APPENDIX A – Air Quality Study

Date: October 21, 2024

To: Mr. Barry Munz, Antelope Valley Engineering, Inc.

From: M. S. Hatch Consulting, LLC

Subject: Revised Air Quality Study – Mini Storage Facility APN 3051-019-030, and -112 Palmdale CA

M. S. Hatch Consulting, LLC (MSHC) appreciates the opportunity to prepare the air quality study for the proposed construction and operation of the mini storage facility on Assessor Parcel Number (APN): 3051-019-030, and -112 for Antelope Valley Engineering, Inc. (AV Engineering). The project consists of 702 storage units on a vacant approximately 5.06-acre lot in the City of Palmdale. This revised air quality study estimates the criteria pollutant and greenhouse gas emissions from the construction and operation of the proposed project and incorporates the city comments that were received on October 19, 2024.

Executive Summary

Table 1 and Table 2 compare the estimated annual and maximum daily emissions summaries from the construction and operation of the proposed mini storage facility to the significant emission thresholds in the Antelope Valley Air Quality Management District (AVAQMD) California Environmental Quality Act (CEQA) and Federal Conformity Guidelines, dated August 2016, included in Attachment A. The estimated emissions of criteria pollutants and greenhouse gases for each year of construction and the total operational emissions **are below the applicable thresholds**. Greenhouse gas emissions are presented in units of carbon dioxide equivalent (CO_2e). The proposed project is not considered one of the project types that the AVAQMD CEQA and Federal Conformity Guidelines requires to be evaluated for potentially exposing sensitive receptors to substantial pollutant concentrations.[1] As such, hazardous air pollutant (HAP) emissions were not calculated, and the project was not evaluated for potential health risks to sensitive receptors. Since the construction and operational emissions are below the significance thresholds, emissions mitigation measures are not required.

Table 1. Annual Emissions Summary and Significance Thresholds

Emissions Source	Total Emissions (tons per year)						
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (MT/year)
Year 1 Construction Emissions (2025)	0.41	1.13	1.47	< 0.01	0.12	0.06	301
Total Operational Emissions	**0.76**	**0.61**	**4.18**	**0.01**	**0.82**	**0.22**	**1,447**
Significant Emissions Threshold	**25**	**25**	**100**	**25**	**15**	**12**	**100,000**
Threshold Exceedance (Yes/No)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

ROG: Reactive Organic Compounds, used interchangeably with Volatile Organic Compounds (VOC); NO_X: oxides of nitrogen; CO: Carbon monoxide; SO_X: Oxides of sulfur; $PM_{2.5}$: particulate matter less than 2.5 micrometers in diameter; PM_{10}: particulate matter less than 10 micrometers

[1] Residences, schools, daycare centers, playgrounds and medical facilities are considered sensitive receptor land uses. The following project types proposed for sites within the specified distance to an existing or planned (zoned) sensitive receptor land use must be evaluated using significance threshold criteria number 4 (refer to the significance threshold discussion): any industrial project within 1000 feet; a distribution center (40 or more trucks per day) within 1000 feet; a major transportation project (50,000 or more vehicles per day) within 1000 feet; a dry cleaner using perchloroethylene within 500 feet; or a gasoline dispensing facility within 300 feet.

in diameter; CO_2e: Carbon dioxide equivalent; MT: metric ton. Some of the values in the columns do not add up to the number shown due to rounding.

Table 2. Maximum Daily Emissions Summary and Significance Thresholds

Emissions Source	Total Emissions (pounds per day)						
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	CO_2e
Year 1 Construction Emissions (2025)	46.80	23.00	22.40	0.06	4.43	2.60	7,615
Total Operational Emissions	**4.95**	**3.62**	**33.20**	**0.06**	**5.21**	**1.39**	**9,881**
Significant Emissions Threshold	**137**	**137**	**548**	**137**	**82**	**65**	**548,000**
Threshold Exceedance (Yes/No)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

ROG: Reactive Organic Compounds, used interchangeably with Volatile Organic Compounds (VOC); NO_X: oxides of nitrogen; CO: Carbon monoxide; SO_X: Oxides of sulfur; $PM_{2.5}$: particulate matter less than 2.5 micrometers in diameter; PM_{10}: particulate matter less than 10 micrometers in diameter; CO_2e: Carbon dioxide equivalent. Some of the values in the columns do not add up to the number shown due to rounding.

Project Description

The proposed project includes the construction of 702 storage units on an approximately 5.06-acre lot. The project site is located at Pearblossom Highway and Fallingstar Place, in Palmdale, CA. Figure 1 shows the site location; the proposed site plan is included in Figure 2.

Figure 1. Regional Vicinity

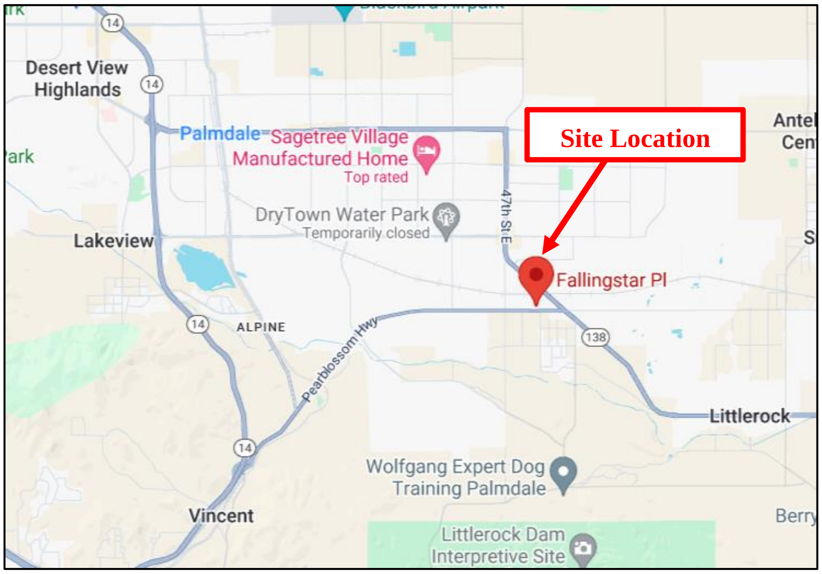
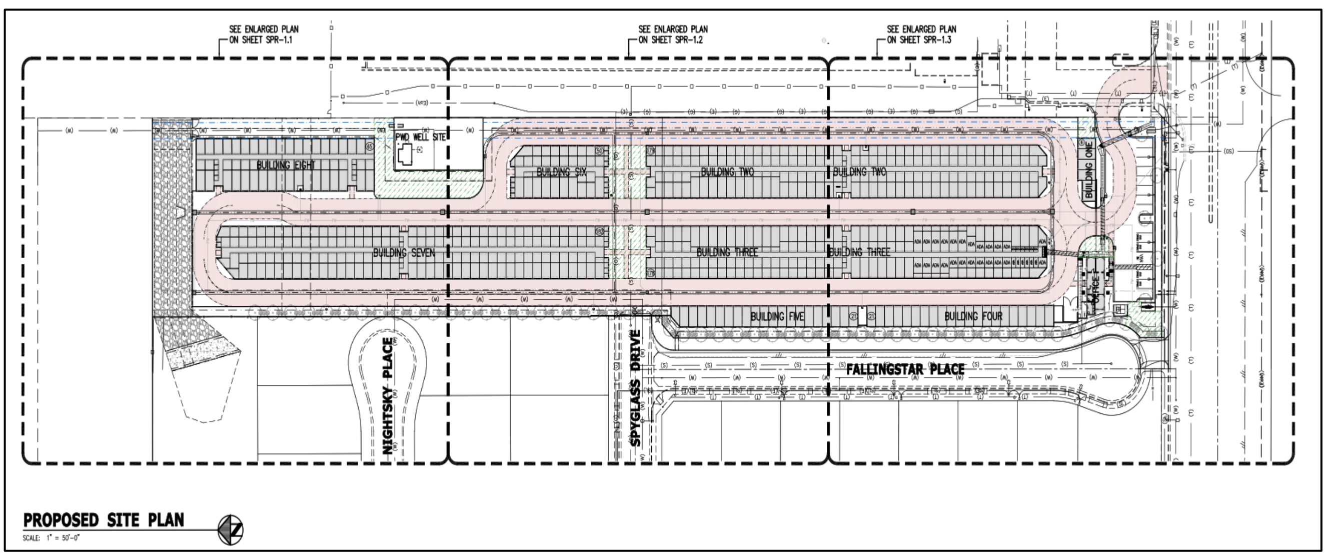


Figure 2. Site Plan – Proposed Mini Storage Facility – Palmdale, CA



Sources of Emissions

The emissions associated with the proposed project consist of construction and operational emissions from the mini storage facility. Construction emissions are temporary and include emissions of criteria pollutants and greenhouse gases from construction activities during site preparation, grading, paving, building construction, and the application of architectural coatings. Operational emissions consist of area sources (i.e., re-applying architectural coatings, consumer products, and landscaping equipment), energy use (i.e., electricity and natural gas), mobile sources (e.g., commuting), solid waste disposal, water, and wastewater (i.e., supplying and treating water and wastewater), and refrigerants (i.e., air conditioners).

Emissions Estimates

Table 3 and Table 4 present the annual and maximum daily emissions summaries from the construction and operation of the proposed project, respectively. Emissions were estimated using CalEEMod Version 2022.1.1.24, and the detailed emissions report is included in Attachment B.

This proposed project is not considered one of the project types that the AVAQMD CEQA and Federal Conformity Guidelines require to be evaluated for potentially exposing sensitive receptors to substantial pollutant concentrations. As such, HAP emissions were not calculated, and the project was not evaluated for potential health risks to sensitive receptors.

Table 3. Annual Construction and Operational Emissions Summary

Emissions Source	Total Emissions (tons per year)						
	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (MT/year)
Construction Emissions							
Year 1 Construction Emissions (2025)	0.41	1.13	1.47	< 0.01	0.12	0.06	301
Operational Emissions							
Mobile	0.31	0.49	3.72	0.01	0.82	0.21	826
Area	0.45	< 0.01	0.36	< 0.01	< 0.005	< 0.005	1.34
Energy	0.01	0.11	0.10	< 0.01	0.01	0.01	521
Water	N/A	N/A	N/A	N/A	N/A	N/A	59
Waste	N/A	N/A	N/A	N/A	N/A	N/A	36
Refrigerants	N/A	N/A	N/A	N/A	N/A	N/A	3.95
Total Operational Emissions	**0.76**	**0.61**	**4.18**	**0.01**	**0.82**	**0.22**	**1,447**
Significant Emissions Threshold	**25**	**25**	**100**	**25**	**15**	**12**	**100,000**
Threshold Exceedance (Yes/No)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

ROG: Reactive Organic Compounds, used interchangeably with Volatile Organic Compounds (VOC); NO_X: oxides of nitrogen; CO: Carbon monoxide; SO_X: Oxides of sulfur; $PM_{2.5}$: particulate matter less than 2.5 micrometers in diameter; PM_{10}: particulate matter less than 10 micrometers in diameter; CO_2e: Carbon dioxide equivalent; MT: metric ton. Some of the values in the columns do not add up to the number shown due to rounding.

Table 4. Maximum Daily Construction and Operational Emissions Summary

Emissions Source	Total Emissions (pounds per day)						
	ROG	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$	CO_2e
Construction Emissions							
Year 1 Construction Emissions (2025)	46.80	23.00	22.40	0.06	4.43	2.60	7,615
Operational Emissions							
Mobile	2.14	3.00	28.70	0.06	5.15	1.34	6,126
Area	2.78	< 0.01	3.99	< 0.01	0.01	0.01	17
Energy	0.03	0.62	0.52	< 0.01	0.05	0.05	3,145
Water	N/A	N/A	N/A	N/A	N/A	N/A	355
Waste	N/A	N/A	N/A	N/A	N/A	N/A	214
Refrigerants	N/A	N/A	N/A	N/A	N/A	N/A	24
Total Operational Emissions	**4.95**	**3.62**	**33.20**	**0.06**	**5.21**	**1.39**	**9,881**
Significant Emissions Threshold	**137**	**137**	**548**	**137**	**82**	**65**	**548,000**
Threshold Exceedance (Yes/No)	**No**	**No**	**No**	**No**	**No**	**No**	**No**

ROG: Reactive Organic Compounds, used interchangeably with Volatile Organic Compounds (VOC); NO_X: oxides of nitrogen; CO: Carbon monoxide; SO_X: Oxides of sulfur; $PM_{2.5}$: particulate matter less than 2.5 micrometers in diameter; PM_{10}: particulate matter less than 10 micrometers in diameter; CO_2e: Carbon dioxide equivalent. Some of the values in the columns do not add up to the number shown due to rounding.

Emissions Calculation Methodology

Construction and operational emissions were based on four CalEEMod land use types*: Industrial Park, Parking Lot, Other Asphalt Surfaces*, and *Other Non-Asphalt Surfaces*. A discussion on the land use types that were used for the emissions modeling is included in this section.

CalEEMod Land Use Type: Industrial Park

The *Industrial Park* land use type was used to model the emissions associated with the proposed office building and storage facilities. The total building square footage (91,663 square feet), number of storage units (702), the lot acreage (2.62 acres), and the total landscape area (24,141 square feet) were provided by AV Engineering.[2]

CalEEMod Land Use Type: Parking Lot

The *Parking Lot* land use type was used to model the emissions associated with the parking lot for the office and the storage buildings. The total acreage (0.15 acres) was provided by AV Engineering.

CalEEMod Land Use Type: Other Asphalt Surfaces

The *Other Asphalt Surfaces* land use type was used to model the emissions associated with the drive aisle throughout the site for access to the various units. The total acreage (2.2 acres) was provided by AV Engineering.

[2] The lot acreage includes the city park acreage provided by AV Engineering via data request form received on 10/19/2024.

CalEEMod Land Use Type: Other Non-Asphalt Surfaces

The *Other Non-Asphalt Surfaces* land use type was used to model the emissions associated with the concrete sidewalks within the proposed mini storage facility. The total acreage (0.03 acres) was provided by AV Engineering.

Construction Emissions

Construction emissions were calculated using CalEEMod defaults and input provided by AV Engineering. The anticipated construction schedule and list of construction equipment were reviewed and verified by AV Engineering.

Table 5 provides the anticipated construction schedule. AV Engineering indicated that work would be conducted six days per week and provided the proposed start date (2/3/2025) for the project. The end date (9/9/2025) for the project is defined based on the duration of each construction phase. The durations for all phases are provided by AV Engineering, except for *Site Preparation* which was the default value provided by CalEEMod.

Table 6 provides the anticipated equipment that will be used during each construction phase, the hours per day the equipment will be operated, and the horsepower of the equipment. The values in Table 6 are based on CalEEMod default values, except for the number of equipment and using scrapers instead of rubber-tired dozers in *Grading* phase which was provided by AV Engineering.

Based on input from AV Engineering, this project will require 50 cubic yards of material export during the *Site Preparation* phase and 5,000 cubic yards of material import during the *Grading* phase; as such, the emissions for material haul trips were included in the construction emissions. For fugitive dust emissions, CalEEMod defaults do not include any control of fugitive dust from construction sites. AVAQMD Rule 403 requires fugitive dust from any "active operation, open storage pile, or disturbed surface area" be controlled so that no presence of dust remains visible beyond the property line. To meet this requirement, it was assumed the site would be watered three times per day.

Table 5. Construction Schedule

Construction Phase	Start Date	End Date	Days/week	Total Days
Demolition	N/A	N/A	N/A	N/A
Site Preparation	2/3/2025	2/13/2025	6	10.0
Grading	2/14/2025	3/11/2025	6	22.0
Building Construction	3/12/2025	8/5/2025	6	126
Paving	8/6/2025	8/26/2025	6	18.0
Architectural Coating	8/27/2025	9/9/2025	6	12.0

Table 6. Construction Equipment

Construction Phase	Equipment	Number of Equipment	Hours per day	Horsepower
Site Preparation	Rubber Tired Dozers	2	8	367
	Tractors/Loaders/Backhoes	2	8	84
Grading	Excavators	1	8	36
	Graders	1	8	148
	Scrapers	3	8	367
	Tractors/Loaders/Backhoes	2	8	84
Building Construction	Cranes	1	7	367
	Forklifts	3	8	82
	Generator Sets	1	8	14
	Tractors/Loaders/Backhoes	3	7	84
	Welders	1	8	46
Paving	Pavers	2	8	81
	Paving Equipment	2	8	89
	Rollers	2	8	36
Architectural Coating	Air Compressors	1	6	37

Operational Emissions

Operational emissions consist of area sources (i.e., re-applying architectural coatings, consumer products, and landscaping equipment), energy use (i.e., electricity and natural gas), mobile sources (e.g., commuting), solid waste disposal, water, and wastewater (i.e., supplying and treating water and wastewater), and refrigerants (i.e., air conditioners).

For area-source emissions, it was determined that emergency generators, fire pumps, or boilers would not be installed.[3] All other operational emissions sources were calculated using CalEEMod default factors.

Findings

The estimated emissions of criteria pollutants and greenhouse gases for each year of construction and the total operational emissions **are below the applicable AVAQMD Significant Emissions Thresholds**; therefore, this project does not have a significant air quality impact on the environment. In addition, this project is not one of the project types that would expose sensitive receptors to substantial pollutant concentrations. Since the construction and operational emissions are below the significance thresholds, emissions mitigation measures are not required.

[3] Based on data request form provided by AV Engineering on 3/26/2024.

ATTACHMENT A – Antelope Valley AQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines

Antelope Valley AQMD

California Environmental Quality Act (CEQA)

and

Federal Conformity

Guidelines

August 2016

AVAQMD Planning, Rule-making and Grants Section
AVAQMD Air Monitoring Section

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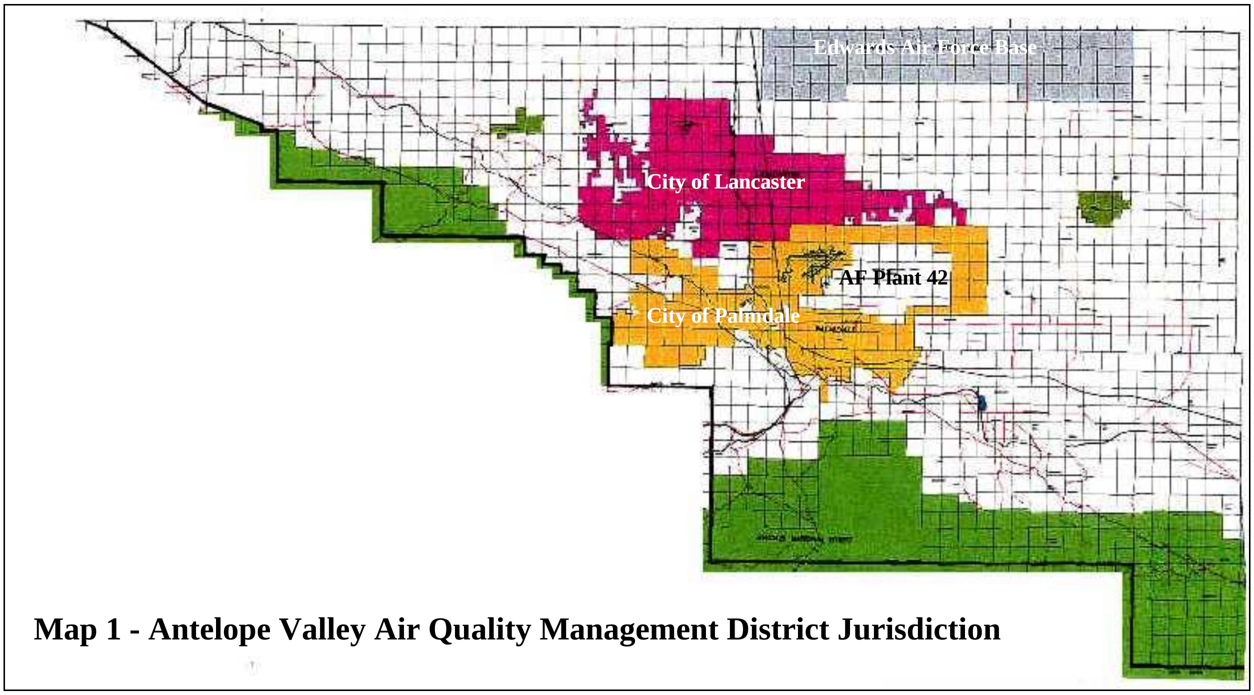
Background

Under the California Environmental Quality Act (CEQA), the AVAQMD (District) is an expert commenting agency on air quality and related matters within its jurisdiction (or impacting on its jurisdiction). The District has dedicated resources to reviewing projects to ensure that they will not: (1) cause or contribute to any new violation of any air quality standard; (2) increase the frequency or severity of any existing violation of any air quality standard; or (3) delay timely attainment of any air quality standard or any required interim emission reductions or other milestones of any federal attainment plan. The District has adopted a federal attainment plan for ozone pursuant to the Federal Clean Air Act.

Purpose

These Guidelines are intended to assist persons preparing environmental analysis or review documents for any project within the jurisdiction of the District by providing background information and guidance on the preferred analysis approach.



Map 1 - Antelope Valley Air Quality Management District Jurisdiction

Jurisdiction

The District has jurisdiction over the northern, desert portion of Los Angeles County (please refer to Map 1). This region includes the incorporated cities of Lancaster and Palmdale, Air Force Plant 42, and the southern portion of Edwards Air Force Base. The Kern County-Los Angeles County boundary forms the northern boundary of the District; the San Bernardino-Los Angeles County boundary forms the eastern boundary of the District.

Non-attainment Designations and Classification Status

The United States Environmental Protection Agency and the California Air Resources Board have designated portions of the District non-attainment for a variety of pollutants, and some of those designations have an associated classification. Please refer to Table 1 for a chart of these designations and classifications.

Table 1 – AVAQMD Designations and Classifications

Ambient Air Quality Standard	**AVAQMD**
One-hour Ozone (Federal) – standard has been revoked, this is historical information only	Proposed attainment in 2014; historical classification Severe-17
Eight-hour Ozone (Federal 84 ppb (1997))	Subpart 2 Nonattainment; classified Severe-15
Eight-hour Ozone (Federal 75 ppb (2008))	Nonattainment, classified Severe-15
Eight-hour Ozone (Federal 70 ppb (2015))	Expected nonattainment; classification to be determined
Ozone (State)	Nonattainment; classified Extreme
PM_{10} 24-hour (Federal)	Unclassifiable/attainment
$PM_{2.5}$ Annual (Federal)	Unclassified/attainment
$PM_{2.5}$ 24-hour (Federal)	Unclassified/attainment
$PM_{2.5}$ (State)	Unclassified
PM_{10} (State)	Nonattainment
Carbon Monoxide (State and Federal)	Attainment
Nitrogen Dioxide (State and Federal)	Attainment/unclassified
Sulfur Dioxide (State and Federal)	Attainment/unclassified
Lead (State and Federal)	Attainment
Particulate Sulfate (State)	Unclassified
Hydrogen Sulfide (State)	Unclassified
Visibility Reducing Particles (State)	Unclassified

Attainment Plans

The District has adopted a single attainment plan for ozone. Please refer to Table 2 for information regarding this attainment plan.

Table 2 – AVAQMD Attainment Plans

Name of Plan	Date of Adoption	Standard(s) Targeted	Applicable Area	Pollutant(s) Targeted	Attainment Date*
AVAQMD 2004 Ozone Attainment Plan (State and Federal)	4/2004	Federal one hour ozone	Entire District	NO_x and VOC	2007
AVAQMD Federal 8-Hour Ozone Attainment Plan	5/20/2008	Federal eight hour ozone (84 ppb)	Entire District	NO_x and VOC	2019 (revised from 2021)

*Note: A historical attainment date given in an attainment plan does not necessarily mean that the affected area has been re-designated to attainment; please refer to Table 1.

Rules and Regulations

The District maintains a set of Rules and Regulations to improve air quality and maintain good air quality. Please contact the District to obtain a copy of the District rulebook, or visit www.avaqmd.ca.gov.

Recommended Environmental Setting Elements

Air Quality Data

The District gathers a variety of air quality data at the Lancaster monitoring site. Table 3 details the data available from the District for this site.

Table 3 - Available Air Quality Data

Site	Address	Pollutants	Dates
Lancaster	W. Ponderosa	O_3, NO_x, CO, PM_{10} (Hi-Vol and TEOM)	7/1/97 to 11/01
Lancaster	W. Ponderosa	$PM_{2.5}$	1/1/99 to 11/01
Lancaster	43301 Division St.	O_3, NO_x, CO, PM_{10} (hourly), $PM_{2.5}$	11/01 to present

Meteorological Data

A variety of meteorological data is available from the District for the Lancaster site. Table 4 contains a list of the data available for the Lancaster site.

Table 4 - Available Meteorological Data

Site	Address	Data	Dates
Lancaster	W. Ponderosa	Wind speed/direction, pressure, temperature, humidity	7/1/97 to 11/01
Lancaster	43301 Division St.	Wind speed/direction, pressure, temperature, humidity	11/01 to present

Topography and Climate Discussion

The District covers a western portion of the Mojave Desert Air Basin (MDAB). The MDAB is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains which dot the vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada mountains to the north; air masses pushed onshore in southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses. The Antelope Valley is bordered in the northwest by the Tehachapi Mountains, separated from the Sierra Nevadas in the north by the Tehachapi Pass (3,800 ft elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 ft).

During the summer the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time the reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. MDAB annual average precipitation is presented in Table 5; the data displayed is 1981-2010 averages from the NOAA National Climate Data Center. The MDAB is classified as a dry-hot desert climate (BWh), with portions classified as dry-very hot desert (BWhh), to indicate at least three months have maximum average temperatures over 100.4° F.

Table 5 - MDAB Average Annual Precipitation

Site	County	District	Precipitation (inches)
Baker	San Bernardino	MDAQMD	4.48
Barstow Daggett Airport	San Bernardino	MDAQMD	4.06
Barstow	San Bernardino	MDAQMD	5.30
Blythe Airport	Riverside	MDAQMD	3.77
Desert Center 2 NNE	Riverside	SCAQMD	3.92
Eagle Mountain	Riverside	SCAQMD	4.10
Goldstone Echo Number 2	San Bernardino	MDAQMD	5.88
Joshua Tree	San Bernardino	MDAQMD	5.11
Lancaster Wm J Fox Field	Los Angeles	AVAQMD	7.38
Mitchell Caverns	San Bernardino	MDAQMD	11.50
Mojave	Kern	EKAPCD	6.67
Mountain Pass 1 SE	San Bernardino	MDAQMD	9.94
Needles Airport	San Bernardino	MDAQMD	4.62
Palmdale Airport	Los Angeles	AVAQMD	8.30
Palmdale	Los Angeles	AVAQMD	7.40

Site	County	District	Precipitation (inches)
Parker Reservoir	San Bernardino	MDAQMD	6.16
Pearblossom	Los Angeles	AVAQMD	6.73
Randsburg	Kern	EKAPCD	7.26
Trona	San Bernardino	MDAQMD	3.88
Twentynine Palms	San Bernardino	MDAQMD	4.46
Victorville Pump Plant	San Bernardino	MDAQMD	6.15
Wrightwood	Los Angeles	AVAQMD	22.61

Recommended Impacts Discussion Elements

Direct Impacts

Direct impacts are the result of the project itself (from its construction and operation), in the form of project activity and trips generated by the project. For example, in the case of a subdivision project, construction emissions (equipment exhaust, wind erosion, vehicle exhaust), housing use activity (natural gas consumption) and trips to and from the housing (vehicle exhaust, tire wear) represent direct impacts. In the case of a new mine project, construction emissions (equipment exhaust, wind erosion, vehicle exhaust), material handling (drilling, blasting, transfers, crushing, screening, bagging), operational emissions (wind erosion, vehicle travel, vehicle exhaust, tire wear), and employee/customer/delivery travel (vehicle exhaust, tire wear) represent direct impacts.

Indirect Impacts

Indirect impacts are the result of changes that would not occur without the project. In the case of a subdivision project, indirect impacts on the surrounding community can be generated in many ways: nearby construction of roadways (or roadway modifications) and other infrastructure to support the subdivision, construction and operation of new commercial/retail establishments, changes in traffic/circulation patterns that result in increased congestion/delays, etc. In the case of a new mine project, indirect impacts can be generated by nearby construction of infrastructure to support the mine, housing constructed and/or occupied by mine employees, changes in traffic/circulation patterns that result in increased congestion/delays, etc.

Cumulative Impacts

Cumulative impacts are similar to direct and indirect impacts of the project, which the project contributes to. In the case of a subdivision project, a given project has a cumulative impact with all other subdivision projects, from the standpoint of each type of impact (cumulative construction emissions, residential natural gas consumption, solvent use, transportation emissions, congestion, etc.). Similarly, a new mine project has a cumulative impact with all other mining projects, from the standpoint of each type of impact (cumulative construction emissions, diesel equipment emissions, blasting emissions, fugitive emissions, transportation, congestion, etc.).

Conformity Impacts

A project is non-conforming if it conflicts with or delays implementation of any applicable attainment or maintenance plan. A project is conforming if it complies with all applicable District rules and regulations, complies with all proposed control measures that are not yet adopted from the applicable plan(s), and is consistent with the growth forecasts in the applicable plan(s) (or is directly included in the applicable plan). Conformity with growth forecasts can be established by demonstrating that the project is consistent with the land use plan that was used to generate the growth forecast. An example of a non-conforming project would be one that increases the gross number of dwelling units, increases the number of trips, and/or increases the overall vehicle miles traveled in an affected area (relative to the applicable land use plan).

Sensitive Receptor Land Uses

Residences, schools, daycare centers, playgrounds and medical facilities are considered sensitive receptor land uses. The following project types proposed for sites within the specified distance to an existing or planned (zoned) sensitive receptor land use must be evaluated using significance threshold criteria number 4 (refer to the significance threshold discussion):

- Any industrial project within 1000 feet;
- A distribution center (40 or more trucks per day) within 1000 feet;
- A major transportation project (50,000 or more vehicles per day) within 1000 feet;
- A dry cleaner using perchloroethylene within 500 feet;
- A gasoline dispensing facility within 300 feet.

Recommended Substantiation Discussion Elements

For projects applying the emissions-based significance thresholds, project emissions quantification is required. In addition the environmental documentation must include support for the quantification methodology used, including emission factors, emission factors source, assumptions, and sample calculations where necessary. For projects using a calculation tool such as CalEEMod or URBEMIS, the support section must specify the inputs and settings used for the evaluation.

Significance Thresholds

Any project is significant if it triggers or exceeds the most appropriate evaluation criteria. The District will clarify upon request which threshold is most appropriate for a given project; in general, the emissions comparison (criteria number 1) is sufficient:

1. Generates total emissions (direct and indirect) in excess of the thresholds given in Table 6;
2. Generates a violation of any ambient air quality standard when added to the local background;
3. Does not conform with the applicable attainment or maintenance plan(s) [1];

[1] A project is deemed to not exceed this threshold, and hence not be significant, if it is consistent with the existing land use plan. Zoning changes, specific plans, general plan amendments and similar land use plan changes which do not increase dwelling unit density, do not increase vehicle trips, and do not increase vehicle miles traveled are also deemed to not exceed this threshold.

4. Exposes sensitive receptors to substantial pollutant concentrations, including those resulting in a cancer risk greater than or equal to 10 in a million and/or a Hazard Index (HI) (non-cancerous) greater than or equal to 1.*

**Refer to the Sensitive Receptor Land Use discussion above*

A significant project must incorporate mitigation sufficient to reduce its impact to a level that is not significant. A project that cannot be mitigated to a level that is not significant must incorporate all feasible mitigation. Note that the emission thresholds are given as a daily value and an annual value, so that a multi-phased project (such as a project with a construction phase and a separate operational phase) with phases shorter than one year can be compared to the daily value.

Table 6 – Significant Emissions Thresholds

Criteria Pollutant	**Annual Threshold (tons)**	**Daily Threshold (pounds)**
Greenhouse Gases (CO2e)	100,000	548,000
Carbon Monoxide (CO)	100	548
Oxides of Nitrogen (NO_x)	25	137
Volatile Organic Compounds (VOC)	25	137
Oxides of Sulfur (SO_x)	25	137
Particulate Matter (PM_{10})	15	82
Particulate Matter ($PM_{2.5}$)	12	65
Hydrogen Sulfide (H_2S)	10	54
Lead (Pb)	0.6	3

District Contacts

If an address is not listed, please use the general address, to the attention of the listed individual.

AVAQMD General and Rulebook	Crystal Goree (661) 723-8070 x1 Mailing and Physical Address: 43301 Division St., Suite 206 Lancaster, CA 93535-4649
Planning and Rules	Tracy Walters (760) 245-1661 x6122
Air Quality and Meteorological Data	Orlando Salinas (760) 245-1661 x1810
CEQA and Conformity	Alan De Salvio (760) 245-1661 x6726
Permitting	Bret Banks (661) 723-8070 x2

Appendix A – Basic Definitions of Major Air Pollutants

Technical and/or legal definitions exist for many of these pollutants, depending on context. The following definitions are for general, introductory purposes only:

Carbon Dioxide (CO_2) – Common product of combustion. Not a criteria pollutant, but considered an important "greenhouse gas." Important on a national or global scale.

Carbon Monoxide (CO) – Common product of incomplete combustion. A criteria pollutant with state and federal standards. Not a primary photochemical reaction compound, but involved in photochemical reactions. Dissipates rapidly, and is therefore only important on a local scale near sources.

Criteria Pollutants – Those air pollutants specifically identified for control under the Federal Clean Air Act (currently six: carbon monoxide, nitrogen oxides, lead, sulfur oxides, ozone and particulates).

Lead (Pb) – A heavy metal, present in the environment mainly due to historical use in motor vehicle fuel. Primarily associated with lead smelting operations. A criteria pollutant with state and federal standards. Primarily of concern near sources.

Oxides of Nitrogen (NO_x) – Common product of combustion in the presence of nitrogen. Includes NO_2, which is a criteria pollutant with state and federal standards. Locally and regionally important due to its involvement in the photochemical formation of ozone.

Oxides of Sulfur (SO_x) – Common product of combustion in the presence of sulfur. Associated primarily with diesel and coal burning. Includes SO_2, a criteria pollutant with state and federal standards. Primarily of concern near sources.

Ozone (O_3) – A gas mainly produced by a photochemical reaction between reactive organic gases and oxides of nitrogen in the presence of sunlight (also produced by molecular oxygen in the presence of ultraviolet light or electrical discharge). A strong oxidant that is damaging at ground level but necessary at high altitude (in the stratosphere, where it absorbs dangerous ultraviolet light). Also considered an important greenhouse gas. A criteria pollutant with state and federal standards.

Particulate Matter (TSP or PM_{30}) – Solid or liquid matter suspended in the atmosphere, excluding water. Includes aerosols and droplets that form in the atmosphere. Locally and regionally important.

Reactive/Volatile Organic Compounds/Gases (ROG, VOC, NMOG, NMOC) – A portion of total organic compounds or gases, excludes methane, ethane and acetone (due to low photochemical reactivity). "ROG" is generally used by the California Air Resources Board, "VOC" is generally used by the United States Environmental Protection Agency, but all four terms are interchangeable for most uses. Regionally important due to its involvement in the photochemical reaction that produces ozone.

Respirable Particulate Matter (coarse or PM_{10}, and fine or $PM_{2.5}$) – That portion of particulate matter that tends to penetrate into the human lung. The subscript refers to aerodynamic diameter. Criteria pollutants with state and federal standards. Locally and regionally important.

Total Organic Compounds/Gases (TOC or TOG) – Compounds containing at least one atom of carbon, except carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and metallic carbonates. Primarily methane in the atmosphere, a "greenhouse gas."

ATTACHMENT B – CalEEMod Detailed Emissions Report

Air Quality Study - AV Engineering, APN 3051-019-030, and -112 Mini Storage Facility, Palmdale, CA Detailed Report

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1.1. Basic Project Information

Data Field	Value
Project Name	Air Quality Study - AV Engineering, APN 3051-019-030, and -112 Mini Storage Facility, Palmdale, CA
Construction Start Date	2/3/2025
Operational Year	2025
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.50
Precipitation (days)	13.0
Location	34.54402323457967, -118.0373979136933
County	Los Angeles-Mojave Desert
City	Palmdale
Air District	Antelope Valley AQMD
Air Basin	Mojave Desert
TAZ	3634
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.28

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
Industrial Park	91.7	1000sqft	2.62	91,663	24,141	0.00	—	—

Parking Lot	15.0	Space	0.15	0.00	0.00	0.00	—	—
Other Asphalt Surfaces	2.20	Acre	2.20	0.00	0.00	0.00	—	—
Other Non-Asphalt Surfaces	0.03	Acre	0.03	0.00	0.00	0.00	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

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

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	46.8	11.1	17.0	0.03	0.44	0.63	1.07	0.40	0.15	0.56	—	3,405	3,405	0.12	0.10	3,442
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.39	23.0	22.4	0.06	0.88	3.55	4.43	0.81	1.79	2.60	—	7,505	7,505	0.23	0.35	7,615
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	2.27	6.21	8.06	0.01	0.25	0.43	0.68	0.23	0.12	0.35	—	1,800	1,800	0.06	0.06	1,820
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.41	1.13	1.47	< 0.005	0.05	0.08	0.12	0.04	0.02	0.06	—	298	298	0.01	0.01	301

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	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	46.8	11.1	17.0	0.03	0.44	0.63	1.07	0.40	0.15	0.56	—	3,405	3,405	0.12	0.10	3,442
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	2.39	23.0	22.4	0.06	0.88	3.55	4.43	0.81	1.79	2.60	—	7,505	7,505	0.23	0.35	7,615
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	2.27	6.21	8.06	0.01	0.25	0.43	0.68	0.23	0.12	0.35	—	1,800	1,800	0.06	0.06	1,820
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.41	1.13	1.47	< 0.005	0.05	0.08	0.12	0.04	0.02	0.06	—	298	298	0.01	0.01	301

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.95	3.40	33.2	0.06	0.10	5.11	5.21	0.09	1.30	1.39	102	9,355	9,457	10.7	0.36	9,881
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.08	3.62	21.9	0.06	0.09	5.11	5.20	0.09	1.30	1.38	102	8,807	8,909	10.7	0.37	9,311
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.18	3.33	22.9	0.05	0.09	4.43	4.52	0.08	1.12	1.21	102	8,233	8,334	10.7	0.34	8,737
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unmit.	0.76	0.61	4.18	0.01	0.02	0.81	0.82	0.02	0.21	0.22	16.9	1,363	1,380	1.77	0.06	1,447

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	2.14	2.75	28.7	0.06	0.04	5.11	5.15	0.04	1.30	1.34	—	6,024	6,024	0.21	0.24	6,126
Area	2.78	0.03	3.99	< 0.005	0.01	—	0.01	0.01	—	0.01	—	16.4	16.4	< 0.005	< 0.005	16.5
Energy	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	3,134	3,134	0.21	0.02	3,145
Water	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Waste	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Total	4.95	3.40	33.2	0.06	0.10	5.11	5.21	0.09	1.30	1.39	102	9,355	9,457	10.7	0.36	9,881
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.93	3.00	21.4	0.05	0.04	5.11	5.15	0.04	1.30	1.34	—	5,493	5,493	0.21	0.25	5,573
Area	2.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	3,134	3,134	0.21	0.02	3,145
Water	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Waste	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Total	4.08	3.62	21.9	0.06	0.09	5.11	5.20	0.09	1.30	1.38	102	8,807	8,909	10.7	0.37	9,311
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	1.70	2.69	20.4	0.05	0.04	4.43	4.47	0.03	1.12	1.16	—	4,911	4,911	0.19	0.22	4,991
Area	2.45	0.02	1.97	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.08	8.08	< 0.005	< 0.005	8.11
Energy	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	3,134	3,134	0.21	0.02	3,145

Water	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Waste	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Total	4.18	3.33	22.9	0.05	0.09	4.43	4.52	0.08	1.12	1.21	102	8,233	8,334	10.7	0.34	8,737
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.31	0.49	3.72	0.01	0.01	0.81	0.82	0.01	0.21	0.21	—	813	813	0.03	0.04	826
Area	0.45	< 0.005	0.36	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.34	1.34	< 0.005	< 0.005	1.34
Energy	0.01	0.11	0.10	< 0.005	0.01	—	0.01	0.01	—	0.01	—	519	519	0.04	< 0.005	521
Water	—	—	—	—	—	—	—	—	—	—	6.72	29.9	36.6	0.69	0.02	58.8
Waste	—	—	—	—	—	—	—	—	—	—	10.1	0.00	10.1	1.01	0.00	35.5
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.95
Total	0.76	0.61	4.18	0.01	0.02	0.81	0.82	0.02	0.21	0.22	16.9	1,363	1,380	1.77	0.06	1,447

3. Construction Emissions Details

3.1. Site Preparation (2025) - 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	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.14	20.4	18.8	0.03	0.88	—	0.88	0.81	—	0.81	—	3,337	3,337	0.14	0.03	3,348
Dust From Material Movement	—	—	—	—	—	3.41	3.41	—	1.75	1.75	—	—	—	—	—	—

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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.56	0.52	< 0.005	0.02	—	0.02	0.02	—	0.02	—	91.4	91.4	< 0.005	< 0.005	91.7
Dust From Material Movement	—	—	—	—	—	0.09	0.09	—	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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	15.1	15.1	< 0.005	< 0.005	15.2
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—
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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05	0.06	0.67	0.00	0.00	0.13	0.13	0.00	0.03	0.03	—	129	129	0.01	< 0.005	130
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
Hauling	< 0.005	0.05	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	46.3	46.3	< 0.005	0.01	48.5
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.62	3.62	< 0.005	< 0.005	3.67
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

Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	1.27	1.27	< 0.005	< 0.005	1.33
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.60	0.60	< 0.005	< 0.005	0.61
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
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.21	0.21	< 0.005	< 0.005	0.22

3.3. Grading (2025) - 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	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.26	20.9	20.7	0.05	0.86	—	0.86	0.79	—	0.79	—	5,400	5,400	0.22	0.04	5,418
Dust From Material Movement	—	—	—	—	—	0.97	0.97	—	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	1.26	1.25	< 0.005	0.05	—	0.05	0.05	—	0.05	—	325	325	0.01	< 0.005	327
Dust From Material Movement	—	—	—	—	—	0.06	0.06	—	0.01	0.01	—	—	—	—	—	—
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

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.23	0.23	< 0.005	0.01	—	0.01	0.01	—	0.01	—	53.9	53.9	< 0.005	< 0.005	54.1
Dust From Material Movement	—	—	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.11	1.17	0.00	0.00	0.23	0.23	0.00	0.05	0.05	—	225	225	0.01	0.01	228
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
Hauling	0.04	1.98	0.47	0.01	0.03	0.51	0.54	0.03	0.14	0.17	—	1,880	1,880	< 0.005	0.30	1,969
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	13.9	13.9	< 0.005	< 0.005	14.1
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
Hauling	< 0.005	0.12	0.03	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	113	113	< 0.005	0.02	119
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	2.31	2.31	< 0.005	< 0.005	2.34
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
Hauling	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	18.8	18.8	< 0.005	< 0.005	19.7

3.5. Building Construction (2025) - 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	CO2e

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.39	3.61	4.50	0.01	0.15	—	0.15	0.14	—	0.14	—	828	828	0.03	0.01	831
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.66	0.82	< 0.005	0.03	—	0.03	0.03	—	0.03	—	137	137	0.01	< 0.005	138
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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.22	0.22	3.82	0.00	0.00	0.50	0.50	0.00	0.12	0.12	—	557	557	0.02	0.02	565
Vendor	0.02	0.46	0.18	< 0.005	0.01	0.13	0.14	0.01	0.04	0.04	—	451	451	< 0.005	0.06	471
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

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.20	0.24	2.58	0.00	0.00	0.50	0.50	0.00	0.12	0.12	—	495	495	0.03	0.02	501
Vendor	0.01	0.49	0.18	< 0.005	0.01	0.13	0.14	0.01	0.04	0.04	—	451	451	< 0.005	0.06	470
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
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.09	1.00	0.00	0.00	0.17	0.17	0.00	0.04	0.04	—	176	176	0.01	0.01	178
Vendor	0.01	0.17	0.06	< 0.005	< 0.005	0.04	0.05	< 0.005	0.01	0.01	—	156	156	< 0.005	0.02	162
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.02	0.18	0.00	0.00	0.03	0.03	0.00	0.01	0.01	—	29.1	29.1	< 0.005	< 0.005	29.5
Vendor	< 0.005	0.03	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	25.8	25.8	< 0.005	< 0.005	26.9
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

3.7. Paving (2025) - 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	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.80	7.45	9.98	0.01	0.35	—	0.35	0.32	—	0.32	—	1,511	1,511	0.06	0.01	1,517
Paving	0.34	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.37	0.49	< 0.005	0.02	—	0.02	0.02	—	0.02	—	74.5	74.5	< 0.005	< 0.005	74.8
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	0.09	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.3	12.3	< 0.005	< 0.005	12.4
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
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09	0.09	1.49	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	217	217	0.01	0.01	220
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
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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	9.78	9.78	< 0.005	< 0.005	9.92
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
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	1.62	1.62	< 0.005	< 0.005	1.64
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
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

3.9. Architectural Coating (2025) - 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	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.88	1.14	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	134
Architectural Coatings	46.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	4.39	4.39	< 0.005	< 0.005	4.40
Architectural Coatings	1.53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.73	0.73	< 0.005	< 0.005	0.73
Architectural Coatings	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

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.04	0.76	0.00	0.00	0.10	0.10	0.00	0.02	0.02	—	111	111	< 0.005	< 0.005	113
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
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
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.02	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	3.35	3.35	< 0.005	< 0.005	3.40
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.55	0.55	< 0.005	< 0.005	0.56
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
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

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Industrial Park	2.14	2.75	28.7	0.06	0.04	5.11	5.15	0.04	1.30	1.34	—	6,024	6,024	0.21	0.24	6,126
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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
Total	2.14	2.75	28.7	0.06	0.04	5.11	5.15	0.04	1.30	1.34	—	6,024	6,024	0.21	0.24	6,126
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	1.93	3.00	21.4	0.05	0.04	5.11	5.15	0.04	1.30	1.34	—	5,493	5,493	0.21	0.25	5,573
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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
Total	1.93	3.00	21.4	0.05	0.04	5.11	5.15	0.04	1.30	1.34	—	5,493	5,493	0.21	0.25	5,573
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	0.31	0.49	3.72	0.01	0.01	0.81	0.82	0.01	0.21	0.21	—	813	813	0.03	0.04	826
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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

Total	0.31	0.49	3.72	0.01	0.01	0.81	0.82	0.01	0.21	0.21	—	813	813	0.03	0.04	826

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	2,381	2,381	0.15	0.02	2,390
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	8.34	8.34	< 0.005	< 0.005	8.37
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	2,389	2,389	0.15	0.02	2,398
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	2,381	2,381	0.15	0.02	2,390
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	8.34	8.34	< 0.005	< 0.005	8.37
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00

Total	—	—	—	—	—	—	—	—	—	—	—	2,389	2,389	0.15	0.02	2,398
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	394	394	0.02	< 0.005	396
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	1.38	1.38	< 0.005	< 0.005	1.39
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	396	396	0.02	< 0.005	397

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	745	745	0.07	< 0.005	747
Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	745	745	0.07	< 0.005	747
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Industrial Park	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	745	745	0.07	< 0.005	747
Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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	0.03	0.62	0.52	< 0.005	0.05	—	0.05	0.05	—	0.05	—	745	745	0.07	< 0.005	747
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	0.01	0.11	0.10	< 0.005	0.01	—	0.01	0.01	—	0.01	—	123	123	0.01	< 0.005	124
Parking Lot	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	0.00
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
Other Non-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	0.01	0.11	0.10	< 0.005	0.01	—	0.01	0.01	—	0.01	—	123	123	0.01	< 0.005	124

4.3. Area Emissions by Source

4.3.1. 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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Consumer Products	1.97	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.65	0.03	3.99	< 0.005	0.01	—	0.01	0.01	—	0.01	—	16.4	16.4	< 0.005	< 0.005	16.5
Total	2.78	0.03	3.99	< 0.005	0.01	—	0.01	0.01	—	0.01	—	16.4	16.4	< 0.005	< 0.005	16.5
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	1.97	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	2.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.06	< 0.005	0.36	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.34	1.34	< 0.005	< 0.005	1.34
Total	0.45	< 0.005	0.36	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.34	1.34	< 0.005	< 0.005	1.34

4.4. Water Emissions by Land Use

4.4.1. 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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	40.6	180	221	4.18	0.10	355
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	6.72	29.9	36.6	0.69	0.02	58.8

Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	6.72	29.9	36.6	0.69	0.02	58.8

4.5. Waste Emissions by Land Use

4.5.1. 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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214

Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	61.3	0.00	61.3	6.12	0.00	214
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	10.1	0.00	10.1	1.01	0.00	35.5
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	10.1	0.00	10.1	1.01	0.00	35.5

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	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23.9
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial Park	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.95
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.95

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)

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

Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	2/3/2025	2/13/2025	6.00	10.0	—
Grading	Grading	2/14/2025	3/11/2025	6.00	22.0	—
Building Construction	Building Construction	3/12/2025	8/5/2025	6.00	126	—
Paving	Paving	8/6/2025	8/26/2025	6.00	18.0	—
Architectural Coating	Architectural Coating	8/27/2025	9/9/2025	6.00	12.0	—

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	2.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Scrapers	Diesel	Average	3.00	8.00	367	0.40
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	10.0	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT
Site Preparation	Hauling	0.70	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	17.5	18.5	LDA,LDT1,LDT2
Grading	Vendor	—	10.2	HHDT,MHDT
Grading	Hauling	28.4	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	38.5	18.5	LDA,LDT1,LDT2
Building Construction	Vendor	15.0	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	7.70	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	0.00	0.00	137,495	45,832	6,220

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	0.00	50.0	15.0	0.00	—
Grading	5,000	0.00	20.0	0.00	—
Paving	0.00	0.00	0.00	0.00	2.38

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	3	74%	74%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Industrial Park	0.00	0%
Parking Lot	0.15	100%
Other Asphalt Surfaces	2.20	100%
Other Non-Asphalt Surfaces	0.03	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2025	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
Industrial Park	309	233	114	98,603	7,211	5,435	2,653	2,301,807
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Non-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

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)
0	0.00	137,495	45,832	6,220

5.10.3. Landscape Equipment

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 CO_2 and CH_4 and N_2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Industrial Park	1,633,461	532	0.0330	0.0040	2,323,333
Parking Lot	5,724	532	0.0330	0.0040	0.00
Other Asphalt Surfaces	0.00	532	0.0330	0.0040	0.00
Other Non-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)
Industrial Park	21,197,069	390,705
Parking Lot	0.00	0.00
Other Asphalt Surfaces	0.00	0.00
Other Non-Asphalt Surfaces	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Industrial Park	114	—
Parking Lot	0.00	—
Other Asphalt Surfaces	0.00	—
Other Non-Asphalt Surfaces	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
Industrial Park	Other commercial A/C and heat pumps	R-410A	2,088	0.30	4.00	4.00	18.0

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

5.16. 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. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

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

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

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

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	31.0	annual days of extreme heat
Extreme Precipitation	1.85	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	9.14	annual hectares burned

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

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	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 Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	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 Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	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	88.7

AQ-PM	17.9
AQ-DPM	22.1
Drinking Water	48.4
Lead Risk Housing	42.7
Pesticides	18.6
Toxic Releases	79.3
Traffic	39.3
Effect Indicators	—
CleanUp Sites	17.1
Groundwater	0.00
Haz Waste Facilities/Generators	43.3
Impaired Water Bodies	0.00
Solid Waste	0.00
Sensitive Population	—
Asthma	73.7
Cardio-vascular	64.8
Low Birth Weights	96.6
Socioeconomic Factor Indicators	—
Education	82.2
Housing	47.6
Linguistic	85.1
Poverty	75.0
Unemployment	80.4

7.2. Healthy Places Index Scores

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

Indicator	Result for Project Census Tract
Economic	—

Above Poverty	37.61067625
Employed	24.27819838
Median HI	37.49518799
Education	—
Bachelor's or higher	9.829334018
High school enrollment	100
Preschool enrollment	73.96381368
Transportation	—
Auto Access	80.12318748
Active commuting	37.3668677
Social	—
2-parent households	57.48748877
Voting	24.66315925
Neighborhood	—
Alcohol availability	90.1321699
Park access	12.84486077
Retail density	11.11253689
Supermarket access	24.48351084
Tree canopy	10.08597459
Housing	—
Homeownership	77.71076607
Housing habitability	42.07622225
Low-inc homeowner severe housing cost burden	50.49403311
Low-inc renter severe housing cost burden	2.117284743
Uncrowded housing	46.83690491
Health Outcomes	—
Insured adults	34.83895804
Arthritis	81.7

Asthma ER Admissions	28.8
High Blood Pressure	80.7
Cancer (excluding skin)	85.3
Asthma	34.7
Coronary Heart Disease	74.7
Chronic Obstructive Pulmonary Disease	59.8
Diagnosed Diabetes	38.1
Life Expectancy at Birth	29.6
Cognitively Disabled	39.7
Physically Disabled	55.6
Heart Attack ER Admissions	10.5
Mental Health Not Good	27.0
Chronic Kidney Disease	55.3
Obesity	21.1
Pedestrian Injuries	19.6
Physical Health Not Good	32.1
Stroke	58.2
Health Risk Behaviors	—
Binge Drinking	33.9
Current Smoker	31.0
No Leisure Time for Physical Activity	36.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	19.9
Elderly	88.9
English Speaking	11.3
Foreign-born	66.6

Outdoor Workers	22.3
Climate Change Adaptive Capacity	—
Impervious Surface Cover	81.0
Traffic Density	38.0
Traffic Access	23.0
Other Indices	—
Hardship	72.0
Other Decision Support	—
2016 Voting	21.7

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	63.0
Healthy Places Index Score for Project Location (b)	39.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
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	Information provided by the client.
Construction: Construction Phases	An estimated start date of 2/3/2025, end date of 9/9/2025, and 6 workdays per week was provided by the client.
Construction: Off-Road Equipment	Information is provided by the client.
Construction: Dust From Material Movement	The amount of material import/export is provided by the client.

APPENDIX B – Biological Resource Assessment

Biological Resource Assessment of
APNs 3051-019-030, and 112
Palmdale, California

February 21, 2024

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Biological Resource Assessment of APNs 3051-019-030, and 112, Palmdale, California

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Abstract

Development has been proposed for APNs 3051-019-030, and 112, Palmdale, California. The approximately 5 acre (2 ha) study site was located north of Pearblossom Highway, and west of 52nd Street, T5N, R11W, the E1/2 of the E1/2 of the SE1/4 of the SW1/4 of Section 4, S.B.B.M. A transect survey was conducted on 14 February 2024 to inventory biological resources. The proposed project site was characteristic of a highly disturbed lot. A total of 15 plant species and 7 wildlife species or their sign were observed during the line transect survey. No desert tortoises (*Gopherus agassizii*) or their sign were observed within the study site. No Mohave ground squirrels (*Xerospermophilus mohavensis*) were observed or audibly detected. No Mohave ground squirrel habitat was present within or adjacent to the study site. No burrowing owls (*Athene cunicularia*) or their sign were observed within the study site. No potential for future cover sites for burrowing owls were present. No desert kit foxes (*Vulpes macrotis*) or their sign were observed within the study site. Three trees within a road drainage in the southeast corner of the study site offer potential nesting habitat for migratory birds. No Swainson's hawk (*Buteo swainsoni*) nests have been documented within 5 miles of the study site. No western Joshua trees (*Yucca brevifolia*), desert cymopterus (*Cymopterus deserticola*), Barstow woolly sunflowers (*Eriophyllum mohanense*), or alkali mariposa lilies (*Calochortus striatus*) were observed within the study site. No suitable habitat for sensitive species was present within the study site. No other state or federal listed species are expected to occur within the study site. No ephemeral streams or washes occur within the study site. A manmade road drainage was present within the study site.

Recommended Protection Measures:

If possible, removal or ground disturbance near the three American elm trees (*Ulmus americana*) will occur outside the breeding season for migratory birds. Nesting generally lasts from February to July but may extend beyond this time frame. If activities impacting the trees will occur during or close to the nesting season, a qualified biologist will survey this area as close as possible but no more than one week prior to disturbances. If active bird nests are found impacts to nests will be avoided by either delaying work or establishing initial buffer areas of a minimum of 500 feet (160 m) around active raptor nests or a minimum of 50 feet (16 m) around other migratory bird species nests. The project biologist will determine if the buffer areas should be increased or decreased based on the nesting bird response to disturbances.

Significance: Given the condition and small size of the study site and adjacent land uses this project would not result in an adverse impact to biological resources.

Development has been proposed for APNs 3051-019-030, and 112 (Figure 1). Development may include installation of access roads, parking, and utilities (water, sewer, electric, etc.). The entire project site would be graded prior to construction activities.

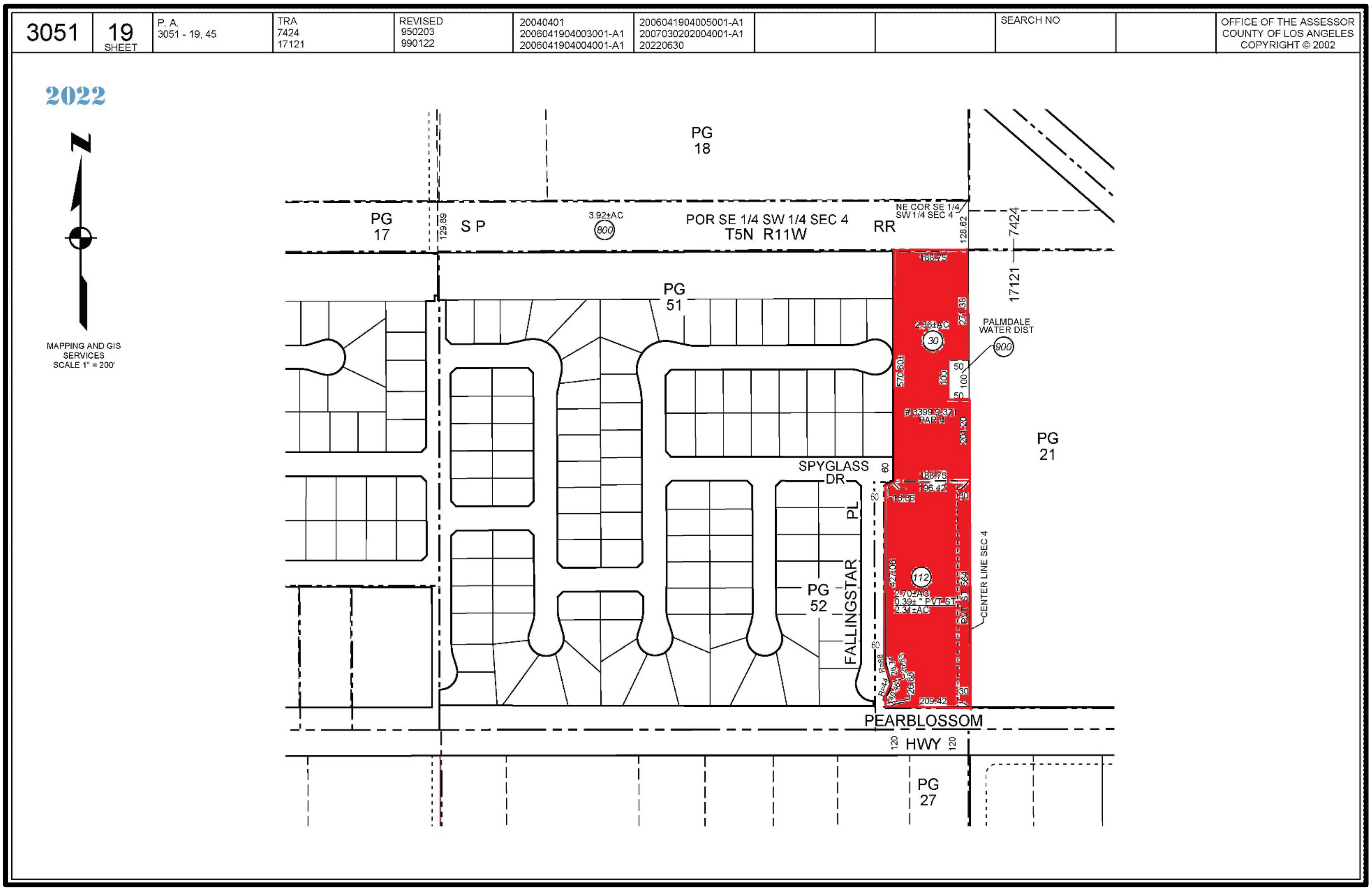

Figure 1. Location of proposed project site as depicted on APN map.

An environmental analysis should be conducted prior to any development project. An assessment of biological resources is an integral part of environmental analyses (Gilbert and Dodds 1987). The purpose of this study was to provide an assessment of biological resources potentially occurring within or utilizing the proposed project site. Specific focus was on the presence/absence of rare, threatened and endangered species of plants and wildlife. Species of concern included the desert tortoise (*Gopherus agassizii*), Mohave ground squirrel (*Xerospermophilus mohavensis*), burrowing owl (*Athene cunicularia*), Swainson's hawk (*Buteo swainsoni*), desert kit fox (*Vulpes macrotis)*, desert cymopterus (*Cymopterus deserticola*), Barstow woolly sunflower (*Eriophyllum mohanense*), alkali mariposa lily (*Calochortus striatus*), and Joshua tree (*Yucca brevifolia*).

Study Area

The approximately 5 acre (2 ha) study site was located north of Pearblossom HIghway, and west of 52nd Street, T5N, R11W, a portion of the E1/2 of the E1/2 of the SE1/4 of the SW1/4 of Section 4, S.B.B.M. (Figures 2 and 3). Residential housing formed the western boundary of the study site. Railroad tracks formed the northern boundary of the study site. Commercial buildings were present east of the eastern boundary of the study site. Pearblossom Highway formed the southern boundary of the study site. Single-family homes were present south of Pearblossom Highway.

Methods

A line transect survey was conducted to inventory plant and wildlife species occurring within the proposed project site (Cooperrider et al. 1986, Davis 1990). The USFWS (2010) has provided recommendations for survey methodology to determine presence/absence and abundance/distribution of desert tortoises. Random line transects were walked within the study site. The California Department of Fish and Game (2012) prepared recommendations for burrowing owl survey methodology. Consistent with the survey protocol the entire site was surveyed, and adjacent areas were evaluated (CDFG 2012). A habitat assessment was conducted for Mohave ground squirrels (MGS) to determine whether potential habitat was present for the species (CDFW 2019, Leitner and Leitner 2017).

All observations of plant and animal species were recorded in field notes. Field guides were used to aid in the identification of plant and animal species (Arnett and Jacques 1981, Borror and White 1970, Burt and Grossenheider 1976, Gould 1981, Jaeger 1969, Knobel 1980, Robbins et al. 1983, Stark 2000). Observations were aided with the use of 10x42 binoculars. Observations of animal tracks, scat, and burrows were also utilized to determine the presence of wildlife species inhabiting the proposed project site (Cooperrider et al. 1986, Halfpenny 1986, Lowrey 2006, Murie 1974). The USGS topographic map of the study site, and eBird were reviewed. Photographs of the study site were taken (Figures 4 and 5).

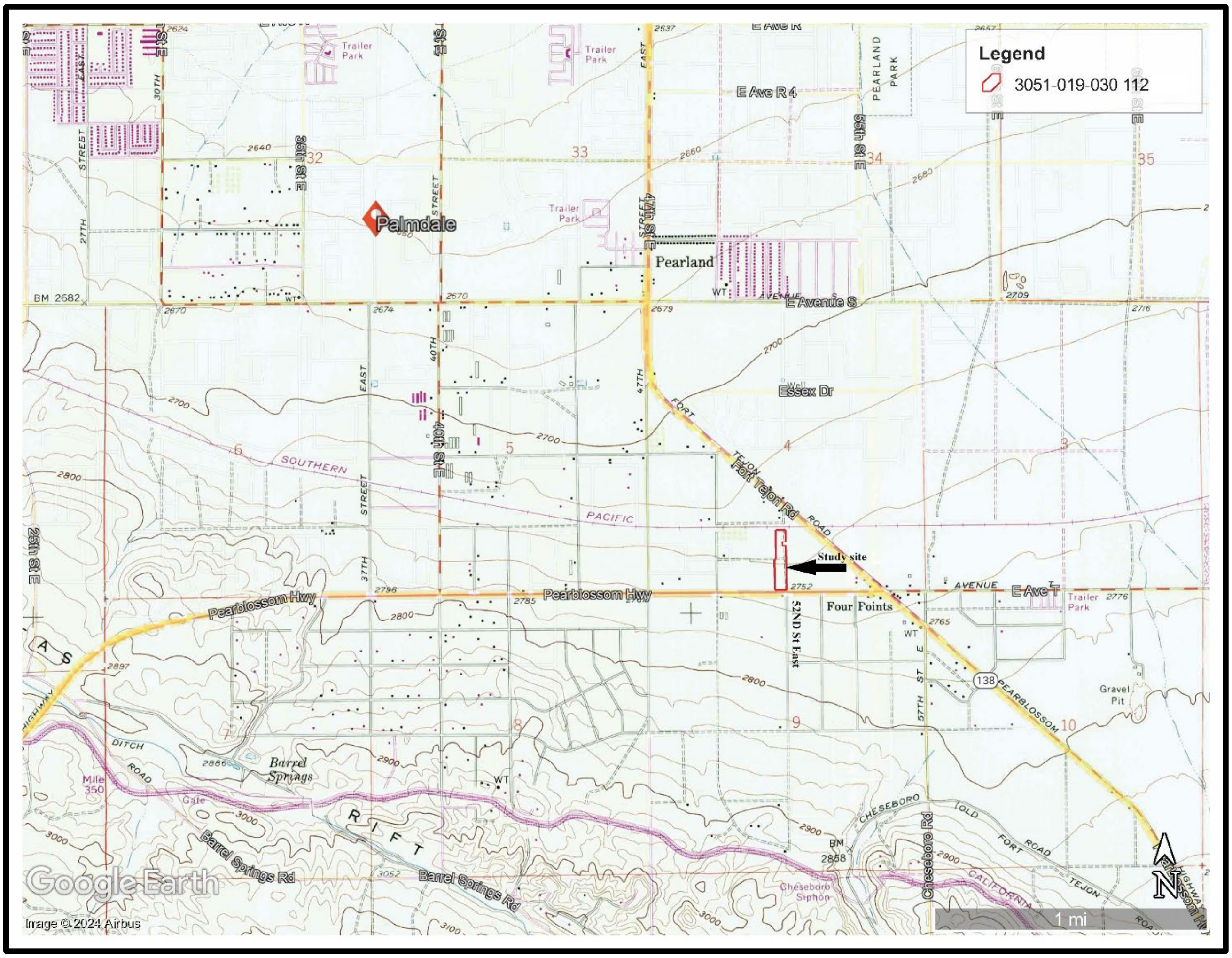

Figure 2. Approximate location of study site (see black arrow and red rectangle) as depicted on excerpt from USGS Quadrangle, Palmdale, California, 7.5', 1974.

Figure 3. Approximate location of study site, Google Earth May 2023, showing surrounding land use.

Figure 4. Top photo is view from the northwestern corner looking south. Bottom photo is facility seen in the top photo (likely a pump station) which is not part of the project site.

Figure 5. Top view from center of the site looking south southeast; bottom view from south looking north.

Results

A total of 4 random transects were walked on 14 February 2024. Weather conditions consisted of warm temperatures (estimated 60 degrees F), 50% hazy cloud cover, and light wind. Sandy loam surface soil texture with over approximately 75% of the study site covered with gravel and broken asphalt was observed within the study site. Topography of the study site was approximately 2,740 feet (835 m) above sea level. There were no blue line streams delineated on the U.S.G.S. topographic map within the study site. There were no washes or streams observed within the project site. One manmade road drainage was observed within the southeast corner of the study site.

The study site was characteristic of a highly disturbed lot. A total of 15 plant species were observed during the line transect survey (Table 1). The study site was all but devoid of perennial shrubs. Red-stem filaree (*Erodium cicutarium*) was the dominant annual species observed within the study site. No western Joshua trees, desert cymopterus, Barstow woolly sunflowers, or alkali mariposa lilies were observed within the study site. No sensitive species habitat was present within the study site.

A total of 7 wildlife species or their sign were observed during the line transect survey (Table 2). No desert tortoises or their sign were observed during the field survey. No suitable desert tortoise habitat was observed within or adjacent to the study site. No burrowing owls or their sign were observed within the study site during the field survey. No potential or future cover sites for burrowing owls were observed within the study site. Approximately 3 American elm trees were present within the study site which offer potential nesting habitat for migratory birds. No bird nests were observed within the study site. No suitable forage or nesting opportunity was present within the study site for Swainson's hawks. No desert kit foxes, dens, or tracks were observed within the study site. No Mohave ground squirrels were observed or audibly detected during the survey. No suitable Mohave ground squirrel habitat was observed within the study site.

Most of the study site was covered with gravel and broken asphalt. The northern area was being used as overflow for a regular occurring swap meet along the northeast boundary of the study site. Scattered litter, debris, and small dumps were observed within the study site. Railroad ties were within the study site.

Discussion

It is likely most annual species were visible during the time the field survey was performed. Although not observed, several wildlife species would be expected to occur within the proposed project site (Table 3).

Human impacts within the study site are expected to continue. Habitat in the general area consisted of an urban environment on three sides of the study site. Burrowing animals within the proposed project site are not expected to survive construction activities. More mobile species, such as birds, are expected to survive construction activities. Development of this site will result in a minimal loss of cover and foraging opportunities for the common wildlife species occurring within and adjacent to the study site.

Table 1. List of plant species that were observed during the line transect survey of APNs 3051-019-030, and 112, Palmdale, California.

Common Name	Scientific Name
American elm	*Ulmus americana*
Creosote	*Larrea tridentata*
Rabbit brush	*Chrysothamnus nauseosis*
Silverscale	*Atriplex argentea*
Desert straw	*Stephanomeria pauciflora*
Turkey mullein	*Eremocarpus setigerus*
Fiddleneck	*Amsinckia tessellata*
Russian thistle	*Salsola iberica*
Red-stem filaree	*Erodium cicutarium*
Prickly lettuce	*Lactuca seriola*
Annual burweed	*Franseria acanthicarpa*
Sahara mustard	*Brassica tournefortii*
Tumble mustard	*Sisymbrium altisissiimum*
Red brome	*Bromus rubens*
Schismus	*Schismus* sp.

Table 2. List of wildlife species, or their sign, that were observed during the line transect survey of APNs 3051-019-030, and 112, Palmdale, California.

Common Name	Scientific Name
Rodents	Order: Rodentia
Desert cottontail	*Sylvilagus auduboni*
Rock dove	*Columba livia*
Common raven	*Corvus corax*
Say's phoebe	*Sayornis saya*
House sparrow	*Passer domesticus*
European honey bees	Order: Hymenoptera

Table 3. List of wildlife species that may occur within the proposed study site, APNs 3051-019-030, and 112, Palmdale, California.

Common Name	Scientific Name
Domestic cat	*Felis* sp.
Domestic dog	*Canis familiaris*
European starling	*Sturnus vulgaris*
Fly	Order: Diptera
Spider	Order: Araneida

The desert tortoise is a state endangered and federal listed threatened species. The proposed project site was located within the geographic range of the desert tortoise. The proposed project site was not located in critical habitat designated for the Mojave population of the desert tortoise. Based on the location, condition, and results of the field survey, desert tortoises are not present within the study site. No protection measures are recommended for desert tortoises.

The Mohave ground squirrel (MGS) is a state listed threatened species. The proposed project site was located within the geographic range of the MGS. The western limit of the geographic range of the Mohave ground squirrel is currently thought to be Highway 14. Suitable habitat was not present within or adjacent to the study site. No MGS have been documented in Palmdale since the 1990s (CNDBB 2020, CDFW 2019, Leitner and Leitner 2017). MGS are not present within the study site. No protection measures are recommended for MGS.

Many species of birds and their active nests are protected under the Migratory Bird Treaty Act. The three trees within the study site offer potential nesting habitat for migratory birds. Swainson's hawk is a state threatened listed species. Based on an assessment of the pattern of Swainson's hawk sightings documented over time it does not appear Swainson's hawk would use this area (eBird 2024). Swainson's hawk observations appear to be strongly correlated to active agricultural fields, parks, and large retention basins within the Antelope Valley (eBird 2024). No Swainson's hawk nests have been documented within 5 miles (8 km) of the study site (eBird 2022). No Swainson's hawks are expected to use this study site. No protection measures for Swainson's hawks are recommended.

No western Joshua trees, desert cymopterus, Barstow woolly sunflowers, or alkali mariposa lilies were observed within the study site. No suitable habitat for western Joshua trees, desert cymopterus, alkali mariposa lilies, or Barstow woolly sunflowers was present or adjacent to the study site. No protection measures are recommended for plant species. No other state or federal listed species are expected to occur within the proposed project site (California Department of Fish and Wildlife 2023a-b).

Landscape design should incorporate the use of native plants to the maximum extent feasible. Native plants that have food and cover value to wildlife should be used in landscape design (Adams and Dove 1989). Diversity of native plants should be maximized in landscape design (Adams and Dove 1989).

Recommended Protection Measures:

If possible, removal or ground disturbance near the three American elm trees will occur outside the breeding season for migratory birds. Nesting generally lasts from February to July but may extend beyond this time frame. If activities impacting the trees will occur during or close to the nesting season, a qualified biologist will survey this area as close as possible but no more than one week prior to disturbances. If active bird nests are found impacts to nests will be avoided by either delaying work or establishing initial buffer areas of a minimum of 500 feet (160 m) around active raptor nests or a minimum of 50 feet (16 m) around other migratory bird species nests. The project biologist will determine if the buffer areas should be increased or decreased based on the nesting bird response to disturbances.

Significance: Given the condition and small size of the study site and adjacent land uses this project would not result in an adverse impact to biological resources if recommended protection measures are implemented.

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APPENDIX C – Phase I Cultural Resources Assessment

Stantec

PHASE I CULTURAL RESOURCES ASSESSMENT FOR THE FOUR POINTS MINI-STORAGE PROJECT (APN 3051-019-030 & 112) IN THE CITY OF PALMDALE, LOS ANGELES COUNTY, CALIFORNIA

May 10, 2024

Prepared for:

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The conclusions in this report, titled Phase I Cultural Resources Assessment for the Four Points Mini-Storage Project (APN 3051-019-030 & 112) in the City of Palmdale, Los Angeles County, California, are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from the Client and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by: ______________________
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Project Summary

Report Title:	Phase I Cultural Resources Assessment for the Four Points Mini-Storage Project (APN 3051-019-030 & 112) in the City of Palmdale, Los Angeles County, California
Consultant Archaeological Project Manager:	Emily Rinaldi-Williams, M.A.
Lead Archaeologist(s):	Kevin P. Groark, Ph.D.
Report Author(s):	Kevin P. Groark, Ph.D.
Report Date:	May 10, 2024
Fieldwork Dates:	April 27, 2024
County:	Los Angeles
Land Jurisdiction:	City of Palmdale
Legal Location:	Township 5 North, Range 11 West, Section 4, SBBM
United States Geological Survey 7.5' Quadrangle(s):	Palmdale, CA
Survey Data Shapefiles Provided:	☒ Yes ☐ No
Site Data Shapefiles Provided:	☐ Yes ☒ No
Newly Recorded Resources:	0
Previously Recorded Resources:	0
Total Cultural Resources:	0
Resources Recommended Eligible:	0
Resources Recommended Ineligible:	0
Resources Not Evaluated:	0
Resources Not Relocated:	0

Abstract

In accordance with the California Environmental Quality Act (CEQA) of 1970, as amended, and the requirements of the City of Palmdale, Stantec Consulting Services Inc. (Stantec) initiated a Phase I cultural resources investigation of a 5-acre property (Assessor's Parcel Numbers [APNs] 3051-019-030 & 112) on undeveloped land at Pearblossom Highway and Fallingstar Place in the City of Palmdale, Los Angeles County, California. The goal of this investigation was to identify, document, and evaluate any cultural resources of potential historical significance within the project site, as defined under CEQA.

A California Historical Records Information System (CHRIS) records search conducted by the South Central Coastal Information Center (SCCIC) at California State University, Fullerton, identified seven previous cultural resources studies that have been conducted within 0.25 miles (mi) of the project site; of these, zero have been conducted within or overlapping the project site. Seven cultural resources are recorded within the 0.25-mile buffer, none of which are located within the project site. A search of the Native American Heritage Commission's (NAHC) Sacred Lands File (SLF) returned negative results for tribal cultural resources (TCRs) within the project site and vicinity.

Following a review of the records search data, Stantec conducted an intensive pedestrian survey of the project site to identify cultural resources. The survey results were negative. Although subsurface testing was not performed as part of the study, the absence of significant surficial cultural resources or signs of midden soils suggests a low likelihood of discovering subsurface cultural materials or human remains on the subject property during ground-disturbing work.

Based on the records search, archival research, and intensive pedestrian field survey results, Stantec does not anticipate that the project will directly or indirectly impact any California Register of Historical Resources (CRHR)-eligible precontact or historic-era cultural resources. Any potential impacts to unidentified buried cultural resources or human remains will be reduced to a less than significant level with the implementation of Mitigation Measures CR-1 and CR-2 (see Section 8 of this report). As required under Assembly Bill (AB) 52, the City of Palmdale should consult with traditionally affiliated tribes to gain additional information on any unrecorded TCRs that might be present in the project site, to assess any potential impacts that might result from project implementation, and to develop appropriate mitigation measures. A list of tribal contacts is provided in Appendix C.

This cultural resources investigation conforms to the California Office of Historic Preservation's (OHP) Archaeological Resource Management Reports Recommended Contents and Format (1990) and the Secretary of the Interior's standards and guidelines for archaeology and historic preservation (48 Code of Federal Regulations [CFR] 44716).

Acronyms/Abbreviations

AB	Assembly Bill
AMSL	Above Mean Sea Level
APN	Assessor Parcel Number
ARMR	Archaeological Resource Management Reports
BERD	Built Environment Resources Directory
BLM GLO	Bureau of Land Management General Land Office
BP	Before Present
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGC	California Government Code
CHL	California Historical Landmarks
CHRIS	California Historical Resources Information System
CHSC	California Health and Safety Code
City	City of Palmdale
CRHR	California Register of Historical Resources
DPR	Department of Parks and Recreation
GPS	Global Positioning System
MLD	Most Likely Descendant
MSL	Mean Sea Level
NAHC	Native American Heritage Commission
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PRC	Public Resources Code
SB	Senate Bill
SCCIC	South Central Coastal Information Center
SHPO	State Historic Preservation Office
SLF	Sacred Lands File
SOI	Secretary of the Interior
Stantec	Stantec Consulting Services Inc.
TCR	Tribal Cultural Resource
USC	U.S. Code
USGS	United States Geological Survey

1 Project Location and Description

On 27 April 2024, in accordance with the California Environmental Quality Act (CEQA) of 1970, as amended, and the requirements of the City of Palmdale (City), Stantec Consulting Services Inc. (Stantec), under contract to Barry Munz / Antelope Valley Engineering, conducted a Phase I cultural resources investigation of a 5-acre property (Assessor's Parcel Numbers [APNs] 3051-019-030 & 112) on undeveloped land at Pearblossom Highway and Fallingstar Place in the City of Palmdale, Los Angeles County, California. The project site is specifically located in the SE ¼ of the SW ¼ of Section 4, Township 5 North, Range 11 West, San Bernardino Baseline Meridian, on the *Palmdale, Calif.,* 7.5' United States Geologic Survey (USGS) topographic quadrangle (Appendix A, Figures 1-2).

The proposed project consists of the development of a 702-unit mini-storage facility ("Four Points Mini-Storage") and associated infrastructure. The project site encompasses all access routes, staging areas, and all areas of planned ground disturbance, including grading and excavation.

This report is part of the environmental review process for the proposed project, as required by the City of Palmdale, pursuant to CEQA. CEQA mandates that state, county, and municipal agencies consider the impacts of their projects on the cultural environment, with particular attention to cultural resources that may be eligible for listing on the CRHR (Public Resources Code [PRC] § 21100 et seq.)

The purpose of this study is to provide the City with the necessary information and analysis to determine whether the proposed development would impact any "historical resources" (as defined in California PRC § 21084.1) that may exist in or near the project site. As defined under CEQA, "historical resources" include both precontact and historic-era resources more than 50 years old that are assessed as being "significant" due to an association with an important historic context, and in the case of most archaeological sites that are deemed significant, the potential to yield important information on prehistory or history.

The goals of this assessment include: 1) the identification and documentation of any cultural resources located on the property; 2) an evaluation of the significance of said resources, as defined under CEQA; and 3) an impact assessment for significant cultural resources, with recommended mitigation measures. This report presents the results of the Phase I Cultural Resources Assessment and is based on the following data sources:

- Records searches of the California Historical Resources Information System (CHRIS) and Native American Heritage Commission's (NAHC) Sacred Lands File (SLF) to assess recorded historic and prehistoric cultural resources, as well as tribal cultural resources (TCRs), in or near the project site.

- Historical topographical maps, aerial imagery, and Bureau of Land Management General Land Office (BLM GLO) patents for the subject property.

- Intensive pedestrian archaeological survey to identify cultural resources visible on the property's surface.

The regulatory framework provided by CEQA, as it relates to the assessment of significance for cultural resources, as well as the evaluation of impacts upon such resources from the proposed project. Kevin P. Groark, Ph. D., was the Principal Investigator and lead author for this cultural study. The assessment documented in this report was carried out in compliance with state regulations, and it has been prepared according to California Office of Historic Preservation (OHP) standards as outlined in *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* (OHP 1990).

2 Regulatory Context

2.1 STATE REGULATIONS

2.1.1 California Environmental Quality Act (CEQA)

CEQA requires public agencies to evaluate the implications of their project(s) on the environment, including but not limited to historical resources and tribal cultural resources. CEQA evaluation aims to determine if cultural resources qualify as “historical resources,” which are typically assessed based on their eligibility for listing in the CRHR.

Under CEQA, a project that results in a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (PRC § 21084.1). CEQA defines substantial adverse change as the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the resource is materially altered (PRC § 15064.5). Additionally, no project that may cause a substantial adverse change in the significance of a historical resource is exempt from CEQA (PRC § 21084[e]).

A resource is considered historically significant if listed on the CRHR or determined eligible for listing by the California State Historic Resource Commission. A historical resource may also be considered significant if the CEQA Lead Agency determines, based on substantial evidence, that the resource meets the criteria for inclusion on the CRHR.

2.1.2 California Register of Historical Resources (CRHR)

The CRHR is a listing of resources in the State of California that are significant to California’s history. The CRHR criteria are modeled after the National Register of Historic Places (NRHP) criteria; however, the CRHR focuses more closely on resources that have contributed to the development of California.

The CRHR serves as a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. It helps government agencies identify, evaluate, and protect California’s historical resources and indicates which properties are subject to mitigation from substantial adverse change (PRC § 5024.1[a]). The CRHR is administered through the State OHP.

CEQA manages cultural resources differently than under federal laws and regulations. CEQA requires consideration of impacts to:

- Historical resources

- Unique archaeological resources, and
- Tribal Cultural Resources

Each of these resource types is discussed below.

Historical Resources—In California, a “historical resource” is defined as a resource listed in or determined to be eligible for listing in the CRHR (PRC § 21084.1); a resource included in a local register of historical resources (CCR Tit. 14 § 15064.5[a][2]); or any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California” (PRC § 5020.1[j]).

Under CEQA (CCR Tit. 14 § 15064.5), the term “historical resource” specifically includes:

1) A resource listed in or determined eligible by the State Historical Resources Commission for listing in the CRHR (PRC § 5024.1; CCR Tit. 14 § 4850, et seq.).
2) A resource included in a local register of historical resources, as defined in PRC § 5020.1(k) or identified as significant in a historical resource survey meeting the PRC § 5024.1(g) requirements, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3) A resource that has been identified as significant in a historical resources survey, as defined in PRC § 5024.1; or
4) A resource that is determined to be historically significant by the CEQA Lead Agency (PRC § 5020.1[j] or 5024.1)

The specific criteria for listing resources in the CRHR were expressly developed to be in accordance with previously established criteria developed for listing in the NRHP, enumerated below. According to PRC § 5024.1(c)(1–4), a resource is considered historically significant if it (i) retains “substantial integrity” and (ii) meets at least one of the following criteria:

1) It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) It is associated with the lives of persons important to California history;
3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) It has yielded, or has the potential to yield, information important to the prehistory or history of California.

Accordingly, a cultural resource may be eligible for the CRHR because it is significant relative to state or local history, but that resource need not be significant at a national level, which would similarly make it eligible for inclusion in the NRHP. Therefore, any resource associated with California and eligible for or included in the NRHP is automatically considered eligible for inclusion in the CRHR, but resources found eligible for the CRHR may or may not be similarly eligible for the NRHP. Finally, the California State OHP recognizes an age threshold of 45 years. Cultural resources built less than 45 years ago may qualify for consideration, but only under extraordinary circumstances. If a cultural resource in question is an archaeological resource, CEQA Guidelines requires that the Lead Agency first determine if the resource is a historical resource as defined in CCR Tit. 14 § 15064.5(a) (CCR Tit. 14 § 15064.5[c][1]). Typically, archaeological sites exhibiting significant features qualify for the CRHR under Criterion D because such features have information important to the prehistory of California. However, a Lead Agency may determine that a resource may be a historical resource as defined in PRC § 5020.1(j) or 5024.1, even if it is:

- Not listed in or determined to be eligible for listing in the CRHR
- Not included in a local register of historical resources pursuant to PRC § 5020.1(k)
- Not Identified in a historical resources survey per PRC § 5024.1(g).

To be eligible for listing on the CRHR, a resource must not only be historically or architecturally significant under one or more of the criteria for listing, but it must also retain integrity, or its ability to convey its historical importance for its period of significance. Integrity is grounded in an understanding of a property's physical features and how they relate to its significance within one or more historical contexts. It is a function of the resource's location, design, setting, materials, workmanship, feeling, and association and must be closely related to the reason for the resource's significance. Resources that have lost a great deal of integrity are generally not eligible for the NRHP. However, the CRHR regulations have specific language regarding integrity that notes: "It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register" (CCR Tit. 14 § 4852).

If an archaeological resource does not qualify as a historical resource but does qualify as a "unique archaeological resource," then the archaeological resource is treated in accordance with PRC § 21083.2 (see also CCR Tit. 14 § 15064.5[c][3]).

According to CEQA, the fact that a resource is not listed in or determined eligible for listing in the CRHR or is not included in a local register or survey shall not preclude the Lead Agency from determining that the resource may be a historical resource (PRC § 5024.1). Pursuant to CEQA, a project with an effect that may cause a substantial adverse change in the significance of a historical resource may have a significant effect on the environment (CCR Tit. 14 § 15064.5[b]).

Unique Archaeological Resources—The second type of resource, "unique archaeological resource," is a rarely used classification of cultural resource considered under CEQA, established in 1981 by the Deddeh Act (AB 952), representing Section 21083.2 of the PRC and prior to the establishment of the CRHR criteria (AB 2881, 1992). The CEQA Guidelines require that lead agencies determine whether a site is a historical resource as defined above and in CCR Tit. 14 § 15064.5(a). Only if the site does not meet those definitions, then the Lead Agency must consider whether it represents a unique archaeological resource, which is defined as: "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria":

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information

2) Has a special and particular quality, such as being the oldest of its type or the best available example of its type

3) Is directly associated with a scientifically recognized important prehistoric or historic event or person (PRC § 21083.2[g]).

The definition of a unique archaeological resource mirrors the eligibility criteria for inclusion in the CRHR. As a practical matter, any resource that meets this definition will meet the comparable criteria for inclusion in the CRHR and vice versa, thereby triggering the requirement to avoid, minimize, or mitigate impacts.

Tribal Cultural Resources (TCR)—The final type of cultural resource subject to CEQA is "tribal cultural resources." Effective July 1, 2015, AB 52 amended CEQA to mandate consultation with California Native American tribes during the CEQA process to determine whether a proposed project may have a significant impact on a TCR. California Native American tribes are defined as "a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of the Statutes of 2004." (PRC § 21073).

For the purpose of CEQA, TCRs are defined as: "Sites, features, places, cultural landscapes (geographically defined in terms of the size and scope), sacred places, and objects with cultural value to a California Native American tribe that are either of the following":

a) Included or determined to be eligible for inclusion in the CRHR; and/or

b) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1; and/or

c) A resource determined by the Lead Agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the Lead Agency shall consider the significance of the resource to a California Native American tribe (PRC § 21074[a]).

Because criteria (a) and (b) also meet the definition of a historical resource under CEQA, a TCR may also require additional (and separate) consideration as a historical resource. Moreover, a tribal cultural resource may or may not also meet the definition of a Traditional Cultural Property under federal guidelines (Parker and King 1992).

Adverse Effects to Cultural Resources—State CEQA Guidelines specify that a "substantial adverse change in the significance of a historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired" (CCR Tit. 14 § 15064.5). Material impairment occurs when a project alters in an adverse manner or demolishes "those physical characteristics of a historical resource that convey its historical significance and that justify its inclusion" or eligibility for inclusion in the NRHP, CRHR, or local register. In addition, pursuant to State CEQA Guidelines, the "direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects" (CCR Tit. 14 § 15126.2).

A study for a project under CEQA requires consideration of "the whole of an action, which has the potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment" (CCR Tit. 14 § 15378). State CEQA Guidelines further define direct and indirect impacts:

1) A direct physical change in the environment is a physical change in the environment which is caused by and immediately related to the project.
2) An indirect physical change in the environment is a physical change in the environment which is not immediately related to the project, but which is caused indirectly by the project. If a direct physical change in the environment in turn causes another change in the environment, then the other change is an indirect physical change in the environment.
3) An indirect physical change is to be considered only if that change is a reasonably foreseeable impact which may be caused by the project (CCR Tit. 14 § 15064[d]).

If it can be demonstrated that a proposed project will cause damage to a unique archaeological resource, the Lead Agency may require reasonable efforts to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that they cannot be left undisturbed, mitigation measures are required (PRC § 21083.2[a], [b], and [c]). CEQA notes if an archaeological resource is neither a unique archaeological resource nor a historical resource, the effects of the project on those resources shall not be considered to be a significant effect on the environment (CCR Tit. 14 15064.5[c][4]).

2.1.3 California State Senate Bill 18 (SB 18)

Signed into law in 2004, SB 18 requires that cities and counties notify and consult with California Native American tribes about proposed local land use planning decisions for the purpose of protecting traditional tribal cultural sites. Cities and counties must provide general and specific plan amendment proposals to California Native American tribes that the NAHC has identified as having traditional lands located within the City's boundaries. If requested by the Native American tribes, the City must also conduct consultations with the tribes prior to adopting or amending their general and specific plans.

2.1.4 California State Assembly Bill 52 (AB 52)

Recognizing that California tribes are experts in their TCRs and heritage, AB 52 of 2104 formalized the consultation process to require the Lead Agency to initiate consultation with Native American groups traditionally and culturally affiliated with the Project, including tribes that may not be federally recognized. Lead agencies are required to begin consultation prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report. AB 52 requires that lead agencies consult with tribes at the commencement of the CEQA process to identify TCRs.

Section 4 of AB 52 adds Sections 21074(a) and (b) to the PRC, which address tribal cultural resources and cultural landscapes. Section 21074(a) defines tribal cultural resources as one of the following:

1. Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

    a. Included or determined to be eligible for inclusion in the CRHR.

    b. Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

2. A resource determined by the Lead Agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the Lead Agency shall consider the significance of the resource to a California Native American tribe.

Section 1 (a)(9) of AB 52 establishes that “a substantial adverse change to a tribal cultural resource has a significant effect on the environment.” Therefore, effects on TCRs should be considered under CEQA. Section 6 of AB 52 adds Section 21080.3.2 to the PRC, which states that parties may propose mitigation measures “capable of avoiding or substantially lessening potential significant impacts to a tribal cultural resource or alternatives that would avoid significant impacts to a tribal cultural resource.” Further, if a California Native American tribe requests consultation regarding project alternatives, mitigation measures, or significant effects to tribal cultural resources, the consultation shall include those topics (PRC § 21080.3.2[a]). The environmental document and the mitigation monitoring and reporting program (where applicable) shall include any mitigation measures that are adopted (PRC § 21082.3[a]).

Consultation is concluded when either the Lead Agency and tribes agree to appropriate mitigation measures to mitigate or avoid a significant effect, if a significant effect exists, or when a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached (PRC § 21080.3.2[b], whereby the Lead Agency uses its best judgment in requiring mitigation measures that avoid or minimize impact to the greatest extent feasible.

2.1.5 Treatment of Human Remains

The disposition of burials and cremations—whether intact or disturbed—falls under the general prohibition on disturbing or removing human remains under California Health and Safety Code (CHSC) § 7050.5. More specifically, remains suspected to be Native American are treated under CEQA at CCR Tit. 14 § 15064.5; PRC § 5097.98 illustrates the process to be followed if remains are discovered. If human remains are discovered during construction, no further disturbance to the site shall occur, and the County Coroner must be notified (CCR Tit. 14 § 15064.5 and PRC § 5097.98).

Section 7050.5 of the CHSC states the following regarding the discovery of human remains:

a) Every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in Section 5097.99 of the PRC. The provisions of this subdivision shall not apply to any person carrying out an agreement developed pursuant to subdivision (l) of Section 5097.94 of the PRC or to any person authorized to implement Section 5097.98 of the PRC.

b) In the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the Coroner of the County in which the human remains are discovered has determined, in accordance with Chapter 10 (commencing with Section 27460) of Part 3 of Division 2 of Title 3 of the California Government Code (CGC), that the remains are not subject to the provisions of Section 27491 of the CGC or any other related provisions of law concerning the investigation of the circumstances, manner and cause of any death, and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation or their authorized representative, in the manner provided in Section 5097.98 of the PRC. The Coroner shall make his or her determination within two working days from the time the person responsible for the excavation, or their authorized representative, notifies the Coroner of the discovery or recognition of the human remains.

c) If the Coroner determines that the remains are not subject to their authority and if the coroner recognizes the human remains to be those of a Native American or has reason to believe that they are those of a Native American, he or she shall contact, by telephone within 24 hours, the NAHC (CHSC § 7050.5).

Of particular importance to cultural resources is subsection (c), requiring the coroner to contact the NAHC within 24 hours if discovered human remains are determined to be Native American in origin. After notification, NAHC will follow the procedures outlined in PRC § 5097.98, which include notification of most likely descendants (MLDs), if possible, and recommendations for treatment of the remains. The MLD will have 24 hours after notification by the NAHC to make their recommendation (PRC § 5097.98). In addition, knowing or willful possession of Native American human remains or artifacts taken from a grave or cairn is a felony under State law (PRC § 5097.99).

2.1.6 Confidentiality of Cultural Resources Data

Under existing law, environmental documents must not include information about the location of an archaeological site or Native American sacred lands or any other information that is exempt from public disclosure pursuant to the Public Records Act (CCR Tit. 14 § 15120[d]). Native American graves, cemeteries, sacred places, records of Native American places, features, and objects are exempt from disclosure. (PRC § 5097.9, 5097.993.) The Public Records Act contains an exemption from disclosure for the items listed in these sections. Lead agencies under CEQA should maintain the confidentiality of cultural resource inventories or reports generated for environmental documents.

Recently enacted sections of CEQA govern confidentiality during tribal consultation. (PRC § 21082.3(c).) First, information submitted by a California Native American tribe during the environmental review process may not be included in the environmental document or disclosed to the public without the prior written consent of the tribe (however, consistent with current practice, confidential information may be included in a confidential appendix). A Lead Agency may also exchange information confidentially with other public agencies that have jurisdiction over the environmental document (PRC § 21082.3[c][1]).

Regarding a public agency acting as Lead Agency under CEQA, the Lead Agency and the tribe may share confidential information regarding tribal cultural resources with the project applicant. However, the project applicant should keep the information confidential unless the tribe consents to disclosure in writing to prevent looting, vandalism, or damage to the cultural resource. Additionally, information that is already publicly available, developed by the project applicant, or lawfully obtained from a third party that is not the tribe, Lead Agency, or another public agency may be disclosed during the environmental review process (PRC § 21082.3[c][2]).

2.2 LOCAL REGULATIONS

2.2.1 City of Palmdale General Plan (2045)

The City of Palmdale General Plan includes specific goals, objectives, policies, and actions related to protecting and conserving historic and archaeological resources. Policies that apply to the proposed project are listed below:

GOAL CON-8.1: Historic Landmark Identification. Identify and recognize historic landmarks from Palmdale's past.

GOAL CON-8.2: Cultural and historic buildings. Identify and preserve unique cultural and historic buildings and features in order to enhance community character.

GOAL CON-8.3: Identified landmarks. Maintain, rehabilitate, and appropriately reuse identified landmarks where feasible.

GOAL CON-8.4: Preservation in new development. Require that new development preserve significant historic, paleontological, or archaeological resources.

GOAL CON-8.5: Tribal consultation. Conduct Native American consultation consistent with the applicable regulations when new development is proposed in potentially culturally sensitive areas.

GOAL CON-8.6: Discovery coordination with Tribal groups. When human remains suspected to be of Native American origin are discovered, coordinate with the Native American Heritage Commission and any local Native American groups to determine the most appropriate course of action.

GOAL CON-8.7: Cooperation with preservation entities. Cooperate with private and public entities whose goals are to protect and preserve historic landmarks and important cultural resources.

GOAL CON-8.8: Recognition of local historic resources. Promote respect and recognition of unique historical resources within the community by identifying significant cultural resources with landmark designation plaques, directional signage, self-guided tours, school curriculum, programs, and events.

GOAL CON-8.9: Maintain cultural assets. Discourage historic landmark properties from being altered in such a manner as to significantly reduce their cultural value to the community.

3 Project Setting

The project site lies in Antelope Valley, a 3,000-square-mile area on the western edge of the Mojave Desert. The valley is separated from the San Joaquin Valley by the Tehachapi Mountains to the northwest. To the south and southwest, it is separated from the San Gabriel Valley by the San Gabriel Mountain Range. Isolated buttes distinguish the northern and eastern boundaries of Antelope Valley. The City of Palmdale lies in the southern part of Antelope Valley, adjoining the northern foothills of the San Gabriel Mountains.

3.1 ENVIRONMENTAL CONTEXT

The subject parcel is within the Mojave Desert Geomorphic Province (Jenkins 1938). This province lies east of the Great Basin geomorphic province and shares many of the same geomorphic features. Geologically, the Mojave Desert region is a tremendous wedge-shaped fault block, bounded to the southwest by the San Andreas fault, to the north and northwest by the Garlock fault, with an indefinite eastern boundary (Norris and Webb 1976). Mountain ranges separate the Mojave Desert from the coastal area to the southwest and the Basin and Range province to the north. The desert is characterized by north-south trending mountain ranges enclosing arid valleys and low-lying basins or sinks. All drainage within this plain is interior, resulting in several saline lakes. The province contains Paleozoic and Mesozoic rocks, while the desert is a Cenozoic feature formed by the Garlock and San Andreas faults (Oakeshott 1971). The valley floors are composed primarily of Pleistocene alluvium containing gravel, sand, and silt. Lithic resources are restricted to buttes and ridges. Significant rhyolite deposits are found in great quantity in the Fairmont Buttes, and high-quality cryptocrystalline silicates occur in the nearby Tehachapi Mountains.

The climate of the Mojave Desert is sub-arid, a transitional zone between the Great Basin's relatively colder climate and the Sonoran Desert's subtropical climate (Axelrod 1979; McCorkle-Apple and Lilburn 1992;). Seasonal temperatures vary, as do rain, general humidity, and wind levels. As a result, temperature extremes are common, ranging from well below freezing to over 100° Fahrenheit. Reliable water sources in the Mojave Desert are currently found only along major rivers, intermittent streams and springs, and seasonal claypans. Three main river systems flow into the Mojave Desert: the Mojave River, the Amargosa River, and the Owens River. During the Pleistocene and early Holocene, these rivers formed lakes where the present-day sinks are located.

Flora and fauna of the Mojave Desert have adjusted to these extreme environmental conditions and the unpredictable availability of freshwater sources. The project site lies in the Mojave Desert scrub vegetation community. This biome is dominated by drought-resistant bushes such as creosote (*Larrea tridentate*), all-scale (*Atriplex polycarpa*), brittlebush (Encelia farinose), desert holly (*Atriplex hymenelytra*), Joshua tree (*Yucca brevifolia*), and white burro brush (*Hymenoclea salsola*), all of which commonly occur near desert playas. In addition, black brush (*Coleogyne ramosissima*) and various cactus species are common throughout the region. Blackbrush communities (which include yuccas and agaves) dominate at lower elevations, giving way to creosote communities between 3900-6000 feet above mean sea level (AMSL) (Vasek and Barbour 1977:854). These plants were essential to the region's aboriginal inhabitants, having economic and nutritional uses. Finally, at higher elevations, we find piñon-juniper communities. Piñon nuts occur in the eastern and northern Mojave mountain ranges and were an essential aboriginal diet staple. The juxtaposition of different biotic communities and their vertical distribution provided a diverse inventory of foods critical to the native inhabitants of the region (Altschul 1991).

Fauna in the Mojave Desert includes a variety of rodents, reptiles, small carnivores, and birds. Reptile species include the desert tortoise (*Gopherus agassizi*), chuckwalla (*Sauromalus obesus*), rattlesnakes (*Crotalus spp.*), shovelnose snake (*Chionactis occipitalis*), and several species of lizards. Carnivores include coyotes (*Canis latrans*), badgers (*Taxidea taxus*), desert kit foxes (*Vulpes macrotis*), and bobcats (*Felis rufus*). The small mammals include black-tailed jackrabbits (Lepus californicus), woodrats (*Neotoma sp.),* ground squirrels (*Spermophilus sp.*), and cottontail jackrabbits (*Sylvilagus audobonii*). Large herbivores such as the desert bighorn sheep (*Ovis canadensis*) and mule deer (*Odocoileus hemionus*) can be found at higher elevations but are uncommon.

During the precontact period, the faunal community included pronghorn antelope (*Antilocapra americana*). Avifauna includes the LeConte thrasher (*Taxostoma lecontei*), sage thrasher (*Oreoscoptes montanus*), cactus wren (*Heleodytes brunneicapillu*s), raven (*Corvus corax*), red-tailed hawk (*Buteo jamaicensi*), turkey vulture (*Cathartes aura*), various ducks (*Anas spp*.), and the American coot (*Fulica americana*).

3.2 CULTURAL CONTEXT

3.2.1 <u>Precontact Overview</u>

Although archaeologists first became interested in the western Mojave Desert in the 1930s, little systematic research was done before the 1960s. Around that time, a sustained archaeology program based at Antelope Valley Community College (under the direction of Roger Robinson) began to identify site distributions and chronologies for the Antelope Valley region. Efforts since the 1960s have led to a precontact cultural chronology divided into seven periods distinguished by paleoclimatic variations and differences in adaptive strategies (Warren 1984).

Throughout the precontact period, many groups occupied the Mojave Desert. Although long-term habitation sites in the foothills and near rocky buttes have been found to contain significant subsurface depth, most archaeological sites on the valley floor are sparse surface scatters without subsurface components. Given the rarity of developed cultural middens, Mojave chronologies have relied on temporally diagnostic artifacts, such as projectile points, or upon the presence/absence of other temporal indicators, such as groundstone. Fagan (2003), Moratto (1984), Chartkoff and Chartkoff (1984), and Sutton et al. (2007) provide overviews of California archaeology in general and review the history of the desert regions in southern California. The most widely accepted regional chronology for Southern California's coastal and central interior is derived from Wallace's four-part Horizon format, which Warren later updated and revised (Wallace 1955, 1962, 1978; Warren 1984). Archaeologists generally follow Wallace's Southern California format, but the exact dates for each period remain approximations. The documented stages are as follows (from Lloyd 2007):

Paleoindian Period (before 10,000 BP): The earliest archaeological evidence of cultural activity in the western Mojave Desert occurs during the terminal Pleistocene, a period marked by rising temperature, precipitation, and unstable climate. Although evidence of a Paleoindian occupation in the region is sparse, marked by a single Clovis point recovered from the foothills of the Tehachapi Mountains (Glennan 1971), the valley was likely an ideal place for the exploitation of late Pleistocene megafauna.

Recent research at Searles Lake basin in the eastern Mojave Desert has identified geoglyphs and artifact concentrations dating back 11,000 years (Barna 2004). Archaeologists hypothesize that the earliest occupants of the region led a foraging lifestyle focused on lakeshore or wetland environments (Davis 1978; Moratto 1984). Thus, the population density was presumably relatively low. The tool kit included large lanceolate and fluted points (e.g., Clovis or Folsom) for hunting game, as well as crescents, gravers, scrapers, choppers, perforators, and numerous small formalized and informal flake tools (Davis 1978). Groundstone implements were rare, indicating that processed seeds or nuts did not play a significant dietary role.

Lake Mojave Period (10,000–7000 BP): Most of the early material identified within the valley dates to the Lake Mojave Period, when the climate was much drier than the preceding period with intermittent moist episodes. Numerous sites dating to this period have been found within the southwestern Great Basin and the northern Mojave Desert, suggesting a considerable population increase. Local sites from this interval include CA-KER-322, on the northwestern fringe of Rogers Lake (Peak 1974, 1976; Sutton 1979), and CA-KER-760, northeast of Rogers Lake (Robinson, personal communication 1980; in Sutton 1988). Lake Mojave artifacts include large percussion-flaked foliate and stemmed points and knives (typically Lake Mojave and Silver Lake types), stone crescents, and a wide variety of scrapers, gravers, and perforating tools. Groundstone implements continue to be rare. Sutton (1988:30) noted that Pleistocene Lake Thompson may have been inundated much of the Antelope and Fremont valleys. Because the relief in the valley is slight, extensive marshlands likely ringed the lake. Such marshes are among the most productive habitats, and Davis (1978) argued that these wetlands would have attracted early occupants. Thus, it is presumed that the adaptive strategy was one of generalized hunting and gathering focused on exploiting wetland resources.

Pinto Period (7000–4000 BP): A generalized hunting and gathering strategy continued into the Pinto Period; however, it underwent marked changes with the onset of greater aridity. The population decreased in response to variable and unstable climatic conditions and a decrease in permanent wetland habitats beginning in the mid-Holocene. This period corresponds to Antevs's (1953) Altithermal (i.e., hot and dry), although recent research suggests that in the Antelope Valley, this aridity was punctuated by wet episodes (Grayson 1993; Mehringer 1986). Sites from this period tend to be small seasonal camps near streams and seasonal water sources. They lack developed middens but contain a diverse tool kit consisting of Pinto projectile points, other flaked stone tools, ground stone milling slabs, and hand stones. The appearance of milling tools indicates an increased reliance on seeds and nuts from the scrub and chaparral plant communities as wetland resources diminished. Rhyolite, fine-grained basalts, and poorer quality chert and quartz materials dominate the lithic assemblages.

Gypsum Period (4000–1500 BP): The Little Pluvial episode occurred between 5000 and 2000 BP, marking a period of increased precipitation that intensified every thousand years until circa 1900 BP Modern vegetation and climate were well established by 4300 BP, and mesquite trees, oaks, and piñon were readily available. The mortar and pestle were introduced to process mesquite pods, acorns, pine nuts, yuccas, and agaves. The archaeological record is marked by large village sites reflecting a transition from seasonal migration to year-round or semisedentary settlements (Sutton 1988). The presence of coastal marine shell artifacts (e.g., *Olivella* beads) and Coso obsidian indicate that long-distance exchange systems were in place. Milling tools of various types dominate the artifact assemblages; diagnostic flaked stone artifacts include Humboldt, Elko, Gypsum, and Rose Spring projectile points.

Rose Spring/Saratoga Springs Period (1500–800 BP): This period is marked by moderate climatic conditions interrupted by severe drought at 1000– 900 BP. Adaptive strategies remain similar to the Gypsum Period, evinced by large village sites with deep middens reflecting a subsistence strategy focused on hunting and gathering and a continuation of trade networks with coastal and other outside groups (Moratto 1984; Sutton 1981). The most significant difference from the preceding period is the replacement of the atlatl, or spear thrower, by the bow and arrow. Projectile points diagnostic of this period include Rose Spring and Cottonwood points. Also prevalent are stone beads and schist and steatite ground stone artifacts reflecting the development of a regional stone trade. Schist and steatite stone workshops have been identified at habitation sites along Amargosa Creek west of Palmdale (Earle 2004). The end of the period is marked by a shift away from obsidian importation and increased use of local cryptocrystallines. Earle (2004) suggests that changes in regional networks of raw material exchange may be associated with a drought episode (circa 850–650 BP) and the migration of Numic-speaking populations out of southeastern California.

Late Prehistoric Period (800–300 BP): Adaptive strategies of the Rose Spring/Saratoga Springs Period continued during the Late Prehistoric Period. With the amelioration of climatic conditions and increased precipitation circa 600 BP, despite a severe drought around 500 BP, the population increased, and subsistence practices featured more intensive exploitation of various large and small mammals and some fish. The number of special-purpose sites appears to increase, the use of Coso obsidian declines, and coastal trade items (particularly shells) increase. Rose Spring and Cottonwood points continue during this period, while Desert Side-notched types are also introduced. Late-period sites in the Antelope Valley are distinguished from others in the southern Mojave Desert by their general lack of pottery. Moratto (1984) and others argue that the southwestern Hakataya influence prevalent along the Mojave River valley was relatively minor in Antelope Valley because trade between the coast was well established.

However, ceramic sherds have been found at CA-LAN-192 and other sites in the buttes (Earle 2004). Additional study of these sherds is necessary to determine their type. As Earle (2004) points out, their presence, along with the numerous shell beads, may reflect the existence of a coastal trans-Colorado trade route through the Antelope and Mojave River valleys. Alternatively, the pottery may be of Numic origin, suggesting an affiliation with Numic-speaking groups.

Ethnohistoric Period (300 BP to Present): At the time of first contact with Europeans, the western Mojave Desert was occupied by at least five groups of Shoshonean speakers: four from the Takic family and one from the Numic family. These include the Numic-speaking Kawaiisu of the Tehachapi Valley (and throughout the southern Sierra Nevada in the vicinity of Lake Isabella and Walker Pass), the Tataviam (Takic), who occupied the Santa Clarita Valley, with a territory that extended north to the southwestern edge of Antelope Valley; the Kitanemuk (Takic), who resided south of the Kawaiisu and north of the Tataviam on the northwestern edge of the west end of Antelope Valley; the Serrano (Takic), of the foothills of the San Gabriel Mountains, and their valley floor neighbors the Vanyume Serrano, who resided along the Mojave River in the Victorville region and the southern and southwestern portions of Antelope Valley. Ethnohistoric sources indicate that the principal ethnic groups occupying or utilizing the Antelope Valley were the Kitanemuk, Kawaiisu, Tataviam, and Vañume. In general, the native occupants lived in sizeable permanent winter villages. They dispersed into smaller mobile gathering groups during the late spring, summer, and fall months to harvest piñon nuts, mesquite, yucca buckwheat, chia, berries, and other seasonally available foods. The villages were exogamous, and marriage was patrilocal. Each village was ruled by a headman whose position was inherited from his father. Despite marital ties with other villages, most were politically independent.

Local Cultural Complexes: Based on data drawn from more than 20 years of archaeological excavation in the Mojave Desert, Sutton et al. (2007) have proposed a refined cultural chronology reflecting these local cultural trajectories. This revised chronology—which replaces Wallace's "cultural horizons" and Warren's "cultural periods" with local "cultural complexes"—is presented below in tabular form:

Date	Geological Epoch	Cultural Complex Sutton et al. (2007)	Cultural Period Warren (1984)	Cultural Horizon Warren (1984)	Artifacts
< 10,000 BP	Pleistocene to Early Holocene	Pre-Clovis*			Unknown
10,000-8,000 BP		Paleo-Indian	Clovis	Early Man	Fluted points
8,000-6,000 BP	Early Holocene	Lake Mojave	Lake Mojave	Millingstone	Stemmed points
7,000-3,000 BP	Middle Holocene	Pinto	Pinto		Pinto points
		Deadman Lake			Contracting stem & Leaf-shaped points
2,000 BP – 200 CE	Late Holocene	Gypsum	Gypsum	Intermediate	Gypsum & Elko Series points
200 – 1,100 CE		Rose Spring	Saratoga Springs		Rose Springs & Eastgate Series points
1,100 CE - Contact		Late Prehistoric	Protohistoric	Late Prehistoric	Desert Series points, ceramics

*Hypothetical cultural period; to date, no supporting material evidence

3.2.2 Ethnographic Overview

The project site lies near the traditional homeland of the Tataviam people, whose ancestral home stretches from the Liebre and Sawmill Mountains to the upper reaches of the Santa Clara River drainage in Los Angeles and Kern Counties. Like the neighboring Chumash, Gabrieliño, and Kitanemuk groups, the Tataviam adopted a general hunting and foraging subsistence strategy and did not farm or practice animal husbandry. The native language of the Tataviam may have been of the Takic family, and it likely diverged from various other languages in the family as late as 1,000 BP. The language was mutually exclusive at the onset of the historic period and unrecognizable to neighboring groups. Today, only a little historical information regarding the group is known, although their population at the time of historic contact is estimated to have been around 1,000 (King and Blackburn 1978).

The field notes of Smithsonian ethnographer John P. Harrington, collected in the first quarter of the 20th century, indicate that neighboring tribal groups whose core territories were located elsewhere utilized or traveled through the Antelope Valley occasionally and intermittently. Indeed, archaeological and ethnohistoric sources suggest that the Antelope Valley was an active hub of exchange and communication between coastal populations to the south and the west, interior populations living in the southern San Joaquin Valley to the north, and the Great Basin groups to the east. Harrington's field notes document extensive cultural exchanges (including trade, intermarriage, ceremonial exchanges, and conflict) between coastal, southern, and central California during the Spanish Period and into the historical era. Archaeological data indicates that these networks predated the mission system, characterizing interethnic relations during the precontact period. Southwestern Anasazi pottery sherds (including Tuzigoot White on Red, Flagstaff Black on White, and Wupatki Black on White—all from the

Verde River area southwest of Flagstaff) have been found at the Barrel Springs site in the southern foothills of the Antelope Valley, indicating trade networks extending well into the southwest region.

With the development of the Franciscan mission system, numerous Serrano people were relocated to the missions between 1800 and 1820. Earle suggests that small Numic-speaking groups of Chemehuevi-Southern Paiute affiliation migrated into the western Mojave Desert from the east and settled across the valley and the San Gabriel Mountains from the 1840s to 1890. More detailed overviews of the ethnography and ethnohistory of the region are available in Heizer (1978). Bean and Smith (1978) offer some information about the Vanyume and Serrano, while Blackburn and Bean (1978) present background data on the Kitanemuk. Significant ethnohistoric data on the tribal groups in the region can also be found in the unpublished ethnographic notes of John Peabody Harrington on file at the Smithsonian Institution.

3.2.3 Historic-Period Overview

The "historic period" in the Antelope Valley is generally understood to begin with the passage of Spaniards through the region in the mid- to late 18th Century. Captain Pedro Fages was the first recorded European to visit the Antelope Valley in 1772. However, the most well-known early entrada was that of Francisco Garcés. He was charged by the San Fernando mission to search out apostate Indians in the Antelope Valley in early 1776.

Fortunately, he left a detailed account of his journey through the region, and these records provide some of the earliest accounts of the native inhabitants of the area (notably, the Chemeheuvi, Kitanemuk, and Kawaiisu), as well as his stay at Willow Springs (near current-day Rosamond). Over the next 100 years, several small expeditions traveled through the region, including Jedediah Smith (1827), Kit Carson (1830), and perhaps most well-known, the John C. Fremont Expedition (1844), which undertook the first significant survey of the various resources of the region (Greenwood and McIntyre 1980).

Euro-American settlement began with the Southern Pacific Railroad, which laid tracks through the valley in 1876, connecting Los Angeles to San Francisco. The two cities of Lancaster and Palmdale originated in the late 1880s, following penetration by the Southern Pacific Railroad and its chain of stations and small settlements. Settlers flooded the Valley between the late 1870s and the turn of the century. Lancaster was the first stable community in the region, created in 1884 when a real estate developer named M.L. Wicks purchased six sections of land from the Southern Pacific Railroad and established a small farming community. By the turn of the century, Lancaster had become a prosperous and rapidly growing town.

Four events played critical roles in the settling of Antelope Valley. The first, as mentioned, was the entry of the Southern Pacific Railroad, which provided essential infrastructure and transportation. The second significant event was the 1877 Desert Lands Act, which granted title of government-held lands to private citizens at an affordable price. Third, and equally important, was the 1887 Wright Irrigation Act, which established irrigation districts and agricultural colonies. The fourth event was the completion of the California-Los Angeles Aqueduct system in 1913, which brought reliable water supplies into the region for domestic and agricultural uses.

The Palmdale area remained largely undeveloped until the Southern Pacific Railroad's completion through the Antelope Valley. In 1886, farming families, predominantly from the Midwest, settled in the region. Mistaking native Joshua trees for palms, they named their settlement Palmenthal. However, the valley's desert climate and subsequent drought soon made many agricultural homesteads unviable, forcing settlers to relocate closer to the Southern Pacific Railroad Station, now Palmdale's civic center.

The Los Angeles Aqueduct's completion in 1914 brought much-needed irrigation to the Antelope Valley, enabling the cultivation of pears, apples, and alfalfa. Despite this agricultural boost, Palmdale's character began to shift dramatically during World War II with the growth of the aerospace sector. The town's proximity to Edwards Air Force Base and the establishment of U.S. Air Force Plant 42 in 1953 transformed Palmdale into a hub of the U.S. aerospace industry. Today, Plant 42 and the adjacent Los Angeles/Palmdale Regional Airport employ thousands of military personnel and aerospace workers, hosting manufacturing and flight test facilities for industry giants like Northrop Grumman, Boeing, and Lockheed Martin.

4 Background Research

Prior to fieldwork, Stantec performed a cultural resources literature and records search of the project site and a 0.25-mile buffer. The records search and literature review provides a better understanding of the types of cultural resources that may be expected to occur within the project site. This review included a CHRIS records search, an examination of historical USGS topographic quadrangle maps, historical aerial imagery, BLM GLO records, and a review of secondary sources to determine the extent of previous inventories, previously recorded cultural resources, and historic-period activity in or near the project site.

4.1 CHRIS RECORDS SEARCH

On 23 February 2024, Stantec archaeologist Ben Kerridge, M.A., requested a CHRIS records search from the SCCIC at California State University, Fullerton. The records search included a review of all previously recorded cultural resources (historic and precontact) and previous cultural resources studies conducted within a 0.25-mile radius of the project site. In addition, the NRHP, CRHR, California Historical Landmarks, California Inventory of Historic Resources, California Points of Historical Interest, and the Built Environment Resource Directory (BERD) were consulted. These data were used to identify the cultural context for the project site, including the types and density of archaeological and historical resources.

Based on CHRIS data, seven previous cultural resources studies have been conducted within the 0.25 mi project buffer. Of these, zero previous cultural resources studies are recorded within the project site (see Table 1)

Table 1: Previous Cultural Resources Studies Within 0.25 mi of Project Site (n=7)

Report #	Year	Author(s)	Title	Affiliation	In Project Site
LA-01941	1989	Norwood, Richard H.	Cultural Resource Survey for Tentative Tract No. 47879 Palmdale, California	RT Factfinders	N

LA-01943	1989	Norwood, Richard H.	Cultural Resource Survey for Tentative Tract No. 48567 Palmdale, California	RT Factfinders	N
LA-01966	1989	Love, Bruce	Cultural Resources Evaluation for Tracts 49020 and 44325 Palmdale, Los Angeles County	Pyramid Archaeology	N
LA-02335	1991	Norwood, Richard H.	Cultural Resource Survey for Tentative Tract No. 46356, 20 Acres in Palmdale, California	RT Factfinders	N
LA-02336	1991	Norwood, Richard H.	Phase I Cultural Resource Study for Tentative Tract No. 46324, 25.5 Acres in Palmdale, California	RT Factfinders	N
LA-04007	1996	Unknown	Historic Resources Compliance Report for Improvements to Sierra Highway and Pearblossom Highway in the City of Palmdale, County of Los Angeles, California	Petra Resources, Inc.	N

Four previously recorded cultural resources are recorded within the 0.25 mi project buffer. Of these, zero are recorded within the project site (see Table 2).

Table 2: Previous Cultural Resources Within 0.25 mi of Project Site (n=4)

Primary #	Trinomial	Description	Attributes	Recordation	In Project Site
P-19-001687	CA-LAN-001687H	L. Town Ruins	AH02; AH04; AH05; AH06; AH11	1989 (RH Norwood, RT Factfinders)	N
P-19-100004	—	104/03	AP02	1990 (William H. De Witt, Pyramid Archaeology)	N
P-19-120020	—	Historic Porch Foundation	AH02	1996 (J. Rosenthal, P. Jertberg, Petra Resources, Inc)	N
P-19-192304	—	California State Route 18; Palmdale Blvd	HP37	2015 (Carrie Chasteen, Applied Earthworks); 2016 (Kristina Lindgren, ECORP)	N

4.2 SACRED LANDS FILE (SLF) SEARCH

The NAHC maintains the confidential SLF containing sites of traditional, cultural, or religious value to Native American tribes. On 23 February 2024, Stantec archaeologist Ben Kerridge requested an SLF search from the NAHC. Results were received from the NAHC in a letter dated 11 March 2024. The results of the SLF file search were negative for the presence of recorded TCRs in or near the project site.

The NAHC noted that tribes do not always record their sacred sites in the SLF, nor are they required to do so, and an SLF search is not a substitute for AB 52 consultation with tribes that are traditionally and culturally affiliated with the project's geographic area. Therefore, Stantec recommends that the Lead Agency contact traditionally affiliated tribes for additional information on any TCRs, as well as other Native American tribes who may also have knowledge of tribal cultural resources in or near the project site, to fully assess the potential impact of the project on any tribally-recognized resources. A list of tribes and their contact information is provided, along with the NAHC's response (see Appendix C).

4.3 BLM GLO RECORDS

The BLM GLO land patents database records a single transaction for the subject parcel: On 1/21/1890, Horatio Marteen was deeded 160 acres of land encompassing the project site under the Homestead Act of 1862. Marteen's name does not appear in local historical accounts of Palmdale, nor does he appear to be a significant person in California's history.

4.4 HISTORICAL TOPOGRAPHICAL MAPS & AERIALS

Stantec reviewed historical USGS topographic maps of the Elizabeth Lake, Pearland, and Palmdale, CA Quadrangles to help identify past uses of the project site and the potential for cultural resources. The following list summarizes the maps reviewed and relevant results:

- **1915 Elizabeth Lake, CA** (1:125,000) – No structures shown on the subject property.
- **1930 Pearland, CA** (1:24,000) – No structures shown on subject property.
- **1934 Pearland, CA** (1:24,000) – No structures shown on subject property.
- **1958 Palmdale, CA** (1:24,000)—Dirt roads appear on the subject property, one running north-south and two running east-west. The railroad is shown in its current location immediately north of the property. No structures are shown on the subject property.

A review of historic aerials and satellite imagery indicates that the project site was graded and in agricultural production as early as 1948. By 1974, the railroad is shown in its current location at the north end of the project site. By 2009, the north-south dirt road had been graded, and a small utility building is now shown. By 2022, almost the entirety of the project site had been covered in imported gravel.

Historical sources consulted for this study suggest that the project site is relatively low in sensitivity for historic-era cultural resources. Historic topographical maps and aerials indicate that the parcel has been largely undeveloped up to the present. Sometime before 1948, the project site was graded and was in agricultural use. No further development of the project site is evident until 2009, when a north-south dirt road was constructed. No other features or structures are present.

5 Survey Methods

On 27 April 2024, Stantec archaeologist Kevin P. Groark, Ph.D., completed an intensive pedestrian survey of the project site. The project location was confirmed using GPS, the setting and disturbances were recorded and photo-documented with a digital camera, and digital fieldnotes were taken. The project site was surveyed using systematic, parallel transects spaced 15 meters or less. The survey aimed to locate and document any previously recorded or newly identified cultural resources 45 years old or older, including archaeological sites, features, isolates, and historic resources within the project boundaries. Where present, exposed subsurface sediments (for example, in road cuts and rodent burrows) were visually examined for cultural resources or midden soils. Fieldwork methods and personnel meet or exceed the Secretary of the Interior's standards. All photographs and documentation are on file at Stantec's office in Monrovia, California, and representative photographs of the project site are included in Appendix B.

6 Survey Results

The Subject Property is a vacant rectangular parcel 2,740 feet AMSL. The property's topography is relatively flat, with a slight descending gradient toward the north. Adjoining properties include residential housing tracts to the west, a railroad line to the north, and a gas station to the east. Soils in the project site consist of a yellow-tan sandy loam characterized by granular materials of silty or clayey gravel and sand.

Approximately 90 percent of the project site was covered in a thick layer of coarse imported gravel. A wide north-south gravel access road runs along the western side of the project site from Pearblossom Highway to the gravel parking area at the northern end of the parcel. Most of the remaining portions of the parcel were covered in gravel and/or thick vegetation; the western side of the road was mostly desert grasses and tumbleweeds, and dense stands of green shrubby vegetation characterized the eastern side of the road. Due to gravel and vegetation, surface visibility was poor (0-20 percent) across the site (see Appendix B for photographs of the project site).

Despite the poor visibility, a very light scatter of modern refuse—consisting primarily of domestic refuse and bottle fragments—was noted across much of the project site. A pile of recently deposited construction debris (~15 pressure-treated salvaged lumber beams, ranging in size from 6 in. x 10 in. x 48 in. to 6 in. x 10 in. x 108 in.) was identified just southwest of the small utility building near the north end of the project site. A review of satellite imagery indicates that the lumber was imported to the site sometime around 2022 when the parcel was used as a construction storage lot; they are not present in the images from 2020 and earlier and do not qualify as cultural resources under CEQA. No surface evidence of precontact or historic-era cultural resources was identified during the survey.

7 Cultural Resources Impact Analysis

This section discusses potential impacts associated with the proposed project, with suggested mitigation measures for historical resources, archaeological resources, and human remains:

7.1 HISTORICAL RESOURCE (IMPACT CR-1)

Threshold: Would the project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5 of the State CEQA Guidelines?

Impact Analysis CR-1: No historical resources eligible for the CRHR were identified on the subject property. Therefore, there will be no impact to historical resources, and no mitigation is required.

Level of Significance Before Mitigation: N/A

Mitigation Measure CR-1 (MM-CR-1): No mitigation is necessary.

Level of Significance After Mitigation: N/A

7.2 ARCHAEOLOGICAL RESOURCE (IMPACT CR-2)

Threshold: Would the project cause a substantial adverse change in the significance of an archaeological resource as defined in Section 15064.5 of the State CEQA Guidelines?

Impact Analysis CR-2: As previously discussed, the results of the SCCIC records search indicate that there are zero previously recorded archaeological sites within the project site and four within 0.25 miles. Moreover, no archaeological resources (precontact or historic-era) were identified during an intensive pedestrian survey of the project site.

Although there is no evidence of subsurface archaeological deposits, visibility was poor across much of the project site. In addition, the project site could contain buried deposits, such as precontact cultural materials, refuse deposits, or architectural features (e.g., foundations, walls, etc.) that are not visible during a pedestrian survey. Although agricultural development in the late 19th and early 20th centuries likely disturbed upper soil layers and any possible surficial deposits, intact archaeological deposits could be preserved in deeper layers. The proposed project will involve ground disturbance, which could result in the inadvertent discovery and/or disturbance of an archaeological resource. Any previously unrecorded cultural resources encountered during construction would be potentially eligible for the CRHR and, thus, a potential historical resource under CEQA. In such a situation, the proposed project could cause a substantial adverse change in its significance, thereby impacting a historical resource. This impact is considered potentially significant but would be reduced to a less than significant level by implementing Mitigation Measures CR-2.

Level of Significance Before Mitigation: Potentially Significant Impact.

Mitigation Measure CR-2 (MM-CR-2)—Inadvertent Discoveries: If surficial or buried cultural resources (such as chipped or ground stone, historic debris, or building foundations) are encountered during ground-disturbing activities, work shall stop in that area and within a 100-foot radius of the find until a qualified archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology can assess the significance of the discovery and, if necessary, develop a response plan with appropriate treatment measures, in consultation with the City and other relevant agencies. If necessary, the evaluation may require the preparation of a treatment plan and Phase II archaeological testing to determine CRHR eligibility. Preservation in place (avoidance, open space, capping, easement) shall be the preferred treatment method per State CEQA (CCR Tit 14. § 15126.4[b]). If the discovery proves significant under CEQA and cannot be avoided by the project, data recovery may be warranted to exhaust the resource's data potential, thereby reducing any impact to a less-than-significant level. Construction shall not resume until a qualified archaeologist has conferred with the City on the significance of the resource and the recommendations made by the Qualified Archaeologist have been implemented to the reasonable satisfaction of the archaeologist.

Level of Significance After Mitigation: Implementation of mitigation measures MM-CR-2 would avoid impacts during construction if archaeological resources are discovered during excavation and grading activities, as all work activities in the area (within approximately 100 feet) of the discovery would be halted until a qualified archaeologist has evaluated the find, coordinated with appropriate Native American representatives, and developed an Archaeological Resources Treatment Plan for the resource(s) in consultation with the City. **Therefore, with the implementation of mitigation measures MM-CR-2, impacts on archaeological resources would be less than significant.**

7.3 HUMAN REMAINS (IMPACT CR-3)

Threshold: Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Impact Analysis CR-3: There is no evidence of cemeteries or burials in the historical records for the project site. While no formal cemeteries, burial grounds, or other places of human interment are known to occur within the immediate vicinity, there is always a possibility that human remains could be encountered during construction. In the event of discovery, compliance with the regulatory requirements outlined in MM-CR-3 would reduce potential impacts to a less than significant level.

Level of Significance Before Mitigation: Potentially Significant Impact.

Mitigation Measure CR-4 (MM-CR-3)—Inadvertent Discovery of Human Remains: If previously unknown human remains are found during excavation, the Project will follow procedures as detailed in the CHSC § 7050.5. If human remains of Native American origin are discovered during construction, the project shall comply with State laws, which fall within the jurisdiction of the NAHC relating to the disposition of Native American burials (PRC § 5097). Upon discovery of human remains, all work within a minimum of 200 feet of the find must cease immediately, and the County Coroner must be notified and allowed to examine the remains. If the Coroner determines the remains to be of Native American origin, he or she shall notify the NAHC. The NAHC shall then identify the MLD to be consulted regarding treatment and/or repatriation of the remains. The MLD shall be granted access to examine the remains and has 48 hours to provide recommendations for the treatment or reburial of the remains. If the MLD fails to make a recommendation within 48 hours of being granted access to the remains, the land manager/owner can rebury the remains in a location not subject to further disturbance. If the Coroner determines that no investigation of the cause of death is required and that the human remains are not Native American, then ground-disturbing activities may resume after the Coroner informs the County of Los Angeles of such determination. According to State law, six or more human burials at one location constitute a cemetery, and disturbance of Native American cemeteries is a felony.

Level of Significance After Mitigation: In the unlikely event that human remains are discovered during construction, compliance with the regulatory requirements outlined in MM-CR-3 would reduce potential impacts to a less than significant level. **Therefore, with the implementation of mitigation measures MM-CR-3, impacts to human remains would be less than significant.**

8 Summary

Stantec conducted a cultural resources assessment in support of the planned development of a 702-unit mini-storage facility (“Four Points Mini-Storage”) at the northeast corner of Pearblossom Highway and Fallingstar Place in Palmdale, California. This work was required by the City to fulfill its responsibilities as the Lead Agency under CEQA. The assessment included a CHRIS records search, an SLF records search conducted by the NAHC, a review of historic USGS maps, aerial imagery, and BLM GLO land patents, and an intensive-level pedestrian survey of the project site. The goal of this assessment was to identify, document, and evaluate any cultural resources of potential historical significance located on the property, as defined under CEQA.

A CHRIS Information Center records search indicates that seven previous cultural resources studies have been conducted within 0.25 mi of the project site; of these, zero have been undertaken within or overlapping the project site. Seven previously recorded cultural resources are recorded within the 0.25-mile records search buffer, none of which are within the project site. Results from the SLF records search conducted by the NAHC were negative, indicating that no TCRs have been recorded in or near the project site (see Appendix C).

Following background data collection, Stantec conducted a pedestrian survey of the project site to identify any cultural resources that may be present. No precontact or historic-era cultural resources were identified. However, surface visibility was poor at the time of the survey, and unidentified cultural resources could be present under the imported gravel and dense vegetation cover present at the project site.

9 Recommendations

Based on the CHRIS records search, SLF search, and intensive pedestrian field survey results, Stantec recommends that the City reach a finding that no known CRHR-eligible historic or precontact cultural resources will be affected by the proposed development. However, poor ground visibility limited the ability to fully assess the project site for the presence of cultural resources. Although subsurface testing was not conducted as part of this study, the absence of previously recorded sites, visible surficial cultural resources, or signs of midden soils suggests a low likelihood of subsurface cultural materials or human remains within the project site. In addition, no intact landforms or surfaces are present; the entirety of the project site was disced/graded in the 1940s for agricultural use. Any impacts to unidentified surficial or buried cultural resources or human remains will be reduced to a less than significant level with the implementation of Mitigation Measures CR-2 and CR-3 (see Section 7).

Also, as required under AB 52, Stantec recommends the City consult with traditionally affiliated tribes to gain additional information on the nature and location of any unrecorded tribal cultural resources that might be present within the project site and immediate vicinity, to assess any potential impacts that may result from project implementation, and to develop appropriate mitigation measures in consultation with the appropriate tribes.

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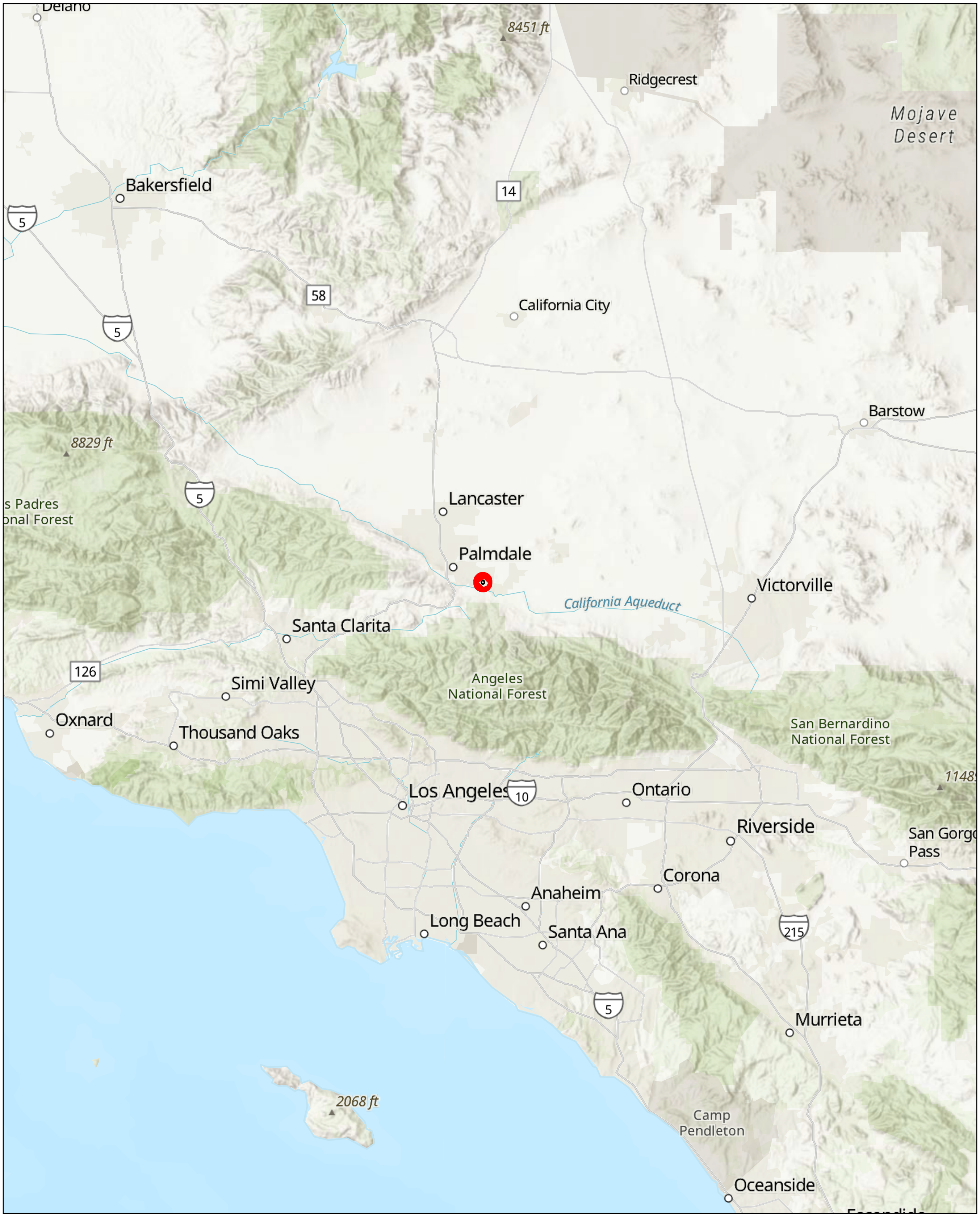
APPENDIX A

Figures



185806435 Project Area

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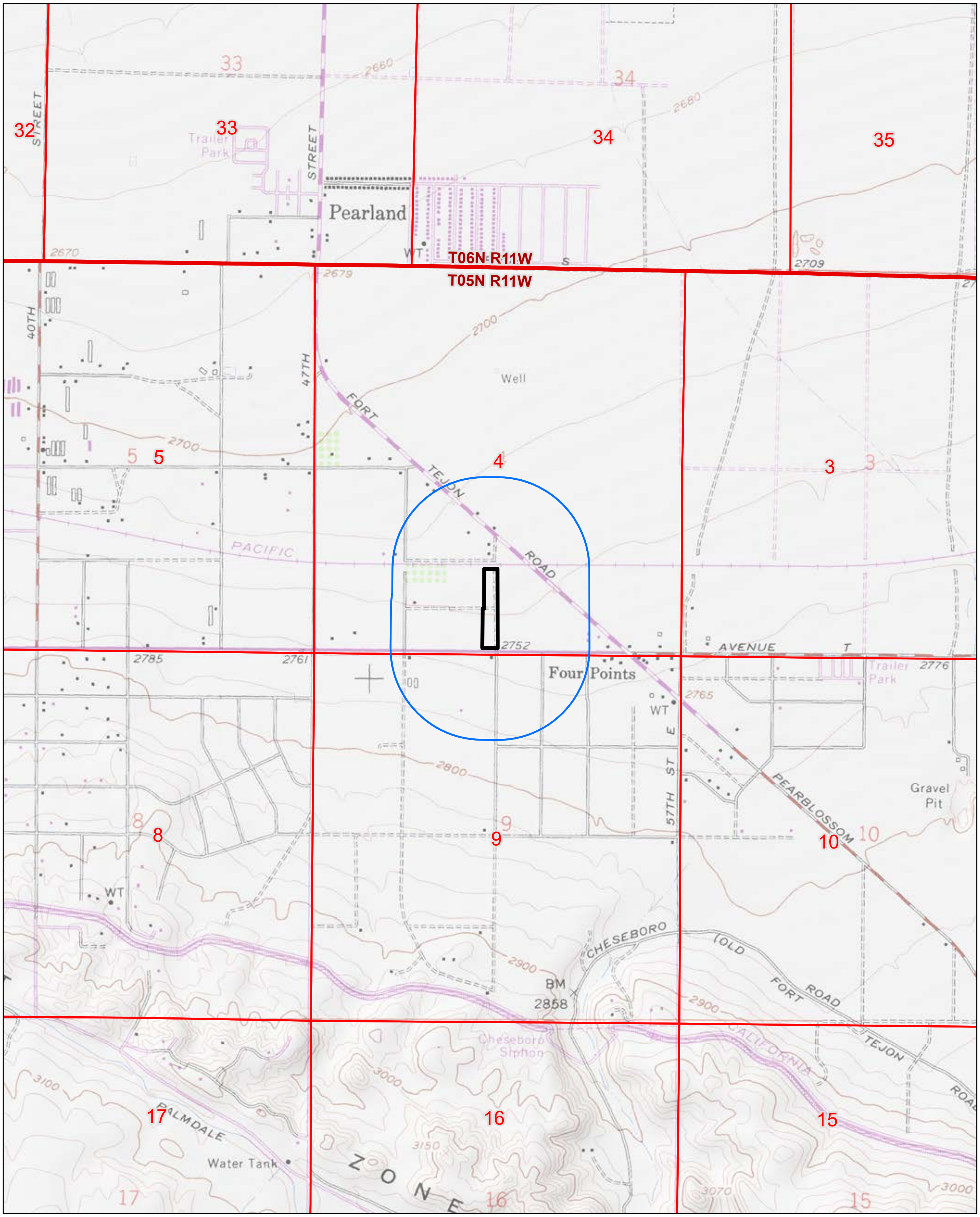

Project Area
.25 Mile Record Search Buffer
Township and Range
Section

USGS 7.5' Quad: Palmdale, CA

0 1,000 2,000 Feet

N

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APPENDIX B

Photographs


Photograph 1 – Project Area; North View


Photograph 2 – Project Area; North-east View

Photograph 3 – Imported Construction Refuse / Wood Beams; South-east View

Photograph 4 – Imported Construction Refuse / Wood Beams; East View

APPENDIX C

NAHC SLF Search Results

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

March 11, 2024

Ben Kerridge
Stantec Consulting Services Inc.

Via Email to: Ben.Kerridge@stantec.com

Re: APNs 3051-019-030 & 112; Project Number: 185806435 Project, Los Angeles County

To Whom It May Concern:

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

Native American Heritage Commission
Native American Contact List
Los Angeles County
3/11/2024

Tribe Name	Fed (F) Non-Fed (N)	Contact Person	Contact Address	Phone #	Fax #	Email Address	Cultural Affiliation	Counties	Last Updated
Fernandeno Tataviam Band of Mission Indians	N	Sarah Brunzell, CRM Manager	1019 Second Street San Fernando, CA, 91340	(818) 837-0794		CRM@tataviam-nsn.us	Tataviam	Kern,Los Angeles,Ventura	5/25/2023
Morongo Band of Mission Indians	F	Robert Martin, Chairperson	12700 Pumarra Road Banning, CA, 92220	(951) 755-5110	(951) 755-5177	abrierty@morongo-nsn.gov	Cahuilla Serrano	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	
Morongo Band of Mission Indians	F	Ann Brierty, THPO	12700 Pumarra Road Banning, CA, 92220	(951) 755-5259	(951) 572-6004	abrierty@morongo-nsn.gov	Cahuilla Serrano	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	
Quechan Tribe of the Fort Yuma Reservation	F	Jordan Joaquin, President, Quechan Tribal Council	P.O.Box 1899 Yuma, AZ, 85366	(760) 919-3600		executivesecretary@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
Quechan Tribe of the Fort Yuma Reservation	F	Manfred Scott, Acting Chairman - Kw'ts'an Cultural Committee	P.O. Box 1899 Yuma, AZ, 85366	(928) 210-8739		culturalcommittee@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
Quechan Tribe of the Fort Yuma Reservation	F	Jill McCormick, Historic Preservation Officer	P.O. Box 1899 Yuma, AZ, 85366	(928) 261-0254		historicpreservation@quechantribe.com	Quechan	Imperial,Kern,Los Angeles,Riverside,San Bernardino,San Diego	5/16/2023
San Fernando Band of Mission Indians	N	Donna Yocum, Chairperson	P.O. Box 221838 Newhall, CA, 91322	(503) 539-0933	(503) 574-3308	dyocum@sfbmi.org	Kitanemuk Vanyume Tataviam	Kern,Los Angeles,San Bernardino,Ventura	5/8/2023
San Manuel Band of Mission Indians	F	Alexandra McCleary, Senior Manager of Cultural Resources Management	26569 Community Center Drive Highland, CA, 92346	(909) 633-0054		alexandra.mccleary@sanmanuel-nsn.gov	Serrano	Kern,Los Angeles,Riverside,San Bernardino	1/16/2024
Serrano Nation of Mission Indians	N	Wayne Walker, Co-Chairperson	P. O. Box 343 Patton, CA, 92369	(253) 370-0167		serranonation1@gmail.com	Serrano	Kern,Los Angeles,Riverside,San Bernardino	10/10/2023
Serrano Nation of Mission Indians	N	Mark Cochrane, Co-Chairperson	P. O. Box 343 Patton, CA, 92369	(909) 578-2598		serranonation1@gmail.com	Serrano	Kern,Los Angeles,Riverside,San Bernardino	10/10/2023

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed APNs 3051-019-030 & 112; Project Number: 185806435 Project, Los Angeles County.

Record: PROJ-2024-001385
Report Type: List of Tribes
Counties: Los Angeles
NAHC Group: All

APPENDIX D – Geotechnical Engineering Report

GEOTECHNICAL ENGINEERING REPORT

Prepared For
Four Points Enterprises, LLC

Proposed
Mini Storage Facility
Vicinity of Pearblossom Highway and Fallingstar Place
Palmdale, Los Angeles County, California
APN 3051-019-030, 112, 900

Job No.: 23-434
June 25, 2024

BRUIN GEOTECHNICAL SERVICES, INC.
44732 Yucca Avenue
Lancaster, California 93534
www.bruingsi.net

SOIL AND MATERIAL
TESTING AND INSPECTIONS

June 25, 2024 Job No.: 23-434

Ms. Joyce Bruce
Four Points Enterprises, LLC
Via email: joyce@avswapmeet.com

Subject: **Geotechnical Engineering Report for Proposed Mini Storage Facility Located in the Vicinity of Pearblossom Highway and Fallingstar Place, Palmdale, Los Angeles County, California, APN 3051-019-030, 112, 900**

Dear Ms. Bruce:

Presented herewith in is our Geotechnical Engineering Report for the subject project. Our work was performed in accordance with the scope of work outlined in our original proposal dated December 13, 2023.

This report presents the results of our field investigation, laboratory testing, along with our engineering judgment, opinions, conclusions, and recommendations pertaining to the proposed development.

It has been a pleasure to be of service to you on this project. Should you have any questions regarding the contents of this report, or should you require additional information, please contact the undersigned at (661) 273-9078.

Respectfully submitted,

BRUIN GEOTECHNICAL SERVICES, INC.

Ryan D. Duke, P.E.
RDD/mes

REGISTERED PROFESSIONAL ENGINEER
RYAN DUKE
9/2024
C 79729
CIVIL ENGINEER
STATE OF CALIFORNIA

BRUIN
GEOTECHNICAL SERVICES INC.
est. 2004

SOIL AND MATERIAL TESTING AND INSPECTIONS

June 25, 2024 Job No.: 23-434

EXECUTIVE SUMMARY

There appear to be no significant geotechnical constraints on-site that cannot be mitigated by our recommendations, the proposed planning, design, and utilization of sound construction practices.

Based on our geotechnical investigation of the subject site, the information obtained from our subsurface exploration, and review of available reports and literature, it is our professional opinion that the proposed development is feasible at the site provided that the geotechnical engineering recommendations contained in this report are implemented in the design and construction of the project.

The following key elements should be noted from this investigation:

- The subject site is located within the seismically active Southern California area. As such, the proposed development shall be designed in accordance with seismic considerations specified in the 2022 California Building Code (CBC) and the County requirements.

- The Limitations and Uniformity of Conditions Section should be read for an understanding of the report limitations.

This Executive Summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this summary, and the report must be read in its entirety for a complete interpretation of the items contained herein.

SUMMARY OF RECOMMENDATIONS

DESIGN ITEM	RECOMMENDATIONS
REMEDIAL GRADING	
Structure Over-Excavation	48” below existing or finish grade, whichever is lower
Scarification	12” compacted at 90%
Horizontal Limits	5 feet beyond foundation perimeter
Traffic Pavement Concrete (Driveway)	Scarify 12” compacted to 95%
Exterior Non-Traffic Bearing Concrete Flatwork	Scarify 12” compacted to 90%
Native Soil Shrinkage	10-15%
PERIMETER (CONTINUOUS) FOUNDATION DESIGN VALUES	
Allowable Net Bearing Capacity	1,500 psf
Width	Minimum 15 inches
Embedment (Single-Story)	Minimum 18 inches below lowest adjacent soil elevation
Reinforcement	Minimum four No. 4 bars, two top and two bottom
ISOLATED (COLUMN/PIER) FOUNDATION DESIGN VALUES	
Allowable Net Bearing Capacity	1,800 psf
Width	Minimum 24 inches square
Embedment (Single-Story)	Minimum 18 inches below lowest adjacent soil elevation
Reinforcement	No. 4 mat, one top and one bottom
LATERAL LOAD RESISTANCE	
Allowable Passive Pressure	200 psf per foot
Coefficient of Friction	0.25
SOIL EXPANSION	
Expansion Index	0
Classification	Very Low
LATERAL EARTH PRESSURES	
Active (Well-Drained Soil)	45 psf
At Rest (Restrained Wall)	55 psf
CORROSION AND CHEMICAL ATTACK	
Soil Resistivity	9,400 ohm-cm
Sulfate Attack Potential	0.0098% (Negligible)
INTERIOR SLAB-ON-GRADE	
Thickness	Minimum 4” thick over 48” of compacted soil
Reinforcement	No. 4 bars, 16” on-center both ways
Vapor Barrier	Min. 15 mil.

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Appendix D	General Earthwork and Grading Guidelines

<u>GEOTECHNICAL ENGINEERING REPORT</u>
PROPOSED MINI STORAGE FACILITY
VICINITY OF PEARBLOSSOM HIGHWAY AND FALLINGSTAR PLACE
PALMDALE, LOS ANGELES COUNTY, CALIFORNIA
APN 3051-019-030, 112, 900

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed by Bruin Geotechnical Services, Inc. for the proposed development at the subject site based on discussions and preliminary site plans provided by the client. This report is specific to the proposed development.

The purpose of this investigation was to evaluate the on-site subsurface soil conditions relative to geotechnical engineering characteristics and to provide geotechnical recommendations relative to proposed development.

The scope of the authorized geotechnical investigation included the following tasks:

- Performing a site reconnaissance
- Conducting field subsurface exploration through soil borings and sampling
- Laboratory testing program of selected soil samples
- Performing engineering analyses of the data
- Preparing this Geotechnical Engineering Report

This study also includes a review of published and unpublished literature and geotechnical maps with respect to active and potentially active faults located in proximity to the site which may have an impact on the seismic design of the proposed structure.

2.0 SITE LOCATION AND DESCRIPTION

The subject site, herein after referred to as Site, is located on the north side of Pearblossom Highway, approximately .31 miles west of Fort Tejon Road in Palmdale, Los Angeles County, California. The rectangular-shaped parcels consist of approximately 5 acres. The Site is located in a semi-rural area of Palmdale, with residential developments in the vicinity of the subject site. The parcel to the south across Pearblossom Highway contains a single-family residence, the parcels to the north are vacant, the parcel to the east contains a commercial building, and the parcels to the west contain a residential subdivision.

At the time of our investigation, the Site vegetation consisted of sparse, low annual weeds along the east and west portions and a gravel path traversing the center of the lot. An existing Well House was observed on the east portion of the Site. The Site topography is relatively flat and level with a general slope to the northwest with drainage by sheet flow at approximately one to two (1-2) percent across the Site. The approximate elevation of the Site is approximately 2,750 feet above mean sea level. The aforementioned site description is intended to be illustrative and is specifically not intended for use as a legal description of the Site.

Access to the Site is from Pearblossom Highway which is a paved road.

The general location of the subject site is shown on Figure 1.

3.0 PROPOSED GRADING AND CONSTRUCTION

Based on our review of the preliminary site plans and discussions, Bruin GSI understands that the development will consist of ten mini-storage buildings, and an office building with a small parking lot near the entrance.

We anticipate light gauge steel construction with some masonry walls with conventional concrete continuous and isolated foundations and slab-on-grade floors. No basements are planned. We anticipate maximum structural loads of 1,500 pounds per lineal foot and 8-10 kips for isolated foundations.

Exterior improvements are anticipated to include concrete flatwork, landscape and hardscape areas, and asphalt-concrete drive areas, as well as off-site roadway improvements. It is anticipated that the drainage will consist of sloped surfaces to drainage swales to an approved area. The proposed structures will be connected to existing utilities lines from the street.

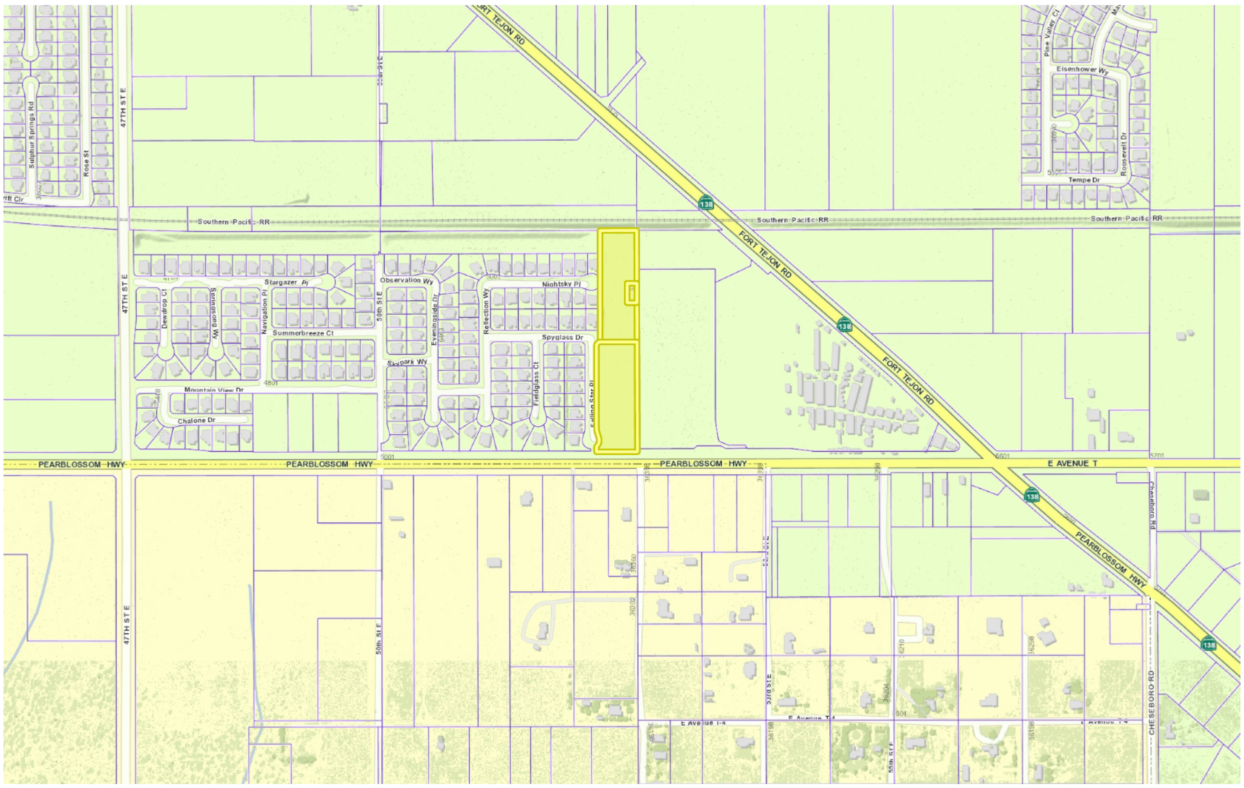
Due to the relatively flat topography, it appears the proposed earthwork will be minimal and consist of conventional cut and fill methods to grade the Site, with anticipated maximum slope heights of approximately one to two (1-2) feet to achieve design grades.

4.0 GEOTECHNICAL INVESTIGATION

The geotechnical investigation included a field subsurface exploration program and a laboratory testing program on soil samples collected. These programs were performed in accordance with our proposal for Geotechnical Investigation Report dated December 13, 2023. The scope of work did not include environmental assessment or investigation for the presence or absence of hazardous substances or toxic materials in structures, soil, surface

Vicinity Map

N.T.S.



= Denotes approximate parcel boundary

Project:

Proposed Mini Storage Facility
Vicinity of Pearblossom Highway and Fallingstar Place
Palmdale, Los Angeles County, California
APN 3051-019-030, 112, 900

Job Number:

23-434

Figure 1

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water, groundwater, or air, below or around the site. The field subsurface exploration and laboratory testing programs are described below.

4.1 Field Exploration Program

A site reconnaissance was made by our representative prior to instigating the field exploration program. The Site was observed, and boundaries roughly located for purposes of underground utility locating. As required by law, Bruin GSI contacted Underground Service Alert (one-call notification service) to attain underground utility marking and clearance, a minimum of 72 hours prior to performing the field subsurface investigation.

The field exploration program was initiated on April 22, 2024, under the technical supervision of our engineer. A total of six (6) exploratory borings were drilled using a CME 75 drill rig with eight (8) inch hollow stem auger in accordance with generally accepted geotechnical exploration procedures (ASTM D 1452). The borings were advanced to maximum depths of fifty (50) feet below ground surface (bgs). The approximate locations of the borings within the area of the proposed construction were determined by sighting and pacing from existing site improvements, such as streets, and should be only considered accurate to the degree implied by the method used. The borings locations are shown on Figure 2.

Soil samples were obtained at various depth intervals, consisting of relatively undisturbed brass ring samples (Modified California split-spoon sampler) and Standard Penetration Test (SPT) samples driven by a 140-pound hammer falling 30 inches. After seating of the sampler, the number of blows required to drive the sampler one foot was recorded in six (6) inch increments, in general accordance with procedures presented in ASTM D 1586.

Bulk samples were also collected at various depths from auger cuttings during drilling and represent a mixture of soils within the noted depths. The soil samples were returned to the laboratory for analysis and testing.

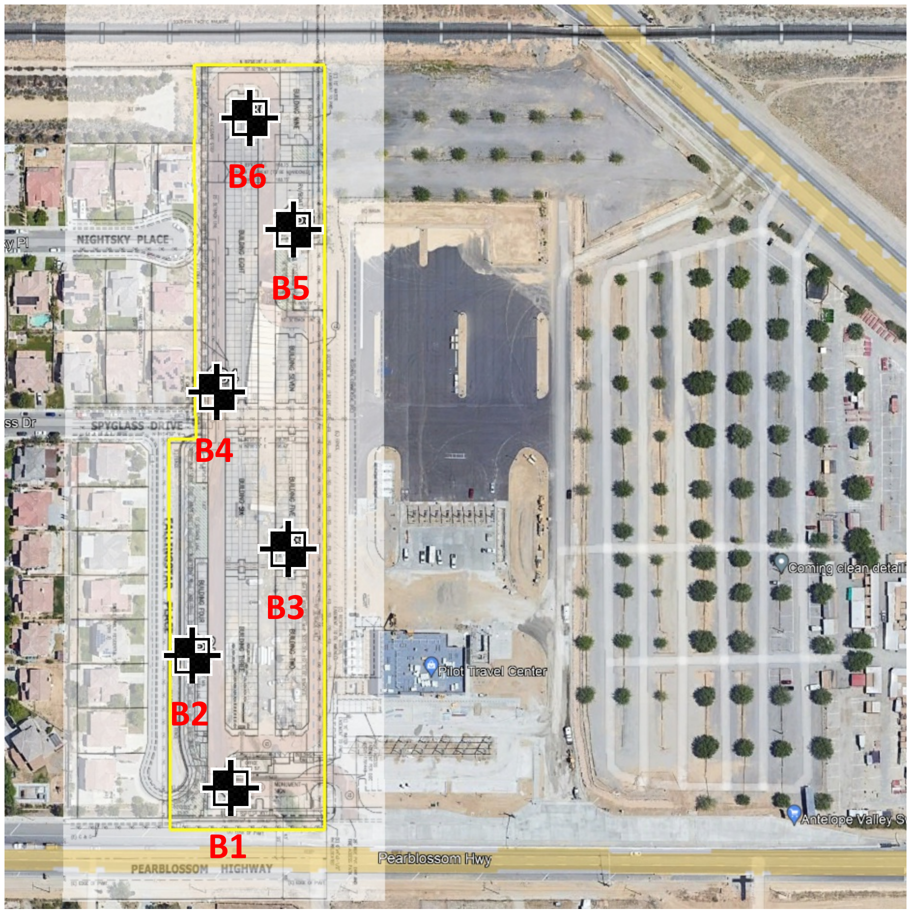
Final boring logs presented in Appendix A are Bruin GSI's interpretation of the field logs prepared by our representative during drilling, as well as laboratory test results. The stratification lines represent approximate boundaries between soil types. The actual soil transitions may be gradual.

4.2 Site and Subsurface Conditions

Native alluvial materials were encountered within all our exploratory trenches. The native materials were noted to be dry to moist and loose to dense. The soil strata encountered consisted primarily of silty sands, fine- to coarse-grained, with gravel

Boring Location Map

N.T.S.



B1 = Denotes Approximate Boring Location

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Figure 2

to 1" (SM). For more detailed descriptions of the subsurface materials refer to the excavation logs in Appendix A.

4.3 Groundwater Conditions

Groundwater was not encountered in any of our exploratory trenches, at least to the maximum depth explored (15 feet bgs). Bruin GSI reviewed available reports and electronic data-bases to assess historic water level conditions in the vicinity of the Site. Sources reviewed included the historically highest groundwater contours prepared by State of California Department of Water Resources SGMA electronic database, historically highest groundwater levels in the immediate site vicinity indicate that groundwater level at the site are over 50 feet bgs. Based on this information, groundwater is not a design factor for this project.

4.4 Laboratory Testing

The field excavation logs and soil samples were reviewed to assess which samples would be analyzed further. The selected soil samples collected during trenching activities at the Site were then tested in the laboratory to assist in evaluating engineering properties of subsurface materials deemed within structural influence.

The soil samples were classified in accordance with the Unified Soils Classification System and a testing program was established. The samples were tested to determine the following:

- In-situ moisture and dry unit weight determinations were determined in accordance with ASTM D 2937.
- Relative strength characteristics were estimated from results of direct shear tests (ASTM D 3080) performed on bulk soil samples remolded to approximately 90% of the maximum dry density as determined by ASTM D 1557 test method.
- Consolidation potential was determined on select soil samples in accordance with ASTM D 2435.
- Soil chemical analysis on a soil sample from the site was performed by Anaheim Test Lab, which included pH, resistivity, soluble sulfates and soluble chlorides as well as other chemical contents.

The following additional tests were performed:

• Identification of soils	ASTM D 2488
• Expansion Index	ASTM D 4829

- Maximum density – Optimum moisture ASTM D 1557
- Material Finer than the No. 200 Sieve ASTM D 1140
- Sand Equivalent Value ASTM D 2419

Pertinent tabular and graphic test results are presented in Appendix B.

4.5 Soil Engineering Properties

Physical tests were performed on the bulk and relatively undisturbed samples to characterize the engineering properties of the native soils.

Moisture content and dry unit weight determinations were performed on samples to evaluate the in-situ unit weights of the different materials. Moisture contents were generally three to sixteen (3-16) percent. In-place dry densities ranged generally 99 pounds per cubic foot (pcf) to 121 pcf. Moisture content and dry unit weight results are shown on the excavation logs in Appendix A.

The expansion index tests (ASTM D 4829) indicate that the surficial soils are within the “very low” expansion category.

Consolidation test results reveal that some samples tested in the upper four (4) feet soil has a moderate potential to hydro-consolidate.

5.0 REGIONAL GEOLOGY AND SEISMIC HAZARDS

The project site is located in a seismically active area typical of Southern California and likely to be subjected to a strong ground shaking due to earthquakes on nearby faults.

The San Andreas Fault zone is the largest active fault rift zone, which is several miles wide, and passes through the Antelope Valley, extending from the Gulf of Mexico through the western portion of the State of California to a point at Cape Mendocino in northern California. The San Andreas Fault is predicted to have an event every 100-200 years based on geologic records. The San Andreas Fault has had two major eruptions in the last 150 years: 1) in the Southern California area in 1857, and 2) in San Francisco in 1906. In each event, approximately 320 kilometers of surface rupture has taken place, as well as a horizontal displacement of approximately 9 meters. Additional faulting has occurred adjacent to the San Andreas Fault causing numerous events of various magnitudes throughout the length of the San Andreas Fault.

The project site is located in an area in which active seismic occurrences are recorded on a yearly basis. Seismic studies conducted show a major break along the San Andreas Fault could be responsible for an event of approximately 8.4 on the Richter scale. A seismic event of this magnitude could cause bedrock accelerations as large as 0.5g. Events of this magnitude are anticipated to occur approximately every 150 years. The last occurrence of this magnitude was in 1857.

No known active faults have been mapped across the subject site. The potential hazards due to active fault ground rupture are considered minimal. According to current publications by the State of California, the project site is not located within the Alquist-Priolo special studies zone.

According to the California Department of Conservation (CGS) and California Geological Survey (CGS) online database for Zones of Required Investigation, this parcel is not located within a Liquefaction, Landslide, or Earthquake Zone.

5.1 CBC Design Parameters

The following coefficients have been estimated in accordance with the requirements of the 2022 CBC, utilizing the Structural Engineers Association of California and California's Office of Statewide Health Planning and Development Seismic Design Maps Application:

https://seismicmaps.org/

The following seismic parameters are provided, based on the approximate latitude and longitude at the northeast corner of the subject site:

Latitude	34.54299282°
Longitude	-118.03577233°

Spectral Response Acceleration, Short Period) - S_s	2.287g	0.2(sec)
Spectral Response Acceleration at 1 sec. - S_1	0.972g	1.0(sec)
Mapped Spectral Response, Short period - S_{DS}	1.525g	0.2(sec)
Mapped Spectral Response at 1 sec. - S_{D1}	*	1.0(sec)
Site Coefficient – F_A	1.0	
Site Coefficient – F_V	*	
Site Modified Spectral Response Acceleration, Short period -S_{MS}	2.287g	
Site Modified Spectral Response Acceleration, Short period -S_{M1}	*	

Site Classification (2022 CBC, further defined in ASCE7-16 Chapter 20) = D Default

* The actual method of seismic design should be determined by the Structural Engineer in accordance with Section 11.4.8 Site-Specific Ground Motion Procedures of the ASCE 7-16. Refer to Appendix C for the Design Maps Summary Report provided by the Structural Engineers Association of California and California's Office of Statewide Health Planning and Development website.

The actual method of seismic design should be determined by the Structural Engineer.

5.2 Liquefaction Potential

Liquefaction is a seismic phenomenon in which loose, saturated, granular (non-cohesive) soils react as a fluid when subject to high-intensity ground shaking. Research and historical data indicate loose granular soils with a specific range of grain size distribution, saturated by a relatively shallow groundwater table are most susceptible to liquefaction.

The effects of liquefaction on level ground include settlement, sand boils and bearing capacity failures below structures.

In view of the relatively dense silty sand encountered in the exploratory borings, relative densities, and depth to static groundwater, it is Bruin GSI's opinion that the potential for on-site liquefaction or seismically induced dynamic settlement should be negligible.

5.2.1 Other Liquefaction Associated Hazards

Potential hazards associated with liquefaction include lateral spreading and slow slides, foundation bearing failure, and ground surface settlement. Considering the upper native soils are not likely to liquefy, these hazards are not considered to be design factors for this project.

5.3 Other Secondary Seismic Hazards

Seismic hazards relative to earthquakes include landslides, ground lurching, tsunamis, seiches and seismic-induced settlement. As site topography is relatively flat, hazards from landslides are considered negligible. Ground lurching is generally associated with fault rupture and liquefaction. As these hazards are considered unlikely, it is Bruin GSI's opinion that the potential for ground lurching is low. Tsunami hazards are considered nonexistent due to the site location.

5.4 Soil Settlement

Differential soil settlement occurs when supporting soils are not uniform in density or classification and seismic shaking causes one type of soil to settle more than the other. When unaccounted for in design, such settlement can result in damage to structures, pavement, and subsurface utilities. Soils with potential for hydro-consolidation can also cause differential settlement under loading conditions and the induction of moisture.

Re-compaction of the upper site soils is intended to remedy most potentials of settlement due to structures supported on native soils with non-uniform densities, soil classifications and hydro-consolidation.

Settlement of structures founded on compacted fill will be relatively small, less than one (1) inch. Differential settlement is anticipated to be on the order of 50% of the total settlement in a thirty (30) foot span. Most settlement should take place during construction.

5.5 Erosion

The subject site drainage occurs by minor sheet flow and erosion could occur. Appropriate analysis, grading and drainage design and site maintenance should minimize the sheet flow erosion potential.

6.0 111 STATEMENT

Subsequent to compliance with the recommendations provided in this report and based on the site reconnaissance, subsurface exploration, and laboratory analysis, it is our opinion the proposed structures will be safe from hazards associated with faulting, landslides, slippage, and settlement. The proposed development will not adversely impact the existing geologic stability of adjacent sites.

7.0 EFFECT OF PROPOSED GRADING ON ADJACENT PROPERTIES

It is our opinion that the proposed grading and construction will not adversely affect the stability of adjoining properties provided that grading and construction are performed in compliance with the recommendations presented herein.

8.0 OPINIONS AND CONCLUSIONS

Based upon the results of our investigation, the proposed development is considered feasible from a geotechnical standpoint provided the recommendations presented herein are incorporated into the design and construction. If changes in the design of the structure are made or variations of changed conditions are encountered during construction, Bruin GSI should be contacted to evaluate their effects on these recommendations.

The upper four (4) feet of soil were found to be non-uniform with some areas of the site soils subject to hydro-consolidation. Based on the laboratory testing and subsurface data obtained, it is Bruin GSI's opinion that the upper site soils will not provide a uniform soil support system without remediation through re-compaction. In order to provide a more uniform soil support system and minimize the potential for differential settlement, the proposed structures should be supported by a re-compacted fill mat.

Provided that the recommendations in this report are incorporated into the design and construction, it is Bruin GSI's opinion that conventional shallow (continuous and isolated) foundations and/or state approved foundation system may be designed to support the proposed structure. Refer to Section 9.2 for details and soil values regarding foundation design.

9.0 GEOTECHNICAL RECOMMENDATIONS

The following geotechnical engineering recommendations for the proposed development are based on observations from the field investigation program and the laboratory test results and our experience with sites of similar conditions.

The local Department of Building and Safety should be contacted prior to start of construction to assure the project is properly permitted and inspected during construction. Any grading performed at the site shall be incompliance with the recommendations provided in this report, the local building code and the Earthwork and Grading Specifications for Rough Grading presented in Appendix D.

Field observations and testing during rough-grading operations should be provided by Bruin GSI so a decision can be formed regarding the adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the project geotechnical specifications. **Any work related to grading performed without the full knowledge of, and under the supervision of the Geotechnical Consultant, may render the recommendations of this report invalid.**

9.1 Earthwork

Prior to any grading, the site should be cleared and grubbed of all vegetation. All pavements, vegetation, trash, debris and abandoned underground utilities shall be removed from the area to be graded and should not be incorporated into engineered fill.

Any depressions resulting from removals during grubbing process (trees etc.) shall be observed by the Geotechnical Consultant. Depressions requiring backfill within structural areas will require placement of engineered fill, observed, and tested by the Geotechnical Consultant.

It is our professional opinion that the grading of the site can be performed with conventional earth-moving equipment.

9.2 Remedial Grading for Building Pads

To provide a more uniform bearing for the proposed structure foundations and slab-on-grade, subsequent to clearing and grubbing of the area to graded, the existing native soils shall be <u>excavated to a depth of forty eight (48) inches below existing grade or finish grade, whichever is lower.</u> The excavation shall extend a minimum of five (5) feet beyond the limits of the proposed foundations, where obtainable. Observation and approval of the over-excavation by the Geotechnical Consultant is required prior to any fill placement.

The Geotechnical Consultant shall inspect the resulting surfaces prior to scarification and fill placement. A minimum of twenty-four (24) inches of compacted fill is required beneath the proposed foundations.

Subsequent to approval of the resulting surface by the Geotechnical Consultant, the resulting soil surface shall be scarified (ripped) an additional six (6) inches, properly moisture conditioned or aerated to near optimum moisture content, and mechanically compacted with heavy compaction equipment to 90% relative compaction as determined by ASTM D 1557 test method. **Compaction shall be verified by testing.**

9.3 Remedial Grading for Flexible (Asphalt-Concrete) and Rigid (PCC) Pavement

Subsequent to clearing and grubbing the area to be graded, the existing native soils shall be excavated twelve (12) inches below existing grade or finish grade, whichever is lower. The exposed surface shall be scarified (ripped) an additional six (6) inches. The excavation shall extend a minimum of three (3) feet beyond the limits of the proposed pavement, where obtainable. The Geotechnical Consultant shall inspect the resulting surfaces prior to fill placement.

Subsequent to approval of the resulting surface by the Geotechnical Consultant, the resulting soil surface shall be properly moisture conditioned or aerated to near optimum moisture content, and mechanically compacted with heavy compaction equipment to 90% relative compaction (95% relative compaction beneath proposed PCC pavement in the upper twelve inches) as determined by ASTM D 1557 test method. **Compaction shall be verified by testing**.

9.4 Remedial Grading and Exterior Non-Traffic Bearing Concrete Flatwork (Sidewalks, Patios, Walkways, etc.)

Subsequent to clearing and grubbing the area to be graded, the existing native soils shall be excavated twelve (12) inches below existing grade or finish grade, whichever is lower. The exposed surface shall be scarified (ripped) an additional six (6) inches. The excavation shall extend a minimum of two (2) feet beyond the limits of the proposed flatwork, were obtainable. The Geotechnical Consultant shall inspect the resulting surfaces prior to fill placement.

Subsequent to approval of the resulting surface by the Geotechnical Consultant, the resulting soil surface shall be properly moisture conditioned or aerated to near optimum moisture content, and mechanically compacted with mechanical compaction equipment to 90% relative compaction as determined by ASTM D 1557 test method. **Compaction shall be verified by testing**.

9.5 Fill Placement and Compaction Requirements

The excavated native soils may be used as engineered fill to backfill the excavation. Materials for engineered fill should be free of organic material, debris, and other deleterious substances, and should not contain rocks greater than eight (8) inches in maximum dimension.

All native soil shall be moisture conditioned or air dried as necessary to achieve near optimum moisture condition, placed in lifts (eight to ten inches, measured loose) and then compacted in place by mechanical compaction equipment to a minimum relative compaction of 90% as determined in accordance with Test Method ASTM D 1557.

All import soil fill (meeting the requirements of Section 10.8) should be placed in eight-inch-thick maximum lifts measured loose, moisture conditioned or air dried as necessary to near optimum moisture condition, and then compacted in place to a minimum relative compaction of 90% as determined in accordance with Test Method ASTM D 1557.

A representative of the project consultant should be present on-site during grading operations to verify proper placement and compaction of all fill, as well as

to verify compliance with the other geotechnical recommendations presented herein.

9.6 Native Soil Shrinkage

A shrinkage factor of the upper site soils is estimated at ten to fifteen (10-15) percent. This estimate is based on the limited data collected from the subsurface exploration and laboratory test data with an average degree of compaction of 92% and may vary depending on contractor methods.

During compaction, an additional one-quarter of an inch (1/4") subsidence of the underlying soil is estimated. Losses from site clearing and grubbing operations mat effect quantity calculations and should be taken into account. Actual shrinkage of the soil may vary.

We recommend monitoring the rough grading excavations by survey with comparison to grading contractor earthwork yardage estimates to determine a closer estimate of actual shrinkage so adjustments (if necessary) may be made during grading.

9.7 Fill Slope Construction and Stability

Provided all material is properly compacted as recommended, fill slopes may be constructed at a 2:1 (horizontal to vertical) gradient or flatter. Permanent cut slopes may be constructed at 2:1 or flatter. Fill slopes constructed as recommended at a slope ratio not exceeding 2:1 (horizontal: vertical), are expected to be both grossly and surficially stable and are expected to remain so under normal conditions.

Proper drainage should be planned so water is not allowed to flow over the tops of slopes. The slopes should be planted as soon as possible to minimize erosion and maintenance.

If slopes are planned steeper than 2:1, the Geotechnical Consultant shall be notified for slope stability determinations.

9.8 Imported Soils

If imported soils are required to complete the planned grading, these soils shall be free of organic matter and deleterious substances, meeting the following criteria:

- 100% passing a 2-inch sieve
- 60% to 100% passing the #4 sieve
- no more than 20% passing a #200 sieve

- expansion index less than 20
- liquid limit less than 35
- plasticity index less than 12
- R-value greater than 40
- Low corrosion potential
    - Soluble Sulfates less than 1,500 ppm
    - Soluble Chlorides less than 150 ppm
    - Minimum Resistivity greater than 8,000 ohm-cm

Prospective import soils should be observed, tested and pre-approved by this firm prior to importing the soils to the site. Final approval of the import soil will be given once the material is on site either in place or adequate quantities to finish the grading.

9.9 Grading Observations and Testing

The grading of the site shall be observed and tested by the Geotechnical Consultant to verify compliance with the recommendations. Any grading performed without full knowledge of the Geotechnical Consultant may render the recommendations of this report invalid.

10.0 POST-GRADING AND DESIGN CONSIDERATIONS

10.1 Pad Drainage

A surface drainage system consisting of a combination of sloped concrete flatwork, swales and sheet flow gradients in landscape areas, and roof gutters and downspouts should be designed for the site. The roof gutters and downspouts should also be tied directly into the proposed area drain system. Drainage from structures should be designed at minimum 5% gradient to approved areas. The purpose of this drainage system will be to reduce water infiltration into the subgrade soils and to direct surface waters away from building foundations, walls and slope areas.

Concrete flatwork surfaces and paved sloped surfaces should be inclined at a minimum gradient of 2% away from the building foundations and similar structures. A minimum twelve-inch-high berm should be maintained along the top of the descending slope to prevent any water from flowing over the slope.

The owner is advised that all irrigation and drainage devices should be properly maintained throughout the lifetime of the development.

10.2 Foundation Design Recommendations

The proposed structure shall be constructed on a conventional concrete foundation system. Provided the recommendations in this report are incorporated into site development, foundation for load bearing walls and interior columns constructed on compacted certified fill may be designed as follows:

10.2.1 Allowable Bearing Capacity

<u>Continuous Foundations Design Values:</u> An allowable “net” bearing capacity of 1,500 psf. can be utilized for dead and sustained live loads. This value includes a minimum safety factor of three (3) and may be increased by one-third (1/3) for total loads, including seismic forces.

Continuous foundations should be embedded a minimum of fifteen (15) inches below lowest adjacent soil elevation and be a minimum of twelve (12) inches in width. Reinforcement shall consist of a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom. Actual depth, width, and reinforcement requirements for continuous foundations will be dependent on the Expansion Index of the bearing soils, applicable sections of the governing building code and requirements of the structural engineer.

The allowable bearing capacity for continuous foundations may be increased by 150 psf for each additional six (6) inches of foundation depth and 150 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 2,000 psf for continuous foundations to keep estimated settlements within allowable limits.

<u>Isolated Pad (Column or Pier) Foundations Design Values:</u> An allowable “net” bearing capacity of 1,800 psf. can be utilized for dead and sustained live loads. This value includes a minimum safety factor of three (3) and may be increased by one-third (1/3) for total loads, including seismic forces.

Isolated foundations should be a minimum of twenty-four (24) inches square and embedded a minimum of eighteen (18) inches below lowest adjacent soil elevation. Actual depth, width, and reinforcement requirements for isolated foundations will be dependent on the Expansion Index of the bearing soil, applicable sections of the governing building code and requirements of the structural engineer.

The allowable bearing capacity for continuous foundations may be increased by 150 psf for each additional six (6) inches of foundation depth and 150 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 2,500 psf for isolated foundations to keep estimated settlements within allowable limits.

10.2.2 Lateral Load Resistance

Lateral load resistance for the spread footings will be developed by passive soil pressure against sides of footings below grade and by friction acting at the base of the concrete footings bearing on compacted fill. An allowable passive pressure of 200 Z PSF, where Z = Depth (in feet) below finish grade. In passive pressure calculations, the upper one (1) foot of soil should be subtracted from the depth, "Z", unless confined by pavement or slab. An appropriate safety factor should be used for design calculations.

Friction along the foundation base may provide resistance to lateral loading. The coefficient of friction was estimated to be 0.25 for site soils compacted to 90% of the maximum dry density as determined by ASTM D 1557 test method and may be used for dead load forces and includes a reduction factor of one-third (1/3).

For design of building foundations, passive resistance may be combined with frictional resistance provided that a one-third (1/3) reduction in the coefficient of friction is used.

10.2.3 Footing Reinforcement

Reinforcement for concrete footings should be designed by the structural engineer based on the anticipated loading conditions and expansion index of the supporting soil. Preliminary expansion index for the native soil is categorized as "very low" as determined by ASTM D 4829. Footings should be reinforced with a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom.

10.2.4 Footing Observations

All footing trenches should be observed by a representative of the project geotechnical consultant to verify that they have been excavated into competent soils prior to placement of forms, reinforcement, or concrete. The excavations should be trimmed neat, level, and square. All loose, sloughed or moisture-softened soils and/or any construction debris should be removed prior to placing concrete. **Excavated soils derived from footing and/or utility trenches should not be placed in building slab-on-grade areas or exterior concrete flatwork areas unless the soils are compacted to at least 90% of maximum dry density.**

10.2.5 Foundation Setbacks

Footings of structures (including retaining walls) located above a slope having a total height of ten (10) feet or less should have a minimum setback of five (5) feet, measured from the outside edge of the footing bottom along a horizontal line to the face of the slope. For footings above slopes having a total height greater than ten (10) feet, the setback should be, at minimum, equal to one third of the total height of the slope but need not exceed forty (40) feet. Refer to CBC Section 1804.

10.3 RETAINING WALLS AND STRUCTURES BELOW GRADE

The project may include shallow retaining walls or walls below grade (i.e., loading docks, light standards, flagpoles, or similar structures supporting soil materials. These walls are anticipated to be shallow (i.e., approximately 10 feet or less in height). Design lateral earth pressures, backfill criteria, and drainage recommendations for walls below grade are presented.

10.3.1 Lateral Earth Pressures

	Driving Earth Pressure*	Resisting Earth Pressure*
Well-Drained level Soil	38	200***
Well-Drained Soil (2:1 Backfill)	60	
At-Rest (Restrained Wall)	55**	

*Equivalent fluid pressure (PSF) per foot of soil height

**For design purposes, a wall is considered restrained if it prevented from movement greater than 0.002H (H= height of wall in feet) at the top of the wall.

***The upper one (1) foot of soil should be subtracted from the depth, “Z”, unless confined by pavement or slab. This is an ultimate value.

Note: The pressures recommended above are based on the assumption that the backfill will be compacted to 90% of the maximum dry density. The use of select may lower the recommended driving earth pressure. The revisiting pressure provided is an ultimate value. An appropriate factor of safety is recommended.

Friction acting along the base of the foundation may provide resistance to lateral loading. The coefficient of friction is estimated to be 0.25 for native soils compacted to 90% of the maximum dry density, and may be used with dead loads. This value may be increase by one-third (1/3) for total loads, including seismic forces. Frictional and passive resistance may be combined without reduction.

The above values are for retaining walls that have been supplied with a proper sub-drain system. All walls should be designed to support any adjacent structural surcharge loads imposed by other nearby walls, footings or vehicular traffic within a distance approximately equal to the height of the wall.

Retaining walls over six (6) feet in height may need to be designed for a seismic load force that is applied to the static forces when seismic shaking occurs. The geotechnical consultant should be contacted for retaining walls over six (6) feet in height.

10.3.2 Wall Backfill

Backfill behind shallow retaining walls or walls below grade should consist of non-expansive granular materials. Wall backfill should not contain organic material, rubble, debris, and rocks or cemented fragments larger than three (3) inches in greatest dimension. In the case where no shoring was used, the granular backfill should extend outward from the base of the wall to ground surface at a 1:1 (horizontal: vertical) slope. The geotechnical consultant should be allowed the opportunity to sample and test and comment about the adequacy of the proposed imported backfill material once adequate quantities to complete the project are on site.

Backfill should be placed in lifts not exceeding eight to ten (8-10) inches in thickness measured loose, moisture conditioned to above optimum moisture content and mechanically compacted with hand-operated equipment to minimum 90% of the maximum dry density as determined by ASTM D 1557. Walls below grade that are not free to deflect should be properly braced prior to placement and compaction of backfill. **Compaction should be verified by testing.**

10.3.3 Drainage and Waterproofing

It is recommended that waterproofing be provided behind the retaining walls to help reduce efflorescent formation.

Walls designed for drained earth pressures shall have adequate drainage provided behind the walls. Sub-drains or weep holes at the base of the walls shall be incorporated into design.

Retaining walls shall be designed by a registered Civil Engineer.

11.0 CORROSION AND CHEMICAL ATTACK

Soluble sulfate, pH, resistivity and chloride concentration test results are presented in Appendix B. The Resistivity (CTM 643) test results on a bulk soil sample from the site indicated that on-site soils are **moderately-corrosive** when in contact with ferrous material (9,400 ohm-cm). Corrosion test results also indicate that the surficial soils at the site have negligible sulfate attack potential (0.0098% by weight) on concrete.

Based on the preliminary chemical analysis performed on a sample of the native soil, foundation concrete shall consist of type II cement with a minimum compressive strength of 2,500 psi as indicated in the ACI 318-19 Table 19.3.2.1. A higher compressive strength may be required by the structural engineer. Additional soil chemical analysis during grading is recommended. The minimum concrete compressive strength should be determined by the structural engineer.

The chemical test results should be distributed to the project design team for their interpretations pertaining to the corrosivity or reactivity of the construction materials (ferrous metals, and piping).

12.0 EXCAVATIONS

It is Bruin GSI’s opinion that standard construction techniques should be sufficient for site excavations. All excavations should be made in accordance with applicable regulations, including CAL/OSHA for and OSHA type “C” soil. Project safety is the contractor’s responsibility and the owner. Bruin GSI will not be responsible for project safety.

The attention of contractors, particularly the underground contractors, should be drawn to the State of California Construction Safety Orders for “Excavations, Trenches, and Earthwork.” Trenches or excavations greater than five (5) feet in depth should be shored or sloped back in accordance with OSHA Regulations prior to entry.

Open excavations, un-shored or un-surcharged (above the groundwater level) may be cut vertically to a maximum depth of no more than five (5) feet. Excavations higher than five (5) feet should be sloped back at a minimum 1.5:1 (horizontal to vertical) slope or flatter or shored. Sloughing will occur if the soil is dry or dries our while open. No excavation should be made within a 1:1 line projected outward from the toe of any existing foundation or structure.

No heavy equipment or other surcharge loads (i.e., excavation spoils) should be allowed within the top of slope a distance equal to the depth of the excavation, both measured from the top of the excavation.

Soil backfill around foundations or behind walls below grade should be placed in lifts not exceeding eight to ten inches, measured loose, moisture conditioned to near optimum moisture content and uniformly mechanically compacted to minimum 90% relative compaction as determined by ASTM D 1557 test method. Flooding or jetting is not recommended.

13.0 UTILITY TRENCHES AND BACKFILL

Standard construction techniques should be sufficient for site utility trench excavations. Utility trenches often settle even when backfill is placed under optimum conditions.

Trench backfill shall be moisture conditioned to near optimum moisture content, placed in lifts not exceeding eight to ten inches, measured loose, and uniformly compacted to minimum 90% of the maximum dry density with mechanical compaction equipment. **No flooding or jetting is recommended.**

Backfill of public utilities within road right-of-ways or on the subject site should be placed in strict conformance with the requirements of the governing agency. As a minimum it is recommended that utility trench backfill should be moisture conditioned to near optimum moisture content, placed in lifts not exceeding eight to ten (8-10) inches, measured loose, (depending on means of compaction) and uniformly compacted to minimum 90% of the maximum dry density with mechanical compaction equipment. If aggregate base is used for backfill material, it should be moisture conditioned to near optimum moisture content, placed in eight to ten inch lifts, measured loose, and uniformly compacted to minimum 95% of the maximum dry density using mechanical compaction equipment. **Compaction should be verified by testing.**

For purposes of this section of the report, “bedding” is defined as material placed in a trench up to one (1) foot above a utility pipe, and “backfill” is all material placed in the trench above the bedding. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use as bedding should be tested in our laboratory to verify its suitability and measure its compaction characteristics. **Sand bedding should be compacted by mechanical means to achieve at least 90% relative compaction based on ASTM D 1557.**

Backfill operations should be observed and tested by the Geotechnical Consultant to monitor compliance with these recommendations.

Where utility trenches enter the footprint of the building, trenches should be backfilled through their entire depths with on-site fill materials, sand-cement slurry, or concrete rather than with any sand or gravel shading. This “Plug” of less- or non-permeable materials will mitigate the potential for water to migrate though the backfilled trenches from outside of the building to the areas beneath the foundations and floor slabs.

The backfill soil should be moisture conditioned to near optimum moisture content, placed in lifts not exceeding eight to ten inches (8-10), measured loose, (depending on means of compaction) and uniformly compacted to minimum 90% of the maximum dry density with mechanical compaction equipment.

14.0 INTERIOR CONCRETE SLAB-ON-GRADE

It should be understood that as a manufactured product, concrete will crack even under ideal conditions. It is our experience that shrinkage is more pronounced in the Antelope Valley due to environmental conditions (high winds, daily extreme temperature differences and low humidity). Appropriate mix designs, placement procedures and concrete curing methods should be planned and implemented during construction in order to reduce the occurrence and magnitude of concrete shrinkage cracking.

Interior slab-on-grade construction should be supported by compacted soil, prepared as recommended in the “Remedial Grading for Proposed Building Pad(s)” Section of this report.

14.1 Vapor Barrier and Water Proofing

It is recommended that a vapor retarded/waterproofing be placed below the concrete slab on grade. Vapor/moisture transmission through slabs does occur and can impact various components of the structure.

Vapor retarded/waterproofing designing and inspection of installation is not the responsibility of the geotechnical engineer (most often the responsibility of the architect). Bruin Geotechnical Services, Inc. does not practice in the field of water and moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted to evaluate the general and specific water and moisture vapor transmission paths and any impact on the proposed development. This person/firm should provide recommendations for mitigation of potential adverse impact of water and moisture vapor transmission on various components of the structure as deemed necessary. The actual waterproofing design shall be provided by the architect, structural engineer, or contractor with experience in waterproofing.

In order to promote good building practices and alert the rest of the design/construction team of the appropriate standards and expect recommendations pertaining to vapor barriers/retarders, engineers (especially those aware of the issues surrounding blow-slab moisture protection and its effect on the success of their projects) should consider recommending and citing specific performance characteristics. The following paragraph includes criteria from the latest standards and expert recommendations and should be considered for use in your firm's own recommendations:

Vapor barrier shall consist of a minimum 15 mil extruded polyolefin plastic (no recycled content of woven materials permitted). Permeance as tested before and after mandatory conditions (ASTM E 17455 Section 7.1 and Sub-Paragraph 7.1.1-7.1.5): less than 0.01 perms [grains/(ft^2-hr-inHg)] and comply with the ASTM E1745 Class A requirements. Install vapor barrier according to ASTM E1643, including proper perimeter seal. Basis of design: Stego Wrap Vapor Barrier 15 mil and Stego Crete Claw Tape (perimeter seal tape). Approved Alternatives: Vaporguard by Reef Industries, Sundance 15 mil Vapor Barrier by Sundance Inc.

14.2 Thickness and Joint Spacing

Concrete slab-on-grade should be at least four (4) inches thick and provided with frequent construction joints or expansion joints. The slab-on-grade should have a minimum compressive strength of 2,500 psi at 28 days. More stringent requirements may be required by the structural engineer.

14.3 Reinforcement

Reinforcement of the slab-on-grade is contingent on the structural engineer's recommendations and the Expansion Index of the supporting soil. As a minimum, reinforcement should consist of No. 4 bars spaced sixteen (16) inches on center, both ways. The reinforcement should be positioned near the middle of the slabs by means of concrete chairs or brick. Additional reinforcement may be required by the structural engineer.

14.4 Subgrade Preparation

As further measure to minimize cracking of concrete flatwork, the subgrade soils and all utility line trenches below concrete slab-on-grade areas should first be compacted to a minimum relative compaction of **90%** and then thoroughly moistened to achieve a moisture content that is near optimum moisture content. **A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soils, and the depth or moisture penetration prior to pouring concrete.**

15.0 EXTERIOR CONCRETE FLATWORK (PATIOS, WALKWAYS, SIDEWALKS, etc.)

It should be understood that as a manufactured product, concrete will crack even under ideal conditions. It is our experience that shrinkage is more pronounced in the Antelope Valley due to environmental conditions (high winds, daily extreme temperature differences and low humidity). Appropriate mix designs, placement procedures and concrete curing methods should be planned and implemented during construction in order to reduce the occurrence and magnitude of concrete shrinkage cracking.

Exterior slab-on-grade construction should be supported by compacted soil, prepared as recommended in the “Remedial Grading and Exterior Non-Traffic Bearing Concrete” Section of this report. At locations where slabs cross trenches, observation and testing of trench backfill should be performed to confirm uniformity of conditions.

15.1 Thickness and Joint Spacing

To reduce the potential of unsightly cracking, concrete sidewalks, patio-type slabs should be at least four (4) inches thick and provided with frequent construction joints or expansion joints, especially at area of re-entrant corners, to help control cracking. Exterior perimeter slabs should be designed relatively independent of the foundation stems (free-floating) to help cracking due to settlement and/or expansion.

15.2 Reinforcement

Reinforcement of the exterior slab-on-grade is contingent on the structural engineer’s recommendations and the Expansion Index of the supporting soil. As a minimum, reinforcement should consist of No. 3 bars spaced twenty-four (24) inches on center, both ways. The reinforcement should be positioned near the middle of the slabs by means of concrete chairs or brick. Additional reinforcement may be required by the structural engineer.

15.3 Subgrade Preparation

As further measure to minimize cracking of concrete flatwork, the subgrade soils below concrete flatwork areas should first be compacted to a minimum relative compaction of 90% and then thoroughly moistened to achieve a moisture content that is near optimum moisture content. Pre-wetting of the soils to a depth of six (6) inches a maximum of 24-hours prior to concrete placement will promote uniform curing of the concrete and minimize the development of shrinkage cracks. **A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soils, and the depth or moisture penetration a maximum of 24-hours prior to pouring concrete.**

16.0 RIGID (PCC) PAVEMENT

It should be understood that as a manufactured product, concrete will crack even under ideal conditions. It is our experience that shrinkage is more pronounced in the Antelope Valley due to environmental conditions (high winds, daily extreme temperature differences and low humidity). Appropriate mix designs, placement procedures and concrete curing methods should be planned and implemented during construction in order to reduce the occurrence and magnitude of concrete shrinkage cracking.

Exterior slab-on-grade construction should be supported by compacted soil, prepared as recommended in “Remedial Grading for Flexible (Asphalt-Concrete) and Rigid PCC Pavement” section of this report. At locations where slabs cross trenches, observation and testing of trench backfill should be performed to confirm uniformity of conditions.

16.1 Thickness and Joint Spacing

To reduce the potential of unsightly cracking, rigid concrete pavement should be at least five (5) inches thick (six inches thick in heavy truck areas) and provided with frequent construction joints or expansion joints, especially at area of re-entrant corners, to help control cracking. Perimeter pavement should be designed relatively independent of the foundation stems (free-floating) to help cracking due to settlement and /or expansion.

16.2 Reinforcement

Reinforcement of the exterior pavement is contingent on the structural engineer’s recommendations and the Expansion Index of the supporting soil. As a minimum, reinforcement should consist of No. 3 bars spaced eighteen (18) inches on center, both ways. The reinforcement should be positioned near the middle of the slabs by means of concrete chairs or brick. Additional reinforcement may be required by the structural engineer.

16.3 Subgrade Preparation

As further measure to minimize cracking of concrete flatwork, the upper twelve inches of subgrade soils below concrete flatwork areas should first be compacted to a minimum relative compaction of **95%** and then thoroughly moistened to achieve a moisture content that is near optimum moisture content. Pre-wetting of the soils to a depth of six (6) inches a maximum of 24-hours prior to concrete placement will promote uniform curing of the concrete and minimize the development of shrinkage cracks. **A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soils, and the depth or moisture penetration a maximum of 24-hours prior to pouring concrete.**

17.0 Flexible (Asphalt-Concrete) Pavement

17.0 CONSTRUCTION CONSIDERATIONS

Based on our field exploration program, earthwork can be performed with conventional construction equipment.

17.1 Temporary Dewatering

Groundwater was not encountered in any of our borings to the maximum depth of our explorations. Based on the anticipated excavation depths, the need for temporary dewatering is considered low.

17.2 Construction Slopes

Excavations during construction should be conducted so that slope failure and excessive ground movement will not occur. The short-term stability of excavation depends on many factors, including slope angle, engineering characteristics of the subsoils, height of the excavation and length of time the excavation remains unsupported and exposed to equipment vibrations, rainfall, and desiccation.

Where spacing permits, and providing that adjacent facilities are adequately supported, open excavations may be considered. In general, unsupported slopes for temporary construction excavations should not be expected to stand at an inclination steeper than 1:1 (horizontal: vertical). The temporary excavation side walls may be cut vertically to a height of three (3) feet and then laid back at a 1:1 slope ratio above a height of three (3) feet.

Surcharge loads (equipment, spoil piles, etc.) should be kept away from the top of temporary excavations a horizontal distance equal to the depth of excavation. Surface drainage should be controlled along the top of temporary excavations to preclude wetting of the soils and erosion of the excavation faces. Even with the implementation of the above recommendations, sloughing of the surface of the temporary excavations may still occur, and workmen should be adequately protected from such sloughing.

17.3 Temporary Shoring

If shoring is considered, Bruin GSI should be notified in order to provide appropriate design parameters.

18.0 ADDITIONAL SERVICES

Final project plans and specifications should be reviewed prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. This report is based on the assumption that an adequate testing and inspection program along with client consultation will be performed during final design and construction phases to verify compliance with the recommendations of this report.

Retaining Bruin GSI as the geotechnical consultant to provide additional services from preliminary design through project completion will assure continuity of services.

Additional services include:

- Consultation during design stages of the project.
- Review, stamp and signature of the grading and building plans.
- Observation and testing during rough grading, fine grading and trench backfill as well as placement of engineered fill.
- Consultation as required during construction.

Cost estimates can be prepared if requested. Please contact our office.

19.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report is based on the development plans provided to our office. If structure design changes or structure locations changes occur, the conclusion and recommendations in this report may not be considered valid unless the changes are reviewed, and the conclusions of this report are modified or approved by the Geotechnical Consultant.

The subsurface conditions and characteristics described herein have been projected from individual borings or test pits placed across the subject property. Actual variations in the subsurface conditions and characteristics may occur.

If conditions encountered during construction differ from those described in this report, this office should be notified so as to consider the necessity for modifications. No responsibility for construction compliance with the design concepts, specifications, or recommendations is assumed unless on-site construction review is performed during the course of construction, which pertains to the specific recommendations contained herein.

It is recommended that Bruin GSI be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design specifications. If Bruin GSI is not accorded the privilege of making this recommended review, Bruin GSI can assume no responsibility for misinterpretation of the recommendations contained in this report.

This report has been prepared in accordance with generally accepted practice and standards in this community at this time. No warranties, either expressed or implied, are made as to the professional advice provided under the terms of the agreement and included in this report. This report has been prepared for the exclusive use of Four Points Enterprises, LLC and their authorized agents. Unauthorized reproduction of any portion of this report without expressed written permission is prohibited.

If parties other than Bruin GSI are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or providing alternate recommendations.

20.0 CLOSURE

The conclusions, recommendations, and opinions presented herein are: (1) based upon our evaluation and interpretations of the limited data obtained from our field and laboratory programs; (2) based upon an interpolation of soil conditions between and beyond the borings; (3) are subject to confirmation of the actual conditions encountered during construction; and, (4) are based upon the assumption that sufficient observation and testing will be provided during the grading, infrastructure installation and building phases of site development.

APPENDIX A

Boring Logs and Classification Key

BRUIN GEOTECHNICAL SERVICES INC. est. 2004

Date(s) drilled	**4/22/2024**	**LOG OF BORING 1**	
Drilling Contractor	**GP Drilling**		
Drilling Method	**Hollow Stem Auger**	**Page 1 of 2**	
Drill Rig Type	**CME 75**	Logged By:	**AM**
Drill Bit Size/Type	**8"**	Checked By:	**MS**
Sampling Method(s)	**SPT/Bulk**	Total Depth of Borehole	**35'**
Groundwater	**None Encountered**	Boring Location:	**See Figure 2**
Borehole Backfill	**Native/ Cuttings**	Notes:	
Hammer Data	**140#, 30" drop**		

Client: Four Points

Project Number: **23-434**

Project Location: **Palmdale**

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand to #4 gravel Loose, moist	3-3-3		6.6
	X	SM		Yellowish brown silty fine to medium sand w.coarse sand & occ. #4 gravel Very loose ,moist	1-1-1		9.2
5'							
	X	ML		Brownish yellow very sandy silt w/ occ. coarse sand to #4 gravel Stiff, moist	5-6-8		12.2
	X	SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4-3/8" gravel Medium dense, moist	5-6-6		
10'							
	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand to #4 gravel Medium dense, slightly moist	5-7-8		10.3
15'	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand & traces of clay Medium dense ,moist	7-8-10		12.6
20'	X	SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel Medium dense, slightly moist	7-9-11		8.9
25'	X	SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4-1" gravel Dense, slightly moist	12-16-19		8.1
30'	X	SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4-1" gravel Dense, slightly moist	12-13-16		8.8

Date(s) drilled	4/22/2024	**LOG OF BORING 1**	
Drilling Contractor	GP Drilling		
Drilling Method	Hollow Stem Auger	**Page 2 of 2**	
Drill Rig Type	CME 75	Logged By:	AM
Drill Bit Size/Type	8"	Checked By:	MS
Sampling Method(s)	SPT/Bulk	Total Depth of Borehole	35'
Groundwater	None Encountered	Boring Location:	See Figure 2
Borehole Backfill	Native/ Cuttings	Notes:	
Hammer Data	140#, 30" drop		

Client:	Four Points
Project Number:	23-434
Project Location:	Palmdale

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
35'	X	SM		SAA Refusal @ 36' auger binding at bottom No groundwater No caving	14-15-18		8.2
40'							
45'							
50'							
55'							
60'							

BRUIN GEOTECHNICAL SERVICES INC. est. 2004 ™

LOG OF BORING 2

Page 1 of 1

Date(s) drilled	**4/22/2024**		
Drilling Contractor	**GP Drilling**		
Drilling Method	**Hollow Stem Auger**		
Drill Rig Type	**CME 75**	Logged By:	**AM**
Drill Bit Size/Type	**8"**	Checked By:	**MS**
Sampling Method(s)	**CSS**	Total Depth of Borehole	**15'**
Client: Four Points	Groundwater	**None Encountered**	Boring Location: **See Figure 2**
Project Number: **23-434**	Borehole Backfill	**Native/ Cuttings**	Notes:
Project Location: **Palmdale**	Hammer Data	**140#, 30" drop**	

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4 gravel Medium dense, slightly moist	11-13	121.0	5.1
5'	X	SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4gravel Dense, moist	12-23	109.6	5.2
	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. coarse sand to 1" gravel Medium dense, slightly moist	9-16	106.9	5.9
10'	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. #4-1/2" gravel Medium dense, slightly moist	10-12	108.2	4.5
15'	X	SM		Light yellowish brown fine sandy silt w/ occ. medium sand to #4 gravel Stiff, slightly moist	15-29	106.6	5.7
20'				Boring terminated @ 15' bgs No groundwater No caving			
25'							
30'							

BRUIN GEOTECHNICAL SERVICES INC. est. 2004

Date(s) drilled	4/22/2024	**LOG OF BORING 3**	
Drilling Contractor	GP Drilling	**Page 1 of 1**	
Drilling Method	Hollow Stem Auger		
Drill Rig Type	CME 75	Logged By:	AM
Drill Bit Size/Type	8"	Checked By:	MS
Sampling Method(s)	CSS	Total Depth of Borehole	20'
Groundwater	None Encountered	Boring Location:	See Figure 2
Borehole Backfill	Native/ Cuttings	Notes:	
Hammer Data	140#, 30" drop		

Client: Four Points

Project Number: 23-434

Project Location: Palmdale

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand to #4 gravel Very loose, moist	2-2	103.3	9.1
	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand to 1/2" gravel Loose, moist	2-3	104.5	7.8
5'	X	SM		SAA Loose, moist	2-4	110.0	8.9
	X	SM		SAA Medium dense, moist	8-9	114.5	10.5
10'							
	X	SM		Yellowish brown silty fine to coarse sand w/ occ. #4-2" gravel Medium dense, moist	5-7	113.2	5.4
15'	X	SM		Yellowish brown silty fine to medium sand w/coarse sand & occ. #4-1/2" gravel Medium dense, moist	12-16	111.5	6.2
20'	X	SM		Yellowish brown silty fine to coarse sand w/ occ. #4-1" gravel Medium dense, moist	8-14	118.9	5.2
				Boring terminated @ 20' bgs No groundwater No caving			
25'							
30'							

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Date(s) drilled	4/22/2024	**LOG OF BORING 4**	
Drilling Contractor	GP Drilling	**Page 1 of 1**	
Drilling Method	Hollow Stem Auger		
Drill Rig Type	CME 75	Logged By:	AM
Drill Bit Size/Type	8"	Checked By:	MS
Sampling Method(s)	CSS	Total Depth of Borehole	20'
Groundwater	None Encountered	Boring Location:	See Figure 2
Borehole Backfill	Native/ Cuttings	Notes:	
Hammer Data	140#, 30" drop		

Client: Four Points

Project Number: 23-434

Project Location: Palmdale

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. coarse sand Loose, moist	2-3	107.7	10.1
5'	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. coarse sand to 1/2" gravel Loose, moist	2-3	112.2	8.3
	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. coarse sand to 1/2" gravel Medium dense, moist	5-8	120.2	9.6
10'	X	SM		Yellowish brown silty fine sand w/ medium sand & occ. coarse sand to 1/2" gravel Loose, moist	4-5	116.3	11.0
	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand -1/2" gravel (Cemented) Very dense, slightly moist	21-32		
15'	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand -1/2" gravel (slightly Ceme Dense,slightly moist	15-24	115.0	10.3
20'	X	SM		Yellowish brown silty fine to. Medium sand w/ occ. coarse San to #4 gravel Medium dense, slightly moist	9-13	113.1	6.1
25'				Boring terminated @ 20' bgs No groundwater No caving			
30'							

Date(s) drilled	4/22/2024	**LOG OF BORING 5**	
Drilling Contractor	GP Drilling	**Page 1 of 1**	
Drilling Method	Hollow Stem Auger		
Drill Rig Type	CME 75	Logged By:	AM
Drill Bit Size/Type	8"	Checked By:	MS
Sampling Method(s)	CSS	Total Depth of Borehole	20'
Groundwater	None Encountered	Boring Location:	See Figure 2
Borehole Backfill	Native/ Cuttings	Notes:	
Hammer Data	140#, 30" drop		

Client: Four Points

Project Number: 23-434

Project Location: Palmdale

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Brown silty fine to medium sand w/ occ. coarse sand to #4 gravel Loose, moist	2-3	105.9	9.5
	X	ML		Brown fine sandy silt w/ occ. medium sand to #4 gravel & clay Soft, very moist	3-4	104.2	16.0
5'	X	SM		Brown silty fine to medium sand w/ occ. coarse sand Medium dense, very moist	5-7	99.7	11.0
	X	SM		SAA Loose, moist	4-5	110.5	7.6
10'	X	SM		Yellowish brown silty fine to medium sand w/ occ. coarse sand to 1/2" gravel Medium dense, moist	4-7		
15'	X	SM		Yellowish brown very silty fine to medium sand w/ occ. coarse sand (cemented) Dense, dry	12-23	108.0	3.6
20'	X	SM		Light yellowish brown silty fine sand w/ medium sand & occ. coarse sand Dense, dry	15-26	103.8	4.2
				Boring terminated @ 20' bgs No groundwater No caving			
25'							
30'							

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Date(s) drilled	4/22/2024	**LOG OF BORING 6**	
Drilling Contractor	GP Drilling	Page 1 of 1	
Drilling Method	Hollow Stem Auger		
Drill Rig Type	CME 75	Logged By:	AM
Drill Bit Size/Type	8"	Checked By:	MS
Sampling Method(s)	CSS	Total Depth of Borehole	15'
Groundwater	None Encountered	Boring Location:	See Figure 2
Borehole Backfill	Native/ Cuttings	Notes:	
Hammer Data	140#, 30" drop		

Client: Four Points

Project Number: 23-434

Project Location: Palmdale

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
	X	SM		Moderate brown silty fine sand w/ medium sand & occ. coarse sand Medium dense, very moist	4-7	115.8	11.8
	X	SP		Grey fine to medium sand w/ coarse sand & occ. #4-1/2" gravel Medium dense, slightly moist	10-12	112.4	4.0
5'							
	X	SP-SM		Brown slightly silty fine to medium sand x w/ occ. coarse sand to #4 gravel Loose ,moist	3-4	110.9	12.7
	X	SP		Greyish brown fine to coarse sand w/ occ. #4-1/2" gravel Medium dense, moist	9-14		
10'							
15'	X	ML		Moderate brown fine sandy silt w/ occ. medium to coarse sand & clay Firm, very moist	9-11	120.7	12.1
				Boring terminated @ 15' bgs No groundwater No caving			
20'							
25'							
30'							

SOIL CLASSIFICATION KEY

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
Coarse Grained Soils 50% or more larger than #200 sieve	**Gravels** More than half coarse-fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, poorly graded gravel-sand-silt mixtures
			GC	Clayey gravels, poorly graded gravel-sand-clay mixtures
	Sands More than half coarse-fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sands, poorly graded sand-silt mixtures
			SC	Clayey sands, poorly graded sand-clay mixtures
Fine Grained Soils 50% or more smaller than #200 sieve	**Silts and Clays** Liquid limit less than 50		ML	Inorganic silts, rock flour, clayey silts
			CL	Inorganic clays of low to medium plasticity, sandy clays, silty clays
			OL	Organic clays and organic silty clays of low plasticity
	Silts and Clays Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy/silty soils, elastic silts
			CH	Inorganic clays with high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils			Pt	Peat and other highly organic soils

CLASSIFICATION SYSTEM BASED ON THE UNIFIED SOIL CLASSIFICATION SYSTEM

44732 Yucca Avenue
Tel (661) 273-9078

Lancaster, California 93534
www.bruingsi.net

Boring Log Key

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1	Depth in feet below the ground surface	5	Description of the material encountered. May include consistency, moisture, color, and other descriptors
2	Sampling Method see "symbols" below	6	Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval
3	USCS symbol	7	Dry weight per unit volume of soil sample measured in laboratory units in pounds per cubic foot
4	Graphic depiction of the subsurface material	8	Water content of the sample expressed as a percentage of the dry weight of the sample

ABBREVIATIONS

DIST = Disturbed Sample
N/R = No Recovery
CHEM = Chemical Test
N/A = Not Analyzed

SAMPLING METHOD SYMBOLS

California Split Spoon (CSS)

Standard Penetration Test (SPT)

Bulk Sample

Grab Sample

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.

2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

APPENDIX B

Laboratory Test Data

SUMMARY OF LABORATORY TEST RESULTS

SIEVE ANALYSIS

Percent passing individual sieves

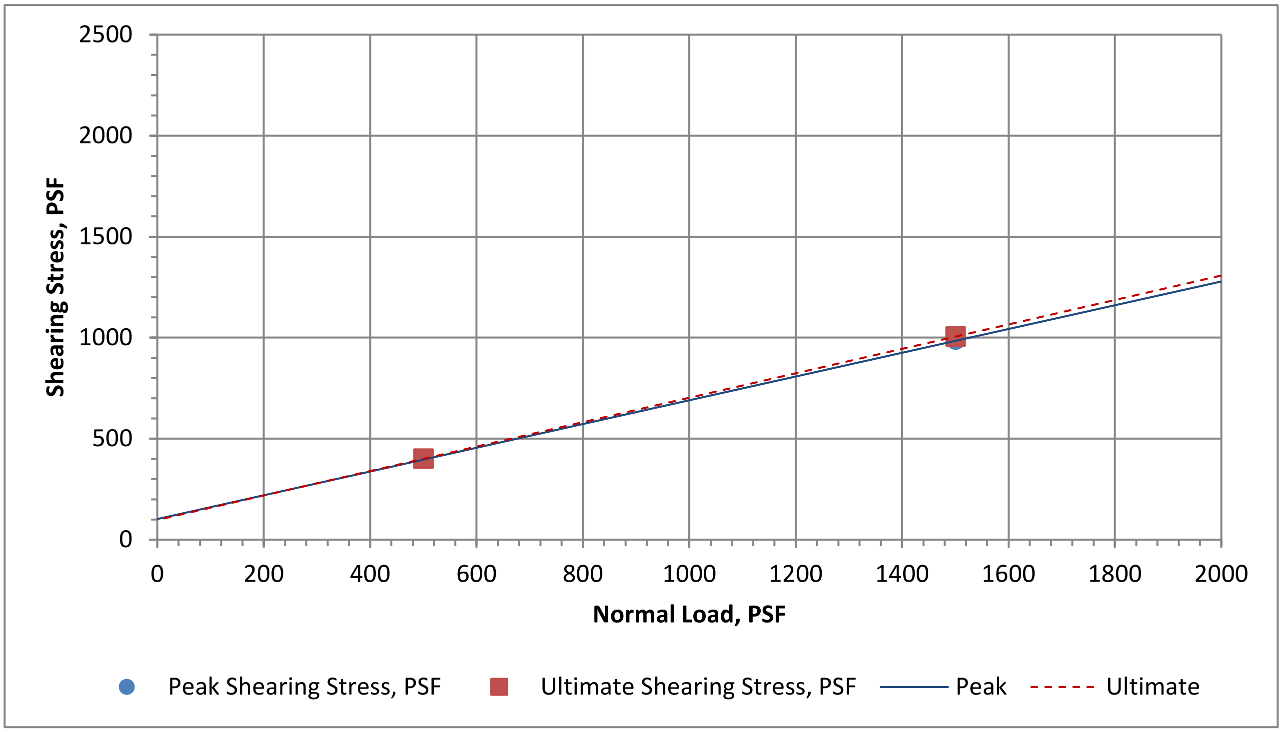
Sample I.D.	1/2"	3/8"	#4	#10	#40	#100	#200
B1@1	100	99	98	94	75	51	32
B1@6		100	99	97	90	74	55
B1@12		100	99	96	80	59	42
B1@25	100	99	98	94	74	49	31
B1@35	100	99	99	94	73	50	34
B2@2		100	99	96	76	50	32
B2@15		100	99	98	87	67	49
B3@3		100	99	96	73	46	30
B3@12	99	98	95	88	49	23	16
B3@15		100	99	94	74	47	28
B4@2	100	99	99	96	82	60	43
B4@15		100	99	97	84	64	46
B4@20	100	99	99	96	74	44	29
B5@2	100	99	99	96	85	63	44
B5@4		100	99	99	97	88	69
B5@15		100	99	96	73	49	34
B5@20		100	99	97	85	66	48
B6@1		100	98	93	73	51	39
B6@15		100	99	96	80	62	48

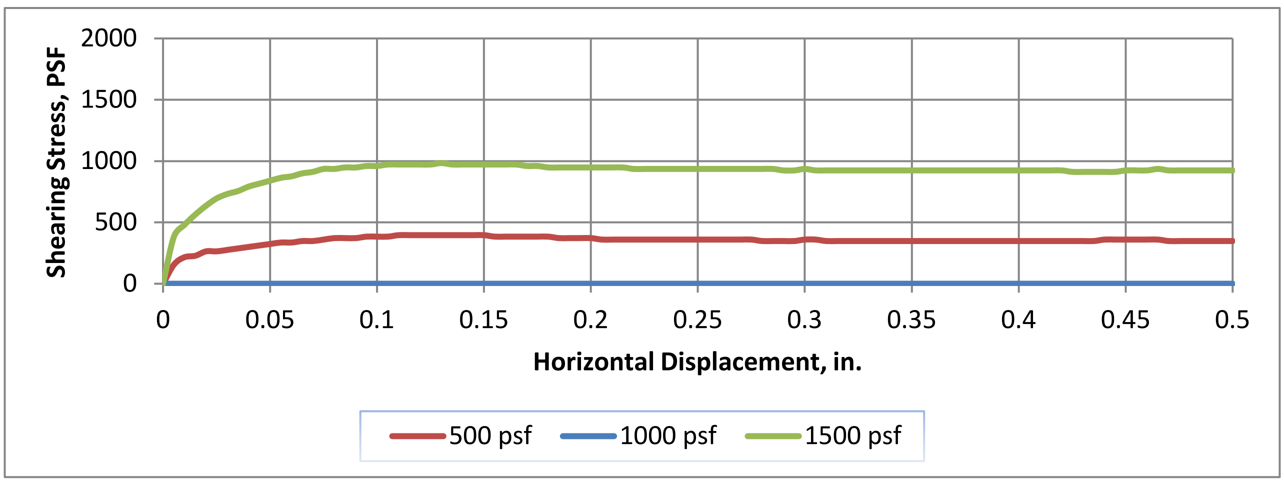
SAND EQUIVALENT

Sample I.D.	Sand Equivalent
B1@3	17
B2@4	18

EXPANSION INDEX

Sample I.D.	Expansion Index	Classification
B1@0-5’	0	Non-Expansive





Sample Description: (SM) - Yellowish brown silty fine sand w/ medium sand to 1/2" gravel

DIRECT SHEAR DATA (ASTM D-3080)

Sample ID	Symbol	Depth, feet	Dry Density, PCF	Average deg. of saturation
4	●	5	146	80
			Peak	Ultimate
Angle of friction, (degrees)			30	31
Cohesive Strength (PSF)			102	98

Direct Shear Test

Four Points Enterprises, LLC.

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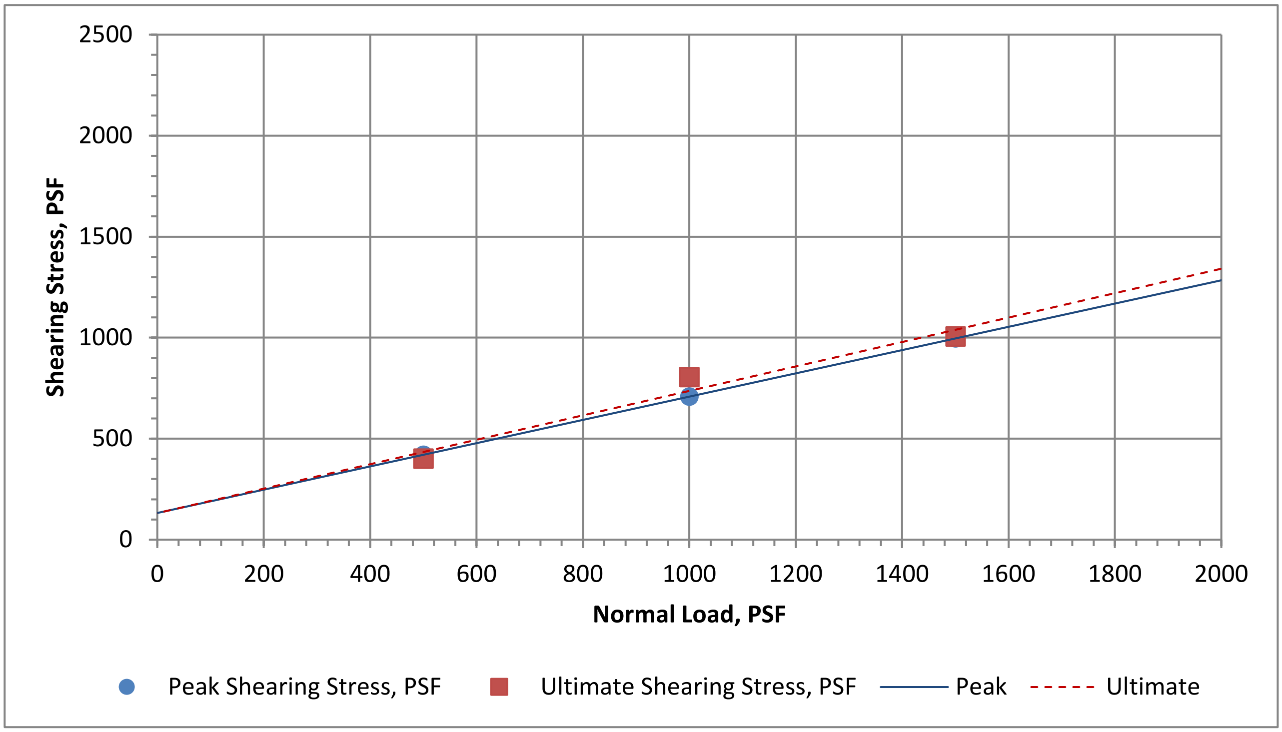
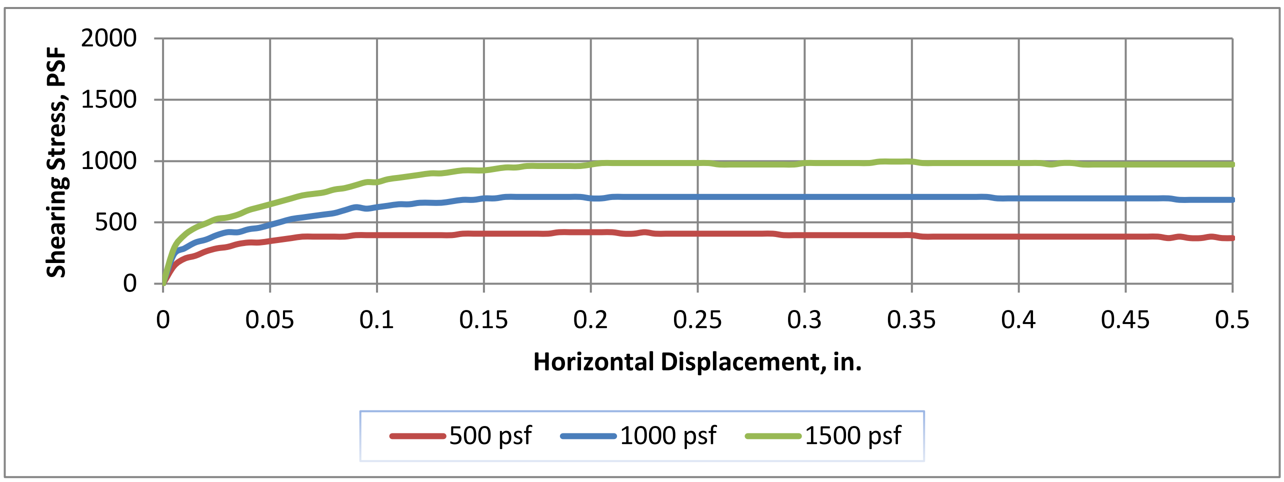
GEOTECHNICAL SERVICES INC.
est. 2004

J.N. 23-434





Sample Description: (SM) - Yellowish brown silty fine to medium sand w/ oc. Coarse sand

DIRECT SHEAR DATA (ASTM D-3080)

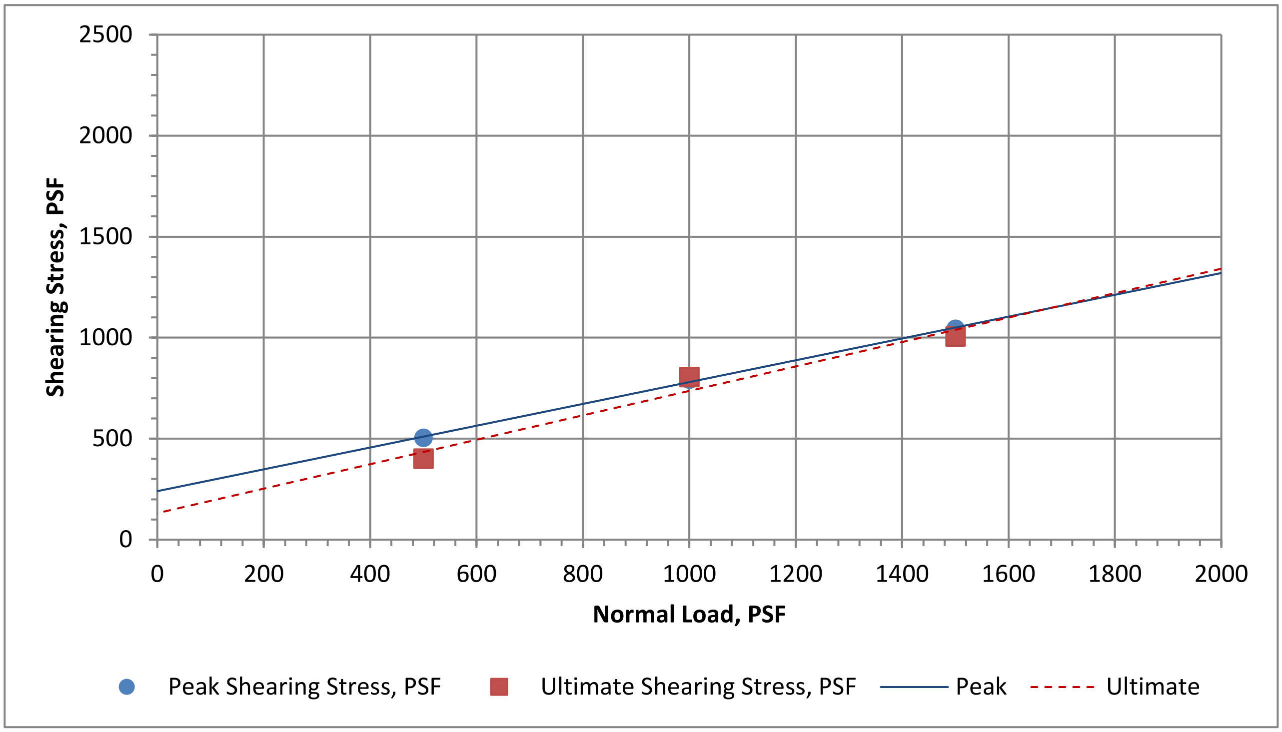
Sample ID	Symbol	Depth, feet	Dry Density, PCF	Average deg. of saturation
5	●	6	133	88
			Peak	Ultimate
Angle of friction, (degrees)			30	31
Cohesive Strength (PSF)			132	131

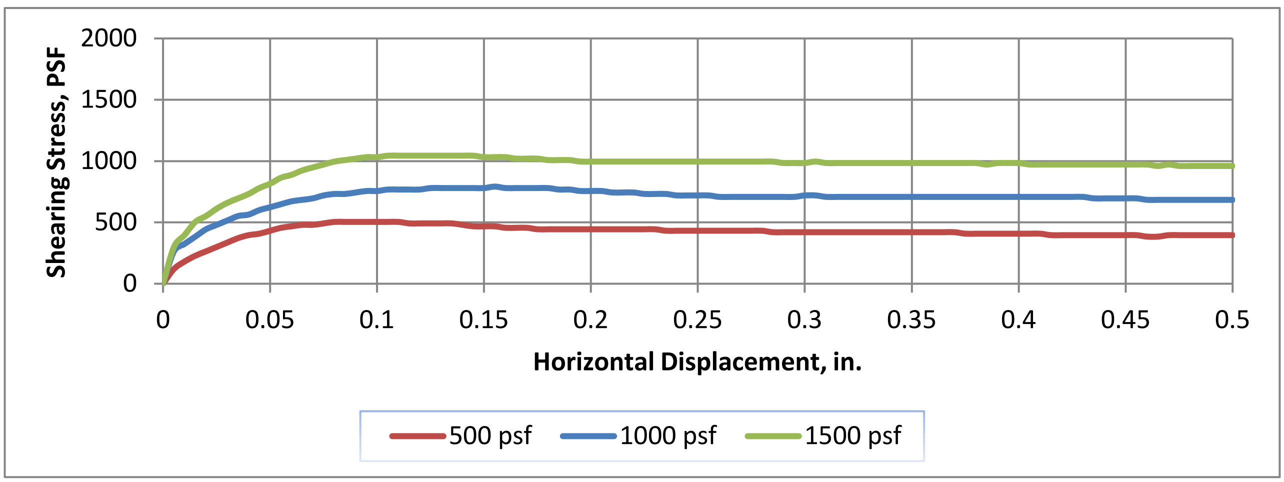
Direct Shear Test

Four Points Enterprises, LLC.

BRUIN GEOTECHNICAL SERVICES INC. est. 2004

J.N. 23-434





Sample Description: (SM) - Yellowish brown silty f-m sand w/ coarse sand & occ. #4 gravel

DIRECT SHEAR DATA (ASTM D-3080)

Sample ID	Symbol	Depth, feet	Dry Density, PCF	Average deg. of saturation
B3	●	8	148	82
			Peak	Ultimate
Angle of friction, (degrees)			28	31
Cohesive Strength (PSF)			240	131

Direct Shear Test

Four Points Enterprises, LLC.

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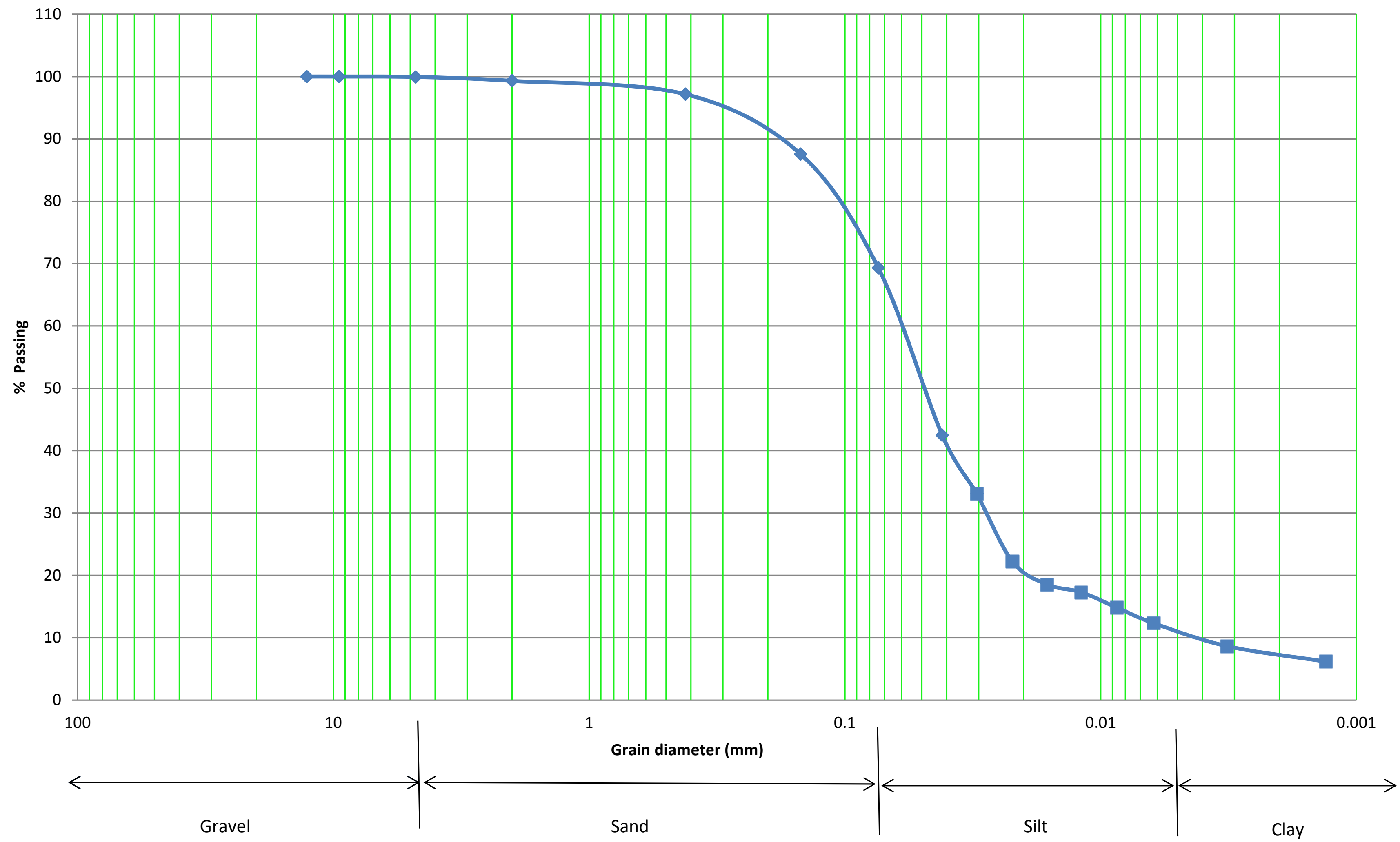

Grain Size Distribution Curve (ASTM D422)

Job Number: 23-434
Client Name: Four Points
Sample I.D.: B1@1'

Coefficient of Uniformity, Cu: 4.97

Particle range, mm: 12.699

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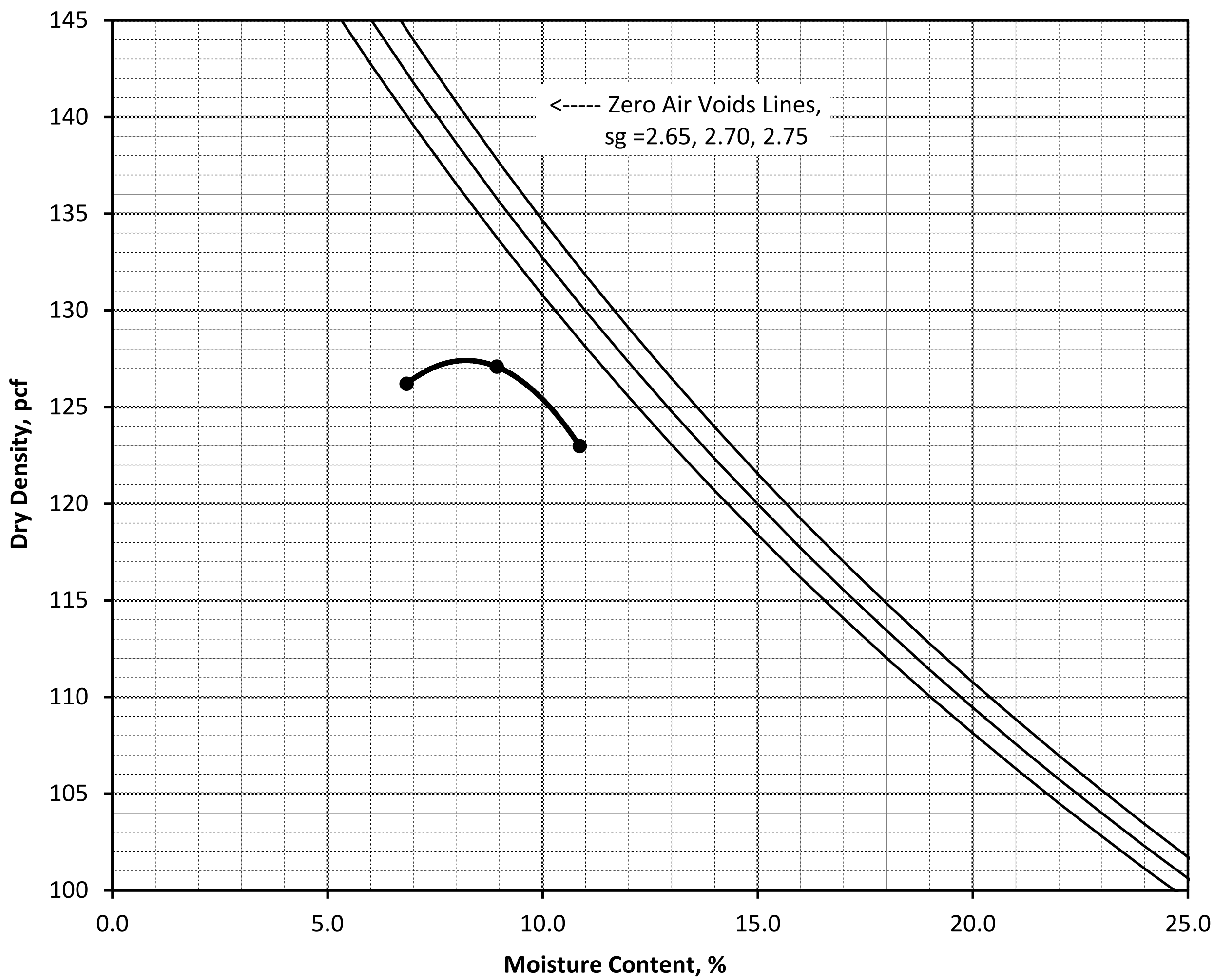
est. 2004

Bruin Geotechnical Services, Inc.
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

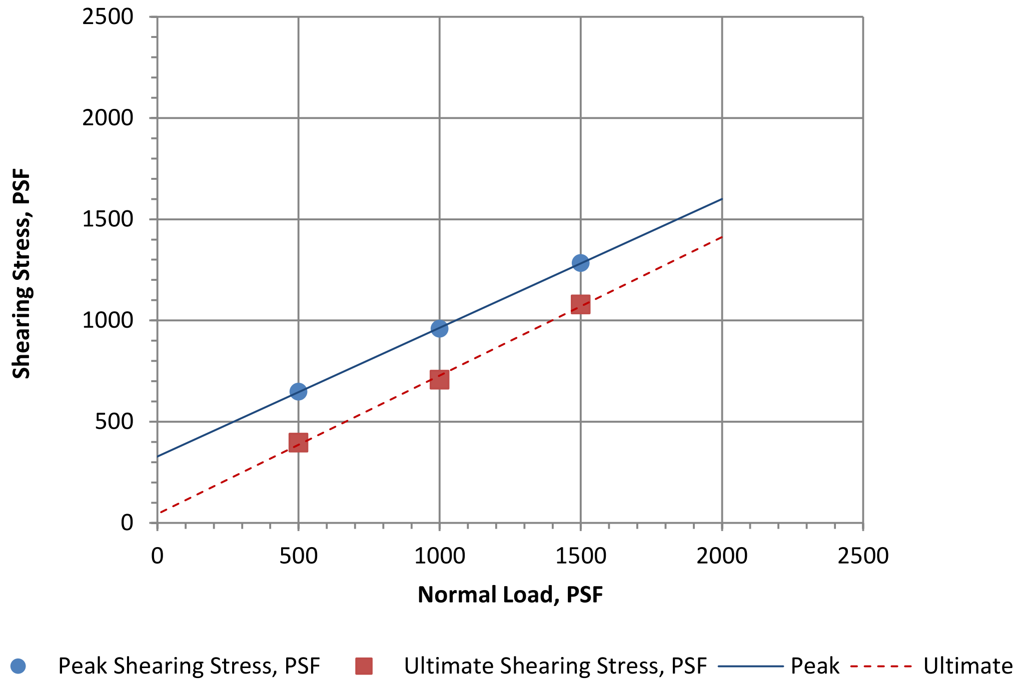
Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

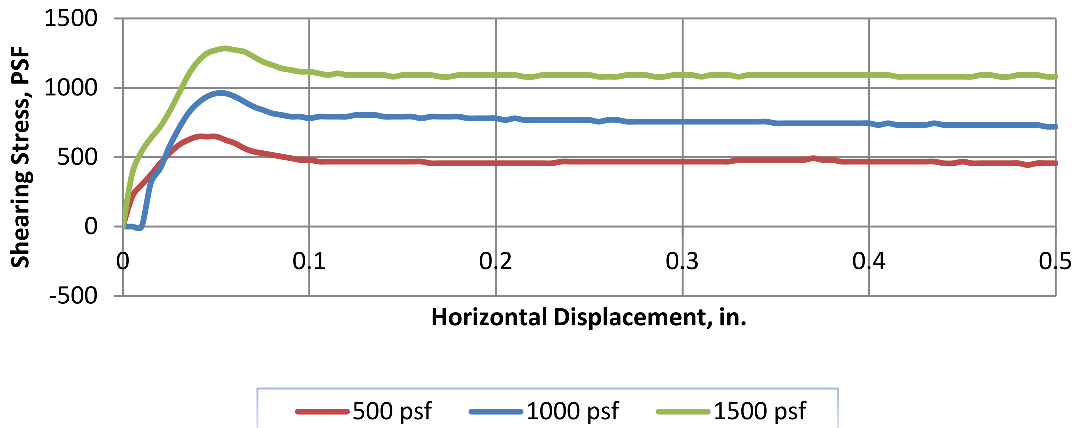
Job Number:	23-434	
Client:	Four Points Enterprises, LLC.	ASTM D 1557 A
Sample ID:	Bulk Sample 0-5' BGS	Rammer Type: 10#
Sample Location:	B1 @ 0-5'	
Description:	(SM) Brown silty fine to medium sand w/ occ. Coarse sand to #4 gravel	

Maximum Density: 127.4
Optimum Moisture: 8.2



---- Zero Air Voids Line, Specific Gravity: 2.7 (assumed)





Sample Description: (SM) - Yellowish brown silty fine to medium sand

DIRECT SHEAR DATA (ASTM D-3080)

Sample ID	Symbol	Depth, feet	Dry Density, PCF	Average deg. of saturation
B1	●	0-5'	113	87

* Sample remolded to 90% relative compaction as determined by ASTM D-1557 Test Method

	Peak	Ultimate
Angle of friction, (degrees)	32	34
Cohesive Strength (PSF)	328	44

Direct Shear Test

Four Points Enterprises, LLC

BRUIN GEOTECHNICAL SERVICES INC.

23-434

ANAHEIM TEST LAB, INC

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949) 336-6544

Bruin Geotechnical Services, Inc.
44732 Yucca Avenue
Lancaster, CA 93534

DATE: 5/7/2024

P.O. NO.: Transmittal

LAB NO.: C-7889

SPECIFICATION: CTM-643/417/422

MATERIAL: Soil

Project No.: 23-434
Project: Four Points
Peasblossom Hwy & Fallingstar Pl, Palmdale, CA
Boring ID: B1 @ 0-5'

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

pH	MIN. RESISTIVITY per CT. 643 ohm-cm	SOLUBLE SULFATES per CT. 417 (% by weight)	SOLUBLE CHLORIDES per CT. 422 ppm
7.8	9,400	0.0098%	27

RESPECTFULLY SUBMITTED

WES BRIDGER, LAB MANAGER

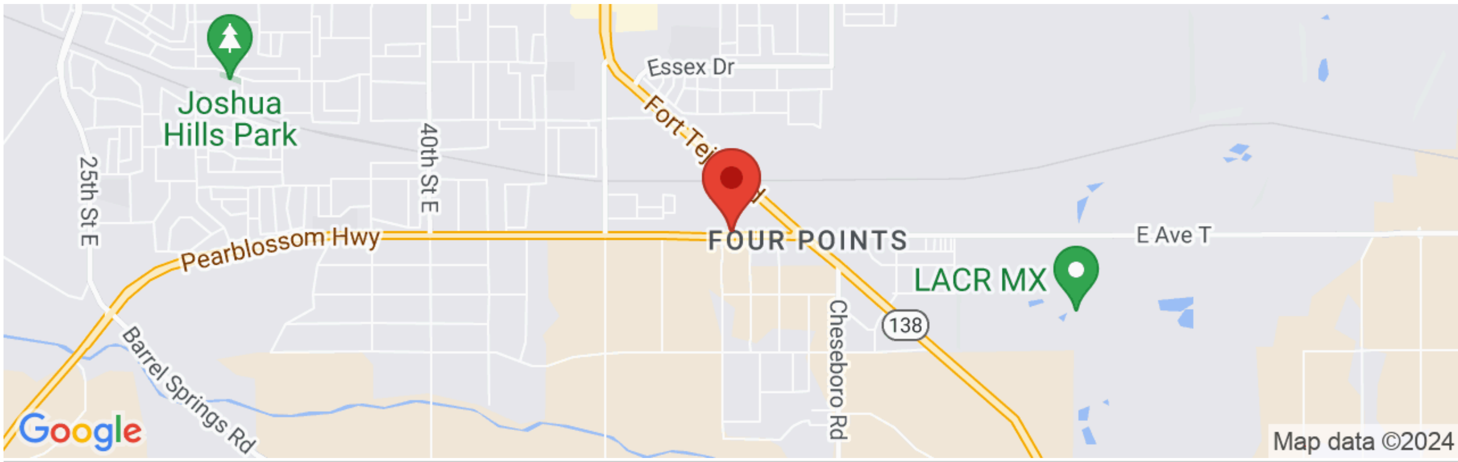
APPENDIX C

USGS Seismic Design Summary Report

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

23-434 Four Points Enterprises

Latitude, Longitude: 34.54299282, -118.03577233



Date	5/14/2024, 1:22:16 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.287	MCE_R ground motion. (for 0.2 second period)
S_1	0.972	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.287	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.525	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.984	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	1.083	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	2.808	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	3.17	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.287	Factored deterministic acceleration value. (0.2 second)
S1RT	1.201	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.382	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.972	Factored deterministic acceleration value. (1.0 second)
PGAd	0.984	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	1.27	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.886	Mapped value of the risk coefficient at short periods
C_{R1}	0.869	Mapped value of the risk coefficient at a period of 1 s
C_V	1.5	Vertical coefficient

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APPENDIX D

General Earthwork and Grading Guidelines

Earthwork and Grading Specifications for Rough Grading

1.0 General

1.1 **Intent:** These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 **The Geotechnical Consultant of Record:** Prior to commencement of work, the owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observations, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to confirm that the attained level of compaction is being accomplished as specified. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 **The Earthwork Contractor:** The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the project plans and specifications. The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "equipment" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultants, unsatisfactory conditions, such as unsuitable soil, improper moisture-condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in the specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified. It is the contractor's sole responsibility to provide proper fill compaction.

2.0 Preparation of Areas to be Filled

2.1 **Clearing and Grubbing:** Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 10 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminant dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed. The contractor is responsible for all hazardous waste relating to his work. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Client should acquire the services of a qualified environmental assessor.

2.2 **Processing:** Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free from oversize material and the working surface is reasonably uniform, flat, and free from uneven features that would inhibit uniform compaction.

2.3 **Overexcavation:** In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading pan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 **Benching:** Where fills are to be places on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter that 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 **Evaluation/Acceptance of Fill Areas:** All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observes, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 **General:** Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 **Oversize:** Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 **Import:** If importing of fill material is required for grading, proposed import material shall meet the requirements of the geotechnical report(s). The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so the suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 **Fill Layers:** Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates that grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 **Fill Moisture Conditioning:** Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain relatively uniform moisture content within 2% of optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 **Compaction of Fill:** After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 **Compaction of Fill Slopes:** In addition to normal compaction procedures specified above, compaction of slopes, shall be accomplished by backrolling of slopes with sheepfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 **Compaction Testing:** Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 **Frequency of Compaction Testing:** Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 **Compaction Test Locations:** The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less then 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical repot(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land survey/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well we over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding Material shall have a Sand Equivalent greater then 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

7.3 The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

APPENDIX E – Conceptual Hydrology Study

CONCEPTUAL HYDROLOGY STUDY

For

Proposed Mini-Storage Facility

APN 3051-019-030 & 112

NEC Pearblossom & Fallingstar Place

Palmdale, CA 93550

July 2024

Prepared For:

Four Points Enterprises, LLC
P.O. Box 901807
Palmdale, CA 93590
Phone: (661) 273-3462

Prepared By:

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129 W. Pondera St
Lancaster, CA 93534
(661) 948-0805
JN 23065

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APPENDICES

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Appendix C	**On-site 50-Yr., 25-Yr. Areas**
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Appendix E	**On & Off-site Pipe Sizing**
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Appendix G	**Existing Off-site Culvert**
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Introduction
This conceptual hydrology study is for a proposed mini-storage facility located on the northeast corner of Pearblossom Hwy & Fallingstar Place in the City of Palmdale, CA. The proposed site is to be constructed on a vacant site pf just under 5 acres (net). The property is located in FEMA flood zone 'X'; therefore, it is not located in an existing special flood hazard area (see sheet 6). There is off-site runoff from an existing culvert located on the southeast corner of the proposed site. The proposed site will install a 42" storm drain pipe that will collect this runoff and also have the capacity to route the ultimate runoff from the future public storm drain system. There is also substantial amount of off-site runoff from the southeast of the proposed site that impacts the site on the northeast corner. This project will construct a trapezoidal channel (a master planned facility) on the north end of the site to collect and channel the off-site runoff into an existing City of Palmdale basin/channel. This study will determine the on & off-site runoff along with the first flush (3/4") peak mitigation runoff in order to size the appropriate drainage facilities.

This site is located in the City of Palmdale Master Plan of Drainage Pearland Watershed. Based on the City of Palmdale Master Plan of Drainage (PMPD), this site is located in the vicinity of a proposed public storm drain system (Pearblossom Hwy & Fort Tejon Road). Since the public storm drain is not currently built, the proposed site will address the off-site runoff that the future storm drain system will handle at this time. Once the public storm drain is constructed the offsite runoff will be reduced or collected before the runoff reaches the proposed site and routed north on Fort Tejon Road, thus, it will past this site.

Rainfall Data
This site has the following rainfall data, etc.

Isohyet Line	=	2.8, 2.46	(see sht. 5)
Soil number	=	(see Appendix A)	
Storm frequency	=	50 Yr., 25Yr.	(Mini-Storage Facility)

Storm Runoff Methodology
The L.A. County HydroCalc computer program is used to determine the storm runoff for on-site & some off-site areas. The main off-site area runoff is calculated using the HEC HMS program. For the component areas, see the hydro-maps, H1-H10.

Off-site Runoff Areas (See Appendix B)

On-site Areas (See Appendix C)

Conveyance
OFF-SITE (Existing Culvert Per ST 96-28)

Off-site Area B is located south of the proposed site and is approximately 284 acres (0.44 square miles). Area B consist of underdeveloped land with some small low density residential areas. The runoff in area B sheet flows northeasterly towards an existing culvert located on the southwest corner of Pearblossom Hwy & 52nd Street East (Per ST 96-28). This culvert outlets onto the proposed site at the south east corner of the site. Using the HEC-HMS modeling program Area B generates a runoff of 97 CFS (see appendix B). Based on the City of Palmdale Master Plan of Drainage the runoff in this area is 106 CFS (Areas 187AB-Area 183AB, 251 CFS - 183 CFS, from PMPD see appendix J), to be conservative this study will use 106 CFS when designing the new drainage facilities. The existing culvert has a capacity of 44.12 CFS see appendix G. This leaves a remaining 61.88 CFS in Pearblossom Hwy.

Pearblossom Hwy. & Proposed 21' Curb Inlet Catch Basin

The south half of Pearblossom Hwy has a capacity of 43.0 CFS (see appendix F for section "D" & "E" and street capacity). The remaining 18.88 CFS (61.88 CFS-43.0 CFS) will flow over to the north half of Pearblossom Hwy. The proposed site will install a 21' curb inlet catch basin on the north side of Pearblossom Hwy to collect this runoff. The proposed 21' catch basin will collect 12.45 CFS of the 18.88 CFS on the north half of Pearblossom Hwy (see appendix D for catch basin capacity). The 6.43 CFS that remains will continue to street flow easterly down Pearblossom Hwy and makes its way into an existing culvert and drainage swale located on the northeast corner of Pearblossom Hwy and Rodney Bruce Dr.

Proposed 42" Storm Drain Pipe (P-6)

The proposed site will install a 42" storm drain pipe that will run thru the proposed site. The proposed 42" storm drain will collect the interim runoff from the existing culvert (44.12 CFS), the runoff that is collected by the proposed catch basin (12.45 CFS) on the north side of Pearblossom Hwy, and the proposed site (Area F= 3.97 CFS) for a total flow of 60.54 CFS. The 42" pipe will ultimately carry the total runoff of 106 CFS plus the 3.97 CFS from the proposed site. The 42" pipe at a slope of 1.0% has a capacity of 117.24 CFS, which is > 109.97 CFS, therefore the pipe has adequate capacity to carry the interim runoff 60.54 CFS and the ultimate City of Palmdale Master Plan of Drainage flow (see appendix E). The 109.97 CFS will be routed through the site and outlet into the proposed trapezoidal channel located at the north end of the proposed site (see trapezoidal channel below).

OFF-SITE (South East Area, Proposed Master Planned Trapezoidal Channel)

Off-site Area C is located southeast of the proposed site and is approximately 1,353 acres (2.11 square miles). Area C consist of underdeveloped land with some small low density residential areas & some small commercial development (gas stations & open swap meet). The runoff in area C sheet flows northwesterly towards an existing culvert located on the southwest corner of Pearblossom Hwy & Rodney Bruce Dr. This culvert outlets into an existing swale that routes the runoff to the north (currently a dirt parking lot) and ultimately drains into the proposed trapezoidal channel. Using the HEC-HMS modeling program Area C generates a runoff of 263 CFS (see appendix B). Based on the City of Palmdale Master Plan of Drainage the runoff in this area is 300 CFS (Areas 189A, from PMPD see appendix J), to be conservative this study will use 300 CFS when designing the new drainage facilities.

Trapezoidal Channel (Master Planned Facility)

The proposed rock lined trapezoidal channel is located at the north end of the site and will collect the offsite runoff from Area C which is located to the southeast of the site along with the runoff from the proposed 42" pipe (which includes the proposed site).

Just east of the northeast corner of the proposed site, sections were taken to verify the water surface level along with the flow limits (see appendix I for location & appendix F for calculations). These sections (A-C) show the runoff entering the proposed channel at the northeast corner of the site. The WSL (water surface level) at the critical section C (before the water enters the trapezoidal channel) is at an elevation of 2737.25' which is 0.56' below the finish floor elevation of the proposed storage building (FF=2737.81'). Once the flow enters into the trapezoidal channel the depth of flow is 1.80' above the channels bottom (2734.0'). This makes a WSL elevation of 2735.8, which is 2.01' below finish floor of the proposed storage buildings. The runoff from the proposed 42" pipe will increase the flow in the channel to 408.63 CFS (300 CFS + 106 CFS + 3.97 CFS (site) = 409.97 CFS). The depth of flow in the trapezoidal channel with the additional runoff is 3.42' (WSL =2735.39'), which is 2.42' below the finish floor of the proposed storage buildings, thus the channel had adequate capacity see appendix H. The trapezoidal channel will than route the runoff into a City of Palmdale drainage basin (see City of Palmdale Drainage Basin section below).

ON-SITE AREA F (Proposed Mini –Storage Facility)

On-site Area F will utilize an on-site private storm drain system to collect the onsite runoff (3.97 CFS) and route the flow into the proposed 42" storm drain. The 42" storm drain will than route the onsite runoff into the proposed trapezoidal channel.

ON-SITE CATCH BASIN SIZING

On-site areas are broken up to sub-areas and the runoff was proportioned based on areas to size the proposed on-site catch basins. (See appendix I Map H3 for subarea and appendix D catch basin calculations)

ON-SITE PIPE SIZING (See Appendix E, map H4 for location in appendix I)

CITY OF PALMDALE DRAINAGE BASIN/CHANNEL

Based on the City of Palmdale Master Plan of Drainage Pearland Watershed map all off-site areas (Areas A, B, C, D, E,) and onsite area (Area F) flow into an existing basin (see appendix I for area location). This basin was constructed with the development of Tract No. 46356 & 52029. Unfortunately, the city could not find the hydrology studies for these tracts. Thus, none of the pervious design information was available for reference. Per the master plan of drainage, the basin/channel will be extended to the west. In the interim per the grading plan for Tract No. 46356 the basin will sheet overflow to the north across the railroad tracks just east of 47th Street East.

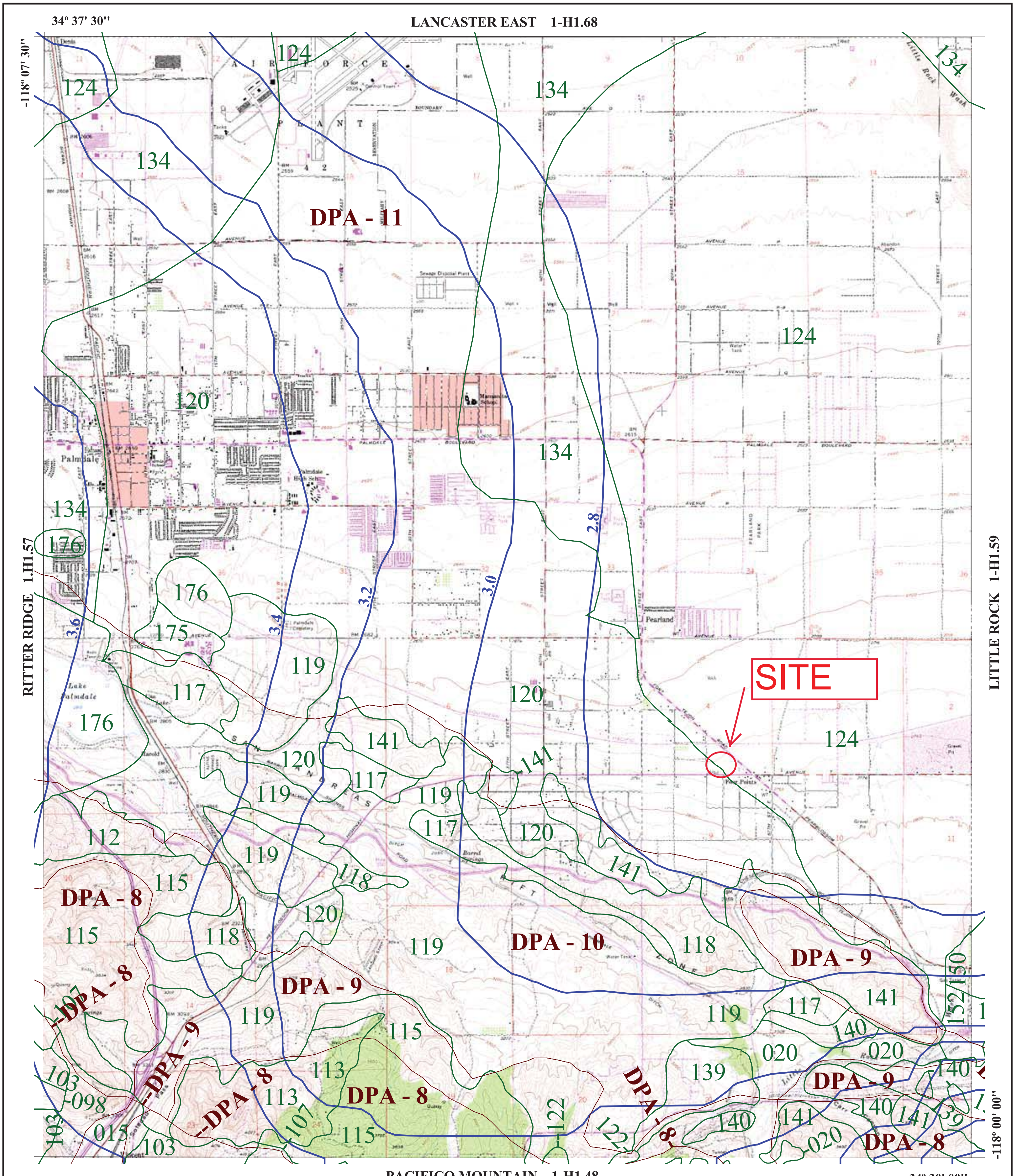
Using the HEC-HMS & the L.A. County HydroCalc the flow and volume for a 25 Year Storm Frequency are as followed (see appendix B):

AREA	FLOW RATE	VOLUME
A	66.6 CFS	26.3 AC-FT
B	73.9 CFS	29.7 AC-FT
C	165.5 CFS	84.8 AC-FT
D	18.3 CFS	8.0 AC-FT
E	13.16 CFS	4.1 AC-FT
(SITE) F	2.63 CFS	0.75 AC-FT
TOTAL	340.09 CFS	153.65 AC-FT

The total capacity of the existing basin is approximately is 41 AC-FT.

Storm Water and Nuisance Water Mitigation

In order to comply with the State's NPDES permit, the first flush (3/4") of runoff from this site must mitigate potential pollutants from the storm water runoff. The site will utilize catch basin filters installed in the various catch basins to achieve this.



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

P A L M D A L E
50-YEAR 24-HOUR ISOHYET

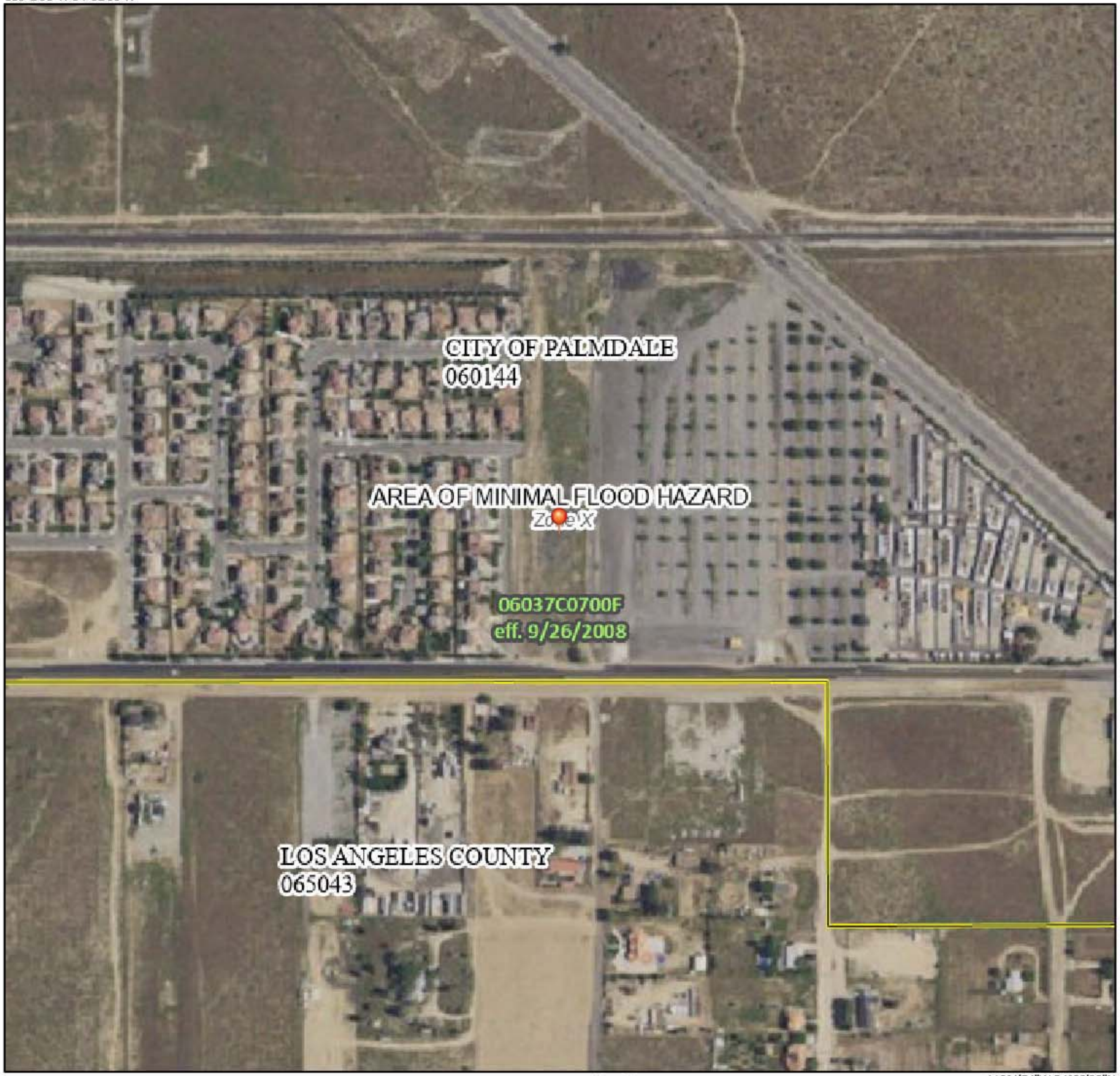
1-H1.58
SHEET 5

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

National Flood Hazard Layer FIRMette

FEMA

118°2'31"W 34°32'53"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

118°1'54"W 34°32'23"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99* With BFE or Depth *Zone AE, AO, AH, VE, AR* Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X* Future Conditions 1% Annual Chance Flood Hazard *Zone X* Area with Reduced Flood Risk due to Levee. See Notes. *Zone X* Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X* Effective LOMRs Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
OTHER FEATURES	B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation 8 Coastal Transect 513 Base Flood Elevation Line (BFE) Limit of Study Jurisdiction Boundary Coastal Transect Baseline Profile Baseline Hydrographic Feature
MAP PANELS	Digital Data Available No Digital Data Available Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/19/2024 at 3:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

SHEET 6

APPENDIX A

(SOIL CLASSIFICATION)

AREA A

Map Scale: 1:8,420 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 400, 800, 1600, 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

AREA A

Map Scale: 1:5,670 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

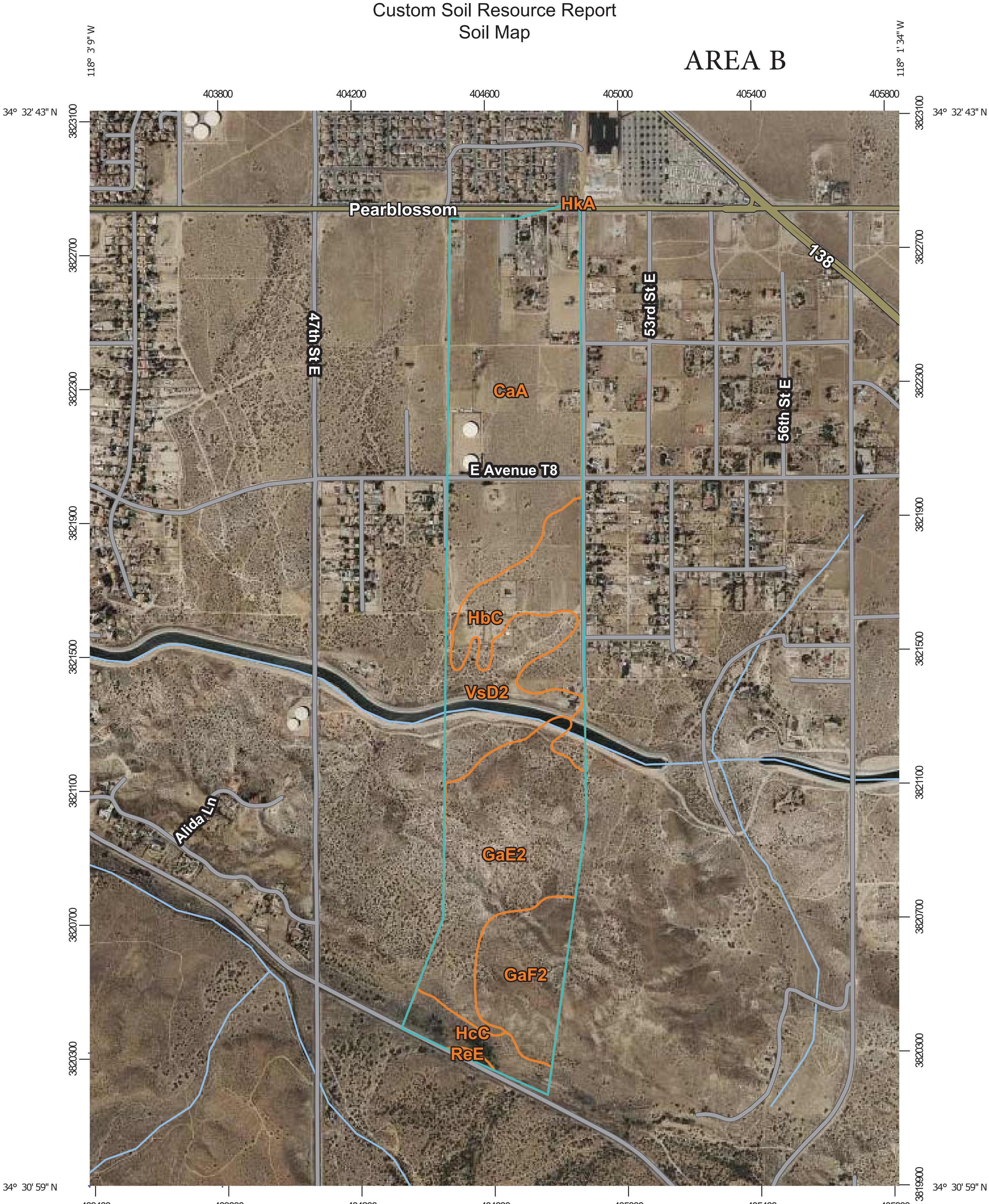
Feet: 0, 250, 500, 1000, 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Soil Map

AREA B



Map Scale: 1:15,700 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Soil Map

AREA C

Map Scale: 1:22,200 if printed on A portrait (8.5" x 11") sheet.

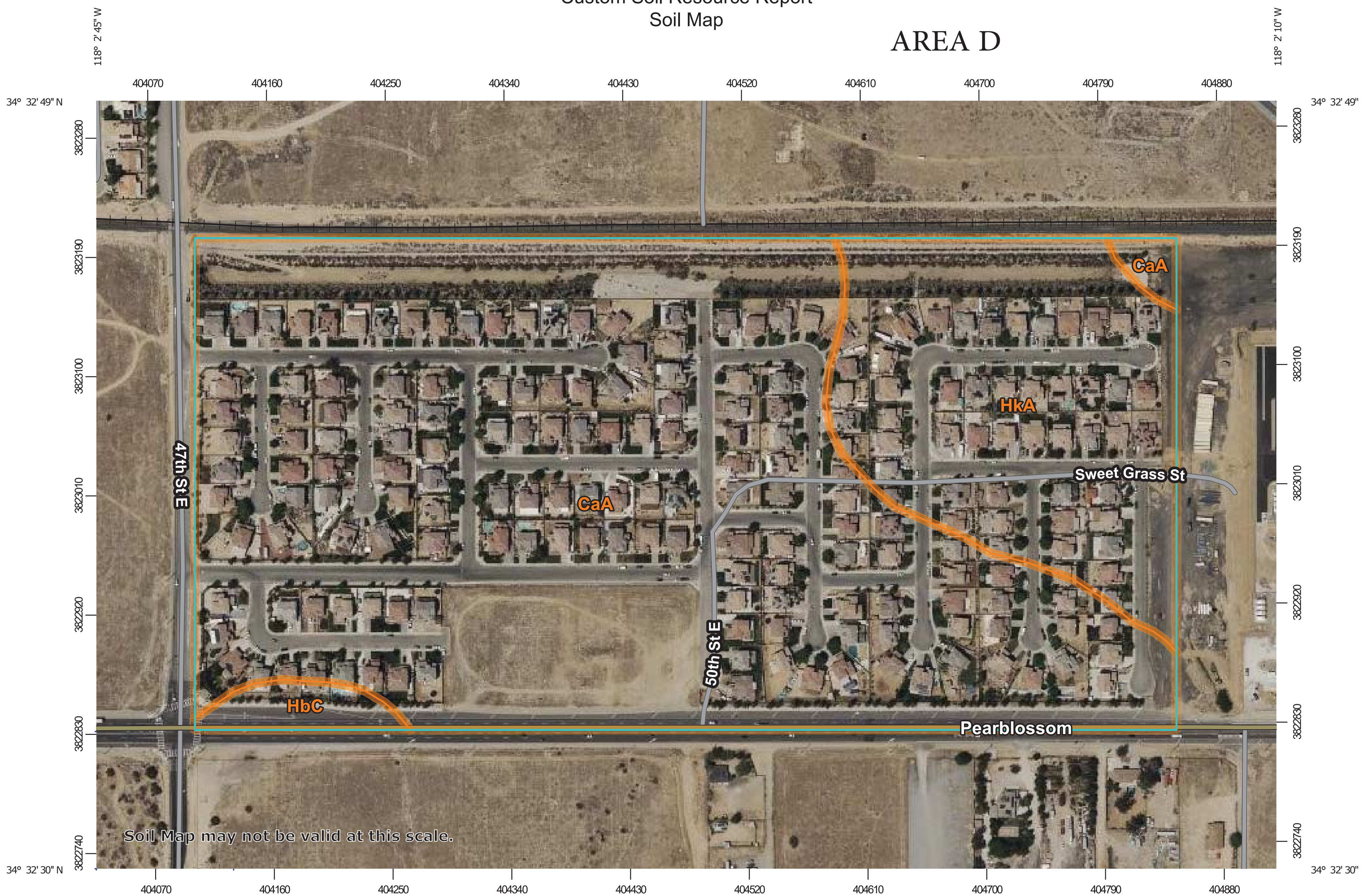
N

0 300 600 1200 1800 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

AREA D



Map Scale: 1:4,090 if printed on A landscape (11" x 8.5") sheet.

0 50 100 200 300 Meters

0 150 300 600 900 Feet

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

APPENDIX B

(OFF-Site 50-Yr., 25-Yr. Areas)

(25-YEAR)

OFF-SITE AREA A 25YR

Summary Results for Sink "Sink-1A"

Project: AREA A 25YR Simulation Run: Run 1
Sink: Sink-1A

Start of Run:	07Jul2024, 00:00	Basin Model:	Basin 1A
End of Run:	08Jul2024, 00:00	Meteorologic Model:	Met 1A
Compute Time:	18Jul2024, 14:35:24	Control Specifications:	Control 1A

Volume Units: ◯ IN ◉ ACRE-FT

Computed Results

Peak Discharge:	66.6 (CFS)	Date/Time of Peak Discharge	07Jul2024, 14:01
Volume:	26.3 (ACRE-FT)		

OFF-SITE AREA B 25YR

Summary Results for Sink "Sink-1B"

Project: AREA B 25YR   Simulation Run: Run 1
Sink: Sink-1B

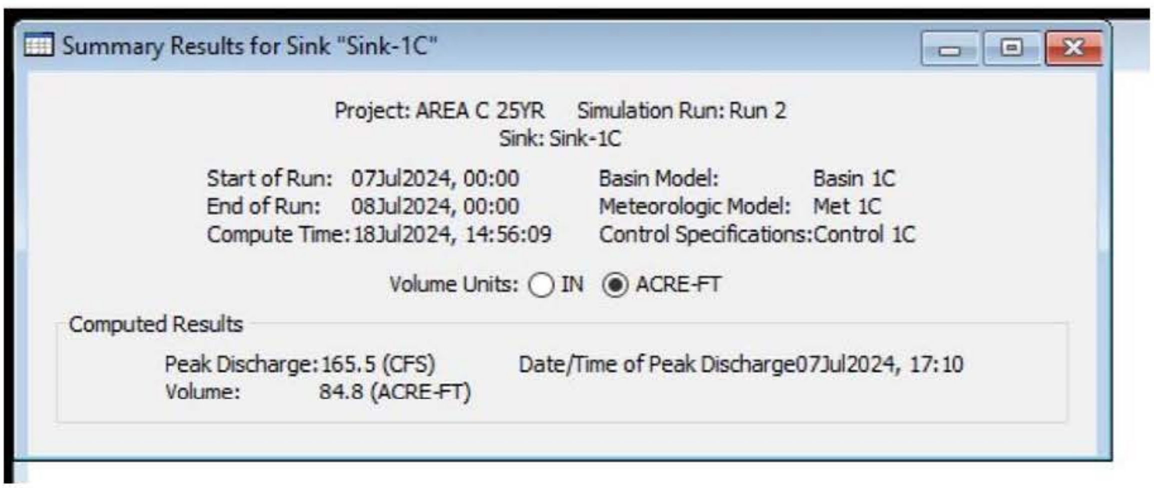
Start of Run:	07Jul2024, 00:00	Basin Model:	Basin 1B
End of Run:	08Jul2024, 00:00	Meteorologic Model:	Met 1B
Compute Time:	18Jul2024, 14:45:47	Control Specifications:	Control 1B

Volume Units: ○ IN ◉ ACRE-FT

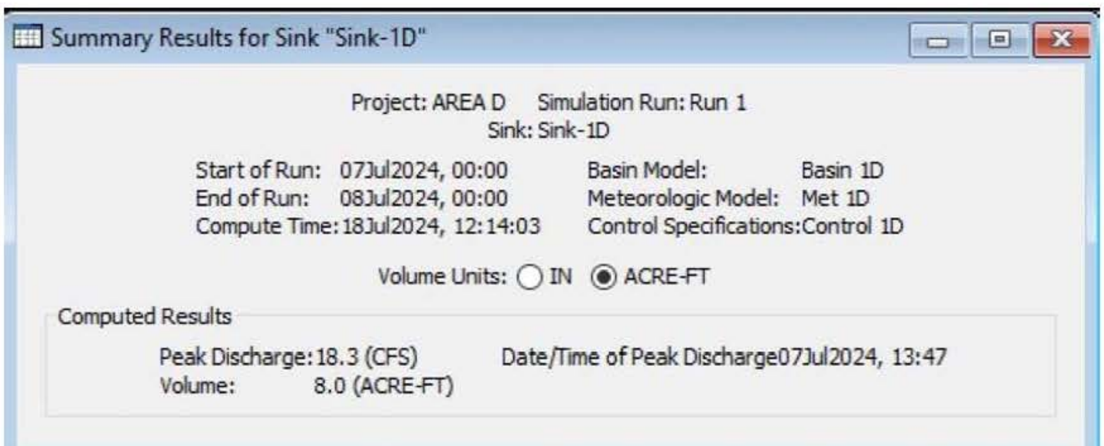
Computed Results

Peak Discharge:	73.9 (CFS)	Date/Time of Peak Discharge	07Jul2024, 14:02
Volume:	29.7 (ACRE-FT)		

OFF-SITE AREA C 25YR



OFF-SITE AREA D 25YR


Summary Results for Sink "Sink-1D"

Project: AREA D Simulation Run: Run 1
Sink: Sink-1D

Start of Run:	07Jul2024, 00:00	Basin Model:	Basin 1D
End of Run:	08Jul2024, 00:00	Meteorologic Model:	Met 1D
Compute Time:	18Jul2024, 12:14:03	Control Specifications:	Control 1D

Volume Units: IN ACRE-FT

Computed Results

Peak Discharge:	18.3 (CFS)	Date/Time of Peak Discharge	07Jul2024, 13:47
Volume:	8.0 (ACRE-FT)		

Peak Flow Hydrologic Analysis

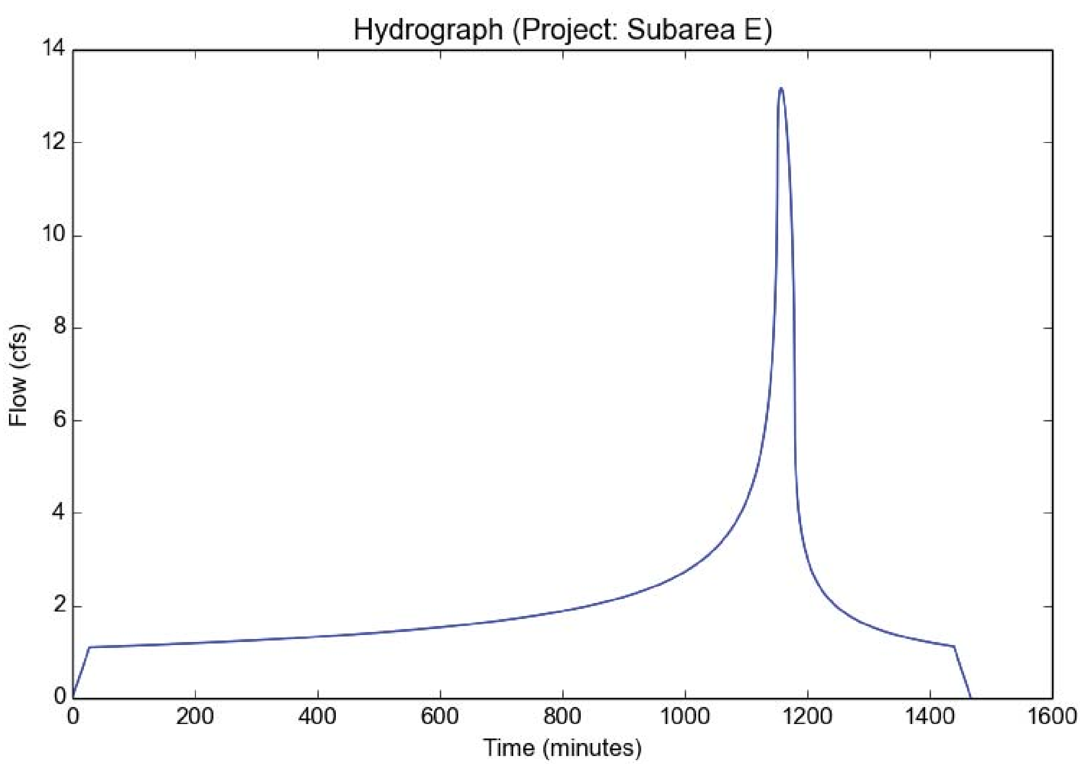
File location: F:/PROJECTS/23065/Hydro/hEC/AREA E/Project - Subarea E.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea E
Area (ac)	28.0
Flow Path Length (ft)	1400.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	2.46
Percent Impervious	0.9
Soil Type	124
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.1599
Peak Intensity (in/hr)	0.5734
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.82
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	13.1661
Burned Peak Flow Rate (cfs)	13.1661
24-Hr Clear Runoff Volume (ac-ft)	4.0985
24-Hr Clear Runoff Volume (cu-ft)	178528.8245



(50-YEAR)

OFF-SITE AREA A 50YR

Summary Results for Sink "Sink-1A"

Project: AREA A   Simulation Run: Run 3
Sink: Sink-1A

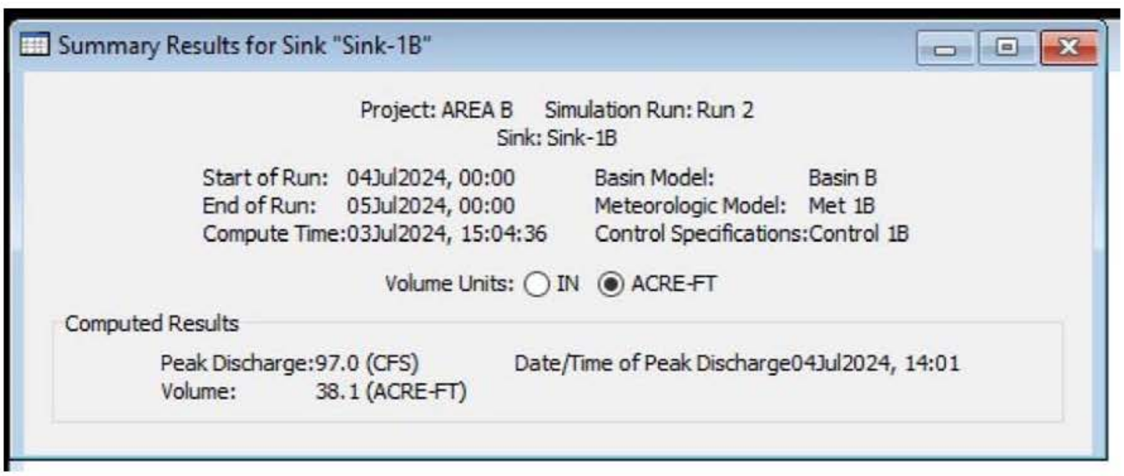
Start of Run:	04Jul2024, 00:00	Basin Model:	Basin A
End of Run:	05Jul2024, 00:00	Meteorologic Model:	Met 1A
Compute Time:	03Jul2024, 15:01:06	Control Specifications:	Control 1A

Volume Units: ◯ IN ◉ ACRE-FT

Computed Results

Peak Discharge:	86.5 (CFS)	Date/Time of Peak Discharge	04Jul2024, 14:01
Volume:	33.4 (ACRE-FT)		

OFF-SITE AREA B 50YR


Summary Results for Sink "Sink-1B"

Project: AREA B Simulation Run: Run 2
Sink: Sink-1B

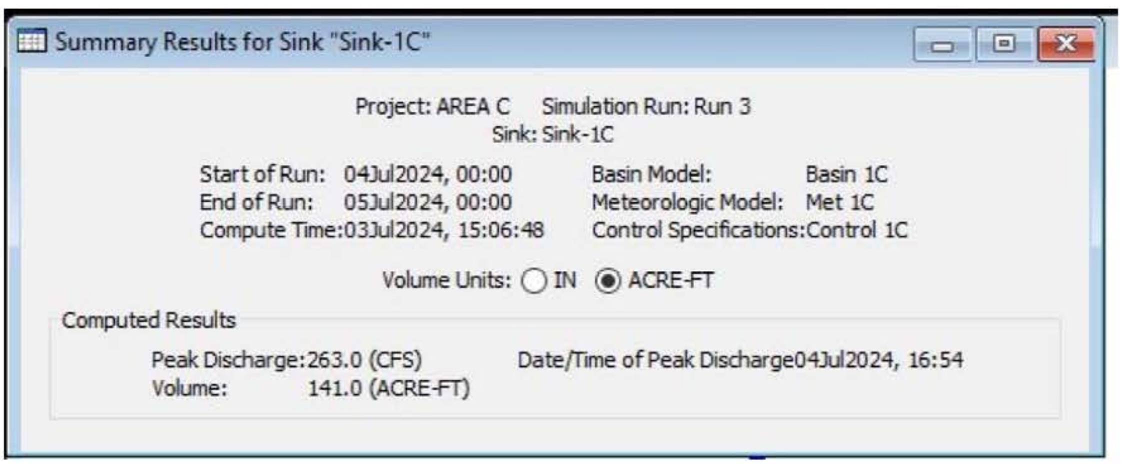
Start of Run: 04Jul2024, 00:00 Basin Model: Basin B
End of Run: 05Jul2024, 00:00 Meteorologic Model: Met 1B
Compute Time:03Jul2024, 15:04:36 Control Specifications:Control 1B

Volume Units: IN ACRE-FT

Computed Results

Peak Discharge:97.0 (CFS) Date/Time of Peak Discharge04Jul2024, 14:01
Volume: 38.1 (ACRE-FT)

OFF-SITE AREA C 50YR



APPENDIX C

(On-site 50-Yr., 25-Yr. Areas)

Peak Flow Hydrologic Analysis

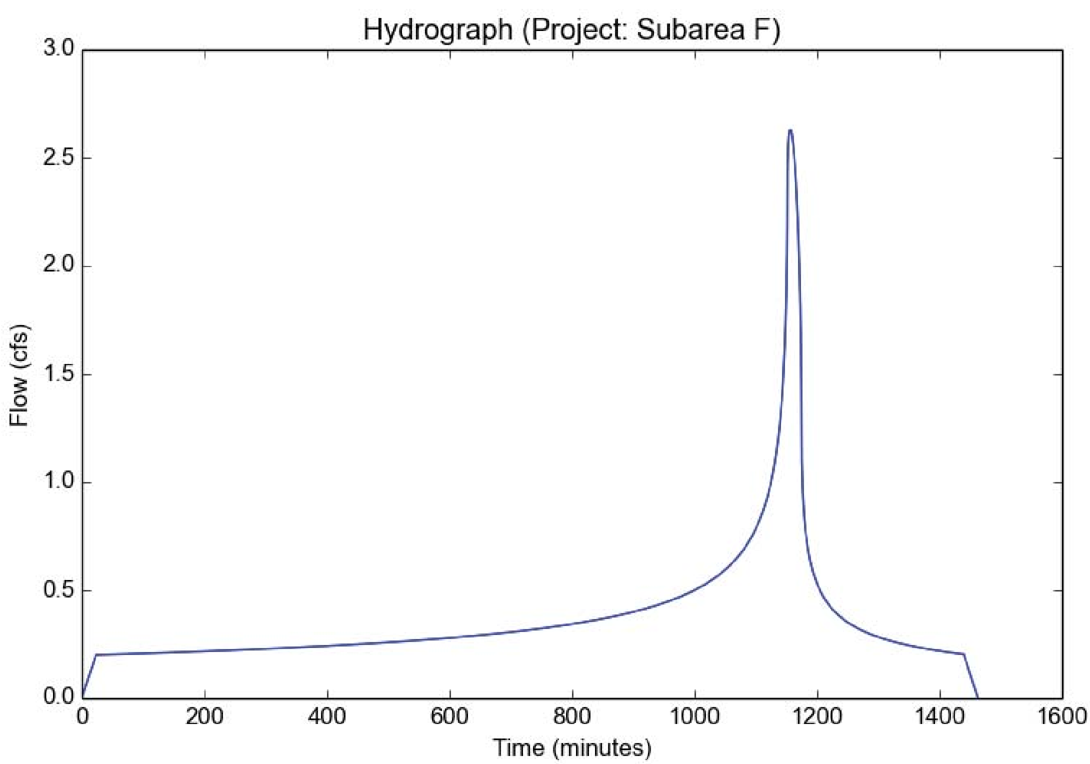
File location: F:/PROJECTS/23065/Hydro/hEC/AREA F/Project - Subarea F.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea F
Area (ac)	5.0
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	2.46
Percent Impervious	0.92
Soil Type	120
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	2.1599
Peak Intensity (in/hr)	0.629
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.836
Time of Concentration (min)	23.0
Clear Peak Flow Rate (cfs)	2.6291
Burned Peak Flow Rate (cfs)	2.6291
24-Hr Clear Runoff Volume (ac-ft)	0.7461
24-Hr Clear Runoff Volume (cu-ft)	32502.0926



Peak Flow Hydrologic Analysis

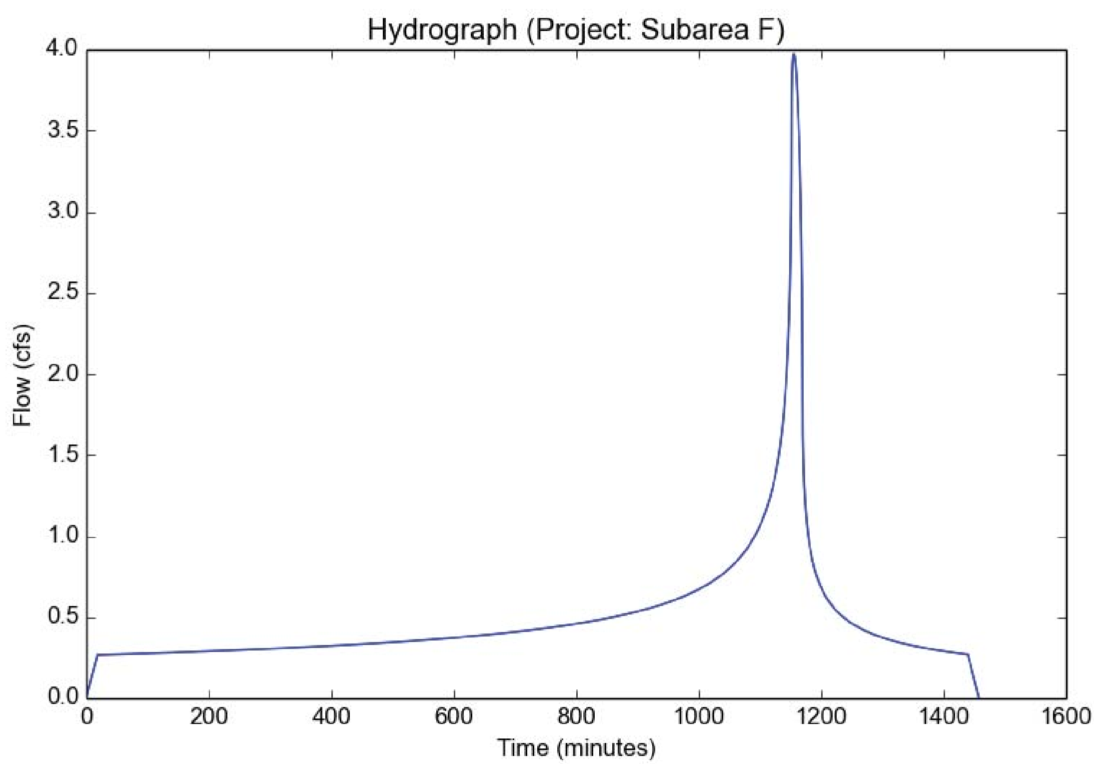
File location: F:/PROJECTS/23065/Hydro/hEC/AREA F/Project - Subarea F 50YR.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Project
Subarea ID	Subarea F
Area (ac)	5.0
Flow Path Length (ft)	1000.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	2.8
Percent Impervious	0.95
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.8
Peak Intensity (in/hr)	0.915
Undeveloped Runoff Coefficient (Cu)	0.2698
Developed Runoff Coefficient (Cd)	0.8685
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	3.9731
Burned Peak Flow Rate (cfs)	3.9731
24-Hr Clear Runoff Volume (ac-ft)	0.9957
24-Hr Clear Runoff Volume (cu-ft)	43371.3557



APPENDIX D

(On & Off-site CB Sizing)

AREA F		ac:	5	flow:	3.97
AREA	AC	flowrate			
1F	0.20	0.16			
2F	0.23	0.18			
3F	0.27	0.22			
4F	0.54	0.43			
5F	0.39	0.31			
6F	0.53	0.42			
7F	0.80	0.63			
8F	0.73	0.58			
9F	0.57	0.45			
10F	0.22	0.17			
11F	0.33	0.26			

ON-SITE CB SIZING

SUBAREAS	CB	SIZE OF CATCH BASIN	CB SIDE LENGTH FT.	CB SIDES USED	CB FLOW CFS	DEPTH		
1F	CB1	2' SQ	2	2	0.16	0.09	<0.4'	ok
6F	CB6	4' SQ	4	3	0.42	0.08	<0.4'	ok
8F	CB8	3' SQ	3	3	0.58	0.12	<0.4'	ok
10F	CB10	2' SQ	2	3	0.31	0.11	<0.4'	ok

From L.A.C. Highway Design Manual, plates 2.6-0658, and if H< 0.4'
Perimeter divided by 2 to account for Clogging

CATCH BASIN CB-2

RUNOFF = 0.18 CFS

CAPACITY = 0.18 CFS

Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road: 0.046 (ft/ft)

Cross-slope of Pavement: 0.015 (ft/ft)

Define Cross-slope of Gutter 0.015 (ft/ft)

Manning's Roughness: 0.015

Gutter Width: 3.000 (ft)

Enter one of the following:

Design Flow: 0.180 (cfs)

Width of Spread: 3.326 (ft)

Compute unknown

Gutter Depression: 0.000 (in)

Area of Flow: 0.083 (ft^2)

Eo (Gutter Flow to Total Flow): 0.998

Depth at Curb: 0.599 (in)

Inlet

Inlet Location

Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types

Grate

Grate Types

P - 1-7/8

Grate Width: 4.000 (ft)

Grate Length: 4.000 (ft)

Length of Inlet: 0.000 (ft)

Curb Opening Height: 0.000 (in)

Local Depression: 0.000 (in)

Compute Inlet Data

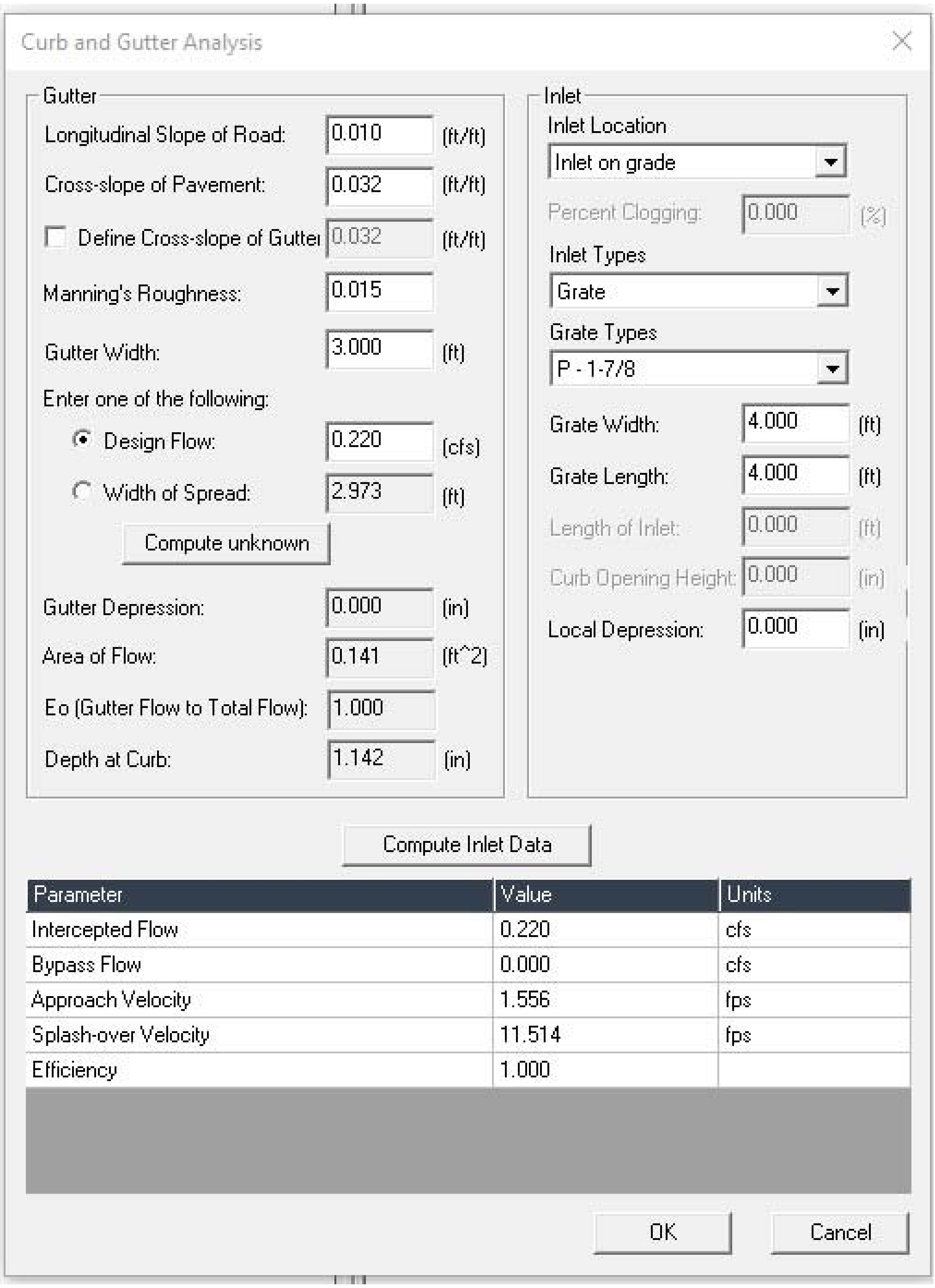
Parameter	Value	Units
Intercepted Flow	0.180	cfs
Bypass Flow	0.000	cfs
Approach Velocity	2.170	fps
Splash-over Velocity	11.514	fps
Efficiency	0.999	

OK Cancel

CATCH BASIN CB-3

RUNOFF = 0.22 CFS

CAPACITY = 0.22 CFS



Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road: 0.010 (ft/ft)

Cross-slope of Pavement: 0.032 (ft/ft)

☐ Define Cross-slope of Gutter 0.032 (ft/ft)

Manning's Roughness: 0.015

Gutter Width: 3.000 (ft)

Enter one of the following:

◉ Design Flow: 0.220 (cfs)

○ Width of Spread: 2.973 (ft)

Compute unknown

Gutter Depression: 0.000 (in)

Area of Flow: 0.141 (ft^2)

Eo (Gutter Flow to Total Flow): 1.000

Depth at Curb: 1.142 (in)

Inlet

Inlet Location: Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types: Grate

Grate Types: P - 1-7/8

Grate Width: 4.000 (ft)

Grate Length: 4.000 (ft)

Length of Inlet: 0.000 (ft)

Curb Opening Height: 0.000 (in)

Local Depression: 0.000 (in)

Compute Inlet Data

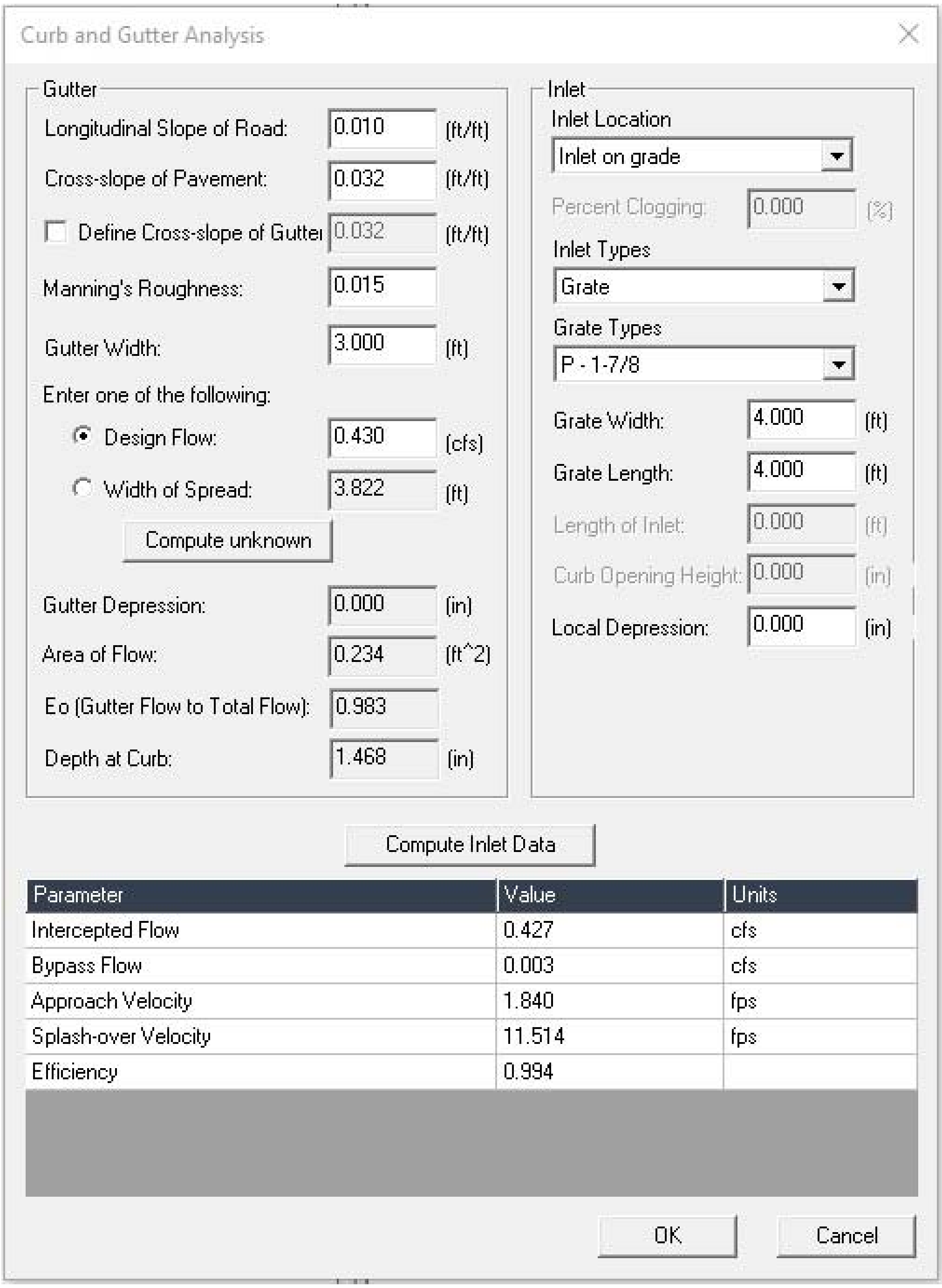
Parameter	Value	Units
Intercepted Flow	0.220	cfs
Bypass Flow	0.000	cfs
Approach Velocity	1.556	fps
Splash-over Velocity	11.514	fps
Efficiency	1.000	

OK Cancel

CATCH BASIN CB-4

RUNOFF = 0.43 CFS

CAPACITY = 0.43 CFS


Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road: 0.010 (ft/ft)

Cross-slope of Pavement: 0.032 (ft/ft)

Define Cross-slope of Gutter 0.032 (ft/ft)

Manning's Roughness: 0.015

Gutter Width: 3.000 (ft)

Enter one of the following:

Design Flow: 0.430 (cfs)

Width of Spread: 3.822 (ft)

Compute unknown

Gutter Depression: 0.000 (in)

Area of Flow: 0.234 (ft^2)

Eo (Gutter Flow to Total Flow): 0.983

Depth at Curb: 1.468 (in)

Inlet

Inlet Location

Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types

Grate

Grate Types

P - 1-7/8

Grate Width: 4.000 (ft)

Grate Length: 4.000 (ft)

Length of Inlet: 0.000 (ft)

Curb Opening Height: 0.000 (in)

Local Depression: 0.000 (in)

Compute Inlet Data

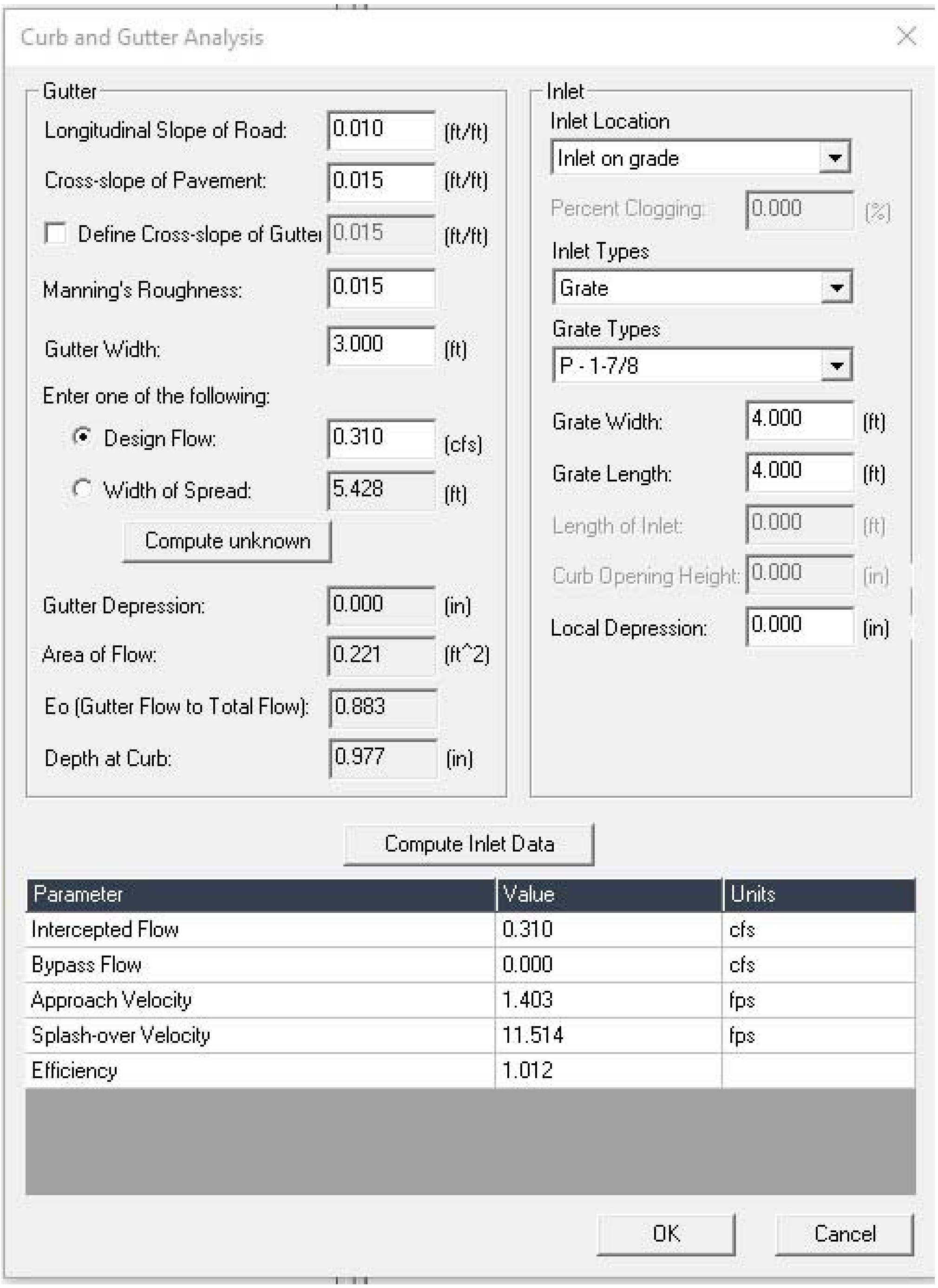
Parameter	Value	Units
Intercepted Flow	0.427	cfs
Bypass Flow	0.003	cfs
Approach Velocity	1.840	fps
Splash-over Velocity	11.514	fps
Efficiency	0.994	

OK Cancel

CATCH BASIN CB-5

RUNOFF = 0.31CFS

CAPACITY = 0.31 CFS



Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road:	0.010	(ft/ft)
Cross-slope of Pavement:	0.015	(ft/ft)
☐ Define Cross-slope of Gutter	0.015	(ft/ft)
Manning's Roughness:	0.015	
Gutter Width:	3.000	(ft)

Enter one of the following:

(•) Design Flow:	0.310	(cfs)
( ) Width of Spread:	5.428	(ft)

Compute unknown

Gutter Depression:	0.000	(in)
Area of Flow:	0.221	(ft^2)
Eo (Gutter Flow to Total Flow):	0.883	
Depth at Curb:	0.977	(in)

Inlet

Inlet Location: Inlet on grade

Percent Clogging:	0.000	(%)

Inlet Types: Grate

Grate Types: P - 1-7/8

Grate Width:	4.000	(ft)
Grate Length:	4.000	(ft)
Length of Inlet:	0.000	(ft)
Curb Opening Height:	0.000	(in)
Local Depression:	0.000	(in)

Compute Inlet Data

Parameter	Value	Units
Intercepted Flow	0.310	cfs
Bypass Flow	0.000	cfs
Approach Velocity	1.403	fps
Splash-over Velocity	11.514	fps
Efficiency	1.012	

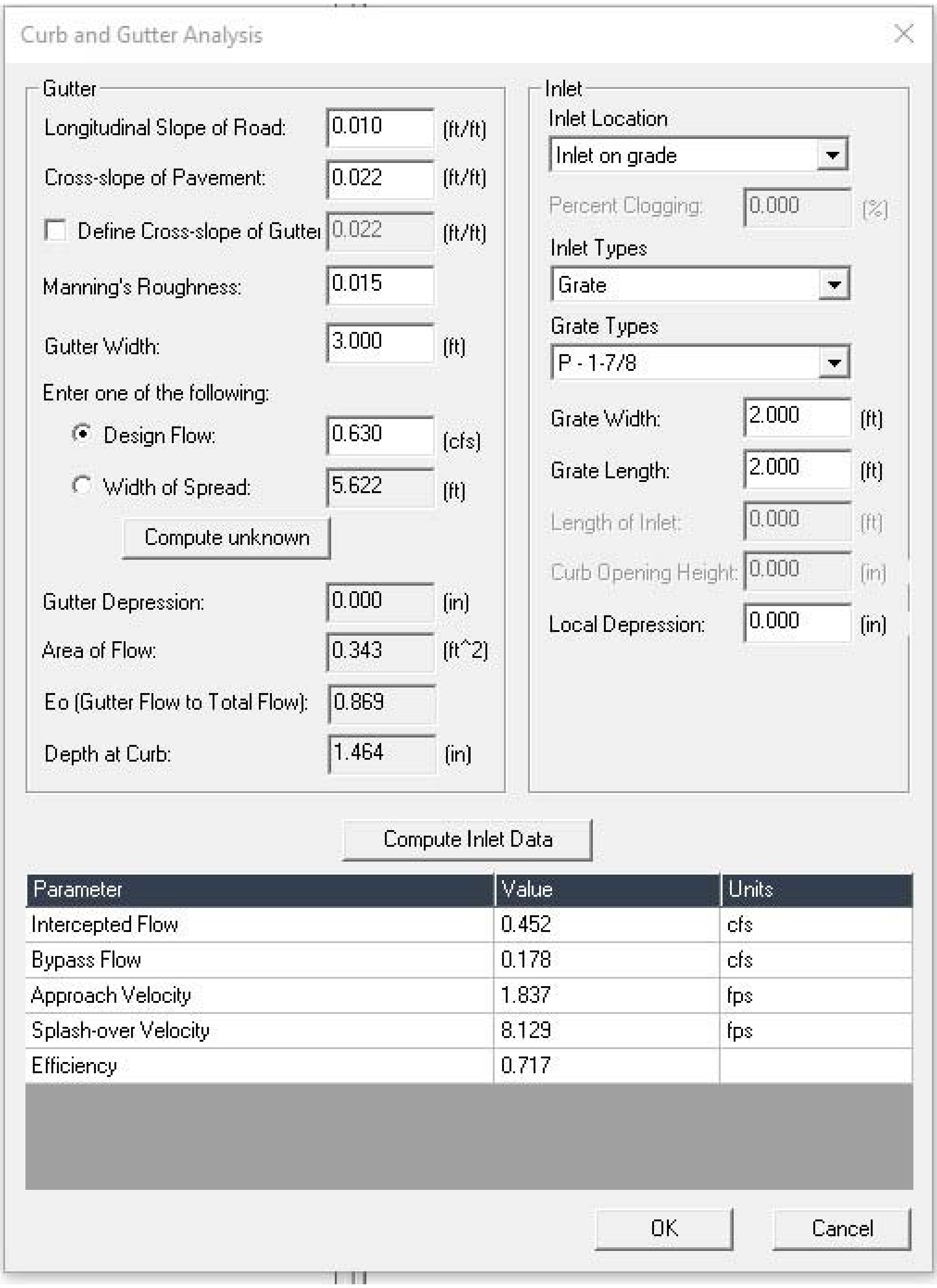
OK Cancel

CATCH BASIN CB-7

RUNOFF = 0.68 CFS

CAPACITY = 0.45 CFS

BYPASS =0.18 CFS TO CB-8



Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road: 0.010 (ft/ft)

Cross-slope of Pavement: 0.022 (ft/ft)

Define Cross-slope of Gutter 0.022 (ft/ft)

Manning's Roughness: 0.015

Gutter Width: 3.000 (ft)

Enter one of the following:

Design Flow: 0.630 (cfs)

Width of Spread: 5.622 (ft)

Compute unknown

Gutter Depression: 0.000 (in)

Area of Flow: 0.343 (ft^2)

Eo (Gutter Flow to Total Flow): 0.869

Depth at Curb: 1.464 (in)

Inlet

Inlet Location

Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types

Grate

Grate Types

P - 1-7/8

Grate Width: 2.000 (ft)

Grate Length: 2.000 (ft)

Length of Inlet: 0.000 (ft)

Curb Opening Height: 0.000 (in)

Local Depression: 0.000 (in)

Compute Inlet Data

Parameter	Value	Units
Intercepted Flow	0.452	cfs
Bypass Flow	0.178	cfs
Approach Velocity	1.837	fps
Splash-over Velocity	8.129	fps
Efficiency	0.717	

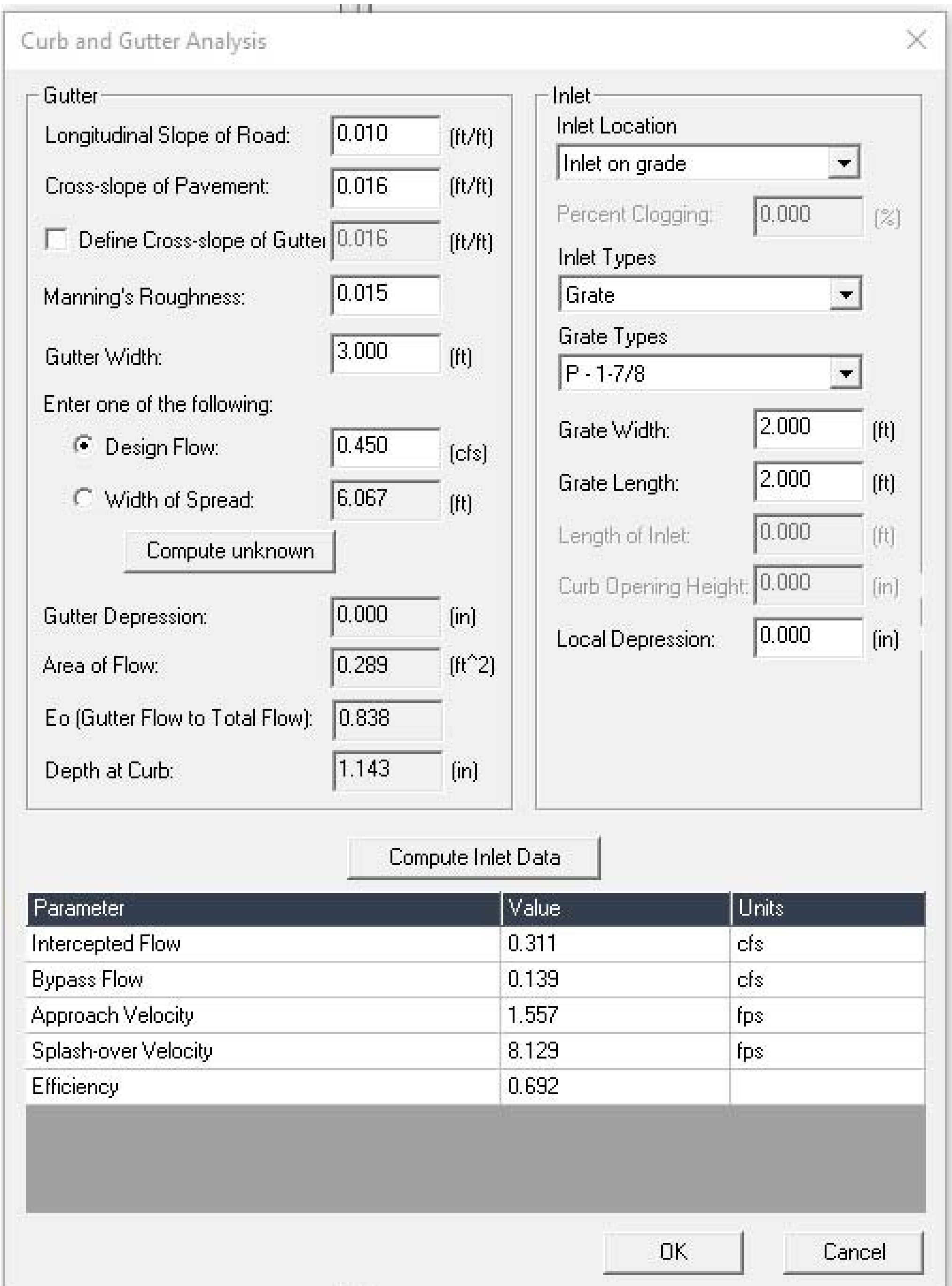
OK Cancel

CATCH BASIN CB-9

RUNOFF = 0.45 CFS

CAPACITY = 0.31 CFS

BYPASS =0.14 CFS TO CB-10



Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road: 0.010 (ft/ft)

Cross-slope of Pavement: 0.016 (ft/ft)

Define Cross-slope of Gutter 0.016 (ft/ft)

Manning's Roughness: 0.015

Gutter Width: 3.000 (ft)

Enter one of the following:

Design Flow: 0.450 (cfs)

Width of Spread: 6.067 (ft)

Compute unknown

Gutter Depression: 0.000 (in)

Area of Flow: 0.289 (ft^2)

Eo (Gutter Flow to Total Flow): 0.838

Depth at Curb: 1.143 (in)

Inlet

Inlet Location

Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types

Grate

Grate Types

P - 1-7/8

Grate Width: 2.000 (ft)

Grate Length: 2.000 (ft)

Length of Inlet: 0.000 (ft)

Curb Opening Height: 0.000 (in)

Local Depression: 0.000 (in)

Compute Inlet Data

Parameter	Value	Units
Intercepted Flow	0.311	cfs
Bypass Flow	0.139	cfs
Approach Velocity	1.557	fps
Splash-over Velocity	8.129	fps
Efficiency	0.692	

OK Cancel

OFF-SITE CURB INLET CATCH BASIN

21’ OFF-SITE

CATCH BASIN

RUNOFF = 18.88 CFS

CAPACITY = 12.45 CFS

BYPASS =6.47 CFS continue flowing easterly on Pearblossom Hwy.

Curb and Gutter Analysis

Gutter

Longitudinal Slope of Road:	0.004	(ft/ft)
Cross-slope of Pavement:	0.023	(ft/ft)
☐ Define Cross-slope of Gutter	0.023	(ft/ft)
Manning's Roughness:	0.015	
Gutter Width:	2.000	(ft)

Enter one of the following:

◉ Design Flow:	18.880	(cfs)
○ Width of Spread:	22.855	(ft)

Compute unknown

Gutter Depression:	0.000	(in)
Area of Flow:	6.085	(ft^2)
Eo (Gutter Flow to Total Flow):	0.217	
Depth at Curb:	6.390	(in)

Inlet

Inlet Location: Inlet on grade

Percent Clogging: 0.000 (%)

Inlet Types: Curb opening

Grate Types: P - 1-7/8

Grate Width:	0.000	(ft)
Grate Length:	0.000	(ft)
Length of Inlet:	21.000	(ft)
Curb opening height:	0.000	(in)
Local Depression:	0.000	(in)

Compute Inlet Data

Parameter	Value	Units
Intercepted Flow	12.452	cfs
Bypass Flow	6.428	cfs
Approach Velocity	3.103	fps
Efficiency	0.660	

OK Cancel

APPENDIX E

(On & Off-site Pipe Sizing)

ON-SITE STORM DRAIN PIPE SIZING				
PIPE	SIZE (IN)	SLOPE	CFS	CAPACITY
P-1	8	2.00%	0.04	1.99
P-2	8	3.00%	0.45	2.43
P-3	8	3.00%	0.31	2.43
P-4	8	2.00%	0.31	1.99
P-5	8	1.50%	0.76	1.72
P-6	42	1.00%	109.97	117.24

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                        CIVILDESIGN CORP.                          .
.                      Consulting Engineers                         .
.                         250 S. Lena Rd.                           .
.                    San Bernardino, CA 92408                       .
.                          (909)885-3806                            .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```


```
                             Inside Diameter
                               (  8.00 in.)

                                    *
                              *           *
                            *               *

                          *                   *_ _ _ _ _
                          ^^^^^^^^^^^^^^^^^^^^^      ^
                         *        Water        *     |
                                                     |
                         *                     *     |
                                                     |
                          *                   *  (  7.50 in.)
                                                 ( 0.625 ft.)
                            *               *        |
                              *           *          |
                                    *_ _ _ _ _ _ _ _ v_


                        Circular Channel Section
                        ------------------------
```

PIPES
P-1, P-4

```
     Flowrate ..................        1.992  CFS
     Velocity ..................        5.856  fps
     Pipe Diameter .............        8.000  inches
     Depth of Flow .............        7.504  inches
     Depth of Flow .............        0.625  feet
     Critical Depth ............        0.625  feet
     Depth/Diameter  (D/d) .....        0.938
     Slope of Pipe .............        2.000  %
     X-Sectional Area ..........        0.340  sq. ft.
     Wetted Perimeter ..........        1.759  feet
     AR^(2/3) ..................        0.114
     Mannings 'n' ..............        0.012
     Min. Fric. Slope, 8 inch
        Pipe Flowing Full ......        2.314  %
```

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                          CIVILDESIGN CORP.                          .
.                        Consulting Engineers                         .
.                           250 S. Lena Rd.                           .
.                     San Bernardino, CA 92408                        .
.                            (909)885-3806                            .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

```
                                Inside Diameter
                                  (  8.00 in.)

                                       *
                                 *           *
                               *               *

                             *                   *_ _ _ _
                             ^^^^^^^^^^^^^^^^^^^^^      ^
                            *        Water        *     |
                                                        |
                            *                     *     |
                                                        |
                             *                   *  (  7.50 in.)
                                                    ( 0.625 ft.)
                               *               *        |
                                 *           *          |
                                       *_ _ _ _ _ _ _ _ v_

                            Circular Channel Section
                            ------------------------
```

PIPES
P-2, P-3

```
        Flowrate ..................        2.439  CFS
        Velocity ..................        7.172  fps
        Pipe Diameter .............        8.000  inches
        Depth of Flow .............        7.504  inches
        Depth of Flow .............        0.625  feet
        Critical Depth ............        0.644  feet
        Depth/Diameter  (D/d) .....        0.938
        Slope of Pipe .............        3.000  %
        X-Sectional Area ..........        0.340  sq. ft.
        Wetted Perimeter ..........        1.759  feet
        AR^(2/3) ..................        0.114
        Mannings 'n' ..............        0.012
        Min. Fric. Slope, 8 inch
           Pipe Flowing Full ......        3.471  %
```

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                         CIVILDESIGN CORP.                           .
.                       Consulting Engineers                          .
.                          250 S. Lena Rd.                            .
.                     San Bernardino, CA 92408                        .
.                          (909)885-3806                              .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

```
                         Inside Diameter
                           (  8.00 in.)

                                *
                          *           *
                        *               *

                      *                   *_ _ _ _
                      ^^^^^^^^^^^^^^^^^^^^^      ^
                     *        Water        *     |
                                                 |
                     *                     *     |
                                                 |
                      *                   *  (  7.50 in.)
                                             ( 0.625 ft.)
                        *               *        |
                          *           *          |
                                *_ _ _ _ _ _ _ _ v_
```

PIPE
P-5

```
                     Circular Channel Section
                     ------------------------


      Flowrate ..................        1.725  CFS
      Velocity ..................        5.071  fps
      Pipe Diameter .............        8.000  inches
      Depth of Flow .............        7.504  inches
      Depth of Flow .............        0.625  feet
      Critical Depth ............        0.602  feet
      Depth/Diameter  (D/d) .....        0.938
      Slope of Pipe .............        1.500  %
      X-Sectional Area ..........        0.340  sq. ft.
      Wetted Perimeter ..........        1.759  feet
      AR^(2/3) ..................        0.114
      Mannings 'n' ..............        0.012
      Min. Fric. Slope, 8 inch
         Pipe Flowing Full ......        1.736  %
```

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                          CIVILDESIGN CORP.                          .
.                        Consulting Engineers                         .
.                           250 S. Lena Rd.                           .
.                      San Bernardino, CA 92408                       .
.                            (909)885-3806                            .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

```
                         Inside Diameter
                           ( 42.00 in.)

                                *
                          *           *
                        *               *

                      *                   *_ _ _ _
                      ^^^^^^^^^^^^^^^^^^^^^      ^
                     *        Water        *     |
                                                 |
                     *                     *     |
                                                 |
                      *                   *  ( 39.40 in.)
                                             ( 3.283 ft.)
                        *               *        |
                          *           *          |
                                *_ _ _ _ _ _ _ _ v_
```

PIPE
P-6

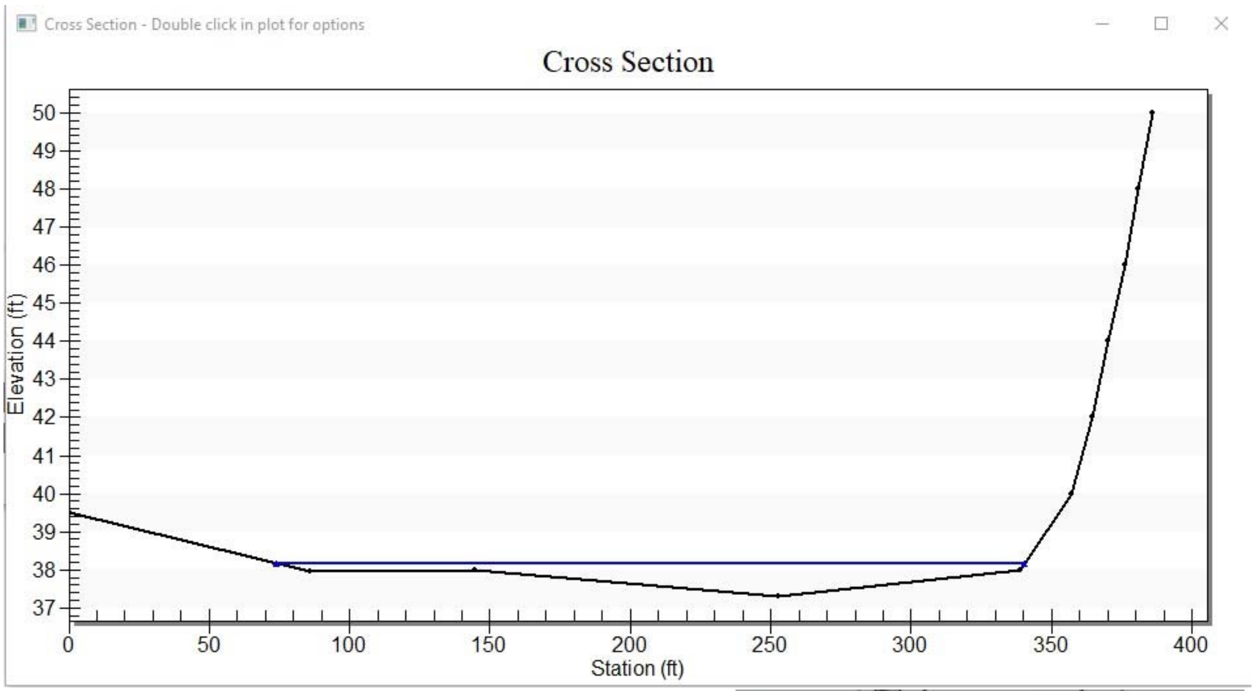
```
                     Circular Channel Section
                     ------------------------
```

```
Flowrate ..................      117.245  CFS
Velocity ..................       12.508  fps
Pipe Diameter .............       42.000  inches
Depth of Flow .............       39.396  inches
Depth of Flow .............        3.283  feet
Critical Depth ............        3.231  feet
Depth/Diameter  (D/d) .....        0.938
Slope of Pipe .............        1.000  %
X-Sectional Area ..........        9.374  sq. ft.
Wetted Perimeter ..........        9.234  feet
AR^(2/3) ..................        9.468
Mannings 'n' ..............        0.012
Min. Fric. Slope, 42 inch
   Pipe Flowing Full ......        1.157  %
```

APPENDIX F

(Off-site Sections (A-F)

SECTION A-A



Channel Analysis

Type: Cross Section — Define...

Side Slope 1 (Z1): 0.0 H : 1V

Side Slope 2 (Z2): 0.0 H : 1V

Channel Width (B): 0.0 (ft)

Pipe Diameter (D): 0.0 (ft)

Longitudinal Slope: 0.01 (ft/ft)

Manning's Roughness: 0.0300

Enter Flow: 310.017 (cfs)

Enter Depth: 0.860 (ft)

Calculate

Plot... Compute Curves...

Parameter	Value	Units
Flow	310.017	cfs
Depth	0.860	ft
Area of Flow	111.742	sq ft
Wetted Perimeter	266.568	ft
Hydraulic Radius	0.419	ft
Average Velocity	2.774	fps
Top Width (T)	266.552	ft
Froude Number	0.755	
Critical Depth	0.786	ft
Critical Velocity	3.366	fps
Critical Slope	0.01859	ft/ft
Critical Top Width	261.778	ft
Max Shear Stress	0.537	lb/ft^2
Avg Shear Stress	0.262	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0300	

OK Cancel

User-Defined Cross Section

Channel File

Browse for Existing .TW File — Import...

Channel

Slope of Channel: 0.0100 ft/ft

Number of Cross-sec Points: 11

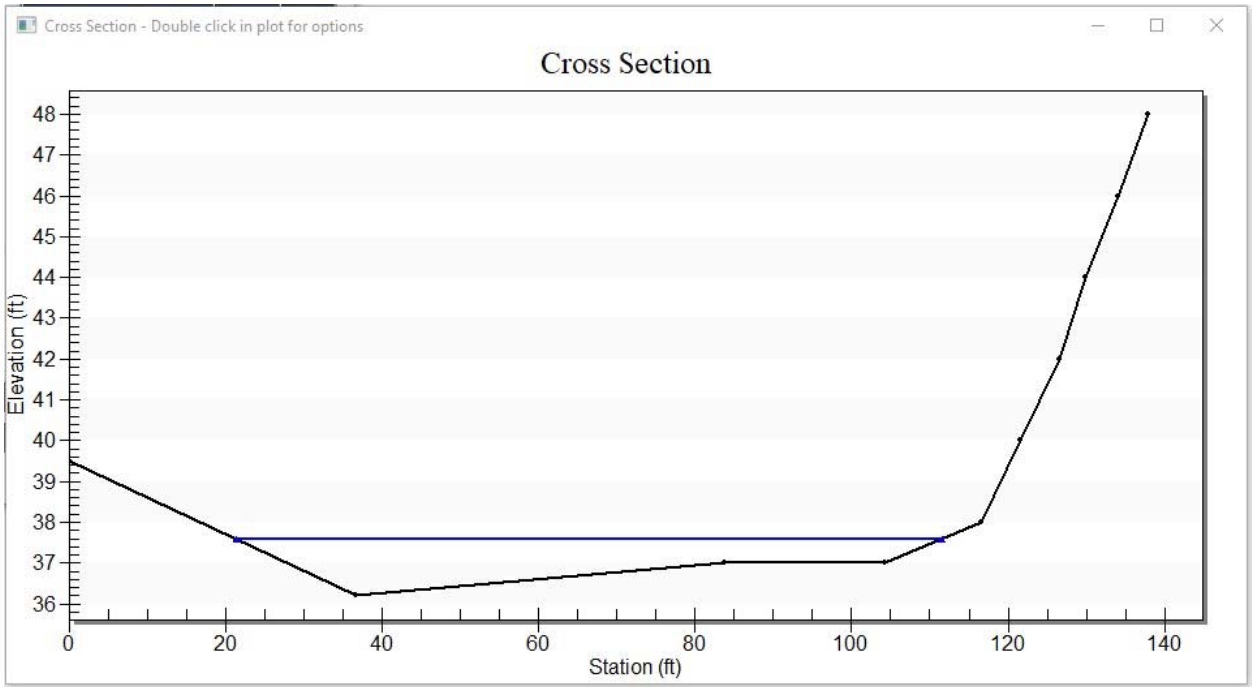
Irregular Channel Cross-Section

No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	39.500	0.0300
2	86.000	37.940	0.0300
3	144.510	38.000	0.0300
4	252.700	37.300	0.0300
5	338.970	38.000	0.0300
6	357.140	40.000	0.0300
7	364.370	42.000	0.0300
8	370.070	44.000	0.0300
9	376.170	46.000	0.0300
10	380.820	48.000	0.0300
11	386.010	50.000	

Plot — Plot Manning's n values

OK Cancel

SECTION B-B



Channel Analysis

Type: Cross Section Define...

Side Slope 1 (Z1): 0.0 H : 1V

Side Slope 2 (Z2): 0.0 H : 1V

Channel Width (B): 0.0 (ft)

Pipe Diameter (D): 0.0 (ft)

Longitudinal Slope: 0.01 (ft/ft)

Manning's Roughness: 0.0300

Enter Flow: 300.000 (cfs)

Enter Depth: 1.379 (ft)

Calculate

Plot... Compute Curves...

Parameter	Value	Units
Flow	300.000	cfs
Depth	1.379	ft
Area of Flow	71.036	sq ft
Wetted Perimeter	90.233	ft
Hydraulic Radius	0.787	ft
Average Velocity	4.223	fps
Top Width (T)	90.141	ft
Froude Number	0.838	
Critical Depth	1.284	ft
Critical Velocity	4.789	fps
Critical Slope	0.01471	ft/ft
Critical Top Width	87.931	ft
Max Shear Stress	0.860	lb/ft^2
Avg Shear Stress	0.491	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0300	

OK Cancel

User-Defined Cross Section

Channel File

Browse for Existing .TW File Import...

Channel

Slope of Channel: 0.0100 ft/ft

Number of Cross-sec Points: 10

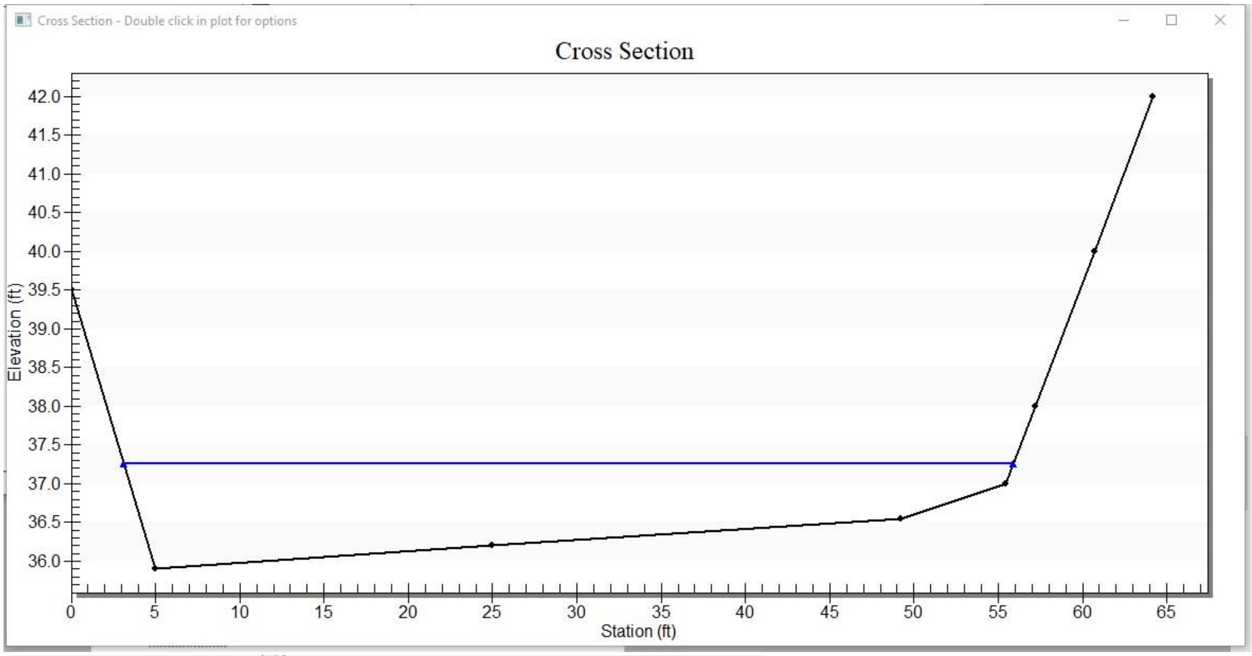
Irregular Channel Cross-Section

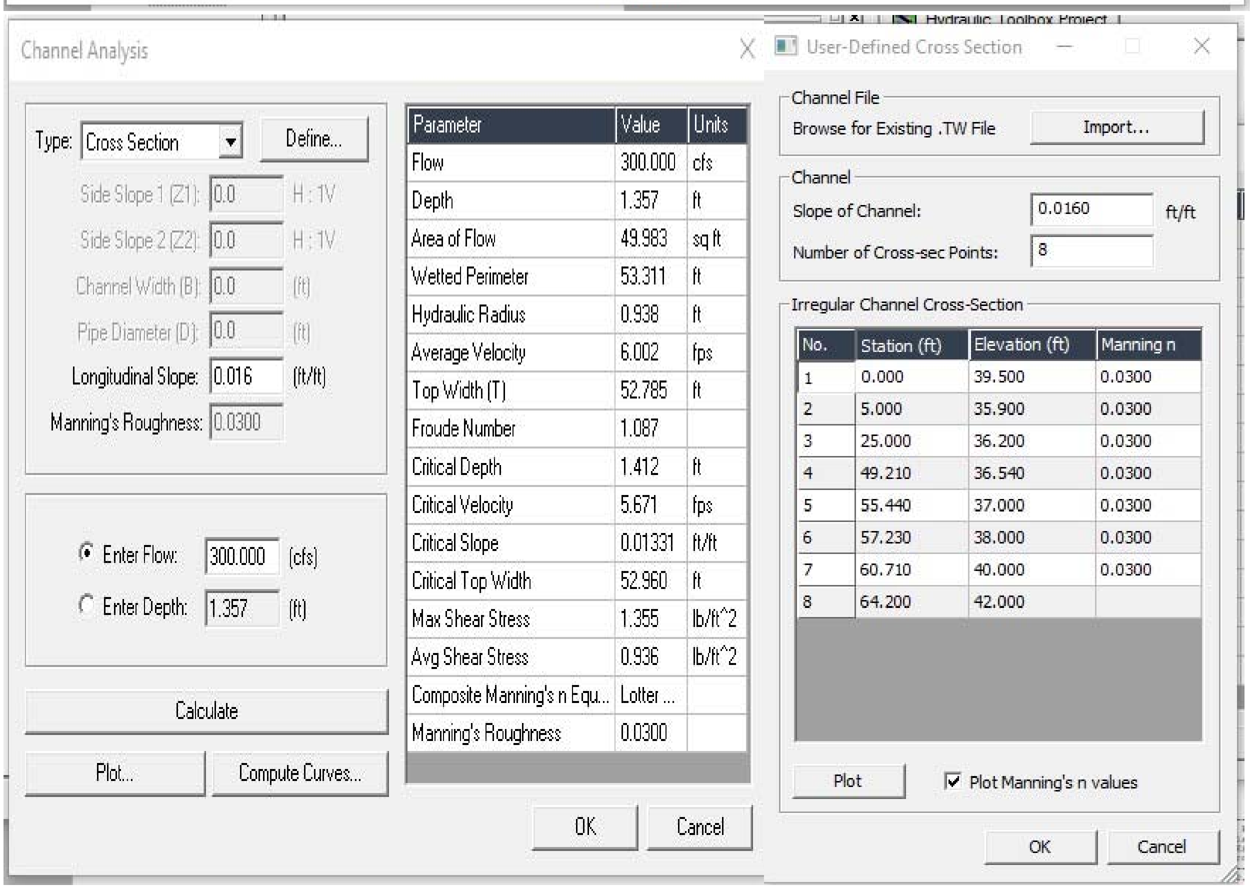
No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	39.500	0.0300
2	36.770	36.210	0.0300
3	83.710	37.000	0.0300
4	104.290	37.000	0.0300
5	116.540	38.000	0.0300
6	121.640	40.000	0.0300
7	126.630	42.000	0.0300
8	129.890	44.000	0.0300
9	134.010	46.000	0.0300
10	137.890	48.000	

Plot ☑ Plot Manning's n values

OK Cancel

SECTION C-C

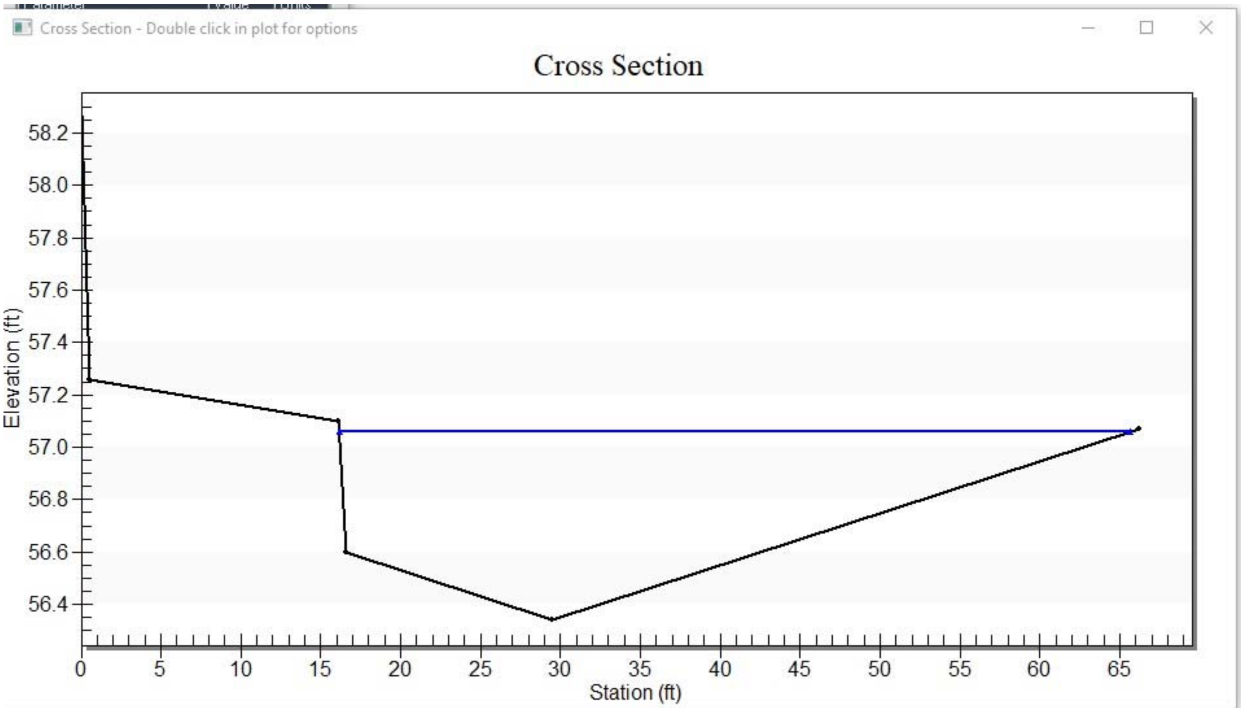




Parameter	Value	Units
Flow	300.000	cfs
Depth	1.357	ft
Area of Flow	49.983	sq ft
Wetted Perimeter	53.311	ft
Hydraulic Radius	0.938	ft
Average Velocity	6.002	fps
Top Width (T)	52.785	ft
Froude Number	1.087	
Critical Depth	1.412	ft
Critical Velocity	5.671	fps
Critical Slope	0.01331	ft/ft
Critical Top Width	52.960	ft
Max Shear Stress	1.355	lb/ft^2
Avg Shear Stress	0.936	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0300	

No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	39.500	0.0300
2	5.000	35.900	0.0300
3	25.000	36.200	0.0300
4	49.210	36.540	0.0300
5	55.440	37.000	0.0300
6	57.230	38.000	0.0300
7	60.710	40.000	0.0300
8	64.200	42.000	

SECTION D-D



Channel Analysis

Type: Cross Section   Define...

Side Slope 1 (Z1): 0.0 H : 1V

Side Slope 2 (Z2): 0.0 H : 1V

Channel Width (B): 0.0 (ft)

Pipe Diameter (D): 0.0 (ft)

Longitudinal Slope: 0.002 (ft/ft)

Manning's Roughness: 0.0179

Enter Flow: 43.033 (cfs)

Enter Depth: 0.720 (ft)

Calculate

Plot...   Compute Curves...

Parameter	Value	Units
Flow	43.033	cfs
Depth	0.720	ft
Area of Flow	20.744	sq ft
Wetted Perimeter	49.748	ft
Hydraulic Radius	0.417	ft
Average Velocity	2.074	fps
Top Width (T)	49.547	ft
Froude Number	0.565	
Critical Depth	0.556	ft
Critical Velocity	3.229	fps
Critical Slope	0.00726	ft/ft
Critical Top Width	41.166	ft
Max Shear Stress	0.090	lb/ft^2
Avg Shear Stress	0.052	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0179	

OK   Cancel

User-Defined Cross Section

Channel File

Browse for Existing .TW File   Import...

Channel

Slope of Channel: 0.0020 ft/ft

Number of Cross-sec Points: 6

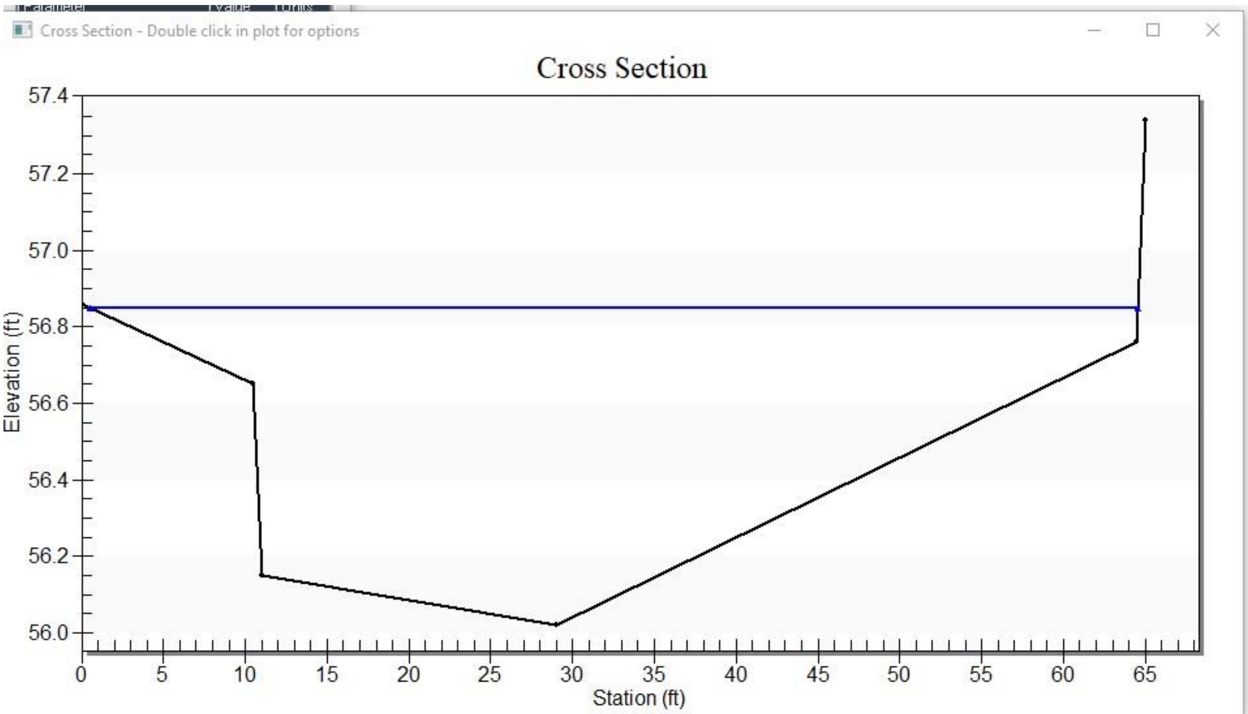
Irregular Channel Cross-Section

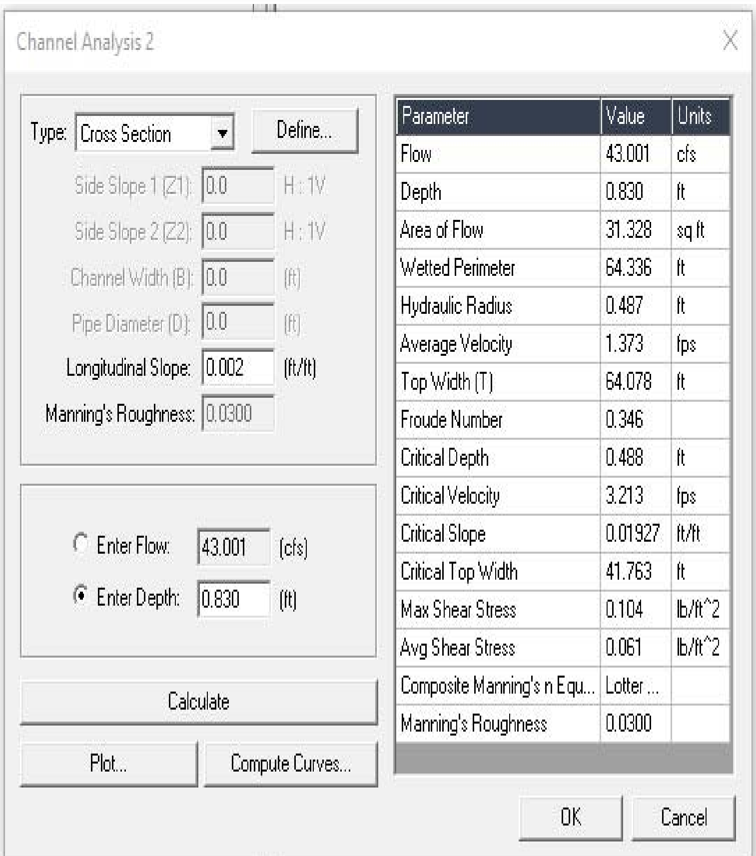
No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	57.760	0.0300
2	0.500	56.760	0.0300
3	16.100	56.600	0.0300
4	16.600	56.100	0.0300
5	29.500	55.970	0.0140
6	66.190	57.070	

Plot   Plot Manning's n values

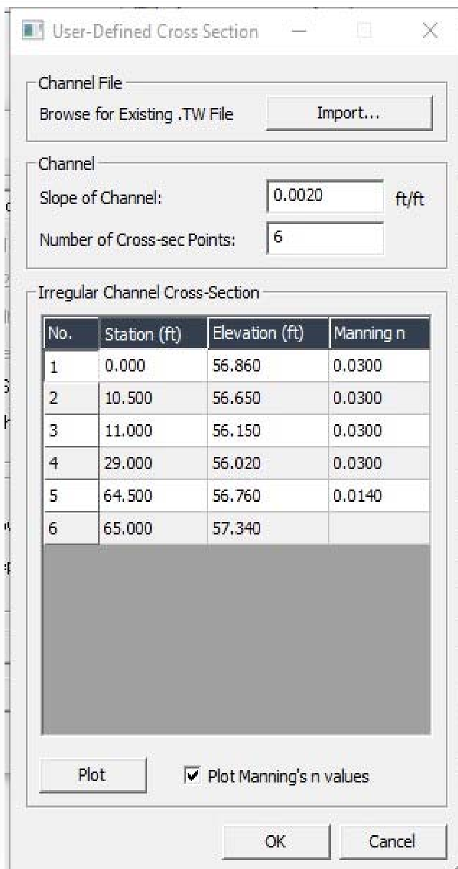
OK   Cancel

SECTION E-E





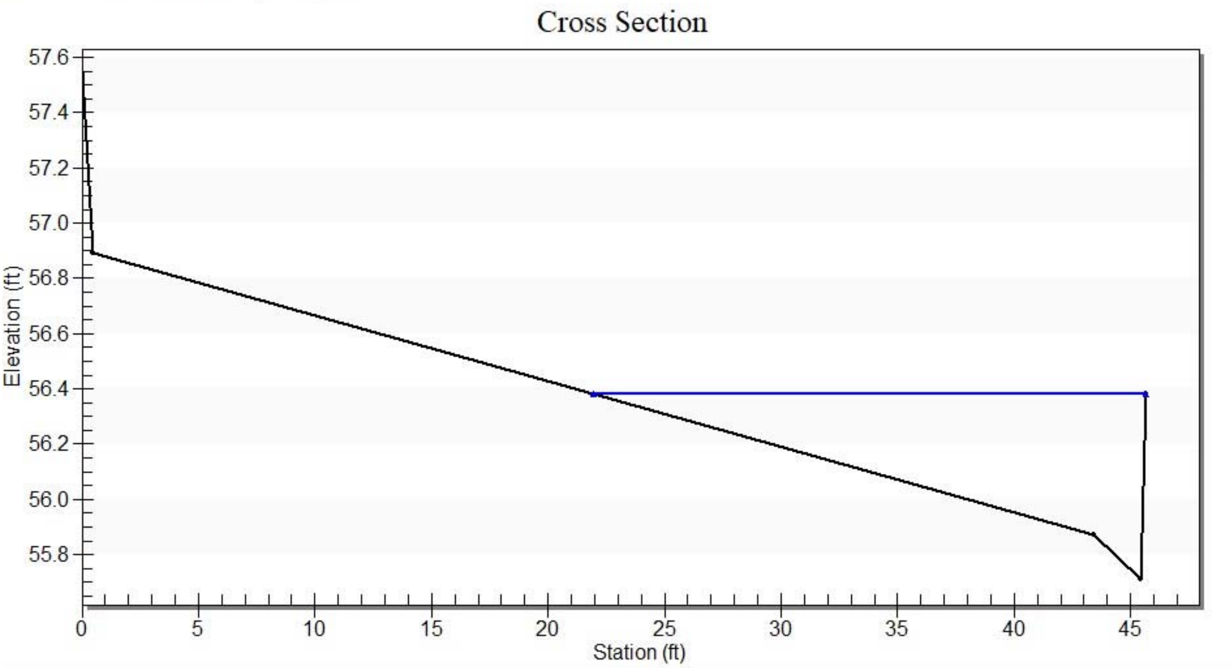
Parameter	Value	Units
Flow	43.001	cfs
Depth	0.830	ft
Area of Flow	31.328	sq ft
Wetted Perimeter	64.336	ft
Hydraulic Radius	0.487	ft
Average Velocity	1.373	fps
Top Width (T)	64.078	ft
Froude Number	0.346	
Critical Depth	0.488	ft
Critical Velocity	3.213	fps
Critical Slope	0.01927	ft/ft
Critical Top Width	41.763	ft
Max Shear Stress	0.104	lb/ft^2
Avg Shear Stress	0.061	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0300	



No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	56.860	0.0300
2	10.500	56.650	0.0300
3	11.000	56.150	0.0300
4	29.000	56.020	0.0300
5	64.500	56.760	0.0140
6	65.000	57.340	

SECTION F-F

Cross Section - Double click in plot for options



Channel Analysis 3

Type: Cross Section ▾ Define...

Side Slope 1 (Z1): 0.0 H : 1V

Side Slope 2 (Z2): 0.0 H : 1V

Channel Width (B): 0.0 (ft)

Pipe Diameter (D): 0.0 (ft)

Longitudinal Slope: 0.004 (ft/ft)

Manning's Roughness: 0.0139

Enter Flow: 19.376 (cfs)

Enter Depth: 0.670 (ft)

Calculate

Plot... Compute Curves...

Parameter	Value	Units
Flow	19.376	cfs
Depth	0.670	ft
Area of Flow	6.722	sq ft
Wetted Perimeter	24.182	ft
Hydraulic Radius	0.278	ft
Average Velocity	2.883	fps
Top Width (T)	23.670	ft
Froude Number	0.953	
Critical Depth	0.659	ft
Critical Velocity	2.996	fps
Critical Slope	0.00443	ft/ft
Critical Top Width	23.212	ft
Max Shear Stress	0.167	lb/ft^2
Avg Shear Stress	0.069	lb/ft^2
Composite Manning's n Equ...	Lotter ...	
Manning's Roughness	0.0139	

OK Cancel

User-Defined Cross Section

Channel File

Browse for Existing .TW File Import...

Channel

Slope of Channel: 0.0040 ft/ft

Number of Cross-sec Points: 5

Irregular Channel Cross-Section

No.	Station (ft)	Elevation (ft)	Manning n
1	0.000	57.540	0.0140
2	0.500	56.890	0.0140
3	43.440	55.870	0.0140
4	45.440	55.710	0.0130
5	45.640	56.380	

Plot ☑ Plot Manning's n values

OK Cancel

APPENDIX G

(Existing Off-site Culvert)

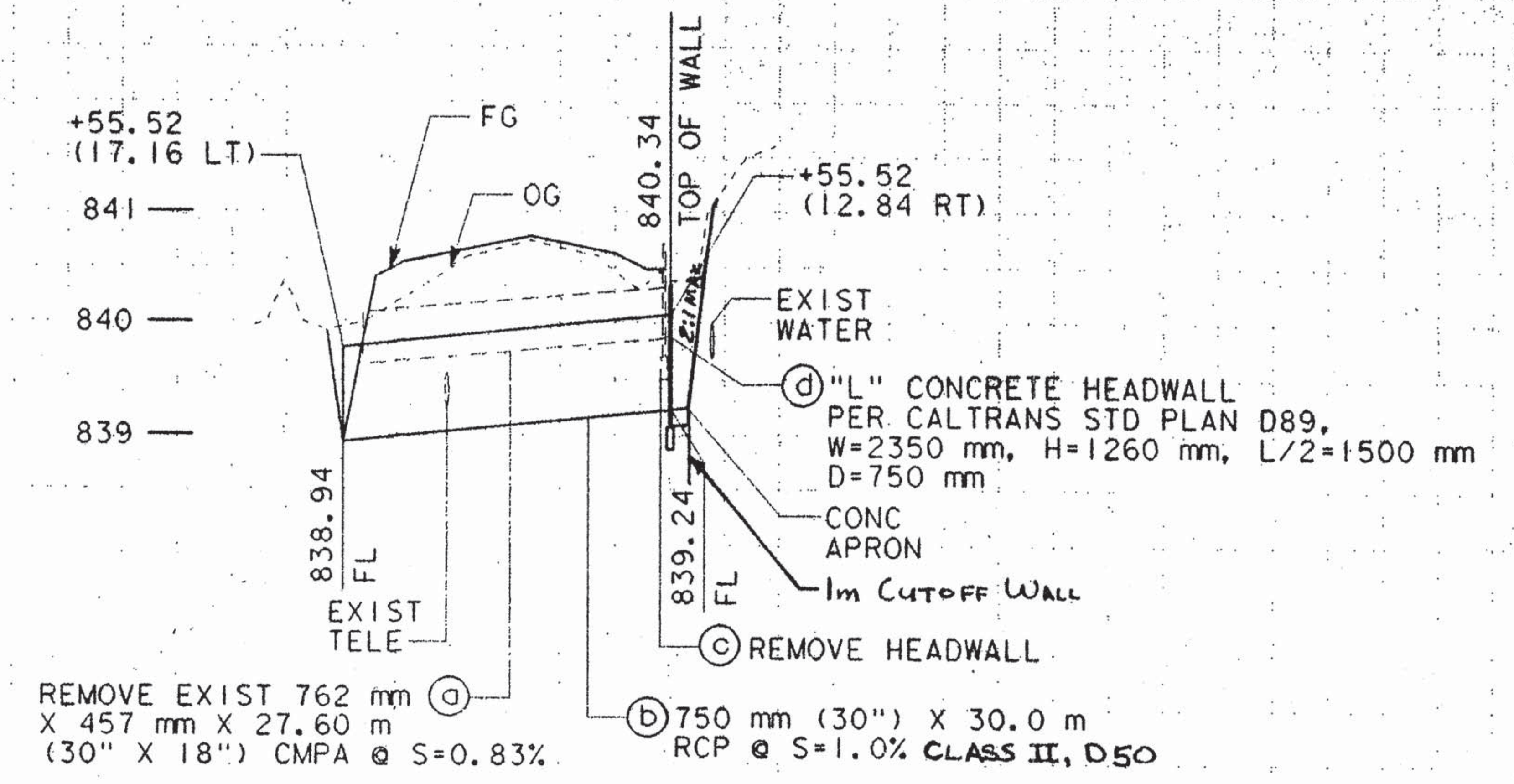
```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                         CIVILDESIGN CORP.                          .
.                       Consulting Engineers                         .
.                          250 S. Lena Rd.                           .
.                     San Bernardino, CA 92408                       .
.                          (909)885-3806                             .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

```
                    Inside Diameter
                     ( 30.00 in.)

                          *
                    *           *
                  *               *

                *                   *_ _ _ _
                ^^^^^^^^^^^^^^^^^^^^^      ^
               *        Water        *     |
                                           |
               *                     *     |
                                           |
                *                   *  ( 28.14 in.)
                                       ( 2.345 ft.)
                  *               *        |
                    *           *          |
                          *_ _ _ _ _ _ _ _ v_
```

EXISTING CULVERT IN
PEARBLOSSOM HWY

```
               Circular Channel Section
               ------------------------
```

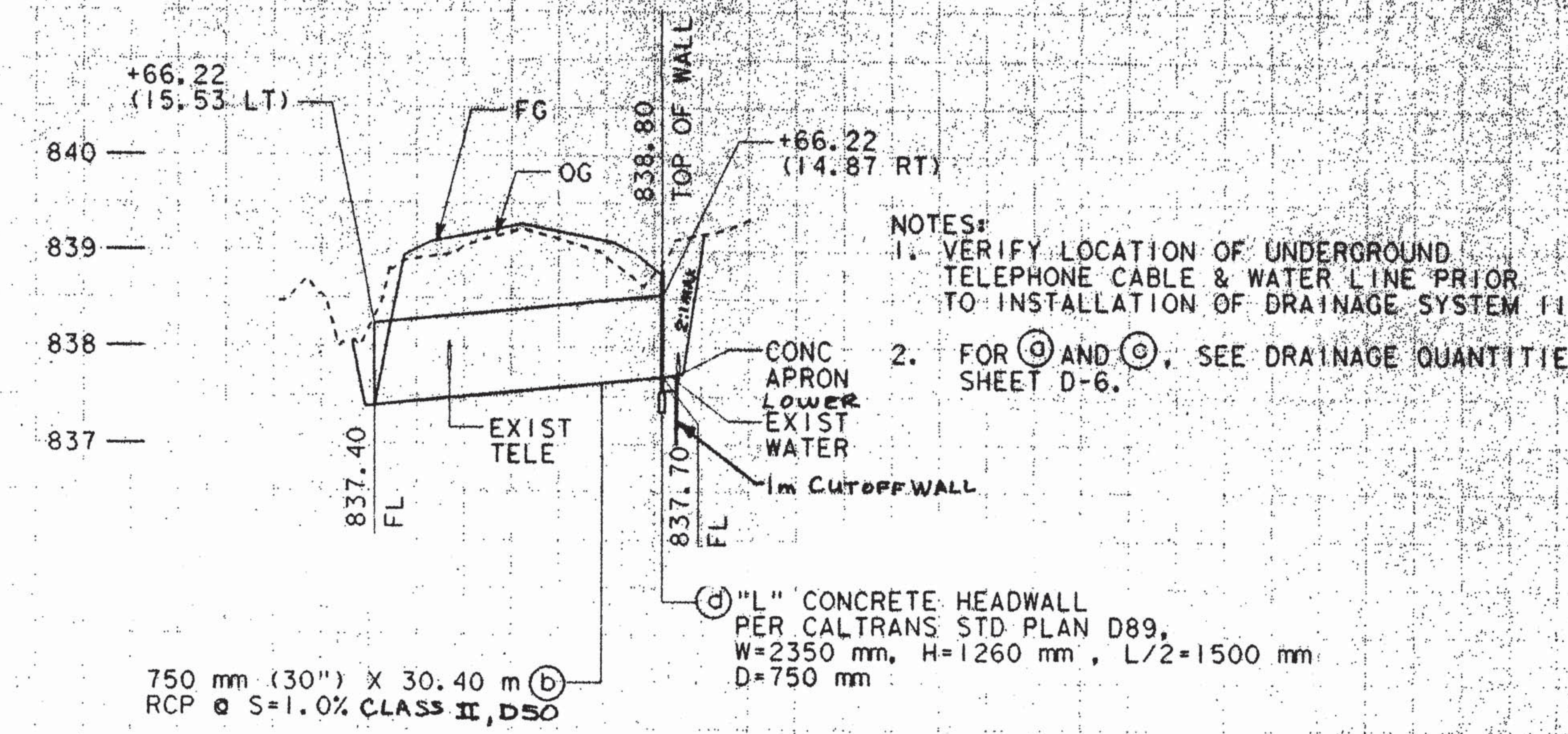
Flowrate	44.122	CFS
Velocity	9.226	fps
Pipe Diameter	30.000	inches
Depth of Flow	28.140	inches
Depth of Flow	2.345	feet
Critical Depth	2.206	feet
Depth/Diameter (D/d)	0.938	
Slope of Pipe	1.000	%
X-Sectional Area	4.783	sq. ft.
Wetted Perimeter	6.596	feet
AR^(2/3)	3.860	
Mannings 'n'	0.013	
Min. Fric. Slope, 30 inch Pipe Flowing Full	1.157	%



NOTE:
VERIFY LOCATION OF UNDERGROUND TELEPHONE CABLE & WATER LINE PRIOR TO INSTALLATION OF DRAINAGE SYSTEM 10.

DRAINAGE SYSTEM 10

STA 86+55.52

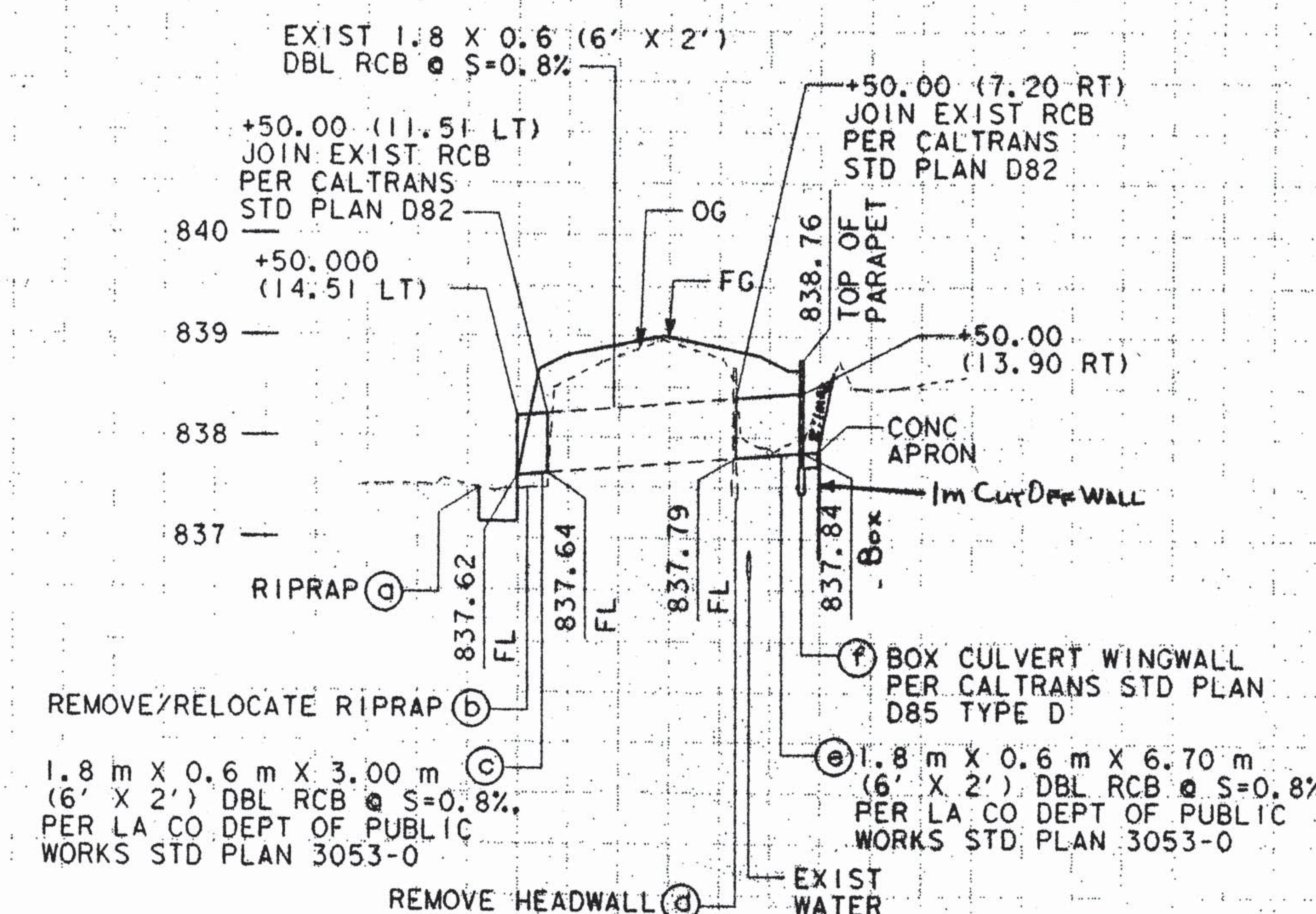


NOTES:
1. VERIFY LOCATION OF UNDERGROUND TELEPHONE CABLE & WATER LINE PRIOR TO INSTALLATION OF DRAINAGE SYSTEM 11.
2. FOR ⓐ AND ⓒ, SEE DRAINAGE QUANTITIES SHEET D-6.

EXISTING
CULVERT

DRAINAGE SYSTEM 11

STA 90+66.22



DRAINAGE SYSTEM 12

STA 92+50.00

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

NOTES:

1. UTILITY LOCATIONS SHOWN ARE APPROXIMATE.
2. ELEVATIONS OF CULVERTS MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.

PREPARED BY:
Sverdrup CIVIL, INC.
38424 10th STREET EAST, SUITE 200
PALMDALE, CALIFORNIA 93550
(805) 265-8580

SIGNATURE DATE 6/02/97

REGISTERED PROFESSIONAL ENGINEER
J. G. JENSEN
No. C 30535
Exp. 3/31/00
CIVIL
STATE OF CALIFORNIA

6/02/97

DATE	MK	DESCRIPTION	DATE	MK	DESCRIPTION

CHECKED BY:

PLAN CHECK ENGINEER DATE 7/1/97

RECOMMENDED BY:

DATE

CITY OF PALMDALE

STREET IMPROVEMENT PLANS

PEARBLOSSOM HIGHWAY WIDENING

ST 96-28

DRAINAGE PROFILE

SCALE HORIZ 1:500
VERT 1:50

74308

D-3

APPENDIX H

(Trapeziodal Channel Sizing)

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                         CIVILDESIGN CORP.                          .
.                       Consulting Engineers                         .
.                          250 S. Lena Rd.                           .
.                     San Bernardino, CA 92408                       .
.                           (909)885-3806                            .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```


```
******                                                          ******
     ***                                                      ***
       ***                                                  ***
         ***                                              ***
           *** |<-------------( 20.80')-------------->| ***
             ***^^^^^^^^^ Water Depth (  1.80')^^^^^^^^^***
               ***                                  ***
                 ***                              ***
                   ***                          ***
                     ***|<-----( 10.00')---->|***
                       ************************
                         ********************
```

Trapezoidal Channel

```
Flowrate ..................      300.000  CFS
Velocity ..................       10.825  fps
Depth of Flow .............        1.800  feet
Critical Depth ............        2.384  feet
Freeboard .................        0.000  feet
Total Depth ...............        1.800  feet
Width at Water Surface ....       20.798  feet
Top Width .................       20.798  feet
Slope of Channel ..........        3.380  %
Left Side Slope ...........        3.000 : 1
Right Side Slope ..........        3.000 : 1
Base Width ................       10.000  feet
X-Sectional Area ..........       27.712  sq. ft.
Wetted Perimeter ..........       21.382  feet
AR^(2/3) ..................       32.943
Mannings 'n' ..............        0.030
```

```
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
.                         CIVILDESIGN CORP.                         .
.                       Consulting Engineers                        .
.                          250 S. Lena Rd.                          .
.                     San Bernardino, CA 92408                      .
.                           (909)885-3806                           .
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

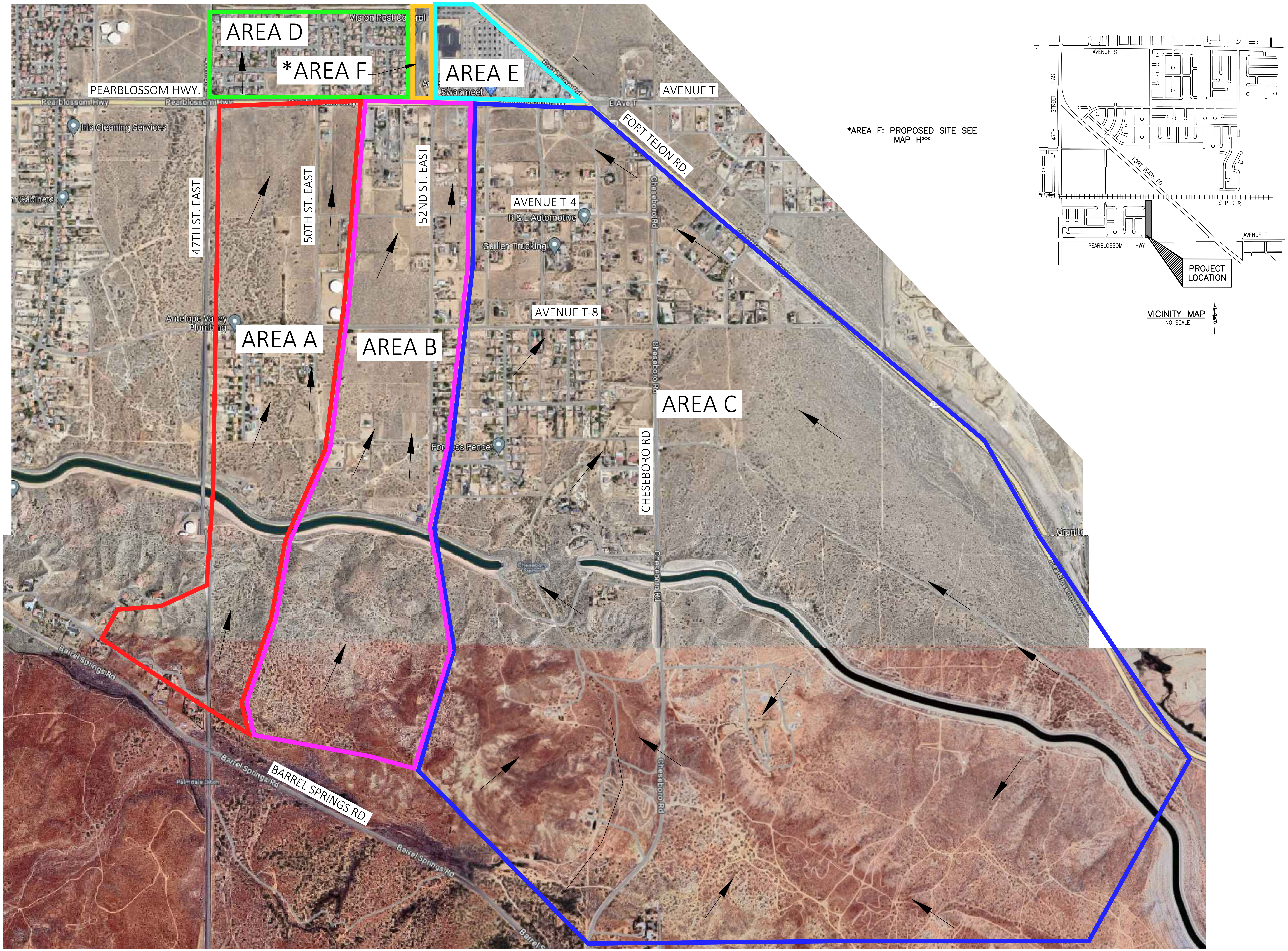
```
******                                                        ******
     ***                                                  ***
       ***                                              ***
         ***                                          ***
           *** |<-------------( 30.54')-------------->| ***
             ***^^^^^^^^^ Water Depth (  3.42')^^^^^^^^^***
               ***                                  ***
                 ***                              ***
                   ***                          ***
                     ***|<-----( 10.00')---->|***
                       ************************
                         ********************
```

Trapezoidal Channel

Flowrate	409.970	CFS
Velocity	5.910	fps
Depth of Flow	3.423	feet
Critical Depth	2.822	feet
Freeboard	0.000	feet
Total Depth	3.423	feet
Width at Water Surface	30.535	feet
Top Width	30.535	feet
Slope of Channel	0.500	%
Left Side Slope	3.000	: 1
Right Side Slope	3.000	: 1
Base Width	10.000	feet
X-Sectional Area	69.366	sq. ft.
Wetted Perimeter	31.646	feet
AR^(2/3)	117.049	
Mannings 'n'	0.030	

APPENDIX I

(Hydrology Maps)



*AREA F: PROPOSED SITE SEE MAP H**

VICINITY MAP
NO SCALE

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	

OWNER
JOYCE BRUCE
P.O. BOX 901807
PALMDALE, CA 93590
PHONE: (661) 273-3462

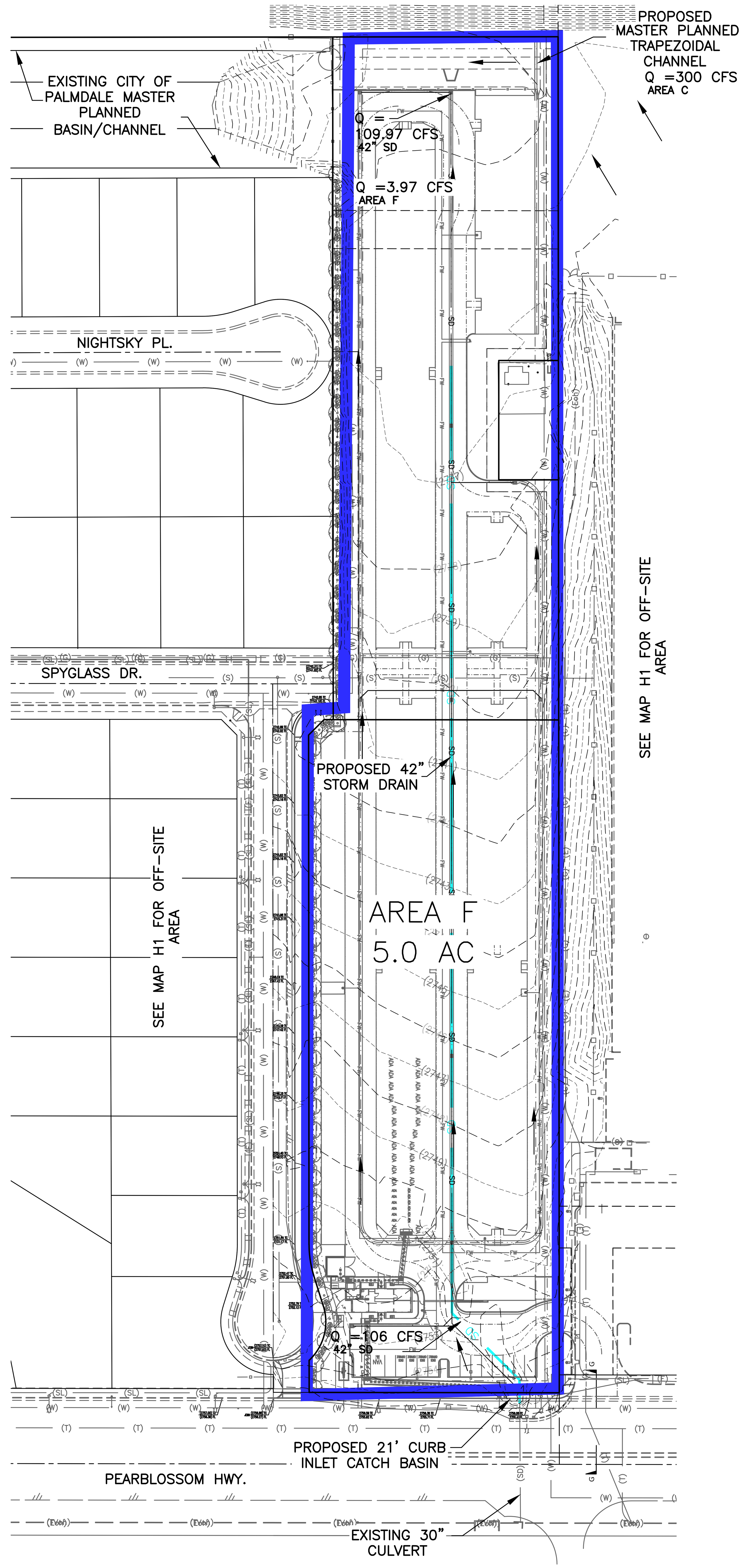
PROJECT
PROPOSED MINI-STORAGE FACILITY
APN: 3051-019-030 & 112
NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE
PALMDALE, CA 93550

SHEET TITLE
OVERALL OFF & ONSITE AREAS

REGISTERED PROFESSIONAL ENGINEER
BARRY S. MUNZ
C44094
EXP. 6-30-25
CIVIL
STATE OF CALIFORNIA

Antelope Valley Engineering est. 1975
129 West Pondera St.
Lancaster, Ca 93534
Tel: (661) 948-0805
Email: info@antelopevalleyengineering.com

DRAWN:	EP
DATE:	7-11-24
JOB No.:	23065
SHEET:	H1
OF – SHEETS	

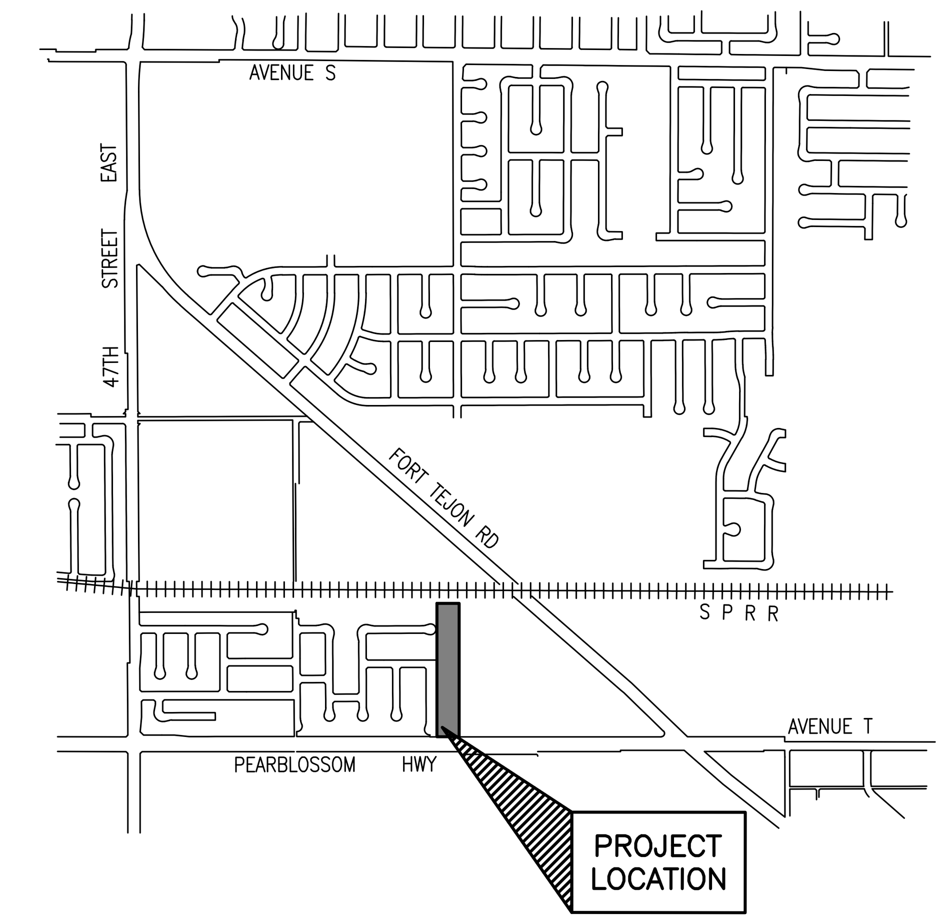


HYDROLOGY DATA

SOIL # 120

STORM FREQUENCY 2YR.

ISOHYET LINE 1.12



VICINITY MAP
NO SCALE

SCALE: 1 inch = 60 ft

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	

OWNER

FOUR POINTS ENTERPRISES, LLC
P.O. BOX 901807
PALMDALE, CA 93590
PHONE: (661) 273-3462

PROJECT

PROPOSED MINI-STORAGE FACILITY
APN: 3051-019-030 & 112
NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE
PALMDALE, CA 93550

SHEET TITLE

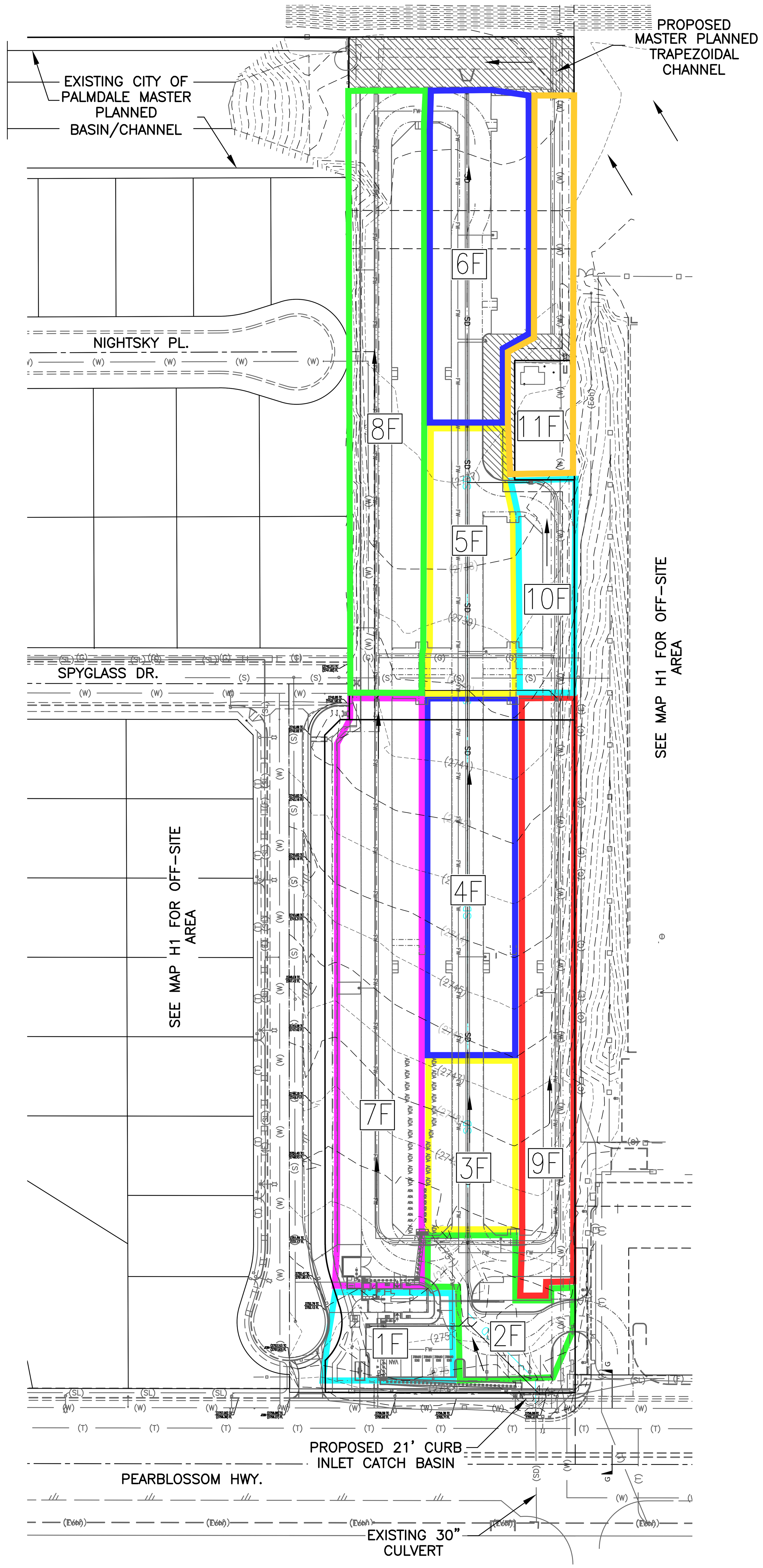
ON-SITE AREA F

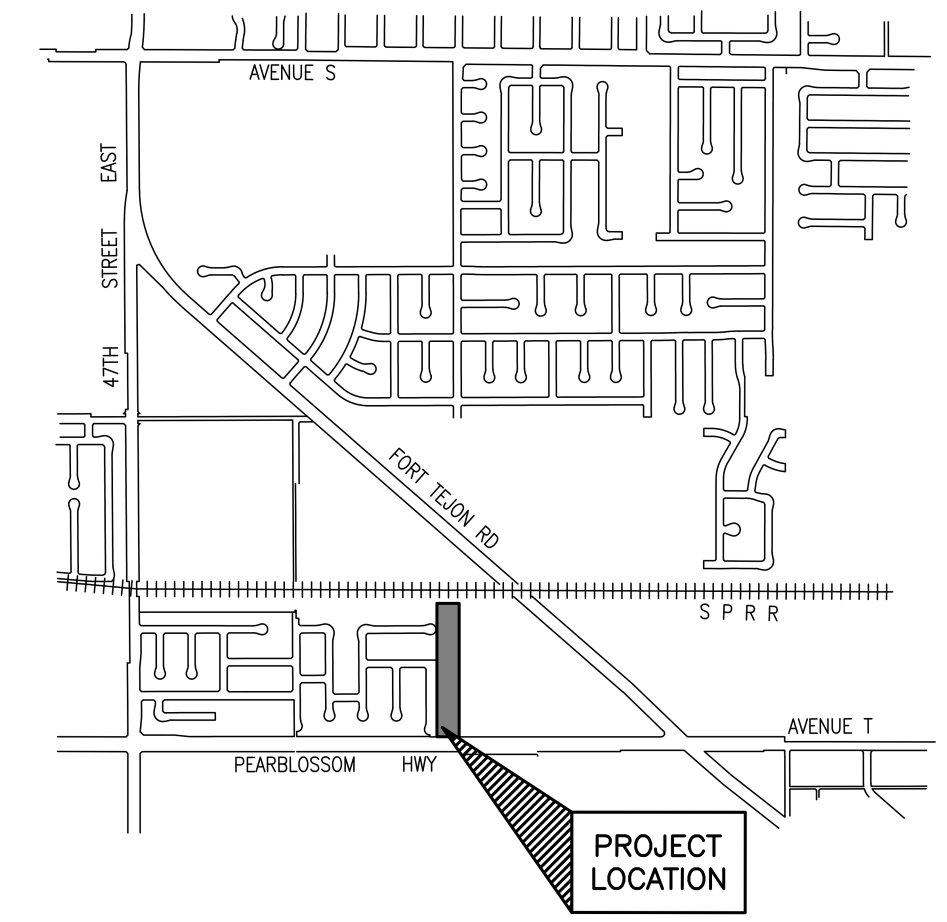
REGISTERED PROFESSIONAL ENGINEER
BARRY S. MUNZ
C44094
EXP. 6-30-25
CIVIL
STATE OF CALIFORNIA

Antelope Valley Engineering *est. 1975*
129 West Pondera St.
Lancaster, Ca 93534
Tel: (661) 948-0805
Email: info@antelopevalleyengineering.com

DRAWN:	EP
DATE:	7-11-24
JOB No.:	23065
SHEET:	H2
OF – SHEETS	

F:\PROJECTS\23065\HYDRO\SECTION.DWG Plot Date: 7/26/2024 By: Mark Duran Last Saved: MDURAN





VICINITY MAP
NO SCALE

HYDROLOGY DATA

SOIL # 120
STORM FREQUENCY 50YR.
ISOHYET LINE 2.8

SCALE: 1 inch = 60 ft

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	

OWNER

FOUR POINTS ENTERPRISES, LLC
P.O. BOX 901807
PALMDALE, CA 93590
PHONE: (661) 273-3462

PROJECT

PROPOSED MINI-STORAGE FACILITY
APN: 3051-019-030 & 112
NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE
PALMDALE, CA 93550

SHEET TITLE

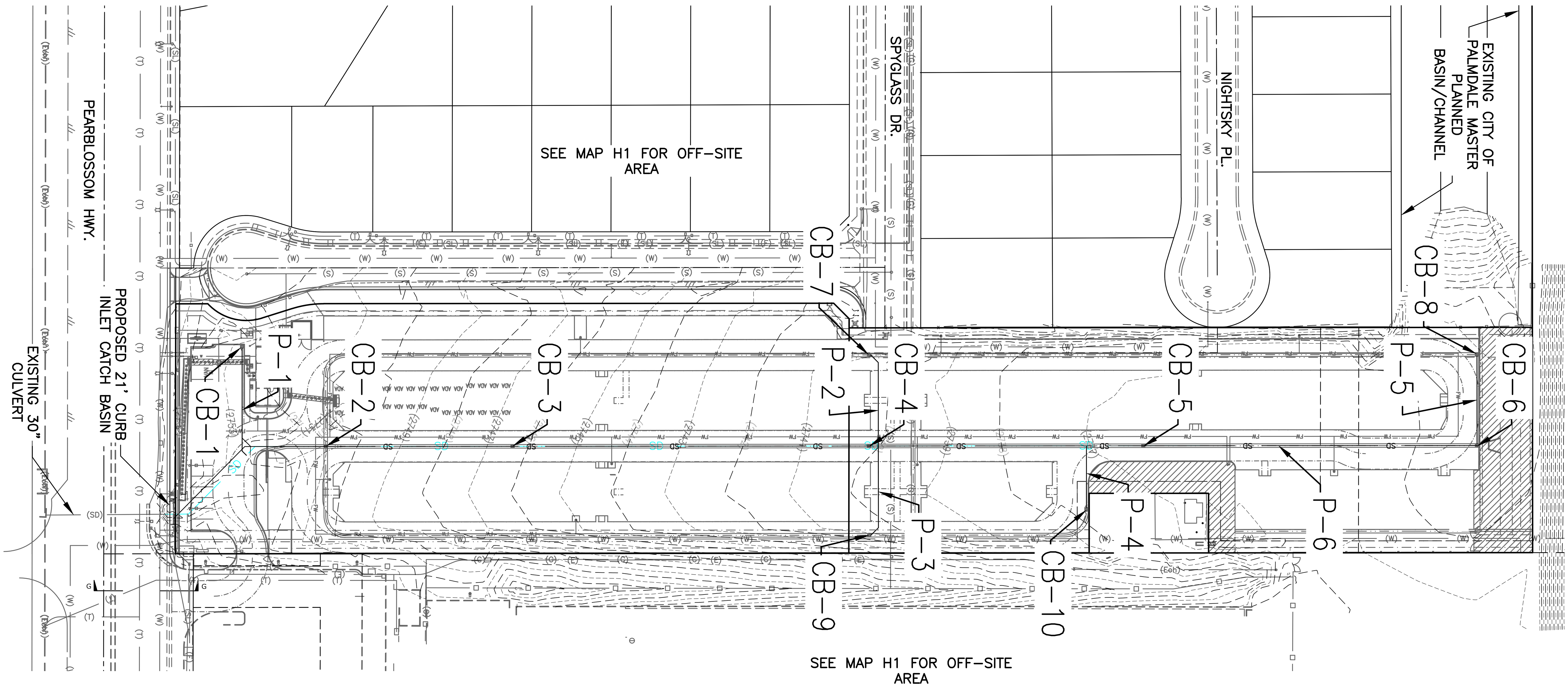
ON-SITE AREA BREAKDOWN FOR CATCH BASINS SIZING

REGISTERED PROFESSIONAL ENGINEER
BARRY S. MUNZ
C44094
EXP. 6-30-25
CIVIL
STATE OF CALIFORNIA

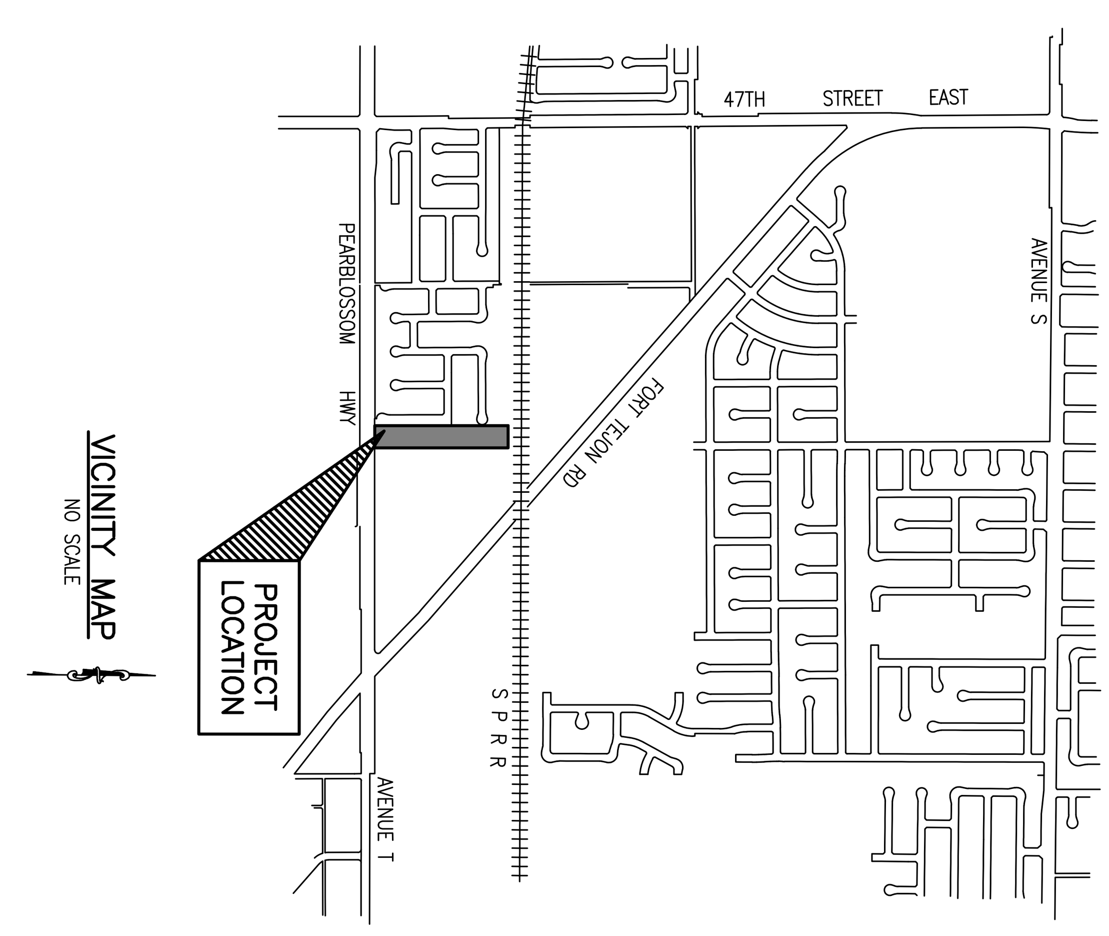
Antelope Valley Engineering est. 1975
129 West Pondera St
Lancaster, Ca 93534
Tel: (661) 948-0806
Email: info@antelopevalleyengineering.com

DRAWN:	EP
DATE:	7-11-24
JOB No.:	23065
SHEET:	H3
OF	– SHEETS

F:\PROJECTS\23065\HYDRO\SECTION.DWG Plot Date: 7/26/2024 By: Mark Duran Last Saved: MDURAN



SCALE: 1 inch = 60 ft.



DRAWN:	EP
DATE:	7-11-24
JOB No.:	23065
SHEET:	H4
OF _ SHEETS	

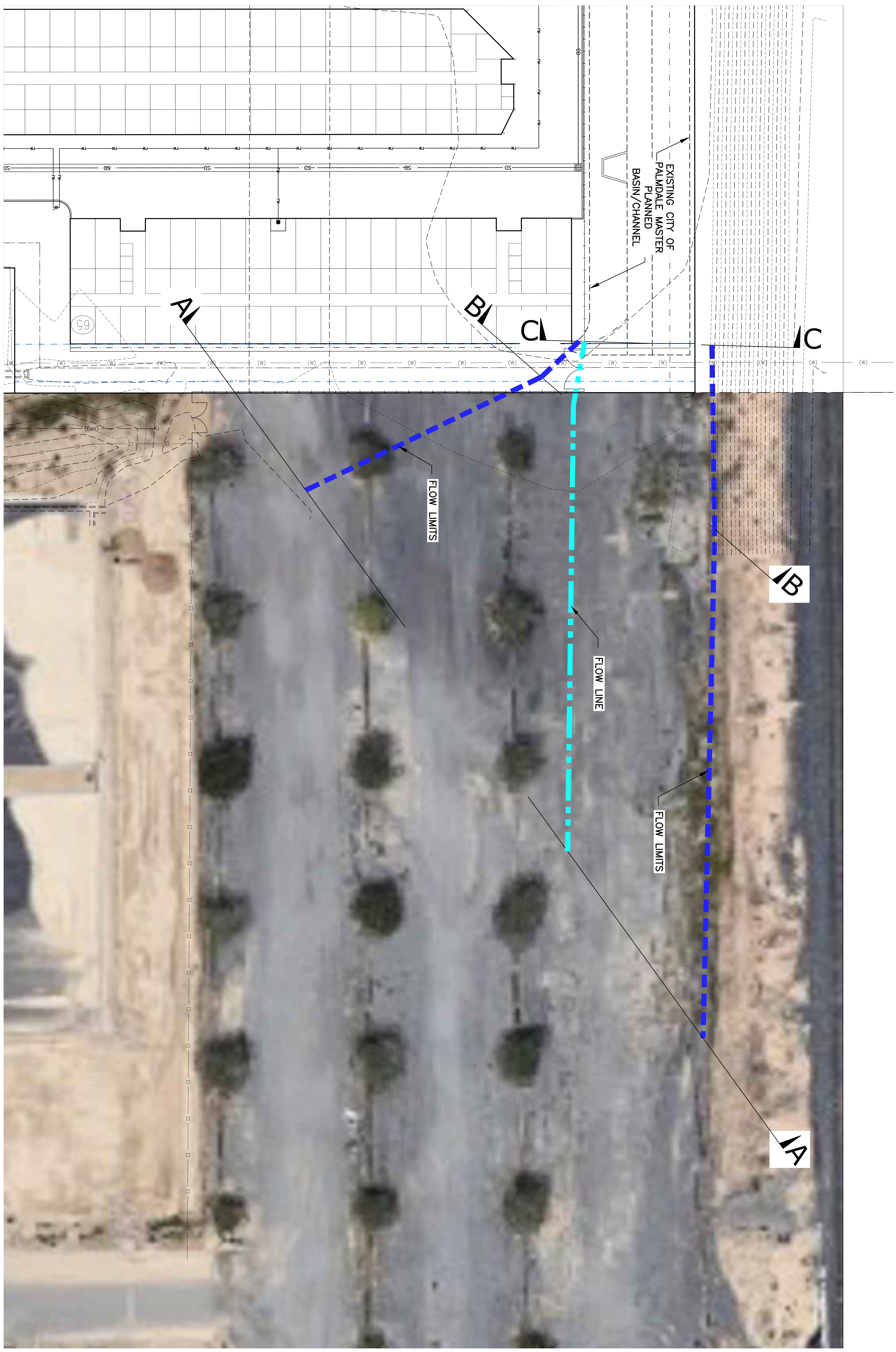
Antelope Valley Engineering est. 1975
129 West Pondera St.
Lancaster, Ca 93534
Tel: (661) 948-0805
Email: info@antelopevalleyengineering.com

REGISTERED PROFESSIONAL ENGINEER
BARRY S. MUNZ
C44094
EXP. 6-30-25
CIVIL
STATE OF CALIFORNIA

SHEET TITLE	PROJECT	OWNER
ON-SITE STORM DRAIN & CATCH BASINS LOCATION	**PROPOSED MINI-STORAGE FACILITY** APN: 3051-019-030 & 112 NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE PALMDALE, CA 93550	**FOUR POINTS ENTERPRISES, LLC** P.O. BOX 901807 PALMDALE, CA 93590 PHONE: (661) 273-3462

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	

F:\PROJECTS\23065\HYDRO\SECTION.DWG Plot Date: 7/26/2024 By: Mark Duron Last Saved: MDURAN



SCALE: 1 inch = 20 ft

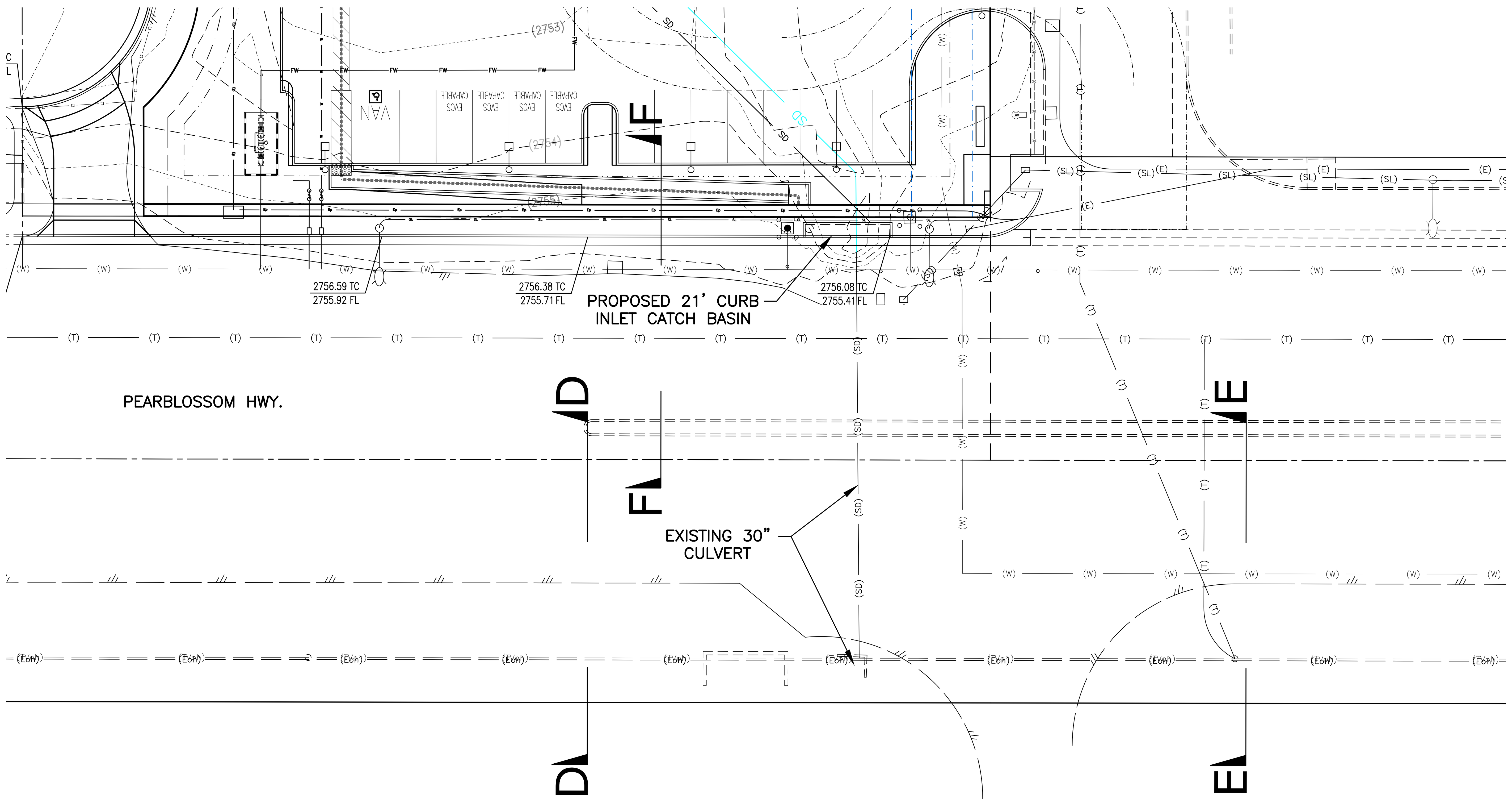
DRAWN:	EP
DATE:	7-11-24
JOB No.:	23065
SHEET:	H5
OF — SHEETS	

Antelope Valley Engineering est. 1975
129 West Pondera St.
Lancaster, Ca 93534
Tel: (661) 948-0805
Email: info@antelopevalleyengineering.com

REGISTERED PROFESSIONAL ENGINEER BARRY S. MUNZ C44094 EXP. 6-30-25 CIVIL STATE OF CALIFORNIA

SHEET TITLE	PROJECT	OWNER
SECTION A-C	**PROPOSED MINI-STORAGE FACILITY** APN: 3051-019-030 & 112 NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE PALMDALE, CA 93550	**FOUR POINTS ENTERPRISES, LLC** P.O. BOX 901807 PALMDALE, CA 93590 PHONE: (661) 273-3462

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	



SCALE: 1 inch = 20 ft

REV.	DESCRIPTION	DATE	APPR.
1	--	-/-/-	

OWNER

FOUR POINTS ENTERPRISES, LLC
P.O. BOX 901807
PALMDALE, CA 93590
PHONE: (661) 273-3462

PROJECT

PROPOSED MINI-STORAGE FACILITY
APN: 3051-019-030 & 112
NEC PEARLBLOSSOM HWY & FALLINGSTAR PLACE
PALMDALE, CA 93550

SHEET TITLE

SECTION D-F

REGISTERED PROFESSIONAL ENGINEER
BARRY S. MUNZ
C44094
EXP. 6-30-25
CIVIL
STATE OF CALIFORNIA

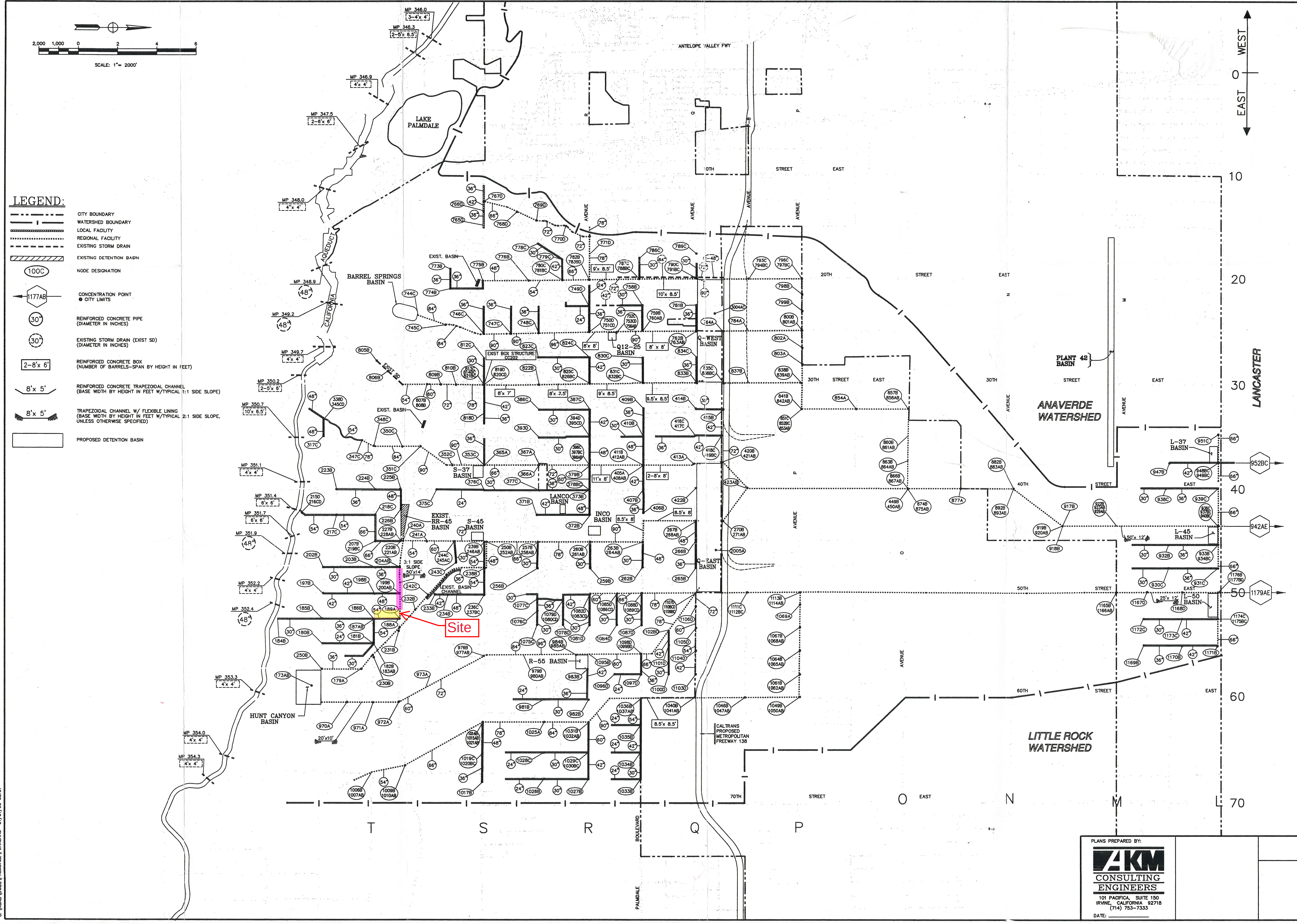
Antelope Valley Engineering est. 1975
129 West Pondera St
Lancaster, Ca 93534
Tel: (661) 948-0806
Email: info@antelopevalleyengineering.com

DRAWN: EP
DATE: 7-11-24
JOB No.: 23065
SHEET: H6
OF – SHEETS

F:\PROJECTS\23065\HYDRO\SECTION.DWG Plot Date: 7/26/2024 By: Mark Duran Last Saved: MDURAN

APPENDIX J

(Reference)



CITY OF PALMDALE
MASTER PLAN OF DRAINAGE UPDATE
PEARLAND WATERSHED

REGIONAL FACILITIES NODE DESIGNATION	DISCHARGE Q50 (CFS)
173AB (IN) (HUNT BASIN)	Qb=1845 Qw=1625
228AB (IN) (RR-45 BASIN)	Qb=1577 Qw=1502
240A (OUT) (RR-45 BASIN)	180
241A	217
245AC	360
246AB (IN) (S-45 BASIN)	681
250B	69
252AB (OUT) (S-45 BASIN)	276
258AB	387
261AB	495
264AB	612
268AB	813
271AB (IN) (Q-EAST BASIN)	@ 45TH ST. E. 920
347C	633
348C	706
350C	838
351C	838
352C	917
353C (IN) (S-37 BASIN)	984
365A (OUT) (S-37 BASIN)	321
412AB	1416
413A	1447
421AB	1718
423AB (IN) (Q-EAST BASIN)	@ 40TH. ST. E 1675
429A (OUT) (Q-EAST BASIN)	W. OF 37TH. ST. E 410
430B (OUT) (Q-EAST BASIN)	E. OF 43RD. ST. E 410
744C (IN) (BARREL SPRINGS)	Qb=5205 Qw=4836
744C (OUT) (BARREL SPRINGS)	593
745C	624
746C	723
747C	794
748C	861
751CD	992
753CD (IN) (Q12-25 BASIN)	TOTAL RUNOFF 1023
753CD (BY-PASS) (Q12-25 BASIN)	500
753CD (IN) (Q12-25 BASIN)	523
756AB (OUT) (Q12-25 BASIN)	TOTAL OUTFLOW 628
760AB	750
763AB	864
764A (IN) (Q-WEST BASIN)	@ 25TH ST. E. 937
764A (OUT) (Q-WEST BASIN)	@ 25TH ST. E. 254
767D	309
768D	384
769D	419
770D	465
771D	501
775B	169
776B	197
781BC	369
783BD	878
784A	1005
788BC	960
791BC (IN) (Q-WEST BASIN)	@ 20TH ST. E. 1041
791B (OUT) (Q-WEST BASIN)	@ 20TH ST. E. 43
808B	482
809B	556
810B	596
821BC	657
822B	878
826BC	1013
832BC	1064
833B	1086
836BC (IN) (Q-WEST BASIN)	@ 30TH. ST. E 1182
836B (OUT) (Q-WEST BASIN)	@ 30TH. ST. E 508
929AB	5755
931C	164
934BC	312
937BC	469
939C	158
940BC (IN) (L-45 BASIN)	622
940BC(OUT) (L-45 BASIN)	138
942AE	TOTAL OUTFLOW 5851
948B	166
951C	163
952BC (L-37 BASIN)	TOTAL RUNOFF 321
952BC (BY-PASS) (L-37 BASIN)	30
952BC (IN) (L-37 BASIN)	291
952BC (OUT) (L-37 BASIN)	TOTAL OUTFLOW 73
970A	18
971A	38
972A	90
973A	130
977AB	272
980AB	333

REGIONAL FACILITIES NODE DESIGNATION	DISCHARGE Q50 (CFS)
985AB (IN) (R-55 BASIN)	448
1007AB	205
1010AB	254
1021AB	480
1025A	510
1032AB	710
1037AB	851
1041AB	1032
1083CD	121
1086CD	150
1089CD	180
1095B (OUT) (R-55 BASIN)	170
1099BD	223
1102BD	307
1109BC (IN) (Q-EAST BASIN)	@ 50TH ST. E. 906
1109B (OUT) (Q-EAST BASIN)	@ 50TH ST. E. 80
1166AB	3210
1171B	149
1175BC	299
1177BD (IN) (L-50 BASIN)	458
1177BD (OUT) (L-50 BASIN)	113
1179AE (OUT) (L-50 BASIN)	TOTAL OUTFLOW 3291
2005A (IN) (Q-EAST BASIN)	TOTAL INFLOW 3467
3004AC (IN) (Q-WEST BASIN)	TOTAL INFLOW 3041

LOCAL FACILITIES NODE DESIGNATION	DISCHARGE Q10 (CFS)
180B	35
183AB	145
185B	74
187AB	251
189A	300
197B	153
198B	179
200AB	497
202B	67
203B	92
204AB	572
207B	92
216CD	231
217C	259
218C	282
219BC	356
221AB	918
223B	86
224B	117
225B	132
226B	148
233B	96
234B	109
237BC	140
238B	159
239B	180
256B	25
257B	62
259B	24
260B	52
262B	22
263B	65
265B	32
266B	74
267B	112
371B	84
372B	107
375C	28
376C	38
377C	48
378BC	185
379B	206
386C	41
387C	60
393D	72
394D	88
395CD	147
369C	168
409B	36
410B	70
411B	102
414B	26
415B	46
417C	52
419BC	116
420B	134
422B	27
749D	30
750D	53
758B	27
759B	69
762B	59
765D	41
766D	71
767D	20
773B	33
774B	57
778C	38
779C	57
780C	74
786C	12
787C	35
790C	44
805B	48
806B	107
812C	29
813C	44
818D	63
819D	105
823C	26
824C	47
825C	74
830C	23
831C	59
834C	28
930C	45
931C	85
932B	45
933B	85
938C	45
939C	85
947B	46
948C	85
981B	29
982B	48
983B	65
984B	77
1017B	27
1020BC	63
1026B	25
1027B	34
1028C	34
1030BC	98
1031B	119
1033B	25
1034B	53
1035B	77
1036B	97
1075C	24
1076C	42
1077C	61
1078D	16
1079D	31
1080CD	91
1081D	16
1082D	30
1084D	16
1085D	32
1096D	17
1097D	30
1098D	48
1100D	20
1101D	43
1103D	20
1104D	43
1105D	74
1106D	105
1169B	30
1170B	60
1172C	22
1173C	52
1174C	80
1175BC	156

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DATE:

CITY OF PALMDALE

MASTER PLAN OF DRAINAGE
PEARLAND WATERSHED
FACILITY MAP

EXHIBIT 4

PROJECT NUMBER:

C:\ACAD\DWGS\PALMDALE\PEARLAND 01/01/96 03:51

APPENDIX F – Noise Impact Study

Mini-Storage Facility Project

Noise Impact Study

City of Palmdale, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set-forth by the Federal, State and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An analysis of traffic noise impacts to and from the project site
- An analysis of operational noise impacts
- An analysis of construction noise impacts

1.2 Site Location and Study Area

The project site is located at the northeast corner of Pearblossom Highway and Fallingstar Place in the City of Palmdale, CA, as shown in Exhibit A. Land uses directly around the site include regional commercial to the east, and Single Family Residential 3 (SFR3) to the north and west. South of the project site is within unincorporated Los Angeles County boundaries in the Antelope Valley planning area and is zoned as light agricultural. Pearblossom Highway is to the south and Fallingstar Place is to the west.

1.3 Proposed Project Description

The project proposes to develop a 91,663-square-foot mini-storage facility consisting of 702 storage units on approximately 5.06 acres. The facility will include an office building, 15 parking spaces, and eight (8) mini-storage buildings.

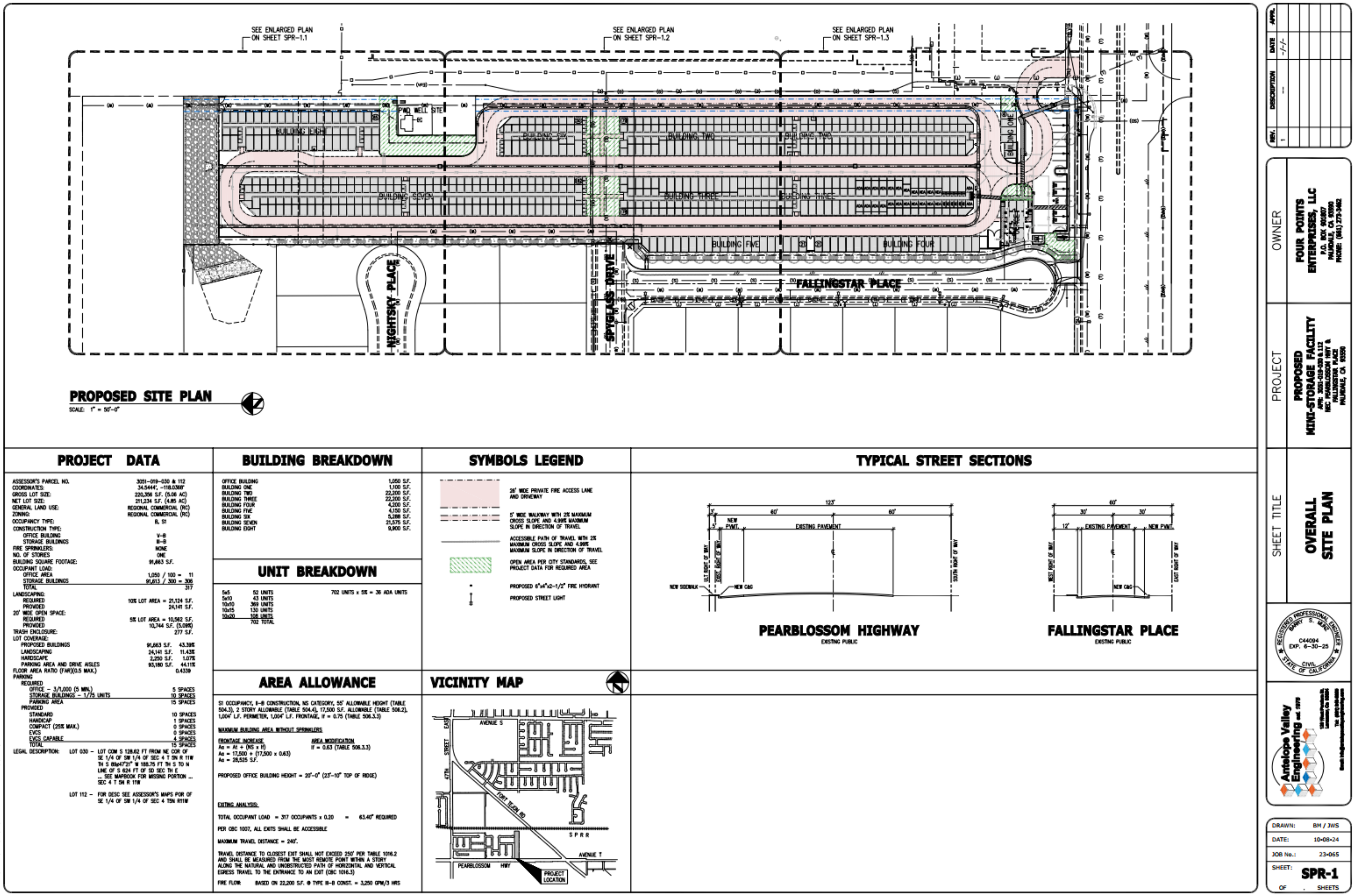
This study assesses the operational noise and traffic noise to and from the project site and compares the results to the applicable City noise standards. In addition, the study reviews noise generated by construction activities.

Exhibit A

Location Map

Exhibit B

Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

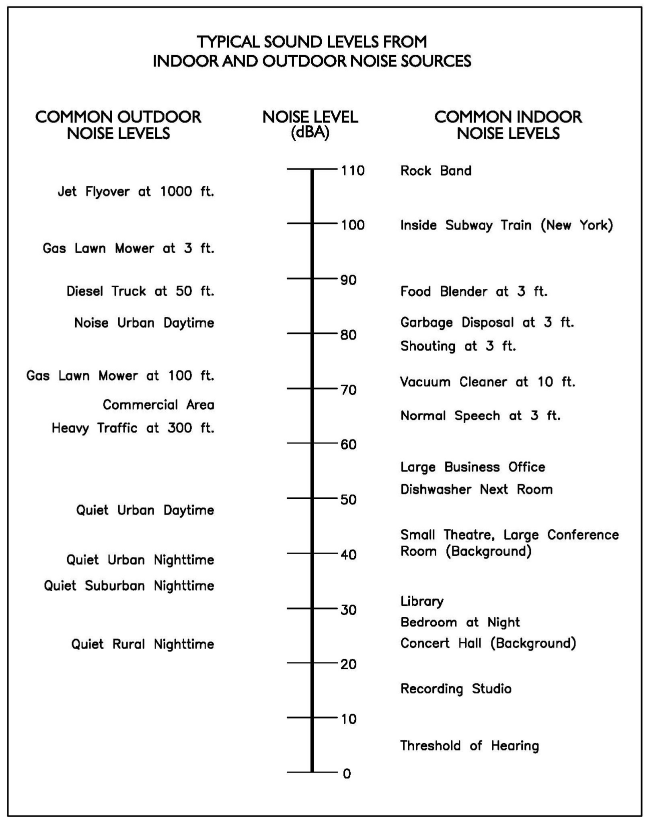
2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding), and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch from 20 Hz to the high pitch of 20,000 Hz.

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates reference sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz (A-weighted scale), and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns; others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after the addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly, L50, L90 and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depend on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2 axle) and heavy truck percentage (3 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds, and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet or more from a noise source. Wind, temperature, air humidity and turbulence can further impact have far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude.

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of Palmdale, and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated, leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 of the California Building Code (CBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan.

The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

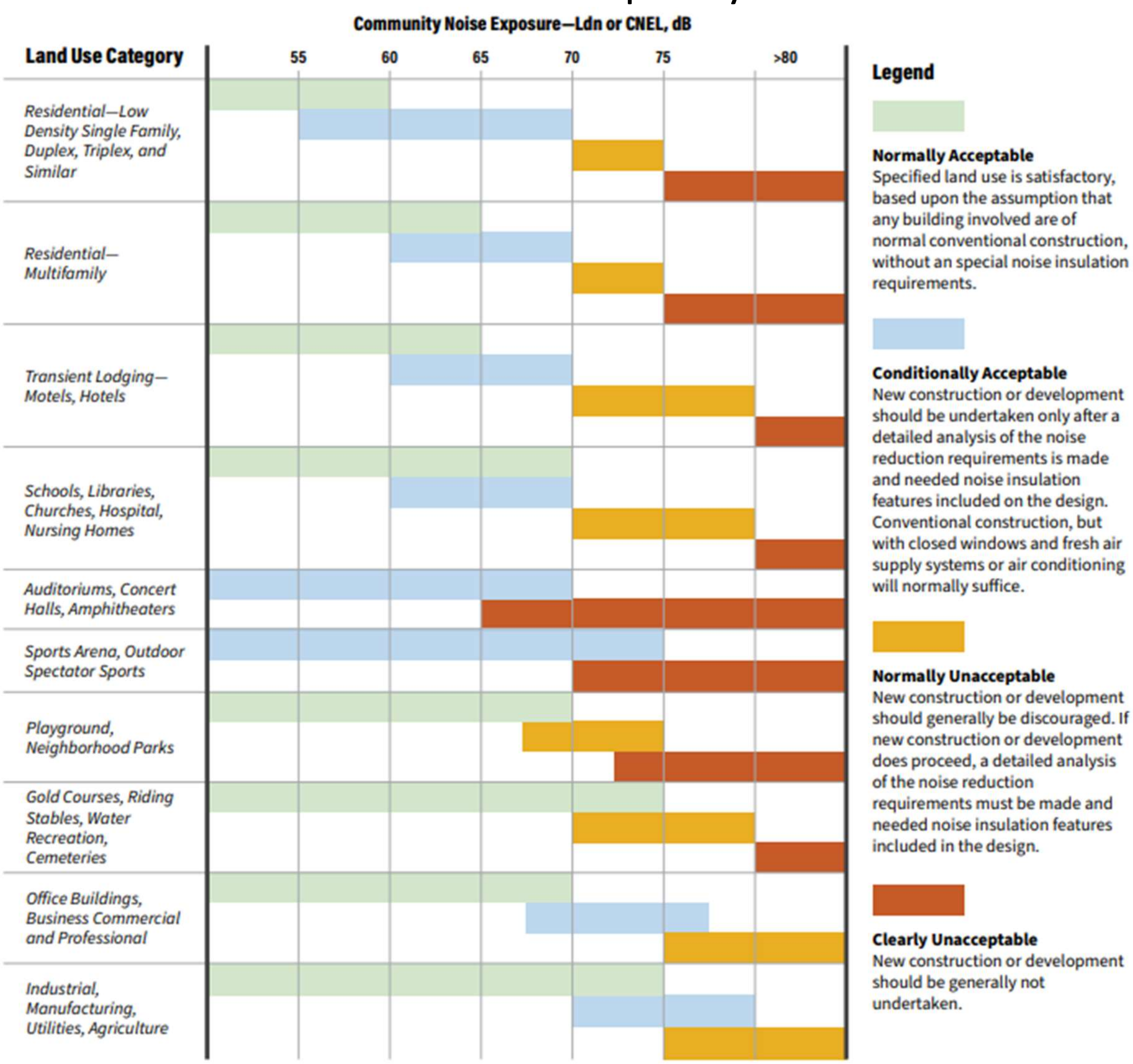
4.3 City of Palmdale Noise Regulations

The City of Palmdale outlines their noise regulations and standards within the Noise Element from the City's General Plan and Chapter 9.18 – Disturbing, Excessive, Loud, or Offensive Noise from the City's Municipal Code.

City of Palmdale General Plan

Applicable policies and standards governing environmental noise in the City of Palmdale are set forth in the General Plan Noise Element. Table 16.1 (Exhibit D of this report) of the City's Noise Element outlines the exterior noise standards for community noise environments.

Exhibit D: Land Use Compatibility Guidelines



General Plan Noise Element goals and policies applicable to the proposed project are presented below.

Goal N-1: Minimize resident exposure to excessive noise.

Policy N-1.1: Use the state-recommended noise level guidelines shown in Figure 16.1 *(Exhibit D of this report)* to determine the compatibility of proposed land uses with the existing and future noise environment of each proposed development site.

Policy N-1.2: Restrict noise sensitive land uses near existing or future air, rail, or highway transportation noise sources unless mitigation measures have been incorporated into the design of the project to reduce the noise levels at the noise sensitive land use to less than 65 dBA CNEL at all exterior living spaces including but not limited to, single-family yards and multi-family patios, balconies, pool areas, cook-out areas and related private recreation areas.

Policy N-1.3: When proposed stationary noise sources could exceed an exterior noise level of 65 dBA CNEL at the property line or could impact future noise sensitive land uses, require preparation of an acoustical analysis and mitigation measures to reduce exterior noise levels to no more than 65 dBA CNEL at the property line.

Policy N-1.4: Explore the use of noise abatement strategies such as natural barriers, sound walls, and other buffers to mitigate excessive noise.

Goal N-2: Maintain acceptable noise environments throughout the City.

Policy N-2.2: Restrict construction activities in the vicinity of sensitive receptors during the evening, early morning, and weekends and holidays.

Policy N-2.3: Utilize any or all the following measures to maintain acceptable noise environments throughout the city:

- Control of noise at its source, including noise barriers and other muffling devices built into the noise source.
- Provision of buffer areas and/or wide setbacks between the noise source and other development.
- Reduction of densities, where practical, adjacent to the noise source (freeway, airport, railroad).
- Use of sound insulation, blank walls, double paned windows and other design or architectural techniques to reduce interior noise levels.
- Designation of appropriate land uses adjacent to known noise sources.

Policy N-2.4: Where deemed appropriate based upon available information, require acoustical analysis and appropriate mitigation for noise-sensitive land uses proposed in areas that may be adversely impacted by significant intermittent noise sources. Such noise sources may include but not be limited to railroads, racetracks, stadiums, aircraft overflights and similar uses.

Goal N-4: Minimize adverse noise impacts associated with transportation.

City of Palmdale Municipal Code

Chapter 9.18 – Disturbing, Excessive, Loud, or Offensive Noise and Chapter 8.28 – Building Construction Hours of Operation and Noise Control of the City of Palmdale's Municipal Code outlines the City's noise standards as it relates to stationary and construction noise sources.

Section 9.18.010 Noise

A. It shall be unlawful for any person to willfully make or continue, or cause or permit to be made or continued, any loud, unnecessary, or unusual noise which unreasonably disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

B. The characteristics and conditions, which may be considered in determining whether such noise violates the provisions of this section, shall include, but not be limited to, the following:

(1) The volume of the noise;

(2) The intensity of the noise;

(3) Whether the nature of the noise is usual or unusual;

(4) Whether the origin of the noise is natural or unnatural;

(5) The volume and intensity of the background noise, if any;

(6) The proximity of the noise to sleeping facilities;

(7) The nature and zoning of the area within which the noise emanates;

(8) The density of the inhabitation of the area within which the noise emanates;

(9) The time of the day or night the noise occurs;

(10) The duration of the noise;

(11) Whether the noise is recurrent, intermittent, or constant;

(12) Whether the noise is produced by a commercial or noncommercial activity.

Section 8.28.030 Construction noise prohibited in residential zones

Except as otherwise provided in this chapter, no person shall perform any construction or repair work on any Sunday, or any other day after 8:00 p.m. or before 6:30 a.m., in any residential zone or within 500 feet of any residence, hotel, motel or recreational vehicle park. For the purposes of this section, construction and repair work includes work of any kind upon any building or structure, earth excavating, filling, or moving, and delivery, preparation or operation of construction equipment, materials or supplies where any of the foregoing entails the use of an air compressor, jack hammer, power-driven drill, riveting machine, excavator, semi-truck, diesel power truck, tractor, cement truck, or earth moving equipment, hand hammer, or other machine, tool, device or equipment which makes loud noise which disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness sleeping or residing in the area.

Threshold Applied to the Project

Land uses directly around the site include regional commercial to the east and single family residential to the north and west. Therefore, the adjacent residential and commercial uses are compared to the limits set forth in the General Plan.

The threshold applied to the nearest residential uses is that the project only noise level may not exceed the exterior limit of 65 dBA CNEL, according to Policy N-1.3. The residential uses must not exceed the interior limit of 45 dBA CNEL, according to the California Code of Regulations, Title 24, adopted by the General Plan. Typical building construction will provide a very conservative 20 dBA noise level reduction, so it is safe to assume that if the project meets the exterior limit of 65 dBA CNEL, it will also comply with the interior noise limit.

There is not a stationary noise threshold specified for commercial uses. However, Table 16.1 (Exhibit D in this report) provides the noise/land use compatibility matrix for mobile noise sources and was applied to the adjacent commercial uses. The threshold applied to the adjacent commercial uses is that the project noise level due to traffic must not exceed the exterior noise limit of 70 dBA, CNEL.

4.4 CEQA Guidelines

According to CEQA guidelines, the project would have a potential impact if it resulted in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generation of excessive groundborne vibration or groundborne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to the County's and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

The noise monitoring locations were selected to obtain a baseline of the existing noise environment. Two (2) short-term 15-minute noise measurements were conducted at the Project site, and long-term data was extrapolated based on traffic patterns. Appendix A includes photos, the field sheet, and measured noise data. Exhibit E illustrates the location of the measurements.

5.3 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) standards. The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL Roadway volumes correspond to the County's traffic counts and the trip generation for storage facilities from the ITE Trip Generation Manual. The referenced traffic data was applied to the model and is in Appendix B. The following outlines the key adjustments made to the REMEL for the roadway inputs:

- Roadway classification – (e.g., freeway, major arterial, arterial, secondary, collector, etc.),

- Roadway Active Width – (distance between the center of the outermost travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Travel Speeds, Percentages of automobiles, medium trucks and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g., soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

Table 1 indicates the roadway parameters and vehicle distribution utilized for this study.

Table 1: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT[1]	Existing + Project ADT[1]	Speed (MPH)	Site Conditions
Pearblossom Highway	West of Highway 138	13,700	13,894	60	Hard
Arrow Blvd Vehicle Distribution and Mix[2]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		77.7	12.7	9.6	93.3
Medium Trucks		87.4	5.1	7.5	1.84
Heavy Trucks		89.1	2.8	8.1	4.86

Notes:
[1] Existing ADT from County of Los Angeles.
[2] Typical California Vehicle Distribution and Mix.

To determine the project’s noise impact to the surrounding land uses, MD generated noise contours for projected traffic conditions. Noise contours are used to provide a characterization of sound levels experienced at a set distance from the centerline of a subject roadway. They are intended to represent a worst-case scenario and do not take into account structures, sound walls, topography, and/or other sound attenuating features which may further reduce the actual noise level. Noise contours are developed for comparative purposes and are used to demonstrate potential increases/decreases along subject roadways because of a project.

5.4 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure’s facade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a “windows open” condition and a very conservative 20 dBA noise level reduction with “windows closed”. MD estimated the interior noise level by subtracting the building shell design from the predicted exterior noise level. For a “windows closed” condition, the project will require mechanical fresh air ventilation (e.g., air conditioning) to the habitable dwelling units.

5.5 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. The construction noise calculation output worksheet is in Appendix D.

Exhibit E

Measurement Locations

= Short-Term Monitoring Location

6.0 Existing Noise Environment

Two (2) 15-minute noise measurements were conducted at the project site to document the existing noise environment. The measurements include the 15-minute Leq, Lmin, Lmax, and other statistical data (e.g., L2, L8). Noise measurement field sheets are provided in Appendix A.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 2. Measurement locations are in Exhibit E.

Table 2: Short-Term Noise Measurement Data[1]

Location	Start Time	Stop Time	L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}	Estimated CNEL[2]
NM1	11:08 AM	11:23 AM	69.7	89.5	44.8	77.8	74.4	70.5	65.8	50.9	73.2
NM2	11:29 AM	11:44 AM	53.4	68.2	43.9	58.9	55.6	53.7	52.1	48.7	56.9

Notes:
1. Short-term noise monitoring locations are illustrated in Exhibit E.
2. CNEL estimated based off typical traffic patterns. See Appendix A.

Noise data indicates the ambient noise level ranged from 53 to 70 dBA Leq at the surrounding uses. Additional field notes are provided in Appendix A.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts to the project and compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadway sources. The project area is outside of any airport 65 dBA CNEL contours and therefore, there is no aircraft impact.

7.1 Future Exterior Noise

The exterior noise level off-site of the project will be impacted by transportation-related sources and stationary sources from the site. The following outlines the impacts associated with exterior noise levels.

7.1.1 Future Off-Site Traffic Noise Impact

The potential off-site noise impacts caused by the increase in vehicular traffic as a result of the project were calculated at a distance of 50 feet. The distance to the 55, 60, 65, and 70 dBA CNEL noise contours are also provided for reference. The noise level at 50 feet is representative of approximate distances to existing commercial uses close to the subject roadway impacted by the project. The noise contours were calculated for the following scenarios and conditions:

- Existing Condition: This scenario refers to the existing traffic noise condition and is demonstrated in Table 3.
- Existing + Project Condition: This scenario refers to the existing plus project traffic noise condition and is demonstrated in Table 3.

<Table 3, next page>

Table 3: Existing/Existing + Project Scenario – Noise Levels Along Roadways (dBA CNEL)

Existing Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Pearblossom Hwy	West of Hwy 138	72.7	94	297	938	2968

Existing + Project Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Pearblossom Hwy	West of Hwy 138	72.8	95	301	952	3010

Change in Noise Levels as a Result of Projects

Roadway[1]	Segment	CNEL at 50 Feet dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Pearblossom Hwy	West of Hwy 138	72.7	72.8	0.1	No

Notes:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.

Table 3 provides the Existing and Existing + Project noise conditions and shows the change in noise level because of the proposed project. As shown in Table 3, there will be a small increase in traffic noise of 0.1 dBA at 50 feet from the centerline of the subject roadway as a result of the project. This will be inaudible (see Section 2.5), and therefore, the impact is less than significant, and no mitigation is required.

7.1.2 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Sensitive receptors that may be affected by project operational noise include adjacent residences to the west.

On-site operational noise includes transformers and HVAC units. HVAC equipment is assumed to be located on each rooftop. Equipment will be at least 50 feet away from the nearest residences to the west. The maximum sound power level from a single unit is 78 dBA. At 50 feet away, the sound pressure level is estimated to be 43 dBA. Assuming one third of all 48 units are located on the building closest to the residences and are running simultaneously, the sound level is 55 dBA Leq. If the units ran simultaneously for 24 hours, the noise level would be 62 dBA CNEL. This does not take into account the property line wall, which would lower the operational noise at the residential receptors. According to

Policy N-1.3 of the City's General Plan Noise Element, the noise at residential properties must not exceed 65 dBA CNEL. The worst-case noise due to the HVAC units operating simultaneously will be 62 dBA CNEL, and thus meets the City's noise level limit for residential properties. See Appendix D.

Per ANSI and NEPA requirements for transformer noise, transformers must be no louder than 65 dBA at 6 feet. Transformers should be placed at least 20 feet from the adjacent residential receptors or should be shielded to stay below the noise level limit.

Operational noise complies with the Palmdale General Plan Noise Element. The impact is, therefore, less than significant.

7.2 Noise Impacts to On-Site Receptors Due to Traffic

Traffic noise from Pearblossom Highway was evaluated and compared to the City's guidelines. Per the Noise Element of the General Plan, commercial uses are normally acceptable up to 70 dBA CNEL and conditionally acceptable up to 77.5 dBA CNEL. Using cumulative traffic, the edge of the Project site will be up to 72 dBA CNEL and falls within the conditionally acceptable land use compatibility. At the proposed office building and storage buildings, the noise due to traffic will be up to 69 dBA CNEL and falls within the normally acceptable land use compatibility.

8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction. The construction noise and vibration level projections are provided in the sections below.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise characteristics of typical construction activities. The data is presented in Table 4.

Table 4: Typical Construction Noise Levels[1]

Equipment Powered by Internal Combustion Engines

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86

Impact Equipment

Type	Noise Levels (dBA) at 50 Feet
Saws	71 - 82
Vibrators	68 - 82

Notes:
[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

Construction is anticipated to occur during the permissible hours as described in the City's Municipal Code Section 8.28.030 – Construction Noise Prohibited in Residential Zones. Construction noise is considered a short-term impact and would be considered significant if construction occurs outside the allowable times as described in the City's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Construction noise level projections are provided below.

Sensitive land uses surrounding the site include existing residential to the west. These uses are an average of 80 feet away from construction activities and as close as 15 feet from construction activities.

CalEEMod methodology was utilized to determine the construction equipment. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels are in Table 5. A likely worst-case construction noise scenario assumes equipment operating as close as 15 feet and an average of 80 feet from the nearest sensitive receptor. Leq levels represent the average construction noise level during each phase.

Table 5: Construction Noise Levels at Existing Adjacent Residences

Phase	dBA Leq	dBA Leq with Mufflers
Demo	79.0	64.0
Site Prep	80.6	65.6
Grading	81.5	66.5
Build	80.7	65.7
Paving	77.8	62.8
Arch Coating	68.6	53.6

Construction noise will range from 69 to 82 dBA Leq at the nearest sensitive receptors. To reduce the impact to the adjacent receptors, the project must ensure that all construction equipment is equipped with mufflers that have a 15 dB reduction, or that all equipment is less than 80 dBA at 50 feet. With the implementation of mufflers, the impact is considered less than significant.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a vibratory roller. A vibratory roller has a vibration impact of 0.210 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref}\ (100/D_{rec})^{n}$$

Where: PPV_{ref} = reference PPV at 100ft.
D_{rec} = distance from equipment to receiver in ft.
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 6 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 6: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 7 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 7: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

All proposed construction is at least 15 feet from any existing structures. At a distance of 15 feet, a vibratory roller would yield a worst-case 0.368 PPV (in/sec) which may be perceptible but below any risk of damage (0.5 in/sec PPV is the threshold of old residential structures). The impact is less than significant, and no mitigation is required.

9.0 CEQA Analysis

The California Environmental Quality Act Guidelines establishes thresholds for noise impact analysis as presented below:

(a) Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise Code, or applicable standards of other agencies?

Transportation Noise Impacts

The main source of noise due to traffic near the project site is due to traffic from Pearblossom. The project trip generation estimates the project will generate 194 daily trips. It takes a change in noise level of 3 dB for the human ear to perceive a difference. An additional 194 daily trips will increase the existing traffic noise due to Pearblossom Highway by a maximum of 0.1 dBA CNEL. The impact is not perceptible and the impact is less than significant.

Stationary Noise Sources

Stationary noise impacts would be considered significant if they result in exceedances of 65 dBA CNEL at residential uses according to Policy N-1.3 of the General Plan Noise Element. Implementation of the proposed project may result in stationary noise related to HVAC Systems. The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources. The model assumes that the noise sources are operating simultaneously and continuously (worst-case scenario) when the noise will, in reality, be intermittent and lower in noise level. The projected Project-only noise level at the nearest residential uses will be 62 dBA CNEL and will be below the City's residential noise standard. Thus, the project is less than significant.

Construction Noise and Vibration

Construction is anticipated to occur during the permissible hours as described in the City's Municipal Code Section 8.28.030 – Construction Noise Prohibited in Residential Zones. Construction noise is considered a short-term impact and would be considered significant if construction occurs outside the allowable times as described in the City's Municipal Code.

The grading and building phases of on-site construction activities will generate the highest temporary noise levels. The loudest construction equipment on the site will be tractors, graders, scrapers, rollers, and dozers. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings. Construction at the nearest residential uses will be up to 82 dBA Leq. The construction noise will occur during the allowable times. Thus, the impact is less than significant.

b) Generate excessive ground-borne vibration or ground-borne noise levels?

Construction vibration will be significant if vibration exceeds levels that would result in structural damage to existing buildings. Construction activity is not anticipated to occur within 15 feet of neighboring buildings. At a distance of 15 feet, the nearest building to the project property line, a vibrational roller would yield a worst-case 0.368 PPV (in/sec), which will be perceptible but is below the threshold of any risk of damage. Therefore, the impact is less than significant.

10.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of Palmdale: 2045 General Plan Noise Element.

City of Palmdale: Municipal Code Chapter 9.18 – Disturbing, Excessive, Loud, or Offensive Noise.

Caltrans Noise Technical Manual. 2013

Federal Highway Administration. Noise Barrier Design Handbook. June 2017.

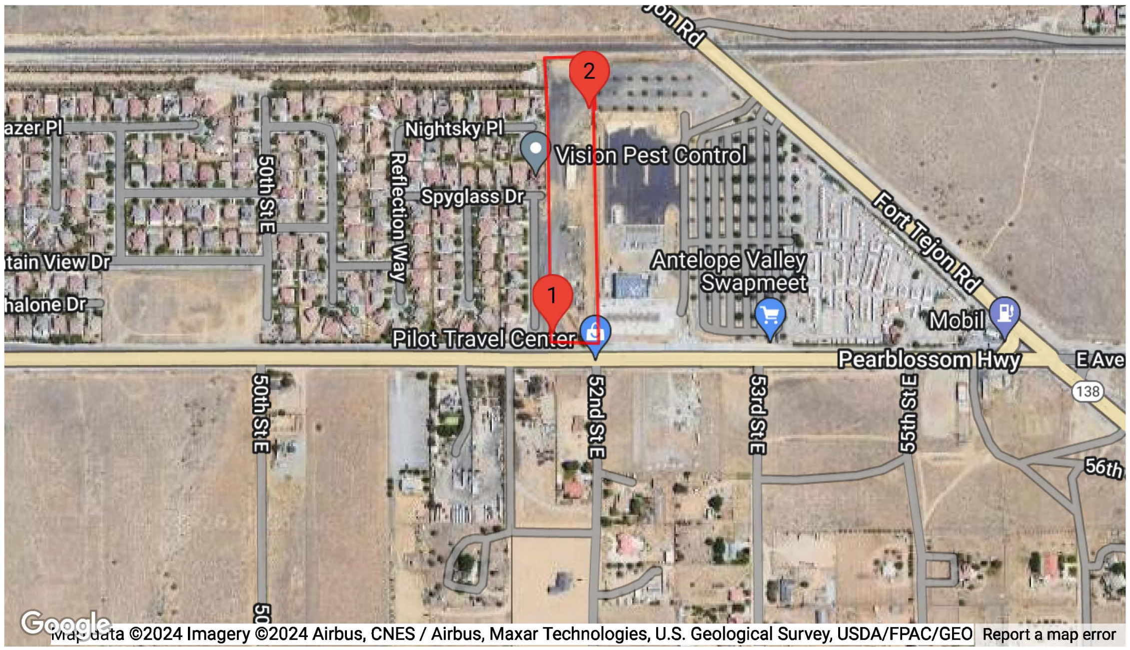
Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual. September 2018

Appendix A:
Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet

Project Name:	Mini Storage Palmdale Noise	**Site Observations:**	
Project: #/Name:	0898-2024-001	Clear skies winds gusty 0-13 MPH. NM1 seemed less windy than NM2. Standing water on-site made placing NM2 at the exact pinpoint requested impossible. note the adjustment.	
Site Address/Location:	Pearblossom Hwy & Fallingsta		
Date:	02/08/2024		
Field Tech/Engineer:	Jason Schuyler / Rachel Edelman		

Sound Meter:	XL2, NTI	**SN:** A2A-08562-E0
Settings:	A-weighted, slow, 1-sec, 15-minute interval	
Site Id:	NM1, NM2	



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Mini Storage Palmdale Noise

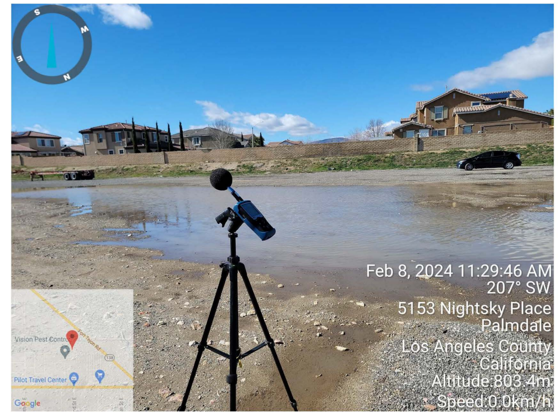
Site Address/Location: Pearblossom Hwy & Fallingsta

Site Id: NM1, NM2

Figure 1: NM1

Figure 2: NM1

Figure 3: NM2



MD ACOUSTICS

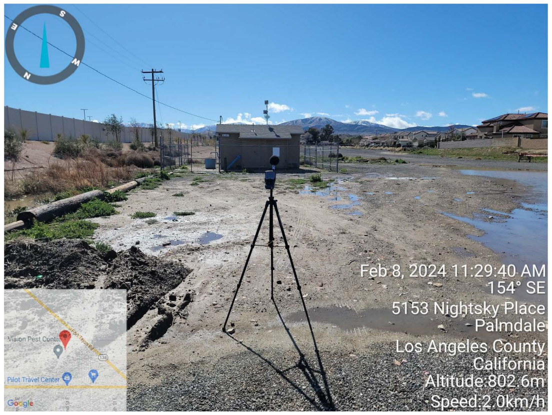
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Mini Storage Palmdale Noise

Site Address/Location: Pearblossom Hwy & Fallingsta

Site Id: NM1, NM2

Figure 4: NM2



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Mini Storage Palmdale Noise

Site Address/Location: Pearblossom Hwy & Fallingsta

Site Id: NM1, NM2

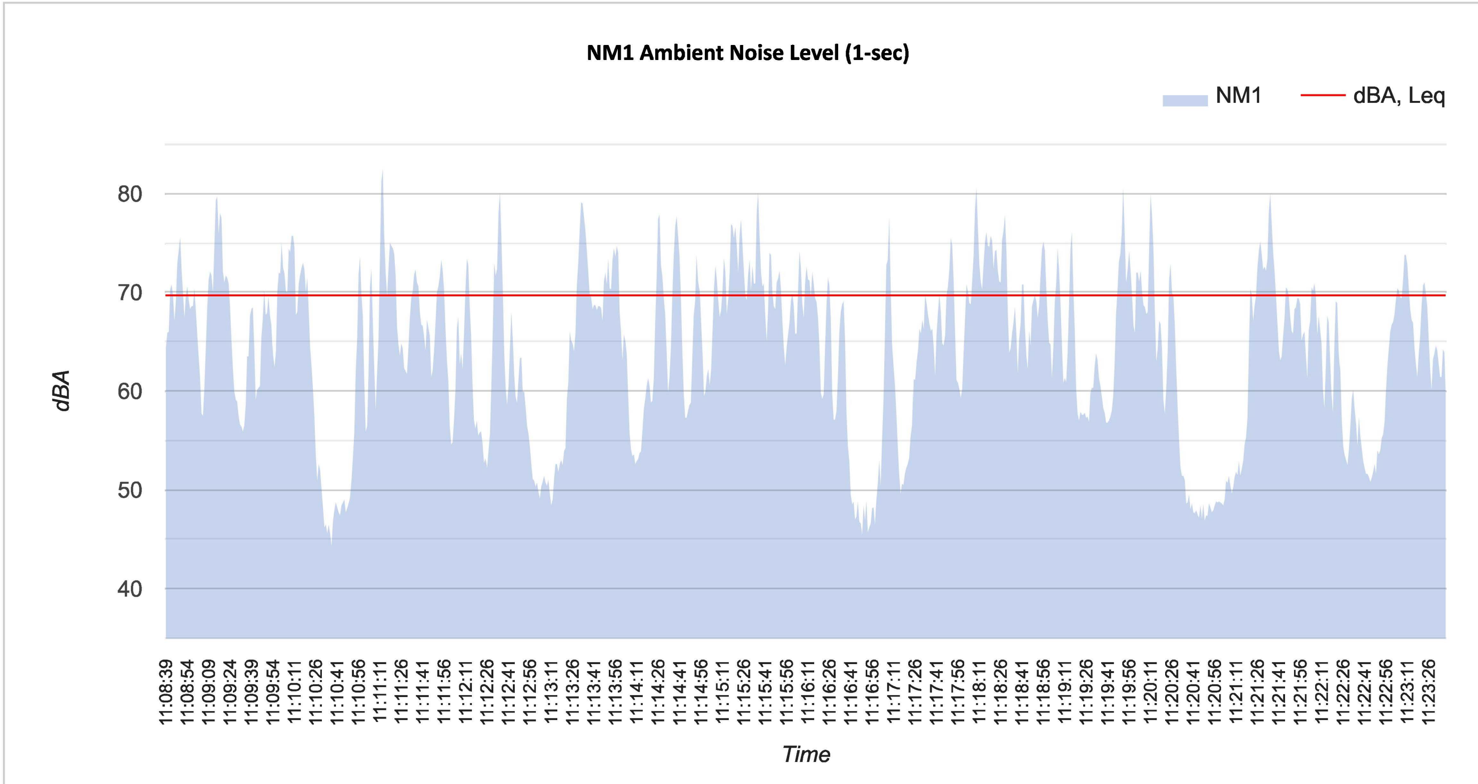
Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	11:08 AM	11:23 AM	69.7	89.5	44.8	77.8	74.4	70.5	65.8	50.9
NM2	11:29 AM	11:44 AM	53.4	68.2	43.9	58.9	55.6	53.7	52.1	48.7

MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

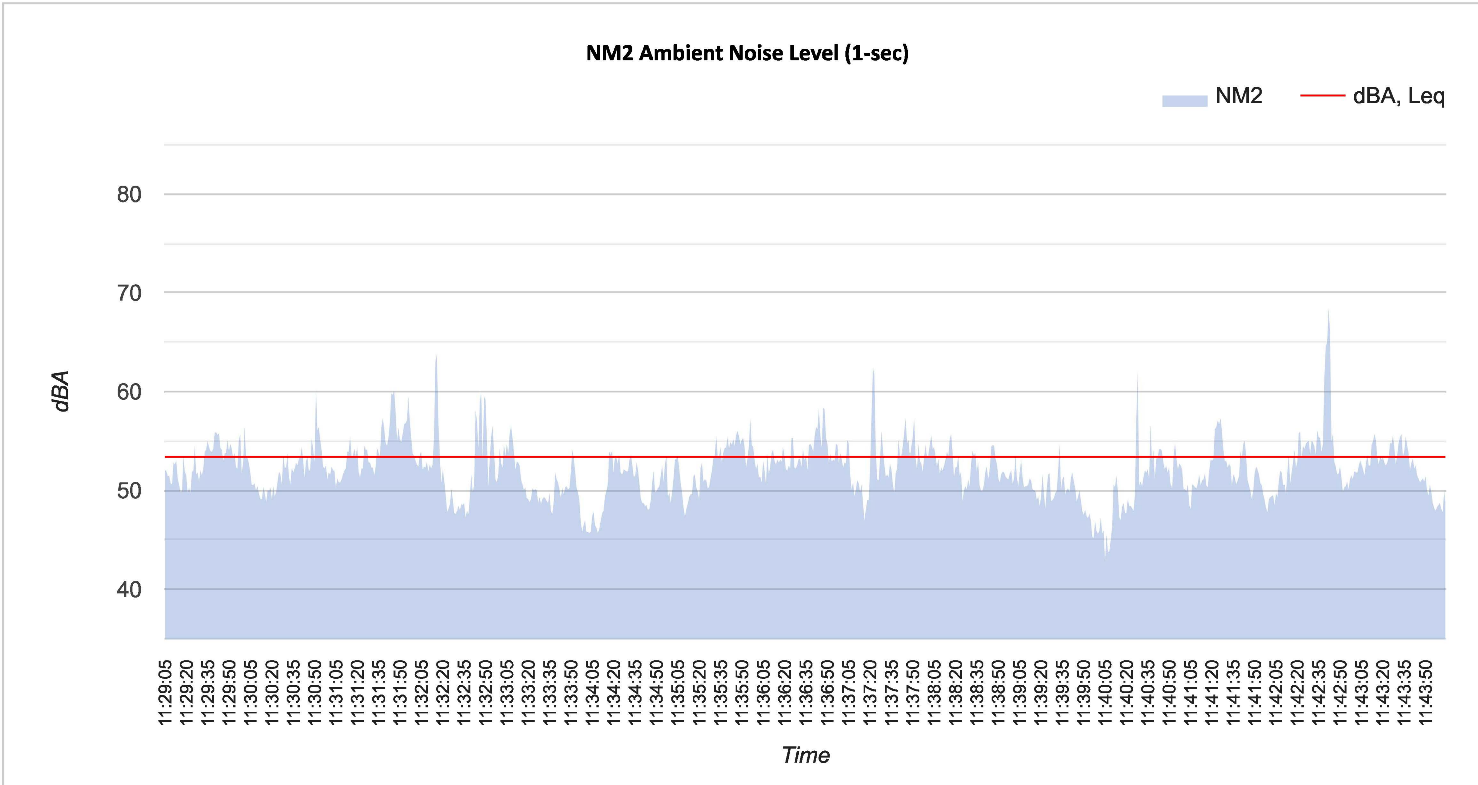
Project Name:	Mini Storage Palmdale Noise	**Site Topo:**	Buildings 1-2 stories tall/Open	**Noise Source(s) w/ Distance:**
Site Address/Location:	Pearblossom Hwy & Fallingsta	**Meteorological Cond.:**		Road and commercial noise
Site Id:	NM1	**Ground Type:**	3/4 inch crushed stone, sandy soil and clay	



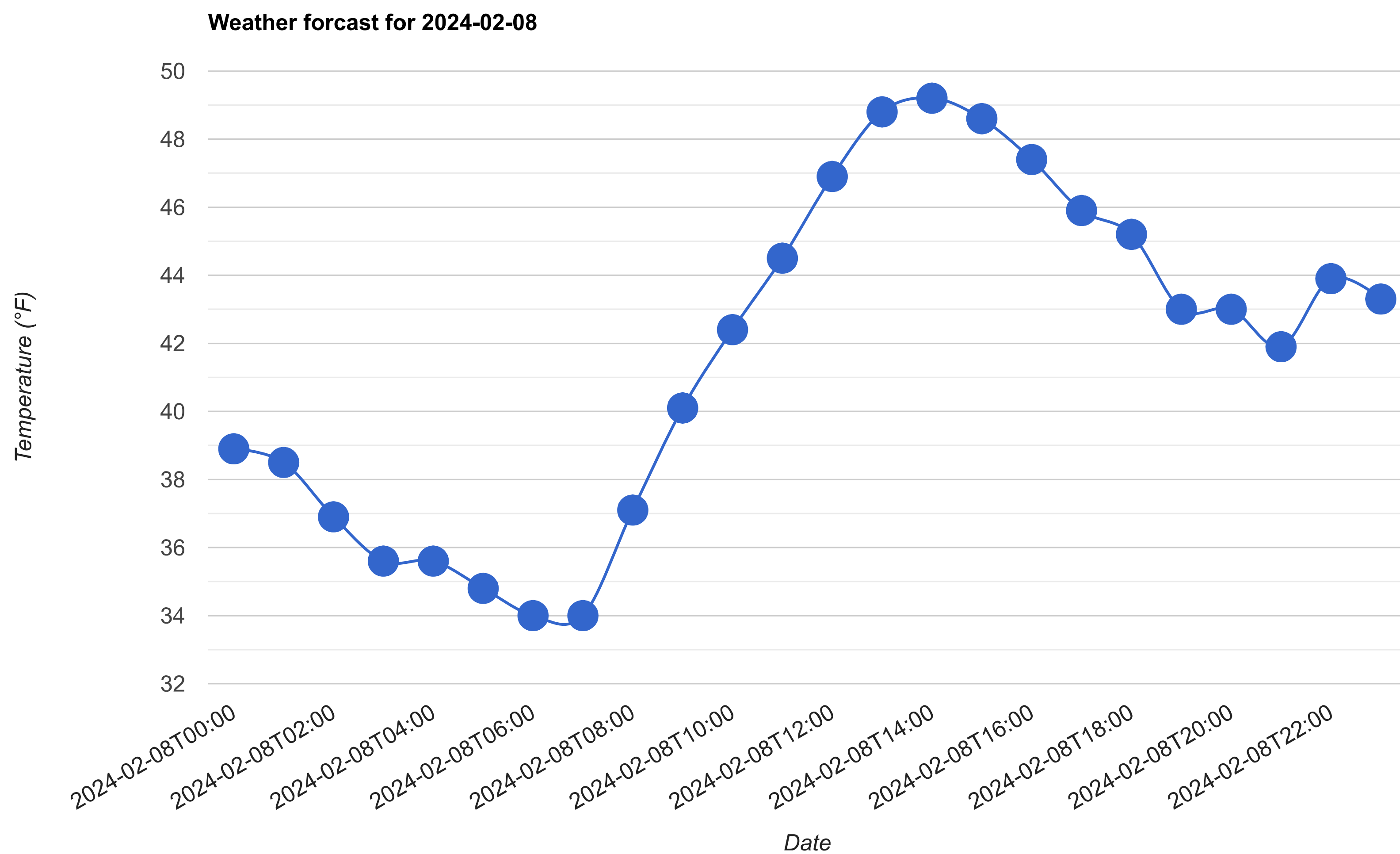
MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Mini Storage Palmdale Noise	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	Pearblossom Hwy & Fallingsta	**Meteorological Cond.:**	45F winds 19MPH	road noise and residential noise
Site Id:	NM2	**Ground Type:**	3/4 inch crushed stone sandy soil and clay	



MD ACOUSTICS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Temperature (°F)
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48
46
44
42
40
38
36
34
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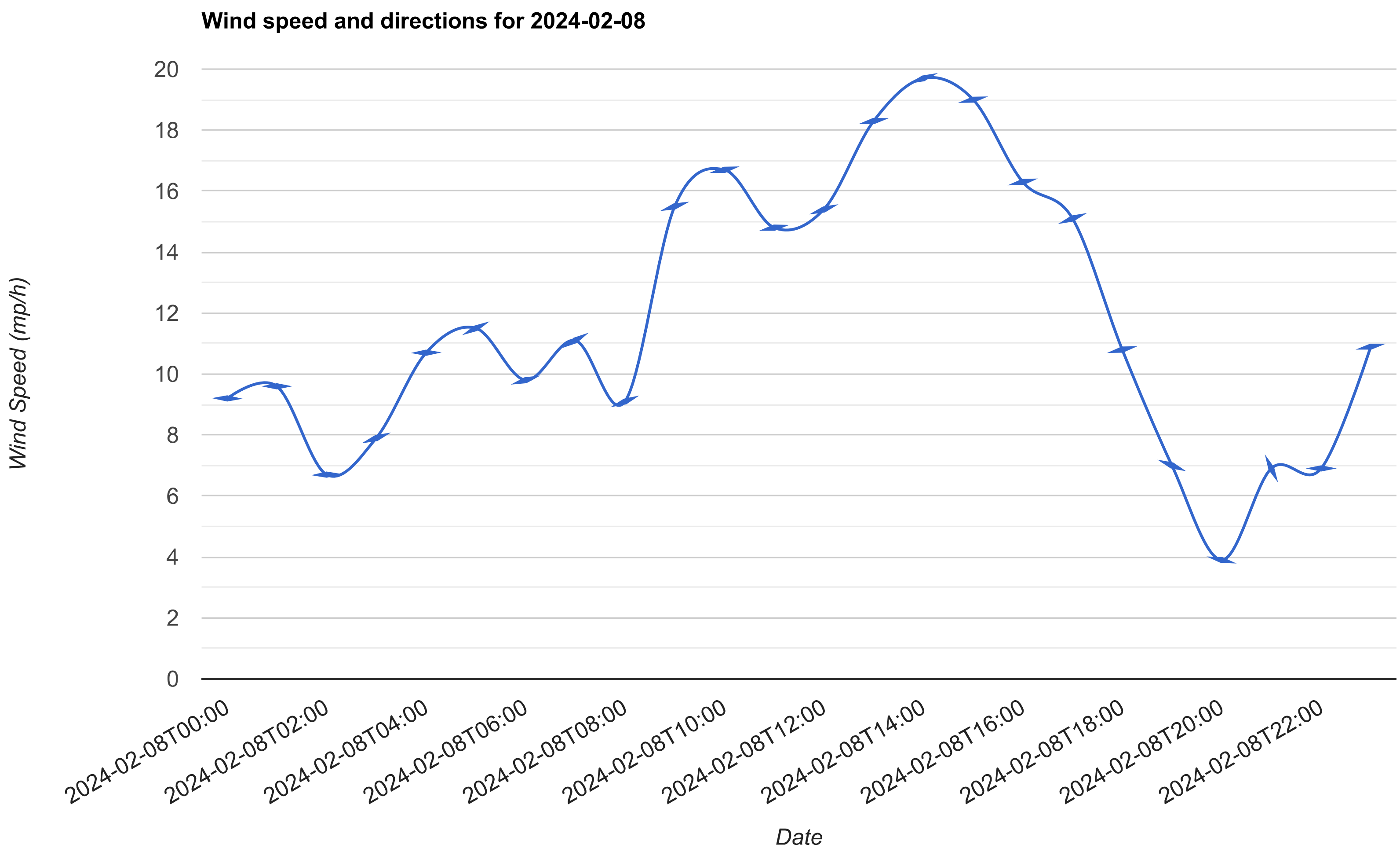
Date



Source: Global Forecast System (GFS) weather forcast model

Appendix B:

Traffic Noise Modeling Output

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	PALMDALE MINI STORAGE	JOB #:	0898-2024-00:
ROADWAY:	PEARBLOSSOM HWY	DATE:	15-Feb-24
LOCATION:	N OF JUNCTION	ENGINEER	R. Edelman

NOISE INPUT DATA - Existing

ROADWAY CONDITIONS

ADT =	13,700
SPEED =	60
PK HR % =	10
NEAR LANE/FAR LANE DI:	36
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	1,370

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVEF		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE:	90
	DF ANGLE:	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10
HEAVY TRUCKS =	10

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	46.78	- -
MEDIUM TRUCKS	4.0	46.67	- -
HEAVY TRUCKS	8.0	46.71	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.6	70.7	68.9	62.9	71.5	72.1
MEDIUM TRUCKS	62.0	60.5	54.1	52.6	61.0	61.3
HEAVY TRUCKS	61.7	60.3	51.3	52.5	60.9	61.0
NOISE LEVELS (dBA)	73.3	71.4	69.1	63.6	72.2	72.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.6	70.7	68.9	62.9	71.5	72.1
MEDIUM TRUCKS	62.0	60.5	54.1	52.6	61.0	61.3
HEAVY TRUCKS	61.7	60.3	51.3	52.5	60.9	61.0
NOISE LEVELS (dBA)	73.3	71.4	69.1	63.6	72.2	72.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	94	297	938	2968
LDN	83	262	828	2618

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	PALMDALE MINI STORAGE	JOB #:	0898-2024-001
ROADWAY:	PEARBLOSSOM HWY	DATE:	15-Feb-24
LOCATION:	N OF JUNCTION	ENGINEER	R. Edelman

NOISE INPUT DATA - Existing + Project

ROADWAY CONDITIONS

ADT = 13,894
SPEED = 60
PK HR % = 10
NEAR LANE/FAR LANE DIS 36
ROAD ELEVATION = 0.0
GRADE = 1.0 %
PK HR VOL = 1,389

RECEIVER INPUT DATA

RECEIVER DISTANCE = 50
DIST C/L TO WALL = 50
RECEIVER HEIGHT = 5.0
WALL DISTANCE FROM RECEIVER 0
PAD ELEVATION = 0.5
ROADWAY VIEW: LF ANGLE= -90
RT ANGLE= 90
DF ANGLE= 180

SITE CONDITIONS

AUTOMOBILES = 10
MEDIUM TRUCKS = 10
HEAVY TRUCKS = 10
(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL 0.0
AMBIENT= 0.0
BARRIER = 0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	46.78	- -
MEDIUM TRUCKS	4.0	46.67	- -
HEAVY TRUCKS	8.0	46.71	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.6	70.7	69.0	62.9	71.5	72.1
MEDIUM TRUCKS	62.0	60.5	54.2	52.6	61.1	61.3
HEAVY TRUCKS	61.8	60.4	51.3	52.6	60.9	61.1
NOISE LEVELS (dBA)	73.3	71.5	69.2	63.7	72.3	72.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.6	70.7	69.0	62.9	71.5	72.1
MEDIUM TRUCKS	62.0	60.5	54.2	52.6	61.1	61.3
HEAVY TRUCKS	61.8	60.4	51.3	52.6	60.9	61.1
NOISE LEVELS (dBA)	73.3	71.5	69.2	63.7	72.3	72.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	95	301	952	3010
LDN	84	266	840	2655

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	PALMDALE MINI STORAGE	JOB #:	0898-2024-00
ROADWAY:	PEARBLOSSOM HWY	DATE:	15-Feb-24
LOCATION:	N OF JUNCTION	ENGINEER	R. Edelman

NOISE INPUT DATA - Existing + Project

ROADWAY CONDITIONS

ADT =	13,894
SPEED =	60
PK HR % =	10
NEAR LANE/FAR LANE DI	36
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	1,389

RECEIVER INPUT DATA

RECEIVER DISTANCE =		63
DIST C/L TO WALL =		63
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVEF		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10
HEAVY TRUCKS =	10

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	60.48	- -
MEDIUM TRUCKS	4.0	60.39	- -
HEAVY TRUCKS	8.0	60.43	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.5	69.6	67.9	61.8	70.4	71.0
MEDIUM TRUCKS	60.9	59.4	53.1	51.5	60.0	60.2
HEAVY TRUCKS	60.7	59.3	50.2	51.5	59.8	60.0
NOISE LEVELS (dBA)	72.2	70.4	68.1	62.5	71.1	71.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.5	69.6	67.9	61.8	70.4	71.0
MEDIUM TRUCKS	60.9	59.4	53.1	51.5	60.0	60.2
HEAVY TRUCKS	60.7	59.3	50.2	51.5	59.8	60.0
NOISE LEVELS (dBA)	72.2	70.4	68.1	62.5	71.1	71.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	93	293	928	2933
LDN	82	259	818	2588

Appendix C:

Construction Noise Modeling Output

Receptor - Residences to the west

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent[1]	Ground Factor[2]	Usage Factor	Receptor Item Lmax, dBA	Recptor. Item Leq, dBA
DEMO									
Excavator	3	81	**15**	**80**	40	**0.66**	0.40	94.9	71.6
Dozer	2	82	15	80	40	0.66	0.40	95.9	72.6
Concrete Saw	1	90	15	80	20	0.66	0.20	103.9	77.6
Tractor	0	84	15	80	40	0.66	0.40	0.0	0.0
							Log Sum	103.9	79.0
SITE PREP									
Grader	0	85	15	80	40	0.66	0.40	0.0	0.0
Tractor	4	84	15	80	40	0.66	0.40	97.9	74.6
Dozer	3	82	15	80	40	0.66	0.40	95.9	72.6
Scraper	0	84	15	80	40	0.66	0.40	0.0	0.0
							Log Sum	97.9	80.6
GRADE									
Dozer	1	82	15	80	40	0.66	0.40	95.9	72.6
Tractor	3	84	15	80	40	0.66	0.40	97.9	74.6
Grader	1	85	15	80	40	0.66	0.40	98.9	75.6
Excavator	1	81	15	80	40	0.66	0.40	94.9	71.6
Scraper	0	84	15	80	40	0.66	0.40	0.0	0.0
								98.9	81.5
BUILD									
Crane	1	81	15	80	16	0.66	0.16	94.9	67.6
Man lift	3	75	15	80	20	0.66	0.20	88.9	62.6
Tractor	3	84	15	80	40	0.66	0.40	97.9	74.6
Welder/Torch	1	74	15	80	40	0.66	0.40	87.9	64.6
Generator	1	81	15	80	50	0.66	0.50	94.9	72.6
								97.9	80.7
PAVE									
Paver	1	77	15	80	50	0.66	0.50	90.9	68.6
Concrete Mixer Truck	2	79	15	80	40	0.66	0.40	92.9	69.6
Roller	2	80	15	80	20	0.66	0.20	93.9	67.6

Tractor	1	84	15	80	40	0.66	0.40	97.9	74.6
Compactor (ground)	2	83	15	80	20	0.66	0.20	96.9	70.6
								97.9	77.8
ARCH COAT									
Compressor (air)	1	78	15	80	40	0.66	0.40	91.9	68.6
								91.9	68.6

[1]FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors

VIBRATION LEVEL IMPACT

Project:	Palmdale Mini-Storage Facility	Date: 2/15/24
Source:	Vibratory Roller	
Scenario:	Unmitigated	
Location:	Adjacent residences	
Address:	Palmdale	

PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN BLUE
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	15.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.368**	IN/SEC	OUTPUT IN RED

APPENDIX G – Sewer Area Study

SEWER AREA STUDY

FOR

PROPOSED MINI-STORAGE FACILITY
APN 3051-019-030 & 112
NEC PEARBLOSSOM HWY & FALLINGSTAR PLACE
PALMDALE, CA 93550

JULY 29, 2024

PREPARED BY:

ANTELOPE VALLEY ENGINEERING, INC.
129 WEST PONDERA STREET
LANCASTER, CA. 93534
(661) 948-0805

J.N. 23065

SEWER AREA STUDY

J.N. 23–065

PROPOSED MINI-STORAGE

INTRODUCTION

THE PROPOSED PROJECT IS LOCATED ON NEC PEARBLOSSOM HWY. & FALLINGSTAR PLACE (A.P.N. 3051–019–030 & 112).

THE PURPOSE OF THIS STUDY IS TO VERIFY THE CAPACITY OF THE PROPOSED 6" SEWER LATERAL BEING CONNECTED TO THE EXISTING 8" SEWER MAIN IN FALLINGSTAR PLACE. THE PROPOSED PROJECT CONSIST OF A MINI–STORAGE FACILITY. SINCE, THERE IS ONLY ONE OFFICE BUILDING WITH 3 EMPLOYEES THE CALIFORNIA PLUMBING CODE ESTIMATED WASTE/SEWAGE FLOW RATE TABLE H 201.1 (4) WILL BE USED TO DETERMINE THE WASTE FLOW RATE FOR THIS SITE

BASED ON THE CALIFORNIA PLUMBING CODE TABLE H 201.1 (4) THE FLOW RATE FOR AN OFFICE (PER EMPLOYEE) IS 20 GALLONS PER DAY (SEE EXHIBIT 1).

FLOWS PROPOSED 6" SEWER LATERAL (SEE EXHIBIT 3)

OK

20 GAL/DAY x 3 (EMPLOYEES) = 60 GAL/DAY
60 GAL/DAY ÷ 24 HR ÷ 60 MINS = **0.04 GAL/MIN**

PROPOSED 6"ø VCP @ 2.0% MIN. FLOWING 1/2 FULL HAS A CAPACITY OF 192.91 GPM, WHICH IS > 0.04 GPM THEREFORE THE PROPOSED LATERAL HAS ADEQUATE CAPACITY– SEE EXHIBIT 2

CONCLUSION

SINCE, THE ADDITIONAL FLOW 0.04 GPM (0.000089 CFS) IS INSIGNIFICANT TO THE OVER ALL FLOW IN THE EXISTING SEWER SYSTEM IT WILL NOT AFFECT THE CAPACITY OF THE EXISTING 8" SEWER MAIN IN FALLINGSTAR PLACE.

»

TABLE H 201.1(3)
LEACHING AREA SIZE BASED ON SEPTIC TANK CAPACITY

REQUIRED SQUARE FEET OF LEACHING AREA PER 100 GALLONS SEPTIC TANK CAPACITY (square feet per 100 gallons)	MAXIMUM SEPTIC TANK SIZE ALLOWABLE (gallons)
20–25	7500
40	5000
90	3500
120	3000

For SI units: 1 square foot per 100 gallons = 0.000245 m^2/L, 1 gallon = 3.785 L

»

TABLE H 201.1(4)
ESTIMATED WASTE /SEWAGE FLOW RATES[1, 2, 3]

TYPE OF OCCUPANCY	GALLONS PER DAY
Airports (per employee)	15
Airports (per passenger)	5
Auto washers – check with equipment manufacturer	-
Bowling alleys – with snack bar only (per lane)	75
Campground – with central comfort station (per person)	35
Campground – with flush toilets - no showers (per person)	25
Camps (day) – no meals served (per person)	15
Camps (summer and seasonal camps) – (per person)	50
Churches – sanctuary (per seat)	5
Churches – with kitchen waste (per seat)	7
Dance halls – (per person)	5
Factories – no showers (per employee)	25
Factories – with showers (per employee)	35
Factories – with cafeteria (per employee)	5
Hospitals – (per bed)	250
Hospitals – kitchen waste only (per bed)	25
Hospitals – laundry waste only (per bed)	40
Hotels – no kitchen waste (per bed)	60
Institutions – resident (per person)	75
Nursing home – (per person)	125
Rest home – (per person)	125
Laundries – self-service with minimum 10 hours per day (per wash cycle)	50
Laundries – commercial check with manufacturer's specification	-
Motel (per bed space)	50
Motel – with kitchen (per bed space)	60
Offices – (per employee)	20
Parks – mobile homes (per space)	250
Parks (picnic) – with toilets only (per parking space)	20
Parks (recreational vehicles) – without water hook-up (per space)	75
Parks (recreational vehicles) – with water and sewer hook-up (per space)	100
Restaurants – cafeteria (per employee)	20
Restaurants – with toilet waste (per customer)	7
Restaurants – with kitchen waste (per meal)	6
Restaurants – with kitchen waste disposable service (per meal)	2
Restaurants – with garbage disposal (per meal)	1
Restaurants – with cocktail lounge (per customer)	2
Schools staff and office (per person)	20
Schools – elementary (per student)	15
Schools – intermediate and high (per student)	20
Schools – with gym and showers (per student)	5

EXHIBIT 1

CIVILDESIGN CORP.
Consulting Engineers
250 S. Lena Rd.
San Bernardino, CA 92408
(909)885-3806

```
               Inside Diameter
                 (  6.00 in.)

                       *
                 *           *
               *               *

             *                   *_ _ _ _ _
             ^^^^^^^^^^^^^^^^^^^^^      ^
            *        Water        *     |
                                        |
            *                     *     |
                                        |
             *                   *  (  3.00 in.)
                                    ( 0.250 ft.)
               *               *        |
                 *           *          |
                       *_ _ _ _ _ _ _ _ v_
```

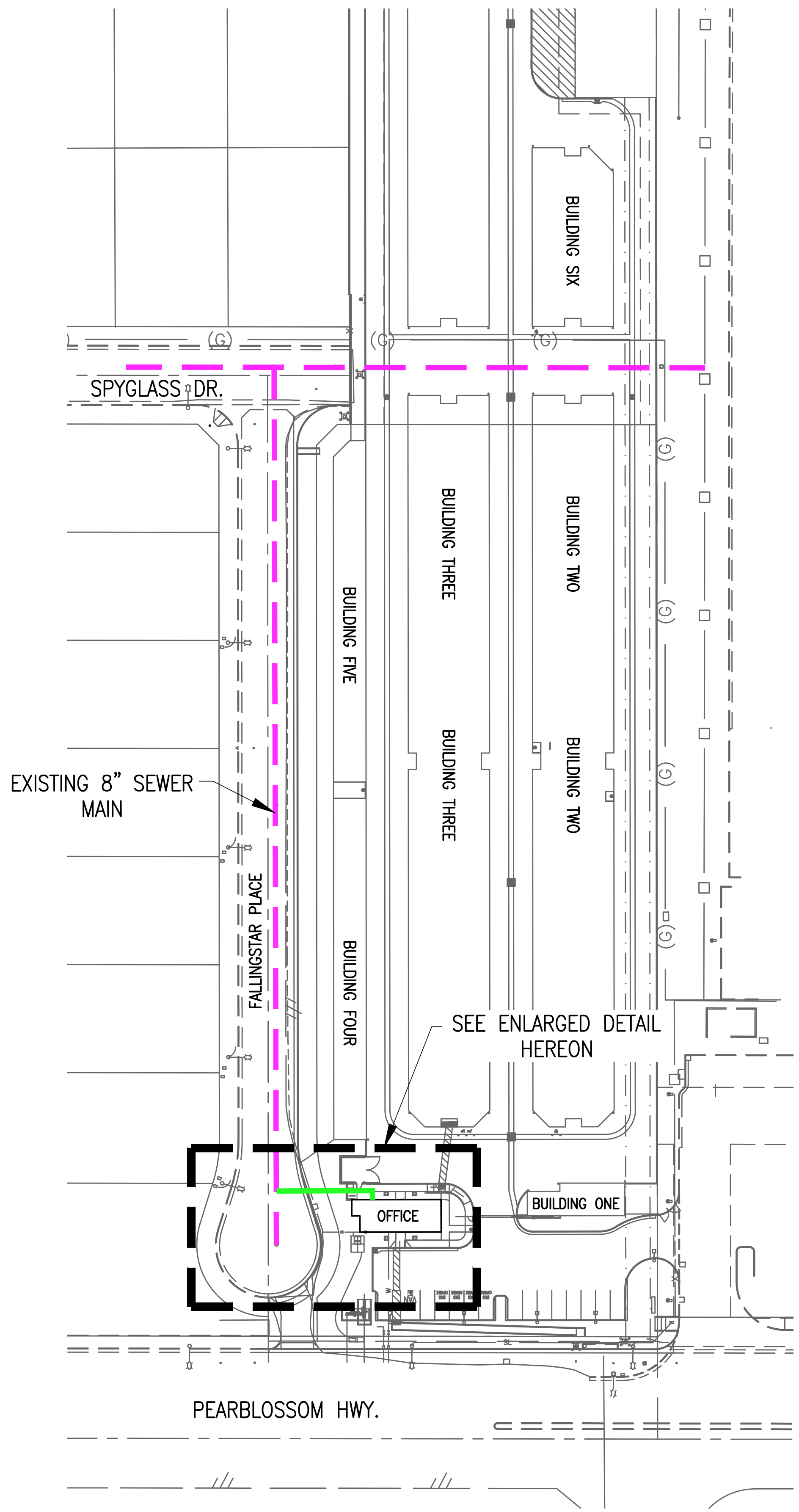
PROPOSED 6" SEWER LATERAL

Circular Channel Section

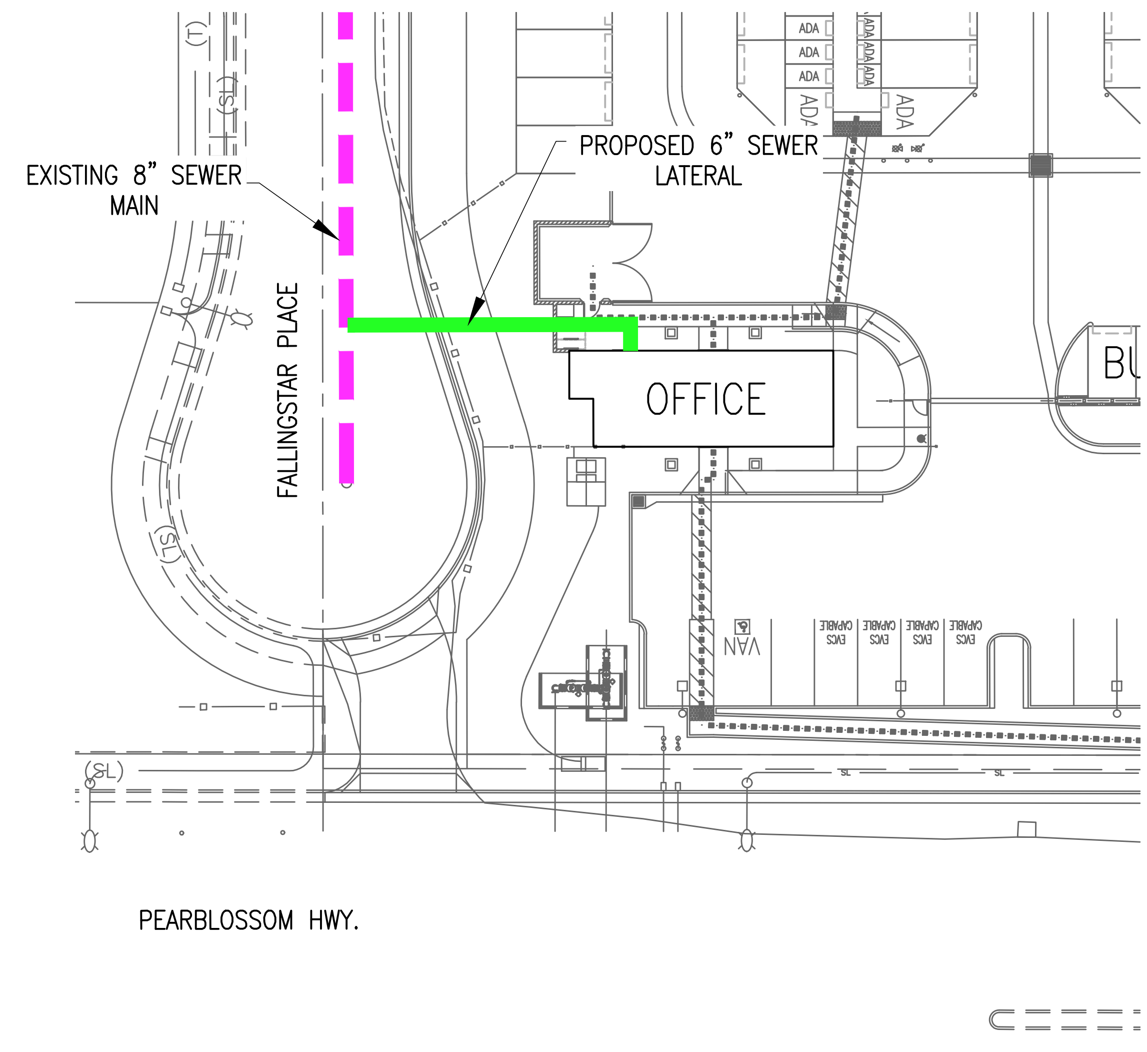
Flowrate	192.906	GPM
Velocity	4.378	fps
Pipe Diameter	6.000	inches
Depth of Flow	3.000	inches
Depth of Flow	0.250	feet
Critical Depth	0.334	feet
Depth/Diameter (D/d)	0.500	
Slope of Pipe	2.000	%
X-Sectional Area	0.098	sq. ft.
Wetted Perimeter	0.785	feet
AR^(2/3)	0.025	
Mannings 'n'	0.012	
Min. Fric. Slope, 6 inch Pipe Flowing Full	0.500	%

> 0.04 GPM, THEREFORE OK

EXHIBIT 2



OVERALL SITE DETAIL
SCALE= 1"=100'



ENLARGED DETAIL
SCALE= 1"=40'

LEGEND

PROPOSED 6" SEWER LATERAL

EX. 8" SEWER MAIN

EXHIBIT 3
SEWER AREA MAP

PROPOSED SEWER CONNECTION

JOB NO. 23065
BY: MD/BM
DATE: 7/30/24
SHT 1 OF 1

Antelope Valley Engineering
129 West Pondera St.
Lancaster, Ca 93534
est. 1975
Tel: (661) 948-0805
Email: info@antelopevalleyengineering.com