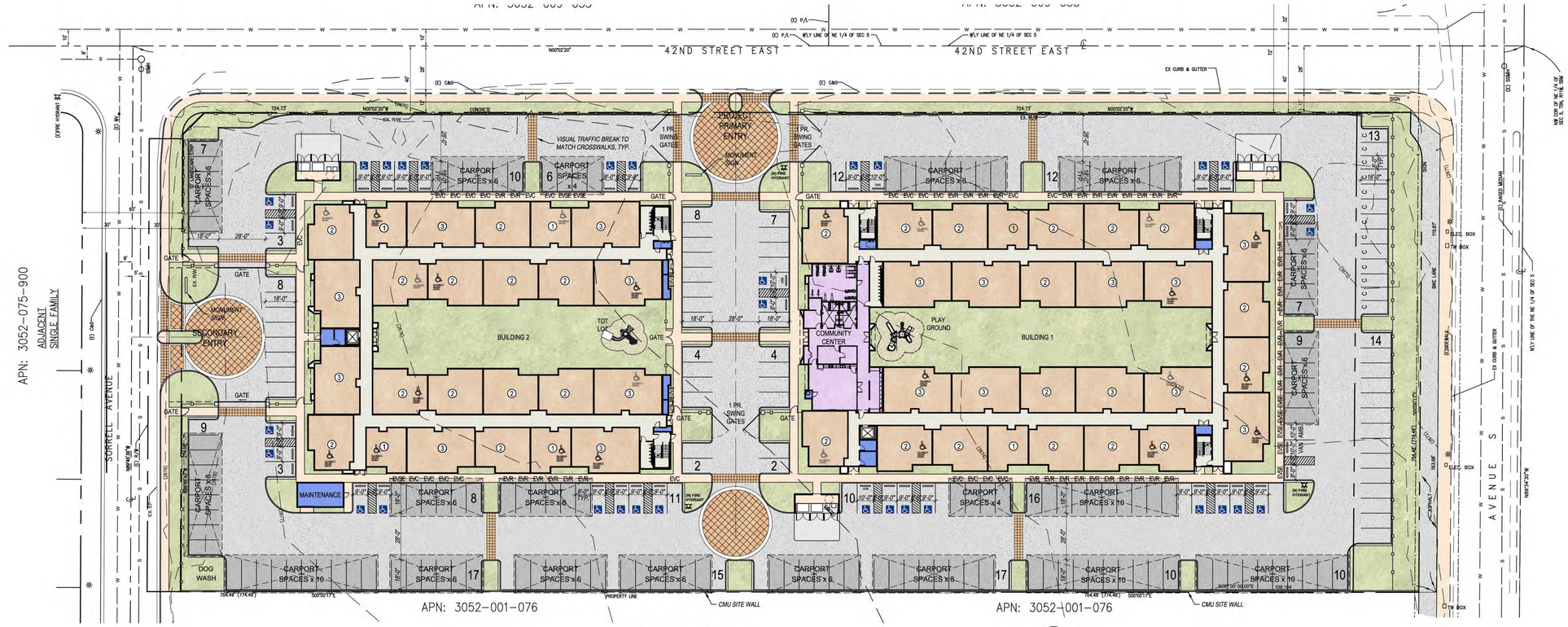
Appendix A: Site Plan



SITE PLAN

1" = 30'-0"

N

PROJECT DATA:

PUBLIC HOUSING:
2022 CBC - 11B-233: 5% MOBILITY UNITS, 2% COMMNICATIONS

CALIFORNIA TAX CREDIT ALLOCATION COMMITTEE PROJECT:
CALIFORNIA CODE OF REGULATIONS TITLE 4, DIVISION 17, CHAPTER 1
15% MOBILITY UNITS, 10% COMMUNICATION UNITS

GENERAL:
TOTAL NUMBER OF RENTAL DWELLING UNITS - 159 (ONE UNIT USED FOR MANAGER)
1 BEDROOM - 18
2 BEDROOM - 83
3 BEDROOM - 58

MOBILITY UNITS:
NUMBER OF MOBILITY UNITS REQUIRED PER 2022 CBC - 8 (5% OF EACH BUILDING)
NUMBER OF MOBILITY UNITS REQUIRED PER TCAC - 24 (15% OF TOTAL UNITS)
TCAC IS MORE STRINGENT REQUIREMENT SO IT APPLIES TO THIS PROJECT.
24 MOBILITY UNITS PROPOSED ON THE FIRST FLOOR WITH 16 COMMUNICATION UNITS

PARKING:

REQUIRED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS REQUIRED		263 PARKING STALLS
- EVCS PARKING REDUCTION (SEE BELOW)		- 13 PARKING STALLS
TOTAL NET PARKING STALLS REQUIRED		250 PARKING STALLS

PROPOSED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS PROPOSED		250 PARKING STALLS
TOTAL PARKING STALLS ON SITE		254 PARKING STALLS

COVERED PARKING SPACES REQUIRED: (0.5) SPACES PER UNIT = (80) PARKING SPACES
COVERED PARKING SPACES PROVIDED: = (138) PARKING SPACES

EVCS - 2022 GREEN BUILDING CODE:

5% LEVEL 2 EVSE (CHARGING EQUIPMENT)	= 160 x 0.05	= 8 STALLS
10% EV CAPABLE (ELEC. PANEL & CONDUIT)	= 160 x 0.10	= 16 STALLS
6 additional stalls required per Muni. Code 17.72.040, Table 3-5		= 6 STALLS
25% EV READY (FULLY WIRED AND READY FOR USE 208/240 VOLT, 40 AMP RECEPTACLE, OR CHARGE STATION)	= 160 x 0.25	= 40 STALLS
TOTAL EVCS		= 70 STALLS

EVCS ALLOWED PARKING REDUCTION:
REQUIRED PARKING MAY BE REDUCED BY (2) SPACES FOR EVERY EV CHARGING STATION
= 70 / 2 = 35 PARKING SPACE REDUCTION ALLOWED

ACCESSIBLE PARKING - 2022 CBC - 11B-208.2.3:

RESIDENTIAL FACILITIES:	1/EACH MOBILITY UNIT (2 VAN, 22 STANDARD) 24 ACCESSIBLE PARKING STALLS REQUIRED.
ADDITIONAL RESIDENTIAL:	261 TOTAL RESIDENTIAL SPACES PROVIDED - 24 MOBILITY SPACES = 237 * 2% = 4.74 ~ 5 ADDITIONAL (1 VAN, 4 STANDARD)
GUEST ACCESSIBLE PARKING:	32 GUEST SPACES = 32 * 2% = 0.64 ~ 1 ADDITIONAL STANDARD
EVSE:	1 VAN, 1 STANDARD ACCESSIBLE SPACE REQUIRED
TOTAL ACCESSIBLE PARKING REQUIRED:	32 (4 VAN AND 28 STANDARD)

BICYCLE SPACES REQUIRED: (0.5) SPACES PER UNIT = (80) PARKING SPACES
BICYCLE SPACES PROVIDED:
(4) BIKE STORAGE ROOMS IN BUILDING 1 WITH CAPACITY FOR 11 BIKES/ROOM = (44) PARKING SPACES
(6) BIKE STORAGE ROOMS IN BUILDING 2 WITH CAPACITY FOR 7 BIKES/ROOM = (42) PARKING SPACES
TOTAL BICYCLE SPACES PROVIDED: = (86) PARKING SPACES

LEGEND

- ACCESSIBLE ROUTE
- SIDEWALK DETECTABLE WARNING
- ELECTRIC VEHICLE CHARGING STATION — EVCS
- BICYCLE RACKS
- EXISTING OR PROPOSED FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- HVAC CONDENSER UNIT — A/C
- MOBILITY AND HEARING IMPAIRED LOCATIONS — FULL MOBILITY ACCESS UNIT & HEARING IMPAIRED UNIT

NOTES:

- ARCHITECTURAL SITE PLAN IS FOR BUILDING IDENTIFICATION AND INFORMATION ONLY.
- CIVIL ENGINEER TO PROVIDE ALL SETBACKS, PROPERTY BOUNDARY, AND GRADING INFORMATION.
- LANDSCAPE ARCHITECT TO REVIEW ALL WALKWAYS AND OPEN SPACE REQUIREMENTS.
- REFER TO CIVIL ENGINEER'S PRECISE GRADING PLAN FOR BUILDING LOCATIONS.

W S N E

0' 15' 60'
7.5' 30'

42ND ST. COMMUNITIES AFFORDABLE HOUSING
42ND STREET EAST & AVENUE S, PALMDALE, CA

PRELIMINARY SITE PLAN

SCALE: 1"=30'-0" 1/16/2026

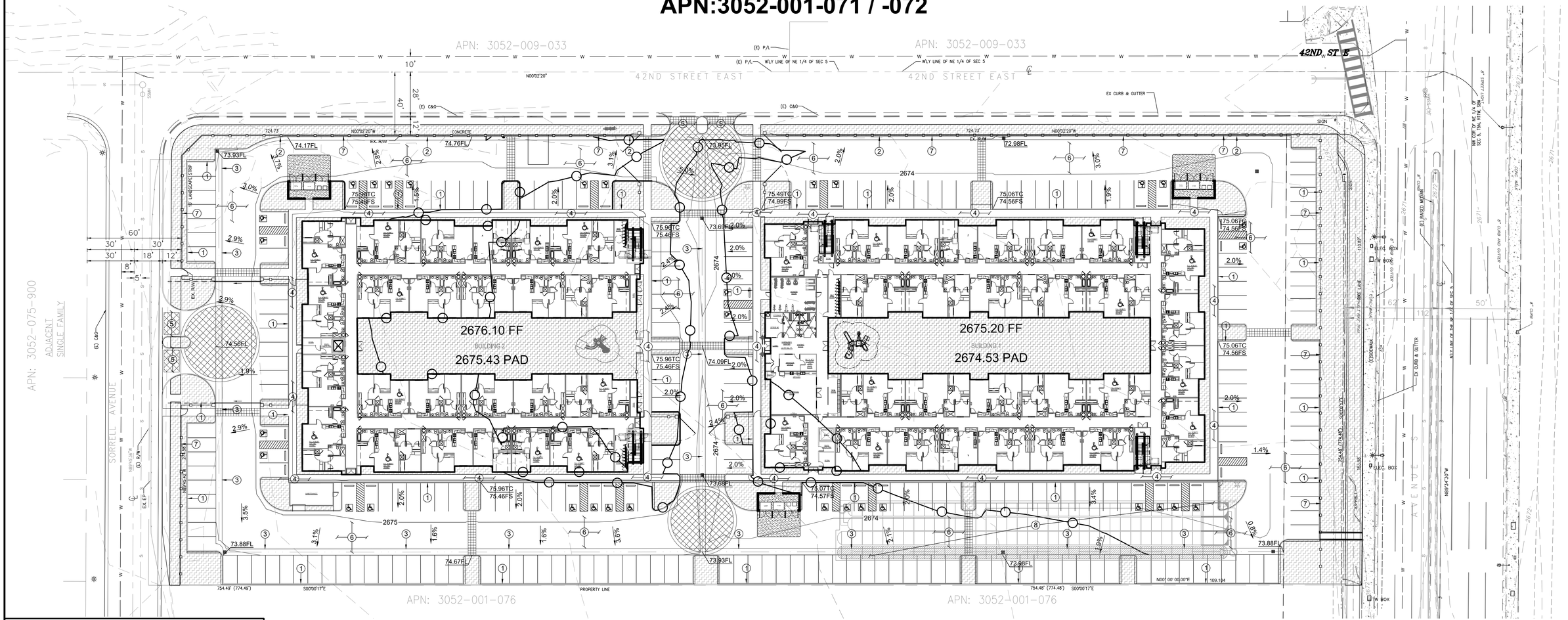
42ND STREET COMMUNITIES

42ND ST. COMMUNITIES AFFORDABLE HOUSING
PALMDALE, CA
PRELIMINARY SITE PLAN

MDA GROUP

A3

CONCEPTUAL GRADING PLAN
CITY OF PALMDALE
APN:3052-001-071 / -072



SUMMARY OF EARTHWORK QUANTITIES

ITEM	A CUT/CUBIC YDS..	B FILL/CUBIC YDS.
1. LAND DEVELOPMENT PROGRAM FOR PURE VOLUME (RAW) – ONSITE	4,812	3,153
2. SUBSIDENCE LOSS – 0.04' 220532* 0.04 / 27		327
3. OVEREXCAVATION – PAD 3' OVEREXCAVATION 62,854* 3 / 27	6,984	6,984
4. OVEREXCAVATION – PAVED AREAS 1' OVEREXCAVATION 75981 * 1 / 27	2,814	2,814
5. SUBTOTALS	14,610	13,278
6. SHRINKAGE @ 85% 288/.85-288		1,846
7. TOTALS	14,610	15,124
8. IMPORT TO SITE		514

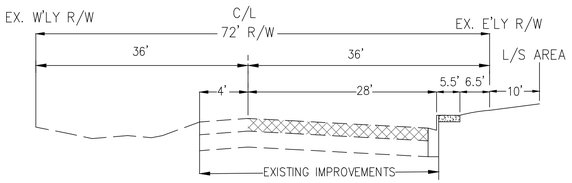
GRADING CONTRACTOR TO DETERMINE HIS/HER OWN EARTHWORK QUANTITIES. EARTHWORK VOLUMES ARE LISTED FOR CITY PERMIT PURPOSES ONLY. QUANTITIES SHOWN ARE NOT FOR BIDDING PURPOSES. CONTRACTOR SHOULD NOTE THAT TRUCKED MATERIAL VOLUMES WILL DIFFER FROM THE COMPACTED FILL VOLUME STATED HERE.

CONSTRUCTION NOTES

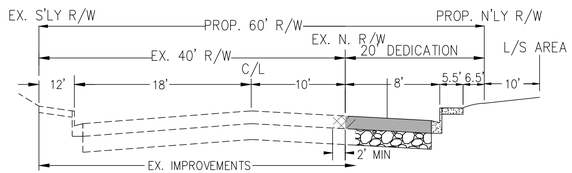
1. 6" PCC CURB PER SPPWC STD 120-3, TYPE A1-6.
2. 6" PCC CURB AND GUTTER PER SPPWC STD 120-3, TYPE A2-6.
3. 4' RIBBON GUTTER PER DETAIL.
4. 4" 2,500 PSI PCC OVER 12" COMPACTED SUBGRADE PER GEOTECH RECOMMENDATION
5. 6", 3,500 PSI PCC DRIVEWAY WITH #3 @ 18" O.C. OVER 12" MIN COMPACTED SOIL PER SOILS REPORT.
6. 4" AC PAVEMENT OVER 8" CLASS II BASE. 24" OF SUBGRADE COMPACTED PER SOILS REPORT.
7. WROUGHT IRON FENCING AND GATES PER ARCHITECTURAL PLANS.
8. UNDERGROUND ADS SYTEM

LEGEND

- PROPERTY LINE
- CURB LINE
- RIBBON GUTTER
- DAYLIGHT LINE
- W — WATERLINE
- S — SEWER LINE
- WROUGHT IRON FENCE



42nd STREET EAST



SORRELL AVENUE
NTS

GRAPHIC SCALE
30' 0 15' 30' 60' 120'
1" = 30'

Underground Service Alert
CALL BEFORE YOU DIG
Call: TOLL FREE 811
TWO WORKING DAYS BEFORE YOU DIG

PROJECT OWNER
42ND ST COMMUNITIES LLC
9281 SIERRA COLLEGE BLVD
ROSEVILLE, CA 95661

ENGINEER OF RECORD
759 W LANCASTER BLVD,
LANCASTER, CA 93534
(661) 952-7918

DUKE ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
RYAN DUKE
No. 79729
EXP. 12-30-26
CIVIL
STATE OF CALIFORNIA

NO.	REVISION DESCRIPTION	BY	DATE	APPROVED

CITY OF PALMDALE

CONCEPTUAL GRADING PLAN

42ND ST COMMUNITIES

APN: 3052-001-071/-072

Project: 25100
DESIGNED:RD
DRAWN:VP
CHECKED:RD
SHEET No.
1 OF 2

2/2/2026 2:46:27 PM, Do Not Scale Drawings

Appendix B: Site and Surrounding Area Photographs



View from south boundary across the site looking at land use to the north.



View from eastern portion across the site looking at land use to the west with the "For future generations" feature indicated in the Cultural Report in the foreground.

Appendix C: Air Quality Study

42nd Street Multifamily Project

Air Quality, Greenhouse Gas, and Energy Impact Study

City of Palmdale, CA

Prepared for:

Ms. Shawna Vargo
Duke Engineering
759 W Lancaster
Lancaster, CA 93534

Prepared by:

MD Acoustics, LLC
Tyler Klassen, EIT
1197 Los Angeles Ave, Ste C-256
Simi Valley, CA 93065

Date: 2/10/2026

MD ACOUSTICS
Sound Solutions for Planning and Design

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GLOSSARY OF TERMS

AQMP	Air Quality Management Plan
AVAQMD	Antelope Valley Air Quality Management District
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFCs	Chlorofluorocarbons
CH_4	Methane
CNG	Compressed natural gas
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DPM	Diesel particulate matter
GHG	Greenhouse gas
HFCs	Hydrofluorocarbons
LST	Localized Significant Thresholds
MDAB	Mojave Desert Air Basin
$MTCO_2e$	Metric tons of carbon dioxide equivalent
$MMTCO_2e$	Million metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standards
NOx	Nitrogen Oxides
NO_2	Nitrogen dioxide
N_2O	Nitrous oxide
O_3	Ozone
PFCs	Perfluorocarbons
PM	Particle matter
PM10	Particles that are less than 10 micrometers in diameter
PM2.5	Particles that are less than 2.5 micrometers in diameter
PMI	Point of maximum impact
PPM	Parts per million
PPB	Parts per billion
RTIP	Regional Transportation Improvement Plan
RTP	Regional Transportation Plan
SCAQMD	South Coast Air Quality Management District
SF_6	Sulfur hexafluoride
SIP	State Implementation Plan
SOx	Sulfur Oxides
SRA	Source/Receptor Area
TAC	Toxic air contaminants
VOC	Volatile organic compounds
WRCC	Western Regional Climate Center

1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This air quality and greenhouse gas (GHG) analysis was prepared to evaluate whether the estimated criteria pollutants and GHG emissions generated from the project would cause a significant impact to the air resources in the project area. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.). The assessment is consistent with the methodology and emission factors endorsed by Antelope Valley Air Quality Management District (AVAQMD), California Air Resource Board (CARB), and the United States Environmental Protection Agency (US EPA).

1.2 Project Summary

1.2.1 Site Location

The project site is located on the southeast corner of 42nd Street and Avenue S in the City of Palmdale, CA, as shown in Exhibit A. The site is currently zoned as Residential Neighborhood 3 (RN 3) by the City of Palmdale. The project is bordered by vacant land to the east, Avenue S to the north, 42nd Street to the west, and single-family residential uses to the south.

1.2.2 Project Description

The project proposes the construction of 160 multi-family affordable housing units with 250 parking spaces on approximately 5 acres. Exhibit B demonstrates the site plan for the project.

Construction activities within the project area will consist of site preparation, grading, building, paving, and architectural coating. Table 1 summarizes the land use description for the project Site.

Table 1: Land Use Summary

Land Use	Unit Amount	Size Metric
Condo/Townhouse High Rise	160	Dwelling Units
Parking Lot	160	Dwelling Units

1.2.3 Sensitive Receptors

Sensitive receptors are considered land uses or other types of population groups that are more sensitive to air pollution than others due to their exposure. Sensitive population groups include children, the elderly, the acutely and chronically ill, and those with cardio-respiratory diseases. For CEQA purposes, a sensitive receptor would be a location where a sensitive individual could remain for 24-hours or longer, such as residences, hospitals, and schools (etc.).

The closest existing sensitive receptor (to the site area) is the single-family residence 55 feet to the south of the project boundary.

1.3 Executive Summary of Findings and Mitigation Measures

The following is a summary of the analysis results:

Construction-Source Emissions
Project construction-source emissions would not exceed regional thresholds of significance established by the AVAQMD for VOCs. For localized emissions, the project will not exceed applicable Localized Significance Thresholds (LSTs) established by the AVAQMD.

Project construction-source emissions would not conflict with the Basin Air Quality Management Plan (AQMP). As discussed herein, the project will comply with all applicable AVAQMD construction-source emission reduction rules and guidelines. Project construction source emissions would not cause or substantively contribute to violation of the California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS).

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts from the project are therefore considered less-than-significant.

Operational-Source Emissions
The project operational-sourced emissions would not exceed applicable regional thresholds of significance established by the AVAQMD. Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the Operations-Related Local Air Quality Impacts section of this report. Additionally, project-related traffic will not cause or result in CO concentrations exceeding applicable state and/or federal standards (CO “hotspots). Project operational-source emissions would therefore not adversely affect sensitive receptors within the vicinity of the project.

Project operational-source emissions would not conflict with the Basin Air Quality Management Plan (AQMP). The project's emissions meet AVAQMD regional thresholds and will not result in a significant cumulative impact. The project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential operational-source odor impacts are therefore considered less-than significant.

Project-related GHG emissions meet the AVAQMD thresholds and are also considered to be less than significant. The project also complies with the goals of the CARB Scoping Plan, AB-32, and SB-32**.**

Mitigation Measures

A. Construction Measures

Adherence to AVAQMD Rule 403 is required.

No construction mitigation required.

B. Operational Measures to Reduce Greenhouse Gas Emissions

No operational mitigation required.

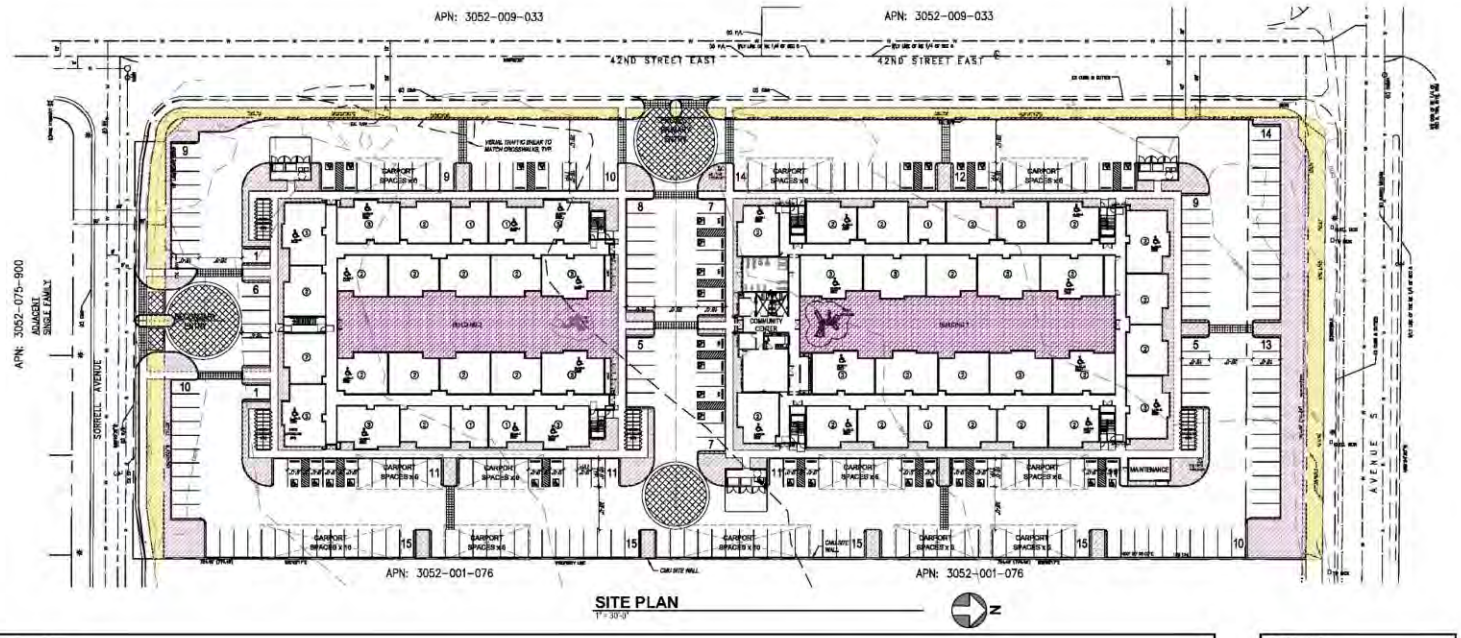
Exhibit A

Location Map



Exhibit B

Site Plan



PROJECT DATA:

SITE INFORMATION:

PROJECT ADDRESS:

APN:	3052-001-071/072
ZONING:	RH-2
PROPOSED OCCUPANCY:	R-2, B, A-3
TYPE OF CONSTRUCTION:	V-A
FIRE SPRINKLERS:	FULL SPRINKLER
FIRE ALARM:	YES
LOT AREA:	219,197 S.F. = 5.03 ACRES

DENSITY BONUS:

PER CALIFORNIA STATE DENSITY BONUS LAW, CALIFORNIA GOVERNMENT CODE SECTION 65915, THIS SITE IS ELIGIBLE TO RECEIVE A 35% DENSITY BONUS, AND THREE CONCESSIONS GRANTED BY RIGHT. RECENTLY SIGNED INTO LAW, AB 1763 UPDATED THE EXISTING DENSITY BONUS LAW BY AUTHORIZING QUALIFYING AFFORDABLE HOUSING PROJECTS UP TO 80% DENSITY BONUS, AND FOUR CONCESSIONS BY RIGHT.

ALLOWED DENSITY UNIT:	MAX. 20/ACRE	
ALLOWED D.U. PER LOT SIZE:	20 x 5.03 ACRE =	100.6 D.U.
AFFORDABLE D.U. BONUS:	ELIGIBLE:	80%
	PROPOSED:	58%
DENSITY BONUS CALC:	100.6 D.U. x 1.58 =	158.9 D.U.

TOTAL NUMBER OF NEW UNITS: 160 UNITS
(18) 3 BD-2 BA
(84) 2 BD-2 BA,
(58) 1 BD-1 BA
PROPOSED DENSITY: 31.8 D.U./ACRE

SETBACKS:	FRONT:	15 FT. MIN.; 25 FT. MAX.
	STREET SIDE:	15 FT. MIN.; 25 FT. MAX.
	INTERIOR:	5 FT.; 10 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY
	REAR:	15 FT.; 20 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY

BUILDING HEIGHT ALLOWED - PRIMARY BLDGS:	40' / 3 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS
BUILDING HEIGHT ALLOWED - ACCESSORY BLDGS:	17' / 1 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS

STREET FRONTAGE: REQUIRED: NO MORE THAN 30% OF STREET FRONTAGE AT AVENUE S CAN BE PARKING.
PROVIDED: CURRENT PARKING AT AVENUE S STREET FRONAGE = 85.3%

SITE COVERAGE:

BUILDING AREA:	80,397 S.F.	1.39 ACRES	27.5% COVERAGE
HARDSCAPE:	138,895 S.F.	3.18 ACRES	63.3% COVERAGE
10% LANDSCAPE AREA:	REQUIRED: 21,911 S.F.	0.50 ACRES	10% OF SITE AREA
	PROVIDED: 21,911 S.F.	0.50 ACRES	10% COVERAGE

OPEN SPACE REQUIRED: MIN. 200 S.F. PER UNIT	= 32,000 S.F.	0.73 ACRES	
PROVIDED ON-SITE LANDSCAPE AREA:	= 20,915 S.F.	0.48 ACRES	9.1% COVERAGE
PROVIDED OFF-SITE LANDSCAPE AREA:	= 10,133 S.F.	0.23 ACRES	4.6% COVERAGE
PROVIDES OPEN SPACE & AMENITIES: (INCLUDES COMMUNITY CENTER AREA)	= 17,388 S.F.	0.40 ACRES	7.9% COVERAGE
TOTAL OPEN SPACE PROVIDED:	= 25,839 S.F.	0.59 ACRES	11.7% COVERAGE

PRIVATE OPEN SPACE: NO PATIOS/BALCONIES PROVIDED
PRIVATE STORAGE SPACE: NO PRIVATE ENCLOSED STORAGE SPACE PROVIDED

BUILDING AREA:

BUILDING 1:	FIRST LEVEL:	35,982 S.F.	BUILDING 2:	FIRST LEVEL:	25,759 S.F.
	SECOND LEVEL:	36,245 S.F.		SECOND LEVEL:	25,323 S.F.
	THIRD LEVEL:	36,245 S.F.		THIRD LEVEL:	25,323 S.F.
	TOTAL AREA:	108,472 S.F.		TOTAL AREA:	78,405 S.F.

COMMUNITY CENTER: 2,767 S.F.

UNIT MIX:

1-BEDROOM (585 SQ. FT. +- CONDITIONED):	18 (11.2%)	18x585 S.F.	= 10,224 S.F.
2-BEDROOM (696 SQ. FT. +- CONDITIONED):	84 (52.5%)	84x696 S.F.	= 67,704 S.F.
3-BEDROOM (1,025 SQ. FT. +- CONDITIONED):	58 (36.2%)	58x1,025 S.F.	= 59,450 S.F.
TOTAL:	160 UNITS		= 137,378 S.F.

TOTAL BEDROOMS: 380 BEDROOMS

PUBLIC HOUSING:
2022 CBC - 11B-233: 5% MOBILITY UNITS, 2% COMMUNICATIONS

CALIFORNIA TAX CREDIT ALLOCATION COMMITTEE PROJECT:
CALIFORNIA CODE OF REGULATIONS TITLE 4, DIVISION 17, CHAPTER 1
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EVCS - 2022 GREEN BUILDING CODE:

5% LEVEL 2 EVSE (CHARGING EQUIPMENT)	= 160 x 0.05	= 8 STALLS
10% EV CAPABLE (ELEC. PANEL & CONDUIT)	= 160 x 0.10	= 16 STALLS
6 additional stalls required per Muni. Code 17.72.040, Table 3-5		= 6 STALLS
25% EV READY (FULLY WIRED AND READY FOR USE 208/240 VOLT. 40 AMP RECEPTACLE, OR CHARGE STATION)	= 160 x 0.25	= 40 STALLS
TOTAL EVCS		= 70 STALLS

EVCS ALLOWED PARKING REDUCTION:
REQUIRED PARKING MAY BE REDUCED BY (2) SPACES FOR EVERY EV CHARGING STATION
= 70 / 2 = 35 PARKING SPACE REDUCTION ALLOWED

ACCESSIBLE PARKING - 2022 CBC - 11B-208.2.3:

RESIDENTIAL FACILITIES:	1 EACH MOBILITY UNIT (2 VAN, 22 STANDARD) 24 ACCESSIBLE PARKING STALLS REQUIRED.
ADDITIONAL RESIDENTIAL:	251 TOTAL RESIDENTIAL SPACES PROVIDED - 24 MOBILITY SPACES = 227 * 2% = 4.74 = 5 ADDITIONAL (1 VAN, 4 STANDARD)
GUEST ACCESSIBLE PARKING:	32 GUEST SPACES = 32 * 2% = 0.64 = 1 ADDITIONAL STANDARD
EVSE:	1 VAN, 1 STANDARD ACCESSIBLE SPACE REQUIRED.
TOTAL ACCESSIBLE PARKING REQUIRED:	32 (4 VAN AND 28 STANDARD)

BICYCLE SPACES: (0.5) SPACES PER UNIT = (80) PARKING SPACES

LEGEND

NOTES:

- ARCHITECTURAL SITE PLANS FOR BUILDING IDENTIFICATION AND INFORMATION ONLY.
- CIVIL ENGINEER TO PROVIDE ALL SETBACKS, PROPERTY BOUNDARY, AND GRADING INFORMATION.
- LANDSCAPE ARCHITECT TO REVIEW ALL WALKWAYS AND OPEN SPACE REQUIREMENTS.
- REFER TO CIVIL ENGINEERS GRADING PLAN FOR BUILDING LOCATIONS.

42ND STREET COMMUNITIES AFFORDABLE HOUSING
PALMDALE, CALIFORNIA
CONCEPTUAL DRAWINGS

42ND STREET COMMUNITIES AFFORDABLE HOUSING
PALMDALE, CALIFORNIA
CONCEPTUAL DRAWINGS

MDA GROUP

2.0 Regulatory Framework and Background

2.1 Air Quality Regulatory Setting

Air pollutants are regulated at the national, state, and air basin level; each agency has a different level of regulatory responsibility. The United States Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (ARB) regulates at the state level. The Antelope Valley Air Quality Management District (AVAQMD) regulates at the air basin level.

2.1.1 National and State

The EPA is responsible for global, international, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans, provides research and guidance for air pollution programs, and sets National Air Quality Standards, also known as federal standards. There are six common air pollutants, called criteria pollutants, which were identified from the provisions of the Clean Air Act of 1970.

- Ozone
- Nitrogen Dioxide
- Lead
- Particulate Matter (PM10 and PM2.5)
- Carbon Monoxide
- Particulate Matter
- Sulfur Dioxide

The federal standards were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to project the public health.

A State Implementation Plan (SIP) is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The State Implementation Plan for the State of California is administered by the ARB, which has overall responsibility for statewide air quality maintenance and air pollution prevention. California's State Implementation Plan incorporates individual federal attainment plans for regional air districts—air district prepares their federal attainment plan, which are sent to ARB to be approved and incorporated into the California State Implementation Plan. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms. See http://www.arb.ca.gov/research/aaqs/aaqs.htm for additional information on criteria pollutants and air quality standards.

The federal and state ambient air quality standards are summarized in Table 2 and can also be found at http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

Table 2: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentrations[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O3)	1-Hour	0.09 ppm	Ultraviolet Photometry	- -	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm		0.070 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)[8]	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µ/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		- -		
Fine Particulate Matter (PM2.5)[8]	24-Hour	- -	- -	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 µg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 µg/m^3)	- -	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 µg/m^3)		9 ppm (10 µg/m^3)	- -	
	8-Hour (Lake Tahoe)	6 ppm (7 µg/m^3)		- -	- -	
Nitrogen Dioxide (NO_2)[9]	1-Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	- -	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (357 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1-Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	- -	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3-Hour	- -		- -	0.5 ppm (1300 mg/m^3)	
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	- -	
	Annual Arithmetic Mean	- -		0.130ppm (for certain areas)[10]	- -	
Lead[11,12]	30 Day Average	1.5 µg/m^3	Atomic Absorption	- -	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Calendar Qrtr	- -		1.5 µg/m^3 (for certain areas)[12]		
	Rolling 3-Month Average	- -		0.15 µg/m^3		
Visibility Reducing Particles[13]	8-Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Notes:

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

9. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

10. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

11. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

12. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

13. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Several pollutants listed in Table 2 are not addressed in this analysis. Analysis of lead is not included in this report because the project is not anticipated to emit lead. Visibility-reducing particles are not explicitly addressed in this analysis because particulate matter is addressed. The project is not expected to generate or be exposed to vinyl chloride because proposed project uses do not utilize the chemical processes that create this pollutant and there are no such uses in the project vicinity. The proposed project is not expected to cause exposure to hydrogen sulfide because it would not generate hydrogen sulfide in any substantial quantity.

2.1.2 Antelope Valley Air Pollution Control District

The 1976 Lewis Air Quality Management Act established the AVAQMD and other air districts throughout the State. The federal CAA Amendments of 1977 required that each state adopt an implementation plan outlining pollution control measures to attain the federal standards in nonattainment areas of the state.

The ARB is responsible for incorporating air quality management plans for local air basins into a State Implementation Plan (SIP) for EPA approval. Significant authority for air quality control within them has been given to local air districts that regulate stationary source emissions and develop local nonattainment plans.

California is divided geographically into air basins for the purpose of managing the air resources of the State on a regional basis. An air basin generally has similar meteorological and geographic conditions throughout. The State is currently divided into 15 air basins. The proposed project site is located within

the Mojave Desert Air Basin (MDAB). The AVAQMD includes the desert portion of Los Angeles County. The AVAQMD is responsible for controlling emissions primarily from stationary sources within the AVAQMD and also maintains air quality monitoring stations to document historical and current levels of air quality within the District. The AVAQMD is also responsible for developing, updating, and implementing the Ozone Attainment Plan which establishes a plan to implement, maintain, and enforce a program of emission control measures to attain and maintain the federal ozone air quality standards. Attainment plans prepared by the various air pollution control districts throughout the state are used to develop the SIP for the State of California. The proposed project is located within the AVAQMD and, thus, is subject to the rules and regulations of the AVAQMD.

The AVAQMD and MDAB are responsible for formulating and implementing the air quality attainment plan (AQAP) for the Basin. Regional AQAPs were adopted in 1991, 1994, and 1997. The following SIP and AQAP are the currently approved plans for the Basin region:

- 1997 SIP for O_3, PM10, and NO_2
- 1995 Mojave Desert Planning Area Federal PM10 Attainment Plan; no formal action by the EPA

The AVAQMD completed the AVAQMD 2004 Ozone Attainment Plan (State and federal) in April 2004, which has been approved by the EPA.

The AVAQMD is downwind of the Los Angeles basin and the San Joaquin Valley. Prevailing winds transport ozone and ozone precursors from both regions into and through the MDAB during the summer ozone season. These transport couplings have been officially recognized by the CARB. Local AVAQMD emissions contribute to exceedances of both the NAAQS and CAAQS for ozone, but photochemical ozone modeling conducted by the AVAQMD and CARB indicates that the MDAB would be in attainment of both standards without the influence of this transported air pollution from upwind regions. Therefore, emissions reductions in the upwind area are critical to the attainment demonstration.

The following includes, but is not limited to, the AVAQMD rules that are applicable to the proposed project:

Rule 402 prohibits a person from discharging from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

Rule 403 governs emissions of fugitive dust during construction and operation activities. Compliance with this rule is achieved through application of standard Best Management Practices, such as application of water or chemical stabilizers to disturbed soils, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 miles per hour, sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph, and establishing a permanent ground cover on finished sites.

Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, Rule 403 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Applicable suppression techniques are indicated below and include but are not limited to the following:

- Apply nontoxic chemical soil stabilizers according to manufacturers' specifications to all inactive construction areas (previously graded areas in active for 10 days or more).
- Water active sites at least three times daily.
- Cover all trucks hauling dirt, sand, soil, or other loose materials, or maintain at least 2 feet of freeboard in accordance with the requirements of California Vehicle Code (CVC) section 23114.
- Pave construction access roads at least 100 feet onto the site from the main road.
- Reduce traffic speeds on all unpaved roads to 15 mph or less.
- Suspension of all grading activities when wind speeds (including instantaneous wind gusts) exceed 25 mph.
- Bumper strips or similar best management practices shall be provided where vehicles enter and exit the construction site onto paved roads or wash off trucks and any equipment leaving the site each trip.
- Replanting disturbed areas as soon as practical.
- During all construction activities, construction contractors shall sweep on-site and off-site streets if silt is carried to adjacent public thoroughfares, to reduce the amount of particulate matter on public streets.

Rule 1113 governs the sale, use, and manufacturing of architectural coating and limits the VOC content in paints and paint solvents. This rule regulates the VOC content of paints available during construction. Therefore, all paints and solvents used during construction and operation of project must comply with Rule 1113.

Idling Diesel Vehicle Trucks – Idling for more than 5 minutes in any one location is prohibited within California borders.

2.1.3 Local

Local jurisdictions, such as the City of Palmdale, have the authority and responsibility to reduce air pollution through its police power and decision-making authority. It is the responsibility of the City of Palmdale to monitor pollutant levels and regulate air pollution sources.

City of Palmdale 2045 General Plan

The City of Palmdale updated their General Plan in October 2022. The 2045 General Plan Environmental Impact Report contains the following measures aimed at reducing air pollution:

AQ-1: Minimize local air pollution caused by motor vehicles.

AQ-1-1 *Reduced work-related trips.* Reduce the number and length of work-related trips through such means as providing a balance of jobs and housing in the community, promoting alternate work schedules, telecommuting, teleconferencing, company-sponsored ride-share and alternative fuel vehicle programs, use of commuter trains and other alternative modes of transportation to the workplace, creation of additional park and ride facilities, and improving the fiber optic network and connectivity.

AQ 1-2 *Reduced Non-Work Trips.* Reduce motor vehicle non-work trips through such means as location of residences in proximity to shopping and recreation/entertainment destinations, transit system improvements, and promoting merchant transportation incentives, and distance learning.

AQ 1-3 *Improve Traffic Flow.* Reduce vehicle emissions by maintaining and improving traffic flow per the Mobility Element.

AQ 1-4 *High Occupancy Vehicle Lanes.* Coordinate with Caltrans to promote high occupancy vehicle lanes on SR-14.

AQ 1-5 *Reduced Tailpipe Emissions.* As technology allows, reduce tailpipe emissions from City vehicles by replacing them with alternative fuel vehicles and encourage reduction of emissions from private vehicles through such means as reducing parking requirements and providing preferential parking for alternative fuel vehicles and bicycles.

AQ 1-6 *Airport Emissions Control.* To the extent practicable, reduce emissions from the future Palmdale Regional Airport by purchasing renewable energy, installing airport renewable energy systems, reducing energy consumption, monitoring the efficiency of heating, ventilation, and colling systems, and purchasing low or zero emission vehicles and ground support equipment.

AQ 1-7 *Expand Dial-A-Ride.* Expand services of the existing dial-a-ride program, resulting in reduced need for automobiles and parking by seniors and those with disabilities.

AQ 1-8 *Environmentally Review New Development.* Use the environmental review process for new development applications to assess and, as necessary, mitigate the impacts of new development related to increased vehicle miles traveled.

AQ 1-9 *Encourage transit and bike use.* Provide incentives to residents who bike or use public transportation such as free or discounted public transit or employer-provided subsidies or reimbursements for residents willing to bike or use public transit.

AQ 1-10 *Truck routes.* Restrict freight to certain routes and times by adopting rules and regulations that prohibit the use of trucks in certain areas within Palmdale.

AQ-2: Minimize particulates less than 10 microns in size (PM10) and minimizes activities that generate dust.

AQ 2-1 *Vegetative Stabilization.* Reduce roadway dust by requiring paving or vegetative stabilization of unpaved roads and parking lots.

AQ 2-2 *Construction Site Requirements.* Require measures at construction sites to prevent deposition of soil onto public rightof-way.

AQ 2-3 *Natural Contours.* Encourage developers to maintain natural contours to the greatest degree possible, to eliminate the need for extensive land clearing, blasting, ground excavation, grading and cut and fill operations.

AQ 2-4 *Erosion and Dust Control Measures.* Require erosion and dust control measures for new construction, including covering soil with straw mats or use of chemical soil and dust binders during site grading, followed by hydroseeding and watering disturbed construction areas as soon as possible after grading to prevent fugitive dust.

AQ-3: Reduction and/or elimination of unnecessary sources of air pollution.

AQ 3-1 *AVAQMD and Proven Technologies.* Promote the AVAQMD program to encourage local entities to install public electric vehicle charging stations to offer incentivize residents to purchase electric vehicles (e.g., vehicle buyback program), and the Carl Moyer program, which aims to improve the local air quality by funding local, cost-effective projects to upgrade heavy-duty equipment (Gross Vehicle Weight Rating greater than 14,000 lbs.) using proven technologies.

AQ 3-2 *Eliminate Emissions.* Promote the AVAQMD's efforts to eliminate emissions from such sources as excessive car dealership cold starts, excessive curb idling, emissions from advertising vehicles, and emissions from leaf blowers, among others, through assisting with implementation and enforcement of AVAQMD programs and rules.

AQ 3-3 *Complete Streets.* Design a more effective street system by emphasizing complete streets which accommodate all modes of transportation.

AQ 3-4 *Reduce Reactive Organic Gas.* Reduce reactive organic gas (ROG) and particulate emissions from building materials and construction methods, by promoting the use of nonsolvent-based, highsolid, or water-based coatings, and requiring compliance with all pertinent AVAQMD rules.

AQ 3-5 *Minimize Emissions.* Minimize emissions of toxic air contaminants that contribute to climate change and ozone depletion, and that create potential health risks for residents, workers, and visitors.

AQ 3-6 *Community Awareness.* Promote community awareness of the effects of climate change and ozone depleting gases, as well as methods to minimize the creation of those gases, by preparing and distributing educational materials, and cooperating with AVAQMD in establishing regional programs.

AQ 3-7 *Environmentally Review New Development Applications.* Through the environmental review process for new development applications, ensure that emissions of toxic air contaminants are minimized and that any significant health effects associated with such contaminants are appropriately mitigated.

AQ 3-8 *Green Technology Companies.* Encourage nonpolluting industry and clean green technology companies to locate in the city.

AQ-4: Reduce air pollution caused by energy consumption.

AQ 4-1 *EPIC Participation.* Encourage residents and business owners to participate in Energy for Palmdale's Independent Choice (EPIC).

AQ 4-2 *Energy Conservation.* Encourage energy conservation from all sectors of the community by promoting and/or requiring the use of energy efficient appliances, processes, and equipment, and promoting energy audits and retrofits of existing structures.

AQ 4-3 *Recycling.* Require local government, Palmdale citizens, and local businesses and industries to recycle, as mandated by state law, and to otherwise recycle to the maximum extent possible in accordance with the requirements of the Palmdale Municipal Code.

AQ 4-4 *Solar Energy.* Require new developments to minimize obstruction of direct sunlight for solar energy systems on adjacent properties.

2.2 Greenhouse Gas Regulatory Setting

2.2.1 International

Many countries around the globe have made an effort to reduce GHGs since climate change is a global issue.

Intergovernmental Panel on Climate Change. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

United Nations. The United States participates in the United Nations Framework Convention on Climate Change (UNFCCC) (signed on March 21, 1994). Under the Convention, governments gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

The 2014 UN Climate Change Conference in Lima Peru provided a unique opportunity to engage all countries to assess how developed countries are implementing actions to reduce emissions.

Kyoto Protocol. The Kyoto Protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global GHG emissions could be reduced by an estimated 5 percent from 1990 levels during the first commitment period of 2008 – 2012 (UNFCCC 1997). On December 8, 2012, the Doha Amendment to the Kyoto Protocol was adopted. The amendment includes: New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 2013 – 2020; a revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

2.2.2 National

Greenhouse Gas Endangerment. On December 2, 2009, the EPA announced that GHGs threaten the public health and welfare of the American people. The EPA also states that GHG emissions from on-road vehicles contribute to that threat. The decision was based on *Massachusetts v. EPA* (Supreme Court Case 05-1120) which argued that GHGs are air pollutants covered by the Clean Air Act and that the EPA has authority to regulate those emissions.

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). The second phase of the national program would involve proposing new fuel economy and greenhouse gas standards for model years 2017 – 2025 by September 1, 2011.

On October 25, 2010, the EPA and the U.S. Department of Transportation proposed the first national standards to reduce greenhouse gas emissions and improve fuel efficiency of heavy-duty trucks and buses. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20 percent reduction in carbon dioxide emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the agencies are proposing engine and vehicle standards starting in the 2014 model year which would achieve up to a 10 percent reduction in fuel consumption and carbon dioxide emissions by 2018 model year.

Issued by NHTSA and EPA in March 2020 (published on April 30, 2020 and effective after June 29, 2020), the Safer Affordable Fuel-Efficient Vehicles Rule would maintain the Corporate Average Fuel Economy (CAFE) and CO2 standards applicable in model year 2020 for model years 2021 through 2026. The estimated CAFE and CO2 standards for model year 2020 are 43.7 mpg and 204 grams of CO2 per mile for passenger cars and 31.3 mpg and 284 grams of CO2 per mile for light trucks, projecting an overall industry average of 37 mpg, as compared to 46.7 mpg under the standards issued in 2012. This

Rule also excludes CO2- equivalent emission improvements associated with air conditioning refrigerants and leakage (and, optionally, offsets for nitrous oxide and methane emissions) after model year 2020.[1]

Mandatory Reporting of Greenhouse Gases. On January 1, 2010, the EPA started requiring large emitters of heat-trapping emissions to begin collecting GHG data under a new reporting system. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of greenhouse gas emissions are required to submit annual reports to the EPA.

Climate Adaption Plan. The EPA Plan identifies priority actions the Agency will take to incorporate considerations of climate change into its programs, policies, rules and operations to ensure they are effective under future climatic conditions. The following link provides more information on the EPA Plan: https://www.epa.gov/arc-x/planning-climate-change-adaptation

2.2.3 California

California Code of Regulations (CCR) Title 24, Part 6. CCR Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. Although it was not originally intended to reduce GHG emissions, electricity production by fossil fuels results in GHG emissions and energy efficient buildings require less electricity. Therefore, increased energy efficiency results in decreased GHG emissions.

The Energy Commission adopted 2008 Standards on April 23, 2008 and Building Standards Commission approved them for publication on September 11, 2008. These updates became effective on August 1, 2009. 2013, 2016, and 2019 standards have been approved and became effective July 1, 2014, January 1, 2016, and January 1, 2020, respectively.

California Code of Regulations (CCR) Title 24, Part 11. All buildings for which an application for a building permit is submitted on or after January 1, 2023 must follow the 2022 standards. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas emissions. The following links provide more information on Title 24, Part 11:
https://www.dgs.ca.gov/BSC/Codes
https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency

[1] National Highway Traffic Safety Administration (NHTSA) and U.S. Environmental Protection Agency (USEPA), 2018. Federal Register / Vol. 83, No. 165 / Friday, August 24, 2018 / Proposed Rules, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks 2018. Available at: https://www.gpo.gov/fdsys/pkg/FR-2018-08-24/pdf/2018-16820.pdf.

California Green Building Standards On January 12, 2010, the State Building Standards Commission unanimously adopted updates to the California Green Building Standards Code, which went into effect on January 1, 2011. The Housing and Community Development (HCD) updated CALGreen through the 2015 Triennial Code Adoption Cycle, during the 2016 to 2017 fiscal year. During the 2022-2023 fiscal year, the Department of Housing and Community Development (HCD) updated CALGreen through the 2023 Triennial Code Adoption Cycle.

The Code is a comprehensive and uniform regulatory code for all residential, commercial and school buildings. CCR Title 24, Part 11: California Green Building Standards (Title 24) became effective in 2001 in response to continued efforts to reduce GHG emissions associated with energy consumption. CCR Title 24, Part 11 now require that new buildings reduce water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and install low pollutant-emitting finish materials. One focus of CCR Title 24, Part 11 is water conservation measures, which reduce GHG emissions by reducing electrical consumption associated with pumping and treating water. CCR Title 24, Part 11 has approximately 52 nonresidential mandatory measures and an additional 130 provisions for optional use. Some key mandatory measures for commercial occupancies include specified parking for clean air vehicles, a 20 percent reduction of potable water use within buildings, a 50 percent construction waste diversion from landfills, use of building finish materials that emit low levels of volatile organic compounds, and commissioning for new, nonresidential buildings over 10,000 square feet.

The CEC estimates that over 30 years the 2022 Energy Code will provide $1.5 billion in consumer benefits and reduce 10 million metric tons of GHG. Changes compared to the 2019 Energy Code include increases to on-site renewable energy generation from solar, increases to electric load flexibility to support grid reliability, reduction of emissions from newly constructed buildings, reduction of air pollution for improved public health, and increased adoption of environmentally beneficial efficient electric technologies.

The California Green Building Standards Code does not prevent a local jurisdiction from adopting a more stringent code as state law provides methods for local enhancements. The Code recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided, they provide a minimum 50-percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. State building code provides the minimum standard that buildings need to meet in order to be certified for occupancy. Enforcement is generally through the local building official. The following link provides more on CalGreen Building Standards:
http://www.bsc.ca.gov/Home/CALGreen.aspx

Executive Order S-3-05. California Governor issued Executive Order S-3-05, GHG Emission, in June 2005, which established the following targets:

- By 2010, California shall reduce greenhouse gas emissions to 2000 levels;
- By 2020, California shall reduce greenhouse gas emissions to 1990 levels.

- By 2050, California shall reduce greenhouse gas emissions to 80 percent below 1990 levels.

The executive order directed the secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. To comply with the Executive Order, the secretary of CalEPA created the California Climate Action Team (CAT), made up of members from various state agencies and commissions. The team released its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of businesses, local governments, and communities and through State incentive and regulatory programs.

Executive Order S-01-07. Executive Order S-1-07 was issued in 2007 and proclaims that the transportation sector is the main source of GHG emissions in the State, since it generates more than 40 percent of the State's GHG emissions. It establishes a goal to reduce the carbon intensity of transportation fuels sold in the State by at least ten percent by 2020. This Order also directs CARB to determine whether this Low Carbon Fuel Standard (LCFS) could be adopted as a discrete early-action measure as part of the effort to meet the mandates in AB 32.

On April 23, 2009 CARB approved the proposed regulation to implement the low carbon fuel standard and began implementation on January 1, 2011. The low carbon fuel standard is anticipated to reduce GHG emissions by about 16 MMT per year by 2020. CARB approved some amendments to the LCFS in December 2011, which were implemented on January 1, 2013. In September 2015, the Board approved the re-adoption of the LCFS, which became effective on January 1, 2016, to address procedural deficiencies in the way the original regulation was adopted. In 2018, the Board approved amendments to the regulation, which included strengthening and smoothing the carbon intensity benchmarks through 2030 in-line with California's 2030 GHG emission reduction target enacted through SB 32, adding new crediting opportunities to promote zero emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector.

The LCFS is designed to encourage the use of cleaner low-carbon transportation fuels in California, encourage the production of those fuels, and therefore, reduce GHG emissions and decrease petroleum dependence in the transportation sector. Separate standards are established for gasoline and diesel fuels and the alternative fuels that can replace each. The standards are "back-loaded", with more reductions required in the last five years, than the first five years. This schedule allows for the development of advanced fuels that are lower in carbon than today's fuels and the market penetration of plug-in hybrid electric vehicles, battery electric vehicles, fuel cell vehicles, and flexible fuel vehicles. It is anticipated that compliance with the low carbon fuel standard will be based on a combination of both lower carbon fuels and more efficient vehicles.

Reformulated gasoline mixed with corn-derived ethanol at ten percent by volume and low sulfur diesel fuel represent the baseline fuels. Lower carbon fuels may be ethanol, biodiesel, renewable diesel, or blends of these fuels with gasoline or diesel as appropriate. Compressed natural gas and liquefied natural gas also may be low carbon fuels. Hydrogen and electricity, when used in fuel cells or electric vehicles are also considered as low carbon fuels for the low carbon fuel standard.

SB 97. Senate Bill 97 (SB 97) was adopted August 2007 and acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. SB 97 directed the Governor's Office of Planning and Research (OPR), which is part of the State Resource Agency, to prepare, develop, and transmit to CARB guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA, by July 1, 2009. The Resources Agency was required to certify and adopt those guidelines by January 1, 2010.

Pursuant to the requirements of SB 97 as stated above, on December 30, 2009 the Natural Resources Agency adopted amendments to the state CEQA guidelines that address GHG emissions. The CEQA Guidelines Amendments changed 14 sections of the CEQA Guidelines and incorporate GHG language throughout the Guidelines. However, no GHG emissions thresholds of significance are provided and no specific mitigation measures are identified. The GHG emission reduction amendments went into effect on March 18, 2010 and are summarized below:

- Climate action plans and other greenhouse gas reduction plans can be used to determine whether a project has significant impacts, based upon its compliance with the plan.
- Local governments are encouraged to quantify the greenhouse gas emissions of proposed projects, noting that they have the freedom to select the models and methodologies that best meet their needs and circumstances. The section also recommends consideration of several qualitative factors that may be used in the determination of significance, such as the extent to which the given project complies with state, regional, or local GHG reduction plans and policies. OPR does not set or dictate specific thresholds of significance. Consistent with existing CEQA Guidelines, OPR encourages local governments to develop and publish their own thresholds of significance for GHG impacts assessment.
- When creating their own thresholds of significance, local governments may consider the thresholds of significance adopted or recommended by other public agencies, or recommended by experts.
- New amendments include guidelines for determining methods to mitigate the effects of greenhouse gas emissions in Appendix F of the CEQA Guidelines.
- OPR is clear to state that "to qualify as mitigation, specific measures from an existing plan must be identified and incorporated into the project; general compliance with a plan, by itself, is not mitigation."
- OPR's emphasizes the advantages of analyzing GHG impacts on an institutional, programmatic level. OPR therefore approves tiering of environmental analyses and highlights some benefits of such an approach.
- Environmental impact reports (EIRs) must specifically consider a project's energy use and energy efficiency potential.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. "Greenhouse gases" as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. ARB is the state agency charged with monitoring and regulating sources of greenhouse gases. AB 32 states the following:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

The ARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent (MMTCO2e) on December 6, 2007 (California Air Resources Board 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 MMTCO2e. Emissions in 2020 in a "business as usual" scenario are estimated to be 596 MMTCO2e.

Under AB 32, the ARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California. Discrete early action measures are currently underway or are enforceable by January 1, 2010. The ARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of these early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The ARB estimates that the 44 recommendations are expected to result in reductions of at least 42 MMTCO2e by 2020, representing approximately 25 percent of the 2020 target.

The ARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 (California Air Resources Board 2008). The Scoping Plan identifies recommended measures for multiple greenhouse gas emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 greenhouse gas target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, Including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the inclusion of these emissions within the cap-and trade program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional greenhouse gas emission reductions.[4]

Senate Bill 100. Senate Bill 100 (SB 100) requires 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045. SB 100 was adopted September 2018.

The interim thresholds from prior Senate Bills and Executive Orders would also remain in effect. These include Senate Bill 1078 (SB 1078), which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. Senate Bill 107 (SB 107) which changed the target date to 2010. Executive Order S-14-08, which was signed on November 2008 and expanded the State's Renewable Energy Standard to 33 percent renewable energy by 2020. Executive Order S-21-09 directed the CARB to adopt regulations by July 31, 2010 to enforce S-14-08. Senate Bill X1-2 codifies the 33 percent renewable energy requirement by 2020.

SB 375. Senate Bill 375 (SB 375) was adopted September 2008 and aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPO) to adopt a sustainable communities strategy (SCS) or alternate planning strategy (APS) that will prescribe land use allocation in that MPOs Regional Transportation Plan (RTP). CARB, in consultation with each MPO, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's sustainable communities strategy or alternate planning strategy for consistency with its assigned targets.

The proposed project is located within the Southern California Association of Governments (SCAG), which has authority to develop the SCS or APS. For the SCAG region, the targets set by CARB are at eight percent below 2005 per capita GHG emissions levels by 2020 and 13 percent below 2005 per capita GHG emissions levels by 2035. On April 4, 2012, SCAG adopted the 2012-2035 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS), which meets the CARB emission reduction requirements.

On September 3, 2020, SCAG's Regional Council approved and fully adopted the Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy), and the addendum to the Connect SoCal Program Environmental Impact Report. Connect SoCal is a long-range visioning plan that builds upon and expands land use and transportation strategies established over several planning

cycles to increase mobility options and achieve a more sustainable growth pattern. Connect SoCal outlines more than $638 billion in transportation system investments through 2045. Connect SoCal is supported by a combination of transportation and land use strategies that help the region achieve state greenhouse gas emission reduction goals and federal Clean Air Act requirements, preserve open space areas, improve public health and roadway safety, support our vital goods movement industry and utilize resources more efficiently. By integrating the Forecasted Development Pattern with a suite of financially constrained transportation investments, Connect SoCal can reach the regional target of reducing greenhouse gases, or GHGs, from autos and light-duty trucks by 8 percent per capita by 2020, and 19 percent by 2035 (compared to 2005 levels).

City and County land use policies, including General Plans, are not required to be consistent with the RTP and associated SCS or APS. However, new provisions of CEQA would incentivize, through streamlining and other provisions, qualified projects that are consistent with an approved SCS or APS and categorized as "transit priority projects."

Assembly Bill 939, Assembly Bill 341, and Senate Bill 1374. Assembly Bill 939 (AB 939) requires that each jurisdiction in California to divert at least 50 percent of its waste away from landfills, whether through waste reduction, recycling or other means. AB 341 requires at least 75 percent of generated waste be source reduced, recycled, or composted by the year 2020. Senate Bill 1374 (SB 1374) requires the California Integrated Waste Management Board to adopt a model ordinance by March 1, 2004 suitable for adoption by any local agency to require 50 to 75 percent diversion of construction and demolition of waste materials from landfills.

Executive Order S-13-08. Executive Order S-13-08 indicates that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, the 2009 California Climate Adaptation Strategy (California Natural Resource Agency 2009) was adopted, which is the "… first statewide, multi-sector, region-specific, and information-based climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Executive Order B-30-15. Executive Order B-30-15, establishing a new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030, was signed by Governor Brown in April 2015.

Executive Order B-29-15. Executive Order B-29-15, mandates a statewide 25% reduction in potable water usage and was signed into law on April 1, 2015.

Executive Order B-37-16. Executive Order B-37-16, continuing the State's adopted water reduction, was signed into law on May 9, 2016. The water reduction builds off the mandatory 25% reduction called for in EO B-29-15.

Executive Order N-79-20. Executive Order N-79-20 was signed into law on September 23, 2020 and mandates 100 percent of in-state sales of new passenger cars and trucks be zero-emission by 2035; 100 percent of medium- and heavy-duty vehicles in the state be zero-emission vehicles by 2045 for all operations where feasible and by 2035 for drayage trucks; and to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible.

2.2.4 Antelope Valley Air Pollution Control District

The project is within the MDAB, which is under the jurisdiction of the AVAQMD. The AVAQMD has identified thresholds of 100,000 tons per year or 548,000 pounds per day of CO2e emissions for individual projects (AVAQMD 2016).

3.0 Setting

3.1 Existing Physical Setting

The project site is located in the City of Palmdale in the northern portion of the County of Los Angeles, which is part of the Mojave Desert Air Basin (MDAB) that includes the desert portion of San Bernardino County and the far eastern end of Riverside County

3.1.1 Local Climate and Meteorology

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 Nevada's in the north by the Tehachapi Pass (3,800-foot elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 feet). The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriel's by the Cajon Pass (4,200 feet). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains (the Morongo Valley).

The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 feet) between the San Bernardino and San Jacinto Mountains.

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. The MDAB averages between three and seven inches of precipitation per year (from 16 to 30 days with at least 0.01 inches of precipitation). 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.

The temperature and precipitation levels for Palmdale, the nearest station with available data are in Table 3. Table 3 shows that July is typically the warmest month and January is typically the coolest month. Rainfall in the project area varies considerably in both time and space. Almost all the annual rainfall comes from the fringes of mid-latitude storms from late November to early April, with summers being almost completely dry.

Table 3: Meteorological Summary

Month	Temperature (˚F)		Average Precipitation (inches)
	Average High	Average Low	
January	56.8	29.0	1.13
February	61.7	32.2	0.76
March	66.0	36.1	0.62
April	73.1	41.6	0.40
May	81.1	48.8	0.05
June	90.5	56.3	0.03
July	98.9	64.1	0.07
August	97.9	62.5	0.11
September	91.4	55.4	0.17
October	79.4	44.6	0.20
November	65.9	35.0	0.84
December	57.5	28.8	0.67
Annual Average	**76.7**	**44.5**	**5.05**

Notes:
[1] Source: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?caplms+sca

3.1.2 Local Air Quality

The AVAQMD maintains an air-monitoring network that measures levels of several air pollutants throughout the air basin. The nearest air monitoring station to the project site is the Lancaster monitoring station located approximately 8.7 miles northwest of the project site at 43301 Division Street, Lancaster, CA. Table 4 presents the monitored pollutant levels within the vicinity. However, it should be noted that due to the air monitoring station distance from the project site, recorded air pollution levels at the air monitoring station reflect with varying degrees of accuracy, local air quality conditions at the project site.

<Table 4, next page>

Table 4: Local Area Air Quality Levels from Lancaster Air Monitoring Station[1]

	Year		
Pollutant (Standard)[2]	**2020**	**2021**	**2022**
Ozone:			
Maximum 1-Hour Concentration (ppm)	0.099	0.086	0.098
Days > CAAQS (0.09 ppm)	**4**	**0**	**3**
Maximum 8-Hour Concentration (ppm)	0.083	0.079	0.082
Days > NAAQS (0.07 ppm)	**8**	**3**	**33**
Days > CAAQS (0.070 ppm)	**8**	**4**	**36**
Carbon Monoxide:			
Maximum 1-Hour Concentration (ppm)	-	-	-
Days > NAAQS (20 ppm)	-	-	-
Maximum 8-Hour Concentration (ppm)	-	-	-
Days > NAAQS (9 ppm)	-	-	-
Nitrogen Dioxide:			
Maximum 1-Hour Concentration (ppm)	0.052	0.046	0.044
Days > NAAQS (0.25 ppm)	0	0	0
Sulfur Dioxide:[3]			
Maximum 1-Hour Concentration (ppm)	-	-	-
Days > CAAQS (0.25 ppm)	-	-	-
Inhalable Particulates (PM10):			
Maximum 24-Hour Concentration (ug/m^3)	192.3	411.2	76.2
Days > NAAQS (150 ug/m^3)	1	1	0
Days > CAAQS (50 ug/m^3)	-	-	-
Annual Average (ug/m^3)	30.6	29.6	26
Annual > NAAQS (50 ug/m^3)	No	No	No
Annual > CAAQS (20 ug/m^3)	**Yes**	**Yes**	**Yes**
Ultra-Fine Particulates (PM2.5):			
Maximum 24-Hour Concentration (ug/m^3)	74.7	35.7	15.1
Days > NAAQS (35 ug/m^3)	**9**	**1**	**0**
Annual Average (ug/m^3)	9.2	8.1	9.0
Annual > NAAQS (15 ug/m3)	No	No	No
Annual > CAAQS (12 ug/m^3)	No	No	No

[1.] Source: obtained from https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year and /or https://www.arb.ca.gov/adam/topfour/topfour1.php.
[2] CAAQS = California Ambient Air Quality Standard; NAAQS = National Ambient Air Quality Standard; ppm = parts per million
[3] No data available.

The monitoring data presented in Table 4 shows that ozone is the air pollutant of primary concern in the project area, which are detailed below.

Ozone

During the 2020 to 2022 monitoring period, the State 1-hour concentration standard for ozone has been exceeded four days in 2020 and three days in 2022 at the Lancaster Station. The State 8-hour ozone standard has been exceeded between four and 36 days each year over the past three years at the Lancaster Station. The Federal 8-hour ozone standard has been exceeded between three and 33 days each year over the past three years at the Lancaster Station.

Ozone is a secondary pollutant as it is not directly emitted. Ozone is the result of chemical reactions between other pollutants, most importantly hydrocarbons and NO_2, which occur only in the presence of bright sunlight. Pollutants emitted from upwind cities react during transport downwind to produce the oxidant concentrations experienced in the area. Many areas of the AVAQMD contribute to the ozone levels experienced at the monitoring station, with the more significant areas being those directly upwind.

Carbon Monoxide
CO is another important pollutant that is due mainly to motor vehicles. During the 2019 to 2021 monitoring period, the Federal 1-hour and 8-hour concentration standards for CO were not exceeded.

Nitrogen Dioxide
During the 2020 to 2022 monitoring period, the Federal 1-hour concentration standard for Nitrogen Dioazide has not been exceeded.

Sulfur Dioxide
The Lancaster Station did not have SO_2 data available for the last three years.

Particulate Matter
During the 2020 to 2022 monitoring period, the Federal 24-hour PM10 concentration standard was exceeded one day in 2020 and one day in 2021 at the Lancaster Station.

During the same period, the Federal 24-hour standard for PM2.5 was exceeded nine days in 2020 and one day in 2021 the Lancaster Station.

According to the EPA, some people are much more sensitive than others to breathing fine particulate matter (PM10 and PM2.5). People with influenza, chronic respiratory and cardiovascular diseases, and the elderly may suffer worsening illness and premature death due to breathing these fine particles. People with bronchitis can expect aggravated symptoms from breathing in fine particles. Children may experience decline in lung function due to breathing in PM10 and PM2.5. Other groups considered sensitive are smokers and people who cannot breathe well through their noses. Exercising athletes are also considered sensitive because many breathe through their mouths during exercise.

3.1.3 Attainment Status

The EPA and the ARB designate air basins where ambient air quality standards are exceeded as “nonattainment” areas. If standards are met, the area is designated as an “attainment” area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered “unclassified.” National nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards. Each standard has a different definition, or ‘form’ of what constitutes attainment, based on specific air quality statistics. For example, the Federal 8-hour CO standard is not to be exceeded more than once per year; therefore, an area is in attainment of the CO standard if no more than one 8-hour ambient air monitoring values exceeds the threshold per year. In contrast, the federal annual $PM_{2.5}$ standard is met if the three-year average of

the annual average $PM_{2.5}$ concentration is less than or equal to the standard. Table 5 lists the attainment status for the criteria pollutants in the AVAQMD.

Table 5: AVAQMD Attainment Status

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 Severe15
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
PM10 24-hour (Federal)	Unclassifiable/attainment
PM2.5 Annual (Federal)	Unclassified/attainment
PM2.5 24-hour (Federal)	Unclassified/attainment
PM2.5 (State)	Unclassified
PM10 (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
[1] Obtained from 2016 Antelope Valley AQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines	

3.2 Greenhouse Gases

Constituent gases of the Earth's atmosphere, called atmospheric greenhouse gases (GHG), play a critical role in the Earth's radiation amount by trapping infrared radiation emitted from the Earth's surface, which otherwise would have escaped to space. Prominent greenhouse gases contributing to this process include carbon dioxide (CO_2), methane (CH_4), ozone, water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs). This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate. Anthropogenic (caused or produced by humans) emissions of these greenhouse gases in excess of natural ambient concentrations are responsible for the enhancement of the Greenhouse Effect and have led to a trend of unnatural warming of the Earth's natural climate, known as global warming or climate change. Emissions of gases that induce global warming are attributable to human activities associated with industrial/manufacturing, agricultural, utilities, transportation, and residential land uses. Transportation is responsible for 41 percent of the State's greenhouse gas emissions, followed by electricity generation. Emissions of CO_2 and nitrous oxide (NO_2) are byproducts of fossil fuel combustion. Methane, a potent greenhouse gas, results from off-gassing associated with agricultural practices and landfills. Sinks of CO_2, where CO_2 is stored outside of the

atmosphere, include uptake by vegetation and dissolution into the ocean. Table 6 provides a description of each of the greenhouse gases and their global warming potential.

Additional information is available: https://www.arb.ca.gov/cc/inventory/data/data.htm

<Table 6, next page>

Table 6: Description of Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide	Nitrous oxide (N_20),also known as laughing gas is a colorless gas. It has a lifetime of 114 years. Its global warming potential is 298.	Microbial processes in soil and water, fuel combustion, and industrial processes. In addition to agricultural sources, some industrial processes (nylon production, nitric acid production) also emit N_20.
Methane	Methane (CH_4) is a flammable gas and is the main component of natural gas. It has a lifetime of 12 years. Its global warming potential is 25.	A natural source of CH_4 is from the decay of organic matter. Methane is extracted from geological deposits (natural gas fields). Other sources are from the decay of organic material in landfills, fermentation of manure, and cattle farming.
Carbon dioxide	Carbon dioxide (CO_2) is an odorless, colorless, natural greenhouse gas. Carbon dioxide's global warming potential is 1. The concentration in 2005 was 379 parts per million (ppm), which is an increase of about 1.4 ppm per year since 1960.	Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Chlorofluorocarbons	CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). They are gases formed synthetically by replacing all hydrogen atoms in methane or methane with chlorine and/or fluorine atoms. Global warming potentials range from 3,800 to 8,100.	Chlorofluorocarbons were synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone, therefore their production was stopped as required by the Montreal Protocol.
Hydrofluorocarbons	Hydrofluorocarbons (HFCs) are a group of greenhouse gases containing carbon, chlorine, and at least one hydrogen atom. Global warming potentials range from 140 to 11,700.	Hydrofluorocarbons are synthetic manmade chemicals used as a substitute for chlorofluorocarbons in applications such as automobile air conditioners and refrigerants.
Perfluorocarbons	Perfluorocarbons (PFCs) have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above the Earth's surface. They have a lifetime 10,000 to 50,000 years. They have a global warming potential range of 6,200 to 9,500.	Two main sources of perfluorocarbons are primary aluminum production and semiconductor manufacturing.
Sulfur hexafluoride	Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. It has a lifetime of 3,200 years. It has a high global warming potential, 23,900.	This gas is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Notes:

1. Sources: Intergovernmental Panel on Climate Change 2014a and Intergovernmental Panel on Climate Change 2014b. https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

4.0 Modeling Parameters and Assumptions

4.1 Construction

Typical emission rates from construction activities were obtained from CalEEMod Version 2022.1.1.37 CalEEMod is a computer model published by the SCAQMD for estimating air pollutant emissions. The CalEEMod program uses the EMFAC2017 computer program to calculate the emission rates specific for the Mojave Desert portion of Los Angeles County for construction-related employee vehicle trips and the OFFROAD2011 computer program to calculate emission rates for heavy truck operations. EMFAC2017 and OFFROAD2011 are computer programs generated by CARB that calculates composite emission rates for vehicles. Emission rates are reported by the program in grams per trip and grams per mile or grams per running hour. Using CalEEMod, the peak daily air pollutant emissions were calculated and presented below. These emissions represent the highest level of emissions for each of the construction phases in terms of air pollutant emissions.

The analysis assesses the emissions associated with the construction of the proposed project as indicated in Table 1. The project was analyzed to be operational in 2028; therefore, construction is estimated to start no sooner than the first quarter of 2027. The phases of the construction activities which have been analyzed below are: 1) site preparation, 2) grading, 3) building, 4) paving, and 5) architectural coating. For details on construction modeling and construction equipment for each phase, please see Appendix A.

4.2 Operations

Operational or long-term emissions will occur over the life of the project. Both mobile and area sources generate operational emissions. Area source emissions arise from consumer product usage, heaters that consume natural gas, gasoline-powered landscape equipment, and architectural coatings (painting). Mobile source emissions from motor vehicles are the largest single long-term source of air pollutants from the operation of the project. Small amounts of emissions would also occur from area sources such as the consumption of natural gas for heating, from landscaping emissions, and consumer product usage. The operational emissions were estimated using the latest version of CalEEMod.

Mobile Sources
Mobile sources include emissions from the additional vehicle miles generated from the proposed project. The vehicle trips associated with the proposed project are based upon the trip generation rates given in CalEEMod.

The program then applies the emission factors for each trip which is provided by the EMFAC2017 model to determine the vehicular traffic pollutant emissions. The CalEEMod default trip lengths were used in this analysis. Please see CalEEMod output comments sections in Appendix A for details.

Area Sources
Area sources include emissions from consumer products, landscape equipment and architectural coatings. Landscape maintenance includes fuel combustion emissions from equipment such as lawn mowers, rototillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers, as well as

air compressors, generators, and pumps. As specifics were not known about the landscaping equipment fleet, CalEEMod defaults were used to estimate emissions from landscaping equipment.

Per AVAQMD Rule, architectural coatings will be limited to an average of 50 grams per liter or less for flat coatings and 100 grams per liter or less for non-flat coatings; however, no changes were made to the CalEEMod architectural coating default values.

Energy Usage

2022.1.1.37 CalEEMod defaults were utilized.

5.0 Thresholds of Significance

5.1 Air Quality Thresholds of Significance

5.1.1 CEQA Guidelines for Air Quality

The CEQA Guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on air quality, the type, level, and impact of emissions generated by the project must be evaluated.

The following air quality significance thresholds are contained in Appendix G of the CEQA Guidelines. A significant impact would occur if the project would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable national or state ambient air quality standard;

c) Expose sensitive receptors to substantial pollutant concentrations; or

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

While the final determination of whether a project is significant is within the purview of the Lead Agency pursuant to Section 15064(b) of the CEQA Guidelines, AVAQMD recommends that its quantitative air pollution thresholds be used to determine the significance of project emissions. If the Lead Agency finds that the project has the potential to exceed these air pollution thresholds, the project should be considered to have significant air quality impacts. There are daily emission thresholds for construction and operation of a proposed project in the basin.

5.1.2 Regional Significance Thresholds

According to the AVAQMD, 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 AVAQMD rules and regulations, complies with all proposed control measures that are not yet adopted from the applicable plan(s), and it is consistent with the growth forecasts in the applicable plan(s) (or is directly included in the applicable plan).

The AVAQMD currently recommends that projects with construction-related and/or operational emissions that exceed any of the following emissions thresholds should be considered significant:

- 25 tons per year or 137 pounds per day pounds per day of VOC
- 25 tons per year or 137 pounds per day of NOx
- 100 tons per year or 548 pounds per day of CO

- 25 tons per year or 137 pounds per day of Sox
- 15 tons per year or 82 pounds per day of PM10
- 12 tons per year or 65 pounds per day of PM2.5

For the purposes to this air quality impact analysis, a regional air quality impact would be considered significant if emissions exceed the AVAQMD significance thresholds identified above.

5.2 Greenhouse Gas Thresholds of Significance

5.2.1 CEQA Guidelines for Greenhouse Gas

CEQA Guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on greenhouse gases, the type, level, and impact of emissions generated by the project must be evaluated.

The following greenhouse gas significance thresholds are contained in Appendix G of the CEQA Guidelines, which were amendments adopted into the Guidelines on March 18, 2010, pursuant to SB 97. A significant impact would occur if the project would:

(a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

(b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

However, despite this, currently neither the CEQA statutes, OPR guidelines, nor the draft proposed changes to the CEQA Guidelines prescribe thresholds of significance or a particular methodology for performing an impact analysis; as with most environmental topics, significance criteria are left to the judgment and discretion of the Lead Agency. As previously discussed (Section 2.2.4 of this report), AVAQMD has identified thresholds of 100,000 tons per year or 548,000 pounds per day of CO2e emissions for individual projects. The AVAQMD thresholds were used in this analysis.

6.0 Air Quality Emissions Impact

6.1 Construction Air Quality Emissions Impact

The latest version of CalEEMod was used to estimate the onsite and offsite construction emissions. The emissions incorporate Rule 402 and 403. Rule 402 and 403 (fugitive dust) are not considered mitigation measures as the project by default is required to incorporate these rules during construction.

6.1.1 Regional Construction Emissions

The construction emissions for the Project would not exceed the AVAQMD's daily and annual emission thresholds at the regional level as demonstrated in Table 7, and therefore would be considered less than significant.

Table 7: Regional Significance – Unmitigated Construction Emissions (pounds/day)

Activity	Pollutant Emissions					
	VOC	**NOx**	**CO**	**SO_2**	**PM10**	**PM2.5**
Daily Emissions (pounds/day)						
2027	3.13	28.06	29.32	0.10	9.07	5.07
2028	62.06	9.97	19.56	0.03	1.96	0.67
Maximum	**62.06**	**28.06**	**29.32**	**0.10**	**9.07**	**5.07**
AVAQMD Daily Thresholds	**137**	**137**	**548**	**137**	**82**	**65**
Exceeds Thresholds	No	No	No	No	No	No
Annual Emissions (tons/year)						
2027	0.19	1.36	2.50	0.00	0.27	0.10
2028	0.57	0.09	0.16	0.00	0.01	0.05
Total	**0.76**	**1.45**	**2.67**	**0.00**	**0.28**	**0.15**
AVAQMD Annual Thresholds	**25**	**25**	**100**	**25**	**15**	**12**
Exceeds Thresholds	No	No	No	No	No	No

Notes:
[1] Source: CalEEMod Version 2022.1.1.37
[2] On-site emissions from equipment operated on-site that is not operated on public roads. On-site grading PM10 and PM2.5 emissions show mitigated values for fugitive dust for compliance with AVAQMD Rule 403.
[3] Off-site emissions from equipment operated on public roads.
[4] Construction, architectural coatings and paving phases may overlap.

6.1.2 Construction-Related Human Health Impacts

Regarding health effects related to criteria pollutant emissions, the applicable significance thresholds are established for regional compliance with the state and federal ambient air quality standards, which are intended to protect public health from both acute and long-term health impacts, depending on the potential effects of the pollutant. Because regional and local emissions of criteria pollutants during construction of the project would be below the applicable thresholds, it would not contribute to long-term health impacts related to nonattainment of the ambient air quality standards. Therefore, significant adverse acute health impacts as a result of project construction are not anticipated.

6.1.3 Odors

Potential sources that may emit odors during construction activities include the application of materials such as asphalt pavement. The objectionable odors that may be produced during the construction process are short-term in nature and the odor emissions are expected cease upon the drying or hardening of the odor producing materials. Diesel exhaust and VOCs would be emitted during construction of the project, which are objectionable to some; however, emissions would disperse rapidly from the project site and therefore should not reach an objectionable level at the nearest sensitive receptors. Due to the short-term nature and limited amounts of odor producing materials being utilized, no significant impact related to odors would occur during construction of the proposed project.

The AVAQMD recommends that odor impacts be addressed in a qualitative manner. Such an analysis shall determine whether the project would result in excessive nuisance odors, as defined under the California Code of Regulations and Section 41700 of the California Health and Safety Code, and thus would constitute a public nuisance related to air quality.

Potential sources that may emit odors during the on-going operations of the proposed project would include odor emissions from vehicle emissions and trash storage areas. Due to the distance of the nearest receptors from the project site and through compliance with AVAQMD's Rule 402 no significant impact related to odors would occur during the on-going operations of the proposed project.

6.1.4 Construction-Related Toxic Air Contaminant Impact

The greatest potential for toxic air contaminant emissions would be related to diesel particulate emissions associated with heavy equipment operations during construction of the proposed project. The Office of Environmental Health Hazard Assessment (OEHHA) has issued the Air Toxic Hot Spots Program Risk Assessment Guidelines and Guidance Manual for the Preparation of Health Risk Assessments, February 2015 to provide a description of the algorithms, recommended exposure variates, cancer and noncancer health values, and the air modeling protocols needed to perform a health risk assessment (HRA) under the Air Toxics Hot Spots Information and Assessment Act of 1987. Hazard identification includes identifying all substances that are evaluated for cancer risk and/or non-cancer acute, 8-hour, and chronic health impacts. In addition, identifying any multi-pathway substances that present a cancer risk or chronic non-cancer hazard via non-inhalation routes of exposure.

Given the relatively limited number of heavy-duty construction equipment and construction schedule, the proposed project would not result in a long-term substantial source of toxic air containment emissions and corresponding individual cancer risk. Furthermore, construction-based particulate matter (PM) emissions (including diesel exhaust emissions) do not exceed any local or regional thresholds. Therefore, no significant short-term toxic air contaminant impacts would occur during construction of the proposed project.

6.2 Operational Air Quality Emissions Impact

6.2.1 Regional Operational Emissions

The operations-related criteria air quality impacts created by the proposed project have been analyzed through the use of CalEEMod model. The operating emissions were based on year 2028, which is the anticipated opening year for the project. The summer and winter emissions created by the proposed project's long-term operations were calculated and the highest emissions from either summer or winter are summarized in Table 8.

Table 8: Regional Significance - Unmitigated Operational Emissions (lbs/day)

Activity	Pollutant Emissions[1]					
	VOC	NOx	CO	SO2	PM10	PM2.5
Daily Emissions (pounds/day)						
Area Sources[2]	4.05	0.09	9.09	0.00	0.00	0.00
Energy Usage[3]	0.03	0.45	0.19	0.00	0.04	0.04
Mobile Sources[4]	3.57	2.42	25.91	0.05	4.83	1.25
Total Emissions	**7.64**	**2.95**	**35.20**	**0.05**	**4.87**	**1.29**
AVAQMD Daily Thresholds	**137**	**137**	**548**	**137**	**82**	**65**
Exceeds Threshold?	No	No	No	No	No	No
Annual Emissions (tons/year)						
Area Sources[2]	0.67	0.01	0.82	0.00	0.00	0.00
Energy Usage[3]	0.00	0.08	0.03	0.00	0.01	0.01
Mobile Sources[4]	0.58	0.49	4.06	0.01	0.87	0.23
Total Emissions	**1.25**	**0.58**	**4.91**	**0.01**	**0.88**	**0.23**
AVAQMD Annual Thresholds	**25**	**25**	**100**	**25**	**15**	**12**
Exceeds Threshold?	No	No	No	No	No	No

Notes:
[1] Source: CalEEMod Version 2022.1.1.37
[2] Area sources consist of emissions from consumer products, architectural coatings, and landscaping equipment.
[3] Energy usage consists of emissions from on-site natural gas usage.
[4] Mobile sources consist of emissions from vehicles and road dust.

Table 8 provides the project's unmitigated operational emissions. Table 8 shows that the project does not exceed the AVAQMD daily emission threshold and regional operational emissions are considered to be less than significant.

6.2.3 Operations-Related Human Health Impacts

As stated previously, regarding health effects related to criteria pollutant emissions, the applicable significance thresholds are established for regional compliance with the state and federal ambient air quality standards, which are intended to protect public health from both acute and long-term health impacts, depending on the potential effects of the pollutant. Because emissions of criteria pollutants during operation of the project would be below the applicable thresholds, it would not contribute to long-term health impacts related to nonattainment of the ambient air quality standards. Therefore, less than significant adverse acute health impacts as a result of project operation are anticipated.

6.3 CO Hot Spot Emissions

CO is the pollutant of major concern along roadways because the most notable source of CO is motor vehicles. For this reason, CO concentrations are usually indicative of the local air quality generated by a roadway network and are used as an indicator of potential local air quality impacts. Local air quality impacts can be assessed by comparing future without and with project CO levels to the State and Federal CO standards which were presented in above in Section 5.0.

To determine if the proposed project could cause emission levels in excess of the CO standards discussed above in Section 5.0, a sensitivity analysis is typically conducted to determine the potential for CO "hot spots" at a number of intersections in the general project vicinity. Because of reduced speeds and vehicle queuing, "hot spots" potentially can occur at high traffic volume intersections with a Level of Service E or worse.

Micro-scale air quality emissions have traditionally been analyzed in environmental documents where the air basin was a non-attainment area for CO. However, the SCAQMD has demonstrated in the CO attainment redesignation request to EPA that there are no "hot spots" anywhere in the air basin, even at intersections with much higher volumes, much worse congestion, and much higher background CO levels than anywhere in Los Angeles County. If the worst-case intersections in the air basin have no "hot spot" potential, any local impacts will be below thresholds.

Traffic analysis showed that the project would generate a net increase of 765 average daily trips. The 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan) showed that an intersection which has a daily traffic volume of approximately 100,000 vehicles per day would not violate the CO standard. The volume of traffic at project buildout would be well below 100,000 vehicles and below the necessary volume to even get close to causing a violation of the CO standard. Therefore, no CO "hot spot" modeling was performed and less than significant long-term air quality impact is anticipated to local air quality with the on-going use of the proposed project.

6.4 Cumulative Regional Air Quality Impacts

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of emissions is from mobile sources, which travel well out of the local area. Therefore, from an air quality standpoint, the cumulative analysis would extend beyond any local projects and when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for the project's air quality must be generic by nature.

The project area is out of attainment for both ozone and PM10 particulate matter. Construction and operation of cumulative projects will further degrade the local air quality, as well as the air quality of the Mojave Desert Air Basin. The greatest cumulative impact on the quality of regional air cell will be the incremental addition of pollutants mainly from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with the construction of these projects. Air quality will be temporarily degraded during construction activities that occur separately or simultaneously. However, in accordance with the AVAQMD methodology, projects that do not exceed the AVAQMD criteria or can be mitigated to less than criteria levels are not significant

and do not add to the overall cumulative impact. The project does not exceed any of the thresholds of significance and therefore is considered less than significant.

6.5 Air Quality Compliance

The California Environmental Quality Act (CEQA) requires a discussion of any inconsistencies between a proposed project and applicable General Plans and Regional Plans (CEQA Guidelines Section 15125). According to the AVAQMD, 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).

The project site is located within the City of Palmdale. The proposed project will be a multi-family residential development. Per the City's Land Use Zoning map, the current land use zoning is Residential Neighborhood 3 (RN 3). As shown by the results of this air analysis, the project's emissions do not exceed any AVAQMD thresholds during either short-term construction or long-term operation of the project. Therefore, the proposed project is not anticipated to exceed the Attainment Plan assumptions for the project site.

Based on the above, the proposed project would not conflict with implementation of the AVAQMD Attainment Plans, impacts are considered to be less than significant.

7.0 Greenhouse Gas Impact Analysis

7.1 Construction Greenhouse Gas Emissions Impact

The greenhouse gas emissions from project construction equipment and worker vehicles are shown in Table 9. The emissions are from all phases of construction. The total construction emissions amortized over a period of 30 years are estimated at 18.04 metric tons of CO_2e per year. Annual CalEEMod output calculations are provided in Appendix A.

Table 9: Construction Greenhouse Gas Emissions

Activity	Emissions ($MTCO_2e$)[1]		
	Onsite	Offsite	Total
Site Preparation	12.06	0.51	12.57
Grading	10.78	38.28	49.06
Building Construction	251.72	210.16	461.88
Paving	11.06	3.28	14.34
Coating	1.09	2.40	3.49
Total	286.71	254.63	541.34
Averaged over 30 years[2]	9.56	8.49	**18.04**

Notes:
[1.] $MTCO_2e$=metric tons of carbon dioxide equivalents (includes carbon dioxide, methane and nitrous oxide).
[2.] The emissions are averaged over 30 years because the average is added to the operational emissions, pursuant to AVAQMD.
* CalEEMod output (Appendix A)

7.2 Operational Greenhouse Gas Emissions Impact

Operational emissions occur over the life of the project. The operational emissions for the project are 1,173.87 metric tons of CO_2e per year (see Table 10). Furthermore, as shown in Table 10, the project's total emissions (with incorporation of construction related GHG emissions) would be 1,191.91 metric tons of CO_2e per year or 13,510 pounds of CO_2e per day. These emissions do not exceed the AVAQMD annual threshold of 100,000 MTCO2e or the AVAQMD daily threshold of 548,000 pounds of CO2e. Therefore, the project's GHG emissions are considered to be less than significant.

<Table 10 next page>

Table 10: Opening Year Unmitigated Project-Related Greenhouse Gas Emissions

Category	Greenhouse Gas Emissions (Metric Tons/Year)[1]							(lbs/day)
	Bio-CO2	**NonBio-CO_2**	**CO_2**	**CH_4**	**N_2O**	**R**	**CO_2e**	CO2e
Area Sources[2]	0.00	1.98	1.98	0.00	0.00	0.00	1.99	24.36
Energy Usage[3]	0.00	265.11	265.11	0.02	0.00	0.00	266.02	1,606.75
Mobile Sources[4]	0.00	836.05	836.05	0.04	0.04	1.29	850.94	5,503.85
Solid Waste[5]	10.57	0.00	10.57	1.06	0.00	0.00	36.97	223.28
Water[6]	1.89	9.64	11.54	0.02	0.00	0.00	17.80	107.49
Refrigerants	0.00	0.00	0.00	0.00	0.00	0.16	0.16	0.98
Total Emissions	12.46	1,112.78	1,125.24	1.14	0.05	1.45	**1,173.87**	**7,466.71**
Construction[7]	0.00	17.80	17.80	0.00	0.00	0.01	18.04	**13,510.10**
Combined Emissions	12.46	1,130.58	1,143.04	1.14	0.05	1.46	**1,191.91**	-
AVAQMD GHG Thresholds							**100,000**	**548,000**
Exceeds Threshold?							**No**	**No**

Notes:
[1] Source: CalEEMod Version 2022.1.1.37
[2] Area sources consist of GHG emissions from consumer products, architectural coatings, and landscape equipment.
[3] Energy usage consist of GHG emissions from electricity and natural gas usage.
[4] Mobile sources consist of GHG emissions from vehicles.
[5] Solid waste includes the CO_2 and CH_4 emissions created from the solid waste placed in landfills.
[6] Water includes GHG emissions from electricity used for transport of water and processing of wastewater.
[7] Construction GHG emissions based on a 30-year amortization rate.

7.3 Greenhouse Gas Plan Consistency

CARB Scoping Plan Consistency

The ARB Board approved a Climate Change Scoping Plan in December 2008. The Scoping Plan outlines the State's strategy to achieve the 2020 greenhouse gas emissions limit. The Scoping Plan "proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health" (California Air Resources Board 2008). The measures in the Scoping Plan have been in place since 2012.

This Scoping Plan calls for an "ambitious but achievable" reduction in California's greenhouse gas emissions, cutting approximately 30 percent from business-as-usual emission levels projected for 2020, or about 10 percent from today's levels. On a per-capita basis, that means reducing annual emissions of 14 tons of carbon dioxide for every man, woman and child in California down to about 10 tons per person by 2020.

In May 2014, CARB released its *First Update to the Climate Change Scoping Plan* (CARB 2014). This *Update* identifies the next steps for California's leadership on climate change. While California continues on its path to meet the near-term 2020 greenhouse gas limit, it must also set a clear path toward long-term, deep GHG emission reductions. This report highlights California's success to date in reducing its GHG emissions and lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050.

In November 2017, CARB release the 2017 Scoping Plan. This Scoping Plan incorporates, coordinates, and leverages many existing and ongoing efforts and identifies new policies and actions to accomplish the State's climate goals, and includes a description of a suite of specific actions to meet the State's 2030 GHG limit. In addition, Chapter 4 provides a broader description of the many actions and proposals being explored across the sectors, including the natural resources sector, to achieve the State's mid and long-term climate goals.

Guided by legislative direction, the actions identified in the 2017 Scoping Plan reduce overall GHG emissions in California and deliver policy signals that will continue to drive investment and certainty in a low carbon economy. The 2017 Scoping Plan builds upon the successful framework established by the Initial Scoping Plan and First Update, while identifying new, technologically feasible, and cost-effective strategies to ensure that California meets its GHG reduction targets in a way that promotes and rewards innovation, continues to foster economic growth, and delivers improvements to the environment and public health, including in disadvantaged communities. The Plan includes policies to require direct GHG reductions at some of the State's largest stationary sources and mobile sources. These policies include the use of lower GHG fuels, efficiency regulations, and the Cap-and Trade Program, which constrains and reduces emissions at covered sources.

As the latest, the 2022 Scoping Plan builds upon previous versions, project consistency with applicable strategies of both the 2008 and 2017 Plan are assessed in Table 11. As shown in Table 11, the project is consistent with the applicable strategies and would result in a less than significant impact.

Therefore, the project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. Furthermore, the project will also comply with applicable Green Building Standards and City of Palmdale's policies regarding sustainability (as dictated by the City's General Plan). With incorporation of regulatory compliance and credit for reductions due to CAPCOA location-based efficiency measures, impacts are considered to be less than significant, further analysis is not warranted.

Table 11: Project Consistency with CARB Scoping Plan Policies and Measures[1]

2008 Scoping Plan Measures to Reduce Greenhouse Gas Emissions	Project Compliance with Measure
California Light-Duty Vehicle Greenhouse Gas Standards – Implement adopted standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Energy Efficiency – Maximize energy efficiency building and appliance standards; pursue additional efficiency including new technologies, policy, and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California.	Consistent. The project will be compliant with the current Title 24 standards.

Low Carbon Fuel Standard – Develop and adopt the Low Carbon Fuel Standard.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Vehicle Efficiency Measures – Implement light-duty vehicle efficiency measures.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Medium/Heavy-Duty Vehicles – Adopt medium and heavy-duty vehicle efficiency measures.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Green Building Strategy – Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.	Consistent. The California Green Building Standards Code (proposed Part 11, Title 24) was adopted as part of the California Building Standards Code in the CCR. Part 11 establishes voluntary standards, that are mandatory in the 2022 edition of the Code, on planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The project will be subject to these mandatory standards.
High Global Warming Potential Gases – Adopt measures to reduce high global warming potential gases.	Consistent. CARB identified five measures that reduce HFC emissions from vehicular and commercial refrigeration systems; vehicles that access the project that are required to comply with the measures will comply with the strategy.
Recycling and Waste – Reduce methane emissions at landfills. Increase waste diversion, composting, and commercial recycling. Move toward zero-waste.	Consistent. The state is currently developing a regulation to reduce methane emissions from municipal solid waste landfills. The project will be required to comply with City programs, such as the City's recycling and waste reduction program, which comply, with the 75 percent reduction required by 2020 per AB 341.
Water – Continue efficiency programs and use cleaner energy sources to move and treat water.	Consistent. The project will comply with all applicable City ordinances and CAL Green requirements.
2017 Scoping Plan Recommended Actions to Reduce Greenhouse Gas Emissions	Project Compliance with Recommended Action
Implement Mobile Source Strategy: Further increase GHG stringency on all light-duty vehicles beyond existing Advanced Clean Car regulations.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Implement Mobile Source Strategy: At least 1.5 million zero emission and plug-in hybrid light-duty electric vehicles by 2025 and at least 4.2 million zero emission and plug-in hybrid light-duty electric vehicles by 2030.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.

Implement Mobile Source Strategy: Innovative Clean Transit: Transition to a suite of to-be-determined innovative clean transit options. Assumed 20 percent of new urban buses purchased beginning in 2018 will be zero emission buses with the penetration of zero-emission technology ramped up to 100 percent of new sales in 2030. Also, new natural gas buses, starting in 2018, and diesel buses, starting in 2020, meet the optional heavy-duty low-NOX standard.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Implement Mobile Source Strategy: Last Mile Delivery: New regulation that would result in the use of low NOX or cleaner engines and the deployment of increasing numbers of zero-emission trucks primarily for class 3-7 last mile delivery trucks in California. This measure assumes ZEVs comprise 2.5 percent of new Class 3–7 truck sales in local fleets starting in 2020, increasing to 10 percent in 2025 and remaining flat through 2030.	Consistent. These are CARB enforced standards; vehicles that access the project that are required to comply with the standards will comply with the strategy.
Implement SB 350 by 2030: Establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in electricity and natural gas end uses by 2030.	Consistent. The project will be compliant with the current Title 24 standards.
By 2019, develop regulations and programs to support organic waste landfill reduction goals in the SLCP and SB 1383.	Consistent. The project will be required to comply with City programs, such as City's recycling and waste reduction program, which comply, with the 75 percent reduction required by 2020 per AB 341.
2022 Scoping Plan Recommended Actions to Reduce Greenhouse Gas Emissions	Project Compliance with Recommended Action
Deploy ZEVs and reduce driving demand	Consistent. The project will be mixed use locating retail near residential uses.
Coordinate supply of liquid fossil fuels with declining California fuel demand	Consistent. The project will be compliant with the current Title 24 standards.
Generate clean electricity	Consistent. The project will be compliant with the current Title 24 standards and would not interfere with clean energy generation.
Decarbonize industrial energy supply	Consistent. The project will be compliant with the current Title 24 standards and would be commercial, therefore would not interfere with this goal.
Decarbonize buildings	Consistent. The project will be compliant with the current Title 24 standards.
Reduce non-combustion emissions	Consistent. The project will be compliant with the current Title 24 standards.
Notes: [1] Source: CARB Scoping Plan (2008, 2017, and 2022)	

7.4 Cumulative Regional Greenhouse Gas Impacts

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of emissions is from mobile sources, which travel well out of the local area. Therefore, from a greenhouse gas standpoint, the cumulative analysis

would extend beyond any local projects and when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for the Project's greenhouse gas impacts must be generic by nature.

Construction and operation of cumulative projects will add to greenhouse gas emissions. The greatest cumulative impact will be the incremental addition of pollutants mainly from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with the construction of these projects. Greenhouse gas emissions will temporarily increase during construction activities that occur separately or simultaneously. However, in accordance with the AVAQMD methodology, projects that do not exceed the AVAQMD criteria or can be mitigated to less than criteria levels are not significant and do not add to the overall cumulative impact. The Project does not exceed any of the thresholds of significance and therefore is considered less than significant.

8.0 Energy Analysis

Information from the CalEEMod 2022.1.1.37 Daily and Annual Outputs contained in the air quality and greenhouse gas analyses above was utilized for this analysis. The CalEEMod outputs detail project related construction equipment, transportation energy demands, and facility energy demands. As shown in this Section, the project will not result in wasteful or inefficient use of energy and will therefore have a less than significant impact in regards to energy usage.

8.1 Construction Energy Demand

8.1.1 Construction Equipment Electricity Usage Estimates

Electrical service will be provided by Southern California Edison (SCE). Based on the 2017 National Construction Estimator, Richard Pray (2017)[2], the typical power cost per 1,000 square feet of building construction per month is estimated to be $2.32. The project plans to develop the site with 137,378 square feet of new development over the course of approximately 13 months. Based on Table 12, the total power cost of the on-site electricity usage during the construction of the proposed project is estimated to be approximately $4,143.32. As shown in Table 12, the total electricity usage from Project construction related activities is estimated to be approximately 75,333 kWh.[3]

Table 12: Project Construction Power Cost and Electricity Usage

Power Cost (per 1,000 square foot of building per month of construction)	Total Project Size (1,000 Square Foot)[1]	Construction Duration (months)	Total Project Construction Power Cost
$2.32	137.378	13	$4,143.32

Cost per kWh	Total Project Construction Electricity Usage (kWh)
$0.06	75,333

* Assumes the project will be under the GS-1 General Service rate under SCE.

[2] Pray, Richard. 2017 National Construction Estimator. Carlsbad: Craftsman Book Company, 2017.
[3] LADWP's Small Commercial & Multi-Family Service (A-1) is approximately $0.06 per kWh of electricity Southern California Edison (SCE). Rates & Pricing Choices: General Service/Industrial Rates. https://library.sce.com/content/dam/sce-doclib/public/regulatory/historical/electric/2020/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_GS-1_2020.pdf

8.1.2 Construction Equipment Fuel Estimates

Using the CalEEMod data input, the project's construction phase would consume electricity and fossil fuels as a single energy demand, that is, once construction is completed their use would cease. CARB's 2017 Emissions Factors Tables show that on average aggregate fuel consumption (gasoline and diesel fuel) would be approximately 18.5 hp-hr-gal.[4] As presented in Table 13 below, project construction activities would consume an estimated 28,837 gallons of diesel fuel.

Table 13: Construction Equipment Fuel Consumption Estimates

Phase	Number of Days	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	HP hrs/ day	Total Fuel Consumption (gal diesel fuel)[1,2]
Site Preparation	5	Rubber Tired Dozers	3	8	367	0.4	3,523	952
	5	Tractors/Loaders/Backhoes	4	8	84	0.37	995	269
Grading	8	Graders	1	8	148	0.41	485	210
	8	Excavators	1	8	36	0.38	109	47
	8	Rubber Tired Dozers	1	8	367	0.4	1,174	508
	8	Tractors/Loaders/Backhoes	3	7	84	0.37	653	282
Building Construction	230	Cranes	1	7	367	0.29	745	9,262
	230	Forklifts	3	8	82	0.2	394	4,893
	230	Generator Sets	1	8	14	0.74	83	1,030
	230	Tractors/Loaders/Backhoes	3	7	84	0.37	653	8,114
	230	Welders	1	8	46	0.45	166	2,059
Paving	18	Cement and Mortar Mixers	2	6	10	0.56	67	65
	18	Pavers	1	8	81	0.42	272	265
	18	Paving Equipment	2	6	89	0.36	384	374
	18	Rollers	2	6	36	0.38	164	160
	18	Tractors/Loaders/Backhoes	1	8	84	0.37	249	242
Architectural Coating	18	Air Compressors	1	6	37	0.48	107	104
CONSTRUCTION FUEL DEMAND (gallons of diesel fuel)								**28,837**

Notes:
[1]Using Carl Moyer Guidelines Table D-21 Fuel consumption rate factors (bhp-hr/gal) for engines less than 750 hp.
(Source: https://www.arb.ca.gov/msprog/moyer/guidelines/2017gl/2017_gl_appendix_d.pdf)
[2]Discrepancies are due to rounding.

8.1.3 Construction Worker Fuel Estimates

It is assumed that all construction worker trips are from light duty autos (LDA) along area roadways. With respect to estimated VMT, the construction worker trips would generate an estimated 508,347

[4] Aggregate fuel consumption rate for all equipment was estimated at 18.5 hp-hr/day (from CARB's 2017 Emissions Factors Tables and fuel consumption rate factors as shown in Table D-21 of the Moyer Guidelines: (https://www.arb.ca.gov/msprog/moyer/guidelines/2017gl/2017_gl_appendix_d.pdf).

VMT. Vehicle fuel efficiencies for construction workers were estimated in the air quality and greenhouse gas analysis using information generated using CARB's EMFAC model (see Appendix B for details). Table 14 shows that an estimated 16,425 gallons of fuel would be consumed for construction worker trips.

Table 14: Construction Worker Fuel Consumption Estimates

Phase	Number of Days	Worker Trips/Day	Trip Length (miles)[1]	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)[2]
Site Preparation	5	17.5	18.5	1,619	30.95	52
Grading	8	15	18.5	2,220	30.95	72
Building Construction	230	115.2	18.5	490,176	30.95	15,838
Paving	18	20	18.5	6,660	30.95	215
Architectural Coating	18	23.04	18.5	7,672	30.95	248
Total Construction Worker Fuel Consumption						**16,425**

Notes:
[1]Assumptions for the worker trip length and vehicle miles traveled are consistent with CalEEMod 2022.1.1.37 defaults.
[2]Discrepancies are due to rounding.

8.1.4 Construction Vendor/Hauling Fuel Estimates

Tables 15 and 16 show the estimated fuel consumption for vendor and hauling during building construction and architectural coating. With respect to estimated VMT, the vendor and hauling trips would generate an estimated 66,044 VMT. For the architectural coatings it is assumed that the contractors would be responsible for bringing coatings and equipment with them in their light duty vehicles. Tables 15 and 16 show that an estimated 8,161 gallons of fuel would be consumed for vendor and hauling trips.

Table 15: Construction Vendor Fuel Consumption Estimates (MHD Trucks)[1]

Phase	Number of Days	Vendor Trips/Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Site Preparation	5	0	10.2	0	9.22	0
Grading	8	0	10.2	0	9.22	0
Building Construction	230	17.104	10.2	40,126	9.22	4,352
Paving	18	5	10.2	918	9.22	100
Architectural Coating	18	0	10.2	0	9.22	0
Total Vendor Fuel Consumption						**4,452**

Notes:
[1] Assumptions for the vendor trip length and vehicle miles traveled are consistent with CalEEMod 2022.1.1.37 defaults.

Table 16: Construction Hauling Fuel Consumption Estimates (HHD Trucks)[1]

Phase	Number of Days	Hauling Trips/Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Site Preparation	5	0	20	0	6.74	0
Grading	8	156.25	20	25,000	6.74	3,709
Building Construction	230	0	20	0	6.74	0
Paving	18	0	20	0	6.74	0
Architectural Coating	18	0	20	0	6.74	0
Total Construction Hauling Fuel Consumption						**3,709**

Notes:
[1]Assumptions for the hauling trip length and vehicle miles traveled are consistent with CalEEMod 2022.1.1.37 defaults.

8.1.5 Construction Energy Efficiency/Conservation Measures

Construction equipment used over the approximately 13-month construction phase would conform to CARB regulations and California emissions standards and is evidence of related fuel efficiencies. In addition, the CARB Airborne Toxic Control Measure limits idling times of construction vehicles to no more than five minutes, thereby minimizing unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. Furthermore, the project has been designed in compliance with California's Energy Efficiency Standards and 2022 CALGreen Standards.

Construction of the proposed residential development would require the typical use of energy resources. There are no unusual project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities; or equipment that would not conform to current emissions standards (and related fuel efficiencies). Equipment employed in construction of the project would therefore not result in inefficient wasteful, or unnecessary consumption of fuel and a less than significant impact.

8.2 Operational Energy Demand

Energy consumption in support of or related to project operations would include transportation energy demands (energy consumed by employee and patron vehicles accessing the project site) and facilities energy demands (energy consumed by building operations and site maintenance activities).

8.2.1 Transportation Fuel Consumption

The largest source of operational energy use would be vehicle operation of customers. The site is located in an urbanized area just in close proximity to transit stops. Using the CalEEMod output, it is assumed that an average trip to be 8.84 miles for all vehicles. To show a worst-case analysis, as the proposed project is a residential project, it was assumed that vehicles would operate 365 days per

year. Table 17 shows the worst-case estimated annual fuel consumption for all classes of vehicles from autos to heavy-heavy trucks.[5] Table 17 shows that an estimated 98,425 gallons of fuel would be consumed per year for the operation of the proposed project.

Table 17: Estimated Vehicle Operations Fuel Consumption

Vehicle Type	Vehicle Mix	Number of Vehicles	Average Trip (miles)[1]	Daily VMT	Average Fuel Economy (mpg)	Total Gallons per Day	Total Annual Fuel Consumption (gallons)
Light Auto	Automobile	422.5	8.8363	3,733	31.82	117.32	42,823
Light Truck	Automobile	44.3	8.8363	391	27.16	14.40	5,255
Light Truck	Automobile	136.4	8.8363	1,205	25.6	47.07	17,181
Medium Truck	Automobile	111.4	8.8363	984	20.81	47.30	17,263
Light Heavy Truck	2-Axle Truck	21.0	8.8363	186	13.81	13.44	4,907
Light Heavy Truck 10,000 lbs +	2-Axle Truck	5.8	8.8363	51	14.18	3.60	1,313
Medium Heavy Truck	3-Axle Truck	8.9	8.8363	79	9.58	8.25	3,012
Heavy Heavy Truck	4-Axle Truck	14.8	8.8363	130	7.14	18.27	6,670
Total		765	--	6,760	--	269.66	--
Total Annual Fuel Consumption							**98,425**

Notes:
[1] The trip generation assessment, the project is to generate 765 total net new trips after reduction of existing uses. Default CalEEMod vehicle fleet mix utilized.
[1]Based on the size of the site and relative location, trips were assumed to be local rather than regional.

Trip generation generated by the proposed project are consistent with other similar residential uses of similar scale and configuration as reflected in the traffic analysis. That is, the proposed project does not propose uses or operations that would inherently result in excessive and wasteful vehicle trips, nor associated excess and wasteful vehicle energy consumption. Therefore, project transportation energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

8.2.2 Facility Energy Demands (Electricity and Natural Gas)

The annual natural gas and electricity demands were provided per the CalEEMod output and are provided in Table 18.

Table 18: Project Unmitigated Annual Operational Energy Demand Summary[1]

Natural Gas Demand	kBTU/year
Condo/Townhouse High Rise	1,777,095
Total	1,777,095
Electricity Demand	**kWh/year**
Condo/Townhouse High Rise	586,533
Parking Lot	707,877
Total	586,533

Notes:

[5] Average fuel economy based on aggregate mileage calculated in EMFAC 2017 for opening year (2023). See Appendix D for EMFAC output.

[1]Taken from the CalEEMod 2022.1.1.37 annual output.

As shown in Table 18, the estimated electricity demand for the proposed project is approximately 586,533 kWh per year. In 2024, the residential sector of the County of Los Angeles consumed approximately 21,554 million kWh of electricity.[6] In addition, the estimated natural gas consumption for the proposed project is approximately 1,777,095 kBTU per year. In 2024, the residential sector of the County of Los Angeles consumed approximately 1,081 million therms of gas.[7] Therefore, the increase in both electricity and natural gas demand from the proposed project is insignificant compared to the County's 2024 demand.

8.3 Renewable Energy and Energy Efficiency Plan Consistency

Regarding federal transportation regulations, the project site is located in an already developed area. Access to/from the project site is from existing roads. These roads are already in place so the project would not interfere with, nor otherwise obstruct intermodal transportation plans or projects that may be proposed pursuant to the ISTEA because SCAG is not planning for intermodal facilities in the project area.

Regarding the State's Energy Plan and compliance with Title 24 CCR energy efficiency standards, the applicant is required to comply with the California Green Building Standard Code requirements for energy efficient buildings and appliances as well as utility energy efficiency programs implemented by the SCE and Southern California Gas Company.

Regarding the State's Renewable Energy Portfolio Standards, the project would be required to meet or exceed the energy standards established in the California Green Building Standards Code, Title 24, Part 11 (CALGreen). CalGreen Standards require that new buildings reduce water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and install low pollutant-emitting finish materials.

The project will be consistent with all relevant renewable energy and energy efficiency plans and will therefore have a less than significant impact.

[6] California Energy Commission, Electricity Consumption. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-consumption-dashboards-0.
[7] California Energy Commission, Natural Gas Consumption. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-consumption-dashboards-1.

9.0 References

The following references were used in the preparing this analysis.

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2016 Antelope Valley AQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines. August.

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2008 Climate Change Scoping Plan, a framework for change.

2011 Supplement to the AB 32 Scoping Plan Functional Equivalent Document

2014 First Update to the Climate Change Scoping Plan, Building on the Framework Pursuant to AB32, the California Global Warming Solutions Act of 2006. May.

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City of Palmdale

2023 City of Palmdale General Plan. March 15.

Governor's Office of Planning and Research

2008 CEQA and Climate: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review

2009 CEQA Guideline Sections to be Added or Amended

Integrated Engineering Group

2023 Maverik Gas Station Traffic Impact Analysis

Office of Environmental Health Hazard Assessment

2015 Air Toxics Hot Spots Program Risk Assessment Guidelines

Appendix A:

CalEEMod Output

42nd St Palmdale Multifamily Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	42nd St Palmdale Multifamily
Construction Start Date	1/1/2027
Operational Year	2028
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.50000
Precipitation (days)	13.0000
Location	34.55737009976242, -118.05387480282177
County	Los Angeles-Mojave Desert
City	Palmdale
Air District	Antelope Valley AQMD
Air Basin	Mojave Desert
TAZ	3633
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.37

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
Condo/Townhouse High Rise	160.000	Dwelling Unit	1.39000	137,378	0.00000	—	474.000	—

Parking Lot	3.18000	Acre	3.18000	0.00000	82,028.0	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

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

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.65649	10.4311	23.2623	0.02724	0.34042	1.65211	1.99253	0.31349	0.39338	0.70688	—	4,499.98	4,499.98	0.16529	0.14884	6.86419	4,555.33
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	62.0588	28.0644	29.3182	0.09967	1.17173	7.89497	9.06671	1.07799	3.99357	5.07157	—	13,030.7	13,030.7	0.22590	1.59536	0.53951	13,510.1
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	3.13920	7.45450	13.7203	0.01970	0.24269	1.25047	1.49316	0.22370	0.34360	0.56730	—	3,059.21	3,059.21	0.11152	0.12772	2.03372	3,102.09
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.57290	1.36045	2.50395	0.00360	0.04429	0.22821	0.27250	0.04083	0.06271	0.10353	—	506.487	506.487	0.01846	0.02114	0.33671	513.586

2.2. Construction Emissions by Year, Unmitigated

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

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

2027	1.65649	10.4311	23.2623	0.02724	0.34042	1.65211	1.99253	0.31349	0.39338	0.70688	—	4,499.98	4,499.98	0.16529	0.14884	6.86419	4,555.33
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	3.12925	28.0644	29.3182	0.09967	1.17173	7.89497	9.06671	1.07799	3.99357	5.07157	—	13,030.7	13,030.7	0.22590	1.59536	0.53951	13,510.1
2028	62.0588	9.97032	19.5589	0.02725	0.30408	1.65211	1.95620	0.28007	0.39338	0.67345	—	4,285.12	4,285.12	0.16785	0.14500	0.16230	4,332.69
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	1.04566	7.45450	13.7203	0.01970	0.24269	1.25047	1.49316	0.22370	0.34360	0.56730	—	3,059.21	3,059.21	0.11152	0.12772	2.03372	3,102.09
2028	3.13920	0.48384	0.90208	0.00115	0.01535	0.05205	0.06741	0.01413	0.01237	0.02650	—	166.008	166.008	0.00657	0.00462	0.08507	167.633
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2027	0.19083	1.36045	2.50395	0.00360	0.04429	0.22821	0.27250	0.04083	0.06271	0.10353	—	506.487	506.487	0.01846	0.02114	0.33671	513.586
2028	0.57290	0.08830	0.16463	0.00021	0.00280	0.00950	0.01230	0.00258	0.00226	0.00484	—	27.4845	27.4845	0.00109	0.00076	0.01409	27.7536

2.4. Operations Emissions Compared Against Thresholds

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

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	7.64581	2.95154	35.1982	0.05624	0.07719	4.78948	4.86667	0.07386	1.21601	1.28987	75.2463	7,091.95	7,167.20	7.91654	0.27704	19.0356	7,466.71
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	6.46208	3.07587	20.8226	0.05123	0.07296	4.78948	4.86245	0.07068	1.21601	1.28669	75.2463	6,601.70	6,676.95	7.93044	0.28729	1.45195	6,962.27
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	6.86990	3.17554	26.9093	0.05249	0.07505	4.74961	4.82466	0.07225	1.20604	1.27829	75.2463	6,721.26	6,796.50	7.93405	0.29066	8.77845	7,090.25
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.25376	0.57954	4.91094	0.00958	0.01370	0.86680	0.88050	0.01319	0.22010	0.23329	12.4579	1,112.78	1,125.24	1.31357	0.04812	1.45337	1,173.87

2.5. Operations Emissions by Sector, Unmitigated

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

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.57261	2.41689	25.9139	0.05298	0.03666	4.78948	4.82615	0.03438	1.21601	1.25039	—	5,408.18	5,408.18	0.24729	0.23973	18.0517	5,503.85
Area	4.04696	0.08596	9.09329	0.00039	0.00425	—	0.00425	0.00320	—	0.00320	—	24.2700	24.2700	0.00101	0.00020	—	24.3553
Energy	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	1,601.26	1,601.26	0.11440	0.00883	—	1,606.75
Water	—	—	—	—	—	—	—	—	—	—	11.4281	58.2505	69.6785	1.17543	0.02828	—	107.492
Waste	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Total	7.64581	2.95154	35.1982	0.05624	0.07719	4.78948	4.86667	0.07386	1.21601	1.28987	75.2463	7,091.95	7,167.20	7.91654	0.27704	19.0356	7,466.71
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.18001	2.62718	20.6316	0.04837	0.03669	4.78948	4.82617	0.03441	1.21601	1.25041	—	4,942.20	4,942.20	0.26221	0.25018	0.46805	5,023.77
Area	3.25581	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	1,601.26	1,601.26	0.11440	0.00883	—	1,606.75
Water	—	—	—	—	—	—	—	—	—	—	11.4281	58.2505	69.6785	1.17543	0.02828	—	107.492
Waste	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Total	6.46208	3.07587	20.8226	0.05123	0.07296	4.78948	4.86245	0.07068	1.21601	1.28669	75.2463	6,601.70	6,676.95	7.93044	0.28729	1.45195	6,962.27
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.19768	2.68446	22.2340	0.04943	0.03667	4.74961	4.78628	0.03439	1.20604	1.24043	—	5,049.78	5,049.78	0.26531	0.25345	7.79455	5,139.74
Area	3.64597	0.04239	4.48436	0.00019	0.00210	—	0.00210	0.00158	—	0.00158	—	11.9687	11.9687	0.00050	0.00010	—	12.0109
Energy	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	1,601.26	1,601.26	0.11440	0.00883	—	1,606.75
Water	—	—	—	—	—	—	—	—	—	—	11.4281	58.2505	69.6785	1.17543	0.02828	—	107.492
Waste	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Total	6.86990	3.17554	26.9093	0.05249	0.07505	4.74961	4.82466	0.07225	1.20604	1.27829	75.2463	6,721.26	6,796.50	7.93405	0.29066	8.77845	7,090.25
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.58358	0.48991	4.05770	0.00902	0.00669	0.86680	0.87350	0.00628	0.22010	0.22638	—	836.049	836.049	0.04393	0.04196	1.29048	850.942
Area	0.66539	0.00774	0.81840	0.00004	0.00038	—	0.00038	0.00029	—	0.00029	—	1.98156	1.98156	0.00008	0.00002	—	1.98853
Energy	0.00479	0.08189	0.03484	0.00052	0.00662	—	0.00662	0.00662	—	0.00662	—	265.106	265.106	0.01894	0.00146	—	266.015
Water	—	—	—	—	—	—	—	—	—	—	1.89205	9.64403	11.5361	0.19461	0.00468	—	17.7965
Waste	—	—	—	—	—	—	—	—	—	—	10.5658	0.00000	10.5658	1.05602	0.00000	—	36.9663
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.16290	0.16290
Total	1.25376	0.57954	4.91094	0.00958	0.01370	0.86680	0.88050	0.01319	0.22010	0.23329	12.4579	1,112.78	1,125.24	1.31357	0.04812	1.45337	1,173.87

3. Construction Emissions Details

3.1. Site Preparation (2027) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.05170	27.9724	28.2794	0.04891	1.17173	—	1.17173	1.07799	—	1.07799	—	5,297.82	5,297.82	0.21490	0.04298	—	5,316.00
Dust From Material Movement	—	—	—	—	—	7.66623	7.66623	—	3.93995	3.93995	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04180	0.38318	0.38739	0.00067	0.01605	—	0.01605	0.01477	—	0.01477	—	72.5729	72.5729	0.00294	0.00059	—	72.8219
Dust From Material Movement	—	—	—	—	—	0.10502	0.10502	—	0.05397	0.05397	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00763	0.06993	0.07070	0.00012	0.00293	—	0.00293	0.00269	—	0.00269	—	12.0153	12.0153	0.00049	0.00010	—	12.0565
Dust From Material Movement	—	—	—	—	—	0.01917	0.01917	—	0.00985	0.00985	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07755	0.09202	1.03879	0.00000	0.00000	0.22874	0.22874	0.00000	0.05362	0.05362	—	217.407	217.407	0.01100	0.00868	0.02256	220.292
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00107	0.00136	0.01597	0.00000	0.00000	0.00311	0.00311	0.00000	0.00073	0.00073	—	3.06368	3.06368	0.00015	0.00012	0.00515	3.10803
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00019	0.00025	0.00291	0.00000	0.00000	0.00057	0.00057	0.00000	0.00013	0.00013	—	0.50723	0.50723	0.00002	0.00002	0.00085	0.51457
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.3. Grading (2027) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.58640	14.2321	17.2743	0.02733	0.59767	—	0.59767	0.54986	—	0.54986	—	2,960.07	2,960.07	0.12007	0.02401	—	2,970.23
Dust From Material Movement	—	—	—	—	—	2.81739	2.81739	—	1.34400	1.34400	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03477	0.31194	0.37862	0.00060	0.01310	—	0.01310	0.01205	—	0.01205	—	64.8783	64.8783	0.00263	0.00053	—	65.1009
Dust From Material Movement	—	—	—	—	—	0.06175	0.06175	—	0.02946	0.02946	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.00635	0.05693	0.06910	0.00011	0.00239	—	0.00239	0.00220	—	0.00220	—	10.7413	10.7413	0.00044	0.00009	—	10.7782
Dust From Material Movement	—	—	—	—	—	0.01127	0.01127	—	0.00538	0.00538	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06647	0.07887	0.89039	0.00000	0.00000	0.19606	0.19606	0.00000	0.04596	0.04596	—	186.349	186.349	0.00942	0.00744	0.01933	188.821
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.19290	10.4444	2.51465	0.07234	0.13779	2.89687	3.03466	0.13779	0.79311	0.93090	—	9,884.25	9,884.25	0.01033	1.56390	0.52018	10,351.1
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00146	0.00187	0.02190	0.00000	0.00000	0.00426	0.00426	0.00000	0.00100	0.00100	—	4.20162	4.20162	0.00021	0.00016	0.00706	4.26244
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00445	0.22809	0.05429	0.00159	0.00302	0.06309	0.06611	0.00302	0.01728	0.02030	—	216.531	216.531	0.00023	0.03428	0.18980	226.941
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00027	0.00034	0.00400	0.00000	0.00000	0.00078	0.00078	0.00000	0.00018	0.00018	—	0.69563	0.69563	0.00003	0.00003	0.00117	0.70570
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00081	0.04163	0.00991	0.00029	0.00055	0.01151	0.01206	0.00055	0.00315	0.00371	—	35.8491	35.8491	0.00004	0.00568	0.03142	37.5726

3.5. Building Construction (2027) - Unmitigated

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

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

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.02988	9.39093	12.9379	0.02340	0.33657	—	0.33657	0.30965	—	0.30965	—	2,397.08	2,397.08	0.09724	0.01945	—	2,405.30
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.02988	9.39093	12.9379	0.02340	0.33657	—	0.33657	0.30965	—	0.30965	—	2,397.08	2,397.08	0.09724	0.01945	—	2,405.30
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.63687	5.80731	8.00077	0.01447	0.20814	—	0.20814	0.19149	—	0.19149	—	1,482.34	1,482.34	0.06013	0.01203	—	1,487.43
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11623	1.05983	1.46014	0.00264	0.03798	—	0.03798	0.03495	—	0.03495	—	245.419	245.419	0.00996	0.00199	—	246.261
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.61334	0.55366	10.1411	0.00000	0.00000	1.50577	1.50577	0.00000	0.35295	0.35295	—	1,609.61	1,609.61	0.06730	0.05714	5.73117	1,634.05
Vendor	0.01327	0.48651	0.18318	0.00385	0.00385	0.14634	0.15019	0.00385	0.04043	0.04428	—	493.289	493.289	0.00075	0.07225	1.13301	515.971
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.51048	0.60572	6.83821	0.00000	0.00000	1.50577	1.50577	0.00000	0.35295	0.35295	—	1,431.16	1,431.16	0.07238	0.05714	0.14849	1,450.15
Vendor	0.01214	0.51320	0.18884	0.00422	0.00385	0.14634	0.15019	0.00385	0.04043	0.04428	—	493.828	493.828	0.00075	0.07225	0.02943	515.406
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.31725	0.40520	4.74621	0.00000	0.00000	0.92339	0.92339	0.00000	0.21632	0.21632	—	910.431	910.431	0.04476	0.03534	1.52900	923.610
Vendor	0.00797	0.31554	0.11515	0.00238	0.00238	0.08986	0.09224	0.00238	0.02484	0.02722	—	305.188	305.188	0.00047	0.04468	0.30271	318.817
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.05790	0.07395	0.86618	0.00000	0.00000	0.16852	0.16852	0.00000	0.03948	0.03948	—	150.732	150.732	0.00741	0.00585	0.25314	152.914
Vendor	0.00146	0.05759	0.02101	0.00043	0.00043	0.01640	0.01683	0.00043	0.00453	0.00497	—	50.5274	50.5274	0.00008	0.00740	0.05012	52.7838
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.7. Building Construction (2028) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.99143	8.92495	12.9352	0.02340	0.30024	—	0.30024	0.27622	—	0.27622	—	2,397.46	2,397.46	0.09725	0.01945	—	2,405.68
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01358	0.12226	0.17720	0.00032	0.00411	—	0.00411	0.00378	—	0.00378	—	32.8419	32.8419	0.00133	0.00027	—	32.9546

Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00248	0.02231	0.03234	0.00006	0.00075	—	0.00075	0.00069	—	0.00069	—	5.43735	5.43735	0.00022	0.00004	—	5.45601
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.49271	0.55366	6.44328	0.00000	0.00000	1.50577	1.50577	0.00000	0.35295	0.35295	—	1,405.92	1,405.92	0.06984	0.05714	0.13639	1,424.84
Vendor	0.01214	0.49171	0.18039	0.00385	0.00385	0.14634	0.15019	0.00385	0.04043	0.04428	—	481.740	481.740	0.00075	0.06840	0.02591	502.169
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00682	0.00826	0.09841	0.00000	0.00000	0.02045	0.02045	0.00000	0.00479	0.00479	—	19.8111	19.8111	0.00096	0.00078	0.03111	20.0994
Vendor	0.00018	0.00675	0.00243	0.00005	0.00005	0.00199	0.00204	0.00005	0.00055	0.00060	—	6.59491	6.59491	0.00001	0.00094	0.00591	6.88031
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00124	0.00151	0.01796	0.00000	0.00000	0.00373	0.00373	0.00000	0.00087	0.00087	—	3.27995	3.27995	0.00016	0.00013	0.00515	3.32768
Vendor	0.00003	0.00123	0.00044	0.00001	0.00001	0.00036	0.00037	0.00001	0.00010	0.00011	—	1.09186	1.09186	< 0.000005	0.00016	0.00098	1.13911
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.9. Paving (2028) - Unmitigated

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

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

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.62588	5.84990	8.80025	0.01296	0.21041	—	0.21041	0.19358	—	0.19358	—	1,350.28	1,350.28	0.05477	0.01095	—	1,354.92
Paving	0.46287	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03087	0.28849	0.43398	0.00064	0.01038	—	0.01038	0.00955	—	0.00955	—	66.5892	66.5892	0.00270	0.00054	—	66.8177
Paving	0.02283	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00563	0.05265	0.07920	0.00012	0.00189	—	0.00189	0.00174	—	0.00174	—	11.0246	11.0246	0.00045	0.00009	—	11.0624
Paving	0.00417	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.08554	0.09612	1.11863	0.00000	0.00000	0.26142	0.26142	0.00000	0.06128	0.06128	—	244.084	244.084	0.01213	0.00992	0.02368	247.367
Vendor	0.00355	0.14374	0.05273	0.00112	0.00112	0.04278	0.04390	0.00112	0.01182	0.01294	—	140.827	140.827	0.00022	0.02000	0.00757	146.799

Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00426	0.00516	0.06150	0.00000	0.00000	0.01278	0.01278	0.00000	0.00299	0.00299	—	12.3819	12.3819	0.00060	0.00049	0.01944	12.5621
Vendor	0.00019	0.00711	0.00256	0.00006	0.00006	0.00209	0.00215	0.00006	0.00058	0.00063	—	6.94039	6.94039	0.00001	0.00099	0.00622	7.24073
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00078	0.00094	0.01122	0.00000	0.00000	0.00233	0.00233	0.00000	0.00055	0.00055	—	2.04997	2.04997	0.00010	0.00008	0.00322	2.07980
Vendor	0.00003	0.00130	0.00047	0.00001	0.00001	0.00038	0.00039	0.00001	0.00011	0.00012	—	1.14906	1.14906	< 0.000005	0.00016	0.00103	1.19879
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

3.11. Architectural Coating (2028) - Unmitigated

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

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.10731	0.80814	1.11833	0.00173	0.01536	—	0.01536	0.01413	—	0.01413	—	133.517	133.517	0.00542	0.00108	—	133.975
Architectural Coatings	61.8530	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.00529	0.03985	0.05515	0.00009	0.00076	—	0.00076	0.00070	—	0.00070	—	6.58440	6.58440	0.00027	0.00005	—	6.60700
Architectural Coatings	3.05028	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.00097	0.00727	0.01006	0.00002	0.00014	—	0.00014	0.00013	—	0.00013	—	1.09012	1.09012	0.00004	0.00001	—	1.09386
Architectural Coatings	0.55668	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.09854	0.11073	1.28866	0.00000	0.00000	0.30115	0.30115	0.00000	0.07059	0.07059	—	281.185	281.185	0.01397	0.01143	0.02728	284.967
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00491	0.00595	0.07085	0.00000	0.00000	0.01473	0.01473	0.00000	0.00345	0.00345	—	14.2640	14.2640	0.00069	0.00056	0.02240	14.4716
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00090	0.00109	0.01293	0.00000	0.00000	0.00269	0.00269	0.00000	0.00063	0.00063	—	2.36157	2.36157	0.00011	0.00009	0.00371	2.39593
Vendor	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Hauling	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Mobile source emissions results are presented in Sections 2.6. No further detailed breakdown of emissions is available.

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	854.865	854.865	0.05303	0.00643	—	858.106
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	176.858	176.858	0.01097	0.00133	—	177.528
Total	—	—	—	—	—	—	—	—	—	—	—	1,031.72	1,031.72	0.06400	0.00776	—	1,035.63
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	854.865	854.865	0.05303	0.00643	—	858.106
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	176.858	176.858	0.01097	0.00133	—	177.528

Total	—	—	—	—	—	—	—	—	—	—	—	1,031.72	1,031.72	0.06400	0.00776	—	1,035.63
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	141.533	141.533	0.00878	0.00106	—	142.069
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	29.2808	29.2808	0.00182	0.00022	—	29.3918
Total	—	—	—	—	—	—	—	—	—	—	—	170.814	170.814	0.01060	0.00128	—	171.461

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	569.533	569.533	0.05040	0.00107	—	571.112
Parking Lot	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	569.533	569.533	0.05040	0.00107	—	571.112
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	569.533	569.533	0.05040	0.00107	—	571.112
Parking Lot	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.02625	0.44869	0.19093	0.00286	0.03628	—	0.03628	0.03628	—	0.03628	—	569.533	569.533	0.05040	0.00107	—	571.112

Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	0.00479	0.08189	0.03484	0.00052	0.00662	—	0.00662	0.00662	—	0.00662	—	94.2927	94.2927	0.00834	0.00018	—	94.5542
Parking Lot	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000	0.00000	—	0.00000	—	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	0.00479	0.08189	0.03484	0.00052	0.00662	—	0.00662	0.00662	—	0.00662	—	94.2927	94.2927	0.00834	0.00018	—	94.5542

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	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	2.95078	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.30503	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.79114	0.08596	9.09329	0.00039	0.00425	—	0.00425	0.00320	—	0.00320	—	24.2700	24.2700	0.00101	0.00020	—	24.3553
Total	4.04696	0.08596	9.09329	0.00039	0.00425	—	0.00425	0.00320	—	0.00320	—	24.2700	24.2700	0.00101	0.00020	—	24.3553
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	2.95078	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Architectural	0.30503	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	3.25581	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	0.53852	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.05567	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.07120	0.00774	0.81840	0.00004	0.00038	—	0.00038	0.00029	—	0.00029	—	1.98156	1.98156	0.00008	0.00002	—	1.98853
Total	0.66539	0.00774	0.81840	0.00004	0.00038	—	0.00038	0.00029	—	0.00029	—	1.98156	1.98156	0.00008	0.00002	—	1.98853

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	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	11.4281	50.0492	61.4772	1.17492	0.02822	—	99.2593
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	8.20130	8.20130	0.00051	0.00006	—	8.23240
Total	—	—	—	—	—	—	—	—	—	—	11.4281	58.2505	69.6785	1.17543	0.02828	—	107.492
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T High Rise	—	—	—	—	—	—	—	—	—	—	11.4281	50.0492	61.4772	1.17492	0.02822	—	99.2593
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	8.20130	8.20130	0.00051	0.00006	—	8.23240
Total	—	—	—	—	—	—	—	—	—	—	11.4281	58.2505	69.6785	1.17543	0.02828	—	107.492
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/T ownhouse High Rise	—	—	—	—	—	—	—	—	—	—	1.89205	8.28621	10.1783	0.19452	0.00467	—	16.4335
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	1.35782	1.35782	0.00008	0.00001	—	1.36297
Total	—	—	—	—	—	—	—	—	—	—	1.89205	9.64403	11.5361	0.19461	0.00468	—	17.7965

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	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/T ownhouse High Rise	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/T High Rise	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	63.8182	0.00000	63.8182	6.37840	0.00000	—	223.278
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/T ownhouse High Rise	—	—	—	—	—	—	—	—	—	—	10.5658	0.00000	10.5658	1.05602	0.00000	—	36.9663
Parking Lot	—	—	—	—	—	—	—	—	—	—	0.00000	0.00000	0.00000	0.00000	0.00000	—	0.00000
Total	—	—	—	—	—	—	—	—	—	—	10.5658	0.00000	10.5658	1.05602	0.00000	—	36.9663

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

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

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/T ownhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.98390	0.98390
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condo/Townhouse High Rise	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.16290	0.16290
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.16290	0.16290

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	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

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

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

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

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

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

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

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

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

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

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

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

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

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

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

Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	1/30/2027	2/6/2027	5.00000	5.00000	—
Grading	Grading	2/7/2027	2/18/2027	5.00000	8.00000	—
Building Construction	Building Construction	2/19/2027	1/7/2028	5.00000	230.000	—
Paving	Paving	1/8/2028	2/2/2028	5.00000	18.0000	—
Architectural Coating	Architectural Coating	2/3/2028	2/28/2028	5.00000	18.0000	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00000	8.00000	367.000	0.40000
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	4.00000	8.00000	84.0000	0.37000
Grading	Graders	Diesel	Average	1.000000	8.00000	148.000	0.41000
Grading	Excavators	Diesel	Average	1.000000	8.00000	36.0000	0.38000
Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00000	8.00000	84.0000	0.37000

Grading	Rubber Tired Dozers	Diesel	Average	1.000000	8.00000	367.000	0.40000
Building Construction	Forklifts	Diesel	Average	3.00000	8.00000	82.0000	0.20000
Building Construction	Generator Sets	Diesel	Average	1.000000	8.00000	14.0000	0.74000
Building Construction	Cranes	Diesel	Average	1.000000	7.00000	367.000	0.29000
Building Construction	Welders	Diesel	Average	1.000000	8.00000	46.0000	0.45000
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00000	7.00000	84.0000	0.37000
Paving	Pavers	Diesel	Average	1.000000	8.00000	81.0000	0.42000
Paving	Paving Equipment	Diesel	Average	2.00000	6.00000	89.0000	0.36000
Paving	Rollers	Diesel	Average	2.00000	6.00000	36.0000	0.38000
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.000000	8.00000	84.0000	0.37000
Paving	Cement and Mortar Mixers	Diesel	Average	2.00000	6.00000	10.00000	0.56000
Architectural Coating	Air Compressors	Diesel	Average	1.000000	6.00000	37.0000	0.48000

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	Worker	17.5000	18.5000	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2000	HHDT,MHDT
Site Preparation	Hauling	0.00000	20.0000	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	Worker	15.0000	18.5000	LDA,LDT1,LDT2
Grading	Vendor	—	10.2000	HHDT,MHDT
Grading	Hauling	156.250	20.0000	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	Worker	115.200	18.5000	LDA,LDT1,LDT2

Building Construction	Vendor	17.1040	10.2000	HHDT,MHDT
Building Construction	Hauling	0.00000	20.0000	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	Worker	20.0000	18.5000	LDA,LDT1,LDT2
Paving	Vendor	5.00000	10.2000	HHDT,MHDT
Paving	Hauling	0.00000	20.0000	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	Worker	23.0400	18.5000	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	10.2000	HHDT,MHDT
Architectural Coating	Hauling	0.00000	20.0000	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	278,190	92,730.2	0.00000	0.00000	8,311.25

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Site Preparation	—	—	7.50000	0.00000	0.00000
Grading	—	10,000.00	8.00000	0.00000	0.00000
Paving	0.00000	0.00000	0.00000	0.00000	3.18000

5.6.2. Construction Earthmoving Control Strategies

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

5.7. Construction Paving

Phase Name	Land Use	Area Paved (acres)	% Asphalt
Paving	Condo/Townhouse High Rise	—	0%
Paving	Parking Lot	3.18000	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2027	0.00000	531.983	0.03300	0.00400
2028	0.00000	531.983	0.03300	0.00400

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
Total all Land Uses	765.000	765.000	765.000	279,225	6,759.78	6,759.78	6,759.78	2,467,319

5.10. Operational Area Sources

5.10.1. Hearths

Land Use	Hearth Type	Unmitigated (number)	Mitigated (number)
Condo/Townhouse High Rise	Wood Fireplaces	0	0

Condo/Townhouse High Rise	Gas Fireplaces	0	0
Condo/Townhouse High Rise	Propane Fireplaces	0	0
Condo/Townhouse High Rise	Electric Fireplaces	0	0
Condo/Townhouse High Rise	No Fireplaces	0	0
Condo/Townhouse High Rise	Conventional Wood Stoves	0	0
Condo/Townhouse High Rise	Catalytic Wood Stoves	0	0
Condo/Townhouse High Rise	Non-Catalytic Wood Stoves	0	0
Condo/Townhouse High Rise	Pellet Wood Stoves	0	0
Parking Lot	Wood Fireplaces	0	0
Parking Lot	Gas Fireplaces	0	0
Parking Lot	Propane Fireplaces	0	0
Parking Lot	Electric Fireplaces	0	0
Parking Lot	No Fireplaces	0	0
Parking Lot	Conventional Wood Stoves	0	0
Parking Lot	Catalytic Wood Stoves	0	0
Parking Lot	Non-Catalytic Wood Stoves	0	0
Parking Lot	Pellet Wood Stoves	0	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
278,190	92,730.2	0.00000	0.00000	8,311.25

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00000
Summer Days	day/yr	180.000

5.11. Operational Energy Consumption

5.11.1. Unmitigated

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

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Condo/Townhouse High Rise	586,533	531.983	0.0330	0.0040	1,777,095
Parking Lot	121,344	531.983	0.0330	0.0040	0.00000

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Condo/Townhouse High Rise	5,963,808	0.00000
Parking Lot	0.00000	1,327,565

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Condo/Townhouse High Rise	118.415	0.00000
Parking Lot	0.00000	0.00000

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced

Condo/Townhouse High Rise	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088.00	0.00225	2.50000	2.50000	10.00000
Condo/Townhouse High Rise	Household refrigerators and/or freezers	R-134a	1,430.00	0.11538	0.60000	0.00000	1.000000

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

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	31.0300	annual days of extreme heat
Extreme Precipitation	1.85000	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	9.14000	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	88.6994
AQ-PM	22.2775
AQ-DPM	21.7797
Drinking Water	34.7446
Lead Risk Housing	42.3062
Pesticides	0.00000
Toxic Releases	83.0708
Traffic	54.6000
Effect Indicators	—
CleanUp Sites	17.0773
Groundwater	0.00000
Haz Waste Facilities/Generators	43.2958
Impaired Water Bodies	0.00000
Solid Waste	0.00000
Sensitive Population	—
Asthma	84.6211
Cardio-vascular	83.2378
Low Birth Weights	99.6151
Socioeconomic Factor Indicators	—
Education	84.4723
Housing	62.8264
Linguistic	60.1705
Poverty	55.2387
Unemployment	92.8813

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	32.29821635
Employed	3.811112537
Median HI	41.06249198
Education	—
Bachelor's or higher	24.17554215
High school enrollment	22.2764019
Preschool enrollment	7.4554087
Transportation	—
Auto Access	80.12318748
Active commuting	18.38829719
Social	—
2-parent households	53.77903247
Voting	30.9380213
Neighborhood	—
Alcohol availability	97.0101373
Park access	32.64468112
Retail density	17.40023098
Supermarket access	50.68651354
Tree canopy	1.565507507
Housing	—
Homeownership	82.99756191
Housing habitability	41.99923008
Low-inc homeowner severe housing cost burden	24.25253433
Low-inc renter severe housing cost burden	4.965995124

Uncrowded housing	47.8121391
Health Outcomes	—
Insured adults	41.04965995
Arthritis	67.1
Asthma ER Admissions	33.5
High Blood Pressure	71.3
Cancer (excluding skin)	71.8
Asthma	43.1
Coronary Heart Disease	61.0
Chronic Obstructive Pulmonary Disease	53.7
Diagnosed Diabetes	33.2
Life Expectancy at Birth	25.6
Cognitively Disabled	36.6
Physically Disabled	32.1
Heart Attack ER Admissions	17.6
Mental Health Not Good	34.0
Chronic Kidney Disease	55.3
Obesity	24.2
Pedestrian Injuries	19.6
Physical Health Not Good	34.4
Stroke	51.7
Health Risk Behaviors	—
Binge Drinking	35.4
Current Smoker	34.8
No Leisure Time for Physical Activity	39.9
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0

Children	23.1
Elderly	81.9
English Speaking	66.5
Foreign-born	40.6
Outdoor Workers	32.5
Climate Change Adaptive Capacity	—
Impervious Surface Cover	86.0
Traffic Density	46.8
Traffic Access	23.0
Other Indices	—
Hardship	81.4
Other Decision Support	—
2016 Voting	18.4

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	65.0000
Healthy Places Index Score for Project Location (b)	23.0000
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

8.1. Justifications

Screen	Justification
Land Use	Per site plan
Construction: Construction Phases	No demolition required
Operations: Hearths	No hearths

8.3. Land Use

Model Parameter	Units	Default Value	New Value
Lot Area	acre	2.50000	1.39000
Building Area	sq. ft	153,600	137,378
Landscape Area	sq. ft	—	0.00000

Appendix B:

EMFAC2017 Output

Source: EMFAC2017 (v1.0.3) Emissions Inventory
Region Type: Air District
Region: South Coast AQMD
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Y	Vehicle Cat	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel Consumption	Fuel Consumption	Total Fuel Consumption	VMT	Total VMT	Miles Per Gallon	Vehicle Class
South Coas	2023	HHDT	Aggregate	Aggregate	Gasoline	75.10442936	8265.097	1502.689	1.936286145	1936.286145	1913466.474	8265.097	13656273.03	7.14	**HHD**
South Coas	2023	HHDT	Aggregate	Aggregate	Diesel	109818.6753	13648008	1133618	1911.530188	1911530.188		13648008			
South Coas	2023	LDA	Aggregate	Aggregate	Gasoline	6635002.295	2.53E+08	31352477	7971.24403	7971244.03	8020635.698	2.53E+08	255180358.3	31.82	**LDA**
South Coas	2023	LDA	Aggregate	Aggregate	Diesel	62492.97958	2469816	297086.6	49.3916685	49391.6685		2469816			
South Coas	2023	LDA	Aggregate	Aggregate	Electricity	150700.3971	6237106	751566	0	0		6237106			
South Coas	2023	LDT1	Aggregate	Aggregate	Gasoline	758467.6481	27812996	3504563	1023.913006	1023913.006	1024279.466	27812996	27821405.09	27.16	**LDT1**
South Coas	2023	LDT1	Aggregate	Aggregate	Diesel	360.7799144	8408.618	1256.88	0.366459477	366.4594769		8408.618			
South Coas	2023	LDT1	Aggregate	Aggregate	Electricity	7122.93373	303507.5	35798.19	0	0		303507.5			
South Coas	2023	LDT2	Aggregate	Aggregate	Gasoline	2285150.139	85272416	10723315	3338.798312	3338798.312	3356536.438	85272416	85922778.34	25.60	**LDT2**
South Coas	2023	LDT2	Aggregate	Aggregate	Diesel	15594.68309	650362.8	76635.83	17.73812611	17738.12611		650362.8			
South Coas	2023	LDT2	Aggregate	Aggregate	Electricity	28809.63735	917592.8	145405.4	0	0		917592.8			
South Coas	2023	LHDT1	Aggregate	Aggregate	Gasoline	174910.3847	6216643	2605904	583.3851736	583385.1736	811563.1022	6216643	11211395.79	13.81	**LHDT1**
South Coas	2023	LHDT1	Aggregate	Aggregate	Diesel	125545.0822	4994753	1579199	228.1779285	228177.9285		4994753			
South Coas	2023	LHDT2	Aggregate	Aggregate	Gasoline	30102.75324	1034569	448486.2	111.5753864	111575.3864	209423.5025	1034569	2969599.008	14.18	**LHDT2**
South Coas	2023	LHDT2	Aggregate	Aggregate	Diesel	50003.13116	1935030	628976.5	97.84811618	97848.11618		1935030			
South Coas	2023	MCY	Aggregate	Aggregate	Gasoline	305044.5141	2104624	610089	57.849018	57849.018	57849.018	2104624	2104623.657	36.38	**MCY**
South Coas	2023	MDV	Aggregate	Aggregate	Gasoline	1589862.703	55684188	7354860	2693.883526	2693883.526	2744536.341	55684188	57109879.73	20.81	**MDV**
South Coas	2023	MDV	Aggregate	Aggregate	Diesel	36128.1019	1425691	176566.9	50.65281491	50652.81491		1425691			
South Coas	2023	MDV	Aggregate	Aggregate	Electricity	16376.67653	537591.7	83475.95	0	0		537591.7			
South Coas	2023	MH	Aggregate	Aggregate	Gasoline	34679.50542	330042.9	3469.338	63.26295123	63262.95123	74893.26955	330042.9	454344.9436	6.07	**MH**
South Coas	2023	MH	Aggregate	Aggregate	Diesel	13122.69387	124302	1312.269	11.63031832	11630.31832		124302			
South Coas	2023	MHDT	Aggregate	Aggregate	Gasoline	25624.3151	1363694	512691.3	265.2060557	265206.0557	989975.6425	1363694	9484317.768	9.58	**MHDT**
South Coas	2023	MHDT	Aggregate	Aggregate	Diesel	122124.488	8120623	1221858	724.7695868	724769.5868		8120623			
South Coas	2023	OBUS	Aggregate	Aggregate	Gasoline	5955.291639	245774	119153.5	48.07750689	48077.50689	86265.88761	245774	579743.8353	6.72	**OBUS**
South Coas	2023	OBUS	Aggregate	Aggregate	Diesel	4286.940093	333969.8	41558.29	38.18838072	38188.38072		333969.8			
South Coas	2023	SBUS	Aggregate	Aggregate	Gasoline	2783.643068	112189.6	11134.57	12.19474692	12194.74692	39638.85935	112189.6	323043.5203	8.15	**SBUS**
South Coas	2023	SBUS	Aggregate	Aggregate	Diesel	6671.825716	210853.9	76991.94	27.44411242	27444.11242		210853.9			
South Coas	2023	UBUS	Aggregate	Aggregate	Gasoline	957.7686184	89782.63	3831.074	17.62416327	17624.16327	17863.66378	89782.63	91199.2533	5.11	**UBUS**
South Coas	2023	UBUS	Aggregate	Aggregate	Diesel	13.00046095	1416.622	52.00184	0.239500509	239.5005093		1416.622			
South Coas	2023	UBUS	Aggregate	Aggregate	Electricity	16.11693886	1320.163	64.46776	0			1320.163			

Appendix D: Biological Resource Assessment

Mark Hagan
44715 17th Street East
Lancaster, CA 93535
(661) 433-9956 (m)

January 12, 2026

MDA Group
Attn: Mr. Vadim Zanko
9281 Sierra College Blvd.
Roseville, CA 95661

Dear Mr. Zanko:

Re: Update to 2018 Biological Resource Assessment of APNs 3052-001-071 and 072, Palmdale, California

Development of an approximately 5 acre parcel (APNs 3052-001-071 and 072) has been proposed. The study area was located south of Avenue S and east of 42nd Street East, Palmdale, California. The purpose of this update was to determine whether the original 2018 report was still valid (Hagan 2018).

Updated status on species of concern is hereby amended to include the burrowing owl *(Athene cunicularia),* Crotch's bumblebee (*Bombus crotchii*), and Western Joshua tree (WJT) (*Yucca brevifolia*). The WJT is a candidate species under the California Endangered Species Act (CESA) and is also fully protected under the Western Joshua Tree Conservation Act (WJTCA). Crotch's bumble bees are a candidate species for listing as state threatened or endangered. Burrowing owls are a candidate species for listing as threatened or endangered by the California Department of Fish and Wildlife (CDFW).

The original report noted the area is characteristic of a highly disturbed field (Hagan 2018). The site was mostly devoid of shrubs, red-stemmed filaree (*Erodium cicutarium*) represented the dominant vegetation on site. California ground squirrel (*Citellus beecheyi*) burrows which may be used as future cover sites for burrowing owls (*Athene cunicularia*) were present in 2018. A preconstruction survey to ensure burrowing owls did not immigrate into the site was recommended.

A site visit was conducted on 7 January 2026 to update the biological report previously prepared for this property (Hagan 2018). Four transects were walked in a north-south orientation. Weather conditions consisted of cool temperatures (estimated 55 degrees F), 60% cloud cover, and light winds. Photographs of the study area were previously taken (Figure 1). A current photograph of the study area was taken (Figure 2).



Figure 1. Representative photograph of general habitat conditions within the project site. Top photograph taken 5 February 2018, bottom photograph taken 24 January 2024. Both were taken from the southwest corner looking northeast.



Figure 2. Representative photograph of general habitat conditions within the project site. Photograph taken 7 January 2026 taken from the southwest corner looking northeast.

Since the 2018 survey the site has remained in a degraded state. The site is mostly devoid of perennial shrubs. The dominant plant species is red-stemmed filaree (*Erodium cicutarium*). California ground squirrel (*Citellus beecheyi*) burrows may be used as potential future cover sites for burrowing owls.

No sensitive plant or wildlife species are expected to be present within the study area. WJTs do not occur within the study site. Crotch's bumble bees are not expected to occur within the study area due to a lack of available floristic resources. A preconstruction survey to ensure burrowing owls did not immigrate into the site is recommended. The 2018 biological report is considered to still be valid.

Literature Cited

Hagan, Mark. 2018. Biological resource assessment of APNs 3052-001-071 and 072, Palmdale, California. Mark Hagan, 44715 17th Street East, Lancaster, California, 93535. 9pp.

Sincerely

Mark Hagan
Wildlife Biologist

Biological Resource Assessment of
APNs 3052-001-071 and 072
Palmdale, California

February 8, 2018

Mark Hagan, Wildlife Biologist
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B.S. Degree, Wildlife Management
Humboldt State University

Biological Resource Assessment of APNs 3052-001-071 and 072, Palmdale, California

Mark Hagan, Wildlife Biologist, 44715 17th Street East, Palmdale, CA 93535

Abstract

Development has been proposed for APNs 3052-001-071 and 072, Palmdale, California. The approximately 5 acre (2 ha) study area was located south of Avenue S and east of 42nd Street East, T5N, R11W, a portion of the NW1/4 of the NE1/4 of Section 5, S.B.B.M. A line transect survey was conducted on 5 February 2018 to inventory biological resources. The proposed project area was characteristic of a heavily disturbed field. A total of fifteen plant species and eight wildlife species or their sign were observed during the line transect survey. No desert tortoises (*Gopherus agassizii*) or their sign were observed during the field survey. No burrowing owls (*Athene cunicularia*) or their sign were observed during the field survey. California ground squirrel burrows (*Citellus beecheyi)* were observed within the study area. California ground squirrel burrows provide potential cover sites for burrowing owls. A burrowing owl survey should occur within 30 days prior to ground disturbing activities to ensure no burrowing owls have moved into the study area. If burrowing owls are discovered the California Department of Fish and Wildlife (CDFW) should be consulted prior to ground disturbing activities. The vegetation within the study area did not appear to provide potential nesting sites for birds. The proposed project site was located within the geographic range of the Mohave ground squirrel (*Xerospermophilus mohavensis*). The habitat within the study area was not suitable to support Mohave ground squirrels. No other state or federally listed species are expected to occur within the study area. No washes or ephemeral streams were observed within the study site. This project is not expected to result in a significant adverse impact to biological resources.

Development has been proposed for APNs 3052-001-071 and 072, Palmdale, California (Figure 1). Development would include installation of paved parking areas, access roads and utilities (natural gas, water, sewer, electric, telephone). The entire project area would be graded prior to construction activities.

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 area. Specific focus was on the presence/absence of rare, threatened and endangered species of plants and wildlife.

Study Area

The approximately 5 acre (2 ha) study area was located south of Avenue S and east of 42nd Street East, T5N, R11W, a portion of the NW1/4 of the NE1/4 of Section 5, S.B.B.M. (Figure 2). Avenue S formed the northern boundary of the study area (Figure 3). Heavily disturbed fields and single-family homes were present north of Avenue S. The western boundary was formed by 42nd Street East. A heavily disturbed field and single-family homes were present west of 42nd Street East. A heavily disturbed field was present east of the study area. Sorrel Avenue formed the southern boundary. Single-family homes existed south of Sorrel Avenue. Topography of the study site was approximately 2,720 feet (877 m) above sea level.

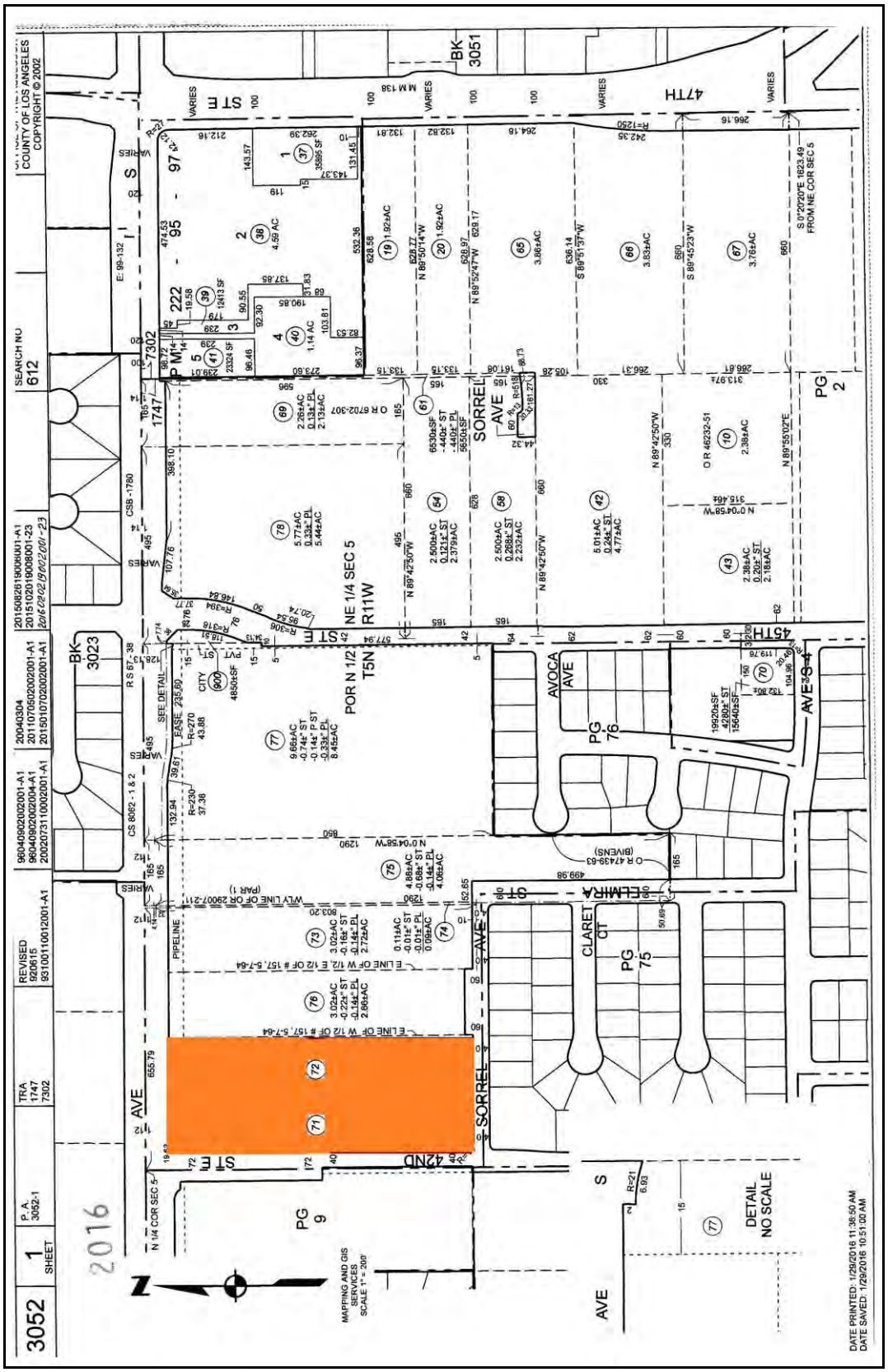


Figure 1. Location of proposed project site as depicted on APN map.



Figure 2. Approximate location of study area as depicted on excerpt from U.S.G.S. Quadrangle, Palmdale, Calif., 7.5' 1974.

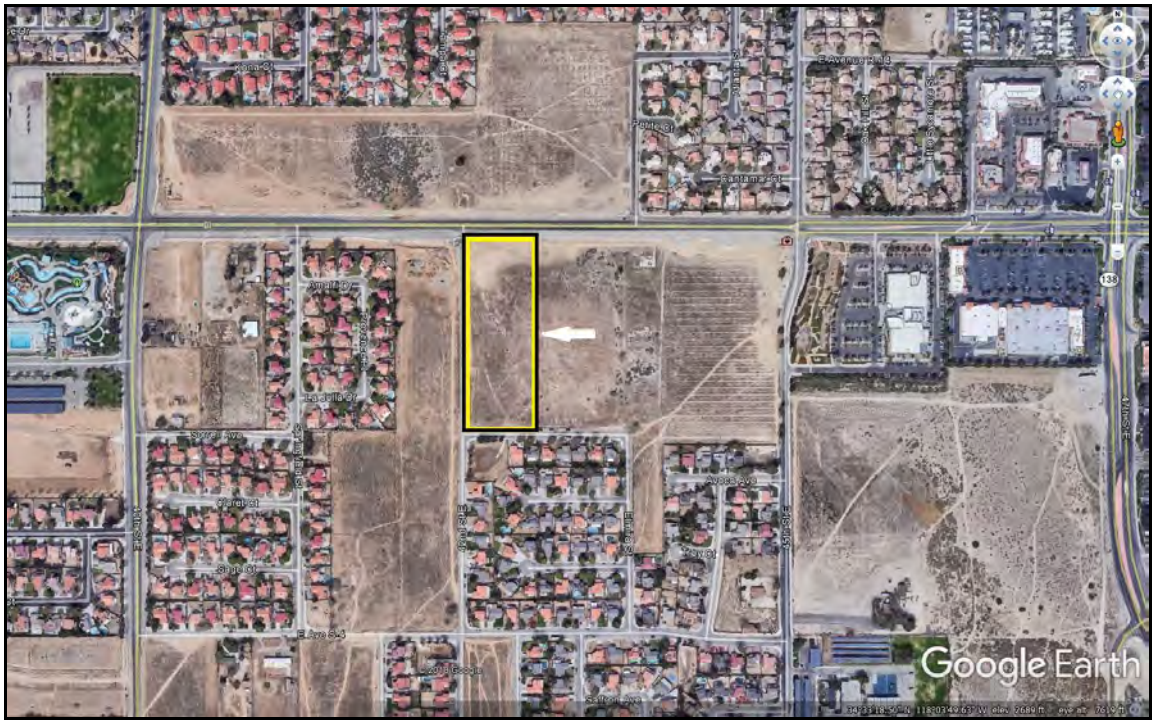


Figure 3. Approximate location of study area as depicted on excerpt from Google Earth accessed 6 February 2018, showing surrounding land use.

Methods

A line transect survey was conducted to inventory plant and wildlife species occurring within the proposed project area (Cooperrider et al. 1986, Davis 1990). Line transects were walked in a north-south orientation. Line transects were approximately 725 feet (234 m) long and spaced about 50 feet (16 m) apart (U.S. Fish & Wildlife Service 2010).

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 area (Cooperrider et al. 1986, Halfpenny 1986, Lowrey 2006, Murie 1974). The USGS topographic map and aerial photographs were reviewed. Representative photographs were taken of the study site (Figure 4).

Results

A total of 4 line transects were walked on 5 February 2018. Weather conditions consisted of warm temperatures (estimated 70 degrees F), 10% hazy cloud cover, and no wind. Sandy loam surface soil texture and clay sandy loam soil texture was characteristic within the study area. No blue line streams were noted on the USGS topographic map. No wetlands or desert washes were observed within the study area.

The proposed project area was characteristic of a heavily disturbed field. A total of fifteen plants were observed during the transect survey (Table 1). The study area was mostly devoid of shrubs. Red-stemmed filaree (*Erodium cicutarium*) was the dominant annual species throughout the study area. No sensitive plant species or suitable habitat was observed within the study site.

A total of eight wildlife species, or their sign were observed during the transect survey (Table 2). No desert tortoises (*Gopherus agassizii*) or their sign were observed during the field survey. No burrowing owls (*Athene cunicularia*) or their sign were observed during the field survey. No bird nests were observed within the study site. California ground squirrel (*Citellus beecheyi*) burrows were observed within the study area. No Mohave ground squirrels (*Xerospermophilus mohavensis)* were detected visually or audibly during the field survey.

Scattered litter was observed within the study area. A bench and sign posts, were observed within the study area. Vehicle tracks were observed within the study area. A dump site was observed within the western boundary of the study area. Gravel piles were observed within the study area.

Discussion

It is likely that some annual species were not visible during the time the field survey was performed. Based on the habitat and level of disturbance, no sensitive plant species are expected to exist within the study area. Several wildlife species would be expected to occur within the proposed project area (Table 3).





Figure 4. Representative photographs of the study area, top: looking from southwest to northeast, bottom: looking northwest to southeast.

Table 1. List of plant species that were observed during the line transect survey of APNs 3052-001-071 and 072, Palmdale, California.

Common Name	Scientific Name
Peachthorn (2 - poor condition)	*Lycium cooperi*
Rabbit brush	*Chrysothamnus nauseosis*
Turkey mullein	*Eremocarpus setigerus*
Spotted buckwheat	*Eriogonum maculatum*
Buckwheat sp.	*Eriogonum maculatum*
Gilia	*Gilia* sp.
Prickly lettuce	*Lactuca seriola*
Annual burweed	*Franseria acanthicarpa*
Red stemmed filaree	*Erodium cicutarium*
Mustard sp.	Brassicaceae
Tumble mustard	*Sisymbrium altisissiimum*
Russian thistle	*Salsola iberica*
Foxtail barley	*Hordeum leporinum*
Red brome	*Bromus rubens*
Cheatgrass	*Bromus tectorum*

Table 2. List of wildlife species, or their sign, that were observed during the line transect survey of the APNs 3052-001-071 and 072, Palmdale, California.

Common Name	Scientific Name
Rodents	Order: Rodentia
Kangaroo rat	*Dipodomys* sp.
Desert cottontail	*Sylvilagus auduboni*
California ground squirrel	*Citellus beecheyi*
Domestic dog	*Canis familiaris*
Common raven	*Corvus corax*
House finch	*Carpodacus mexicanus*
Harvester ants	Order: Hymenoptera

Table 3. List of wildlife species that may occur within the proposed study area, APNs 3052-001-071 and 072, Palmdale, California.

Common Name	Scientific Name
Deer mouse	*Peromyscus maniculatus*
Merriam kangaroo rat	*Dipodomys merriami*
Black-tailed jackrabbit	*Lepus californicus*
Side blotched lizard	*Uta stansburiana*
Rock dove	*Columba livia*
European starling	*Sturnus vulgaris*
House sparrow	*Passer domesticus*
Fly	Order: Diptera
Spider	Order: Araneida

Human impacts are expected to increase as urban development continues to occur in the area. Habitat in the general area will continue to become degraded and fragmented. Burrowing animals within the proposed project area are not expected to survive construction activities. More mobile species, such as lagomorphs (rabbits and hares), coyotes (*Canis latrans*), and birds are expected to survive, but they will have less cover and foraging habitat available.

The desert tortoise is a federally and state listed threatened species. The proposed project area was located within the geographic range of the desert tortoise. However, the study area lacked suitable habitat to support desert tortoises. No mitigation is recommended for this species.

The Mohave ground squirrel is a state listed threatened species. The proposed project area was located within the geographic range of the Mohave ground squirrel. The western limit of the geographic range of the Mohave ground squirrel is currently thought to be Highway 14. Cover and forage for Mohave ground squirrels was lacking within and around the study site. Based on the high level of disturbance, lack of forage and cover, no Mohave ground squirrels are expected to occur within the study area. No mitigation is recommended for this species.

Burrowing owls are considered a species of special concern by the California Department of Fish and Wildlife (CDFW). No burrowing owls or their sign were observed during the field survey. California ground squirrel burrows present within the study area provide potential cover sites for burrowing owls. A burrowing owl survey should occur within 30 days prior to ground disturbing activities to ensure no burrowing owls have moved into the study area. If burrowing owls are discovered the CDFW should be consulted prior to ground disturbing activities.

Many species of birds and their active nests are protected under the Migratory Bird Treaty Act. The vegetation within the study area does not provide potential nesting sites for birds. No mitigation is recommended for migratory birds.

No other state or federally listed threatened or endangered species are expected to occur within the proposed project area (California Department of Fish and Wildlife 2015, Smith and Berg 1988, U.S. Fish & Wildlife Service 2016).

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).

Significance

This project is not expected to result in a significant adverse impact to biological resources.

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Appendix E: Monitoring Mitigation Reporting Plan

MITIGATION MONITORING AND REPORTING PROGRAM (MMRP) SPR26-0001

#	Environmental Factor	Issue Requiring Mitigation	Action Required	When Required	Responsibility of	Monitoring by
BIO 1	Biological Resources Burrowing owl	Although not present this mitigation will ensure avoidance should that change over time.	A take avoidance (preconstruction) burrowing owl survey will be accomplished no more than 30 days prior to ground disturbance activities to ensure no owls have moved into the study site. If burrowing owls are found to have moved into the site, an Incidental Take Permit will be obtained prior to ground disturbing activities.	Prior to ground disturbing activities	Applicant or designee Qualified Botanist/Biologist	City of Palmdale CDFW
CUL 1	Cultural Resources	Ensure protection of any cultural and/or tribal cultural resources that may be uncovered during construction.	In the event that cultural resources are discovered during project activities, all work in the immediate vicinity of the find (within a 60-foot buffer) shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the other portions of the project outside of the buffered area may continue during this assessment period. Additionally, the YSMN and FTBMI shall be contacted, as detailed within TCR-1, regarding any pre-contact finds and be provided information after the archaeologist makes his/her initial assessment of the nature of the find, so as to provide Tribal input with regards to significance and treatment. If significant pre-contact cultural resources, as defined by CEQA (as amended, 2015), are discovered and avoidance cannot be ensured, the archaeologist shall develop a Monitoring and Treatment Plan, the drafts of which shall be provided to FTBMI and YSMN for review and comment, as detailed within TCR-1. The archaeologist shall monitor the remainder of the project and implement the Plan accordingly.	During grading activities	Applicant or designee	City of Palmdale

MITIGATION MONITORING AND REPORTING PROGRAM (MMRP) SPR26-0001

#	Environmental Factor	Issue Requiring Mitigation	Action Required	When Required	Responsibility of	Monitoring by
CUL 2	Cultural Resources	To ensure protection of any cultural and/or tribal cultural resources that may be uncovered during construction.	If human remains or funerary objects are encountered during any activities associated with the Project, work in the immediate vicinity (within a 100-foot buffer of the find) shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5 and that code shall be enforced for the duration of the Project.	During grading activities	Applicant or designee	City of Palmdale
TCR 1	Tribal Cultural Resources	To ensure protection of any cultural and/or tribal cultural resources that may be uncovered during construction.	The YSMN and FTBMI shall be contacted, as detailed in CUL-1, of any pre-contact cultural resources discovered during project implementation, and be provided information regarding the nature of the find, so as to provide Tribal input with regards to significance and treatment. Should the find be deemed significant, as defined by CEQA (as amended, 2015), a Cultural Resources Monitoring and Treatment Plan shall be created by the archaeologist, in coordination with FTBMI and YSMN, and all subsequent finds shall be subject to this Plan. This Plan shall allow for a monitor to be present that represents YSMN and FTBMI for the remainder of the project, should they elect to place a monitor on-site. Any and all archaeological/cultural documents created as a part of the project (isolate records, site records, survey reports, testing reports, etc.) shall be supplied to the applicant and Lead Agency for dissemination to FTBMI and YSMN. The Lead Agency and/or applicant shall, in good faith, consult with each throughout the life of the project.	During grading activities	Applicant or designee	City of Palmdale

MITIGATION MONITORING AND REPORTING PROGRAM (MMRP) SPR26-0001

#	Environmental Factor	Issue Requiring Mitigation	Action Required	When Required	Responsibility of	Monitoring by
GEO 1	Geology and Soils	Paleontological resources protection.	Unanticipated Discovery of Paleontological Resources: If paleontological resources are encountered during ground-disturbing activities, work within 60 feet shall be halted and the project paleontologist shall immediately evaluate the find. If necessary, the evaluation may require preparation of a treatment plan and paleontological testing. If the discovery proves to be significant under CEQA and cannot be avoided by the project, additional work may be warranted, such as data recovery excavation, to mitigate any significant impacts to historical resources. Any reports required to document and/or evaluate unanticipated discoveries shall be submitted to the City of Palmdale for review and approval. Recommendations contained therein shall be implemented throughout the remainder of ground disturbance activities.	During ground disturbing activities	Applicant or designee	City of Palmdale

Appendix F: Cultural Resource Study

Not Included in Document

Appendix G: Geotechnical Engineering (Soils) Report

GEOTECHNICAL INVESTIGATION REPORT
FOR PROPOSED
MULTI-UNIT RESIDENTIAL COMPLEX
PALMDALE, LOS ANGELES COUNTY
CALIFORNIA
APN 3052-001-071 & 072

Prepared by:
BRUIN GEOTECHNICAL SERVICES, INC.
44732 Yucca Avenue
Lancaster, California 93534

March 22, 2018

J.N. 18-18

BRUIN GSI

SOIL AND MATERIAL
TESTING AND INSPECTIONS

March 22, 2018 J.N. 18-18

Mr. Phillip Terry
Creativity Investments, LLC
1401 W. Rancho Vista Blvd.
Palmdale, CA 93551

Subject: **Geotechnical Investigation Report for Proposed Multi-Unit Residential Complex located at the Southwest corner of 42nd Street East and Avenue S, Palmdale, Los Angeles County, California; APN 3052-001-071 & 072**

Dear Mr. Terry:

Presented herewith is the report of our Geotechnical Investigation Report for the subject project. Our work was performed in accordance with the scope of work outlined in our original proposal dated January 31, 2018.

This report presents the results of our field investigation, laboratory testing and 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
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GEOTECHNICAL INVESTIGATION REPORT

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GEOTECHNICAL INVESTIGATION REPORT
PROPOSED MULTI-UNIT RESIDENTIAL COMPLEX
APN 3052-001-071 & 072
PALMDALE, LOS ANGELES COUNTY, CALIFORNIA

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed by Bruin Geotechnical Services, Inc. for the proposed residential 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 Investigation 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 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 at the southeast corner of Avenue S and 42nd Street East in the city of Palmdale, Los Angeles County, California. The Site consists of approximately 5 acres. At the time of Bruin GSI's field investigation, the Site was vacant, undeveloped land. The Site vegetation consisted of a light covering of typical desert flora, consisting of sparse annual grass and weeds and brush. The aforementioned site description is intended to be illustrative and is specifically not intended for use as a legal description of the Site.

The Site is located in a developed area of Palmdale, with single-family subdivisions in the vicinity of the subject site. The parcels immediately north, east and west of the Site are also vacant, undeveloped land, with a residential subdivision immediately south of the site. Access to the Site is from Avenue S or 42nd Street East, both paved roads.

The Site topography is relatively flat and level with a general slope to the north with drainage by sheet flow at approximately one to two (1-2) percent across the Site. The elevation of the Site is approximately 2,673 feet above mean sea level.

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 structures will be two-story multi-family units (apartments), with covered parking. We anticipate typical wood-framed construction 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 30 kips for isolated foundations.

Exterior improvements are anticipated to include concrete flatwork, asphalt-concrete parking and off-site roadway construction. 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 a public sewer system and existing utilities lines from the street.

Due to the relatively flat topography, it appears the proposed earthwork will consist of conventional cut and fill methods to grade the Site, with anticipated maximum slope heights of approximately 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 January 31, 2018. 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 water, groundwater or air, below or around the site. The field subsurface exploration and laboratory testing programs are described below.

Figure 1

Vicinity Map

N.T.S.



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Project:

Creativity Investments, LLC
Proposed Multi-Unit Residential Complex
Palmdale, California
APN 3052-001-071 & 072

Job Number:	**Date:**
18-18	03/22/18

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 February 14, 2018, under the technical supervision of our engineer. A total of six (6) exploratory borings were drilled using a CME 75 drill rig with 8" hallow stem auger in accordance with generally accepted geotechnical exploration procedures (ASTM D 1452). The borings were advanced to maximum depths of thirty one (31) 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 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.

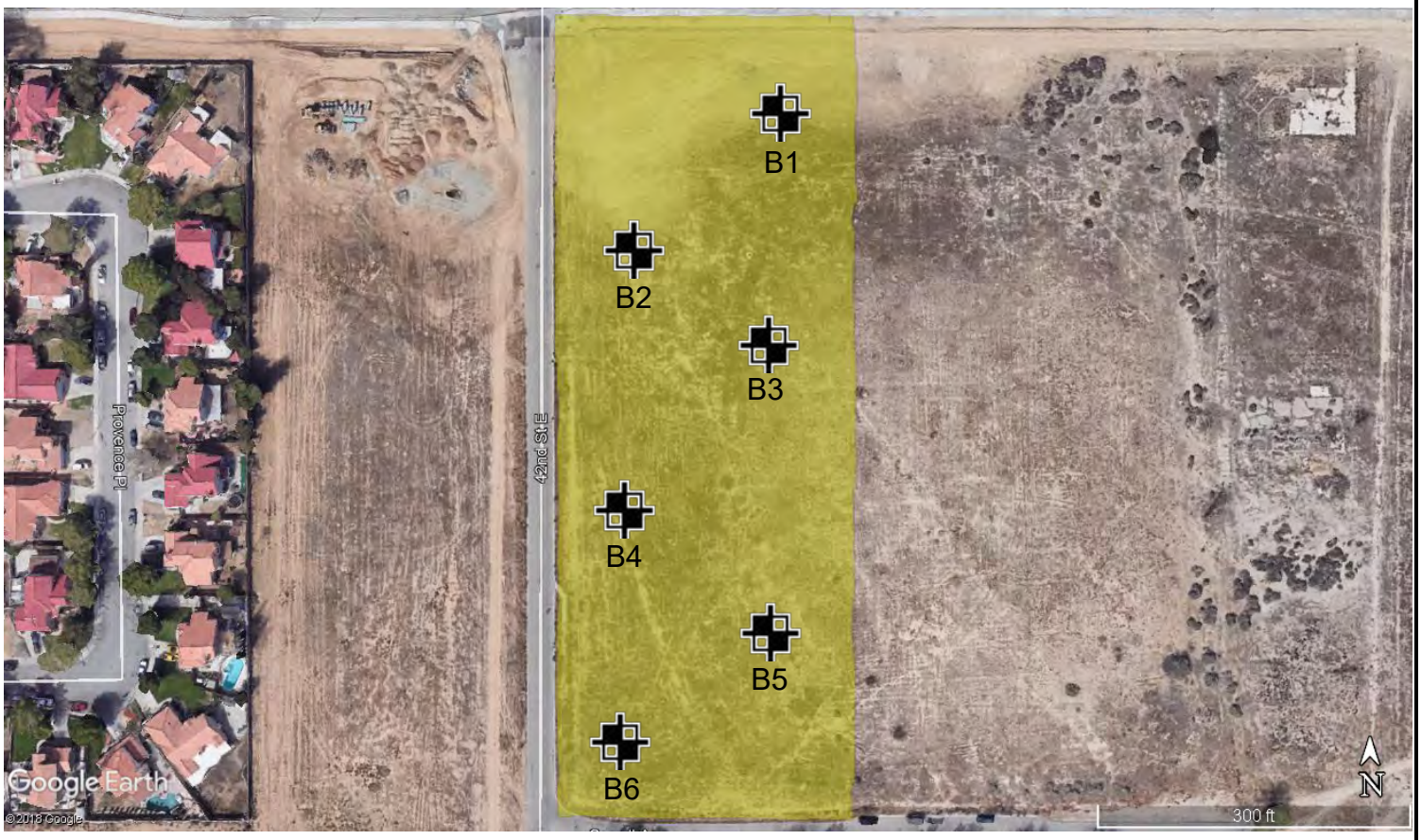
4.2 Laboratory Testing

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

Figure 2

Boring Location Map

N.T.S.



B1 = Denotes Approximate Boring Location

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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 in-situ soil samples from the ring sampler and also bulk soil samples remolded to approximately 90 percent 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. The samples were saturated at 1.1 KSF to check hydroconsolidation potential. The maximum load applied was 4.6 KSF. The soil samples were unloaded to 1.2 KSF to check rebound.
- 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.

5.0 CONCLUSIONS

The following conclusions for the site are based on the results of the field exploration and laboratory testing programs and represent professional opinions.

5.1 Site and Subsurface Conditions

Native alluvial materials were encountered within all of our exploratory borings. The native materials were noted to be slightly moist to moist and loose or soft to dense or hard. The soil strata encountered consisted of interbedded layers of silty sands (SM) sandy silts (ML). The upper five to six feet of soils were found to be relatively loose, low relative compaction and non-uniform. For more detailed descriptions of the subsurface materials refer to the boring logs in Appendix A.

5.2 Groundwater Conditions

Groundwater was not encountered in any of our exploratory borings, at least to the maximum depth explored (31 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 County of Los Angeles, Department of Public Works, Water Resources Division electronic database, historically highest groundwater levels in the immediate site vicinity indicate that groundwater level at the site are over 100 feet bgs. Based on this information, groundwater is not a design factor for this project.

5.3 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 2-5 percent, with an occasional moisture content of 9 percent. In-place dry densities ranged generally 99.0 pounds per cubic foot (PCF) to 117.0 pcf. Occasional very dense soil (over 115.0 pcf) was encountered at various locations at depth. Moisture content and dry unit weight results are shown on the boring 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 five (5) feet of soil has a moderate to high potential to hydroconsolidate.

6.0 REGIONAL GEOLOGY AND SEISMIC HAZARDS

The project site is locate in a seismically active are 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 south of the subject site, 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.

6.1 IBC Design Parameters

The following coefficients have been estimated in accordance with the requirements of the 2016 CBC, utilizing the USGS U.S. Seismic Design Maps Application:
http://earthquake.usgs.gov/designmaps/us/application.php
The following seismic parameters are provided, based on the approximate latitude and longitude at the southwest corner of the subject site:

Latitude	34.5558°
Longitude	118.0540°

Spectral Response Acceleration, Short Period) - S_s	2.440g	0.2(sec)
Spectral Response Acceleration at 1 sec. - S_1	1.137g	1.0(sec)
Mapped Spectral Response, Short period - S_{DS}	2.381g	0.2(sec)
Mapped Spectral Response at 1 sec. - S_{D1}	1.110g	1.0(sec)
Site Coefficient – F_A	1.0	
Site Coefficient – F_V	1.5	
Site Modified Spectoral Response Acceleration, Short period -S_{MS}	2.440	
Site Modified Spectoral Response Acceleration, Short period -S_{M1}	1.705	

Site Classification (2013 CBC, further defined in ASCE7-10, Chapter 20) = D

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

Refer to Appendix C for the Design Maps Summary Report provided by the USGS website.

6.2 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 firm silty sand encountered in the borings, relative densities, and depth to static groundwater (over 100 feet), it id Bruin GSI's opinion that the potential for on-site liquefaction or seismically induced dynamic settlement should be negligible.

6.2.1 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 50 feet of the native soils are not likely to liquefy, these hazards are not considered to be design factors for this project.

6.3 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.

6.4 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 hydroconsolidation can also cause differential settlement under loading conditions and the induction of moisture.

Recompaction 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 hydroconsolidation.

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

6.5 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.

7.0 111 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.

8.0 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.

9.0 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.

As mentioned in Section 5.3, the upper five feet of soil were found to be non-uniform with some areas of the site soils subject to hydroconsolidation. 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 recompaction. 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 recompacted fill mat.

Provide 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 may be designed to support the proposed structures. Refer to Section 11.2 for details and soil values regarding foundation design.

10.0 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.**

10.1 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.

10.2 Remedial Grading for Building Pads

To provide a more uniform bearing for the proposed structure foundations, slab-on-grade and structural retaining walls and, subsequent to clearing and grubbing of the area to graded, the existing native soils shall be excavated to a depth of fifty four (54) inches below existing grade or finish grade, whichever is lower. The excavation shall extend a minimum of five (5) feet beyond the limits of the proposed foundations, where obtainable. The bottom of the excavation shall be a level elevation.

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 twelve (12) 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.**

10.3 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 twelve (12) 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**.

10.4 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 six (6) 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**.

10.5 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 6 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 percent (95% beneath PCC pavement) as determined in accordance with Test Method ASTM D 1557.

All import soil fill (meeting the requirements of Section 10.7) should be placed in 8-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 percent (95% beneath PCC pavement) 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.

10.6 Native Soil Shrinkage

A shrinkage factor of the upper site soils is estimated at fifteen to twenty (15-20) 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 percent 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.

10.7 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.

10.8 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.

10.9 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.

11.0 POST-GRADING AND DESIGN CONSIDERATIONS

11.1 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 2% 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 1 percent away from the building foundations and similar structures. A minimum 12-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.

11.2 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:

11.2.1 Allowable Bearing Capacity

Continuous Foundations Design Values: An allowable "net" bearing capacity of 1,500 p.s.f. can be utilized for dead and sustained live loads. This value

includes a minimum safety factor of three, and may be increased by 1/3 for total loads, including seismic forces.

Continuous foundations for single-story and two-story structures should be a minimum of twelve inches in width and fifteen and twenty four inches in thickness, respectively. Reinforcement shall consist of a minimum of two #4 bars, one top and one 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 200 psf for each additional six inches of foundation depth and 200 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 2,500 p.s.f. for continuous foundations to keep estimated settlements within allowable limits.

Isolated Pad (Column or Pier) Foundations Design Values: An allowable "net" bearing capacity of 1,800 p.s.f. can be utilized for dead and sustained live loads. This value includes a minimum safety factor of three, and may be increased by 1/3 for total loads, including seismic forces.

Isolated foundations should be a minimum of twenty four inches square inches and twenty four inches thick. Actual depth, width, and reinforcement requirements for continuous 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 200 psf for each additional six inches of foundation depth and 200 psf for each additional one foot of foundation width. The allowable bearing capacity should not exceed 2,500 p.s.f. for continuous foundations to keep estimated settlements within allowable limits.

11.2.2 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 275 Z PSF, where Z = Depth (in feet) below finish grade. In passive pressure calculations, the upper one 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 0.27 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 1/3.

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

11.2.3 Footing Reinforcement

Reinforcement for 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 No. 4 bars, one top and one bottom.

11.2.4 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 of 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 percent of maximum dry density.**

11.2.5 Foundation Setbacks

Footings of structures (including retaining walls) located above a slope having a total height of 10 feet or less should have a minimum setback of 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 10 feet, the setback should be, at minimum, equal to one third of the total height of the slope but need not exceed 40 feet. Refer to the IBC Table 1805.3.1.

11.3 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.

11.3.1 Lateral Earth Pressures

*	Driving Earth Pressure*	Resisting Earth Pressure*
Well-drained soil	40	275**
Well-drained soil (2:1 backfill)	63	
At-rest (restrained wall)	60^	

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 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 0.27 for native soils compacted to 90% of the maximum dry density, and may be used with dead loads. This value may be increase by 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 subdrain 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 feet in height may need to be designed for a seismic load force that is applied to the static forces when the seismic shaking occurs. The geotechnical consultant should be contacted for retaining walls over six feet in height

11.3.2 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 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 8 to 10 inches in thickness measured loose, moisture conditioned to above optimum moisture content and mechanically compacted with hand-operated equipment to minimum 90 percent 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.**

11.3.3 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. Subdrains or weep holes at the base of the walls shall be incorporated into design. Wall backdrains shall be designed by a registered Civil Engineer.

12.0 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 corrosive when in contact with ferrous material (3,300 ohm-cm).

Corrosion test results also indicate that the surficial soils at the site have negligible sulfate attack potential (115 ppm) on concrete, according to the ACI 318 Table 4.3.1. Type II cement should be used in all concrete that may be in contact with the on-site soils.

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 Table 4.3.1. 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). Chemical test results performed on a bulk soil sample obtained during the field investigation are presented in Appendix C.

13.0 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, unshored or unsurcharged (above the groundwater level) may be cut vertically to a maximum depth of no more than five feet. Excavations higher than five 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.

14.0 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 not 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 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, measured loose, (depending on means of compaction) and uniformly compacted to minimum 90% of the maximum dry density with mechanical compaction equipment.

15.0 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 at five and one-half feet of compacted soil, prepared as recommended in Section 10.2 of this report.

15.1 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 ad 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/(ft²-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.

15.2 Thickness and Joint Spacing

Concrete slab-on-grade should be at least 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.

15.3 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. 3 bars spaced 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

15.4 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 percent** 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.**

16.0 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 at least 12 inches of compacted soil, prepared as recommended in Section 10.4 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, concrete sidewalks, patio-type slabs should be at least 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.

16.2 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 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.

16.3 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 percent 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 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 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 at least 24 inches of compacted soil, prepared as recommended in Section 10.3 of this report. At locations where slabs cross trenches, observation and testing of trench backfill should be performed to confirm uniformity of conditions.

17.1 Thickness and Joint Spacing

To reduce the potential of unsightly cracking, rigid concrete pavement should be at least five 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

17.2 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 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.

17.3 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 percent 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 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.**

18.0 PRELIMINARY FLEXIBLE PAVEMENT DESIGN

Asphalt concrete pavements shall be designed per the Caltrans Highway Design Manual based on R-Value and Traffic Index. An assumed R-value of the native soil of 35 was utilized for the preliminary structural pavement section. During grading as soils are mixed, soil samples should be tested for R-Value determination.

For pavement design, the preliminary flexible pavement layer thickness is as follows:

RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS

Pavement Material	Recommended Thickness (TI = 6.0)
Asphalt Concrete	4”
Class II Aggregate Base	8”
Compacted Subgrade Soils	24”

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction (“Greenbook”).

Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications, latest edition. The aggregate base should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

19.0 CONSTRUCTION CONSIDERATIONS

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

19.1 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.

19.2 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 3 feet and then laid back at a 1:1 slope ratio above a height of 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.

19.3 Temporary Shoring

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

20.0 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.

21.0 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 Creativity Investments, 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.

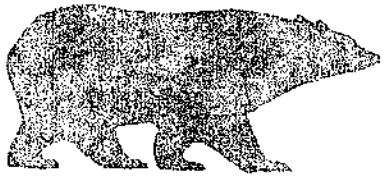
22.0 CLOSURE

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

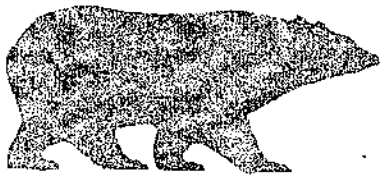


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(661) 273-9078

Log of Boring 1

Project:	**Creativity Investments**	Project Location:	**42nd St W. & Ave. S**	Project number:	**18-18**
Date(s) drilled	**02/14/18**	Logged By	**AM**	Checked By:	**MS**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8"**	Total Depth of Borehole	**20' bgs**
Drill Rig Type	**CME 75**	Drilling Contractor	**GP Drilling**	Approximate Elevation	
Ground-water	**No Groundwater**	Sampling Method(s)	**SPT**	Hammer Data	**140#, 30" drop**
Borehole Backfill	**Native/ Cuttings**	Location:	**See Figure 2**		

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		ML		Light brown fine to medium sanndy silt w/ occ. 3/8" gravel soft, dry	3-3-3		2.9
5'		SM		Brown silty fine to medium sand w/ occ. 3/8" grvael loose, slightly moist	3-6-11		3.0
		SM		Brown silty fine to medium sand w/ coarse sand medium dense, moist	18-17-10		4.6
10'		SM		Brown silty fine to coarse sand w/ occ. #4 gravel medium dense, moist	8-13-15		3.5
15'		SM		Brown very silty fine to medium sand w/ coarse sand & occ. #4 gravel very dense, moist	34-50/6"		6.3
20'		SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel very dense, moist	18-31-36		5.5
25'							
30'							



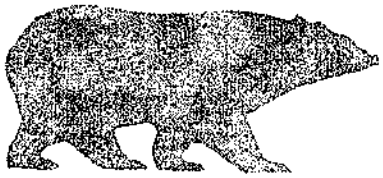
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Log of Boring 2

Sheet 1 of 1

Project:	**Creativity Investments**	Project Location:	**42nd St W. & Ave. S**	Project number:	**18-18**
Date(s) drilled	02/14/18	Logged By	AM	Checked By:	MS
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8"	Total Depth of Borehole	15' bgs
Drill Rig Type	CME 75	Drilling Contractor	GP Drilling	Approximate Elevation	
Ground-water	No Groundwater	Sampling Method(s)	CSS	Hammer Data	140#, 30" drop
Borehole Backfill	Native/ Cuttings	Location:	See Figure 2		

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		SM		Light brown slightly silty fine to medium sand w/ coarse sand & occ. 1/2" gravel medium dense, dry	9-9	DIST	2.1
5'		SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel medium dense, dry	8-10	113.2	1.2
		SM		Yellowish brown very silty fine to coarse sand w/ occ. #4 gravel medium dense, moist	10-18	105.2	5.4
10'		SM		Yellowish brown very silty fine to coarse sand w/ occ. #4-1/2" gravel (slightly cemented) very dense, moist	26-24	112.5	3.5
15'		SM		Yellowish brown silty fine to medium sand w/ coarse sand & 1/2" gravel very dense, moist	50/6"	DIST	4.1
20'							
25'							
30'							



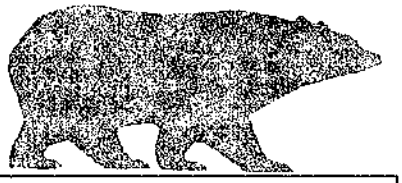
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Log of Boring 3

Sheet 1 of 1

Project: **Creativity Investments**		Project Location: **42nd St W. & Ave. S**		Project number: **18-18**	
Date(s) drilled	02/14/18	Logged By	AM	Checked By:	MS
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8"	Total Depth of Borehole	15' bgs
Drill Rig Type	CME 75	Drilling Contractor	GP Drilling	Approximate Elevation	
Ground-water	No Groundwater	Sampling Method(s)	SPT	Hammer Data	140#, 30" drop
Borehole Backfill	Native/ Cuttings	Location:	See Figure 2		

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		SM		Pale brown very silty fine to coarse sand w/ occ. #4 gravel loose, moist	5-6-6		1.8
5'		ML		Brown fine to medium sandy silt w/ occ. 3/8" gravel hard, moist	14-24-22		4.8
		ML		Brown fine to medium sandy silt w/ occ. #4 gravel hard, moist	18-17-14		6.1
10'		SM		Brown silty fine to coarse sand w/ occ. #4-3/5" gravel medium dense, moist	10-9-7		3.6
15'		SM		Brown silty fine to coarse sand w/ occ. #4-3/5" gravel very dense, moist	27-27-22		4.3
20'							
25'							
30'							



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Log of Boring 4

Project: **Creativity Investments**	Project Location: **42nd St W. & Ave. S**	Project number: **18-18**
Date(s) drilled: **02/14/18**	Logged By: **AM**	Checked By: **MS**
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type: **8"**	Total Depth of Borehole: **30' bgs**
Drill Rig Type: **CME 75**	Drilling Contractor: **GP Drilling**	Approximate Elevation:
Ground-water: **No Groundwater**	Sampling Method(s): **SPT**	Hammer Data: **140#, 30" drop**
Borehole Backfill: **Native/ Cuttings**	Location: **See Figure 2**	

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		SM		Brown very silty fine to medium sand w/ coarse sand & occ. 3/8" gravel loose, moist	6-9	104.4	3.4
5'		SM		Brown very silty fine to medium sand w/ coarse sand & occ. 3/8" gravel medium dense, moist	7-13	99.0	2.7
		SM		Yellowish brown silty fine to coarse sand w/ #4 gravel dense, moist	37-39	113.7	3.4
10'		SM		Yellowish brown silty fine to coarse sand w/ #4 gravel dense, moist	31-40	110.9	5.9
15'		SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel dense, moist	23-45	111.1	4.4
20'		SM		Yellowish brown silty fine to medium sand w/ occ. Coarse sand & 3/8" gravel dense, moist	46-34	117.6	5.5
25'		SM		Yellowish brown silty fine to coarse sandw/ #4-3/5" gravel & DG (slgihtly cemented) dense, moist	27-35	115.2	4.4
30'		SM		Yellowish brown silty fine to coarse sandy silt w/ occ. 3/8" gravel firm, moist	14-35	112.1	9.7

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Log of Boring 5

Sheet 1 of 1

Project: **Creativity Investments**		Project Location: **42nd St W. & Ave. S**		Project number:	**18-18**
Date(s) drilled	02/14/18	Logged By	AM	Checked By:	MS
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8"	Total Depth of Borehole	15' bgs
Drill Rig Type	CME 75	Drilling Contractor	GP Drilling	Approximate Elevation	
Ground-water	No Groundwater	Sampling Method(s)	SPT	Hammer Data	140#, 30" drop
Borehole Backfill	Native/ Cuttings	Location:	See Figure 2		

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		SM		Pale brown silty fine to medium sand w/ occ. #4 gravel loose, slightly moist	3-5-4		2.9
5'		SM		Pale brown silty fine to medium sand w/ coarse sand & occ. 1/2" gravel medium dense, slightly moist	4-17-22		3.3
		SM		Pale brown very silty fine to medium sand w/ coarse sand & occ. 1/2" gravel medium dense, slightly moist	14-18-18		3.6
10'		SM		yellowish brown silty fine to coarse sand w/ occ. #4 gravel dense, moist	15-22-25		4.7
15'		SM		Yellowish brown silty fine to coarse sand w/ occ. #4-3/5" gravel medium dense, moist	8-12-15		5.0
20'							
25'							
30'							

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Log of Boring 6

Sheet 1 of 1

Project:	**Creativity Investments**	Project Location:	**42nd St W. & Ave. S**	Project number:	**18-18**
Date(s) drilled	02/14/18	Logged By	AM	Checked By:	MS
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	8"	Total Depth of Borehole	20' bgs
Drill Rig Type	CME 75	Drilling Contractor	GP Drilling	Approximate Elevation	
Ground-water	No Groundwater	Sampling Method(s)	CSS	Hammer Data	140#, 30" drop
Borehole Backfill	Native/ Cuttings	Location:	See Figure 2		

Depth	Sample	USCS	Graphic Log	Material Description	Penetration Resistance (Blows/6")	Dry Unit Weight pcf	Water Content %
		SM		Yellowish brown silty fine to coarse sand w/ occ. #4-1/2" gravel dense, slightly moist	8-20	110.4	2.9
		SM		Yellowish brown silty fine to coarse sand w/ occ. #4-3/5" gravel medium dense, slightly moist	14-14	110.0	3.1
5'							
		SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel medium dense, moist	17-17	113.9	5.2
		SM		Yellowish brown silty fine to coarse sand w/ occ. 3/8" gravel & DG medium dense, slightly moist	14-16	107.2	3.9
10'							
15'		SM		Yellowish brown silty fine to medium sand w/ coarse sand & occ. #4 gravel very dense, moist	29-50/3"	113.5	7.2
20'		SM		Yellowish brown very silty fine to medium sand w/ occ. coarse sand & 1/2" gravel dense, moist	19-24	111.6	5.0
25'							
30'							

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Soils Key

SOIL CLASSIFICATION KEY

Major Divisions					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 UNIFIED SOIL CLASSIFICATION SYSTEM

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Key to Boring Log

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: depth in feet below the ground surface.
2 Sample: type of sample taken at depth incurred
3 USCS: USCS symbol of the subsurface material.
4 Grading Log: graphic depiction of the subsurface material encountered.
5 Material Description: description of the material encountered. May include consistency, moisture color, and other descriptive text.
6 Blow Count/ft: number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
7 Dry Unit Weight pcf: dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
8 Water Content %: water content of the soil sample, expressed as a percentage of fry weight sample.

FIELD AND LABORATORY TEST ABBREVIATIONS

DIST= Disturbed
N/A= Not Analyzed
CHEM= Chemical tests to assess corrosivity

- California Split Spoon
- Standard Penetration Test
- 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”	3/4"	1/2"	3/8"	#4	#10	#40	#100	#200
B1@3’			100	99	99	97	87	61	54
B1@7’			100	99	98	94	70	39	36
B1@15’			100	100	99	94	75	48	40
B2@4’		100	93	92	89	83	48	19	16
B2@10’		100	93	90	82	68	41	23	18
B3@6’			100	99	99	96	84	58	55
B4@2’			100	99	99	94	72	45	41
B1@15’			100	100	98	93	59	31	27
B4@10’			100	99	98	91	67	43	38
B4@20’			100	99	99	95	79	65	61
B4@30’			100	100	99	97	77	37	33
B5@3’		100	99	99	99	96	97	36	31
B5@5’		100	99	99	96	91	67	39	34
B6@2’			100	99	97	91	62	23	19
B6@9’			100	99	97	91	62	23	19

SAND EQUIVALENT

Sample I.D.	Sand Equivalent
B1 @ 5’	14
B1 @ 9’	19
B2 @ 6’	7
B3 @ 3’	29
B3 @ 10’	16
B4 @ 5’	16
B4 @ 15’	26
B5 @ 7’	11
B6 @ 4’	18

EXPANSION INDEX

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

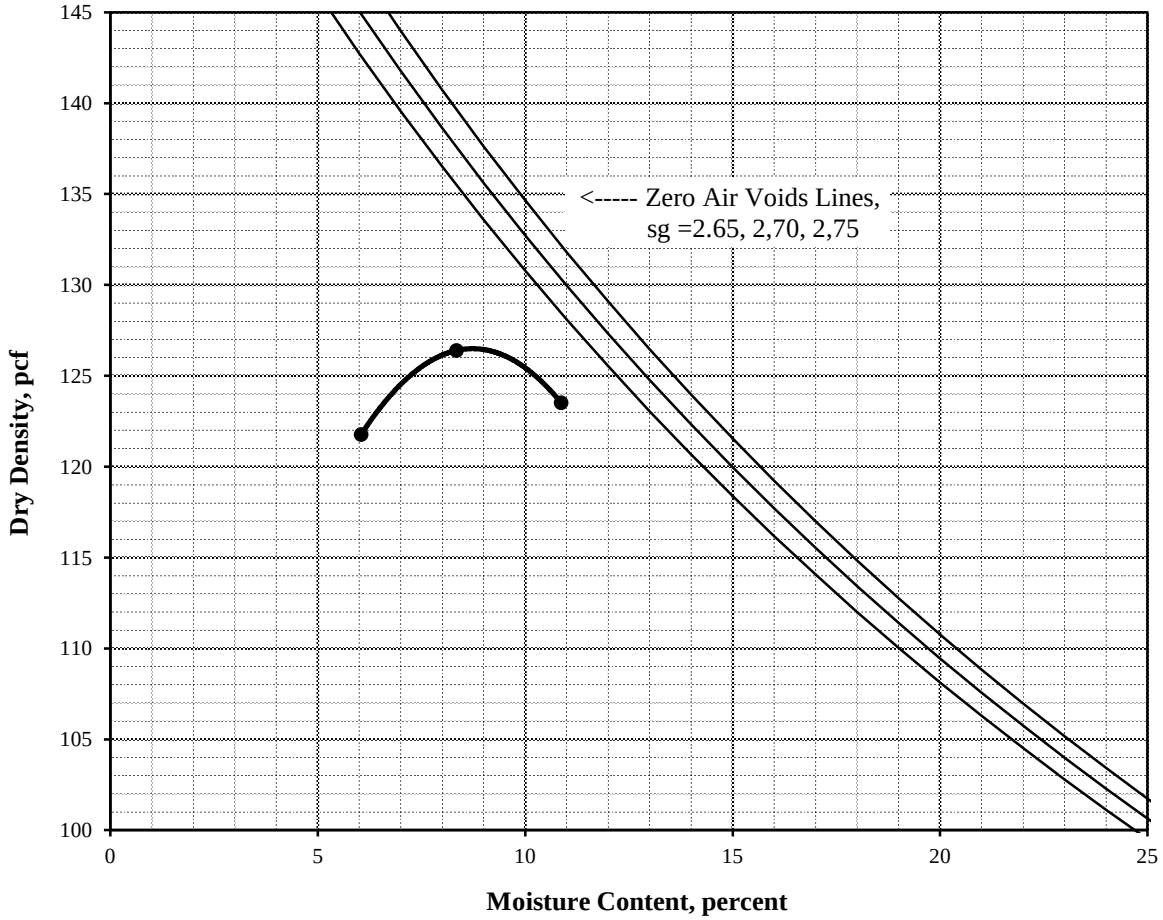
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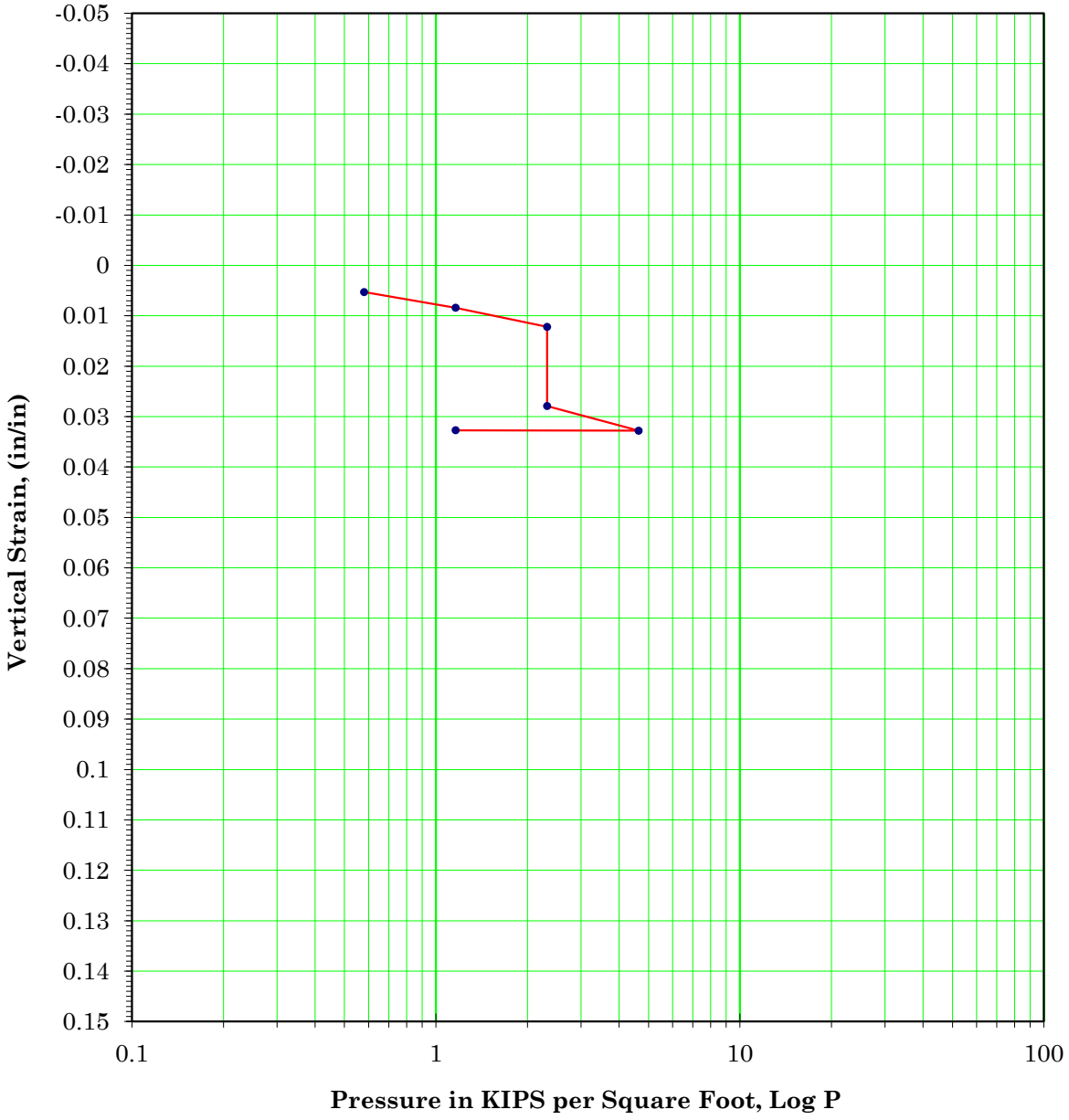
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Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

Project Number:	18-18	March 22, 2018
Project Name:	Creativity Investments, LLC	ASTM D-1557 C
Lab ID Number:	B1	Rammer Type: 10#
Sample Location:	B1 0'-5'	
Description:	Yellowish brown fine to medium sandy silt	

		Sieve Size	% Retained
Maximum Density:	**126.5 pcf**	3/4"	
Optimum Moisture:	**8.5%**	3/8"	
		#4	





Sample Location: B2 @ 8'

Material: silty sand (SM)

Initial Dry Density: 105.2 PCF

Moisture Content: 5.4%

Percent Hydroconsolidation: 1.6%

* Test Method: ASTM D-2435

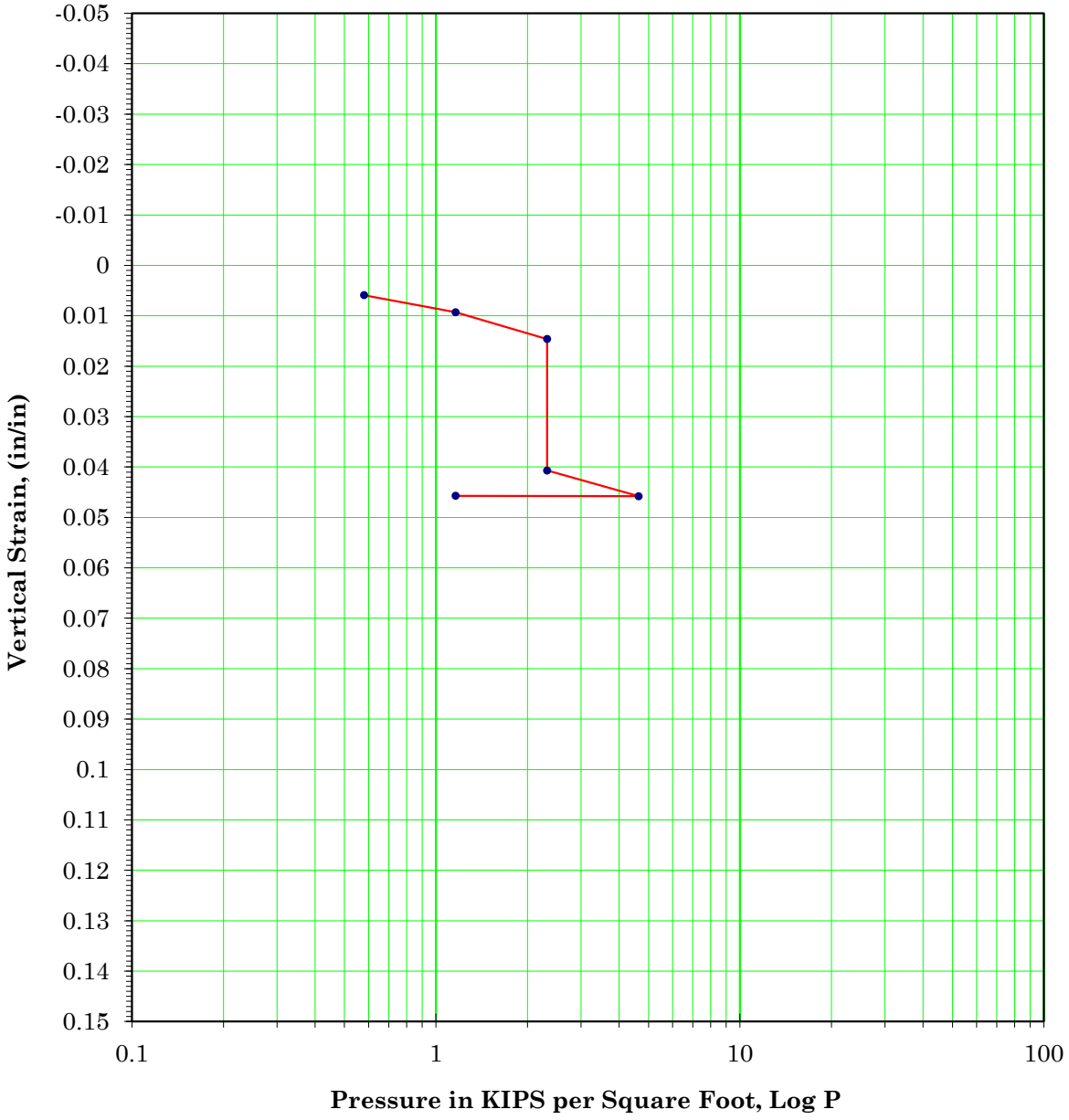
Consolidation Test

Creativity Investments, LLC

42nd Street West and Avenue S, Palmdale

BGSI

3/22/2018	18-18



Sample Location: B4 @ 2'

Material: silty sand (SM)

Initial Dry Density: 104.4 PCF

Moisture Content: 3.4%

Percent Hydroconsolidation: 2.6%

* Test Method: ASTM D-2435

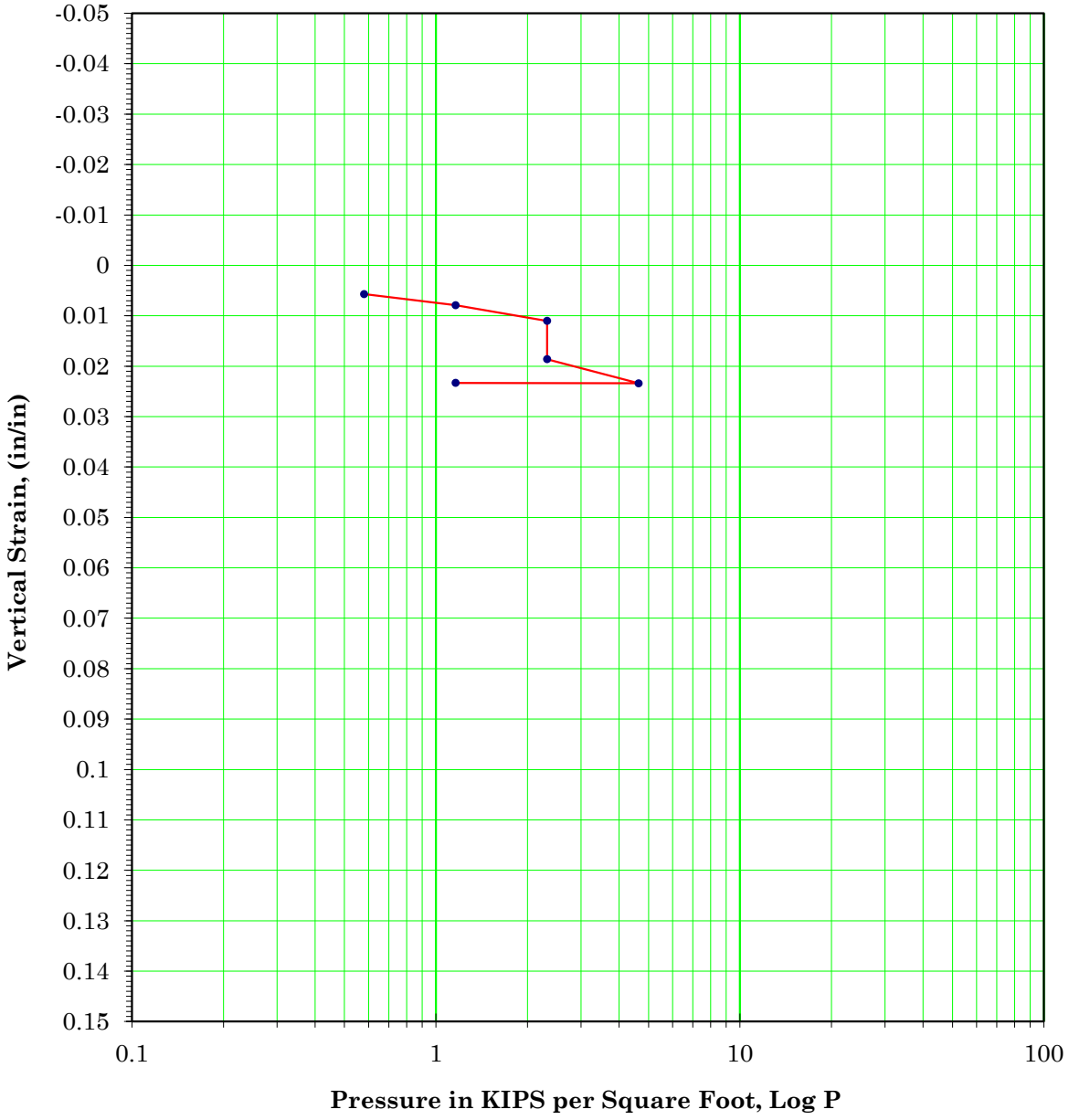
Consolidation Test

Creativity Investments, LLC

42nd Street West and Avenue S, Palmdale

BGSI

3/22/2018	18-18



Sample Location: B4 @ 7'

Material: silty sand (SM)

Initial Dry Density: 113.7 PCF

Moisture Content: 3.4%

Percent Hydroconsolidation: 0.8%

* Test Method: ASTM D-2435

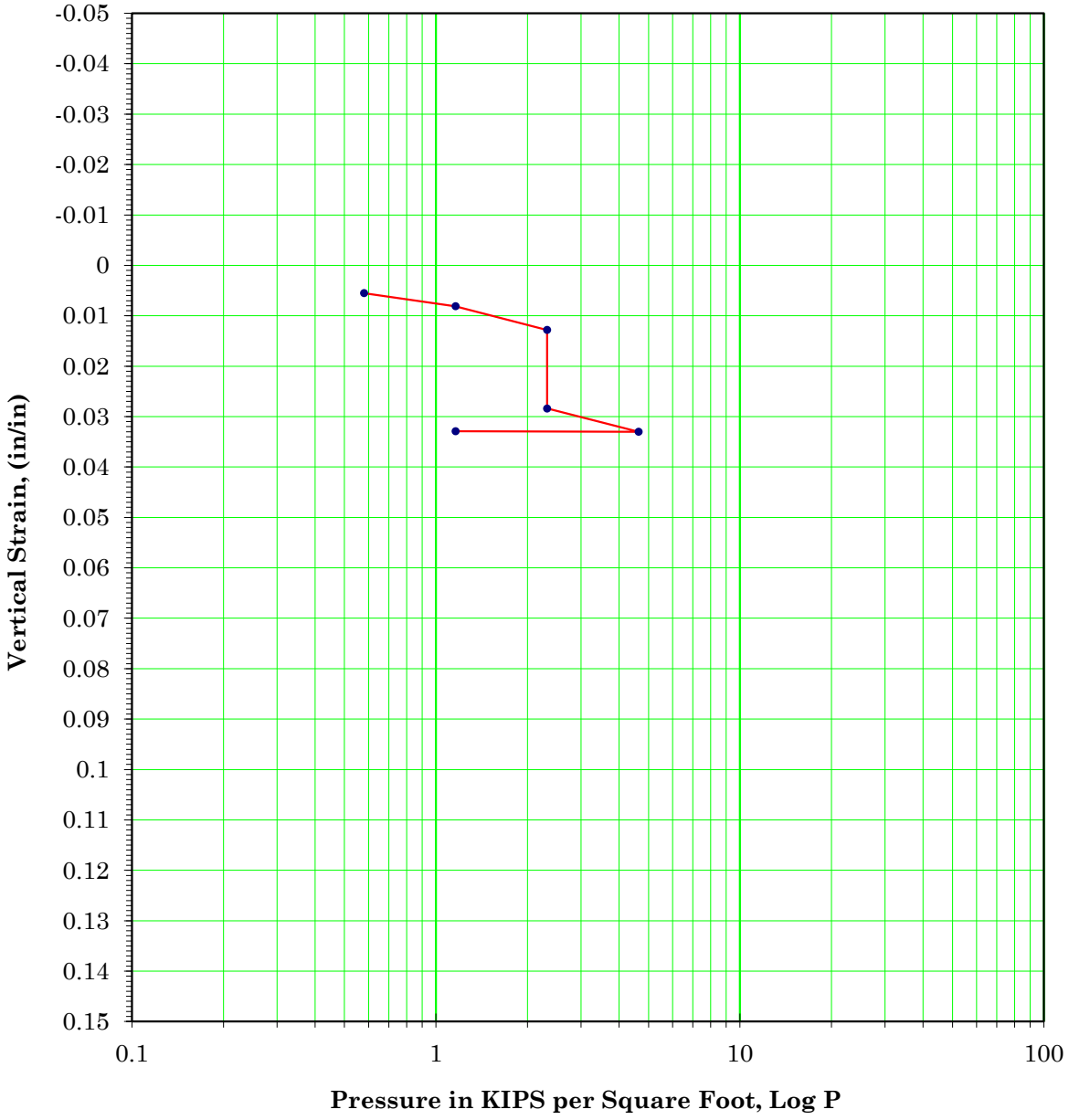
Consolidation Test

Creativity Investments, LLC

42nd Street West and Avenue S, Palmdale

BGSI

3/22/2018	18-18



Sample Location: B6 @ 9'

Material: silty sand (SM)

Initial Dry Density: 107.2 PCF

Moisture Content: 3.9%

Percent Hydroconsolidation: 1.6%

* Test Method: ASTM D-2435

Consolidation Test

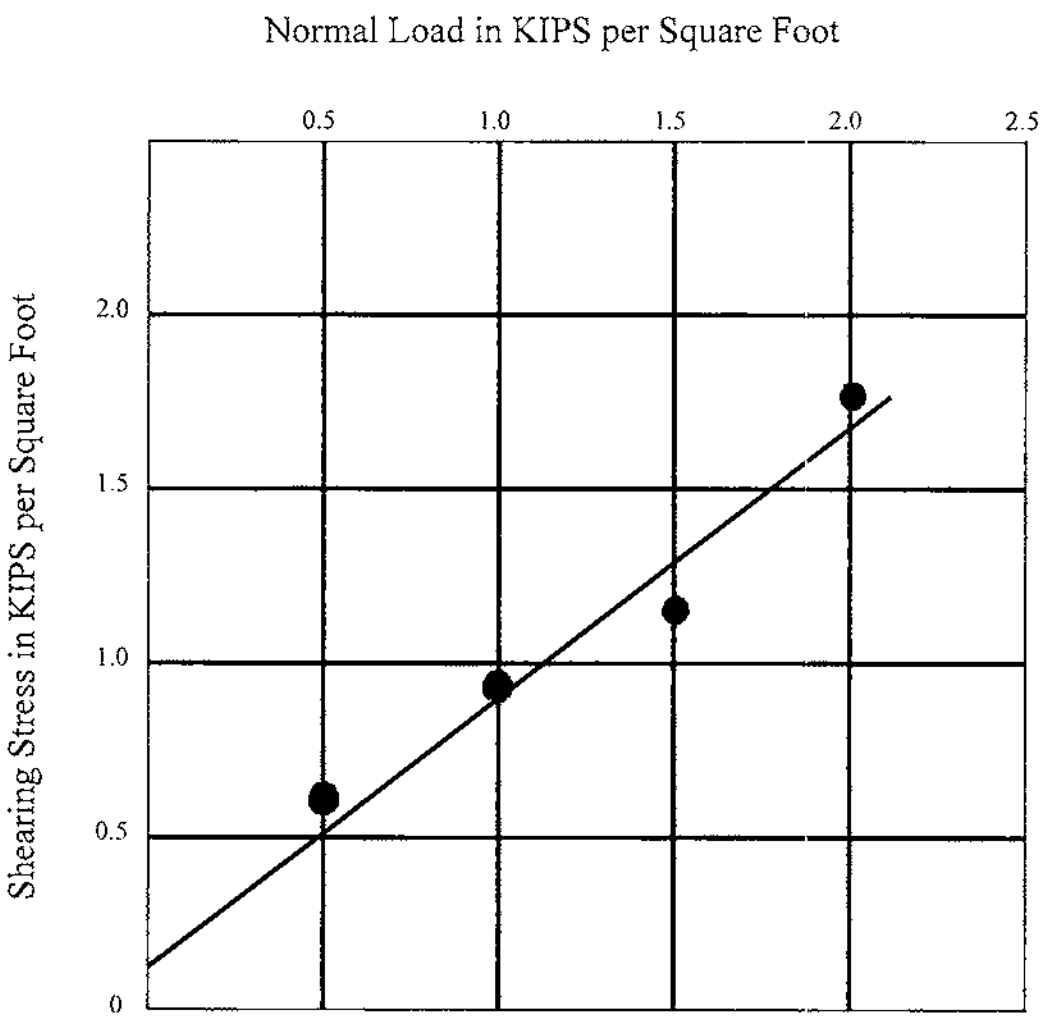
Creativity Investments, LLC

42nd Street West and Avenue S, Palmdale

BGSI

3/22/2018	18-18

Direct Shear Data



Boring	Symbol	Depth (feet)	Dry Density (PCF)	Angle of Friction (degrees)	Cohesion (PSF)
B1	●	0-5'	113.5*	38	150

*Remolded to 90% relative compaction per ASTM D 1557 test method

J.N 18-18

ANAHEIM TEST LAB, INC

3008 ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

BRUIN GEOTECHNICAL SERVICES, INC.
44732 Yucca Avenue
Lancaster, CA 93534

DATE: 03/06/18

P.O. NO.: TRANSMITTAL

LAB NO.: C-1616

SPECIFICATION: CA-417/422/643

MATERIAL: Soil

PROJECT#: 18-18
Creative Investment
42nd St. East & Ave S
Palmdale, CA

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-cm
B-1 @ 0-5'	7.8	115	74	3,300

RESPECTFULLY SUBMITTED

WES BRIDGER CHEMIST

APPENDIX C

USGS Seismic Design Summary Report

USGS Design Maps Summary Report

User–Specified Input

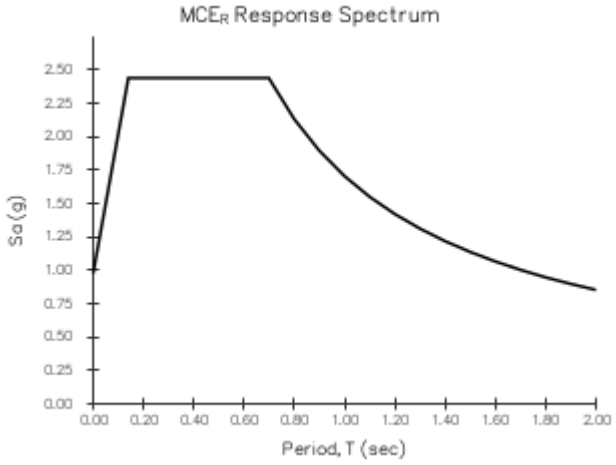
Report Title	18-18 Creativity Investments Mon March 19, 2018 15:16:12 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.55587°N, 118.05406°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

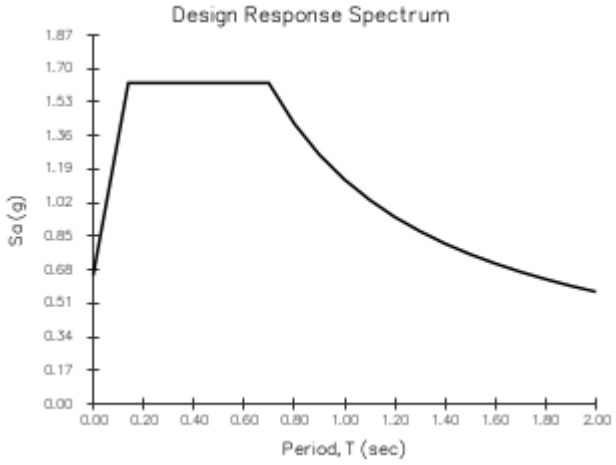


USGS–Provided Output

S_S =	2.440 g	S_{MS} =	2.440 g	S_{DS} =	1.627 g
S_1 =	1.137 g	S_{M1} =	1.705 g	S_{D1} =	1.137 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

USGS Design Maps Detailed Report

2012/2015 International Building Code (34.55587°N, 118.05406°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1]	S_S = 2.440 g
From Figure 1613.3.1(2) [2]	S_1 = 1.137 g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\overline{v}_S$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.440 g, F_a = 1.000

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 1.137 g, F_v = 1.500

Equation (16-37): $S_{MS} = F_a S_S = 1.000 \times 2.440 = 2.440$ g

Equation (16-38): $S_{M1} = F_v S_1 = 1.500 \times 1.137 = 1.705$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = ⅔ S_{MS} = ⅔ \times 2.440 = 1.627$ g

Equation (16-40): $S_{D1} = ⅔ S_{M1} = ⅔ \times 1.705 = 1.137$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.627 g, Seismic Design Category = D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 1.137 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is E for buildings in Risk Categories I, II, and III, and F for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = E

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. Figure 1613.3.1(1): https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. Figure 1613.3.1(2): https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

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 H. Noise Evaluation

42nd Street & E Avenue S Palmdale

Noise Impact Study

City of Palmdale, CA

Prepared for:

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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 construction noise impacts

1.2 Site Location and Study Area

The project site is located at the southeast corner of 42nd Street and E Avenue S, in the City of Palmdale, California, as shown in Exhibit A. The project site lot is designated as residential. Land uses surrounding the site include residential to the north, south, east, and west, and a commercial use located to the northwest.

1.3 Proposed Project Description

The project proposes to develop 160 multi-family units on 5 acres. The site plan used for this project, provided by Duke Engineering, is shown in Exhibit B.

This study assesses the 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. Construction activities within the Project area will consist of on-site demolition, site prep, grading, building, paving, and architectural coating.

Pool equipment, transformers, and other exterior noise-producing equipment must be shielded or ensure that levels do not exceed 58 dBA Leq at the property line in order to meet the 65 dBA CNEL limit.

In order to meet the 65 dBA CNEL exterior noise requirement, the balconies and patios on the Type 4 Buildings must have 5 foot tall walls.

STC 28 or higher windows are required to meet the 45 dBA CNEL requirement for units directly facing E Avenue S.

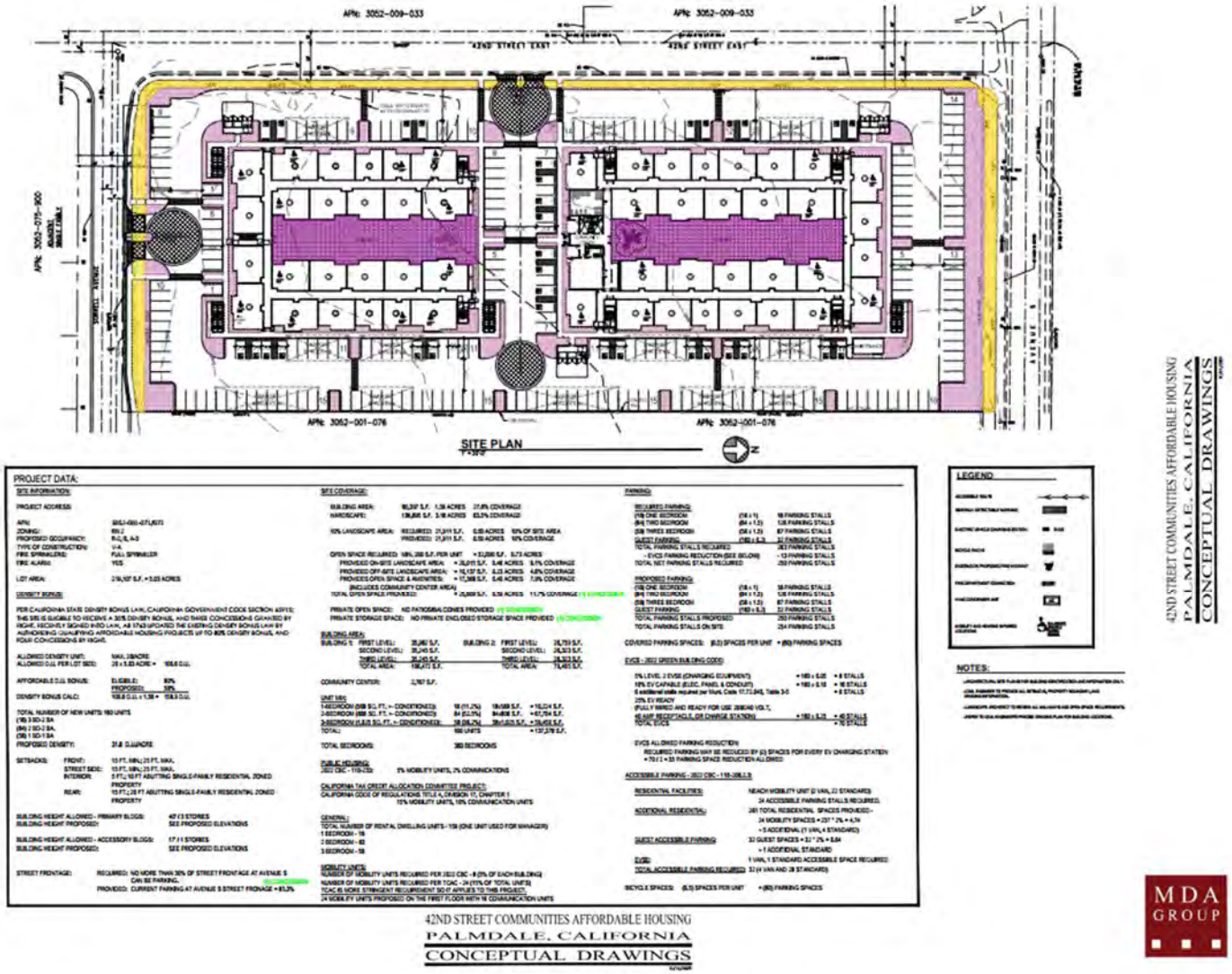
Exhibit A

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.

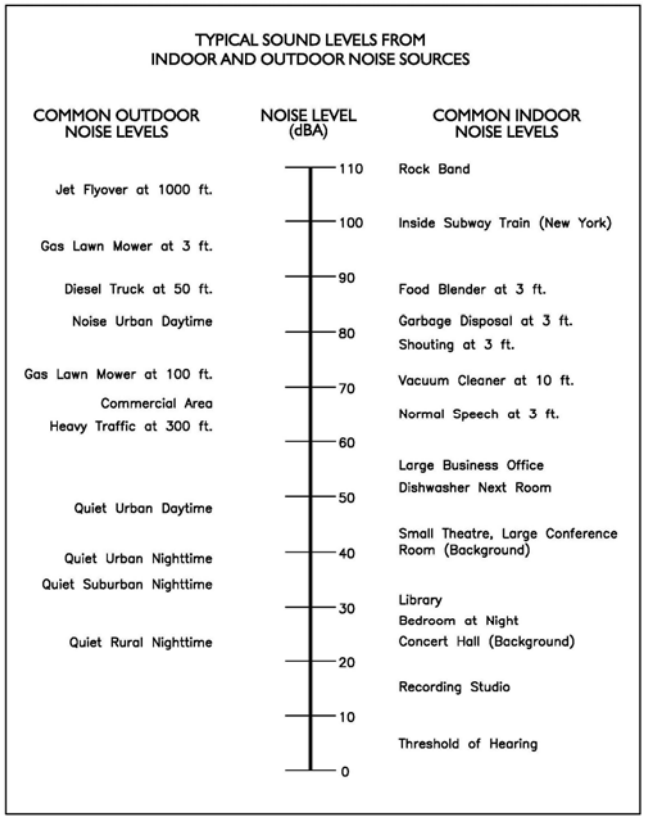
2.1 Sound, Noise and Acoustics

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 starting out at 20 Hz all the way 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 it loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measure 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 references 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 addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after 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 depends 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 wave front, 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 wave front. 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 wave front. 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 to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate 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, or alternatively 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 and the Uniform Building Code (UBC) 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.

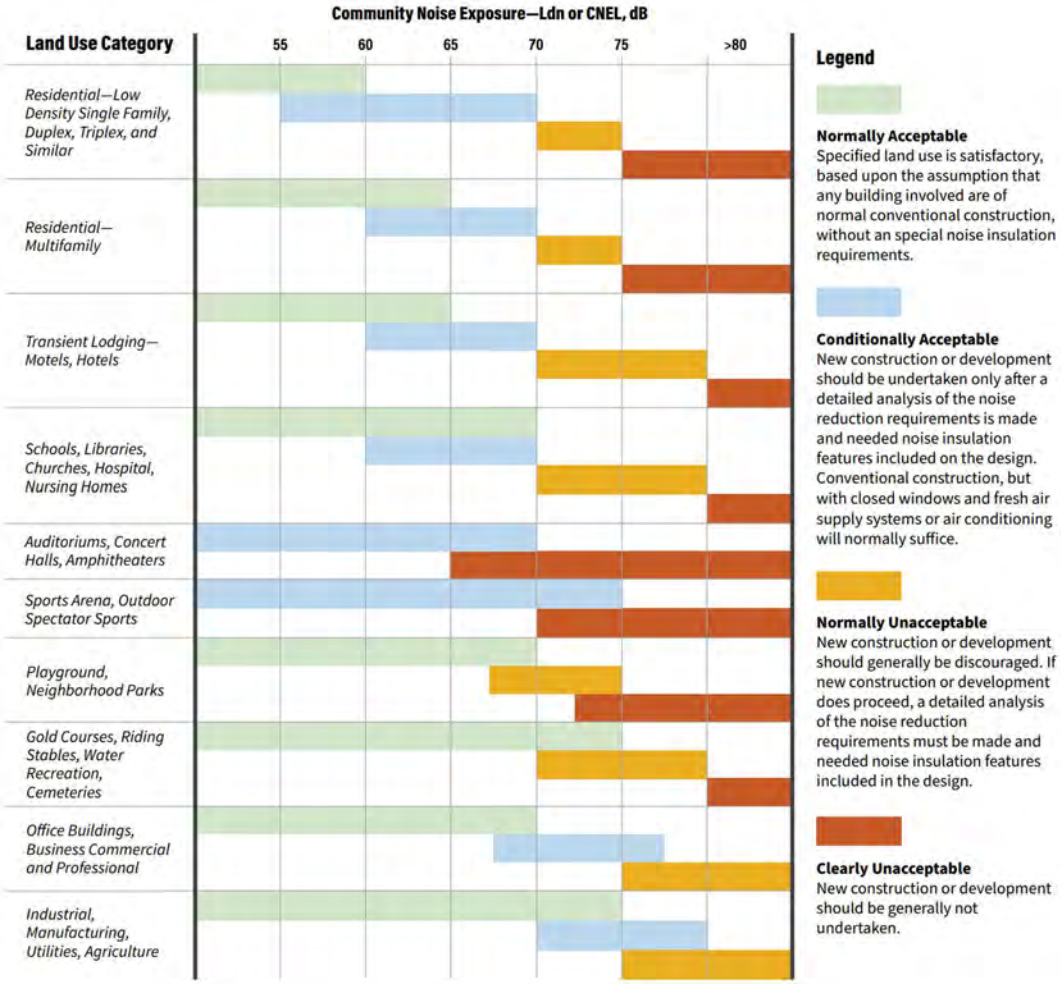
4.3 City of Palmdale Noise Regulations

The City of Palmdale outlines their noise regulations and standards within the Noise Element from the City's General Plan and Chapter 9.18 from the City's Municipal Code.

City of Palmdale General Plan (Envision Palmdale 2045)

Applicable policies and standards governing environmental noise in the City of Palmdale are set forth in the General Plan Noise Element. Table Figure 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, objectives 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 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.

City of Palmdale Municipal Code

Chapters 9.18 and 8.28 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

Uses bordering the project are zoned residential to the north, south, east, and west. Therefore, the adjacent residential use is compared to the residential limits set forth in the General Plan.

The threshold applied to the nearest adjacent residential use is that the project only CNEL may not exceed the exterior limit of 65 dBA, CNEL or the interior limit of 45 dBA, CNEL. 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.

The threshold applied to the nearest existing and zoned residential uses is 65 dBA CNEL at the adjacent property lines.

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

Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed noise sources impacting the area. Two (2) short-term 15-minute noise measurements were conducted at or near the project site and are illustrated in Exhibit F. Appendix A includes photos, field sheet, and measured noise data.

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). Project counts were obtained from the CalEEMod prepared for this project. 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
E Ave S	E Ave S and 47nd St	23,867	24,302	55	Hard
E Ave S 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		77.5	12.9	9.6	97.5
Medium Trucks		84.8	4.9	10.3	1.8
Heavy Trucks		86.5	2.7	10.8	0.7

Notes:
[1] 2017 & 2045 General Plan ADT Conditions.
[2] Project ADT from project CalEEMod.

E Avenue S and 42nd St do not significantly contribute to the noise level on site. To determine the project's noise impact to the surrounding land uses, MD generated noise contours for the City of Palmdale General Plan 2017 & 2045 traffic counts, which were the same. 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 C. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 14-month time period per CalEEMod.

Exhibit E:
Measurement Locations

Short-Term Monitoring Location



6.0 Existing Noise Environment

Two (2) 15-minute ambient noise measurements were conducted at or near the property site. The noise measurements were taken to determine the existing ambient noise levels. Noise data indicates that traffic along E Avenue S is the primary source of noise impacting the site and the adjacent uses.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 2.

Table 2: Short-Term Noise Measurement Data[1]

Location	Date	Start Time	Stop Time	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
1	03/13/24	10:41 AM	10:56 AM	67.5	82.8	43.8	73.8	71.3	68.4	64.7
2	03/13/24	10:59 AM	11:14 AM	54.2	70.5	43.9	64.7	53.5	50.3	48.6

Notes:
[1.] Measurements were taken over a fifteen-minute interval. Measurement locations are indicated in Exhibit E.

Noise data indicates the ambient noise level ranged from 54.2 to 67.5 dBA Leq at the project site. The FHWA-RD-77-108 model predicts a daytime noise level of 68.9 dBA Leq at NM1, which aligns well with the noise measurement. Additional field notes and photographs 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. Only E Avenue S has a significant noise impact on the site. 42nd Street and Sorrell Avenue have a significantly lower ADT and will not result in exterior or interior noise impacts on and off site.

7.1 Future Off-Site Exterior Noise Impact

The exterior noise level off-site of the project will be impacted by transportation-related sources and other stationary sources. 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 105 feet, the distance from the centerline of E Avenue S to the existing residential uses. The distance to the 55, 60, 65, and 70 dBA CNEL noise contours are also provided for reference. The noise level at 105 feet is representative of approximate distances to future buildings homes 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: Existing/Existing + Project Scenario – Noise Levels Along Roadways (dBA CNEL)

Roadway	Segment	CNEL at 105 Ft (dBA)	Distance to Contour (ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
E Ave S	40th to 47th	68.2	79	171	368	792

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 105 Ft (dBA)	Distance to Contour (ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
E Ave S	40th to 47th	68.2	80	173	372	802

Change in Existing Noise Levels as a Result of Project

Roadway[1]	Segment	CNEL at 105 Feet dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
E Ave S	40th to 47th	68.2	68.2	0.0	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 not be a noticeable increase in traffic noise at 105 feet from the centerline of the subject roadway.

7.1.2 Future Off-Site Stationary Noise Impact

HVAC equipment will be enclosed by the project buildings or be on the roof. As a worst case, if the HVAC equipment is on the roof and unshielded, equipment will be a minimum of 135 feet from the nearest residential receptors to the south. The maximum sound power level of an individual HVAC unit is 73 dBA. This is equivalent to a sound pressure level of 33 dBA Leq at the nearest residential receptor, which is equivalent to a CNEL level of 38 dBA if the unit is running continuously for 24 hours. All four units along the project's southern property line running simultaneously would result in a maximum noise level of 44 dBA CNEL at the adjacent residential property line. This is below the 65 dBA CNEL requirement.

Pool equipment, transformers, and other exterior noise-producing equipment must be shielded or ensure that levels do not exceed 58 dBA Leq at the property line in order to meet the 65 dBA CNEL limit.

7.2 Future On-Site Noise Impact

The noise level at balconies and patios facing E Avenue S will be 68 dBA CNEL. This is in the conditionally acceptable level for muti-family residential according to the Land Use Compatibility Matrix, and therefore the project must ensure that the exterior levels do not exceed 65 dBA CNEL at the exterior uses like the balconies and patios and that interior levels do not exceed 45 dBA CNEL.

In order to meet the 65 dBA CNEL exterior noise requirement, the balconies and patios on the Type 4 Buildings must have 5 foot tall walls.

7.3 Interior Noise Levels

The future interior noise level was calculated for the sensitive receptor locations using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level. Table 4 indicates the first, second, and third-floor interior noise levels for the project site.

Table 4: Future Interior Noise Levels (dBA CNEL)

Location	Roadway Noise Source	Exterior Facade Study Location	Noise Level at Building Facade[1]	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL	Interior Noise Level w/ Residential Windows (STC≥ 28)		STC Rating for Windows Facing Subject Roadway[4]
					Window Open[2]	Windows Closed[3]	
1st Row Units Along E Avenue S Property Line	E Avenue S	1st Floor	68	23	56	45	28
		2nd Floor	68	23	56	45	28
		3rd Floor	68	23	56	45	28

Notes:
[1.] Noise level from Table 3.
[2.] A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.
[3.] A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.
[4.] Indicates the required STC rating to meet the interior noise standard.

As shown in Table 4, the interior noise level will be 58 dBA CNEL with the windows open and 45 dBA CNEL with the windows closed. **STC 28 or higher windows are required to meet the 45 dBA CNEL requirement for units directly facing E Avenue S.**

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 generated characteristics of typical construction activities. The data is presented in Table 5.

Table 5: 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 only occur between Monday – Saturday during the permissible hours from 6:30 a.m. to 8:00 p.m. according to the City's Municipal Code Section 8.28.030. Construction noise is considered a short-term impact and would be considered significant if construction activities are taken 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. Furthermore, noise reduction measures are provided to further reduce construction noise. The

construction noise impact is considered less than significant; however, construction noise level projections are provided.

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 6. A likely worst-case construction noise scenario assumes equipment operating at a minimum of 40 feet and an average of 400 feet from the nearest sensitive receptor (southern portion of the site to the closest residences).

Table 6: Construction Noise Levels at the Northwest Property Edge

Phase	dBA Lmax	dBA Leq
Site Prep	87	64
Grading	88	63
Build	87	62
Paving	87	61
Arch Coating	81	50
Notes: Const Equip from CalEEMod		

To further ensure that construction activities do not significantly disrupt the adjacent land uses, the noise reduction policies in Section 8.3 should be taken.

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 0.21 inches per second peak particle velocity (PPV) at 25 feet.

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 25ft.
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 7 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 7: 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 8 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 8: 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.

At a distance of 60 feet, from the property line of the project site to the nearest existing building to the south, a vibratory roller would yield a worst-case 0.080 PPV (in/sec) which may be perceptible but

sustainably below any risk of damage (0.5 in/sec PPV is the threshold of residential structures). The impact is less than significant, and no mitigation is required.

8.3 Construction Noise Reduction Policies

Construction operations must follow the City's Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following policies should be adhered to:

1. Construction shall occur during the hours of 6:30 AM to 8:00 PM per Section 8.28.030 of the Palmdale Municipal Code.

2. During construction, the contactor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.

3. The contractor shall locate equipment staging areas as far as possible, away from the sensitive receptors.

4. Idling equipment shall be turned off when not in use.

5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of Palmdale: General Plan Noise Element.

City of Palmdale: Municipal Code Chapter 9.18, 8.28.

Caltrans Noise Technical Manual. 2013

Konan Vibration Criteria

TJW Engineering, Inc.: Scoping Agreement for Traffic Impact Analysis – 1845 Oak Road Traffic Impact Analysis, August 2022.

Federal Highway Administration. Noise Barrier Design Handbook. June 2017.

Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual. September 2018

Appendix A:

Photographs and Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet

Project Name:	42nd Street & Ave S Noise
Project: #/Name:	1269-2024-001
Site Address/Location:	42nd Street & Ave S Noise
Date:	03/13/2024
Field Tech/Engineer:	

Site Observations:

Winds 12MPH steady, Sunny skies with high clouds. Desert conditions

Sound Meter:	XL2, NTI	**SN:**	A2A-08562-E0
Settings:	A-weighted, slow, 1-sec, 15-minute interval		
Site Id:	NM1, NM2		



MD ACOUSTICS

Project Name: 42nd Street & Ave S Noise

Site Address/Location: 42nd Street & Ave S Noise

Site Id: NM1, NM2

Figure 1: NM1



Figure 2: NM1



Figure 3: NM2

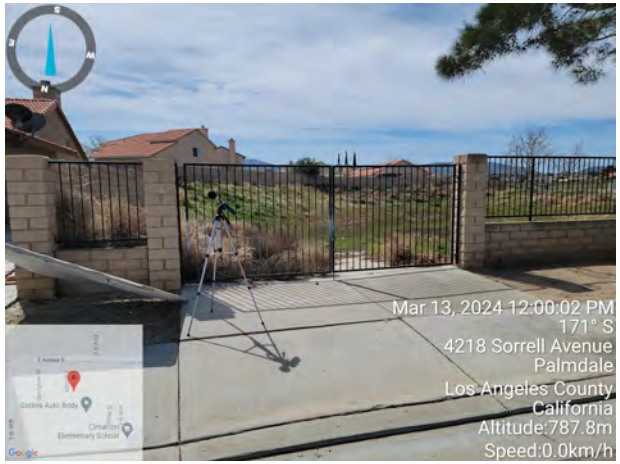
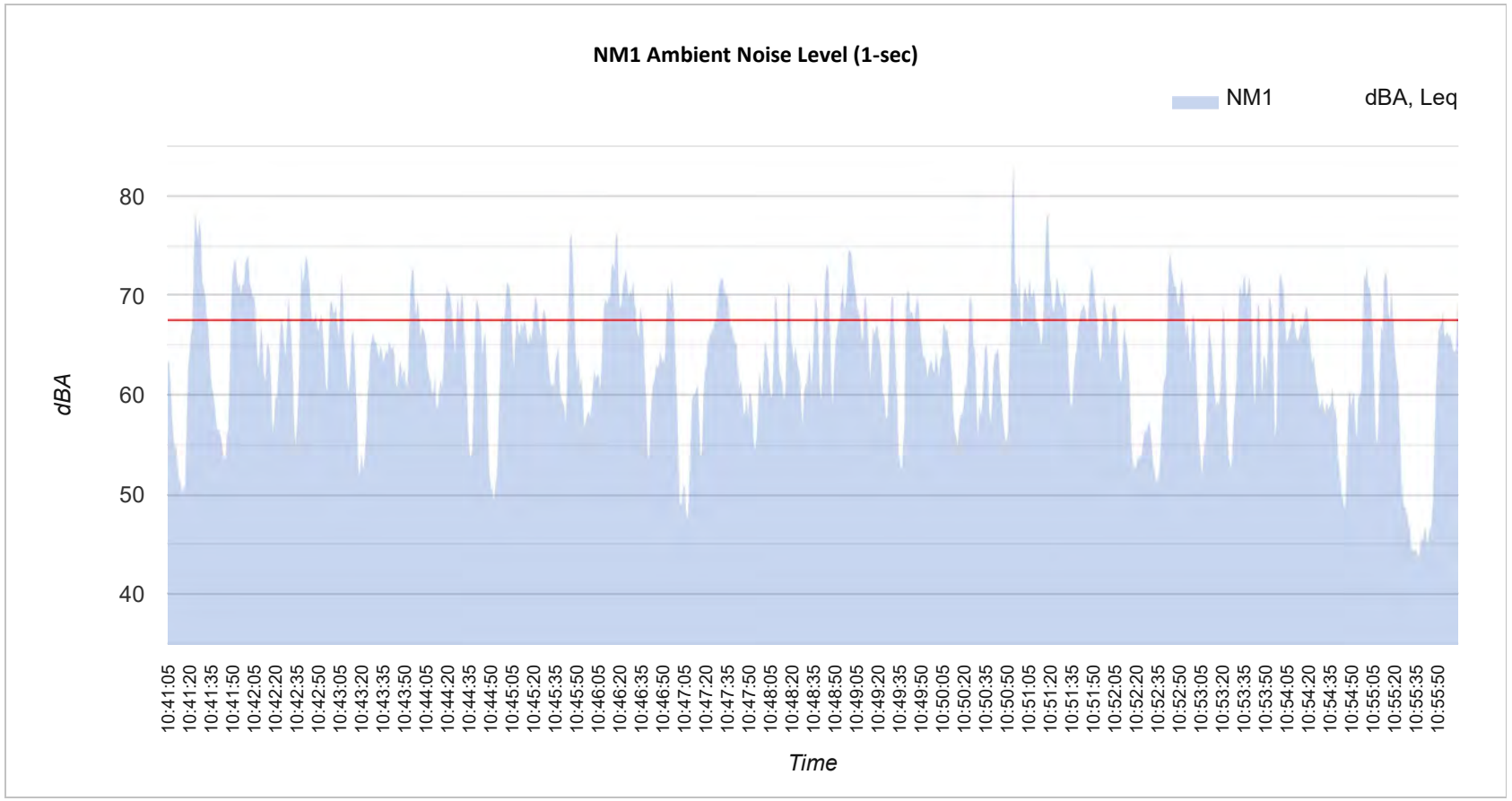


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	10:41 AM	10:56 AM	67.5	82.8	43.8	73.8	71.3	68.4	64.7	54.8
NM2	10:59 AM	11:14 AM	54.2	70.5	43.9	64.7	53.5	50.3	48.6	45.8

15-Minute Continuous Noise Measurement Datasheet - Cont.

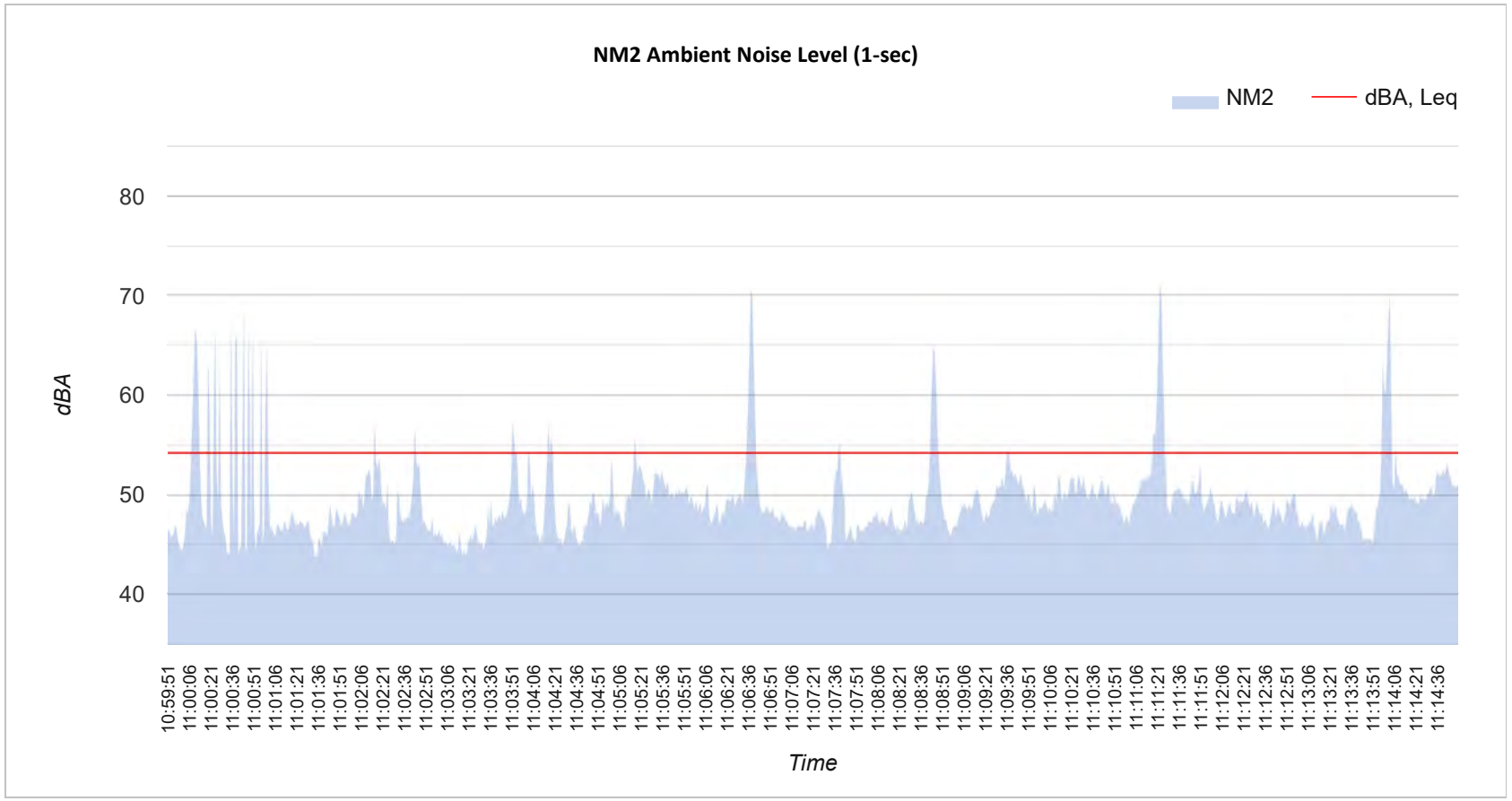
Project Name:	42nd Street & Ave S Noise	**Site Topo:**	Flat desert conditions	**Noise Source(s) w/ Distance:**	
Site Address/Location:	42nd Street & Ave S Noise	**Meteorological Cond.:**	55F Winds 12-15MPH	road noise and residential noise	
Site Id:	NM1	**Ground Type:**	loose powdery dirt with piles of rock		



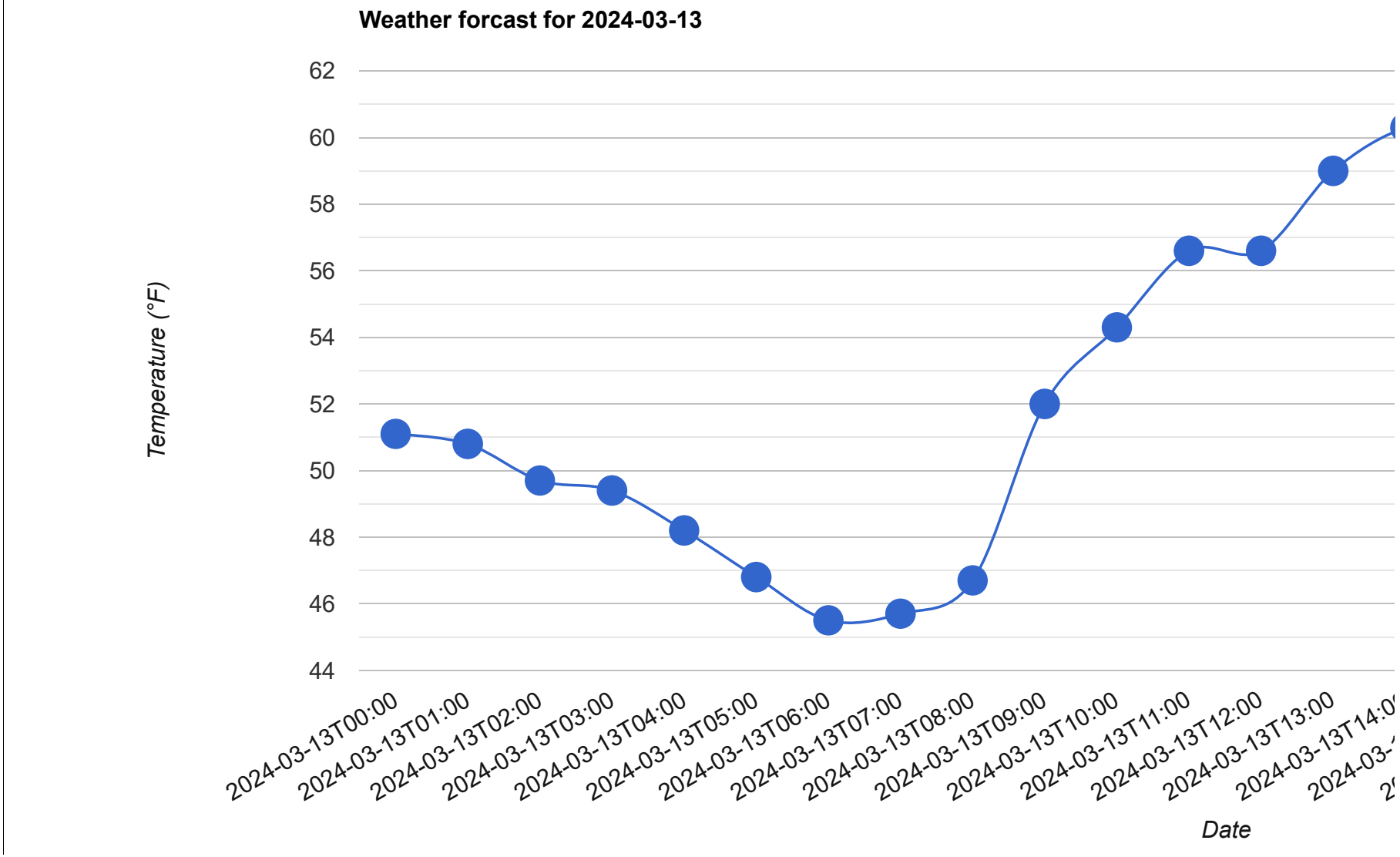
MD ACOUSTICS

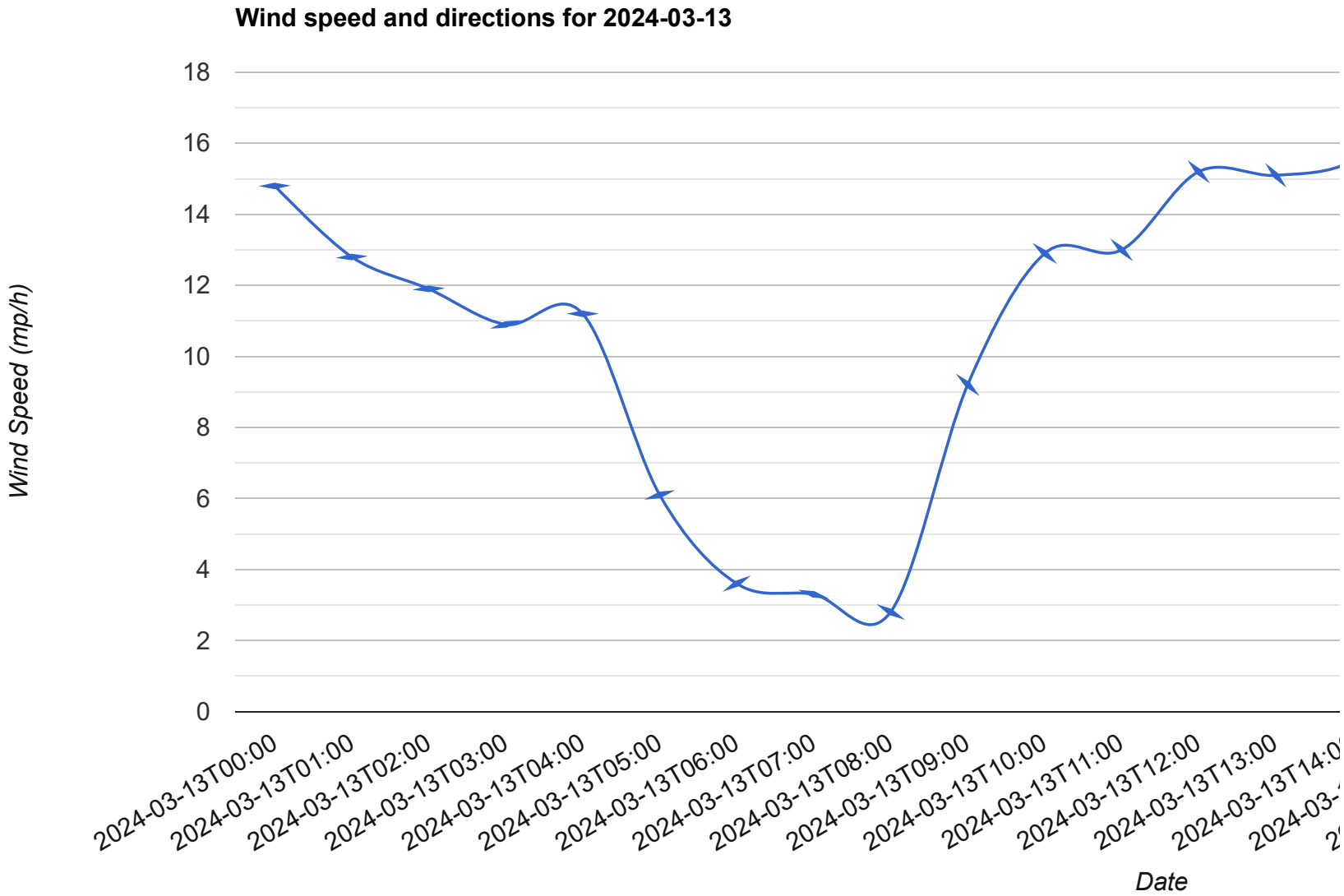
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	42nd Street & Ave S Noise	**Site Topo:**	Flat desert conditions small hou	**Noise Source(s) w/ Distance:**	
Site Address/Location:	42nd Street & Ave S Noise	**Meteorological Cond.:**	55F Winds 12-15MPH		road noise and residential noise
Site Id:	NM2	**Ground Type:**	loose powdery dirt with piles of rock		



MD ACOUSTICS


Weather forcast for 2024-03-13
62
60
58
56
54
52
50
48
46
44
Temperature (°F)
2024-03-13T00:00
2024-03-13T01:00
2024-03-13T02:00
2024-03-13T03:00
2024-03-13T04:00
2024-03-13T05:00
2024-03-13T06:00
2024-03-13T07:00
2024-03-13T08:00
2024-03-13T09:00
2024-03-13T10:00
2024-03-13T11:00
2024-03-13T12:00
2024-03-13T13:00
2024-03-13T14:0
Date



Source: Global Forecast System (GFS) weather forcast model

Appendix B:

Traffic Noise Modeling Output

Table 7: 2017 Existing Daily Segment Volumes

LINKID	Roadway Segments		Lanes	Type of Arterial	Capacity	2017 Existing Counts			2017 Existing Model		
	Roadway	From/To				2-Way Count	V/C	LOS	2017_Tot_Flow	V/C	LOS
1031	Palmdale Blvd	10th Street W to Trade Center Dr	4	Regional arterial	36,000	17,408	0.48	A	19,413	0.54	A
1032	Palmdale Blvd	Trade Center Dr to 5th Street W	4	Regional arterial	36,000	16,548	0.46	A	14,374	0.40	A
1033	Palmdale Blvd	5th Street W to State Route 14	4	Regional arterial	36,000	27,366	0.76	C	24,034	0.67	B
1034	Palmdale Blvd	Division Street to 5th St E	6	Major arterial	54,000	25,175	0.47	A	40,613	0.75	C
1035	Palmdale Blvd	5th Street E to 10th Street E	4	Major arterial	36,000	25,257	0.70	C	34,556	0.96	E
1036	Palmdale Blvd	10th Street E to 15th Street E	4	Major arterial	36,000	25,869	0.72	C	31,975	0.89	D
1037	Palmdale Blvd	15th Street E to 20th Street E	4	Major arterial	36,000	19,223	0.53	A	27,772	0.77	C
1038	Palmdale Blvd	20th Street E to 25th Street E	4	Major arterial	36,000	23,470	0.65	B	28,412	0.79	C
1040	Palmdale Blvd	40th Street E to 47th Street E	4	Major arterial	36,000	18,458	0.51	A	29,731	0.83	D
1041	Palmdale Blvd	50th Street E to 60th Street E	4	Major arterial	36,000	14,147	0.39	A	16,795	0.47	A
1042	Palmdale Blvd	70th Street E to 80th Street E	2	Major arterial	18,000	16,681	0.93	E	21,759	1.21	F
1043	E Avenue R	Sierra Hwy to 10th Street E	4	Major arterial	36,000	19,490	0.54	A	20,337	0.56	A
1044	E Avenue R	10th Street E to 20th Street E	4	Major arterial	36,000	18,495	0.51	A	23,916	0.66	B
1045	E Avenue R	20th Street E to 30th Street E	4	Major arterial	36,000	18,408	0.51	A	16,169	0.45	A
1046	E Avenue R	30th Street E to 40th Street E	3	Major arterial	27,000	14,851	0.55	A	23,278	0.86	D
1047	E Avenue R	40th Street E to 47th Street E	4	Major arterial	36,000	16,231	0.45	A	13,706	0.38	A
1048	E Avenue R	47th Street E to 60th Street E	4	Major arterial	36,000	15,158	0.42	A	4,970	0.14	A
1049	E Avenue R	60th Street E to 70th Street E	4	Major arterial	36,000	5,811	0.16	A	1,285	0.04	A
1050	Avenue S	Tovey Avenue to Tierra Subida Ave	4	Major arterial	36,000	9,346	0.26	A	6,971	0.19	A
1051	Avenue S	Tierra Subida Ave to SR 14	4	Major arterial	36,000	14,027	0.39	A	7,099	0.20	A
1052	Avenue S	SR 14 to 5th Street E	4	Major arterial	36,000	13,190	0.37	A	27,924	0.78	C
1053	Avenue S	5th Street E to Sierra Hwy	4	Major arterial	36,000	25,828	0.72	C	27,339	0.76	C
1054	Avenue S	Sierra Hwy to 10th Street E	4	Major arterial	36,000	32,170	0.89	D	37,784	1.05	F
1055	Avenue S	10th Street E to 20th Street E	4	Major arterial	36,000	29,830	0.83	D	35,288	0.98	E
1056	Avenue S	20th Street E to 25th Street E	4	Major arterial	36,000	30,323	0.84	D	35,328	0.98	E
1057	Avenue S	25th Street E to 30th Street E	4	Major arterial	36,000	29,058	0.81	D	35,702	0.99	E
1058	Avenue S	30th Street E to 35th Street E	6	Major arterial	54,000	24,137	0.45	A	28,809	0.53	A
1059	Avenue S	35th Street E to 40th Street E	6	Major arterial	54,000	23,612	0.44	A	29,185	0.54	A
1060	Avenue S	40th Street E to 47th Street E	6	Major arterial	54,000	23,867	0.44	A	33,374	0.62	B
1061	Avenue S	47th Street E to 55th Street E	4	Major arterial	36,000	21,305	0.59	A	11,417	0.32	A

Table 22: 2045 Preferred Plan Daily Volumes

	Roadway Segments			2045 Preferred Plan			
LINKID	Roadway	From/To	Lanes	2045PrefPlan_Tot_Flow_adj	Capacity	V/C	LOS
1032	Palmdale Blvd	Trade Center Dr to 5th Street W	4	17,785	36,000	0.49	A
1033	Palmdale Blvd	5th Street W to State Route 14	4	27,366	36,000	0.76	C
1034	Palmdale Blvd	Division Street to 5th St E	6	25,510	54,000	0.47	A
1035	Palmdale Blvd	5th Street E to 10th Street E	4	25,257	36,000	0.70	C
1036	Palmdale Blvd	10th Street E to 15th Street E	4	25,869	36,000	0.72	C
1037	Palmdale Blvd	15th Street E to 20th Street E	4	19,233	36,000	0.53	A
1038	Palmdale Blvd	20th Street E to 25th Street E	4	24,649	36,000	0.68	B
1040	Palmdale Blvd	40th Street E to 47th Street E	4	28,011	36,000	0.78	C
1041	Palmdale Blvd	50th Street E to 60th Street E	4	23,700	36,000	0.66	B
1042	Palmdale Blvd	70th Street E to 80th Street E	2	16,681	18,000	0.93	E
1043	E Avenue R	Sierra Hwy to 10th Street E	4	19,490	36,000	0.54	A
1044	E Avenue R	10th Street E to 20th Street E	4	18,495	36,000	0.51	A
1045	E Avenue R	20th Street E to 30th Street E	4	18,408	36,000	0.51	A
1046	E Avenue R	30th Street E to 40th Street E	3	18,843	36,000	0.52	A
1047	E Avenue R	40th Street E to 47th Street E	4	22,831	36,000	0.63	B
1048	E Avenue R	47th Street E to 60th Street E	4	17,279	36,000	0.48	A
1049	E Avenue R	60th Street E to 70th Street E	4	6,564	36,000	0.18	A
1050	Avenue S	Tovey Avenue to Tierra Subida Ave	4	10,895	36,000	0.30	A
1051	Avenue S	Tierra Subida Ave to SR 14	4	17,336	36,000	0.48	A
1052	Avenue S	SR 14 to 5th Street E	4	13,190	36,000	0.37	A
1053	Avenue S	5th Street E to Sierra Hwy	4	25,828	36,000	0.72	C
1054	Avenue S	Sierra Hwy to 10th Street E	4	32,170	36,000	0.89	D
1055	Avenue S	10th Street E to 20th Street E	4	29,830	36,000	0.83	D
1056	Avenue S	20th Street E to 25th Street E	4	30,323	36,000	0.84	D
1057	Avenue S	25th Street E to 30th Street E	4	29,058	36,000	0.81	D
1058	Avenue S	30th Street E to 35th Street E	6	24,137	54,000	0.45	A
1059	Avenue S	35th Street E to 40th Street E	6	23,612	54,000	0.44	A
1060	Avenue S	40th Street E to 47th Street E	6	23,867	54,000	0.44	A
1061	Avenue S	47th Street E to 55th Street E	4	21,305	36,000	0.59	A
1062	Pearblossom Hwy/Avenue T	Sierra Hwy to 25th Street E	4	52,520	36,000	1.46	F
1063	Pearblossom Hwy/Avenue T	25th Street E to 40th Street E	4	45,045	36,000	1.25	F

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: Forty Second St and Ave S
ROADWAY: S Ave
LOCATION: Building Façade Facing Ave S
JOB #: 1269-2024-00
DATE: ########
ENGINEER J Trubakoff

NOISE INPUT DATA - 2017/2045

ROADWAY CONDITIONS

ADT =	23,867	
SPEED =	55	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	70	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	2,387	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		105
DIST C/L TO WALL =		104
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		1
PAD ELEVATION =		2.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

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	99.12	- -
MEDIUM TRUCKS	4.0	99.04	- -
HEAVY TRUCKS	8.0	99.00	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	67.9	66.0	64.3	58.2	66.8	67.4
MEDIUM TRUCKS	57.8	56.3	49.9	48.4	56.9	57.1
HEAVY TRUCKS	57.8	56.4	47.4	48.6	57.0	57.1
NOISE LEVELS (dBA)	68.7	66.9	64.5	59.0	67.6	68.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.9	66.0	64.3	58.2	66.8	67.4
MEDIUM TRUCKS	57.8	56.3	49.9	48.4	56.9	57.1
HEAVY TRUCKS	57.8	56.4	47.4	48.6	57.0	57.1
NOISE LEVELS (dBA)	68.7	66.9	64.5	59.0	67.6	68.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	79	171	368	792
LDN	73	157	339	730

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: Forty Second St and Ave S
ROADWAY: S Ave
LOCATION: Building Façade Facing Ave S
JOB #: 1269-2024-00
DATE: ########
ENGINEER J Trubakoff

NOISE INPUT DATA - 2017/2045 Plus Project

ROADWAY CONDITIONS

ADT =	24,302	
SPEED =	55	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	70	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	2,430	

RECEIVER INPUT DATA

RECEIVER DISTANCE =	105	
DIST C/L TO WALL =	104	
RECEIVER HEIGHT =	5.0	
WALL DISTANCE FROM RECEIVER	1	
PAD ELEVATION =	2.0	
ROADWAY VIEW: LF ANGLE=	-90	
RT ANGLE=	90	
DF ANGLE=	180	

SITE CONDITIONS

AUTOMOBILES =	15	(10 = HARD SITE, 15 = SOFT SITE)
MEDIUM TRUCKS =	15	
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL	5.0	
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	99.06	- -
MEDIUM TRUCKS	4.0	98.98	- -
HEAVY TRUCKS	8.0	99.00	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	68.0	66.1	64.3	58.3	66.9	67.5
MEDIUM TRUCKS	57.9	56.4	50.0	48.5	56.9	57.2
HEAVY TRUCKS	57.9	56.5	47.4	48.7	57.0	57.2
NOISE LEVELS (dBA)	68.8	67.0	64.6	59.1	67.7	68.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.0	61.1	59.4	53.3	61.9	62.6
MEDIUM TRUCKS	52.9	51.4	45.1	43.5	52.0	52.2
HEAVY TRUCKS	57.9	56.5	47.4	48.7	57.0	57.2
NOISE LEVELS (dBA)	64.5	62.7	60.3	54.8	63.4	64.0

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	80	173	372	802
LDN	74	159	343	739

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: Forty Second St and Ave S
ROADWAY: S Ave
LOCATION: Building Façade Facing Ave S
JOB #: 1269-2024-00
DATE: ########
ENGINEER: J Trubakoff

NOISE INPUT DATA - 2017/2045 Plus Project

ROADWAY CONDITIONS

ADT =	24,302	
SPEED =	55	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	70	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	2,430	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		105
DIST C/L TO WALL =		104
RECEIVER HEIGHT =		15.0
WALL DISTANCE FROM RECEIVER		1
PAD ELEVATION =		2.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL	15.0	
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	100.08	- -
MEDIUM TRUCKS	4.0	99.79	- -
HEAVY TRUCKS	8.0	99.35	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	67.9	66.0	64.3	58.2	66.8	67.4
MEDIUM TRUCKS	57.8	56.3	50.0	48.4	56.9	57.1
HEAVY TRUCKS	57.9	56.5	47.4	48.7	57.0	57.2
NOISE LEVELS (dBA)	68.7	66.9	64.5	59.1	67.7	68.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.0	61.1	59.3	53.3	61.9	62.5
MEDIUM TRUCKS	52.9	51.4	45.0	43.5	51.9	52.2
HEAVY TRUCKS	52.9	51.5	42.5	43.7	52.1	52.2
NOISE LEVELS (dBA)	63.8	61.9	59.6	54.1	62.7	63.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	79	171	369	795
LDN	73	158	340	732

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: Forty Second St and Ave S
ROADWAY: S Ave
LOCATION: Building Façade Facing Ave S
JOB #: 1269-2024-00
DATE: ########
ENGINEER: J Trubakoff

NOISE INPUT DATA - 2017/2045 Plus Project

ROADWAY CONDITIONS

ADT =	24,302	
SPEED =	55	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	70	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	2,430	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		105
DIST C/L TO WALL =		104
RECEIVER HEIGHT =		25.0
WALL DISTANCE FROM RECEIVER		1
PAD ELEVATION =		2.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

WALL INFORMATION

HTH WALL	25.0	
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	102.07	- -
MEDIUM TRUCKS	4.0	101.60	- -
HEAVY TRUCKS	8.0	100.76	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	67.8	65.9	64.1	58.1	66.7	67.3
MEDIUM TRUCKS	57.7	56.2	49.9	48.3	56.8	57.0
HEAVY TRUCKS	57.8	56.4	47.3	48.6	56.9	57.1
NOISE LEVELS (dBA)	68.6	66.8	64.4	58.9	67.5	68.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	62.6	60.7	58.9	52.9	61.5	62.1
MEDIUM TRUCKS	52.5	51.0	44.7	43.1	51.6	51.8
HEAVY TRUCKS	52.7	51.3	42.2	43.5	51.8	52.0
NOISE LEVELS (dBA)	63.4	61.6	59.2	53.8	62.3	62.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	78	168	362	780
LDN	72	155	333	718

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: Forty Second St and Ave S
ROADWAY: S Ave
LOCATION: NM1
JOB #: 1269-2024-00
DATE: ########
ENGINEER J Trubakoff

NOISE INPUT DATA - 2017/2045

ROADWAY CONDITIONS

ADT =	23,867	
SPEED =	55	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	70	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	2,387	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		80
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		30
PAD ELEVATION =		1.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15	
MEDIUM TRUCKS =	15	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	15	

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	72.05	- -
MEDIUM TRUCKS	4.0	71.97	- -
HEAVY TRUCKS	8.0	71.97	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	70.0	68.1	66.3	60.3	68.9	69.5
MEDIUM TRUCKS	59.9	58.4	52.0	50.5	58.9	59.2
HEAVY TRUCKS	59.9	58.5	49.4	50.7	59.0	59.2
NOISE LEVELS (dBA)	70.8	68.9	66.6	61.1	69.7	70.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.0	68.1	66.3	60.3	68.9	69.5
MEDIUM TRUCKS	59.9	58.4	52.0	50.5	58.9	59.2
HEAVY TRUCKS	59.9	58.5	49.4	50.7	59.0	59.2
NOISE LEVELS (dBA)	70.8	68.9	66.6	61.1	69.7	70.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	83	179	386	831
LDN	76	165	355	765

Appendix C:

Construction Noise Modeling Output

Receptor - Residences to the South

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
SITE PREP									
Dozer	3	82	40	400	40	0.66	0.40	84.6	54.0
Tractor	4	84	40	400	40	0.66	0.40	86.6	56.0
							Log Sum	86.6	63.7
GRADE									
Excavator	1	81	40	400	40	0.66	0.40	83.6	53.0
Grader	1	85	40	400	40	0.66	0.40	87.6	57.0
Dozer	1	82	40	400	40	0.66	0.40	84.6	54.0
Tractor	3	84	40	400	40	0.66	0.40	86.6	56.0
								87.6	63.3
BUILD									
Crane	1	81	40	400	16	0.66	0.16	83.6	49.0
Man lift	3	75	40	400	20	0.66	0.20	77.6	44.0
Generator	1	81	40	400	50	0.66	0.50	83.6	54.0
Tractor	3	84	40	400	40	0.66	0.40	86.6	56.0
Welder/Torch	1	74	40	400	40	0.66	0.40	76.6	46.0
								86.6	62.1
PAVE									
Paver	2	77	40	400	50	0.66	0.50	79.6	50.0
Compactor (ground)	2	83	40	400	20	0.66	0.20	85.6	52.0
Roller	2	80	40	400	20	0.66	0.20	82.6	49.0
Tractor	1	84	40	400	40	0.66	0.40	86.6	56.0
Concrete Mixer Truck	2	79	40	400	40	0.66	0.40	81.6	51.0
								86.6	61.2
ARCH COAT									
Compressor (air)	1	78	40	400	40	0.66	0.40	80.6	50.0
								80.6	50.0

[1]FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors

VIBRATION LEVEL IMPACT

Project:	42nd St & S Avenue	Date: 3/14/24
Source:	Vibratory Roller	
Scenario:	Unmitigated	
Location:	60 feet from residential west	
Address:	SE Corner 42nd St & S Avenue	

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 =	60.00	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 =	**0.080**	IN/SEC	OUTPUT IN RED

Appendix I: Hydrology Report

City of Palmdale
Hydrology Study

Multi-Family Residential Development
APN: 3052-001-071/-072
42nd St. E and Ave. S, Palmdale,
CA 93552

Prepared For:

42nd St Communities LLC

vzanko@mda-group.com
9281 Sierra College Blvd., Roseville, CA 95661

Prepared By:

Duke Engineering
759 W Lancaster Blvd
Lancaster, California 93534
Phone: (661) 952-7918



ENGINEER'S CERTIFICATION:

The Registered Professional Engineer Certifies that the Storm Drain Facilities have been designed in accordance with the City of Palmdale Engineering Design Guidelines Policies & Procedures.

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1. Introduction

The purpose of this report is to address the proposed drainage conditions for the new development at Ave S and E 42nd St. E in the City of Palmdale. This report will be used to size the on-site underground detention system, catch basin, and storm drain to meet City of Palmdale and County of LA drainage requirements.

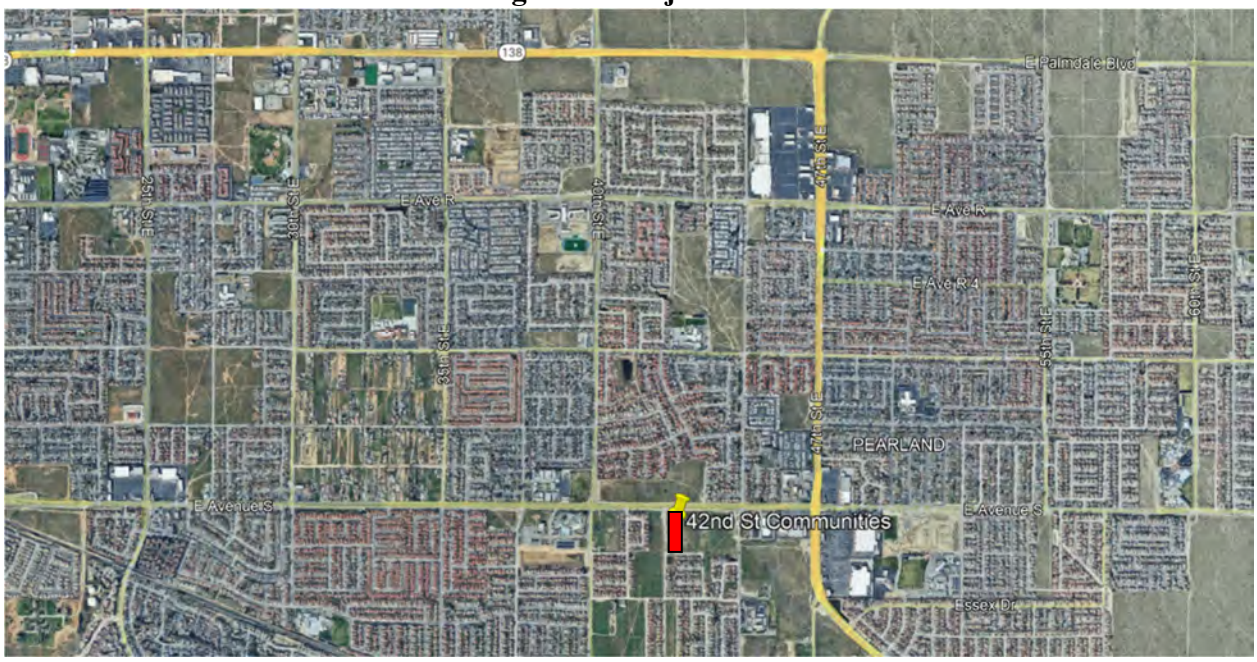
2. Approach

This study uses LA County methods and software such as Hydrocalc and ADS Design Tool. A site survey and proposed grading plans are used to analyze predeveloped and postdeveloped flows.

3. Project Location

The subject property is 11.32 acre along the property frontage along Avenue S. The property is currently undeveloped and will be constructed for the purposes of a Multi-Family Residential development.

Figure 1: Project Site



4. Existing Conditions

The current site condition is an undeveloped 5.03-acre parcel. Due to the size of the development, and single conveyance outfall, the site will be divided into 3 overall subareas that terminate at the northwest end of the property, as shown in Appendix C.

5. Proposed Conditions

The proposed improvements for this project will include multi-family residential development. An underground storage system is proposed. The storm water will collect at new catch basins at the northern portion of the property that will drain into a StormTech MC-7200 to then slowly drain into the earth beneath the detention system.

6. Analysis

6.1 Rainfall Data

Table 1 below shows the rainfall data for the project obtained from the LA County Isohyet maps included in Appendix D.

Table 1: Rainfall Data

Information	Project Specific Values
Storm Frequency	50-Year
Rainfall Amount	2.8 inches
Soil Number	120

6.2 Conveyance

The site comprises three subareas with a catch basin fitted with a first flush filter at the ultimate point of conveyance. See Appendix A for the worst-case scenario catch basin capacity calculation using Q50 data obtained from Hydrocalc. During the 24-hr 50-yr storm, the detention basin will never fill completely and slowly drain during dry periods of time.

6.2.1 Storm Drain System

As discussed above, the project development will include one storm drain run which will convey stormwater to the northwest corner of the project site. The catch basins directs the combined flows into the underground detention system. The capacity analyses of these storm drains are shown in Appendix E.

6.2.2 Detention and Discharge

The requirement to reduce flowrates to below predeveloped flowrates will be met by directing stormwater into a new StormTech MC-7200 underground detention system. This detention system is sized to collect all the stormwater generated during the postdeveloped, 50-year storm. Details for this system are shown in Appendix F. The storm water will then drain to the earth below.

6.3 Runoff

The LA County HydroCalc program is used to determine the storm runoff values. The sub areas are shown on the hydrology map (Appendix B). The 15" storm drain system capacity is shown in Appendix E, and the capacity analysis of the ADS system is shown in Appendix F.

7. Conclusion

In conclusion, the area has been assessed and quantified to sufficiently size the proposed storm drain improvements and storm water detention facilities. This analysis quantified the areas which flow towards each of the proposed improvements within the site.

It is our opinion that this analysis sufficiently quantifies the project area, storm water runoff flow rates, and calculated storm drain device sizes to safely collect and convey the storm water run-off.

Please contact our office with any additional questions.

Sincerely,



Ryan Duke P.E.

RCE 79729

Principle Engineer

Appendix A: Catch Basin Capacity Calculations

CB1 3'x3' Drop Inlet Catch Basin – (Worst Case for 50-Year Storm)

The original perimeter of this catch basin is 12', but the effective perimeter is 6' with 50% clogging applied. The flow rate for catch basin CB1 is 2.02 cfs. Using the equation below to calculate head, the depth of flow at the catch basin during the peak Q50 flow rate of 2.02 cfs is 2.79". This would cause very minimal ponding that would not be considered intrusive. The capacity of this 3' x 3' catch basin is 3.72 cfs, which exceeds the demand of 2.02 cfs from the worse of the two subareas' flow.

Capacity Calculation:

Q = 4.3AD^0.6

A = Area of Opening (W X 0.67)

W = Length of Catch Basin = 3'

D = Depth of Flow

D = [Q50/(3P)]^2/3 = [2.02/(3*6)]^2/3 = 2.79"

P = Effective Perimeter = 6'

Q = 4.3 (3'X0.67)(2.79"^0.6) = 3.72 cfs > 2.02 cfs … OK

Appendix B: Post-Developed Conditions (Map & Hydrocalc)



Underground Service Alert

CALL BEFORE YOU DIG

Call: TOLL FREE

811

TWO WORKING DAYS BEFORE YOU DIG

PREPARED FOR:

42ND ST COMMUNITIES LLC

9281 SIERRA COLLEGE BLVD.,
ROSEVILLE, CA 95661

ENGINEER OF RECORD

759 W LANCASTER BLVD.,
LANCASTER, CA 93534
(661) 952-7918

REGISTERED PROFESSIONAL ENGINEER
RYAN DUKE
C070729
9-30-26
CIVIL
STATE OF CALIFORNIA

CITY OF PALMDALE

POST-DEVELOPED MAP

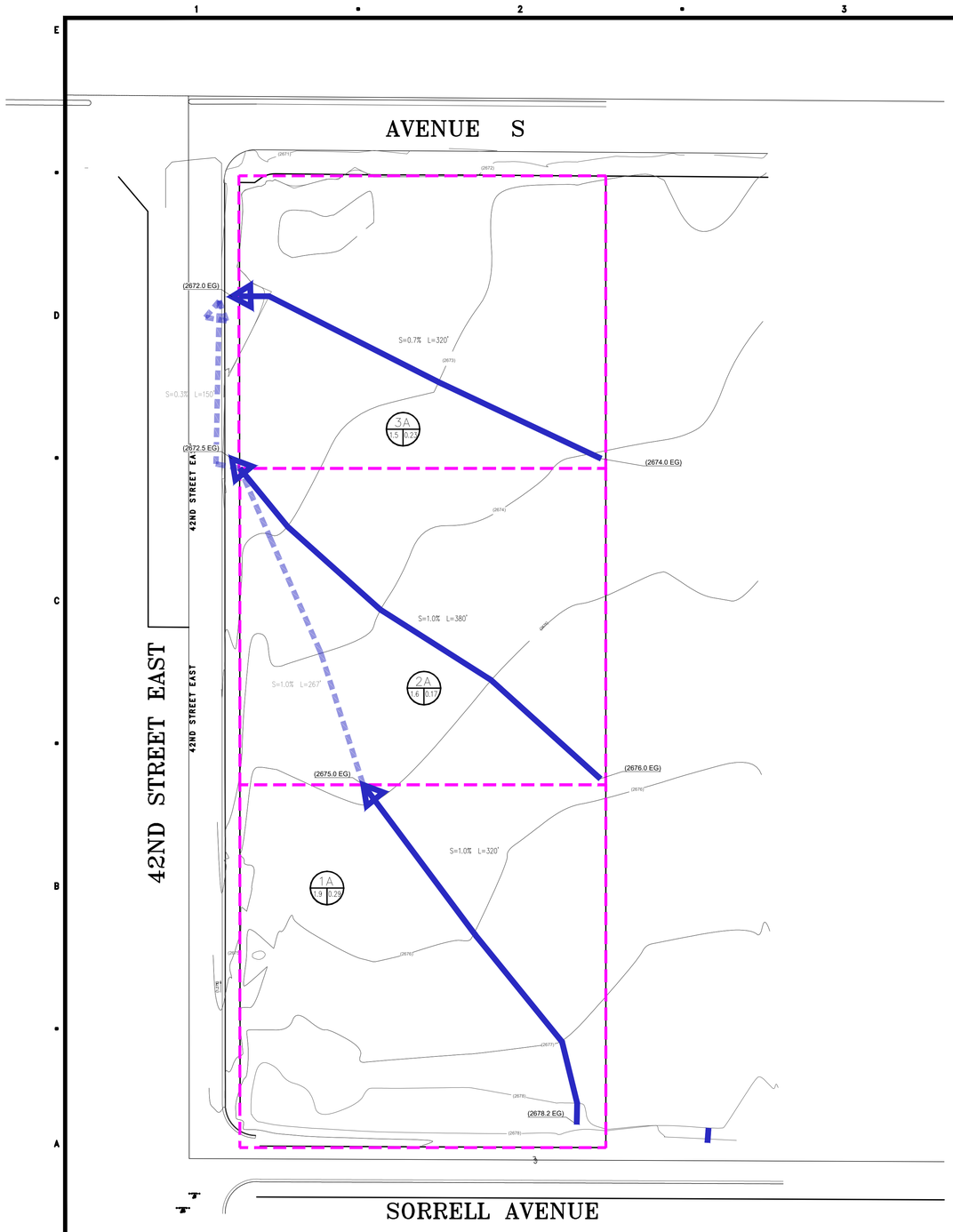
42ND ST COMMUNITIES

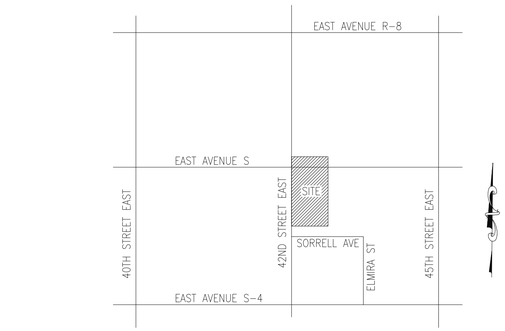
APN: 3052-001-071/-072

SCALE: PER PLAN
DESIGNED: RD
DRAWN: EI
CHECKED: RD
SHEET: **H1**
Project No. 25100
SHEET NO.
SHEET 1 OF 1

11/18/2025 10:01:06 AM, Do Not Scale Drawings

Appendix C: Pre-Developed Conditions (Map & Hydrocalc)



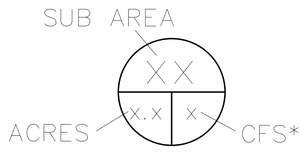


VICINITY MAP
SCALE: N.T.S.

50-YR STORM

HYDROLOGY ANALYSIS PRE		
SUB-AREA	AREA	CFS*
1A	1.9	0.29
2A	1.6	0.18
3A	1.5	0.23
TOTAL	5.0	0.7

*GENERATED DIRECTLY FROM HYDROCALC FOR SEPARATED FLOW CALCULATIONS



PROJECT DEVELOPER

CIVIL ENGINEERS

DUKE ENGINEERING

Sheet Title

PRE DEVELOPED HYDROLOGY MAP

Drawn By: EI

Checked By: RD

Project No. 25100

Sheet

PRE-DEV

11/18/2025 9:26:31 AM, Do Not Scale Drawings

Peak Flow Hydrologic Analysis

File location: C:/Users/Alexandria/DukeEng Dropbox/Job Files 2.0/25100 42nd Street Communities/3 - Civil/9 - Studies/1 - Hydrology Study/Hydrocalc/25
Version: HydroCalc 1.0.3

Input Parameters

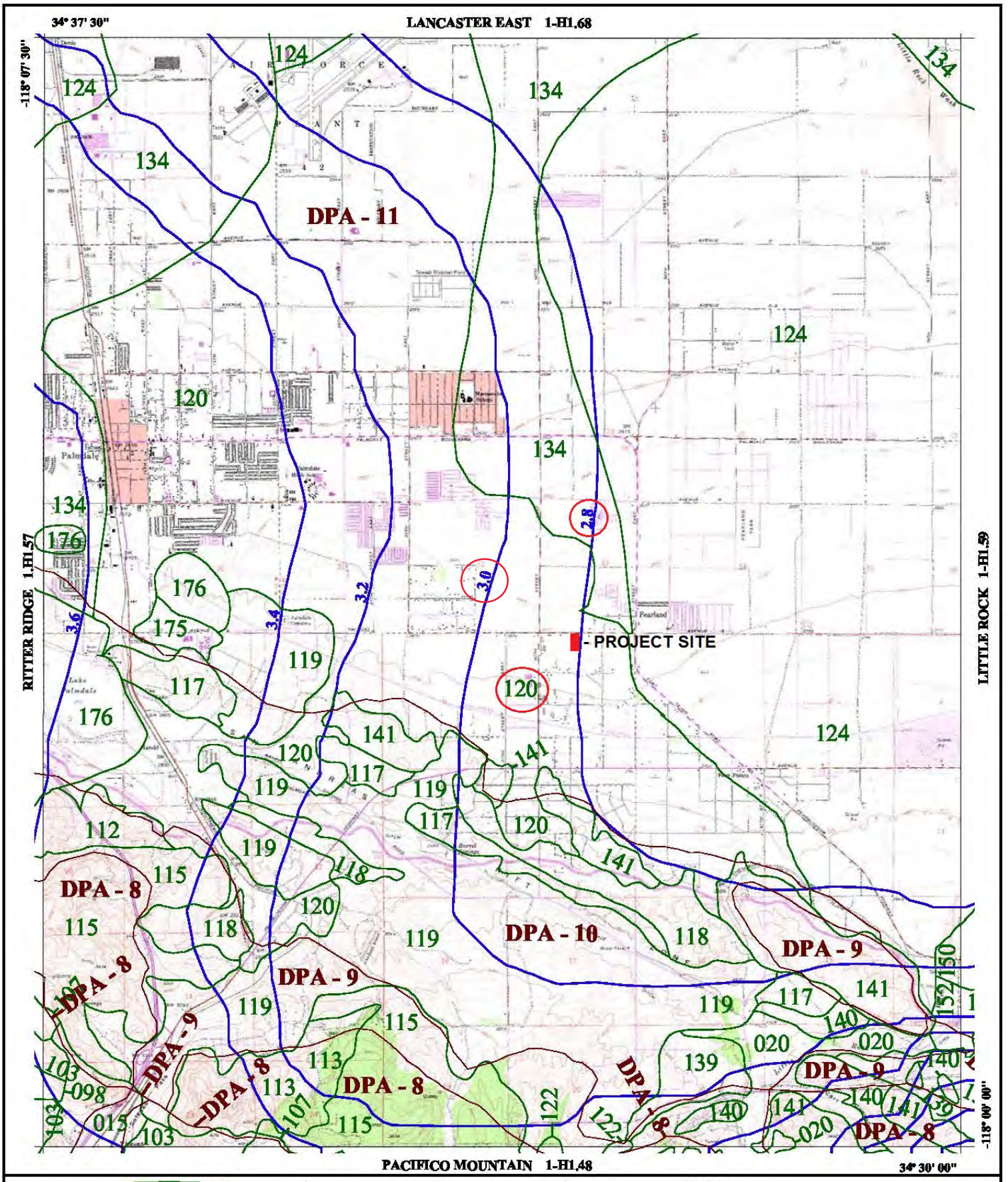
Project Name	25100 42nd St Communities
Subarea ID	3C Pre-Developed
Area (ac)	1.5
Flow Path Length (ft)	320.0
Flow Path Slope (vft/hft)	0.007
50-yr Rainfall Depth (in)	2.8
Percent Impervious	0.01
Soil Type	120
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	2.8
Peak Intensity (in/hr)	0.7841
Undeveloped Runoff Coefficient (Cu)	0.1859
Developed Runoff Coefficient (Cd)	0.1931
Time of Concentration (min)	25.0
Clear Peak Flow Rate (cfs)	0.2271
Burned Peak Flow Rate (cfs)	0.2271
24-Hr Clear Runoff Volume (ac-ft)	0.0393
24-Hr Clear Runoff Volume (cu-ft)	1713.0642



Appendix D: Isohyet Map



N
W E
S

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

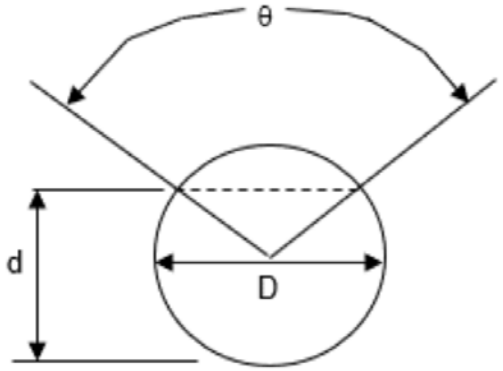
P A L M D A L E
50-YEAR 24-HOUR ISOHYET

1-H1.58

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Appendix E: Storm Drain Capacity Analysis

Pipe Calculation



R = A/P

A = Cross Section Area

P = Wetted Perimeter

S = Slope of Channel

n = Manning's Roughness Coefficient

D =	15	in
d =	11.25	in
n =	0.013	
Angle =	120	θ
S =	0.004	ft/ft

Mannings Formula = Q = (1.486/n) A Rh 2/3 S 1/2

Area, ft2	Wetted Perimeter	Hydraulic Radius	Velocity (ft/s)	Flow Rate (cfs)
0.987	2.618	0.377	3.773	3.7
Q = 3.73 CFS > 2.02 CFS				

Appendix F: Underground Detention Schematic

User Inputs

Chamber Model:	MC-7200
Outlet Control Structure:	Yes
Project Name:	25100 42nd St Communities
Engineer:	Edwin Ilejay
Project Location:	California
Measurement Type:	Imperial
Required Storage Volume:	41134 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Design Constraint Dimensions:	(60 ft. x 256 ft.)

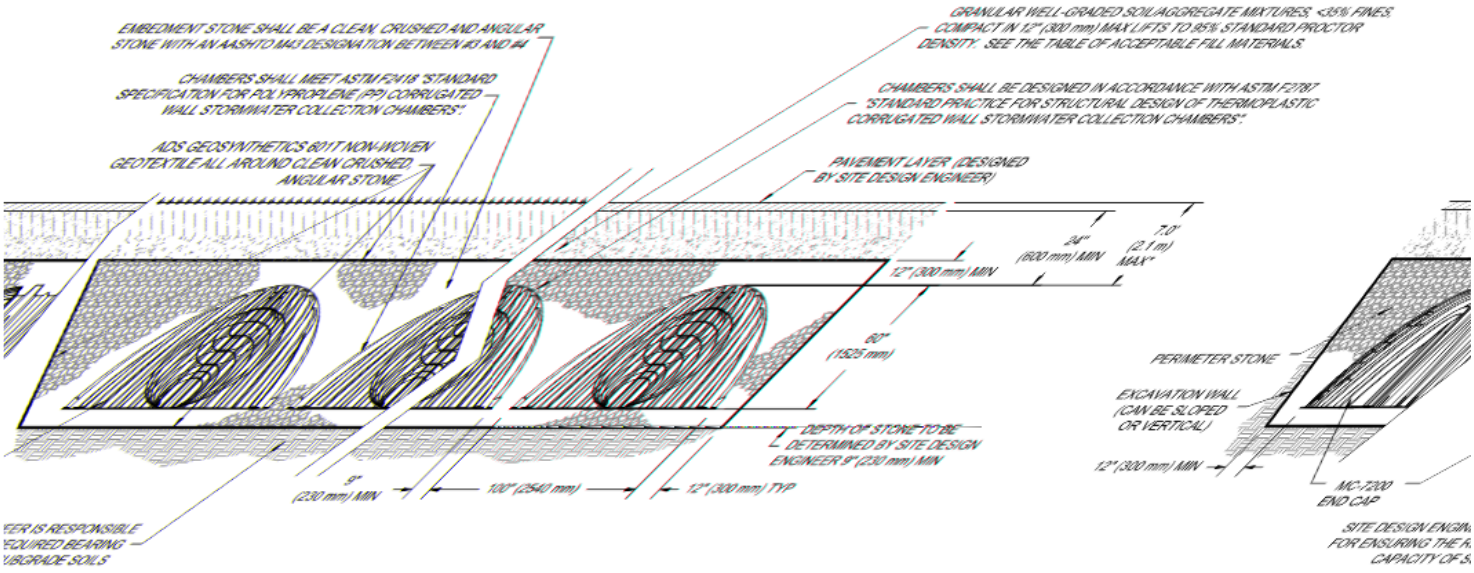
Results

System Volume and Bed Size

Installed Storage Volume:	41850.58 cubic ft.
Storage Volume Per Chamber:	175.90 cubic ft.
Number Of Chambers Required:	146
Number Of End Caps Required:	8
Chamber Rows:	4
Maximum Length:	255.85 ft.
Maximum Width:	38.18 ft.
Approx. Bed Size Required:	9722.87 square ft.
Average Cover Over Chambers:	N/A .

System Components

Amount Of Stone Required (0% Overage):	1468 cubic yards
(Cubic yard to ton factor:1.4):	2054.99 tons
Volume Of Excavation (Not Including Fill):	2431 cubic yards
Total Non-woven Geotextile Required:	3123 square yards
Woven Geotextile Required (excluding Isolator Row):	88 square yards
Woven Geotextile Required (Isolator Row):	582 square yards
Total Woven Geotextile Required:	670 square yards
Impervious Liner Required:	0 square yards



PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

25100 42ND ST COMMUNITIES

PALMDALE, CA, USA

MC-7200 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-7200.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
10. MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
11. ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-7200 CHAMBER SYSTEM

1. STORMTECH MC-7200 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "MC-7200 STORMTECH CHAMBER INSTALLATION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "MC-7200 STORMTECH CHAMBER INSTALLATION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-7200 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "MC-7200 STORMTECH CHAMBER INSTALLATION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "MC-7200 STORMTECH CHAMBER INSTALLATION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

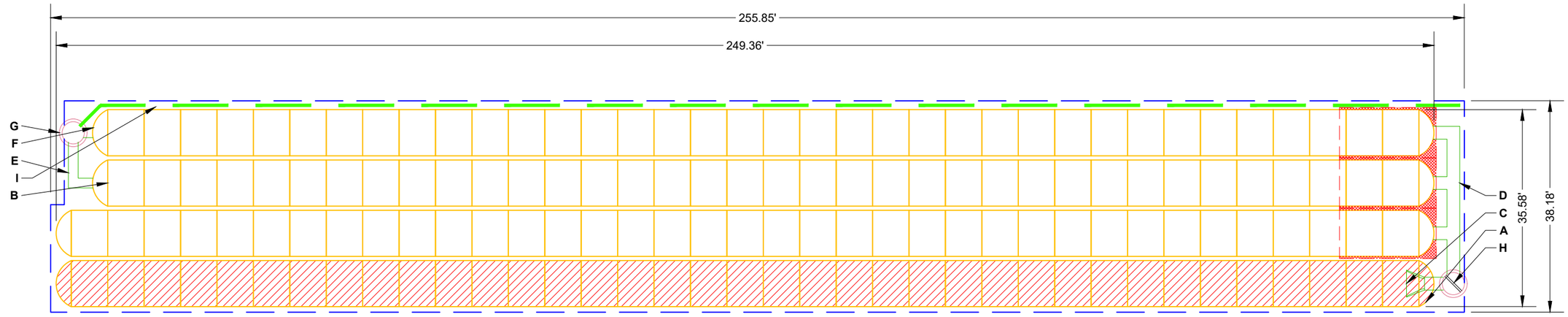
CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
146	STORMTECH MC-7200 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	12.75
8	STORMTECH MC-7200 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	8.25
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	7.75
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	7.75
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	7.75
41851	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	6.75
		TOP OF MC-7200 CHAMBER:	5.75
		24" x 24" BOTTOM MANIFOLD INVERT:	0.94
		24" ISOLATOR ROW PLUS INVERT:	0.94
9723	SYSTEM AREA (SF)	18" x 18" BOTTOM MANIFOLD INVERT:	0.91
588.1	SYSTEM PERIMETER (ft)	18" BOTTOM CONNECTION INVERT:	0.91
		BOTTOM OF MC-7200 CHAMBER:	0.75
		UNDERDRAIN INVERT:	0.00
		BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.26"	
PREFABRICATED END CAP	B	18" BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP18B / TYP OF ALL 18" BOTTOM CONNECTIONS	1.97"	
FLAMP	C	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	D	24" x 24" BOTTOM MANIFOLD, ADS N-12	2.26"	
MANIFOLD	E	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.97"	
PIPE CONNECTION	F	18" BOTTOM CONNECTION	1.97"	
CONCRETE STRUCTURE	G	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		8.0 CFS OUT
CONCRETE STRUCTURE W/WEIR	H	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		28.5 CFS IN
UNDERDRAIN	I	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- **NOT FOR CONSTRUCTION**: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

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Chamber System

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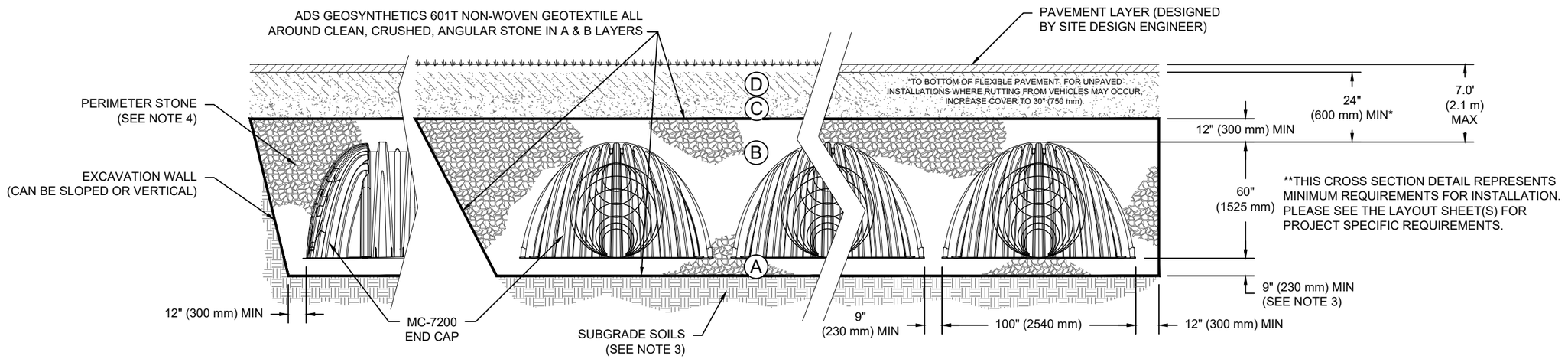
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ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

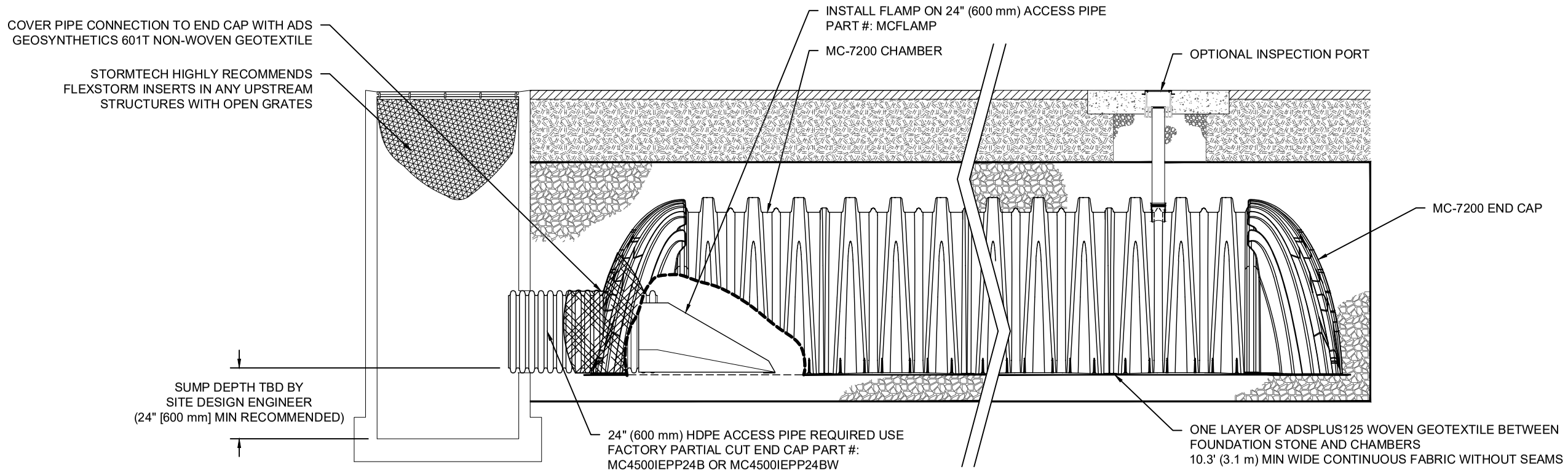
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StormTech® Chamber System

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1-800-733-7473

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MC-7200 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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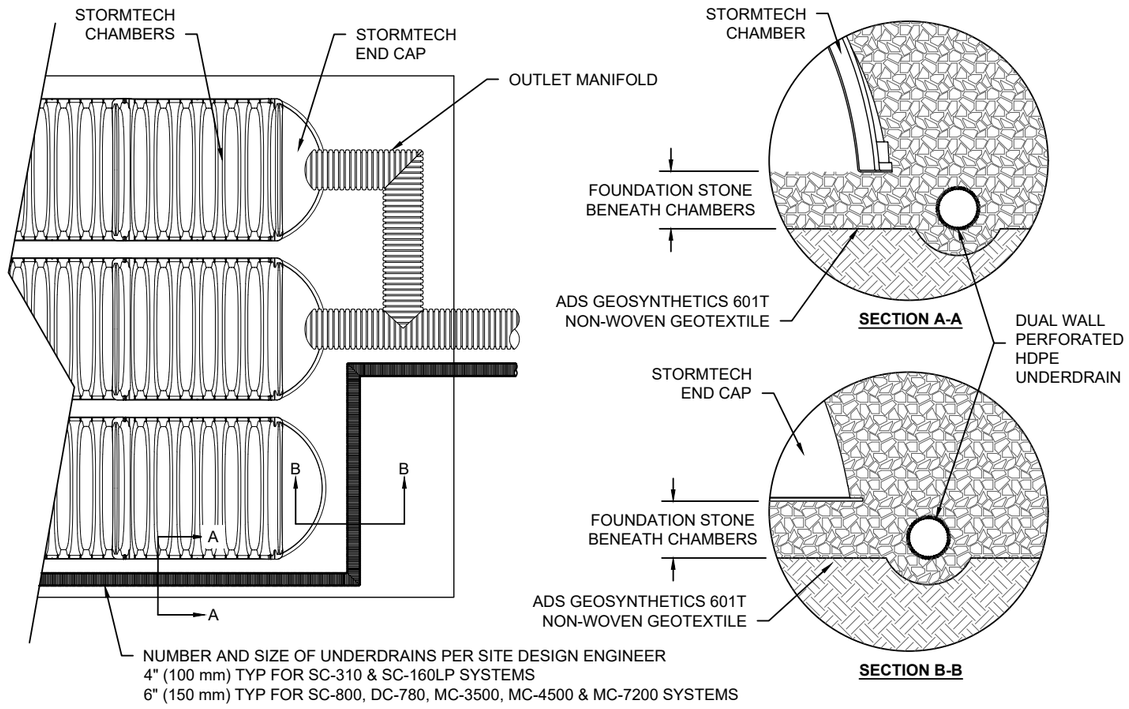
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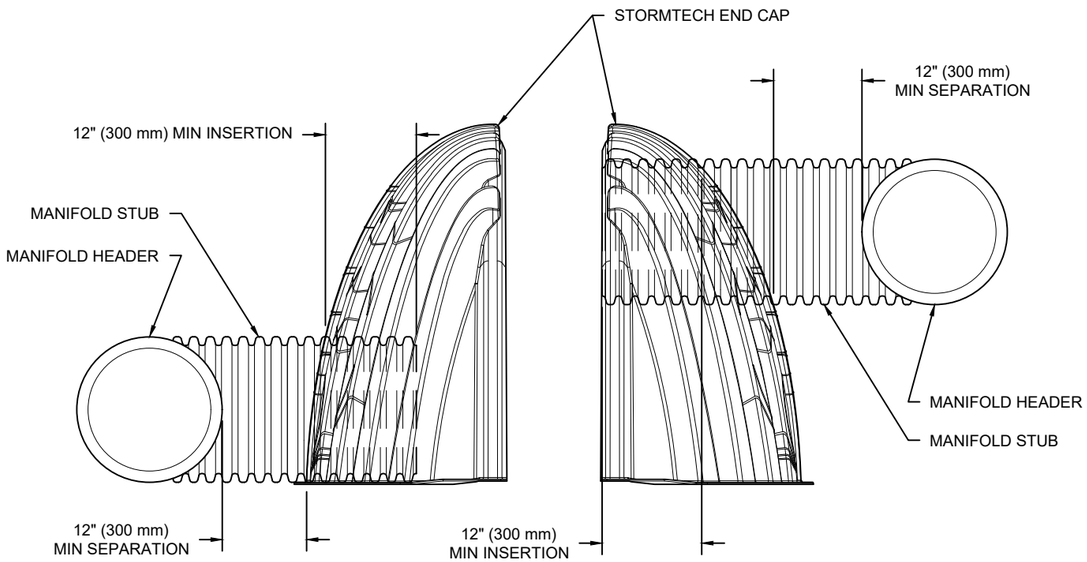
UNDERDRAIN DETAIL

NTS



MC-SERIES END CAP INSERTION DETAIL

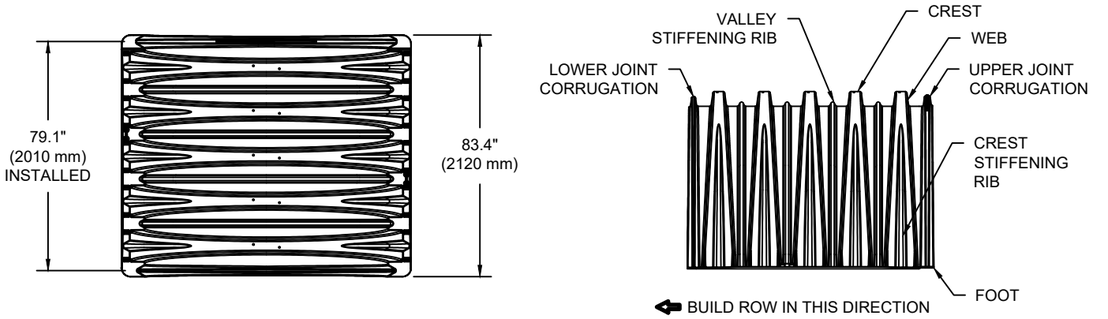
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NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

MC-7200 TECHNICAL SPECIFICATION

NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

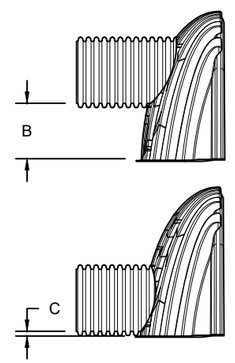
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

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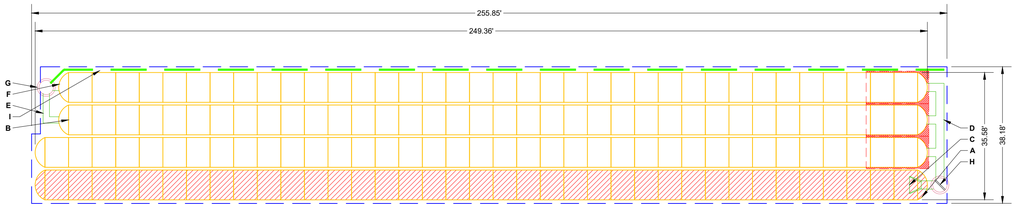
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PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
146	STORMTECH MC-7200 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	12.75
8	STORMTECH MC-7200 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	8.25
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	7.75
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	7.75
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	7.75
41851	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	6.75
		TOP OF MC-7200 CHAMBER:	5.75
		24" x 24" BOTTOM MANIFOLD INVERT:	0.92
		24" ISOLATOR ROW PLUS INVERT:	0.92
9723	SYSTEM AREA (SF)	18" x 18" BOTTOM MANIFOLD INVERT:	0.91
588.1	SYSTEM PERIMETER (ft)	18" BOTTOM CONNECTION INVERT:	0.91
		BOTTOM OF MC-7200 CHAMBER:	0.75
		UNDERDRAIN INVERT:	0.00
		BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	24" BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.26"	
PREFABRICATED END CAP	B	18" BOTTOM PARTIAL CUT END CAP, PART#: MC4500IEPP18B / TYP OF ALL 18" BOTTOM CONNECTIONS	1.97"	
FLAMP	C	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
MANIFOLD	D	24" x 24" BOTTOM MANIFOLD, ADS N-12	2.26"	
MANIFOLD	E	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.97"	
PIPE CONNECTION	F	18" BOTTOM CONNECTION	1.97"	
CONCRETE STRUCTURE	G	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		8.0 CFS OUT
CONCRETE STRUCTURE	H	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		28.5 CFS IN
UNDERDRAIN	I	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		

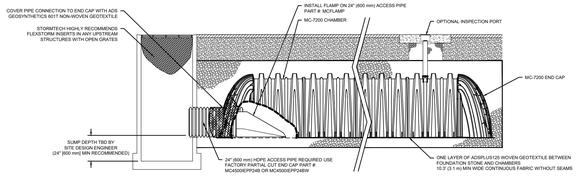


ISOLATOR ROW PLUS (SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- **NOT FOR CONSTRUCTION**: THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.



MC-7200 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

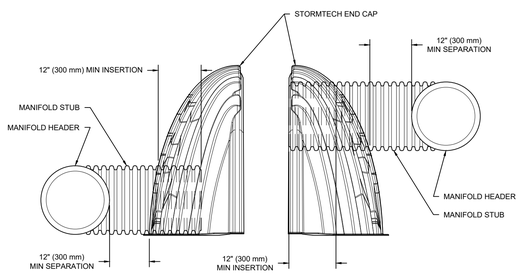
STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

3 MC-7200 ISOLATOR ROW PLUS DETAIL

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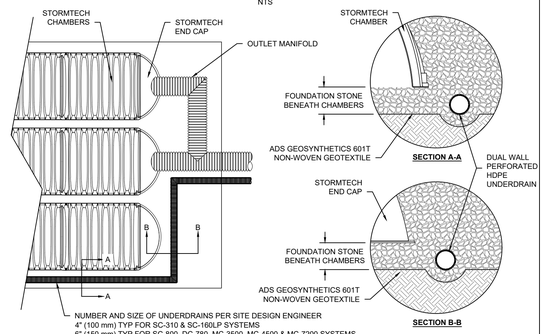
MC-SERIES END CAP INSERTION DETAIL
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

5 MC-SERIES END CAP INSERTION DETAIL

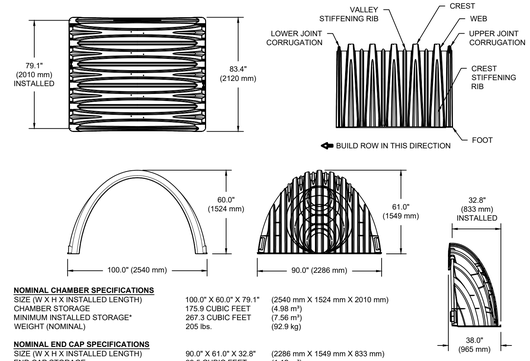
UNDERDRAIN DETAIL
NTS



4 UNDERDRAIN DETAIL

SPACE INTENTIONALLY LEFT BLANK

MC-7200 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

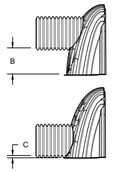
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



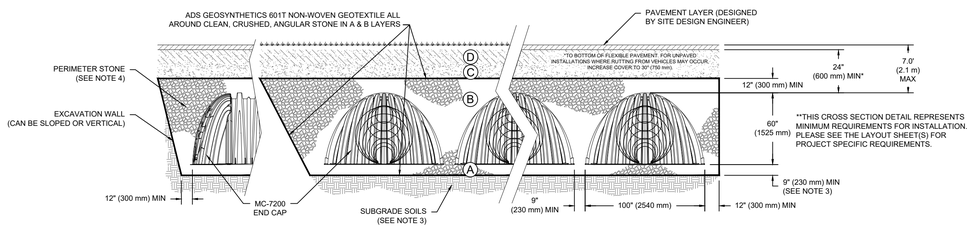
CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2 MC-7200 TECHNICAL SPECIFICATION

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[3]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE; "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:
1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 MC-7200 CROSS SECTION DETAIL

DATE: 11/18/2025
PROJECT #:
DRAWN: EI
CHECKED: N/A
REV:
NOT TO SCALE

25100 42ND ST COMMUNITIES

PALMDALE, CA, USA

StormTech® Chamber System

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS/STORMTECH UNDER THE DIRECTION OF THE PROJECT'S ENGINEER OF RECORD ("EOR") OR OTHER PROJECT REPRESENTATIVE. THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE EOR'S PRIOR APPROVAL. EOR SHALL REVIEW THIS DRAWING PRIOR TO BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

SHEET 1 OF 1

Appendix J: Traffic Study (includes VMT Screening)

Affordable Housing Communities Project
Traffic Impact Study

Prepared for:

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INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

23905 Clinton Keith Road 114-280
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January 2026

EXECUTIVE SUMMARY

Purpose of the Report

The purpose of this traffic impact analysis (TIA) report is to identify and document potential traffic operation deficiencies related to the proposed Affordable Housing Communities Project in the City of Palmdale. This technical report will also recommend transportation mitigation measures and improvements to address potential project related impacts to local and regional transportation facilities.

Project Overview

The project will be developing 159-unit affordable housing units on a vacant lot . Access to the Project site will be provided via 42nd Street East and Sorrell Avenue as shown on the site plan.

The project trip generation was calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual (12th Edition). It is estimated that the project will generate 760 total daily trips, 58 AM peak hour trips and 73 PM peak hour trips. Project trip distribution and assignment were developed, in coordination with City staff, based on the land use characteristics of the proposed project and surrounding area, existing travel patterns within the study area and anticipated travel patterns to and from the project site. Project scenarios and study area were then established in coordination with City staff to determine the potential project impacts on the transportation network.

Project Scenarios:

- Existing Conditions (Year 2025)
- Opening Year 2026 (Existing + 3% Ambient Growth) Conditions
- Opening Year 2026 (Existing + 3% Ambient Growth) + Project Conditions

Study Area Intersections:

1. East Avenue S and 42nd Street East
2. East Avenue S and 40th Street East

Analysis Results and Recommendations

Existing Conditions (Year 2025)

All analyzed intersections are currently operating at an acceptable LOS under Existing Conditions except for the following unsignalized intersection:

- East Avenue S and 42nd Street East.

Opening Year Conditions (Year 2026)

all analyzed intersections are anticipated to operate at an acceptable LOS under Opening Year Conditions with the signalization of East Avenue S and 42nd Street East intersection.

Project Feature Improvements

A new traffic signal is proposed at the intersection of East Avenue S and 42nd Street East. This improvement will be installed prior to the issuance of the first certificate of occupancy among the three properties that bound the intersection. The first property to initiate development will be responsible for constructing the traffic signal. The remaining two properties will be conditioned to

pay their proportional fair-share contribution toward the signalization cost prior to issuance of their first building permit.

Each property's fair share obligation is based on its proportion of total project-generated average daily traffic (ADT). The current distribution is as follows:

1. Market Place Mixed Use Development – 2,903 ADT (79%)
2. Affordable Housing Communities – 760 ADT (21%)
3. Undeveloped Property at East Avenue S and 42nd Street East – Fair-share contribution to be calculated once development intensity is established.

Table ES-1 summarizes the fair-share contributions for the identified projects. When the land use intensity for the vacant southwest-corner parcel is determined, the fair-share allocation will be recalculated, and appropriate reimbursement will be provided to any parties that contributed to the initial construction of the signalized intersection.

Table ES-1
Project Feature Contributions

Project	Project ADT	Project Share %
Market Place Mixed Use Development	2,903	79%
Affordable Housing Communities	760	**21%**
Undeveloped Property (SW corner of East Avenue S & 42nd Street East)	To be determined	-
Total	***3,663***	-

As shown in the table above, the subject project fair-share contribution is **21%**. The project calculated percentage is expected to be reduced once the undeveloped southwest corner property future land use intensity is determined. Once that information becomes available, its proportional contribution will be incorporated, and the fair-share percentages for all participating properties will be recalculated accordingly.

VMT Screening Assessment

In accordance with the SB 743 Vehicle Miles Traveled (VMT) Implementation Guidelines for the City of Palmdale (May 13, 2024), the Project qualifies for VMT screening under the City's Affordable Housing land use screening criterion. Projects meeting this criterion are presumed to result in less-than-significant VMT impacts.

Based on this screening determination, no additional project-level VMT analysis is required, and the Project is recommended for approval without further VMT evaluation.

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1.0 PROJECT INTRODUCTION

This traffic impact analysis (TIA) report has been prepared for the Affordable Housing Communities Project in the City of Palmdale. The proposed project is located at the southeast corner of East Avenue S and 42nd Street East intersection in the City Palmdale.

The project trip generation was calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual (*12th Edition*). It is estimated that the project will generate 760 total daily trips, 58 AM peak hour trips and 73 PM peak hour trips. Project trip distribution and assignment were developed, in coordination with City staff, based on the land use characteristics of the proposed project and surrounding area, existing travel patterns within the study area and anticipated travel patterns to and from the project site. Project scenarios and study area were then established in coordination with City staff to determine the potential project impacts on the transportation network.

PROJECT DESCRIPTION

The project will be developing 159-unit affordable housing units on a vacant lot. Access to the Project site will be provided via 42nd Street East and Sorrell Avenue as shown on the site plan.

Figure 1-1 shows the project site plan.

STUDY AREA

The study area for this project includes those locations that are expected to be affected by this project. The study area intersections were selected consistent with the City of Palmdale requirement. IEG prepared a project traffic study scoping agreement defining the study area, which was reviewed and approved by City staff prior to the preparation of this technical report.

Figure 1-2 presents the study area that includes the following key intersections:

Study Area Intersections:

1. East Avenue S and 42nd Street East
2. East Avenue S and 40th Street East

Turning movement counts were conducted for one weekday during the morning and evening peak hours. The turning movement counts will be utilized in Synchro software to determine LOS at all study intersections.

PROJECT TRIP GENERATION

The trip generation is a measure or forecast of the number of trips that begin or end at the project site. These trips will result in some traffic increases on the streets where they occur. The rates used in this analysis were determined using *Trip Generation, 12th Edition*, published by ITE that is widely used in Southern California. Project ITE average trip generation rates are presented in **Table 1-1**.

Table 1-1
Project Trip Generation Rate

Land Use[1]	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Affordable Housing	DU	223	0.10	0.26	0.36	0.27	0.19	0.46	4.81

[1]Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 12th Edition (2025).
[2]DU = Dwelling Unit

Table 1-2 summarizes the calculated trip generation based on the floor area associated with the proposed Project. As shown on Table 1-2, the proposed development is anticipated to generate approximately 2,903 total daily trips, 313 AM peak hour trips and 193 PM peak hour trips.

Table 1-2
Project Trip Generation

Land Use[1]	Intensity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Affordable Housing	159	DU	17	41	58	43	30	73	765
		Total	***17***	***41***	***58***	***43***	***30***	***73***	***765***

[1]Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, 12th Edition (2025).
[2]DU = Dwelling Unit

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution and assignment is the process of identifying the probable destinations, directions and traffic routes that project related traffic will affect. Trip distribution and assignment information can be estimated from observed traffic patterns, experience or through use of a computerized travel forecast model. Once the proposed development's trips have been estimated, they are assigned to the study area network. For this development, the project trip distribution and assignment were developed, in coordination with City staff, based on the land use characteristics of the proposed project and surrounding area, existing travel patterns within the study area, anticipated travel patterns to and from the project site.

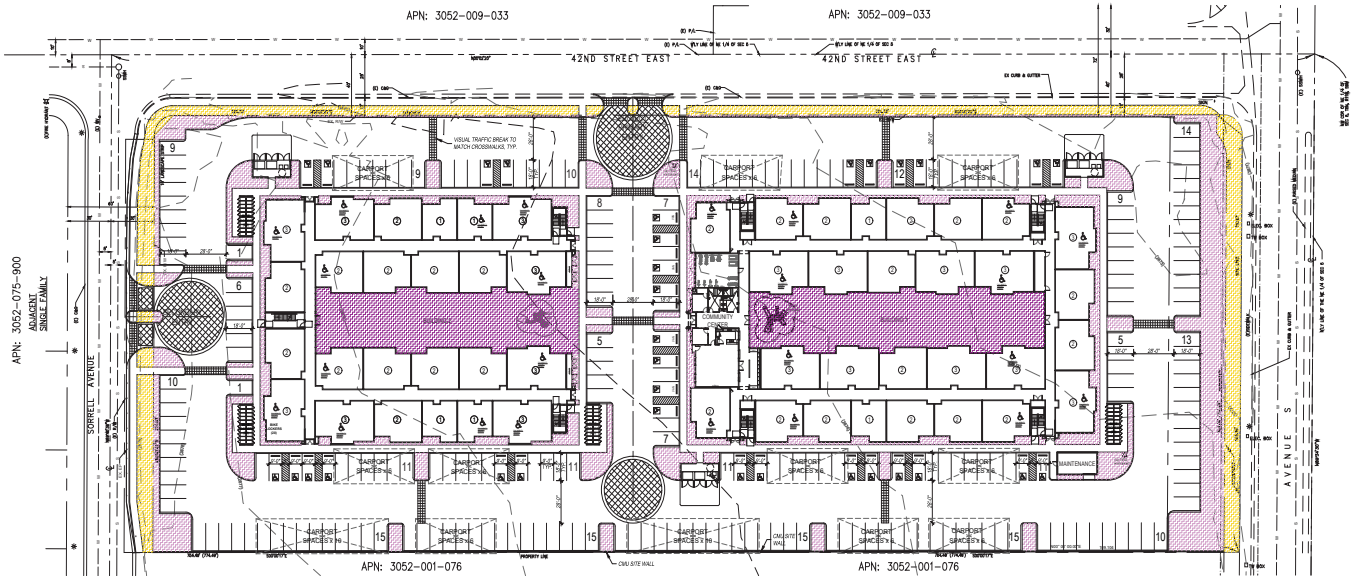
Figures 1-1 through 1-3 show project site plan, study area, trip distribution/assignment including intersection turning movement volumes.

PROJECT ACCESS

Access to the proposed project site will be provided via driveways on E. Avenue S. and Sorrell Avenue S. respectively.

PARKING

The proposed development will be required to provide on-site parking spaces consistent with City of Palmdale parking requirement.



SITE PLAN
1" = 30'-0"

PROJECT DATA:

SITE INFORMATION:

PROJECT ADDRESS:

APN:	3052-001-071/072
ZONING:	RN 2
PROPOSED OCCUPANCY:	R-2, B, A-3
TYPE OF CONSTRUCTION:	V-A
FIRE SPRINKLERS:	FULL SPRINKLER
FIRE ALARM:	YES
LOT AREA:	219,107 S.F. = 5.03 ACRES

DENSITY BONUS:

PER CALIFORNIA STATE DENSITY BONUS LAW, CALIFORNIA GOVERNMENT CODE SECTION 65915; THIS SITE IS ELIGIBLE TO RECEIVE A 35% DENSITY BONUS, AND THREE CONCESSIONS GRANTED BY RIGHT. RECENTLY SIGNED INTO LAW, AB 1763 UPDATED THE EXISTING DENSITY BONUS LAW BY AUTHORIZING QUALIFYING AFFORDABLE HOUSING PROJECTS UP TO 80% DENSITY BONUS, AND FOUR CONCESSIONS BY RIGHT.

ALLOWED DENSITY UNIT:	MAX. 20/ACRE	
ALLOWED D.U. PER LOT SIZE:	20 x 5.03 ACRE =	100.6 D.U.
AFFORDABLE D.U. BONUS:	ELIGIBLE:	80%
	PROPOSED:	58%
DENSITY BONUS CALC:	100.6 D.U. x 1.58 =	158.9 D.U.

TOTAL NUMBER OF NEW UNITS: 160 UNITS
(18) 3 BD-2 BA
(84) 2 BD-2 BA
(58) 1 BD-1 BA
PROPOSED DENSITY: 31.8 D.U./ACRE

SETBACKS:	FRONT:	15 FT. MIN.; 25 FT. MAX.
	STREET SIDE:	15 FT. MIN.; 25 FT. MAX.
	INTERIOR:	5 FT., 10 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY
	REAR:	15 FT.; 20 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY

BUILDING HEIGHT ALLOWED - PRIMARY BLDGS:	40' / 3 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS
BUILDING HEIGHT ALLOWED - ACCESSORY BLDGS:	17' / 1 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS

STREET FRONTAGE: REQUIRED: NO MORE THAN 30% OF STREET FRONTAGE AT AVENUE S CAN BE PARKING. (1) CONCESSION
PROVIDED: CURRENT PARKING AT AVENUE S STREET FRONAGE = 85.3%

SITE COVERAGE:

BUILDING AREA:	60,397 S.F.	1.39 ACRES	27.6% COVERAGE
HARDSCAPE:	139,112 S.F.	3.19 ACRES	63.5% COVERAGE
10% LANDSCAPE AREA:	REQUIRED: 21,911 S.F.	0.50 ACRES	10% OF SITE AREA
	PROVIDED: 21,911 S.F.	0.50 ACRES	10% COVERAGE

OPEN SPACE REQUIRED: MIN. 200 S.F. PER UNIT = 32,000 S.F. 0.73 ACRES

PROVIDED ON-SITE LANDSCAPE AREA:	= 19,598 S.F.	0.45 ACRES	8.9% COVERAGE
PROVIDED OFF-SITE LANDSCAPE AREA:	= 10,137 S.F.	0.23 ACRES	4.6% COVERAGE
PROVIDES OPEN SPACE & AMENITIES: (INCLUDES COMMUNITY CENTER AREA)	= 17,368 S.F.	0.40 ACRES	7.9% COVERAGE
TOTAL OPEN SPACE PROVIDED:	= 25,192 S.F.	0.58 ACRES	11.5% COVERAGE (1) CONCESSION

PRIVATE OPEN SPACE: NO PATIOS/BALCONIES PROVIDED (1) CONCESSION
PRIVATE STORAGE SPACE: NO PRIVATE ENCLOSED STORAGE SPACE PROVIDED (1) CONCESSION

BUILDING AREA:

BUILDING 1:	FIRST LEVEL:	35,982 S.F.	BUILDING 2:	FIRST LEVEL:	26,759 S.F.
	SECOND LEVEL:	35,245 S.F.		SECOND LEVEL:	26,323 S.F.
	THIRD LEVEL:	35,245 S.F.		THIRD LEVEL:	26,323 S.F.
	TOTAL AREA:	106,472 S.F.		TOTAL AREA:	79,405 S.F.

COMMUNITY CENTER: 2,767 S.F.

UNIT MIX:

1-BEDROOM (568 SQ. FT. +- CONDITIONED):	18 (11.2%)	18x568 S.F.	= 10,224 S.F.
2-BEDROOM (806 SQ. FT. +- CONDITIONED):	84 (52.5%)	84x806 S.F.	= 67,704 S.F.
3-BEDROOM (1,025 SQ. FT. +- CONDITIONED):	58 (36.2%)	58x1,025 S.F.	= 59,450 S.F.
TOTAL:	160 UNITS		= 137,378 S.F.

TOTAL BEDROOMS: 360 BEDROOMS

PUBLIC HOUSING:
2022 CBC - 11B-233: 5% MOBILITY UNITS, 2% COMMNICATIONS

CALIFORNIA TAX CREDIT ALLOCATION COMMITTEE PROJECT:
CALIFORNIA CODE OF REGULATIONS TITLE 4, DIVISION 17, CHAPTER 1
15% MOBILITY UNITS, 10% COMMUNICATION UNITS

GENERAL:
TOTAL NUMBER OF RENTAL DWELLING UNITS - 159 (ONE UNIT USED FOR MANAGER)
1 BEDROOM - 18
2 BEDROOM - 83
3 BEDROOM - 58

MOBILITY UNITS:
NUMBER OF MOBILITY UNITS REQUIRED PER 2022 CBC - 8 (5% OF EACH BUILDING)
NUMBER OF MOBILITY UNITS REQUIRED PER TCAC - 24 (15% OF TOTAL UNITS)
TCAC IS MORE STRINGENT REQUIREMENT SO IT APPLIES TO THIS PROJECT.
24 MOBILITY UNITS PROPOSED ON THE FIRST FLOOR WITH 16 COMMUNICATION UNITS

PARKING:

REQUIRED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS REQUIRED		263 PARKING STALLS
- EVCS PARKING REDUCTION (SEE BELOW)		- 13 PARKING STALLS
TOTAL NET PARKING STALLS REQUIRED		250 PARKING STALLS

PROPOSED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS PROPOSED		250 PARKING STALLS
TOTAL PARKING STALLS ON SITE		254 PARKING STALLS

COVERED PARKING SPACES: (0.5) SPACES PER UNIT = (80) PARKING SPACES

EVCS - 2022 GREEN BUILDING CODE:

5% LEVEL 2 EVSE (CHARGING EQUIPMENT)	= 160 x 0.05	= 8 STALLS
10% EV CAPABLE (ELEC. PANEL & CONDUIT)	= 160 x 0.10	= 16 STALLS
6 additional stalls required per Muni. Code 17.72.040, Table 3-5		= 6 STALLS
25% EV READY (FULLY WIRED AND READY FOR USE 208/240 VOLT, 40 AMP RECEPTACLE, OR CHARGE STATION)	= 160 x 0.25	= 40 STALLS
TOTAL EVCS		= 70 STALLS

EVCS ALLOWED PARKING REDUCTION:
REQUIRED PARKING MAY BE REDUCED BY (2) SPACES FOR EVERY EV CHARGING STATION
= 70 / 2 = 35 PARKING SPACE REDUCTION ALLOWED

ACCESSIBLE PARKING - 2022 CBC - 11B-208.2.3:

RESIDENTIAL FACILITIES:	1/EACH MOBILITY UNIT (2 VAN, 22 STANDARD) 24 ACCESSIBLE PARKING STALLS REQUIRED.
ADDITIONAL RESIDENTIAL:	261 TOTAL RESIDENTIAL SPACES PROVIDED - 24 MOBILITY SPACES = 237 * 2% = 4.74 ~ 5 ADDITIONAL (1 VAN, 4 STANDARD)
GUEST ACCESSIBLE PARKING:	32 GUEST SPACES = 32 * 2% = 0.64 ~ 1 ADDITIONAL STANDARD
EVSE:	1 VAN, 1 STANDARD ACCESSIBLE SPACE REQUIRED
TOTAL ACCESSIBLE PARKING REQUIRED:	32 (4 VAN AND 28 STANDARD)

BICYCLE SPACES: (0.5) SPACES PER UNIT = (80) PARKING SPACES

LEGEND

- ACCESSIBLE ROUTE
- SIDEWALK DETECTABLE WARNING
- ELECTRIC VEHICLE CHARGING STATION — EVCS
- BICYCLE RACKS
- EXISTING OR PROPOSED FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- HVAC CONDENSER UNIT — A/C
- MOBILITY AND HEARING IMPAIRED LOCATIONS

NOTES:

- ARCHITECTURAL SITE PLAN IS FOR BUILDING IDENTIFICATION AND INFORMATION ONLY.
- CIVIL ENGINEER TO PROVIDE ALL SETBACKS, PROPERTY BOUNDARY, AND GRADING INFORMATION.
- LANDSCAPE ARCHITECT TO REVIEW ALL WALKWAYS AND OPEN SPACE REQUIREMENTS.
- REFER TO CIVIL ENGINEER'S PRECISE GRADING PLAN FOR BUILDING LOCATIONS.

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Palmdale Affordable Housing
Project Site Plan
Figure 1-1



LEGEND ⓗ **Intersection** ⓓ **Driveway**

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TRANSPORTATION PLANNING AND ENGINEERING

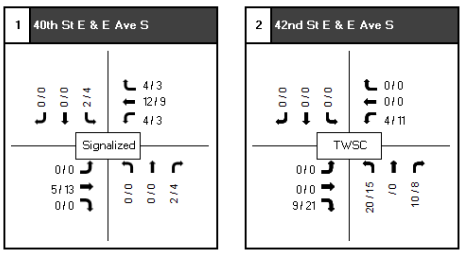
Palmdale Affordable Housing
Project Study Area & Outbound Project Trip Distribution
Figure 1-2a



LEGEND **# Intersection** **# Driveway**

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Palmdale Affordable Housing
Project Study Area & Inbound Project Trip Distribution
Figure 1-2b



XX / XX AM / PM Peak Hour Volumes

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Palmdale Affordable Housing
Project AM/PM Peak Hour Volumes
Figure 1-3

2.0 METHODOLOGIES

This section documents the methodologies and assumptions used to conduct the circulation impact analysis for the proposed project. This section contains the following background information:

- Study scenarios
- Study time periods
- Analysis methodologies

Refer to **Appendix A** for the approved scoping agreement.

STUDY SCENARIOS

This report presents an analysis of the intersection operating conditions during the peak periods, which were selected in consultation with City staff for the following anticipated timeframe scenarios:

- Existing Conditions (Year 2025)
- Opening Year 2026 (Existing + 3% Ambient Growth + Cumulative Projects) Conditions
- Opening Year 2026 (Existing + 3% Ambient Growth + Cumulative Projects) + Project Conditions

A yearly growth factor of 3% will be applied to existing counts to develop the Opening Year 2025 intersection turning movements.

STUDY TIME PERIODS

The City selected the following peak hours for analysis:

- Weekday AM (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM (peak hour between 4:00 PM and 6:00 PM)

ANALYSIS METHODOLOGIES

Street system operating conditions are typically described in terms of "level of service." Level of service is a report-card scale used to indicate the quality of traffic flow on roadway segments and at intersections. Level of service (LOS) ranges from LOS A (free flow, little congestion) to LOS F (forced flow, extreme congestion). **Table 2-1** describes generalized definitions of auto LOS A through F.

Table 2-1 Vehicular Level of Service Definitions

LOS	Characteristics
A	Primarily free-flow operation. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Controlled delay at the boundary intersections is minimal. The travel speed exceeds 80% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
B	Reasonably unimpeded operation. The ability to maneuver within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67% and 80% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
C	Stable operation. The ability to maneuver and change lanes at mid-segment locations may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50% and 67% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
D	Less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volume, or inappropriate signal timing at the boundary intersections. The travel speed is between 40% and 50% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
E	Unstable operation and significant delay. Such operations may be due to some combination of adverse signal progression, high volume, and inappropriate signal timing at the boundary intersections. The travel speed is between 30% and 40% of the base free-flow speed, and the volume-to-capacity ratio is no greater than 1.0.
F	Flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30% or less of the base free-flow speed, or the volume-to-capacity ratio is greater than 1.0.

Source: Transportation Research Board Highway Capacity Manual (7th Edition)

Intersection Capacity Analysis

The analysis of peak hour intersection performance was conducted using the Synchro software program, which uses methodologies defined in the Highway Capacity Manual (HCM) 7th Edition to calculate LOS. Level of service (LOS) for intersections is determined by control delay. Control delay is defined as the total elapsed time from when a vehicle stops at the end of a queue to the time the vehicle departs from the stop line. The total elapsed time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in the queue.

Signalized Intersections

The HCM analysis methodology for evaluating signalized intersections is based on the "operational analysis" procedure. This technique uses 1,900 passenger cars per hour of green per lane (pcphgpl) as the maximum saturation flow of a single lane at an intersection. Average control delay is calculated by taking a volume-weighted average of all the delays for all vehicles entering the intersection. **Table 2-2** summarizes the level of service criteria for signalized intersections.

Table 2-2 Signalized Intersection Level of Service HCM Operational Analysis Method

Average Control Delay Per Vehicle (seconds)	Level of Service (LOS) Characteristics
≤10.0	*LOS A* occurs when the volume-to-capacity ratio is low and either progression is exceptionally favorable, or the cycle length is very short. If it is due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.
10.1 – 20.0	*LOS B* occurs when the volume-to-capacity ratio is low and either progression is highly favorable, or the cycle length is short. More vehicles stop than with LOS A.
20.1 – 35.0	*LOS C* occurs when progression is favorable, or the cycle length is moderate. Individual *cycle failures* (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
35.1 – 55.0	*LOS D* occurs when the volume-to-capacity ratio is high and either progression is ineffective, or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.
55.1 – 80.0	*LOS E* occurs when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.
>80.0	*LOS F* occurs when the volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: Transportation Research Board Highway Capacity Manual (7th Edition)

All-way Stop-controlled (AWSC) Intersections

The HCM analysis methodology for evaluating all-way Stop-controlled intersections is based on the degree of conflict for each independent approach created by the opposing approach and each conflicting approach. Level of Service for AWSC intersections is also based on the average control delay. However, AWSC intersections have different threshold values than those applied to signalized intersections. This is based on the rationale that drivers expect AWSC intersections to carry lower traffic volumes than at signalized intersections. Therefore, a higher level of delay is acceptable at a signalized intersection for the same LOS.

Two-way Stop-controlled (TWSC) Intersections

The HCM analysis methodology for evaluating two-way Stop-controlled (TWSC) intersections is based on gap acceptance and conflicting traffic for vehicles stopped on the minor-street approaches. The critical gap (minimum gap that would be acceptable) is defined as the minimum time interval in the major-street traffic stream that allows intersection entry for one minor-street vehicle. Average control delay and LOS for the "worst approach" are reported. Level of service is not defined for the intersection as a whole. **Table 2-3** summarizes the level of service criteria for unsignalized intersections.

Table 2-3 Level of Service Criteria for Stop Controlled Unsignalized Intersections

Average Control Delay (sec/veh)	Level of Service (LOS)
0-10	A
> 10 – 15	B
> 15 – 25	C
> 25 – 35	D
> 35 – 50	E
> 50	F

Source: Transportation Research Board Highway Capacity Manual (7th Edition)

Analysis of Significance

Traffic impacts are identified if the proposed project will result in a significant change in traffic conditions on a roadway or intersection. A significant impact is normally defined when project related traffic would cause level of service to deteriorate to below the minimum acceptable level by a measurable amount. Impacts may also be significant if the location is already below the minimum acceptable level and project related traffic causes a further decline.

Level of Service D is frequently identified as the minimum allowable "Standard" service level during peak hours at signalized intersections. Most arriving traffic will clear the intersection on the first allowable green cycle under this level of service. Mitigation measures shall be considered by development projects within the City of Palmdale when traffic conditions are forecasted to decline to poorer levels of service.

The City of Palmdale significance thresholds will be applied at study area intersections for the purposes of determining project-related impacts.

3.0 EXISTING CONDITIONS (2025)

This section documents the circulation system conditions within the study area of the project under the existing without and with project scenarios. The Existing Conditions (2025) without project traffic volumes is analyzed using existing volumes counts. No network improvements are assumed under Existing Conditions scenarios.

ROADWAY NETWORK

E. Avenue S.

E. Avenue S. is classified as a major arterial roadway with raised center median that provides an east-west connection within the City of Palmdale. E. Avenue S. is constructed and currently functions as a six-lane major arterial roadway with raised median. Posted speed limit along 40th Street E. corridor is 50 miles per hour (MPH) within the vicinity of the project.

42nd Street E.

42nd Street E. is classified as a local neighborhood street that provides a north-south connection within the City of Palmdale. 42nd Street E. is constructed and currently functions as a two-lane neighborhood street. No speed limit is currently posted along 42nd Street E. within the vicinity of the project.

Figure 3-1 shows City of Palmdale Circulation Plan

TRANSIT NETWORK

Public transportation provides an alternative mode of transportation and means of travel to automobile and offers additional mobility choices, while making more efficient use of available roadway capacity. Antelope Valley Transit Authority (AVTA) services the Cities of Palmdale and Lancaster, and unincorporated portions of northern Los Angeles County. AVTA operates Route 3 within the vicinity of the Project. The nearest westbound bus stop is at the northwest corner of the intersection of 40th Street E. and E. Avenue S and the nearest eastbound stop is located just east of 40th Street E. and E. Avenue S intersection. AVTA/DAVE Transportation Services currently operates a variety of bus routes within the City; however, Bus route 3 is currently the main route servicing the study area of the proposed project with bus stop platform that provides benches and shade. Bus route information is included in **Appendix F**.

Figure 3-2 shows City of Palmdale Existing and proposed Transit Network.

ACTIVE TRANSPORTATION NETWORK

Pedestrian facilities are provided within the Project study area including sidewalks and pedestrian crosswalks at signalized intersections. A separated two-way cycle track is provided along the south side of E. Avenue S.

Figure 3-3 shows City of Palmdale General Bicycle Network.

TRAFFIC VOLUMES

The intersection turning movement counts were conducted during the weekday morning peak period from 7:00 AM to 9:00 AM and during the weekday evening peak period from 4:00 PM to 6:00 PM on April 16, 2025. Traffic count data is provided in **Appendix B**.

ANALYSIS RESULTS

Tables 3-1 shows Existing Conditions intersection operation analysis results.

Figures 3-4 shows Existing Conditions intersection turning movement volumes.

Table 3-1
Existing Conditions (2025) Intersection Operation Analysis

Intersection	Intersection Control	Existing Without Project	
		Delay (a)	LOS (b)
AM/PM Peak Hour			
1. East Avenue S and 40th Street East	Signalized	17.6/16.3	B/B
2. East Avenue S and 42nd Street East	Unsignalized	39.7/22.4	**E**/C

Notes:
***Bold** indicates deficient LOS*
(a) Delay refers to the average control delay for the entire intersection, measured in seconds per vehicle. At unsignalized intersection, delay refers to the worst movement.
(b) LOS calculations are based on the methodology outlined in the Highway Capacity Manual 7th Edition and performed using Synchro 12th

Per the analysis results shown in **Table 3-1**, all analyzed intersections are currently operating at an acceptable LOS under Existing Conditions except for the following unsignalized intersection:

4. East Avenue S and 42nd Street East

Existing peak hour analysis worksheets are provided in **Appendix C**.

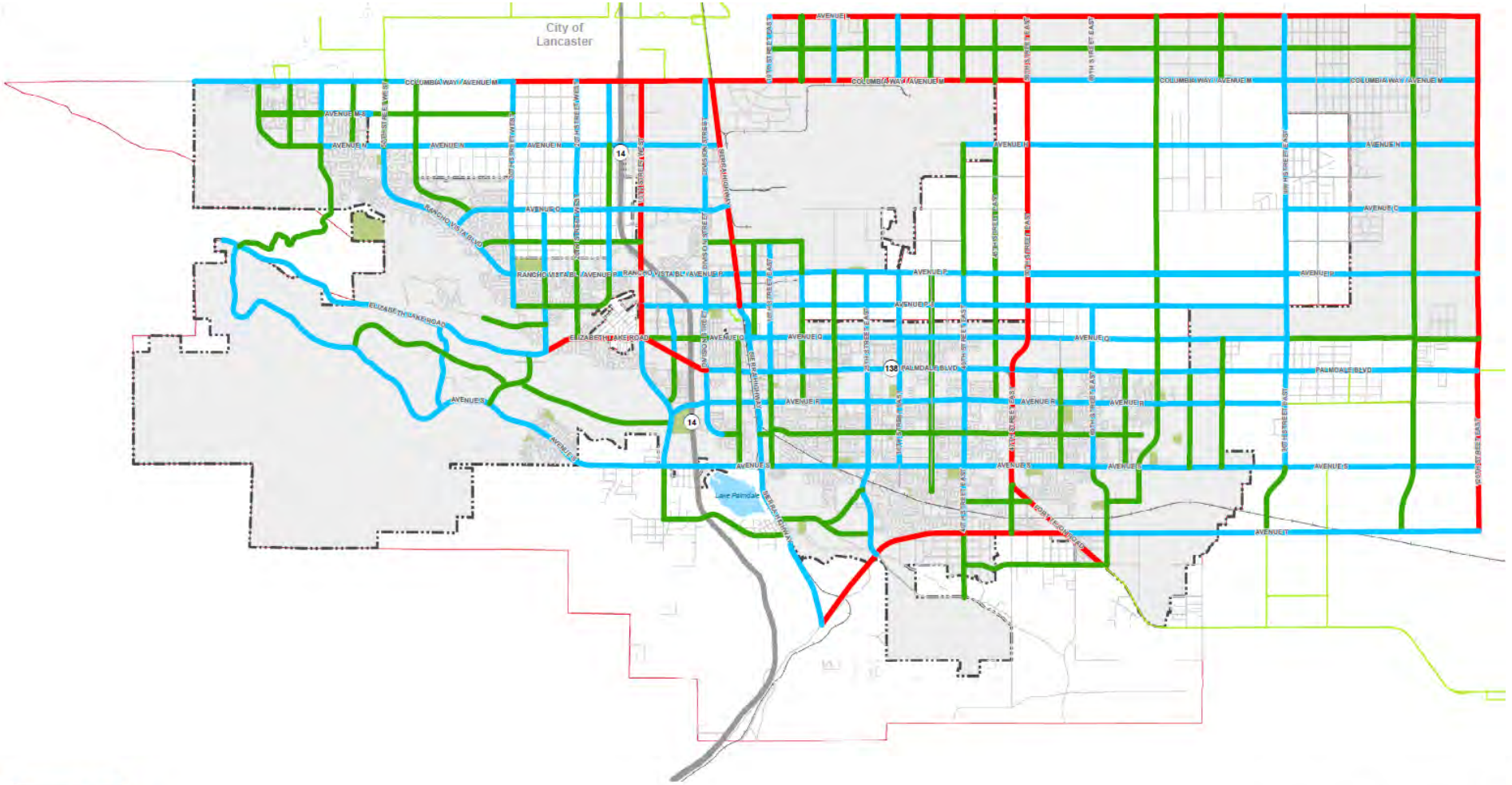


Figure 6.2

Palmdale Roadway Classification Map

- City Boundary
- Sphere of Influence
- Major Arterials
- Major Highway/Arterial
- Railroad
- Transit Center
- California Aqueduct
- Water Body
- Park
- Regional
- Crosstown
- Connector
- Neighborhood

0 0.75 1.5 2.25 3 Miles

0 3,000 6,000 Feet

Data Sources: City of Palmdale GIS data; World Terrain Base, 2015 ESRI, USGS, NOAA.

Produced by Nelson\Nygaard March 2019

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Palmdale Affordable Housing
City of Palmdale Circulation Plan
Figure 3-1

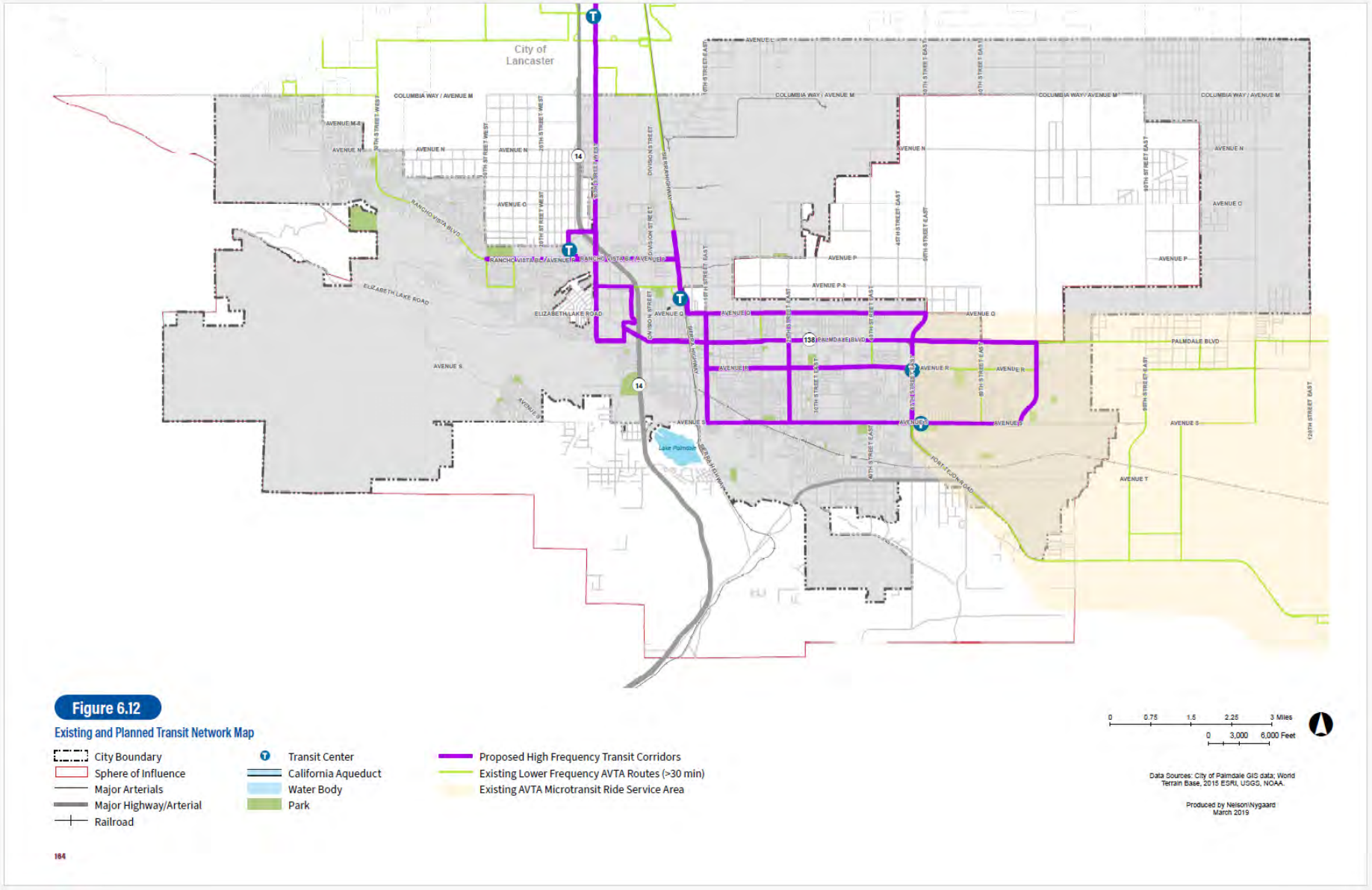
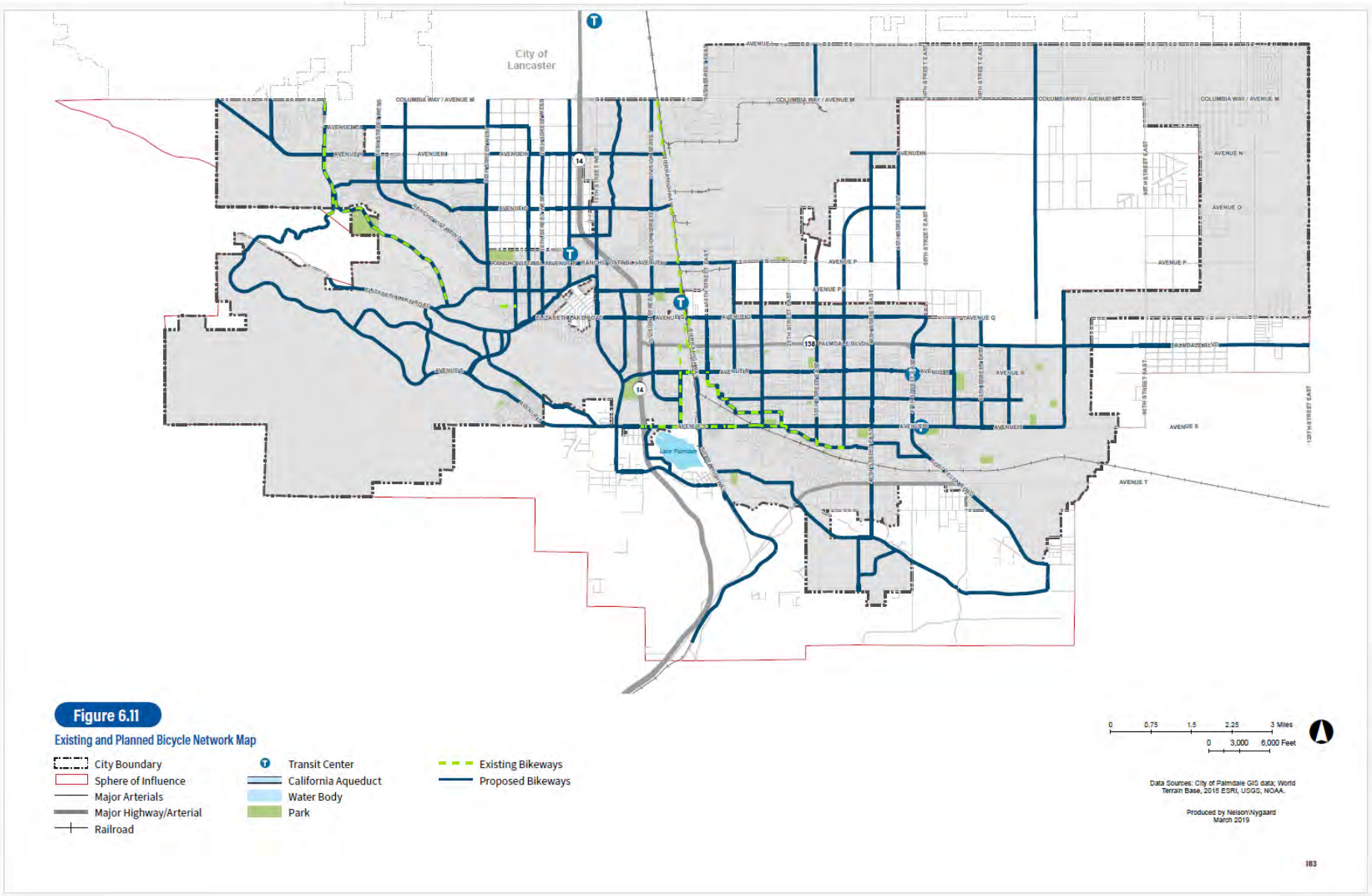


Figure 6.12

Existing and Planned Transit Network Map

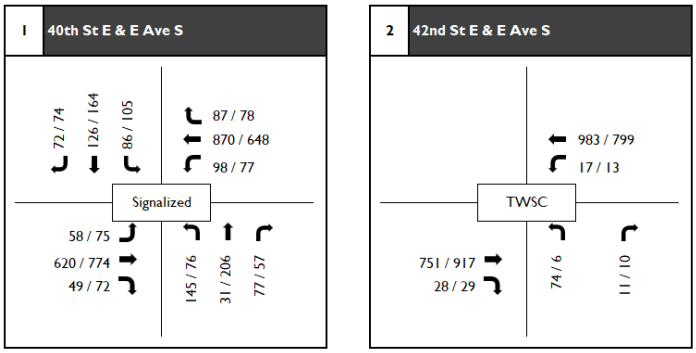
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Palmdale Affordable Housing
Existing and Planned Transit Network Map
Figure 3-2



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TRANSPORTATION PLANNING AND ENGINEERING

Palmdale Affordable Housing
City of Palmdale Bikeway and Multi-Purpose Trail Plan
Figure 3-3



XX / XX AM / PM Peak Hour Volumes

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Palmdale Affordable Housing
Existing Year 2025 AM/PM Peak Hour Volumes
Figure 3-4

4.0 OPENING YEAR CONDITIONS (2026)

This section documents the circulation system conditions within the study area of the project under Opening Year without and with Project scenarios. The Opening Year without Project base Conditions traffic volumes were developed through growing the existing counts by adding a 3% yearly growth over a one-year period and adding applicable cumulative projects. Project traffic volumes are then added to the Opening Year without Project Conditions traffic volumes to develop Opening Year with Project Conditions traffic volumes. This section also documents potential cumulative project impacts on the existing local and regional circulation networks. Cumulative projects are listed in **Table 4-1**. Cumulative project information is included in **Appendix G**.

The following network improvements are assumed under Opening Year Condition scenarios:

- Signalization of East Avenue S and 42nd Street East intersection

ANALYSIS RESUTLS

Table 4-2 shows Opening Year Conditions (2026) intersection operation analysis results.

Figures 4-1 through 4-3 show Opening Year Conditions (2026) intersection turning movement volumes.

Table 4-1
Cumulative Projects

ID	Project	Land Use	Quantity	Units[1]
1	TTM 82985/SPR 22-021	Commercial/Retail	12.3	TSF
2	Palmdale Market Place	Commercial/Retail	17.6	TSF
		Residential	98	DU

[1] DU = Dwelling Units; TSF = Thousand Square Feet

Table 4-2
Opening Year Conditions (2026) Intersection Operation Analysis

Intersection	Intersection Control	Opening Year Without Project		Opening Year With Project		Impact?
		Delay (a)	LOS (b)	Delay (a)	LOS (b)	
AM/PM Peak Hour						
1. East Avenue S and 40th Street East	Signalized	19.7/17.5	B/B	20.0/17.7	C/B	N/N
2. East Avenue S and 42nd Street East	Signalized	6.5/9.5	A/A	6.8/9.6	A/A	N/N

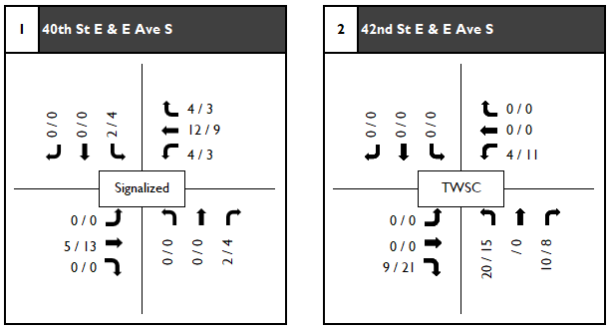
Notes:
***Bold** indicates deficient LOS*
(a) Delay refers to the average control delay for the entire intersection, measured in seconds/vehicle.
LOS calculations are based on the methodology outlined in the Highway Capacity Manual 6th Edition and performed using Synchro 12

Per the analysis results shown in **Table 4-1**, all analyzed intersections are operating at an acceptable LOS under Opening Year Conditions with the signalization of East Avenue S and 42nd Street East intersection.

SIGNIFICANT IMPACTS AND RECOMMENDED IMPROVEMENTS

Signalization of East Avenue S and 42nd Street East intersection would address the exiting operational deficiency at this location.

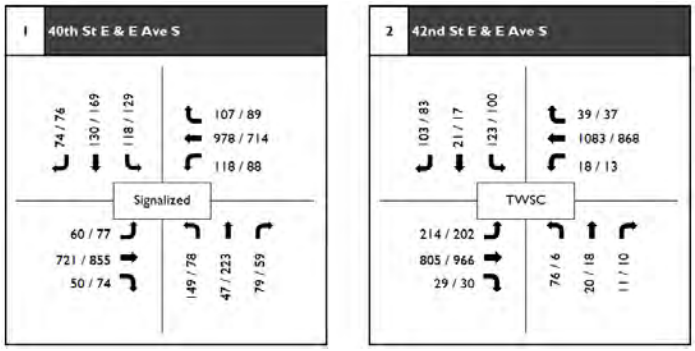
Opening Year and Opening Year with Project peak hour analysis worksheets are provided in **Appendices D and E**, respectively.



XX / XX AM / PM Peak Hour Volumes

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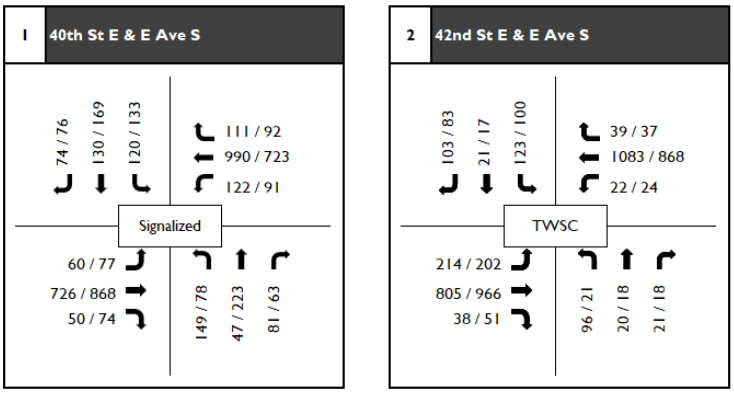
Palmdale Affordable Housing
Cumulative Projects AM/PM Peak Hour Volumes
Figure 4-1



XX / XX AM / PM Peak Hour Volumes

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Palmdale Affordable Housing
Opening Year 2026 AM/PM Peak Hour Volumes
Figure 4-2



XX / XX AM / PM Peak Hour Volumes

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Palmdale Affordable Housing
Opening Year Plus Project AM/PM Peak Hour Volumes
Figure 4-3

5.0 VEHICLE MILES TRAVELED

In accordance with the SB 743 Vehicle Miles Traveled (VMT) Implementation Guidelines for the City of Palmdale (May 13, 2024), the Project qualifies for VMT screening under the City's Affordable Housing land use screening criterion. Projects meeting this criterion are presumed to result in less-than-significant VMT impacts.

Based on this screening determination, no additional project-level VMT analysis is required, and the Project is recommended for approval without further VMT evaluation.

APPENDIX A -

SCOPING AGREEMENT

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Date: January 9, 2026

To: Sychhay Kroeu, Senior Civil Engineer, City of Palmdale

From: George Ghossain, Principal Engineer, Integrated Engineering Group

Subject: Scoping Agreement for the Affordable Housing Communities Project, City of Palmdale

---

Integrated Engineering Group (IEG) is pleased to submit this scoping agreement for the Affordable Housing Communities Project located in the City of Palmdale within the County of Los Angeles, California. The project will be developing 159-unit affordable housing units on a vacant lot. Our goal is to obtain comments from City of Palmdale staff, to ensure that this memo fully addresses the analysis requirements per the City of Palmdale traffic impact guidelines.

The preliminary site plan for the proposed Project is shown on **Attachment 1**. It is anticipated that the proposed development will be built in one phase. Access to the Project site will be provided via 42nd Street East and Sorrell Avenue as shown on the site plan.

TRANSPORTATION IMPACT ANALYSIS PROCESS

The TIA Guidelines provide recommendations and guidance for the California Environmental Quality Act (CEQA) TIA process including screening criteria, assessment methods and defining thresholds of significance.

TRIP GENERATION

Trip generation is a measure or forecast of the number of trips that begin or end at the project site. The traffic generated is a function of the extent and type of development proposed for the site. These trips will result in some traffic increases on the streets where they occur. Per the TIA Guidelines, trip generation for proposed uses must be calculated based on rates from the *Trip Generation Manual (TGM), 12th Edition*, published by the Institute of Transportation Engineers (ITE). Project ITE average trip generation rates and trip calculations summary are presented in **Table 1** and **Table 2**, respectively.

Table 1 – Project Trip Generation Rates

Land Use[1]	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Affordable Housing	DU	223	0.10	0.26	0.36	0.27	0.19	0.46	4.81

[1]Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).
[2]DU = Dwelling unit

Table 2 – Project Trip Generation Summary

Land Use[1]	Intensity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Affordable Housing	159	DU	17	41	58	43	30	73	765
		Total	***17***	***41***	***58***	***43***	***30***	***73***	***765***

[1]Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).
[2] DU = Dwelling Unit

As shown in **Table 2**, the proposed project is estimated to generate approximately 765 daily trips, 58 AM peak hour trips and 73 PM peak hour trips.

STUDY AREA

The study area for this project was developed consistent with the TIA Guidelines criteria of all unsignalized or signalized intersections adjacent to the project or integral to project trip distribution. The following key intersection satisfy this study area criteria:

Intersections

1. East Avenue S and 42nd Street East
2. East Avenue S and 40th Street East

Turning movement counts will be conducted for one weekday (Tuesday through Thursday) during the morning (7:00-9:00am) and evening (4:00-6:00) peak hours. The turning movement counts will be utilized in Synchro to determine level of service (LOS) at all study intersections.

TRIP DISTRIBUTION

Trip distribution and assignment is the process of identifying the probable destinations, directions and traffic routes that project related traffic will likely affect. Consistent with the TIA Guidelines, trip distribution was developed based on the project land use characteristics, surrounding land uses in the vicinity of the project site, anticipated travel patterns to and from the project site and existing travel patterns within the study area. **Attachment 2** includes the project's study area including outbound and inbound trip distribution, respectively. Once the calculated project trips generation and trip distribution are approved by the City Traffic Engineer, they are assigned to the study area network.

ANALYSIS SCENARIOS

Analysis of the intersection operating conditions during the peak periods will be conducted for the anticipated timeframe scenarios listed below.

- Existing Conditions (Year 2025)
- Opening Year 2026 (Existing + 3% Ambient Growth) Conditions

- Opening Year 2026 (Existing + 3% Ambient Growth) + Project Conditions

Cumulative Projects

The following cumulative projects will be included in the analysis:

1. TTM 82985/SPR 22-021 (adjacent to Market Place to the west; commercial property)
2. Market Place mixed use development

Attachment 3 includes cumulative projects site plans

Signal Warrants

Signal Warrant analysis will be provided for the proposed full access point at Ave S and 42nd Street E.

Sincerely,
IEG



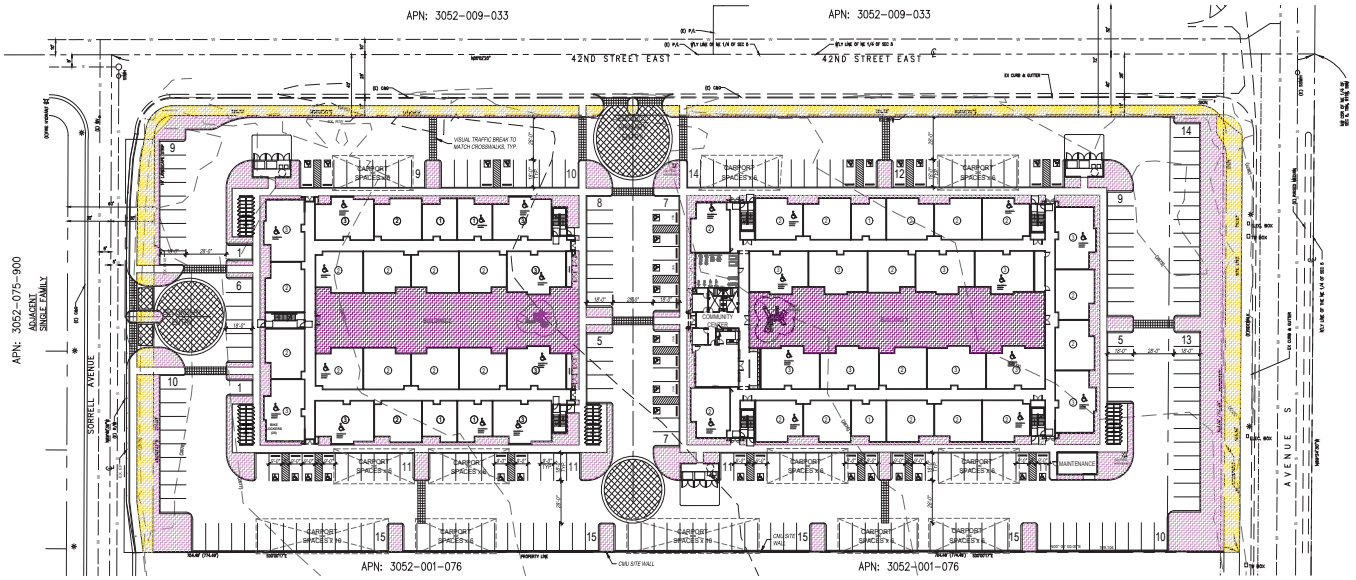
George Ghossain, ***P.E., MSCE, MPA***
Principal Engineer

Approved By:

Signature: _____
Name: _____
_____

Attachments: 1 – Project Site Plan
2 – Project Outbound and Inbound Trip Distribution
3 – Cumulative Projects

Attachment 1 - Project Site Plan



SITE PLAN
1" = 30'-0"

PROJECT DATA:

SITE INFORMATION:

PROJECT ADDRESS:

APN:	3052-001-071/072
ZONING:	RN 2
PROPOSED OCCUPANCY:	R-2, B, A-3
TYPE OF CONSTRUCTION:	V-A
FIRE SPRINKLERS:	FULL SPRINKLER
FIRE ALARM:	YES
LOT AREA:	219,107 S.F. = 5.03 ACRES

DENSITY BONUS:

PER CALIFORNIA STATE DENSITY BONUS LAW, CALIFORNIA GOVERNMENT CODE SECTION 65915; THIS SITE IS ELIGIBLE TO RECEIVE A 35% DENSITY BONUS, AND THREE CONCESSIONS GRANTED BY RIGHT. RECENTLY SIGNED INTO LAW, AB 1763 UPDATED THE EXISTING DENSITY BONUS LAW BY AUTHORIZING QUALIFYING AFFORDABLE HOUSING PROJECTS UP TO 80% DENSITY BONUS, AND FOUR CONCESSIONS BY RIGHT.

ALLOWED DENSITY UNIT:	MAX. 20/ACRE	
ALLOWED D.U. PER LOT SIZE:	20 x 5.03 ACRE =	100.6 D.U.
AFFORDABLE D.U. BONUS:	ELIGIBLE:	80%
	PROPOSED:	58%
DENSITY BONUS CALC:	100.6 D.U. x 1.58 =	158.9 D.U.

TOTAL NUMBER OF NEW UNITS: 160 UNITS
(18) 3 BD-2 BA
(84) 2 BD-2 BA
(58) 1 BD-1 BA
PROPOSED DENSITY: 31.8 D.U./ACRE

SETBACKS:	FRONT:	15 FT. MIN.; 25 FT. MAX.
	STREET SIDE:	15 FT. MIN.; 25 FT. MAX.
	INTERIOR:	5 FT., 10 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY
	REAR:	15 FT.; 20 FT ABUTTING SINGLE-FAMILY RESIDENTIAL ZONED PROPERTY

BUILDING HEIGHT ALLOWED - PRIMARY BLDGS:	40' / 3 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS
BUILDING HEIGHT ALLOWED - ACCESSORY BLDGS:	17' / 1 STORIES
BUILDING HEIGHT PROPOSED:	SEE PROPOSED ELEVATIONS

STREET FRONTAGE: REQUIRED: NO MORE THAN 30% OF STREET FRONTAGE AT AVENUE S CAN BE PARKING. (1) CONCESSION
PROVIDED: CURRENT PARKING AT AVENUE S STREET FRONAGE = 85.3%

SITE COVERAGE:

BUILDING AREA:	60,397 S.F.	1.39 ACRES	27.6% COVERAGE
HARDSCAPE:	139,112 S.F.	3.19 ACRES	63.5% COVERAGE
10% LANDSCAPE AREA:	REQUIRED: 21,911 S.F.	0.50 ACRES	10% OF SITE AREA
	PROVIDED: 21,911 S.F.	0.50 ACRES	10% COVERAGE

OPEN SPACE REQUIRED:	MIN. 200 S.F. PER UNIT	= 32,000 S.F.	0.73 ACRES
PROVIDED ON-SITE LANDSCAPE AREA:		= 19,598 S.F.	0.45 ACRES 8.9% COVERAGE
PROVIDED OFF-SITE LANDSCAPE AREA:		= 10,137 S.F.	0.23 ACRES 4.6% COVERAGE
PROVIDES OPEN SPACE & AMENITIES:		= 17,368 S.F.	0.40 ACRES 7.9% COVERAGE
(INCLUDES COMMUNITY CENTER AREA)			
TOTAL OPEN SPACE PROVIDED:		= 25,192 S.F.	0.58 ACRES 11.5% COVERAGE (1) CONCESSION

PRIVATE OPEN SPACE: NO PATIOS/BALCONIES PROVIDED (1) CONCESSION
PRIVATE STORAGE SPACE: NO PRIVATE ENCLOSED STORAGE SPACE PROVIDED (1) CONCESSION

BUILDING AREA:

BUILDING 1:	FIRST LEVEL:	35,982 S.F.	BUILDING 2:	FIRST LEVEL:	26,759 S.F.
	SECOND LEVEL:	35,245 S.F.		SECOND LEVEL:	26,323 S.F.
	THIRD LEVEL:	35,245 S.F.		THIRD LEVEL:	26,323 S.F.
	TOTAL AREA:	106,472 S.F.		TOTAL AREA:	79,405 S.F.

COMMUNITY CENTER: 2,767 S.F.

UNIT MIX:

1-BEDROOM (568 SQ. FT. +- CONDITIONED):	18 (11.2%)	18x568 S.F.	= 10,224 S.F.
2-BEDROOM (806 SQ. FT. +- CONDITIONED):	84 (52.5%)	84x806 S.F.	= 67,704 S.F.
3-BEDROOM (1,025 SQ. FT. +- CONDITIONED):	58 (36.2%)	58x1,025 S.F.	= 59,450 S.F.
TOTAL:	160 UNITS		= 137,378 S.F.

TOTAL BEDROOMS: 360 BEDROOMS

PUBLIC HOUSING:
2022 CBC - 11B-233: 5% MOBILITY UNITS, 2% COMMNICATIONS

CALIFORNIA TAX CREDIT ALLOCATION COMMITTEE PROJECT:
CALIFORNIA CODE OF REGULATIONS TITLE 4, DIVISION 17, CHAPTER 1
15% MOBILITY UNITS, 10% COMMUNICATION UNITS

GENERAL:
TOTAL NUMBER OF RENTAL DWELLING UNITS - 159 (ONE UNIT USED FOR MANAGER)
1 BEDROOM - 18
2 BEDROOM - 83
3 BEDROOM - 58

MOBILITY UNITS:
NUMBER OF MOBILITY UNITS REQUIRED PER 2022 CBC - 8 (5% OF EACH BUILDING)
NUMBER OF MOBILITY UNITS REQUIRED PER TCAC - 24 (15% OF TOTAL UNITS)
TCAC IS MORE STRINGENT REQUIREMENT SO IT APPLIES TO THIS PROJECT.
24 MOBILITY UNITS PROPOSED ON THE FIRST FLOOR WITH 16 COMMUNICATION UNITS

PARKING:

REQUIRED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS REQUIRED		263 PARKING STALLS
- EVCS PARKING REDUCTION (SEE BELOW)		- 13 PARKING STALLS
TOTAL NET PARKING STALLS REQUIRED		250 PARKING STALLS

PROPOSED PARKING:

(18) ONE BEDROOM	(18 x 1)	18 PARKING STALLS
(84) TWO BEDROOM	(84 x 1.5)	126 PARKING STALLS
(58) THREE BEDROOM	(58 x 1.5)	87 PARKING STALLS
GUEST PARKING	(160 x 0.2)	32 PARKING STALLS
TOTAL PARKING STALLS PROPOSED		250 PARKING STALLS
TOTAL PARKING STALLS ON SITE		254 PARKING STALLS

COVERED PARKING SPACES: (0.5) SPACES PER UNIT = (80) PARKING SPACES

EVCS - 2022 GREEN BUILDING CODE:

5% LEVEL 2 EVSE (CHARGING EQUIPMENT)	= 160 x 0.05	= 8 STALLS
10% EV CAPABLE (ELEC. PANEL & CONDUIT)	= 160 x 0.10	= 16 STALLS
6 additional stalls required per Muni. Code 17.72.040, Table 3-5		= 6 STALLS
25% EV READY (FULLY WIRED AND READY FOR USE 208/240 VOLT, 40 AMP RECEPTACLE, OR CHARGE STATION)	= 160 x 0.25	= 40 STALLS
TOTAL EVCS		= 70 STALLS

EVCS ALLOWED PARKING REDUCTION:
REQUIRED PARKING MAY BE REDUCED BY (2) SPACES FOR EVERY EV CHARGING STATION
= 70 / 2 = 35 PARKING SPACE REDUCTION ALLOWED

ACCESSIBLE PARKING - 2022 CBC - 11B-208.2.3:

RESIDENTIAL FACILITIES:	1/EACH MOBILITY UNIT (2 VAN, 22 STANDARD) 24 ACCESSIBLE PARKING STALLS REQUIRED.
ADDITIONAL RESIDENTIAL:	261 TOTAL RESIDENTIAL SPACES PROVIDED - 24 MOBILITY SPACES = 237 * 2% = 4.74 ~ 5 ADDITIONAL (1 VAN, 4 STANDARD)
GUEST ACCESSIBLE PARKING:	32 GUEST SPACES = 32 * 2% = 0.64 ~ 1 ADDITIONAL STANDARD
EVSE:	1 VAN, 1 STANDARD ACCESSIBLE SPACE REQUIRED
TOTAL ACCESSIBLE PARKING REQUIRED:	32 (4 VAN AND 28 STANDARD)

BICYCLE SPACES: (0.5) SPACES PER UNIT = (80) PARKING SPACES

LEGEND

- ACCESSIBLE ROUTE
- SIDEWALK DETECTABLE WARNING
- ELECTRIC VEHICLE CHARGING STATION — EVCS
- BICYCLE RACKS
- EXISTING OR PROPOSED FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- HVAC CONDENSER UNIT — A/C
- MOBILITY AND HEARING IMPAIRED LOCATIONS

NOTES:

- ARCHITECTURAL SITE PLAN IS FOR BUILDING IDENTIFICATION AND INFORMATION ONLY.
- CIVIL ENGINEER TO PROVIDE ALL SETBACKS, PROPERTY BOUNDARY, AND GRADING INFORMATION.
- LANDSCAPE ARCHITECT TO REVIEW ALL WALKWAYS AND OPEN SPACE REQUIREMENTS.
- REFER TO CIVIL ENGINEER'S PRECISE GRADING PLAN FOR BUILDING LOCATIONS.

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Palmdale Affordable Housing
Project Site Plan
Figure 1

Attachment 2 - Project Study Area & Trip Distribution



LEGEND ① **Intersection** ② **Driveway**

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Palmdale Affordable Housing
Outbound Project Trip Distribution
Figure 2a

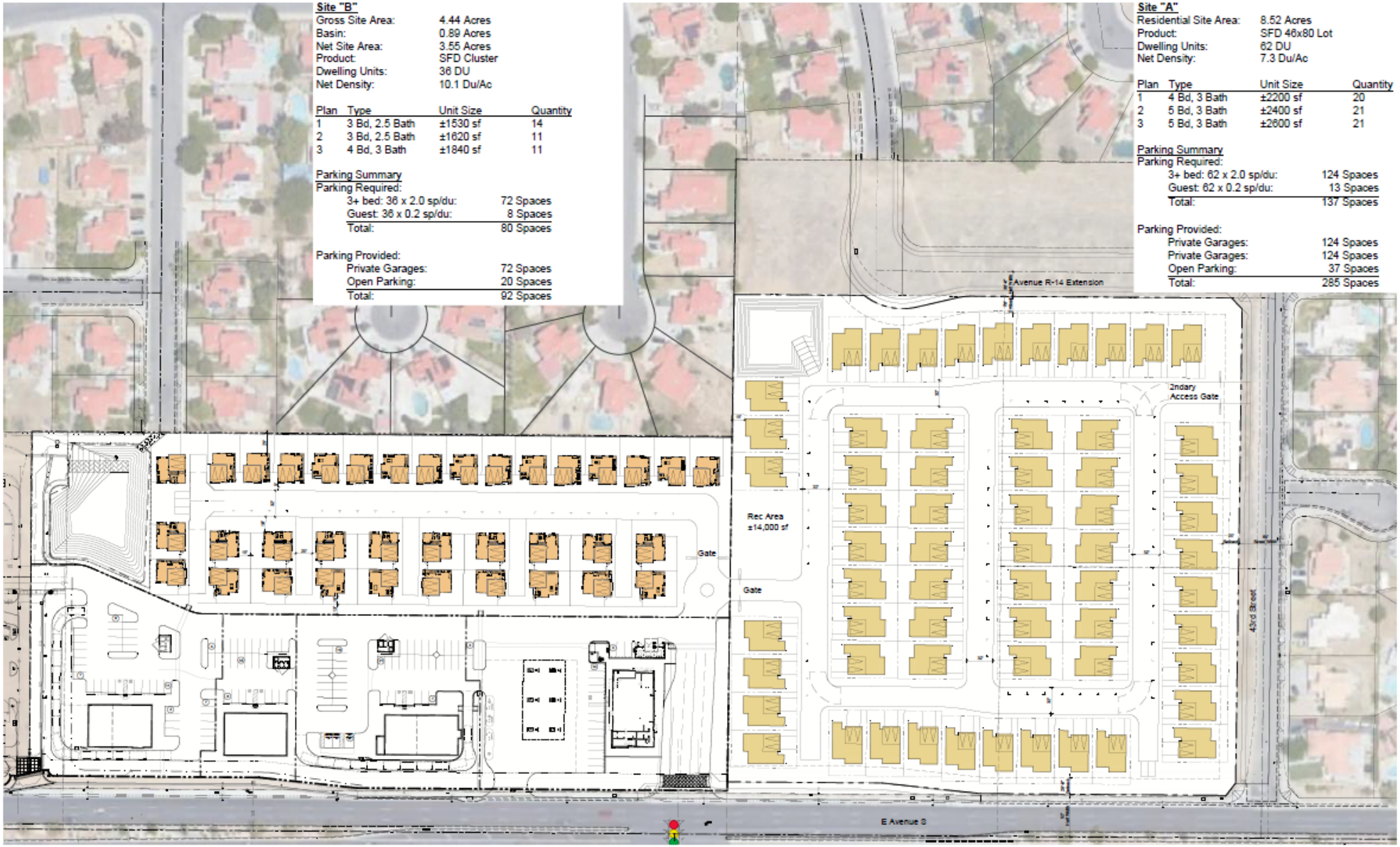


LEGEND (#) **Intersection** (#) **Driveway**

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

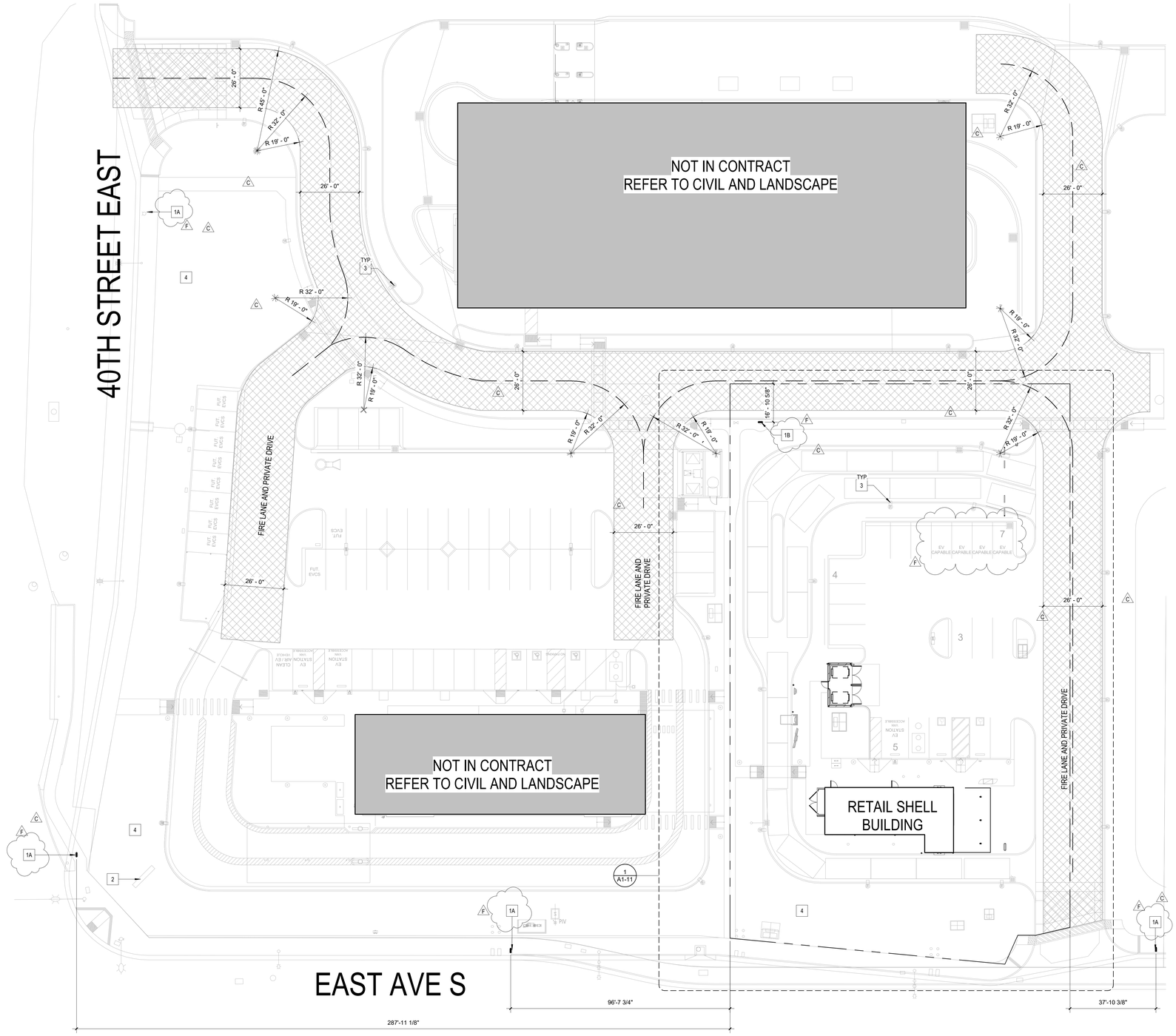
Palmdale Affordable Housing
Inbound Project Trip Distribution
Figure 2b

Attachment 3 - Cumulative Project Site Plans



INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Palmdale Market Place
Site Plan
Attachment 3a



GENERAL NOTES

1. REFER TO GEOTECHNICAL REPORT BY BRUIN GEOTECHNICAL SERVICE, INC. DATED OCTOBER 18, 2023 REPORT INDICATED FOR REFERENCE ONLY.
2. WRAP ALL BURIED METAL PIPE & CONDUIT WITH 2 LAYERS OF 30 MIL POLYETHYLENE TAPE, OR APPROVED EQUAL.
3. REFER TO MECHANICAL, PLUMBING & ELECTRICAL DRAWINGS FOR CONTINUATION OF UTILITIES INSIDE BUILDING.
4. PROVIDE WALKS AND SIDEWALKS WITH A CONTINUOUS SLIP RESISTANT SURFACE. PROVIDE WALKS WITH 5% MAXIMUM SLOPE IN THE DIRECTION OF TRAVEL AND 2% MAXIMUM CROSS SLOPE. PROVIDE ROUTE WITHOUT ANY ABRUPT VERTICAL CHANGES EXCEEDING 1/2" BEVELED AT 1:2 MAXIMUM SLOPE. SEE LANDSCAPE PLAN FOR SPECIFIC FINISH TYPES & REQUIREMENTS.
5. COORDINATED EXPECTED DEPTHS OF ROUGH GRADING & EXCAVATION OPERATIONS WITH DEPTHS OF PROPOSED AND EXISTING UTILITIES, PRIOR TO BID AND START OF GRADING WORK.
6. PATCH REPAIR, AT NO ADDITIONAL COST OR TIME TO CONTRACT, ANY NEW OR (E) CONDITIONS DAMAGED, OUTSIDE LIMIT OF WORK, OUTSIDE PROPERTY LINE, IN PUBLIC WAY,OR ON PRIVATE PROPERTY, AS A RESULT OF THE WORK PERFORMED UNDER THIS CONTRACT IN A MANNER THAT WILL MATCH ADJACENT SURFACES.
7. PROVIDE ALL WORK NECESSARY FOR A COMPLETE PROJECT, INCLUDING ANY UTILITY ALTERATIONS AND CONNECTIONS. PAVEMENT MARKING , IRRIGATION AND LANDSCAPE WORK, OUTSIDE LIMITS OF WORK, OUTSIDE PROPERTY LINE, IN PUBLIC WAY OR ON PRIVATE PROPERTY.
8. SLOPE FINISH GRADE TO PROVIDE DRAINAGE AWAY FROM BUILDING, REFER TO CIVIL DRAWINGS.
9. GRADING, DRAINAGE, & CONSTRUCTION OPERATIONS SHALL COMPLY WITH ALL GOVERNING AGENCY REQUIREMENTS.
10. ENSURE THAT GRADED SURFACES USED FOR OFF STREET CONSTRUCTION PARKING, MATERIAL LAY-DOWN OR AWAITING FUTURE CONSTRUCTION ARE STABILIZED FOR DUST CONTROL.
11. COORDINATE ANY LANE CLOSURES OR DETOURS WITH GOVERNING AGENCIES. PROVIDE NECESSARY TRAFFIC CONTROL MEASURES TO MINIMIZE CONFLICTS BETWEEN CONSTRUCTION ACTIVITY AND OFF-SITE PEDESTRIAN AND VEHICULAR TRAFFIC.
12. COORDINATE STAGING & CONSTRUCTION OPERATION AREAS WITH SITE CONSTRAINTS PRIOR TO BID & START OF CONSTRUCTION. CONFINE OPERATIONS TO AREA OF SITE DEFINED BY PROPERTY LINES.
13. MAINTAIN JOBSITE IN A CLEAN, ORDERLY CONDITION, FREE OF DEBRIS AND LITTER. DO NOT UNREASONABLY ENCUMBER THE SITE WITH ANY MATERIAL OR EQUIPMENT.
14. FOR FINISH PAVING, IRRIGATION & PLANTING REQUIREMENTS, REFER TO LANDSCAPE DRAWINGS .
15. FOR SITE WET UTILITIES, FINISH GRADE ELEVATIONS, FINISH FLOOR ELEVATIONS AND SITE WALL FOOTING & TOP OF WALL ELEVATIONS, REFER TO CIVIL DRAWINGS.
16. VERIFY ON-SITE PARKING LAYOUT WITH CIVIL DRAWINGS. FOR PARKING SUMMARY REFER TO DRAWING.
17. FOR ACCESSIBILITY REQUIREMENTS SEE DRAWINGS.
18. FOR CODE COMPLIANCE INFORMATION REFER TO DRAWINGS.
19. FOR GREEN CODE MANDATORY MEASURES REFER TO DRAWINGS.
20. FOR WAYFINDING DETAIL REFER TO DRAWING AND COORDINATE INSTALL WITH TENANT.

A0-11 | A0-12 | A0-21 | A0-31 | A0-32 | A0-35

SYMBOLS & ABBREVIATIONS

- AREA NOT IN CONTRACT
- FIRE ACCESS LANE, UNOBSTRUCTED WIDTH OF 26FT AND VERTICAL CLEARANCE "CLEAR TO SKY"
- FIRE HYDRANT REFER TO CIVIL DRAWINGS
- PROPERTY LINE

KEYNOTES

- 1A (N) PUBLIC FIRE HYDRANT 6"x4" x 2 1/2", REFER TO CIVIL DRAWINGS
- 1B (N) PRIVATE FIRE HYDRANT 6"x4" x 2 1/2", REFER TO CIVIL DRAWINGS
- 2 SHARED MONUMENT SIGN, REFER TO ELECTRICAL AND CIVIL DRAWINGS
- 3 SITE LIGHTING, REFER TO ELECTRICAL AND CIVIL DRAWINGS
- 4 LANDSCAPE AREA, REFER TO LANDSCAPE DRAWINGS.

FIRE DEPARTMENT NOTES

1. FIRE DEPARTMENT VEHICULAR ACCESS ROADS MUST BE INSTALLED AND MAINTAINED IN A SERVICEABLE MANNER PRIOR TO AND DURING THE TIME OF CONSTRUCTION. FIRE CODE 501.4
2. APPROVED BUILDING ADDRESS NUMBERS, BUILDING NUMBERS OR APPROVED BUILDING IDENTIFICATION SHALL BE PROVIDED AND MAINTAINED SO AS TO BE PLAINLY VISIBLE AND LEGIBLE FROM THE STREET FRONTING THE PROPERTY. THE NUMBERS SHALL CONTRAST WITH THEIR BACKGROUND, BE ARABIC NUMERALS OR ALPHABET LETTERS, AND BE A MINIMUM OF 4 INCHES HIGH WITH A MINIMUM STROKE WIDTH OF 0.5 INCH. FIRE CODE 505.
3. AN APPROVED KEY BOX, LISTED IN ACCORDANCE WITH UL 1037 SHALL BE PROVIDED AS REQUIRED BY FIRE CODE 506. THE LOCATION OF EACH KEY BOX SHALL BE DETERMINED BY THE FIRE INSPECTOR.
4. ALL REQUIRED **PUBLIC** FIRE HYDRANTS SHALL BE INSTALLED, TESTED AND ACCEPTED PRIOR TO BEGINNING CONSTRUCTION. FIRE CODE 501.4
5. PLANS SHOWING UNDERGROUND PIPING FOR PRIVATE ON-SITE FIRE HYDRANTS SHALL BE SUBMITTED TO THE SPRINKLER PLAN CHECK UNIT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION. FIRE CODE 901.2, COUNTY OF LOS ANGELES FIRE DEPARTMENT REGULATION 7
6. DUMPSTERS AND CONTAINERS WITH AN INDIVIDUAL CAPACITY OF 1.5 CUBIV YARDS OR MORE SHALL NOT BE STORED IN BUILDINGS OR PLACED WITHIN 5 FEET OF COMBUSTIBLE WALLS, OPENINGS OR COMBUSTIBLE ROOF EAVES, UNLESS AREAS CONTAIN DUMPSTERS OR CONTAINERS OR CONTAINERS ARE PROTECTED BY AN APPROVED AUTOMATIC FIRE SPRINKLER SYSTEM. FIRE CODE 304.3.3.
7. THE MEANS OF EGRESS TRAVEL SHALL BE ILLUMINATED AT ANY TIME THE BUILDING IS OCCUPIED WITH A LIGHT INTENSITY OF NOT LESS THAN 1 FOOT-CANDLE AT THE FLOOR LEVEL. BUILDING CODE 1008.2.1.
8. EACH REQUIRED COMMERCIAL KITCHEN EXHAUST HOOD AND DUCT SYSTEM SHALL HAVE A TYPE I HOOD PROTECTED WITH AN APPROVED AUTOMATIC FIRE-EXTINGUISHING SYSTEM INSTALLED IN ACCORDANCE WITH BUILDING CODE 904.2.1.
9. STRUCTURES AND OUTDOOR STORAGE UNDERNEATH HIGH VOLTAGE TRANSMISSION LINES (66 KILOVOLTS OR GREATER) SHALL COMPLY WITH FIRE CODE 316.6 AND COUNTY OF LOS ANGELES FIRE DEPARTMENT REGULATION 27. ANY PROPOSED CONSTRUCTION OR LAND USE WITHIN 100 FEET OF THE DRIP LINE OF HIGH VOLTAGE TRANSMISSION LINES SHALL BE SUBJECT TO REVIEW BY THE FIRE MARSHAL.

FIRE FLOW CALCULATION:
TYPE OF CONSTRUCTION: TYPE VB
FIRE-FLOW CALCULATION AREA: 1,264 SQ. FT
FIRE FLOW BASED ON THE FIRE-FLOW CALCULATION AREA: 1,500
GPM REDUCTION FOR FIRE SPRINKLERS (MAXIMUM 50%): 0 GPM
TOTAL FIRE FLOW REQUIRED: 1,500 GPM

C

OVERALL SITE PLAN | SCALE: 1" = 20'-0" | 1

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ktgy.com
949.851.2133

KTGY Project No:

Project Contact: DORINA WATSON
Email: DWATSON@KTGY.COM

Principal: WIL WONG
Project Designer: RUSSEL ROSALES

Developer

RALPH DEPPISCH - SAGE INVESTCO

4350 Von Karman Ave. #200

NEWPORT BEACH, CA, 92660

PHONE NO. 949-705-0426

LANDLORD SHELL

4045 E. AVE. S.
PALMDALE, CA, 93550

No.	Date	Description
C	1/08/2024	Plan Check
F	3/08/2024	Plan Check

It is the clients responsibility prior to or during construction to notify the architect in writing of any perceived errors or omissions in the plans and specifications of which a contractor thoroughly knowledgeable with the building codes and methods of construction should reasonably be aware. Written instructions addressing such perceived errors or omissions shall be received from the architect prior to the client or clients subcontractors proceeding with the work. The client will be responsible for any defects in construction if these procedures are not followed.

OVERALL SITE PLAN

2024-03-12_BID SET

A1-10

APPENDIX B -

TRAFFIC COUNT DATA

INTERSECTION TURNING MOVEMENT COUNTS

T112224

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Wed, Apr 16, 25

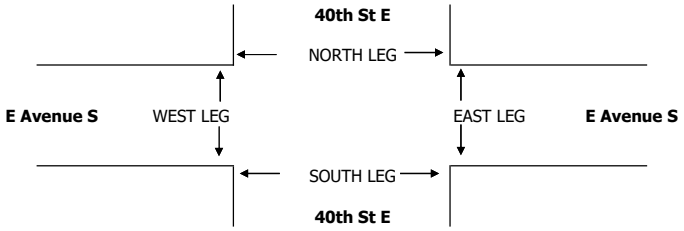
LOCATION: Palmdale
NORTH & SOUTH: 40th St E
EAST & WEST: E Avenue S

PROJECT #: SC5321
LOCATION #: 1
CONTROL: SIGNAL

NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

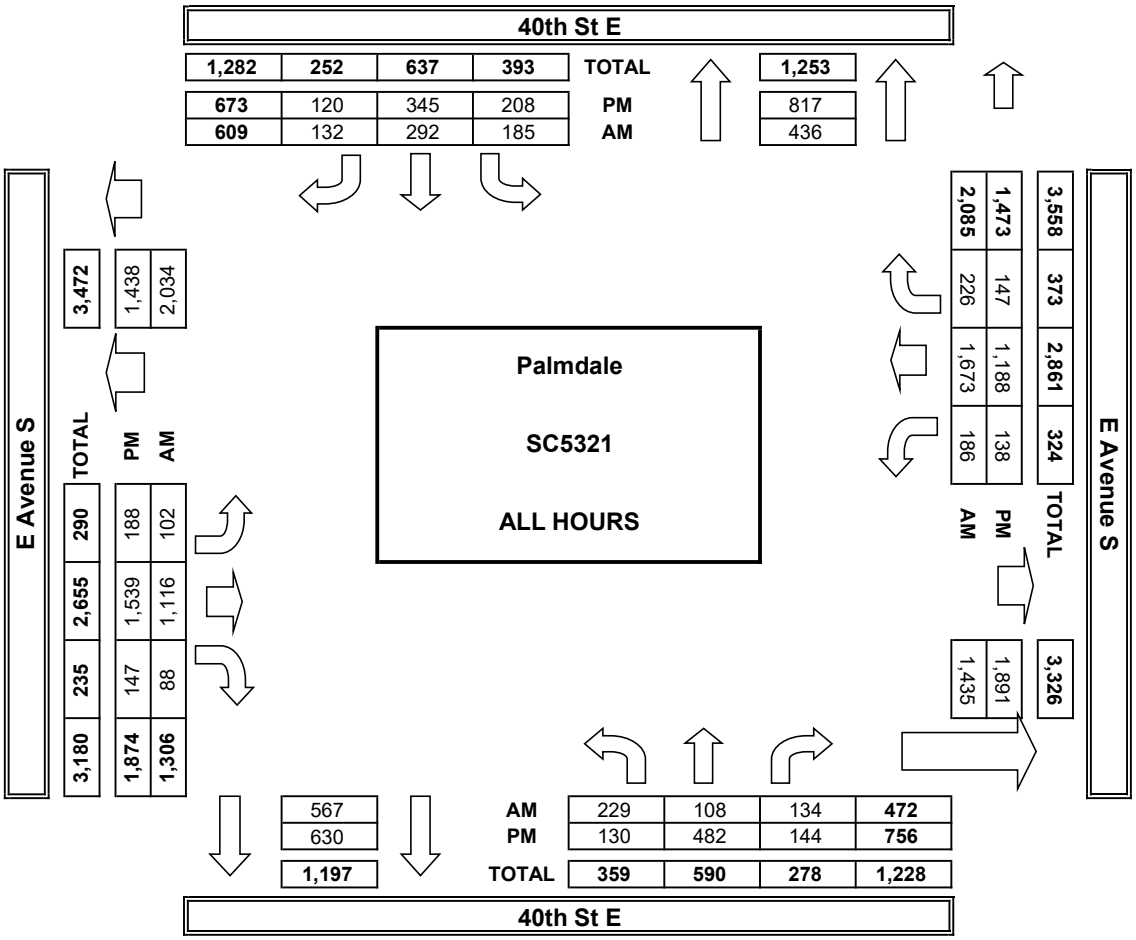
		NORTHBOUND 40th St E			SOUTHBOUND 40th St E			EASTBOUND E Avenue S			WESTBOUND E Avenue S				U-TURNS				
	LANES:	NL 1	NT 2	NR 0	SL 1	ST 1	SR 0	EL 1	ET 3	ER 1	WL 1	WT 3	WR 1	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	14	27	14	49	49	16	8	146	9	28	210	31	601	0	0	0	0	0
	7:15 AM	21	30	13	17	49	11	6	92	5	22	208	43	517	0	0	0	0	0
	7:30 AM	27	7	13	20	38	15	13	122	13	17	201	37	523	1	0	0	0	1
	7:45 AM	22	13	17	13	30	18	17	136	12	21	184	28	511	0	0	0	0	0
	8:00 AM	27	11	15	16	32	15	11	138	14	15	173	27	494	0	0	0	0	0
	8:15 AM	30	9	18	24	25	23	15	158	10	19	215	24	570	0	0	0	0	0
	8:30 AM	47	5	25	27	33	14	14	182	14	36	228	15	640	0	0	0	0	0
	8:45 AM	41	6	19	19	36	20	18	142	11	28	254	21	615	0	0	0	0	0
	VOLUMES	229	108	134	185	292	132	102	1,116	88	186	1,673	226	4,472	1	0	0	0	1
	APPROACH %	49%	23%	28%	30%	48%	22%	8%	85%	7%	9%	80%	11%						
	APP/DEPART	472	/	436	609	/	567	1,306	/	1,435	2,085	/	2,034	0					
	BEGIN PEAK HR		8:00 AM																
	VOLUMES	145	31	77	86	126	72	58	620	49	98	870	87	2,319	0	0	0	0	
	APPROACH %	57%	12%	30%	30%	44%	25%	8%	85%	7%	9%	82%	8%						
	PEAK HR FACTOR		0.821			0.947			0.865			0.870		0.906					
	APP/DEPART	253	/	176	284	/	273	727	/	783	1,055	/	1,087	0					
PM	4:00 PM	14	41	14	33	44	16	12	193	24	26	162	20	599	0	0	0	0	0
	4:15 PM	17	53	10	26	38	20	27	213	18	20	157	27	626	0	0	0	0	0
	4:30 PM	18	47	15	26	43	24	25	175	18	13	170	15	589	0	0	0	0	0
	4:45 PM	27	65	18	20	39	14	11	193	12	18	159	16	592	0	0	0	0	0
	5:00 PM	10	59	25	25	40	10	32	184	14	11	152	19	581	0	0	0	0	0
	5:15 PM	13	68	19	21	54	11	28	186	22	23	133	14	592	0	0	0	0	0
	5:30 PM	14	76	17	24	43	14	29	204	21	13	123	21	599	0	0	0	0	0
	5:45 PM	17	73	26	33	44	11	24	191	18	14	132	15	598	0	0	0	0	0
	VOLUMES	130	482	144	208	345	120	188	1,539	147	138	1,188	147	4,776	0	0	0	0	0
	APPROACH %	17%	64%	19%	31%	51%	18%	10%	82%	8%	9%	81%	10%						
	APP/DEPART	756	/	817	673	/	630	1,874	/	1,891	1,473	/	1,438	0					
	BEGIN PEAK HR		4:00 PM																
	VOLUMES	76	206	57	105	164	74	75	774	72	77	648	78	2,406	0	0	0	0	
	APPROACH %	22%	61%	17%	31%	48%	22%	8%	84%	8%	10%	81%	10%						
	PEAK HR FACTOR		0.770			0.922			0.892			0.965		0.961					
	APP/DEPART	339	/	359	343	/	313	921	/	936	803	/	798	0					

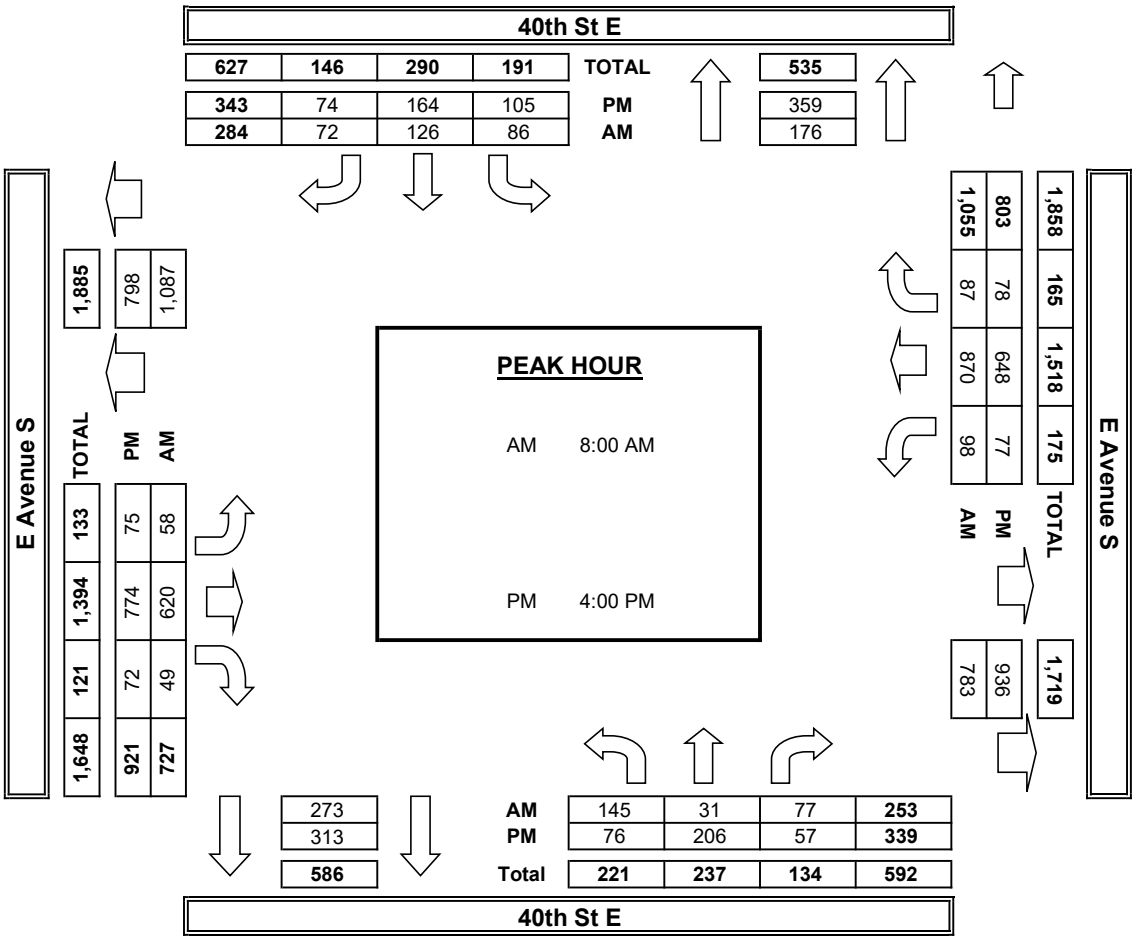


		ALL PED + BIKE & SCOOTER					PEDESTRIAN CROSSINGS					BICYCLE & SCOOTER CROSSINGS				
		N LEG	S LEG	E LEG	W LEG	TOTAL	N LEG	S LEG	E LEG	W LEG	TOTAL	NL	SL	EL	WL	TOTAL
AM	7:00 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	7:15 AM	0	1	0	1	2	0	1	0	1	2	0	0	0	0	0
	7:30 AM	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:15 AM	0	1	0	1	2	0	0	0	0	0	0	1	0	1	2
	8:30 AM	0	2	1	0	3	0	1	0	0	1	0	1	1	0	2
	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	7	1	2	10	0	5	0	1	6	0	2	1	1	4
	BEGIN PEAK HR			8:00 AM			0	1	0	0	1					
PM	4:00 PM	1	0	1	2	4	1	0	1	2	4	0	0	0	0	0
	4:15 PM	0	1	0	2	3	0	1	0	2	3	0	0	0	0	0
	4:30 PM	1	1	0	1	3	1	0	0	1	2	0	1	0	0	1
	4:45 PM	0	1	2	0	3	0	0	1	0	1	0	1	1	0	2
	5:00 PM	0	2	1	0	3	0	2	1	0	3	0	0	0	0	0
	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:30 PM	0	3	0	0	3	0	2	0	0	2	0	1	0	0	1
	5:45 PM	0	2	0	1	3	0	1	0	1	2	0	1	0	0	1
	TOTAL	2	10	4	6	22	2	6	3	6	17	0	4	1	0	5
	BEGIN PEAK HR			4:00 PM			2	1	2	5	10					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

T112224

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Wed, Apr 16, 25

LOCATION: Palmdale
NORTH & SOUTH: 42nd St E
EAST & WEST: E Avenue S

PROJECT #: SC5321
LOCATION #: 2
CONTROL: STOP N

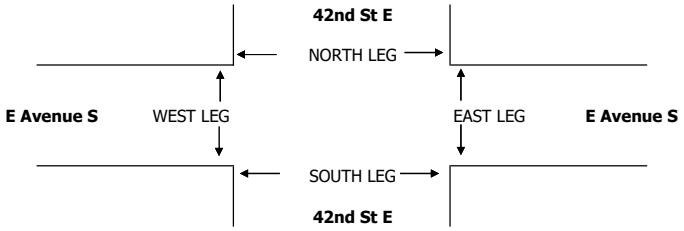
NOTES:

AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

		NORTHBOUND 42nd St E			SOUTHBOUND 42nd St E			EASTBOUND E Avenue S			WESTBOUND E Avenue S			
	LANES:	NL 0	NT X	NR 0	SL X	ST X	SR X	EL X	ET 3	ER 1	WL 1	WT 3	WR X	TOTAL
AM	7:00 AM	9	0	5	0	0	0	0	214	15	3	258	0	504
	7:15 AM	5	0	1	0	0	0	0	129	4	4	266	0	409
	7:30 AM	23	0	4	0	0	0	0	148	5	6	235	0	421
	7:45 AM	12	0	3	0	0	0	0	176	3	5	225	0	424
	8:00 AM	9	0	3	0	0	0	0	164	7	1	213	0	397
	8:15 AM	16	0	1	0	0	0	0	180	6	5	229	0	437
	8:30 AM	30	0	5	0	0	0	0	232	10	4	264	0	545
	8:45 AM	19	0	2	0	0	0	0	175	5	7	277	0	485
	VOLUMES	123	0	24	0	0	0	0	1,418	55	35	1,967	0	3,627
	APPROACH %	84%	0%	16%	0%	0%	0%	0%	96%	4%	2%	98%	0%	
	APP/DEPART	147	/	0	0	/	90	1,474	/	1,446	2,006	/	2,091	0
	BEGIN PEAK HR		8:00 AM											
	VOLUMES	74	0	11	0	0	0	0	751	28	17	983	0	1,867
	APPROACH %	87%	0%	13%	0%	0%	0%	0%	96%	4%	2%	98%	0%	
	PEAK HR FACTOR		0.607			0.000			0.805			0.883		0.853
	APP/DEPART	85	/	0	0	/	45	779	/	765	1,003	/	1,057	0
PM	4:00 PM	1	0	3	0	0	0	0	230	12	4	195	0	445
	4:15 PM	1	0	2	0	0	0	0	237	7	3	203	0	453
	4:30 PM	3	0	3	0	0	0	0	213	7	4	205	0	435
	4:45 PM	1	0	2	0	0	0	0	237	3	2	196	0	441
	5:00 PM	5	0	1	0	0	0	0	208	9	4	173	0	400
	5:15 PM	5	0	2	0	0	0	0	243	7	2	166	0	425
	5:30 PM	5	0	0	0	0	0	0	231	10	6	152	0	404
	5:45 PM	2	0	0	0	0	0	0	247	8	0	163	0	420
	VOLUMES	23	0	13	0	0	0	0	1,846	63	25	1,453	0	3,427
	APPROACH %	64%	0%	36%	0%	0%	0%	0%	97%	3%	2%	98%	0%	
	APP/DEPART	36	/	0	0	/	88	1,910	/	1,862	1,481	/	1,477	0
	BEGIN PEAK HR		4:00 PM											
	VOLUMES	6	0	10	0	0	0	0	917	29	13	799	0	1,776
	APPROACH %	38%	0%	63%	0%	0%	0%	0%	97%	3%	2%	98%	0%	
	PEAK HR FACTOR		0.667			0.000			0.970			0.972		0.980
	APP/DEPART	16	/	0	0	/	42	947	/	928	813	/	806	0

U-TURNS

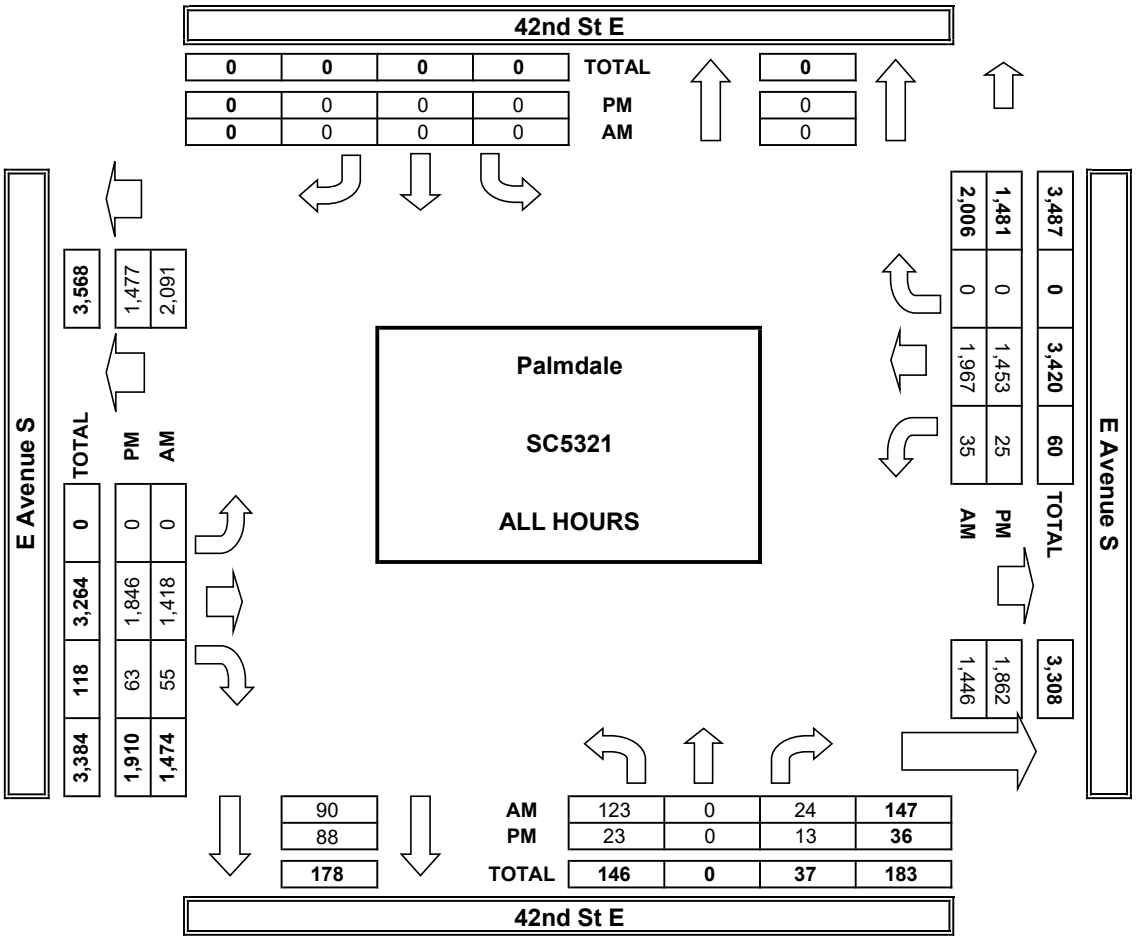
	NB	SB	EB	WB	TTL
7:00 AM	0	0	1	1	2
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	1	1
8:30 AM	0	0	0	2	2
8:45 AM	0	0	0	0	0
VOLUMES	0	0	1	4	5
BEGIN PEAK HR					
VOLUMES	0	0	0	3	
4:00 PM	0	0	1	0	1
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	1	1
5:00 PM	0	0	0	1	1
5:15 PM	0	0	0	1	1
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
VOLUMES	0	0	1	3	4
BEGIN PEAK HR					
VOLUMES	0	0	1	1	

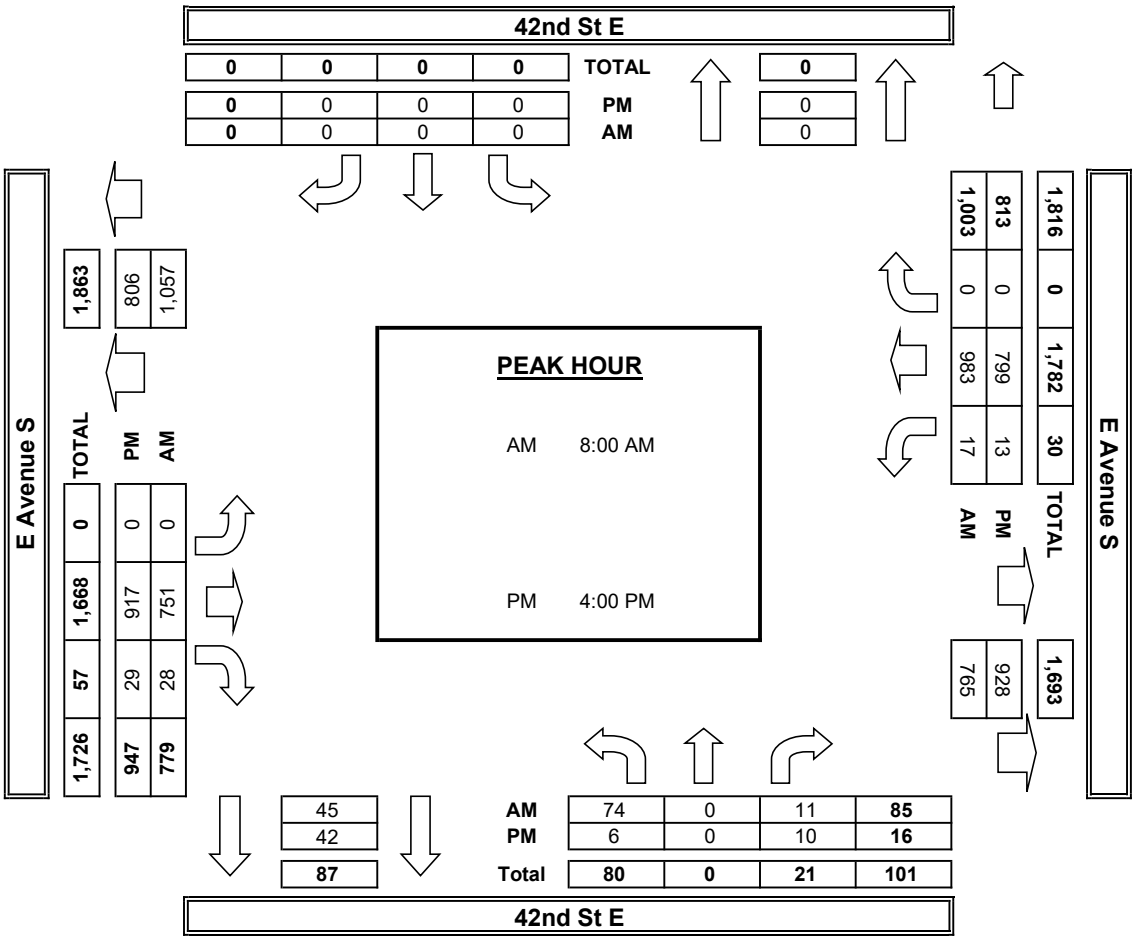


		ALL PED + BIKE & SCOOTER					PEDESTRIAN CROSSINGS					BICYCLE & SCOOTER CROSSINGS				
		N LEG	S LEG	E LEG	W LEG	TOTAL	N LEG	S LEG	E LEG	W LEG	TOTAL	NL	SL	EL	WL	TOTAL
AM	7:00 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	7:15 AM	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0
	7:30 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:00 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1
	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8:45 AM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	TOTAL	0	6	0	0	6	0	5	0	0	5	0	1	0	0	1
	BEGIN PEAK HR			8:00 AM			0	1	0	0	1					
PM	4:00 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	4:15 PM	0	3	0	0	3	0	2	0	0	2	0	1	0	0	1
	4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5:15 PM	0	2	0	0	2	0	2	0	0	2	0	0	0	0	0
	5:30 PM	0	2	0	0	2	0	1	0	0	1	0	1	0	0	1
	5:45 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0
	TOTAL	0	9	0	0	9	0	7	0	0	7	0	2	0	0	2
	BEGIN PEAK HR			4:00 PM			0	3	0	0	3					

AimTD LLC

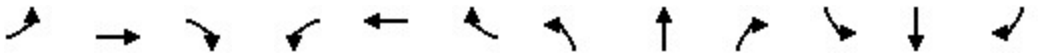
TURNING MOVEMENT COUNTS





APPENDIX C -

EXISTING CONDITIONS PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	620	49	98	870	87	145	31	77	86	126	72
Future Volume (veh/h)	58	620	49	98	870	87	145	31	77	86	126	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	64	681	54	108	956	96	159	34	85	95	138	79
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	1575	658	139	1671	635	203	390	343	131	198	114
Arrive On Green	0.06	0.31	0.31	0.08	0.33	0.33	0.11	0.22	0.22	0.07	0.18	0.18
Sat Flow, veh/h	1781	5106	1547	1781	5106	1584	1781	1777	1564	1781	1110	636
Grp Volume(v), veh/h	64	681	54	108	956	96	159	34	85	95	0	217
Grp Sat Flow(s),veh/h/ln	1781	1702	1547	1781	1702	1584	1781	1777	1564	1781	0	1746
Q Serve(g_s), s	1.7	5.3	1.0	3.0	7.7	1.9	4.3	0.8	2.2	2.6	0.0	5.8
Cycle Q Clear(g_c), s	1.7	5.3	1.0	3.0	7.7	1.9	4.3	0.8	2.2	2.6	0.0	5.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	105	1575	658	139	1671	635	203	390	343	131	0	312
V/C Ratio(X)	0.61	0.43	0.08	0.78	0.57	0.15	0.78	0.09	0.25	0.73	0.00	0.70
Avail Cap(c_a), veh/h	322	3585	1267	179	3175	1101	286	1212	1067	179	0	1086
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.9	13.8	8.6	22.6	13.9	9.5	21.5	15.5	16.1	22.6	0.0	19.2
Incr Delay (d2), s/veh	5.6	0.2	0.1	15.1	0.3	0.1	8.9	0.1	0.4	9.1	0.0	2.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.5	0.2	1.6	2.2	0.5	2.0	0.3	0.7	1.3	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.5	13.9	8.7	37.7	14.2	9.6	30.4	15.6	16.4	31.7	0.0	22.0
LnGrp LOS	C	B	A	D	B	A	C	B	B	C		C
Approach Vol, veh/h		799			1160			278			312	
Approach Delay, s/veh		14.8			16.0			24.3			24.9	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.7	14.9	7.9	19.4	9.7	12.9	6.9	20.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	8.0	31.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	4.6	4.2	5.0	7.3	6.3	7.8	3.7	9.7
Green Ext Time (p_c), s	0.0	0.6	0.0	4.6	0.1	1.1	0.0	6.4

Intersection Summary	
HCM 7th Control Delay, s/veh	17.6
HCM 7th LOS	B

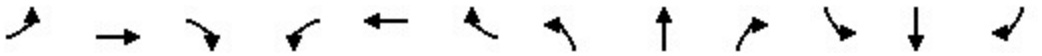
Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	751	28	17	983	74	11
Future Vol, veh/h	751	28	17	983	74	11
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	260	250	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	884	33	20	1156	87	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	917	0	1387	443
Stage 1	-	-	-	-	885	-
Stage 2	-	-	-	-	503	-
Critical Hdwy	-	-	5.34	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	-	-	3.12	-	3.82	3.92
Pot Cap-1 Maneuver	-	-	429	-	197	481
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	523	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	429	-	188	481
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	499	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.23	36.24
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	188	481	-	-	429	-
HCM Lane V/C Ratio	0.464	0.027	-	-	0.047	-
HCM Ctrl Dly (s/v)	39.7	12.7	-	-	13.8	-
HCM Lane LOS	E	B	-	-	B	-
HCM 95th %tile Q(veh)	2.2	0.1	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	774	72	77	648	78	76	206	57	105	164	74
Future Volume (veh/h)	75	774	72	77	648	78	76	206	57	105	164	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	78	806	75	80	675	81	79	215	59	109	171	77
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	121	1547	587	123	1552	602	122	575	154	144	269	121
Arrive On Green	0.07	0.30	0.30	0.07	0.30	0.30	0.07	0.21	0.21	0.08	0.22	0.22
Sat Flow, veh/h	1781	5106	1580	1781	5106	1561	1781	2760	737	1781	1219	549
Grp Volume(v), veh/h	78	806	75	80	675	81	79	136	138	109	0	248
Grp Sat Flow(s),veh/h/ln	1781	1702	1580	1781	1702	1561	1781	1777	1721	1781	0	1768
Q Serve(g_s), s	2.0	6.2	1.5	2.1	5.0	1.6	2.0	3.1	3.2	2.8	0.0	6.0
Cycle Q Clear(g_c), s	2.0	6.2	1.5	2.1	5.0	1.6	2.0	3.1	3.2	2.8	0.0	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.43	1.00		0.31
Lane Grp Cap(c), veh/h	121	1547	587	123	1552	602	122	370	359	144	0	390
V/C Ratio(X)	0.65	0.52	0.13	0.65	0.43	0.13	0.65	0.37	0.38	0.76	0.00	0.64
Avail Cap(c_a), veh/h	340	3790	1281	189	3357	1154	302	1281	1241	189	0	1162
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.4	13.6	9.8	21.4	13.2	9.4	21.4	16.0	16.1	21.2	0.0	16.7
Incr Delay (d2), s/veh	5.7	0.3	0.1	5.7	0.2	0.1	5.7	0.6	0.7	12.0	0.0	1.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.7	0.4	0.9	1.4	0.4	0.9	1.1	1.1	1.5	0.0	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	27.1	13.9	9.9	27.1	13.4	9.5	27.1	16.6	16.7	33.2	0.0	18.4
LnGrp LOS	C	B	A	C	B	A	C	B	B	C		B
Approach Vol, veh/h		959			836			353			357	
Approach Delay, s/veh		14.6			14.3			19.0			22.9	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.8	13.8	7.2	18.3	7.2	14.4	7.2	18.3
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	8.0	31.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	4.8	5.2	4.1	8.2	4.0	8.0	4.0	7.0
Green Ext Time (p_c), s	0.0	1.4	0.0	5.6	0.0	1.3	0.1	4.5

Intersection Summary	
HCM 7th Control Delay, s/veh	16.3
HCM 7th LOS	B

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	917	29	13	799	6	10
Future Vol, veh/h	917	29	13	799	6	10
Conflicting Peds, #/hr	0	3	3	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	260	250	-	0	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	936	30	13	815	6	10

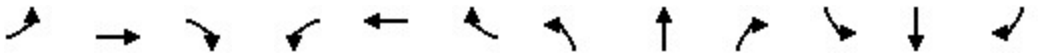
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	968	0	1291	471
Stage 1	-	-	-	-	939	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	-	-	5.34	-	5.74	7.14
Critical Hdwy Stg 1	-	-	-	-	6.64	-
Critical Hdwy Stg 2	-	-	-	-	6.04	-
Follow-up Hdwy	-	-	3.12	-	3.82	3.92
Pot Cap-1 Maneuver	-	-	405	-	221	461
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	625	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	404	-	213	460
Mov Cap-2 Maneuver	-	-	-	-	213	-
Stage 1	-	-	-	-	263	-
Stage 2	-	-	-	-	605	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.23	16.53
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	213	460	-	-	404	-
HCM Lane V/C Ratio	0.029	0.022	-	-	0.033	-
HCM Ctrl Dly (s/v)	22.4	13	-	-	14.2	-
HCM Lane LOS	C	B	-	-	B	-
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0.1	-

APPENDIX D -

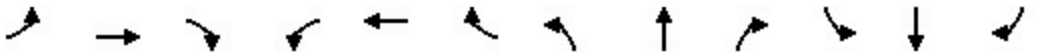
OPENING YEAR 2026 PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	721	50	118	978	107	149	47	79	118	130	74
Future Volume (veh/h)	60	721	50	118	978	107	149	47	79	118	130	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	66	792	55	130	1075	118	164	52	87	130	143	81
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	1598	669	166	1775	698	208	360	317	166	200	113
Arrive On Green	0.06	0.31	0.31	0.09	0.35	0.35	0.12	0.20	0.20	0.09	0.18	0.18
Sat Flow, veh/h	1781	5106	1547	1781	5106	1584	1781	1777	1564	1781	1115	632
Grp Volume(v), veh/h	66	792	55	130	1075	118	164	52	87	130	0	224
Grp Sat Flow(s),veh/h/ln	1781	1702	1547	1781	1702	1584	1781	1777	1564	1781	0	1747
Q Serve(g_s), s	1.9	6.8	1.1	3.8	9.3	2.4	4.8	1.3	2.5	3.8	0.0	6.5
Cycle Q Clear(g_c), s	1.9	6.8	1.1	3.8	9.3	2.4	4.8	1.3	2.5	3.8	0.0	6.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	104	1598	669	166	1775	698	208	360	317	166	0	313
V/C Ratio(X)	0.64	0.50	0.08	0.78	0.61	0.17	0.79	0.14	0.27	0.78	0.00	0.72
Avail Cap(c_a), veh/h	299	3331	1194	166	2950	1063	266	1126	991	166	0	1009
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.7	15.0	9.0	23.8	14.5	9.1	23.1	17.6	18.1	23.8	0.0	20.7
Incr Delay (d2), s/veh	6.3	0.2	0.1	21.4	0.3	0.1	11.6	0.2	0.5	21.4	0.0	3.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.0	0.3	2.3	2.7	0.6	2.4	0.5	0.8	2.4	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	31.0	15.2	9.1	45.2	14.8	9.2	34.6	17.7	18.5	45.2	0.0	23.8
LnGrp LOS	C	B	A	D	B	A	C	B	B	D		C
Approach Vol, veh/h		913			1323			303			354	
Approach Delay, s/veh		16.0			17.3			27.1			31.7	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	14.9	9.0	20.8	10.3	13.6	7.1	22.7
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	8.0	31.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	5.8	4.5	5.8	8.8	6.8	8.5	3.9	11.3
Green Ext Time (p_c), s	0.0	0.7	0.0	5.4	0.0	1.1	0.0	7.1

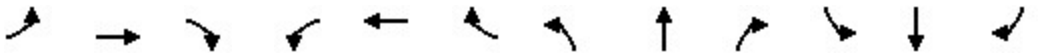
Intersection Summary	
HCM 7th Control Delay, s/veh	19.7
HCM 7th LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	214	805	29	18	1083	39	76	20	11	123	21	103
Future Volume (veh/h)	214	805	29	18	1083	39	76	20	11	123	21	103
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	947	34	21	1274	42	89	22	13	134	23	112
Peak Hour Factor	0.92	0.85	0.85	0.85	0.85	0.92	0.85	0.92	0.85	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	386	3775	1147	503	3775	1171	269	0	214	298	252	214
Arrive On Green	0.74	0.74	0.74	0.74	0.74	0.74	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	417	5106	1552	573	5106	1584	1254	0	1585	1373	1870	1585
Grp Volume(v), veh/h	233	947	34	21	1274	42	89	0	13	134	23	112
Grp Sat Flow(s),veh/h/ln	417	1702	1552	573	1702	1584	1254	0	1585	1373	1870	1585
Q Serve(g_s), s	27.9	3.8	0.4	0.8	5.5	0.5	4.3	0.0	0.5	5.9	0.7	4.2
Cycle Q Clear(g_c), s	33.4	3.8	0.4	4.5	5.5	0.5	4.9	0.0	0.5	5.9	0.7	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	386	3775	1147	503	3775	1171	269	0	214	298	252	214
V/C Ratio(X)	0.60	0.25	0.03	0.04	0.34	0.04	0.33	0.00	0.06	0.45	0.09	0.52
Avail Cap(c_a), veh/h	498	5143	1563	657	5143	1595	455	0	449	502	530	449
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.7	2.6	2.2	3.4	2.9	2.2	26.2	0.0	24.0	26.4	24.1	25.6
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.0	0.1	0.0	0.7	0.0	0.1	1.1	0.2	2.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.3	0.0	0.0	0.5	0.0	1.3	0.0	0.2	1.9	0.3	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	10.2	2.7	2.2	3.4	2.9	2.2	27.0	0.0	24.1	27.4	24.2	27.6
LnGrp LOS	B	A	A	A	A	A	C		C	C	C	C
Approach Vol, veh/h		1214			1337			102			269	
Approach Delay, s/veh		4.1			2.9			26.6			27.2	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.6		51.0		12.6		51.0				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		18.0		64.0		18.0		64.0				
Max Q Clear Time (g_c+I1), s		6.9		35.4		7.9		7.5				
Green Ext Time (p_c), s		0.2		11.6		0.6		11.5				

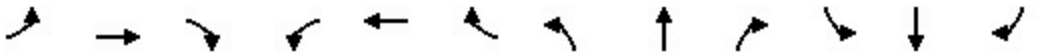
Intersection Summary	
HCM 7th Control Delay, s/veh	6.5
HCM 7th LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	855	74	88	714	89	78	223	59	129	169	76
Future Volume (veh/h)	77	855	74	88	714	89	78	223	59	129	169	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	891	77	92	744	93	81	232	61	134	176	79
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	120	1628	611	129	1654	658	120	537	138	171	270	121
Arrive On Green	0.07	0.32	0.32	0.07	0.32	0.32	0.07	0.19	0.19	0.10	0.22	0.22
Sat Flow, veh/h	1781	5106	1580	1781	5106	1561	1781	2787	715	1781	1220	548
Grp Volume(v), veh/h	80	891	77	92	744	93	81	146	147	134	0	255
Grp Sat Flow(s),veh/h/ln	1781	1702	1580	1781	1702	1561	1781	1777	1725	1781	0	1768
Q Serve(g_s), s	2.2	7.2	1.6	2.5	5.8	1.8	2.2	3.6	3.8	3.7	0.0	6.6
Cycle Q Clear(g_c), s	2.2	7.2	1.6	2.5	5.8	1.8	2.2	3.6	3.8	3.7	0.0	6.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.41	1.00		0.31
Lane Grp Cap(c), veh/h	120	1628	611	129	1654	658	120	343	333	171	0	391
V/C Ratio(X)	0.67	0.55	0.13	0.72	0.45	0.14	0.67	0.43	0.44	0.78	0.00	0.65
Avail Cap(c_a), veh/h	321	3578	1214	178	3169	1121	250	1209	1174	178	0	1133
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.8	14.0	9.9	22.7	13.4	8.9	22.7	17.7	17.8	22.1	0.0	17.7
Incr Delay (d2), s/veh	6.3	0.3	0.1	8.0	0.2	0.1	6.4	0.8	0.9	19.5	0.0	1.8
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.1	0.4	1.2	1.6	0.4	1.0	1.3	1.3	2.2	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.1	14.3	10.0	30.7	13.6	9.0	29.1	18.6	18.7	41.6	0.0	19.6
LnGrp LOS	C	B	A	C	B	A	C	B	B	D		B
Approach Vol, veh/h		1048			929			374			389	
Approach Delay, s/veh		15.1			14.8			20.9			27.1	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.8	13.6	7.6	19.9	7.4	15.0	7.4	20.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	7.0	32.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	5.7	5.8	4.5	9.2	4.2	8.6	4.2	7.8
Green Ext Time (p_c), s	0.0	1.5	0.0	6.2	0.0	1.3	0.1	5.0

Intersection Summary	
HCM 7th Control Delay, s/veh	17.5
HCM 7th LOS	B



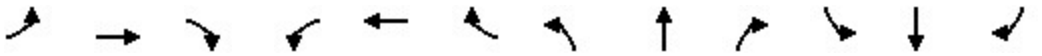
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	966	30	13	868	37	6	18	10	100	17	83
Future Volume (veh/h)	202	966	30	13	868	37	6	18	10	100	17	83
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	220	986	31	13	886	40	6	20	10	109	18	90
Peak Hour Factor	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	404	2863	868	374	2863	886	211	0	187	211	221	187
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	604	5106	1548	554	5106	1581	1781	0	1585	1781	1870	1585
Grp Volume(v), veh/h	220	986	31	13	886	40	6	0	10	109	18	90
Grp Sat Flow(s),veh/h/ln	604	1702	1548	554	1702	1581	1781	0	1585	1781	1870	1585
Q Serve(g_s), s	18.0	6.2	0.5	0.8	5.5	0.7	0.2	0.0	0.3	3.4	0.5	3.1
Cycle Q Clear(g_c), s	23.5	6.2	0.5	7.0	5.5	0.7	0.2	0.0	0.3	3.4	0.5	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	404	2863	868	374	2863	886	211	0	187	211	221	187
V/C Ratio(X)	0.54	0.34	0.04	0.03	0.31	0.05	0.03	0.00	0.05	0.52	0.08	0.48
Avail Cap(c_a), veh/h	494	3623	1098	457	3623	1122	542	0	482	542	569	482
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.2	7.1	5.8	9.0	6.9	5.9	23.1	0.0	23.2	24.5	23.2	24.4
Incr Delay (d2), s/veh	1.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	2.0	0.2	1.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.4	0.1	0.1	1.2	0.1	0.1	0.0	0.1	1.5	0.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.3	7.1	5.8	9.0	7.0	5.9	23.1	0.0	23.3	26.5	23.4	26.3
LnGrp LOS	B	A	A	A	A	A	C		C	C	C	C
Approach Vol, veh/h		1237			939			16			217	
Approach Delay, s/veh		8.4			7.0			23.2			26.1	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.0		37.2		11.0		37.2				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		18.0		42.0		18.0		42.0				
Max Q Clear Time (g_c+I1), s		2.3		25.5		5.4		9.0				
Green Ext Time (p_c), s		0.0		7.7		0.5		6.5				

Intersection Summary	
HCM 7th Control Delay, s/veh	9.5
HCM 7th LOS	A

APPENDIX E -

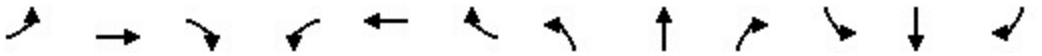
OPENING YEAR 2026 PLUS PROJECT PEAK HOUR INTERSECTION ANALYSIS WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	726	50	122	990	111	149	47	81	120	130	74
Future Volume (veh/h)	60	726	50	122	990	111	149	47	81	120	130	74
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	66	798	55	134	1088	122	164	52	89	132	143	81
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	1612	673	165	1787	701	208	360	317	165	199	113
Arrive On Green	0.06	0.32	0.32	0.09	0.35	0.35	0.12	0.20	0.20	0.09	0.18	0.18
Sat Flow, veh/h	1781	5106	1547	1781	5106	1584	1781	1777	1564	1781	1115	632
Grp Volume(v), veh/h	66	798	55	134	1088	122	164	52	89	132	0	224
Grp Sat Flow(s),veh/h/ln	1781	1702	1547	1781	1702	1584	1781	1777	1564	1781	0	1747
Q Serve(g_s), s	2.0	6.8	1.1	4.0	9.5	2.5	4.8	1.3	2.6	3.9	0.0	6.5
Cycle Q Clear(g_c), s	2.0	6.8	1.1	4.0	9.5	2.5	4.8	1.3	2.6	3.9	0.0	6.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	104	1612	673	165	1787	701	208	360	317	165	0	312
V/C Ratio(X)	0.64	0.50	0.08	0.81	0.61	0.17	0.79	0.14	0.28	0.80	0.00	0.72
Avail Cap(c_a), veh/h	297	3310	1188	165	2932	1056	264	1119	985	165	0	1003
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.9	15.0	9.0	24.0	14.5	9.1	23.2	17.7	18.2	24.0	0.0	20.9
Incr Delay (d2), s/veh	6.3	0.2	0.1	25.6	0.3	0.1	11.8	0.2	0.5	23.7	0.0	3.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.1	0.3	2.6	2.8	0.6	2.4	0.5	0.8	2.5	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	31.2	15.2	9.1	49.6	14.8	9.2	35.0	17.9	18.7	47.7	0.0	24.0
LnGrp LOS	C	B	A	D	B	A	C	B	B	D		C
Approach Vol, veh/h		919			1344			305			356	
Approach Delay, s/veh		16.0			17.8			27.3			32.8	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	14.9	9.0	21.0	10.3	13.7	7.1	22.9
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	8.0	31.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	5.9	4.6	6.0	8.8	6.8	8.5	4.0	11.5
Green Ext Time (p_c), s	0.0	0.7	0.0	5.4	0.0	1.1	0.0	7.2

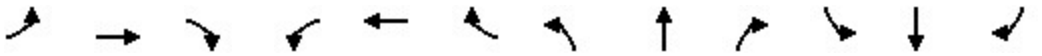
Intersection Summary	
HCM 7th Control Delay, s/veh	20.0
HCM 7th LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	214	805	38	22	1083	39	96	20	21	123	21	103
Future Volume (veh/h)	214	805	38	22	1083	39	96	20	21	123	21	103
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	947	45	26	1274	42	113	22	25	134	23	112
Peak Hour Factor	0.92	0.85	0.85	0.85	0.85	0.92	0.85	0.92	0.85	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	385	3774	1147	499	3774	1171	269	0	215	297	254	215
Arrive On Green	0.74	0.74	0.74	0.74	0.74	0.74	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	417	5106	1552	568	5106	1584	1254	0	1585	1359	1870	1585
Grp Volume(v), veh/h	233	947	45	26	1274	42	113	0	25	134	23	112
Grp Sat Flow(s),veh/h/ln	417	1702	1552	568	1702	1584	1254	0	1585	1359	1870	1585
Q Serve(g_s), s	28.0	3.8	0.5	1.0	5.5	0.5	5.5	0.0	0.9	6.0	0.7	4.2
Cycle Q Clear(g_c), s	33.6	3.8	0.5	4.8	5.5	0.5	6.2	0.0	0.9	6.0	0.7	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	385	3774	1147	499	3774	1171	269	0	215	297	254	215
V/C Ratio(X)	0.61	0.25	0.04	0.05	0.34	0.04	0.42	0.00	0.12	0.45	0.09	0.52
Avail Cap(c_a), veh/h	495	5119	1555	648	5119	1588	453	0	447	496	527	447
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.7	2.7	2.2	3.4	2.9	2.2	26.9	0.0	24.2	26.5	24.1	25.7
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.0	0.1	0.0	1.0	0.0	0.2	1.1	0.2	2.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.3	0.0	0.1	0.5	0.0	1.6	0.0	0.3	1.9	0.3	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	10.3	2.7	2.3	3.5	2.9	2.2	27.9	0.0	24.5	27.5	24.3	27.6
LnGrp LOS	B	A	A	A	A	A	C		C	C	C	C
Approach Vol, veh/h		1225			1342			138			269	
Approach Delay, s/veh		4.1			2.9			27.3			27.3	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		12.7		51.2		12.7		51.2				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		18.0		64.0		18.0		64.0				
Max Q Clear Time (g_c+I1), s		8.2		35.6		8.0		7.5				
Green Ext Time (p_c), s		0.3		11.6		0.6		11.6				

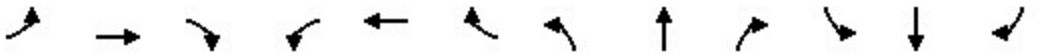
Intersection Summary	
HCM 7th Control Delay, s/veh	6.8
HCM 7th LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	868	74	91	723	92	78	223	63	133	169	76
Future Volume (veh/h)	77	868	74	91	723	92	78	223	63	133	169	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	80	904	77	95	753	96	81	232	66	139	176	79
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	119	1641	614	130	1672	669	120	516	143	177	269	121
Arrive On Green	0.07	0.32	0.32	0.07	0.33	0.33	0.07	0.19	0.19	0.10	0.22	0.22
Sat Flow, veh/h	1781	5106	1580	1781	5106	1561	1781	2735	758	1781	1220	548
Grp Volume(v), veh/h	80	904	77	95	753	96	81	149	149	139	0	255
Grp Sat Flow(s),veh/h/ln	1781	1702	1580	1781	1702	1561	1781	1777	1716	1781	0	1768
Q Serve(g_s), s	2.2	7.4	1.6	2.6	5.9	1.9	2.2	3.7	3.9	3.8	0.0	6.6
Cycle Q Clear(g_c), s	2.2	7.4	1.6	2.6	5.9	1.9	2.2	3.7	3.9	3.8	0.0	6.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.44	1.00		0.31
Lane Grp Cap(c), veh/h	119	1641	614	130	1672	669	120	335	324	177	0	390
V/C Ratio(X)	0.67	0.55	0.13	0.73	0.45	0.14	0.68	0.44	0.46	0.79	0.00	0.65
Avail Cap(c_a), veh/h	318	3549	1205	177	3144	1119	248	1200	1159	177	0	1124
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.0	14.1	9.9	22.9	13.4	8.8	22.9	18.1	18.2	22.2	0.0	17.9
Incr Delay (d2), s/veh	6.4	0.3	0.1	9.5	0.2	0.1	6.5	0.9	1.0	20.4	0.0	1.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	2.1	0.4	1.3	1.7	0.4	1.0	1.3	1.4	2.4	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	29.4	14.4	10.0	32.4	13.5	8.9	29.4	19.0	19.2	42.6	0.0	19.7
LnGrp LOS	C	B	A	C	B	A	C	B	B	D		B
Approach Vol, veh/h		1061			944			379			394	
Approach Delay, s/veh		15.2			15.0			21.3			27.8	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	13.5	7.7	20.2	7.4	15.1	7.4	20.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	5.0	34.0	5.0	35.0	7.0	32.0	9.0	31.0
Max Q Clear Time (g_c+I1), s	5.8	5.9	4.6	9.4	4.2	8.6	4.2	7.9
Green Ext Time (p_c), s	0.0	1.6	0.0	6.3	0.0	1.3	0.1	5.1

Intersection Summary	
HCM 7th Control Delay, s/veh	17.7
HCM 7th LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	202	966	51	24	868	37	21	18	18	100	17	83
Future Volume (veh/h)	202	966	51	24	868	37	21	18	18	100	17	83
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	220	986	52	24	886	40	21	20	18	109	18	90
Peak Hour Factor	0.92	0.98	0.98	0.98	0.98	0.92	0.98	0.92	0.98	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	405	2866	869	369	2866	887	210	0	187	210	221	187
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	604	5106	1548	543	5106	1581	1781	0	1585	1781	1870	1585
Grp Volume(v), veh/h	220	986	52	24	886	40	21	0	18	109	18	90
Grp Sat Flow(s),veh/h/ln	604	1702	1548	543	1702	1581	1781	0	1585	1781	1870	1585
Q Serve(g_s), s	18.0	6.2	0.9	1.5	5.5	0.7	0.6	0.0	0.6	3.4	0.5	3.1
Cycle Q Clear(g_c), s	23.5	6.2	0.9	7.7	5.5	0.7	0.6	0.0	0.6	3.4	0.5	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	405	2866	869	369	2866	887	210	0	187	210	221	187
V/C Ratio(X)	0.54	0.34	0.06	0.06	0.31	0.05	0.10	0.00	0.10	0.52	0.08	0.48
Avail Cap(c_a), veh/h	494	3619	1097	450	3619	1120	541	0	481	541	568	481
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.1	7.1	5.9	9.2	6.9	5.9	23.3	0.0	23.3	24.5	23.3	24.4
Incr Delay (d2), s/veh	1.1	0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.2	2.0	0.2	1.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.4	0.2	0.1	1.2	0.1	0.3	0.0	0.2	1.5	0.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.3	7.1	5.9	9.2	7.0	5.9	23.5	0.0	23.5	26.5	23.4	26.3
LnGrp LOS	B	A	A	A	A	A	C		C	C	C	C
Approach Vol, veh/h		1258			950			39			217	
Approach Delay, s/veh		8.3			7.0			23.5			26.2	
Approach LOS		A			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		11.0		37.3		11.0		37.3				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		18.0		42.0		18.0		42.0				
Max Q Clear Time (g_c+I1), s		2.6		25.5		5.4		9.7				
Green Ext Time (p_c), s		0.1		7.8		0.5		6.7				

Intersection Summary	
HCM 7th Control Delay, s/veh	9.6
HCM 7th LOS	A

APPENDIX J -

TRANSIT ROUTE INFORMATION

3

PM times in bold

Westbound to AV Mall via Avenue S

Depart South Valley Transit Center Stop # 1007	Ave S & 47th St. E Stop # 0308	Ave. S & 25th St. E. Stop # 0121	10th St. E. & Ave R Stop # 0134	Palmdale Transportation Center Stop # 1008	Arrive Antelope Valley Mall Stop # 0028
5:15	5:21	5:27	5:34	5:43	5:59
5:45	5:51	5:57	6:04	6:13	6:29
6:15	6:21	6:27	6:34	6:43	6:59
6:45	6:51	6:57	7:04	7:13	7:29
7:15	7:21	7:27	7:34	7:43	7:59
7:45	7:51	7:57	8:04	8:13	8:29
8:15	8:21	8:27	8:34	8:45	9:01
8:45	8:52	8:59	9:06	9:17	9:34
9:15	9:22	9:29	9:36	9:47	10:04
9:45	9:52	9:59	10:06	10:17	10:34
10:15	10:22	10:29	10:36	10:47	11:04
10:45	10:52	10:59	11:06	11:17	11:34
11:15	11:22	11:29	11:36	11:47	**12:04**
11:45	11:52	11:59	**12:06**	**12:17**	**12:34**
12:15	**12:22**	**12:29**	**12:36**	**12:47**	**1:04**
12:45	**12:52**	**12:59**	**1:06**	**1:17**	**1:34**
1:15	**1:22**	**1:29**	**1:36**	**1:47**	**2:04**
1:45	**1:52**	**1:59**	**2:06**	**2:17**	**2:34**
2:15	**2:22**	**2:29**	**2:36**	**2:47**	**3:04**
2:45	**2:52**	**2:59**	**3:06**	**3:17**	**3:34**
3:15	**3:22**	**3:29**	**3:36**	**3:47**	**4:04**
3:45	**3:52**	**3:59**	**4:06**	**4:17**	**4:34**
4:15	**4:22**	**4:29**	**4:36**	**4:47**	**5:04**
4:45	**4:52**	**4:59**	**5:06**	**5:17**	**5:34**
5:15	**5:22**	**5:29**	**5:36**	**5:47**	**6:04**
5:45	**5:52**	**5:59**	**6:06**	**6:17**	**6:34**
6:45	**6:52**	**6:59**	**7:06**	**7:17**	**7:34**
7:45	**7:52**	**7:59**	**8:06**	**8:17**	**8:34**
8:45	**8:52**	**8:59**	**9:06**	**9:17**	**9:34**
9:45	**9:52**	**9:59**	**10:06**	**10:16**	**10:33**
Saturday / Sábado					
7:00	7:06	7:13	7:20	7:29	7:45
8:00	8:06	8:13	8:20	8:29	8:45
9:00	9:06	9:13	9:20	9:29	9:45
10:00	10:06	10:13	10:20	10:31	10:48
11:00	11:06	11:13	11:20	11:31	11:48
12:00	**12:06**	**12:13**	**12:20**	**12:31**	**12:48**
1:00	**1:06**	**1:13**	**1:20**	**1:31**	**1:48**
2:00	**2:06**	**2:13**	**2:20**	**2:31**	**2:48**
3:00	**3:06**	**3:13**	**3:20**	**3:31**	**3:48**
4:00	**4:06**	**4:13**	**4:20**	**4:31**	**4:48**
5:00	**5:06**	**5:13**	**5:20**	**5:30**	**5:46**
6:00	**6:06**	**6:13**	**6:20**	**6:30**	**6:46**
7:00	**7:06**	**7:13**	**7:20**	**7:30**	**7:46**
8:00	**8:06**	**8:13**	**8:20**	**8:30**	**8:46**
Sunday / Domingo					
7:00	7:06	7:13	7:20	7:29	7:45
8:00	8:06	8:13	8:20	8:29	8:45
9:00	9:06	9:13	9:20	9:29	9:45
10:00	10:06	10:13	10:20	10:31	10:48
11:00	11:06	11:13	11:20	11:31	11:48
12:00	**12:06**	**12:13**	**12:20**	**12:31**	**12:48**
1:00	**1:06**	**1:13**	**1:20**	**1:31**	**1:48**
2:00	**2:06**	**2:13**	**2:20**	**2:31**	**2:48**
3:00	**3:06**	**3:13**	**3:20**	**3:31**	**3:48**
4:00	**4:06**	**4:13**	**4:20**	**4:31**	**4:48**
5:00	**5:06**	**5:13**	**5:20**	**5:30**	**5:46**
6:00	**6:06**	**6:13**	**6:20**	**6:30**	**6:46**
7:00	**7:06**	**7:13**	**7:20**	**7:30**	**7:46**

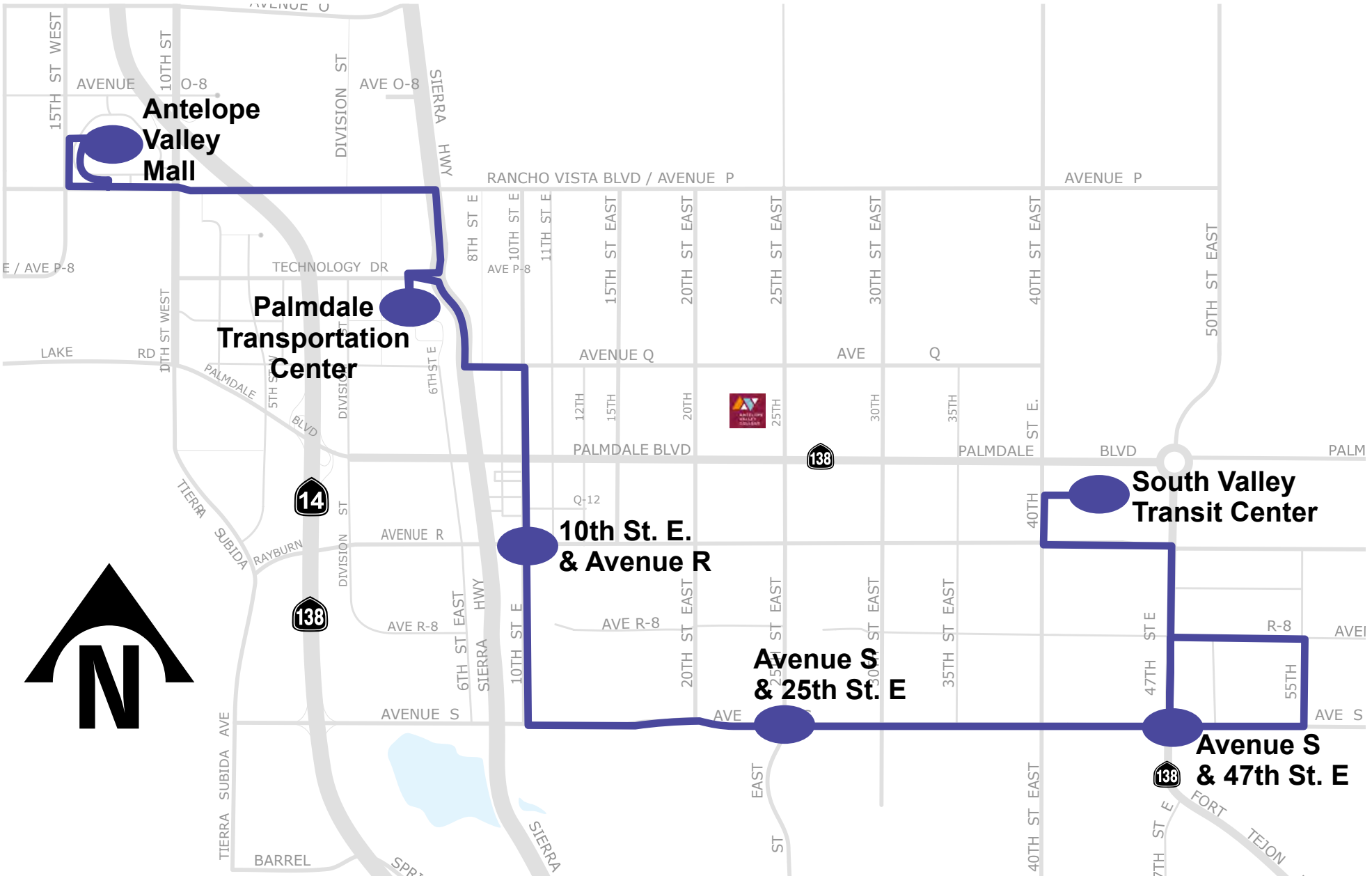
Eastbound to South Valley Transit Center

Depart Antelope Valley Mall Stop # 0028	Palmdale Transportation Center Stop # 1008	10th St. E & Ave R Stop # 0091	Ave. S & 25th St. E Stop # 0284	47th St. E & Ave. S Stop # 0902	Arrive South Valley Transit Center Stop # 1007
5:45	6:01	6:10	6:17	6:24	6:32
6:15	6:31	6:40	6:47	6:54	7:02
6:45	7:01	7:10	7:17	7:24	7:32
7:15	7:31	7:40	7:47	7:54	8:02
7:45	8:01	8:10	8:17	8:24	8:32
8:15	8:31	8:40	8:47	8:54	9:02
8:45	9:01	9:10	9:17	9:25	9:34
9:15	9:34	9:43	9:50	9:58	10:07
9:45	10:04	10:13	10:20	10:28	10:37
10:15	10:34	10:43	10:50	10:58	11:07
10:45	11:04	11:13	11:20	11:28	11:37
11:15	11:34	11:43	11:50	11:58	**12:07**
11:45	**12:04**	**12:13**	**12:22**	**12:30**	**12:40**
12:15	**12:32**	**12:42**	**12:51**	**12:59**	**1:09**
12:45	**1:02**	**1:12**	**1:21**	**1:29**	**1:39**
1:15	**1:32**	**1:42**	**1:51**	**1:59**	**2:09**
1:45	**2:02**	**2:12**	**2:21**	**2:29**	**2:39**
2:15	**2:32**	**2:42**	**2:51**	**2:59**	**3:09**
2:45	**3:02**	**3:12**	**3:22**	**3:30**	**3:40**
3:15	**3:34**	**3:44**	**3:54**	**4:02**	**4:12**
3:45	**4:04**	**4:14**	**4:24**	**4:32**	**4:42**
4:15	**4:34**	**4:44**	**4:54**	**5:02**	**5:12**
4:45	**5:04**	**5:14**	**5:24**	**5:32**	**5:42**
5:15	**5:34**	**5:44**	**5:54**	**6:02**	**6:11**
5:45	**6:04**	**6:13**	**6:21**	**6:28**	**6:37**
6:45	**7:02**	**7:11**	**7:19**	**7:26**	**7:35**
7:45	**8:02**	**8:11**	**8:18**	**8:25**	**8:33**
8:45	**9:02**	**9:11**	**9:18**	**9:25**	**9:33**
9:45	**10:02**	**10:11**	**10:18**	**10:25**	**10:33**
Saturday / Sábado					
7:00	7:16	7:25	7:32	7:39	7:47
8:00	8:16	8:25	8:32	8:39	8:47
9:00	9:16	9:25	9:32	9:39	9:47
10:00	10:16	10:25	10:32	10:40	10:49
11:00	11:19	11:29	11:39	11:47	11:57
12:00	**12:19**	**12:29**	**12:39**	**12:47**	**12:57**
1:00	**1:19**	**1:29**	**1:39**	**1:47**	**1:57**
2:00	**2:19**	**2:29**	**2:39**	**2:47**	**2:57**
3:00	**3:19**	**3:29**	**3:39**	**3:47**	**3:57**
4:00	**4:19**	**4:29**	**4:39**	**4:47**	**4:57**
5:00	**5:19**	**5:29**	**5:39**	**5:47**	**5:57**
6:00	**6:19**	**6:29**	**6:39**	**6:47**	**6:57**
7:00	**7:19**	**7:29**	**7:39**	**7:46**	**7:54**
8:00	**8:17**	**8:26**	**8:33**	**8:40**	**8:48**
Sunday / Domingo					
7:00	7:16	7:25	7:32	7:39	7:48
8:00	8:16	8:25	8:32	8:39	8:48
9:00	9:16	9:25	9:32	9:39	9:48
10:00	10:16	10:25	10:32	10:40	10:50
11:00	11:19	11:29	11:39	11:47	11:56
12:00	**12:17**	**12:27**	**12:37**	**12:45**	**12:54**
1:00	**1:17**	**1:27**	**1:37**	**1:45**	**1:54**
2:00	**2:17**	**2:27**	**2:37**	**2:45**	**2:54**
3:00	**3:17**	**3:27**	**3:37**	**3:45**	**3:54**
4:00	**4:17**	**4:27**	**4:37**	**4:45**	**4:54**
5:00	**5:17**	**5:27**	**5:37**	**5:45**	**5:54**
6:00	**6:17**	**6:27**	**6:37**	**6:45**	**6:54**
7:00	**7:17**	**7:27**	**7:37**	**7:45**	**7:54**

3

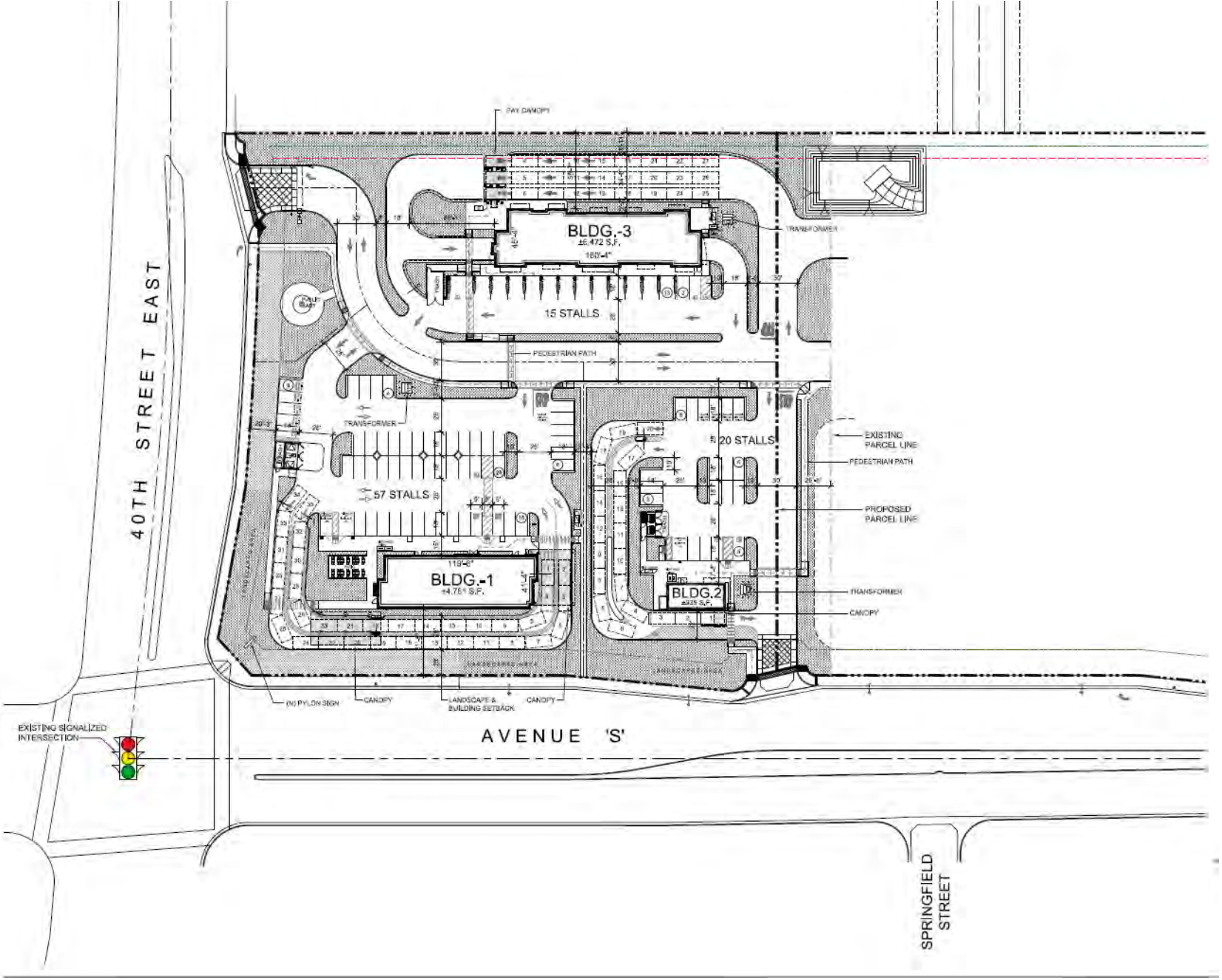
Westbound to AV Mall via Avenue S

Eastbound to South Valley Transit Ctr. via Avenue S



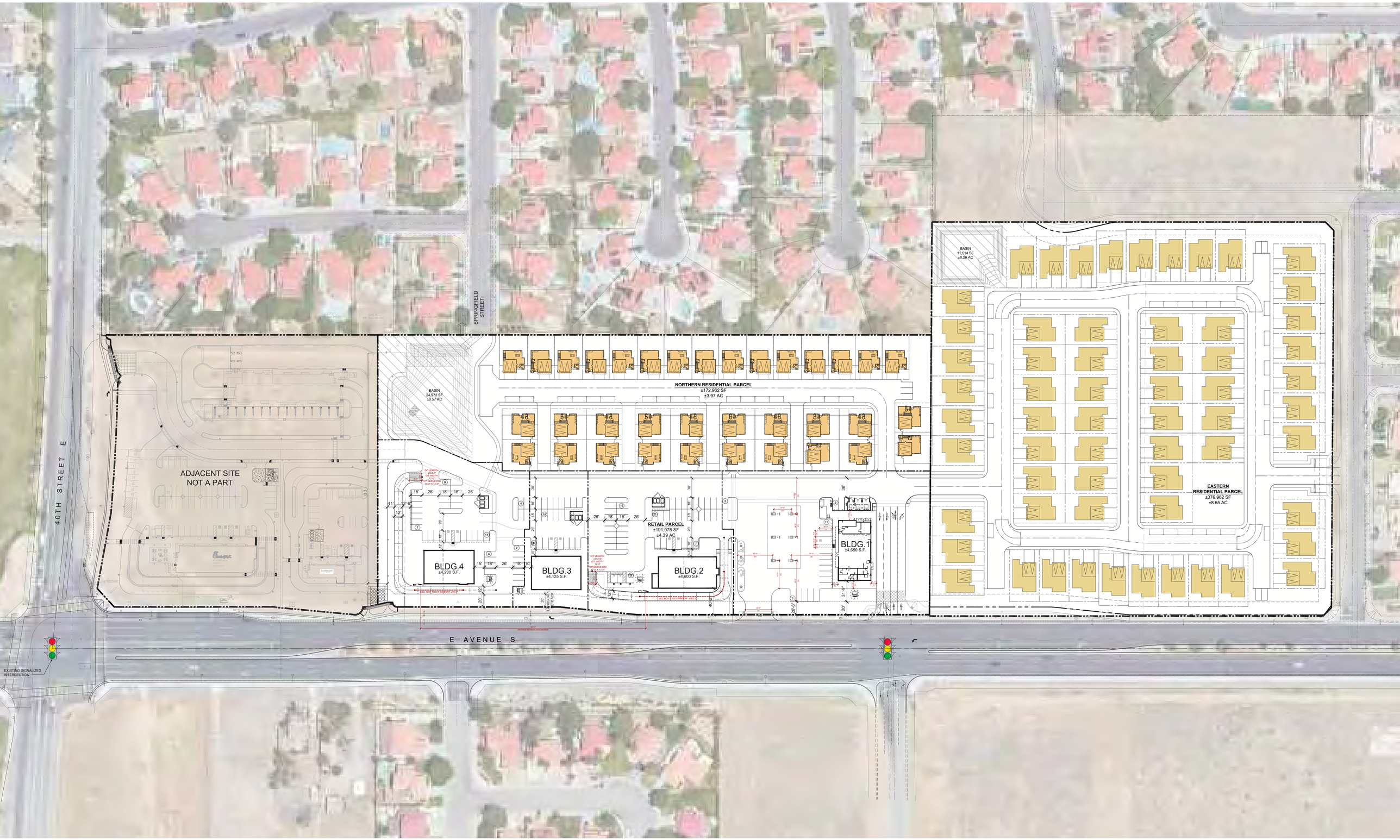
APPENDIX G -

CUMULATIVE PROJECT INFORMATION



INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Palmdale 40th Street and Ave S
Project Site Plan
Figure 1-1

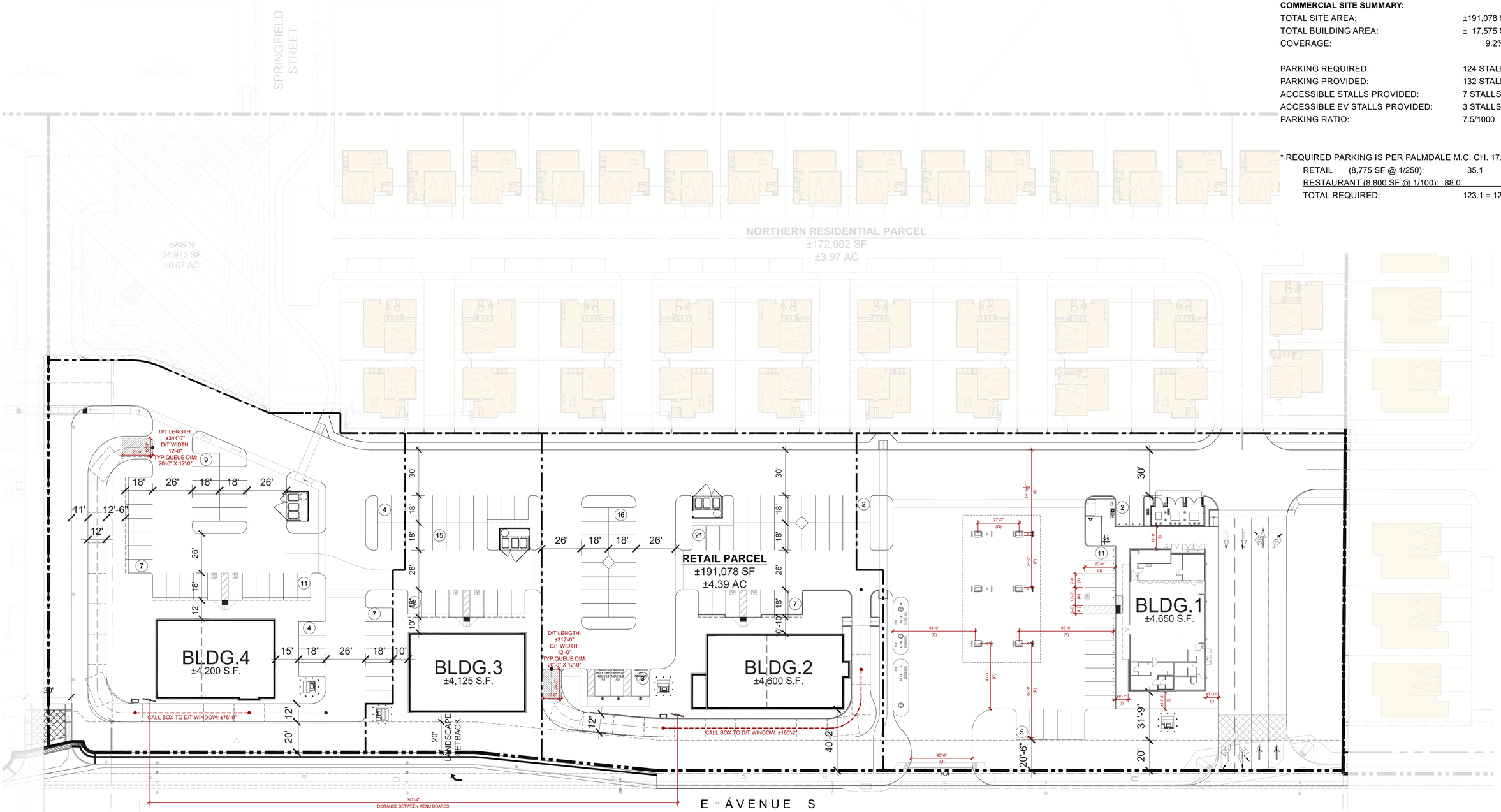

SPRINGFIELD STREET
40TH STREET E
E AVENUE S
ADJACENT SITE
NOT A PART
EXISTING SIGNALIZED INTERSECTION
BASIN
24,972 SF
±0.57 AC
NORTHERN RESIDENTIAL PARCEL
±172,962 SF
±3.97 AC
BASIN
11,514 SF
±0.26 AC
EASTERN
RESIDENTIAL PARCEL
±376,962 SF
±8.65 AC
RETAIL PARCEL
±191,078 SF
±4.39 AC
BLDG.1
±4,650 S.F.
BLDG.2
±4,600 S.F.
BLDG.3
±4,125 S.F.
BLDG.4
±4,200 S.F.
SIT LENGTH:
±36ft
SIT WIDTH:
12'-0"
TYP QUEUE DIM:
20'-0" X 12'-0"
CALL BOX TO CUT WINDOW ±18'-0"
DISTANCE BETWEEN MENU BOARDS
LANDSCAPE PLANTER
TRASH ENCLOSURE

COMMERCIAL SITE SUMMARY:

TOTAL SITE AREA:	±191,078 SF (4.39 AC)
TOTAL BUILDING AREA:	± 17,575 SF
COVERAGE:	9.2%
PARKING REQUIRED:	124 STALLS*
PARKING PROVIDED:	132 STALLS
ACCESSIBLE STALLS PROVIDED:	7 STALLS
ACCESSIBLE EV STALLS PROVIDED:	3 STALLS
PARKING RATIO:	7.5/1000

* REQUIRED PARKING IS PER PALMDALE M.C. CH. 17.87.030

RETAIL (8,775 SF @ 1/250):	35.1
RESTAURANT (8,800 SF @ 1/100):	88.0
TOTAL REQUIRED:	123.1 = 124 STALLS



COMMERCIAL PARCEL NOTES:

1. NON-FOOD SERVICES/USES ARE ALLOWED FOR THE DRIVE-THRU BUILDING(S).
2. FOOD MAY BE ALLOWED FOR THE DRIVE-THRU BUILDINGS, SO LONG AS THE FOOD SELECTIONS ARE CONSIDERED “HEALTHY” OR “HYBRID”
3. BUILDING 1 CANNOT SELL TOBACCO OR ALCOHOL.

Appendix K: Distribution List