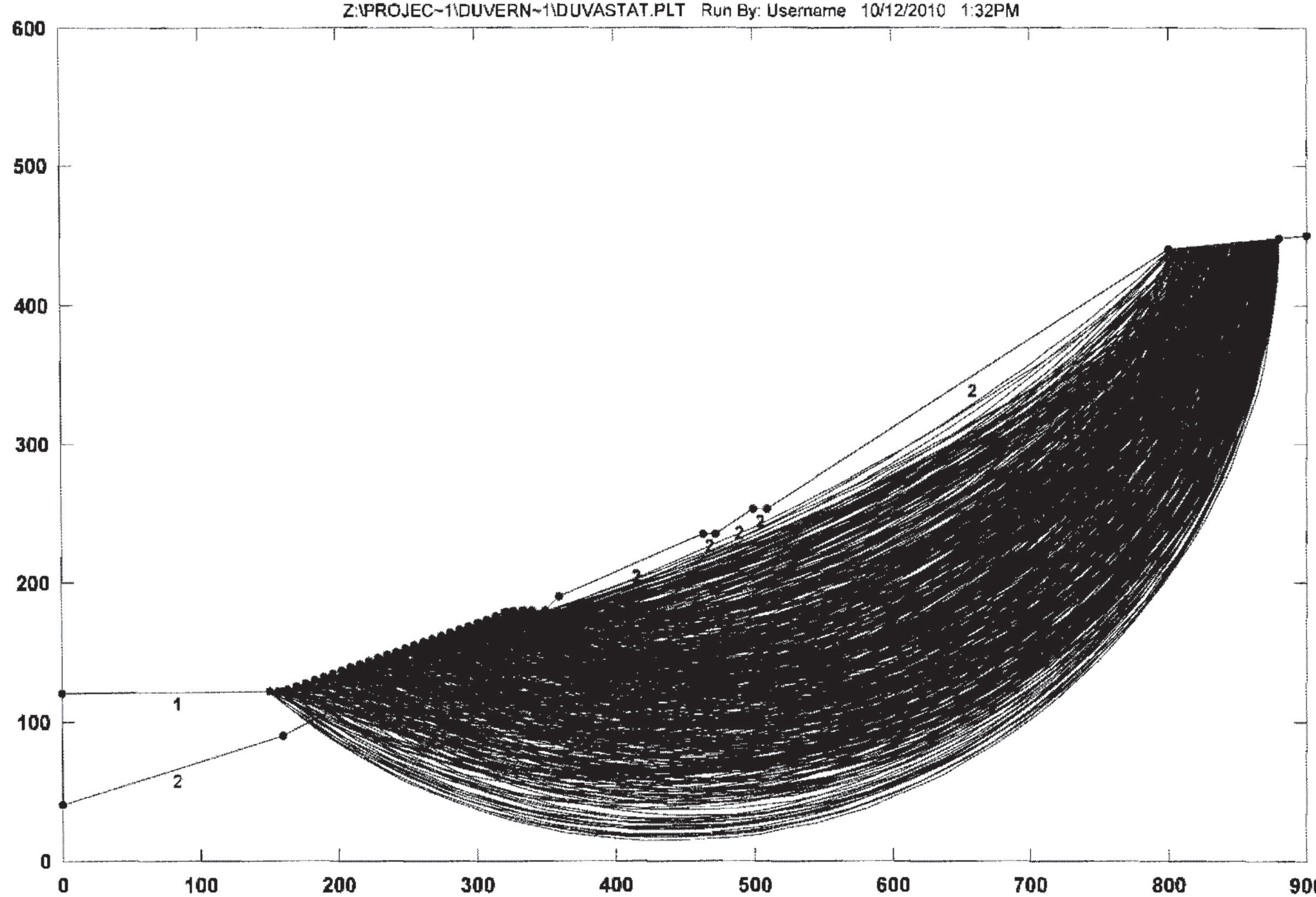

GSTABL7

Duvernay, Section A-A' Seismic Stability Analysis

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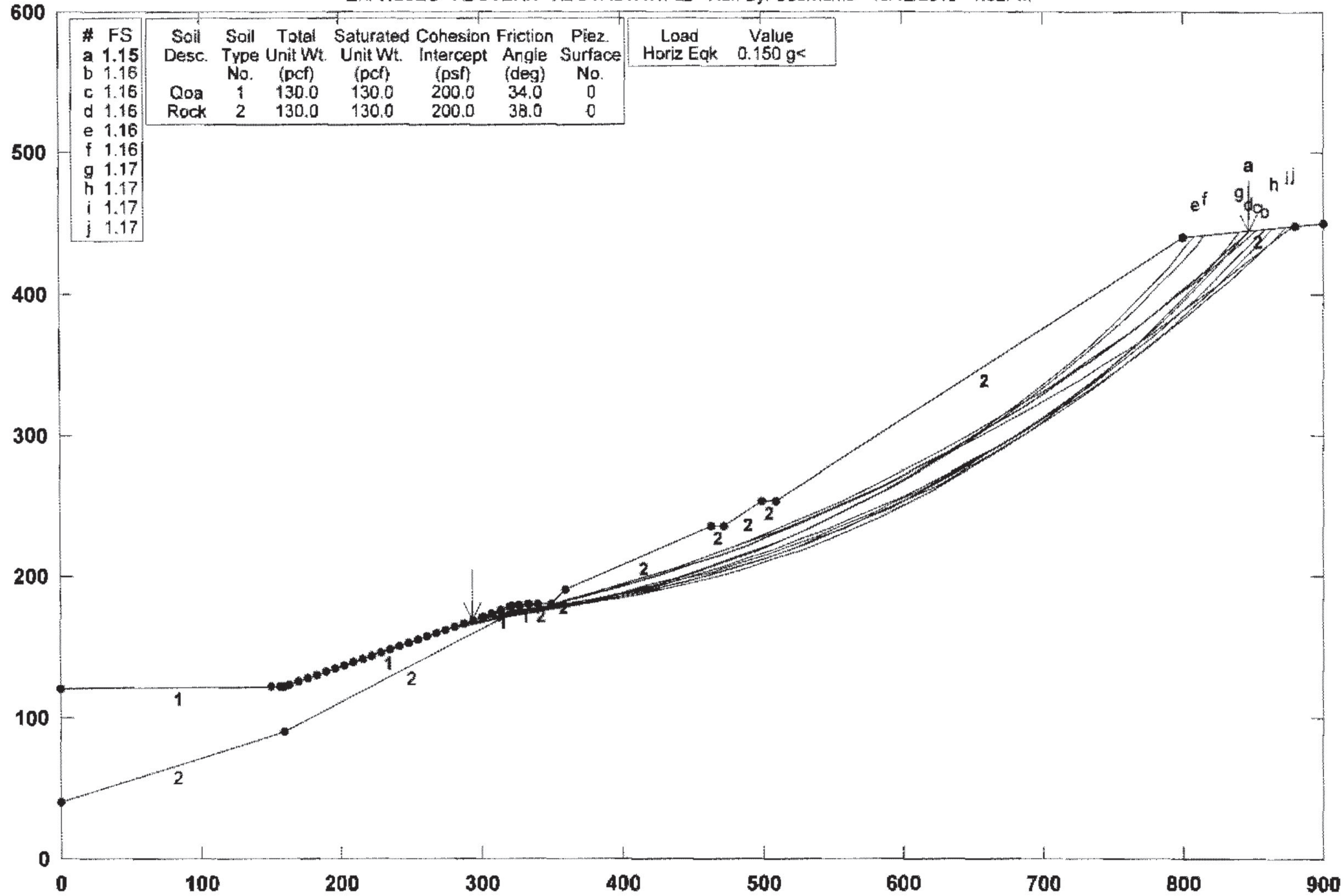

GSTABL7 v.2 FSmin=1.15

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

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                         ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
 ** Original Version 1.0, January 1996; Current Version 2.002, December 2001 **
           (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
      Modified Bishop, Simplified Janbu, or GLE Method of Slices.
      (Includes Spencer & Morgenstern-Price Type Analysis)
      Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
      Nonlinear Undrained Shear Strength, Curved Phi Envelope,
      Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
      Surfaces, Pseudo-Static Earthquake, and Applied Force Options.
*********************************************************************************
Analysis Run Date:          10/12/2010
Time of Run:                1:32PM
Run By:                     Username
Input Data Filename:        Z:DUVASTAT.
Output Filename:            Z:DUVASTAT.OUT
Unit System:                English
Plotted Output Filename:    Z:DUVASTAT.PLT
PROBLEM DESCRIPTION:  Duvernay, Section A-A'
                      Seismic Stability Analysis
BOUNDARY COORDINATES
   12 Top  Boundaries
   14 Total Boundaries
Boundary    X-Left     Y-Left     X-Right     Y-Right     Soil Type
  No.        (ft)       (ft)       (ft)        (ft)       Below Bnd
   1         0.00      120.00     160.00      122.00         1
   2       160.00      122.00     302.00      171.00         1
   3       302.00      171.00     322.00      179.00         1
   4       322.00      179.00     334.00      180.00         1
   5       334.00      180.00     350.00      180.00         2
   6       350.00      180.00     360.00      190.00         2
   7       360.00      190.00     463.00      235.00         2
   8       463.00      235.00     473.00      235.00         2
   9       473.00      235.00     500.00      253.00         2
  10       500.00      253.00     510.00      253.00         2
  11       510.00      253.00     800.00      440.00         2
  12       800.00      440.00     900.00      450.00         2
  13         0.00       40.00     160.00       90.00         2
  14       160.00       90.00     334.00      180.00         2
Default Y-Origin = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 2 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept  Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)     No.
  1   130.0    130.0     200.0    34.0    0.00       0.0      0
  2   130.0    130.0     200.0    38.0    0.00       0.0      0
A Horizontal Earthquake Loading Coefficient
Of0.150 Has Been Assigned
A Vertical Earthquake Loading Coefficient
Of0.000 Has Been Assigned
Cavitation Pressure =     0.0(psf)
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
 600 Trial Surfaces Have Been Generated.
  20 Surface(s) Initiate(s) From Each Of    30 Points Equally Spaced
Along The Ground Surface Between  X = 150.00(ft)
                             and  X = 340.00(ft)
Each Surface Terminates Between   X = 800.00(ft)
                             and  X = 880.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
20.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
```

Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 600
Statistical Data On All Valid FS Values:
FS Max = 2.133 FS Min = 1.148 FS Ave = 1.577
Standard Deviation = 0.280 Coefficient of Variation = 17.76 %
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	294.14	168.29
2	313.80	171.95
3	333.39	175.97
4	352.91	180.35
5	372.34	185.09
6	391.68	190.19
7	410.92	195.65
8	430.06	201.45
9	449.08	207.61
10	468.00	214.12
11	486.78	220.97
12	505.44	228.17
13	523.97	235.72
14	542.35	243.60
15	560.58	251.82
16	578.66	260.37
17	596.58	269.26
18	614.33	278.47
19	631.91	288.01
20	649.31	297.87
21	666.52	308.05
22	683.55	318.54
23	700.38	329.35
24	717.00	340.47
25	733.42	351.88
26	749.63	363.60
27	765.62	375.62
28	781.38	387.93
29	796.92	400.53
30	812.22	413.41
31	827.28	426.57
32	842.09	440.00
33	847.09	444.71

Circle Center At X = 105.20 ; Y = 1237.69 ; and Radius = 1085.97
Factor of Safety
*** 1.148 ***
Individual data on the 43 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	7.9	638.2	0.0	0.0	0.	0.	95.7	0.0	0.0
2	11.8	3851.3	0.0	0.0	0.	0.	577.7	0.0	0.0
3	7.7	4513.6	0.0	0.0	0.	0.	677.0	0.0	0.0
4	0.5	357.9	0.0	0.0	0.	0.	53.7	0.0	0.0
5	11.4	6921.3	0.0	0.0	0.	0.	1038.2	0.0	0.0
6	0.6	311.1	0.0	0.0	0.	0.	46.7	0.0	0.0
7	16.0	4360.1	0.0	0.0	0.	0.	654.0	0.0	0.0
8	2.9	538.7	0.0	0.0	0.	0.	80.8	0.0	0.0
9	7.1	4827.3	0.0	0.0	0.	0.	724.1	0.0	0.0
10	12.3	14602.0	0.0	0.0	0.	0.	2190.3	0.0	0.0
11	19.3	30095.6	0.0	0.0	0.	0.	4514.3	0.0	0.0
12	19.2	37829.5	0.0	0.0	0.	0.	5674.4	0.0	0.0
13	19.1	44477.5	0.0	0.0	0.	0.	6671.6	0.0	0.0
14	19.0	50046.3	0.0	0.0	0.	0.	7507.0	0.0	0.0
15	13.9	39718.0	0.0	0.0	0.	0.	5957.7	0.0	0.0
16	5.0	14118.8	0.0	0.0	0.	0.	2117.8	0.0	0.0
17	5.0	12991.0	0.0	0.0	0.	0.	1948.7	0.0	0.0

18	13.8	37873.3	0.0	0.0	0.	0.	5681.0	0.0	0.0
19	13.2	43074.1	0.0	0.0	0.	0.	6461.1	0.0	0.0
20	5.4	18310.9	0.0	0.0	0.	0.	2746.6	0.0	0.0
21	4.6	14157.2	0.0	0.0	0.	0.	2123.6	0.0	0.0
22	14.0	44721.1	0.0	0.0	0.	0.	6708.2	0.0	0.0
23	18.4	67567.2	0.0	0.0	0.	0.	10135.1	0.0	0.0
24	18.2	75921.3	0.0	0.0	0.	0.	11388.2	0.0	0.0
25	18.1	83083.2	0.0	0.0	0.	0.	12462.5	0.0	0.0
26	17.9	89068.9	0.0	0.0	0.	0.	13360.3	0.0	0.0
27	17.8	93896.5	0.0	0.0	0.	0.	14084.5	0.0	0.0
28	17.6	97587.1	0.0	0.0	0.	0.	14638.1	0.0	0.0
29	17.4	100164.1	0.0	0.0	0.	0.	15024.6	0.0	0.0
30	17.2	101653.3	0.0	0.0	0.	0.	15248.0	0.0	0.0
31	17.0	102083.4	0.0	0.0	0.	0.	15312.5	0.0	0.0
32	16.8	101485.0	0.0	0.0	0.	0.	15222.7	0.0	0.0
33	16.6	99891.3	0.0	0.0	0.	0.	14983.7	0.0	0.0
34	16.4	97337.5	0.0	0.0	0.	0.	14600.6	0.0	0.0
35	16.2	93861.4	0.0	0.0	0.	0.	14079.2	0.0	0.0
36	16.0	89502.8	0.0	0.0	0.	0.	13425.4	0.0	0.0
37	15.8	84303.7	0.0	0.0	0.	0.	12645.6	0.0	0.0
38	15.5	78307.8	0.0	0.0	0.	0.	11746.2	0.0	0.0
39	3.1	14903.9	0.0	0.0	0.	0.	2235.6	0.0	0.0
40	12.2	51372.3	0.0	0.0	0.	0.	7705.8	0.0	0.0
41	15.1	43048.9	0.0	0.0	0.	0.	6457.3	0.0	0.0
42	14.8	19614.5	0.0	0.0	0.	0.	2942.2	0.0	0.0
43	5.0	1368.1	0.0	0.0	0.	0.	205.2	0.0	0.0

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	307.24	173.10
2	327.13	175.24
3	346.96	177.85
4	366.72	180.92
5	386.41	184.44
6	406.01	188.42
7	425.51	192.85
8	444.91	197.73
9	464.18	203.05
10	483.33	208.83
11	502.34	215.04
12	521.20	221.70
13	539.90	228.78
14	558.44	236.30
15	576.79	244.25
16	594.96	252.62
17	612.92	261.41
18	630.68	270.61
19	648.22	280.22
20	665.53	290.23
21	682.61	300.64
22	699.44	311.45
23	716.01	322.64
24	732.33	334.21
25	748.37	346.16
26	764.13	358.47
27	779.60	371.15
28	794.77	384.18
29	809.64	397.56
30	824.19	411.28
31	838.42	425.33
32	852.32	439.71
33	857.94	445.79

Circle Center At X = 224.45 ; Y = 1032.87 ; and Radius = 863.75

Factor of Safety

*** 1.159 ***

Failure Surface Specified By 34 Coordinate Points

Point X-Surf Y-Surf

No.	(ft)	(ft)
1	274.48	161.50
2	294.06	165.59
3	313.57	169.99
4	333.01	174.70
5	352.37	179.72
6	371.65	185.04
7	390.84	190.66
8	409.94	196.59
9	428.95	202.82
10	447.85	209.35
11	466.65	216.18
12	485.34	223.31
13	503.91	230.73
14	522.36	238.44
15	540.69	246.45
16	558.89	254.74
17	576.95	263.33
18	594.88	272.19
19	612.66	281.34
20	630.30	290.77
21	647.79	300.48
22	665.12	310.46
23	682.29	320.72
24	699.29	331.25
25	716.13	342.04
26	732.79	353.10
27	749.28	364.43
28	765.58	376.01
29	781.70	387.85
30	797.63	399.94
31	813.37	412.29
32	828.90	424.88
33	844.24	437.72
34	853.02	445.30

Circle Center At X = 26.20 ; Y = 1399.23 ; and Radius = 1262.38

Factor of Safety

*** 1.160 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	307.24	173.10
2	327.17	174.85
3	347.04	177.10
4	366.85	179.86
5	386.58	183.11
6	406.23	186.86
7	425.77	191.11
8	445.20	195.85
9	464.50	201.08
10	483.67	206.79
11	502.69	212.99
12	521.54	219.66
13	540.22	226.81
14	558.71	234.43
15	577.00	242.51
16	595.09	251.06
17	612.95	260.05
18	630.58	269.50
19	647.96	279.39
20	665.09	289.71
21	681.96	300.46
22	698.54	311.64
23	714.84	323.23
24	730.84	335.23
25	746.54	347.62
26	761.91	360.42

27	776.96	373.59
28	791.67	387.14
29	806.03	401.06
30	820.04	415.34
31	833.68	429.96
32	846.71	444.67

Circle Center At X = 247.90 ; Y = 962.58 ; and Radius = 791.71

Factor of Safety

*** 1.160 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	300.69	170.55
2	320.54	173.03
3	340.31	176.02
4	360.00	179.51
5	379.60	183.51
6	399.09	188.01
7	418.45	193.00
8	437.69	198.49
9	456.77	204.47
10	475.70	210.94
11	494.45	217.89
12	513.02	225.32
13	531.39	233.22
14	549.56	241.59
15	567.50	250.42
16	585.21	259.71
17	602.68	269.44
18	619.90	279.63
19	636.85	290.25
20	653.52	301.30
21	669.90	312.77
22	685.98	324.66
23	701.75	336.96
24	717.20	349.65
25	732.33	362.74
26	747.11	376.22
27	761.54	390.06
28	775.61	404.27
29	789.32	418.84
30	802.65	433.75
31	808.69	440.87

Circle Center At X = 213.72 ; Y = 946.64 ; and Radius = 780.95

Factor of Safety

*** 1.165 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	287.59	166.03
2	307.42	168.59
3	327.19	171.62
4	346.88	175.12
5	366.48	179.09
6	385.98	183.53
7	405.37	188.44
8	424.64	193.81
9	443.77	199.63
10	462.76	205.92
11	481.59	212.65
12	500.26	219.83
13	518.75	227.46
14	537.05	235.52
15	555.15	244.03
16	573.05	252.96
17	590.72	262.31
18	608.17	272.09

19	625.38	282.28
20	642.34	292.88
21	659.04	303.88
22	675.48	315.28
23	691.64	327.06
24	707.51	339.23
25	723.08	351.78
26	738.35	364.69
27	753.31	377.97
28	767.95	391.60
29	782.26	405.57
30	796.23	419.89
31	809.85	434.53
32	816.13	441.61

Circle Center At X = 190.60 ; Y = 996.67 ; and Radius = 836.29

Factor of Safety

*** 1.165 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	313.79	175.72
2	333.76	176.87
3	353.69	178.59
4	373.56	180.86
5	393.36	183.69
6	413.07	187.07
7	432.68	191.00
8	452.17	195.49
9	471.53	200.51
10	490.74	206.08
11	509.78	212.18
12	528.65	218.81
13	547.33	225.97
14	565.79	233.65
15	584.04	241.84
16	602.05	250.54
17	619.80	259.74
18	637.30	269.44
19	654.51	279.62
20	671.43	290.28
21	688.05	301.41
22	704.35	313.01
23	720.31	325.05
24	735.94	337.54
25	751.21	350.45
26	766.11	363.80
27	780.63	377.55
28	794.75	391.71
29	808.48	406.25
30	821.80	421.18
31	834.69	436.47
32	840.74	444.07

Circle Center At X = 282.62 ; Y = 888.48 ; and Radius = 713.44

Factor of Safety

*** 1.166 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	300.69	170.55
2	320.59	172.56
3	340.44	175.03
4	360.22	177.95
5	379.94	181.31
6	399.57	185.13
7	419.11	189.39
8	438.55	194.10
9	457.87	199.24

10	477.08	204.83
11	496.15	210.85
12	515.08	217.31
13	533.86	224.19
14	552.48	231.50
15	570.92	239.23
16	589.15	247.38
17	607.26	255.94
18	625.13	264.91
19	642.80	274.29
20	660.25	284.07
21	677.47	294.24
22	694.45	304.80
23	711.19	315.74
24	727.68	327.06
25	743.90	338.76
26	759.86	350.82
27	775.53	363.24
28	790.92	376.02
29	806.01	389.14
30	820.80	402.60
31	835.28	416.40
32	849.44	430.52
33	863.28	444.96
34	864.66	446.47

Circle Center At X = 222.23 ; Y = 1045.25 ; and Radius = 878.21

Factor of Safety

*** 1.167 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	294.14	168.29
2	313.96	170.92
3	333.73	173.95
4	353.44	177.38
5	373.07	181.19
6	392.62	185.40
7	412.09	190.00
8	431.46	194.98
9	450.72	200.35
10	469.88	206.10
11	488.91	212.23
12	507.82	218.74
13	526.60	225.63
14	545.24	232.89
15	563.72	240.52
16	582.06	248.52
17	600.22	256.88
18	618.22	265.60
19	636.04	274.68
20	653.68	284.12
21	671.12	293.90
22	688.37	304.03
23	705.41	314.50
24	722.23	325.31
25	738.84	336.45
26	755.23	347.92
27	771.38	359.72
28	787.29	371.83
29	802.96	384.26
30	818.38	397.00
31	833.54	410.05
32	848.43	423.39
33	863.06	437.03
34	873.71	447.37

Circle Center At X = 172.03 ; Y = 1163.22 ; and Radius = 1002.39

Factor of Safety

*** 1.167 ***

Failure Surface Specified By 35 Coordinate Points

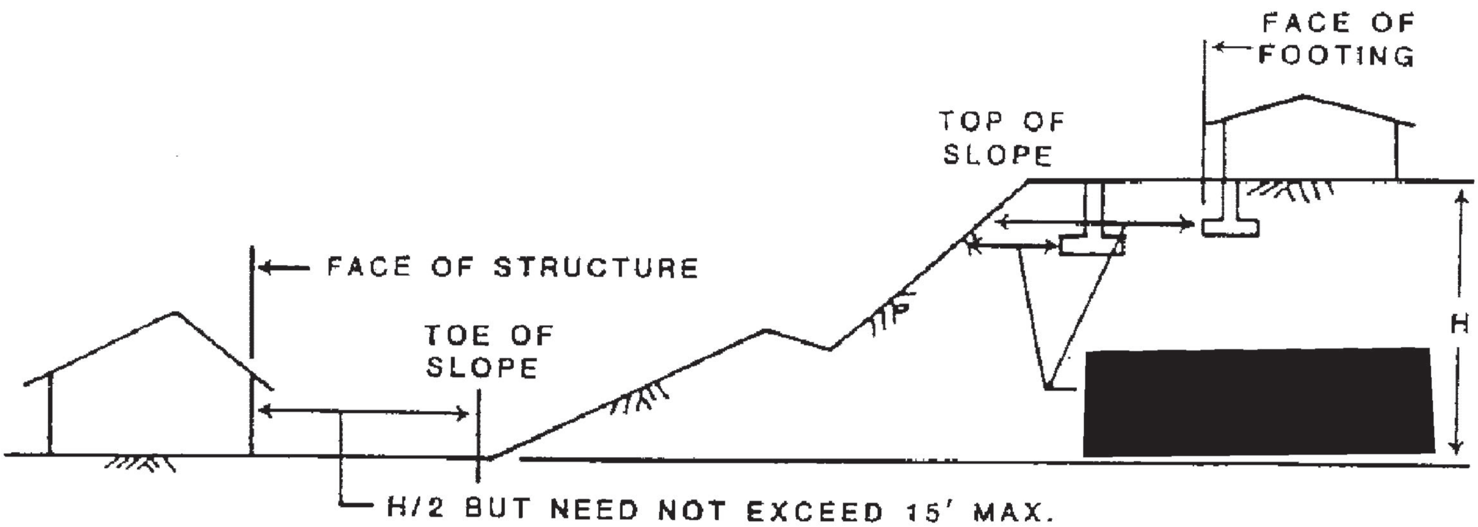
Point No.	X-Surf (ft)	Y-Surf (ft)
1	281.04	163.77
2	300.60	167.93
3	320.10	172.37
4	339.53	177.10
5	358.89	182.10
6	378.18	187.39
7	397.39	192.95
8	416.52	198.80
9	435.56	204.91
10	454.51	211.31
11	473.37	217.97
12	492.13	224.91
13	510.78	232.12
14	529.33	239.60
15	547.77	247.35
16	566.10	255.36
17	584.30	263.63
18	602.39	272.17
19	620.35	280.97
20	638.18	290.03
21	655.88	299.34
22	673.44	308.92
23	690.86	318.74
24	708.14	328.81
25	725.27	339.14
26	742.25	349.71
27	759.07	360.52
28	775.74	371.58
29	792.24	382.87
30	808.58	394.41
31	824.75	406.18
32	840.75	418.18
33	856.57	430.41
34	872.22	442.87
35	878.25	447.83

Circle Center At X = 3.17 ; Y = 1517.96 ; and Radius = 1382.41

Factor of Safety

*** 1.170 ***

**** END OF GSTABL7 OUTPUT ****

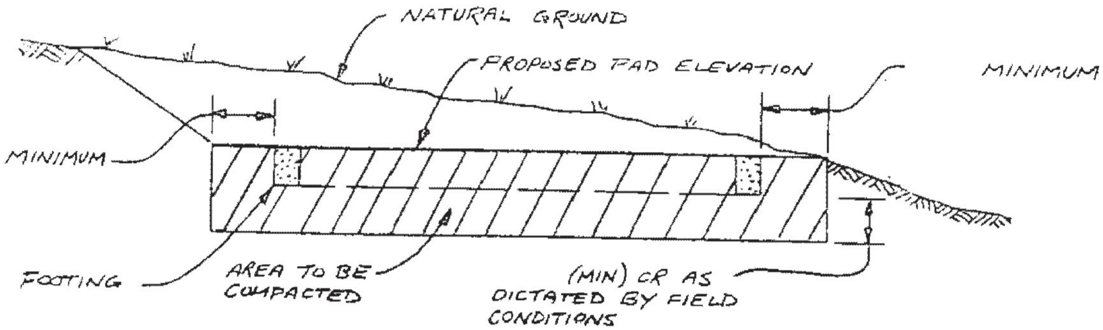


Southwest Geotechnical, Inc.
Consulting Engineers & Geologists

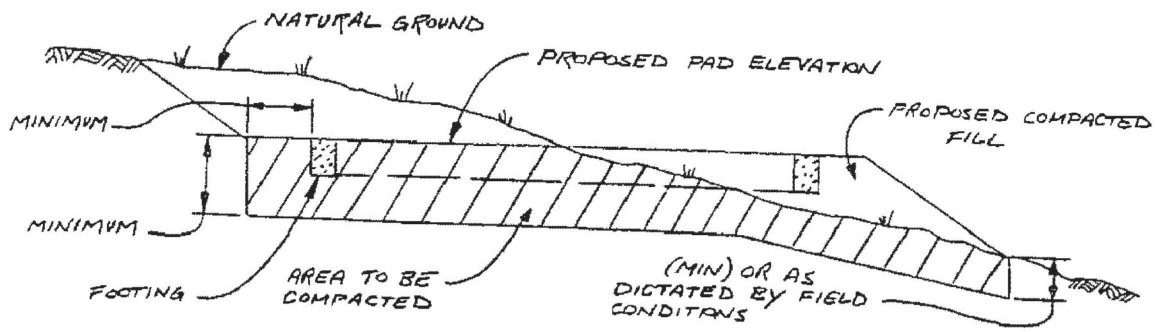
REQUIRED SLOPE
SETBACK DESIGN

UNDERCUT AND RECOMPACTION RECOMMENDATIONS

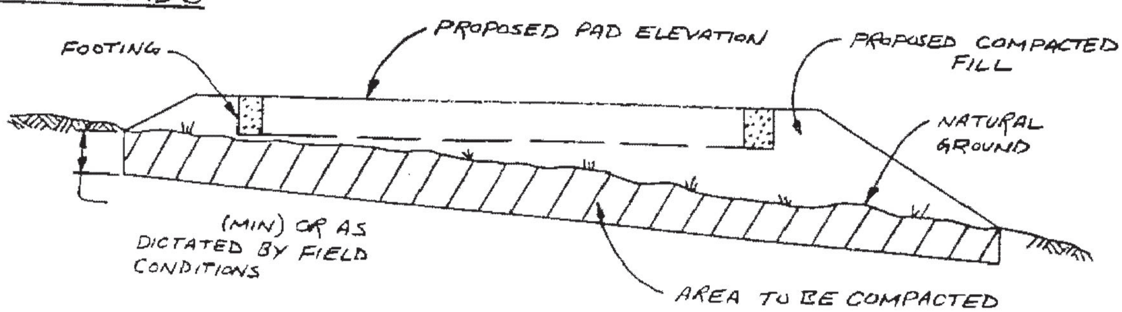
CUT PADS



CUT TO FILL PADS (TRANSITION)



FILL PADS



GRADING AND EARTHWORK GUIDELINES

I. GENERAL

A. These guidelines present general procedures and requirements for earthwork and grading as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installation of subdrains and excavations. The recommendations contained in the geotechnical report are part of the earthwork and grading guidelines and would supersede the provisions contained hereafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new recommendations which could supersede these guidelines or the recommendations contained in the geotechnical report.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with provisions of the project plans and specifications. The project soil engineer and engineering geologist (geotechnical consultant) or their representatives should provide observation and testing services, and geotechnical consultation during the duration of the project.

II. EARTHWORK OBSERVATIONS AND TESTING

A. Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report, the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that determination may be made that the work is being accomplished as specified. It is the responsibility of the contractor to assist the consultants and keep them apprised of anticipated work schedules and changes, so that they may schedule their personnel accordingly.

All cleanouts, prepared ground to receive fill, key excavations, and subdrains should be observed and documented by the project engineering geologist and/or soil engineer prior to placing any fill. It is the contractor's responsibility to notify the engineering geologist and soil engineer when such areas are ready for observation.

B. Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557. Random field compaction tests should be performed in accordance with test method ASTM designations D-1556, D-2937 or D-2922 & D-3017, at intervals of approximately two (2) feet of fill height or every 500 cubic yards of fill placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant.

C. Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by geotechnical consultants and staged approval by the governing agencies. It is the contractor's responsibility to prepare the ground surface to receive the fill, to the satisfaction of the soil engineer, and to place, spread, moisture condition, mix and compact the fill in accordance with the recommendations of the soil engineer. The contractor should also remove all major non-earth material considered unsatisfactory by the soil engineer.

It is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading guidelines, codes or agency ordinances, and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock, or deleterious material, insufficient support equipment, etc., are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

During construction, the contractor should properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor should take remedial measures to control surface water and to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed.

III. SITE PREPARATION

A. All major vegetation, including brush, trees, thick grasses, organic debris, and other deleterious material should be removed and disposed of offsite. These removals must be concluded prior to placing fill.

Existing fill, soil, alluvium, colluvium, or rock materials determined by the soil engineer or engineering geologist as being unsuitable in-place should be removed prior to fill placement.

Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the soil engineer.

B. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading are to be removed or treated in a manner recommended by the soil engineer. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground extending to such a depth that surface processing cannot adequately improve the condition should be overexcavated down to firm ground and approved by the soil engineer before compaction and filling operations continue. Overexcavated and processed soils, which have been properly mixed and moisture-conditioned, should be recompacted to the minimum relative compaction as specified in these guidelines.

C. Existing ground, which is determined to be satisfactory for support of the fills, should be scarified to a minimum depth of six (6) inches or as directed by the soil engineer. After the scarified ground is brought to optimum moisture or greater and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to about six (6) inches in compacted thickness.

D. Existing ground, which is not satisfactory to support compacted fill, should be overexcavated as required in the geotechnical report or by the onsite soils engineer and/or engineering geologist. Scarification, discing, or other acceptable form of mixing should continue until the soils are broken down and free of large lumps or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, or other uneven features which would inhibit compaction as described in Item III, C, above.

E. Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical), the ground should be stepped or benched. The lowest bench, which will act as a key, should be a minimum of 15 feet wide and should be at least two (2) feet deep into firm material, and approved by the soil engineer and/or engineering geologist.

In fill over cut slope conditions the recommended minimum width of the lowest bench or key is also 15 feet with the key founded on firm material, as designated by the Geotechnical Consultant. As a general rule, unless specifically recommended otherwise by the Soil Engineer, the minimum width of fill keys should be approximately equal to one-half (1/2) the height of the slope.

F. Standard benching is generally four feet (minimum) vertically, exposing firm, acceptable material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed four feet. Prestripping may be considered for unsuitable materials in excess of four feet in thickness.

G. All areas to receive fill, including processed areas, removal areas, and toe of fill benches should be observed and approved by the soil engineer and/or engineering geologist prior to placement of fill. Fills may then be properly placed and compacted until design grades are attained.

IV. COMPACTED FILLS

A. Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been determined to be suitable by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the soil engineer. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material.

B. Fill materials derived from benching operations should be dispersed throughout the fill area and blended with other bedrock-derived material. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

C. Oversized materials defined as rock or other irreducible materials with a maximum dimension greater than 12 inches should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the soil engineer. Oversized material should be taken offsite or placed in accordance with recommendations of the soil engineer in areas designated as suitable for rock disposal. Oversized material should not be placed within 10 feet vertically of finish grade or within 20 feet horizontally of slope faces.

To facilitate trenching, rock should not be placed within the range of foundation excavations, future utilities, or underground construction unless specifically approved by the soil engineer and/or the developer's representative.

D. If import material is required for grading, representative samples of the material to be utilized as compacted fill should be analyzed in the laboratory by the soil engineer to determine its physical properties. If any material other than that previously tested is encountered during grading, an appropriate analysis of this material should be conducted by the soil engineer as soon as possible.

E. Approved fill material should be placed in areas prepared to receive fill in near-horizontal layers that when compacted should not exceed six (6) inches in thickness. The soil engineer may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer should be spread evenly and blended to attain uniformity of material and moisture suitable for compaction.

F. Fill layers at a moisture content less than optimum should be watered and mixed, and wet fill layers should be aerated by scarification or should be blended with drier material. Moisture conditioning, blending, and mixing of the fill layers should continue until the fill materials have a uniform moisture content at or above optimum moisture.

G. After each layer has been evenly spread, moisture-conditioned and mixed, it should be uniformly compacted to a minimum of 90 percent of maximum density as determined by ASTM test designation, D 1557, or as otherwise recommended by the soil engineer. Compaction equipment should be adequately sized and should be specifically designed for soil compaction or of proven reliability to efficiently achieve the specified degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture is in evidence, the particular layer or portion should be reworked until the required density and/or moisture content has been attained.

No additional fill should be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the soil engineer.

H. Compaction of slopes should be accomplished by over-building a minimum of three (3) feet horizontally, and subsequently trimming back to the design slope configuration. Testing should be performed as the fill is elevated to evaluate compaction as the fill core is being developed.

Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment.

A final determination of fill slope compaction should be based on observation and/or testing of the finished slope face. Where compacted fill slopes are designed steeper than 2:1, specific material types, a higher minimum relative compaction, and special grading procedures, may be recommended.

I. If the alternative to over-building and cutting back the compacted fill slopes is selected, then special effort should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

1) An extra piece of equipment consisting of a heavy short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face of the slope.

2) Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

3) Field compaction tests will be made in the outer (horizontal) two (2) to eight (8) feet of the slope at appropriate vertical intervals, subsequent to compaction operations.

4) After completion of the slope, the slope face should be shaped with a small tractor and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to verify compaction, the slopes should be grid-rolled to achieve compaction to the slope face. Final testing should be used to confirm compaction after grid rolling.

5) Where testing indicates less than adequate compaction, the contractor will be responsible to rip, water, mix and recompact the slope materials as necessary to achieve compaction. Additional testing should be performed to verify compaction.

6) Erosion control and drainage devices should be designed by the project civil engineer in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

V. SUBDRAIN INSTALLATION

Subdrains should be installed in approved ground in accordance with the approximate alignment and details indicated by the geotechnical consultant. Subdrain locations or materials should not be changed or modified without approval of the geotechnical consultant. The soil engineer and/or engineering geologist may recommend and direct changes in subdrain line, grade and drain material in the field, pending exposed conditions. The location of constructed subdrains should be recorded by the project civil engineer.

VI. EXCAVATIONS

A. Excavations and cut slopes should be examined during grading by the engineering geologist. If directed by the engineering geologist, further excavations or over-excavation and refilling of cut areas should be performed and/or remedial grading of cut slopes should be performed. When fill over cut slopes are to be graded, unless otherwise approved, the cut portion of the slope should be observed by the engineering geologist prior to placement of materials for construction of the fill portion of the slope.

B. The engineering geologist should observe all cut slopes and should be notified by the contractor when cut slopes are started.

C. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the engineering geologist and soil engineer should investigate, evaluate and make recommendations to treat these problems. The need for cut slope buttressing or stabilizing, should be based on in-grading evaluations by the engineering geologist, whether anticipated previously or not.

D. Unless otherwise specified in soil and geological reports, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractors responsibility.

E. Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

VII. COMPLETION

A. Observation, testing and consultation by the geotechnical consultant should be conducted during the grading operations in order to state an opinion that all cut and filled areas are graded in accordance with the approved project specifications.

B. After completion of grading and after the soil engineer and engineering geologist have finished their observations of the work, final reports should be submitted subject to review by the controlling governmental agencies. No further excavation or filling should be undertaken without prior notification of the soil engineer and/or engineering geologist.

C. All finished cut and fill slopes should be protected from erosion and/or be planted in accordance with the project specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as practical after completion of grading.

HILLSIDE MAINTENANCE - Do's and Don't's

Most hillside lot problems are associated with water. Uncontrolled water from broken pipes, septic tanks, excess landscape watering, or wet weather causes the most damage. Most problems occur during wet weather, especially during torrential or prolonged rains. Therefore, drainage and erosion control are important aspects of home site stability, and the provisions built into the developed lot must not be altered without competent professional advice. Maintenance of the provisions must be carried out to assure optimal operation. Therefore, we offer the following list of "Do's" and Don’ts" as a guide:

DO

1. Check roof drains, gutters, and downspouts to be sure they are clear. Depending on location, houses may not have roof gutters and downspouts. These should be installed because roofs and their wide space can shed tremendous quantities of water. Without gutters or other adequate drainage provisions, water falling from the eaves collects against the foundation and basement walls, which is undesirable.

2. Clear drainage ditches and check them frequently during the rainy season. Neighbors should be asked to do likewise.

3. Check interceptor (brow) ditches at the top of slopes to be sure that they are clear and that water will not overflow the slope, causing erosions.

4. Be sure that all drain outlets and weep-holes are open and clear of debris, vegetation, or any other material that could block them in a storm. If blockage is evident, have it cleared.

5. Check for loose fill above and below the property if it is on a slope or terrace.

6. Limit watering and stop watering altogether during the rainy season when little irrigation is required. Over-saturation of the ground can cause major slides and subsurface damage.

7. If landscaping on the slopes is changed, disturb the soil as little as possible and use drought-resistant plants that require a minimum amount of landscape irrigation.

8. Watch for water backup inside the house at sump drains and toilets since this indicates drain sewer blockage.

9. Watch for wet spots on the property. These may be natural seeps or an indication of a broken water or sewer line. In either case, obtain competent advice regarding the problem and its correction.

10. Exercise ordinary precaution. The house and building site were constructed to meet standards that should protect against most natural occurrences, provided they are maintained.

11. The property owner must undertake and maintain a program that eliminates or controls burrowing animals. This must be and ongoing program in order to provide protection to the slope's stability. The uncontrolled burrowing by rodents has proven to be one of the major causes for surficial slope stability problems.

DON'T

1. Don't over-irrigate slopes or leave a hose running or sprinkler unattended on or near a slope. Groundcover and other vegetation does require moisture during hot summer months, but during wet season, irrigation can cause the ground cover to pull loose. This not only destroys the cover, but also starts serious erosion.

2. Don't alter lot grading without competent advice. The man-made slopes on the lot were designed to carry away water runoff to a place where it can be safely distributed.

3. Don't block or alter ditches that have been graded around the house of the lot pad. These shallow ditches have been put there for the purpose of quickly removing water toward the driveway, street, or other positive outlet.

4. Don't block or alter ditches or drains. If several homes rely on the same facilities, it is a good idea to check with neighbors. Water backed up on their property may eventually reach the homeowners property. Water backed up in surface drains will overflow and infiltrate slopes, which leads to instability. Maintain the ground surface upslope of lined ditches to ensure that surface water is collected in the ditch and is not permitted to collect behind or flow under the lining.

5. Don't permit water to collect or pond anywhere on the lot. Such water will either seep into the ground and cause unwanted saturation, or will overflow onto slopes and begin erosion. Once erosion is started, it is difficult to control, and severe damage may result rather quickly.

6. Don't direct water over slopes even where this may seem a good way to prevent ponding. This tends to cause erosion and slope instability. Dry wells are sometimes used to get rid of excess water when other means of disposing of the water are not readily available. However, such facilities should be planned and located by a qualified engineer since dry wells transport surface water in the deep subsurface and may cause landslides.

7. Don't let water pond against structure foundations and basement walls. These walls are built to withstand the ordinary moisture in the ground and, where necessary, are accompanied by subdrains to carry off excess subsurface water. However, excess surface water must be directed away from these structures.

8. Don't connect roof drains, gutters, or downspouts to existing subsurface drains that may not have been designed for that purpose. Instead, collect the water in lined ditches or unperforated pipes and conduct it to a storm drain, paved road, or suitable area of natural ground. Where such channel flow is directed onto natural ground, it must be converted to sheet flow unless a suitable natural channel exists.

9. Don't discharge surface water into septic tanks or leaching fields. Not only are septic tanks constructed for a different purpose, but they will tend, because of their construction, to accumulate additional water from the ground during a heavy rain. Overloading them during the rainy season is bad from a slope stability standpoint, and is doubly dangerous since their overflow can pose a serious health hazard.

10. Don't try to compact earth in trenches by flooding with water. Not only is flooding the least efficient way for compaction fine-grained soils, but this could saturate and reduce the bearing capacity of supporting soils.

11. Don't change the surface grade behind retaining walls because this may increase lateral loading on walls, which could result in damage to such walls.

In conclusion, a neighbor's slope above, or below a homeowner's property line, is as important to the homeowner as any slope that is inside the property line. For this reason, it is desirable to develop a cooperative attitude regarding hillside maintenance, and we recommend developing a "good neighbor" policy. Should conditions develop off the homeowner's property that are undesirable from indications given above, necessary action should be taken by the homeowner to ensure that remedial measures are taken promptly.

A Z Geo Technics, Inc.

Geotechnical, Environmental and General Building Services

APRIL 15, 2010

DOUG BEAM
P.O. BOX 6587
LANCASTER, CA 93539
(661) 726-0071

SUBJECT: UPDATED SOILS REPORT FOR A SITE LOCATED ON SIERRA HIGHWAY IN THE VICINITY OF LISTIE AVENUE, IN THE COMMUNITY OF ACTON, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA
APN: 3057-014-012 ("Site")

REFERENCE: PRELIMINARY SOILS REPORT, DATED AUGUST 15, 2006 PREPARED BY AZ GEO TECHNICS, INC. FOR THE ABOVE SITE.

Dear Mr. Beam:

Pursuant to your request, as "Client", AZ Geo Technics, Inc., as "Consultant", has visited the above subject Site and reviewed the referenced soils report prepared by AZ Geo Technics, Inc., project # GT-2957a, dated August 15th, 2006 herein referred to collectively as "Soils Report". Our findings, recommendations and conclusions in the referenced Soils Report remain unchanged. Prior to construction we will be available to review and sign the proposed grading plan.

This opportunity to be of service is sincerely appreciated and we look forward to working with you in the future. If you have any questions or comments, please do not hesitate to contact our office at your earliest possible convenience.

Respectfully submitted for,

AZ Geo Technics, Inc.

REGISTERED PROFESSIONAL ENGINEER NORIK BEDASSIAN C 53082 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

Norik Bedassian, P.E.

NB:jr/GT-2957a

AZ GEO TECHNICS, INC.

Geotechnical and Environmental Consultants

38713 9th Street East
Palmdale, Ca. 93550
Phone: (661) 273-3123 Fax: (661) 273-4245

GEOTECHNICAL REPORT

PROJECT NUMBER

GT-2957-S

SITE LOCATION

ON SIERRA HIGHWAY, VICINITY OF LISTIE AVENUE
IN THE COMMUNITY OF ACTON
COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

LEGAL DESCRIPTION

APN 3057-014-012

DATE

AUGUST 15, 2006

PREPARED FOR

DOUG BEAM

AUGUST 15, 2006

DOUG BEAM
P.O. BOX 6587
LANCASTER, CA 93539
(661) 726-0071

SUBJECT: PRELIMINARY SOILS REPORT FOR A SITE LOCATED ON SIERRA HIGHWAY IN THE VICINITY OF LISTIE AVENUE, IN THE COMMUNITY OF ACTON, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.
APN 3057-014-012 ("Site")

Dear Mr. Beam

Pursuant to your authorization, AZ Geo Technics, Inc., referred to herein as **"Consultant"**, has visited the Site and performed a preliminary soils evaluation for Doug Beam, referred to herein as **"Client"**. The findings and recommendations contained in this "Report" are based upon three (3) specific exploratory trenches and observations as noted within our described limitations. The materials immediately adjacent to or beneath those observed may have different characteristics and no representations are made as to the quality or extent of materials not observed.

Client, and/or Clients' contractor(s)/agents, are the responsible parties for the implementation of all recommendations during the life of the project. To the best of Consultants' knowledge, the evaluation covered in this limited study is in accordance with applicable recommendations. Any variances not approved in writing by Consultant would nullify this Report for any use. No other warranties are expressed or implied. Please note, this Report is valid for only one (1) year from the date hereof, subject to Consultants' review and approval prior to further use.

If you have any questions regarding this Report, please contact our office at your convenience. We appreciate this opportunity to be of service and will be available for future developments at your convenience.

Respectfully submitted for,

AZ GEO TECHNICS, INC.

Norik Bedassian, P.E.

NB:js/GT-2957

TABLE OF CONTENTS

ENCLOSURES

SCOPE

The scope of this limited evaluation consisted of the following geotechnical steps:

A. Review of literature, reports, and maps made available by Client pertinent to the Site.

B. Preliminary Site reconnaissance and subsurface exploration.

C. Laboratory analysis of selected representative bulk and relatively undisturbed samples.

D. Preparation of this Report presenting our findings, conclusions, and recommendations.

PROPOSED DEVELOPMENT

The proposed development is reported to be a sub-division for a minimum of three (3) building locations. "Client" prepared the Plot Plan. The Site is intended for one or two-story single-family residential dwelling(s). This study was performed for the proposed building areas, associated street, and on-Site utility construction only. Though no building plans were made available to Consultant at the time of the preparation of this Report, this type of structure is typically wood framed with continuous and/or isolated pad footings. Structural loads are anticipated to be light to moderate. Should something other than what is represented here be utilized during construction, Consultant should be notified immediately to review the proposed changes and modify this Report if necessary.

BACKGROUND OF SUBJECT SITE

The Site is currently vacant.

SITE DESCRIPTION

The Site is located in the Community of Acton, County of Los Angeles, State of California. The Site is bounded on the north by a single-family dwelling, on the south by Sierra Highway, on the east by vacant land, and on the west by vacant land. The Site is approximately eighteen (18) acres in size, irregular in shape, and accessible. The Site terrain has relative to steep slopes.

The surface is moderately covered with native weeds and shrubs. No signs of were observed on the Site. Moderate amounts of rock outcroppings were observed on the Site. Drainage is by way of sheetflow in a southerly direction.

<u>FIELD SUB-SURFACE INVESTIGATION AND LABORATORY TESING RESULTS</u>

Subsurface evaluation consisted of three (3) exploratory trenches, excavated to a maximum depth of fifteen (15) feet in order to determine the condition of the near-surface natural material. The trenches were logged and reviewed. Representative bulk and undisturbed samples were collected for laboratory testing. Bulk (disturbed) samples of the near surface soil were observed from the cuttings developed during excavation operations. The subsurface conditions shown on the Trench Logs apply only at the specific locations and to the dates indicated. It is not warranted to be a representative of subsurface conditions at any other locations and times.

<u>Expansive Soils</u>

The potential expansion characteristics of the near-surface soils are classified as low expansive in accordance with UBC Standards No. 18 - 2, Expansion Index Test. General guidelines for the proposed construction are based on soil expansion. Upon completion of rough pad grades, evaluation of foundation bearing materials should be made in accordance with UBC Standards No. 29 – 2. Specific recommendations for construction should be made after evaluation of foundation bearing materials.

<u>Artificial Fill</u>

No artificial fill or structural fill was encountered during the excavation operations.

<u>Surface Erosion Potential</u>

No evidence of significant erosion was observed on the Site. By nature, on-Site soil is Cohesive and must not be considered to be susceptible to surface erosion. The velocity of the concentration of drainage must be reduced by Rip Rap, juding, and landscaping the area to prevent possible erosion.

SHRINKAGE AND SUBSIDENCE

It is estimated that there will be a minimum of five percent (5%) shrinkage approximately six (6) inches below surficial soil at an average density of ninety three percent (93%) compaction relative to the maximum dry density, due to the reworking of the surface soils (excluding rocks and organics). Natural ground subsidence is estimated to be as much as one-half (½) of an inch, depending significantly on the methods and the compaction equipment used. Some additional losses are anticipated due to the preparation and removal of surface and sub-surface obstructions, such as trees and rock outcroppings.

SETTLEMENT

It is estimated that after grading, in accordance with our recommendations/supervision, the settlement of the foundation system is expected to occur on initial load application. A maximum of one-half (½) of an inch settlement is anticipated, but differential settlement is anticipated not to exceed one-fourth (¼) of an inch within a thirty (30) foot span.

ON-SITE SEWAGE DISPOSAL

It is Consultants' opinion that the proposed private on-Site sewage disposal system, via leach line at the Site (which has been tested) will not have any adverse effect as to the stability of the Site.

DRAINAGE

All pads and roof drainage should be collected and transferred to an appropriate non-erosive drainage device. The drainage will not be allowed to pond on the pad or against the foundation.

SUBSURFACE CONDITIONS

Based on our findings from the Site observation and exploratory trenches, the on-Site earth materials generally consist of younger alluvium (Qal). These materials are typically moderately dense to dense sands, silts and clays in varying degrees of combinations. Please refer to the Trench Logs for a brief description of the on-Site earth materials encountered during the excavation operations.

Top Soil	Silty Sand
Near Surface Materials	Silty Sand With Some Fragmented Bedrock
Subsurface At Depth Explored	Silty Sand
Depth To Groundwater	None Encountered
Depth To Bedrock	See Exploratory Trenches

FOUNDATION RECOMMENDATIONS

Foundations may be conventional spread or continuous wall footings, provided they are as follows:

- ▶Minimum continuous footings widths: Twelve (12) inches (one-story)
Fifteen (15) inches (two-story)
Eighteen (18) inches (three-story)
- ▶Minimum column footing width: Two (2) Feet

Minimum footing depths (in inches) below lowest adjacent final grade are as follows:

Expansion Index	Expansion Classification	One Story Structure	One Story structure	Two Story Structure	Two Story Structure	Three Story Structure	Three Story Structure
		Perimeter or Bearing Walls	Interior or Non-Bearing	Perimeter or Bearing Walls	Interior or Non-Bearing	Perimeter or Bearing Walls	Interior or Non-Bearing
0 – 20	Very Low	12	12	18	18	24	18
21 – 50	Low	12	12	18	18	24	18
51 – 90	Medium	15	12	20	18	24	18
91 - 130	High	18	12	24	18	30	18

Foundation reinforcement in addition to minimum structural requirements for dead, live and seismic loads:

Expansion Classification	Expansion Index	No. 4 ReBars Top and Bottom
Very Low	0 to 20	Two (2)
Low	21 to 50	Two (2)
Medium	51 to 90	Two (2)
High	91 to 130	Two (2)

SLABS-ON-GRADE

The concrete for slabs-on grade should conform to the requirements contained in Chapter 19 of the 1997 Uniform Building Code. The concrete slab thickness *minimums* do not preclude more stringent requirements of which may be imposed by the architect, structural engineer, or building official. These *minimums* are as follows:

Expansion Classification	Expansion Index	Minimum Slab Thickness
Very Low	0 to 20	Four (4) inches
Low	21 to 50	Four (4) inches
Medium	51 to 90	Five (5) inches
High	91 to 130	Six (6) inches

Non Permanent Manufactured Home Foundation

Pre-cast concrete footings that would support the standard adjustable piers may be used for state approved manufactured homes.

Slab Reinforcement

The concrete slab reinforcement *minimums* do not preclude more stringent requirements of which may be imposed by the architect, structural engineer, or building official. These *minimums* are as follows:

Expansion Classification	Expansion Index	Slab Reinforcement
Very Low	0 to 20	No. 3 Rebar @ 24" on center, each way
Low	21 to 50	No. 3 Rebar @ 18" on center, each way
Medium	51 to 90	No. 4 Rebar @ 18" on center, each way
High	91 to 130	No. 4 Rebar @ 14" on center, each way

Moisture Vapor Barrier

Where moisture sensitive materials are to be placed on the slab, the slab should be underlain by a moisture vapor barrier (polyethylene plastic vapor barrier). Moisture barriers should have a minimum thickness of ten (10) mil. and should be protected by a two (2) inch thick layer of sand (above and below) in order to reduce the possibility of punctures and to aid in obtaining a satisfactory concrete cure. The moisture barrier must be properly lapped and/or sealed, as well as sealed around all plumbing structures and other openings. The slab areas should be presaturated to near optimum moisture content of the sub-grade material to a minimum depth of six (6) inches prior to placing sand and moisture barrier.

BEARING

Soil Bearing

For the proposed construction, foundations should be designed for an allowable bearing value not to exceed fifteen hundred (1,500) pounds per square foot (psf) on compacted material. This value is for dead loads plus the adjusted live load, which may be increased by one-third (⅓) for short term seismic and wind effects.

LATERAL LOADS

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footing bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of three hundred fifty (350) pounds per square foot (psf) per foot of depth. Base friction may be computed as thirty hundredths (0.30) times the normal dead load. Base friction and passive earth pressure may be combined directly.

RETAINING WALLS

Retaining Wall Foundation Soils

Retaining walls should be founded on clean, non-deleterious natural or compacted competent material. Consultants' representative should observe soil materials exposed at the bottom of the proposed retaining wall footings. If these materials visually appear to be potentially expansive (e.g. clays and elastic silts), the expansion index testing should be performed in order to confirm the expansion characteristics of the material and Consultant should then make the appropriate recommendations.

Retaining Wall Design Parameters

Based upon a review of the current plans, retaining walls may be designed for a maximum height of six (6) feet.

The allowable net bearing pressure for retaining wall footings, at least one (1) foot wide and one (1) foot deep below the lowest adjacent grade which should be founded on competent natural soils or on at least two (2) feet of compacted fill to a minimum of ninety percent (90%) relative compaction, is two thousand (2,000) psf.

If retaining walls are constructed to retain on-Site compacted fill materials, they should be designed to resist lateral pressures equal to those exerted by an equivalent fluid having a density of not less than that shown in the following table.

Based upon analyses, the following Lateral Earth Pressures may be used in the design of any proposed retaining walls or similar structures:

	Driving Earth Pressure*	**Resisting Earth Pressure***
Well Drained Level Soil	30 pcf	300 psf
Well Drained 2:1 Backfill Soil	pcf	--

* Equivalent fluid pressure (psf) per foot of soil height.

NEAR SOURCE FACTOR

The following UBC (1997) Seismic Design Coefficients should be used for the proposed structures. These criteria are based on the soil profile type as determined by existing sub-surface geologic conditions, on the proximity of the Site to the nearby fault, and on the maximum moment magnitude and slip rate of the nearby fault.

UBC 1997 TABLE	PARAMETER	FACTOR
16-I	Seismic Zone Factor Z	0.4
16-J	Soil Profile Type	S_C
16-Q	Seismic Coefficient Ca	.40 Na
16-R	Seismic Coefficient Cv	.56 Nv
16-S	Near Source Factor Na	1.1
16-T	Near Source Factor Nv	1.4
16-U	Seismic Source Type	A
--	Seismic Coefficient Ca	.440
--	Seismic Coefficient Cv	.784

HYDRO-CONSOLIDAITON

The disturbed and loose soil is underlain by sediments, which are subject to hydro-consolidation. This is a phenomenon by which metastable soils undergo rapid consolidation upon introduction of sufficient quantity of water or an increase in ambient loading. These soils are generally of low density and low moisture content.

The soils encountered beneath the Site were dense below a depth of two (2) feet. Samples obtained below this depth had in-place dry densities of approximately one hundred twenty (120) pounds per cubic foot (pcf). The moisture contents were found to be within optimum moisture.

In addition to the density data, the result of a consolidation test performed on a selected sample is included in this Report.

Based upon available data, it is our opinion that hydro-consolidation of on-Site soils do not present any unusual risk for this Site provided that the recommendations contained in this Report are followed.

Over-excavating the building area, Site processing, control of landscape irrigation, and minimal changes from existing grades will further lessen the possibility of hydro-consolidation.

SUMMARY AND CONCLUSIONS

General Conclusions

The following conclusions are presented based upon the results of our findings and analysis of field and laboratory data at the time and locations as shown. No representation is made to any other areas or consistency of the conditions. Environmental testing was not a part of the report.

1. Proposed construction is feasible from a geotechnical point of view provided the soil recommendations presented in this Report have been implemented during construction.
2. The area of the proposed Site is underlain by silty sand. The soils are dense, and slightly moist.
3. On-Site soils are primarily fine to coarse granular with an anticipated low expansion potential.
4. No groundwater or evidence of seepage was encountered within the trenches.
5. Any change of plans must be approved by Consultant prior to construction.

6. At the time of further review and/or during construction, additional recommendations or changes may be provided depending on the future findings of the proposed development.

Liquefaction Potential

The primary factors influencing liquefaction potential include groundwater, soil type, and intensity of ground shaking. Liquefaction potential is greatest in saturated, loose, and poorly graded sand.

Based on our investigation, the sub-surface material is classified as a dense mixture of sand, clay, silts, and groundwater at a depth of below fifty (50) feet.

Therefore, considering the above characteristics, the potential for soil liquefaction and other secondary seismic hazards such as lurch cracks and seismically induced settlement are considered to be minor at the Site.

SECTION 111 OF THE COUNTY OF LOS ANGELES BUILDING CODE

It is the opinion of Consultant that the proposed construction will be safe against any geotechnical hazards from landslides, settlement, or slippage and the proposed work will not adversely affect adjacent property in compliance with the county code, provided Consultants' recommendations are followed.

RECOMMENDATIONS

General Site Grading

All Grading shall be performed in accordance with the General Earthwork and Grading Specifications (Enclosed) *except* as modified in the text of this Report.

The geotechnical exploration trench backfill is uncompacted and is unsuitable for support of structures. If any structure or other improvements (including paved access roads) are located over or immediately adjacent to the uncompacted fill, it is recommended that the backfill be over-excavated and replaced with engineered compacted fill or that the structure be designed to span the trench.

Construction should allow for all plumbing and utility services to be connected with flexible connections and/or provided with convenient shut-offs. Structures should be designed in accordance with at least minimum code standards for Seismic Zone 4 as described in the Los Angeles County Building Code.

Diversion and reduction of the concentrated run-off(s) should be provided to minimize erosion of the on-Site slopes and improvements.

If Grading plans are required, all recommendations must be shown on the Grading plans prior to our review, approval, and signature; otherwise all recommendations should be addressed on the Plot Plan.

Any Site Grading should be in conformity with existing building codes. Chapter A - 33 of the Los Angeles County Building Code contains specific considerations for grading and forms a part of this Report.

Field review of the Site Grading by Consultant, if requested as recommended, will be an additional expense and will be billed at current fee schedule rates in effect at the time of the Site Grading.

Building Area Preparation

The minimum upper two (2) feet of soils across the Site are considered unsuitable to support any structure due to topsoil. These soils should be mitigated in structural areas by a minimum over excavation of the upper two (2) feet below original grade. The resultant ground surface should be scarified an additional six (6) inches and moisture conditioned to optimum moisture and compacted to a minimum of ninety percent (90%) relative compaction prior to fill placement. All lateral over-excavation shall be extended to the equivalent of the depth of over-excavation beyond the building footprint, but not be less than five (5) feet (under any circumstances). If the building pad is to be created by cut and fill transitional, the cut area must be over-excavated thirty-six (36) inches below the bottom of the footing.

The Site should be cleared of surface and sub-surface obstructions including any existing debris, pavement, existing foundations, existing utilities, vegetation, residual top soils, and other deleterious materials. Removed materials and debris should be disposed of off-Site. All cavities created by the removal of buried obstructions should be backfilled with suitable compacted materials. Vertical temporary excavations greater than five (5) feet in height will require sloping or shoring in accordance with the requirements of OSHA.

The non-structural area shall be over-excavated to a minimum depth of twelve (12) inches from the natural grade or finish grade, whichever is lowest, and re-compacted to a minimum of ninety percent (90%) relative to maximum dry density.

Preparation Of Paving Areas

All surfaces to receive concrete or asphaltic concrete paving should be over-excavated and scarified to a minimum depth of twelve (12) inches, or mitigated to the Contractors' satisfaction based on exposed conditions. The scarified bottom should be moisture conditioned and re-compacted to a minimum relative compaction of ninety percent (90%) prior to placing any additional fill.

Regarding preliminary pavement sections, no "R" Value tests were conducted on samples of the proposed parking area sub-grade soils. During Site Grading, sample(s) should be tested, secured from the exposed pavement sub-grade areas, and evaluated for review or revision of the following preliminary pavement sections. Based upon "R" Value estimated, the following sections may be used for developing preliminary earth quantities and paving cost estimates:

Asphalt Concrete Pavement Sections:

Traffic Index 4.0 (Automobile and Light Truck Parking Areas): 2.5" Asphalt Concrete on 4.0" Crushed Aggregate Base or equivalent.

Traffic Index 5.0 (Automobile and Light Truck Drive Lanes): 3.0" Asphalt Concrete on 4.0" Crushed Aggregate Base or equivalent.

Asphalt concrete pavement section recommendations are based on the assumption that the pavement section is placed on a minimum twelve (12) inch thick layer of compacted sub-grade as recommended in this Report. Aggregate base material should be properly moisture conditioned and compacted to at least ninety five percent (95%) of the maximum dry density as determined by ASTM D - 1557 test procedures using mechanical compaction equipment. Pavement sections should be verified with the jurisdictional authority prior to the time of construction.

CORROSIVITY AND CHEMICAL ATTACK CONSIDERATIONS

Bulk samples obtained from near existing grade soils believed to represent possible worst-case conditions were tested for pH, resistivity, and soluble sulfate and chloride contents. Negligible corrosive sulfate and chloride concentrations were measured and pH data indicate no significant acidity of tested soils. Resistivity test results indicate a mildly corrosive potential of these soils to ferrous metals. Test results are summarized in Table 5. Recommendations, of which are considered appropriate for corrosion protection are presented below.

Concrete

Conventional Type II Portland Cement may be used in concrete for structures and concrete pipe that will be in contact with near finish grade soils.

Steel Pipe

Perform an abrasive blast to underground steel utilities and apply a high quality dielectric coating such as extruded polyethylene, a tape coating system, hot applied coal tar enamel, or fusion bonded epoxy.

Bond underground steel pipe with a rubber gasket, mechanical device, a grooved end, or other non-conductive type joints for electrical continuity.

Electrical continuity is necessary for monitoring corrosion and cathodic protection.

Electrically insulate each buried steel pipeline from dissimilar metals, cement-mortar coated and concrete encased steel, also electrically insulate above ground steel pipe using dielectric fittings to prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection.

Apply cathodic protection to steel piping as per NACE International RP – 0169 - 92. As an alternative for steel waterlines to a dielectric coating and cathodic protection, apply a mortar coating as per AWWA Standard C - 205.

Iron Materials Corrosion Protection

Encase cast and ductile iron piping in eight (8) mil. thick low-density polyethylene or four (4) mil. thick high-density; cross-laminated polyethylene plastic tubes or wraps per AWWA Standard C - 105; coat with a high quality dielectric coating such as polyurethane or coal tar epoxy. Electrically insulate underground iron pipe from dissimilar metals and above ground iron pipe with insulated joints and dielectric fittings.

Protect any iron valves and fittings with double polyethylene wrap per AWWA C - 105. Where concrete thrust blocks are to be placed against iron, use a single-polyethylene wrap to prevent concrete/iron contact and to eliminate the slipperiness of double wrap.

Buried Copper Tubing

Buried copper tubing for cold and hot water shall be encased in plastic pipe or cathodic protection should be applied.

All Pipes

On all pipes, it is recommended to coat bare steel appurtenances such as bolts, joint harnesses, or flexible couplings with a coal tar or elastomer-based mastic; coal tar epoxy, moldable sealant, wax tape; or equivalent after assembly.

Where metallic pipelines penetrate concrete structures such as building floors or walls, use plastic sleeves, rubber seals, boots, or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

Other Protective Measures

Electrically insulate (isolate) below-grade ferrous metals by means of dielectric fittings in exposed metal structures breaking grade.

All steel and wire concrete reinforcement of structures and foundations in contact with Site soils should have at least five tenths (0.5) of an inch greater cover than required by the ACI code and a water-cement ratio of five tenths (0.5) or less.

GEOTECHNICAL OBSERVATION AND TESTING SERVICES

Consultant should provide continuous observation and testing during Grading of the subject Site. It is the responsibility of Client to notify Consultant of the date of the pre-grade meeting as well as notifying the inspector of record. The recommendations provided in this report are based on preliminary design information and sub-surface conditions disclosed by widely spaced trenches. The outlined sub-surface conditions should be verified in the field during construction. Consultant should prepare a final as-grade soil report and maps summarizing all conditions encountered and any field modification to the recommendations provided herein. The primary aspects of geotechnical observation and testing may include the following on an as needed basis:

- Observation of all removal and over excavation.
- Observation and material testing during fill placement.
- Geologic mapping of cut slopes (if recommended).
- Observation of footing excavations.
- After pre-saturation of the slab areas, but prior to placement of sand and visqueen.
- During utility trench excavation backfilling and compaction.
- Prior to construction of pavement, parking, and driveway areas to perform R-Value tests (if needed).
- During compaction of sub-grade and aggregate base.
- When any unusual conditions are encountered.

It is the responsibility of Client to ensure the above testing/observations are satisfied and that Consultant is given forty-eight (48) hours prior notice. Any grading performed at the subject Site that does not conform to the recommendations in this Report is the sole liability of Client.

LIMITATIONS

This Report is issued with the understanding that it is the responsibility of the Client to ensure that the information and recommendations contained herein are called to the attention of all parties concerned, including but not limited to future owners, agents, designers and contractors, as well as that the necessary steps are taken to ensure that such recommendations are carried out under any and all circumstances/conditions.

Conclusions and recommendations presented in this Report are based on soil conditions as encountered at the test locations and may not necessarily represent areas between and beyond the trenches. No representation is made to the quality or chemical characteristic of on-Site soil. This Report is not transferable without written consent of Consultant. This Report shall not be used for any appraisal purposes or cost evaluation.

If conditions other than those noted in this Report are encountered, Consultant should be notified immediately so that supplementary recommendations can be provided.

Consultant will be available to make a final review of the project plan and specifications and to assist in assuring correct interpretation of this Report's recommendations for use in applicable sections.

A representative of Consultant should inspect all Grading operations, including Site clearing and stripping. The presence of Consultants' field representative will be for the purpose of providing observation and field testing, and will not include any supervising or directing of the actual work of the Contractor (its employees or agents). Neither the presence of Consultants' field representative nor the observations and testing by Consultant shall excuse the Contractor in any way for defects discovered in Contractors' work.

It is understood that Consultant will not be responsible for job or Site safety on this project, which will be the responsibility of Client and Client's contractor.

Again, it is imperative that all recommendations provided herewith to be adhered to throughout the life of the project. No changes or variations shall be allowed without written approval of Consultant.

The conclusions and recommendations presented in this Report are based upon preliminary field and laboratory observation described herein and information available at this time within the limits prescribed by Client. It is possible that conditions between sampling locations may vary. Should conditions be encountered in the field that appear different than those described in this Report, Consultant should be contacted immediately in order to evaluate their effect and prepare additional recommendations.

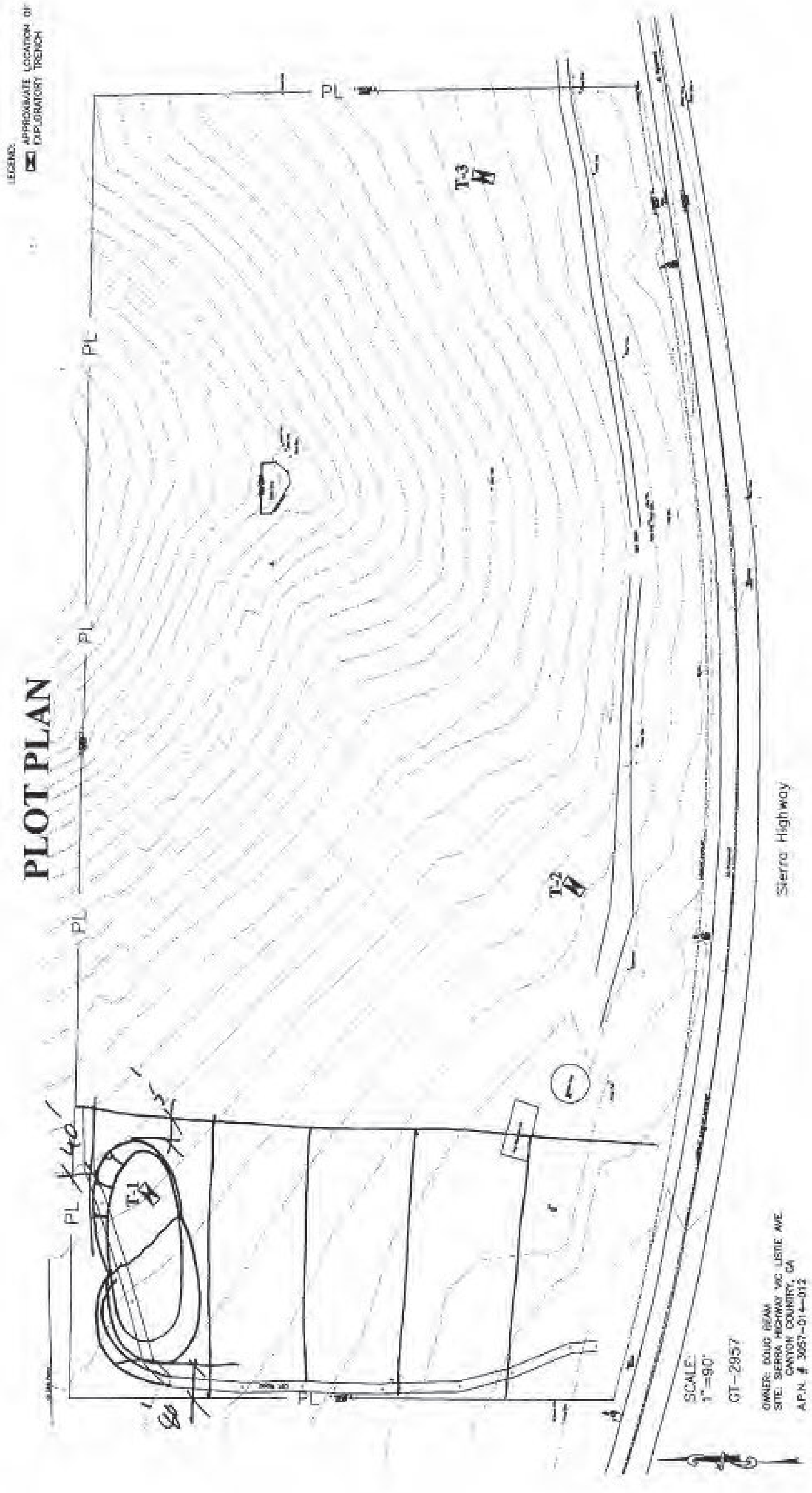
This Report concludes Consultants' services under the scope of services and Consultant makes no other representations or any other warranties, expressed or implied.

If this Report or portions hereof are provided to contractors or included in specifications, it should be understood by all parties that they are provided for preliminary information only, and should be used as such. The Report and its contents resulting from this evaluation are not intended or represented to be suitable for reuse on extensions or modifications of the project, or for use on any other project. Furthermore, this Report is issued to Doug Beam and is not transferable; any further use of this Report beyond one year of the date of this Report will require written consent by Consultant. Consultant must negotiate any additional work clarification or investigations and services. Any variance from Consultants' prescribed requirements would nullify this Report, and Client indemnifies Consultant and its representatives of all liability and obligation. The amount paid for this Report is the total liability of Consultant and its representatives toward all parties and any claimant.

This Report does not cover any environmental, geologic, or flood hazards. If any such hazards exist, a geology report will be required.

ENCLOSURES

VICINITY MAP


PLOT PLAN
LEGEND:
APPROXIMATE LOCATION OF EXPLORATORY TRENCH
PL
T-1
T-2
T-3
Sierra Highway
SCALE:
1"=90'
GT-2957
OWNER: DOUG BEAM
SITE: SIERRA HIGHWAY VIC LISTIE AVE
CANYON COUNTRY, CA
A.P.N. # 3057-014-012

TRENCH LOGS

TRENCH LOG SUMMARY

Date: 7/21/06	Project Number: GT-2957	Logged By: JC
Client: Doug Beam	Location: Sierra Highway, Vicinity Listie Road, Acton	Trench No: T-1

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	USCS	Description
0					
1					
2	1 @ 2'	120.7	3.9	SM	Brown To Slightly Red, Mostly Silty Sand With A Trace Of Clayey Sand, Slightly Moist To Moist, Dense
3					
4	2 @ 4' A	126.6	3.3	SM	Brown, Dense Conglomerate Of Silty Sand And Some Fractured Bedrock, Slightly Moist To Moist, Dense
5					
6	3 @ 6'	122.1	2.4	SM	Brown, Silty Sand, Slightly Moist, Dense
7					
8	⊗ @ 8'			SM	Reddish Brown, Mostly A Silty Sand With Sandy Silt And Gravel Present, Slightly Moist, Dense
9					
10				SM	Reddish Brown, Mostly A Silty Sand With Sandy Silt And Gravel Present, Slightly Moist, Dense
11					
12				SM	Reddish Brown, Mostly A Silty Sand With Sandy Silt And Gravel Present, Slightly Moist, Dense
13					
14					
15					End Of Trench At Fifteen (15) Feet No Bedrock Or Groundwater Encountered

○ = Ring Sample ☐ = Bulk Sample ⊗ = No Recovery

	Graphic Representation
1	
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12	
13	
14	
15	
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Date: 7/21/06	Project Number: GT-2957	Logged By: JC
Client: Doug Beam	Location: Sierra Highway, Vicinity Listie Road, Acton	Trench No: T-2

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	USCS	Description
0					
1					
2	① @ 2'	125.0	0.8	SM	Brown, Mostly Silty Sand With Some Gravel Present, Dry, Moderately Dense
3					
4	⊗ @ 4'			SM	Brown, Mostly Silty Sand With Some Gravel Present, Dry, Moderately Dense
5					
6	⊗ @ 6'				Reddish Brown To Grayish, Weathered Decomposed Granite, Dry, Dense
7					
8	⊗ @ 8' B				Reddish Brown To Grayish, Weathered Decomposed Granite, Dry, Dense
					End Of Trench At Eight And One Half (8½) Feet Refusal Due To Bedrock No Groundwater Encountered

O = Ring Sample ☐ = Bulk Sample ⊗ = No Recovery

Graphic Representation

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Date: 7/21/06	Project Number: GT-2957	Logged By: JC
Client: Doug Beam	Location: Sierra Highway, Vicinity Listie Road, Acton	Trench No: T-3

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	USCS	Description
0					
1					
2	1 @ 2'	104.4	4.0	SM	Brown, Silty Sand, Moist, Moderately Dense
3					
4	⊗ @ 4'				Reddish Brown to White, Conglomerate Of Sandy Silt To Silty Sand And Calcium Carbonate, Dry, Very Dense
5					
6	⊗ @ 6' C				Reddish Brown to White, Conglomerate Of Sandy Silt To Silty Sand And Calcium Carbonate, Dry, Very Dense End Of Trench At Six (6) Feet Refusal Due To Very Dense Conglomerate of Silty Sand And Calcium Carbonate No Groundwater Or Bedrock Encountered

O = Ring Sample ☐ = Bulk Sample ⊗ = No Recovery

	Graphic Representation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Subdivisions			Symbol	Typical Descriptions
Coarse Grained Soils More Than 50% Of Material Is Larger Than No. 200 Sieve	Gravel And Gravelly Soils More Than 50% Of Coarse Fraction Retained On No. 4 Sieve	Clean Gravels (Little To No Fines)	**GW**	Well-Graded **Gravels**, Gravel-Sand Mixtures, Or Little To No Fines.
			GP	Poorly Graded **Gravels** Or Gravel-Sand Mixtures; Or Little To No Fines
		Gravels With Fines	**GM**	**Silty Gravels**, Gravel-Sand-Silt Mixtures.
			GC	**Clayey Gravels**, Gravel-Sand-Clay Mixtures.
	Sand And Sandy Soils More Than 50% Of Coarse Fraction Passing No. 4 Sieve	Clean Sand (Little To No Fines)	**SW**	Well-Graded **Sands**, Gravelly Sands, Or Little To No Fines.
			SP	Poorly Graded **Sands** Or Gravelly Sands; Or Little To No Fines.
		Sands With Fines	**SM**	**Silty Sands** And Sand-Silt Mixtures With Some Gravel.
			SC	**Clayey Sands**, Sand-Clay Mixtures.
Fine Grained Soils More Than 50% Of Material Passes No. 200 Sieve	Silts And Clays	Liquid Limit Less Than 50	**ML**	Inorganic **Silts** And Very Fine Sands, Clayey Fine Sands, Or Clayey Silts Of Low Plasticity.
			CL	Inorganic **Silts** Of Low To Medium Plasticity, Gravelly Sandy, Silty Clays, Or Lean Clays.
			OL	Organic **Silts** And Organic Silty; Clays Of Low Plasticity.
	Silts And Clays	Liquid Limit Greater Than 50	**MH**	Inorganic Silts; Micaceous, Diatomaceous 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.

LABORATORY TESTING

DESCRIPTION OF LABORATORY TESTING

Undisturbed Samples

Undisturbed samples for additional testing in our laboratory are obtained per ASTM D – 1586 – 99, by driving a sampling spoon into the material. A split barrel type spoon sampler was used, having an inside diameter of two and five tenths (2.5) inches, with a tapered cutting tip at the lower end and a ball valve at the upper end. The barrel is lined with thin brass rings, each one (1) inch in length. The spoon penetrated into the soil below the depth of the trench at approximately twelve (12) inches to eighteen (18) inches. The central portion of the sample is retained for testing. All samples in the natural field condition are placed in airtight containers and transported to the laboratory. Bulk samples, representative of the surface and near-surface materials, are obtained.

Classification

Typical materials were subjected to mechanical grain-size analysis by wet sieving from U.S. Standard brass screens (ASTM D - 422). Hydrometer analyses were performed where appreciable quantities of fines were encountered. The data was evaluated in determining the classification of the materials. The grain-size distribution curves are presented in the test data and the Unified Soil Classification is presented in both the test data and the Trench Logs.

Moisture and Density Test

Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test trenches. The results of these tests are presented in the Trench Logs. Where applicable, only moisture content was determined from “undisturbed” or disturbed samples.

Expansion Index Test

The Expansion Index Test, UBC Standard No. 18 - 2, evaluated the expansion potential of selected materials. Specimens are molded under a given compactive energy approximately to the optimum moisture content and approximately fifty percent (50%) saturation or approximately ninety percent (90%) relative compaction.

The prepared one (1) inch thick by four (4) inches in diameter specimens are loaded to an equivalent one hundred forty-four (144) psf surcharge and are inundated with tap water until a volumetric equilibrium is reached.

Consolidation

Compression tests are performed on undisturbed and/or remolded samples in a two and five tenths (2.5) inches diameter, and one (1) inch high brass ring. Consolidometers, like the direct shear machine, are designed to receive the specimens in the rings in field condition. Porous stones, placed at the top and bottom of each specimen, permit the free flow of water from the sample during the test. Settlement accompanying each increment of load is measured by a dial indicator reading to one ten thousandths (0.0001) of an inch. To simulate possible adverse field conditions, moisture was added to an axial load of fifteen hundred (1,500) lbs./sq.ft. and Test Method: ASTM D – 2435 - 2004 was followed.

Standard Penetration Test

Standard Penetration Testing is performed in the trench per ASTM D – 1586 - 99 by driving a split spoon sampler ahead of the trench at selected levels. The number of hammer blows required to drive the sampler twelve (12) inches with a one hundred forty (140) lb. Hammer dropped thirty (30) inches is identified as the Standard Penetration Resistance (SPT). Many correlations have been made between SPT values and soil properties. Empirical correlations also permit the blows of different energy or sampler sizes, such as ring samples, to be converted to SPT values.

Direct Shear

Direct shear tests were performed on selected undisturbed and/or remolded samples, which were soaked for a minimum of twenty-four (24) hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately one (1) hour prior to application of shearing force. The samples were tested under various normal loads, a different specimen being used for each normal load.

The samples were sheared in a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of five hundredths (0.05) of an inch per minute. After a travel of three tenths (0.300) of an inch of the direct shear machine, the motor was stopped and the sample was allowed to "relax" for approximately fifteen (15) minutes.

The "relaxed" and "peak" shear values were recorded. It is anticipated that, in the majority of samples tested, the fifteen (15) minutes relaxing of the sample is sufficient to allow dissipation of pore pressures set up in the samples due to application of shearing force. The relaxed values are therefore judged to be a good estimation of effective strength parameters. The test results were plotted on "Table 2 – Direct Shear Test".

Residual Direct Shear Test

The samples were sheared, as described in the preceding paragraph, with the rate of shearing of one thousandths (0.001) of an inch per minute. The upper portion of the specimen was pulled back to the original position and the shearing process was repeated until no further decrease in shear strength was observed with continued shearing (at least three times resheared). There are two methods to obtain the shear values: (a) the shearing process was repeated for each normal load applied and the shear value for each normal load recorded. One or more than one specimen can be used in this method; (b) only one specimen was needed, and a very high normal load (approximately nine thousand (9,000) psf) was applied from the beginning of the shearing process. After the equilibrium state was reached (after "relaxed"), the shear value for that normal load was recorded. The normal loads were then reduced gradually without shearing the sample (the motor was stopped). The shear values were recorded for different normal loads after they were reduced and the sample was "relaxed.

Atterberg Limits

The Atterberg Limits were determined in accordance with ASTM D – 4318 - 2005 for engineering classification of the fine-grained materials.

Maximum Density Test

The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D – 1557 - 2002 (five (5) layers). The results of these tests are presented in the test data.

Soluble Sulfates

The California Materials Test Method No. 417 determined the soluble sulfate contents of selected samples.

Resistivity Test

California Materials Test Method # 643 as prescribed and forwarded from the California Department of Transportation Materials Lab determined the resistivity test, selected samples, and results. The sample was prepared for testing as follows: Bulk sample material was sieved through a number eight (8) sieve and sixteen hundred (1,600) grams of natural material was collected, weighed, and dried. The sample was removed from the oven and thirteen hundred (1,300) grams of material was separated and prepared as follows: The sample was oven dried and one hundred fifty (150) ml of distilled (deionized) water was added to the material and mixed thoroughly and placed into a calibrated soil box suitable for use with a Nillson Model 400 resistivity meter. The sample was compacted into the soil box by hand level with the top of the soil box.

The material was then tested for resistivity and removed from the soil box and an additional one hundred (100) ml of distilled (deionized) water was added. With two hundred fifty (250) ml. of water added to the sample the material was returned to the soil box in the manner mentioned hereinabove and the material was tested again. Both test results were recorded in an appropriate manner for recording such data.

TABLE I

Maximum Density Test Results

ASTM D - 1557

Sample	Soil Description	USCS	Maximum Dry Density (pcf)	Optimum Moisture (%)
A & B	Gravelly Silty Sand	SM	137.2 pcf	6.8 %

TABLE II

Direct Shear – Undisturbed Saturated Samples

Trench	Angle Of Friction (degrees)	Cohesion (psf)
T-1 @ 6’	27.9 º	74 psf

Remolded Saturated Samples

Sample	Angle Of Friction (degrees)	Cohesion (psf)
A & B	30.2 º	78.7 psf

TABLE III

Chemical Test Results

Sample	Sulfates	Chlorides	pH
A & B	150 ppm (0.015%)	50 ppm	4.0

TABLE IV

Expansion Test Results

ASTM D - 4829

Sample	Expansion Index	Expansion Potential
A & B	39	Low

TABLE V

Resistivity Test Results

California State Method No. 643

Sample: A & B

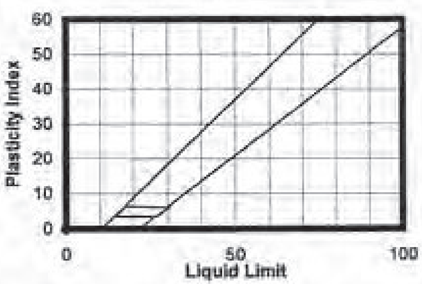
Water Added	Dial Reading	Range Setting	OHM Reading	Factor	OHM-CM
150 mls	12	1K	12,000	**.636**	7,632
250 mls	8	1k	8.000	**.636**	5,088

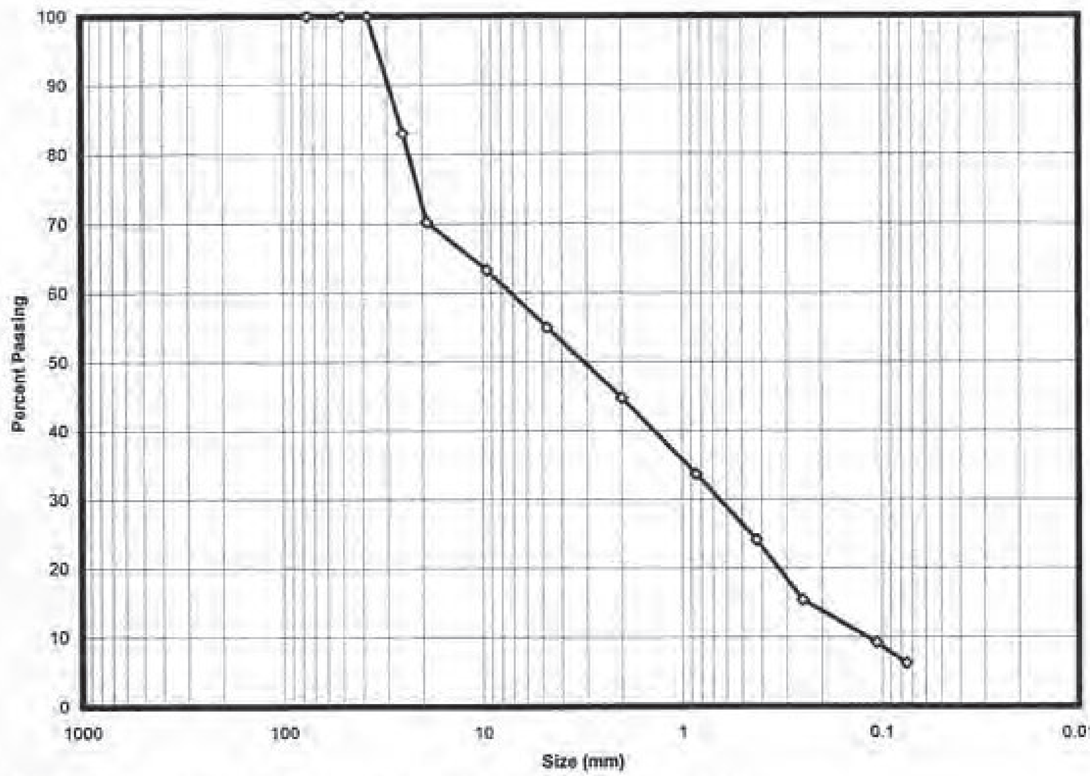
Resistivity Classification

OHMs-CM	Classification
Below 500	Very Corrosive
501 - 999	Corrosive
1,000 – 1,999	Moderately Corrosive
2,000 – 9,999	Mildly Corrosive
10,000 - Above	Negligible

APPENDIX

Sieve Size	Percent Passing
3 inch	100
1.5 inch	83
3/4 inch	70.2
3/8 inch	63.3
No. 4	55
No. 8	44.8
No. 16	33.7
No. 30	24.1
No. 50	15.4
No. 100	9.2
No. 200	6.2
Liquid Limit	0
Plastic Limit	0
Plasticity Index	0





Grain Size Analysis and Soil Classification (ASTM D422-63 & D2487-00)

Sample Identification	Sample Description	Unified Soil Classification	PLATE: G-1 J.O.: GT-2999
A	WellGrdedSdw/ClyeySd	SM	DATE: 7/18/2006

PLATE: HC-1
J.O.: GT-2157
DATE: 3/21/2003

Consolidation Pressure Curve

Sample Identification	Sample Description
T-1 @ -4.0'	Sdw/Slt& Gravel
Wi=4.6% Wf=15.7%	Ws=108.8 pcf

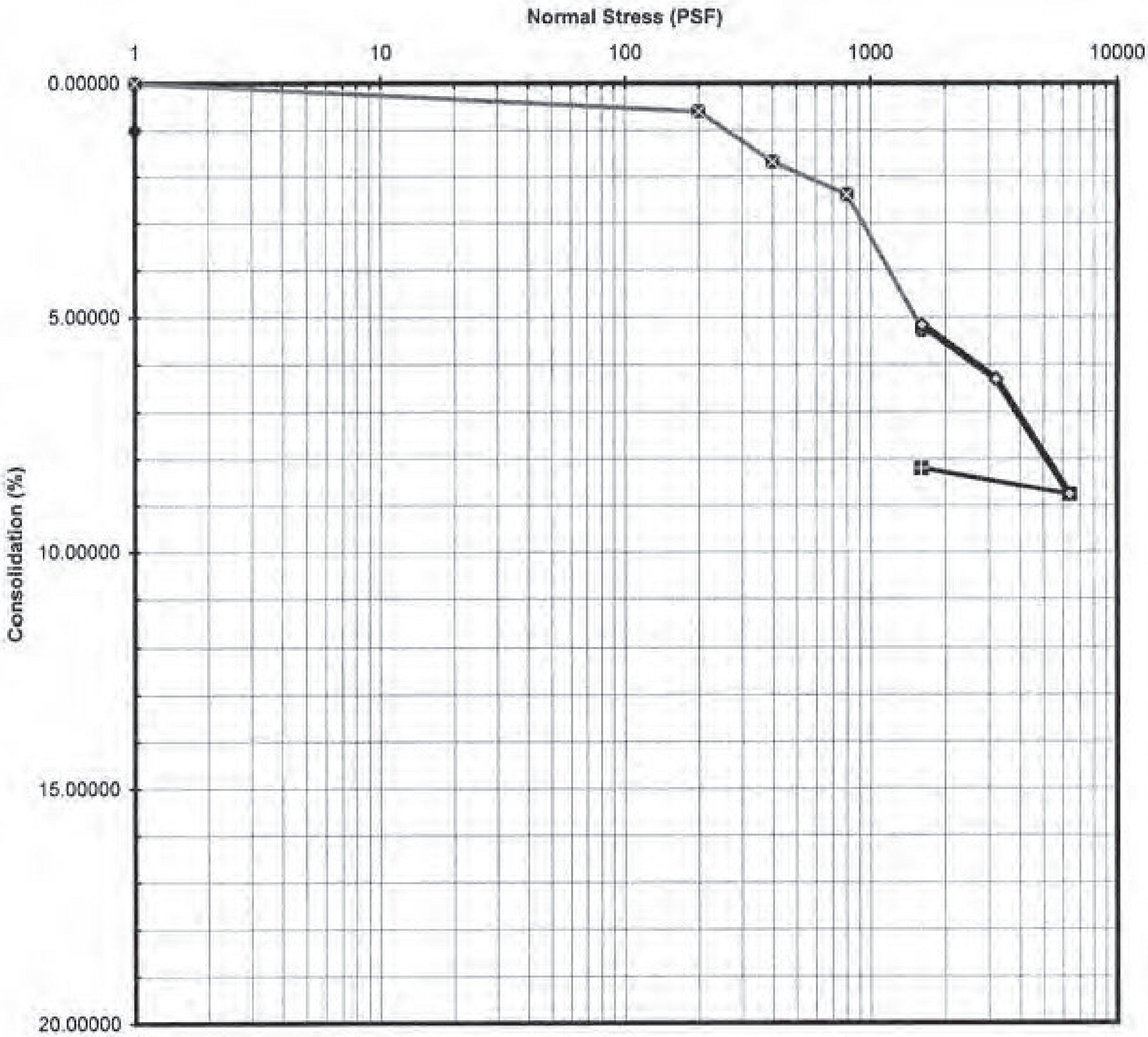
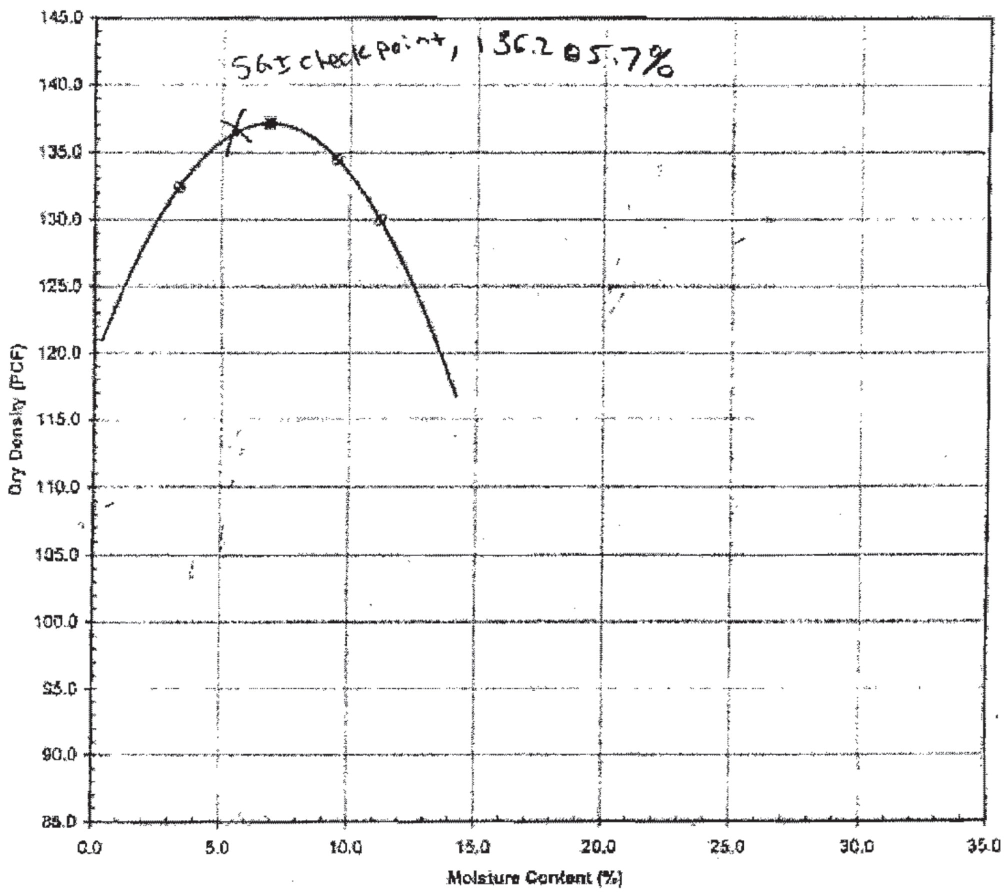


PLATE: M-1
J.O.: GT-2957
DATE: 7/31/2006

Maximum Dry Density & Optimum Moisture Curve

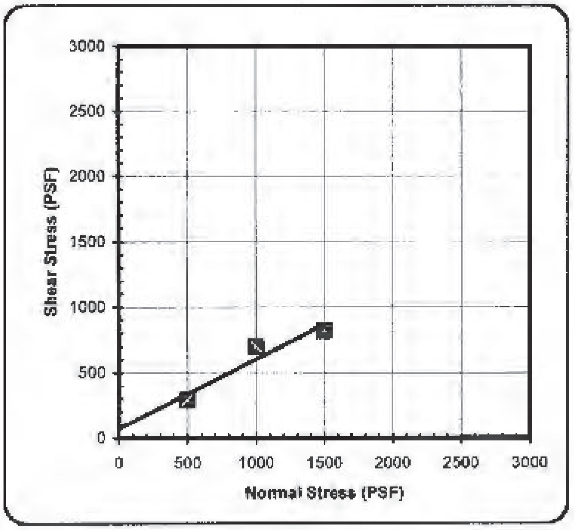
Sample Identification	Sample Description	Maximum Dry Density (PCF)	Optimum Moisture (%)
A & B	GravellySiltySand	137.2	6.8

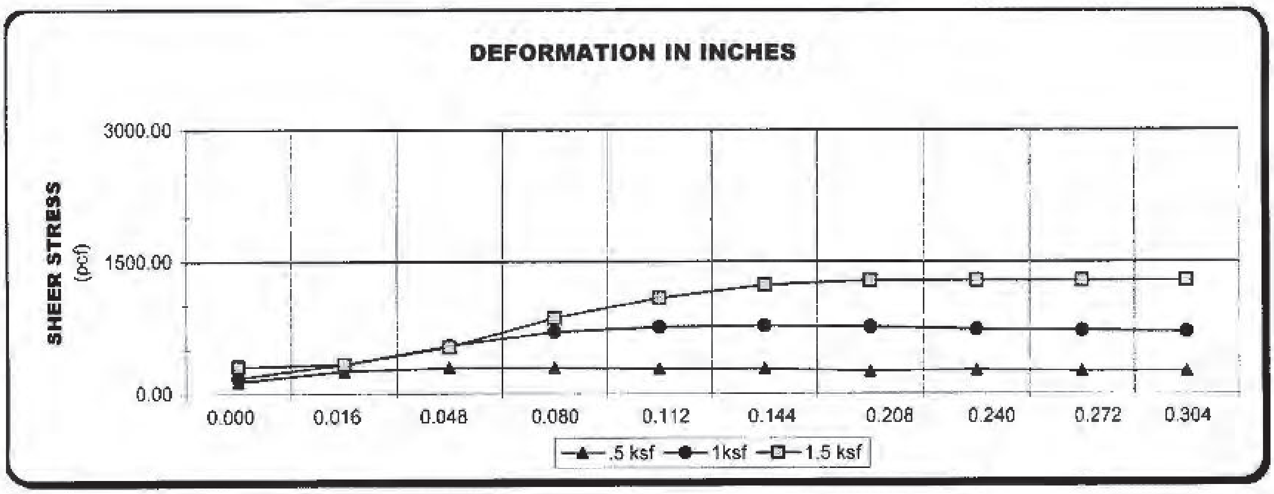


AZ GEO TECHNICS, INC.

DIRECT SHEAR

PLATE: S-1
J.O.: GT-2957
DATE: 8/3/2006





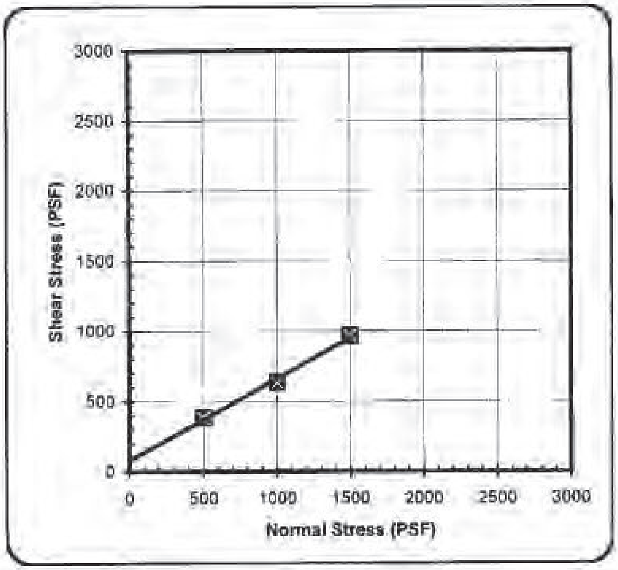
DATE	8/3/2006	WI %	2.4%
PROJECT #	GT-2957	WF %	17.5%
BORING/TRENCH	T-1	WS pcf	122.1
SAMPLE	3	COHESION STRENGTH psf	74
DEPTH	6.0'	FRICTION ANGLE DEGREE phi	27.9
SOIL DESCRIPTION	SiltySand		

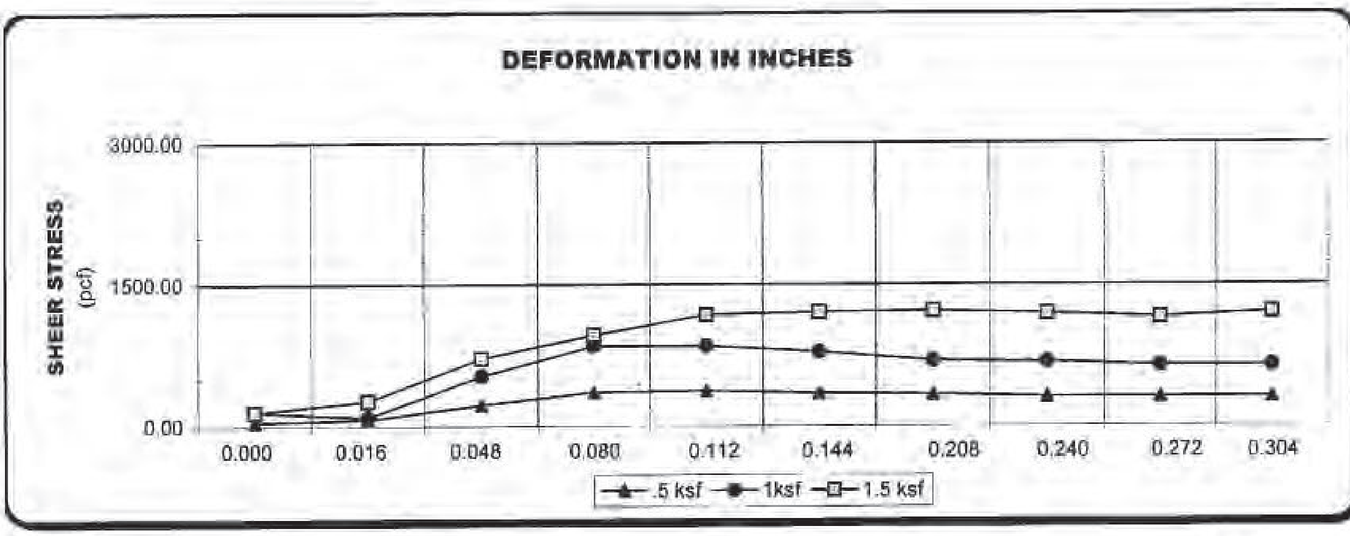
ULTIMATE SHEAR STRENGTH	X	NORMAL SHEAR STRENGTH	
UNDISTURBED	X	DISTURBED	
SATURATED	X	DRY	
RUN	X	RERUN	
		REMOLD TO 90%	

AZ GEO TECHNICS, INC.

DIRECT SHEAR

PLATE: S-2
J.O.: GT-2957
DATE: 8/2/2006





DATE	8/3/2006
PROJECT #	GT-2957
BORING/TRENCH	T-1 & T-2
SAMPLE	A & B
DEPTH	4.0' to 8.0'
SOIL DESCRIPTION	GravellySiltySand

WI %	6.8%
WF %	14.5%
WS pcf	123.5
COHESION STRENGTH psf	78.7
FRICTION ANGLE DEGREE phi	30.2

ULTIMATE SHEAR STRENGTH	X
UNDISTURBED	
SATURATED	X
RUN	X

NORMAL SHEAR STRENGTH	
DISTURBED	X
DRY	
RERUN	
REMOLD TO 90%	X

FIGURE I

Requirements For Concrete Exposed To Sulfate-Containing Solution

Sulfate Exposure	Water Soluble Sulfate (SO_4) Percent By Weight	Water Soluble Sulfate (SO_4) ppm	Cement Type	Maximum Water Cement Ratio	Minimum Compressive Strength Of Concrete (psi)
Negligible	0.00 – 0.10	0 – 999	II		
Moderate	0.10 – 0.20	1,000 – 1,999	II, IP, IS	0.50	4,000
Severe	0.20 – 2.00	2,000 – 20,000	V	0.45	4,500
Very Severe	Over 2.0	Over 20,000	V Plus Pozzolan*	0.40	4,500

Note: A lower water/cement ratio or higher strength may be required for water-tightness for protection against corrosion of embedded items or freezing and thawing.

** Pozzolan has been determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement.*

FIGURE II

Effect Of Commonly Used Chemicals On Concrete (Durability)

Rate Of Attack At Ambient Temperature	Inorganic Acids	Organic Acids	Alkaline Solutions	Salt Solutions	Misc.
Rapid	Hydrochloric, Hydrofluoric, Nitric, Sulfuric	Acetic, Formic, Lactic		Aluminum Chloride	
Moderate	Phosphoric	Tanic	Sodium Hydroxide > 20%	Ammonium Nitrate, Ammonium Sulfate, Sodium Sulfate, Magnesium Sulfate	Bromine (gas), Sulfate Liquor
Slow	Carbonic		Sodium Hydroxide 10 – 20%	Ammonium Chloride, Magnesium, Sodium Cyanide	Chlorine (gas), Seawater, Soft Water
Negligible		Oxalic, Tartaric	Sodium Hydroxide < 10% Sodium Hydrochloride Ammonium Hydroxide	Calcium Chloride, Sodium Chloride, Zinc Nitrate, Sodium Chromate	Ammonia (liquid)

Note: Avoid siliceous aggregates because they are attacked by strong solutions of sodium hydroxide.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

General

These specifications and the Grading details attached to the Grading Plans, if required, represent **AZ Geo Technics, Inc.s'** minimum requirements for Grading and other associated operations on construction projects. These specifications and recommendations of the regulatory agencies should be considered a portion of the project specifications.

Clients' contractor (prior to Site Grading) should arrange to meet at the Site along with Client, the design engineer and/or architect, the soils engineer (Consultant), and representatives of the governing authorities. *All parties should be given at least forty-eight (48) hours notice*.

It is Clients' contractor's responsibility to prepare the ground surface to receive the fills, spread, mix, and compact the fill in accordance with the job specifications. Clients' contractor should also have suitable and sufficient equipment in operation to handle the amount of fill being placed.

PREPARATION OF AREA TO BE FILLED

Clearing And Grubbing

All structures marked for removal; timber, logs, trees, brush, and other rubbish shall be removed, piled, and burned or otherwise disposed of off-Site. This is to leave the areas that have been disturbed with a neat appearance and free from unsightly debris.

A thorough search shall be made of the Site for all existing structures to be removed and for possible underground storage tanks and/or septic tanks as well as cesspools. Concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the Site.

All trees to be removed from the Site shall be pulled in such a manner so as to remove as much of the root system as possible. Any existing brush, topsoil, loose fill, and porous soils shall be excavated to competent native materials.

Prior to placement of any fill soils, the exposed surface shall be scarified, cleansed of debris, and re-compacted to ninety percent (90%) of the laboratory standard under the direction of the soils engineer (Consultant). This is to be done in accordance with the following guidelines for placing, spreading, and compacting fill materials.

Processing

The existing ground, which is determined to be satisfactory for support of fill, shall be scarified to a minimum depth of six (6) inches. Existing ground, which is not satisfactory, shall be over excavated. Scarification shall continue until the soils are broken down and free of large clay lumps and until the working surface is reasonably uniformed and free of uneven features which would inhibit uniform compaction.

Moisture Conditioning

Over-excavated and processed soils shall be watered, dried-back, and blended or mixed as required to attain uniform moisture content. For field-testing purposes, “near optimum” moisture should be considered to mean “optimum moisture to three percent (3%) above optimum moisture”.

Prior to placement of additional compacted fill following a Grading delay, the exposed surface of previously compacted fill should be reprocessed. This should be accomplished by scarification, watering conditioning, and then re-compacted to a minimum of ninety percent (90%) of the laboratory maximum dry density.

No Additional fill should be placed following a period of flooding, rainfall, or over watering until damage assessments have been made and remedial Grading performed.

Benching

Where fills are to be placed on the ground with slopes steeper than five to one (5:1) the ground shall be stepped or benched. The lowest bench shall be a minimum of fifteen (15) feet wide and two (2) feet deep. This should expose firm material; it also should be approved by the soils engineer (Consultant). Other benches shall be excavated into firm material to a minimum width of four (4) feet. If Grading plans are required, typical benching and keying details are included in the Grading details on the Grading plans.

Approval

All areas to receive fill, including processed areas, removal areas, and toe-of-fill benches shall be approved by the soils engineer (Consultant) prior to fill placement.

All Grading operations should be inspected by a soils engineer (Consultant). The presence of the soils engineer (Consultant) will be for the purpose of providing observation and field-testing. This will not include any supervision of the actual work by Clients' contractor, Clients' contractor's employees and/or agents.

It is understood that the soils engineer (Consultant) will not be responsible for job or site safety on this project, which will be the sole responsibility of Client.

It should be stressed that operations undertaken at the Site without the presence of the soils engineer (Consultant) may result in exclusion of certain areas from the final compaction report.

Fill Placement

All fill material should be placed in layers a maximum of six (6) to eight (8) inches thick, moisture conditioned (as necessary), and compacted to a minimum relative compaction of ninety percent (90%) of their maximum dry density as determined by Test Method ASTM D – 1557 - 78.

FILL MATERIAL

General

Material to be placed as fill shall be free of organic matter and other deleterious substances. This shall be approved by the soils engineer (Consultant). Soils of poor gradation and expansion at strength characteristics shall be placed in areas designated by the soils engineer (Consultant) or shall be mixed with other soils to serve as satisfactory fill material.

Import materials shall meet the following minimum requirements:

A. Plasticity index not to exceed twelve (12).

B. R-Value not less than twenty-five (25).

C. Not more than thirty percent (30%) passing the #200 sieve.

Oversized Material

Rocks eight (8) inches and smaller may be utilized within the compacted fill provided that they are placed in such a manner that nesting of the rock is avoided. Fill should be placed and thoroughly compacted to the minimum requirement over and around all rock.

During the course of grading operations rocks or similar irreducible materials greater than twelve (12) inches may be generated. These rocks should not be placed within the compacted fill unless placed as recommended by the soils engineer (Consultant).

Rocks that are greater than twelve (12) inches but less than three (3) feet that are generated during Grading, may be placed within an approved compacted fill provided that it is in accordance with the recommendations in the Grading details on the Grading plans, if any. Rocks greater than three (3) feet should be broken down or disposed of off-Site. Rocks up to three (3) feet should be placed ten (10) feet below the finished grade and should not be closer than fifteen (15) feet from any slope face. Where practical oversized material should not be placed below areas where structures or deep utilities are proposed.

Oversized material should be placed in windrows on a clean over-excavated/unyielding compacted fill or firm natural ground. Select native or imported granular soils (SE = 30 or better) should be placed or thoroughly flooded over as well as around all windrowed rock (such that no voids remain). Windrows of oversized material should be staggered so that successive strata of oversized material are not in the same vertical plane.

COMPACTION

After each layer has been placed, mixed, and spread evenly is shall be thoroughly compacted to no less than ninety percent (90%) of the maximum density in accordance with ASTM D - 1557. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tire rollers, or other types of rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. 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. The roller shall make sufficient trips to ensure that the desired density has been attained.

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting operations shall be continued until the slopes are stable, but not too dense for planting; and that there is no appreciable amount of loose soil on the slopes. Compacting of the slopes may be done progressively in increments of two (2) to four (4) feet in fill height or after the fill is brought to its total height.

Field density tests of each compacted layer of fill shall be made by the soils engineer (Consultant). Density tests may be made at intervals not exceeding two (2) feet of fill height provided that at least every one thousand (1,000) cubic yards of fill are tested. Where sheepsfoot rollers are used, the soils may be disturbed to a depth of several inches. Density test shall be taken in the compacted material below the disturbed surface.

When these tests indicate that the density of a layer or portion is below the required density, that layer or portion shall be reworked until the required density has been attained.

The fill operations shall be continued in six (6) inch compacted layers (as specified above) until the fill has been brought to the finished slopes and grades as shown on the approved Grading plans, if applicable.

SITE PROTECTION

Precautions should be taken to protect the Site from flooding, ponding, or inundation by improper surface drainage. Temporary provisions should be made during the rainy season to direct surface drainage away from the Site. Plastic sheeting should be kept on hand to prevent unprotected slopes from becoming saturated.

Where necessary, Clients' contractor should install check dams, de-silting basins, sandbags, and other devices to control erosion.

Following periods of rainfall, Clients' contractor should arrange a walk-through with the soils engineer (Consultant) to visually assess rain related damage. At the request of the soils engineer (Consultant), Clients' contractor shall make all excavations as necessary to evaluate the extent of rain related damage. Rain related damage might include erosion, silting, saturation, swelling, structural distress, or any other adverse condition observed by the soils engineer (Consultant). Soils adversely affected should be over-excavated and replaced with compacted fill as directed by the soils engineer (Consultant).

SLOPES

Compacted fill or backrolled slopes should be limited to a slope ratio of no steeper than two to one (2:1). All compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm compacted fill liner core.

The actual amount of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by Clients' contractor to provide thorough mechanical compaction to the outer edges of the overbuilt slope surface.

If excavations for cut slopes expose loose, cohesion less, significantly fractured or otherwise unsuitable material; over-excavation, and replacement with a compacted stabilization fill should be done. Stabilization fill construction should conform to the requirements of the Grading details outlined on the Grading plans, if applicable. For cut slopes made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top-of-cut.

SLOPE MAINTENANCE

In order to enhance surficial slope stability, slope planting should consist of de-rooted vegetation requiring little water. Plants native to Southern California and plants that are relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A qualified Landscape Architect should be contracted for specific recommendations.

DRAINAGE

Canyon sub-drain systems should be installed in accordance with the Grading details on the Grading plans, if applicable. Typical sub-drains for compacted fill buttresses, slope stabilizations, or side hill masses should also be installed in accordance with grading details on the Grading plans, if applicable.

All roof, pad, and slope drainage should be directed away from slope area structures to approved disposal areas via gutters, down spouts, or swales. For pad areas created above cut natural slopes, a positive drainage should be established away from the top-of-slopes. This may be accomplished by using a berm and/or appropriate pad gradient. A recommended overall gradient away from the top-of-slope should be two percent (2%) or greater. For drainage immediately away from structures, a minimum five percent (5%) gradient should be maintained.

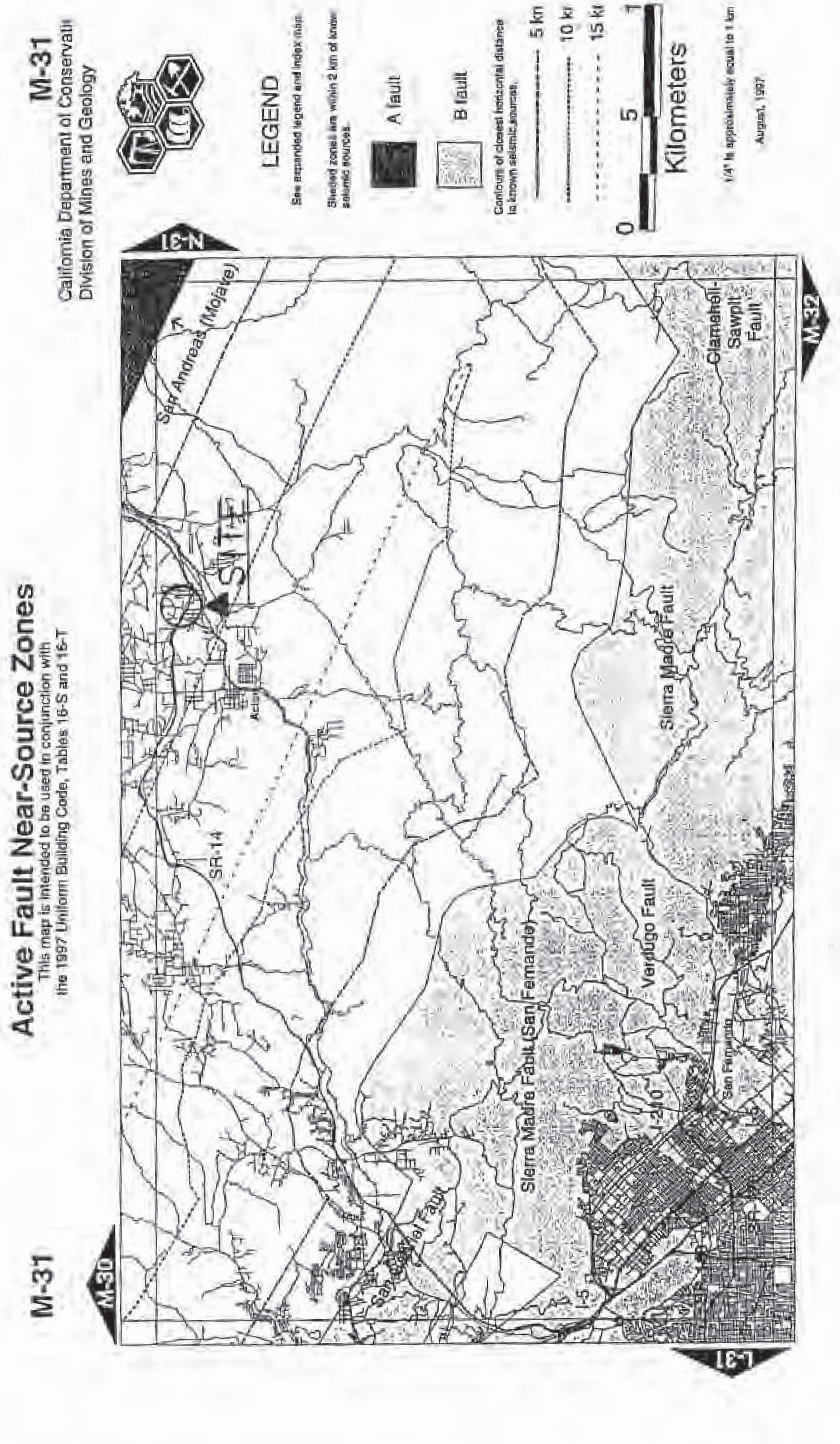
Pad drainage may be reduced to one percent (1%) for projects where no slopes exist, either natural or manmade.

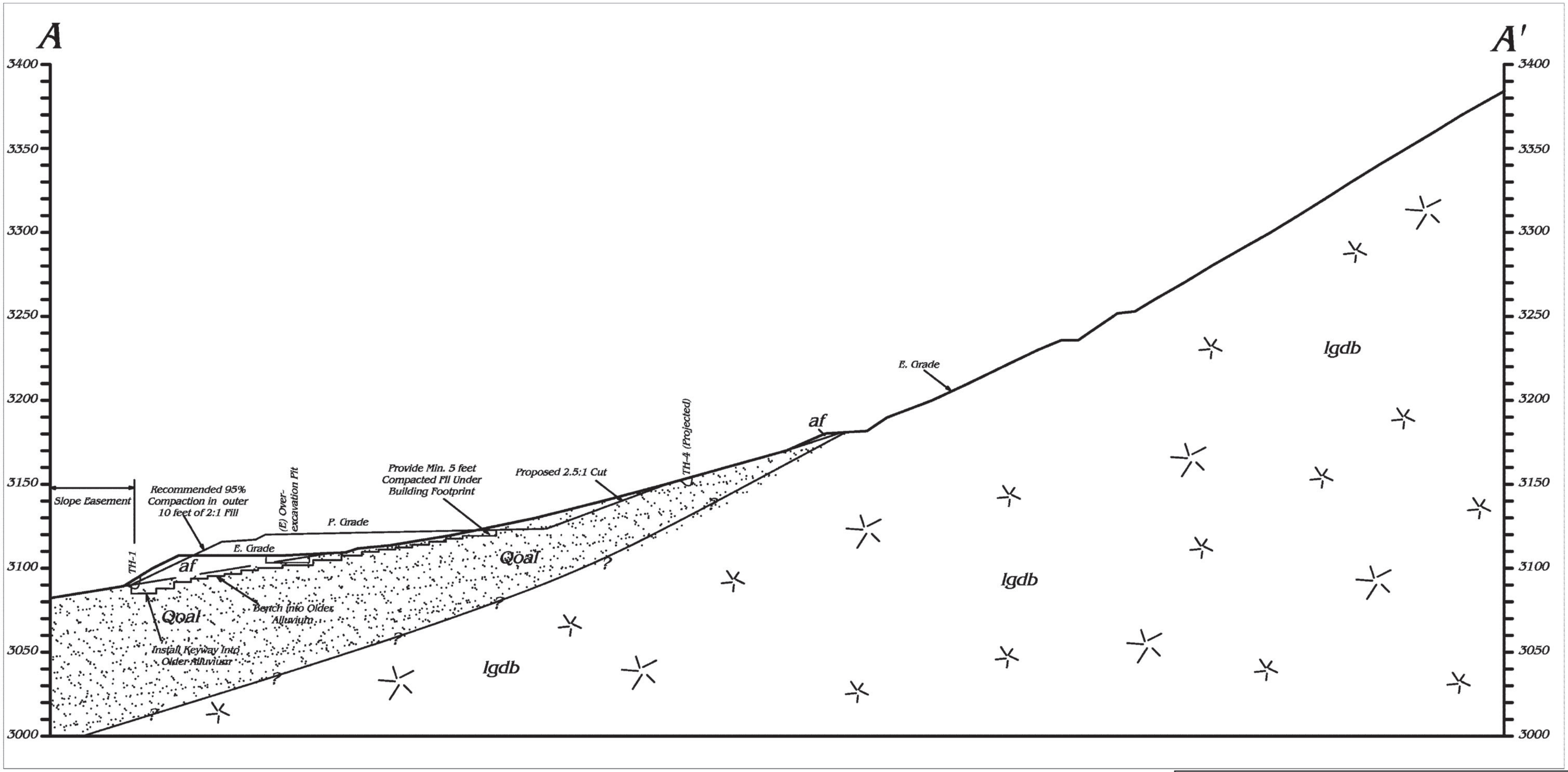
TRENCH BACKFILLS

Utility trench backfill can be best placed by mechanical compaction. Unless otherwise specified, compaction shall be a minimum of ninety percent (90%) of the laboratory maximum density. As an alternative, where specifically approved by the soils engineer (Consultant) clean sand (sand equivalent thirty (30)) may be thoroughly jetted in place. Jetting should only be considered to apply to trenches no greater than two (2) feet in width and four (4) feet in depth. Following jetting operations, trench backfill should be thoroughly compacted by mechanical means.

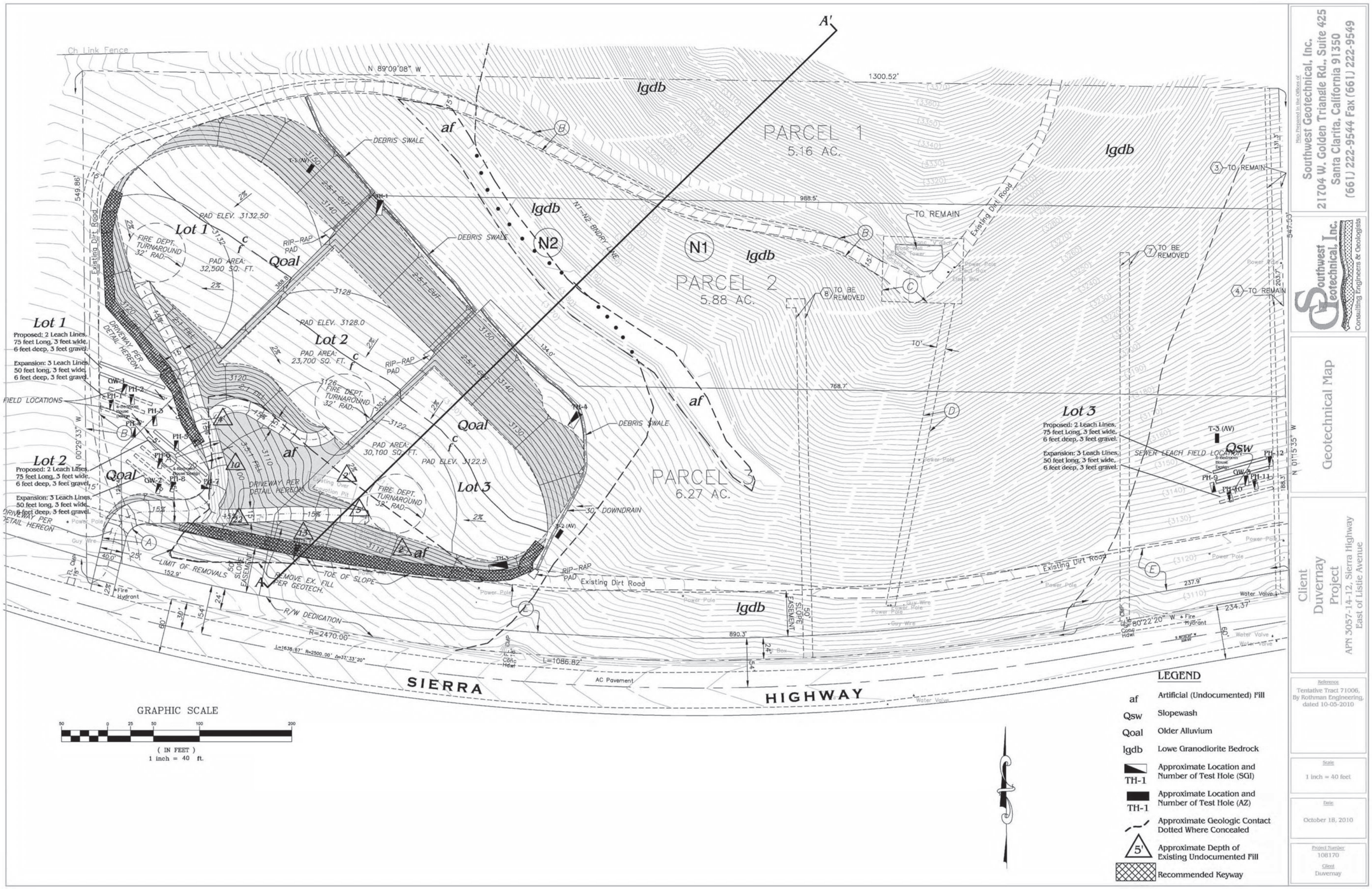
GENERAL BASIC RECOMMENDATIONS FOR SLABS-ON-GRADE

1. Concrete used for residential concrete slabs must achieve a minimum compression strength as recommended by (Table 19A – 3 1997 UBC) or as requested by local regulatory agencies.
2. The concrete should have a minimum cement content of five and two tenths (5.2) sacks per cubic yard.
3. The maximum water content should be seven (7.0) gallons per sack per cubic yard in order to maintain an acceptable water to cement ratio.
4. Maximum slump at which the concrete should be placed should not exceed more than six (6) inches.
5. Maximum size of aggregate for concrete should be between three-fourths (¾) to one (1) inch.
6. Please note that every gallon of water added to the concrete above the design mix will result in the loss of a one (1) inch slump and two hundred (200) per square inch in compression strength. (ACI Manual and Practices of Concrete).
7. Delivery time including unloading of concrete shall not exceed ninety (90) minutes. (ACI Manual and Practices of Concrete and UBC Section 19).
8. Slabs must be cured using Hunt's curing compound, or any approved equivalent curing method. (ACI 318, Chapter 26).
9. Reinforcement should be placed within three (3) inches from the bottom or according to the specifications outlined in Section 1907, 1997 UBC.
10. Control joints should be placed typically on ten (10) foot centers for four (4) inch nominal slabs in order to reduce excessive cracking. Formula for joint spacing = 2.5 ft. x (slab thickness in inches).
11. Concrete shall not be placed at temperatures exceeding the recommended limits (a low of fifty (50) degrees F in winter, and a high of one hundred (100) degrees F in summer) (ACI 306).
12. The sub-grade should be relatively moist prior to placing concrete slabs-on-grade, (ACI 318).
13. Daily information must be kept on file concerning concrete tickets, time of pour, temperature, and other factors effecting concrete placement and finishing.


M-31
Active Fault Near-Source Zones
This map is intended to be used in conjunction with
the 1997 Uniform Building Code, Tables 16-S and 16-T
M-31
California Department of Conservation
Division of Mines and Geology
LEGEND
See expanded legend and index map.
Shaded zones are within 2 km of known seismic sources.
A fault
B fault
Contours of closest horizontal distance to known seismic sources.
5 km
10 km
15 km
0
5
10
Kilometers
1/4" is approximately equal to 1 km
August, 1997
N-31
M-30
M-32
L-31
San Andreas (Mojave)
SITE
Acton
SR-14
Sierra Madre Fault
Sierra Madre Fault (San Fernando)
Verdugo Fault
Clamshell-Sawpit Fault
San Gabriel Fault
San Fernando
I-210
I-5



Southwest Geotechnical, Inc.	
Cross Section A-A'	
Project: 1008170	Scale: 1"=60'
Client: Duvernay	
Date: October 18, 2010	



Map Prepared in the Offices of
Southwest Geotechnical, Inc.
21704 W. Golden Triangle Rd., Suite 425
Santa Clarita, California 91350
(661) 222-9544 Fax (661) 222-9549
Southwest Geotechnical, Inc.
Consulting Engineers & Geologists
Geotechnical Map
Client
Duvernay
Project
APN 3057-14-12, Sierra Highway
East of Lisile Avenue
Reference
Tentative Tract 71006,
By Rothman Engineering,
dated 10-05-2010
Scale
1 inch = 40 feet
Date
October 18, 2010
Project Number
108170
Client
Duvernay
PARCEL 1
5.16 AC.
PARCEL 2
5.88 AC.
PARCEL 3
6.27 AC.
Lot 1
Proposed: 2 Leach Lines,
75 feet Long, 3 feet wide,
6 feet deep, 3 feet gravel.
Expansion: 3 Leach Lines,
50 feet long, 3 feet wide,
6 feet deep, 3 feet gravel.
Lot 2
Proposed: 2 Leach Lines,
75 feet Long, 3 feet wide,
6 feet deep, 3 feet gravel.
Expansion: 3 Leach Lines,
50 feet long, 3 feet wide,
6 feet deep, 3 feet gravel.
Lot 3
Proposed: 2 Leach Lines,
75 feet Long, 3 feet wide,
6 feet deep, 3 feet gravel.
Expansion: 3 Leach Lines,
50 feet long, 3 feet wide,
6 feet deep, 3 feet gravel.
PAD ELEV. 3132.50
PAD AREA: 32,500 SQ. FT.
PAD ELEV. 3128.0
PAD AREA: 23,700 SQ. FT.
PAD AREA: 30,100 SQ. FT.
PAD ELEV. 3122.5
FIRE DEPT. TURNAROUND 32' RAD.
DEBRIS SWALE
RIP-RAP PAD
DRIVEWAY PER DETAIL HEREON
FIELD LOCATIONS
LIMIT OF REMOVALS
REMOVE EX. FILL PER GEOTECH.
TOE OF SLOPE
R/W DEDICATION
30' DOWNDRAIN
Existing Dirt Road
SEWER LEACH FIELD LOCATION
TO REMAIN
TO BE REMOVED
N1-N2 BNDRY LINE
N 89°09'08" W
1300.52'
N 00°29'33" W
N 01°15'35" W
SIERRA HIGHWAY
AC Pavement
Ch Link Fence
GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.
LEGEND
af Artificial (Undocumented) Fill
Qsw Slopewash
Qoal Older Alluvium
lgdb Lowe Granodiorite Bedrock
TH-1 Approximate Location and Number of Test Hole (SGI)
TH-1 Approximate Location and Number of Test Hole (AZ)
Approximate Geologic Contact Dotted Where Concealed
5' Approximate Depth of Existing Undocumented Fill
Recommended Keyway

Southwest Geotechnical, Inc.
Consulting Engineers & Geologists

21704 West Golden Triangle Road Suite #425
Santa Clarita, California 91350
Tel: (661) 222-9544 - Fax: (661) 222-9549

May 28, 2020
SGI# 1008170

Mr. Raymond Duvernay
Mr. Doug Beam
42947 48th Street West
Lancaster, California 93536

Subject: Private Sewage Disposal System Feasibility Report, "Tentative Parcel Map No. 71006", Three Proposed Residential Parcels, APN 3057-014-012, Sierra Highway, Acton, County of Los Angeles, California

References: "Preliminary Feasibility Evaluation Report, Private Sewage Disposal System Utilizing Leach Lines, "Tentative Parcel Map No. 71006", Three Proposed Residential Lots, APN 3057-014-012, Sierra Highway, Acton, Los Angeles County, California", by Southwest Geotechnical, Inc. dated 10/28/2010

Preliminary Geologic and Soils Engineering Feasibility Investigation, "Tentative Parcel Map No. 71006", Three Proposed Residential Lots, APN 3057-014-012, Sierra Highway, Acton Area of Los Angeles County, California", by Southwest Geotechnical, Inc., 10/18/2010

INTRODUCTION

This Report presents the results of the percolation testing that was completed by Southwest Geotechnical, Inc. (SGI) at the subject site. The purpose of the work conducted was to determine the feasibility of percolation on the three Parcels that are planned for individual private sewage disposal systems pursuant to obtaining tentative tract subdivision approval from the Los Angeles County Department of Health Services Land Use Program (LADHS).

This submittal is intended to represent a complete feasibility report that conforms with the applicable provisions of the Los Angeles County Codes – Title 28 Plumbing Code, and the feasibility report requirements of the Department of Public Health - Environmental Health.

Recommendations given herein are preliminary and are based on subsurface exploration and percolation testing and the broad assumptions derived form recent observation and testing as outlined within this document.

PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to conduct field investigations in the areas proposed to utilize private onsite sewage disposal systems currently expected to consist of relatively shallow leach lines. Percolation testing was conducted in order to determine the water-absorption characteristics of the onsite soils and to explore below the existing ground surface to evaluate the suitability of the site for private leach line sewage disposal.

On October 28, 2010, SGI issued the referenced septic system feasibility report, but due to substantial changes in the LADHS policy regarding private sewage disposal system testing, additional testing per the new LADHS guidelines was conducted in May of 2020. This report presents all of the accumulated information, and we consider it necessary to present only this document. Also appended are the test hole logs from the referenced 10/18/2010 geotechnical investigation report.

The scope of services for completed for the October 28, 2010 report included the following items:

- Subsurface exploration utilizing a rubber-tire backhoe and hand-labor, and logging of and testing of 12 Percolation Test Holes, four on each proposed parcel.
- Percolation testing was performed within PH-1 through PH-12. Additionally, three “groundwater determination” Test Holes (labeled GW-1 thru GW-3) were excavated at least 10 feet below the lowest percolation test depth to determine the presence or absence of groundwater-related subsurface features below the proposed sewage disposal system.
- This report presenting the results of explorations, findings, and preliminary recommendations for design of the proposed septic systems for residential subdivision feasibility was prepared.

The additional scope of services completed for this updated report included the following:

- Subsurface exploration utilizing a rubber-tire backhoe and hand-labor, and logging of and testing of 18 Percolation Test Holes, six on each proposed parcel.
- Percolation testing was performed within PH-A through PH-R, with percolation testing being conducted with a continual 4-hour pre-saturation on the day prior to actual percolation testing.

- Preparation of this report presenting the results of all testing and preliminary recommendations for design of the proposed septic systems for residential subdivision feasibility.

PROPOSED DEVELOPMENT

Generally, we understand that the project will consist of the subdivision of an existing 18-acre parcel into three separate parcels of about 5-6 acres each. The parcel will be graded to create three separate typical cut-fill transition building pads. Grading will also be necessary in order to create a shared access driveway for the pads. The residences will be served by public water services and private sewage disposal systems, consisting of leach lines.

SITE DESCRIPTION

The site fronts on the north side of Sierra Highway between 1,200 and 3,000 feet southeast of the intersection of Listie Avenue and Sierra Highway and is legally described as APN 3512-014-012 (Thomas Guide page 4375, grid G-6). The site is currently developed with a cellular telephone relay tower which is located on a bedrock ridge away from the planned development area. A small residential tract has been constructed northwest of the site, and a water tower has been constructed at the top of the ridge that ascends north of the cellular tower, but otherwise the surrounding parcels are vacant. Four easements are shown on the property. The leach lines are not located within any of these easements, two of which are to be abandoned per the current grading plan. The tightline that will transfer the effluent from the residence on pad 3 to the disposal area for pad 3 will cross one of the easements (apparently for power to the cellular tower above).

The site’s topography is characterized by lower areas at the southwest corner of the site adjacent to Sierra Highway being relatively level, i.e., generally at a gradient of about 7:1 (horizontal:vertical), gradually steepening in gradient to the north. A level pad has been graded by placing fills directly on the underlying grade, with fill generated from some minor cuts, and possibly with the soil generated when making the pad for the cellular tower indicated above. The east-central portion of the site is characterized by a steep bedrock ridge with slope gradients of 1.5:1 (h:v), or locally steeper. The far easterly portion of the site is moderately sloping with gradients of about 3.4:1 (h:v).

The maximum vertical relief of the site between the northeast and southwest corners of the subject property is approximately 300 feet over a horizontal span of approximately 1,000 feet. Drainage on the site is primarily via uncontrolled sheet flows from the slopes towards Sierra Highway.

Vegetation on the site is limited to minor brush, sparse grasses and the occasional yucca. Bedrock is exposed or shallowly covered in the approximate middle to eastern portion of the site, but no leach lines are planned in this area.

The site has not changed significantly between the investigations in 2010 and 2020.

FIELD INVESTIGATION

SGI performed fieldwork for the initial investigation on September 13 and 14, 2010 (described above). That work included a visual reconnaissance of the subject property, subsurface exploration and detailed logging of 12 backhoe-excavated Percolation Test Holes and three “groundwater determination” holes. The locations of the previous tests are indicated on the plans as PH-1 through PH-12 on the appended Preliminary Sewage Disposal System Feasibility Map (generally referred to as “Map”).

For this update investigation, work began on May 18, 2020 with the excavation of 18 percolation test holes and pre-saturation of PH-A through PH-L. On May 19, 2020, the initial holes were tested for percolation and PH-M through PH-Q were pre-saturated. Testing of those final holes were completed on May 20, 2020.

The enclosed Preliminary Sewage Disposal Feasibility Map is based on a 1”=40’-scale version of the “Exhibit A CUP 2011-00056 Minor Land Subdivision, Tentative Parcel Map 71006” prepared February 28, 2019 by CRC Enterprises. Our Test Holes were located based on measurements taken in reference to existing onsite landmarks with a 100-foot measuring tape, and should be considered accurate only to the degree implied by the method used. All Test Holes were backfilled following our logging and testing. It should be noted that the backfill may consolidate over time, and future settlement of the backfill material should be expected.

SUBSURFACE/EARTH MATERIALS

Undocumented artificial fill, natural soil, colluvium, older alluvium, and bedrock are present on and below the sites surface. Detailed descriptions of the observed onsite earth materials are discussed below, in the general order of increasing geologic age, and presented on the appended Test Hole Log sheets.

Undocumented Artificial Fill (af)

Undocumented artificial fill consists of silty to gravelly sand with bedrock clasts up to 10 inches in diameter, that is grayish-brown, dry, loose to medium dense, and slightly porous. Where explored, the fill was placed in approximately horizontal layers and was placed directly on the underlying natural ground without any apparent removal of underlying earth prior to fill placement; no excavated keyways were apparent within the explorations. The fill is expected to be a maximum thickness of approximately 22 feet. The undocumented artificial fill is not considered suitable for onsite sewage disposal, to support foundations or additional fill, and is considered grossly and surficially unstable.

Natural Soils (ns)

Natural soils are present over nearly all of the site, except for those areas where bedrock is exposed at grade and is the result of weathering of the underlying substrate. The natural soils consist of silty fine-medium-grained sand with some gravels. It is medium brown, loose, generally dry, slightly porous, and contains common rootlets. The natural soil is unduly hydro-compressible and therefore not recommended for support of foundations or future certified compacted fill in its current state.

Colluvium (Qcol)

The moderately sloping ground at the far easterly portion of the site is mapped as colluvium. These are similar to the older alluvium in general material gradation and texture, however they are substantially less dense than the older alluvial soils. The colluvium is generated from the soil from the steeper slopes above accumulating near the toe of the slopes. The colluvium consists of silty gravelly sand that is medium-brown, medium-dense, and moderately porous. The gravel and bedrock fragments within the soil profile are generally angular to subangular and usually three inches in diameter or less. Colluvium is considered well-suited for percolation of sewage effluent.

Older Alluvium (Qoal)

Most of the site is underlain by older alluvium and the planned residences are almost exclusively located within this material (and the described undocumented fill). The older alluvium consists of silty sand with gravel that is grayish-brown to brown, dry to damp, and generally dense to very dense. It is slightly porous in the upper approximately three feet, but has only minor “pinprick” porosity below this depth.

Bedrock: Lowe Granodiorite-biotite facies (lgdb)

Per Dibblee, 1996, the site is underlain by granodiorite bedrock. This rock is generally pale-gray to which with black speckles. Where observed, the rock was friable and fractured within the upper foot, but became denser, tighter, and less fractured below. The rock is overall strong, forming steep slopes and is expected to perform very well in the existing slopes and possible future cuts made in the bedrock. Bedrock is well-suited for support of foundations or future compacted fill.

GROUNDWATER/SOIL PROFILE

Test Holes GW-1 through GW-3 were excavated to a depth of 10 feet below the percolation Test Holes. This was excavated in order to observe the soil profile below the area of the proposed leach line system and check for the presence (or absence) of groundwater and evaluate the likelihood of groundwater rising to within 10 feet of the bottom of any proposed onsite sewage disposal trenches, or leach lines. Note that the groundwater/soil profile holes were excavated in 2010 prior to the 2016 changes in the policy. A discussion with the County reviewer for the project indicated that additional groundwater evaluation holes would not be required due to knowledge of the significant depth to groundwater in the area.

Phreatophytes, i.e., plants with a taproot that use large amounts of groundwater, are often suggestive of seasonal shallow groundwater; such plants were not observed near the Test Holes or elsewhere onsite. Groundwater was not observed within any of the exploratory trenches observed by our representative on September 13, 2010, or May 20, 2020. Soils observed within the Test Holes were damp to dry, and no evidence of calcium carbonate deposits was observed. These are often considered to be an indicator of the presence of water in the past, and their absence indicates groundwater has likely not risen this high.

The Seismic Hazard Evaluation Report for the Acton Quadrangle indicates that the historic high groundwater levels in the main drainage course along Soledad Canyon Road at 10 -40 feet below grade, though the subject site is several hundred feet higher, and more than a mile from this area. The Acton area in general is known for substantial depth to water rather than having a shallow water table. Based on the above, it is our professional opinion that groundwater at this portion of the property has not come to within 10 feet of the current ground surface, and will not rise to within 10 feet of the bottom of the proposed leach lines at any time throughout the year, assuming that the leach lines are installed as recommended in this report.

SEPTIC SYSTEM DESIGN

Septic Tank Design

This report assumes that the planned residences will be constructed with four bedrooms for Parcel 2, requiring a 1,200-gallon septic tank. Lots 1 and 3 are designed for a 5-6 bedroom residences requiring a 1,500-gallon septic tank. The septic system for Lot 3 will require an effluent pump to transfer the sewage effluent upslope towards the planned leach line; accordingly, a second septic tank will need to be installed with the effluent pump. The second tank will also need to be a 1,500-gallon tank to serve as a temporary holding tank for effluent in the event of a power outage. If a larger septic system is required for parcel 2, the grading plan would need to be revised, or a seepage pit be tested as a primary or backup septic system.

Although it is not within our scope of work to recommend a "brand" and type of septic tank, possible septic tanks that may be used are Jensen JS-1,500 or JS-1,200 Septic Tanks (See enclosed Septic Tank Diagrams). Larger tanks may be utilized if desired to increase the holding capacity of the tank, and if located within 5 feet of a driveway or parking area, a traffic-rated tank shall be used.

We have designed the leach lines according to these assumptions. If additional bedrooms are requested, seepage pits or re-design of the grading plans may be required.

Percolation Testing

Percolation Test Holes were excavated to between to between 5.5 and 8 feet deep below the existing ground surface within the areas planned for private sewage disposal. This depth was determined to be necessary in order to maintain the Code-mandated 15-feet to daylight horizontal setback from the top of the leach line gravel. A one cubic foot (1'x 1' x 1') percolation hole was dug in the bottom of each excavation. In some cases the upper portion of the hole may have been larger than the base of the cubic foot hole.

The Percolation Test Holes were excavated in the area of the proposed leach line system; the locations of the Test Holes are shown on the enclosed "Sewage Disposal Map".

The percolation tests were performed using the Ryon Method. Percolation Test Holes with designation 1-12 were filled with water (presoaked one time) on September 13, 2010 approximately 24 hours prior to performing the actual percolation rate testing. Percolation Test Holes with designation A-R were presoaked for a minimum of 4 hours on May 18 or 19, 2020 and were tested on the day after presoaking (as shown on date on logs). At the time of percolation testing, no standing water remained within any of the Percolation Test Holes from the pre-saturation. The time for each inch from the first through the sixth inch are presented on the attached Percolation Test Log sheets. T

he times recorded for the drop in the water from the fifth inch to the sixth inch (the design rate) are listed below.

Based on the results obtained from the areas tested, the following are the percolation rates for each hole tested:

PERCOLATION TEST RESULTS	
Test Hole Location	**Percolation Rate**
PARCEL 1	
PH-1	32 minutes
PH-2	**42 minutes**
PH-3	29 minutes
PH-4	29 minutes
PH-G	40 minutes
PH-H	38 minutes
PH-I	35 minutes
PH-J	10 minutes
PH-K	29 minutes
PH-L	32 minutes
PARCEL 2	
PH-5	30 minutes
PH-6	37 minutes
PH-7	40 minutes
PH-8	44 minutes
PH-A	22 minutes
PH-B	33 minutes
PH-C	23 minutes
PH-D	11 minutes
PH-E	**46 minutes**
PH-F	**46 minutes**
PARCEL 3	
PH-9	**25 minutes**
PH-10	20 minutes
PH-11	7 minutes
PH-12	6 minutes
PH-M	8 minutes
PH-N	9 minutes
PH-O	8 minutes
PH-P	9 minutes
PH-Q	8 minutes
PH-R	9 minutes

We have designed the system based on the slowest of the rates for each area tested which has been indicated in **bold** above, representing the maximum tested percolation rate as required by the LADHS. Generally, the 4-hour presaturation did not result in significantly slower rates of percolation versus the single-presoak method conducted in 2010. The slowest percolation rate from the original round of testing in PH-9 and PH-10 were substantially slower than the recent tests.

Leach Line Design

Ryon Method:

A = [(T + 6.24)/29][C/2]
Where A = required square feet,
T = Time in minutes for the 6th inch to drain, and
C = required tank holding capacity

It is proposed to install all leach lines with at least three feet of gravel under the distribution line. The trenches will be designed based on seven square feet of percolation area per linear foot of trench, except for Parcel 3 which will have only 2 feet of gravel to ensure 15 feet to daylight.

Parcel 1 (5-Bedrooms)	A = [(42 + 6.24)/29][1500/2] = 1247 ft^2	1247/7 = 178 lineal ft.
	Proposed System: 3 lines, 60 feet long, 6 feet deep, 3 feet gravel.	180 lineal ft. > 178 lf.
	Proposed System: 2 lines, 60 feet long, 6 feet deep, 3 feet gravel *plus* 2 lines, 30 feet long, 6 feet deep with 3 feet of gravel	180 lineal ft. > 178 lf.
Parcel 2 (4-Bedrooms)	A = [(46 + 6.24)/29][1200/2] = 1080 ft^2	1080/7 = 154 lineal ft.
	Proposed System: 2 lines, 77 feet long, 6 feet deep, 3 feet gravel.	154 lineal ft.
	100% Expansion: 1 line, 78 feet long, 6 feet deep, 3 feet gravel *plus* 2 lines, 38 feet long, 6 feet deep, 3 feet gravel	154 lineal ft.
Parcel 3 (5-6-Bedrooms)	A = [(25 + 6.24)/29][1500/2] = 808 ft^2	808/5 = 162 lineal ft.
	Proposed System: 2 lines, 85 feet long, 7.5 feet deep,2 feet gravel**	170 lineal ft. > 162 lf.
	100% Expansion: 3 lines, 85 feet long, 7.5 feet deep, 2 feet gravel**	170 lineal ft. > 162 lf.

** Note that Parcel 3 will require pumping of effluent to the proposed leach field area, and may need to cross an existing easement.

SYSTEM INSTALLATION

The leach lines should be filled with at 2-3 feet of clean ¾" – 2½" gravel beneath the distribution lines, which in turn should be surrounded with 6 inches of gravel. The leach lines should be installed to maintain a relatively level bottom, and should be served by a distribution box set upon a level concrete pad; this pad should be placed at least five feet from the proposed leach line(s).

A schematic of the installation is shown on the Standard Percolation Cross Sections detail. Septic systems should also be installed per the attached "County Guidelines for Private Sewage Disposal Systems". Cross Section X-X', presented on the Map, has been prepared through the are of the Parcel 3 disposal system to show the slope profile and that the system will maintain the Code-mandated 15-feet to daylight (ground surface) requirement.

Parcel 3 will require an effluent pump to transfer sewage to the leach field area. This tightline would likely pass through an easement for power poles as discussed above.

RECOMMENDATIONS

It is understood the site will be served by a public water service. The domestic water service laterals are recommended along the existing and proposed road and driveways, where it will be installed at least five feet away from any leach line. In this case, hardscape may not be placed over the leach line areas, and the leach lines should not be driven over by motor vehicles.

The leach lines on Parcel 2 approach the planned cut slope for the access roadway to the cellular tower on the upper reaches of the property; some revision to the grading plan to distance the cut slope from the leach lines should be accomplished to ensure that the 15 feet to daylight requirement is met.

The following items should be considered by the homeowners throughout the use of their private sewage disposal system. Observing the following suggestions is expected to enhance the lifespan of the disposal system, and may reduce the maintenance required for the private sewage disposal system.

- Non-biodegradable items, such as personal hygiene and infant care products, as well as volatile chemicals, oil-based fluids, and trash should not be allowed to accumulate within the septic tank.
- The septic tank should be annually inspected for sludge levels and pumped when required.
- Only biodegradable household products approved for septic systems should be used.
- All water discharge fixtures should be of a low-flow variety.
- Water should be used conservatively.

- Any leaking plumbing fixtures should be repaired immediately.
- Use of a garbage disposal should be kept to a minimum.

Upon preparation of finalized plans for the site, SGI should be provided with copies of these plans to assess the need for additional percolation testing, in order to allow design of completed percolation reports for the proposed residences in full compliance with the LADHS Codes.

CONCLUSIONS

It is our opinion that effluent will primarily percolate downward through the natural soils at approximately a 45 degree slope down away from the bottom of the trenches. The soils tested for percolation include the relatively dense older alluvium which are determined to maintain the capacity to percolate water. No confining hardpan or impermeable layers are considered to exist below the leach line areas and therefore we do not anticipate that mounding will occur. We also conclude that effluent will not daylight onsite or on contiguous offsite properties provided that the said systems are installed per the recommendations presented herein.

Based on our observation of the subsurface conditions, mounding of the effluent is not anticipated, and the effluent will percolate downward and laterally into the alluvial soils at depth. The site exhibits suitable surface and subsurface conditions for private sewage disposal. The proposed subdivision is therefore considered feasible for private sewage disposal as outlined herein.

CLOSURE

The analysis and recommendations submitted in this report are based, in part, upon the data gathered during our site reconnaissance and our engineering judgment. Southwest Geotechnical, Inc., has prepared this report for the exclusive use of the client and the client's authorized agents, and in accordance with generally accepted geotechnical engineering practices. No other warranties, expressed or implied, are made as to the professional advice provided in this report.

The statements contained herein are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, which may be due to natural processes or to the works of man, on this and adjacent properties.

In addition, changes in applicable or appropriate standards occur, whether they result from legislation or the expanding of knowledge. Accordingly, the conclusions of this Report may be invalidated, wholly or in part, by changes outside of our control.

We thank you for the opportunity to be of professional geotechnical services. If you have any questions regarding this Report, please do not hesitate to contact this office.

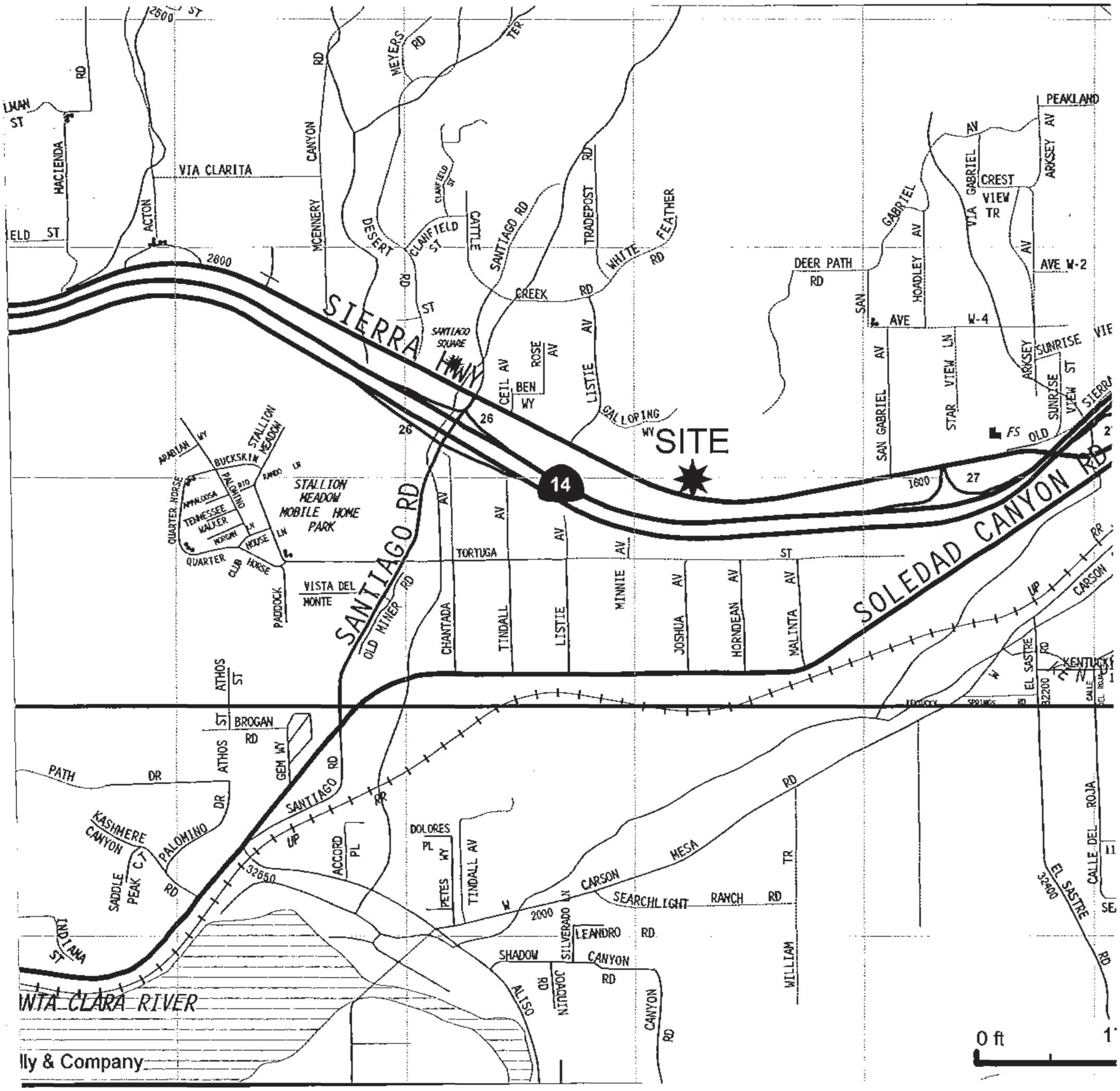
Respectfully submitted,
SOUTHWEST GEOTECHNICAL, INC.

Conrad Carrle
Engineering Geologist
CEG #2359

CC:ss
Duvernay 1008170 Percolation Feasibility Update.doc

Dist: (5) Addressee

Encl: Vicinity Map
Percolation Test Hole Logs PH-A through PH-R
2010 Data: Percolation Test Hole Logs PH 1-12
Ground Water Logs GW 1-3
Geotechnical Test Hole Logs TH 1-4
Sewage Disposal Cross-Sections
County Guidelines for Private Sewage Disposal Systems
Septic Tank Diagrams (2)
Preliminary Sewage Disposal Map (pocket insert)



LEGEND

Site Location

SITE

Southwest Geotechnical, Inc.	
Vicinity Map	
Proj. #: 1008170	Date: 5/28/2020
Scale: Variable	Client: Duvernay
Reference: Thomas Bros. 2006	

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI # 1008170	Date(s) Observed: Presoak 5-18-20 , Tested 5-19-20	Equipment: Backhoe
Client: Duvernay	Location:	Logged By: DJ/CC Tested by: DJ

Percolation Hole #PH-A

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:36	8:44	:08	0' - 5.5'-	**Older Alluvium:** Silty sand with trace clay, light reddish brown, some rock fragments up to 4" in diameter, it is medium dense, porous, and damp to 2', dense, porous and moist below.
1"-2"	8:44	8:54	:10		
2"-3"	8:54	9:09	:15		
3"-4"	9:09	9:25	:16		
4"-5"	9:25	9:44	:19		
5"-6"	9:44	10:06	:22		

Percolation Hole #PH-B

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:34	8:52	:18	0' - 6'-	**Older Alluvium:** Silty sand with trace clay and gravels up to 3" in diameter, light reddish brown, some caliche threads, it is damp, medium dense, and porous to 2.5' and is moist, dense and slightly porous to 5' then very dense below.
1"-2"	8:52	9:11	:19		
2"-3"	9:11	9:33	:22		
3"-4"	9:33	9:58	:25		
4"-5"	9:58	10:25	:27		
5"-6"	10:25	10:58	:33		

Percolation Hole #PH-C

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:57	9:08	:11	0' -6'-	**Older Alluvium:** Silty sand with gravel, medium brown to 4' to reddish brown below, porous and medium dense to 4', moist and dense below.
1"-2"	9:08	9:22	:14		
2"-3"	9:22	9:40	:18		
3"-4"	9:40	10:00	:20		
4"-5"	10:00	10:19	:19		
5"-6"	10:19	10:42	**:23**		

Percolation Hole #PH-D

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:29	8:32	:03	0' -6'-	**Older Alluvium:** Silty sand with gravel, medium brown, medium dense, slightly porous to 3.25' then non porous and dense below.
1"-2"	8:32	8:37	:05		
2"-3"	8:37	8:44	:07		
3"-4"	8:44	8:53	:08		
4"-5"	8:53	9:05	:12		
5"-6"	9:05	9:16	**:11**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI # 1008170	Date(s) Observed: Presoak 5-18-20 , Tested 5-19-20	Equipment: Backhoe
Client: Duvernay	Location:	Logged By: DJ/CC Tested by: DJ

Percolation Hole #PH-E

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:17	8:43	:26	0' - 6' -	**Older Alluvium:** Silty sand with trace clay and gravels, reddish-brown, dense to very dense below 5', trace cobbles, reddish brown.
1"-2"	8:43	9:13	:30		
2"-3"	9:13	9:48	:35		
3"-4"	9:48	10:27	:39		
4"-5"	10:27	11:09	:42		
5"-6"	11:09	11:55	:46		

Percolation Hole #PH-F

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:30	8:56	:26	0' - 6'-	**Older Alluvium:** Clayey silty sand, light reddish brown, slightly porous, dense to 3.5', very dense, non-porous below.
1"-2"	8:56	9:26	:30		
2"-3"	9:26	10:00	:34		
3"-4"	10:00	10:39	:39		
4"-5"	10:39	11:23	:44		
5"-6"	11:23	12:09	:46		

Percolation Hole #PH-G

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	12:56	1:20	:24	0' -6 '-	**Older Alluvium:** Silty sand with trace clay, abundant gravels and trace cobbles, reddish brown, moist, porous, some animal burrows, dense and non-porous below 4.5'.
1"-2"	1:20	1:45	:25		
2"-3"	1:45	2:16	:31		
3"-4"	2:16	2:47	:31		
4"-5"	2:47	3:23	:36		
5"-6"	3:23	4:03	**:40**		

Percolation Hole #PH-H

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	12:58	1:21	:23	0' -6'-	**Older Alluvium:** Silty sand with abundant gravel and some clay, light reddish brown, porous to 2.75' then non-porous and dense below, very dense at 5.5'.
1"-2"	1:21	1:40	:29		
2"-3"	1:40	2:11	:31		
3"-4"	2:11	2:44	:33		
4"-5"	2:44	3:28	:34		
5"-6"	3:28	4:06	**:38**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI # 1008170	Date(s) Observed: Presoak 5-18-20 , Tested 5-19-20	Equipment: Backhoe
Client: Duvernay	Location:	Logged By: DJ/CC Tested by: DJ

Percolation Hole #PH-I

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	1:00	1:20	:20	0' - 6' -	**Older Alluvium:** Light to reddish brown silty sand with trace clay and gravels, medium dense to 3', dense below, some porosity above 3' but non-porous below, slightly moist.
1"-2"	1:20	1:43	:23		
2"-3"	1:43	2:10	:27		
3"-4"	2:10	2:38	:28		
4"-5"	2:38	3:11	:33		
5"-6"	3:11	3:45	:35		

Percolation Hole #PH-J

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	12:58	1:01	:03	0'- 5.75'-	**Older Alluvium:** silty sand, light reddish brown, some gravel, loose to 4', medium dense below, porous, dry.
1"-2"	1:01	1:05	:04		
2"-3"	1:05	1:11	:06		
3"-4"	1:11	1:19	:08		
4"-5"	1:19	1:28	:09		
5"-6"	1:28	1:30	:10		

Percolation Hole #PH-K

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	1:04	1:18	:14	0' -5.5'-	**Older Alluvium:** Silty sand, reddish brown, medium dense to 3.5' but dense below, abundant gravels, some porosity throughout.
1"-2"	1:18	1:37	:19		
2"-3"	1:37	1:58	:21		
3"-4"	1:58	2:23	:25		
4"-5"	2:23	2:48	:25		
5"-6"	2:48	3:17	**:29**		

Percolation Hole #PH-L

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	1:07	1:22	:15	0' -5.5'-	**Older Alluvium:** Clayey silty sand with gravel, reddish brown to brown, moist in upper 2', medium dense to 3' but dense below, minor porosity.
1"-2"	1:22	1:41	:19		
2"-3"	1:41	2:01	:20		
3"-4"	2:01	2:25	:24		
4"-5"	2:25	2:52	:27		
5"-6"	2:52	3:24	**:32**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. Percolation Test Log

Project: SGI # 1008170	Date(s) Observed: Presoak 5-19-20 , Tested 5-20-20	Equipment: Backhoe
Client: Duvernay	Location:	Logged By: DJ Tested by: TZ

Percolation Hole #PH-M

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	7:08	7:11	:03	0' - 8' -	**Older Alluvium:** Silty sand with gravel, loose to medium dense below 4', porous throughout, light brown to light reddish brown, animal burrows.
1"-2"	7:11	7:14	:03		
2"-3"	7:14	7:19	:05		
3"-4"	7:19	7:26	:07		
4"-5"	7:26	7:34	:08		
5"-6"	7:34	7:42	:08		

Percolation Hole #PH-N

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	7:27	7:28	:01	0' - 7.5' -	**Older Alluvium:** Silty sand, tan to light brown, gravels throughout, loose in upper 3.25', medium dense below, very porous in upper 4', only slightly porous below, dry.
1"-2"	7:28	7:31	:03		
2"-3"	7:31	7:35	:04		
3"-4"	7:35	7:40	:05		
4"-5"	7:40	7:48	:08		
5"-6"	7:48	7:57	:09		

Percolation Hole #PH-O

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	7:52	7:53	:01	0' -7.25'-	**Older Alluvium:** Silty sand with gravel, loose to medium dense below 4', porous throughout, light brown to light reddish brown, animal burrows.
1"-2"	7:53	7:56	:03		
2"-3"	7:56	8:00	:04		
3"-4"	8:00	8:04	:04		
4"-5"	8:04	8:09	:05		
5"-6"	8:09	8:17	**:08**		

Percolation Hole #PH-P

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:12	8:15	:03	0' -7.5'-	**Older Alluvium:** Silty sand with trace clay, abundant gravels and trace cobbles, tan to light brown, dry, loose un upper 3', slightly dense below, dense after 6', porous throughout but decreases with depth.
1"-2"	8:15	8:20	:05		
2"-3"	8:20	8:26	:06		
3"-4"	8:26	8:33	:07		
4"-5"	8:33	8:41	:08		
5"-6"	8:41	8:50	**:09**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. Percolation Test Log

Project: SGI # 1008170	Date(s) Observed: Presoak 5-19-20 , Tested 5-20-20	Equipment: Backhoe
Client: Duvernay	Location:	Logged By: DJ Tested by: TZ

Percolation Hole #PH-Q

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	7:08	7:11	:03	0' - 7.5' -	**Older Alluvium:** Silty sand, light brown, abundant gravels, several animal burrows, loose to 3.5' medium dense below, porous to 4' then decreases with depth.
1"-2"	7:11	7:15	:04		
2"-3"	7:14	7:20	:06		
3"-4"	7:20	7:27	:07		
4"-5"	7:27	7:34	:07		
5"-6"	7:34	7:42	:08		

Percolation Hole #PH-R

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	7:27	7:28	:01	0' - 7.5' -	**Older Alluvium:** Silty sand, tan to light brown, gravels throughout, loose in upper 3.25', medium dense below, very porous in upper 4', only slightly porous below, dry.
1"-2"	7:28	7:32	:04		
2"-3"	7:32	7:38	:06		
3"-4"	7:38	7:45	:07		
4"-5"	7:45	7:53	:08		
5"-6"	7:53	8:02	:09		

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Listie Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-1 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:06	8:10	:04	0' to 5'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:10	8:16	:06		
2"-3"	8:16	8:29	:13		
3"-4"	8:29	8:48	:19		
4"-5"	8:48	9:14	:27	5' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 32 minutes
5"-6"	9:14	9:46	**:32**		

Percolation Hole #PH-2 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:10	8:19	:09	0' to 4'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:19	8:43	:24		
2"-3"	8:43	9:10	:27		
3"-4"	9:10	9:40	:30		
4"-5"	9:40	10:15	:35	4' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense to very dense. Percolation Rate: 42 minutes
5"-6"	10:15	10:57	**:42**		

Percolation Hole #PH-3 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:15	8:27	:12	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:27	8:40	:13		
2"-3"	8:40	8:58	:18		
3"-4"	8:58	9:20	:22		
4"-5"	9:20	9:45	:25	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, dry, slighly porous, dense. Percolation Rate: 29 minutes
5"-6"	9:45	10:14	**:29**		

Percolation Hole #PH-4 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:12	8:17	:05	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:17	8:31	:14		
2"-3"	8:31	8:48	:17		
3"-4"	8:48	9:07	:19		
4"-5"	9:07	9:31	:24	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 32 minutes
5"-6"	9:31	10:00	**:29**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Listie Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-5 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:32	8:39	:07	0' to 2'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:39	8:41	:12	2' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 30 minutes
2"-3"	8:41	9:58	:17		
3"-4"	9:58	9:20	:22		
4"-5"	9:20	9:47	:27		
5"-6"	9:47	10:17	:30		

Percolation Hole #PH-6 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:18	8:25	:07	0' to 3½'	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:25	8:41	:16	3½' to 6'	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense to very dense. Percolation Rate: 37 minutes
2"-3"	8:41	9:04	:23		
3"-4"	9:04	9:34	:30		
4"-5"	9:34	10:06	:32		
5"-6"	10:06	10:43	:37		

Percolation Hole #PH-7 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:27	8:44	:17	0' to 3'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	8:44	9:09	:25	3' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, dry, slighly porous, very dense. Percolation Rate: 40 minutes
2"-3"	9:09	9:41	:32		
3"-4"	9:41	10:16	:35		
4"-5"	10:16	10:53	:37		
5"-6"	10:53	11:33	:40		

Percolation Hole #PH-8 — Surface Description: 7:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	8:42	9:02	:20	0' to 4'-	**Natural Soil (ns):** Silty Sand with gravel, grayish brown to brown, dy to damp, porous to slightly porous, loose to medium dense.
1"-2"	9:02	9:27	:25	4' to 6'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 44 minutes
2"-3"	9:27	9:58	:31		
3"-4"	9:58	10:33	:35		
4"-5"	10:33	11:10	:37		
5"-6"	11:10	11:54	:44		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC. — Percolation Test Log

Project: SGI #1008170	Date(s) Observed: Presoak 9-13-10, Test 9-14-10	Equipment: Backhoe, Arman
Client: Duvernay, Raymond	Location: Sierra Highway, East of Listie Ave. APN 3057-014-012	Logged By: CC

Percolation Hole #PH-9 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:50	11:55	:05		
1"-2"	11:55	12:04	:09	0' to 6'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular cobbles up to 8" diameter averaging 3" diameter or less.
2"-3"	12:04	12:17	:13		
3"-4"	12:17	12:32	:17		
4"-5"	12:32	12:51	:19	6' to 8'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 25 minutes
5"-6"	12:51	1:04	**:25**		

Percolation Hole #PH-10 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:53	11:56	:03		
1"-2"	11:56	12:04	:08	0' to 7'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less.
2"-3"	12:04	12:14	:10		
3"-4"	12:14	12:27	:13		
4"-5"	12:27	12:45	:18	7' to 8'-	**Older Alluvium (Qoal):** Silty Sand with gravel, brown, damp, slighly porous, dense. Percolation Rate: 20 minutes
5"-6"	12:45	1:05	**:20**		

Percolation Hole #PH-11 — Surface Description: 3.4:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:56	11:59	:03		
1"-2"	11:59	12:02	:03	0' to 8'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less. Percolation Rate: 7 minutes
2"-3"	12:02	12:06	:04		
3"-4"	12:06	12:11	:05		
4"-5"	12:11	12:17	:06		
5"-6"	12:17	12:24	**:07**		

Percolation Hole #PH-12 — Surface Description: 3.5:1 Slope, Light Vegetation

Inch	Time Start	Time End	Time Elapsed	Depth Interval (feet)	Material Description
0"-1"	11:58	12:00	:02		
1"-2"	12:00	12:03	:03	0' to 8'-	**Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less. Percolation Rate: 6 minutes
2"-3"	12:03	12:06	:03		
3"-4"	12:06	12:10	:04		
4"-5"	12:10	12:15	:05		
5"-6"	12:15	12:21	**:06**		

NOTE: The above descriptions reflect conditions at a particular location and time. Subsurface conditions may vary between test holes and in areas not explored.

SOUTHWEST GEOTECHNICAL, INC

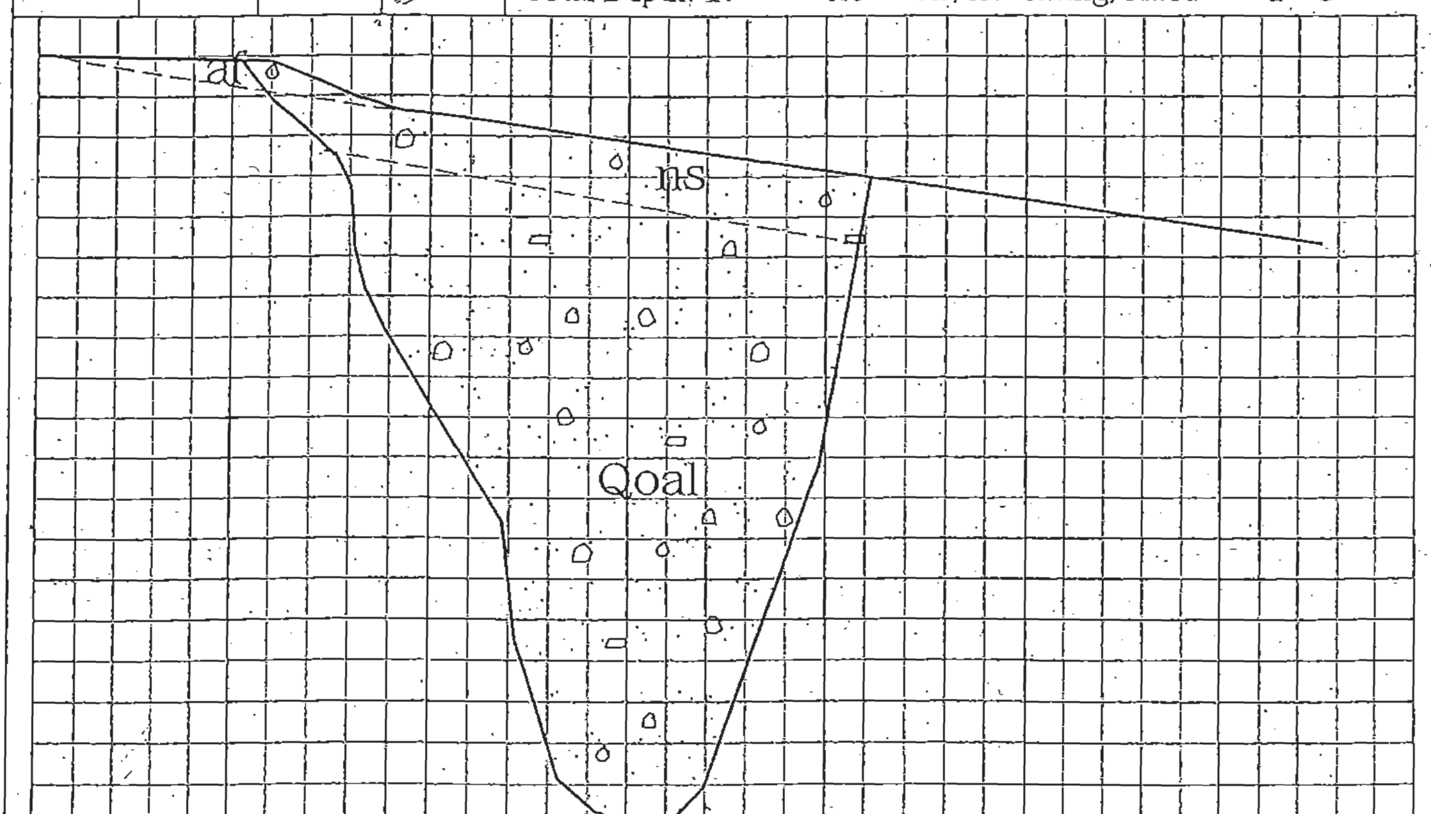
Test Hole Log GW-1

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near existing access roadway and planned septic system area.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
3.5'	131.8	4.1	SM	**Artificial Fill (af):** Silty gravelly Sand, gray, dry, very loose, very porous, minor rootlets. About 18 inches thick.
			SM	**Natural Soil (ns):** Silty gravelly Sand, grayish brown, dry, loose-medium dense, very porous, some rodent burrows, some rootlets throughout but mostly in the upper 3"-4", profile is 18"-2' thick.
			SM	**Older Alluvium (Qoal):** Silty gravelly Sand minor clay, medium brown, dense to very dense, difficult to excavate below 10 feet.

Total Depth: 17' No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

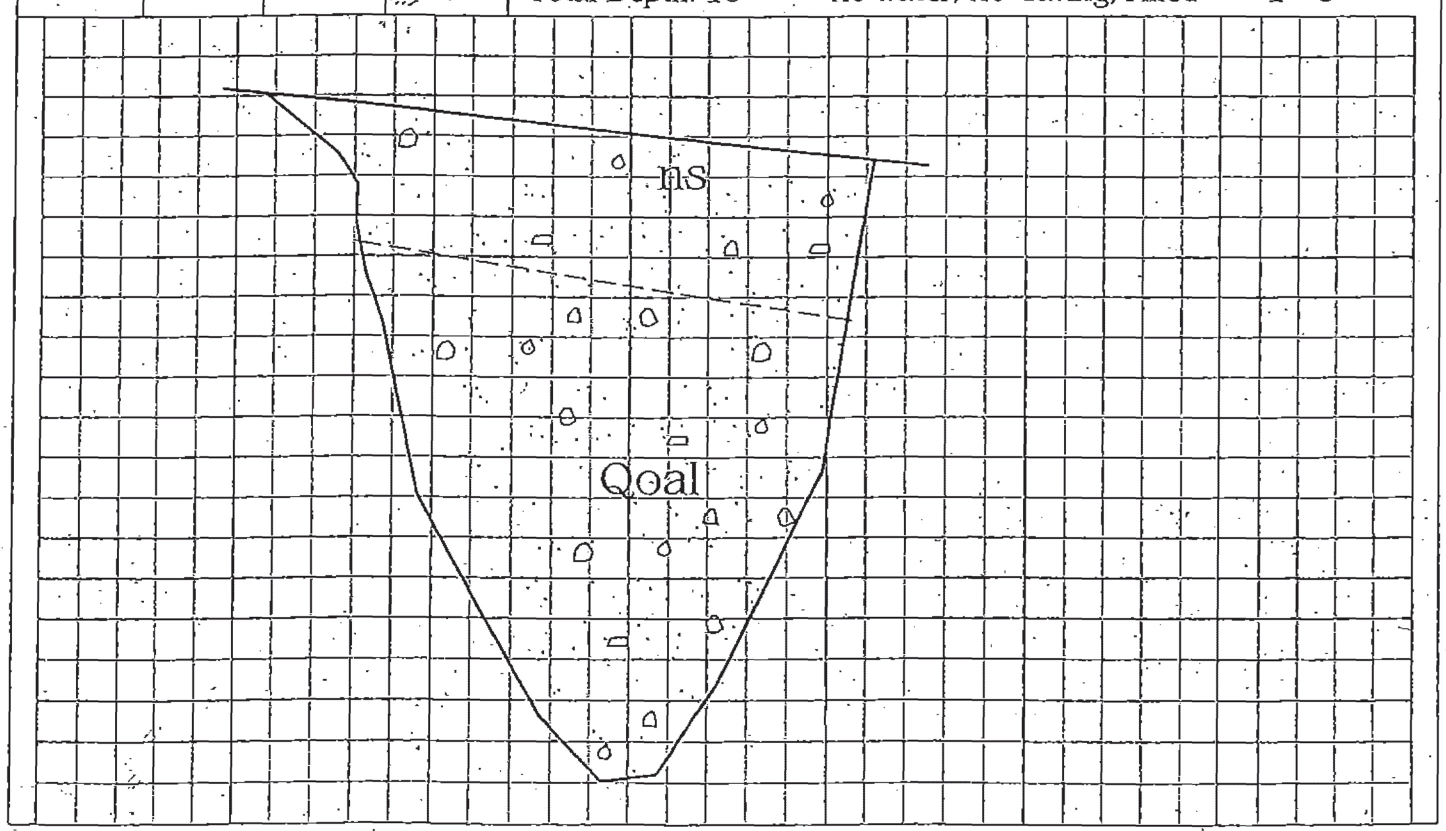
Test Hole Log GW-2

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near 50' road easement and planned septic system area.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**Natural Soil (ns):** Silty gravelly Sand, grayish brown, dry, loose-medium dense, porous,
			SM	**Older Alluvium (Qoal):** Silty gravelly Sand, medium brown, dense to very dense, slow excavation below 11 feet.

Total Depth: 16' No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

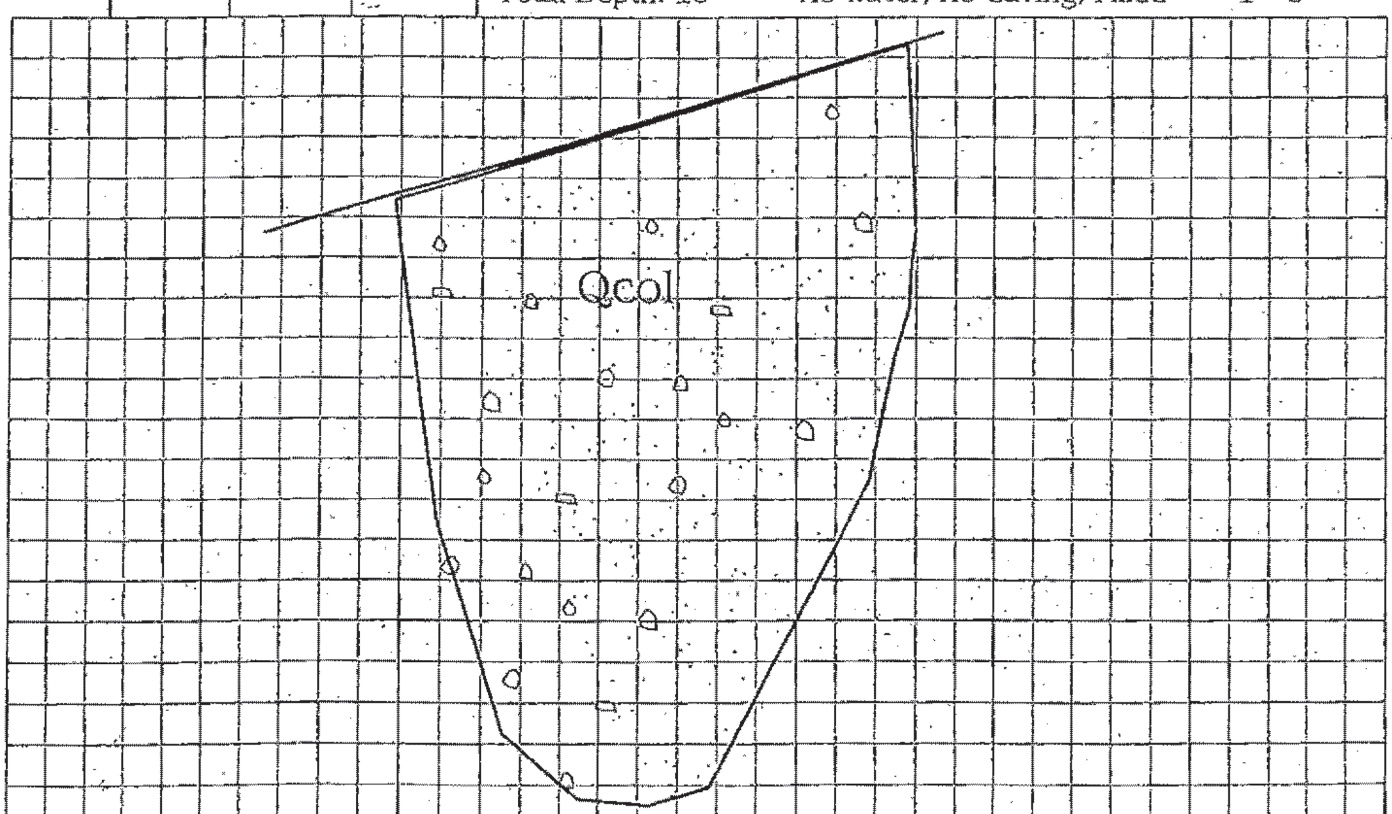
Test Hole Log GW-3

Project No: 1008170	Date(s) Observed: 9-13-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near proposed septic system area, far east side of lot.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**0'-18' Colluvium (Qcol):** Silty gravelly Sand, medium brown, medium dense, porous, damp below 4 feet and dry above, subangular gravels averaging 3" diameter or less.

Total Depth: 18'   No water, No Caving, Filled   1"=5'



SOUTHWEST GEOTECHNICAL, INC

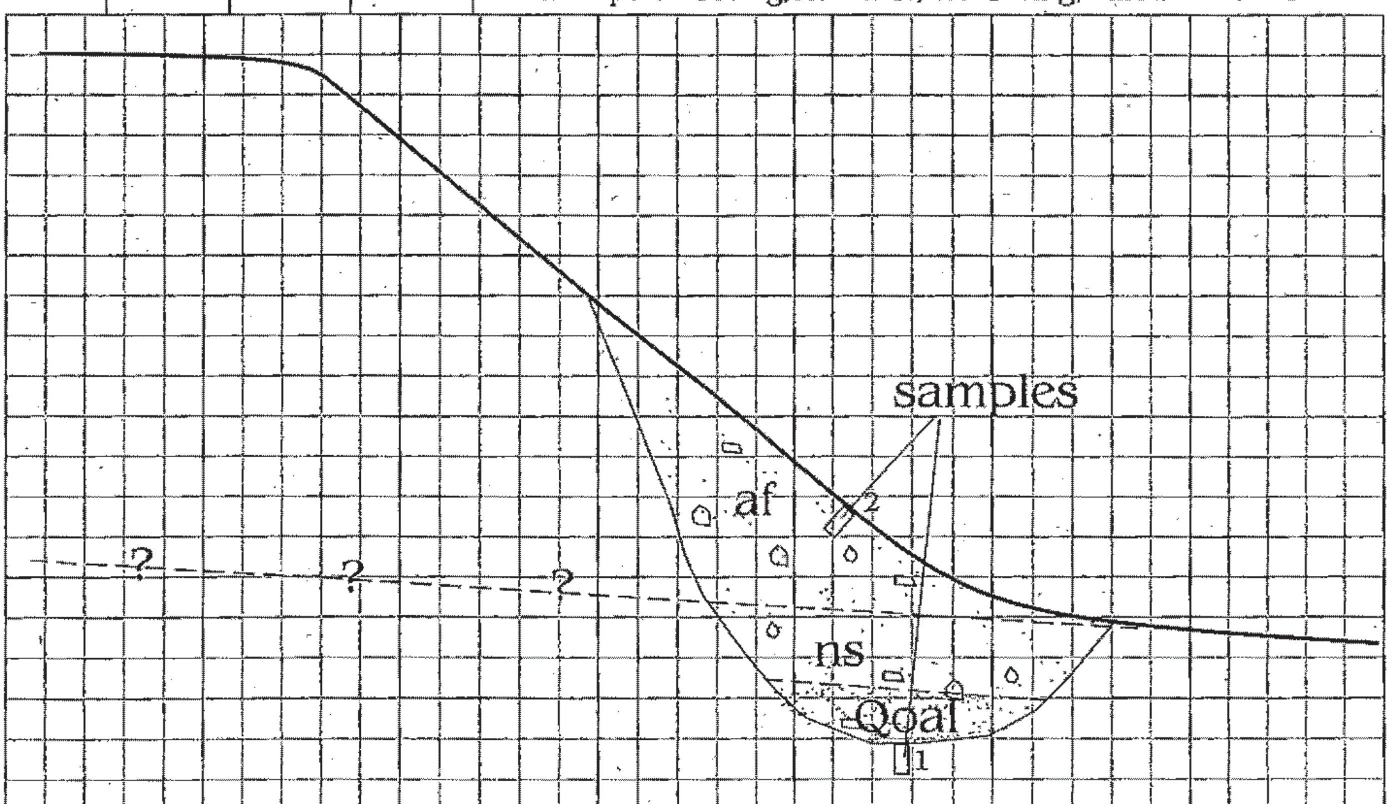
Test Hole Log TH-1

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Into toe of existing fill slope.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
#2	118.3	1.7	SM	**Artificial Fill (af):** Silty to gravelly Sand, grayish brown, dry, loose to medium dense, slighly porous, roughly horizontal layers 6"-14" thick , common bedrock clasts up to 10" in diameter, lower contact gently sloped out of slope. No Keyway.
			SM	**Natural Soil (ns):** Silty fine-medium-grained Sand with some gravel, medium brown, loose, damp, slighlty porous, common rootlets and some decaying vegetation (large root).
#1	125.1	3.0	SM	**Older Alluvium (Qoal):** Silty gravelly Sand trace clay, medium brown, damp, minor pinprick porosity, dense.

Total Depth: See Log, No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

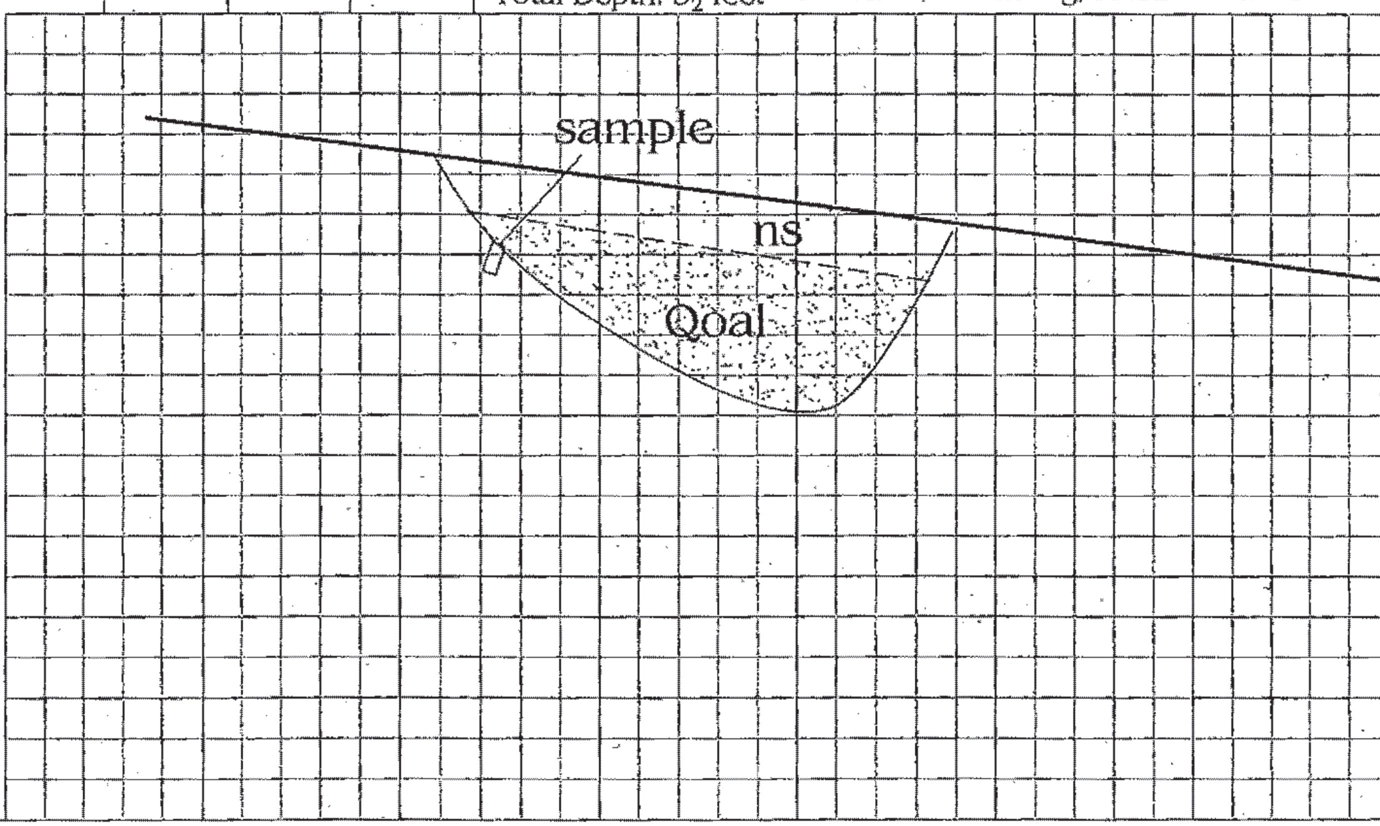
Test Hole Log TH-2

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvemay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near Proposed Cut slope. NW quadrant of site

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	Description
			SM	**Artificial Fill (af):** Silty to gravelly Sand, grayish brown, dry, loose to medium dense, slighly porous, roughly horizontal layers 6"-14" thick , common bedrock clasts up to 10" in diameter, lower contact gently sloped out of slope. No Keyway.
			SM	**Natural Soil (ns):** Silty fine-medium-grained Sand with some gravel, medium brown, loose, damp, slighlty porous, common rootlets and some roots up to 4 inch diameter.
3' #1	120.5	3.8	SM	**Older Alluvium (Qoal):** Silty gravelly Sand trace clay, medium brown, damp, minor pinprick porosity, dense.

Total Depth: $5\frac{1}{2}$ feet No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

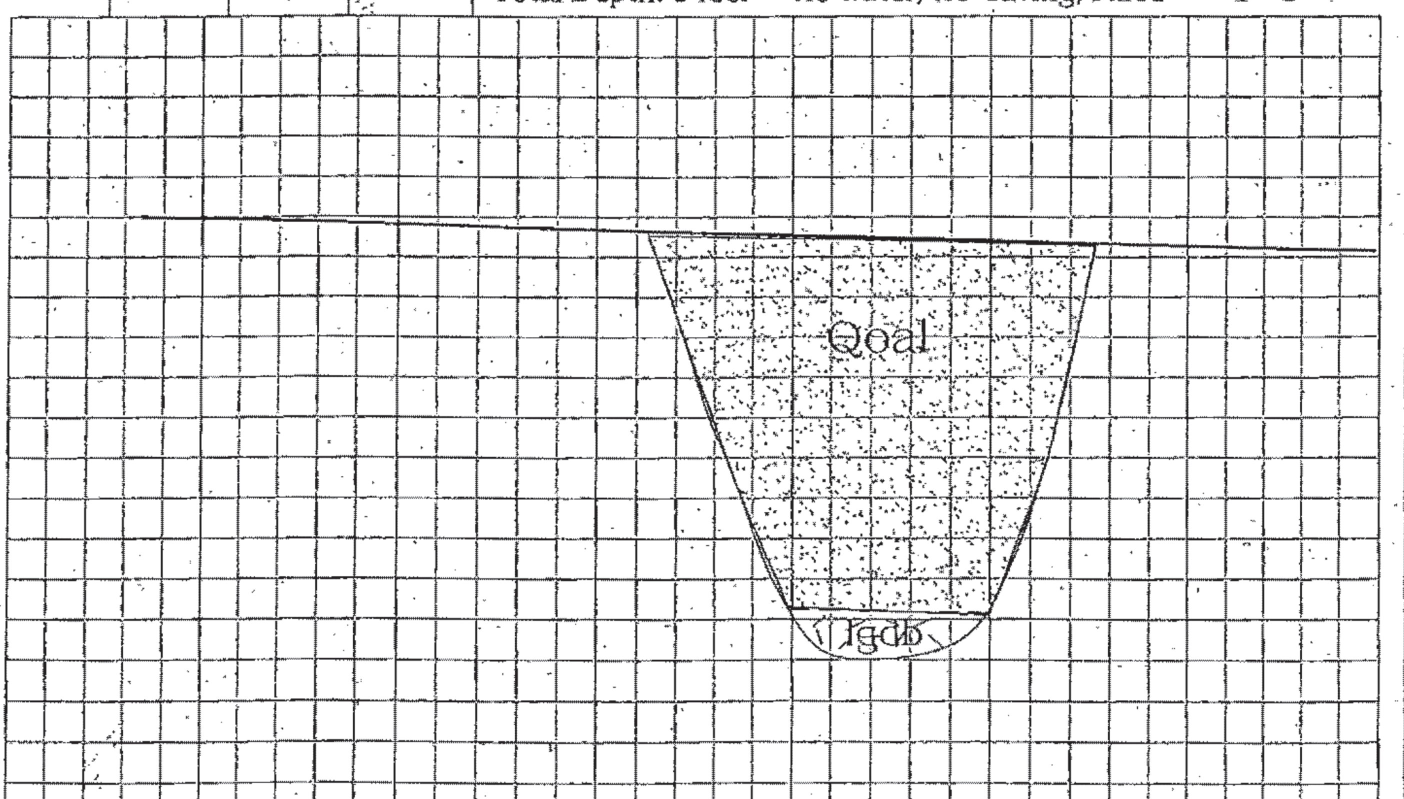
Test Hole Log TH-3

Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: On existing road, near proposed fill at east end of easterly pad.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**0'-8' Older Alluvium (Qoal):** Silty Sand with gravel and trace clay, brown, dry to damp, medium dense in upper 12" and dense to very dense below.
				8'-9' Lowe Granodiorite Bedrock (lgdb): Granodiorite, pale gray with black speckles, fractured, weathered, friable but very dense.

Total Depth: 9 feet No water, No Caving, Filled 1"=5'



SOUTHWEST GEOTECHNICAL, INC

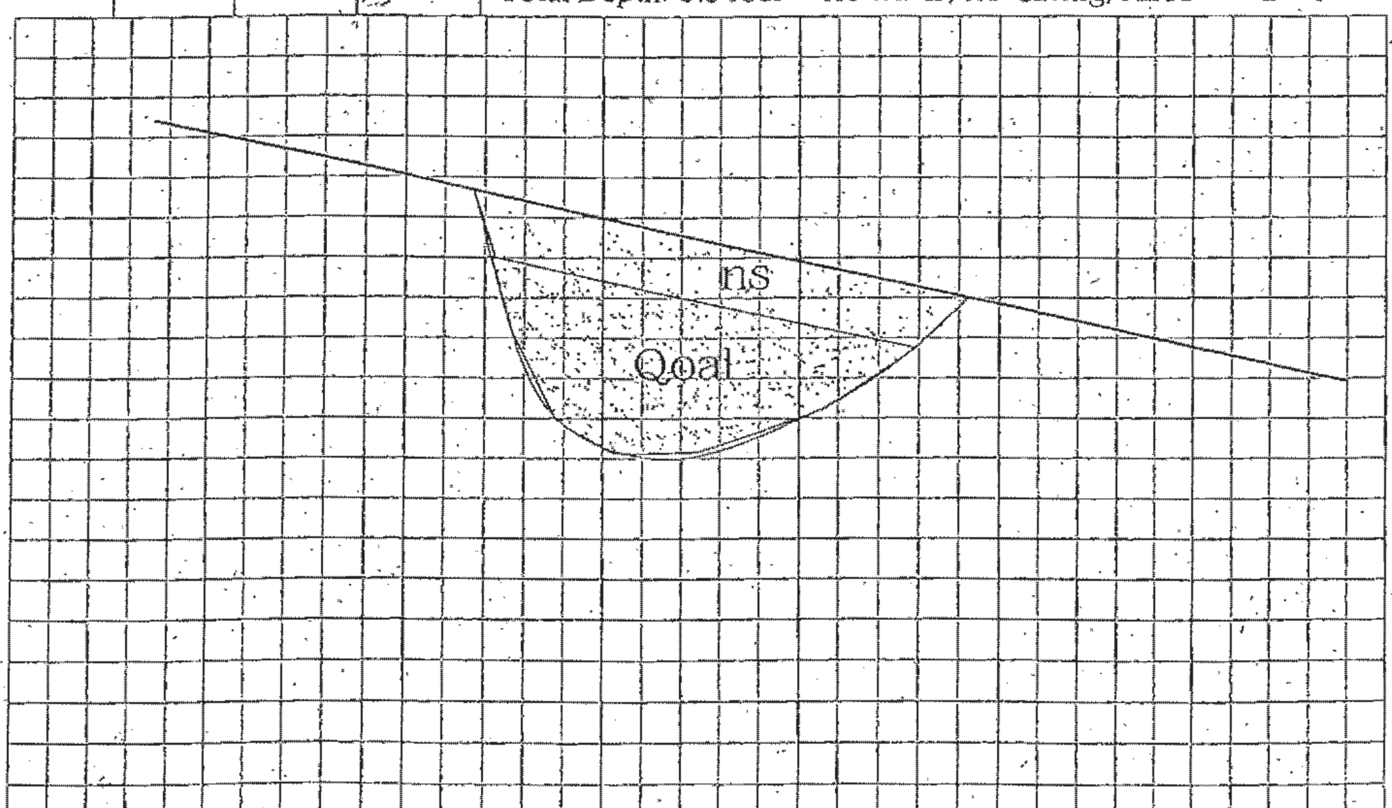
Test Hole Log TH-4

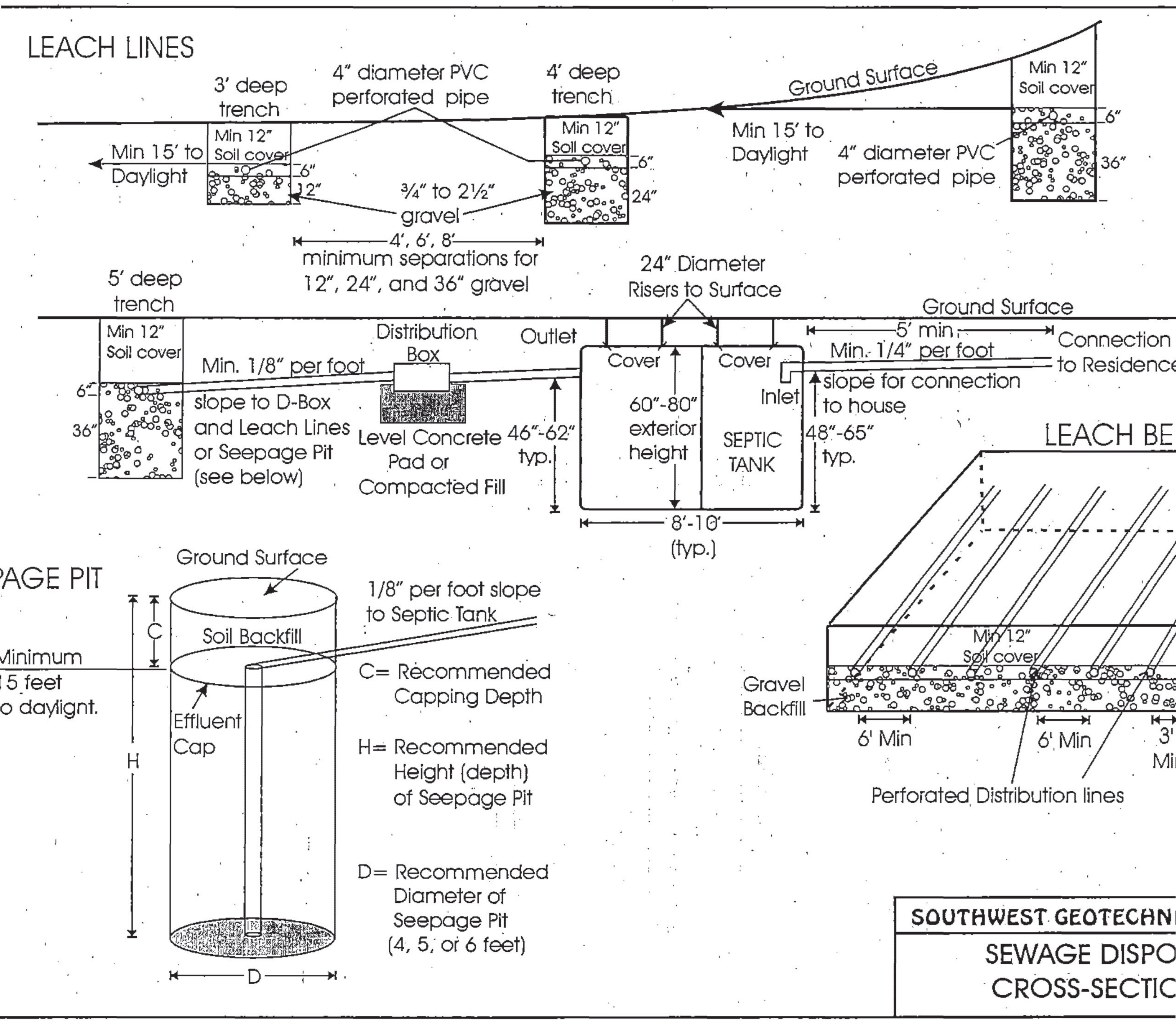
Project No: 1008170	Date(s) Observed: 9-14-10	Equipment Used: Backhoe, Arman Grading
Client: Duvernay	Location: Sierra Highway, E. of Listie Ave. APN 3057-014-012	Logged By: CC

Surface Description: Near Proposed Cut slope. easterly lot.

Sample Depth	Dry Density (pcf)	Insitu Moisture (%)	USCS	
			SM	**Natural Soil (ns):** Silty gravelly with angular granite fragments, brownish gray, dry, medium dense, porous, rodent burrows at 18", minor rootlets.
			SM	**Older Alluvium (Qoal):** Silty Sand with gravel, grayish brown, dry to damp, dense, some small roots.

Total Depth: 5.5 feet No water, No Caving, Filled 1"=5'




LEACH LINES
3' deep trench
4" diameter PVC perforated pipe
4' deep trench
Ground Surface
Min 12" Soil cover
6"
36"
Min 15' to Daylight
4" diameter PVC perforated pipe
Min 12" Soil cover
Min 15' to Daylight
6"
12"
¾" to 2½" gravel
Min 12" Soil cover
6"
24"
4', 6', 8'
minimum separations for 12", 24", and 36" gravel
5' deep trench
24" Diameter Risers to Surface
Ground Surface
Min 12" Soil cover
6"
36"
Distribution Box
Outlet
5' min
Connection to Residence
Min. 1/8" per foot slope to D-Box and Leach Lines or Seepage Pit (see below)
Level Concrete Pad or Compacted Fill
46"-62" typ.
Cover
Cover
60"-80" exterior height
SEPTIC TANK
Inlet
Min. 1/4" per foot slope for connection to house
48"-65" typ.
8'-10' (typ.)
LEACH BE
PAGE PIT
Ground Surface
1/8" per foot slope to Septic Tank
C
Soil Backfill
Minimum 5 feet o daylight.
Effluent Cap
H
C= Recommended Capping Depth
H= Recommended Height (depth) of Seepage Pit
D= Recommended Diameter of Seepage Pit (4, 5, or 6 feet)
D
Min 12" Soil cover
Gravel Backfill
6' Min
6' Min
3' Mi
Perforated Distribution lines
SOUTHWEST GEOTECHNI
SEWAGE DISPO
CROSS-SECTIC

COUNTY GUIDELINES FOR PRIVATE SEWAGE DISPOSAL SYSTEMS

Location of Sewage Disposal System

Minimum Horizontal Distance In Clear Required From:	Building Sewer	Septic Tank		Disposal Field		Seepage Pit or Cesspool	
Buildings or structures	2 feet (610 mm)	5 feet	(1524 mm)	8 feet	(2438 mm)	8 feet	(2438 mm)
Propery line adjoining private property	Clear	5 feet	(1524 mm)	5 feet	(1524 mm)	8 feet	(2438 mm)
Water supply wells	50 feet (15240 mm)	50 feet	(15240 mm)	100 feet	(30.5 m)	150 feet	(45.7 m)
Streams and lakes	50 feet (15240 mm)	50 feet	(15240 mm)	50 feet	(15240 mm)	100 feet	(30.5m)
Trees	–	10 feet	(3048 mm)	–	–	10 feet	(3048 mm)
Seepage pits or cesspools	–	5 feet	(1524 mm)	5 feet	(1524 mm)	12 feet	(3658 mm)
Disposal field	–	5 feet	(1524 mm)	4 feet	(1219 mm)	5 feet	(1524 mm)
On site domestic water service line	1 foot (305 mm)	5 feet	(1524 mm)	5 feet	(1524 mm)	5 feet	(1524 mm)
Distribution box	–		–	5 feet	(1524 mm)	5 feet	(1524 mm)
Pressure public water main	10 feet (3048 mm)	10 feet	(3048 mm)	10 feet	(3048 mm)	10 feet	(3048 mm)

Note:
When disposal fields and/or seepage pits are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be fifteen (15) feet (4572 mm).

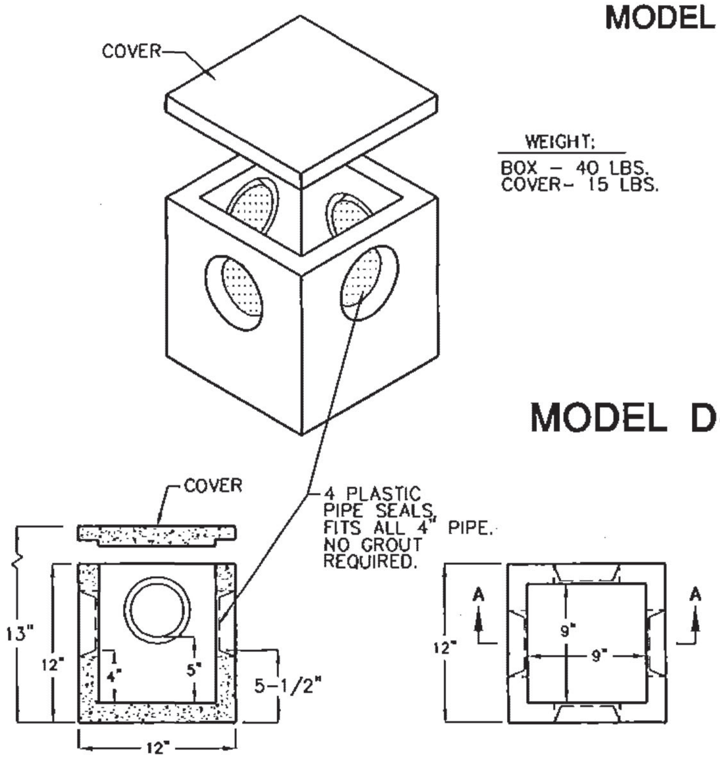
1. Including porches and steps, whether covered or uncovered, breeze ways, roofed porte-cocheres, roofed patios, carports. covered walks, covered driveways and similar structures or appurtenances.
2. See also Section 313.3 of the Uniform Plumbing Code.
3. All drainage piping shall clear domestic water supply wells by at least fifty (50) feet (15240 mm). This distance may be reduced to no less than twenty-five (25) feet (7620 mm) when the drainage piping is constructed of materials approved for use within a building.
4. Plus two (2) feet (610 mm) for each additional (1) foot (305 mm) of depth in excess of one (1) foot (305 mm) below the bottom of the drain line. (See also Section K-6.)
5. See Section 720.0 of the Uniform Plumbing Code.
6. For parallel construction - For crossings, approval by the Health Department shall be required.
7. These minimum clear horizontal distances shall also apply between disposal field, seepage pits, and the ocean mean higher high tide line.
8. Where special hazards are involved, the distance required shall be increased as may be directed by the Health Office or the Administrative Authority.

Capacity of Septic Tanks

Single Family Dwellings Number of Bedrooms	Multiple Dwelling Units or Apartments- One Bedroom Each	Other Uses: Maximum Fixture Units Served Per Table 7-3	Minimum Septic tank Capacity in Gallons
1 or 2		15	750
3		20	1000
4	2 units	25	1200
5 or 6	3	33	1500
	4	45	2000
	5	55	2250
	6	60	2500
	7	70	2750
	8	80	3000
	9	90	3250
	10	100	3500

RESIDENTIAL DISTRIBUTION BOXES

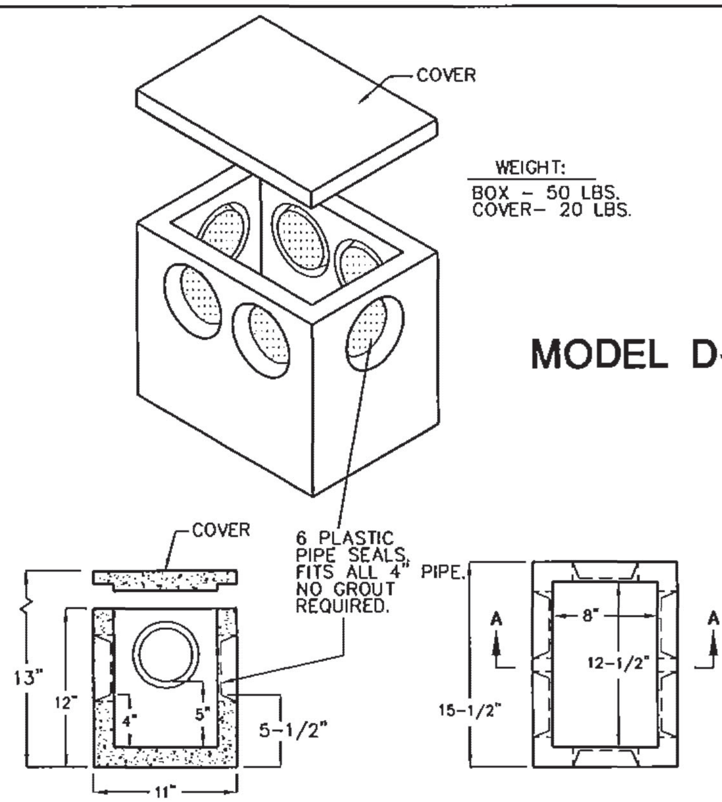
MODEL D-3 & D-5



MODEL D-3

SECTION A-A

TOP VIEW



MODEL D-5

FOR COMPLETE DESIGN AND PRODUCT INFORMATION, CONTACT JENSEN PRECAST.

SECTION A-A

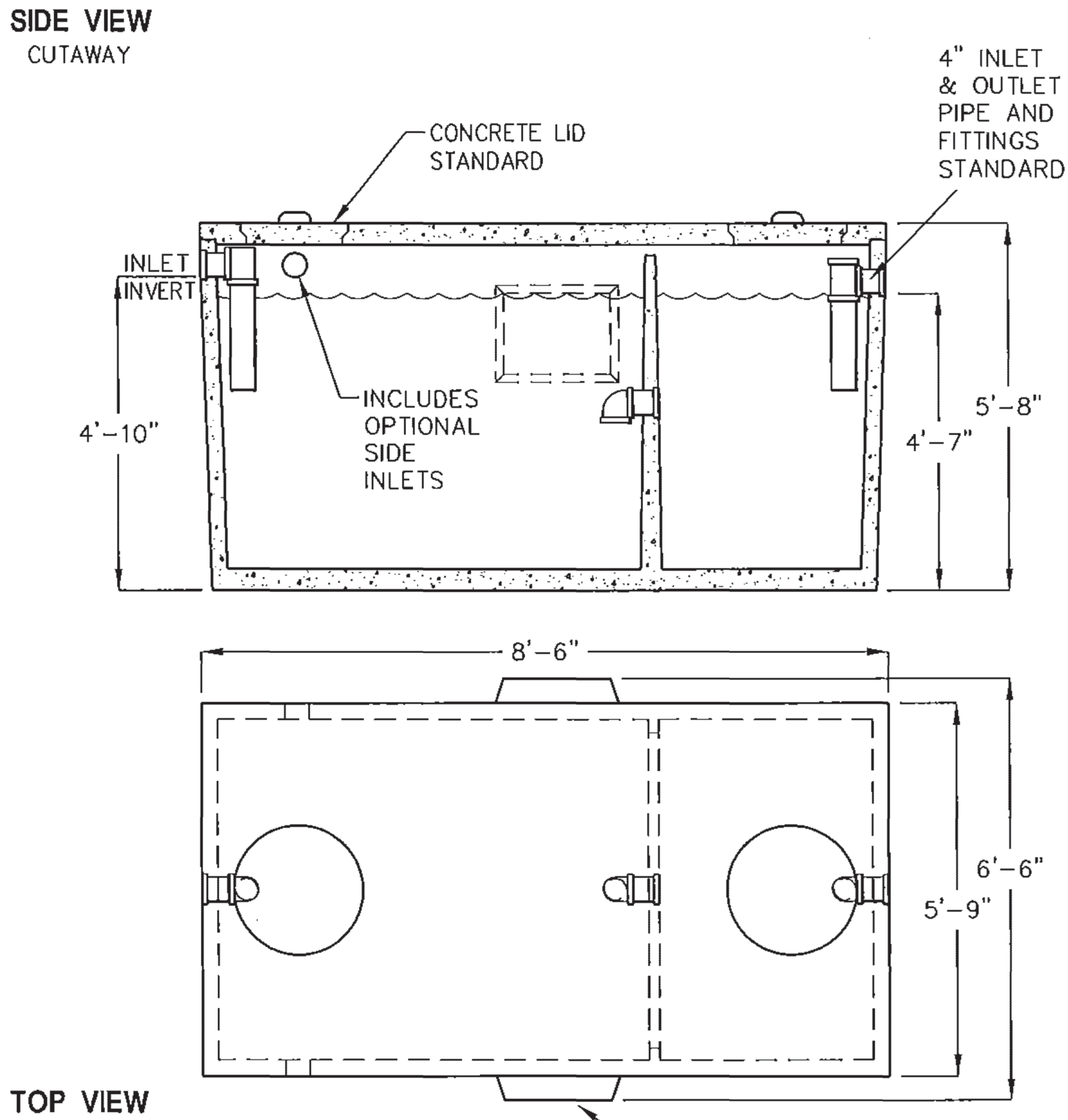
TOP VIEW

5/5/03
D3 & D5 BOX.dwg

JENSEN PRECAST®

1200 GALLON
RESIDENTIAL SEPTIC TANK

MODEL JS1200
ACCEPTED BY UPC®



LIQUID CAPACITY: 1200 GALLONS
BOX DESIGN LOAD: NON-TRAFFIC, UP TO 3 FEET OF SOIL COVER, MAXIMUM 500 PSF.

FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

7/13/05
JS1200_B.dwg

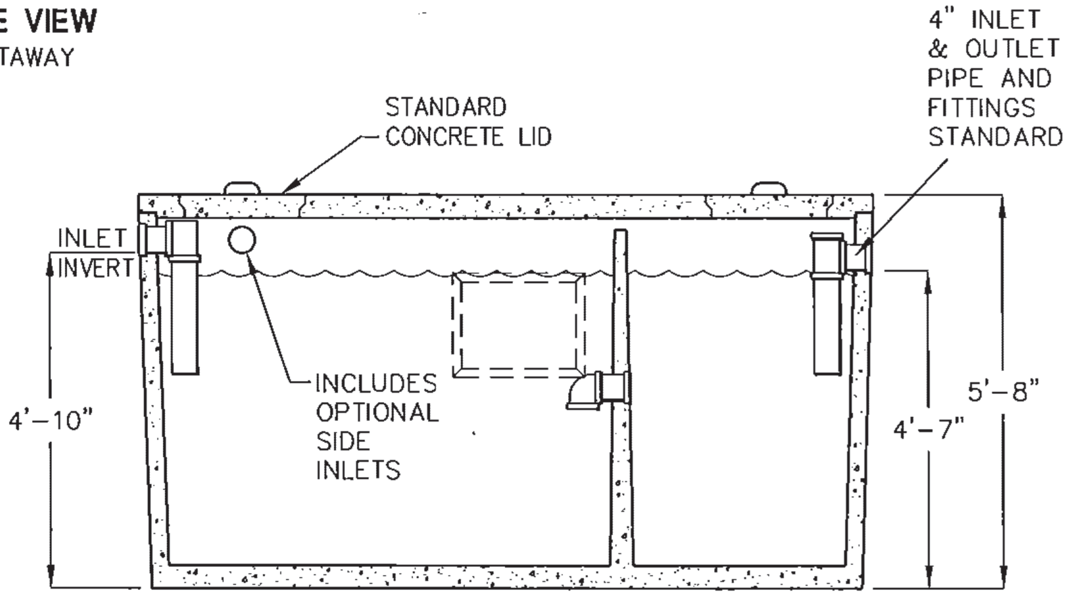
JENSEN PRECAST®

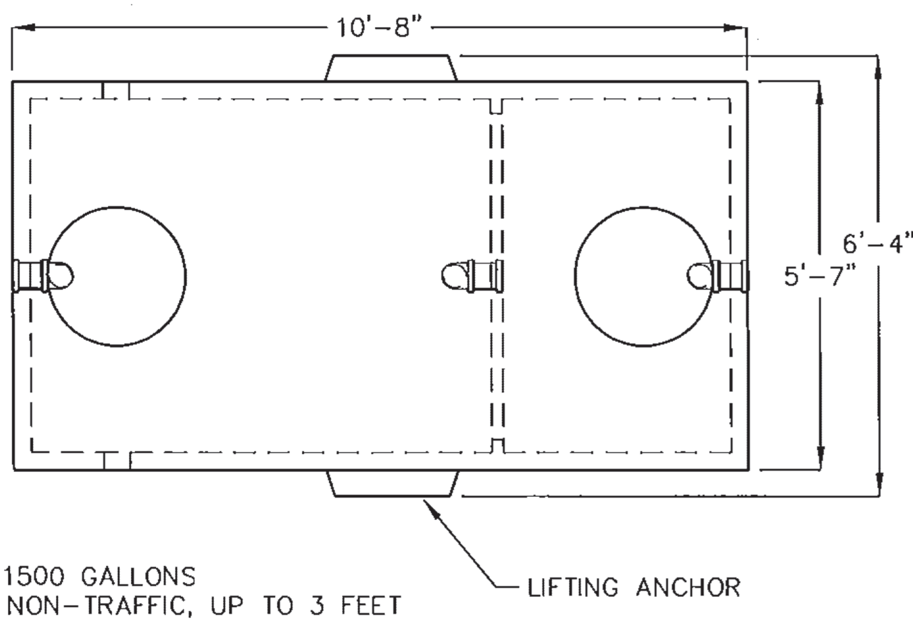
1500 GALLON
RESIDENTIAL SEPTIC TANK

MODEL JS1500

ACCEPTED BY UPC®

SIDE VIEW
CUTAWAY





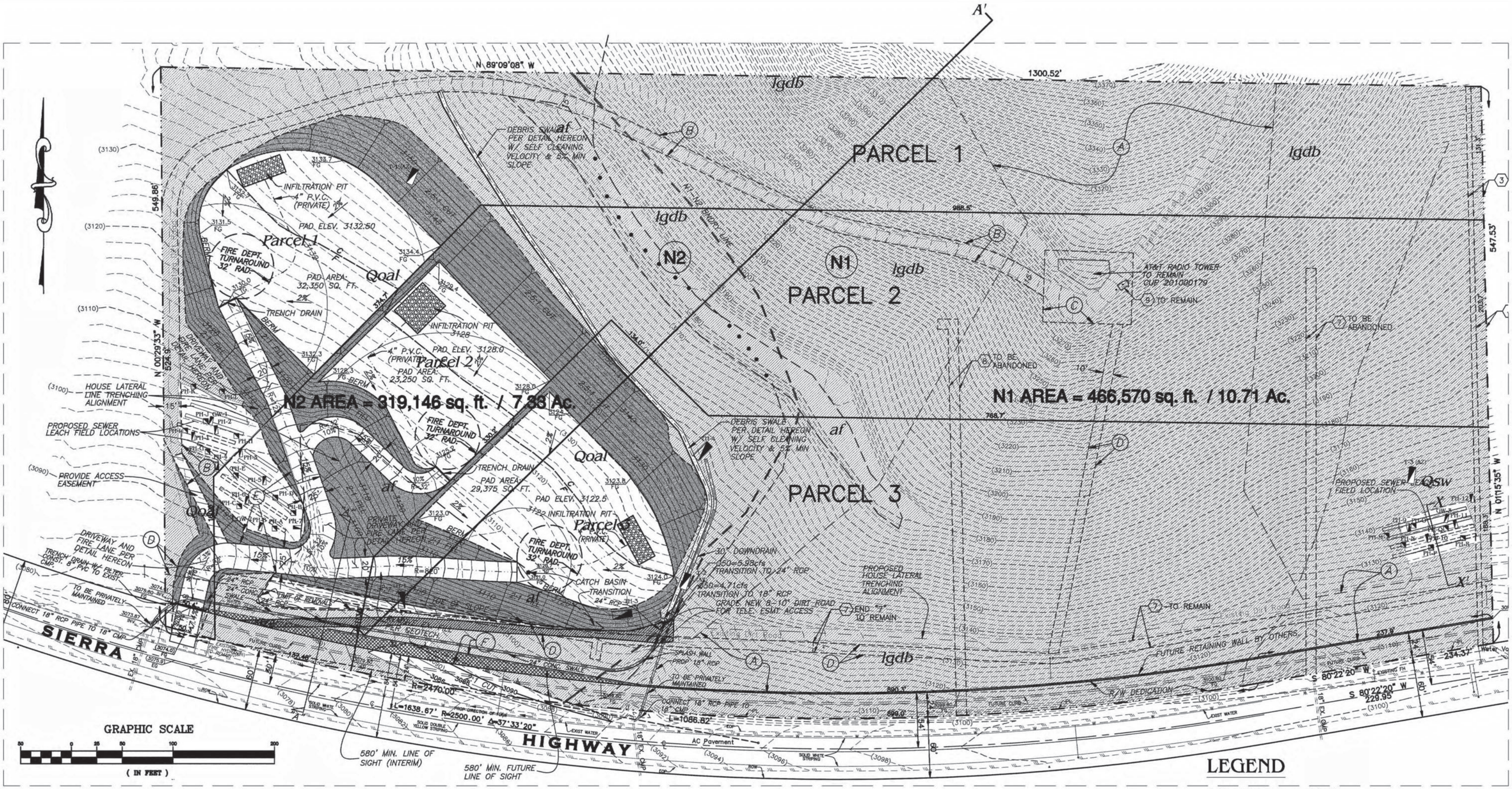
TOP VIEW

LIQUID CAPACITY: 1500 GALLONS
BOX DESIGN LOAD: NON–TRAFFIC, UP TO 3 FEET
OF SOIL COVER, MAXIMUM 500 PSF.

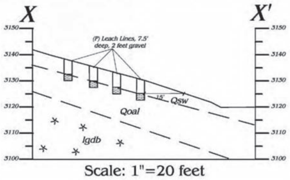
FOR COMPLETE DESIGN
AND PRODUCT INFORMATION
CONTACT JENSEN PRECAST.

7/13/05
JS1500_B.dwg

JENSEN PRECAST®



PARCEL 1	PARCEL 2	PARCEL 3
5-6 Bedroom House Design	4-Bedroom House Design	5-6 Bedroom House Design
Proposed: 3 Leach Lines, 60 feet Long, 3 feet wide, 6 feet deep, 3 feet gravel.	Proposed: 2 Leach Lines, 38 feet Long, 3 feet wide, 6 feet deep, 3 feet gravel *plus* 1 line, 78 feet long, 6 feet deep with 3 feet of gravel.	Proposed: 2 Leach Lines, 85 feet Long, 3 feet wide, 7.5 feet deep, 2 feet gravel.
Expansion: 2 Leach Lines, 60 feet long, 3 feet wide, 6 feet deep, 3 feet gravel *plus* 2 lines, 30 feet long, 6 feet deep, 3 feet of gravel	Expansion: 2 Lines, 77 feet long, 3 feet wide, 6 feet deep, 3 feet gravel.	Expansion: 2 Leach Lines, 85 feet long, 3 feet wide, 7.5 feet deep, 2 feet gravel.



Scale: 1"=20 feet

LEGEND

- af — Artificial (Undocumented) Fill
- Qsw — Slopewash
- Qoal — Older Alluvium
- lgdb — Lowe Granodiorite Bedrock
- TH-1 — Approximate Location and Number of Test Hole (SGI)
- T-1 (AZ) — Approximate Location and Number of Test Hole (AZ Geo)
- PH-1 — Percolation Test Holes (2010)
- PH-A — Percolation Test Holes (2020)
- GW-1 — Groundwater Test Holes
- Approximate Geologic Contact Dotted Where Concealed
- 5' — Approximate Depth of Existing Undocumented Fill

Map Prepared in the Offices of
Southwest Geotechnical, Inc.
21704 W. Golden Triangle Rd., Suite 425
Santa Clarita, California 91350
(661) 222-9544 Fax (661) 222-9549

Southwest Geotechnical, Inc.
Consulting Engineers & Geologists

Preliminary Sewage Disposal System Feasibility Map

Client
Duvernay Project
APN 3057-014-012, Sierra Highway
East of Lisle Avenue

Reference
Tentative Parcel Map 71006, by CRC Enterprises, Inc. dated 2/8/2019

Scale
1"=40 feet

Date
May 28, 2020

Project Number
1008170

Client
Duvernay

COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
ENGINEERING AND SURVEY BRANCH
STORM DRAIN AND HYDROLOGY SECTION

TO: Rothman Engineering
205 S Broadway #706
Los Angeles CA 90012

Date: 10/09/2012

REVIEW OF DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID

PD/MTD. NO.	**NA**	**CITY OF**	**NA**
PM NO.	**71006**	**THOMAS GUIDE**	**4375-G6**
TRANS DATE:	**10/04/2012**	**PLAN CHECK NO.**	**3**

We have reviewed your Drainage Concept / Hydrology Study / SUSMP / LID Plan.

[X] The Drainage Concept / Hydrology Study / SUSMP / LID Plan has been approved for Area and Q only.

COMMENTS:

Please provide a CD with a scanned copy of the approved report and maps

A2 **APPROVED BY** ______________________
Christopher Sheppard
(626) 458-4921

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER M. SHEPPARD
C 70441
EXP. 9/30/14
CIVIL
STATE OF CALIFORNIA

Rothman Engineering, Inc
Civil Engineering, Civil Engineering Consulting

DRAINAGE CONCEPT/HYDROLOGY STUDY/SUSMP/LID PLAN
FOR PM 71006
APN # 3057-014-012
ACTON, CALIFORNIA 93510

Client:
Doug Beam

Job # 0226-07-001
09/06/12

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY: _______ RCE NO. 70441 DATE 10/9/12
CHECKED BY: _______ DATE 10/9/12
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

REGISTERED PROFESSIONAL ENGINEER
ROLAND P. ROTHMAN
No. C47790
Exp. 12/31/13
CIVIL
STATE OF CALIFORNIA

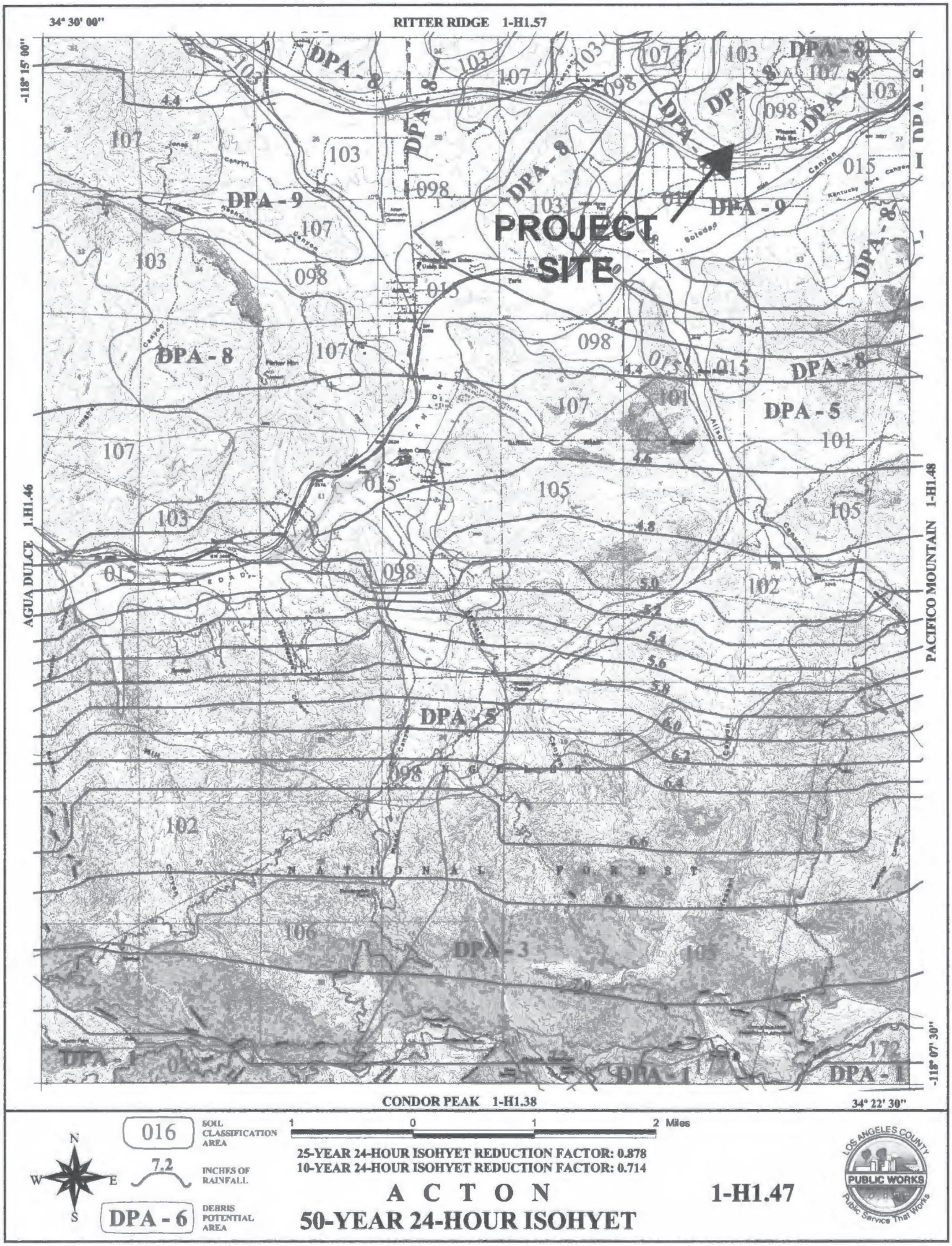
Prepared by:
Rothman Engineering, Inc.
Roland Rothman, P.E.

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

Los Angeles County Hydrology Manual
50-Year 24-Hour Isohyet Map

Acton
1-H1.47

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax



34° 30' 00"
RITTER RIDGE 1-H1.57
-118° 15' 00"
PROJECT SITE
DPA - 8
DPA - 9
DPA - 5
DPA - 3
DPA - 1
107
103
098
015
101
105
102
106
172
4.4
4.6
4.8
5.0
5.2
5.4
5.6
5.8
6.0
6.2
6.4
6.6
NATIONAL FOREST
AGUA DULCE 1-H1.46
PACIFICO MOUNTAIN 1-H1.48
-118° 07' 30"
CONDOR PEAK 1-H1.38
34° 22' 30"
016
SOIL CLASSIFICATION AREA
7.2
INCHES OF RAINFALL
DPA - 6
DEBRIS POTENTIAL AREA
N
W
E
S
1 0 1 2 Miles
25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714
ACTON
50-YEAR 24-HOUR ISOHYET
1-H1.47
LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works

Project Overview

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

PROJECT OVERVIEW:

Design Parameters:

Reference: Los Angeles County Department of Public Works Hydrology Manual

Hydrologic Map	1-H1-47, Acton
Rainfall Isohyet	3.8 in (50 yr. - 24 hr.)
Soil Type	103 / 098
Debris Zone	DPA – 8
Bulking Factor	1.36 (Per B-5, see reference section)
Debris Production Rate	35,000yd^3/mi^2 = 54.7 yd^3/acre (Per B-2, see reference section)
Impervious (p)	0.02 (Undeveloped Condition)
	0.21 (Low Density Single Family Developed, per Appendix D)
Fire Factor	0.34

Note: Project not within FEMA Flood Zone "A"
Project not within County adopted floodway

A hydrology map delineating the Tributary Drainage areas and tabulated findings within this project for this tract is included at the back of this report.

Overview of Analysis Procedures:

Analysis of the storm drain runoff for both the existing and proposed conditions used the same techniques for analysis. Those being as follows:

- Used LA county Tc calculator to determine times of concentration, peak flow rate and burned peak flow rate.
- For both existing and proposed conditions, added up all the peak and burned peak flow rate from Tc calculator for Q25 and Q50.
- Used LA County – "Volume and Flow Rate Calculations" to calculate standard urban stormwater mitigation plan flow rates and volumes based on 0.75-inches of rainfall.

Purpose of Report:

The purpose of this Hydrology Study is to determine the proposed development's impact (change in peak-flow rates) on existing hydrologic conditions. The LACDPW Tc Calculator program was used to calculate the time of concentration and 50-year peak and 25-year peak runoff flow rates.

Site Description:

The site is located on an undeveloped hillside area along Sierra Highway in Acton, CA, APN # 3057-014-012, PM 71006. The existing site consists of an undeveloped hillside property and the proposed conditions involve a subdivision into three lots and grading of three pads for future single-family homes.

Existing & Proposed Q50 Analysis

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

Q50 - Existing Conditions:

The existing Q50 tributary area is broken into three tributary areas: 1A, 2B, and 3C, (see hydrology map H-1). Each of the three undeveloped areas flow southerly to their own existing 18" corrugated metal pipe with concrete headwall inlets along Sierra Highway.

The following is a summary of the existing 50-year 24-hour peak flow rates to Sierra Highway:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Debris Potential (C.Y.)
				Qd(Clear)	QB(Burn)	QBB(Bulk)			
1A	12.77	103	13	11.30	12.15	16.52	12.77	16.52	699
2B	3.32	98	8	4.71	4.88	6.64	3.32	6.64	182
3C	13.73	98	12	15.65	16.24	22.09	13.73	22.09	751

We will call the inlet for area 1A as "Inlet A", inlet for area 2B as "Inlet B", and inlet for area 3C as "Inlet C". The following is a summary of the areas and runoff for each inlet for a 50-year 24-hour storm event:

	Sub-Area (Acres)	Existing Sub-Area Q50 (cfs)			Debris Potential (C.Y.)
		Qd(Clear)	QB(Burn)	QBB(Bulk)	
Inlet "A"	12.77	11.30	12.15	16.52	699
Inlet "B"	3.32	4.71	4.88	6.64	182
Inlet "C"	13.73	15.65	16.24	22.09	751
Total	29.82	31.66	33.27	45.25	1632

Q50 - Proposed Conditions:

The proposed conditions tributary area is broken up in the same manner as the existing conditions with three tributary areas defined for analysis of the Q50: 1A, 2B and 3C (see hydrology map H-2). These three tributary areas also flow to the same existing inlets, with no diversion of flow from one area to another.

Inclusive of Area 1A is the area developed for the three proposed pads, driveway and supporting grading as prepared for the Exhibit "A" of Parcel Map 71006. This developed area covers 4.30 Acres of the 12.77 Acres of Area 1A. A 36 inch wide debris swale (to be privately maintained via Covenant and Agreement between property owners) with 2 foot freeboard is required at the top of the cut slope along the generally easterly edge of the developed area to protect the cut slope and pads from potential debris flow from the existing sloped area above. The swale will direct runoff southerly at a 5% minimum slope to a riprap pad at the southern edge of the developed area. The runoff will then flow westerly along the north side of Sierra Highway, same as in the existing conditions, toward Inlet "A". Just prior to reaching Inlet "A", the runoff will flow across the proposed driveway, which will be an Arizona Crossing. The Arizona Crossing will have a maximum flow depth between 3.0" and 3.5" with a velocity of 3.7 fps to 4.1 fps for a Q50 burn and bulk flow rate of 8.05 cfs.

The developed area in Area 1A will generally sheet flow across the pads and flow down the proposed driveway. Trench drains are provided at the top of the driveways at two of the pads and a catch basin at the third pad to direct the "first flush" runoff from the pads to SUSMP/LID devices located toward the rear of the pads. Additional discussion and calculations are provided on the drainage devices in the following sections regarding SUSMP requirements and LID Δ Volume and Δ Q25 Mitigation. There is also a trench drain with a filter across the proposed driveway along the right of way which will capture flow and outlet adjacent to Inlet "A". This developed area has been excluded from calculations for Q50 burn and Q50 burn and bulk.

Area 2B will drain southerly to Sierra Highway and Inlet "B". The proposed area 5B encompasses an area almost identical to the existing area 2B. A 30" down drain will collect a small portion of the flow from the hillside and outlet onto a rip-rap pad.

Area 3C will remain undisturbed from the existing area 3C. There will be no changes to the hydrologic conditions in this area.

The following is a summary of the proposed 50-year 24-hour peak flow rates to Sierra Highway:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Debris Potential (C.Y.)
				Qd(Clear)	QB(Burn)	QBB(Bulk)			
1A	12.77	103	13	11.67	12.46	16.95	12.77	16.95	463
2B	3.32	98	8	4.71	4.88	6.64	3.32	6.64	182
3C	13.73	98	12	15.65	16.24	22.09	13.73	22.09	751

The following is a summary of the areas and runoff for each inlet along Sierra Highway for comparison to the existing conditions for a 50-year 24-hour storm event:

	Sub-Area (Acres)	Proposed Sub-Area Q50 (cfs)			Debris Potential (C.Y.)
		Qd(Clear)	QB(Burn)	QBB(Bulk)	
Inlet "A"	12.77	11.67	12.46	16.95	463
Inlet "B"	3.32	4.71	4.88	6.64	182
Inlet "C"	13.73	15.65	16.24	22.09	751
Total	29.82	37.67	38.98	50.58	1396

Q50 - Existing vs Proposed Conditions:

The following is a comparison of the existing and proposed conditions at each of the three inlets along Sierra Highway for a 50-year 24-hour storm event:

	ΔSub-Area (Acres)	Sub-Area Q50 (cfs)			ΔDebris Potential (C.Y.)
		ΔQd(Clear)	ΔQB(Burn)	ΔQBB(Bulk)	
Inlet "A"	0.00	+0.37	+0.31	+0.43	-236
Inlet "B"	0.00	0.00	0.00	0.00	0
Inlet "C"	0.00	0.00	0.00	0.00	0
Total	0.00	+0.37	+0.31	+0.43	-236

As shown in the table, the proposed conditions will increase the amount of runoff and decrease the amount of debris potential for Inlet "A". The remaining Inlet "B" (for existing 2B vs proposed 5B) and Inlet "C" (for existing 3C vs proposed 6C) do not have any changes to conditions for runoff or debris potential.

For a 50-year storm, the runoff for Inlet "A" will increase by 0.37 cfs for clear flow, 0.31 cfs for burned flow, and 0.43 cfs for burned and bulked flow. This increase will be reduced by 0.31 cfs due to the ΔQ25 Mitigation (see Hydrology Map H-2).

The debris potential for Inlet "A" has decreased by 236 cubic yards due to the proposed developed land in proposed Area 1A.

Q50 – Mitigated Proposed Conditions:

The following is a summary of the proposed 50-year 24-hour peak flow rates to Sierra Highway as affected by the detention and retention systems proposed to mitigate ΔQ25 and ΔV:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs) Qd(Clear)	Sub-Area Q50 (cfs) QB(Burn)	Sub-Area Q50 (cfs) QBB(Bulk)
1A	12.77	103	13	11.36	12.15	16.64
2B	3.32	98	8	4.71	4.88	6.64
3C	13.73	98	12	15.65	16.24	22.09

Q50 - Existing vs Mitigated Proposed Conditions:

With the infiltration system to mitigate ΔV and the detention system to mitigate ΔQ, the following is the adjusted comparison of the existing and proposed conditions for each of the three sub-areas:

	ΔSub-Area	Sub-Area Q50 (cfs)		
	(Acres)	ΔQd(Clear)	ΔQB(Burn)	ΔQBB(Bulk)
Inlet "A"	0.00	+0.06	0.00	+0.12
Inlet "B"	0.00	0.00	0.00	0.00
Inlet "C"	0.00	0.00	0.00	0.00
Total	0.00	+0.06	0.00	+0.12

As shown in the table above, with the infiltration pit (retention) and detention system in place to mitigate the ΔQ25 and ΔV, there will be a negligible increase in the Q50 peak runoff. From the point of Inlet "A", the storm runoff goes through a culvert to the south side of Sierra Highway, then across a vegetated strip of vacant land to a second culvert under the south bound lanes of State Highway Route 14, to a narrow strip of land between the north and south bound lanes and then through a third culvert passing under the north bound lanes of Route 14 for a total length of approximately 600 feet. A reasonable expectation is that the impact of a less than 1% increase in runoff from a burn and bulked 50-Year design storm to the vacant land south of Sierra Highway and even further south of Route 14. In addition, once the project site runoff mixes with the runoff from the south side of Sierra Highway, the north and south bound lanes of Route 14, and the strips of land in between, the increase will not be practically measurable.

Existing & Proposed Q25 Analysis

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

Q25 - Existing Conditions:

The existing Q25 tributary area is broken into three tributary areas: 1A, 2B, and 3C, (see hydrology map H-3).

The following is a summary of the existing 25-year 24-hour peak flow rates to Sierra Highway:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs) Qd(Clear)	24-hr Runoff Volume (acre-ft)	24-hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	27007
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

Q25 - Proposed Conditions:

The proposed Q25 tributary area is broken into three tributary areas: 1A, 2B, and 3C, (see hydrology map H-4).

The following is a summary of the proposed 25-year 24-hour peak flow rates to Sierra Highway without any detention or retention systems:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs) Qd(Clear)	24-hr Runoff Volume (acre-ft)	24-hr Runoff Volume (ft^3)
1A	12.77	103	15	8.96	0.79	34412
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

Q25 - Existing vs Proposed Conditions:

The following is a comparison of the existing and proposed conditions for each of the three sub-areas without any detention or retention systems:

Sub-Area	Sub-Area (Acres)	Sub-Area Q25 (cfs) Qd(Clear)	24-hr Runoff Volume (ft^3)
1A	12.77	+0.31	+7405
2B	3.32	0.00	0
3C	13.73	0.00	0

The peak runoff flow rate will increase by $\Delta Q25 = 0.31$ cfs in the proposed condition and the 24-hr Runoff Volume will increase by $\Delta V = 7405\ ft^3$.

We have prepared the following to mitigate these increases in area 1A:

- Detention system to reduce the proposed Q25 peak runoff flow rates by 0.31 cfs
- Infiltration pits to store the ΔV of 7405 ft^3 to retain any increase in Q25 volume.

ΔV Mitigation – Infiltration Pits:

The proposed site has incorporated three infiltration pits – one on each of the three pads – to store the increase in runoff volume for a 25-year storm event. We have provided a total infiltration pit volume of 7,611 ft^3, above the required 7,405 ft^3 to store the entire ΔV volume. As the ΔV volume will be stored and retained on-site, we will see no increase in Q25 runoff volume with the infiltration pits in place.

ΔQ25 Mitigation - Detention System:

The proposed detention system is designed to reduce the Q25 peak runoff flow rates by 0.31 cfs for the tributary Area 1A Q25. We will accomplish the reduction in peak flows be restricting flow on the most southerly and easterly of the three proposed pads on the property – this will be called "PAD 3".

The proposed PAD 3 has a Q25 peak runoff flow rate of 1.68 cfs, which will be reduced to 1.37 cfs by constructing a detention system attached to a 24"x24" catch basin. This detention system will detain peak runoff by restricting the lowest outlet to only release flows up to 1.37 cfs and store flows in excess of this flow rate in an 18" RCP pipe connected to the catch basin.

The flowing is a brief summary of the connections to the 24"x24" catch basin detention system:

- 4" PVC pipe – This pipe in located at the bottom of the catch basin to direct "first flush" runoff to the infiltration pit for PAD 3. Runoff will continue to outlet here until the infiltration pit is full and runoff backs up into the catch basin.
- 6" PVC pipe – This pipe outlets at the side of the catch basin (lowest possible side connection) and is sized to limit outflow to a maximum of 1.37 cfs (0.31 cfs less than peak flow) based on orifice flow and a head of 2 ft. See pipe sizing calculations.
- 8" PVC pipe – Located with an invert at a minimum of 2 ft. above the 6" PVC pipe. This pipe is considered an overflow pipe to bypass flows over the proposed Q25 peak flow rates. This pipe has been sized for a Q50 flow. See pipe sizing calculations.
- 18" RCP pipe – Provides storage for the proposed Q25 peak flows above up to 1.68 cfs. The pipe is 11 feet long and provides a total of 27.4 ft^3 of storage (including inside the catch basin). The required storage based on analysis of the hydrograph for PAD 3 is 26.2 ft^3. See Determination of On-Site Storage calculations.

Q25 – Mitigated Proposed Conditions:

The following is a summary of the proposed 25-year 24-hour peak flow rates to Sierra Highway with detention and retention systems to mitigate ΔQ25 and ΔV:

Sub-Area	Sub-Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs) Qd(Clear)	24-hr Runoff Volume (acre-ft)	24-hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	26939
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

Q25 - Existing vs Mitigated Proposed Conditions:

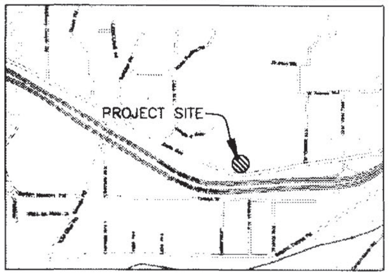
With the infiltration system to mitigate ΔV and the detention system to mitigate ΔQ, the following is the adjusted comparison of the existing and proposed conditions for each of the three sub-areas:

Sub-Area	Sub-Area (Acres)	Sub-Area Q25 (cfs) Qd(Clear)	24-hr Runoff Volume (ft^3)
1A	12.77	0.00	-206
2B	3.32	0.00	0
3C	13.73	0.00	0

As shown in the table above, with the infiltration pit (retention) and detention system in place to mitigate the ΔQ25 and ΔV, there will be no increase in Q25 peak runoff and there will be a small decrease in the 24-hour runoff volume (V) for a 25-year storm event.

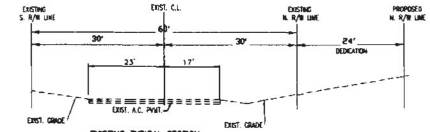
Hydrology Maps
H-1, H-2 and H-3

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

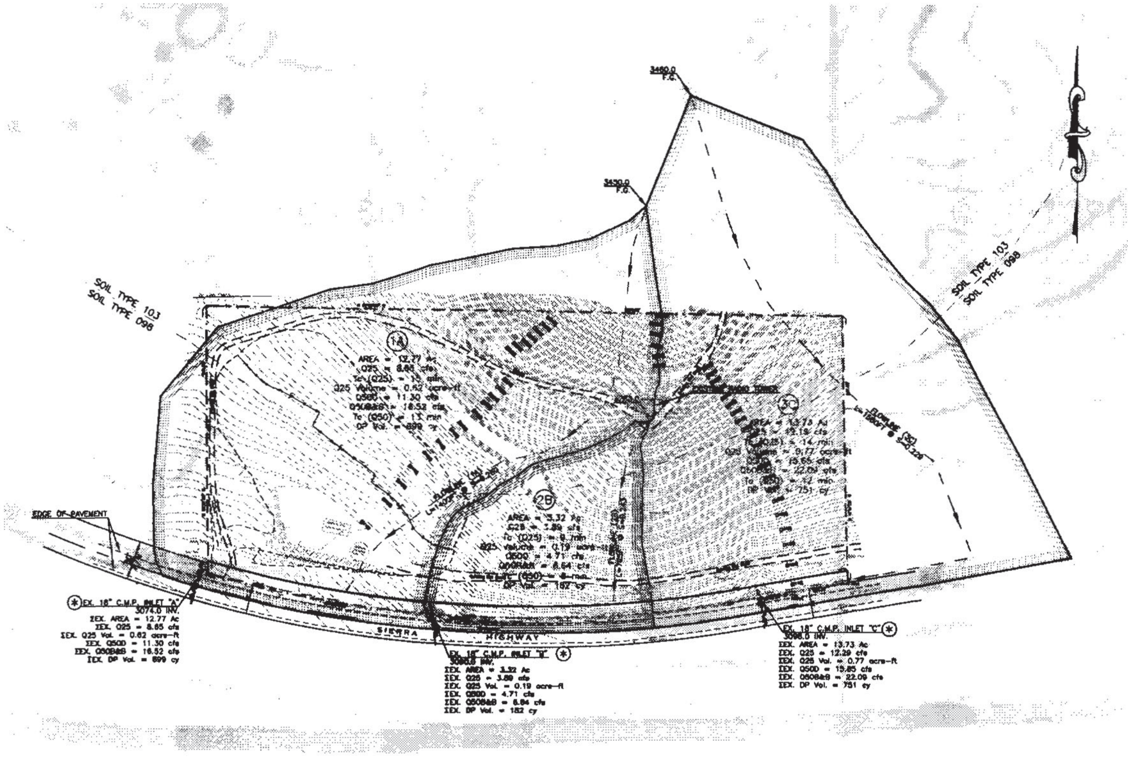


VICINITY MAP
NTS

LOCATION MAP
1" = 1000'



EXISTING TYPICAL SECTION
SIERRA HIGHWAY
NOT TO SCALE



DRAINAGE CONCEPT NOTES:

1) DRAINAGE DEVICES AND THEIR LOCATIONS ARE NOT NECESSARILY APPROVED.
2) COMPLIANCE OF ALL STREET DRAINAGE REQUIREMENTS WILL BE MET TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
3) DEED RESTRICTIONS MUST BE DEDICATED FOR CROSS LOT DRAINAGE TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
4) VEHICULAR ACCESS WILL BE PROVIDED TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
5) APPROVAL OF THE DRAINAGE CONCEPT DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5, (EXCEPT AS NOTED).
6) INFILTRATION PITS PERCOLATION RATES PER SOILS REPORT PREPARED BY SOUTHWEST GEOTECHNICAL, INC. ON MARCH 28, 2012.
7) FIRE DEPARTMENT APPROVAL REQUIRED FOR ARIZONA CROSSING.
8) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM PROPOSED SLOPE(S) A DISTANCE OF H/2, MINIMUM OF 5 FEET, WHERE H IS THE HEIGHT OF THE SLOPE.
9) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM FOUNDATIONS A MINIMUM OF 15 FEET AND A 1:1 GRADIENT FROM THE BOTTOM OF FOUNDATIONS.

LOW IMPACT DEVELOPMENT (LID) NOTES:

PRIOR TO BUILDING PERMITS TWO OF THE FOLLOWING LID REQUIREMENTS WILL BE INTEGRATED INTO THE SITE DESIGN:

1) POROUS PAVEMENT
2) DOWNSPOUT ROUTING
3) DISCONNECT IMPERVIOUS AREAS
4) DRY WELLS/INFILTRATION PITS*
5) LANDSCAPING AND LANDSCAPE IRRIGATION
6) GREEN ROOF

*DRY WELLS/INFILTRATION PITS HAVE BEEN INCORPORATED INTO THIS DRAINAGE CONCEPT FOR THIS PROJECT TO COMPLY WITH THE ACTON/ANTELOPE VALLEY DRAINAGE POLICY AND CAN BE APPLIED TO ONE OF THE TWO REQUIRED LID REQUIREMENTS.

NOTES:

(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4559 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 456.

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

EXISTING CONDITION – HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	27007
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

EXISTING CONDITION – HYDROLOGY TABLE (Q50)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Total Debris Potential CY)
				Qd(Clear)	QB(Burn)	QBB(Bulk)			
1A	12.77	103	13	11.30	12.15	16.52	12.77	16.52	699
2B	3.32	98	8	4.71	4.88	6.84	3.32	6.84	182
3C	13.73	98	12	15.85	16.24	22.09	13.73	22.09	751

HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP – ACTON – 1-H1-47
25 YEAR-24 HR ISOHYET – 3.4 IN
50 YEAR-24 HR ISOHYET – 3.8 IN
SOIL NUMBERS – 103 AND 098
DEBRIS ZONE – DPA-8
BULKING FACTOR – 1.36 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE – 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) – 0.02 FOR UNDEVELOPED.
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR – 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

EXISTING CONDITIONS HYDROLOGY – Q25 & Q50

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY ______ RCE NO. ______ DATE ______
CHECKED BY
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT
RAYMOND DUVERNAY

PROJECT
PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

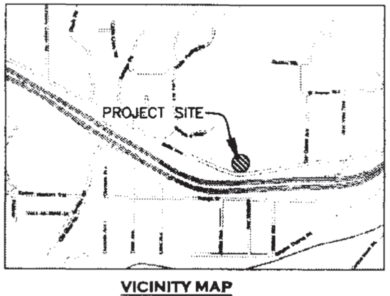
SHEET TITLE
HYDROLOGY/
DRAINAGE CONCEPT/LID PLAN
EXISTING CONDITIONS

REVISIONS

No.	DESCRIPTION	BY	DATE

DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: BW
SCALE: AS SHOWN	DATE: 09/05/12

HYDRO
H-1 of 3
JOB NUMBER
0226-07-001



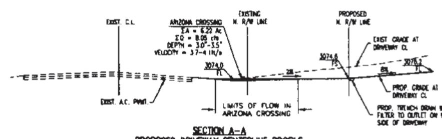
VICINITY MAP

NTS

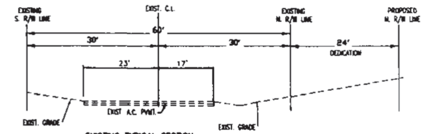
PROJECT LOCATION
TG PG 4375-G6

LOCATION MAP

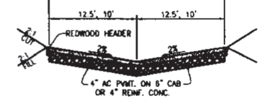
1" = 1000'



SECTION A–A
PROPOSED DRIVEWAY CENTERLINE PROFILE
NOT TO SCALE

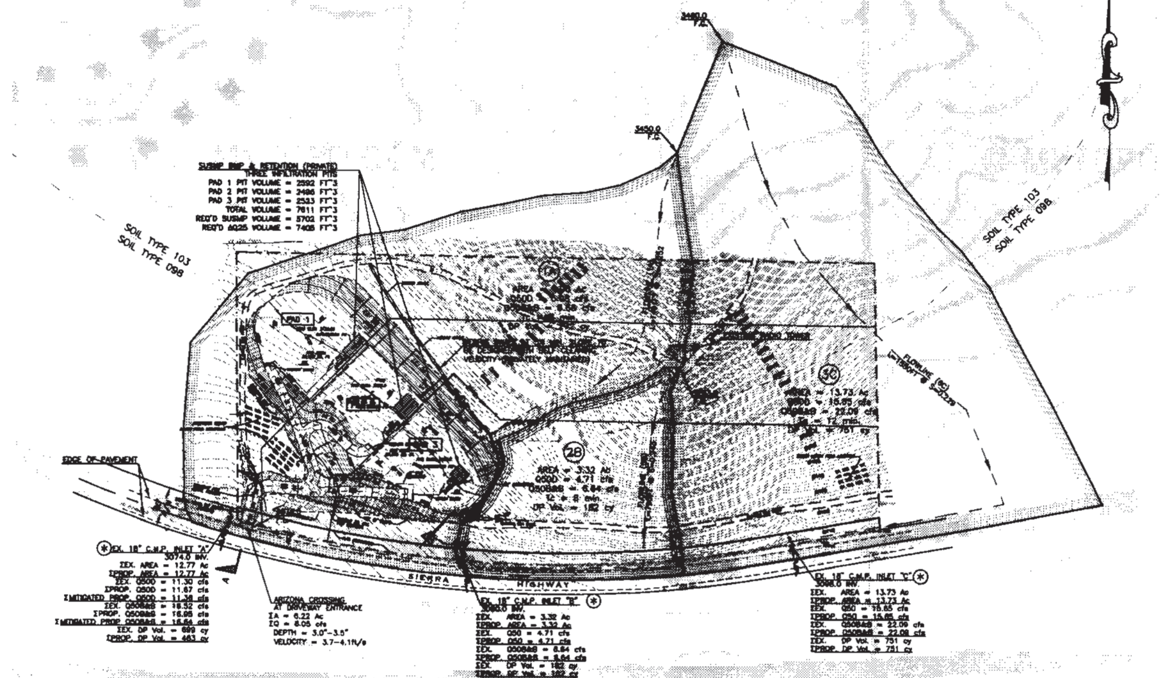


EXISTING TYPICAL SECTION
SIERRA HIGHWAY
NOT TO SCALE



DRIVEWAY DETAIL

NTS



GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

DRAINAGE CONCEPT NOTES:

1) DRAINAGE DEVICES AND THEIR LOCATIONS ARE NOT NECESSARILY APPROVED.
2) COMPLIANCE OF ALL STREET DRAINAGE REQUIREMENTS WILL BE MET TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
3) DEED RESTRICTIONS MUST BE DEDICATED FOR CROSS LOT DRAINAGE TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
4) VEHICULAR ACCESS WILL BE PROVIDED TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
5) APPROVAL OF THE DRAINAGE CONCEPT DOES NOT CONSTITUTE DETERMINATION THAT THE OFFSITE IMPROVEMENTS ARE REQUIRED WITHIN THE MEANING OF GOVERNMENT CODE SECTION 66462.5, (EXCEPT AS NOTED).
6) INFILTRATION PITS PERCOLATION RATES PER SOILS REPORT PREPARED BY SOUTHWEST GEOTECHNICAL, INC. ON MARCH 28, 2012.
7) FIRE DEPARTMENT APPROVAL REQUIRED FOR ARIZONA CROSSING.
8) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM PROPOSED SLOPE(S) A DISTANCE OF H/2, MINIMUM OF 5 FEET, WHERE H IS THE HEIGHT OF THE SLOPE.
9) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM FOUNDATIONS A MINIMUM OF 15 FEET AND A 1:1 GRADIENT FROM THE BOTTOM OF FOUNDATIONS.

LOW IMPACT DEVELOPMENT (LID) NOTES:

PRIOR TO BUILDING PERMITS TWO OF THE FOLLOWING LID REQUIREMENTS WILL BE INTEGRATED INTO THE SITE DESIGN:

1) POROUS PAVEMENT
2) DOWNSPOUT ROUTING
3) DISCONNECT IMPERVIOUS AREAS
4) DRY WELLS/INFILTRATION PITS*
5) LANDSCAPING AND LANDSCAPE IRRIGATION
6) GREEN ROOF

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NOTES:

(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4569 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 456.

HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP – ACTON – 1-H1-47
50 YEAR-24 HR ISOHYET – 3.8 IN
SOIL NUMBERS – 103 AND 098
DEBRIS ZONE – DPA-8
BULKING FACTOR – 1.36 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE – 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) – 0.02 FOR UNDEVELOPED,
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR – 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

PROPOSED CONDITION – HYDROLOGY TABLE (Q50)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Total Debris Potential (CY)
				Q50(Clear)	Q50(Burn)	Q50(Bulk)			
1A	12.77	103	13	12.77(1)	12.46(1)	16.85(1)	12.77	16.85	463
2B	3.32	98	8	4.71	4.85	6.64	3.32	6.64	182
3C	13.73	98	12	15.85	16.24	22.09	13.73	22.09	751

NOTE:
(1) PROPOSED Q50 IN TRIBUTARY AREA 1A WILL BE REDUCED BY 0.31 cfs DUE TO MITIGATION OF AQ25. SEE HYDROLOGY MAP H-3 FOR MORE INFORMATION ON MITIGATED Q25.

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY .... RCE NO. .... DATE ....
CHECKED BY .... DATE ....
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

PROPOSED CONDITIONS HYDROLOGY – Q50

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT
RAYMOND DUVERNAY
PROJECT
PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

SHEET TITLE
HYDROLOGY/
DRAINAGE CONCEPT/LID PLAN
PROPOSED CONDITIONS Q50

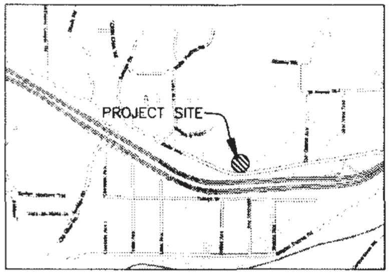
REVISIONS			
NO.	DESCRIPTION	BY	DATE

DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: SW
SCALE: AS SHOWN	DATE: 09/05/12

HYDRO

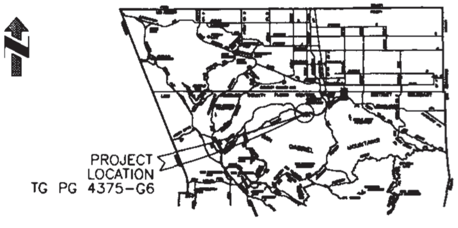
H-2 of 3

JOB NUMBER
0226-07-001



VICINITY MAP

NTS



LOCATION MAP

1" = 1000'

DRAINAGE CONCEPT NOTES:

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LOW IMPACT DEVELOPMENT (LID) NOTES:

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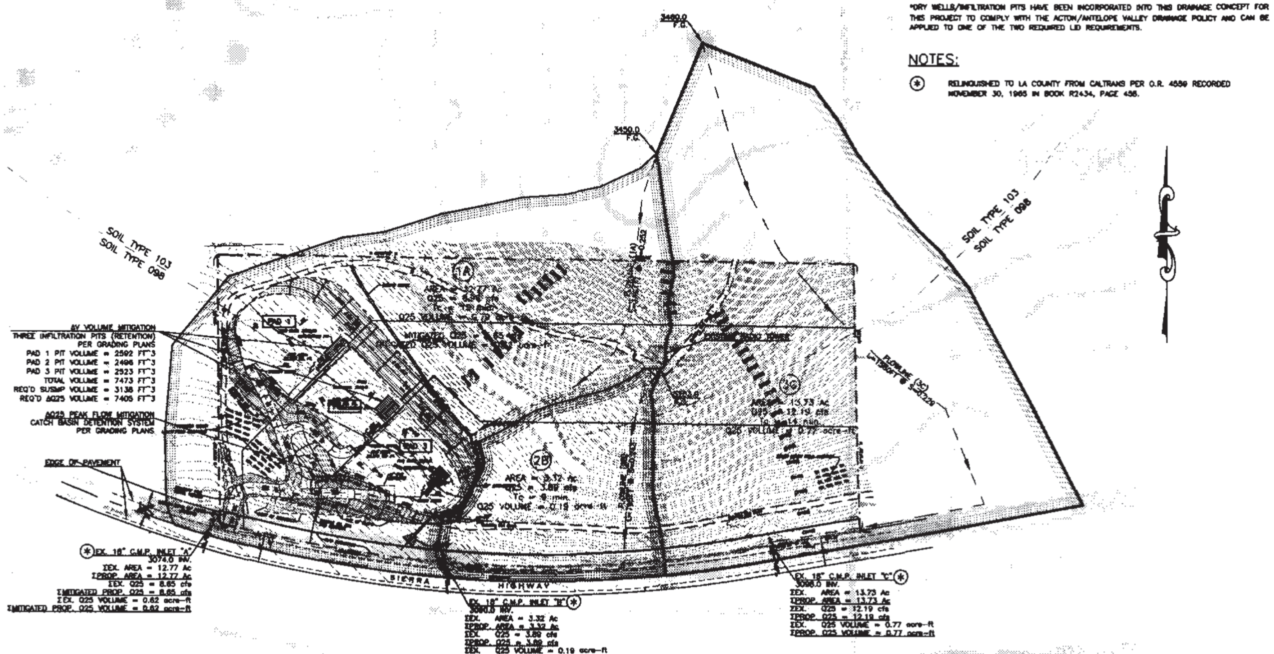
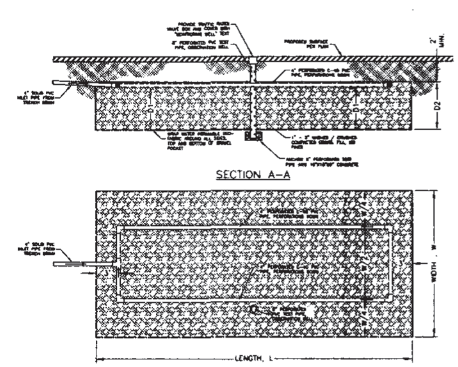
NOTES:

(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4559 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 456.



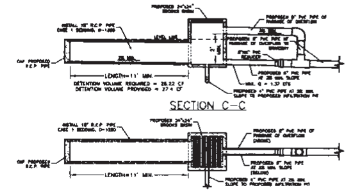


INFILTRATION PIT SIZING

LOCATION	LENGTH, L (FT)	WIDTH, W (FT)	INFILTRATION DEPTH, D1 (FT)	TOTAL PIT DEPTH, D2 (FT)	TOTAL PIT VOLUME, (CU-FT)
PIT PAD 1	48	18	6	6.5	2592
PIT PAD 2	39	32	4	4.5	2496
PIT PAD 3	29	29	6	6.5	2523

DETAIL 1 - INFILTRATION PIT "A"

NTS - FOR REFERENCE ONLY - FINAL DESIGN PER GRADING PLANS



DETAIL 2 - CATCH BASIN DETENTION SYSTEM

NTS - FOR REFERENCE ONLY - FINAL DESIGN PER GRADING PLANS

EXISTING CONDITION - HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	27007
2B	3.32	98	9	3.89	0.19	8278
3C	13.73	98	14	12.19	0.77	33541

PROPOSED CONDITION - HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.96	0.79	34412
2B	3.32	98	9	3.89	0.19	8278
3C	13.73	98	14	12.19	0.77	33541

EXISTING VS. PROPOSED CONDITION (Q25)

Sub-Area	Sub Area (Acres)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	+ 0.31	+ 0.17	+ 7405
2B	3.32	0.00	0.00	0
3C	13.73	0.00	0.00	0

MITIGATED PROPOSED CONDITION - HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	26939
2B	3.32	98	9	3.89	0.19	8278
3C	13.73	98	14	12.19	0.77	33541

EXISTING VS. MITIGATED PROPOSED CONDITION (Q25)

Sub-Area	Sub Area (Acres)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	0.00	0.00	- 68
2B	3.32	0.00	0.00	0
3C	13.73	0.00	0.00	0

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP - ACTON - 1-H1-47
50 YEAR-24 HR ISOHYET - 3.8 IN
SOIL NUMBERS - 103 AND 098
DEBRIS ZONE - DPA-8
BULKING FACTOR - 1.38 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE - 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) - 0.02 FOR UNDEVELOPED.
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR - 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY

APPROVED BY ______ RCE NO ______ DATE ______
CHECKED BY ______ DATE ______
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

PROPOSED CONDITIONS HYDROLOGY - Q25

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT
RAYMOND DUVERNAY

PROJECT
PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

SHEET TITLE
HYDROLOGY/
DRAINAGE CONCEPT/LID PLAN
PROPOSED CONDITIONS Q25

REVISIONS			
NO.	DESCRIPTION	BY	DATE

DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: BW
SCALE: AS SHOWN	DATE: 09/05/12

HYDRO

JOB NUMBER
0226-07-001

SUSMP Requirements

Standard Urban Stormwater Mitigation Plan (SUSMP) Requirements:

For the proposed conditions, the "first flush" runoff from the impervious surfaces must be treated before leaving the site. The pollutants of concern for the driveway include petroleum hydrocarbons (gasoline, oil and grease), trash, and metals. The County of Los Angeles "Volume and Flow Rate Calculations" spreadsheet was used to calculate standard urban stormwater mitigation plan flow rates and volumes.

The following is a summary of the SUSMP calculations for the Volume of Stormwater Runoff to be Mitigated (V_M) and Peak Mitigation Flow Rate (Q_{PM}) (see calculations section):

Sub-Area	Sub-Area (Ac)	Flow-Based Q_{PM} (cfs)	Volume-Based V_M (ft^3)
1A	12.77	0.41	5702
2B	3.32	n/a	n/a
3C	13.73	n/a	n/a

For the SUSMP requirements, only the impervious areas for the developed pads will need to be treated before leaving the site. All of the developed areas are included in the Q50 proposed area 1A.

The proposed SUSMP treatment devices area the same infiltration pits used to provide retention storage for the 25-year ΔV mitigation. We have provided a total infiltration pit volume of 7,611 ft^3, far above the 5,702 ft^3 required for SUSMP volume based treatment.

Drainage will be collected at the driveway entrances of each pad and routed to infiltration pits located on the northeast corner of each of pad. In the case of the trench drains for the upper two pads, drainage will be collected and routed to the infiltration pits until they are full. Once full, the pipes to the infiltration pits will back up until they reach the trench drains, then runoff will bypass the trench drains at the surface and flow down the driveway. In the case of the catch basin/ detention system, drainage will back up to the catch basin and then outlet through either the 6" restricted outflow pipe or the 8" overflow pipe.

LID Requirements

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Low Impact Development (LID) Requirements:

Each of the three proposed properties must include at least two of the following items into the site design:

- Porous pavement
  Install porous pavement that allows rainwater to infiltrate through it. Porous pavement includes, but is not limited to, porous asphalt, porous concrete, ungrouted paving blocks, and gravel. At least 50 percent of the pavement on the lot shall be porous.
- Downspout routing
  Each roof downspout shall be directed to one of the following BMPs. The sum of the capacity of the downspout BMPs shall be at least 200 gallons.
  a. Cistern/rain barrel
     Direct roof downspouts to rain barrels or cisterns. The stored stormwater can then be used for irrigation or other nonpotable uses.
  b. Rain garden/planter box
     Direct roof downspouts to rain gardens or planter boxes that provide retention and treatment of stormwater.
- Disconnect impervious surfaces
  Slope driveways and other impervious surfaces to drain toward pervious surfaces. If possible, runoff should be directed toward vegetated areas or water quality BMPs. Limit the total area not directed toward vegetated areas or water quality BMPs to 10 percent or less of the area of the lot.
- Dry well
  Install a dry well to infiltrate stormwater. The dry well shall be sized to hold at least 200 gallons of stormwater.
- Landscaping and landscape irrigation
  Plant trees near impervious surfaces to intercept rainfall in their leaves. Trees planted adjacent to impervious surfaces can intercept water that otherwise would have become runoff. Two trees shall be planted on each parcel so that they overhang impervious surfaces. Install irrigation systems that minimize water usage and eliminate dry-weather urban runoff.
- Green roof
  Install a green roof to retain and treat stormwater on the rooftop. A green roof shall cover at least 50 percent of the total rooftop area.

Hydrologic Calculations

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Existing Conditions
50-Year Peak Flow

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
EXIST 1A	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
12.77	.02	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1400	0.269

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
12.77	0.02	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1400	0.269

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

[Import "tcdata.xls" File]

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
EXIST 1A	1.45	0.6	0.61

☐ Calculate Runoff Volume

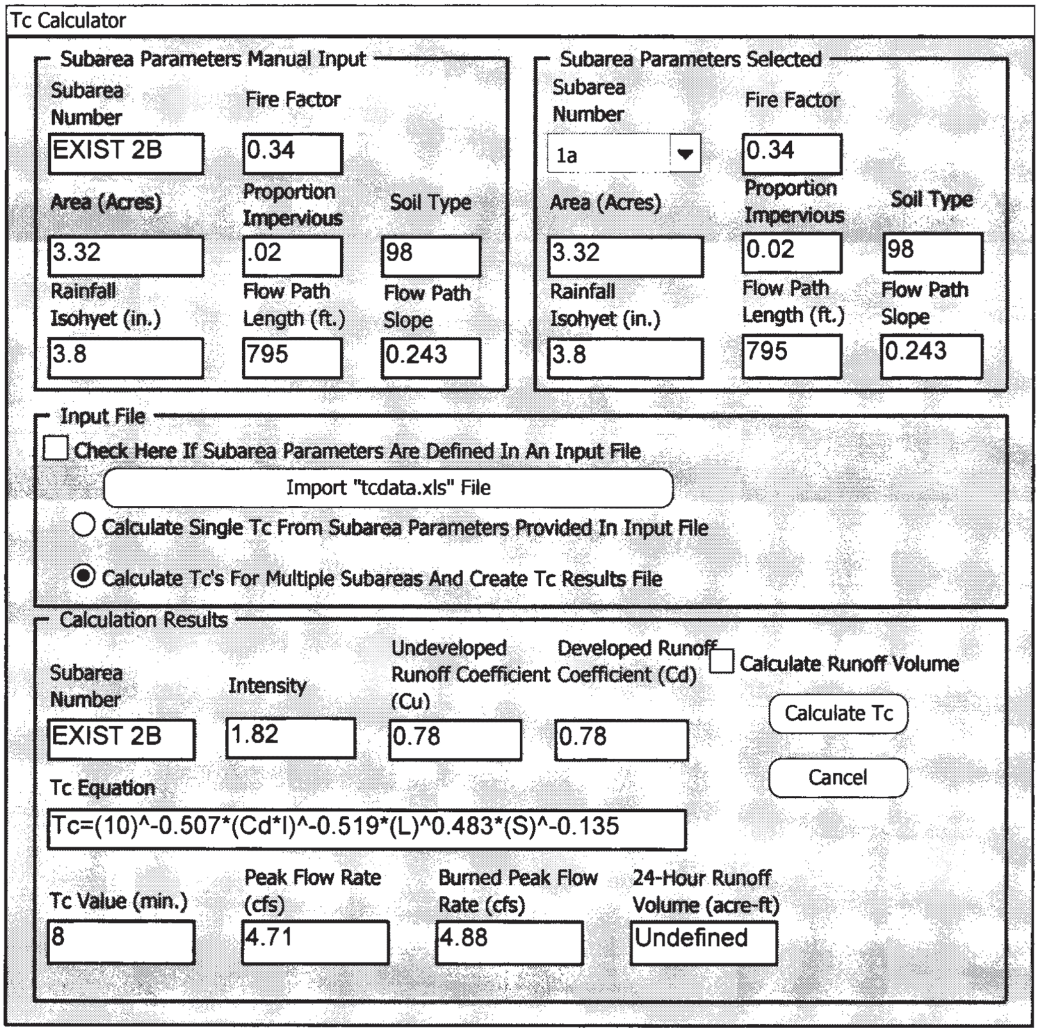
[Calculate Tc]

[Cancel]

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
13	11.3	12.15	Undefined


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
Fire Factor
EXIST 2B
0.34
Area (Acres)
Proportion Impervious
Soil Type
3.32
.02
98
Rainfall Isohyet (in.)
Flow Path Length (ft.)
Flow Path Slope
3.8
795
0.243
Subarea Parameters Selected
Subarea Number
Fire Factor
1a
0.34
Area (Acres)
Proportion Impervious
Soil Type
3.32
0.02
98
Rainfall Isohyet (in.)
Flow Path Length (ft.)
Flow Path Slope
3.8
795
0.243
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
Intensity
Undeveloped Runoff Coefficient (Cu)
Developed Runoff Coefficient (Cd)
Calculate Runoff Volume
EXIST 2B
1.82
0.78
0.78
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
Peak Flow Rate (cfs)
Burned Peak Flow Rate (cfs)
24-Hour Runoff Volume (acre-ft)
8
4.71
4.88
Undefined

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
EXIST 3C	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
13.73	.02	98
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1580	0.229

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
13.73	0.02	98
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1580	0.229

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
EXIST 3C	1.5	0.76	0.76

☐ Calculate Runoff Volume

Calculate Tc

Cancel

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
12	15.65	16.24	Undefined

Existing Conditions
Burn and Bulk Peak Flow and Debris Potential

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Existing - Burned and Bulked Peak Flow Rate Calculations:

$Q_{BB} = BF \times Q_B$

where: Q_{BB} = Burned and Bulked peak runoff rate (cfs)
BF = Bulking Factor (see Appendix P)
Q_B = Burned peak runoff rate (cfs)

Area	A (acres)	Q_D (cfs)	Q_B (cfs)	BF	Q_{BB} (cfs)
EX 1A	12.77	11.30	12.15	1.36	16.52
EX 2B	3.32	4.71	4.88	1.36	6.64
EX 3C	13.73	15.65	16.24	1.36	22.09

Existing - Debris Production Calculations:

$DP = DPR \times A$

where: DP = Debris Production (yd^3)
DRP = Debris Production Rate (yd^3/acre) = 35,000yd^3/mi^2 = 54.7 yd^3/acre per B-2
A = Area (acre)

Area	DPR yd^3/acre	A acre	DP yd^3
EX 1A	54.7	12.77	699
EX 2B	54.7	3.32	182
EX 3C	54.7	13.73	751

Proposed Conditions
50-Year Peak Flow

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Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
PROP 1A	.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
12.77	.084	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1491	.252

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
12.77	0.084	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1491	0.252

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
PROP 1A	1.45	0.6	0.63

☑ Calculate Runoff Volume

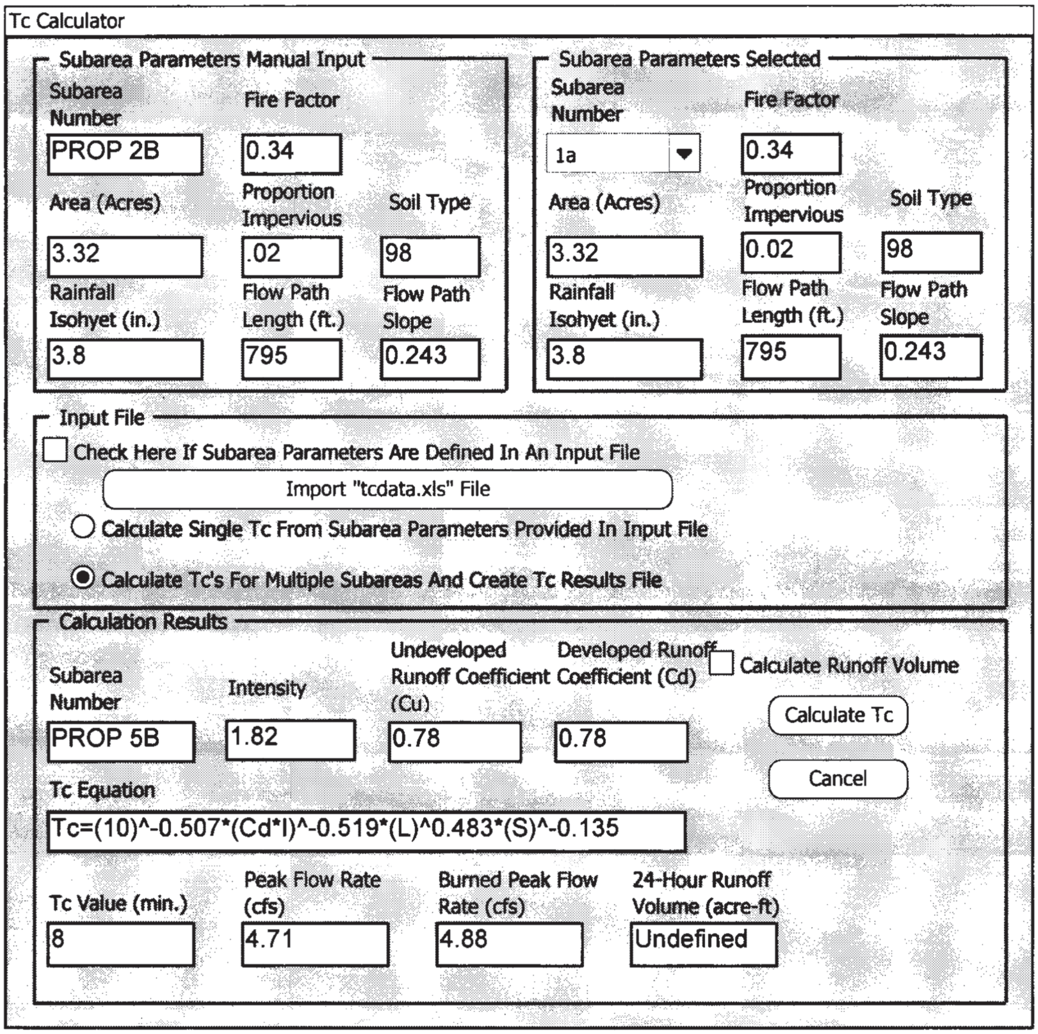
Calculate Tc

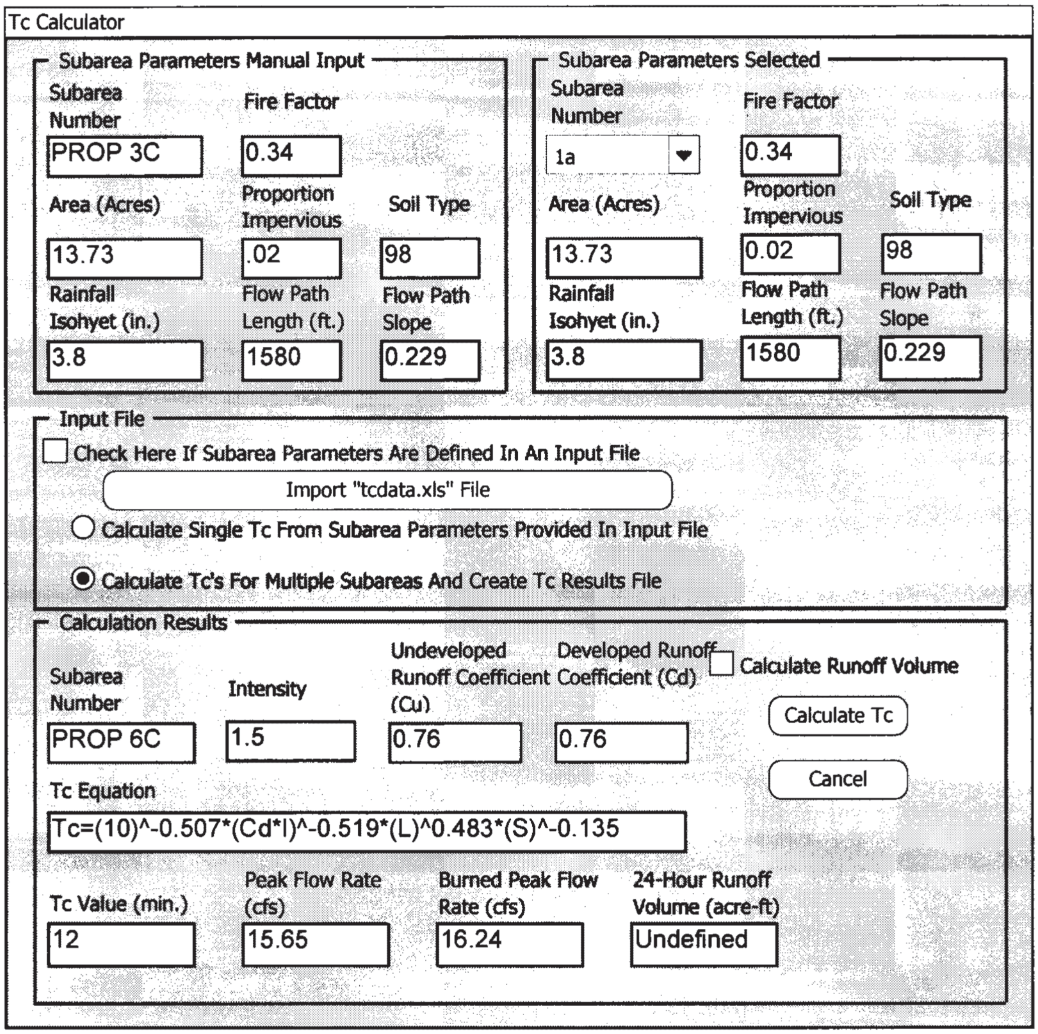
Cancel

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
13	11.67	12.46	0.92


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
PROP 2B
Fire Factor
0.34
Area (Acres)
3.32
Proportion Impervious
.02
Soil Type
98
Rainfall Isohyet (in.)
3.8
Flow Path Length (ft.)
795
Flow Path Slope
0.243
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0.34
Area (Acres)
3.32
Proportion Impervious
0.02
Soil Type
98
Rainfall Isohyet (in.)
3.8
Flow Path Length (ft.)
795
Flow Path Slope
0.243
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
PROP 5B
Intensity
1.82
Undeveloped Runoff Coefficient (Cu)
0.78
Developed Runoff Coefficient (Cd)
0.78
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
8
Peak Flow Rate (cfs)
4.71
Burned Peak Flow Rate (cfs)
4.88
24-Hour Runoff Volume (acre-ft)
Undefined


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
PROP 3C
Fire Factor
0.34
Area (Acres)
13.73
Proportion Impervious
.02
Soil Type
98
Rainfall Isohyet (in.)
3.8
Flow Path Length (ft.)
1580
Flow Path Slope
0.229
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0.34
Area (Acres)
13.73
Proportion Impervious
0.02
Soil Type
98
Rainfall Isohyet (in.)
3.8
Flow Path Length (ft.)
1580
Flow Path Slope
0.229
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
PROP 6C
Intensity
1.5
Undeveloped Runoff Coefficient (Cu)
0.76
Developed Runoff Coefficient (Cd)
0.76
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
12
Peak Flow Rate (cfs)
15.65
Burned Peak Flow Rate (cfs)
16.24
24-Hour Runoff Volume (acre-ft)
Undefined

Proposed Conditions
Burn and Bulk Peak Flow and Debris Potential

Proposed - Burned and Bulked Peak Flow Rate Calculations:

$Q_{BB} = BF \times Q_B$

where: Q_{BB} = Burned and Bulked peak runoff rate (cfs)
BF = Bulking Factor (see Appendix P)
Q_B = Burned peak runoff rate (cfs)

Area	A (acres)	Q_D (cfs)	Q_B (cfs)	BF	Q_{BB} (cfs)
PROP 1A	12.77	11.67	12.46	1.36	16.95
PROP 2B	3.32	4.71	4.88	1.36	6.64
PROP 3C	13.73	15.65	16.24	1.36	22.09

Proposed - Debris Production Calculations:

DP = DPR x A

where: DP = Debris Production (yd^3)
DRP = Debris Production Rate (yd^3/acre) = 35,000yd^3/mi^2 = 54.7 yd^3/acre per B-2
A = Area (acre)

Area	DPR (yd^3/acre)	A (acre)	DP (yd^3)
PROP 1A	54.7	8.47	463
PROP 2B	54.7	3.32	182
PROP 3C	54.7	13.73	751

Existing Conditions
25-Year Peak Flow and 24hr Runoff Volume

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Tc Calculator

Subarea Parameters Manual Input

Subarea Number	EXIST 1A
Fire Factor	0.34
Area (Acres)	12.77
Proportion Impervious	.02
Soil Type	103
Rainfall Isohyet (in.)	3.4
Flow Path Length (ft.)	1400
Flow Path Slope	.269

Subarea Parameters Selected

Subarea Number	1a
Fire Factor	0.34
Area (Acres)	12.77
Proportion Impervious	0.02
Soil Type	103
Rainfall Isohyet (in.)	3.4
Flow Path Length (ft.)	1400
Flow Path Slope	0.269

Input File

- [ ] Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

- ○ Calculate Single Tc From Subarea Parameters Provided In Input File
- ● Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
EXIST 1A	1.21	0.55	0.56

- [x] Calculate Runoff Volume

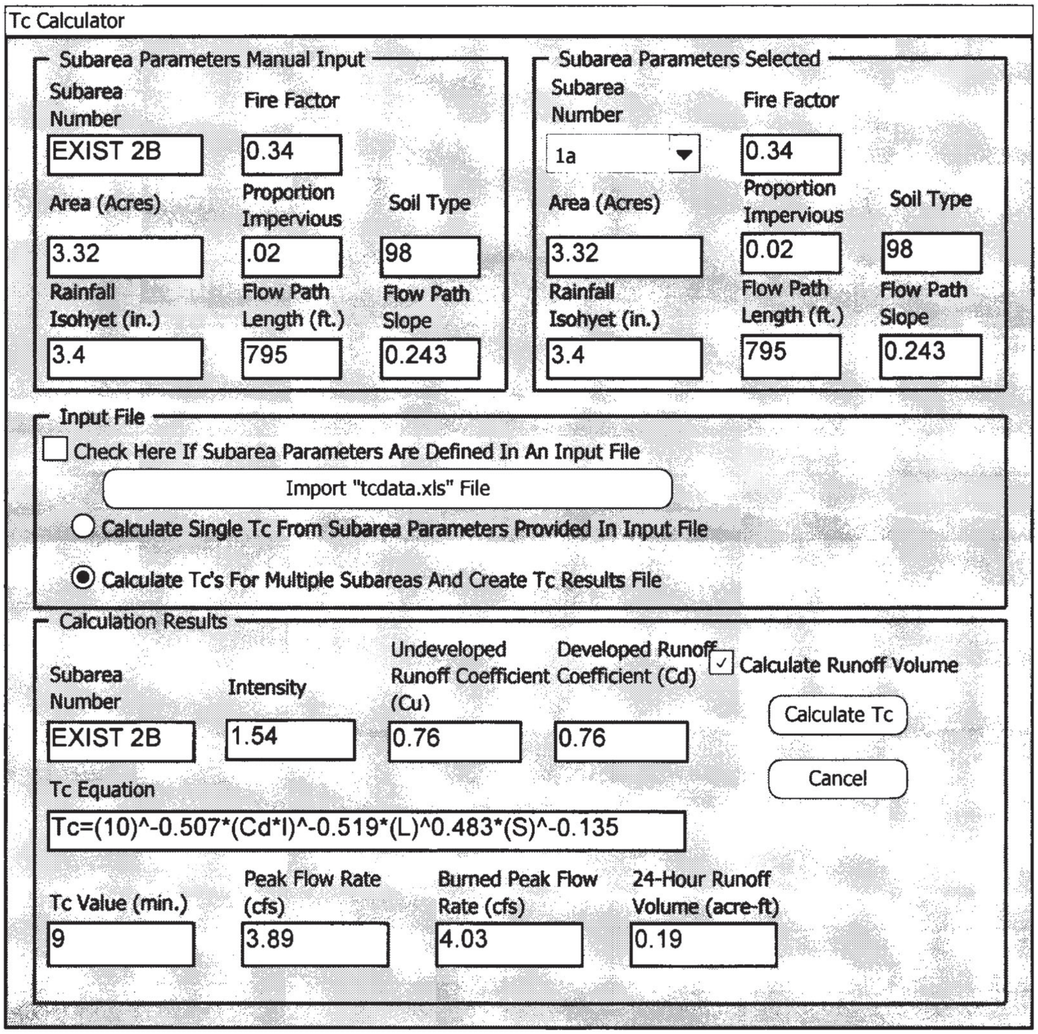
Calculate Tc

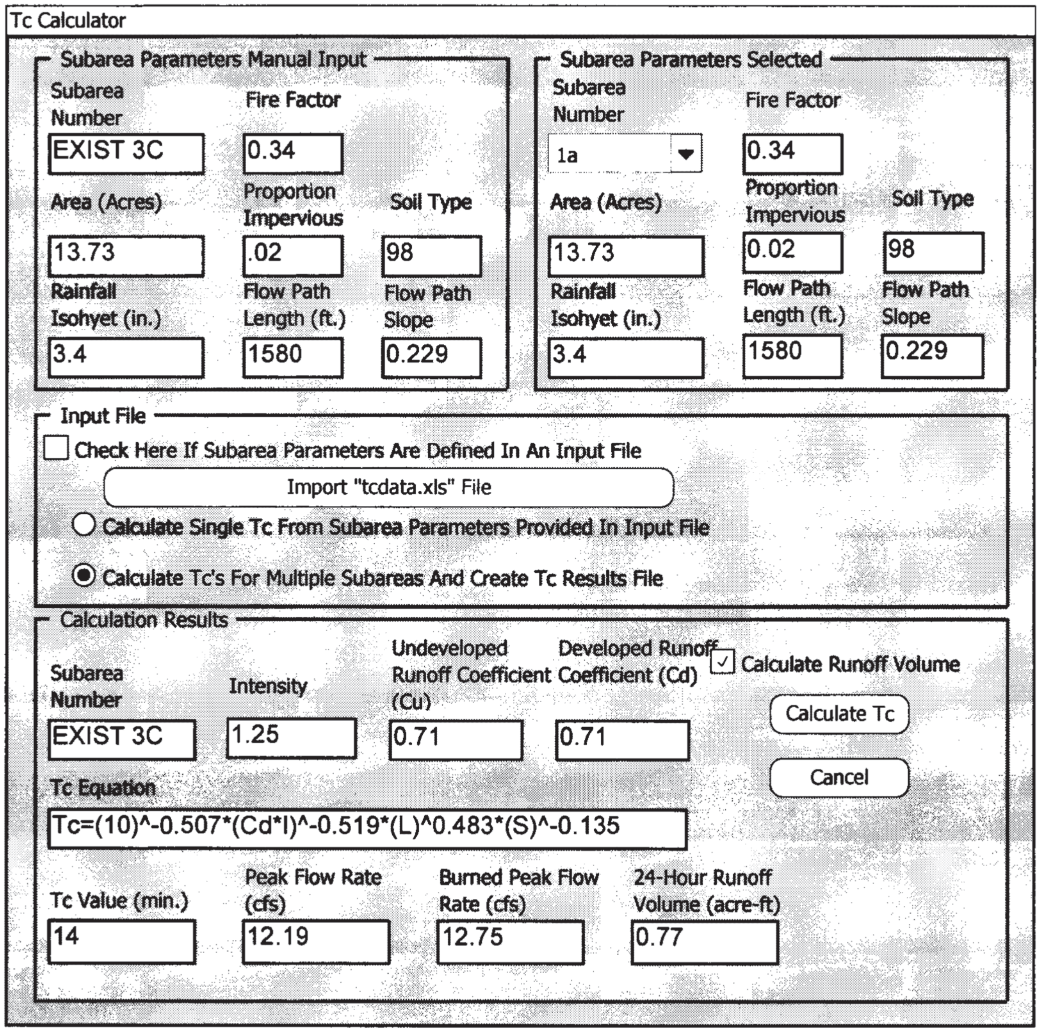
Cancel

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
15	8.65	9.43	0.62


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
EXIST 2B
Fire Factor
0.34
Area (Acres)
3.32
Proportion Impervious
.02
Soil Type
98
Rainfall Isohyet (in.)
3.4
Flow Path Length (ft.)
795
Flow Path Slope
0.243
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0.34
Area (Acres)
3.32
Proportion Impervious
0.02
Soil Type
98
Rainfall Isohyet (in.)
3.4
Flow Path Length (ft.)
795
Flow Path Slope
0.243
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
EXIST 2B
Intensity
1.54
Undeveloped Runoff Coefficient (Cu)
0.76
Developed Runoff Coefficient (Cd)
0.76
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
9
Peak Flow Rate (cfs)
3.89
Burned Peak Flow Rate (cfs)
4.03
24-Hour Runoff Volume (acre-ft)
0.19


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
Fire Factor
EXIST 3C
0.34
Area (Acres)
Proportion Impervious
Soil Type
13.73
.02
98
Rainfall Isohyet (in.)
Flow Path Length (ft.)
Flow Path Slope
3.4
1580
0.229
Subarea Parameters Selected
Subarea Number
Fire Factor
1a
0.34
Area (Acres)
Proportion Impervious
Soil Type
13.73
0.02
98
Rainfall Isohyet (in.)
Flow Path Length (ft.)
Flow Path Slope
3.4
1580
0.229
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
Intensity
Undeveloped Runoff Coefficient (Cu)
Developed Runoff Coefficient (Cd)
Calculate Runoff Volume
Calculate Tc
Cancel
EXIST 3C
1.25
0.71
0.71
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
Peak Flow Rate (cfs)
Burned Peak Flow Rate (cfs)
24-Hour Runoff Volume (acre-ft)
14
12.19
12.75
0.77

Proposed Conditions
25-Year Peak Flow and 24hr Runoff Volume

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Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
PROP 1A	0.34	

Area (Acres)	Proportion Impervious	Soil Type
12.77	.084	103

Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
3.4	1491	.252

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	

Area (Acres)	Proportion Impervious	Soil Type
12.77	0.084	103

Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
3.4	1491	0.252

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

☑ Calculate Runoff Volume

Calculate Tc

Cancel

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
PROP 1A	1.21	0.55	0.58

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
15	8.96	9.69	0.79

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
PROP 2B	0.34	
Area (Acres)	Proportion Impervious	Soil Type
3.32	.02	98
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
3.4	795	0.243

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	Proportion Impervious	Soil Type
3.32	0.02	98
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
3.4	795	0.243

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

☑ Calculate Runoff Volume

Calculate Tc

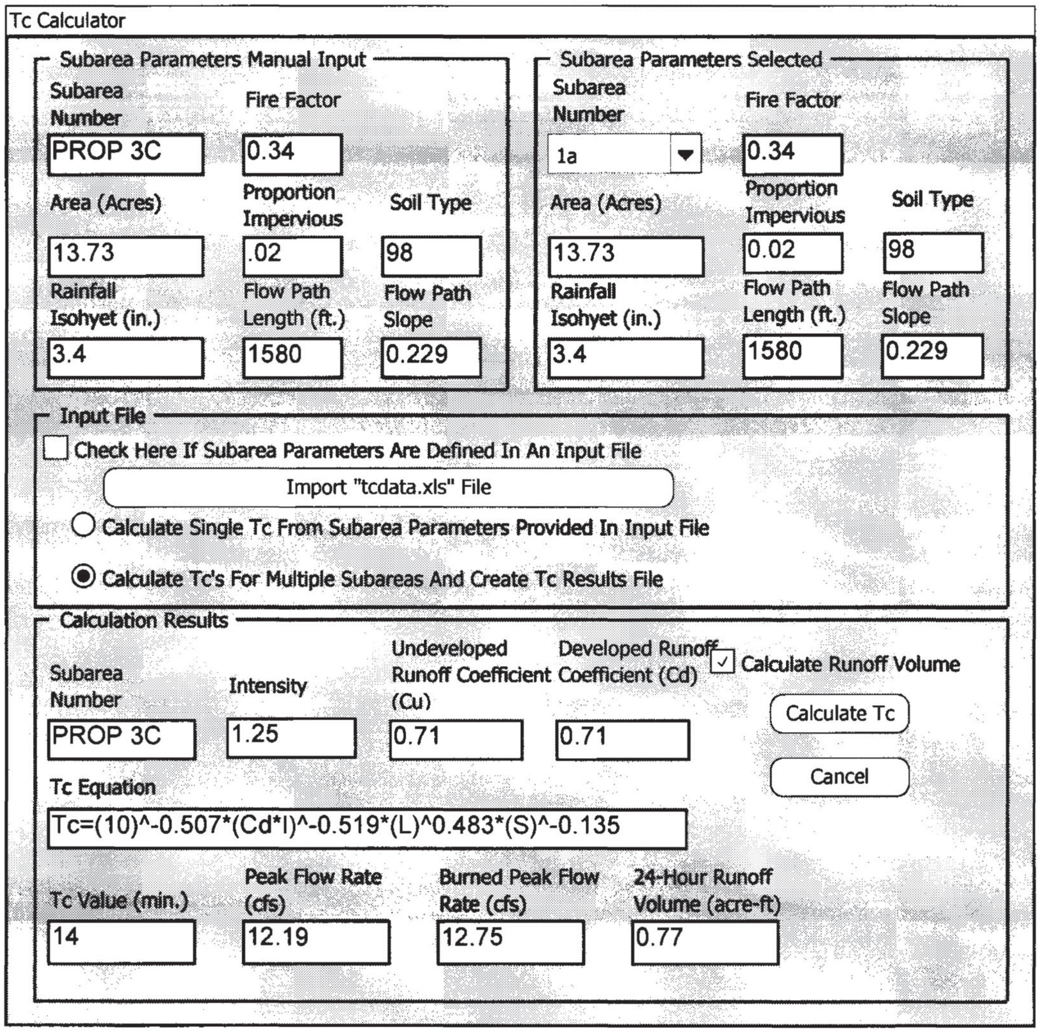
Cancel

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
PROP 2B	1.54	0.76	0.76

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
9	3.89	4.03	0.19


Tc Calculator
Subarea Parameters Manual Input
Subarea Number
PROP 3C
Fire Factor
0.34
Area (Acres)
13.73
Proportion Impervious
.02
Soil Type
98
Rainfall Isohyet (in.)
3.4
Flow Path Length (ft.)
1580
Flow Path Slope
0.229
Subarea Parameters Selected
Subarea Number
1a
Fire Factor
0.34
Area (Acres)
13.73
Proportion Impervious
0.02
Soil Type
98
Rainfall Isohyet (in.)
3.4
Flow Path Length (ft.)
1580
Flow Path Slope
0.229
Input File
Check Here If Subarea Parameters Are Defined In An Input File
Import "tcdata.xls" File
Calculate Single Tc From Subarea Parameters Provided In Input File
Calculate Tc's For Multiple Subareas And Create Tc Results File
Calculation Results
Subarea Number
PROP 3C
Intensity
1.25
Undeveloped Runoff Coefficient (Cu)
0.71
Developed Runoff Coefficient (Cd)
0.71
Calculate Runoff Volume
Calculate Tc
Cancel
Tc Equation
Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135
Tc Value (min.)
14
Peak Flow Rate (cfs)
12.19
Burned Peak Flow Rate (cfs)
12.75
24-Hour Runoff Volume (acre-ft)
0.77

Δ Volume Mitigation
Infiltration Pit Sizing Calculations

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

Delta Volume - Infiltration Volume Calculations

Infiltration Pit - PAD 1

Required Volume

Req'd ΔQ25 Volume	2469.0	FT^3
Total =	2469.0	FT^3

Basin Volume

Length (L)	48	FT
Width (W)	18	
Depth (D) =	6	FT
Void Ratio (e) =	0.5	

Volume = e[(L)x(W)x(D)] = 2592.0 FT^3

Infiltration Pit Volume	>	Required Volume
2592.0 FT^3	>	2469.0 FT^3

The infiltration trench must infiltrate total volume of runoff into the soil within 72 hours

Time for Infiltration (hr) = Infitration Rate (in/hr) / Trench Depth (in)

where: Trench Depth = 6 ft = 72 in
Infiltration Rate = 34.41 gallons/sf/day = 2.30 in/hr *

Time for Infiltration (hr) = (72 in) / (2.30 in/hr)

Time for Infiltration (hr) =	31.3 hr

* Infiltration Rate per soils report prepared by Southwest Geotechnical, Inc. on March 28, 2012.

Infiltration Pit - PAD 2

Required Volume

Req'd ΔQ25 Volume	2469.0	FT^3
Total =	2469.0	FT^3

Basin Volume

Length (L)	39	FT
Width (W)	32	
Depth (D) =	4	FT
Void Ratio (e) =	0.5	

Volume = e[(L)x(W)x(D)] = 2496.0 FT^3

Infiltration Pit Volume	>	Required Volume
2496.0 FT^3	>	2469.0 FT^3

The infiltration trench must infiltrate total volume of runoff into the soil within 72 hours

Time for Infiltration (hr) = Infitration Rate (in/hr) / Trench Depth (in)

where: Trench Depth = 4 ft = 48 in
Infiltration Rate = 10.47 gallons/sf/day = 0.70 in/hr *

Time for Infiltration (hr) = (48 in) / (0.70 in/hr)

Time for Infiltration (hr) =	68.6 hr

* Infiltration Rate per soils report prepared by Southwest Geotechnical, Inc. on March 28, 2012.

Infiltration Pit - PAD 3

Required Volume

Req'd ΔQ25 Volume	2469.0	FT^3
Total =	2469.0	FT^3

Basin Volume

Length (L)	29	FT
Width (W)	29	
Depth (D) =	6	FT
Void Ratio (e) =	0.5	

Volume = e[(L)x(W)x(D)] = 2523.0 FT^3

Infiltration Pit Volume	>	Required Volume
2523.0 FT^3	>	2469.0 FT^3

The infiltration trench must infiltrate total volume of runoff into the soil within 72 hours

Time for Infiltration (hr) = Infitration Rate (in/hr) / Trench Depth (in)

where: Trench Depth = 6 ft = 72 in
Infiltration Rate = 35.16 gallons/sf/day = 2.35 in/hr *

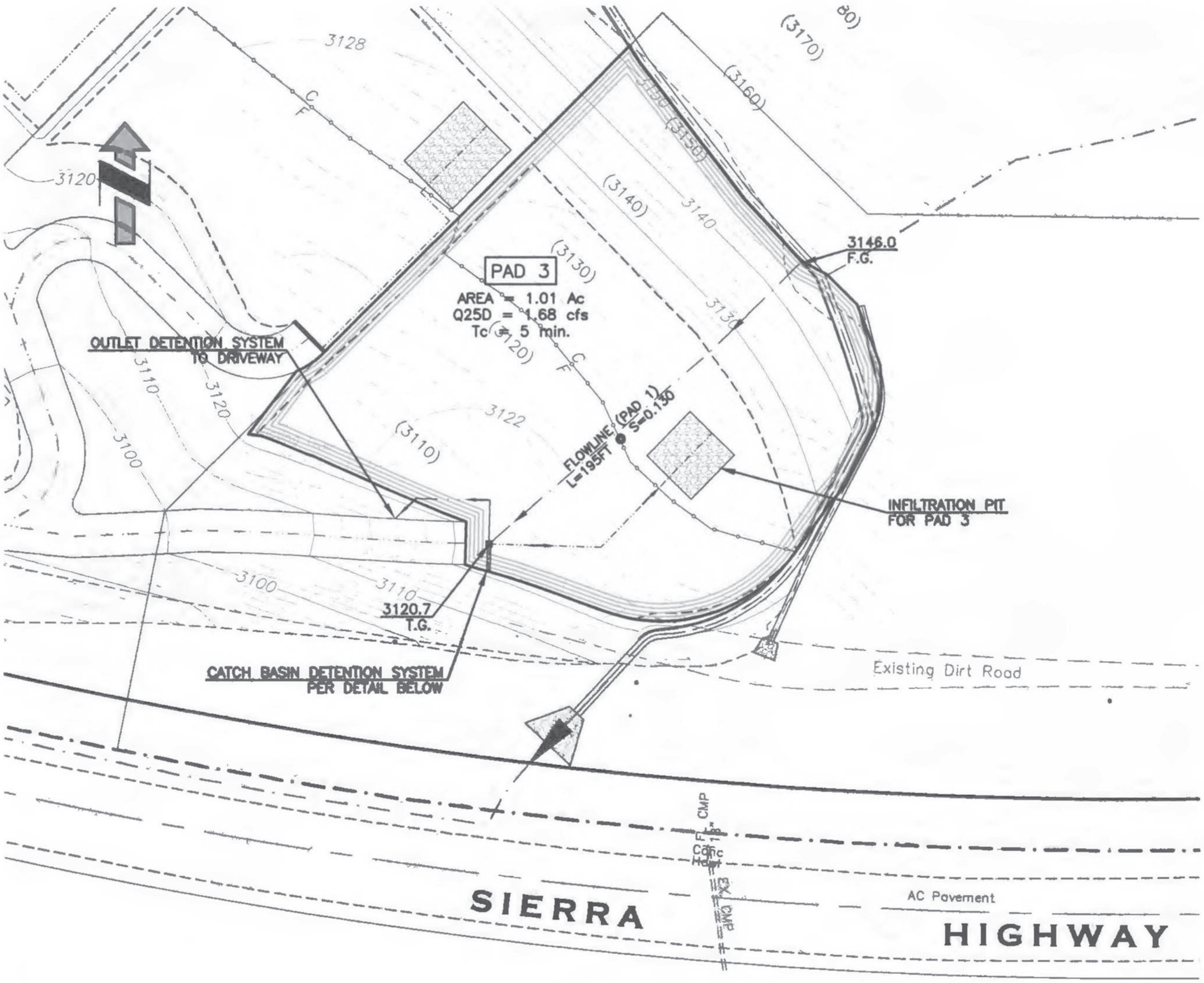
Time for Infiltration (hr) = (72 in) / (2.35 in/hr)

Time for Infiltration (hr) = 30.6 hr

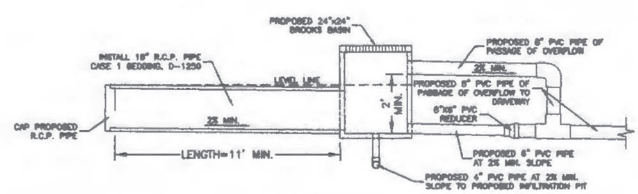
* Infiltration Rate per soils report prepared by Southwest Geotechnical, Inc. on March 28, 2012.

Δ Q25 Mitigation
Detention System Calculations

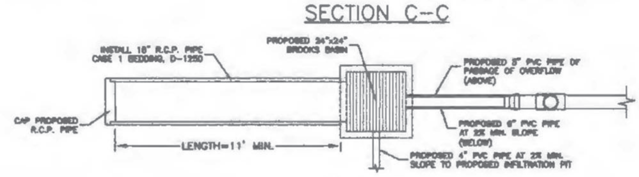
205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax



SCALE 1" = 40'



SECTION C--C



PLAN VIEW

PEAK FLOW DETENTION - CATCH BASIN DETENTION SYSTEM

NTS - FOR REFERENCE ONLY - FINAL DESIGN PER GRADING PLANS

ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA 90012
(213) 621-3155 FAX (213) 621-3105

PROPOSED PAD 3 FLOW REDUCTION
TRIBUTARY AREA CALCULATION
FOR Q25 FLOWS FROM PAD 3
TO REDUCE FLOWS BY 0.31 cfs

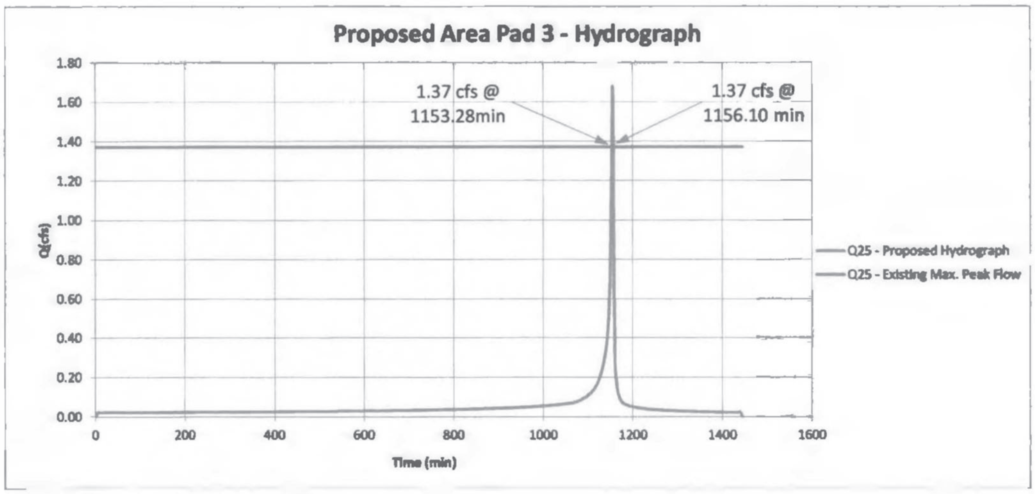
07/31/12

PAD 3 - Determination of On-Site Storage

Proposed Q25 = 1.68 cfs

Reduced Q25 = 1.37 cfs

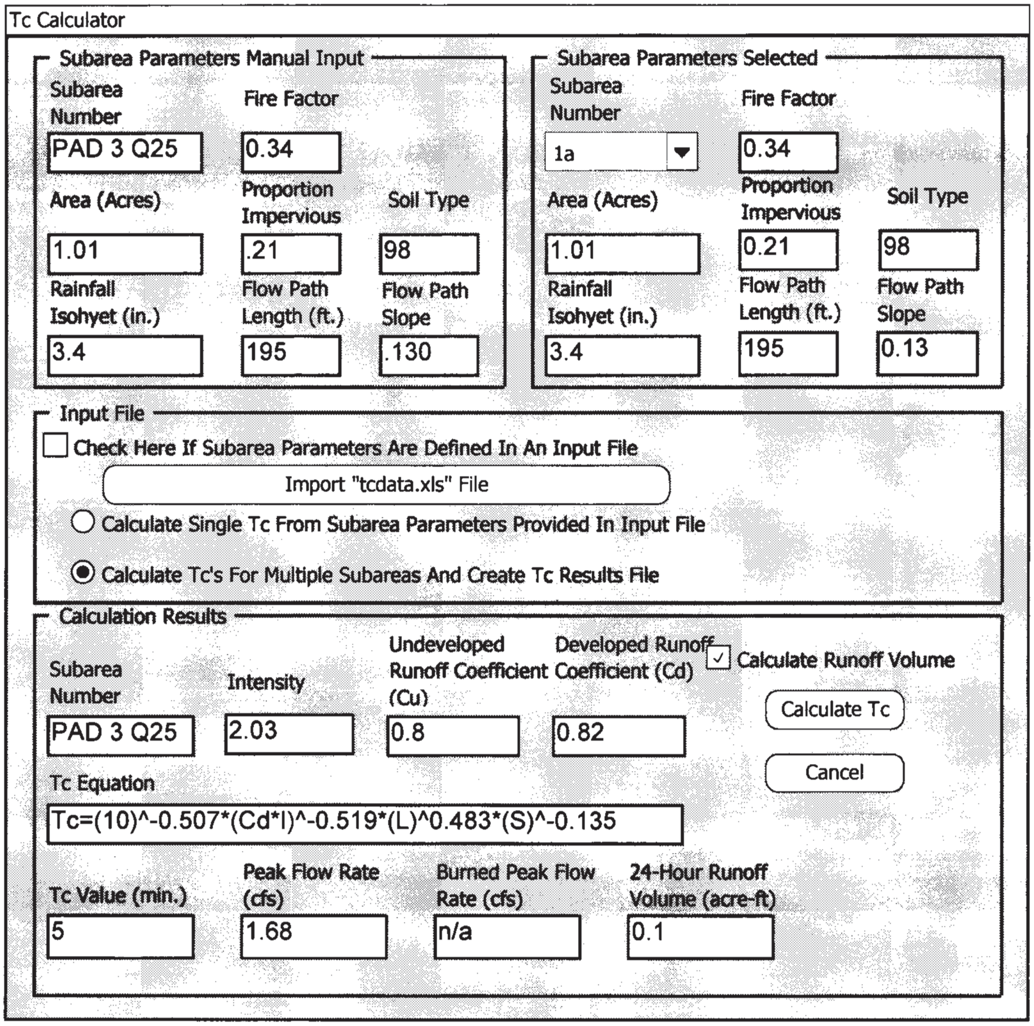
Runoff in excess of the existing Q25 flow rate must be temporarily detained on-site. Below is the hydrograph for the proposed area 1A in blue and the maximum Q25 from the existing area 1A in red.
Runoff in excess of the existing Q25 must be temporarily stored on-site.



Storage Volume = Area under hydrograph curve bounded by allowable Q25 from the existing condition.

Time (min)	Proposed Q25 (cfs)	Reduced Q25 (cfs)	Prop Q25 - Reduced (cfs)	Volume (cfs*min)	Volume (ft^3)	Total Storage (ft^3)
1153.28	1.37	1.37	0.00			
				0.27	16.03	16.03
1155.00	1.68	1.37	0.31			
				0.17	10.19	26.22
1156.10	1.37	1.37	0.00			

Total Required On-Site Storage = 26.22 ft^3



Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
PAD 3 Q25	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.01	.21	98
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.4	195	.130

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
1.01	0.21	98
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.4	195	0.13

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

● Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
PAD 3 Q25	2.03	0.8	0.82

☑ Calculate Runoff Volume

Calculate Tc

Cancel

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
5	1.68	n/a	0.1

Summary

Pad 3 - Restricted Outflow by 0.31 cfs

Proposed Pad 3 - Q25 = 1.68 cfs

Reduced Pad 3 - Q25 = 1.37 cfs

6" PVC Pipe with 2ft of head restricts outflow to 1.37cfs

Orifice Calculator

```
Given Input Data:
     Solving for .....................  Area or Diameter
     Flowrate ........................  1.3700 cfs
     Coefficient .....................  0.6100
     Headwater .......................  2.0000 ft
     Tailwater .......................  0.0000 ft

Computed Results:
     Diameter ........................  0.5021 ft
     Velocity ........................  6.9201 fps
```

Tc Calculator

Subarea Parameters Manual Input

Subarea Number: PAD 3 Q50

Fire Factor: 0.34

Area (Acres): 1.01

Proportion Impervious: .21

Soil Type: 98

Rainfall Isohyet (in.): 3.8

Flow Path Length (ft.): 195

Flow Path Slope: .130

Subarea Parameters Selected

Subarea Number: 1a

Fire Factor: 0.34

Area (Acres): 1.01

Proportion Impervious: 0.21

Soil Type: 98

Rainfall Isohyet (in.): 3.8

Flow Path Length (ft.): 195

Flow Path Slope: 0.13

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number: PAD 3 q50

Intensity: 2.27

Undeveloped Runoff Coefficient (Cu): 0.81

Developed Runoff Coefficient (Cd): 0.83

☐ Calculate Runoff Volume

Calculate Tc

Cancel

Tc Equation: Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.): 5

Peak Flow Rate (cfs): 1.9

Burned Peak Flow Rate (cfs): n/a

24-Hour Runoff Volume (acre-ft): Undefined

Area PAD 3 - Q50 Overflow Pipe Sizing

8" PVC Pipe at S=2.0%

Manning Pipe Calculator

```
Given Input Data:
     Shape ..........................  Circular
     Solving for ....................  Depth of Flow
     Diameter .......................  0.6700 ft
     Flowrate .......................  1.9000 cfs
     Slope ..........................  0.0200 ft/ft
     Manning's n ....................  0.0090

Computed Results:
     Depth ..........................  0.4368 ft
     Area ...........................  0.3526 ft2
     Wetted Area ....................  0.2434 ft2
     Wetted Perimeter ...............  1.2592 ft
     Perimeter ......................  2.1049 ft
     Velocity .......................  7.8061 fps
     Hydraulic Radius ...............  0.1933 ft
     Percent Full ...................  65.1882 %
     Full flow Flowrate .............  2.5015 cfs
     Full flow velocity .............  7.0953 fps
```

Street Flow Calculation at Driveway Entrance
Determination of Flow Depth and Velocity

205 S. Broadway, Suite 206, Los Angeles, California 90012
(213) 621-3155 Office - (213) 621-3105 Fax

HYDRAULIC ANALYSIS OF PROPOSED CONDITION DRIVEWAY ENTRANCE ON SIERRA HIGHWAY

Rothman Engineering

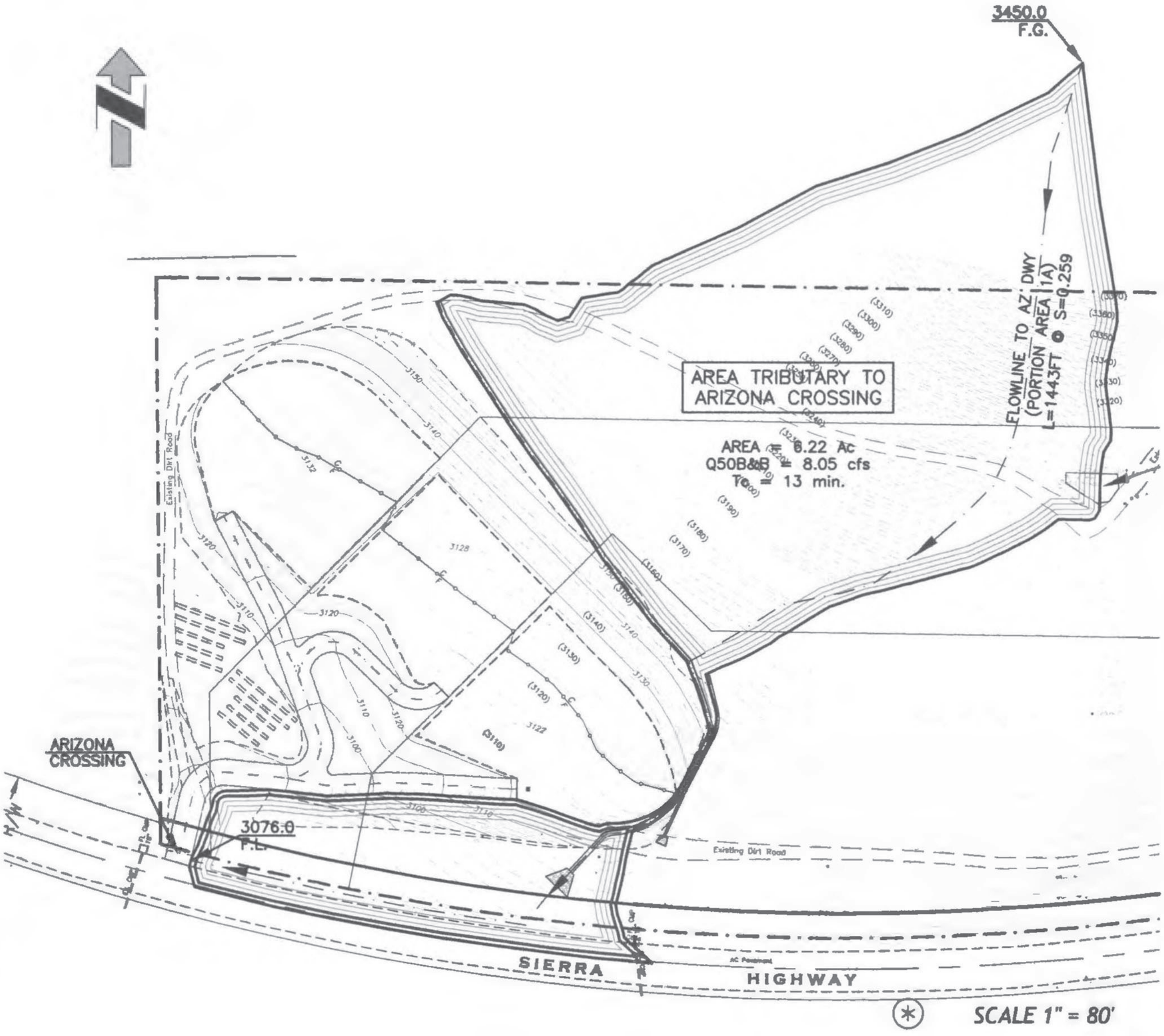
Civil Engineering / Civil Engineering Consulting

Developed	10/13/98			
W.O. No.	1086 004	Beginning Elevation:	3076	ft.
Updated:	08/06/12	Ending Elevation:	3074	ft.
By:	R.P.R.	Length of Run:	77.47	ft.
		Mannings "n":	0.016	<---Asphalt

Formula used to calculate flow = Mannings equation;

Q = (1.49/n) * ((Area/wetted perimeter)^.667) * (Slope^0.5) * Area

Depth of Flow (in)	Depth of Flow (ft)	Area (ft^2)	Wetted Perimeter (ft)	Slope (ft/ft)	n	Q1 (cfs)	Velocity (ft/s)	
0.0								Flowline elevation at 3074' at proposed driveway entrance centerline
0.5	0.042	0.05	2.45	0.026	0.016	0.06	1.1	
1.0	0.083	0.20	4.91	0.026	0.016	0.35	1.8	
1.5	0.125	0.46	7.36	0.026	0.016	1.08	2.4	
2.0	0.167	0.82	9.81	0.026	0.016	2.35	2.9	
2.5	0.208	1.28	12.27	0.026	0.016	4.24	3.3	
3.0	0.250	1.84	14.72	0.026	0.016	6.88	3.7	
								<---Water surface between 3.0-3.5" for Q50 B&B of 8.05 cfs (Portion of 1A)
3.5	0.292	2.50	17.17	0.026	0.016	10.35	4.1	Velocity between 3.7-4.1 ft/s
4.0	0.333	3.27	19.63	0.026	0.016	14.81	4.5	
4.5	0.375	4.14	22.08	0.026	0.016	20.29	4.9	
5.0	0.417	5.11	24.53	0.026	0.016	26.87	5.3	
5.5	0.458	6.18	26.99	0.026	0.016	34.61	5.6	
6.0	0.500	7.35	29.44	0.026	0.016	43.60	5.9	



ROTHMAN ENGINEERING, INC.
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LOS ANGELES, CALIFORNIA 90012
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PROPOSED ARIZONA CROSSING
TRIBUTARY AREA CALCULATION
FOR Q50 BURN & BULK FLOWS
(PORTION OF AREA 1A)

07/30/12

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
AZ DWY Q50	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
6.22	.02	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1443	.259

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	0.34	
Area (Acres)	**Proportion Impervious**	**Soil Type**
6.22	0.02	103
Rainfall Isohyet (in.)	**Flow Path Length (ft.)**	**Flow Path Slope**
3.8	1443	0.259

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input File

Import "tcdata.xls" File

○ Calculate Single Tc From Subarea Parameters Provided In Input File

◉ Calculate Tc's For Multiple Subareas And Create Tc Results File

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)
AZ DWY Q5	1.45	0.6	0.61

☐ Calculate Runoff Volume

Calculate Tc

Cancel

Tc Equation

Tc=(10)^-0.507*(Cd*I)^-0.519*(L)^0.483*(S)^-0.135

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume (acre-ft)
13	5.5	5.92	Undefined

Proposed Conditions
SUSMP Calculations – Area 1A

205 S. Broadway, Suite 206, Los Angeles, California 90012
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APPENDIX A VOLUME & FLOW RATE CALCULATIONS

A.1 METHOD FOR CALCULATING STANDARD URBAN STORMWATER MITIGATION PLAN FLOW RATES AND VOLUMES BASED ON 0.75-INCHES OF RAINFALL: WORKSHEET

PROJECT NAME

APN # 3057-014-012

Examination of Onsite Qpm for Area 1A

PROVIDE PROPOSED PROJECT CHARACTERISTICS

Atotal	12.77	Acres
Type of Development	Single-Family	
Predominate Soil Type #	103	
% of Project Impervious	8.0%	
% of Project Pervious	25.7%	
% of Project Contributing Undeveloped Area	66.3%	
Ai	1.02	Acres
Ap	3.28	Acres
Au	8.47	Acres
L =	1491	feet
S =	25.2%	

DETERMINING THE PEAK MITIGATED FLOW RATE (Qpm):

In order to determine the peak mitigated flow rate (Qpm) from the new development, use the Los Angeles County Department of Public Works Hydrology Manual. Use the Modified Rational Method for calculating the peak mitigation Qpm for compliance with the Standard Urban Stormwater Mitigation Plan (SUSMP). Use attached Table 1 for all maximum intensity (Ix) values used.

By trial and error, determine the time of concentration (Tc), as shown below:

CALCULATION STEPS:

1. Assume an initial Tc value between 5 and 30 minutes.

Tc $\boxed{5}$ minutes

2. Using Table 1, look up the assumed Tc value and select the corresponding Ix intensity in inches/hour.

Ix $\boxed{0.447}$ inches/hour

3. Determine the value for the Undeveloped Runoff Coefficient, Cu, using the runoff coefficient curve corresponding to the predominant soil type.

Cu $\boxed{0.10}$

4. Calculate the Developed Runoff Coefficient, Cd = (0.9*Imp.)+[(1.0 - Imp.)*Cu]

Cd $\boxed{0.16}$

5. Calculate the value for Cd * Ix

Cd * Ix $\boxed{0.073}$

6. Calculate the time of Concentration, $Tc = 10^{(-0.507)} * (Cd * Ix)^{(-0.519)} * Length^{(0.483)} * Slope^{(-0.135)}$

Calculated Tc $\boxed{49.6}$ minutes

7. Calculate the difference between the initially assumed Tc and the calculated Tc, if the difference is greater than 0.5 minutes. Use the calculated Tc as the assumed initial Tc in the second iteration. If the Tc value is within 0.5 minutes, round the acceptable Tc value to the nearest minute.

Area 1A

TABLE FOR ITERATIONS:

Iteration No.	Initial Tc (min)	Ix (in/hr)	Cu	Cd	Cd * Ix (in/hr)	Calculated Tc (min)	Difference (min)	
1	5	0.447	0.10	0.16	0.073	49.6	44.6	Unacceptable
2	50	0.193	0.10	0.16	0.032	76.7	26.7	Unacceptable
3	77	0.193	0.10	0.16	0.032	76.7	-0.3	Acceptable
4								
5								
6								
7								
8								
9								
10								

Acceptable Tc value 77 minutes

8. Calculated the Peak Mitigation Flow Rate,

Qpm = Cd * Ix * Atotal * (1.008333 ft^3-hour / acre-inches-seconds)

Qpm = 0.41 cfs

Area 1A

APPENDIX A VOLUME & FLOW RATE CALCULATIONS

In oder to determine the volume (Vm) of stormwater runoff to be mitigated from the new development, use the following equation:

$Vm = (2{,}722.5\ ft^3 / acre) * [(Ai)(0.9) + (Ap + Au)(Cu)]$

$Vm = \boxed{5701.7}\ ft^3$

Area 1A

APPENDIX A **VOLUME & FLOW RATE CALCULATIONS**

TABLE 1

INTENSITY - DURATION DATA FOR 0.75-INCHES OF RAINFALL
FOR ALL RAINFALL ZONES

Duration, Tc (min)	Rainfall Intensity, Ix (in/hr)
5	0.447
6	0.411
7	0.382
8	0.359
9	0.339
10	0.323
11	0.309
12	0.297
13	0.286
14	0.276
15	0.267
16	0.259
17	0.252
18	0.245
19	0.239
20	0.233
21	0.228
22	0.223
23	0.218
24	0.214
25	0.210
26	0.206
27	0.203
28	0.199
29	0.196
30	0.193

DETERMINING THE VOLUME (Vm)

Area 1A

APPENDIX A VOLUME & FLOW RATE CALCULATIONS

NOMENCLATURE

Ai = Impervious Area (acres)

Ap	=	Pervious Area (acres)
Au	=	Contributing Undeveloped Upstream Area (acres)
Atotal	=	Total Area of Development and Contributing Undeveloped Upstream Area (acres)
Cd	=	Developed Runoff Coefficient
Cu	=	Undeveloped Runoff Coefficient
Ix	=	Rainfall Intensity (inches/hour)
Qpm	=	Peak Mitigation Flow Rate (cfs)
Tc	=	Time of Concentration (minutes, must be between 5-30 min.)
Vm	=	Mitigation Volume (ft^3)

EQUATIONS

Atotal	=	Ai + Ap + Au
Ai	=	(Atotal * % of Development which is Impervious)
Ap	=	(Atotal * % of Development which is Pervious)
Au	=	(Atotal * % of Contributing Undeveloped Upstream Area***)
Cd	=	(0.9 * Imp.) + [(1.0 - Imp.) * Cu] If Cd < Cu, use Cd = Cu
Qpm	=	Cd * Ix * Atotal * (1 hour / 3,600 seconds) * (1 ft / 12 inches) * (43,560 ft^2 / 1 acre)
Tc	=	$10^{(-0.507)} * (Cd * Ix)^{(-0.519)} * Length^{(0.483)} * Slope^{(-0.135)}$
Vm	=	(0.75 inches) * [(Ai)(0.9) + (Ap + Au)(Cu)] * (1ft / 12 inches) * (43,560 ft^2 / 1 acre)
	=	(2,722.5 ft^3 / acre) * [(Ai)(0.9) + (Ap + Au)(Cu)]

***** Contributing Undeveloped Upstream Area is an area where stormwater runoff from an undeveloped upstream area will flow directly or indirectly to the Post-Construction Best Management Practices (BMPs) proposed for the development. This additional flow must be included in the flow rate and volume calculations to appropriately size the BMPs.**

Reference

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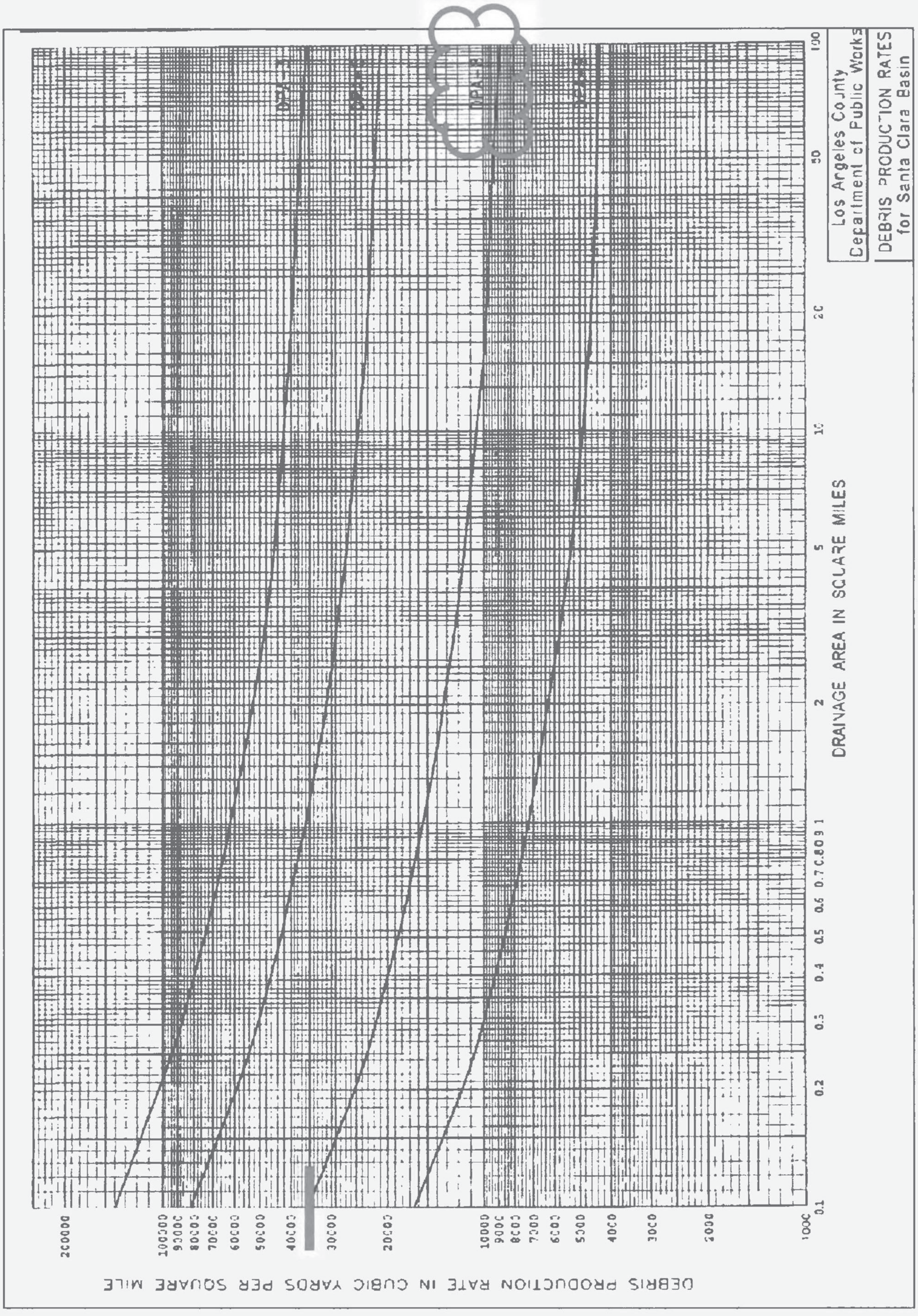
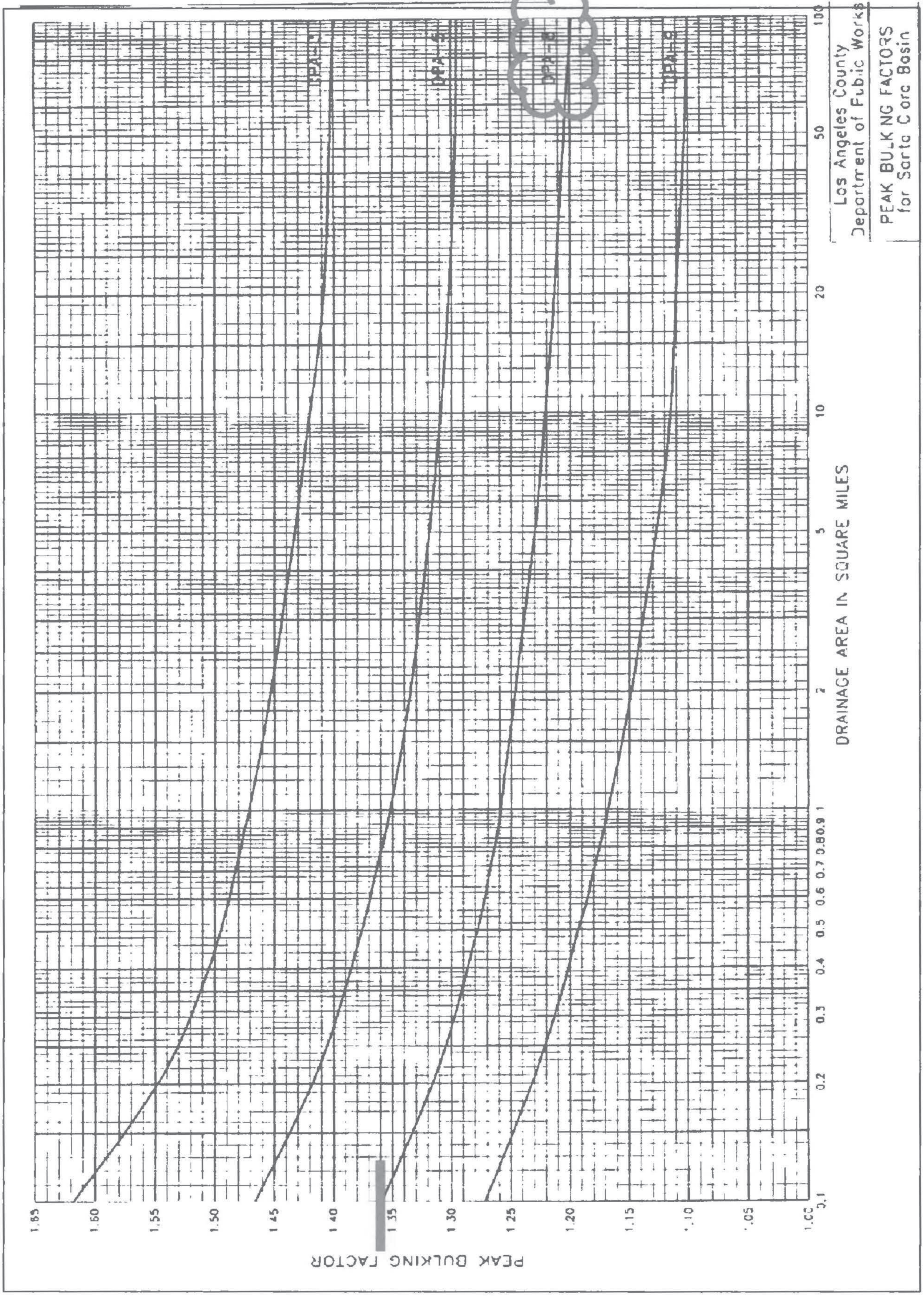
(213) 621-3155 Office - (213) 621-3105 Fax



Los Angeles County
Department of Public Works
DEBRIS PRODUCTION RATES
for Santa Clara Basin
DRAINAGE AREA IN SQUARE MILES
DEBRIS PRODUCTION RATE IN CUBIC YARDS PER SQUARE MILE

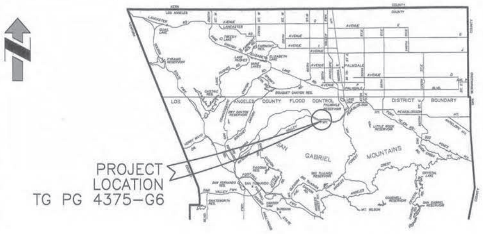

Los Angeles County
Department of Public Works
PEAK BULKING FACTORS
for Santa Clara Basin
DRAINAGE AREA IN SQUARE MILES
PEAK BULKING FACTOR
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
5
10
20
50
100
1.00
1.05
1.10
1.15
1.20
1.25
1.30
1.35
1.40
1.45
1.50
1.55
1.60
1.65

Proportion Impervious Data

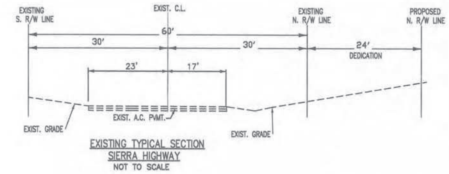
Code	Land Use Description	% Impervious
1111	High-Density Single Family Residential	42
1112	Low-Density Single Family Residential	21
1121	Mixed Multi-Family Residential	74
1122	Duplexes, Triplexes and 2-or 3-Unit Condominiums and Townhouses	55
1123	Low-Rise Apartments, Condominiums, and Townhouses	86
1124	Medium-Rise Apartments and Condominiums	86
1125	High-Rise Apartments and Condominiums	90
1131	Trailer Parks and Mobile Home Courts, High-Density	91
1132	Mobile Home Courts and Subdivisions, Low-Density	42
1140	Mixed Residential	59
1151	Rural Residential, High-Density	15
1152	Rural Residential, Low-Density	10
1211	Low- and Medium-Rise Major Office Use	91
1212	High-Rise Major Office Use	91
1213	Skyscrapers	91
1221	Regional Shopping Center	95
1222	Retail Centers (Non-Strip With Contiguous Interconnected Off-Street	96
1223	Modern Strip Development	96
1224	Older Strip Development	97
1231	Commercial Storage	90
1232	Commercial Recreation	90
1233	Hotels and Motels	96
1234	Attended Pay Public Parking Facilities	91
1241	Government Offices	91
1242	Police and Sheriff Stations	91
1243	Fire Stations	91
1244	Major Medical Health Care Facilities	74
1245	Religious Facilities	82
1246	Other Public Facilities	91
1247	Non-Attended Public Parking Facilities	91
1251	Correctional Facilities	91
1252	Special Care Facilities	74
1253	Other Special Use Facilities	86
1261	Pre-Schools/Day Care Centers	68
1262	Elementary Schools	82
1263	Junior or Intermediate High Schools	82
1264	Senior High Schools	82
1265	Colleges and Universities	47
1266	Trade Schools and Professional Training Facilities	91
1271	Base (Built-up Area)	65
1271.01	Base High-Density Single Family Residential	42
1271.02	Base Duplexes, Triplexes and 2-or 3-Unit Condominiums and T	55

Code	Land Use Description	% Impervious
1271.03	Base Government Offices	91
1271.04	Base Fire Stations	91
1271.05	Base Non-Attended Public Parking Facilities	91
1271.06	Base Air Field	45
1271.07	Base Petroleum Refining and Processing	91
1271.08	Base Mineral Extraction - Oil and Gas	10
1271.09	Base Harbor Facilities	91
1271.10	Base Navigation Aids	47
1271.11	Base Developed Local Parks and Recreation	10
1271.12	Base Vacant Undifferentiated	1
1272	Vacant Area	2
1273	Air Field	45
1274	Former Base (Built-up Area)	65
1275	Former Base Vacant Area	2
1276	Former Base Air Field	91
1311	Manufacturing, Assembly, and Industrial Services	91
1312	Motion Picture and Television Studio Lots	82
1313	Packing Houses and Grain Elevators	96
1314	Research and Development	91
1321	Manufacturing	91
1322	Petroleum Refining and Processing	91
1323	Open Storage	66
1324	Major Metal Processing	91
1325	Chemical Processing	91
1331	Mineral Extraction - Other Than Oil and Gas	10
1332	Mineral Extraction - Oil and Gas	10
1340	Wholesaling and Warehousing	91
1411	Airports	91
1411.01	Airstrip	10
1412	Railroads	15
1412.01	Railroads-Attended Pay Public Parking Facilities	91
1412.02	Railroads-Non-Attended Public Parking Facilities	91
1412.03	Railroads-Manufacturing, Assembly, and Industrial Services	91
1412.04	Railroads-Petroleum Refining and Processing	91
1412.05	Railroads-Open Storage	66
1412.06	Railroads-Truck Terminals	91
1413	Freeways and Major Roads	91
1414	Park-and-Ride Lots	91
1415	Bus Terminals and Yards	91
1416	Truck Terminals	91
1417	Harbor Facilities	91
1418	Navigation Aids	47
1420	Communication Facilities	82
1420.01	Communication Facilities-Antenna	2

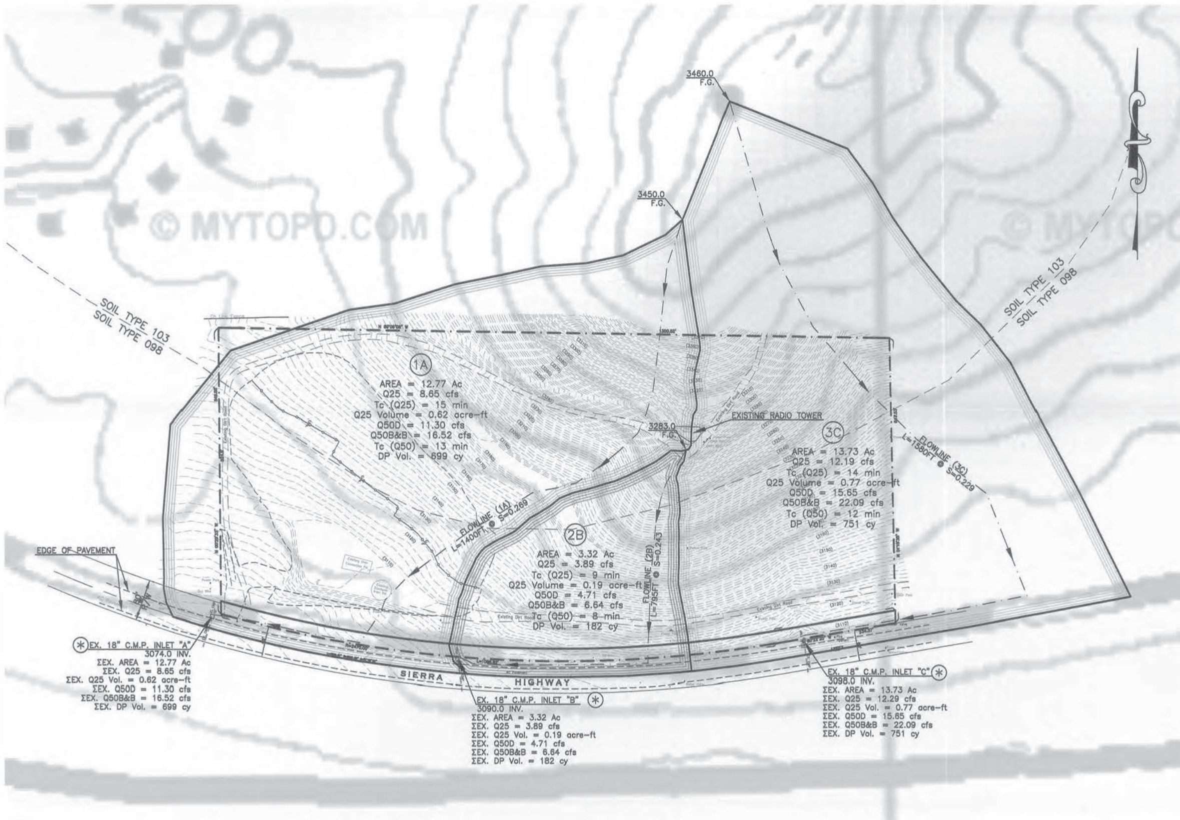
VICINITY MAP
NTS



LOCATION MAP
1" = 1000'



EXISTING TYPICAL SECTION
SIERRA HIGHWAY
NOT TO SCALE



GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

DRAINAGE CONCEPT NOTES:

1) DRAINAGE DEVICES AND THEIR LOCATIONS ARE NOT NECESSARILY APPROVED.
2) COMPLIANCE OF ALL STREET DRAINAGE REQUIREMENTS WILL BE MET TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
3) DEED RESTRICTIONS MUST BE DEDICATED FOR CROSS LOT DRAINAGE TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
4) VEHICULAR ACCESS WILL BE PROVIDED TO ALL INLETS AND OUTLETS TO THE SATISFACTION OF THE DEPARTMENT OF PUBLIC WORKS.
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6) INFILTRATION PITS PERCOLATION RATES PER SOILS REPORT PREPARED BY SOUTHWEST GEOTECHNICAL, INC. ON MARCH 28, 2012.
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8) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM PROPOSED SLOPE(S) A DISTANCE OF H/2, MINIMUM OF 5 FEET, WHERE H IS THE HEIGHT OF THE SLOPE.
9) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM FOUNDATIONS A MINIMUM OF 15 FEET AND A 1:1 GRADIENT FROM THE BOTTOM OF FOUNDATIONS.

LOW IMPACT DEVELOPMENT (LID) NOTES:

PRIOR TO BUILDING PERMITS TWO OF THE FOLLOWING LID REQUIREMENTS WILL BE INTEGRATED INTO THE SITE DESIGN:

1) POROUS PAVEMENT
2) DOWNSPOUT ROUTING
3) DISCONNECT IMPERVIOUS AREAS
4) DRY WELLS/INFILTRATION PITS*
5) LANDSCAPING AND LANDSCAPE IRRIGATION
6) GREEN ROOF

*DRY WELLS/INFILTRATION PITS HAVE BEEN INCORPORATED INTO THIS DRAINAGE CONCEPT FOR THIS PROJECT TO COMPLY WITH THE ACTON/ANTELOPE VALLEY DRAINAGE POLICY AND CAN BE APPLIED TO ONE OF THE TWO REQUIRED LID REQUIREMENTS.

NOTES:

(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4559 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 458.

EXISTING CONDITION – HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	27007
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

EXISTING CONDITION – HYDROLOGY TABLE (Q50)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Total Debris Potential CY)
				Qd(Clear)	QB(Burn)	QBB(Bulk)			
1A	12.77	103	13	11.30	12.15	16.52	12.77	16.52	699
2B	3.32	98	8	4.71	4.88	6.64	3.32	6.64	182
3C	13.73	98	12	15.65	16.24	22.09	13.73	22.09	751

HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP – ACTON – 1-H1-47
25 YEAR-24 HR ISOHYET – 3.4 IN
50 YEAR-24 HR ISOHYET – 3.8 IN
SOIL NUMBERS – 103 AND 098
DEBRIS ZONE – DPA-8
BULKING FACTOR – 1.36 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE – 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) – 0.02 FOR UNDEVELOPED.
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR – 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

EXISTING CONDITIONS HYDROLOGY – Q25 & Q50

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY: ______ RCE NO. ______ DATE ______
CHECKED BY: ______ DATE ______
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

NO. C47790
EXP. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT
RAYMOND DUVERNAY

PROJECT
PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

SHEET TITLE
HYDROLOGY/
DRAINAGE CONCEPT/LID PLAN
EXISTING CONDITIONS

REVISIONS			
No.	DESCRIPTION	BY	DATE

DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: BW
SCALE: AS SHOWN	DATE: 09/05/12

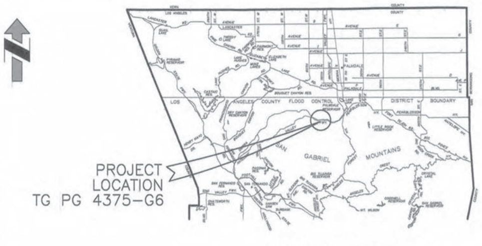
HYDRO

H-1 of 3

JOB NUMBER
0226-07-001

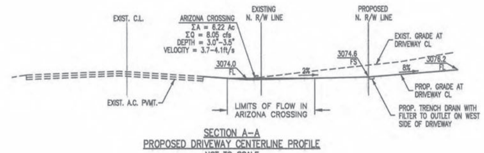
VICINITY MAP

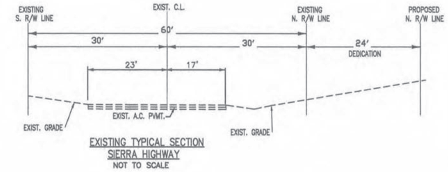
NTS

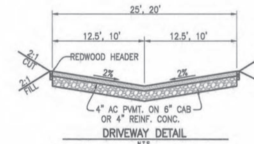


LOCATION MAP

1" = 1000'







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8) ALL PROPOSED INFILTRATION BASINS MUST BE SETBACK FROM PROPOSED SLOPE(S) A DISTANCE OF H/2, MINIMUM OF 5 FEET, WHERE H IS THE HEIGHT OF THE SLOPE.
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LOW IMPACT DEVELOPMENT (LID) NOTES:

PRIOR TO BUILDING PERMITS TWO OF THE FOLLOWING LID REQUIREMENTS WILL BE INTEGRATED INTO THE SITE DESIGN:

1) POROUS PAVEMENT
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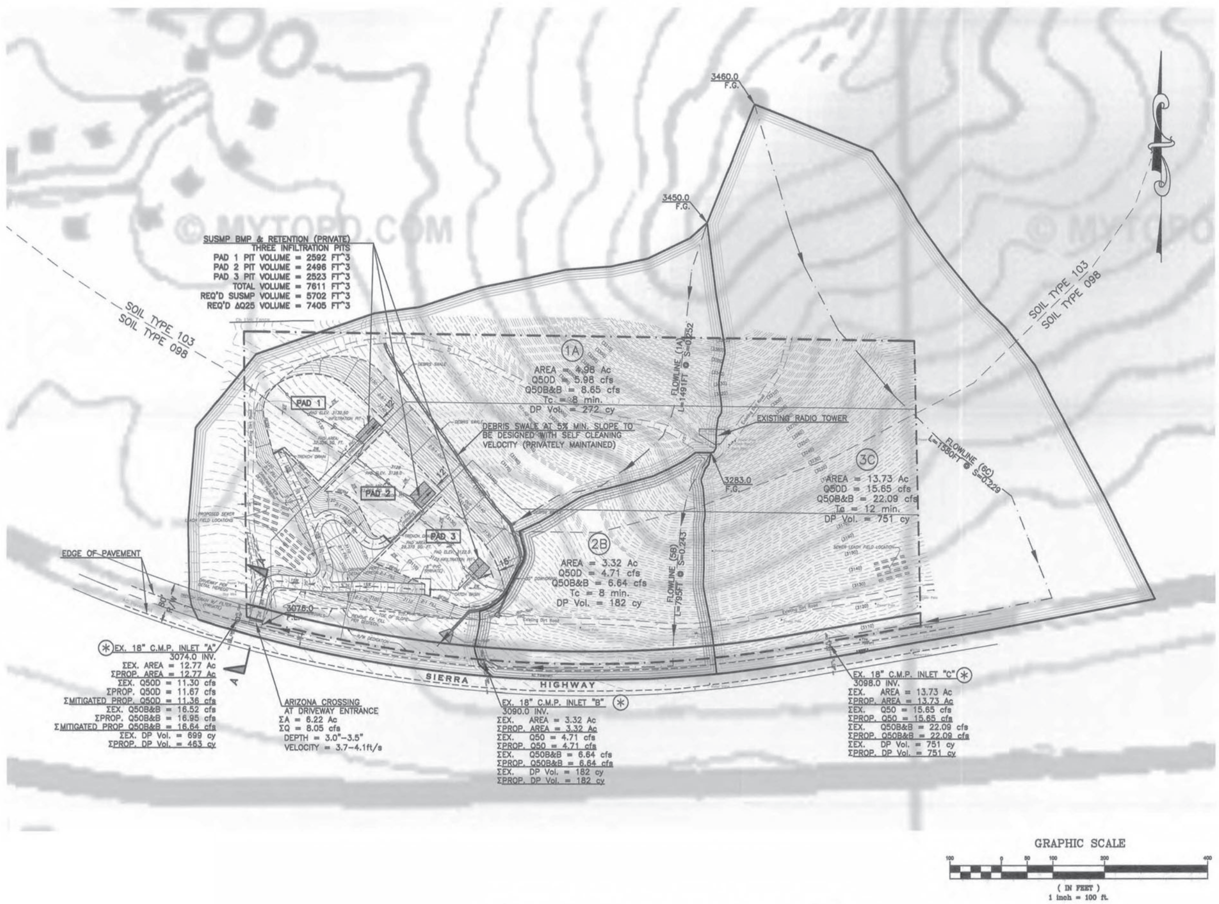
NOTES:

(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4559 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 458.



HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP – ACTON – 1-H1-47
50 YEAR-24 HR ISOHYET – 3.8 IN
SOIL NUMBERS – 103 AND 098
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BULKING FACTOR – 1.36 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE – 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) – 0.02 FOR UNDEVELOPED.
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR – 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

PROPOSED CONDITION – HYDROLOGY TABLE (Q50)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q50 (cfs)			Total Area (Acres)	Total Q50 (cfs)	Total Debris Potential (CY)
				Qd(Clear)	QB(Burn)	QBB(Bulk)			
1A	12.77	103	13	12.77 (1)	12.46 (1)	16.95 (1)	12.77	16.95	463
2B	3.32	98	8	4.71	4.88	6.64	3.32	6.64	182
3C	13.73	98	12	15.65	16.24	22.09	13.73	22.09	751

NOTE:
(1) PROPOSED Q50 IN TRIBUTARY AREA 1A WILL BE REDUCED BY 0.31 cfs DUE TO MITIGATION OF ΔQ25. SEE HYDROLOGY MAP H-3 FOR MORE INFORMATION ON MITIGATED Q25.

PROPOSED CONDITIONS HYDROLOGY – Q50

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY: RCE NO. DATE 10/9/12
CHECKED BY: DATE 12/21/12
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

NO. C47790
EXP. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT
RAYMOND DUVERNAY

PROJECT
PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

SHEET TITLE
HYDROLOGY/
DRAINAGE CONCEPT/LID PLAN
PROPOSED CONDITIONS Q50

REVISIONS			
No.	DESCRIPTION	BY	DATE

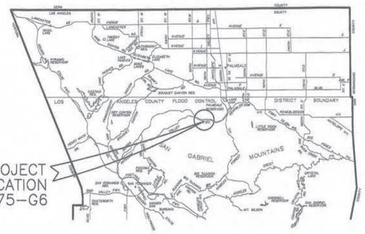
DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: BW
SCALE: AS SHOWN	DATE: 09/05/12

HYDRO

H-2 of 3

JOB NUMBER
0226-07-001

VICINITY MAP
NTS



LOCATION MAP
1" = 1000'

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2) DOWNSPOUT ROUTING
3) DISCONNECT IMPERVIOUS AREAS
4) DRY WELLS/INFILTRATION PITS*
5) LANDSCAPING AND LANDSCAPE IRRIGATION
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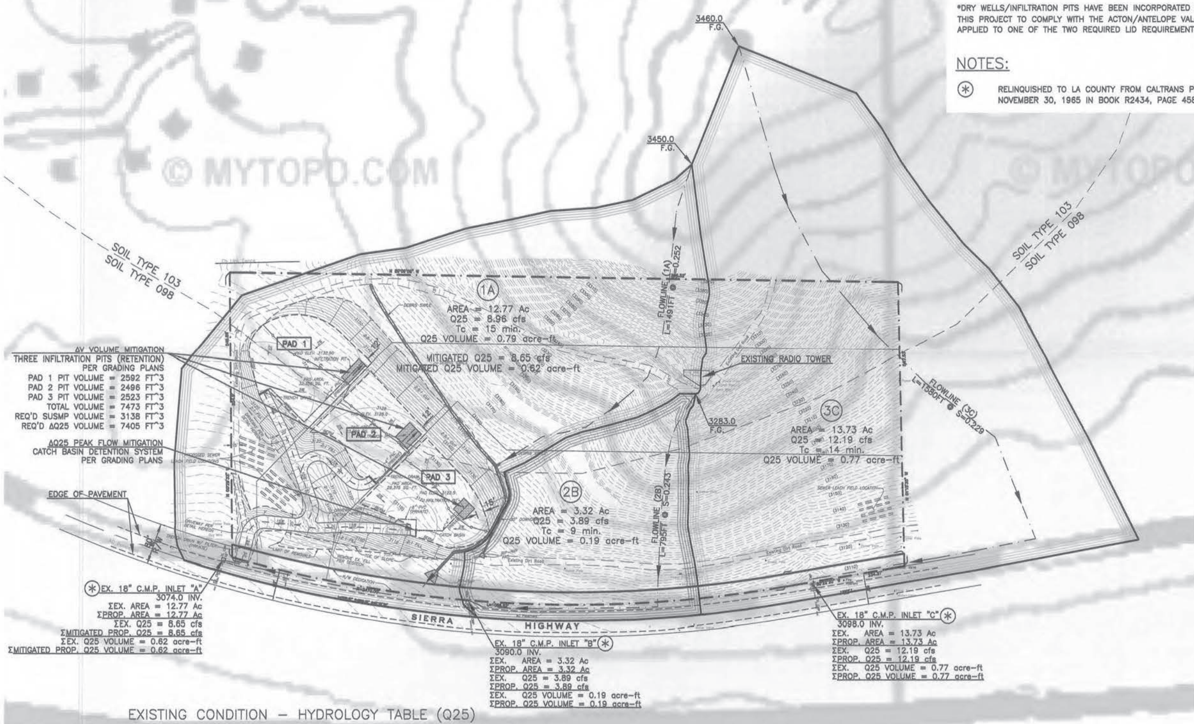
(*) RELINQUISHED TO LA COUNTY FROM CALTRANS PER O.R. 4559 RECORDED NOVEMBER 30, 1965 IN BOOK R2434, PAGE 458.



EXISTING CONDITION – HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	27007
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

PROPOSED CONDITION – HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.96	0.79	34412
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

EXISTING VS. PROPOSED CONDITION (Q25)

Sub-Area	Sub Area (Acres)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	+ 0.31	+ 0.17	+ 7405
2B	3.32	0.00	0.00	0
3C	13.73	0.00	0.00	0

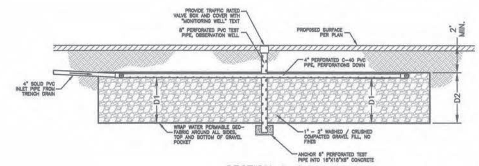
MITIGATED PROPOSED CONDITION – HYDROLOGY TABLE (Q25)

Sub-Area	Sub Area (Acres)	Soil Type	Tc (min)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	103	15	8.65	0.62	26939
2B	3.32	98	9	3.89	0.19	8276
3C	13.73	98	14	12.19	0.77	33541

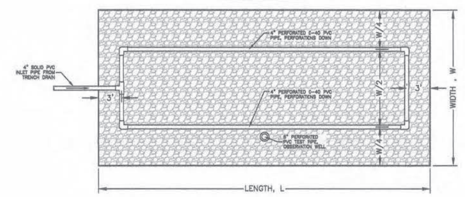
EXISTING VS. MITIGATED PROPOSED CONDITION (Q25)

Sub-Area	Sub Area (Acres)	Sub-Area Q25 (cfs)	24hr Runoff Volume (acre-ft)	24hr Runoff Volume (ft^3)
1A	12.77	0.00	0.00	- 68
2B	3.32	0.00	0.00	0
3C	13.73	0.00	0.00	0

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.



SECTION A–A

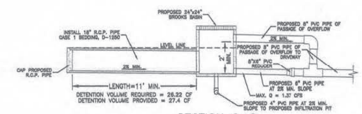


PLAN VIEW

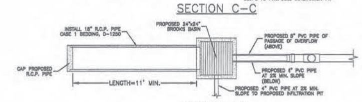
INFILTRATION PIT SIZING

LOCATION	LENGTH, L (FT)	WIDTH, W (FT)	INFILTRATION DEPTH, D1 (FT)	TOTAL PIT DEPTH, D2 (FT)	TOTAL PIT VOLUME, (CU-FT)
PIT PAD 1	48	18	6	6.5	2592
PIT PAD 2	39	32	4	4.5	2496
PIT PAD 3	29	29	6	6.5	2523

DETAIL 1 – INFILTRATION PIT "A"
NTS – FOR REFERENCE ONLY – FINAL DESIGN PER GRADING PLANS



SECTION C–C



PLAN VIEW

DETAIL 2 – CATCH BASIN DETENTION SYSTEM
NTS – FOR REFERENCE ONLY – FINAL DESIGN PER GRADING PLANS

HYDROLOGIC DATA:

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS HYDROLOGY MANUAL
HYDROLOGY MAP – ACTON – 1-H1-47
50 YEAR-24 HR ISOHYET – 3.8 IN
SOIL NUMBERS – 103 AND 098
DEBRIS ZONE – DPA-8
BULKING FACTOR – 1.36 (FOR DPA-8 PER B-5)
DEBRIS PRODUCTION RATE – 54.7 C.Y./AC (FOR DPA-8 PER B-2)
IMPERVIOUS (IMP) – 0.02 FOR UNDEVELOPED.
0.21 FOR LOW DENSITY SINGLE-FAMILY RESIDENTIAL
FIRE FACTOR – 0.34

NOTES: NOT WITHIN FEMA FLOOD ZONE "A"
NOT WITHIN COUNTY ADOPTED FLOODWAY

HYDROLOGY/SUSMP/LID STUDY
APPROVED FOR AREA AND Q ONLY
APPROVED BY: ___ RCE NO. 70441 DATE 10/4/12
CHECKED BY: ___ DATE 12/4/12
COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION

PROPOSED CONDITIONS HYDROLOGY – Q25

PLAN PREPARED IN THE OFFICES OF:
ROTHMAN ENGINEERING, INC.
205 S. BROADWAY, SUITE 206
LOS ANGELES, CALIFORNIA, 90012
(213) 621-3155 FAX (213) 621-3105

CLIENT: RAYMOND DUVERNAY
PROJECT: PM 71006 - APN 3057-014-012
SIERRA HIGHWAY, CA

SHEET TITLE: HYDROLOGY/ DRAINAGE CONCEPT/LID PLAN PROPOSED CONDITIONS Q25

DESIGNER: MT	APPR'D BY: RR
DRAFTER: MT	REVISED BY: BW
SCALE: AS SHOWN	DATE: 09/05/12

HYDRO
H-3 of 3
JOB NUMBER 0226-07-001

"CONDITIONAL WILL-SERVE LETTER"

☒ County of Los Angeles
Water Ordinance Unit
900 S. Fremont Ave., 4th Fl.
Alhambra, CA. 91803-1331

☐ City of Lancaster
44933 N. Fern Ave.
Lancaster CA. 93534

☐ City of Palmdale
38300 N. Sierra Hwy.
Palmdale CA. 93550

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 37 , ACTON

STATEMENT OF WATER SERVICE FOR SUBDIVISION

PARCEL MAP NO. 71006 NO. OF PARCELS 3 ; APN: 3057-014-012 INQUIRY NO. N/A

SPECIFICATION NO. N/A AVG WATER USE 3.6 AC-FT/YR

☐ This is to state that the District's current water system, presently owned and operated by the District, can adequately provide water service to the development that meets the requirements of the County/City Engineer and the County/City Fire Chief adopted for the development* and the Rules and Regulations of the District. The developer has paid or will have paid the District's charges at such time as permanent water service is provided.

☐ This is to state that there is a water system proposed to be installed to serve this development that will, upon satisfactory completion of construction by the developer, at the developer's expense, meet the requirements of the County/City Engineer and the County/City Fire Chief adopted for the development* and the Rules and Regulations of the District.

☒ This is to state that additional water system facilities may have to be installed to serve this development to meet the requirements of the County/City Engineer and the County/City Fire Chief, which at this time have not been specifically set. As a condition of receiving water service from the District, the developer will have to install such facilities at his expense and pay the District's applicable charges and fees. It is understood that the developer, by recording the map for this development, assumes responsibility for the installation of any thereby needed water system facilities and payment of the applicable charges and fees of the District.

☐ The developer has signed and filed a statement with the District agreeing to install the needed water system facilities at his expense. The developer has executed a statement agreeing to the District not providing permanent water service until the facilities are satisfactorily completed and all charges and fees of the District have been paid or are offset by applicable credits.

☒ The developer will be required to pay appropriate connection fees, including meter fees, capital improvement, local improvement, prior to start of construction and installation of permanent water service.

☒ The developer has secured permanent water supply entitlement sufficient to meet the project's annual water demands and provided the District with adequate confirmation, prior to installation of the water service.

Upon satisfactory completion of construction, the developer must dedicate/transfer any necessary right of way to the Waterworks District for ownership before the District will provide permanent water service to the development.

This Conditional will serve letter expires one (1) calendar year from the date the District Engineer signs below. After the one year expiration date, the District's obligation to provide water service to this Project is terminated and the District withdraws its commitment to serve this Project.

* Under the County/City Fire Code (Section 13.301) additional fire protection requirements may be set by the Fire Chief upon review of the plans submitted for building permit(s) that may result in additional water system facilities being required to be installed at the developer's expense.

cc: Developer: Raymond Duvernay
P.O.Box 6587
Lancaster, CA 93539

Signature Date 4-23-2021

Developer's Engineer: CRC Enterprises
27600 Bouquet Canyon Rd. #200
Santa Clarita, CA 91350

For the District:

Signature Date May 6, 2021

Los Angeles County Waterworks Districts
900 South Fremont Avenue
Alhambra, CA 91803-1331
(626) 300-3300

D40 CWSL 9/20

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: WW-3
NWSR NOTICE NO: 37-002

February 4, 2021

Raymond Duvernay
P.O. Box 6587
Lancaster, CA 93539

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 37, ACTON
NEW WATER SUPPLY REQUIREMENT

Sufficient New Water Supply to meet the annual demand is required for this project prior to issuance of a fire-flow availability statement or Conditional Will-Serve Letter from the Los Angeles County Waterworks District No. 37, Acton.

PROJECT: Parcel Map 71006 (3 parcels) – Sierra Highway, Acton, CA 93510

ASSESSOR PARCEL NO.: 3057-014-012

NEW ANNUAL WATER SUPPLY REQUIRED: 3.6 acre-feet per year

You may secure New Water Supply, per the June 2, 2020, Amended and Restated Memorandum of Understanding with the Antelope Valley-East Kern Water Agency (AVEK) or other fully reliable permanent water supply entitlement to be set aside for the District. Please submit AVEK's receipt or confirmation of other permanent water supply entitlement to the District.

FORM 195
Rev. 11/06/2019

COUNTY OF LOS ANGELES FIRE DEPARTMENT
FIRE PREVENTION DIVISION

Fire Prevention Engineering
5823 Rickenbacker Road
Commerce, CA 90040
Telephone (323) 890-4125 Fax (323) 890-4129

Information on Fire Flow Availability for Building Permit

For One and Two Family Dwellings, Townhomes, and Accessory Dwelling Units

INSTRUCTIONS:

Complete parts I, II (A), and II (B)

Verifying fire flow, fire hydrant location and fire hydrant size.

PROJECT INFORMATION
(To be Completed by Applicant)

PART I

Building Address: APN 3057-014-012

City or Area: Acton APN ____

Nearest Cross Street: Listie Ave

Distance of Nearest Cross Street: approx. 1600 ft east of Listie

Property Owner: Ray Duvernay Telephone: (661) 267-2336

Address: P.O. Box 6587

City: Lancaster Zip Code 93539

Occupancy (Use of Building): Residential Sprinklered: Yes ☐ No ☐

Type of Construction none at this time.

Square Footage: ____ Number of Stories: ____

Applicant's Signature ____ Date 11/6/23

PART II (A) **INFORMATION ON FIRE FLOW AVAILABILITY**
(Part II A and II B to be completed by Water Purveyor)

The distance from the fire hydrant to the property line is 0

feet via vehicular access. The fire flow services will be rendered from a 12

inch diameter water main. The hydrant is located on north side of Sierra Hwy
(Direction/side) (Street)

1010 (Feet) west (Direction) of San Gabriel Ave centerline (Nearest Cross - Street)

Static PSI 154 Residual PSI 149 Orifice size ____ Pitot__

Fire Flow at 20 PSI 1250 GPM for one-hour duration ☐ Flow Test Date / Time ____
■ Hydraulic model

Domestic Meter Size 3/4"x1" (30 GPM Max)

PART II (B)

LA County Waterworks
Water Purveyor

Signature: Josh Svensson

(661) 940-9270 — 12/6/23
Phone Number — Date

Senior Civil Engineer
Title

PART III **Conditions for Approval by the Building Department**
(To be Completed by Building Department)

The building permit may be issued for new or additions to detached one and two family dwellings, townhomes, and accessory dwelling units when the above information is completed and shows that the following minimum requirements are met and is not located in a Fire Hazard Severity Zone.

- The water system is capable of delivering at least 1000 GPM at 20 PSI for one-hour if non-sprinklered
- The water system is capable of delivering at least 500 GPM at 20 PSI for one-half hour if sprinklered.
- The total area of the entire structure is less than 3,600 square feet.
- No portion of the lot frontage to the public fire hydrant shall exceed 450 feet via vehicular access.
- All portions of a new single family, two-family or townhome construction must be within 150 feet of a vehicular access roadway that is a minimum of 20 feet wide clear to sky, paved with concrete or asphalt and does not exceed 15% grade.
- A new detached ADU that is fire sprinklered, the 150-foot distance to all portions of the structure can be extended to 300 feet of a vehicular access roadway that is a minimum of 20 feet wide clear to sky, paved with concrete or asphalt and does not exceed 15% grade.

APPROVED BY ____ DATE ____ OFFICE ____

This Information is Considered Valid for Twenty-Four Months

When the project does not meet all of the above requirements for approval by the **Building Department,** the project must be sent to the **Fire Prevention Division** for approval before a Building Permit can be issued by the **Building Department**.

COUNTY OF LOS ANGELES

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MARK PESTRELLA, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: T-4

August 26, 2024

Jean Lightell
CRC Enterprises
27600 Bouquet Canyon Road, Suite 200
Santa Clarita, CA 91350

Dear Jean Lightell:

TENTATIVE PARCEL MAP NUMBER 71006
TRAFFIC ACCESS MANAGEMENT STUDY (JUNE 26, 2024)
UNINCORPORATED ACTON AREA

Public Works has reviewed the Traffic Access Management Study dated June 6, 2024, for the Tentative Parcel Map No. 71006 project located in the unincorporated Acton area.

Project Description

The project proposes to construct three single-family lots on approximately 18.04 gross acres of vacant land.

Site Access Requirements

According to the Traffic Access Management Study, an exclusive left-turn lane is required for the project's driveway. We generally agree with the findings in the Traffic Access Management Study.

- An exclusive left-turn lane is required at the project's driveway along Sierra Highway.

- Detailed signing and striping plans and street improvement plans shall be submitted to Public Works for review and approval.

- Provide stopping sight distance along Sierra Highway Street frontage for a design speed of 60mph, 580 feet east, from the driveway entrance. Line of sight shall be within right of way or dedicated airspace easements to the satisfaction of Public Works. Additional grading may be required.

If you have any questions regarding the review of this document, please contact Mr. James Harris of Traffic Safety and Mobility Division, at (626) 300-4646 or jharris@dpw.lacounty.gov.

Very truly yours,

MARK PESTRELLA
Director of Public Works

AMIR S. IBRAHIM, P.E., L.S.
Principal Engineer
Traffic Safety and Mobility Division

JH:vr
SP:TSM\DOC\STUDIES\LTR&MEMO\2024-0725ESTU2024000196SIERRAHWYPM

bc: Land Development (Lasso, Suarez)

Los Angeles County
Department of Regional Planning

Planning for the Challenges Ahead

Amy J. Bodek, AICP
Director

September 18, 2023

Christina Conley
Gabrielino Tongva Indians of California
PO Box 941078
Simi Valley, CA 93094

RE: Tribal Cultural Resources under the California Environmental Quality Act, AB 52 (Gatto, 2014). Formal Notification of the Proposed Project pursuant to Public Resources Code (PRC) §21080.3.1.

The Los Angeles County Department of Regional Planning is issuing this formal notification of the proposed project. Below please find a description of the proposed project, a map showing the project location, and our contact information along with the name of our point of contact, pursuant to PRC §21080.3.1(d).

Proposed Project: PM071006
Project No. PM071006 - 5
Tentative Parcel Map No. PM071006
Conditional Use Permit No. 201100056
Environmental Assessment No. 200900009

Project Description: Subdivide a vacant approximateley 18 acre property into three residential lots, consisting of a minimum of five acres. The project site contains a juniper woodland and slopes of 25%. A total of approximately 42,000 cubic yards of grading is proposed.

Project Location: (APN) 3057-014-012

Lead Agency Contact Information:
Marie Pavlovic
Subdivisions Section
Department of Regional Planning
320 W. Temple Street, Room 160
Los Angeles, CA 90012
Tel: (213) 974-6433
Email: mpavlovic@planning.lacounty.gov

Pursuant to PRC §21080.3.1(b), you have 30 days from the receipt of this letter to request consultation, in writing, with the Department of Regional Planning. Written request must be submitted to the contact information listed above.

Our office hours are Monday through Thursday, 7:00 a.m. to 5:30 p.m. We are closed on Fridays.

Sincerely,
DEPARTMENT OF REGIONAL PLANNING
Amy J. Bodek, AICP
Director

Marie Pavlovic

Marie Pavlovic, Senior Planner
Subdivisions Section

Encl: Map of Project Location

JH, MP

Los Angeles County
Department of Regional Planning

Planning for the Challenges Ahead

Amy J. Bodek, AICP
Director

September 18, 2023

Lee Clauss
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346

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Amy J. Bodek, AICP
Director

Marie Pavlovic

Marie Pavlovic, Senior Planner
Subdivisions Section

Encl: Map of Project Location

JH, MP

Los Angeles County
Department of Regional Planning

Planning for the Challenges Ahead

Amy J. Bodek, AICP
Director

September 18, 2023

Sarah Brunzell, Manager
Fernandeno Tatavium Band of Mission Indians
1019 Second Street
San Fernando, CA 91340

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DEPARTMENT OF REGIONAL PLANNING
Amy J. Bodek, AICP
Director

Marie Pavlovic

Marie Pavlovic, Senior Planner
Subdivisions Section

Encl: Map of Project Location

JH, MP

COUNTY OF LOS ANGELES
FIRE DEPARTMENT

FUEL MODIFICATION UNIT
605 NORTH ANGELENO AVENUE
AZUSA, CA 91702
(626) 969-5205
www.fire.lacounty.gov/forestry-division/forestry-fuel-modification/

"Proud Protectors of Life, Property, and the Environment"

DARYL L. OSBY
FIRE CHIEF
FORESTER & FIRE WARDEN

September 19, 2022

Dear Resident:

FUEL MODIFICATION PLAN – SIERRA HIGHWAY, ACTON
PARCEL #3057-014-012 FM PROJECT #10115 – FFFM #

The Preliminary Fuel Modification Plan has been reviewed. The project is approved in concept, and needs to be resubmitted for final review and approval prior to granting building permits.

Questions regarding this response should be directed to the Fuel Modification Unit. Office hours are Monday through Thursday, from 8:00 a.m. to 4:00 p.m. for plan submittal and general questions. Plan checkers are available 8:00 a.m. to 10:00 a.m. and by appointment. The Fuel Modification Unit may be reached at (626) 969-5205.

Very truly yours,

KEVIN T. JOHNSON, ASSISTANT CHIEF, FORESTRY DIVISION
PREVENTION SERVICES BUREAU

LP:bw

Enclosures